TABLE OF CONTENTS

HOME

"The idea of the university, as it seems to me, consists in the Societas Magistrorum et Discipulorum; an association, by authority, of Masters, who are conspicuous in ability, learning, and devotion to study, for the intellectual guidance, in many subjects, of youthful Scholars who have been prepared for the freedom of investigation by prolonged discipline in literature and science."

– Daniel Coit Gilman, Johns Hopkins University's inaugural president *The Idea of the University, 1881*

I am thrilled to welcome you to the Johns Hopkins University catalogue!

Founded in 1876 as the nation's first research university, we have continued to follow our inaugural president's vision over the past 144 years to create a place where all students can make extraordinary discoveries, advance innovative solutions, and see their big ideas brought to life. Supported by peers and faculty who are among the most passionate, dedicated, and talented people in the world, Johns Hopkins students are motivated each day by this culture of fearless enthusiasm and pursuit of knowledge.

Current and prospective students are invited to review the detailed information about the many academic opportunities occurring across our nine academic divisions. The catalogue also serves to detail the university, school, department, and academic program policies and procedures in place as of June 2022.

We hope the catalogue provides both the information and inspiration for your academic journey here at Johns Hopkins!

Sincerely,

Stephen J. Gange, PhD
Executive Vice Provost for Academic Affairs & Professor

The Johns Hopkins University is accredited by The Middle States Commission on Higher Education. Information regarding accreditation can be found on the Office of the Provost website (https://provost.jhu.edu/education/accreditation-and-academic-compliance/).

For current faculty and contact information go to http://krieger.jhu.edu/publichealth/directory/

EXPLORE OUR PROGRAMS

Johns Hopkins University faculty and students study, teach, and learn across more than 400 programs in the arts and music, the humanities, the social and natural sciences, engineering, international studies, education, business, and the health professions.

Use the interactive program explorer to browse the programs that JHU offers. Sort by division and/or degree type, or use the keyword search to get started.

No results found, please try again. Reset selections.

- Accounting and Financial Management, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Adolescent Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Adult-Gerontological Acute Care Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Adult-Gerontological Critical Care Clinical Nurse Specialist, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Adult-Gerontological Health Clinical Nurse Specialist, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Adult-Gerontological Primary Care Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Africana Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Africana Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Anatomy Education, MS
  - School of Medicine

  Master'sFull-timeSchool of MedicineIn-person
- Anthropology, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Anthropology, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Anthropology, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Applied and Computational Mathematics, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Applied and Computational Mathematics, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Applied Behavior Analysis, Post–Master's Certificate
  - School of Education

  CertificatePart-timeSchool of EducationIn-personPost-Master's Certificate (Graduate Certificate)
- Applied Biomedical Engineering, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Applied Biomedical Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Applied Biomedical Engineering, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Applied Economics, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Applied Economics, MS/ Investment Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sPart-timeHybridPost-Master's Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)
- Applied Economics, MS/Financial Management Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Applied Economics, MS/MBA

  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Applied Health Sciences Informatics, MS
  - School of Medicine

  Master’sFull-timeSchool of MedicineIn-personOnline

- Applied Mathematics and Statistics, Bachelor of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor’sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Applied Mathematics and Statistics, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor’sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Applied Mathematics and Statistics, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master’sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Applied Mathematics and Statistics, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors

- Applied Mathematics and Statistics, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Applied Physics, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master’sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Applied Physics, Post-Master’s Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master’s Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Archaeology, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Artificial Intelligence, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridOnlinePost-Master’s Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Artificial Intelligence, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master’sPart-timeHybridOnlineWhiting School of Engineering (Engineering For Professionals)

- Artist’s Diploma
  - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person

- Astronomy and Astrophysics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Audio Sciences: Acoustics, Master of Arts
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person

- Audio Sciences: Recording Arts and Sciences, Master of Arts
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person

- Behavioral Biology, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biochemistry and Molecular Biology, MHS
  - Bloomberg School of Public Health

  Master’sFull-timePart-timeBloomberg School of Public HealthIn-person

- Biochemistry and Molecular Biology, PhD
  - Bloomberg School of Public Health

  DoctoralFull-timeBloomberg School of Public HealthIn-person

- Biochemistry and Molecular Biology, ScM
  - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person

- Biochemistry, Cellular and Molecular Biology, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Bioengineering Innovation and Design, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master’sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Bioethics, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Bioethics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Bioinformatics, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Biological Chemistry, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Biology, Bachelor of Arts

- Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biology, Bachelor of Arts/Master of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biomedical Engineering, Bachelor of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Biomedical Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Biomedical Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Biomedical Engineering, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Biomedical Engineering, PhD through the School of Medicine
  - School of Medicine
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeSchool of MedicineWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Biophysics and Biophysical Chemistry, PhD/Molecular Biophysics, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Biophysics, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biophysics, Fifth-Year Master's Degree
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Master'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biophysics, PhD - Jenkins Biophysics Program
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biophysics, PhD - Program in Molecular Biophysics
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biophysics, PhD - The Program in Cell, Molecular Developmental Biology and Biophysics
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Biostatistics, MHS
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public Health

- Biostatistics, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health

- Biostatistics, ScM
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person

- Biotechnology Education, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Biotechnology Enterprise, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Biotechnology, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Biotechnology, Master of Science/MBA
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Business Administration (Flexible), MBA
  - Carey Business School

  Master'sPart-timeCarey Business SchoolIn-person

- Business Administration (Full Time), MBA

- Business Analytics and Risk Management (Part Time), Master of Science
  - Carey Business School

  Master'sPart-timeCarey Business SchoolIn-person

- Business Analytics and Risk Management, Master of Science
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person

- Business of Music, Minor
  - Peabody Institute

  Full-timePeabody InstituteIn-personMinors

- Business, Minor
  - Carey Business School

  Full-timeCarey Business SchoolIn-personMinors

- Cellular and Molecular Medicine, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Cellular and Molecular Physiology, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Cellular, Molecular, Developmental Biology and Biophysics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Chemical and Biomolecular Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Chemical and Biomolecular Engineering, Master of Chemical and Biomolecular Engineering
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeIn-personWhiting School of Engineering (Engineering For Professionals)
- Chemical and Biomolecular Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Chemical and Biomolecular Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Chemistry, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Chemistry, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Chinese and American Studies, Hopkins-Nanjing Center Certificate
  - School of Advanced International Studies

  CertificateFull-timeSchool of Advanced International StudiesIn-person
- Civil and Systems Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Civil Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Civil Engineering, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Civil Engineering, Master of Civil Engineering
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Civil Engineering, Master of Science in Engineering (MSE)
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Civil Engineering, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Classics, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Classics, Bachelor of Arts/Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Classics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Classics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Climate and Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Clinical Anaplastology, MS
  - School of Medicine

  Master'sFull-timeSchool of MedicineIn-person
- Clinical Informatics, Post-Baccalaureate Certificate
  - School of Medicine

  CertificateFull-timeSchool of MedicineIn-person
- Clinical Mental Health Counseling, Post–Master's Certificate
  - School of Education

  CertificateFull-timePart-timeSchool of EducationIn-personPost-Master's Certificate (Graduate Certificate)
- Clinical Trials, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Cognitive Science, Bachelor of Arts

- Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Cognitive Science, Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Master'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Cognitive Science, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Communication, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Communication, Master of Arts/MBA
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Communication, Master of Arts/Nonprofit Management, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

CertificatePart-timeHybridPost-Master's Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)

- Community-Based Public Health, Certificate
  - Bloomberg School of Public Health

CertificatePart-timeBloomberg School of Public HealthOnline

- Composition, Bachelor of Music
  - Peabody Institute

Bachelor'sFull-timePeabody InstituteIn-person

- Composition, Bachelor of Music Education
  - Peabody Institute

Bachelor'sFull-timePeabody InstituteIn-person

- Composition, Bachelor of Music in Recording Arts
  - Peabody Institute

Bachelor'sFull-timePeabody InstituteIn-person

- Composition, Doctor of Musical Arts
  - Peabody Institute

DoctoralFull-timePeabody InstituteIn-person

- Composition, Master of Music
  - Peabody Institute

Master'sFull-timePeabody InstituteIn-person

- Computational Medicine, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors

- Computational Medicine, Pre-Doctoral Training Program
  - Whiting School of Engineering (Full Time, On Campus Programs)

Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personNon Degree Program

- Computer Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Computer Integrated Surgery, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors

- Computer Music, Bachelor of Music
  - Peabody Institute

Bachelor'sFull-timePeabody InstituteIn-person

- Computer Music, Bachelor of Music in Recording Arts
  - Peabody Institute

Bachelor'sFull-timePeabody InstituteIn-person

- Computer Music, Master of Music
  - Peabody Institute

Master'sFull-timePeabody InstituteIn-person

- Computer Science, Bachelor of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Computer Science, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Computer Science, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Computer Science, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Computer Science, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors

- Computer Science, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Computer Science, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Conducting: Orchestral, Master of Music
  - Peabody Institute

Master’sFull-timePeabody InstituteIn-person

- Conducting: Wind, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Counseling, Certificate of Advanced Graduate Study
  - School of Education

  CertificatePart-timeSchool of EducationIn-person
- Counseling, Master of Science
  - School of Education

  Master’sFull-timePart-timeSchool of EducationIn-person
- Cross-Disciplinary Program in Biomedical Sciences, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Cultural Heritage Management, MA/Digital Curation, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Cultural Heritage Management, MA/Nonprofit Management, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Cultural Heritage Management, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Cybersecurity, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master’sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Cybersecurity, Post-Master’s Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master’s Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Dance, Bachelor of Fine Arts
  - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Data Analytics and Policy, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Data Analytics and Policy, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Data Analytics and Policy, MS/Intelligence, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Data Science, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master’sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Data Science, Master’s Degree
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master’sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Data Science, Post-Master’s Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeOnlinePost-Master’s Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Demographic Methods, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Design Leadership, MBA/MA Dual Degree
  - Carey Business School

  Master’sPart-timeCarey Business SchoolIn-person
- Digital Curation, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Directed Studies, Minor
  - Peabody Institute

  Full-timePeabody InstituteIn-personMinors
- DNP Executive/ MPH Dual Degree
  - School of Nursing

  DoctoralMaster’sFull-timeSchool of NursingIn-person
- DNP Executive/MBA Dual Degree
  - School of Nursing

  DoctoralMaster’sFull-timeSchool of Nursing
- DNP/MPH
  - Bloomberg School of Public Health

  DoctoralMaster’sBloomberg School of Public Health
- Doctor of Medicine, MD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Doctor of Nursing Practice (DNP): Advanced Practice Track/Doctor of Philosophy in Nursing (PhD) Dual Degree
  - School of Nursing

  DoctoralFull-timeSchool of NursingIn-person
- Doctor of Nursing Practice, Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingIn-person
- Doctor of Nursing Practice: Executive Track
  - School of Nursing

DoctoralPart-timeSchool of NursingOnline

- Doctor of Public Health (DrPH)
  - Bloomberg School of Public Health

  DoctoralPart-timeBloomberg School of Public HealthOnline
- DVM/MPH
  - Bloomberg School of Public Health

  DoctoralMaster'sFull-timeBloomberg School of Public HealthIn-person
- Earth and Planetary Sciences, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Earth and Planetary Sciences, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Earth and Planetary Sciences, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- East Asian Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- East Asian Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Economics, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Economics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Economics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Education (Online), EdD
  - School of Education

  DoctoralPart-timeSchool of EducationOnline
- Education of Students with Autism and Other Pervasive Developmental Disorders, Graduate Certificate
  - School of Education

  CertificatePart-timeSchool of EducationOnlinePost-Master's Certificate (Graduate Certificate)
- Education, Master of Science
  - School of Education

  Master'sPart-timeSchool of EducationHybridIn-personOnline
- Education, PhD
  - School of Education

  DoctoralFull-timeSchool of EducationHybridIn-person
- Educational Leadership for Independent Schools, Graduate Certificate
  - School of Education

  CertificatePart-timeSchool of EducationIn-personPost-Master's Certificate (Graduate Certificate)
- Electrical and Computer Engineering, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Electrical and Computer Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Electrical and Computer Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Electrical and Computer Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Electrical and Computer Engineering, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificateFull-timePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Electrical Engineering, Bachelor of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Electrical Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Energy Policy and Climate, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Energy, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Energy, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Engineering for Sustainable Development, Minor
  - Whiting School of Engineering (Engineering For Professionals)
  MinorsWhiting School of Engineering (Engineering For Professionals)
- Engineering Management, Master of Engineering Management
  - Whiting School of Engineering (Engineering For Professionals)
  Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)
- Engineering Management, Master of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Engineering Mechanics, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Engineering, Doctor of Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)
  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- English, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- English, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- English, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Entrepreneurship and Management, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Entry into Nursing, Master of Science in Nursing
  - School of Nursing
  Master'sFull-timeSchool of NursingIn-person
- Environmental and Occupational Health, Certificate
  - Bloomberg School of Public Health
  CertificatePart-timeBloomberg School of Public HealthOnline
- Environmental Engineering and Science, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)
  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Engineering and Science, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)
  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Environmental Engineering and Science, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)
  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Environmental Engineering, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)
  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Engineering, Master of Environmental Engineering
  - Whiting School of Engineering (Engineering For Professionals)
  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Environmental Engineering, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)
  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Environmental Engineering, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)
  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Health, MHS
  - Bloomberg School of Public Health
  Master'sFull-timePart-timeBloomberg School of Public HealthIn-person
- Environmental Health, PhD
  - Bloomberg School of Public Health
  DoctoralBloomberg School of Public Health
- Environmental Health, SCM
  - Bloomberg School of Public Health
  Master'sFull-timeBloomberg School of Public HealthIn-person
- Environmental Planning and Management, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)
  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Planning and Management, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)

- Environmental Planning and Management, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Environmental Science, Bachelor of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Environmental Sciences and Policy, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Environmental Sciences, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Environmental Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Environmental Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Epidemiology for Public Health Professionals, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Epidemiology, MHS
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- Epidemiology, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health
- Epidemiology, ScM
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- European Public Policy, Master of Arts
  - School of Advanced International Studies

  Master'sFull-timeSchool of Advanced International StudiesIn-person
- Evaluation: International Health Programs, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Evidence-Based Teaching in the Health Professions, Post–Master's Certificate
  - School of Education

  CertificatePart-timeSchool of EducationOnlinePost-Master's Certificate (Graduate Certificate)
- Family Primary Care Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Film and Media Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Film and Media Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Film and Media, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeIn-personKrieger School of Arts and Sciences (Advanced Academic Programs)
- Finance (Part Time), Master of Science
  - Carey Business School

  Master'sPart-timeCarey Business SchoolIn-personOnline
- Finance, Master of Science
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-personOnline
- Financial Economics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Financial Management, Graduate Certificate
  - Carey Business School

  CertificatePart-timeCarey Business SchoolHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)
- Financial Management, Graduate Certificate, Investments, Graduate Certificate, Applied Economics, MS
  - Carey Business School

  CertificatePart-timeCarey Business SchoolHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)
- Financial Mathematics, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Financial Mathematics, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Financial Risk Management, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Five-Year BM/MM Program
  - Peabody Institute

  Bachelor'sMaster'sFull-timePeabody InstituteIn-person

- Five-Year BMRA/MA Program
  - Peabody Institute

  Bachelor'sMaster'sFull-timePeabody InstituteIn-person

- Food Safety Regulation, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Food Systems, the Environment & Public Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- French, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- French, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- French, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Functional Anatomy and Evolution, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Gender and Health, Certificate
  - Bloomberg School of Public Health

  CertificateBloomberg School of Public Health

- General Engineering, Bachelor of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Genetic Counseling, ScM
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person

- Geographic Information Systems, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateKrieger School of Arts and Sciences (Advanced Academic Programs)

- Geographic Information Systems, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sPart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Geography and Environmental Engineering, Master of Arts
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Geography and Environmental Engineering, Master of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Geography and Environmental Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Geography and Environmental Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Geospatial Intelligence, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- German Bachelor of Arts/Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- German, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- German, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- German, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Gerontology, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Gifted Education, Graduate Certificate
  - School of Education

  CertificatePart-timeSchool of EducationHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)

- Global Health Economics, MHS
    - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Global Health Practice, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Global Health, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Global Policy, Master of Arts
    - School of Advanced International Studies

  Master’sFull-timeSchool of Advanced International StudiesIn-person
- Global Risk, Master of Arts
    - School of Advanced International Studies

  Master’sFull-timeSchool of Advanced International StudiesIn-personOnline
- Global Risk, Master of Arts (Online)
    - School of Advanced International Studies

  Master’sFull-timePart-timeSchool of Advanced International StudiesOnline
- Global Security Studies, MA/Intelligence, Certificate
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Global Security Studies, Master of Arts
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Global Tobacco Control, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Government, MA/Intelligence, Certificate
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Government, MA/MBA
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Government, Master of Arts
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Graduate Certificates
    - School of Advanced International Studies

  School of Advanced International StudiesPost-Master’s Certificate (Graduate Certificate)
- Graduate Performance Diploma
    - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person
- Graduate Training Programs in Clinical Investigation, MHS
    - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Graduate Training Programs in Clinical Investigation, PhD
    - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health
- Guitar, Bachelor of Music
    - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Guitar, Bachelor of Music Education
    - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Guitar, Bachelor of Music in Recording Arts
    - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Guitar, Doctor of Musical Arts
    - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person
- Guitar, Master of Music
    - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Guitar, Performer’s Certificate
    - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person
- Harpsichord, Bachelor of Music
    - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Harpsichord, Master of Music
    - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Health Administration, (MHA)
    - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Health and Human Rights, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Health Care Management (Part Time), Master of Science
    - Carey Business School

  Master’sPart-timeCarey Business SchoolHybridIn-personOnline
- Health Care Management, Master of Science
    - Carey Business School

  Master’sFull-timeCarey Business SchoolIn-person
- Health Communication, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Health Disparities and Health Inequality, Certificate
    - Bloomberg School of Public Health

CertificatePart-timeBloomberg School of Public HealthOnline

- Health Economics and Outcomes Research, MHS
  - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Health Education and Health Communication, MSPH
  - Bloomberg School of Public Health

  Master’sFull-timePart-timeBloomberg School of Public HealthIn-person
- Health Education, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Health Finance and Management, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Health Policy and Management, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health
- Health Policy, MSPH
  - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Health Professions (Online), Master of Education
  - School of Education

  Master’sPart-timeSchool of EducationOnline
- Health Sciences Informatics, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Health Sciences Informatics–Research, MS
  - School of Medicine

  Master’sFull-timePart-timeSchool of MedicineIn-person
- Health, Behavior and Society, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health
- Healthcare Epidemiology and Infection Prevention and Control, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Healthcare Organizational Leadership, MSN/MBA, Dual Degree
  - School of Nursing

  Master’sSchool of Nursing
- Healthcare Organizational Leadership, Post-Master’s Certificate
  - School of Nursing

  School of NursingIn-personPost-Master’s Certificate (Graduate Certificate)
- Healthcare Systems Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master’sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Historical Performance Instruments, Doctor of Musical Arts
  - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person
- Historical Performance Instruments, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Historical Performance Voice, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Historical Performance, Bachelor of Music
  - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Historical Performance, Minor
  - Peabody Institute

  Peabody InstituteIn-personMinors
- Historical Performance: Voice, Minor
  - Peabody Institute

  Peabody InstituteIn-personMinors
- History of Art, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- History of Art, Bachelor of Arts/Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sMaster’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- History of Art, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- History of Art, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- History of Medicine, MA (On-site)
  - School of Medicine

  Master’sSchool of MedicineIn-person
- History of Medicine, MA (Online)
  - School of Medicine

  Master’sFull-timeSchool of MedicineOnline
- History of Medicine, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- History of Medicine, Post-Baccalaureate Certificate (Online)
  - School of Medicine

  CertificateFull-timeSchool of MedicineIn-person
- History of Science and Technology, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- History of Science, Medicine and Technology, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- History of Science, Medicine, and Technology, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- History, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- History, Bachelor of Arts/Master of Arts Four-Year Program
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- History, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- History, PhD
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)

- Honors Program in the Humanities
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personNon Degree Program

- Human Genetics and Molecular Biology, PhD
    - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Humane Sciences and Toxicology Policy, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Humanistic Studies, PhD
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Humanitarian Health, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Immunology, PhD
    - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Individualized Genomics and Health, Master of Science
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Information Systems Engineering, Graduate Certificate
    - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Information Systems Engineering, Master of Science
    - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeHybridOnlineWhiting School of Engineering (Engineering For Professionals)

- Information Systems Engineering, Post-Master's Certificate
    - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Information Systems, Master of Science
    - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person

- Injury and Violence Prevention, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Intelligence Analysis, Master of Science
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sPart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Intelligence, Certificate
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

- Interdisciplinary Studies, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- International Affairs, Doctor of
    - School of Advanced International Studies

  DoctoralFull-timePart-timeSchool of Advanced International StudiesIn-person

- International Affairs, Master of Arts
    - School of Advanced International Studies

  Master'sFull-timeSchool of Advanced International StudiesIn-person

- International Economics and Finance, Master of Arts
    - School of Advanced International Studies

  Master'sSchool of Advanced International StudiesIn-person

- International Health, MA/MSPH
    - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person

- International Health, MSPH
    - Bloomberg School of Public Health
  Master'sFull-timeBloomberg School of Public HealthIn-person

- International Health, MSPH, Human Nutrition - Dietitian
    - Bloomberg School of Public Health
  Master'sFull-timeBloomberg School of Public Health

- International Health, PhD
    - Bloomberg School of Public Health
  DoctoralBloomberg School of Public Health

- International Healthcare Management and Leadership, Certificate
    - Bloomberg School of Public Health
  CertificatePart-timeBloomberg School of Public HealthOnline

- International Public Policy, Master of
    - School of Advanced International Studies
  Master'sFull-timePart-timeSchool of Advanced International StudiesIn-person

- International Relations, Master of Arts
    - School of Advanced International Studies
  Master'sFull-timeSchool of Advanced International StudiesIn-person

- International Studies Five-Year Accelerated B.A./M.A. Program with Sciences Po
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- International Studies Five-Year Accelerated B.A./M.A. Program with the Paul H. Nitze School of Advanced International Studies (SAIS)
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
    - School of Advanced International Studies
  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)School of Advanced International Studies

- International Studies, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- International Studies, Diploma
    - School of Advanced International Studies
  CertificateFull-timeSchool of Advanced International StudiesIn-person

- International Studies, Doctor of Philosophy (PhD)
    - School of Advanced International Studies
  DoctoralFull-timeSchool of Advanced International StudiesIn-person

- International Studies, Master of Arts
    - School of Advanced International Studies
  Master'sFull-timeSchool of Advanced International StudiesIn-person

- Investments, Graduate Certificate
    - Carey Business School
  CertificatePart-timeCarey Business SchoolHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)

- Islamic Studies, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Italian, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Italian, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Italian, PhD
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Jazz Performance, Bachelor of Music
    - Peabody Institute
  Bachelor'sFull-timePeabody InstituteIn-person

- Jazz, Bachelor of Music Education
    - Peabody Institute
  Bachelor'sFull-timePeabody InstituteIn-person

- Jazz, Bachelor of Music in Recording Arts
    - Peabody Institute
  Bachelor'sFull-timePeabody InstituteIn-person

- Jazz, Master of Music

- JD/MPH
    - Bloomberg School of Public Health
  Master'sFull-timeBloomberg School of Public HealthIn-person

- Jewish Studies, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Latin American Studies, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Leadership Development Program, Graduate Certificate
    - Carey Business School
  Carey Business SchoolPost-Master's Certificate (Graduate Certificate)

- Leadership for Public Health and Healthcare, Certificate
    - Bloomberg School of Public Health
  CertificateFull-timeBloomberg School of Public HealthOnline

- Leadership in Technology Integration (Online), Graduate Certificate
    - School of Education

CertificatePart-timeSchool of EducationOnlinePost-Master's Certificate (Graduate Certificate)

- Leadership Studies, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) Public Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Liberal Arts, Minor
  - Peabody Institute

  Peabody InstituteIn-personMinors
- Linguistics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- LLM/MPH
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- Marketing (Part Time), Master of Science
  - Carey Business School

  Master'sFull-timeCarey Business SchoolHybridIn-personOnline
- Marketing and Communications, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Marketing, Master of Science
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person
- Master of Applied Science in Community-Based Primary Health Care Programs in Global Health, MAS
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Applied Science in Global Health Planning and Management, MAS
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Applied Science in Humanitarian Health, MAS
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Applied Science in Patient Safety and Healthcare Quality, MAS
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Applied Science in Population Health Management, MAS
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Applied Science in Spatial Analysis for Public Health, MAS
  - Bloomberg School of Public Health

  Master'sFull-timePart-timeBloomberg School of Public HealthOnline
- Master of Arts in Public Health Biology, MA
  - Bloomberg School of Public Health

  Master'sPart-timeBloomberg School of Public HealthOnline
- Master of Bioethics (MBE)
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- Master of Biotechnology Enterprise and Entrepreneurship
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Master of Liberal Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Master of Public Health Program (MPH)
  - Bloomberg School of Public Health

  Master'sFull-timePart-timeBloomberg School of Public HealthIn-personOnline
- Master of Science in Nursing (MSN) Healthcare Organizational Leadership Track
- Materials Science and Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Materials Science and Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Materials Science and Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Materials Science and Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Maternal and Child Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Mathematics, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Mathematics, Bachelor of Arts/Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Mathematics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Mathematics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Mathematics/STEM Instructional Leader (PreK-6) (Online), Graduate Certificate
  - School of Education

  CertificatePart-timeSchool of EducationOnlinePost-Master's Certificate (Graduate Certificate)

- MBA/Applied Economics, MS Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolHybridIn-personOnline

- MBA/Biotechnology, MS Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolHybridIn-personOnline

- MBA/Communication, MA Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolHybridIn-personOnline

- MBA/DNP Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolOnline

- MBA/Government, MA Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolHybridIn-personOnline

- MBA/Healthcare Organizational Leadership, MSN Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolOnline

- MBA/JD Dual Degree
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person

- MBA/MA in International Relations
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person

- MBA/MD Dual Degree
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person

- MBA/MPH Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business SchoolIn-person

- MBA/MPH with China Europe International Business School
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person

- MD-PhD, Combined Degree
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- MD/MPH
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person

- MD/PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health

- Mechanical Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)

- Mechanical Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Mechanical Engineering, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Mechanical Engineering, PhD
  - Whiting School of Engineering (Full Time, On Campus Programs)

  DoctoralFull-timePart-timeWhiting School of Engineering (Full Time, On Campus Programs)HybridIn-personOnline

- Mechanical Engineering, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Medical and Biological Illustration, MA
  - School of Medicine

  Master'sFull-timeSchool of MedicineIn-person

- Medical Physics, MS

- Medicine, Science, and the Humanities, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Mental Health Policy, Economics and Services, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Mental Health, MHS
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-personOnline

- Mental Health, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health

- Military Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Krieger School of Arts and Sciences (Full Time, On Campus Programs)Non Degree Program

- Mind, Brain and Teaching (Online), Graduate Certificate
  - School of Education

CertificatePart-timeSchool of EducationOnlinePost-Master's Certificate (Graduate Certificate)

- Molecular & Cellular Biology, Bachelor of Science/Master of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Molecular and Cellular Biology, Bachelor of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Molecular Microbiology & Immunology, MHS
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- Molecular Microbiology & Immunology, PhD
  - Bloomberg School of Public Health

  DoctoralFull-timeBloomberg School of Public HealthIn-person
- Molecular Microbiology & Immunology, ScM
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- MPH/MBA
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- MS in Environmental Sciences and Policy/Geographic Information Systems, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster'sPart-timeIn-personOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- MSF/MBA Dual Degree
  - Carey Business School

  Master'sPart-timeCarey Business School
- MSW/MPH
  - Bloomberg School of Public Health

  Master'sBloomberg School of Public Health
- Museum Studies, MA/Digital Curation, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Museum Studies, MA/Nonprofit Management, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Museum Studies, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Museums and Society, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Music Education Certification - Instrumental
  - Peabody Institute

  CertificateFull-timePart-timePeabody InstituteIn-person
- Music Education Certification - Vocal
  - Peabody Institute

  CertificateFull-timePart-timePeabody InstituteIn-person
- Music Education, Master of Music
  - Peabody Institute

  Master'sFull-timePart-timePeabody InstituteIn-person
- Music for New Media, Bachelor of Music
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person
- Music Theory Pedagogy, Master of Music
  - Peabody Institute

  Master'sFull-timePeabody InstituteIn-person
- Music Theory, Minor
  - Peabody Institute

  Peabody InstituteIn-personMinors
- Music, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Musicology, Master of Music
  - Peabody Institute

  Master'sFull-timePeabody InstituteIn-person
- Musicology, Minor
  - Peabody Institute

  Peabody InstituteIn-personMinors
- Nano-Biotechnology, Certificate of Advanced Study
  - Whiting School of Engineering (Full Time, On Campus Programs)

  CertificateFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Natural Sciences Area, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Near Eastern Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Near Eastern Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)Minors

- Near Eastern Studies, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Neuroscience, Bachelor of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Neuroscience, Bachelor of Science/Master of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Neuroscience, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Non-Governmental Organization (NGO) Management, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Nonprofit Management, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Nonprofit Management, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Nurse Anesthesia, DNP Advanced Practice Track
  - School of Nursing

  DoctoralSchool of NursingHybrid

- Nursing Education, Post-Master's Certificate
  - School of Nursing

  Part-timeSchool of NursingOnlinePost-Master's Certificate (Graduate Certificate)

- Nursing, Doctor of Philosophy
  - School of Nursing

  DoctoralFull-timeSchool of NursingIn-person

- Occupational and Environmental Hygiene, Master of Science
  - Bloomberg School of Public Health
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeBloomberg School of Public HealthWhiting School of Engineering (Full Time, On Campus Programs)HybridIn-person

- Occupational and Environmental Hygiene, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Orchestral Conducting, Doctor of Musical Arts
  - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person

- Orchestral Instruments, Bachelor of Music
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Orchestral Instruments, Bachelor of Music Education
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Orchestral Instruments, Bachelor of Music in Recording Arts
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Orchestral Instruments, Doctor of Musical Arts
  - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person

- Orchestral Instruments, Master of Music
  - Peabody Institute

  Master'sFull-timePeabody InstituteIn-person

- Orchestral Instruments, Performer's Certificate
  - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person

- Organ, Bachelor of Music
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Organ, Doctor of Musical Arts
  - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person

- Organ, Master of Music
  - Peabody Institute

  Master'sFull-timePeabody InstituteIn-person

- Organ, Performer's Certificate
  - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person

- Organizational Leadership, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sPart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Pathobiology, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person

- Peabody-Homewood Double Degree Program
  - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Pediatric Acute Care Nurse Practitioner, Post-Master's Certificate
  - School of Nursing

  Part-timeSchool of NursingOnlinePost-Master's Certificate (Graduate Certificate)

- Pediatric Critical Care Clinical Nurse Specialist, DNP Advanced Practice Track
  - School of Nursing

DoctoralFull-timeSchool of NursingOnline

- Pediatric Dual Primary/Acute Care Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Pediatric Primary Care Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Performance/Pedagogy, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Pharmacoepidemiology and Drug Safety, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Pharmacology, PhD
  - School of Medicine

  DoctoralFull-timeSchool of MedicineIn-person
- Philosophy, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Philosophy, Bachelor of Arts/Master of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sMaster’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Philosophy, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Philosophy, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Physics, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Physics, Bachelor of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Physics, Bachelor of Science/Master of Science
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sMaster’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Physics, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Physics, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Piano, Bachelor of Music
  - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Piano, Bachelor of Music Education
  - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Piano, Bachelor of Music in Recording Arts
  - Peabody Institute

  Bachelor’sFull-timePeabody InstituteIn-person
- Piano, Doctor of Musical Arts
  - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person
- Piano, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Piano, Performer’s Certificate
  - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person
- Piano: Ensemble Arts Vocal Accompanying, Master of Music
  - Peabody Institute

  Master’sFull-timePeabody InstituteIn-person
- Political Science, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Political Science, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Population and Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Population Health Management, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Population, Family and Reproductive Health, MHS
  - Bloomberg School of Public Health

Master’sFull-timeBloomberg School of Public HealthIn-person

- Population, Family and Reproductive Health, MHS Online
  - Bloomberg School of Public Health

  Master’sFull-timePart-timeBloomberg School of Public HealthOnline
- Population, Family and Reproductive Health, MSPH
  - Bloomberg School of Public Health

  Master’sFull-timeBloomberg School of Public HealthIn-person
- Population, Family and Reproductive Health, PhD
  - Bloomberg School of Public Health

  DoctoralBloomberg School of Public Health
- Product Stewardship for Sustainability, Certificate
  - Bloomberg School of Public Health

  CertificateFull-timeBloomberg School of Public HealthOnline
- Professional Communication Program
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personNon Degree Program
- Professional Development Program
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personNon Degree Program
- Psychiatric Mental Health Nurse Practitioner, DNP Advanced Practice Track
  - School of Nursing

  DoctoralFull-timeSchool of NursingOnline
- Psychiatric Mental Health Nurse Practitioner, Post-Master’s Certificate
  - School of Nursing

  Part-timeSchool of NursingOnlinePost-Master’s Certificate (Graduate Certificate)
- Psychology, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Psychology, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Psychology, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Public Health Advocacy, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Health Economics, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Health Informatics, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Health Practice, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Health Preparedness, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Health Studies, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor’sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Public Health Training Certificate for American Indian Health Professionals
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Public Management, MA/Data Analytics and Policy, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Public Management, MA/Intelligence, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateMaster’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Public Management, MA/Nonprofit Management, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Public Management, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master’sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)
- Public Mental Health Research, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Quality, Patient Safety, and Outcomes Research, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Quantitative Methods in Applied Economics, Post-Master’s Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridPost-Master’s Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)
- Quantitative Methods in Public Health, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Quantitative Portfolio Management, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Real Estate and Infrastructure (Part Time), Master of Science
  - Carey Business School

  Master'sPart-timeCarey Business SchoolIn-person
- Real Estate and Infrastructure, Master of Science
  - Carey Business School

  Master'sFull-timeCarey Business SchoolIn-person
- Regenerative and Stem Cell Technologies, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sPart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Regulatory Science, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Research Administration, Master of Science
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Rigor, Reproducibility and Responsibility in Scientific Practice, Certificate
  - Bloomberg School of Public Health

  Bloomberg School of Public HealthPost-Master's Certificate (Graduate Certificate)
- Risk Sciences and Public Policy, Certificate
  - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline
- Robotics and Autonomous Systems, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

  Master'sPart-timeOnlineWhiting School of Engineering (Engineering For Professionals)
- Robotics, Master of Science in Engineering
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Robotics, Minor
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Full-timeWhiting School of Engineering (Full Time, On Campus Programs)In-personMinors
- Romance Languages, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- School Administration and Supervision, Graduate Certificate
  - School of Education

  CertificatePart-timeSchool of EducationHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)
- Science Writing, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridOnlinePost-Master's Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)
- Science Writing, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)
- Securitization, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

  CertificatePart-timeOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)
- Security Informatics, Master of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Security Informatics, Master of Science/Applied Mathematics and Statistics, Master of Science in Engineering Dual Master's Program
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Security Informatics, Master of Science/Computer Science, Master of Science in Engineering Dual Master's Program
  - Whiting School of Engineering (Full Time, On Campus Programs)

  Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person
- Sequence Analysis and Genomics, Post-Master's Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

  CertificateFull-timePart-timeHybridPost-Master's Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)
- Social Factors in Health, MHS
  - Bloomberg School of Public Health

  Master'sFull-timeBloomberg School of Public HealthIn-person
- Social Policy, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors
- Sociology, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person
- Sociology, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Sociology, PhD/Applied Mathematics and Statistics, MSE Joint Program
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

DoctoralMaster'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Space Science and Engineering, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)
  - Whiting School of Engineering (Full Time, On Campus Programs)

Krieger School of Arts and Sciences (Full Time, On Campus Programs)Whiting School of Engineering (Full Time, On Campus Programs)Minors

- Space Systems Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Spanish for the Professions, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Spanish Language and Hispanic Cultures, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Spanish, Bachelor of Arts
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Spanish, PhD
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

DoctoralFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Spatial Analysis for Public Health, Certificate
  - Bloomberg School of Public Health

CertificatePart-timeBloomberg School of Public HealthOnline

- Special Education, Master of Science
  - School of Education

Master'sFull-timePart-timeSchool of EducationIn-person

- Strategy, Cybersecurity, and Intelligence, Master of Arts
  - School of Advanced International Studies

Master'sFull-timeSchool of Advanced International StudiesIn-person

- Sustainable Energy, Master of Arts (Online)
  - School of Advanced International Studies

Master'sFull-timePart-timeSchool of Advanced International StudiesOnline

- Systems Engineering, Bachelor of Science
  - Whiting School of Engineering (Full Time, On Campus Programs)

Bachelor'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Systems Engineering, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Systems Engineering, Master of Science
  - Whiting School of Engineering (Engineering For Professionals)

Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Systems Engineering, Master of Science in Engineering (ABET-accredited)
  - Whiting School of Engineering (Engineering For Professionals)

Master'sPart-timeHybridIn-personOnlineWhiting School of Engineering (Engineering For Professionals)

- Systems Engineering, Master of Science in Engineering (MSE)
  - Whiting School of Engineering (Full Time, On Campus Programs)

Master'sFull-timeWhiting School of Engineering (Full Time, On Campus Programs)In-person

- Systems Engineering, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Teaching Writing, Certificate
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

CertificateFull-timePart-timeHybridOnlinePost-Master's Certificate (Graduate Certificate)Krieger School of Arts and Sciences (Advanced Academic Programs)

- Teaching Writing, Master of Arts
  - Krieger School of Arts and Sciences (Advanced Academic Programs)

Master'sFull-timePart-timeHybridOnlineKrieger School of Arts and Sciences (Advanced Academic Programs)

- Technical Management, Graduate Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Technical Management, Post-Master's Certificate
  - Whiting School of Engineering (Engineering For Professionals)

CertificatePart-timeHybridIn-personOnlinePost-Master's Certificate (Graduate Certificate)Whiting School of Engineering (Engineering For Professionals)

- Theatre Arts and Studies, Minor
  - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Toxicology for Human Risk Assessment, MS
  - Bloomberg School of Public Health

Master'sFull-timeBloomberg School of Public HealthIn-person

- Training Certificate in Public Health
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Tropical Medicine, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Urban Education, Graduate Certificate
    - School of Education

  CertificatePart-timeSchool of EducationIn-personPost-Master's Certificate (Graduate Certificate)

- Vaccine Science and Policy, Certificate
    - Bloomberg School of Public Health

  CertificatePart-timeBloomberg School of Public HealthOnline

- Visual Arts, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Voice, Bachelor of Music
    - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Voice, Bachelor of Music Education
    - Peabody Institute

  Bachelor'sFull-timePeabody InstituteIn-person

- Voice, Doctor of Musical Arts
    - Peabody Institute

  DoctoralFull-timePeabody InstituteIn-person

- Voice, Master of Music
    - Peabody Institute

  Master'sFull-timePeabody InstituteIn-person

- Voice, Performer's Certificate
    - Peabody Institute

  CertificateFull-timePeabody InstituteIn-person

- Wind Conducting, Doctor of Musical Arts
    - Peabody Institute

  DoctoralFull-timePeabody Institute

- Women, Gender, and Sexuality, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Writing Seminars, Bachelor of Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Bachelor'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Writing Seminars, Master of Fine Arts
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Master'sFull-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-person

- Writing Seminars, Minor
    - Krieger School of Arts and Sciences (Full Time, On Campus Programs)

  Full-timeKrieger School of Arts and Sciences (Full Time, On Campus Programs)In-personMinors

- Writing, Master of Arts
    - Krieger School of Arts and Sciences (Advanced Academic Programs)

  Master'sFull-timePart-timeHybridKrieger School of Arts and Sciences (Advanced Academic Programs)

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UNIVERSITY-WIDE POLICIES AND INFORMATION

University-Wide Policies and Information

The University-wide Policies and Information section of the Academic Catalogue includes academic and non-academic university policies as of June 2022 that pertain to students across Johns Hopkins University. All students are responsible for observing relevant University policies and meeting relevant University requirements as they are set forth here and in other official University sources. The University reserves the right to add, remove, or revise policies whenever such an action is deemed appropriate or necessary. The most current version of each policy can be accessed in the online Policies and Document Library (https://www.jhu.edu/university-policies/), a searchable resource for all university-level policies, statements, and guidelines.

Please note that policies specific to each of the University's nine academic divisions are included within the Academic Catalogue. In addition to observing relevant University policies and requirements, students are expected to familiarize themselves with and adhere to any applicable policies and regulations that may be instituted by their individual school(s).

The Office of the University Registrar (OUR) collaborates with university partners and divisional leaders to publish this Academic Catalogue. The OUR also establishes university-wide operational guidelines pertaining to student record processes, management, and other components of the academic experience at the university in collaboration with other university partners. The operational guidelines and the mission statement of OUR is available on The Office of the University Registrar website (https://registrar.jhu.edu/).

Academic Policies and Information

Academic Calendar

JHU Academic Calendar

The 10-year academic calendar can be found on the Office of the University Registrar website (https://registrar.jhu.edu/academic-calendar/).

- The calendar was created in consultation with the School Deans' offices and registrars over the past three years
- The calendar will be set and published for ten years to enhance academic and administrative planning.
- These common calendars make it easier for students to contemplate and possibly take curricular offerings across the divisions.
- Students will be subject to tuition separately for summer programs.
- The start dates for semesters and the eight-week instructional periods are aligned. The non-compulsory summer terms continue to vary with fewer instructional patterns.
- Students should consult their division websites for school-specific dates and deadlines.

Academic Integrity Policies

Academic Integrity Policies

Responsible academic conduct is a central component of graduate and post-doctoral training and is essential to the core values of Johns Hopkins University. Students at The Johns Hopkins University are expected to meet the highest standards of academic excellence and ethical conduct. Each of the divisions of the University maintains an academic integrity policy, and students, faculty, and staff are required to promptly report known or suspected violations of the policy.

The policy for undergraduate students at KSAS and WSE can be found here. (https://studentaffairs.jhu.edu/policies-guidelines/undergrad-ethics/) The links below detail the specifics of the academic integrity policies that apply to graduate students and postdoctoral trainees for each division at the University. Cases of academic misconduct will be resolved using the policy from the student's division of enrollment.

- Bloomberg School of Public Health (p. 634)
- Carey Business School (p. 682)

- Krieger School of Arts & Sciences (https://provost.jhu.edu/wp-content/uploads/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf) (Including Advanced Academic Programs - AAP)
- Peabody Institute (p. 753)
- School of Advanced International Studies (https://mediahost.sais-jhu.edu/saismedia/media/web/files/red-book.pdf)
- School of Education (p. 864)
- School of Medicine (https://hpo.johnshopkins.edu/doc/fetch.cfm/DaKy5cjc/)
- School of Nursing (p. 1064)
- Whiting School of Engineering (https://provost.jhu.edu/wp-content/uploads/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf) (Including Engineering for Professionals - EP)

Animal Care and Use Program

Overview

Animals that are used in research and teaching at Johns Hopkins University are covered by the Animal Care and Use Program. The Johns Hopkins program is designed to ensure that it is in compliance with the Animal Welfare Act regulations and Public Health Service (PHS) Policy on Humane Care and Use of Laboratory Animals. Johns Hopkins University has an approved PHS Assurance that describes the conduct of our animal care and use program. Johns Hopkins also maintains accreditation of our program by the private Association for the Assessment and Accreditation of Laboratory Animal Care (AAALAC) International. Our overarching goals are to assure that laboratory animals receive the highest quality care and to protect the health of people who work with and around animals at Johns Hopkins. We believe that excellence in research and teaching requires excellence in our animal care and use program.

The Animal Care and Use Program at Johns Hopkins is a University-wide program. It is comprised of multiple components, which cover animal housing and care, veterinary medical care, facilities management, training, occupational health, and assurance of compliance with federal and state laws and policies that govern use of animals in research and teaching. In general, the National Research Council's *Guide to the Care and Use of Laboratory Animals* serves as the primary source for standards for the Johns Hopkins Animal Care and Use Program. Additional detailed information regarding policies and guidance may be found on or through links from the Animal Care and Use Committee website (www.jhu.edu/animalcare (http://web.jhu.edu/animalcare/)).

For comprehensive information about this policy, please see the Animal Care and Use Program policy - PDF (https://policies.jhu.edu/doc/fetch.cfm/C5yxDfrs/).

Credit Hour Policy

Policy Statement

The Johns Hopkins University's nine academic divisions operate under a variety of semester and other term systems, in which credits (equivalently, credit hours) are awarded, and alternative systems with equivalent measures wherein credit hours are not awarded. The Credit Hour Policy ("Policy") codifies practices across Johns Hopkins University ("JHU" or "University") schools regarding the awarding of credit hours, in accordance with Federal, State, and accreditation guidelines. This Policy applies equally to all credit-bearing courses regardless of duration, mode of delivery, or instructional format.

Find the full Credit Hour Policy here (https://policies.jhu.edu/doc/fetch.cfm/jhiiy1jH/).

School of Nursing Specific Information

The School of Nursing Academic Credit Hour Policy describes how academic credits are calculated for clinical hours including laboratory clinical hours.

For clinical/laboratory experiences, one academic credit is equal to 4 hours of clinical/laboratory experience in all programs and tracks except the DNP Nurse Anesthesia Track. Thus, one clinical/laboratory/practicum credit hour is calculated as 4 clock hours per week per semester week, which is equal to 56 clock hours/semester for 1 credit.

One academic credit is equal to 8 hours in the clinical setting in the DNP nurse anesthesia track (112 clock hours).

This policy applies to students enrolled in a Johns Hopkins School of Nursing course.

FERPA

Family Educational Rights and Privacy Act (FERPA)

The Family Educational Rights and Privacy Act of 1974 (20 U.S.C. § 1232g; 34 CFR Part 99) (FERPA) is a federal law regarding the privacy of student education records and the related requirements of educational institutions, primarily in the areas of education record access and information release.

Educational institutions that receive funds under any program administered by the U.S. Secretary of Education must adhere to FERPA regulations. As a recipient of federal funding, Johns Hopkins University (JHU) and all schools operating within JHU are obligated to comply with FERPA.

Please see the Office of the University Registrar's FERPA Compliance (https://registrar.jhu.edu/ferpa-compliance/) website for comprehensive information pertaining to FERPA and JHU's FERPA compliance procedures; as well as JHU FERPA resources including the required Annual Notification of Rights (https://registrar.jhu.edu/annual-notification-of-rights/), FERPA-related forms (https://registrar.jhu.edu/ferpa-forms/), and FERPA FAQs (https://registrar.jhu.edu/ferpa-resources/).

PHD Specific Policies

PhD Specific Policies

The Doctor of Philosophy Board, formed in 2010, advises the Provost about university-wide issues pertaining to the Ph.D. and sets guidelines and policies that enhance the experience of all Ph.D. students. This Board also recommends Ph.D. candidates who have met the university-wide requirements for the Ph.D. for conferral to the President. The below policies apply to all Ph.D. students at Johns Hopkins.

PhD Mentoring Policies and Resources

- PhD Mentoring Policies and Resources (https://provost.jhu.edu/education/graduate-and-professional-education-resources/phd-mentoring-policies-and-resources/)

PhD Professional Development Policies and Resources

- PhD Professional Development Policies and Resources (https://provost.jhu.edu/education/graduate-and-professional-education-resources/phd-professional-development-policies-and-resources/)

University Requirements for PhD

- University Requirements for PhD (https://provost.jhu.edu/wp-content/uploads/2022/03/university-requirements-for-PhD-1.pdf)

Transcripts and Enrollment Verifications

Transcripts

To provide the best service possible and to maintain security of academic records, Official Electronic and Paper Transcripts can be ordered online through the National Student Clearinghouse (NSC), an authorized agent of Johns Hopkins University.

Electronic Transcripts

- Your transcript will be sent securely through the NSC (https://www.studentclearinghouse.org/) (a secure electronic alternative to the traditional paper transcript) in PDF format via email.
- The AAMC's American Medical College Application Service® (AMCAS®) and the Law School Admission Council now accept electronic transcripts from Johns Hopkins University.
- Electronic transcripts sent to the recipient are considered official upon delivery, but become unofficial if passed on to another recipient. The link will expire after 30 days.
- Order updates will be emailed to you, or you can check your order status history online with the NSC. (https://tsorder.studentclearinghouse.org/tyo/login/)

Paper Transcripts

- This service has been suspended by some Schools and will resume once operations return to normal.
- Your transcript will be mailed using specific domestic and international carriers - delivery varies based on destination.
- Order updates will be emailed to you, or you can check your order status history online with the NSC. (https://tsorder.studentclearinghouse.org/tyo/login/)

Enrollment and Degree Verifications

A verification certificate provides proof of enrollment or degree completion for a student's financial lender, insurance company, sponsor, employer etc.

Please note:

- Enrollment verifications may include the total number of credit hours taken, current and/or past semesters enrolled, and status for current and/or past terms.
- Degree verifications may include the program and major for degree(s) completed and date(s) of conferral.

Current Students

Current students may print an enrollment verification certificate by accessing the National Student Clearinghouse portal through SIS Self-Service.

Alumni & Third-Party

Alumni may request a degree verification through the National Student Clearinghouse (http://www.studentclearinghouse.org/).

Admission and Aid

Johns Hopkins University is America's first research university, founded on the belief that teaching and research are interdependent, and that a modern university must do both well.

Today, JHU remains a world leader in both teaching and research, with more than 24,000 undergraduate and graduate students studying with esteemed faculty members across nine world-class academic divisions.

Please visit the Office of Admissions website (https://www.jhu.edu/admissions/) for more information about how to apply to JHU. Additional information on the cost of attendance at JHU can also be found on the Office of Admissions website (https://www.jhu.edu/admissions/tuition/) and by following the links below.

Undergraduate Admission

Arts & Sciences/Engineering

Please visit the Undergraduate Admissions website for detailed information on admissions dates, deadlines, and processes. The Undergraduate Admissions website can be found here (https://apply.jhu.edu/application-process/).

Peabody Institute

Please visit the Peabody Institute Office of Admissions website for all admissions and auditions related questions and information.

Peabody Institute Admissions: https://peabody.jhu.edu/audition-apply/

Graduate Admission

JHU faculty and students study, teach, and learn in and across more than 180 programs regularly recognized as being among the nation's best. All nine of JHU's academic divisions offer full-time graduate programs.

Graduate Admissions: https://www.jhu.edu/admissions/graduate-admissions/

Tuition and Fees

Cost of Attendance at Johns Hopkins University

- Financial Aid (p. 45)

Undergraduate Programs

Undergraduate Arts & Sciences and Engineering

Johns Hopkins University is dedicated to enrolling the strongest students from all backgrounds each year, and it's our goal to enable students to make their college decision without being limited by their family's financial circumstances. The Office of Undergraduate Admissions and the Office of Student Financial Services are committed to removing barriers and providing opportunities through a combination of need-blind admissions, meeting 100% of demonstrated need, and no loans in financial aid packages.

Financial aid advisors in the Office of Student Financial Services are always available to guide students through the process. Reach them at 410-516-8028 or fin_aid@jhu.edu for more information.

Visit the Office of Student Accounts website (https://studentaffairs.jhu.edu/student-accounts/tuition-fees/) for the fall and spring semester tuition refund policy and deadlines.

The tuition refund policy and deadlines for summer courses are posted on the Summer Programs website (https://summerprograms.jhu.edu/).

Peabody Institute

Please visit the Peabody Institute website (https://peabody.jhu.edu/audition-apply/tuition-fees/) for an overview of all possible tuition and fees. If students would like to view more on the general cost of attendance at the Peabody Conservatory, please visit the Financial Aid page (http://peabody.jhu.edu/audition-apply/financial-aid-scholarships/prospective-students/cost-of-attendance/).

Graduate Programs

For information about tuition and fees for a specific program, please visit the applicable division's website below.

Bloomberg School of Public Health (https://www.jhsph.edu/admissions/tuition-and-fees/)

Carey Business School (https://carey.jhu.edu/programs/admissions/how-to-apply/tuition-fees/)

Krieger School of Arts & Sciences Full-time Programs (https://krieger.jhu.edu/graduate-admissions/apply/cost-of-attendance/)

Krieger School of Arts & Sciences Part-time Programs (https://advanced.jhu.edu/admissions-aid/tuition-fees/)

Peabody Institute (https://peabody.jhu.edu/audition-apply/tuition-fees/)

School of Advanced International Studies (https://sais.jhu.edu/admissions-aid/tuition-and-aid/cost-attendance/)

School of Education (https://education.jhu.edu/admission-financial-aid/tuition-fees/)

School of Medicine (https://www.hopkinsmedicine.org/som/offices/finaid/cost/)

School of Nursing (https://nursing.jhu.edu/admissions/tuition/)

Whiting School of Engineering Full-time Programs (https://engineering.jhu.edu/graduate-admissions/)

Whiting School of Engineering Part-time Programs (https://ep.jhu.edu/admissions-and-aid/tuition-and-fees/)

Financial Aid

Financial Aid at Johns Hopkins University

As an institution with a long-standing tradition of crossing academic boundaries and making new discoveries that have shaped the world around us, our commitment to supporting the best and brightest students is at the core of our mission. As we aim to bring the best to our campus, we are committed to making education affordable.

Our undergraduate students can receive the full Hopkins experience via our generous financial aid program. This includes grant and scholarship aid available for admitted students to meet their demonstrated financial need while enrolled. Likewise, our graduate students can take their research and education to a higher level by utilizing the numerous financial aid options available to finance the higher costs of pursing advanced degrees. These students can expect to finance their education through grants, highly competitive scholarships, loans, and payment options.

Johns Hopkins is dedicated to making education affordable to the most talented students who, in turn, can use their unique opportunities at Hopkins to make a lasting impact on the world. Our divisions offer a unique financial aid experience, and each are prepared to guide you through the entire process. To learn more about financing your education, please choose from the list of schools below.

KRIEGER SCHOOL OF ARTS AND SCIENCES

- For undergraduate students, please visit the financial aid website at https://finaid.jhu.edu/undergraduate-aid/.
- For graduate students, including Advanced Academic Programs, please visit https://finaid.jhu.edu/graduate-aid/. (https://finaid.jhu.edu/graduate-aid/.html)

carey Business school

For more information, please refer to the financial aid website at carey.jhu.edu/current-students/financial-aid/policies/title-iv-funds (http://www.carey.jhu.edu/current-students/financial-aid/policies/title-iv-funds/).

SCHOOL OF EDUCATION

For more information, please refer to the financial aid website at Financial Aid - Johns Hopkins University School of Education (jhu.edu) (https://education.jhu.edu/admission-financial-aid/apply-for-financial-aid/)

WHITING SCHOOL OF ENGINEERING

- For undergraduate students, please visit the financial aid website at https://finaid.jhu.edu/undergraduate-aid/.
- For graduate students, and students of Engineering for Professionals, please visit https://finaid.jhu.edu/graduate-aid/.

SCHOOL OF ADVANCED INTERNATIONAL STUDIES

For more information, please refer to the financial aid website at https://sais.jhu.edu/admissions-aid/tuition-and-aid/financial-aid#welcome (https://sais.jhu.edu/admissions-aid/tuition-and-aid/financial-aid/#welcome).

SCHOOL OF MEDICINE

For more information, please refer to the financial aid website at https://www.hopkinsmedicine.org/som/offices/finaid/.

SCHOOL OF NURSING

For more information, please visit our website at http://nursing.jhu.edu/admissions/financial-aid/index.html (http://nursing.jhu.edu/admissions/financial-aid/).

Peabody institute

For more information, please refer to the financial aid website at https://peabody.jhu.edu/audition-apply/financial-aid-scholarships/.

BLOOMBERG SCHOOL OF PUBLIC HEALTH

To learn more, please visit the financial aid website at Financial Aid | Johns Hopkins (jhu.edu) (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/)

Higher Education Act Disclosures

The Higher Education Act of 1965, as amended in 2008, includes many student disclosures and reporting requirements by universities. These requirements include statistics and/or information on the following subjects:

1. Retention and graduation rates;
2. Financial assistance available to students and requirements and restrictions imposed on Title IV aid;
3. Crime statistics;
4. Athletic program participation rates and financial support; and
5. Other institutional information including: the cost of attendance, accreditation and academic program data, facilities and services available to students with disabilities, and withdrawal and refund policies.

Higher Education Act Disclosures - "Student Right to Know"

Disclosures applicable to all students across Johns Hopkins University are outlined below. **University and School specific Student Diversity Data** can be found on the Office of Institutional Research Website (https://oir.jhu.edu/university-enrollment/).

- General Institutional Information (p. 46)
- Health and Safety Information (p. 47)
- Student Financial Assistance Information (p. 48)

Student Outcomes

- None at the University-level

Equity in Athletics Disclosure Act

- Equity in Athletics Disclosure Act Report (https://hopkinssports.com/sports/compliance/)

Voter Registration Information

- Voter Registration Information (https://www.usa.gov/register-to-vote/)

General Institutional Information

General Institutional Information

- Accreditation and State Licensing Authorities (https://provost.jhu.edu/education/accreditation-and-academic-compliance/)
- College Navigator website (http://nces.ed.gov/collegenavigator/)
- Copyright infringement policy and sanctions- PDF Document (https://www.jhu.edu/assets/uploads/2016/11/compliance_policy.pdf)
- Family Educational Rights and Privacy Act (p. 43)
- JHU Net Price Calculator (https://npc.collegeboard.org/student/app/jhu/)
- Services/Facilities available to Students with Disabilities (http://accessibility.jhu.edu/accommodations/student-accommodations/)
- State Authorization of Distance Education (NC-SARA) (p. 46)

State Authorization of Distance Education (NC-SARA)

State Authorization of Distance Education

Johns Hopkins University has been approved by the Maryland Higher Education Commission to participate in the National Council for State Authorization Reciprocity Agreements effective February 22, 2016. NC-SARA (http://nc-sara.org/) is a voluntary, regional approach to state oversight of postsecondary distance education.

Additional information can be found here (https://provost.jhu.edu/education/accreditation-and-academic-compliance/state-authorization-of-distance-education/).

Disclosures and Policies

NC-SARA

The following disclosures and policies pertains to students who enroll in Johns Hopkins University distance education programs as a condition of participating in NC-SARA.

The Johns Hopkins University encourages the complainant to seek resolutions to the allegations/grievances within the university's processes. If a complainant has exhausted JHU grievance procedures and the grievance has not been resolved, the complainant has the right to file a complaint with the Maryland Higher Education Commission, the state portal agency for SARA. The portal agency is responsible for further consideration and resolution.

Maryland Higher Education Commission, 6 North Liberty Street, 10th Floor, Baltimore, MD 21201

The JHU Academic Grievance Policy: Students and Postdoctoral Fellows can be found in the online JHU Policies and Document Library (https://policies.jhu.edu/doc/fetch.cfm/pYwNZVAg/).

The School of Medicine grievance policy can be accessed here: School of Medicine (http://www.hopkinsmedicine.org/som/faculty/policies/facultypolicies/grievance.html)

California

Students attending these out-of-state institutions can file those complaints online at www.dca.ca.gov (http://www.dca.ca.gov/) or call toll-free 833-942-1120.

Texas

The following disclosure pertains to students who enroll in Johns Hopkins School of Education Master of Science in Education program offered in Texas.

After exhausting Johns Hopkins' grievance/complaint process, current, former, and prospective students may initiate a complaint with THECB by submitting the required forms along with evidence of their completion of their institution's complaint procedures. Complaints may be submitted using one of the following three options:

- Completing the online student complaint form and uploading the required supporting documentation in Portable Document Format (PDF)

To access the online student complaint form, use the "Contact Us (https://www1.thecb.state.tx.us/Apps/CRAFT/Home/Create/)" link to submit an email with "Student Complaint Against a Higher Education Institution" selected as the Contact Reason. After submitting your email, wait a few moments for the online student complaint form to be automatically presented for your use.

- Sending the required Student Complaint and Release Forms (http://www.thecb.state.tx.us/reports/DocFetch.cfm?DocID=8616&Format=PDF) and supporting documentation as PDF attachments by email to studentcomplaints@thecb.state.tx.us

or

- Mailing printed forms and documentation to:

Texas Higher Education Coordinating Board
Office of General Counsel
P.O. Box 12788
Austin, Texas 78711-2788

Facsimile transmissions of student complaint forms are not accepted.

All submitted student complaint forms must include a signed Family Educational Rights and Privacy Act (FERPA) Consent and Release form and THECB Consent and Agreement Form. Submitted complaints regarding students with disabilities shall also include a signed Authorization to Disclose Medical Record Information (http://www.thecb.state.tx.us/reports/DocFetch.cfm?DocID=8145&Format=PDF) form.

Process: The first step in addressing a complaint is to follow Johns Hopkins' complaint procedures. If Johns Hopkins is unable to resolve the matter after you have exhausted their complaint and appeal processes, you may file a complaint with this Agency.

Health and Safety Information

Clery Act Disclosures

In compliance with the Jeanne Clery Disclosure of Campus Security Policy and Crime Statistics Act (commonly known as the Clery Act), the **Annual Security and Fire Safety Report** provides important information regarding campus safety, safety programs, and related policies. Also included in this report are crime statistics for the past three years. For a printed copy of this report please call 410-516-4631.

Additional resources, including **JHU Emergency Response guides**, **Timely Warning Policy** and **Missing Student Procedures** (see Annual Security and Fire Safety Report (https://publicsafety.jhu.edu/assets/uploads/sites/9/2020/05/annual_report_securityfiresafety.pdf)), can be found on the JHU Public Safety website (https://publicsafety.jhu.edu/compliance-and-crime-statistics/), and in the Office of Institutional Equity section (p. 48) of this catalogue.

Additional Health and Safety Information:

- Drug and Alcohol Abuse Prevention Program (https://studentaffairs.jhu.edu/chew/alcohol-and-other-drugs/)
- Inclement Weather Information (p. 47)
- Vaccinations (https://covidinfo.jhu.edu/health-safety/covid-vaccination-information/)

Inclement Weather Information

Inclement Weather

When there is an alteration or curtailment of the university operating schedule or the operating schedule of a designated unit, an official announcement will be made on the University Emergency Telephone Hotline and on the Johns Hopkins website at http://www.jhu.edu/alert (http://www.jhu.edu/alert/). Since conditions may vary in the geographic areas where Johns Hopkins has campuses, there may be times when the Required Attendance Policy is invoked for some campuses, departments or units and not others.

Carey Inclement Weather Information

In order to maintain the academic integrity of our programs, it is important that any class session that is missed due to weather, instructor illness or other emergency is made up, and that any missed material is covered. However, faculty members have considerable latitude over how the class sessions will be made up and have two options from which to choose.

They may:

- Plan and schedule a virtual class session
- Re-schedule the class period to a designated make-up day (Designated make-up days are scheduled at the end of each 8-week term or semester.)

Whenever a class session is cancelled, each faculty member may choose the appropriate make-up alternative for that particular class. The faculty member must notify the students in the class and the Office of Education about which option will be used to make up the class period.

This policy is designed to address those situations when a single class day has been cancelled. Weather emergencies or other events that result in multiple-day cancellations will be handled on a case-by-case basis. Please call the University Weather Emergency Line at 410-516-7781 or 1-800-548-9004 or visit jhu.edu/alert (https://jhu.edu/alert/) for more information.

School of Nursing Additional Information

The university and school will make every effort to remain open and hold classes at all scheduled times, however there are times when the university, campus or school operations must be interrupted. On-site classes will meet unless operation of the University or School has been officially curtailed. Students, faculty, and staff are not permitted on campus if the university or the school is closed except in the case of required attendance on-site personnel. In order to maintain the continuity of the School's academic mission, online courses will continue even if the university or school is closed or if a building closure is necessary. Some on-site courses may continue by utilizing distance learning technology.

Clinical hours missed when the university is closed do not need to be made up.

Student Financial Assistance Information

Student Financial Assistance Information

- Access to National Student Loan Data System for borrowers (https://studentaid.gov/)
- Inform all eligible borrowers of state grant assistance in their state of residence (http://www2.ed.gov/about/contacts/state/)
- Private Loan Disclosures and Self Certification Form for prospective borrowers (https://finaid.jhu.edu/graduate-aid/types-of-aid/)
- Student Loan Code of Conduct (http://pages.jh.edu/~news_info/policy/finaid_code.html)
- Summary of requirements for return of federal grant or loans - PDF Document (https://e-catalogue.jhu.edu/university-wide-policies-information/higher-education-act-disclosures/student-financial-assistance-information/Microsoft_Word_-_Return_of_Title_IV_Funds_Policy_062921_Letterhead.pdf)
- TEACH grant counseling (https://studentloans.gov/myDirectLoan/launchTeach.action/)

Office of Institutional Equity

About the Office of Institutional Equity

The Office of Institutional Equity (OIE) leads JHU efforts to foster an environment that is inclusive, respectful and free from discrimination and harassment. In its role, OIE ensures compliance with affirmative action and equal opportunity laws, investigates complaints of discrimination, harassment, and sexual misconduct, and serves as a central resource for those with disabilities or those who require religious accommodation. For more information, please visit OIE's Website (https://oie.jhu.edu/discrimination-and-harassment/).

- Discrimination and Harassment Policy and Procedures (p. 48)
- Equal Opportunity and Title IX Notice (p. 48)
- Sexual Misconduct (p. 48)

Discrimination and Harassment Policy and Procedures

The University is committed to maintaining learning and working environments that are free from all forms of discrimination and harassment (and related retaliation). Each member of the community is responsible for fostering civility, for being familiar with this policy, and for refraining from conduct that violates this policy.

The Office of Institutional Equity (OIE) maintains the University's Discrimination and Harassment Policies and Procedures (https://oie.jhu.edu/policies-and-laws/JHU-Discrimination-and-Harassment-Policy-and-Procedures-7.1.21-Present/). The comprehensive policies and procedures can be found here on OIE's website (https://oie.jhu.edu/discrimination-and-harassment/).

- Information on how to report discrimination, harassment and/or retaliation to the University (https://oie.jhu.edu/policies-and-laws/jhu-policies/Johns%20Hopkins%20University%20Discrimination%20and%20Harassment%20Policy%20and%20Procedures/#Section_IV)
- Discrimination and Harassment Report Form (https://forms.jh.edu/view.php?id=164822)
- Information on how to report discrimination, harassment and/or retaliation to law enforcement or government agencies (https://oie.jhu.edu/policies-and-laws/jhu-policies/Johns%20Hopkins%20University%20Discrimination%20and%20Harassment%20Policy%20and%20Procedures/#Reporting_to_Law_Enforcement_or_Government_Agencies)
- Information to contact Campus Security and Local Law Enforcement (https://oie.jhu.edu/policies-and-laws/jhu-policies/Johns%20Hopkins%20University%20Discrimination%20and%20Harassment%20Policy%20and%20Procedures/#Appendix_A)
- Information to contact Confidential Resources (https://sexualmisconduct.jhu.edu/policies-laws/Confidential-Resources/)
- Information to contact the Student Affairs Offices (https://sexualmisconduct.jhu.edu/policies-laws/Non-Confidential-Resources/)
- Information to contact External Government Resources (https://oie.jhu.edu/policies-and-laws/jhu-policies/Johns%20Hopkins%20University%20Discrimination%20and%20Harassment%20Policy%20and%20Procedures/#Appendix_D)
- Learn more about JHU's Timely Warning Policy (https://policies.jhu.edu/doc/fetch.cfm/rQtD4o5g/)
- Access the University's Annual Security & Fire Safety Report (https://publicsafety.jhu.edu/assets/uploads/sites/9/2020/05/annual_report_securityfiresafety.pdf)
- Access the University's Crime Logs (http://security.jhu.edu/compliance-and-crime-statistics/)

Equal Opportunity and Title IX Notice

The University's statement on Equal Opportunity and Title IX Notice for Students, Faculty, Staff and Applicants can be found here (https://oie.jhu.edu/policies-and-laws/jhu-policies/Equal_Opportunity_and_Title_IX_Notice/).

The University has adopted these statements concerning equal opportunity and Title IX to provide notice to students, faculty, staff, applicants for employment and admissions, and unions or other professional organizations holding collective bargaining or professional agreements with the University. This notice must be published in appropriate communications, such as university-wide and divisional websites, handbooks, catalogues and publications.

Sexual Misconduct

Sexual Misconduct

Johns Hopkins University (JHU) is committed to promoting a safe and supportive environment for each and every member of our community. If you have experienced sexual misconduct, we encourage you to reach out for support and medical care (https://sexualmisconduct.jhu.edu/). We are available to assist you if you would like to file a report with JHU and/or local law enforcement. The JHU complete Sexual Misconduct Policy and Procedures can be found on OIE's website (https://oie.jhu.edu/discrimination-and-harassment/) and the Sexual Misconduct Response and Prevention website (https://sexualmisconduct.jhu.edu/policies-laws/).

What is sexual misconduct?

The term “sexual misconduct” refers to both "Title IX Sexual Harassment (https://sexualmisconduct.jhu.edu/policies-laws/#Title%20IX%20Sexual%20Harassment)" and "Other Sexual Misconduct (https://sexualmisconduct.jhu.edu/policies-laws/#Other%20Sexual%20Misconduct)."

- More information on sexual misconduct (http://sexualassault.jhu.edu/policies-laws/)
- More information on supportive services (https://sexualmisconduct.jhu.edu/Connect/)
- Learn more about JHU's work on the National Academies of Science Action Collaborative on Preventing Sexual Harassment in Higher Education (http://sites.nationalacademies.org/sites/sexualharassmentcollaborative/)

Filing a sexual misconduct complaint

Individuals are encouraged to report sexual misconduct to the JHU Office of Institutional Equity (OIE). The information provided in a report will be kept as confidential as is reasonably possible.

- File a sexual misconduct complaint (https://forms.jh.edu/view.php?id=158633)
- What happens when a report is made to the Title IX Coordinator? (https://oie.jhu.edu/docs/Procedures%20Per%20New%20Title%20IX%20Regulations.pdf)

Rights, Privileges, and Responsibilities

Academic Grievance Policy: Students and Postdoctoral Fellows

Policy Statement

Johns Hopkins University seeks to provide a supportive educational, training, and professional environment. The University provides several avenues of redress for students and postdoctoral fellows who believe they have been adversely affected in their professional or educational activities as a result of an arbitrary or capricious act, or failure to act, or a violation of a University, division, school, or center procedure or regulation by their supervisor, department chair, center director, or other administrator or administrative body. The University encourages individuals involved in such disputes to resolve the matter informally. The purpose of this Policy is to provide a formal mechanism to resolve grievances of all students and postdoctoral fellows of the University. This Policy is only to be used to resolve serious matters which meet the definition of a “grievable” matter and cannot be resolved through informal discussions or processes, and is only to be applied after reasonable efforts have been made to settle the dispute informally.

Full Policy

The full policy (https://policies.jhu.edu/doc/fetch.cfm/pYwNZVAg/) can be found in the JHU Policy and Document Library.

New Child Accommodations for Full-Time Graduate Students and Postdoctoral Trainees

Policy Statement

Johns Hopkins University recognizes the importance of balancing the family and academic responsibilities faced by new parents and promoting the well-being of their families. The University is supportive of accommodating eligible full-time graduate students and full-time postdoctoral fellows, scholars and trainees (collectively “postdoctoral trainees”) who are expecting a new child. Consistent with grant funding policies that place a limit of 8 weeks for parental leave, all eligible full-time graduate students and postdoctoral trainees shall receive no less than 8 weeks of fully-paid new child accommodations.

Each school has in place provisions for taking a formal leave of absence, which is an option at any time for students and trainees who are new parents. Electing this option relieves students of all university responsibilities but comes with consequences that may suspend students' privileges and access to university benefits and resources. This option may also have visa consequences for international students. The goal of this Policy is to put in place a set of guidelines for full-time graduate students and postdoctoral trainees who have new family additions who do not elect a formal leave of absence.

Full Policy

The full policy (https://policies.jhu.edu/doc/fetch.cfm/MsN4wHC0/) can be found in the JHU Policy and Document Library.

Personal Relationships Policy

Policy Statement

The Johns Hopkins University (“JHU” or “University”) is committed to the personal, academic, and professional well-being and development of its students, trainees, faculty, staff, post-doctoral fellows, clinical residents, and all other members of the University community. In particular, the University is committed to fostering an environment that promotes academic and professional success for all members of its community by addressing behaviors that can undermine the important missions of our institution. The University seeks to create and maintain an atmosphere of mutual respect, collegiality, fairness, and trust. The Personal Relationships Policy (the "Policy") implements the University's commitment to maintaining the integrity of its educational and working environment. This Policy focuses on the conflict of interest that may exist when individuals simultaneously engage in both personal and professional relationships in which one individual has the potential to exert substantial academic or professional influence over the other.

Full Policy

The full policy (https://policies.jhu.edu/doc/fetch.cfm/HVZArki5/) can be found in the JHU Policy and Document Library.

Photography and Film Rights Policy

Policy Statement

Johns Hopkins University reserves the right to film or take photographs of faculty, staff, and students engaged in teaching, research, clinical practices, and other activities, as well as casual and portrait photography or film. These photographs and films will be used in such publications as catalogues, posters, advertisements, recruitment, and development materials as well as on the university's website, for various videos, or for distribution to local, state, or national media for promotional purposes. Classes will be photographed only with the permission of the faculty member.

Such photographs and film — including digital media — which will be kept in the files and archives of Johns Hopkins University, will remain available for use by the university without time limitations or restrictions. Faculty, students, and staff are made aware by virtue of this policy that the university reserves the right to alter photography and film for creative purposes. Faculty, students, and staff who do not want their photographs used in the manner(s) described in this policy statement should contact the Office of Communications by email at cpa@jhu.edu. Faculty and students are advised that persons in public places are deemed by law to have no expectation of privacy and are subject to being photographed by third parties. Such public places include both campus and off-campus environments, including those used to host university-organized events and functions. Johns Hopkins University has no control over the use of photographs or film taken by third parties, including without limitation the news media covering university activities.

Full Policy

The full policy (https://policies.jhu.edu/doc/fetch.cfm/exV8PxQ7/) can be found in the JHU Policy and Document Library.

Student Conduct Code

Student Conduct Code

The full student conduct code can be found on the Policies & Guidelines page of the Office of Student Affairs here: https://studentaffairs.jhu.edu/policies-guidelines/student-code/

The Johns Hopkins University Student Conduct Code applies to all students, including without limitation undergraduate and graduate students, and student groups/organizations, whether recognized by the University or not, in the following schools and divisions:

- Paul H. Nitze School of Advanced International Studies (SAIS) (http://www.sais-jhu.edu/)
- Krieger School of Arts and Sciences (KSAS) (https://krieger.jhu.edu/)
- Whiting School of Engineering (WSE) (https://engineering.jhu.edu/)
- Carey Business School (CBS) (http://carey.jhu.edu/)
- School of Education (SOE) (http://education.jhu.edu/)
- School of Medicine (SOM) (https://www.hopkinsmedicine.org/som/)
- School of Nursing (SON) (http://nursing.jhu.edu/)
- Bloomberg School of Public Health (BSPH) (http://www.jhsph.edu/)
- Peabody Institute (Peabody) (http://www.peabody.jhu.edu/)

The schools and divisions above must comply with, and ensure that their policies and procedures comply with, this Code. To the extent there is any inconsistency between divisional policies and procedures and this Code, this Code controls.

Student Disability Services (SDS)

Accessibility at Johns Hopkins University

As Johns Hopkins University works to foster diversity and build a campus culture of inclusion, it is committed to ensuring people with disabilities enjoy full participation in the university's programs, services, and benefits. JHU seeks the continuous improvement of accessibility on its campuses and in its activities, and prohibits unlawful discrimination on the basis of disability.

Request Accommodations

Johns Hopkins University is committed to providing access to its educational programs for all qualified students, including those with disabilities. For more information, students are encouraged to review the guidelines here and to contact the office or individual who coordinates disability accommodations for their school or program.

Accommodations for Undergraduate Students

Admitted undergraduate students with disabilities who plan to request accommodations and attend the Krieger School of Arts & Sciences (KSAS), Whiting School of Engineering (WSE), or Peabody Institute can contact Student Disability Services (SDS) Homewood to begin the process.

- Student Disability Services Website (http://web.jhu.edu/disabilities/) (Homewood)
  - Email: Student Disability Services (studentdisabilityservices@jhu.edu) (Homewood)
- **Peabody** Student Disability Services Website
- JHU Disability Documentation Guidelines (https://oie.jhu.edu/ada-compliance/documentation-guidelines/)

Accommodations for Graduate Students and Other Learners

In order to best serve the needs of students with disabilities in the various schools and programs of Johns Hopkins University, we have designated one or more staff members to work closely with students who require accommodations. Students should initiate requests for accommodation with the disability coordinator in their respective schools.

- Visit Student Disability Services Website (http://web.jhu.edu/disabilities/) (KSAS & WSE - Homewood)
- Contact the disability coordinator for your school (https://oie.jhu.edu/ada-compliance/disability-coordinator-list/)
- JHU Disability Documentation Guidelines (https://oie.jhu.edu/ada-compliance/documentation-guidelines/)

Student Health

Health Insurance Requirements

It is the policy of Johns Hopkins University that all[1] full-time students maintain adequate health insurance coverage to provide protection against unexpected accidents and illnesses. Most full-time students are automatically enrolled in a university student-sponsored health benefits plan, and the plan premium will be charged to your university student account, unless proof of comparable health insurance is provided for students eligible to waive.

Those who are eligible to waive the insurance must do so annually. International students with a F1 or J1 Visa status are **ineligible** to waive and are required to purchase the university plan, however, some permissions for insurance waivers for international students are permitted with proper evidence of a comparable plan.

There are some instances where a student's department covers the cost of health benefits. Please consult your departmental insurance administrator for specific cost-related questions.

[1] There are few exceptions to health insurance requirements based on degree program. Please consult your school's insurance website or contact your administrator for clarification.

Health Insurance Eligibility

Eligibility for the JHU health insurance plan is based on school enrollment. The program types are briefly described along with the applicable school affiliation. Please go to your school's insurance page through the links provided to understand further information about enrollment, rates, waiving processes, and other areas of interest.

Dental coverage is available from Delta Dental for all schools who didn't previously have coverage. For Carey Business School, Krieger School of Arts and Sciences, Peabody Institute, School of Advanced International Studies, School of Education, Whiting School of Engineering and School of Nursing, details on the coverage can be found here (https://hr.jhu.edu/benefits-worklife/health-life/student-health-benefits/delta-dental-plan/).

A vision plan is also available from EyeMed for students across the university; details on the coverage can be found here (https://hr.jhu.edu/benefits-worklife/health-life/student-health-benefits/eyemed-vision-plan/).

Student Health Benefits Plan, Administered by Wellfleet

Students in the following programs are eligible for the Wellfleet medical plan:

Advanced Academic Programs (https://advanced.jhu.edu/student-resources/student-services/student-health-insurance/) (AAP)

Carey Business School (https://carey.jhu.edu/student-experience/services-resources/student-health-benefits-plan/) (CBS)

Engineering for Professionals (https://ep.jhu.edu/student-services/other-services/student-health-insurance/) (EP)

Krieger School of Arts and Sciences (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) (KSAS)

Peabody Institute (https://peabody.jhu.edu/life-at-peabody/student-life/health-wellness/) (Peabody)

School for Advanced International Studies (https://sais.jhu.edu/student-experience/wellbeing-and-support/) (SAIS)

School of Education (https://education.jhu.edu/student-resources/office-of-the-registrar/tuition-costs-and-benefits-information/health-insurance-information/) (SOE)

Whiting School of Engineering (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) (WSE)

Plan Description

Students can use their student health insurance in and outside the Baltimore area. Wellfleet utilizes the Cigna PPO network, which has expansive options throughout the US and some countries. Visit the Wellfleet website (http://www.wellfleetstudent.com/) or call 1-877-657-5044. You can search for a provider by visiting the Cigna website (https://hcpdirectory.cigna.com/web/public/consumer/directory/search/?consumerCode=HDC001). Choose the type of search you want to conduct, and when prompted to "Login/Register," click "Continue as Guest." When prompted to "Please Select a Plan", enter location, hit "Continue", and then choose "PPO, Choice Fund PPO."

Students enrolled in KSAS, Peabody and WSE are eligible for health services from the Student Health and Wellness Center (https://studentaffairs.jhu.edu/student-health/) and SAIS students are eligible to receive health services from Georgetown University Student Health Services (https://studenthealth.georgetown.edu/medical-care/).

Deductibles

A deductible is the amount you must pay annually before your insurance begins to pay. Students who are eligible for treatment and referral from a university provider may receive a reduced deductible for qualifying referrals. Consult with the insurance specialist at your school for further questions. Otherwise, both in-network and out of network have a deductible of $150 per person. Deductibles reset each plan year. The Wellfleet plan year is August 15-August 14.

Out-of-Network Claims

A provider network is a list of health-care providers who are contracted by an insurance company and provide medical care to those enrolled in plans offered by that insurance company. The providers in the health insurance plan's network are called "in-network providers". Those providers who are out-of-network, may require additional costs.

Your Wellfleet network through Cigna has providers all over the country. However, if you need to go out-of-network, you can work with the SHWC to discuss claims processing and reimbursements. See the Wellfleet Student website for Johns Hopkins University (https://www.studentinsurance.com/Client/858/) for coverage percentages for in-network and out-of-network coverage as the percentage of coverage may differ.

Brief Mental Health Support

Students enrolled in the following schools are also eligible for short-term mental health support from the Johns Hopkins Student Assistance Program (https://jhsap.org/) (JHSAP).

- AAP
- CBS
- EP
- SOE
- SAIS

Students enrolled in the following schools are eligible for short-term mental health support from the JHU Counseling Center (https://studentaffairs.jhu.edu/counselingcenter/).

- KSAS
- Peabody

- WSE

Student Health Plan, Administered by the Johns Hopkins Employer Health Programs (EHP)

Students in the following programs are eligible for the EHP.

Bloomberg School of Public Health (https://www.jhsph.edu/offices-and-services/student-affairs/resources/student-insurance/student-health-plan.html) (BSPH)

School of Medicine (https://www.hopkinsmedicine.org/som/StudentInsurance/Index.html) (SoM)

School of Nursing (https://nursing.jhu.edu/information/current-student/student-affairs/health-safety/) (SoN)

Plan Description

The EHP Student Health Program has partnered with Multiplan (https://www.multiplan.us/) to provide covered services outside of Maryland as in-network when using a Multiplan participating provider. Learners can go online to the Multiplan website to find participating providers by zip code. Multiplan information is printed on the back of each EHP Student Health Program membership card. Members can also call EHP customer service at 410-424-4485 with any questions.

Students currently enrolled in the Student Health Program who are expected to graduate or permanently leave the University will receive written notification that they are automatically terminated from the plan. However, under the Consolidated Omnibus Budget Reconciliation Act (COBRA), students leaving or graduating from the University have the option of extending their existing coverage for up to 18 months. Students must contact the School of Medicine Registrar's Office via email at sombenefits@jhmi.edu within 60 days to be reinstated in COBRA and are responsible for all premiums.

All full-time on-campus students are billed a Health Clinic Fee for access University Health Services (https://www.hopkinsmedicine.org/uhs/), on-campus health center. The University Health Services Fee (UHS) is not insurance and students are billed the fee on a per-term basis. This fee grants students unlimited access to Primary Care Services as well as Mental Health Services at the UHS Clinic and is billed to all full-time on-campus students regardless of whether they are enrolled in the Student Health Plan.

Deductibles

A deductible is the amount you must pay before your insurance begins to pay. Deductibles remain the same in or out of network. Please consult your plan details for impacts of in-network or out-of-network visits on out-of-pocket expenses, co-pays, and co-insurance.

Out-of-Network Claims

A provider network is a list of health-care providers who are contracted by an insurance company and provide medical care to those enrolled in plans offered by that insurance company. The providers in the health insurance plan's network are called "in-network providers". Those providers who are out-of-network, may require additional costs.

A covered member can download claim forms (https://www.ehp.org/plan-benefits/member-forms/) from the EHP website.

Mental Health Support

BSPH, SoM, and SoN students are eligible for mental health support from UHS Mental Health (https://www.hopkinsmedicine.org/uhs/university_mental_health.html) or brief consultation with the Johns Hopkins Student Assistance Program (https://jhsap.org/) (JHSAP).

Veterans Affairs

https://registrar.jhu.edu/veterans/

Johns Hopkins is approved by the Maryland Higher Education Commission for the training of veterans, service members, eligible spouses and dependents under the provisions of the various federal laws pertaining to veterans' educational benefits. Johns Hopkins University also complies with Federal Law Section 103 (effective Aug. 1, 2019) which ensures that Johns Hopkins University will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities, or the requirement that an eligible individual borrow additional funds, on any covered individual because of the individual's inability to meet their financial obligations to the institution due to the delayed disbursement funding from the VA under Chapter 31 or 33. Johns Hopkins University participates in the Principles of Excellence standards.

In order to prevent outstanding student accounts, Chapter 31 and 33 students are required to:

- Submit a COE or Statement of Benefits
- Complete the Third Party Payer VA certification request each semester
- Provide any additional information needed for certification

Contact the JHU Veterans Affairs office (https://registrar.jhu.edu/veterans/)to obtain information about veterans' benefits and enrollment procedures.

Standards of Progress

Continuation of VA payments depends on the student's meeting the university's academic standards for all students. The student must also meet any standards of progress which may be established by VA regulations.

Military TA

Johns Hopkins University is an approved University with the DOD MOU for use of Military TA. For guidance with utilizing Military tuition assistance please contact our team at veterans@jhu.edu .

If you are a veteran, active duty service member, or a military affiliated spouse/dependent, you may be eligible for education benefits offered by the Department of Veterans Affairs (https://www.va.gov/education/), including:

- Chapter 33: Post-9/11 GI Bill®
- Chapter 30: Montgomery GI Bill®
- Chapter 31: Vocational Rehabilitation & Employment
- Chapter 35: Dependents' Educational Assistance (DEA) Program
- Chapter 1606: Montgomery GI Bill®: Selected Reserve (MGIB-SR)

It is recommended that all veterans review the GI Bill® web site (https://benefits.va.gov/gibill/). For comprehensive VA Education Benefits counseling, or if you have questions pertaining to payment, availability of benefits, or approvals, please call the VA Education Call Center at 1-888-442-4551.

To request VA certification at JHU: Each semester please select Third Party Payer under your billing tab in the student system then select the VA chapter of benefits for the appropriate semester.

If you have questions about how your benefits will work at JHU, please contact our Veterans Affairs Office at veterans@jhu.edu or see information found on our Veterans Webpage (https://registrar.jhu.edu/veterans/).

GI Bill® is a registered trademark of the U.S. Department of Veterans Affairs (VA).

School Certifying Official for all schools: veterans@jhu.edu

School	Campus Location(s)	Full-Time Enrollment
Advanced Academic Programs	Baltimore: 3400 N. Charles Street Baltimore, MD 21218 Washington DC Center: 1717 Massachusetts Avenue, NW Washington, DC 20026	9 credits/semester
Bloomberg School of Public Health	615 N. Wolfe Street Baltimore, MD 21205	12 credits/semester
Carey Business School	Baltimore: 100 International Drive Baltimore, MD 21202 Washington, DC: 1625 Massachusetts Avenue, NW Washington, DC 20036	Fall and spring semesters: 8 credits/semester Summer semester: 4 credits/semester
Krieger School of Arts and Sciences	Homewood Campus 3400 N. Charles Street Baltimore, MD 21218	Undergraduate students: 12 credits/semester Graduate students: 9 credits/semester
Peabody Institute	1 East Mount Vernon Place Baltimore, MD 21202	Undergraduate students: 12 credits/semester Graduate students: 9 credits/semester Graduate Performance diploma (GPD): 4 credits/semester Artist Diploma: 4 credits/semester Doctoral students: 9 credits/semester DMA/DIP (degree in progress, doctoral): 1 credit/semester
School of Advanced International Studies	Washington, DC: 1740 Massachusetts Avenue, NW Washington, DC 20036 SAIS Europe: Via Beniamino Andreatta, 3 40126 Bologna Italy The Hopkins-Nanjing Center: 162 Shanghai Road Nanjing, Jiangsu Province 210008 People's Republic China	Graduate students: 12 credits/semester Global Policy students: 9 credits/semester
School of Education	2800 N. Charles St. Baltimore, MD 21218	Graduate students: 9 credits/semester
School of Medicine	733 North Broadway Edward D. Miller Research Building Baltimore, MD 21205-2196	Graduate students: 20 credits/fall and spring semesters; 8 credits/summer semester MD students: 18 credits/ fall and spring semesters; 12 credits/summer semester
School of Nursing	525 N. Wolfe Street Baltimore, MD 21205	Undergraduate/special students, and Master of Science Entry to Practice (graduate level): 12 credits/semester MSN (graduate level): 10 credits/semester Doctoral students: 9 credits/semester
Whiting School of Engineering	3400 N. Charles Street Baltimore, MD 21218-2608 Applied Physics Lab 11100 Johns Hopkins Rd. Laurel, MD 20723 University System of Maryland at Southern Maryland 44219 Airport Road Wildwood Technology Park California, MD 20619-2010	Undergraduate students: 12 credits/semester Graduate students: 9 credits/semester

Yellow Ribbon

Johns Hopkins University participates in the yellow ribbon program please click her (https://registrar.jhu.edu/veterans/yellow-ribbon-program/)e to see rates and number of awards for each school.

BLOOMBERG SCHOOL OF PUBLIC HEALTH

The Johns Hopkins Bloomberg School of Public Health (http://www.jhsph.edu) has a big vision: Protecting Health, Saving Lives—*Millions at a Time*.

Since its founding in 1916, the Bloomberg School has advanced research, education and practice to create solutions to public health problems around the world.

Faculty, staff and students have helped eradicate smallpox, made water safe to drink, improved child survival, reduced the spread of HIV and uncovered the dangers of tobacco smoke.

Researchers and scientists are now discovering ways to eliminate malaria, increase healthy behavior, reduce the toll of chronic disease, improve the health of mothers and infants, and change the biology of aging.

Every day, the Bloomberg School works to keep millions around the world safe from illness and injury by pioneering new research, deploying knowledge in the field and educating tomorrow's public health leaders. Learn more through the Bloomberg School's strategic plan (https://www.jhsph.edu/about/strategic-plan/).

Faculty (https://www.jhsph.edu/faculty/directory/list/)

Departments

Accreditation

Every seven years, the Johns Hopkins Bloomberg School of Public Health is evaluated by the Council on Education for Public Health (CEPH), the independent accrediting agency for U.S. Schools of Public Health.

As part of this evaluation, the school constructs a self-study that comprehensively describes the school's organization, governance, resources, faculty, students, curriculum, research, and services. The self-study is reviewed by an external committee who visits the school and meets with a variety of stakeholders including faculty, students, staff, alumni, and external community representatives. This committee makes a recommendation to the CEPH Board on whether the school should continue to be accredited.

In 2015, the CEPH Board voted to renew the accreditation of the School for another seven year term, ending in 2022. This has since been extended to December 2023. The School will conduct a self-study in 2022 and a CEPH accreditation site visit will be conducted before December 2023.

Our thanks are extended to Stephen Gange, James Yager, Karen Charron and Yelizaveta Kalashnikova-Luby for their dedication and hard work during the 2015 re-accreditation process.

The final self-study and accreditation reports are available upon request by email at academicaffairs@jhu.edu.

Doctoral Programs

Master's Programs

Dual Degrees

Certificate Programs

Courses

PH.700.600. Basics of Bioethics. 2 Credits.
Offers an introduction to fundamental issues and approaches in bioethics, provides an overview of the history of the field, and highlights the events that led to the birth and growth of bioethics. Introduces theoretical approaches to bioethics, public health policy, research ethics, ethics of genetics and science, and clinical ethics. Provides students with opportunities to gain from the experience of some of the most respected scholars in the field of bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.601. Foundations of Bioethics. 3 Credits.
Offers an introduction to central approaches and issues in bioethics. Includes a discussion of the history of the field and the issues that led to its birth and growth internationally. Introduces philosophical, empirical and non-empirical approaches to bioethics and core ethical issues in clinical care, public health, science and research. Provides a foundation for future study in bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.602. Hot Topics in Bioethics. 3 Credits.
Offers a continuation of the exploration of ethical theory and its use in bioethics begun in "Introduction to Ethical Theory". Utilizes the conceptual and methodological tools from "Ethical Theory" in analyzing topics and cases currently being discussed in bioethics. Although topics will change from year to year, common themes include: discussion of legal changes concerning end of life; the ethics of new reproductive technologies; ethical challenges concerning genome-editing technologies; and global ethical challenges such as climate change and resource allocation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.603. Introduction to Ethical Theory. 3 Credits.
Explores the relationship between philosophical ethical theory and the practical world of bioethics. In particular, examines the classical accounts of moral obligation and virtue in the context of a variety of contemporary bioethical problems. Further presents the distinction between individual bioethics and collective bioethics, with the goal of determining how the theoretical grounding for these fields differ. The motivating questions are both methodological and substantive: First, how does theory contribute to bioethical investigations? And second, does reflection on ethical theory tell us what to do concerning particular, bioethical problems?
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.604. Methods in Bioethics. 3 Credits.
This course introduces some of the main methods used in bioethics research, scholarship and practice, including philosophical, legal, historical, religious, qualitative, and quantitative research methods. The strengths and weaknesses of each method in addressing bioethical questions or problems will be described. Each method will be illustrated with contemporary topical examples. In addition, one cross-cutting example of an issue addressed by all methods will be discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.605. Critical Reasoning for Bioethics. 2 Credits.
Introduces critical thinking skills that are widely used in bioethics research and practice. Introduces argument mapping techniques and gives students practice extracting arguments from texts and mapping those arguments. Introduces students to common strengths and weaknesses of arguments and gives students practice in evaluating arguments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.606. Critical Reasoning for Bioethics II. 2 Credits.
This course builds on Critical Thinking in Bioethics Scholarship 1. It builds on student training in argument mapping, identifying common strengths and weaknesses of arguments and evaluating arguments, formulating good arguments and expressing them in text, and writing critical essays.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.621. Ethics in Clinical Practice: Fundamentals, Problems and Approaches. 3 Credits.
Offers students a) a theoretical and practical foundation for identifying and analyzing ethical issues arising in clinical medicine and b) a survey of important current issues and problems in clinical ethics with c) a focus on case analysis and application of principles to problems. Includes interactive content and case-based materials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.622. Bioethics, Human Rights, and Global Health. 3 Credits.
Explores the theoretical justifications of human rights and their relationship to the contemporary human rights movement based in positive law and how human rights are operationalized. Reviews theories of human rights, evolution of human rights as law, and common ground and tensions between bioethics and legal approaches to human rights. Illustrates how bioethics and human rights concepts apply to key public health issues of our time, particularly as they relate to problems of inequality and inequity. Discuss issues including access to essential medicines, women's health, disease surveillance and response to pandemics, and health claims of immigrants, refugees and prisoners.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.623. Ethics and Decision-Making in Clinical Practice. 3 Credits.
Acquaints students with the ethical dimensions of healthcare decision-making by individuals, including shared decision-making in patient-provider encounters; decision-making in the context of incomplete information, patient disadvantage, distress or conflict; the understanding and approach of providers and systems to the ethical dimensions of decision-making; and relevant social and economic constraints on such decision-making. Explores topics in multiple settings, populations and health conditions, with the goal of making learners aware of the ethical implications of healthcare decisions, both in everyday practice and from a policy perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.625. Bioethics and the Law. 3 Credits.
This course introduces students to the U.S. legal system and analyzes the relationship between law and bioethics. During the course, students will: (1) develop an understanding of the relevance of law for bioethics as a scholarly field and as a profession; (2) become familiar with legal structures, mechanisms, institutions, functions, and sources of law; (3) develop a critical appreciation of the complexity, flexibility, and evolution of law; and (4) develop a set of core legal skills applicable to bioethics scholarship and practice. Specific topic areas include legal duties of health care providers, end-of-life decisionmaking, ownership in body parts and informed consent, health inequities, assisted reproduction, and public health. No background in law is required to take this course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.630. Food Ethics. 3 Credits.
Introduces students to the primary ethical challenges in the global food system and explores ethical issues in the United States food system. Provides students with the opportunity to think critically about a variety of conflicting views about the ethics of animal agriculture, healthy eating efforts and decision-making about food. Uses theories and tools from practical ethics, political philosophy, and theories of justice to shed light on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.632. Ethics, Policy, and Emerging Biomedical Technologies. 3 Credits.
Examines the ethics and policy issues raised by emerging biomedical technologies, including stem cell science, genetics/genomics, neuroscience, and synthetic biology. Integrates primers on the relevant science with discussion of the ethics and policy issues raised by the design, conduct and integration of the science into research, clinical care and commerce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.641. Germs, Genes, Patients, and Populations. 3 Credits.
Explores past, present, and future ethical, legal, social and policy issues at the intersection of infectious disease and genomics. Due to the social nature of contagion, infectious disease challenges individualistic assumptions in bioethical models with public health dilemmas requiring attention to the relationships and interactions between hosts, vectors, pathogens, and environments. Focuses on the potential ethical, legal, and social implications of emerging genomic science and technology for infectious disease control. Each class focuses on a specific type of infectious disease highlighting different notions of disease causation and mode of transmission. Explores in three related contexts: research, clinical practice and public health. Addresses the enduring bioethical concerns about social responsibility, stigma, and the challenge of balancing individual interests and protections against risks of harms to others and to public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.642. Vulnerability in Childhood -- from Ethics to Advocacy. 3 Credits.
Introduces students to the concept of vulnerability from an interdisciplinary lens of ethics, philosophy, medicine, and public health. Discusses how special protections for vulnerable populations can impact research and clinical care at the individual and population level. Presents examples of vulnerable populations of children (eg. children with medical complexity, children in foster care, transgender youth) in order to illustrate relevant ethical challenges faced by vulnerable populations. Introduces students to written media (eg. op-ed, letter to the editor) as a tool to advocate for vulnerable children.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.643. Understanding Addiction: Philosophy, Science, Ethics. 3 Credits.
Employs an inter-disciplinary approach to understand the nature of addiction, drawing on philosophy, psychological science, and the perspectives of people who struggle with addiction. Provides an overview of competing models of addiction and evaluates their theoretical foundations and supporting evidence. Explores the heterogeneity of individual-level decision-making in addiction. Distinguishes different ideas of responsibility and how they intersect with addiction research and individual and societal responses to addiction, including drug criminalization. Provides students with the opportunity for in-depth reflection on conceptual and ethical issues surrounding addiction, developing analytic and argumentative skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.644. Justice Theory and Health. 3 Credits.
Explores how to make the world a better and more just place from the standpoint of human rights & justice theory. Topics include the distinctive role of justice and structural justice in moral thought, theoretical foundations for human rights, the relationship between human rights & justice, & the related concepts of fairness, power and disadvantage. Explores these topics in the particular context of the pandemic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.645. Fogarty Bioethics Fellows Seminar. 1 Credit.
Provides a small, interactive setting for discussion of research ethics, ethics committees, and ethics concepts among the trainees and between trainees and affiliated faculty. Divides sessions among the following activities: reviewing and critiquing journal articles related to research ethics; trainees' individual presentations on practicum research progress; guest speakers related to research ethics cases and/or concepts; and development and presentation of original case studies by each trainee. Includes topics standard of care, justice, inducements, research ethics committees, informed consent, and gender roles in research decisions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.663. Global Food Ethics and Policy. 2 Credits.
Examines global food systems and the policies that impact global food security, and broader aspects of sustainable development including public health, the environment and economies. Presents and critiques different food system policies that determine the availability, affordability, and nutritional quality of the food supply and influence the amount and combination of foods that people are willing and able to consume. Encourages use of critical thinking skills and debate to understand how policy and science interact with regard to food systems. Presents data, case studies and real-time challenges related to global food systems with an emphasis on the development of practical skills to analyze systems approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.665. Introduction to Ethics of U.S. and International Human Subject Research. 2 Credits.
Provides an introduction to the ethics of human subject research and allows participants to apply what they learn to case examples from the U.S. and international settings. Presents ethical principles and a framework for analysis. Reviews key U.S. and international regulations that guide the ethical conduct of research. Through lectures and moderated discussions, addresses a variety of issues including: informed consent for research participation; ethical aspects of study design; just selection of research subjects and duties of justice when working in resource poor settings; and the role and function of institutional review boards/ethics review committees. Uses case discussions to explore research in both domestic and international settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.667. Catastrophe Ethics: How to Respond to Public Health Disasters. 2 Credits.
Explores the ethics of responding to large, structural, public health disasters, or 'catastrophe ethics'. Investigates catastrophes with the following property: they are so large that no individual action or person can solve them; rather, they require coordination of large collectives. Focuses on climate change, the Covid-19 pandemic, and structural racism over the course of the week, asking two, overarching questions about each: what are we obligated to do in the face of such crises; and regardless of what we as a society do, what are we obligated to do in our private lives? Investigates the relationship between the structural and the individual answers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.702. THE ETHICS OF MAKING BABIES. 2 Credits.
Examines one of the most morally significant decisions people face: whether or not to create a new person. Explores our pronatal outlook—a positive moral outlook on the activity of making babies. Considers why it is uncomfortable, and perhaps even threatening, to suggest that procreation is an activity that is subject to a whole variety of moral requirements. Engages students in asking and beginning to answer the question, is it permissible to create a new child.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.801. Bioethics Program Thesis Seminar. 3 Credits.
Provides students with the basic research and organizational skills needed for successful completion of the MBE thesis. Addresses skills needed to conduct a literature review, choose an appropriate topic, and construct a rigorous argument.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.820. Bioethics Program Thesis Research. 1 - 6 Credits.
Provides an opportunity for students to actively conduct research in bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.830. Postdoctoral Research Berman Institute. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.840. Bioethics Program Independent Study. 2 Credits.
Provides students with a one-on-one independent study experience in which they independently review papers from the current literature and meet weekly with a departmental faculty member to discuss them. Offers opportunities for complementary activities which may include participating in related course discussions, seminars, conferences, etc. Culminates with the completion of a written document, typically a substantial paper.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.895. Bioethics Program Practicum. 3 Credits.
The MBE Practicum is a mentored, bioethics experience, which involves either field work with a practicing bioethicist, or applying one's bioethical training to a real-world environment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.896. Clinical Ethics Practicum I. 1 Credit.
Introduces common ethical challenges in patient care that arise in different clinical settings, and the systems in place to address them. Explores the perspectives of patients, families, trainees and practicing clinicians on complex ethical dilemmas in clinical care. Presents different methods of analyzing ethical dilemmas in the care of patients, and different styles of communicating about them with patients.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.601. Biochemistry II. 5 Credits.
Examines the major metabolic pathways that are central to eukaryotic cell growth and maintenance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.602. Concepts of Molecular Biology. 4 Credits.
Discusses synthesis of macromolecules, the genetic code, regulation of gene expression and gene function, and recent advances in biotechnology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.603. Molecular Biology of Pandemic Influenza. 3 Credits.
Explores how molecular biology is used to understand how specific respiratory viruses create pandemics. Begins with an analysis of the virus that caused the great public health catastrophe, the 1918 Spanish Influenza Pandemic and then examines more recent pandemic viruses, including SARS-Cov-2. Focuses on the use of molecular techniques in defining why specific mutations increase the virulence and pandemic potential of a virus, the pathological response of a host's immune system to a virulent virus and pathological interactions between two different respiratory pathogens. Emphasizes how molecular, pathophysiological and immunological studies may be used to predict a virus' pandemic potential. Reviews how governmental responses affect the spread of a disease with pandemic potential, including the response to SARS-CoV-2.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.604. Introduction to Molecular Biology. 3 Credits.
Molecular biology deals with how nucleic acids and proteins interact within the cell to promote proper growth, division, and development. This course will provide an overview of these processes, including DNA replication, repair, transcription, splicing, protein synthesis, and gene regulation in different organisms. We will also explore many biological tools that have been developed from molecular biology processes, such as DNA sequencing and gene editing (CRISPR-Cas9).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.605. Genome Integrity. 3 Credits.
Provides students with a broad base in fundamental principles of genome integrity. Examines connections between genome integrity, organism fitness, and human diseases and disorders. Addresses 1) Homologous recombination, (2) Non-homologous end joining, (3) Mismatch repair, (4) Transposable elements, (5) Topoisomerases, (6) Structural maintenance of chromosomes and (7) Chromosome segregation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.606. Cellular Stress in Physiology and Disease. 3 Credits.
Discuss molecular mechanisms through which eukaryotes maintain cellular homeostasis in response to stress. Stress response pathways are examined at the DNA, RNA, and protein levels; topics include stress and transcription, RNA processing, and protein quality control. Organelle-specific stress response, such as ER stress and mitochondrion stress responses, are also discussed. Additionally, molecular mechanisms of cellular responses to environmental stimuli, such as heat, hypoxic, oxidative, and starvation stressors, are examined.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.607. Premedical Seminars: Planning and Preparing for Medical School Application. 1 Credit.
Helps students prepare to apply to medical school. Covers specific topics to address the complex premedical journey, including planning the months/years leading up to the application, reviewing the application process, addressing the medical schools' expectations, medical school selection, writing the personal statement, requesting letters of evaluation, interviewing and more.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.608. Gene Editing, therapy and Manipulation. 3 Credits.
Introduces genes and genetics, and their role in the genetic basis of human health and disease. Explores the current status of gene editing and gene therapy technologies both in the context of therapeutics and as tools in the life sciences. A large focus of the class centers on the impact of CRISPR on these technologies. Discuss the ethical implications of these technologies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.610. Biochemistry I: Protein Structure and Enzyme Catalysis. 3 Credits.
Covers the physical and chemical properties of the amino acids, the various elements of protein structure, and the cooperative behavior of multimeric proteins. Explore the kinetics of enzyme-catalyzed reactions, and the active site mechanisms of representative classes of enzymes. Describes the molecular basis of action for selected enzyme inhibitor-based drugs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.613. Nucleic Acid Chemistry. 3 Credits.
Discusses nucleic acid structure, and also describes techniques for manipulating and analyzing nucleic acids, including gel electrophoresis, PCR, and DNA sequencing. Reviews methods used to synthesize nucleosides, nucleotides and oligonucleotides, and chemical reactions that lead to modifications of nucleic acids. Covers topics including DNA-drug interactions, antisense and antigene oligonucleotides, ribozymes and deoxyribozymes, DNA cages, DNA origami, DNA nanostructures, and DNA nanodevices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.616. Advanced Concepts in Biochemistry, Cell and Molecular Biology. 1 - 2 Credits.
Provides a platform for students, postdoctoral fellows and faculty to present and discuss scientific papers from the current literature that deal with mechanisms underlying disease along with accompanying methods. Explores additional aspects that are relevant to conducting and conveying laboratory research, including study design and statistical analysis, manuscript and grant review, policy and practice, and risk assessment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.620. Fundamentals of Reproductive Biology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.622. Molecular and Cellular Mechanisms of Reproduction. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.624. Cancer Biology. 3 Credits.
Explores some of the key molecular and cellular aspects of the biology of cancer. Includes topics: cancer genetics, DNA damage, and cell signaling pathways including RAS and Epidermal Growth Factor Receptors. Covers a select set of current research areas that aim to further the understanding and treatment of cancer. Emphasizes how these molecular mechanisms are regulated, contribute to oncogenesis, and can be targeted therapeutically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.625. Introduction to Cancer Biology. 3 Credits.
This Cancer Biology course will educate students on the principles of cancer biology, including the various genetic and molecular changes normal cells undergo during transformation into malignant cancer cells. To this end, this course will help students to gain an understanding of cellular and molecular mechanisms that go awry, thereby providing optimal conditions for cancer. We will explore the role of mutations in cancer cells, and how they lead to the dysregulation of essential biological properties like programmed cell death, cell proliferation and differentiation. We will also focus on the interface of cancer and medicine. Classical treatment methods will be compared with newer treatment strategies like targeted therapies. We will also explore the challenges associated with diagnosing cancers, as well as ways in which to prevent cancer.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.626. Principles of Cell Biology. 3 Credits.
Provides students with a basic understanding of the structure and functions of eukaryotic cells. Introduces students to new facts and vocabulary pertinent to cell biology, as well as experimental methods used by scientists to define and understand cell structure and functions. Highlights relationships between defects in basic cell functions and human diseases. Classroom time is divided into 8 formal lecture sessions, 3 less formal review/discussion/problem solving sessions, and 3 closed-book, in-class exams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.627. Stem Cells and the Biology of Aging and Disease. 3 Credits.
Exposes students to cutting-edge topics in stem cell biology through a combination of lectures and discussions based on primary literature. Topics include basic stem cell biology in a invertebrate and vertebrate systems, including germline, neural, and epithelial stem cells; the regulation of stem cells by physiology and aging; the connection between stem cells, telomerase, and cancer; and ethical issues pertaining to potential therapeutic applications of stem cells.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.630. Fellowship Grant Writing for Students and Postdoctoral Fellows in Biomedical Research. 2 Credits.
Provides students and postdoc trainees with an overview of the entire fellowship application process, including how to write an effective research proposal and specific aims, how to prepare a NIH style biosketch and how to formulate an effective personal biography. Discusses the peer review process, how fellowship applications are judged and scored. The students and postdocs will gather to form an in-class study section where trainees have the opportunity to review grants in the style of NIH study sections.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.644. BMB SCM Laboratory Rotations. 4 - 8 Credits.
All departmental ScM students spend one to three terms, respectively, participating in the research activities of departmental faculty's laboratories. Students select appropriate rotations in consultation with their academic advisor and the ScM Program Director. The objective is to provide the opportunity for interaction with several faculty members, so that a thesis laboratory may be identified. The course aims to broaden a student's knowledge of laboratory techniques and skills, expose the student to a variety of research areas and to develop the ability to carry out a research project.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.720. Applying Reproductive Biology Literacy Through Service-Learning. 3 Credits.
Builds from "Fundamentals of Reproductive Biology" in 1st term (120.620.01). In this service-learning course, students have the opportunity to extend beyond hypothetical applications of what they have learned, and apply their "reproductive biology literacy" to help in a professional, real-world setting. The service component of this course is for students to produce deliverable(s) of use/value for a community-based organization (CBO), to be complemented by in-class activities to absorb and learn from these experiences in working with the CBO.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.800. MPH Capstone: Biochemistry and Molecular Biology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.820. Thesis Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.821. MHS Student Research. 3 Credits.
Acquaints MHS students with basic research in the biomedical sciences through work under the guidance of a faculty member in the Department of Biochemistry and Molecular Biology, and provides an introduction to hands-on experience in laboratory research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.822. Seminars in Research in Biochemistry and Molecular Biology. 1 Credit.
Integrates academic training with current research in biochemistry and molecular biology and the implications of this research in addressing major public health concerns. Weekly presentations are held by researchers from JHU and other biomedical research institutions on the results of state of the art investigations conducted in their laboratories, emphasizing experimental design and methodology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.825. Advanced MHS Student Research. 5 Credits.
Builds upon existing basic research skills in biomedical sciences and emphasizes more independent hands-on research working under the guidance of a faculty member in the Department of Biochemistry and Molecular Biology or affiliated principle investigator. Provides further experience for future research pursuits at JHU and beyond.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.829. Summer Thesis Research. 12 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.830. Postdoctoral Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.840. Special Studies and Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.850. Biochemical Techniques. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.852. Core Research Literature. 1 - 2 Credits.
Provides a complement to the BCMB core curriculum. Student reads research papers relating to a core lecture topic. Discussions are led by a student while a faculty member from Biochemistry or MMI act as facilitator. Helps students to develop skills in reading the primary literature and provides an introduction to the experimental paradigms underlying the concepts presented in the core course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.853. Summer Biochemical Techniques. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.860. Thesis Preparation. 2 Credits.
Students engage in one-on-one independent study with a departmental faculty member who will be the student's thesis supervisor. Prepares students for completing the MHS using independent reading of papers from current literature, combined with meetings with the thesis supervisor to discuss the reading and how to recognize this research to develop the MHS thesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.861. Special Topics in Biochemistry: X-Ray Crystallography-A Hands on Workshop. 3 Credits.
Enables students to carry out all key steps to successfully solve and refine a protein crystal structure. Theoretical aspects are followed by application to various problem sets. Topics include tricks for data collection, data processing and collection. Touches upon all standard techniques such as molecular replacement, SAD phasing and MAD phasing, both in theory and then applied in practical context with previously collected data. Identification of unknown ligand densities and model refinement lead to the last part of preparing publication quality figures using PyMol.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.870. Thesis in Biochemistry and Molecular Biology. 5 Credits.
In consultation with a faculty mentor from the Department of Biochemistry and Molecular Biology, students prepare a critical, scholarly paper on an assigned subject.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.872. Special Studies-Current Topics in BMB. 1 Credit.
Introduces students to the faculty and to current research being conducted in their respective laboratories within the Department of Biochemistry and Molecular Biology and by other training faculty of the Cancer Biology Training Program. Informs doctoral students about research opportunities in each laboratory and allows them to make informed decisions about their choices for laboratory rotations during their first year. Similarly, informs current MHS students who are considering the ScM Program during the second year about potential research opportunities in laboratories of BMB faculty. Provides time for faculty presentation, student questions and further discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.895. MPH Practicum: Biochemistry and Molecular Biology. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.604. Introduction to R for Public Health Researchers. 2 Credits.
Provides "hands-on" training for analyzing data in the R statistical software package, a popular open-source solution for data analysis and visualization. Covers data input/output, data management and manipulation, and constructing useful and informative graphics. Geared towards individuals who have never used R or have a little familiarity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.605. Introduction to the SAS Statistical Package. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.606. Survival Analysis. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.607. Multilevel Models. 2 Credits.
Gives an overview of "multilevel statistical models" and their application in public health and biomedical research. Multilevel models are regression models in which the predictor and outcome variables can occur at multiple levels of aggregation: for example, at the personal, family, neighborhood, community and regional levels. They are used to ask questions about the influence of factors at different levels and about their interactions. Multilevel models also account for clustering of outcomes and measurement error in the predictor variables. Students focus on the main ideas and on examples of multi-level models from public health research. Students learn to formulate their substantive questions in terms of a multilevel model, to fit multilevel models using Stata during laboratory sessions and to interpret the results.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.608. Analysis of Longitudinal Data. 2 Credits.
Covers statistical models for drawing scientific inferences from longitudinal data. Topics include longitudinal study design; exploring longitudinal data; linear and generalized linear regression models for correlated data, including marginal, random effects, and transition models; and handling missing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.609. Improving Precision and Power in Randomized Trials by Leveraging Baseline Variables. 0.5 Credits.
Explains what covariate adjustment is, how it works, when it may be useful to apply, and how to implement it (in a preplanned way that is robust to model misspecification) for a variety of scenarios. Demonstrates the impact of covariate adjustment using trial data sets in multiple disease areas. Provides step-by-step, clear documentation of how to apply the software in each setting. Applies the software tools on the different datasets in small groups.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.611. Statistical Reasoning in Public Health I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.612. Statistical Reasoning in Public Health II. 3 Credits.
Provides a broad overview of biostatistical methods and concepts used in the public health sciences, emphasizing interpretation and concepts rather than calculations or mathematical details. Develops ability to read the scientific literature to critically evaluate study designs and methods of data analysis. Introduces basic concepts of statistical inference, including hypothesis testing, p-values, and confidence intervals. Includes topics: comparisons of means and proportions; the normal distribution; regression and correlation; confounding; concepts of study design, including randomization, sample size, and power considerations; logistic regression; and an overview of some methods in survival analysis. Draws examples of the use and abuse of statistical methods from the current biomedical literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.613. Data Analysis Workshop I. 2 Credits.
Emphasizes concepts and illustration of concepts applying a variety of analytic techniques to public health datasets in a computer laboratory using Stata statistical software. Learns basic methods of data organization/management and simple methods for data exploration, data editing, and graphical and tabular displays. Includes additional topics: comparison of means and proportions, simple linear regression and correlation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.614. Data Analysis Workshop II. 2 Credits.
Emphasizes concepts and illustration of concepts applying a variety of analytic techniques to public health datasets in a computer laboratory using Stata statistical software. Masters advanced methods of data analysis including analysis of variance, analysis of covariance, nonparametric methods for comparing groups, multiple linear regression, logistic regression, log-linear regression, and survival analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.615. Statistics for Laboratory Scientists I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.616. Statistics for Laboratory Scientists II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.620. Advanced Data Analysis Workshop. 2 Credits.
Covers methods for the organization, management, exploration, and statistical inference from data derived from multivariable regression models, including linear, logistic, Poisson and Cox regression models. Students apply these concepts to two or three public health data sets in a computer laboratory setting using STATA statistical software. Topics covered include generalized linear models, product-limit (Kaplan-Meier) estimation, Cox proportional hazards model.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.621. Statistical Methods in Public Health I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.622. Statistical Methods in Public Health II. 4 Credits.
Presents use of confidence intervals and and hypothesis tests to draw scientific statistical inferences from public health data. Introduces generalized linear models, including linear regression and logististic regression models. Develops unadjusted analyses and analyses adjusted for possible confounders. Outlines methods for model building, fitting and checking assumptions. Focuses on the accurate statement of the scientific question, appropriate choice of generalized linear model, and correct interpretation of the estimated regression coefficients and confidence intervals to address the question.
Prerequisite(s): Must also register for lab, PH.140.922.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.623. Statistical Methods in Public Health III. 4 Credits.
Prerequisite(s): Must also enroll for PH.140.923
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.624. Statistical Methods in Public Health IV. 4 Credits.
Builds on the concepts, methods, and computing (Stata, R) covered in Statistical Methods 1,2, and 3. Focuses on investigating scientific questions via data analysis and clearly communicating the methodology and results. Uses examples from the contemporary and public health literature and allows students the opportunity to work with their own data over the duration of the class.
Prerequisite(s): Must also enrol for a lab, PH.140.924.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.628. Data Science for Public Health I. 4 Credits.
Presents the basics of data science using the R programming language. Teaches basic unix, version control, graphing and plotting techniques, creating interactive graphics, web app development, reproducible research tools and practices, resampling based statistics and artificial intelligence via deep learning, focusing on practical implementation specifically tied to computational tools and core fundamentals necessary for practical implementation. Culminates with a web app development project chosen by student (who will come out of this course sequence well-equipped to tackle many of the data science problems that they will see in their research).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.629. Data Science for Public Health II. 4 Credits.
Presents the basics of data science using the R programming language. Teaches basic unix, version control, graphing and plotting techniques, creating interactive graphics, web app development, reproducible research tools and practices, resampling based statistics and artificial intelligence via deep learning, focusing on practical implementation specifically tied to computational tools and core fundamentals necessary for practical implementation. Culminates with a web app development project chosen by student (who will come out of this course sequence well-equipped to tackle many of the data science problems that they will see in their research).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.630. Introduction to Data Management. 3 Credits.
Introduces students to the principles and skills required to collect and manage research data in a public health setting. Focuses on tools for collecting data that range from spreadsheets to web-based systems, database fundamentals, data collection form design, data entry screen design, proper coding of data, strategies for quality control and data cleaning, protection and sharing of data, and integrating data from external sources. Includes practical and hands-on exercises that require some entry-level computer programming.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.631. The SAS Statistical Package: A Survey for Statisticians. 3 Credits.
Introduces students to the SAS statistical package using the SAS Studio interface. Using examples of public health data students learn to write programs to summarize data and to perform statistical analyses. Using the interactive matrix language introduces computation within a matrix environment and the development of modular programming techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.632. Introduction to the SAS Statistical Package. 3 Credits.
Introduces students with no experience with SAS. Familiarizes them with the skills needed for effective data management anddata analysis. Covers performing exploratory analysis on data including the creation of tables and graphs. Proceeds next to creating new datasets and altering old datasets. Covers building regression models (linear, logistic, and Poisson), interpreting results and criticizing such models, and attempting to improve them.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.633. Biostatistics in Medical Product Regulation. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.634. Non-Inferiority and Equivalence Clinical Trials. 2 Credits.
Presents the important differences between superiority trials and those intended to show either equivalent effect, or to show that one therapy is no worse than another (but might be better). Explores the problems of setting equivalence margins, preservation of some proportion of active control effect, and emphasizes the use of confidence intervals to interpret the results of studies. Discusses special issues of quality of the trial conduct, assay sensitivity, historical evidence of treatment effects and assumptions of constancy of treatment effects over time. Compares sample size requirements between superiority trials, equivalence trials and non-inferiority trials. Discusses the use of different analysis populations (ITT and per-protocol) and issues of changing conclusions between non-inferiority and superiority. Discusses the regulatory aspects of trial design and interpretation, and reviews existing regulatory guidance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.636. Scalable Computational Bioinformatics. 4 Credits.
Introduces the computational hardware and programming model upon which analysis tools and languages are based. Introduces and uses three main languages (Python, Perl, SQL) and their underlying rationale to develop computer science concepts such as data structures, algorithms, computational complexity, regular expressions, and knowledge representation. Draws examples and exercises from high-throughput sequence analysis, proteomics and modeling of biological systems. Reinforces key concepts through lectures with live computer demonstrations, weekly readings, and programming exercises. Has students working with a High Performance Compute Cluster and the Amazon cloud.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.638. Analysis of Biological Sequences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.640. Statistical Methods for Sample Surveys. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.641. Survival Analysis. 3 Credits.
Introduces fundamental concepts, theory and methods in survival analysis. Emphasizes statistical tools and model interpretations which are useful in medical follow-up studies and in general time-to-event studies. Includes hazard function, survival function, different types of censoring, Kaplan-Meier estimate, log-rank test and its generalization. For parametric inference, includes likelihood estimation and the exponential, Weibull, log-logistic and other relevant distributions. Discusses in detail statistical methods and theory for the proportional hazard models (Cox model), with extensions to time-dependent covariates. Includes clinical and epidemiological examples (through class presentations). Introduces basic concepts and methods for competing risks data, including the cause-specific hazard models and other models based of cumulative incidence function (CIF). Illustrates various statistical procedures (through homework assignments).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.642. Design of Clinical Experiments. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.643. Practice of Statistical Consulting. 3 Credits.
Emphasizes the understanding of, and practical experience in, the spectrum of non-technical aspects of statistical consulting, the art and science of applying statistics to real-world problems. Discusses the elements of a consultation, from defining the research problem to providing final products to the client, interpersonal communication, reproducible work, ethics and consulting in different environments. Develops students' consulting skills via lectures, role-play opportunities, consulting sessions, and actual research projects. Acquaints students with practical consulting experience through shadowing and leading the Biostatistics Center's clinics on Friday mornings. Provides opportunities to work directly with Johns Hopkins researchers to elicit information about the research question, and to provide a presentation and final report to researchers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.644. Statistical Machine Learning: Methods, Theory, and Applications. 4 Credits.
Introduces popular Machine Learning methods and emphasizes their practical usage for data analysis. Acquaints students with methods to evaluate statistical machine learning models defined in terms of algorithms or function approximations using basic coverage of their statistical and computational theoretical underpinnings. Topics covered include: regression and prediction, tree-based methods, overview of supervised learning theory, support vector machines, kernel methods, ensemble methods, clustering, visualization of large datasets and graphical models. Examples of method applications covered include cancer prognosis from microarray data, visualization and analysis of social network data, and graphical models for clinical decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.646. Essentials of Probability and Statistical Inference I: Probability. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.647. Essentials of Probability and Statistical Inference II: Statistical Inference. 4 Credits.
Introduces students to the theory of statistical inference. Includes the frequentist, Bayesian and likelihood approaches to statistical inference including estimation, testing hypotheses and interval estimation. Emphasizes rigorous analysis (including proofs), as well as interpretation of results and simulation for illustration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.648. Essentials of Probability and Statistical Inference III: Theory of Modern Statistical Methods. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.649. Essentials of Probability and Statistical Inference IV. 4 Credits.
Builds on the concepts discussed in 140.646, 140.647, 140.648 to provide the theory for modern statistical methods such as linear models, generalized linear models, random effects models, and marginal regression models. Also discusses the theory of causal inference. De-emphasizes proofs and replaces them with extended discussion of interpretation of results and simulation for illustration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.651. Methods in Biostatistics I. 4 Credits.
Presents fundamental concepts in applied probability, exploratory data analysis, and statistical inference, focusing on probability and analysis of one and two samples. Includes topics discrete and continuous probability models; expectation and variance; central limit theorem; inference, including hypothesis testing and confidence interval for means, proportions, and counts; maximum likelihood estimation; sample size determinations; elementary non-parametric methods; graphical displays; and data transformations. Introduces R and concepts are presented both from a theoretical, practical and computational perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.652. Methods in Biostatistics II. 4 Credits.
Presents fundamental concepts in applied probability, exploratory data analysis, and statistical inference, focusing on probability and analysis of one and two samples. Includes discrete and continuous probability models; expectation and variance; central limit theorem; inference, including hypothesis testing and confidence for means, proportions, and counts; maximum likelihood estimation; sample size determinations; elementary non-parametric methods; graphical displays; and data transformations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.653. Methods in Biostatistics III. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.654. Methods in Biostatistics IV. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.655. Analysis of Longitudinal Data. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.656. Multilevel Statistical Models in Public Health. 4 Credits.
Explores conceptual and formal approaches to the design, analysis, and interpretation of studies with a “multilevel” or “hierarchical” (clustered) data structure (e.g., individuals in families in communities). Develops skills to implement and interpret random effects, variance component models that reflect the multi-level structure for both predictor and outcome variables. Includes topics: building hierarchies; interpretation of population-average and level-specific summaries; estimation and inference based on variance components; shrinkage estimation; discussion of special topics including centering, use of contextual variables, ecological bias, sample size and missing data within multilevel models. Supports STATA and R software.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.658. Statistics for Psychosocial Research: Structural Models. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.664. Causal Inference in Medicine and Public Health I. 4 Credits.
Presents an overview of methods for estimating causal effects: how to answer the question of “What is the effect of A on B?” Includes discussion of randomized designs, but with more emphasis on alternative designs for when randomization is infeasible: matching methods, propensity scores, regression discontinuity, and instrumental variables. Methods are motivated by examples from the health sciences, particularly mental health and community or school-level interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.665. Causal Inference in Medicine and Public Health II. 3 Credits.
Presents principles, methods, and applications in drawing cause-effect inferences with a focus on the health sciences. Building on the basis of 140.664, emphasizes statistical theory and design and addresses complications and extensions, aiming at cultivating students’ research skills in this area. Includes: detailed role of design for causal inference; role of models and likelihood perspective for ignorable treatment assignment; estimation of noncollapsible causal effects; statistical theory of propensity scores; use of propensity scores for estimating effect modification and for comparing multiple treatments while addressing regression to the mean; theory and methods of evaluating longitudinal treatments, including the role of sequentially ignorable designs and propensity scores; likelihood theory for instrumental variables and principal stratification designs and methods to deal with treatment noncompliance, direct and indirect effects, and censoring by death.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.673. INTRODUCTION TO STATISTICAL THEORY I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.676. Biostatistical Analysis of Epidemiologic Data I: Basic Tools. 2 Credits.
Begins with a brief review of statistical estimation and probability distributions. Also included is an introduction to bootstrap methods of statistical estimation. Then, confidence intervals are explored in detail. The analysis of two of the most common and important biostatistical/epidemiological tools, namely 2 by 2 tables and 2 by k tables, follows. The roll of a variety of issues such as confounding variables, interaction, bias and independence, key elements in many statistical applications, are an additional focus of these discussions. Weighted averages are discussed particularly in the context of combining tables and estimates.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.677. Biostatistical Analysis of Epidemiologic Data II: Logistic Regression Analysis. 2 Credits.
Presents applications of regression techniques , starting with a review of simple linear regression, as a foundation. Followed by application to non-linear data using more general regression techniques. Then, a complete and extensive description of log-linear regression analysis (also called Poisson regression) and how it works, particularly for the application to count data and tables. Also included is the concept of quasi-independence and the analysis of incomplete tables. Logistic regression techniques are similarly described in detail with emphasis on application to epidemiologic binary outcome data in several contexts. All regression techniques are illustrated with applied examples.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.678. Biostatistics Analysis of Epidemiologic Data III. 2 Credits.
Discusses elementary survival analysis biostatistical tools such as the nonparametric techniques, life tables, Kaplan/Meire survival probabilities and cox regression. Equally, parametric approaches based on exponential and Weibull probability distributions are similarly discussed. Presents six statistical tools often useful in specific situations but rarely found in introductory texts. Two examples are the capture/recapture methods for estimating population sizes, both human and animal populations, and random response survey techniques that guarantee complete confidentially.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.686. Advanced Methods for Statistical Genetics and Genomics. 3 Credits.
Covers statistical methods and theory underlying advanced analysis of genetic and genomic data to address mechanistic hypotheses and to build models for prediction. Topics include methods for complex association testing, inference on genetic architecture using mixed model techniques, methods for understanding causal mechanisms using Mendelian randomization, and integrative genomic analysis and strategies for clinical translation using risk prediction models. Requires making presentations and critiquing published studies that have used advance statistical methods to make new scientific observations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.688. Statistics For Genomics. 3 Credits.
Covers the basics of R software and the key capabilities of the Bioconductor project (a widely used open source and open development software project for the analysis and comprehension of data arising from high-throughput experimentation in genomics and molecular biology and rooted in the open source statistical computing environment R), including importation and preprocessing of high-throughput data from microarrays and other platforms. Also introduces statistical concepts and tools necessary to interpret and critically evaluate the bioinformatics and computational biology literature. Includes an overview of of preprocessing and normalization, statistical inference, multiple comparison corrections, Bayesian Inference in the context of multiple comparisons, clustering, and classification/machine learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.689. Adaptive Enrichment Designs for Confirmatory Randomized Trials: Methods and Software. 1 Credit.
Provides an overview of the strengths and limitations of randomized trial designs that adaptively change enrollment criteria during a trial (adaptive enrichment designs) and have the potential to provide improved information about which subpopulations benefit from new treatments. Explains recent advances in statistical methods for these designs, and presents adaptive design software planning tools. Discusses FDA guidance documents on adaptive designs. Examines methods for improving precision of estimators of the average treatment effect, by leveraging information in baseline variables; these methods can be used in adaptive designs as well as standard (non-adaptive) trial designs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.698. Spatial Analysis III: Spatial Statistics. 4 Credits.
Introduces statistical techniques used to model, analyze, and interpret public health related spatial data. Analysis of spatially dependent data is cast into a general framework based on regression methodology. Topics covered include the geostatistical techniques of kriging and variogram analysis and point process methods for spatial case control and area-level analysis. Although the focus is on statistical modeling, students will also cover topics related to clustering and cluster detection of disease events. Although helpful, knowledge of specific GIS software is not required. Instruction in the public domain statistical package R/RStudio, (to be used for analysis), is provided.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.699. Spatial Analysis IV: Spatial Design and Application. 3 Credits.
Expands students' abilities to design, conduct and report the results of a complete public health related spatial analysis. Focuses on further developing and integrating components of the spatial science paradigm, Spatial Data, GIS and Spatial Statistics. Introduces relevant topics in GIS, spatial data technologies and spatial statistics not previously covered in Spatial Analysis I-III.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.711. Advanced Data Science I. 3 Credits.
In this course, we will focus on hands-on data analyses with a main objective of solving real-world problems. We will teach the necessary skills to gather, manage and analyze data using the R programming language. We will cover an introduction to data wrangling, exploratory data analysis, statistical inference and modeling, machine learning, and high-dimensional data analysis. We will also learn the necessary skills to develop data products including reproducible reports that can be used to effectively communicate results from data analyses. Students will train to become data scientists capable of both applied data analysis and critical evaluation of the next generation next generation of statistical methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.712. Advanced Data Science II. 3 Credits.
Builds on Advanced Data Science I by introducing the idea of data products and encouraging students to build products based on their data analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.721. Probability Theory I. 3 Credits.
Presents the first part of the classical results of probability theory: measure spaces, LP spaces, probability measures, distributions, random variables, integration, and convergence theorems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.722. Probability Theory II. 3 Credits.
Presents the first part of the classical results of probability theory: independence, types of convergence, laws of large numbers, Borel-Cantelli lemmas, Kolmogorov's zero-one law, random series and rates of convergence. Also discusses characteristic functions and weak convergence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.723. Probability Theory III. 3 Credits.
Presents the second part of the classical results of probability theory: central limit theorems, Poisson convergence, coupling, Stein-Chen method, densities, derivatives and conditional expectations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.724. Probability Theory IV. 3 Credits.
Covers basic stochastic processes including martingales and Markov chains, followed by consideration of Markov Chain Monte Carlo (MCMC) methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.731. Statistical Theory I. 4 Credits.
Introduces probability and inference, including random variables; probability distributions; transformations and sums of random variables; expectations, variances, and moments; properties of random samples; and hypothesis testing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.732. Statistical Theory II. 4 Credits.
Introduces modern statistical theory; sets principles of inference based on decision theory and likelihood (evidence) theory; derives the likelihood function based on design and model assumptions; derives the complete class theorem between Bayes and admissible estimators; derives minimal sufficient statistics as a necessary and sufficient reduction of data for accurate inference in parametric models; derives the minimal sufficient statistics in exponential families; introduces maximum likelihood and unbiased estimators; defines information and derives the Cramer-Rao variance bounds in parametric models; introduces empirical Bayes (shrinkage) estimators and compares to maximum likelihood in small-sample problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.733. Statistical Theory III. 4 Credits.
Derives the large sample distribution of the maximum likelihood estimator under standard regularity conditions; develops the delta method and the large sample distribution of functions of consistent estimators, including moment estimators; introduces the theory of estimation in semiparametric regression models based on increasing approximation of parametric models; develops likelihood intervals and confidence intervals with exact or approximate properties; develops hypothesis tests through decision theory.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.734. Statistical Theory IV. 4 Credits.
Focuses on the asymptotic behavior of estimators, tests, and confidence interval procedures. Specific topics include: M-estimators; consistency and asymptotic normality of estimators; influence functions; large-sample tests and confidence regions; nonparametric bootstrap
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.741. Advanced Survival Analysis. 3 Credits.
Introduces statistical models and methods useful for analyzing univariate and multivariate failure time data. Extends Survival Analysis I to topics on length-bias and prevalent samplings, martingale theory, multivariate survival data, time-dependent ROC analysis, and recurrent event processes. Emphasizes nonparametric and semiparametric approaches for modeling, estimation and inferential results. Clinical and epidemiological examples included in class presentation illustrate statistical procedures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.742. Risk Prediction and Precision Medicine. 3 Credits.
Covers various topics for evaluating the performance of biomarkers to predict risk of clinical or disease outcome, specifically including: a. relative, absolute and competing risks for binary and time-to-disease outcomes; b. ROC/AUC biomarker inference with binary outcome; c. ROC/AUC biomarker inference with time-to-event outcome, with censoring and truncation; d. statistical methods and inference for case-control study designs; e. a few topics on precision medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.751. Advanced Methods in Biostatistics I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.752. Advanced Methods in Biostatistics II. 4 Credits.
Surveys basic statistical inference, estimates, tests and confidence intervals, and exploratory data analysis. Reviews probability distributions and likelihoods, independence and exchangeability, and modes of inference and inferential goals including minimizing MSE. Reviews linear algebra, develops the least squares approach to linear models through projections, and discusses connections with maximum likelihood. Covers linear, least squares regression, transforms, diagnostics, residual analysis, leverage and influence, model selection for estimation and predictive goals, departures from assumptions, efficiency and robustness, large sample theory, linear estimability, the Gauss Markov theorem, distribution theory under normality assumptions, and testing a linear hypothesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.753. Advanced Methods in Biostatistics III. 4 Credits.
Introduces generalized linear model (GLM). Foundational topics include: contingency tables, logistic regression for binary and binomial data, models for polytomous data, Poisson log-linear model for count data, and GLM for exponential family. Introduces methods for model fitting, diagnosis, interpretation and inference and expands on those topics with techniques for handling overdispersion, quasi-likelihood and conditional likelihood. Introduces the role of quantitative methods and sciences in public health, including how to use them to describe and assess population health, and the critical importance of evidence in advancing public health knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.754. Advanced Methods in Biostatistics IV. 4 Credits.
Extends topics in 140.753 to encompass generalized linear mixed effects models. Introduces expectation-maximization and Markov Chain Monte Carlo. Introduces functional data analysis. Foundational topics include: linear mixed model, generalized linear mixed model, EM, MCMC, models for longitudinal data, and functional data analysis. Emphasizes both rigorous methodological development and practical data analytic strategies. Discusses the role of quantitative methods and sciences in public health, including how to use them to describe and assess population health, and the critical importance of evidence in advancing public health knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.762. Bayesian Methods I. 3 Credits.
Illustrates current approaches to Bayesian modeling and computation in statistics. Describes simple familiar models, such as those based on normal and binomial distributions, to illustrate concepts such as conjugate and noninformative prior distributions. Discusses aspects of modern Bayesian computational methods, including Markov Chain Monte Carlo methods (Gibbs' sampler) and their implementation and monitoring. Bayesian Methods I is the first term of a two term sequence. The second term offering, Bayesian Methods II (140.763), develops models of increasing complexity, including linear regression, generalized linear mixed effects, and hierarchical models.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.763. Bayesian Methods II. 3 Credits.
Builds upon the foundation laid in Bayesian Methods I (140.762). Discusses further current approaches to Bayesian modeling and computation in statistics. Describes and develops models of increasing complexity, including linear regression, generalized linear mixed effects, and hierarchical models. Acquaints students to advanced tools for fitting Bayesian models, including non-conjugate prior models. Includes examples of real statistical analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.771. Advanced Statistical Theory I. 4 Credits.
Examines statistics as a discipline along the path towards making decisions. First examines the justification of statistics from axioms on informed preferences and its close connection to Bayesian theory, and then examines the role of standardizing intermediate steps, through various additional restrictions on estimation, and studies the properties of the resulting methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.772. Advanced Statistical Theory. 4 Credits.
Examines statistics as a discipline along the path towards making decisions. First examines the justification of statistics from axioms on informed preferences and its close connection to Bayesian theory, and then examines the role of standardizing intermediate steps, through various additional restrictions on estimation, and studies the properties of the resulting methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.773. Foundations of Statistical Inference. 4 Credits.
Investigates the foundations of statistics as applied to assessing the evidence provided by an observed set of data. Topics include: law of likelihood, the likelihood principle, evidence and the likelihood paradigm for statistical inference; failure of the Neyman-Pearson and Fisherian theories to evaluate evidence; marginal, conditional, profile and other likelihoods; and applications to common problems of inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.774. Foundations of Statistics II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.776. Statistical Computing. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.778. Advanced Statistical Computing. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.800. MPH Capstone Biostatistics. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.820. Thesis Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.830. Postdoctoral Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.840. Special Studies and Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.850. Advanced Special Topics in Biostatistics. 1 - 22 Credits.
Exposes Biostatistics PhD students to advanced special topics that are not covered in the core courses. Comprises two- and four-week modules, with revolving instructors and topics. Possible topics include: theory underlying analysis for correlated data; latent variable modeling; advanced survival analysis; image analysis; time series; and likelihood inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.860. Current Topics in Biostatistics Research. 1 Credit.
Features presentations by Biostatistics faculty, postdocs and senior students on their research, with a focus on the public health and scientific questions driving the work, why the research makes a difference for the subject area and how to translate the research into practice. Offers an opportunity for discussion and clarification of key Biostatistical concepts being taught in the core courses and how they apply to problems in public health and science. Provides an opportunity for students and faculty to come together and discuss novel research questions and the role that Biostatisticians have in helping to support, enrich and promote solutions to these novel research questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.895. MPH Practicum: Biostatistics. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.921. Biostats Lab for 140.621.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.922. Lab for Biostats 140.622.
Prerequisite(s): Lab for PH.140.622
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.923. Lab for Biostats PH.140.623.
Prerequisite(s): Must also enroll for PH.140.623
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.924. Lab for Biostatatistics 140.624.
Prerequisite(s): Must also enrol for PH.140.624
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.936. Lab - Scalable Computational Bioinformatics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.941. Biostats Lab for 140.641.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.955. Lab for Biostat 140.655.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.958. Biostats Lab for 140.658.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.998. Lab for PH.140.698.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.631. Principles of Drug Development. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.673. Ethical and Regulatory Issues in Clinical Research. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.675. Outcomes and Effectiveness Research. 3 Credits.
Provides an overview of outcomes and effectiveness research. Emphasizes conceptual, design, and analytical aspects of research including policy implications. Covers both experimental (randomized) and observational designs. Addresses spectrum of outcomes and effectiveness research. Includes topics: qualitative research, cost-effectiveness and adaptive trial design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.677. Database Design and Implementation in Clinical Research. 2 Credits.
Presents basic concepts of relational database design for clinical and basic research. Includes development of data collection forms, building databases for both “classic” and “longitudinal” projects using REDCap, data quality control, and data security.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.678. Introduction to Quality Improvement & Knowledge Translation Research. 3 Credits.
Introduces basic principles of quality improvement/knowledge translation (QI/KT) research. Focuses on efforts aimed at increasing the extent to which patients receive evidence-based therapies. Discusses the concepts, methods, and applications of QI/KT theory and explores real-world QI/KT projects. Outlines the development of a research proposal for a specific QI/KT topic. Critically appraises a published guideline. Systematically reviews literature around a QI/KT topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.703. Presentation Skills. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.710. Biomedical Writing I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.711. Biomedical Writing II. 2 Credits.
Introduces the process of writing peer-reviewed research papers and provides a brief overview of grant proposal writing. Emphasizes a logical organization, clear writing, and an understanding of readers’ and reviewers’ expectations. Prepares selected sections of a first draft of a research paper based on their own research, and they receive feedback on their drafts through in-class discussion and written comments from the instructor.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.721. Principles of Grant Writing I. 2 Credits.
Considers the principles of successful clinical research strategies and the requirements of funding agencies. Identifies a defined research project together with a suitable team of mentors and collaborators. Develops a written research proposal in the format of a grant application which integrates the scientific principles of the GTPCI curriculum.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.722. Principles of Grant Writing II. 4 Credits.
Considers the principles of successful clinical research strategies and the requirements of funding agencies. Identifies a defined research project together with a suitable team of mentors and collaborators. Develops a written research proposal in the format of a grant application which integrates the scientific principles of the GTPCI curriculum.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.750. Introduction to Clinical Research. 2 Credits.
Provides an intensive introduction to clinical research methods, emphasizing epidemiological & biostatistical methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.751. Seminars in Clinical Investigation. 2 Credits.
Explores topics related to clinical investigation presented by faculty experts from within and outside of Johns Hopkins. Addresses issues related to biomeasurement, the design of randomized clinical trials, challenges with observational cohort studies, studies focusing on special populations (pediatric age group, pregnant subjects, international studies), and research fraud.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.801. Professional Goals and Objectives. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.820. Thesis Research in Clinical Investigation. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.840. Special Studies and Research in Clinical Investigation. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.855. Research Forum. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

EN.570.108. Introduction to Environmental Engineering and Design. 3 Credits.
Overview of environmental engineering including water/air quality issues, water supply/ wastewater treatment, hazardous/solid waste management, pollution prevention, global environmental issues, public health considerations/environmental laws, regulations and ethics.Cross-listed with Public Health Studies.

EN.570.110. Introduction to Engineering for Sustainable Development. 3 Credits.

EN.570.201. Environmental Biology and Ecology. 3 Credits.
This course will cover basic topics in environmental biology and ecology for environmental engineering majors. The course will begin by describing the basic building blocks of life, cells and cellular components, which are common to all living things. We will then investigate factors that promote multicellularity, plant and animal physiology, and ecological principles that determine the distribution and function of organisms in the ecosystem.

EN.570.222. Environment and Society. 3 Credits.
Humans make their living in the environment. How we do that changes nature and changes us. This class explores human impacts on the environment, how we have thought about our relationship to nature over the millennia, and contemporary environmental discourses.

EN.570.239. Environmental Engineering Chemistry - Current and Emerging Topics. 3 Credits.
Students will utilize their chemistry knowledge to understand contemporary environmental issues in various media. Lectures will discuss the chemical phenomena leading to and resulting from air and water pollution issues. Climate change impacts to air and water chemistry will also be covered.

EN.570.303. Environmental Engineering Principles and Applications. 3 Credits.
Fundamentals and applications of physical, chemical, and biological processes in the natural environment and engineered systems. The first part of this class will cover material balances, chemical equilibrium, chemical kinetics, vapor pressure, dissolution, sorption, acid-base reactions, transport phenomena, reactor design, and water quality. The second part of this class focuses on the principles and design of water and wastewater treatment processes, such as coagulation, sedimentation, filtration, biological treatment processes, and disinfection.

EN.570.304. Environmental Engineering Laboratory. 3 Credits.
Introduction to laboratory measurements relevant to water supply and wastewater discharge, including pH and alkalinity, inorganic and organic contaminants in water, reactor analysis, bench testing for water treatment, and measurement and control of disinfection by-products.
Recommended Course Background: EN.570.210 or Instructor Permission.
Prerequisite: EN.570.303.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.303

EN.570.305. Environmental Health and Engineering Systems Design. 4 Credits.
Techniques from systems analysis applied to environmental engineering design and management problems: reservoir management, power plant siting, nuclear waste management, air pollution control, and transportation planning. Design projects are required.

EN.570.320. Case Studies in Climate Change - A Field Course. 2 Credits.
In this interdisciplinary seminar class, we will discuss past, present, and future climate change. We will do so through several case studies on California; Eastern California is a hub of research on past climate change, and arguably few states are being more heavily impacted by current climate change than California. Throughout the first half of the course, we will learn how climate has changed in the past, the magnitude of those changes, the possible causes, and the physical and ecological impacts of past climate change. In the second half of the course, we will contrast past climate change with the impacts and severity of contemporary climate change. We will explore how climate change is stressing water resources, air quality, and ecological resilience across California, and we will critically evaluate how the state's recent policy initiatives are ameliorating (or exacerbating) these stresses.? This course has a 2-credit co-requisite in the spring semester where we will travel to Eastern California for a week-long field trip. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite spring field trip.

EN.570.321. Case Studies in Climate Change - A Field Course. 2 Credits.
This is the 2 credit co-requisite course for EN.570.320 Case Studies in Climate Change offered in fall. In this course we will travel to Eastern California for a week-long field trip to explore how climate change is stressing water resources, air quality, and ecological resilience across California. We will critically evaluate how the state's recent policy initiatives are ameliorating (or exacerbating) these stresses. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite.
EN.570.320

EN.570.334. Engineering Microeconomics. 3 Credits.
The course introduces the principles of microeconomics and engineering economics, and applications of those principles to environmental engineering and public policy analysis. The financial and economic implications of engineering designs and control policies are critical to their success. We introduce principles of engineering economics and microeconomics (demand and production theory) and their uses in engineering decision making.

EN.570.349. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced.
EN.570.303

EN.570.350. Environmental Hazards and Health Risks. 3 Credits.
This course explores the concepts, assessment, and control of exposure to biological, physical and chemical hazards in the environment, the risk of adverse health outcomes resulting from such exposures, and the relationship between the exposures and health outcomes. These are placed in the context of the multi-disciplinary scientific field of environmental health as an essential component of the wider field of public health. The course is comprised of lectures, examples, group discussions, and group presentations. The proposed course will fill a gap in content and skill development in the issues and techniques relating to human health risk assessment. This course is targeted toward undergraduates who may not have had any exposure to environmental health science, and provides an introduction to environmental health using the framework of health risk assessment. The course first introduces the concepts of exposure to environmental hazards and biological dose, routes of exposure, statistical characterization of exposure variability in populations, and monitoring networks. The next set of concepts relate to hazard characterization, i.e., adverse health outcomes resulting from such exposures using a variety of types of data including in vitro and in vivo studies, and human epidemiological studies and their strengths and weaknesses. The next segment will deal with the quantitative characterization of the relationship between exposure/dose and the adverse health outcomes, i.e., the dose-response relationships, the metrics used for this, and quantitatively characterizing the health risks of a population. The course will introduce students to several tools including mathematical modeling of exposures and risk, and uncertainty analysis.
(AS.171.101) AND (AS.030.101 AND AS.030.102) AND (AS.110.108 AND AS.110.109)

EN.570.351. Introduction to Fluid Mechanics. 3 Credits.
Introduction to the use of the principles of continuity, momentum, and energy to fluid motion. Topics include hydrostatics, ideal-fluid flow, laminar flow, turbulent flow. Recommended Course Background: Statics, Dynamics, and AS.110.302
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.353. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.406. Environmental History. 3 Credits.
Environmental history explores the interactions between social change and environmental transformation, or the ways in which societies modify landscapes and are themselves affected by geological, climatological and changing ecological conditions. Topics include the relationship between climate change and human evolution, the environmental impacts of market-based commodity production and regional economic specialization; the relationship between urbanization and environmental change; how warfare affects and is affected by environmental conditions.
Area: Writing Intensive

EN.570.411. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.412. Landscape Hydrology and Watershed Analysis. 3 Credits.
The purpose of this class is to understand the landscape-scale controls on the fluxes of water and waterborne materials through watersheds. This class differs from the Hydrology and Hydrologic Modeling classes in its focus on data analysis, and its embrace of the complexity of real landscapes. There will be significant quantitative components to the material taught, but emphasis will be on developing a greater sense of the way that landscapes “function”, and how this function is related to real-world issues of water resources and pollution. Students will gain an understanding of how climate, geologic and ecologic setting, and human impacts control the partitioning of water between different fates, the flowpaths through the landscape and the storage and residence time of water. They will also learn conceptual and practical tools for analyzing hydrologic and other landscape data, and integrating this data in a holistic approach to watershed analysis. The class will be of interest for students intending to go into watershed or landscape management, and anyone wishing to pursue research in hydrology, geomorphology or ecology at landscape and watershed scales. The class will include at least one field trip to an instrumented watershed. GIS skills will be an advantage but are not required.

EN.570.415. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.615.

EN.570.416. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machine learning, to explore data sets, explain phenomena and build predictive models. The course begins with an overview of some traditional analysis approaches including ordinary least squares regression and related topics, notably diagnostic testing, detection of outliers and methods to impute missing data. More recent developments are presented, including ridge regression. Generalized linear models follow, emphasizing logistic regression and including models for polytomous data. Variable subsetting is addressed through stepwise procedures and the LASSO. Supervised machine learning topics include the basic concepts of boosting and bagging and several techniques: Decision Trees, Classification and Regression Trees, Random Forests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and Neural Networks. Unsupervised machine learning approaches are addressed through applications using k-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods for assessing model predictive performance are introduced including Confusion Matrices, k-fold Cross-Validation and Receiver Operating Characteristic Curves. Public health and environmental applications are emphasized, with modeling techniques and analysis tools implemented in R.

EN.570.419. Environmental Engineering Design I. 2 Credits.
Through general lectures and case study examples, this course will expose students to some of the non-technical professional issues that they will face as professional engineers and in their second-semester senior design project.

EN.570.420. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth’s surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed. This course meets with EN.570.657, Air Pollution.

EN.570.421. Environmental Engineering Design II. 3 Credits.
Engineering design process from problem definition to final design. Team projects include written/oral presentations. Students will form small teams that work with local companies or government agencies in executing the project. Recommended Course Background: EN.570.303, EN.570.352, and EN.570.419
EN.570.419

EN.570.422. Resilience of Ecological Systems. 3 Credits.
The ability of ecosystems to recover from natural events and human actions is increasingly being threatened by climate change. This course is a study of ecosystems using mathematical models, with a particular focus on quantifying their resilience. We will model a number of ecosystems, including rainforests, lakes, temperate forests, savannas, and grasslands. We will analyze ecological phenomena that impact public health and commerce. These include lake eutrophication and anoxia, forest fires, and insect outbreaks. We will study whole-earth mathematical models, biodiversity, and models to study the spread and control of pandemics. New this semester will be game theory applications, urban ecosystems and environmental justice. In all cases, potential pro-active and reactive management and control approaches will be evaluated. Mathematical techniques will be introduced and developed in a context-sensitive manner. Undergraduate and graduate students are welcome to enroll. Recommended course background (i.e. potentially useful but not required): EN.553.291 or AS.110.302, or equivalent.

EN.570.426. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes.
EN.570.351 or Equivalent

EN.570.428. Problems in Applied Economics. 3 Credits.
This course focuses on a monetary approach to national income determination and the balance of payments. Money and banking, as well as commodity and financial markets, are dealt with under both central banking, as well as alternative monetary regimes. Particular emphasis is placed on currency board systems. Students learn how to properly conduct substantive economic research, utilizing primary data sources, statistical techniques and lessons from economic history. Findings are presented in the form of either memoranda or working papers of publishable quality. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND AS.180.101 AND AS.180.102

EN.570.429. Methods in Microbial Community Analysis. 3 Credits.
This course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions. Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Open to undergraduates. Co-listed with EN.570.619

EN.570.441. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals.Co-listed with EN.570.641

EN.570.442. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles.
AS.030.101 AND AS.030.102. Course in organic chemistry preferred.

EN.570.443. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.643 (Aquatic and Biofluid Chemistry).

EN.570.445. Physical and Chemical Processes I. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).
EN.570.303 or permission of instructor.

EN.570.446. Biological Process of Wastewater Treatment. 3 Credits.
Fundamentals and application of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater. Recommended Course Background: EN.570.411

EN.570.448. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes. Recommended Course Background: EN.570.445 or Permission Required.

EN.570.449. Social Theory for Engineers. 3 Credits.
Engineers work in a social context. This course addresses a number of questions about that social context. How should we understand how societies come about, how they evolve,and why the rules of the game are what they are? What is the relationship between the individual and society, what does it mean to be 'modern,' are there different forms of rationality? How might all this impinge on what it means to be an engineer?
Area: Writing Intensive

EN.570.451. Environmental Dispersion and Transport. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.452. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences.Co-listed with EN.570.652
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.443

EN.570.454. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.470. Applied Economics & Finance. 3 Credits.
This course focuses on company valuations, using a Probabilistic Discounted Cash Flow Model. Students use the model and primary data from financial statements filed with the Securities and Exchange Commission to calculate the value of publically-traded companies. Using Monte Carlo simulations, students also generate forecast scenarios, project likely share-price ranges and assess potential gains/losses. Stress is placed on using these simulations to diagnose the subjective market expectations contained in current objective market prices, and the robustness of these expectations. During the weekly seminar, students company valuations are reviewed and critiqued. A heavy emphasis is placed on research and writing. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND (EN.570.428 OR AS.360.528)

EN.570.490. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.491. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment. Co-listed with EN.570.691

EN.570.492. Wolman Seminar - Undergraduates. 1 Credit.
Undergraduates only with permission of instructor.

EN.570.496. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.497. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.501. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.502. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.504. Financial Market Research. 3 Credits.
This course investigates the workings of financial, foreign exchange, and commodity futures markets. Research is focused on price behavior, speculation, and hedging in these markets. Extensive research and writing of publishable quality are required. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. An approved research proposal is a pre-requisite.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.505. Undergraduate Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.590. Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.597. Undergraduate Research-Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.607. Energy Policy and Planning Models. 3 Credits.
Methods for optimizing operation and design of energy systems and for analyzing market impacts of energy and environmental policies are reviewed, emphasizing both theory and solution of actual models. Review of linear and nonlinear programming and complementarity methods for market simulation. Recommended Course Background: EN.570.493 and EN.570.495 or equivalent.

EN.570.610. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.615. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.415

EN.570.616. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machinelearning, to explore data sets, explain phenomena and build predictive models. The coursebegins with an overview of some traditional analysis approaches including ordinary leastsquares regression and related topics, notably diagnostic testing, detection of outliers andmethods to impute missing data. More recent developments are presented, including ridgeregression. Generalized linear models follow, emphasizing logistic regression and includingmodels for polytomous data. Variable subsetting is addressed through stepwise procedures andthe LASSO. Supervised machine learning topics include the basic concepts of boosting andbagging and several techniques: Decision Trees, Classification and Regression Trees, RandomForests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and NeuralNetworks. Unsupervised machine learning approaches are addressed through applications usingk-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods forassessing model predictive performance are introduced including Confusion Matrices, k-foldCross-Validation and Receiver Operating Characteristic Curves. Public health andenvironmental applications are emphasized, with modeling techniques and analysis toolsimplemented in R. EN.570 616 meets with EN.570.416. Undergraduate (usually Senior) students should sign up for 416 with permission of instructor only.

EN.570.619. Methods in Microbial Community Analysis. 3 Credits.
This graduate level course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions. Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Co-listed with EN.570.429

EN.570.626. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes. Recommended Course Background: A course in Differential Equations or Consent of Instructor.

EN.570.631. Collaborative Modeling for Resolving Water Resources Disputes. 3 Credits.
Overview of collaborative modeling in water resources, Economic issues in water resources disputes, Legal issues in water resources disputes, Biological/Environmental issues in water resources disputes, Water management in the Delaware Basin, Understanding and using the Delaware River Basin Commission's water management tool (an OASIS based model of the Delaware, Multi-objective water management, Understanding management trade-offs, Collaborative processes, Reality based negotiation skills, and Consensus building. Recommended Course Background: A strong interest in utilizing scientific tools to help resolve real-world disputes A background in general science – with at least two of the following disciplines: Biology, chemistry, physics, earth science, economics.

EN.570.641. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals. Co-listed with EN.570.441

EN.570.642. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles. New prerequisites (grad students only): at least one year of undergraduate general chemistry, a course in organic chemistry preferred.

EN.570.643. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.443 (Aquatic and Biofluid Chemistry)

EN.570.644. Physical and Chemical Processes. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).

EN.570.647. Hydrologic Transport in the Environment. 3 Credits.
This course considers the transport of solutes and sediments by water through terrestrial landscapes, with an emphasis on the movement of nutrients and contaminants from the landscape into receiving water bodies like rivers, lakes and estuaries. The course will cover the theoretical approaches (advection-diffusion/dispersion, transit time distributions), the use of active and passive tracers to infer transport processes, analysis of water quality time series, runoff generation and flow pathways in watersheds, and the effect of climate variability on transport. Assessment is based on a semester project and in-class presentations. Seniors interested in joining the class must have Hydrology 570.353 and should contact the instructor.

EN.570.648. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes. Recommended Course Background: EN.570.445 or Permission Required.

EN.570.649. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced. Students should have taken EN.570.303 (or equivalent).

EN.570.650. Seminar on Critical Zone Science. 1 Credit.
Seminar class covering foundational literature and current research in soils, geomorphology, hydrology, ecology, geochemistry, biogeochemistry, and related topics. Each semester will focus on a particular theme. The course is pass-fail, with attendance and engagement required, as well as minimal writing assignments intended to encourage critical thinking.

EN.570.651. Environmental Transport and Dispersion. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.652. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences. Co-listed with EN.570.452
Area: Writing Intensive
EN.570.443 OR EN.570.643 OR permission of instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.653. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.654. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.657. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth's surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed.

EN.570.690. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.691. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment.

EN.570.695. Environmental Health and Engineering Systems Design. 3 Credits.
A collection of systems analytic techniques which are frequently used in the study of public decision making is presented. Emphasis is on mathematical programming techniques. Primarily linear programming, integer and mixed-integer programming, and multiobjective programming. Recommended Course Background: AS.110.106-AS.110.107/AS.110.109

EN.570.696. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.697. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.800. Graduate Independent Study. 1 - 3 Credits.

EN.570.801. Doctoral Research. 3 - 20 Credits.

EN.570.803. Master's Research. 3 - 10 Credits.

EN.570.805. Jensen Internship. 3 Credits.
Restricted internship; reserved for students who have received the Jensen Fellowship.

EN.570.841. Wolman Seminar- Graduates. 1 Credit.

EN.570.873. Environmental Science & Management Seminar. 1 Credit.

EN.570.881. Environmental Engineering Seminar. 1 Credit.

PH.180.600. Public Health Implications of Health as a Human Right. 2 Credits.
Applies a human rights framework to the analysis of key determinants of health status and PH policies, programs and practices. Readings and discussions explore health as a human right and its implications for PH research and practice. Focuses broadly on 3 areas: health as a human right, impact of public health policies, programs and practices on human rights; and collective health impact of human rights violations, whether gross violations in human conflict or insidious violations associated with mistreatment of marginalized groups. Topics include: international instruments defining human rights principles, their historical development and application; operationalization of the right to health and its consequences for public health practice; governmental obligations for health under international human rights law; linkages between health and human rights; application of the human rights framework to the design, implementation, and evaluation of PH programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.601. Environmental Health. 5 Credits.
Summarizes the concepts and principles underlying environmental health sciences, characterizes the major environmental agents and vectors affecting public health, and introduces major ecologic, scientific, and political issues from selected topical areas of environmental health. Presents the major concepts and principles that are environmentally mediated and that constitute a risk to humans —emphasizing the chemical, biological, and physical agents and factors. Considers sources, environmental pathways of transmission, exposure-dose relationships, adverse health effects, and particularly susceptible populations. Identifies the principles and methods of risk assessment and risk management, and uses these as a unifying theme.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.602. Environment and Health in Low and Middle income Countries. 2 Credits.
Introduces students to how environmental health hazards can affect human health in low and middle income settings. The core concepts are: exposure assessment, environmental epidemiology, and risk communication. Topics include: heavy metals, water sanitation and hygiene, waterborne and related diseases, tropical diseases, energy resources and health, and air pollution.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.605. Food Systems Practicum. 4 Credits.
Students learn first-hand about food system sustainability issues by engaging with organizations working for positive change. They broaden their learning through classroom education, readings and assignments covering: food system sustainability, with emphasis on content areas relevant to student projects; skills and context relevant to working with these organizations; and reflection on service-learning experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.606. Case Studies in Food Production and Public Health. 4 Credits.
Focuses on food production practices in the United States and the associated public health risks and benefits; discussions on animal and crop agriculture and food processing encompass both historical practices and modern methods. Presents case studies which delve deeper into specific topics, including industrial food animal production, aquaculture, veterinary drugs, agricultural policy, chemical exposures, rural communities and food animal worker health, and sustainable production methods. Lectures draw from the literature, and from the firsthand experiences of lecturers in research translation and agricultural production.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.607. Climate Change and Public Health. 3 Credits.
Explores the science of how and why the climate is changing, as well as the likely and potential impacts of climate change on public health in developed and developing regions of the world. Discusses how rising sea levels;fossil fuels,worsening air quality; frequency and severity of weather-related disasters; and scarcity of food and drinking water are all influenced by the changing climate. Examinespolicy,behavior, mental health, social determinants of health,economics,sustainablestrategies for mitigation and adaptation, and the role public health professionals can play in these decisions. Synthesizes concepts and knowledge from multiple disciplines through a hands-on, translational project.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.608. Public Health Responses to Environmental incidents and Disasters. 3 Credits.
Focuses on population exposures to and health impacts of non-infectious agents. Prepares students for applying methodologies for public health response and acquiring skills in developing standardized protocols to effectively recognize, evaluate and respond to public health emergencies and reported clusters of disease. Presents basic aspects of applied environmental health and policy frameworks for decision-making in environmental health. Provides competencies in finding and using web-based data sources, applying geospatial and other methodologies in analyzing information on exposures and health outcomes; identifying resources for coordinated response to environmental incidents; and communicating findings to decision-makers and the public. Equips students to participate in responding to disasters, reported outbreaks and apparent clusters. Provides experience in establishing exposure registries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.609. Principles of Environmental Health. 4 Credits.
Presents concepts, principles, and applications underlying the field of environmental health. Topics include contaminant sources, fate and transport, exposure and dose, study design in toxicology, climate change, environmental justice, and the built environment. Emphasizes policy, practice, and systems-based approaches. Discussions and exercises focus on reviewing current environmental health issues in the media, evaluating peer-reviewed literature on these issues, and deliberating on potential opportunities for prevention and intervention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.610. Applied Environmental Health Practice. 4 Credits.
Applies principles of environmental health to a real-world problem impacting a community in our own backyard. Investigates the driving forces that underlie these complex environmental health issues. Explores strategies for assessment and intervention. Integrates the lived experiences of community members and students wherever possible. Incorporates group work, so students are expected to coordinate schedules with each other and the community-based organization. Students practice skills in project management and data analysis —enacting theoretical principles of environmental health learned in previous classes—while working in a group setting. The combination of these practical skills and theoretical foundations are fundamental in today's professional practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.611. The Global Environment, Climate Change, and Public Health. 4 Credits.
Explores how global environmental issues such as global warming, urban sprawl, deforestation, mining, environmental refugees, biodiversity loss, and food security may cause increasing human harm. Provides an overview of the science and policy issues related to the changing environment, how environmental problems affect human health, and emphasizes potential solutions and sustainable development methods essential for resolving a myriad of environment-health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.612. Advanced Environmental Health I. 4 Credits.
Addresses environmental contaminates originating from four environmental vectors, Air, Water, Soil, and Food, impact human health. Focuses on the foundational knowledge and methods in environmental health needed by doctoral students to prepare for advanced careers in environmental health including integration of multi-disciplinary approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.613. Teaching Environmental Health. 1 Credit.
Prepares students to excel in required teaching activities as part of their PhD program. Includes access to teaching resources, departmental best practices and faculty support. Reviews critical skills in teaching and communicating environmental health and engineering concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.614. Urban Agriculture and Public Health. 2 Credits.
Explores the connections between urban agriculture and public health using case studies around the United States. Examines the people, practices, policies, and public health significance of urban agriculture. Lectures and background reading provide an evidence-based introduction to the connections among public health, agriculture, community development and food justice. Students are expected to listen to online lecture(s), do readings, and quizzes before the course begins. The course be based at the Center for a Livable Future's Food System Lab, an urban farm at Cylburn Arboretum featuring an aquaponics system. Field trips to local food system sites, such as a farm, farmers market and community garden, and hands-on activities help students blend theory and practice. For a final project, students will translate what they learn in the course by exploring and reporting on aspects of their own local food environment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.618. Law and Laboratory Animals: Statutes, Regulations and Policies. 3 Credits.
Examines the laws, regulations and policies that govern the relationship between biomedical institutions, laboratory researchers and animals that have developed over the past half-century. Focuses on the systems of governmental and self-regulation that are at the heart of the U.S. (and international) efforts to address ethical and societally beneficial laboratory animal use. Explores the ethical foundations of these laws and discusses the relationship between scientists, animals and society. Includes both in-person and online lectures by research scientists, veterinarians, and professionals who are experts in humane science. Features class discussions and case studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.619. Drinking Water and Water Policy: Avoiding Another Flint. 1 Credit.
Provides an overview of the federal drinking water and clean water laws, as well as the resultant regulations from these laws. Considers the contaminants addressed by the regulations and the drinking water and wastewater treatment necessary to comply with the regulations. Explores the use of the Consumer Confidence Report (CCR) to understand what's in drinking water. Investigates current issues and problems facing the water sector, as well as some of the potential solutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.620. Introduction to Food Systems and Public Health. 4 Credits.
Introduces the complex and challenging public health issue of food security (sufficient, safe and nutritious food for all) in a world where approximately 850 million people are under-nourished while over 2 billion are overweight or obese. Explores the connections among diet, our food system, the environment and public health, considering factors such as equity, population pressure and the historical, economic and political forces that have helped shape food systems. Considers approaches to achieving both local and global food security. Explores the important role public health professionals can play. Guest lecturers include experts from a variety of disciplines and experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.621. Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach. 3 Credits.
Examines environmental and worker health by introducing and analyzing four real world problems; Explores how evidence-based interventions are designed and implemented; Emphasizes the role that social justice and environmental equity play in establishing effective public health interventions; Reviews how science, communication, and policy interweave in environmental and occupational health decision-making; Shows how environmental and occupational health leaders act to address and solve problems and prepares students to tackle and design solutions for contemporary problems in environmental and occupational health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.622. Seafood and Public Health: from Production to Consumption. 2 Credits.
Explores trade-offs between sustainability and dietary recommendations to increase seafood intake based on health benefits. Introduces the complex nature of the changing global seafood supply, which is important to human nutrition but also raises concerns regarding environmental health, transparency, and human rights. Compares wild and farmed seafood production methods using a perspective grounded in food systems and public health. Examines approaches taken by governments and non-governmental organizations to address challenges in the global seafood supply, and the difficulty involved when focusing on the world's most traded food type. Emphasizes the importance of understanding the many ways seafood production and consumption impacts health, and roles for public health professionals in addressing these issues. Encourages application of critical thinking skills to complex issues through class discussions and written assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.623. Infectious Disease Threats to Global Health Security. 3 Credits.
This course will introduce students to the major health security threats that face the US and other countries and the strategies, policies and organizations that are in place to defend against them. Throughout the course, we will make notes of areas where approaches to health security have evolved. We will also examine where important gains in health security preparedness have been made and identify areas in which progress is still needed. Given their particular challenges and frequency with which they occur, preparedness for and response to biological threats to health security will be a large focus of this class. Discussions of other health security threats and sharing of experiences from students are welcome.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.624. Biotechnology and Health Security. 3 Credits.
Prepares students to examine the complex issues surrounding the security of advances in the biological sciences, and their impact on public health. Acquaints students with medical and public health options that may be possible as a result biotechnology advances—for example, to rid areas of malaria-carrying mosquitoes. Will also acquaint students with the difficult history of past bioweapons programs in the 20th century, and the continuing effect that history has on current biodefense and health security efforts. Introduces the concept of the dual-use dilemma—that is, how biotechnologies may have applications for good and harm—and explores how current biotechnology advances may be applied towards security aims, or could be misused. Topical issues in science and security policy, including genetically modified organism (GMO) controversies, will be explored, researched, and debated. Encourages application of critical thinking skills through class discussions and written assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.625. Community-Driven Epidemiology and Environmental Justice. 3 Credits.
Introduces principles, concepts, and methods in community-driven environmental justice research. Presents current environmental justice research and future research needs. Offers practice opportunities for active involvement in problem-solving in environmental justice research. Provides students an opportunity to develop facility with analytic methods needed to conduct research into community environmental justice concerns.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.626. Environmental Justice and Public Health Practice. 3 Credits.
Explores environmental justice through a historical, ethical and political lens with discussions on the impacts of environmental injustice on health disparities, particularly in low income and minority communities. Critical assessment of existing environmental justice approaches will be used to foster discussions and strategies for alleviating inequities in environmental exposure and disease at multiple levels and domains of public health. This course will highlight various approaches for public health officials, advocacy groups, health professionals, policymakers, and stakeholders to contribute to environmental justice, and guide students through integrating existing expertise into environmental justice solutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.627. Lessons Learned in 1918 Pandemic Flu. 1 Credit.
Prepares students to examine the complex history surrounding the 1918 influenza pandemic, the public health response at that time, and compare to preparedness, today. Acquaints students with the realities of mass vaccination and medical countermeasure development. Topical issues related to influenza preparedness will be discussed, including an examination of what happened in the 1977 reemergence of H1N1 influenza, gain of function influenza experiments and other controversial influenza research, and the effectiveness of non-pharmaceutical interventions. Encourages application of critical thinking skills through class discussions and written assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.628. Introduction To Environmental and Occupational Health Law. 4 Credits.
Introduces the theory and practice of environmental and occupational health law. Examines the approaches and strategies that underlie federal (United States) and state environmental and occupational health laws and regulations. Focuses on the study of the most significant federal and state environmental and occupational health laws and regulations, such as the Clean Air Act, Occupational Safety and Health Act, Comprehensive Environmental Response, Compensation, and Liability Act, and workers' compensation laws, with a particular emphasis on how they can be utilized as public health tools. Introduces students to the institutions and agencies that administer worker and environmental protection programs, and acquaint students with international treaties and laws aimed at protecting the environment and workers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.629. Environmental and Occupational Health Law and Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.630. Chemical and Biological Weapons Threats: Science, Public Health, Policy. 3 Credits.
Provides a broad understanding of the application of scientific concepts of biological and chemical warfare agents to inform evidence-based public health action and policy-making. Reviews the scientific principles and outcomes of threat agent use. Includes topics such as scientific and clinical aspects of threats agents, history of past use, and overarching policies to control their use. Examines the public health aspects of preparedness, including national development, use, and sharing of medical countermeasures. Explains principles of preparedness and response using case studies. Builds skills in crafting evidence-based public health policy options in preparing and responding to chemical and biological threats.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.631. Environmental and Occupational Health Policy Seminar. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.632. Introduction to Molecular Toxicology. 3 Credits.
'Introduction to Molecular Toxicology' is a 3-credit online course that introduces toxicology at a molecular level. It is designed for students with minimal background in biology and toxicology. The course will review the molecular mechanisms of diseases associated with environmental exposures. The course will introduce the cellular signaling pathways involved in protection from effects of chronic exposure to environmental toxicants, including responses to stress and oxidative damage. The course will also review both genetic and epigenetic changes that are associated with disease pathogenesis. In addition, the course will present the most recent technological advances in the molecular tools available to study effects of environmental toxicants, including next generation sequencing, mass spectrometry, gene editing models and emerging alternative animal models.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.633. The Sociocultural Dimensions of Disasters. 3 Credits.
Provides an anthropological viewpoint on extreme events including natural disasters, outbreaks, and technological accidents. Explores the human hand in, and experience of disasters - phenomena that influenced by the ways people imagine, build, organize, and value their communities. Critically examines the present trend of more frequent and more severe disasters, as well as chronic disparities in people's abilities to withstand and to recover from mass tragedy. Introduces theories of social vulnerability and community resilience to inform policies on how to reduce the chances for, as well as consequences of disasters.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.634. Public Health Emergencies: Risk Communication and Decision Science. 3 Credits.
Explores the science of risk communication and decision making. Discusses risk perception, communication guidance, and news media portrayal of risks. Reviews existing guidance on risk decision making. Presents previous and current public health emergencies as practice-based examples of risk communication and decision making. Examines public health emergency scenarios to prepare students for communication and decision making in their future work.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.635. Seafood and Public Health: Global Trade, Nutrition and the Environment. 2 Credits.
Explores the (sea)food system with a multi-disciplinary approach and real world examples. Examines the local-to-global connections in the most internationally traded food commodity, and why this matters for food and nutrition security, as well as environmental health. Discusses how the seafood sector can create sustainable aquatic food systems that work for businesses, fish workers, and consumers. Focuses on low- and middle-income countries where seafood is key for food and livelihoods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.636. Human Rights and Health Seminar. 3 Credits.
Introduces students to human rights in general, health as a human right, impact of health policies, programs and practices on human rights, and collective impacts of human rights violations, whether gross violations in human conflict or insidious violations associated with mistreatment of individuals and marginalized groups.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.637. Refinement of Animal Experimentation: Essential to Reduce Animal Suffering and Enhance Scientific Rigor. 2 Credits.
Prepares students who work or plan to work with animal subjects in the laboratory. Explores how to comprehensively and adequately apply Refinement methods in practice. Focuses on current housing and husbandry standards and discusses the benefits of a 'culture of care' for animals. Examines current best approaches to the important experimental refinements, namely anesthesia, analgesia, pain assessment and management, health monitoring, and humane endpoints and killing methods. To further assess the quality of animal-based research, necessary refinements in planning, conduct, analysis and reporting practices of animal studies are reviewed. Presents potential barriers to the uptake and application of Refinement methods and how they are challenged.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.638. Animals in Research: Ethics. 1 Credit.
Introduces students to the principles of bioethics when using animals in biomedical research and testing. Discusses the most common ethical theories such as contractarianism, Kantianism and utilitarianism. Addresses ethical issues arising from the use of animals in biomedical research and emphasizes on the role the three Rs of animal experimentation (Replacement, Reduction and Refinement) play when conducting animal experiments. Explores the harms involved in animal studies and assesses these against the benefits (harm-benefit analysis, HBA). The HBA is considered to be a key ethical safeguard for animals and, thus, is discussed in detail. Prepares students for real-world problems they may face in the laboratory.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.639. Advanced Environmental Health II. 4 Credits.
Focuses on the foundational knowledge and methods and their application in environmental health and engineering needed by doctoral students to prepare for careers in environmental health. Frames how environmental contaminants originating from four environmental vectors, Air, Water, Soil and Food, impact human health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.640. Molecular Epidemiology and Biomarkers in Public Health. 4 Credits.
Emphasizes the scientific basis of molecular epidemiology and provides examples of the application of molecular biology, analytical chemistry, and toxicology to the study of chronic disease etiology and its public health application, including examples in human cancer, cardiovascular, immunological, and neurological diseases. Also discusses methodological and study design problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.641. Climate Change and Public Health Problem Solving Seminar: Global Challenges and Solutions for Mitigation, Adaptation, and Sustainability. 3 Credits.
Equips students with the skills to understand how to evaluate, assess, and design adaptation and mitigation strategies for global climate change impacts on public health. Features “real world” scenarios and case studies that are used to demonstrate the likely impacts of climate change on public health. Analyzes case studies and discusses how evidence-based science is deployed to combat the environmental health aspects of climate change. Gains a better understanding of the role that social justice and environmental equity play in the challenges that climate change brings. Emphasizes a systems-based approach, recognizing that climate change problem-solving methodology is multi-dimensional and multi-sectorial.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.644. Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond. 2 Credits.
Provides an overview of the ways food systems have been impacted by COVID-19, actions to protect and improve food security, and the implications for public health. Engages students with guest speakers working at the cutting edge of food+COVID policy, practice and research, from community-based to global levels of action. Explores concepts of food systems, food system resilience, disaster management, and equity. Discusses how systemic factors (including poverty, racism and unsustainable food systems), affect outcomes, with application to climate change and other disasters. Reviews the strengths and limitations of responses in policy, practice, and research, primarily in the U.S. but also internationally. Challenges students to explore diverse perspectives and constraints; and to envision and design further responses addressing short-term emergency needs, adaptation of systems, and longer-term, deep, systemic change.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.647. The Health Effects of Indoor and Outdoor Air Pollution. 3 Credits.
Provides a broad understanding of air pollution, it's sources, transport and exposure. Examines important atmospheric chemistry and measurement methods. Discusses the relationship between air pollution and health effects. Includes topics such as oxidant pollutants, sulfur dioxide and acid aerosols, particulates, bioaerosols, volatile organic compounds, and indoor air pollution. Also covers host susceptibility factors, the influence of global warming, and regulation and public policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.650. Fundamentals of Clinical Oncology for Public Health Practitioners. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.651. Energy, Environment, and Public Health. 2 Credits.
Examines why energy policy choices are so important to human health and well-being. Explores how the impacts of energy exploration, generation, and usage patterns are tied directly to economic prosperity, the condition of the environment, the health of the population, and even aspects of national and international security, for developed as well as developing nations. Discusses and presents potential solutions to the three biggest energy challenges: (1) meeting the basic energy needs of the world s poorest people in a more healthful manner, (2) de-carbonizing electricity generation, and (3) reducing oil dependence. Emphasizes that energy is the core of the environment problem and environment is the core of the energy problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.653. Climate Change: Avoiding Conflict and Improving Public Health. 3 Credits.
This course explores the potential for a changing climate to cause food and water shortages, forced migration, and conflict. Through a series of case studies of climate change-relevant crisis events around the world, we will examine the factors that led to the communities in question mustering resilience to survive and recover from the crisis vs. the factors that led to conflict. Through this analysis, we will identify a suite of resilience factors and strategies, such as community cohesion, ecosystem restoration, agricultural and water capture and storage, that could be built into policies to assist high risk areas in avoiding conflict.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.655. Baltimore Food Systems: A Case Study of Urban Food Environments. 4 Credits.
Challenges students to look closely at the environment of Baltimore City's complex food systems, and to consider what it would take to improve these systems to assure access for all to nutritious, adequate, affordable food, ideally with reduced environmental harm. Students "go backstage" with tour guides at sites including a supermarket, a corner store, an emergency food distribution center, and a farm connected to the city school system. Students learn about the types of food available at these sites, who uses them, relevant aspects of their operations, and site-relevant key barriers to, and opportunities for, providing access to healthier and more sustainably produced food. Students also conduct oral history interviews about food with elderly city residents to understand how food access has changed over the years. Class sessions engage students to think critically, and provide background and frameworks for understanding the experiential sessions. Throughout, students consider the relative impacts of access, demand, and stakeholder interests, and consider the relative strengths and weaknesses of voluntary, regulatory (governmental), legal and other strategies. Lectures and discussions consider applicability of lessons gained from the study of Baltimore to other food systems. For their final papers, students identify a problem and its key determinants, and they propose/analyze an option to address it. Students think critically about selected aspects of the city's food systems and food environments, identifying challenges and opportunities for change and incorporating lessons learned from other food systems and programs. Students also discuss implications beyond Baltimore
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.660. Introductory Principles of Environmental Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.661. Writing Scientific Papers I. 2 Credits.
Enables doctoral students to attain skills in writing successful scientific papers—that is, papers that are accepted by peer-reviewed journals. Confers skills in identifying and using online information sources. Informs participants on different publication options, including open source journals. Explains NIH requirements for notification and access. Through problem based learning and review of successful scientific papers, conveys the elements of successful scientific papers, including formats, data presentation, citations and acknowledgements. Demonstrates successful response to reviewer comments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.662. Writing Scientific Papers II. 2 Credits.
Enables doctoral students to attain skills in writing successful scientific papers—that is, papers that are accepted by peer-reviewed journals. Confers skills in identifying and using online information sources. Informs participants on different publication options, including open source journals. Explains NIH requirements for notification and access. Through problem based learning and review of successful scientific papers, conveys the elements of successful scientific papers, including formats, data presentation, citations and acknowledgements. Demonstrates successful response to reviewer comments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.663. Grant Writing I. 2 Credits.
Enables doctoral students to attain skills in writing successful funding proposals—that is, proposals that are likely to receive approval for funding. Introduces students to grant writing, funding sources, types of NIH grants, how to read an RFA, PA or other announcements, and develop a biosketch. Explores the requirements of a successful NIH style grant proposal.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.664. Grant Writing II. 2 Credits.
Enables doctoral students to attain skills in writing successful funding proposals—that is, proposals that are likely to receive approval for funding. Introduces students to grant writing, funding sources, types of NIH grants, how to read an RFA, PA or other announcements, and develop a biosketch. Explores the requirements of a successful NIH style grant proposal.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.670. Introduction to Public Health Emergency Preparedness. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.820. EHE Doctoral Thesis Research. 1 - 22 Credits.
Provides an opportunity to actively conduct research in environmental health
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.829. Summer Thesis Research. 12 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.840. EHE Doctoral Special Studies and Research. 1 - 22 Credits.
Provides a forum for students to receive feedback on their research ideas and projects. Acquaints students with research of leading environmental health experts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.841. SS/R: INTRODUCTION TO ENVIRONMENTAL HEALTH. 3 Credits.
Examines health issues, scientific understanding of causes, and possible future approaches to control of the major environmental health problems in industrialized and developing countries. Topics include physical, chemical, and biological agents of environmental contamination; solid and hazardous waste; susceptible populations; biomarkers and risk analysis; the scientific basis for policy decisions; and emerging global environmental health problems
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.860. EHE Student Seminar & Grand Rounds. 1 Credit.
Provides a forum for students to present their current research project and receive feedback from faculty and students. Introduces students to research of leading environmental health experts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.180.880. SPECIAL STUDIES IN ENVIRONMENTAL HEALTH/COMMUNITY OUTREACH. 1 - 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.181.845. MHS Special Studies & Research. 1 - 22 Credits.
Provides a forum for students to receive feedback on essay topics and outlines.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.181.850. MHS Essay. 1 Credit.
Provides the opportunity for the student to work with their adviser to formulate, research, finalize, and gain approval of the required essay.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.613. Exposure Assessment Techniques for Health Risk Management. 3 Credits.
Prepares the students to use techniques of exposure assessment to quantitatively estimate exposures in occupational and non-occupational settings. Students will be introduced to concepts of exposure variability and its implications for interpreting small exposure data sets. Students will apply advanced techniques such as mathematical modeling of exposures using exposure determinant information, analysis of variance for between- and within-subject variability, Monte Carlo analysis of uncertainty, Bayesian decision analysis using small data sets, exposure assessment strategies in occupational settings. Students will analyze case studies to assess exposures in real-life scenarios using multiple methods. Students will critically evaluate key scientific papers on exposure assessment strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.614. Industrial Hygiene Laboratory. 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.615. Airborne Particles. 4 Credits.
Describes the basics of airborne particles. Explores properties of gases, particle motion, size statistics, Brownian motion and diffusion, curvilinear motion of particles, particle deposition and clearance in the human respiratory system, filtration, aerosol samplers, and sampling methodology, optical properties and electrical properties of aerosols.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.617. Exposure Sciences for Health Risk Assessment. 4 Credits.
Prepares students to use techniques of exposure assessment in aid of epidemiological studies. Introduces students to core concepts including exposure variability and its implications for reconstructing historical exposures; sparse data and measurement errors; the exposure data matrix; methods for imputation of missing values; the relationship between exposure and tissue concentrations; the choice of exposure metric; and exposure-response relationships. Examines advanced techniques for imputing missing data while reconstructing exposures. Demonstrates the application of mathematical models of exposure using exposure determinant information and Bayesian methods. Considers exposure windows and exposure lagging. Focuses on using biologic models of how disease develops in response to exposure. Students critically evaluate exposure assessment strategies in selected epidemiological studies from the peer-reviewed literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.621. Introduction to Ergonomics. 4 Credits.
Introduces the fundamental principles of ergonomics, including terminology, concepts, and applications of physiology, anthropometry, biomechanics, psychology, and engineering to work place and work methods design. Emphasizes the complex relationships among workers, job demands, work place designs, and work methods. Prepares students for advanced study in safety science, industrial hygiene, injury prevention, industrial engineering, and safety and health management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.622. Ventilation and Hazard Control. 4 Credits.
Covers the principles of industrial ventilation and engineering controls for airborne hazards. Provides competency in general ventilation and industrial ventilation design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.623. Occupational Health Management. 3 Credits.
Examines modern Lean management methodology and how it can be leveraged to design and implement an effective health, safety, and environmental (HSE) management system in an organization. Dtresses Lean management methods and tools and how they impact organizational structure, SHE planning, risk assessment, training, and continuous HSE improvement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.625. Principles of Occupational and Environmental Hygiene. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.626. Issues for Water and Sanitation in Tropical Environmental Health. 2 Credits.
Introduces major environmental health problems in the tropical areas of the world and discusses some solutions in detail. Covers engineering, human behavior, and public health approaches to providing potable water and sanitation including simple water supplies, sanitary latrines, the relationship of water supply and sanitation to diarrheal diseases, disaster sanitation, and techniques for disinfection. Demonstrates field treatment of water supplies and water microbiology. Each student develops a case study drawn from current events and designs a field project for an environmental control measure to reduce disease in a community. In addition, students develop a short (4-6 page) mock grant proposal designed to implement an integrated water and sanitation hygiene intervention of their choosing drawing on the lessons learned during this course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.631. Principles of Occupational Safety. 2 Credits.
Introduces the organizational framework in which safety sciences are practiced in the U.S. Illustrates professional and scientific methodologies by focusing on selected, substantive areas of practice (systems safety, nature of accidents, electrical hazards, fire and fire suppression, explosions and explosives, and falls and walking and working surfaces).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.637. Noise and Other Physical Agents in the Environment. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.638. Environmental and Health Concerns in Water Use and Reuse. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.640. Food- and Water- Borne Diseases. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.641. AIR, WATER AND FOOD TOXINS. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.810. MS Field Placement. 1 - 22 Credits.
Focuses on a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.845. EHE MS Special Studies and Research. 1 - 22 Credits.
Prepares students to identify and research the central issues in environmental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.850. EHE MS Essay. 1 - 16 Credits.
Students work with their adviser to formulate, research, finalize, and gain approval of their master's essay, which is based on a required Independent Professional Project (IPP). Students write the essay as a professional report summarizing the findings of the IPP. This represents a substantive application of professional technical skills through the process of collecting and summarizing data and reviewing appropriate literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.182.860. Special Studies Seminar in Occupational and Environmental Hygiene. 1 Credit.
Presents seminars by faculty, students and invited speakers dealing with occupational and environmental hygiene professional practice and research. Provides examples of various occupational/environmental settings and associated worker hazards. Serves to integrate various courses taken as part of the online master's in OEH program and to familiarize students with state-of-the art professional practice procedures and guidelines. Provides a venue for master's students to present their final essays.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.631. Fundamentals of Human Physiology. 4 Credits.
Encompasses the integration of a variety of organ systems. Invites leading scientists from different fields of physiology to offer exceptional and up-to-date lectures that quickly move through the basic mechanistic principles. Applies basic mechanistic principles of each organ system to current public health issues and environmentally relevant topics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.638. Mechanisms of Cardiopulmonary Control. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.642. The Cardiopulmonary System Under Stress. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.643. Essentials of Pulmonary Function Measurements. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.825. EHE ScM Thesis Research. 1 - 22 Credits.
Provides an opportunity to actively conduct research in environmental health
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.183.840. EHE Scm Special Studies and Research. 1 - 22 Credits.
Provides a forum for students to receive feedback on research ideas and projects. ScM students enroll in this course prior to passing the written comprehensive exam.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.184.830. Postdoctoral Research Environmental Health and Engineering. 1 - 22 Credits.
Offers an opportunity for postdoctoral students to conduct research and write papers for publication.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.600. One Health Tools to Promote and Evaluate Healthy and Sustainable Communities. 3 Credits.
Students will learn and apply tools and principles of One Health, which is the interface of human health, animal health and environmental health, to promote and evaluate healthy and sustainable communities. Classes will cover methods central to the conduct of One Health research or programs, which includes study design, stakeholder participation, community engagement and program evaluation, and will cover topics of high relevance to One Health in a way that uses systems approaches and synthesis to join perspectives from the multiple disciplines. These topics include drivers—such as the food system and antimicrobial resistance—that can contribute to or detract from the health and sustainability of communities. Methods will be presented in the context of applications such as policy, regulation, and economics and will connect One Health techniques for knowledge integration and other approaches to the design of healthy communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.601. One Health Seminar. 1 Credit.
Addresses global and domestic health challenges through a One Health lens, including practice-based approaches increasingly adopted by government agencies, non-governmental organizations and the tripartite (WHO, OIE, FAO). Engages experts in the field to discuss emerging topics and application of One Health approaches. Explores wide-ranging topics that include zoonotic infectious diseases, health security, preparedness, disaster response, climate change, planetary health, food systems, sustainability, chemical exposures, occupational health, health communication, and policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.801. Exposure Sciences & Environmental Epi Journal Club. 1 Credit.
Provides a forum for students and multiple faculty to keep up-to-date on the latest environmental health research and get feedback on their research ideas and projects. Emphasizes active participation in discussions of the peer-reviewed literature, the most up-to-date research, and the process of research development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.803. Health Security Journal Club. 1 Credit.
Provides a forum for students to engage with multiple faculty to discuss current topics in health security and global catastrophic biological risks. Emphasizes active participation in discussions related to peer-reviewed publications, as well as trends in research and policy, and offers an environment to contemplate and receive feedback on research development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.805. Toxicology, Physiology & Molecular Mechanisms Journal Club & Seminar. 1 Credit.
Provides an opportunity for students and postdoctoral fellows to present scientific papers from the current literature dealing with mechanisms underlying environmental diseases and the methodologies used to study them. Papers are organized around specific themes selected by the course instructors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.806. Advanced Concepts in Toxicology, Physiology & Molecular Mechanisms. 2 Credits.
Provides a platform for students, postdoctoral fellows and faculty to present and discuss impactful scientific papers from the current literature that deal with mechanisms underlying environmental disease along with accompanying methods. Explores additional aspects that are relevant to conducting and conveying laboratory research, including study design and statistical analysis, manuscript and grant review, policy and practice, and risk assessment. Outside speakers will also be invited to present on a topic relevant to advanced concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.185.810. Field Placement Esee. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.186.800. MPH Capstone: Environmental Health & Engineering. 2 Credits.
Provides students with the opportunity to work on a public health practice project on a chosen public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.186.895. MPH Practicum: EHE. 1 - 4 Credits.
The MPH Practicum is a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.610. Public Health Toxicology. 4 Credits.
Examines basic concepts of toxicology as they apply to the effects of environmental agents present in air, water and food (e.g. chemicals, metals) on public health. Discusses the distribution, cellular uptake, metabolism, and elimination of toxic agents, as well as the fundamental principles governing the interaction of foreign chemicals with biological systems. Considers how population data on disease incidence (various cancers, lung, kidney, heart, etc.) can suggest possible etiologies and how genetic and epigenetic factors can influence risk for adverse health effects. Focuses on the application of hoe these concepts provide evidence relevant to the understanding and prevention of morbidity and mortality resulting from environmental exposures to toxic substances through presentation of case studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.625. Animals in Research: Law, Policy, and Humane Sciences. 3 Credits.
Imparts fundamental knowledge about basic and applied (bio)medical research. Explores the main shortcomings of animal use in science. Discusses how to fully apply the 3R principles, and how to properly conduct experiments. Prepares students to critically appraise the validity of animal and non-animal models and methods in order to choose the best means for particular research interests.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.632. Molecular Toxicology. 4 Credits.
Reviews the mechanisms by which environmental toxicants cause chronic diseases such as cancer, COPD, asthma and heart diseases that impact public health. Topics include cell signaling pathways involved in oxidative and nitrosative stress, the microbiome, cell growth, cell death, DNA repair, inflammation and carcinogenesis in response to exposure to air pollutants, metals and other environmental toxicants. Presents most recent technological advances in the molecular and genetic tools available to study how environmental toxicants cause diseases, which includes omics technologies (genomics, proteomics and metabolomics), next-generation sequencing for gene expression and genetic variations, transgenic animals and emerging alternative animal models.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.633. Introduction to Environmental Genomics and Epigenomics. 3 Credits.
Presents the concept of the genetic and epigenetic data analysis in environmental health studies. Introduces not only single gene analysis but also genome-wide data searching. Also introduces cutting-edge analytical tools for 'omic' data not limited to genomics, but also for epigenomics, proteomics and metabolomics. Provides an introduction to the pathway analysis for 'omic' data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.634. Analysis for Environmental Genomics and Epigenomics. 1 Credit.
Emphasizes the analytical methods for genomic and epigenomic data analysis. Presents step-by-step instructions for searching and extracting databases and performing pathway analyses on existing genomic and/or epigenomic data. Acquaints students with 'omic' data analysis by participating group project that aims for proving the principle or generating new hypothesis for a selected research topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.640. Toxicology 21: Scientific Foundations. 1 Credit.
Provides students with fundamental knowledge of the emerging science driving new strategies for human risk assessment. Includes topics: toxicokinetics, xenobiotic activation and inactivation, systems biology, and databases for toxicity testing. Presents case studies that have used different data bases for toxicity testing. Offers hands-on experiences using the databases and other Web-based applications.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.645. Toxicology 21: Scientific Applications. 3 Credits.
Familiarizes students with the novel concepts being used to revamp regulatory toxicology in response to a breakthrough National Research Council Report "Toxicity Texting in the 21st Century: A Vision and a Strategy." Presents the latest developments in the toxicology field: moving away from animal testing toward human relevant, high content, high throughput integrative testing strategies. Active programs from EPA, NIH and the scientific community work-wide illustrate the dynamics of safety sciences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.650. Alternative Methods in Animal Testing. 3 Credits.
Discusses and evaluates strategies for reducing the number of animals utilized in basic and applied research. Addresses traditional in vitro methods, including cell culture and analytical chemistry as well as newer and evolving techniques such as informatics, genomics, proteomics, and metabolomics. Also discusses governmental regulatory processes for approving new testing methods, especially in vitro methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.655. Evidence-Based Toxicology. 3 Credits.
Provides students with fundamental knowledge about EBT approaches currently in use (or in development) that integrate and utilize diverse sources of data. These approaches include meta-analysis and systematic reviews, as used in evidence-based medicine. Introduces, explains and expands upon techniques such as risk of bias, QA/QC, good laboratory practice and validation, and the role that these tools and techniques play in assuring maximum confidence in evidence-based approaches
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.187.661. Environmental Health in Neurological and Mental Disorders. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.680. Fundamentals of Occupational Health. 3 Credits.
Introduces selected important topics in occupational health through lectures, readings, and class discussion. Provides an overview of the field, providing a survey of the history of occupational health; analysis of case studies in the history of asbestos, coal workers pneumoconiosis, and uranium mining; identification of the burden of occupational injuries and diseases; application of the toxicologic paradigm to activities in occupational health; analysis of occupational health hazards; identify the association between social, behavioral, and organizational factors and health outcomes in the workplace; identification of legal, regulatory, and ethical issues; analysis and research in clinical and non-clinical emerging issues in occupational health; and an introduction to the concepts of occupational health in developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.681. Onsite Evaluation of Workplace and Occupational Health Programs. 5 Credits.
Lectures, discussions, and visits to various industrial sites present approaches to evaluating the industrial environment, including industrial process, hazards, organization, and management structure. Stresses the importance of interdisciplinary cooperation in the development of occupational health programs, with reference to the U.S. workplace in the next decade.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.682. A Built Environment for A Healthy and Sustainable Future. 3 Credits.
Addresses the role that the built environment plays in public health. Examines how building design, community planning and design, land use, and transportation networks contribute to energy use, water supply degradation, climate change, ecosystem degradation, and public health. Explores the contributions of suburban sprawl to adverse environmental and public health outcomes. Examines how the built environment could and must change if we are to stabilize the climate and move into a sustainable future.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.686. Clinical Environmental and Occupational Toxicology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.688. Global Sustainability & Health Seminar. 1 Credit.
Discusses the causes, consequences, and implications of key global environmental challenges that we are facing and that are likely to become more challenging over time. Addresses how land use (e.g., patterns of urban growth and suburban sprawl), energy use, food production and distribution, water use, and population growth are causing climate change, ecosystem degradation, biodiversity losses, species extinctions, and other resource depletion, and how all this is in turn is a threat to human health as individuals, in communities, and globally. Focuses on discussion and not lectures and will utilize a mix of movies, guest discussants, and student-directed discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.694. Health of Vulnerable Worker Populations. 3 Credits.
Discusses occupational safety and health program considerations for vulnerable populations, including all levels of prevention and using examples such as the health needs of women workers, shift workers, aging workers, workers' families, and workers with chronic diseases or impairments. Focuses on strategies for identifying and removing barriers that affect health and work performance, program development and management responsibilities, and cost issues related to selected preventive and rehabilitative programs. Presents relevant research findings on the ability of vulnerable populations to benefit from safe and healthy working lives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.840. Special Studies and Research Environmental Health & Engineering. 1 - 22 Credits.
Prepares students to identify and research the central issues in environmental health
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.188.861. Advanced Topics in Toxicology and Physiology. 1 Credit.
Reviews the unique and advanced topics in toxicology and physiology. Presents students with guidelines for understanding the basic knowledge as well as the advanced methodology in toxicology and physiology. Prepares students to be able to identify the environmental health problems and present the critical reviews on the original peer-review papers in selected topics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.600. Stata Programming. 2 Credits.
Teaches Stata programming in a systematic way to students who have had exposure to Stata or another statistical package, but may not have the tools to perform complex analytical projects independently. Covers data management, programming concepts, procedural programming, Stata-specific commands and constructs, and project workflow.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.601. Principles of Epidemiology. 5 Credits.
Introduces principles and methods of epidemiologic investigation of infectious and noninfectious diseases. Illustrates methods by which studies of the distribution and dynamic behavior of disease in a population can contribute to an understanding of etiologic factors, modes of transmission, and pathogenesis. Presents different types of study design, including randomized trials, case-control and cohort studies, risk estimation, and causal inferences. Demonstrates the relationship between epidemiology and the development of policy. Laboratory problems provide experience in epidemiologic methods and inferences, illustrating a common-vehicle epidemic; the spread of infectious disease in school, home, and community; epidemiological aspects of a noninfectious disease; vaccination; the epidemiological approach to health services evaluation; rates of morbidity and mortality; sensitivity and specificity; and life table methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.602. Intermediate Epidemiology. 3 Credits.
Covers key principles, designs and methods of observational epidemiology studies. Includes a description of general designs of the main observational studies (birth cohort analysis, ecologic studies, cohort, case-based case-control studies, case-control studies within a defined cohort, and case-crossover studies), measures of disease frequency (cumulative incidence, rate and odds) and of association (relative risk, odds ratio), evaluation of confounding and interaction, types of bias, and the most often used methods of adjustment for confounding effects and their assumptions. Employs lectures and group discussions of exercise
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.604. Introduction to -Omics in Public Health. 2 Credits.
Introduces quantitative scientists to how "omics" can address public health questions. Reviews basic biology concepts for –omics with a focus on genomics, epigenomics, transcriptomics, and metabolomics. Presents commonly used –omic measurement methods and data preprocessing tools. Discusses challenges that may arise in data analysis due to data measurement issues as well as interpretation of results.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.606. Methods for Conducting Systematic Reviews and Meta-Analyses. 4 Credits.
Presents basic methods in the qualitative and quantitative meta-analysis, including formulating a hypothesis that can be addressed via meta-analysis, methods for searching the literature, abstracting information, and synthesizing the evidence. Includes Bayesian and likelihood approaches to meta-analysis quantitative methods. Emphasizes essential steps of conducting systematic reviews through hands-on exercises. Focuses on analytical skills in performing meta-analyses and network meta-analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.607. Introduction to Cardiovascular Disease Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.608. Using Big Data for Epidemiologic Research in Health Care. 0.5 Credits.
Demonstrates a practical approach to big data: where to find it, how to store and analyze it, and why to use it. Provides a technical overview of the utilization of big data with the inclusion of several case examples and inclusion of industry leaders in the application of big data to health care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.609. Concepts and Methods in Infectious Disease Epidemiology. 3 Credits.
Develops deeper understanding of the concepts and quantitative methods unique to infectious disease epidemiology. Builds upon the concepts and methods of general epidemiology and knowledge of specific infectious diseases. Topics include disease emergence, transmissibility and the basic reproductive number, transmission patterns and serial intervals, seasonality, virulence, heterogeneity in hosts and pathogens, herd immunity, diagnosis of infectious diseases, co-infections, and phylodynamics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.610. The One Health Approach to Epidemiology and Global Public Health: Problem Solving Seminar. 3 Credits.
Introduces students to the One Health approach to public health research and practice, providing examples of how evidence shapes public health policy and health promotion, from the local to the global scale. Students will practice strategic thinking and decision making in translating evidence to behavior and policy and will have the opportunity to interact with guest speakers working in One Health fields.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.612. Epidemiologic Basis for Tuberculosis Control. 2 Credits.
Considers subjects and epidemiologic principles relevant to control measures against tuberculosis. Includes the following topics: diagnosis of TB infection and disease; risk factors and epidemiology; prevention by case-finding and treatment, vaccination, and preventive therapy; pediatric TB; TB modeling; and elements of control programs in low-, middle-, and high-income settings. Offers lectures, group discussions, and review of the tuberculosis literature as the primary components.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.613. Design and Conduct of Clinical Trials. 2 Credits.
Introduces clinical trial design in the context of epidemiological concepts, covers various topics in the design and conduct of clinical trials, and profiles clinical trials that illustrate these issues. Topics include the definition and history of clinical trials; trial designs, including phase III-IV, cross-over, factorial, and large, simple designs; internal and external validity; controls, randomization, and masking; ethical issues; introductions to data collection and management and analysis principles; monitoring of trials for safety and efficacy; and use of clinical trial data in healthcare decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.614. Conducting Epidemiologic Research. 2 Credits.
Covers applications of epidemiologic principles in the conduct of observational studies as taught in advanced epidemiologic methods. Focuses on developing skills to conduct and manage a research protocol, monitor data collection, manage data and disseminate results. Covers components of a clinical research team, responsibilities, expertise and tasks study members perform, and organizational, logistical and attitudinal issues that need to be addressed in producing an effective research group. Topics include infrastructure needed for single-site and multi-site studies, selection bias and analytical intent in the determination of populations and methods for recruitment, development of a manual of operations and forms for data collection and administration, data management tools, implementation and review of quality assurance, specimen repository tracking, and useful statistics for evaluating the progress of the study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.615. Understanding the Relevance of New Analytical Methods to Epidemiological Research. 2 Credits.
Provides a basis for understanding how new analytic methods are relevant to epidemiologic research. Explores methods in "plain English" in order to focus on utility of the methods as well as how to interpret analyses as they are applied to research. Addresses the assumption of the methods and big picture pros and cons.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.616. Epidemiology of Aging. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.617. Pharmacoepidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.618. Epidemiology: the Basics. 3 Credits.
Introduces the population science of epidemiology, including methods and approaches to measurement and outcomes, study design and inference, risk estimation, and surveillance. Provides the essential elements of epidemiology as appropriate for public health scientists.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.619. Topics in Pharmacoepidemiology. 2 Credits.
Introduces the key elements of pharmacoepidemiology. Explores the utilization and effects of drugs in large numbers of people and the application of epidemiological methods to pharmacological issues. Focuses on questions of drug safety and effectiveness, concentrating on clinical patient outcomes and on evaluating the use of therapies. Applies the research methods of clinical epidemiology (e.g., randomized trials, cohort studies, case-control studies, use of secondary data, attention to biases and confounding, effects of non-adherence, active and passive surveillance for adverse events) to study medication exposures and outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.620. Principles of Clinical Epidemiology. 2 Credits.
Presents lectures and interactive sessions designed to expose students to basic principles of clinical epidemiology and introduce key methods utilized in clinical outcomes research. Focuses on principles and methods in clinical epidemiology which would be most utilized by clinicians/clinician researchers for screening and diagnosis of illness as well as for prognostication and decision-making. Introduces methods and issues in studying clinical epidemiology in health care settings (e.g. administrative data).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.623. Cancer Epidemiology, Prevention, and Control. 2 Credits.
Emphasizes the role of epidemiology in cancer prevention and control. Compares and contrasts the descriptive epidemiology, natural history, and pathologic and biologic characteristics of selected common cancers, as well as factors related to their etiology. Discusses the influence of environmental and genetic factors and their interplay on the development of cancer together with the epidemiologic issues involved in their investigation. Provides overview of problems involved in cancer prevention and screening.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.624. Etiology, Prevention, and Control of Cancer. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.627. Epidemiology of Infectious Diseases. 4 Credits.
Introduces the basic methods for infectious disease epidemiology and case studies of important disease syndromes and entities. Includes definitions and nomenclature, outbreak investigations, disease surveillance, case-control studies, cohort studies, laboratory diagnosis, molecular epidemiology, dynamics of transmission, and assessment of vaccine field effectiveness. Focuses case studies on acute respiratory infections, diarrheal diseases, hepatitis, HIV, tuberculosis, sexually transmitted diseases, malaria, and other vector-borne diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.628. Social Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.629. The Epidemiology of LGBTQ Health. 3 Credits.
Introduces constructs of sexual orientation and gender identity in the context of public health. Explores historical, epidemiological, and social perspectives related to the physical and mental health of lesbian, gay, bisexual, transgender and queer (LGBTQ) individuals and communities. Orients students to current and historic epidemiological and contextual issues that shape what is known about LGBTQ health, presents an overview of LGBTQ health disparities and interventions, and develops a foundation for critical thinking about LGBTQ health research and intervention potential.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.630. Topics in Social Epidemiology. 2 Credits.
Provides a systematic and selective overview of conceptual approaches and research findings related to the impact of social context and social phenomena on health. Sessions highlight a different area of frontier social epidemiology research. Social processes examined include 1) social inequalities (including social class differences as well as the effects of income inequality), 2) social networks, 3) neighborhood and urban characteristics, 4) gender inequalities and 5) macro-social changes. Discusses global health approaches to social determinants of health including research experiences from different parts of the world. Includes discussion of methods related to the study of social epidemiology; however, this is not intended to be a methods course. Includes limited lecture matter and thorough group discussions on selected classic papers and latest readings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.633. Data Management in Clinical Trials. 3 Credits.
Acquaints students with important principles of the acquisition, management, and distribution of data in the clinical research environment. Focuses on real-world needs of investigators and emphasizes those issues that researchers need to understand to work effectively with other members of study teams, including coordinators, data entry staff, programmers, and data managers. Covers topics that apply to many studies, and discusses approaches ranging from small single-investigator trials using only a spreadsheet through international networks using sophisticated web-based data management systems, although does not focus on any particular type or size of study. Discusses the benefits and costs of alternatives rather than recommending particular courses of actions. Combines practical and hands-on exercises with advanced treatment of important concepts, although it does not focus on computer programming.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.635. Clinical Trials: Issues and Controversies. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.636. Epidemiology in Evidence-Based Policy. 2 Credits.
Focus on how scientific evidence in general and epidemiologic studies in particular are used to inform health and regulatory policies. Reviews the role of scientists and epidemiologists in translating evidence to practice and policy; examines how science fares in the legislative, regulatory, and judicial settings; addresses methodological issues related to types and availability of evidence to guide policy. Topics include nutrition recommendations (e.g. population-wide sodium intake), environmental policies; opioid epidemic (e.g. safe injection sites); tobacco control and e-cigarettes; health disparity (e.g., racial disparities in kidney transplantation); diabetes prevention; legal and policy implications of class action lawsuits (e.g., gun policy and local food policy); COVID-19 (e.g., evidence-informed policy making during a pandemic); and modelling to guide policy. Guest faculty, experts in their field, present examples, discuss their experiences using evidence to guide policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.639. Assessing Epidemiologic Impact of Human Rights Violations. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.640. Eye Disease: Epidemiology and Control. 1 Credit.
Presents lectures and group discussions on the pathology, clinical manifestations, epidemiology, treatment, and control of the major blinding diseases, including diabetic retinopathy, cataract, glaucoma, trachoma, and age-related macular degeneration, as well as refractive error and ocular complications of Ebola and Zika.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.641. Healthcare Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.644. Epidemiology of Diabetes and Obesity. 2 Credits.
Describes the epidemiology and prevention of diabetes, obesity, and associated complications. Discusses methodological issues associated with evaluating these in epidemiologic studies. Designed to cover the global epidemics of diabetes and obesity, environmental and genetic risk factors, as well as interventions to improve diabetes outcomes and weight management. Includes lectures from several expert faculty members in the School of Public Health and the School of Medicine
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.645. Introduction to Clinical Trials. 3 Credits.
Introduces clinical trial design in the context of epidemiological concepts, covers various topics in the design and conduct of clinical trials, and profiles clinical trials that illustrate these issues. Topics include the definition and history of clinical trials; trial designs, including phase I-IV, cross-over, factorial, and large, simple designs; internal and external validity; controls, randomization, and masking; ethical issues; data analysis principles; monitoring of accumulating safety and efficacy data; and use of data from randomized trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.646. Epidemiology and Public Health Impact of HIV and AIDS. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.648. Clinical Trials Management. 3 Credits.
Provides an overview of methods related to the day-to-day conduct of multicenter randomized clinical trials with an emphasis on the Coordinating Center perspective. Using case studies of multicenter clinical trials for illustration, emphasizes topics related to practical applications such as organizational models, use of standardization, and performance monitoring. Discussion of methods is encouraged, including alternatives to usual practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.650. Nutritional Epidemiology (Sum Epi). 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.651. Emerging Infections. 2 Credits.
Explores the factors promoting the emergence of new infectious diseases and the re-emergence of some of the more traditional infections. Evaluates agent, host, environmental and ecological factors in the emergence of infectious diseases. Presents methods of surveillance and early recognition of several important emerging infections. Includes discussions from lecturers with considerable experience in the investigation of specific emerging infections on the issues specific to emerging infections. Presents and discusses a paper describing an investigation of an Emerging Infection following each one-hour lecture. Presents, describes, and analyzes the factors related to the emergence of infectious diseases, new and old, that have emerged as important public health problems, or which have the potential for major epidemic spread. Explains possible methods for the rapid recognition, prevention, and control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.653. Epidemiologic Inference in Outbreak Investigations. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.654. Epidemiology and Natural History of Human Viral Infections. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.658. Critical Reading of Epidemiologic Literature. 1 Credit.
Develops skills in the critical reading of epidemiologic reports. Reviews key epidemiologic concepts and methods including bias, confounding and interaction. Identifies the key issues and common mistakes in the preparation of epidemiologic reports of empirical research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.660. Practical Skills in Conducting Research in Clinical Epidemiology and Investigation. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.663. Epidemiology Workshop: Interpreting and Using Epidemiologic Evidence. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.666. Foundations of Social Epidemiology. 3 Credits.
Presents applications of social epidemiologic concepts, introduced through weekly online lectures and readings, and the use of discussions and case studies. Prepares students to understand and appreciate the contribution of social factors to disease etiology, course, and the distribution of states of health in populations. Reviews the conceptual and theoretical underpinnings of social epidemiology from an historical perspective. Focuses on the scientific findings in the field from the 1970's until today; the influence of social context on behavior is well known and forms the backbone for most health promotion interventions. Delineates how the social environment influences behavior by shaping norms, reinforcing social control, providing environmental opportunity, and coping strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.667. Health Equity Research Methods to Address Social Determinants of Health. 4 Credits.
Introduces innovative methods, practical tools, and skills required to conduct evidence-based research that addresses the social determinants of health disparities. Draws on theoretical frameworks on fundamental values and principles, including social justice, human rights, the value of diverse ideas and stakeholder perspectives, inclusiveness, trustworthiness, behavioral and implementation science, and community-based participatory design. Uses lectures, panel discussions, and case-based examples to provide opportunities in obtaining feedback on ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.668. Topics in Infectious Disease Epidemiology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.671. Topics in Management of Clinical Trials. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.674. Causal Inference: Emulating A Target Trial to Assess Comparative Effectiveness. 2 Credits.
Introduces students to a general framework for the assessment of comparative effectiveness and safety research. The framework, which can be applied to both observational data and randomized trials with imperfect adherence to the protocol, relies on the specification of a (hypothetical) target trial. Explores key challenges for comparative effectiveness research and critically reviews methods proposed to overcome those challenges. The methods are presented in the context of several case studies for cancer, cardiovascular, renal, and infectious diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.676. Bayesian Adaptive Trials. 2 Credits.
Presents Bayesian adaptive designs and teaches students the skills and considerations necessary to construct such designs. Examines the operating characteristics of Bayesian adaptive designs and the benefits and costs of interim analyses, in particular within the regulatory framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.677. Infectious Disease Dynamics: Theoretical and Computational Approaches. 3 Credits.
Focuses on the dynamic processes that affect the spread of infectious disease. Presents basic conceptual approaches and a survey of specific theoretical and computational methods for simulating the spread of diseases. Specific topics include the effect of population heterogeneity on transmission, simulation of the impacts of interventions, social networks and the links between transmission dynamics and the evolution of pathogens. Particular methods include mathematical models, spatial-temporal analysis of epidemics, social network theory, genetic algorithms, individual based models and other tools of systems epidemiology. Concepts and methods are applied to historical epidemics, current emerging diseases and diseases of international public health importance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.678. Infectious disease transmission models for public health decision making. 3 Credits.
Studies global tobacco control methods in depth. Focuses on designing, implementing, and evaluating tobacco control interventions based on the need of a specific region or country. Highlights the use of multi-level solutions linking policy, communication, prevention, education, regulation, advocacy, and community organizing to address the interdisciplinary problem of tobacco use. Examines the aspects of tobacco use and tobacco control through lectures, case studies, presentations, and discussion.Upon successfully completing this course, students should be able to: • Perform a situational assessment of the tobacco control environment in a particular country including the health and economic burden of tobacco use in the country; • List criteria that can be used to determine the tobacco control priorities of a country, and evaluate the strengths and weaknesses of different criteria for setting tobacco control priorities; • Evaluate the strengths and weaknesses of various strategies to reduce tobacco use; •Select and define appropriate indicators for evaluating progress in implementing a tobacco control intervention; •Utilize acquired methods to plan, implement, evaluate, and lead a tobacco control interventions based on the need of a specific region or country; •Utilize acquired methods to formulate grant applications.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.680. Environmental and Occupational Epidemiology. 4 Credits.
Introduces the key health effects of environmental and occupational exposures and the epidemiologic methods used to identify and estimate those effects. Emphasizes the interplay of methodological issues, including the assessment of environmental exposures and the understanding of specific disease processes in identifying the health impact of environmental exposures in the population. Learns about environmental and occupational exposures (including water and air pollution, food contamination, ionizing radiation, persistent environmental pollutants and emergent environmental exposures) and key methodological issues relevant for these exposures in population studies (including study design, exposure assessment and biomonitoring, disease clusters, dose-response relationships, susceptibility, geographic analysis, and evidence synthesis).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.682. Pharmacoepidemiology Methods. 3 Credits.
Introduces the key elements of pharmacoepidemiology. Explores the utilization and effects of drugs in large numbers of people. Discusses the application of epidemiological methods to pharmacological issues. Focuses heavily on questions of drug safety and effectiveness, concentrating on clinical patient outcomes and on evaluating the use of therapies. Applies the research methods of clinical epidemiology (e.g., randomized trials, cohort studies, case-control studies, use of secondary data, attention to biases and confounding) to the content area of pharmacology (e.g., determinants of beneficial and adverse drug effects, effects of patient heterogeneity on drug effect, effects of non-adherence, active and passive surveillance for adverse events).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.683. Human Rights in Public Health Practice. 2 Credits.
Presents human rights as both a tool and an analytical framework for public health practice. Considers how concepts and values from human rights can enhance the work of public health professionals in a variety of realms. This includes the development of policy in public health, the design and implementation of programs, and identification of human rights obstacles to achieving public health goals and potential responses. Examines the relationship between traditional bioethics and human rights approaches to ethical questions and will conclude with discussions and controversies about the roles of public health professionals in advocacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.684. Pharmacoepidemiology: Drug Utilization. 3 Credits.
Provides an overview of drug classification systems as well as a review of data sources used for drug utilization research. Reviews methods of investigating drug utilization and evaluating interventions to modify utilization, such as time-series designs and segmented regression analyses. Discusses varied patient, provider, practice and system-level determinants of prescription drug utilization, including their impact on costs and quality of care. Emphasizes the impact of drug formularies, marketing and promotion of drugs, health insurance exchanges, and emerging evidence of benefits and harms.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.686. Introduction to Systematic Reviews and Meta-Analysis. 2 Credits.
Reviews methods used by those performing systematic reviews and meta-analysis, including building a team, formulating a research question and hypothesis, methods for searching the literature, abstracting information, and synthesizing the evidence both qualitatively and quantitatively. Covers how to formulate an answerable research question, defining inclusion and exclusion criteria, searching for the evidence, data extraction, assessing the risk of bias in the underlying studies, qualitative synthesis, meta-analysis, sensitivity analysis, and assessing meta-bias. Acquaints students with a few practicalities of conducting a systematic review using hands-on exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.687. Epidemiology of Kidney Disease. 2 Credits.
Studies kidney disease comprehensively, emphasizing chronic and end-stage kidney disease, since kidney disease is characterized as an epidemic worldwide, and the prevalence continues to rise. Highlights controversies and areas of ongoing and future research by reviewing findings from cohort studies, clinical trials, and landmark studies. Emphasizes methodological issues specific to the study of kidney disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.690. Epidemiologic Approaches to Hearing Loss and Public Health. 1 Credit.
Introduces biologic, epidemiologic and clinical aspects of aging-related declines in the auditory system. Demonstrates methods of assessment of auditory function for epidemiologic studies. Reviews current epidemiologic knowledge of sensory function and aging-related outcomes in older adults, including the epidemiology and consequences of dual sensory loss. Presents areas for future research and opportunities for intervention and prevention
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.692. Prisons, Public Health, and Human Rights. 2 Credits.
Explores the public health implications of mass incarceration and discusses the human rights and ethical ramifications of providing health care to men, women, and children in jails, prisons, and detention centers both in the United States and internationally. Takes a systems approach to addressing the basic health needs of the prison population, including infection control, care for acute and chronic medical conditions, and mental health care. Students apply problem-solving skills and explore the challenges of providing care in incarcerated settings. Emphasizes the roles of human rights principles and professional ethics in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.693. Investigation of Outbreaks. 2 Credits.
Learns how to detect, investigate, and interpret disease outbreaks. Focuses on application of epidemiological skills to develop hypotheses relevant to understanding source or reservoirs of infection, modes of spread and possible control measures. Includes simple epidemiological approaches for examining field data on outbreaks and deriving inferences. Reviews the main factors involved in the occurrence of an outbreak and steps in investigating an epidemic. Uses data from large and small epidemics to illustrate the main concepts and terminology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.694. Power and Sample Size for the Design of Epidemiological Studies I. 1 Credit.
Systematically introduces students to sample size and power analysis for the most common epidemiological study designs. Provides participants with the key conceptual elements and practical tools for computing sample sizes to achieve a given level of precision and power in statistical tests.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.696. Spatial Analysis I: ArcGIS. 3 Credits.
Examines the use of Geographic Information System (GIS) software (ArcGIS Pro) as a tool for integrating, manipulating, and displaying public health-related spatial data. Covers mapping, geocoding, and manipulations related to data structures and topology. Introduces the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics. Uses selected case studies to demonstrate concepts along this paradigm. Focuses on using GIS to generate and refine hypotheses about public health-related spatial data in preparation for a formal statistical analysis. Discusses topics related to spatial statistical modeling throughout (although not a required part of the curriculum). Includes both lecture and lab formats with GIS concepts and software-specific details demonstrated during the lab portions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.697. Spatial Analysis II: Spatial Data Technologies. 2 Credits.
Examines technologies for collecting, obtaining and creating spatial data. Technologies considered include, but are not limited to GPS, tablets, tracking devices, cell phones, Google Earth, remote sensing applications, and the Internet. Introduces software applications such as ArcGIS, QGIS, and R for integrating spatial data from the aforementioned technologies into useable forms for spatial analysis. Also covers metadata, data accuracy, and confidentiality/disclosure issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.698. Methods For Assessing Power, Privilege, and Public Health in the United States. 4 Credits.
Discusses emergent health issues and how the choice of measures for power, privilege, and inequality influence results in epidemiological research. Challenges you to reflect on how your own positions of privilege influence your interpretation of data and your public health practice. Provides an opportunity to apply epidemiology research skills to develop and execute a data-driven project on a real-world health problem that can will be presented and used by a community partner.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.699. Epidemiology of Sensory Loss in Aging. 3 Credits.
Introduces biologic, epidemiologic and clinical aspects of aging-related declines in the auditory, visual, and vestibular systems. Demonstrates methods of assessment of sensory function for epidemiologic studies. Reviews current epidemiologic knowledge of sensory function and aging-related outcomes in older adults, including the epidemiology and consequences of dual sensory loss. Presents areas for future research and opportunities for intervention and prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.700. Advanced Stata Programming. 1 Credit.
Presents advanced topics in Stata Programming to expand upon the material in 340.600. Topics include simulations, advanced programming, file manipulation, and code optimization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.701. Epidemiologic Applications of Gis. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.705. Advanced Seminar in Social Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.706. Methods and Applications of Cohort Studies. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.710. Seminar in Disability Health Research. 2 Credits.
Examines disability and disability health within the context of public health research and policy to advance equity and social justice. Discusses the origins and current landscape of disability health research from the perspectives of key stakeholders, inclusive of researchers, advocates, policy makers, with a focus on including the perspectives of people with disability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.715. Problems in the Design of Epidemiologic Studies: Proposal Development and Critique. 5 Credits.
Presents the methodologic and logistic problems involved in designing and conducting epidemiologic studies. Students participate in the preparation of a research protocol for a study in a human population. Offers an opportunity to critically evaluate the adequacy and scientific merit of research protocols, develop an appreciation of the ethical aspects of conducting research involving human subjects, and apply methods and principles learned in earlier (340.751 - 753) and current courses to specific epidemiologic problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.716. Implementation Science Concepts, Methods & Study Designs. 2 Credits.
Digs into how to conceptualize implementation science questions, define implementation outcomes, and leverage frameworks and designs to achieve public health impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.717. Health Survey Research Methods. 4 Credits.
Exposes students to the practical aspects of health survey research methods. Emphasizes the development of skills to design and administer a survey. Introduces formative research, sampling methods, questionnaire development, recruitment techniques, interviewer training, and quality assurance/quality control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.721. Epidemiologic Inference in Public Health I. 5 Credits.
Introduces principles and methods of epidemiologic investigation of disease and other health states. Presents different types of study designs, including randomized trials, cohort and case-control studies; measurement of exposures and outcomes; risk estimation; surveillance; program evaluation; and causal inference. Discusses evaluation measures for screening programs and health interventions. Links epidemiologic inferences with the development of policy. Activities provide experience in applying epidemiologic methods, interpreting findings, and drawing inferences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.722. Epidemiologic Inference in Public Health II. 4 Credits.
Expands knowledge beyond introductory level epidemiologic concepts and methods material, using examples from the published literature. Emphasizes interpretation and the ability to critically evaluate issues related to populations/study design, measurement, population comparisons and inference, including: modern cohort study designs; advanced nested designs; novel techniques for exposure assessment; interpretation and utility of measures of impact; sources of bias and methods for their prevention; descriptive and analytical goals for observational study inference; the counterfactual model for defining exchangeability, cause, and confounding; and synthesis of inferences from observational studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.723. Epidemiologic Practice Methods for Population Health Research. 2 Credits.
Introduces quantitative epidemiologic techniques applied by both academics and public health professionals to analyze and interpret routinely collected at the subpopulation level to target and address health inequities. Four modules include instruction in Stata and R, with topics including:1. Weighted Survey Analysis: Analytic techniques for the incorporation of weights in the analysis of survey data to make inferences about the target population.2. Calculating Life Expectancy: Calculation of single-decrement life tables using statistical programs as well as publically available Excel-based tools.3. Estimate Preventable Deaths: Econometric techniques for estimating preventable deaths and potential lives saved from risk factor modification.4. Conceptual Frameworks in Epidemiology: Apply graph theory to understand the relationships between variables in commonly-used causal frameworks. Understand the importance of using conceptual frameworks in guiding epidemiologic inquiry.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.724. Global Cancer Epidemiology. 2 Credits.
Examines the causes, incidence, and trends in cancer globally, with a perspective on the differences across settings. Provides an epidemiological foundation for understanding cancer statistics and engaging in international cancer research and control activities. Covers key concepts such as study designs for cancer epidemiology and interventions, use and meaning of common cancer statistics, levels of prevention, and cancer screening/use of diagnostic tests.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.725. Methods for Clinical and Translational Research. 1 Credit.
Provides an overview of the methods of translational research. Emphasizes developing skills in the interpretation and application of findings of translational research. Topics include study design, biomarkers, statistical analyses, validation strategies, and evidence synthesis methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.726. Implementation Research Methods to Address Real World Epidemiological Questions. 3 Credits.
Considers the use of observational data, including real-world program data, natural experiments and designs for interventions which cannot be ethically or practically randomized and experimental designs, focused on implementation and real-world effectiveness. Analyzes preference-based research methods, which can be observational or experimental, highlighting the importance of human-centered approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.727. Introduction to Health Survey Research Methods. 2 Credits.
Exposes students to the practical aspects of health survey research by emphasizing the development of skills to design and administer a survey questionnaire. Introduces students to formative research, questionnaire development, interviewer training, and quality assurance/quality control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.728. Advanced Methods for Design and Analysis of Cohort Studies. 5 Credits.
Explores advanced methods useful for the design and analysis of cohort studies. Emphasizes methods for analyzing time-to-event data subject to staggered entries using advanced parametric and semi-parametric methods; analytical methods for incomplete observations in cohort studies; methods to measure effects of exposures on time-to-event using relative times and relative hazards; parametric survival analysis methods and taxonomy of hazard functions; coefficients of determination based on parametric models for survival data; regression methods for trajectories of biomarkers; methods for the analysis of interventions in observational studies: confounding by indication, marginal structural models for individual effectiveness; methods for estimating population effectiveness; and methods to jointly analyze longitudinal and survival data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.729. U.S. Based National Health Surveys: their Application and Associated Research Methods. 2 Credits.
Introduces the purpose and application of national health surveys, and the strengths and limitations of this type of data. Uses publicly available survey data collected by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS), including data from the National Health Interview Survey (NHIS) and National Health and Nutrition Examination Survey (NHANES) to provide practical experience in accessing the data files, designing and executing basic analysis using complex survey data and determining when and how to appropriately conduct age adjustment and trend analysis. While the class utilizes U.S.-based examples, the principles and methods covered are applicable to other settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.730. Assessment of Clinical Cardiovascular Disease. 2 Credits.
Familiarizes students with techniques used to detect and quantify the presence of clinical cardiovascular disease. Tour the hospital, and the dialysis, angiography, echocardiography, and vascular laboratories. Observe radiographic (CT and MRI) imaging of atherosclerosis and review gross and histological specimens of atherosclerosis in the pathology laboratory. Directly observe various cardiac imaging techniques performed including 1) cardiac echocardiography, 2) coronary or peripheral angiography, 3) coronary calcium scores and coronary CT angiography using multi-detector CT, 4) carotid and peripheral vascular studies using ultrasound, 5) the clinical assessment of blood pressure, and 6) DXA and anthropometric measures of body composition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.731. Principles of Genetic Epidemiology 1. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.732. Principles of Genetic Epidemiology 2. 3 Credits.
Second offering in a three-part series of graduate courses in Genetic Epidemiology. Details the concepts of linkage disequilibrium and population genetics, including methods for admixture analysis useful for adjusting for individual variation in genetic ancestry/background. Presents the principles of genetic association analyses for quantitative and qualitative phenotypes for population-based studies. Details the concepts and tools related to confounding due to population stratification, and approaches for genome-wide association studies. Introduces methods for linkage analysis in families and use of high-throughput sequence data (whole exome and whole genome). Selected class sessions are dedicated to computer labs to illustrate the methods covered.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.733. Principles of Genetic Epidemiology 3. 3 Credits.
Concepts behind linkage and association studies in genome-wide studies, and demonstrates how they can be applied to complex qualitative and quantitative phenotypes (i.e. those where both genetic and environmental factors influence the phenotype). Introduces the principles underlying family-based and population-based study designs and analytical methods for both marker panels and sequencing data (whole exome and whole genome).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.734. Principles of Genetic Epi 4: Emerging and Advanced Methods. 2 Credits.
Discusses advanced topics in genetic epidemiology methods. Builds on the knowledge gained in Principles of Genetic Epidemiology 1-3. Students discuss the details of the methods they have learned, and are also exposed to cutting-edge topics not yet in the mainstream. Also covers emerging topics such as CNV analysis, epigenetic analysis, sequencing analysis, and admixture mapping. Students also carry out an independent analysis project through the term.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.744. Advanced Topics on Control and Prevention of HIV/AIDS. 4 Credits.
Focuses on directed readings and discussion on the science and pathogenesis of HIV/AIDS. Covers dynamics of the HIV epidemic in the populated world, difficulties and contrasts between clinical management of HIV/AIDS in developed and developing countries, prevention and control modalities against HIV/AIDS, and predicting patterns of future growth of the HIV/AIDS epidemic with special reference to global economic impact of HIV vaccine and eradication issues of HIV/AIDS.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.751. Epidemiologic Methods 1. 5 Credits.
Presents as the first course in the Epidemiologic Methods sequence. Introduces students to the principles and concepts used in epidemiologic research. Presents material in the context of an epidemiological framework with three major areas: populations and an introduction to study designs; measurement, including measures of accuracy and disease occurrence; and methods used for comparing populations. Illustrates synthesis lectures on how these elements come together in modern epidemiological research. Provides experience using laboratory exercises and assignments with applying concepts and calculations to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.752. Epidemiologic Methods 2. 5 Credits.
Second offering in the Epidemiologic Methods sequence. Builds on the concepts of epidemiologic reasoning, population health measures, validity, and study design taught in Epidemiologic Methods 1. Provides a detailed presentation of causal inference, study design and threats to validity (confounding, information bias and selection bias). Discusses a wide range of epidemiologic designs in detail, together with their advantages and limitations. Laboratory exercises, assignments, and the MiniProject provide experience with applying concepts and calculations to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.753. Epidemiologic Methods 3. 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.765. Professional Epidemiologic Methods: Epidemiologic intelligence and Population Health Assessments. 2 Credits.
Focuses on practical skills for epidemiological assessments of population health, which include methods for monitoring epidemiological profiles and health trends, using public health information systems for measuring health burden, developing epidemiological profiles and conducting health situation analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.766. Professional Epidemiologic Methods: Surveillance. 2 Credits.
Covers epidemiological methods and analyses for public health surveillance, including novel measurement approaches for “real and near real time” surveillance, syndrome surveillance and surveillance of public health events. Students learn interpretation of analytic strategies including descriptive and inferential epidemiological methods for surveillance data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.767. Professional Epidemiologic Methods: Topics and Methods for Health Situation Analysis. 2 Credits.
Focuses on epidemiological methods and tools used in key health situation analyses. Includes the use of prospective epidemiological scenarios for monitoring health targets and indications. Also covers examples of health priority setting assessments; health needs assessments, and the methods for epidemiological stratification of public health problems. Laboratory exercises provide experience with applying concepts, methods and tools to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.768. Professional Epidemiologic Methods: Decision Making in Health Situation Analysis. 2 Credits.
Covers advanced health situation analyses for the evaluation of effectiveness of public health programs using real public health scenarios and available health information datasets. Covers selected epidemiological metrics for measuring social health inequalities and methods for informing evidence-based healthcare decision-making using epidemiologic data. Also addresses the role of available epidemiological evidence and translational research for public health programs. Laboratory exercises provide experience with applying concepts, methods and tools to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.769. Professional Epidemiology Methods. 4 Credits.
Trains future leaders using advanced epidemiological methods applied in modern public health practice, and provides students with the key epidemiological competencies for mid-level and senior-level epidemiologists. Covers examples of health priority assessments, health needs assessments, epidemiological stratification of public health problems, measuring health inequalities and evaluation of effectiveness of public health programs using real public health scenarios and available health information datasets. Also covers selected methods for translating epidemiologic data for decision-making. Addresses the role of available epidemiological evidence and translational research for public health programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.770. Public Health Surveillance. 3 Credits.
Acquaints students with Public Health Surveillance, which is a core public health function essential for understanding and monitoring population health. Covers the theory, data collection methods, data analysis techniques, and presentation strategies of the systematic, continuous, analysis and interpretation of population health data to inform planning, implementation, and evaluation of public health practice. Students identify the different types of surveillance, and how each is applied in varied settings. Practical experiences/labs involve creating data collection tools, and reviewing how they can be applied in practice. Real-world surveillance data is used to illustrate methods for analysis, and how surveillance data should be presented to different audiences. Guests who are coordinating and conducting surveillance in different community settings lead interactive discussion sessions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.774. Advanced Theory and Methods in Epidemiology. 4 Credits.
Integrates and extends content taught in the Epidemiologic Methods 340.751-753 sequence. Focuses on the conceptual underpinnings and application of strategies for addressing key methodologic challenges that arise when carrying out epidemiologic research. Incorporates experiential learning components, including a term-long self-directed group research project, and provides resources for students to acquire a working knowledge of how to apply presented methodological tools.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.775. Measurement Theory and Techniques in Epidemiology. 4 Credits.
Reviews concepts, key assumptions, and published applications of measurement theory, including true scores and counterfactual outcomes, latent variables, and validity. Explores novel applications of item response theory to refinement of measures, assessment of differential item functioning, and calibration of metrics across diverse samples. Topics include analysis of novel types of data (biomarkers, high-dimensional data, administrative records, genetics), item response theory, latent growth curve models for longitudinal data and their extensions, and cross-study statistical harmonization and co-calibration. Draws examples from epidemiologic applications in the behavioral and social sciences. Offers students opportunities for applying lessons from didactic lectures in a laboratory setting using prepared examples.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.776. Study Design and Analysis for Causal Inference With Time-Varying Exposures. 3 Credits.
Presents a holistic framework for studying causal effects of time-varying exposures. Builds on 140.664 and 340.774 and explores how to articulate causal questions and clarifies assumptions needed to identify the effects of time-varying exposures. Distinguishes total effects of exposures at a given point in time from those that involve cumulative doses or adherence to dynamic treatment rules. Outlines design parameters such as eligibility, start of follow-up, and artificial censoring with data from cohorts or administrative healthcare records. Reviews the motivation, intuition, and application of advanced methods such as time-dependent propensity scores, marginal structural models, and the parametric g-formula to overcome time-varying confounding and selection-bias. Emphasizes practical application and robustness checks, guideposts for choosing among study designs and analytic methods, and comparative strengths for studies with an etiologic vs. translational focus.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.794. Power and Sample Size for the Design of Epidemiological Studies II. 1 Credit.
Introduces power and sample size (PSS) calculations for the design of more complicated studies, including survival or time-to-event outcomes, cluster randomized trials, studies with correlated outcomes, and non-inferiority trials. Introduces the use of simulation to conduct PSS calculations for the design of special situations where existing PSS tools do not directly apply. Showcases the design and conceptualization processes of real-world examples and how PSS statistical calculations serve as an integral component of the processes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.800. MPH Capstone Epidemiology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.802. Expert Searching for High Quality Evidence in The Online Environment. 2 Credits.
Introduces students to effective and efficient searching of the medical literature, in particular the skills and knowledge needed to produce an effective search in support of a systematic review of the medical literature. Discusses existing standards and evidence for these standards. Familiarizes students with software that helps with managing the results of literature searches. Addresses the competencies needed to complete comprehensive, systematic, transparent searches of the literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.803. Advanced Topics in Cardiovascular Disease Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.810. Field Placement Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.820. Thesis Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.830. Postdoctoral Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.840. Special Studies and Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.853. First Year Epidemiology Doctoral Seminar. 1 Credit.
Introduces current discussion, controversies, and applications of epidemiology. Reviews landmark papers and current literature and provides guided discussions of the materials. Focuses on exploring key paradigms that have influenced the field of epidemiology. Includes discussion of current trends influencing epidemiologic research and training, mentorship, controversies in the assessment of populations and outcomes, individual-level vs. population-health, and the relationship of epidemiology to the health care system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.855. SS/R: Biological Basis of Cardiovascular Disease Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.860. Current Topics in Epidemiologic Research. 1 Credit.
Engages with staff, students, fellows, and faculty in the Department of Epidemiology for exposure to epidemiologic methods as applied in research settings. Provides a broader perspective on contemporary issues in epidemiology and its research, through presentations of current research in the field of epidemiology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.861. Clinical Trials: Procedures, Design, and Interpretation of Results. 3 Credits.
Augments Introduction to Clinical Trials (340.645). Describes current standards for clinical trial protocols, consent procedures and describes regulatory requirements and expands upon design and analysis concepts presented in 340.645. Reviews key standards for clinical trial protocols, including the SPIRIT guidelines, recruitment and consent of participants, and principles for data acquisition and sharing. Covers regulatory requirements for drug development and adverse event monitoring as well as the statistical aspects of data monitoring for clinical trials. Provides more in-depth discussion of newer designs for clinical trials including non-inferiority design and adaptive designs. Investigates specific analysis issues for handling missing data, interim monitoring and cost-effectiveness. Addresses the synthesis of results from clinical trials in meta-analyses and the role of post-marketing surveillance in assessing drug safety.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.863. Doctoral Seminars in Epidemiology. 3 Credits.
Provides an opportunity for doctoral students to discuss challenges in epidemiology and apply methods and principles learned in didactic courses to formulate research questions and specific aims. Participates in the preparation of dissertation proposal components, develop skills to effectively communicate research questions, and critically evaluate the scientific merit of research proposals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.865. Teaching Epidemiologic Methods and Concepts At the Graduate Level. 1 - 8 Credits.
Review and evaluate critical skills in teaching and communicating science, epidemiology, methods, and theory to a wide range of individuals. Provides a feedback mechanism for learning best practices in education at the graduate level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.871. Welch Center Research Seminar. 1 Credit.
Students, postdoctoral fellows and faculty present contemporary epidemiological research articles, focusing on clinical and cardiovascular epidemiology. Emphasizes presentation skills and the ability to critically evaluate scientific papers. Uses a journal-club format in which one or more papers are distributed in advance. Participants are expected to read and discuss the assigned material. Media reporting/coverage in the lay and medical press is explicitly discussed related to the article. Provides a forum for the discussion of the appropriate use of statistical methods for various study designs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.872. Genetic Epidemiologic Seminars in Current Research and Methodology. 1 Credit.
Emphasizes the importance of reading, understanding, and discussing literature. Presents scientific papers from the current literature in genetic epidemiology (students, postdoctoral fellows, and faculty). Provides students the opportunity to interact with faculty regularly. Reviews current topics and methodology in genetic epidemiology with current faculty and research leaders and practitioners.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.873. Contact Tracing During the COVID-19 Pandemic. 1 Credit.
Provides basic elements and methodology of contact tracing and practical experience by executing these newly learned skills. Reviews current issues and concerns encountered by students. Evaluates and promulgates best practices in contact tracing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.874. Current Topics in Human Rights. 1 Credit.
Reviews a common framework for the analysis of comparative effectiveness and safety research CER randomized trials and observational studies, and presents several applications for cardiovascular, renal, and infectious diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.895. MPH Practicum: Epidemiology. 1 - 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.901. Principles of Epidemiology Lab.
Lab for Principles of Epi
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.921. EPIDEMIOLOGIC INFERENCE IN PUBLIC HEALTH I Lab.
EPIDEMIOLOGIC INFERENCE IN PUBLIC HEALTH I LAB
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.951. EPI Methods 1 Lab.
Lab for PH.340.751
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.952. EPI Methods 2 Lab.
Lab for PH.340.752
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.953. Lab for Epi PH.340.753.
Lab for EPI 340.753
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.001. English for Academic Purposes I.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.002. English for Academic Purposes II.
Focuses on academic writing skills including documentation styles, and combines Saturday class meetings with online assignments and one individual conference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.600. Living Science Ethics - Responsible Conduct of Research. 1 Credit.
Fosters the responsible conduct of scientific research using a combination of lectures, discussion and analysis of case studies. Includes topics: data management, conflict of interest, scientific misconduct, questionable research practices, responsible authorship, peer review, collaborations with peers and industry, trainee-mentor relationships, research ethics and regulatory requirements of the conduct of animal and human research, and the scientist as a responsible member of society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.601. Implementation Research and Practice. 3 Credits.
Distinguishes implementation science from traditional research and practice. Combines didactic methods and group activities to explore the rapidly evolving topic of implementation as it pertains to public health research and practice. Provides an overview of the concepts, theories, tools, and methods used to advance implementation research and practice. Presents key principles of implementation science from a multidisciplinary perspective and provides practical applications of those principles in both practice and research-based settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.602. Interprofessional Education Activity.
Provides the opportunity to participate in a case study highlighting the essential role of teams and teamwork in building multi-sector collaborations and partnerships in population health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.603. Fundamentals of Immunology. 3 Credits.
Introduces the major molecular and cellular components of the immune system and provides a broad understanding of the biological concepts associated with the induction and regulation of innate and adaptive immune responses. Explores major mechanistic topic areas that include the innate recognition of pathogens, the molecular nature of antigens and antigen presentation; molecular basis for antibody and T-cell receptor structure and diversity; cytokine signaling in immune activation, T cell lineage commitment, cellular basis for antibody production, cellular basis for T cell activation and cellular immunity, and central and peripheral tolerance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.604. Qualitative Reasoning in Public Health. 2 Credits.
Provides students with a broad overview of qualitative methods and concepts used in the public health sciences. Emphasizes the conceptual foundations of qualitative research and how it is used in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.605. History of Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.606. Milestones in Public Health. 1 Credit.
Provides a broad overview of public health milestones through the lens of diverse public health faculty spanning from molecular biology, vaccine policy, injury, and micronutrient supplementation to health disparities, legal issues, bioethics, and health security. Reviews a milestone with each lecture as viewed by an individual faculty and provides opportunity for questions and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.607. MPH Seminar in Public Health Topics. 1 Credit.
Provides a broad overview of public health topics through lectures given by faculty across the Departments and Centers of the School. Provides exposure to these issues and discussions that may help students further refine their MPH interests, goals, and future projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.608. Problem Solving in Public Health. 4 Credits.
Uses divergent public health issues to illustrate a systematic problem solving process for use in addressing public health problems. The problem solving process includes defining the problem, measuring its magnitude, understanding the key determinants, developing a conceptual framework of the relationships between the key determinants, identifying and developing intervention and prevention strategies (either interventions or policies), setting priorities among intervention options, understanding barriers to implementation and evaluation, and developing an effective communication strategy. Consists of lectures, discussions, small-group exercises, a group project, and individual assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.609. Life and Death in Charm City: Histories of Public Health in Baltimore, 1750 to the Present. 3 Credits.
Critically explores a range of important topics in the history of public health in Baltimore from the mid-18th century to the present, including: migration and health; sewers and water supply; infectious disease control (for example, tuberculosis and STDs); housing and lead poisoning; rodent control. Recurrent themes are racial inequality, the geography of poverty and the multiple challenges of urban government. Focuses on the city of Baltimore, but the issues discussed are placed in their wider national and international contexts and take into account broad historical developments in the theory and practice of public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.630. Public Health Biology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.631. Biological Basis of Public Health. 3 Credits.
Discusses molecular, biochemical, cellular and immunological methodology and approaches for the mechanistic understanding, treatment and prevention of human diseases, and for understanding disease susceptibility. The focus will be on the application of biological methods and approaches to such critical issues as infectious disease, cancer, neurodegenerative disease, COPD, environmental toxicant effects on early development, and reproductive anomalies and their treatment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.714. Secondary Uses of Electronic Health Record Data. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of analytics to Electronic Health Record (EHR) data. Covers the use of EHR data to define and identify populations and sub-populations of patients, evaluate common metrics in health care, and improve patient safety and care quality. Emphasizes the use of EHR data in hospital settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.800. MPH Capstone Extradepartmental. 2 Credits.
The MPH capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.840. P.H. Special Studies and Research. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.844. Current Issues in Public Health: COVID-19 Pandemic Response. 2 Credits.
Provides students with expert information and insight around the current COVID-19 pandemic globally. This series will meet virtually, featuring experts on multiple clinical, epidemiological, and social elements of the novel coronavirus.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.845. Comprehensive Or Preliminary Oral Exam for Part Time International DRPH Students. 2 Credits.
Since US Immigration laws require that all International students must be enrolled full time when on campus, students must complete their departmental/program comprehensive examination or their School preliminary oral examination enrolled as a full-time student during the time period of the exam.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.850. MPH MBA Internship. 12 Credits.
MPH MBA Internship
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.853. Seminar for MPH Concentration in Social and Behavioral Sciences I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.854. Seminar for MPH Concentration in Social and Behavioral Sciences II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.855. MA Public Health Biology Thesis. 5 - 6 Credits.
Provides an opportunity for students to, in consultation with a faculty mentor from the Dept of Biochem and Molecular Bio, Environmental Health or Molecular Microbiology and Immunology, prepare a critical, scholarly paper on an agreed upon subject area.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.860. Academic & Research Ethics at BSPH.
Examines academic and research ethics at BSPH in a series of online interactive modules. Focuses on information about the academic ethics code and responsible conduct of research at the School. Explores issues of academic integrity such as proper ethical conduct and referencing, and discusses violations such as plagiarism and cheating, relative to case studies that illustrate situations faced by students and faculty in the academic setting. Addresses topics that include responsible conduct of research, authorship, data management, data ownership, guidelines for professional conduct, research fraud or scientific misconduct, federal and institutional guidelines related to research using human and animal subjects and ethical issues involving vulnerable subjects in research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.864. Baltimore Community Practicum. 1 - 4 Credits.
Conducts a project involving a defined denominator population at a community-based organization or local health department. Participates in seminar sessions that cover basic methods of outreach to community organizations, attitudes and values about the role of professionals in community-based work, the social contract required of service professionals, and the attitudes required for effective public health practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.865. Public Health Perspectives on Research. 2 Credits.
Introduces the substantive and methodologic bases for public health research, emphasizing the critical roles of the quantitative, qualitative, biologic, social, and behavioral sciences in improvement of public health. Highlights principles of high-quality research, including the value of a population perspective, interdisciplinary cooperation, the importance of new measurement techniques, and the interface between theory and practice. Gives students information about the interactions between the public and the researcher.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.867. Introduction to MPH Studies.
Introduces MPH students to their educational program. Includes enrichment seminars, required readingsand assignments, including the Goals Analysis requirement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.870. SS/R: Occupational Medicine Residency-Practicum Year. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.880. SS/R: General Preventive Medicine Residency-MPH. 1 Credit.
Prepare residents in the theoretical, practical, and clinical knowledge and skills essential to leadership roles in the design, management, and evaluation of population-based approaches to health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.890. SS/R: General Preventive Medicine Residency-Residency Year. 6 - 16 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.895. MPH Practicum (Non Departmental). 1 - 4 Credits.
The MPH Practicum is a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.908. Lab for Prob Solving 550.608.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.840. P.H. Special Studies and Research. 0.5 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.867. Designing an MPH Capstone Project. 1 Credit.
Discusses the importance of selecting the appropriate format for addressing different capstone topic. Reviews search strategies and data bases for a literature review. Provides tips for using a citation management software such as RefWorks in order to provide proper attribution to references. Introduces the basic strategies for writing a clear and concise capstone paper. Provides tips for presenting data in tables and graphs. Introduces the basic strategies for giving a good oral presentation. Presents tips for giving and receiving meaningful feedback. Introduces principles for the design of a good poster.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.895. Source Practicum Special Studies. 1 - 4 Credits.
Special studies for practicum activities with SOURCE and participating Baltimore City community-based organizations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.602. The Role of Quantitative Methods in Public Health. 0.5 Credits.
Covers the bases for the role of quantitative methods in public health, including how to formulate scientific questions quantitatively, different types of data, properties characterizing high or poor quality of measurements, the implications of statistical uncertainty, and the difference between association and causation. Uses illustrative case examples including the opioid epidemic and aging.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.603. The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health. 0.5 Credits.
Acquaints students with a broad overview of the use of qualitative research methods in public health. Explores the types of critical public health questions best addressed through a qualitative approach and introduces conceptual principles that are foundational to qualitative research. Exposes students to key issues in planning and conducting qualitative research, as well as strategies for analyzing qualitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.604. Causes and Trends in Morbidity and Mortality. 0.5 Credits.
Provides a broad understanding of the top causes of morbidity and mortality globally, in the U.S., and in Baltimore City, as well as the trends in these estimates. Introduces measurement of morbidity and mortality, and threats to the quality of measurements. Addresses the role of population characteristics (age, sex, region, race/ethnicity) in estimates and trends. Discusses case studies of major causes and trends in morbidity and mortality in defined populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.605. The Science of Primary Secondary and Tertiary Prevention in Population Health. 0.5 Credits.
Provides a broad understanding of the different levels of public health prevention: primary, secondary, and tertiary and discusses the impact of each level on prevention in population health. Emphasizes the role of epidemiology in prevention and control; compares and contrasts the descriptive epidemiology, natural history, and pathologic and biologic characteristics as well as factors related to their etiology. Presents the impacts of recent advances in human genomics/genetics, immunology and metabolism on prevention strategies for chronic and acute disease. Introduces basic principles, theories, and methods in the field of prevention science. Identifies public health interventions that operate at multiple ecological levels, including the community, family, and individual. Introduces the role of resilience. Discusses case studies related to the prevention of different physical, mental, behavioral and infectious disease health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.606. The Critical Importance of Evidence in Advancing Public Health Knowledge. 0.5 Credits.
Emphasizes the need to establish the credibility of the evidence, based on the rigor of the methods used in generating it (e.g., type of studies, rules of causality, the nature of errors) before employing evidence to advance knowledge, practice, or policy. Discusses the bases for debate about recommendations for particular interventions that impact a population's health, how to weigh their benefits and harms, the ethics of scientific conduct, and effective communication in building evidence. Uses illustrative case examples, such as breast and prostate cancer screening, vaccines for measles and cervical cancer, nutritional sodium reductions, and the opioid epidemic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.607. Essentials of Environmental Health. 0.5 Credits.
Course Description: Summarizes the public health impact of environmental agents (e.g. chemical, biological, physical) present in air, water, soil, food, and the community. Discusses how these agents cause adverse health effects as well as ways to assess the risk of such effects and apply strategies for preventive interventions. Presents systems that have major impacts on environmental health, as well as applications of the science in the real domestic and international world. Through four modules: Foundations; Exposures in Air, Water and Food; Systems; and Cases, exemplifies effects of specific environmental exposures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.608. Biologic, Genetic and Infectious Bases of Human Disease. 0.5 Credits.
Focuses on the basics of cellular and molecular biology, genetics, and infectious agents. Explains concepts that link basic biology to disease and population health. Illustrates application of biologic and genetic principles to population health using case studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.609. Psychological and Behavioral Factors That Affect A Population's Health. 0.5 Credits.
Shows the role of behavior in health, drawing from smoking and other risk behaviors. Examines factors along the socioecological continuum that influence such behavior. Highlights key determinants for achieving behavior change to improve health outcomes, such as feasibility, self-efficacy and social support. Introduces common types of behavior change interventions, such as counseling and social marketing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.610. The Social Determinants of Health. 0.5 Credits.
Provides an overview of social, political, and economic influences on health and their role in producing health inequalities within and among populations. Emphasizes key axes of inequality: gender, race/ethnicity, and socioeconomic status. Explains conceptual foundations for social determinants of health and health inequalities. Summarizes evidence linking selected social, political, and economic factors to health and the pathways by which they influence health. Highlights importance of understanding social determinants of health, despite challenges of designing interventions targeting social determinants.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.611. Globalization and Population Health. 0.5 Credits.
Evaluates in depth the complex relationship between globalization and health. Discusses this relationship across the four main dimensions of globalization (economic, political, cultural and environmental). Examines the existing evidence on the impact of globalization on global burdens of disease. Explores the opportunities of globalization and strategies for mitigating its negative effects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.612. Essentials of One Health. 0.5 Credits.
Introduces the principles of One Health, the interface of human health, animal health and environmental health. Examines the methods and tools for the conduct of One Health studies and the design of One Health programs. Uses a systems thinking approach to explore multiple topics including food systems, food and animal policies, One Health governance, and stakeholder engagement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.621. Basic Resources Management for Public Health. 1 Credit.
Provides an overview of budgeting and resource management for public health practitioners working in health settings. Discusses the role and functions of governing bodies. Considers the types and categories of performance problems as well as how to determine causes of performance deviations and approaches for remedying them. Explores the tools and resources of budget and resource management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.622. Creating, Implementing and Monitoring Budgets for Projects and Programs. 1 Credit.
Addresses strategies for creating budgets for projects and programs. Stresses the essential role of budgets in promoting the health of organizations and resource management. Explores how budgets are used to facilitate project and program management, including assessing whether high-quality outcomes are being achieved on time and within resource constraints or whether changes to the work plan, budget, or available resources are needed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.623. Principles of Negotiation and Mediation for Public Health Professionals. 0.5 Credits.
Examines the theory and principles of negotiation and mediation. Through readings and didactic instruction, explores negotiation and mediation processes, models and techniques. Investigates verbal and nonverbal communication and persuasion as well as other factors that influence successfully negotiated compromises of complex public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.624. Applications of Negotiation and Mediation for Public Health Professionals. 0.5 Credits.
Offers students opportunities to apply negotiation and mediation principles and models to “get to yes” in their public health negotiation simulations. Uses a negotiation and mediation simulation that will enable students to practice the art of negotiating and examine their personal strengths and weaknesses in these processes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.625. Building Collaborations Across Sectors to Improve Population Health. 0.5 Credits.
This course provides an overview of the essential role interprofessional teams in building multi-sector collaborations and partnerships in population health. Following deliberate, evidence-based methods for effective collaboration, the course identifies and discusses several key factors that can only be addressed through cross-sector efforts. These factors include the social determinants of health, complexity, context, and societal resistance. The Collective Impact Model, designed to tackle entrenched, socially complex issues, is introduced as an evidence-based for effective, large scale, sustainable change.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.626. Systems Thinking: Concepts and Methods. 0.5 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers opportunities to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply systems thinking to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policymakers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.644. Public Health Advocacy: Grassroots Organizing for Policy Change. 3 Credits.
Provides a practical introduction to grassroots organizing for policy change. Uses foundational literature and case studies to review the history of advocacy and organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.Introduces students to two key areas of knowledge in public health practice: 1) the principles and methods of community organizing and 2) campaigning for policy and structural change. Includes a series of short assignments and group activities that will culminate in a final product: the creation of a campaign plan for changing public policy regarding a specific public health problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.600. Fundamentals of Health, Behavior and Society. 4 Credits.
Introduces students to a social ecological perspective of population health. Challenges students to address societal and structural forces such as socioeconomic position, racial and ethnic and gender sources of inequality as well as interpersonal processes reflected in norms, networks, and social capital. Focuses on behavior, communication, decision-making, and health outcomes at the individual, family, and community levels. Applies these social and behavioral perspectives to a better understanding of health problems and prepares students to develop effective public health interventions for individuals, families, communities, and populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.601. Emerging Tobacco Products and Regulatory Approaches. 3 Credits.
This course provides students with an overview of tobacco product regulation, including cigarettes, smokeless tobacco, shisha, and emerging nicotine delivery systems, such as e-cigarettes and heated tobacco products. Students will explore tobacco regulatory frameworks and national policies; review past regulatory successes and emerging regulatory strategies; search industry patents to understand how product innovation is protected and presented; and study the tobacco industry’s tactics to counter tobacco regulation by critically assessing media stories.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.602. Evaluation of Workplace Health Promotion Programs. 2 Credits.
Provides an introduction to workplace health promotion (wellness) programs, including a practical measurement and evaluation guide. Explains the key elements of measurement: structure, process, and outcomes. Reviews rigorous techniques and principles used in applied research studies and how they can be adapted to workplace health promotion evaluations. Offers easy to implement techniques for conducting survey studies at the workplace.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.603. Introduction to Genetic Counseling Research. 1 Credit.
Acquaints first-year genetic counseling students with the thesis proposal development process. Provides an overview of the ongoing research opportunities at Johns Hopkins and the National Institutes of Health. Familiarizes students with possible collaborators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.604. Harm Reduction: A Framework for Evidence-Based Policy and Practice. 3 Credits.
Discusses a variety of harm reduction strategies as they pertain to substance use issues. Introduces various programs that address substance use problems from a harm reduction perspective. Describes the evidence base supporting harm reduction programs. Explores the complicated legal and contextual issues associated with implementation of harm reduction programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.605. Fundamental Tools for Promoting Health Equity. 3 Credits.
Prepare DrPH students to apply health equity frameworks and measurement tools in their everyday functions; Includes four components: definitions and historical perspectives of health equity, health disparity, and social justice; common theoretical frameworks and their applications to different aspects of health equity, health disparities, and social justice; measurement tools used for health equity and health disparities in context; strategies and policies to reduce health disparities and promote health equity; Students complete a final project in which they must propose a program based in theory and proven need within their professional capacity
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.606. Local and Global Best Practices in Health Equity Research Methods. 4 Credits.
Introduces students to innovative methods, practical tools, and skills required to conduct evidence-based research that promotes local and global health equity. Theoretical frameworks draw on fundamental values and principles, including human rights, social justice, the value of diverse ideas and perspectives, inclusiveness, trustworthiness, behavioral and implementation science, and participatory decision-making. Includes lectures, interactive panel discussions, case-based examples, and opportunities to obtain feedback on research ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.607. Introduction to the Video Production Process for Public Health Professionals. 1 Credit.
Introduces public health professionals to the five phases of the video production process: conceptualization, script writing, pre-production (e.g., scouting locations, casting), production (e.g., shooting, voice-over), post-production (e.g., editing, graphics). Acquaints students to the fundamentals of script writing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.608. Applying Systems Thinking to Obesity Prevention. 2 Credits.
Given the complexity of many public health problems, systems thinking is increasingly cited as an approach and competency needed to understand these problems. The field of obesity in particular has benefited from systems thinking, methods and modeling, however, the application of these methods remains in an inchoate stage. Students will explore various systems concepts such as leverage points, heterogeneity, complexity, adaptability, interdependence, and learn how those concepts have been applied in obesity and food system research. Students will learn which systems concepts are most useful for researching specific obesity topics and their limitations. Finally, students will explore how systems research concepts and models critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.609. The Wellness Industry and Public Health: Partners Or Adversaries in Health Promotion?. 1 Credit.
Introduces students to the contemporary wellness industry in the US (including fitness and yoga) and explores the relevance of this industry for public health promotion. Describes core industry strategies for behavior change, and opportunities for public health evidence and research to inform industry practice. Content includes consideration of social media and the application of effective industry communication and motivation strategies for health promotion broadly defined.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.610. Housing Insecurity and Health. 3 Credits.
Introduces the issues of homelessness and its relationship to health. Presents factors leading to homelessness, myths about homelessness, barriers to accessing services, health problems that arise from homelessness, multidisciplinary approaches to health care from homeless persons, and advocacy strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.611. Under Pressure: Health, Wealth & Poverty. 3 Credits.
Explores the relationship between health, wealth, poverty, and public policy in the U.S. as well as internationally; assesses past and future strategies to remedy inequities in health and health care. Addresses theories of social class; distribution of poverty across gender, age, and ethnic/racial groups; antipoverty programs and their effects; effects of changes in health care organization on the poor; and possible modifications to provide greater equity. Investigates how a dramatically changing media landscape influences patterns of belief about the causes of poverty and its remedies. Synthesizes scientific evidence with a variety of genres and disciplines including: history, psychology, political science, religious thought, philosophy, geography, literary theory, popular culture, film/media studies, and music.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.612. Sociological Perspectives on Health. 3 Credits.
Presents sociological concepts, paradigms, and theories frequently cited or used as sources of basic ideas and assumptions in contemporary analyses of health behavior and health systems. Discusses the social construction of concepts and theories, especially those that apply to our understanding of health and illness, and the implications of sociological perspectives for public health, including social stratification, deviance, social control, role performance, and stress.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.613. Psychosocial Factors in Health and Illness. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.614. A New View: Improving Public Health Through innovative Social and Behavioral Tools and Approaches. 4 Credits.
Emphasizes real world integrative thinking, tools, and solutions in the pursuit of improving public health in the U.S. and internationally. Presents a global, multifaceted examination of health and illness, exploring the many factors that influence - or even determine - whether we remain healthy or become ill. Using biopsychosocial and environmental/ecological perspectives, explores the most prevalent diseases and health challenges confronting us today. Presents emerging views of health and illness being used in research, program and policy arenas. Examines factors such as socioeconomic status, ethnicity, stress, stigma, social support, coping, and politico-cultural influences through an array of contemporary issues, including: obesity, HIV/AIDS, women's health, bioterrorism, environmental public health, mental health and others. Presents innovative social and behavioral perspectives, tools and approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.615. Research Design in the Social and Behavioral Sciences. 3 Credits.
Provides an overview of the design and conduct of research in the social and behavioral sciences as applied to public health. Draws primarily from the research perspectives and methodologies of sociology, anthropology, and health promotion, students examine the formulation of a research question, selection of a research design, selection of a study site and population, issues and methods of data collection, and measurement validity and reliability. Evaluates the strengths and weaknesses of the major types of research design used in the social sciences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.616. Social and Behavioral Aspects of Public Health. 4 Credits.
Explores social influences on behavior and health. Teaches what research and experience in public health practice can tell us about how to affect social and structural change to improve the health of the public. Draws on theoretical, epidemiological, and case study evidence, uses specific health issues such as substance use, HIV, and stigma, and explores and illustrates the effects of social structures and practices on individual health status and behaviors. Develops a deeper understanding of the key concepts that inform a social and structural perspective on health, including race, class, gender, sexuality, socio-economic status, environments, and social networks and social capital. Also instructs and challenges students to think in terms of multi-level interventions that can influence these factors toward improved health outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.617. Foundations of University Teaching and Learning. 3 Credits.
This eight-week course will prepare participants to be effective teachers who: 1. Are knowledgeable about how learning takes place 2. Can develop and use appropriate active learning strategies in their classrooms 3. Can propose ways to make classrooms more inclusive and equitable
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.618. Using Software in Qualitative Research and Analysis. 1 Credit.
Introduces students to several qualitative data analysis software (QDAS) programs, including MAXQDA, Atlas.ti, NVivo, and Dedoose. Discusses the functions and limitations of qualitative data analysis software. Explores how QDAS can be used throughout a qualitative research project. Explains how to use QDAS for multi-media analysis, including images, video, and audio. Demonstrates how to use QDAS to organize data, produce reports, make comparisons, detect patterns, and facilitate analysis. Demonstrates how to use QDAS in team-based research projects for data coding and analysis. Prepares students to use QDAS to develop deeper insights into their data through visualization and mapping. Complements qualitative research methods and data analysis courses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.619. Social Justice: Policy, Practice, and Research. 4 Credits.
Introduces students to social justice frameworks and operational definitions to apply to research, policy, and practice. Challenges students to address societal and structural forms of oppression across systems in efforts to center cultural values and practices when implementing public health policies or programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.620. Program Planning for Health Behavior Change. 3 Credits.
Introduces students to different health behavior change theories addressing several levels of the Ecological Model. Students review and practice using program planning frameworks and needs assessments for designing effective interventions. Students choose a public health problem of their choice and design a behavior change intervention to address that problem. The process of creating the intervention is guided by a needs assessment and is theoretically informed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.621. The Opioid Crisis: Problem Solving Seminar. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.622. Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries. 4 Credits.
Introduces students to the principles of strategic leadership, placing these in the context of facilitating health systems change in developing countries. Covers the following topics: mental models and the household production of health, systems thinking and strategic leverage, personal mastery and commitment to change, action-learning principles and practice, shared vision and creative tension, the theory of constraints and root cause analysis, strategy design and key moves, implementation with accountability, and linking data to action. Develops leadership skills via interactive computer exercises using STARGuide software, small group work and class presentations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.623. Interprofessional Education Activity.
Provides the opportunity to participate in a case study highlighting the essential role of teams and teamwork in building multi-sector collaborations and partnerships in population health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.624. Genetic Counseling Cancer Standardized Patient Clinical Rotation. 4 Credits.
Prepares students for case preparation and genetic counseling in the cancer setting. Exposes students to a wide range of challenging counseling scenarios that require intermediate and some advanced counseling and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.625. Injury and Violence Prevention: Behavior Change Strategies. 2 Credits.
Expands students' understanding of, and skills in planning, implementing, and evaluating injury and violence prevention programs. Both unintentional and intentional injuries have been the focus of a considerable body of behavioral science research and behavior change interventions. Students read and discuss selected examples of this work and enhance their skills in applying behavioral science principles and best practices to an injury or violence area of interest to them. Topics include historical overview of behavior change and the injury prevention field, as well as examples of behavior change theories, strategies, and methods that have been applied to selected injury and violence problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.627. Human-Centered Solutions to Public Health Challenges. 3 Credits.
Introduces design thinking, a transdisciplinary, human-centered, creative problem-solving approach, and its applications in public health. Focuses on engagement with a Baltimore-based organization to address a real design challenge based on a problem the organization is facing. Provides students with practice using the design thinking process to identify a product, service, or system that more effectively meets end-user needs and preferences. Includes empathetic research methods to uncover insights about the challenge and end-users' experiences, working with stakeholders to generate a range of potential solutions, prototyping, and testing promising solutions, and identifying key considerations for implementation and scale-up. Discusses real-world case studies with HCD practitioners from the Johns Hopkins Center for Communication Programs (CCP).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.630. Implementation and Sustainability of Community-Based Health Programs. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.631. Introduction to Community-Based Participatory Research: Principles and Methods. 3 Credits.
Introduces students to the fundamental principles of, rationale for, and key considerations in conducting community-based participatory research (CBPR). Offers knowledge of and skills in CBPR that emphasize the importance of community inclusion and partnership as a viable approach to constructing and increasing the acceptance of interventions and improving the health and well-being of populations. Also uses case-based learning as an approach for real world application of CBPR concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.635. Applications of innovative Methods in Local and Global Health Equity Research. 4 Credits.
Provides practical methods to develop, implement, and sustain successful health equity research programs in the United States and communities around the world. Introduces students to innovative methods, practical tools, and skills required to conduct rigorous health equity research and translate evidence-based strategies into practice and policy. Topics range from stakeholder engagement and behavioral intervention development to research methods in healthcare services for socially at-risk populations. Includes lectures, interactive discussions, case-based examples, and opportunities to obtain feedback on research ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.638. Scientific Writing in Health Sciences: Developing A Manuscript for Publication I. 3 Credits.
This course introduces and guides students in the writing of scientific manuscripts for publication in an area related to public health, particularly social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: principles of good writing; tips for writing more efficiently; journal selection; co-author selection, and the anatomy of a manuscript. Students begin the course with a research question (purpose of study) and a summary of quantitative or qualitative (or mixed methods) data they would like to present in a scientific manuscript. This typically takes the form of summary tables. All analyses must be completed prior to the start of the course. Students end the course with at least two sections (e.g., methods and results) of a completed manuscript.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.639. Scientific Writing in Health Sciences: Developing A Manuscript for Publication II. 3 Credits.
This course guides students in the writing of scientific manuscripts for publication in an area related to social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: completion of the manuscript; drafting a cover letter; the process of peer review; revising a manuscript; and proofs and ultimate publication. Students end the course with a completed manuscript for ready for submission to a journal for publication.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.640. Global Tobacco Control. 3 Credits.
Provides an overview of actions taken over 50 years that have led to tobacco control being the most successful public health initiative. Actions of tobacco control are directly linked to changes in societal norms so that smoking is no longer socially acceptable in the US and in other countries. This course presents evidence-based policies, regulations, advocacy and communication strategies responsible for these changes. Challenges still present include disparities as well as introduction of novel products (Juul). The influence of transnational tobacco industries will be discussed and their role in undermining governmental and international actions to control tobacco use.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.642. TOBACCO CONTROL LEADERSHIP. 2 Credits.
Through lectures and discussion students develop an understanding of the role of the tobacco control leader, and the essential knowledge and skills this role requires. Provides a framework for understanding the process of working effectively with and leading others. Emphasizes the role of the leader in leading change and developing a vision for the future of tobacco control.Upon successfully completing this course, students will be able to: • Explain the nature of organizational leadership;• Describe the requirements of effective public health and tobacco control leadership;• Apply principles and theories of leadership to current tobacco control issues and challenges;• Develop a personal philosophy and approach to the practice of leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.645. Applying the Social Ecological Model in Tobacco Control and Climate Change. 3 Credits.
Compares the fields of tobacco control and climate change by describing the lessons learned from tobacco control—one of the most successful public health movements. Provides an overview of tobacco control research and advocacy approaches that form a comprehensive public health strategy and considers the use of the social ecological model to address the threats posed by climate change. Explores how both issues involve economic, social, environmental, and behavioral forces that require multi-level approaches from multiple sectors. Offers insight into industry and private sector interference that obfuscates scientific evidence, confuses the public, and stalls effective regulatory policy for both fields of study. Encourages critical comparative skills throughout to discuss how to improve public health approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.650. Introduction to Persuasive Communications: Theories and Practice. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.651. Health Literacy: Challenges and Strategies for Effective Communication. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.652. Interpersonal Influence in Medical Care. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.653. Contemporary Issues in Health Communication. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.654. Health Communication Programs I: Planning and Strategic Design. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.655. Health Communication Programs II: Implementation and Evaluation. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.656. Entertainment Education for Behavior Change and Development. 4 Credits.
Examines and teaches ways in which education can be subtly but effectively worked into both new and time-honored genres of entertainment in order to foster positive behavior change and life improvement in both developing countries and local environments. Develops students' ability to understand the ingredients of successful entertainment: emotions, empathy, efficacy and empowerment, and how these can be employed to enhance social and personal health and life skills. Examines methodology and develops skills needed to create a successful Entertainment-Education (E-E) project in entertainment (story, drama, etc.) formats with effective behavior change messages.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.657. Communication Strategies For Sexual Risk Reduction. 3 Credits.
Focuses on strengthening students' understanding of sexual risk-taking and provides a solid foundation in communication strategies for sexual risk-reduction from an international perspective. The literature and examples emphasize HIV and STI risk reduction. Adopts a seminar format and consists of readings, discussions, presentations, video viewing, case studies, and critiques of literature on sexual risk-taking and protective behaviors. Includes hands-on analyses and interpretation of empirical data on sexual risk-taking and development of a communication strategy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.658. Health Communication Planning and Management for Behavior Change. 3 Credits.
Provides an overview of concepts and theories in communication with a focus on health behavior change. Explains the importance of health behavior as a contributor to current public health problems and the role of behavior change communication; describes methods of communications needs assessment. Also provides the approaches, conceptual tools in planning and management of communication processes in hospitals and out-reach programs in health services, and to develop skills for effective communication with clients and other stakeholders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.660. Latino Health: Measures and Predictors. 3 Credits.
Examines the measures and predictors of health for the US Latino population. Learns how psychosocial and other individual-level factors, as well as socio-political, community, and health care delivery factors influence an individual's success in accessing the health care system in a sustainable manner. Learns key steps to design, implement, and evaluate health care programs working to decrease the health disparities gap faced by Latinos in the US, by using case studies that take into consideration the heterogeneity of the Latino population.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.663. Media Advocacy and Public Health: Theory and Practice. 3 Credits.
Broadens students' understanding of health communication to include the strategic use of the news media to support community organizing to change public health policy. Builds on theoretical and empirical work in mass communications, and uses case examples in a number of health policy areas to show how the strategies and tools of media advocacy may be applied to specific public health policy campaigns. Ample opportunities are provided for students to "practice" media advocacy, in the form of writing letters to the editor and opinion pieces, role-playing interviews, and so on. Introduces students to research literature about news media forms and practices; to framing techniques to influence news content and gain access to news channels; and to the relationship between media advocacy and other forms of health communication
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.664. Knowledge Management for Effective Global Health Programs. 3 Credits.
Introduces participants to knowledge management (KM), behavioral science, and adaptive management principles, processes, and tools, and their applicability to the design and implementation of global health efforts. Demonstrates, through real-life examples, how KM, behavioral science, and adaptive management principles can be applied to strengthen public health systems and maximize available knowledge to reach public health objectives. Emphasizes the importance of culture and equity as drivers for program success.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.668. Policy Interventions for Health Behavior Change. 3 Credits.
Examines the major theoretical frameworks that are relevant to the development, enactment, implementation and evaluation of policy interventions that support healthy behavior change. Explores the roles of ideas, interests, institutions, key actors and ethics in the policy process are explored. Discusses how the environment can be influenced to improve the chances of implementing effective interventions to improve the public's health. Presents case studies to critically explore the strengths and limitations of policy change theories as they relate to current hot topics in the area of health, behavior and society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.671. Introduction to Qualitative Research Methods. 3 Credits.
Introduces students to qualitative research methods applied to the investigation of public health issues. Explores the theoretical underpinnings of qualitative research, factors that influence the utility of a qualitative approach, and ethical considerations in qualitative research. Focuses on the qualitative interview and provides an overview of the practical skills and tools required for conducting qualitative interviews and analyzing qualitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.672. Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy. 3 Credits.
Introduces students to a key area of knowledge in public health practice: the principles and methods of community organizing and campaigning for policy and structural change. Focuses on how to mobilize the right people at the right time, with the right demands, to change public policies to promote health. Complements other courses in the school that look at advocating within policy processes or by using the mass media by placing these strategies in the context of the practical daily work and thinking of people who plan and carry out policy change campaigns at grassroots and grasstop levels.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.673. Introduction to Qualitative Data Analysis for Public Health. 2 Credits.
Introduces students to the analysis of interview and focus group data collected as part of qualitative public health research. Explores distinct analytic approaches and traditions, and compares the strengths and weaknesses of different analytic paradigms for different research questions. Introduces computer software for coding and managing data using freely available online demonstration of various software packages. Presents both theoretical and practical dimensions of qualitative data analysis. Emphasizes hands-on learning activities within the classroom to practice and apply concepts learned through readings, lectures, and discussion. Develops skills to conceptualize an analytic plan for qualitative data for future research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.675. Critical Analysis of Popular Diets and Dietary Supplements. 3 Credits.
Focuses on the dietary supplements and diets purporting to promote health, induce weight loss, or treat specific health concerns are widely used by Americans, which are often minimally regulated. Students apply the tools of nutritional science to a critical analysis of popular diets and supplements. Students explore the following: nutrient analysis, dissecting several example diets and supplements in class discussions, preparing a comprehensive written analysis of a specific diet or supplement of their choosing, and presenting their findings orally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.677. Theory and Practice in Campaigning and Organizing for Public Health I. 4 Credits.
Provides a practical introduction to campaigning and organizing for public health. Combines experiential learning (through participation in an actual campaign) with traditional learning (online lectures, in-class discussions and readings). Uses case studies to review the history of organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Part of a two-term sequence that prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.678. Theory and Practice in Campaigning and Organizing for Public Health II. 4 Credits.
Provides a practical introduction to campaigning and organizing for public health. Combines experiential learning (through participation in an actual campaign) with traditional learning (online lectures, in-class discussions and readings). Uses case studies to review the history of organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Part of a two-term sequence that prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.679. Decolonization, Global Communication, and Public Health. 3 Credits.
Applies insights from anti-colonialist texts to the field of global health communication. Critically examines the intersection of theories of economic development, social change, and communication as applied to public health. Introduces the complex and dynamic role of global communication in the social determinants of health. Interrogates “development” discourses as applied to health communication in middle- and low-resource areas countries. Presents evaluations of communication interventions in low- and middle-resource nation-states. Investigates health communication endeavors abroad as well as in low-resource settings in the U.S.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.680. Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions. 3 Credits.
Addresses social approaches to promoting sustained adherence to health regimens among persons living with chronic conditions. Addresses prescribed use of medications, lifestyle changes, and retention in healthcare over time among persons living with HIV/AIDS, hypertension, and other chronic conditions. Enables students to: (1) assess adherence to health regimens, (2) identify correlates of adherence at the individual, interpersonal, and social network levels, and (3) assess major approaches and components of medical adherence interventions, and their linkage to theories of behavior change. Explores social factors impacting vulnerable populations’ medical adherence and health disparities, drawing examples from both domestic and international contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.681. Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic. 3 Credits.
Introduces students to key epidemiological, conceptual and historical constructs critical to understanding and responding to the HIV epidemic among gay, bisexual and other MSM in the United States. Explores the role of social and ecological factors and theoretical constructs (e.g., race and ethnicity, intersectionality and minority stress, gender and masculinity, policy and structural changes, and other social determinants) on individual and population-level experience of the HIV epidemic. Provides an in-depth understanding of the challenges to prevention and care in these constituencies through lectures, readings, small group work, and a panel discussion with community stakeholders. Provides students with an ability to develop new lines of theory, research and practice to more effectively apply a socio-ecologic framework to the HIV epidemic and better respond to HIV as a public health issue.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.682. Integrating Children's Mental Health and Primary Care: A Social and Behavioral Science Perspective. 3 Credits.
Examines integration of mental health and primary care as both a solution to chronic shortfalls in the provision of children’s mental health services and an example of the processes involved in making change in complex systems. Frames the change process as taking place at three social-ecologic levels: how care is designed to bring about health behavior change at the client/patient/consumer level; how interventions are implemented to influence staff/clinician behavior at the organizational level; and incentives and barriers at the inter-organizational and health systems level. Uses this three-level framework to analyze a range of integration models (the medical home, collaborative and stepped care, task shifting, screening and brief intervention, and co-location of services). Uses examples largely from both ongoing programs in Maryland, Massachusetts, and Ohio with which the instructors are involved, as well as international programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.683. Global Perspectives on LGBT Health. 3 Credits.
This course introduces and guides students in the writing of scientific manuscripts for publication in an area related to public health, particularly social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: principles of good writing; tips for writing more efficiently; journal selection; co-author selection, and the anatomy of a manuscript. Students begin the course with a research question (purpose of study) and a summary of quantitative or qualitative (or mixed methods) data they would like to present in a scientific manuscript. This typically takes the form of summary tables. All analyses must be completed prior to the start of the course. Students end the course with at least two sections (e.g., methods and results) of a completed manuscript.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.684. Effective Risk Communication to Overcome Health Disparities During a Pandemic. 2 Credits.
Prepares students to develop effective risk communication strategies and materials for use during a pandemic. Reviews common theories of social and behavior change communication across the socioecological spectrum. Examines the disproportionate impact of pandemics on marginalized and vulnerable population groups. Challenges students to critically assess risk communication messages and approaches using an equity and disparities lens. Challenges students to develop communication strategies that mitigate the effects of social and structural disparities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.686. Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction. 4 Credits.
Presents advanced analytic methods relevant to the social ecological model and other theoretical frameworks common in the social and behavioral sciences. Emphasizes multilevel analyses, longitudinal analyses, and propensity score methods. Introduces factor analysis, analysis of experimental studies, structural equation modeling, and complex surveys. Explores the suitability of these methods to address different research questions and study designs. Provides discussions of underlying concepts and assumptions and presents key issues in their application. Illustrates methods through critical review of published articles and by working through examples in Stata. Presents resources for continued advanced study, including methods courses offered through the school.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.690. Ethnographic Fieldwork. 3 Credits.
Introduces students to ethnography as a method of qualitative research (fieldwork) and a product of this research (written accounts and monographs). Introduces skills and data collection methods fundamental to ethnographic fieldwork, particularly immersion, participant observation, writing field notes, and listening. Discusses what constitutes “the field” in ethnographic fieldwork, the holistic perspective, and “thick description.” Explores key theoretical and methodological issues in contemporary ethnographic fieldwork such as ethics, positionality, reflexivity, and power. Emphasizes the role of ethnographic research in public health. Prepares students to critically assess ethnographic writing. Combines lecture, discussion, and practical skill development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.710. Concepts in Qualitative Research for Social and Behavioral Sciences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.711. Doctoral Seminar in Mixed Methods for Public Health Research. 3 Credits.
Introduces doctoral students to emerging discussions and applications of mixed methods research in public health. Explores mixed methods as a third research paradigm that involves the utilization of both quantitative and qualitative methods within a single inquiry to enhance the researcher's abililty to understand the problem at hand. Fosters synthesis of and engaged reflection on qualitative and quantitative research training. Specific topics include: history and language of mixed methods research; relevant paradigms and epistemological debates; mixed methods design and research questions; and analysis and dissemination considerations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.712. Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.721. Translating Research into Public Health Programs and Policy. 3 Credits.
Examines how behavioral research (especially intervention research) is used, and not used, by policy makers and program administrators to determine what public health services are delivered. Defines the major types of decisions made in determining services to deliver in public health programs and major decision analytic methods used to aid these selections. Includes these types of decisions: (1) how much to invest in service for one disease area relative to another, (2) determining if an intervention is affordable for large-scale delivery, and (3) choosing how much to invest in each of several different types of services within one disease area. Includes methods decision tree analysis, cost analysis, and cost-utility analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.722. Translating Research into Public Health Programs II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.733. Communication Network Analysis in Public Health Programs. 4 Credits.
Introduces the theory and method of network analysis, its application to public health, emphasizing the dissemination of public health information and the transmission of disease, and the influence of networks on health-related behavior.Introduces the theory and method of network analysis, its application to public health, emphasizing the dissemination of public health information and the transmission of disease, and the influence of networks on health-related behavior. The course consists of class lectures, discussions, labs, reading materials, and problem sets. Data analysis will be conducted using STATA, UCINET and Netdraw software packages. Students need to have the access to Window system to download a free version of UCINET and Netdraw.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.752. Children, Media, and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.755. Health Communication Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.800. MPH Capstone Health, Behavior and Society. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.810. Field Placement Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.820. Thesis Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.830. Postdoctoral Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.840. Special Studies and Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.850. MHS Research Practicum in Health Behavior and Society. 1 - 16 Credits.
Introduces MHS Social Factors students to hands-on social science research for public health. Provides an opportunity to work extensively with a doctorally trained research mentor. Prepares students to participate in social science research initiatives. Builds students' research knowledge and skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.860. Graduate Seminar in Social and Behavioral Sciences. 2 Credits.
Explores and debates theoretical concepts and orientations in the social and behavioral sciences and their application to public health research and practice through readings, discussion, and writing assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.861. Graduate Seminar in Community-Based Research. 1 Credit.
Explores faculty-community partnership in community-based research (CBPR), education, and practice. Seminar topics may include CBPR principles and ethics, coalition and partnership building, implementation, dissemination, translation and sustainability, media and marketing, advocacy, policy, cultural diversity, collaborative grant writing, and publishing. Speakers include faculty and also community patrons.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.863. Doctoral Seminar in Social and Behavioral Research and Practice. 1 Credit.
Explores and critiques social and behavioral sciences research and practice, emphasizing key constructs and methods of department faculty through presentations, readings, and group discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.864. Critical Issues in Health Disparities. 1 Credit.
Provides an opportunity for students, postdoctoral trainees, and faculty to present scientific papers from the current and/or classic health disparities literature. Emphasizes presentation skills and the ability to critically evaluate scientific papers. Requires participants to read and discuss the assigned material.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.865. MSPH Seminar in Health Education and Health Promotion. 1 Credit.
Introduces a variety of topics important to the profession of health education and health promotion, including both historical and current issues. Presents role definitions and competencies, health education certification, professional organizations representing the field, and other health education and promotion resources. Prepares students for the field placement requirement in the second year of the program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.866. Careers in Health Education and Health Promotion. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.867. MSPH Field Placement Preparation. 1 Credit.
Prepares students to fully understand the MSPH field placement requirements, processes, and opportunities, so that they may make the most of this professional preparation opportunity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.868. Program Planning for Health Behavior Change Practicum. 2 Credits.
Explores program planning application through project-based experiential learning. Includes work in small groups to apply the PRECEDE-PROCEED needs assessment planning framework in a real world setting with a community-based organization or local government agency. Focuses on the basic methods of working with communities and community organizations, types of needs assessment tools, and the skills needed to develop these tools, through four seminar sessions and weekly sessions with community based organization representatives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.870. HBS Research and Proposal Writing Process for Doctoral Students I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.871. HBS Research and Proposal Writing Process for Doctoral Students II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.881. MHS Seminar in Social Factors in Health I. 1 Credit.
Introduces students to social science concepts in public health and to ongoing social factors research at JHSPH. Introduces students to key concepts and tools necessary to successfully complete the MHS in Social Factors in Health degree program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.882. MHS Seminar in Social Factors in Health II. 1 Credit.
Provides additional skills in social science concepts for public health research. Introduces research methods for social factors research. Identifies current social factors research of interest to students.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.883. MHS in Social Factors in Health Seminar III. 1 Credit.
Upon successfully completing this course, students will be able to: 1) Identify a range of social scientific research approaches adopted by public health agencies. 2) Identify a range of public health agencies where social science research is conducted.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.884. MHS Seminar in Social Factors in Health IV. 1 Credit.
Advances students' understanding of the relationship between social factors and health outcomes and experiences. Exposes students to research pertinent to social factors in health. Provides MHS students with opportunities to explore applications of public health research skills in a variety of research and practice settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.895. MPH Practicum: Health Behavior and Society. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.610. Practical Genetic Counseling. 2 Credits.
415.610 addresses the chromosomal basis of heredity, chromosomes and genes, tools of human molecular genetics, single gene inheritance, variation, polymorphism and mutation, genes in populations and genes in families. 415.611 presents the role of genetic counseling in health care and emphasizes the essential components of prenatal, pediatric, and adult genetics services. Indications for referral and genetics education and counseling components are illustrated using care examples. Clinical skills and tools are taught including family, medical and development history taking and pedigree construction. Additional case management skills such as the choice of laboratory and test interpretation, and issues in billing and reimbursment of genetic counseling services are addressed. 415.612 -613 expand on the previous two courses to examine the Hemoglobinapathics and Thalassemias as models of molecular pathology, the molecular/biochemical basis of genetic disease, genetics of cancer, gene mapping
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.611. Introduction to Human Genetics I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.612. Introduction to Human Genetics II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.613. Introduction to Medical Genetics I. 2 Credits.
Provides a foundation in medical genetics. Focuses on teaching genetic disorders using a systems approach. Presents an overview of the disease process and differential diagnosis of related genetic disorders. Includes the following topics: birth defects/embryology, prenatal diagnosis, pulmonary disorders, muscle diseases, hemoglobinopathies, ocular diseases, kidney disorders, craniosynostoses, skin disorders, deafness, because knowledge of the genetic contribution to disorders within these categories is critical to the work of genetic counselors and medical geneticists. Prepares students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.614. Introduction to Medical Genetics II. 2 Credits.
Builds upon the material in 415.613, and emphasizes other organ systems. Includes a patient panel where individuals discuss the impact of a genetic disorder on their lives and the lives of their family. Includes the following topics: neurogenetics, cardiac defects, cancer genetics, orofacial clefting, genitourinary disorders, skeletal dysplasias, connective tissue disorders because knowledge of the genetic contribution to disorders within these categories is critical to the work of genetic counselors and medical geneticists. Prepares students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.619. New Genetic Technologies and Public Policy. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.620. Introduction to Genetic Counseling I. 2 Credits.
Compares definitions of genetic counseling (GC) with objectives and service outcomes. Explores counselor values as they relate to roles and responsibilities toward clients. Introduces ethical and policy issues specific to GC in conjunction with a research agenda. Discusses and practices basic tools, including interviewing, history gathering, and case assessment, and nondirective counseling approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.621. Introduction to Genetic Counseling II. 2 Credits.
Compares definitions of genetic counseling (GC) with objectives and service outcomes. Explores counselor values as they relate to roles and responsibilities toward clients. Introduces ethical and policy issues specific to GC in conjunction with a research agenda. Discusses and practices basic tools, including interviewing, history gathering, and case assessment, and nondirective counseling approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.624. Ethical, Legal and Social Implications in Genetics and Genomics Over Time. 3 Credits.
Examines the ethical, legal and social implications (ELSI) of human genetics and genomics through the lens of significant and field-defining periods and events in the history of the field. Examines the ELSI raised by those events, and how the events have shaped and defined the current state of the science and emerging scientific, ethical, policy and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.630. Therapeutic Genetic Counseling I. 2 Credits.
Equips graduate students enrolled in the JHU/NHGRI Genetic Counseling Program with an applied psychological paradigm for genetic counseling. Defines and illustrates goals and the process of genetic counseling. Teaches students skills to assess clients' cognitive and affective responses to the genetic contribution to disease and risk. Defines components of a therapeutic relationship. Allows opportunities to practice establishing and acting on a therapeutic relationship.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.631. Therapeutic Genetic Counseling II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.640. Health Judgment and Decision Making. 2 Credits.
Provides a foundation in cognitive, emotional, and motivational processes underlying judgment and decision making in a variety of health contexts. Focuses on antecedents and consequences of adaptive and maladaptive health judgments and decisions, with particular attention to risk perception and communication, application of decisional heuristics, and personal beliefs underlying health decisions. Considers how people make decisions, how they respond to health information, and how they mentally represent illness, as well as how health teams make decisions. Prepares students to apply basic research on health judgment and decision-making to effective genetic counseling and other applied settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.650. Facilitating Family Adaptation to Loss and Disability I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.651. Facilitating Family Adaptation to Loss and Disability II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.675. Cancer Genetics: Managing the Risks Through Testing and Counseling. 2 Credits.
Equips graduate students enrolled in the JHU/NHGRI genetic counseling program with principles of genetic components to common diseases, using cancer as the example for this course. Introduces key concepts throughout the course through case-based learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.701. Genetic Counseling Lab I. 2 Credits.
Explores interactive genetic counseling interventions as they apply to specific clinical settings and client needs. Presents key issues in client education for various medical specialties, and identifies research needs related to genetic counseling. Examines counseling issues through the use of role-plays.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.702. Genetic Counseling Lab II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.710. Medical Genetics and Genomic Medicine: from Diagnosis to Treatment I. 2 Credits.
Examines advances in the diagnosis of genetic disorders and treatments that result from genomic medicine. Focuses on examples from multiple malformation syndromes, autoinflammatory diseases, deletion/duplication syndromes, and Ras-opathies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.711. Medical Genetics and Genomic Medicine: from Diagnosis to Treatment II. 2 Credits.
Examines advances in the diagnois of genetic disorders and treatments that result with a focus on neurocutaneous syndromes, muscular dystrophies, connective tissue disorders and ciliopathies. Both terms aim to prepare students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.820. Thesis Research: Genetic Counseling. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.840. SS/R: Genetic Counseling. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.851. Supervised Clinical Rotations: Genetic Counseling. 2 - 4 Credits.
Clinical placements in adult, pediatric, and prenatal genetic centers in the Baltimore-Washington area provide opportunity to learn about genetic conditions by their impact on individuals and their families, and about roles of the genetic counselor. Individual rotations are scheduled to achieve a wide range of clinical experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.861. Genetic Counseling Seminar: Topics in the Field. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.866. Current Topics in Molecular Genetics I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.867. Current Topics in Molecular Genetics II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.870. Genetic Counseling Clinical Supervision. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.880. Genetic Counseling Program Thesis Proposal Development I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.881. Genetic Counseling Program Thesis Proposal Development II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.882. Genetic Counseling Program Thesis Proposal Development III. 2 Credits.
This is the third of a series of three courses designed to provide students with the skills needed to turn a research idea into a formally presented and orally defended thesis proposal. In this final course of the series, students will refine their working proposal for submission to the Executive Committee and prepare for the oral examination. They will be expected to have turned a nascent research idea into a workable proposal for the conduct of a research study that will constitute the ScM thesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.600. Introduction to Health Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.603. The Tools of Public Health Practice and Decision Making. 3 Credits.
Introduces the core functions of public health and the core competencies for public health professionals. Students assess their strengths and academic goals while building their toolbox of public health competencies. Uses case studies to examine the application of the competencies in public health practices. Provides an opportunity to apply knowledge by working in teams to assess a public health problem and propose potential solutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.610. Public Health Policy. 4 Credits.
Introduces MPH students to the many opportunities in public health policy to improve the health of populations in communities around the world. Focuses on identifying decision-makers, framing problems and key questions, developing and evaluating policy options, and advocating for change. Provides an introduction to some major policy challenges facing public health, such as inequity, injury, tobacco, nutrition, addiction, and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.615. The Tools of Public Health Practice. 1 Credit.
Introduces the challenges and rewards of public health practice. Presents and discusses the core functions and essential services of public health in the context of real world practice examples. Provides opportunities for application of the core competencies of public health professionals. Prepares students for their practicum experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.650. Crisis and Response in Public Health Policy and Practice. 3 Credits.
Studies the phenomenon of crises in public health. From a historical perspective, demonstrates how much of U.S. public health policy traces back to crises and responses that riveted public attention. Explains how substantial increases in FDA authority came about through serial crises in drug, device, food and tobacco markets. Shows that modern vaccine infrastructure emerged out of both disease and vaccine-related crises. From a management perspective, reviews how public health leaders at all levels respond to crises – the good, the bad and the ugly. From a strategic perspective, explores how health officials effectively manage crisis and response in order to win significant policy advances.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.651. Introduction to the U.S. Healthcare System. 4 Credits.
Focuses on the organization, financing, and delivery of healthcare in the U.S. Contrasts the private and public sectors and examines the effects of market competition and government regulation. Examines the ways that medical providers are paid, and explores the major issues currently facing physicians, hospitals, and the pharmaceutical industry. Discusses several potential small and large scale reforms to the U.S. healthcare system and evaluates their likely effects on healthcare spending, quality of care, and access to care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.652. Politics of Health Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.690. Designing your MPH Capstone as a Research Report. 4 Credits.
Discusses the importance of clearly articulating a research question and its associated aims. Reviews search strategies and data bases for a literature review and critical appraisal. Critically examines how students can design research plans to answer their research questions, provides tips for formulating a conceptual framework, define variables and decide how to measure them and select the most appropriate study design (taxonomy).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.712. Formulating Policy: Strategies and Systems of Policymaking in the 21st Century. 3 Credits.
Considers theories, strategies, and participants involved in formulating health and social policies. Discusses defining health and social problems, selecting and assessing policy options, and the role of stakeholders in policy process, as well as the context in which policy decisions are made. Analyzes case studies, discusses theories, participates in service-learning projects and writing exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.713. Research and Evaluation Methods for Health Policy. 3 Credits.
Introduces basic principles and methods for undertaking scientifically rigorous research with a special emphasis on evaluations of interventions intended to improve health and safety. Focuses on evaluations of policy, health care delivery systems, and public health programs. Topics include the evaluation and health policy analysis; common research designs and their strengths and weaknesses; and internal and external validity with the intent of giving students the fundamental tools needed to conduct health policy evaluations and/or making them better consumers of research conducted by others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.715. Advanced Research and Evaluation Methods in Health Policy. 4 Credits.
Introduces basic principles and methods for undertaking scientifically rigorous research with a special emphasis on evaluations of interventions intended to improve health and safety. Focuses on evaluation of health policies, health care delivery systems, and public health programs. Topics include the relationship between health services research, health policy research, health policy analysis and health program management; common research designs and their strengths and weaknesses; internal and external validity; survey research techniques; qualitative research methods; and basic cost effectiveness analysis with the intent of making students better conductors of research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.721. Foundations in Health Policy I. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development, implementation and analysis of health policies. Explores how different disciplines (political science, ethics, law, economics, sociology, behavioral sciences and history) inform thinking about the development, implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking, informed debate with respect for a range of opinions, and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.722. Foundations in Health Policy II. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development implementation and analysis of health policies. Explores how different disciplines (political science ethics law economics sociology behavioral sciences and history) inform thinking about the development implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking informed debate with respect for a range of opinions and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.723. Foundations in Health Policy III. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development, implementation and analysis of health policies. Explores how different disciplines (political science, ethics, law, economics, sociology, behavioral sciences and history) inform thinking about the development, implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking, informed debate with respect for a range of opinions, and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.724. Foundations in Health Policy IV. 1 Credit.
Supplements and builds upon the course entitled Health Policy Analysis and Synthesis. Students analyze and discuss in depth the materials presented in that course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.741. PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research. 1 Credit.
Provides a small class-size, doctoral-focused experience and examines some of the most common data sources used in the field to study health policy and management research topics. Emphasizes secondary data sources and discusses: (1) data structure and challenges with conducting research with secondary data; (2) developing research questions and testable hypotheses using these data sources; (3) strategies for data cleaning, work flow management, and replication; (4) data protection and storage related concerns; and (5) orally communicating strengths and weaknesses of datasets in the context of research talks. Exposes doctoral students to faculty research projects and the specific datasets being used to conduct this research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.750. Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community. 3 Credits.
Offers students opportunities for exploring how to design, develop, deliver, and evaluate educational approaches for a range of audiences and to attain professional aims. Considers a variety of approaches for integrating educational practices and strategies into professional practice. Engages students in developing educational philosophies and reflecting upon personal educational experiences and use of educational approaches for professional and leadership advancement. Presents strategies for designing an educational plan.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.800. MPH Capstone Health Policy and Management. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.801. The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health. 2 Credits.
This course provides an overview of some of the nation's major data collection efforts in households and healthcare establishments in the United States. The course introduces population-based and establishment-based surveys conducted by the National Center for Health Statistics, covering policy-relevant topics including health and nutritional status, health care access and utilization, and the provision of services in inpatient, outpatient, ambulatory, long-term, and hospice care settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.830. Postdoctoral Research Health Policy and Management. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.840. Special Studies and Research in HPM. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.860. Special Studies/Research: The Media and the Message: What Public Health Needs to Know about the News. 3 Credits.
Studies contemporary U.S. media through the lens of public health. Analyzes the economic, social and political forces behind the changing media landscape. Provides insight into how news is gathered and how coverage decisions are made. Reviews the current media landscape, provides insight on problems and potential solutions, with specific lessons for practitioners in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.862. Current Issues in Public Health. 1 Credit.
Faculty experts present public health topics of current interest in both industrialized and developing nations, such as health promotion and disease prevention, health care delivery systems, environmental problems and the spectrum of factors influencing the health status of populations and communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.863. HPM Practicum. 2 - 3 Credits.
Provides PhD students in HPM with an integrated, practical experience, applying coursework and theory to real-world settings. Places students based on their individual goals and interests and preceptor needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.870. The Research and Proposal Writing Process I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.871. The Research and Proposal Writing Process II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.895. MPH Practicum: HPM. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.615. Seminar in Health Disparities. 3 Credits.
Addresses the nature of racial and ethnic disparities in health status and introduces the research literature on race disparities. Develops an annotated bibliography of research on a minority health topic selected by the class and produces a literature review on that topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.627. Understanding and Preventing Violence. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.635. Policing and Public Health. 3 Credits.
Provides an overview of the history and evolution of policing in the United States and the intersections between policing and public health. Considers both short- and long-term policing impacts, both positive or negative, on the health and safety of communities and individuals through various interactions with the public. Explores how public safety is reimagined through a public health lens to understand the impacts of police on social determinants of health, justice, and equity. Examines needed reforms, police-community relationships, and strategies to co-create public safety
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.645. Health Advocacy. 3 Credits.
Prepares health professionals, (from government health officials, business leaders, non-profit organization representatives to scientists) to advance public health policy improvements. Through lectures, group exercises and a "mock" congressional hearing, students develop the skills to evaluate the policymaking process, create opportunities to inform and influence policymaking, and become more effective in translating and communicating in a policymaking environment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.650. Crafting Effective Solutions to Gun Violence: Problem Solving Seminar. 3 Credits.
Provides a foundation of data, theory and perspectives on understanding gun violence within the United States. Students apply common public health methods for assessing risk and protective factors for multiple forms of gun violence at many levels (individual, family, community), assessing available evidence on prevention options, and determining how to enhance population-level success. Provides an understanding of the legal, political, and institutional constraints and opportunities for enacting policies to curb gun violence. Opportunities to develop plans to prevent gun violence with examples dealing with urban gun violence, domestic violence, and situations in which someone is threatening to commit an act of gun violence (e.g., school or workplace shooting) and develop creative public health alternatives to current approaches to gun violence that promote equity and justice as well as safety will be available.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.660. Connecting Public Health Research with the U.S. Policymaking Process. 3 Credits.
Considers the contradictory role of public health research in the U.S. policy making process. Examines the question of when does research influence the policy-making process and how is it verified and what role can and should researchers play in the process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.692. The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health. 3 Credits.
Provides students with a working knowledge of NGOs and CBOs in health and public health, both domestically and internationally. Acquires on-the-ground insights and skills important to those planning a public health career from public health research, to service delivery, to health policy and management, both novice and expert. Presents the roles of CBOs/NGOs in a variety of arenas, including infectious disease control, environmental health, and disaster and humanitarian response. Provides basic skills and lessons, from starting and sustaining an organization, to working with CBOs/NGOs to achieve and maximize the success of your particular public health goals. Discusses the roles of CBOs/NGOs within the larger contexts of globalization, world politics, and social development. Includes guest lectures from domestic and internationally recognized organizations such as the American Red Cross, the National AIDS Fund, and the Center for Disaster and Humanitarian Assistance Medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.771. Case Studies in Communicating With The Media. 1 Credit.
Provides real-life examples of public health communications—both good and bad—and teaches practical skills for effectively sharing messages with the media in the era of "fake news." Students are exposed to techniques and guidelines to understand and handle the media during both crisis and non-crisis situations. Topics include: an overview of the media needs in a crisis, the essential elements of crisis communication plans, tips and techniques for spokespersons, common pitfalls to avoid, audience psychology, non verbal communication and techniques for communicating complex information to the lay audience. Students review videotapes of news coverage and participate in simulation exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.772. Making Effective Public Presentations. 2 Credits.
Enhances skills to construct and deliver oral presentations with clarity and impact. Provides a template for "audience-centered" presentation construction with examples, tools and exercises. Provides individual assessment and feedback for each participant through videotaped exercises and a short formal presentation constructed during the course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.820. Thesis Research in Health Policy and Management. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.861. Graduate Seminar in Health and Public Policy. 1 Credit.
Reviews and critiques current literature in health and public policy and evaluates studies from a methodological and conceptual basis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.610. State Healthcare Policy. 3 Credits.
Acquaints participants with the critical role states play in developing and implementing policies that affect both health and health care. Reviews how the role of states has evolved within the US federal system of government where states and the national government both have significant responsibilities. Drawing upon the experience of implementing the health insurance exchanges in Maryland and Alabama, participants assess how state differences affect the implementation of a major new national health program--the Affordable Care Act.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.675. Crisis Response in Public Health Practice: International Perspectives. 2 Credits.
Examines crises from the point of view of an agency leader responsible for designing and implementing an effective response while maintaining credibility and securing long-term policy change. Discusses recent crises including: global response to Ebola and Zika, responses to regulatory failures, foodborne outbreaks, and vaccine controversies. Offers students an opportunity to apply their knowledge by proposing a crisis response plan for a public health agency
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.843. SS/R: CRISIS RESPONSE IN PUBLIC HEALTH PRACTICE: INTERNATIONAL PERSPECTIVES. 2 Credits.
Examines crises from the point of view of an agency leader responsible for designing and implementing an effective response while maintaining credibility and securing long-term policy change. Discusses recent crises including: global response to Ebola and Zika, responses to regulatory failures, foodborne outbreaks, and vaccine controversies. Offers students an opportunity to apply their knowledge by proposing a crisis response plan for a public health agency.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.605. Public Health Policy: The Intersection of Science and Politics. 3 Credits.
Employs both lecture and interactive formats to explore the nature of the public health policy process, including how policy is a reflection of knowledge, political will and social strategy. Through presentations by instructors and guest speakers, offers examples of public health policy development highlighting the intersection of science and politics. Deepens and enriches the learning process through field trip(s) that actively engage students with Washington, D.C. public health advocates and policy makers with varying policy roles and perspectives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.607. Public Health Practice. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.610. Issues in Injury and Violence Prevention. 2 Credits.
Addresses prominent sources of injury, including motor vehicles, falls, fires, and firearms. Explores the biological, behavioral, and social issues relating to injury and violence prevention and policy. Emphasizes basic strategies for preventing injuries and deaths in the workplace, home, travel, and recreation, and the relative effectiveness of various types of approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.615. Occupation Injury Prevention and Safety Policy and Practice. 2 Credits.
Provides a link between the public health approach to injury prevention, the traditions of safety science and engineering, and their relationship with ergonomics and biomechanics. Topics covered include identifying the injury problem; using surveillance and record-keeping systems; preventing injuries by government, unions, health departments, and industry; and comparing safety sciences and a public health approach to injury prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.623. Fundamentals of Clinical Preventive Medicine. 3 Credits.
Examines the complex interplay between clinical preventive medicine, population medicine, and the practice of public health. Covers core topics for practice and for the preventive medicine board examination: prevention at the individual and community level; the evidence-based policy approach to prevention; and the creation and use of clinical governance standards and practice guidelines for prevention. Covers high-yield topics in short modules that focus on a clinical prevention frame, including the latest science and best practices in integrative medicine, chronic diseases, communicable diseases, injury and violence prevention. Covers prevention-based approaches to various issues of public health significance including the use of: mind-body medicine, lifestyle medicine, diet and nutrition wellness, motivational interviewing and health coaching, and evidence-based complementary and alternative medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.630. Transportation Policy, Equity and Health. 2 Credits.
Provides an overview of the significant role of national politics on transportation safety policy in the United States. Using case studies of notable safety enhancement efforts in aviation, highway, and other transportation modes, students discover the significant roles and interactions of lobbyists, industry associations, politicians, and Federal Agencies in transportation safety research and subsequent safety improvement rulemaking. Through informal lectures, readings and a field trip to the Baltimore Washington International airport tower, students learn that transportation safety and injury prevention improvements often require significant efforts to successfully navigate the path from research findings to interventions that improve the traveling public's safety and health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.670. Principles and Practice of Injury Prevention. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.684. Health Impact Assessment. 3 Credits.
Since health impact assessment (HIA), is an approach that informs decision-makers about the potential health effects of proposed projects, programs, and policies made in areas outside of the health sector (e.g., education or housing), students learn about HIA through readings, lectures, and hands-on experience. Students study the rationale for conducting HIAs, review a range of analytic methods used to conduct HIAs analyze cases from international and domestic settings, understand its role in policymaking, and walk through the steps of how to conduct a HIA. Students then apply these skills through working on a HIA with a partnering organization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.861. Graduate Seminar in Injury Research and Policy. 1 Credit.
Weekly seminar advances understanding of injury, violence, and resulting disabilities as public health problems. Topics include methodological approaches, substance use and overdose, occupational injury, violence prevention, and disability. Emerging topics as well as the application of policy, law and practice for injury and violence prevention are considered.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.864. SS/RES: SOCIAL INEQUALITIES IN HEALTH IN LIGHT OF ROAD TRAFFIC SAFETY. 3 Credits.
Provides an overview of the various manners in which the road traffic infrastructure and environment may contribute to the occurrence of accidents and injuries and also to social inequalities in mobility and safety. Examines analytic methods related to injury research and prevention using examples from both LMICs and HICs
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.865. Advanced Seminar in Injury Prevention. 2 Credits.
Broadens, advances, and challenges existing skills and knowledge of injury prevention students and/or multi-disciplined injury prevention practitioners. Elaborates on the 9 Core Competencies for Injury and Violence Prevention, as developed by the SAVIR-STIPDA Joint Committee on Infrastructure Development. In addition to interactive lecture, students are given as many opportunities as possible, within the constraints of the 2-day training, to practice skills through practical application sessions for a facilitated hands-on, skills-development experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.601. Introduction to Bioethics in Public Health Practice and Research. 1 Credit.
Introduces MPH students to the basic principles and frameworks for research and public health ethics as well as concepts in professional and research integrity as a public health professional. Explores both domestic and global health examples. Focuses on introductory material on public health ethics, research ethics and professional integrity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.625. Ethical Issues in Health Policy: Public Health and Health Care. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.650. Public Health and the Law. 3 Credits.
Introduces non-lawyers to the important role played by the law in determining the public's health. Analyzes judicial opinions, statutes, and regulations in classroom discussions. Covers substantive legal topics including the balance between individual rights and public health initiatives, privacy, medical malpractice, and informed consent.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.655. Ethical Issues in Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.660. Legal and Public Health Issues in the Regulation of intimacy. 3 Credits.
Examines the ways in which the state regulates intimate and private relations and the justifications for such regulation. Particularly focuses on the attention paid to the public health and morality justifications offered by the state for the enactment and enforcement of privacy laws. Topics include: when state regulation of intimate decisions, actions and relationships is justified; the regulation of consensual sexual activity; the regulation of contraception and abortion; the regulation of same-sex sexual activity; and the regulation of same-sex marriage.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.662. Public Health Agencies: Law, Policy and Practice. 3 Credits.
Explores the important and expanding role that regulatory or administrative agencies, such as FDA and EPA, play in protecting and promoting the public's health. Examines agencies' ability to create and implement health policy, and discusses the legal limits on agency powers. Discusses how agencies develop regulations and employ other regulatory tools. Uses case studies to illustrate key concepts, such as the role of science in the regulatory process and the influence of politics on agency actions. Class sessions involve the interpretation and analysis of judicial opinions, regulations, and other administrative materials. Focuses on U.S. regulatory policy, but also examines examples and implications for international health policy. This course builds on the skills introduced in 306.650, and exposes students to new public health law and policy topics relevant to regulatory agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.663. Legal and Ethical Issues in Health Services Management. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.665. Research Ethics and integrity: U.S. and International Issues. 3 Credits.
Introduces ethical theory and principles, including ethics requirements when conducting research with human subjects in the U.S. and/or developing countries. Covers the following topics through lecture and case studies: ethical theory and principles; informed consent in research; Institutional Review Boards; the just selection of research participants; cultural relativism; genetic research; ethical issues in vaccine research; ethics and human rights; appropriate use of placebos; what is owed to research participants, communities, and countries after research is completed; the use of animals in research; and scientific and academic integrity. Familiarized students with research ethics in both the U.S. and global contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.670. Issues in LGBTQ Health Policy. 3 Credits.
Examines the impact and importance of health policy on the health, well-being, and lives of LGBTQ people. Explores how particular health policies, both historically and currently, have contributed to and/or reduced health disparities within LGBTQ communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.861. Graduate Doctoral Seminar in Bioethics. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.864. Fogarty Bioethics Fellows Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.307.864. Mental Health Services and Systems Practicum I. 0.5 Credits.
Part I of a year-long practicum that complements traditional coursework by providing exposure to the real-world settings and organizations that compose the mental health care infrastructure. Through site visits and opportunities to interact with representatives from different components of the mental health care system, students will develop an understanding of the historical evolution of the mental health care system in the U.S. and be introduced to the various settings through which mental health services are delivered, including emergency psychiatric services, intensive outpatient treatment, psychiatric rehabilitation, and early intervention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.307.865. Mental Health Services and Systems Practicum II. 0.5 Credits.
Part II of a year-long practicum that complements traditional coursework by providing exposure to the real-world settings and organizations that compose the mental health care infrastructure. Through this course, students will develop an understanding of the operational, organization, and financial aspects of service delivery, barriers to implementation of evidence-based services, and the interaction of other service settings (e.g., social services, criminal justice) with the mental health care system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.600. SS/R: Managing the COVID-19 Pandemic: From Epidemiology to Policy. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.604. Effective Writing for Public Health Change. 3 Credits.
Sharpens writing skills for clear, effective public health communication. Introduces the key elements of successful writing, and how to successfully apply those fundamentals to different communication formats and goals, both traditional and modern. Writing and organization skills practiced through writing assignments focused on practical real-world examples students will face in their careers, including one-pagers, policy memos, and data summaries, including learning to edit, improve, and pressure test the work of others. Professional standards for accuracy, readability, structure, and style that help communicate more effectively and persuasively in the pursuit of public health goals will be presented.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.605. THE IMPACT OF THE FINANCIAL, ECONOMIC AND POLITICAL CRISES ON HEALTH, QUALITY OF LIFE AND WELL-BEING OF POPULATIONS. 3 Credits.
Analyzes the causes of the current worldwide crises, both in developed and developing countries, with a special emphasis on the United States, Canada and Europe. Focuses on the consequences of those crises on health and social policies that affect the quality of life, the well-being and the health of populations. Considers these issues from the political economy, social policy and health policy perspectives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.610. The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.615. The Opioid Crisis: Problem Solving Seminar. 3 Credits.
Uses interactive case-based and problem-based strategies to provide an overview of the impact of the opioid crisis in the United States. Enables students to develop skills to address different aspects of the opioid crisis. Addresses topics including stigma attached to opioid use and treatment of opioid use disorders, the development of strategies to address such stigma, the importance of data in identifying opportunities for response, assessment of current policy options for addressing the opioid crisis in the United States, and addressing the political challenges to support effective policymaking. Prepares students to undertake data collection at the state level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.630. U.S. Pharmaceutical Policy. 3 Credits.
Examines the pharmaceutical market and addresses the core issues related to pharmaceutical policy within the US health care system, such as drug pricing, regulation, and financing, drug coverage decisions, and ethical aspects of drug regulation. Considers the role of multiple health care system actors involved in and affected by pharmaceutical policy: drug manufacturers, drug regulation agencies, insurers, pharmaceutical benefits managers, health care providers, patients, families, and others. Provides an in-depth analysis of drug pricing strategies, coverage decisions, and access and affordability issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.650. Public Health Perspectives on U.S. Drug Policy. 3 Credits.
Presents a critical examination of U.S. drug policy through a public health lens. Course topics include: policy mechanisms for reducing drug-related harm; implications of various drug control policies on population health and wellbeing; drug control enforcement and the role of the criminal justice system; stigma and the politics of drug policy; the organization and financing of services for people who use substances, including treatment of substance use disorders; and policies and services targeting special populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.660. Food Industry, Politics and Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.680. Health Care and Congress: Perspective From K Street. 2 Credits.
Introduces the roles and functions of the entire legislative process -- from bill introduction, to committee markup, to the enactment of legislation. Throughout this process, students also examine the essential role of congressional lobbyists in shaping health care policy stemming from coalition building, knowing your opponents, organizing grassroots and campaign contribution efforts, identifying key Members of Congress and staff, working with the Administration, testifying on Capitol Hill, and knowing what and what not to tell your constituency. Using a case-study approach, students walk through the process of how an idea goes from an organization into federal or state law.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.701. Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners. 3 Credits.
Enhances skills to construct and deliver oral presentations with clarity and impact. Provides techniques and guidelines to increase your effectiveness in translating public health information to various audiences, as well as communicating through the news media during both crisis and non-crisis situations. Includes topics: basics of effective presentations, non-verbal communications, case studies, giving an interview, preparing talking points, advocacy and the news media, and communicating in a public health emergency. Reviews videotapes of news coverage and participate as spokespersons in on-camera simulation exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.810. Field Placement Health Policy-MSPH. 1 - 22 Credits.
Provides students with an intensive “hands on” extension of their academic training under the guidance of one or two senior level health policy professionals and program faculty. Students gain a deeper understanding of how health policies affect the public’s health and further develop their professional health policy skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.842. SS/R: Emerging Dimensions of Social Determinants of Health Inequalites: A Transdiciplinary Integrated Approach. 3 Credits.
Introduces a novel transdisciplinary approach on Social Determinants of Health Inequities (SDHI). Provides an in-depth understanding of macro, meso and micro levels, all of which generate health inequities. Prepares students to examine the changes, causes, and potential policies to address systemic public health and equity-related subjects and the complex interactions between biology, behaviors, society and politics. Integrates a broad range of disciplines, ‘systems thinking’ practices, and methodological pluralism. Reviews research advances, including explanatory case studies and the evaluation of policies and interventions to reduce health inequities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.851. Phase Internship. 1 - 6 Credits.
Public Health Applications for Student Experience (PHASE), offers students the opportunity to gain real world public health practice experience. PHASE internships require students to synthesize, integrate and apply academic theory in public health practice settings. Through PHASE, students have the opportunity to learn first-hand how public health agencies function and engage in public health decision-making on a daily basis
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.852. Applied Health Policy Experience: Health Policy Internship. 2 Credits.
Provides JHSPH graduate students with experience and insight into the public health policy research and development process. Gains insight, while working directly with legislators, into the inner workings of the policy-making process including legal research, stakeholder engagement, and coalition building. Allows interns to provide legislative assistance to the policymaker throughout the legislative session, including legal research and analysis, stakeholder engagement, and writing testimony, bills and amendments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.867. MSPH Seminar in Health Policy. 1 Credit.
Introduces work undertaken in health policy settings and prepares MSPH. students in Health Policy and Management for the field placement requirement in the second year of the program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.600. Evaluating Quality Improvement and Patient Safety Programs. 3 Credits.
Prepares students to evaluate Quality Improvement/Patient Safety (QI/PS), projects by developing their competencies in the following areas: 1) Critiquing evaluations of QI/PS projects; 2) Designing a robust evaluation of a QI/PS project; and 3) Conducting a small scale qualitative study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.605. Health Issues for Aging Populations. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.609. Palliative and Hospice Care: Quality of Care and Health Policy. 2 Credits.
Addresses the policy problems related to improving access, quality and cost-effectiveness for palliative and hospice care within the current medical system, using case studies and workshop exercises. Also addresses the challenges and opportunities palliative and hospice care face under health reform. Considers questions such as: what communication strategies can be widely applied to help patients understand and choose care in accordance with their goals and values; how palliative care and hospice services should be delivered by accountable care organizations and medical homes; how palliative care can be integrated into the long-term care environment; and what quality measures should be integrated into performance measurement for all providers of the seriously ill.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.616. Introduction to Methods for Health Services Research and Evaluation I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.617. Introduction to Methods for Health Services Research and Evaluation II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.620. Managed Care and Health insurance. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.631. Population Health Informatics. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of health information technology (HIT) to population health. Emphasizes the population health potential of comprehensive electronic health records (EHRs), personal health records (PHRs), mobile health and telemedicine devices; and consumer focused internet-based based tools. Covers the uses of HIT to define and identify populations and sub-populations of interest, describe the health status and needs of populations, improve the health of populations, and evaluate services provided to populations. Emphasizes the use of HIT within both local, regional and federal public health agencies and population-based private health care organizations such as integrated delivery systems and health insurance plans. Lessons are mainly US oriented but are also applicable to other high and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.635. Population Health: Analytic Methods and Visualization Techniques. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of data science to population health. Covers the uses of informatics to define and identify populations and sub-populations of interest, and describe the health status and needs of them. Describes the process of analyzing population health data from checking data quality to developing predictive models of utilization. Examines different data sources / methods to risk stratify a population of interest and compares the advantage and disadvantages of each data source / method. Describes various techniques to visualize data quality, depict the denominator selection process, and illustrate the risk adjustment results for large populations
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.670. Comparative Health insurance. 3 Credits.
Provides an overview of the organization and financing of health systems in middle and high-income countries – focusing on population coverage, in terms of both how different groups are covered and the benefits package provided. Begins with a conceptual framework of financing flows in the health sector, and proceeds to identify a series of topics and case studies as the subject of specific lectures. Explores in depth the principal models for population coverage – including national health insurance, national health service, social insurance, private insurance, and mixed hybrid models. Provides case studies of health insurance coverage in specific countries, including the United Kingdom, France, Germany, Japan, Taiwan, Chile – with lessons drawn for transitional countries interested in expanding health insurance coverage
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.712. Assessing Health Status and Patient Outcomes. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.716. Advanced Methods in Health Services Research: Analysis. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.720. Applied Econometrics for Health Policy Research. 3 Credits.
Advanced econometrics course that builds on techniques introduced in the prerequisite courses. Topics addressed include techniques for risk adjustment and provider profiling, advanced topics in instrumental variables analysis, calculating appropriate marginal effects and standard errors, heterogeneous treatment effects, decomposition approaches, and methods of assessing the robustness of various estimates. Students work on independent research projects that provide hands-on exposure to research design and data analysis with Stata.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.730. Patient Safety and Medical Errors. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.731. Patient Safety in Developing Countries. 2 Credits.
Introduces students to the rapidly evolving field of patient safety in developing countries, focusing on health systems improvement. Explains the role of global organizations, national governments, institutions, local communities, and individuals in improving patient safety in developing countries. Reviews key global patient safety resources that can be utilized to enhance patient safety in developing country health systems. Students learn how to utilize a “problem solving paradigm” to patient safety, conduct a patient safety situational analysis, and develop an action plan for patient safety at the institutional level. Explores the use of patient safety partnerships between hospitals as a model for inter-continental collaboration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.732. Human Factors in Patient Safety. 3 Credits.
Provides students with the essential concepts, methods and tools to enable them to design effective patient safety interventions and evaluate their impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.750. Applied Research Methods for Health Policy and Management. 3 Credits.
Helps Tsinghua DrPH cohort students synthesize methods content to conduct a valid statistical analysis applied to a Chinese-relevant data set or topic area. Students develop advanced skills in modeling and methods for conducting health policy, healthcare management, and health services research analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.861. Graduate Seminar in Health Services Research and Policy. 1 Credit.
Provides opportunity to learn about the PhD process, faculty research, discuss issues and concepts relevant to the field of health services research, and learn skills important for academic and professional success in the field of health services research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.864. Quality, Patient Safety, and Outcomes Research Practicum. 3 Credits.
Provides students in the Quality, Patient Safety, and Outcomes Research Certificate Program with an integrated experience in quality, patient safety, outcomes research, or a combination of the 3 domains in any one of a wide variety of settings in the health service delivery environment. Students are placed based on their individual goals and interests and the preceptors' needs. Students join an active work group and are supervised directly or indirectly by the practicum preceptor
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.871. Health Services and Outcomes for Aging Populations Practicum I. 0.5 Credits.
Focuses on Home-Based Care and provides an in-depth overview of home-based medical care, skilled home health care, and telehealth. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.872. Health Services and Outcomes for Aging Populations Practicum II. 0.5 Credits.
Students work in small groups to apply the concepts learned in Knowledge Translation, I (309.870.11) to a practical case study of a knowledge translation problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.873. Health Services and Outcomes for Aging Populations Practicum III. 0.5 Credits.
Focuses on the importance of interdisciplinary care in the care of older adults. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.874. Health Services and Outcomes for Aging Populations Practicum IV. 0.5 Credits.
Fourth of 4-term sequence. Focuses on issues associated with provision of long-term services and supports in the community, assisted living, nursing homes, and innovative models of care. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.615. Quality of Medical Care. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.720. Tsinghua DRPH Capstone. 2 Credits.
Helps Tsinghua DrPH students synthesize course content with a specific focus on problem identification and the development of testable hypotheses; how to develop a conceptual model; approaches for conducting a literature review and synthesis. Provides an overview of the DrPH written qualifying examination.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.820. Thesis Research HPM-DRPH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.861. Graduate Seminar in Health Care Management and Leadership. 1 Credit.
Provides opportunity to discuss concepts and issues related to organizational performance improvement, organizational performance indicators, and change strategies. Facilitates preparation for comprehensive exams and the design and conduct of dissertation projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.865. Tsinghua DRPH Seminar. 1 Credit.
Provides opportunity to learn about faculty research, discuss issues and concepts relevant to the field of health management and leadership, and learn skills important for academic and professional success in the field. Intended for DrPH students from the Tsinghua cohort.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.867. Tsinghua Graduate Seminar. 1 Credit.
Provides opportunity to discuss concepts and issues related to organizational performance improvement, organizational performance indicators, and change strategies. Facilitates preparation for comprehensive exams and the design and conduct of dissertation projects. Intended for DrPH students in the Tsinghua cohort program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.600. Managing Health Services Organizations. 4 Credits.
Presents a framework for understanding and managing health services and health sector organizations. Discusses strategic and organizational management [e.g., health care environment, stakeholders and customers, missions, vision and values, governance, organizational structure and design]; management & performance improvement tools [e.g., budgeting and financial management, logistics, continuous quality improvement, balanced scorecard, logical framework, learning networks and collaboratives; management role and functions [e.g., leadership style, employee performance, decision-making, human resource management]
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.601. Fundamentals of Management for Health Care Organizations. 3 Credits.
Discusses how to manage in health care organizations, including management processes, organizational structures, and types of governance and management issues of U.S.-based health care delivery systems. Topics to be examined include introduction to health care systems; managing health care organizations; health care environments, administrative management responsibilities; approaches to performance improvement and financial management concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.602. Applied Methods for Optimizing Performance in Health Care Organizations. 2 Credits.
Performance Optimization Methods for Health Care Organizations is designed for MHA students who seek an understanding of continuous improvement in healthcare organizations. The content and framework of the course are designed to provide students with a broad exposure to current knowledge, competencies and management tools required for the effective operation of health care delivery systems. Focus is on how to apply continuous improvement tools and methodologies in various health care environments. Provides a detailed explanation of Lean and Six Sigma methodologies with opportunity to apply these skills to real world examples within health care settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.603. Fundamentals of Budgeting and Financial Management. 3 Credits.
Provides students with an understanding of budgeting as an important management tool. Focuses on budget development, evaluation of the financial status of a department or operating unit and the ability to determine what, if any, corrective actions need to be taken. Includes strategies for measuring and reporting skills. Considers the analytical tools used to support evaluation and decision-making including; volume adjusted variance analysis, benefit-cost ratio analysis, breakeven analysis, process flow analysis, benchmarking, and methods for building cost standards.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.604. Quantitative Tools for Managers. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.607. Quantitative Tools for Managers in Asia. 3 Credits.
Designed to provide concept and real-world application of quantitative tools (methods) commonly applied in the healthcare industry in Asia. Topics to be addressed include: facility location/payout, forecasting and financial analysis, re-engineering and utilization (productivity) management and quality matrix and improvement tools. Applications and case studies will focus specifically on the Asia-Pacific rim.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.610. Foundations of Organizational Leadership. 3 Credits.
Students develop an understanding of the role expectations of the organizational leader and the essential knowledge and skills the role requires. Provides a framework for understanding the process of working effectively with, influencing and leading others. Drawing from a variety of disciplines, emphasizes organizational effectiveness, developing a future vision and direction, leading change and building adaptive organizational cultures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.617. Fundamentals of Financial Accounting. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.620. Performance Measurement in Health Care. 2 Credits.
Focuses on performance measurement for hospitals and describes key aspects and challenges of measurement initiatives in the current context of health care reform in general, and payment reform more specifically. Includes the faculty, all senior health care professionals from the trenches, describing the regulatory environment and Joint Commission and CMS requirements. Summarizes key measures used for public reporting and payment such as chart-abstracted clinical process, administrative data based outcomes, satisfaction, and efficiency. Highlights the advantages and disadvantages of each type of measure and discusses appropriate use of analytics and comparison data including patient satisfaction. Covers current public reporting and pay for performance initiatives and associated challenges. Includes emerging initiatives in the context of the electronic medical records, such as e-measures and meaningful use.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.621. Strategic Planning. 3 Credits.
Focuses on principles of strategic management and competitive analysis to support strategy development for health care organizations. Provides an understanding of how current business and management knowledge is applied to health care organizations to promote future success and competitive advantage. Examining contemporary theory and models, students learn to assess and develop an organization's mission and vision; perform an internal and external strategic assessment; evaluate competitive threats and responses; develop organizational strategies and measures of success; and evaluate the decision-making approaches best able to develop and execute the best strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.623. Financial Management in Health Care I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.624. Financial Management in Health Care II. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.630. Healthcare Financial Management. 3 Credits.
Provides managers and professionals, both novice and experienced, with the financially quantitative knowledge needed for planning, controlling and managing in contemporary health care organizations under constantly changing conditions. Provides a foundation in the basic financial management skills as well as their advanced application. Introduces the basic business finance approaches to decision-making and governance. Provides students with a sound conceptual and applied understanding of the role that financial and cost management play in the business setting decision-making process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.633. Health Management Information Systems. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.635. Human Resources in Health Organizations. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.650. Non-Traditional & innovative Health Services Partnerships. 2 Credits.
Introduces innovative, non-traditional partnerships as an integral part of achieving a value-based healthcare system. Examines growing trends in healthcare and basic principles and practices of non-traditional partnerships. Discusses the method of building balanced business models to ensure obtainable milestones and returns for all parties. Presents lessons learned by industry leaders who have experienced establishing partnerships with multi-national corporate, investor, and strategic entities focusing on clinical services, population health and health/IT activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.651. Principles and Applications of Advanced Payment Models in Population Health Management. 3 Credits.
Presents an overview of major issues related to the design, function, management, regulation, and evaluation of health insurance and managed care plans and implications for population health management. Provides a firm foundation in basic concepts pertaining to private and public sector health insurance/benefit plans. Includes key topics such as, population care delivery and payment innovations and management techniques, provider payment models, risk-sharing and other incentives for organizational integration, quality and accountability, cost-containment. Reviews innovative payment models and initiatives supporting health care providers and health care organizations in testing alternative care delivery in the context of three core strategies for improving the US health system: improving the way health care providers are paid, improving the way care is delivered, and increasing the availability of information to guide decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.655. Organizational Behavior and Management. 2 Credits.
Explores organizational behavior perspectives and theories, which provide the framework for the critical study of management, and the interpersonal skills and knowledge required by managers in the dynamic health sector. Students develop an approach to thinking about health sector organizations and their complexity. Emphasizes current thinking and the application of theory to practice in the areas of management, employee motivation, group behavior and team development, power and influence plus conflict management and negotiation skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.660. Marketing in Health Care Organizations. 3 Credits.
Introduces students to marketing concepts in health care through readings, guest speakers, small group exercises and individual study. Prepares students to conduct a situational analysis, understanding the market and consumer behavior as well as assessing the capabilities of the organization. Explores primary and secondary market research techniques. Discusses marketing strategy, including positioning and branding, program/service development, pricing, distribution, and promotion. Explains evaluation and measurement methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.670. Negotiation in Health Care Settings. 3 Credits.
Addresses the basic skills needed for effective negotiation of business relationships in health care and other settings. Focuses on understanding and developing a systematic approach to preparing for, structuring, and negotiating key business relationships. Presents basic process and conflict management skills needed for effective negotiation of business relationships in health care. Also explores the ethics of negotiation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.675. Medical Practice Management. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.678. Introduction to Healthcare Quality and Patient Safety: A Management Perspective. 2 Credits.
Introduces students to the latest thinking on healthcare quality and patient safety improvement through didactic sessions, interactive exercises and case studies that have direct relevance for the public health practitioner, healthcare administrator or clinician. Focuses on the specific domains of healthcare quality and patient safety based on the strategies recommended by the Institute of Medicine report "To Err is Human."
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.693. Introduction to Comparative Effectiveness and Outcomes Research. 3 Credits.
Introduces students to the motivation and methods of comparative effectiveness research. Reviews the problems faced by decision makers across the US health care system, and the priority topics for investigation. Explains the role of stakeholders, including payors, manufacturers, health care organizations, professional groups, providers and patients. Explains study designs and methods used in effectiveness research, focusing in particular on observational studies. Also describes the policy implications of this research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.700. Leading Organizations. 3 Credits.
Focuses on the essential principles of personal and interpersonal leadership that can be used in an organizational setting to enhance performance, align and empower personnel, and assure organizational engagement. Applies leadership skills in a hands-on practical way that encourages students to challenge their own beliefs and assumptions about what constitutes leadership. Offers a comprehensive review of contemporary issues and perspectives on leadership. Explores multidisciplinary and systems-oriented approaches as well as classic leadership theory and evolving contemporary beliefs. Includes topics such as development of leadership theories, personal assessment and development, values and ethics, motivation, power, followership, group dynamics, multiculturalism in leadership, conflict resolution, performance excellence, and the change process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.701. Strategic Leadership and Decision Making. 3 Credits.
Examines how leaders formulate coherent and effective strategies for policy-making in a complex and unpredictable environment, consider planning, organization, persuasion, and adaptation to changing national and international pressures, as well as broader studies of strategic decision-making in the modern world. Considers what it means to be an effective strategist, policy-maker, agenda-setter, and change agent. Assess the difficulties involved with fulfilling these often difficult tasks within and outside of the organizational setting.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.702. Leading Change: Building and Empowering Teams. 3 Credits.
Examines the design, management, and leadership of teams in organizational settings. Focuses on the interpersonal processes and structural characteristics that influence the effectiveness of teams, the dynamics of intra-team relationships, and sharing of knowledge and information in teams. Participants will understand the theory and processes of group and team behavior to become successful leaders and adept in leading and managing groups and teams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.703. Learning Organizations & Knowledge Management. 3 Credits.
Explores concepts of organizational learning, analyzes global research trends in how evidence-of-learning is captured in workplace settings around the world, and applies organizational learning models to foster and support innovative workplaces. Discusses how various factors such as diversity, complexity, crises, and increasingly advanced digital solutions (technology) change the pace in which an organization learns, adapts, and competes. Embraces a system perspective of learning at the organizational level-of-analysis grounded in the premise that innovation and sustainable change is contingent upon an organization’s ability to create management structures that apply, analyze, evaluate and convey information, enhance decision-making, and achieve desired results through continuous learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.810. MHA Residency. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.861. MHA Case Competition. 2 Credits.
Introduces students to the case competition early in the year as part of their seminar. Provides students with the opportunity to apply what they have learned in the classroom setting to a real-world case study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.862. MHA Capstone. 1 Credit.
MHA students synthesize and integrate the knowledge and skills they have acquired throughout the program and their field placement to the examination and analysis of a current healthcare trend and its potential implications for health care services and delivery systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.867. MHA Seminar. 1 Credit.
Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in low and middle-income settings. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status. Explores the degree to which malnutrition can be prevented or reduced prior to achieving high-income populations or certain economic development, through targeted public and private sector interventions that address the causes of malnutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.869. Healthcare Consulting Practicum. 2 Credits.
Students are required to meet with the client (hospital sponsor of the consulting project) to develop an understanding of the project requirements. Prior to beginning the consulting engagement students will a) devise a plan for carrying out the consultancy, b) prepare a scope letter describing the project, the scope of work, deliverables, timeline and fee arrangement
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.873. SS/R: ADVANCED CONFLICT MANAGEMENT AND COACHING SKILLS. 1 Credit.
Builds upon the strategies and approaches presented in #312.871.97 SS/R - Leadership Skills: Negotiation & Conflict Management in Health Care. Part One teaches participants how to analyze, prepare for, and conduct a successful conversation or negotiation when emotions are running high. Uses case studies, experiential learning, group discussion, and lecture to introduce the “Difficult Conversation” framework developed by members of the Harvard Negotiation Project and a diagnostic tool for managing conflict. Participants are videotaped while participating in a conflict management simulation. Each participant receives an analysis and critique of her/his taped performance and a copy of their filmed simulation. Part Two equips participants with the skills needed to coach supervisees and colleagues through workplace conflicts and strengthen conflict management capacity in the organization. Develops understanding of and proficiency in the use of a conflict coaching framework by using lectures, case studies, group discussions and experiential learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.910. LAB for 312.810.
Lab for PH.312.810
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.601. Economic Evaluation I. 3 Credits.
Presents an introduction to the theory, methods, and application of economic evaluation in health care. Provides a specific focus on cost-effectiveness analysis, with an emphasis on identifying and measuring outcomes, understanding incremental cost-effectiveness ratios (ICERs), conducting sensitivity analyses, and incorporating time preferences. Considers decisions about the allocation of funds to different population segments or different types of programs, and to programs with great benefit for a few versus modest benefit for many. Prepares students for advanced topics in Economic Evaluation II-IV.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.602. Economic Evaluation II. 3 Credits.
Builds on the theory and methods taught in Economic Evaluation I to allow students to gain an understanding of intermediate topics in CEA. Provides students with experience of hands on development of decision trees. Focuses on having students become familiar with best practices in this growing field. Establishes the ability to critically appraise published work and construct simple cost-effectiveness models using Excel and other software. Prepares students for more complex modeling covered in Economic Evaluation III-IV.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.603. Economic Evaluation III. 3 Credits.
Builds upon the theoretical concepts taught in Economic Evaluation I-II by providing advanced content in the areas of decision analysis, cost-effectiveness, and alternative approaches of modeling research questions for these fields. Include approaches for calculation of costs and effectiveness measures using standard modeling methods. Compares outputs as a result of decision tree and Markov modeling and introduces sensitivity analysis. Includes group projects to produce a well-thought model on a topic of their own choosing in decision analysis or cost-effectiveness.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.604. Economic Evaluation IV. 3 Credits.
Builds upon the theoretical concepts taught in Economic Evaluation I-II and the methodological skills taught in Economic Evaluation III. Examines advanced methods, as well as areas of controversy with applications to international health. Explores methods for performing cost-effectiveness analysis (CEA) and benefit-cost analysis (BCA) with primary and secondary data. Examines alternatives to CEA, including cost-benefit analysis, stated preference methods, revealed preferences, and multi-criteria decision analysis. Emphasizes an applied experience in conducting economic analysis based on survey data as well as secondary data in a global context. Includes additional applications to adjust CEA to account for equity goals, to project program scale-up, and to account for "behavioral" agents.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.610. Health Economics for Managers. 3 Credits.
Applies the analytical tools of economics to issues in health care that are especially relevant to managers and leaders of health care organizations. Examines topics including: the use of economic incentives to influence health behavior; asymmetric information and the role of agency in health care; the application of behavioral economics to health care; government as payer and regulator, and equity/ethical considerations; the role of health insurance; and the theory of the firm as it applies to physicians, hospitals, and systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.620. Introduction to Behavioral Economics: Theory and Practice. 3 Credits.
Explores the theoretical framework of behavioral economics, and applies that framework to issues in health and healthcare. Addresses elements of the theory of behavioral economics including: prospect theory, System 1/System 2 thinking, hyperbolic discounting, loss aversion, the endowment effect, framing and anchoring, mental accounting and commitment contracts, heuristics and biases, the power of the default, and pricing strategies. Applies these concepts to human behavior in general, as well as that of patients and physicians.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.641. Introduction to Health Economics. 3 Credits.
Introduces students to the application of economic tools to the interaction among the many stakeholders in the health care system and the public health system. Intended for those students who want an overview of health economics, but who do not expect to pursue additional courses in the field. Uses a standard health economics text as the main reading; also draws on articles from the popular press and professional journals that illustrate the tools of economics or their application to health care and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.643. Health Economics. 3 Credits.
Introduces the analytical tools of economics and applies them to issues in healthcare. Topics include: resource allocation in health care; government as payor and regulator; asymmetric information and the role of agency; the market for health insurance; market structure and competitive strategy as it applies to health care organizations; the market for labor in health care; and the market for innovations and technology. Uses mainstream neoclassical microeconomic theory as the basis for analysis, but also explores the implications when the assumptions of this model are violated. Uses a standard health economics text as the main reading, but uses journal articles in the field to examine how the profession is analyzing health care and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.644. Intermediate Health Economics. 3 Credits.
Building on the basic concepts and applications presented in Health Economics I, students in Health Economics II are exposed to some of the seminal topics in health economics, with a particular focus on the issues of human capital, economics of the household and the demand for healthy and risky behaviors. Topics include: the economic returns of education; economics of the household; the demand for health (Grossman Model); addiction; teen sex; obesity, the statistical value of a life, and fertility. While it will not be the focus of the class, some time will be spent on the dynamic modeling and econometric techniques that are used in the papers that we review. Teaching methods include lectures, group discussion and problem solving exercises, and hands on experiments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.653. Advanced Health Economics I. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.654. Advanced Health Economics II. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.655. Advanced Health Economics III. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.656. Advanced Health Economics IV. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.685. The Economics of Tobacco Control. 1 Credit.
Introduces students to the economic tools and analysis used to confront the public health challenges caused by smoking. Reviews the evidence of the health and economic consequences of tobacco use. Emphasizes the rationale for increases in taxes, financial incentives to discontinue tobacco cultivation, and regulatory measures such as bans on smoking in public places and restrictions on access for minors. Provides economic tools and background information for public health specialists, policymakers, the news media, and others interested in using evidence-based policy to prioritize and address public health concerns related to tobacco control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.790. Introduction to Economic Evaluation. 3 Credits.
Prepares students to read and interpret cost-effectiveness studies. Introduces the basic economic concepts that are needed in order to understand the recommendations from the United States Panel on Cost Effectiveness in Health and Medicine, such as the distinction between opportunity costs and budgetary costs. Considers review recommendations, particularly as they apply to cost-effectiveness research reports. Discusses the relationship between cost-effectiveness results and other elements of the health care policy decision-making process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.793. Extended Exercises in Cost Effectiveness. 2 Credits.
Provides students with experience in seven short exercises that explore a variety of aspects of cost-effectiveness analysis. Students learn how to link all the steps together to complete a full cost-effectiveness analysis from start to finish. During the two day course, students work in Microsoft Excel to setup a workbook that will allow them to complete a cost-effectiveness analysis, manipulate the results to explore multiple possible assumptions, and have the opportunity to share their work in a format that is easily accessible.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.861. Public Health Economics Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.865. MHS Capstone in Health Economics. 2 Credits.
Produce a scholarly paper that provides a meaningful contribution to knowledge of the health economics. Affords the opportunity to work under the direction of a research mentor and presenting research results to a group of peers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.700. Health Information Systems: Design to Deployment. 3 Credits.
Reviews health information systems, such as patient records, patient monitoring, imaging, public health, educational, bioinformatics and scholarly systems. Teaches the core architectures and technologies of these core systems, focusing on commonalities and differences and design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.703. Leading Change Through Health Informatics. 3 Credits.
This course will review the health information systems through case studies in the evaluation processes. Presents a framework for design and evaluation of systems based on user needs, functions performed, related information activities, and available technology. Skills taught include the use of measures and methods for qualitative and quantitative evaluation of information systems, including cost, performance, effectiveness and benefit/outcome determination.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.707. Introduction to Biomedical and Public Health Informatics. 3 Credits.
This course will contrast differences in roles, needs, and solutions among major players in the national and commercial health IT and informatics communities. The course will define public health informatics and explain why things do or don't happen in IT at the national and institutional levels. The course will apply available sources of data, information, and knowledge to address healthcare and public health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.708. HIT Standards and Systems Interoperability. 3 Credits.
Students learn the data, information, and knowledge standards critical to the successful implementation of local, regional, and national health-related information systems. Target competencies are to identify the appropriate level of HITSP standards for an informatics problem, and select the appropriate standard within that level; create use cases and an organizational process to define an interoperability standard for a specific healthcare/regional situation; participate in a national standards-creation process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.709. Health Sciences Informatics, Knowledge Engineering and Decision Support. 3 Credits.
Provides a framework for understanding decision support in the workflow of the health sciences. Focuses on the types of support needed by different decision makers, and the features associated with those types of support. Discusses a variety of decision support algorithms, examining advantages and disadvantages of each, with a strong emphasis on decision analysis as the basic science of decision making. Students are expected to demonstrate facility with one algorithm in particular through the creation of a working prototype, and to articulate the evidence for efficacy and effectiveness of various types of decision support in health sciences and practice, in general.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.725. Applied Clinical Informatics. 3 Credits.
Introduces the field of Applied Clinical Informatics, which is focused on leveraging clinical information systems and technology to improve patient and family-centered care. Provides exposure to a range of clinical workflows as well as patient/caregiver needs and how these may be supported by health information technology. Topics include: Workflow analysis, clinical decision support (CDS), electronic health record (EHR) and patient portal best practices, health information exchange (HIE), integrated laboratory, imaging and pharmacy information, telehealth and digital health strategies, and evaluation. Considers topics in the appropriate context of care continuum, clinical care transitions, patient safety and care quality, regulatory requirements, information security, organizational governance and project management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.727. Database Querying in Health. 3 Credits.
Introduces core concepts of relational databases using Structured Querying Language (SQL) along with terminologies related to clinical databases used in health information systems. Utilizes the Precision Medicine Analytics Platform with access to de-identified medical records of 70K patients with Diabetes with over 100 million data elements, including las, medications, encounters procedures, symptoms, and vitals. Focuses on answering clinical and research questions and discussion around effective data governance. Analyzes 3-yers of data to look for clinical and population-level management strategies for type 1 and type 2 diabetes. Includes analysis of a thorough data quality evaluation framework as well as identifying predictors for hospitalization and rehospitalization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.600. Introduction to the Risk Sciences and Public Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.605. Methods in Quantitative Risk Assessment. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.610. Risk Policy, Management and Communication. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.615. Topics in Risk Assessment. 2 Credits.
Uses a case study approach of a selected risk-based public health issue to integrate student's application of the skills in the risk sciences (risk assessment, risk management, and risk communication).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.700. Climate Change Adaptation in Public Health: Large World Cities. 3 Credits.
Provides an overview of the science behind climate change and highlights the particular risks of global mega-cities due to their concentrated populations, urban heat-island effect, frequent proximity to coasts and rivers, and locus of transport and trade. Uses the WHO and US CDC Guides to Vulnerability for Public Health and the UN Habitat Guide to Vulnerability Assessment for Cities to identify populations at greatest risk from climate impacts. Critically evaluates through case studies actual climate and health adaptive policies as they are implemented in real-life contexts in several large, innovative world cities including San Francisco, London, Rio de Janeiro, Durban, and Copenhagen.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.864. Advanced Topics in Climate Change Policy. 2 Credits.
Focuses on advanced issues at the forefront of climate change and public health policy and practice. Takes a complex-systems view that traverses the boundaries between sectors, spans government levels, and integrates perspectives across public and private actors. Topics to be determined each year according to faculty interest and student need. Uses case studies, policy analysis readings, and discussions to foster student learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.603. Applied Microeconomics for Policymaking. 3 Credits.
Introduces the basic principles of microeconomics by emphasizing applications to the solutions of public problems. Students examine how markets operate and the role of government intervention. Acquaints students with public versus private goods, externalities, information asymmetry and other issues. Provides a theoretical framework for addressing policy problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.615. Program Evaluation for Public Policy I. 3 Credits.
Introduces the fundamental principles and practices involved in the design, implementation, and analysis of program evaluations. Topics to be considered include the evaluation of ongoing programs and test of new interventions being considered for broader adoption; determining whether programs are 'working'; procedures involved in implementing an evaluation in the field, including potential pitfalls; procedures for collecting and analyzing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.616. Program Evaluation in Public Policy II. 3 Credits.
Introduces the fundamental principles and practices involved in the design, implementation, and analysis of program evaluations. Topics to be considered include the evaluation of ongoing programs and test of new interventions being considered for broader adoption; determining whether programs are 'working'; procedures involved in implementing an evaluation in the field, including potential pitfalls; procedures for collecting and analyzing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.623. Social Policy for Vulnerable Populations in the U.S.. 3 Credits.
Explores the social determinants underlying poor health outcomes among vulnerable populations in the U.S. and considers policy approaches to address those determinants. Explores examples of vulnerable populations including but not limited to groups facing extreme poverty, homelessness, serious mental illness, addiction, and disability. Examines definitions of vulnerability; the array of social determinants contributing to poor health outcomes among vulnerable populations in the U.S.; current U.S. social policy approaches for vulnerable populations in the areas of healthcare, disability, poverty, housing, and criminal justice policy; and the politics of social policy in the US. Provides students with opportunities for integrating social policy concepts, theories, and frameworks through an in-depth analysis of the sources of vulnerability and related policy approaches to improve health and social outcomes in specific vulnerable populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.625. Management of Nonprofit Organizations. 3 Credits.
Provides the necessary tools to effectively manage a nonprofit organization. Emphasizes financial, personnel and operations management, focusing on skills necessary to be an executive running a program within a large institution or heading an independent nonprofit agency. Addresses budgeting (both grant and organizational), reading and interpreting financial reports, grant writing techniques and staff and compensation management. Also examines how to work with the legal restraints and opportunities to maximize organizational effectiveness within the laws and regulations that make nonprofits different from the government and for-profit sectors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.636. Urban Policy. 3 Credits.
Explores urban issues through a policy lens. Examines a wide range of urban characteristics and the challenges cities face from fiscal stress and governance to poverty, homelessness, and drugs. Explores policy remedies proposed or tried in the past, how well they have worked, and what other strategies may be tried.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.640. PRACTICAL POLITICS, POLICY AND PUBLIC HEALTH. 3 Credits.
Explores how one effectively influences policy and the connection between policy and politics. Addresses how the two are related via a practical and hands-on approach, focusing on effectiveness, influencing the legislative process, and practical skills. Addresses how to approach legislators and other policy makers, gain insight into the political process, understand how bills are drafted and amended, develop persuasive arguments, and build strategic political coalitions. A sample of issues, with a focus at the state level, include: insurance regulation, reproductive rights, mental health systems, air/water quality, programs for the disabled, and gun policy. Also considers non-health care issues, including education funding and policy, transportation, criminal justice system and jails, gambling/gaming, building development, and election law.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.864. Current Issues in Policy Analysis. 2 Credits.
Provides policy researchers with a set of analytical frameworks to gain a greater understanding of policy issues. Explores all aspects of a topical policy issue from its origins, transformations, and impact on health and social justice. Policy topics are determined each year according to faculty interest, student need, and policy saliency. Uses case studies, policy analysis readings, and discussions to foster student learning. Some sessions focus directly on translating policy research into policy alternatives while others focus on the political and social environment
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.600. Quality Management in Health Care. 3 Credits.
Teaches students the basic concepts of quality in health care, and also equips them with approaches and skills to implement sustainable quality assurance programs in the health system. Introduces students to various quality improvement approaches (QC, QA, CQI, TQM), role of standards and norms, use of quality improvement tools, methods of quality assessment, and approaches to operationalize and implement quality assurance programs. Explains the concepts of organization for quality improvement, including Quality Teams (QT) and Quality Control Circles (QCC).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.601. Health Information Management and Decision-Making. 3 Credits.
The course provides an overview of Health Information Management System, its structure and functions. Identify information needs and indicators in the health systems and public health. Describe uses of information for effective management of health services. Review framework and organizational structure of HMIS. Provide a critical review of current issues problems in information management in the health systems in the context of developing countries. Describes various decision models and reviews decision making process in health care; application of information in performance tracking and analysis; monitoring of services and programs, supervision and impact evaluation. The course emphasizes designing health information systems and uses of IT.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.602. Project Management and Evaluation. 3 Credits.
Covers basic concepts and principles of project management and project management cycles. Provides learning opportunities for developing project management skills, and translates modern management concepts into project planning and management using a Log Frame Approach (LFA). Describes implementation structure, coordination and supervision mechanisms, and project evaluation methods. Reviews human aspects of project management such as motivating people, team building, and improving personal influence and effectiveness
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.603. Strategic Management. 3 Credits.
Presents a practical framework for formulating, implementing and controlling organizational and program strategies in public health. Provides an overview of the sub-systems, processes and models in strategic management as applicable to public health and health care organizations. Critically reviews the major environmental trends affecting healthcare organizations. Discusses how to use internal and external environmental analysis to identify the bases of sustained competitive advantage. Presents frameworks for strategy formulation and implementation including SWOT analysis and decision logic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.606. Health Economics and Cost Effectiveness. 3 Credits.
Introduces economic concepts and principles for better resource management in the health care sector. Examines the public finance approach to policy questions relating to the role of government and other stakeholders. Acquaints students with the methodologies of both cost and demand analyses. Demonstrates how to make use of such analyses in policy planning and evaluation, including practical skills in cost effectiveness analysis of public health services and programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.607. Human Resources Management for Health. 3 Credits.
Focuses on the skills necessary for managing people in the health organizations and systems. Introduces concepts of human resource management in the context of organizations including organizational characteristics, learning organizations, human resource planning, recruitment and selection, job analysis and evaluation, performance appraisal, career planning, motivation, leadership, team work, and managing employee relations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.608. Finance Management, Accounting and Budgeting. 3 Credits.
Explains the role of budgeting as a key component of the administrative process. Describes basic financial management concepts and techniques, and provides a foundation for integrating these techniques into health care organizations. Presents strategies for evaluating the financial status of a department or health unit in order to determine whether corrective actions need to be taken. Presents various analytical methods in management decision making, including benefit/cost ratio analysis, variance analysis, and break-even analysis
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.610. Principles of Management in Public Health. 3 Credits.
Introduces the basic principles of management in the context of public health. Covers basic management functions such as planning, organizing, implementation, coordination, monitoring, supervision, leading and controlling. Explores strategic management and decision making tools. Addresses core management areas in public health – planning, human resources management, management information systems, logistics and supply chain, financial management and budgeting, communication, and organizational culture and behavior. Discusses concepts of leadership and motivation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.601. Foundational Principles of Public Health. 0.5 Credits.
Provides a broad systematic understanding of the executive practice of public health from its inception to modern day. Uses case studies, as well as ethical and public heath practice frameworks to provide students with a grounding in "what is public health practice," why it is important, and why it is contested.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.600. International Travel Preparation, Safety, & Wellness. 1 Credit.
Prepares students who aim to work and live overseas. Explores the epidemiology of common morbidity and mortality among travelers. Examines key prevention, safety, and travel medicine principles and services to contextualize risks and maintain wellness. Reviews applicable interventions, appropriate vaccines, and personal protection methods to prepare students to respond to expected and unexpected situations. Assists students with personal preparations for travel through country-specific assignments. Challenges students to examine travel health and safety priorities through case studies and discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.601. Foundations of International Health. 4 Credits.
Provides an overview of foundational approaches and issues in International Health, preparing students to gain the skills and attributes needed to work in global public health. Examines conditions faced by disadvantaged populations, primarily in low and middle income countries (LMICs), and pathways to achieving better health outcomes. Applies principles of health equity and social justice in analyzing global health policies and programs, and develops skills to apply different frameworks for diverse types of public health intervention. Students develop and articulate evidence-informed arguments concerning public health strategies in different contexts, and practice communication skills that demonstrate respect for other cultures and perspectives. They use a range of tools to prepare for work in global public health, including how to conduct situational analyses across a range of settings, how to analyze scale-up, sustainability, and equity, and how to move research into practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.605. Doctoral Seminar in International Health I. 3 Credits.
Explores topics of relevance to International Health, in a six-module format. Each module comprises a set of readings which are discussed in class by students working in groups. Each session is led by a group of students with facilitation by course faculty and guest faculty as appropriate to the topic. Modules include (1) Health and International Development (2)Transitions (demographic, epidemiologic, nutritional and migration), (3) Sanitation programs, (4) Disease Eradication Programs, past present and future , (5) Chronic Disease, a new challenge for programs, (6) Primary Health Care, history, evidence and future
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.606. Doctoral Seminar in International Health II. 3 Credits.
Discusses how to identify a thesis topic, write a proposal, seek funding, understand challenges in execution, and thesis format and write up. Students read five doctoral theses, one from each Department of International Health program, and student groups lead discussions with the former students and their thesis advisors in class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.608. International and Global Health. 4 Credits.
Introduces students to an international perspective of health, disease, injury, and health systems. Develops requisite knowledge and understanding of globalization and health, global disease burden and international health scenario. Using case studies, students perform a comparative analysis of disease burden in various countries, health systems and policies, in developed and developing countries, health sector reforms and country experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.701. School-wide 2nd Year DRPH Seminar. 2 Credits.
Assists 2nd year DrPH students mastering skills related to study design and implementation, as preparation for work on their dissertation proposal. During the course of the year, this seminar series focuses on epistemology, alternative study designs, and how different study designs may best be suited to address different types of research questions. The course builds upon other methods classes and supports students to develop a draft research proposal of their own. While the course is designed to prepare students for their dissertation work, students can complete the course without having decided upon a dissertation topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.800. MPH Capstone International Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.810. Field Placement DRPH Program International Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.820. Thesis Research DRPH IH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.840. Special Studies and Research DRPH Program International Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.842. Doctoral Independent Goals Analysis - International Health. 1 Credit.
Develop a doctoral academic plan through discussions with faculty advisor resulting in the development of a written document called the Individual Development Plan. Review course tracking sheet based on skills and methods student plans to learn. The IDP is a living document that is part of the student's self-assessment and departmental annual review. Supports the student's successful performance in the program and prepares students for their intended future career.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.895. MPH Practicum: International Health. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.602. Applications in Managing Health Organizations in Low and Middle income Countries. 3 Credits.
Uses case studies, a simulation, and group-based activities, supplemented by required weekly online lectures and readings, students explore a variety of settings found in low and middle-income countries in which to apply management concepts. Examines: (1) organizational restructuring in response to decentralization, (2) environmental scanning ,(3) systems behavior in hospital organizations, (4) multiple approaches to group decision making, (5) managing to achieve agreement in health organizations, (6) preparing, implementing, and communicating a budget that is based on limited resources within a business, (7) performance improvement concepts and tools in a healthcare organization, and (8) the construct of a "balanced score card" for a health organization. Applies these concepts to the activities and assignments in this management skills learning lab.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.604. Case Studies in Management Decision-Making. 3 Credits.
Students analyze problems and develop strategies based on real dilemmas faced by decision-makers. Students formulate positions before class and actively participate in discussion during class. Cases come from both International and U.S. settings, and deal with issues such as: conflict between budget and program offices, working with governing boards, contracting between government and non-government providers, dysfunctional clinics, reforming hospitals, managing local politics, cutting budgets and collaborating in informal organizations. Develops skills in leadership, negotiation, analysis, communication, and human resource management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.605. History of International Health and Development. 2 Credits.
Examines the history of western efforts to promote health and nutrition in the "developing world" from the beginnings of tropical medicine to recent efforts of disease eradication. Explores the various economic and political interests, as well as cultural assumptions, that have shaped the development of ideas and practices associated with international health in "developing" countries. Topics include history of international health organizations, strategies, and policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.606. Training Methods and Continuing Education for Health Workers. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.607. Essential Skills for Women's Leadership in Global Health. 3 Credits.
Provides a robust understanding of the barriers women face in leadership and guides the development of solutions and strategies for individuals and institutions moving forward. Enhances knowledge about women's leadership in global health including barriers and models/frameworks that have been used to promote women in leadership. Distinguishes various leadership approaches and their implications in different cultural settings, highlighting diversity and intersectionality theories in particular. Builds essential skills including self-awareness, communication, and negotiation. Encourages a solutions-oriented mindset via the development of individual and institutional strategies. Utilizes case studies and discussion exercises that feature diverse organizational and societal contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.608. Managing Non-Governmental Organizations in the Health Sector. 3 Credits.
Familiarizes students with the key competencies required for managing NGOs in the health sector. Though many of the situations described in the lectures are taken from the instructor's experiences in managing international NGOs in developing countries, the material presented is applicable in organizational settings in developed countries as well. Topics correspond to the key responsibilities of NGO or health program directors. Lectures present guidelines, best practices, and management tools for the area of responsibility followed by a discussion of the lecturer's and students' experiences on those topics. Readings, which provide background information, are assigned for each class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.610. Pharmaceuticals Management for Under-Served Populations. 3 Credits.
Students analyze problems and develop strategies based on real world drug management issues, including regulations, manufacture, procurement, distribution, safety, policy, financing and the unique aspects of international pharmaceutical trade, the role of the World Trade Organization -- Trade-Related Aspects of Intellectual Property Rights (WTO-TRIPS), government, NGOs and individuals in the selection and use of pharmaceutical products. Course materials are drawn from both developed and developing countries so that the student will be knowledgeable about the role of Essential Medicines and the formation of a National Drug Policy. Uses a multidisciplinary approach to provide students with an operational understanding of factors influencing access to and use of pharmaceuticals and other health commodities. Collectively, these materials and approaches are intended to stimulate critical thinking on how to improve access to and the use of pharmaceutical products.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.611. Food Security and Nutrition in Humanitarian Emergencies. 2 Credits.
Examines food aid, food insecurity, and nutritional deficiencies as they appear in different types of humanitarian emergencies. Discusses profiles of major international relief organizations involved in nutrition and food assistance and common programmatic interventions used in response to food crises. Emphasizes development of practical skills and knowledge that can be applied in field settings. Students learn to appraise and compare content, cost, and logistical considerations associated with large-scale feeding programs, and become familiar with nutrition surveys and curative nutrition programs. Factors contributing to food insecurity are considered and various response modalities, including in-kind assistance and cash-based approaches, discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.612. Confronting the Burden of Injuries: A Global Perspective. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.613. Introduction to Humanitarian Emergencies. 3 Credits.
Introduces different types of humanitarian emergencies, humanitarian architecture and provides an overview of sectoral focus areas of humanitarian response. Informs students of the environment in which these emergencies occur and how public health responses in various types of emergencies and contexts differ. Explores mechanisms of preparedness, management of response to humanitarian emergencies and long-term recovery.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.614. International Political Science for Ph Practitioners. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.615. Health Emergencies in Large Populations (H.E.L.P.). 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.616. Ethics of Public Health Practice in Developing Countries. 2 Credits.
Provides a forum for discussion and deliberation about ethical issues in the practice of public health (including the conduct of research) in developing countries. Equips students to identify and analyze critical ethical issues and to consider systematically the ethical responsibilities of all parties involved.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.617. Behavioral Economics in Health Decisions. 2 Credits.
Prepares students to challenge superficial intuitive judgments that are attractive because they make obvious sense, but which overlook important considerations that demand more analytical assessment. Discusses human behaviors that then come into play in a more careful analysis, which are then examined for their legitimacy and reasonableness in resolving questions that are traditionally considered to be economic in nature. Develops ways to blend relevant behavioral factors with economic perspectives and methods to design balanced action strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.619. Introduction to Microeconomics. 3 Credits.
Introduces economics of the business enterprise, the household, and the industry. Topics include supply and demand, price and income elasticity, equilibrium of the firm, and the measurement of poverty and inequality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.620. Applying Summary Measures of Population Health to Improve Health Systems. 3 Credits.
Explores the conceptual basis and application of summary measures of population health status. Presents approaches to measuring the burden of disease in populations and their use for guiding resource allocation and planning efficient and equitable health care systems. Lectures, discussions, and group exercises focus on composite indicators, exploring social and ethical value choices, and assessing the burden of disease at national level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.621. Gender and Health: Foundational Theories and Applications. 2 Credits.
Provides a broad overview of the field of gender as applied to public health. Discusses the distinction between sex and gender and how they intertwine. Examines the effect of gender power relations on women's, men's, and gender minorities' health, including transgender and cisgender people. Prepares students to apply foundational theories in gender and health to a broad range of health topics. Presents strategies for incorporating gender analysis into health research and interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.622. Using Qualitative Methods for Program Planning and Evaluation. 1 Credit.
Introduces students to the role of qualitative methods in assessing population needs and designing acceptable interventions. Emphasizes the complementarity of qualitative and quantitative methods and how both should be combined for effective program design, implementation, monitoring, and evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.623. Water, Sanitation and Hygiene in Humanitarian Emergencies. 2 Credits.
Water, sanitation and hygiene (WASH) is an essential component of humanitarian emergency planning and response. This course provides WASH introductory concepts, technical knowledge and practice in humanitarian contexts, including conflict, natural disasters and disease epidemics. Essential cross-cutting issues such as coordination, intersectoral planning and response as well as community and behavioral aspects are provided with examples from recent disasters.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.624. Urban Health in Developing Countries. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.625. Evaluation of District-Level Primary Health Care Implementation in Low-and Middle-income Settings. 3 Credits.
Prepares students to analyze local contexts and project implementation designs in order to develop evaluation plans that can be practically applied to programs in middle and low-resource settings. Discusses actual experiences of helping implementers design evaluations for district level programs, taking into consideration time and budget limitations. Focuses on developing pre-post evaluation plans that measure adequacy of implementation, based on evaluation conceptual frameworks, following theory of change logic. Explores choosing the proper evaluation methodology (i.e. Qualitative and/or Quantitative). Includes choosing appropriate indicators based on internationally accepted primary health care indicators. Explores alternatives for addressing mortality measurement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.626. Introduction to Household Surveys for Evaluation of Primary Health Care Programs in Low- and Middle- Resource Settings. 3 Credits.
Introduces participants to fundamental skills needed to design and manage implementation of household surveys. Presents real world experiences of using the Knowledge, Practice, and Coverage (KPC) tool for household surveys in middle and low-resource settings. Includes constructing a questionnaire from standard KPC modules, indicator selection, sampling plan development, use of parallel sampling, household selection, management and oversight plan, and ethical considerations. Introduces participants to adjustments that can be made so that the survey can be implemented within time and budget constraints.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.627. Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries. 4 Credits.
Understands the clinical and social causes of high maternal and newborn mortality and morbidity. Exposes students to the clinical, program and policy interventions that address these issues, and evaluates the strength of the evidence supporting these interventions. Offers practical exercises for students to: 1.) understand the scope and epidemiology of both maternal and neonatal problems, and 2.) design and assess programmatic responses to address them. Upon completion, students will have the knowledge base to be able to contribute to program and policy responses with an informed perspective to avert maternal and newborn deaths in different contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.628. Psychological First Aid: Principles and Practice. 2 Credits.
Examines the psychological principles and practical guidelines for the provision of PFA as a means of fostering resilience in others. Provides in-person instruction in the RAPID model of PFA to students as well as practicing professional in a wide range of disciplines. The ability to assist people in acute distress is an essential aspect of healthcare, disaster relief, education, and leadership in all profession.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.629. Prospective policy analysis for health policy and systems research: methods and applications. 2 Credits.
Introduces learners to tools and methods to facilitate aspects of real-time policy analysis (from agenda setting, policy formulation, to policy implementation) and supports them to think through and plan to conduct a prospective policy analysis to a current public health problem, as well as to identify ways of engaging with the policy making process for the identified problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.630. Tackling the Intersectoral Challenge of Antimicrobial Resistance: Problem Solving Seminar. 3 Credits.
Examines antimicrobial resistance (AMR) as an intersectoral challenge, one that affects both our healthcare delivery and food systems. As a One Health issue, AMR also has an environmental dimension: up to 80% of some antimicrobials consumed by humans or food animals may be discharged into the environment. The incentives of traditional business models, where a drug company's revenues come from volume-based sales, are at odds with efforts to ensure access, but not excess use of antimicrobials. Some have called AMR an ongoing pandemic; others have noted the opportunity to invest in shared infrastructure, from infection control and prevention to integrated disease surveillance, that might address both future pandemics and AMR. Invites students to tackle this global health challenge by applying strategic planning tools to deepen one's appreciation and find creative solutions to AMR.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.631. Evaluation Methods for Injury Interventions. 3 Credits.
Prepares students to participate in the design/conduct of LMIC road safety program evaluations using standardized tools from the WHO, and to translate results for advocacy. Introduces the theory and use of these tools/study designs via lectures followed by case studies of how they have been used in LMICs. Students use EpiInfo to compile secondary data and do basic calculations to understand the burden of road crashes in an LMIC and then identify a plausible intervention and propose a study to evaluate its impact. Students work in groups to prepare an advocacy presentation based on a published program evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.632. Introduction to Improving Quality in Public Health Practice. 1 Credit.
Prepares students to design and implement a program of performance and assessment in public health practice. Examines the historical and theoretical background of public health practice and quality improvement. Presents strategies for developing public health practice improvement strategies that can be implemented in a high or low income setting, in a public or private sector, in a national or a sub-national organization. Includes practical tools that can be adapted for local use. Compares top-down and bottom-up approaches to public health practice quality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.633. Policy Advocacy in Low and Middle-income Countries: Application for Real World Challenges. 2 Credits.
Introduces fundamentals of policy advocacy with an emphasis on low- and middle-income countries. Reviews relevant frameworks, presents lessons learned from low- and middle-income countries case studies, and explains approaches for engaging both global and local stakeholders in influencing policy adoption or change. Provides students will skills necessary for developing and presenting an advocacy plan and to strengthen stakeholder engagement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.634. Stress Management for Relief Workers. 2 Credits.
Provides an introduction to the need for, strategic principles of, and tactics for the provision of stress management and crisis intervention to relief workers. Emphasizes on providing assistance to others as well as self-care. Provides awareness of emotional stress faced by health workers providing humanitarian assistance in emergency situations. Includes topics signs and symptoms of stress disorders (critical-incident stress), components of critical-incidence management programs, and provision of services to prevent long-term mental health consequences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.635. Global Advances in Community-Oriented Primary Health Care. 3 Credits.
Introduces students to the origins and recent advances in community-oriented primary health care through case studies from both developing and developed countries. Like hands-on clinical bedside teaching, the course uses real cases to help students develop problem-solving skills in practical situations. Program examples all use community participatory and community-based approaches to address priority health problems. There is a strong focus on equity and empowerment in all cases discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.636. High Performing Organizations in Lmic Settings. 3 Credits.
Provides an understanding of the core features, characteristics, systems and processes adopted by organizations that lead to high performance in LMIC settings. Introduces the Baldrige Performance Excellence Framework in Healthcare and utilizes a case study approach to share organizational best practices in setting standards, building robust processes and creating a culture of continuous improvement and excellence. Includes a contextual and cultural understanding of the LMIC settings that act as facilitators and/or barriers for high performance in LMIC settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.637. Health Information Systems. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.638. Health Systems Research and Evaluation in Developing Countries. 4 Credits.
Builds an understanding of the purpose and nature of health systems research and evaluation (HSRE) as a multi-disciplinary endeavor with scope for diverse inferences. Provides a landscape of the range of research questions and associated methodological approaches and study designs available for HSRE within health system building blocks and at various levels of the health system (macro, meso, micro). In addition, explores cross-cutting issues of equity and social justice, digital health applications and scientific rigor. Fosters the ability to develop different research strategies depending on the research question at hand and to read health systems research (HSR) critically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.639. Health Care in Humanitarian Emergencies. 3 Credits.
Introduces the provision of basic health requirements for refugees other displaced populations. This includes the health of persons displaced by conflict as well as natural and man-made disasters. Although its main concern is with the health needs or those displaced in low and middle-income countries it also touches on the issue of persons resettled to developed countries. Addresses epidemiologic assessment, control of communicable and noncommunicable diseases, nutrition, mental health needs, establishing and managing health services, reproductive health services, ethical decision making, application of International Humanitarian law, and coordinating activities among agencies in international contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.640. Design and Implementation of Incident Management Systems in Low- and Middle-income Countries. 2 Credits.
Introduces students to the design and implementation of organizational structures, specifically the Incident Management Systems (IMS), established to support health emergency response efforts in low- and middle-income countries. Discusses the functions that enable governments and international agencies to effectively respond to health emergencies, including management, planning, operations, logistics, finance, and administration. Reviews effective and ineffective management components of health emergency response efforts using case studies that include the Ebola virus outbreak in West Africa and the COVID-19 epidemic in India. Focuses on the application of the IMS in the context of some management principles.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.641. Measurement Methods in Humanitarian Emergencies. 2 Credits.
Gives students an overview of selected field-based methods used in humanitarian emergencies to measure basic health indicators and demographic characteristics of affected populations. Upon completion, students can describe the assessment process in the various phases of humanitarian emergencies. Students are able to describe a variety of methods, both qualitative and quantitative, used in field-based assessments of humanitarian settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.642. Mental Health Aspects of Disaster: Public Health Preparedness and Response. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.643. Armed Conflict and Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.644. Econometric Methods for Evaluation of Health Programs. 4 Credits.
Introduces students to the application of common econometric methods available to address questions of concern to policy makers, administrators, managers, and program participants regarding evaluation of health programs in low and middle-income countries. Students learn to apply econometric methods in their research and to recognize the limitations in applying the same methods in estimating the impact of a policy intervention. Combines a theoretical development of methods and a numerical application involving continuous dependent variables. Emphasizes the correct use of data in framing relevant questions and understanding the importance as well as the limitations of data analysis in order to equip students with the quantitative skills necessary to evaluate policy alternatives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.645. Large-scale Effectiveness Evaluations of Health Programs. 4 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a systems thinking lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.646. Health Systems in Low and Middle income Countries. 3 Credits.
Explores health systems in low and middle income countries (LMICs), and examines approaches to improving the performance of health systems. Focuses on frameworks, tools, skills, and strategies to understand, influence, and evaluate health systems in LMICs. Identifies key institutions, functions, and performance issues for national and local health systems. By using frameworks and tools, students gain experience in systematically analyzing health systems and methods to plan, implement, and evaluate changes in health systems in a variety of settings, including countries in various levels of demographic, epidemiologic and economic transitions. Covers key controversies in health systems, including issues in monitoring health systems performance, the role of the public sector, dealing with unregulated private health markets, linking priority health programs and health systems, raising accountability in the health system, etc.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.647. Advanced Topics in Economic Evaluation & Modeling for Global Health. 3 Credits.
Presents evaluation techniques to compare health system interventions in international health. Focuses on addressing existing constraints in health systems development, given key policy goals as quality, equity and efficiency. Presents both qualitative and quantitative approaches to evaluate interventions to better inform policy how to improve system performance and functions. Identifies policy goals, actor groups, system functions and ways to assess improvement strategies related to policy goals using existing systems frameworks. Covers key constraints in systems performance such as: effective prevention and treatment programs, patient compliance, health worker performance, inequitable access, collective financing, choosing priorities, and community-level interventions. Comparative methods draw on a mix of epidemiology, health economics, disease modeling, services research, and qualitative techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.650. Health Policy Analysis in Low and Middle income Countries. 3 Credits.
Provides an overview of political frameworks and theories related to policy development and offers practical perspectives on their application to health policy in low and middle income countries (LMICs). Analyzes the political economy of health policy, (ie. how the political environment and country institutions policy development). Introduces the main actors, processes and contextual features that are typical of policy development and implementation in LMICs. Topics encompass national policy and planning frameworks; aid harmonization and alignment; the role of policy networks (particularly civil society actors); policy implementers and their role in shaping policy; and mechanisms for global health policy development. Final sessions focus on practical strategies to strengthen policy processes. Teaching draws upon examples from different diseases, services and health systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.651. Econometrics I. 4 Credits.
Introduces students to the application of basic statistical methods to economic analyses. They use econometrics to support or reject theories from economics using empirical observation. Students cover the basic concepts behind linear regression models by studying cases where the dependent variable is continuous and is a linear function of the parameters of interest. Improves students' ability to conduct economic analysis using observational data, as economic studies rarely benefit from the availability of controlled experiments. Exercises provide hands-on experience in implementing well-crafted empirical analysis. Students learn to employ tools and methods and compare the results with respect to those obtained from initial estimations based on very restricted assumptions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.652. Financing Health Systems for Universal Health Coverage. 3 Credits.
Teaches the financing of health care in low and middle-income countries with the goal of achieving universal health coverage. The course is built around four themes of financing health systems: revenue sources, pooling, purchasing and provision of healthcare. Using this framework students will learn how to evaluate country health financing systems. Progressing through these themes students will learn to use metrics related to health financing, use household surveys to estimate some of these metrics, and also have an in-depth understanding of health financing systems of select countries. At the end of this course students will have a good understanding of health financing for a career in global health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.653. Hospital-Based Injury/Trauma Surveillance in Low- and Middle-income Countries. 3 Credits.
Examines the high, and growing, global injury burden with a focus on low- and middle-income countries. Establishes the need for and complexities of establishing and maintaining reliable injury surveillance systems in LMIC. Focuses on training students on the fundamentals of an injury surveillance system in LMIC settings– data needs, collection, coding, processing and use, as well as on evaluation of such systems, and how to sustain them. Prepares students to participate in designing and sustaining hospital-based injury/trauma surveillance systems in LMIC to inform health program planning at the local and national level. Uses case studies to compare and contrast injury surveillance systems in different LMIC settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.654. Systems Thinking in Public Health: Applications of Key Methods and Approaches. 3 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a systems thinking lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.655. Surgical Care Needs in Low and Middle Income Countries. 2 Credits.
Explores the components of health systems related to surgical care. Focuses on the global burden of surgical disease and trauma, and deficiencies in surgical capacity in LMICs. Case studies from the US, Sierra Leone and Rwanda illustrate common surgical conditions and needed components for a comprehensive health system. Specific topics include surgical care for Women's Health, obstetrical or gynecological injury, and trauma care. Discusses the importance of planning for surgical interventions in disaster management and conflict , including the difference between war surgery and military surgery. Also addresses the economic cost and benefit of surgery and surgical care in LMICs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.656. Conceptual and Evidential Foundations of Health Equity and Social Justice. 4 Credits.
Explores the conceptual bases of health equity and the underlying social justice, human rights, and disparity models for defining health equity. Examines strategies for promoting health equity and the strength of evidence supporting these strategies. Translates various causal models for defining health equity into research and practice frameworks. Presents integrative examples applying relevant concepts to identify causes, consequences, and solutions of health inequities in various contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.657. Disease and Program Costing in Global Health Programs. 3 Credits.
Provides a solid foundation in the key concepts and methods used for costing in global contexts with a focus on practice and policy. Focuses on defining costs and rationales for costing, quantifying the cost, defining the disease case, and identifying cost components that vary by country and settings. Discusses the challenges of costing in low- and middle-income settings and prepares students to design and execute a cost analysis on a global health program and on a disease. Helps students frame cost data and economic evidence for policymaking and advocacy. Includes topics such as taxonomy of costs, perspectives, epidemiological considerations, evaluating data sources, patient/caregiver economic survey design, analysis methods, and dissemination techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.658. Globalization: Challenges and Opportunities for Future Health Systems. 2 Credits.
Everything in life has positive and negative effects, and globalization is just one example of this reality. This course evaluates how globalization creates challenges and opportunities for health systems and health outcomes in general. Students discuss evidence on globalization and health, and propose strategies to leverage its opportunities and mitigates its risks.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.659. Introduction to Health Systems Modeling. 2 Credits.
Introduces students to mathematical and computational modeling and simulation methods to better understand, evaluate, and improve health systems. Addresses the basic concepts of mathematical and computational modeling and simulation and how they may apply to health systems. Covers the basics of economic and operational modeling and simulation, and introduces advanced Microsoft Excel features and the VenSim software.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.660. Systems Science in Public Health: Basic Modeling and Simulation Methods. 3 Credits.
Introduces students to mathematical and computational modeling and simulation methods that can help public health decision makers better understand and improve various systems in public health. Addresses the basic concepts of mathematical and computational modeling and simulation. Covers probability theory, decision analysis, Markov models, compartment models, and systems dynamics models, as well as basics of economic and operational modeling. Introduces TreeAge, and VenSim software. Offers examples of public health systems including both communicable and non-communicable disease control programs (e.g., vaccines, medications, and non-pharmaceutical interventions), dietary and physical activity behaviors and interventions, and healthcare systems and healthcare policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.661. Project Development for Primary Health Care in Developing Countries. 4 Credits.
Allows participants to design a Primary Health Care (PHC) project in a low or middle-income country. Students learn how to navigate needs and limitations, and utilize resources available. Focuses on project design, project implementation and evaluation. Students select one of several Request for Proposals (RFA) for a specific situation, conduct a needs assessment, create a problem statement, set goals and objectives, and a theory of change for this proposed project. Students learn how to address community participation, human resources and their training and supervision, project information, approaches to sustainability, logistics of service delivery, project budgeting and financial management, monitoring, and evaluation, and finally close out of a project. At the conclusion, students develop a proposal ready for submission to a donor that embodies their PHC project design responsive to the RFA.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.662. Globalization and Health: Economic Development. 3 Credits.
Explores how economic development affects global burden of disease and human capital. Focuses on the relationship between economic growth, health, human capital achievement, and socioeconomic inequalities in health. Divided into three parts; the first part examines the effect of wealth on health, as well as, how better health influences human capital and income. The second part examines socioeconomic inequalities in health, primarily focusing on theories of how income inequalities affect health, and the measurement of socioeconomic inequalities in health. Finally, the third and last part examines policy strategies to improve investments in human capital and reduce income inequalities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.663. Globalization and Health: Framework for Analysis. 3 Credits.
Evaluates in depth the influence of globalization on population health across the four main dimensions of globalization (economic, political, cultural and environmental). Teaches the use of analytical tools to observe the impact of globalization on population health using Global Burden of Disease data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.664. Prevention of Unintentional Injuries in American Indian Communities. 2 Credits.
Introduces the basic skills and knowledge required to address the injury burden in the Native American Community. Based upon the nine Core Competencies for Injury and Violence Prevention, provides students with opportunities to practice these skills through application sessions. Prepares students to enter a network of injury prevention colleagues with a specific interest in the prevention of injuries in the Native American community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.665. Early Childhood Intervention in Tribal Communities. 2 Credits.
Examines a constellation of economic, social, historical and cultural challenges to American Indian families that potentially compromise optimal early child development. Reviews opportunities for tribal grantees to assess needs and develop early childhood intervention strategies funded through the Affordable Health Care Act. Explores methods and theoretical approaches to early childhood development and intervention research in tribal contexts. Considers optimal systems of early childhood care in low resource settings. Examines unique aspects of tribal research and culture, emphasizing the importance of community-based and community-engaged approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.666. Introduction to American Indian Health Research Ethics. 2 Credits.
Introduces students to the ethics of human subject research specific to working with American Indian communities. Also introduces ethical theory and principles, followed by a brief history of research ethics in Indian Country. Topics covered in lectures and moderated discussions include the importance of health research in Indian Country, informed consent for research participation, role and function of institutional and ethic review
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.667. An Interdisciplinary Approach to Understanding the Health of Native Americans. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.668. COVID-19 & Infectious Disease Outbreaks in Native American Communities. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.669. American Indian Health Policy. 2 Credits.
Examines the historical, social, political, legal and economic factors and values that have influenced the development and implementation of health policy pertaining to American Indian and Alaska Natives. Focuses on the four substantive areas that form the analytic basis for many of the issues in health policy and management: economics and financing; need and demand; politics/ethics/law; and quality/effectiveness. Discusses the unique relationship between the U.S. federal government and American Indian tribes. Addresses key policy and advocacy issues impacting Tribal communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.670. Collecting, Analyzing and Using Public Health Data in Native American Communities. 3 Credits.
Introduces Native American tribal health leaders, health professionals, health paraprofessionals and others interested in Native American health concerns to the basic concepts of epidemiology and biostatistics. Designed for persons who may not have previous formal training in epidemiology or biostatistics, but may be working to determine or to address tribal priorities for health care, or working in, or interested in clinical research or public health within tribal communities. Prepares students for the core epidemiology and biostatistics courses offered by the School of Public Health. Teaches participants how to collect, analyze and use community data to address public health problems. Participants are asked to work on datasets from tribal communities to apply the principles taught during the course. Individuals do not have be Native American nor work with Native American communities to participate in the course since the concepts can be translated to many public health settings; howe
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.671. Introduction to Quantitative and Qualitative Research for American Indian Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.672. Introduction to Data Management Using American Indian Health Data. 2 Credits.
Introduces Native American tribal health leaders, health professionals, health paraprofessionals, and others interested in Native American health concerns to the basic concepts of data management. Designed for persons who may not have previous formal training in data management but may be working to determine or to address tribal priorities for health care, or working or interested in clinical research or public health within tribal communities. Designed to prepare students for the core courses on data management methods offered by the School of Public Health. Introduces students to basic principles and methods of data management using examples pertinent to American Indian health. Individuals do not have to be Native American, nor work with Native American communities, to participate in the course since the concepts can be translated to many public health settings; however, the examples and assignments will be drawn from Native American settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.673. Mental Health in American Indian Communities. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.679. Introduction to Design and Implementation of Digital Health Programs in Lmic Settings. 2 Credits.
Provides an understanding of different types of digital interventions in healthcare. Reviews existing "global goods" and tools that are helpful in planning digital programs. Examines effective implementation strategies to make digital programs effective using case studies. Reviews critical team skills needed for implementation and scale. Explores emerging analytic methodologies to monitor digital programs. Prepares students to become effective decision-makers and digital health leaders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.681. Global Health Entrepreneurship: from Ideas to innovations.. 3 Credits.
Teaches how to think about possibilities to make a difference in the global health community. Looks at how organizations like Medicine Sans Frontiers, Gates Foundation, and other smaller but impactful NGOs and Foundations had their roots in a team of public health-minded individuals who learned the business of global health and created organizations that fit their vision of how to make a difference in the world. Guides students through the process of idea conception, team and partner building, global health ethics, marketing/branding, finance and other fundamental pieces of creating, building and maintaining a successful global health start-up. Prepares students to conceptualize, design, build and manage sustainable and innovative global public health initiatives specifically focusing on critical and often missed topics such as marketing, budgeting / financial management, fundraising, legal and governance issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.685. Modeling and Simulation for Health Workforce Analysis. 2 Credits.
Introduces modeling tools and statistical techniques to simulate health workforce scenarios. Equips students to analyze the impact of health workforce policies and programs on population health. Focuses on the production, training, distribution, and retention of health workers for primary care in low- and middle-income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.688. Social and Behavioral Foundations of Primary Health Care. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.690. Strengthening Primary Health Care Across the World: Problem Solving Seminar. 3 Credits.
Uses interactive case-based and problem-based strategies to provide a 360 degree perspective on the challenges that typically undermine PHC strengthening, from articulating the relationship between PHC and the rest of the health system to measuring the impact of PHC. Equips students to develop pragmatic strategies that can address inequity in health systems, and promotes inclusion within public health programs through the use of primary health care strategies. Addresses multiple aspects of PHC strengthening from building coalitions to support primary health care, to engaging communities in the delivery of PHC services, to the use of implementation research to fine tune PHC strategies. Focuses on genuine country experiences and problems this seminar draws upon relevant bodies of theory from health systems, social and behavioral theory, social epidemiology, social justice and political science to craft practical strategies to strengthen PHC across the world.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.691. Human Resilience: Public Health Perspectives. 2 Credits.
Examines the nature of human resilience while focusing on how it may be fostered within organizations, communities, and individuals. Focuses upon building resilience systems while touching upon fostering individual resilience. Builds "cultures of resilience" by discussing building organizational and community cultures of resilience drawing not only upon social and community psychology, but also management and leadership tactics that may be employed to foster such cultures in healthcare, public safety, international aid organizations, and communities in general. Fosters resilience in others, developing essential leadership skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.695. Seminar in Humanitarian Health. 0.5 Credits.
Introduces important and evolving issues in global humanitarian health from various perspectives including experts, practitioner, policymakers and academics. Examines trending issues such as new emergencies, politics, human rights, humanitarian architecture, leadership, cash transfers, innovative financing among others. Prepares students to explore practicums, internships, develop capstone projects, and apply to careers in the humanitarian health field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.700. Public Engagement Practices for Scientists (Peps) in International Settings. 2 Credits.
Introduces the fundamentals of PEPS and its importance for public health professionals. Explores applications of quantitative and qualitative methods from other public health disciplines to assess and improve PEPS. Analyzes different frameworks to plan, implement, and assess PEPS, with a focus on low income, global settings. Provides opportunities to practice designing and evaluating PEPS within five engagement goal areas: (1) increasing scientist to scientist engagement, (2) increasing uptake of interventions, (3) increasing evidence-informed public health policy, (4) increasing minority populations into public health science workforce, and (5) increasing capacity of public health science workforce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.701. Applications to Gender Analysis Within Health Research and Interventions. 2 Credits.
Introduces gender analysis as an integral part of health research and interventions. Focuses on teaching students on how to incorporate gender analysis into health research and interventions. Explores: (1) theoretical approaches to gender and health, including intersectionality, masculinities, and non-binary approaches; (2) how gender and gender relations affects health needs, risks, experiences, and outcomes; and (3) ways in which gender analysis can be incorporated into health research and interventions, including the use of gender frameworks and questions, gender assessments, and transformative approaches. Examples will cover a range of international settings, with a focus on low-and-middle income country settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.702. Introduction to Gender Analysis Within Health Systems Research in Lmic Settings. 2 Credits.
Introduces gender analysis as an integral part of health systems research (HSR). Focuses on training students on how to incorporate gender analysis into HSR in LMIC settings. Explores how gender analysis can be incorporated into: (1) HSR content, i.e. the substantive focus of HSR – through the use of sex disaggregated data, gender frameworks and gender analysis questions; (2) HSR process – how HSR itself is imbued by power relations during data collection and analysis; and 3) HSR outcomes – how gender inequities in health systems can be transformed progressively or at least not exacerbated.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.705. Monitoring and Evaluation of Health Systems Strengthening in Low and Middle income Countries. 3 Credits.
Covers the essentials of monitoring and evaluating health systems strengthening in LMICs. The class analyzes the development of theories of change, and their application to the design of monitoring and evaluation systems, as well as alternative approaches to evaluating equity impacts. The development of monitoring indicators, use of quantitative techniques and the integration of M&E into health systems decision making will all be addressed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.710. Designing Transformative innovation for Global Health. 2 Credits.
Familiarizes students with policy analysis tools to help position innovation of technologies or institutions for transformative potential. Demonstrates the application of principles of design guided by public policy and public health concerns to adapt such innovation in resource-limited settings. Considers technologies that are potentially transformative for improving health and narrowing disparities—making water potable, cook stoves more efficient and less polluting, and point-of-care diagnostics more available in local clinics. Examines the context of what makes innovation potentially transformative. Enables students to apply key policy tools such as stakeholder, value chain and market analyses as well as systems thinking, and consider how to structure and critique prize competitions, innovative financing approaches, and public-private partnerships.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.711. Managing District Health Systems in Low and Middle Income Countries. 3 Credits.
Provides a broad understanding of the application of basic principles of health management and leadership at the sub-national level. Focuses on strengthening of district health systems by managing health services through planning and program development and generation and management of resources. Acquaints strategic approaches in effective service delivery with emphasis on forecasting, problem analysis, managing change, supportive supervision and skills development. Discusses issues in implementing and evaluating national health programs, translating national health priorities into action.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.712. Leadership & Management in Humanitarian Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.722. Quality Assurance Management Methods for Developing Countries. 4 Credits.
Presents the principles and practice of total quality management methods for health systems in developing countries. Emphasizes integrated district-level health systems management; fostering a genuine team approach in the face of an authoritarian tradition; central importance of community governance; interventions performed according to standards and in an equitable fashion; introducing a measurement-based approach to problem solving, emphasizing analysis of service delivery process and outcome; and developing operational research as an integral component of the management system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.801. Health Systems Program Seminar I. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and activities, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.802. Health Systems Graduate Seminar 2. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Focuses on topics like injuries, evaluation of health programs, health systems strengthening, universal health coverage, among other topics
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.803. Health Systems Graduate Seminar 3. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Focuses on topics like globalization and health, social determinants of health, primary health care, health security, among others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.804. Health Systems Graduate Seminar 4. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Discusses topics on evidence and public health knowledge, connection between animal and human health, humanitarian health, health financing, among others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.810. Health Systems Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in management of health programs in low- and middle-income countries according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.820. Thesis Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.830. Postdoctoral Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.840. Special Studies and Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.850. Msph Capstone Health Systems. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.861. Doctoral Seminar in Health Systems. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.945. Large-scale Effectiveness Evaluations of Health Programs Lab.
A complimentary lab course to 221.645.01 LARGE-SCALE EFFECTIVENESS EVALUATIONS OF HEALTH PROGRAMS. This lab will be used to have in-depth discussions and also have students apply some of what they have learned in lectures through structured exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.630. Nutrition, Infection and Immunity. 3 Credits.
Provides an overview of the relationships between nutrition and immune function, with a focus on established and emerging public health problems. Reviews assessment methods for immune function in the context of public health nutrition research. Discusses the impact of the immune response on nutrient metabolism, nutritional status, and interpretation of biomarkers. Examines the deleterious effects of malnutrition on host barrier defenses and innate, humoral, cell-mediated immunity, and mucosal immunity. Presents case studies on the synergistic and antagonistic interactions between the immune response and malnutrition. Provides self-study materials covering the basic tenets of immunology and nutritional status assessment, for students with limited background in immunology or nutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.641. Principles of Human Nutrition in Public Health. 4 Credits.
Prepares students for integrating the biology of nutrition in solving public health problems globally, with application to public health research, policy and practice. It summarizes the history of nutritional sciences as related to public health and provides an integrated overview of the physiological functions of energy, macronutrients and micronutrients that influence health, and risk for disease. Topics include dietary sources and nutrient requirements, absorption, metabolism, and function. The course covers advances in the use of novel assessment techniques and biomarkers in the diagnoses of deficiency and nutritional status, and describes the dynamics of the nutrition transition occurring globally and dietary underpinnings of overweight and non-communicable disease risks. Also covers emerging topics linking nutrition, immunity, gut health and the microbiome.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.642. Assessment of Nutritional Status. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.644. Cellular Biochemistry of Nutrients. 3 Credits.
Students learn biochemical processes of cellular macromolecules, such as DNA, RNA and protein synthesis, with particular emphasis on the function of essential nutrients in these processes. Covers biochemical aspects of carbohydrate, protein, and fat metabolism, and introduces essential concepts of molecular biology, such as structure and function of intracellular organelles and fundamental cellular processes. Topics also include nutritional and hormonal regulation of gene expression and concepts of detoxification to give the nutrition student a full appreciation of the relevance of nutritional biochemistry studies and cells to population perspectives. The course structure consists of core lectures led by faculty..
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.647. Nutrition Epidemiology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.649. International Nutrition. 3 Credits.
Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in low and middle-income settings. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status. Explores the degree to which malnutrition can be prevented or reduced prior to achieving high-income populations or certain economic development, through targeted public and private sector interventions that address the causes of malnutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.651. Nutrients in Biological Systems. 2 Credits.
Provides in-depth review of the metabolism of major macro- or micronutrients and their functional roles in a variety of biological systems. Focuses on biochemical or molecular mechanisms of how nutrients influence health and disease at the cell, tissue, organ, and regulatory network levels. Discusses emerging nutritional -omics studies and biomarkers to provide a global view of complex interactions between nutrients and genes, proteins, metabolites, and gut microbiota.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.652. Nutrition in Disease Treatment and Prevention. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.653. Food Technology and Health. 3 Credits.
Discusses nutritional, chemical, physical, and technological perspectives of food, food ingredients, food quality, food safety, and the regulation thereof. Focuses on the core constituents of foods, and examines the non-nutritional (phytochemical, flavor, pigment, texture and fragrance) constituents of whole foods and food products and their impact on health. Evaluates food delivery and production systems, and specific eating patterns. Students evaluate dietary patterns and develop dietary strategies for specific individual, family, and community dietary needs based upon knowledge of ingredient nutrient composition and ethnic food consumption issues and trends.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.654. Food, Culture, and Nutrition. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.655. Nutrition and Life Stages. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.657. Food and Nutrition Policy. 2 Credits.
Examines the policy making process underlying large-scale governmental, bilateral, and multilateral agency policies and initiatives that directly or indirectly affect 1) the availability and quality of food and 2) the health and nutrition status of populations. Draws examples from the United States as well as low and middle income countries. Includes discussions led by faculty and guest lecturers with diverse experience in developing and implementing food and nutrition policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.658. Critical Thinking in Nutrition. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.659. Critical Thinking in Nutrition II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.660. ADVANCED NUTRITIONAL EPIDEMIOLOGY. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.661. Designing Healthy Diets. 2 Credits.
Examines the factors influencing dietary patterns and food choices in the U.S. and internationally. Focuses on modifying recipes, calculation of nutritional information for foods and recipes, and on planning, analyzing and evaluating dietary choices and patterns using the Nutrition Data System for Research (NDSR) software program and food composition tables, so that they meet guidelines for overall health and wellbeing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.662. Obesity in Public Health. 3 Credits.
Examines obesity as a public health problem, (including prevalence, trends and disparities as well as the health, psychosocial, and economic consequences of obesity and its associated co-morbidities). Explores physiologic, psychological, economic, and cultural drivers of food consumption. Identifies key issues and approaches for current and future public health and environmental approaches to obesity
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.664. Food insecurity and nutrition: Partnering with community organizations to make change. 2 Credits.
Provides the opportunity to learn about community-based public health efforts to improve food security and diet quality and factors that influence food choices across the socio-ecological framework. Works with a community organization that provides community outreach services aimed at addressing food insecurity, improving diet quality, or addressing other nutritional needs of the population(s) they serve. Assesses the food environment and food access landscape for the population the organization they work with serves, and familiarize themselves with other organizations also serving that population. Gains practical experience developing innovative program elements to advance food access and nutrition services while accounting for real world considerations organizations face.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.665. Planning for Food Systems and Public Health. 3 Credits.
Introduces urban and regional planning as an integral part of addressing structural determinants of food and nutrition disparities. Examines the network of actors, infrastructure, resources, power relationships, and local government policies that influence health inequalities in food systems in communities of the US and globally. Includes topics related to food security such as land use, food production, gentrification, environmental sustainability, conflict and trauma, and mobility and transportation. Encourages students' critical thinking in how to reimagine and reshape food and community systems for social, economic, and health equity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.679. Food Insecurity and Nutrition: Partnering with Community Organizations to make change. 2 Credits.
Provides students the opportunity to learn about community-based public health efforts to improve food security and diet quality and factors that influence food choices across the socio-ecological framework. Works with a community organization that provides community outreach services aimed at addressing food insecurity, improving diet quality, or addressing other nutritional needs of the population(s) they serve. Assesses the food environment and food access landscape for the population the organization they work with serves, and familiarize themselves with other organizations also serving that population. Gains practical experience developing innovative program elements to advance food access and nutrition services while accounting for real world considerations organizations face.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.810. Human Nutrition Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop field, laboratory, or clinical skills related to nutrition research or programs according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), university projects, and multi-lateral, private, and/or for-profit sector. Practicum locations exist in the US and typically most regions of the world. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.815. Human Nutrition - Registered Dietitian (RD) Program Practicum. 1 - 16 Credits.
Provides a combination of didactic instruction, competency-based learning activities and supervised experiential learning at clinical facilities, community and public health organizations. Learning experiences include lectures/presentations, group discussions, peer learning and case-based scenarios in preparation for applying knowledge in the practice of dietetics. The practicum engages the student, the practicum site, and the faculty/preceptors in shared responsibility for the provision and acquisition of competencies across a broad spectrum of dietetic practice settings including clinical, food service and community nutrition, culminating in an 8-week public health nutrition experience. Led by the Johns Hopkins Health System Clinical Nutrition Department, the practicum extends from June (following the first 4 terms of coursework) to March of the next calendar year (3rd term of the subsequent academic year).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.820. Thesis Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.830. Postdoctoral Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.840. Special Studies and Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.850. Msph Capstone Human Nutrition. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.860. Graduate Nutrition Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.861. Doctoral Seminar in Proposal Development. 1 Credit.
Facilitates doctoral students in the development of research ideas and their dissertation proposals. Incudes the following topics that will vary by term: how to develop a research idea, and components of a solid research proposal – background, design, methods, sample size, analysis, writing to different audiences, research designs in nutrition, ethical review, funding sources and requirements, budgeting, staff management, thesis and manuscript preparation, and professional development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.600. Application of Spatial Analysis Tools to Inform Decision-Making in Lmics. 4 Credits.
Applies spatial analysis tools relevant for policy decision-making in resource-poor settings. Analyzes the concepts and techniques of Geographic Information Systems (GIS) and Exploratory Spatial Data Analysis (ESDA) with a global health focus. Introduces both descriptive and analytical functions of GIS along with additional spatial and geographic concepts including: cartographic communication automated mapping characteristics map projections geocoding coordinate systems the nature of spatial public health data and spatial statistical methods. Provides students with an opportunity to gain hands-on experience in the use of ArcGIS QGIS Geoda SatScan and Geographically Weighted Regression for spatial data analysis and mapping.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.603. Controlling Infectious Disease-1851 to the Present. 3 Credits.
Discusses advanced topics in the field of global health exploring the development of the first international sanitary conferences to responses to present day public health emergencies of international concern. Acquaints students with the colonial roots of international health, the rise of disease eradication strategies and contemporary responses to global epidemics. Introduces students with the histories and roles of several global health institutions such as the World Health Organization, the Pan-American Health Bureau, the World Bank and others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.615. Digital Health Strategies to Control COVID19. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.620. Domestic Immigrant Health Issues and Emerging Diseases. 2 Credits.
Focuses on diseases prominent in domestic immigrant populations. Areas of emphasis are epidemiology, diagnosis, clinical presentations, pathophysiology, strategies for treatment and control, and effects on immigrant populations. Principal diseases covered include diarrheal diseases, tuberculosis, HIV/AIDS, Cysticercosis, Chagas, and Malaria. Covers how the U.S. handles emerging diseases such as Ebola, Nipah, and Zika (e.g., Ebola in volunteers, etc). Examines special topics such as the effects of climate change on infectious disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.621. Design and Implementation of Global Digital Health interventions. 3 Credits.
Provides an understanding of different types of digital interventions in healthcare. Reviews existing "global goods" and tools that are helpful in planning digital programs. Examines effective implementation strategies to make digital programs effective using case studies. Reviews critical team skills needed for implementation and scale. Explores emerging analytic methodologies to monitor digital programs. Prepares students to become effective decision-makers and digital health leaders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.622. Design and Implementation of Global Digital Health Interventions II. 3 Credits.
Reviews necessary components of the digital health ecosystem that need to be addressed in order to develop and implement a successful digital health intervention. Provides an understanding of the different methods used to develop digital health interventions, including user-centered design. Explains the frameworks for the monitoring, evaluating, and reporting evaluation of digital health programs and interventions. Provides hands-on experience in developing digital data collection tools. Reviews components of successfully scaled digital health programs using both case studies and established guidelines.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.626. Special Topics in Global Digital Health. 1 Credit.
Offers a series of seminars on global digital health-related topics - including ethical, legal, and social issues of global digital health, behavioral economics and digital applications, innovative methods in digital health, among others. Includes leading digital health experts at JHU, from other institutions, organizations, government agencies, and industry. Provides the student with an understanding the global digital health context, covering scientific, social, economic, political, and ethical dimensions of the context.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.630. The Practice of Public Health Through Vaccine Case Studies: Problem Solving Seminar. 3 Credits.
Presents several historic vaccine case studies highlighting challenges in emerging science, program design and evaluation, management, policy and communication. Examines decision-making surrounded by scientific uncertainty, controversy and competing public health priorities. Explores the challenges of developing policy and practice decisions within the constraints of emerging and uncertain science. Challenges students to make policy decisions and develop programmatic and communication strategies in real world settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.632. Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries. 4 Credits.
Prepares students to design, implement, and analyze large-scale evaluations of health programs, focusing on low and middle income settings. Provides students with the skills to conduct household surveys, assessments of provider readiness and quality of care, and documentation of contextual factors, as well as overall planning, design, and analysis of program evaluations. Focuses on adaptation, development, and refinement of project-specific tools; sampling and sample size calculations; and various analytical methods appropriate for program evaluations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.660. Tropical Medicine and Parasitology. 4 Credits.
Provides a broad overview of select tropical medicine and public health issues. Highlights specific tropical diseases and case studies stressing diagnosis, treatment, and implementation of preventive and control measures. Introduces students to clinical tropical medicine and travel medicine. Includes specific topics: the etiology, biology, epidemiology, and clinical presentation of enteritides, intestinal protozoa and helminths, cysticercosis and hydatid disease, hepatitis, viral and arboviral infections, and malaria. Includes practical lab experience in parasitology and diagnosis. Prepares students working with current and emerging health problems in developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.662. Vaccine Development and Application. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.663. Infectious Diseases and Child Survival. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.664. Design and Conduct of Community Trials. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.667. Chronic Diseases in Low and Middle income Countries: Prevalence and Epidemiology. 4 Credits.
Introduces students to the major transitional diseases in low and middle income countries. Lectures detail specific chronic diseases, stressing such areas as significance, prevention, diagnosis and management. Includes both traditional lectures as well as case studies. Gains basic foundation of the epidemiology and challenges in the management of chronic diseases in low and middle income countries, which prepares them to work with research programs and international organizations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.668. Chronic Diseases in Low and Middle income Countries: Study Design and Metrics. 4 Credits.
Provides public health students and medical researchers with the necessary skills to engage in study design and conduct, analytic methods, and use of metrics to help conduct research on chronic diseases in low and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.672. Data Mgmt Methods in Health Research Studies. 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.680. Global Disease Control Programs and Policies. 4 Credits.
Presents the history, social and political context, organization, technical content, funding and evaluation of current, major, global initiatives for disease control. Emphasizes programs focused on health problems of the developing world and includes, initiatives for vaccines and immunization, non-communicable diseases, safe motherhood and reproductive health, malaria, Neglected Tropical Diseases, HIV, emerging infectious diseases, TB, tobacco control, nutritional interventions and injury control. Also examines the process of policy formulation and resource allocation to international health and disease control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.682. Clinical and Epidemiologic Aspects of Tropical Diseases. 4 Credits.
Focuses on infectious diseases that disproportionately affect those in developing countries. Some of these are major killers, others are neglected tropical diseases not covered in other courses. Discusses the epidemiological and clinical aspects of each disease, including diagnosis and treatment. Introduces students to the major infectious diseases that are prevalent and of public health importance in tropical and developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.684. Vector-Borne Diseases in the Tropics. 4 Credits.
Focuses on vector-borne diseases prominent in tropical infections. Emphasizes global epidemiology, diagnosis, clinical presentations, pathophysiology, and treatment of microorganisms as well as characterization and control of vectors. Integrates clinical cases and pathology through laboratory sessions. Covers principal diseases including malaria, African and American trypansomiasis, leishmaniasis, filariasis, yellow fever, dengue, hemorrhagic fevers, Bartonella, Lyme, Rickettsial, plague and toxoplasmosis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.685. Tuberculosis, HIV and Other Chronic Infections in the Tropics. 4 Credits.
Covers the history, clinical presentation, epidemiological factors, new diagnostic techniques, treatment, and control of tuberculosis. Addresses pathophysiology, clinical presentation, ecology, and effects of HIV/AIDS on developing countries, their populations, and resource utilization. Includes additional topics such as other chronic infections that have global public health importance. Emphasizes integrating policies addressing TB, HIV/AIDS, other infections and poverty in resource-poor settings and how these interactions influence control strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.686. Child and Public Health in the Tropics. 4 Credits.
Introduces students to the major global causes of child mortality and the strategies and interventions to reduce child mortality. Includes specific topics: malaria, HIV, measles, pneumonia, diarrhea, neonatal disorders and nutritional deficiencies. Additional topics may include maternal mortality, eye diseases, demography and anthropometry. Focuses on and emphasizes a theme through the different lectures, with the tension and balance between horizontal approaches to child survival, such as Integrated Management of Childhood Illness (IMCI), and vertical programs such as disease eradication programs. Discusses several papers published as part of the Lancet Child Survival and Lancet Neonatal Survival series, and gain hands-on experience applying different child survival strategies using the Lives Saved Tool (LiST).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.687. Vaccine Policy Issues. 3 Credits.
Examines current domestic and international policy issues in vaccine research, development, manufacturing, supply, licensure, delivery, and utilization. Includes topics: priorities for funding vaccine research and development, ensuring an adequate supply of safe and effective vaccines, vaccine financing and new vaccine introduction decision-making, ethics, and compulsory vaccination. Emphasizes the identification of important vaccine policy issues and the formulation and evaluation of policies to address these issues. Presents the roles, responsibilities, and policy positions of key immunization stakeholders via guest lectures by a wide array of experts who have worked for/with important vaccine stakeholders (e.g., UNICEF, The Bill and Melinda Gates Foundation, US Government, and GAVI Alliance). Learns skills including developing a Policy Paper. Includes readings relevant scientific papers and publications of U.S. and international agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.688. Intestinal Infections in the Tropics. 4 Credits.
Provides an overview of the epidemiology, presentation, and effects of microbial, protozoan, and viral intestinal infections, including Salmonella, Shigella, cholera, typhoid, rotavirus, amebiasis, dysentery, H. pylori, Campylobacter, Cryptopsoridium, Cyclospora, and Giardia. Addresses clinical presentation, life cycle, distribution, prevention, and treatment of intestinal helminthes, including Ascaris, Trichuris, Strongyloides, and hookworm. Addresses interactions between parasites, diarrhea, and malnutrition along with treatment, prevention and control strategies, and oral rehydration therapy. Covers Cysticercosis and hydatid disease. Includes laboratory sessions and practical lab experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.689. Biologic Basis of Vaccine Development. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.690. The Design and Analysis of Cluster Randomized Trials. 2 Credits.
Covers the major concepts and methods in the design and analysis of trial in which the unit of randomization is a group of participants. Focuses on design: discusses unmatched, matched, stepped wedge, and other approaches, with particular attention paid to randomization and sample size considerations. Presents a variety of methods for the analysis of these correlated-outcomes studies. Includes special aspects of infectious disease interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.705. Good Clinical Practice: A Vaccine Trials Perspective. 4 Credits.
Acquaints students with the regulatory and ethical standards of conducting trials in accordance with FDA Code of Federal Regulations and ICH GCP Guidelines. Provides students with background and resources needed to conduct clinical trials in healthy populations. Students complete a project based on a real-world vaccine trial focusing on logistical and operational components of protocol design, informed consent process, recruitment considerations, human subjects protection including adverse event assessments and reporting. Additional concepts include the responsibilities of ethical review committees, principal investigators, and sponsors; investigational product management and preparation; data collection methods; quality assurance and quality control (QA/QC). Contributors to the course have experience conducting clinical trials research in various settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.801. Global Disease Epidemiology and Control Program Seminar 1. 1 Credit.
Introduces students to the diverse projects and research activities led by faculty in the Global Disease Epidemiology and Control (GDEC) program. Presents key institutes and centers working to improve international health and introduces faculty-led case studies to identify challenges in ongoing research and practice initiatives. Examines and reflects on the history of prevention and control activities using the book, "A History of Global Health," by Randall M. Packard as a framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.802. Global Disease Epidemiology and Control Program Seminar 2. 1 Credit.
Introduces students to skills and resources for career development within the field of international health. Provides an opportunity for students to focus in on these skills such as giving presentations, tailoring their resume to a public health audience and developing their publication profile. Prepares students for the practicum application process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.803. Global Disease Epidemiology and Control Program Seminar 3. 1 Credit.
Explores a variety of tools and methods applied by GDEC faculty to conduct public health research with a focus on hands-on skills building. Specific sessions address: data sources, including datasets that are publicly available; development of a basic statistical plan; use and interpretation of modeling tools; field data collection; data visualization strategies, and data management considerations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.804. Global Disease Epidemiology and Control Program Seminar 4. 1 Credit.
Prepares students for the activities and requirements of the second year of the MSPH program including the practicum and beyond. Presents best practices and workshop for conducting a strategic literature search. Explains the role and resources of the Institutional review Board (IRB) Explores the continuum of qualitative to quantitative research and programs. Explores practicum and capstone requirements and documentation. Establishes second year MSPH milestones within CoursePlus Portfolio.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.810. Global Disease Epidemiology and Control Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in epidemiologic and data analysis skills applied to diseases of importance in low and middle income countries according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.820. Thesis Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.830. Postdoctoral Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.840. Special Studies and Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.850. Msph Capstone Global Disease Epidemiology and Control. 2 - 16 Credits.
This course is offered so that MSPH students who are working on their capstone (formerly MSPH essay) can register for credits with their academic advisors. This allows the Department and academic advisors to better track 2nd year MSPH students on their progress towards completing degree requirements. This also allow 2nd year students to more formally block time off in their academic terms to complete their capstone.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.860. Global Disease Epidemiology and Control Program Seminar 2. 1 Credit.
Introduces students to skills and resources for career development within the field of international health. Provides an opportunity for students to focus in on these skills such as giving presentations, tailoring their resume to a public health audience and developing their publication profile. Prepares students for the practicum application process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.861. Global Disease Epidemiology and Control Program Doctoral Seminar. 1 Credit.
Creates a focused, small group environment for the entering PhD students, which actively engages them in relevant, challenging content necessary for success in the PhD program. Seminar supports and extends beyond those topics taught in the classroom setting. The doctoral student education does not merely consist of successful completion of required courses--each student is expected to become a leading scientific expert during the years spent at JHU. It provides an opportunity to engage with senior faculty and move meaningfully toward selection of a dissertation topic and the skills necessary to successfully complete the PhD.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.866. Special Topics in Program Evaluation in International Health. 1 Credit.
Acquaints students with current or on-going examples of large scale evaluations, and the practitioners or organizations that are the key players in implementation and evaluations of maternal and child health programs in low and middle income countries. Provides students with the skills to articulate current methodological issues around program planning, implementation and evaluation. Discusses key publications related to program implementation and evaluation. Introduces student to the various roles and responsibilities of a public health expert in the field of program evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.867. Special Topics in Vaccine Science. 1 Credit.
Offers a series of seminars (4 per term) on research and access of vaccine against infectious diseases of global importance including COVID-19, emerging infections, childhood illnesses, and other important vaccine-preventable illnesses. Covers scientific, social, economic, political, and ethical dimensions of vaccine research, development and access. Includes leading vaccine experts at JHU, and from other institutions, organizations, government agencies and industry present seminars. Provides the student with an understanding of the pathways leading to development and utilization of vaccines with public health impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.605. Indigenous Health. 2 Credits.
Examines Indigenous Health through a public health lens. Critically evaluates the historical, social, cultural, and political determinants of Indigenous health utilizing various Indigenous theoretical frameworks. Provide students with an understanding of Indigenous research methodologies and prevention/interventions programs employed to promote and strengthen the overall health status of Indigenous populations globally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.630. The Obesity Epidemic Problem Solving Seminar: What We Can Learn from Native American Communities. 3 Credits.
Provides an overview of trends in obesity in the US, examines use/limitations of data from national surveys and describes how the epidemic varies geographically, by race/ethnicity and socio-economic status. Lectures and activities survey the complex, multi-faceted set of factors that contribute to the obesity epidemic and propagate disparities. Case studies in Native American communities, where some of the highest obesity rates exist, illustrate the importance of community collaboration and inclusion of culture in developing public health programs and policies. This class analyzes how the integration of knowledge, cultural norms and values, and engagement of multiple stakeholders is critical to shaping effective programs and policies. Course prepares students to identify and assess communities with obesity risk factors and propose culturally sensitive strategies to decrease obesity and eliminate underlying health disparities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.689. Health Behavior Change At the Individual, Household and Community Levels. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.690. Qualitative Research Theory and Methods. 3 Credits.
Introduces practical skills for conducting qualitative research in domestic and international settings. Provides an overview of theoretical foundations of qualitative research and different methodologies for qualitative inquiry, including programmatic qualitative research, grounded theory, ethnography, phenomenology, narrative analysis, and case studies. Enables students to develop, interpret, and evaluate three common qualitative data collection methods: in-depth interviews, focus groups, and observation. Emphasizes understanding the basic principles and techniques critical for conduct, including question formation, tool design, sampling, data generation, ethics, and quality. Critically assesses the use of qualitative methods in the published health literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.691. Qualitative Data Analysis. 3 Credits.
Combines lecture, hands-on exercises, and work with individual datasets to guide students through several approaches to managing and analyzing qualitative data in the context of both international and domestic public health research. Offers instruction in how to create efficient and accessible qualitative databases, apply different coding and other analytic strategies to different types of qualitative data, write analytical memos, and present qualitative results in forms appropriate for different target audiences, both academic and programmatic. Provides a brief introduction to the use of computer-aided qualitative data analysis software (CAQDAS).
Prerequisite(s): Must also enroll for PH.224.991
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.692. Methods in Formative Research and Human Centered Design for Intervention Development. 4 Credits.
Examines how to conduct formative research and human-centered design and apply its findings in the design, implementation, and evaluation of public health interventions. Prepares students with conceptual and methodological understanding that can be applied across a diverse range of public health traditions from social science to clinical research including implementation science, program evaluation, community diagnosis, and translational research. Presents and explores method case studies and the use of the data collected to develop tailored, more effective behavioral and community interventions, implementation models, and valid and reliable measurements. Discusses cross-cutting issues in study design, community entry and involvement, data sharing and use, as well as staff development and supervision. Examples presented and analyzed include HIV and malaria prevention and control, Aedes aegypti control, and global maternal and child health care-seeking programs and services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.694. Mental Health Intervention Programming in Low and Middle-Income Countries. 3 Credits.
Introduces students to mental illness symptoms and syndromes found across contexts and the variety of strategies used to treat such symptoms. Discusses mental health services as an integral part of global health program development. Addresses methods of adapting and developing interventions in low-resource countries and humanitarian contexts, as well as research designs used to evaluate these interventions. Challenges students to use critical and creative thinking skills throughout to discuss the issues involved in this relatively new field. Focuses on cross-cultural challenges in conducting mental health research in these settings. Topics covered include an overview of mental health issues in low-resource countries and humanitarian contexts; cross-cultural challenges; developing, modifying and disseminating prevention and intervention strategies; and the interplay between mental health and related topics such as nutrition, fitness and diabetes; HIV; substance abuse; and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.697. Qualitative Research Practicum I: Partnerships and Protocol Development. 2 Credits.
Places students in teams collaborating with a local community-based organization or JHU faculty member to develop a qualitative research project. Introduces key topics in qualitative research including conducting field research, developing study protocol s and data collection instruments, and interacting with qualitative research participants and collaborators. Addresses the practical aspects of qualitative study design (e.g. choosing between data collection methods, resolving logistical challenges, and operationalizing an iterative research design) as well as the practical aspects of ethical review (including the JHSPH IRB and school ethical review processes). Prepares students to develop the components needed to begin the qualitative research project conducted in 224.698.01: Qualitative Research Practicum II: Collecting Qualitative Data and 224.699.01:Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings (NOTE: concurrent or prior enrollment required).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.698. Qualitative Research Practicum II: Collecting Qualitative Data. 2 Credits.
Enables students to begin data collection and analysis for a qualitative research project in collaboration with a local community-based organization or JHU faculty. Discusses the informed consent process, common problems in qualitative data collection (interviews, focus groups, observation) and strategies for addressing them, how to make iterative changes to data collection methods, and different approaches to transcription and translation. Includes a debriefing with qualitative data collectors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.699. Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings. 2 Credits.
Enables students to complete data collection, analysis and write-up of results from a qualitative research project in collaboration with a local community-based organization or JHU faculty. Discusses common challenges in qualitative research including analysis of qualitative data, writing qualitative papers and reports, presenting qualitative findings, and ethical issues related to fieldwork and authorship.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.801. Building Resilience During Times of Uncertainty: An Evidence-Based Guide to Strengthen Your Personal Agency. 1 Credit.
Draws content from positive psychology, neuroscience, and mindfulness to teach the science and practice of building positive mental habits and fostering personal agency. Through a series of interactive sessions that review the scientific basis for these concepts as well as self-reflective exercises, students experience a personal journey to understand where they are now, where they would like to be and the mental tools to get there. Exposes students to several cognitive strategies and practical tools that can help navigate daily challenges, increase positive emotions, decrease stress and plan for the future.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.810. Social and Behavioral Interventions Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in the development, implementation, and evaluation of social and behavioral global health interventions, according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.820. Thesis Res Soc & Beh Interv. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.830. Postdoctoral Research Social and Behavioral Interventions. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.840. Special Studies and Research Social and Behavioral Interventions. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.850. Msph Capstone Social and Behavioral Interventions. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.860. Social and Behavioral Interventions Program Seminar I:Applied Social Science & Global Health. 1 Credit.
Discusses the history and philosophy of social sciences in public health. Students read the book "Global Health: Why Cultural Perceptions, Social Representations, and Biopolitics Matter" by Mark Nichter. This book serves as a starting point for a series of discussions on why a thorough understanding of the historical, cultural, social and economic context is important in global public health practice; how globalization affects global burden of disease, health equity, and relationship with the social and physical environment; and the role of applied social science theory and methods in shaping and evaluating social and behavioral interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.861. Social and Behavioral Interventions Program Seminar II: Participatory Approaches and the Role of Community. 1 Credit.
Provides an overview of participatory methods as they apply in international health, and discusses the role of community in social and behavioral international health interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.862. Social and Behavioral Interventions Program Seminar III: Intervention Case Studies. 1 Credit.
Discusses intervention case studies examining formative research, implementation process, or monitoring and evaluation aspects. Relevant readings illustrating one or more of these aspects are provided by the SBI faculty, advanced students or other guests who will be leading each of the sessions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.863. Doctoral Seminar in Research Methods in Applied Medical Anthropology I. 4 Credits.
Discusses and explores advanced topics in qualitative methods, including participant observation, interviews and focus groups, content analysis, discourse analysis, and online ethnography. Discusses theories in medical anthropology that are particularly useful in the design and analysis of international health interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.864. Doctoral Seminar in Research Methods in Applied Medical Anthropology II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.865. Doctoral Seminar in Behavior, Change and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.866. Social and Behavioral Interventions Doctoral Proposal Development Seminar. 2 Credits.
Guides students through the process of developing a dissertation proposal for the doctoral degree in SBI. Introduces the proposal requirements and provides information about the oral defense, including forming committees. Sessions include discussions of students' projects to help define the scope of a dissertation, understand how to use conceptual frameworks, approach the literature review, research methods, and analytic plan. Also discusses research ethics. Students work with the faculty instructor and in pairs and/or small groups to critique each others' proposals during the process of developing their own proposals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

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Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.600. Racism and Public Mental Health. 1 Credit.
Presents a multi-level understanding of the effects of racism on mental health among historically marginalized racial and ethnic populations. Prepares students to gain introductory knowledge of racism, from a historical and empirical perspective, as a fundamental cause of mental health disparities. Addresses and discusses the personal and vicarious influence of racism on specific psychiatric disorders such as depression, anxiety, schizophrenia, and suicidal thoughts and behaviors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.602. The Epidemiology of Substance Use and Related Problems. 3 Credits.
Presents an overview of the epidemiology of drug and alcohol dependence and its relevance to public health. Reviews trends in estimates of prevalence and incidence of drug and alcohol use and problems related to use. Examines factors that might influence subgroup variation and health disparities in drug use outcomes using a dynamic approach that addresses changes over time and across the life course. Explores the universe of suspected causal influences and mechanisms ranging from genetic to societal influences using a model in which transitions in stages of drug involvement are influenced by interactions between individual susceptibility and social environmental factors. Presents research methodology and recent innovations in drug and alcohol epidemiologic research. The goal of this course is further understanding of the usefulness of epidemiology for shedding light on the natural history of drug and alcohol use and the relevance of epidemiologic research to basic and clinical research
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.603. Psychiatric Epidemiology. 3 Credits.
Reviews descriptive and analytic epidemiology for major mental disorders. Examines issues of classification and nosology of psychiatric disorders, operational case definitions and measurement techniques, prevalence and incidence rates, natural history, risk factor research and plausible explanations for credible risk factors. Considers aspects of psychiatric epidemiology that illustrate important problems and concepts in epidemiology generally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.604. Seminars in Research in Public Mental Health. 1 Credit.
Integrates academic training with current research in public mental health, including etiological, epidemiologic and intervention research for mental and behavioral disorders across the lifespan. Features presentations by researchers from JHU and other research and practice institutions on the results of state of the art investigations of mental and behavioral health problems and issues of public health significance, emphasizing experimental design and methodology for analysis and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.605. Doctoral Seminar in Public Mental Health. 1 Credit.
Explores and critiques public mental health research and practice, emphasizing key constructs and methods with department faculty through presentations, readings, and group discussions. Develops professional development skills for careers in public mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.606. Digital and Mobile Health Research in Public Mental Health. 3 Credits.
Introduces students to digital and mobile health (mHealth) research in mental health. Covers a wide range of digital health topics and studies on mental and behavioral health conditions. Topics will include using digital health for research participant recruitment, assessment and data collection, as well as mental and behavioral health intervention development and delivery. Offers hands-on experience in digital and mobile health study design and data collection. Provides students a comprehensive overview over of the digital and mobile health field in mental health and encourages creative thinking about how these research methods can be applied.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.607. PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.608. School-Based Preventive Interventions and Research. 1 Credit.
Participants will have an an understanding of school-based prevention and research including the theoretical frameworks supporting schools as a context to address public health; the barriers and challenges to implementation of evidence-based interventions in schools; methodological implications of school-based research; and sources of funding for conducting school-based research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.609. Climate Change and Mental Health: Research, Practice, and Policy Perspectives. 3 Credits.
This course will introduce mental health concepts of disorder, distress, well-being, and resilience in the context of climate change. Online course sessions will be structured around three pillars: 1) climate change exposures and their impacts on mental health and well-being, 2) social and environmental justice in climate change and mental health, 3) resilience, psychosocial adaptation, and action. Lectures will be given by research, policy, and mental health practice experts. Research findings on direct and indirect mental health and psychosocial impacts of chronic and acute climate change exposures will be presented. Sessions will explore inequalities in climate change impacts on mental health with examples provided from across local and global social and economic contexts. Individual and community-level resilience, psychosocial adaptation, and areas of priority action will be defined, highlighted, and discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.610. Knowledge for Managing County and Local Mental Health, Substance Use, and Developmental Disability Authorities. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.611. Writing Publishable Manuscripts for the Social and Behavioral Sciences. 2 Credits.
Provides training in the preparation of manuscripts for submission to peer-reviewed journals, with a focus on empirical papers and systematic reviews. Develops students' ability to serve as reviewers and critically evaluate the written work of peers. Covers topics relevant to effective communication and dissemination of ideas, including journal selection, preparation of cover letters, and responses to reviewers. Incorporates student critiques of other students' works in progress and writing accountability group (WAG) activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.612. Introduction to Behavioral and Psychiatric Genetics. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.613. Mental Health and the Gut. 2 Credits.
Explores the strong, bidirectional communication between the gastrointestinal tract and the brain. Reviews the role of the microbiome in shaping brain health, the link between gastrointestinal symptoms and mental health, and new and seminal research on the brain-gut connection in specific psychiatric disorders such as schizophrenia, depression, and autism spectrum disorders. Students will learn to read and critique literature on this subject, and will learn the basics of how to design and analyze a study on the microbiome and mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.614. Advanced Latent Variable Modeling: Matching Model To Question. 3 Credits.
Reviews concepts, key assumptions, and published applications of advanced latent variable methods commonly used in psychology or mental health research including growth mixture models, latent class analysis with covariates and distal outcomes, and latent transition analysis. Acquaints students with the current state of science related to latent variable methods, which is a quickly advancing field, and gives students the tools they need to build an appropriate latent model for their research question. Topics include growth mixture modeling, latent class regression, latent transition analysis, multi-level models, and measurement invariance. Presents students with examples from psychological, mental health, and developmental datasets with applications in the behavioral and social sciences. Students will apply lessons from didactic lectures in assignments and class projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.615. Mental and behavioral health: from birth to early adulthood. 1 Credit.
Introduces students to the field of developmental psychopathology and its fundamental concepts and theoretical perspectives, including sensitive periods and the role of early experiences, risk, and resilience, and developmental pathways. Addresses factors that contribute to the development of psychopathology, including temperament, genetics, neurobiological processes, and social influences at the family, peer, and neighborhood levels. Discusses the contributions of individual-specific and contextual factors on the development of internalizing, externalizing, and substance use disorders across the childhood, adolescent, and emerging adulthood years.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.617. Psychopathology for Public Health. 3 Credits.
Examines the major mental disorders, emphasizing the current thinking regarding their essential features and their assessment in public health research. Class sessions include lectures by the instructor and by experts in particular disorders. Reviews best-practice non-pharmacological and pharmacological approaches to the treatment of disorders, and commonly-utilized measures in public health and clinical contexts, including self- and informant-report measures, clinician-administered scales, and structured interviews.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.618. Mental Health in Later Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.619. Psychiatric Genomics. 3 Credits.
Addresses the rapidly changing landscape of the study of complex genetics diseases. Students explore the current state of the quantitative issues in complex disease genetics, so that they can translate their experiences into research practice. Analyzes genome-wide association scans, epigenetics, and next-generation sequencing, as well as approaches to power calculation, including the use of simulation. Students study the current literature as well as examples from real data sets. In addition to learning the analytic techniques, students also become familiar with the assumptions and limitations of these approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.620. Qualitative and Quantitative Methods for Mental Health and Psychosocial Research in Low Resource Settings. 3 Credits.
Introduces mental health as an integral part of global health research, including using qualitative and quantitative methods to conduct needs assessments and to monitor and evaluate interventions. Presents and critiques qualitative strategies for integrating local cultural perspectives into research models. Examines qualitative and quantitative methods of adapting psychiatric assessment tools for use cross-culturally and presents challenges for developing interventions for use in low-resource contexts. Encourages use of critical and creative thinking skills throughout to discuss the issues involved in this important area of study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.621. Mixed Methods for Research in Public Health. 2 Credits.
Introduces students to the field of mixed methods research, which can be thought of as research in which investigators combine quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or program of research. Focuses on applications in mental health services research. Acquaints student with the logic of inquiry, which includes the use of induction (discovery of patterns), deduction (testing theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations for understanding results). Explores which questions lend themselves to mixed methods research. Discusses mixed designs and methods, and writing. Students critique mixed methods manuscripts and proposals, and can outline a mixed methods study based on their own program of research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.622. Neuroimaging: Methods and Applications in Mental and Behavioral Health. 3 Credits.
Provides an introduction to neuroimaging methods, relevance and possible implementations of these methods and background to critically evaluate neuroimaging applications in mental and behavioral health research. Introduces basic principles of neuroimaging as applied to human subjects research and specifically public health research. Reviews various imaging applications in the context of their specific methods, source of signal, goals and limitations, and research design and statistics and relevance to mental and behavioral health. Encourages critical evaluation of neuroimaging methods in public mental and behavioral health through review of published studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.623. Brain and Behavior in Mental Disorders. 3 Credits.
Examines the onset and clinical symptoms of mental disorders over the life course of the developing and aging brain to illustrate neurobiological systems involved in thinking, feeling, and acting. Increases understanding of behavioral disorders, their assessment, neurobiological underpinnings, and systemic influences. Reviews some common disorders, discussion (1) clinical and case studies; (2) definitions and diagnostic methods; treatment, epidemiologic evidence regarding etiology, and (3)challenges to examining brain-behavior relationships across disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.625. Mobile Mental Health Research: Planning and Conducting Ecological Momentary Assessment. 1 Credit.
Introduces mobile health (mHealth) approaches and methods to study human health behavior and mental health in near real-time and everyday life. Provides a brief overview of Ecological Momentary Assessment (EMA) studies and critical study design considerations. Gives students hands on experience setting up a small EMA study using freely available online software and smartphone apps.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.626. Propensity Score Methods in Non-Experimental Research in Mental Health. 1 Credit.
Discusses the importance of the careful design of non-experimental studies, and the role of propensity scores in that design, with the main goal of providing practical guidance on the use of propensity scores in mental health research. Covers the primary ways of using propensity scores to adjust for confounders when estimating the effect of a particular “cause” or “intervention,” including weighting, sub classification, and matching. Examines issues such as how to specify and estimate the propensity score model, selecting covariates to include in the model, and diagnostics. Draws examples from school-based prevention research, drug abuse and dependence, and non-randomized treatment trials, among others. Primarily emphasizes non-experimental studies; however, also discusses applications to randomized trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.628. Gaps and Opportunities in Public Mental Health: A Systems Approach. 3 Credits.
Acquaints students with mental health systems and the development of a comprehensive approach to the delivery of services to a variety of vulnerable populations living in difficult conditions in the community. Topics include a survey of the variety of current mental health services and evidence-based approaches, the impact on services of governance, organization and financing of services including a primer on Medicaid and Medicare, the link between poverty and mental health and the use of jails as mental asylums, the development of a competent workforce and an introduction to international community mental health issues. Features discussion and problem solving and involves a high degree of interaction between the participants as well as several field trips.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.629. Mental Health in General Medical Settings. 1 Credit.
Provides an overview of barriers to mental health care. Introduces evidence-based models of integrated physical and mental health care. Describes an array of mental health interventions that can be delivered in general medical settings (e.g., screening, brief intervention, case management, etc.), and evaluates the evidence supporting the use of such interventions. Explores integrated care in special settings (e.g., low- and middle-income countries, substance use care, emergency department).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.630. Stigma and Mental Health: Issues and Interventions. 1 Credit.
Provides a broad understanding of the interrelationship between stigma and mental health. Focuses on health consequences of stigma for individuals living with mental health disorders. Introduces students to intervention strategies for reducing mental health-related stigma at different health systems and ecological levels, with a focus on the role of mental health service users in stigma reduction. Prepares students to incorporate anti-stigma approaches into their own work.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.631. LATENT CLASS ANALYSIS AND REGRESSION FOR MENTAL HEALTH RESEARCH. 2 Credits.
Addresses latent class analysis, a latent variable method often used in Mental Health research to identify latent groups of individuals based on patterns of categorical observed variables. Use of additional variables to predict latent class membership will also be explored. Includes discussion of examples from the mental health literature as well as hands-on model-fitting using MPLUS. Latent class analysis is a method of modeling categorical latent variables, such as psychiatric diagnoses, as a function of a set of categorical observed variables.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.632. Grant Writing: NIH and Other Funding Sources. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.633. DEVELOPING AND USING LOGIC MODELS/THEORY OF CHANGE FOR BEHAVIORAL HEALTH AND VIOLENCE PREVENTION PROGRAMS. 1 Credit.
Developing and Using Logic Models/Theory of Change for Behavioral Health and Violence Prevention Programs. Introduces the concept of the logic model/theory of change in the development of programming and in the creation of grant applications. Reviews logic models/theory of change strategies from existing programming related to the prevention of behavioral health problems/violence or the treatment/remediation of behavioral health problems/violence/trauma. Discusses strategies for using the logic model/theory of change to build effective teams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.634. Stigma and Public Health: Issues and Interventions. 3 Credits.
Provides a broad understanding of the public health impact of stigma and discrimination related to a variety of identities and health conditions. Introduces students to frameworks for understanding stigma (including intersectionality), strategies for characterizing and measuring stigma, and intervention approaches for reducing stigma and discrimination at different ecological levels with the goal of improving health equity, access to quality healthcare services, and promoting psychosocial wellbeing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.635. Conflict Resolution Skills in Mental Health. 1 Credit.
Examines the dimensions of conflict in the mental health field including, but not limited to assessing one's personal conflict style; dynamics and elements of negotiation; power disparities; conflicting parties' positions, needs, and interests; Mediation--stages, behaving as a mediator, facilitating agreements; dealing with impasse; techniques to re-frame disputes; dealing with high emotions; ethical dilemmas; conflict coaching; and designing conflict prevention and resolution systems in mental health agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.636. Methods for Handling Missing Data in Psychosocial Research. 1 Credit.
Since analyses that use just the individuals for whom data is observed can lead to bias and misleading results, students discuss types of missing data, and its implications on analyses. Covers solutions for dealing with attrition (non-response) and missingness on individual items. These solutions include weighting approaches for unit non-response and imputation approaches for item non-response. Emphasizes practical implementation of the proposed strategies, including discussion of software to implement imputation approaches. Examples come from school-based prevention research as well as drug abuse and dependence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.637. Causal Mediation Analysis. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.638. The Science of Narrative: Why Storytelling Is Important to Research. 1 Credit.
Introduces the basic components of storytelling. Examines the science within the narrative arts. Challenges students to present the art within public health sciences. Emphasizes critical perspective on how nuances and merits of public health research should be expressed to relevant audiences, including community members and policymakers. Explores why storytelling is a powerful modality for conveying uncommon knowledge and insight in a manner that appreciates common experiences. Prepares students to combine data and narrative while acknowledging both as essential to effective public health advocacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.639. The Intersection of Mental and Physical Health. 3 Credits.
Addresses the epidemiology, consequences, measurement, and implications for health service delivery of co-morbidity of mental and physical disorders. Employs a conceptual framework that emphasizes the potential psychological, behavioral, social, and biological mechanisms through which mental and medical illness interact to cause disability and death. This model has implications for development of new service delivery models that integrate the care of mental health disorders into the care of medical conditions such as cancer, cardiovascular disease, and diabetes. Students interact with investigators and clinicians in lecture format, examine case studies, and generate a paper related to a medical-psychiatric co-morbidity of their choosing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.640. Childhood Victimization: A Public Health Perspective. 3 Credits.
Examines childhood victimization across a wide spectrum of victimizations, including sexual and physical abuse, peer and sibling assaults, witnessing domestic violence and verbal abuse and neglect. Acquaints students with the epidemiology of childhood victimization, reviews existing victim and perpetrator-focused interventions, and explores established emerging prevention strategies. Reviews legal policies aimed at reducing childhood victimization, their strengths and weaknesses, and challenges to the notion that childhood victimization is, or can be, effectively addressed solely or primarily via criminal justice interventions
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.641. The Epidemiology of Substance Use and Related Problems. 1 Credit.
resents an overview of the epidemiology of substance use and substance use disorders within a public health framework. Initially we review how drugs are classified and regulated and then we examine trends in estimates of prevalence of use and use disorders. Covers the most common drugs of abuse, including alcohol, tobacco/nicotine, cannabis, opioids, and cocaine. Included are lectures from those with expertise in specific drugs or areas of study within substance use epidemiology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.642. Manuscript Writing for the Social and Behavioral Sciences. 1 Credit.
Trains students to prepare manuscripts for submission to peer-reviewed journals with a focus on empirical papers. Discusses topics relevant to effective communication and dissemination of ideas, including journal selection.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.643. The Science of Narrative: Intersectionality of Storytelling and Public Health. 2 Credits.
Introduces the basic components, concepts, and frameworks of storytelling. Examines the science within the narrative arts. Challenges students to present the art within public health sciences. Emphasizes critical perspective on how nuances and merits of public health research should be expressed to relevant audiences, including community members and policymakers. Explores why storytelling is a powerful modality for conveying uncommon knowledge and insight in a manner that appreciates common experiences. Explores approaches that capture narratives for health research and practice. Prepares students to combine data and narrative while acknowledging both as essential to effective public health advocacy. Encourages a re-imagination of public health's epistemology, pedagogy, and methodology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.646. Autism Spectrum Disorder in Public Health. 2 Credits.
Since the number of children with an autism spectrum disorder (ASD) has increased dramatically over the past two decades and is now a major public health issue, students learn about the state of the science of autism epidemiological and etiological research, and the emerging questions for Public Health. Students also learn about prescriptive epidemiology, genetics, environmental risk factors, and prognosis of ASD, as well as long-term outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.647. Childhood Victimization: An Overview of Public Health Efforts. 1 Credit.
Examines childhood victimization from a public health perspective. Familiarizes students with public health strategies used to address three related domains: detection and prevention, treating victims, and offender interventions. Challenges students to critically examine policy and practice, using cases such as the Penn State sex abuse scandal. Uses small group break-out sessions to help familiarize students with the public health approach to violence prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.648. Child and Adolescent Psychopathology. 1 Credit.
Reviews, in detail, the current and historic role of government as funder, regulator, and provider of mental health services in the United States. Highlights a number of critical dimensions of public mental health programs, including, but not limited to, the organization of services for children, adults, and aging adults; substance abuse services; specialty services designed to enhance long-term recovery support and community integration; supported housing; and integrated behavioral health and primary care. Focuses on the role other public agencies, working in parallel and integrated with public behavioral health agencies, such as Social Services, Social Security, Corrections, Juvenile Justice, Public Health, and Medicaid. Features an overview of public agencies, peer (current and former mental health clients) operated services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.649. Investigating Behavioral Health Outbreaks and Epidemics. 1 Credit.
Introduces outbreak investigation, with a focus on outbreaks and epidemics of behavioral health problems such as substance use, mental health, violence, and neurocognitive disorders. Provides hands-on experience through a practice investigation that uses examples and data from a real outbreak of lung injuries linked to use of e-cigarettes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.650. Methods in Implementation Science. 3 Credits.
Introduces methods, research designs and evaluation approaches that can be used to study implementation science questions. Includes an introduction of methods such as mixed-methods, measurement validity and reliability, randomized and non-randomized designs, and simulation studies using examples from mental and behavioral health settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.651. How to Derive a Polygenic Risk Score. 2 Credits.
Explores what polygenic risk scores are, and what they have revealed to date about human genetic mental health outcomes, with computer laboratory exercises to step-by-step develop the tools needed to create and analyze these scores with genetic study data. Includes creating summary statistics and descriptive figures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.655. Applying the DHHS Healthy People 2020 Model of Health Determinants. 1 Credit.
Presents the model of health determinants, and focuses on the effects on population health and community and personal wellbeing. Explores the health determinants model introduced by the US. Department of Health and Human Services Healthy People 2020 Committee. Discusses the model which links negative social and physical determinants of health, such as abuse, lack of social support, or poor-quality living conditions, with trauma responses, and then with behavioral and health conditions. Discusses population health as an approach to understanding and intervening in this system to prevent trauma and subsequent illness. Examines the dimensions of wellbeing to reflect subsequent health status.Introduces and explores the model and several areas of application.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.657. Statistics for Psychosocial Research: Measurement. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.658. Mental Health and Psychosocial Support in International Humanitarian Settings. 2 Credits.
Explores key issues in the development and evaluation of mental health and psychosocial support interventions with populations affected by humanitarian crises, such as natural disasters and armed conflicts. Discusses such questions as: ‘how do populations in diverse socio-cultural settings define mental health in the context of humanitarian crises?’; ‘How can we build on existing resources and practices that promote mental health in humanitarian crises?’; ‘What is known from epidemiological and intervention studies about common mental health problems and effective interventions in humanitarian settings?’. Challenges participants to reflect on translating science to practice, and vice versa. Course methods entail a mix of multimedia presentations and case discussions, focusing on real-world experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.659. Current Issues in Military Mental Health. 1 Credit.
Explores issues in mental health affecting U.S. military personnel and veterans over more than a decade of war. Presents an overview of the epidemiology of mental disorders and suicide within military populations. Critically reviews existing epidemiological studies and the current military psychiatric epidemiology literature. Introduces military mental health data systems used for surveillance and research. Discusses challenges in prevention and service delivery. Explores the significance of traumatic brain injury. Reviews evolving practices in deployment mental health screening. Addresses controversial topics including the practice of polypsychopharmacy, multiple deployments, recruitment, retention, and separation policies, and the role of the all-volunteer force. Examines current issues in the care of military veterans, including homelessness, suicide, and substance abuse.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.660. Grant Writing for the Social and Behavioral Sciences. 3 Credits.
Targets the development of effective research proposals in public mental health, including the identification of research questions, factors related to significance and innovation, study design, and analytic approaches. Reviews of research proposals and articles address issues such as topic selection, sample selection, measurement , and analytic strategies. Reviews strengths and weakness of proposals and studies and considers recent advances in epidemiologic and statistical methods as alternative approaches for addressing research questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.661. Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.662. Public Mental Health. 2 Credits.
Provides an overview and framework for the full spectrum of public mental health. Presents key concepts in public health applied to mental and behavioral health and disorders. Discusses the causes and consequences of mental health disorders, the frameworks for understanding the origins of these disorders, strategies for treatment and prevention, and issues related to health services and policy for mental and behavioral health
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.663. Mental and Behavioral Clinical Practice Exposure. 2 Credits.
Introduces students to the mental health/behavioral care clinical settings. Acquaints students with the therapeutic relationship that exists between clinician and patient. Presents opportunities for shadowing and research partnerships with clinicians. Provides access to potential clinical data sets for exploration and analysis. Emphasizes practical hands-on experience over didactic secondary exposure. Challenges student notions of the psychiatric patient and their care, while destigmatizing both the illnesses and the treatment processes. Encourages creative hypothesis generation grown from observation of solvable challenges experienced in the field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.664. Introduction to Mental Health Services. 3 Credits.
Examines issues in mental health care utilization, including definition of need for mental health care, concerns about the treatment gap in the community, treatment seeking and barriers to care (most importantly stigma and financial barriers) and treatment seeking models and predictors of mental health treatment-seeking in community settings. Introduces students to the study of delivery of mental health care, including historical trends in the delivery of mental health care in the US, the mental health care system's governance and financing, quality and outcomes of mental health care and mental health services for children and older adults and treatment services for substance disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.665. Climate Change and Mental Health. 1 Credit.
Introduces mental health concepts of disorder, distress, well-being, and resilience that warrant consideration in the context of climate change. Structured around chronic and acute climate change exposures, including rising temperatures, rising sea levels, and disasters, such as floods, hurricanes, and wildfires. Explores mental health impacts of particular climate change exposures with examples from across high-, middle-, and low-resource contexts. Includes discussion of social inequalities on the impacts of climate change on mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.666. Sleep and Public Health. 1 Credit.
Provides a foundation of knowledge concerning the basics of sleep, how sleep changes across the lifespan, how it is measured, its links to physical and mental health, important sociodemographic sleep disparities, and implications for public health and policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.667. Mental Health and the Law. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.668. Complex Systems Thinking in Aging Research: Fundamentals and Methods. 1 Credit.
Trains students on the fundamentals of systems thinking. Considers key aging-related health outcomes from a systems science lens. Examines basic systems models (dynamic models, agent-based models, social network models). Examines application of systems thinking on evaluating health programs and polices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.669. Epidemiology of Major Mental Disorders. 2 Credits.
Presents an overview of the epidemiology of anxiety and mood disorders, schizophrenia and associated syndromes, affective psychosis including bipolar disorder, and dementia and related syndromes. Prepares students who have basic knowledge of the clinical features of the syndromes, but will touch briefly on issues of assessment in the context of epidemiology. It includes the fundamentals of descriptive epidemiology for each syndrome (prevalence, incidence, natural history); consequences of the syndromes for impairment, disability, and general health; and an assessment of risk factors for the syndromes, including a discussion of the genetic epidemiology of the syndromes. Examines the special conceptual challenges for the field of epidemiology which are presented by the mental disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.670. Creating Trauma Informed and Healing Policies and Practices. 1 Credit.
Provides a broad overview of the challenges presented by traumas including COVID-19 and violence. Reviews how trauma, including COVID-19 and violence, impacts clients, patients, participants in programs or community activities, and those leading these services, supports, and activities. Describes policies and practices that are healing and trauma-informed. Examines opportunities and challenges for creating more healing and trauma-informed organizations, programs, and policies and the challenges encountered. Prepares students to positively impact their own programs, organizations, and activities and to provide consultation to others interested in creating more healing and trauma informed polices, practices, and activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.671. Traumatic Pasts but Hopeful Futures: Resilience and Positive Youth Development in the Context of School-Based Mental Health. 1 Credit.
Introduces research on resilience and youth development that addresses adolescent mental and behavioral health for at-risk youth using the definitions, theories, and measurement of resilience. Focuses on how a framework of positive youth development can inform school-based, universal interventions to build youth resilience, promote self-efficacy, and reduce disparities in youth mental health. Includes discussion of how we can use these frameworks to address mental and behavioral health inequities are exacerbated by the COVID-19 epidemic and protests against structural racism and police brutality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.672. Evaluation of Mental Health Service Systems. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.673. Prevention Research in Mental Health. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.674. Suicide As A Public Health Problem. 3 Credits.
Introduces students to the following content areas with regard to suicide: history and theories; epidemiology; etiological factors and mechanisms; clinical phenomenology and comorbid disorders; assessment of suicidal behaviors; special populations; preventive and treatment interventions; ethical issues on the conduct of research on suicidal populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.675. Suicide Prevention: Problem Solving Seminar. 3 Credits.
Explores the following suicide-related topics: history, frameworks and theories; epidemiology, etiological factors and mechanisms; national and local suicide data sources; policy and preventive interventions; high-risk populations; common barriers and challenges to implementing and sustaining suicide prevention. Introduces leadership and management competencies including organizational change and strategic plans. Presents strategies for designing systems-level interventions. Engages students in interprofessional team approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.677. Translation of Mental Health Research Into Field-based Public Health Interventions. 2 Credits.
Provides a broad overview of how evidence-based mental and behavioral health interventions are being interwoven into education, health, and community programs in the United States and around the world in order to prevent or intervene with issues of interpersonal violence and trauma-related disorders and promote well-being and mental health resiliency. Introduces examples for different populations across the lifecourse and in different US and global contexts. Addresses challenges of integrating and scaling up interventions in non-clinical settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.680. Promoting Mental Health and Preventing Mental Disorders in Low- and Middle-income Countries. 3 Credits.
Focuses on research and intervention approaches in low- and middle-income countries in the field of mental health prevention and promotion. Particularly emphasizes populations exposed to adversity, and challenges students to bridge the gap between research and practice in this area. Discusses the determinants of mental health, and how they can be targeted: at different life stages and different socio-ecological levels (e.g., family, school, and neighborhood). Addresses such questions as 'What is resilience, and how can it be promoted?', 'How can interventions prevent depression in women exposed to intimate partner violence?', and 'How do poverty, violence and malnutrition impact mental health?'. Uses real-world examples, and follows a case method approach.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.681. Mental Health and Psychosocial Needs of Refugees After Resettlement in High income Countries. 1 Credit.
Provides a broad understanding of the refugee resettlement process and presents data on the epidemiology of mental health and psychosocial problems among refugees resettled in high income countries like the U.S. Introduces methods for measurement and evaluation of these problems and prepares students to be able to design mental health studies among this population. Explores mental health treatment options and service utilization among resettled refugees in high income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.682. PRINCIPLES AND PRACTICES OF HARMONIZATION IN MENTAL HEALTH RESEARCH. 2 Credits.
Introduces concepts and key assumptions of item response theory (IRT). Explores novel applications of IRT to refinement of measures, assessment of differential item functioning, computer adaptive testing, and calibration of metrics across diverse samples. Students apply lessons from didactic lectures in a laboratory setting using prepared examples. Original data are welcome.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.685. Introduction to Screening for Behavioral Health Conditions. 1 Credit.
Describes the application of screening to different behavioral health conditions across the life course. Reviews key psychometric properties of screening tools. Introduces the desired diagnostic, treatment, and health-related outcomes of screening. Discusses possible harms and drawbacks of behavioral health screening for different stakeholders. Encourages critical thinking when reading empirical research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.688. Public Health and the Good Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.690. Applications and Analysis of Epigenetic Data in Public Health Research. 1 Credit.
Presents applications of epigenetic measurement in public health research. Begins by providing a rationale for such work, then describing measurement tools, from single-site methylation typing, to array-based methods, and whole-genome sequencing. Study design options, quality control analyses, and association analyses will then be presented. Examples based on both mental and physical health outcomes will be used.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.698. Strategies for Success: Public Mental Health Career Development and Beyond. 1 Credit.
Provides MHS students with the structure, resources, and support needed to start building a career in Public Mental Health. Explores career options, resume development, interview skills, networking, and salary negotiation through lectures and small-group activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.700. Public Health Approaches in Autism and Developmental Disabilities. 3 Credits.
Examines public health approaches to the assessment, etiology, services, and policy issues related to autism and developmental disabilities. Introduces the state of the science of autism and developmental disabilities epidemiology, and emerging questions for Public Health. Includes presentations and discussions of current information on descriptive epidemiology, genetics, environmental risk factors, and prognosis of ASD. Presents research on long-term outcomes in individuals with ASD. Provides an overview of research progress to date and points to challenges as we work to learn more about this enigmatic neurodevelopmental disability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.800. MPH Capstone Mental Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.802. Seminar on Aging, Cognition and Neurodegenerative Disorders. 2 Credits.
Addresses age-related cognitive and neuropsychiatric disorders that are of particular importance with the rapid expansion of the aging population. Focuses on the major domains of cognition and comparison of the age-related changes that occur in each cognitive domain. Includes emphasis on contrasting the major neurodegenerative disorders related to age and describing the clinical presentation and pattern of cognitive change in each condition. Participants address current strategies for maximizing cognitive function with age and treatment strategies for the primary neurodegenerative disorders. Examines and identifies gaps in knowledge and research approaches to fill these gaps. Explores concepts of cognitive systems, animal and imaging models, and neuropathological changes associated with aging and with disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.805. Seminar on Statistical Methods for Mental Health. 1 Credit.
Discusses recent advances in statistical methods in mental health. Includes student and faculty presentations as well as discussions of recent articles in the literature. Includes topics: missing data, longitudinal data analysis, causal inference, and measurement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.811. MHS Thesis in Mental Health: from Proposal to Publication I. 1 Credit.
Students are required to conduct a systematic review of the literature or a data-driven paper in partial fulfillment of the Master of Health Science (MHS) degree in the Department of Mental Health. Students will be provided with basic research and organizational skills needed for successful completion of the MHS project. Topics include: conducting a systematic review or literature review for data driven papers, selecting an appropriate research design, and interpreting findings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.812. MHS Thesis in Mental Health: from Proposal to Publication II. 1 Credit.
Students are required to conduct a systematic review of the literature or data-driven paper in partial fulfillment of the Master of Health Science (MHS) degree in the Department of Mental Health. Emphasis is placed on revision and dissemination of the final project. Topics include: Selecting an outlet for dissemination (e.g., journal submission, conference presentation) and writing assignments (e.g., cover letter, abstract for conference).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.820. Thesis Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.830. Postdoctoral Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.840. Special Studies and Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.895. MPH Practicum: Mental Health. 1 - 4 Credits.
The MPH Practicum is a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.990. Computer Lab: Epigenetic Data in Public Health Research. 1 Credit.
Offers hands-on computer lab experience analyzing epigenetics data using quality control and statistical association analyses presented in the course, 330.690 Applications and Analysis of Epigenetic Data in Public Health Research. Real and simulated data will be used to demonstrate software that will implement particular programs. Software applications will primarily use the R statistical environment and packages in BioConductor.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.600. Introduction to the Biomedical Sciences. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.601. Vector-Borne Disease Control. 3 Credits.
Addresses various vector-borne disease control strategies that target any of the complex interactions between the pathogen, vector and host. Emphasizes on malaria, dengue and other arboviral diseases, as well as Chagas, leishmaniasis and schistosomiasis. Discusses some examples of control strategies such as current and future prophylactic, therapeutic and transmission-blocking vaccines and drugs, vector control, and vector-targeted pathogen transmission control. Addresses interactions between control methods and factors that influence efficacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.603. Biology of the Next Pandemic. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.606. Major Global Infectious Diseases: Prospects for Control. 2 Credits.
Provides in-depth information on the basic pathogenic mechanisms of selected infectious diseases that continue to be of major public health importance worldwide, with an emphasis on underlying problems for development of effective public health interventions. Includes topics: HIV/AIDS, malaria, tuberculosis, measles, as well as infectious disease hazards that may become important in the future. Obtains a working knowledge of the biology of these diseases, including prospects for their effective management and control at both the individual and public health level, and of basic human immunology and vaccinology
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.607. Methods in life sciences, literature and practice. 2 Credits.
Focuses on understanding laboratory research technologies and applying this knowledge to evaluate current scientific literature. Achieves these goals through in-depth small group discussions with a range of faculty expertise, weekly assigned reading, short projects, short writing assignments or other activities. Includes both faculty and student leaders for each session; some sessions held in Core facilities. Includes topic areas: molecular biology, genomics, protein structure and strategies to evaluate the literature (primarily term 1), microscopy technologies, image analysis, flow cytometry and lab notebook archiving (primarily in term 2), cell biology, organelle dynamics, cell signaling, data management and experimental design (primarily term 3).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.611. Principles of Immunology I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.612. Principles of Immunology II. 3 Credits.
Introduces biological concepts of immunology; molecular nature of antigens; molecular basis for antibody and T-cell receptor structure and diversity; complement; hypersensitivity reactions; cellular basis for the immune response; cell-mediated immunity; adhesion molecules and coreceptors cell activation; cytokines and other soluble mediators; major histocompatibility complex (MHC) antigens; tumor immunology; transplantation immunobiology; mechanisms of resistance to microorganisms; tolerance; autoimmunity; and immuno-deficiency.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.613. Techniques in Molecular Biology. 3 Credits.
During five days of intensive hands-on laboratory instruction, students develop skills in the use of modern laboratory investigative tools in the area of molecular biology. They learn how to perform polymerase chain reaction (PCR) DNA amplification, quantitative PCR, DNA and protein gel chromatography, Western blotting, transformation of bacteria, and expression of heterologous proteins by bacteria.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.615. Critically Reviewing the Scientific Literature. 2 Credits.
Unlike the typical literature review course, focuses specifically on literature that is flawed in the approach or methods used to examine a scientific question and examines how well the conclusions drawn are justified by the data. Oral discussions of assigned literature are accompanied by weekly 2-3 page written reviews, which provides opportunities for students to get feedback on their writing skills, as well as their critical reading skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.623. Fundamental Virology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.624. Advanced Virology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.625. Scientific Grant Writing. 2 Credits.
Covers the critical components of a scientific grant application, common errors in grantsmanship and how to avoid them, grant application review criteria, ethics related to grant writing and reviewing, and identification of funding sources. Students prepare a short (5-page) draft proposal and a revision of this proposal following review. Proposal topics are selected by the students and developed with the instructor. Students also prepare critiques of other students' anonymous, instructor-edited proposals for discussion in class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.627. Pathogenesis of Bacterial Infections. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.631. Immunology, Infection and Disease. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.633. Autoimmune Diseases of the Endocrine Glands. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.635. Biology of Parasitism. 5 Credits.
Presents a biological basis of parasitic lifestyles with concurrent laboratory including host responses and parasite evasion of host defense mechanisms, transmission, epidemiology, diagnosis, clinical manifestations, pathology, treatment, and control of the major helminthic and protozoan infections of man
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.636. Evolution of Infectious Disease. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.650. Vector Biology and Vector-Borne Diseases. 3 Credits.
Presents the principles of transmission of human and animal pathogens by insects, mites and ticks. Covers basic arthropod biology with special attention to biological properties of vectors and their interactions with pathogens, basic components of arbopathogen disease cycles and principles of pathogen transmission dynamics. Special topics include emerging pathogens, vector genetics, traditional and next generation control strategies and venomous arthropods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.653. Molecular Biology Literature. 2 Credits.
Discusses over two sessions the assigned paper from historic or current scientific literature. Covers only the methodologies and how they work in the first session, the second covers the scientific advancements achieved with these methods. Includes both student and faculty discussion leaders for each session.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.654. Current Literature in Microbial Immunity. 1 Credit.
Current Literature in Microbial Immunity is designed primarily for Master's level students to provide an overview of the current state of research relating to topics in microbial immunity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.656. Malariology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.657. Vector Biology and Disease Ecology Literature. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.658. Advanced Malariology. 2 Credits.
Presents current controversies and issues in malaria research and control in format of topical lecture and discussion each week. Weekly topics include Epidemiology, Pathogenesis, Mosquitoes, Drugs, Diagnostics, Vaccines, Elimination and Control and Economics of Different Interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.663. Biological Response to Biomaterials. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.665. Biological Basis of Aging. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.700. How Do We Know? - Theory and Practice of Science. 3 Credits.
Examines the nature and philosophical foundations of science using an interdisciplinary approach that emphasizes critical thinking and storytelling; discusses the principles of good scientific practice – rigor, reproducibility and responsibility (the 3R's) - by exploring revolutionary discoveries in the life, public health and natural sciences; elaborates the relationship between theory, practice and serendipity in scientific discovery, and concludes with a discussion of the role of scientists in society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.701. Anatomy of Scientific Error. 3 Credits.
Examines sources of error in scientific practice (misconduct or honest mistakes, methodological or systematic errors). Presents real-world examples to analyze errors that cause problems in science across the disciplines. Introduces methodological and mathematical approaches to error reduction. Explores the review- and retraction mechanisms for journal articles and grants as methods of science self-correction. Discusses historic and contemporary cases where errors constitute sources of innovation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.704. Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles. 3 Credits.
Challenges the classical format of a journal club by preparing students to critically evaluate literature across the science disciplines. Acquaints students with concrete applications of the 3 R's of good scientific practice: rigor, responsibility, and reproducibility. Discusses techniques for effective research literature analysis and evaluation. Emphasizes in-depth understanding of journal article preparation, data evaluation, and the context of conclusions and discussion points within a given research field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.705. Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences. 3 Credits.
Provides a broad introduction to interdisciplinary, scientific reasoning using current problems from science and society. Explores the fundamentals of basic probability and statistics using real-world datasets from a variety of basic science disciplines. Introduces data analysis and visualization in the natural and biomedical sciences. Explains the importance of computational and quantitative methods for hypothesis testing in science, technology, and daily life.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.707. Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations. 3 Credits.
Acquaints students interested in teaching in biomedical and health professional settings with the foundations of how adults learn as well as the science of learning. Explores practical applications of evidence-based teaching techniques most relevant to the biomedical and public health professions. Discusses a variety of assessment techniques, and their alignment with learning objectives and educational strategies using state of the art course design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.708. Evidence-Based Teaching in the Biomedical and Health Sciences – Practice. 3 Credits.
Provides students interested in gaining hands-on teaching experience with opportunities to plan and develop classroom materials on self-selected topics and deliver them in an interdisciplinary classroom setting, mentored by professional educators. Explores evidence-based instructional and assessment strategies to meet identified learner needs in the life and health sciences. Introduces students to a growing community of educational practitioners and scholars across the JHBSPH departments and JH divisions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.709. Evidence-Based Mentoring. 3 Credits.
Examines the literature on evidence-based mentoring. Introduces participants to authentic mentoring situations taken from real-life cases, enriched by practitioner interviews. Discusses responsibilities, reciprocities, and trust-building in mentor-mentee relationships. Emphasizes and nurtures mentorship practices based on self-responsibility, personal growth, active listening, social intelligence, mutual support, goal setting, ethics and equitable leadership, and cultural sensitivity. Focuses on collaborative, reflective practice with the goal of developing one's own, unique mentorship philosophy. Acquaints participants with the benefits of mutual peer support through an inclusive community of practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.710. Communication Practice for Health Science Professionals. 3 Credits.
Introduces students to current trends in presentation design and delivery. Focuses on narrative-oriented thinking to improve information dissemination. Emphasizes clarity and simplicity in communication practice in multiple settings, targeting both lay and interdisciplinary expert audiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.711. Principles of Neuroimmunology. 3 Credits.
Briefly covers the role of specific cells of the central nervous system (CNS), immune functions of CNS cells, and trafficking of leukocytes into the CNS, both in health and disease. Subsequently, it discusses various immune cells, e.g. monocytes, T cells, B cells, inflammatory molecules such as cytokines, chemokines, metalloproteinases, and prostaglandins in more detail, focusing on their role in either protecting from neurological disease or in causing CNS disease pathologies, including cognitive dysfunction. Presentations from experts in the field address topics and diseases, such as multiple sclerosis (MS), the blood brain barrier (BBB), HIV and other neurotropic microbes in eliciting neurological disease and emerging neurotropic infections.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.712. Clinical Immunology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.713. R3 Writing Seminar for Graduate Students. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.715. Unleash Your Writing Superpower: Crafting Clear, Concise and Persuasive Prose. 3 Credits.
Introduces a system of planning, organization, writing and revision. Emphasizes the importance of defining the message, audience and purpose for any piece of writing. Illuminates the basic elements of good writing. Focuses on clear, concise and persuasive writing. Explores the use of rhetoric and storytelling to maximize a piece of writing's impact. Emphasizes best practices in various forms of writing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.717. Graduate Immunology: the Immune Response. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.720. Communications Primer for the Public Health Sciences. 1 Credit.
Acquaints students with the basics of effective oral and written communications in the form of brief exercises. Focuses on clarity and simplicity in presentation practice across disciplines and cultures to emphasize central messages. Introduces students to writing succinctly for advocacy using "compelling writers strategies" for opinion pieces and short speeches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.730. Civility and Professionalism in the Workplace. 1 Credit.
Discusses how to create an inclusive and welcoming workplace atmosphere. Emphasizes culturally sensitive and respectful communication. Familiarizes participants with workplace expectations, acceptable behaviors, and general professional deportment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.800. MPH Capstone Molecular Microbiology and Immunology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.801. Topics in Immunology I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.802. Topics in Immunology II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.810. Field Placement Molecular Microbiology and Immunology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.811. Field Studies in Ecology and Behavior. 3 - 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.812. The Performance of Leadership: Foundations. 2 Credits.
Explores leader and leadership as one's natural self-expression through the ontological/phenomenological model in which ontology is the study or science of the nature and function of being (as in "being a leader"), and phenomenology is the method of direct access used to study and research the nature and function of being (as in being's impact on "exercising leadership effectively"). Introduces a new conversational domain and transformative learning paradigm for leadership. Encourages discovery through discussion, exercises, and assignments. Prepares students to develop the skills necessary to create positive, effective, and sustainable change.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.813. SURVIVAL SKILLS FOR ACADEMIA IN THE LAB SCIENCES. 2 Credits.
Aimed at providing MMI and other lab sciences with the skills necessary to present and publish data and to find post-docs and/or jobs in the laboratory sciences. Topics include time management and organization, preparing effective conference presentations, manuscripts, and curriculum vitae, networking, interviewing, and getting hired.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.815. The Business of Academic Biomedical Research. 1 Credit.
Addresses topics related to business aspects of academic biomedical research, and focuses specifically on organizational, managerial, political, strategic and economical characteristics of academic biomedical research. Prepares students for a career in academic biomedical research by discussing essential features for success, other than the actual science.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.820. Thesis Research Molecular Microbiology and Immunology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.821. Research Forum in Molecular Microbiology and Immunology. 1 Credit.
Prepares students for their future careers by creating a forum in which they can practice the essential skills of scientific communication. Focuses on the oral presentation of research findings resulting from laboratory investigations or literature review to faculty and fellow students. Examines the students' ability to condense and communicate background, hypotheses, experimental design, result presentation, and data analysis in a timed presentation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.822. Seminars in Research in Molecular Microbiology and Immunology. 1 Credit.
Integrates academic training with current research in microbiology, immunology, and infectious diseases. Presents results of state of the art investigations of microbial diseases of public health significance, emphasizing experimental design and methodology for analysis and discussion by researchers from JHU and other biomedical research institutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.829. Summer Thesis Research. 12 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.830. Postdoc Research MMI. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.840. SS/R: Mol Microbiology & Imm. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.844. Causation. 3 Credits.
Acquaints students with the central concept of causation across the biomedical and public health disciplines. Discusses how cause and effect relationships govern today's research and evidence-based decision-making based on the social, physical, political, and economic determinants of health. Compares how fields and sub-disciplines in biomedicine and public health approach causation using research case examples that illustrate major morbidity and mortality-related health problems. Examines strategies to mitigate the limitations of causal inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.848. Community-Based Practice Through Civic Engagement. 2 Credits.
Examines a participatory, online service-learning approach to enable students regardless of geographical location to engage in real-word, community-based, educational projects. Acquaint students to work with Baltimore-based community organizations through critical reflection on issues of equity and professional practice. Emphasizes the application of professional skills to real-world issues. Discusses the limitations and ethical aspects inherent to civic engagement work. Prepares students to develop evaluation plans and materials for the organizations' identified programs. Emphasizes translation of experiences with Baltimore Community-based organizations into local contexts. Focuses on building reciprocal partnerships that reach beyond "consultancy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.851. Laboratory Rotations. 4 - 8 Credits.
All departmental Sc.M. and doctoral students spend one and three terms, respectively, participating in the research activities of departmental faculty's laboratories. Students select appropriate rotations in consultation with their academic advisors and the departmental Graduate Program Committee.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.855. Pandemics of the 20Th Century. 1 Credit.
Focuses on major pandemics in the human population that have occurred in the 20th century: the 1918 influenza pandemic; the emergence of HIV; the severe acute respiratory distress syndrome (SARS) outbreak of 2002-03; and viral hepatitis (hepatitis B and C viruses). For each pandemic, discussion groups cover a clinical-, public health- and pathogen-oriented reading topic in order to give students a broad understanding of the overall importance of each, as well as to compare and contrast the key aspects of each disease. Focuses on acute and chronic diseases, as well as diseases with different routes of transmission and incubation times between infection and disease. Provides a comprehensive overview of how each pandemic emerged, what key factors dictated spread in the population, and how each pathogen induced disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.895. MPH Practicum: MMI. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.935. Lab for MMI 260.635. 3 Credits.
Laboratory sessions examine living and preserved parasites, gross pathology, histopathology, and vectors. Journal discussions based on research papers and topics of fundamental importance to parasitology will involve student participation in a seminar format.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.601. Seminars in Public Health. 2 Credits.
Introduces the basic principles of the practice of public health at the local, regional, national, and international levels. Uncovers relevant public health topics through a combination of presentations by experts, discussions, and lectures. Focuses on the core competencies required for the effective assessment and improvement of the health and well-being of communities. Explores the public health approach to describing the health of a population, including the importance of understanding the social and cultural context surrounding every community. Covers a broad spectrum of population-based, prevention-oriented issues relevant to public health in the private and public sectors of both domestic and international communities, including global health promotion, disease prevention, health care delivery systems, environmental issues, and the spectrum of factors influencing the health status of populations and communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.602. Seminars in Public Health: Advanced Topics. 2 Credits.
Expands upon the 1st term of Seminars in Public Health to focus on how to effect public health change. Uses a combination of expert presentations and engaging discussions to explore topics including identification of key stakeholders, acknowledging competing governance priorities, and gathering support for population-level interventions. Explores the dissemination of public health messages, understanding key aspects of speaking to a range of stakeholder audiences and utilizing available communication tools. Focuses on examples of successful advocacy for change, and key lessons learned. Encourages students to utilize the public health approach discussed over the two terms to refine their future career goals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.611. Professional Development Workshops: Effective online Searching. 2 Credits.
Introduces and explores online sources for finding high-quality, full-text research articles. Also prepares students to use advanced search techniques efficiently within these sources and to manage references using tools such as RefWorks, EndNote, Zotero and Mendeley. Finally, students learn about tools available to use to stay current on topics related to the public health field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.612. Professional Development: Writing for Results. 2 Credits.
Professional Development: Writing for Results: Introduces a systematic approach to writing— from planning and organization to revision and completion. Emphasizes the importance of defining the message and understanding the audience and purpose. Examines the basic elements of good writing. Focuses on clarity, concision and style. Explores the use of rhetoric and storytelling to maximize a piece of writing's impact. Emphasizes best practices in various forms of writing, including emails, memos, reports, proposals and op-eds.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.701. Introduction to Epidemiology. 4 Credits.
Introduces principles and methods of epidemiologic investigation of diseases. Illustrates methods by which studies of the distribution and transmission of diseases in populations (including disease outbreaks and epidemics) can contribute to an understanding of etiologic factors and modes of transmission. Covers various study designs, including randomized trials, case-control and cohort studies, as well as risk estimation and causal inference. Discusses applications of epidemiology to solving public health problems, such as identifying sources and strategies for control of disease outbreaks, applying research findings to policy and practice, and program evaluation. Explores quantitative and analytic methods including life tables, disease surveillance, measures of morbidity and mortality, and measures of diagnostic test accuracy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.702. Intermediate Epidemiology. 4 Credits.
Expands knowledge beyond introductory level epidemiologic concepts and methods material using examples from the published literature. Emphasizes interpretation and the ability to critically evaluate issues related to populations/study design, measurement, population comparisons and inference, including modern cohort study designs; advanced nested designs; novel techniques for exposure assessment; interpretation and utility of measures of impact; sources of bias and methods for their prevention; descriptive and analytical goals for observational study inference; the counterfactual model for defining exchangeability, cause, and confounding; and synthesis of inferences from observational studies as compared with randomized clinical trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.709. Statistical Concepts in Public Health 1. 3 Credits.
Provides students with a broad overview of Biostatistical methods and concepts used in the public health sciences. Emphasizes the interpretation and conceptual foundations of statistical estimation and inference. Covers summary measures, measures of association, confidence intervals, p-values, and statistical power.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.710. Statistical Concepts in Public Health 2. 3 Credits.
Provides a broad overview of biostatistical methods and concepts used in the public health sciences, emphasizing interpretation and concepts rather than calculations or mathematical details. Develops ability to read the scientific literature to critically evaluate study designs and methods of data analysis. Introduces basic concepts of statistical inference, including hypothesis testing, p-values, and confidence intervals. Topics include comparisons of means and proportions; the normal distribution; regression and correlation; confounding; concepts of study design, including randomization, sample size, and power considerations; logistic regression; and an overview of some methods in survival analysis. Draws examples of the use and abuse of statistical methods from the current biomedical literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.711. Public Health Statistics I. 4 Credits.
Provides students with a broad overview of Biostatistical methods and concepts used in the public health sciences. Emphasizes the interpretation and conceptual foundations of statistical estimation and inference. Covers summary measures, measures of association, confidence intervals, p-values, and statistical power. The software package R will be incorporated into the course learning experiences, and students will be able to use R for a portion of each of the four class homework assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.712. Public Health Statistics II. 4 Credits.
Employs a conceptual framework to highlight the similarities and differences between linear, logistic and Cox Proportional Hazards methods, in terms of usage and the interpretations of results from such models. Provides details for these regression approaches in the “simple” scenario, involving relating an outcome to single predictor. Following this overview of simple regression, explores the use of multiple regression models to compare and contrast confounding and effect modification, produce adjusted and stratum-specific estimates, and allow for better prediction of an outcome via the use of multiple predictors. Offers a brief introduction to linear spline models and propensity score methods for adjustment. T
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.731. Spatial Analysis for Public Health. 4 Credits.
Introduces the field of spatial analysis for public health. Examines concepts through the use of ArcGIS Geographic Information System (GIS) mapping software as a tool for integrating, manipulating, and displaying public health related spatial data. Covers GIS topics including mapping, geocoding, and manipulations related to data structures and topology. Introduces the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics and uses selected case studies to demonstrate concepts along the paradigm. Focuses on using GIS to generate and refine hypotheses about public health related spatial data in preparation for follow up analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.732. Spatial Data Technologies for Mapping. 4 Credits.
Examines technologies for collecting, obtaining and creating spatial data. Considers technologies including GPS, tablets, tracking devices, cell phones, Google Earth, remote sensing applications, and the Internet. Integrates spatial data from the aforementioned technologies into ArcGIS for spatial analysis. Introduces other GIS related software applications such as ArcGIS Online, QGIS and R. Explores relevant properties of spatial data such as format, metadata, and spatial data accuracy. Covers additional topics and concepts that reinforce the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.733. Applied Spatial Statistics. 4 Credits.
Introduces statistical techniques used to model, analyze, and interpret public health related spatial data. Casts analysis of spatially dependent data into a general framework based on regression methodology. Covers the geostatistical techniques of kriging and variogram analysis, point process methods for spatial event and case control data, and area-level analysis. Focuses on statistical modeling and topics relating to clustering and cluster detection of health related events. Provides an introduction to the public domain statistical software R, to be used for analysis. Reinforces skills and concepts related to the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.734. Spatial Applications. 4 Credits.
Focuses on further developing and integrating components of the spatial science paradigm: Spatial Data, GIS and Spatial Statistics. Provides an opportunity for students to gain a working knowledge of resources for conducting spatial analysis (e.g., literature, software, and data). Expands students’ abilities to design and conduct spatial analysis by providing data for reproduction, and in some cases, extension of analyses from existing studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.805. Spatial Analysis Journal Club. 2 Credits.
This course will involve reading and critically evaluating the application and interpretation of spatial statistical methodology in published public health literature. Focus will be on understanding how the epidemiological/public health objectives translate into spatial statistical analyses. Literature reviews will also include outlines detailing spatial statistical methods and analyses that can be applied as an extended and/or alternative analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.880. Spatial Analysis integrative Activity. 4 Credits.
This course will involve the research, analysis and writing of a complete and independent spatial analysis project. Intermediate outlines, hypotheses and objectives produced in previous classes will be finalized. No new material will be covered. The finalized project will follow journal article format including an abstract, and introduction/background, methods, results and conclusion sections. The final project will represent an integrated and synthesized assessment of the spatial science paradigm (Spatial Data, GIS, Spatial Statistics) applied to a relevant public health problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.931. Spatial Analysis Lab 1. 2 Credits.
Expands on GIS concepts and skills previously learned with more hands-on practice with epidemiological applications. Focuses on translating an epidemiological problem or getting into a set of spatial objectives that align with our spatial science paradigm. Surveys and summarizes the literature on spatial applications in public health. Prepares students to design a protocol to help identify a public health problem and accompanying data for their MAS Integrative Activity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.932. Spatial Analysis Lab 2. 2 Credits.
Applies spatial concepts and skills towards identifying a public health project that can be the focus of the MAS Integrative Activity. Prepares students to translate projects into a set of spatial objectives that align with the spatial science paradigm. Details out the mechanisms and processes needed for collecting, creating and/or obtaining necessary supporting data for the chosen project.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.631. Essentials of Population Health Management. 3 Credits.
Population health refers to outcomes for a group of individuals. Acquaints students with key concepts related to maintaining the health and wellness of populations. Examines the importance of determinants of health, including medical care, public health, genetics, personal behaviors and lifestyle, and a broad range of social, environmental, and economic factors. Explores this broad view of the determinants of population health and its impact on organizations that may not think of themselves as being in the business of health, such as housing organizations, employers, schools, and others who make decisions and create environments that can help or hinder good health. Population health management (PHM) has emerged as an important strategy for healthcare providers and payers. This course examines the challenges and opportunities to improving health within and across populations, as well as models of value-driven accountable care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.651. Principles and Applications of Advanced Payment Models in Population Health Management. 3 Credits.
Presents an overview of major issues related to the design, function, management, regulation, and evaluation of health insurance and managed care plans and implications for population health management. Provides a firm foundation in basic concepts pertaining to private and public sector health insurance/benefit plans. Key topics include population care delivery and payment innovations and management techniques, provider payment models, risk-sharing and other incentives for organizational integration, quality and accountability, cost-containment. Innovative payment models and initiatives supporting health care providers and health care organizations in testing alternative care delivery and payment models are reviewed in the context of three core strategies for improving the US health system: improving the way health care providers are paid, improving the way care is delivered, and increasing the availability of information to guide decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.671. Collective Impact: Developing and Leading Community Partnerships to Improve Population Health. 3 Credits.
Identifies the elements necessary to create a culture of collaboration. Following deliberate, evidence-based methods, evaluates components of cultural transformation. Examines strategies related to building infrastructure for collaboration, including application of the Collective Impact Framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.681. Applications in Accountable Care: Assessing Quality and Effectiveness of Population Health initiatives. 3 Credits.
This course examines approaches by health plans, employers, and providers to evaluate population health management initiatives, define and measure quality from a population perspective, and assess the impact of Delivery System Reform and multi-payer alignment on outcomes examine new approaches to outcome and cost measurement. By focusing on the role of value measurement as part of a strategic agenda to transform quality and costs, participants will learn how to enable systematic improvement in the care delivery process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.691. Managing Health Across the Continuum: Contemporary Models and Applications of Care Coordination and Management. 3 Credits.
Understanding gained from the evolution of care management models has prompted the need for a more comprehensive approach to managing the health of populations. The continuum of care refers to the concept of managing individuals with various levels and intensity of health services from prevention to chronic disease management and end of life care. In order to manage health across the "community" continuum, health management strategies need to align with data collected from Community Health Needs Assessments and other sources to target identified health risks across the continuum. This course incorporates concepts from various models (e.g. Triple Aim) and provides a framework to transform care delivery. It examines the concepts and strategies of care management, analyzes strategies aimed at primary and secondary prevention, and evaluates models and efforts to expand care management accountability into the community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.701. Applied Concepts and Foundations of High Performance for Population Health. 3 Credits.
Provides students with an understanding of the core features, characteristics, values, culture, and systems that lead to high performance for population health. Introduces evidence-based approaches such as the Baldrige framework that allow organizations to address performance gaps and develop robust processes and a culture of continuous improvement and excellence to improve the health of populations. Utilizes a case study approach to share best practices within population health that lead to sustained high performance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.711. Health Behavior: Improving Health Through Health Education/Promotion. 3 Credits.
Provides students with an overview of the field of health education/health promotion and an opportunity to develop skills in needs assessment and program planning. Reviews the importance of health behavior as a contributor to current public health problems, as well as the role of health education and health promotion in addressing these problems. Learns how to use planning frameworks (PRECEDE/PROCEED and Social Marketing) for conducting needs assessments and designing health promotion programs. Introduces theories of health behavior change and their applications to health behavior change interventions described. Presents examples of health education and health promotion programs from health care and community settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.721. Organizing for Public Health: A Systems Approach. 2 Credits.
Systems thinking, (ST), is a holistic approach to analyzing how components of complex systems interact and adapt. Through systems thinking we can understand how societies organize themselves to achieve collective health goals and how different actors contribute to policy outcomes. Provides students with an understanding of how to apply ST in public health. Trains students on the fundamentals of ST theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a ST lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.731. Population and Consumer Health Informatics. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of health information technology (HIT) to population health. Emphasizes the population health potential of comprehensive electronic health records (EHRs), personal health records (PHRs), mobile health and telemedicine devices; and, consumer focused internet-based tools. Covers the uses of HIT to define and identify populations and sub-populations of interest, and describe the health status and needs of populations. Emphasizes the use of HIT within both local, regional and federal public health agencies and population-based private health care organizations such as integrated delivery systems and health insurance plans. Lessons are mainly U.S. oriented but are also applicable to other high and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.741. Behavioral Economics and Risk: Value-Based Payment Methods and incentives. 4 Credits.
Provides students with tools from mainstream and behavioral economics that can be used for managing population health. Demonstrates the value – and limitations – of these approaches for influencing the decision-making of providers and the health behaviors of individuals, with particular attention to value-based payment methods and incentives. Examines the influence of payment design on provider and patient behaviors and applies concepts of behavioral economics to evaluate and propose essential elements of effective payment models and incentives designed to improve health and reduce costs. Draws on articles from the popular press and professional journals that illustrate how these approaches have been applied in experimental and real situations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.751. The Built Environment: Influences and Challenges to Improving Population Health. 3 Credits.
Focuses on describing the relations between the urban and suburban built environments in the U.S., with emphasis on land use and transportation infrastructure, access to healthy food, access to green space and recreational opportunities, and exposures to air pollution and noise that accompany these community designs all of which have been shown to have an impact on community health. Explores the use of Health Impact Assessments for assessing the programs and policies that do not traditionally evaluate public health outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.761. Value-Based Concepts of Socially-Responsible Leadership. 3 Credits.
Focuses on the essential principles of personal and interpersonal leadership that can be used in and across organizational settings to enhance performance, align and empower relevant stakeholders, and assure multisector organizational engagement. Provides students with opportunities to learn and apply leadership skills in a manner that encourages them to challenge their own beliefs and assumptions about what constitutes leadership. Offers a comprehensive review of contemporary issues and perspectives on leadership including multidisciplinary and systems-oriented approaches as well as classic leadership theory and evolving contemporary beliefs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.880. Population Health Management integrative Activity. 4 Credits.
Emphasizes the research, analysis, and writing of a complete and independent population health management strategy. Prepares students to draw upon the relevant evidence-based concepts of population health and population health management provided through the curriculum. Covers no new material. Focuses on the finalized project, in the format of a consulting report to senior leadership and will contain an executive summary in addition to, introduction, background, assessment and analysis, findings, and recommendation sections. Challenges students to produce a final project paper that will represent an integrated and synthesized assessment of population health management paradigm of Know-Engage-Manage as applied to a defined community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.651. Case Studies in Quality and Patient Safety. 2 Credits.
• Provides an understanding of the approaches undertaken by US and international health care organizations (HCOs) to institute quality and patient safety initiatives in patient care • Explores the extent, relevance and impact of the HCO's structure and strategy on quality and patient safety functions, • Introduces the Baldrige Performance Excellence framework to assess the quality and patient safety functions, • Describes the quality and safety domains using case studies of different HCOs in the US and international settings, • Emphasizes how the internal HCO culture and external HCO environment serve as facilitators or barriers for implementing quality and patient safety initiatives, and • Highlights key HCO roles senior- and middle-level management play both at the institutional and departmental levels to enable effective practical implementation of quality and patient safety initiatives, including resource allocation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.701. Introduction to Quality of Care for Practitioners. 4 Credits.
Introduces quality issues, including quality assessment and assurance performed by clinicians, health systems, professional societies, and government and other third party organizations who pay for care. Provides a basis to evaluate the effectiveness of quality assessment and assurance activities. Describes different approaches to quality improvement and evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.702. Quality Improvement Tools. 3 Credits.
Describes, demonstrates and trains in the use of key tools used at leading institutions to improve quality of care and patient safety. These will include the Comprehensive Unit-based Safety Program (CUSP), Plan Do Study Act (PDSA), Translating Research into Practice (TRiP), Human Factors Analysis and Classification System (HFACS), Systems Engineering Initiative for Patient Safety (SEIPS), Lean Six Sigma, Management Discussion & Analysis (MD&A), Safer Matrix, briefings, debriefings and TeamSTEPPS©. Presents a framework and strategies for the successful implementation of quality improvement interventions, including specific approaches, methods, structures and resources to promote uptake of the components of an intervention. Learners will gain first hand experience through role playing, individual and group exercises and simulations with each of the techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.711. Science of Patient Safety. 4 Credits.
Provides an introduction to the science of safety and how it relates to problems with patient safety in health care. Explores the extent, nature and impact of safety problems. Introduces definitions for key concepts including error, adverse event, and harm. Provides a framework for understanding factors that cause, mitigate, and prevent errors and patient harm. Emphasizes the role of both individuals and systems in improving patient safety. Explains the importance of achieving a culture of safety, and the concept of high reliability in health care organizations. Points to roles that involve the practical application of this knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.721. Leadership for Change and Patient Safety and Quality Improvement. 3 Credits.
Describes, demonstrates and builds competence in leadership to support organizational quality and safety, and support transformational change. Explores organizational theory and frameworks for leadership and management. Explains the importance of vision, mission, and strategies for organizations. Describes organizational culture and articulates the role of exploring values and creating a shared vision in developing a culture of patient safety. Explains the roles of top managers, technical leaders and unit managers in safety improvement. Demonstrates the use of analytics in leading and management safety and quality improvement. Describes practices to engage leaders and staff to improve patient safety. Introduces topics including conflict management, negotiation, transparency, managing transitions, and innovation in health care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.731. Measurement and Evaluation in Quality and Safety. 4 Credits.
Provides an overview of principles of good measurement and introduces applied evaluation methods for real world patient safety and quality improvement efforts that seek to implement evidence-based healthcare. Familiarizes students with important factors that influence success or failure in improvement efforts. Discusses implementation concepts and social and cultural phenomena and how to measure them. Prepares students to conduct initial data gathering, analysis and reporting in the Measurement Lab course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.751. Infection Prevention in Healthcare Settings. 2 Credits.
Introduces hospital epidemiology, infection prevention and antimicrobial stewardship as core components of quality care, including standards and indicators, appropriate strategies and indicators to measure hospital-acquired infection in the U.S. and internationally, key methods for preventing the transmission of infection in healthcare facilities and components and benefits of antimicrobial stewardship programs. Provides a basis to plan effective hospital epidemiology, infection prevention and antimicrobial stewardship activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.880. Patient Safety and Healthcare Quality integrative Activity. 4 Credits.
This course will involve the research, analysis and writing of a complete and independent quality and patient safety improvement project. Concepts around the science of quality of medical care, patient safety and measurement will be heavily utilized. No new material will be covered. The finalized project will follow journal article format including an abstract, introduction/background, Literature review, methods, results and conclusion sections. The final project paper will represent an integrated and synthesized assessment of the quality and patient safety paradigm (Q&PS problem—Evidence—Intervention---assessment) applied to a relevant setting within the healthcare delivery process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.931. Measurement Lab in Quality & Safety. 2 Credits.
Familiarizes students with different data sources and measurement methods to assess health care quality and patient safety. Data sources include both secondary data, including from administrative claims, medical records, and malpractice claims, and primary data including from cohorts, surveys, direct observation and clinical monitoring. Introduces different methods to measure structure, process and outcome, including both quantitative and qualitative data. Describes methods to analyze these data including techniques related to risk adjustment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.601. Public Health Humanitarian Emergencies. 4 Credits.
Introduces different types of humanitarian emergencies, humanitarian architecture and provides an overview of sectoral focus areas of humanitarian response. Informs students of the environment in which these emergencies occur and how public health responses in various types of emergencies and contexts differ. The course explores mechanisms of preparedness, management of response to acute and prolonged humanitarian emergencies as well as long-term recovery.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.603. Ethics in Global Health Practice. 2 Credits.
Equips students to identify and analyze critical ethical issues in global health practice. It provides a forum for discussion of and deliberation about these issues, enabling students to explore a range of possible solutions. Students will practice using central concepts and frameworks of public health ethics to consider systematically the responsibilities of public health professionals in real-world global health cases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.604. Global Epidemiology Policies and Programs. 3 Credits.
Presents the history, social and political context, organization, technical content, funding and evaluation of current, major, global initiatives for disease control. Emphasizes programs focused on health problems of the developing world and includes, initiatives for vaccines and immunization, non-communicable diseases, safe motherhood and reproductive health, malaria, Neglected Tropical Diseases, HIV, emerging infectious diseases, TB, tobacco control, nutritional interventions and injury control. Also examines the process of policy formulation and resource allocation to international health and disease control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.621. Design and Planning of Primary Health Care Projects. 4 Credits.
Help participants to design a Primary Health Care (PHC) project in a low or middle-income country consider its implementation and evaluation. Selects one of several Request for Proposals (RFA) for a specific situation, conduct a needs assessment, create a problem statement, set goals and objectives, and a theory of change for this proposed project. In the course you will learn how to address community participation, human resources and their training and supervision, project information, approaches to sustainability, logistics of service delivery, project budgeting and financial management, monitoring, and evaluation, and finally close out of a project. Develops a proposal ready for submission to a donor that embodies your PHC project design responsive to the RFA at the conclusion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.641. Disaster Preparedness. 2 Credits.
Introduces public health emergency preparedness concepts and procedures that are relevant for natural disasters, technological disasters, terrorism, and emerging threats such as infectious disease outbreaks and pandemics. Describes the roles of various agencies and organizations engaged in emergency preparedness and response and global health security. Describes the interactions across these agencies and organizations that help to ensure public health and safety. Provides an overview of methods to address different types of public health emergencies, including both planning and response perspectives with a focus on recent domestic and international public health emergencies and their consequences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.651. Introduction of Water, Sanitation and Hygiene in Emergencies. 2 Credits.
Introduces water, sanitation and hygiene (WASH) concepts, technical knowledge and practice in emergencies, including natural disasters and humanitarian emergencies. Addresses the importance of intersectoral collaboration among all sectors with an emphasis on WASH, health and nutrition. Focuses on community and behavioral aspects using examples from recent disasters. Describes the roles and coordination frameworks of all actors including Government, United Nations, international and national non-governmental organizations, and donors. Illustrates monitoring and evaluation various WASH methodologies and practices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.701. Assessment Approaches in Humanitarian Settings. 3 Credits.
The goal of the course is to give students an overview of selected field-based methods used in humanitarian emergencies to measure basic health indicators and demographic characteristics of affected populations. Upon completion, students will be able to describe the assessment process in the various phases of humanitarian emergencies. Students will also be able to describe a variety of methods, both qualitative and quantitative, used in field-based assessments of humanitarian emergencies. These include: qualitative assessments, quantitative surveys. population estimation, and site planning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.715. Health Needs and Service Provision in Humanitarian Emergencies. 3 Credits.
Addresses the health needs and the provision of health care to populations affected by disasters. Discusses such areas as who provides humanitarian assistance and how it is paid for. Explores strategies for assessing health needs. Considers a variety of topics including the use of information, water and sanitation, reproductive health, food and nutrition, and the provision of health services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.721. Securing Food Assistance and Nutrition in Humanitarian Emergencies. 2 Credits.
Introduces food security, including the components of food security, causes for the deterioration of food security in humanitarian emergencies and nutritional deficiencies in humanitarian settings. Provides an overview of food and nutrition standards, nutrition surveys and response programming, including organizations involved in nutrition and food assistance and common programmatic interventions and policies used in response to food crises. Topics covered include food assistance strategies, including in-kind assistance, cash transfers and livelihoods programming, as well as preventative and curative nutrition programs. Focuses on recent and past food and nutrition crises to illustrate important concepts and utilizes a field-based approach to guide discussions and consider applications of concepts to real life humanitarian crises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.731. Management and Leadership in Humanitarian Health. 2 Credits.
Examines an array of management and leadership models. Applies management and leadership theories and models to multiple humanitarian contexts. Assesses students' management and leadership styles and how they may affect humanitarian work. Discusses organizational structures and design as well as culture, and how they can affect humanitarian response.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.741. Human Rights in Humanitarian Emergencies. 2 Credits.
The goal of the course is to give students an introduction to human rights as an analytical framework, a tool, and a source of ethical guidance in humanitarian emergencies. The focus is on how human rights violations may cause, and shape the context of, humanitarian emergencies and how an examination of human rights frameworks and rights-based programs can guide researchers and practitioners to make ethical decisions in their work.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.751. Mental Health and Psychosocial Support in Low-Resource Humanitarian Emergencies. 2 Credits.
Explores key issues in the development and evaluation of mental health and psychosocial support interventions with populations affected by humanitarian crises, such as natural disasters and armed conflicts. Discusses such questions as: 'how do populations in diverse socio-cultural settings define mental health in the context of humanitarian crises?'; 'How can we build on existing resources and practices that promote mental health in humanitarian crises?'; 'What is known from epidemiological and intervention studies about common mental health problems and effective interventions in humanitarian settings?'. Challenges participants to reflect on translating science to practice, and vice versa. Course methods entail a mix of multimedia presentations and case discussions, focusing on real-world experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.771. Social & Cultural Basis for Community and Primary Health Programs. 3 Credits.
Introduces students to the social and cultural aspects of global health programming at community, organizational, and policy levels. Utilizes social and behavioral theories to understand change processes and health program implementation with a particular focus on low- and middle-income countries, and underserved populations. Identifies the factors that promote and inhibit community involvement in PHC program development and implementation. Provides a foundation for planning appropriate Primary Health Care (PHC) programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.880. Humanitarian Health integrative Activity. 4 Credits.
Requires students to synthesize knowledge and skills in humanitarian health on a project topic that demonstrates mastery program competencies. Completes a project on a selected aspect of humanitarian health, using one of a variety of formats including: 1) literature review; 2) program/operational plan; 3) program evaluation; 4) policy analysis; 5) research proposal; or 6) research report using data from a de-identified public data set. Presents results in the form of a final paper and an oral presentation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.621. Tobacco Prevention and Control. 3 Credits.
Introduces tobacco control strategies, policies, and practices to provide an understanding of what is being done to address this public health problem. Provides a historical context in which to understand the consequences of smoking and tobacco use. Provides a framework to understand how tobacco control has evolved and includes practical approaches for tobacco prevention, control, cessation, advocacy, surveillance, and evaluation being implemented in the U.S. and in other countries. Discusses the transnational tobacco companies and their role in undermining actions to control tobacco use. Examines international tobacco control issues and the Framework Convention on Tobacco Control (FCTC) using lectures, case studies, and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.651. Strategic Communication Planning. 4 Credits.
Focuses on the step-by-step design, implementation, evaluation, and critique of communication programs designed to change behavior relevant to tobacco control Allows students to create actual health communication campaigns guided by P-Process worksheets. The course will explore the concept of stages applied to tobacco control – strategic defensive, stalemate, strategic offensive and consolidation. At the individual level, the course will sharpen approaches to specific audience segments such as non-smoker unlikely to smoke, non-smoker likely to smoke, occasional smoker and established smoker.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.671. Tobacco Regulatory Science. 4 Credits.
Presents an overview of tobacco product regulation, including cigarettes, smokeless tobacco, shisha, and emerging nicotine delivery systems, such as e-cigarettes. Provides students a working knowledge of tobacco regulatory frameworks, including the Framework Convention of Tobacco Control (Articles 9 and 10), and national policies, including the Family Smoking Prevention and Tobacco Control Act. Students learn about past regulatory successes, including fire-safe cigarettes, flavor and menthol bans, and emerging strategies to limit nicotine content. Prepares students to search industry patents to understand how product innovation is protected and presented. Examines the tobacco industry's tactics to counter tobacco regulation by critically assessing media stories.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.701. Leadership in Tobacco Control. 2 Credits.
Through lectures, discussion, and exercises, students develop an understanding of the role of the tobacco control leader in policy development and implementation and the essential knowledge and skills this role requires. The course provides a framework for understanding the process of working effectively with and leading others and emphasizes the role of the leader in leading change and developing a vision for the future of tobacco control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.735. Quantitative Methods for Tobacco Control. 4 Credits.
Quantitative Methods for Tobacco Control teaches students about the quantitative methods that are most often used in tobacco control and tobacco-related research. Topics to be covered will include study designs and methods commonly used in tobacco control research, including methods to assess the burden of tobacco-related disease and evaluate prevention and cessation interventions. Students have the opportunity to apply these new skills in interpreting and presenting quantitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.745. Qualitative Methods for Tobacco Control. 3 Credits.
• Reviews the methods and rationale for incorporating qualitative approaches into tobacco control research. • Explores the main principles of qualitative research and consider how these principles shape the questions to which qualitative methods can best be applied in tobacco control research. • Introduces applied research techniques used in tobacco control, including observational studies, focus group discussion, in-depth interviews, and documents analysis. • Describes techniques to analyze qualitative data collection and disseminate findings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.751. Implementation: Making Change Happen in Tobacco Control. 3 Credits.
Provides an introduction to implementation science in the context of tobacco control. Identifies the challenges associated with tobacco control policy/program implementation and highlights how implementation science can address them. Discusses commonly used implementation frameworks and emphasizes implementation determinants, strategies, and outcomes that may help guide implementation efforts. Examines key implementation topics in the context of tobacco control including industry interference, enforcement and compliance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.606.601. Fundamentals in Global Health Practice. 4 Credits.
Global health requires practitioners to be well versed in understanding health systems, the controlling disease, and improving the health of mothers and children, and vulnerable populations. This course provides an introduction to these issues. Students will have an opportunity to apply these skills by analyzing the health situation in select low and middle-income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.606.651. Seminars in Health Management Information Systems for Low- and Middle-Income Countries. 1 Credit.
Covers basic components of health information management systems (HMIS) in low-and middle-income countries (LMICs) including vital registration, routine service data, health surveys and surveillance systems. Offers an overview of the use of HMIS data for decision making in LMICs. Describes processes for collecting data through HMIS in LMICs and considers challenges to the quality of HMIS in LMICs with an eye toward strengthening these systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.701. Health and Safety Preparation for Global Health Assignments. 1 Credit.
Whether you've traveled before or not, living and working internationally can be challenging. Learn how best to prepare and make the most of your time. Explores health and wellness concerns for travelers. Examines key prevention, safety, and travel medicine principles and services to contextualize risks and maintain wellness. Reviews applicable interventions, appropriate vaccines, and personal protection methods to prepare students to respond to expected and unexpected situations. Assists students with personal preparations for travel through country-specific assignments. Challenges students to examine travel health and safety priorities through case studies and discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.704. Essential Medicines, Commodities and Supplies Needed for Community Level Primary Health Care Interventions. 2 Credits.
Primary health care programs in low and middle-income countries require essential health commodities be made available at the community level. Logistic systems need to be developed to ensure that commodities are adequately estimated and delivered. In addition, systems for safely maintaining and monitoring stocks are needed at the community level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.711. Applying Evaluation to More Effectively Reach Communities Through Primary Health Care. 3 Credits.
Presents fundamental concepts and approaches for evaluating primary health care programs in low- and middle- income countries. Prepares students to analyze real-world programs so that they can make basic decisions resulting in evaluation designs that can be practically applied. Discusses actual experiences of working with implementers to design evaluations that balance methodological rigor with restraints of time and budget. Includes fundamental concepts such as choosing indicators, objectives and appropriate study designs; working with implementers who may not be evaluation experts; and understanding context.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.721. Urban Primary Health Care in Low and Middle-income Countries. 3 Credits.
Presents emergent public health issues related to the rapid growth of urban population in low- and middle-income countries. Explores the inadequacy of conventional health services for meeting the needs of the urban poor. Presents selected cases studies as examples of primary health care approaches that effectively addressed the public health consequences of rapid urbanization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.724. Applying Household Surveys to Primary Health Care Programs. 3 Credits.
Introduces participants to fundamental skills needed to design and manage implementation of household surveys. Presents real world experiences of using the Knowledge, Practice, and Coverage (KPC) tool for household surveys in middle and low-resource settings. Includes constructing a questionnaire from standard KPC modules, indicator selection, sampling plan development, use of parallel sampling, household selection, management and oversight plan, and ethical considerations. Introduces participants to adjustments that can be made so that the survey can be implemented within time and budget constraints.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.735. Planning Training and Learning Programs for Community Health Workers. 4 Credits.
Discusses the skills required for planning, designing, and evaluating training and learning programs for CHWs. Explores how training and learning needs are determined by CHWs, their communities, and national contexts. Provides students with an opportunity to design a training guide based upon an assessment of CHW's learning needs. Demonstrates how to outline a formative, summative, and follow-up evaluation plan for CHW training and learning needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.751. Building Community Capacity for Primary Health Care in Low and Middle-Income Countries. 3 Credits.
This course, coming near the end of the MAS in Community Based PHC, reinforces an understanding of the origins and recent advances in community-oriented PHC through case studies from low- and middle-income countries. Focuses on problem-solving skills in practical situations by connecting case experiences with the contexts where students are working or will work in the future. Examines strategies and frameworks to assess and enhance community-based approaches to building community capacity. Explores current events and emerging opportunities and challenges for community based PHC.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.880. Integrative Activity in Community-Based Primary Health Care. 4 Credits.
This course will enable the learner to apply skills obtained through the coursework in the MAS in Community-Based Primary Health Care to design or update a community based PHC program in a real life community. Learners will select a community where they have lived or worked and obtain data and reports to analyze the social, cultural, epidemiological and demographic profile of the community and use this information to design strategies that involvement community members in improving their health. Learners will draw on previous course materials and independent desk review to produce a program strategy/plan document that includes human and material resource development and an evaluation component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.705. Emerging Trends in Pharmaceutical Systems Strengthening. 3 Credits.
Explores pharmaceuticals management and universal health coverage effective, feasible frameworks and possible metrics to measure capacity and accountability. Considers the big picture in pharmaceutical systems: pharma regulatory harmonization and convergence; country, global, and donor financing policies; and sustainability strategies. Presents and contrasts different countries regulatory systems for medicines. Introduces the importance of pharmaceutical harmonization convergence/reliance. Addresses selected challenges within the pharmaceutical services delivery framework among under-served and within LMIC populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.712. Frameworks and Tools for Health Systems in Global Settings. 3 Credits.
Explores health systems in global settings, with a focus on low and middle income (LMIC) contexts, and examines approaches to improving the performance of health systems. Focuses on frameworks, tools, skills, and strategies to understand, influence, and evaluate health systems in LMICs. Identifies key institutions, functions, and performance issues for national and local health systems. By using frameworks and tools, students gain experience in systematically analyzing health systems and methods to plan, implement, and evaluate changes in health systems in a variety of settings, including countries in various levels of demographic, epidemiologic and economic transitions. Covers key controversies in health systems, including issues in monitoring health systems performance, the role of the public sector, dealing with unregulated private health markets, linking priority health programs and health systems, raising accountability in the health system, etc.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.725. Quality Management Concepts and Tools for Healthcare in Low and Middle income Countries. 4 Credits.
Presents the concepts, principles, and tools of total quality management methods for health systems in low and middle income economies. Emphasizes integrated health systems management; fostering a genuine team approach in the face of an hierarchical tradition; central importance of community governance; interventions designed based on evidence and standards of practice and in an equitable fashion; introducing a measurement-based approach to problem solving, emphasizing analysis of service delivery process and outcome; and integrating implementation science as an integral component of the management system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.771. Non-Governmental Organizations and the Administration of Global Health Programs. 3 Credits.
Students will describe the practical challenges and philosophical dilemmas faced by NGOs operating in low- and middle-income countries, and basic concepts in the administration of global health programs. Simulation exercises will allow students to experience and analyze real-world scenarios faced by NGO managers and leaders. The first half of the course will focus on the role of NGOs in the health sector, situating a manager’s responsibilities in the broader context of the development and humanitarian environment. The second half will focus on the internal workings of an NGO and the day-to-day challenges of managing strategy, finances, human resources, and accountability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.880. Integrative Activity in Global Health Planning and Management. 4 Credits.
This course will enable the learner to apply skills obtained through the coursework in the MAS in Global Health Planning and management to identify and address an organizational problem or need in a real life organization that focuses on underserved people in aa global health setting. Learners will select an organization where they have worked and obtain data and reports to analyze the environmental, structural, human, technical and policy characteristics of the organization and use this information to design strategies for improving organizational functioning. Learners will draw on previous course materials and independent desk review to produce a program strategy/plan document that includes human and material resource strengthening and an evaluation component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.600. Principles of Population Change. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.601. Critically Evaluating the Science for Policy and Practice. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.602. Basic Demography and Population Dynamics. 3 Credits.
Acquaints students with global population trends and patterns; population and health. Enhances technical skills and knowledge regarding use of demographic data for policy analysis development, program strategies and priorities. Examines measures and indicators of nuptiality, fertility, mortality and migration, and migrant health issues. Provides skills in making population estimation and projection.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.603. Demographic Methods for Public Health. 4 Credits.
Teaches students the basic methods demographers use to describe populations and analyze population change. Introduces the concept of a population, describes the demographic approach to populations, and identifies sources of population data. Covers four sets of methods with broad applicability in public health: 1) techniques for describing population composition, distribution, and growth; 2) methods to compare populations (age-period-cohort approaches and standardization and decomposition of rates); 3) single-decrement life tables; and 4) the cohort-component method for population projection. Covers the basic tools used to study the fundamental population processes of fertility, mortality, and migration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.604. Life Course Perspectives on Health. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.605. Advanced Demographic Methods in Public Health. 4 Credits.
Covers six areas regarding population studies including: population composition, fertility, migration, population projections, an introduction to stable populations, and measures of population health. Draws examples from data from both developed and developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.607. Youth Voice in Public Health. 1 Credit.
Examines how project-based and surveillance data can be used by policy-makers and program administrators to determine needed public health services for youth. Defines the major types of data available for decision making and gaps in available data systems including the determinants of health inequities. Highlights the need for young people to collect, interpret and define data for decision-making in public health and explores the developmentally appropriate conditions for authentic youth engagement in the process. Features young people and adult leaders from the Center's Youth Advisory Board in leadership roles.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.610. Substance Use in Women and Families. 3 Credits.
Introduces students to the complex etiology of substance use in women and the impact of substance use on women and their children and families. Provides an overview of the biopsychosocial risk and protective factors for substance use disorders in women. Explores the etiology, epidemiology, data sources, interventions, and policies for women who use substances and their families, from a life course perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.611. Fundamentals of Program Evaluation. 4 Credits.
Familiarizes students with different types of program evaluation, including formative research, process evaluation, impact assessment, cost analysis, and theory-based evaluations. Gains practical experience through a series of exercises involving the design of a logic model, selection of indicators and data sources, and the design of an evaluation plan to measure both a process and impact evaluation. Covers experimental, quasi-experimental, and non-experimental study designs, including the strengths and limitations of each.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.612. Applications in Program Monitoring and Evaluation. 4 Credits.
Builds on 380.611, Fundamentals of Program Evaluation and partially fulfills the MPH practicum requirement. The Fundamentals course prepared students to explain major concepts in program evaluation, perform fundamental tasks in evaluation, and write a basic evaluation plan. This course introduces advanced evaluation methods using concrete illustrations from real world evaluations of public health initiatives. Class sessions will integrate lectures with case studies, experiential learning activities, and reflection. Students will develop enhanced skills in the design of appropriate evaluation plans for specific community-based public health programs, with an emphasis on problem solving to address challenges and promote the usefulness of results. This course includes a service learning component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.616. Child Health Epidemiology. 3 Credits.
Explores conditions and diseases that compromise children's health from birth (congenital anomalies) through adolescence (violence/bullying). Presents methodological challenges to estimating the burden of disease, including the strengths and weaknesses of standardized outcome measures. Analyzes preventive strategies and treatment modalities considering the social context of disease. Encourages creative thinking about needed research and discusses the public health implication of childhood disease. Focuses on domestic health but presents data on the global burden of childhood conditions/diseases, when available.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.620. A Coalition-based SMART Approach to Public Health Advocacy. 3 Credits.
Introduces the coalition-based SMART model of advocacy as an approach for improving public health outcomes and changing public health policies. Examines international case studies in which advocacy focused on decision-makers played a central role and includes lectures from seasoned advocates. Using reproductive health examples, presents foundational advocacy frameworks and enables students to work through advocacy strategies that are adaptive to a variety of health areas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.623. Adolescent Health and Development. 3 Credits.
Consists of online recorded lectures and panel discussions, readings, LiveTalks, and two written assignments focused on an adolescent public health issue of your choosing. Lectures, readings, and discussion explore a variety of aspects of adolescence health and development. Paper assignments enhance knowledge of public health issues affecting adolescents, as well as evidence-based solutions and interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.624. Maternal and Child Health Legislation and Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.625. Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being. 3 Credits.
Introduces students to a range of scientific, programmatic and policy evidence related to childhood adversity and well-being. Examines evidence-based interventions and common elements of approaches to both prevent and mitigate the impact of adversity and promote resilience and well-being among children, families and communities. Interventions and programs will focus on communities, public health and health care settings, with a special focus on young children and children with special health care needs. Students evaluate policies, frameworks, interventions and research drawing on conceptual models and evidence related to the successful implementation and scaling of public health and services programs and policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.628. Public Health Perspectives On Abortion. 3 Credits.
This course provides students with an overview of abortion practice in the United States and worldwide from a public health perspective. Lectures and readings enable students to critically evaluate current research, public health practice, and policy related to abortion, and to speak knowledgeably and accurately on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.633. Promoting Equity for Adolescents and Emerging Adults: Problem-Solving Seminar. 3 Credits.
Introduces the scope, unequal distribution, and negative impacts of disconnection from school and the workforce among young people in the United States (“opportunity youth”). Discusses the importance of different sectors and stakeholders for promoting success and eliminating inequalities in outcomes among adolescents and young adults. Highlights the importance of involving young people in all phases of research and policy making. Describes communication strategies for addressing diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies for adolescents and young adults. Summarizes promising strategies for preventing youth disconnection and re-engaging young people who have become disconnected from school and the workforce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.635. Urban Health in Contemporary America. 4 Credits.
Introduces students to the historical forces associated with the rise of the modern city and the fundamental characteristics of urban living in the U.S. Discusses the impact of the increase in urban settings on population health. Examines contexts of the urban environment that shape health including: the physical environment, housing, education, discrimination and racism, policing, and safety. Explores the complexity and diversity of the determinants of health among domestic urban populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.640. Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth. 3 Credits.
Uses experienced practitioners, community leaders, and community members to expose students to a wide range of domestic youth health, welfare issues and interventions through an asset lens. Using an asset-based approach, the class highlights domestic youth challenges (e.g., disconnection, homelessness, LGBTQ status and justice involvement) and aims to expose students to thoughts, voices, and perspectives from a variety of different backgrounds. Class sessions feature ample discussion, expert lecturers, youth voices, and an examination of existing programs in and out of Baltimore City. Some students are concurrently enrolled in a practicum component of the course. Classroom discussion will focus on the experiences of practitioners and students and the issues they see youth in the community facing. Overall both practicum and non-practicum students alike will have the chance to read, reflect and discuss programs and interventions that positively impact youth domestically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.642. Child Health and Development. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.650. Demographic Methods for Measuring Health and Longevity. 4 Credits.
Covers demographic methods commonly used to understand how long people live and how this varies over time, across space, and between population groups. Explores the construction of life tables to calculate life expectancy, and understand its determinants. Introduces multi-state methods to calculate what proportion of their life individuals spend in good health, or affected by various illnesses and limitations. Emphasizes the practical application of these methods to the analysis of several large demographic datasets.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.651. Methods and Measures in Population Studies. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.655. Social and Economic Aspects of Human Fertility. 3 Credits.
Studying fertility is integral to population studies and understanding population changes and dynamics (along with mortality and migration). Offers an essential background for those studying women’s, infant and perinatal health. Covers social and economic theories of fertility change, explores fertility transitions across geographic contexts, examines major distal and intermediate determinants of fertility, and considers policies affecting fertility globally. Based on a mix of lectures, readings, and interactive discussion among students and faculty.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.661. Clinical Aspects of Maternal and Newborn Health. 3 Credits.
Presents morbidity and mortality in the mother, fetus, and newborn and the health care practices utilized to prevent, diagnose, and treat morbidities. Guest speakers in clinical care present lectures from the clinical perspective; course instructors present the public health perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.662. Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health. 4 Credits.
Discusses the sources of data and analytic and conceptual basis for methodological approaches to the study of maternal, neonatal, and reproductive health. Evaluates selected research articles in maternal, neonatal, and reproductive health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.663. Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies. 3 Credits.
Explores gender-based violence (GBV), including intimate partner violence, sexual violence, and sex trafficking. Topics include the following as they relate to GBV: epidemiology, theoretical frameworks, structural risks and gender equity, policy, prevention and intervention, perpetrators, populations with unique needs, and health consequences spanning sexual and reproductive health, STI, and HIV. Prepares students to undertake meaningful scholarly, community-based, programmatic or policy work in the field. Emphasizes active learning and facilitates application of knowledge and skills gained to real world issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.664. Reproductive and Perinatal Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.665. Family Planning Policies and Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.666. Women's Health. 3 Credits.
Provides an overview of leading topics in women’s health with an emphasis on the US and other developed settings. Examines leading sources of morbidity and mortality through age-gender-race/ethnicity-disaggregated data. For each topic, we examine historical context, risk factors, prevention, and treatment. Considers health from biological, lifecourse, and social determinants perspectives, including via frameworks of women’s health disparities and intersectionality that address inequities in interpersonal, social, political and economic power. Major topics include: non-communicable diseases (cardiovascular disease, cancer), immunology, infectious disease, preventive health, aging, mental health, and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.667. Women's Health Policy. 3 Credits.
Provides an overview of selected, timely policy issues related to women’s health in both developed and developing countries. It covers the history of selected policy concerns, frameworks for viewing these concerns, and specific policies related to women’s health issues such as family planning, gender-based violence, welfare reform, employment and workplace conditions, and disabilities. Topics may change yearly depending on the primacy of the topic or issue.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.668. International Perspectives on Women, Gender, and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.670. Religion, Spirituality and Public Health. 3 Credits.
Presents a broad overview of the ways in which religion and spirituality affect health, both generally and with a particular focus on fertility, family planning and adolescent health. Investigates the outreach of religious organizations tackling public health issues in domestic urban settings and internationally. Examines prescriptions for how faith-based organizations can be more integrated into governmental and NGO public health campaigns.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.697. Health and Wellbeing of the Urban Poor: Labor Markets, Safety Nets, and the Criminal Justice System. 3 Credits.
Examines the causes and consequences of U.S. urban poverty, its implications for health and wellbeing, and explores strategies for addressing it. Covers the major theoretical explanations scholars have advanced to explain the persistence of urban poverty in the U.S. including labor markets, residential segregation, welfare policy, family structure, and the criminal justice system. Discusses consequences, particularly related to health and wellbeing of the urban poor. Within each topic area, introduces students to a range of interventions aimed at alleviating urban poverty.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.701. Accessing Demographic and Population Health Data. 2 Credits.
Provides students with the skills and tools needed to access and use publicly available datasets that are commonly used in demographic and population health research. Introduces online databases and provides instruction on how to use online data analysis platforms to generate commonly used population health indicators quickly and easily. Features two online databases: 1) CDC Wonder: an online database published by CDC that includes data on all deaths and births in the United States; and 2) IPUMS: an online database platform that contains data from over 750 censuses and surveys from around the world.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.703. Prospective Birth Cohort Studies and Developmental Origins of Health and Disease. 2 Credits.
Introduces prospective birth cohort studies related to the developmental origins of health and disease. Provides overview of major US and international birth cohort studies. Compares advantages and disadvantages of their different study designs. Reviews specific considerations in conducting such studies, including field data and bio-sample collection and long-term follow-up. Explains importance of collecting sensitive and specific biomarkers. Emphasizes link between study design and interpretation of study data and thus to understanding the developmental origins of health and disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.707. Advocating for Global Reproductive Health. 2 Credits.
Introduces students to policy analysis and advocacy in reproductive health, with a focus on international family planning. Analyzes policymaking processes and ways to influence these processes through evidence-based advocacy within foreign and domestic political and financial environments. Provides first-hand knowledge of effective advocacy efforts and tools. Emphasizes practical application of the Advance Family Planning SMART approach to advocacy, which centers on advocacy objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.708. Strategic Leadership Principles and Tools for Health System Transformation in PFRH. 2 Credits.
Introduces principles of strategic leadership in the context of facilitating health systems change in low resource settings. Introduces mental models and the household production of health, systems thinking and strategic leverage, personal mastery and commitment to change, action-learning principles and practice, shared vision and creative tension, the theory of constraints and root cause analysis, strategy design and key moves, implementation with accountability, and linking data to action. Develops leadership skills via interactive workbook exercises, small group work and class presentations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.709. Introduction to Program Evaluation in PFRH. 1 Credit.
Familiarizes students with the basic concepts of program evaluation. Teaches skills in writing goals and SMART objectives, as well as developing logic models and creating a plan for a process evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.710. Public Health Perspectives on Abortion Policy. 1 Credit.
Provides students with an overview of abortion practice in the United States and worldwide from a public health perspective. Enables students to critically evaluate current research, public health practice, and policy related to abortion, and to speak knowledgeably and accurately on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.711. Issues in Survey Research Design. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.712. Methods in Analysis of Large Population Surveys. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.720. Masculinity, Sexual Behavior & Health: Adolescence & Beyond. 3 Credits.
Focuses on male health with particular attention to sexual and reproductive health and healthcare use among adolescents, extending throughout the lifespan. Assesses the principal health concerns for sexual and reproductive health, the associated population-based risk factors, and the relative impact of each risk factor. Examines the meaning of masculinity and the impact of masculinity beliefs on males' health and healthcare use. Evaluates strategies to promote population health including the policies and programs or health care delivery that address health concerns and behavior for male sexual and reproductive health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.721. Schools and Health. 3 Credits.
Highlights K-12 schools as public health contexts in 3 ways: as contexts for shaping youth development and behavioral outcomes, for the delivery of health information and services, and for research. Lays a foundation for the connections between health and education by discussing the reciprocal relationship between a young person's health and their educational outcomes including the role that school health can play in addressing disparities in education and health. Explores school context using the ten-component Whole School, Whole Community, Whole Child (WSCC) framework developed by the CDC and the Association for Supervision and Curriculum Development.? Using the framework, explores established standards and practices for schools, opportunities for intervention in schools, and challenges to implementation, evaluation, and research in schools. Dives into the debates around school openings and COVID mitigation measures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.725. The Social Context of Adolescent Health and Development. 3 Credits.
Recognizes the social ecological model, social determinants of health tenants and the life course perspective as tools to understanding adolescent health. Explores the influences of contexts, such as neighborhoods, education and families, on adolescent health and well-being. Examines empirical work to consider the role of context in prevention and interventions aimed at adolescents.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.740. Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health. 3 Credits.
Addresses nutrition programs, policies, and politics in the US, and their impact on economically disadvantaged mothers, children, and families. Defines and explores food insecurity. Examines nutrition programs directed at high-risk populations. Reviews the administrative and political considerations of nutrition programs and discusses the nutritional impact on health, growth and development. Discusses corporate and commercial interests, their role in shaping the political discussion and their impact on food and nutrition policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.742. Family - Health, Public Health and Policy. 3 Credits.
Focuses on understanding how programs and policies are likely to affect the capacities of families to develop and maintain health, and on teaching students to apply analytic methods to evaluate the relative value and impact of various programs or policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.744. Nutrition and Growth in Maternal and Child Health. 3 Credits.
Examines the impact of nutritional status on growth, development, intellectual performance, health status, and the onset and progress of chronic diseases. Considers ethnic, cultural, and environmental issues related to food intake as well as the relationship between physical activity and health. Examines the origin and basis for the identification and assessment of community need using the national nutrition monitoring system. Reviews federally funded nutrition program outcomes and their policy implication.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.747. International Adolescent Health. 3 Credits.
Focuses on the major health issues that affect adolescents and the effective interventions/policies to address these issues in the developing world. Explores the meaning and health of adolescence from various contexts around the world through lectures, readings, video clips, panels, and discussions .
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.749. Adolescent Sexual and Reproductive Health. 3 Credits.
Explores key topics in adolescent sexual and reproductive health (ASRH). Includes topics ranging from the impact of adolescent physical, sexual, and social development on sexual risk-taking behavior to policy and ethical issues influencing adolescent sexual health outcomes. Discusses important clinical topics such as contraception, teen pregnancy, abortion, and sexually transmitted infections using a public health framework from a domestic and global perspective. Explores the role of key social determinants of health and their intersectional functionality in shaping the context through which sexual and reproductive health is operationalized in an effort to develop effective public health solutions to problems facing vulnerable youth.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.750. Migration and Health: Concepts, Rates, and Relationships. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.755. Population Dynamics and Public Health. 2 Credits.
Provides an introduction to population dynamics, the processes by which populations change, as a foundation for understanding population health. Students will learn how births, deaths, and migrations determine the size, growth, age-sex structure, and geographic location of populations. Students will review the proximate and indirect causes of population change and assess their socioeconomic, environmental, and public health consequences. Students will calculate and interpret basic measures used to describe populations and measure population dynamics, and learn the main sources of population data and their strengths and limitations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.756. Poverty, Economic Development, and Health. 4 Credits.
Introduces students to leading theories in economic development and in the macroeconomic determinants of the health of populations, communities, and individuals. Reviews both historical and current cases to answer the following questions: What is economic development? How does economic development occur? Which aspects of development improve and which aspects are detrimental to human health? Can policymakers plot more “hygienic” plans for economic development? Do investments in health and family planning cause economies to prosper?
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.758. Demographic Estimation for Developing Countries. 4 Credits.
Introduces students to defects or deficiencies often experienced in demographic data for developing countries, and how to quantify the magnitude of errors. Describes approaches to data adjustment, with emphasizing the underlying theory and modeling. Also describes unconventional or indirect methods for estimating basic demographic parameters from robust indicators. Heavily emphasizes practical applications and quantitative calculations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.760. Clinical Aspects of Reproductive Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.761. Sexually Transmitted Infections in Public Health Practice. 4 Credits.
Considers features of sexually transmitted diseases relevant to their control, reviewing the natural history of the infections and laboratory diagnosis. Emphasizes public health practice control measures, including policy, behavior intervention, and medical screening/treatment intervention of sexually transmitted diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.762. HIV Infection in Women, Children, and Adolescents. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.765. Preventing Infant Mortality and Promoting the Health of Women, Infants and Children. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.767. Couples and Reproductive Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.768. Selected Topics in Women’s Health and Women’s Health Policy. 4 Credits.
Discusses major health concerns among women in developed and developing countries within a life course framework that integrates biological determinants of health and the social, cultural and economic contexts of women’s lives. Examines a spectrum of current health and policy concerns, and may include family planning, preventive services for women, chronic disease, migration, gender-based violence, and disability. Also includes historical perspectives and a gender justice framework for viewing health policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.771. Understanding and Changing International Reproductive Health Policy. 3 Credits.
Introduces students to policy analysis and issues in reproductive health, with a focus on international family planning. Teaches how to analyze policymaking processes and ways to influence these processes through evidence-based advocacy. Uses case studies and other readings to analyze policies within the current political and foreign and domestic financial environment. Provides first-hand knowledge of effective advocacy efforts and tools. Focuses on Family Planning 2030 (FP2030), the international partnership launched in 2012. Presents an "insider's" perspective reflecting their experience and draws from the advocacy approach of the Advance Family Planning (AFP) multi-country initiative. Includes practical application of the SMART Advocacy approach as a core part of the course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.777. Global Population Change and Local Public Health Needs: Problem Solving Seminar. 3 Credits.
Describes global and national population trends, examines their causes, and considers their consequences. Explains why population change in a local area may differ from changes observed in the nation as a whole. Reviews major sources of population data and key measurement concepts. In a series of case studies, analyzes data to describe population changes in both domestic and international settings. Students use these data to develop a strategic plan for addressing the changing public health needs of a local population and to design a system-level intervention for meeting those needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.800. MPH Capstone Population, Family and Reproductive Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.810. Field Placement in Population, Family and Reproductive Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.816. SS/R: Population, Family and Reproductive Health Master's Seminar. 1 Credit.
Prepares students to identify and research the central issues in Population, Family and Reproductive Health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.817. PFRH First Year Doctoral Seminar Part 1. 1 Credit.
Facilitates students' transitions into the PFRH doctoral program. Reviews program requirements and school and departmental resources. Hones skills students need for success in a doctoral program. Develops students' abilities to formulate scientific questions and understandings of the scientific process. Guides students as they focus their areas of research interest.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.820. Thesis Research PFRH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.821. PFRH Proposal Writing Seminar. 2 Credits.
Focuses on development of dissertation project, writing dissertation proposal, and preparation for Department and Schoolwide Preliminary Exams. Explains dissertation expectations and requirements. Reviews dissertation proposal structure and components. Discusses evaluation of existing research, identification of gaps and topics, and design of research projects. Emphasizes clear communication of ideas. Provides opportunity to present work-in-progress and receive peer feedback. Introduces proposal assessment through review of peers' work. Provides forum to practice Preliminary Exam presentation including answering questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.822. PFRH First Year Doctoral Seminar Part 2. 1 Credit.
Examines and demystifies the research process using case examples from existing research conducted by faculty members within the department. Introduces departmental and school-wide resources for conducting effective literature searches, developing sound research designs, funding research, addressing IRB concerns, and disseminating research findings. Encourages the use of critical and creative thinking skills to develop personal research agendas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.823. Research Seminar in Population, Family and Reproductive Health I. 2 Credits.
Provides experience in critical evaluation of historical and contemporary research pertinent to Population, Family and Reproductive Health. Addresses a range of topics, drawing on research from multiple academic disciplines. Critique and discusses conceptual frameworks and empirical articles and examine the methodological and disciplinary perspectives of the research or articles..
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.824. Research Seminar in Population, Family and Reproductive Health II. 2 Credits.
Provides experience in critical evaluation of historical and contemporary research pertinent to the focal areas within Population, Family and Reproductive Health. Addresses a range of topics, drawing on research from multiple academic disciplines. Students and faculty critique and discuss conceptual frameworks and empirical articles and examine their methodological and disciplinary perspectives of the research or articles related to the focal areas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.830. Postdoctoral Research in Population, Family and Reproductive Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.840. Special Studies in PFRH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.850. PFRH Master's Essay. 3 - 6 Credits.
This is a required course for all master's students in PFRH. The goal of the essay is for students to apply the skills and knowledge acquired during their academic program to a public health problem or concern of interest to them.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.870. PFRH Special Studies in Public Health Practice. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.880. Lessons in Leadership: Applications for Population, Family and Reproductive Health I. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.881. Lessons in Leadership: Applications for Population, Family and Reproductive Health II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.882. Lessons in Leadership: Applications for Population, Family and Reproductive Health III. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.883. Lessons in Leadership: Applications for Population, Family and Reproductive Health IV. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.895. MPH Practicum: PFRH. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.955. PFRH Lab for 380.755.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

Academic Calendar

2022-2023 Academic Calendar

Regular Summer Term
T July 5 - F Aug 26

Summer Institute Term
T May 31- F Aug 26 (Class Days - variable)

Date	Event
M Feb 14	Registration Begins for Summer Institute Terms
M April 4	Registration Begins for Regular Summer Term
M May 30	MEMORIAL DAY HOLIDAY
T May 31	Summer Institutes Begin
Sun June 5	Internet-Based/Part-Time MPH New Student Orientation
M June 20	JUNETEENTH HOLIDAY RECESS
F July 1	Regular Summer Term Registration Ends
TH June 30– F July 1	NEW STUDENT ORIENTATION
M July 4	INDEPENDENCE DAY HOLIDAY RECESS
T July 5	Instruction Begins for Summer Term
T July 5 - M July 11	Regular Summer Add Period
T July 5 - M July 18	Regular Summer Drop Period
F Aug 26	Last Class Day of Regular Summer Term

1st Term
M Aug 29 - M Oct 24 (40 class days)

Date	Event
M Apr 11	1st Term Registration Begins for Continuing and Special Students
F Aug 26	1st Term Registration Ends for Continuing and Special Students
W Aug 24 - F Aug 26	NEW STUDENT ORIENTATION
M Aug 29	Instruction Begins for 1st Term
M Sept 5	LABOR DAY Holiday
M Aug 29 – F Sept 2	Add Period
M Aug 29 – F Sept 9	Drop Period
M Oct 24	Last Class Day of 1st Term

2nd Term
W Oct 26 - F Dec 23 (40 class days)

Date	Event
M Apr 11	2nd Term Registration Begins
F Oct 21	2nd Term Registration Ends
W Oct 26	Instruction Begins for 2nd Term
W Oct 26 – T Nov 1	Add Period
W Oct 26 – T Nov 8	Drop Period
W Nov 23 – Su Nov 27	THANKSGIVING RECESS
F Dec 23	Last Class Day of 2nd Term

Winter Intersession
W Jan 4 - F Jan 20

Date	Event
M Jan 3	INTERNET-BASED/PART-TIME MPH NEW STUDENT ORIENTATION
M Oct 3	Winter Intersession Registration Begins
F Dec 30	Winter Intersession Registration Ends
M Jan 16	MARTIN LUTHER KING, JR. HOLIDAY RECESS

3rd Term
M Jan 23 - F Mar 17 (40 class days)

Date	Event
M Nov 14	Registration Begins for 3rd Term
F Jan 20	3rd Term Registration Ends

M Jan 23	Instruction Begins for 3rd Term
M Jan 23 - F Jan 27	Add Period
M Jan 23 – F Feb 3	Drop Period
F Mar 17	Last Class Day of 3rd Term
M Mar 20 - F Mar 24	SPRING RECESS

4th Term
M March 27 - F May 19 (40 class days)

Date	Event
M Nov 14	Registration Begins for 4th Term
F Mar 24	4th Term Registration Ends
M Mar 27	Instruction Begins for 4th Term
M Mar 27 – F March 31	Add Period
M Mar 27 – F Apr 7	Drop Period
F May 19	Last Class Day of 4th Term
T May 23	PUBLIC HEALTH CONVOCATION
Th May 25	UNIVERSITY COMMENCEMENT
F June 30	RESIDENCY PROGRAM ENDS

All JHU divisions begin fall terms on Monday, August 29, 2022 and spring terms on M January 23, 2023.

APHA Nov. 6-9, 2022

Admissions

Services Overview

The Admissions Office is the go-to resource for students who are interested in exploring a public health education at the Johns Hopkins Bloomberg School of Public Health. We support the School's mission and excellence in public health by ensuring that the best candidates from all backgrounds and around the world have the resources and information they need to apply and matriculate successfully.

Start your journey here (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/) for information on the application process. International applicants (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/international-applicants/) may have slightly different application requirements.

Contact Us

Johns Hopkins Bloomberg School of Public Health
Admissions Services Office
615 N. Wolfe Street, E1002
Baltimore, MD 21205
bsph.admission@jhu.edu
410-955-3543
Admissions Services answers phone inquiries from 9am to 12pm (Eastern time), Monday through Friday. We do our best to answer all calls during this time, but if we cannot get to your call, please leave a message and we will get back to you as soon as possible.

CEPH Requirements

I. According to the requirements of the Council on Education for Public Health (CEPH), all BSPH degree students must be grounded in foundational public health knowledge. Grounding in foundational public health knowledge is measured by the student's achievement of the learning objectives listed below, or higher-level versions of the same objectives.

Profession & Science of Public Health

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
6. Explain the critical importance of evidence in advancing public health knowledge

Factors Related to Human Health

1. Explain effects of environmental factors on a population's health
2. Explain biological and genetic factors that affect a population's health
3. Explain behavioral and psychological factors that affect a population's health
4. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
5. Explain how globalization affects global burdens of disease
6. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (eg, One Health)

II. In addition to the CEPH learning objectives, graduating students in professional master's degrees must demonstrate their ability to perform foundational competencies. These CEPH competencies are informed by the traditional public health core knowledge areas, (biostatistics, epidemiology, social and behavioral sciences, health services administration and environmental health sciences), as well as cross-cutting and emerging public health areas.

Evidence-based Approaches to Public Health

1. Apply epidemiological methods to settings and situations in public health practice
2. Select quantitative and qualitative data collection methods appropriate for a given public health context
3. Analyze quantitative and qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate
4. Interpret results of data analysis for public health research, policy or practice

Public Health & Health Care Systems

1. Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings

2. Discuss the means by which structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and systemic levels

Planning & Management to Promote Health

1. Assess population needs, assets and capacities that affect communities' health
2. Apply awareness of cultural values and practices to the design, implementation or critique of public health policies or programs
3. Design a population-based policy, program, project or intervention
4. Explain basic principles and tools of budget and resource management
5. Select methods to evaluate public health programs

Policy in Public Health

1. Discuss the policy-making process, including the roles of ethics and evidence
2. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
3. Advocate for political, social or economic policies and programs that will improve health in diverse populations
4. Evaluate policies for their impact on public health and health equity

Leadership

1. Apply leadership and/or management principles to address a relevant issue
2. Apply negotiation and mediation skills to address organizational or community challenges

Communication

1. Select communication strategies for different audiences and sectors
2. Communicate audience-appropriate public health content, both in writing and through oral presentation
3. Describe the importance of cultural competence in communicating public health content

Interprofessional Practice

1. Integrate perspectives from other sectors and/or professions to promote and advance population health

Systems Thinking

1. Apply a systems thinking tool to visually represent a public health issue in a format other than standard narrative

III. In addition to the CEPH learning objectives, graduating DrPH students must demonstrate their ability to perform foundational competencies outlined below.

Data & Analysis

1. Explain qualitative, quantitative, mixed methods and policy analysis research and evaluation methods to address health issues at multiple (individual, group, organization, community and population) levels
2. Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue
3. Explain the use and limitations of surveillance systems and national surveys in assessing, monitoring and evaluating policies and programs and to address a population's health

Leadership, Management & Governance

1. Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders and other partners
2. Communicate public health science to diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies
3. Integrate knowledge, approaches, methods, values and potential contributions from multiple professions, sectors and systems in addressing public health problems
4. Create a strategic plan
5. Facilitate shared decision making through negotiation and consensus-building methods
6. Create organizational change strategies
7. Propose strategies to promote inclusion and equity within public health programs, policies, and systems
8. Assess one's own strengths and weaknesses in leadership capacities, including cultural proficiency
9. Propose human, fiscal, and other resources to achieve a strategic goal
10. Cultivate new resources and revenue streams to achieve a strategic goal

Policy & Programs

1. Design a system-level intervention to address a public health issue
2. Integrate knowledge of cultural values and practices in the design of public health policies and programs
3. Integrate scientific information, legal and regulatory approaches, ethical frameworks and varied stakeholder interests in policy development and analysis
4. Propose interprofessional and/or intersectoral team approaches to improving public health

Education & Workforce Development

1. Assess an audience's knowledge and learning needs
2. Deliver training or educational experiences that promote learning in academic, organizational or community settings
3. Use best practice modalities in pedagogical practices

Departments

Department of Biochemistry and Molecular Biology

About

The Department of Biochemistry and Molecular Biology (https://www.jhsph.edu/departments/biochemistry-and-molecular-biology/) conducts research to discover and characterize the fundamental biological processes relevant to health and disease.

Faculty and students work together to increase knowledge of the biochemical and molecular bases of normal and abnormal cellular processes and to train highly qualified scientists who—through research, teaching and service—continue to provide new insights into the biomedical issues that have a profound impact on public health.

Programs

Biochemistry and Molecular Biology, MHS

The Master of Health (M.H.S.) Program

Overview

The Master of Health Science (MHS) degree program is designed for students interested in graduate-level preparation for careers in medicine, biomedical research, public health, and related health sciences.

Our MHS students pursue advanced graduate work, a career in medicine, or positions in industry or public health. The MHS in the Department of Biochemistry and Molecular Biology includes courses within a core curriculum focused around biochemistry, molecular biology, reproductive biology, and the biology of disease and public health.

Program Requirements

Course location and modality is found on the BSPH website (https://www.jhsph.edu/courses/).

Course Requirements

Code	Title	Credits
School-wide Required Courses		
PH.550.865	Public Health Perspectives on Research [1]	2
Select a minimum of three credits of basic epidemiology from the following:		3
PH.340.721	Epidemiologic Inference in Public Health I [2]	
PH.340.751	Epidemiologic Methods 1 [3]	
Council on Education for Public Health Accreditation Required Courses		
All of the following **must** be taken: [4]		
PH.552.601	Foundational Principles of Public Health (1st & 3rd term)	0.5
PH.552.602	The Role of Quantitative Methods in Public Health (2nd term)	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (1st & 3rd term)	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality (2nd term)	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health (2nd term)	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (2nd term)	0.5
PH.552.607	Essentials of Environmental Health (1st term)	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health (1st & 3rd term)	0.5
PH.552.610	The Social Determinants of Health (2nd & 4th term)	0.5
PH.552.611	Globalization and Population Health (2nd & 4th term)	0.5
PH.552.612	Essentials of One Health (1st term)	0.5
Departmental Required Courses		
PH.120.600		5
PH.120.601	Biochemistry II: Major Metabolic Pathways	5
PH.120.602	Concepts of Molecular Biology (1st term)	4
PH.120.872	Special Studies-Current Topics in BMB (pass/fail)	1
PH.120.624	Cancer Biology (4th term)	3
Select at least five of the following upper-level BMB courses, while also taking at least one BMB course each term:		15-16
PH.120.603	Molecular Biology of Pandemic Influenza (2nd term)	
PH.120.620	Fundamentals of Reproductive Biology (1st term)	
PH.120.626	Principles of Cell Biology (2nd term)	
PH.120.608	Gene Editing, therapy and Manipulation (3rd term)	
PH.120.613	Nucleic Acid Chemistry (3rd term)	
PH.120.606	Cellular Stress in Physiology and Disease (4th term)	
PH.120.622	Molecular and Cellular Mechanisms of Reproduction (4th term)	
PH.120.605	Genome Integrity (4th term)	
Thesis Requirement		
PH.120.860	Thesis Preparation (3rd term, pass/fail)	2
PH.120.870	Thesis in Biochemistry and Molecular Biology (4th term)	5
Total Credits		**50.5-51.5**

1 An online, 2 credit pass/fail course in 2nd term, required of all BSPH students, except those in the MPH program

2 1st term or online 3rd term – This is a good "all-purpose" epidemiology course, designed for a wide audience of SPH students.

3 1st term – This course is more advanced than PH.340.721 Epidemiologic Inference in Public Health I in terms of the statistics background that is expected. Please see the course site in the course catalogue for further information on the statistics prerequisites.

Council on Education for Public Health Accreditation Required Courses

- Please note that 552.XXX are 0.5 credit courses and are required of all MHS students. While the credits for each of these courses do not count towards your total number of credit hours they **must** be completed to fulfill your degree. These courses are Pass/Fail, and to receive credit for each of them, you *must* earn a **Pass** in each to fulfill your degree requirements. Failure to pass any of these courses may preclude you from graduating in May.
- These courses are offered online only, and many of them are offered during two different terms – either 1st and 3rd or 2nd and 4th. You may add in as many as you wish per term; yet, I encourage you to be mindful of how many you are taking, particularly in light of the other coursework you have during the given term.

Waivers

Waivers from the School's epidemiology can be granted in the following circumstances:

- If you took Course AS.280.350 Fundamentals of Epidemiology, (offered at the Homewood campus), you can be granted a waiver from the School's requirement to take an epidemiology course. Please contact Vicki Keller or Erika Vaitekunas and they will arrange with the Registrar's office to have this noted in your records. However, be advised that no course credit is given.
- If you have previously taken a graduate level course in epidemiology at a U.S.-based, accredited school of public health, you can be granted a waiver from the School's epidemiology requirement. Please contact Vicki Keller or Erika Vaitekunas and they will arrange with the Registrar's office to have this noted in your records. However, be advised that no course credit is given.
- If you have previously taken an epidemiology course, but not graduate-level or at an U.S.-accredited school of public health, then the Department of Epidemiology offers a waiver exam. The contact for information about this exam is Allyn Arnold, instructor in the Department of Epidemiology (aarnold2@jhu.edu). If the student passes the waiver exam, the student is waived of the requirement to take basic epidemiology, and this waiver is noted in the student's

academic record with Records and Registration (however, no course credit is given for passing the waiver exam).

Term by Term Breakdown of Course Requirements

Course	Title	Credits
First Year		
First Term		
Required		
PH.120.872	Special Studies-Current Topics in BMB (pass/fail)	1
PH.120.602	Concepts of Molecular Biology [1]	4
PH.120.620	Fundamentals of Reproductive Biology [1]	3
Optional		
PH.120.600	[2]	
	Credits	**8**
Second Term		
Required		
Select at least one of these upper-level BMB courses (a minimum of five are required):		3
PH.120.603	Molecular Biology of Pandemic Influenza [3,4]	
PH.120.626	Principles of Cell Biology [3,5]	
Optional		
PH.120.601	Biochemistry II: Major Metabolic Pathways [6]	
	Credits	**3**
Third Term		
Required		
PH.120.860	Thesis Preparation (pass/fail)	2
Select at least one of the following upper-level courses (a minimum of five are required):		3
PH.120.608	Gene Editing, therapy and Manipulation [3,7]	
PH.120.613	Nucleic Acid Chemistry [3,8]	
PH.120.627	Stem Cells and the Biology of Aging and Disease [3,9]	
	Credits	**5**
Fourth Term		
Required		
PH.120.624	Cancer Biology [1]	3
PH.120.870	Thesis in Biochemistry and Molecular Biology [1]	5
Select one of the following upper-level BMB courses (a minimum of five are required) if needed:		
PH.120.624	Cancer Biology [1,10]	
PH.120.606	Cellular Stress in Physiology and Disease [11]	
PH.120.622	Molecular and Cellular Mechanisms of Reproduction [12]	
	Credits	**8**
	Total Credits	**24**

1 **Required BMB courses must be taken for a grade** (not Pass/Fail or for Audit credit)

2 Usually required for PH.120.601 Biochemistry II: Major Metabolic Pathways Biochemistry I and II are fundamental biochemistry courses and are excellent options for students who would like a biochemistry refresher for taking/re-taking the MCAT.

3 Satisfies the MHS degree requirement as one of the five upper-level courses

4 Literature-based course addressing one of the most interesting examples of the intersection of public health and the basic biomedical sciences.

5 Topics-based cell biology course; good choice for students who will be taking/re-taking the MCAT.

6 Second half of Biochemistry, continues from Biochemistry I (although it is not a strict requirement to take Biochemistry I in order to take Biochemistry II)

7 Addresses the genetic basis of health and disease, with emphasis on treating conditions with gene therapy or cutting-edge genome editing techniques.

8 Good choice for students with a strong chemistry background or seeking to build on their chemistry background; addresses the syntheses and chemical modifications of nucleotides, oligonucleotides, and nucleic acids, and in the application of oligonucleotides to solving problems in biology.

9 Covers topics in this cutting-edge area of biomedical science relevant to regenerative medicine, and reproductive and cancer biology.

10 Examines topics such as DNA repair, chromosome maintenance, and cell cycle control as these apply to cancer and other diseases.

11 Addresses the emerging, hot area of biomedical science on the "cell biology of stress" – events like cellular stress sensing pathways and stress response pathways, pertinent to many diseases and pathological states, such as neurodegeneration. Feedback from recent MHS alums is that this course material on oxidative stress is highly relevant to medical school!

12 For students interested in reproductive biology and health; this course builds on PH.120.620 Fundamentals of Reproductive Biology, in 1st term.

You must take a minimum of four of the upper-level BMB courses for a letter grade (and you are urged to take *all* for a letter grade, as P/F in a letter-graded course really doesn't do your credentials much good!).

Note: If you have previously taken any of these BMB courses (e.g., in satisfaction of your undergraduate degree or as a special student at Hopkins):

- If you have previously taken any of BMB courses, you do not have to re-take the course (nor are you allowed to take the course over again and have it count toward your Master's degree). If you are placing out of a BMB course, then you satisfy your requirement for BMB-based courses by taking *one additional BMB course for each course that you placed out of. You should **take a minimum of eight BMB classes over the four terms** of the academic year*.

Thesis Requirements

The **independent study MHS thesis** is completed by BMB MHS students. This thesis is a literature review (see details below), and there are two components that students register for as part of this process:

- You must complete and receive a P (Pass) in Course PH.120.860 Thesis Preparation, in 3rd term.
- You must receive a grade of **B or better on the thesis** to be eligible for the MHS degree. The grade you receive on the thesis will show in your transcript for Course PH.120.870 Thesis in Biochemistry and

Molecular Biology in 4th term, and will figure in to your cumulative GPA.

Term By Term Required and Other Courses

Notes:

1. Please be aware that ***course information can and does change*** (e.g., days/times, instructors, sometimes even if the course is going to be offered at all – and sometimes with little notice). For the most up-to-date information on course times, instructors, prerequisites, requirements for instructor permission, etc., ***go to the School's course search engine***: www.jhsph.edu/courses (https://www.jhsph.edu/courses/)
2. Many of the courses listed here have been ***recommended by previous MHS students or are noted here for various reasons of interest to BMB MHS students*** *(e.g., relevance to medicine and/or public health and/or MCAT, biological areas of interest, etc.).* ***But this is by no means a comprehensive list!*** *There are hundreds of great courses in the School of Public Health -- feel free to shop around with the course search engine to see the many other options.*

Course	Title	Credits
First Year		
First Term		
Before Labor Day to late October		
BMB Required Courses		
PH.120.602	Concepts of Molecular Biology	4
PH.120.620	Fundamentals of Reproductive Biology	3
PH.120.872	Special Studies-Current Topics in BMB (pass/fail)	1
BMB Optional 1st Term Course		
PH.120.600		
BSPH Epidemiology Required Courses		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.751	Epidemiologic Methods 1	5
Various 1st Term Courses of Interest		
PH.120.821	MHS Student Research (pass/fail) [1]	
PH.140.611	Statistical Reasoning in Public Health I	
PH.140.621	Statistical Methods in Public Health I	
PH.180.609	Principles of Environmental Health [2,3]	
PH.180.611	The Global Environment, Climate Change, and Public Health	
PH.187.610	Public Health Toxicology	
PH.221.613	Introduction to Humanitarian Emergencies	
PH.260.611	Principles of Immunology I [4,5]	
PH.260.623	Fundamental Virology	
PH.260.636	Evolution of Infectious Disease	
PH.300.651	Introduction to the U.S. Healthcare System	
PH.330.662	Public Mental Health	
PH.380.604	Life Course Perspectives on Health	
PH.410.600	Fundamentals of Health, Behavior and Society	
PH.410.612	Sociological Perspectives on Health	
PH.550.630	Public Health Biology	
	Credits	**18**
Second Term		
Late October to just before the December holiday season		
School-wide Required Course for all BSPH Students Not in the MPH Program		
PH.550.865	Public Health Perspectives on Research (online, pass/fail)	2
BMB Upper-level Courses		
PH.120.603	Molecular Biology of Pandemic Influenza	3
PH.120.626	Principles of Cell Biology	3
BMB Optional 2nd term Course		
PH.120.601	Biochemistry II: Major Metabolic Pathways	
Various 2nd term Courses of Interest		
PH.120.821	MHS Student Research (pass/fail) [1]	
PH.120.720	Applying Reproductive Biology Literacy Through Service-Learning [6]	
PH.140.612	Statistical Reasoning in Public Health II [7]	
PH.140.622	Statistical Methods in Public Health II [8]	
PH.180.650	Fundamentals of Clinical Oncology for Public Health Practitioners	
PH.180.610	Applied Environmental Health Practice [3,6,9]	
PH.183.631	Fundamentals of Human Physiology	
PH.187.632	Molecular Toxicology [10]	
PH.187.610	Public Health Toxicology (online)	
PH.223.662	Vaccine Development and Application	
PH.260.612	Principles of Immunology II (5,9)	
PH.260.631	Immunology, Infection and Disease	
PH.260.635	Biology of Parasitism	
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond	
PH.410.611	Under Pressure: Health, Wealth & Poverty	
	Credits	**8**
Third Term		
Mid-January to Mid-March		
BMB Required Courses		
PH.120.860	Thesis Preparation (pass/fail)	2
BMB Upper-level Courses		
PH.120.608	Gene Editing, therapy and Manipulation	3
PH.120.613	Nucleic Acid Chemistry	3
PH.120.627	Stem Cells and the Biology of Aging and Disease [3]	3
BSPH Epidemiology Required Courses		
PH.340.721	Epidemiologic Inference in Public Health I (online)	5
Various 3rd Term Courses of Interest		
PH.120.821	MHS Student Research (pass/fail) [1]	
PH.140.615	Statistics for Laboratory Scientists I	
PH.182.640	Food- and Water- Borne Diseases	
PH.183.638	Mechanisms of Cardiopulmonary Control	
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth [11]	
PH.221.635	Global Advances in Community-Oriented Primary Health Care	
PH.223.687	Vaccine Policy Issues	

PH.260.627	Pathogenesis of Bacterial Infections	
PH.260.635	Biology of Parasitism	
PH.260.650	Vector Biology and Vector-Borne Diseases	
PH.260.656	Malariology	
PH.260.665	Biological Basis of Aging	
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life [6]	
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	
PH.340.607	Introduction to Cardiovascular Disease Epidemiology	
PH.380.665	Family Planning Policies and Programs	
PH.380.760	Clinical Aspects of Reproductive Health	
PH.410.610	Housing Insecurity and Health	
PH.410.613	Psychosocial Factors in Health and Illness	
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	
	Credits	**16**
Fourth Term		
Mid/end of March to mid/end of May		
BMB Required Courses		
PH.120.624	Cancer Biology [3]	3
PH.120.870	Thesis in Biochemistry and Molecular Biology [12]	5
Additional BMB Courses		
(if still need courses for the minimum of five upper-level BMB courses)		
PH.120.606	Cellular Stress in Physiology and Disease	
PH.120.622	Molecular and Cellular Mechanisms of Reproduction	
PH.120.605	Genome Integrity [3]	
Other 4th Term Courses of Interest		
PH.120.821	MHS Student Research (pass/fail) [1]	
PH.140.616	Statistics for Laboratory Scientists II	
PH.183.631	Fundamentals of Human Physiology (online)	
PH.183.642	The Cardiopulmonary System Under Stress	
PH.187.661	Environmental Health in Neurological and Mental Disorders [10]	
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases	
PH.260.656	Malariology	
PH.260.712	Clinical Immunology [6]	
PH.223.689	Biologic Basis of Vaccine Development [14]	
PH.300.651	Introduction to the U.S. Healthcare System (online)	
PH.380.667	Women's Health Policy	
PH.380.762	HIV Infection in Women, Children, and Adolescents	
PH.410.652	Interpersonal Influence in Medical Care	
	Credits	**8**
	Total Credits	**50**

1 Research in a BMB faculty member's lab
2 Continues in second term, PH.180.610 Applied Environmental Health Practice consent of instructor required
3 Online course will not satisfy the requirements for the MHS program
4 Prerequisite: course in Advanced Biology continues in second term, PH.260.612 Principles of Immunology II
5 Recommended only for students with a very strong biology background
6 Consent of instructor required
7 Continuation from PH.140.611 Statistical Reasoning in Public Health I, in 1st term
8 Continuation from PH.140.621 Statistical Methods in Public Health I, in 1st term
9 Continuation from first term
10 Prerequisite: PH.187.610 Public Health Toxicology, a basic course in molecular biology, or consent of instructor
11 Also has an optional, complementary practicum component in 3rd and 4th term
12 This is how you get your grade for the MHS thesis.
13 Prerequisite: PH.260.623 Fundamental Virology or instructor consent required
14 Prerequisite PH.260.611 Principles of Immunology I-112 or equivalent knowledge of principles of modern immunology

The M.H.S. Thesis

The MHS thesis is the culminating experience of the degree and should "*provide new knowledge and/or a critical synthesis and integration of existing knowledge*" (as described by the Policy and Procedure manual of the Bloomberg School of Public Health). This is a *library-based* thesis – meaning the thesis does not involve independent research in a laboratory, but instead requires a synthesis of the scientific literature, in the style of a review article. It is also possible that the thesis could take on elements of a research proposal.

You get a grade for the MHS thesis. Your thesis grade will show on your transcript and will figure in to your cumulative GPA, through a five-credit thesis 'course' listed for 4th term, PH.120.870 Thesis in Biochemistry and Molecular Biology. Although the grade is assigned in 4th term, you will be working on your thesis for significantly more than one term. (Indeed, if you only work on the thesis starting over spring break before 4th term, you are very likely not to get a passing grade.)

Procedure and Rules for the MHS Thesis

1. A list of thesis topics will be distributed. You will select your top **3-4 topics** from this list. The deadline for submitting your choices will be in 2nd term; you will receive email notifications to your JHU email account about this. (Note: There is no advantage to handing a list in sooner than this date, i.e,. there is no "first come, first served.")
2. You will be assigned one of your topic choices, and a thesis supervisor to advise on this topic; you will know your topic and thesis supervisor by approximately midway through 2nd term.
3. You then should consult with their thesis supervisor regarding topic, tips for starting your work, etc. The MHS thesis is intended to be an **independent study project** in which you work **one-on-one with your faculty supervisor** to assist your research as needed. There are several important milestones and deadlines related to the MHS thesis:

Milestone	Deadline
Students submit 5 topics of interest via BMB Masters Resource CoursePlus site	Monday, September 26, 2022, 11:59 PM
Student notification of topic and advisor	Friday, October 7, 2022, 11:59 PM
Meeting 1 - Required organizational meeting with thesis supervisor to discuss topic, overall thesis work plan, and work plan for developing the 2-4 page outline	No later than Friday, October 28, 2022, 5:00 PM
Meeting 2 - Progress report with thesis supervisor at least once by Week 2 of 3rd term (and before the end of 2nd term is encouraged, so that you can work more on your general outline over winter break)	Before Friday, December 16, 2022; before the end of 2nd term if possible
2-4 page initial outline due – email to thesis supervisor, and also submit via CoursePlus website for PH.120.860	No later than Friday, January 27, 2023, 11:59 PM (sooner is encouraged)
Meeting 3 - Progress report with thesis advisor at least once by end of Week 5 of 3rd term – get feedback on general outline and discuss the detailed outline/rough draft	Before Friday, February 17, 2023
~10+ page detailed outline or partial rough draft, with references (consult your thesis supervisor on what they prefer), – email to thesis supervisor and also submit through CoursePlus website for PH.120.860	No later than Friday, March 10, 2023, 11:59 PM (sooner is encouraged)
Meeting 4 - Progress report with thesis supervisor at least once by end of Week 2 of 4th term - feedback on detailed outline or partial draft	No later than Friday, March 24, 2022
Final Thesis Due (20-30 pages long, not counting figures, references) – hard copy or e-copy to thesis supervisor and secondary reader, and submit e-copy through CoursePlus website for PH.120.870	Friday, April 14, 2023, 11:59 PM

4. Document uploads will use dropboxes associated with the appropriate CoursePlus course site, for PH.120.860 Thesis Preparation in 3rd term and PH.120.870 Thesis in Biochemistry and Molecular Biology in 4th term.
5. The work-in-progress document – i.e., the detailed outline ***or*** partial rough draft due (depending on which your thesis supervisor on what s/he prefers), including references. This document must be submitted to your thesis supervisor by email **and** submitted to the CoursePlus dropbox by 11:59 PM of the Monday of the week between 3rd and 4th terms to get a Pass for Course PH.120.860 Thesis Preparation.
6. **Final MHS thesis is due *by* Sunday, April 14, 2023, 11:59 PM.** Communicate with your thesis supervisor and secondary reader to determine if they prefer a hard copy or an e-copy. You also must submit a PDF version to the CoursePlus website for PH.120.870 Thesis in Biochemistry and Molecular Biology, to be saved for departmental records. You may also use CoursePlus to upload your thesis to your academic portfolio.
7. Thesis grade: **You must receive an A or B on the MHS thesis to be eligible for the MHS degree.** As noted above, your grade on your thesis will show on your transcript and figure in to your cumulative GPA, for the five-credit course PH.120.870 Thesis in Biochemistry and Molecular Biology. **The grade you get on the thesis that you hand in on April 14, 2023 is the final grade that goes and stays on your transcript, and figures in to your cumulative GPA.**
   ***If you receive a C or D on the thesis,* you are not eligible for the MHS degree for May graduation. However, you have the option to re-write the thesis if you still wish to be eligible for the MHS degree.**Re-written theses must be submitted to your thesis supervisor, your secondary reader, and the BMB academic affairs office (Vicki Keller and Erika Vaitekunas); the absolute last date that the re-written thesis can be submitted is **August 1**. This re-written thesis must be of A or B grade quality to make you eligible for the MHS degree. Although the grade of C or D will stay on your transcript, the department will submit a letter to Records and Registration to note that you have satisfactorily completed the thesis requirement.
   If you receive an F on the MHS thesis*, you will be permanently ineligible for the MHS degree; *there is no rectifying this deficiency (theses that receive an F are not eligible for a re-write). The draft that you hand in on **April 14, 2023** must get a D or better for you to have the option of receiving the MHS degree in the future.
8. **Theses handed in after the due date:**
   Students should do everything in their power to stay on target for the April due date for MHS thesis submission. If a health or personal emergency develops that will prevent you from submitting your thesis by the deadline, you must provide documentation of this emergency (e.g., from a healthcare professional and/or from the Office of Student Affairs). Also be advised that *you will not be eligible for spring graduation and marching in our Convocation ceremonies*. You will receive an Incomplete for PH.120.870 Thesis in Biochemistry and Molecular Biology. Completion of your thesis by August 1 and receiving a grade of A or B will make you eligible for summer degree conferral. Be advised that grades of Incomplete for PH.120.870 Thesis in Biochemistry and Molecular Biology have to be resolved by 120 days after the conclusion of 4th term.
   Students handing in the thesis late *without* a valid excuse will automatically receive a **D** for Course PH.120.870 Thesis in Biochemistry and Molecular Biology. This grade will stay on your transcript and will figure in to your cumulative GPA. If you wish to be eligible for the MHS degree, you will have to re-write the thesis; this must be handed in to your thesis supervisor, your secondary reader, the BMB academic affairs office (Vicki Keller and Erika Vaitekunas) *by* **August 1**, so that you can be eligible for summer degree conferral. This re-written thesis must be an A or B grade quality to make you eligible for the MHS degree. Although the grade of D will stay on your transcript, the department will submit a letter to Records and Registration to note that you have satisfactorily completed the thesis requirement.

General Guidelines for the MHS Thesis

- Length - 20-30 pages (not counting bibliography or figures)
  - Note: A thesis shorter than 20 pages typically will not provide sufficient depth and breadth to earn an A. If your thesis is going to be longer than 30 pages, you should discuss this with your

thesis supervisor and either get approval for a longer thesis, or discuss how to shorten the thesis.
- Double-spaced with one-inch margins
- Must include an **abstract** of 250 words or less at the beginning.
- Font - Arial, Times, Times New Roman, etc. (i.e., nothing crazy looking), size 12 (nothing too tiny, nothing too large).
- For hard copies, binding is not necessary, but certainly welcome.
- Organization varies depending on topic, but a general format could include
  - Introduction
  - Background
  - The state of the field currently -- including what's known, and what's *controversial* and/or *unknown*
  - Where the field is going (to address controversies and unknowns)
  - Conclusions/summary
    Note: Headings and subheadings can be used to distinguish sections and subsections. A table of contents may be included to highlight these sections and subsections.
- **References:** ~40-100 referenced works (will vary widely, depending on the topic)
- **Reference formats** (for using RefWorks or other bibliographic software, you may select the *Journal of Cell Biology* as style)
  - *In-text citations* (at the end of sentence or phrase needing a citation):
    - If one author: A monoclonal antibody that recognizes Protein X inhibits viral fusion with cells (Jones, 2003).
    - If two authors: A monoclonal antibody that recognizes Protein X inhibits viral fusion with cells (Jones and Smith, 2003).
    - If 3+ authors: A monoclonal antibody that recognizes Protein X inhibits viral fusion with cells (Jones et al., 2003).
  - *Bibliography list of references at the end of the thesis*
    Alphabetical by first author's last name, formatted as follows: Lastname1 A., Lastname2 B., Lastname3, C. (Year) Title of paper. *Journal name (or abbrev.)* Vol.#: page#-page#.
- You are *strongly urged* to use ***bibliographic software***; this will be significantly easier for you than typing all your references into your outlines and thesis drafts or trying to keep the papers you find and read organized without software. The web-based bibliographic software **RefWorks** is available free to JHU students through Welch Library. Other bibliographic software options include Reference Manager, EndNote, and Mendeley (www.mendeley.com (http://www.mendeley.com)).
  Links for various services available from Welch Medical Library (http://welch.jhmi.edu):
  - **Welch Library classes and tutorials:** welch.jhmi.edu/welchone/Classes-and-Lectures (http://welch.jhmi.edu/welchone/Classes-and-Lectures/)
    Online tutorials and schedule of classes for using various services and databases
  - **Welch Library's information on RefWorks:**
    Online tutorials available through:
    welch.jhmi.edu/welchone/Online-Tutorials-and-Guides (http://welch.jhmi.edu/welchone/Online-Tutorials-and-Guides/)
  - **Portal for using RefWorks:** Under the "Services" tab at welch.jhmi.edu/welchone/ (http://welch.jhmi.edu/welchone/)
- **Illustrations:** Illustrations are allowed in the thesis. Figures must include a figure legend. You should consult with your thesis supervisor about including figures and in what format – particularly if your thesis supervisor is comfortable with you using a figure from a published work, or whether you should draw your own illustration (and provide attribution for the inspiration). If you do an exact duplication of a figure (by copy and paste) that was published somewhere, you must provide a citation, with some phrase in the figure legend like "taken from Smith et al., 2014." If you draw your own illustration that is roughly based on one or more figures that have been published, you should cite this as, "adapted from Smith et al., 2014 and Comsnogle et al., 2010."
- **Working with others** – You should verify with your thesis supervisor, but in general, most thesis supervisors will be supportive of you working with your fellow MHS students, such as exchanging thesis drafts with a friend and checking each other's draft for readability, grammar, typos, etc.

Crucial issue with referencing and with illustrations –Must avoid plagiarism!!!

Information from the School's Policies and Procedures:
Policy and Procedure Memorandum Students - 1
Subject: Academic Ethics

https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Pages/default.aspx

Constitution of the Academic Ethics Board of the Bloomberg School of Public Health

Article Two. Definitions

Section Two.

Plagiarism is defined as taking for one's own use the words, ideas, concepts or data of another without proper attribution. Plagiarism includes both direct use or paraphrasing of the words, thoughts or concepts of another without proper attribution. Proper attribution includes:

1. use of quotation marks or single-spacing and indentation for words or phrases directly taken from another source, accompanied by proper reference to that source,
2. proper reference to any source from which ideas, concepts, or data are taken even if the exact words are not reproduced.

Tips for working on the MHS thesis:

- **Meet with your thesis supervisor early and regularly.** This is important for getting tips on where to get started, and how to make progress. With regard to getting started, there are many different ways to consider, which are based on you, the topic, and your thesis supervisor. Examples include:
  - Use PubMed or other literature database search (e.g., Google Scholar) with keywords related to your topic.
  - Use PubMed to search for a few authors' names to PubMed, to see what leaders in the field are doing
  - Thesis supervisor might assign a couple review articles for overview
  - Thesis supervisor might assign 2-5 research papers to get you started on a few key issues in the field.
- Start collecting papers, review and original research – and dive in and start reading.
- Start jotting down ideas, key concepts, important issues, etc. that come up in these papers.

- Continue meeting with your thesis supervisor and feedback during your regular progress report meetings.
- As your ideas of thesis content start coming together, start working on an **outline**. A short outline is part of the required work in 3rd term on the thesis. It is highly recommended that you include references during your outlining, both to organize your thoughts and to keep track of citations.
- Make modifications/additions in response to thesis supervisor's comments.
- Start writing from your outline. Text can be broken into sections and subsections, with headings for each section / subsection.

Academic Requirements

- Must have a **minimum of 16 credits per term** for full-time status, and **64 total credits** to graduate.
- Of the 16 credits per term, *up to four credits each term can be **BMB Special Studies (120.840**, listed as "Special Studies and Research Biochemistry")*. This means that a *minimum of 12 credits* must be non-Special Studies courses. Part of the purpose of Special Studies (120.840) credits is to give you credit for the time you spend in various activities, even though these activities are not formal specific courses for which you get grades (e.g., seminars, meetings, other enrichment activities).
- While a few online courses are offered to MHS students through our department, a large number of online course offerings are available to you through the School. Be advised that many **medical schools do NOT accept online courses**, particularly those that are required and/or recommended courses for entrance into medical school. You may want to check with the AAMC website or your choice schools' admissions requirements to determine their online course acceptance preferences.
- The maximum number of credits in one term is 22, unless a student gets permission from the program director (Dr. Roza Selimyan; rselimyan@jhu.edu) to take more than 22 credits in a given term.
- An MHS student must have a minimum cumulative G.P.A. of **2.75** to graduate. Additionally, maintaining a cumulative GPA of 2.75 is required to remain in sufficient academic standing for receiving federal financial aid (known as *Satisfactory Academic Progress*, or SAP).

A student with a cumulative GPA below 2.75 will be:

1. Be placed on departmental academic probation. The student will be required to meet with the program director, Dr. Roza Selimyan, to discuss classes, study needs, and factors that could be addressed to enhance academic performance.
2. Prepare an academic plan for the coming term that identifies specific tactics to start an upward trend in academic performance. Be advised that students who are receiving **federal financial aid** who have a cumulative GPA below 2.75 are asked to prepare an academic plan as part of their ***Satisfactory Academic Progress* suspension appeal**. This academic plan for the Satisfactory Academic Progress suspension appeal can also be used as the plan for departmental academic probation.

- D or F in any class or failure to have a cumulative GPA of 2.25 is *grounds for dismissal* (note: this differs from automatic dismissal). Also be advised that that no credits are received for a course in which a student receives an F, and therefore a course in which a student receives an F will not count toward the 64 credits one needs to graduate.

The Master of Health Science (MHS) degree program is designed for students interested in graduate-level preparation for careers in medicine, biomedical research, public health, and related health sciences. Our MHS students pursue advanced graduate work, a career in medicine, or positions in industry or public health.

The MHS program is completed in one academic year (late August through mid May). The program's flexible curriculum allows opportunity to take courses throughout the Bloomberg School of Public Health. Because of the School's unique academic calendar (https://www.jhsph.edu/academics/calendar/2019-2020.html)with four eight-weeks terms, students have ample opportunity to take a rich variety of courses.

The MHS in the Department of Biochemistry and Molecular Biology includes courses within a core curriculum focused around biochemistry, molecular biology, reproductive biology, and the biology of disease and public health. The remainder of the courses are electives- that can be chosen based on interests and career goals. Students have extensive opportunities to have one-on-one interaction with faculty and staff, for advising, career guidance, and thesis preparation. The department also has a part-time pre-health advisor who leads workshops through the academic year to prepare students for applying to medical school or other professional schools in healthcare.

Biochemistry and Molecular Biology, ScM

The Master of Science (ScM) Program

Overview

The Department of Biochemistry and Molecular Biology offers two different master's degrees: The Master of Health Science (**MHS**) and the Master of Science (**ScM**). For the ScM degree, MHS students transfer to the ScM program and continue in a second year after completion of the first-year coursework. In this second year, students conduct laboratory research in one of the BMB primary appointment faculty members. The active labs with available space and appropriate projects for ScM students will vary from year to year, but can include Drs. Bailey, Cai, Culotta, Kavran, Leung, Matunis, Nayar, Rebecca, Wan, and Wang, as well as joint BMB appointees with training privileges, Marsha Wills-Karp, Photini Sinnis, Sabra Klein, Sean Prigge, Ann Hamacher-Brady, and Alan Meeker. The ScM degree work culminates in the writing of an ScM thesis (literature review and research report). Students start their research in June after the MHS coursework year, and then complete their research and thesis in the next spring-summer (~12-13 months). Tuition is reduced for the ScM year as compared to what students pay for the MHS coursework year. This typically is ~25% of the MHS year tuition. Questions about the ScM program can be directed to, Dr. Roza Selimyan (director of the ScM program) or the Academic Program Coordinator.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The majority of ScM students who start their research in June will finish their degree work in June or July of the next year. This is because it takes

12-13 months to accumulate enough data for the ScM thesis, and then to write the thesis and have it approved by your adviser and thesis reader. Be advised that it is unusual, although not impossible, to get the ScM degree completed in time for May graduation (see details on deadlines below).

Academic Year 2022-23

Due Dates for Summer Conferral (August 26, 2022)

JUNE 10, 2022

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

JUNE 17, 2022

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

AUGUST 26, 2022

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Due Dates for Fall Conferral (December 30, 2022)

OCTOBER 14, 2022

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

OCTOBER 28, 2022

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

DECEMBER 16, 2022

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Due Dates for Spring Conferral (May 25, 2023)

FEBRUARY 10, 2023

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

march 17, 2023

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

May 5, 2023

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Presentation of Work at Departmental Retreat and Other Venues

ScM students are *required to present their work at the spring BMB departmental research retrea*t. ScM students are also encouraged to present their work at other venues, including the departmental colloquium, multi-lab group meetings, and regional/national scientific meetings.

Appointment of Thesis Readers

The ScM thesis must be read and approved by a committee of two readers. **Be advised that the appointment of readers for a ScM thesis is more formal than that of the MHS thesis**, with a form that must be submitted to the Office of Records and Registration by a specific deadline.

The following form must be submitted to the Office of Records and Registration: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/Documents/ScM%20-%20MBe%20Appointment%20of%20Thesis%20Readers%20Form.pdf (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/%20Documents/ScM%20-%20MBe%20Appointment%20of%20Thesis%20Readers%20Form.pdf)

Or go to my.jhsph.edu (http://my.jhsph.edu):

- At the main page, select the *Offices* tab,
- pull down to *Student Affairs*
- On the main Student Affairs page, select *Records and Registration* (under the heading "Offices")
- Scroll the bottom of this next page to "Other Areas" and select "*Masters Candidate Information*"
- Look for the document, "**ScM - MBe Appointment of Thesis Readers Form**"

Approximate deadlines for submission for different completion dates and degree conferral are below. *We encourage all ScM students regardless of anticipated degree completion to submit the Appointment of Thesis Readers Form in **mid-February***.

Event	Deadline
For spring degree conferral (and marching in Convocation ceremonies)	Mid-February
For US citizens and permanent residents only -	Last day of 4th term
For submission by June 30, to have thesis submission covered by 4th term tuition	
For summer degree conferral	Mid-June[1]
For fall degree conferral	Mid-October[1]

[1] The deadlines for Academic year 2019-2020 (for summer and fall degree conferral) will be released in spring of 2020.

The exact date changes from year to year; be sure to check the Office of Records and Registration site on my.jhsph.edu (http://my.jhsph.edu) **for the dates.**

The URL for deadlines for Academic Year 2019-2020 will be made available here (***copy and paste this address***): https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/

Documents/Forms/AllItems.aspx (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/%20Documents/Forms/AllItems.aspx)

The ScM thesis reader committee consists of two members, one of which is the student's advisor. The second member **must** be a full-time (professor, scientist, lecturer, instructor of any rank), emeriti, or adjunct faculty from any BSPH or JHU department, including the student's sponsoring department. However, only one adjunct may serve on the committee of thesis readers. Visiting faculty may not serve on the committee.

Completion and Submission of the ScM Thesis

Be advised that submission of the ScM thesis is a more structured and formalized process than is submission of the MHS thesis.

You must remain registered until your final thesis is submitted and until all your committee members' letters are on file in the Office of Records and Registration. Students also must be registered for at least *two consecutive terms* leading up to submission of the thesis and completion of the ScM degree.

Non-US citizens/permanent residents: You must ensure that your student visa will be current throughout your completion of the degree. If you will not be completing the program as originally scheduled and your visa is expiring, please note that it is crucial to be in contact with the Office of International Services (OIS; http://ois.jhu.edu/) to stay on top of any impending deadlines, regarding your visa, potential application for Optional Practical Training (OPT), etc. It is essential to keep your supervisor and BMB administration informed.

Thesis Preparation and Submission Process

- The thesis must formatted according to University specifications.
  - Basic information - http://guides.library.jhu.edu/etd (http://guides.library.jhu.edu/etd/)
  - Formatting the thesis - http://guides.library.jhu.edu/etd/formatting (http://guides.library.jhu.edu/etd/formatting/)
  - It will also be helpful to look at past ScM theses. The BMB McCollum Reading Room (W8017) has copies of past students' theses. Your advisor may have copies from past students as well.
- ScM students work closely with their advisor to write the ScM thesis. The ScM advisor will read drafts, and ultimately, the ScM advisor must approve the version that is distributed to the other thesis reader.
- Once the thesis is acceptable to the advisor and approved by the advisor for distribution, the student then provides a copy of the ScM thesis to the other thesis reader.
  - It is recommended that you give your readers this near-final, advisor-approved version of your thesis *approximately three weeks before the date you need to submit the final copy*. This gives the readers plenty of time to read your thesis, provide critique, and for you to revise your thesis in response to their feedback as necessary.
- The student must incorporate recommended thesis revisions from the thesis readers.
- The final thesis, incorporating the thesis readers' revisions, is then submitted by the student electronically to JHU Sheridan libraries through the ETD process (ETD = Electronic Thesis and Dissertation - http://guides.library.jhu.edu/etd (http://guides.library.jhu.edu/etd/)).
- The final thesis must be submitted and verified by the indicated deadlines for degree conferral. ***Be advised that sometimes verification can take a couple days, so you do not want to wait right up to the very last day*.**
- The two members of the thesis reader committee must submit thesis acceptance letters to the Office of Records and Registration by the indicated deadlines for degree conferral.

Approximate deadlines for submission + verification of final thesis and acceptance letters from advisor and thesis reader:

Event	Deadline
For spring degree conferral (and marching in Convocation ceremonies)	Third Friday in April
For US citizens and permanent residents only -	Last working day in June
To have thesis submission covered by 4th term tuition	
For summer degree conferral (requires paying summer term tuition)	Mid-August[1]
For fall degree conferral (requires paying 1st term, and if necessary, 2nd term tuition)	Mid-December[1]

[1] The deadlines for each Academic Year 2019-2020 (for summer and fall degree conferral) are released at the end of the previous academic year. To find this, go to my.jhsph.edu (http://my.jhsph.edu):

- At the main page, select the *Offices* tab,
- Pull down to *Student Affairs*
- On the main Student Affairs page, select *Records and Registration* (under the heading "Offices")
- Scroll the bottom of this next page to "Other Areas" and select "*Masters Candidate Information*"
- Look for the appropriate Due Dates document.

The exact deadlines change from year to year; be sure to check the Office of Records and Registration site on my.jhsph.edu **(**http://my.jhsph.edu**) for the dates.**

The URL for the document with deadlines for the academic year: publichealth.jhu.edu/academics/academic-calendar (https://publichealth.jhu.edu/academics/academic-calendar/)

Program Policies

Master's students must register for a minimum 16 credits each term. These credits include didactic courses, special studies, thesis research, seminars, etc. While a minimum of 64 credits are required by the School for a Master's degree, due to this Departmental requirement, BMB ScM students will exceed that number at the time of graduation. Course requirements and suggestions for electives are summarized in the next section.

In core courses, Master's students must receive a 'C' or higher. A student who earns a grade below that threshold in a course listed as a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the ScM Director. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

To remain in good academic standing, Master's students must maintain a minimum grade point average of 2.75. If a student's GPA falls below the requirement, the student will be placed on academic probation. School policy states that a Master's student cannot graduate with a GPA lower than 2.75.

Educational Objectives:

Key educational objectives for ScM students include:

1) develop knowledge through coursework focused around biochemistry, molecular and cellular biology, reproductive biology, and the biology of disease and public health

2) develop skills for the critical evaluation of scientific literature

3) develop literature-based analytical and research skills

4) develop the ability to communicate scientific information orally and in writing. Additional educational objectives for ScM students include development of laboratory and analytical skills required to effectively conduct laboratory research

Biochemistry and Molecular Biology, PhD

Introduction

The PhD Program in the Department of Biochemistry and Molecular Biology is designed for students interested in graduate-level preparation for careers in biomedical and health sciences research. Emphasizing molecular studies of multiprotein systems, molecular and cellular biology, and biochemical nutrition, the research of our doctoral students has applications to cancer, aging, neurological diseases, and environmentally-based diseases.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Required Coursework

All Ph.D. students in the training program have a common core curriculum during their first and second years as outlined in Table 1. Students who are supported by the National Cancer Institute training grant in their second year or beyond are also required to take **ME.510.760 Fundamentals in Cancer: Cause to Cure** offered by the Sidney Kimmel Comprehensive Cancer Center, or an equivalent course. Students should consult with the departmental Academic Program Manager regarding course availability.

A rich array of seminar programs and journal clubs are also available to all students. Students may also elect, in consultation with their thesis adviser, to take additional coursework in their chosen area of interest. In addition to registering for required coursework, students also register for thesis research once they have chosen a thesis adviser.

All students, regardless of year, are required to attend the bi-weekly BMB Seminar Series given on Mondays at noon throughout the academic year and the annual BMB Retreat. Students who have completed their first year of study are also required to participate in the weekly journal club and attend the monthly BMB Colloquium series each academic year.

Table 1. Course Requirements for BMB Ph.D. Students

Course	Title	Credits
First Year		
First Term		
ME.100.709	Macromolecular Structure and Analysis (Macromolecular Structure and Analysis)	3
ME.100.710	Biochemical and Biophysical Principles (Biochemical and Biophysical Principles)	3
PH.120.850	Biochemical Techniques (laboratory rotations)	6
PH.120.852	Core Research Literature	2
PH.120.872	Special Studies-Current Topics in BMB	1
PH.120.840	Special Studies and Research Biochemistry	2
PH.550.860	Academic & Research Ethics at BSPH	0
	Credits	**17**
Second Term		
ME.260.709	Molecular Biology and Genomics (Molecular Biology and Genomics)	3
ME.800.707	Computational Biology and Bioinformatics (Computational Biology and Bioinformatics)	3
ME.260.708	Fundamentals of Genetics	2
ME.330.709	Organic Mechanisms in Biology (Organic Mechanisms in Biology - taken either year 1 or 2 at student's discretion)	2
PH.120.850	Biochemical Techniques (lab rotations)	6
PH.120.840	Special Studies and Research Biochemistry	2
PH.120.852	Core Research Literature	2
	Credits	**20**
Third Term		
ME.110.728	Cell Structure and Dynamics (Cell Structure and Dynamics)	3
ME.360.728	Pathways and Regulation (Pathways and Regulation)	2
PH.120.850	Biochemical Techniques (laboratory rotations)	6
PH.120.840	Special Studies and Research Biochemistry	2
PH.120.852	Core Research Literature	2
	Credits	**15**
Fourth Term		
PH.120.624	Cancer Biology	3
PH.120.850	Biochemical Techniques (laboratory rotations)	6
PH.120.840	Special Studies and Research Biochemistry	2
PH.120.852	Core Research Literature	2
	Credits	**13**
Second Year		
First Term		
PH.120.840	Special Studies and Research Biochemistry (variable credit)	1 - 22
PH.120.820	Thesis Research Biochemistry	1 - 22
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
	Credits	**1**

Second Term		
PH.120.840	Special Studies and Research Biochemistry (variable credit)	1 - 22
PH.120.820	Thesis Research Biochemistry (variable credit)	1 - 22
PH.550.865	Public Health Perspectives on Research	2
	Credits	**2**
Third Term		
PH.120.840	Special Studies and Research Biochemistry (variable credit)	1 - 22
PH.120.820	Thesis Research Biochemistry (variable credit)	1 - 22
	Credits	**0**
Fourth Term		
PH.120.840	Special Studies and Research Biochemistry (variable credit)	1 - 22
PH.120.820	Thesis Research Biochemistry (variable credit)	1 - 22
	Credits	**0**
	Total Credits	**68**

Notes:

- Courses designated ME are offered by the School of Medicine and those designated PH are offered by the Bloomberg School of Public Health.
- Special Studies and Research/BMB = Monday Departmental Seminar Series
- Current Research Literature 4th term = Thesis proposal writing workshop

Additional Requirements

- Three (3) credits of a course in Epidemiology (PH.340.618 Epidemiology: the Basics – offered in 4th term).
- Six (6) credits of course work outside BMB but within BSPH. **Note: PH.500 series courses do not count toward this requirement.**

Laboratory Rotations

During their first year, students spend approximately one-half of their time conducting bench research during four laboratory rotations. Each rotation lasts eight weeks. The purpose of these rotations is to familiarize the student with research activities performed by faculty members in the program and to allow the student to make an informed decision in choosing a thesis adviser. Each rotation will be assigned by the Program Director, Dr. Michael Matunis, with input from the student, as follows:

- For the first rotation, students will receive a list during the summer of laboratories available for rotations. After receiving this list, students will provide the Program Academic Manager, with the names of three labs for possible rotation assignment. Assignments will be made by the Program Director in consultation with the Program Steering Committee.
- For the second through fourth rotations, students are required to meet with available faculty and discuss possible rotations during the two weeks prior to the end of their current rotation. Following these discussions, students will provide the Academic Office, with the names of three labs for possible rotation assignment. This list must be submitted one week prior to the end of the current rotation. Rotation assignments will be determined by the Program Director in consultation with the Program Steering Committee.

Students are allowed to rotate only once in any given lab. Normally, the rotations will be distributed so there is only one rotation student per laboratory. This rule may be waived if there are unusual circumstances. To assist students in rotation choices, the department offers a one-credit course titled "Current Topics in BMB" held twice a week (12:00-1:00 PM) during the first term of the academic year, in which training faculty introduce students to their ongoing research.

Students will be given a specific research project at the beginning of each laboratory rotation. The student is expected to acquire the necessary background information to carry out the project through literature reviews and discussions with the faculty adviser and other lab members. In carrying out the project, the student can also expect hands-on assistance as required from the faculty heading the lab and their trainees.

At the end of each rotation, first year students present a report on their rotation project before the faculty and other interested parties. Each student will write a brief abstract which is to be submitted to the Academic Program Manager on the day before the rotation report. During the rotation report, students give an oral presentation lasting 10 minutes. A five-minute question period follows each oral presentation. Each student is also required to complete a rotation self-evaluation form at the end of each rotation (Appendix I). The completed form should be discussed in person with the faculty adviser who will provide their own assessment of the student's understanding of the project, effort, interest and technical abilities in carrying out the project. The faculty's assessment, including an overall evaluation of the rotation, will be documented on the final page of the form. **The signed form together with the updated "Milestones Tracker" form must be returned to, and briefly discussed with, the student's first year faculty adviser within one week of the end of each rotation.**

Satisfactory Academic Progress and Laboratory Rotation Performance

- Students must receive a grade of B or better in each of the eight core (ME) courses listed in Table 1 and in Cancer Biology. Accumulation of two or more C's or lower in these courses is grounds for dismissal from the program. If a student receives a C or lower grade in any of these nine courses, then the student must repeat the course and receive a B or better grade the second time.
- The School of Public Health requires Ph.D. candidates to achieve a final GPA of 3.0 or higher for graduation.
- Students must also receive satisfactory evaluations for each of the four laboratory rotations. Receiving two or more "poor" evaluations is grounds for dismissal from the program.
- Academic progress and laboratory rotation performances will be evaluated by the Program Steering Committee in early April, prior to the completion of the 4th rotation. Students who have met both academic and laboratory rotation standards will be notified and permitted to select a laboratory for thesis research. Students who have not met these standards may be dismissed from the program.

Selecting a Thesis Adviser

As a general policy, only one student may enter a given laboratory in any one year. Exceptions to this policy are made when circumstances warrant. Students are expected to meet with potential thesis lab advisers during the two weeks prior to the end of the fourth rotation and discuss the possibility of joining that lab for their thesis studies. Following these meetings, students will provide the Academic Program Manager, with the names of possible thesis advisers. Names must be submitted one week prior to the end of the fourth rotation. Students are required to meet and discuss thesis lab choices with the Program Director, Dr. Matunis, during the last week of the final rotation. Thesis lab placements will then be formalized between the student and adviser following this discussion. Every effort will be made to give students their first choice of thesis research lab.

Thesis Proposal/Oral Exam

Students must successfully pass one program examination (step 1, by October 15) and one oral practice examination (step 2, by November 15) before they are permitted to take the university Preliminary Oral Exam (step 3, by April 30) (see Table 2 (p. 191) for a summary of completion dates). The first of these steps, the program examination, is a two-part written/oral exam that must be based on the student's doctoral thesis project. Students are asked to write a six-page research proposal that follows the format of a NIH F31 fellowship. This proposal shall be written with close guidance from the thesis adviser during the summer/early fall of the second year. The completed proposal will be submitted by the first week of October of the second year to a committee consisting of the student's thesis adviser and two other JHU faculty members that may be within or outside of BMB. The student must present the research proposal and defend the rationale and experimental plan during an oral exam that must take place before October 15th of the second year. The committee will provide instructive feedback and recommended changes for a revised written proposal that the student submits by November 15th. Once the revised proposal is approved by the committee, the student has passed the departmental written and oral exam requirement. Full details of the examination process are provided in Appendix II (p. 192). Additionally, detailed instructions on how to develop and write the research proposal shall be disseminated as part of the Current Research Literature class taken in the 4th quarter.

Preparation for Preliminary Oral Exam

Students are required to successfully pass a university administered Preliminary Oral Exam (described below) to be officially accepted as candidates for the Ph.D. degree. In preparation for this exam, students are required to schedule an oral examination practice session within 4 months of completing their Thesis Proposal/ Oral exam (by March 31). This practice session should be held no later than 1 month prior to the Preliminary Oral Examination. The purpose of the practice session is to help assess exam readiness. The student will select a committee consisting of their Ph.D. thesis adviser and five peers. These five peers should be pre-doctoral students who have already taken and passed their oral exam, and/or postdoctoral students. No more than two of the peers can be from the student's own laboratory. Scientific diversity is highly encouraged. The role of the adviser is to ensure that the practice session emulates the official Preliminary Oral Examination mandated by the university, and to provide feedback and guidance to the student for the final stages of their preparation. A form (available from the BMB academic office) attesting that the practice session has taken place must be signed and dated by the members of the committee, including the student's adviser, and filed with the Academic Office. The student is allowed to finalize the faculty panel and schedule the Preliminary Oral Examination prior to the oral examination practice session. However, the practice session must be completed before the official examination.

Preliminary Oral Examination

The Preliminary Oral Examination is a university-administered examination that is designed to test the student's breadth and depth of knowledge in their area of study. Students must pass this examination to officially become candidates for the Ph.D. degree. The examining committee must:

1. consist of at least five voting members, no more than three of whom may be from the department sponsoring the candidate; **the student's thesis adviser will not be a member of the examining committee**;
2. be comprised of duly appointed faculty members of Johns Hopkins University departments and must hold, at the time of selection, an appointment at the rank of Assistant Professor, Assistant Research Professor or Assistant Public Health Professor or higher;
3. be comprised of three departments of Johns Hopkins University, two being from the Bloomberg School of Public Health; and
4. include a faculty member outside of BMB who has a rank of Associate or Full Professor, Research Professor or Public Health Professor; there must be at least one member who has neither a primary nor joint appointment in BMB.

The Chair of the committee is appointed by the Senior Associate Dean for Graduate Affairs. The senior faculty member outside of the student's department will normally serve as Chair and must hold the rank of Associate or Full Professor. One adjunct faculty member or Scientist track faculty member may serve on the Committee but may not serve as Chair. Once a Ph.D. candidate's Examination Committee has been approved by the Office of Academic Affairs, substitution of Committee members may not be made without prior approval of that office. Students are encouraged to select their committee members and two alternates in consultation with their thesis adviser. Forms must be completed at least one month prior to the exam and submitted to the office of Academic Affairs.

Students then meet with their committee to take the oral exam. During the oral examination, each faculty member of the committee is given an opportunity to ask questions designed to probe the student's understanding of the basic principles of biochemistry, molecular and cellular biology and ability to conduct hypothesis driven research. The examination has three possible outcomes: unconditional pass; conditional pass; or failure. In cases of conditional pass, students may be required to take additional coursework, or write an essay to remove the condition. If the student fails the Preliminary Oral Examination and is permitted a re-examination, the student must be re-examined within one year. **The Preliminary Oral Examination should be completed by April 30th of the second academic year.**

Thesis Advisory Committee

Upon successfully completing the Preliminary Oral Examination, a Thesis Advisory Committee is formed to monitor the student's progress on their thesis research. The committee consists of at least three faculty members (typically four) including the student's thesis adviser. Members of the committee may have primary appointments in BMB or in other departments of the university. Students are encouraged to select members of their committee in consultation with their thesis adviser. In addition to regularly scheduled meetings with their Thesis Advisory Committees, students are also encouraged to consult regularly with their committee members for advice, as necessary.

Students are required to meet with their Thesis Advisory Committees at least once each year, beginning from the time that they select a thesis lab in April. Thesis committee meetings will be conducted using the following format:

1. Students will designate one committee member as the chair – this should be the most senior BMB faculty member on the committee,

excluding the thesis adviser. If the thesis adviser is the only BMB faculty member on the committee, the chair should be the most senior faculty member from outside of the department.

2. The student "Annual Thesis Committee Meeting Form" (Appendix III) will be completed and mailed to all committee members at least one day in advance of the meeting.
3. The meeting begins with the student stepping out of the room, allowing for a private discussion between committee members.
4. The meeting proceeds with the student presenting research progress and any other relevant information related to meeting individual development plans and progress toward graduation.
5. Following completion of the student presentation, the committee chair will lead a discussion that summarizes the committee's views on student progress and recommendations for continued success and timely completion. Specific points in the committee's "Annual Thesis Committee Meeting Form" (Appendix IV) will also be discussed and the form will be completed by the chair and signed by all committee members before the end of the meeting. The student will retain a copy of the form and return a copy to the Program Academic Manager.
6. The meeting concludes with the thesis adviser stepping out the room, allowing for a private discussion between the student and all other committee members.

Individual Development Plans

After joining a thesis research laboratory, all pre-doctoral trainees and their preceptors are required to participate in an Individual Development Plan (IDP) process on an annual basis. The form being used for this purpose is provided in Appendix V. As part of this process, trainees and their mentor discuss the following elements during a confidential, face-to-face meeting set up specifically for the IDP purpose:

1. career goals;
2. assessment of relevant skills, ranging from proficiency at the lab bench to knowledge of the literature, oral presentation, writing, leadership, collegiality, etc., as they relate to these goals;
3. list the achievements of the last year;
4. set specific goals relating to productivity, training, and professional development for the upcoming year; and
5. discuss time to graduation and preparation for post-graduation professional life. Completed IDP forms are to be sent to the IDP Program Director, Dr. Valeria Culotta.

Thesis Preparation

Once a target date for completion of the thesis project has been set by the Thesis Advisory Committee, the student should begin preparing to write their thesis. The thesis must consist of novel and publishable research findings, and may contain material that has already been published by the student during the course of the thesis project.

The thesis will be evaluated by a Thesis Committee composed of four readers that include the student's thesis adviser. Two committee members must have a primary faculty appointment in a department other than BMB. The readers should have a rank of Assistant Professor or higher. A minimum of three departments of Johns Hopkins University, two from the School of Public Health, must be represented. Two readers must be primarily affiliated with BMB. At least one member must have neither a primary nor joint appointment in BMB. The committee may be increased to five members, provided that the above conditions are satisfied for four readers.

The committee and the required Final Oral Examination Form must be submitted to the BMB Academic Office at least one month prior to the date of the thesis defense. The thesis, accompanied by a letter from the student's adviser signifying that the thesis is ready for distribution to the committee, should be submitted to the Thesis Committee at least two weeks prior to the thesis defense.

Thesis Defense

The thesis defense consists of a seminar in which the student presents some or all of the findings of their thesis project. This seminar, which is sponsored by BMB, is open to the public. Immediately after the seminar, the student will meet privately with the Thesis Committee. The Committee will ask questions about the thesis and will inform the student if the thesis is satisfactory. Following any necessary revisions, the student will submit the final thesis to the School of Public Health Registrar. Thesis fees are the responsibility of the student, unless their mentor agrees to pay them.

Table 2. Summary of Program Milestones and Completion Dates

PhD Program Milestones	Completion Dates
Laboratory rotations (year one)	(Specific dates vary)
	1st: September/October
	2nd: November/December
	3rd: January/February
	4th: March/April
Thesis lab selection (year one)	April 15
Thesis proposal / oral exam (year two)	Oral defense: October 15
	Revised proposal: November 15
Departmental practice POE (year two)	Before March 31
University POE (year two)	Before April 30 (within one month of practice POE)
Thesis Advisory Committee Meetings (years three to completion)	Annual
Individual Development Plans (year two to completion)	Annual
Thesis defense	To be determined / Maximum of 7 years

Laboratory Notebooks

While different laboratories may use different kinds of physical (or online) notebooks, all share certain fundamentals. A proper laboratory notebook is an accurate, contemporaneous, permanent, and legible record of the student's deeds and thoughts regarding their research project. This notebook is the property of the laboratory and should not leave the laboratory, though students are free to make and take copies. The student's notebook will be consulted by others to establish what the student did, and to find out how they did it, often long after the student has gone. So, if a student has not developed good record-keeping habits, this is an excellent time to begin. Consult the faculty preceptors for guidance and please refer to the Bloomberg School of Public Health Student Handbook (publichealth.jhu.edu/offices-and-services/office-of-student-affairs) for Policy and Procedures on the subject of Academic Ethics.

Appendix II

Thesis Research Proposal / Oral Exam

In completion of the departmental written and oral exam requirements

All students that matriculated as of fall 2014 must prepare a research proposal that meets the requirements of the "Research Training Plan" section of an NIH F31 grant application. Specific guidelines for preparing this proposal, as detailed in the F31 grant application guide, are attached below. Other specifics and a timeline for completing the proposal and oral exam are as follows:

May – September, Year 1: Student works full-time in their chosen thesis lab to generate the preliminary data and ideas for developing a research proposal. The mentor must work closely with the student in defining the research project to pursue. The student and mentor choose a committee of two additional faculty that will act as additional consultants for the student, reviewers of the written proposal and serve as members of an oral examination committee. These faculty members may come from within the BMB department or from outside the department should they provide special expertise in the research area and in writing fellowships. Over the summer the student should schedule the oral exam component of the proposal that should occur within the first two weeks of October (see below).

September – October, Year 2: The student writes the first draft of the proposal. The mentor is expected to play an active role in proposal development and coaching the student to write in a clear, concise, study section-friendly manner. The adviser should not write the proposal but provide guidance and feedback through several drafts. Consultation with other committee members is also encouraged.

October 1st-15th, Year 2: The student submits their proposal to the committee at least one week in advance of the oral exam which must be scheduled no later than October 15th. For this oral exam, the student presents in a chalk talk format, the rationale and experimental sections of the research plan. The committee will test the student's ability to defend the proposed experiments – is the rationale sufficiently compelling to support the experiments proposed? The committee will also provide guidance as how to re-structure the proposal as needed and improve the research plan.

October 15th – November 15th, Year 2: The student prepares a revised version of the proposal that addresses concerns and incorporates suggestions by the committee. The adviser should work closely with the student in assembling this revised application. The revised application must be submitted to the committee no later than November 15th for review. Following approval of this revised application, and satisfactorily completing the oral exam component, the student has officially passed the departmental written and oral exam requirement.

Additional comments: This exercise is designed to help students prepare quality research proposals that can be submitted as fellowship applications for funding considerations. It is expected that a majority (but not all) students will choose to submit their proposals to the NIH and the exam requirement will be completed in time for the December 8th F31 deadline. Other students may choose alternative funding sources, but regardless, the exam requirements remain the same: A minimum 6-page research plan with separate Specific Aims page as outlined below. Students seeking non-NIH funding sources should be able to re-format the proposal as needed to meet the specific agency requirements.

The reviewing committee should be considered as a continual resource for the student. Prior to submitting the fellowship for funding considerations, the student is recommended to solicit feedback from their committee on all aspects of the fellowship application including pages that address selection of sponsor and institution, description of research experience, etc.

Appendix VI

Timeline Summary

Time	Description
May – September, yr 1	Define specific aims of the proposal, identify two committee members, generate preliminary data
September – October, yr 2	Prepare first written draft of the proposal
October 1st-15th, yr 2	Submit the proposal to examining committee, schedule and complete oral exam
October 15th – November 15th	Submit revised proposal for review by the committee

Guidelines for Preparing the Proposal (Verbiage Taken Directly from NIH Guidelines)

The Research Training Plan should include sufficient information needed for evaluation of the project, independent of any other document (e.g., previous application). Be specific and informative, and avoid redundancies. This section should be well-formulated and presented in sufficient detail that it can be evaluated for both its research training potential and scientific merit. It is important that it be developed in collaboration with your sponsor, but it should be written by you, the fellowship applicant.

The following page limits apply (All page limits include all tables, graphs, figures, diagrams and charts).

- Specific Aims – limited to one page.
- Research Strategy – limited to six pages (does **not** include the Bibliography and References Cited section).

Be succinct and remember that there is no requirement to use all six pages allotted to the Research Strategy. Note that the Research Training Plan may include graphic images of gels, micrographs, photographs, etc.; however these images may not be included in an Appendix.

Note: Begin each text section of the Research Training Plan with a section header (e.g., Specific Aims, Research Strategy).

Specific Aims are limited to one page.

State concisely the goals of the proposed research and summarize the expected outcome(s), including the impact that the results of the proposed research will exert on the research field(s) involved. List succinctly the specific objectives of the research proposed, e.g., to test a stated hypothesis, create a novel design, solve a specific problem, challenge an existing paradigm or clinical practice, address a critical barrier to progress in the field, or develop new technology.

Research Strategy is limited to six pages.

Organize the Research Strategy in the specified order using the instructions provided below. Start each section with the appropriate section heading — Significance, Innovation, Approach. Cite published experimental details in the Research Strategy section and provide the full reference in the Bibliography and References Cited section (there is not page limit to the Bibliography and References Cited section).

Significance

- Explain the importance of the problem or critical barrier to progress in the field that the proposed project addresses.
- Explain how the proposed project will improve scientific knowledge, technical capability, and/or clinical practice in one or more broad fields.
- Describe how the concepts, methods, technologies, treatments, services, or preventative interventions that drive this field will be changed if the proposed aims are achieved.

Innovation

Fellowship applications should not include an Innovation section unless specified in the FOA.

Approach

- Describe the overall strategy, methodology, and analyses to be used to accomplish the specific aims of the project. Unless addressed separately in Item 14 (Resource Sharing Plan), include how the data will be collected, analyzed, and interpreted as well as any resource sharing plans as appropriate.
- Discuss potential problems, alternative strategies, and benchmarks for success anticipated to achieve the aims.
- If the project is in the early stages of development, describe any strategy to establish feasibility, and address the management of any high risk aspects of the proposed work.
- Point out any procedures, situations, or materials that may be hazardous to personnel and precautions to be exercised. A full discussion on the use of select agents should appear in Item 15, below.
- If research on Human Embryonic Stem Cells (hESCs) is proposed but an approved cell line from the NIH hESC Registry cannot be identified, provide a strong justification for why an appropriate cell line cannot be chosen from the Registry at this time.

If an applicant has multiple Specific Aims, then the applicant may address Significance, Innovation and Approach for each Specific Aim individually, or may address Significance, Innovation and Approach for all of the Specific Aims collectively.

As applicable, also include the following information as part of the Research Strategy, keeping within the three sections listed above: Significance, Innovation, and Approach.

Preliminary Studies for New Applications.

For new applications, include information on preliminary studies, if any. Discuss the applicant's preliminary studies, data and/or experience pertinent to this application. When applicable, provide a succinct account of published and unpublished results, indicating progress toward their achievement.

Course Requirement Specific to the NCI-funded Training Grant

Cancer Training Grant: Training in Areas Fundamental to Cancer Research

- Fundamentals of Cancer (ME.510.706 Fundamentals of Cancer: Cause to Cure – 1st and 2nd terms)

See Program Academic Coordinator regarding course availability or alternatives

RESPONSIBLE CONDUCT OF RESEARCH

All research students must complete courses in the responsible conduct of research before graduation. Currently, the online course PH.550.860 Academic & Research Ethics at BSPH must be completed by all students during the first term of matriculation. Students must also take the course PH.550.600 Living Science Ethics - Responsible Conduct of Research, in the 1st term of their second year. Students should refer to the Bloomberg School of Public Health Student Handbook (publichealth.jhu.edu/offices-and-services/office-of-student-affairs (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/))for Policy and Procedures on the subject of Academic Ethics.

Satisfactory Academic Progress and Laboratory Rotation Performance

1) Students must receive a grade of B or better in each of the eight core (ME) courses listed in Table 1 and in Cancer Biology. Accumulation of two or more C's or lower in these courses is grounds for dismissal from the program. If a student receives a C or lower grade in any of these nine courses, they must repeat the course and receive a B or better grade the second time.

2) The School of Public Health requires Ph.D. candidates to achieve a final GPA of 3.0 or higher for graduation.

3) Students must also receive satisfactory evaluations for each of the four laboratory rotations. Receiving two or more "poor" evaluations is grounds for dismissal from the program. Academic progress and laboratory rotation performances will be evaluated by the Program Steering Committee in early April, prior to the completion of the 4th rotation. Students who have met both academic and laboratory rotation standards will be notified and permitted to select a laboratory for thesis research. Students who have not met these standards may be dismissed from the program.

The goals of the Department of Biochemistry and Molecular Biology (BMB) are to increase current knowledge of the biochemical and molecular basis of normal and abnormal cellular processes relevant to public health and medicine, and to train highly qualified scientists who, through research, teaching, and service will continue to provide new insights into the biochemical, molecular, and biophysical underpinnings of biomedical issues that have an impact on the health of the public.

Research activities in BMB span a broad range of topics including DNA replication and repair pathways (genome integrity), cellular stress responses, reproductive biology, stem cells, cell differentiation, aging, cancer, and chronic diseases. The department is also home to a structural biology technological platform with ongoing efforts focusing on cell signaling and genome engineering and integrity.

Non-Degree Training

The postdoctoral fellowship program provides concentrated training with individual faculty from the Department of Biochemistry and Molecular Biology. BMB offers Postdoctoral opportunities in research areas including cellular and molecular biology, biochemistry, molecular genetics, structural biology, developmental and reproductive biology, enzymology, molecular biophysics, molecular endocrinology, chemical biology, epigenetics, post-translational modifications, and inflammation and stress response biology.

Furthermore, BMB hosts a Postdoctoral Training Program in Cancer Research in collaboration with members of the Sidney Kimmel Comprehensive Cancer Center. This program provides training in basic biochemical, biophysical and molecular biological approaches that can be applied to critical problems in cancer biology. In addition to carrying out a traditional laboratory-based project, trainees will receive training and participate in activities that provide an introduction to current topics in the clinical aspects of the cancer problem and their relationships to public health. This is a two-year training program intended for individuals in the first two years of their post-graduate careers. Qualified applicants will select a laboratory in which to carry out their research project from among the preceptors of the training program. Trainees in this program will have the opportunity to audit courses specifically related to current trends in cancer research including "Fundamentals of Cancer-Cause to Cure", a course offered by the Sidney Kimmel Comprehensive Cancer Center.

In addition to their laboratory research and didactic training opportunities, trainees will also participate in the following learning activities:

Cancer Biology Seminar Series-seminars covering topics in cancer research will be presented by invited researchers throughout the academic year as part of the weekly BMB seminar series.

BMB Journal Club-this journal club meets weekly throughout the academic year to discuss basic research papers relevant to topics in cancer research.

Oncology Ground Rounds-trainees have the opportunity to attend four Oncology Grand Rounds each year in the Sidney Kimmel Comprehensive Cancer Center. These consist of case presentations followed by discussion of relevant research or clinical issues.

Cancer Center Fellow Research Day-trainees can attend this one-day meeting, which is sponsored by the Sidney Kimmel Comprehensive Cancer Center. This event provides an opportunity for trainees to present a poster about their research project.

Department of Biostatistics

About

Johns Hopkins Bloomberg School of Public Health's Department of Biostatistics (https://www.jhsph.edu/departments/biostatistics/) is the oldest department of its kind in the world and has long been considered as one of the best. With a rich history (https://www.jhsph.edu/departments/biostatistics/about-us/history/) of outstanding contributions in both research and education, we are dedicated to:

- advancing statistical and data science
- making discoveries to improve health by partnering with our colleagues in other science domains
- providing an innovative and outstanding biostatistics education for those seeking to be conversant with concepts as well as for users and experts in the application and development of new methodology

The discipline of biostatistics creates and applies methods for quantitative research in the health sciences. Our faculty conducts research across the spectrum of statistical science, from foundations of inference to the discovery of new methodology for health applications, leadership in data-driven health discovery, and creation of data science pipelines and tools. Our designs and analytic methods enable health scientists and professionals working in academia, government, industry, research and elsewhere to efficiently acquire knowledge and draw valid conclusions from their ever-expanding sources of information.

Our department offers an intellectually vibrant and interpersonally collegial environment that's conducive to learning and discovery.

Programs

Our department is committed to a safe and welcoming environment for all members of our community and, indeed, for everyone with whom we interact. Click here (https://www.jhsph.edu/departments/biostatistics/about-us/Department%20of%20Biostatistics%20Code%20of%20Conduct.pdf) to view our policy on harassment and discrimination.

Students and postdoctoral fellows in the Bloomberg School of Public Health are expected to abide by the highest levels of academic and research integrity (click here (p. 634) to view the Johns Hopkins Academic Ethics Code).

All students and postdoctoral fellows must complete an online module (https://www.jhsph.edu/offices-and-services/office-of-academic-affairs/academic-integrity/academic-ethics.html) to familiarize themselves with this code.

As stated in the Academic Ethics Code, "violations of academic integrity include, but are not limited to: cheating; plagiarism; knowingly furnishing false information to any agent of the University for inclusion in the academic record; violation of the rights and welfare of animal or human subjects in research; and misconduct as a member of either School or University committees or recognized groups or organizations."

For a Biostatistics student or postdoctoral fellow, abiding by the Academic Ethics code includes:

- Completing work on one's own when an individual assignment or examination is given in a course.
- Providing proper attribution to others' work by providing citations with quotations and giving proper references for all data analysis projects, research proposals and dissertations and theses.

Biostatistics, MHS

Overview

The Johns Hopkins Department of Biostatistics MHS program is intended for outstanding individuals with prior professional experience or a professional degree (ie, PhD or MD) seeking a one-year intensive course of study in biostatistical theory and methods. It is also open to students concurrently enrolled in a doctoral program at the Bloomberg School of Public Health. MHS graduates:

- Design research studies of human health and disease.
- Design and implement data management systems, pipelines and tools.

- Design and implement tabular and graphical displays of quantitative information.
- Draw inferences from quantitative data.
- Use statistical reasoning and theory to deal effectively with non-standard statistical problems.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The MHS program involves one year of coursework (64 units) in biostatistics and other courses. Students are required to take a year-end comprehensive written examination. Students must demonstrate competence in material covered by the courses:

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Code	Title	Credits
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4
PH.140.646	Essentials of Probability and Statistical Inference I: Probability	4
PH.140.647	Essentials of Probability and Statistical Inference II: Statistical Inference	4
PH.140.648	Essentials of Probability and Statistical Inference III: Theory of Modern Statistical Methods	4
PH.140.649	Essentials of Probability and Statistical Inference IV	4
PH.340.721	Epidemiologic Inference in Public Health I	5
Total Credits		**37**

A culminating data analysis project, documenting the statistical ideas and skills developed in the coursework, is also required.

Concurrent School-Wide Master of Health Science Program in Biostatistics

The object of this program is to provide doctoral students in other departments with the opportunity to pursue an MHS program in Biostatistics concurrently with their doctoral program. The administrative requirements and certifications by the faculty as set forth in the existing Policy and Procedure Memoranda for the respective doctoral degrees apply to the doctoral degree requirements of the concurrent School-wide Doctoral/Master of Health Science program in Biostatistics.

Students must have been accepted into one of the doctoral programs at Johns Hopkins University. With the primary department's approval, the student may apply to the Master of Health Science program in Biostatistics. Students already in residence may also apply to the program. Specific details about sequencing of courses, etc., will be arranged in conjunction with the doctoral program involved. Core course requirements consist of successful (graded) completion of the 651 and 646 sequences; these classes should be taken over the course of the student's first two or three years in residence in the doctoral program. Three additional (graded) statistical electives are required (introductory statistics courses excluded; other quantitative courses may serve as substitutes upon approval of the graduate program). Sixty-four total credits of coursework in Biostatistics or other areas are required.

Additionally, students must attend Biostatistics departmental seminars (https://www.jhsph.edu/departments/biostatistics/about-us/news-and-seminars/seminars/), take a written comprehensive examination, and complete a culminating data analysis project. Upon satisfactory completion of these requirements, the student is then eligible for award of the Master of Health Science in Biostatistics degree.

Before they will be awarded the MHS degree, students whose primary department is NOT in the Bloomberg School of Public Health will also need to:

1. register and pay tuition for two credits of special studies research (PH.140.840 Special Studies and Research Biostatistics) as a School of Public Health student during a summer term;
2. complete a course on the responsible conduct of research (ie, PH.550.860 Academic & Research Ethics at BSPH or PH.306.665 Research Ethics and integrity: U.S. and International Issues); and
3. complete all of the following half-credit, online courses: 552.601 (Foundational Principles of Public Health); 552.603 (Role of Qualitative Methods and Science in Describing and Assessing a Population's Health); 552.607 (Essentials of Environmental Health); 552.608 (Biologic, Genetic and Infectious Bases of Human Disease); 552.609 (Psychological and Behavioral Factors That Affect a Population's Health); 552.610 (Social Determinants of Health); 552.611 (Globalization and Population Health); and 552.612 (Essentials of One Health).

There is a brief (one-page) application that interested students will need to fill out and have approved by their advisor and department chair. Prospective students should wait to apply until they have completed one term of either the 651 or 646 sequences, but they must apply before they have completed one-half of the required coursework.

For further information about the concurrent school-wide Master of Health Science Program in Biostatistics, or to request an application, please contact Mary Joy Argo (margo@jhsph.edu), academic administrator for the Department of Biostatistics.

The department may accept a few students who do not seek degrees (special students and postdoctoral fellows) for periods of at least one academic year. This provision is intended for mature students who wish to undertake specialized study or research.

The Department offers a weekly seminar (https://www.jhsph.edu/departments/biostatistics/about-us/news-and-seminars/seminars/) program featuring recent work by outstanding statistical scientists from around the world. Attendance is required for all graduate students. The seminar on the first Wednesday of each month is the "Biostatistics Grand Rounds," which features statistical analyses addressing important public health questions.

Sample Curriculum

The curriculum is essentially the same as that for ScM candidates, with the exception that MHS students do not write a thesis but instead, prepare a culminating data analysis project.

During their time in the program, MHS students may choose from a wide range of elective courses to meet their educational needs.

Code	Title	Credits
Students specifically interested in clinical trials may want to consider the courses:		
PH.140.642	Design of Clinical Experiments	3
PH.340.645	Introduction to Clinical Trials	3
Students specifically interested in learning the SAS statistical package may want to consider the course:		
PH.140.632	Introduction to the SAS Statistical Package	3

Click here to search for course schedules and descriptions (https://www.jhsph.edu/courses/).

Master's Student Academic Standing Guide

This document covers policies regarding academic performance of MHS students that are specific to the Department of Biostatistics. Students also must satisfy the academic standing requirements of the University and Bloomberg School of Public Health. Master's students are expected to maintain a grade point average of no less than 2.75 throughout their studies, to meet the minimum grade threshold of a C in required courses, and to complete academic requirements within established deadlines.

Departmental Master's Comprehensive Exam

The Departmental master's exam is taken at the end of the first year of study (typically in early June). The Departmental master's exam is administered only once a year.

The grading of the Departmental exam is as follows. Passing scores are determined by exam writers after grading with examiners blinded from student names. Students who pass all sections of the exam pass the exam. Students failing one or more sections will be discussed by the faculty as a whole. This discussion will include exam and course performance in the first year. Possible resolutions include: declaring the student as passing the exam, declaring the student as having failed the exam, take-home remediation of sections of the exam or a full retake (only available if it is the student's first attempt at the exam).

In the event of a retake of the exam, students are allowed one retake. Student retakes typically occur in the following year, with exceptions occurring when mitigating circumstances are present, such as a leave of absence. In the event of a failure in the retake, the student will be asked to leave the MHS program.

Relevant to stand-alone MHS degree candidates: Students who fail the exam are not eligible to receive the 75% tuition reduction for their second year of study. Failing the exam typically results in at least one extra academic year without the tuition reduction.

Often students who will not receive the 75% tuition reduction in their second year consider switching to part time status. Such a switch must be discussed and approved with the graduate committee. Further, it should be noted that part-time status is often not an option for foreign students due to visa issues and residency requirements.

Upon successful completion of the Master of Health Science in Biostatistics, students will have mastered the following competencies:

- Design research studies of human health and disease.
- Design and implement data management systems, pipelines and tools.
- Design and implement tabular and graphical displays of quantitative information.
- Draw inferences from quantitative data.
- Use statistical reasoning and theory to deal effectively with non-standard statistical problems.

Biostatistics, ScM

The Johns Hopkins Department of Biostatistics ScM program is intended for individuals who have demonstrated excellence at the undergraduate level in quantitative or biological sciences and prepares them for a career as a professional statistician. Typically, ScM graduates assume positions in research or professional settings as scientific project coordinators and data analysts where they:

- Design research studies of human health and disease.
- Design and implement data management systems, pipelines and tools.
- Design and implement tabular and graphical displays of quantitative information.
- Draw inferences from quantitative data.
- Use statistical reasoning and theory to deal effectively with non-standard statistical problems.
- Perform major statistical analyses to address public health or statistical research questions.
- Assist statistical researchers in the conduct of original, methodologic research.

More detailed information is available below, in the Department of Biostatistics Student Handbook, and in the School's Policies and Procedures Memorandum for the ScM degree.

Program Overview

The ScM program typically takes two years, with the first year spent in didactic coursework and the second year spent working closely with a departmental faculty member in a master's thesis project and completing elective courses that are in-line with the individual student's interests.

Program Requirements

Student Evaluations

The Department is committed to providing every opportunity for its ScM students to successfully complete this academic program. To support students in progressing toward the degree, a comprehensive written examination is given at the end of the first year.

Seminars

The Department offers a weekly seminar program (https://www.jhsph.edu/departments/biostatistics/about-us/news-and-seminars/seminars/) featuring recent work by outstanding statistical scientists from around the world. Attendance is required for all graduate students. One seminar per month may be designated to be part of the Biostatistics "Grand Rounds" series, which features statistical analyses addressing important public health questions.

In addition, first year graduate students are required to complete the Current Topics in Biostatistics Research course, where faculty, postdocs and senior students from the Department present their research, with a focus on the public health and scientific questions driving the work, why the research makes a difference for the subject area and how to translate the research into practice.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Recommended Curriculum

The second year curriculum is considerably less course-intensive than the first, as thesis development becomes a priority during this year. However, we encourage students to avail themselves of the array of biostatistical electives that are available[8] and to be mindful of completing the School's extra-departmental course requirements and new requirements for students who **have not** already taken 3 credits of Epidemiology coursework and PH.550.865 Public Health Perspectives on Research[9].

Course	Title	Credits
First Year		
August		
PH.260.600	Introduction to the Biomedical Sciences [1]	4
	Credits	**4**
First Term		
PH.140.651	Methods in Biostatistics I [2]	4
PH.140.646	Essentials of Probability and Statistical Inference I: Probability [2]	4
PH.140.776	Statistical Computing [3]	3
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.550.860	Academic & Research Ethics at BSPH [4]	0
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to at least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**18-39**
Second Term		
PH.140.652	Methods in Biostatistics II [2]	4
PH.140.647	Essentials of Probability and Statistical Inference II: Statistical Inference [2]	4
PH.550.865	Public Health Perspectives on Research [5]	2
PH.140.630	Introduction to Data Management	3
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to at least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**15-36**
Third Term		
PH.140.653	Methods in Biostatistics III [2]	4
PH.140.648	Essentials of Probability and Statistical Inference III: Theory of Modern Statistical Methods [2]	4
PH.140.631	The SAS Statistical Package: A Survey for Statisticians	3
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to at least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**13-34**
Fourth Term		
PH.140.654	Methods in Biostatistics IV [2]	4
PH.140.649	Essentials of Probability and Statistical Inference IV [2]	4
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to at least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**10-31**
Second Year		
First Term		
PH.140.776	Statistical Computing (if not taken in first year)	3
PH.140.711	Advanced Data Science I [6]	3
PH.550.860	Academic & Research Ethics at BSPH (if not taken in first year) [7]	0
Electives [8]		
Epidemiology Course (at least 3 credits), if applicable [9]		3
"Cells to Society" modules, if applicable [9]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits tota)	
	Credits	**10-31**
Second Term		
PH.140.712	Advanced Data Science II [6]	3
PH.140.643	Practice of Statistical Consulting [6]	3
Epidemiology Course (at least 3 credits), if applicable [9]		3
"Cells to Society" modules, if applicable [9]		
Electives [8]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits tota)	
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits tota)	
	Credits	**10-31**
Third Term		
Electives [8]		
Epidemiology Courses (at least 3 credits), if applicable [9]		3
"Cells to Society" modules, if applicable [9]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits total)	

PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
	Credits	**4-25**
Fourth Term		
Electives [8]		
Epidemiology Courses (at least 3 credits), if applicable [9]		3
"Cells to Society" modules, if applicable [9]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
	Credits	**4-25**
	Total Credits	**88-256**

1. The credits of this course count toward the first term.
2. The sequences *Methods in Biostatistics I – IV* (140.651-654) and *Essentials of Probability and Statistical Inference I – IV* (140.646- 649) are required course sequences for the 1st year. Per school policy, for students to remain in satisfactory academic standing students must meet the minimum grade threshold of a C in required courses.
3. Only recommended for those with some prior programming experience with a language such as C/C++, perl, java, python etc. Please consult the course instructor.
4. Although this course is offered in subsequent terms, incoming students are required to take this during their first term and will not be able to register for 2nd term until they have done so.
5. Students who have earned an MPH from a domestic university within the last 10 years may waive this requirement.
6. The courses Advanced Data Science (140.711-712) and PH.140.643 Practice of Statistical Consulting are required course sequences for the 2nd year. Per school policy, for students to remain in satisfactory academic standing students must meet the minimum grade threshold of a C in required courses.
7. Although this course is offered in subsequent terms, continuing students who have not previously taken the course are required to take this during 1st term of 2019-20 and will not be able to register for 2nd term until they have done so.
8. Note that PH.140.641 Survival Analysis and PH.140.741 Advanced Survival Analysis will be taught in terms 1 and 2, PH.140.630 Introduction to Data Management in term 2, PH.140.631 The SAS Statistical Package: A Survey for Statisticians in term 3, PH.140.642 Design of Clinical Experiments in term 3, and PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I in term 3. Please consult the SPH course search engine (http://www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) to identify additional Biostatistics electives that are available.
9. Students who **have not** already taken 3 credits of Epidemiology coursework and PH.550.865 Public Health Perspectives on Research must complete at least 3 credits of Epidemiology coursework, the online module PH.552.608 Biologic, Genetic and Infectious Bases of Human Disease, and any 3 of the following “Cells to Society” online modules (PH.552.601 Foundational Principles of Public Health, PH.552.603 The Role of Qualitative Methods and Science in Describing and Assessing a Population’s Health, PH.552.607 Essentials of Environmental Health, PH.552.609 Psychological and Behavioral Factors That Affect A Population’s Health, PH.552.610 The Social Determinants of Health, PH.552.611 Globalization and Population Health, PH.552.612 Essentials of One Health).

Additional Notes and Requirements

First Year

- Students must enroll in a minimum of 16 credits per term. The 16 credits can be reached by enrolling for special studies credit (PH.140.840 Special Studies and Research Biostatistics). These special studies must have a clearly defined objective.
- By the end of the first year, students **must** have earned 12 credits in non-Biostatistics courses (of which 6 credits must come from SPH courses). Special studies (800-level) courses in another department do **not** count toward this requirement. The courses Responsible Conduct of Research, Academic and Research Ethics at JHSPH, and Public Health Perspectives on Research do **not** count toward this requirement. Public Health extradepartmental courses (beginning with a “550” course number) do **not** count toward this requirement. Credits earned from the Introduction to Biomedical Sciences course **do** count.
- All students must attend the departmental seminar series.
- There will be a qualifying exam (multi-hour in-class exam followed by a 3-day take-home data analysis project) during the first half of June of the 1st year.
- Please consult our Master’s Student Academic Standing Guide (http://www.biostat.jhsph.edu/academics/program/ScM_MHS_academic_expectations.pdf) for more detailed information about academic requirements and expectations.

Second Year

- Students must enroll for a minimum of 16 credits per term. The 16 credits can be reached by enrolling for special studies credit. These special studies must have a clearly defined objective.
- Students should immediately start the process of identifying a thesis topic/adviser.
- In order for ScM students to graduate from the Bloomberg School of Public Health: Students **must** have earned 12 credits in non-Biostatistics courses (of which 6 credits must come from SPH courses). Special studies (800-level) courses in another department do **not** count toward this requirement. The courses PH.550.860 Academic & Research Ethics at BSPH and PH.552.602 The Role of Quantitative Methods in Public Health do **not** count toward this requirement.
- Please consult our Master’s Student Academic Standing Guide for more detailed information about academic
- requirements and expectations.
- Click here (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/Documents/DueDatesScM%20MBe%20and%202022_23.pdf) for a timetable for completion of ScM requirements during the 2022-23 academic year.

Electives

During their time in the program, ScM students may choose from a wide range of elective courses to meet their educational needs.

Code	Title	Credits
Students specifically interested in clinical trials may want to consider the courses:		
PH.140.642	Design of Clinical Experiments	3
PH.340.645	Introduction to Clinical Trials	3

Students specifically interested in learning the SAS statistical package may want to consider the course:		
PH.140.632	Introduction to the SAS Statistical Package	3

Click here to search for course times and descriptions (https://www.jhsph.edu/courses/).

Master's Student Academic Standing Guide

This document covers policies regarding academic performance of master's students that are specific to the Department of Biostatistics. Students also must satisfy the academic standing requirements of the University and Bloomberg School of Public Health. Master's students are expected to maintain a grade point average of no less than 2.75 throughout their studies, to meet the minimum grade threshold of a C in required courses, and to complete academic requirements within established deadlines.

Departmental Master's Comprehensive Exam

The Departmental master's exam is taken at the end of the first year of study (typically the third Monday following the end of the 4th term). The Departmental master's exam is administered only once a year.

The grading of the Departmental exam is as follows. Passing scores are determined by exam writers after grading with examiners blinded from student names. Students who pass all sections of the exam pass the exam. Students failing one or more sections will be discussed by the faculty as a whole. This discussion will include exam and course performance in the first year. Possible resolutions include: declaring the student as passing the exam, declaring the student as having failed the exam, take-home remediation of sections of the exam or a full retake (only available if it is the student's first attempt at the exam).

In the event of a retake of the exam, students are allowed one retake. Student retakes typically occur in the following year, with exceptions occurring when mitigating circumstances are present, such as a leave of absence. In the event of a failure in the retake, the student will be asked to leave their master's program or switch to another program (for example from ScM to MHS).

Students who fail the exam are not eligible to receive the 75% tuition reduction for their second year of study. Failing the exam typically results in at least one extra academic year without the tuition reduction.

Often students who will not receive the 75% tuition reduction in their second year consider switching to part time status. Such a switch must be discussed and approved with the graduate committee. Further, it should be noted that part-time status is often not an option for foreign students due to visa issues and residency requirements.

Upon successful completion of the Master of Science in Biostatistics, students will have mastered the following competencies:

- Design research studies of human health and disease.
- Design and implement data management systems, pipelines and tools.
- Design and implement tabular and graphical displays of quantitative information.
- Draw inferences from quantitative data.
- Use statistical reasoning and theory to deal effectively with non-standard statistical problems.
- Perform major statistical analyses to address public health or statistical research questions.
- Assist statistical researchers in the conduct of original, methodologic research.

Biostatistics, PhD

Program Overview

The PhD program of the Johns Hopkins Department of Biostatistics provides training in biostatistical methodology and practice, grounded both in the theory of probability and statistics and in advanced data science. The program is unique in its broad emphasis spanning the foundations of statistical reasoning through data science and in providing rigorous training in both real analysis-based probability and statistics, equivalent to what is provided in most departments of mathematical statistics, and in data science principles and practice.

The Department of Biostatistics PhD program prepares persons who have demonstrated excellence in mathematics, engineering, and the natural or social sciences to become research biostatisticians in academia, industry, or government. PhD graduates:

- Conduct and publish original research on the theory, methodology and practice of biostatistics and data science;
- Translate methodological advances into software and other tools by which to disseminate these into practice;
- Apply innovative theory and methods to the solution of public health problems;
- Serve as expert biostatisticians and data scientists on collaborative teams of investigators addressing key public health questions;
- Teach biostatistics and data science effectively to health professionals and scientists as well as to graduate students in biostatistics.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The core curriculum consists of the following components:

Code	Title	Credits
A one-year sequence on biostatistical methodology		
PH.140.751	Advanced Methods in Biostatistics I	3
PH.140.752	Advanced Methods in Biostatistics II	4
PH.140.753	Advanced Methods in Biostatistics III	4
PH.140.754	Advanced Methods in Biostatistics IV	4
A one-year sequence on probability		
EN.553.720	Probability Theory I	4
PH.140.723	Probability Theory III	3
PH.140.724	Probability Theory IV	3
A one-year sequence on foundations and theory of statistical science		
PH.140.731	Statistical Theory I	4
PH.140.732	Statistical Theory II	4
PH.140.733	Statistical Theory III	4
PH.140.734	Statistical Theory IV	4

A two-term sequence on advanced data science		
PH.140.711	Advanced Data Science I	3
PH.140.712	Advanced Data Science II	3
PH.340.721	Epidemiologic Inference in Public Health I	5

Student Evaluations

The Department is committed to providing every opportunity for its students to successfully complete the academic program of their choice. To support students in progressing toward the degree and to further their educational experience, the Department offers a comprehensive written examination at the end of the first year and a practice oral exam, usually taken no later than six months after the end of the fourth term of the second year. See the Department of Biostatistics Student Handbook for more details about the first-year PhD comprehensive exam.

The main purpose of the practice examination is to evaluate students' ability to communicate statistical ideas and concepts. Students should prepare a paper/proposal related to their potential thesis topic. In addition, the University requires students to successfully complete a preliminary oral examination, typically taken at the beginning of the third year where a thesis proposal is presented and discussed, and an oral thesis defense, where the completed thesis is defended in a public forum.

Research and Teaching Assistantships

The Department of Biostatistics offers teaching and research assistantships to its PhD students on a competitive basis. All PhD applicants (US and international) are ranked based upon their merits; top candidates are offered assistantships which last five years and include full tuition, health insurance, and a living stipend starting at a minimum of $27,000 per year over the five years of study. Students in their second year and following are required to apprentice with faculty as research and teaching assistants for up to 19 hours per week: Students find the teaching and research assistantships to be the most valuable part of their PhD experience. At AY22-23 rates, students who engage in 40 hour per week research assistantships during non-academic periods earn a stipend of approximately $40,000 per year.

Seminars

The Department offers a weekly seminar program (https://www.jhsph.edu/departments/biostatistics/about-us/news-and-seminars/seminars/) featuring recent work by outstanding statistical scientists from around the world. Attendance is required for all graduate students. One seminar per month may be designated to be part of the Biostatistics "Grand Rounds" series, which features statistical analyses addressing important public health questions.

In addition, first year graduate students are required to complete the Current Topics in Biostatistics Research course (140.860 (https://www.jhsph.edu/courses/course/34636/2022/140.860.01/current-topics-in-biostatistics-research/)), where faculty, postdoctoral fellows, and senior students from the Department present their research, with a focus on the public health and scientific questions driving the work, why the research makes a difference for the subject area and how to translate the research into practice.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Recommended Curriculum

First Year PhD Students

Some students, based on a placement assessment and in consultation with their adviser and graduate program committee, may opt to take the first year of the ScM curriculum and defer the PhD curriculum until their second year. Students who opt for this route typically also are required to successfully complete the ScM qualifying exam.

Second Year PhD Students

Students joining the PhD program on and after August 1, 2018, are required to take a minimum of 16 credits of advanced elective courses in Biostatistics or other related disciplines (e.g. computer science). Students joining the PhD program on or before July 31, 2018, are **not** required but are encouraged to take 16 credits in advanced elective courses. Please consult our List of Elective Courses for PhD Students for recommended elective courses.

Curriculum

Course	Title	Credits
First Year		
August		
PH.260.600	Introduction to the Biomedical Sciences [1]	4
	Credits	**4**
First Term		
PH.140.751	Advanced Methods in Biostatistics I [2]	3
EN.553.720	Probability Theory I [2]	4
PH.140.731	Statistical Theory I [2]	4
PH.140.776	Statistical Computing	3
PH.550.860	Academic & Research Ethics at BSPH [3]	0
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to al least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**16-37**
Second Term		
PH.140.752	Advanced Methods in Biostatistics II [2]	4
EN.553.720	Probability Theory I [2]	4
PH.140.732	Statistical Theory II [2]	4
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to al least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**14-35**
Third Term		
PH.140.753	Advanced Methods in Biostatistics III [2]	4
PH.140.723	Probability Theory III [2]	3
PH.140.733	Statistical Theory III [2]	4
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to al least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**13-34**

Fourth Term		
PH.140.754	Advanced Methods in Biostatistics IV [2]	4
PH.140.724	Probability Theory IV [2]	3
PH.140.734	Statistical Theory IV [2]	4
Electives		
PH.140.840	Special Studies and Research Biostatistics (Credits as needed in order to get to al least 16 credits total)	1 - 22
PH.140.860	Current Topics in Biostatistics Research	1
	Credits	**13-34**
Second Year		
First Term		
PH.140.711	Advanced Data Science I [4]	3
PH.140.776	Statistical Computing (if not taken the first year)	3
PH.340.721	Epidemiologic Inference in Public Health I (if not taken the first year)	5
PH.550.600	Living Science Ethics - Responsible Conduct of Research [5]	2
"Cell to Society" modules, if applicable [6]		
PH.550.860	Academic & Research Ethics at BSPH (if not taken in a previous term) [7]	0
Electives		
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits total)	1 - 22
	Credits	**14-35**
Second Term		
PH.140.712	Advanced Data Science II [4]	3
"Cell to Society" modules, if applicable		6
Electives		
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to least 16 credits total)	1 - 22
	Credits	**10-31**
Third Term		
Electives		
"Cell to Society" modules, if applicable [6]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
	Credits	**1-22**
Fourth Term		
Electives		
"Cells to Society" modules, if applicable [6]		
Select one or both of the following:		1-22
PH.140.820	Thesis Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
PH.140.840	Special Studies and Research Biostatistics (credits as needed in order to get to at least 16 credits total)	
	Credits	**1-22**
Third Year		
Coursework in scientific/statistical electives/special studies for a minimum of 16 credits per term		64
	Credits	**64**
Fourth Year		
Coursework in scientific/statistical electives/special studies for a minimum of 16 credits per term		64
	Credits	**64**
	Total Credits	**214-382**

1 The credits of this course count toward the first term.

2 The sequences *Advanced Methods in Biostatistics I – IV* (140.751-754), *Probability Theory I-IV* (553.720-140.723-724), and *Statistical Theory I-IV* (140.731-734) are required course sequences for the 1st year. Per school policy, for students to remain in satisfactory academic standing students must meet the minimum grade threshold of a B in required courses.

3 Although this course is offered in subsequent terms, incoming students are required to take this during their first term and will not be able to register for 2nd term until they have done so.

4 The courses *Advanced Data Science I-II* (140.711-712) are required course sequences for the 2nd year. Per school policy, for students to remain in satisfactory academic standing students must meet the minimum grade threshold of a B in required courses.

5 Students may take the 3rd term course PH.306.665 Research Ethics and integrity: U.S. and International Issues in lieu of PH.550.600 Living Science Ethics - Responsible Conduct of Research.

6 Students who **have not** already taken 3 credits of Epidemiology coursework and PH.550.865 Public Health Perspectives on Research must complete at least 3 credits of Epidemiology coursework, the online module PH.552.608 Biologic, Genetic and Infectious Bases of Human Disease, and any 3 of the following “Cells to Society” online modules (PH.552.601 Foundational Principles of Public Health, PH.552.603 The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health, PH.552.607 Essentials of Environmental Health, PH.552.609 Psychological and Behavioral Factors That Affect A Population's Health, PH.552.610 The Social Determinants of Health, PH.552.611 Globalization and Population Health, PH.552.612 Essentials of One Health).

7 Although this course is offered in subsequent terms, continuing students who have not previously taken the course are required to take this during 1st term of 2021-22 and will not be able to register for 2nd term until they have done so.

Additional Notes

First Year

- Students must enroll in a minimum of 16 credits per term. The 16 credits can be reached by enrolling for special studies credit PH.140.840 Special Studies and Research Biostatistics. These special studies must have a clearly defined objective.
- It is strongly recommended that by the end of the first year, students should have earned 12 credits in non-Biostatistics courses (of which 6 credits must come from SPH courses). Special studies (800-level) courses in another department do **not** count toward this requirement. The courses Responsible Conduct of Research, Academic and

Research Ethics at JHSPH, and Public Health Perspectives on Research do **not** count toward this requirement. Public Health extradepartmental courses (beginning with a “550” course number) do **not** count toward this requirement. Credits earned from the Introduction to Biomedical Sciences course **do** count.
- By no later than the end of the fall term in the fourth year in-program, and in advance of scheduling the final oral exam (i.e. thesis defense), students **must** have earned a minimum of 16 credits from advanced elective courses in Biostatistics or other related disciplines (e.g. computer science). The course sequences *Advanced Methods in Biostatistics I – IV* (140.751-754), *Probability Theory I-IV* (553.720-140.723-724), *Statistical Theory I-IV* (140.731-734), and *Advanced Data Science I-II* (140.711-712) do **not** count toward this requirement. Please consult our List of Elective Courses for PhD Students for recognized elective courses. Students may take courses not included in this list, but they **must** first consult and obtain approval from both their adviser and the graduate program committee.
- All students are expected to obtain training in the statistics/science interface (see attached).
- All students must attend the weekly Biostatistics seminar series.
- There will be a qualifying exam (multiple-hour in-class exam) within the first two weeks of June at the end of the 1st year.
- Please consult our Doctoral Student Academic Standing Guide for more detailed information about academic requirements and expectations.

Second Year

- In order for PhD students to graduate from the Bloomberg School of Public Health: At least 18 credit units of formal coursework are required in courses outside the student’s primary department. At least nine of these credits must be taken in the School of Public Health. Students must also satisfactorily complete the courses PH.550.860 Academic & Research Ethics at BSPH and PH.550.600 Living Science Ethics - Responsible Conduct of Research.
- Students must enroll for a minimum of 16 credits per term. The 16 credits can be reached by enrolling for special studies credit. These special studies must have a clearly defined objective.
- All students are expected to obtain training in the statistics/science interface (see Expectations of Doctoral Students Regarding Training at the Statistics-Science Interface).
- Students are required to attend departmental seminars and participate in a working group.
- During the course of the second year, students should start the process of identifying a thesis topic/adviser with the expectation that they start the thesis work at the beginning of their third year.
- In order to take the preliminary schoolwide oral exam (usually to be held no later than end of December of the 3rd year), students should prepare a paper/proposal related to their potential thesis topic.
- When selecting a preliminary oral exam committee, note that at least two members are expected to be non-statistical scientists and the chair must approve the committee.
- Please consult our Doctoral Student Academic Standing Guide for more detailed information about academic requirements and expectations.

Other Notes

In order for PhD students to graduate from the Bloomberg School of Public Health: At least 18 credit units of formal coursework are required in courses outside the student’s primary department. At least nine of these credits must be taken in the School of Public Health. Additionally, PhD candidates will successfully complete the courses PH.550.600 Living Science Ethics - Responsible Conduct of Research, PH.550.860 Academic & Research Ethics at BSPH, and PH.550.865 Public Health Perspectives on Research. A waiver to the requirement for Public Health Perspectives is given automatically if a student earned an MPH from a U.S. institution within the last ten years.

For PhD students matriculating in 2018-19 and later: By no later than the end of the fall term of Year 4, and in advance of scheduling the thesis defense, students **must** have earned a minimum of 16 credits from advanced elective courses in Biostatistics or other related disciplines (e.g. Computer Science). The course sequences Advanced Methods in Biostatistics I – IV (140.751-754), Probability Theory I-IV (553.720-140.723-724), Statistical Theory I-IV (140.731-734), and Advanced Data Science I-II (140.711-712) do **not** count toward this requirement. Please consult our List of Elective Courses for PhD Students (https://www.biostat.jhsph.edu/research/publication/handbook/PhD/Elective_Courses_PhD.pdf) for recognized courses. Students may take courses not included in this list, but they **must** first consult with and obtain approval from both their adviser and the graduate program committee. Elective courses **must** be taken for either a letter grade or pass/fail.

Doctoral Student Academic Standing Guide

This document covers policies regarding academic performance of doctoral students that are specific to the Department of Biostatistics. Students also must satisfy the academic standing requirements of the Johns Hopkins University and Bloomberg School of Public Health.

Academic Standing and Exams

Doctoral students are expected to stay in good academic standing throughout their PhD studies.

Students are expected to maintain grades of B or higher in core classes. Any core class with a grade lower than a B will need to be retaken.

First year students maintaining B grades in core classes can sit for the first year Departmental exam. Students with any grades lower than a B in core classes must receive approval from the graduate committee to sit for the exams. In the event that students are denied, possible resolutions include postponing the exam for one year, switching to a master’s program or being required to leave the doctoral program based on a consideration by the faculty of overall academic performance.

In the event of a failure of the exam, students are allowed one retake. Student retakes typically occur in the following year, with exceptions occurring when mitigating circumstances are present, such as a leave of absence. In the event of a failure in the retake, the student will be asked to leave the doctoral program, typically with the option to join the master’s program. The exams, either a first take or retake, are only given once per year at the start of the summer break (typically in early June).

The grading of the Departmental exam is as follows. Passing scores are determined by exam writers after grading with examiners blinded from student names. Students who pass all sections of the exam pass the exam. Students failing one or more sections will be discussed by the faculty as a whole. This discussion will include exam and course performance. Possible resolutions include: declaring the student as passing the exam, declaring the student as having failed the exam, take-home remediation of sections of the exam or a full retake (only available if it is the student's first attempt at the exam).

To maintain good academic standing students must complete their school-wide preliminary oral exam by the end of their third academic year, before the start of the first term of their fourth year (typically late August or early September depending on that year's academic calendar).

Full funding for tuition and stipend is provided to PhD students for five years. Students are expected to finish their doctoral programs within this time. Students who do not finish within five years may continue in the program for up to two additional years. In these cases a 75% departmental tuition scholarship is provided, but students are responsible for the remaining tuition, their own health insurance, and living expenses. Personal office space cannot be guaranteed for students beyond the five-year point. Common areas (Biostatistics Library, Genome Cafe) remain available for use by these students.

Program Changes from PhD to ScM or MHS

In the event that a doctoral student switches to the ScM or MHS programs the following should be noted.

Funded doctoral students forfeit their funding in the event of a program switch.

Students have the option of switching to part time status after switching programs. However, visa residency requirements of maintaining full-time student status typically prevent foreign students from being able to switch to part time.

MHS and ScM students receive a 75% tuition reduction in their second year provided that they have taken 12 credits of courses outside of the Department (of which at least 6 credit hours must come from the School of Public Health courses) and have passed their Departmental exams. Doctoral students considering a program switch should appropriately plan their first year coursework to ensure eligibility for the tuition reduction in their second year. The 75% tuition remission is contingent on passing the first year exams at the master's level. PhD students who take the doctoral exam and then elect, or are asked to switch to, a master's program will be informed whether their performance on the doctoral exam constitutes a pass at the master's level. Students who are deemed to have not passed at the master's level, will be asked to take the master's Departmental exam in the subsequent year to fulfill the requirements of the master's program and will not be eligible for the tuition reduction until the exam requirements have been met. Students will be allowed this one administration of the master's exam in these circumstances.

Upon successful completion of the Doctor of Philosophy in Biostatistics, students will have mastered the following competencies:

- Conduct and publish original research on the theory, methodology and practice of biostatistics and data science;
- Translate methodological advances into software and other tools by which to disseminate these into practice;
- Apply innovative theory and methods to the solution of public health problems;
- Serve as expert biostatisticians on collaborative teams of investigators addressing key public health questions;
- Teach biostatistics effectively to health professionals and scientists as well as to graduate students in biostatistics.

Department of Environmental Health and Engineering

About

The Department of Environmental Health and Engineering (https://ehe.jhu.edu/) (EHE) is a collaborative hybrid uniquely designed to lead pioneering research and fuel technology translation as it prepares the next generation of scholars to solve critical and complex issues at the interface of public health and engineering.

EHE's mission is to improve the health of the Earth and its inhabitants. EHE's academic and research activities span the science of biological processes, environmental engineering, environmental and health policy, and data analytics. With its accomplished faculty and visionary students, EHE is poised to use its broad and deep expertise to propel discovery and innovation, as well as to inspire and educate scholars of the 21st century and beyond.

Our broad, multidisciplinary approach creates a collaborative and supportive learning atmosphere for students with diverse backgrounds and interests, while assisting them in developing lifetime careers in environmental and public health research and practice. Our graduates work in academic research institutions, health agencies, health departments, and private industry organizations that are leaders in environmental and occupational health in the U.S. and in many countries around the world.

These areas offer students many opportunities for course selection, research, and training in a setting that enables students to pursue a wide range of environmental health science interests. Our relationships with the Johns Hopkins School of Medicine (https://www.hopkinsmedicine.org/som/), the Whiting School of Engineering (https://engineering.jhu.edu/), and the School of Nursing (https://nursing.jhu.edu/) ensure that our research can be rapidly translated into prevention strategies. In addition, our Department houses a number of centers including the Johns Hopkins Water Institute (https://water.jhu.edu/), Education and Research Center for Occupational Safety and Health (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-education-and-research-center-for-occupational-safety-and-health/), Center for a Livable Future (CLF) (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-a-livable-future/), the Center for Alternatives to Animal Testing (CAAT) (https://caat.jhsph.edu/), the Center for Health Security (https://www.centerforhealthsecurity.org/), and the Center for Public Health Preparedness (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-public-health-preparedness/) enhancing our unique academic environment.

Programs

Policies

Students are expected to adhere to the schoolwide policies on academics, research, and student life (p. 633) in addition to departmental policies. Students who fail to follow or meet the established policies may be subject to dismissal.

SIS Account

Students are responsible for monitoring their SIS account (http://sis.jhu.edu/sswf/) on a monthly basis so that problems may be resolved in a timely manner. The Department may deposit funds for tuition and certain fees into accounts, but the student is responsible for charges related to expenses that are not covered by the Department. These charges include late registration fees, even when the Department pays for tuition costs. More information can be found on the Student Accounts (http://www.jhsph.edu/offices-and-services/student-accounts-and-business-services/) website.

Course Registration

It is the student's responsibility to register for courses during the appropriate time periods specified by the Office of Records and Registration (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/) (and available on the academic calendar). Students are expected to discuss course plans with their adviser before registration and confirm registration details with their adviser every term. Regardless of funding sources such as grants, stipends, etc., students are responsible for any applicable fees if they do not register properly.

Course Waivers

Waiver requests will be considered when a student has taken a similar, graduate-level course(s), with a passing grade, in another division of JHU or another university. A waiver will not be granted for courses in which the student received less than a B or did not receive a letter grade. Please note that approval of a waiver does not reduce the total number of credits a student is required to earn to meet graduation requirements.

Students must complete the course waiver request form and include documentation (i.e. transcript and syllabus) to support the request. Waivers and substitutions are only approved by the student matters subcommittee, not the adviser. The academic coordinator will notify the student of the outcome.

International Travel

Graduate students at the Johns Hopkins Bloomberg School of Public Health, may have an opportunity to supplement their education or conduct research in another country. These opportunities often enrich the academic curriculum, contribute to dissertation research, and allow students to apply the knowledge they obtain in the classroom to the world's communities. While the School encourages participation in these kinds of experiences, international tensions can be high and the resources on the international travel website (https://ssc.jhmi.edu/travel/) are provided to assist students in making an informed decision.

Students are not obligated to travel internationally, and each student has the right to decline to travel abroad. If the student is supported by a research project that requires such travel and the student chooses not to travel, the student may be removed from that project following discussions with the principal investigator and the EHE program or track directors.

Graduate students who decide to travel abroad must demonstrate that they understand and voluntarily accept the risks inherent in international travel. To do so, students must first receive the appropriate departmental approvals for the trip through their adviser and program or track director(s). Once approved, students must complete the following steps:

1. Review the JHSPH Student Travel Handbook and student-related information on the JHU International Travel site (https://ssc.jhmi.edu/travel/).
2. Consult the Department of State website at http://travel.state.gov. Information on U.S. embassies, travel advisories (https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html), and the availability of transportation should the situation in a country deteriorate may be found on this site.
3. Register your travels with the JHU International Travel Registry (https://travelregistry.johnshopkins.edu/Travel/).
4. Complete the International Travel Checklist and Graduate Student Study Release form. Submit both documents to the academic coordinator at least one week in advance of your proposed travel date.

When traveling in an area where regular communication is difficult, students are encouraged to maintain contact with their adviser and/or the academic coordinator.

Environmental Health, MHS

MHS in Environmental Health

The Master of Health Science provides a firm academic foundation in the field of environmental health.

The program primarily targets individuals holding a bachelor's degree who see a place for environmental health in their future academic or career goals. In addition to coursework, MHS students prepare an essay addressing an environmental health problem and make a formal presentation on the topic to an audience of faculty and students.

Some graduates pursue doctoral degrees in public health, medicine, and law, while others head to governmental agencies, NGOs, and the private sector. The program may also accommodate the educational needs of those already working in these sectors, who want to develop a stronger knowledge base in environmental health.

If desired, the MHS further offers specialization in the following areas (https://ehe.jhu.edu/graduate/masters-programs/master-of-health-science-in-environmental-health/):

- Food Systems, Water, and Environmental Sustainability
- Health Security
- Pre-medicine
- Population Environmental Health
- Toxicology for Human Risk Assessment

Program Director:
Megan Latshaw, PhD, MHS

Program Requirements

MHS students formally meet as a group four times during the academic year. These meetings aim to build community, provide professional development, and share information about administrative, course, or other programmatic issues. Attendance is mandatory for MHS students, as is attendance at the EHE Grand Rounds seminars scheduled on the second Friday of each month, and at the master's presentations in May. This attendance, along with monthly check-ins with advisers, and meeting deadlines for the essay, forms the basis of the grade for special studies courses PH.181.845 MHS Special Studies & Research and PH.181.850 MHS Essay. Students who do not successfully complete the requirements for the special studies courses face dismissal from the program.

Coursework

Students consult the course list and obtain formal approval from their faculty adviser prior to registration. Required core courses include environmental health, toxicology, epidemiology, risk sciences, and statistics. Electives allow students to select courses according to their interests and career goals.

Generally, full-time students register for at least 16 credits per term in order to reach the 64-credit requirement for the degree. Students should discuss with their adviser the options which meet the biostatistics and epidemiology course requirements. In order to substitute a recommended course with something not listed, approval must be granted by the program director. Students may also consider earning certificates (http://www.jhsph.edu/academics/certificate-programs/) in addition to the MHS.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Required Courses

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH	0
PH.180.609	Principles of Environmental Health	4
PH.180.610	Applied Environmental Health Practice	4
PH.187.610	Public Health Toxicology	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.181.845	MHS Special Studies & Research	varies
PH.181.850	MHS Essay	1
Biostatistics		*varies*
Epidemiology		*varies*
Electives		

Electives

Code	Title	Credits
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.180.634	Public Health Emergencies: Risk Communication and Decision Science	3
PH.188.680	Fundamentals of Occupational Health	3
PH.188.694	Health of Vulnerable Worker Populations	3
PH.317.610	Risk Policy, Management and Communication	3
PH.180.620	Introduction to Food Systems and Public Health	4
PH.180.621	Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach	3
PH.120.601	Biochemistry II: Major Metabolic Pathways	5
PH.180.647	The Health Effects of Indoor and Outdoor Air Pollution	3
PH.180.644	Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond	2
PH.187.632	Molecular Toxicology	4
PH.188.688	Global Sustainability & Health Seminar	1
PH.183.631	Fundamentals of Human Physiology	4
PH.187.640	Toxicology 21: Scientific Foundations	1
PH.180.650	Fundamentals of Clinical Oncology for Public Health Practitioners	3
PH.180.602	Environment and Health in Low and Middle income Countries	2
PH.180.623	Infectious Disease Threats to Global Health Security	3
PH.180.624	Biotechnology and Health Security	3
PH.182.640	Food- and Water- Borne Diseases	3
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.180.625	Community-Driven Epidemiology and Environmental Justice	3
PH.180.651	Energy, Environment, and Public Health	2
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	4
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.317.605	Methods in Quantitative Risk Assessment	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.183.638	Mechanisms of Cardiopulmonary Control	2
PH.340.607	Introduction to Cardiovascular Disease Epidemiology	4
PH.340.701	Epidemiologic Applications of Gis	2
PH.187.645	Toxicology 21: Scientific Applications	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
PH.317.610	Risk Policy, Management and Communication	3
PH.180.606	Case Studies in Food Production and Public Health	4
PH.180.653	Climate Change: Avoiding Conflict and Improving Public Health	3
PH.188.682	A Built Environment for A Healthy and Sustainable Future	3
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.182.638	Environmental and Health Concerns in Water Use and Reuse	4
PH.187.625	Animals in Research: Law, Policy, and Humane Sciences	3
PH.180.627	Lessons Learned in 1918 Pandemic Flu	1
PH.180.630	Chemical and Biological Weapons Threats: Science, Public Health, Policy	3
PH.180.633	The Sociocultural Dimensions of Disasters	3
PH.180.636	Human Rights and Health Seminar	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3

PH.180.670	Introduction to Public Health Emergency Preparedness	3
PH.317.615	Topics in Risk Assessment	2
PH.120.604	Introduction to Molecular Biology	3
PH.120.610	Biochemistry I: Protein Structure and Enzyme Catalysis	3
PH.180.632	Introduction to Molecular Toxicology	3
PH.187.661	Environmental Health in Neurological and Mental Disorders	3
PH.187.650	Alternative Methods in Animal Testing	3
PH.187.655	Evidence-Based Toxicology	3
PH.183.642	The Cardiopulmonary System Under Stress	2
PH.340.651	Emerging Infections	2
PH.340.680	Environmental and Occupational Epidemiology	4

Essay and Presentation

MHS students must write an essay and present a summary of it during a formal symposium. The essay serves as an integrating experience for students, representing a substantive application of analytic and technical skills learned during the degree program. The content addresses a current environmental health problem pertinent to the educational goals of the student and approved by the adviser. The essay is not a research paper or thesis, but rather an informative and in-depth literature review that includes potential solutions to the problem. Ideally students will work with community-based organizations, governmental agencies, or researchers on a real-world issue. A more detailed guidance document for the essay will be shared with students during their second term and they can find the most recent essay guidance and policy in the handbook.

The student will meet with the adviser throughout the essay-writing process in order to ensure fulfillment of essay requirements, as well as assure that the essay is properly prepared for presentation and final approval. The essay must be reviewed and approved by the adviser and one other faculty member or expert chosen by the student and approved by the adviser.

All students completing the MHS are required to make at least one presentation of their essay to an audience of faculty and students of the Department.

MHS Policies

Advisers

All master's students will be assigned an adviser who serves as the primary contact for the Department, assists the student with course selection each term, approves their essay or thesis, and helps interpret Departmental and School policies. The student is free to change advisers, but this change must be approved by the program director and sent to the academic coordinator via email.

Assessment of Progress

Students must meet minimum academic standards to remain in the master's program. Each term the student should review grades from the previous term with their adviser. Specific goals will be determined following this review. A student who is experiencing academic difficulty will be notified in writing if they are expected to achieve a specific GPA during the upcoming term. Failure to meet any of the following criteria is grounds for dismissal from the program.

Cumulative GPA

The School requires master's students to maintain a minimum 2.75 cumulative grade point average. Students with a GPA falling below 2.75 will be placed on academic warning and will have one term of registration in which to raise their GPA above the threshold for their degree. The academic coordinator will notify students placed on academic warning and their performance will be reviewed by the Educational Programs Committee (EPC).

All recommendations about academic standing will be then presented to the Department's Executive Committee for final disposition. Students not meeting the minimum GPA after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA; that approval beyond one term must be reported to the School's Committee on Academic Standards. Students on academic warning must meet with their academic adviser and program director (or academic coordinator) each term to review their academic plan and receive approval for their course schedule prior to registering for courses. Students with a cumulative GPA below the minimum may not register for more than 18 credits per term. Any repeated courses count towards this 18-credit limit.

Grades in Core Courses

Students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "C" or higher for master's students for courses offered for letter grading. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the program director. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

Department Retreat

Each January, the EHE faculty and students attend a retreat on research currently being conducted in the department. The retreat ends with a keynote talk from an investigator outside of EHE. The retreat provides master's students the chance to learn more about research being conducted in the department. Attending the retreat, including talks and poster sessions, is expected for ScM students and optional for MHS students.

Bachelor's/MHS Credit Transfer

Bachelor's/MHS students who take JHSPH courses as an undergraduate may transfer up to one-half, but no more than 16 JHSPH credits to the MHS program. Online courses do not count towards this requirement. Students must earn a grade of B or higher in courses transferred to fulfill a program requirement; grades of C may only be transferred towards elective credits.

MHS to ScM Transfer Process

Students who are interested in transferring to the ScM program may begin the process to do so at the start of term 2. Identification of an appropriate and willing faculty research mentor (https://ehe.jhu.edu/graduate/masters-programs/master-of-science-in-environmental-health/program-faculty-research-advisers.html) serves as an essential step in the process, which should be initiated as early as possible, preferably while an applicant to the MHS program.

By the middle of term 2, MHS students submit a ScM transfer request form. The form includes a brief explanation of how the ScM research opportunity fits with the student's educational and research goals. The proposed research faculty needs to provide a letter of willingness to assume the role and responsibilities of ScM thesis adviser (this person may or may not be the current MHS adviser). Students must demonstrate excellent academic success at the graduate level in the first two terms of the year (minimum GPA of 3.0).

A sub-group of the ScM research faculty (program director and 2-3 others) will review the request to confirm that the requirements have been met and, based on that input, the program director will approve or disapprove of the request for degree transfer. The Office of Records and Registration will be notified of the degree transfer, effective term 3.

Graduates have competence in the following:

1. toxicology
2. statistical evaluation of data
3. epidemiological studies in environmental health
4. risk sciences and public policy
5. research ethics
6. public health perspectives in research

Environmental Health, SCM

ScM in Environmental Health

The Master of Science (ScM) in Environmental Health (https://ehe.jhu.edu/graduate/masters-programs/master-of-science-in-environmental-health/) is intended for individuals with a strong interest in pursuing research in one of the various areas within environmental health. Typically, students have prior hands-on experience in laboratory, field or population-based investigations that they would like to build upon. ScM students write a thesis that is based on original research carried out by the student under the direction of a faculty adviser.

Graduates of the program are well-prepared to transition directly into opportunities for further training and research through doctoral degree programs in their primary areas of interest. For those wishing to apply their knowledge and research skills in the field of environmental health prior to pursuing advanced degrees, the ScM will position graduates to compete for research positions in the private sector, federal agencies and non-governmental organizations.

Program Director:
Megan Latshaw, PhD, MHS

Program Requirements

Coursework

Each term, students should register for at least 16 credits in order to reach the 64-credit requirement. Students reach this 16-credit-per-term minimum by first registering for the required courses, then choosing among the elective courses. Please refer to the course directory (https://www.jhsph.edu/courses/) for the most current course information. Students should consult their adviser about options for meeting the biostatistics and epidemiology course requirements.

After completing fourth-term coursework and successfully passing the comprehensive exam, the student begins a year-long research project under the direction of their adviser. During the second year, full-time enrollment must be maintained by taking a minimum of 16 credits of PH.183.825 EHE ScM Thesis Research in each of the four terms. Students are required to participate in all journal clubs, seminars, and meetings deemed necessary by the faculty research adviser. Students will be expected to complete the program at the end of the fourth term of their second year.

Students must successfully complete 64-credits of coursework and successfully passed the comprehensive exam to be considered for the Master's Tuition Scholarship (MTS) (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/funding-and-scholarships/) in the second year. Students must meet all curriculum, grade, GPA, and registration requirements.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Required Courses

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH	0
PH.180.609	Principles of Environmental Health	4
PH.180.610	Applied Environmental Health Practice	4
PH.187.610	Public Health Toxicology	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.183.840	EHE Scm Special Studies and Research	1 - 22
PH.183.825	EHE ScM Thesis Research	1 - 22
Journal Club (select one):		
PH.185.805	Toxicology, Physiology & Molecular Mechanisms Journal Club & Seminar	
or PH.185.806	Advanced Concepts in Toxicology, Physiology & Molecular Mechanisms	
PH.185.801	Exposure Sciences & Environmental Epi Journal Club	
Biostatistics		*varies*
Epidemiology		*varies*
Electives		

Electives

Code	Title	Credits
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.180.634	Public Health Emergencies: Risk Communication and Decision Science	3
PH.188.680	Fundamentals of Occupational Health	3
PH.188.694	Health of Vulnerable Worker Populations	3
PH.317.610	Risk Policy, Management and Communication	3
PH.180.620	Introduction to Food Systems and Public Health	4
PH.180.621	Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach	3
PH.120.601	Biochemistry II: Major Metabolic Pathways	5
PH.180.647	The Health Effects of Indoor and Outdoor Air Pollution	3
PH.180.644	Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond	2
PH.187.632	Molecular Toxicology	4

PH.188.688	Global Sustainability & Health Seminar	1
PH.183.631	Fundamentals of Human Physiology	4
PH.187.640	Toxicology 21: Scientific Foundations	1
PH.180.650	Fundamentals of Clinical Oncology for Public Health Practitioners	3
PH.180.602	Environment and Health in Low and Middle income Countries	2
PH.180.623	Infectious Disease Threats to Global Health Security	3
PH.180.624	Biotechnology and Health Security	3
PH.182.640	Food- and Water- Borne Diseases	3
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.180.625	Community-Driven Epidemiology and Environmental Justice	3
PH.180.651	Energy, Environment, and Public Health	2
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	4
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.317.605	Methods in Quantitative Risk Assessment	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.183.638	Mechanisms of Cardiopulmonary Control	2
PH.340.607	Introduction to Cardiovascular Disease Epidemiology	4
PH.340.701	Epidemiologic Applications of Gis	2
PH.187.645	Toxicology 21: Scientific Applications	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
PH.317.610	Risk Policy, Management and Communication	3
PH.180.606	Case Studies in Food Production and Public Health	4
PH.180.653	Climate Change: Avoiding Conflict and Improving Public Health	3
PH.188.682	A Built Environment for A Healthy and Sustainable Future	3
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.182.638	Environmental and Health Concerns in Water Use and Reuse	4
PH.187.625	Animals in Research: Law, Policy, and Humane Sciences	3
PH.180.627	Lessons Learned in 1918 Pandemic Flu	1
PH.180.630	Chemical and Biological Weapons Threats: Science, Public Health, Policy	3
PH.180.633	The Sociocultural Dimensions of Disasters	3
PH.180.636	Human Rights and Health Seminar	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3
PH.180.670	Introduction to Public Health Emergency Preparedness	3
PH.317.615	Topics in Risk Assessment	2
PH.120.604	Introduction to Molecular Biology	3
PH.120.610	Biochemistry I: Protein Structure and Enzyme Catalysis	3
PH.180.632	Introduction to Molecular Toxicology	3
PH.187.661	Environmental Health in Neurological and Mental Disorders	3
PH.187.650	Alternative Methods in Animal Testing	3
PH.187.655	Evidence-Based Toxicology	3
PH.183.642	The Cardiopulmonary System Under Stress	2
PH.340.651	Emerging Infections	2
PH.340.680	Environmental and Occupational Epidemiology	4

Research Proposal

During the first year of the program, ScM students draft a proposal for their research project. The product, formatted similar to a NIH R21 or F32 research proposal, includes an in-depth review of the literature and presents the key components of the research plan. Students will enroll in PH.183.840 EHE Scm Special Studies and Research which allows the adviser to evaluate the student's progress in completing the proposal. Further guidance is provided at the start of the academic year.

Comprehensive Examination

Upon completion of first year coursework, ScM students complete the comprehensive examination. The comprehensive examination requires the student to demonstrate their knowledge of the proposed research – its rationale, approaches, and methodologies – as well as its relevance and potential contributions within the broader perspective of environmental health. The research proposal serves as the written basis for the comprehensive examination. Students must pass the comprehensive examination prior to beginning the research year of the program and to be eligible for the second year Master's Tuition Scholarship (MTS) (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/funding-and-scholarships/).

Thesis and Presentation

The ScM degree requires successful completion of a research project and the writing of a master's thesis based on that work. The research will be completed under the direction of a faculty mentor (research adviser) who is a member of the Department of Environmental Health and Engineering. The work must represent an original hypothesis-driven investigation on a topic of interest to the student and agreed upon by the adviser. The format will adhere to University guidelines which can be found on the Johns Hopkins Sheridan Libraries website (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/). The document quality must be suitable for publication in a peer-reviewed scientific journal.

Students are required to present their research during the MHS & ScM student presentation days in May. Presentations should be 10 minutes in length followed by 5 minutes of questions and answers from faculty and students.

ScM Policies

Advisers

All master's students will be assigned an adviser, who serves as the primary contact for the Department, assists the student with course selection each term, approves their essay or thesis, and helps interpret Departmental and School policies. The student is free to change advisers, but this change must be approved by the program director and sent to the academic coordinator via email. For students in the ScM, initially-assigned advisers may change when a student transitions from the MHS to the ScM program at the end of term 2 in the first year of the program.

Assessment of Progress

Students must meet minimum academic standards to remain in the master's program. Each term the student should review grades from the previous term with their adviser. Specific goals will be determined following this review. A student who is experiencing academic difficulty will be notified in writing if they are expected to achieve a specific GPA during the upcoming term. Failure to meet any of the following criteria is grounds for dismissal from the program.

Cumulative GPA

The School requires master's students to maintain a minimum 2.75 cumulative grade point average. Students with a GPA falling below 2.75 will be placed on academic warning and will have one term of registration in which to raise their GPA above the threshold for their degree. The academic coordinator will notify students placed on academic warning and their performance will be reviewed by the Educational Programs Committee (EPC). All recommendations about academic standing will be then presented to the Department's Executive Committee for final disposition. Students not meeting the minimum GPA after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA; that approval beyond one term must be reported to the School's Committee on Academic Standards. Students on academic warning must meet with their academic adviser and program director (or academic coordinator) each term to review their academic plan and receive approval for their course schedule prior to registering for courses. Students with a cumulative GPA below the minimum may not register for more than 18 credits per term. Any repeated courses count towards this 18-credit limit.

Grades in Core Courses

Students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "C" or higher for master's students for courses offered for letter grading. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the program director. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

Department Retreat

Each January, the EHE faculty and students attend a retreat that includes faculty presentations and student posters on research currently be conducted in the department. The retreat ends with a keynote talk from an investigator outside of EHE. The retreat provides both ScM and MHS students with the chance to meet faculty and students and learn more about research being conducted in the department. Attending the retreat, including talks and poster sessions, is expected for ScM students and optional for MHS students.

Toxicology for Human Risk Assessment, MS

The Master of Science (MS) in Toxicology for Human Risk Assessment is the only program of its kind in the United States. Our innovative master's program equips graduates with the knowledge and skills needed to begin or advance their career as professionals in the evolving field of human health and environmental risk assessment.

The MS program consists of:

- Coursework in the fundamental concepts and testing approaches used in classic risk assessment processes, as well as those used in the new paradigm for toxicity in the 21st Century (https://jhu.pure.elsevier.com/en/publications/food-for-thought-toxicity-testing-in-the-21st-century-beyond-envi-6/), and
- A seven- to twelve-month internship with a government agency, non-governmental organization, industry, or private sector group.

Students enrolled in the program may also complete the Certificate in Risk Sciences and Public Policy. (p. 628)

Program Director:
Joseph Bressler, PhD

Curriculum

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The curriculum consists of a core of program-required coursework that is taken during the first year of the program. Courses are offered in four 8-week terms from the beginning of September to mid-May. Courses related to the internship and to the capstone essay will be completed in the second year.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH	
PH.180.609	Principles of Environmental Health	4
PH.187.610	Public Health Toxicology	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.610	Risk Policy, Management and Communication	3
PH.317.605	Methods in Quantitative Risk Assessment	4
PH.317.615	Topics in Risk Assessment	2
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.187.640	Toxicology 21: Scientific Foundations	1
PH.187.632	Molecular Toxicology	4
PH.187.645	Toxicology 21: Scientific Applications	3
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	4
PH.187.655	Evidence-Based Toxicology	3
PH.187.650	Alternative Methods in Animal Testing	3
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.410.620	Program Planning for Health Behavior Change	3
PH.340.680	Environmental and Occupational Epidemiology	4
PH.182.845	EHE MS Special Studies and Research	1 - 22
PH.182.810	MS Field Placement	1 - 22

PH.182.850	EHE MS Essay	1 - 16

Internship

Students in this professional MS degree program will be expected to assume independent responsibility for a professional project that will be carried out off-site at a governmental agency, nongovernmental organization or industry or private sector company. Specific opportunities will be identified by the student in conjunction with the adviser. The minimum requirements for the internship will be a duration of four months (two academic terms) in conjunction with 32 course credits of special studies and research. The student will be directed in the internship experience by an on-site mentor with whom the adviser will communicate regularly to follow and support the student's progress and success in achieving the agreed-upon goals of the independent project. If agreeable to the student and sponsor, the overall length of the project period may extend beyond the minimum necessary for completion of the internship requirements of the MS degree program.

Master's Essay and Presentation

Students in professional programs at the Johns Hopkins School of Public Health are required to successfully complete and submit a culminating project that demonstrates integration of the skills developed during the coursework and internship experiences. For students in this program, this project takes the form of an in-depth capstone essay.

The topic of the essay will typically be linked to the specific or general focus of the internship experience and will be chosen in consultation with the adviser, who must approve it. The format of the essay will conform to standards set by the Department and may vary to accommodate the nature of the topic. Students are encouraged to select a topic that will lend itself to publication in a scientific journal. Following approval of the essay, students will make a formal presentation of the essay to departmental faculty and students to complete the requirements for the MS degree.

Academic Standards

Students must meet minimum satisfactory academic standards to remain in the MS program. To meet these standards, students must maintain a minimum 2.75 cumulative grade point average, and retake any required coursework in which they earn a grade of "D" or "F". If a student receives a grade of "D" or "F" twice in the same required course, they may not repeat the course a third time. If the course is a required core course with no other options, the student will be dismissed from the program.

Upon completion of the program, students will be able to:

- Explain and interpret epidemiologic studies to support risk assessment and decision making;
- Elaborate commonly used public health measures, such as relative risk, attributable risk and relative hazards, and select appropriate statistical methods for estimating such measures in the presence of covariates;
- Interpret descriptive and inferential statistics resulting from data analysis and draw relevant conclusions;
- Interpret studies that use bioinformatic techniques;
- Evaluate and interpret traditional toxicological studies;
- Elaborate novel methodological approaches in toxicology;
- Apply and integrate epidemiological, traditional and novel toxicological studies to support risk assessment;
- Define the major environmental agents (i.e., environmental chemical, biological, and physical that cause adverse effects on human health) and their sources, natural and anthropomorphic;
- Discuss the transport and fate of major environmental agents in the environment, and identify the carriers or vectors (air, water, soil, and food) that promote the transfer of these agents from various environments (e.g. occupational setting) to the human;
- Describe the toxicokinetics of major environmental agents including routes of entry, metabolism, storage, and excretion;
- Describe the toxicodynamics of major environmental agents, including toxicological pathways and the mechanisms by which agents exert adverse health effects, and the use of in vitro models for predicting the magnitude of adverse effects;
- Describe approaches for in vitro to in vivo modeling of toxicokinetics;
- Summarize areas of emerging science for risk assessment (personalized toxicology, chemical mixture toxicology, systems toxicology, multi-natured stressor mixtures);
- Use systematic approaches for combining and evaluating toxicokinetic and toxicodynamic evidence;
- Evaluate evidence-based toxicology studies and studies conducted using other systematic approaches;
- Utilize exposure and epidemiologic and traditional and novel toxicological data to conduct a risk assessment;
- Communicate and translate science to general audiences and policymakers;
- Describe key risk management practices in the US and internationally;
- Explain the application of evidence used to make environmental health decisions, setting of standards and guidance;
- Summarize the function of federal agencies in public health practices and decision making.

Environmental Health, PhD

PhD in Environmental Health

Students in the PhD program pursue one of the following tracks:

Environmental Sustainability, Resilience, and Health (https://publichealth.jhu.edu/academics/phd-in-environmental-health/track-in-environmental-sustainability-resilience-and-health/)

The Environmental Sustainability, Resilience and Health (ESRH) track aims to cultivate innovative public health scientists and engineers who address urgent challenges at the intersection of climate, sustainability, resilience, and equity. Students in the track will research anthropogenic drivers and other factors that exacerbate ecological crises, and interventions aimed at adapting to threats and minimizing the diverse impacts on human well-being, with emphasis on equity. Additionally, students focus on how global environmental changes affect human societies, infrastructure, and ecosystems, as well as strategies for adapting to evolving public health threats.

Exposure Sciences and Environmental Epidemiology (https://publichealth.jhu.edu/academics/phd-in-environmental-health/track-in-exposure-sciences-and-environmental-epidemiology/)

The track in Exposure Sciences and Environmental Epidemiology offers research and training opportunities in key topic areas relevant to environmental and occupational health. These areas include air, water, the food system, early life exposures, metals and synthetic chemicals, environmental microbiology, the built environment, global environmental health, molecular and integrated epidemiology, and the investigation of susceptibility factors, occupational health, and effective interventions.

Health Security (https://publichealth.jhu.edu/academics/phd-in-environmental-health/track-in-health-security/)

The track in Health Security focuses on research and training in a wide, complementary range of topics aimed to reduce health security threats and their impacts, and to increase community resilience to global catastrophic biological risks. Students in this track will focus on identifying major health security risks, applying risk assessment principles to address health security risks, identifying and assessing current initiatives to improve health security, evaluating the effectiveness of health security strategies, and communicating information to inform policy.

Toxicology, Physiology & Molecular Mechanisms (https://publichealth.jhu.edu/academics/phd-in-environmental-health/track-in-toxicology-physiology-and-molecular-mechanisms/)

Basic research in this track is focused on discovering novel molecular mechanisms that drive the pathophysiology of major chronic diseases to develop prevention and therapeutic strategies to improve public health. Students in this track will engage in academic training in specific areas of environmental health with in-depth courses in molecular, toxicologic, physiologic, immunologic, and pathophysiologic sciences.

PhD Requirements

The following information regarding doctoral requirements serves as a general guide to Departmental policies and procedures and is subject to change.

Core Coursework

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The School and the Department have specified a series of required core courses to be completed by all PhD students. PhD students are required to complete at least 64 credits of formal coursework (i.e., not special studies). At least 18 credits of formal coursework are required in courses outside the student's primary department. At least nine of these credits must be taken in the School of Public Health.

Code	Title	Credits
CORE CURRICULUM		
YEAR 1		
PH.550.860	Academic & Research Ethics at BSPH	0
PH.180.612	Advanced Environmental Health I	4
PH.180.639	Advanced Environmental Health II	4
PH.187.610	Public Health Toxicology	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
Epidemiology (See track requirements)		5
Biostatistics (See track requirements)		3-4
YEAR 2		
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.180.661	Writing Scientific Papers I	2
PH.180.662	Writing Scientific Papers II	2
PH.180.663	Grant Writing I	2
PH.180.664	Grant Writing II	2
EN.570.616	Data Analytics in Environmental Health and Engineering	3
ALL YEARS & TERMS		
PH.180.860	EHE Student Seminar & Grand Rounds	1
PH.180.840	EHE Doctoral Special Studies and Research	Varies

Note: The School's Satisfactory Academic Performance policy requires doctoral students to maintain a minimum GPA of 3.0 and to have a B or greater in program core courses. Please refer to the following track-specific sections for additional course requirements.

Track-Specific Coursework

Environmental Sustainability, Resilience, and Health

Code	Title	Credits
Required Courses		
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.180.620	Introduction to Food Systems and Public Health	4
PH.188.682	A Built Environment for A Healthy and Sustainable Future	3
EN.570.607	Energy Policy and Planning Models	3
At least 9 credits in chosen topic area		**9**
Climate Change		
PH.180.607	Climate Change and Public Health	3
PH.188.688	Global Sustainability & Health Seminar	1
PH.180.653	Climate Change: Avoiding Conflict and Improving Public Health	3
PH.410.645	Applying the Social Ecological Model in Tobacco Control and Climate Change	3
PH.330.609	Climate Change and Mental Health: Research, Practice, and Policy Perspectives	3
Food Systems		
PH.180.644	Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond	2
PH.180.606	Case Studies in Food Production and Public Health	4
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.182.640	Food- and Water- Borne Diseases	3
PH.222.653	Food Technology and Health	3
PH.222.654	Food, Culture, and Nutrition	4
PH.180.605	Food Systems Practicum	4
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3
PH.700.630	Food Ethics	3
Built Environment		
PH.305.630	Transportation Policy, Equity and Health	2
PH.318.636	Urban Policy	3
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
EN.575.734	Smart Growth Strategies for Sustainable Cities	3
Air		

EN.570.657	Air Pollution	3
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.188.688	Global Sustainability & Health Seminar	1
PH.182.615	Airborne Particles	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.305.630	Transportation Policy, Equity and Health	2
Energy		
PH.180.651	Energy, Environment, and Public Health	2
EN.530.664	Energy Systems Analysis (graduate)	3
EN.570.657	Air Pollution	3
Water		
PH.182.640	Food- and Water- Borne Diseases	3
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
EN.570.631	Collaborative Modeling for Resolving Water Resources Disputes	3
EN.570.653	Hydrology	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.714	Water Resources Management	3
EN.575.731	Water Resources Planning	3
Recommended Courses in Diversity, Equity, and Inclusion		
PH.180.625	Community-Driven Epidemiology and Environmental Justice	3
PH.180.626	Environmental Justice and Public Health Practice	3
PH.180.621	Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach	3
PH.180.602	Environment and Health in Low and Middle income Countries	2
PH.410.606	Local and Global Best Practices in Health Equity Research Methods	4

Exposure Sciences and Environmental Epidemiology

Students receiving funding from the NIOSH Education and Research Center (ERC) may be required to complete additional coursework. Contact your adviser for more information.

Code	Title	Credits
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.182.617	Exposure Sciences for Health Risk Assessment	4
PH.340.680	Environmental and Occupational Epidemiology	4
PH.185.801	Exposure Sciences & Environmental Epi Journal Club	1
Biostatistics:		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
Epidemiology:		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Cells to Society:		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

Health Security

Code	Title	Credits
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
PH.180.623	Infectious Disease Threats to Global Health Security	3
PH.180.624	Biotechnology and Health Security	3
PH.180.627	Lessons Learned in 1918 Pandemic Flu	1
PH.180.630	Chemical and Biological Weapons Threats: Science, Public Health, Policy	3
PH.180.633	The Sociocultural Dimensions of Disasters	3
PH.180.634	Public Health Emergencies: Risk Communication and Decision Science	3
PH.180.661	Writing Scientific Papers I	2
PH.180.662	Writing Scientific Papers II	2
PH.180.663	Grant Writing I	2
PH.180.664	Grant Writing II	2
PH.180.670	Introduction to Public Health Emergency Preparedness	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3
PH.185.803	Health Security Journal Club	1
PH.187.610	Public Health Toxicology	4
PH.120.603	Molecular Biology of Pandemic Influenza	3
PH.260.631	Immunology, Infection and Disease	3
PH.300.650	Crisis and Response in Public Health Policy and Practice	3
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.552.601	Foundational Principles of Public Health	0.5
PH.140.644	Statistical Machine Learning: Methods, Theory, and Applications optional	4
PH.260.603	Biology of the Next Pandemic optional	3

Toxicology, Physiology and Molecular Mechanisms

Code	Title	Credits
PH.183.631	Fundamentals of Human Physiology	4
PH.187.632	Molecular Toxicology	4

PH.187.633	Introduction to Environmental Genomics and Epigenomics	3
PH.187.634	Analysis for Environmental Genomics and Epigenomics	1
PH.260.611	Principles of Immunology I	4
PH.260.612	Principles of Immunology II	3
PH.140.615	Statistics for Laboratory Scientists I	4
PH.140.616	Statistics for Laboratory Scientists II	4
PH.340.618	Epidemiology: the Basics	3
PH.185.805	Toxicology, Physiology & Molecular Mechanisms Journal Club & Seminar	1
PH.185.806	Advanced Concepts in Toxicology, Physiology & Molecular Mechanisms	2
School of Medicine:		
ME.260.709 Molecular Biology and Genomics		3
ME.360.728 Pathways and Regulation		3
ME.110.728 Cell Structure and Dynamics		3
Cells to Society:		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5

Grade and GPA Requirements

Doctoral students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "B" or higher for courses offered for letter grading. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the track directors. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

The School requires doctoral students to maintain a minimum 3.0 cumulative GPA. Students with a GPA falling below 3.0 will be placed on academic warning and will have one term of registration in which to raise their GPA above the threshold for their degree.

Teaching Assistant Requirement

Teaching assistant positions provide students with an opportunity to develop their teaching and interpersonal skills, to work professionally with faculty and fellow students, and to contribute service to the Department. All PhD students are required to serve as TA for an 8-week term SPH course each year during their second, third, and fourth year of the program, or for a single full-semester WSE course each year. Only EHE courses may be used to fulfill this requirement and students must be enrolled in courses on a full-time basis. The academic coordinator maintains a list of EHE courses that are approved to fulfill the TA requirement. Students must receive approval from their adviser prior to accepting a TA position and must notify the academic coordinator prior to the start of the course for the course chosen to fulfill the TA requirement. Students are required to complete the online TA training during their first year in the program. The academic coordinator will verify the student has completed the training prior to starting a TA position.

A student will only become eligible for compensation of future TAships once they have satisfied the yearly TA requirement.

Code	Title	Credits
Students must register in each term or semester in which they complete their required TAship.		
PH.180.613	Teaching Environmental Health	1

Individual Development Plan

The University Doctoral Board requires that each doctoral student will be reviewed annually during each year of their doctoral program. This requirement is also in line with a 2014 National Institute of Health notice strongly encouraging the development of an institutional policy on Individual Development Plans (IDPs) for all graduate students supported by NIH funds. The IDP addresses two needs. First, it provides a structure to systematically identify training needs and competencies, establish goals and take stock of year-by-year progress. Thus, IDPs help doctoral students stay on track with their research as well as paper and grant writing and skills development. Second, there are many career options for individuals who have obtained a PhD in Environmental Health. The IDP helps doctoral students plan and prepare for their post-PhD future. In both areas, IDPs can serve as a tool to facilitate communication between trainees and their mentors.

Goals and benefits

An annual IDP as part of a broader mentoring program will give the trainee a framework for self-assessment, planning, and communication:

- Assessing current skills, interests, and strengths and their progress in the program;
- Establishing target dates for academic and research milestones;
- Developing a plan for skill development to meet academic and professional goals;
- Set goals and sub-goals for the next year, including how to spend their time;
- Defining in detail the approach they plan to take in order to obtain the specific skills and strengths needed (e.g. courses, technical skills, teaching, supervision) along with an anticipated time frame for obtaining those skills and strengths;
- Helping define career goals and create annual plans to reach goals;
- Providing a tool that can be used to provide structure for conversations between the student and their mentor;
- Communicating and collaborating with colleagues and potential employers about evolving goals and related skills;
- Using the IDP to make sure student and adviser expectations are clearly outlined and in agreement so that there are no big surprises, particularly towards the end of doctoral training;
- The IDP is meant as a living document, to be modified as the student moves through the program to help solidify goals and plans.

Students are encouraged to take advantage of this opportunity to reflect on their success and challenges from the previous year and work towards key milestones and anticipate challenges in the coming year(s). They are encouraged to use the questions in the IDP as a starting place for thinking; they should not feel the need to respond to all questions, if some are less relevant for the individual, and the student should feel free to also consider addressing other aspects not included in the structured IDP questions.

IDP AND ANNUAL REVIEW COMPONENTS

The annual review will have three components:

1. Student self-assessment and IDP
2. Monitoring of progress in the program
3. Written feedback from the department to the student.

STUDENT SELF-ASSESSMENT AND IDP

At the start of each academic year students will complete or update the self-assessment and IDP. They will meet with their adviser in person to discuss the IDP no later than the end of fall semester/2nd term. If insufficient progress is being made (e.g. failing grades, inadequate progress), the student may be placed on probation prior to the start of the spring semester/3rd term.

Students in the second year and beyond will document their accomplishments from the past year and note specifically any accomplishment(s) and activities not presently reported (i.e. papers in review/published, posters presented, presentations or guest lectures given, and/or grant proposals in progress, submitted or funded). Students should note if they had any teaching assistant (TA) duties.

Students should include short- and long-term research/academic/ professional goals, for the next year and beyond, how their progress in the past year has contributed to those goals, how their planned activities in the next year will contribute to their longer-term goals, and any impediments they see to reaching those goals.

Students should note issues that could impede their progress in the program or in terms of their broader professional goals. Students should also identify and discuss new activities and opportunities that could assist them in achieving their goals.

MONITORING STUDENT PROGRESS IN THE PROGRAM

If the student has not completed their qualifying written and oral exams, then the student will schedule an in-person meeting with their adviser and another faculty member, if desired (e.g. co-adviser or track director), to review the IDP. If the student has completed their qualifying written and oral exams, then this meeting will be done in conjunction with a thesis advisory committee meeting. There should be mention of a timeline for meeting program goals and degree completion; and any concern regarding performance. Funding, research changes, TA expectations, etc. should be confirmed and clarified as well. Concerns, questions and needed clarifications should be addressed in this meeting. If there are irreconcilable concerns between the student and adviser, the track directors should be consulted with next steps potentially engaging the Departmental chair in the discussions. After the meeting, the student will write a brief summary of their goals and plans for the next year and sends it to their adviser for their comments and feedback. The completed form is then emailed to the academic coordinator as documentation that the IDP was completed and discussed between student and adviser. Students who have successfully passed the School-wide preliminary oral exam will meet with their thesis advisory committee every six months until program completion. A report of each meeting will be documented on Form C- Thesis Advisory Committee Meeting Evaluation and submitted to the academic coordinator to be include in the students file.

DEPARTMENTAL FEEDBACK TO THE STUDENT

Each year the Department will provide written feedback to the student. Feedback will be in the form of a letter detailing the student's progress and deficiencies, evidence of completion of the IDP process and discussion, and summary of specific goals and expectations for the next year.

REPORTING AND RECORDS

The Department is responsible for initiating the IDP/annual review process and ensuring its completion even if a student or adviser does not comply or engage in the process.If a student does not respond to requests to participate in the annual review process, a note will be placed with the Department's tracking system citing that the student did not comply. Non-compliance will result in probation. In the event the adviser is unable or unwilling to complete the annual review process the department will select another faculty member to complete the review. The Department chair will discuss the implications of non-compliance of faculty mentors with the IDP process.

Milestones

Written Comprehensive Examination

A written comprehensive exam is required of all doctoral students. The examination will be taken upon completion of the EHE-required PhD core courses and a substantial proportion of the track-required courses. The track directors will send written notification of the successful completion of the examination to the academic coordinator. If a student fails the exam they can be terminated from the program. Track directors will decide if a student will be permitted to re- take the exam, and if so, whether they will be examined on a particularly weak area or be required to take another complete exam comprised of new questions. Only one reexamination may be permitted. Failing the reexamination will result in termination from the program. Doctoral students who are not able to continue in the program may request a transfer to the MHS or ScM.

Research Proposal

All PhD students are required to develop a written proposal to prepare for the preliminary oral examinations. The proposal will be in the form of a standard NIH or other funding agency format. In general, the grant proposal will be drafted as a component of the Writing Scientific Papers and Grant Writing courses. It is the responsibility of the adviser to inform the student if there are any track-specific deviations from this requirement.

Departmental Practice Oral Evaluation

In preparation for taking the School-wide preliminary oral examination, all PhD students of the Department of Environmental Health and Engineering are required to achieve satisfactory performance on a Departmental practice oral evaluation. This evaluation provides an opportunity for the student to demonstrate the effective verbal communication skills and the ability to engage in scientific exchange that will be tested on the official formal School-wide preliminary oral examination..

The evaluating committee will consist of five faculty members with primary or joint appointments in EHE: four from the student's track (including the adviser) and one from within the Department but outside the student's track. The most senior faculty member (excluding the student's adviser) will serve as the chair of the evaluation process. Students should work with their adviser to select the faculty composition and exam time and complete the Departmental oral evaluation form.

School-wide Preliminary Oral Examination

The School-wide preliminary oral examination (POE), administered by the School's Office of Academic Affairs under University guidelines, determines whether the student has the ability, depth, breadth, and knowledge to undertake significant doctoral-level research in their specialized area of interest. The examination should be taken at the earliest feasible time, no later than the end of the student's third year in residence, and before significant engagement in dissertation research.

The School provides guidance for conduct of the preliminary oral exam for PhD students (https://my.jhsph.edu/StudentDocuments/JHSPH-PhDPreliminaryOralExam-Guidance-28July2018.pdf). The student and their adviser are responsible for initiating arrangements for this examination. Requests for scheduling the exam must be sent to the School's Office of Records and Registration at least one month prior to the examination; therefore, the form must be submitted in advance of this time to the academic coordinator. All members of the committee must be present at the scheduled exam location. If the student fails the preliminary oral examination and is permitted a re-examination, they must be re-examined within one year.

Thesis Advisory Committee

Upon successful completion of the preliminary oral examination, a thesis advisory committee will be formed to provide continuity in the evaluation of progress and development of the student. The principal responsibilities of the committee are to review the student's dissertation proposal, to advise and guide the student's research, and to read and evaluate the student's final dissertation. Students work in consultation with their adviser and/or track directors to select members of the committee. The committee consists of the student's adviser and two to four other faculty members from both inside and/or outside the student's Department with expertise in areas relating to the proposed research of the student. Membership of the committee may change as dictated by the needs of the student and direction of the research.

It is required that the student will meet formally at least twice per year (every six months) with the committee, beginning six months after the successful completion of the school-wide preliminary oral examination and continuously until the final defense. At these meetings, the student will present progress on their thesis project and the committee will offer advice. For each meeting, an evaluation (completed Form C - Thesis Advisory Committee) of the student's development and progress will be prepared by the adviser in consultation with the committee, discussed with the student, and submitted to the academic program administrator to be included in the student's file. As the thesis project progresses, the committee may indicate a target date for completion of the thesis research. Noncompliance with committee meeting requirements is grounds for dismissal from the program.

Final Oral Defense and Public Seminar

The committee of thesis readers shall conduct the oral defense of the thesis after the thesis advisory committee agrees that the candidate is ready for the formal defense (also known as final oral exam or FOE). During this defense the committee shall evaluate:

I.The originality and publication potential of the research;

II.The candidate's understanding of the details of the methodologic and analytic work;

III.The final quality of the written thesis document.

The final oral examination is a defense of the thesis before a committee of at least four readers. Guidance on committee composition can be found on the doctoral candidate information page. Once a date for the defense has been agreed upon by the committee of thesis readers, a formal request for the final oral defense should be submitted to the Office of Records and Registration at least one month prior to the exam date. This should be submitted in advance of the one-month period to the academic coordinator for processing. The adviser will confirm that the thesis is in a final form, is ready to be submitted to the readers, and that all other School and Department requirements for the degree have been fulfilled. Readers must have at least one month to read the thesis before the final examination is held as they might have suggested revisions as well. All doctoral candidates are required to give a formal presentation of their completed thesis work at a public seminar.

Doctoral students will have up to 30 days after the final defense to make corrections and submit their electronic dissertation. All doctoral students must remain registered during this time. If the funding has not gone over the total number of years allotted, they will receive stipend and health insurance coverage for these 30 days. After the 30 days, they will be terminated from payroll as a graduate student in the Department. Students on the School health plan are responsible for cancelling their insurance and should contact Student Accounts.

The Department requires one bound copy of the dissertation. The School recommends using Thesis on Demand. The binding should be black with the students name, degree, and year on the spine; dissertation title and name on the front. The Department does not cover the cost of electronic thesis submission or binding. All Departmental copies are placed in an accessible Departmental archive.

PhD Program Policies

Time to Completion

PhD students have seven years from the time of matriculation to complete their degree requirements. However, it is expected that all doctoral students will have completed the program within five years after matriculation. Students will receive a maximum of five years of funding from the program, dependent on continued satisfactory progress. Student funding beyond five years is not available. A formally approved leave of absence does not count toward this time.

Faculty Advisers

PhD students are assigned a faculty adviser once they are admitted to the program. The adviser serves as the primary contact for the Department and will assist the student with course selection each term, planning research rotations if appropriate, preparation of journal club and seminar presentations, and the interpretation of Departmental and School policies. This initial, or academic, adviser may or may not become the student's research adviser. As early as the first year, a thesis research adviser is selected to serve as the student's adviser for the conduct of their research. This selection, however, does not exclude significant interactions with other members of the faculty. The faculty adviser must approve student registration and course plans (as applicable). At the end of each academic year, the adviser and the student must review academic progress and determine plans that will keep the student on track toward graduation. This information is also reviewed by the student's doctoral track director(s) and the academic coordinator. If the student wants to change advisers, they must discuss the reasons with their track director(s) and submit a request to the academic program administrator. Such changes are considered upon mutual agreement and availability of an appropriate adviser. Changes will be noted on the students' transcript.

Doctoral Registration

In addition to the School's residency requirement, full-time doctoral students in the Department must register on a continuous basis for a minimum of 16-credits each academic term. Registration is not required during the summer* or interim sessions and tuition funding is typically not provided for these terms. All students are required to discuss course registration with their adviser prior to the start of each term. Full-time students who fail to register by the published deadlines during a regular academic term will incur a late registration fee from the School that must be paid by the student. If a student still does not register after the add/drop deadline for the term, they will be considered withdrawn by the School and the Department. Note: Some students will be registered by the Department during the summer term for administrative purposes; however, this registration does not imply that didactic courses will be funded.

Assessment of Progress

In order to monitor and document adequate academic performance and progress, a review of the doctoral student's grades and activities is carried out continually. This information is reviewed by the adviser, the doctoral track directors and the academic coordinator. In addition to maintaining satisfactory academic progress and being in good standing with departmental standards, each student must successfully complete a comprehensive written examination, departmental practice oral evaluation, and the school-wide preliminary oral examination. Failure to successfully complete any of these requirements will be grounds for dismissal from the program.

Seminars and Retreat

In addition to attendance at formal courses, students are required to attend Departmental and program seminars and track journal club. Students are also required to attend the EHE Grand Rounds in which Hopkins faculty, scientists from other institutions, and alumni are invited to present cutting-edge research findings. In addition, students will attend and present (once per year in years 2-4) their ongoing research at the EHE Student Seminar series and attend the annual Departmental research retreat.

Attendance

Students are required to attend all classes, including journal clubs and seminars, and actively participate. Scheduling conflicts that arise must be discussed with the student's adviser. Since research and practice are fundamental parts of the curriculum, it is required that students will work (with the approval of their adviser) in the laboratory, or pursue other research, including participation in public health practice opportunities during term breaks. Non-compliance with attendance is grounds for probation or dismissal from the program.

Vacation

Students will take no more than two weeks' vacation per academic year (University holidays are approved time off and are not included in the two weeks' vacation). Students must discuss all plans for vacation or other absences with their adviser. Non-compliance with vacation is grounds for probation or dismissal from the program.

Learning Outcomes

Training Competencies

The goal of PhD training in EHE is to, through core and track-specific courses, research rotations, qualifying examinations, and mentored research, prepare graduates to be independent investigators who engage in scholarship that creates new knowledge, use research to transform practice and improve environmental health, and effectively communicate research findings.

We expect graduates of the PhD program to be able to:

1. Describe all aspects of the environmental health paradigm (from sources to health effects) for a range of agents and stressors and scales from local to global
2. Identify common environmental health hazards and risks
3. Understand the interdisciplinary nature of environmental health research
4. Explain core epidemiological concepts
5. Explain the role of law, policy, and regulations in environmental health protection
6. Explain concepts of risk assessment and management to assess and control environmental health risks
7. Utilize statistical techniques to support research designs and perform data analyses
8. Write and critique a grant proposal in the NIH format
9. Evaluate and critique a body of literature in order to assess the state of knowledge and research gaps
10. Develop a specialized area of knowledge within one of the Department's academic tracks
11. Develop a set of research tools and skills needed to conduct independent research
12. Develop, conduct, and defend original research that is worthy of publication and leads to a completed thesis
13. Communicate research results to technical and lay audiences
14. Translate research findings into practice

Non-Degree Training

Certificate Programs

Four certificate programs are offered by the Department of Environmental Health and Engineering:

- Climate and Health (https://www.jhsph.edu/academics/certificate-programs/certificates-for-hopkins-and-non-degree-students/climate-change-and-public-health-certificate.html)
- Environmental and Occupational Health (https://www.jhsph.edu/academics/certificate-programs/certificates-for-hopkins-and-non-degree-students/environmental-and-occupational-health.html)
- Food Systems, the Environment and Public Health (https://www.jhsph.edu/academics/certificate-programs/certificates-for-hopkins-and-non-degree-students/food-system-envir-publ-health.html)
- Humane Sciences and Toxicology Policy (https://publichealth.jhu.edu/academics/humane-sciences-and-toxicology-policy-certificate-program/)
- Product Stewardship for Sustainability (https://publichealth.jhu.edu/academics/product-stewardship-for-sustainability-certificate-program/)

Postdoctoral Opportunities

Postdoctoral fellows spend virtually all their time conducting research in the laboratory of their faculty mentor. While the focus is on conducting research, in consultation with their faculty mentor, postdoctoral fellows have the opportunity to take selected courses that may advance their training and research capabilities. Attending and giving seminars, journal clubs, and participating in research retreats are also an integral part of the postdoctoral training experience.

A prospective postdoctoral candidate should directly contact a member of the Department of Environmental Health and Engineering faculty (https://ehe.jhu.edu/people/faculty/) with whom they wish to work. The faculty member will request letters of reference and an interview may be required as well. Once the faculty member decides to accept a postdoctoral fellow, the departmental chair or administrator is notified for approval, including verification of adequate funding for the postdoctoral candidate. Once the department approves the appointment, an acceptance letter with details on funding and terms of appointment is sent to the postdoctoral candidate.

Summer Institute in Environmental Health and Engineering

The Summer Institute courses (https://ehe.jhu.edu/non-degree-programs/summer-institute-in-environmental-health-and-engineering/) are designed for practicing public health professionals with responsibilities for health, safety, and environmental matters in government agencies, non-government organizations, and industry; and for students who are interested in learning more about environmental health sciences concepts. The courses may be taken for academic or non-credit. The Summer Institute in Environmental Health and Engineering is held in June.

Department of Epidemiology

About

The mission of the Department of Epidemiology (https://www.jhsph.edu/departments/epidemiology/) is to improve the public's health by training epidemiologists and by advancing knowledge concerning the causes and prevention of disease and the promotion of health. As the oldest autonomous academic department of epidemiology in the world, the Department of Epidemiology at the Johns Hopkins Bloomberg School of Public Health has maintained leadership in fulfilling this mission.

The Goals of the Department are to

- Provide the highest quality education in epidemiology and thus prepare the next generation of epidemiologists
- Advance the science of epidemiology by developing new methods and applications
- Use epidemiologic methods to investigate the etiology of disease in human populations
- Use epidemiologic methods to evaluate health care delivery, prevention, and health promotion programs
- Develop methodologies for translating epidemiologic research findings into clinical medicine
- Develop approaches for applying the findings of epidemiologic research in the formulation of public policy and participate in formulating and evaluating the effects of such policy

Students gain proficiency in study designs, measurement, and inference to illuminate the distribution and determinants of health states—as they identify and evaluate strategies for the prevention and control of disease in human populations. Faculty continue to honor the legacy of excellence set forth in the early days of the Department's founding—bolstering our growth, development, and numerous contributions to the field. A history of the Department (https://www.jhsph.edu/departments/epidemiology/about/history.html), as well as a complete list of affiliated Centers and Institutes, may be found on the Department's website: https://publichealth.jhu.edu/departments/epidemiology (https://publichealth.jhu.edu/departments/epidemiology/).

Departmental Governance

Chair and Vice-Chairs

Responsible (https://my.jhsph.edu/sites/EPI/committeerolesandresponsibilities/default.aspx) for leading the academic and research vision for the Department

- Chair: David D. Celentano, ScD; Charles Armstrong Chair and Professor (https://www.jhsph.edu/faculty/directory/profile/122/david-d-celentano/)
- Vice-Chair for Research and Administration: Shruti H. Mehta, PhD; Professor
- Vice-Chair for IDARE (Inclusion, Diversity, Anti-Racism, and Equity): Otis Brawley, MD; Bloomberg Distinguished Professor (https://publichealth.jhu.edu/faculty/3877/otis-brawley/)
- Vice-Chair for Educational Programs: Stephan Ehrhardt, MD; Associate Professor (https://publichealth.jhu.edu/faculty/2694/stephan-ehrhardt/)
- Vice-Chair for Faculty: Priya Duggal, PhD; Professor (https://publichealth.jhu.edu/faculty/2134/priya-duggal/)

Faculty Executive Committee

The faculty executive committee members are elected and appointed by the chairs and the faculty of the department to represent the faculty and take on the responsibility and work of formulating solutions/policies for any Department issues, so options can be clearly and succinctly presented to the full faculty for discussion and decisions.

Research Track Directors

The Tracks were established to help trainees develop their expertise and specialize in different areas of epidemiologic research. The tracks help to establish the curriculum and provide trainees with guidance in major domains of epidemiology. The Tracks also help the Department student body to develop a sense of camaraderie and passion around these 8 domains:

- Cancer Epidemiology: Kala Visvanthan, MD; Professor (https://www.jhsph.edu/faculty/directory/profile/1129/kala-visvanathan/)
- Cardiovascular and Clinical Epidemiology: Liz Selvin, PhD; Professor (https://www.jhsph.edu/faculty/directory/profile/1882/elizabeth-selvin/)
- Clinical Trials and Evidence Synthesis: Ann Margret Ervin, PhD; Associate Scientist (https://publichealth.jhu.edu/faculty/1881/ann-margret-ervin/)
- Environmental Epidemiology: Eliseo Guallar, MD, DrPH; Professor (https://www.jhsph.edu/faculty/directory/profile/844/eliseo-guallar/)
- Epidemiology of Aging: Jennifer A. Schrack, PhD; Associate Professor (https://www.jhsph.edu/faculty/directory/profile/2686/jennifer-a-schrack/)
- General Epidemiology and Methodology: Bryan Lau, PhD; Associate Professor (https://www.jhsph.edu/faculty/directory/profile/1592/bryan-lau/)

- Genetic Epidemiology: Christine Ladd-Acosta, PhD; Associate Professor (https://publichealth.jhu.edu/faculty/2787/christine-m-ladd-acosta/)
- Infectious Disease Epidemiology: Becky Lynn Genberg; PhD; Associate Professor

Degree and Program Directors

- Post-Doctoral Fellowships Co-Directors: Casey M. Rebholz, PhD; Associate Professor (https://publichealth.jhu.edu/faculty/3208/casey-m-rebholz/) and Josef Coresh, MD, PhD; George W Comstock Professor (https://publichealth.jhu.edu/faculty/155/josef-coresh/)
- Doctoral Program Co-Directors: Eliseo Guallar, MD, DrPH; Professor (https://www.jhsph.edu/faculty/directory/profile/844/eliseo-guallar/)and Anne F. Rositch, PhD; Associate Professor (https://www.jhsph.edu/faculty/directory/profile/3087/anne-fortino-rositch/)
- Masters Program Co-Directors: Corinne Joshu, PhD; Associate Professor (https://www.jhsph.edu/faculty/directory/profile/2436/corinne-e-joshu/) and Catherine Sutcliffe, PhD; Associate Scientist (https://www.jhsph.edu/faculty/directory/profile/2280/catherine-gayle-sutcliffe/)
- BA-MHS Program Co-Director: Aruna Chandran, MD; Senior Scientist (https://publichealth.jhu.edu/faculty/1612/aruna-chandran/)

Epidemiology Administration

Central Administration oversees the Department's policy-making, financial management, research administration, human resources and payroll, and degree program leadership.

General Admin E-mail Contact: EPIADMINAP@jhu.edu

- Department Administrator: Thomas P. Bogdan
- Assistant Administrator & Sr. Financial Manager: April Hawkins
- Financial Manager: Steven D Bonaccorsi
- Human Resources information (BHRSCustomerServices@jhu.edu)

Academic Support Core and Student Funding

The Academic Support Core (https://www.jhsph.edu/departments/epidemiology/academic-support-core/) oversees the advancement of epidemiologic education and research for students and faculty through the coordination, management, and dissemination of Departmental courses, programs, and communications.

General Academic Core E-mail Contact: jhsph.epiasc@jhu.edu

- Director of Graduate Education and Instructor: Laura Camarata, MPH
- Senior Financial Manager, Matthew Miller
- Instructor: Ayesha Khan, DrPH
- Instructor: Allyn Arnold, SCM
- Communications Associate, Jonathan Eichberger, MA
- Senior Academic Program Manager: Frances S Burman, MSEd
- Academic Program Manager: Justin Switzer, MLS
- Senior Academic Program Coordinator: Ebony A Moore
- Academic Program Coordinator: Julie Thorne
- Academic Program Coordinator / Student Funding Coordinator: Jordan Meredith
- Academic Services Assistant: Sheila Small

Epidemiology Student Organization

Organization

The Epidemiology Student Organization (https://www.jhsph.edu/departments/epidemiology/eso/) (ESO) was established in 1982 to facilitate student-to-student and student-to-faculty communication in the department and to advocate for student needs. The organization is composed of all students associated with the Department of Epidemiology. It is a forum for planning various student activities, ranging from volunteer opportunities to social activities. The organization is open to new ideas and initiatives from the student body, and all epidemiology students are encouraged to actively participate in ESO activities. ESO meetings are open and encouraged to all students and are generally held on the first Monday of the month from 12:15-1:20 PM. E-mail Contact JHSPH.ESO@jhu.edu.

Alumni Engagement

Please join our alumni network (https://www.jhsph.edu/alumni/)for engagement opportunities, career news and information, and events around the world.

Professional Organizations

Students are strongly encouraged to join professional organizations related to their topical research interests and to attend and present their research at scientific conferences sponsored by those organizations. For a list of conferences of Interest as provided by Track Directors, please visit the Epi Intranet Site's (https://my.jhsph.edu/sites/EPI/default.aspx) *Epi Academic Resources* section ("JHSPH EPI Conferences of Interest").

Society for Epidemiologic Research

The Society for Epidemiologic Research (SER), established in 1968, provides a forum for sharing the latest in epidemiologic research and for student research presentations. The SER sponsors the *American Journal of Epidemiology* and *Epidemiologic Reviews*, and the annual SER meeting, which includes the John C. Cassel Memorial Lecture and contributed papers, symposia, and posters on a wide range of epidemiologic issues. Each year SER selects a limited number of students from the abstracts submitted to the annual conference to participate in an intense peer review/professional training workshop in which the students work with the faculty. This pre-conference activity provides the students with a venue to polish their work and provides an extra level of support and training at the professional level. Students are strongly encouraged to join the organization. The department has a limited amount of bulk memberships that can be requested by doctoral students in their second through fourth years, free of charge to the doctoral student. Applications are available online (https://epiresearch.org/).

American College of Epidemiology

The American College of Epidemiology (ACE) is a professional organization whose mission is to develop criteria for professional recognition of epidemiologists and to address their professional concerns. Its goals are to advocate policies and actions that enhance the science and practice of epidemiology; promote the professional development of epidemiologists through educational initiatives; to recognize excellence in epidemiology, and to develop and maintain an active membership base of both Fellows and Members representative of all aspects of epidemiology. Students are encouraged to participate as student (associate) members and are recognized annually through the Student Prize Paper for excellence in research. The Annual Awardee is invited to present their paper at the annual meeting. Information on the ACE is available online at https://www.acepidemiology.org (https://www.acepidemiology.org/)

American Public Health Association

The American Public Health Association (APHA) serves as the umbrella organization for public health and publishes the *American Journal of Public Health*, a print newsletter. The annual conference draws over 10,000 attendees and the APHA offers career search and mentoring services to become familiar with the profession. More information can be found online at https://www.apha.org/.

Scientific Publications:

American Journal of Epidemiology (AJE)

The *American Journal of Epidemiology* is the premier epidemiological journal devoted to the publication of empirical research findings, opinion pieces, and methodological developments in the field of epidemiological research. It is a peer-reviewed journal aimed at both fellow epidemiologists and those who use epidemiological data, including public health workers and clinicians. http://www.oxfordjournals.org/our_journals/aje/about.html. The *American Journal of Epidemiology* is published on behalf of the Department of Epidemiology and has been based in the department since its inception in 1920.

Epidemiologic Reviews

Epidemiologic Reviews, a sister publication of the *American Journal of Epidemiology*, is devoted to publishing comprehensive and critical reviews on specific themes once a year. Recent issues included the topics The Obesity Epidemic, Epidemiologic Research on Health Disparities, and Epidemiologic Approaches to Global Health. Department Chair, David Celentano, Professor of Epidemiology, currently serves as the Editor-in-Chief. http://epirev.oxfordjournals.org/

Research Focus

The Department is loosely grouped around 8 research focus "homes" called tracks. Tracks (https://www.jhsph.edu/departments/epidemiology/tracks/) are the substantive and methodologic educational units of the Department. They comprise faculty, staff, students, and fellows. The Department has eight tracks, each of which has a curriculum beyond the Department's core curriculum. Tracks are led by Track Directors. Each Track holds Journal Clubs, Research-in-Progress meetings, and other activities that Track students are expected to attend. These activities are opportunities to engage and interact with Track faculty, other students, and post-doctoral fellows, and to participate and present in the topic area of the student's Track. These opportunities are open to all students in the Department. Students are encouraged to attend activities of interest outside of their Track as well.

Cancer Epidemiology

Cancer epidemiology is the study of the distribution, frequency, and determinants of cancer and disease progression in populations worldwide. A greater understanding of the factors that impact cancer is crucial to developing effective preventive strategies to control the disease and minimize its burden. The cancer epidemiology track provides in-depth training in population-based, clinical epidemiology research related to cancer prevention, screening, early detection, and disease progression, with a focus on the more common cancers. Our graduates have made successful transitions to positions in academia, government, and private sector organizations. The track benefits from its close links with the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins, an NCI-supported training grant in cancer epidemiology, prevention, and control, community and clinical cohort studies, as well as national/international collaborations.

Cardiovascular and Clinical Epidemiology

Cardiovascular and clinical epidemiology includes the study of the determinants and distribution of cardiovascular diseases and other leading causes of disease burden in the population and approaches to their control. Training focuses on the use of epidemiologic methods in clinical research as well as interdisciplinary training on the epidemiology of cardiovascular disease. The program integrates knowledge on all aspects of disease etiology and control, including biology, behavior, prevention, and treatment. The main didactic course focuses on risk factors for cardiovascular disease and strategies for prevention. Seminar-style courses offer a more in-depth understanding of disease pathophysiology and clinical management and the role of epidemiology in informing clinical practice. Training emphasizes active participation in research and translational epidemiology using a collaborative approach, which is enhanced by close relationships between the Department of Epidemiology and clinical departments of the Johns Hopkins School of Medicine at the Johns Hopkins Hospital. The curriculum is designed to accommodate both clinical fellows who are interested in receiving a degree from the Department of Epidemiology and students who may not have a formal background in clinical medicine. A number of large ongoing cohort studies and clinical trials provide a rich environment for the conduct of research.

Clinical Trials and Evidence Synthesis

Randomized clinical trials and their synthesis using systematic reviews are important to evaluate interventions. The Clinical Trials and Evidence Synthesis (CTES) Track focuses on research and teaching of key methods that make clinical trials less prone to confounding and some biases than observational study designs. Systematic Review Methodology is another cornerstone of the track. CTES offers a modern curriculum, journal clubs, research in progress meetings, a seminar series, and hands-on training with clinical trialists and systematic reviewers. CTES faculty and post-docs have been coordinating large, often international multicenter clinical trials across a variety of content areas like pulmonary medicine, gastroenterology, ophthalmology, neurology, psychiatry, and infectious diseases for decades. These trials and modern approaches to evidence synthesis like network meta-analysis offer ample opportunities for training, scientific discourse, and methods development.

Environmental Epidemiology

Environmental Epidemiology concentrates on the impact of environmental exposures on health and disease states in human populations. Environmental Epidemiology is a multidisciplinary activity that integrates epidemiological methods, assessment of environmental exposures, and understanding of specific disease processes to identify the health consequences of environmental exposures. Environmental Epidemiology provides basic information for risk assessment, risk communication, and environmental health policy decisions and has a central role in identifying, implementing, and evaluating strategies for the prevention and control of environmental exposures. Training in Environmental Epidemiology emphasizes active participation in large population research projects, with close collaborations across the School and with national and international collaborators.

Epidemiology of Aging

The Epidemiology of Aging is the study of disease distributions and trends that are most prominent in older adults. The primary focus of the program is studying contributors to – and consequences of – age-related physical and cognitive decline. A secondary focus of the program is on the interaction of aging with disease processes, including but not limited to Alzheimer's disease, cancer, and HIV. In addition to the core curriculum, students are encouraged to engage in monthly journal clubs, bi-monthly research-in-progress seminars, and monthly seminars on aging with invited experts both internally and externally to Johns Hopkins. The Center on Aging and Health is an additional valuable resource that provides students the opportunity to interact with faculty across multiple disciplines within the Schools of Public Health, Nursing, and Medicine, and to engage in ongoing research projects. COAH is also home to the Epidemiology of Aging and Biostatistics training program, which includes T-32 funding for eligible students.

General Epidemiology and Methodology

General Epidemiology and Methodology is designed for individuals who seek to be a generalist rather than focus on a specific area (e.g., genetics or trials) or specific disease area (e.g., cancer). Therefore, students within General Epidemiology and Methodology are able to individually tailor their educational focus. To help achieve this, within General Epidemiology and Methodology we have three sub-tracks: a) individualized, b) methodological, and c) pharmacoepidemiology.

For the individualized sub-track, students can design their own educational programs in conjunction with their advisers. Students focusing on methodology often would like to position themselves at the intersection of epidemiological methods and biostatistics. Therefore, the recommended courses within the methodology track reflect this emphasis. Doctoral students with a methodology focus are highly encouraged to take the 140.651-140.654 Methods in Biostatistics series (in the second year). Furthermore, doctoral students with a methodology focus are encouraged to take the Biostatistics 140.646 - 140.649 series on probability and statistical inference and apply for the Concurrent School-Wide Master of Health Science Program in Biostatistics (https://publichealth.jhu.edu/academics/mhs-dept-of-biostatistics/concurrent-school-wide-master-of-health-science-program-in-biostatistics/) program.

The last sub-track focuses on pharmacoepidemiology, which is the study of the utilization and effects of drugs at the population level. The training focuses on providing students with the core knowledge of pharmacoepidemiology and drug safety. Finally, the burgeoning field of Social Epidemiology is housed within General Epidemiology. Students interested in measuring the social, demographic, and structural factors that impact population health and health equity are encouraged to meet with our social epidemiology faculty, select from several electives to provide a strong basis in the field, and participate in the school-wide Social Epidemiology Student Organization and Journal Club.

Genetic Epidemiology

Genetic Epidemiology is the study of the human genome and its role in complex diseases. Genetic Epidemiology focuses on the study of genetic and environmental factors and their interaction in complex diseases and in normal variations. Emphasis is on understanding the methodology and approach to designing, executing, and analyzing human genetic studies. This includes didactic learning, hands-on learning with real data, and discussion of literature. Training is broad-based and collaborative and encourages participation in research from faculty in the Johns Hopkins Bloomberg School of Public Health, the Institute of Genetic Medicine, and the School of Medicine.

Infectious Disease Epidemiology

Infectious disease epidemiology is the study of the distribution and control of infectious diseases in humans. It is a diverse field with studies ranging from cohort studies of chronic infections such as HIV to mathematical modeling of disease transmission to the emergence of disease across the human-animal interface. The infectious disease track's curriculum reflects the diversity of infectious disease epidemiology, with required classes focusing on critical biomedical knowledge and methodological techniques to provide a strong foundation for students with a diverse focus on problems in epidemiological research and practice. These include courses providing a broad overview of important infectious diseases and methods for their study, how the human body responds to pathogen exposure, and study design. In addition to the core courses, the track conducts regular journal clubs and research in progress meetings for students and faculty to exchange ideas and discuss the latest developments in the field. The large and diverse faculty affiliated with the track also affords students numerous opportunities to engage with individual research groups on topics.

Programs / Departmental offerings (https://www.jhsph.edu/departments/epidemiology/programs/)

Summer Institute

The Graduate Summer Institute in Epidemiology and Biostatistics (https://www.jhsph.edu/departments/epidemiology/continuing-education/graduate-summer-institute-of-epidemiology-and-biostatistics/) offers short, intensive courses in epidemiology and biostatistics intended to develop an understanding of the principles, methodologic strategies, and practical aspects of epidemiological research. The Department has offered the Summer Institute Program since 1983 and has trained thousands of students from the U.S. and around the world. Institute participants include students, clinicians, public health practitioners, physicians in training, and those considering a career in public health. Current postdoctoral fellows and degree-seeking students in epidemiology must pay 100% of institute tuition themselves. The minimum credits registration and its associated postdoctoral tuition apply in terms 1-4. Summer Institutes are outside of terms 1-4.

Statement on Inclusion and Diversity

JHSPH Epidemiology believes in Equity, Diversity & Civility, and is dedicated to developing solutions and responses that are meaningful, sustainable, and that do not duplicate activities that are already being done elsewhere in the School. (https://www.jhsph.edu/about/school-wide-initiatives/diversity-and-inclusion/) The Department of Epidemiology denounces individual and systemic racism in all its forms. Developing meaningful and lasting solutions requires collaboration, research, and time. The department's full statement on Racism as a Public Health Problem (https://www.jhsph.edu/departments/epidemiology/_pdf/Letter_on_Racism.pdf), a video (https://youtu.be/W16dp1UNsMc/) of our intent, and accompanying commitments, can be found on the Epidemiology Intranet Site (https://my.jhsph.edu/sites/EPI/Pages/Epi-Combatting-and-Addressing-Racism.aspx) ("Epidemiology Statement - Racism is a Public Health Problem").

Department diversity and inclusion activities fall under three broad overarching goals:

- Communicating epidemiologic science to broad audiences;
- Addressing how diversity influences our epidemiology practice and honoring the diversity in the audiences of our science; and
- Fostering a culture of diversity and inclusion in the Department

Each goal includes short-term and long-term activities for faculty, students, and staff. Some of these activities have already begun and others are still in the planning phase. These activities below are only those that are sponsored or led by the Department; please see 'Diversity and Inclusion Additional Resources (https://www.jhsph.edu/about/school-wide-initiatives/diversity-and-inclusion/resources/)' for a list of other resources offered through BSPH that are outside of the Department.

GOAL 1: Communicating epidemiologic science to broad audiences

- Host a series on "Communication of Epidemiologic Data" that can be embedded into Current Topics and would be open to faculty, staff, and students. Additionally, the department is exploring interactive workshops that could be held at Epidemiology Student Organization (ESO) meetings that follow-up on the topics discussed in a larger session
- Review the epidemiology core competencies and explore which competencies could be expanded to include a diversity component

GOAL 2: Addressing how diversity influences epidemiology practice and honoring the diversity in the audiences of our science

- Educate course instructors about how diversity by sex, gender identity, sexual orientation, race/ethnicity, discrimination, religion, socio-economic position, and populations that are understudied influences which epidemiological methods are used and the interpretation of study results
- Expand course offerings on diverse populations and allow student interaction with the populations studied through service-learning courses
- The Department supports a Community Engagement Liaison who coordinates Day at the Market (https://ictr.johnshopkins.edu/community-engagement/programs/day-at-the-market/) opportunities, which students should join. These are Johns Hopkins-coordinated outreach and education sessions to reach community members about health topics every Wednesday. Other sponsors include the Department of Environmental Health and Engineering, the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins, and the Institute for Clinical and Translational Research
- Starting in 1st term of the Academic Year, The Director of Graduate Education (Laura Camarata) directs a Special Studies (340.840) on Community Engagement, giving students credit for participating in the Hopkins Day at the Market
- The Department recommends that master's and doctoral students register for this special studies course once during their degree program. Contact Laura Camarata at lcamarata@jhu.edu for more information

GOAL 3: Fostering a culture of diversity and inclusion in the Department

- To open up the discussion about diversity and inclusion in the Department
- Offer diversity and inclusion training for faculty and staff
- Host student-led workshops and small group discussions on diversity
- Epidemiology Student Organization (ESO) would like to ensure that the group of students who plan activities and events reflect the diversity of the Department and the communities served. If students are interested in helping to develop or plan these events in the coming year or be otherwise involved in ESO events, please contact JHSPH.eso@jhu.edu

Inclusion, Diversity, Equity, and Science (Epi IDEAS) Workgroup

Formed in November 2016 to address the needs of students, staff, and faculty to make a difference in the academic and research life of the department and school. Specifically, to

- Liaise between students, student leaders, and departmental leadership about challenges and opportunities for inclusion, diversity, and equity
- Review and offer suggestions for curricular needs on interpreting scientific findings through a lens of diversity and inclusion
- Design activities that encourage inclusion, diversity, and equity
- Promote a safe learning environment within the Department

The Epi IDEAS group has Epidemiology students, faculty, and staff representation. For more information, contact the Director of Graduate Education, Laura Camarata (lcamarata@jhu.edu).

Additional Resources

Courses on advocacy, media engagement, and research translation

- 308.604.11 (https://www.jhsph.edu/courses/course/26184/2018/308.604.11/effective-writing-for-public-health-change/): Effective Writing for Public Health Change (Summer Institute - HPM)
- 330.638.11 (https://www.jhsph.edu/courses/course/26603/2018/330.638.11/the-science-of-narrative-why-storytelling-is-impor/): The Science of Narrative: Why Storytelling Is Important to Research (Summer Institute – MH)
- 301.645.01 (https://www.jhsph.edu/courses/course/27058/2018/301.645.01/health-advocacy/): Health Advocacy (4th term - HPM)
- 410.663.01 (https://www.jhsph.edu/courses/course/27247/2018/410.663.01/media-advocacy-and-public-health-theory-and-practi/): Media Advocacy and Public Health: Theory and Practice (4th term - HBS)
- 410.721.01 (https://www.jhsph.edu/courses/course/26826/2018/410.721.01/translating-research-into-public-health-programs-i/): Translating Research into Public Health Programs I (3rd term - HBS)
- 410.722.01 (https://www.jhsph.edu/courses/course/27213/2018/410.722.01/translating-research-into-public-health-programs-i/): Translating Research into Public Health Programs II (4th term - HBS)

Resources for policy and community engagement, service, and science communication

- Bloomberg American Health Initiative (https://americanhealth.jhu.edu/)
- Engaging in the Policy Process Seminar Series hosted by the Office of Public Health Practice and Training. Click here for the link (https://my.jhsph.edu/Academics/practice/Pages/default.aspx) to recorded sessions.
- Hopkins Day at the Market (https://ictr.johnshopkins.edu/community-engagement/programs/day-at-the-market/): attracts over 700 community members who learn about health topics

- Johns Hopkins American Muslim Wellness Seminar Series (http://www.jhsph.edu/departments/international-health/news/American-Muslim-Women-A-Panel-Discussion-with-Local-Professionals.html) hosted by International Health Department
- Johns Hopkins Center for Health and Human Resources (http://www.jhsph.edu/research/centers-and-institutes/center-for-public-health-and-human-rights/).
- Public Health United: Science Communication podcast (http://www.publichealthunited.org/) led by students from our school
- SOURCE: http://source.jhu.edu (http://source.jhu.edu/)
- Urban Health Institute (http://urbanhealth.jhu.edu/)

Student groups

- Epidemiology Student Association: email JHSPH.eso@jhu.edu
- Social Epidemiology Journal Club
- Student Assembly (http://www.jhsph.edu/offices-and-services/student-assembly/): For a list of student groups at BSPH, click here (http://www.jhsph.edu/offices-and-services/student-assembly/student-groups/)
- SPARC (http://source.jhu.edu/programs-and-events/students-for-a-positive-academic-partnership-with-the-east-baltimore-community/): Students for a Positive Academic Partnership with the East Baltimore Community
- The Johns Hopkins OUTList (http://studentaffairs.jhu.edu/lgbtq/outlist/membership/)

Training Offerings

- Office of Institutional Equity (Title IX, bias, gender identity, and other MyLearning training courses) (http://oie.jhu.edu/training/)
- Safe Zone Training (https://studentaffairs.jhu.edu/lgbtq/education/safe-zone/)

University Offices

- Diversity at JHU (https://diversity.jhu.edu/)
- BSPH Diversity and Inclusion (https://www.jhsph.edu/about/school-wide-initiatives/diversity-and-inclusion/)
- Office of International Services (http://ois.jhu.edu/)
- JHU Statement on Diversity & Inclusion (http://web.jhu.edu/dlc/resources/statements_diversity_inclusion/)
- Office of Institutional Equity (https://oie.jhu.edu/)
    - Includes an East Medical Campus Location at Reed Hall, Suite 403, 1620 McElderry Street, Baltimore, MD 21205

Conduct and Training

All students, staff, and faculty are expected to abide by the academic (p. 634), behavioral, (p. 648) and research conduct (p. 651) policies of the School and University.

Academic & Research Ethics (and Avoiding Plagiarism) Course Requirement

All students must complete 550.860.82 Academic & Research Ethics (https://www.jhsph.edu/courses/course/29897/2020/550.860.82/academic-research-ethics-at-jhsph/) prior to or during the first term of enrollment in the School. Students must complete the Avoiding Plagiarism training (https://guides.library.jhu.edu/avoidingplagiarism/) developed by JHU's Sheridan Libraries and is an online course. Students must submit the completion certificates as proof of completion of these pieces of training. Subsequent terms registration can be blocked awaiting the completion of these courses.

- Certificate from JHU for the Avoiding Plagiarism module
- Certificate from SPH for completion of the Responsible Conduct of Research module

Students must also send a copy of the certificates to the Senior Academic Program Manager, Frances Burman (FranBurman@jhu.edu) with their name and "Academic & Research Ethics Requirement" in the subject line of the e-mail.

Office of Institutional Equity

The Office of Institutional Equity (https://oie.jhu.edu/) handles many issues. Specifically, this office handles Discrimination and Harassment (https://oie.jhu.edu/discrimination-and-harassment/), Sexual Misconduct (https://oie.jhu.edu/sexual-misconduct/), ADA Compliance and Disability Accommodations (https://oie.jhu.edu/ada-compliance/), Religious Accommodations (https://oie.jhu.edu/religious-accommodations/), and Training (https://oie.jhu.edu/training/). All students must complete Title IX and Harassment Prevention Training (http://lms14.learnshare.com/authenticate/Login.ClientDetect.aspx?Redir=%2fl.aspx%3fCID%3d89%26A%3d1%26T%3d568688). Further, the Department of Epidemiology requires Unconscious Bias Training (https://hr.jhu.edu/learn-grow/diversity-and-inclusion-training/) as well. OIE also defines Confidential Resources (https://oie.jhu.edu/confidential-resources/) and houses the Roadmap to Diversity and Inclusion (https://oie.jhu.edu/diversity/roadmap-on-diversity-inclusion/), the JHU Diversity Leadership Council (https://diversity.jhu.edu/diversity-at-jhu/diversity-leadership-council/), and the office of the Vice Provost for Institutional Equity (https://diversity.jhu.edu/).

Communication

All communications between the Department and the students are conducted via email to the JH.edu address. Therefore, students are required to activate and monitor their emails and respond to requests politely and in a timely fashion. Staff and faculty endeavor to do the same. The Johns Hopkins University-hosted email is an official form of Department-related communication. Students have the responsibility to stay current in this communication while enrolled and recognize that certain communications may be time-critical. Failure to check for messages and failure to receive messages due to full mailboxes, spam filtering, lapses in service, or auto-forwarded email, etc., are not acceptable excuses for missing official communications. Graduates are expected to convert their emails through the Alumni Office (https://alumni.jhu.edu/alumniemail/injhed/).

Academic Policies

The Department of Epidemiology encourages students to identify questions and concerns, research these through this catalogue and the School website, and bring nuanced questions to the Office of the Senior Academic Program Manager, the Director of Graduate Education, or their academic adviser for discussion. All requests for changes to program, track, advising, courses, and departmental requirements should be submitted in writing with the endorsement of the academic adviser for review by the Admissions and Credentials Committee via email in care of FranBurman@jhu.edu.

Advising Changes

The adviser has the responsibility of assisting the student in designing an academic program that meets the student's goals within the framework of the requirements of the Department and School. The adviser guides the student to appropriate resources and research opportunities. The adviser is the first point of contact in resolving academic problems and concerns. For a variety of reasons, a student/faculty member may wish to change adviser/advisee. Student-initiated changes of adviser should be made with the Academic Office, please see Departmental Forms (https://my.jhsph.edu/sites/EPI/Departmental%20Forms/Forms/Public%20listing.aspx) ("Change or Add New Adviser or co-Adviser Form (https://my.jhsph.edu/sites/EPI/Departmental%20Forms/Change%20or%20Add%20Adviser%20or%20Co-adviser%20Form.pdf)"). It is the student's responsibility to meet with the current adviser and the intended or additional adviser prior to the request and to obtain the signatures of both faculty members prior to submitting the request. Please note that epidemiology degree-seeking students seeking a primary adviser change must retain a faculty member with a full-time primary appointment in Epidemiology. Faculty wishing to initiate a change should use the same form and will need to submit a report of the student's progress at the time of this request.

Enrollment Requirements

Masters and doctoral students are considered full-time students and must maintain a minimum registration of 16 credits per term continuously during terms one through four through completion of all degree requirements. Students wishing to drop below 16 credits must consult with their adviser and the Senior Academic Program Manager. International students must also consult the Office for International Services. The minimum credits registration and its associated tuition apply in terms one through four. Summer Term and Summer and Winter Intersessions are outside of terms one through four and, therefore; tuition for Summer and the Intersession or Institutes is the responsibility of the student.

Leave of Absence

The School offers mechanisms for students who need to take medical or other caregiving/care-receiving leaves throughout the program. Students wishing to explore their options should discuss their situations with the Senior Academic Program Manager or the Director of Graduate Education, review the policy statement, (https://www.jhsph.edu/offices-and-services/student-affairs/resources/student-policies/_documents/Academic_Leave_of_Absence.pdf) and file the appropriate Leave-of-Absence form available from the Office of Registration and Records.

Program Changes

Students are expected to complete the degree program they entered based on the review by the Admissions Committee at the time of acceptance to the program. In rare instances, students may request changes to their degree program. It is the student's responsibility to meet with the current adviser and the co-directors of the intended program prior to the request and to obtain the signatures signifying endorsements prior to submission to the Admissions Committee. Transfers from the MHS and SCM to the PhD program are not permitted. Students enrolled in our masters' programs must complete their degree requirements prior to enrolling in the PhD program.

Track changes

Students may find that their research focus changes between the time of application through the time of matriculation. Students may change tracks by submitting the request form (https://my.jhsph.edu/sites/EPI/Departmental%20Forms/Change%20or%20Add%20Adviser%20or%20Co-adviser%20Form.pdf) to the Senior Academic Program Manager through the second term of their first year (December 31), provided they have completed the required courses (offered thus far) for the new Track. Changes to Tracks after this time require the request form, (https://my.jhsph.edu/sites/EPI/Departmental%20Forms/Change%20or%20Add%20Adviser%20or%20Co-adviser%20Form.pdf) letter of request, a plan for completing the courses required of the new track, and written approval from the adviser and intended track's Director. Occasionally, this may require a change in advisers as well. Other instances requiring a change in track include failure of track-related courses or the track-specific section of the comprehensive examination (Part B) and should be discussed with the Senior Academic Program Manager, the adviser, and the current and intended track directors.

Course waivers

The Department expects students to have some familiarity with the field prior to enrollment. In the case where students have successfully completed the coursework required by the track, the director may approve that coursework. The Johns Hopkins University system does not accept transfer credits but does accept previous knowledge. Therefore, students may request waivers of required coursework thus providing time to take additional relevant coursework. Graduate students who believe they have passed equivalent graduate-level courses (with a grade of B or higher) at other institutions may apply for a waiver for courses. Request Forms (https://my.jhsph.edu/sites/EPI/Departmental%20Forms/Course%20Waiver%20Form.pdf) should be sent to the Senior Academic Program Manager, Frances Burman. Requests must include a clear rationale, a course syllabus, and a transcript (unofficial is okay) from the institution where the course was taken. Waiver requests require adviser and primary instructor (if Epidemiology course) consent, as well as approval from the Admissions and Credentials Committee. Waivers of Track required courses require approval from the Track director as well. The Epidemiologic Methods sequence 340.751-753 and completion of either 140.621-624 or 140.651-654 Biostatistics series may not be waived.

Primary Data Collection Waiver

The Curriculum Committee of the Department of Epidemiology acknowledges that in the era of "Big Data", many important research questions can be satisfactorily answered and insights gained from pooling large data sets. As these are often long-standing collaborative research studies, they would be impossible to complete by one student during a training program. Therefore, the department developed policy and waiver documents to be developed and discussed by the thesis advisory committee and included in the doctoral proposal document. Students can access these under the PhD Policies section of this catalogue.

Teaching Assistantship requirement substitutions

Requests to substitute a methods course for a topical course or an online modality for an on-campus modality should be made by a letter of request and endorsement from the adviser to the Curriculum Committee after discussion with the director of graduate education, Laura Camarata.

Student Evaluations

The evaluation of satisfactory academic progress and the individual course letter grades are handled at the School level and tied to federal regulations. Therefore, any student who earns a grade of C or lower or a cumulative grade point average below the minimum for the degree program is *automatically reviewed* by the Departmental Admissions and Credentials Committee, the track and program directors, and the Schoolwide Committee on Academic Standards (http://www.jhsph.edu/offices-and-services/office-of-academic-affairs/) (CAS). Students whose grades fall below the minimum standard should submit an explanation and waiver request but *should be prepared to retake the course if necessary*. For students receiving financial aid, the Office of Financial Aid will also review any C grades or grade point cumulative averages below the minimum for the degree, *which may result in loss of financial aid for the upcoming term*. To that end, the Senior Academic Program Manager, along with the Departmental Admissions and Credentials Committee, review mid-term grades for the 340.751, 340.752, and 340.753 courses, and the biostatistics series, and contact students whose work may place them in jeopardy for the above review. The Department policy remains that students are permitted "1 free C" without placement on academic probation. However, students who earn C in any of 340.751-753 and/or 140.621-624 or 140.651-654 may be required to retake that course in the following year next year unless:

- Students obtain an A in at least one of the subsequent courses of the series without receiving another C (or any lower grade);
- Students pass the comprehensive exam at the appropriate level for their degree program prior to the following year

Students are expected to earn As and Bs in Epidemiology coursework, (minimum equivalency of 80%) maintain a cumulative GPA (2.75 for master's; 3.0 for doctoral), and pass the Department Comprehensive exams at the designated level. Other grounds for removal from degree candidacy include

- Any grade of D or F in a required course;
- Two grades of C in required courses;
- Two grades of D or F or any combination thereof in elective courses;
- Failure to maintain a minimum cumulative GPA of 2.75 for masters and 3.0 for doctoral students;
- Failure on one or both parts of the Department comprehensive exam;
- Failure to maintain progress on dissertation research/thesis projects; or
- Academic or behavioral ethics violations

In such cases, after reviewing the student's performance, the Departmental Admissions and Credentials Committee will make a decision regarding the student's continuation in the program and notify the Department Chair for a final decision. Occasionally, students may be placed on academic probation within the department prior to dismissal. This time period will permit students to attempt to bring their GPA above 2.75 for masters and 3.0 for doctoral programs. Conversely, any student whose GPA removes them from academic probation will be notified and reported to the Admissions and Credentials Committee.

Students may choose to withdraw from the degree program or School at any time but should consult with their adviser and the Senior Academic Program Manager prior to making this decision. Failure to maintain registration is considered a withdrawal from the School.

The Department fully expects that students will be able to handle the course load; however, if students experience being overwhelmed, they are encouraged to contact their adviser(s), The Director of Graduate Education, Laura Camarata, lcamarata@jhu.edu (office 443-287-2723), the Senior Academic Program Manager, Frances Burman, FranBurman@jhu.edu (office 410-955-3926), the Office of Student Life (http://www.jhsph.edu/offices-and-services/office-of-student-life/) (410-502- 2487), and/or JHSAP (http://jhsap.org/) (443-287-7000).

Student Funding

Students registered full-time in the School are eligible for consideration for a number of scholarships, research fellowships, and awards offered by the various departments of the School. Most of these are listed in the School's catalogue. Notices generally begin appearing on bulletin boards and as email announcements throughout the School during the second term. Applications should follow the instructions provided by the announcements. These awards are usually made in early spring for the upcoming academic year. A full list of such scholarships can be found on the School's website, (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/funding-and-scholarships (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/funding-and-scholarships/)), which was developed by the School to help students identify and secure outside sources of support for tuition and academic research. The Student Funding Guide (https://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/_documents/Funding%20Resource%20Guide_2122.pdf) is updated annually and serves a critical purpose in outlining support for graduate students.

Contact Information

Matthew Miller, Epidemiology Financial Manager and Student Financial Coordinator
Room W6510, (410) 955-2714, mmille16@jhu.edu

Jennifer Moessbauer, Director of Graduate Education and Research, JHSPH
Room W1033, (410) 955-3257, jmoessbauer@jhu.edu

Financial Aid Office, JHSPH (http://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/)
Room E1002, (410) 955-3004, finaid@jhsph.edu
Student Accounts and Business Services, JHSPH (https://www.jhsph.edu/offices-and-services/student-accounts-and-business-services/)
Room W1101, (410) 955-5725, jhsph.bursar@jhu.edu

Masters Level

The School (not the Department) provides Master's Tuition Scholarships in the 2nd year in the amount of 75% tuition scholarships for students who have completed the first-year curriculum (and 64 credits) and who have passed the Department comprehensive exams. The Master's Tuition Scholarship covers four terms only and is only awarded when students have registered for a minimum of 16 credits per term. Incoming students must select the distribution of the MTS (either 25% of tuition in year one and 50% tuition in year two or 75% tuition in year two) at the time of acceptance and intent to enroll. The distribution cannot be changed after enrollment. Additionally, students in the Epidemiology MHS and ScM programs qualify for some of the endowments.

Doctoral Level

The Department of Epidemiology is committed to helping students pay for their graduate education. Sources of student support are outlined in this Handbook. Incoming doctoral students are considered for all possible training grant positions and tuition support both in the Department and at the School. The doctoral program is a 4-year program. The exception is for students who received a JHSPH master's degree within the 3 years prior to doctoral matriculation, including having completed the first-year Department of Epidemiology course curriculum and passed the Department of Epidemiology's comprehensive examination; such a student will enter as a second-year doctoral student and their doctoral program is 3 years. The Department will provide 100% tuition support for 4 years, unless the doctoral student enters as a second-year student, in which case, the Department will provide 100% tuition support for 3 years. For all years of tuition support, the Department will also cover the costs of individual-level JHSPH student health insurance (if elected), and the University's UHS clinic fee. Continued support beyond the first year is contingent on the successful completion of 64 credits with a 3.0 GPA and must earn a grade of "B" or higher in all required courses in the core departmental curriculum that are offered for letter grading and a "Pass" grade for those only offered on a pass/fail basis. In addition, students must successfully pass the Department's comprehensive examination.

Each spring, students are asked to complete a student funding plan and thesis timeline regarding their anticipated needs for the upcoming year. It is assumed that students who do not submit the form(s) on time do not require tuition funds from the Department. Students receiving any of the support mentioned above (including those in training grant positions) must request tuition support for each year of the program. The Student Financial Coordinator (Matthew Miller) handles all tuition requests for the Department and the Admissions and Credentials Committee. Additionally, doctoral students qualify for some of the endowments.

Selection of all funding packages is made by the Admissions and Credentials Committee prior to the start of the academic year and is not subject to revision based on exceptional academic performance. However, continued funding support is contingent on satisfactory progress in one's doctoral program. All students must remain full-time (a minimum of 16 credits per term) during the standard academic year throughout the program to qualify for Department tuition support; part-time tuition scholarships (<16 credits/term) will not be permitted. In addition, the tuition scholarship does not apply to either the summer term or to various summer or winter institutes held in JHSPH. Finally, Department tuition support may not be repurposed for other uses (for example as a stipend) in the event of alternative funding.

Special Note: Students under special circumstances (new child-parent, poor health, extended family emergencies, etc.) may request an official Leave of Absence (p. 641) period from their program. It is expected that the student will pay the required leave of absence fee ($50 per term). Those who take a leave of absence MAY be eligible to request funding terms beyond the normal period of support provided satisfactory progress has been achieved. All extended support must be granted by the Admissions and Credentials Committee which will determine if adequate progress has been achieved to warrant support. For example, a student who went on Leave of Absence for two terms (as caring for a new child) during their third year of support MAY be eligible to request those lost two terms of Department support during their return to full-time student status, provided the student is close to the defense of their thesis.

Grant Application Assistance:

This policy applies to any Department student proposal (for dissertation, fellowship, stipend support, or otherwise) by which an external agency would award monies to the student through the University. The student must schedule an initial meeting with the Student Funding Coordinator ***at least 45-60 days prior to the due date*** of the proposal to discuss the terms of the application and to be oriented to internal procedures. Any application brought to the Student Funding Coordinator's attention less than 30 days prior to the due date will not be considered. The student should send a copy of the PA (Program Announcement) or terms and Conditions to the Student Funding Coordinator prior to the meeting for review. The Student Funding Coordinator will assist the student with the cover page, budget, and any administrative or technical questions. Students must work with their mentors or advisers to develop an acceptable research proposal (science). The mentor or adviser must acknowledge a draft of the science (aims and research methods); certifying that it has met acceptable standards for submission before it is submitted to the Department Chair for final approval. A copy of the research proposal/science (Specific Aims and Research Strategy only) affirmed by the adviser/mentor must be submitted to the Department Chair (W6041) ***no later than 10 business days prior to the due date*** for review. The adviser/mentor (not the student) should e-mail this document to their attention certifying that the science has met an acceptable review. The student should immediately schedule a second meeting with the Student Funding Coordinator to review the final proposal and complete a JHURA internal information/compliance worksheet. *This second meeting should take place at least 5-7 business days prior to the due date* so the Student Funding Coordinator has time to obtain the necessary e-signatures (Department Administrator, Department Chair). The application (minus the science) must be submitted along with a signed information sheet to Johns Hopkins University Research Administration (JHURA) ***no later than 5 business days prior to the due date for review***.

Endowed Funds / Current Use Scholarships / NIH Training Grants (https://www.jhsph.edu/departments/epidemiology/training-programs/)

The following awards are sponsored by the Department of Epidemiology for degree candidates in the Department. Requests for nomination are issued every December, and applications are received and reviewed by the Department's Honors and Awards Committee; award recipients are notified in the spring.

Open to Epidemiology MHS, ScM, and doctoral students:

Miriam Brailey Fund: The fund is named after Dr. Brailey, the first woman to be named to the Department's faculty. It was established by Dr. Jonathan Samet in 2000. The fund is designated as incoming support for graduate training and research in the Department of Epidemiology and will support members of underserved populations.

Charlotte Ferencz Scholarship: Dr. Ferencz devoted her professional life to unraveling the enormously complex issues posed by congenital heart disease. This scholarship supports students' research projects in the field of maternal and child health epidemiology. The intention of the Scholarship is to have the research, which may be part of the faculty's work, lead to a student's doctoral or master's thesis.

The Abe Lilienfeld Scholarship Fund: This endowment was established by Johns Alexander, MD, MPH, in memory of this distinguished former faculty member. Preference will be given to outstanding students in the area of applied epidemiology.

The Dorothy and Arthur Samet Student Support Fund in Epidemiology This endowment was established by Dr. Jonathan Samet in 1996 to create a general fund to support student research or other activities. No application procedure is required; faculty members will nominate a qualified student. The award is presented to masters or doctoral students whose dissertation research and/or extracurricular activities, exemplify a significant contribution in the field of epidemiology.

Louis I. Dublin and Thomas D. Dublin Fund for the Advancement of Epidemiology and Biostatistics: The award in Biostatistics and Epidemiology will support graduate student research. The award is open to current and new students in both departments. Selections will alternate annually between Epidemiology and Biostatistics. The winner of this award will be selected by the Department of Biostatistics. Per the website, the application material is due in February.

Student Travel Support Fund in Epidemiology: This fund supports student travel to present at conferences, symposiums, and the Society of Epidemiologic Research annual meeting. The poster or presentation must be directly related to the dissertation and be accepted by the symposium or conference. It is a one-time award per student. The review will be ongoing throughout the year. Applicants will submit a letter requesting funds, a copy of their abstract, a letter of acceptance from the conference, and a travel budget of up to $750 to the Student Financial Coordinator for distribution to the Honors and Awards members. Doctoral students can include any directly-related travel costs in the up to $750 budget. Master's students and Postdoctoral fellows can only submit for registration costs up to a $500 allowance. Student applicants must be degree candidates in the Department of Epidemiology (MHS, ScM, PhD, or Postdoctoral) at the time of the conference to receive funds.

The Marilyn Menkes Book Award: The Marilyn Menkes Book Award was established in 1988 by friends and colleagues of Dr. Marilyn Spivak Menkes to commemorate her personal integrity and academic excellence. Each year, the Epidemiology Student Organization organizes a call for nominees and the vote on the awardee. The award is a $100 prize toward the purchase of a book selected by the winner and presented to the recipient at the Department of Epidemiology's annual awards reception. Balloting is generally held during the third term each year.

Reserved for Current Masters (MHS and SCM students Only)

The Trudy Bush Fund: Family and friends of Dr. Trudy Bush, a former faculty member in the Department of Epidemiology, have created this fund in her memory to support a student pursuing an MHS or ScM degree in the Department of Epidemiology with a specialization in women's health.

The Nancy Fink Scholarship and Service Award: The award was established to honor the memory of Nancy Fink, a beloved faculty member of the Welch Center and a Senior Scientist in the Department of Epidemiology and jointly in the Department of Medicine, who passed away in 2010. The fund supports an accomplished master's student in the Department.

Anna Huffstutler Stiles Scholarship: Created by Dr. H. M. "Mac" Stiles in memory of his mother, Anna Huffstutler Stiles, this scholarship will support graduate students in the Department of Epidemiology. Preference will be given to an outstanding second-year master's student.

Reserved for Current Epidemiology doctoral students Only

Dr. and Mrs. Roscoe Moore Jr. Scholarship: Dr. and Mrs. Roscoe Moore established this fund in 2000. The fund will be used to support doctoral students. All eligible students are considered with preference given to graduates of historically black colleges and universities.

The Charlotte Silverman Award: This award was established by Dr. Silverman in 1996 to acknowledge scholarly endeavors related to epidemiology and public policy with the goal of improving the health of communities. This award is designed to recognize Department of Epidemiology doctoral students and newer faculty for outreach projects involving significant research, education, and/or service.

The Jean Coombs Award: This endowment was established by the estate of Jean Coombs (PhD '78). Preference is given to a doctoral student whose dissertation research concerns cancer or childhood diseases.

The Ellen B. Gold Fund for Epidemiology: Income from the fund supports graduate students in the Department of Epidemiology. At least one award will be given each year to an academically outstanding doctoral student with financial need, who is within their first five years of studies.

Doctoral Thesis Research Fund: The Department awards approximately 10 research grants each year to enable doctoral students to conduct research in the field of Epidemiology. The grant is designated for start-up funds of up to $5,000 for doctoral thesis research and may be used for basic costs such as photocopying, buying of materials and supplies, payment of interviewers, etc. Application forms (contact the Student Financial Coordinator for details) should be completed including a statement of whether or not the project could be conducted without the Department funding, include the itemized budget, and include the 3-5 page thesis proposal. Applications should be submitted to the Student Financial Coordinator's Office (W6510) upon the successful completion of the preliminary oral examination and IRB approval. Applications are reviewed by the members of the Honor and Awards Committee in a review cycle (to be determined). Students must be post-oral doctoral degree candidates in the Department of Epidemiology at the time of support. Applications should be received on October 31st and March 31st of each year respectively.

Incoming PhD Students in Epidemiology

The Admissions and Credentials Committee considers all doctoral applicants for all possible funds and support. Applicants may indicate that they wish to be considered for specific grants but this is not required.

The Mary Meyers Scholars Program in Epidemiology: The Department of Epidemiology is pleased to have a generous and competitive scholarship program designed to identify, select, and support outstanding doctoral applicants. Selected incoming doctoral students will receive tuition support and stipend support. The program is open only to new students enrolling at JHSPH for the first time. The program provides a stipend and a full-tuition grant to cover the first year of the doctoral program for the selected candidates. The Department expects to fund 1-2 students annually. Priority is granted to the very top candidates in reproductive and infant and child health from each entering class. Further funds may be available to the initial awardees for their subsequent years of study on a competitive renewal process. The Honors and Awards Committee will review and award continuing support if warranted. The Scholars Program was originally established in 1981 by Dr. Meyer's family and friends as a lasting memorial to an associate professor who gave much to students and to the School. Through the continued generosity of her family, the Mary Meyer Award is now known as the Mary Meyer Scholars Program.

The Robert Dyar Award: Dr. Robert Dyar (MPH '37, DrPH '38) established this award to support the Department of Epidemiology students who are concurrently pursuing medical degrees and who demonstrate a commitment to incorporating these fields in their research and future careers. The award is designed for incoming Epidemiology graduate students who have completed medical education or who have or are concurrently seeking medical degrees and is open to Doctoral applicants. Funds will be used to offset tuition or for a stipend.

Harvey M. Meyerhoff Fellowship in Cancer Prevention: This endowment was established by the Joseph Meyerhoff Family Charitable Funds in 2003 to assist with cancer prevention efforts. Income from this fund will support a stipend or tuition for a doctoral student in the Department of Epidemiology whose research focuses on the epidemiology of cancer and cancer prevention.

Levy/Russo Doctoral Scholarship in Epidemiology: The "current use" scholarship supports one doctoral student in emerging infectious diseases with a stipend for four years.

Current NIH Training Grants supporting Epidemiology Students

This listing may not reflect all NIH grants supporting the Department of Epidemiology students but is accurate as of June 2020.

NIH NRSA T32 Training Grants (Pre- and Postdoctoral Fellowships)

The Department offers a limited number of NIH-supported, pre-and postdoctoral fellowship opportunities for U.S. citizens or U.S. permanent residents. Decisions regarding the distribution of funds for tuition and stipend support are made by Committees representing the various training grants and headed by the principal investigators listed.

Epidemiology and Biostatistics of Aging Training Program: Dr. Karen Bandeen-Roche

Cancer Epidemiology, Prevention, and Control Training Program: Dr. Elizabeth Platz

Cardiovascular Epidemiology Institutional Training Program: Drs. Josef Coresh, Elizabeth Selvin, and Shoshana Ballew

Johns Hopkins HIV Epidemiology Prevention Sciences Training Program: Drs. Chris Beyrer and Shruti Mehta

NHLBI Training Program in Pharmacoepidemiology: Drs. Caleb Alexander and Jodi Segal

Renal Disease Epidemiology Training Grant (postdoctoral only): Dr. Lawrence Appel and Christine Mitchell

Training Awards (Non-NIH)

MD-GEM: The Maryland Genetics, Epidemiology, and Medicine Training Program (predoctoral only): Drs. Priya Duggal and David Valle; *Sponsored by the Burroughs Welcome Fund*

Cochlear Center for Hearing and Public Health: Drs. Frank Lin and Jennifer Deal
https://www.jhucochlearcenter.org/students.html

Additional training mechanisms available through the **Welch Center for Prevention Epidemiology and Clinical Research:**

- Graduate Training Programs in Clinical Investigation (http://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/)
- Clinical Research and Epidemiology in Diabetes and Endocrinology (http://www.jhsph.edu/research/centers-and-institutes/welch-center-for-prevention-epidemiology-and-clinical-research/training/training-programs/clinical-research-and-epidemiology-in-diabetes-and-endocrinology/index.html (http://www.jhsph.edu/research/centers-and-institutes/welch-center-for-prevention-epidemiology-and-clinical-research/training/training-programs/clinical-research-and-epidemiology-in-diabetes-and-endocrinology/))

Upon notification of selection to receive support, the student should direct fiscal questions to the Student Financial Coordinator (mimille16@jhu.edu). Additionally, departmental students may be supported on grants housed in other departments or schools within the University. However, it is necessary that this information be relayed to the Student Financial Coordinator for administrative purposes.

NIH F-Level Individual Predoctoral National Research Service Awards (NRSAs)

As a result of the advisory Biomedical Research Workforce Working Group to the NIH Director, nearly all NIH institutes and centers offer individual predoctoral (F30 and F31) NRSA fellowships. The Department encourages each eligible graduate student to apply for individual fellowship grants. Interested students should first talk with their adviser(s) and the Student Financial Coordinator. Individual institute and center information and guidelines may differ from one another and can be explored at:

- https://grants.nih.gov/grants/guide/pa-files/PA-19-195.html: (Parent F31 for predoctoral fellowships)
- https://grants.nih.gov/grants/guide/pa-files/PA-19-196.html (F31 to Promote Diversity predoctoral fellowships)
- https://grants.nih.gov/grants/guide/pa-files/PA-19-191.html (Parent F30 for MD/PhD or other dual degree programs)

The Department hosts an annual information session at the start of the third term, hosted by recent successful student applicants to F-level awards, and in partnership with the Student Financial Coordinator, designed to prepare interested applicants to make a decision about whether, and when, to apply for an F-level grant. The Student Financial Coordinator also keeps a repository of supplemental items and is current on best practices and policies.

Donations / Giving

The Department greatly appreciates its alumni and friends and welcomes your support (https://www.jhsph.edu/giving/) in all ways. To find a way to support our mission, our students, and our research, please contact the Development Office. (jhsph.development@jhu.edu)

Epidemiology, MHS

Master of Health Science Degree Programs

Ideal for individuals with strong science and mathematics skills who may or may not have research experience, the MHS in Epidemiology is a two-year, intensive academic degree program that focuses on applying epidemiological and biostatistical methods to a variety of current public health issues. Successful applicants are those individuals who are motivated to use advanced quantitative methods to analyze public health information and use a translational approach to communicate results. Students select and specialize in one of the research tracks listed below and complete at least 64 credit units in epidemiology, biostatistics, and elective courses, pass a written comprehensive exam, produce a high-quality thesis, and present their research during the annual poster symposium. Graduates from the MHS go on to positions in research coordination, government, and policy work, consulting or pharmaceutical research, or pursue doctoral degrees after some years of work experience in a variety of fields.

https://publichealth.jhu.edu/departments/epidemiology/programs (https://publichealth.jhu.edu/departments/epidemiology/programs/)

Bachelors/MHS

The Bachelors/MHS degree is designed for undergraduate students at Johns Hopkins University who are majoring in Public Health Studies (https://krieger.jhu.edu/publichealth/academics/bamasters-program/) and who are interested in pursuing an advanced degree at JHSPH and prepares students for further graduate work or prominent careers in research and science. The benefit of the Bachelors/MHS is that it allows Johns Hopkins University undergraduates (only) to take BSPH courses during their undergraduate program and apply up to 16 credits accumulated as undergraduates into the MHS program. Students who complete the undergraduate degree at JHU enroll as MHS candidates and follow the MHS program, with a compressed version of the master's degree encouraged.

Academic Advising

Master's students are each assigned a group academic adviser for the first three terms of the program. The Group Master Adviser is an academic adviser who meets with a group of advisees regularly to discuss academic issues, progress, development, and goals in the degree program.

The Group Master Adviser is a faculty member in the Department of Epidemiology but may/may not be from the advisee's Track. Throughout the Spring, the track directors, with input from the students and faculty, assign the student a thesis adviser. The thesis adviser may be a faculty member with a primary or joint appointment in the Department of Epidemiology. If the thesis adviser has a joint appointment in the Department, a faculty member with a primary appointment in the department must co-advise with the thesis adviser, and serve as the primary adviser of record.

All Master's students are required to meet with their thesis advisers regularly. Students should work with their thesis advisers to develop a timeline for completing their thesis research by the required deadlines. Students are expected to begin thesis research in the summer after their first year.

Academic Year 2022-23 Applies to MA, MAS, MHA, MHS, MS and MSPH

Due Dates for Summer Conferral (August 26, 2022)

JUNE 10, 2022

- Special Project, Scholarly Report, Paper or Thesis has been submitted to the Department Chair or Adviser

August 26, 2022

- Department Chair has:
    - Indicated in writing to the Office of Records and Registration that all degree requirements have been fulfilled
    - Certified the student's eligibility for award of degree

Due Dates for Fall Conferral (December 30, 2022)

October 21, 2022

- Special Project, Scholarly Report, Paper or Thesis has been submitted to the Department Chair or Adviser

December 16, 2022

- Department Chair has:
    - Indicated in writing to the Office of Records and Registration that all degree requirements have been fulfilled
    - Certified the student's eligibility for award of degree

Due Dates for Spring Conferral (May 25, 2023)

April 7, 2023

- Special Project, Scholarly Report, Paper or Thesis has been submitted to the Department Chair or Adviser

May 5, 2023

- Department Chair has:
    - Indicated in writing to the Office of Records and Registration that all degree requirements have been fulfilled
    - Certified the student's eligibility for award of degree

Degree Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Residency / Registration Requirement

A minimum of 64 credits is required to complete either the MHS degree. The residency requirement is four consecutive terms of at least 16 credits each. Residency must be completed during the first year of the program. Other than for BA/MHS students, the MHS degree program usually requires two years of full-time registration to complete the required coursework and thesis but may, under unique circumstances, be completed in 14-months.

Non-Class Requirements

TRACK-SPECIFIC ACTIVITIES MASTERS

Each Track holds journal clubs, research-in-progress meetings, and other activities, that those Track students are expected to attend (list included in this Student Handbook). These activities are opportunities to engage and interact with Track faculty, fellow students, and post-doctoral fellows, and to participate and present in the topic area of the Track. All master's students are expected to participate in their Track. If a student for some reason wishes to switch tracks during the course of their degree, they must schedule a meeting with the Senior Academic Program Manager, Frances Burman (FranBurman @jhu.edu (FranBurman@jhu.edu)) to ascertain whether a switch is feasible to still meet graduation requirements in time and to complete a formal form.

QUARTERLY MASTER'S MEETINGS

The Master's Program Co-Directors host quarterly meetings with all of the first and second-year Master's students. These meetings provide a forum to learn about academic policies and deadlines, for students to raise questions and concerns, and for all to hear the answers. All Master's students are expected to attend.

Core Coursework (Required for All Epidemiology MHS and Bachelors/MHS Students)

The Masters Level Core Requirements are listed by year and term for all Epidemiology Master of Health Science students. A minimum of 64 credits is required. To broaden perspective and to enhance the student's capabilities for work in public health or disease-related fields, at least 12 credits of coursework are required in courses from at least one department outside the student's primary department. At least 6 of these credits must be taken in BSPH. Full-time students should register for a minimum of 16 credits and a maximum of 22 credits each term.

BA/MHS Course Prerequisites

Applicants to the formal combined BA/MHS program enrolled in the JHU KSAS Public Health Studies program should complete (earning a B or higher) the coursework below prior to application to the BA/MHS program.

1. Calculus or an additional math course completed during enrollment at JHU,
2. Biology or an additional science course completed during enrollment at JHU,
3. AS.280.101 Introduction to Public Health,
4. AS.280.345 Public Health Biostatistics,
5. AS.280.350 Fundamentals of Epidemiology.

Applications are processed through SOPHAS Express and are due no later than July 1 before the applicant's senior year. Applicants admitted to the formal program should complete the Biostatistics courses PH.140.621-140.624 during their senior year.

Cells to Society Courses [CEPH Core Requirements]

A full list of courses and term offerings is located online (https://www.jhsph.edu/course-directory/cells-to-society-courses.html). Epidemiology degree students are required to complete these 8 of the 12 sessions. Each course is 0.5 credits and is offered only online. Many of these courses can be used as introductions to full-term courses offered in multiple modalities throughout the year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

REQUIRED CORE COURSEWORK (subject to change)

Course	Title	Credits
First Year		
First Term		
Summer Before Year 1		
Online Incoming Epi Students 2020 Orientation includes:		
Introduction to Online Learning		
Sexual Harassment and Sexual Violence Prevention Training (Title IX)		
Unconscious Bias Training		
First Term		
PH.140.621 or PH.140.651	Statistical Methods in Public Health I or Methods in Biostatistics I	4
PH.340.751	Epidemiologic Methods 1	5
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		6
	Credits	**16**
Second Term		
PH.140.622 or PH.140.652	Statistical Methods in Public Health II or Methods in Biostatistics II	4
PH.340.752	Epidemiologic Methods 2	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.550.865	Public Health Perspectives on Research [1]	2
Select recommended and elective courses to total 16 credits per term		4
	Credits	**16**
Third Term		
PH.140.623	Statistical Methods in Public Health III	4
PH.140.653	Methods in Biostatistics III	4
PH.340.753	Epidemiologic Methods 3	5
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		2
	Credits	**16**
Fourth Term		
PH.140.624 or PH.140.654	Statistical Methods in Public Health IV or Methods in Biostatistics IV	4
PH.340.723	Epidemiologic Practice Methods for Population Health Research	2
PH.340.820	Thesis Research Epidemiology (varies)	1 - 3
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		8
Department Comprehensive Examination		
Pass Parts A&B - immediately following Fourth Term		
	Credits	**16-18**
Second Year		
First Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Second Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Third Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Fourth Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
	Total Credits	**68-154**

[1] May be waived if student holds MPH from a CEPH accredited program in past 10 yrs

COURSES THAT MEET THE "OUTSIDE TRACK REQUIREMENT"

All students must complete one introductory topical epidemiology course outside of the chosen track. Choices below:

Code	Title	Credits
Select one of the following:		3-4
PH.340.616	Epidemiology of Aging (Term 1)	
PH.340.731	Principles of Genetic Epidemiology 1 (Term 1)	
PH.340.682	Pharmacoepidemiology Methods (Term 2)	
PH.330.603	Psychiatric Epidemiology (Term 2)	
PH.340.624	Etiology, Prevention, and Control of Cancer (Term 2)	
PH.340.627	Epidemiology of Infectious Diseases (Term 2)	
PH.340.645	Introduction to Clinical Trials (Term 2)	
PH.340.699	Epidemiology of Sensory Loss in Aging (Term 3)	
PH.340.607	Introduction to Cardiovascular Disease Epidemiology (Term 3)	
PH.340.680	Environmental and Occupational Epidemiology (Term 4)	
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	
PH.340.666	Foundations of Social Epidemiology (Term 4)	
Total Credits		**3-4**

DEPARTMENT-WIDE RECOMMENDED COURSES

Code	Title	Credits
PH.340.860	Current Topics in Epidemiologic Research (Term 1-4, credits variable) [2]	1
PH.340.770	Public Health Surveillance (Term 2)	3
PH.340.769	Professional Epidemiology Methods (Term 3)	4
PH.340.840	Special Studies and Research Epidemiology (Term 1-4, credits variable) [1]	1 - 8

[1] 1 term, can be taken in any term 1 through 4
[2] Recommended for all four terms during year 2

Specific track requirements will be cross-referenced with the e-catalogue and course system before listing below.

Track Course Requirements (subject to change)

Each track requires additional coursework as below and the course content is covered on the annual Comprehensive Exams.

Cancer Epidemiology

Courses Required for Masters Students in Cancer Epidemiology
First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1

Term 2: PH.340.732 Principles of Genetic Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer

Second Year

Term 1: ME.510.706 Fundamentals of Cancer: Cause to Cure **or** PH.120.624 Cancer Biology

Term 2: ME.510.706 Fundamentals of Cancer: Cause to Cure **or** PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health

Recommended courses for masters students in Cancer Epidemiology
[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.340.616 Epidemiology of Aging 3 cr
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3 cr
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5 cr
Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4 cr
PH.140.630 Introduction to Data Management 3 cr
PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners 3 cr
PH.330.603 Psychiatric Epidemiology 3 cr
PH.340.645 Introduction to Clinical Trials 3 cr
PH.340.666 Foundations of Social Epidemiology* 3 cr (alt yrs offered 4th term)
PH.340.682 Pharmacoepidemiology Methods 3 cr* alternates every other year online (4) and in-person (2)

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4 cr
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1 cr

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3 cr
PH.340.680 Environmental and Occupational Epidemiology 4 cr
PH.120.624 Cancer Biology 3 cr
PH.380.664 Reproductive and Perinatal Epidemiology 4 cr

Cardiovascular and Clinical Epidemiology

Courses Required for masters students in Cardiovascular and Clinical Epidemiology
Required Courses for Students focusing in Cardiovascular Epidemiology
First Year

(Students WITHOUT a background in biology or medicine:PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) **OR** PH.550.630 Public Health Biology
AND PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology
AND PH.340.730 Assessment of Clinical Cardiovascular Disease (alternate years 3rd term))

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.607 Introduction to Cardiovascular Disease Epidemiology

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Required Courses for Students focusing in Clinical Epidemiology
First Year

(Students WITHOUT a background in biology or medicine:)
PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) **OR**PH.550.630 Public Health Biology

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials
PH.340.620 Principles of Clinical Epidemiology

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Recommended courses for masters students in Cardiovascular and Clinical Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Course number / Course Name / Credits

Term 1: PH.340.687 Epidemiology of Kidney Disease 2

PH.340.731 Principles of Genetic Epidemiology 1 4

PH.340.616 Epidemiology of Aging 3 (alternates online and in-person every other year)

Term 2: PH.340.624 Etiology, Prevention, and Control of Cancer 4

PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses* 4 *usually taken in Year 2

Term 4: PH.340.644 Epidemiology of Diabetes and Obesity 3

Skills Courses (can be taken Year 1 or later with commensurate progress in Biostats series)

Term 4: PH.340.600 Stata Programming (4th term, 2 credits) 2

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3

Advanced Methods Courses (recommended in Year 2, review course catalogue for prerequisites)

Term 1: PH.140.641 Survival Analysis 3

PH.140.776 Statistical Computing 3

PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

Term 2: PH.340.717 Health Survey Research Methods 4

Term 3: PH.140.655 Analysis of Longitudinal Data 4

PH.140.664 Causal Inference in Medicine and Public Health I 4

Recommended courses for Master's students with a focus in Cardiovascular Epidemiology

Term 1: PH.140.651 Methods in Biostatistics I 4

Term 2: PH.140.652 Methods in Biostatistics II 4

PH.340.620 Principles of Clinical Epidemiology 2

Term 3: PH.140.653 Methods in Biostatistics III 4

Term 4: PH.140.654 Methods in Biostatistics IV 4

Recommended courses for Master's students with a focus in Clinical Epidemiology

Term 2: PH.309.712 Assessing Health Status and Patient Outcomes 3

Term 3: PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4

PH.340.730 Assessment of Clinical Cardiovascular Disease 2

Term 4: PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology 2

PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology 2 *

(Incoming students with a U.S. medical degree will be waived automatically. Other students who believe they may qualify for a waiver from the requirement based on their previous course work should consult with the track director)

Clinical Trials and Evidence Synthesis

Courses Required for Masters Students in Clinical Trials and Evidence Synthesis
First Year

Term 2: PH.340.645 Introduction to Clinical Trials 3

Term 3: PH.340.633 Data Management in Clinical Trials 3

Term 4: PH.340.648 Clinical Trials Management 3

Second Year

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4
PH.140.655 Analysis of Longitudinal Data 4

Recommended courses for masters students in Clinical Trials and Evidence Synthesis
Course number / Course Name / Credits

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.140.651 Methods in Biostatistics I 4
PH.221.722 Quality Assurance Management Methods for Developing Countries 4
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5
PH.390.631 Principles of Drug Development 2

PH.390.673 Ethical and Regulatory Issues in Clinical Research 3
PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.140.630 Introduction to Data Management 3
PH.140.652 Methods in Biostatistics II 4
PH.340.717 Health Survey Research Methods 4
PH.410.710 Concepts in Qualitative Research for Social and Behavioral Sciences 3

Term 3: PH.140.634 Non-Inferiority and Equivalence Clinical Trials 2
PH.140.642 Design of Clinical Experiments 3
PH.140.653 Methods in Biostatistics III 4
PH.223.664 Design and Conduct of Community Trials 4
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1
PH.340.775 Measurement Theory and Techniques in Epidemiology 4
PH.140.664 Causal Inference in Medicine and Public Health I 4

Term 4: PH.140.654 Methods in Biostatistics IV 4
PH.140.632 Introduction to the SAS Statistical Package 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.221.616 Ethics of Public Health Practice in Developing Countries 2
PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
PH.224.691 Qualitative Data Analysis 3
PH.390.675 Outcomes and Effectiveness Research 3

Summer Inst PH.330.621 Mixed Methods for Research in Public Health 2

Environmental Epidemiology

Course Required for Masters Students in Environmental Epidemiology
First Year

Term 4: PH.340.680 Environmental and Occupational Epidemiology

Recommended courses for masters students in Environmental Epidemiology
Course number / Course Name / Credits

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.182.615 Airborne Particles 4
PH.187.610 Public Health Toxicology 4
PH.188.680 Fundamentals of Occupational Health 3
PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.182.625 Principles of Occupational and Environmental Hygiene 4
PH.317.610 Risk Policy, Management and Communication 3
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.717 Health Survey Research Methods 4

Term 3: PH.180.601 Environmental Health 5
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.317.605 Methods in Quantitative Risk Assessment 4

Term 4: PH.188.681 Onsite Evaluation of Workplace and Occupational Health Programs 5
PH.317.615 Topics in Risk Assessment 2

Epidemiology of Aging

Courses Required for Masters Students in Epidemiology of Aging
First Year

Term 1: PH.340.616 Epidemiology of Aging

Recommended courses for masters students in Epidemiology of Aging
Course number / Course Name / Credits

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

First Year

each term PH.330.802 Seminar on Aging, Cognition and Neurodegenerative Disorders 1

Term 1:PH.140.641 Survival Analysis 3
PH.380.604 Life Course Perspectives on Health 4

Term 2: PH.340.620 Principles of Clinical Epidemiology 2
PH.340.666 Foundations of Social Epidemiology 3
PH.380.603 Demographic Methods for Public Health 4

Term 3: PH.340.699 Epidemiology of Sensory Loss in Aging 3
PH.260.665 Biological Basis of Aging++ 3

Term 4: PH.330.623 Brain and Behavior in Mental Disorders 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.330.618 Mental Health in Later Life++ 3

++offered every other year

Second Year

Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.309.605 Health Issues for Aging Populations 3

Term 3: PH.140.655 Analysis of Longitudinal Data 4

General Epidemiology and Methodology

Courses Required for Masters Students in General Epidemiology and Methodology
First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4
(recommended for year 1 but may be taken in year 2, satisfies the out-of-track requirement as well)

Term 2: PH.340.645 Introduction to Clinical Trials 3
(recommended for year 1 but may be taken in year 2)

Second Year

CHOOSE AT LEAST TWO of these 3 courses in PH research skills:

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
Term 2: PH.340.717 Health Survey Research Methods 4
Term 3: PH.340.648 Clinical Trials Management 3

Recommended courses for masters students in General Epidemiology and Methodology
[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Master's Students with a Methodology Focus:

Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.616 Epidemiology of Aging 3
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.183.631 Fundamentals of Human Physiology 4
PH.260.631 Immunology, Infection and Disease 3
PH.330.603 Psychiatric Epidemiology 3
PH.340.620 Principles of Clinical Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.666 Foundations of Social Epidemiology* 3
PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3: PH.140.640 Statistical Methods for Sample Surveys 3
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.222.647 Nutrition Epidemiology 3
PH.224.690 Qualitative Research Theory and Methods 3
PH.309.616 Introduction to Methods for Health Services Research and Evaluation I 2
PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4
PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3
PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4: PH.140.656 Multilevel Statistical Models in Public Health 4
PH.224.691 Qualitative Data Analysis 3
PH.309.617 Introduction to Methods for Health Services Research and Evaluation II 2
PH.340.641 Healthcare Epidemiology 4
PH.340.677 Infectious Disease Dynamics: Theoretical and Computational Approaches 3
PH.340.680 Environmental and Occupational Epidemiology 4
PH.380.664 Reproductive and Perinatal Epidemiology 4
PH.390.675 Outcomes and Effectiveness Research 3

*alternates online and in-person every other year
++ alternate year course

Second Year courses:

Term 1: PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.140.655 Analysis of Longitudinal Data 4
PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4

Recommended statistical programming computing courses:

Term 1: PH.140.776 Statistical Computing 3

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3
PH.340.600 Stata Programming 2

Master's Students with a Pharmacoepidemiology and Drug Safety Focus:
Strongly Recommended courses for Masters Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.600 Introduction to the Risk Sciences and Public Policy 4
PH.390.631 Principles of Drug Development 2

Term 2: PH.317.610 Risk Policy, Management and Communication 3

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.340.684 Pharmacoepidemiology: Drug Utilization 3 (alternate year format)
PH.221.610 Pharmaceuticals Management for Under-Served Populations 3

Term 4: PH.410.680 Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions 3

Recommended courses for Masters Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.605 Methods in Quantitative Risk Assessment 4
Term 4: PH.317.615 Topics in Risk Assessment 2

the following courses are offered outside of BSPH and require interdivisional registration and instructor permission

AS.410.651 Clinical Development of Drugs and Biologics 4
AS.410.627 Translational Biotechnology: From Intellectual Property to Licensing 4
ME.330.809 Analytic Methods for Clinical Pharmacology variable
NR.110.508 Clinical Pharmacology 3

Individualized Focus:
Students designing their own educational programs should, in conjunction with their advisor, choose three to four graduate-level courses (taken for a letter grade) in their field from among the offerings of the University in addition to taking the GEM Required courses listed above.

Genetic Epidemiology

Courses Required for Masters Students in Genetic Epidemiology
First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4

Term 2: PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3: PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4: PH.340.734 Principles of Genetic Epi 4: Emerging and Advanced Methods 2

Second Year

Term 1: PH.120.602 Concepts of Molecular Biology (Pass/Fail, or Grade) 4

Recommended courses for masters students in Genetic Epidemiology
Analytic Methods Courses (ideal for year 2):

Term 1: PH.140.641 Survival Analysis 3
PH.140.651 Methods in Biostatistics I* 4

PH.140.776 Statistical Computing 3

Term 2: PH.140.638 Analysis of Biological Sequences 3
PH.140.652 Methods in Biostatistics II 4
PH.140.778 Advanced Statistical Computing 3
PH.340.774 Advanced Theory and Methods in Epidemiology* 4

Term 3: PH.140.644 Statistical Machine Learning: Methods, Theory, and Applications 4
PH.140.653 Methods in Biostatistics III 4
PH.140.655 Analysis of Longitudinal Data 4

Term 4: PH.140.688 Statistics For Genomics 3

Biology and Molecular Methods Courses:

Term 1: PH.260.611 Principles of Immunology I 4

Term 2: PH.260.612 Principles of Immunology II 4
PH.183.631 Fundamentals of Human Physiology 4 (*For non-physician trained students only)

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

Term 4: PH.120.608 Gene Editing, therapy and Manipulation 3

Topic-Specific Electives:

Term 3: PH.340.775 Measurement Theory and Techniques in Epidemiology 4

Term 4: PH.330.619 Psychiatric Genomics 3
PH.415.624 Ethical, Legal and Social Implications in Genetics and Genomics Over Time 3 (offered in alternate years)

Infectious Disease Epidemiology

Courses Required for Masters Students in Infectious Disease Epidemiology First Year

Term 1: PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3

Students must complete at least one course in each of the four disciplinary sections below. Additional courses would be recommended.

Section one: General Electives: choose 1

Term 1: PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.641 Healthcare Epidemiology 4

Term 2: PH.223.662 Vaccine Development and Application 4

Term 3: PH.182.640 Food- and Water- Borne Diseases 3
PH.223.663 Infectious Diseases and Child Survival 3
PH.223.687 Vaccine Policy Issues 3
PH.260.656 Malariology 4
PH.340.612 Epidemiologic Basis for Tuberculosis Control 2

Term 4: PH.223.682 Clinical and Epidemiologic Aspects of Tropical Diseases 4
PH.223.689 Biologic Basis of Vaccine Development 3
PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
PH.340.651 Emerging Infections 2
PH.380.761 Sexually Transmitted Infections in Public Health Practice 4
PH.380.762 HIV Infection in Women, Children, and Adolescents 4

Section two: Skills in Research: choose 1

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
Term 2: PH.340.717 Health Survey Research Methods 4

Section three: Biology and Pathogenesis of Disease: choose 1

Term 1: PH.260.623 Fundamental Virology 4
PH.260.636 Evolution of Infectious Disease 3
PH.340.654 Epidemiology and Natural History of Human Viral Infections 6
Term 3: PH.260.627 Pathogenesis of Bacterial Infections 4
PH.260.650 Vector Biology and Vector-Borne Diseases 3

Section four: Immunology: choose one set (recommended to complete in year two)

either:

Term 1: PH.260.611 Principles of Immunology I 4
and 2: PH.260.612 Principles of Immunology II* 4 cr each
**students requesting pass/fail for these two courses only must seek permission from their adviser and the track director*

OR

Term 2: PH.260.631 Immunology, Infection and Disease 3

Department Comprehensive Examination

A two-day written departmental comprehensive examination is administered to all students enrolled in Epidemiology degree programs in late May of the first academic year. All students are required to sit for the exam on the scheduled dates—no alternate exams will be offered.

By the time of the examination, students should have completed 64 credits (one full year of residence), **the required first-year coursework in their Track with a cumulative GPA of at least 2.75,** and in these courses:

Code	Title	Credits
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Select one of the following Biostatistics series:		16
PH.140.621 & PH.140.622 & PH.140.623 & PH.140.624	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III and Statistical Methods in Public Health IV	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV	

The first day of the exam (Part A) includes testing on the following topics:

- Knowledge and application of epidemiologic concepts and methods (and related biostatistics)
- History of epidemiology
- Contemporary issues in public health
- Research ethics

The second day of the exam (Part B) is Track-specific, and tests knowledge of concepts and methods presented in the required courses and activities for each Track, as well as the Department core courses as applied to the Track.

Students must pass both Part A and Part B of the comprehensive examination. Master's students must attain at least a 70% on each Part A and Part B to pass. A repeat examination may be allowed but is not guaranteed. If a repeat is granted, it must be completed before starting the second academic year. Failure to pass one or both sections of the comps may result in dismissal from the master's program or from the Department. Further policies are located on the next tab.

Master's Thesis (MHS and Bachelors/MHS)

Master of Health Science (MHS) students must complete a satisfactory thesis in their Track. The thesis must be approved by two members of the Department's faculty, including the thesis adviser. The thesis may be a critical review of the literature pertaining to a specific area of interest, secondary data analysis, program or project proposal, or original research. It is expected that the student will meet with their thesis adviser throughout the duration of the research project. MHS students planning on a May graduation must adhere to all program deadlines. The School's Policy and Procedures Memorandum (PPM) for the MHS degree program is available here (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx), "Academic_Programs_08_Master_of_Health_Science_Degree_071417." Students should follow the written guidelines for the preparation of the thesis. The thesis is a requirement for partial fulfillment of the MHS degree.

MASTER'S THESIS EXPECTATIONS

Epidemiology Bachelors/MHS and MHS student theses will be evaluated in the following areas by both the faculty thesis adviser(s) and the second reader. In addition, the thesis adviser(s) will evaluate student quarterly progress detailed in point 5 below.

Each student must register for 4 terms of Thesis Research Epidemiology with their thesis adviser in their second year. The thesis adviser(s), in consultation with the thesis reader, each student will be evaluated on whether their thesis shows:

1. Their understanding of the current state of the knowledge about the public health problem studied for the thesis is demonstrated by the student's descriptions and discussions of:
   a. The descriptive epidemiology of the public health problem. For example, its prevalence and distribution in the population, and its risk factors (e.g., modifiable, non-modifiable, comorbidities, social, environmental risk factors, etc.).
   b. The biology, physiology, and natural history of the public health problem, if relevant.
   c. The contemporary questions about the public health problem, including new directions in research on the public health problem (including technology, diagnosis, and methodologic challenges).
   d. The impact of the public health problem in the real world, with specific discussions about sub-populations or vulnerable populations that are particularly affected by the problem.
2. The student's ability to integrate and synthesize the current body of literature on the public health problem, and is demonstrated by:
   a. Preparation of a comprehensive literature review (systematic review, if appropriate see separate document).
   b. Interpretation of findings from multiple research papers and understanding of the full body of research relevant to the public health problem.
   c. Interpretation of the student's own findings within the context of the current body of literature.
   d. Use or evaluation of proper study design, measurement of exposures and/or outcomes, biases, and confounding, biostatistical methods, and application.
   e. Explanation and interpretation of epidemiologic findings for a non-epidemiologist audience.
   f. Identify next steps and future questions that need to be addressed.
   g. Articulation of how the student's findings could be applied in order to affect or diminish the problem at a population (or sub-population) level.
3. The student's ability to prepare a thesis that is:
   a. Logically structured and organized; and
   b. Includes figures that illustrate important findings, with proper formatting (e.g. legends, labeled axes, appropriate titles, etc.); and
   c. Includes tables that convey important findings, organized and formatted efficiently (e.g. appropriate titles, headings, footnotes, legends, etc.).
4. The student's ability to write a thesis that is grammatically accurate, including:
   a. Correct punctuation and spelling; and
   b. Easily readable by epidemiologists; and
   c. Appropriately and adequately referenced citations; and
   d. The student's own original work (please see Plagiarism modules).
5. The student's thesis adviser will evaluate the student on student professionalism, documented by:
   a. Keeping appointments with the thesis adviser and being on time.
   b. Being prepared and organized at each meeting with the thesis adviser, which includes creating and sending an agenda before the meeting.
   c. Demonstrating appropriately paced progress on the thesis research.
   d. Preparing the thesis document.

The expectation is that the student will improve in all aspects of their research during the course of the thesis work and work will show growth across the year culminating in the final thesis.

Master's Poster Session

All Master's students are required to participate in the Master's Poster Symposium held at the end of their 2nd year. Participation is a requirement for partial fulfillment of the Bachelors/MHS and MHS degrees. Students prepare a 3'x4' portrait-oriented poster of their thesis work (no other work can be presented) and gain the approval of the poster from their adviser(s) before presenting. Although the research conducted for the poster will represent the Master's student's thesis, the adviser(s), and any other research colleagues, should be included as co-authors. In addition, any funding sources that supported the research directly or indirectly should be cited on the poster (in consultation with thesis adviser(s)). Additional guidelines for the creation of a scientific poster will be disseminated to students at the quarterly program meetings. Students are expected to follow these guidelines.

Students should carefully proofread their posters prior to submitting them for printing. Students are welcome to utilize the printing service they wish, but two local recommendations are

https://phdposters.com (Campus Pick-up Available)

FedEx Print & Ship / Carnegie Building Room #170
600 N. Wolfe St.
Baltimore, MD 21287
410-502-7637
usa5032@fedex.com

A poster title and abstract should be submitted to the academic program manager (Justin Switzer) prior to the Master's Poster Symposium for inclusion in the program. Attendees at the Master's Poster Symposium include peers, staff, and faculty.

Students who will not graduate in May are still required to present a poster. This poster must be approved by their adviser(s) and presented to the Master's Program Director at least three weeks prior to the date by which the Department must certify student eligibility for the award of degree to the School's Office of Records and Registration. Students graduating in August or December must contact the Master's Program Director by July 1 (August graduation) or November 1 (December graduation) to indicate their plans to graduate and determine a poster presentation date.

The Policy and Procedures Manual for the Master of Health Science

The Department of Epidemiology reserves the right to augment the PPM (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_08_Master_of_Health_Science_Degree_071417.pdf) for BSPH.
The Admissions and Credentials Committee handles most policy concerns as described above. The Curriculum Committee handles exceptions to requirements.

For concerns and changes to advising, tracks, course requirements, etc. please see the academic policies for the department. (p. 220)

Compressed vs. Regular MHS Timeframes

Ideally formulated for the Bachelors/MHS students, the compressed vs. regular timeframe permits highly focused and motivated students the opportunity to complete the degree requirements for the MHS program in a 14-month period.

Any student interested in completing the compressed program should discuss their research and career goals with the senior academic program manager and the BA/MHS Director.

MHS COMPRESSED TIMELINE

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Admitted during summer prior to senior year at KSAS:
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take Biostatistics 140.621 - 624 and Current Topics (4 terms) 340.860 during senior year

Summer prior to enrolling: Meet with Academic Program Manager, Justin Switzer, to connect with faculty for possible research projects. Begin discussing ideas for research.

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Enrollment – Johns Hopkins Bloomberg School of Public Health:
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Attend BSPH Orientation in August
First – Second terms: Continue required coursework **and** work on thesis proposal
During January, get approval from the thesis adviser for the proposed hypothesis, identify the dataset, and submit paperwork for IRB approval
Throughout Third and Fourth terms: complete coursework **and** conduct research for the thesis
Participate in the Annual Poster Symposium (if ready)

Take the written departmental comprehensive exam (last Wednesday and Thursday at end of May)

Summer after the first year: Register for 2 credits 340.820 with the adviser
Complete thesis
Prepare and present a poster of the research project (no later than July)
MHS completion and award of the degree at end of August

Regular MHS timeline

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Enrollment – Johns Hopkins Bloomberg School of Public Health:
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Attend BSPH Orientation
First – fourth terms: Take course requirements and identify adviser during the third term
During the fourth term, identify the research hypothesis and data set
Take the written departmental comprehensive exam (last Wednesday and Thursday at end of May)

During summer, complete IRB application and begin research

Fifth – eighth terms:
Take any remaining required or recommended coursework
Complete thesis
Prepare and present poster of research project at end of April
MHS completion, award of the degree, and graduation occurs in May of year two

Comprehensive Examination Grading Policy

The Departmental Written Comprehensive Examination is graded by the Department of Epidemiology faculty according to a rubric determined by the Comprehensive Examination Committee. Final results are distributed to students via CoursePlus by mid-July. Students who wish to view their exam should set up an appointment with the Senior Academic Coordinator, Ebony Moore (eamoore@jhu.edu).

Master's students whose results fall below 70% are allowed to submit a written request for a re-grade of specific questions. Re-grade requests must include a justification for a change in points allocated for each question being contested; requests without appropriate justification will not be considered. Re-grade requests must have the adviser's endorsement who must have reviewed and approved the student's request. Re-grade requests are handled by the faculty on the Comprehensive Examination Committee. Adviser-approved requests can be e-mailed to the current year's Comprehensive Examination Committee Chair and must include a copy to the adviser. For approved requests, a new score will be assigned for each question that is re-graded. This score may be equal to, greater than, or less than, the original score awarded and cannot be contested a second time.

Master's students admitted to an Epidemiology PhD program may waive the PhD comprehensive exam if they pass (as a master's student) at the doctoral level (75%) and matriculate within the three years following graduating from a Johns Hopkins Bloomberg School of Public Health Epidemiology Master's Degree.

Comprehensive Examination Retake Policy

Students who do not pass the Comprehensive Exam at the appropriate level for their degree program may be granted an opportunity for a retake in August following the May Exam. Students who do not pass the Comprehensive Exam at the appropriate level are not automatically granted a retake. To request a retake, students must submit an official request within two weeks of notification of the not passing grade. This request should include a detailed timeline and study plan, to make the case for passing a retake. This request and plan must be endorsed by, and developed with, the adviser. Retake requests are reviewed via the Department's Admissions and Credentials Committee. Adviser-approved requests can be e-mailed to the current year's Admissions and Credentials Committee Chair and must include a copy to the adviser and Senior Academic Program Manager (Frances Burman). For approved requests, students are granted one retake only, and it must be in August immediately following the May Exam. A student cannot continue in the degree program without passing the Comprehensive Examination at the appropriate level, prior to the start of the second year.

Recommendations for Special Studies versus Thesis Research

Special Studies and Research in Epidemiology, PH.340.840.xx, is offered during terms 1, 2, 3, and 4. Thesis Research, PH.340.820.XX is offered terms S, 1, 2, 3, and 4.

Special Studies and Research: PH.340.840.XX

All first-year MHS and SCM students should take 1 credit special studies and research each term during terms 1 -3.

The following list of activities may be approved for independent study or special studies and research and is not inclusive:

- Directed readings and discussion leading up to preparing for the research proposal,
- Literature searches and meta-analyses
- Secondary data analysis,
- Self-guided focused study on a particular methodology or a disease of interest

Thesis Research: PH.340.820.XX

Masters students take 340.820 once they begin working on their research thesis. Students should begin registering for thesis research during the fourth term of the first year once their adviser selection is confirmed. MHS students must take a minimum of 2 credits of thesis research for two terms during their program.

Calculating credits for a variable credit course:

- Students must remember that the 1 hour – in class, 2 hours – outside of class ratio still applies: e.g. Students should think about the time the faculty member will be involved in guiding them (see faculty contact hours below) as well as how much time the student uses to conduct outside readings and work.

What constitutes Faculty Contact Hours?

- Individual one-on-one meetings
- Faculty revisions of writing projects (Faculty members spend considerable time editing, proofreading, and otherwise providing feedback to students.)
- Mentoring and networking preparation and discussion.
- Time spent in group settings with a faculty mentor e.g. journal clubs or weekly "lab/group" meetings. Students should make every effort to attend the group meetings for their track and adviser.

How to Register?

- Students must communicate their intent to register with and receive approval from the faculty mentor in writing, prior to registering for credits for the special studies or thesis research and include the content/activities to be conducted and the number of credits.
- Students may take 1-3 credits while taking a full load of courses.
- Students may take up to 8 credits per term while taking a partial load of courses with the approval of the faculty mentor.
- Students must meet with the faculty mentor before or during add/drop to discuss objectives.

Adviser / Advisee Manual [subject to change]

Each student in the Department is assigned an adviser and selects co-adviser(s) as they move through the program; Adviser(s) have the responsibility of serving as a guide and mentor. This manual is intended to guide the student and the faculty member(s) in making the adviser/advisee relationship as successful as possible.

This manual has two goals:

- To provide answers to questions that students frequently ask and,
- To provide guidance on how the student and adviser can interact most effectively

Academic Advisers should:

- Provide oversight of the student's academic progress by:
  - Assisting in the selection of courses
  - Ensuring the student is meeting degree milestones in a timely manner
  - Being available for regular meetings with the student
  - Assessing and developing the student's interests and abilities
  - Monitoring student progress in academic coursework through periodic examination of transcripts
  - Monitoring student progress in fieldwork
  - Writing letters of reference (given appropriate lead-time)
  - Assisting with grant preparation (doctoral students, given appropriate lead-time)
  - Referring students to the appropriate individuals or offices that provide academic support and/or resources
- Provide leadership in matters of academic integrity:
  - Being knowledgeable about ethical issues that pertain to academics, research, and practice
  - Helping students interpret and understand institutional policies and procedures regarding the responsible conduct of research
  - Discouraging students from circumventing institutional policies and procedures, and when confronted with such issues, directing students to appropriate institutional resources or contacts, avoiding actual or appearance of conflicts of interest
  - Respecting the confidentiality of students

- Encourage active participation in the greater community (department, school, university, local, state, national, international)

STUDENTS MAY EXPECT THE FOLLOWING FROM THEIR ADVISER(S):

- Advisers' approval for course registrations, course changes, and pass/fail agreements, and on all reasonable petitions to the Admissions and Credentials Committee
- At least one meeting per term with the advisers
- Oversight of the student's overall academic program and sensitivity to any academic difficulties
- Knowledge of and interest in the student's career objectives
- Review of required and recommended courses for the track
- Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year

Advising students is an integral part of faculty members' responsibilities. Thus, students should not feel or be made to feel that they are imposing by asking for advice. Faculty members expect to be able to meet with students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. The responsibility for arranging meetings lies with the student. Students should not expect advisers to seek them out for needed appointments. The student remains obligated to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline.

RIGHTS AND RESPONSIBILITIES OF THE ADVISER(S)**:

- To assist in determining the advisee's educational goals and needs upon starting the program
- To serve as an educational and/or professional mentor for the student
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and the advisers in terms of academic, professional, and personal interests
- To facilitate a change of adviser or program, if deemed appropriate for the student
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty
- To provide guidance throughout the academic program
- To be sensitive to cultural, medical, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be aware, sensitive, understanding, and supportive
- Advisers have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be consulted when students have questions or concerns about the research focus or progress, and to serve as team leader on the research team

RIGHTS AND RESPONSIBILITIES OF THE ADVISEE**:

- To arrange to meet with the adviser at least once each term, and observe registration and administrative deadlines
- To identify and develop professional career goals and interests
- To access and demonstrate knowledge of administrative policies and procedures and be familiar with the content in the Student Handbook
- To maintain the academic checklist and review it at meetings with the advisers
- Advisees have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be notified when advisers have questions or concerns about the research focus or progress, and to be granted the role of a team member on the research team

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**Students and Faculty each have the right to request changes
 to the adviser/advisee relationship upon consultation with the
 Director of Graduate Education (Laura Camarata) without penalty.
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Please review the CEPH Competencies located: https://e-nextcatalog.jhu.edu/public-health/ceph-requirements/index.html (p. 176)

Epidemiology, ScM

Master of Science (ScM) Degree Program

Ideal for individuals with strong science and mathematics skills with at least one year of research and work experience, the ScM in Epidemiology is a two-year, intensive research degree program that focuses on applying epidemiological and biostatistical methods to a variety of current public health issues. Successful applicants are those individuals who are motivated to use advanced quantitative methods to analyze public health information and use a translational approach to communicate results. Students select and specialize in one of the research tracks listed below and are expected to complete at least 64 credit units in epidemiology, biostatistics, and elective courses, pass a written comprehensive exam, produce a publishable-quality manuscript based on original research, and present their research during an annual poster symposium. Graduates from the ScM often continue to work in academic research upon graduation and many pursue PhD degrees in a variety of public health arenas after some years of work experience.

https://publichealth.jhu.edu/departments/epidemiology/programs (https://publichealth.jhu.edu/departments/epidemiology/programs/)

Academic Advising

Master's students are each assigned a group academic adviser for terms one through three of the first year of the program. The Group Master Adviser is an academic adviser who meets with a group of advisees regularly to discuss academic issues, progress, development, and goals in the degree program.

The Group Master Adviser is a faculty member in the Department of Epidemiology but may/may not be in the advisee's Track. At the beginning of the 4th term of the first year, the Track Director, with input from the student, will assign the student a thesis adviser. The thesis adviser may be a faculty member with a primary or joint appointment in the Department of Epidemiology. If the thesis adviser has a joint appointment in the Department, a faculty member with a primary appointment in the department must co-advise with the thesis adviser, and serve as the primary adviser of record.

All Master's students are required to meet with their thesis adviser regularly. Students should work with their thesis advisers to develop a timeline for completing their thesis research by the required deadlines. Students are expected to begin thesis research in the summer after their first year.

Academic Year 2022-23

Due Dates for Summer Conferral (August 26, 2022)

JUNE 10, 2022

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

JUNE 17, 2022

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

AUGUST 26, 2022

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Due Dates for Fall Conferral (December 30, 2022)

OCTOBER 14, 2022

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

OCTOBER 28, 2022

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

DECEMBER 16, 2022

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Due Dates for Spring Conferral (May 25, 2023)

FEBRUARY 10, 2023

- All academic requirements for the degree (except for submission of the thesis) have been fulfilled

march 17, 2023

- Appointment of Thesis Readers for has been submitted to the Office of Records and Registration

May 5, 2023

- Thesis Acceptance Letters have been submitted to the Office of Records and Registration
- The Office of Records and Registration has received approval of submitted electronic copy of dissertation has received from the Sheridan Library

Degree Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Residency / Registration Requirement

A minimum of 64 credits are required to complete either the MHS or ScM degree. The residency requirement is four consecutive terms of at least 16 credits each. Residency must be completed during the first year of the program. ScM degree programs require two years of full-time registration to complete the required coursework and thesis.

Non-Class Requirements

Track-Specific Activities Masters

Each Track holds journal clubs, research-in-progress meetings, and other activities, that those Track students are expected to attend (list included in this Student Handbook). These activities are opportunities to engage and interact with Track faculty, fellow students, and post-doctoral fellows, and to participate and present in the topic area of the Track. All master's students are expected to participate in their Track. If a student for some reason wishes to switch tracks during the course of their degree, they must schedule a meeting with the Senior Academic Program Manager, Frances Burman (FranBurman @jhu.edu (FranBurman@jhu.edu)) to ascertain whether a switch is feasible to still meet graduation requirements in time and to complete a formal form.

Quarterly Master's Meetings

The Master's Program Co-Directors host quarterly meetings with all of the first and second-year Master's students. These meetings provide a forum to learn about academic policies and deadlines, for students to raise questions and concerns, and for all to hear the answers. All Master's students are expected to attend quarterly group meetings.

Core Coursework (Required for All Epidemiology MHS and ScM Students)

The Masters Level Core Requirements are listed by year and term for all Epidemiology Master of Science students. To broaden perspective and to enhance the student's capabilities for work in public health or disease-related fields, at least 12 credits of coursework are required in courses from at least one department outside the student's primary department. At least 6 of these credits must be taken in the BSPH. Full-time students register for a minimum of 16 credits and a maximum of 22 credits each term.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Cells to Society Courses [CEPH Core Requirements]

A full list of courses and term offerings is located online (https://www.jhsph.edu/course-directory/cells-to-society-courses.html). Epidemiology degree students are required to complete these 8 of the 12 sessions. Each course is 0.5 credits and is offered only online. Many of these courses can be used as introductions to full-term courses offered in multiple modalities throughout the year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

Required Core Coursework (Subject to change)

Course	Title	Credits
First Year		
First Term		
Summer Before Year 1		
Online Incoming Epi Students 2020 Orientation includes:		
Introduction to Online Learning		
Sexual Harassment and Sexual Violence Prevention Training (Title IX)		
Unconscious Bias Training		
First Term		
PH.140.621 or PH.140.651	Statistical Methods in Public Health I or Methods in Biostatistics I	4
PH.340.751	Epidemiologic Methods 1	5
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		6
	Credits	**16**
Second Term		
PH.140.622 or PH.140.652	Statistical Methods in Public Health II or Methods in Biostatistics II	4
PH.340.752	Epidemiologic Methods 2	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.550.865	Public Health Perspectives on Research [1]	2
Select recommended and elective courses to total 16 credits per term		4
	Credits	**16**
Third Term		
PH.140.623	Statistical Methods in Public Health III	4
PH.140.653	Methods in Biostatistics III	4
PH.340.753	Epidemiologic Methods 3	5
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		2
	Credits	**16**
Fourth Term		
PH.140.624 or PH.140.654	Statistical Methods in Public Health IV or Methods in Biostatistics IV	4
PH.340.723	Epidemiologic Practice Methods for Population Health Research	2
PH.340.820	Thesis Research Epidemiology (varies)	1 - 3
PH.340.860	Current Topics in Epidemiologic Research	1
Select recommended and elective courses to total 16 credits per term		8
Department Comprehensive Examination		
Pass Parts A&B - immediately following Fourth Term		
	Credits	**16-18**
Second Year		
First Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Second Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Third Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
Fourth Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 22
	Credits	**1-22**
	Total Credits	**68-154**

[1] May be waived if student holds MPH from a CEPH accredited program in past 10 yrs

Courses that meet the "Outside Track Requirement"

All students must complete one introductory topical epidemiology course outside of the chosen track. Choices below:

Code	Title	Credits
Select one of the following:		3-4
PH.340.616	Epidemiology of Aging (Term 1)	
PH.340.731	Principles of Genetic Epidemiology 1 (Term 1)	
PH.340.682	Pharmacoepidemiology Methods (Term 2)	
PH.330.603	Psychiatric Epidemiology (Term 2)	
PH.340.624	Etiology, Prevention, and Control of Cancer (Term 2)	
PH.340.627	Epidemiology of Infectious Diseases (Term 2)	
PH.340.645	Introduction to Clinical Trials (Term 2)	
PH.340.699	Epidemiology of Sensory Loss in Aging (Term 3)	
PH.340.607	Introduction to Cardiovascular Disease Epidemiology (Term 3)	
PH.340.680	Environmental and Occupational Epidemiology (Term 4)	
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	
PH.340.666	Foundations of Social Epidemiology (Term 4)	
Total Credits		**3-4**

DEPARTMENT-WIDE RECOMMENDED COURSES

Code	Title	Credits
PH.340.860	Current Topics in Epidemiologic Research (Term 1-4, credits variable) [1]	1
PH.340.770	Public Health Surveillance (Term 2) [2]	3
PH.340.769	Professional Epidemiology Methods (Term 3)	4
PH.340.840	Special Studies and Research Epidemiology (Term 1-4, credits variable) [1]	1 - 22

[1] 1 term, can be taken in any term 1 through 4
[2] Recommended for all four terms during year 2

Specific track requirements will be cross-referenced with the catalogue and course system before listing below.

Track Course Requirements (subject to change)

Each track requires additional coursework as below and the course content is covered on the annual Comprehensive Exams.

Cancer Epidemiology

Courses Required for masters students in Cancer Epidemiology
First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1

Term 2: PH.340.732 Principles of Genetic Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer

Second Year

Term 1: ME.510.706 Fundamentals of Cancer: Cause to Cure **or** PH.120.624 Cancer Biology

Term 2: ME.510.706 Fundamentals of Cancer: Cause to Cure **or** PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health

Recommended Courses for masters students in Cancer Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.340.616 Epidemiology of Aging 3 cr
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3 cr
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5 cr

Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4 cr
PH.140.630 Introduction to Data Management 3 cr
PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners 3 cr
PH.330.603 Psychiatric Epidemiology 3 cr
PH.340.645 Introduction to Clinical Trials 3 cr
PH.340.666 Foundations of Social Epidemiology* 3 cr (alt yrs offered 4th term)
PH.340.682 Pharmacoepidemiology Methods 3 cr* alternates every other year online (4) and in-person (2)

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4 cr
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1 cr

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3 cr
PH.340.680 Environmental and Occupational Epidemiology 4 cr
PH.120.624 Cancer Biology 3 cr
PH.380.664 Reproductive and Perinatal Epidemiology 4 cr

Cardiovascular and Clinical Epidemiology

Courses Required for masters students in Cardiovascular and Clinical Epidemiology
Required Courses for Students focusing in Cardiovascular Epidemiology
First Year

Students WITHOUT a background in biology or medicine must complete: PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) **OR** PH.550.630 Public Health Biology
AND PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology
AND PH.340.730 Assessment of Clinical Cardiovascular Disease (alternate years 3rd term)

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.607 Introduction to Cardiovascular Disease Epidemiology

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Courses Required for masters students focusing in Clinical Epidemiology
First Year

Students WITHOUT a background in biology or medicine must complete: PH.260.600 Introduction to the Biomedical Sciences (offered over the summer prior to enrollment) **OR** PH.550.630 Public Health Biology

Term 1: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 2: PH.340.871 Welch Center Research Seminar (2 terms required)
PH.340.645 Introduction to Clinical Trials
PH.340.620 Principles of Clinical Epidemiology

Term 3: PH.340.871 Welch Center Research Seminar (2 terms required)

Term 4: PH.340.871 Welch Center Research Seminar (2 terms required)

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Courses Recommended for masters students in Cardiovascular and Clinical Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.340.687 Epidemiology of Kidney Disease 2

PH.340.731 Principles of Genetic Epidemiology 1 4

PH.340.616 Epidemiology of Aging 3 (alternates online and in-person every other year)

Term 2: PH.340.624 Etiology, Prevention, and Control of Cancer 4

PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses* 4 *usually taken in Year 2

Term 4: PH.340.644 Epidemiology of Diabetes and Obesity 3

Skills Courses (can be taken Year 1 or later with commensurate progress in Biostats series)

Term 4: PH.340.600 Stata Programming (4th term, 2 credits) 2

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3

Advanced Methods Courses (recommended in Year 2, review course catalogue for prerequisites)

Term 1: PH.140.641 Survival Analysis 3

PH.140.776 Statistical Computing 3

PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

Term 2: PH.340.717 Health Survey Research Methods 4

Term 3: PH.140.655 Analysis of Longitudinal Data 4

PH.140.664 Causal Inference in Medicine and Public Health I 4

Courses recommended for masters students with a focus in Cardiovascular Epidemiology

Term 1: PH.140.651 Methods in Biostatistics I 4

Term 2: PH.140.652 Methods in Biostatistics II 4

PH.340.620 Principles of Clinical Epidemiology 2

Term 3: PH.140.653 Methods in Biostatistics III 4

Term 4: PH.140.654 Methods in Biostatistics IV 4

Courses recommended for masters students with a focus in Clinical Epidemiology

Term 2: PH.309.712 Assessing Health Status and Patient Outcomes 3

Term 3: PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4

PH.340.730 Assessment of Clinical Cardiovascular Disease 2

Term 4: PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology 2

PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology 2 *

(Incoming students with a U.S. medical degree will be waived automatically. Other students who believe they may qualify for a waiver from the requirement based on their previous course work should consult with the track director)

Clinical Trials and Evidence Synthesis

Courses Required for masters students in Clinical Trials and Evidence Synthesis

First Year

Term 2: PH.340.645 Introduction to Clinical Trials 3

Term 3: PH.340.633 Data Management in Clinical Trials 3

Term 4: PH.340.648 Clinical Trials Management 3

Second Year

Term 3: PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4
PH.140.655 Analysis of Longitudinal Data 4

Courses Recommended for masters students in Clinical Trials and Evidence Synthesis

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.140.651 Methods in Biostatistics I 4
PH.221.722 Quality Assurance Management Methods for Developing Countries 4
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5
PH.390.631 Principles of Drug Development 2
PH.390.673 Ethical and Regulatory Issues in Clinical Research 3
PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.140.630 Introduction to Data Management 3
PH.140.652 Methods in Biostatistics II 4
PH.340.717 Health Survey Research Methods 4
PH.410.710 Concepts in Qualitative Research for Social and Behavioral Sciences 3

Term 3: PH.140.634 Non-Inferiority and Equivalence Clinical Trials 2
PH.140.642 Design of Clinical Experiments 3
PH.140.653 Methods in Biostatistics III 4
PH.223.664 Design and Conduct of Community Trials 4
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1
PH.340.775 Measurement Theory and Techniques in Epidemiology 4
PH.140.664 Causal Inference in Medicine and Public Health I 4

Term 4: PH.140.654 Methods in Biostatistics IV 4
PH.140.632 Introduction to the SAS Statistical Package 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.221.616 Ethics of Public Health Practice in Developing Countries 2

PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
PH.224.691 Qualitative Data Analysis 3
PH.390.675 Outcomes and Effectiveness Research 3

Summer Inst PH.330.621 Mixed Methods for Research in Public Health 2

Environmental Epidemiology

Course Required for masters students in Environmental Epidemiology
First Year
Term 4: PH.340.680 Environmental and Occupational Epidemiology

Courses recommended for masters students in Environmental Epidemiology
[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1: PH.182.615 Airborne Particles 4
PH.187.610 Public Health Toxicology 4
PH.188.680 Fundamentals of Occupational Health 3
PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2: PH.182.625 Principles of Occupational and Environmental Hygiene 4
PH.317.610 Risk Policy, Management and Communication 3
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.717 Health Survey Research Methods 4

Term 3: PH.180.601 Environmental Health 5
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.317.605 Methods in Quantitative Risk Assessment 4

Term 4: PH.188.681 Onsite Evaluation of Workplace and Occupational Health Programs 5
PH.317.615 Topics in Risk Assessment 2

Epidemiology of Aging

Course Required for masters students in Epidemiology of Aging
First Year
Term 1: PH.340.616 Epidemiology of Aging

Recommended Courses for Masters Students in Epidemiology of Aging
[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

First Year
each term PH.330.802 Seminar on Aging, Cognition and Neurodegenerative Disorders

Term 1: PH.140.641 Survival Analysis 3
PH.380.604 Life Course Perspectives on Health 4

Term 2: PH.340.620 Principles of Clinical Epidemiology 2
PH.340.666 Foundations of Social Epidemiology 3
PH.380.603 Demographic Methods for Public Health 4

Term 3: PH.340.699 Epidemiology of Sensory Loss in Aging 3
PH.260.665 Biological Basis of Aging++ 3

Term 4: PH.330.623 Brain and Behavior in Mental Disorders 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.330.618 Mental Health in Later Life++ 3

++offered every other year

Second Year
Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.309.605 Health Issues for Aging Populations 3

Term 3: PH.140.655 Analysis of Longitudinal Data 4

General Epidemiology and Methodology

Courses Required for masters students in General Epidemiology and Methodology
First Year
Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4
(recommended for year 1 but may be taken in year 2, satisfies the out-of-track requirement as well)

Term 2: PH.340.645 Introduction to Clinical Trials 3
(recommended for year 1 but may be taken in year 2)

Second Year
CHOOSE AT LEAST TWO of these 3 courses in PH research skills:

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
Term 2: PH.340.717 Health Survey Research Methods 4
Term 3: PH.340.648 Clinical Trials Management 3

Courses Recommended for Masters Students in General Epidemiology and Methodology
[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Master's Students with a Methodology Focus:
Term 1: PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.616 Epidemiology of Aging 3
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.183.631 Fundamentals of Human Physiology 4
PH.260.631 Immunology, Infection and Disease 3
PH.330.603 Psychiatric Epidemiology 3
PH.340.620 Principles of Clinical Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.666 Foundations of Social Epidemiology* 3
PH.340.732 Principles of Genetic Epidemiology 2 3
PH.340.641 Healthcare Epidemiology 4

Term 3: PH.140.640 Statistical Methods for Sample Surveys 3
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.222.647 Nutrition Epidemiology 3
PH.224.690 Qualitative Research Theory and Methods 3
PH.309.616 Introduction to Methods for Health Services Research and Evaluation I 2

PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4
PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3
PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4: PH.140.656 Multilevel Statistical Models in Public Health 4
PH.224.691 Qualitative Data Analysis 3
PH.309.617 Introduction to Methods for Health Services Research and Evaluation II 2
PH.340.677 Infectious Disease Dynamics: Theoretical and Computational Approaches 3
PH.340.680 Environmental and Occupational Epidemiology 4
PH.380.664 Reproductive and Perinatal Epidemiology 4
PH.390.675 Outcomes and Effectiveness Research 3

*alternates online and in-person every other year
++ alternate year course

Second Year courses:

Term 1: PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2: PH.340.774 Advanced Theory and Methods in Epidemiology 4

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.140.655 Analysis of Longitudinal Data 4
PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4

Recommended statistical programming computing courses:

Term 1: PH.140.776 Statistical Computing 3

Term 4: PH.140.632 Introduction to the SAS Statistical Package 3
PH.340.600 Stata Programming 2

Master's Students with a Pharmacoepidemiology and Drug Safety Focus:
Strongly Recommended courses for Masters Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.600 Introduction to the Risk Sciences and Public Policy 4
PH.390.631 Principles of Drug Development 2

Term 2: PH.317.610 Risk Policy, Management and Communication 3

Term 3: PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.340.684 Pharmacoepidemiology: Drug Utilization 3 (alternate year format)
PH.221.610 Pharmaceuticals Management for Under-Served Populations 3

Term 4: PH.410.680 Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions 3

Recommended courses for Masters Students with a Pharmacoepidemiology Focus:

Term 1: PH.317.605 Methods in Quantitative Risk Assessment 4
Term 4: PH.317.615 Topics in Risk Assessment 2

the following courses are offered outside of BSPH and require interdivisional registration and instructor permission

AS.410.651 Clinical Development of Drugs and Biologics 4
AS.410.627 Translational Biotechnology: From Intellectual Property to Licensing 4
ME.330.809 Analytic Methods for Clinical Pharmacology variable
NR.110.508 Clinical Pharmacology 3

Individualized Focus:
Students designing their own educational programs should, in conjunction with their advisor, choose three to four graduate-level courses (taken for a letter grade) in their field from among the offerings of the University in addition to taking the GEM Required courses listed above.

Genetic Epidemiology

Courses Required for Masters Students in Genetic Epidemiology
First Year

Term 1: PH.340.731 Principles of Genetic Epidemiology 1 4

Term 2: PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3: PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4: PH.340.734 Principles of Genetic Epi 4: Emerging and Advanced Methods 2

Second Year

Term 1: PH.120.602 Concepts of Molecular Biology (Pass/Fail, or Grade) 4

Courses recommended for masters students in Genetic Epidemiology
Analytic Methods Courses (ideal for year 2):

Term 1: PH.140.641 Survival Analysis 3
PH.140.651 Methods in Biostatistics I* 4
PH.140.776 Statistical Computing 3

Term 2: PH.140.638 Analysis of Biological Sequences 3
PH.140.652 Methods in Biostatistics II 4
PH.140.778 Advanced Statistical Computing 3
PH.340.774 Advanced Theory and Methods in Epidemiology* 4

Term 3: PH.140.644 Statistical Machine Learning: Methods, Theory, and Applications 4
PH.140.653 Methods in Biostatistics III 4
PH.140.655 Analysis of Longitudinal Data 4

Term 4: PH.140.688 Statistics For Genomics 3

Biology and Molecular Methods Courses:

Term 1: PH.260.611 Principles of Immunology I 4

Term 2: PH.260.612 Principles of Immunology II 4
PH.183.631 Fundamentals of Human Physiology 4 (*For non-physician trained students only)

Term 3: PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

Term 4: PH.120.608 Gene Editing, therapy and Manipulation 3

Topic-Specific Electives:

Term 3: PH.340.775 Measurement Theory and Techniques in Epidemiology 4

Term 4: PH.330.619 Psychiatric Genomics 3
PH.415.624 Ethical, Legal and Social Implications in Genetics and Genomics Over Time 3 (offered in alternate years)

Infectious Disease Epidemiology

Courses Required for masters students in Infectious Disease Epidemiology First Year

Term 1: PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2: PH.340.627 Epidemiology of Infectious Diseases 4

Term 3: PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3

Students must complete at least one course in each of the four disciplinary sections below. Additional courses serve as recommended courses.

Section one: General Electives: choose 1

Term 1: PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.641 Healthcare Epidemiology 4

Term 2: PH.223.662 Vaccine Development and Application4

Term 3: PH.182.640 Food- and Water- Borne Diseases 3

PH.223.663 Infectious Diseases and Child Survival 3
PH.223.687 Vaccine Policy Issues 3
PH.260.656 Malariology 4
PH.340.612 Epidemiologic Basis for Tuberculosis Control 2

Term 4: PH.223.682 Clinical and Epidemiologic Aspects of Tropical Diseases 4
PH.223.689 Biologic Basis of Vaccine Development 3
PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
PH.340.651 Emerging Infections 2
PH.380.761 Sexually Transmitted Infections in Public Health Practice 4
PH.380.762 HIV Infection in Women, Children, and Adolescents 4

Section two: Skills in Research: choose 1

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

Term 2: PH.340.717 Health Survey Research Methods 4

Section three: Biology and Pathogenesis of Disease: choose 1

Term 1: PH.260.623 Fundamental Virology 4
PH.260.636 Evolution of Infectious Disease 3
PH.340.654 Epidemiology and Natural History of Human Viral Infections 6
Term 3: PH.260.627 Pathogenesis of Bacterial Infections 4
PH.260.650 Vector Biology and Vector-Borne Diseases 3

Section four: Immunology: choose one set (recommended to complete in year two)

either:

Term 1: PH.260.611 Principles of Immunology I 4

AND

Term 2: PH.260.612 Principles of Immunology II 4
**students requesting pass/fail for these two courses only must seek permission from their adviser and the track director*

OR

Term 2: PH.260.631 Immunology, Infection and Disease 3

Department Comprehensive Examination

A two-day written departmental comprehensive examination is administered to all students enrolled in Epidemiology degree programs in late May of the first academic year. All students are required to sit for the exam on the scheduled dates—no alternate exams will be offered.

By the time of the examination, students should have completed 64 credits (for four consecutive terms, e.g. one full year of residence), **the required first-year coursework in their Track with a cumulative GPA of at least 2.75,** and in these courses:

Code	Title	Credits
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Select one of the following Biostatistics series:		16
PH.140.621 & PH.140.622 & PH.140.623 & PH.140.624	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III and Statistical Methods in Public Health IV	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV	

The first day of the exam (Part A) includes testing on the following topics:

- Knowledge and application of epidemiologic concepts and methods (and related biostatistics)
- History of epidemiology
- Contemporary issues in public health
- Research ethics

The second day of the exam (Part B) is Track-specific, and tests knowledge of concepts and methods presented in the required courses and activities for each Track, as well as the Department core courses as applied to the Track.

Students must pass both Part A and Part B of the comprehensive examination. Master's students must attain at least a 70% on each Part A and Part B to pass. A repeat examination may be allowed but is not guaranteed. If a repeat is granted, it must be completed before starting the second academic year. Failure to pass one or both sections of the comps may result in dismissal from the master's program or from the Department. For additional policies regarding the Comprehensive Exams, please see the next tab.

Master's Thesis (ScM)

Master of Science (ScM) students must complete a thesis based on original research. The readers' committee is comprised of the adviser and one additional University faculty member prior to beginning the thesis project (professor, scientist, lecturer, instructor of any rank). Upon completion, the thesis is submitted to these two readers for their approval. ScM students planning on a May graduation must adhere to all program deadlines. The School's Policy and Procedures Memorandum (PPM) for the ScM degree program is available here (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx), "Academic_Programs_10_Master_of_Science_Degree_071417." The thesis is a requirement for partial fulfillment of the ScM degree.

Master's Thesis Expectations

Epidemiology ScM student theses will be evaluated in the following areas by both the faculty thesis adviser(s) and the second reader. In addition, the thesis adviser(s) will evaluate student quarterly progress detailed in point 5 below.

Each student must register for 4 terms of Thesis Research Epidemiology with their thesis adviser in their second year. The thesis adviser(s), in consultation with the thesis reader, each student will be evaluated on whether their thesis shows:

1. Their understanding of the current state of the knowledge about the public health problem studied for the thesis, as demonstrated by the student's descriptions and discussions of:
    a. The descriptive epidemiology of the public health problem. For example, its prevalence and distribution in the population, and its risk factors (e.g., modifiable, non-modifiable, comorbidities, social, environmental risk factors, etc.).
    b. The biology, physiology, and natural history of the public health problem, if relevant.
    c. The contemporary questions about the public health problem, including new directions in research on the public health problem (including technology, diagnosis, and methodologic challenges).
    d. The impact of the public health problem in the real world, with specific discussions about sub-populations or vulnerable populations that are particularly affected by the problem.
2. The student's ability to integrate and synthesize the current body of literature on the public health problem, is demonstrated by:
    a. Preparation of a comprehensive literature review (systematic review, if appropriate see separate document).
    b. Interpretation of findings from multiple research papers and understanding of the full body of research relevant to the public health problem.
    c. Interpretation of the student's own findings within the context of the current body of literature.
    d. Use or evaluation of proper study design, measurement of exposures and/or outcomes, biases, and confounding, biostatistical methods, and application.
    e. Explanation and interpretation of epidemiologic findings for a non-epidemiologist audience.
    f. Identify next steps and future questions that need to be addressed.
    g. Articulation of how the student's findings could be applied in order to affect or diminish the problem at a population (or sub-population) level.
3. The student's ability to prepare a thesis that is:
    a. Logically structured and organized; and
    b. Includes figures that illustrate important findings, with proper formatting (e.g. legends, labeled axes, appropriate titles, etc.); and
    c. Includes tables that convey important findings, organized and formatted efficiently (e.g. appropriate titles, headings, footnotes, legends, etc.).
4. The student's ability to write a thesis that is grammatically accurate, including:
    a. Correct punctuation and spelling; and
    b. Easily readable by epidemiologists; and
    c. Appropriately and adequately referenced citations; and
    d. The student's own original work (please see Plagiarism modules).
5. The student's thesis adviser will evaluate the student on student professionalism, documented by:
    a. Keeping appointments with the thesis adviser and being on time.
    b. Being prepared and organized at each meeting with the thesis adviser, which includes creating and sending an agenda before the meeting.
    c. Demonstrating appropriately paced progress on the thesis research.
    d. Preparing the thesis document.

The expectation is that the student will improve in all aspects of their research during the course of the thesis work and work will show growth across the year culminating in the final thesis.

Master's Poster Session

All Master's students are required to participate in the Master's Poster Symposium held at the end of their 2nd year. Participation is a requirement for partial fulfillment of the ScM degree. Each student should prepare a 3'x4' portrait-oriented poster of their thesis work (no other work can be presented,) and have the approval of the poster from their adviser(s) before presenting. Although the work done for the poster will represent the Master's student's thesis, the adviser(s), and any other research colleagues, should be included as co-authors. In addition, any funding sources that supported the research directly or indirectly should be cited on the poster (in consultation with thesis adviser(s)). Additional guidelines for the creation of a scientific poster will be disseminated to students at the quarterly Master's meetings. Students are expected to follow these guidelines.

Students should carefully proofread their posters prior to submitting them for printing. Students are welcome to utilize the printing service they wish, but two local recommendations are:

https://phdposters.com (Campus Pick-up Available)

FedEx Print & Ship / Carnegie Building Room #170
600 N. Wolfe St.
Baltimore, MD 21287
410-502-7637
usa5032@fedex.com

A poster title and abstract should be submitted to the Academic Program Coordinator (Justin Switzer) prior to the Master's Poster Symposium for inclusion in the program. Attendees at the Master's Poster Symposium include peers, staff, and faculty.

Students who will not graduate in May are still required to present a poster. This poster must be approved by their adviser(s) and presented to the Master's Program Director at least three weeks prior to the date by which the Department must certify student eligibility for the award of degree to the School's Office of Records and Registration. Students graduating in August or December must contact the Master's Program Director by July 1 (August graduation) or November 1 (December graduation) to indicate their plans to graduate and determine a poster presentation date.

The Policy and Procedures Manual for the Master Science

The Department of Epidemiology reserves the right to augment the PPM (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_10_Master_of_Science_Degree_071417.pdf) for BSPH.
The Admissions and Credentials Committee handles most policy concerns as described above. The Curriculum Committee handles exceptions to requirements.

Comprehensive Examination Grading Policy

The Departmental Written Comprehensive Examination is graded by the Department of Epidemiology faculty according to a rubric determined by the Comprehensive Examination Committee. Final results are distributed to students via CoursePlus by mid-July. Students who wish to view their exam should set up an appointment with the Senior Academic Coordinator, Ebony Moore (eamoore@jhu.edu).

Master's students whose results fall below 70% are allowed to submit a written request for a re-grade of specific questions. Re-grade requests must include a justification for a change in points allocated for each question being contested; requests without appropriate justification will not be considered. Re-grade requests must have the adviser's endorsement who must have reviewed and approved the student's request. Re-grade requests are handled by the faculty on the Comprehensive Examination Committee. Adviser-approved requests can be e-mailed to the current year's Comprehensive Examination Committee Chair and must include a copy to the adviser. For approved requests, a new score will be assigned for each question that is re-graded. This score may be equal to, greater than, or less than, the original score awarded and cannot be contested a second time.

Master's students admitted to an Epidemiology PhD program may waive the PhD comprehensive exam if they pass (as a master's student) at the doctoral level (75%) and matriculate within the three years following graduating from a Johns Hopkins Bloomberg School of Public Health Epidemiology Master's Degree.

Comprehensive Examination Retake Policy

Students who do not pass the Comprehensive Exam at the appropriate level for their degree program may be granted an opportunity for a retake in August following the May Exam. Students who do not pass the Comprehensive Exam at the appropriate level are not automatically granted a retake. To request a retake, students must submit an official request within two weeks of notification of the not passing grade. This request should include a detailed timeline and study plan, to make the case for passing a retake. This request and plan must be endorsed by and developed with the adviser. Retake requests are reviewed via the Department's Admissions and Credentials Committee. Adviser-approved requests can be e-mailed to the current year's Admissions and Credentials Committee Chairs and must include a copy to the adviser and Senior Academic Program Manager (Frances Burman). For approved requests, students are granted one retake only, and it must be in August immediately following the May Exam. A student cannot continue in the degree program without passing the Comprehensive Examination at the appropriate level, prior to the start of the second year.

Recommendations for Special Studies versus Thesis Research

Special Studies and Research in Epidemiology, PH.340.840.xx, is offered during terms 1, 2, 3, and 4. Thesis Research, PH.340.820.XX is offered terms S, 1, 2, 3, and 4.

Special Studies and Research: PH.340.840.XX

All first-year ScM students should take 1 credit special studies and research each term during terms 1 -3.

The following list of activities may be approved for independent study or special studies and research and is not inclusive:

- Directed readings and discussion leading up to preparing for the research proposal,
- Literature searches and meta-analyses
- Secondary data analysis,
- Self-guided focused study on a particular methodology or a disease of interest

Thesis Research: PH.340.820.XX

Masters students take 340.820 once they begin working on their research thesis. Students should begin registering for thesis research during fourth term of the first year once their adviser selection is confirmed. ScM students must take a minimum of 2 credits of thesis research for two terms during their program.

Calculating credits for a variable credit course

- Students must remember that the 1 hour – in class, 2 hours – outside of class ratio still applies: e.g. Students should think about the time the faculty member will be involved in guiding them (see faculty contact hours below) as well as how much time the student uses to conduct outside readings and work.

What constitutes Faculty Contact Hours

- Individual one-on-one meetings
- Faculty revisions of writing projects (Faculty members spend a lot of time editing, proofreading, and otherwise providing written feedback to students.)
- Mentoring and networking preparation and discussion.
- Time spent in group settings with faculty mentors e.g. journal clubs or weekly "lab/group" meetings. Students should make every effort to attend the group meetings for their track and adviser.

How to Register

- Students must communicate their intent to register with and receive approval from the faculty mentor in writing, prior to registering for credits for the special studies or thesis research and include the content/activities to be conducted and the number of credits.
- Students may take 1-3 credits while taking a full load of courses.
- Students may take up to 8 credits per term while taking a partial load of courses with the approval of the faculty mentor.
- Students must meet with the faculty mentor before or during add/drop to discuss objectives.

Adviser / Advisee Manual

Each student in the Department is assigned an adviser and selects co-adviser(s) as they move through the program; Adviser(s) have the responsibility of serving as a guide and mentor. This manual is intended to guide the student and the faculty member(s) in making the adviser/advisee relationship as successful as possible.

This manual has two goals:

- To provide answers to questions that students frequently ask and,
- To provide guidance on how the student and adviser can interact most effectively

Academic Advisers should:

- Provide oversight of the student's academic progress by:
  - Assisting in the selection of courses
  - Ensuring the student is meeting degree milestones in a timely manner
  - Being available for regular meetings with the student
  - Assessing and developing the student's interests and abilities
  - Monitoring student progress in academic coursework through periodic examination of transcripts
  - Monitoring student progress in fieldwork
  - Writing letters of reference (given appropriate lead-time)
  - Assisting with grant preparation (doctoral students, given appropriate lead-time)
  - Referring students to the appropriate individuals or offices that provide academic support and/or resources
- Provide leadership in matters of academic integrity:
  - Being knowledgeable about ethical issues that pertain to academics, research, and practice
  - Helping students interpret and understand institutional policies and procedures regarding the responsible conduct of research
  - Discouraging students from circumventing institutional policies and procedures, and when confronted with such issues, directing students to appropriate institutional resources or contacts, avoiding actual or appearance of conflicts of interest
  - Respecting the confidentiality of students
- Encourage active participation in the greater community (department, school, university, local, state, national, international)

STUDENTS MAY EXPECT THE FOLLOWING FROM THEIR ADVISER(S):

- Advisers' approval for course registrations, course changes, and pass/fail agreements, and on all reasonable petitions to the Admissions and Credentials Committee
- At least one meeting per term with the advisers
- Oversight of the student's overall academic program and sensitivity to any academic difficulties
- Knowledge of and interest in the student's career objectives
- Review of required and recommended courses for the track
- Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year

Advising students is an integral part of faculty members' responsibilities. Thus, students should not feel or be made to feel that they are imposing by asking for advice. Faculty members expect to be able to meet with students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. The responsibility for arranging meetings lies with the student. Students should not expect advisers to seek them out for needed appointments. The student remains obligated to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline.

RIGHTS AND RESPONSIBILITIES OF THE ADVISER(S)**:

- To assist in determining the advisee's educational goals and needs upon starting the program
- To serve as an educational and/or professional mentor for the student
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and the advisers in terms of academic, professional, and personal interests
- To facilitate a change of adviser or program, if deemed appropriate for the student
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty
- To provide guidance throughout the academic program
- To be sensitive to cultural, medical, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be aware, sensitive, understanding, and supportive
- Advisers have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be consulted when students have questions or concerns about the research focus or progress, and to serve as team leader on the research team

RIGHTS AND RESPONSIBILITIES OF THE ADVISEE**:

- To arrange to meet with the adviser at least once each term, and observe registration and administrative deadlines
- To identify and develop professional career goals and interests
- To access and demonstrate knowledge of administrative policies and procedures and be familiar with the content in the Student Handbook
- To maintain the academic checklist and review it at meetings with the advisers
- Advisees have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be notified when advisers have questions or concerns about the research focus or progress, and to be granted the role of a team member on the research team

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**Students and Faculty each have the right to request changes
 to the adviser/advisee relationship upon consultation with the
 Director of Graduate Education (Laura Camarata) without penalty.
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Please review the CEPH Competencies located: https://e-nextcatalog.jhu.edu/public-health/ceph-requirements/index.html (p. 176)

Epidemiology, PhD

Doctor of Philosophy Degree Program

The PhD program in Epidemiology (https://publichealth.jhu.edu/academics/phd-dept-of-epidemiology/) is anchored in public health and quantitative population research and analysis. Students approach research using epidemiologic methods to understand complex human health problems. The PhD comprises two years of coursework followed by two (or more) years of research. Students are required to complete a teaching training curriculum and serve as teaching assistants for methods and topical courses. Additionally, students must successfully complete a written comprehensive exam, a practice oral exam, a preliminary oral exam, multiple oral and poster presentations, and a final dissertation including presentation and defense. The doctoral degree program targets students with specific career goals in public health research, teaching, and/or leadership.

PhD students focus on the creation of new and innovative knowledge through their research. Training is offered through a core methodologic sequence with the addition of more focused courses in specialized areas. Students are expected to tailor their curricula, working with their advisers to create a comprehensive plan of study and research. PhD theses must be based on original research, worthy of publication, and approved by the Department and a committee of thesis (dissertation) readers. PhD students must also be engaged in primary data collection as a component of their dissertation research or embedded in other research during their training here.

The PhD program requires that students:

- Complete at least 64 credits of coursework with a cumulative 3.0 GPA (B or higher average);
- Successfully pass the departmental comprehensive examination at the appropriate level;
- Complete the teaching assistantship (TA) curriculum, including serving as a TA in 3 departmental courses;
- Present a doctoral proposal seminar in the Department;
- Pass the Departmental Oral Examination;
- Pass the Graduate Board Preliminary Oral Examination,
- Fulfill the primary data collection requirement
- Develop and conduct independent research culminating in a doctoral dissertation in an approved format;
- Present their dissertation research in a final seminar (open to the public);
- Successfully defend their dissertation during the Final Oral Examination.

Students work closely with their advisers and Thesis Advisory Committee to develop their research questions and design their projects to address those questions and to conduct the dissertation research.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Doctoral students in the Department of Epidemiology are expected to train to be public health leaders and educators. By following an apprenticeship model, students take courses, learn to teach methods and concepts to a wide audience, conduct a rigorous examination of the existing science, and discover and contribute new knowledge to the field. Thus we require students to complete a residency and participate fully in journal clubs, research-in-progress meetings, programmatic activities, and scientific poster sessions and conferences. Doctoral students serve as teaching assistants, conduct research, and prepare a dissertation of the caliber expected of graduates of the Johns Hopkins University.

Residency

A minimum of 64 credits is required to complete a doctoral degree. The residency requirement (completed by maintaining full-time registration of four consecutive terms of at least 16 credits each) must be completed during the first year of the program. To broaden perspective and to enhance the student's capabilities for work in public health or disease-related fields, at least 18 credits of coursework are required in courses from at least two other departments outside the student's primary department. At least nine of these credits must be taken at BSPH. Students who have completed a master's degree at Johns Hopkins Bloomberg School of Public Health, and are continuing into the doctoral program, must complete 18 new credits outside of Epidemiology, in at least two different departments of the school **and** complete 18 credits within the Department of Epidemiology, to establish the grade point average. Of note: University and Schoolwide requirements do not count toward the 18 credits outside of the department.

Track Specific Activities

Each Track holds journal clubs, research-in-progress meetings, and other activities, which Track students are expected to attend. PhD students should take on leadership roles after their first year of study. These activities are opportunities to engage and interact with Track faculty, fellow students, and post-doctoral fellows, and to participate and present in the topic area of the Track. All doctoral students are expected to participate in their Track. If a student for some reason wishes to switch tracks during the course of their degree, they must schedule a meeting with the Senior Academic Program Manager, Frances Burman (FranBurman@jhu.edu) to ascertain whether a switch is feasible to still meet graduation requirements in time and to complete a formal form.

Quarterly Doctoral Meetings

Doctoral students and the Doctoral Program Directors meet quarterly. The agenda is developed by the Epidemiology Student Organization (ESO) doctoral student representatives in consultation with the program co-directors. These meetings provide a forum to learn about academic policies and deadlines, for students to raise questions and concerns, and for all to hear the answers. All doctoral students are expected to attend these meetings.

Annual Advising and Planning Meetings with Adviser

PhD students must meet at least annually with their primary academic adviser for a formal review of their progress with written feedback and discussion plans for the upcoming year. This is accomplished using the Individualized Development Plan **(**https://my.jhsph.edu/sites/EPI/students/DocumentLibrary/JHSPH_Annual-Discussion-and-Planning-Document_form[1].pdf**)** (IDP) in the My.jhsph.edu portal.

Any template for an IDP may be used but at a minimum, however, the form must include sections for the student to complete on the following topics. There must also be space for advisor comments and feedback:

- Academic and/or thesis research progress of the past year and specific academic and/or research goals for the upcoming year;
- How the advisor can help the student achieve the student's academic or research goals for the coming year;
- Short and long-term professional goals and the types or range of professional sectors of possible interest;
- Specific skills the student wants to develop, or professional areas about which the student wants to learn more;
- How the advisor can help the student achieve, or connect the student to resources for, these professional goals.

Doctoral Teaching Assistant (TA) Curriculum Requirements

PURPOSE OF THE DOCTORAL TA CURRICULUM

Learning how to be an effective teacher and communicator about epidemiologic principles and methods is an integral part of doctoral education in epidemiology. Teaching is an opportunity for students to meet several Departmental doctoral program core competencies, enabling students to:

- Interpret and critique epidemiological studies;
- Interpret epidemiologic data and make valid inferences from study findings;
- Communicate effectively in oral and written formats with students, professionals, and the public on issues related to epidemiology and public health; and
- Provide epidemiologic critique and advice through advising students and professionals on epidemiologic concepts and methods and conducting peer review activities

Practicing these skills also prepare students for Department and Preliminary Oral Examinations and for their future careers, whether in academia or in other venues. The full description of the Teaching Curriculum is outlined in the Policy tab. (p. 263)

School-wide Coursework

Academic & Research Ethics (and Avoiding Plagiarism) Course Requirement

All doctoral students must enroll in PH.550.860 Academic & Research Ethics at BSPH during the first term of doctoral enrollment at the School. The Avoiding Plagiarism at JHU training developed by JHU's Sheridan Libraries course material is contained within the PH.550.860 Academic & Research Ethics at BSPH course. This online course, is administered through CoursePlus. All students are required to complete this online course by the end of their first term enrolled. In the course, students are asked to upload two certificates to a CoursePlus DropBox showing completion of both parts of this course:

- Certificate from JHU for the Avoiding Plagiarism module
- Certificate from SPH for completion of the Responsible Conduct of Research module

Students must also send a copy of the certificates to the Senior Academic Program Manager, Frances Burman (FranBurman@jhu.edu) with their name and "Academic & Research Ethics Requirement" in the subject line of the e-mail.

Responsible Conduct of Research Course Requirement

All doctoral students must fulfill the Responsible Conduct of Research requirement. Please note, while there is a Responsible Conduct of Research module within the PH.550.860 Academic & Research Ethics at BSPH.82, this is a separate requirement and is not fulfilled by that module contained within PH.550.860 Academic & Research Ethics at BSPH.82.

Additionally, doctoral students who are supported by a National Institutes of Health (NIH) training grant, career development award (individual or institutional), research education grant, or dissertation research grant (including D43, D71, F05, F30, F31, F32, F33, F34, F37, F38, K01, K02, K05, K07, K08, K12, K18, K22, K23, K24, K25, K26, K30, K99/R00, KL1, KL2, R36, T15, T32, T34, T35, T36, T37, T90/R90, TL1, TU2, and U2R) must repeat this in-person requirement every four years.

This requirement can be met by completing either of the following two courses:

- PH.550.600 Living Science Ethics - Responsible Conduct of Research (1st term)
  or
- PH.306.665 Research Ethics and integrity: U.S. and International Issues (3rd term)

CEPH Cells to Society Courses

The Council on Education in Public Health designates core knowledge for all public health professionals. The list of courses and term offerings is located online (https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings/). Epidemiology degree students are required to complete 8 of the 12 sessions as listed below. Each course is 0.5 credits and is offered only online. Many of these courses can be used as introductions to full-term courses offered in multiple modalities throughout the year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

Departmental Core and Required Courses [subject to change]

The Doctoral Level Core Requirements are listed by year and term for all Epidemiology doctoral students. Students complete **CEPH Cells to Society Courses**, **Core Courses**, **Track-Specific Courses**, a **course outside of their track**, and recommended courses appropriate to provide a base for their intended research. Students who group their electives and recommended courses in a cohesive theme may wish to complete one of the many Certificates (https://www.jhsph.edu/academics/certificate-programs/) offered by the Department and School. Doctoral students who have a strong interest in methodology may apply for and complete the Concurrent MHS in Biostatistics (https://www.jhsph.edu/departments/biostatistics/academics-and-student-life/degree-programs/mhs/) while enrolled in the doctoral program.

REQUIRED: Core Courses for all doctoral students in Epidemiology

Core Courses should be completed during the first year of enrollment in preparation for the Written Comprehensive Examinations and as preparation for the Teaching Curriculum.

Course	Title	Credits
First Year		
First Term		
Summer Before Year 1		
Online Incoming Epi Students 2021 Orientation includes:		
Introduction to Online Learning		
Sexual Harassment and Sexual Violence Prevention Training (Title IX)		
Unconscious Bias Training		
First Term		

PH.140.621 or PH.140.651	Statistical Methods in Public Health I or Methods in Biostatistics I	4
PH.340.751	Epidemiologic Methods 1	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.340.853	First Year Epidemiology Doctoral Seminar	1
Select out-of-track, recommended, or elective courses to total 16 credits per term		5
	Credits	**16**
Second Term		
PH.140.622 or PH.140.652	Statistical Methods in Public Health II or Methods in Biostatistics II	4
PH.340.752	Epidemiologic Methods 2	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.550.865	Public Health Perspectives on Research [1]	2
PH.340.853	First Year Epidemiology Doctoral Seminar	1
Select out-of-track, recommended, or elective courses to total 16 credits per term		3
	Credits	**16**
Third Term		
PH.140.623 or PH.140.653	Statistical Methods in Public Health III or Methods in Biostatistics III	4
PH.340.753	Epidemiologic Methods 3	5
PH.340.860	Current Topics in Epidemiologic Research	1
PH.340.853	First Year Epidemiology Doctoral Seminar	1
Select out-of-track, recommended, or elective courses to total 16 credits per term		5
	Credits	**16**
Fourth Term		
PH.140.624 or PH.140.654	Statistical Methods in Public Health IV or Methods in Biostatistics IV	4
PH.340.820	Thesis Research Epidemiology (varies)	1 - 3
PH.340.860	Current Topics in Epidemiologic Research	1
Select out-of-track, recommended, or elective courses to total 16 credits per term		10
Department Comprehensive Examination		
Pass Parts A&B - immediately following Fourth Term		
	Credits	**16-18**
Second Year		
First Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 5
PH.340.863	Doctoral Seminars in Epidemiology	3
PH.340.865	Teaching Epidemiologic Methods and Concepts At the Graduate Level (Select this course to coincide with TA positions fulfilling requirement)	1 - 3
Select recommended and elective courses to total 16 credits per term		11
	Credits	**16-22**
Second Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 5
PH.340.863	Doctoral Seminars in Epidemiology	3
PH.340.865	Teaching Epidemiologic Methods and Concepts At the Graduate Level (Select this course to coincide with TA positions fulfilling requirement)	1 - 3
Select recommended and elective courses to total 16 credits per term		11
	Credits	**16-22**
Third Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 5
PH.340.863	Doctoral Seminars in Epidemiology	3
PH.340.865	Teaching Epidemiologic Methods and Concepts At the Graduate Level (Select this course to coincide with TA positions fulfilling requirement)	1 - 3
Select recommended and elective courses to total 16 credits per term		11
	Credits	**16-22**
Fourth Term		
PH.340.820	Thesis Research Epidemiology (with thesis adviser, credits variable)	1 - 5
PH.340.715	Problems in the Design of Epidemiologic Studies: Proposal Development and Critique	5
PH.340.865	Teaching Epidemiologic Methods and Concepts At the Graduate Level (Select this course to coincide with TA positions fulfilling requirement)	1 - 3
Select recommended and elective courses to total 16 credits per term		9
	Credits	**16-22**
	Total Credits	**128-154**

[1] May be waived if student holds MPH from a CEPH accredited program in past 10 yrs

Courses approved for the "OUTSIDE OF TRACK" requirement

All students must complete one introductory topical epidemiology course outside of the chosen track. Courses approved by the Curriculum Committee to meet this requirement are listed below:

Code	Title	Credits
Select one of the following:		3-4
PH.340.616	Epidemiology of Aging (Term 1)	
PH.340.731	Principles of Genetic Epidemiology 1 (Term 1)	
PH.340.682	Pharmacoepidemiology Methods (Term 2)	
PH.330.603	Psychiatric Epidemiology (Term 2)	
PH.340.624	Etiology, Prevention, and Control of Cancer (Term 2)	
PH.340.627	Epidemiology of Infectious Diseases (Term 2)	
PH.340.645	Introduction to Clinical Trials (Term 2)	
PH.340.699	Epidemiology of Sensory Loss in Aging (Term 3)	
PH.340.607	Introduction to Cardiovascular Disease Epidemiology (Term 3)	

Code	Title	Credits
PH.340.680	Environmental and Occupational Epidemiology (Term 4)	
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	
PH.340.666	Foundations of Social Epidemiology (Term 4)	
Total Credits		**3-4**

DEPARTMENT-WIDE RECOMMENDED COURSES

Code	Title	Credits
PH.340.860	Current Topics in Epidemiologic Research (Term 1-4, credits variable) [1, 2]	1
PH.340.770	Public Health Surveillance (Term 2 or Term 3) [2]	3
PH.340.769	Professional Epidemiology Methods (Term 3)	4
PH.340.840	Special Studies and Research Epidemiology (Term 1-4, credits variable) [1]	1 - 22

1 1 term, can be taken in any term 1 through 4
2 Recommended for all four terms during year 2

Specific track requirements will be cross-referenced with the course directory and course system database before listing below.

Track Course Requirements (subject to change)

In addition to the Department-wide Core Requirements, each track requires additional coursework specific to their fields to prepare students to conduct research and serve as leaders. Please see the track-specific requirements and recommended courses listed below. Additionally, the first-year course content is covered in the annual Written Comprehensive Exams. All students may take courses in any of the tracks listed and are encouraged to do so.

Cancer Epidemiology

Courses Required for doctoral Students in Cancer Epidemiology

First Year

Term 1

Code	Title	Credits
PH.340.731	Principles of Genetic Epidemiology 1	4

Term 2

Code	Title	Credits
PH.340.624	Etiology, Prevention, and Control of Cancer	4
PH.340.732	Principles of Genetic Epidemiology 2	3

Second Year

Term 1

Code	Title	Credits
ME.510.706	Fundamentals of Cancer: Cause to Cure ((Fundamentals of Cancer: Cause - to - Cure)) offered alternate years - check catalog listing	2.5
PH.120.624	Cancer Biology (may be completed instead of term 1 of Cause to Cure)	3

Term 2

Code	Title	Credits
ME.510.706	Fundamentals of Cancer: Cause to Cure ((Fundamentals of Cancer: Cause - to - Cure) offered alternate years - check catalog listing)	2.5
PH.180.650	Fundamentals of Clinical Oncology for Public Health Practitioners (may be completed instead of term 2 of Cause to Cure)	3

Term 3

Code	Title	Credits
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	4

Additional Recommended Courses for doctoral students in Cancer Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1

PH.140.651 Methods in Biostatistics I
PH.340.616 Epidemiology of Aging (fulfills an out-of-track requirement)
PH.340.696 Spatial Analysis I: ArcGIS
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation ideally taken in year 2
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies should be completed in year 2 or later

Term 2

PH.140.652 Methods in Biostatistics II
PH.340.774 Advanced Theory and Methods in Epidemiology
PH.140.630 Introduction to Data Management
PH.180.650 Fundamentals of Clinical Oncology for Public Health Practitioners (becomes recommended only when used in addition to Cancer: Cause to Cure)
PH.330.603 Psychiatric Epidemiology (fulfills an out-of-track requirement)
PH.340.645 Introduction to Clinical Trials (fulfills an out-of-track requirement)
PH.340.666 Foundations of Social Epidemiology (fulfills an out-of-track requirement)
PH.340.682 Pharmacoepidemiology Methods (fulfills an out-of-track requirement)
PH.340.697 Spatial Analysis II: Spatial Data Technologies

Term 3

PH.140.653 Methods in Biostatistics III
PH.140.655 Analysis of Longitudinal Data
PH.140.664 Causal Inference in Medicine and Public Health I
PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I

Term 4

PH.140.632 Introduction to the SAS Statistical Package
PH.140.654 Methods in Biostatistics IV
PH.140.656 Multilevel Statistical Models in Public Health
PH.340.644 Epidemiology of Diabetes and Obesity
PH.340.600 Stata Programming

PH.340.680 Environmental and Occupational Epidemiology (fulfills an out-of-track requirement)
PH.120.624 Cancer Biology (becomes recommended only when used in addition to Cancer: Cause to Cure)
PH.380.664 Reproductive and Perinatal Epidemiology (fulfills an out-of-track requirement)

Cardiovascular and Clinical Epidemiology

Courses Required for doctoral students in Cardiovascular and Clinical Epidemiology

First Year

Code	Title	Credits
PH.260.600	Introduction to the Biomedical Sciences (offered over the summer prior to enrollment for students without a prior background in biology or medicine)	4
PH.550.630	Public Health Biology (for students WITHOUT a background in biology or medicine)	3
PH.340.855	SS/R: Biological Basis of Cardiovascular Disease Epidemiology (for students WITHOUT a background in biology or medicine)	2

Term 1:

Code	Title	Credits
PH.340.871	Welch Center Research Seminar (2 terms are required, students normally complete all 4 during first year)	1

Term 2:

Code	Title	Credits
PH.340.871	Welch Center Research Seminar	1
PH.340.645	Introduction to Clinical Trials (fulfills an out-of-track requirement)	3

Term 3:

Code	Title	Credits
PH.340.871	Welch Center Research Seminar	1

Term 4:

Code	Title	Credits
PH.340.871	Welch Center Research Seminar	1

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Additional Required Courses for Doctoral Students focusing in Cardiovascular Epidemiology

Term 3

Code	Title	Credits
PH.340.607	Introduction to Cardiovascular Disease Epidemiology	4
PH.340.730	Assessment of Clinical Cardiovascular Disease (for students WITHOUT a background in biology or medicine)	2

Term 4

Code	Title	Credits
PH.340.803	Advanced Topics in Cardiovascular Disease Epidemiology	2
PH.340.855	SS/R: Biological Basis of Cardiovascular Disease Epidemiology (for students WITHOUT a background in biology or medicine)	2

Additional Required Course for Doctoral Students focusing in Clinical Epidemiology

First Year

Term 2

Code	Title	Credits
PH.340.620	Principles of Clinical Epidemiology	2

Second Year

please consider recommended courses appropriate to augment your knowledge in fields of interest

Recommended Courses for Doctoral Students in Cardiovascular and Clinical Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1
PH.340.687 Epidemiology of Kidney Disease   2
PH.340.731 Principles of Genetic Epidemiology 1 (fulfills and out of track requirement) 4
PH.340.616 Epidemiology of Aging (fulfills and out of track requirement) 3

Term 2
PH.340.624 Etiology, Prevention, and Control of Cancer (fulfills and out of track requirement) 4
PH.340.627 Epidemiology of Infectious Diseases(fulfills and out of track requirement) 4

Term 3
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses* 4 *usually taken in Year 2

Term 4
PH.340.644 Epidemiology of Diabetes and Obesity (fulfills and out of track requirement) 3

Skills Courses *(can be taken Year 1 or later with commensurate progress in Biostats series)*

Term 4
PH.340.600 Stata Programming 2
PH.140.632 Introduction to the SAS Statistical Package 3

Advanced Methods Courses (recommended in Year 2, review course catalogue for prerequisites)

Term 1
PH.140.641 Survival Analysis 3
PH.140.776 Statistical Computing 3
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3

Term 2

PH.340.717 Health Survey Research Methods 4

Term 3
PH.140.655 Analysis of Longitudinal Data 4
PH.140.664 Causal Inference in Medicine and Public Health I 4

Additional Recommended Courses for Doctoral Students with a focus in Cardiovascular Epidemiology

Term 1
PH.140.651 Methods in Biostatistics I 4

Term 2
PH.140.652 Methods in Biostatistics II 4
PH.340.620 Principles of Clinical Epidemiology 2

Term 3
PH.140.653 Methods in Biostatistics III 4

Term 4
PH.140.654 Methods in Biostatistics IV 4

Additional Recommended Courses for Doctoral Students with a focus in Clinical Epidemiology

Term 3

PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4
PH.340.730 Assessment of Clinical Cardiovascular Disease 2

Term 4
PH.340.803 Advanced Topics in Cardiovascular Disease Epidemiology 2
PH.340.855 SS/R: Biological Basis of Cardiovascular Disease Epidemiology 2

Clinical Trials and Evidence Synthesis

Courses Required for Doctoral Students in Clinical Trials and Evidence Synthesis

First Year

Term 2

Code	Title	Credits
PH.340.645	Introduction to Clinical Trials	3

Term 3

Code	Title	Credits
PH.340.633	Data Management in Clinical Trials	3

Term 4

Code	Title	Credits
PH.340.648	Clinical Trials Management	3

Second Year

Term 3

Code	Title	Credits
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.140.655	Analysis of Longitudinal Data	4
Total Credits		**8**

Recommended Courses for Doctoral Students in Clinical Trials and Evidence Synthesis

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1
PH.140.651 Methods in Biostatistics I 4
PH.221.722 Quality Assurance Management Methods for Developing Countries 4
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3
PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5
PH.390.631 Principles of Drug Development 2
PH.390.673 Ethical and Regulatory Issues in Clinical Research 3
PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2
PH.140.630 Introduction to Data Management 3
PH.140.652 Methods in Biostatistics II 4
PH.340.717 Health Survey Research Methods 4
PH.410.710 Concepts in Qualitative Research for Social and Behavioral Sciences 3

Term 3
PH.140.634 Non-Inferiority and Equivalence Clinical Trials 2
PH.140.642 Design of Clinical Experiments 3
PH.140.653 Methods in Biostatistics III 4
PH.223.664 Design and Conduct of Community Trials 4
PH.340.694 Power and Sample Size for the Design of Epidemiological Studies I 1
PH.340.775 Measurement Theory and Techniques in Epidemiology 4
PH.140.664 Causal Inference in Medicine and Public Health I 4

Term 4
PH.140.654 Methods in Biostatistics IV 4
PH.140.632 Introduction to the SAS Statistical Package 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.221.616 Ethics of Public Health Practice in Developing Countries 2
PH.223.705 Good Clinical Practice: A Vaccine Trials Perspective 4
PH.224.691 Qualitative Data Analysis 3
PH.390.675 Outcomes and Effectiveness Research 3

Summer Inst
PH.330.621 Mixed Methods for Research in Public Health 2

Environmental Epidemiology

Course Required for Doctoral Students in Environmental Epidemiology

First Year

Term 4

PH.340.680 Environmental and Occupational Epidemiology

Recommended Courses for Doctoral Students in Environmental Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Term 1
PH.182.615 Airborne Particles 4
PH.187.610 Public Health Toxicology 4
PH.188.680 Fundamentals of Occupational Health 3

PH.317.600 Introduction to the Risk Sciences and Public Policy 4

Term 2
PH.182.625 Principles of Occupational and Environmental Hygiene 4
PH.317.610 Risk Policy, Management and Communication 3
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.717 Health Survey Research Methods 4

Term 3
PH.180.601 Environmental Health 5
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.317.605 Methods in Quantitative Risk Assessment 4

Term 4
PH.188.681 Onsite Evaluation of Workplace and Occupational Health Programs 5
PH.317.615 Topics in Risk Assessment 2

Epidemiology of Aging

Course Required for Doctoral Students in Epidemiology of Aging

First Year

Term 1

PH.340.616 Epidemiology of Aging

Recommended Courses for Doctoral Students in Epidemiology of Aging

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

First Year

each term PH.330.802 Seminar on Aging, Cognition and Neurodegenerative Disorders 1

Term 1
PH.140.641 Survival Analysis 3
PH.380.604 Life Course Perspectives on Health 4

Term 2
PH.340.620 Principles of Clinical Epidemiology 2
PH.340.666 Foundations of Social Epidemiology 3
PH.380.603 Demographic Methods for Public Health 4

Term 3
PH.340.699 Epidemiology of Sensory Loss in Aging 3
PH.260.665 Biological Basis of Aging++ 3

Term 4
PH.330.623 Brain and Behavior in Mental Disorders 3
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.330.618 Mental Health in Later Life++ 3
++offered every other year

Second Year

Term 1
PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2
PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.309.605 Health Issues for Aging Populations 3

Term 3
PH.140.655 Analysis of Longitudinal Data 4

General Epidemiology and Methodology

Courses Required for Doctoral Students in General Epidemiology and Methodology

First Year

Term 1

PH.340.731 Principles of Genetic Epidemiology 1 4 (recommended for year 1 but may be taken in year 2, satisfies the out-of-track requirement as well)

Term 2

PH.340.645 Introduction to Clinical Trials 3 (recommended for year 1 but may be taken in year 2)

Second Year

CHOOSE AT LEAST TWO of these 3 courses in Public Health Research Skills:

Term 1: PH.340.660 Practical Skills in Conducting Research in Clinical Epidemiology and Investigation 3
Term 2: PH.340.717 Health Survey Research Methods 4
Term 3: PH.340.648 Clinical Trials Management 3

Recommended Courses for Doctoral Students in General Epidemiology and Methodology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Doctoral Students with a Methodology Focus:

Term 1
PH.330.657 Statistics for Psychosocial Research: Measurement 4
PH.340.646 Epidemiology and Public Health Impact of HIV and AIDS 4
PH.340.616 Epidemiology of Aging 3
PH.340.653 Epidemiologic Inference in Outbreak Investigations 3

Term 2
PH.140.658 Statistics for Psychosocial Research: Structural Models 4
PH.183.631 Fundamentals of Human Physiology 4
PH.260.631 Immunology, Infection and Disease 3
PH.330.603 Psychiatric Epidemiology 3
PH.340.620 Principles of Clinical Epidemiology 2
PH.340.624 Etiology, Prevention, and Control of Cancer 4
PH.340.666 Foundations of Social Epidemiology* 3
PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3
PH.140.640 Statistical Methods for Sample Surveys 3
PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4
PH.222.647 Nutrition Epidemiology 3
PH.224.690 Qualitative Research Theory and Methods 3
PH.309.616 Introduction to Methods for Health Services Research and Evaluation I 2
PH.340.607 Introduction to Cardiovascular Disease Epidemiology 4
PH.340.609 Concepts and Methods in Infectious Disease Epidemiology 3
PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4
PH.140.656 Multilevel Statistical Models in Public Health 4
PH.224.691 Qualitative Data Analysis 3
PH.309.617 Introduction to Methods for Health Services Research and Evaluation II 2
PH.340.641 Healthcare Epidemiology 4

PH.340.677 Infectious Disease Dynamics: Theoretical and Computational Approaches 3
PH.340.680 Environmental and Occupational Epidemiology 4
PH.380.664 Reproductive and Perinatal Epidemiology 4
PH.390.675 Outcomes and Effectiveness Research 3

*alternates online and in-person every other year
++ alternate year course

Second Year courses:
Term 1
PH.340.728 Advanced Methods for Design and Analysis of Cohort Studies 5

Term 2
PH.340.774 Advanced Theory and Methods in Epidemiology 4

Term 3
PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.140.655 Analysis of Longitudinal Data 4
PH.340.606 Methods for Conducting Systematic Reviews and Meta-Analyses 4

Recommended statistical programming computing courses:
Term 1
PH.140.776 Statistical Computing 3

Term 4
PH.140.632 Introduction to the SAS Statistical Package 3
PH.340.600 Stata Programming 2

Doctoral Students with a Pharmacoepidemiology and Drug Safety Focus:

Strongly Recommended courses for Doctoral Students with a Pharmacoepidemiology Focus:
Term 1
PH.317.600 Introduction to the Risk Sciences and Public Policy 4
PH.390.631 Principles of Drug Development 2

Term 2
PH.317.610 Risk Policy, Management and Communication 3

Term 3
PH.140.664 Causal Inference in Medicine and Public Health I 4
PH.340.684 Pharmacoepidemiology: Drug Utilization 3 (alternate year format)
PH.221.610 Pharmaceuticals Management for Under-Served Populations 3

Term 4
PH.410.680 Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions 3

Recommended courses for Doctoral Students with a Pharmacoepidemiology Focus:
Term 1
PH.317.605 Methods in Quantitative Risk Assessment 4

Term 4
PH.317.615 Topics in Risk Assessment 2

the following courses are offered outside of BSPH and require interdivisional registration and instructor permission
AS.410.651 Clinical Development of Drugs and Biologics 4
AS.410.627 Translational Biotechnology: From Intellectual Property to Licensing 4
ME.330.809 Analytic Methods for Clinical Pharmacology variable
NR.110.508 Clinical Pharmacology 3

Individualized Focus:

Students designing their own educational programs should, in conjunction with their advisor, choose three to four graduate-level courses (taken for a letter grade) in their field from among the offerings of the University in addition to taking the GEM Required courses listed above.

Genetic Epidemiology

Courses Required for Doctoral Students in Genetic Epidemiology

First Year
Term 1
PH.340.731 Principles of Genetic Epidemiology 1 4

Term 2
PH.340.732 Principles of Genetic Epidemiology 2 3

Term 3
PH.340.733 Principles of Genetic Epidemiology 3 3

Term 4
PH.340.734 Principles of Genetic Epi 4: Emerging and Advanced Methods 2

Second Year
Term 1
PH.120.602 Concepts of Molecular Biology (Pass/Fail, or Grade) 4

Recommended Courses for Doctoral Students in Genetic Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

Analytic Methods Courses (ideal for year 2)
Term 1
PH.140.641 Survival Analysis 3
PH.140.651 Methods in Biostatistics I* 4
PH.140.776 Statistical Computing 3

Term 2
PH.140.638 Analysis of Biological Sequences 3
PH.140.652 Methods in Biostatistics II 4
PH.140.778 Advanced Statistical Computing 3
PH.340.774 Advanced Theory and Methods in Epidemiology* 4

Term 3
PH.140.644 Statistical Machine Learning: Methods, Theory, and Applications 4
PH.140.653 Methods in Biostatistics III 4
PH.140.655 Analysis of Longitudinal Data 4

Term 4
PH.140.688 Statistics For Genomics 3

Biology and Molecular Methods Courses
Term 1
PH.260.611 Principles of Immunology I 4

Term 2
PH.260.612 Principles of Immunology II 4
PH.183.631 Fundamentals of Human Physiology 4 (*For non-physician trained students only)

Term 3

PH.180.640 Molecular Epidemiology and Biomarkers in Public Health 4

Term 4
PH.120.608 Gene Editing, therapy and Manipulation 3

Topic-Specific Electives
Term 3
PH.340.775 Measurement Theory and Techniques in Epidemiology 4

Term 4
PH.330.619 Psychiatric Genomics 3
PH.415.624 Ethical, Legal and Social Implications in Genetics and Genomics Over Time (offered in alternate years)

Infectious Disease Epidemiology

Courses Required for Doctoral Students in Infectious Disease Epidemiology

[Terms and offerings change each year. Always check the course directory for the most up-to-date offerings]

First Year
Term 1

Code	Title	Credits
PH.340.653	Epidemiologic Inference in Outbreak Investigations	3

Term 2

Code	Title	Credits
PH.340.627	Epidemiology of Infectious Diseases	4

Term 3

Code	Title	Credits
PH.340.609	Concepts and Methods in Infectious Disease Epidemiology	3

Students must complete at least one course in each of the four disciplinary sections below:

Section one: General Electives: choose 1
Term 1

Code	Title	Credits
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	4

Term 2

Code	Title	Credits
PH.223.662	Vaccine Development and Application	4
PH.340.641	Healthcare Epidemiology	4

Term 3

Code	Title	Credits
PH.182.640	Food- and Water- Borne Diseases	3
PH.223.663	Infectious Diseases and Child Survival	3
PH.223.687	Vaccine Policy Issues	3
PH.260.656	Malariology	4
PH.340.612	Epidemiologic Basis for Tuberculosis Control	2

Term 4:

Code	Title	Credits
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases	4
PH.223.689	Biologic Basis of Vaccine Development	3
PH.223.705	Good Clinical Practice: A Vaccine Trials Perspective	4
PH.340.651	Emerging Infections	2
PH.380.761	Sexually Transmitted Infections in Public Health Practice	4
PH.380.762	HIV Infection in Women, Children, and Adolescents	4

Section two: Skills in Research: choose 1
Term 1

Code	Title	Credits
PH.340.660	Practical Skills in Conducting Research in Clinical Epidemiology and Investigation	3

OR

Term 2

Code	Title	Credits
PH.340.717	Health Survey Research Methods	4

Section three: Biology and Pathogenesis of Disease: choose 1
Term 1

Code	Title	Credits
PH.260.623	Fundamental Virology	4
PH.260.636	Evolution of Infectious Disease	3
PH.340.654	Epidemiology and Natural History of Human Viral Infections	6

Term 3

Code	Title	Credits
PH.260.627	Pathogenesis of Bacterial Infections	4
PH.260.650	Vector Biology and Vector-Borne Diseases	3

Section four: Immunology: choose one set (recommended to complete in year two)
Term 1

Code	Title	Credits
PH.260.611	Principles of Immunology I	4

<u>AND</u>

Term 2

Code	Title	Credits
PH.260.612	Principles of Immunology II (Principles of Immunology II)	3

**students requesting pass/fail for these two courses only must seek permission from their adviser and the track director*

<u>OR</u>

Term 2

Code	Title	Credits
PH.260.631	Immunology, Infection and Disease	3

Department Comprehensive Examination

A two-day written Department comprehensive examination is administered to all students enrolled in Epidemiology degree programs in late May of the first academic year. All students are required to sit for the exam on the scheduled dates—no alternate exams will be offered.

By the time of the examination, students should have completed 64 credits (one full year of residence), **the required first-year coursework in their Track with a cumulative GPA of at least 3.0,** and in these courses:

Code	Title	Credits
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Select one of the following Biostatistics series:		16
PH.140.621 & PH.140.622 & PH.140.623 & PH.140.624	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III and Statistical Methods in Public Health IV	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV	

The first day of the exam (Part A) includes testing on the following topics:

- Knowledge and application of epidemiologic concepts and methods (and related biostatistics)
- History of epidemiology
- Contemporary issues in public health
- Research ethics

The second day of the exam (Part B) is Track-specific, and tests knowledge of concepts and methods presented in the required courses and activities for each Track, as well as the Department core courses as applied to the Track.

Students must pass both Part A and Part B of the comprehensive examination. Doctoral students must attain at least a 75% on each Part A and Part B to pass. A repeat examination may be allowed but is not guaranteed. If a repeat is granted, it must be completed before starting the second academic year.

Failure to pass one or both sections of the comps may result in dismissal from the doctoral program or from the Department.

Dissertation Steps

Timing of Activities / Milestones

1. Years one and two: Complete academic preparation for dissertation through coursework, special studies and research with the adviser, and attend seminars, journal clubs, and research-in-progress activities of interest. Students should meet at least once per term with their adviser and possibly weekly while completing special studies and research (PH.340.840).
2. Year two: Students develop their specific aims, add a co-adviser, and produce a working draft of their dissertation research proposal prior to or during the fourth term of the second year. Students, in combination with their advisers, select a third member for the Thesis Advisory Committee and present their proposed research at a public seminar to the department during the fourth term of year two or the first term of year three. Students also begin to fulfill their Teaching Requirements during year two and begin assuming leadership roles within the department or school.
3. Year three: Students hold their departmental and preliminary oral exams and begin research. Many students continue their teaching requirements and begin submitting papers for publication in conjunction with their advisers or other faculty mentors. Students should schedule a minimum of two weeks between the doctoral proposal seminar and the departmental oral exam and must schedule a minimum of four weeks between the departmental oral exam and the preliminary (school-wide) exam. Students may schedule all three activities simultaneously or wait to pass one before scheduling the next. Students may elect to take up to six months to prepare for each exam. Students must successfully pass their Preliminary Oral Exam within three academic years of enrollment in the doctoral degree program.
4. Year four: Students conclude data collection and analysis, complete their dissertation, and hold the defense of their research. This timeframe varies from student to student depending on a wide variety of factors.
5. The University permits as many as seven years or 28 terms to complete the PhD degree requirements; however, the financial support granted PhD students by the Department of Epidemiology will not extend beyond that specified in the acceptance letter.

Thesis Advisory Committee

The role of the Thesis Advisory Committee is to provide continuity in the evaluation of the progress and development of the doctoral student. The Thesis Advisory Committee is assembled by the doctoral student and their adviser(s). For doctoral students, the Thesis Advisory Committee consists of the dissertation (thesis) adviser and at least two additional faculty members who hold either primary or joint appointments in Epidemiology. If the student has a co-adviser, the co-Adviser should serve on the Thesis Advisory Committee. Additional faculty within and outside of the School may also be recruited. Committee membership is permitted to change during the research period. The Thesis Advisory Committee is not the same as the Preliminary or Final Oral Examination Committees. The Thesis Advisory Committee decides when the student is ready to proceed through each of the milestones needed to complete the degree requirements, including the Doctoral Proposal Seminar, the Departmental and School-wide Preliminary Oral Examinations, and the Final Oral Examination ("defense"). Bi-annual formal meetings of the Thesis Advisory Committee are required, but meetings may and should occur more frequently. It is the student's responsibility to schedule meetings.

Tips for doctoral students for successful formal meetings of the Thesis Advisory Committee:

- Prior to each meeting, draft an agenda with advisor input and distribute a one-page description of progress, including any key results

- After each meeting, send a written report of the items discussed and decisions reached to the members for approval
- Maintain a log of the meetings to aid in writing the annual progress report and financial support documentation

Once the Thesis Advisory Committee is formed, submit the signed "Thesis Committee Approval Form" (on the Epi Intranet (https://my.jhsph.edu/sites/EPI/default.aspx)) to Ebony Moore (eamoore@jhu.edu).

Dissertation Research Proposal

The 12-page single-spaced dissertation research proposal is developed during the second year, during terms 1 – 3 of PH.340.863 Doctoral Seminars in Epidemiology, and is the final project for the course PH.340.715 Problems in the Design of Epidemiologic Studies: Proposal Development and Critique. The dissertation proposal must be reviewed and approved by the Thesis Advisory Committee prior to scheduling the Doctoral Proposal Seminar.

Doctoral Research Proposal Seminar

After the Thesis Advisory Committee has approved the student's 12-page dissertation research proposal, the student must orally present the proposal in a Doctoral Proposal Seminar to the Department. Students should present a prepared presentation (typically PowerPoint) of approximately 40-45 minutes in length, followed by approximately 15-20 minutes of questions and discussion. The Proposal Seminar is presented during the Department-wide Epidemiology Seminars (Current Topics in Epidemiologic Research) on Fridays during terms 1-4, from 12:15-1:20 pm, in Sheldon Hall W1214 (or via hybrid technology). Seminars are not permitted during the Summer. The dissertation (thesis) adviser must attend, and the Thesis Advisory Committee members and the Track Director are strongly encouraged to attend. Doctoral Proposal Seminars are advertised to the Department at large, and students and their adviser(s) should personally invite any other colleagues they would like to attend. The best ways to prepare for this seminar include attending Doctoral Research Proposal Seminars presented by peers and by presenting in a track research-in-progress meeting. Students should plan to conduct a 'dress rehearsal,' prior to the actual proposal (in the same room reserved for the defense to familiarize themselves with the surroundings and test all technology) for use during the Doctoral Research Proposal Seminar.

After the Thesis Advisory Committee has approved the student to present their Doctoral Proposal Seminar, the student should work with the adviser and Thesis Advisory Committee to select a seminar date. Once the Advisory Committee and adviser(s) have confirmed readiness, the student can proceed with reserving a date and room. To schedule a date, students should contact Laura Camarata, lcamarata@jhu.edu, to discuss open dates and submit the "Doctoral Proposal Seminar Form" (on the Epi Intranet (https://my.jhsph.edu/sites/EPI/default.aspx)), which includes preferences for seminar dates (1st, 2nd, and 3rd choices). This form requires the signature of the adviser and the Track Director.

Tips to keep in mind:

- Students cannot schedule their doctoral proposal seminars without the approval of their adviser(s) and Advisory Committee
- Doctoral students are required to propose during the academic year (Terms 1-4), in Department-wide Friday Epidemiology Seminars, and this seminar series additionally hosts annual events and outside speakers
  - Work with adviser(s) and Committee to have a timeline, and give as much lead time as possible (but no less than 3 months) to schedule
- Seminars start at 12:15 pm, with an introduction by the student's adviser, that the student should arrange
- Students should test their presentations prior, report early on the day of, and have their presentations saved in more than one place for back-up
- Sheldon Hall is equipped with a dedicated laptop, projector, laser pointer, and microphone/audio system

Departmental Oral Examination

Purpose

After the Thesis Advisory Committee has approved the Dissertation Research Proposal and the student has presented the Doctoral Proposal Seminar, the next step is sitting for the Departmental Oral Examination. The primary purpose of the Departmental Oral Examination is to prepare the student for the Preliminary Oral Examination. As such, the Departmental Oral Examination shares the purpose of the Preliminary Oral Examination:

To determine whether the student has both the ability and knowledge to undertake significant research in the general area of interest, including:

1. the student's capacity for logical thinking;
2. their breadth of knowledge in relevant areas; and
3. their ability to develop and conduct research leading to a completed dissertation (thesis).

Discussion of a specific research proposal, if available, may serve as a vehicle for determining the student's general knowledge and research capacity. However, this examination is not intended to be a defense of a specific research proposal.

Meeting with the Senior Academic Program Manager

In preparation for scheduling the Department Oral Examination, students should meet with the Senior Academic Program Manager, Frances Burman (FranBurman@jhu.edu), to confirm that the student has met all Track, Department, and Schoolwide course requirements and has assembled a valid set of proposed committee members for the Department and Preliminary Oral Examinations.

Department Oral Examination Committee Membership

For PhD students, the Department Oral Examination Committee should consist of: the adviser (primary); two other members, and one alternate member, all of whom have primary appointments in the Department of Epidemiology. Thesis committee members, including co-advisers, are **not** permitted to serve on the Departmental Oral Examination committee with the exception of the student's adviser, who must participate. All Professorial and Scientist Track faculty may serve on the Committee. Students are not required to meet with members of the Committee prior to the examination and should not expect that committee members will discuss what questions they will be asked.

While the above describes the necessary committee, in any case where the student or advising team wants to have an additional faculty member present, the examiners and student must decide in advance whether the extra faculty member may ask questions and if yes, whether the student's responses will count. In any case, the extra person may not vote but may contribute feedback to the student. Students considering this should first check in with the academic office.

DEPARTMENT ORAL EXAMINATION FORM

The “Department Oral Examination Form” (on the Epi Intranet (https://my.jhsph.edu/sites/EPI/default.aspx)), is due to the Senior Academic Program Coordinator, Ebony Moore (eamoore@jhu.edu), at least 14 days prior to the date of the proposed exam. With the approval of the Dissertation (thesis) Adviser, the form should be submitted after presenting the Doctoral Proposal Seminar and incorporating any key input from the Seminar into the Dissertation Research Proposal.

SCHEDULING

The Senior Academic Coordinator, Ebony Moore (eamoore@jhu.edu), will schedule the room and send a memo to examiners prior to the examination date. For hybrid or Zoom-based exams, the adviser will provide the zoom link.

CONDUCT OF THE EXAMINATION

Prior to the exam, students submit to the Department Oral Examination Committee members a single-page summary of the dissertation proposal, including the specific aims, hypotheses, and methods. Committee members may request the longer 12-page Dissertation Research Proposal. The examination should be scheduled for and completed in one and a half hours but may be concluded earlier or later as determined by the Committee. At the start of the exam, students will present a brief talk of no more than 10 minutes that concisely summarizes the aims, hypothesis, methods, limitations, and significance of their proposed dissertation research. This presentation may be a distillation of the Doctoral Proposal Seminar.

Department Oral Examination Outcome

The possible outcomes of the oral examination are Unconditional Pass, Conditional Pass, or Failure (retake). Conditional Pass requires the student and Department Oral Examination Committee to agree on a remedial course of action designed to be completed within two weeks of the examination. Students who fail will be required to re-take the Department Oral Examination within six months. Two failures of the Departmental Oral Examination will result in dismissal from the degree program. For more information about the Departmental Oral Examination, please review the Department of Epidemiology Student Guidelines for the Departmental Oral Examination” (on the Epi Intranet (https://my.jhsph.edu/sites/EPI/default.aspx)).

Preliminary Oral Examination (aka School-wide Exam)

This is also colloquially known as the “Schoolwide Oral Examination.” Students and their adviser(s) are responsible for initiating arrangements for the preliminary doctoral examination. The University Graduate Board oversees these exams.

Purpose

After the student has passed the Departmental Oral Examination, the next step is the Preliminary Oral Examination. The purpose of the Preliminary Oral Examination is to determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest, including:

1. the student’s capacity for logical thinking;
2. their breadth of knowledge in relevant areas; and
3. their ability to develop and conduct research leading to a completed dissertation.

Discussion of a specific research proposal, if available, may serve as a vehicle for determining the student’s general knowledge and research capacity. However, this examination is not intended to be a defense of a specific research proposal. The preliminary oral examination is two hours in duration.

Preliminary Oral Examination Committee Membership

- Must consist of five voting members
  - Two members must be from the epidemiology department; one of these is the adviser
  - A third member from the epidemiology department is optional
    - **Limit** of 3 members from sponsoring department
- Thesis Advisory Committee members may serve on the Committee
- The student’s adviser of record must serve as a member of the Committee.
  - The adviser must be among the members present; an alternate may not serve in place of the adviser.
- The senior faculty member without a primary appointment in Epidemiology will serve as Chair of the Committee and must hold the rank of Associate or Full Professor.
  - All faculty members serving on the Committee must represent the department of their primary faculty appointment.
    - The only instance when the faculty member can serve in their joint appointment capacity is if they are the student’s adviser.
- Most often, the committee is comprised of duly appointed faculty members of a University department and must hold, at the time of selection, a faculty appointment at the rank of Assistant Professor or higher.
  - Occasionally, one adjunct or one scientist faculty member, <u>but not both</u>, may serve on the Committee; neither may serve as the Chair.
- All members of the Committee must be present at the scheduled exam location; teleconference is permitted on a case-by-case basis.
- The committee must be comprised of three Departments of the University, **two** being from the Bloomberg School of Public Health
- The committee must have appropriate alternate members to serve on the committee.
  - The selection of alternates is very important for ensuring the exam can take place at the originally scheduled date/time. If a student has two members on their committee from epidemiology, the student should have one alternate from epidemiology and one from a non-sponsoring department.
  - If a student has three members on their committee from epidemiology, then two alternates should be selected from two different non-sponsoring departments.
- At least two weeks prior to the exam, students submit to the Preliminary Oral Examination Committee members a single-page summary of the dissertation proposal, including the specific aims, hypotheses, and methods. Committee members may request the longer 12-page Dissertation Research Proposal.

Preliminary Oral Examination Form

- Graduate Board Preliminary Oral Examination Request Form (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Documents/Preliminary%20Oral%20Exam%20PhD%20ScD%20Form%204.27.22.pdf)
- Students submit this form once they have successfully passed the Departmental Oral Examination.
- JHSPHExams@jhu.edu must receive the form at least **30 days prior** to the anticipated exam date. There are no exceptions.
- The form requires signatures from the Senior Academic Program Manager, the adviser, and the Department Chair. The student is responsible for obtaining the required signatures in that order.

The form should therefore be submitted to Frances Burman (FranBurman@jhu.edu) at least 3-to 4 days prior to the date of submission to the Registrar's Office.

- The exam is not considered officially scheduled and cannot be held until the student and examiners received notification from the Dean of the approval of the exam to be held.

Scheduling

The student is responsible for scheduling the room (https://my.jhsph.edu/Offices/InformationTechnology/forms/SETForm.aspx) for the exam, requesting Multimedia support (https://my.jhsph.edu/Offices/InformationTechnology/forms/Multimedia%20and%20Production%20Request%20Form.aspx) if needed, and sending a memo to examiners confirming the date, time, and location of the exam prior to the exam date.

Examination Outcome

The outcome of the examination is Unconditional Pass, Conditional Pass, or Failure. Should the student receive a conditional pass, the Committee remains standing until the conditions, specified in writing, have been met. The consequence of a failure is decided by the Committee:

1. no re-examination;
2. re-examination by the same committee;
3. re-examination in written form and conducted by the same committee; or
4. re-examination by a new committee.

Primary Data Collection Requirement

Primary data collection is defined as

1. instrument design;
2. data collection; or
3. data management, quality assurance, and quality control.

Primary data collection is required for all PhD students. This requirement may be met through dissertation research or is satisfied through work on projects distinct from the dissertation. It may be obtained through work with a single epidemiologic study or it can a compilation of several experiences that together fulfill the requirement. Primary data collection may be obtained as part of paid work. Students must document their plan for obtaining experience with primary data collection and submit this plan to their Thesis Advisory Committee with their 12-page dissertation proposal.

The Thesis Advisory Committee may approve primary data collection that occurred prior to matriculation to the doctoral program, but this approval is not guaranteed. Any questions regarding primary data collection will be directed from the Thesis Advisory Committee to a Deputy Chair. Students are expected to demonstrate an understanding of primary data collection processes in the epidemiologic study (or studies) utilized for their dissertation. This includes knowledge of the forms, instruments, and measurement processes relevant to their research; knowledge of quality control/assurance procedures of the study (or studies); and an evaluation of the potential threats to validity in the processes extending from primary measurement to the analytic dataset. If primary data collection is not a direct component of the dissertation research, doctoral students should include their primary data collection experience as an appendix to the dissertation.

Doctoral Dissertation

Doctoral students must complete an original investigation presented in the form of a dissertation. The dissertation should be based on original research involving the generation of new knowledge by the student, worthy of publication, and acceptable to the Department of Epidemiology and to the Final Oral Examination Committee (Thesis Readers). Doctoral students have two options for the format of their dissertation, the traditional format, and the manuscript format. The Department recommends the manuscript format to accelerate the time to submission of manuscripts for publication in peer-reviewed journals.

Manuscript Format

The manuscript format must meet the following criteria:

1. The dissertation includes at least three manuscripts, linked by a common theme;
2. The doctoral student must be the first author on each of the manuscripts;
3. A manuscript will not be accepted as part of the dissertation if it was submitted before the student's dissertation topic was approved by the Thesis Advisory Committee;
4. The manuscripts must be acceptable for publication based on usual substantive area peer review expectations; and
5. The dissertation should be organized as follows:
    a. The body of the dissertation should include a series of papers that are linked by a common theme (i.e., the student's dissertation topic)
    b. The first chapter may be a comprehensive critical literature review suitable for publication. It should introduce the scientific hypothesis for the dissertation
    c. Chapters two and three (or more) are the manuscripts, possibly with a transitional short chapter between each relating one to the other
    d. A final chapter should integrate and discuss the findings reported in the manuscripts. It should include a discussion of the conclusions drawn from research, a synthesis of the findings, and should make recommendations for further studies
    e. The dissertation may include an appendix outlining the details of study methods and any accompanying data tables deemed necessary to fully understand the data

Traditional Format

The traditional format includes:

1. An introductory chapter, outlining the theme, hypotheses, and/or goals of the dissertation coupled with a review of the literature;
2. Research chapters that are coherently structured for the research aims, each providing a reader enough detail to apply similar methods in another study; and
3. A concluding chapter with an overall analysis and integration of the research and conclusions of the dissertation in light of current research in the field

Regardless of the format, it is expected that the student will work with their adviser and any co-advisers to develop drafts of their dissertation chapters and receive constructive substantive and editorial feedback. Together, they will decide when drafts are ready for wider distribution to other members of the Thesis Advisory Committee and, if necessary, to other project collaborators. Follow the School's guidelines (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) for the preparation of the dissertation. The dissertation is a requirement for partial fulfillment of the PhD degree. Students may consult the School's Policy and Procedures Memoranda (PPM) for the PhD program.

Final Defense:

Appointment of thesis readers/final defense form

- Appointment of Thesis Readers/Final Defense Form (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Documents/Appointment%20of%20Thesis%20Readers%20and%20Final%20Oral%20Examination%20Form%204.27.22.pdf)
- JHSPHExams@jhu.edu must receive the form at least **30 days prior** to the anticipated exam date. There are no exceptions.
- The form requires signatures from the Senior Academic Program Manager, the adviser, and the Department Chair. The student is responsible for obtaining the required signatures in that order. The form should therefore be submitted to Frances Burman (FranBurman@jhu.edu) at least 3-to 4 days prior to the date of submission to the Registrar's Office.
- The exam is not considered officially scheduled and cannot be held until the student and examiners received notification from the Dean of the approval of the exam to be held.

Seminar

As a culminating experience for the doctoral student, the student will present a formal, public seminar. This requirement provides experience for the student in preparing a formal seminar; provides the faculty and Department with an opportunity to share in the student's accomplishments; and gives the student a sense of finality to the doctoral experience. Students typically present a formal public seminar in conjunction with the Final Oral Examination. If possible, students are encouraged to give their Final Defense Seminars during the Department-wide Friday Epidemiology Seminars series (Current Topics; please contact Laura Camarata (lcamarata@jhu.edu) or Frances Burman (FranBurman@jhu.edu) regarding scheduling), but the seminar may be alternately scheduled during normal working hours.

The student is responsible for scheduling the room (https://my.jhsph.edu/Offices/InformationTechnology/forms/SETForm.aspx) for the defense, and requesting Multimedia support (https://my.jhsph.edu/Offices/InformationTechnology/forms/Multimedia%20and%20Production%20Request%20Form.aspx) if needed (unless they will be presenting as part of the Department-wide Friday Epidemiology Seminars series (Current Topics), coordinating with their adviser(s) to be briefly introduced, and inviting any additional outside guests.

Examination

Purpose

The purpose of the Final Oral Examination is to ensure that the Candidate is able to present and defend the dissertation and its underlying assumptions, methodology, results, and conclusions in a manner consistent with the doctoral degree being sought.

The final oral examination is three hours total (one for seminar/presentation and two for exam by committee)

Committee Membership (Dissertation (Thesis) Readers) and Appointment of Thesis readers / final defense examination request form

- Must consist of four voting members:
  - Two members **must** have a primary faculty appointment in Epidemiology
  - The other two members must have appointments in two different departments other than Epidemiology
- The student's adviser of record must serve as a Thesis Reader and a member of the Final Oral Examination Committee
  - Alternates are not permitted to serve in place of the adviser
  - If the adviser is unable to attend the Final Oral Examination, co-advisers may serve in this role
- All faculty members must serve on the Committee representing the department of their primary faculty appointment
  - The only instance when the faculty member can serve in their joint appointment capacity is if they are the student's adviser
- The senior faculty member without a primary appointment in the Epidemiology will serve as Chair of the Committee and **must** hold the rank of Associate or Full Professor
  - Co-advisors may not serve as Chair
- The committee is comprised of duly appointed faculty members of a University department and must hold, at the time of selection, a JHU faculty appointment at the rank of Assistant Professor or higher
- Either one scientist track or one adjunct faculty member may serve on the Exam Committee, <u>but not both</u>
- The Committee of Thesis Readers may be increased to five members, provided that all other committee composition requirements are satisfied.
  - The fifth member may serve on the Final Oral Examination Committee but that individual does not have voting privileges.
- All members of the Committee must be present at the scheduled exam location; teleconference/remote participation may be permitted on a case-by-case basis.
- Must be comprised of three Departments of the University, **two** being from the Bloomberg School of Public Health
  - It is permissible to have three different BSPH departments represented on the committee
- Must have appropriate alternate members to serve on the committee
  - The selection of alternates is very important for ensuring the exam can take place at the originally scheduled date/time
  - Choose alternates that will fulfill the committee composition requirements, regardless of who is able to attend
  - One alternate should be from epidemiology; the other from a non-sponsoring department
- The final oral examination is three hours total (one for seminar/presentation and two for exam by committee)
- The Registration Coordinator will not accept the form unless it is submitted to the Registrar's Office **a minimum of 30 days prior** to the proposed examination date. There are no exceptions.
- This form requires signatures from the Senior Academic Program Manager, Frances Burman, the adviser, and the Department Chair or a Deputy Chair. The student is responsible for obtaining the required signatures in that order. The form should therefore be submitted to Frances Burman (FranBurman@jhu.edu) at least 3-4 days prior to the date of submission to the Registrar's Office.
- The exam is not considered officially scheduled and cannot be held until the student and examiners received notification from the Dean of the approval of the exam to be held.

The student is responsible for scheduling the rooms for the Final Oral Examination. While the Defense Seminar is held in an auditorium or large classroom, the Final Oral Examination usually is held in a smaller classroom or conference room. The Department recommends scheduling the examination in E6130 or W6015. The exam may be held virtually (subject to change by university COVID guidelines). If held virtually, the adviser provides the zoom link for the seminar and the exam.

Distribution of Dissertation to Dissertation (Thesis) Readers

Committee members are encouraged and expected to communicate to the student specific recommendations for changes in the dissertation prior to the Final Oral Examination. The student is, therefore, expected to distribute the dissertation to the Committee at least four weeks before the date of the Final Oral Examination. The Dissertation Approval Form signed by the student's adviser should accompany the dissertation at the time it is distributed to the committee members.

Conduct of the Examination

If one of the officially appointed Committee members fails to appear on the Final Oral Examination date/time, the previously approved alternate will serve as an examiner. A Final Oral Examination may not be held with fewer than four officially approved faculty members present in the room. The adviser must be among the members present; an alternate may not serve in the place of the adviser. Only approved Committee members are permitted to participate as examiners. During the Final Oral Examination, the Committee will evaluate:

1. the originality and publication potential of the research;
2. the candidate's understanding of the details of the methodologic and analytic work; and
3. the final quality of the written dissertation document.

The examination committee chair along with the examiners will determine the details of how the Final Oral Examination is conducted.

Examination Outcome

The possible outcome of the Final Oral Examination based on the student's performance and written dissertation is determined by closed ballot as Acceptable, Conditionally Acceptable, or Unacceptable. If one or more members require substantive changes to the dissertation (Conditionally Acceptable), the specific nature of these changes and the time expected for the student to complete them will be provided to the student in writing. The appropriately revised dissertation must be submitted to each of the members for final approval. If one or more members feel that the candidate's understanding of the written dissertation is inadequate (Unacceptable), or that the dissertation in its present form is not acceptable, then the candidate has failed. Re-examination would be in order unless there is a unanimous recommendation to the contrary. Re-examination is normally conducted by the same committee, but a new committee may be selected by the School's Chair of the Committee on Academic Standards if petitioned by the student.

After the Final Defense

Please consult the Registrar's Office portal site (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx) for dissertation format and submission, procedures to follow upon completion (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Documents/AFTER%20THE%20FINAL%20DEFENSE%20-%20Revised%20March%202019.pdf) of the defense, and additional policy matters.

Graduation

The Registrar's Office (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/) handles all aspects of (https://www.jhsph.edu/student-life/convocation/) graduation (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/Graduation/Pages/default.aspx) and degree verification (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/forms.html). We encourage all graduates to participate in our convocation ceremonies!

The Policy and Procedures Manual for the Doctor of Philosophy

The Department of Epidemiology reserves the right to augment the (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_042522.pdf)PPM (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_071717.pdf) for JHSPH.
The Admissions and Credentials Committee handles most policy concerns as described above. The Curriculum Committee handles exceptions to requirements.

Policy Components for Metrics

Doctoral Teaching Assistant (TA) Curriculum Requirements

PURPOSE OF THE DOCTORAL TA CURRICULUM

Learning how to be an effective teacher and communicator about epidemiologic principles and methods is an integral part of doctoral education in epidemiology. Teaching is an opportunity for students to meet several Departmental doctoral program core competencies, enabling students to:

- Interpret and critique epidemiological studies;
- Interpret epidemiologic data and make valid inferences from study findings;
- Communicate effectively in oral and written formats with students, professionals and the public on issues related to epidemiology and public health; and
- Provide epidemiologic critique and advice though advising students and professionals on epidemiologic concepts and methods and conducting peer review activities
  - Practicing these skills also prepare students for Department and Preliminary Oral Examinations and for their future careers, whether in academia or in other venues. (See the "Benefits of Teaching" from Former TAs section in this Student Handbook for additional benefits of teaching).

COMPONENTS OF THE DOCTORAL TA CURRICULUM

All doctoral students are required to complete the TA Curriculum after passing the Department Comprehensive Examination and before graduation. Training and feedback is an important part of this curriculum, which includes:

- Formal didactic training;
- In-classroom training through experience as a TA in Department courses; and
- Feedback from instructors
- Students will share their goals for TA training with course instructors prior to the start of each course taught. After TAing

a course, students will document their TA experience for their resume or CV.

Formal Didactic Training Elements:

1. Courses
2. Workshops
3. Teaching practicums
4. Teaching as research fellowship appointments
5. Individual consultation
Teaching Academy also offers a three-day teaching institute for students to advance the development of university-level educators by enhancing classroom teaching skills. This is a free institute and offered at the JHSPH campus early June. https://cer.jhu.edu/teaching-academy/ti (https://cer.jhu.edu/teaching-academy/ti/)
CTL's "Teaching Assistantship Training" covers the learning objectives required to align with completion of Phase I of the Teaching Academy's "Preparing Future Faculty Teaching (PFFT) Certificate Program (https://cer.jhu.edu/teaching-academy/pff/)."
    - The following didactic trainings and activities are flexibly designed to give doctoral students the skills and tools necessary to be a successful TA and to meet teaching and learning goals. Please note, that while all students are welcome to attend the trainings and activities at any time, it may behoove to do after first year, but in advance/at the start of second, as that is when most doctoral students will begin the TA Curriculum.
    Required: Department of Epidemiology Student-led In-Person Training Session
    This student-led in-person 1.5-hour training covers the basics of TAing in the Department, including TA roles, benefits and expectations. This session is held during lunchtime at the beginning of 1st term. Information regarding the date and location is distributed via the Department's student listserv.
    Required: Teaching Assistantship Training (Online Course)
    This online course offered through the JHSPH Center for Teaching and Learning (CTL) *"orients Teaching Assistants to the roles and responsibilities of their position, relevant policies and regulations, technical tools, teaching tips, and other important information*."
    Students can complete when time allows but must be complete in advance of starting In-classroom portion of the TA Curriculum. To sign up, visit: https://sites.google.com/site/ctltteachingtoolkit/teaching-assistants/ta-training (https://sites.google.com/site/ctltteachingtoolkit/teaching-assistants/ta-training/).
    Recommended: Teaching Academy Activities
    https://cer.jhu.edu/teaching-academy (https://cer.jhu.edu/teaching-academy/)
    Offers additional resources around the pedagogy of teaching. To prepare graduate students so they may thrive in higher education as academic professionals once they graduate, this academy offers teacher training and academic career preparation opportunities through:

In-classroom Training

As part of the TA Curriculum, doctoral students will serve as TAs. Students are required to TA 3 courses: 2 epidemiologic methods courses and 1 topical epidemiology course (see list below for courses). No more than 1 of the 3 courses TAed as part of the TA Curriculum may be an online course.

To document the in-classroom training on the academic transcript and to receive academic credit, doctoral students should register for PH.340.865 Teaching Epidemiologic Methods and Concepts At the Graduate Level.01 for up to 3 credit hours during the term that they are TAing. Credit hours depends on the level of TAship, and students will receive instructions prior to the start from the Academic Office as to the allowed number of credits. If the course is being TAed in the Summer term, the credit hour(s) should be registered for in the following 1st term, to avoid additional tuition fees.

Department of Epidemiology epidemiologic methods courses are:

Code	Title	Credits
PH.340.601	Principles of Epidemiology (Summer term)	5
PH.340.653	Epidemiologic Inference in Outbreak Investigations (1st term)	3
PH.340.721	Epidemiologic Inference in Public Health I (.60 - 1st term, blended in-person)	5
PH.340.721	Epidemiologic Inference in Public Health I (.81 - 3rd term, online)	5
PH.340.722	Epidemiologic Inference in Public Health II (.60 - 2nd term, blended in-person)	4
PH.340.722	Epidemiologic Inference in Public Health II (.81 - 4th term, online)	4
PH.340.723	Epidemiologic Practice Methods for Population Health Research (4th term)	2
PH.340.728	Advanced Methods for Design and Analysis of Cohort Studies (1st term)	5
PH.340.751	Epidemiologic Methods 1 (1st term)	5
PH.340.752	Epidemiologic Methods 2 (2nd term)	5
PH.340.753	Epidemiologic Methods 3 (3rd term)	5
PH.340.774	Advanced Theory and Methods in Epidemiology (2nd term)	4
PH.340.769	Professional Epidemiology Methods (3rd term)	4
PH.340.770	Public Health Surveillance (2nd term)	3
AS.280.350	Fundamentals of Epidemiology (Fall Semester)	4
AS.280.350	Fundamentals of Epidemiology (Spring Semester)	4

*Summer Institute courses do not count towards the TA in-classroom training requirement. A student may TA for the Summer Institute prior to the completion of their TA training requirements.

All other Department of Epidemiology courses (PH.340.xxx) eligible to have a TA are considered topical epidemiology courses for the purpose of the TA Curriculum.

To fulfill the 2 methods courses of the TA Curriculum, students are encouraged to TA: PH.340.751 Epidemiologic Methods 1, PH.340.752 Epidemiologic Methods 2, and/or PH.340.753 Epidemiologic Methods 3, although any of the courses listed above may be used to fulfill the requirement.

Students are eligible to TA as part of this curriculum once they have successfully passed the Department Comprehensive Examination. Students may TA PH.340.601 Principles of Epidemiology during the summer term immediately following completing the comps. Students are expected to complete the TA Curriculum during their second and third years of training. Students are responsible for coordinating with course administrators and/or course instructors for each course they wish to TA. The Department recommends students proactively, directly contact faculty once they have identified a course that they would like to TA as part of the Curriculum. Course faculty take many factors into consideration in selecting TAs for a course (sometimes including performance in the course), and some courses may have more TA requests than can be accommodated. Students may not always be able to serve as a TA for their first choice of courses, so should keep several courses in mind and be flexible. TA responsibilities vary by course, and students are expected to work with course faculty to understand their responsibilities prior to the start of the course. Responsibilities may include but are not limited to: preparing for lab/activities and office hours, attending instructors' meetings, attending lectures and lab/activities, holding office hours, and assisting with assessment writing and piloting. TAs are expected to devote 5-19 hours per week for each course; the wide range reflects the variability in responsibilities by course.

Prior to the start of each course TAed as part of the TA Curriculum, students are required to provide to course instructor(s) 3 goals for the TA experience in writing via email. The purpose of these goals is to provide a basis for reflection by TAs on their current skills and knowledge, as well as their future professional teaching/communication goals, in order to improve student achievement. Progress toward achieving goals over the term will be evaluated by course instructor(s) as part of the feedback process.

Feedback from Instructors

As part of the TA Curriculum, students will receive standardized, individualized feedback from course and/or lab instructors (see below Feedback form). If applicable, TAs will also receive student feedback recorded as part of the School's online course evaluation system. Students are responsible for sending the feedback form complete with student's goals from the start of the term to course instructor(s) no later than 2 weeks following the end of the term. Faculty are not obligated to honor requests for feedback that occur more than 2 weeks after the end of the course. TAs are encouraged to document feedback from instructors and from students (if applicable) in their CV or resume.

Compensated TA Positions

Additional TA opportunities may be available for a pre-specified fixed payment after the TA Curriculum has been completed. As with the TA Curriculum, students are responsible for coordinating with course administrators and/or course instructors for each course they wish to TA for pay. Students should proactively, contact faculty directly once they have identified a course that they would like to TA. Course faculty take many factors into consideration in selecting TAs for a course and students should be aware that some courses may have more TA requests than can be accommodated.

Students holding a Departmental TA position should expect that there will be approximately two weeks of light preparatory work in advance of the course start date, and light conclusory work in excess of the course start and end dates. Please note that State of Maryland law sets student hourly work limitations, at 20 hours per week maximum. Exception: 40 hours over Thanksgiving, winter, and spring breaks, and during the summer.

Benefits of Teaching (from Former TAs)

- Improve oral and written communication skills
- Develop an ability to articulate complex epidemiologic concepts to audiences with varying degrees of research experience
- Preparation for oral exams/defense
- Experience with educational technology (e.g., CoursePlus, VoiceThread)
- Experience in nuts and bolts of graduate courses (e.g., design of assessments and feedback)
- Opportunity to provide essential input that can influence the ongoing development of the department's core courses
- Ability to progress to more independent instructor roles (e.g., Gordis Fellows, TA training seminars/modules, Lab instructors)
- Management skills (managing up to faculty instructors and leading teams of TAs)
- Mentorship from, and relationships with, faculty instructors
- Builds a sense of community with TA colleagues
- Allows students to gauge interest in academic/teaching roles post-graduation
- Development of a teaching portfolio that can be used in CV development, job searches, and interviews
- Getting to know diverse groups of students/mentoring new students

DOCUMENTATION OF TEACHING EXPERIENCE FOR A RESUME OR CURRICULUM VITAE

Doctoral students are encouraged to document their TA experience, including teaching responsibilities and feedback, using the below "Guide to Documentation for a Resume or Curriculum Vitae" template.

WAIVERS

A written request for a waiver to any aspect of the TA Curriculum due to exceptional circumstances, including the in-classroom training (i.e., being a TA), should be submitted to the Academic Core office (JHSPH.epiasc@jhu.edu) and will be reviewed by the Department of Epidemiology Curriculum Committee and decided upon by the Admissions and Credentials Committee. Matriculating doctoral students are eligible to apply (with the support of their adviser) for a waiver to the requirement of passing the Department Comprehensive Examination before beginning in the TA curriculum if the student has completed a JHSPH master's degree program in the 2 years immediately prior to matriculation; **and** has completed the following courses as part of that JHSPH master's degree program. Students must meet with the faculty mentor before or during add/drop to discuss their learning objectives.

Comprehensive Examination Grading Policy

The completed Comprehensive Examination is graded by the Department of Epidemiology faculty according to a rubric determined by the Comprehensive Examination Committee. Final results are distributed to students via CoursePlus by mid-July. Students who wish to view their exam should set up an appointment with the Senior Academic Coordinator, Ebony Moore (eamoore@jhu.edu).
Doctoral students whose results fall below 75% are allowed to formally request in writing a re-grade of specific questions. Re-grade requests must include a justification for a change in points allocated for each question being contested; requests without appropriate justification will not be considered. Re-grade requests must have the adviser's endorsement, and they need to have reviewed and approved the student's request. Re-grade requests are handled by the faculty on the Comprehensive Examination Committee. Adviser-approved requests can be e-mailed to the current year's Comprehensive Examination Committee

Chair and must include a copy to the adviser. For approved requests, a new score will be assigned for each question that is re-graded. This score may be equal to, greater than, or less than, the original score awarded and cannot be contested a second time.

Comprehensive Examination Retake Policy

Students who do not pass the Comprehensive Exam at the appropriate level for their degree program may be granted an opportunity for a retake in August immediately following the May Exam. Students who do not pass the Comprehensive Exam at the appropriate level are not automatically granted a retake. To request a retake, students must submit an official request within two weeks of notification of the not passing grade. This request should include a detailed timeline and study plan, to make the case for passing a retake. This request and plan must be endorsed by and developed with the adviser. Retake requests are reviewed via the Department's Admissions and Credentials Committee. Adviser-approved requests can be e-mailed to the current year's Admissions and Credentials Committee Chairs and must include a cc to the adviser and Senior Academic Program Manager (Frances Burman). For approved requests, students are granted one retake only, and it must be in August following the May Exam. A student cannot continue in the degree program without passing the Comprehensive Examination at the appropriate level, prior to the start of the second year.

Recommendations for Special Studies versus Thesis Research

Special Studies and Research in Epidemiology, PH.340.840.xx, is offered during terms 1, 2, 3, and 4. Thesis Research, PH.340.820.XX is offered terms S, 1, 2, 3, and 4.

SPECIAL STUDIES AND RESEARCH: PH.340.840.XX

All first-year PhD students should take 1 credit special studies and research each term during terms 1 -3.

The following list of activities may be approved for independent study or special studies and research and is not inclusive:

- Directed readings and discussion leading up to preparing for the research proposal,
- Literature searches and meta-analyses
- Secondary data analysis,
- Self-guided focused study on a particular methodology or a disease of interest

THESIS RESEARCH: PH.340.820.XX

Doctoral students take 340.820 once they successfully pass their School-wide Preliminary Oral Exam and begin working on their research thesis.

CALCULATING CREDITS FOR A VARIABLE CREDIT COURSE

- Students must remember that the 1 hour – in class, 2 hours – outside of class ratio still applies: e.g. Students should think about the time the faculty member will be involved in guiding them (see faculty contact hours below) as well as how much time the student uses to conduct outside readings and work.

What constitutes Faculty Contact Hours

- Individual one-on-one meetings
- Faculty revisions of writing projects (Faculty members spend considerable time editing, proofreading, and otherwise providing written feedback to students.)
- Mentoring and networking preparation and discussion.
- Time spent in group settings with faculty mentors e.g. journal clubs or weekly "lab/group" meetings. Students should make every effort to attend the group meetings for their track and adviser.

HOW TO REGISTER

- Students must communicate their intent to register with and receive approval from the faculty mentor in writing, prior to registering for credits for the special studies or thesis research and include the content/activities to be conducted and the number of credits.
- Students may take 1-3 credits while taking a full load of courses.
- Students may take up to 8 credits per term while taking a partial load of courses with the approval of the faculty mentor.

Adviser / Advisee Manual

Each student in the Department is assigned an adviser and selects co-adviser(s) as they move through the program; Adviser(s) have the responsibility of serving as a guide and mentor. This manual is intended to guide the student and the faculty member(s) in making the adviser/advisee relationship as successful as possible.

This manual has two goals:

- To provide answers to questions that students frequently ask and,
- To provide guidance on how the student and adviser can interact most effectively

Academic Advisers should:

- Provide oversight of the student's academic progress by:
  - Assisting in the selection of courses
  - Ensuring the student is meeting degree milestones in a timely manner
  - Being available for regular meetings with the student
  - Assessing and developing the student's interests and abilities
  - Monitoring student progress in academic coursework through periodic examination of transcripts
  - Monitoring student progress in fieldwork
  - Writing letters of reference (given appropriate lead-time)
  - Assisting with grant preparation (doctoral students, given appropriate lead-time))
  - Referring students to the appropriate individuals or offices that provide academic support and/or resources
- Provide leadership in matters of academic integrity:
  - Being knowledgeable about ethical issues that pertain to academics, research, and practice
  - Helping students interpret and understand institutional policies and procedures regarding the responsible conduct of research
  - Discouraging students from circumventing institutional policies and procedures, and when confronted with such issues, directing students to appropriate institutional resources or contacts, avoiding actual or appearance of conflicts of interest
  - Respecting the confidentiality of students
- Encourage active participation in the greater community (department, school, university, local, state, national, international)

STUDENTS MAY EXPECT THE FOLLOWING FROM THEIR ADVISER(S):

- Advisers' approval for course registrations, course changes, and pass/fail agreements, and on all reasonable petitions to the Admissions and Credentials Committee
- At least one meeting per term with the advisers
- Oversight of the student's overall academic program and sensitivity to any academic difficulties
- Knowledge of and interest in the student's career objectives
- Review of required and recommended courses for the track
- Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year

Advising students is an integral part of faculty members' responsibilities. Thus, students should not feel that they are imposing by asking for advice. Faculty members expect to be available to students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. The responsibility for arranging meetings lies with the student. Students should not expect advisers to seek them out for needed appointments. The student remains obligated to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline.

RIGHTS AND RESPONSIBILITIES OF THE ADVISER(S)**:

- To assist in determining the advisee's educational goals and needs upon starting the program
- To serve as an educational and/or professional mentor for the student
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and the advisers in terms of academic, professional, and personal interests
- To facilitate a change of adviser or program, if deemed appropriate for the student
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty
- To provide guidance throughout the academic program
- To be sensitive to cultural, medical, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be aware, sensitive, understanding, and supportive
- Advisers have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be consulted when students have questions or concerns about the research focus or progress, and to serve as team leader on the research team

RIGHTS AND RESPONSIBILITIES OF THE ADVISEE**:

- To arrange to meet with the adviser at least once each term, and observe registration and administrative deadlines
- To identify and develop professional career goals and interests
- To understand administrative policies and procedures and be familiar with the Student Handbook
- To maintain the academic checklist and review it at meetings with the advisers
- Advisees have the right to expect to be treated with respect and courtesy, to be notified in writing when a meeting must be canceled or rescheduled, to be notified when advisers have questions or concerns about the research focus or progress, and to be granted the role of a team member on the research team

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**Students and Faculty each have the right to request changes
 to the adviser/advisee relationship upon consultation with the
 Director of Graduate Education (Laura Camarata) without penalty.
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Please review the CEPH Competencies located: https://e-nextcatalog.jhu.edu/public-health/ceph-requirements/index.html (p. 176)

Non-Degree Training

Postdoctoral Fellows

The Department welcomes individuals who have completed doctoral degrees to postdoctoral fellow (PDF) affiliations. Post-doctoral Fellows identify a mentor and enjoy advising from faculty and use of the School's facilities.

Prospective PDFs submit a PDF application (https://www.jhsph.edu/academics/postdoctoral-training/process-appointmentoffellows.pdf). The Application requires proof of sponsorship by either the School or an outside agency for the entire period of the program. Post-doctoral fellows may not use personal funds to support themselves during their program. PDFs will not be able to register, be paid, and/or buy health insurance until verification of their official receipt of the doctoral degree is filed and their PDF application is formally approved.

After being admitted to the Program, each fellow should design, in collaboration with their faculty mentor, an **Individualized Development Plan** for their research time with the Department. PDFs should discuss the anticipated duration of their fellowship with their mentor when they begin the fellowship. PDFs wishing to extend their position beyond the agreed-upon time in the acceptance letter will need to send a letter of request and a report of accomplishments or work completed over the past year to their mentor. After meeting with their mentor, PDFs should send these materials to the Senior Academic Coordinator for the Department, Ebony Moore (eamoore@jhu.edu) and copy their mentor. PDFs are evaluated annually and must maintain an appropriate level of professionalism and scientific research for the duration of their program. Upon satisfactory completion of their program, PDFs are issued a Certificate of Completion. PDFs must submit a request form and provide an updated curriculum vitae, a forwarding address, and the start and end dates, approved by their mentor, to the Academic Support Core (JHSPH.epiasc@jhu.edu).

Directors

The Co-Directors for the PDF program, Casey Rebholz (https://www.jhsph.edu/faculty/directory/profile/3208/casey-m-rebholz/) and Joe Coresh (https://www.jhsph.edu/faculty/directory/profile/155/josef-coresh/) meet regularly with the PDFs for engagement and professional growth. Epidemiology Department PDFs are encouraged to participate in the Epidemiology Postdoctoral Association (EpiPDA) and in the Johns Hopkins Postdoctoral Association (JHPDA (https://jhpda.jhmi.edu/)). To join the EpiPDA listserv, please email Jonathan Eichberger at je@jhu.edu. The staff of the Professional Development (https://pdco.med.jhmi.edu/) and Career Office provides seminars, workshops, and career development assistance to all PDFs at the JHH campus.

Staff
Senior Academic Coordinator, Ebony Moore, eamoore@jhu.edu, handles questions, concerns, application procedures, and certification of completion for PDFs.

Required Courses and Training
PDFs must adhere to the student code of conduct (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx) ("Student_Conduct_Code") for all students of the Johns Hopkins Bloomberg School of Public Health.

PDFs are considered non-degree seeking students and must register for 16 credits during each course term. The Postdoctoral Research Credits course number is PH.340.830 Postdoctoral Research Epidemiology.

PDFs conducting research must complete the School-wide Academic and Research Ethics and Responsible Conduct of Research courses during their first term of enrollment:

PH.550.860 Academic & Research Ethics at BSPH
The Avoiding Plagiarism at JHU training, developed by JHU's Sheridan Libraries, is contained within the PH.550.860 Academic & Research Ethics at JHSPH course. This online course is administered through CoursePlus. All students are required to complete this online course by the end of their first term enrolled. In the course, students are asked to upload two certificates to a CoursePlus DropBox showing completion of both parts of this course

- Certificate from JHU for the Avoiding Plagiarism module
- Certificate from SPH for completion of the Responsible Conduct of Research module

Responsible Conduct of Research Course Requirement
Additionally, those who are supported by a National Institutes of Health (NIH) training grant, career development award (individual or institutional), research education grant or dissertation research grant (including D43, D71, F05, F30, F31, F32, F33, F34, F37, F38, K01, K02, K05, K07, K08, K12, K18, K22, K23, K24, K25, K26, K30, K99/R00, KL1, KL2, R36, T15, T32, T34, T35, T36, T37, T90/R90, TL1, TU2, and U2R) must repeat this in-person requirement every four years. This requirement can be met by completing either of the following two courses:

PH.550.600 Living Science Ethics - Responsible Conduct of Research (1st term) 1 credit
or
PH.306.665 Research Ethics and integrity: U.S. and International Issues (3rd term) 3 credits

Cost of the Program
Tuition
The fee for tuition and research for PDFs is set at $200 per term by the School and a postdoctoral scholarship covering tuition is generally granted. PDFs have the option of taking up to 16 credits of didactic courses during their fellowship period. PDFs who wish to take academic classes should discuss this with their research mentor as part of their Individualized Development Plan; these courses cannot be transferred into a degree program at a later date. Please visit the School's PDF website (https://www.jhsph.edu/academics/postdoctoral-training/) and PDF guidebook (https://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook-revised.pdf) for additional critical information.

Living in Baltimore (https://www.jhsph.edu/student-life/life-in-baltimore/)
Generally, PDFs complete their training onsite in Baltimore, MD. The Office of Financial Aid lists the Cost of Living and Health Insurance (https://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/cost-of-attendance/).

Information for International PDFs
The Office of International Services (https://ois.jhu.edu/Contact_Us/Medical%20Institutions/) is most helpful for answering questions related to the program.

PDF Helpful Links

- JHSPH Postdoctoral Training (https://www.jhsph.edu/academics/postdoctoral-training/)
- Guidelines for PDF NIH Stipend Levels (https://grants.nih.gov/grants/guide/notice-files/NOT-OD-18-175.html)
- Postdoctoral Fellows Policy and Procedures Memorandum (PPM) (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Pages/default.aspx) ("Students_05_Postdoctoral_Fellows")
- Postdoctoral Fellows Guidebook (http://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook-revised.pdf)
- Johns Hopkins Postdoctoral Association (JHPDA) (https://jhpda.jhmi.edu/)
- JHM Professional Development and Career Office (https://pdco.med.jhmi.edu/)

Certificate Programs

Certificate Programs offer focused academic training in specific areas of public health. They provide a focused way of integrating elective courses into a research area of interest. The School offers over 30 certificates outlined here: https://www.jhsph.edu/academics/certificate-programs/.

The Certificates offered by the Department of Epidemiology are:

- Clinical Trials (p. 580)
- Epidemiology for Public Health Professionals (p. 586)
- Health and Human Rights (p. 597)
- Healthcare Epidemiology and Infection Prevention and Control (p. 602)
- Pharmacoepidemiology and Drug Safety Certificate (p. 613)
- Risk Sciences and Public Policy (p. 628) (Epidemiology is one of three sponsoring departments; the primary Department Sponsor is Health Policy and Management)

Generally, students interested in a particular certificate will need to forward a brief statement and a CV to the contact person listed. The statement should indicate research/professional interest and background preparation for the certificate and explain how the additional certificate will be beneficial to the student's career. Many of the Certificates also require a planning chart of the courses including term/year to meet the Certificate's requirements.

Applying for a certificate as an enrolled degree candidate in Epidemiology at BSPH: https://www.jhsph.edu/academics/certificate-programs/how-to-apply/jhsph-degree-students.html. Many of the Certificates require formal acceptance prior to beginning the coursework. Students can count just 6 credits of the coursework taken toward a Certificate before acceptance into the Certificate program. Students who enroll in the last course of a certificate should complete and submit the Notification of Completion form during add/drop of that final term. Once the Certificate requirements have been satisfied, please comply with all completion instructions; ***certificates cannot be processed retroactively*** https://www.jhsph.edu/academics/certificate-programs/completion.html. Please see the individual certificate page or the Certificate FAQs (p. 575) for more information.

Graduate Summer Institute of Epidemiology and Biostatistics

The Graduate Summer Institute (https://publichealth.jhu.edu/academics/graduate-summer-institute-of-epidemiology-and-biostatistics/) offers short, intensive courses in epidemiology and biostatistics intended to develop an understanding of the principles, methodologic strategies and practical aspects of epidemiological research. The Department has offered the Summer Institute Program since 1983 and has trained thousands of students from the U.S. and around the world. Institute participants include students, clinicians, public health practitioners, physicians in training, and those considering a career in public health. Tuition for the GSIEB is assessed separately from the regular academic year and current degree-seeking students in epidemiology are responsible for 100% of institute tuition.

Department of Health, Behavior and Society

About

The Department of Health, Behavior and Society (HBS) advances public health research, pedagogy, and practice through our focus on health equity, social justice, and the myriad factors that drive people's health and well-being. We develop, evaluate, and implement solutions to pressing pubic health challenges in Baltimore, throughout the U.S., and in some two dozen countries around the world. We believe that human behaviors are key determinants of health and well-being and that behavioral determinants reside at the nexus of social context, political and policy structures, systems, and constructed environments.

Our research, practice, and pedagogy reflect this multilevel orientation, centering on factors occurring within and across each level. These include:

- **The individual level**: people’s own attitudes, beliefs, and emotions.
- **The interpersonal level**: people’s social networks at home, the workplace, and elsewhere.
- **The policy level**: policies that promote or hinder access to healthy living, including access to healthcare, insurance, and housing.
- **The structural level**: structures of racism, inequity, and injustice.

Some of HBS’s areas of expertise include addiction, social justice, anti-racism, health equity, LGBTQ studies, chronic diseases, health communication, social factors, sex work, opioid use, tobacco control, nutrition, HIV/AIDS, and COVID-19 prevention and control. We are particularly known for our mixed methods (including qualitative) approaches.

We house several centers and institutes, including one of BSPH’s largest centers, the Center for Communication Programs. Since our founding in 2005, our Department has grown to include 120 students and 58 full-time faculty members. We are proud to have a dedicated core of highly skilled staff members who support all aspects of the work in the Department of Health, Behavior and Society.

Programs

Summer Institute

Our HBS Summer Institute offers short, intensive courses that provide students with an understanding of behavioral and societal impacts on public health—and specific strategies to address the challenges they present.

Overview - Explore how social context and behavior shape population health through our HBS Summer Institute courses. Institute courses offer the same rigor and quality of our full-term HBS courses, condensed into days instead of weeks. Our HBS faculty experts lead each of our courses, ranging in focus from risk communication to qualitative studies and more. HBS Summer Institute courses:

- Offer the same rigor and quality of full-term courses, **condensed into days** instead of weeks.
- Are taught by our **HBS faculty experts**.
- May be taken on a **for-credit** or **non-credit basis** (with reduced tuition available for courses taken not for credit).
- Are eligible for **tuition remission** under the terms of the Hopkins Tuition Remission Plan (https://hr.jhu.edu/benefits-worklife/tuition-assistance/tuition-remission/).
- Courses taken for credit may be applied towards the completion of many full-time and part-time **degree programs** at HBS and BSPH.

Winter Institute

Our HBS Winter Institute offers compressed, intensive courses exploring behavioral and societal impacts on public health — and specific strategies to address the challenges they present.

Overview - Expand your knowledge of behavioral and societal impacts on public health through our winter institute courses. HBS Winter Institute courses:

- Offer the same rigor and quality of full-term courses, **condensed into days** instead of weeks.
- Are taught by our **HBS faculty experts**.
- May be taken on a **for-credit** or **non-credit basis** (with reduced tuition available for courses taken not for credit).
- Are eligible for **tuition remission** under the terms of the Hopkins Tuition Remission Plan (https://hr.jhu.edu/benefits-worklife/tuition-assistance/tuition-remission/).
- Courses taken for credits may be applied towards the completion of many full-time and part-time **degree programs** at HBS and BSPH.

HBS Policies and Student Resources

HBS Policy on Advising

All students are assigned a faculty adviser at the time of admission to their program. Adviser assignments are based, in part, on compatibility of the student and faculty research or practice interests. Advisers play an important role in the student's academic life. The adviser is expected to keep abreast of school and departmental degree requirements so that they can counsel students on courses and the proper progression towards the degree. Students should consult with their advisers prior to registering for courses each term. In addition, any special requests or petitions that a student submits to any of the administrative offices of the School will require the endorsement of the student's adviser as well as that of the department chair.

As students move through their degree programs, they may elect to choose a different adviser, depending on their chosen area of concentration and the dissertation topic selected, or for other reasons. In that event, the student should contact the preferred faculty member to determine if that person is able to assume responsibility as the student's adviser. If so, the student should notify the department in writing of an adviser change, obtaining the signatures of the prior adviser and the new adviser, and submit the signed notification to their respective program director for approval. Once approved, notify the Academic Program Administrator so that the change may be processed.

Each student is required to meet with their adviser at least once per academic term to discuss academic progress, to plan for fulfillment of degree requirements, and to review and modify course selection plans for the next term. These meetings are formally scheduled before each major registration period. **HBS students are responsible for scheduling these meetings with their advisers. See Milestones tables in each degree program description.** The Academic Program Administrator works closely with the faculty advisers and also provides guidance to students with the School and departmental academic policies and procedures.

- Students are expected to engage in pre-planning for these meetings.
- Both advisers and students should be aware of and understand curriculum policies and procedures.
- Students and advisers should identify future professional career goals and interests.
- The adviser and student should review the student's tentative curriculum and course schedule, and alternatives should be identified.
- Any major issues or questions about academic programs and non-academic problems should be identified and discussed.

HBS Program Directors for each respective program and the Academic Program Administrator are also available as resources within the department for students who have questions or concerns related to their own academic advisers. These individuals may be able to assist with mediation, coaching, facilitating co-mentoring, or switching advisers as needed. The Vice Chair for Pedagogy and Academic Affairs is also available to serve in this role.

HBS Teaching Assistant Policy

Any student, regardless of program, who wishes to serve as a Teaching Assistant (TA) in any Health, Behavior and Society course must first complete the self-paced, online "Teaching Assistantship Training (https://sites.google.com/site/ctlteachingtoolkit/teaching-assistants/ta-training/)" course. The Center for Teaching and Learning (CTL) will provide students with a certificate of completion, which they must then submit with their TA Payment Form.

Introduction to Online Learning: Students are now required to take the free, non-credit mini course "Introduction to Online Learning (IOL) (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/)" before beginning their first term.

Funding

The Department is committed to seeking opportunities that will allow it to provide financial support to its students. Most eligible accepted applicants will automatically be considered for School scholarship support. Departmental scholarship decisions are made during the admissions process and communicate to students in their letters of acceptance.

Federally funded institutional training grants may be available for eligible students. During the admissions process, admissions committees and program directors review and screen applications for appropriate candidates to be appointed. Appointees must be U.S. Citizens or permanent residents according to federal law.

The individual NRSA (National Research Service Award, NIH) may provide tuition and stipend support for up to 3 years for doctoral candidates planning to undertake research in certain areas. Students may apply for individual training support for NIH. The department provides a set of resources and a required internal review process to support student applications for NRSAs and similar grant proposals. Students interested in submitting a NRSA proposal should notify the Doctoral Program Director, with cc to the Academic Program Administrator and Administrative Program Coordinator as early as possible to initiate this process. The internal review process requires submission of grant text one month prior to the official submission deadlines.

Once a student begins working on their dissertation proposal, the Department strongly encourages students to seek dissertation writing support. Government agencies and private organizations provide funding for students once they are working on an approved thesis topic. The award amount varies by agency and organization. Application deadlines vary, but notices are sent to eligible students.

Students interested in applying for dissertation support should watch for postings and take special note of application procedures and deadlines. The Department has policies and procedures in place for student submission of grant applications.

Social Factors in Health, MHS

General Program Information

The Master's of Health Science (MHS) in Social Factors in Health is an advanced research degree for students with undergraduate exposure to social and behavioral sciences and/or public health, who are interested in further training in the theory and methods in this area. The degree is intended to prepare students either for further doctoral training in public health, or to work in a public health research, policy, or practice position. The focus of the MHS in Social Factors program in the Department of Health, Behavior, and Society is on integrating and applying a broad range of knowledge and analytical skills in social aspects of public health, with an emphasis on contemporary health problems.

Graduates of the program will be prepared to embark on doctoral training in public health or pursue careers in research, policy, and practice positions in local, state, national, and international agencies, organizations, and institutions.

The curriculum provides broad foundational training in public health, as well as specific training to build substantive knowledge and analytic skills as social scientists in public health, with the ability to understand problems and to design and implement solutions. The program focuses on understanding and influencing the societal structures and behaviors that create risk for disease and illness, as well as social factors that are protective and health enhancing. Rigorous training in applied research methods is also a key element of the curriculum.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The program consists of one and one-half to two years of full-time study, combining classroom-based coursework, seminars, and independent study. Students must also complete a mentored research experience, which includes the development of a research plan. Students must also write a master's research thesis presenting original research (in most cases based on the mentored research experience). The research experience, planned with the guidance of the student's academic adviser, may begin after successful completion of 64 credits, typically at the end of the first year, and must include the equivalent of 600 hours of activity in a paid or unpaid position.

After the completion of 64 credits, students in good academic standing are eligible for a Master's Tuition Scholarship (MTS) from the School. The MTS provides 75 percent tuition support during year two of the program.

Academic Progress

The Department expects students to maintain satisfactory academic progress for the duration of the degree program. In the Department, satisfactory academic progress is defined as follows:

- Maintaining a minimum cumulative grade point average of 2.75. Students falling below this minimum will have one term (or 12 additional units of coursework if part-time) to raise the GPA above 2.75.
- Earning a grade of "C" or higher in program specific core courses. Students earning lower grades must repeat the course.
- Adhering to the time frame for completion of degree, defined as two years for all program requirements (coursework, placement and written assignment). Extensions are possible but must be formally approved by the Department and Committee on Academic Standards.

Maintaining a minimum cumulative grade point average of 2.75. Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program.

Course/Credit Load

The Department strongly encourages students to register for fewer than 19 credits (including special studies and thesis research) in any one academic term. While a credit registration of more than 18 credits is possible through the registration system, departmental faculty think that the additional course burden prohibits students from dedicating the appropriate time needed for the educational activities being undertaken. Any decision to register for more than 18 credits should be carefully considered and discussed with the student's adviser prior to registering. The Department encourages students to register for a minimum of 16 credits each term. The School requires a minimum of 12 credits to maintain full-time status and a maximum of 22 credits.

Course of Study

Students will complete a minimum of 96 total units of credit hours, in six to eight full-time terms, graduating at the end of the second year. Students must attend the MHS in Social Factors Seminar for all of the terms in which they are registered, including a minimum of two terms in their second year program. It is also expected that MHS students will attend HBS seminar series events.

Students planning to take online courses must first take the free, non-credit mini-course “Introduction to Online Learning (IOL).” Students are now required to take IOL before beginning their first term.

All students are required to complete the Academic and Research Ethics course (550.860) during their first term.

In the first year, the four full-time terms of study will consist of academic coursework in classroom and seminar settings. A total of 64 academic units must be completed prior to beginning the research practicum, typically within the first four terms of study. HBS students typically register for 16 credits or more each term in the first year to complete the required total of 64 credits and to be eligible for the Master's Tuition Scholarship in the second year (though enrollment may vary slightly from term to term, the 64 credit hour requirement cannot be changed). Audited courses may not be applied toward the full-time enrollment requirement or toward the required 64 credits. All required courses must be taken for a letter grade, unless the course is only offered for Pass/Fail. It is anticipated that students will complete a significant portion of their research practicum activities during the summer between first and second year.

In the second year, HBS students register for 16 credits each term for a course of study that will include remaining courses and thesis research hours with their adviser (or another JHU faculty member) as they work to complete their mentored research experience and compose their research thesis. Students may be eligible to complete all requirements for graduation by the end of second term or the beginning of the third term of their second year, depending on the timing of their research experience and final approval of their thesis.

The final requirement of the program is that the student must perform a public presentation of their placement and associated research. Typically, this presentation will take place in the second and third quarters of the second year.

Students who have not completed both the mentored research experience and the final thesis by the May graduation deadline will be required to register for two credits in the summer term.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Methodologic and Research Training

Epidemiology

Students must take a minimum of five credit hours in epidemiology, starting with Epidemiological Inference in Public Health. This course should be taken in Term 1 of Year 1.

Code	Title	Credits
PH.340.721	Epidemiologic Inference in Public Health I (Term 1)	5
Total Credits		5

Biostatistics
MHS students must take all 4 of the following courses:

Code	Title	Credits
PH.140.621	Statistical Methods in Public Health I (Term 1) [1]	4
PH.140.622	Statistical Methods in Public Health II (Term 2) [1]	4
PH.140.623	Statistical Methods in Public Health III (Term 3) [1]	4
PH.140.624	Statistical Methods in Public Health IV (Term 4) [1]	4
Total Credits		16

[1] The more advanced Biostatistics series PH.140.651 Methods in Biostatistics I – PH.140.654 Methods in Biostatistics IV may be substituted.

Social Science Research Methods
Students must take:

Code	Title	Credits
PH.410.615	Research Design in the Social and Behavioral Sciences (Term 2)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (Term 2)	3
MHS in Social Factors Seminar – (1 unit per term, 6 terms minimum)		6
PH.410.881	MHS Seminar in Social Factors in Health I (1st term of first year)	
PH.410.882	MHS Seminar in Social Factors in Health II (2nd term of first year)	
PH.410.883	MHS in Social Factors in Health Seminar III (3rd term of first year)	
PH.410.884	MHS Seminar in Social Factors in Health IV (4th term of first year)	
Total Credits		12

Students must take the above courses. In addition, students must take at least 1 course in each of 2 areas: quantitative methods and qualitative methods. Students should carefully choose methods training considering both their previous training and future research goals. One course in each of the two areas is considered the minimum; students are encouraged to build their methodological expertise in all areas relevant to their proposed research activities and scientific areas of interest. It is valuable for students to seek both breadth and depth in methods training. Therefore, we strongly recommend that students also elect an area of methodological focus and take multiple courses in this area.

Quantitative Methods Courses

Code	Title	Credits
Select at least two of the following:		6-10
PH.410.686	Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction (Term 4)	
PH.330.657	Statistics for Psychosocial Research: Measurement (Term 1)	
PH.140.658	Statistics for Psychosocial Research: Structural Models (Term 2)	
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I (Terms 3 & 4)	
PH.410.733	Communication Network Analysis in Public Health Programs (Term 1)	
PH.140.698	Spatial Analysis III: Spatial Statistics	4
PH.140.699	Spatial Analysis IV: Spatial Design and Application	3
PH.340.696	Spatial Analysis I: ArcGIS	3
PH.340.697	Spatial Analysis II: Spatial Data Technologies	2
Total Credits		18-22

Qualitative Methods Courses

Code	Title	Credits
PH.550.604	Qualitative Reasoning in Public Health	2
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3
PH.410.712	Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences	3
PH.410.690	Ethnographic Fieldwork	3

‡Students who intend to take 410.712 should also take 410.710 (Concepts in Qualitative Research) or be able to demonstrate exposure to qualitative research methods through prior coursework or work experience. 550.604 (Qualitative Reasoning) does not meet the prerequisites for this course. Qualitative Reasoning is designed to foster an appreciation of a qualitative approach but does not teach skills necessary for qualitative data collection.

Strongly recommended:

Code	Title	Credits
PH.410.638 & PH.410.639	Scientific Writing in Health Sciences: Developing A Manuscript for Publication I and Scientific Writing in Health Sciences: Developing A Manuscript for Publication II (Terms 3 & 4)	6

Public Health Core Competencies
All students matriculating into a graduate program in an accredited school of public health (such as BSPH), are required to take courses that expose them to content that covers 12 'introductory learning objectives' before graduation. For MHS students in HBS, some of these exposures will come through regular program courses, and others will come through ½ credit "Cells to Society" (C2S) online modules developed by the school. The C2S modules will be offered at least twice a year and will be taken in the first 4 weeks of the term in which they are held. Some courses fulfill more than one learning objective. HBS MHS students will fulfill some CEPH requirements through coursework in other domains. Other CEPH requirements will be fulfilled by taking the following courses:

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5

PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
Total Credits		**3**

Required of all PhD/ScD students, ScM students, and MHS students enrolled in academic/advanced study programs. Students may obtain waivers if they have:

1. completed an MPH, professional MHS, or MSPH degree at a domestic institution within the last ten years,
2. enrolled in an MSPH program or in the DrPH program, or
3. taken and passed with a B or better graduate-level courses in the five CEPH core areas that are biostatistics, epidemiology, social and behavioral sciences, environmental health sciences, and health systems administration.

Requests for waivers should be addressed to Maryann Smith (mksmith@jhsph.edu (p. 18)).

Lecture times: Not applicable (online); LiveTalk sessions: Wednesdays at 12:00 noon or 5:30 PM online.

Social Science Theory as Applied to Public Health

Fundamentals of Social Theory in Public Health

Students must take:

Code	Title	Credits
PH.410.612	Sociological Perspectives on Health (Term 1)	3
PH.410.600	Fundamentals of Health, Behavior and Society (Term 1)	4
PH.410.611	Under Pressure: Health, Wealth & Poverty (Term 3)	3
PH.550.605	History of Public Health (Term 3)	3
Total Credits		**13**

Policy Courses

In addition, students must take at least 1 of the following policy courses:

Code	Title	Credits
Select one of the following:		3-4
PH.300.600	Introduction to Health Policy (Terms 1 & 2)	
PH.300.650	Crisis and Response in Public Health Policy and Practice (Term 3)	
PH.318.636	Urban Policy (Term 1)	
PH.318.623	Social Policy for Vulnerable Populations in the U.S. (Term 2)	
Total Credits		**3-4**

Social Science Applications in Public Health

Students must take at least 12 credit hours from the following list. Alternate courses may be substituted with permission from the program director.

Code	Title	Credits
Select at least 12 credit hours from the following:		12
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels (Term 2)	
PH.300.652	Politics of Health Policy (Term 4)	
PH.306.650	Public Health and the Law (Term 3)	
PH.313.601	Economic Evaluation I	
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	
PH.380.600	Principles of Population Change (Term 2)	
PH.380.604	Life Course Perspectives on Health (Terms 1 & 2)	
PH.380.611	Fundamentals of Program Evaluation (Term 3)	
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	
PH.410.613	Psychosocial Factors in Health and Illness (Term 3)	
PH.410.630	Implementation and Sustainability of Community-Based Health Programs (Term 4)	
PH.410.721 & PH.410.722	Translating Research into Public Health Programs and Policy and Translating Research into Public Health Programs II (Terms 3 & 4)	
PH.410.645	Applying the Social Ecological Model in Tobacco Control and Climate Change	
PH.340.666	Foundations of Social Epidemiology (Term 4, Offered every other year)	
PH.410.620	Program Planning for Health Behavior Change (Terms 1 & 4)	
PH.306.660	Legal and Public Health Issues in the Regulation of intimacy (Term 4)	
PH.410.668	Policy Interventions for Health Behavior Change (Term 2)	
PH.318.636	Urban Policy (Term 1)	
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life (Terms 2 & 4)	
PH.410.679	Decolonization, Global Communication, and Public Health (Term 2)	
Total Credits		**12**

Public Health Priority Populations, Issues, and Solutions

MHS in Social Factors students must take at least 12 credit hours from the following list. Alternate courses may be substituted with permission from the program director.

Code	Title	Credits
Select at least 12 credit hours from the following:		12
PH.410.604	Harm Reduction: A Framework for Evidence-Based Policy and Practice (Term 2)	
PH.410.610	Housing Insecurity and Health (Term 3)	
PH.410.640	Global Tobacco Control (Term 2)	
PH.410.660	Latino Health: Measures and Predictors (Term 4)	
PH.410.663	Media Advocacy and Public Health: Theory and Practice (Term 4)	
PH.410.677	Theory and Practice in Campaigning and Organizing for Public Health I (Term 3)	
PH.410.680	Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions (Term 4)	
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (Term 4)	

PH.410.683	Global Perspectives on LGBT Health (Term 3)	
PH.410.752	Children, Media, and Health (Term 3)	
PH.188.682	A Built Environment for A Healthy and Sustainable Future	
PH.221.643	Armed Conflict and Health (Term 3)	
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs (Terms 2 & 4)	
PH.222.654	Food, Culture, and Nutrition (Term 4)	
PH.222.657	Food and Nutrition Policy (Term 1)	
PH.300.615	The Tools of Public Health Practice (Term 2)	
PH.301.615	Seminar in Health Disparities	
PH.301.627	Understanding and Preventing Violence (Term 2)	
PH.301.645	Health Advocacy (Term 4)	
PH.305.684	Health Impact Assessment (Term 3)	
PH.306.625	Ethical Issues in Health Policy: Public Health and Health Care (Term 2)	
PH.306.663	Legal and Ethical Issues in Health Services Management	
PH.306.665	Research Ethics and integrity: U.S. and International Issues (Term 3)	
PH.308.615	The Opioid Crisis: Problem Solving Seminar (Term 1)	
PH.309.605	Health Issues for Aging Populations (Term 2)	
PH.317.600	Introduction to the Risk Sciences and Public Policy (Terms 1 & 3)	
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS	
PH.330.623	Brain and Behavior in Mental Disorders	
PH.330.639	The Intersection of Mental and Physical Health	
PH.330.664	Introduction to Mental Health Services (Term 1)	
PH.330.667	Mental Health and the Law (Term 3)	
PH.330.680	Promoting Mental Health and Preventing Mental Disorders in Low- and Middle-income Countries (Term 4)	
PH.340.629	The Epidemiology of LGBTQ Health	
PH.330.674	Suicide As A Public Health Problem (Terms 3 & 4)	
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	
PH.340.692	Prisons, Public Health, and Human Rights	
PH.380.635	Urban Health in Contemporary America (Term 4)	
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (Term 3)	
PH.380.665	Family Planning Policies and Programs (Term 3)	
PH.380.666	Women's Health (Term 3)	
PH.380.667	Women's Health Policy (Term 4)	
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (Term 2)	
PH.380.721	Schools and Health (Term 4)	
PH.380.725	The Social Context of Adolescent Health and Development (Term 4)	
PH.380.744	Nutrition and Growth in Maternal and Child Health (Term 1)	
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (Term 3)	
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	
PH.380.767	Couples and Reproductive Health (Variable credits, Term 1)	
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (Term 1)	
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (Term 3)	
PH.550.609	Life and Death in Charm City: Histories of Public Health in Baltimore, 1750 to the Present (Term 1)	
Total Credits		**12**

MHS Degree Policy and Procedure Manual (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_08_Master_of_Health_Science_Degree_071417.pdf)

Milestones for the MHS in Social Factors in Health Program

Key Dates	Task/Event
First Year	
Term 1	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
Term 2	
Before Drop/Add	Advisor Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
Term 3	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
	Research Practicum Options
Term 4	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
	Research Practicum Options/ Selection
	Completed 64 credits (minimum)
	Master Tuition Scholarship Certification
Second Year	
First Term	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
	Satisfactory progress in research practicum
	Satisfactory progress in Final Paper
Term 2	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress

Term of completion	
	Completion of Final Paper
	Successful Presentation of Work in Seminar

Timetable for Completion of Degree Requirements

Please direct questions regarding the timetable for completion of degree requirements to Office of Records & Registration (JHSPH.Registra@jhu.edu).

MHS Program Policies

MHS Program Prerequisites

1. In order to take required online courses, students must complete Introduction to Online Learning, which is offered through the Center for Teaching and Learning at the Bloomberg School. This non-credit course is a pre-requisite that **must be completed in the summer prior to matriculation**.
2. All students must take the required course *PH.550.860* Academic & Research Ethics at BSPH. This is an online offering that **must be completed in the summer prior to matriculation**. Failure to complete this course will prevent students from registering for 2nd term.

Master's Tuition Scholarship

The MTS provides eligible second year MHS students with a 75% tuition scholarship for up to four consecutive terms. Students are eligible if they have successfully completed all Year 1 required coursework, are in good academic standing, and have accumulated a minimum of 64 credits. ***Once the scholarship has been awarded, the student must maintain full# time registration for the entire period of the award.*** Upon completion of the final written assignment, the MTS will be concluded. Students will not be permitted to enroll in courses using the MTS once they have been certified as complete in the MHS program.

Satisfactory Academic Progress

The Department expects students to maintain satisfactory academic progress for the duration of the degree program. For the MSPH program, satisfactory academic progress is defined as follows:

- Maintaining a minimum cumulative grade point average of 2.75. Students falling below this minimum will have one term (or 12 additional units of coursework if part-time) to raise the GPA above 2.75.
- Earning a grade of "C" or higher in program specific core courses. (Students earning lower grades must repeat the course.)
- Adhering to timeframe for completion of degree, defined as four years for all program requirements (coursework, placement and written assignment). Extensions are possible but must be formally approved by the Department and Committee on Academic Standards.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program.

HBS Policy on Course Waivers

Waiving or substituting a course that the faculty have determined essential to the program is a serious consideration. Students should discuss this thoroughly with their adviser well in advance of the start of the term in which the required course is offered. Course waivers are rare and are appropriate only when the student has completed the course or one very similar to it in prior graduate level training. Course substitutions may be appropriate if the student can provide a rationale for why an alternate course is preferred to the required one. (NB: The alternate course must cover much of the same content as the required course.) If the student and the adviser agree that a waiver or substitution is warranted, a memo from the student (co- signed by the adviser) to the program directors, requesting the waiver should be submitted to the HBS Academic Office no later than the first day of the term of the course in question.

All requests for course substitutions must be submitted in writing using the required form to the program directors and student's adviser prior to course enrollment and should include the following information: Proposed competency area for substitution; Proposed course name, number, number of credits, and description; Rationale for substitution, including demonstrated match between course objectives and relevant training competency. Substitutions for coursework in Methodologic and Research Training will only be considered with evidence of prior equivalent coursework. No substitutions can be made for coursework in Section 1d (Public Health Core Competencies).

Program Competencies

1. Articulate the influences of social context and behavior on health with the aim of developing, evaluating and implementing solutions to pressing public health challenges in Baltimore, the United States and around the globe
2. Describe relationships and potential pathways between social factors, behaviors, and health and related contributions to health disparities
3. Critically evaluate literature related to individual and social influences on health behaviors and health
4. Apply interdisciplinary, ecological, and other multi-level theoretical models of health and health behavior to identify relevant social and structural factors and effective social and behavioral intervention strategies to address public health challenges in diverse populations and settings
5. Design and critically assess interventions and community-based programs to prevent disease and injury, alleviate illness and disability, improve quality of life, and reduce health disparities
6. Translate research on effective social and structural interventions with implications for public health related practice and policy
7. Apply a variety of study designs, methods and analytic techniques to appropriately address key questions about social and structural influences on health
8. Apply appropriate ethical standards in the conduct of public health research and practice

Health Education and Health Communication, MSPH

General Program Information

The Master of Science in Public Health (MSPH) program in Health Education and Health Communication is designed for individuals seeking formal academic training in health education, health promotion, and health communication. The program equips students with the fundamental skills and knowledge necessary for a career in these areas in settings ranging from voluntary, community-based agencies to health departments and government agencies to for-profit companies. The degree is appropriate for individuals interested in either or both domestic or international work. Four major elements comprise the MSPH program in Health Education and Health Communication and are described below:

program requirements, academic course requirements, a field placement, and a final written assignment.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Student Status

The program is open to both full-time and part-time students. However, during the field placement, all students must be registered as full-time students. Students must maintain their student status up until they complete all requirements for graduation.

Timing

Full-time students complete course requirements in their first year of study; part-time students must complete them within three years of matriculating into the program. All students are required to participate in a full-time field placement of at least six months duration, only after their required and elective coursework is complete.

Course/Credit Load

The Department strongly encourages students to register for fewer than 19 credits (including special studies) in any one academic term. While a credit registration of more than 18 credits is possible through the registration system, departmental faculty think that the additional course burden prohibits students from dedicating the appropriate time needed for the educational activities being undertaken. Any decision to register for more than 18 credits should be carefully considered and discussed with the student’s adviser prior to registering. The Department encourages students to register for a minimum of 16 credits each term. The School requires a minimum of 12 credits to maintain full-time status and a maximum of 22 credits.

Certification for Graduation

MSPH students in good academic standing who complete all program components are certified for graduation by the Department’s Academic Program Administrator.

Students must communicate their graduation plans well in advance to their adviser, program director, and the School and meet all deadlines for degree requirements. Students are certified for graduation only after they have successfully completed all course work, the field placement, and the final writing assignment. Students who do not fulfill program requirements within the stated time frame run the risk of delaying their graduation. Specific deadlines and graduation conferral dates will be provided to the student.

The University now has three conferral dates for graduation (December, May, and August) but only one graduation ceremony per year (May). December and August graduates may participate in the May graduation ceremony of the appropriate academic year. Most MSPH students are certified for May graduation.

Students who have not completed both the field placement experience and the final writing assignment by the May graduation deadline will be required to register for two credits in the summer term. Students will receive an Incomplete (I) grade for field placement (PH.410.810 Field Placement Health Behavior and Society) and, as dictated by School policy, the Incomplete grade will convert to a Fail (F) grade if the activity is not completed within 120 days of the end of 4th term.

Academic Course Requirements

Students must complete a *minimum* of 64 credits, which includes both required and elective courses (see table below), before becoming eligible for field placement. Program course requirements are designed to give students general competence in core areas of public health and more in#depth competence in the theories and practice of public health education, promotion and communication. For a number of required areas, students may select among options to fulfill the requirement. For instance, students can pursue the Biostatistics requirement through one of two options. The first option (Track A) emphasizes interpretation and concepts rather than data analysis. This sequence develops an understanding of statistical methods rather than developing a student’s own data analysis skills. The second option (Track B) is aimed at students who intend to analyze data themselves or contribute meaningfully to a group of practitioners or researchers doing so. Students may not switch between tracks after they have begun one. Both courses in the track must be completed to fulfill the Biostatistics requirement. *All students taking online courses are required to complete Introduction to Online Learning (offered all four terms) before they take their first online course.* Students are encouraged to consult with their academic advisers when making course selections.

The required curriculum emphasizes:

- assessment of educational and communication needs;
- development and implementation of health behavior change strategies and health communication programs targeting the individual, group, and community; and
- evaluation of program effects.

Required Courses: Core Public Health Requirements

Code	Title	Credits
Ethics		
PH.550.860	Academic & Research Ethics at BSPH (all terms)	0
Epidemiology		
PH.340.721	Epidemiologic Inference in Public Health I (Terms 1 (recommended),3,SI)	5
Biostatistics		
Select one of the following:		6-8
PH.140.611 & PH.140.612	Statistical Reasoning in Public Health I and Statistical Reasoning in Public Health II [1]	
PH.140.621 & PH.140.622	Statistical Methods in Public Health I and Statistical Methods in Public Health II [2]	
Total Credits		**11-13**

1. Terms 1 (recommended), 2, 3 for PH.140.611 Statistical Reasoning in Public Health I; Terms 2 (recommended), 3, 4 for PH.140.612 Statistical Reasoning in Public Health II
2. Term 1 recommended for PH.140.621 Statistical Methods in Public Health I; Term 2 recommended for PH.140.622 Statistical Methods in Public Health II

Required Courses: Health Education, Promotion and Communication

Code	Title	Credits
Theory		
PH.410.600	Fundamentals of Health, Behavior and Society (Term 1 recommended)	4

Planning and Implementation		
Select one of the following:		6-8
PH.410.620 & PH.410.630	Program Planning for Health Behavior Change and Implementation and Sustainability of Community-Based Health Programs [1]	
PH.410.654 & PH.410.655	Health Communication Programs I: Planning and Strategic Design and Health Communication Programs II: Implementation and Evaluation [2]	
Program Evaluation		
Select one of the following:		3-4
PH.410.615	Research Design in the Social and Behavioral Sciences (Term 2 recommended)	
PH.380.611	Fundamentals of Program Evaluation (Term 3 recommended)	
Communication		
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (Term 2 recommended, WI)	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (Term 3 recommended)	3
Policy		
PH.410.668	Policy Interventions for Health Behavior Change	3
Professional Development		
PH.410.865	MSPH Seminar in Health Education and Health Promotion (Term 1 reecommended)	1
PH.410.866	Careers in Health Education and Health Promotion (Term 2 recommended)	1
PH.410.867	MSPH Field Placement Preparation (Term 3 recommended)	1
Total Credits		**26-29**

1 Terms 1 (recommended), WI, 4 for PH.410.620 Program Planning for Health Behavior Change; Terms 2 (recommended), 4 for PH.410.630 Implementation and Sustainability of Community-Based Health Programs
2 Term 3 recommended for PH.410.654 Health Communication Programs I: Planning and Strategic Design; Term 4 recommended for PH.410.655 Health Communication Programs II: Implementation and Evaluation

Remember to check for prerequisites. Note all online courses require completion of Introduction to Online Learning.

Required Courses: CEPH Introductory Learning Objectives and Professional Development Competencies

The Council for Education in Public Health (CEPH) is responsible for the accreditation of all schools of public health. According to CEPH requirements, all degree students must be grounded in foundational public health knowledge, as outlined in 12 ‘introductory learning objectives.’ In addition, students in professional master’s degree programs like the MSPH must also demonstrate their ability to perform 22 professional development competencies. For MSPH students in HBS, many of these competencies are integrated into core departmental and program requirements. Competencies not already covered are included in 0.5 credit “Cells to Society” (C2S) online modules (552.601 - 552.626) or variable credit "Leadership Skills" courses (552.622, 552.651, 552.655) developed by the school. The C2S modules are offered every academic term; the Leadership Skills courses are offered as noted. All CEPH requirements must be completed prior to graduation. MPSH students are *strongly encouraged* to complete them prior to the start of the field placement. More details about CEPH requirements can be found here (p. 176).

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population’s Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population’s Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	1
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.625	Building Collaborations Across Sectors to Improve Population Health	0.5
PH.552.626	Systems Thinking: Concepts and Methods	0.5
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.312.655	Organizational Behavior and Management	2
Total Credits		**12.5**

Elective Courses

Students have ample opportunity to choose elective courses to tailor their program of study to their own unique needs and interests. Students may use electives to broaden their understanding of major public health issues by taking courses in any of the departments of the School. Electives may also be used to pursue specialized training such as that offered by the Certificate in Injury Control, Certificate in Health Finance and Management, etc. Again, students are encouraged to consult with their advisers and program director about elective course selections.

Field Placement

Overview

The field placement is designed to provide students with an opportunity, under supervision, to apply the knowledge and skills from the classroom to professional health education, promotion, and communication practice. The primary purpose of the field placement, an integral component of the MSPH program, is skill-building: helping students learn how to apply theories and principles and develop skills essential for functioning as an effective health educator. Another goal for the placement is to allow for the seamless transition from student to public health professional.

The field placement is an activity in which the student, the placement agency, and the faculty share responsibility. All three parties must be involved in developing work objectives to guide the student's field placement experience. An appropriate field placement is one that consists of a full-time work experience as a health education, promotion, or communication trainee in a health-related agency or organization in which the student participates in some aspect of program/project planning, implementation, and/or evaluation. The placement must be full time, last at least six months (consecutive) and provide the student with appropriate supervision and guidance from agency personnel. Both the student and the agency preceptor will be asked to participate in a mid-course discussion and a final evaluation.

Part-time students who are employed full-time by an agency may propose a field placement with their current employer. In such instances, the student must propose a scope of work that involves new responsibilities or activities that are not part of their current work, and the students must extend the time frame to accommodate the fact that they are not engaged in new work for 100% effort.

Additional field placement information and requirements will be provided to students by the program director.

Second Year Seminar

Students are required to participate in a monthly seminar series during year two of the program. The purpose of the seminar series is to allow students to learn about each other's placements and to discuss issues relevant to current health education and communication practice. The seminar also reviews the purpose and procedures for the final written assignment. Additional seminar information and requirements will be provided to the students by the program director. The seminars will be held virtually using Zoom technology; students will need a laptop or desktop computer with audio capabilities. If time zone or work priorities interfere with the student's ability to participate in the seminar, it is the student's responsibility to watch on their own time the recorded seminar. Monthly seminars are held during the academic year on Friday afternoons; the specific schedule will be shared by the program director.

Final Written Assignment

The concluding requirement of the program is the completion of a program proposal prepared by the student. The goal of this written assignment is threefold:

- to provide students with an opportunity to synthesize information obtained in the academic year with that experienced during the field placement,
- to demonstrate the ability to write at the graduate level, and
- to gain proposal writing skills.

The proposal must display academic rigor, must comply with program requirements (provided by the program director and reviewed in seminar), and must be grounded in the needs and activities of the field placement agency.

The proposal must be reviewed and approved by the academic adviser and one faculty member from outside the Department, known as the Second Reader. Failure to submit the completed, approved proposal to the MSPH program director by the specified due date may delay graduation. Students must maintain their registration status until the approved proposal is submitted to the program director. Additional proposal information and requirements will be provided to students by the program director.

Graduates

Recent graduates from the MSPH program in Health Education and Health Communication are employed by such agencies as Academy for Educational Development, Centers for Disease Control and Prevention, National Institutes of Health, Health Resources and Services Administration, Washington DC Department of Health, Ogilvy Public Relations Worldwide, and the Center for Communication Programs at The Johns Hopkins University.

Graduates from this program are eligible to sit for national certification exams. One is conducted by the National Commission for Health Education Credentialing. Upon successful completion of this exam, individuals earn the designation of Certified Health Education Specialist (CHES) or MCHES (Masters Certified Health Education Specialist). Another is conducted by the National Board of Public Health Examiners. Upon successful completion of this exam, individuals earn the designation of Certified in Public Health (CPH). Additional information and requirements about CHES, MCHES and CPH will be provided to students by the program director.

Milestones for the MSPH in Health Education and Health Communication Program

Key Dates	Task/Event
First Year	
Term 1	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
Term 2	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
Term 3	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
	Field Placement Options
Term 4	
Before Drop/Add	Adviser Meeting
Before Drop/Add	Course Selections
	Satisfactory academic progress
	Field Placement Options/Selection
	Completed 64 credits (minimum)
	Master Tuition Scholarship Certification
Second Year	
Terms 1-4	
	Registered for Field Placement (each term)
	Work Agreement Signed Prior to Placement Start
	Seminar Participation
	Advisor Meetings #1 through #5
	Evaluation Completed
	Proposal Topics Discussed/ Selected
	Proposal Outline
	Proposal Final Draft
	Second Reader Discussed/Selected
	Proposal Approved by Both Second Reader and Advisor

	Certified for Graduation
	Graduation

Timetable for Completion of Degree Requirements

Please direct questions regarding the timetable for completion of degree requirements to Office of Records & Registration (JHSPH.Registra@jhu.edu).

MSPH Program Policies

MSPH Program Prerequisites

1. In order to take required online courses, students must complete Introduction to Online Learning, which is offered through the Center for Teaching and Learning at the Bloomberg School. This non-credit course is a pre-requisite that **must be completed in the summer prior to matriculation**.
2. All students must take the required course PH.550.860 Academic & Research Ethics at JHSPH. This is an online offering that **must be completed in the summer prior to matriculation**. Failure to complete this course will prevent students from registering for 2nd term.

Master's Tuition Scholarship

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Satisfactory Academic Progress

The Department expects students to maintain satisfactory academic progress for the duration of the degree program. For the MSPH program, satisfactory academic progress is defined as follows:

- Maintaining a minimum cumulative grade point average of 2.75. Students falling below this minimum will have one term (or 12 additional units of coursework if part-time) to raise the GPA above 2.75.
- Earning a grade of "C" or higher in program specific core courses. (Students earning lower grades must repeat the course.)
- Adhering to timeframe for completion of degree, defined as four years for all program requirements (coursework, placement and written assignment). Extensions are possible but must be formally approved by the Department and Committee on Academic Standards.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program.

HBS Course Waivers and Substitutions

Waiving or substituting a course that the faculty have determined essential to the program is a serious consideration. Students should discuss this thoroughly with their adviser well in advance of the start of the term in which the required course is offered. Course waivers are rare and are appropriate only when the student has completed the course or one very similar to it in prior *graduate* level training. Course substitutions may be appropriate if the student can provide a rationale for why an alternate course is preferred to the required one. (NB: The alternate course must cover much of the same content as the required course in order to ensure that we stay true to the program as presented to and approved by CEPH.) If the student and the adviser agree that a waiver or substitution is warranted, a memo from the student (co-signed by the adviser) to the program directors, requesting the waiver should be submitted to the HBS Academic Program Administrator no later than the first day of the term of the course in question.

Learning Outcomes

Link to HBS MSPH Degree Program Competencies http://www.jhsph.edu/departments/health-behavior-and-society/degree-programs/msph-in-health-education-and-health-communication/

Genetic Counseling, ScM

General Degree Information

The JHU/NIH Genetic Counseling Training Program is a joint effort between the Department of Health, Behavior, and Society and the National Institutes of Health through the National Human Genome Research Institute (NHGRI) and the National Cancer Institute (NCI). This collaboration draws on resources from the two research institutions to address needs in the genetic counseling profession. This program was initiated in 1996. Its goals are to shape genetic counseling services through student and faculty research and develop outstanding genetic counselors who are innovators and leaders in:

- psychotherapeutic genetic counseling,
- genetic counseling research and scholarship,
- applications of genomics and precision health
- transdisciplinary learning and practice, incorporating perspectives from public health, policy, ethics, and advocacy

Prospective students who would like additional information after perusing this site, please visit the program's NIH site (https://www.genome.gov/careers-training/Professional-Development-Programs/Genetic-Counseling-Training/).

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Course Requirements

The program requires two and one-half years of full-time study. The curriculum consists of at least 146 credit hours of didactic course work and rotations in the areas of human genetics, genetic counseling, public policy, research methodology, ethics, and health education. One credit of Supervised Clinical Rotation must be completed during the summer between the first and second years of study. The coursework is taken on the NIH campus in Bethesda, Maryland, and at Johns Hopkins Bloomberg School of Public Health in Baltimore. Clinical rotations extend in location from northern Baltimore to Washington, D.C and northern Virginia, and include both in-person and telegenetics experiences.

Per School regulations, at least 12 credits of formal course work must be completed outside the Department of Health, Behavior, and Society, of which at least eight (8) must be earned in another department of the School of Public Health.

Important General Notes

All students are required to enroll for a minimum of 12 credits per term in order to be considered full-time. If a student opts out of a course that is *considered an elective in this curriculum, other electives must be selected with the student's adviser to maintain the 12 credit minimum.*

There are four course requirements for which we are able to offer some choices. All options are reflected in the curriculum further below, but students are only required to choose one course from each set of requirements as outlined below:

Qualitative research methods requirement

Students *must* take one of the following:

For those NOT planning to pursue a qualitative thesis:

1. PH.550.604 Qualitative Reasoning in Public Health - 2 credits, 1st or 2nd term (online) (highly recommended)

OR

2. PH.552.603 The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health-0.5 credits, 1st, 2nd, or 3rd term (online) (less recommended, discuss with your advisor)

For those considering a qualitative thesis:

1. PH.550.604 Qualitative Reasoning in Public Health-2 credits in 1st or 2nd term (online)

OR

2. PH.410.710 Concepts in Qualitative Research for Social and Behavioral Sciences- 3 credits, 2nd term (on-site)

Taking one of these courses also allows students to take the following additional elective:

PH.410.712 Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences - 3 credits, 3rd term (on-site)

Social Determinants of Health Requirement

Students *must* take one of the following:

1. PH.410.651 Health Literacy: Challenges and Strategies for Effective Communication - 3 credits, 2nd term (online)

OR

2. PH.552.610 The Social Determinants of Health -0.5 credits, 1st, 2nd or 3rd term (online)

medical genetics requirement

Students *must* take one of the following:

1. PH.415.613 Introduction to Medical Genetics I and PH.415.614 Introduction to Medical Genetics II-2 credits each (online), 3rd and 4th terms

OR

2. Clinical Genetics for Genetic Counselors I - 2 credits (asynchronous online) and Clinical Genetics for Genetic Counselors II - 2 credits (asynchronous online) (new courses, under review), 3rd and 4th terms

Responsible conduct of research requirement

Students *must* take one of the following:

1. 306.665 Research Ethics and Integrity: U.S. and International Issues -3 credits (on-site)

OR

2. 550.600 Living Science Ethics Responsible Conduct of Research -1 credit, 1st term online or 4th term online or on-site

Satisfactory Academic Progress

All ScM students in the Department of Health, Behavior, and Society are expected to maintain satisfactory academic standards for the duration of the degree program. In the department, satisfactory academic progress is defined as follows:

A minimum grade point average (GPA) of 2.75. Any ScM student who does not obtain the minimum 2.75 GPA will not be eligible to present his/her written research proposal. If this minimum grade point average is not maintained, the program directors will meet to determine the appropriate course of action.

ScM students are required to pass all of their clinical rotations and are required to pass a minimum of four semesters of clinical supervision. In the event a student fails to pass a rotation, criteria for repeating and successfully passing the rotation will be determined and communicated by the program director.

Clinical Rotations

In addition to didactic course work, the program requires a minimum of six hundred contact hours of supervised clinical rotations in a variety of settings. Clinical rotations begin with a standardized patient rotation in the second quarter of the program, transition to an on-site rotation in third quarter and are required throughout the remainder of study. During the first and second years, rotations are scheduled during one full or two half-days each week. During the third year, they are scheduled for a minimum of two full days each week for one term or one full day each week for two terms. These rotations provide a critical opportunity for students to learn directly about genetic conditions and their impact on individuals and their families, as well as about roles of the professional counselor. Most of the preceptors for clinical rotations are board-certified genetic counselors. Those who are not (bioethicists, medical social workers, health educators, physicians) enhance the clinical training by exposing students to a variety of disciplines. This type of broad experience is endorsed by the Accreditation Council for Genetic Counseling that accredits the program.

Thesis

Students are expected to conduct original research worthy of publication as part of their Master's thesis. To this end, students are required to take courses that will provide them with the training and experience to develop, carry out, and publish their research. Students are expected to develop an acceptable thesis proposal by the middle of the second year of study and to conduct their study during the second and third years of the program. Students are expected to prepare a publishable manuscript of their study results and present the findings at a research seminar in January of their third year on the NIH campus in Bethesda.

By December of the student's second year, the student must submit a written thesis research proposal. The written proposal is to be submitted two weeks prior to a scheduled meeting of the Executive Committee faculty. The proposal includes the following sections: an abstract, specific aims, hypotheses (if applicable), background, research plan, plan for analysis, significance of the proposed work, and a timeline. Written feedback is returned to the student for response during an oral presentation with the Executive Committee. The student receives a written evaluation with the stipulations and recommendations detailed.

Comprehensive Examinations

Prior to conducting the thesis project, the student completes a comprehensive written exam that consists of questions intended to further the student's thinking on topics related to the conduct of genetic counseling research.

Institutional Review Board

An application for SRC (Scientific Review Committee) and NHGRI IRB (Institutional Review Board) review at the NIH or the Johns Hopkins IRB must be submitted after successful completion of the comprehensive exam and prior to beginning thesis research.

Students should discuss any questions about the use of human subjects in their research activities with their adviser.

Program Accreditation

The Accreditation Council for Genetic Counseling re-accredited the program in 2016 for eight years. Graduates of the program are eligible to sit for the genetic counseling board examinations after completion of the degree program and a clinical logbook demonstrating significant involvement in the evaluation and counseling of at least 50 patients seen in approved rotation sites.

2022-23 Curriculum for Sc.M. Program in Genetic Counseling

(All Courses are required unless indicated otherwise. Total credits listed per term include all electives. Actual totals vary.)

Course	Title	Credits
First Year		
First Term		
Introduction to Online Learning (non-credit)		
PH.550.860	Academic & Research Ethics at BSPH (Students must take this non-credit course upon matriculation) [4]	
PH.140.621	Statistical Methods in Public Health I	4
PH.340.721	Epidemiologic Inference in Public Health I	5
ED.861.502	Counseling Theory and Practice (elective for Psych majors/minors; required for others) [1]	2.5
PH.415.610	Practical Genetic Counseling	2
PH.415.620	Introduction to Genetic Counseling I	2
PH.415.611	Introduction to Human Genetics I	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
	Credits	**20.5**
Second Term		
PH.140.622	Statistical Methods in Public Health II	4
PH.410.615	Research Design in the Social and Behavioral Sciences	3
ED.861.502	Counseling Theory and Practice (elective for Psych majors/minors; required for others) [1]	2.5
PH.415.621	Introduction to Genetic Counseling II	2
PH.415.612	Introduction to Human Genetics II	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
Genetic Counseling Prenatal Standardized Patient Clinical Rotation (under review)		2
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (elective) [6]	3
	Credits	**21.5**
Third Term		
PH.140.623	Statistical Methods in Public Health III (elective)	4
PH.415.613	Introduction to Medical Genetics I (or Clinical Genetics for Genetic Counselors I) [2]	2
PH.415.630	Therapeutic Genetic Counseling I	2
PH.415.640	Health Judgment and Decision Making	2
PH.410.603	Introduction to Genetic Counseling Research	1
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling	4
	Credits	**18**
Fourth Term		
PH.415.650	Facilitating Family Adaptation to Loss and Disability I	2
PH.415.624	Ethical, Legal and Social Implications in Genetics and Genomics Over Time [3]	3
PH.415.675	Cancer Genetics: Managing the Risks Through Testing and Counseling	2
PH.415.614	Introduction to Medical Genetics II (or Clinical Genetics for Genetic Counselors II)	2
PH.415.880	Genetic Counseling Program Thesis Proposal Development I	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling (Total credits for 4th term: 18)	4
Summer		
PH.415.851	Supervised Clinical Rotations: Genetic Counseling (Total credits for 4th term AND Summer: 19)	4
	Credits	**22**
Second Year		
First Term		
PH.415.631	Therapeutic Genetic Counseling II	2
PH.415.710	Medical Genetics and Genomic Medicine: from Diagnosis to Treatment I [5]	2
PH.415.881	Genetic Counseling Program Thesis Proposal Development II	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1

PH.415.851	Supervised Clinical Rotations: Genetic Counseling	4
PH.550.600	Living Science Ethics - Responsible Conduct of Research (also offered 4th term; take this or Research Ethics and Integrity)	1
PH.552.601	Foundational Principles of Public Health (also offered 2nd and 3rd term) [7]	0.5
PH.552.607	Essentials of Environmental Health (also offered 2nd and 3rd term) [7]	0.5
PH.552.612	Essentials of One Health (also offered 4th term) [7]	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (take at least one qualitative course; also offered 2nd and 3rd term) [7]	0.5
PH.550.604	Qualitative Reasoning in Public Health (take at least one qualitative course; also offered in 2nd term)	2
	Credits	**18**
Second Term		
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences (take at least one qualitative course)	3
PH.550.604	Qualitative Reasoning in Public Health (take at least one qualitative course; also offered 1st term)	2
PH.415.651	Facilitating Family Adaptation to Loss and Disability II	2
PH.415.711	Medical Genetics and Genomic Medicine: from Diagnosis to Treatment II [5]	2
PH.415.882	Genetic Counseling Program Thesis Proposal Development III	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling (2 credits required plus 2 credits elective non-clinical rotation)	4
PH.552.610	The Social Determinants of Health (take this or Health Literacy; also offered 1st and 3rd term) [7]	0.5
PH.552.611	Globalization and Population Health (also offered 1st and 3rd term) [7]	0.5
	Credits	**19**
Third Term		
PH.306.665	Research Ethics and integrity: U.S. and International Issues (take this or Living Science Ethics Responsible Conduct of Research)	3
PH.415.866	Current Topics in Molecular Genetics I (elective) [2]	1
PH.415.840	SS/R: Genetic Counseling	2
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.410.624	Genetic Counseling Cancer Standardized Patient Clinical Rotation	4
PH.410.712	Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences (elective)	3
	Credits	**16**
Fourth Term		
PH.415.867	Current Topics in Molecular Genetics II (elective)	1
PH.415.624	Ethical, Legal and Social Implications in Genetics and Genomics Over Time [3]	3
PH.550.600	Living Science Ethics - Responsible Conduct of Research (also offered 1st term; take this or Research Ethics and Integrity)	1
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling	4
PH.415.840	SS/R: Genetic Counseling	2
	Credits	**14**
Third Year		
First Term		
PH.415.701	Genetic Counseling Lab I	2
PH.415.710	Medical Genetics and Genomic Medicine: from Diagnosis to Treatment I [5]	2
PH.415.820	Thesis Research: Genetic Counseling	4
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling (can take 4 credits across 2 terms or 8 credits in one term)	4
	Credits	**15**
Second Term		
PH.415.702	Genetic Counseling Lab II	2
PH.415.711	Medical Genetics and Genomic Medicine: from Diagnosis to Treatment II [5]	2
PH.415.820	Thesis Research: Genetic Counseling	4
PH.415.861	Genetic Counseling Seminar: Topics in the Field [2]	2
PH.415.870	Genetic Counseling Clinical Supervision	1
PH.415.851	Supervised Clinical Rotations: Genetic Counseling (can take 4 credits across 2 terms or 8 credits in one term)	4
	Credits	**15**
	Total Credits	**179**

1 Fall semester course offered through the Johns Hopkins School of Education

2 NIH FAES courses also listed at Johns Hopkins

3 Two courses alternate every other year. For the 2022-23 AY, PH 415.624 ETHICAL, LEGAL AND SOCIAL IMPLICATIONS IN GENETICS AND GENOMICS OVER TIME will be taught. It alternates with PH 415.619 NEW GENETIC TECHNOLOGIES AND PUBLIC POLICY.

[4] This non-credit, online mini-course **must** be completed before you can take online courses. You must enroll yourself. The course includes one mandatory LiveTalk session. See https://courseplus.jhsph.edu/core/index.cfm/go/course.home/cid/90/ to enroll.
[5] Precision Health and Precision Oncology (under development) alternate every other year with 415.710/711 Medical Genomics and Genomic Medicine I/II.
[6] For students taking the Counseling Theory course, it will be difficult to take Health Literacy during this term in the first year. Students may alternatively choose to take in the second year.
[7] Enroll in 1-4 of the required half-credit PH classes listed in Year 2, which are offered in terms 1, 2, 3, and (in some cases) 4.

Timetable for Completion of Degree Requirements

Please direct questions regarding the timetable for completion of degree requirements to Office of Records and Registration (JHSPH.Registra@jhu.edu (jhsph.registra@jhu.edu)).

Key Dates	Task/Event
First Year	
Terms 1 and 2	
Before 3rd term registration	**Academic Adviser Meeting**
	Course Selections
	Satisfactory academic progress
Terms 3 and 4	
Before the end of the term	**Academic Adviser Meeting**
	Course Selections
	Satisfactory academic progress
	Discuss potential thesis (Deadline: mid-July, specific aims and progress report due to Executive Committee)
	Discuss thesis advisor choice (choose a second advisor to serve as thesis advisor or use academic advisor in both capacities)
	Discuss summer internship/rotation plans
Second Year	
Term 1	
Before 2nd term registration	**Academic Adviser Meeting**
	Course Selections
	Satisfactory academic progress
	Discuss thesis proposal process
At least twice during the term	**Thesis Adviser Meetings**
	Decide on other thesis committee members
Term 2	
At least twice during the term	**Thesis Adviser Meetings**
	Discuss proposal draft progress (Deadline: **mid-November** (or earlier) Proposal due to the Executive Committee 2-3 weeks before the meeting)
	Thesis Advisor meeting/phone call to discuss strategy for Executive Committee Meeting (Deadline: The day before the Executive Committee meeting)
	Thesis Advisor attends the meeting Executive Committee (Deadline: **late November to early-Dec**)
	Thesis Advisor meeting/phone call to plan for the response to the Executive Committee (Deadline: After the Executive Committee meeting)
Term 3	
At least once during the term	**Thesis Adviser Meetings**
	Discuss proposal revisions (Deadline: by **January 30** submit to IRB)
	Monitor progress toward thesis timeline
Term 4	
Before the end of the term	**Academic Adviser Meeting**
	Course Selections
	Satisfactory academic progress
	Discuss summer internship/rotation/research plans
At least once during the term	**Thesis Adviser Meetings**
	Monitor progress toward thesis timeline (**April 15** deadline to submit revised proposal if needed)
Third Year	
Term 1	
Before 2nd term registration	**Academic Adviser Meeting**
	Course Selections
	Satisfactory academic progress
	Discuss potential career directions
At least once during the term	**Thesis Adviser Meetings**
	Monitor progress toward thesis timeline (Data collection should be completed by the end of the summer at the latest for December conferral)
	Discuss data analysis issues
	Review thesis draft
	Discuss potential thesis readers
	Review student's poster for NHGRI research retreat
Term 2	
At least twice during the term	**Thesis Adviser Meetings**
	Final thesis reader choice (Deadline for December conferral: **October 28** readers' names submitted)
	Review written thesis document (**mid-November** deadline to give final thesis to readers for December conferral)

	December 16 deadline for readers' letters to registrar, if December conferral (February 3 for spring conferral)
	Assist in preparation for final thesis seminar

Degree Program Competencies

All **ScM in Genetic Counseling** students must attain proficiency in these competencies, in addition to the competencies required by the Accreditation Council for Genetic Counseling:

1. Articulate the influences of social context and behavior on health when developing, evaluating and implementing solutions to pressing public health challenges in Baltimore, the United States, and around the globe.
2. Appreciate the interface between genetic counseling and public health and policy
3. Define and describe social, ethical, and legal issues as they pertain to the delivery of genetic services
4. Apply the principles of human genetics to asses disease risk for genetic counseling clients
5. Provide genetic counseling to clients for a variety of different indications
6. Explain methods, indications, and limitations of genetic testing
7. Plan, organize and conduct public and professional education programs in human genetics, patient care, and genetic counseling issues
8. Develop self-awareness and critical assessment of personal strengths/weaknesses that enhance/interfere with providing effective psychotherapy
9. Demonstrate the ability to conduct research into different aspects of genetic counseling

Health, Behavior and Society, PhD

Overview of PhD Program

The PhD program is designed for students seeking training for careers in social and behavioral sciences, health education, and health communication, most often in academic or research settings. The curriculum emphasizes the application of social and behavioral science perspectives to contemporary health problems. The training in this program focuses on the theoretical perspectives and methods of the social and behavioral sciences that enable scholars to understand and influence the social contexts and behaviors relevant to health.

The PhD degree represents outstanding scholarly achievement and the accomplishment of independent research. The University's Doctor of Philosophy Board oversees the granting of all PhD degrees.

The following two areas are examples of significant work in the PhD program:

Social and Psychological Influences on Health

This area focuses on social and psychological factors and processes in the etiology and prevalence of disease, in health care seeking behavior, adaptation and coping, and disease prevention. Students are exposed to current research on contextual factors and their relation to health knowledge, attitudes and beliefs; social and psychological factors in disease etiology; risk reduction; and cultural influences in public health, including cross-cultural studies.

This sociological and psychological conceptualizations of health and illness, theories of stress and coping, and the special problems in the design and measurement of social and psychological variables are emphasized in the training of the PhD student. The interactive and independent roles of psychosocial factors for disease, with a focus on the social context in which illness is defined and treated, are emphasized. Major social structural divisions such as gender, socioeconomic status, and ethnicity are influential in health outcomes. The basic structure and function of health care systems of societies are also considered in their social-political context.

Health Education and Health Communication

Research and practice in this area focus on how principles from educational, behavioral, social, psychological, and communication theory influence health practices and behaviors conducive to optimal health in individuals, groups, and communities. Students are exposed to current research on health education and communication, with a particular focus on ecological models of health, evaluating multi-faceted intervention programs, and patient-provider communication.

Health education and communication programs are laboratories for the study of effective intervention strategies. Students in this area focus on needs assessment, planning, implementation, and evaluation of comprehensive health promotion programs with an eye toward improving both theory and practice. Specific intervention strategies of interest may include individual behavior change strategies based on learning theory and theories of psychosocial dynamics; use of mass media communication; interpersonal communication; mobilization of social and community support; and advocacy. Program implementation issues such as administrative and staff development and support are also considered. Interventions studied include those directed at patients, health care professionals, administrators, legislators, the general public, or combinations of the above.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Our doctoral curriculum is designed to help students master a set of program competencies through corresponding required and recommended courses. Courses listed as required must be taken by all doctoral students. Students should meet with their advisers prior to registering for courses each term to discuss the selection and sequence of HBS recommended courses, as well as courses offered by other departments and divisions appropriate for their individual areas of interest.

Students are expected to take methods courses relevant to the field of their dissertation research. Students who wish to take advanced biostatistics courses (PH.140.651 Methods in Biostatistics I-PH.140.654 Methods in Biostatistics IV) in place of the basic requirements are encouraged to do so, provided they have the necessary background. To register for the advanced series, a working knowledge of calculus and linear algebra is required.

At the end of the first year of coursework, first-year doctoral students take the qualifying exam. This exam tests whether the student has mastered the basic knowledge of the field (as exemplified by the competencies) and whether the student is ready to specialize in a specific area of study.

Students take the Departmental and School-wide Preliminary Oral Examinations in sequence by the end of their third year in the PhD program. In these exams, the goal is for faculty members to examine the student's readiness to conduct independent research. Upon passing, students pursue a research topic under the guidance of an academic adviser and faculty committee. The student's written dissertation is presented in a formal public seminar and then defended at a closed oral examination. Most students complete the PhD within four to five years, and the School requires that students complete within seven years.

Course Requirements - School

The School requires that at least 18 credit units must be satisfactorily completed in formal courses **outside** the student's primary department. Among these 18 credit units, no fewer than three courses (totaling at least 9 credits) must be satisfactorily completed in two or more departments of the Bloomberg School of Public Health. The remaining outside credit units may be earned in any department or division of the University. This requirement is usually satisfied with the biostatistics and epidemiology courses required by the department and taken in Year 1 of the PhD program.

Students who have completed a master's program at the Bloomberg School of Public Health may apply 12 credits from that program toward this School requirement of taking at least 18 credit units outside the department. Contact the HBS Academic Office for further information.

Council on Education in Public Health (CEPH) Requirements

As of 2019-2020, all students matriculating into a graduate program in an accredited school of public health (such as BSPH) are required to take courses that expose them to content that covers 12 'introductory learning objectives' before graduation. For PhD students in HBS, some of these exposures will come through regular program courses, and others will come through ½ credit "Cells to Society" (C2S) online modules developed by the school. The C2S modules will be offered at least twice a year, and will be taken in the first 4 weeks of the term in which they are held. Some courses fulfill more than one learning objective. *These courses need to be successfully completed prior to graduation, and it may be advisable to take some of them in years 2 and 3.* HBS PhD students will fulfill the CEPH requirements by taking the following courses:

1. Explain public health history, philosophy and values: 552.601.81 Foundational Principles of Public Health
2. Identify the core functions of public health and the 10 essential services of public health: 552.601.81 Foundational Principles of Public Health
3. 3a. Explain the role of quantitative methods and sciences in describing and assessing a population's health: 140.621 Statistical Methods in Public Health 3b. Explain the role of qualitative methods and sciences in describing and assessing a population's health: 410.710 Concepts in Qualitative Methods (or another qualitative course of at least 3 credits)
4. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.: 340.721 Epidemiological Inferences in Public Health
5. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program: 340.721 Epidemiological Inferences in Public Health
6. Explain the critical importance of evidence in advancing public health knowledge: 340.721 Epidemiological Inferences in Public Health
7. Explain effects of environmental factors on a population's health: 552.607.81 Essentials of Environmental Health
8. Explain biological and genetic factors that affect a population's health. *Choose 1 of the following*: 552.608.81 Biologic, Genetic, and Infectious Bases of Human Disease, 380.604.01 Life Course Perspectives on Health, 550.631.81 Biological Basis of Public Health
9. Explain behavioral and psychological factors that affect a population's health: 410.650 Persuasive Communication
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities: 410.860 Graduate Seminar in Social and Behavioral Sciences
11. Explain how globalization affects global burdens of disease: 552.611.81 Globalization and Health: A Framework for Analysis
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g. One Health): 552.612.81 Essentials of One Health

Curriculum - Social and Behavioral Sciences

Note: Minimum of 16 credits (including special studies and thesis research) required each term throughout the first 4 years of the PhD program. After Year 4, most students will elect to go part-time, and register for 3 credits per term.

Students must take the free, non-credit mini-course "Introduction to Online Learning (IOL)." Students are now required to take IOL before beginning their first term. See https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH (online-should be automatically enrolled in this course)	
PH.140.621	Statistical Methods in Public Health I	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.410.860	Graduate Seminar in Social and Behavioral Sciences	2
PH.410.863	Doctoral Seminar in Social and Behavioral Research and Practice	1
PH.410.600	Fundamentals of Health, Behavior and Society [1]	4
PH.410.612	Sociological Perspectives on Health	3
	Credits	**19**
Second Term		
PH.140.622	Statistical Methods in Public Health II	4
PH.410.860	Graduate Seminar in Social and Behavioral Sciences	2
PH.410.615	Research Design in the Social and Behavioral Sciences [2]	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
	Credits	**13**

Third Term		
PH.140.623	Statistical Methods in Public Health III	4
PH.410.860	Graduate Seminar in Social and Behavioral Sciences	2
	Credits	**6**
Fourth Term		
PH.140.624	Statistical Methods in Public Health IV	4
PH.410.860	Graduate Seminar in Social and Behavioral Sciences	2
	Credits	**6**
Second Year		
First Term		
PH.410.870	HBS Research and Proposal Writing Process for Doctoral Students I	2
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
	Credits	**5**
Second Term		
PH.410.871	HBS Research and Proposal Writing Process for Doctoral Students II	2
	Credits	**2**
	Total Credits	**51**

[1] Highly recommended for those students with little social and behavioral sciences background. Students should discuss this with their advisors to ensure that they have covered the course content and have met the learning objectives of this course in prior coursework. The course should be taken in 1st term by students who plan to take the course.
Students are required to discuss course selections with their advisors prior to registration. Students not taking PH.410.600 FUNDAMENTALS OF HEALTH, BEHAVIOR AND SOCIETY in 1st term are required to select at least one 1st term HBS course in addition to PH.410.860 GRADUATE SEMINAR IN SOCIAL AND BEHAVIORAL SCIENCES and PH.410.863 DOCTORAL SEMINAR IN SOCIAL AND BEHAVIORAL RESEARCH AND PRACTICE (often this will be Sociological Perspectives/410.612).

[2] Highly recommended for those students with little social and behavioral sciences research background. Students should discuss this with their advisors to ensure that they have covered the course content and have met the learning objectives of this course in prior coursework.

Recommended HBS Courses

Students should discuss the selection and sequence of recommended and other courses relevant to their research interests with their advisers. Students will select some recommended courses in their first year; other courses may be taken in their second and later years of the program. Note methodological training requirements (p. 287) in next section.

The Department offers a flexible PhD curriculum. Students are strongly encouraged to balance breadth and depth, theory, and methodology in pursuing training in the Department. The Department has a broad focus, incorporating health education/health communication as well as social and psychological influences on health.

Students are strongly recommended to take at least 24 credits of taught (non-special studies) HBS classes before they sit for their departmental oral exams. For students with a prior masters in HBS or a BSPH MPH with an SBS concentration, 10 of these credits can be transferred.

HBS courses recommended for doctoral students and offered by term (list does not include required courses noted above):

Code	Title	Credits
Term 1		
PH.410.600	Fundamentals of Health, Behavior and Society	4
PH.410.620	Program Planning for Health Behavior Change	3
PH.410.653	Contemporary Issues in Health Communication	1
PH.410.656	Entertainment Education for Behavior Change and Development	4
PH.410.733	Communication Network Analysis in Public Health Programs	4
PH.410.861	Graduate Seminar in Community-Based Research	1
PH.410.690	Ethnographic Fieldwork	3
Term 2		
PH.550.601	Implementation Research and Practice (extradepartmental)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods	3
PH.340.629	The Epidemiology of LGBTQ Health	3
PH.410.640	Global Tobacco Control	3
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.410.679	Decolonization, Global Communication, and Public Health	3
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3
PH.410.861	Graduate Seminar in Community-Based Research	1
Term 3		
PH.410.654	Health Communication Programs I: Planning and Strategic Design	4
PH.410.613	Psychosocial Factors in Health and Illness	3
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
PH.410.638	Scientific Writing in Health Sciences: Developing A Manuscript for Publication I	3
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy	3
PH.410.721	Translating Research into Public Health Programs and Policy	3
PH.410.752	Children, Media, and Health	3
PH.410.755	Health Communication Programs	4
PH.410.861	Graduate Seminar in Community-Based Research	1
PH.410.712	Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences	3
Term 4		
PH.410.610	Housing Insecurity and Health	3
PH.410.611	Under Pressure: Health, Wealth & Poverty	3
PH.410.620	Program Planning for Health Behavior Change	3
PH.410.625	Injury and Violence Prevention: Behavior Change Strategies	2

PH.410.711	Doctoral Seminar in Mixed Methods for Public Health Research	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs	3
PH.410.640	Global Tobacco Control	3
PH.410.655	Health Communication Programs II: Implementation and Evaluation	4
PH.410.657	Communication Strategies For Sexual Risk Reduction	3
PH.410.660	Latino Health: Measures and Predictors	3
PH.410.663	Media Advocacy and Public Health: Theory and Practice	3
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy	3
PH.410.675	Critical Analysis of Popular Diets and Dietary Supplements	3
PH.410.680	Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions	3
PH.410.617	Foundations of University Teaching and Learning	3
PH.410.639	Scientific Writing in Health Sciences: Developing A Manuscript for Publication II	3
PH.410.722	Translating Research into Public Health Programs II	2
PH.410.861	Graduate Seminar in Community-Based Research	1
PH.410.686	Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction	4

School of Public Health course listings for courses in HBS and other departments: https://www.jhsph.edu/courses/

Students also have the opportunity to take courses in other divisions of the University. Contact Records and Registration regarding interdivisional course registration procedures. https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/interdivisional-registration.html

Additional Requirements in Methodological Training

In addition to the specific required courses listed above, students are required to complete, **prior to their preliminary oral examination**, at least one course in each of four areas of methodological training in the social and behavioral sciences: quantitative methods (QN), qualitative methods (QL), evaluation methodologies (EV), and methods applications specific to the social and behavioral sciences (SBS). These courses should be taken for letter grade and not on a Pass/Fail basis. From the menu of courses listed below, students should carefully choose methods training by considering both their previous training and future research goals. Departmental faculty should be consulted as needed.

One course in each of the four areas is considered the minimum; students are encouraged to build their methodological expertise in all areas relevant to their proposed thesis activities and scientific areas of interest. It is valuable for students to seek both breadth and depth in methods training. Therefore, we strongly recommend that students also elect an area of methodological focus and take multiple courses (3 or more) in this area. We additionally recommend that all students take at least two courses in Qualitative area.

Students who would like to propose taking a methods course not currently listed in lieu of the listed courses may, with their adviser's consent, request such a substitution in writing to the doctoral program director.

Code	Title	Credits
Qualitative (QL) **		
PH.410.690	Ethnographic Fieldwork [1]	3
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences [1]	3
PH.410.712	Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences [1]	3
PH.224.691	Qualitative Data Analysis	3
PH.410.711	Doctoral Seminar in Mixed Methods for Public Health Research [1]	3
Quantitative (QN)		
PH.410.686	Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction [1]	4
PH.410.733	Communication Network Analysis in Public Health Programs [1]	4
PH.140.640	Statistical Methods for Sample Surveys	3
PH.140.641	Survival Analysis	3
PH.140.655	Analysis of Longitudinal Data	4
PH.140.656	Multilevel Statistical Models in Public Health	4
PH.140.762 & PH.140.763	Bayesian Methods I and Bayesian Methods II (every other year)	6
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.380.712	Methods in Analysis of Large Population Surveys	3
Evaluation (EV)		
PH.140.721 & PH.410.722	Probability Theory I and Translating Research into Public Health Programs II [1]	5
PH.300.713	Research and Evaluation Methods for Health Policy	3
PH.380.611	Fundamentals of Program Evaluation	4
PH.380.612	Applications in Program Monitoring and Evaluation	4
SBS Research Approaches (SBS)		
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods [1]	3
PH.221.638	Health Systems Research and Evaluation in Developing Countries	4
PH.340.677	Infectious Disease Dynamics: Theoretical and Computational Approaches	3
PH.340.717	Health Survey Research Methods	4
PH.380.603	Demographic Methods for Public Health	4
PH.380.711	Issues in Survey Research Design	3

** Note: Qualitative Reasoning in Public Health (550.604) cannot count towards fulfilling the qualitative requirements for HBS PhD students

1 HBS faculty instructor

Course/Credit Load

The Department strongly encourages doctoral students to register for fewer than 19 credits (including special studies and thesis research) in any one academic term. While a credit registration of more than 18 credits is possible through the registration system, departmental faculty think that the additional course burden prohibits doctoral students from dedicating the appropriate time needed for the educational activities being undertaken. Any decision to register for more than 18 credits should be carefully considered and discussed with the student's adviser prior to registering. Doctoral students should register for a minimum of 16 credits each term; the maximum number of credits per term is 22.

Satisfactory Academic Progress

Doctoral students in the Department of Health, Behavior, and Society are expected to maintain satisfactory academic standards for the duration of the degree program. In the Department, satisfactory academic progress is defined as follows:

1. A minimum grade point average (GPA) of 3.00. Any doctoral student who does not obtain the minimum 3.00 GPA by the end of the third term during the first year will not be permitted to sit for the written qualifying exams. In this situation, an appropriate course of action will be determined by the Department Chair. If students fall below a 3.0 GPA, they have 2 terms to re-gain at least a 3.0 GPA.
2. All courses required for the program must be taken for a letter grade. All HBS departmental courses must be taken for a letter grade except with prior consent of the adviser. The pass/fail option may only be used for elective courses and only with the consent of the student's adviser.
3. No grades below a "B" in core courses. Any required course (or course taken to fulfill a methodological requirement) for which a grade of C or below is received) must either be retaken, or an alternative mechanism for material mastery must be agreed upon between the PhD program director, the adviser and the student. This should be successfully completed before taking the schoolwide oral exam.
4. All grades will be calculated into the student's GPA.
5. All doctoral students will have their transcript evaluated at the end of their first year. This evaluation will be completed in conjunction with the qualifying exam review process.

Independent Developmental Plans (IDP)

It is now university policy that each Ph.D. student and Post Doctoral Fellow should develop an individual development plan (IDP) in conjunction with their adviser. This is in line with the 2014 NIH notice that strongly encourages the development of an institutional policy on Individual Development Plans for all graduate students and postdoctoral scholars who are supported by NIH funds. Beginning in 2017-2018, all matriculating PhD students must complete an IDP, review it with their adviser and submit a signed IDP form for departmental records on an annual basis.

The IDP is a mechanism for self-reflection as well as a communication and planning tool for the student and their faculty mentor/s. The IDP can be useful to make sure that the student's and the adviser's expectations are clearly outlined and in agreement so that there are no big surprises, particularly at the end of the student's training.

The goal of the IDP and the annual review process is to support the student in their success in the program and in attaining readiness for their intended future career. To this end, the IDP creates a structure for the student to:

1. assess current skills, interests, and strengths;
2. make a plan for developing skills to meet academic and professional goals; and
3. communicate and collaborate with supervisors, advisers, and mentors about evolving goals and related skills.

The onus to engage in the IDP process is on the student, with the support and input of the adviser. Although the IDP is kept on file in the department, it is primarily a document for use by the student. Through the IDP process, it is possible that the student may decide to identify various additional mentors to whom they can go for expertise and advice.

Once an IDP is written, it is expected that it will be revisited and revised by the student and their adviser (and when appropriate, the dissertation committee) on an annual basis, and that this review will be integrated into an annual review process for each student. It is expected that the department will keep a record of this document, and of the process by which it was developed and revised.

There are three aspects of the HBS IDP that will be completed on an annual basis, and **submitted to the Academic Program Administrator by January 15th of each year**. The IDP summary and the signature form will both be kept in the student's departmental file.

1. **Self assessment and goal setting**, primarily accomplished by the student through the completion of one of 2 'self assessment tools'.
   a. The university has developed a template that is available at Provost Annual Discussion and Planning Document (https://provost.jhu.edu/wp-content/uploads/2019/08/Annual-Discussion-and-Planning-Document_pdf-form-1.pdf)
   b. Or, the AAAS IDP tool, which is required for NIH training grants is accessible at the following website: https://myidp.sciencecareers.org (https://myidp.sciencecareers.org/).
2. **Adviser's Response to the plan.** It is required that the adviser be involved in a review and possible refinement of the student's IDP process. In most instances, an adviser's feedback will be provided in the context of an in-person meeting. There may be circumstances where it makes sense to involve other faculty members (such as co-advisers, training program leaders, or members of the thesis committee). There may also be times (such as if remote field work is being undertaken) where review of a plan needs to occur via skype or phone call. In all cases students and advisers should discuss the plan submitted/amended
   a. The student should set up a meeting with their adviser specifically to review the IDP. The IDP should be forwarded to the adviser in advance of this meeting so that the adviser has time to review before the meeting. The student and the adviser should discuss the IDP, and possibly revise (e.g. add goals or members of the mentorship team).
   b. Both student and adviser should sign the signature form. The student must scan this form and send electronic copies of the IDP and the form to **Academic Program Administrator, cc'ing their adviser and the PhD program director.**
3. **Annual Departmental and program feedback to the student**. Written feedback will be provided from the department/program, that evaluates student progress in the program to date and the student's graduation trajectory, and progress towards stated career goals. Departmental feedback should be integrated into the IDP process. **After Year 1, students will receive written departmental feedback before the beginning of the first term of each year**. The goals outlined in the IDP will be reviewed in preparation of this feedback. Other elements of the IDP will not factor into departmental feedback.

Ideas for Items/Topics to Consider in Creation/Review of the IDP

Year 1

1. Career goal for PhD program (long term goals)
2. Coursework plans/goals for Year 1 (other than required courses)
3. Coursework plans/goals before embarking on dissertation
4. Skills assessment (areas of strength and needs for additional training)
5. Goals for establishment of professional identity and network
6. Goals for research opportunities in coming year/entire PhD program
7. Goals for teaching opportunities
8. Goals for practice opportunities
9. Funding targets/opportunities
10. Preparation for qualifying exams

Year 2/3 (before departmental and schoolwide preliminary exams)

1. Achievements/goals met over the past year
2. Challenges faced over the past year
3. Career goal for PhD program (long term goals)
4. Remaining coursework plans/goals (other than required courses)
5. Skills assessment (areas of strength and needs for additional training)
6. Goals for establishment of professional identity and network
7. Goals for research opportunities in coming year/entire PhD program
8. Goals for teaching opportunities
9. Goals for practice opportunities
10. Goals related to identification of dissertation topic/focus
11. Progress on identification of broader mentorship team/committee
12. Progress on preparation of dissertation proposal
13. Funding targets/opportunities

Years 3+ (after preliminary exams)

1. Achievements/goals met over the past year
2. Challenges faced over the past year
3. Career goal for PhD program (long term goals)
4. Dissertation goals for the coming year
5. Planned timeline for program completion and remaining activities and milestones
6. Non-dissertation (research/teaching/practice) goals for remainder of program
7. Skills assessment (areas of strength and needs for additional training)
8. Goals for establishment of professional identity and network
9. Identification of possible career opportunities
10. Funding targets/opportunities

Departmental Qualifying Examination

As stated in the School's Policy and Procedure Memorandum for doctoral degree programs, the examination should constitute a comprehensive inquiry into the student's grasp of the subject matter underlying their discipline. It should explore the student's understanding of scientific principles and methods as well as their substantive knowledge of the major field and related areas.

Doctoral students become eligible for the departmental qualifying examination upon successful completion of the first-year required courses while maintaining the minimum GPA required.

The exam is offered in June and is under the purview of the HBS Exam Committee. Specific details on the nature of the exam and policies related to grading will be distributed well in advance of the exam.

Research Hours

The School requires all doctoral students to engage in research in addition to the research conducted as part of their dissertation, so that they will gain exposure to and experience in different research skills, and approaches. While HBS encourages students to work within the Department, students are free to pursue opportunities of interest throughout the School, University, or off-campus. Research hours can be fulfilled by engaging in either paid or unpaid research tasks.

The research hours can involve participation in any of the following aspects of research, including but not limited to:

- elements of research design (literature review and development of the conceptual framework of a study);
- community development and liaison activities;
- community needs assessment and its related social, epidemiological, behavioral, or political diagnosis;
- development and piloting of health interventions or materials;
- data collection;
- data analysis and interpretation;
- policy analysis;
- literature reviews;
- manuscript preparation;
- grant preparation and any other form of research approved by the adviser.

Students must discuss their plan for fulfilling the research hours requirement with their academic adviser and have the plan approved by their academic adviser prior to engaging in the research tasks. Students are expected to engage in at least two different research tasks, which may be related to a single study or two separate studies. These tasks should reflect different elements of the research design as outlined above. The student must identify a primary mentor to work with for each of the tasks, and this mentor must agree to serve in this capacity by signing the research hours form in advance. Up to 50% of the required hours can be accomplished through off-campus work, as long as the work has been approved by the student's academic adviser. A student's academic adviser can serve as a primary mentor for one but not both of the research tasks. A minimum of 300 hours for total work on research tasks is required, with at least 100 hours on each task.

The research hours should be completed between matriculation and the Departmental preliminary oral exam. Completion of this requirement will be monitored by the Department through submission of the Research Hours Form to the HBS Academic Office. Please contact the Academic Office for the form.

Departmental Preliminary Oral Examination

Students must successfully pass the Departmental preliminary oral examination before taking or scheduling the School-wide preliminary oral exam. The format of the exam is similar to the School-wide preliminary oral exam and is intended to determine if the student is academically prepared to pass the School-wide preliminary oral exam and to carry out independent dissertation research. Students must have successfully completed the departmental qualifying exam before taking the departmental or schoolwide oral exam.

The examination requires the student to prepare a dissertation protocol that will be examined by the committee members before the exam takes place. This protocol should be between 7,000 and 9,000 words (rough guide) and no more than 10,000 words. The proposal should provide the committee with the student's rationale for the proposed study and the research questions to be examined and the approach and methods the student proposes to use.

The departmental preliminary orals committee consists of four faculty members and an alternate. The student's adviser is included in the four committee members. All committee members should have primary appointments in the Department of Health, Behavior, and Society. (An exception is made when the student's adviser has a primary appointment in another department and a joint appointment in HBS.) The senior faculty member from the department who is not the student's adviser will serve as chair of the committee. The exam is closed, with only the committee members and the student in attendance.

The student will coordinate the date of the exam with the exam committee members and <u>will distribute a copy of the research proposal to all committee members at least three weeks before the exam is scheduled to be held</u>. The student is required to complete the Departmental Oral Form, available from the HBS Academic Office. The information required on this form includes the names of the committee members, the title of the research protocol and the date, time, and location of the exam. Committee members will receive formal written notification of the exam date and time by memo.

Immediately following the examination, the committee evaluates the success or failure of the student. One of the following results must be reported to the HBS Academic Program Administrator by the Committee Chair. The two main criteria to determine the outcome of this exam are:

1. The student is academically prepared to pass the School-wide oral examination.
2. The student is academically prepared to carry out their dissertation research.
   Note: The exam is an evaluation of the student's general academic preparation and is not limited to an assessment of the student's proposal or the details of the proposed study.

Based on the above criteria, students can then receive:

1. Unconditional Pass: If the members each vote "unconditional pass" on the first ballot, this result is reported with no further discussion. If one or more members vote "conditional pass" or "fail," then the committee should discuss the specific concerns of those members as discussed below.
2. Conditional Pass: The committee may decide that further evidence of qualifications is necessary and impose a specific condition that the candidate must fulfill within a given period of time. Those who feel the need for a condition or failure must convince the others, or vice versa. The committee should make a concerted effort to reach a consensus. In the case of a conditional pass, the committee will remain appointed until the condition is removed. Terms of the condition and its removal must be reported in writing to the HBS Academic Office. Students will *not* be permitted to sit for the School-wide preliminary oral until the conditions have been removed. It is recommended that conditions are met within six months unless otherwise recommended by the examination committee.
3. Failure: If a majority of the committee decides that the candidate has failed the exam, the committee must recommend a future course of action. A student will be permitted to retake the exam only once. The committee may recommend one of the following:
   a. Reexamination by the same Committee
   b. Reexamination by a new committee.

HBS Guidelines for the Dissertation Proposal

Research Plan: The student must provide a narrative project description which contains a detailed discussion of the following specific points.

1. An introduction which describes the public health problem and brief overview of the sample, aims/research questions, and public health significance.
2. A literature review which describes the supporting literature and a synthesis of the themes, gaps, and weaknesses in the literature related to the social and behavioral aspects of the proposed project.
3. A conceptual framework and theoretical foundations discussion.
4. The methodology section will discuss sampling, recruitment, data collection procedures, measures, analysis, and steps that will be taken to protect human subjects as appropriate.
5. The strengths and limitations of the proposed project.
6. Timeline for completion of the proposed study.
7. Other pertinent
   information deemed appropriate by the student and their adviser such facilities and resources, timeline, etc.

School-wide Preliminary Oral Examination

The School-wide preliminary oral examination takes place after the student has successfully completed the departmental qualifying examination and the departmental preliminary oral examination and completed PH.550.600 LIVING SCIENCE ETHICS - RESPONSIBLE CONDUCT OF RESEARCH **(it is only offered in 1st term)**. You will not be approved to complete the school-wide exam if you have not taken this course. The purpose of this examination, as stated in the School's Policy and Procedure Memorandum (PPM), is to determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest. Specifically, the examiners will be concerned with the student's:

- capacity of logical thinking;
- breadth of knowledge in relevant areas;
- ability to develop and conduct research leading to a completed dissertation.

Discussion of a specific research proposal, if available, may serve as a vehicle for determining the student's general knowledge and research capacity. However, this examination is not intended to be a defense of a specific research proposal.

It is a School requirement that the School-wide preliminary oral exam be taken by the end of the student's third year in residence and before significant engagement in their own research. <u>Note: The school has placed a time limit of three years between matriculation into a degree program and successful completion of the preliminary oral exam.</u> Students are encouraged to keep this time limit in mind when planning their academic schedule.

All requests for extensions beyond the stated time periods to take and pass the School-wide Preliminary Oral Examination or to complete the doctoral degree requirements must be approved by the Committee on Academic Standards. School policy regarding extension requests:

https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/AcademicInformation/Pages/default.aspx Contact the Academic Administrator for the most up-to-date information on extension policies.

The School-wide preliminary oral examination must be scheduled at least one month in advance by submission of a preliminary oral examination form to the Academic Program Administrator. Instructions on scheduling the examination and information on committee composition are available are available on the Records and Registration web site: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx

After successful completion of School-wide preliminary oral exam, students register for 16 credits of PH.410.820 THESIS RESEARCH IN HEALTH BEHAVIOR AND SOCIETY **each term (or a combination of Thesis Research and other courses totaling at least 16 credits) until completion of all degree requirements.**

Dissertation Advisory Committee

The progress of each doctoral student is followed regularly, at least once a year, by a committee consisting of the dissertation adviser and two to four other faculty members. Other committee members can come from either inside and/or outside the student's department. The student and their adviser, with the consent of the Department chair, decide on the composition of this committee. The objective of the Dissertation Advisory Committee is to provide continuity in the evaluation of the student's progress during the dissertation phase of the student's training. Students should form their advisory committees and obtain IRB approval soon after passing their preliminary oral exams and well before the Office of Graduate Education and Research deadline.

Each month, the Office of Graduate Education and Research will generate a report of the students who passed their Preliminary Oral Exam within the past three months. (Students receiving a conditional pass must meet the conditions before this contact is initiated.) An e-mail and "Dissertation Research Documentation Form" will be sent to the student and copied to the student's Dissertation A (as identified on the Preliminary Oral Exam Committee) and the Academic Program Administrator. The form is to be completed and returned within three months of contact (or six months past preliminary oral exam date) to the Office of Graduate Education and Research for tracking and inclusion in the student's academic file. A copy is kept in the HBS Academic Office. This documentation will then be attached to the combined Appointment of Dissertation Readers' and Final Oral Exam Committee Composition form in order to obtain final signatory approval from the Sr. Associate Dean for Academic Affairs.

As noted in the "Milestones" table of this handbook, students should schedule meetings with their advisers at least once per term to review their dissertation progress. Students should also plan to meet at least once per year with their Dissertation Advisory Committee and provide this committee with a written progress report and a copy of the "HBS Doctoral Dissertation Progress Evaluation Form" (available from the HBS Academic Program Administrator) to be completed by the student's adviser, attached to the progress report, and submitted to the HBS Academic Administrator for the student's file. The first progress report and evaluation form should be completed by one year from the date the "Dissertation Research Documentation Form" was submitted.

Completion of this requirement each year will be monitored by the student's adviser and the Academic Program Administrator.

Dissertation Guidelines

All doctoral students must complete an original investigation presented in the form of a dissertation. The dissertation must be based on original research, worthy of publication, and acceptable to the Department of Health, Behavior, and Society and to a committee of dissertation readers. During the student's application process, various research ideas may have been discussed with faculty members. However, each student's dissertation proposal must be developed, reviewed, and found acceptable to departmental faculty <u>while the candidate has been enrolled as a doctoral student</u>.

The traditional doctoral dissertation consists of a statement of the problem and specific aims; a literature review; data and research methods; analyses and results; and a discussion of findings and their implications. The form these take will reflect the specific academic discipline or orientation guiding the student's research. Doctoral students also have the option of a manuscript-oriented dissertation as an alternative to the traditional dissertation. See the "Dissertation Policy for HBS Doctoral Students" at the end of this section for more information on manuscript formats.

Students should discuss the advantages and disadvantages of each option with their adviser before deciding on a dissertation strategy.

Completion of a satisfactory investigation in the principal subject and its presentation in the form of a dissertation, approved by a committee of the faculty, is the next step toward the doctoral degree. The material contained in the dissertation should be worthy of publication in a scientific journal in the field involved. To establish this committee, the student and adviser recommend four faculty members to serve as dissertation readers. These faculty members, one of whom is the dissertation adviser, should hold an appointment as Assistant Professor or higher and represent at least three departments of the University and at least two departments of the School of Public Health. One member must hold the rank of Associate Professor or Full Professor and not hold a joint appointment in the student's department. This individual will serve as the Chair of the Final Oral Examination Committee. One adjunct or one scientist faculty member may serve on the Committee, but not both. All faculty members must serve as Dissertation Readers representing the department of their primary faculty appointment.

The committee of readers may be increased to five members provided the conditions stated above are satisfied for four readers. If a fifth member was approved to serve as a Dissertation Reader, that individual does not have voting privileges on the Final Examination Committee.

Oral Defense of Dissertation

The oral defense of the dissertation by the candidate before a committee of the faculty is the final step for the doctoral degree candidate. Instruction and forms for the appointment of dissertation readers and scheduling the final oral exam can be accessed at https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx.

Records and Registration requires that the "Appointment of Dissertation Readers & Final Oral Examination Committee" form be submitted at least one month in advance of the proposed date.

The completed form must be submitted to the HBS Academic Program Administrator for review. The Academic Program Administrator will obtain the Department Chair's signature and forward the form to Records and Registration. **Committee members should be given at least 30 days to properly read the dissertation before the defense, and the "Dissertation/Dissertation Approval Form," signed by the adviser, should be included**

with the dissertation copies. The adviser should consult with committee members at least two weeks prior to the exam date to ensure that the student is ready to proceed with the exam.

Students must be continuously registered up to and including their term of completion. A doctoral student is not considered complete at the time they pass their final defense. Note that students must be registered in the term of their final oral exam. Doctoral students who schedule their exams after the end of 4th term must register for summer term. They then have until the end of the add/drop period of the following term to complete all requirements. Students are considered complete:

1. when copies of their acceptance letters from the Examining Committee Chair and Dissertation Adviser are on file in the Office of Records & Registration;
2. the dissertation is submitted electronically to The Milton S. Eisenhower Library; and
3. a pdf copy of the dissertation and a dissertation form submitted to the academic administrator once approved by the library.

Students should be sure to check both graduation and registration deadlines with the Academic Program Administrator well in advance.

Public Seminar

As a culminating experience, all doctoral students are required by the School to present a formal, public seminar. A room that holds no less than 25 people should be reserved for the public seminar. A three-hour period should be allowed for the final oral examination, consisting of the public seminar and session with the examination committee. It will begin with an approximately 45 minute public seminar followed by 15 minutes of Q&A with the audience. This will be immediately followed by the closed portion of the examination, which is closed to all except the doctoral candidate and the examination committee. Records and Registration posts the seminar announcement to the School's events calendar.

Dissertation Policy for HBS Doctoral Students

Students in HBS have the choice of completing a "traditional" doctoral dissertation or a manuscript-oriented dissertation. Ideally, this decision should be made by the time the student undergoes the departmental preliminary oral examination. There are advantages and disadvantages to each option which should be carefully discussed with the student's adviser.

Each of these options is described briefly below.

The traditional doctoral dissertation generally consists of an abstract, five chapters, references, and any appendices. The outline of chapters below is merely a guide. The pages numbers are rough estimates, and the form of the chapters will vary, reflecting the academic discipline or orientation of the student's research.

> **Abstract:** The abstract is a short overall summary of the work. It lays out the purpose(s) and aims of the study, the methods, and the key results and implications. The abstract generally is 2-3 double spaced pages.
>
> **Chapter 1: Introduction: Statement of the Problem and Specific Aims.** This chapter, which tends to be relatively short (5-6 double spaced pages), provides an introduction to the dissertation. It describes briefly why this work was undertaken, what background conditions or data suggested it was an important problem, and what, then, this project was intended to accomplish.
>
> **Chapter 2: Literature Review.** The literature review summarizes existing literature that informed the dissertation research. It generally is organized topically. The literature review tends to be a fairly detailed review, particularly for those topics most directly related to the content and methods of the dissertation. The literature review tends to be 30-60 pages in length.
>
> **Chapter 3: Methods.** The content of the methods chapter varies tremendously with the methodological approach taken by the student for the dissertation research. With traditional empirical studies, it will generally include the specific aims, research questions, and/or hypothesis; a description of the source of study data, a description of the study instrument and its development, if relevant; a description of secondary data obtained, if relevant; analytic methods, including data cleaning, creation of a data set, creation of variables and/or qualitative codes, types of analyses done, and human subjects issues. The methods chapter ranges from 20-40 pages.
>
> **Chapter 4: Results.** The results chapter reports the main findings of the dissertation. It often is organized by research question or specific aim or hypothesis, but need not necessarily follow this format. The results chapter ranges from 25-50 pages.
>
> **Chapter 5: Discussion of Results and Policy Implications.** The discussion chapter both summarizes key findings and discusses findings in light of existing literature and in light of their policy implications. Also included generally are a description of the study's limitations and implications for future research. The Discussion chapter is generally 25-50 pages.
>
> **References:** A listing of all citations used for the dissertation must be provided. The Department allows any standard format for references.
>
> **Appendices:** Appendices can be used for many purposes. They can include study instruments, if relevant; they can include additional tables not included in the main body of the dissertation; also to be included must be a copy of the student's CV. The traditional dissertation should be able to "stand alone" without appendices, however, so results should never be put in appendices that are key to the study's main findings.

All components of the traditional dissertation will be judged by the committee to be one of the following: Acceptable, Acceptable with Revisions, or Unacceptable. Students, with guidance from their adviser, will rework their dissertation until all components are judged acceptable.

The manuscript dissertation consists of the following:

- A total of three (or more) papers, linked to the student's dissertation topic. One of these papers may be the literature review, provided it is a comprehensive critical review, suitable for publication.
  If one of the three papers is not a literature review, the dissertation must still contain a chapter that critically surveys the literature.
- A chapter which integrates and discusses the findings reported in the manuscripts. It should include a discussion of the conclusions of the research, and it should make recommendations for further studies.
- An appendix outlining in detail the study methods and any accompanying data tables necessary to fully understand the data.

A manuscript-oriented dissertation must also meet the following criteria:

- The doctoral student must be the first author on the three manuscripts used to satisfy this requirement.
- No manuscript will be accepted as part of the dissertation if it was submitted for publication before the student passes the School-wide preliminary oral exam.

As is true for the traditional doctoral dissertation, all components of the manuscript-oriented dissertation, will be judged to be one of the following: Acceptable, Acceptable with Revisions, or Unacceptable. Students, with guidance from their adviser, will rework their dissertation until all components are judged acceptable.

Role of Faculty Adviser in Relation to the Dissertation:

The adviser's role is to facilitate successful completion of the doctoral dissertation. The type of assistance provided should be tailored to the individual student's needs. Both the traditional dissertation and the manuscript-oriented dissertation must reflect work that is the student's independent and original work. The adviser, then, can and should provide ongoing and critical feedback, but the research must be that of the student.

Maintaining this balance may be particularly challenging for manuscript-oriented theses. Even if the adviser (or another committee member) will be a co-author on a manuscript, the manuscripts must be viewed first and foremost as fulfilling the student's needs in the dissertation process, with publication as a secondary goal. Advisers or other committee members who are co-authors may not undertake the first draft of any portions of the manuscripts nor substantial re-writes. Whether an adviser will be a co-author on any manuscript should be decided early in the dissertation process.

Link to Thesis guidelines and deadlines (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx)

Link to School PPM on PhD Degree (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_042522.pdf)

Career Development Resources for PhD Students

The BSPH Career Services Office provides a variety of assistance including individual career coaching, a university wide job and employer database (http://jhu.joinhandshake.com/), career development workshops and events (https://www.jhsph.edu/offices-and-services/career-services/events/), a list of career resources (https://www.jhsph.edu/offices-and-services/career-services/for-students/career-resources/), and an annual career fair (https://www.jhsph.edu/offices-and-services/career-services/events/career-fair/). More information is available here: https://www.jhsph.edu/offices-and-services/career-services/for-students/

The Professional Development and Career Office (PDCO) provides professional development training and career services to support PhD students and Postdoctoral Scholars in designing their life. The PDCO supports academic careers by providing grant writing workshops, teaching opportunities at local undergraduate institutions and through an annual academic job search series. It also supports career exploration outside the academy by hosting alumni career panels, organizing an alumni mentorship program, running leadership workshops and by offering paid internships in science policy, consulting, business development, etc. PDCO staff can also meet with PhD students or post-doctoral fellows one on one to meet their specific career goals. The PDCO services are outlined here: https://pdco.med.jhmi.edu. They also send monthly emails that list events for PhDs happening across the university (sent through the doctoral student listserv).

Milestones for the PhD Program

Key Dates	Task/Event
First Year	
Term 1	
Before 1st term registration	Introductory Advisor Meeting
	Course selections – Discussion of required and highly recommended courses, courses in area of interest, and special studies.
	Identify professional and educational goals. Review deadlines. Review the Individual Development Plan Procedures
Term 2	
Before 2nd term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
	Discuss research plans. Identify faculty resources.
	Discuss the individual Development Plan (IDP)
Term 3	
Before 3rd term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
	Submit IDP to Academic Coordinator
Term 4	
Before 4th term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
By end of first year	Residency requirement met
	Student has discussed research hours requirement with advisor
	Departmental qualifying exam in June
Second Year	
Term 1	
Before 1st term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
	Discuss possible composition of oral exam committees.
	Review IDP and procedures
Term 2	
Before 2nd term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
Term 3	
Before 3rd term registration	Before 3rd term registration
	Course selections

	Satisfactory academic progress
	If student plans to take oral exam in 2nd year, committee members should be identified by 3rd term.
	Submit CV and IDP to academic coordinator
Term 4	
Before 4th term registration	Advisor Meeting
	Course selections
	Satisfactory academic progress
Third Year	
Terms 1-4	
Before registration each term	Advisor Meeting
	After successful completion of school preliminary oral exam, student registers for PH.410.820 Thesis Research each term until completion of all degree requirements (see timetable at end of student handbook).
Prior to prelim exams	Research Hours form has been completed by student, signed by advisor, and submitted to Academic Office.
By 3 years from matriculation date	Successful completion of departmental and school preliminary oral examinations
Within 3 months of successful completion of school prelim oral exam	Student has identified a dissertation advisory committee and submitted the School's Thesis Research Documentation form to HBS Academic Office
	Review IDP
	Submit CV to Academic Coordinator
Fourth Year	
Terms 1-4	
At least once per term	Advisor Meetings to review thesis progress
Annually, post prelim oral exam	Dissertation Advisory Committee meets to evaluate progress and submits evaluation to HBS Academic Office
	Ensure that students who have an interest in an academic career have had some teaching experience as TA or the opportunity to apply for a Dean's Teaching Fellowship.
	Review IDP
	Submit CV to Academic Coordinator

Timetable for Completion of Degree Requirements

Please direct questions regarding the timetable for completion of degree requirements to the Office of Records & Registration (JHSPH.Registra@jhu.edu).

Advising

All students are assigned a faculty adviser at the time of admission to the program. Adviser assignments are based, in part, on compatibility of the student and faculty research or practice interests. Advisers play an important role in the student's academic life. The adviser is expected to keep abreast of school and depart- mental degree requirements so that they can counsel students on courses and the proper progression towards the degree. Students should consult with their advisers prior to registering for courses each term. In addition, any special requests or petitions that a student submits to any of the administrative offices of the School will require the endorsement of the student's adviser as well as that of the department chair.

As students move through their degree programs, they may elect to choose a different adviser, depending on their chosen area of concentration and the dissertation topic selected, or for other reasons. In that event, the student should contact the preferred faculty member to determine if that person is able to assume responsibility as the student's adviser. If so, the student should notify the department in writing of an adviser change, obtaining the signatures of the prior adviser and the new adviser, and submit the signed notification to their respective program director for approval. Once approved, notify the Academic Program Administrator so that they change may be processed.

Each student is required to meet with their adviser at least once per academic term to discuss academic progress, to plan for fulfillment of degree requirements, and to review and modify course selection plans for the next term. These meetings are formally scheduled before each major registration period. HBS students are responsible for scheduling these meetings with their advisers. The Academic Program Administrator works closely with the faculty advisers and also provides guidance to students with the School and departmental academic policies and procedures.

- Students are expected to engage in pre-planning for these meetings.
- Both advisers and students should be aware of and understand curriculum policies and procedures.
- Students and advisers should identify future professional career goals and interests.
- The adviser and student should review the student's tentative curriculum and course schedule, and alternatives should be identified.
- Any major issues or questions about academic programs and non-academic problems should be identified and discussed.
- The academic program administrator, the student, and the adviser should be aware of the administrative policies and procedures affecting payment of tuition and fees, academic eligibility for scholarships, loans, and college work-study support. The academic program administrator, working with the student and adviser, can help clarify and identify funding opportunities as well as provide guidance regarding academic policies and procedures.
- See below for more details about roles and responsibilities of doctoral students and advisers.

The Doctoral Program Director and the Academic Program Administrator are also available as resources within the department for students who have questions or concerns related to their academic advisers. The Program Director may be able to assist with mediation, coaching, facilitating co-mentoring, or switching advisers as needed. If these individuals are not available, the Vice Chair for Pedagogy and Academic Affairs is available to serve in this role.

Satisfactory Academic Progress

Doctoral students in the Department of Health, Behavior and Society are expected to maintain satisfactory academic standards for the duration of the degree program. Satisfactory academic progress is defined as follows:

1. A minimum grade point average (GPA) of 3.00. Any doctoral student who does not obtain the minimum 3.00 GPA by the end of the third term during the first year will not be permitted to sit for the written qualifying exams. In this situation, an appropriate course of action will be determined by the Department chair. If students fall below a 3.0 GPA, they have 2 terms to re-gain at least a 3.0 GPA.

2. All courses required for the program must be taken for a letter grade. All HBS departmental courses must be taken for a letter grade except with prior consent of the adviser. The pass/fail option may only be used for elective courses and only with the consent of the student's adviser.

3. No grades below a "B" in required courses. Any required course (or course taken to fulfill a methodological requirement) for which a grade of C or below is received) must either be retaken, or an alternative mechanism for material mastery must be agreed upon between the PhD program director, the adviser and the student. This should be successfully completed before taking the school-wide oral exam.

4. All grades taken for a grade will be calculated into the student's GPA.

5. All doctoral students will have their transcript evaluated at the end of their first year. This evaluation will be completed in conjunction with the qualifying exam review process.

HBS IRB Approval

When developing a research study using human data or biospecimens, students must consider whether the activity will qualify as human subjects research requiring IRB review and oversight. The BSPH IRB office is charged with making sure that research studies involving human subjects comply with federal, state, and local law, as well as institutional policy. All student-initiated projects involving human data/biospecimens must have a preliminary review by the IRB Office to determine whether they require IRB oversight, unless the BSPH PI is adding you as a student investigator to an existing, BSPH IRB-approved study.

All student studies involving data about humans or biospecimens should be submitted to the IRB either through the PHIRST system or via a preliminary Determination Form (using the New Data Collection/Secondary Data Analysis https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/student-research/irb-office-preliminary-determinations-for-mph-and-other-degree-students. (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/student-research/irb-office-preliminary-determinations-for-mph-and-other-degree-students/))

A faculty member must serve as the Principal Investigator for all student research projects. The IRB website includes extensive FAQs about general IRB topics, using the electronic application system (PHIRST), completing the CITI human subjects research training, and student research. If there are further questions, contact the IRB Office (JHSPH.irboffice@jhu.edu) and make an appointment to review any questions with the IRB Navigator (IRBNav@jhu.edu) or an IRB Analyst. More information about student projects is available on our Student Research page: http://www.jhsph.edu/offices-and-services/institutional-review-board/student-projects/ (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/student-research/) which includes a Student Primer and Frequently Asked Questions.

Students should review this primer carefully and discuss the issues as they relate to the proposed project with their advisers as a first step in understanding the process and evaluating whether the proposed study will involve human subjects research.

HBS Extension Request for Completion of Degree Requirements

The School's PPM governing the PhD program requires students to defend their thesis within seven years of matriculation. Failure to meet this deadline necessitates the submission of an extension request by the student to both the Department and the School before they are permitted to continue in the program.

A request for an extension of time to complete the degree must be submitted at least two months prior to the conclusion of the 7th year in the program and may not exceed four terms.

The request is first submitted to your HBS adviser for review, and if approved, is forwarded to the Student Matters Subcommittee of the School's Committee on Academic Standards (CAS). All requests must include the following information or will not be considered:

- A letter of request, initiated and signed by the student, stating the rationale for the request
- A supporting letter signed by the adviser
- Timetable and plan developed by the student in collaboration with the student's adviser and members of the thesis advisory committee that provide specific milestones from completion; agreement to this plan should be indicated in writing by member(s) of the thesis advisory committee
- A (student) copy of the current transcript
- If the HBS adviser approves the request, a supporting letter from the Department will be included in the request that is forwarded to the school for final approval.

Policy on Mentoring Commitments for PhD Students and Faculty Advisers

Johns Hopkins University has a commitment to quality mentoring of PhD students, in support of the mission of excellence in PhD education at Johns Hopkins. As such, the university requires every PhD-granting school to undertake ALL of the following:

1. Distribute "JHU Mentorship Commitments of Faculty Advisers and PhD Students" to all PhD students and all PhD-advising faculty at least annually;
2. Identify when and by whom (role) the "JHU Mentorship Commitments of Faculty Advisers and PhD Students" will be distributed annually to students and to faculty advisers;
3. Ensure that the "JHU Mentorship Commitments of Faculty Advisers and PhD Students" are included in student handbooks
4. Ensure that the "JHU Mentorship Commitments of Faculty Advisers and PhD Students" are included in both new student orientation and new faculty orientation materials and/or sessions;
5. Identify a point person within each PhD program or department, as well as at the school level, to whom students can go if they have questions or concerns related to their own PhD adviser. This should include:

a. A description of how it is communicated to students that they may go to this named person with questions or concerns about advising;
b. A description of the functions the person may perform to assist with the advising situation (e.g., mediation, coaching, training, co-mentoring, switching advisers).
c. A description of the back-up procedure should the primary person be involved in the situation themselves or be temporarily unavailable.

In addition, it is the responsibility of the school's dean's office to ensure, either within the school as a whole or within each PhD program (or through a combination thereof), that at least two strategies (e.g., from list below, or others) will be used to enhance and support a good mentoring environment. Examples of mentoring supports are listed below. Additional supports, and additional innovative ideas to support good mentoring, are encouraged.

1. Dean's or chair's communication about the importance of good PhD advising and mentoring with supporting description of where to go with any concerns;

2. Workshops, lunches, or discussions about PhD mentoring (could include external guests with experience with mentoring, case discussions among faculty, best practice discussions, discussions of hard cases, etc.);

3. Mentoring awards:

- Smaller vs. larger number given annually within a school
- With or without financial award
- High visibility and celebration around awardees

4. Training on how to be a great mentor:

- Length, format, target audience, topics, etc. to be determined by program and/or school

5. Robust thesis committee structure

- Required 1-2x annually
- Goal: Broader intellectual input to student's work; also can diffuse singular power of mentor
- May choose to allow time in each meeting when i) the adviser leaves the room; and ii) the student leaves the room.
- Letter generated after meeting with consensus of where things stand and goals for upcoming year. Distributed to student and all committee members

6. Mechanism to provide feedback on adviser's and student's adherence to commitments:

- Option: More formal survey/evaluation of each commitment
  - Returned to adviser/student?
  - Collected by program head or department chair?
  - Collected centrally by an institutional research office within school?
- Option: Ask student to identify three mentoring commitments the adviser is meeting the best and three commitments to work on for coming year. Faculty adviser does same for student.
- Option: Adviser asks student: "What is the one thing I should work on in the coming year?" Student asks adviser the same.

7. Mentoring mavens

- Each school identifies a few highly-effective faculty mentors to be master mentors, able to chat with or coach others, able to counsel students, able to serve on panels providing tips for good mentoring; also serves as important recognition

8. Any other strategy suggested by the program or school that is also designed to support a culture of excellence in mentoring

JHU Mentorship Commitments of Faculty Advisers and PhD Students

This document outlines mentoring expectations of faculty advisers and of PhD students at Johns Hopkins University. These expectations should be discussed together.

Faculty advisers should commit to the following responsibilities:

Training:

- The PhD adviser has the responsibility to mentor the PhD student. This responsibility includes committing to the training of their PhD student, building on the PhD student's individual professional background and in support of their individual professional aspirations.
- The PhD adviser has the responsibility to participate in ongoing and regular meetings with their advisees to discuss academic and research progress. The adviser and student should agree on expected frequency of and preparation for meetings and use meetings to brainstorm ideas, troubleshoot challenges, and outline next steps. The adviser should identify a co-adviser/mentor should the primary adviser be unavailable for an extended period (sabbatical, leave, etc.).
- The PhD adviser has the responsibility to participate in a formal annual meeting with the student to discuss academic progress and next steps in the academic program. This responsibility includes helping to ensure that the document summarizing this annual discussion is completed and submitted in accordance with program requirements.
- The PhD adviser has the responsibility to encourage their advisees to reach out, as relevant, to additional co-advisers or informal mentors.
- The PhD adviser has the responsibility clarify the student's funding package and to clarify any work and/or teaching expectations associate with the package.
- The PhD adviser has the responsibility to contribute to a training environment that fosters independent, scholarly research, and professional growth.

Research

- The PhD adviser has the responsibility to provide guidance in scholarly research. This responsibility includes helping to identify a workable research project and helping to set reasonable goals and timelines for research completion. The adviser should encourage the student to expand their skill sets and share ideas with others at Johns Hopkins and externally.
- The PhD adviser has the responsibility to monitor research progress. The adviser should encourage effective use of time. The adviser should meet regularly with the PhD student to hear updates on progress, results, and challenges in activities and research.

Professional development:

- The PhD adviser has the responsibility to discuss career development with the PhD student, including in any number of sectors of interest to the student. PhD advisers should assist in identifying resources to further the student's professional goals.
- The PhD adviser has the responsibility to participate in a formal annual meeting with the PhD student to discuss professional development goals. The adviser should help to ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.
- The PhD adviser has the responsibility to nominate the student for relevant professional opportunities and try to connect their advisees to relevant professional contacts and networks.
- The PhD adviser has the responsibility to allow time outside of research for student engagement in professional development activities including, for example, skill building workshops, professional conferences, additional research collaborations, or other informational sessions.

Respectful engagement and well-being:

- The PhD adviser has the responsibility to treat their advisees, other students, and colleagues with respect at all times.
- The PhD adviser has the responsibility to commit to being available to meet with the PhD student. The adviser and the student should agree on expected frequency of and preparation for meetings, and expected time frame for responding to emails and for providing feedback on work products. The PhD adviser should give their full attention during meetings and should reach out to PhD students who are not making contact.
- The PhD adviser has the responsibility to provide support during both successful and discouraging periods of training.
- The PhD adviser has the responsibility to communicate in a respectful and constructive manner, including if the adviser has concerns that the PhD student is not meeting the expectations outlined in this document. This responsibility includes using concrete and specific language when providing suggestions or critiquing work.
- The PhD adviser has the responsibility to take an interest in the student's well-being, to listen to any concerns, and to connect the student, as appropriate, with additional resources.

Policies:

- The PhD adviser has the responsibility to become familiar with and respect University, school, and program policies for PhD students. The adviser will acknowledge all PhD student benefits and entitlements, including, as relevant, paid and unpaid leave.
- The PhD adviser has the responsibility to discuss with the student relevant policies, commitments, and expectations related to funding, work, research assistantships, teaching assistantships, sick leave, or vacation.

Responsible conduct:

- The PhD adviser has the responsibility to become familiar with university and professional codes of responsible conduct for PhD students. This responsibility includes reporting any possible violations as required to relevant parties, including to the relevant Dean's office and to the Office of Institutional Equity.
- The PhD adviser has the responsibility to discuss and help clarify authorship or intellectual property issues and appropriately recognize the student's contributions to any collaborative work.
- The PhD adviser has the responsibility to model professional behavior in both interpersonal interactions and in scholarly integrity.
- The PhD adviser has the responsibility to complete Title IX Training regarding sexual misconduct and sexual harassment as required by the University. http://oie.jhu.edu/training/

Continuous quality improvement as an adviser:

- The PhD adviser has the responsibility to participate in mentor training and best practices discussions. This responsibility includes striving to be a better mentor and to learn tips and practices that improve their work and skills as an adviser.
- The PhD adviser has the responsibility to ask advisees for constructive feedback on mentoring. This responsibility includes doing their best to respond professionally to these suggestions and consider whether or how best to incorporate them into their mentoring interactions.

PhD students should commit to the following responsibilities:

Training:

- The PhD student has the primary responsibility for the successful completion of their degree.
- The PhD student has the responsibility to familiarize themselves with academic milestones and to strive to meet all milestones within the expected timeframe.
- The PhD student has the responsibility to meet regularly with the PhD adviser. This responsibility includes providing the adviser with updates on the progress, outcomes, and challenges in coursework, research, and academic or professional activities. The adviser and the student should agree on expected frequency of and preparation for meetings, and will use meetings to brainstorm ideas, troubleshoot challenges, and outline expectations for work and timelines.
- The PhD student has the responsibility to participate in a formal annual meeting with the adviser to discuss academic progress and next steps in the academic program. The student should ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.
- The PhD student has the responsibility to seek additional mentors to expand their training experience, as appropriate.
- The PhD student has the responsibility to understand their funding package and to clarify any work and/or teaching expectations in line with this funding.

Research:

- The PhD student has the responsibility to work with the adviser to develop a thesis/dissertation project. This responsibility includes establishing a timeline for each phase of work and striving to meet established deadlines.
- The PhD student has the responsibility to seek guidance from their adviser, while also aspiring increasingly for independence.
- The PhD student has the responsibility to engage in activities beyond their primary research responsibilities. The student should attend and participate in any research-related meetings and seminars relevant to their training area.

Professional development:

- The PhD student has the primary responsibility to identify their professional goals and to develop their career plan following completion of the PhD degree. This responsibility includes familiarizing themselves with professional development opportunities within Johns Hopkins and externally. Students should identify specific activities to pursue that will advance their professional development and networking.

- The PhD student has the responsibility to prepare a Professional Development Plan annually that outlines their research and career objectives. This responsibility includes discussing this plan annually with the adviser. The student should ensure that the document summarizing this discussion is completed and submitted in accordance with program requirements.

Respectful engagement and well-being:

- The PhD student has the responsibility to treat the adviser, other mentors, and colleagues with respect at all times.
- The PhD student has the responsibility to make themselves available, within reason, to meet with the adviser upon request.
- The PhD student has the responsibility to communicate in a respectful and constructive manner if they have concerns that the adviser is not meeting the expectations outlined in this document.
- The PhD student has the responsibility to be open to constructive criticism by the adviser, other mentors, and colleagues.
- The PhD student has the responsibility, as possible, for their well-being, should consider discussing any concerns with the adviser or other mentor(s), and should connect with available resources when needed.

Policies:

- The PhD student has the responsibility to familiarize themselves and comply with University, school, and program-specific policies and requirements for PhD students.
- The PhD student has the responsibility to discuss with the adviser relevant policies, commitments, and expectations related to funding, work, research assistantships, teaching assistantships, sick leave, or vacation. As needed, the student will provide any documentation relevant to stated policies on leave and other requirements to the student's program, school, or the University.

Responsible conduct:

- The PhD student has the responsibility to conduct themselves in a responsible and ethical manner at all times.
- The PhD student has the responsibility to familiarize themselves with University codes of responsible conduct for PhD students.
- The PhD student has the responsibility to engage in responsible research conduct. This responsibility includes completing the responsible conduct of research training requirements of their specific school and program, and any specific discipline training requirements (e.g., animal and human subject work). The student will maintain accurate and contemporaneous records of research activities in accordance with the norms of best practices in their own discipline. The student should discuss authorship and intellectual property issues with the adviser.
- The PhD student has the responsibility to complete Title IX Training regarding sexual misconduct and sexual harassment as required by the University. http://oie.jhu.edu/training/

Our curriculum is designed to help students master the following competencies:

- Analyze and theorize the influences of social context and behavior on health with the aim of developing, evaluating, and implementing solutions to pressing public health challenges in Baltimore, the United States and around the world
- Apply, develop and critically evaluate interdisciplinary, ecological, and other multi-level theoretical models of health and health behavior to societal, structural, community and organizational influences on health behaviors, disease, and injury
- Design, conduct and disseminate rigorous and innovative social and behavioral sciences research of relevance to public health
- Develop, implement and evaluate behavioral and structural interventions to prevent disease and injury, alleviate illness and disability, improve the quality of life and reduce health disparities
- Critically evaluate, synthesize, and question the theoretical/conceptual orientation and perspectives on health, risk, illness and health interventions
- Lead and collaborate as an expert social and behavioral scientist on a team of public health investigators

Non-Degree Training

Post Doctoral Fellows

The Department welcomes individuals who have completed doctoral degrees to postdoctoral fellow (PDF) affiliations. PDFs identify a mentor and enjoy advising from faculty and use of the School's facilities. Postdoctoral Research fellowships are generally for two years. The postdoctoral programs differ from program to program. Most postdoctoral fellowships are tailored to the needs and abilities of the individual fellow.

Prospective PDFs should submit a PDF application. The Application requires proof of sponsorship by either the School or an outside agency for the entire period of the program. Post-doctoral fellows may not use personal funds to support themselves during their program. PDFs will not be able to register, be paid, and/or buy health insurance until verification of their official receipt of the doctoral degree is filed and their PDF application is formally approved.

After being admitted to the Program, each fellow should design, in collaboration with their faculty mentor, an Individualized Development Plan (IDP) for their research time with the Department. PDFs should discuss the anticipated duration of their fellowship with their mentor when they begin the fellowship. PDFs are evaluated annually and must maintain an appropriate level of professionalism and scientific research for the duration of their program.

PDFs must adhere to the student code of conduct (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx) for all students of the Johns Hopkins Bloomberg School of Public Health.

PDFs are considered non-degree seeking students and should register for 16 credits during each course term. The Postdoctoral Research Credits course number is 410.830 Postdoctoral Research in Health Behavior and Society. Tuition for PDFs is set at $200 per term by the School and a postdoctoral scholarship covering tuition is generally granted. PDFs who wish to take academic courses should discuss this with their research mentor as part of their IDP (Individualized Development Plan); these courses cannot be transferred into a degree program at a later date. Please visit the School's PDF website (https://www.jhsph.edu/academics/postdoctoral-training/) and PDF guidebook (https://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook-revised.pdf) for additional critical information.

The NIH requires that Postdoctoral fellows supported by an NIH training grant receive training in the responsible conduct of research. Courses that fulfill this requirement are PH.550.600 Living Science Ethics - Responsible Conduct of Research and PH.306.665 Research Ethics and integrity: U.S. and International Issues PH.306.665 Research Ethics and integrity: U.S. and International Issues PH.306.665 Research Ethics and integrity: U.S. and International Issues These courses must be taken for pass/fail.

Upon satisfactory completion of their program, PDFs are issued a Certificate of Completion from the Bloomberg School of Public Health.

Further questions may be directed to HBS Academic Program Administrator (HBS_Admissions@jhu.edu).

Certificate Programs

The Department of Health, Behavior and Society offers a number of certificate programs that provide academic training to students seeking targeted education in a specific area of public health. The certificate admissions process and requirements for successful completion are available at https://www.jhsph.edu/departments/health-behavior-and-society/certificates/

Our certificates require a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (http://www.jhsph.edu/academics/certificate-programs/completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the School of Public Health Registrar.

Hopkins students enrolled in a degree program **must notify** the Academic Program Administrator their intent to pursue the certificate. Non-Hopkins students must submit an application through the SOPHAS express system. **Certificate completions cannot be processed retroactively; the Notification of Certificate Program Completion Form must be submitted before the end of the add/drop period of the term in which a student is taking their last certificate course.**

Further questions may be directed to HBS Academic Program Administrator (HBS_Certificates@jhu.edu).

Department of Health Policy and Management

About

Since its founding in 1921, the Department of Health Policy and Management (https://www.jhsph.edu/departments/health-policy-and-management/) (HPM) has been dedicated to advancing the public health field through the development, implementation and evaluation of health and social policies. HPM strives to bring order to the policy-making process by working with decision makers to develop rational, evidence-based arguments in support of new and improved policies. The faculty's policy-making expertise provides a sound basis for systemic changes to promote health, monitor, and evaluate the results of those changes and train tomorrow's leading policymakers and administrators.

The Department trains public health professionals and researchers in diverse disciplines and fields relevant to the translation of public health sciences into practice and policy. The goal is to train researchers and public health leaders to become agents of change to advance the public's health through effective, efficient and equitable policies, programs and services.

The Department is committed to advancing research, education and practice in the following areas:

- **Bioethics and Health Policy**: the ethical issues relevant to public health policy, practice and research.
- **Health Economics and Policy**: the concepts and methods of economic analysis to study how clinical and public health resources are and should be allocated.
- **Health and Public Policy**: the development, analysis, implementation, and evaluation of health and social policies that promote population health and quality of life.
- **Health Services Research and Policy**: the organization, financing, and delivery of both curative and preventive services, and their impact on access, quality, outcomes and cost, particularly for the most vulnerable.
- **Leadership and Management**: the leadership and management needs of health and public health organizations in today's rapidly changing environment.

Programs

Department Governance

The Department strives to ensure that policy and decision-making processes are participatory, and that decision criteria are transparent to all stakeholders. The Department engages faculty, staff and students in its governance. Standing committees consist of elected or appointed members and there are formal and informal opportunities to meet with the department leadership to discuss issues and policies. Central to the functioning of the Department is the Executive Management Team and several standing faculty and staff committees.

The **Executive Management Team (EMT)** is charged with making day-to-day decisions for the Department and facilitating strategic change. The committee consists of the Chair of the Department, the Associate Chair for Academic Programs, the Associate Chair for Finance and Administration, the Associate Chair for Research and Practice, the Associate Chair for Inclusion, Diversity, Anti-Racism & Equity (IDARE), the Department Administrator, and the Director of the Department's Office of Academic Affairs.

The **Committee on Inclusion, Diversity, Anti-Racism, and Equity (IDARE)** promotes scholarship and training to cultivate an environment where all people, especially those who are historically marginalized, disenfranchised, or excluded, can thrive. The committee, which is comprised of students, staff, and faculty, works closely with the School's IDARE office and HPM leadership to build a diverse inclusive community in HPM and support actions grounded in anti-racism and equity.

The **Academic Policy and Admissions Committee (APAC)** monitors the department's policies related to admissions, curriculum, and methods for assessing the quality of education in the Department. The scope of APAC's responsibilities includes oversight of academic policies, review of new programs, monitoring consistency among program curricula, setting standards for admissions, and other issues of concern related to the academic health of the department. Members of APAC include program directors and student representatives.

The **Faculty Development Committee (FDC)** monitors department faculty progress, appointments and promotions and makes recommendations to the Department Chair in accordance with the School's policies. The committee is composed of all full professors and senior scientists in the department.

The **Social Committee** is charged with improving interactions among faculty, staff, and students. It organizes department-wide events such as the annual holiday party. Members of the committee include faculty, staff and students.

The **Student Endowment Awards Committee** is charged with reviewing and selecting recipients for Departmentally-based student endowments. Faculty members are appointed by the chair to serve on this committee.

Faculty

The faculty of the Department are trained in many disciplines, and lead a wide range of research and practice. Areas of focus include:

- Analyzing and evaluating the effects of policy changes on the health of individuals and populations.
- Assessing the organization, financing, and delivery of health care and public health services and their impact on access, quality of care, patient outcomes, and cost.
- Developing and testing community-based models of health and preventive services to improve access, quality of care, patient outcomes, and cost.
- Improving methods for measuring the health of populations and individuals, risks to health, and the characteristics of health services provided to individuals and populations, including access to care, quality, and cost.
- Analyzing the ethics of public health policy, practice, and research.

The department also has a distinguished part-time faculty including leaders in management, practice, policy, and public health. The part-time faculty hold appointments as adjunct professors, senior associates, and associates. They teach courses, serve as preceptors and are available to mentor students.

A full list of faculty associated with the Department can be found here (https://www.jhsph.edu/faculty/directory/list/?department=6).

Research Centers & Institutes

HPM faculty come from many disciplinary and professional backgrounds, but share a common focus on research and practice that addresses major health and social policy issues and their impact on population health. The Department's research efforts are largely organized around centers and institutes in areas of public health importance.

- Center for Gun Violence Solutions (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-gun-policy-and-research/)
- Center for Health Disparities Solutions (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-health-disparities-solutions/)
- Center for Health Services & Outcomes Research (https://www.jhsph.edu/research/centers-and-institutes/health-services-outcomes-research/)
- Center for Hospital Finance and Management
- Center for Injury Research & Policy (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-injury-research-and-policy/)
- Center for Law & the Public's Health (https://www.jhsph.edu/research/centers-and-institutes/center-for-law-and-the-publics-health/)
- Center for Mental Health & Addiction Policy Research (https://www.jhsph.edu/research/centers-and-institutes/center-for-mental-health-and-addiction-policy-research/)
- Center for Population Health IT (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-center-for-population-health-information-technology/)
- Evidence-Based Practice Center (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-evidence-based-practice-center/)
- Institute for Health and Social Policy (https://www.jhsph.edu/research/centers-and-institutes/institute-for-health-and-social-policy/)
- Major Extremity Trauma Research Consortium (METRC) (https://www.metrc.org/)
- Primary Care Policy Center (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-primary-care-policy-center/)
- Risk Sciences & Public Policy Institute (https://www.jhsph.edu/research/centers-and-institutes/risk-sciences-and-public-policy-institute/)
- Lipitz Center for Integrated Health Care (https://www.jhsph.edu/research/centers-and-institutes/roger-c-lipitz-center-for-integrated-health-care/)
- Johns Hopkins University Public Policy Center (https://www.jhsph.edu/departments/health-policy-and-management/research-and-centers/johns-hopkins-public-policy-center/),
- Lerner Center for Public Health Advocacy (https://www.jhsph.edu/research/centers-and-institutes/center-for-public-health-advocacy/)
- Berman Institute of Bioethics (https://bioethics.jhu.edu/)

Affiliated Centers

- Johns Hopkins Drug Access and Affordability Initiative (https://www.jhsph.edu/research/affiliated-programs/johns-hopkins-drug-access-and-affordability-initiative/)
- Hopkins Business of Health Initiative
- Hopkins' Economics of Alzheimer's Disease and Services Center (https://www.jhsph.edu/departments/health-policy-and-management/research-centers-and-institutes/hopkins-economics-of-alzheimers-disease-and-services-center/)

The research conducted by these centers and institutes is timely and rigorous, responsive to the needs to clinicians, health care administrators, officials and policy-makers at the local, state, and national levels. The

Department's research is broad, beyond the U.S. and North America, to promote and protect health across the world including the European Union, South America, the Middle East, Asia, and parts of Africa.

Departmental Academic Policies

Advising

All students are assigned a faculty adviser at the time of admission to the program. Advisers play an important role in the student's academic life. The adviser is expected to keep abreast of school and departmental degree requirements so that they can counsel advisees on courses and the proper progression towards the degree. Registration, add/drop, pass/fail agreements and many other School forms require the signature of the student's adviser. In addition, any special requests or petitions that a student submits to any of the administrative offices of the School will require the endorsement of the student's adviser as well as that of the Department chair.

In an effort to eliminate unclear expectations for both faculty and students, the following guidelines have been developed.

Expectations, Rights, and Responsibilities

Students can expect their adviser to work with them in defining educational goals, course work and independent studies that will assist in achieving their goals. In addition, the adviser periodically will review academic progress with the student, including assessing the student's strengths and weaknesses. Advisers provide advice while students must make the final choices consistent with the guidelines and policies of the Department, School, and University.

Students are responsible for scheduling regular meetings with their advisers, in-person or by phone, to discuss goals, progress, problems, and next steps. If an adviser does not know the answer to specific questions or issues, the adviser will refer the student to knowledgeable sources. Advisers are expected to make a regular time available for student-adviser meetings or have a clearly stated process by which students can schedule time to meet individually. Students have the right to change advisers and individual faculty members have the right to accept or not to accept any specific student as an advisee. The first step in the process for changing advisers is to consult the program director.

All tenure-track faculty are expected to have an advising load consistent with their rank and are expected to commit their best efforts to provides students with the academic advice and career direction needed to be successful. Non-tenured professional faculty and scientists frequently advise master's and doctoral students. Their advising and teaching roles and loads vary, depending on their primary academic commitments.

Advisers are expected to provide what guidance they can in helping a student meet the financial demands of tuition and living expenses. This may include assistance in completing applications for scholarships, dissertation grants, and training grants. The Department's Office of Academic Affairs and the School's Office of Financial Aid share responsibilities for advising students on financial aid and work opportunities.

Minimum Expectations for Student-Adviser Meetings

The following are minimum expectations for scheduled meetings between a faculty adviser and advisee. In general, meetings should be scheduled so students can prepare for the meeting, should be at least a half-hour or more in duration, and should be conducted in an appropriate location, desirably without interruptions.

Degree	Year in Program	Minimum Meeting Frequency
Master of Health Administration	Year 1	One in-person meeting in each academic term
	Year 2	Zoom or in-person meeting in each academic term
Master of Science in Public Health in Health Policy	Year 1	One in-person meeting in each academic term
	Year 2	Check-in each academic term (either in-person or by Zoom or electronic correspondence)
Master of Health Science in Health Economics and Outcomes Research	Year 1	One in-person meeting in each academic term
PhD in Health Policy and Management	Year 1	One in-person or Zoom meeting in each academic term
	Years 2-3	One in-person or Zoom meeting every 3-4 weeks
	During Thesis Research	One in-person or Zoom meeting in each academic term; written comments on thesis drafts within 4 weeks of receipt.

E-mail Signature Lines

If a student in the Department chooses to indicate an affiliation with the University in an e-mail signature line, the line *must contain information on the student's candidacy status*.

Teaching Assistantships

Students can TA in the department but need instructor AND departmental approval prior to starting work. For more information, students must talk to the instructor and if both agree, will complete the necessary paperwork. For the most updated policy and open positions, please see the Department's portal page (separate login required).

All TA's who serve in HPM courses, regardless of their department or program, are required to take the Center for Teaching and Learning (CTL) TA training course designed to guide students in their roles and responsibilities as TA's prior to beginning any work. The training can be done online (https://sites.google.com/site/ctltteachingtoolkit/teaching-assistants/ta-training/).

CTL's TA Training has been approved by the Johns Hopkins University Center for Teaching Excellence & Innovation (CTEI) to fulfill the Teaching Academy – *Preparing Future Faculty (PFF)* program – Phase I requirement. Students interested in obtaining a Teaching Academy certification can finish CTL's TA training and continue their path with the Teaching

Academy. For more information on the Teaching Academy Program please follow this link (https://ctei.jhu.edu/).

Student Conflict Mediator

Are you stressed about a challenging relationship with a faculty mentor, supervisor or a staff member? Are you unsure about how to proceed with your concern? Do you feel unfairly treated?

The Health Policy and Management Conflict Mediator can help with all of these types of concerns. The HPM Conflict Mediator provides a confidential, impartial, informal and independent place to discuss Departmental student concerns, access information, clarify policies and procedures, discuss response options and get problem-solving assistance. Those using the Conflict Mediator's services can remain anonymous, if they choose, and in control over what, if any, actions are taken (unless information disclosed is legally required to be reported). The Conflict Mediator will not take sides in a dispute and does not serve as an office of record or keep any personally-identifiable records. The Conflict Mediator does not take part in any formal process but can talk with you about your formal and informal options.

The HPM Student Conflict Mediator is Professor Jon Vernick (https://publichealth.jhu.edu/faculty/724/jon-vernick/).

HPM Student Coordinating Committee (SCC)

The Department of Health Policy and Management has an active and organized student group, the Student Coordinating Committee (SCC). The SCC works to facilitate communication and interaction between the Department (faculty and administrators) and the students. The SCC works each year to plan and develop different opportunities aimed at achieving this goal. Participation by all HPM students is welcomed and encouraged.

Required Course Waivers/Substitution Policy

In rare cases, students may request a waiver or substitution of a required program course. Any request must be submitted in writing according to the guidelines outlined below at least one week prior to the start of the academic term and be approved in writing by the student's Program Director.

Examples of when a substitution might be appropriate:

- A student has successfully completed a **graduate level** course with a grade of "A" or "B" that covered the same content areas as the required course. (The completed graduate-level course syllabus must be submitted with the request.)
- A course or series of courses fulfills a general area of the required curriculum, such as biostatistics or epidemiology, but the student wishes to take a different course or series that is equally or more advanced than the normal requirement and that better aligns with their overall academic and career goals.

Course substitutions must abide by the following principles:

- A strong rationale must be made for how the substitution will benefit the student's overall academic and career goals.
- The resulting curriculum meets the requirements of a learning competencies of the student's program.

Procedure for making a substitution request:

- The request for substitution must be submitted to student's Program Director in writing at least one week before the substituted course is to be offered.
- A brief rationale for the substitution must be provided in writing.
- A completed course-by-course curriculum plan for the degree must accompany the request.
- Approval or denial will be provided by the Program Director within one week of being received. Decisions on course substitutions may not be appealed, as such, students should be prepared to complete the required curriculum if the request is denied.

Funding and HPM Student Endowment Opportunities

Master's Tuition Scholarship

The Master's Tuition Scholarship (MTS) provides eligible MSPH and MHA students with a tuition scholarship worth 75% of one year's tuition. The scholarship can be applied in one of two ways; (1) All 75% applied in Year 2; or (2) 25% applied in Year 1 and 50% applied in year 2. Students in these programs must declare which option they prefer in the summer before matriculating. Once a preference has been selected, students may not change their scholarship allocation. Upon completion of the 2nd year field placement or residency, the scholarship will be concluded. Students are not permitted to enroll in courses using the scholarship once they have completed the program.

PhD Funding

All PhD students admitted to the Department are offered a standard funding package which covers the following: 4 years of tuition; 4 years of a NIH pre-doc level stipend; health, dental and vision insurance, along with the University's clinic fee for the duration of their enrollment in the program up to 7 years.

Student Endowment Awards

The Department has a number of Student Endowment Awards that provide competitive opportunities for students to obtain additional funding. These awards are limited to enrolled students only. Recipients are selected based on the applicant's match to the spirit of the funder's wishes.

Satisfactory Academic Progress

Students must meet minimum standards (https://e-catalogue.jhu.edu/public-health/policies/academic/grading-system/) to remain enrolled in the degree programs in the Department of Health Policy and Management. A student's failure to meet the criteria is grounds for being placed on academic warning and/or being dismissed from the program.

Students enrolled in the 2 year Master of Health Administration (MHA) and Master of Science in Public Health (MSPH) programs who do not achieve the minimum GPA by the end of the 4th term in the first year (or upon completion of all required course work) may be prevented from initiating their 2nd year placement or residency. Program Directors, in consultation with the HPM Student Matters Committee, will determine the appropriate course of action.

Guidelines for Student Employment

Master's Students

Full-time master's students who work for the Bloomberg School are eligible to work a maximum of 19.99 hours per week during each academic term. During periods of academic non-enrollment (i.e., summer, spring break, etc.) student employees may work up to 40 hours per week.

This work hour limit does not apply to the Year 2 placement or residency for the MHA and MSPH programs. For FICA TAX purposes, "summer" begins on **June 1st** and ends on the last day of August prior to the first day of Term 1. During this time, students may work up to 40 hours per week. International students should always consult with their OIS officer prior to accepting any employment offer.

PhD Students

HPM PhD students may be permitted to work more than 19.99 hours per week during each academic term when the work opportunity is well-aligned with their degree program and will not interfere with their role as full-time students. Those funded on NIH training grants are not permitted to work more than 10 hours per week during each academic term.

Eligible HPM PhD students wishing to work more than 19.99 hours per week must obtain written approval from their academic/thesis advisor and program director documenting how the additional work beyond 19.99 hours aligns with their program and progress in the program. Approval or disapproval by the advisor and program director will be based on the student's stage and performance in their program, any policies or requirements specific to the student's source of funding, and the nature of the additional work.

International students under limited circumstances may be able to work more than 19.99 hours but the work must be related to the student's program and approved in advance by OIS before increasing the student's work hours.

During periods of academic non-enrollment, (i.e. summer, spring, winter break), student employees may work up to 40 hours per week.

Program Pre-requisites

All students matriculating into the Department of Health Policy and Management are required to complete the following training modules prior to the start of their first term of enrollment. These training sessions are incorporated into the Department's summer orientation period, which runs from early June through the end of August, prior to the start of the formal academic year. Some HPM programs may have additional pre-requisites that are noted on their requirements page.

1. Opioid Epidemic Awareness Education
2. Title IX: Sexual Assault Prevention Course
3. History of Baltimore module
4. Indigenous Peoples History Module
5. Introduction to Online Learning
6. PH.550.860 (https://e-catalogue.jhu.edu/search/?P=PH.550.860) Academic & Research Ethics

Withdrawals

Failure to register for a term results in an automatic withdrawal. A withdrawn student must be formally readmitted before resuming a program of study. Students requesting to be readmitted must submit the most current transcript prior to the withdrawal and a cover letter explaining the reasons for the withdrawal and why the students wants to be readmitted to the program director who will recommend to the HPM Student Matters committee approval or rejection of the request.

Registration

All MSPH, MHS, and MHA students are expected to maintain a continuous registration through graduation. Those enrolled in *full-time* programs must register for a minimum of 12 credits each in terms 1-4. International students should work with the Office of International Services to make sure they understand the requirements of their visa. Please reach out to your program director with any questions about how to meet the requirements within the context of your specific degree program

Registration requirements for HPM PhD students can be found in the HPM PhD requirements (p. 314) section.

Academic Leave of Absence (LOA)

Academic leave of absence refers and is limited to students in a degree program requiring continuous enrollment and have completed a minimum of one academic term of program coursework, and who, while in good academic standing, are forced to withdraw temporarily from graduate work due to reasons beyond their control, such as illness, military service, financial exigency, or pressing personal reasons justifying an interruption of the degree program. Please read the school-wide academic leave of absence (https://e-catalogue.jhu.edu/public-health/policies/academic/academic-leave-absence/) policy for further information.

An active file fee of $50 per term is assessed for each term within the leave of absence period. The Department will cover this fee for all *full time* HPM degree seeking students for up to 8 terms (which is the limited per the School's Leave of Absence Policy). For further information, contact the HPM Office of Academic Affairs.

Bloomberg School Policies

Graduate Student Sick Leave

All students receiving a fellowship/stipend from BSPH for full-time study while enrolled in a Master's or PhD program at the School are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a student's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure.

When a student takes sick leave, they should notify their faculty adviser and keep them as up to date as feasible. At its discretion, the department or adviser may require the student to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a student's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the student and the adviser to the Department Administrator as quickly as possible. If the illness requires an extended absence, the student may apply for a leave of absence.

Academic Ethics Code

The faculty and students of the Bloomberg School of Public Health have the joint responsibility for maintaining the academic integrity and guaranteeing the high standard of conduct of this institution. Please read the Code of Academic Ethics (https://e-catalogue.jhu.edu/public-health/policies/academic/academic-ethics-code/) for more information.

Compliance Line

The mission of Johns Hopkins University is to educate its students and cultivate their capacity for life-long learning, to foster independent and original research, and to bring the benefits of discovery to the world. In service to this mission, the university strives to promote an environment of integrity, ethics and safety. All members of the Johns Hopkins community are expected to uphold these standards, which is why The Johns Hopkins Compliance Line (https://e-catalogue.jhu.edu/

public-health/policies/academic/compliance-line/) was established. This independently administered hotline allows for anonymous (if desired) reporting of serious concerns or violations of any kind.

Student Grievance Procedure

On occasion, disputes arise between students and other members of the Hopkins Bloomberg School of Public Health community. The School encourages individuals involved in such disputes to resolve the matter directly between them. For those disputes that cannot be resolved informally, the following policy (https://e-catalogue.jhu.edu/public-health/policies/academic/student-grievance-policy/) has been created to provide students or student groups with a formal process to seek resolution of a grievance. A grievance covered by these procedures is a complaint by a student or group of students alleging that they have been adversely affected in their capacity as students.

Parental Accommodations

Contact the HPM Academic Office to discuss the accommodations policy and how it impacts the student, at least three months before the birth or adoption of a child, as we may need to create a plan that instructors, supervisors, student and advisers approve of. Please read the University parental accommodations policy (https://policies.jhu.edu/?event=render&mid=764&pid=32391&fid=policy_32391.pdf&_=0.931885768396) for graduate students and post-docs.

Additional Bloomberg School Policies impacting on students can be found here **(**https://e-catalogue.jhu.edu/public-health/policies/**)**

Bloomberg School Offices and Services

The following are selected offices and services provided by the Bloomberg School or the Johns Hopkins University which the Department of Health Policy and Management recommends its students utilize. A full list of BSPH offices and services can be found here (https://www.jhsph.edu/offices-and-services/).

- Career Services (https://www.jhsph.edu/offices-and-services/career-services/)
- Student Disability Services (https://www.jhsph.edu/offices-and-services/student-affairs/disability-support-services/)
- SOURCE (https://source.jhu.edu/) (Service learning and community engagement)
- Institutional Review Board (IRB) (https://www.jhsph.edu/offices-and-services/institutional-review-board/)
- Student Life (https://www.jhsph.edu/offices-and-services/office-of-student-life/)
- Records and Registration (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/)
- Inclusion, Diversity, Anti-Racism, and Equity (IDARE) Office (https://publichealth.jhu.edu/offices-and-services/office-of-inclusion-diversity-anti-racism-and-equity-idare/)

University Resources and Services

- International Services (https://ois.jhu.edu/)
- Libraries (https://www.jhsph.edu/offices-and-services/libraries/)
- University Health Services (https://www.hopkinsmedicine.org/uhs/)
- Office of Institutional Equity (https://oie.jhu.edu/)
- Student Assistance Program (https://jhsap.org/)

Health Administration, (MHA)

Program Overview

The Master of Health Administration (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-health-administration/) is a professional degree, preparing future healthcare executives for management and leadership positions dedicated to improving health and health service delivery across all sectors. The Hopkins program focuses on the U.S. healthcare system and is well-suited for early careerists interested in managerial and leadership positions within hospitals and health systems, the health insurance industry, and consulting firms.

The accelerated two-year residential cohort program is designed specifically for the early careerist. The curriculum includes one year of full-time academic coursework followed by a full-time, 11-month compensated administrative residency with faculty preceptors designed to provide direct experience through hands-on learning. The curriculum is founded on principles of innovation and strategic problem-solving, and develops the analytical, technical, and management skills required to improve the quality, cost-effectiveness, and integration of health and health care organizations and systems.

The full-time residential program has a required residency component during the 2nd year of the program. The program has partnerships with local and national organizations providing the full-time paid residency positions, many exclusive to Bloomberg students. However, because many of the residency sites have rules prohibiting placement of non-U.S. citizens and non-permanent residents, the program cannot guarantee placement of international students and thus the ability to successfully complete the degree program requirements for graduation. Therefore, non-U.S. citizens and non-U.S. permanent residents should carefully consider these possibilities before applying to or accepting an offer of admission from the full-time residential program.

Program Accreditation

The program's curriculum, accredited by the Commission on Accreditation of Healthcare Management Education (CAHME), provides for the development of conceptual, quantitative, and applied skills essential to lead contemporary health care organizations.

Program Administration

Program Director: Mark J. Bittle, DrPH, MBA, FACHE (https://www.jhsph.edu/faculty/directory/profile/1047/mark-j-bittle/)
Associate Director: Conan Dickson, PhD, FACHE (https://www.jhsph.edu/faculty/directory/profile/1868/conan-dickson/)
Assistant Director: Karen Charron, MPH, BSN (https://www.jhsph.edu/faculty/directory/profile/810/karen-r-charron/)
Sr. Academic Coordinator: Keasha Wormley, MA

Bachelor's/MHA

The Johns Hopkins University, in conjunction with the Bloomberg School, offers a combined Bachelor's degree and Master of Health Administration (MHA) degree. The combined degree programs have been tailored to prepare students for a range of careers, including public health, healthcare management, and medicine.

JHU undergraduate students have the unique opportunity to seek early admission to the MHA degree. The combined Bachelor's/MHA program emphasizes innovation and strategic problem-solving by applying analytical, technical, and management skills required to improve the quality, cost-effectiveness, and integration of healthcare organizations and systems. Students in this program will receive co-advising from both schools to optimize their academic experience.

Successful applicants will demonstrate relevant experience in the U.S. health care system (paid or volunteer), strong analytical skills, and/or demonstrate a passion for, and a desire to lead, health and health care delivery transformation in the U.S. Applicants must provide evidence of strong quantitative skills as reflected by undergraduate course work in college algebra, calculus, and/or statistics with a minimum 3.0 GPA.

While not required, it is also strongly recommended that applicants take EN.660.203 Financial Accounting. Those who earn a "B" in this course and pass a waiver exam do not need to take the required MHA course PH.312.617 Fundamentals of Financial Accounting.

Applicants who are admitted and have not completed an undergraduate microeconomics course are required to complete a course before matriculating.

Requirements
Bachelor's/MHA degree applications should be submitted through SOPHAS Express by the July 1st between junior and senior years. Bachelor's/MHA students must be accepted before the start of their senior year. Please note that admitted students must complete the Bachelor's degree before formally matriculating in the Bloomberg School of Public Health.

Bachelor's/MHA applicants must submit the following:

- Transcripts from Johns Hopkins University and, if applicable, transcripts from any other college-level institutions students have attended.*
- Three letters of recommendation.
- Resume or curriculum vitae.
- Statement of purpose and objectives. The Statement of Purpose should provide a compelling rationale for admittance and focus on the applicant's relevant health care experience (volunteer or paid), leadership potential, and early career goals.

*Students may upload unofficial transcripts in the document section to expedite the application review process; however, admitted students must submit an official transcript before they can matriculate into the program.

For more information on the Bachelor's/MHA program, contact Assistant Director, Karen Charron, or visit our website (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-health-administration/ba-mha/).

MHA Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Core Curriculum

The MHA program requires a minimum 79 credits of didactic coursework. All required courses must be taken for a letter grade except for courses only offered as pass/fail.

Course	Title	Credits
First Year		
Summer Term		
XXX.XXX	Opioid Epidemic Awareness & Education	
XXX.XXX	Title IX: Sexual Assault Prevention Course	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**0**
First Term		
PH.140.611	Statistical Reasoning in Public Health I [1]	3
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.312.602	Applied Methods for Optimizing Performance in Health Care Organizations	2
PH.312.617	Fundamentals of Financial Accounting	3
PH.312.867	MHA Seminar	1
PH.312.700	Leading Organizations	3
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
	Credits	**21**
Second Term		
PH.312.601	Fundamentals of Management for Health Care Organizations	3
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.312.604	Quantitative Tools for Managers	3
PH.312.651	Principles and Applications of Advanced Payment Models in Population Health Management	3
PH.312.701	Strategic Leadership and Decision Making	3
PH.312.867	MHA Seminar	1
PH.313.643	Health Economics	3
	Credits	**19**
Third Term		
PH.312.621	Strategic Planning	3
PH.312.623	Financial Management in Health Care I	3
PH.312.675	Medical Practice Management	3
PH.312.678	Introduction to Healthcare Quality and Patient Safety: A Management Perspective	2
PH.312.867	MHA Seminar	1
PH.312.869	Healthcare Consulting Practicum	2
PH.312.702	Leading Change: Building and Empowering Teams	3
	Credits	**17**
Fourth Term		
PH.306.663	Legal and Ethical Issues in Health Services Management	3
PH.312.624	Financial Management in Health Care II	3
PH.312.635	Human Resources in Health Organizations	2
PH.312.650	Non-Traditional & innovative Health Services Partnerships	2
PH.312.670	Negotiation in Health Care Settings	3
PH.312.703	Learning Organizations & Knowledge Management	3
PH.312.861	MHA Case Competition	2

PH.312.867	MHA Seminar	1
	Credits	**19**
Second Year		
First Term		
PH.312.810	MHA Residency	16
	Credits	**16**
Second Term		
PH.312.810	MHA Residency	13
PH.309.631	Population Health Informatics	3
	Credits	**16**
Third Term		
PH.312.810	MHA Residency	16
	Credits	**16**
Fourth Term		
PH.312.810	MHA Residency	15
PH.312.862	MHA Capstone	1
	Credits	**16**
	Total Credits	**140**

[1] Course meets one or more CEPH learning objectives (p. 176).

CEPH Required Courses

The following online CEPH required courses may be taken in either Year 1 or 2. ***All eight courses, (an additional 4 credits beyond the MHA requirements) are required before graduation***. Some courses, indicated below, may be held prior to First Term. Those courses will count toward First Term registration.

Code	Title	Credits
Summer Courses		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	.5
Term 1A		
PH.552.607	Essentials of Environmental Health	0.5
Term 1B		
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**4**

Administrative Residency

In the second year of the program, students continue to register full-time while their 11-month full-time, paid administrative residency in a healthcare management setting. While the actual organizations may vary, the sectors include community hospitals, university-affiliate hospitals, investor-owned hospitals, physicians' medical practices, consulting firms, long-term care facilities and managed care organizations.

The MHA program has a residency placement process partnering students with local and national organizations providing administrative residency positions, many exclusive to JHU students. Residency "showcases" are scheduled throughout the fall of the first year for students to meet the preceptors and discuss the organization and residency prior to the interview and selection process. Residencies are only available to U.S. citizens and U.S. permanent residents.

The residency provides students with healthcare management experience in which the student applies the knowledge and skills learned in the program's coursework. The residency experience is supervised by an on-site faculty preceptor and an MHA program adviser. During the residency year, students are required to submit reports that consist of an educational goals paper, three progress reports, a residency critique, summary of accomplishments and a final capstone paper. In addition, students will have the opportunity to present their capstones to their classmates and program faculty during the 4th term.

In year two, students must register for a total of 60 credits of PH.312.810, MHA Residency, in addition to other courses. A minimum of 16 credits per term is required to be considered full-time. Student evaluation is based on the completed and timely submission of all assignments as well as continued satisfactory performance in the residency site as determined by the on-site preceptor and the program directors.

All students in the MHA program who have a minimum of three years of post-graduate clinical experience and plan to return to their clinical responsibilities after graduation may, with approval of the MHA Program Office, complete a case study or project at their workplace in lieu of a separate residency.

Capstone Guidelines

The MHA Capstone provides an opportunity for students to integrate the knowledge that they have gained through their course work and residency. The program offers three options for the Capstone: a case study of a major project from their administration residency, submission of an acceptable paper for the Stull competition, or participation in the UAB case competition. All students will register for 1 credit of PH.312.862 MHA Capstone in Term 4 and present their Capstone topics and findings in May.

Option #1: A Case Study from the Administrative Residency

Students who choose the case study option will report on a major initiative in which they were involved during their administrative residency. They are expected to provide a thorough analysis of the situation or problem that the organization faced, a description of the alternative approaches that the organization considered (if it did so), a description of the initiative that was adopted, presentation of data regarding the results of the initiative, and a thorough analysis of whether or not the initiative succeeded (including lessons learned). The case study should incorporate theories, concepts, knowledge, and practice relevant to the healthcare management field of study. (This option differs from a classroom-based case study in which issues are presented and questions provided to assist the student in resolving a problem.)

Deliverables

Students should submit their proposal for the case study to their CoursePlus portfolio by the first week of Term 2. The proposal (approximately 500 words) should describe the problem(s) facing the organization, the context of the problem within the healthcare system, the initiative undertaken by the organization, and the measures of success used by the organization. Students are encouraged to consult with their academic advisers throughout the year to ensure that the case study will meet expectations.

Students should submit their case to the CoursePlus Portfolio by the beginning of Term 3. Case studies should be written in MLA or APA Style format (12pt sans serif type face, e.g. Arial or Garamond, one-inch margins and double-spaced), and should be between 5,000 and 10,000 words (not including abstract, bibliography, tables and appendices). Students are expected to include references from sources outside the organization (such as peer-reviewed and scholarly journals as well as other periodicals, books, newspaper articles, and government documents).

Students should submit PowerPoint slides for the Capstone Symposium to the CoursePlus Portfolio by the last Friday in April.

Examples of excellent case studies from previous students are posted on the MHA Residency CoursePlus site.

Evaluation of Case Studies

Faculty will evaluate the case study using a quality rubric posted on the CoursePlus Portfolio focused on these four areas:

1. Central idea
2. Literature review and analytical support
3. Organization
4. Mechanics

Option #2: Submission of Paper for Stull Essay Competition

Students may choose to submit a paper for American College of Healthcare Executive's (ACHE's) Richard Stull Student Essay Competition in the Fall. The specifications for the paper are described on ACHE's website. Proposals should be submitted to the CoursePlus Portfolio no later than **October 1**. Final manuscripts should be submitted to the CoursePlus Portfolio no later than **November 1**. The program office will select the best paper for submission to ACHE in early December.

Option #3: Participation in the UAB Case Competition

Three students will be selected to represent the program at the annual Health Administration Case Competition held at the University of Alabama at Birmingham (UAB) in February. Participation in this event fulfills the capstone requirement. Team members are identified in early October.

Capstone Symposium

All students are expected to present the results of their Capstone in May, regardless of which option they choose. Each student will have no more than 15 minutes to present the topic and findings of their Capstone to classmates and faculty. The content should be no more than 10 minutes with approximately two (2) minutes of Q&A.

MHA Program Policies

Please view the HPM Departmental Policies for details on program satisfactory academic progress, course waivers and the Masters Tuition Scholarship (MTS).

The following program prerequisites apply to students enrolled in the HPM MHA program only.

1. Incoming students who have not completed an undergraduate microeconomics course are required to complete a course in this area before matriculating. The MHA program office will provide online course options to help you fulfill this prerequisite. Please contact the program office for more information.
2. Incoming students may want to consider completing a business accounting course, similar to the Hopkins course EN.660.203 Financial Accounting, prior to matriculation. Those who earn a "B" or better and pass a waiver exam will not need to take the required course PH.312.617 Fundamentals of Financial Accounting.

MHA Learning Outcomes

Program Competencies

It is the program's goal that by the time students have successfully completed the course work and administrative residency, they will have mastered the competencies outlined in the following domains.

Health and Healthcare Environment

- **Legal and Regulatory Environment**: Explain federal, state and local laws and regulations affecting the delivery of health care and related services.
- **Financing Environments**: Analyze the healthcare financing and economic environments, including regulation and processes applicable to public and private payers.
- **Health Policy Environment**: Analyze the effects of health policy on providers, payers and populations and its implications for organizational response and change.
- **Provider Environment**: Describe the array of key provider organizations and health professions and their implications for the quality and cost of care of individuals and populations.
- **Public Health**: Establish goals and objectives for improving health outcomes that incorporate an understanding of the social determinants of health and the socioeconomic environment in which the organization functions.

Management

- **Financial Capability**: Apply financial and accounting information and analytical tools to evaluate short and long term options and goals and monitor financial performance.
- **Budget Management**: Apply key accounting principles to prepare, monitor and manage budgets.
- **Market Analysis**: Apply economic models to analyze health care sector events, developments and trends, and plan accordingly.
- **Operatives Management and Performance Measurement**: Apply quantitative and qualitative tools and models to analyze, evaluate and improve an organization's service orientation, patient safety and quality processes and outcomes.
- **Knowledge Management**: Create management structures that apply, analyze, evaluate and convey information (gathered from both human and technological sources) to facilitate organizational decision making.
- **Population Health Management**: Apply epidemiological, biostatistical and evidence-based methods to improve health system performance at the population-level. Use vital statistics and core health indicators to guide decision-making and analyze health trends of the population to guide the provision of health services.
- **Workforce Systems**: Organize and manage the workforce utilizing key performance indicators and employee engagement metrics.
- **Workforce Management**: Direct the operation of a business segment through the development of the workforce's knowledge, skills, abilities and competencies.
- **Health Services Management**: Explain the various organizational structures of health care delivery, funding mechanisms and the way that health care services are delivered.

- **Strategic Thinking and Management**: Provide overall direction to the enterprise, including specifying the organization's objectives, developing policies and plans designed to achieve these objectives, and then allocating resources to implement the plans.
- **Systems Thinking**: Describe the analyze an organization form a systems perspective (i.e., as a complex set of cause and effect relationships).
- **Governance**: Explain how to create and maintain a system of governance that ensures appropriate oversight of the organization.

Leadership

- **Innovation and Creativity**: Facilitate diversity of thought in pursuit of developing new ideas, creating an entrepreneurial spirit and identifying break-through opportunities to significantly enhance organization performance.
- **Leading Change**: Promote ongoing organizational learning, champion organizational change when necessary and manage the resources necessary to accomplish the change.
- **Influence**: Promote the ideas and help shape the opinions and actions of others by: Understanding their needs, interests and concerns through questioning thoughtfully and listening empathetically; Communicating clearly both in writing and orally; and Delivering persuasive and organized presentations.
- **Team Leadership**: Develop team-oriented structures and systems to promote team performance, balance giving direction and support for team processes and promote consensus to achieve goals.
- **Organizational Leadership**: Articulate and communicate the mission, objectives and priorities of the organization to internal and external stakeholders and entities.
- **Cultural Engagement**: Create an organizational climate built on mutual trust and transparency, establish and communicate a compelling vision and hold oneself and others accountable for achieving organizational goals.

Relationship Management

- **Interpersonal Understanding**: Exercise the use of empathy, listening and diagnostic behavior in order to understand others' interests, concerns, needs and non-verbal behavior.
- **Relationship Management**: Develop and maintain collaborative relationships and shared decision-making with key leaders, colleagues and stakeholders to achieve organization and personal goals.
- **Collaboration**: Facilitate a work environment focused on a shared purpose or goal, encouraging colleagues to work effectively with others, demonstrating enthusiasm for a collaborative solution and communicating a shared sense of ownership and autonomy.

Standards of Professional Behavior

- **Professionalism**: Demonstrate high ethical conduct, integrity, transparency and accountability for one's actions and respect for others.
- **Initiative**: Take action without being asked and offer solutions/ options when presenting problems.
- **Advocacy**: Advocate for the rights and responsibilities of patients and their families.
- **Professional Development**: Demonstrate commitment to self-development including continuing education, networking, reflection and personal improvement.
- **Self-Awareness**: Be aware of one's own assumptions, values, strengths and limitations.
- **Mentoring**: Develop others by mentoring, advising, coaching and serving as a role model.

CEPH-Defined Foundational Public Health Learning Objectives

The curriculum for the MHA program includes coursework that has been approved to meet the foundational public health knowledge learning objectives (p. 176) in the *Profession & Science of Public Health* and *Factors Related to Human Health* domains as required by the Council on Education for Public Health (CEPH).

Health Policy, MSPH

Program Overview

The Master of Science in Public Health (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-science-in-public-health-in-health-policy/) (MSPH) in Health Policy is a professional degree program designed for individuals seeking specialized academic training in health policy in order to establish or expand their careers in health policy. The interdisciplinary faculty associated with the program are recognized for excellence in policy analysis, health services research, public health practice, and teaching. The faculty are actively involved in formulating and implementing health policy at the federal, state, and municipal levels.

The program requires one academic year of full-time, residential academic coursework, followed by a 9-month field placement in a professional public health setting. Through their coursework, students acquire a solid foundation in public health policy along with substantive knowledge of the U.S. public health and healthcare delivery system, as well as key health and public policy issues. The required curriculum and field placement experience provide students with a rich understanding of U.S. health/public health policy; knowledge of the process by which public policy decisions are made; training in basic quantitative and analytic methods; and the skills needed to critically assess and apply research findings to the development, implementation and analysis of health/public health policy.

In addition to the core requirements, the program offers professional development and flexibility for students to pursue their individual interests in the health/public health policy arena. Elective courses may be selected from those offered within HPM or any other department in the Bloomberg School.

Program Administration

Program Director: Beth Resnick (https://www.jhsph.edu/faculty/directory/profile/1104/beth-a-resnick/), DrPH, MPH
Assistant Director: David Earle, MLA
Sr. Academic Coordinator: Mary Wisniewski

Bachelor's/MSPH

The Johns Hopkins University, in conjunction with the Bloomberg School, offers a combined Bachelor's degree and Master of Science in Public Health in Health Policy (MSPH) degree. The combined degree programs have been tailored to prepare students for a career in health policy.
JHU undergraduate students have the unique opportunity to seek early admission to the MSPH degree. The combined Bachelor's/MSPH program emphasizes a solid foundation in public health policy along with substantive knowledge of the U.S. public health and healthcare delivery

system. Students in this program will receive co-advising from both schools to optimize their academic experience.

Successful applicants to the Bachelor's/MSPH are recommended to take at least one math or statistics course and at least one writing-intensive course during undergraduate study.

Requirements

Bachelor's/MSPH degree applications should be submitted through SOPHAS Express by July 1st between the junior and senior years. Bachelor's/MSPH students must be accepted before the start of their senior year. Please note that admitted Bachelor's/MSPH students must complete their Bachelor's degree before formally matriculating in the Bloomberg School of Public Health.

Bachelor's/MSPH applicants must submit the following:

- Transcripts from Johns Hopkins University and, if applicable, transcripts from any other college-level institutions students have attended.*
- Three letters of recommendation.
- Resume or curriculum vitae.
- Statement of purpose and objectives.

*You may upload unofficial transcripts in the document section to expedite the application review process; however, admitted students must submit an official transcript before they can matriculate into the program.

For more information on the Bachelor's/MSPH program, contact Assistant Director David Earle, or visit our website (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-science-in-public-health-in-health-policy/ba-msph.html).

MSPH Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Year 1 Course Requirements

The MSPH in Health Policy program requires a minimum of 64 credits of didactic coursework to be completed in the first year of the program. Coursework includes program core requirements and electives. Students must complete a self-assessment and a tentative course plan prior to matriculating.

The program recommends completing all required online course modules in Year 1, but it is permissible to take some in Year 2 if necessary. All courses listed below, or an approved full-term substitute, must be taken prior to graduation. Half-term online modules (worth .5 credits) are offered multiple times throughout the year, including during the summer. Information on the half-term online courses available in the summer will be posted to the MSPH program orientation site. Online courses taken in the summer will be included in first term registration.

Core MSPH Courses

Code	Title	Credits
Summer Prerequisites		
XXX.XXX	Opioid Epidemic Awareness Education	
XXX.XXX	Title IX: Sexual Assault Prevention Course	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
Core Policy Courses		
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century	3
PH.301.645	Health Advocacy	3
PH.306.650	Public Health and the Law	3
PH.312.655	Organizational Behavior and Management	2
PH.318.603	Applied Microeconomics for Policymaking	3
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	3
PH.308.867	MSPH Seminar in Health Policy [1]	1
Core Methods Courses		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.300.713	Research and Evaluation Methods for Health Policy	3
Required Online Modules		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
PH.552.621	Basic Resources Management for Public Health	1
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	1
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.626	Systems Thinking: Concepts and Methods	0.5
Total Credits		**49**

1 MSPH Seminar in Health Policy must be taken every term.

Electives

In addition to the core course curriculum, MSPH in Health Policy students must take elective courses in order to meet the first year 64 credit requirement. Elective options should be discussed with the academic adviser prior to registration. Students may take the opportunity to specialize in a specific area of policy. Specialty areas include:

Advocacy	Bioethics
Child & Adolescent Health	Environmental Health Policy
Food & Nutrition Policy	Health & Aging Populations
Health Disparities & Health Inequality	Health Economics

Health Finance & Management	Health Informatics
Injury & Violence Prevention	LGBT Health
Mental Health Policy & Services	Quality Improvement & Outcomes Research
Social Policy	Women's & Reproductive Health

Year 2 Course Requirements

Each term of the second year, students must register for the course PH.308.810 Field Placement Health Policy-MSPH for 16 credits. **It is the student's responsibility to maintain their field placement registration for each term.**

Students are welcome to take additional elective courses during the 2nd year if their schedule allows.

Field Placement

The second-year field placement experience allows students to apply their academic training in a professional health policy/public health setting, demonstrate essential health policy analyst competencies and transition seamlessly to a full-time health policy career.

Students are eligible to initiate their placement after meeting all of the following requirements:

- Completion of the required 64 program didactic credits
- Satisfactory academic progress with a minimum overall GPA of 2.75 by the end of the 4th term of their first academic year
- Earned a minimum grade of "C" in all required core courses

The minimum length of a field placement is nine cumulative months. Many students begin their field placement employment in the summer after the first year of coursework, although students are not required to begin their field placement until the first day of the first term in their second year. The nine-month field placement requirement can be completed at one or multiple sites domestically or internationally.

Field Placement Goals

The field placement experience provides students with the opportunity to apply their academic training in real world settings under the guidance of at least one senior-level health policy/public health professional and the program faculty. Through the field placement experience, students will gain perspective on how public health policies affect the public's health and hone their professional health policy skills. During their employment, students are expected to accomplish the following objectives:

- Develop practical, applied public health policy skills including but not limited to: problem analysis, oral and written communications to various audiences, and quantitative analysis to advance evidence-based policy decisions.
- Contribute to their field placement organization by participating in and completing all assigned work. Where appropriate, share work with field placement colleagues, and suggest additional projects in support of the organization's mission.
- Discern their own role in the organization as to how their work fits both into the mission of the organization and within the "larger health policy system."
- Explore the internal structure, function and history of the organization and its impact on the organization's mission and operations.
- Observe the preceptor's leadership and managerial approach and implications of these leadership approaches on the student's field placement experience as well as their overall career advancement and development.

Selection and Approval of Field Placement Sites

Students may choose to pursue field placements in a wide variety of settings, including governmental agencies, the legislative arena, consulting, advocacy, non-profit, research and professional organizations in both domestic and/or international settings.

Students are responsible for securing their own field placement positions, with assistance and final approval from MSPH staff and faculty. The program will disseminate field placement opportunities to students and they are encouraged to utilize existing MSPH partnerships with health policy/public health related employers via alumni contacts, recruiters, and established networking contacts. Additionally, students are encouraged to identify appropriate placements on their own. Placements can be domestic or international and can be completed in a single or multiple experiences. Students must submit an official field placement offer letter to the MSPH for final approval.

Field Placement Requirements

HPM faculty and staff oversee the evaluation of the field placement as a culminating experience. During the field placement, students are experienced to chronicle their professional practice developments in health policy/public health, as well as synthesize and integrate knowledge and competencies acquired in their coursework through the completion of four (4) pass-fail assignments. Details and due dates for these assignments will be provided to the students at the beginning of their 2nd year.

Evaluation Of Student's Completion Of The Requirement: Preceptor

Each preceptor is asked for feedback on the student's performance through the completion of a brief evaluation form near the end of the students' placement.

MSPH Program Policies

Please view the HPM Departmental Policies (p. 301) for details on program satisfactory academic progress, course waivers and the Masters Tuition Scholarship (MTS).

MSPH Learning Outcomes

Program Learning Outcomes

The learning outcomes specific to the MSPH in Health Policy are met through coursework and a 9-month field placement. Upon successful completion of the program, students will have mastered the following:

- Evaluate critically the sources of vulnerability and related policy approaches to improve health and social outcomes in a specific vulnerable population.
- Appraise the range of policy options that can be used to improve health outcomes among populations.
- Describe the array of collaboration, evidence, and leadership needed to translate a policy idea into a viable policy option.
- Apply skills and knowledge about policy formulation to advance health and social policy initiatives.
- Acknowledge the legal and ethical underpinnings of health policy formulation.

CEPH-Defined Foundational Competencies for Professional Programs

The curriculum for the MSPH in Health Policy program includes coursework that has been approved to meet the introductory Public Health Knowledge Learning Objectives (p. 176) identified by CEPH and the 22 CEPH-defined foundational competencies (p. 176) for public health professional programs.

Health Economics and Outcomes Research, MHS

Program Overview

The Master of Health Science in Health Economics and Outcomes Research (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-health-science-in-health-economics/) (MHS in HEOR) is an academic/research program focused on economic evaluation and outcomes research methods for healthcare. This rigorous program develops data analytic and economic modeling skills, as employed in the health policy context. Health economics and outcomes research is an applied field of study drawing upon two disciplines: economic evaluation and outcomes research. Methods in this field are used to promote the efficient and equitable allocation of healthcare resources in public health.

The discipline of economic evaluation is grounded on seminal theories of health economics that relate the value of healthcare to individuals and society. Statistical and decision sciences further enable researchers to build upon these theories and model the valuef healthcare technologies to individuals and society. Some examples of this research include the evaluation of the value of new pharmaceuticals to existing therapies, the value of vaccines to society, or the value of a public health campaign to provide safety.

The discipline of outcomes research is grounded on seminal theories of health services that relate the role of healthcare to improving the lives of individuals and society. These theories enable researchers to identify important clinical, patient, and provider outcomes; design measurement techniques to capture different outcomes; and incorporate outcomes measurement into health systems. Specific examples of this research include assessing the impact of new pharmaceuticals on patient outcomes, how to measure a new approach for healthcare delivery, or how to validate a new patient reported outcomes instrument for a pediatric population.

Students enrolled in the program have the opportunity to take courses from multiple departments across the Bloomberg School taught by faculty with expertise in a variety of disciplines-many of which are true leaders in the respective fields. Through their coursework, experience at seminars, and capstone projects, students are provided a multidisciplinary experience. Graduates of the program work in public health research, healthcare consulting, pharmaceutical and insurance industries. Many go on to pursue doctoral study in health services research, health economics or other areas of economics or public health and some have entered the program with a medical degree or plan to pursue medical school, and these graduates have used the tools taught in the program to supplement their clinical research.

The MHS program can be completed both full-time (9 months on site in Baltimore or online) or part-time (2 years online). The curriculum requires a minimum of 64 course credits and a mentored research experience (the Capstone project.)

Program Administration

Program Director: Jeromie Ballreich (https://www.jhsph.edu/faculty/directory/profile/3522/jeromie-m-ballreich/), PhD, MHS
Assistant Director: David Earle, MLA
Sr. Academic Coordinator: Mary Wisniewski

Bachelor's/MHS Program

The Johns Hopkins University, in conjunction with the Bloomberg School, offers a combined Bachelor's degree and Master of Health Science (MHS) in Health Economics and Outcomes Research degree. The combined degree programs have been tailored to prepare students for a career in economic evaluation and outcomes research methods for healthcare.

JHU undergraduate students have the unique opportunity to seek early admission to the MHS in Health Economics and Outcomes Research degree. The combined Bachelor's/MHS program is focused on economic evaluation and outcomes research methods for healthcare. Students in this program will receive co-advising from both schools to optimize their academic experience.

Successful applicants to the program will have taken an undergraduate course in economics or microeconomics.

Requirements

Bachelor's/MHS degree applications should be submitted through SOPHAS Express by July 1st between the junior and senior years. Bachelor's/MHS students must be accepted before the start of their senior year. Please note that admitted Bachelor's/MHS students must complete their Bachelor's degree before formally matriculating in the Bloomberg School of Public Health.

Bachelor's MHS applicants must submit the following:

- Transcripts from Johns Hopkins University and, if applicable, transcripts from any other college-level institutions the student has attended.*
- Three letters of recommendation.
- Resume or curriculum vitae.
- Statement of purpose and objectives.
- *Students may upload unofficial transcripts in the document section to expedite the application review process; however, admitted students must submit an official transcript before they can matriculate into the program.

For further information on the Bachelor's/MHS in Health Economics and Outcomes Research program, contact Assistant Director, David Earle, or visit our website (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/master-of-health-science-in-health-economics/ba-mhs/).

MHS Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Program Core Curriculum

The MHS in HEOR requires the completion of at least 64 credits. In addition to the program requirements, electives are chosen in consultation with the program or academic adviser. All requirements, including elective courses, must be completed for letter grade if the course is offered for letter grade. Any exceptions must be approved by the Program Director prior to the start of the term

Code	Title	Credits
Summer Prerequisites		
XXX.XXX	Opioid Epidemic Awareness & Education	
XXX.XXX	Title IX: Sexual Assault Prevention Course	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
Program Core		
PH.140.621	Statistical Methods in Public Health I [1]	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.309.712	Assessing Health Status and Patient Outcomes	3
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.603	Economic Evaluation III	3
PH.318.603	Applied Microeconomics for Policymaking	3
PH.313.865	MHS Capstone in Health Economics	2
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
PH.552.601	Foundational Principles of Public Health [1]	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health [1]	0.5
PH.552.607	Essentials of Environmental Health [1]	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease [1]	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health [1]	0.5
PH.552.610	The Social Determinants of Health [1]	0.5
PH.552.611	Globalization and Population Health [1]	0.5
PH.552.612	Essentials of One Health [1]	0.5
Choose 1 of:		
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	2
and		
PH.309.617	Introduction to Methods for Health Services Research and Evaluation II	2
OR		
PH.300.713	Research and Evaluation Methods for Health Policy	3
Choose 1 of:		
PH.313.641	Introduction to Health Economics	3
OR		
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research	3

[1] Course meets one or more CEPH learning objectives (p. 176).

Electives

In order to meet the graduation requirement, students are required to take elective coursework. With so many elective options available, all students should meet with their program advisor prior to registering to determine the right options to meet their program goals.

Capstone Project

Students will complete a mentored capstone (scholarly article) as the culminating requirement for the program. To facilitate this, each student will enroll for the MHS Capstone in the 4th term. The capstone is an economic analysis on a topic with health policy implications. The capstone project is completed under the guidance of a BSPH faculty member. All students are required to submit a written product and give an oral presentation of their capstone work in 4th Term.

MHS Program Policies

Please view the HPM Departmental Policies (p. 301) for details on program satisfactory academic progress and course waivers.

MHS Learning Outcomes

Learning Outcomes

The learning outcomes for the MHS in HEOR are met through required and elective coursework, and a mentored research capstone. Upon successful completion of the program, students will have mastered the following; specifically, students will have the ability to:

- Use statistics and econometric methods (including statistical inferences, regression methods, and applied econometric methods) to solve public health problems
- Measure and calculate health outcomes; differentiate between methods of economic evaluation and practice use of economic evaluation
- Apply economic theory and mathematical microeconomic modeling within the field of health economics
- Evaluate and apply methods in health economics and economic evaluation in public health research
- Assess the analytical methods in health economics and economic techniques in the fields of health services research and health policy
- Cite and reference methods and techniques used within the field of health economics
- Execute a post-graduate career plan

CEPH-Defined Introductory Public Health Learning Objectives

The curriculum for the MHS program includes coursework that has been approved to meet the foundational public health knowledge learning objectives (p. 176) in the *Profession & Science of Public Health* and *Factors Related to Human Health* domains as required by the Council on Education for Public Health (CEPH).

Health Policy and Management, PhD

PhD Program Overview

The Department of Health Policy and Management offers a full-time PhD program (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/phd-in-health-policy-and-management/) with students choosing one of four areas of concentration in which to focus their study. The program trains its students to conduct original investigator-initiated research through a combination of coursework and research mentoring. The curriculum includes core courses that are common across the four HPM PhD concentrations, including courses in health policy, epidemiology, economics, and biostatistics, along with courses specific to each individual concentration. Student enrolled in the PhD program meet the Introductory Public Health knowledge learning objectives through the required curriculum.

- The Bioethics and Health Policy (https://publichealth.jhu.edu/academics/phd-in-health-policy-and-management/bioethics-and-health-policy/) concentration addresses the ethical issues relevant to public health policy, practice and research.
- The Health Economics and Policy (https://publichealth.jhu.edu/academics/phd-in-health-policy-and-management/health-economics-and-policy/) concentration addresses the concepts and methods of economic analysis to study how clinical and public health resources are and should be allocated.
- The Health Services Research and Policy (https://publichealth.jhu.edu/academics/phd-in-health-policy-and-management/health-services-research-and-policy/) concentration addresses the organization, financing and delivery of both curative and preventive services, and their impact on access, quality, outcomes and cost, particularly for the most vulnerable.
- The Health and Public Policy (https://publichealth.jhu.edu/academics/phd-in-health-policy-and-management/health-and-public-policy/) concentration addresses the development, implementation, analysis, and evaluation of public policies to prevent disease and injury, reduce inequalities, and promote the health and quality of life of populations.

Concentration in Bioethics and Health Policy

Concentration Director: Brendan Saloner, PhD (https://www.jhsph.edu/faculty/directory/profile/2929/brendan-saloner/)
The PhD concentration in Bioethics and Health Policy differs from most other bioethics doctoral programs in two important ways: first, it focuses on bioethics as it relates to moral questions in public health and health policy (rather than, for example, in clinical decision-making or bedside dilemmas); and, second, it provides rigorous training in quantitative and qualitative empirical research methods and expects the analysis of data to be part of the dissertation. Students and faculty in the concentration study and conduct independent empirical and normative research on ethical issues in public health practice, research, and policy such as: ethics and emergency preparedness, domestic and international research ethics, genetic screening policy, ethics and obesity prevention, ethics and infectious diseases, HIV screening, social justice and resource allocation.

Original doctoral research conducted by students in the bioethics program involves analyzing primary or secondary empirical data about specific areas of public health, health policy, of health research, and examining the ethical implications of the issue or study results. By the end of their PhD training, students are prepared to provide not only normative recommendations regarding ethics and public health policy but also are equipped to function as independent researchers, conducting empirical research related to bioethics, public health, and health policy.

Students in the Bioethics program complete the departmental core requirements, including courses in health policy, epidemiology, economics, and biostatistics. In addition, students in Bioethics also complete coursework in moral philosophy, applied bioethics and public health law. These requirements are satisfied, in part, through the Department of Philosophy of the Johns Hopkins University and Kennedy Institute of Ethics at Georgetown University. Generally, course work is completed in the first two years of the program. Students are required by the concentration to have a normative ethics chapter in their thesis in addition to the other chapters traditionally required. Students completing the manuscript option for the PhD will have one of their manuscripts focus on the normative aspects of their selected issue or results.

Concentration in Health Economics and Policy

Concentration Director: Matthew Eisenberg, PhD, MPhil (https://www.jhsph.edu/faculty/directory/profile/3217/matthew-d-eisenberg/)
Health economics is a field of study that applies the theoretical concepts an empirical methods of economic analysis to various issues throughout the health sector, such as understanding underlying patient, provider, and insurer behaviors and evaluating healthcare interventions and policies. The PhD concentration in Health Economics and Policy prepares doctoral students for conducting innovative research on the economics of health and healthcare.

The curriculum stresses a solid grounding in applied modern microeconomic theory, economic evaluation, quantitative methods, and econometrics applications, including PhD-level courses from the Department of Economics in the Krieger School of Arts and Sciences (KSAS). Incoming students must have prior training in linear algebra, multivariable calculus, and real analysis in preparation for the economics courses at KSAS. The curriculum offers a broad exposure to the health economics literature and public health disciplines and stresses the policy implications of these fields of research. Student research generally focuses on econometric analyses of hypotheses generated by economic theory or quantitative evaluation of the effectiveness of various interventions.

Concentration in Health and Public Policy

Concentration Director: Cass Crifasi, PhD, MPH (https://www.jhsph.edu/faculty/directory/profile/3089/cassandra-crifasi/)
Finding solutions to public health problems through the development, analysis, implementation, and evaluation of health policies is the focus of the PhD concentration in Health and Public Policy. Faculty and students consider a broad array of public health policies that affect health and safety. These include policies pertaining to food, alcohol, tobacco, firearms, inequality, housing, injury, transportation, and the environment. Students examine challenging public health problems and learn how political, social, economic, ethical, and legal factors affect health, and how health policy can address these problems. Students acquire skills that enable them to conduct rigorous research to inform policy solutions, effectively translate their scholarly work to policy and practice, and emerge as leaders in public health policy.

Faculty employ an interdisciplinary approach to their teaching, research, and practice which is reflected by their backgrounds in medicine, epidemiology, political science, sociology, law, environmental health, and the risk sciences. Through coursework, research, and practice, students across the concentration gain an understanding of the relationship between health and policy.

Within this concentration, students may focus their elective and dissertation studies in one of the following areas: environmental and occupational health policy, injury prevention and control, social policy and health, and the practice of prevention; other specialty areas may be developed in consultation with each student's adviser and concentration director.

Concentration in Health Services Research & Policy

Concentration Director: Jennifer L. Wolff, PhD, MHS (https://publichealth.jhu.edu/faculty/68/jennifer-l-wolff/)

The PhD concentration in Health Services Research and Policy provides a firm grounding in public health principles, research and evaluation methods, policy analysis and numerous content areas related to health and health services delivery and population health. The program at the Bloomberg School is one of the oldest and most respected of its type in the nation.

In this concentration, students acquire the conceptual and methodological tools needed to conduct research, program evaluation, and policy analysis and synthesis to advance the state of knowledge. The curriculum emphasizes the following areas: public and private sector health insurance and financing, organization and delivery of health care, methods for measuring and improving quality and safety of medical care, methods to measure personal and population health status, methods for assessing the impact of government health care policy on individuals and populations, and patient-centered outcomes research and comparative effectiveness research methods for assessing the impact of technology and treatments on patient outcomes. Emphasis is placed on special need populations, such as older adults, minorities, persons with mental illness and substance abuse, high burden diseases, and disabilities.

The concentration stresses the development of skills in research and analysis methods, as well as content knowledge. In addition to careers in academia, this concentration prepares students for leadership careers as health services researchers and health care policy analysts working in public or private agencies or organizations. Issues of relevance to the U.S. are emphasized. All students in the concentration will be exposed to a broad array of methods and content. In addition, it is expected that all students will select at least one methods sub-area (e.g., econometrics, advanced statistical methods, informatics, or qualitative analysis). It is also expected that all students will develop expertise in one or more content areas.

There are many research opportunities within the Department and elsewhere within the University and Health System. The Baltimore-Washington area is the home to the largest concentration of public and private health services research and health care policy analysis organizations in the world. Formal and informal relationships with these agencies, including research practicums, thesis collaborations, and internships are encouraged and facilitated.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Concentration in Bioethics and Health Policy Curriculum

Note, the timing and choice of some courses will be determined based on availability and individual needs.

Course	Title	Credits
First Year		
Summer Term		
XXX.XXX	Opioid Epidemic Awareness & Education	
XXX.XXX	Title IX: Sexual Assault Prevention	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**0**
First Term		
Required		
PH.140.621	Statistical Methods in Public Health I [1]	4
PH.300.721	Foundations in Health Policy I [1]	2
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
PH.700.603	Introduction to Ethical Theory	3
PH.552.601	Foundational Principles of Public Health [1]	.5
PH.552.612	Essentials of One Health	0.5
	Credits	**16**
Second Term		
Required		
PH.140.622	Statistical Methods in Public Health II	4
PH.300.722	Foundations in Health Policy II [1]	2
PH.306.655	Ethical Issues in Public Health	3
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease [1]	.5
PH.552.611	Globalization and Population Health [1]	.5
XXX.XXX	Health Policy/Public Health Term 2 Elective	5
	Credits	**16**
Third Term		
Required		
PH.140.623	Statistical Methods in Public Health III	4
PH.300.715	Advanced Research and Evaluation Methods in Health Policy [1]	4
PH.300.723	Foundations in Health Policy III [1]	2
PH.306.650	Public Health and the Law	3
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
PH.552.607	Essentials of Environmental Health [1]	.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health [1]	.5
XXX.XXX	Health Policy/Public Health Term 3 Elective	3
	Credits	**18**
Fourth Term		
Required		
PH.140.624	Statistical Methods in Public Health IV	4
PH.300.724	Foundations in Health Policy IV	1
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
PH.700.644	Justice Theory and Health	3
XXX.XXX	Health Policy/Public Health Term 4 Elective	7
	Credits	**16**
Second Year		
First Term		
Required		
PH.300.741	PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research	1
PH.300.840	Special Studies and Research in HPM	8
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
XXX.XXX	Moral and/or Political Philosophy Elective	3

XXX.XXX	Advanced Bioethics Course	3
	Credits	**16**
Second Term		
Required		
PH.300.840	Special Studies and Research in HPM	7
PH.300.870	The Research and Proposal Writing Process I	2
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
XXX.XXX	Moral and/or Political Philosophy Elective	3
XXX.XXX	Advanced Bioethics Course	3
	Credits	**16**
Third Term		
Required		
PH.300.840	Special Studies and Research in HPM	6
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
XXX.XXX	Moral and/or Political Philosophy Elective	3
XXX.XXX	Advanced Bioethics Course	3
	Credits	**16**
Fourth Term		
Required		
PH.300.840	Special Studies and Research in HPM	7
PH.306.861	Graduate Doctoral Seminar in Bioethics	1
PH.300.871	The Research and Proposal Writing Process II	2
XXX.XXX	Moral and/or Political Philosophy Elective	3
XXX.XXX	Advanced Bioethics Course	3
	Credits	**16**
	Total Credits	**130**

[1] Course meets one or more CEPH learning objectives (p. 176).

Note, all HPM PhD students are required to complete **one** of the following courses in Economics, based on their individual interests

Code	Title	Credits
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
The entire sequence noted below		
PH.313.653	Advanced Health Economics I	2
PH.313.654	Advanced Health Economics II	2
PH.313.655	Advanced Health Economics III	2
PH.313.656	Advanced Health Economics IV	2

Once students have completed all of the required and elective coursework, they must maintain a full-time registration (12+ credits per term) for the duration of their program. Students who have not yet passed the school-wide oral exam should register for 12 credits of PH.300.840 Special Studies and Research in HPM with their adviser to work on their thesis proposal. Once a student has passed the school-wide oral exam, they should register for PH.301.820 Thesis Research in Health Policy and Management.

Graduate Seminar in Bioethics

Students in their first two years will participate in PH.306.861 Graduate Doctoral Seminar in Bioethics a joint graduate student and postdoctoral fellows bioethics seminar at the Berman Institute of Bioethics.

Bioethics Course Requirement

All students in the bioethics concentration are required to take a total of 15 course credits in the field of bioethics. This must include at least one class in moral/political philosophy and at least two classes that are considered advanced bioethics classes. The 15 credits, as a whole, can be satisfied through a combination of JHSPH (including Masters in Bioethics) term-length bioethics courses (2-3 credits each) and/or semester-length courses either at the JHU Homewood campus or through the Kennedy Institute of Ethics at Georgetown (5 credits each). Generally, these requirements are completed during the second year of the program. Students are encouraged to enroll in at least one semester length courses as part of their course combination, but the specific course plan is to be determined by each student in consultation with the concentration director and advisor.

Special Thesis Requirements

Students in the bioethics concentration are welcome to write either a traditional thesis or a manuscript thesis. Additional guidelines for the thesis for students enrolled in the Bioethics and Health Policy concentration can be obtained from the Bioethics concentration director.

Concentration in Health Economics and Policy Curriculum

Note, the timing and choice of some courses will be determined based on availability and individual needs.

Course	Title	Credits
First Year		
Summer Term		
XXX.XXX	Opioid Epidemic Awareness & Education	
XXX.XXX	Title IX: Sexual Assault Prevention Course	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**0**
First Term		
First Term		
PH.140.651	Methods in Biostatistics I [1]	4
AS.180.600	General Equilibrium Theory [3]	3
AS.180.609	Core Mathematics for Economics [2, 3]	3
PH.300.721	Foundations in Health Policy I [1]	2
PH.552.601	Foundational Principles of Public Health [1]	.5
PH.552.612	Essentials of One Health	0.5
XXX.XXX	Economics 1st Term Elective	3
	Credits	**16**
Second Term		
PH.140.652	Methods in Biostatistics II	4
AS.180.601	Microeconomic Theory I [3]	3
PH.300.722	Foundations in Health Policy II [1]	2
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease [1]	.5

PH.552.611	Globalization and Population Health [1]	.5
XXX.XXX	Economics 2nd Term Elective	6
	Credits	**16**
Third Term		
PH.140.653	Methods in Biostatistics III	4
PH.140.664	Causal Inference in Medicine and Public Health I	4
AS.180.695	Microeconomic Theory Workshop [3]	3
PH.300.715	Advanced Research and Evaluation Methods in Health Policy [1]	4
PH.300.723	Foundations in Health Policy III [1]	2
PH.552.607	Essentials of Environmental Health [1]	.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health [1]	.5
	Credits	**18**
Fourth Term		
PH.140.654	Methods in Biostatistics IV	4
AS.180.695	Microeconomic Theory Workshop [3]	3
PH.300.724	Foundations in Health Policy IV	1
XXX.XXX	Economics 4th Term Elective	8
In addition to meeting the requirements for Satisfactory Academic Progress as defined by the Department of Health Policy and Management, students in the Health Economics concentration must complete the first-year KSAS Microeconomic Theory Workshop with a minimum grade of "B."		
	Credits	**16**
Second Year		
First Term		
PH.300.741	PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research	1
PH.309.716	Advanced Methods in Health Services Research: Analysis	3
PH.313.653	Advanced Health Economics I	2
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
PH.300.840	Special Studies and Research in HPM	2
XXX.XXX	Economics Advanced Term 1 Electives	3
	Credits	**16**
Second Term		
PH.300.870	The Research and Proposal Writing Process I	2
PH.313.654	Advanced Health Economics II	2
XXX.XXX	Economics Advanced Term 2 Electives	9
PH.300.840	Special Studies and Research in HPM	3
	Credits	**16**
Third Term		
PH.221.644	Econometric Methods for Evaluation of Health Programs	4
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.313.655	Advanced Health Economics III	2
XXX.XXX	Economics Advanced Term 3 Electives	5
PH.300.840	Special Studies and Research in HPM	2
	Credits	**16**
Fourth Term		
PH.309.720	Applied Econometrics for Health Policy Research	3
PH.313.656	Advanced Health Economics IV	2
PH.300.871	The Research and Proposal Writing Process II	2
XXX.XXX	Economics Advanced Term 3 Electives	6
PH.300.840	Special Studies and Research in HPM	3
	Credits	**16**
	Total Credits	**130**

1 Course meets one or more CEPH learning objectives (p. 176).
2 Core Mathematics for Economics meets for 2 weeks in Summer Term and once weekly in Term 1.
3 KSAS courses follow a semester schedule, and overlap multiple SPH terms. Please see JHU policy on multi-term courses (p. 646) for more information.

Note, all HPM PhD students are required to complete one of the following courses in Economics. The Advanced Health Economics sequence is required for students in the Health Economics concentration.

Code	Title	Credits
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
PH.313.653	Advanced Health Economics I	2
PH.313.654	Advanced Health Economics II	2
PH.313.655	Advanced Health Economics III	2
PH.313.656	Advanced Health Economics IV	2

Electives

Students should choose electives in consultation with the Concentration Director and their academic adviser to ensure adequate preparation for departmental exams. Names and availability of Homewood classes subject to change. Electives must include at least one PhD-level KSAS economics course.

All students are encouraged to choose from the following courses for their elective options, including at least one of the KSAS Applied Economics courses:

Code	Title	Credits
Health Economics Courses		
PH.221.617	Behavioral Economics in Health Decisions	2
PH.221.652	Financing Health Systems for Universal Health Coverage	3
Applied Economics Courses		
AS.180.371	Industrial Organization	3
AS.180.611	Economics of Uncertainty	
AS.180.622	Game Theory	
AS.180.632	Topics in Applied Microeconometrics	
AS.180.651	Labor Economics I	
AS.180.694	Applied Microeconomics Workshop	
Outcomes and Evaluation Courses		
PH.311.615	Quality of Medical Care	3

PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.340.620	Principles of Clinical Epidemiology	2
Biostatistics Courses		
PH.140.641	Survival Analysis	3
PH.140.655	Analysis of Longitudinal Data	4
PH.140.656	Multilevel Statistical Models in Public Health	4
PH.140.664	Causal Inference in Medicine and Public Health I	4
PH.140.655	Analysis of Longitudinal Data	4

Once students have completed all of the required and elective coursework, they must maintain a full-time registration (12+ credits per term) for the duration of their program. Students who have not yet passed the school-wide oral exam should register for 12 credits of PH.300.840 Special Studies and Research in HPM with their adviser to work on their thesis proposal; once a student has passed the school-wide oral exam, they should register for PH.301.820 Thesis Research in Health Policy and Management.

Health Economics and Policy Comprehensive Exam

Students take a comprehensive exam in health economics and policy at the conclusion of their second year. The exam has a written component and an oral component. For the written component, students are provided with a brief summary of a specific topic and given two days to write a seven-page, single-spaced research proposal on that topic which draws on the broad theoretical and empirical literature in health economics. For the oral component, students have an hour-long meeting with members of the economics faculty one to two weeks after the written exam to answer questions related to their specific written proposal and their general health economics knowledge. Students receive a copy of the prior year's written exam in advance in order to become familiar with the exam format.

The exam must be completed during the summer between second and third year at a time that is mutually convenient for students sitting for the exam and the faculty exam committee. In order to pass the exam, students must exhibit mastery of theory and methods in both the written and oral portions of the exam. If a student does not pass the comprehensive exam, a single retake is allowed; both the written and oral exams must be completed by the end of the second term in the third year.

Students who do not pass the health economics and policy comprehensive exam on the first attempt must meet with members of the exam committee to determine areas of weakness and create a plan approved by their adviser and the Health Economics and Policy Concentration Director. Students who fail the exam a second time will not be eligible to remain in the Health Economics and Policy Concentration. In exceptional circumstances, a student who has failed the exam a second time may request a transfer to a different HPM PhD Concentration. The student must formally apply and be admitted by the new concentration.

Health Economics and Policy Oral Exam Committee composition

Dissertations in health economics and policy require specialized expertise in econometrics and economic theory. To ensure that students will have access to appropriate advising, the list of proposed committee members for the department and school-wide oral exams must be approved by the Health Economics Concentration Director. Students wishing to change primary advisers after the department or school-wide preliminary oral exam must obtain permission from the Health Economics Concentration Director and the Department chair.

Concentration in Health and Public Policy Curriculum

Note, the timing and choice of some courses will be determined based on availability and individual needs.

Course	Title	Credits
First Year		
Summer Term		
XXX.XXX	Opioid Epidemic Awareness & Education	
XXX.XXX	Title IX: Sexual Assault Prevention	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**0**
First Term		
Required		
PH.140.621	Statistical Methods in Public Health I [1]	4
PH.300.721	Foundations in Health Policy I [1]	2
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
PH.552.601	Foundational Principles of Public Health [1]	.5
PH.552.607	Essentials of Environmental Health [1]	.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health [1]	.5
PH.552.612	Essentials of One Health	0.5
XXX.XXX	Elective or Strongly Recommended 1st Term course	3
	Credits	**17**
Second Term		
Required		
PH.140.622	Statistical Methods in Public Health II	4
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century	3
PH.300.722	Foundations in Health Policy II [1]	2
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease [1]	.5
PH.552.611	Globalization and Population Health [1]	.5
XXX.XXX	Elective or Strongly Recommended 2nd Term course	5
	Credits	**16**
Third Term		
Required		
PH.140.623	Statistical Methods in Public Health III	4
PH.300.715	Advanced Research and Evaluation Methods in Health Policy [1]	4
PH.300.723	Foundations in Health Policy III [1]	2
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.306.650	Public Health and the Law	3

XXX.XXX	Elective or Strongly Recommended 3rd Term course	3
	Credits	**17**
Fourth Term		
Required		
PH.140.624	Statistical Methods in Public Health IV	4
PH.300.724	Foundations in Health Policy IV	1
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.301.645	Health Advocacy	3
PH.306.662	Public Health Agencies: Law, Policy and Practice	3
XXX.XXX	Elective or Strongly Recommended 4th Term course	4
	Credits	**16**
Second Year		
First Term		
Required		
PH.300.741	PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research	1
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.300.840	Special Studies and Research in HPM	11
XXX.XXX	Advanced Elective or Strongly Recommended 1st Term course	3
	Credits	**16**
Second Term		
Required		
PH.300.870	The Research and Proposal Writing Process I	2
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.300.840	Special Studies and Research in HPM	7
XXX.XXX	Advanced Elective or Strongly Recommended 2nd term Course	6
	Credits	**16**
Third Term		
Required		
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.300.840	Special Studies and Research in HPM	6
XXX.XXX	Advanced Elective or Strongly Recommended 3rd term Course	6
	Credits	**16**
Fourth Term		
Required		
PH.300.871	The Research and Proposal Writing Process II	2
PH.301.861	Graduate Seminar in Health and Public Policy	1
PH.300.840	Special Studies and Research in HPM	10
XXX.XXX	Advanced Elective or Strongly Recommended 4th term Course	3
	Credits	**16**
	Total Credits	**130**

[1] Course meets one or more CEPH learning objectives (p. 176).

Note, all HPP PhD students must complete **one** of the following courses:

Code	Title	Credits
PH.180.629	Environmental and Occupational Health Law and Policy	4
PH.305.610	Issues in Injury and Violence Prevention	2
PH.305.684	Health Impact Assessment	3
PH.317.600	Introduction to the Risk Sciences and Public Policy	4

Note, all HPM PhD students are required to complete one of the following courses in Economics, based on their individual interests

Code	Title	Credits
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
The entire sequence noted below		
PH.313.653	Advanced Health Economics I	2
PH.313.654	Advanced Health Economics II	2
PH.313.655	Advanced Health Economics III	2
PH.313.656	Advanced Health Economics IV	2

All HPP students should choose electives in consultation with their academic adviser; students are encouraged to choose from the following courses for their elective options:

Code	Title	Credits
PH.300.650	Crisis and Response in Public Health Policy and Practice	3
PH.300.750	Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community	3
PH.305.684	Health Impact Assessment	3
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	3
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.550.601	Implementation Research and Practice	3

Once students have completed all of the required and elective coursework, they must maintain a full-time registration (12+ credits) for the duration of the program. Students who have not yet passed the school-wide oral exam should register for 12 credits of PH.300.840 Special Studies and Research in HPM with their adviser to work on their thesis proposal. Once a student has passed the school-wide oral exam, they should register for PH.301.820 Thesis Research in Health Policy and Management. Students are also encouraged to engage in a field-based practicum as part of their doctoral education.

Distributional Methods Course Requirements

During the second year, students complete at least two of the methods courses below (equaling at least 6 credits) in one of the following domains. The intent of this distributional methods requirement is to allow the student to develop a special area of methods expertise. Alternative methods courses require approval from the concentration director and the student's adviser. Note that, unless they are listed below, prerequisites for methods courses do not count towards the distributional methods requirement.

Code	Title	Credits
Social and Behavioral Methods		
PH.140.658	Statistics for Psychosocial Research: Structural Models	4
PH.330.657	Statistics for Psychosocial Research: Measurement	4
Design and Conduct of Population-Based Surveys		
PH.140.640	Statistical Methods for Sample Surveys	3
PH.340.717	Health Survey Research Methods	4
PH.380.712	Methods in Analysis of Large Population Surveys	3
Qualitative Research Methods		
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3
Key Advanced Methods for Policy Research		
PH.140.655	Analysis of Longitudinal Data	4
PH.140.656	Multilevel Statistical Models in Public Health	4
PH.140.665	Causal Inference in Medicine and Public Health II	3
PH.140.698	Spatial Analysis III: Spatial Statistics	4
PH.221.651	Econometrics I	4
PH.221.660	Systems Science in Public Health: Basic Modeling and Simulation Methods	3
PH.309.716	Advanced Methods in Health Services Research: Analysis	3
PH.309.720	Applied Econometrics for Health Policy Research	3

Graduate Seminar in Health and Public Policy

Students are expected to participate in the graduate seminar during their first three years of the program and are strongly encouraged to participate as much as their schedule allows in subsequent years of the program.

Specialty Areas

Students in Health and Public Policy may choose specialized areas identified to help students focus their electives in such a way as to best provide the background needed for their dissertation work. Those interested in taking additional graduate level coursework in policy or research methods for the social sciences as part of their electives requirement, should consider courses offered at the Krieger School of Arts and Sciences (KSAS) and at the School of Advanced International Studies (SAIS).

Environmental and Occupational Health Policy

Factors in the human environment that affect health require a multidisciplinary approach for evaluation. Courses from the Departments of Epidemiology, Environmental Health and Engineering, and Health Policy and Management are integrated to provide a foundation for the application of science to occupational and environmental policy. Evaluation, development and refinement of policies at local, state, federal and international levels are emphasized.

Code	Title	Credits
Strongly Recommended		
PH.180.601	Environmental Health	5
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.187.610	Public Health Toxicology	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.605	Methods in Quantitative Risk Assessment	4
PH.317.610	Risk Policy, Management and Communication	3
PH.317.615	Topics in Risk Assessment	2
PH.340.680	Environmental and Occupational Epidemiology	4
Additional Options		
PH.180.631	Environmental and Occupational Health Policy Seminar	3
PH.182.623	Occupational Health Management	3
PH.182.625	Principles of Occupational and Environmental Hygiene	4
PH.182.640	Food- and Water- Borne Diseases	3
PH.188.694	Health of Vulnerable Worker Populations	3
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2

Injury Prevention and Control

In conjunction with the Center for Injury Research and Policy, students focus on injuries of all types, including road traffic injuries, falls, burns, drowning and violence. The epidemiology of these injuries is assessed, and strategies to prevent injuries are formulated, implemented, and evaluated. Students who focus their electives in this area may also decide to complete the Certificate in Injury and Violence Prevention.

Code	Title	Credits
Strongly Recommended		
PH.221.612	Confronting the Burden of Injuries: A Global Perspective	3
PH.301.627	Understanding and Preventing Violence	3
PH.301.650	Crafting Effective Solutions to Gun Violence: Problem Solving Seminar	3
PH.305.610	Issues in Injury and Violence Prevention	2
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
PH.305.630	Transportation Policy, Equity and Health	2
PH.305.861	Graduate Seminar in Injury Research and Policy	1
PH.330.640	Childhood Victimization: A Public Health Perspective	3
PH.330.674	Suicide As A Public Health Problem	3
PH.410.625	Injury and Violence Prevention: Behavior Change Strategies	2

Social Policy and Health

Social policy and health examines how social policies influence public health and/or the relationship between healthcare policy and other social policies.

Code	Title	Credits
Strongly Recommended		
PH.305.630	Transportation Policy, Equity and Health	2
PH.308.650	Public Health Perspectives on U.S. Drug Policy	3
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	3
PH.318.636	Urban Policy	3
PH.410.611	Under Pressure: Health, Wealth & Poverty	3

Additional Elective Options		
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.300.650	Crisis and Response in Public Health Policy and Practice	3
PH.301.615	Seminar in Health Disparities	3
PH.306.660	Legal and Public Health Issues in the Regulation of intimacy	3
PH.306.670	Issues in LGBTQ Health Policy	3
PH.340.666	Foundations of Social Epidemiology	3
PH.410.663	Media Advocacy and Public Health: Theory and Practice	3
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.410.721	Translating Research into Public Health Programs and Policy	3
PH.410.722	Translating Research into Public Health Programs II	2

Practice of Prevention

The practice of prevention examines specific public health problems such as AIDS, tobacco, obesity, and violence and develops strategies for addressing problems through traditional and innovative policies.

Code	Title	Credits
Strongly Recommended		
PH.410.721	Translating Research into Public Health Programs and Policy	3
PH.410.722	Translating Research into Public Health Programs II	2
PH.550.601	Implementation Research and Practice	3
Additional Elective Options		
PH.300.650	Crisis and Response in Public Health Policy and Practice	3
PH.305.684	Health Impact Assessment	3
PH.340.683	Human Rights in Public Health Practice	2

Concentration in Health Services Research & Policy Curriculum

Note, the timing and choice of some courses will be determined based on availability and individual needs.

Course	Title	Credits
First Year		
Summer Term		
XXX.XXX: Opioid Epidemic Awareness & Education		
XXX.XXX	Title IX: Sexual Assault Prevention	
XXX.XXX	History of Baltimore Module	
XXX.XXX	Indigenous Peoples History Module	
XXX.XXX	Introduction to Online Learning	
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**0**
First Term		
Required		
PH.140.651 or PH.140.621	Methods in Biostatistics I [1] or Statistical Methods in Public Health I	4
PH.300.651	Introduction to the U.S. Healthcare System [2]	4
PH.300.721	Foundations in Health Policy I [1]	2
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
PH.340.721	Epidemiologic Inference in Public Health I [1]	5
PH.552.601	Foundational Principles of Public Health	.5
PH.552.612	Essentials of One Health	0.5
	Credits	**17**
Second Term		
Required		
PH.140.652 or PH.140.622	Methods in Biostatistics II or Statistical Methods in Public Health II	4
PH.300.722	Foundations in Health Policy II [1]	2
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease [1]	.5
PH.552.611	Globalization and Population Health [1]	.5
XXX.XXX	HSR Elective or Strongly Recommended 2nd Term Course	8
	Credits	**16**
Third Term		
Required		
PH.140.653 or PH.140.623	Methods in Biostatistics III or Statistical Methods in Public Health III	4
PH.300.723	Foundations in Health Policy III	2
PH.300.715	Advanced Research and Evaluation Methods in Health Policy [1]	4
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
PH.552.607	Essentials of Environmental Health [1]	.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health [1]	.5
XXX.XXX	HSR Elective or Strongly Recommended 3rd Term course	4
	Credits	**16**
Fourth Term		
Required		
PH.140.654 or PH.140.624	Methods in Biostatistics IV or Statistical Methods in Public Health IV	4
PH.300.724	Foundations in Health Policy IV	1
PH.309.635	Population Health: Analytic Methods and Visualization Techniques	3
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
XXX.XXX	HSR Elective or Strongly Recommended 4th Term course	7
	Credits	**16**
Second Year		
First Term		
Required		

PH.300.741	PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research	1
PH.300.840	Special Studies and Research in HPM	8
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
PH.309.716	Advanced Methods in Health Services Research: Analysis	3
XXX.XXX	Advanced Elective or Strongly Recommended 1st term Course	3
	Credits	**16**
Second Term		
Required		
PH.300.840	Special Studies and Research in HPM (XXX.XXX::Advanced Elective or Strongly Recommended 2nd term Course)	7
PH.300.870	The Research and Proposal Writing Process I	2
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
XXX.XXX	Advanced Elective or Strongly Recommended 2nd term Course	6
	Credits	**16**
Third Term		
Required		
PH.300.840	Special Studies and Research in HPM	6
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
XXX.XXX	Advanced Elective or Strongly Recommended 3rd term Course	6
	Credits	**16**
Fourth Term		
Required		
PH.300.840	Special Studies and Research in HPM	7
PH.300.871	The Research and Proposal Writing Process II	2
PH.309.861	Graduate Seminar in Health Services Research and Policy	1
XXX.XXX	Advanced Elective or Strongly Recommended 4th term Course	6
	Credits	**16**
	Total Credits	**129**

[1] Course meets one or more CEPH-defined learning objectives (p. 176).
[2] Also available 4th term

Note, all HPM PhD students are required to complete one of the following courses in Economics, based on their individual interests

Code	Title	Credits
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
The entire sequence noted below		
PH.313.653	Advanced Health Economics I	2
PH.313.654	Advanced Health Economics II	2
PH.313.655	Advanced Health Economics III	2
PH.313.656	Advanced Health Economics IV	2

All HSR&P students should choose electives in consultation with their academic adviser; students are encouraged to choose from the following courses for their elective options:

Code	Title	Credits
PH.140.664	Causal Inference in Medicine and Public Health I	4
PH.140.665	Causal Inference in Medicine and Public Health II	3
PH.221.651	Econometrics I	4
PH.300.750	Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community	3
PH.301.615	Seminar in Health Disparities	3
PH.308.630	U.S. Pharmaceutical Policy	3
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs	3
PH.309.605	Health Issues for Aging Populations	3
PH.309.620	Managed Care and Health insurance	3
PH.309.730	Patient Safety and Medical Errors	3
PH.311.615	Quality of Medical Care	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research	3
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.644	Intermediate Health Economics	3

Distributional Methods

During the second year, students will complete at least two of the methods courses below (equaling at least 6 credits) in one of the following domains. The intent of this distributional methods requirement is to allow the student to develop a special area of methods expertise. Approval for alternative methods courses will require approval from the program director and the student's adviser. Students are also encouraged to familiarize themselves with the School's certificate programs (http://www.jhsph.edu/academics/programs/certificates/), which can be combined with the PhD degree (and which, in the case of methods-oriented certificates, would in most cases meet the distributional requirements), particularly the Quality, Gerontology and Pharmacoepidemiology certificates.

Code	Title	Credits
Qualitative Research Methods		
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.224.697	Qualitative Research Practicum I: Partnerships and Protocol Development	2
PH.224.698	Qualitative Research Practicum II: Collecting Qualitative Data	2
PH.224.699	Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings	2
Or		
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3

PH.410.712	Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences	3
Additional Qualitative Courses		
PH.224.863	Doctoral Seminar in Research Methods in Applied Medical Anthropology I	4
PH.224.864	Doctoral Seminar in Research Methods in Applied Medical Anthropology II	4
PH.410.690	Ethnographic Fieldwork	3
Economic Evaluation		
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.603	Economic Evaluation III	3
PH.313.604	Economic Evaluation IV	3
PH.318.603	Applied Microeconomics for Policymaking	3
Econometrics		
PH.221.644	Econometric Methods for Evaluation of Health Programs	4
PH.221.651	Econometrics I	4
PH.309.720	Applied Econometrics for Health Policy Research	3
Advanced Statistical Analysis for Special Data Issues		
PH.140.655	Analysis of Longitudinal Data	4
PH.140.656	Multilevel Statistical Models in Public Health	4
PH.140.665	Causal Inference in Medicine and Public Health II	3
PH.340.696	Spatial Analysis I: ArcGIS	3
PH.340.697	Spatial Analysis II: Spatial Data Technologies	2
PH.140.698	Spatial Analysis III: Spatial Statistics	4
PH.140.699	Spatial Analysis IV: Spatial Design and Application	3
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
Informatics and Information Sciences		
PH.309.635	Population Health: Analytic Methods and Visualization Techniques	3
PH.315.700	Health Information Systems: Design to Deployment	3
PH.315.703	Leading Change Through Health Informatics	3
PH.315.707	Introduction to Biomedical and Public Health Informatics	3
PH.315.708	HIT Standards and Systems Interoperability	3
Social and Behavioral Measurement Methods		
PH.140.658	Statistics for Psychosocial Research: Structural Models	4
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.410.615	Research Design in the Social and Behavioral Sciences	3
Epidemiologic Perspective on Research Design & Analysis		
PH.340.682	Pharmacoepidemiology Methods	3
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.340.769	Professional Epidemiology Methods	4
Design and Conduct of Population-Based Surveys		
PH.140.640	Statistical Methods for Sample Surveys	3
PH.340.717	Health Survey Research Methods	4
PH.380.711	Issues in Survey Research Design	3
PH.380.712	Methods in Analysis of Large Population Surveys	3

Once students have completed all of the required and elective coursework, they must maintain a full-time registration (12+ credits each term) for the duration of their program. Students who have not yet passed the school-wide oral exam should register for 12 credits of PH.300.840 Special Studies and Research in HPM with their adviser to work on their thesis proposal. Once a student has passed the school-wide oral exam, they should register for PH.301.820 Thesis Research in Health Policy and Management.

HPM PhD Requirements

PhD Program Milestones and Timeline

The following is an estimated timeline for PhD students based on the average length of the program. This timeline may change based on individual circumstances.

Year 1 Milestones

- Complete 1st year required coursework
- Complete TA training module
- Complete PhD qualifying exam

Year 2 Milestones

- Complete 2nd year required and elective coursework
- Meet with adviser regarding individual development plan (IDP) and research proposal
- Satisfy department's research hours requirement
- Satisfy department's TA requirement

Year 3 Milestones

- Defend research proposal at Departmental and School-wide Oral Exams
- Identify Thesis Advisory Committee

Year 4 Milestones

- Meet with Thesis Advisory Committee
- Complete thesis research
- Defend and graduate

Department PhD Core Curriculum

All PhD students must complete the Departmental core courses. These courses are incorporated into the concentration requirements noted earlier. Students are also expected to take methods courses relevant to the field of their thesis research (e.g., courses in ethics, history, political science, economics, epidemiology, and/or advanced courses in biostatistics).

Code	Title	Credits
PH.300.721	Foundations in Health Policy I	2
PH.300.722	Foundations in Health Policy II	2
PH.300.723	Foundations in Health Policy III	2
PH.300.724	Foundations in Health Policy IV	1
PH.300.741	PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research	1
PH.300.715	Advanced Research and Evaluation Methods in Health Policy	4
PH.300.870	The Research and Proposal Writing Process I	2

PH.300.871	The Research and Proposal Writing Process II	2
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
And one of the following courses/course sequences in economics		
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
The entire sequence noted below		
PH.313.653	Advanced Health Economics I	2
PH.313.654	Advanced Health Economics II	2
PH.313.655	Advanced Health Economics III	2
PH.313.656	Advanced Health Economics IV	2

Residency & Course Distribution Requirements

The total number of course credits to be earned depends upon individual concentration requirements. But, to meet the Residency requirement, students must complete a minimum of 64 credits of didactic courses in four consecutive terms. When general and program-specific requirements total less than 64, the difference may be made up in electives. Thesis Research (820 series) may not be included in the count, but special studies earning credit that is part of a concentration's requirements only (840 series) are admissible.

The School's Policy and Procedure Memorandum (PPM) overseeing all PhD programs require that *at least 18 credits* of formal coursework must be completed *outside* the student's primary department. Among these 18 credit units, no fewer than three courses must be completed in two or more departments of the Bloomberg School of Public Health. The remaining outside credit units may be earned in any department or division of the University.

PhD students who have completed a master's program at the Bloomberg School of Public Health may apply 12 credits from that program toward this School requirement. Students must request this application of credits in a formal letter. Contact the HPM Office of Academic Affairs for further information.

Full-time PhD registration

The Department is firmly committed to full-time PhD doctoral education. The Department's policy requires a full-time registration for the duration of the student's program. Students should register for a minimum of 16 credits per term during the first year of the program. This will fulfill the School's residency requirement of four consecutive terms of 16-credits each.

The Department strongly discourages PhD students from registering for more than 18 credits in any one academic term unless required by their concentration. Any decision to register for more than 18 credits should be carefully considered and discussed with the student's adviser prior to registering.

Once a student has completed all of their required or formal coursework, they must maintain a full-time 12 credit per term registration. Students who have not yet successfully passed the School-wide Preliminary Oral Exam should register for special studies credits with their adviser while working on their thesis proposal. Once the School-wide Preliminary Oral Exam has been successfully passed, students should register for thesis research credits.

Qualifying Exam

PhD students are eligible for the departmental qualifying exam upon successful completion of the first year-required courses while maintaining the minimum GPA requirement. All students matriculating in September are expected to sit for the exam at the end of the first year. The exam is offered every June. The Academic Policy and Admissions Committee (APAC) and the PhD Exam Committee will consider exceptions on a case-by-case basis. The HPM PhD Qualifying Exam Guidelines can be found on the HPM doctoral portal page (portal login required).

Research Hours

PhD students are required to engage in at least two research projects to understand different research approaches. While students are encouraged to work within the department, students are free to pursue opportunities of interest throughout the School, University or off-campus.

The research hours can involve participation in any of the following aspects of research, including, but not limited to: elements of research design (literature review and development of the conceptual framework of a study); community development and liaison activities; community needs assessment and its related social, epidemiological, behavioral, or political diagnosis; development and piloting of health interventions or materials; quantitative or qualitative data collection; data analysis and interpretation; policy analysis; literature reviews; manuscript preparation; grant preparation; and any other form of research approved by the adviser.

Students are expected to engage in at least two different research tasks, which may be related to a single study or two separate studies. Up to 50% of the required hours can be accomplished through off -campus work, as long as the adviser has approved the work. A minimum of 300 hours total split over both projects should be used as a guideline.

The research hours must be met prior to scheduling the Departmental Preliminary Oral Exam. The Department, through submission of the Research Hours Form to the HPM Office of Academic Affairs, will monitor completion of this requirement. The form is available on the HPM doctoral portal page (portal login required.)

TA Educational Experience

All PhD students are required to serve as a full-time teaching assistant (TA) for *six* Health Policy and Management courses while enrolled in the PhD program. The department strongly values this educational experience and believes that these skills are critical components to a PhD education.

The following restrictions apply to the experience:

- Only courses offered by the Department of Health Policy and Management can be used to meet the requirement.
- Courses must be for two or more credits offered during the traditional 8-week term or as part of the summer MPH curriculum.

Courses offered in an Institute (summer, fall or winter) may not be used to fulfill the requirement.

PhD students may occasionally have primary instructor responsibilities in Johns Hopkins graduate or undergraduate courses while enrolled in the PhD program. In these situations, a student may request a one-for-one substitution to the TA requirement. Students requesting the substitution should submit a written request, including a copy of the course syllabus and letter of support from their adviser to the HPM Office of Academic Affairs.

Online paperwork to confirm completion of this requirement must be submitted and approved by the course instructor prior to the start of the term in which the course is offered. The link to the online form will be forward to an identified student by the HPM Office of Academic Affairs.

Once the six course requirement has been met, PhD students serving as a TA in HPM course(s) will receive payment for their efforts.

Individual Development Plan (IDP)

The Individual Development Plan (IDP) is a mechanism for self-reflection as well as a communication and planning tool for the student and their faculty adviser and mentor(s). The goal of the IDP is to support the student's successful performance in the program and in attaining readiness for their intended future career. To this end, the IDP creates a structure for the student to:

1. assess current skills, interests, and strengths;
2. make a plan for developing skills to meet academic and professional goals; and
3. communicate and collaborate with supervisors, advisers, potential employers, and mentors about evolving goals and related skills.

Rising HPM 2nd year PhD students will receive instructions on preparing the IDP after successful completion of the 1st year qualifying exam. Students are required to complete the self assessment and the IDP and meet and discuss with their adviser prior to submission of their first progress report due in the fall of the 2nd year. Third and 4th year students will revisit their IDP and discuss with their adviser each year at the submission of their yearly progress report.

Student Progress Report

The Department is committed to assisting students make steady and timely progress through the PhD program. To facilitate this process, all PhD students are required to submit regular progress reports to the HPM Office of Academic Affairs.
Students who have passed the written qualifying exam, but have not yet passed their School-wide Preliminary Oral Exam, must submit a progress report on December 1 and June 1 each year until they have passed their School-wide Preliminary Oral Exam. The report must be reviewed, discussed and approved by the student's adviser prior to submission.

Once a student has passed their School-wide Preliminary Oral Exam, a yearly progress report is submitted to the HPM Office of Academic Affairs until the program is complete. The progress report is due each year on June 1st. The report must be reviewed and discussed with the student's adviser prior to submission.

Preliminary Oral Exams

Departmental

The Departmental Preliminary Oral Exam takes place before the School-wide Preliminary Oral Exam. The Departmental Exam may not take place until after the successful completion of the departmental qualifying exam. The format of the exam is similar to the School-wide Preliminary Oral Exam and is intended to determine if the student is academically prepared to pass the School-wide Preliminary Oral Exam and carry out independent research.

The exam requires the student to prepare a thesis proposal that will be examined by the faculty exam committee. The HPM Departmental Preliminary Oral Exam committee consists of a minimum of three faculty members; one must be the student's adviser. A fourth alternative committee member should be identified and may choose to participate in the exam. Guidelines for the Departmental Preliminary Oral Exam can be found on the Department's portal page (portal login required).

School-wide

The School-wide Preliminary Oral Exam takes place after the student has successfully completed the departmental qualifying exam and the Departmental Preliminary Oral Exam. The purpose of this examination is to determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest.

The examiners will be concerned with the student's capacity of logical thinking, breadth of knowledge in relevant areas, and ability to develop and conduct research leading to a completed thesis. While the specific proposal serves as a vehicle for determining the student's general knowledge and research capacity, this examination is not intended to be a defense of a specific proposal. The student will be expected to defend the public health significance of the proposal as well as the methodologies use to evaluate the problem.

The exam should be taken at the earliest feasible time, before significant engagement in thesis research and must not take place until after the Departmental Oral Exam has been successfully passed. If the student fails the Preliminary Oral Exam and is permitted re-examination, they must be re-examined within one year.

Extension Request to Sit for Oral Exams

The School's PPM governing the PhD program requires students to sit for the School-wide Preliminary Oral Exam prior to the start of their 4th year in the program. Failure to meet this deadline necessitates the submission of an extension request by the student to both the Department and the School before they are permitted to continue in the program.

An initial request for an extension of time to sit for the oral exams must be submitted at least two months prior to the start of the 4th year in the program and may not exceed two terms.

The request is first submitted to the HPM APAC Student Matters Subcommittee for review, and if approved, is forwarded to the Student Matters Subcommittee of the School's Committee on Academic Standards (CAS). All requests must include the following information or will not be considered:

- A letter of request, initiated and signed by the student, stating the rationale for the request
- A supporting letter signed by the advisor
- Timetable and plan developed by the student in collaboration with the student's advisor and members of the thesis advisory committee that provide specific milestones from completion; agreement to this plan should be indicated in writing by member(s) of the thesis advisory committee
- A (student) copy of the current transcript
- If the HPM APAC Student Matters Subcommittee approves the request, a supporting letter from the Department will be included in the request that is forwarded to the school for final approval.

If the extension is granted, the student and advisor, in cooperation with the HPM Office of Academic Affairs, must provide evidence of progress at intervals determined by the applicable school subcommittee, not to exceed 90 days, toward satisfying the milestones specified in the plan for completion. Failure to meet the specified milestones according to the prescribed timetable for completion may result in further action. Requests for a second extension beyond that of the initial extension are taken very seriously by the Department and CAS and require extension documentation.

Thesis Advisory Committee

Within three months of passing the School-wide Preliminary Oral Exam, every doctoral student must identify a thesis advisory committee. This committee, consisting of the student's adviser and at least two other faculty members from either inside or outside the Department, will meet with the student at minimum once a year until the student has graduated to evaluate the student's work and progress.

Each student is required to submit a written summary report to the advisory committee prior to the committee's meeting. This approved summary report will be submitted to the Department each June with the annual progress report. A sample of the summary report can be found on the Department's portal page (portal login required).

Thesis Guidelines

All PhD students must complete an original investigation presented in the form of a thesis. The thesis must be based on original research, worthy of publication, and acceptable to the Department and to a committee of faculty readers. During the student's application process, various research ideas may have been discussed with faculty members. However, each student's thesis proposal must be developed, reviewed and found acceptable to Departmental faculty while enrolled as a doctoral student at the BSPH.

PhD students in HPM have two options for the format of the thesis:

- The traditional doctoral thesis consists of a statement of the problem and specific aims; a literature review; data and research methods; analyses and results; and a discussion of findings and their implications. The form these will take reflect the specific academic discipline or orientation guiding the student's research.
- The manuscript-oriented thesis is an alternative to the traditional thesis. The manuscript thesis consists of a total of three (or more) papers, linked to the student's research topic.

The decision on which format to follow should be made at the time of the Departmental Preliminary Oral Exam. If, during the writing process, the student wishes to change formats, the student must seek approval for this change from their faculty adviser and thesis committee

The Department has developed the following guidelines to help a student determine which of these options is best for their particular research. Students should discuss the advantages and disadvantages of each option with their adviser before determining a strategy.

Traditional Thesis Guidelines

The traditional doctoral thesis generally consists of an abstract, five chapters, references, and any appendices. The outline of chapters below is merely a guide. The page numbers are rough estimates, and the form of the chapters will vary, reflecting the academic discipline or orientation of the student's research.

- **Abstract**: The abstract is a short overall summary of the work. It lays out the purpose(s) and aims of the study, the methods, and the key results and implications. The abstract generally is 2-3 double spaced pages.
- **Chapter I: Introduction: Statement of the problem and specific aims**. This chapter, which tends to be relatively short (5-6 double spaced pages), provides an introduction to the thesis. It describes briefly why this work was undertaken, what background conditions or data suggested it was an important problem, and what, then, this project was intended to accomplish.
- **Chapter 2: Literature Review**. The literature review summarizes existing literature that informed the thesis research. It generally is organized topically. The literature review tends to be a fairly detailed review, particularly for those topics most directly related to the content and methods of the thesis. The literature review tends to be 30-60 page in length.
- **Chapter 3: Methods**. The content of the methods chapter varies tremendously with the methodological approach taken by the student for the thesis research. With traditional empirical studies, it will generally include the specific aims, research questions, and/or hypothesis; a description of the source of study data, a description of the study instrument and its development, if relevant; a description of secondary data obtained, if relevant; analytic methods, including data cleaning, creation of a data set, creation of variables and/or qualitative codes, types of analyses done; and human subjects issues. The methods chapter ranges from 20-40 pages.
- **Chapter 4: Results**. The results chapter reports the main findings of the thesis. It often is organized by research question or specific aim or hypothesis, but need not necessity follow this format. The results chapter ranges from 25-50 pages.
- **Chapter 5: Discussion of results and policy implications**. The discussion chapter both summarizes key findings and discusses findings in light of existing literature and in light of their policy implications. Also included generally are a description of the study's limitations and implications for future research. The discussion chapter is generally 25-50 pages.
- **References**. A listing of all citations used for the thesis must be provided. The Department allows any standard format for references.
- **Appendices**. Appendices can be used for many purposes. They can include study instruments, if relevant; they can include additional tables not included in the main body of the thesis; also to be included must be a copy of the student's CV. The traditional thesis should be able to 'stand alone' without appendices, however, so results should never be put in appendices that are key to the study's main findings.

Manuscript-Oriented Thesis Guidelines

The manuscript thesis consists of the following:

- A total of three (or more) papers, linked to the student's thesis topic. One of these papers may be a literature review, providing a comprehensive critical review, if it is suitable for publication.
- A chapter that integrates and discusses the findings reported in the manuscripts. It should include a discussion of the conclusions of the research, and should make recommendations for further studies.
- An appendix outlining in detail the study methods and any accompanying data tables necessary to understand the data.

A manuscript-oriented thesis must also meet the following criteria:

- The PhD student must be the first author on the three manuscripts used to satisfy this requirement;
- No manuscript will be accepted as part of the thesis if it was submitted for publication before the student passes the School-wide Preliminary Oral Exam; and,
- Co-authors should be determined based on the criteria (http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html) for authorship developed by the International Committee of Medical Journal Editors (ICMJE)

Role of Faculty Adviser

The adviser's role is to facilitate successful completion of the doctoral thesis. Students should refer to the HPM policy for advising for general guidelines about the frequency of meetings between advisers and students during the thesis research and writing period. The thesis must reflect the student's independent and original work. The adviser can and should provide ongoing and critical feedback, but the research must be that of the student.

Even if the adviser (or another committee member) serves as a co-author on a manuscript, the manuscripts must be viewed first and foremost as fulfilling the student's needs in the thesis process, with publication as a secondary goal. Advisers or other committee members who are co-authors may not undertake the first draft of any portions of the manuscripts nor substantial re-writes. Whether an adviser will be co-author on any manuscript should be decided early in the thesis writing process.

Thesis Approval

PhD advisers must provide official approval of the final draft of a student's thesis prior to dissemination to the other members of the Final Oral Examination Committee. A signed Thesis Approval Form (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx) (portal login required) must accompany each copy of the thesis distributed. Students should provide the final copy of the thesis to the readers at least four weeks prior to the Final Oral Examination.

Thesis Readers and Final Examination Committee

Paperwork (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx) (portal login required) to establish the formal final examination committee is submitted by the Department to the Office of Records and Registration at least one month in advance of the final defense.

Final Public Seminar and Closed Oral Defense of Thesis

A formal, public seminar and closed oral defense of the thesis before a committee of the faculty is one of the final steps for a PhD candidate. The public seminar and oral thesis defense are typically held on the same day with the seminar being conducted first, followed immediately by the closed defense before the approved final exam committee.

The public seminar generally lasts approximately 45 minutes to 1 hour, and the closed defense generally lasts approximately 60-90 minutes. Members of the Final Oral Examination Committee are required to attend both the seminar and the closed defense. The Office of Records and Registration will post the final defense date and location in the Public Health calendar. Students are strongly encouraged to attend the public seminars of their fellow students whenever feasible.

The Final Oral Examination Committee judges all components of the thesis to be either: Acceptable, Acceptable with Revisions, or Unacceptable. This is the case for both a traditional thesis and a manuscript-oriented thesis. Students, with guidance from their adviser, will rework their thesis until all components are judged Acceptable.

Taking the Final Oral Examination and receiving an unconditional pass does not release the student from further responsibilities to complete the degree requirements. All students must stay continually registered until the degree requirements have been completed, including receipt of the thesis acceptance letters and electronic submission of the thesis to the Sheridan Library. Once everything has been submitted, the student will be reported to the Committee on Academic Standards and be considered complete.

Online Submission of Thesis to Sheridan Library

- ETD Electronic Submission (https://etd.library.jhu.edu/)
- Formatting Instructions (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/)
- Sheridan Library contact: dissertations@jhu.edu
- Publication Embargo: Students are allowed to choose an embargo period of 0, 1, 2, 3, or 4 years during the ETD submission. This means that the Sheridan Library will withhold publication of the thesis for the period of time chosen. The Sheridan Library does make some details of the thesis public (student name, degree, thesis title, abstract) during the embargo period, but the actual thesis is hidden from view.
- The Department of Health Policy and Management does not require submission of an electronic or paper copy of the final thesis document to the department. However, students must forward the thesis acceptance confirmation from the Sheridan Library to the HPM Office of Academic Affairs to certify completion of all program requirements.

Extension Request for Completion of Degree Requirements

The School's PPM governing the PhD program requires students to defend their thesis within seven years of matriculation. Failure to meet this deadline necessitates the submission of an extension request by the student to both the Department and the School before they are permitted to continue in the program.

A request for an extension of time to complete the degree must be submitted at least two months prior to the conclusion of the 7th year in the program and may not exceed four terms.

The request is first submitted to the HPM APAC Student Matters Subcommittee for review, and if approved, is forwarded to the Student Matters Subcommittee of the School's Committee on Academic Standards (CAS). All requests must include the following information or will not be considered:

- A letter of request, initiated and signed by the student, stating the rationale for the request
- A supporting letter signed by the advisor
- Timetable and plan developed by the student in collaboration with the student's advisor and members of the thesis advisory committee that provide specific milestones from completion; agreement to this plan should be indicated in writing by member(s) of the thesis advisory committee
- A (student) copy of the current transcript
- If the HPM APAC Student Matters Subcommittee approves the request, a supporting letter from the Department will be included in the request that is forwarded to the school for final approval.

If the extension is granted, the student and advisor, in cooperation with the HPM Office of Academic Affairs, must provide evidence of progress at intervals determined by the applicable school subcommittee, not to exceed 90 days, toward satisfying the milestones specified in the plan for completion. Failure to meet the specified milestones according to the prescribed timetable for completion may result in further action. Requests for a second extension beyond that of the initial extension are taken very seriously by the Department and CAS and require extension documentation.

HPM PhD Program Policies

HPM PhD Student Work Space

The Department provides shared student office space for full-time PhD students. Each full-time PhD student in the Department will have access to a workstation and a locked drawer file cabinet in one of the identified shared office spaces. The workstation is not dedicated to an individual student; those using the office will select a station that is available when they use the space (similar to a parking lot). Any materials that the student wishes to leave in the office must be locked in their assigned file cabinet.

The HPM Office of Academic Affairs will evaluate student workspace yearly. Incoming students will be assigned keys at orientation. Upon graduation, students must return the key to the Sr. Academic Coordinator in order to be certified for graduation. Students are responsible for both the room and file cabinet keys. Lost keys should be reported to the Sr. Academic Coordinator immediately; replacement keys are subject to a $10 replacement fee.

Note: Students working as Research Assistants on a funded grant which requires analyses of restricted/confidential data may be eligible for other office space arrangements. Faculty responsible for projects in this category must submit formal requests to the HPM Administrator stating the need for individual space.

HPM Grant Proposal Submission Process

Most sources of outside the Department or School funding for PhD education requires the submission of a formal grant proposal. HPM works closely with students in submitting these proposals and managing the award if and when it is awarded.

If a student is considering submitting a grant proposal, they must contact the Department's Grants and Contracts Analyst who will work with them on the application process. All application/proposals that are submitted to external funding agencies must be reviewed and approved by the Office of Research Administration (ORA). The department requires that all application materials be submitted a *minimum of 8 business days before the grant due date.* Students should seek guidance from the Grants and Contracts Analyst for specific due dates.

Once a grant has been submitted, the student must be available by e-mail or phone at least 72 hours after submission in case any questions arise.

IRB Approval

The Institutional Review Board (IRB) supports students in applying ethical principles in their research interactions with humans and/or their data, regardless of whether IRB review is required.

All HPM PhD research must undergo IRB review and students must receive approval or an approved exemption within three months of passing the School-wide Preliminary Oral Exam. Students should consult the IRB website (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/student-research/) and specifically review the Student Primer and FAQ that are posted on that page.

PhD students are required to submit the "Thesis Research Documentation Form" *within three months* of passing the School-wide Preliminary Oral Exam. This for requires the signature of the HPM Senior Academic Coordinator in addition to the student and advisor prior to submission. Forms should be submitted to the HPM Office of Academic Affairs who will forward the completed form to the appropriate school office. Forms submitted directly to the school office without a departmental signature will not be accepted.

PhD Program Learning Outcomes

HPM PhD Departmental Competencies

Upon successful completion of the PhD program in Health Policy and Management, students in each of the four concentrations will have mastered the following core competencies; specifically, students by the end of the program will have the ability to:

- Analyze the nature, scope and determinants of major health policy problems by applying conceptual frameworks from key academic disciplines, formulating testable hypotheses, and identifying appropriate interventions based on an understanding of the existing evidence base.
- Critique the policymaking process, including the underlying roles of legislation, regulation, litigation, and advocacy; the differences between federal, state, and local policies; and the influence of academic research in the policy formulation and evaluation processes.
- Assess the organization and financing of public health and/or medical services and critique their impact on access and use, quality of care, costs, and outcomes.
- Apply appropriate rigorous empirical methods to the evaluation of health policy, including a well-rounded foundation of the methods and tools of public health.
- Communicate scientific findings effectively through written and oral methods to technical and lay audiences, demonstrating an ability to interpret study limitations and prior research.
- Conduct research in accordance with the highest ethical standards, scientific integrity, and interpersonal collegiality.

Concentration in Bioethics and Health Policy Competencies

Upon successful completion of the PhD concentration in Bioethics and Health Policy, students will have mastered the following core competencies; specifically, students by the end of the program will have the ability to:

- Recognize moral problems in public health practice, research, and health policy, and identify which ethical principles or foundational ethical theories are at stake and potentially in tension.
- Analyze moral problems in public health practice, research, and health policy, identify and communicate morally compelling lines of argument that may include: building on existing ethical frameworks, further specification of an existing framework or ethical principle; further specification of an ethical norm or formulating a novel ethical norm.
- Use relevant literature from moral and political philosophy and public health ethics in analyzing moral problems in public health practice, research, and health policy.
- Identify when, why, and how empirical scholarship can make a contribution to bioethics and how data can be relevant to normative analysis.
- Construct public policy arguments informed by the analysis of empirical and normative scholarship in bioethics.

Concentration in Health Economics and Policy Competencies

Upon successful completion of the PhD concentration in Health Economics and Policy, students will have mastered the following core competencies; specifically, students by the end of the program will have the ability to:

- Apply key concepts in microeconomic theory, including how the behavior of individual households and firms affects the market supply and demand of goods and services and how market failures arise under certain circumstances.
- Analyze key theoretical concepts in health economics, including the underlying determinants of health, patient demand for healthcare services, and the organization and financing of healthcare services, with an emphasis on critiquing the effects of alternative forms of financing and organizing healthcare services on cost, quality, access, and overall public health.
- Apply key concepts in applied econometrics, including both sophisticated empirical models for healthcare utilization, expenditures, and health outcomes.
- Conduct original research in the field of health economics, ranging from conception of innovative ideas through study design, selection and application of appropriate analytic methods and data; interpretation of results; and both written and oral dissemination of findings.

Concentration in Health and Public Policy Competencies

Upon successful completion of the PhD concentration in Health and Public Policy, students will have mastered the following core competencies; specifically, students by the end of the program will have the ability to:

- Demonstrate how to identify, describe, and analyze a public health problem, and recommend an appropriate policy solution to address it (e.g., legislative, regulatory, judicial, organizational).
- Describe the steps of the policymaking process, including problem setting, formulation, implementation, analysis, and evaluation.
- Critically compare and apply theories of the policy process to the study of public health problems.
- Identify the major institutions, sectors, and stakeholders involved in the policymaking processes at the global, federal, state, and local levels.
- Effectively translate and communicate public health policy research, in both oral and written forms, to policymakers, key stakeholders, and the public.

Concentration in Health Services Research & Policy Competencies

Upon successful completion of the PhD concentration in Health Services Research and Policy, students will have mastered the following core competencies; specifically, students by the end of the program will have the ability to:

- Understand key concepts and developments in the field of health services research, including issues relating to care quality and safety, access, cost, and the role and effects of alternative forms organizing and financing services.
- Integrate and critique theoretical and empirical literature in the formulation of an original and significant health services research and policy research question with clear and testable hypothesis.
- Evaluate the strengths and weakness of experimental, quasi-experimental and observational study designs and be able to select the most appropriate design for a specified research question.
- Identify, evaluate and determine the most suitable data source for a specified research question (data sources may include existing data sources or the development of a primary data collection protocol utilizing quantitative or qualitative methods).
- Select and implement appropriate analytic techniques from advanced epidemiological, statistical, economic, and qualitative or survey methods to examine a specified research question.

CEPH-Defined Introductory Public Health Learning Objectives

The PhD program includes coursework that has been approved to meet the Introductory Public Health Learning Objectives (p. 176) required by the Council on Education for Public Health (CEPH) for academic programs.

Health Policy and Management, DrPH (Tsinghua)

Tsinghua DrPH Program Overview

The JHU-Tsinghua Doctor of Public Health (https://www.jhsph.edu/departments/health-policy-and-management/degree-programs/drph-in-health-policy-and-management/jhu-tsinghua-drph-program/) program is a cohort-based program administered collaboratively between the Department of Health Policy and Management at Johns Hopkins University and the Institute for Hospital Management at Tsinghua University, with support from the Capital Healthcare Group. Students undertake the Healthcare Management and Leadership track within the Health Policy and Management concentration of the School-wide DrPH program. Courses for the cohort program are offered in Beijing, China and Baltimore, Maryland, with limited online coursework. At this time, no further cohorts are being enrolled.

The mission of the DrPH program within the Bloomberg School of Public Health is to prepare graduates to advance the public's health through the integration and application of a broad range of knowledge and skills in leadership, practice, policy analysis, management, and professional communication, coupled with preparation in a specific public health field.

Healthcare Management and Leadership Overview

The focus of the Healthcare Management and Leadership Track is on measuring, monitoring and improving the clinical and financial performance of health services organizations, as well as training leaders for organizational change. The track curriculum is based on the Malcolm Balridge Healthcare Criteria for Performance Excellence framework.

Concurrent MHS in Health Finance and Management Option

DrPH students currently enrolled in the JHU-Tsinghua program have the opportunity to pursue a Master of Health Science (MHS) with a focus in Health Finance and Management concurrently with their doctoral program. The administrative requirements and certifications by the faculty as set forth in the existing Policy and Procedure Memoranda apply to the doctoral degree requirements of the concurrent Doctoral/Master of Health Science program in Health Finance and Management.

Students must be accepted into the JHU-Tsinghua DrPH program within the Department of Health Policy and Management. With the program's approval, the student may submit an application to the concurrent Master of Health Science program in Health Finance and Management.

Core course requirements consist of successful (graded) completion of the core courses: these classes should be taken over the course of the student's first two or three years in the DrPH program. Sixty-four total credits of coursework are required.

Additionally, students must successfully pass the written comprehensive examination. Upon satisfactory completion of these requirements, the student is eligible for award of the Master of Health Science in Health Science in Health Finance and Management degree.

Should a student not complete the DrPH degree, the MHS degree may be awarded. Students must complete all of the core course requirements, and a final graded paper. The degree will be awarded upon the recommendation of the Department.

Program Administration

Program Director: Leiyu Shi (https://www.jhsph.edu/faculty/directory/profile/640/leiyu-shi/), DrPH, MBA, MPA
Director, HPM Office of Academic Affairs: Judith L. Holzer, MBA
Senior Academic Program Coordinator: Mary Sewell

Tsinghua DrPH Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Cohort Course Requirements

Students will follow the cohort plan developed by the program administration each year. Students are expected to complete course requirements with their cohort.

Year 1

Code	Title	Credits
Taken Prior to Matriculation		
PH.550.860	Academic & Research Ethics at BSPH	
XXX.XXX	Introduction to Online Learning	
XXX.XXX	Title IX & Sexual Harassment Prevention Training for Students	
Taken After Matriculation		
PH.180.601	Environmental Health	5
PH.309.620	Managed Care and Health insurance	3
PH.309.712	Assessing Health Status and Patient Outcomes	3
PH.311.865	Tsinghua DRPH Seminar	1
PH.312.600	Managing Health Services Organizations	4
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.312.610	Foundations of Organizational Leadership	3
PH.312.621	Strategic Planning	3
PH.312.635	Human Resources in Health Organizations	2
PH.550.630	Public Health Biology	3
Total Credits		**30**

Year 2

Code	Title	Credits
PH.340.601	Principles of Epidemiology	5
PH.312.670	Negotiation in Health Care Settings	3
PH.312.620	Performance Measurement in Health Care	2
PH.312.623	Financial Management in Health Care I	3
PH.311.865	Tsinghua DRPH Seminar	1
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.612	Statistical Reasoning in Public Health II	3
PH.140.613	Data Analysis Workshop I	2
PH.140.614	Data Analysis Workshop II	2
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	2
PH.309.617	Introduction to Methods for Health Services Research and Evaluation II	2
PH.312.617	Fundamentals of Financial Accounting	3
PH.312.633	Health Management Information Systems	3
PH.313.641	Introduction to Health Economics	3
PH.306.663	Legal and Ethical Issues in Health Services Management	3
Total Credits		**44**

Year 3

Code	Title	Credits
PH.140.620	Advanced Data Analysis Workshop	2
PH.300.600	Introduction to Health Policy	4
PH.309.730	Patient Safety and Medical Errors	3
PH.309.750	Applied Research Methods for Health Policy and Management	3
PH.311.615	Quality of Medical Care	3
PH.311.867	Tsinghua Graduate Seminar	1
PH.311.720	Tsinghua DRPH Capstone	2
PH.312.607	Quantitative Tools for Managers in Asia	3
PH.312.624	Financial Management in Health Care II	3
PH.312.660	Marketing in Health Care Organizations	3
PH.313.790	Introduction to Economic Evaluation	3
PH.313.793	Extended Exercises in Cost Effectiveness	2
PH.340.620	Principles of Clinical Epidemiology	2
PH.410.620	Program Planning for Health Behavior Change	3
Total Credits		**37**

Year 4

Code	Title	Credits
PH.300.840	Special Studies and Research in HPM	4
PH.311.840	HPM DrPH Qualifying Exams	3
Total Credits		**7**

Year 5 And Beyond

Code	Title	Credits
PH.311.820	Thesis Research HPM-DRPH	4
DrPH students must maintain a 1-credit per term registration until graduation.		
Total Credits		**4**

Registration Requirement

By design, the JHU-Tsinghua DrPH program in HPM is part-time. All students must be continuously registered for **at least one credit per term** for the duration of the program. Students who are not able to participate in coursework or dissertation research work during a registration term must request an official leave from the program.

Students may request leave for up to 8 terms (2 years) over the entire duration of their program.

Qualifying Exam

JHU-Tsinghua DrPH students became eligible for the Department Qualifying Exam at the conclusion of Year 3. The exam consists of a case study identified by the exam committee for the exam period.

The exam is offered in July. Students receiving a grade of "conditional pass" or "fail" will be eligible for a retake at the discretion of the exam committee.

DrPH Practicum Requirement

JHU-Tsinghua DrPH students are required to complete a practicum. The purpose of the DrPH practicum is to further the development of high-level competencies and, in particular, applied competencies and critical thinking relevant to the student's area of specialization. The practicum should form an integral part of the student learning, complementing course work, special studies and student dissertations in a way that responds to student learning objectives.

Minimum Practicum requirements

- **Applies and further develops public health skills and competencies** - the objectives of the student practicum should be clearly identified as part of an integrated, individualized, academic plan that is approved in advance of the practicum. Students will identify competency domains in which they wish to achieve high-level skills and the DrPH student practicum presents an important opportunity for the application of these skills.
- **Is framed and carried out in a public health context** - the practicum will include population-level activities carried out at, or in collaboration with, an organization or agency. Students should not merely crunch numbers or administer surveys, but should be engaged in the larger public health context of their activities.
- **Is supervised and supported** - The practicum preceptor will be qualified to evaluate the student's professional competence and will supervise the student throughout the project. The preceptor will typically be from an outside organization (i.e., community-based organization, health department, private corporation, etc.), but can be a JHSPH faculty member if appropriate. The preceptor will provide background information, directions, feedback, and guidance with regards to the student progress on well-defined learning objectives. The faculty adviser will be kept informed of the student's practicum activities and progress and may provide additional assistance if warranted.
- **Is significant** - The practicum should be more than an opportunity for additional work experience given the significant work experience already held by DrPH students. Practicum projects should make a significant contribution to the organization with which the student is collaborating, as well as constituting a significant investment of student time and effort. There is no minimum number of hours required, but it is estimated that the typical DrPH student may spend a minimum of 100 hours on practicum projects. Student practica may take the form of one significant large project or several smaller practica experiences. DrPH student practica do not need to be individual projects, students may work independently but may also be part of a student team, or a team composed of other members of the organization with which they are collaborating. If students are members of a broader team, then their role on the team should be clearly defined.
- **Is evaluated** - Students will be evaluated on achievement of defined learning objectives and deliverables by the preceptor. Faculty advisers will be informed and have an opportunity to provide feedback on the student's progress if they choose to do so. As part of the practicum experience students will reflect on and evaluate their overall practicum experiences, particularly as they related to their career goals. Clearly identified outputs from the practicum experience (not necessarily written products, but oral presentations or a new management or information system) should be identified in advance.

The DrPH practicum is designed to be flexible, and to respond to individual students' prioritized learning needs. The practicum should be an important part of the program for all DrPH students.

Mentoring/Approval of Preceptor

All preceptors must be approved by JHSPH prior to the start of the practicum. Current JHSPH faculty may act as preceptors where this is appropriate, for example where the faculty member is engaged in collaborative work with an outside agency. Many other individuals working in relevant practice positions will already have an adjunct position at the school, and thus are "pre-approved" as preceptors. Where the preceptor does not have any faculty position at the School, their CV will be submitted to the Program Director along with the practicum proposal for approval.

Documentation and Evaluation

- When a student wishes to proceed with a practicum opportunity, they will complete a short practicum proposal form that outlines the nature of the project, how it fits with their learning objectives, the location of the practicum, the preceptor, a time frame for the work and outputs. After discussion with the student's adviser, the form will be submitted to the department to be included in their student file.
- At the end of the practicum, the student and the preceptor will complete the practicum summary form. The summary will reflect on the experience and lessons learned and will provide constructive feedback to the student. Final outputs from the project should be attached to the form and these should all be submitted to the Department.

Questions related to the DrPH practicum should be directed to Dr. Leiyu Shi or Judith Holzer.

Student Progress Reports

The Department of Health Policy and Management is committed to assist students with steady progress through the completion of the DrPH program. To facilitate this process, all students are required to submit regular progress reports to the HPM Office of Academic Affairs.

Beginning in Year 4, after successful completion of the written qualifying exams, students must submit a progress report on December 1st and June 1st each year until they have passed their School-wide Preliminary Oral Exam. The report must be reviewed, discussed and approved by the student's adviser prior to submission. Approximately six weeks prior to the due date, a reminder e-mail will be sent by the HPM Office of Academic Affairs.

Once a student has passed their School-wide Preliminary Oral Exam, a yearly progress report is to be submitted to the HPM Office of Academic Affairs until the program is complete. The progress report, along with the approved summary report of the Dissertation Advisory Committee Meeting (see below), will be due each year on June 1. The report must be reviewed and discussed with the student's adviser prior to submission. Approximately six weeks prior to the deadline, a reminder e-mail will be sent by the HPM Office of Academic Affairs.

Departmental Preliminary Oral Exam

The Departmental Preliminary Oral Exam takes place before the student takes the School-wide Preliminary Oral Exam. The Departmental Exam may not take place until after the successful completion of the Departmental Qualifying Exam. The format of the exam is similar to the School-wide Preliminary Oral Exam and is intended to determine if the student is academically prepared to pass the School-wide Preliminary Oral Exam and to carry out independent dissertation research.

The exam requires the student to prepare a dissertation proposal that will be examined by the committee members. This proposal is approximately 30 pages in length and provides the committee with the student's basic hypothesis to be research or program to be evaluated or work-place challenge to be addressed.

The HPM Departmental Preliminary Oral Exam committee consists of a minimum of three faculty members; one must be the student's adviser. A fourth alternate committee member should be identified and may choose to participate in the exam.

School-wide Preliminary Oral Exam

The School-wide Preliminary Oral Exam takes place after the student has successfully completed the Departmental Qualifying Exam and the Departmental Preliminary Oral Exam. The purpose of this examination is to determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest.

The examiners will be concerned with the student's capacity for logical thinking, breadth and depth of knowledge in public health and evaluate methodologies, and ability to undertake a project aimed at addressing a significant public health problem leading to a completed dissertation. While the specific proposal serves as a vehicle for determining the student's general knowledge and research capacity, this examination is not intended to be a defense of a specific proposal. The student will be expected to defend the public health significance of the proposal as well as the methodologies used to evaluate the problem.

The examination should be taken at the earliest feasible time, before significant engagement in dissertation research. If the student fails the Preliminary Oral Examination and is permitted a re-examination, they must be re-examined within one year. The School-wide Preliminary Oral must be scheduled at least one month in advance but not until the departmental oral has been successfully passed.

Thesis Advisory Committee

Within three months of passing the School-wide Preliminary Oral Exam, every DrPH student must identify a thesis advisory committee. This committee, consisting of the student's adviser and at least two other faculty members from either inside or outside the Department, will meet with the student at minimum once a year until the student has graduated to evaluate the student's work and progress.

Each student is required to submit a written summary report to the Thesis Advisory Committee prior to the committee's meeting. This approved summary report will be submitted to the Department each June with the annual progress report (see above).

Thesis Guidelines

All students must complete an original investigation presented in the form of a thesis. The thesis must be based on original research, worthy of publication, and acceptable to the Department of Health Policy and Management and to a committee of faculty readers. During the student's application process, various research ideas may have been discussed with faculty members. However, each student's thesis proposal must be developed, reviewed and found acceptable to departmental faculty **while enrolled as a doctoral student at the BSPH**.

DrPH students in HPM have options for the format of the thesis. These options are described below:

- The traditional doctoral thesis consists of a statement of the problem and specific aims; a literature review; data and research methods; analyses and results; and a discussion of findings and their implications. The form these take will reflect the specific academic discipline or orientation guiding the student's research.
- The manuscript-oriented thesis is an alternative to the traditional dissertation. The manuscript thesis consists of a total of three (or more) papers, linked to the student's research topic.
- The workplace challenge requires the selection of one organization or a combination of several organizations to complete a series of five practice-based projects.

The decision on which format to follow should be made by the time the student takes the departmental preliminary oral examination. There are advantages and disadvantages to each option that should be carefully discussed with the student's adviser. If a decision is made during the thesis writing stage to change the format of the thesis, all members of the thesis advisory committee and/or the thesis readers committee should be informed.

Each of these options is described briefly below:

Option 1: The Traditional Doctoral Thesis

The traditional doctoral thesis generally consists of an abstract, five chapters, references, and any appendices. The outline of chapters below is merely a guide. The pages numbers are rough estimates, and the form of the chapters will vary, reflecting the academic discipline or orientation of the student's research.

Abstract: The abstract is a short overall summary of the work. It lays out the purpose(s) and aims of the study, the methods, and the key results and implications. The abstract generally is 2-3 double spaced pages.

Chapter 1: Introduction: Statement of the problem and specific aims; This chapter, which tends to be relatively short (5-6 double spaced pages), provides an introduction to the thesis. It describes briefly why this work was undertaken, what background conditions or data suggested it was an important problem, and what, then, this project was intended to accomplish.

Chapter 2: Literature Review. The literature review summarizes existing literature that informed the thesis research. It generally is organized topically. The literature review tends to be a fairly detailed review, particularly for those topics most directly related to the content and methods of the thesis. The literature review tends to be 30-60 pages in length.

Chapter 3: Methods. The content of the methods chapter varies tremendously with the methodological approach taken by the student for the thesis research. With traditional empirical studies, it will generally include the specific aims, research questions, and/or hypothesis; a description of the source of study data, a description of the study instrument and its development, if relevant; a description of secondary data obtained, if relevant; analytic methods, including data cleaning, creation of a data set, creation of variables and/or qualitative codes, types of analyses done; and human subjects issues. The methods chapter ranges from 20-40 pages.

Chapter 4: Results: The results chapter reports the main findings of the thesis. It often is organized by research question or specific aim or hypothesis, but need not necessarily follow this format. The results chapter ranges from 25-50 pages.

Chapter 5: Discussion of results and policy implications. The discussion chapter both summarizes key findings and discusses findings in light of existing literature and in light of their policy implications. Also included generally are a description of the study's limitations and implications for future research. The discussion chapter is generally 25-50 pages.

References: A listing of all citations used for the thesis must be provided. The Department allows any standard format for references.

Appendices: Appendices can be used for many purposes. They can include study instruments, if relevant; they can include additional tables not included in the main body of the thesis; also to be included must be a copy of the student's CV. The traditional thesis should be able to "stand alone" without appendices, however, so results should never be put in appendices that are key to the study's main findings.

<u>Option 2: The Manuscript Thesis</u>

The manuscript thesis consists of the following:

a total of three (or more) papers, linked to the student's thesis topic. One of these papers may be a literature review, providing a comprehensive critical review only if it would advance the field and would be suitable for publication.

the thesis as a whole must somewhere address the implications for policy and practice. This may be significantly addressed through one or more of the manuscripts or could instead be addressed in a chapter that integrates and discusses the findings reported in the manuscripts.

an appendix outlining in detail the study methods and any accompanying data tables necessary to fully understand the data.

A manuscript-oriented thesis must also meet the following criteria:

(1) The doctoral student must be the first author on the three manuscripts used to satisfy this requirement;

(2) No manuscript will be accepted as part of the thesis if it was submitted for publication before the student passes the school-wide preliminary oral exam;

(3) At least two members of the thesis committee must not be co-authors of any of the manuscripts to avoid conflict of interest if published prior to the final defense.

<u>Option 3: The "Work Place Challenge" Thesis</u>

Students are required to select either ONE organization or a combination of SEVERAL organizations and complete a series of five practice-based projects outlined below:

Organizational Assessment of an entire organization, large department, or program. This assessment should use a systematic framework (e.g., Baldrige framework, balanced scorecard approach, European Excellence framework, Abu Dhabi Award for Excellence in Government Performance), and is expected to examine the mission or purpose of the organization, its stakeholders, its internal processes, and its performance. The assessment should include a list of areas for further improvement. Please use the perspective of an "outside" consultant for completing this project.

Plan for a New Program or Service to address a workplace need. The plan must include a focused needs assessment, review of relevant literature, program design, implementation plan, evaluation plan and proposed budget with detailed justification.

Program Evaluation. The program evaluation should include a program description, rationale for how the program should have an impact (the "program logic"), review of relevant literature, evaluation design (e.g., before/after with comparison group), measurement of process and outcome indicators, data analysis, discussion of possible threats to the reliability and validity of evaluation results, and implications for program management. Qualitative, quantitative, or mixed methodologies may be used. In addition to the evaluation results, please discuss the potential generalizability of research findings for other organizations, as well as possible policy implications.

Economic Evaluation. This section should include a description of the program, project, or service under analysis, a review of the relevant literature, and a cost-benefit analysis, cost effectiveness analysis, equity analysis, return on investment analysis, or other type of cost-consequence analysis. The analysis should include both the societal perspective and the perspective of the organization being analyzed. Implications for program management and policy, as well as the potential generalizability of analysis results, should also be addressed.

Discussion of Implications. This section summarizes the lessons learned through the 'workplace challenge' experience, identifies opportunities for improvement from the perspectives of relevant stakeholders, and draws implications for other similar programs or organizations. Please address the role that leadership played or could have played with regard to the projects and/or outcomes observed. For example, what was done and could have been done to enhance, assure, foster or mitigate the outcomes observed.

Role of the Faculty Adviser

The adviser's role is to facilitate successful completion of the doctoral thesis. The type of assistance provided should be tailored to the individual student's needs. The thesis must reflect work that is the student's independent and original work. The adviser should provide ongoing and critical feedback, but the research must be that of the student.

Maintaining this balance may be particularly challenging for manuscript-oriented and "workplace challenge" theses. Even if the adviser (or another committee member) will be a co-author on a manuscript, the manuscripts must be viewed first and foremost as fulfilling the student's needs in the thesis process, with publication as a secondary goal. Advisers or other committee members who are co-authors may not undertake the first draft of any portions of the manuscripts nor substantial re-writes. Whether an adviser will be a co-author on any manuscript should be decided early in the thesis process.

Thesis Approval

Doctoral advisers must provide official approval of the final draft of a student's thesis prior to dissemination to the other members of the Thesis Readers/Final Oral Examination committee. A signed Thesis Approval Form must accompany each copy of the thesis distributed.

Final Public Seminar of Thesis

A formal, public seminar *and* closed oral defense of the thesis before a committee of the faculty is one of the final steps for a DrPH candidate. The public seminar and oral thesis defense are typically held on the same day with the seminar being conducted first, followed immediately by the closed defense before the approved final exam committee.

It is expected that the public seminar will last approximately 45 minutes and the closed defense, approximately 90 minutes. Members of the final examination committee are required to attend both the seminar and the closed defense.

The Final Oral Examination Committee judges all components of the thesis to be either: Acceptable, Acceptable with Revisions, or Unacceptable. This is the case for both the traditional thesis and a manuscript-oriented thesis. Students, with guidance from their adviser, will rework their thesis until all components are judged Acceptable.

Taking the Final Oral Exam and receiving an unconditional pass does not release the student from further responsibilities to complete the degree requirements. All students must stay continually registered until the degree requirements have been completed, including the thesis acceptance letters and electronic submission of the thesis to the Welch Medical Library. Once everything is submitted, the student will be reported to the Committee on Academic Standards and be considered complete.

Tsinghua DrPH Program Policies

Program Prerequisites

Students entering the DrPH in Healthcare Management and Leadership are expected to have taken the following prerequisite courses during their previous Master's program. Students who have not met the prerequisite will need to complete these courses while enrolled in the DrPH program. These courses are incorporated into the 3-year didactic course plan presented for the students enrolled in the JHU-Tsinghua cohort program.

Students who have completed the prerequisite courses may request a waiver provided they meet the waiver requirement described below. Students who waive courses may not be eligible for the concurrent MHS degree. The maximum number of credits that may be waived is 45.

School-wide DrPH Prerequisite Courses

Code	Title	Credits
PH.180.601	Environmental Health	5
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.612	Statistical Reasoning in Public Health II	3
PH.300.600	Introduction to Health Policy	4
PH.340.601	Principles of Epidemiology	5
PH.410.620	Program Planning for Health Behavior Change	3
PH.550.630	Public Health Biology	3

Healthcare Management and Leadership Prerequisite Courses

Code	Title	Credits
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.312.600	Managing Health Services Organizations	4

HPM DrPH Advising Policy

All DrPH students will work with the Program Director, who will serve as the initial advisor during the coursework portion of the program. After the successful completion of the written qualifying exam and once the student has identified their proposed dissertation area, a dissertation advisor will be identified to mentor the student on the content-specific work.

The following guidelines have been developed to make clear the advising expectations for both faculty and students.

Expectations, Rights, and Responsibilities

Students can expect their advisor to work with them in defining educational goals, course work and independent studies that will assist in achieving their goals. In addition, the advisor periodically will review academic progress with the student, including assessing the student's strengths and weaknesses. Advisors provide advice while students must make the final choices consistent with the guidelines and policies of the Department, School, and Johns Hopkins University.

Students are responsible for scheduling regular meetings with their advisors, in-person or by telephone, to discuss goals, progress, problems, and next steps. If an advisor does not know the answer to the specific questions or issues, the advisor will refer the student to knowledgeable sources. Advisors are expected to make a regular time available for student/advisor meetings or have a clearly stated process by which students can schedule time to meet individually. Students have the right to change advisors and individual faculty members have the right to accept or not accept any specific student as an advisee. The first step in the process for changing advisors is to consult the program director.

Minimum Expectations for Student-Advisor Meetings

The following are minimum expectations for scheduled meetings between a faculty advisor and advisee. In general, meetings should be scheduled so students can prepare for the meeting, should be at least a half-hour in duration or more if needed, and should be conducted in an appropriate location, desirably without interruptions.

Degree	Time in Program	Minimum Meeting Frequency
Doctor of Public Health (DrPH) Part-time	Year 1-3 (coursework)	Meeting at least once a year until departmental qualifying exams
	Year 3 to preliminary oral	One meeting every academic term
	During dissertation research	One meeting each academic term; written comments on dissertation drafts within 4 weeks of receipt

Standards of Academic Performance

Students must meet minimum academic standards to remain in the DrPH program in the Department. A student's failure to meet any of the criteria below is grounds for being placed on academic warning and/or being dismissed from the program.

To remain in good academic standing in the Tsinghua DrPH program, students must:

- Maintain a minimum cumulative grade point average (GPA) of 3.0. Students with a GPA falling below a 3.0 will be placed on academic warning and will have one term of registration in which to raise their cumulative GPA above the 3.0 threshold. Students not meeting the minimum GPA after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA; approval beyond one term must be reported to the School's Committee on Academic Standards. Students on academic warning must meet with their academic advisor and program director each term to review their academic plan and receive approval for their course schedule prior to registering for courses.
- Must earn a minimum grade on all required program-specific core courses of "B" or higher in courses offered for letter grading and a "Pass" for courses only on a pass/fail basis.
- Not accrue more than 6 credits of "incomplete" coursework at any given time. Students exceeding this limit must immediately e-mail the program director in writing to discuss their academic situation and registration for subsequent terms until the in-completes have been resolved.

Any student enrolled in the DrPH program that does not obtain the minimum 3.0 GPA by the end of the coursework phase of the program will not be permitted to proceed to the written qualifying exam. In this situation, the program director, in consultation with the HPM APAC's Student Matters Subcommittee, will determine the appropriate course of action.

Tsinghua DrPH Learning Outcomes

The learning outcomes for the JHU-Tsinghua DrPH program in Healthcare Management and Leadership are met through required and elective coursework, including doctoral seminars, a practicum, independent research, and the process of writing a dissertation. Upon successful completion of the program, students will have mastered the following learning outcomes:

- Identify, synthesize and apply evidence-based public health research and theory from a broad range of disciplines and health-related data sources for problem solving and to advance programs, policies, and systems promoting population health.
- Identify and analyze ethical issues including balancing the claims of personal liberty with the responsibility to protect and improve the health of the population; and act on the ethical concepts of social justice and human rights in public health research and practice.
- Influence decision-making regarding policies and practices that advance public health using scientific knowledge, analysis, communication and consensus building.
- Assess and use communication strategies across diverse audiences to inform and influence individual, organization, community and policy actions in order to promote the health of the public.
- Enable organizations and communities to create, communicate and apply shared visions, missions and values; inspire trust and motivate others; build capacity; improve performance; enhance the quality of the working environment; and use evidence-based strategies to enhance essential public health services.
- Provide fiscally responsible, strategic, and operational guidance within both public and private health organizations, for achieving individual and community health and wellness.
- Apply organizational theory and interpret its relation to professional practice as it contributes to the development, implementation, and monitoring of organizational performance standards while promoting team learning and organizational learning.
- Identify and apply concepts and methods for measurement, monitoring and improvement of the clinical and financial performance of health services organizations, as well as train leaders for organizational change initiatives.
- Utilize strategic assessment and planning skills to identify internal and external issues that may impact delivery of essential public health services and apply facilitation skills to ensure the participation of key internal and external organizational stakeholders.

Non-Degree Training

Non-Degree Training

HPM Academic Institutes

The Department encourages all students to take advantage of the many educational opportunities offered throughout the Johns Hopkins University. Many opportunities are available for formal and informal coursework in non-traditional formats.

The Department offers graduate courses in Institutes throughout the academic year, specifically in the January intersession (Winter Institute), in the June session (Summer Institute) and during 2nd term, in Barcelona Spain (Fall Institute).

Institutes are opportunities for students to take courses in compressed formats, from 1 to 4 days, over a 1 to 3 week period. Courses taken for academic credit may be applied to degree programs at the School of Public Health and to the appropriate certificate programs. Other Departments, Programs and Centers within the Bloomberg School offer additional Institutes. For the most up to date information, consult the School of Public Health Institutes web page (https://publichealth.jhu.edu/academics/academic-programs/accelerated-learning-institutes/).

HPM Certificates

The Department of Health Policy and Management offers 12 graduate certificate programs; an asterisk (*) indicates programs that can be completed online. For detailed information on each program, please visit our certificate page (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/).

Certificate Programs for Hopkins Students Only

- Gerontology
- Health Disparities and Health Inequality
- Public Health Advocacy
- Public Health Preparedness

Certificate Programs for Hopkins and Non-Degree Students

- Health Finance and Management*
- Injury and Violence Prevention
- Leadership for Public Health and Healthcare*

- Public Health Economics
- Public Health Informatics*
- Quality, Patient Safety, and Outcomes Research*
- Risk Sciences and Public Policy

Certificate Programs Open to Non-Degree Students Only

- International Healthcare Management and Leadership*

Executive Education

The Department of Health Policy and Management sponsors an inter-professional continuing education program for health care executives: Leading Transformation for Value-Based Health Care (https://www.jhsph.edu/academics/continuing-and-executive-education/professional-trainings/leading-transformation-for-value-based-health-care/) (LTVH).

LTVH is a fully on-line, multidisciplinary, inter-professional program offered from January to June each year. The interactive curriculum provides health care leaders with the requisite knowledge and skills to transform their organizations for success under value-based health care. The program starts with an intense 3 days of on-line learning in January, followed by weekly Wednesday evening seminars through early June, spanning finance, leadership, negotiation, quality, population health, ethics and IT.

Department of International Health

About

The Department of International Health (https://www.jhsph.edu/departments/international-health/) is a global leader and partner in building capacity and identifying, developing, testing, and implementing practices and policies that help the world's most vulnerable and disadvantaged people improve their health and well-being.

Programs

- Global Health Economics, MHS (p. 340)
- International Health, MSPH (p. 343)
- International Health, MSPH, Human Nutrition-Dietitian (p. 362)
- International Health, MA/MSPH (p. 362)
- International Health, PhD (p. 363)
- Non-Degree Training (p. 384)

General Information

Central Academic Program Administration

Name	Position	Email	Phone	Fax
David Peters	Department Chair	Dpeters@jhu.edu		
Cyrus Engineer	Associate Chair for Academic Programs	Cengineer@jhu		
Julie Denison	Associate Chair for Student Matters	Jdenison@jhu.edu		
Cristina Salazar	Academic Program Manager	Csalazar@jhu.		
Elisabeth Simmons	Academic Program Administrator	Esimmo15@jhu.edu		

Global Disease Epidemiology and Control

Name	Position	Email	Phone	Fax
Andrea Ruff	Program Director	Aruff1@jhu.edu		
Melissa Marx	PhD Program Coordinator	Mmarx@jhu.ec		
Elizabeth Hazel	MSPH Program Co-coordinator	Ehazel1@jhu.edu		
Yvonne Tam	MSPH Program Co-coordinator	Yvonneyotam(		
Nicole Billops	Financial Manager	Njohns15@jhu.edu		

Health Systems

Name	Position	Email	Phone	Fax
Sara Bennett	Program Director	Sbennett@jhu.edu		
Abdul Bachani	PhD Program Coordinator	Abachani@jhu		
Ligia Paina	MSPH Program Co-coordinator	Lpaina@jhu.edu		
Nukhba Zia	MSPH Program Co-coordinator	Nukhba.zia@jh		
Elliot Rosen	Financial Manager	Erosen@jhu.edu		

Human Nutrition

Name	Position	Email	Phone	Fax
Parul Christian	Program Director	Pchrist1@jhu.edu		
Laura Caulfield	PhD Program Coordinator	Lcaulfi1@jhu.e		
Amanda Palmer	MSPH Program Coordinator	Acpalmer@jhu.edu		
Debra Rukstelis	Financial Manager	Drukstel@jhu.e		

Social and Behavioral Interventions

Name	Position	Email	Phone	Fax
Caitlin Kennedy	Program Director	Caitlinkennedy@jhu.edu		
Svea Closser	PhD Program Coordinator	Sclosser@jhu.		
Elli Leontsini	MSPH Program Coordinator	Eleontsi@jhu.edu		

Nora West	MSPH Program Co-Coordinator	Nwest7@jhu.e		
Nicole Billops	Financial Manager	Njohns15@jhu.edu		

Global Health Economics

Name	Position	Email	Phone	Fax
Antonio J. Trujillo	MHS Global Health Economics Director	Atrujil1@jhu.edu		
Elliot Rosen	Financial Manager	Erosen@jhu.ec		

Departmental Policy

Academic Faculty and Staff

Several administrative staff and faculty members within the Department help oversee and facilitate the academic programs. They are available to help you navigate the program and the department. The following information is intended to help you understand the roles of each person.

Cyrus Engineer (Associate Chair for Academic Programs): Dr. Engineer is responsible for the management and oversight of all academic programs. In this role, she chairs the Curriculum & Credentials Committee, which sets and implements policies and procedures for department academic programs and monitors student advising.

Julie Denison (Associate Chair for Student Matters): This position is responsible for the management and oversight of all students. In this role, leads the Admissions committee and coordinates with all academic coordinators and programs by leading new efforts to improve master's and doctoral student experiences. The Associate Chair for Student Matters will be announced in September.

Cristina Salazar (Academic Program Manager): Cristina oversees the operations of the academic programs in the department and works as the liaison between students, faculty, and administrative offices of both the department and the School.

Elisabeth Simmons (Academic Program Administrator): Elisabeth is the Academic Program Administrator for all master's and doctoral programs and assists students and Program Coordinators with academic issues related to tracking of student academic progress, departmental exams, and graduation requirements.

Degree Program Coordinators – within the IH Department, the PhD and MSPH degrees are broken down into four concentrations, also known as program areas. Each program area has a faculty member as the overall coordinator of the degree program. The degree program coordinators are responsible for the management and oversight of the individual degree programs and are the first point of contact for any questions, issues, or concerns. They act as a secondary/general adviser for students within their program areas and can be sought out to answer questions in the adviser's absence or as an additional source of information. Students are encouraged to approach program coordinators for questions about the program area and degree information (including curriculum requirements, course selection, etc.). The MHS degree program has a program director serving in the role of a degree program coordinator.

Financial Managers – Each program area has its own financial manager and grant specialists who are responsible for the oversight of each area's budget and payroll activities. Students who plan to work within the department should see one of these individuals to fill out the appropriate paperwork prior to their start date. If students are at all uncertain who they should see about an issue, students must contact Cristina Salazar or Elisabeth Simmons for clarification.

Academic Committees

Curriculum and Credentials Committee

- Cyrus Engineer: Chair
- Cristina Salazar: Staff
- Elisabeth Simmons: Staff

Honors and awards Committee

- Laura Caulfield: Chair
- Elisabeth Simmons: Staff

Course Waivers and/or Substitutions

Waivers of requirements may be granted for credits earned in equivalent graduate level courses taken in this or another school. The course waiver request must be based on coursework already taken which is similar in content, and documentation (i.e., a transcript and course syllabus) must be provided. In addition, a waiver request form must be submitted prior to the beginning of the quarter in which the course is offered. No requests will be granted after a course has been taken. **Requests for waivers for any course offered in the first quarter must be submitted no later than the end of the first day of class. No requests for first term waivers will be considered after this time.**

WAIVER PROCESS: The course waiver form can be found in the Portfolio Library and should be completed for each course requirement a student is requesting be waived. Requests should include the required supporting documentation noted on the form and a short explanation, which includes the name of the course, and why they are requesting the waiver. The completed form and supporting documentation should be **merged into one PDF** and emailed to the Academic Program Administrator, **Elisabeth Simmons** (esimmo15@jhu.edu), for review. The Academic Program Administrator will review the request and obtain the appropriate approval from the student's faculty Program Coordinator and or the IH Associate Chair for Academic Programs. The student will then receive the course waiver form with a final decision to keep for their record and a copy of the form will be kept in the students' academic file.

Course waivers are only approved by the Program Coordinators for each program and/or the Associate Chair for Academic Programs. **advisers do not approve waivers or course substitutions. Students should not consider a course waived until they have completed the course waiver form and received a decision form from the Academic Program Administrator.**

SUBSTITUTION PROCESS: A similar process should also be followed to request course substitutions. Students are reminded that waivers are not the same as substitutions. Waiving out of a course requirement allows a student to take any course(s) they choose in place of the course they are receiving permission to waive out of. A substitution allows students to substitute a specific program requirement by another course that is approved by the Program Coordinator in advance. Please note that approval of a waiver or substitution request does not reduce the total number of credits a student is required to earn in their degree program to meet graduation requirements.

Leave of Absence

A Leave of Absence is an officially recognized inactive student status. Please read the school-wide academic leave of absence (p. 641) policy. This is an option available to students who must take a temporary break from their program of study due to reasons beyond their control. There are specific criteria for determining if you are eligible for a LOA and it may have an impact on international student visa status, financial aid, and student employment. International students who are on LOA will have their I-20/DS2019 cancelled and will have to request a new visa in order to come to the US again. If you are considering requesting a LOA, the first thing you should do is speak with **Cristina Salazar** (csalazar@jhu.edu) to determine your eligibility and consider other potential impacts.

Students requesting a LOA cannot be employed in a position where their work is related to their MSPH requirement. Any requests for a LOA must be made in writing to the Department through the Academic Program Manager (Cristina Salazar) by both the student submitting a letter of request and fully complete LOA form, along with a supporting letter from their adviser. Once a written request for a LOA is received, the student's request must be approved by the Curriculum and Credentials (C&C) Committee. The C&C committee will review the request and may ask for more information. If the C&C approves the LOA request the Academic Program Manager will then submit the Leave of Absence Form to the Registrar's Office for final processing. Once the Registrar's office has processed the LOA request, the student will receive an email indicating they are on LOA and will be charged $50 per term for each term they are on leave. When a student is ready to return they should contact Cristina Salazar. If a student takes a leave of absence, the student must be registered for a minimum of ***two*** consecutive terms prior to completing degree requirements.

In some instances you may be forced to take a Involuntary Leave of Absence and Condition of Enrollment, please read the school-wide policy Involuntary Leave of Absence and Condition of Enrollment (p. 645) for more information.

Parental Accommodations

Contact Cristina Salazar to discuss the accommodations policy and how it impacts the student, at least three months before the birth or adoption of a child, as we may need to create a plan that instructors, supervisors, student and advisers approve of. Please read the University parental accommodations policy (https://policies.jhu.edu/?event=render&mid=764&pid=32391&fid=policy_32391.pdf&_=0.931885768396) for graduate students and post-docs.

Tracking Sheets

Tracking sheets are used to track all course requirements from each student's program. All students are required to fill out and submit their tracking sheets at least once a year, by the end of 3rd term for all continuing students, to **Elisabeth Simmons** (esimmo15@jhu.edu) via their CoursePlus Portfolio. Approved waivers and substitutions must also be submitted with the tracking sheets. Students should use the tracking sheet when meeting with their advisers.

Transfers

MSPH to MPH: It is important to note that transfers between these programs are very rare due to the capacity of each program and because the MPH program timeline starts one term before the MSPH program. If after beginning the MSPH program a student desires admission to the MPH program instead, the student must contact Cristina Salazar. Students will need to obtain adviser approval in writing and also receive approval from the Associate Chair for Academic Programs. If approved the student will submit this approved letter, to the Director of the MPH Program. Once the letter is signed for approval by the Director of the MPH Program, it is then submitted to the Office of Records and Registration to make the transfer official.

MSPH to MSPH (from one program to another, or one department to another): It is important to note that these types of transfers are very rare, due to the capacity of the programs and the sequencing of courses by each program area. If after beginning the MSPH program a student wishes to change programs, the student must request the change in writing along with a new personal statement and have it endorsed by the MSPH Program Coordinator(s) of the current and future program area. The request then needs to be endorsed by the Associate Chair for Academic Programs.

Students considering transfers to the MPH or a different MSPH program, must first talk to Cristina Salazar before submitting written requests.

MSPH to PhD: Students in the MSPH program who are interested in going on to a PhD program in the Department of International Health are required to formally apply to the Department for admission to the PhD program. They must first complete the MSPH degree and then apply to the PhD program to enter in September following the completion of the MSPH practicum and completion of their MSPH capstone.

IH Student Group

The Department of International Health has an active and organized student group. This group was formed to facilitate stronger communication and interaction between the Department (faculty and administrators) and the students and works each year to plan and develop different opportunities aimed at achieving this goal. Participation by all IH students is welcomed and encouraged. For more information on the activities and functions of this group and to learn more about getting involved, please contact **Elisabeth Simmons** (esimmo15@jhu.edu) and **Cristina Salazar** (csalazar@jhu.edu).

Travel Policy for Students Traveling Abroad

Below is the required process for all International Health students traveling for school related purposes, and students from other departments working under the supervision of International Health faculty:

1. Fill out the Student Emergency Information Form **(**https://goo.gl/forms/hkTcpXNIOVH89NFE3/**) (IH students complete this during orientation)**

2. Complete the online course International Travel Preparation, Safety and Wellness (220.600.81) during your first year and/or prior to travel

3. Fill out the IH Department Travel Registration Form **(**https://goo.gl/forms/jRimLu7ElmySzQaj1/**) prior to every trip abroad**

As you prepare to take an overseas assignment you should take into account a few administrative, health, and safety issues and requirements before you leave the country. Keep in mind that when working overseas, even in the short-term, you need to be prepared before leaving the US in order to have a productive experience and avoid unnecessary health and safety risks. The Department of International Health has developed the step by step process listed above for you to complete prior to leaving the country to assist you in preparing for your assignment and in acquiring the appropriate approvals before traveling.

It is the responsibility of each student to complete and submit the completed registration forms no later than <u>FIVE WEEKS</u> prior to your departure for all overseas assignments.

The US State Department now issues travel advisories using a system of levels 1 through 4. Students traveling to countries with Travel advisory levels 3 or 4, or Bangladesh, Cameroon, Colombia, Egypt, Ethiopia, Jordan, Kenya, or Mexico, must follow the procedure described in section A. Administrative (10). Students traveling to other countries may also be required to follow procedure A. Administrative (10) if the IH Leadership deems it necessary upon initial review of their IH Travel Registration Form. Copies of the registration form may be obtained from the Departmental Academic Program Administrator. Students must register their travel each time they travel and every time they return for follow up trips. Students traveling to travel warning countries must obtain approval prior to every trip.

Below are instructions for you when traveling overseas:

A. ADMINISTRATIVE

(1) STUDENT EMERGENCY INFORMATION FORM: Students must submit the online Student Emergency Information Form during orientation. A copy of the form will be kept securely in each student's academic file and will be updated by the student on a yearly basis.

(2) TRAVEL COURSE REQUIREMENT – All students must take the online course 220.600.81 International Travel Course through CoursePlus during their first year. It is a mandatory 1-credit pass/fail course offered 2nd, 3rd and 4th terms. Students must complete all lectures and assignments, take the quiz, and participate in a LiveTalk session during the year. The course provides information on University and departmental travel approvals and procedures, safety, health information and guides students in answering questions they have about traveling abroad. Students in other departments who are engaging in work with IH Faculty or in IH projects must take this course. Students who do not take this course will not be allowed to travel.

(3) REQUIRED FORMS AND DEPARTMENTAL APPROVALS – All students must submit the IH Department Travel Registration Form prior to traveling. If a student is traveling to a country with a U.S. State Department Travel Warning they must also complete the Traveling to Countries with Travel Warning portion of the form and submit everything at least five weeks prior to departure, to get approval from the IH Leadership Committee (see section 10 below). MSPH students are required to have their practicum approval form submitted and approved along with the IH travel policy process completed before traveling. Proper registration of student travel facilitates a faster response during an emergency. **<u>Students who travel without prior approval and without completing the IH travel forms outlined by this policy may be subject to disciplinary action deemed appropriate by the IH Leadership.</u>**

(4) STUDENTS FROM OTHER JHU DEPARTMENTS – Students from other JHSPH departments who will be traveling with the IH Department for school related travel must follow the DIH travel policy and process outlined in pages one to four, including steps 1-4 on page one, and must notify and obtain permission from their primary department prior to traveling.

(5) REPEAT TRAVEL TO THE SAME COUNTRY – If a student is traveling to the same city and country they traveled to previously and all the information in the initial form is the same, the student has to submit a short version of the IH Department Travel Registration Form, in which only the dates of travel are updated. If this repeat trip is to a country with a U.S. State Department Travel Warning, they have to go through IH Leadership approval again. Repeat travel must also be registered in the University Travel Registry.

(6) SHORT TRIP TO ANOTHER COUNTRY WITHIN INITIAL TRAVEL ASSIGNMENT – Students who will be engaged in short trips to another country from their initial country of travel for personal reasons, must submit a short version of the IH Department Travel Registration Form. Short trips are defined as trips that last up to 14 days.

(7) TRAVEL DOCUMENTATION – You should assure that your travel documents are current and appropriate. Visas, if necessary, should be obtained well in advance of your travel. You can find out if a visa is required for the country you will be visiting by calling the embassy of that country (most are in Washington), or by checking the embassy web sites. If you have a problem with getting a visa you will often fare better if you then go yourself to the embassy to have the visa processed. This is especially true if you hold a non-US passport. Remember also that you may need a visa for transit through some countries. Also, a tourist visa is often all you will need, but a business visa may give you extra time in country and help you avoid additional fees if multiple visits are required. Your adviser can help you obtain a letter to submit with your visa application if that is required. You should also be sure that your passport will be valid for the full time that you will be away. Most countries require that your passport be valid for 6 months from the date of departure. Finally, be sure that you have return airline tickets well in advance of your trip. Do not travel with a one-way ticket, as you may be restricted from entering the country upon arrival, and you may have difficulty securing airline tickets while away. Students on a visa should consult with OIS regarding letters and or information they might need to re-enter the country.

(8) UNIVERSITY APPROVALS – Be sure that you have the requisite approvals from the University to initiate any overseas research. These include approval from your thesis committee for dissertation research (must be signed before collecting data) or approval from your adviser and Program Coordinator for the MSPH Practicum, and approval from the IRB for collecting data for research projects. Remember that for student research, the Principal Investigator for purposes of JHSPH IRB approval will be either (typically) your adviser or (in some cases) another JHSPH faculty member selected in consultation with your adviser, and they must approve the research and sign the forms. It can take several months to get all of the IRB approvals finalized, so plan ahead accordingly. Post-hoc submission of these forms is not acceptable, and you run the risk of your research being deemed invalid, so you should take these precautions seriously. Conducting research on human subjects without IRB approval is a serious breach of ethical conduct. All students should discuss the IRB process with their advisers and review the BSPH website for more information (https://www.jhsph.edu/offices-and-services/institutional-review-board/).

(9) HOST COUNTRY APPROVALS – Be sure that you have the necessary approvals from the host country to travel and conduct research. Many host country governments have agencies that must approve all foreign research projects. To check on this you should consult with your adviser, as well as with your host country collaborators. These approvals often take considerable time, so be sure to plan ahead. You should also be sure that the host-country collaborating agency has granted you approval. It is good to get this in writing. Be sure that they know the scope of your work in-country, your travel dates, where you will stay while there, and who they can contact if a problem develops. Take care to set your travel

dates to accommodate your collaborators. If you are not sensitive to their schedules you run the risk of getting a low level of support while you are on travel status. You should identify who your local preceptor/supervisor will be.

(10) TERRORISM AND CIVIL CONFLICT – GETTING TRAVEL APPROVED BY IH – Check before you leave the country with the US State Department's country alerts and warnings website (https://travel.state.gov/content/passports/en/alertswarnings.html) to see about safety in the country you are traveling to.

If you are traveling for a school related activity (including a practicum requirement with an organization or a faculty member, or for your doctoral thesis research), to a country that has a Travel advisory level of 3, 4, or Bangladesh, Cameroon, Colombia, Egypt, Ethiopia, Jordan, Kenya, or Mexico, from the US. State Department, you must submit the following forms prior to every trip:

1. A completed International Health Department Travel Registration Form

2. An evacuation plan or a safety plan from the organization or faculty member you will be working with.

3. A Practicum Proposal form approved by your adviser (MSPH students only)

4. Due to the COVID-19 pandemic, we are requiring you to obtain local office approval from your supervisor (via letter or email) outlining:

- A brief description of your job duties/responsibilities
- The dates of your travel

5. A photocopy of your passport (needed only once)

Once approval is granted from IH Leadership, you must send:

6. A copy of your itinerary to Elisabeth Simmons

Email Elisabeth Simmons (esimmo15@jhu.edu) at least **FIVE WEEKS** in advance informing her of your trip to a travel warning location and include the necessary documentation listed above. The IH Leadership Committee will review your trip. Final approval will come from the International Health Leadership Committee. Students cannot travel without approval.

Once in country you must register with the US Consulate and/or your home embassy if you are a 3rd country national. If you have any problems you should contact the Consulate and follow your evacuation plan if necessary. This includes for problems with health, safety, or civil conflict. You should also contact your adviser, family and the department if you have any problems. Use common sense in your dealings and avoid association with persons who may place you at risk or cause you to be a target for police interrogation or terrorism.

(11) CONTACT INFORMATION – It is important that you leave your contact information with your family and your adviser. Also, be sure to leave your family's contact information with your adviser, and vice versa. If you are out of town while away be sure to let your adviser and family know. It is quite common for students to leave town for trips and people at home are unable to reach them, generating significant worry and concern among your family and colleagues. You should also leave behind the name and contact information of your colleagues you are working with and let them know how to contact you when you are in-country in the event of an emergency

B. HEALTH

(1) INSURANCE – You should check to be sure that your health insurance will cover you when you are overseas. Contact your provider to obtain information on coverage overseas. Please note the conditions under which your insurance plan will or will not reimburse you for overseas costs. Sometimes you may need to notify your insurance provider within a certain time frame of seeking care in order to be reimbursed. Usually, if you need prescription medication for more than three months, your medical insurance will require a written letter from the department stating the nature of the trip and the length of time. Cristina Salazar or Elisabeth Simmons can write this letter if you were to need it. You should also consider getting supplementary travel insurance. This type of insurance will assist you in seeking quality medical care should a serious problem arise.

C. IN CASE OF AN EMERGENCY

(1) JHU Healix International – Healix International provides medical or security assistance to all faculty, staff and students during university-related travel. This includes include 24-hour support via Johns Hopkins Global Travel Assistance helplines. JHU approves all emergency services by Healix, which is why it is crucial you register your travel through the University Travel Registry in case Healix services are needed in an emergency or for an evacuation. For general medical issues Healix will assist in providing care, but students should understand that it is not a regular medical insurance and that there may be fees.

- For travel within the Americas, call 443-455-0711.
- For travel within Europe, the Middle East, Africa, and Asia, call 44-20-8763-4952.

Students must register on the Healix Travel Oracle website (https://traveloracle.healix.com/johnshopkins/) to gain access to Johns Hopkins–specific travel assistance information. Use **policy number JH18492** to register. From there, you may also download the Travel Oracle app.

Students should carry the Healix contact information with them at all times while traveling in case of an emergency or for medical or travel assistance. If you have questions about the Johns Hopkins Global Travel Assistance Program, send an email johnshopkins@healix.com to Healix. You can also find information about these program services on the Johns Hopkins Travel Portal under Traveler Tools.

2. EMERGENCY CONTACT TRAVEL CARD – Every student will receive a wallet size card to be given to their emergency contact (person identified in the Student Emergency Information Form) while the student is traveling along with a letter describing the intention of the card and how to use it. The card outlines in three simple steps on who to contact if the student is in an emergency while traveling abroad and can only reach their emergency contact. All IH students should provide the card to their emergency contact prior to traveling and inform them of the process if an emergency such as a natural disaster were to occur while traveling. The card should only be used for this purpose.

NOTE TO STUDENTS

Please take these common-sense precautions seriously. With a little care and planning you can have a safe and enjoyable experience overseas. Realize that each country is unique and has special issues that should be attended to. Your adviser, and others who have traveled regularly to the country you are visiting, can help you plan for your trip accordingly. Note also that this list of recommendations is cursory and will not cover all events that may occur. Plan ahead, be careful, follow the advice of colleagues, and do not be shy about advocating for your health and safety. It can also be helpful to contact students who have worked in that country or with the organization you will be working with as they may have additional advice and useful tips for you. They can also help you budget by giving you cost of living information.

Internet Resources for Traveling Abroad

- US State Department Travel Information (https://travel.state.gov/content/travel.html)
- US State Department Current Travel advisories (https://travel.state.gov/content/travel/en/traveladvisories/traveladvisories.html/)
- CDC's "Traveler's Health" site. Useful information on health issues, and warnings by country (https://wwwnc.cdc.gov/travel/page/contact-us/)
- JHU Institutional Review Board. Includes forms for applying for approval (https://phirst.jhsph.edu/sph/sd/PublicCustomLayouts/SSO/Selection/?redirect=https%3A%2F%2Fphirst.jhsph.edu%2Fsph%2Fsd%2FRooms%2FDisplayPages%2FLayoutInitial%3FContainer%3Dcom.webridge.entity.Entity%255BOID%255B0A7646F3B149874E902185897C144551%255D%255D)
- Healix Travel website (https://traveloracle.healix.com/register/a9f1f118-b5b0-482c-8a59-993e5855e444/). Useful information on medical, security, travel, and other alerts worldwide and specific vaccination requirements for different countries.
- Full list of travel clinics in Maryland (http://www.travelhealthresource.com/)
- US State Department Study Abroad Website (https://travel.state.gov/content/travel/en/international-travel/before-you-go/travelers-with-special-considerations/students.html?refcode=osac). Useful travel and destination info for students before and during their trips. The site is mobile-responsive

Guidelines for Student Employment

For information about student employment please go to the International Health Department latest academic guides (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) for more information.

Teaching Assistantships

Students can TA in the department but need instructor AND departmental approval prior to starting work. For more information, students must talk to the instructor and **Elisabeth Simmons** (esimmo15@jhu.edu) to fill out the necessary forms. For the most updated policy please go to the International Health Department latest academic guides (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html).

All TA's are required to take the TA training course designed to guide students in their roles and responsibilities as TA's prior to beginning any work. The training can be done online (https://courseplus.jhu.edu/core/index.cfm/go/enr.enr.start/cID/1886/). Our CTL's TA Training has been approved by Homewood's CIRTL to fulfill Teaching Academy – Preparing Future Faculty (PFF) program – Phase I requirement. Students interested in obtaining a Teaching Academy certification can finish our TA training and continue their path with Teaching Academy, if interested. For more information on the Teaching Academy Program please follow this link (https://ctei.jhu.edu/teaching-academy/).

Withdrawals

Failure to register for a term results in automatic withdrawal. A withdrawn student must be formally readmitted before resuming a program of study. This would mean providing the original application, most current transcript prior to withdrawal, and a cover letter explaining reasons for withdrawal and why the student wants to be readmitted. Upon readmission, a student must register for a minimum of two consecutive terms prior to completing degree requirements.

Registration

All MSPH, MHS, and PhD students must register for a minimum of 16 credits of courses each term until they graduate to be a full-time student in the IH department. Students do not register for summer or winter intersession.

Introduction to Online Learning

The School of Public Health offers courses in various formats, including a number of online classes. You may at some point want or need to register for a course online. In order to be eligible to take an online course, students must complete the Introduction to Online Learning, which is offered through the Distance Education Division of the Johns Hopkins Bloomberg School of Public Health. This noncredit mini course is a pre-requisite for all courses offered by this division and must be completed prior to the start of the term in which a student wishes to enroll in an online course. Since the School does not permit conditional and/or concurrent enrollment (that is, you must take the online course prior to enrolling in a distance education class), **we require all incoming students to take this non-credit course during the first term they enroll**. For course dates and enrollment information, please visit the CoursePlus website (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/).

Standards of Academic Performance

Letter grades must be earned in all courses used to satisfy requirements. Please note that courses may be counted **only once** to fulfill requirements. Students must receive satisfactory grades of C or higher in all required courses and continuously maintain a cumulative Grade Point Average (GPA) of at least 2.75 in the MSPH and MHS programs, and a cumulative GPA of at least 3.0 in the PhD program in order to remain a degree candidate in good standing. Any student who receives a D or F in a required course must repeat the course and achieve at least a C. Anyone not meeting these standards will be placed on probationary status. The Committee will establish the minimum conditions to be fulfilled in order to return to the "good standing" status and avoid termination. Typical cases with no conditions require that students improve their academic standing within 2 academic terms. In cases where conditions are imposed, the Committee will specify the maximum time allowed for satisfaction of the conditions. Failure to satisfy these conditions may result in termination from the program.

If students receive Federal Loans administered through the Financial Aid Office (http://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/) there are other academic standards that students must abide by in order to comply with Federal Loan requirements. Please check with the Financial Aid office or email them at JHSPH.finaid@jhu.edu to request more information.

Global Health Economics, MHS

Overview

Director: Dr. Antonio J. Trujillo

The Master of Health Science (MHS) in Global Health Economics is a 9-month academic program that teaches students how to use economic tools to help solve pressing global health problems.

With increasing globalization, there is a growing need for health economists who can translate research into policy and directly inform governments and organizations on the best course of action. Through this degree program, students will learn how health economic principles are used to address global issues such as migration, displaced persons, climate change and pandemics. They'll also learn how health economics can be used to promote healthy lifestyles, positive health outcomes, and equitable access to care.

Using applied health cases from around the world, students will learn how to conduct economic evaluations of health programs and how to evaluate the impact of social problems on the health of a community or population. They will also gain a solid understanding of how to influence behavior through the use of economic incentives.

The major components of the MHS in Global Health Economics include:

- Nine months of academic coursework building strengths in economics, econometrics, economic evaluation, and epidemiology
- Written comprehensive exam
- Scholarly paper
- Specialty elective courses in international health

Completion of a scholarly paper that integrates material from multiple courses applying econometric, evaluation or other research techniques to a topic of interest. Within the School this degree is classified as an academic MHS as it provides an opportunity for advanced study and research in a specific public health discipline and will prepare students for a career in global health economics or further graduate study.

An academic adviser is assigned from the list of Advising Faculty in the student's program area. The Program Coordinator provides general guidance and supervision over all students in each program area.

Requirements for Admission

Students must have a strong quantitative background with undergraduate coursework in microeconomics and calculus highly recommended. Some prior international or health systems experience is highly desirable.

Advising Faculty

While students will have a designated adviser, they are encouraged to meet and discuss their interests with a variety of faculty members.

Cristina Garcia

Antonio J. Trujillo

Bryan Patenaude

Krishna Rao

Alan Sorkin

Andres Vecino

General Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

A minimum of 67 credits in formal coursework must be earned over four academic quarters. Required and elective courses are described in the curriculum section. **Students must be continuously registered until all requirements for the degree program have been satisfied**. Failure to register for a quarter will result in automatic withdrawal. A withdrawn student must be formally readmitted before resuming a program of study. Upon readmission, a student must be registered for a minimum of two consecutive terms prior to completing degree requirements.

Ethics Requirement

Ethics – All master's students are required to take the course PH.550.860 Academic & Research Ethics at BSPH. This is an online course for 0 credits that every student is required to take in their first term of matriculation. Failure to complete this course will prevent students from matriculating for 3rd term.

Students who are being funded by an NIH training grant must also take one of the following two courses: PH.550.600 Living Science Ethics - Responsible Conduct of Research offered first term, OR PH.306.665 Research Ethics and integrity: U.S. and International Issues, offered third term.

Core and International Health Requirements

Students in the MHS in Global Health Economics must required courses examples of the required courses are listed below. Schedule permitting, students can take additional electives provided they do not conflict with the required and elective courses. **A list of elective courses is provided. Additional electives not included in the list need to be approved by the Program Director.**

All core and elective courses must be taken for letter grade. Course substitutions are not allowed for any of the required or the elective courses. Students cannot take more than 22 credits per term.

For the most up-to-date information on course requirements please view our departmental academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
Example of Core and International Health Requirements		
First Term		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.220.601	Foundations of International Health (On campus only)	4
PH.140.621	Statistical Methods in Public Health I	4
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	3
PH.221.840	Special Studies and Research Health Systems ((IGA) Sign up under adviser)	1
PH.221.801	Health Systems Program Seminar I	1
PH.318.603	Applied Microeconomics for Policymaking	3
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.550.860	Academic & Research Ethics at BSPH	
Second Term		
PH.140.622	Statistical Methods in Public Health II	4
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.802	Health Systems Graduate Seminar 2	1
PH.313.643	Health Economics	3

PH.313.602	Economic Evaluation II	3
Third Term		
PH.313.603	Economic Evaluation III	3
PH.221.651	Econometrics I	4
PH.221.803	Health Systems Graduate Seminar 3	1
PH.221.662	Globalization and Health: Economic Development	3
PH.313.644	Intermediate Health Economics	3
PH.221.652	Financing Health Systems for Universal Health Coverage	3
PH.221.840	Special Studies and Research Health Systems (Sign up under adviser for Scholarly paper)	2
Fourth Term		
PH.221.840	Special Studies and Research Health Systems (Sign up under adviser for Scholarly paper)	2
PH.221.804	Health Systems Graduate Seminar 4	1
PH.221.663	Globalization and Health: Framework for Analysis	3
PH.221.647	Advanced Topics in Economic Evaluation & Modeling for Global Health	3

NOTE: Students must choose from the elective selection given to them for each term. They cannot substitute with a course not listed.

Code	Title	Credits
Elective Courses		
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.639	Health Care in Humanitarian Emergencies	3
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.140.640	Statistical Methods for Sample Surveys	3
PH.223.687	Vaccine Policy Issues	3
PH.313.861	Public Health Economics Seminar	1
PH.140.632	Introduction to the SAS Statistical Package	3
PH.221.617	Behavioral Economics in Health Decisions	2
PH.223.680	Global Disease Control Programs and Policies	4
PH.340.600	Stata Programming	2
PH.380.712	Methods in Analysis of Large Population Surveys	3
PH.140.624	Statistical Methods in Public Health IV	4

Comprehensive Exam

Satisfactory performance is required on a written comprehensive examination. Students will take the exam in the 4th term date to be announced in February. The exam will cover the materials taught in the core courses, and the required courses from International Health.

A minimum overall passing grade of 75 is required. Exams will be graded by the co-instructors of the Capstone course. Those scoring below this level may re-take the entire examination on a later term decided by the co-Director of International Health (student must maintain registration if taking the comprehensive exam a second time). Only one re-examination is permitted. Students failing twice are terminated from the MHS program.

Scholarly Paper

Students are expected to write a scholarly paper during their four-term degree. Students must work with their adviser on their paper starting 1st term. Students must register for Special Studies with the Global Health Economics Program Director for 2 credits, during third and fourth terms to work solely on their scholarly paper. The paper must be completed during the Special Studies course in fourth term and due date for the paper TBA. The scholarly essay will be graded by two faculty members: the Director of the MHS program in Global Health Economics, and the student's adviser. If a student identifies a topic that does not align with their adviser's research area, the student must identify a new adviser and needs to seek approval of this change from the Program Director.

Time of Completion of Requirements

Students are expected to complete all requirements for the degree in one year (four terms). Delays for reason will be considered, but in no case, may the time in the program exceed four years from the time of matriculation, regardless of the residence status of the student (other than leave of absence).

BA/MHS

Johns Hopkins undergraduate students currently majoring in Public Health Studies or Economics interested in the BA/MHS program contact **Elisabeth Simmons** (esimmo15@jhu.edu) and for more information visit this page (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-health-science-in-global-health-economics/bachelor-of-arts-and-master-of-health-science-health-economics-BA-MHS.html).

PREREQUISITE COURSES

Undergraduate students applying must have completed the following coursework and have received a B or higher on each of the following:

- AS 280.380 Global Health Principles and Practice
- AS 280.345 Public Health Biostatistics or EN 553.311 Probability and Statistics for the Biological Sciences and Engineering
- AS 280.350 Fundamentals of Epidemiology
- AS 180.101 Elements of Microeconomics
- AS 180.301 Intermediate Microeconomics or its advanced equivalent 180.434

BENEFITS OF PROGRAM

- Johns Hopkins University undergraduates (only) to take BSPH courses during their undergraduate program, can select up to 16 credits of BSPH courses accumulated as undergraduates to transfer into their Master's program.
- Apply by July 1, before senior year, without submitting GRE's as long as their cumulative and SPH undergraduate grade point average remains above 3.3.
- Students who complete the BA/BS at JHU, become MHS candidates and follow the MHS program.
- Receive International Health advisor during your senior year
- This 9-month MHS program allows students to apply to PhD programs faster

BA/MHS ADMISSION REQUIREMENTS

- Online SOPHAS Express application
- Unofficial JHU transcripts when applying. Official transcript required before starting the MHS degree.
- GRE score required if cumulative GPA less than 3.3 at the time of application
- Three letters of recommendation
- Resume or curriculum vitae

- Statement of purpose
- Completion of all prerequisite courses (B or higher)

INDIVIDUALIZED GOALS ANALYSIS (IGA)

The IGA is a process of discussion with your advisor resulting in a written document.

Part 1: Briefly explain what knowledge, skills, and experiences you bring to the program.

Part 2: Identify your goals for your education by explaining what you hope to gain in terms of knowledge, skills, personal and professional contacts, and other experiences while a student in the program. Describe one or more topics for your scholarly paper and indicate how these will be used to build your competencies and achieve your goals.

Part 3: Identify what courses and electives you intend to take and when you plan to complete your courses. Course descriptions in the catalogue indicate when courses are generally offered. Your tracking sheet should include a tentative list of electives you plan to complete and the total credit hours. Carefully review your paper and tracking sheet with your advisor to ensure the proposed curriculum is not only feasible, but that it meets program requirements. Explain how your curriculum plan is aligned with the goals you identified in Part 2. A spreadsheet is often the best way to do this part.

MHS in Global Health Economics Program Learning Outcomes

For a complete list of learning outcomes, please consult the most recent Department of International Health MSPH/MHS Academic Guide (https://my.jhsph.edu/sites/IH/Student-academic-forms/Forms/AllItems.aspx?RootFolder=%2Fsites%2FIH%2FStudent%2Dacademic%2Dforms%2FAcademic%20Guides&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence) published in August of each year.

Standards of Academic Performance

Letter grades must be earned in all courses used to satisfy requirements. Please note that courses may be counted only once to fulfill requirements. Students must receive satisfactory grades of C or higher in all required courses and continuously maintain a cumulative Grade Point Average (GPA) of at least 2.75 in order to remain a degree candidate in good standing. Any student who receives a D or F in a required course must repeat the course and achieve at least a C. Anyone not meeting these standards will be placed on probationary status. The Committee will establish the minimum conditions to be fulfilled in order to return to the "good standing" status and avoid termination. Typical cases with no conditions require that students improve their academic standing within 2 academic terms. In cases where conditions are imposed, the Committee will specify the maximum time allowed for satisfaction of the conditions. Failure to satisfy these conditions may result in termination from the program.

If students receive Federal Loans administered through the Financial Aid Office (http://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/) there are other academic standards that students must abide by in order to comply with Federal Loan requirements. Please check with the Financial Aid office or email them at JHSPH.finaid@jhu.edu to request more information.

Registration

MHS students must register for a minimum of 16 credits of courses each term to be a full-time student in the IH department. Students do **not** register for summer term or winter intersession classes. **Registration below 16 credits is not allowed and violates the terms of a student's full-time requirements and good academic standing. Any student registering below 16 credits during any term could be in violation of their requirements. Audit courses do not count toward the 16-credit per term requirement**.

International Health, MSPH

MASTER OF SCIENCE IN PUBLIC HEALTH DEPARTMENT OF INTERNATIONAL HEALTH

Overview

Each student is admitted into one of the four program areas approved for study leading to the Master of Science in Public Health degree in International Health: Social and Behavioral Interventions, Global Disease Epidemiology and Control, Health Systems, or Human Nutrition.

An academic adviser is assigned from the list of Advising Faculty in the student's program area. The Program Coordinator provides general guidance and supervision over all students in each program area.

Concentrations

GLOBAL DISEASE EPIDEMIOLOGY AND CONTROL

Director: Andrea Ruff, MD

Program Coordinators: Elizabeth Hazel, PhD and Yvonne Tam, MHS

REQUIREMENTS FOR ADMISSION

Students in the program ideally have a bachelor's degree in health or biological sciences or statistics. An applicant with another undergraduate degree must have satisfactorily completed courses in mathematics; biology; and chemistry, physics, or another natural science.

EDUCATIONAL OBJECTIVES

Overall Program Goal

This program provides training for public health practitioners who will use epidemiologic, immunologic and/or laboratory and statistical methods to design, implement and/or evaluate disease control interventions for diseases of public health importance to under-served populations. Graduates will have a fundamental understanding of the pathogenesis, epidemiology, and control measures applicable to diseases of public health importance in disadvantaged populations. Interventions to be studied will be primarily biomedical (e.g. therapeutic or prophylactic drugs, vaccines or environmental modifications), although there may be a behavioral component to effective implementation of such interventions.

Special strengths of the program are infectious disease epidemiology (including emerging infections), vaccinology, and micronutrients. Students have the opportunity to learn from leading experts in vaccine science and policy and may take courses to complete a certificate in this area. Students can acquire a broad understanding of the methods, skills, and tools needed to design, conduct, and analyze community and clinical trials and/or laboratory-based investigations. Students will be able to provide technical assistance to public health researchers and public health managers in the design, implementation and evaluation of programs to address public health problems facing underserved populations in the US and abroad.

Advising Faculty

Smisha Agarwal

Agbessi Amouzou Jessica Atwell

Naor Bar-Zeev Robert Black

Emily Carter Subhra Chakraborty

Victoria Chou Amanda Debes

Anna Durbin Christine Marie George

Robert Gilman Laura Hammitt

Kyla Hayford Mary Carol Jennings

Almamy Malick-Kante Ruth Karron

Joanne Katz Maria Knoll

Alain Labrique Rupali Limaye

Abdoulaye Maiga Melissa Marx

Diwakar Mohan Lawrence Moulton

Melinda Munos

Bareng Aletta Nonyane Jamie Perin

Malathi Ram Timothy Roberton

Andrea Ruff Beulah P. Sabundayo

David Sack Daniel Salmon

Ashley Sheffel Anita Shet

Kawsar Talaat Yvonne Tam

Brian Wahl Neff Walker

HEALTH SYSTEMS

Director: Sara Bennett, PhD

Program Coordinators: Ligia Paina, PhD and Nukhba Zia, PhD

Requirements for Admission

Students must have a degree in biological or health sciences, social sciences or management. Some prior international or health systems experience is highly desirable.

Educational Goals

Graduates of the Health Systems MSPH program will be prepared to take on leadership and management roles in health policy and planning, health financing and management, and monitoring and evaluation of health programs. Graduates will contribute to strengthening health systems through the implementation of equitable and cost-effective interventions for improving access, quality, and efficiency of health services for underserved populations. A health-related practicum experience is an important component of this degree program.

Core Health System Competencies

1. Demonstrate knowledge of public health problems pertinent to disadvantaged populations and approaches to their assessment, management, and control;
2. Demonstrate a thorough understanding of concepts and application of management principles to the operation of health systems in resource-poor settings;
3. Analyze and synthesize data relevant to the management and control of health problems of public health importance in resource-poor settings;
4. Produce written and oral reports for public health professionals and policy makers.

Advising Faculty

Joe Ali Olakunle Alonge

Chiara Altare Abdulgafoor Bachani

Abdullah Baqui Sara Bennett

William Brieger Gilbert Burnham

Andreea Creanga Shannon Doocy

Anbrasi Edward Dustin Gibson

Shivam Gupta Connie Hoe

Rasheda Khanam Alain Koffi

Adam Koon Qingfeng Li

Nina Martin

Maria Merritt Rosemary Morgan

Ligia Paina George Pariyo

Bryan Patenaude David Peters

Court Robinson Daniela Rodriguez

Mathuram Santosham Meike Schleiff

Yusra Shawar Jeremy Shiffman

Anthony So Alan Sorkin

Paul Spiegel Antonio Trujillo

Andres Vecino-Ortiz Shirin Wadhwaniya

William Weiss Krishna Rao

HUMAN NUTRITION

Director: Parul Christian, DrPH

Program Coordinator: Amanda Palmer, PhD

Requirements for Admission

The program seeks to attract and train future experts in public health nutrition across a range of
professional interests and background. Entry into the Master of Science in Public Health (MSPH)
program in Human Nutrition requires, at a minimum, a bachelor's degree or its equivalent, preferably in

nutrition, biology, health or social sciences, public health, health, economics, or health policy.

Educational Objectives

The MSPH program in Human Nutrition is designed to train professionals to focus on understanding
and solving public health problems in food and nutrition across a diverse societal landscape. The
MSPH degree in Human Nutrition prepares students to assume professional, technical, and
management positions within public health nutrition programs or government, international or nongovernmental
agencies, universities, hospitals and private industry. The program also offers a broad
public health nutrition component that complements dietetics skills acquired in the combined MSPH-Dietitianietitian
program (see below). The MSPH program also prepares students with a foundation of knowledge and
skills for carrying out subsequent doctoral studies and research in the field of human nutrition, or
training in medicine.

Overall Program Goal

There are four overarching academic competencies that students are expected to master during the
course of their masters' degree program. Students should:

- Demonstrate knowledge of public health nutrition problems and characterize these problems in
  terms of measurable indicators
- Identify nutrition problems of public health importance; analyze and synthesize relevant data; and
  develop and implement prevention, control, and evaluation plans
- Participate in a field, laboratory or clinical experience related to nutrition research or programs
  from conception of ideas through design, management, monitoring, data collection, and analysis
- Communicate through written reports, oral presentations and other media nutrition information of
  high technical quality and program or policy relevance.

Advising Faculty

- Laura Caulfield
- Jessica Fanzo (co-adviser)
- Joel Gittelsohn
- Ethan Gough
- Jean Humphrey
- Vanessa Garcia-Larsen
- Rebecca Heidkamp
- Kristen Hurley
- Yunhee Kang
- Yeeli Mui
- Amanda Palmer
- Kerry Schulze
- Andrew Thorne-Lyman
- Keith P. West Jr.

Program Requirements

Students will be expected to enroll each term, satisfy the educational requirements, and successfully complete a practicum experience and write a capstone. Students must also pass a written comprehensive exam. A minimum of 16 total credits of coursework per term is required. Of these, approximately 64 credits are associated with directed coursework usually completed in the first year, a minimum of 28 credits are associated with a practicum experience, and minimum of 4 credits with a capstone usually completed during the second year.

Students are required to take specific courses in each of four core content areas in order to develop specific competencies: Nutrition and Health, Biochemistry and Metabolism, Research Methods, and Professional Skills. Approximately 53 course credits are associated with these core content areas common to all MSPH students. MSPH-Dietitianietitian students are required to take an additional 12 credits of required coursework. Within these required courses, all students must complete coursework in environmental health and management sciences. To complete the remainder of their coursework requirements, students will choose elective coursework and special studies in conjunction with their adviser, depending on their unique career goals.

Nutrition Practicum

MSPH candidates complete a practicum for a minimum of 2 terms. The student, faculty adviser, and other faculty within the department or school arrange this experience, as necessary. The practicum complements and reinforces the didactic portion of the MSPH program. It provides students with an opportunity to apply the knowledge gained during the first year, to develop field, laboratory, or clinical skills related to nutrition research or programs according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGO's), university projects, and multi-lateral, private, and/or for-profit sector. Practicum locations exist in the US and in most regions of the world. Students are often placed in organizations such as WHO, the World Bank, UNICEF, Helen Keller International, USDA, Feeding America, and the Center for Livable Future. Funding or scholarship opportunities for the practicum experience include funding from the Center for Global Health at JHU, Sight and Life, and the Borlaug Foundation. In addition to providing students with a real-life opportunity to apply their knowledge, the practicum experience helps facilitate subsequent career opportunities.

SOCIAL AND BEHAVIORAL INTERVENTIONS

Director: Caitlin Kennedy, PhD

Program Coordinator: Elli Leontsini, MD, MPH

Program Co-Coordinator: Nora West, PhD, MPH

Requirements for Admission

Applicants into the program must have a bachelor's degree in the health or social sciences. Some prior international or health experience is highly desirable.

Educational Objectives

The program offers multidisciplinary training for researchers and public health practitioners who wish to use the social sciences in the design, implementation, and evaluation of public health programs, particularly community-based interventions. The program provides students with exposure to applied theory and methods from the fields of social psychology and medical anthropology and sociology. The combined use of qualitative and quantitative methods is a defining characteristic of the program.

Students may choose to specialize in the development, implementation, and evaluation of public health programs related to a given area of interest such as HIV/AIDS, maternal and child health, malaria prevention, or a host of other topical areas relevant to the enhancement of health in lower income settings. Upon completion of the program, students will be able to provide technical assistance in assessing and responding to the socio-cultural context surrounding public health interventions, and in the development, implementation, and evaluation of social and behavioral change programs to improve the health of underserved communities.

The program addresses the following educational objectives:

The Evidence Base for International Health: Identify, define and address major global health problems of underserved populations in lower income contexts, using appropriate indicators and current best practice.

- *International Health:* Examine conditions faced by disadvantaged populations in lower income contexts, principles of health equity and social justice and apply a range of tools to achieve better health outcomes.
- *Public Health Biology:* Explain biologic mechanisms and/or clinical manifestations of disease(s) impacting public health.
- *Environmental Health:* Discuss environmental influences on public health and appropriate risk assessment and public health response options.

Epidemiology and Biostatistics: Develop a solid foundation in epidemiologic and statistical research and evaluation skills applicable to public health assessment and action.

- Identify and utilize epidemiologic and biostatistics tools relevant to assessing the scope of a public health problem or the impact of public health action on a given condition.

Social and Behavioral Interventions: Develop the theoretical and methodological tools to gain an understanding of the socio-cultural context surrounding public health in lower income contexts and to assist in the development, implementation and evaluation of locally appropriate social and behavioral change programs.

- *Theory and Practice:* Apply relevant theories and concepts drawn from anthropology, sociology and psychology to design effective theory-driven social and behavioral interventions to improve the health and well-being of underserved communities.
- *Qualitative Methods:* Develop an understanding of theoretical paradigms and perspectives informing ethnography and qualitative research and use appropriate and rigorous qualitative research methods to understand the socio-cultural context of health and inform public health action.
- *Formative Research and Human Centered Design:* Conduct multi-method formative research to develop locally appropriate social and behavioral interventions to improve health, including development of appropriate communication interventions in support of those strategies.

Management and Leadership: Apply management and leadership techniques to develop, implement and evaluate health programs including organizational and financial best practices.

Evaluation: Propose, conduct, or assess process and outcome evaluations of social and behavioral interventions in global health

Professional Communication and Interprofessional Performance: Produce written reports of programmatic findings and/or research and communicate them via oral presentations, posters, briefs, or other official documents, intended for public health professionals and/or policy makers in audience- appropriate formats; perform effectively on interprofessional teams with local community organizations and stakeholders over the course of a project of mutual interest.

Advising Faculty

- Allison Barlow
- William Brieger
- Laura Beres
- Svea Closser
- Mary Cwik
- Julie Denison
- Joel Gittelsohn
- Emily Haroz
- Steve Harvey
- Allison Ingalls
- Caitlin Kennedy
- Anne Kenney
- Shea Littlepage
- Kristin Masten
- Elli Leontsini
- Hannah Marker
- Victoria O'Keefe
- Hima Patel
- Summer Rosenstock
- Erica Rosser
- Kate Rucinski
- Haneefa Saleem
- Pamela Surkan
- Lauren Tingey
- Peter Winch
- Melissa Walls
- Emma Waugh
- Teresa Yeh

BA/MSPH

FOR PUBLIC HEALTH MAJORS AT JHU KRIEGER SCHOOL OF ARTS AND SCIENCES

The Department of International Health offers early graduate school admission to JHU seniors majoring in Public Health Studies. This transition program serves as a mode of entry into the following International Health MSPH degree programs:

- MSPH in Global Disease Epidemiology and Control (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/global-disease-epidemiology-control/)
- MSPH in Health Systems (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/health-systems/)

The Department of International Health also offers early graduate school admission to any undergraduate at JHU Krieger School of Arts and Sciences, for those who apply to:

- MSPH in Social and Behavioral Interventions (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/social-and-behavioral-interventions/)

Students in this Program will receive co-advising from both Schools as part of this unique experience. Admitted students must complete the BA degree before formally enrolling in the degree program.

Once students complete the BA degree, admitted students will be automatically enrolled into the MSPH degree at JHSPH starting that fall. The MSPH degree consists of a full year of coursework, a comprehensive written exam, and in the second year, a minimum of 4 months and maximum of 9 months of a full time practicum (32 credits), where students apply all their skills in a field setting, and finally fulfilling the MSPH Essay requirement. Students find practicum opportunities overseas or domestically.

Applications for the BA/MSPH degree must be submitted by July 1 between the junior and senior years to ensure completion of the review process prior to the first day of the academic year. Students must be accepted before the start of their senior year.

Standardized test scores are not required for application to the BA/MSPH program for students with a cumulative GPA of 3.3 or higher. However, a transcript is required for all prerequisite courses listed below and for all coursework through the 2nd semester of the student's junior year.

Undergraduate students applying must have completed the following coursework and have received a B or higher on each of the following:

- AS 280.380 Global Health Principles and Practice
- AS 280.345 Public Health Biostatistics or EN 553.311 Probability and Statistics for the Biological Sciences and Engineering
- AS 280.350 Fundamentals of Epidemiology

HOW TO APPLY

Applications for the BA/MSPH degree should be submitted by July 1 between the junior and senior year. Admitted students must complete their BA degree before formally enrolling in the Bloomberg School.

To apply, please use the the SOPHAS Express Application. (https://sophasexpress.liaisoncas.com/applicant-ux/#/login)

If you have questions please email **Elisabeth Simmons** (esimmo15@jhu.edu).

MSPH Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Program Concentration Specific Requirements

Global Disease Epidemiology and Control

GDEC MSPH Course Requirements

All required courses must be taken for a letter grade except for courses only offered for pass/fail.

Students may choose Epidemiology Option 3 with guidance and approval from their academic adviser AND the GDEC MSPH Academic Program Coordinators. Please review the guidance from the Epi Dept provided during GDEC orientation to decide which Epi course option best fits.

The below courses are examples of required courses, for the most up-to-date information and an accurate required course list please view our departmental academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
Required Courses		
General		
PH.550.860	Academic & Research Ethics at BSPH	
PH.223.840	Special Studies and Research Disease Control (Individual Goals Analysis (IGA) (Register and select your advisor's name)	1
PH.223.801	Global Disease Epidemiology and Control Program Seminar 1	1
PH.223.802	Global Disease Epidemiology and Control Program Seminar 2	1
PH.223.803	Global Disease Epidemiology and Control Program Seminar 3	1
PH.220.600	International Travel Preparation, Safety, & Wellness	1
Epidemiology (Choose one series option)		
Epidemiology - Series Option 1		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.722	Epidemiologic Inference in Public Health II	4
Epidemiology - Series Option 2		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.770	Public Health Surveillance	3
Epidemiology - Series Option 3		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
Biostatistics		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
International Health		
PH.220.601	Foundations of International Health	4
PH.223.680	Global Disease Control Programs and Policies	4

Infectious Disease (choose one)		
PH.223.663	Infectious Diseases and Child Survival	3
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases	4
Applied Epidemiology/Randomized Trials (choose one)		
PH.223.664	Design and Conduct of Community Trials	4
PH.340.769	Professional Epidemiology Methods	4
PH.223.705	Good Clinical Practice: A Vaccine Trials Perspective	4
Vaccines		
PH.223.662	Vaccine Development and Application	4
PH.223.687	Vaccine Policy Issues	3
Environmental Health		
PH.180.602	Environment and Health in Low and Middle income Countries	2
Management Sciences		
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
Qualitative Methods (choose one of the following)		
PH.550.604	Qualitative Reasoning in Public Health	2
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
Design and Implementations (choose one of the following)		
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.221.688	Social and Behavioral Foundations of Primary Health Care	4
PH.221.661	Project Development for Primary Health Care in Developing Countries	4
PH.410.620	Program Planning for Health Behavior Change	3
Leadership and Interprofessional Practice		
PH.552.625	Building Collaborations Across Sectors to Improve Population Health	0.5
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
YEAR 2 Requirements		
PH.223.810	Global Disease Epidemiology and Control Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.223.810	Global Disease Epidemiology and Control Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.223.850	Msph Capstone Global Disease Epidemiology and Control	4
Recommended Courses based on student feedback and topic areas		
International Health and Diseases		
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
Infectious Disease		
PH.340.612	Epidemiologic Basis for Tuberculosis Control	2
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	4
PH.340.627	Epidemiology of Infectious Diseases	4
PH.340.609	Concepts and Methods in Infectious Disease Epidemiology	3
PH.340.677	Infectious Disease Dynamics: Theoretical and Computational Approaches	3
Chronic Disease		
PH.223.667	Chronic Diseases in Low and Middle income Countries: Prevalence and Epidemiology	4
Nutrition		
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.222.647	Nutrition Epidemiology	3
PH.222.649	International Nutrition	3
Population/Program Evaluation		
PH.221.641	Measurement Methods in Humanitarian Emergencies	2
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.380.600	Principles of Population Change	4
PH.380.603	Demographic Methods for Public Health	4
PH.223.866	Special Topics in Program Evaluation in International Health	1
PH.380.611	Fundamentals of Program Evaluation	4
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	4
Research Ethics		
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.306.655	Ethical Issues in Public Health	3
Vaccines		
PH.223.867	Special Topics in Vaccine Science	1
PH.223.689	Biologic Basis of Vaccine Development	3
Data Management/Survey Design		
PH.340.696	Spatial Analysis I: ArcGIS	3
PH.140.630	Introduction to Data Management	3
PH.340.697	Spatial Analysis II: Spatial Data Technologies	2
PH.340.717	Health Survey Research Methods	4
PH.223.600	Application of Spatial Analysis Tools to Inform Decision-Making in Lmics	4
PH.380.711	Issues in Survey Research Design	3
PH.140.632	Introduction to the SAS Statistical Package	3
Epidemiology Methods		
PH.340.653	Epidemiologic Inference in Outbreak Investigations	3
PH.340.753	Epidemiologic Methods 3	5
PH.340.682	Pharmacoepidemiology Methods	3
Qualitative Methods		
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
Environmental Health		
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
PH.182.640	Food- and Water- Borne Diseases	3
Management Sciences		

PH.221.722	Quality Assurance Management Methods for Developing Countries	4
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.305.607	Public Health Practice	4
PH.221.610	Pharmaceuticals Management for Under-Served Populations	3
Social and Behavioral Sciences		
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs	3
Crisis & Response		
PH.300.650	Crisis and Response in Public Health Policy and Practice	3
Injury		
PH.221.631	Evaluation Methods for Injury Interventions	3

Plan of Study Example

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.223.840	Special Studies and Research Disease Control (with adviser)	1
PH.223.801	Global Disease Epidemiology and Control Program Seminar 1	1
PH.340.721	Epidemiologic Inference in Public Health I	5
OR		
PH.340.751	Epidemiologic Methods 1	
PH.140.621	Statistical Methods in Public Health I	4
PH.220.601	Foundations of International Health	4
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
	Credits	**18**
Second Term		
PH.223.802	Global Disease Epidemiology and Control Program Seminar 2	1
PH.340.722 or PH.340.770	Epidemiologic Inference in Public Health II (or PH.340.752) or Public Health Surveillance	4
PH.140.622	Statistical Methods in Public Health II	4
PH.223.662	Vaccine Development and Application	4
	Credits	**13**
Third Term		
PH.223.803	Global Disease Epidemiology and Control Program Seminar 3	1
PH.140.623	Statistical Methods in Public Health III	4
PH.223.687	Vaccine Policy Issues	3
PH.180.602	Environment and Health in Low and Middle income Countries	2
	Credits	**10**
Fourth Term		
PH.140.624	Statistical Methods in Public Health IV	4
PH.223.680	Global Disease Control Programs and Policies	4
	Credits	**8**
	Total Credits	**49**

Add in selections from the following to the Plan of Study Example:

- General: International Travel Preparation, Safety and Wellness
- Infectious Disease
- Applied Epidemiology/Randomized Trials
- Social and Behavioral Sciences
- Leadership and Interprofessional Practice

Health Systems

Health Systems Course Requirements

All required courses must be taken for a letter grade with the exception of courses only offered for pass/fail.

The below courses are examples of required courses, for the most up-to-date information and an accurate required course list please view our departmental academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
Year 1		
General Degree Requirements		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.550.604	Qualitative Reasoning in Public Health	2
PH.220.601	Foundations of International Health	4
PH.550.860	Academic & Research Ethics at BSPH	
PH.220.600	International Travel Preparation, Safety, & Wellness	1
Health Systems Program Requirements		
PH.221.840	Special Studies and Research Health Systems (Individual Goals Analysis)	1
PH.221.801	Health Systems Program Seminar I	1
PH.221.802	Health Systems Graduate Seminar 2	1
PH.221.803	Health Systems Graduate Seminar 3	1
PH.221.804	Health Systems Graduate Seminar 4	1
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.638	Health Systems Research and Evaluation in Developing Countries	4
or		
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4

PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	3
PH.221.661	Project Development for Primary Health Care in Developing Countries	4
Year 2		
PH.221.810	Health Systems Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.221.810	Health Systems Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.221.850	Msph Capstone Health Systems	2 - 16

Health Systems Program Electives Twelve (12) additional credits should be selected from the following list of elective courses. Courses below are organized under specific headings relevant to our program to facilitate selection, thus some courses may appear under more than one heading. These courses must be taken for a letter grade, with the exception of courses only offered pass/fail.

Code	Title	Credits
Part 1: General Electives		
Health Systems Planning and Management		
PH.221.722	Quality Assurance Management Methods for Developing Countries	4
PH.312.617	Fundamentals of Financial Accounting	3
PH.410.620	Program Planning for Health Behavior Change	3
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.312.604	Quantitative Tools for Managers	3
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	3
PH.312.610	Foundations of Organizational Leadership	3
PH.221.605	History of International Health and Development	2
PH.221.608	Managing Non-Governmental Organizations in the Health Sector	3
PH.221.610	Pharmaceuticals Management for Under-Served Populations	3
PH.312.621	Strategic Planning	3
PH.312.633	Health Management Information Systems	3
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
International Health Topics		
PH.221.613	Introduction to Humanitarian Emergencies	3
PH.180.620	Introduction to Food Systems and Public Health	4
PH.221.612	Confronting the Burden of Injuries: A Global Perspective	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.635	Global Advances in Community-Oriented Primary Health Care	3
PH.221.637	Health Information Systems	3
PH.221.639	Health Care in Humanitarian Emergencies	3
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
PH.221.634	Stress Management for Relief Workers	2
PH.221.643	Armed Conflict and Health	2
PH.221.688	Social and Behavioral Foundations of Primary Health Care	4
PH.380.750	Migration and Health: Concepts, Rates, and Relationships	3
PH.221.642	Mental Health Aspects of Disaster: Public Health Preparedness and Response	2
PH.221.616	Ethics of Public Health Practice in Developing Countries	2
PH.221.624	Urban Health in Developing Countries	3
PH.221.611	Food Security and Nutrition in Humanitarian Emergencies	2
PH.221.653	Hospital-Based Injury/Trauma Surveillance in Low- and Middle-income Countries	3
Health Policy		
PH.300.600	Introduction to Health Policy	4
PH.221.614	International Political Science for Ph Practitioners	2
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century	3
PH.223.687	Vaccine Policy Issues	3
PH.300.652	Politics of Health Policy	4
PH.301.645	Health Advocacy	3
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life	3
Part 2: Research and Evaluation Methods Electives		
Research Methods		
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.221.641	Measurement Methods in Humanitarian Emergencies	2
PH.221.701	Applications to Gender Analysis Within Health Research and Interventions	2
PH.309.716	Advanced Methods in Health Services Research: Analysis	3
PH.340.717	Health Survey Research Methods	4
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3
PH.550.601	Implementation Research and Practice	3
PH.223.664	Design and Conduct of Community Trials	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.300.713	Research and Evaluation Methods for Health Policy	3
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.224.694	Mental Health Intervention Programming in Low and Middle-Income Countries	3
PH.380.711	Issues in Survey Research Design	3
PH.224.691	Qualitative Data Analysis	3
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.380.712	Methods in Analysis of Large Population Surveys	3
Monitoring and Evaluation		

PH.221.641	Measurement Methods in Humanitarian Emergencies	2
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.221.631	Evaluation Methods for Injury Interventions	3
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	4
PH.380.611	Fundamentals of Program Evaluation	4
PH.300.713	Research and Evaluation Methods for Health Policy	3
PH.380.612	Applications in Program Monitoring and Evaluation	4
Health Economics		
PH.318.603	Applied Microeconomics for Policymaking	3
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.603	Economic Evaluation III	3
PH.313.604	Economic Evaluation IV	3
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
PH.221.652	Financing Health Systems for Universal Health Coverage	3
PH.221.662	Globalization and Health: Economic Development	3
PH.221.663	Globalization and Health: Framework for Analysis	3
PH.309.670	Comparative Health insurance	3
PH.221.617	Behavioral Economics in Health Decisions	2
PH.221.651	Econometrics I	4

PLAN OF STUDY EXAMPLE

Course	Title	Credits
First Year		
First Term		
PH.140.621	Statistical Methods in Public Health I	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.550.604	Qualitative Reasoning in Public Health	2
PH.220.601	Foundations of International Health	4
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
PH.221.801	Health Systems Program Seminar I	1
PH.221.840	Special Studies and Research Health Systems	1
PH.550.860	Academic & Research Ethics at BSPH	
	Credits	**20**
Second Term		
PH.140.622	Statistical Methods in Public Health II	4
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.802	Health Systems Graduate Seminar 2	1
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
	Credits	**17**
Third Term		
PH.140.623	Statistical Methods in Public Health III	4
PH.221.638	Health Systems Research and Evaluation in Developing Countries	4
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.221.803	Health Systems Graduate Seminar 3	1
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	4
	Credits	**16**
Fourth Term		
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	3
PH.221.661	Project Development for Primary Health Care in Developing Countries	4
PH.221.804	Health Systems Graduate Seminar 4	1
PH.380.612	Applications in Program Monitoring and Evaluation	4
PH.221.624	Urban Health in Developing Countries	3
	Credits	**15**
	Total Credits	**68**

Human Nutrition

Human Nutrition Course Requirements

All required courses must be taken for a letter grade with the exception of courses only offered for pass/fail.

The below courses are examples of required courses, for the most up-to-date information and an accurate required course list please view our departmental academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

IMPORTANT NOTE: Courses taken to meet one group of requirements may NOT be used to meet another group of requirements

Code	Title	Credits
General/Professional Skills		
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.222.840	Special Studies and Research Human Nutrition	1
PH.222.860	Graduate Nutrition Seminar	1
PH.550.860	Academic & Research Ethics at BSPH	
Nutrition and Health		
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.222.657	Food and Nutrition Policy	2
PH.222.642	Assessment of Nutritional Status	3
PH.222.644	Cellular Biochemistry of Nutrients	3
PH.222.654	Food, Culture, and Nutrition	4
PH.222.655	Nutrition and Life Stages	3
PH.222.658	Critical Thinking in Nutrition	1
Research Methods, Biostatistics: Chose one of the following series for a total of 16 credits		

PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
OR		
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4
Research Methods, Epidemiology:		
PH.340.721	Epidemiologic Inference in Public Health I	5
Environmental Health: Choose one of the following (any courses not chosen may be used to satisfy the elective requirement)		
PH.180.602	Environment and Health in Low and Middle income Countries	2
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.180.601	Environmental Health	5
PH.180.609	Principles of Environmental Health	4
PH.182.640	Food- and Water- Borne Diseases	3
PH.187.610	Public Health Toxicology	4
Budgeting, choose one of the following		
PH.552.621	Basic Resources Management for Public Health	1
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	1
Management Sciences, choose one of the following *The courses not chosen can be used to satisfy the elective requirement*		
PH.312.600	Managing Health Services Organizations (This course also fulfills the budget requirement)	4
PH.312.601	Fundamentals of Management for Health Care Organizations	3
PH.312.655	Organizational Behavior and Management	2
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries	4
Leadership and Interprofessional Practice		
PH.552.625	Building Collaborations Across Sectors to Improve Population Health	0.5
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
Year 2		
PH.222.810	Human Nutrition Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.222.810	Human Nutrition Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.222.850	Msph Capstone Human Nutrition	4
Recommended Electives: 18-23 Credits		
Food Systems and Production		
PH.180.620	Introduction to Food Systems and Public Health	4
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.180.606	Case Studies in Food Production and Public Health	4
Nutrition		
PH.222.647	Nutrition Epidemiology	3
PH.221.611	Food Security and Nutrition in Humanitarian Emergencies	2
PH.222.649	International Nutrition	3
PH.340.644	Epidemiology of Diabetes and Obesity	2
PH.700.603	Introduction to Ethical Theory	3
PH.222.840	Special Studies and Research Human Nutrition (Developing Skills in Clinical Nutrition)	1
Research Methods		
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.223.664	Design and Conduct of Community Trials	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.410.690	Ethnographic Fieldwork	3
PH.221.660	Systems Science in Public Health: Basic Modeling and Simulation Methods	3
PH.222.653	Food Technology and Health	3
PH.222.661	Designing Healthy Diets	2
PH.222.652	Nutrition in Disease Treatment and Prevention	3
PH.224.691	Qualitative Data Analysis	3

Plan of Study Example

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.222.840	Special Studies and Research Human Nutrition (IGA)	1
PH.222.860	Graduate Nutrition Seminar	1
PH.260.600	Introduction to the Biomedical Sciences	4
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.222.658	Critical Thinking in Nutrition	1
PH.140.621	Statistical Methods in Public Health I	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.552.625	Building Collaborations Across Sectors to Improve Population Health	0.5
PH.222.657	Food and Nutrition Policy	2
	Credits	**22.5**
Second Term		
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.222.860	Graduate Nutrition Seminar	1
PH.222.644	Cellular Biochemistry of Nutrients	3
PH.222.642	Assessment of Nutritional Status	3
PH.140.622	Statistical Methods in Public Health II	4
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5

PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
	Credits	**16**
Third Term		
PH.222.860	Graduate Nutrition Seminar	1
PH.222.655	Nutrition and Life Stages	3
PH.140.623	Statistical Methods in Public Health III	4
PH.182.640	Food- and Water- Borne Diseases	3
	Credits	**11**
Fourth Term		
PH.222.860	Graduate Nutrition Seminar	1
PH.222.654	Food, Culture, and Nutrition	4
PH.140.624	Statistical Methods in Public Health IV	4
	Credits	**9**
	Total Credits	**58.5**

Social and Behavioral Interventions Program Requirements

A minimum total of 96 credits of coursework is required. Of these, 64 credits are associated with academic coursework, generally completed within the first year of the program. During the second year 28 credits are associated with a practicum experience and a minimum of 4 credits with a final capstone. Courses taken to fulfill program requirements must be taken for a letter grade unless, only offered Pass/Fail.

The below courses are examples of required courses, for the most up-to-date information and an accurate required course list please view our departmental academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

IMPORTANT NOTE: A course taken to meet a requirement may NOT be used to meet another requirement

Code	Title	Credits
Required Courses		
Schoolwide		
PH.550.860	Academic & Research Ethics at BSPH	
International Health		
PH.220.601	Foundations of International Health (Students must take the on-campus version)	4
PH.220.600	International Travel Preparation, Safety, & Wellness	1
Epidemiology and Biostatistics		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
Management and Leadership		
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
Social and Behavioral Interventions		
PH.224.840	Special Studies and Research Social and Behavioral Interventions (IGA)	1
PH.224.860	Social and Behavioral Interventions Program Seminar I:Applied Social Science & Global Health	1
PH.224.861	Social and Behavioral Interventions Program Seminar II: Participatory Approaches and the Role of Community	1
PH.224.862	Social and Behavioral Interventions Program Seminar III: Intervention Case Studies	1
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.224.697	Qualitative Research Practicum I: Partnerships and Protocol Development	2
PH.224.698	Qualitative Research Practicum II: Collecting Qualitative Data	2
PH.224.699	Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings	2
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
Year 2 Required Courses		
PH.224.810	Social and Behavioral Interventions Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.224.810	Social and Behavioral Interventions Practicum (Students must complete a minimum of 28 credits of practicum)	14
PH.224.850	Msph Capstone Social and Behavioral Interventions	4
Public Health Policy (choose one of the following)		
PH.222.657	Food and Nutrition Policy	2
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.223.687	Vaccine Policy Issues	3
PH.380.771	Understanding and Changing International Reproductive Health Policy	3
Social & Behavioral Sciences Electives: Choose two to three courses (6 credits minimum) from the following options		
PH.222.657	Food and Nutrition Policy	2
PH.410.612	Sociological Perspectives on Health	3
PH.410.690	Ethnographic Fieldwork	3
PH.410.656	Entertainment Education for Behavior Change and Development	4
PH.410.733	Communication Network Analysis in Public Health Programs	4
PH.180.620	Introduction to Food Systems and Public Health	4
PH.221.701	Applications to Gender Analysis Within Health Research and Interventions	2
PH.301.627	Understanding and Preventing Violence	3
PH.330.620	Qualitative and Quantitative Methods for Mental Health and Psychosocial Research in Low Resource Settings	3
PH.340.717	Health Survey Research Methods	4
PH.380.642	Child Health and Development	3
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond	3
PH.410.615	Research Design in the Social and Behavioral Sciences	3

PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.340.629	The Epidemiology of LGBTQ Health	3
PH.700.622	Bioethics, Human Rights, and Global Health	3
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.221.605	History of International Health and Development	2
PH.221.635	Global Advances in Community-Oriented Primary Health Care	3
PH.221.642	Mental Health Aspects of Disaster: Public Health Preparedness and Response	2
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.221.688	Social and Behavioral Foundations of Primary Health Care	4
PH.224.694	Mental Health Intervention Programming in Low and Middle-Income Countries	3
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	3
PH.340.683	Human Rights in Public Health Practice	2
PH.380.623	Adolescent Health and Development	3
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies	3
PH.380.665	Family Planning Policies and Programs	4
PH.410.613	Psychosocial Factors in Health and Illness	3
PH.410.654	Health Communication Programs I: Planning and Strategic Design	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
PH.221.621	Gender and Health: Foundational Theories and Applications	2
PH.410.752	Children, Media, and Health	3
PH.180.636	Human Rights and Health Seminar	3
PH.221.616	Ethics of Public Health Practice in Developing Countries	2
PH.222.654	Food, Culture, and Nutrition	4
PH.224.605	Indigenous Health	2
PH.300.652	Politics of Health Policy	4
PH.301.645	Health Advocacy	3
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life	3
PH.380.668	International Perspectives on Women, Gender, and Health	3
PH.380.747	International Adolescent Health	3
PH.380.771	Understanding and Changing International Reproductive Health Policy	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs	3
PH.410.655	Health Communication Programs II: Implementation and Evaluation	4
PH.410.663	Media Advocacy and Public Health: Theory and Practice	3
PH.410.721	Translating Research into Public Health Programs and Policy	3
Evaluation-related Research Electives, choose one of the following		
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.340.717	Health Survey Research Methods	4
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.221.631	Evaluation Methods for Injury Interventions	3
PH.221.638	Health Systems Research and Evaluation in Developing Countries	4
PH.222.647	Nutrition Epidemiology	3
PH.223.664	Design and Conduct of Community Trials	4
PH.300.713	Research and Evaluation Methods for Health Policy	3
PH.380.611	Fundamentals of Program Evaluation	4
PH.380.711	Issues in Survey Research Design	3
PH.140.624	Statistical Methods in Public Health IV	4
Public Health Biology (choose one of the following)		
PH.380.661	Clinical Aspects of Maternal and Newborn Health	3
PH.120.620	Fundamentals of Reproductive Biology	3
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.260.636	Evolution of Infectious Disease	3
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	4
PH.550.630	Public Health Biology	3
PH.223.662	Vaccine Development and Application	4
PH.260.631	Immunology, Infection and Disease	3
PH.182.640	Food- and Water- Borne Diseases	3
PH.223.663	Infectious Diseases and Child Survival	3
PH.260.656	Malariology	4
PH.380.760	Clinical Aspects of Reproductive Health	3
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases	4
PH.223.689	Biologic Basis of Vaccine Development	3
PH.330.623	Brain and Behavior in Mental Disorders	3
PH.380.762	HIV Infection in Women, Children, and Adolescents	4
Environmental Health (choose one of the following)		
PH.180.609	Principles of Environmental Health	4
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.182.640	Food- and Water- Borne Diseases	3
PH.180.606	Case Studies in Food Production and Public Health	4
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities (This course also fulfills the Management and Leadership requirement)	3
Other International Health Electives to consider (none required)		
PH.221.612	Confronting the Burden of Injuries: A Global Perspective	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.639	Health Care in Humanitarian Emergencies	3

PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.605	History of International Health and Development	2
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries	4
PH.221.608	Managing Non-Governmental Organizations in the Health Sector	3
PH.221.635	Global Advances in Community-Oriented Primary Health Care	3
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.223.687	Vaccine Policy Issues	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships	3
PH.221.616	Ethics of Public Health Practice in Developing Countries	2
PH.221.624	Urban Health in Developing Countries	3
PH.221.661	Project Development for Primary Health Care in Developing Countries	4
PH.222.649	International Nutrition	3
PH.223.680	Global Disease Control Programs and Policies	4
PH.340.639	Assessing Epidemiologic Impact of Human Rights Violations	2
PH.380.668	International Perspectives on Women, Gender, and Health	3
PH.380.747	International Adolescent Health	3

Plan of Study Example

Course	Title	Credits
First Year		
First Term		
PH.224.840	Special Studies and Research Social and Behavioral Interventions (IGA)	1
PH.224.860	Social and Behavioral Interventions Program Seminar I:Applied Social Science & Global Health	1
PH.550.860	Academic & Research Ethics at BSPH	
PH.220.601	Foundations of International Health	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.140.621	Statistical Methods in Public Health I	4
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
	Credits	**18**
Second Term		
PH.224.861	Social and Behavioral Interventions Program Seminar II: Participatory Approaches and the Role of Community	1
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.224.697	Qualitative Research Practicum I: Partnerships and Protocol Development	2
PH.140.622	Statistical Methods in Public Health II	4
PH.410.668	Policy Interventions for Health Behavior Change	3
PH.340.717	Health Survey Research Methods	4
PH.552.626	Systems Thinking: Concepts and Methods	0.5
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
	Credits	**19.5**
Third Term		
PH.224.862	Social and Behavioral Interventions Program Seminar III: Intervention Case Studies	1
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.698	Qualitative Research Practicum II: Collecting Qualitative Data	2
PH.140.623	Statistical Methods in Public Health III	4
PH.182.640	Food- and Water- Borne Diseases	3
PH.380.611	Fundamentals of Program Evaluation	4
	Credits	**17**
Fourth Term		
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.224.691	Qualitative Data Analysis	3
PH.224.699	Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings	2
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.222.654	Food, Culture, and Nutrition	4
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases	4
	Credits	**18**
	Total Credits	**72.5**

MSPH Departmental Requirements

Residency Requirement

The total number of course credits to be earned depends upon individual program requirements. But, to meet the Residency requirement, students must complete a minimum of 64 credits of didactic courses in four consecutive terms. When general and program-specific requirements total less than 64, the difference may be made up in electives. Only those special studies earning credit that are part of a program's requirements (840 series) are admissible. The Residency requirement is usually fulfilled in a master's student's first year

General Requirements

Individual Goals Analysis (IGA): During the first term of enrollment, students will register for one credit of Special Studies (Individual Goals Analysis) with their adviser in order to define specific educational objectives and to work out a program of study consonant with those objectives.

Ethics Requirement - All master's students are required to take course 550.860.82 Academic and Research Ethics at JHSPH in their first term of matriculation. Failure to complete this course will prevent students from matriculating for the next term and continuing their program.

Students who are being funded by an NIH training grant must also take one of the following two courses: 550.600 Responsible Conduct of Research offered first term, OR 306.665 Research Ethics and Integrity: US and International Issues, offered third term.

All students must complete the Online Human Subjects Training Module prior to the end of the 4th term. However, for students wishing to work on research projects part time for faculty during the academic year, it would be advisable to take this module in 1st term as the training is required for such research work. For information on the Training module go to http://www.jhsph.edu/offices-andservices/institutional-review-board/training/.

International Travel Preparation, Safety, and Wellness: All IH students are required to take this course (220.600.81) during their first year and before traveling overseas for any academic reason, and regardless of whether their research is conducted within or outside of the United States. This course is offered three times a year, students must only take it once.

Registration

MSPH students must register for a minimum of 16 credits of courses each term until they graduate to be a full-time student in the IH department. Students do not register for summer or winter intersession. Summer and winter intersession courses may be available to students with the understanding that students pay 100% of its tuition.

Courses taken for audit do not count towards this 16-credit minimum. Failure to register for a term results in automatic withdrawal. A withdrawn student must be formally readmitted before resuming a program of study. Upon readmission, a student must be registered for a minimum of two consecutive terms prior to completing degree requirements.

Students must be registered in the term they complete their capstone. If a student does not complete all requirements by the last day of fourth term of their second year and wishes to graduate in August, they are required to register for 2 credits during the summer term. Students are responsible for their full tuition and fees during the summer. If students are unable to complete in August, the student must register full time in first term and in each term until they complete.

Important Information about Registration:

1. **Registration below 16 credits is not allowed and violates the terms of a student's tuition scholarship.**
2. **Any student registering below 16 credits during any term could be in violation of their scholarship requirements resulting in a loss of their tuition scholarship.**
3. **Courses taken for Audit do not count toward the 16 credits per term requirement but do count toward the 22 credit maximum.**

During their 2nd year students register in their Program Area's MSPH Practicum course and for their Capstone requirements. When a student takes Special Studies, they must register for Special studies in their specific Program area. The following course numbers correspond to the different program areas:

Practicum

221.810 Health Systems Practicum

222.810 Human Nutrition Practicum

222.815 Human Nutrition Registered Dietitian Practicum

223.810 GDEC Practicum

224.810 SBI Practicum

Capstone

221.850 MSPH Capstone Health Systems

222.850 MSPH Capstone Human Nutrition (including Dietitian)

223.850 MSPH Capstone GDEC

224.850 MSPH Capstone SBI

Special Studies

221.840 Special Studies in Health Systems

222.840 Special Studies in Human Nutrition

223.840 Special Studies in GDEC

224.840 Special Studies in SBI

These are pass/fail credits and a passing grade is only provided if program requirements are met within the corresponding term.

Students each term can register for 14-16 credits of Practicum or a combination of Practicum, Capstone and didactic courses. If they audit a course, they must have 16 additional credits for letter grade or pass/fail. Within a term, a maximum of 22 credits is allowed, combining Practicum, Capstone, and other didactic courses (audited courses are also counted within the 22 credit maximum). A sample schedule for year 2 is below.

SAMPLE SCHEDULE

- Complete at least 2 terms of practicum in the second year by completing at least 28 credits of practicum (22X.810). A student can register and earn more than 28 credits, but not less.
- Students should register for 22X.850 during the term in which they will complete their Capstone requirement. A student must register for a minimum of 4 credits.

Courses taken at other schools within the Johns Hopkins University must be considered carefully. If a student is interested in taking courses outside of the Bloomberg School of Public Health students must meet with the Academic Program Administrator (Elisabeth Simmons) prior to registering to discuss if the credits count toward their degree and or toward registration requirements.

Time of Completion Requirements

Students are expected to complete all requirements for the degree within two years of matriculation. Delays may be considered in special circumstances but in no case may the time in the program exceed four years, regardless of the residence status of the student (other than a leave of absence). Responsibility for tracking and adhering to the graduation timelines belongs to the student. If requirements are not met by the dates posted (see graduation schedule), registration for subsequent terms is required.

Introduction to Online Learning

The School of Public Health offers courses in various formats, including a number of online courses. In order to be eligible to take an online course, students must complete the Introduction to Online Learning, which is offered through the Center for Teaching and Learning at the Johns Hopkins Bloomberg School of Public Health. **This non-credit mini course is a prerequisite for all courses offered by this division and must**

be completed prior to the start of the term in which a student wishes to enroll in an online course. Since the School does not permit conditional and/or concurrent enrollment (that is, a student must take the online course prior to enrolling in a distance education course), we require all incoming students to take this non-credit course during the first term they enroll. For course dates and enrollment information, please visit the CoursePlus website (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/).

Capstone

The culminating experience of the MSPH program is the production of an MSPH capstone that provides a meaningful contribution to knowledge of the health of underserved populations. The capstone is not a thesis in that it need not contain original research findings for review by an academic committee. However, it should provide tangible evidence of expertise on a specific applied topic of international health relevance. The capstone must be reviewed and approved by two faculty readers. Detailed, step by step, guidelines for the MSPH capstone content, format and submission for each program area can be found in the Final Capstone Guide.

Capstone Deadlines

Students must select one of four graduation timelines. Each task must be completed by the due dates indicated or students will be required to register for the next academic term until all requirements are met. The deadline for a cohort will be similar to the deadlines for the previous cohort. Students should familiarize themselves with the capstone deadlines for the previous cohort, to view these deadlines please see the academic guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html). The timeline for the second year will be distributed at the end of the first year.

MSPH Students must also abide by the complete list of additional tasks and deadlines which may be set by each program area and will be given to students by their respective Program Coordinators by the date of the Comprehensive Exam, end of May or early June of the student's 1st year.

Practicum

In addition to completing the requisite coursework, students must gain practical experience in the application of the principles and methods learned. Often the experience is acquired through field placement (practicum) in a work setting that may be the route to permanent employment, though such long-term implications are by no means essential. Alternatively, the student may undertake within the School environment the investigation and analysis of a significant issue related to health of underserved populations. Students begin their full-time practicum sometime between June and September of their second year. Practicum requirements are a minimum of two terms full time (4 months) and up to 8 months. Detailed information on the requirements for the practicum, including IRB requirements, can be found in the Practicum Guide.

Departmental Written Comprehensive Examination

Satisfactory performance is required on a written comprehensive examination. The date for the Departmental Comprehensive Exam TBA. The student should take the exam after completing required coursework, because questions will cover all required fields of study. Although most of the material for the exam is covered in specific courses, graduate education involves much more than the accumulation of specific course credits. Thus, students are responsible for the material on the exam regardless of the particular curriculum they have taken.

A minimum overall passing grade of 70/100 is required. Those scoring below this level may re-take the entire examination in January of the following year. A January examination sitting is offered only for students who fail the May examination. Only one re-examination is permitted. Students failing twice are terminated from the MSPH program.

Students must **NOT** pass along exam questions to future generations of students, **NOT** post questions and/or answers online, **NOT** seek, solicit, accept, or consult content from prior comprehensive exams, and **NOT** share or publicize any content from the comprehensive exam in any form with anyone at any time. Failure to adhere to these rules could result in termination from the program

Master's Degrees Specific Policy

Academic Advising Master's Degrees

Master's degree programs in the Department of International Health are a mixture of didactic coursework, independent reading, research/practice experience and the preparation of a culminating document. As the program progresses, there are many decisions to be made regarding which courses and experiences will address a student's educational objectives. To assist with navigating this process, each student is assigned an academic faculty adviser who has the responsibility of serving as a guide and mentor. While these programs seem to be tightly scripted by the Department and School, it is the Department's view that graduate degree programs must be owned by the student with the faculty acting as guides in the student's own development as a scholar and practitioner. This section is intended to guide the student and the faculty member in making the adviser-advisee relationship as successful as possible.

The suggestions are derived from the experience of faculty who have worked with students for many years and from students who themselves have been guided by these faculty members. The information is dynamic and needs input from students and advisers as they use it. Please submit comments and concerns to the Academic Program Administrator.

THE DEPARTMENT'S ADVISING PHILOSOPHY

Advising Philosophy, Department of International Health

The primary purpose of the academic advising process is to assist students in the development and implementation of a meaningful and appropriate plan for their graduate education and future career, based on the student's individual goals. This purpose is driven by a set of core values:

1. Advisers are responsible to the students they advise.
    - Advising is an integral part of the educational process with both students and advisers benefiting from the relationship
    - Regular student-adviser communication allows advisers to maximize the student's ability to develop life-long learning skills and for the adviser to act as an advocate for the student.
    - Advisers must recognize the diversity of student backgrounds and the opportunities provided by this diversity for maximizing educational achievement.
    - Advisers are responsible for connecting students with others in the academic community who can, when appropriate, assist in the advising process.
2. Advisers are responsible to the institution.
    - As faculty, advisers are responsible for maintaining the academic standards and reputation of the Department, School, and

University. This implies a focus on academic excellence for the students they advise.
  - Advisers must comply with the policies and procedures established by the Department, School and University for the didactic, exploratory, and research portions of a graduate student's educational experience.
3. Advisers are responsible to the community of higher education.
  - Advisers must uphold the values of academic and intellectual freedom that characterize the university environment in the United States.
  - As faculty, advisers are responsible for the training of the next generation of academic leaders in education, research, practice, and service.
4. Advisers are responsible to the public health community
  - As faculty in a School of Public Health, advisers are committed to improving the health and well-being of populations everywhere in the world through education, research, practice and service.

The Adviser-Advisee Relationship

All students in the Department are assigned a faculty adviser who is a full-time member of the advising faculty in their program area. In addition, **the MSPH Academic Coordinator for their program also serves as a back-up adviser to students**. The adviser has the responsibility of assisting the student in designing an academic program that meets the student's goals within the requirements of the University, School and Department. Additionally, the adviser serves to direct the student to appropriate resources and research opportunities. The adviser should be the first point of contact in resolving academic problems. Advising students is an integral part of every faculty member's responsibilities. Thus, the student should not feel that they are imposing by asking for advice. Faculty members expect to be available to students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. This is especially true in our department where research and practice responsibilities of the faculty require them to travel a significant portion of their time. **The responsibility for arranging meetings with their adviser lies with the student. Students should not expect advisers to seek them out for required appointments**. The student bears the responsibility of consulting the adviser when necessary and arranging periodic appointments, even if there are no specific problems. In general, advisers and advisees should communicate at least once per term, preferably more often. All course registrations must be approved by the adviser. The student is required to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline. If due to travel or scheduling difficulties, such communication cannot be conducted before the registration period deadline, students should receive approval for course registration from their MSPH Program Coordinator.

Student Feedback on Adviser Performance

The Department Chair reviews all faculty performance on an annual basis. This review assesses the career track of each faculty member as a part of the faculty mentoring role played by the Chair. In order to provide the most accurate information on faculty performance, the Chair needs information on all aspects of the faculties' roles including student advising. As a part of this process, we have initiated a formal adviser evaluation process that includes input from students. The provision of honest information is required of all students twice per year and these adviser ratings are handled with complete confidentiality. At the completion of the 2nd and 4th terms each year, all students will complete an Academic Adviser Evaluation Form (https://jhsph.co1.qualtrics.com/jfe/form/SV_8cvVZ1RanXU4PAN/) (will be updated and sent to students twice a year) and submit it online. The survey results are analyzed to provide a body of information on advising style, content, and collective perception from multiple students advised by each faculty member over time, focusing on aggregate results accumulating over successive administrations of the survey. The Department Chair (David Peters), the Associate Chair for Academic Programs (Cyrus Engineer), and the Associate Chair for Student Matters (Julie Denison) are the only faculty who may review individual survey responses, and each is excluded from reviewing responses naming themselves as adviser. The responses are also reviewed by the Academic Program Manager (Cristina Salazar) and Academic Program Administrator (Elisabeth Simmons), who may lead or participate in survey analysis. Survey responses about individual faculty members **will be handled with complete confidentiality**. Any feedback relayed to a faculty member from these surveys will be informed only by cumulative or aggregate survey results, will be communicated to faculty only in a manner that does not identify individual students (with due awareness of the faculty member's overall number of advisees), and will be solely for the purpose of helping faculty prospectively improve their approach to advising as appropriate.

It is **not the aim of this survey-based evaluation** to intervene in specific individual situations that may be problematic. If a student wishes to discuss concerns about a **specific individual situation**, we encourage that student to consult directly with their Degree Program Coordinator(s), the Academic Program Administrator, the Academic Program Manager, or the Associate Chair for Student Matters.

Advising Information

CHANGE OF Adviser

For a variety of reasons, a student may wish to change advisers. Faculty wishing to initiate a change should discuss this with the Chair of the Curriculum and Credentials Committee. Faculty will need to submit a report of the student's progress at the time of this request. Student-initiated changes of adviser are made without penalty and are a common occurrence. Students should write a letter of request to the Chair of the Curriculum and Credentials Committee to change from one faculty member to another. Both faculty members must agree. Any request for changes must also be discussed and approved by the student's Program Coordinator. Once approved the change should be sent to Elisabeth Simmons, who will update the students' DIH academic file and inform the Records and Registration Office to update the student's schoolwide file.

RESPONSIBILITIES OF adviser

- To assist in determining the advisee's educational goals and needs at the start of the program.
- To serve as an educational and/or professional mentor for the student.
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and themselves in terms of academic, professional, and personal interests.
- To facilitate a change of adviser if deemed appropriate to the student.
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty.
- To be sensitive to cultural, health, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be understanding, and supportive. The Department has a sizable portion of foreign students coming from diverse pre-professional and professional educational backgrounds. As such, they have diverse

needs and experience in managing a US based graduate education program.
- To meet regularly with the student and to identify a mechanism for advising while traveling either through email or by identifying a back-up adviser for periods of extended travel.

RESPONSIBILITIES OF ADVISEE

- To arrange to meet with the adviser at least once each term.
- To comply with registration and administrative deadlines.
- To identify and develop professional career goals and interests.
- To understand administrative policies and procedures and be familiar with the requirements for their program as described in the Academic Guide.
- To maintain the academic checklist and review it at meetings with the adviser.
- To complete an Adviser Evaluation Form twice during the academic year, once at the end of 2nd term and again at the end of 4th term.

STUDENT EXPECTATIONS OF AdviserS

- Adviser's approval and or recommendation on course registrations, course changes, pass/fail agreements, waiver requests, practicum approvals and on all petitions to the Curriculum and Credentials Committee.
- At least one meeting per term with the adviser.
- Oversight of the student's overall academic program and sensitivity to any academic difficulties.
- Knowledge of and interest in the student's career objectives including writing recommendation letters.
- Review of required and recommended courses for the program area. Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year.

MSPH Adviser/Advisee Meeting Guidelines

The guidelines below are the absolute minimum interactions students and advisers should expect. Many of our students and faculty meet much more frequently and often become life-long colleagues as a result of the mentoring experience.

YEAR ONE

First Term

- Minimum of two meetings with advisee
- Review with advisee competencies, departmental requirements, develop a written plan of courses and experiences to meet the student's educational goals
- Review and approve Individual Goals Analysis (IGA) assignment
- Review administrative deadlines
- Identify other people and resources of which students should be aware
- Monitor progress after midterms and review transcript at end of term

Second Term

- One Meeting
- Monitor advisee's progress, evaluate, discuss first term grades
- Begin discussion of possible internship opportunities
- Follow up on plan set out in first term
- Provide advice on courses advisee might take in third term
- Monitor progress after midterms and review transcript at end of term

Third Term

- One Meeting
- Monitor advisee's progress; evaluate; discuss second term grades
- Continue discussion on internship opportunities
- Discuss preparation for comprehensive examination, student study groups
- Provide advice on courses advisee might take in fourth term
- Write letters of recommendation for practicum and scholarship applications
- Monitor progress after midterms and review transcript at end of term

Fourth Term

- One or two meetings
- Monitor student's progress; evaluate; discuss third term grades
- Encourage participation in study groups for comprehensive examination
- Finalize plans for practicum; review and approve practicum proposal/sign approval form
- Review and approve travel plans and forms
- Students should begin working with the Career Services Office to explore options for post-graduation employment or further education
- Monitor progress after midterms, review transcript at end of term, and discuss year-end grades

YEAR TWO

First term Practicum

- Communicate via email or Skype or in-person once a month
- Discuss MSPH capstone topic, readers, and graduation timeline
- Discuss post-graduation employment or further education
- Advisers who have December graduate advisees must follow corresponding deadlines from Graduation Deadline Table found in students CoursePlus library
- Adviser to review and approve advisee's Portfolio Touchpoints
  - Identify Topics and Capstone readers
  - Declare intent to graduate Capstone outline for students completing in January

Second term Practicum & Capstone

- Communicate via email or in-person once a month
- Continue discussions regarding post-graduation employment or further education
- Adviser to review and approve student's Portfolio Touchpoints
  - Capstone outline
  - First draft
  - Final draft
- Other drafts and revisions should be conducted via email
- Follow up with advisee and second reader for timely feedback on drafts
- Make sure your advisee has completed or is in a practicum by this term
- For December graduates and January completers, submit grade for their capstone special studies
- Discuss post-graduation employment or further education

Third term Practicum & Capstone

- Communicate via email or in-person once a month
- Make sure advisee has completed all course requirements or are registered to complete all course requirements
- Adviser to review and approve student's Portfolio Touchpoints
  - Capstone outline
  - First draft
  - Final draft
- Other drafts and revisions should be conducted via email
- Follow up with advisee and second reader for timely feedback on drafts
- For those finishing in third term, submit grade for their capstone special studies
- Discuss post-graduation employment or further education

Fourth term Practicum & Capstone

- Communicate via email or in-person once a month
- Make sure advisee has completed all course requirements or are registered to complete all course requirements
- Adviser to review and approve student's Portfolio Touchpoints
  - Capstone outline
  - First draft
  - Final draft
- Other drafts and revisions should be conducted via email
- Follow up with advisee and second reader for timely feedback on drafts
- For those finishing in third term, submit grade for their capstone special studies
- Discuss post-graduation employment or further education

Standards of Academic Performance

Letter grades must be earned in all courses used to satisfy requirements. Please note that courses may be counted only once to fulfill requirements. Students must receive satisfactory grades of C or higher in all required courses and continuously maintain a cumulative Grade Point Average (GPA) of at least 2.75 in order to remain a degree candidate in good standing. Any student who receives a D or F in a required course must repeat the course and achieve at least a C. Anyone not meeting these standards will be placed on probationary status. The Committee will establish the minimum conditions to be fulfilled in order to return to the "good standing" status and avoid termination. Typical cases with no conditions require that students improve their academic standing within two academic terms. In cases where conditions are imposed, the Committee will specify the maximum time allowed for satisfaction of the conditions. Failure to satisfy these conditions may result in termination from the program.

If students receive Federal Loans administered through the Financial Aid Office (http://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/) there are other academic standards that students must abide by in order to comply with Federal Loan requirements. Please check with the Financial Aid office or email them at JHSPH.finaid@jhu.edu to request more information. Any student below a 2.75 GPA at the end of their 1st year will automatically be disqualified from receiving the schoolwide Master's MSTP scholarship in their 2nd year.

Masters Tuition Scholarship

All MSPH students will receive a 75% tuition scholarship in their second year of their MSPH degree. This scholarship is contingent on completing the Residency Requirement (page 28) continue to be registered full time in the second year of the MSPH degree and being in good academic standing. The 75% tuition scholarship can only be applied during terms 1-4 of the student's second year. It does not apply for summer term or winter intersession.

Individualized Goals Analysis (IGA)

The IGA is a process of discussion between a student and their adviser to help them plan their course and program goals. Students are required to enroll for one credit of Special Studies (22X.840) with their adviser during 1st term.

Students will work on a written document that is uploaded to their Portfolio outlining the process below.

Part 1: Students briefly explain what knowledge, skills, and experiences they bring to the program.

Part 2: Students Identify their goals for their education by explaining what they hope to gain in terms of knowledge, skills, personal and professional contacts, and other experiences while a student in the MSPH program. Students will review the list of MSPH core competencies with their adviser. Students are encouraged to identify additional competencies particularly relevant to their professional future and/or academic stream. Students will describe one or more practicum assignments and potential capstone topics and indicate how these will be used to build their competencies and achieve their goals.

Part 3: Develop an MSPH Curriculum Planning and Tracking Sheet by developing a tentative course plan for a student's entire MSPH program. Identify what courses and special studies they intend to take and when they plan to complete their courses. Course descriptions in the catalogue indicate when courses are generally offered. A student's tracking sheet should include a tentative list of electives they plan to complete and the total credit hours. Students should carefully review their paper and tracking sheet with their adviser to ensure the proposed curriculum is not only feasible, but that it meets program requirements. Students will then explain how their curriculum plan is aligned with the goals they identified in Part 2. A spreadsheet is often the best way to do this part.

Part 4: Students upload their MSPH Curriculum Planning to their Portfolio by the end of 1st term and address the touchpoint to complete the requirement and for feedback from their Program Coordinators.

Tracking Sheet

Tracking sheets are used to track all course requirements from each student's program. All students are required to fill out and submit their tracking sheets once a year to Elisabeth Simmons via their Portfolio. Approved waivers and substitutions must also be submitted with the tracking sheets. Students should use the tracking sheet when meeting with their advisers. Students will have access to their tracking sheets in their Portfolio libraries and will submit their completed sheet in March, by the end of 3rd term, to the required touchpoint.

Portfolio

All MSPH students have access to 'My Portfolio' in CoursePlus. The Portfolio provides students an easy way to receive feedback on progress from Advisers and Program Coordinators and allows them to provide “evidence” of assignments and completed tasks for their MPSH degree all in one convenient location.

The Portfolio is used for students to turn in assignments such as the Individual Goals Analysis and the second year Capstone process and deadlines. Students will be responsible for uploading and adhering to all deadlines as part of their MSPH program. At the beginning of each year students will be given instruction on how to use the Portfolio and will be expected to visit their Portfolio regularly for assignments and due dates.

Travel Policy (p. 336)

Practicum Guidelines

The latest practicum information can be found in the practicum section **(**https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html**) in the Academic Guide.**

MSPH Practicum Opportunity Examples

1. JHSPH Center for Global Health: Field Placements and Field Research Awards (http://www.hopkinsglobalhealth.org/funding-opportunities/student-and-trainee-grants/ghefp/) - Deadline: February Length of internship: Depends on the posting from faculty Location of internship: Depends on the posting from faculty Benefits: Grants of up to $3,500

> Contact: Anna Kalbarczyk, MPH Program Manager 410-502-9873 akalbarc@jhu.edu

2. Fulbright US Student Program (https://studentaffairs.jhu.edu/fellowships/fulbright/) - Deadline: September (JHSPH Deadline) Benefits: Round trip transportation to host country. Funding for room, board and incidental costs based on country cost of living. Health benefits. Country specific benefits also exist. Contact: follow the link (https://studentaffairs.jhu.edu/fellowships/fulbright/) or contact nfp@jhu.edu

3. Program in Applied Vaccine Experience (PAVE) (https://www.jhsph.edu/departments/international-health/current-students/Program-in-Applied-Vaccine-Experiences-PAVE/): Deadline: January Length of Internship: 3-4 months Location of Internship: Geneva, Switzerland; Washington, DC; Atlanta, GA; New York, NY; depending on agency placement Benefits: Grants of up to $3,500 per month Contact: Jessica Atwell, PhD, MPH Program Manager jatwell@jhu.edu

Internships are currently offered with the following organizations: WHO, Gavi, UNICEF, PAHO and CDC

4. New York Epi Scholarship Program: Deadline: February Length of internship: 10-12 week summer internship Location of internship: NYC Department of Health and Mental Hygiene, Los Angeles County Department of Public Health, or at Public Health – Seattle & King County Benefits: An allowance to defray expenses for a full-time 10-12 week summer internship. Mentoring by some of the nation’s leading epidemiologists and researchers. Enhanced academic opportunities and practical experience in statistical analysis.

Contact: http://www.nyc.gov/html/doh/html/career/epi-scholar-apply.shtml

5. STAR Program (https://www.ghstar.org/): Deadline: Dependent on Open Posting Due Dates (see website) Length of internship: work full or part time for up to six calendar months Location of internship: USAID offices in Washington, DC (the Agency’s headquarters), in the Agency’s missions throughout the world, or with Agency implementing partners (other government agencies, multilateral and non-governmental organizations).

6. Boren Fellowship: Deadline: January Length of internship: a preference of 6 months or longer, absolute minimum of 3 months Location of internship: All over the globe- see website for complete listing Benefits: Language learning fellowship to combined with a practicum Contact: see website (https://www.borenawards.org/)

7. Critical Language Scholarship Program: Deadline: Early November Benefits: Language learning scholarship to combine with a practicum

8. Helen Keller International (http://www.hki.org/internships-and-volunteering/#VIsTJGTF8ms): Deadline: December - Length of internship: minimum of 6 months - Location of internship: Africa,

9. Congressional Hunger Center (http://www.hungercenter.org/fellowships/emerson/): Emerson Hunger Fellowship: Deadline: January Length of internship: 1 year Location of internship: Washington DC Benefits: $16,000 annual living expenses, health insurance, travel insurance, housing during field placement, $4,000 housing subsidy in DC, $3,500 end of service award, relocation subsidies Contact: Apply online

10. U.S. Borlaug Fellows in Global Food Security Program (https://www.fas.usda.gov/programs/borlaug-fellowship-program/): Deadline: Deadline for fall applications is early November Length of internship: Varies Location of internship: Varies Contact: see website

11. World Food Program (http://www.wfp.org/careers/internships/): Deadline: December Length of internship: Varies Location of internship: Rome, Italy Contact: see website (http://www.wfp.org/careers/internships/)

12. World Bank - Deadline: January 31 st – summer internship & October 31st – winter internship Length of internship: At least 4 weeks Location of internship: Most positions are in Washington DC, but some positions are offered in country offices Benefits: The Bank pays an hourly salary to all Interns and, where applicable, provides an allowance towards travel expenses. Interns are responsible for their own living accommodations. Contact: apply online; Annie Provo (previous HN MSPH student)

13. WHO internships (https://www.who.int/careers/internship-programme/) -

Deadline: January 31 st – summer internship & September 30th – winter internship Length of internship: A minimum of 6 weeks to a maximum of 12 weeks on a full-time basis. Exceptionally, internships may be extended up to 24 weeks to respond to special academic requirements. Location of internship: Geneva, Switzerland (apply online)

For internships at regional offices email directly:

- WHO Regional Office for Africa: afrgohrinterns@who.int
- WHO Regional Office for the Americas: interns@paho.org
- WHO Regional Office for Europe: interns@euro.who.int
- WHO Regional Office for the Eastern Mediterranean: emrgohrs@who.int
- WHO Regional Office for South-East Asia: seinterns@who.int
- WHO Regional Office for the Western Pacific: interns@wpro.who.int

WHO Headquarters also accepts interns in the following out-posted offices:

- WHO Global Service Centre: gsoffice@who.int
- WHO Kobe Office: wkc@wkc.who.int

Benefits: WHO internships are not paid, and no travel expenses are available.

Contact: apply online or with email addresses above

See list of previous/current student practicums and essays/capstones for ideas and contact

*No practicum is currently permitted in the state of Kentucky

Capstone Guidelines

The latest capstone information can be found in the capstone section in the Academic Guide **(**https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html**).**

Program Concentration Learning Outcomes

For a complete list of learning outcomes by program concentration, please consult the most recent Department of International Health MSPH/MHS Academic Guide (https://my.jhsph.edu/sites/IH/Student-academic-forms/Forms/AllItems.aspx?RootFolder=%2Fsites%2FIH%2FStudent%2Dacademic%2Dforms%2FAcademic%20Guides&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence) published in August of each year.

International Health, MSPH, Human Nutrition - Dietitian

International Health, MSPH, Human Nutrition-Dietitian

Program Coordinator: Laura Caulfield, PhD

Requirements for Admission

The Dietitian program seeks to attract and train future experts in public health nutrition across a range of professional interests and background. Entry into the Master of Science in Public Health (MSPH) program in Human Nutrition requires, at a minimum, a bachelor's degree and eight prerequisite courses. For more information please go to the MSPH, Human Nutrition - Dietitian homepage (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/registered-dietician-program/).

Advising Faculty

- Laura Caulfield

Visit our Departmental website for International Health, MSPH, Human Nutrition-Dietitian requirements, application, fees, and additional information. (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/registered-dietician-program/)

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Visit our Departmental website for MSPH, Human Nutrition-Dietitian requirements, application, fees, and additional information. (https://www.jhsph.edu/departments/international-health/global-health-masters-degrees/master-of-science-in-public-health/registered-dietician-program/)

Educational Objectives

The MSPH program in Human Nutrition is designed to train professionals to focus on understanding and solving public health problems in food and nutrition across a diverse societal landscape. The MSPH degree in Human Nutrition prepares students to assume professional, technical, and management positions within public health nutrition programs or government, international or non-governmental agencies, universities, hospitals and private industry. The program also offers a broad public health nutrition component that complements dietetics skills acquired in the combined MSPH-Dietitian program (see below). The MSPH program also prepares students with a foundation of knowledge and skills for carrying out subsequent doctoral studies and research in the field of human nutrition, or training in medicine.

Overall Program Goal

There are four overarching academic competencies that students are expected to master during the course of their Masters' degree program. Students should:

- Demonstrate knowledge of public health nutrition problems and characterize these problems in terms of measurable indicators
- Identify nutrition problems of public health importance; analyze and synthesize relevant data; and develop and implement prevention, control, and evaluation plans
- Participate in a field, laboratory or clinical experience related to nutrition research or programs from conception of ideas through design, management, monitoring, data collection, and analysis
- Communicate through written reports, oral presentations and other media nutrition information of high technical quality and program or policy relevance

International Health, MA/MSPH

International Health, MA/MSPH

Students in the dual degree program may complete both Masters in 3 years (6 terms at BSPH and 3 semesters at SAIS) depending on what SAIS track a student chooses. Dual degree candidacy does not remove the MSPH practicum or the master's Capstone requirements. Students can choose to do the MSPH or MA first. For more information about the dual degree please ask **Cristina Salazar** (csalazar@jhu.edu), the

Academic Program Manager. For more information please visit this site (https://publichealth.jhu.edu/academics/ma-msph/).

International Health, PhD

Doctor of Philosophy (PhD)

The PhD prepares students to become independent investigators in academic and non-academic research institutions, and emphasizes contributions to theory and basic science.

Students interested in a doctoral research degree must apply to one of the Department's four concentrations.

Program Concentrations

Global Disease Epidemiology and Control

Program Director: Andrea Ruff, MD

Program Coordinator: Melissa Marx, PhD

Requirements for Admission

Applicants to the program must have a degree in medicine, veterinary medicine, or dentistry; or a master's level degree or equivalent graduate training in epidemiology, statistics, international health, tropical medicine, microbiology, parasitology, immunology, or virology. Prior work experience is preferable.

Educational Objectives

Overall Program Goal

This program provides training for public health researchers who will use epidemiologic, immunologic and/or laboratory and statistical methods to design, implement, and/or evaluate disease control interventions for diseases of public health importance to under-served populations. Graduates will have a fundamental understanding of the pathogenesis, epidemiology, and control measures applicable to diseases of public health importance in disadvantaged populations throughout the world. Interventions to be studied will be primarily biomedical (e.g. therapeutic or prophylactic drugs, vaccines or environmental modifications), although there may be a behavioral component to effective implementation of such interventions.

Special strengths of the program are infectious disease epidemiology and vaccinology. Students can acquire a broad understanding of the methods needed to design studies and gain hands-on experience in the design, conduct and analysis of community and clinical trials and/or laboratory based investigations, including the immunologic and biologic basis of responses to immunizations and other prophylactic or therapeutic interventions.

General Knowledge

Learning Objectives

- Describe the evolution of key approaches that have been applied in an attempt to address the major public health problems of underserved populations and to place these approaches in the context of general development, culture and health policies.
- Define the most important indicators of health status of underserved populations, identify databases and other sources of information for these indicators, and describe how changes in these indicators reflect changes in the health status of populations.
- Describe the epidemiology, biology, pathophysiology, modes of transmission, and strategies for prevention and control of the major infectious diseases of public health importance to resource-poor environments. Be able to argue for the appropriateness of specific strategies for prevention and control in selected circumstances.

Research Skills

Learning Objectives

- Review and critique the relevant literature on a topic of interest.
- Place a research question in the context of current knowledge.
- Frame a research question in terms of study goals and specific aims.
- Design a research study to address specific aims. Be able to differentiate between study designs and to argue in favor of using a specified design as most appropriate to address that research question
- Develop and write a research proposal
- Develop and justify a budget for a research proposal.
- Discuss the ethical issues involved in research in resource poor environments and argue for a particular approach to addressing these ethical issues.
- Prepare an application to an IRB for ethical approval.
- Implement and manage a research study, monitor the progress of the study and the quality of data collected.
- Produce an appropriate statistical analysis of the data collected during the research project, and provide a reasoned interpretation of these results.
- Place the research findings in the context of current knowledge, identify limitations of the research, and be able to specify further areas for research.
- Analyze the policy implications and public health significance of the research findings.

Communications

Learning Objectives

- Make oral and poster presentations of research findings for professional audiences.
- Write manuscripts of publishable quality for the peer reviewed literature that describe and explain research findings.
- Teach other students basic introductory materials in the student's general area of expertise.

Advising Faculty

- Agbessi Amouzou
- Smisha Agarwal
- Naor Bar-Zeev
- Abdullah Baqui
- Chris Beyrer (joint)
- Robert Black
- Richard Chaisson (joint)
- Priya Duggal (joint)
- Anna Durbin
- Christine Marie George
- Robert Gilman
- Jonathan Golub (joint)
- Amita Gupta (joint)
- Laura Hammitt
- Christopher Heaney (joint)

- Ruth Karron
- Joanne Katz
- Alain Labrique
- Melissa Marx
- William Moss (joint)
- Lawrence Moulton
- Melinda Munos
- Douglas Norris (joint)
- Thomas Quinn (joint)
- Andrea Ruff
- David Sack
- Daniel Salmon
- Kawsar Talaat
- Jonathan Zenilman (joint)

Health Systems

Program Director: Sara Bennett, PhD

Program Coordinator: Abdul Bachani, PhD

Requirements for Admission

Applicants must have a prior Master's degree in biological, health sciences, or alternatively in management or social sciences. Prior international or health systems experience is a significant advantage.

Educational Objectives

The overall goal of the Doctor of Philosophy (PhD) degree in the Health Systems Program is to produce the next generation of leaders in health systems research and practice, particularly in low- and middle income country settings. Graduates of the PhD program in Health Systems should have the competencies to play leadership roles in: (a) health policy; (b) health planning, financing, and management; (c) monitoring and evaluation; (d) institution building and community development; (e) public health teaching; and (f) research on health systems; in low and middle-income countries or with disadvantaged populations in any part of the world.

Overall Program Goal

There are four overarching academic competencies applicable to each area of study, that students are expected to master during the course of their doctoral program. Students should be able to:

- Apply public health sciences to address health problems in vulnerable populations
- Provide leadership in health systems management and analysis
- Conduct independent research on health systems in low- and middle-income countries and vulnerable populations
- Communicate effectively with researchers, policy makers, and key stakeholders in health systems

Advising Faculty

- Joseph Ali
- Olakunle Alonge
- Abdullah Baqui
- Abdul Bachani
- Sara Bennett
- Stan Becker (joint)
- David Bishai (joint)
- William Brieger
- Andreea Creanga
- Shannon Doocy
- Azadeh Farzin (joint)
- Alain Labrique
- Maria Merritt
- Bryan Patenaude
- David Peters
- Ligia Paina
- Krishna Rao
- Courtland Robinson
- Mathuram Santosham
- Jeremy Shiffman
- Anthony So
- Paul Spiegel
- Antonio Trujillo

Human Nutrition

Program Director: Parul Christian, DrPH

Program Coordinator: Laura Caulfield, PhD

Requirements for Admission

The program seeks to attract and train future experts and leaders in public health nutrition across a range of professional interests and backgrounds. Entry into the doctorate in philosophy (PhD) program in Human Nutrition requires, at a minimum, a bachelor's degree or its equivalent, preferably in nutritional, biological, food health or social sciences, public health practice, food security, economics or health policy with a minimum of one year of post-baccalaureate experience which can take the form of a master's degree, a dietetic internship, medical training or other relevant work experience.

Educational Objectives

The doctoral program in Human Nutrition is designed to train professionals to identify, understand and solve, through scientific methods, problems of public health importance in human nutrition. Graduates are expected to assume leadership roles in academia, government, industry and other private sector enterprises. They will be expected to advance knowledge in human nutrition through research and advocate the application of such knowledge through public health policies and programs.

Overall Program Goal

There are five overarching academic competencies, applicable to each area of study, that students are expected to master during the course of their doctoral program. Students should:

- Understand the biochemical, molecular, epidemiological, social and behavioral fundamentals of human nutrition
- Comprehend the complex interrelationships between food-and-nutrition and health-and-disease in diverse populations
- Master quantitative and qualitative analytic skills required to understand, critically evaluate and conduct nutrition research
- Be able to integrate ethical principles and standards in the conduct of human research
- Develop the professional skills necessary to communicate effectively

Students in the doctoral program in Human Nutrition are expected to gain knowledge and master skills in the following broad content areas of the curriculum, each with sub-areas of specialization:

Nutrition and Health

Sub-areas: Nutrition over the life span, social, cultural and behavioral influences, food and nutrition policy.

This content area of the curriculum has core competencies that can be addressed in a flexible manner, and in consultation with a student's academic adviser.

Learning Objectives – Know and understand:

- Nutritional processes in each stage of life
- Age-, disease- and physiologic state-specific nutrient requirements
- Social, political and cultural contexts influencing nutritional status of individuals and populations
- Pathological processes and how they influence nutritional well-being and vice versa
- Development and application of evidence-based food and nutrition policies

Biochemistry and Metabolism

Sub-areas: Nutrient metabolism

Minimum requirements in the area of metabolism would provide candidates with the biochemical and metabolic fundamentals of nutritional science.

Learning Objectives – Know and understand:

- Biochemical and metabolic pathways of macronutrients and micronutrients
- Relationship between cell structure and metabolism and nutrient functions
- Genetic basis of nutritional interactions and requirements

Research Methodology

Sub-Areas: Biostatistics, Epidemiology, Nutritional Assessment, Nutritional Epidemiology, Research Proposal Development, Qualitative Research Methods

Minimum required competencies in research methodology provide candidates with the quantitative and qualitative knowledge and skills for understanding and conducting research in human nutrition.

Learning Objectives – Know and understand concepts and terms

- Compose research questions
- Link nutrition research questions to appropriate study design, methods, analysis, interpretation, and writing
- Be familiar with underlying principles, methods of collection, analysis and interpretation of quantitative and qualitative data
- Demonstrate ability to analyze a nutrition-related (e.g., dietary or nutritional status) data set
- Understand the use of nutrition reference data
- Demonstrate competence in one primary statistical software and data management package
- Understand the principles and use of nutrition-related laboratory techniques, equipment and field assessment methods

Professional Skills

Sub-areas: Grant writing, scholarly publishing, teaching and public speaking, ethics, information technology

The goal of the professional skills core curriculum is to provide the student with exposure to or experiences in important skills necessary to work effectively as a professional at the doctoral level., Development of these competencies occur through the academic process of the degree rather than through didactic coursework per se.

To support students in transitioning from coursework to thesis research, Dr. Caulfield leads the Doctoral Seminar in Proposal Development. Through the sequence, HN doctoral students (or those in other programs with research interests in nutrition) are engaged in career planning, identifying opportunities at Johns Hopkins, speaking and communicating their research ideas, persuasive written communication to various audiences, seeking research funding, and grant writing and budgeting. By the end of the sequence (2nd quarter of year 2), students are expected to have a solid draft of their research proposal and are planning for completion of the proposal and their oral exams. To support this process, and to reflect the academic work involved, students also sign up for varying credits of special studies with their adviser.

We encourage students to write and publish peer-reviewed scientific papers in addition to their thesis throughout their doctoral program. Dr. Gittelsohn offers a 2-quarter special studies course designed to assist students in writing their first research article for publication, or students may sign up for special studies with their adviser.

Advising Faculty

- Robert Black
- Laura Caulfield
- Vanessa Garcia Larsen
- Jessica Fanzo
- Mika Matsuzaki

- Joel Gittelsohn
- Jean Humphrey
- Kristen Hurley
- Yeeli Mui
- Amanda Palmer
- Keith P. West Jr.
- Julia Wolfson

Social and Behavioral Interventions

Program Director: Caitlin Kennedy, PhD

Program Coordinator: Svea Closser, PhD

Requirements for Admission

Entrants into the program must have: professional experience and a master's degree in the health or social sciences.

Educational Objectives

The program exposes students to applied social science and health education/communication theory and methods for health-related research, program implementation, and evaluation. Coursework emphasizes theoretical and methodological approaches within applied medical anthropology and social determinants of health, qualitative and quantitative methods, competency within a specific cultural/geographic area, and principles and methods for community-based intervention research.

Advising Faculty

- William Brieger
- Svea Closser
- Julie Denison
- Joel Gittelsohn
- Steven Harvey
- Caitlin Kennedy
- Victoria O'Keefe
- Haneefa Saleem
- Pamela Surkan
- Melissa Walls
- Peter Winch

Program Specific Requirements and Courses

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Global Disease Epidemiology and Control

Global Disease Epidemiology and Control Course REQUIREMENTS

All required courses must be taken for a letter grade with the exception of courses only offered for pass/fail.

The below courses are the possible list of requirements, for the most up-to-date information and an accurate list of required course please view our departmental Academic Guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
General		
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.220.605	Doctoral Seminar in International Health I	3
PH.220.606	Doctoral Seminar in International Health II	3
PH.220.842	Doctoral Independent Goals Analysis - International Health	1
PH.550.604	Qualitative Reasoning in Public Health	2
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
Ethics		
PH.550.860	Academic & Research Ethics at BSPH	
AND choose one of the below		
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
International Health		
PH.223.663	Infectious Diseases and Child Survival	3
PH.223.680	Global Disease Control Programs and Policies	4
Biostatistics, choose one of the series for a total of 16 credits		
Series Option 1		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
Series Option 2		
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4
Epidemiology		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
And choose one of the following:		
PH.223.664	Design and Conduct of Community Trials	4
PH.223.705	Good Clinical Practice: A Vaccine Trials Perspective	4
Environmental Health (choose one of the following courses)		
PH.180.602	Environment and Health in Low and Middle income Countries	2
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
Social and Behavioral Sciences (choose one of the following)		
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.410.620	Program Planning for Health Behavior Change	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
Nutrition (choose one of the following courses)		
PH.222.642	Assessment of Nutritional Status	3
PH.222.647	Nutrition Epidemiology	3
PH.222.649	International Nutrition	3
PH.222.655	Nutrition and Life Stages	3
Vaccines (choose one of the following)		
PH.223.662	Vaccine Development and Application	4
PH.223.687	Vaccine Policy Issues	3
PH.223.689	Biologic Basis of Vaccine Development	3
Population/Family Planning (choose one of the following)		
PH.380.600	Principles of Population Change	4
PH.380.603	Demographic Methods for Public Health	4
PH.380.758	Demographic Estimation for Developing Countries	4

Although students take several biostatistics and epidemiology courses in this program, 340.694.81 Power and Sample Size for the Design of Epidemiological Studies is a highly recommended course online in 3rd term that is helpful in preparing for the comprehensive examinations and in preparing proposals.

Students are encouraged to take advantage of offerings in other schools of the University. The Institute of the History of Medicine in the School of Medicine is a unique resource; the courses most relevant to GDEC students are: History of International Health and Development, and History of Health and Development in Africa (http://www.hopkinshistoryofmedicine.org/content/course-descriptions)

Health Systems

Health Systems Course Requirements

All required courses must be taken for a letter grade with the exception of courses only offered pass/fail. Any application to waive courses must be made in writing (with an approval from the adviser) to the coordinator at least 1 term prior to the start of the course. Even if waivers are granted, students are responsible for course content on comprehensive exams.

The below courses are the possible list of requirements, for the most up-to-date information and an accurate list of required course please view our departmental Academic Guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
Required Courses		
PH.220.605	Doctoral Seminar in International Health I	3
PH.220.606	Doctoral Seminar in International Health II	3
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	3
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	3
PH.221.638	Health Systems Research and Evaluation in Developing Countries	4
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.220.842	Doctoral Independent Goals Analysis - International Health	1
Biostatistics choose one of the series options		
Series option 1		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
Series option 2		
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4
Epidemiology		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
Seminars		
PH.221.801	Health Systems Program Seminar I	1
PH.221.802	Health Systems Graduate Seminar 2	1
PH.221.861	Doctoral Seminar in Health Systems (Terms 3-4 of 1st year, and terms 1-2 of second year)	1
Ethics		
PH.550.860	Academic & Research Ethics at BSPH	
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
or PH.306.665	Research Ethics and integrity: U.S. and International Issues	
General Elective Courses		
Fifteen (15) additional credits are required for the PhD program from the following list of courses, if not already selected to satisfy another requirement. The courses must cover at least 2 of the 3 blocks below. These courses must be taken for a letter grade with the exception of courses only offered pass/fail.		
Health Systems Management		
PH.221.608	Managing Non-Governmental Organizations in the Health Sector	3
PH.221.610	Pharmaceuticals Management for Under-Served Populations	3
PH.221.722	Quality Assurance Management Methods for Developing Countries	4
PH.312.604	Quantitative Tools for Managers	3
PH.312.610	Foundations of Organizational Leadership	3
PH.312.617	Fundamentals of Financial Accounting	3
PH.312.621	Strategic Planning	3
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.312.633	Health Management Information Systems	3
International Health Topics		
PH.180.620	Introduction to Food Systems and Public Health	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2
PH.221.612	Confronting the Burden of Injuries: A Global Perspective	3
PH.221.613	Introduction to Humanitarian Emergencies	3
PH.221.616	Ethics of Public Health Practice in Developing Countries	2
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.221.635	Global Advances in Community-Oriented Primary Health Care	3
PH.221.639	Health Care in Humanitarian Emergencies	3
PH.221.661	Project Development for Primary Health Care in Developing Countries	4
PH.221.624	Urban Health in Developing Countries	3
PH.221.637	Health Information Systems	3
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.410.610	Housing Insecurity and Health	3
Health Policy		
PH.221.614	International Political Science for Ph Practitioners	2
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.223.687	Vaccine Policy Issues	3
PH.300.652	Politics of Health Policy	4
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century	3
PH.300.713	Research and Evaluation Methods for Health Policy	3

PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life	3
PH.300.600	Introduction to Health Policy	4
Research/Analytical Methods Electives		
Fifteen (15) additional credits are required from following list of courses. The selected courses must cover at least 2 of the following 5 blocks. These courses may be taken for a letter grade or Pass/Fail.		
Quantitative Methods		
PH.140.646	Essentials of Probability and Statistical Inference I: Probability	4
PH.140.647	Essentials of Probability and Statistical Inference II: Statistical Inference	4
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.340.715	Problems in the Design of Epidemiologic Studies: Proposal Development and Critique	5
PH.340.728	Advanced Methods for Design and Analysis of Cohort Studies	5
PH.340.753	Epidemiologic Methods 3	5
Health Systems Research & Evaluation		
PH.223.664	Design and Conduct of Community Trials	4
PH.309.712	Assessing Health Status and Patient Outcomes	3
PH.309.716	Advanced Methods in Health Services Research: Analysis	3
PH.340.717	Health Survey Research Methods	4
PH.380.711	Issues in Survey Research Design	3
PH.380.712	Methods in Analysis of Large Population Surveys	3
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
Qualitative Methods		
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences	3
Methods in Specific Topics		
PH.221.641	Measurement Methods in Humanitarian Emergencies	2
PH.221.644	Econometric Methods for Evaluation of Health Programs	4
PH.222.647	Nutrition Epidemiology	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships	3
Health Economics		
PH.221.644	Econometric Methods for Evaluation of Health Programs	4
PH.221.652	Financing Health Systems for Universal Health Coverage	3
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.603	Economic Evaluation III	3
PH.313.604	Economic Evaluation IV	3
PH.313.641	Introduction to Health Economics	3
PH.313.643	Health Economics	3
PH.313.644	Intermediate Health Economics	3
PH.221.662	Globalization and Health: Economic Development	3
PH.221.663	Globalization and Health: Framework for Analysis	3

Although students take several biostatistics and epidemiology courses in this program, 340.694.81 Power and Sample Size for the Design of Epidemiological Studies is a highly recommended course online course in 3rd term that is helpful in preparing for the comprehensive examinations and in preparing proposals.

The Health Systems Program also offers a Health Economics “specialization” which tracks with school wide standards set out by the interdepartmental PhD Program in Health Economics. For further information on these courses, see the Health Systems Program Coordinators.

Human Nutrition

Requirements

Students are expected to take 6 quarters and at least 96 credits of coursework to satisfy the educational requirements for the Human Nutrition program, pass a written and an oral comprehensive exam, a final oral defense and to successfully complete a thesis research project.

At least two thirds of course credits that are required are associated with the core content areas common to all doctoral students (about 64 credits). The exact number of required core course credits taken by a student will vary depending on specific choices made by the student in conjunction with their adviser. To complete the remainder of their coursework requirements, students will choose elective courses and special studies. Thus, about 25-35 credits will be completed through electives chosen by the student in conjunction with their adviser, depending on their unique career goals and research interests.

The goals of the doctoral program form the basis for the four core content areas of the educational program: Metabolism, Research Methods, Nutrition and Health, and Professional Skills. Students are required to take specific courses in each of these four content areas in order to develop the competencies expected of all doctoral-level nutrition professionals. Within each content area are various sub-areas that more clearly define the content area and provide the basis for identifying minimum competencies for all doctoral candidates. Agreement about these competencies, in turn, led to the development of the core curriculum requirements.

Human Nutrition Course Requirements

All required courses must be taken for a letter grade with the exception of courses only offered for pass/fail.

The below courses are the possible list of requirements, for the most up-to-date information and an accurate list of required course please view our departmental Academic Guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

Code	Title	Credits
Nutrition and Health: Required		
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.222.657	Food and Nutrition Policy	2
PH.222.655	Nutrition and Life Stages	3

PH.222.654	Food, Culture, and Nutrition	4
Nutrition and Health: Suggested Electives		
PH.221.611	Food Security and Nutrition in Humanitarian Emergencies	
PH.222.649	International Nutrition	
PH.222.661	Designing Healthy Diets	
PH.222.652	Nutrition in Disease Treatment and Prevention	
PH.222.630	Nutrition, Infection and Immunity	
PH.700.630	Food Ethics	
Biochemistry and Metabolism: Required		
PH.260.600	Introduction to the Biomedical Sciences (taken the summer before matriculation)	4
PH.222.644	Cellular Biochemistry of Nutrients	3
PH.222.651	Nutrients in Biological Systems	2
Research Methodology: Required		
Biostatistics, choose one of the following series		
Series option 1		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
Series option 2		
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4
Epidemiology, choose one of the following series		
Series option 1		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.722	Epidemiologic Inference in Public Health II	4
Series option 2		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Research Methods		
PH.222.642	Assessment of Nutritional Status	3
PH.222.647	Nutrition Epidemiology	3
PH.222.861	Doctoral Seminar in Proposal Development	1
PH.222.840	Special Studies and Research Human Nutrition (Special studies in HN each quarter to complement 222.861. Students should sign up for credits with their advisor to reflect time spent in development of their research ideas and thesis project)	2-6
Professional Skills: Required		
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.222.658	Critical Thinking in Nutrition	1
PH.220.842	Doctoral Independent Goals Analysis - International Health	1
PH.222.860	Graduate Nutrition Seminar	1
Ethics		
PH.550.860	Academic & Research Ethics at BSPH	
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
or PH.306.665	Research Ethics and integrity: U.S. and International Issues	
Research Methods: Suggested Electives		
PH.140.641	Survival Analysis	3
PH.140.655	Analysis of Longitudinal Data	4
PH.223.664	Design and Conduct of Community Trials	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.313.601	Economic Evaluation I	3
PH.313.602	Economic Evaluation II	3
PH.313.603	Economic Evaluation III	3
PH.313.604	Economic Evaluation IV	3
PH.340.696	Spatial Analysis I: ArcGIS	3
PH.340.697	Spatial Analysis II: Spatial Data Technologies	2
PH.140.698	Spatial Analysis III: Spatial Statistics	4
PH.140.699	Spatial Analysis IV: Spatial Design and Application	3
PH.340.717	Health Survey Research Methods	4
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.140.658	Statistics for Psychosocial Research: Structural Models	4
PH.221.660	Systems Science in Public Health: Basic Modeling and Simulation Methods	3
Other Suggested Electives		
International Health and Disease		
PH.220.605	Doctoral Seminar in International Health I	3
PH.220.606	Doctoral Seminar in International Health II	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.223.663	Infectious Diseases and Child Survival	3
PH.223.680	Global Disease Control Programs and Policies	4
Population, Behavior, and Health		
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.380.611	Fundamentals of Program Evaluation	4
PH.380.604	Life Course Perspectives on Health	4
PH.380.623	Adolescent Health and Development	3
PH.380.642	Child Health and Development	3
PH.380.600	Principles of Population Change	4
Environmental Health, Food Production, Safety, and Food Systems		
PH.180.601	Environmental Health	5
PH.182.640	Food- and Water- Borne Diseases	3
PH.187.610	Public Health Toxicology	4
PH.180.620	Introduction to Food Systems and Public Health	4
PH.180.605	Food Systems Practicum	4
PH.180.606	Case Studies in Food Production and Public Health	4
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments	4
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3
Management Sciences		

PH.312.603	Fundamentals of Budgeting and Financial Management	3
Teaching		
PH.300.750	Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community	3
Thesis Registration (after completing oral exams)		
PH.222.820	Thesis Research Human Nutrition	1 - 22

Although students take several biostatistics and epidemiology courses in this program, 340.694.81 Power and Sample Size for the Design of Epidemiological Studies is a highly recommended online course in 3rd term that is helpful in preparing for the comprehensive examinations and in preparing proposals.

Social and Behavioral Interventions

Requirements and courses

During the 1st and 2nd term of each academic year each doctoral student should develop a course plan. This can be done through discussions with the adviser and through the individualized Goals Analysis that will be part of the Special Studies requirement for Educational Program Development. This should be reviewed and discussed with the student's adviser. If changes are needed the student is requested to discuss and get approval from their adviser.

If students have particular interests that cannot be met through existing course offerings, requirements for these topic areas can be met through special studies courses after students have requested permission to substitute course requirements using the Course Waiver Form. Such courses, when carefully developed, are an excellent way for doctoral students to gain requisite knowledge and skills, and they give students the opportunity to work closely with faculty and pursue specific intellectual interests. These courses need to first be negotiated with sponsoring faculty and agreed upon by the academic advisers. Once substitutions are approved the Course Waiver Form should be completed and submitted with the student's tracking sheet via CoursePlus. Students are given access to the tracking course at the beginning of each year by the Academic Program Administrator. Students may take courses at any of the Schools within the Johns Hopkins University system. A full listing of University courses can be accessed via: https://sis.jhu.edu/classes/.

SBI CURRICULUM

Unless otherwise specified all required courses must be taken for a letter grade with the exception of courses only offered for pass/fail.

The below courses are the possible list of requirements, for the most up-to-date information and an accurate list of required course please view our departmental Academic Guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html) published August of each academic year.

A. General Requirements This area of requirements is designed to give students broad knowledge of global public health issues and grounding in epidemiology, disease prevention, and statistics.

Code	Title	Credits
PH.220.605	Doctoral Seminar in International Health I	3
PH.220.606	Doctoral Seminar in International Health II	3
PH.220.600	International Travel Preparation, Safety, & Wellness	1
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
Choose one of the three epidemiology series options below		
Series option 1		
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.340.769	Professional Epidemiology Methods	4
PH.340.770	Public Health Surveillance	3
Series option 2		
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Series option 3		
3 course series in Advanced Epidemiology (This option requires advanced permission from the SBI Program Coordinator)		
Biostatistics, choose one of the following series (a total of 16 credits)		
Series option 1		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.140.624	Statistical Methods in Public Health IV	4
Series option 2		
PH.140.651	Methods in Biostatistics I	4
PH.140.652	Methods in Biostatistics II	4
PH.140.653	Methods in Biostatistics III	4
PH.140.654	Methods in Biostatistics IV	4

B. SBI Program Course Requirement

These nine courses provide students with a theoretical and methodological base necessary to be a competent and educated social scientist working on global health issues in the social sciences.

Code	Title	Credits
PH.140.658	Statistics for Psychosocial Research: Structural Models (Can be taken pass/fail)	4
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3
PH.224.697	Qualitative Research Practicum I: Partnerships and Protocol Development	2
PH.224.698	Qualitative Research Practicum II: Collecting Qualitative Data	2
PH.224.699	Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings	2
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.220.842	Doctoral Independent Goals Analysis - International Health	1
PH.224.866	Social and Behavioral Interventions Doctoral Proposal Development Seminar	2
PH.224.860	Social and Behavioral Interventions Program Seminar I:Applied Social Science & Global Health	1
PH.224.863	Doctoral Seminar in Research Methods in Applied Medical Anthropology I	4
PH.224.864	Doctoral Seminar in Research Methods in Applied Medical Anthropology II	4

PH.330.657	Statistics for Psychosocial Research: Measurement	4

Doctoral students who were Master's students in SBI and have already taken PhD required courses can apply for a waiver for SBI program core requirements. If students have taken more than three years off between degrees, they will still have to earn at least 64 credits during the PhD program. For students who have taken a similar course at other schools, waivers will be evaluated on a case by case basis (upon submission of the relevant syllabus and, in some cases, an exam on the content area).

Although the SBI program seminar in the 2 nd and 3 rd terms (224.861 and 224.862) is not required for PhD students, they are encouraged to register or informally attend sessions as a way to connect to the rest of the SBI cohort or to get information relevant to specific doctoral interests.

C. School-wide Doctoral Requirements

The following three courses are required of all doctoral students in the School. They provide an overview of the appropriate role of research in the public health endeavor, and how to conduct research ethically with integrity.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH	
AND choose one of the below		
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1

For each of the following topic areas students may propose any university course (including special studies) that meets the learning objectives associated with each topic area. After most topic areas is a list of pre-approved courses.

D. Research Design and Methods (7 credits)

The learning objectives for this area are to: (a) understand the fundamentals of designing research studies, (b) expand the student's knowledge and facility with a core research methodology, such as social network analysis, or survey research, and (c) gain a working knowledge of how to appropriately evaluate a social or behavioral intervention.

Although students take several biostatistics and epidemiology courses in this program, 340.694.81 Power and Sample Size for the Design of Epidemiological Studies is a highly recommended online course in 3rd term that is helpful in preparing for the comprehensive examinations and in preparing proposals.

Code	Title	Credits
PH.140.640	Statistical Methods for Sample Surveys	3
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.223.664	Design and Conduct of Community Trials	4
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	2
PH.309.617	Introduction to Methods for Health Services Research and Evaluation II	2
PH.330.650	Methods in Implementation Science	3
PH.340.666	Foundations of Social Epidemiology	3
PH.340.705	Advanced Seminar in Social Epidemiology	4
PH.340.717	Health Survey Research Methods	4
PH.380.603	Demographic Methods for Public Health	4
PH.380.611	Fundamentals of Program Evaluation	4
PH.380.612	Applications in Program Monitoring and Evaluation	4
PH.380.651	Methods and Measures in Population Studies	4
PH.380.711	Issues in Survey Research Design	3
PH.380.712	Methods in Analysis of Large Population Surveys	3
PH.410.606	Local and Global Best Practices in Health Equity Research Methods	4
PH.410.615	Research Design in the Social and Behavioral Sciences	3
PH.410.686	Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction	4
PH.410.711	Doctoral Seminar in Mixed Methods for Public Health Research	3
PH.140.641	Survival Analysis	3
PH.140.655	Analysis of Longitudinal Data	4
PH.140.656	Multilevel Statistical Models in Public Health	4

E. Social and Behavioral Sciences (9-12 credits)

This area covers a broad range of issues and topics and is meant to provide a core foundation in the social and behavioral sciences. The learning objectives for this area are to: (a) understand the major social determinants of health, (b) gain an understanding of multi-level influences on health behaviors, including social, policy, familial, dyadic, and environmental forces that affect health behavior, (c) gain broad knowledge of the major theories of behavior change, (d) understand the theoretical basis and components of major types of behavioral health interventions, such as health education and communication, social marketing, and structural and policy-based interventions, (e) gain a comprehensive understanding of the association between health behavior and health outcomes, and (f) understand how community-based behavioral health initiatives are designed and implemented. This list is not comprehensive. Other courses in social and behavioral sciences offered in the School of Public Health, the School of Arts and Sciences or elsewhere in the university can be substituted with permission of the PhD Program Coordinator.

Code	Title	Credits
PH.221.605	History of International Health and Development	2
PH.221.624	Urban Health in Developing Countries	3
PH.222.654	Food, Culture, and Nutrition	4
PH.224.605	Indigenous Health	2
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life	3
PH.313.643	Health Economics	3
PH.313.641	Introduction to Health Economics	3
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS	3
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	3
PH.340.705	Advanced Seminar in Social Epidemiology	4
PH.410.600	Fundamentals of Health, Behavior and Society	4
PH.410.612	Sociological Perspectives on Health	3
PH.410.613	Psychosocial Factors in Health and Illness	3

PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
PH.410.679	Decolonization, Global Communication, and Public Health	3
PH.410.863	Doctoral Seminar in Social and Behavioral Research and Practice	1
PH.410.654	Health Communication Programs I: Planning and Strategic Design	4
PH.410.655	Health Communication Programs II: Implementation and Evaluation	4

F. History, Geography, Culture, and Linguistics (6 credits)

The main learning objective associated with this topic area is to prepare students for dissertation fieldwork with regard to knowledge of the history, geography, culture, and language specific to the population they plan to study. Given that there is no required set of courses for this topic area, students and their advisers should include in their course plan which of the two options below the student will pursue:

> **Option 1** includes a combination of direct study courses across the University that is relevant to the student's fieldwork area, including language study. Students who are unable to obtain a field practicum prior to their dissertation fieldwork may benefit from this option. A minimum sum of 6 units is required.
>
> **Option 2** requires enrollment in a special studies course plan (minimum of 6 credits; student enrolls in credit requirement all at one time) with the student's adviser. The special studies should integrate a pre-approved reading list and attendance or participation in at least three cultural, ethnographic, historical, or political activities related to the country or field site for the student's dissertation. Examples of such activities include, but are not limited to: review of a related film or documentary, informational meeting with community or health systems representative, seminar attendance, cultural fest attendance/participation, etc. As part of this requirement, students prepare a short paper or essay summarizing their experience and/or findings in the context of their proposed fieldwork or study proposal.

The overall goal in providing these two options is to enable students to fulfill this requirement within the contexts of their dissertation fieldwork, intellectual needs, and/or course availability. For example, enhancing language skills may be appropriate for some students, but not others. Students should also use this area to become familiar with ethnographic, sociological, historical and economic literature in the area – as well become familiar with regional medical systems and literature on ethnomedical beliefs and practices.

Code	Title	Credits
Option 1: Combination of selected direct study courses for history, geography, culture, or language related to area of student's dissertation country, region, or neighborhood of choice at JHSPH, Homewood Campus, SAIS, etc.		6
PH.224.840	Special Studies and Research Social and Behavioral Interventions (Option 2)	6

G. Public Health Problem Area (6 credits)

The learning objective for this topic area is to acquire detailed knowledge of the public health problem area that the student plans to examine in their dissertation research (e.g., HIV/AIDS, violence, family planning, malaria, mental health, adolescent health, maternal/child health, water and sanitation, nutrition). The student should consider the following aspects of the health issue of interest: (a) epidemiology (b) regional and global variations (c) biologic aspects and medical treatment, (d) social and behavioral interventions addressing the health issue, (e) policy issues relevant to the health issues, and (f) social aspects such as stigma and discrimination associated with the health issue, or its interventions.

Code	Title	Credits
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
PH.222.649	International Nutrition	3
PH.224.694	Mental Health Intervention Programming in Low and Middle-Income Countries	3
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	4
PH.380.661	Clinical Aspects of Maternal and Newborn Health	3
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health	4
PH.380.665	Family Planning Policies and Programs	4
PH.380.760	Clinical Aspects of Reproductive Health	3
PH.380.761	Sexually Transmitted Infections in Public Health Practice	4
PH.380.762	HIV Infection in Women, Children, and Adolescents	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health	2

General PhD Requirements

Residency & Outside Department Course Requirements

The total number of course credits to be earned depends upon individual program requirements. But, to meet the Residency requirement, students must complete a minimum of 64 credits of didactic courses in four consecutive terms. When general and program-specific requirements total less than 64, the difference may be made up in electives. Thesis Research (820 series) may not be included in the count, but special studies earning credit that is part of a program's requirements only (840 series) are admissible.

The School also requires that 18 credits must be satisfactorily completed in formal courses outside of the IH Department. Among those 18 credits, no fewer than three courses must be satisfactorily completed in one or more departments of the School of Public Health. The remaining outside credits may be earned in any department or division of the University.

Teaching Assistant Requirement

For the most up-to-date policy on teaching assistants please view our Academic Guide (https://www.jhsph.edu/departments/international-health/current-students/academic-guides.html).

Departmental Written Comprehensive Examination

The written comprehensive exam is offered annually soon after the end of the Second or Fourth Terms, depending on the program, and is two days in length. Although most of the material is covered in specific courses, it must be understood that graduate education involves much more than the accumulation of specific course credits. Thus, students are responsible for the material, regardless of the particular curriculum followed. Students in the GDEC and Health Systems programs will take the comprehensive exam at the end of their first year. Students in the SBI and Human Nutrition programs will take the exams in January of their second year. The dates of the exam are announced in the fall.

A minimum overall grade of 75% is required. Those scoring below this level must re-take the entire examination at a specially arranged offering 6 months later. Only one re-examination is permitted. Students failing twice are terminated from the doctoral program. MSPH students who pass the PhD examination must enter the PhD program within 3 years of graduation or retake the exam and pass it again.

Students should plan to take the exam when course work is essentially completed, since questions will cover both required courses and those representing the elected field of specialization and research. Because of the infrequent offering, however, students may have to take the exam before the final completion of coursework. While the exam may be taken whenever the student and adviser feel prepared, the timing does not affect the breadth and depth of coverage of course material. Not taking the exam with the rest of the cohort will delay a student's timeline to completion and will likely lengthen their time to completion for the program.

Students must **NOT** pass along exam questions to future generations of students, **NOT** post questions and/or answers online, **NOT** seek, solicit, accept, or consult content from prior comprehensive exams, and **NOT** share or publicize any content from the comprehensive exam in any form with anyone at any time.

Students who require exam accommodations must get the accommodations approved by Disability Support Services at the Bloomberg School of Public Health (https://publichealth.jhu.edu/about/key-commitments/inclusion-diversity-anti-racism-and-equity-idare/student-disability-services/).

Thesis Advisory Committee (TAC)

In order to undertake research leading to a thesis the student must prepare a research protocol acceptable to a Thesis Advisory Committee (TAC). The objective of the TAC is to provide continuity in the evaluation of the progress and development of the student's thesis work. The TAC is expected to: counsel the student in protocol preparation; determine the protocol's acceptability as a basis for actually carrying out the research; and provide guidance during the conduct of the research and the writing of the thesis.

The TAC should be formed as soon as the student has selected a tentative research topic. This will normally be by the time that coursework has been completed and the Departmental Written Comprehensive Examination has been taken and no later than when the student takes their Preliminary Oral Exam. The student and their adviser decide on the composition of this committee. The Committee will have at least 3 members: the adviser, a second faculty member with advising privileges in the student's department, and at least one faculty member(s) from another program or department. We encourage students to consider adding a fourth and even a fifth member if they provide needed expertise to advise the student appropriately on their thesis topic. Students should have no more than five members total. TAC members from outside of JHU can be approved (for example, a project PI) after consultation with the student's adviser about the composition of the student's TAC. For such requests to be approved a student must have three members of their TAC within JHU, of whom one is their adviser, and their 4th member can be from outside of JHU. At least two of the TAC members must be tenure-track faculty eligible to serve on School examining committees. The proposed members must be approved by the adviser and the relevant PhD Program Coordinator. Students will complete the Thesis Research Documentation Form (PDF) and upload it to their Portfolio once they have selected a TAC and no later than at the time of their Preliminary Oral Exam.

The TAC (3-5 members), the departmental oral examination committee (4 members), the Preliminary Oral Examination Committee (POE) (5 members), and the Committee of Final Readers (CFR) (4 members) are four separate entities. Although it is desirable to provide for overlapping membership, the adviser is the only individual who must be a member of all four committees.

The first meeting of the TAC should occur when the student is developing their thesis proposal. A written progress report should be submitted to the TAC by the student at the time of the meeting and then should be uploaded to the student's Portfolio. This progress report, and all subsequent progress reports, should follow the format described in the following section. Following the meeting, the adviser will discuss this evaluation with the student and will then approve the report in the student's Portfolio as part of the student's academic file.

It is a requirement that the student meet at least every 6 months (either in-person or via phone/skype) with the entire TAC during the thesis phase of the program. Students will submit written progress reports, which will be read and evaluated by the TAC. It is the responsibility of the Department to provide administrative oversight of the TAC to ensure that the student meets and submits reports. Although a once yearly meeting and report is required by the school, the DIH department requires students meet with the TAC more frequently, ideally every 6 months during the conduct of their thesis research, and to prepare a progress report with any questions for the TAC for each meeting. Students who are working outside of the country or at distant sites within the country are not required to return in person for annual TAC meetings, although in-person participation is desirable.

Progress Report Template for TAC Meetings

FIRST TAC REPORT TEMPLATE (During Proposal Development)

A. Describe your likely thesis topic (150 words).

B. What options have you identified for funding your thesis research?

C. What funding challenges remain? Please describe

D. What is the anticipated process for obtaining IRB approval for your thesis project?

E. What is your anticipated timeline for completing oral exams and conducting your thesis research?

F. What are your goals for the next 6 months?

G. Do you have any course requirements or other degree requirements outstanding? If so, please describe

ALL SUBSEQUENT REPORTS (After Oral Exams)

A. Please describe your thesis topic (150 words).

B. Type of analysis list all that apply: e.g. Primary, Secondary, or Both

C. Have you filed the Thesis Proposal Approval form? If not, when do you anticipate doing so?

D. What options have you identified for funding your thesis research?

E. What funding challenges remain? Please describe

F. Have you obtained IRB approval for your thesis project?

G. What is your anticipated timeline for conducting your thesis research and defending your thesis?

H. Have you decided whether to take the papers approach or the traditional thesis approach?

I. Have you discussed with your adviser, thesis project PI and appropriate others regarding authorship of papers for publication?

J. Please review goals you stated in your most recent report. Have you accomplished your goals or made tangible progress toward accomplishing them?

K. What are your goals for the next twelve months?

L. Discuss scientific progress and challenges, and document decision made with the approval of the TAC to address these.

M. If you had any outstanding course or degree requirements as of your most recent report, have you completed them?

Non-Thesis Related Research Experience

All PhD students must complete a research experience in addition to their doctoral thesis work. This is typically conducted with the student's adviser or other faculty member prior to beginning doctoral thesis work. This can take a variety of forms including participating in the development and planning of a new research project, development of data collection instruments for a research project, conducting analysis of existing data, or completing an entire, small research project on a topic other than the thesis topic. It is also possible to fulfill this requirement through an internship or practicum with a foundation, nongovernmental organization, or government or private industry entity, provided it includes a significant research training component. The PhD is a research degree and obtaining a variety of practical training in research is an integral part of the learning process. Once this experience is completed please fill out the Non-Thesis Related Research PDF Form found in the Portfolio library and upload it to the indicated Portfolio touchpoint.

THESIS PROPOSAL APPROVAL

Regardless of the mode and timing of general presentation of the proposal, the TAC members will provide continuing guidance in its development. After the student has passed the University Preliminary Oral Exam and before the student begins field work on the dissertation, the TAC should be satisfied that the proposal is of acceptable quality to be implemented, at which point the student must obtain the TAC members' signatures on the Thesis Proposal Approval Form found in the Portfolio library and should be uploaded to the student's Portfolio touchpoint. After approving the thesis proposal, the TAC is expected to continue offering suggestions for further improvement, especially in light of unexpected difficulties encountered in the field.

Realistically, it is not always possible for the student to carry out in the field the specific study designed and presented at the preliminary oral exam. In such cases when the topic of the study changes entirely or if the proposed research undergoes substantial changes, the student must submit a new thesis proposal to the TAC. The TAC approves the proposal and the student will then submit a new Thesis Proposal Approval Form to their Portfolio. If the student's TAC changes, the student will need to submit a new Thesis Research Documentation Form and a new Thesis Proposal Approval Form.

ORAL EXAMS AND DEFENSE

Departmental Oral Exam

The purpose of the departmental oral examination is to determine whether the student is adequately prepared to conduct research. Because the department requires the student to have a proposal for their research in hand and to provide this proposal to the examining committee in advance of the examination, the student may receive constructive criticism of the proposal as part of feedback associated with the examination.

Specific procedures for the examination are as follows:

- The student, in consultation with the Thesis adviser, identifies at least four IH faculty (two faculty must be at least at the level of Associate Professor or Professor to serve as the chair and subchair for the exam of which the adviser cannot serve either role) of the committee. At least two faculty must have primary appointments in the International Health Department, of whom one can be the student's adviser. The other two faculty must at least have a joint appointment with IH. One member with a primary appointment in IH must be from the student's program area. One faculty member should be identified as an alternate and cannot count as one of the two required faculty with a primary appointment in IH. Two scientist track faculty are able to sit in the departmental exam committee at the same time. If the student's adviser does not have a primary appointment with IH then at least two other faculty on the committee, excluding the alternate, must have a primary appointment with IH.
- Copies of a research proposal are to be circulated to all participating faculty at least 2 weeks in advance of the exam.
- Departmental Orals must be taken **at least 30 days** before the University Preliminary Oral Exam. When planning this, students should first meet with the Elisabeth Simmons, the Academic Program Administrator, to discuss requirements for both exams and timing.
- The most senior faculty member other than the adviser will act as Chair of the examining committee. The Chair is responsible for maintaining an atmosphere of constructive criticism, ensuring that each faculty member has adequate opportunity to question the student, and limiting the total duration of the exam to a maximum of two hours.
- The oral exam will produce one of three results: (1) Unconditional Pass; proceed with the University Preliminary Oral as scheduled; (2) Conditional Pass; before proceeding as scheduled, the student should strengthen their competence in certain identified areas of weakness; or (3) Failure.

Only one re-examination is permitted. Anyone failing the departmental oral examination twice will be terminated from the doctoral program.

Students must formally schedule their Departmental Oral Exam with Elisabeth Simmons at least 2 weeks in advance.

Schoolwide Preliminary Oral Exam

The University Preliminary Oral Examination must be taken no later than the end of the student's second year in the PhD program. Students must have completed their ethics requirement before taking the Preliminary

Oral Exam. Students should keep in prior to taking this exam they should have passed the Departmental Oral Examination.

All members of the examining committee represent the department of their primary appointment except the student's adviser who would represent IH if they have a joint appointment. The committee of five members includes the student's Thesis adviser, one other IH faculty member, and three members from at least two other departments in the University, of whom one must be from JHSPH. The most senior faculty member from outside the student's department will serve as the chair and must hold the rank of full or Associate Professor. One adjunct faculty, one scientist track faculty or one visiting professor may serve on the committee but may not serve as the chair or adviser. Exceptions to this only apply if a student had an adviser assigned to them prior to having their rank changed in which case they can continue to advise the student and can serve on the committee. Two alternates should be identified. One alternate is a DIH faculty while the other is from outside the student's department. Students should be aware that an alternate who may need to serve in place of the committee chair must be of the rank of Associate or full Professor and be from outside the Department of International Health.

The examination's purpose is to determine whether the student is sufficiently knowledgeable of the general field of public health and is capable of undertaking independent research in a specialized area of interest. The question period of about two hours considers the student's course work as well as the feasibility and logical consistency of any research proposal. The examination is not meant to be a proposal defense; rather a research proposal permits the student to be questioned on areas of expertise and public health problems with which the student is familiar.

Three results of the examination are possible: (1) unconditional pass; (2) conditional pass; and (3) failure with the possibility for one reexamination. When the second or third outcomes occur, the examining committee is expected to set time limits for the satisfaction of conditions or the reexamination. In case the examining committee fails to set time limits, they will be established by the IH Curriculum and Credentials Committee. In no case may the time allowed exceed one year. Only one reexamination is permitted. Students failing the University Preliminary Oral Examination twice will be terminated from the doctoral program.

For both the Departmental and University Preliminary oral examinations, the student may need to begin polling faculty for dates/times that will be available a couple months in advance, as many faculty members have fixed teaching and travel commitments. **Paperwork for the University Preliminary Oral Examination must be submitted (37 days) prior to the date of the exam**. Students must meet with Elisabeth Simmons to learn about the necessary forms and other considerations when forming an examination committee.

Thesis REaders and Final Oral Defense

The thesis topic acceptable to the TAC must be a piece of original, independent research focusing on selected aspects of international health in developing or underserved societies.

The Final Oral Defense consists of two parts, a public seminar and a defense of the thesis before a Committee of Readers. The public seminar and closed thesis defense are held on the same day with the seminar being conducted first, followed immediately by the closed defense. Thesis readers should have at least 30 days to read the final thesis prior to the Final Oral defense. The Dissertation Approval Form will be sent to the committee by the student along with a copy of their final thesis at minimum 30 days before the Final Oral Defense indicating the adviser's approval of their thesis as suitable for dissemination to their final thesis defense committee members. After the exam the Committee of Readers must accept the thesis as satisfactory and, in addition, the Committee Chair and the Thesis adviser must write a letter of acceptance to the Associate Dean for Academic Affairs.

If a student defends any time after the last day of 4th term and before the first day of Summer Term, the student must register for three credits of Thesis Research during the Summer Term. The only time PhD students are allowed to register during summer term is when they are defending in the summer. Tuition scholarship is not applied in the summer term.

International students must notify OIS at least two months before defending to determine if there are any issues with their visa. OIS must also be notified that the student is planning on defending, outside of the typical academic year. Any student on a visa must communicate with OIS, and have approval to proceed in the summer, before a student can register and work with Elisabeth Simmons to schedule their exam and submit the required forms.

If a student defends after the last day of Summer Term, the student must register for 1st term as a fulltime student.

The Final Thesis must be submitted to the JHU Library, and to the Department of International Health. The Department of International Health accepts final theses as a PDF document. Final thesis and the letters from the Chair of the examination committee and the adviser must be submitted to the School of Public Health Registrar's office respectively, by the end of the term in which they are registered (if international student) or by add/drop of the following term. Failure to meet this deadline means having to register for the following term.

Any student returning from a leave of absence must be registered for a minimum of two terms before their thesis defense can be scheduled.

Students must contact Elisabeth Simmons at least two months in advance from their desired defense date to learn about defense and convocation deadlines.

Selecting the Committee of Readers

Students must follow instructions on selecting committee members and readers stated in the Appointment of Thesis Readers and Final Oral Exam form found in the Portfolio library. The Associate Dean for Academic Affairs shall, upon recommendation of the student's Department Chair or Associate Chair for Academic Programs, approve a committee of four readers, including the student's thesis adviser, who serves as a departmental reader. The readers should be at the rank stated on Page 15, "Advising and Exam Committee Composition by Faculty Rank". A minimum of three departments of the University, two being from the School of Public Health, must be represented. Two readers must be from the student's Department. All faculty serve on the Committee representing the department of their primary faculty appointment except when the faculty member serves in their capacity as the student's adviser. The most senior faculty member without a primary appointment in the student's Department will serve as Chair of the Committee and MUST hold the rank of Associate or full Professor. A second reader not in the student's department will sever as the Sub-Chair of the Committee and must also hold the rank of Associate or full Professor. With the approval of the Dean for Academic Affairs, the Department may nominate an individual from outside the University to serve as a 5th non-voting member.

PhD Program Policy
PhD Schoolwide Policy

Department of International Health (IH) candidates for the degree Doctor of Philosophy (PhD) must fulfill all School requirements, as specified in the PhD Schoolwide Policy (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_071717.pdf). These include, but are not limited to, a minimum of four consecutive academic terms at the School in full-time residency (some programs require 6 terms), continuous registration throughout their tenure as a PhD student, satisfactory completion of a Departmental Written Comprehensive Examination, satisfactory performance on a University Preliminary Oral Examination, readiness to undertake research, and preparation and successful defense of a thesis based upon independent research. Furthermore, all doctoral students must complete a non-thesis related research experience in addition to their doctoral thesis.

Additional IH requirements are specified herein and require that full-time registration be a minimum of 16 credits per term of courses taken for letter grade or pass/fail. Courses taken for audit do not count toward the 16-credit registration minimum.

Students having already earned credit at BSPH within the past three years for any of the listed courses may be able to use them toward satisfaction of doctoral course requirements. Refer to section "Students with a master's degree from BSPH" for more information. Students who have completed similar courses elsewhere may consider requesting a course waiver.

Completion of Requirements

While the University places a seven-year maximum limit upon the period of doctoral study, IH students are expected to complete all requirements within a period of 4 years (16 terms maximum). Formal leaves of absence may extend this time.

Introduction to Online Learning

The Bloomberg School of Public Health offers courses in various formats, including a number of online classes. In order to be eligible to take an online course, students must complete the Introduction to Online Learning, which is offered through the Center for Teaching and Learning at the Bloomberg School. This non-credit mini course is a pre-requisite for all courses offered by this division and must be completed prior to the start of the term in which a student wishes to enroll in an online course. Since the School does not permit conditional and/or concurrent enrollment (that is, students must take the Introduction to Online Learning course prior to enrolling in an online class), the **School requires all incoming students to take this non-credit course during or before the first term they enroll**. For course dates and enrollment information, please visit the CoursePlus website.

Ethics (2 courses) - All doctoral students must take two general ethics courses. The first, PH.550.860 Academic & Research Ethics at BSPH, is an online course for 0 credits that every student is required to take prior to or during the student's first term of matriculation. Failure to complete this course will prevent students from registering for the following term. For the second course, PhD students must take PH.550.600 Living Science Ethics - Responsible Conduct of Research offered first term, OR PH.306.665 Research Ethics and integrity: U.S. and International Issues offered third term. Students will not be allowed to take their University Preliminary oral exam if their two general ethics course requirements are not complete.

Doctoral Seminar in International Health – PhD students in GDEC, Health Systems and SBI are required to take the multi-term course 220.605 and 220.606 Doctoral Seminar in International Health I & II, offered in first and second terms. This course explores the topics relevant to International Health in a seminar format with readings and critical writing. This seminar series is not a requirement for PhD Human Nutrition students but is highly recommended.

International Travel Preparation, Safety and Wellness – All IH students are required to take this course (220.600.81) during their first year and before traveling overseas for any academic reason. IH students are required to take this course regardless of whether their research is conducted within or outside of the United States. Please refer to the Department of International Health Travel Policy.

Doctoral Independent Goals Analysis – Students will enroll for one credit of 220.842 with their adviser in first term every year until students complete their degree. Students will develop a course and academic plan, which will be done through discussion with their adviser and through their Independent Goals Analysis (IGA) that will be part of their requirement in first term of each year in the doctoral program. The IGA is a process of discussion with the adviser resulting in a written document that is then uploaded to the student's Portfolio in CoursePlus and reviewed during the student's semi-annual review. Students will also review their course tracking sheet/course plan with their advisers during this time. All doctoral students will have access to 'My Portfolio' in CoursePlus to upload their IGA and tracking sheet documents due by the end of 1st term each year. This is a guide for students and advisers, but the independent goals analysis should be modified as the student progresses through the program.

Students are required to discuss changes to their course plan with their adviser and update their IGA by uploading these to "My Portfolio" at least once a year, by the end of 1st term.

Standards of Academic Performance

Minimum GPA

All required courses must be taken for letter grade unless courses are only offered pass/fail. Courses may be counted only once when fulfilling requirements. Students must receive satisfactory grades of B or higher in all required courses and continuously maintain a cumulative Grade Point Average (GPA) of at least 3.0 in order to remain a degree candidate in good standing. Any student who receives a C or below in a required course must repeat the course and achieve at least a B or attain a B or higher in a subsequent course in the sequence of course (e.g. In Biostatistics 622 one must get a B, if one received a C in 621).

Academic Progress

Students are required to meet their academic milestones in a timely manner. These milestones and time frames are specified in the table students can reference in their CoursePlus My Portfolio program library. Students are reviewed twice a year in the fall and the spring by the Curriculums and Credentials Doctoral Subcommittee to monitor students' progress through their doctoral program and identify any major barriers to meeting milestones. Specifically, the Subcommittee will review students' academic progress, whether they are able to meet research deadlines, and are regularly communicating with their advisers.

Anyone not meeting academic performance standards will be placed on probationary status pending action by the Department's Curriculum and Credentials Committee. In all cases, the maximum time allowed for the student to come out of probationary status will be no more than two consecutive terms following the term in which the student's GPA fell below the required minimum. The Committee will review scholarship eligibility and establish the minimum conditions to be fulfilled in order to return to the "good standing" status and avoid termination. If conditions are imposed, the Committee will specify the maximum time allowed to satisfy these conditions. Failure to satisfy these conditions may result in termination from the program.

Consistent academic probation status (defined as two or more terms) will result in a reconsideration of tuition and stipend support and possible termination.

If students receive Federal Loans administered through the Financial Aid Office, there are other academic standards that students must abide by in order to comply with Federal Loan requirements. Please check with the Financial Aid office or email them at JHSPH.finaid@jhu.edu to request more information.

Students with a Master's Degree from BSPH

PhD students who received a master's degree from BSPH within 1 year of starting their doctoral degree can waive out of the residency requirement but must still complete 18 credits of formal coursework outside of the department. Students also qualify for a waiver of certain course requirements completed as a master's student. Students are required to request waivers for these courses at the beginning of their PhD program and are required to complete all other program specific requirements.

PhD students who completed a master's degree from BSPH and have more than 1 year between the start of their PhD program and the completion of their master's degree cannot waive out of the residency requirement. Students who fall into this category are required to meet all credit totals for the program and graduation as well as the 18 outside the department credit requirement. Students can however request waivers to count courses taken during their master's program. There are no guarantee waivers will be accepted if there are five years or more between degrees. Students who are granted waivers are not excused from the total credit requirements for their program, graduation and/or the residency requirement.

Thesis Research

After completing oral exams, students engaged in the planning or conduct of their thesis research will register for credit (pass/fail) in 22X.820, "Thesis Research [Program Area]". In order to receive credit for this work a specified deliverable must be submitted to the adviser before the end of each academic quarter of such registration. In the absence of a deliverable the adviser is expected to assign a grade of "F" or "Incomplete." All grades of "Incomplete" automatically convert to "F" if not made up within 120 days from the end of the term in which assigned. Students should not register for thesis research until they have completed their Preliminary Oral Exam. Prior to the completion of that exam, and while preparing for their orals, students should only register for Special Studies (22X.840).

Tracking Sheet

Tracking sheets are used to track all course requirements from each student's program. All students are required to fill out and submit their tracking sheets at least once a year, by the end of 3rd term for all continuing students, to Elisabeth Simmons via their CoursePlus Portfolio. Approved waivers and substitutions must also be submitted with the tracking sheets. Students should use the tracking sheet when meeting with their advisers.

Tuition Scholarship

Doctoral students who matriculated after August 2020 will receive 100% of tuition scholarship up until their 16 term of enrollment. Health insurance, dental insurance, and UHS clinic fee are covered for up to 16 terms of full time enrollment, and satisfactory academic performance. Students who have not completed their degree by the end of the fourth year will be responsible for 100% of their tuition, health insurance, and UHS clinic fee, and must still register full-time. Students who need more time to complete their PhD degree must request an appeal to the Associate Chair of Student Matters in writing with a timeline for completion and an endorsement letter from their adviser. The department would consider additional tuition scholarship support in only on a case by case basis. Leaves of absence are not counted in the four-year plan.

A student's tuition scholarship support is contingent on satisfactory academic progress during their degree. This progress is reviewed twice a year by the Curriculum and Credentials committee.

Withdrawals

Failure to register for a term results in automatic withdrawal. A withdrawn student must be formally readmitted before resuming a program of study. This would mean providing the original application, most current transcript prior to withdrawal, and a cover letter explaining reasons for withdrawal and why the student wants to be readmitted. Upon readmission, a student must register for a minimum of two consecutive terms prior to completing degree requirements.

Timeline to Completion

A suggested timeline of the sequence to completion in 4 years is located in the students CoursePlus My Portfolio program library for each student's reference. Any questions regarding requirements should be discussed with the student's adviser and with the Academic Program Administrator, Elisabeth Simmons.

ACADEMIC ADVISING PHD DEGREE

PhD degree programs in the Department of International Health are a mixture of didactic coursework, independent reading, research/practice experience and the preparation of a culminating document. As the program progresses, there are many decisions to be made regarding which courses and experience will address a student's educational objectives. To assist with navigating this process, each student is assigned an academic faculty adviser who has the responsibility of serving as a guide and mentor. It is the Department's view that graduate degree programs must be owned by the student with the faculty acting as guides in the student's own development as a scholar and practitioner. This section is intended to guide the student and the faculty member in making the adviser-advisee relationship as successful as possible.

The suggestions in this section are derived from the experience of faculty who have worked with students for many years and from students who themselves have been guided by these faculty members. The document is dynamic and needs input from students and advisers as they use it. Please submit comments and concerns to the Academic Coordinator.

THE DEPARTMENT'S ADVISING PHILOSOPHY

The primary purpose of the academic advising process is to assist students in the development and implementation of a meaningful and appropriate plan for their graduate education and future career. This purpose is driven by a set of core values:

1. Advisers are responsible to the students they advise
    - Advising is an integral part of the educational process with both students and advisers benefiting from the relationship.
    - Regular student-adviser communication allows advisers to maximize the student's ability to develop life-long learning skills and for the adviser to act as an advocate for the student.
    - Advisers must recognize the diversity of student backgrounds and the opportunities provided by this diversity for maximizing educational achievement.
    - Advisers are responsible for connecting students with others in the academic community who can, when appropriate, assist in the advising process.
2. Advisers are responsible to the institution.
    - As faculty, advisers are responsible for maintaining the academic standards and reputation of the Department, School, and University. This implies a focus on academic excellence for the students they advise.
    - Advisers must comply with the policies and procedures established by the Department, School and University for the didactic, exploratory, and research portions of a graduate student's educational experience.
3. Advisers are responsible to the community of higher education.
    - Advisers must uphold the values of academic and intellectual freedom that characterize the university environment in the United States.
    - As faculty, advisers are responsible for the training of the next generation of academic leaders in education, research, practice, and service.
4. Advisers are responsible to the public health community.
    - As faculty in a School of Public Health, advisers are committed to improving the health and wellbeing of populations everywhere in the world through education, research, practice and service.

The Adviser-Advisee Relationship

All students in the Department are assigned a faculty adviser who is a full-time member of the advising faculty in their program area. In addition, the **PhD Program Coordinator for their program also serves as a general adviser to students**. The adviser has the responsibility of assisting the student in designing an academic program that meets the student's goals within the requirements of the University, School and Department. Additionally, the adviser serves to direct the student to appropriate resources and research opportunities. The adviser should be the first point of contact in resolving academic problems. Advising students is an integral part of every faculty member's responsibilities. Thus, the student should not feel that they are imposing by asking for advice. Faculty members expect to be available to students, although the students should be respectful of the faculty's time by scheduling and respecting appointments. This is especially true in our department where research and practice responsibilities of the faculty require them to travel a significant portion of their time. **The responsibility for arranging meetings with their adviser lies with the student**. **Students should not expect advisers to seek them out for required appointments**. The student bears the responsibility of consulting the adviser when necessary and arranging periodic appointments, even if there are no specific problems. In general, advisers and advisees should communicate at least once per term, preferably more often, especially at certain critical times during their doctoral research progress.

All course registrations must be approved by the adviser. The student is required to schedule a meeting in order to assure that the adviser has reviewed the student's schedule and to plan any special studies projects or thesis research as needed with the adviser before the registration period deadline. If due to travel or scheduling difficulties, such communication cannot be conducted before the registration period deadline, students should receive approval for course registration from their PhD Program Coordinator.

Student Feedback on Adviser Performance

The Department Chair reviews all faculty performance on an annual basis. This review assesses the career track of each faculty member as a part of the faculty mentoring role played by the Chair. In order to provide the most accurate information on faculty performance, the Chair needs information on all aspects of the faculties' roles including student advising. As a part of this process, we have initiated a formal adviser evaluation process that includes input from students. The provision of honest information is required of all students twice per year and these adviser ratings are handled with complete confidentiality. At the completion of the 2nd and 4th terms each year, all students will complete an Academic Adviser Evaluation Form (https://jhsph.co1.qualtrics.com/jfe/form/SV_8cvVZ1RanXU4PAN/) (will be updated and sent to students twice a year) and submit it online. The survey results are analyzed to provide a body of information on advising style, content, and **collective** perception from **multiple** students advised by each faculty member **over time**, focusing on aggregate results accumulating over successive administrations of the survey. The Department Chair (David Peters), the Associate Chair for Academic Programs (Cyrus Engineer), and the Associate Chair for Student Matters (Julie Denison) are the only faculty who may review individual survey responses, and each is excluded from reviewing responses naming themselves as adviser. The responses are also reviewed by the Academic Program Manager (Cristina Salazar) and Academic Program Administrator (Elisabeth Simmons), who may lead or participate in survey analysis. Survey responses about individual faculty members **will be handled with complete confidentiality**. Any feedback relayed to a faculty member from these surveys will be informed only by cumulative or aggregate survey results, will be communicated to faculty only in a manner that does not identify individual students (with due awareness of the faculty member's overall number of advisees), and will be solely for the purpose of helping faculty prospectively improve their approach to advising as appropriate.

It is **not the aim of this survey-based evaluation** to intervene in specific individual situations that may be problematic. If students wish to discuss concerns about a **specific individual situation**, we encourage them to consult directly with their Degree Program Coordinator(s), the Academic Program Administrator, the Academic Program Manager, or the Associate Chair for Student Matters.

REGISTRATION

PhD students must register for a minimum of 16 credits of courses continuously each term to be a fulltime student in the IH department. **Students do not register for summer or winter intersession**. Summer and winter intersession courses are exempt from tuition scholarship. Students must understand they pay 100% of the tuition for those courses.

Important Information about Registration:

1. Registration below 16 credits is not allowed and violates the terms of a student's tuition scholarship.

> **2. Any student registering below 16 credits during any term could be in violation of their scholarship requirements resulting in a loss of their tuition scholarship.**
>
> **3. Courses taken for Audit do not count toward the 16 credits per term requirement but do count toward the 22 credit maximum.**

Courses taken at other schools within the Johns Hopkins system must be considered carefully. If a student is interested in taking courses outside of the School of Public Health, students **must** meet with the Academic Program Administrator (Elisabeth Simmons) prior to registering to discuss whether the credits count toward their degree and, if so how. There is a separate calculation for courses taken in schools on semesters, and some courses (e.g. language courses) do not count for credit.

Students registering for Special Studies or Thesis research must do so in their specific program area. The following course numbers correspond to the different program areas:

Thesis Research:

Code	Title	Credits
PH.221.820	Thesis Research Health Systems	1 - 22
PH.222.820	Thesis Research Human Nutrition	1 - 22
PH.223.820	Thesis Research Disease Control	1 - 22
PH.224.820	Thesis Res Soc & Beh Interv	1 - 22

Special Studies:

Code	Title	Credits
PH.221.840	Special Studies and Research Health Systems	1 - 22
PH.222.840	Special Studies and Research Human Nutrition	1 - 22
PH.223.840	Special Studies and Research Disease Control	1 - 22
PH.224.840	Special Studies and Research Social and Behavioral Interventions	1 - 22

THESIS RESEARCH

After completing oral exams, students engaged in the planning or conduct of their thesis research will register for credit (pass/fail) in 22X.820, “Thesis Research [Program Area]”. In order to receive credit for this work a specified deliverable must be submitted to the adviser before the end of each academic quarter of such registration. In the absence of a deliverable the adviser is expected to assign a grade of "F" or "Incomplete." All grades of "Incomplete" automatically convert to "F" if not made up within 120 days from the end of the term in which assigned. Students should not register for thesis research until they have completed their Preliminary Oral Exam. Prior to the completion of that exam, and while preparing for their orals, students should only register for Special Studies (22X.840).

SEMI-ANNUAL REVIEWS

All students are required to maintain regular and sustained progress towards completion of their doctoral program. Twice per academic year a review of past progress and future expectations will be carried out as follows

1. Students without a TAC (during proposal development and before oral exams are complete)
   a. PH.220.842 Doctoral Independent Goals Analysis - International Health
   b. The adviser will write a brief report of their advisee’s academic progress twice during the academic year.
2. Students with a TAC Formed (after oral exams)
   a. PH.220.842 Doctoral Independent Goals Analysis - International Health
   b. The report submitted to the TAC at each meeting and then uploaded to the students Portfolio.
   c. The adviser will write a brief report of their advisee’s academic progress twice during the academic year.

The Curriculum and Credentials Committee will review the students’ progress and supporting documentation. Continued enrollment in the doctoral program is contingent upon a satisfactory review by the Committee.

Students not making adequate progress may receive warning letters or requests for specific plans to move ahead with their programs. The IGA, TAC reports and adviser Reports will become part of the official student record maintained by the Academic Program Administrator.

CRITERIA AND PREPARATION FOR DOCTORAL THESIS RESEARCH AND DISSERTATION

The final authority for requirements for the Doctor of Philosophy degree is held by the Graduate Board of Johns Hopkins University. The following description of the doctoral thesis is taken from Electronic Theses & Dissertation from the Sheridan Libraries (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/):

> The dissertation/thesis is the culmination of the graduate degree. It represents an original critical or synthetic treatment of a subject in the student’s field. It documents research formulated independently and presents its findings in a manner consistent with publications in scholarly journals or with scholarly books. The dissertation serves as a reference through the UMI (formerly University Microfilm, Inc.) *Dissertation Abstracts International* and through publication in whole or in part. Manuscripts not conforming to the following standards will not be accepted as partial fulfillment towards the graduate degree.
>
> The Council of Graduate Schools offers the following definition:
>
> The doctoral dissertation should:

1. Reveal the student’s ability to analyze, interpret, and synthesize information
2. Demonstrate the student’s knowledge of the literature relating to the project or at least acknowledge prior scholarship on which the dissertation is built
3. Describe the methods and procedures used
4. Present results in a sequential and logical manner; Display the student’s ability to discuss fully and coherently the meaning of the results. In the sciences, the work must be described in sufficient detail to permit an independent investigator to replicate the results

The dissertation/thesis is the beginning of one's scholarly work, not its culmination.

Dissertation research should provide students with hands-on, directed experience in the primary research methods of the discipline, and should prepare students for the type of research/ scholarship that will be expected of them after they receive the PhD degree.

The question of originality - In its most general sense, "original" describes research that has not been done previously or that creates new knowledge. Although a dissertation should not duplicate another researcher's or scholar's work, the topic, project, or approach taken need not be solely that of the graduate student. An adviser or other faculty member should encourage a student to explore a particular topic or project with the idea that the student themselves will independently develop the "thesis" of the dissertation. The student should be able to demonstrate what portion of the research or scholarship represents their own thinking.

The question of collaboration, in those disciplines where doctoral research efforts are typically part of a larger collaborative project, is crucial that an individual student's contribution be precisely delineated. Whether the collaboration is between faculty or student, or among students, PhD candidates are expected to be able to demonstrate the uniqueness of their own contributions and to define what part of the larger work represents their own ideas and individual efforts. (The Role and Nature of the Doctoral Dissertation, Council of Graduate Schools. CGS, Washington, D.C. 1991). The student assumes the responsibility for conducting the research and the writing of the dissertation in a manner that reflects the academic integrity of the University.

The Policy and Procedures Manual of the Bloomberg School of Public Health is briefer in its description of a doctoral thesis: "The thesis must be (1) based on original research, (2) worthy of publication, and (3) acceptable to the sponsoring department and to a committee of thesis readers."

Requirements for the doctoral thesis research in the Department of International Health include meeting the following educational objectives:

- Identifying and articulating an important scientific or public health problem in a manner conducive to research. In the thesis proposal, this would be expressed by documenting at least one substantive question that is both researchable and important to the field of international health. The research question(s) must be expressed as specific research objectives and/or hypotheses that define the variables and relationships of interest.
- Summarizing and critically appraising relevant existing knowledge on the subject under study. In the thesis, this would be expressed by a focused and critical review of the relevant literature pertinent to the research question(s) being addressed. In many theses, this will also involve the description of the theoretical model or conceptual framework upon which the research question(s) will be based.
- Using scientifically sound and appropriate methods to design and implement a research study to adequately address the question(s) of interest. In the thesis, this would involve the detailed specification of the study methods, including all data collection and data management efforts needed to implement the study design, a description of the analytic approaches to be used, and the application of any inferential models that will be used to describe the results of the data analysis. All research involving human subjects must be approved by the School's Institutional Review Board and all research involving animals must be approved by the University's Committee on Animal Care and Use. It is expected that the doctoral student will develop the application for approval from these committees under the supervision of their thesis adviser who must be named as Principal Investigator of the IRB protocol. If the student is working within a research project of a faculty member other than their adviser, the Principal Investigator (PI) of that project may be the person named as PI on the IRB protocol.
- Interpreting the research findings in the context of previous knowledge in the specific topical area of the thesis. As a part of the thesis, conclusions and recommendations for further research or programmatic initiatives based on the evidence generated by the thesis research must be critically explored, presented and shown to make important contributions to the state of knowledge in the field.

PRIMARY DATA COLLECTION

As the academic programs in the Department of International Health span a spectrum of disciplinary boundaries, the specific requirements for the form of the doctoral thesis work will vary by program. However, all students are expected to meet the above-mentioned minimal educational objectives in addition to any further objectives stated in the program-specific sections of this handbook. The specific activities of the doctoral thesis research must meet the experiential requirements of the primary research methods typically employed by the discipline. For example, most doctoral theses in all four program areas in the department will be based on primary data collection, as this is the primary research method in most behavioral science, epidemiologic, nutrition, and health services research studies. This will often involve extensive time in the field implementing and/or overseeing the actual data collection and management process. Doctoral theses in the health economics specialization of the Health Systems Program may be based on original data or on secondary data analysis or theoretical development. It should be noted that the level and depth of analytic skill, scientific rigor and innovative approaches expected by the faculty for a doctoral thesis based solely on secondary data analysis will be considerable.

TRADITIONAL VS. "PAPERS" OPTION

Students may fulfill their thesis requirement using either the traditional or "papers" option. Both options must comply with the organizational and formatting requirements of the Graduate Board outlined on the Sheridan Library. In each case the product must reflect high standards of scholarly endeavor. It is important to recognize that these options reflect only different formats for presentation and not fundamentally different processes.

The traditional thesis consists of a number of chapters typically including an introduction and specific research objectives, critical review of the literature and discussion of a theoretical or conceptual framework, study methods, results, interpretation, discussion and conclusions.

The "papers" option requires a minimum of three separate papers based on the thesis research in addition to complementary sections that make the thesis a whole. Each paper should stand on its own merits, and in addition, the papers together should embody a recognizable unifying theme. Although no required page length is specified, it is understood that taken together the papers should contain as much substantive information as is usually expected in a traditional thesis. As a result, the length of the papers may exceed the guidelines followed by journals. Appendices can be used to present additional analyses that allow for the review of the thesis by the final examination committees but are not likely to be included in the paper when submitted for publication.

Each of these “papers” is typically a separate chapter in the thesis document. A separate literature review is not always necessary; rather, literature citations should be made in each paper as appropriate and a comprehensive list of references must be included at the end of the document as per University regulations. However, the thesis must incorporate a critical review of available literature relevant to the research topic somewhere in the document. If the “papers” option is selected for the format of the thesis, this critical review can be either in a separate chapter or as a part of the discussion in each of the papers. In addition, when the thesis project consists of a portion of a larger research effort, an additional chapter discussing the overall methods and how the thesis research fit into the whole is often helpful and required by the thesis adviser and committee. Finally, discussion, conclusions and recommendations for further research and/or programmatic initiatives should be included either in each paper, or as a separate chapter.

If following the “papers” option, the department strongly recommends that each paper be formatted for journal submission with additional analyses and information that would be part of the online supplemental materials for the paper being included in the thesis appendices. This makes it more likely that graduates can submit their thesis research for publication as soon after the defense as possible. Publication of thesis research as soon as possible after thesis completion is strongly encouraged. It also fulfills the ethical requirement to share research findings that provide benefit to research participants and/or society that balances the risks assumed by participants.

As with most public health research, most thesis research will be a collaborative effort of the student and other members of an investigative team. However, the thesis itself must be authored by the student in its entirety. Therefore, manuscripts arising from the thesis are typically first authored by the student. Papers included in the thesis must be first authored by the student. However, the adviser and TAC members will read and provide advice to the student on their thesis and/or papers. It should be noted that an overall thesis abstract is required as part of the thesis for both the traditional and papers options.

The student’s Thesis Advisory Committee (TAC) will appraise the adequacy of the research proposal and the appropriateness of the option selected for presenting the results. They will also advise and approve the appropriate “chaptering” of the student’s thesis.

If a student commits an academic ethics violation (including plagiarism) on the thesis, the Department will recommend dismissal from the PhD program, regardless whether it is the student’s first offense.

AUTHORSHIP GUIDELINES

The Department expects and encourages scholarly student authorship. This is part of the educational process and career development that we hope will occur during the degree program. There may be opportunities for students to publish research with faculty separately from the thesis work, as well as publication of thesis results. This is a guide to help students understand what to expect regarding authorship of scientific publications.

GENERAL GUIDELINES FOR AUTHORSHIP

The International Committee of Medical Journal Editors (ICMJE) recommends authorship based on the following criteria: “Substantial contributions to the conception or design of the work; or the acquisition, analysis, or interpretation of data for the work; AND Drafting the work or revising it critically for important intellectual content; AND Final approval of the version to be published; AND Agreement to be accountable for all aspects of the work in ensuring that questions related to the accuracy or integrity of any part of the work are appropriately investigated and resolved.” Please click this link for further details (https://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html).

ROLE OF FIRST AUTHOR

The first author is usually responsible for drafting the paper and will usually take primary responsibility for the content of the paper and analysis, along with the senior author (last author). The first author may be the corresponding author, or the senior author (or another co-author) may play this role. The corresponding author provides the email where correspondence regarding the paper from submission to final publication (and fielding of any correspondence from readers following publication) is sent. The first author is also typically responsible for obtaining input from co-authors, submitting the materials to the journal, and making the first draft of responses to reviewers (with subsequent input from co-authors), and re-submissions and proofing the final version prior to publication (along with co-authors). Of course, all authors have to approve the paper prior to submission and approve any subsequent revisions.

DISTINGUISHING BETWEEN AUTHORSHIP AND NON-AUTHORSHIP CONTRIBUTIONS

Some forms of contribution to the production of a manuscript are meaningful, yet do not rise to the level of authorship. Examples include one-off conversations about themes and ideas, reading through a draft to offer helpful comments, and suggesting light edits to correct typographical errors or stylistic infelicities. Typically, the proper way to recognize these sorts of contributions is to list them in a separate acknowledgments section: for instance, “The authors are grateful to [names] for their [valuable discussion of / helpful comments on / critical readings of] earlier versions of this manuscript.”

PUBLICATIONS NOT INCLUDED IN THE DOCTORAL THESIS

When starting to discuss research projects in which a student may participate, students should feel comfortable raising the issue of authorship with faculty, and vice versa. This allows students to be proactive in asking whether the work they may do could merit authorship if the conditions above are met. It is important to have this conversation prior to starting work on a project, although decisions about adding authors and/or order of authorship may change over time. This is because intellectual input of investigators may change as the project progresses. Even for publications that are team-written, the person who will function as lead author should be identified as early as possible in the project timeline to avoid confusion.

The decision on authorship inclusion should be guided by the principal investigator (PI) of the project. However, it is the responsibility of the PI to discuss any anticipated authorship changes with all authors, including students, in a timely manner. Please note, especially in international health work, that there may be local investigators who merit authorship but whose role in the research the student may not be aware of. Please be aware that some journals have restrictions on the number of people who can be listed as authors on a publication. The ICMJE also provides guidance on acknowledgements versus named authorships. See the above link to the guidance. When draft manuscripts are circulated to coauthors for comments, it is reasonable for the first author (including students) to set deadlines for feedback, but these should allow time for busy faculty and collaborators to review thoroughly and carefully.

PUBLICATIONS ARISING FROM THE DOCTORAL THESIS

For students who fulfill their thesis requirement using the “papers” option, as described in the Academic Guide, the thesis includes “a minimum of three separate papers based on the thesis research”, with each paper "stand[ing] on its own merits" and "the papers together…embody[ing] a recognizable unifying theme." Because the papers taken together "should contain as much substantive information as is usually expected in a traditional thesis," they may each be longer than the more compact version that would be submitted under the tight word-count restrictions typical of scholarly journals. These papers are embedded in the thesis and may be published verbatim from the thesis chapters or in a modified format for their respective target journals. In preparing a thesis-derived manuscript for submission to a journal, the student as first author (in consultation with their adviser) may seek to orchestrate additional unique contributions from other researchers, which could not have been included in the thesis itself as written solely by the student. For students who fulfill their thesis requirement using the traditional option, as described in the Academic Guide, the thesis will consist of a set of chapters "typically including an introduction and specific research objectives, critical review of the literature and discussion of a theoretical or conceptual framework, study methods, results, interpretation, discussion and conclusions." Typically, three or more distinct papers suitable for submission to peer-reviewed journals can be developed from the materials presented in the traditional thesis, either in parallel with thesis composition or as soon as possible after the student successfully defends the thesis.

Under either the "papers" option or the traditional option, the papers based on the students' thesis research should be written by the student and published with the student as the first author. This is the expectation. If faculty have a concern about 1st authorship of thesis work embedded in larger research projects, these topics should not be considered for a student thesis.

Faculty members' eligibility for co-authorship on a student's 1st-authored papers based on thesis research should generally be determined by the ICMJE guidelines cited above. Co-authorship is not automatically guaranteed merely by being named a thesis adviser. Rather, it is earned by fully performing the function of thesis adviser by providing sustained, substantial intellectual guidance to the advisee to an extent that would typically qualify one to serve as co-author of the manuscripts based on the advisee's thesis research.

Often, the student's work is embedded in a larger collaborative project and the adviser may be the PI who is responsible for funding, IRB approval, and intellectual conceptualization. Although the adviser does not directly write any part of the thesis, which must be written entirely by the student, the adviser provides comments on the thesis and may suggest ways to reword for improved understanding. It is typically the adviser's intellectual contribution to sustaining the overall project that merits co-authorship on the student's thesis-derived papers. Similar contributions by others – such as helping to conceptualize the project, obtaining funding, helping with study design, data management and analysis, training of data collectors, and lab analysis – may also merit co-authorship as per ICMJE guidelines and in discussion with the adviser and/or PI of the larger project.

Authorship should not be a presumed or quid pro quo expectation of faculty for service on a student's Thesis Advisery Committee or Committee of Final Readers, so far as the faculty member's committee service involves only reading the thesis, providing comments, and assessing the readiness of the thesis for approval. In general, such advice should be seen as an educational contribution to the student rather than authorship. Committee service might lead to authorship, however, where the faculty member makes additional substantive contributions so as to meet the ICMJE authorship criteria.

In sum, determinations of faculty co-authorship on the student's thesis-derived papers require care, judgment, and good-faith compliance with the ICMJE authorship criteria, all supported by explicit discussion as early as possible in the process of composing the papers based on the student's thesis research.

Additional papers arising more broadly from a student thesis project, but not based on material in the thesis itself, may be published by the student or by others after the student has graduated. The adviser/PI of the project should discuss authorship of additional papers with the student/graduate as soon as publication topics are identified but note that authorship may also change for such papers as the project progresses.

FURTHER GUIDANCE

It is important to acknowledge that in most instances these matters are decided in advance and without confusion. However, there can be instances of misunderstanding and miscommunication that make authorship decisions challenging. Under those circumstances, it is recommended that the student have a frank, collegial discussion with the adviser/PI to try and clarify these issues. If that is not satisfactory, the student should approach the relevant program director and seek advice. The section below also contains links to good resources.

In the end the production of a paper should always be a collaborative, exciting and respectful exercise and help everyone involved.

USEFUL RESOURCES

- http://www.icmje.org/recommendations/browse/roles-and-responsibilities/defining-the-role-of-authors-and-contributors.html
- http://www.apa.org/science/about/psa/2015/06/determining-authorship.aspx

Adviser-Specific

CHANGE OF adviser

For a variety of reasons, a student or a faculty member may wish to have the student change advisers. Faculty wishing to initiate a change should discuss this with the Chair of the Curriculum and Credentials Committee. Faculty will need to submit a report of the student's progress at the time of this request.

Student-initiated changes of adviser are made without penalty and are a common occurrence. Students should write a letter of request to the Chair of the Curriculum and Credentials Committee to change from one faculty member to another. Any request for changes must also be discussed and approved by the students Program Coordinator. Once approved the change request letter and email approval from the student's Program Coordinator should be sent to Elisabeth Simmons via email. Once approved, Elisabeth will update the student's' DIH academic file and inform the Records and Registration Office to update the student's schoolwide file.

Although visiting faculty have full-time appointments, they may not serve as doctoral advisers. Sr. Research associates, research associates, and Instructors, cannot be doctoral advisers, or co-advisers.

RESPONSIBILITIES OF adviser

- To assist in determining the advisee's educational goals and needs at the start of the program
- To serve as an educational and/or professional mentor for the student
- To maintain awareness of and sensitivity to the level of compatibility between the student advisee and themselves in terms of academic, professional, and personal interests

- To facilitate a change of adviser if deemed appropriate to the student
- To monitor the advisee's overall academic program and be sensitive to signs of academic difficulty
- To be sensitive to cultural, medical, legal, housing, visa, language, financial, or other personal problems experienced by the advisee and to be understanding and supportive. The Department has a sizable portion of foreign students coming from diverse pre-professional and professional educational backgrounds. As such, they have diverse needs and experience in managing a US based graduate education program
- To meet regularly with the student (at least once a term or more as needed is recommended) and to identify a mechanism for advising while traveling either through email/skype or by identifying a back-up adviser for periods of extended travel or sabbatical

RESPONSIBILITIES OF ADVISEE

- To arrange to meet with the adviser at least once each term.
- To comply with registration and administrative deadlines.
- To identify and develop professional career goals and interests.
- To understand administrative policies and procedures and be familiar with the requirements for their program as described in the Academic Guide.
- To maintain the academic checklist and review it at meetings with the adviser.

STUDENT EXPECTATIONS OF THEIR adviser

- Adviser's review and advise on course registrations, course changes, pass/fail agreements, waiver requests, and on all petitions to the Curriculum and Credentials Committee.
- At least one meeting per term or more frequently as needed with the adviser.
- Oversight of the student's overall academic program and sensitivity to any academic difficulties.
- Knowledge of and interest in the student's career objectives.
- Review of required and recommended courses for the program area. Assistance in designing a plan for the fulfillment of required courses and assistance with planning the course schedule for the year.
- Advice and feedback on the development of a thesis/research proposal, assistance and feedback on IRB approvals, oversight of the implementation of the thesis research project, feedback on the thesis document and public final oral defense presentation

PHD ADVISER/ADVISEE MEETING GUIDELINES

The guidelines here are the absolute minimum interactions students and advisers should expect. Many of our students and faculty meet much more frequently and often become life-long colleagues as a result of the mentoring experience.

The guidelines below are the absolute minimum interactions students and advisers should expect. Many of our students and faculty meet much more frequently and often become life-long colleagues as a result of the mentoring experience.

YEAR ONE

- Student: Schedule at least one meeting per term
- Student and Adviser: Review academic guide, competencies, departmental requirements, and administrative deadlines
- Student and Adviser: Develop a written plan of courses and experiences to meet the student's educational goals (IGA assignment due in 1st term)
- Student: Discuss possible research topics for thesis and non-thesis related research at every meeting
- Student and Adviser: Discuss course registration for the following term
- Student: Notify adviser of possible letters of recommendation student will need in next few months (must give adviser 2 weeks-notice if recommendation letter is needed)
- Adviser: Identify other people and resources of which students should be aware

YEAR TWO

- Student: Schedule at least one meeting per term
- Student: Complete non-thesis related research experience
- Student: Select a topic and a project, draft thesis proposal
- Student and Adviser: If taking comprehensive exams in January, discuss preparation for exams, student study groups
- Student: Prepare for oral exams through meetings with TAC and mock orals
- Student: Form Departmental and Preliminary Oral exam committees and take exams
- Student: Apply for funding opportunities
- Student: Form a Thesis Advisory Committee
- Student: Obtain approval for thesis proposal from TAC
- Adviser: Monitor student's progress in identifying thesis project; discuss courses left to take
- Adviser: Help student prepare for exams, and help student form a TAC
- Adviser: Write letters of recommendation for student

YEAR THREE

- Student: Schedule meeting with adviser every few weeks (could be via skype or email). Frequency to be discussed with adviser.
- Student: Obtain funding for research
- Student: Obtain IRB approvals for thesis research
- Student: Conduct thesis research, gather data, finish data collection
- Student: Write Thesis Progress Report and deliver to TAC
- Student: Decide if thesis will be a three-paper format or a large thesis
- Student: At least one meeting with full TAC
- Adviser and TAC: Assess student's progress and give feedback
- Adviser: Write an evaluation of student's progress and development, discuss with student, and submit evaluation to the academic program office
- Adviser: write letters of recommendation for student

YEAR FOUR

- Student: Schedule meeting with adviser every few weeks (could be via skype or email). Frequency to be discussed with adviser.
- Student: Data analysis and thesis writing
- Student: Write Thesis Progress Report and deliver to TAC
- Student: At least one meeting with full TAC
- Student: Distribute full thesis draft to TAC
- Student: Schedule exam to meet May graduation
- Student: Give defense seminar and final oral exam, make requested changes to thesis and submit to library, adviser and chair of defense write completion letter to registrar/dean
- Adviser and TAC: Assess student's progress and give feedback

- Adviser: Write an evaluation of student's progress and development, discuss with student, and submit evaluation to the academic program office
- Adviser and TAC: approve final thesis
- Student and Adviser: work on identifying final exam committee

Departmental Travel Policy (p. 336)

Program Concentration Learning Outcomes

For a complete list of learning outcomes by program concentration, please consult the most recent Department of International Health PhD Academic Guide (https://my.jhsph.edu/sites/IH/Student-academic-forms/Forms/AllItems.aspx?RootFolder=%2Fsites%2FIH%2FStudent%2Dacademic%2Dforms%2FAcademic%20Guides&InitialTabId=Ribbon%2ERead&VisibilityContext=WSSTabPersistence) published in August of each year.

Non-Degree Training

Non-Degree Training

Continuing Education Programs

The Department of International Health sponsors two types of continuing education programs for both health professionals and students.

Certificate programs (https://www.jhsph.edu/departments/international-health/continuing-education/certificates/)

Certificate programs offer focused academic training in specific areas of public health. Certificates typically require less time and coursework than a degree, making them appealing both to current Bloomberg degree students desiring specialization in particular topic areas and to individuals seeking to learn more about specific areas of public health.

Click here to see our certificate programs (https://www.jhsph.edu/departments/international-health/continuing-education/certificates/).

Winter and Summer Institute

Institute courses are short (one day to three weeks in length), offered in January, over the Summer, and in November and can be taken for academic credit (resulting in an official transcript from JHSPH) or not for credit (at a reduced cost). Institute courses have the same academic rigor and same world-class faculty as regular term courses, but the courses are compressed to take place in fewer days. Courses vary in length from one day to three weeks, depending on the number of credits and the requirements of the particular course.

Click here to see a list of our institutes (https://www.jhsph.edu/departments/international-health/continuing-education/institutes/).

INSTITUTES SPONSORED BY INTERNATIONAL HEALTH

Center for American Indian Health (http://caih.jhu.edu/training/course-offerings/) (offered winter and summer))

Health Emergencies in Large Populations (HELP) (http://www.hopkinshumanitarianhealth.org/education/help-course/) (offered winter and summer)

Health Systems Summer Institute (https://www.jhsph.edu/departments/international-health/continuing-education/institutes/health-systems-summer-institute/) (only offered in summer)

Tropical Medicine and Public Health (https://www.jhsph.edu/departments/international-health/continuing-education/institutes/summer-institute-in-tropical-medicine-and-public-health/) (offered winter and summer)

Post-Doctoral Training (https://www.jhsph.edu/academics/postdoctoral-training/University%20Policy.pdf)

Department of Mental Health

About

The Department of Mental Health (https://www.jhsph.edu/departments/mental-health/) is the first and the only department-level unit in a school of public health that focuses on Mental Health. The mission of the Department is to advance the understanding of mental and behavioral disorders; to develop, implement, evaluate methods to prevent and control these disorders; to promote mental health in populations around the world; and to educate the next generation of public health professionals that will promote this mission.

The Department brings together leading researchers across multiple disciplines joined by their dedication for understanding, preventing, and addressing mental health and substance use disorders. Faculty have expertise in a range of areas, including: global mental health, mental health and aging, services and policy, prevention science, psychiatric and substance use epidemiology, psychiatric and behavioral genetics, autism and developmental disabilities, violence prevention, and methods.

The department is led by the Interim Department Chair (Dr. Elizabeth Letourneau). Under the chair is a Vice Chair for Diversity, Equity and Inclusion (Dr. Renee Johnson), a Vice Chair of Research (Dr. Spira) and a Vice Chair of Education (Dr. Bass). The Department Chair appoints all committee chairpersons, faculty, and staff. In each case, the committee's function is to establish an agenda of interests in a specific area, initiate a discussion and review issues or requests, formulate a consensus and specific proposals or policies, and bring recommendations for action before the full Department for vote.

The Master of Health Science (MHS) degree program is directed by Dr. Jeanine Parisi; and the PhD program is directed by Dr. Rashelle Musci.

Programs

Summer Institute

The **Summer Institute in Mental Health Research** offers:

- A variety of mental health-related courses, many of which touch upon the Covid-19 pandemic
- Online course offerings
- The option of taking courses for either credit or non-credit
- A certificate of completion for all courses taken
- Tuition remission for JHU faculty and staff

The Institute focuses on methodological and substantive topics in mental health and substance-use research. It is intended for working professionals or students who are interested in developing research expertise in the epidemiology of mental health and substance use disorders, the implementation and evaluation of mental health services and interventions, and/or the methodological issues encountered in mental health research in the population. Our experts are not only training the next generation of public health leaders, they are leading the way in research areas, including the mental health implications of Covid-19. For more details, please visit our course page (https://www.jhsph.edu/departments/mental-health/summer-institute/courses.html).

Research Areas and Centers

The Department emphasizes ongoing research that enriches and stimulates the teaching programs. All students and fellows are encouraged to participate in at least one research group of a major research program such as those listed below.

Psychiatric Epidemiology

(Primary Faculty Contacts: Dr. Heather Volk, hvolk1@jhu.edu; Dr. Peter Zandi, pzandi1@jhu.edu)

Mental and behavioral disorders impose a significant burden on public health, and are among the leading causes of disability worldwide. Faculty use the tools of epidemiology and biostatistics to understand the occurrence and distribution of mental and behavioral disorders across people, space and time, and to investigate the causes and consequences of these disorders in order to develop more effective intervention strategies to treat and prevent them and to promote mental health. Faculty are involved in a range of population-based studies of mental and behavioral disorders that span the life course from in utero to the elderly, typically with studies that are prospective and developmentally oriented.

Substance Use

(Primary Faculty Contacts: Dr. Renee Johnson, rjohnson@jhu.edu; Dr. Brion Maher, brion@jhu.edu)

A major focus of the Department is the epidemiology of substance use and related disorders, encompassing tobacco, alcohol, and illegal drugs. Our faculty's research uses a life course framework and social-ecological perspective to understand the determinants of substance use, including opportunities to use drugs, initiation, use disorders, services, and treatment. A major goal of this research is the identification of potential targets for intervention leading to the development and testing of preventive intervention approaches. Another body of research focuses on the consequences of drug use, including comorbid psychiatric disorders and health consequences such as HIV/AIDS. The Department is the site of several National Institute on Drug Abuse (NIDA) funded studies, as well as a NIDA-funded research training program.

Cognitive Health and Aging

(Primary faculty contacts: Dr. Michelle Carlson, mcarlso2@jhu.edu)

The Department offers advanced training in epidemiologic study of the determinants of cognitive health and cognitive decline in older adults. The dementias of aging are among the most pressing public health concerns in the developed world, where more than 30% of those over age 85 are impaired. In the U.S.A., at least 20% of adults now living are expected to develop severe memory loss and other clinical features of dementia, with African-Americans and Hispanics having higher rates of Alzheimer's disease and related dementias compared to white older adults. With the rapid growth in life expectancy, many countries in the developing world are also seeing dramatic increases in the prevalence of dementing disorders. Department faculty have affiliations with the Johns Hopkins Center on Aging and Health, the Johns Hopkins Center for Innovative Care in Aging, the Johns Hopkins Alzheimer's Disease Resource Center for Minority Aging Research, the Hopkins Economics of Alzheimer's Disease and Services Center, the Alzheimer's Disease Research Center, and direct several NIA-funded projects as well as the Aging and Dementia Training Fellowship, all of which seek to find the role of genes and the environment in the cause of Alzheimer's disease, to identify specific environmental factors that may modify genetic influences, and to test interventions aimed at delaying or preventing the occurrence of cognitive decline and dementia. The training includes course offerings in the Departments of Mental Health, Epidemiology, Biostatistics, Health Policy and Management, and the Department of Psychiatry and Behavioral Sciences of the School of Medicine. Graduate and post-doctoral students have the opportunity to work with several large observational and intervention datasets related to mental health in aging, including the observational, the Epidemiologic Catchment Area (ECA) follow-up, Cache County Study, Cardiovascular Health Study, the Women's Health and Aging II studies, and trial-based studies, including the Advanced Cognitive Training for Independent and Vital Elderly (ACTIVE) Study, Ginkgo Evaluation of Memory Study (GEMS), and Baltimore Experience Corps Trial (BECT). Students are invited to attend monthly Work-in-Progress (WiP) meetings as a forum for informal discussion and development of research papers, dissertation ideas, and grant proposals.

Global Mental Health

(Primary faculty contact: Dr. Judy Bass, jbass1@jhu.edu; Dr. Sarah Murray, Sarah.murray@jhu.edu)

Populations living in contexts of broad adversity, such as conflict, endemic poverty, HIV, and natural disasters, face impediments not just in infrastructure development but also in human development. Establishing a physically and mentally healthy populace is a necessary component for promoting development, securing the right to health, and promoting health equity in contexts and countries with limited resources. As publicized in the 'Global Burden of Disease' reports, common mental illnesses constitute *the* major cause of dysfunction globally and specifically in most resource-poor countries. Addressing these problems requires a multifaceted treatment and prevention approach that also considers fundamental social determinants of poor mental health, including stigma, violence, the relationship between physical and mental well-being, and poverty. Faculty in the Department of Mental Health and throughout the School of Public Health are pioneers in conducting applied research to understand cross-contextual variations in the manifestation of mental disorders and to investigate and innovate in the area of prevention and intervention programming for vulnerable populations living in areas with limited mental health resources. The Department houses an NIMH-funded training program for pre- and postdoctoral training in Global Mental Health.

Psychiatric Genomics

(Primary faculty contact: Dr. Brion Maher, brion@jhu.edu)

Family, twin and adoption studies show that genetic factors play an important role in the etiology of the major mental and behavioral health disturbances and responses to treatment for these disturbances. Faculty in the department are leaders in research to identify these genetic factors and explain how they interact with the physical and social environment to increase (or decrease) the risk for these disturbances. The goal of this research is to establish better predictive models of who is at risk for illness and establish the foundation for developing more rational treatment and preventative strategies. Faculty collaborate with investigators from around the school, including the Department of Epidemiology and the Department of Biostatistics in the School of Public Health; the Department of Psychiatry and Behavioral Sciences and the Institute of Genetic Medicine in the School of Medicine; and the Kennedy Krieger Institute. They are engaged in population and family based studies of a wide range of psychiatric disorders and related phenotypes including: Major Depression, Bipolar Disorder, Alzheimer's Disease, Schizophrenia, Autism, Obsessive-Compulsive Disorder, Substance Abuse and Dependence, Suicide, and Stress-related cortisol response. The latest tools and techniques are utilized from genome-wide linkage, genome-wide association, next-generation sequencing, gene expression and epigenetic studies. There are a number of outstanding didactic and practical training opportunities for students interested in psychiatric and behavioral genetic epidemiology. Students may pursue advanced coursework in genetic epidemiology, behavioral genetics, statistical genetics, and bioinformatics. They may also gain practical research experience by collaborating on different projects lead by the departmental and affiliated faculty around the school.

Prevention Science

(Primary faculty contacts: Dr. Rashelle Musci, rmusci@jhu.edu; Dr. Holly Wilcox, hwilcox1@jhmi.edu, Dr. Tamar Mendelson, tmendel1@jhu.edu)

Several faculty work in the area of prevention science. The Department was the home to the former Center for Prevention and Early Intervention, a collaborative effort between the Bloomberg School of Public Health and community partners in prevention and early intervention such as the Baltimore City Public Schools System, the Family League of Baltimore City, Baltimore Mental Health Systems and the Maryland Department of Education, and prevention and early intervention researchers at Morgan State University, Pennsylvania State University, the University of California at Los Angeles, the University of Alabama, Columbia University, and Stanford University.

The goals of that center included improvement of school-based preventive and early treatment interventions for children and adolescents identification of factors that inhibit or facilitate prevention and treatment practices and dissemination of best practices. The Center for Prevention and Early Intervention builds on the foundation laid by the Johns Hopkins Prevention Intervention Research Center (1985-2001), which provided the basis for two generations of school-based, preventive intervention field trials in Baltimore and their ongoing follow-ups. These general goals are still the focus on many ongoing studies by prevention faculty in our department. In addition, prevention scientists in the department also work in the health care sector, and on prevention of specific outcomes such as child sexual abuse and suicide.

Epidemiologic Catchment Area-East Baltimore (ECA)

(Primary faculty contact: Dr. Adam Spira, aspira@jhu.edu (aspira@jhu.edu))) (aspira@jhu.edu))

The Baltimore Epidemiologic Catchment Area (ECA) Research project started out as one of five sites around the country, in the early 1980s. The Baltimore site was led by Morton Kramer, with collaborators from the Department of Health Policy and Management, and from the Department of Psychiatry. The Baltimore site was the only one of the five to conduct follow-ups, during 1993-1996 and then 2004-2005. The Baltimore ECA follow-up involves investigators from the Departments of Epidemiology, Biostatistics, and Health Policy and Management in the Bloomberg School of Public Health and with investigators from the Departments of Psychiatry and Behavioral Sciences, and Medicine, in the School of Medicine, and from the National Institute on Aging Intramural Research Program. The goals of the follow-up are to provide data on the incidence and natural history of the most frequent mental disorders occurring during adulthood; to search for risk factors for disorders and syndromes; and to study the consequences of psychopathology in terms of physical illness, disability, cognitive and functional decline and dementia, physiological aging, and mortality. Data from the original five sites of the national ECA program, and from the Baltimore ECA follow-up, are available for analysis by members of the Johns Hopkins community, via a Sharepoint Team web site on my.jhsph.edu. The fifth wave of the Baltimore ECA follow-up is supported by grants from the National Institute on Aging.

Wendy Klag Center for Autism and Developmental Disabilities

(Primary faculty contact: Dr. Heather Volk, hvolk1@jhu.edu) (dfallin@jhu.edu;%20Dr.%20Heather%20Volk,%20hvolk1@jhu.edu))

The Wendy Klag Center (WKC) is dedicated to the promotion of research and education regarding the origins, detection, measurement and prevention of conditions that affect behavioral, socioemotional and/or cognitive development, related to developmental disabilities, as well as evaluation of services and policies that support optimal development of affected children and their families. The Center, housed in Mental Health, is a school-wide effort that involves faculty and students across all departments who are pursuing research in autism or developmental disabilities. The Center offers journal clubs, seminars, and other events, as well as student internship placements and competitive student project funding and student travel awards. Current research by WKC faculty and students include national autism surveillance with the CDC (ADDM network), a national autism case-control study focused on genetic and environmental contributions to etiology (the SEED study), a national pregnancy cohort study of autism spectrum disorder (the EARLI study), multiple projects in genetic and epigenetic analyses of these samples, and projects focused on services delivery and policy, as well as methodological research. The Center offers competitive student research funding, internships, and travel awards.

Moore Center for the Prevention of Child Sexual Abuse

(Primary faculty contact: Dr. Elizabeth Letourneau, elizabethletourneau@jhu.edu)

The Moore Center for the Prevention of Child Sexual Abuse was established in October 2012 with philanthropic support from Dr. Stephen and Mrs. Julia Moore. The Center's vision is a world without child sexual abuse. It's mission is to effect prevention change by leading strategic efforts in research, education, communication, advocacy, and policy. With respect to research, Center projects focus on the development, evaluation, and dissemination of effective primary and secondary child sexual abuse perpetration prevention strategies; establishing the prevalence of child sexual abuse perpetration and related risk factors; and evaluating policy impacts. Regarding education, center faculty teach graduate courses on childhood victimization and collaborate locally, nationally, and internationally to bring relevant research to all stakeholders. Regarding communication, the center's full time Communications Director ensures broad promotion of our research findings. Regarding advocacy and policy, we collaborate with state, federal, and international lawmakers to increase resources for prevention and to ensure a strong focus on implementing effective policy and ending harmful policy. As just two examples: In 2020 we were successful in supporting a new line item in the U.S. federal budget that provides funding to the CDC specifically for child sexual abuse prevention research. In 2021, our research was cited in the American Law Institute's Model Penal Code, which recommends (as do we) the end of juvenile sex offender registration, a costly and harmful policy. While the Model Penal Code stopped short of recommending the end of adult registration, it does overtly acknowledge the absence of supporting research (to which we have contributed) and recommends significant curtailment of this policy. We are proud of our influence at the center's 10-year mark and look forward to expanding our work and our influence in the next 10 years.

Statistical Methods for Mental Health

(Primary faculty contacts, Dr. Elizabeth Stuart, estuart@jhu.edu; Dr. Rashelle Musci, rmusci1@jhu.edu)

The methods program area is interested in developing and applying innovative statistical methods for public mental health research. These methods are crucial for generating accurate answers to research questions. The methods, for example, help deal with complications regarding missing data and non—adherence in randomized trials, how to analyze complex data such as DNA or complex longitudinal data, how to measure and model variables that are not directly observable, and how to integrate data from multiple sources or studies. There are strong links between the methods research group and other groups in the Department, such as mental health services & policy, prevention research, and substance use epidemiology. There are three particular research areas within this program area: causal inference (led by Dr. Stuart), measurement (led by Dr. Musci), and mixed methods (led by Dr. Gallo). The causal inference area focuses on the development of statistical methods for estimating causal effects in experiments and non-experimental studies, including for studying the effects of programs and policies. The measurement area includes the development and application of novel latent variable methods and data harmonization tools. The mixed methods area studies how to combine qualitative and quantitative methods. Student involvement in the methods program area consists of research assistance opportunities, related T32 training programs (in Mental Health Services & Systems and Data Analytics for Behavioral Health) as well as advising by faculty members in statistical and related methods. Relevant coursework includes term-long and summer institute courses in the Department of Mental Health, including a two-term sequence on statistics for psychosocial research, a course on causal inference, and the seminar on statistical methods for mental health research, with topics that evolve each year. Courses in the Biostatistics department are also relevant, and some doctoral students interested in this program area also pursue a concurrent MHS in Biostatistics. There are also close links with working groups in the Department of Biostatistics and with Methods cores of other centers, including the ALACRITY Center for Health and Longevity in Mental Illness, the ECHO study in the Department of Epidemiology, and the Wendy Klag Center for Autism and Developmental Disabilities.

Other Collaborations

The Department faculty work in close association with city, state, and federal public mental health agencies, and enjoy working relationships with the Maryland State Department of Health and Mental Hygiene and the Baltimore City Health Department. Department faculty and staff also work with local non-profit agencies working in mental health including Baltimore Mental Health Systems and the Behavioral Health Leadership Institute, the B'MORE Clubhouse, as well as with the Baltimore Substance Abuse Systems, Inc. In addition, the Department faculty has established close working relationships internationally with the WHO Department of Mental Health and Substance Abuse; the World Psychiatric Association; the National Center for Register-based Research in Denmark; and the World Federation for Mental Health.

Department Organization

The department is led by the Interim Department Chair (Dr. Letourneau). Under the chair is Vice Chair for Diversity, Equity and Inclusion (Dr. Johnson), Vice Chair of Research (Dr. Spira) and Vice Chair of Education (Dr. Bass). The Department Chair appoints all committee chairpersons, faculty, and staff. In each case, the committee's function is to establish an agenda of interests in a specific area, initiate a discussion and review issues or requests, formulate a consensus and specific proposals or policies, and bring recommendations for action before the full Department for vote.

Within the department structure, there are several standing and ad-hoc committees that oversee faculty and student research, practice and education.For specific questions on committee mandate and make-up, please contact the Vice Chairs or the Senior Academic Program Coordinator.

Departmental Honors and Awards

Annually, a committee of Department faculty, solicits nominations and selects students as recipients of the following awards:

- The Morton Kramer Award – made annually to a doctoral student who has demonstrated excellence in the application of biostatistical and epidemiologic methods to the solution of problems in research dedicated to advancing our knowledge of the epidemiology of mental disorders, and to the application of such knowledge in programs designed to prevent and control mental disorders and associated disabling conditions.
- The Paul V. Lemkau Award – made annually for outstanding performance in doctoral studies in the field of mental health.
- The Lucy Shum Memorial Award– made annually for a student in the Department of Mental Health who will work in the arena of public health policy for mental health issues. If there are several eligible students a preference will be given to students of Chinese heritage.
- The Rose and Ali Kawi Award – made annually to support outstanding students pursuing a doctoral degree in the Department of Mental Health who furthers the work of Dr. Ali Kawi, a graduate of the Department, and his work in research and education in neuropsychiatric disorders, psychosomatic research and prenatal factors in reading disorders, and learning and mental health.
- The Alberta Szalita Award – made annually to support a graduate student or junior faculty member in the Department of Mental Health. Preference will be given to recipients who are clinically trained.

The departmental Honors and Awards Committee is responsible for choosing the recipients of the awards each year, based on nominations from the faculty, and the awards are granted at a school-wide awards ceremony and also recognized at the department's annual end-of-year party.

Academic Training Programs

The Department of Mental Health houses multiple NIH-funded doctoral and postdoctoral institutional training programs:

Psychiatric Epidemiology Training (PET) Program

This interdisciplinary doctoral and postdoctoral program is affiliated with the Department of Epidemiology and with the Department of Psychiatry and Behavioral Sciences at the School of Medicine. The Program is directed by Dr. Heather Volk (hvolk1@jhu.edu). The goal of the program is to increase the epidemiologic expertise of psychiatrists and other mental health professionals, and to increase the number of epidemiologists with the interest and capacity to study psychiatric disorders. Graduates are expected to undertake careers in research on the etiology, classification, distribution, course, and outcome of mental disorders and maladaptive behaviors. The Program is funded with a training grant from the National Institute of Mental Health.

Pre-doctoral trainees are required to take the four term series in Epidemiologic Methods (340.751-340.754), as well as the four term series in Biostatistics (140.621-624). In addition to the other departmental requirements for the doctoral degree, pre-doctoral trainees must also take four advanced courses in one of the domains of expertise they have selected to pursue: Genetic and Environmental Etiology of Mental Disorders, Mental Health Services and Outcomes, Mental Health and Aging, and Global Mental Health. Pre-doctoral trainees should consult with their adviser and the program director to select courses consistent with their training goals.

Postdoctoral fellows take some courses, depending on background and experience, and engage in original research under the supervision of a faculty member. They are expected to have mastery in the basic principles and methods of epidemiology and biostatistics. Thus, fellows are required to take 340.721 Epidemiologic Inference in Public Health, 330.603 Psychiatric Epidemiology, and some equivalent of 140.621 Statistical Methods in Public Health I and 140.622 Statistical Methods in Public Health II. They may be waived from these requirements by the program director if they can demonstrate equivalent prior coursework.

Drug Dependence Epidemiology Training (DDET) Program

This training program is co-led by Dr. Renee M. Johnson (rjohnson@jhu.edu) and Dr. Brion Maher (brion@jhu.edu). The DDET program is designed to train scientists in the area of substance use and substance use disorders. Research training within the DDET Program focuses on: (1) genetic, biological, social, and environmental factors associated with substance use, (2) medical and social consequences of drug use, including HIV/AIDS and violence, (3) co-morbid mental health problems, and (4) substance use disorder treatment and services. The DDET program is funded by the NIH National Institute on Drug Abuse.

The program supports both pre-doctoral and postdoctoral trainees. Pre-doctoral trainees have a maximum of four years of support on the training grant. After completing required coursework, pre-doctoral trainees are expected to complete original research under the supervision of a faculty member affiliated with the DDET program. Postdoctoral trainees typically have two years of support on the training grant. They are required to engage in original research on a full-time basis, under the supervision of a DDET faculty member. Trainees' research projects must be relevant to the field of substance use.

All trainees are required to attend a weekly seminar series focused on career development and substance use research. The DDET program supports trainees' attendance at relevant academic meetings, including the Annual Meeting of the College on Problems of Drug Dependence (CPDD) each June. Training grant appointments are awarded annually and are renewable given adequate progress in the academic program, successful completion of program and departmental requirements, and approval of the training director.

Pre-doctoral trainees are required to take the required series in epidemiology and biostatistics, as well as The Epidemiology of Substance Use and Related Problems (330.602). In addition, they must take three advanced courses that enhance skills or content expertise in substance use and related problems: one in epidemiology (e.g., HIV/AIDS epidemiology), one in biostatistics, and one in social and behavioral science or health policy. The most appropriate biostatistics course will provide instruction on a method the trainee will use during the thesis research (e.g., survival analysis, longitudinal analysis methods). (Course requirements for trainees from other departments will be decided on a case-by-case basis.)

Postdoctoral trainees are expected to enter the program with mastery in the basic principles and methods of epidemiology and biostatistics. They are required to take The Epidemiology of Substance Use and Related Problems in their first year (330.602), as well as required ethics courses. Postdoctoral trainees are encouraged to take courses in scientific writing and grant writing.

Global Mental Health Training (GMH) Program

The Global Mental Health Training (GMH) Program is a training program to provide public health research training in the field of Global Mental Health. It is housed in the Department of Mental Health (http://www.jhsph.edu/dept/mh/), in collaboration with the Departments of International Health and Epidemiology. The GMH Program is supported by a T32 research training grant award from the National Institute of Mental Health (NIMH). Dr. Judy Bass (jbass1@jhu.edu) is the training program director.

As part of this training program, trainees will undertake a rigorous program of coursework in epidemiology, biostatistics, public mental health and global mental health, field-based research experiences, and integrative activities that will provide trainees with a solid foundation in the core proficiencies of global mental health while giving trainees the opportunity to pursue specialized training in one of three concentration areas that are recognized as high priority: (1) Prevention Research; (2) Intervention Research; or (3) Integration of Mental Health Services Research.

Pre-doctoral trainees are required to take the required series in epidemiology and biostatistics and department of mental health required courses. In addition, they must take three courses that will enhance skills and content expertise in global mental health: 330.620 Qualitative and Quantitative Research Methods for Low Resource Contexts, 224.694 Mental Health Intervention Programming in Low and Middle Income Countries, and 330.680 Promoting Mental Health and Preventing Mental Disorder in Low and Middle Income Countries.

The Mental Health Services and Systems (MHSS) Program

The Mental Health Services and Systems (MHSS) program is an NIMH-funded T32 training program run jointly by the Department of Mental Health and the Department of Health Policy and Management. and also has a close affiliation with the Johns Hopkins School of Medicine. Dr. Elizabeth Stuart (estuart@jhu.edu) is the training program director.

The goal of the MHSS Program is to train scholars who will become leaders in mental health services and systems research. This program focuses on producing researchers who can address critical gaps in knowledge with a focus on: (1) how health care services, delivery settings, and financing systems affect the wellbeing of persons with mental illness; (2) how cutting-edge statistical and econometric methods can be used in intervention design, policies, and programs to improve care; and (3) how implementation science can be used to most effectively disseminate evidence-based advances into routine practice. The program strongly emphasizes the fundamental principles of research translation and dissemination throughout its curriculum.

Pre-doctoral trainees in the MHSS program are expected to take a set of core coursework in epidemiology and biostatistics, 5 core courses related to the core elements of mental health services and systems (330.662: Public Mental Health, 330.664: Introduction to Mental Health Services, 140.664: Causal Inference in Medicine and Public Health, 550.601: Implementation Research and Practice, and 306.665: Research Ethics and Integrity), and to specialize in one of 3 tracks: (1) health services and economics; (2) statistics and methodology; or (3) implementation science applied to mental health. Trainees are also expected to participate in a biweekly training grant seminar every year of the program, and take a year-long practicum course exposing them to real world mental health service systems and settings.

For more details see this webpage: http://www.jhsph.edu/research/centers-and-institutes/center-for-mental-health-and-addiction-policy-research/training-opportunities/

Epidemiology and Biostatistics of Aging

This program offers training in the methodology and conduct of significant clinical- and population-based research in older adults. This training grant, funded by the National Institute on Aging, has the specific mission to prepare epidemiologists and biostatisticians who will be both leaders and essential members of the multidisciplinary research needed to define models of healthy, productive aging and the prevention and interventions that will accomplish this goal. The Associate Director of this program is Dr. Michelle Carlson (mcarlso2@jhu.edu).

The EBA training grant has as its aims:

- Train pre- and post-doctoral fellows by providing a structured program consisting of a) course work, b) seminars and working groups, c) practica, d) directed multidisciplinary collaborative experience through a training program research project, and e) directed research.
- Ensure hands-on participation in multidisciplinary research bringing trainees together with infrastructure, mentors, and resources, thus developing essential skills and experience for launching their research careers.
- Provide in-depth knowledge in established areas of concentration, including a) the epidemiology and course of late-life disability, b) the epidemiology of chronic diseases common to older persons, c) cognition, d) social epidemiology, e) the molecular, epidemiological and statistical genetics of aging, f) measurement and analysis of complex gerontological outcomes (e.g, frailty), and g) analysis of longitudinal and survival data.
- Expand the areas of emphasis to which trainees are exposed by developing new training opportunities in: a) clinical trials; b) causal inference; c) screening and prevention; and d) frailty and the integration of longitudinal physiologic investigation into epidemiology.
- Integrate epidemiology and biostatistics training to form a seamless, synthesized approach whose result is greater than the sum of its parts, to best prepare trainees to tackle aging-related research questions.

These aims are designed to provide the fields of geriatrics and gerontology with epidemiologists and biostatisticians who have an appreciation for and understanding of the public health and scientific issues in human aging, and who have the experience collaborating across disciplines that is essential to high quality research on aging. More information can be found on the training grant website at: http://coah.jhu.edu/academics/aging-training.html

Aging and Dementia Training Program

This interdisciplinary pre- and post-doctoral training program is is an interdisciplinary program, funded by the National Institute on Aging, affiliated with the Department of Neurology and the Department of Psychiatry at the School of Medicine, the Department of Mental Health at the School of Public Health and the Department of Psychology and Brain Sciences at the School of Arts and Sciences. The Department of Mental Health contact is Dr. George Rebok (grebok1@jhu.edu). The goal of this training program is to train young investigators in age-related cognitive and neuropsychiatric disorders.

General Student/Fellow Travel Planning

Students or fellows traveling on a training grant or faculty grant/contract related projects must secure written approval (via email is acceptable) from the Principal Investigator (PI) for any travel that will be funded by these sources prior to making any arrangements or embarking on a trip. The student or fellow is responsible for getting the correct budget number from the PI. The student, fellow or the PI's support staff makes the necessary travel arrangements either with a travel agency or through airlines, Amtrak, etc. directly.

If a student/fellow requires a travel advance, the student should ask the PI to assist with a Travel Request using SAP. By University policy, an advance will not be given sooner than 10 days prior to the actual trip. However, if arrangements are made far enough in advance, the Department can pay on an invoice prior to the actual travel. Some hotels will also invoice in advance and can be paid directly. This cuts down on the amount of travel advance. Invoices can be processed by the support staff person using SAP and will then be approved by the budget analyst for payment. Invoices will also need approval from the PI.

NOTE: A travel advance is considered by the University as an encumbrance against an account; it is not cleared until a Travel Expense Report is filed within SAP. If travel advances are not cleared within 3 months of the advance, the individual will be charged taxes on the amount of the advance and the dollar amount of the advance will be reported to the IRS as income on the W-2 at the end of the calendar year in which the advance was made.
It is essential to have original receipts since the University will not pay from photocopies or statements. Include all transportation receipts, invoices that might have come with tickets, charge card receipts, toll, parking, meal, etc. charges related to travel.

Reimbursements must be submitted within 30 days of the last day of travel or date non-travel expenses were incurred. *Receipts older than 90 days will not be processed*. This policy is now being fully enforced by MH and Accounts Payable due to the IRS Accountable Plan Rules. You can access the full Travel Guide Policies & Procedures (https://policies.jhu.edu/doc/fetch.cfm/DpbSS14O/) .

Travel Funds for Professional Meetings or Conferences

Doctoral students are encouraged to present at and attend professional meetings and conferences related to their area of study. *Students on training grants have access to meeting funds through their training grant* *and should seek approval from the training grant PI.* **The Department sets aside a limited amount of funds for travel and registration fees for doctoral students who are not supported by training grants.** Students and fellows can apply for travel support, after they have also applied for support from the conference or meeting itself, to the Senior Academic Program Coordinator who will obtain the approval of the Department Chair for each request. To be eligible, the student or fellow must have an accepted communication (i.e., poster or oral presentation) at the meeting or conference. **The maximum amount for any one trip is $1,000 and students and fellows can only be supported once per year.**

For access to Department funds, requests should be sent to the Academic Program Administrator via email listing the following information: Student name, name of conference, location of conference, dates of conference, breakdown of estimated expenses, type of presentation (poster, paper, etc.) and whether or not the student has requested scholarship funds from the conference. Once approval has been obtained and the trip is completed, **receipts and proof of payment** must be submitted to be reimbursed. Proof of payment can be in the form of a blinded credit card number (Example: Visa XXXX-XXXX-XXXX-1234) on the receipt, or a bank statement showing the charges and the account holder's name (You may black out any other charges not relevant to the trip). **At least 30 days or more advance notice is requested for approval.**

Travel Abroad

Students at the Johns Hopkins Bloomberg School of Public Health may have an opportunity to supplement their education or conduct research in another country. These opportunities often enrich the academic curriculum, contribute to dissertation research, and allow application of knowledge obtained in the classroom to the world's communities. While the School encourages participation in these kinds of experiences, international tensions can be high. Therefore, students should seek information on conditions abroad before traveling.

The International Travel Resources (https://my.jhsph.edu/Resources/ITR/Pages/default.aspx) portal site is designed to provide tools and information to BSPH students who travel internationally in order to allow them to make informed personal decisions; to protect reasonably themselves from foreseeable harm; to increase their own level of health, safety, and security awareness; and to prepare for emergencies abroad. The site offers a wealth of useful links, travel resources, and insurance information in addition to State Department and Center for Disease Control travel advisories.

Students traveling to a less developed part of the world should be certain to contact their health care provider or the Johns Hopkins International Travel clinic to learn about recommended immunizations and other matters to guard your health. The International Travel Clinic is located on the East Baltimore campus and can be reached by telephone at 410-955-8931. Further information about recommended immunizations and prophylaxis is available at the CDC Website (https://www.cdc.gov/).

International students must contact the Office of International Services (OIS) well in advance of any travel to avoid compliance issues with their visa status. OIS may be contacted at 667-208-7001, or at https://ois.jhu.edu/About_OIS/Contact_Us/index.html (https://ois.jhu.edu/About_OIS/Contact_Us/).

Students who travel abroad as part of a practicum experience or as part of a research team must complete a Graduate Student Study Release and International Travel Checklist and leave the forms with Patty Scott, Academic Program Administrator for the Department of Mental Health.

Mental Health, MHS

The Master of Health Science (MHS) degree is organized around a core set of four terms of graduate courses, and a final research paper that demonstrates mastery of what has been learned in the course work experience. The MHS degree is completed in one academic year. The MHS degree in the Department of Mental Health may be combined with a certificate program offered in another department within the Bloomberg School of Public Health, e.g., Health Education, Health Finance & Management, Health Policy, Health and Human Rights, Health Communication, Health Disparities & Health Inequality, Injury Control, and Maternal and Child Health. These certificate programs are at no extra cost to full-time students and are available to enhance the mental health research educational experience. Courses taken during Winter or Summer sessions will require additional payments.

The Director of the MHS Program is Dr. Jeanine Parisi. The MHS Program Director is the advisor of record for all MHS students. The Director of the MHS Program serves as a resource for MHS students, advising on the choice of courses, career planning, guiding students in selecting a topic for their MHS paper, and connecting them with an appropriate faculty co-advisor in relation to this paper.

Bachelor's/MHS

The Bachelor's/MHS in the Department of Mental Health is designed exclusively for undergraduate students currently enrolled in the Johns Hopkins University. We encourage all JHU undergraduates to apply to this program during the regular admissions cycle.

JHU undergraduates may formally apply for early admission before completing their Bachelor's degree, preferably during the summer between their junior year and senior year, or within the first month of their senior year. As soon as a student is admitted to the MHS degree program, our department will assign a graduate advisor to work with the student while the undergraduate degree is being completed. Admitted students must complete the Bachelor's degree before formally enrolling in the Bloomberg School of Public Health. Program requirements for the Bachelor's/MHS program are the same as requirements for other MHS students in our department. However, up to one half of the PH graduate credits earned interdivisionally toward the Bachelor's degree may also apply to the master's degree. (This is the equivalent of no more than 16 credits, which is one full-time term of graduate level study in the School of Public Health.) Thus, the Bachelor's/MHS degree program will require fewer than 64 credits taken as a matriculated student for those who have taken up to 16 units of coursework offered by JHSPH, only if grades of A or B are earned.

Students in this program will receive co-advising from both schools to optimize their academic experience.

Contact:
Jeanine Parisi, PhD
Email: jparisi1@jhu.edu (jparisi@jhsph.edu)

Requirements

Applications for the Bachelor's/MHS degree should be submitted through SOPHAS Express by July 1st between the junior and senior years to insure completion of review process prior to the first day of the academic year. JHU seniors can also apply during the beginning of their senior year until October 15 once the application reopens in mid-August. Please note that admitted students must complete the Bachelor's degree before formally enrolling in the Bloomberg School of Public Health.

Applicants must submit the following:

- Transcripts from Johns Hopkins University and, if applicable, transcripts from any other college-level institutions you have attended.*
- Three letters of recommendation.
- Resume or curriculum vitae.
- Statement of purpose and objectives.
- No GRE Test scores are required for JHU students.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Course	Title	Credits
First Term		
PH.140.621 or PH.140.611	Statistical Methods in Public Health I or Statistical Reasoning in Public Health I	3-4
PH.330.604	Seminars in Research in Public Mental Health	1
PH.330.617	Psychopathology for Public Health	3
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.330.662	Public Mental Health	2
PH.330.840	Special Studies and Research Mental Health ((for bi-weekly meetings with the MHS director) with student advisor's name listed)	1
PH.550.860	Academic & Research Ethics at BSPH	0
	Credits	**15-16**
Second Term		
PH.140.622 or PH.140.611	Statistical Methods in Public Health II or Statistical Reasoning in Public Health I	3-4
PH.330.603 or PH.330.602	Psychiatric Epidemiology or The Epidemiology of Substance Use and Related Problems	3
PH.330.604	Seminars in Research in Public Mental Health	1
PH.340.722	Epidemiologic Inference in Public Health II	4
PH.330.811	MHS Thesis in Mental Health: from Proposal to Publication I	1
	Credits	**12-13**
Third Term		
PH.330.661 or PH.330.612	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders [1] or Introduction to Behavioral and Psychiatric Genetics	3
PH.330.604	Seminars in Research in Public Mental Health	1
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS	3
PH.330.812	MHS Thesis in Mental Health: from Proposal to Publication II	1
	Credits	**8**
Fourth Term		
PH.330.612 or PH.330.661	Introduction to Behavioral and Psychiatric Genetics [1] or Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	3
PH.330.604	Seminars in Research in Public Mental Health	1
	Credits	**1**
	Total Credits	**36-38**

[1] PH.330.661 Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders is taught in 3rd term. PH.330.612 Introduction to Behavioral and Psychiatric Genetics is taught in 4th term.

A minimum of 64 credits (16 credits per term) is required to complete the degree; a maximum of 22 credits is allowed in any single term. Students in the MHS program must take six credits of electives (i.e. additional courses beyond those required and described above) in the Department of Mental Health which must be taken for a letter grade.

CEPH Courses

According to the requirements of the Council on Education for Public Health (CEPH), all JHSPH degree students must be grounded in foundational public health knowledge. Grounding in foundational public health knowledge is measured by the student's achievement of the learning objectives listed below, or higher-level versions of the same objectives.

https://e-nextcatalog.jhu.edu/public-health/ceph-requirements/index.html (p. 176)

552.601 (.5 credit) Found principles of public health (offered in August, term 1A, term 2A and term 3A)
552.603 (.5 credit) Role of qualitative methods (offered in August, term 1B, term 2B and term 3B)
552.607 (.5 credit) Essentials of Environmental Health (offered term 1A, term 2A, and term 3A)
552.608 (.5 credit) Bio Genetic & Infect basis of health* (offered in August, term 1B, term 2B, and term 3B)
552.610 (.5 credit) Social Determinants of health** (offered in August, term 1B, term 2B and term 3B)
552.611 (.5 credit) Globalization and health (offered in August, term 1B, term 2B and term 3B)
552.612 (.5 credit) Essentials of One Health (offered term 1B and term 4A)

The CEPH courses must be completed by fourth term in order to meet graduation requirements.
* Students taking 330.612 Behavioral and Psychiatric Genetics or 260.600 Introduction to Biomedical Sciences do not need to take this CEPH course.
** Students taking the 330.661 Social, Psychological and Development Processes course do not need to take this CEPH course

Final Research Paper

All MHS students must complete a final research paper in their area of interest. The paper may either be a critical and comprehensive review of the literature pertaining to a specific area of interest or an original analysis of existing data. Alternate formats may also be possible (e.g., policy brief, program evaluation) with faculty approval. This paper should be of sufficient quality to be considered by the Department faculty as worthy of publication in a recognized journal or be used to inform policy or practice. A brief proposal of the final research paper should be submitted to the academic advisor during second term and should be approved by the academic advisor and faculty co-advisor before work on the project is started. Special studies credits with a faculty member may be taken to allocate time and mentoring to working on this research paper. In order to graduate in May, all degree requirements are due in April. The final draft of the paper must be completed and approved by the student's academic advisor and faculty co-advisor by the first week of April. Requirements for the MHS degree will not be fulfilled until the Department receives a copy of the research paper and a letter confirming completion of the degree requirements is filed in the Office of Records & Registrar (BSPH E1002).

Academic Plans

During the first quarter of each academic year, each master's student will complete a plan describing how academic and career goals will be achieved through their learning experience in the department. The plan will contain broad, general goals to be attained during the entire experience at the Department of Mental Health and list of courses to be taken to ensure success is met. A copy of the academic plan template is provided by the MHS Program Director and the Academic Program Administrator. The plan is prepared in collaboration with the advisor, and signed by the student and the advisor. The MHS Program Director will review all MHS academic plans.

Academic Progress

The performance and progress of each student is reviewed by the student's advisor and the Academic Program Administrator for their degree. The MHS Program Director along with the Academic Program Administrator review each student's transcripts every quarter. When the academic achievement of any student comes into question (typically this involves a grade of "C" or lower), the advisor may consult with faculty and/or the Chair about the student's progress. Satisfactory academic progress is earning a grade of C or better in the required coursework, earning a minimum of 64 credits, a satisfactory written paper and maintaining a minimum GPA of 2.75. Unsatisfactory or incomplete grades may constitute grounds for removal of a student from a degree program (see Dismissal Policy).

A student's overall academic standing and progress will be judged not only on grades received, but also successful completion of a final research paper.

Mental Health Seminar Series

Attendance at the Mental Health Seminar series is required for all MHS students and first year doctoral students. Credit is obtained for attendance via a one course credit per term 330.604 Seminars in Research in Public Mental Health. All other students and fellows are expected to attend the Seminar Series throughout the course of their program to gain exposure to a wide range of mental health issues and research.

At the beginning of each term a schedule of speakers and presentation topics is shared with all of the students and faculty and is posted on the departmental bulletin board. Once per month, there will be a student-only session during this seminar time that coincides with faculty meetings. Topics for these sessions include grant writing, job search tips, reviews of recent seminars, etc. Students are welcome to suggest topics and formats. This is intended to provide students with an informal forum for peer communication and advice.

The curriculum for the MHS in the Department of Mental Health includes coursework to build knowledge in public mental health, with a foundation in Epidemiology and Biostatistics. The degree can be tailored to meet the students interests and electives can be taken from different departments throughout the school.

Courses are also included that have been approved to meet the Introductory Public Health Knowledge Learning Objectives (p. 176) required by the Council on Education for Public Health for academic programs.

Mental Health, PhD

Overview

PhD Program Description

The PhD program is designed to provide key knowledge and skill-based competencies in the field of public mental health. To gain the knowledge and skills, all PhD students will be expected to complete required coursework, including courses that meet the CEPH competency requirements and research ethics; successfully pass the departmental comprehensive exam; select and meet regularly with a Thesis Advisory Committee (TAC) as part of advancing to doctoral candidacy; present a public seminar on their dissertation proposal; successfully pass the departmental and school wide Preliminary Oral Exams; complete a doctoral thesis followed by a formal school wide Final Oral Defense; participate as a Teaching Assistant (TA); attend Grand Rounds in the Department of Psychiatry; and provide a formal public seminar on their own research. Each of these components is described in more detail below. **The** Introduction to Online Learning **(**https://courseplus.jhsph.edu/core/index.cfm/go/course.home/cid/90/**) course is taken before the start of first term .**

Department Organization

The PhD Program Director, Dr. Rashelle Musci (rmusci1@jhu.edu), works with the Vice Chair for Education, Dr. Judy Bass (jbass1@jhu.edu), to support new doctoral students, together with their advisers, to formulate their academic plans; oversee their completion of ethics training; assist with connections to faculty who may serve as advisers or sources for data or special guidance; provide guidance to students in their roles as teaching assistants; and act as a general resource for all departmental doctoral students. The Vice Chair also leads the Department Committee on Academic Standards and sits on the School Wide Academic Standards Committee. Students can contact Drs. Musci or Bass directly if they have questions or concerns.

Within the department structure, there are several standing and ad-hoc committees that oversee faculty and student research, practice and education.For specific questions on committee mandate and make-up, please contact Dr. Bass or the Academic Program Administrator, Patty Scott patty.scott@jhu.edu.

CEPH Requirements

According to the requirements of the Council on Education for Public Health (p. 176***) (CEPH), all BSPH degree students must be grounded in foundational public health knowledge. Grounding in foundational public***

health knowledge is measured by the student's achievement of the learning objectives listed below, or higher-level versions of the same objectives.

Academic Training Programs

The Department of Mental Health houses multiple NIH-funded doctoral and postdoctoral institutional training programs:

Psychiatric Epidemiology Training (PET) Program

This interdisciplinary doctoral and postdoctoral program is affiliated with the Department of Epidemiology and with the Department of Psychiatry and Behavioral Sciences at the School of Medicine. The Program is co-directed by Dr. Peter Zandi (pzandi1@jhu.edu) and Dr. Heather Volk (hvolk1@jhu.edu). The goal of the program is to increase the epidemiologic expertise of psychiatrists and other mental health professionals, and to increase the number of epidemiologists with the interest and capacity to study psychiatric disorders. Graduates are expected to undertake careers in research on the etiology, classification, distribution, course, and outcome of mental disorders and maladaptive behaviors. The Program is funded with a training grant from the National Institute of Mental Health.

Pre-doctoral trainees are required to take the four term series in Epidemiologic Methods (340.751-340.754), as well as the four term series in Biostatistics (140.621-624). In addition to the other departmental requirements for the doctoral degree, pre-doctoral trainees must also take four advanced courses in one of the domains of expertise they have selected to pursue: Genetic and Environmental Etiology of Mental Disorders, Mental Health Services and Outcomes, Mental Health and Aging, and Global Mental Health. Pre-doctoral trainees should consult with their adviser and the program director to select courses consistent with their training goals.

Postdoctoral fellows take some courses, depending on background and experience, and engage in original research under the supervision of a faculty member. They are expected to have mastery in the basic principles and methods of epidemiology and biostatistics. Thus, fellows are required to take 340.721 Epidemiologic Inference in Public Health, 330.603 Psychiatric Epidemiology, and some equivalent of 140.621 Statistical Methods in Public Health I and 140.622 Statistical Methods in Public Health II. They may be waived from these requirements by the program director if they can demonstrate equivalent prior coursework.

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This training program is co-led by Dr. Renee M. Johnson (rjohnson@jhu.edu) and Dr. Brion Maher (brion@jhu.edu). The DDET program is designed to train scientists in the area of substance use and substance use disorders. Research training within the DDET Program focuses on: (1) genetic, biological, social, and environmental factors associated with substance use, (2) medical and social consequences of drug use, including HIV/AIDS and violence, (3) co-morbid mental health problems, and (4) substance use disorder treatment and services. The DDET program is funded by the NIH National Institute on Drug Abuse.

The program supports both pre-doctoral and postdoctoral trainees. Pre-doctoral trainees have a maximum of four years of support on the training grant. After completing required coursework, pre-doctoral trainees are expected to complete original research under the supervision of a faculty member affiliated with the DDET program. Postdoctoral trainees typically have two years of support on the training grant. They are required to engage in original research on a full-time basis, under the supervision of a DDET faculty member. Trainees' research projects must be relevant to the field of substance use.

All trainees are required to attend a weekly seminar series focused on career development and substance use research. The DDET program supports trainees' attendance at relevant academic meetings, including the Annual Meeting of the College on Problems of Drug Dependence (CPDD) each June. Training grant appointments are awarded annually and are renewable given adequate progress in the academic program, successful completion of program and departmental requirements, and approval of the training director.

Pre-doctoral trainees are required to take the required series in epidemiology and biostatistics, as well as The Epidemiology of Substance Use and Related Problems (330.602). In addition, they must take three advanced courses that enhance skills or content expertise in substance use and related problems: one in epidemiology (e.g., HIV/AIDS epidemiology), one in biostatistics, and one in social and behavioral science or health policy. The most appropriate biostatistics course will provide instruction on a method the trainee will use during the thesis research (e.g., survival analysis, longitudinal analysis methods). (Course requirements for trainees from other departments will be decided on a case-by-case basis.)

Postdoctoral trainees are expected to enter the program with mastery in the basic principles and methods of epidemiology and biostatistics. They are required to take The Epidemiology of Substance Use and Related Problems in their first year (330.602), as well as required ethics courses. Postdoctoral trainees are encouraged to take courses in scientific writing and grant writing.

Global Mental Health Training (GMH) Program

The Global Mental Health Training (GMH) Program is a training program to provide public health research training in the field of Global Mental Health. It is housed in the Department of Mental Health (http://www.jhsph.edu/dept/mh/), in collaboration with the Departments of International Health and Epidemiology. The GMH Program is supported by a T32 research training grant award from the National Institute of Mental Health (NIMH). Dr. Judy Bass (jbass1@jhu.edu) is the training program director.

As part of this training program, trainees will undertake a rigorous program of coursework in epidemiology, biostatistics, public mental health and global mental health, field-based research experiences, and integrative activities that will provide trainees with a solid foundation in the core proficiencies of global mental health while giving trainees the opportunity to pursue specialized training in one of three concentration areas that are recognized as high priority: (1) Prevention Research; (2) Intervention Research; or (3) Integration of Mental Health Services Research.

Pre-doctoral trainees are required to take the required series in epidemiology and biostatistics and department of mental health required courses. In addition, they must take three courses that will enhance skills and content expertise in global mental health: 330.620 Qualitative and Quantitative Methods for Mental Health and Psychosocial Research in Low Resource Settings, 224.694 Mental Health Intervention Programming in Low and Middle Income Countries, and 330.680 Promoting Mental Health and Preventing Mental Disorder in Low and Middle Income Countries.

The Mental Health Services and Systems (MHSS) Program

The Mental Health Services and Systems (MHSS) program is an NIMH-funded T32 training program run jointly by the Department of Mental Health and the Department of Health Policy and Management. and also has a close affiliation with the Johns Hopkins School of Medicine. Drs. Elizabeth Stuart (estuart@jhu.edu) and Colleen Barry (cbarry@jhu.edu) are the training program co-directors.

The goal of the MHSS Program is to train scholars who will become leaders in mental health services and systems research. This program focuses on producing researchers who can address critical gaps in knowledge with a focus on: (1) how health care services, delivery settings, and financing systems affect the wellbeing of persons with mental illness; (2) how cutting-edge statistical and econometric methods can be used in intervention design, policies, and programs to improve care; and (3) how implementation science can be used to most effectively disseminate evidence-based advances into routine practice. The program strongly emphasizes the fundamental principles of research translation and dissemination throughout its curriculum.

Pre-doctoral trainees in the MHSS program are expected to take a set of core coursework in epidemiology and biostatistics, 5 core courses related to the core elements of mental health services and systems (330.662: Public Mental Health, 330.664: Introduction to Mental Health Services, 140.664: Causal Inference in Medicine and Public Health, 550.601: Implementation Research and Practice, and 306.665: Research Ethics and Integrity), and to specialize in one of 3 tracks: (1) health services and economics; (2) statistics and methodology; or (3) implementation science applied to mental health. Trainees are also expected to participate in a biweekly training grant seminar every year of the program, and take a year-long practicum course exposing them to real world mental health service systems and settings.

For more details see this webpage: http://www.jhsph.edu/research/centers-and-institutes/center-for-mental-health-and-addiction-policy-research/training-opportunities/

Epidemiology and Biostatistics of Aging

This program offers training in the methodology and conduct of significant clinical- and population-based research in older adults. This training grant, funded by the National Institute on Aging, has the specific mission to prepare epidemiologists and biostatisticians who will be both leaders and essential members of the multidisciplinary research needed to define models of healthy, productive aging and the prevention and interventions that will accomplish this goal. The Associate Director of this program is Dr. Michelle Carlson (mcarlso2@jhu.edu).

The EBA training grant has as its aims:

- Train pre- and post-doctoral fellows by providing a structured program consisting of a) course work, b) seminars and working groups, c) practica, d) directed multidisciplinary collaborative experience through a training program research project, and e) directed research.
- Ensure hands-on participation in multidisciplinary research bringing trainees together with infrastructure, mentors, and resources, thus developing essential skills and experience for launching their research careers.
- Provide in-depth knowledge in established areas of concentration, including a) the epidemiology and course of late-life disability, b) the epidemiology of chronic diseases common to older persons, c) cognition, d) social epidemiology, e) the molecular, epidemiological and statistical genetics of aging, f) measurement and analysis of complex gerontological outcomes (e.g, frailty), and g) analysis of longitudinal and survival data.
- Expand the areas of emphasis to which trainees are exposed by developing new training opportunities in: a) clinical trials; b) causal inference; c) screening and prevention; and d) frailty and the integration of longitudinal physiologic investigation into epidemiology.
- Integrate epidemiology and biostatistics training to form a seamless, synthesized approach whose result is greater than the sum of its parts, to best prepare trainees to tackle aging-related research questions.

These aims are designed to provide the fields of geriatrics and gerontology with epidemiologists and biostatisticians who have an appreciation for and understanding of the public health and scientific issues in human aging, and who have the experience collaborating across disciplines that is essential to high quality research on aging. More information can be found at: https://coah.jhu.edu/graduate-programs-and-postdoctoral-training/epidemiology-and-biostatistics-of-aging/.

Aging and Dementia Training Program

This interdisciplinary pre- and post-doctoral training program is is an interdisciplinary program, funded by the National Institute on Aging, affiliated with the Department of Neurology and the Department of Psychiatry at the School of Medicine, the Department of Mental Health at the School of Public Health and the Department of Psychology and Brain Sciences at the School of Arts and Sciences. The Department of Mental Health contact is Dr. George Rebok (grebok1@jhu.edu). The goal of this training program is to train young investigators in age-related cognitive and neuropsychiatric disorders.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Residence Requirements

All doctoral students must complete and register for four full-time terms of a regular academic year, in succession, starting with Term 1 registration in August-September of the academic year and continuing through Term 4 ending in May of that same academic year. Full-time registration entails a minimum of 16 credits of registration each term and a maximum of 22 credits per term.

Full-time residence means more than registration. It means active participation in department seminars and lectures, research work group meetings, and other socializing experiences within our academic community. As such, doctoral trainees are expected to be in attendance on campus for the full academic year except on official University holidays and vacation leave.

Course Requirements

Not all courses are required to be taken in the first year alone; students typically take 2 years to complete all course requirements. Please note that PhD students are required to take either PH.550.600 Living Science Ethics - Responsible Conduct of Research or PH.306.665 Research Ethics and integrity: U.S. and International Issues as part of their ethics requirement (see research ethics section below).

Students must obtain an A or B in all required courses. If a grade of C or below is received, the student will be required to repeat the course. An exception is given if a student receives a C (but not a D) in either of the first two terms of the required biostatistics series, but then receives a B or better in both of the final two terms of the series; then a student will not be required to re-take the earlier biostatistics course. However, the student cannot have a cumulative GPA lower than 3.0 to remain in good academic standing. Any other exceptions to this grade requirement must be reviewed and approved by the departmental CAS and academic adviser.

The following are the course requirements for the PhD program in the Department of Mental Health.

Biostatistics

Code	Title	Credits
PH.140.621	Statistical Methods in Public Health I (first term) [1]	4
PH.140.622	Statistical Methods in Public Health II (second term) [1]	4
PH.140.623	Statistical Methods in Public Health III (third term) [1]	4
PH.140.624	Statistical Methods in Public Health IV (fourth term) [1]	4
Total Credits		**16**

[1] Must be completed to be eligible to sit for the departmental written comprehensive exams.

Epidemiology

Code	Title	Credits
PH.340.751	Epidemiologic Methods 1 (first term) [1]	5
PH.340.752	Epidemiologic Methods 2 (second term) [1]	5
PH.340.753	Epidemiologic Methods 3 (third term) [1]	5

[1] Must be completed to be eligible to sit for the departmental written comprehensive exams.

Department of Mental Health Courses

Code	Title	Credits
Courses usually taken first year:		
PH.330.604	Seminars in Research in Public Mental Health (all terms required for first year students)	1
PH.330.617	Psychopathology for Public Health (first term) [1]	3
PH.330.662	Public Mental Health (first term) [1]	2
PH.330.603	Psychiatric Epidemiology (second term) [1]	3
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders (third term) [1]	3
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS (third term) [1]	3
PH.330.612	Introduction to Behavioral and Psychiatric Genetics (fourth term) [1]	3
PH.330.623	Brain and Behavior in Mental Disorders (fourth term) [1]	3
Courses to be taken either first or second year:		
PH.330.664	Introduction to Mental Health Services (first term) [1]	3
PH.330.602	The Epidemiology of Substance Use and Related Problems (first term online and second term in person) [1]	3
Courses usually taken second year:		
PH.330.657	Statistics for Psychosocial Research: Measurement (first term) [1]	4
PH.330.660	Grant Writing for the Social and Behavioral Sciences (fourth term)	3
PH.330.611	Writing Publishable Manuscripts for the Social and Behavioral Sciences (second year and beyond only - second term)	2
PH.330.605	Doctoral Seminar in Public Mental Health (2nd year PhD students only)	1

[1] Must be completed to be eligible to sit for the departmental written comprehensive exams.

[2] For Department of Mental Health doctoral students, a research paper is required entailing one additional course credit. PH.330.840 Special Studies and Research Mental Health listing Dr. Eaton as the mentor.

Course Requirements Outside the Department of Mental Health

The School requires that at least 18 credit units must be satisfactorily completed in formal courses outside the student's primary department. Among these 18 credit units, no fewer than three courses (totaling at least 9 credits) must be satisfactorily completed in two or more departments of the Bloomberg School of Public Health. The remaining outside credit units may be earned in any department or division of the University. This requirement is usually satisfied with the biostatistics and epidemiology courses required by the department.

Candidates who have completed a master's program at the Bloomberg School of Public Health may apply 12 credits from that program toward this School requirement. Contact the Academic Office for further information.

School-wide Courses

Introduction to Online Learning (http://distance.jhsph.edu/core/index.cfm/go/course.home/cid/90/) taken before the first year.

Ethics Training

PH.550.860 Academic & Research Ethics at BSPH (0 credit - pass/fail) **required of all students in first term of registration.**

Responsible Conduct of Research (RCR) connotes a broad range of career development topics that goes beyond the more narrowly focused "research ethics" and includes issues such as conflict of interest, authorship responsibilities, research misconduct, animal use and care, and human subjects research. RCR training requirements for JHPSH students are based on two circumstances: their degree program and their source of funding, which may overlap.

1. All PhD students are required to take one of two courses in Responsible Conduct of Research, detailed below one time, in any year, during their doctoral studies.
2. All students, regardless of degree program, who receive funding from one of the federal grant mechanisms outlined in the NIH notice below, must take one of the two courses listed below to satisfy the 8 in-person hours of training in specific topic areas specified by NIH (e.g., conflict of interest, authorship, research misconduct, human and animal subject ethics, etc.).

The two courses that satisfy either requirement are:

- PH.550.600 Living Science Ethics - Responsible Conduct of Research [1 credit, Evans]. Once per week, 1st term.
- PH.306.665 Research Ethics and integrity: U.S. and International Issues [3 credits, Kass]. Twice per week, 3rd term.

Registration in either course is recorded on the student's transcript and serves as documentation of completion of the requirement.

- If a non-PhD or postdoctoral student is unsure whether or not their source of funding requires in person RCR training, they or the PI should contact the project officer for the award.
- Students who have conflicts that make it impossible for them to take either course can attend a similar course offered by Sharon Krag at Homewood during several intensive sessions (sequential full days or half days) that meet either on weekends in October or April, a week in June, or intersessions in January. Permission is required. Elizabeth Peterson (epeterso@jhsph.edu) can provide details on dates and times.
- Students who may have taken the REWards course (Research Ethics Workshops About Responsibilities and Duties of Scientists) in the SOM can request that this serve as a replacement, as long as they can provide documentation of at least 8 in person contact hours.
- Postdoctoral students are permitted to enroll in either course but BSPH does not require them to take RCR training. However, terms of their funding might require RCR training and it is their obligation to fulfill the requirement.
- The required Academic Ethics module is independent of the RCR training requirement. It is a standalone module which must be completed by all students at the Bloomberg School of Public Health. This module covers topics associated with maintaining academic integrity, including: plagiarism, proper citations, and cheating.

Special Studies Credits

Several educational opportunities come under the description of special studies that should be formally registered (PH.330.840 Special Studies and Research Mental Health). Some are described further below such as TA requirements and grand rounds. Other examples will arise, such as special study arrangements with specific faculty or helping with a specific project whose goals are aimed at the student's education and training. Research group meetings may qualify for this under certain circumstances. Please discuss this with your adviser and with the Vice Chair for Education, Dr. Bass. To determine the number of special studies credit hours consider each credit is associated with 3-4 hours of work per week.

Comprehensive Examination

The Comprehensive Examination provides the faculty with an assessment of the doctoral student's level of competence, integration of knowledge across the core curriculum, and fulfills the School's requirements as outlined below:

> "This examination should constitute a comprehensive inquiry into the student's grasp of the subject matter underlying their discipline. It should explore the student's understanding of scientific principles and methods as well as their substantive knowledge of the major field and related areas."

A student will become eligible for the Comprehensive Examination upon completion of all the courses required for the exam and approval of his/her adviser. This will normally take place after 6 consecutive terms of full-time study. Students must pass the Comprehensive Examination prior to scheduling the Departmental Oral Examination and the School's Preliminary Oral Examination.

Exams will be offered by the Department **one time each year in January** at a date announced via memo to all students from the Academic Program Administrator. All students starting their 2nd year will be assumed to be sitting for the January exam. Any student who will not be taking the exam at that time must make the decision in conjunction with their adviser and notify the Senior Academic Program Coordinator before the 2nd year begins.

Format of Exam

The Department's Comprehensive Examination will be a multi-day exam consisting of a total of 4 substantive knowledge essays (each one 1500-2000 words in length). In writing the essays, candidates are expected to demonstrate their knowledge of a particular area in the field of public mental health.

The four substantive knowledge essay questions will be derived from a list of 20 questions provided to the students in the summer after the first year of study (usually early July). The questions will be designed to cut across the required course curriculum, forcing students to integrate across material and topics. The Comprehensive Exam coordinator will solicit questions from all department faculty, and will select from contributed questions plus the existing bank of questions to generate the 20 questions to be provided to each new cohort of students.

Essays are expected to draw on the existing literature as well as the student's own critiques of and insights into current research. All assertions of fact must be documented with references to published research. Formal references will be required for major works that provide fundamental support for the conclusions presented. Unresolved issues in each area should also be discussed with references made to existing and ongoing research.

Preparation for Examination

Students are expected to prepare for the examination over the course of two terms by drafting outlines and gathering relevant materials in order to comprehensively answer each of the 20 questions. Students may work with other students who will take the exam at the same time to prepare and review one another's outlines and drafts essays. During the exam, we expect see essays that represent each student's own work and students may not share drafts with one another once the exam period has begun. Students will sign an honor code document when they receive the essay questions noting that they will not share the questions with anyone not taking the exam with them at the same time and date.

READERS

The Comprehensive Exam Coordinator shall be responsible for assignment of reviewers for the different essays and will supervise the grading process. Where possible, assignment of reviewers will take into account the research questions selected by the candidate and faculty specialty areas. Readers are free to seek consultation for specific questions outside their own areas. Readers will not include the candidate's adviser.

Grading and Evaluation

Each essay will be read by at least two independent faculty reviewers, who will assign a pass or fail grade (note: high and low pass will not be options, only pass/fail). Students must score a "pass" on 3 of 4 essays in order to pass the entire exam. If there is disagreement among the faculty, the Comprehensive Exam Coordinator will bring the reviews to the Department Chair for a final decision.

The decision of the reviewers will be communicated to the Department Chair who will send a letter to each student and their adviser advising them of their Comprehensive Exam results. Written notification of the decision to pass will be communicated to the Office of Records and Registration by the Senior Academic Program Coordinator.

Non-Passing Determination

If a student receives a 'fail' on 2 or more of the essays, the student will be required to retake the number of essays they failed (e.g., if they failed 2 essays, they will retake 2 essays). The re-take essays will be selected from among the 21 essay topics that were not selected for the original exam; the student **will not** be asked to re-write the specific essay that they failed. The decision on when to hold the re-take will be made on an individual basis after discussions with the student's adviser, to ensure the student is adequately prepared for their re-take. The re-take must be taken within 6 months of the initial exam.

Debriefing

Debriefing sessions for each student who failed to pass the Comprehensive Exam will be scheduled as soon as possible after the decision of pass/fail has been made for all candidates. This meeting will include the student's adviser and the coordinator of the comprehensive exams. The debriefing will be an opportunity to identify the difficulties and receive guidance to help with preparation for a retake, if one is allowed. In the event of a second failure, the Department Chair will meet with the student and adviser to discuss whether the student should be allowed to continue their studies.

Requirements for Advancement to Doctoral Candidacy

Students advance to doctoral candidacy following successful passing of the Departmental and School-Wide Preliminary Oral Examinations. Prior to the Oral Exams, students must pass the Department's Written Comprehensive Examination and take and pass the proposal writing course offered by the Department of Mental Health (PH.330.660 Grant Writing for the Social and Behavioral Sciences). This course will be offered in the fourth term and is typically taken in the second year of doctoral study to assist with the development of the student's dissertation proposal.

Dissertation Proposal

To facilitate consistency and provide an opportunity for building skills in grantsmanship, students will be required to write their dissertation proposal using the NIH NRSA F31 Research Component format. This format includes a 1-page Specific Aims page and 6 pages of proposal text, single space with 0.5-inch margins and a minimum of 11-point font. As is standard for NIH research proposals, the proposal should include the following sections:

- Significance of the proposed research,
- Innovation of the research and/or methods, and
- the Research Approach which includes the methods for the dissertation research.

References are not included in the 6-page limit. Example proposals are available from the Vice Chair for Education.

Thesis Advisory Committee

All students will put together a Thesis Advisory Committee (TAC), which consists of the thesis adviser and two to four other faculty, as their proposal is being developed. The TAC can be formed during the 3rd or 4th term of 2nd year and should be formed no later than the 1st term of the 3rd year. The composition of this Committee is decided on by the student and their adviser with the objective of including faculty who will assist the student in the development of feasible and relevant research aims, support the student throughout their dissertation process, and provide continuity in the evaluation of each student's progress as they work to complete their thesis. Students may meet with their TAC members individually or as a group to get ongoing feedback, though it is recommended that group meetings be regularly held in order to facilitate group-level feedback which is often different from what is obtained during one-on-one meetings. Students often find it is also more efficient to meet with committee members as a group for feedback. **The Thesis Advisory Committee also provides final approval and sign off of the student's dissertation proposal prior to scheduling Departmental and School-Wide Oral Exams.** A Dissertation Proposal Approval form is available from the Academic Program Administrator, Patty Scott.

Public Presentation of Dissertation Proposal

To assist with the development and synthesis of the dissertation proposal and provide an opportunity for students to present their research ideas and methods for feedback from an audience that includes colleagues and peers not in their area of study, students are required to present a 30-45 minute oral public presentation of their dissertation proposal followed by a Q&A session. Students may choose to schedule this presentation in connection with a TAC meeting, which could follow after the presentation to help the student finalize their proposal. *The faculty adviser and the Vice Chair for Education will assist with the scheduling of the Proposal Presentations, which may be scheduled as part of the Wednesday lunchtime seminar*. **The public presentation must be completed prior to scheduling the Department and School-Wide Preliminary Oral Exams.**

Departmental Preliminary Oral Examination

The purpose of this examination, as stated in the Policy and Procedure Memorandum (PPM-Academic 01), is to "determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest." Specifically, the examiners will be concerned with the student's capacity for logical thinking; breadth of knowledge in relevant areas; and ability to develop and conduct research leading to a completed thesis. Discussion of a specific research proposal will serve as a vehicle for determining the student's general knowledge and research capacity. However, this examination is not intended to be a defense of a specific research proposal.

Each doctoral student will briefly (~10 minutes) present their proposed dissertation research at the Departmental Oral Examination, which is intended to determine the student's readiness to proceed to the School Preliminary Oral. The student and adviser will propose to the Department Chair which faculty will sit for this exam. There must be at least three teaching faculty, including the adviser, on the committee. The faculty member of highest seniority, other than the adviser, will chair the committee. Please let the Senior Academic Program Coordinator (Patty Scott) know in advance of any AV needs.

Conduct of Examination and Report of Results

A folder containing an up-to-date transcript will be made available to the faculty of the oral examination on the day of the exam by the Senior Academic Program Coordinator. Immediately following the examination, the departmental oral exam committee will evaluate the student's readiness to move on to the school-wide oral exam. If the exam committee determines the student is ready, they will inform the student and the student may proceed with the school-wide exam as scheduled. If the exam committee determines the student is not yet prepared, a list of items to review and materials to prepare will be provided to the student by the committee (through the adviser) and advice will be given as to postponing the school-wide exam until the student is more fully prepared.

The results of the examination will be reported by the student's adviser to the Academic Program Administrator (Patty Scott). Any further conditions will be dictated to the Academic Program Administrator for preparation of the appropriate memorandum.

School-Wide Preliminary Oral Examination

The School-Wide Preliminary Oral Examination takes place after the student has successfully completed the Departmental Preliminary Oral Examination. The student selects a faculty committee of at least five (5) members, representing at least three departments, with no more than three from the student's own department. One of the faculty members must be the student's thesis adviser. All of the committee members must be at the level of assistant professor or higher. The chair of the examining committee is appointed by the Graduate Board Office and must be a full or associate professor from outside the student's department. **The School--Wide Preliminary Orals must be scheduled at least one month in advance.** The appropriate forms must be submitted to the Senior Academic Program Coordinator for review and be signed by the Chair of the Department. Upon approval by the Chair of the Department, the form will be directed to the Office of Records and Registration. Forms are available online through the BSPH portal: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx

The School-Wide Preliminary Oral Exam should be taken no later than the end of the student's third year in residence and before significant engagement in research. If a student has not taken their School-Wide Preliminary Oral Exam by the end of their third year, they are no longer considered in 'good standing' and must request an extension in their timeline. (Note: the summer before the beginning of the fourth year is still considered the third year and the student may complete this exam during that time).

Suggested Time Line

We recognize that not all students' academic and research plans will necessarily fit into one timeline. Students and their adviser should develop a proposal and dissertation timeline that best suits their needs. Below is a suggested timeline for completion of the milestones needed to move to doctoral candidacy and completion of the doctoral degree. Note: Students may register for elective coursework at anytime during their 4 years of the program.

- 1st Year
    - Terms 1 through 4: Required coursework
- 2nd Year
    - Terms 1 and 2: Required coursework and studying for comprehensive exam
    - January: Comprehensive exam
    - Terms 3 and 4: Draft aims, put together TAC (have first TAC meeting if possible)
    - Term 4: Grant writing class
    - Summer: Continue drafting aims and full proposal
- 3rd Year[1]
    - Terms 1 through 3: Public proposal presentation, TAC sign off on proposal
    - Terms 2 through 4: Schedule and complete Department and School-wide Preliminary
- 4th Year
    - Terms 1 through 4: Ongoing dissertation work
    - Terms 3 through 4: Final dissertation defense

[1] To remain in academic good standing, the school-wide Preliminary Oral Exam must be completed by the end of the 3rd year.

Doctoral Thesis

All doctoral students must complete an original investigation presented in the form of a thesis. The thesis must be based on original research, worthy of publication, and acceptable to the Department of Mental Health and to a committee of thesis readers. As part of the thesis process, each student must develop a thesis proposal that will be reviewed and found acceptable by the student's adviser while the student is enrolled as a doctoral student.

Monitoring of Progress

After passing the School-Wide Preliminary Oral Examination, each student's thesis progress will be monitored by their TAC on at least a bi-annual basis.

Doctoral advisers must officially approve the final draft of a student's thesis prior to dissemination to the other members of the Thesis Oral Examination Committee. **Students must fill out and submit the paperwork for the Final Oral Examination at least 30 days prior to the final defense date.** A signed Dissertation Approval form must accompany each hard copy of the thesis distributed. A copy of this form is available on the Office of Records and Registration website. An adviser may provide the approval in the form of an email message if traveling makes a signature impractical. Students should provide a complete and final copy of their dissertation to the committee members at least four weeks prior to the Final Oral Examination. All forms related to the final thesis defense can be found on the JHU portal at: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx. (https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx.html)

After the student completes the Thesis Defense and the final version of dissertation is approved by the committee and the student's adviser, each doctoral student is required to submit one copy for binding to the Office of Records and Registration for the departmental library. The copy should be on acid-free paper. One additional copy is to be provided to the Eisenhower Library. Information on formatting requirements is posted on the Registrar's Office website (see above).

Institutional Review Board Approval (IRB: Committee on Human Subjects)

IRB Approval should be sought as soon the student has a final proposal for their dissertation research project. In order to graduate, certification that the student is on an IRB approved protocol (either on a new application or as an amendment to an existing protocol) that is the basis for the dissertation must be on file with the Office of Graduate Education and Research, which is provided to that office by the IRB. More details can be viewed at the IRB website: www.jhsph.edu/irb (https://www.jhsph.edu/irb/). Students should discuss any questions about the use of human subjects in their research activities with their adviser.

Thesis Format

The dissertation can take one of two forms: the traditional dissertation monograph model; or the three manuscript dissertation model.

The Traditional Dissertation Monograph Model

In this model the dissertation typically consists of an abstract, 5-7 chapters, references, and any appendices. The outline of chapters below is merely a guide, reflecting the academic discipline or orientation of the student's research. All dissertations must include a Table of Contents at the beginning.

Abstract: The abstract is a short overall summary of the work. It lays out the purpose(s) and aims of the study, the methods, and the key results and implications. The abstract generally is 2-3 double spaced pages.

Chapter 1: Introduction: Statement of the Problem and Specific Aims. This chapter, which tends to be relatively short (5-6 double spaced pages), provides an introduction to the dissertation. It describes briefly why this work was undertaken, what background conditions or data suggested it was an important problem, and what, then, this project was intended to accomplish.

Chapter 2: Literature Review. The literature review summarizes existing literature that informed the dissertation research. It generally is organized topically. The literature review tends to be a fairly detailed review, particularly for those topics most directly related to the content and methods of the dissertation.

Chapter 3: Methods. The content of the methods chapter varies tremendously with the methodological approach taken by the student for the dissertation research. With traditional empirical studies, it will generally include the specific aims, research questions, and/or hypothesis; a description of the source of study data, a description of the study instrument, and its development, if relevant; a description of secondary data obtained, if relevant; analytic methods, including data cleaning, creation of a data set, creation of variables and/or qualitative codes, types of analyses done, and human subjects issues.

Chapters 4-6: Results. The results chapter(s) report the main findings of the dissertation. They are often organized by research question, specific aim, or hypothesis, but need not necessarily follow this format.

Chapter 7: Discussion of Results and Policy Implications. The discussion chapter both summarizes key findings and discusses findings in light of existing literature and in light of their policy implications. Also included generally are a description of the study's limitations and implications for future research.

References: A listing of all citations used for the dissertation must be provided. The Department allows any standard format for references.

Appendices: Appendices can be used for many purposes. They can include study instruments, if relevant; they can include additional tables not included in the main body of the dissertation; also included must be a copy of the student's CV. The traditional dissertation should be able to "stand alone" without appendices, however, so results should never be put in appendices that are key to the study's main findings.

All components of the traditional dissertation will be judged by the committee to be one of the following: Acceptable, Acceptable with Revisions, or Unacceptable. Students, with guidance from their adviser, will rework their dissertation until all components are judged acceptable.

The Three Manuscript Thesis Model

In this model, the thesis typically consists of a minimum of three papers in publishable form, linked to the student's thesis topic, with accompanying introductory and conclusion chapters. One of these papers may be the literature review, providing a comprehensive critical review, suitable for publication. The format of the manuscript dissertation generally consists of an abstract, 5-6 chapters, references, and any appendices. The outline of chapters below is merely a guide. The pages numbers are rough estimates, and the form of the chapters will vary, reflecting the academic discipline or orientation of the student's research. All dissertations must include a Table of Contents at the beginning.

Abstract: The abstract is a short overall summary of the work as a whole, providing a rationale for the inclusion of the different manuscripts being brought together. It lays out the overall dissertation purpose(s) and aims of each manuscript, a brief description of the methodological approach, and the key results and implications. The abstract generally is 2-3 double spaced pages.

Chapter 1: Introduction: Statement of the Problem and Specific Aims. This chapter provides an introduction to the topics covered in the manuscripts and the conceptual model or guiding theory that links the different manuscripts together. It describes briefly why the work was undertaken, what background conditions or data suggested it was an important problem, and what, in terms of public health significance, this project was intended to accomplish.

Chapter 2: Literature Review. A general literature review summarizes existing literature that informed the overall project. It generally is organized topically. This can be relatively brief (4-7 pages) as a review for the individual papers or it can be one of the manuscripts, providing a comprehensive critical review of the literature.

Chapter 3-5: Individual Dissertation Manuscripts. In these chapters, the student presents the complete manuscripts, each containing their own abstract, background, methods, results and discussions, as well as references and accompanying tables/figures.

Chapter 6: Discussion of Results and Policy Implications. A chapter which integrates and discusses the findings reported in the manuscripts. It should include a discussion of the conclusions of the research, and it should make recommendations for further studies.

References: A listing of any citations not already included in the individual manuscripts (i.e. from Chapters 1, 2, 6) must be provided. The Department allows any standard format for references.

Appendices: An appendix outlining in detail the study methods and any accompanying data tables necessary to fully understand the data. They can also include study instruments. A copy of the student's CV must also be included in the Appendices.

A manuscript oriented thesis must also meet the following criteria:

- The doctoral student must be the first author on the three manuscripts used to satisfy this requirement.
- No manuscript will be accepted as part of the dissertation if it was submitted for publication before the student passes the School-Wide Preliminary Oral Exam.

As is true for the traditional doctoral dissertation, all components of the manuscript-oriented dissertation will be judged as one of the following: Acceptable, Acceptable with Revisions, or Unacceptable. Students, with guidance from their adviser, will rework their dissertation until all components are judged acceptable.

Each doctoral student is required to submit one copy for binding to the Office of Records and Registration for the departmental library. The copy should be on acid-free paper.

Final Oral Defense of Thesis

Oral defense of the thesis by the candidate before the committee of faculty is the final step for the doctoral degree. All doctoral students are required to present their completed thesis to a Thesis Oral Examination Committee, and gain approval. To establish this Thesis Oral Examination Committee, the student and their adviser identify four faculty members to serve as thesis readers. The composition of this committee includes the student's adviser and faculty from at least two other departments of the University, two of which must be from the Bloomberg School of Public Health; at least one committee member must have neither a primary nor a joint appointment in the student's department. The committee may be increased to five members provided the conditions stated above are satisfied for four readers. The faculty included in the committee should be at least the rank of assistant professor, with at least one faculty at the level of associate or full professor from outside the Department of Mental Health to serve as committee chair. One faculty at the scientist level or one adjunct faculty is allowed. ***The committee may contain faculty members who are part of the Thesis Advisory Committee, but should also contain at least one non-TAC member*.**

Forms to establish this committee are available through the Office of Records and Registration. The Appointment of Thesis Reader and Final Oral Exam form (combined form) must be submitted **at least one month** before the scheduled defense date. This form must be submitted to the Senior Academic Program Coordinator for review and to be signed by the Chair of the Department. Upon approval by the Chair of the Department, the form should be directed to the Office of Records and Registration. The form is available online through the BSPH portal under the Office of Records and Registration/Doctoral Students page.

A Doctoral student is not considered complete at the time they pass their final oral defense. Students are considered complete when:

1. copies of their acceptance letters from the Examining Committee Chair and Thesis Adviser are on file in the Office of Records and Registration;
2. one copy of the dissertation is delivered to the Office of Records and Registration (departmental copy);
3. one copy of their dissertation is delivered to The Milton S. Eisenhower Library (Homewood Campus).

Students should consult the "After the Final Thesis Defense To Do List" which can be found on the Office of Records and Registration page for doctoral students on the BSPH portal.

Students who would like their dissertation copyright protected may do so through the Commercial Binding Office of the Milton S. Eisenhower Library (A Level, Commercial Binding Office, 516-8397, Homewood).

Students must be continuously registered up to and including their term of completion.

Policy Regarding Publishing Thesis Papers Before the Final Defense

Doctoral Students are encouraged to submit papers for publication in a range of areas prior to the final defense. Students who submit papers before the defense that become part of the dissertation must document in the appendix of the thesis what stage of publishing the papers are in (e.g., submitted, in press, or published), as well as document the contributions of the co-authors to the papers.

Teaching Assistantships

Teaching Assistant (TA) positions provide students with an opportunity to develop their teaching and interpersonal skills, to work professionally with faculty and fellow students, and to contribute service to the Department. All full-time doctoral students are required to serve as a TA for 3 courses offered by the Department of Mental Health course during their time in the program. Students usually begin their teaching assistantships in their 2nd year and frequently TA one class per year.

Prior to TAing, all students are required to take the Online Module: Essential Elements for Teaching Assistantships https://courseplus.jhu.edu/core/index.cfm/go/enr.enr.start/cID/1886/

Because this is an educational requirement, students will register for PH.330.840 Special Studies and Research Mental Health the term they are TAing with the faculty they are assisting (number of credits corresponding to number of credits for that course). Prior to the start of the course, the teaching faculty and TAs should meet to review the checklist of expectations and responsibilities for both the primary faculty and TAs, which will serve as guidelines for the TA commitments (See Appendix). During this meeting, the TA and faculty will discuss expectations of both the TA and faculty members. The checklist can be used as a template for the discussion, with particular expectations circled or initialed to show they have been discussed. We recommend that a **similar meeting occur at the course midpoint** to evaluate the TA relationship and performance from both perspectives. This is separate from the normal, much more frequent, interactions related to the actual course management or other work products. Students who choose to serve as a TA beyond the three required terms may receive compensation for their time. This should be discussed with the primary instructor, Senior Academic Program Coordinator, and the Department Administrator.

Length of TA Commitment

The TA commitment is for 8-12 weeks for an 8-week (quarter-based) course, to include 2 weeks before the course begins and 2 weeks after. TA responsibilities should take an ***average* of 8-10 hours per week,** including time in class and office hours. Emphasis on "average", as this timing may be >10 hours during heavy weeks for the course and less in light weeks of the quarter. TAs are expected to attend all class sessions unless specifically arranged otherwise with the primary instructor.

During each summer, the Senior Academic Program Coordinator will send an email to the students entering their 2nd, 3rd, and 4th years to solicit preferences for which class they want to TA. All students should discuss with their adviser which courses would best fit their interests and schedule before sending in their requests.

Psychiatry Grand Rounds

To gain a deeper understanding of mental disorders from a clinical perspective, doctoral students are required to attend Grand Rounds in the Department of Psychiatry and Behavioral Sciences for at least two terms. This is usually during the second or later year of study. Credit is obtained for attendance by registering for one credit of special studies (PH.330.840 Special Studies and Research Mental Health) with the adviser of record, and providing a final document per term with approximately one-paragraph summaries of each grand rounds to be reviewed and discussed with the adviser (typically via an hour in-person session near the end of the term). The student should also email the Senior Academic Program Coordinator with this information so it can be documented in the file. The schedule for Grand Rounds can be found at: http://www.hopkinsmedicine.org/Psychiatry/for_faculty/

calendars.html (https://www.hopkinsmedicine.org/Psychiatry/for_faculty/calendars.html)

Public Didactic Lecture or Seminar

As part of building students' competency to public present their research, each doctoral student is required to present a formal, public seminar of their research during their academic program. Conference presentations will **not** meet this requirement. The purpose of this requirement is to give students an opportunity to plan for and present a 30-45 minute presentation of their own research for feedback from peers, faculty, and, when appropriate, community members.

Expectations for Good Standing

"Good standing" is defined as maintaining an overall 3.0 GPA or higher, standing for the comprehensive examination at or before the end of the second year of study, and standing for the preliminary oral examination at or before the end of the third year of study. If a student does not meet these criteria, approval by the Department Chair will be needed to continue to receive any departmental scholarship funds.

Monitoring of Academic Progress

At the end of the first quarter each year, the Vice Chair for Education reviews each student's Academic Plan to assess doctoral progress, and each quarter a review of all students' academic grades is done by the Vice Chair for Education and the Senior Academic Coordinator. This review should help anticipate potential problems that might move a student out of 'good standing'. The faculty adviser, Director of Doctoral Programs, and the Senior Academic Coordinator will work with any student at risk of falling out of 'good standing' to proactively prevent this situation. If a student is not in good standing, this could trigger dismissal from the PhD program (see below).

Dismissal Policy

Any of the following criteria are considered grounds for dismissal from the PhD program in the Department of Mental Health:

1. Failure of any or all sections of the Department's comprehensive examination on two occasions
2. Overall GPA below 3.0 for two consecutive terms
3. Earning a C or less in a course required by the Department after 2 attempts at taking the course
4. Failure of school-wide orals on two occasions
5. Failure to complete a successful dissertation defense within 7 years of matriculation

Postdoctoral Fellowships

Postdoctoral fellows (PDFs) are considered non-degree seeking students, but must maintain registration for each term: 16 credits for PH.330.830 Postdoctoral Research Mental Health, with a minimum of 12 credits per term if additional courses of interest are taken. PDFs are not permitted to earn more than 16 credits of didactic course work for academic credit during their tenure as postdoctoral fellows. However, this 16 credit limit may be extended for some special PDF training programs if prior approval is obtained from the School's Committee on Academic Standards. There is no limit on the number of courses a fellow may audit. The PDF's adviser approves the registration request. Upon successful completion of the program, the Department will notify the Office of Records and Registration, which will issue a PDF Certificate. The School's postdoctoral handbook has additional critical information for PDFs: https://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook.pdf

The NIH requires that Postdoctoral fellows supported by an NIH training grant receive training in the responsible conduct of research. Courses that fulfill this requirement are PH.550.600 Living Science Ethics - Responsible Conduct of Research and PH.306.665 Research Ethics and integrity: U.S. and International Issues. These courses must be taken for pass/fail. Postdoctoral Research fellowships are generally for two years. The postdoctoral programs differ from program to program. Most postdoctoral fellowships are tailored to the needs and abilities of the individual fellow.

PhD Schoolwide Program Policy

Department of Mental Health candidates for the degree Doctor of Philosophy (PhD) must fulfill all School requirements, as specified in the PhD Schoolwide Policy (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_042522.pdf) last revised April 25, 2022. These include, but are not limited to, a minimum of four consecutive academic terms at the School in full-time residency (some programs require 6 terms), continuous registration throughout their tenure as a PhD student, satisfactory completion of a Departmental Written Comprehensive Examination, satisfactory performance on a University Preliminary Oral Examination, readiness to undertake research, and preparation and successful defense of a thesis based upon independent research.

PhD Students are required to be registered full-time for a minimum of 16 credits per term and courses must be taken for letter grade or pass/fail. *Courses taken for audit do not count toward the 16-credit registration minimum.*

Students having already earned credit at BSPH from a master's program or as a Special Student Limited within the past three years for any of the required courses may be able to use them toward satisfaction of doctoral course requirements.

Completion of Requirements

The University places a seven-year maximum limit upon the period of doctoral study. The Department of Mental Health students are expected to complete all requirements in an average of 4 - 5 years. Tuition funding is provided for up to four years. Formal leaves of absence may extend this time.

General Policies

Admission Standards

The admissions committee for the Department reviews all applications for admissions to degree programs and fellowships. Each application is reviewed and scored by multiple faculty members. Many factors are taken into consideration before the faculty member assigns a score including the student's past experiences and commitment to research or professional practice and educational excellence in this field. Included in the consideration are standardized test scores (i.e. GRE) and the Test of English as a Foreign Language (TOEFL) for foreign students. The Statement of Purpose of each applicant is carefully considered also as part of the admission process as are the recommendations and their indication of the program fit to the student's training and goals. There must be a fit between an applicant's career commitment and the interests of a faculty adviser for admission for research-oriented doctoral students and postdoctoral fellows in the Department. These rating sheets are confidential and do not become part of a student's file.

Advisers

Each student/fellow is assigned a faculty adviser prior to the time of enrollment in a course of study. Every attempt is made to assign advisers appropriate to the student's/fellow's area of interest. All Master of Health Science (MHS) students are assigned the Director of the MHS (Dr. Parisi) program as their primary adviser, and encouraged to designate a secondary adviser who will serve as a mentor for their thesis project. All Doctoral students are assigned an adviser at acceptance and are encouraged to be in contact with them prior to the start of the academic year.

Advisers play an important role in the student's/fellow's life. They are the initial point of contact regarding academic program, registration for courses, and subsequent changes in status or program. Registration, add/drop, pass/fail agreements and many other School forms require the adviser's signature. The adviser is available to help students choose courses, to help with resolution of academic problems, and to provide general guidance. It is the student's/fellow's responsibility to seek the advice and guidance of the adviser. Faculty members establish their own office schedules and this may vary from faculty member to faculty member. Students and fellows should speak with individual advisers to make arrangements for regular meetings.

As students/fellows progress in their academic careers, they may request a change to a different adviser. These requests should be sent in writing with approvals from both the old and new adviser and submitted to the Senior Academic Program Coordinator to be approved by the Vice Chair for Education. Requests to discuss adviser-related issues can be made to either the Senior Academic Program Coordinator or the Vice Chair for Education.

Course Waivers

It sometimes is possible to waive a required course based on previous course work and/or experience. Required courses outside the Department of Mental Health may have different waiving requirements than courses within the Department. If a student wishes to receive a waiver for a required course, they should first meet with their adviser and confirm that the requirements have been met. Together with the adviser, a student should draft a detailed request in writing for submission to the Vice Chair for Education. The request should have signatures of the lead faculty teaching the course, the training program director (if appropriate), and the student's adviser prior to submission to the Vice Chair. A final decision on the waiver request will be made in consultation with the Department Chair; the student and adviser will be notified of the decision and if the waiver is granted, a note will go in the students academic file.

Academic Standards

To maintain satisfactory academic performance and good academic standing the school-level policy indicates that students must meet minimum academic standards to remain in their program. A student's failure to meet any of the criteria below is grounds for being placed on academic warning and/or being dismissed from the program. To remain in satisfactory academic standing a student must:

Minimum cumulative grade-point average (GPA). Qualitatively, on a scale of 0 - 4.0, students must maintain a minimum cumulative GPA: 2.75 for Master's students and 3.0 for Doctoral students. Students with a GPA falling below that limit will be placed on academic warning and will have one term of registration in which to raise their GPA above the threshold for their degree. Students not meeting the minimum GPA after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA; that approval beyond one term must be reported to the School's Committee on Academic Standards. Students on academic warning must meet with their academic adviser and program director (or senior academic program coordinator) each term to review their academic plan and receive approval for their course schedule prior to registering for courses. Students with a cumulative GPA below the minimum may not register for more than 18 credits per term. Any repeated courses count towards this 18 credit limit.

Minimum grades in core (i.e. required) courses. Students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "C" or higher for Master's students, and "B" or higher for Doctoral students, for courses offered for letter grading. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the Vice Chair for Education. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

Maximum timeframe for completion of degree. Students must successfully complete all program-specific requirements (such as a thesis or dissertation, as detailed in other program PPMs) within 4 years for Master's programs, and 7 years for PhD program according to the requirements specified in the program-specific descriptions and PPMs. Extensions are possible as described in the program-specific PPMs and must be formally approved by the Committee on Academic Standards.

Academic Ethics

Students in the Bloomberg School of Public Health are expected to abide by the highest levels of academic and research integrity. Information on the Academics Policy of the Johns Hopkins Bloomberg School of Public Health can be found at:

http://www.jhsph.edu/offices-and-services/office-of-academic-affairs/academic-integrity/academic-ethics.html

The Department of Mental Health adheres to the School's Academic Ethics. The faculty and students of the Bloomberg School of Public Health have the joint responsibility for maintaining academic integrity and guaranteeing the high standard of conduct of this Institution. An ethical code is based upon the support of both faculty and students who must accept the responsibility to live honorably and to take action when necessary to safeguard the academic integrity of this University.

Students enrolled in the Bloomberg School of Public Health assume an obligation to conduct themselves in a manner appropriate to The Johns Hopkins University's mission as an institution of higher education. A student is obligated to refrain from acts which they know or under the circumstances has reason to know, impair the academic integrity of the university. Violations of academic integrity include, but are not limited to: cheating; plagiarism; knowingly furnishing false information to any agent of the University for inclusion in the academic records; falsification, forgery, alteration, destruction, or misuse of official university documents or seal; violation of the rights and welfare of human subjects in research; violation of the welfare of animal subjects in research; falsification of research results; and misconduct as a member of either School or University committees or recognized groups or organizations.

For a Mental Health student, abiding by the Academic Ethics code includes:

- Completing work on one's own when an individual assignment or examination is given in a course.
- Providing proper attribution to others' work by providing citations with quotations and giving proper references for all course assignments, data analysis projects, research proposals, dissertations and theses.

All members of the academic community are responsible for the academic integrity of the university. Students and faculty alike must work together to minimize the possibility of violations of academic integrity.

The faculty is responsible for the conduct of examinations, for announcing the ground rules for all work in a course at the beginning of the term in which the course is offered, and for the security of examination papers and teaching laboratories. Proctoring is at the discretion of the instructor.

A student with knowledge of any violation of academic integrity governed by the Bloomberg School of Public Health Constitution has an obligation to report such violations, including the identity of the alleged violator(s) to the appropriate faculty member, the Dean or to the Academic Ethics Board.

All members of the Johns Hopkins community are responsible for immediately informing the Academic Ethics Board of the Bloomberg School of Public Health of any suspected violations of its Constitution. The Ethics Board, composed of six students and four faculty members, is responsible for implementing its Constitution according to the procedures set forth therein. This includes formal hearings of suspected violations. Students and faculty should become familiar with the Constitution, copies of which can be obtained in the office of the associate dean responsible for student affairs.

To be approved for graduation, the student must have all outstanding charges of misconduct and violations of academic ethics resolved.

All students are required to take course 550.860.82 Academic and Research Ethics at BSPH (0 credit – pass/fail) in first term of registration.

Academic Progress

The performance and progress of each student is reviewed by the student's adviser and the Coordinator for their degree. For MHS students, this is the MHS Program Director (Dr. Jeanine Parisi). For doctoral students and postdoctoral fellows, this is the Vice Chair of Education (Dr. Judy Bass). These directors, together with the Senior Academic Program Coordinator, review each student's transcripts every quarter. When the academic achievement of any student comes into question, the appropriate director will bring this to the adviser's attention (typically this involves a grade of "C" or lower). The adviser may consult with faculty and/or the Chair about the student's progress. Satisfactory academic progress is described under academic standards above. Unsatisfactory or incomplete grades may constitute grounds for removal of a student from a degree program (see Dismissal Policy).

A student's overall academic standing and progress will be judged not only on grades received, but also successful completion of other degree-specific milestones.

Leave of Absence

We recognize that it is sometimes necessary for students to take a leave of absence from their studies. An academic leave of absence refers to, and is limited to, students in a degree program requiring continuous enrollment who, while in good academic standing, are forced to withdraw temporarily from graduate work due to parental/family leave or reasons beyond their control, such as illness, military service, financial exigency, or pressing personal reasons justifying an interruption of the degree program. Students may be also given a leave of absence for other reasons (e.g., involuntary, medical leave).

As per school policy, leaves of absence are typically limited to one year except for military service. Students requiring additional terms of leave beyond the one year must reapply. Students who have had federal financial aid may be subject to additional restrictions and should check with the Financial Aid Office before extending a leave of absence beyond two terms. No more than two years of leave may be granted. The academic clock is stopped for periods in which the student is approved for leave of absence. The period is regarded as an approved break in study. No academic activities may be conducted during leave and this leave may not be used to avoid payment of tuition.

The failure of a student in a full-time program requiring continuous registration to register without obtaining an approved leave of absence status will be considered a withdrawal. The student considered to be withdrawn must be formally readmitted before resuming a program of study. Upon readmission, a student must be registered for a minimum of two consecutive terms prior to completion of their degree program.

Students planning to request a leave of absence must file a petition, which is signed by the departmental chairman, the student's adviser, appropriate staff members in the area of Student Services, and the Office of Records and Registration. Prior to resuming the degree program, students on leave of absence must notify the department chairperson and the associate director of the Office of Records and Registration. Upon return from leave of absence status, students must register for a minimum of two successive terms before completion of their degree programs.

Academic Plans

The department recognizes that students and fellows come from different disciplines and are at varying developmental stages with respect to their careers. Explicit plans developed by students and fellows and approved by advisers foster investigation of the various training opportunities available within a flexible and developing career path, and help to monitor achievement of goals.

During the first quarter of each academic year, each master's student, doctoral student and postdoctoral fellow will complete a plan describing how academic and career goals will be achieved through their learning experience in the department. The plan will contain broad, general goals to be attained during the entire experience at the Department of Mental Health; concrete objectives including specific products, so that it can be readily determined if the objectives are met; and methods and strategies for reaching the objectives. The plans will include a schedule for the year with projected dates for completion of objectives. If course waivers are to be requested, they should be included in the academic plans. A copy of the academic plan template is available from the advisers and the Senior Academic Program Coordinator.

The plan is prepared in collaboration with the adviser, and signed by the student or fellow and the adviser. The MHS Program Director will review all the MHS academic plans and the Vice Chair for Education will review all the doctoral student and postdoctoral fellow plans. Feedback on the plans will be provided to the advisers who will then relay any adjustments or further information back to the students. The Senior Academic Program Coordinator will keep a file of all plans.

After the student has passed the School Preliminary Oral Examination (usually in their 3rd year), work begins on the dissertation. At this time the Academic Plan is supplemented with written documentation of meetings of the thesis advisory committee, which must take place at least annually.

Mental Health Seminar Series

Attendance at the Mental Health Seminar Series is required for all MHS students and first year doctoral students. Credit is obtained for attendance via a one-course credit per term 330.604.01 Seminars in Research in Public Mental Health. All other students and fellows are expected to attend the Seminar Series throughout the course of their program to gain exposure to a wide range of mental health issues and research.

At the beginning of each term a schedule of speakers and presentation topics is shared with all of the students and faculty and is posted on the departmental bulletin board. Once per month, there will be a student-only session during this seminar time that coincides with faculty meetings. Topics for these sessions include grant writing, job search tips, reviews of recent seminars, etc. Students are welcome to suggest topics and formats. This is intended to provide students with an informal forum for peer communication and advice.

Course Evaluation Summaries

All courses offered for academic credit in the Johns Hopkins Bloomberg School of Public Health, whether onsite or offsite, are evaluated by students. The mechanics of course evaluations are handled by the Office of the Associate Dean for Graduate Education and Research. This information is intended as a general guide only. To select the best courses to meet your needs, you should seek additional information from other students, the academic program coordinator, your academic adviser and teaching faculty.

Course Materials

Course materials will usually be posted in CoursePlus. In some courses, materials will be reproduced and put together in a book. The student will be charged for course fees which is the amount it cost to photocopy.

Council on Education for Public Health (CEPH) Public Health Learning Objectives

In 2016, CEPH (the main accreditation agency for Schools of Public Health) generated a new set of guidelines for curriculum standards for all students obtaining Masters and Doctoral degrees from Schools of Public Health. For MHS and PhD degrees, the curriculum standards include 12 specific learning objectives that need to be met through courses taken during the degree program. These learning objectives include gaining at least an introductory competency in the following 12 topic areas: 1) foundational principles of public health; 2) role of quantitative methods in public health; 3) role of qualitative methods in public health; 4) causes and trends in morbidity and mortality; 5) primary, secondary and tertiary prevention; 6) evidence for advancing public health knowledge; 7) essentials of environmental health; 8) biologic, genetic and infectious bases of disease; 9) psychological and behavioral factors in health; 10) social determinants of health; 11) globalization and health; and 12) essentials of one health.

To support MHS and PhD program in meeting this curriculum standard, Johns Hopkins School of Public Health has developed a series of 0.5 credit online courses for each of the 12 topic areas (course numbers 552.601.81-552.612.81). All students matriculating in the 2019-2020 academic year will need to meet this curriculum standard either through completion of the 0.5 credit courses or through completion of a regularly-offered course that has been approved by the Committee on Academic Standards as covering the required content. A copy of the approved courses is available from Dr. Parisi and Dr. Bass and is updated throughout the year as new courses are added. The academic plan completed by all MHS and PhD students at the beginning of each academic year has a section where each student can indicate how they are meeting each required competency. Decisions on which course to take should be made in conversation with the student's adviser; questions about which courses meet which competencies can be addressed to the Vice Chair for Education (Dr. Bass).

Introduction to Online Learning

The Bloomberg School of Public Health offers courses in various formats, including a number of online classes. In order to be eligible to take an online course, students must complete the Introduction to Online Learning, which is offered through the Center for Teaching and Learning at the Bloomberg School. This non-credit mini course is a pre-requisite for all courses offered by this division and must be completed prior to the start of the term in which a student wishes to enroll in an online course. Since the School does not permit conditional and/or concurrent enrollment (that is, you must take the Introduction to Online Learning course prior to enrolling in an online class), the **School requires all incoming students to take this non-credit course during or before the first term they enroll**. For course dates and enrollment information, please visit the CoursePlus website (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/).

Travel Funds for Professional Meetings

Doctoral students are encouraged to present at and attend professional meetings and conferences related to their area of study. *Students on training grants have access to meeting funds through their training grant and should seek approval from the training grant PI.* **The Department sets aside a limited amount of funds for travel and registration fees for doctoral students who are not supported by training grants.** Students and fellows can apply for travel support, after they have also applied for support from the conference or meeting itself, to the Senior Academic Program Coordinator who will obtain the approval of the Department Chair for each request. To be eligible, the student or fellow must have an accepted communication (i.e., poster or oral presentation) at the meeting or conference. **The maximum amount for any one trip is $1,000 and students and fellows can only be supported once per year.**

For access to Department funds, requests should be sent to the Senior Academic Program Coordinator via email listing the following information: Student name, name of conference, location of conference, dates of conference, breakdown of estimated expenses, type of presentation (poster, paper, etc.) and whether or not the student has requested scholarship funds from the conference. Once approval has been obtained and the trip is completed, **receipts and proof of payment** must be submitted to be reimbursed. Proof of payment can be in the form of a blinded credit card number (Example: Visa XXXX-XXXX-XXXX-1234) on the receipt, or a bank statement showing the charges and the account holder's name (You may black out any other charges not relevant to the trip). **At least 30 days or more advance notice is requested for approval.**

Travel Abroad

Students at the Johns Hopkins Bloomberg School of Public Health may have an opportunity to supplement their education or conduct research in another country. These opportunities often enrich the academic curriculum, contribute to dissertation research, and allow application of knowledge obtained in the classroom to the world's communities. While the School encourages participation in these kinds of experiences, international tensions can be high. Therefore, students should seek information on conditions abroad before traveling.

The International Travel Resources portal site (https://my.jhsph.edu/Resources/ITR/Pages/default.aspx) is designed to provide tools and information to BSPH students who travel internationally in order to allow them to make informed personal decisions; to protect reasonably themselves from foreseeable harm; to increase their own level of health, safety, and security awareness; and to prepare for emergencies abroad. The site offers a wealth of useful links, travel resources, and insurance information in addition to State Department and Center for Disease Control travel advisories.

Students traveling to a less developed part of the world should be certain to contact their health care provider or the Johns Hopkins International Travel clinic to learn about recommended immunizations and other matters to guard your health. The International Travel Clinic is located on the East Baltimore campus and can be reached by telephone at 410-955-8931. Further information about recommended immunizations and prophylaxis is available at the CDC Website (https://www.cdc.gov/).

International students must contact the Office of International Services (OIS) well in advance of any travel to avoid compliance issues with their visa status. OIS may be contacted at 410-955-3371, or at https://ois.jhu.edu/About_OIS/Contact_Us/index.htm (https://ois.jhu.edu/About_OIS/Contact_Us/)l.

Students who travel abroad as part of a practicum experience or as part of a research team must complete a Graduate Student Study Release and International Travel Checklist and leave the forms with Patty Scott, Academic Program Administrator for the Department of Mental Health.

General Resources

Office Supply/Stationery Orders

Doctoral students who are on a training grant will need to email their training grant director to get approval prior to requesting office supplies which will be paid for by the training grant. The student should forward the email with the training program director's approval to the Budget Assistant Candice Davis (cdavi108@jhu.edu) so the item(s) can be ordered. Students not on training grants should email the Senior Academic Program Coordinator for requests for paper and/or toner. Do not wait until the last minute to make stationery requests because not all items are kept on hand by the department and will likely need to be ordered.

MHS students who need paper or toner for the MHS student office should see Candice Davis (cdavi108@jhu.edu) in HH850.

Telephones

Telephones are not provided in student offices. If you run into a situation where you need a landline for a local call, please see Patty Scott and she can assist you with locating a phone for use.

Office Keys

All doctoral students and postdoctoral fellows are equipped with one office key, and one 8^{th} floor common key that opens the copier room, kitchen, and 8^{th} floor conference rooms. Students must return keys to HH850 upon their departure.

Learning Outcomes

PhD Program Description

The PhD program is designed to provide key knowledge and skill-based competencies in the field of public mental health. To gain the knowledge and skills, all PhD students will be expected to:

- complete required coursework, including courses that meet the CEPH competency requirements and research ethics;
- successfully pass the departmental comprehensive exam;
- select and meet regularly with a Thesis Advisory Committee (TAC) as part of advancing to doctoral candidacy;
- present a public seminar on their dissertation proposal;
- successfully pass the departmental and school wide Preliminary Oral Exams;
- complete a doctoral thesis followed by a formal school wide Final Oral Defense;
- participate as a Teaching Assistant (TA);
- attend Grand Rounds in the Department of Psychiatry; and
- provide a formal public seminar on their own research.

Each of these components is described in more detail below.

Non-Degree Training

Non-Degree Training

Post Doctoral Fellows

The Department welcomes individuals who have completed doctoral degrees to postdoctoral fellow (PDF) affiliations. PDFs identify a mentor and enjoy advising from faculty and use of the School's facilities.

Prospective PDFs should submit a PDF application (https://www.jhsph.edu/academics/postdoctoral-training/process-appointmentoffellows.pdf). The Application requires proof of sponsorship by either the School or an outside agency for the entire period of the program. Post-doctoral fellows may not use personal funds to support themselves during their program. PDFs will not be able to register, be paid, and/or buy health insurance until verification of their official receipt of the doctoral degree is filed and their PDF application is formally approved.

After being admitted to the Program, each fellow should design, in collaboration with their faculty mentor, an Individualized Development Plan for their research time with the Department. PDFs should discuss the anticipated duration of their fellowship with their mentor when they begin the fellowship. PDFs are evaluated annually and must maintain an appropriate level of professionalism and scientific research for the duration of their program.

PDFs must adhere to the student code of conduct (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Forms/AllItems.aspx) ("Student_Conduct_Code") for all students of the Johns Hopkins Bloomberg School of Public Health.

PDFs are considered non-degree seeking students and should register for 16 credits during each course term. The Postdoctoral Research Credits course number is PH.330.830 (https://www.jhsph.edu/courses/course/29822/2020/330.830.01/postdoctoral-research-mental-health/) POSTDOCTORAL RESEARCH MENTAL HEALTH. Tuition for PDFs is set at $200 per term by the School and a postdoctoral scholarship covering tuition is generally granted. PDFs have the option of taking up to 16 credits of courses during their fellowship period. PDFs who wish to take academic courses should discuss this with their research mentor as part of their Individualized Development Plan; these courses cannot be transferred into a degree program at a later date. Please visit the School's PDF website (https://www.jhsph.edu/academics/postdoctoral-training/) and PDF guidebook (https://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook-revised.pdf) for additional critical information.

The NIH requires that Postdoctoral fellows supported by an NIH training grant receive training in the responsible conduct of research. Courses that fulfill this requirement are PH.550.600 LIVING SCIENCE ETHICS - RESPONSIBLE CONDUCT OF RESEARCH and PH.306.665 RESEARCH ETHICS AND INTEGRITY: U.S. AND INTERNATIONAL ISSUES. These courses must be taken for pass/fail. Postdoctoral Research fellowships are generally for two years. The postdoctoral programs differ from program to program. Most postdoctoral fellowships are tailored to the needs and abilities of the individual fellow.

Upon satisfactory completion of their program, PDFs are issued a Certificate of Completion from the School of Public Health.

Further questions may be directed to the Academic Program Administrator, Patty Scott, at: patty.scott@jhu.edu.

Helpful Links

- JHSPH Postdoctoral Training (https://www.jhsph.edu/academics/postdoctoral-training/)
- Guidelines for PDF NIH Stipend Levels (https://grants.nih.gov/grants/guide/notice-files/NOT-OD-22-132.html)
- Postdoctoral Fellows Policy and Procedures Memorandum (PPM) (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Pages/default.aspx) ("Students_05_Postdoctoral_Fellows")
- Postdoctoral Fellows Guidebook (http://www.jhsph.edu/academics/postdoctoral-training/Postdoc-guidebook-revised.pdf)
- Johns Hopkins Postdoctoral Association (JHPDA) (https://jhpda.jhmi.edu/)

Certificate Programs

Certificate Programs offer focused academic training in specific areas of public health. They provide a focused way of integrating elective courses into a research area of interest. The School offers over 30 certificates outlined here: https://www.jhsph.edu/academics/certificate-programs/.

Hopkins students who are enrolled in a degree program need to send an email to the Academic Program Administrator, Patty Scott to notify the department of their intent to pursue the certificate. Upon enrolling in the last course to complete the certificate, the student would then email the Academic Program Administrator the certificate completion form listing all of the required coursework taken to complete the certificate. Students must take the courses for academic credit and earn a grade of B for better. Non-Hopkins students must submit an application through the SOPHAS express system.

Tuition, application fee, and book costs are subject to change from one academic year to another academic year. The student should review the section of the website that addresses completion (http://www.jhsph.edu/academics/certificate-programs/completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the School of Public Health Registrar.

Department of Mental Health sponsored certificates are:

- Public Mental Health Research Certificate (p. 624) (not open to Department of Mental Health Students)
- Mental Health Policy, Economics and Services (p. 612)

Certificate Program in Public Mental Health Research

Our certificate program provides graduate training in understanding the causes and consequences of mental disorders in populations. The courses describe the clinical and behavioral features and prevalence of mental and behavioral disorders. They also identify factors that influence the occurrence, persistence or severity of these disorders. The goals of the program are to increase the epidemiologic expertise of psychiatrists and other mental health professionals, as well as the number of epidemiologists, biostatisticians and health policy makers interested in psychiatric disorders.

Mental Health Policy, Economics and Services

The certificate introduces current issues in mental health policy including economic evaluation of mental and substance disorders and their treatments; access to mental health care treatments and utilization patterns; and mental health care financing, insurance, and delivery system issues in the US. The certificate program also strives to orient mental health policy, economics, and services training within the broader context of ongoing national health care debates. It is open to Johns Hopkins University graduate students interested in policy, advocacy, and research careers within the field of mental health and junior and mid-level public health professionals interested in expanding their knowledge base and expertise in mental health services and economics and related policy issues.

Summer Institute in Mental Health Research

The Institute focuses on methodological and substantive topics in mental health and substance-use research. It is intended for working professionals or students who are interested in developing research expertise in the epidemiology of mental health and substance use disorders, the implementation and evaluation of mental health services and interventions, and/or the methodological issues encountered in mental health research in the population. Our experts are not only training the next generation of public health leaders, they are leading the way in research areas, including the mental health implications of Covid-19.

After completing the program, participants will understand the latest findings on the occurrences of mental health and substance use disorders in the population and their implications for public mental health; know the steps involved in the scientific, empirical evaluation of services and interventions targeted for mental health outcomes; and acquire the skills and knowledge needed in using the state of the art methodological tools for collecting and analyzing mental health data. Where academic credit leading to a degree is desired, students are required to pay the standard school tuition for 2022 of $1,270 per credit.

This rate does not apply to students taking courses for non-credit. The non-credit tuition rate for 2022 is $675. No scholarship and/or grant support is available.

PROGRAM DIRECTOR
Michelle C. Carlson, PhD

DEPUTY DIRECTOR
M. Danielle Fallin, PhD

PROGRAM ADMINISTRATOR
Patricia Scott, BS (mhinstitute@jhsph.edu?subject=Summer%20Institute%20in%20Mental%20Health%20Research)
telephone 410-955-1906 fax 410-614-7469; patty.scott@jhu.edu

Department of Molecular Microbiology & Immunology

About

The Department of Molecular Microbiology and Immunology (https://www.jhsph.edu/departments/w-harry-feinstone-department-of-molecular-microbiology-and-immunology/) integrates many disciplines concerned with the study of the transmission, immunobiology and pathogenesis of bacterial, parasitic, viral, immunological and infectious diseases of public health importance. Research is at the population, organismal, cellular and molecular levels.

Programs

Molecular Microbiology & Immunology, MHS

Introduction

The goal of the MHS training program in MMI is to provide a solid foundation in the biomedical sciences for a select group of students interested in addressing outstanding issues underlying infectious and immunologic diseases of public health importance. It aims to equip students with a diversity of disciplinary concepts and methodological tools to solve specific disease-related problems. This holistic approach requires a common core of knowledge of the population, clinical, cellular and molecular aspects of disease.

This MMI MHS Guidebook, which supplements the School's resources page, which can be found at https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/) is intended to summarize most of the School and Departmental requirements for your degree program. In addition, other practical information is included for your convenience and consideration.

The MHS in MMI

The Department provides the Master of Health Science (MHS) program for students who wish to gain a greater depth of knowledge in molecular microbiology, immunology, and infectious diseases or in tropical public health, but who do not wish to commit to longer-term research training programs. MHS training is provided through coursework, special studies with faculty members, and participation in other Departmental activities. An elective opportunity to gain experience with basic molecular biological laboratory techniques is also available.

MHS to ScM Program Transfer

MHS students who excel in the program and wish to add a research component to their training may apply for transfer to the MMI ScM program. The integrated MMI Master's program is intended to facilitate transfer between ScM and MHS degree programs; the program requirements have a high degree of overlap for the first two academic terms. However, the programs diverge significantly in the third term and a decision on degree program, therefore, must be made before that time. At the time of application for transfer from the MHS to the ScM program, students are strongly encouraged to have identified into which laborator(ies) they wish to rotate and to have confirmed that those laborator(ies) would be amenable to taking on an ScM student.

Masters students who wish to transfer programs should inform the Student Coordinator in writing by December 1st. Applications for transfer to the ScM program are evaluated by the departmental Admissions Committee on the same basis as incoming ScM applications and a completed School application form must be available for review. In general, the Departmental copy of the student's original MHS application (held by the Student Coordinator) can be used. However, the student should confirm that the information contained on the application is still current, and may wish to modify the thesis to reflect the new goals of his/her proposed training program. Additional references may also be added. Note that because this application is submitted directly to MMI and not the School, no application fee is required.

Applicants for the MHS to ScM transfer will be informed of the Admission Committee's decision before the beginning of third term. Because there is no guarantee that an application will be successful, students should continue to follow the MHS academic program including thesis preparation (below) until they have received a final decision.

Program Requirements

There are several requirements for the completion of degree programs – some set by the school and others set by the department. The degree requirements for all programs, established by the School are contained in Policy and Procedure Memoranda available at https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Pages/default.aspx

The Departmental requirements are explained in this Student Handbook. Of particular note is the requirement to register each term for one credit of Special Studies specifically designed to assist MHS students in navigating the program requirements and timeline for completion of thesis steps.

Residency: Minimum duration is one academic year (9 months) in full-time residence (enrollment for 12 or more credits per term). Most students complete their degrees in 9 months, however, the period may be extended for up to 24 months.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Academic Program

Academic adviser

New students will be assigned to small advising groups – each group composed of 8-10 students. Each small group will be directed by a faculty member from MMI who will serve as the academic adviser for all students in the group. The academic adviser will assist the student in the selection of appropriate courses for the year and help the student with problems they may encounter.

In addition, full MHS cohort meetings will take place weekly via the Special Studies course through the academic year. Attendance at these meetings is required. These meetings will be used to disseminate information, build skills required for thesis preparation, detail requirements for the degree, establish benchmarks for Thesis preparation, review progress, promote career development, and address general questions.

MHS Thesis Mentors

Students will be presented with a list of potential thesis topics and thesis mentors early in the 1st term. MHS students will be responsible for identifying thesis topics of interest and reaching out to faculty to identify a thesis mentor who will serve as both supervisor of thesis preparation and primary reader of the thesis. Students may consult with their academic adviser to discuss potential thesis topics and identify potential thesis mentors. Thesis topics and mentors are formalized on a form turned in to the Student Coordinator during the 2nd term. Secondary readers for the thesis will be assigned by the MHS Committee in the 3rd term.

Coursework

Masters students must register for a minimum of 16 credits each term. (The maximum a student can register for is 22 credits per term.) These credits include didactic courses, special studies, seminars, etc. A minimum of 64 credits are required by the School for a Master's degree. Course requirements and suggestions are summarized in the accompanying table.

In core courses, Master's students must receive a 'C' or higher. A student who earns a grade below that threshold in a course listed as a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the Graduate Program Committee (GPC) Chair. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards. To remain in good academic standing, Master's students must maintain a minimum grade point average of 2.75. If a student's GPA falls below the requirement, the student will be placed on academic probation. School policy states that a Master's student cannot graduate with a GPA lower than 2.75.

COURSE DISTRIBUTION REQUIREMENT

The School requires MHS students to complete at least 5 credits of formal coursework outside of their home department. All 5 credits must be taken for a letter grade (Audit or Pass/Fail is not acceptable). Many university-wide courses can be used to fulfill specific requirements. Consult the catalogs of the various university divisions available for viewing on line.

1. Bloomberg School of Public Health catalog -- see interdepartmental program.
2. School of Medicine catalog.
3. School of Arts and Sciences (Homewood Campus) catalog.

MHS CURRICULUM

Outlined below is an example of a curriculum based on the choices of past MHS students. The specifics of your personalized curriculum is likely to vary from the list below depending on your interests and needs. Students should consult with your Academic Adviser and/or The Director of Graduate Studies as they build their curriculum.

The 1 credit courses "Departmental Research Forum" and "Seminar" Series are requirements that students need to register for each term.

In addition to required courses, for each term there is a list of selected elective courses that previous MHS students have rated favorably. Students will note that several of these suggested courses are outside MMI and can be used to fulfill the **Course Distribution Requirement**.

Course	Title	Credits
First Term		
Summer		
Introduction to Online Learning: https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90 (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/)/ (non-credit)		0
Required		
PH.260.623	Fundamental Virology [1]	4
PH.260.653	Molecular Biology Literature [2]	2
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles	3
PH.260.840	SS/R: Mol Microbiology & Imm [3]	Varies
PH.552.6XX	Cells-to-Society (p. 410)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.550.860	Academic & Research Ethics at BSPH (non-credit) [4]	
Suggested Electives		
PH.260.636	Evolution of Infectious Disease	
PH.260.700	How Do We Know? - Theory and Practice of Science (R3)	
PH.260.707	Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations (R3)	
PH.140.611	Statistical Reasoning in Public Health I	
PH.180.609	Principles of Environmental Health	
PH.550.630	Public Health Biology	
PH.220.601	Foundations of International Health	
PH.120.600	[5]	
PH.120.602	Concepts of Molecular Biology [5]	
PH.318.603	Applied Microeconomics for Policymaking	
PH.120.607	Premedical Seminars: Planning and Preparing for Medical School Application	
	Credits	**11**
Second Term		
Required		
PH.260.631	Immunology, Infection and Disease	3
PH.260.635	Biology of Parasitism [1]	5
PH.260.840	SS/R: Mol Microbiology & Imm [3]	Varies

PH.260.654	Current Literature in Microbial Immunity [2]	1
PH.552.6XX	Cells-to-Society (p. 410)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
Suggested Electives		
PH.260.701	Anatomy of Scientific Error	
PH.260.710	Communication Practice for Health Science Professionals (R3)	
PH.340.627	Epidemiology of Infectious Diseases	
PH.223.662	Vaccine Development and Application	
PH.183.631	Fundamentals of Human Physiology	
PH.120.607	Premedical Seminars: Planning and Preparing for Medical School Application	
PH.260.844	Causation	
	Credits	**11**
Third Term		
Required		
PH.260.627	Pathogenesis of Bacterial Infections [1]	4
PH.260.650	Vector Biology and Vector-Borne Diseases [1]	3
PH.260.655	Pandemics of the 20Th Century	1
PH.260.840	SS/R: Mol Microbiology & Imm [3]	Varies
PH.552.6XX	Cells-to-Society (p. 410)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
Suggested Electives		
PH.260.700	How Do We Know? - Theory and Practice of Science (R3)	
PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences	
PH.260.709	Evidence-Based Mentoring	
PH.260.613	Techniques in Molecular Biology (Winter Intercession - see below)	
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	
PH.260.656	Malariology	
PH.340.612	Epidemiologic Basis for Tuberculosis Control	
PH.340.654	Epidemiology and Natural History of Human Viral Infections	
PH.140.615	Statistics for Laboratory Scientists I	
BU.150.710	Discovery to Market I	
PH.120.607	Premedical Seminars: Planning and Preparing for Medical School Application	
	Credits	**10**
Fourth Term		
Required		
PH.260.657	Vector Biology and Disease Ecology Literature [2]	1
PH.260.840	SS/R: Mol Microbiology & Imm [3]	Varies
PH.552.6XX	Cells-to-Society (p. 410)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
Suggested Electives		
PH.260.601	Vector-Borne Disease Control	
PH.260.701	Anatomy of Scientific Error (R3)	
PH.260.710	Communication Practice for Health Science Professionals (R3)	
PH.340.651	Emerging Infections	
PH.340.653	Epidemiologic Inference in Outbreak Investigations	
PH.140.616	Statistics for Laboratory Scientists II	
BU.150.715	Discovery to Market II	
PH.223.689	Biologic Basis of Vaccine Development	
PH.120.607	Premedical Seminars: Planning and Preparing for Medical School Application	
PH.260.844	Causation	
	Credits	**3**
First Year		
Third Term		
PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences	
	Credits	**0**
	Total Credits	**35**

1 MHS students are required to take only two of the following MMI core courses:
- PH.260.623 Fundamental Virology
- PH.260.627 Pathogenesis of Bacterial Infections
- PH.260.650 Vector Biology and Vector-Borne Diseases
- PH.260.635 Biology of Parasitism

2 Only one literature course is required. Selection made in consultation with academic adviser. Options include:
- PH.260.653 Molecular Biology Literature
- PH.260.654 Current Literature in Microbial Immunity
- PH.260.655 Pandemics of the 20Th Century
- PH.260.657 Vector Biology and Disease Ecology Literature

3 Special studies credit hours are to be used for thesis preparation. During each term, this will entail attending noon meetings on thesis preparation and meeting with your academic adviser to discuss how to approach thesis preparation, writing and presentation.

4 As a School-wide requirement, all students must take Academic and Research Ethics in the first term of their enrollment (PH.550.860 Academic & Research Ethics at BSPH).

5 Students with little or no Molecular Biology or Biochemistry background are strongly encouraged to take one or both of these courses, offered by the Department of Biochemistry and Molecular Biology.

MHS & Biotechnology

A subset of MHS students are interested in a career in the biotechnology arena. To accommodate this interest MMI is offering MHS students an elective set of four courses focused on how innovative technologies are moved to a commercial sphere to receive wider distribution. The goal of this program is to teach students how to apply the science they will learn in traditional courses to a translational setting. Students who successfully complete this course of study will be able to indicate to potential employers that in addition to having a strong background in the science of immunology and infectious diseases, they also have a foundational understanding of how innovative science is translated into commercial products. No certificates will be issued for this program, but provided that all four of the below courses are completed, at the student's request, the Department Chair will provide a letter describing the skill sets developed through this path of study.

Descriptions of the four courses can be found in the course catalogues for the School of Public Health and the Carey Business School. The courses cover basic microeconomic theory, practical exposure to the molecular tools used by biotechnology companies and, in a set of two courses offered by the Johns Hopkins Carey Business School, direct experience with addressing the issues involved in moving technology from the laboratory to the marketplace. Please note that these four courses will be taken as elective courses to compliment the core MMI MHS requirements. The Applied Microeconomics is required as a pre-requisite for the Discovery to Market courses.

The courses include:

Code	Title	Credits
PH.260.613	Techniques in Molecular Biology	3
PH.318.603	Applied Microeconomics for Policymaking	3
BU.150.710	Discovery to Market I	2
BU.150.715	Discovery to Market II	2

MHS & Medical School

A subset of MHS students are interested in pursuing medical careers. Students who plan to apply to medical school should strongly consider enrolling in the premedical seminars course (120.607), which is a one-credit course offered all four terms that helps students prepare to apply to medical school. The course covers specific topics to address the complex premedical journey, including planning the months/years leading up to the application, reviewing the application process, addressing the medical schools' expectations, medical school selection, writing the personal statement, requesting letters of evaluation, interviewing, and more. Each term focuses on different aspects of preparing for medical school and medical careers, so interested students should plan on registering for this pre-med seminar course every term.

Cells-to-Society Requirements for All Degree Programs

The Council on Education for Public Health (CEPH) requires didactic coursework covering and assessing 12 CEPH-defined Introductory Public Health Knowledge Learning Objectives. It is important to emphasize that this is a School-level requirement of all degree programs.

The School's Committee on Academic Standards approved 12 online, 0.5 credit, mini-courses, graded S/U (satisfactory/unsatisfactory) that will cover each of the 12 Learning Objectives (see table below). Each of the mini-courses consists of 3-5, 30-40 minute presentations with an accompanying assessment. **Note:** Certain learning objective can be fulfilled by taking a course that covers this material instead of the mini-course (noted in the table below).

Each of the C2S mini-courses will be offered multiple times starting in the summer term and extending through terms 1, 2 and 3. NOTE: In the 4th term, only C2S LO #12 will be offered.

The 2022-2023 schedule is here: https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings (https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings/)

Please note that for the presentation of these mini-courses each term has been split into a A section covering the first 4 weeks of the term and a B section that covers the second 4 weeks of the term.

These 12 mini-courses must be completed by the end of your MHS program.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.602	The Role of Quantitative Methods in Public Health (or take any of the following courses: 140.611-12 (term 1 and 2) or 140.615-16 (term 3 and 4) or 260.705 (term 3 or term 4))	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (or take 260.700 (term 1 or term 3))	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality (or take 260.600 (summer, credit in term 1) or 260.844 (term 2 or term 4))	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (or take 260.700 (term 1 or term 3))	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (or take 260.600.81 in summer (credit in term 1))	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health (or take 260.844 (term 2 or term 4))	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**6**

Additional Course Requirements for MHS Students

The School requires MHS students to complete at least 5 credits in formal courses outside of their home department. All 5 credits must be taken for a letter grade (Audit or Pass/Fail is not acceptable).

Required for all MMI graduate students:

Code	Title	Credits
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology (all terms 2nd year)	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology (all terms 2nd year)	1
PH.552.6XX	Cells-to-Society	

Additional Course Information

Many university-wide courses can be used to fulfill specific requirements. Consult the catalogs of the various university divisions available for viewing online:

1. Bloomberg School of Public Health catalog -- see interdepartmental programs.
2. School of Medicine catalog.
3. School of Arts and Sciences (Homewood Campus) catalog.

Winter and Summer Institute Courses

Tuition for these courses is charged separately by the School of Public Health Registrar, and is not covered by tuition paid during the academic year. An exception to this rule is a course offered specifically for MHS students interested in gaining some experience with laboratory techniques in molecular biology, PH.260.613 Techniques in Molecular Biology. This course will be offered during the last week of the winter institute, but the final examination for the course will occur at the beginning of the third term, allowing the course to be registered as a third term course without additional tuition.

Departmental Seminars

A weekly Departmental Seminar is held at 12:00 pm on Thursdays during the academic year and **all students are required to attend.**

Research Forum is held at 12:00 pm on Mondays and **all students are required to attend.**

MHS Thesis

The student will select the topic for the thesis in consultation with his/her academic adviser or another faculty member. The thesis will typically involve a critical review of the scientific literature on a substantive public health issue. MHS students will meet weekly in Special Studies, which will outline the expectations for the thesis including focus, scope, structure, and criteria for evaluation.

Important Graduation Requirement

Your MHS Thesis needs to be submitted to the Student Coordinator, via email/PDF for binding, for our department library. (You do not need to submit your MHS thesis to the JHU library.) Guidelines for formatting the thesis can be found here: https://www.library.jhu.edu/library-services/electronic-theses-dissertations/formatting-guidelines/

Readers and Deadlines for MHS Thesis Completion

Students are responsible for finding a primary thesis reader who will act as a mentor through the thesis-writing process. Students may consult their academic adviser for advice on choosing a primary reader appropriate for their thesis topic. The primary reader must have an appointment in MMI. A secondary reader will be assigned by the department. The primary and secondary readers cannot be from the same laboratory group.

The MHS student and primary reader are required to have regular meetings to review progress and to ensure that the benchmarks and deadlines listed in the following table are meet. The responsibilities of the primary reader includes guidance on the crafting of the hypothesis to be tested, guidance on the focus and scope of the thesis, as well as editorial and technical critiques to aid in this learning experience. When the primary reader is satisfied with the quality of the thesis draft, the student will submit the final draft of the MHS Thesis to the secondary reader whose responsibility is to evaluate the thesis manuscript for scientific validity, approach, and intelligibility.

An outline of the evaluation criteria that will be used by the faculty can be viewed in the MMI MHS Thesis Scoring Form found at the end of this handbook.

It is the student's responsibility to meet the benchmarks and deadlines listed below. Students who fail to meet the April & May deadlines will be removed from the May graduation list.

Important Dates for MHS Thesis 2022-2023

Date	Description
November 2, 2022	Select topic, identify primary reader, Submit 'MHS Thesis Proposal' form to the student coordinator
November 11, 2022	Provide a provisional outline to primary reader
December 2, 2022	Advanced outline with provisional bibliography
January 23, 2023	Submit first draft of MHS thesis to the primary reader
February 3, 2023	Select secondary thesis reader
February 24, 2023	Submit second draft of the MHS thesis to the primary reader
March 10, 2023	Submit revised draft of the MHS thesis to the secondary reader for comments
March 27, 2023	Third draft of MHS thesis to primary reader
April 7, 2023	Final version of MHS thesis to secondary reader for review and scoring
April 21, 2023	Deadline for primary and secondary readers to submit review results to the student coordinator.
April 28, 2023 (or earlier)	Submit approved MHS Thesis to the student coordinator (via PDF)
May 10 and 12, 2023	Oral presentation of MHS thesis research

For those individuals who require assistance, writing/editing assistance is offered at:

- JHMI: Editing Referral Service: http://www.hopkinsmedicine.org/fac_development/researchers/publishing.html#ERS
- JHU: Writing Center: http://krieger.jhu.edu/writingcenter/about/
- https://www.jhsph.edu/offices-and-services/student-affairs/resources/writing-resources.html

MHS Thesis Presentation

As part of the requirements of the MHS degree, each student must present their Thesis orally in the special MHS Forum held in the fourth term, schedule details pending. All MHS students are required to attend the MHS Forum for the entire time.

Vacation/Holiday Policy

Graduate student holiday and vacation schedules traditionally have been flexible to accommodate the varied demands of individual research projects. Guidelines which reflect the Department's expectations are outlined below. These guidelines are not intended to eliminate flexibility in the scheduling of holidays and vacation, and do not replace any conditions that might be imposed by fellowships/funding agencies. These guidelines also do not restrict legitimate academic or research activities conducted off campus, such as attendance at scientific meetings and field work. Students are generally entitled to the following holidays and vacation time:

- University holidays
- Spring break
- The period between last day of 2nd term and the first day of winter intersession

Leave of Absence (p. 641)

Application for LOA must be made on a form available from the Student Coordinator. Please discuss any potential LOA with your mentor and the Student Coordinator.

Graduate Student Organization

All MMI graduate students are members of the MMI Graduate Student Organization (GSO). The GSO generally meets at the annual departmental retreat to elect officers, and can meet at other times as often as the students desire. Apart from the annual retreat meeting, GSO meetings and activities are organized by the students. Officers elected by the GSO who bear specific official responsibilities are a President, a faculty liaison who attends faculty meetings, a representative to the School's Student Assembly, and Student Admissions Coordinators. Additional officers (Social Chair, Treasurer, etc.) can be chosen by the GSO if it wishes. In the past, activities sponsored by the GSO have included charity events, fundraisers, picnics, student birthday celebrations, etc.

Academic Performance

Academic Performance and Academic Probation

MHS students are required to maintain a 2.75 grade point average or better. Students who do not satisfy this and other academic requirements will be placed on Academic Probation by the Graduate Program Committee. Formal notification of Academic Probation generally will be accompanied by conditions that the student must fulfill in order to be returned to good academic standing. Students who fail to meet those conditions may be dismissed from the program. Students cannot graduate with a GPA lower than 2.75.

Criteria for Dismissal from the MHS Program

Students may be dismissed from the MMI MHS program for reasons that include (but are not limited to) failure to satisfy conditions specified for removal from academic probation, failure to maintain an adequate GPA, violations of academic or professional ethics, and failure to adhere to School and Departmental time limitations.

Academic Ethics and Responsible Conduct of Research

MMI requires students to adhere rigorously to the School's standards for Academic Ethics and Responsible Conduct of Research in all activities. Violations of these standards are ground for dismissal from the program. Policies are detailed in Policy and Procedures Memoranda (PPMs) "Students 01 Academic Ethics" and (for research, including student research) "Faculty 07 Scientific Misconduct". A lecture introducing students to these topics will be presented during the first term. Time and location will be announced by the Student Coordinator.

Attendance is required. Each student is also required to complete the online module on Academic and Research Ethics in their first term of enrollment (PH.550.860 Academic & Research Ethics at BSPH)

Student Conduct Code

The fundamental purpose of the JHU's regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. As members of the University community, students accept certain responsibilities that support the educational mission and create an environment in which all students are afforded the same opportunity to succeed academically and professionally. The JHU Student Conduct Code is outlined at: https://studentaffairs.jhu.edu/policies-guidelines/student-code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/)

Learning Outcomes

Key educational objectives for MHS students include:

1. Develop knowledge through coursework in the areas of immunology and microbiology;
2. Develop skills for the critical evaluation of scientific literature;
3. Develop literature-based analytical and research skills; and
4. Develop the ability to communicate scientific information orally and in writing.

Molecular Microbiology & Immunology, ScM

Introduction

The goal of the ScM training program in MMI is to provide a solid foundation in the biomedical sciences for a select group of students interested in addressing outstanding issues underlying infectious and immunologic diseases of public health importance. It aims to equip students with a diversity of disciplinary concepts and methodological tools to solve specific disease-related problems. This holistic approach requires a common core of knowledge of the population, clinical, cellular, and molecular aspects of disease.

This MMI ScM Guidebook, which supplements the School's resources page, which can be found at https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/) is intended to summarize most of the School and Departmental requirements for your degree program. In addition, other practical information is included for your convenience and consideration.

The ScM in MMI

The Department offers the Master of Science (ScM) program for students who wish to obtain, in addition to course work, rigorous training in laboratory research. The ScM program includes most elements of the MHS program combined with an additional laboratory component. Successful completion of a Departmental Comprehensive Exam is required of all ScM students.

Educational Objectives: Key educational objectives for ScM students include: 1) develop knowledge through coursework in the areas of immunology and microbiology; 2) develop skills for the critical evaluation of scientific literature; 3) develop literature-based analytical and research skills; and 4) develop the ability to communicate scientific information orally and in writing. Additional educational objectives for ScM students include development of laboratory and analytical skills required to effectively conduct laboratory research.

Academic adviser

Each new student is assigned an MMI faculty member as their academic adviser. The academic adviser will assist the student in the selection of appropriate courses for the first year, act as the student's source of information concerning school and departmental policies and procedures, and help the student with problems they may encounter. A student who wishes to change their assigned academic adviser should contact the Student Coordinator, who will consult the Graduate Program Committee (GPC.)

ScM Thesis Mentors

Selection of a thesis adviser takes place after completion of the required laboratory rotation (see below). After consultation with the prospective thesis adviser, the student should submit a completed Thesis Adviser Selection Form (available on the MMI web portal or from the Student Coordinator), signed by the prospective adviser, to the departmental Student Coordinator for approval by the Department Chair. Requests for extra time to identify a thesis adviser must be submitted to the GPC. When appointed, a thesis adviser becomes the student's Primary Adviser.

Approval of thesis adviser selection will take into account the interests of the student and the faculty and the availability of resources in the faculty member's laboratory (e.g, funds, space, faculty time). Every effort will be made to accommodate a student's request to work with a specific faculty member for their thesis research. The Department, however, cannot guarantee that a student will be able to work in the laboratory that they select as a first choice. In the event that a student's first choice cannot be met, an alternative will be arranged in consultation with the student.

With the specific approval of the GPC, ScM students may conduct thesis research in laboratories outside of MMI (for example, in departments other than MMI or in the School of Medicine). Requests to conduct thesis research outside the department will be noted on a Thesis Adviser Form that includes acknowledgement from the proposed extra-departmental thesis adviser that MMI will provide no financial support for the student, a detailed research topic and timetable, and an agreement by a faculty member with a primary appointment in MMI (see Core Faculty list, page 2) to act as co-adviser. (Field work conducted off-campus under the direction of an MMI faculty member does not need to be approved by the GPC.)

Coursework

Masters students must register for a minimum of **16 credits** each term. (The maximum allowed per term by the School is 22 credits.) These credits include didactic courses, special studies, thesis research, seminars, etc. (A minimum of 64 credits are required by the School for a Master's degree.) Course requirements and suggestions for electives are summarized in the next section.

In core courses, Master's students must receive a 'C' or higher. A student who earns a grade below that threshold in a course listed as a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the GPC Chair. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards. To remain in good academic standing, masters students must maintain a minimum grade point average of 2.75. If a student's GPA falls below the requirement, the student will be placed on academic probation. School policy states that a Master's student cannot graduate with a GPA lower than 2.75.

Academic Performance

Academic Performance and Academic Probation

Master's students are required to maintain a 2.75 grade point average or better. Students who do not satisfy this and other academic requirements will be placed on Academic Probation by the Graduate Program Committee. Formal notification of Academic Probation generally will be accompanied by conditions that the student must fulfill in order to be returned to good academic standing. Students who fail to meet those conditions may be dismissed from the program. Students cannot graduate with a GPA lower than 2.75

Criteria for Dismissal from the ScM Program

Students may be dismissed from the MMI ScM program for reasons that include (but are not limited to) failure to satisfy conditions specified for removal from academic probation, failure to maintain an adequate GPA, failure of the Departmental Comprehensive Examination, failure to make satisfactory progress in thesis research, violations of academic or professional ethics, and failure to adhere to School and Departmental time limitations.

Academic Ethics and Responsible Conduct of Research

MMI requires students to adhere rigorously to the School's standards for Academic Ethics and Responsible Conduct of Research in all activities. Violations of these standards are ground for dismissal from the program. Policies are detailed in Policy and Procedures Memoranda (PPMs) "Students 01 Academic Ethics" and (for research, including student research) "Faculty 07 Scientific Misconduct". A lecture introducing students to these topics will be presented during the first term. Time and location will be announced by the Student Coordinator. Attendance is required. Each student is also required to complete the online module on Academic and Research Ethics in their first term of enrollment (PH.550.860 Academic & Research Ethics at BSPH)

Student Conduct Code

The fundamental purpose of the JHU's regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. As members of the University community, students accept certain responsibilities that support the educational mission and create an environment in which all students are afforded the same opportunity to succeed academically and professionally. The JHU Student Conduct Code is outlined at: https://studentaffairs.jhu.edu/policies-guidelines/student-code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/).

Program Requirements

Degree Requirements

There are several requirements for the completion of degree programs: those set by the school, those set by the department, and those set by the thesis advisor (for ScM students). The degree requirements for all programs, established by the School are contained in Policy and Procedure Memoranda available at https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/Pages/default.aspx

Students will need to log in with their BSPH e-mail user name and password to have access to these pages.

The Departmental requirements for Molecular Microbiology and Immunology (MMI) are explained in this Student Guidebook. A student's thesis advisor generally will set requirements regarding the preparation for, and completion of, the thesis or dissertation project. A brief summary with an approximate timetable of the requirements of the school and of the department is included at the end of this section.

Residency: Minimum duration of two academic years in full-time residence (including the Summer Term between the first and second years.) Completion, including the requirement of an Advisor-approved written thesis, is required within four calendar years of matriculation. Most students complete their degrees in two years.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

ScM Curriculum

Listed below are courses required of all ScM students, as well as a selection of elective courses that ScM students have found useful.

Course	Title	Credits
First Term		
Summer		
Introduction to Online Learning: https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90 (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/)/ (noncredit)		0
Required		
PH.260.623	Fundamental Virology [2]	4
PH.260.653	Molecular Biology Literature [3]	2
PH.552.6XX	Cells-to-Society (p. 415)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.550.860	Academic & Research Ethics at BSPH (non-credit) [5]	0
Suggested Electives		
PH.260.700	How Do We Know? - Theory and Practice of Science (R3)	
PH.260.707	Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations (R3)	
PH.140.611	Statistical Reasoning in Public Health I	
PH.180.609	Principles of Environmental Health	
PH.550.630	Public Health Biology	
PH.220.601	Foundations of International Health	
PH.120.600	[4]	
PH.120.602	Concepts of Molecular Biology [4]	
PH.260.636	Evolution of Infectious Disease	
	Credits	**8**
Second Term		
Required		
PH.260.611	Principles of Immunology I [1]	4
PH.260.635	Biology of Parasitism [2]	5
PH.260.654	Current Literature in Microbial Immunity [3]	1
PH.552.6XX	Cells-to-Society (p. 415)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
Suggested Electives		
PH.260.709	Evidence-Based Mentoring	3
PH.260.710	Communication Practice for Health Science Professionals (R3)	
PH.340.627	Epidemiology of Infectious Diseases	
PH.223.662	Vaccine Development and Application	
PH.183.631	Fundamentals of Human Physiology	
PH.140.612	Statistical Reasoning in Public Health II	
PH.120.601	Biochemistry II: Major Metabolic Pathways	
PH.180.610	Applied Environmental Health Practice	
PH.380.642	Child Health and Development	
	Credits	**15**
Third Term		
Required		
PH.260.627	Pathogenesis of Bacterial Infections [2]	4
PH.260.650	Vector Biology and Vector-Borne Diseases [2]	3
PH.260.855	Pandemics of the 20Th Century [3]	1
PH.552.6XX	Cells-to-Society (p. 415)	Varies
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
Suggested Electives		
PH.260.700	How Do We Know? - Theory and Practice of Science (R3)	
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles (R3)	
PH.260.624	Advanced Virology	
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health	
PH.260.656	Malariology	
PH.260.700	How Do We Know? - Theory and Practice of Science (R3)	
PH.340.612	Epidemiologic Basis for Tuberculosis Control	
PH.340.654	Epidemiology and Natural History of Human Viral Infections	
PH.140.615	Statistics for Laboratory Scientists I	
	Credits	**10**
Fourth Term		
Required		
PH.260.657	Vector Biology and Disease Ecology Literature [3]	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1

Suggested Electives

PH.260.601	Vector-Borne Disease Control	
PH.260.701	Anatomy of Scientific Error (R3)	
PH.260.710	Communication Practice for Health Science Professionals (R3)	
PH.260.717	Graduate Immunology: the Immune Response	
PH.260.656	Malariology	
PH.183.631	Fundamentals of Human Physiology	
PH.340.618	Epidemiology: the Basics	
PH.340.651	Emerging Infections	
PH.340.653	Epidemiologic Inference in Outbreak Investigations	
PH.140.616	Statistics for Laboratory Scientists II	
	Credits	**3**
	Total Credits	**36**

[1] The required Immunology course for ScM students is Immunology, Infection, and Disease (PH.260.631 Immunology, Infection and Disease) offered in the 2nd term. While PH.260.611 Principles of Immunology I & PH.260.612 Principles of Immunology II are not recommended for ScM students, those who wish to substitute this two-term series for IID are required to gain permission from the course director Dr. Scott. Topics in Immunology I & II are only available to doctoral students.

[2] ScM students are only required to take two of the following four core courses in the area of microbial pathogenesis:

- PH.260.623 Fundamental Virology
- PH.260.627 Pathogenesis of Bacterial Infections
- PH.260.650 Vector Biology and Vector-Borne Diseases
- PH.260.635 Biology of Parasitism

[3] Only one literature course is required. Selection made in consultation with the academic advisor.

[4] Students with little or no Molecular Biology or Biochemistry background are strongly encouraged to take one or both of these courses, offered by the Department of Biochemistry and Molecular Biology.

[5] As a School-wide requirement, all students must take Academic and Research Ethics in the first term of their enrollment (PH.550.860 Academic & Research Ethics at BSPH).

Cells-to-Society Requirements for All Degree Programs

The Council on Education for Public Health (CEPH) requires didactic coursework covering and assessing 12 CEPH-defined Introductory Public Health Knowledge Learning Objectives. It is important to emphasize that this is a School-level requirement of all degree programs.

The School's Committee on Academic Standards approved 12 online, 0.5 credit, mini-courses, graded S/U (satisfactory/unsatisfactory) that will cover each of the 12 Learning Objectives (see table below). Each of the mini-courses consists of 3-5, 30-40 minute presentations with an accompanying assessment. **Note:** Certain learning objective can be fulfilled by taking an MMI course that covers this material instead of the mini-course. See notes in the table, below.

Each of the C2S mini-courses will be offered multiple times starting in the summer term and extending through terms 1, 2 and 3. NOTE: In the 4th term, only C2S LO #12 will be offered. The 2022-2023 schedule is here: https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings (https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings/)

Please note that for the presentation of these mini-courses each term has been split into a A section covering the first 4 weeks of the term and a B section that covers the second 4 weeks of the term.

These 12 mini-courses must be completed by the end of the first academic year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.602	The Role of Quantitative Methods in Public Health (or take any of the following courses: 140.611-12 (term 1 and 2) or 140.615-16 (term 3 and 4) or 260.705 (term 3 or term 4))	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (or take 260.700 (term 1 or term 3))	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality (or take 260.600 (summer, credit in term 1) or 260.844 (term 2 or term 4))	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (or take 260.700 (term 1 or term 3))	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (or take 260.600 in summer (credit in term 1))	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health (or take 260.844 (term 2 or term 4))	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**6**

Additional Course Requirements for ScM Students

The School requires ScM students to complete 12 credits in formal courses outside of their own department, at least 6 of which are within the Bloomberg School of Public Health. These courses must be taken during the first year. All 12 credits must be taken for a grade (Pass/Fail is not acceptable).

Required for all MMI graduate students:

Code	Title	Credits
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology (all terms 2nd year)	1
PH.260.821	Research Forum in Molecular Microbiology and Immunology (all terms 2nd year)	1
PH.552.6XX	Cells-to-Society	

Additional Course Information

Many university-wide courses can be used to fulfill specific requirements. Consult the catalogues of the various university divisions available for viewing online:

1. Bloomberg School of Public Health catalogue -- see interdepartmental programs.
2. School of Medicine catalogue.
3. School of Arts and Sciences (Homewood Campus) catalogue.

Winter and Summer Institute Courses

Tuition for these courses is charged separately by the School of Public Health Registrar, and is not covered by tuition paid during the academic year.

Certificate Programs

There are several certificate programs offered by the School in specific areas of public health that have fewer course requirements than do formal degree programs. Certificate programs are focused academic training programs designed to appeal to students seeking targeted education in a specific area of public health. Educational objectives, admission requirements, courses of study, and other information is provided for each certificate program and can be found at https://publichealth.jhu.edu/academics/academic-programs/certificate-programs (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/).

Departmental Seminars

Departmental Seminar is held at 12:00 pm on Thursdays during the academic year and **all students are required to attend.**

Research Forum is held at 12:00 pm on Mondays and **all students are required to attend.**

Laboratory Rotations

ScM students must conduct at least one laboratory rotation before formal selection of a Thesis Adviser. The required rotation should be performed in the first rotation period and students should register for PH.260.851 Laboratory Rotations in the second term. If desired, a second rotation may be performed; register again for PH.260.851 Laboratory Rotations in the third term. See the table below for rotation period dates. Rotation periods in a series of laboratories broaden a student's knowledge of laboratory techniques and skills, expose them to a variety of research areas, help them to select a laboratory for thesis research, provide the student an opportunity for interaction with several faculty members, and develop their ability to carry out a research project. Faculty from outside MMI are eligible to supervise ScM students, but the research project must be within the scope MMI's core research areas (immunology, bacteriology/microbiome, parasitology, virology, mycology, and/or vector biology). If a student chooses to join a lab outside of MMI, a co-advisor with a primary appointment in MMI is required (see Core Faculty list, page 2). During a laboratory rotation, a student is given a specific research problem of limited scope as their rotation exercise. This provides close interaction with the faculty member who supervises the rotation. It is not expected that a student necessarily complete the assigned project. At the end of the laboratory rotation term, the student will give a short oral presentation of their research project at the Research Forum in Molecular Microbiology and Immunology (see below). The rotation supervisor will submit a written evaluation of the student's performance to the Student Coordinator and will assign a grade of Pass or Fail. The form is available here: https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx. Failing grades will be given for not having spent sufficient time in the laboratory or for an unsatisfactory performance in the laboratory.

The selection of laboratory or laboratories for rotation(s) is the responsibility of the student. Students (with the assistance of their academic adviser) should identify potential laboratories for their rotations and consult with the faculty members in charge of these laboratories to arrange a rotation for a particular period. To assist students in identifying the research interests of the faculty, each faculty member has prepared a short summary of their ongoing projects which can be found on their official school web pages: https://publichealth.jhu.edu/departments/w-harry-feinstone-department-of-molecular-microbiology-and-immunology/people/faculty (https://publichealth.jhu.edu/departments/w-harry-feinstone-department-of-molecular-microbiology-and-immunology/people/faculty/)

2022-2023 MMI Laboratory Rotation Schedule

Rotation Period	Dates	Register in Term
First	11/8/22 - 1/20/23	2
Second	1/23/23 – 3/17/23	3

ScM students must present reports after each laboratory rotation during weekly Departmental Research Forum. Rotation reports are 20 minutes. Presentation dates are assigned by the Course Director; rotation reports generally will be scheduled 1 to 3 weeks after the completion of the rotation.

In preparing a rotation report, students should keep in mind that it is most important to provide sufficient background and a sufficiently good explanation of the experimental rationale to make the rotation project and its objectives understandable by a diverse audience. As noted above, it is not required that students successfully complete their assigned rotation project, and many rotation reports cannot include firm conclusions. This is not a shortcoming if the presentation is clear, intelligible, and presents good analyses of any difficulties encountered. **Once a laboratory is chosen, ScM students should register for thesis research credits in subsequent terms.**

ScM Comprehensive Examination

The ScM Comprehensive Examination constitutes a comprehensive inquiry into the student's grasp of the subject matter underlying disciplines underlying MMI's main areas of research. The exam tests the student's understanding of scientific principles and methods, as well as his substantive knowledge of major subjects and related areas. At approximately mid-year, first year ScM students are furnished with a list of about fifty questions from which the comprehensive exam will be drawn. The questions cover the five main areas of research in MMI – virology, bacterology, parasitology, vector biology and immunology. Students are encouraged to consider essay format responses to these questions that demonstrates a firm grasp of the principles and relevant details addressed by the question. The exam will be administered at the end of the fourth term (**Thursday, May 25, 2023**) and will consist of two questions each from the five different MMI subject areas (Virology, Bacteriology, Vector Biology, Parasitology, and Immunology). Students are required to select one of the immunology questions and two other questions from two of the remaining topic areas. The exam is closed book and 3 hours in length. Student responses to the three exam questions are graded independently. Students who fail only one exam question must retake both questions from the original exam in that topic area and pass both questions, submitting written answers within two weeks for reassessment. Failing marks on two or more of the questions from the original exam results in retaking the exam with a new series of questions within a month. Failure of the exam twice may result in dismissal from the ScM program.

ScM Thesis

The ScM thesis is the culminating product of a student's ScM studies and provides a permanent record of a student's intellectual contribution to the field. Unlike published papers that might result from the same work, the thesis both requires and provides opportunity for the student to creatively place their work in the broadest possible context, explore implications, and speculate on where the future of the field lies. Preparation of a thesis requires the greatest care both in thought and execution.

Most students find that writing a thesis requires much more time and effort than expected. For that reason, students are encouraged to write as they go, rather than wait for the final few weeks of their graduate careers. Students are also encouraged to work closely with their advisors on thesis organization, scope, and content. To facilitate these recommendations, the Department requires that a student follow the timetable below:

In addition to the primary reader (typically the thesis advisor) a secondary reader from a different laboratory must be chosen. Preparation Requirements for ScM theses, including additional instructions for the selection of thesis readers, details on the format of the final version of the thesis, procedures for thesis submission and approval, and deadlines, are available from the School of Public Health Registrar's office and online at:

- https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/MastersCandidateInformation/Pages/default.aspx
- https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_10_Master_of_Science_Degree_071417.pdf
- https://www.library.jhu.edu/library-services/electronic-theses-dissertations/

Thesis Presentation

As part of the requirements of the ScM degree, each student must defend their completed thesis orally, late in the fourth term. The ScM thesis presentations for second year students will be held during the week of May 15-19, 2023.

ScM Thesis Submission Deadlines

Date	Description
2/10/2023 (or earlier)	Students should meet with the student coordinator to go over transcripts and make sure all other degree requirements have been met.
3/10/2023	1st draft of thesis is due to thesis advisor.
3/17/2023 (or earlier)	Deadline for submitting the Thesis Readers and Final Examination form to the registrar
3/31/2023	Final draft of thesis is due to the secondary reader.
5/05/2023 (or earlier)	Final deadline for submitting final copies of ScM thesis and all readers' letters. **Note: the thesis and letters should be submitted several days ahead of the final deadline to ensure their receipt and allow for processing.**

Vacation/Holiday Policy

Graduate student holiday and vacation schedules traditionally have been flexible to accommodate the varied demands of individual research projects. Guidelines which reflect the Department's expectations are outlined below. These guidelines are not intended to eliminate flexibility in the scheduling of holidays and vacation, and do not replace any conditions that might be imposed by fellowships/funding agencies. These guidelines also do not restrict legitimate academic or research activities conducted off campus, such as attendance at scientific meetings and field work. Students are generally entitled to the following holidays and vacation time:

- University holidays
- Spring break
- The period between last day of 2nd term and the first day of winter intersession
- A fortnight vacation in the second and subsequent years as scheduled by arrangement with the adviser.

Graduate students are expected to be present during winter intersession and summer term or as required by their experimental protocols.

Leave of Absence

A leave of absence (LOA) is for students who are forced to take a temporary break from their programs of study due to reasons beyond their control, such as illness, military service, financial exigency, or pressing personal reasons justifying an interruption of their graduate studies. A leave of absence is an officially recognized inactive student status that is entered on a student's academic record. LOA cannot be used by a student working on a thesis who has completed all other degree requirements. LOA is limited to one academic year except for military service.

Application for LOA must be made on a form available from the Student Coordinator. Please discuss any potential LOA with your mentor and the Student Coordinator.

Please review the BSPH Schoolwide Policy (p. 641).

Employment as a Full-Time ScM Student

Full-time ScM students can be employed by faculty, including by their PI, to conduct part-time work **<u>not directly related to their thesis</u>**. Hours worked per week from all sources at JHU **<u>must not exceed 20 hours</u>**.

Learning Outcomes

Key educational objectives for ScM students include:

1. Develop knowledge through coursework in the areas of immunology and microbiology;
2. Develop skills for the critical evaluation of scientific literature;
3. Develop literature-based analytical and research skills; and

4. Develop the ability to communicate scientific information orally and in writing.

Additional educational objectives for ScM students include development of laboratory and analytical skills required to effectively conduct laboratory research.

Molecular Microbiology & Immunology, PhD

Introduction

The goal of the MMI doctoral program is to train independent scientists to take leading roles in advancing our understanding of the cellular and molecular mechanisms that drive infectious and immune diseases. The specific goals listed below are designed to foster ingenuity, creativity and critical thinking in students that will enable them to recognize and solve key problems in infectious and immunological diseases of public health importance.

A majority of the content of the MMI PhD Student Guidebook can also be found at School's resources page – see https://www.jhsph.edu/offices-and-services/student-affairs/resources/. In addition, MMI PhD Student Guidebook contains other practical information that is included for your convenience and consideration.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

There are several levels of requirements for the completion of your degree program: those set by the school, by the department, by the Thesis Advisory Committee (TAC), and by the thesis adviser. The degree requirements established by the School are contained in Policy and Procedure Memoranda available at the Bloomberg School of Public Health (https://my.jhsph.edu/).

School procedures, information and forms can be found on the Bloomberg School of Public Health website (https://my.jhsph.edu/).

The requirements for MMI are explained in this Student Guidebook. A student's thesis adviser with participation of the Thesis Advisory Committee (TAC) generally will set requirements regarding the preparation for, and completion of, the thesis or dissertation project.

Advisers

Each student is assigned an MMI faculty member who will serve as their initial Academic Adviser during the first year of training. The Academic Adviser assists the student in navigating the first year by advising on the selection of appropriate courses, providing information concerning school and departmental policies, etc. The Academic Adviser is a temporary appointment and is typically replaced by the Thesis Adviser at some point during the first academic year. A student who wishes to change their Academic Adviser should contact the Student Coordinator, who will consult the GPC.

Selection of a Thesis Adviser takes place after completion of laboratory rotations (see below), generally prior to June 1. After discussion with the prospective thesis adviser, the student should submit to the Student Coordinator a completed Thesis Adviser Selection form (available on the Departmental portal, https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx signed by the prospective adviser, for approval by the department Chair.

Note that MMI graduate students must perform thesis research in the laboratory of a faculty member who holds a primary appointment in MMI or in the laboratory of a JHU faculty member who holds a joint appointment in MMI and is designated as a trainer on a MMI training grant. **Requests for thesis advisers other than these will not be approved**.

Every effort will be made to accommodate a student's request to work with a specific faculty member for their thesis research. However, the department cannot guarantee that a student will be able to work in the laboratory that is selected as a first choice. In the event that a student's first choice cannot be met, an alternative will be arranged in consultation with the student.

Thesis Advisory Committees (TAC) and Individual Development Plans (IDP)

The Thesis Advisory Committee (TAC) meetings provide a structured opportunity for students to discuss scientific goals, research progress, and issues relevant to their project as well as to adopt an Individual Development Plan (IDP) that will support and monitor your professional and career development. The TAC, which is composed a with a customized group of faculty members with expertise in the areas relevant to your research project, meets at least annually through the fourth year of the program and semi-annually thereafter.

Each student is required to form a TAC during their second academic year. The initial TAC meeting should be scheduled by the end of the 4th term of year two and the meeting should take place no later than the end of the first term of year three. Students in their second year and beyond who do not complete the annual TAC meeting including the submission of the TAC/IDP Report will not be allowed to register in the first term of the following academic year. It is the responsibility of the student and their faculty adviser to schedule the annual meetings. The Student Coordinator should be informed of the anticipated date of the TAC meeting when it is scheduled. Note that a long lead time (months) may be needed to find a date when all TAC members are available for the meeting and so it is wise to begin the scheduling process early.

TACs consist of the student's Thesis Adviser and at least two faculty members with a primary appointment in MMI at the rank of assistant professor or higher. The highest-ranking MMI faculty member, other than the adviser, will serve as the committee chair. TACs can include additional members and participants from other departments/divisions of JHU and from other institutions are welcome. Inclusion and diversity are encouraged on TACs. Committee members should be jointly selected by the student and the thesis adviser.

TAC meetings are conducted in four parts in the following order:

Introduction by the adviser. With the student absent, the adviser should briefly introduce the student (thesis topic, year in the program, background, unusual career circumstances, or other relevant matters) and assess the student's performance relative to the adviser's expectations. Factors that may be impeding the student's progress should be raised and discussed. At the discretion of the TAC, these may be discussed with the student during the meeting.

Review of the student's progress in the program and professional development, guided by the points listed in Part B of the TAC/IDP and the experiences gained in the programs offered by the JHU Professional Development and Career Office (see page 28). Part B should be completed by the student before the meeting and furnished to the committee members at the meeting. As appropriate, the committee will discuss the student's responses to the points on the form and offer recommendations, advice, and insights into how the student might best approach their professional goals. Starting in the 3rd year special attention will be focused on the completion of the first author paper requirement. At the end of this discussion, the TAC Chair will summarize this discussion and note action items on the form. It is recognized that career goals evolve, and it is the intent that TAC/IDP reports will reflect, facilitate, and potentially guide that evolution, not constrain it. At the end of this discussion, the TAC/IDP form is signed by the committee and the student and returned to the Student Coordinator.

Discussion of the scientific aspects of the student's project, beginning with a concise presentation by the student that summarizes the current status of the research project, research accomplishments during the previous year, and an outline of research plans for the coming year. The scientific discussion is intended to provide fresh perspectives on the project, overall guidance, potential technical solutions to difficulties that have arisen, and access to expertise in varied fields. This part of the TAC meeting will be summarized at the end of the discussion by the TAC Chair in Part A of the Thesis Advisory Committee and Individual Development Plan (TAC/IDP) Report form, available on the MMI portal. https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx

Discussion with the student in the absence of the adviser. At the conclusion of the discussion of the IDP, the adviser will leave the meeting to give the student an opportunity to evaluate the status of his project, the relationship with the adviser or the lab generally, and to identify measures that would enhance their educational and professional experience. Substantive issues that are revealed should be summarized in a confidential e-mail from the TAC Chair to the GPC c/o the Student Coordinator. The TAC chair should also inform the adviser of matters that arose, unless the student specifies that the discussion remain confidential.

Annual Evaluation of Progress, Performance, and Mentoring

The principal element in the training and guidance of graduate students is the interaction with their Thesis Adviser. Such mentoring commonly occurs on an ongoing basis involving frequent informal discussions, lab meetings, etc. However, a formal mechanism of evaluation of performance and of satisfaction of both the adviser and student is valuable in many cases. Annual progress, performance, and mentoring meetings between each student and their mentor guided by the Annual Evaluation of Progress, Performance, and Mentoring (AEPPM) form ensures that such formal performance and satisfaction discussions occur in MMI. Once per year, a month prior to the TAC meeting, each student is required to complete this document (available on the MMI departmental portal), and to discuss it with their Thesis Adviser. Following that discussion, the form, signed by student and Thesis Adviser should be returned to the Student Coordinator. <u>The signed form must be turned in prior to the TAC meeting.</u> Completed forms are reviewed by the GPC with the object of identifying developing problems. This mechanism is intended to foster frank discussions between student and adviser and will be of value only if the student's answers and the adviser's responses during the following discussions are honest. Note: A GPC committee member will be added to the TAC starting in year 5 if graduation is not scheduled.

Laboratory Rotations

Rotation periods broaden a student's knowledge of laboratory techniques and skills, provide exposure to a variety of research areas, help in selecting a laboratory for thesis research, provide an opportunity for interaction with several faculty members, and develop the ability to carry out a research project. During a laboratory rotation, a student will be given a specific research problem of limited scope as their rotation exercise. At the end of the laboratory rotation term, the student will give a short oral presentation on the project at the Research Forum in Molecular Microbiology and Immunology (see below). Students are encouraged to discuss expectations (time and effort spent, etc.) with the rotation supervisor early in the rotation.

Doctoral students are required to rotate through at least three (3) laboratories of faculty members who hold primary appointments in MMI or who are designated as members of the MMI training faculty.

MMI ScM students who matriculate to the PhD program are required to complete a total of 3 rotations over the course of both programs. These rotations must be in different departmental laboratories.

Each laboratory rotation lasts about 8 weeks. The rotation starting and ending dates are listed in the table below. Because laboratory rotations do not correspond to standard academic terms, **students should register for PH.260.851 Laboratory Rotations during the second, third, and fourth terms.**

2022-2023 MMI Laboratory Rotation Schedule

Rotation Period	Dates	Register in Term
First	11/8/22 - 1/20/23	2
Second	1/23/23 – 3/17/23	3
Third	3/27/23 – 5/19/23	4

The selection of laboratories for rotations is the responsibility of the student. Students (with the assistance of their academic adviser) should identify potential laboratories for their rotations and consult with the faculty members in charge of these laboratories to arrange a rotation for a particular academic term.

Students may conduct rotations in addition to the three required to explore other laboratories or to learn particular laboratory techniques or skills. These extra rotations may be conducted in departmental laboratories or in labs outside the MMI training faculty. Because PhD students must conduct thesis research in a laboratory within MMI or in the laboratory of a designated MMI trainer, rotations outside such labs should <u>**not**</u> be considered a means for identifying potential thesis research laboratories.

It is expected that substantial time will be spent in the laboratory during each rotation. It is critical that the student and rotation supervisor discuss this issue and reach an agreement on their mutual expectations. In the case of questions on this point, seek the advice of the MMI Ombuds, the GPC chair or any MMI faculty member.

At the conclusion of each rotation, the student and the rotation supervisor will complete a rotation report that will be turned in to the student coordinator. A copy of the form can be found on the MMI portal. https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx

NOTE: Animal protocols; radiation licenses; pathogen, and recombinant DNA registrations. Any rotating student who participates in animal experiments must be added to the appropriate animal protocol before beginning work. While it is the responsibility of the Principle Investigator

(PI) of the protocol, working with the PI prior to the start of the rotation to make sure that you are included on the protocol(s) will prevent costly delays. Students also must complete online animal research training and must enroll in the Animal Exposure Surveillance Program prior to beginning work. Students must also be added to radiation licenses, pathogen registration and recombinant DNA registration, and human IRBs by the PI as required. In general, training in procedures is required for work with these agents or human samples.

Once the POE has been passed (see pages 23-24), the student needs to complete a **Thesis Research Documentation Form** that will be sent from the Dean's Office, which must be filled out **within 6 months of passing the POE.** It is the student's responsibility to ensure that the necessary research approvals are obtained (either IRB for human subjects research or ACUC for animal research) on the appropriate approved protocol(s). Retroactive research approval for research involving human subjects and/or animals **cannot**, under any circumstance, be granted. Failure to obtain research approval will prevent a student from publishing their thesis/dissertation.

MMI guidelines request that 1st year PhD students choose a research adviser by no later than June 1st, to ensure that any payroll change deadlines are met.

Research Forum and Laboratory Rotation Presentations

Ph.D. students are required to give oral presentation of their research. During the first year, the student will present the results of their rotation projects. These oral presentations will be delivered during weekly Departmental Research Forum. Rotation presentations are 20 minutes long and thesis research presentations are 30 minutes long. Suggested organization of presentations:

1. Introduction - Present the background and rationale of the work and outline the working hypothesis.
2. Experimental Design - Describe the overall experimental approach.
3. Results/Discussion - Results should be presented in an organized, meaningful and comprehensible manner.
4. Summary/Conclusion - Provide a short summary of the results and give an indication of future research directions.

An evaluation form (available from the departmental web portal and the TA) will be completed by two students and two faculty and returned to the student to provide constructive comments to improve future presentations.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Required Courses

All MMI required courses must be passed with a grade of A or B. Students not meeting that standard must repeat the relevant course(s) and pass with an A or B. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the GPC Chair. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

First year students must register for **16-22 credits each term**. Students in their 2nd year and beyond should register for a maximum of 16 credits. First year students should register for PH.260.851 Laboratory Rotations in terms 2, 3 and 4. (See Laboratory Rotations (p. 419), above).

The required core curriculum necessitates that each student takes:

- Principles of Immunology I & II and the companion courses Topics in Immunology I & II.
- Course work in 3 out of the 4 areas that focus on microbial biology and pathogenesis – Fundamentals of Virology, Pathogenesis of Bacterial Infections, Biology of Parasitology and Vector Biology & Vector Borne Disease.
- Two molecular and cell biology courses taught at the School of Medicine – Molecular Biology & Genomics; Cell Structure & Dynamics
- Two courses from the R3 menu of offerings (indicated by a * below) (scroll down for a full list).
- Cells-to-Society Learning Objectives (see below)

In addition, students are required to register for Research Forum in MMI (Monday noon research presentations) and Seminars in Research in MMI (Thursday departmental noon seminar) each term.

Outlined below is an example of a representative curriculum taken in the first and second years of the program. Depending on interests and background, the details of a student's specific curriculum can vary from the prototype outlined below. Consult your academic adviser prior to registering for courses..

NOTE: Students in the R^{3}IM Track – go to R^{3}IM Required Courses below.

Requirements for General PhD Program

First-Year Course Requirements

Course	Title	Credits
First Term		
Summer		
Introduction to Online Learning: https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90 (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/)/ (non-credit)		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	0
PH.260.623	Fundamental Virology	4
PH.260.607	Methods in life sciences, literature and practice	2
PH.260.611	Principles of Immunology I	4
PH.260.801	Topics in Immunology I	1
PH.260.700	How Do We Know? - Theory and Practice of Science	3
(See R3 Course Offerings for a full list)		
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**16**
Second Term		
PH.260.635	Biology of Parasitism	5
PH.260.612	Principles of Immunology II	3

PH.260.802	Topics in Immunology II	1
ME.260.709	Molecular Biology and Genomics (Molecular Biology and Genomics)	3
PH.260.607	Methods in life sciences, literature and practice	2
PH.260.701	Anatomy of Scientific Error	3
(See R3 Course Offerings for a full list)		
PH.260.851	Laboratory Rotations (Variable credits)	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**23-27**
Third Term		
PH.260.627	Pathogenesis of Bacterial Infections	4
ME.110.728	Cell Structure and Dynamics (Cell Structure and Dynamics)	3
PH.260.607	Methods in life sciences, literature and practice	2
PH.260.650	Vector Biology and Vector-Borne Diseases	3
PH.260.851	Laboratory Rotations (Variable credits)	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**18-22**
Fourth Term		
PH.260.851	Laboratory Rotations (Variable credits)	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**6-10**
	Total Credits	**63-75**

Electives

PhD students are strongly advised to take at least one departmental advanced course during each of the third and fourth terms of their first year. The specific courses taken should be chosen after discussion between the student and their adviser. Generally, these courses will include at least one in the area in which the student expects to conduct their thesis research.

Cells-to-Society Requirements for All Degree Programs

The Council on Education for Public Health (CEPH) requires didactic coursework covering and assessing 12 CEPH-defined Introductory Public Health Knowledge Learning Objectives. It is important to emphasize that this is a School-level requirement of all degree programs.

The School's Committee on Academic Standards approved 12 online, 0.5 credit, mini-courses, graded S/U (satisfactory/unsatisfactory) that will cover each of the 12 Learning Objectives (see table below). Each of the mini-courses consists of 3-5, 30-40 minute presentations with an accompanying assessment. **Note:** Certain learning objective can be fulfilled by taking a course that covers this material instead of the mini-course (see right-hand column in table below).

Each of the C2S mini-courses will be offered several times each year, starting in the summer term. The 2022-2023 schedule is here: https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings (https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings/)

Please note that for the presentation of these mini-courses each term has been split into a A section covering the first 4 weeks of the term and a B section that covers the second 4 weeks of the term.

These 12 mini-courses must be completed by the end of the first academic year.

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.602	The Role of Quantitative Methods in Public Health (or take any of the following courses: 140.611-12 (term 1 and 2) or 140.615-16 (term 3 and 4) or 260.705 (term 3 or term 4))	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (or take 260.700 (term 1 or term 3))	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality (or take 260.600 (summer, credit in term 1) or 260.844 (term 2 or term 4))	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (or take 260.700 (term 1 or term 3))	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (or take 260.600.81 in summer (credit in term 1))	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health (or take 260.844 (term 2 or term 4))	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**6**

Second-Year Course Requirements

Course	Title	Credits
First Term		
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.260.820	Thesis Research Molecular Microbiology and Immunology (Variable credits)	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**4-25**
Second Term		
PH.260.625	Scientific Grant Writing	2

PH.260.820	Thesis Research Molecular Microbiology and Immunology (Variable credits)	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**5-26**
Third Term		
PH.260.820	Thesis Research Molecular Microbiology and Immunology (Variable credits)	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Select one of the following: [1]		4-8
PH.140.615	Statistics for Laboratory Scientists I (Recommended)	
PH.140.611 & PH.140.612	Statistical Reasoning in Public Health I and Statistical Reasoning in Public Health II	
PH.140.621 & PH.140.622	Statistical Methods in Public Health I and Statistical Methods in Public Health II	
	Credits	**7-32**
Fourth Term		
PH.260.820	Thesis Research Molecular Microbiology and Immunology (Variable credits)	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**3-24**
	Total Credits	**19-107**

1 All doctoral degree candidates are required to take one course in biostatistics. The recommended biostatistics course is PH.140.615 Statistics for Laboratory Scientists I. Other courses that fulfill the requirement include: PH.140.611 Statistical Reasoning in Public Health I/PH.140.612 Statistical Reasoning in Public Health II and PH.140.621 Statistical Methods in Public Health I/PH.140.622 Statistical Methods in Public Health II.

Second year and beyond, PhD students should continue to register for a minimum of 16 credits per term, including courses (if any),

- 1 credit for PH.260.821 Research Forum in Molecular Microbiology and Immunology,
- 1 credit for PH.260.822 Seminars in Research in Molecular Microbiology and Immunology, and
- PH.260.820 Thesis Research Molecular Microbiology and Immunology.

PhD students must also register for summer term:

Code	Title	Credits
PH.260.829	Summer Thesis Research	12
Total Credits		**12**

Additional Course Requirements

PhD students must complete the online course Academic and Research Ethics (550.860.82) in the first term they are enrolled. Additionally, PhD students must take Living Science Ethics – Responsible Conduct of Research (550.600, 1st term) or Research Ethics and Integrity (306.665, 3rd term.) These courses are usually taken during the second year and must be taken prior to taking the Preliminary Oral Exam (POE.)

**All doctoral degree candidates are required to take coursework in biostatistics. The recommended biostatistics course is 140.615 Statistics for Laboratory Scientists I. Other courses that fulfill the requirement include: PH 140.638 Analysis of Biological Sequences (3 credits), Ph 140.688 Statistics for Genomics (3 credits)140.611/612 Statistical Reasoning in Public Health 1 & 2 and 140.621/622 Statistical Methods in Public Health 1 & 2.

R3 Course Offerings – Online (.81) and blended (.60) R3 courses by Term.

Code	Title	Credits
First Term		
PH.260.700	How Do We Know? - Theory and Practice of Science	3
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles	3
PH.260.707	Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations	3
PH.260.713	R3 Writing Seminar for Graduate Students	1
PH.260.720	Communications Primer for the Public Health Sciences	1
Second Term		
PH.260.701	Anatomy of Scientific Error	3
PH.260.708	Evidence-Based Teaching in the Biomedical and Health Sciences – Practice	3
PH.260.710	Communication Practice for Health Science Professionals	3
PH.260.713	R3 Writing Seminar for Graduate Students	1
PH.260.715	Unleash Your Writing Superpower: Crafting Clear, Concise and Persuasive Prose	3
PH.260.720	Communications Primer for the Public Health Sciences	1
PH.260.844	Causation	3
Third Term		
PH.260.700	How Do We Know? - Theory and Practice of Science	3
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles	3
PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences	3
PH.260.713	R3 Writing Seminar for Graduate Students	1
PH.260.720	Communications Primer for the Public Health Sciences	1
Fourth Term		
PH.260.701	Anatomy of Scientific Error	3
PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences	3
PH.260.710	Communication Practice for Health Science Professionals	3
PH.260.713	R3 Writing Seminar for Graduate Students	1

PH.260.812	The Performance of Leadership: Foundations	2
PH.260.844	Causation	3
PH.260.848	Community-Based Practice Through Civic Engagement	2

Distribution Requirement
The School requires Ph.D. students to complete a minimum of 18 credits in formal courses outside their own department with no fewer than nine (9) of these credits taken in the Bloomberg School of Public Health. All 18 credits must be taken for a grade (Pass/Fail is not acceptable). Credits earned for Molecular Biology and Genomics and Cell Structure and Dynamics count toward the required credits outside of MMI, as do credits earned for biostatistics. Credits for Academic and Research Ethics, Responsible Conduct of Research and Cells to Society are counted as separate School requirements and are not included in the 18-credit requirement.

Academic Performance and Academic Probation
Doctoral students are required to maintain a 3.0 grade point average and, as noted above, complete required courses with a grade of B or better. Students who do not comply with these and other academic requirements may be placed on Academic Probation by the Graduate Program Committee. Formal notification of Academic Probation generally will be accompanied by conditions that the student must fulfill in order to be returned to good academic standing. Students who fail to meet those conditions may be dismissed from the program.

Winter and Summer Institute Courses
Tuition for these courses is charged separately by the School of Public Health Registrar and is not covered by tuition paid during the academic year. Students wishing to take any of these courses may do so at their own expense.

Certificate Programs
There are several certificate programs offered by the School in specific areas of public health that have fewer course requirements than do formal degree programs. Certificate programs are focused academic training programs designed to appeal to students seeking targeted education in a specific area of public health. Educational objectives, admission requirements, courses of study, and other information are provided for each certificate program and can be found at https://publichealth.jhu.edu/academics/academic-programs/certificate-programs (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/)

Teaching Assistant
Teaching Assistant positions provide students with an opportunity to develop their teaching and interpersonal skills, to work professionally with faculty and fellow students, and to contribute service to the Department.

Policy: All PhD students are required to serve as TA for one course, preferably during the second year of the program. Only MMI courses may be used to fulfill this requirement.

TA Training: Students are required to complete the TA training during their first year in the program. The TA training course is offered twice per year-July-December and January-June. The academic program administrator will verify the student has completed the training prior to starting a TA position.

Compensation: A student will become eligible for TA compensation after they have satisfied the TA requirement. Completion of the requirement will be noted on the IDP/TAC form and eligibility for compensation will be noted on the departmental TA request form.

Additional Opportunities:
Gordis Teaching Fellowship
Teaching Academy- Preparing Future Faculty Program

R^{3}IM Track - Required Courses

All MMI required courses must be passed with a grade of A or B. Students not meeting that standard must repeat the relevant course(s) and pass with an A or B. A student who earns a grade below that threshold in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course or by completing another course that has been approved by the GPC Chair. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards.

First year students must register for 16-22 credits each term. Students in their 2^{nd} year and beyond should register for a maximum of 16 credits.

First year students should register for 260.851 Laboratory Rotation in terms 2, 3 and 4. (See Laboratory Rotations table).

Course	Title	Credits
First Year		
Summer Term		
Introduction to Online Learning: https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90 (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/)/ (non-credit)		
	Credits	**0**
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.260.600	Introduction to the Biomedical Sciences	4
PH.260.700	How Do We Know? - Theory and Practice of Science	3
PH.260.611	Principles of Immunology I	4
PH.260.801	Topics in Immunology I	1
PH.260.607	Methods in life sciences, literature and practice	2
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose 2 of the courses listed below:		
PH.260.623	Fundamental Virology [1]	
PH.120.602	Concepts of Molecular Biology	
PH.260.636	Evolution of Infectious Disease	
PH.260.707	Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations	
PH.260.713	R3 Writing Seminar for Graduate Students	
	Credits	**16**
Second Term		
PH.260.701	Anatomy of Scientific Error [2]	3
PH.260.612	Principles of Immunology II	3

PH.260.802	Topics in Immunology II	1
PH.260.710	Communication Practice for Health Science Professionals [3]	3
PH.260.607	Methods in life sciences, literature and practice	2
PH.260.851	Laboratory Rotations	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	Varies
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose 1 of the courses listed below:		
PH.260.635	Biology of Parasitism	
ME.260.709	Molecular Biology and Genomics (Molecular Biology and Genomics)	
PH.260.710	Communication Practice for Health Science Professionals	
PH.260.844	Causation [4]	
PH.260.715	Unleash Your Writing Superpower: Crafting Clear, Concise and Persuasive Prose [5]	
PH.260.713	R3 Writing Seminar for Graduate Students	
PH.260.709	Evidence-Based Mentoring	3
PH.187.632	Molecular Toxicology	
PH.140.638	Analysis of Biological Sequences	
PH.223.662	Vaccine Development and Application	
	Credits	**21-25**

Third Term

PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences (Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences)	3
PH.260.607	Methods in life sciences, literature and practice	2
PH.260.851	Laboratory Rotations	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose 2 of the courses listed below:		
PH.260.627	Pathogenesis of Bacterial Infections	
PH.260.650	Vector Biology and Vector-Borne Diseases	
PH.260.656	Malariology	
ME.110.728	Cell Structure and Dynamics (Cell Structure and Dynamics)	
PH.140.615	Statistics for Laboratory Scientists I	
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles	
PH.260.713	R3 Writing Seminar for Graduate Students	
PH.221.700	Public Engagement Practices for Scientists (Peps) in International Settings	
PH.306.665	Research Ethics and integrity: U.S. and International Issues	
	Credits	**11-15**

Fourth Term

PH.260.844	Causation [4]	3
PH.260.851	Laboratory Rotations	4 - 8
PH.552.6XX	Cells-to-Society (p. 421)	
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose 1 of the courses listed below:		
PH.260.658	Advanced Malariology	
PH.260.710	Communication Practice for Health Science Professionals	
PH.260.701	Anatomy of Scientific Error	
PH.140.616	Statistics for Laboratory Scientists II	
PH.260.713	R3 Writing Seminar for Graduate Students	
PH.340.618	Epidemiology: the Basics	
PH.120.627	Stem Cells and the Biology of Aging and Disease	
PH.140.688	Statistics For Genomics	
PH.260.848	Community-Based Practice Through Civic Engagement	
PH.187.625	Animals in Research: Law, Policy, and Humane Sciences	
PH.260.812	The Performance of Leadership: Foundations	
PH.223.687	Vaccine Policy Issues	
	Credits	**9-13**
	Total Credits	**57-69**

1) First year students must take **at least three out of either four microbiology** courses: PH.260.623 Fundamental Virology; PH.260635 Biology of Parasitism; PH.260.627 Pathogenesis of Bacterial Infections; PH.260.650. Vector Biology and Vector Borne Diseases. If of interest, students have the option to take any of the microbiology courses that could not be taken in AY 1 as an AY 2 elective.

2) MMI PhD students are required to take two molecular and cell biology courses taught at the School of Medicine – Molecular Biology & Genomics (ME 260.709); Cell Structure & Dynamics (ME 110.728)

3) 260.701 Anatomy of Scientific Error must be taken during AY 1, either during term 2 or 4, however is recommended during term 2.

4) 260.710 Communications Practice for Health Science Professionals must be taken during AY 1 or AY2, either in term 2 or term 4.

5) 260.844 Causation must be taken in either term 2 or 4 of AY 1, or in term 2 of AY 2, however is recommended in Term 4 or AY1.

6) 260.715 Unleash your Writing Superpower must be taken in either term 2 of AY 1 or AY 2.

7) All BSPH doctoral degree candidates are required to take coursework in statistics. To fulfill the statistics requirement for the R^{3}IM track, PH.260.705 Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences, **and either** PH.140.615/616 Statistics for Laboratory Scientists I and II **or** PH.140.611/612 Statistical Reasoning in Public Health I and II must be taken in AY 1 or AY 2, respectively.

8) R^{3}IM track students are required to take either Evidence-Based Teaching (260.707) or Evidence-Based Mentoring (260.708) in either AY 1 or AY2.

Cells-to-Society Requirements for All Degree Programs

The Council on Education for Public Health (CEPH) requires didactic coursework covering and assessing 12 CEPH-defined Introductory Public Health Knowledge Learning Objectives. It is important to emphasize that this is a School-level requirement of all degree programs.

The School's Committee on Academic Standards approved 12 online, 0.5 credit, mini-courses, graded S/U (satisfactory/unsatisfactory) that will cover each of the 12 Learning Objectives (see table below). Each of the mini-courses consists of 3-5, 30-40 minute presentations with an accompanying assessment. **Note:** Certain learning objective can be fulfilled by taking an MMI course that covers this material instead of the mini-course. See notes in the table, below.

Each of the C2S mini-courses will be offered 2-4 times during the academic year. The current schedule can be found at: https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings (https://publichealth.jhu.edu/academics/course-directory/schedule-of-cells-to-society-course-offerings/)

Please note that for the presentation of these mini-courses each term has been split into a A section covering the first 4 weeks of the term and a B section that covers the second 4 weeks of the term.

> **These 12 mini-courses must be completed by the end of the first academic year.**

Code	Title	Credits
PH.552.601	Foundational Principles of Public Health (or take 260.700.81 in term 1 or 260.700.60 in term 3)	0.5
PH.552.602	The Role of Quantitative Methods in Public Health (or take any of the following courses: 140.611-12 (term 1 and 2) or 140.615-16 (term 3 and 4) or 260.705 (term 3 or term 4))	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (or take 260.700 (term 1 or term 3))	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality (or take 260.600 (summer, credit in term 1) or 260.844 (term 2 or term 4))	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (or take 260.700 (term 1 or term 3))	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (or take 260.600 in summer (credit in term 1))	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health (or take 260.844 (term 2 or term 4))	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**6**

Course	Title	Credits
Second Year		
First Term		
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.260.820	Thesis Research Molecular Microbiology and Immunology	Variable
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose from the list below if requirements have not been met in AY1:		
PH.140.611	Statistical Reasoning in Public Health I	
PH.260.707	Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations	
	Credits	**3**
Second Term		
PH.260.625	Scientific Grant Writing [6]	2
PH.260.820	Thesis Research Molecular Microbiology and Immunology	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
Choose from the list below if requirements have not been met in AY1:		
PH.140.612	Statistical Reasoning in Public Health II	
PH.260.708	Evidence-Based Teaching in the Biomedical and Health Sciences – Practice	
	Credits	**5-26**
Third Term		
PH.260.820	Thesis Research Molecular Microbiology and Immunology	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**3-24**
Fourth Term		
PH.260.820	Thesis Research Molecular Microbiology and Immunology	1 - 22
PH.260.821	Research Forum in Molecular Microbiology and Immunology	1
PH.260.822	Seminars in Research in Molecular Microbiology and Immunology	1
	Credits	**3-24**
	Total Credits	**14-77**

Second year and beyond, PhD students should continue to register for a minimum of 16 credits per term, including courses (if any), 1 credit for Research Forum (260.821), 1 credit for Seminars in Research (260.822), and Thesis Research (260.820). PhD students must also register for summer term: 12 credits Summer Thesis Research (260.829).

R3 certificate requirement for support on the Molecular and Cellular Basis of Infectious Diseases (MCBID) T32 training grant

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 The MCBID T32 training grant typically has slots open each
 year to support MMI PhD students.  PhD students who are
 working in the laboratory of a training grant preceptor
 can apply for up to two years of training grant support.
 To receive support, students must commit to completing
 the R3 certificate program as described in the link
 below: https://e-catalogue.jhu.edu/public-health/certificates/
rigorreproducibilityandresponsibilityinscientificpractice/
#newitemtextThe R3 certificate will be considered a PhD degree
 requirement for students who are supported by the MCBID T32.
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Written & Oral Exams

DEPARTMENTAL COMPREHENSIVE EXAMINATION (PHD COMPS)

The School requires a departmentally-administered written comprehensive examination for students in doctoral degree programs. In MMI, the comprehensive examination is intended to test the student's grasp of basic factual material necessary for PhD-level research in molecular microbiology and immunology and their ability to integrate the information obtained in the several disciplines of departmental interest. The examination also assesses each student's ability to identify important scientific problems and to formulate hypotheses and plausible experimental approaches to testing those hypotheses.

The MMI comprehensive exam is given at the end of the first year and has a written and an oral component. The written component of the exam takes the form of a critical review of the literature on a currently active topic relevant to first-year coursework. The review should be limited in scope, but a thorough, scholarly exploration of the topic area. Included should be a discussion of the public health and scientific significance of the topic, a critical analysis of the current state of knowledge in the field including important unanswered questions, a discussion of potential experimental approaches to address those questions, and their implications for future research. The student's written review will be evaluated by a Comprehensive Exam Committee (CEC) of three MMI faculty, with the student's Academic Adviser serving as CEC Chair, and will be defended in an oral examination administered by the same CEC.

This is an examination. Thus, the written review must be the student's own work. However, students must select the review topic in consultation with the Academic Adviser and will receive their CEC's comments on their outline/description (see below). Additionally, students are encouraged to discuss their original ideas, concepts, experimental approaches, etc. with advisers, faculty and colleagues at whatever length. Members of the CEC will not evaluate the written review before submission. The GPC suggests that students hold at least three substantive meetings with their adviser(s): prior to topic selection, before finalization of the outline/description, and during preparation of the review/exam document.

Summary of the Comprehensive Examination Process

- Select a topic relevant to first-year coursework in consultation and with the approval of your academic adviser.
- Submit an email stating the topic, cc'd to the academic adviser, to the Student Coordinator.
- The GPC will appoint a CEC of three MMI faculty members. The student's Academic Adviser serves as the Chair of the CEC.
- Submit an outline or brief description of your topic (about 1 page) to your CEC and to the Student Coordinator. The CEC will comment on the proposed content and organization of the review. If necessary, your adviser will assist in revision of the outline.
- Provide copies of the finished review (4000-5000 words, double spaced, 11 pt font) to each CEC member and to the Student Coordinator. The CEC will grade the review.
- Arrange an oral exam - you are responsible for setting the date and time, subject to CEC member availability.
- Present a 15-minute overview of the written exam document and answer general knowledge questions asked by the CEC. CEC members will grade the oral exam.

MMI Ph.D. Comprehensive Examination Timetable

Steps	Dates	Who is Responsible?
Letter stating topic due to Student Coordinator	4/3/2023	Student
Review Committee appointed	4/10/2023	GPC
Outline/description due	4/17/2023	Student
Committee response to student	5/1/2023	Adviser/Committee
Final review due	6/12/2023	Student
Grades/request for revision due from committee members	6/19/2023	Committee members
Oral examinations completed	7/21/2023	Student/Committee

Written Component

The written review will be graded Pass/Conditional Pass/Fail in its entirety on criteria that include:

- Significance to the field
- Quality of the literature review, including inclusion of primary literature, depth and synthesis of the review, and inclusion of recent literature
- Quality of critical analysis of the state of the field
- Clarity and precision of writing
- Quality of assessment of future research directions

CEC members will grade the review, meet to discuss the critiques and determine the outcome, and the Chair, on behalf of the CEC, will inform the student of a Pass, Conditional Pass, or Fail. A Conditional Pass constitutes minor revisions that the CEC has decided would help the student improve the quality of the written document, but that does not preclude progression to the oral component.

A Fail that requires a substantial revision to the document before the student can proceed to the oral component. The CEC will document the areas that need revision and, in consultation with the student, set a timeline for providing the revised document to the CEC for assessment. The revised document will be due at least two weeks prior to the rescheduled oral examination date. If the revised document does not receive a unanimous grade of Pass from the CEC, this will constitute a second failure of the written portion of the Comprehensive Examination and will trigger a meeting of the GPC to consider the student's dismissal from the PhD program.

Oral Component

The oral exam will consist of a brief (10-15 minute) oral summary of the review topic, followed by questions from the committee. Students are strongly encouraged to use PowerPoint, Keynote, or similar software in presenting their summary. During the exam, questions will address topics both related to and outside the immediate subject area of the proposal to assess the student's breadth of understanding of material presented in required coursework, departmental seminars, and research forum. The oral exam will be one to two hours long. The student is responsible for reserving a room for the exam (the Student Coordinator can assist if needed.)

Scoring of Oral Component

After the oral exam, the committee will meet in private to determine an outcome. Possible outcomes are Pass, Conditional Pass, or Fail. The committee will impose specific conditions upon students who receive a Conditional Pass and will specify a timetable and mechanism for satisfying the condition. The outcome of the oral component will be reported to the Student Coordinator by the adviser by e-mail.

A student who passed the written component in their first try, but fails the oral defense must repeat the oral defense within a time frame specified by the committee. The student should meet with each committee member to discuss the areas that need improvement before scheduling a second oral exam.

The following framework should be used in evaluating the oral defense:

- 20% of emphasis: Summary.
- 30% of emphasis: Discussion of questions posed by committee specific to the review, including
  - Explanation of why this topic was selected from subject matter
  - Demonstration of knowledge of concepts and terms used
  - Demonstration of understanding of experimental evidence discussed
- 50% of emphasis: Discussion of questions extending beyond immediate subject areas to other fields in microbiology and immunology. (Remember, this is a Comprehensive Exam.)

Outcome of the comprehensive exam. Each student has two attempts to pass their comprehensive exam. A failure on either the written or the oral component, constitutes failure of the comprehensive exam. A total of two determinations of 'fail', on either the written, the oral, or a combination of the components, constitutes failure of the exam and may result in dismissal from the PhD program. For example, a student who passes the written component after two tries but then fails the oral defense may be dismissed from the PhD program.

Preliminary Oral Examination

Note: PH.550.600 Living Science Ethics - Responsible Conduct of Research **and the 552.6XX Cells-to-Society series must be completed before taking the POE.**

The purpose of the preliminary oral examination (POE), an exam required by the University for all PhD candidates, is to determine whether the student has the depth and breadth of scientific and technical knowledge to undertake dissertation research. Examiners will be concerned with the student's reasoning ability; depth and breadth of knowledge; and ability to develop and conduct research leading to a completed thesis or dissertation. The POE is conducted by a committee of examiners usually selected by the student's adviser according to eligibility rules set by the university (link below). Note that the student's adviser, or co-adviser of record, is NOT a member of the POE committee. Diversity and inclusion are encouraged on the POE and any student who would like to include a faculty member from outside of the University, including faculty members from groups underrepresented in the biomedical sciences, on the POE voting committee, may do so by having their adviser seek appointment of the outside faculty member to a Senior Associate position at the BSPH. Appointment as a Senior Associate must be requested in a letter by the Department Chair in a nomination letter to the Dean, for vote by the School's Advisery Board. A copy of the external faculty member's CV (in BSPH CV format) must be included.

The POE must be scheduled by February 1 and completed by March 31 in the student's second year. If a committee/date is not set by February 1, the GPC will assume the responsibility for committee assignment and scheduling of the student's POE. The GPC's decisions will be made with input from the adviser if offered, but to simplify scheduling, the GPC will not feel obligated to honor requests for certain examiners or dates. The student is responsible for arranging for a room for the exam.

The PPM describing the preliminary oral exam process: https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_071717.pdf

The preliminary oral examination form can be found here: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx

Please note that the POE form must be submitted to the School of Public Health Registrar's Office at least one month prior to the exam.

At least two weeks prior to the scheduled date of the exam, the student should make their Grant Writing Course proposal available to the committee members. This is for background purposes and the proposal will not be evaluated as part of the exam by committee members, nor will the examination be confined to topics related to the proposal.

Conduct of the Exam

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The student's adviser does not participate in the student's POE.
  However, in the student's absence, the adviser will provide
 a brief overview of the student's research progress to the
 committee prior to the start of the POE.
The student may prepare a short talk (5 min) based on their
 proposal and/or their anticipated research project to serve as
 an introduction to the examination.  If a presentation is made,
 students are strongly encouraged to make use of PowerPoint,
 Keynote, or similar presentation software.
Exams last 1 to 2 hours. After the exam, a form indicating the
 outcome (Pass, Conditional Pass, or Fail) will be filled out
 by the examiners and returned to the School of Public Health
 Registrar.  It is suggested that the POE Committee Chair inform
 the student's PI of issues that arose in the course of the exam.
 In particular, if the outcome of the exam is a Conditional Pass
 or Failure, the advisor will require this information to assist
 the student in correcting deficiencies.
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Requirement for a Conditional Pass includes demonstration of a limited deficiency in a specific area. Examples of acceptable requirements that can be used to fulfill a Conditional Pass include:

1. Reading assigned literature in the area of deficiency and taking an oral examination on the subject material; and
2. Reading assigned literature in area of deficiency and writing a review paper to be read by one or more POE committee members.

Requirement for a Fail includes demonstration of a significant deficiency in two or more areas. Receipt of a Fail requires retaking the POE. A student who receives a Fail on a POE will be granted one additional try to pass the POE. Two Fails on the POE will result in termination from the PhD program.

After the completion of the preliminary oral exam, PhD students will be required to complete a "Thesis Documentation Form." Melissa Cooke in the Dean's Office collects these forms. Final orals paperwork will not be processed unless this form is on file with the Dean's Office.

MMI F31 Proposal Requirement

Success in obtaining independent funding for research is an essential element of most scientific careers. Therefore, as part of their training, each MMI PhD student is required to submit a grant proposal for funding by outside agencies. It is anticipated that most proposals will be for NIH F31 grants, but similar applications to NSF or other governmental or non-governmental organizations will also fulfill the requirement.

The grant application must be submitted by the end of the summer term (late August) in the student's second year, for example, on the F31 NIH submission deadlines of April 8th or August 8th.

Proposals will generally be written on the student's thesis project (or anticipated thesis project) and should be prepared in close cooperation of the student's PI. Additionally, each student must obtain written critiques of a draft of the proposal from two different MMI faculty members apart from the PI prior to submission. Since students will have formed Thesis Advisory Committees (TACs) by that time, it is suggested that members of the TAC be identified as reviews. Proposal drafts should be submitted to these reviewers at least ONE MONTH before the application is due at the School's Office or Research Administration (ORA) or to the sponsoring organization. Note that for many applications (for example, NIH applications), the ORA deadline is several days before the sponsor's due date.

Students must notify the Student Coordinator of grant application submissions by completing a form available from the MMI portal. TACs will record submissions on the TAC report form. https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx

Publication Requirement

Publication is an essential component of training for a research career and a strong publication record as a graduate student is of great benefit to the trainee, the laboratory, and the program. Therefore, each PhD student in MMI is required to have published or submitted for publication in a peer-reviewed journal one or more first-author manuscripts prior to the date of the Final Oral Examination. Publication plans should be discussed as part of the IDP portion of each TAC meeting, and the TAC must indicate on the TAC Report Form whether the student is making satisfactory progress toward publication. If not, the TAC must provide a written recommendation for steps to be followed to expedite publication. Students must notify the Student Coordinator of first author publications by completing the First Author Form available from the MMI departmental portal. https://my.jhsph.edu/sites/MMI/academic-forms/default.aspx. Submission of the First Author Form is required before the student's paperwork can be submitted to schedule their final defense.

Final Oral Exam

The PhD thesis/dissertation is the culminating product of a student's PhD studies and provides a permanent record of a student's intellectual contribution to the field. Unlike published papers that might result from the same work, the thesis both requires and provides opportunity for the student to creatively place their work in the broadest possible context, explore implications, and speculate on where the future of the field lies. Preparation of a thesis requires the greatest care both in thought and execution.

Most students find that writing a dissertation requires much more time and effort than expected. For that reason, students are encouraged to write as they go, rather than wait for the final few weeks of their graduate careers. Students are also encouraged to work closely with their advisers on thesis organization, scope, and content. To facilitate these recommendations, the Department requires a student to submit a draft of each of the components of the thesis to their adviser at least eight weeks prior to the Final Oral Examination (thesis defense) date, and to submit a final draft of the complete thesis to the readers at least four weeks prior to that date. Readers will provide comments on the thesis at or before the Final Oral Examination and may require that changes be made prior to approval.

The Committee of Thesis Readers conducts the Final Oral Examination and ultimately must approve the thesis. Diversity and inclusion are encouraged for the Final Oral Exam and any student who would like to include a faculty member from outside of the University, including faculty members from groups underrepresented in the biomedical sciences, on the Final Oral Exam voting committee, may do so by having their adviser seek appointment of the outside faculty member to a Senior Associate position at the BSPH. Appointment as a Senior Associate must be requested in a letter by the Department Chair in a nomination letter to the Dean, for vote by the School's Advisory Board. A copy of the external faculty member's CV (in BSPH CV format) must be included.

School-wide policies and deadlines governing the selection of readers, conduct of the oral examination, and approval of the written thesis are available from the School of Public Health Registrar's office and online: https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Programs_03_Doctor_Of_Philosophy_Degree_071717.pdf.

Note:The Appointment of Thesis Readers and Final Orals Form must be submitted to the School of Public Health Registrar's Office for processing at least one month prior to the scheduled exam.

Comprehensive information for doctoral students including timelines, guidelines, exam and graduation information for doctoral students, including Thesis Reader Appointment forms can be found here: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Pages/default.aspx

Details of the required format of a PhD thesis are available at: https://www.library.jhu.edu/library-services/electronic-theses-dissertations/

For dissertations that contain published work, suitably modified versions of the published manuscripts may be used as chapters, with careful attribution of the work of co-authors. In general, because the depth of the introductions and discussions of published papers are not sufficient for thesis use, and additional introductory and summary chapters will be required in the thesis.

Essay/thesis writing/editing assistance is offered at both campuses:

- JHMI: Editing Referral Service: http://www.hopkinsmedicine.org/fac_development/researchers/publishing.html#ERS
- JHU: Writing Center: http://krieger.jhu.edu/writingcenter/about/

Other resources: https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/)

Official PhD thesis submission to the University is now done electronically. Please review the checklist for specific requirements regarding thesis submission: https://my.jhsph.edu/Offices/StudentAffairs/RecordsRegistration/DoctoralCandidateInfo/Documents/AFTER%20 THE%20FINAL%20DEFENSE%20-%20Revised%20March%202019.pdf

The department requires one printed copy of the PhD thesis, which will be kept in the Department Library. Students should provide the Student Coordinator with a PDF, and they will have a copy printed for the department.

Final Seminar Presentation

At the conclusion of their dissertation research, students are required to present their work at a formal seminar that is advertised throughout the University and open to the public. This seminar is scheduled in conjunction with the Final Oral Examination.

Time Limits

PhD students must successfully complete all program-specific requirements (such as a dissertation, as detailed in the specific program PPMs) within 7 years. Extensions are possible and must be formally approved by the Committee on Academic Standards.

Program Policies

Vacation/Holiday Policy

Graduate student holiday and vacation schedules traditionally have been flexible to accommodate the varied demands of individual research projects. Guidelines which reflect the Department's expectations are outlined below. These guidelines are not intended to eliminate flexibility in the scheduling of holidays and vacation, and do not replace any conditions that might be imposed by fellowships/funding agencies. These guidelines also do not restrict legitimate academic or research activities conducted off campus, such as attendance at scientific meetings and field work. Students are generally entitled to the following holidays and vacation time:

- University holidays
- Spring break
- The period between last day of 2nd term and the first day of winter intersession
- A fortnight vacation in the second and subsequent years as scheduled by arrangement with the adviser.

Graduate students are expected to be present during winter intersession and summer term or as required by their experimental protocols.

Leave of absence

A leave of absence (LOA) is for students who are forced to take a temporary break from their programs of study due to reasons beyond their control, such as illness, military service, financial exigency, or pressing personal reasons justifying an interruption of their graduate studies. A leave of absence is an officially recognized inactive student status that is entered on a student's academic record. LOA cannot be used by a student working on a thesis who has completed all other degree requirements. LOA is limited to one academic year except for military service. Application for LOA must be made on a form available from Student Coordinator. Please discuss any potential LOA with your mentor and the Student Coordinator. Please review the BSPH Schoolwide Policy (p. 641).

Parental leave

Graduate students may request parental leave following the adoption or birth of a child. Parental leave applies to either or both parents and includes sixty calendar days of stipend/salary support and health insurance coverage. Parental leave must be requested on a Departmental Paid Leave of Absence form, available from the MMI administration. More detailed information is available here (https://policies.jhu.edu/?event=render&mid=764&pid=32391&fid=policy_32391.pdf&_=0.0023679474985).

Sick Leave

All students receiving a fellowship/stipend from BSPH for full-time study while enrolled in a Master's or PhD program at the School are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a student's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure. When a student takes sick leave, they should notify their faculty adviser and keep them as up to date as feasible. At its discretion, the department or adviser may require the student to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a student's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the student and the adviser to the Department Administrator as quickly as possible. If the illness requires an extended absence, the student may apply for a leave of absence.

Policy for MMI PhD Students Changing Thesis Laboratories

MMI PhD students occasionally want to, or have to, change thesis laboratories. In all cases, PhD students must choose to do their thesis research in the laboratory of a faculty member with a primary appointment in MMI, or in the laboratory of a faculty member with a joint appointment in MMI who is also designated as a trainer on an MMI training grant. Students can request a list of current training faculty who are eligible to accept PhD students from the academic coordinator or the Graduate Program Committee (GPC) chair at any time. To remain in good standing, students should adhere to the following process:

PhD students considering changing thesis laboratories must first schedule a confidential meeting with the departmental ombud to discuss the proposed change. Based on the discussion, the ombud may direct the student to additional resources such as the BSPH Office of Student Life or the university ombuds office.

The student may then consult with faculty members to identify a new thesis laboratory and thesis project. At some point during this process, the student must notify their current adviser of the proposed change with copy of this correspondence also sent to the graduate student coordinator, the department administrator and the chair of the GPC. The student must work with their current adviser in a professional manner to transfer any relevant notes, data, reagents or supplies.

The student and proposed new thesis adviser must then submit the Thesis Adviser Form to the graduate student coordinator for approval by the departmental administrator. In addition to serving as a commitment to advise the student, this form also details the available financial support. Once this form has been approved, the student will be free to pursue thesis research in the new laboratory.

Learning Outcomes

MMI PhD students will:

- Attain an in-depth understanding of the molecular and cellular basis for infectious and immunological diseases through structured course work, informal instruction, mentoring, and firsthand knowledge gained during dissertation research.
- Develop the ability to critically analyze scientific data.
- Learn how to create sound hypotheses and to test hypotheses employing the scientific method.

- Attain a broad understanding of the theory, utility, and limitations of classic and modern scientific approaches and techniques.
- Develop the ability to adapt current methods or to develop a new methodology to address specific scientific problems.
- Acquire the communication skills necessary to effectively report research findings to other scientists as well as to the non-scientific community.
- Gain an appreciation for the tenets of professional and scientific ethics.

The Department's Graduate Program Committee (GPC) and faculty constantly monitor the components of the MMI graduate program for its effectiveness. Adjustments are made when necessary to maintain an optimal balance of didactic, literature-based, and technical training.

Professional Development

In addition to the commitment to enhancing their scientific knowledge base, critical thinking and research skills, MMI is equally dedicated to students development as a science professionals. Experience teaches that students who start the process of formulating and refining a career plan early in their academic career have a better chance of achieving their goals. In this spirit, MMI requires that starting in their first year each student participate in the structured career and professional development OPTIONS program offered by the Johns Hopkins Professional Development and Career Office (PDCO). This multi-year program is designed to help students identify career objectives and systematically devise and implement a strategic plan to achieve their goals. This plan includes a series of programs - **Career Exploration**, **Career Development**, and **Career Readiness** – that provide opportunities to explore career options, train in and develop valuable professional skill sets, and even gain hands on experience as an intern in their field of interest. In addition, PDCO holds **Career Clinics** to aid students in preparing winning resumes, CVs, and web pages to prepare them to enter the marketplace. See the PDCO web site for details of the program. https://pdco.med.jhmi.edu/. The progress and direction developed through the PDCO program will be monitored at each Thesis Advisory Committee meeting and documented in each student's customized Individual Development Plan (IDP).

In addition to the program offered by the PDCO, MMI has academic offerings designed to assist students with professional development such as the required course Scientific Grant Writing (260.625) and the elective Business of Academic Biomedical Research (260.815).

Johns Hopkins Teaching Academy

The Teaching Academy serves as an exceptional graduate and post-doctoral fellow professional development program. The Teaching Academy offers PhD students and post-doctoral fellows, college-level teacher training and academic career preparation opportunities through courses, workshops, teaching practicums, teaching as research fellowship appointments and individual consultation. The Teaching Academy is located in the Center for Educational Resources (CER) in the Garrett Room of the Milton S. Eisenhower Library on the Homewood campus. How to find us: https://cer.jhu.edu/teaching-academy (https://cer.jhu.edu/teaching-academy/).

NOTE: Teaching or outside work: Federal law stipulates a maximum of 19 hours for paid work outside of laboratory thesis work. All paid fellowships, part-time working opportunities and teaching need to be discussed with the student's primary adviser.

Career Resources

The Career Services Office at the Bloomberg School helps students, alumni, faculty, staff and employers navigate the world of public health jobs. Career Services Office provides valuable resources to assist students in the process. Specifically, the Bloomberg School's Career Services Office provides career coaching, resume preparation, a database of jobs and internships, and networking opportunities.

Non-Degree Training

Postdoctoral Training

Postdoctoral fellows (PDFs) are trained in most laboratories in MMI. Postdoctoral training provides the opportunity for doctoral degree holders trained in more traditional environments to broaden their exposure to problems of public health importance and offers the opportunity for rigorous advanced training in those areas of public health biology that are the special expertise of MMI faculty.

Postdoctoral training consists primarily of close interaction with the trainee's preceptor in the performance of a research project. At the end of the first three months in residence and for each subsequent year, PDFs are to complete an individual development plan with their preceptor and mentor team in an effort to provide a formal opportunity to define goals and expectations as well as recommend actions that will assist the PDF successfully realize their preferred career path.

Didactic courses in the School and other divisions of the University also are available to PDFs, who are considered by the School to be non-degree students. PDFs attend the MMI Seminar Series and are invited to attend and present posters or talks at the annual MMI Retreat. In addition, MMI conducts a summer continuation of Research Forum devoted exclusively to research seminars delivered by PDFs.

PDFs are also encouraged to participate in special career development courses and workshops administered through the Johns Hopkins Medical Institutes Professional Development Office (https://pdco.med.jhmi.edu/) – e.g., *Grantcraft, Your Research Career, Research Leadership*. Undergraduate teaching opportunities are available through the mentored Instructional Associate Program at the Notre Dame of Maryland University.

Individuals interested in pursuing postdoctoral training in MMI should contact individual investigators directly.

Department of Population, Family and Reproductive Health

About

Our mission is to optimize the health and well-being of individuals, families, and populations across the life course through public health science, teaching and practice locally, nationally, and globally. Learn about the Life Course Framework. (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/research-and-practice/life-course-framework/)

The Department of Population, Family and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/) is grounded in a life course framework with domestic and international areas of interest including: adolescent health; child health; maternal, fetal and perinatal health; population and health; sexual and reproductive health; women's health. Skills emphasized in departmental training include: population sciences, behavioral science, program evaluation, evidence based advocacy and the translation of research for programs and policy.

Centers and Initiatives

PFRH is home to eight research centers and initiatives that provide unrivaled hands-on experience with industry leaders domestically and globally.

- Bill and Melinda Gates Institute for Population and Reproductive Health (https://www.gatesinstitute.org/)
- Center for Adolescent Health (https://www.jhsph.edu/research/centers-and-institutes/center-for-adolescent-health/)
- Center on the Early Origins of Disease (https://www.jhsph.edu/departments/population-family-and-reproductive-health/center-on-early-life-origins-of-disease/)
- Center of Excellence in Maternal and Child Health (http://jhu-mchcenterofexcellence.org/)
- Child and Adolescent Health Measurement Initiative (CAHMI) (https://www.jhsph.edu/departments/population-family-and-reproductive-health/child-adolescent-health-measurement-initiative/)
- Early Childhood Services Research Program (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/research-and-practice/life-course-framework/child-health/early-childhood-services-research-program/)
- Hopkins Population Center (https://popcenter.jhu.edu/)
- Women, Infants and Children Program (WIC) (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/research-and-practice/child-health/women-infants-children/)

Degree Programs

- Population, Family and Reproductive Health, MHS (p. 431)
- Population, Family and Reproductive Health, MHS Online (p. 438)
- Population, Family and Reproductive Health, MSPH (p. 444)
- Population, Family and Reproductive Health, PhD (p. 457)

Faculty

Meet the faculty of PFRH. (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/people/faculty/)

Summer Institute

Summer Institute in Data to Policy (https://publichealth.jhu.edu/academics/summer-institute-in-data-to-policy/) offered by Department of Population, Family and Reproductive Health. The Data to Policy in Population, Family and Reproductive Health Summer Institute is designed to equip students with skills needed to understand population-based data and shape policies related to families, reproductive health, and the health of populations.

Departmental Seminars

Departmental Seminars PFRH holds a noon seminar series every Wednesday 1st through 4th term. PFRH students are required to attend. The schedule of seminars will be sent in advance via email to all PFRH students and listed in the JHSPH Weekly Calendar. All graduating master's students are required to make a presentation of their thesis results in a formal academic setting, which may include the departmental noon seminar or a professional meeting. For upcoming seminars and recording of past seminars, please visit our news and events page (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/news-and-events/).

PFRH Teaching Assistant Policy

The Department of Population, Family and Reproductive Health supports full-time graduate students serving in the role of teaching assistants (TA). The department values the educational and learning experience that students gain through participating as a TA in addition to providing monetary compensation to them. The department classifies TA positions into 2 levels: 1.0 FTE TA and 0.5 FTE TA. The expectation for time commitment as well as monetary compensation differs for the two levels. Part-time students are not eligible for TA positions due to FLSA rules.

Information about current TA positions will be sent to students throughout the year. Typically, students should have already taken the course in order to be a TA. Students wishing to serve as a TA in a course should meet with the course instructor prior to agreeing to serve as a TA and discuss the nature of the course as well as the faculty member's expectations. Both should discuss the responsibilities of the TA as well as the tasks the department deems beyond the scope of the TA to be sure there are no misunderstandings about roles. The expected number of hours/week as well as preparation needs should also be addressed. Once a student and faculty member have agreed, they both must sign the TA agreement form; students submit it to the department's payroll office.

The number of hours that a TA actually works may vary substantially from course to course, but it is generally expected that a TA will begin work approximately two weeks prior to the start of the course and continue to work at least 10 days beyond the last class session or until grades are submitted. 1.0 FTE TA is expected to attend each class session. 0.5 FTE TAs may or may not be required to attend class sessions.

Population, Family and Reproductive Health, MHS

The academic Master's of Health Science (MHS) program allows students to select from the five areas of interest listed below. This full-time, one-year, 64 credit program is designed for those with a desire to enhance their research skills in public health and includes both methods and content courses. Students choose one of four methodological approaches: demography; behavioral and social sciences; epidemiology; or health services research and evaluation. The one-year curriculum is intended for students with two or more years of public health or related experience to inform their area of research inquiry prior to entry into the program.

The Department's current areas of interest in the MHS program include:

- Adolescent Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/adolescent-health/)
- Child Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/child-health/)
- Maternal, Fetal, and Perinatal Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/maternal-fetal-perinatal-health/)
- Population and Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/population-and-health/)

- Women's, Sexual and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/women-sexual-and-reproductive-health/)

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

MHS Departmental Competencies

Code	Title	Credits
Competency 1: Applying statistical methods to address the health of populations (Choose 4 in sequence)		
PH.140.621	Statistical Methods in Public Health I	4
OR		
PH.140.651	Methods in Biostatistics I	4
AND		
PH.140.622	Statistical Methods in Public Health II	4
OR		
PH.140.652	Methods in Biostatistics II	4
AND		
PH.140.623	Statistical Methods in Public Health III	4
OR		
PH.140.653	Methods in Biostatistics III	4
AND		
PH.140.624	Statistical Methods in Public Health IV	4
OR		
PH.140.654	Methods in Biostatistics IV	4

Code	Title	Credits
Competency 2: Applying epidemiological methods to address the health of populations (Choose 1)		
PH.340.721	Epidemiologic Inference in Public Health I	5
OR		
PH.340.751	Epidemiologic Methods 1	5

Code	Title	Credits
Competency 3: Applying ethical concepts and tools to population health research and practice.		
PH.550.860	Academic & Research Ethics at BSPH	0
AND		
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3
OR		
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
If student takes 550.600, must also takes one of the following:		
PH.306.663	Legal and Ethical Issues in Health Services Management	3
OR		
PH.221.616	Ethics of Public Health Practice in Developing Countries	2

CEPH Learning Objectives

Code	Title	Credits
CEPH Learning Objective 1 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.552.601	Foundational Principles of Public Health	0.5
CEPH Learning Objective 2 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.552.601	Foundational Principles of Public Health	0.5
CEPH Learning Objective 3 (Must take both)		
PH.380.603	Demographic Methods for Public Health	4
AND		
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
CEPH Learning Objective 4:		
PH.380.600	Principles of Population Change	4
CEPH Learning Objective 5 (Choose 1):		
PH.340.721	Epidemiologic Inference in Public Health I	5
OR		
PH.340.751	Epidemiologic Methods 1	5
CEPH Learning Objective 6 (Choose 1):		
PH.380.664	Reproductive and Perinatal Epidemiology	4
OR		
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge	0.5
CEPH Learning Objective 7 (Choose 1):		
PH.380.616	Child Health Epidemiology	3
OR		
PH.552.607	Essentials of Environmental Health	0.5
CEPH Learning Objective 8:		
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
CEPH Learning Objective 9:		
PH.380.604	Life Course Perspectives on Health	4
CEPH Learning Objective 10:		
PH.380.604	Life Course Perspectives on Health	4
CEPH Learning Objective 11:		
PH.552.611	Globalization and Population Health	0.5
CEPH Learning Objective 12:		
PH.552.612	Essentials of One Health	0.5

Students must select 2 research methods courses within a methodological area of their choice: behavioral/social science; epidemiology (2 different options); or health services research and evaluation. The methods areas and course requirements are listed in alphabetical order below.

Behavioral/Social Science Specialty Core Requirements

Code	Title	Credits
PH.380.611	Fundamentals of Program Evaluation	4
Data Collection and Analysis (Choose 1):		
PH.340.717	Health Survey Research Methods	4
PH.380.711	Issues in Survey Research Design	3
PH.224.690	Qualitative Research Theory and Methods	3
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.140.658	Statistics for Psychosocial Research: Structural Models	4
PH.224.690	Qualitative Research Theory and Methods	3
PH.224.691	Qualitative Data Analysis	3

*Multi-term course. Students must take both 224.690 and 224.691 in order to receive a grade for the course. 220.689 is a prerequisite for the course.

Epidemiology Specialty Core Requirements

Code	Title	Credits
Choose either Option 1 or Option 2		
Option 1 Professional Track:		
PH.340.722	Epidemiologic Inference in Public Health II	4
Data Collection (Choose 1):		
PH.340.717	Health Survey Research Methods	4
OR		
PH.380.711	Issues in Survey Research Design	3
OR		
PH.340.770	Public Health Surveillance	3
Option 2 (must take both):		
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5

Health Services Research and Evaluation Specialty Core Requirements

Code	Title	Credits
Choose 1:		
PH.380.611	Fundamentals of Program Evaluation	4
OR		
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	2
AND		
PH.309.617	Introduction to Methods for Health Services Research and Evaluation II	2
Choose 1:		
PH.380.612	Applications in Program Monitoring and Evaluation	4
OR		
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	4
OR		
PH.340.717	Health Survey Research Methods	4
OR		
PH.380.711	Issues in Survey Research Design	3
Students who take 309.616 must also take 309.617.		

Students must take both 224.690 and 224.691 in order to receive a grade for course. Course 220.689 is a prerequisite for the courses.

Adolescent Health Area of Interest

Code	Title	Credits
Competency 1:		
PH.380.604	Life Course Perspectives on Health	4
Competency 2 (Choose 1):		
PH.380.600	Principles of Population Change	4
OR		
PH.380.603	Demographic Methods for Public Health	4
Competency 3 (Choose 1):		
PH.380.623	Adolescent Health and Development	3
OR		
PH.380.747	International Adolescent Health	3
Competency 4 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.380.665	Family Planning Policies and Programs	4
Competency 5:		
PH.380.725	The Social Context of Adolescent Health and Development	3

Child Health Area of Interest

Code	Title	Credits
Competency 1:		
PH.380.604	Life Course Perspectives on Health	4
Competency 2 (Choose 1):		
PH.380.600	Principles of Population Change	4
OR		
PH.380.603	Demographic Methods for Public Health	4
Competency 3 (Choose 1):		
PH.380.616	Child Health Epidemiology	3
OR		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	3
OR		
PH.380.623	Adolescent Health and Development	3
Competency 4 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.380.661	Clinical Aspects of Maternal and Newborn Health	3
Competency 5 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.380.744	Nutrition and Growth in Maternal and Child Health	3

Maternal and Child Health Area of Interest

Code	Title	Credits
Competency 1:		
PH.380.604	Life Course Perspectives on Health	4

Competency 2 (Choose 1):		
PH.380.600	Principles of Population Change	4
OR		
PH.380.603	Demographic Methods for Public Health	4
Competency 3 (Choose 1):		
PH.380.664	Reproductive and Perinatal Epidemiology	4
OR		
PH.380.616	Child Health Epidemiology	3
OR		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	3
Competency 5 (Choose 1):		
PH.380.642	Child Health and Development	3
OR		
PH.380.744	Nutrition and Growth in Maternal and Child Health	3
OR		
PH.380.623	Adolescent Health and Development	3
OR		
PH.380.747	International Adolescent Health	3
OR		
PH.380.725	The Social Context of Adolescent Health and Development	3

Maternal, Fetal and Perinatal Health Area of Interest

Code	Title	Credits
Competency 1		
PH.380.604	Life Course Perspectives on Health	4
Competency 2 (Choose 1):		
PH.380.600	Principles of Population Change	4
OR		
PH.380.603	Demographic Methods for Public Health	4
Competency 3 (Choose 1):		
PH.380.664	Reproductive and Perinatal Epidemiology	4
OR		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	3
Competency 4 (Choose 1):		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.380.665	Family Planning Policies and Programs	4
OR		
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries	4
Competency 5 (Choose 1):		
PH.380.655	Social and Economic Aspects of Human Fertility	3
OR		
PH.380.750	Migration and Health: Concepts, Rates, and Relationships	3
OR		
PH.380.756	Poverty, Economic Development, and Health	4

Women's Sexual and Reproductive Health Area of Interest

Code	Title	Credits
Competency 1:		
PH.380.604	Life Course Perspectives on Health	4
Competency 2 (Choose 1):		
PH.380.600	Principles of Population Change	4
OR		
PH.380.603	Demographic Methods for Public Health	4
Competency 3 (Choose 1):		
PH.380.664	Reproductive and Perinatal Epidemiology	4
OR		
PH.380.666	Women’s Health	3
Competency 4 (Choose 1):		
PH.380.665	Family Planning Policies and Programs	4
OR		
PH.380.771	Understanding and Changing International Reproductive Health Policy	3
OR		
PH.380.667	Women’s Health Policy	3
OR		
PH.380.768	Selected Topics in Women’s Health and Women’s Health Policy	4
OR		
PH.380.760	Clinical Aspects of Reproductive Health	3
Competency 5 (Choose 1):		
PH.380.655	Social and Economic Aspects of Human Fertility	3
OR		
PH.380.668	International Perspectives on Women, Gender, and Health	3

MHS Essay and Presentation Guidelines

The Master’s Essay is a requirement for graduation from the MHS program in the Department of Population, Family, and Reproductive Health. The goal of the essay is for students to apply the skills and knowledge they have acquired during their academic program to a public health problem or concern of interest to them; a priority for the essay is that it has a research focus even if it does not involve data analysis. In addition to the written essay, students must give a 10-minute public presentation of their essay.

Students should begin thinking about essay topics and format at the end of the first term.

During Terms 3 and 4 of their studies, students will register for PFRH Master’s Essay (380.850), designating their first reader as the instructor. Guidelines for credit hours are as follows:

- Term 3: 3-6 credits
- Term 4: 3-5 credits
- Students need to take a minimum of 3 credits of special studies each term for the essay
- If taking more than 3 credits student must meet weekly with 1st reader

The following sections provide detailed guidelines about the essay and presentation.

Essay Readers

Students must have at least one reader for their essay. The following guidelines must be applied:

- The students' reader must be PRFH faculty; faculty with a joint appointment in PFRH can be a reader.
- If a student wishes to select a reader who is not PFRH faculty, then a second reader from PFRH must also be selected.

Responsibilities of Students and Readers

Primary Reader

The essay reader has the overall responsibility of working with the student on the essay from the outline to final draft, and on preparation for the presentation. They must be identified as the instructor for the special studies course for the PFRH Master's Essay Essay (380.850) in the 3rd and 4th terms. Students must submit outline and essay drafts to the primary reader on key dates starting in November through April; these dates are indicated to assure timely completion of the essay.

Second Reader

A second reader may also provide comments on the essay at any stage. A second reader will seldom be needed but may be asked if a student is using data from a study conducted by the reader or at the agency of the reader. If a second reader is external to the department, students are strongly advised to discuss the roles and responsibilities of this reader with their primary reader. Second readers do not give approval for the essay, unless the first reader is external to PFRH.

The essay must meet the standards required by faculty of the School. However, student who are using data affiliated with the second reader or the second reader's agency should provide drafts of the essay to this reader and discuss when feedback will be given to the student from the reader.

Choosing a Topic and Format for the Essay

In addition to selecting a topic and readers, students select one of five formats for the essay:

- Research Report
- Analysis of a Public Health Problem or Legislation Position Paper
- Structured Literature Review
- Evaluation of a Program/Project
- Research Proposal

Given the research/academic focus of MHS degree, the essay should include data to support the topic even if it is not a research report. Students may a public health concern or problem which may or may not be in their area of interest.

The student and their adviser must verify the knowledge and skills required for the selected essay format (see Essay Topic Form); for example, students conducting a systematic literature review for their essay must have taken a related course or work with a primary reader with methodological expertise in systematic reviews.

Steps to Complete the Essay

Step 1: Identify topic, format, and readers

Students should identify a reader whose research interests and expertise are in the topic area or methodology for the essay. Advisers are as a useful resource for discussing potential topics of interest and providing referrals to other faculty members in the department whose expertise may better match the proposed topic of the essay. Other resources for identifying potential readers are the Master's Director, academic coordinators and PFRH website.

Step 2: Discuss roles and responsibilities with readers

Once readers have been identified, all students should have a conversation with their readers so that each knows their responsibility for the essay. This discussion is especially important for readers outside PFRH and especially for third readers. A timeline should also be provided to the readers so that each is aware of when feedback should be provided. In general, readers should be given at least a minimum of one week to provide feedback to students. While not required, the student and readers also should discuss plans to publish the essay and the order of authors for the publication. Separate guidelines regarding authorship will be provided to the students.

Step 3: Determine Whether Essay Involves 'Human Subjects Research'

What is 'human subjects research'?

"Human subjects research' is broadly defined to include any activity involving humans that seeks to test a hypothesis or answer a scientific question. This activity can include secondary data analysis and research involving direct contact with participants. All students who plan to undertake human subjects' research must have IRB approval before working with human subjects' data or samples and before contacting human subjects if undertaking primary data collection. The BSPH IRB Office (publichealth.jhu.edu/offices-and-services/institutional-review-board-irb (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/)) is charged with assuring that human subjects research studies conducted in the School comply with internal school policies and external regulations designed to protect human subjects.

After students have identified the data source(s) for research for their essay, they should complete the online IRB Worksheet (http://jhsph.us2.qualtrics.com/SE/?SID=SV_1GrF6WBUcNFZCV6) to determine additional steps (if any) needed for securing IRB approval for the essay, or documenting existing approval.

For additional questions about the IRB process, please visit: http://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/policies-and-guidance (http://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/policies-and-guidance/)

Step 4: Submit the Essay Topic Form

After students have selected an essay topic and format, the Essay Topic Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.viewAll/coid/7100/) must be completed and signed by the student, academic adviser, and primary reader (if different from the adviser). This form will ensure that a student has the needed skills and knowledge to complete the essay. For example, if a student decides to conduct or propose an evaluation of a project or program for the essay, they must have either taken the 'Fundamentals of Program Evaluation' course or equivalent or had prior experience conducting an evaluation (formats listed under

“MSPH Essay and Presentation Guidelines” section). Students also must indicate whether IRB approval is needed for the essay.

Step 5: Register for 380.850 PFRH Master's Essay

Students should register for 3 to 6 credits with their reader using course number 380.850 in the 7th term and 3 to 5 credits in the 8th term. The number of credits is dependent on the amount of time students think they will spend on data collection, analysis, and writing during each term. Each credit is equivalent to approximately 3 hours of work per week.

Step 6: Submit Outline of Essay to Essay Reader

Students must submit an outline of the essay to the primary reader by the required deadline. The outline should contain all major headings and sub-headings of the specific essay format, with bulleted text on the content of each section. Primary readers must be given at least 1 week for feedback. .

Step 7: Submit First Draft of Essay to Essay Reader

Students must submit a complete draft of their essay to the reader by the 2nd week of the term in which the essay is to be completed. The reader should ensure that the draft contains all necessary elements of the essay in the standardized format and provide feedback to the student within 2 weeks of receiving the draft essay.

Step 8: Submit Second Draft of Essay to Readers

Second drafts must be submitted to both the primary (and second readers if needed) for final edits and recommendations by the required deadline. Readers should provide feedback to the student within 2 weeks of receiving the second draft. Students should submit a second draft that is of reasonable quality so that faculty can complete their review and provide comments in a timely manner. Students must incorporate comments from each reader in their final draft

Step 9: Submit Final Draft of Paper to Primary and Secondary Readers for Approval

Students must submit the final draft of their essay to their reader for approval and submission to the PFRH Academic Office. The readers must also submit the Reader Approval Form for the essay directly to the Office. If the reader is not from PFRH, then the second reader from PFRH must also sign the form. **If the essay is not approved by the reader by the deadline, students may not be able to participate in the oral presentation and may be in jeopardy of not graduating on time.** The reader may nominate the student’s essay for a distinction award if the quality of the essay is deemed to be excellent. The essay must be completed by the required deadline to be nominated.

Step 10: Oral Presentation of Essay

Each student is required to present their essay in a 10-minute PowerPoint presentation at a public seminar before the end of the 4th term. The student’s adviser is expected to review draft presentations prior to a practice session. A practice session will be scheduled approximately one week prior to the public seminar with input from doctoral students in the department. No video clips are allowed in the presentation.

Before students can present their essay, they must meet these conditions:

- Any existing incompletes in coursework must be rectified, with confirmation by the student’s adviser and academic coordinator,
- The essay has received final approval from first and second readers,
- All slides have been approved by the primary reader.

Failure to meet any of these conditions before the time of presentation will result in postponement of graduation.

Master’s Essay Deadlines

In preparation for completion of the MHS essay and presentation, students should contact their adviser and/or their primary reader no later than the 2nd term to discuss the essay topic and format of interest to them. MHS Essays are due early in the 4th Term. Students should begin work on their paper no later than the start of 3rd term, preferably before the term begins, and complete it early in the 4th term . Students should begin to consider essay topics and format early in the 2nd term. Essays will be presented at a public seminar in May, prior to graduation.

General Guidelines for All Essay Formats

The essay should be between 15-20 pages in length, excluding the title page, acknowledgements, tables, references/bibliography, and appendices.

All essays should have a title page including: the title, student’s name, readers (identifying the adviser), and date. Please see the template included in the *Appendices* section at the end of the handbook. Students may include an acknowledgments page (does not count toward the total).

Typing guidelines:

- Standard letter size paper 8 ½ by 11
- Double spaced/single sided (can single space block quotations)
- Type size no smaller than 11 pt.
- 1-inch margins all around
- Page numbering: title page, acknowledgments, etc., usually not numbered. Others numbered consecutively to the end of the paper
- Consistent format for all tables, figures, headings, and end notes and/or bibliography materials

Use APA or AMA format for references; see http://www.apastyle.org/ and http://www.amamanualofstyle.com/.

Essay Formats

The following are specific guidelines for each essay format. If a student prefers a format different from those specified below, they will need approval by their adviser and the Director of the Master’s Program.

Research Report

This format could be based on secondary data analysis (more typical) or primary data collection and analysis. IRB approval is needed for this format. The sections in this format essay are as follows:

- Structured abstract (1 page maximum)
  - Should include the following headings: Background, Objective (s) of study, Methods, Results, Conclusions
- Introduction (1 to 3 pages)
  - Importance of public health concern/problem
  - The magnitude of problem and population affected
  - Knowledge gaps and how the current study fills the gaps
- Methods (2 to 4 pages) *See Methods Section below*
  - Study design
  - Sample/participants

- Data Sources
- Measures/Topics [for quantitative analyses, include variable tables that specifies variables and how they are operationalized (e.g., categorical, ordinal, interval); for qualitative analyses, include table with domains and sample questions]
- Data analysis

- Results
- Discussion with Limitations and Implications for public health practice
- References
- Tables/figures

Analysis of a Public Health Problem or Legislation Position Paper:

Both formats examine a public health problem and recommend either a specific intervention strategy or policy/policies for addressing the problem. The analysis of a public health problem format offers solutions and recommendations related to intervention strategies, while a legislation position paper offers solutions and recommendations related to a policy or a set of policies. Both formats also identify concerns of key stakeholders. The sections in this essay format are as follows:

- Executive summary (2-3 pages) [Should include an Introduction and overview of public health problem and a brief discussion about how the problem could be addressed.]
- Statement of the problem (1 page)
- Magnitude of problem (1-2 pages)
- Causes/determinants of the problem (3-5 pages)
- Alternative policy strategies; and may also include an evaluation of a current policy and its impact along with the discussion of alternative policy strategies (4-6 pages)
- Specific recommendations (2-4 pages)

Structured Literature Review

This format analyzes an important public health problem by examining the empirical literature published on the problem. The sections in this essay format are as follows:

- Structured abstract (1 page maximum)
  - Should include the following headings: Background, Objective (s) of review, Methods, Results, Conclusions
- Introduction (1 to 3 pages)
  - Why is the topic an important public health problem?
  - What is the magnitude of problem and population affected?
  - What are the knowledge gaps and how does the current literature review contribute to field or fill the gaps?
- Methods (1 to 3 pages) *See Methods Section below*
  - Databases used
  - Search criteria
  - Analytic tables describing literature cited
- Results (3 to 6 pages)
- Discussion (3 to 5 pages)
- References
- Tables/figures

Evaluation of a Program/Project

This format involves evaluating/monitoring an existing public health program/project and could include a process, outcome, or impact evaluation. It may also be a proposed evaluation with additional details on the planned design and hypotheses to substitute for results. The sections in this essay format are as follows:

- Introduction (1 to 2 pages)
- Description of program/project (1 to 3 pages)
  - Need (what is the public health problem the program/project is trying to address?)
  - Target audiences (what are the groups/individuals who are targeted for the program/project?)
  - Activities of program/project
- Objectives of program/project (1 page)
- Logic Model of program/project (1 page)
- Evaluation Methodology (3 to 6 pages) *See Methods Section below*
  - Type of evaluation
  - Indicators
  - Data collection methods
  - Sampling strategy and sample size
  - Data analysis
- Anticipated use of results (2 to 5 pages)
- Timetable if proposed project (1 page)

Research Proposal

This essay format simulates a grant proposal for a research project. The sections in this essay format are as follows:

- Introduction (1 page)
- Statement of research question (1/2 page)
- Specific aims (1 page) o Background and significance (2-3 pages) o
- Methods (6-8 pages): Study design; Sampling/participants/sample size; Data Sources and variables; Methods of Analysis
- Strengths and Limitations (1 page)
- Budget and budget justification (1-2 pages)

Methods Section for Research Report, Structured Literature Review and Evaluation Formats

The information included in the Methods section should provide enough detail to the reader so that the quality of the study design, sampling methods, data sources, and measures can be clearly evaluated, even if the methods have been reported elsewhere. If the maximum essay length of 20 pages does not permit this level of detail, then students are encouraged to include an appendix describing additional details about the study methods. This appendix should be a supplement and not duplicate material already found in the body of the essay. Referring the reader to previous publications about the methods is not adequate.

Evaluation Criteria for MHS Essay Readers

- The student demonstrates the ability to successfully complete a cohesive and acceptable essay in the timeframe provided applying public health knowledge and skills.
- The student demonstrates the ability to make appropriate inference(s) and draw logical conclusion(s) to inform the field of public health.
- The essay is suitable for publication as a peer-reviewed journal or an organization/government report or is deemed of publishable quality.

Honors

Student essays that demonstrate excellence, as indicated by both the primary and secondary readers, can be nominated for an honorary 'distinction' award if the essay submission deadline is met. Nominations will be accepted from the primary reader. Student essays that receive a distinction award will be selected by the masters committee.

All PFRH MHS students must attain proficiency in the following three (3) competencies:

1. Applying statistical methods to address the health of populations.
2. Applying epidemiological methods to address the health of populations.
3. Applying ethical concepts and tools to population health research and practice.

Degree Program Competencies

All **PFRH MHS students** must attain proficiency in three MHS-specific research competencies:

1. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.
2. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.
3. Translating and communicating research findings to researchers, policy makers, and the public.

Area of Interest Competencies

All **PFRH MHS students** must attain proficiency in five competencies:

1. Applying a life course framework to understand population health problems related to their area of interest, including multiple determinants framework for the health of populations across the life course.
2. Identifying and assessing the causes and consequences of population change using demographic methods.
3. Assessing the principal health concerns for the populations relevant to the area of interest , the associated population-based risk factors, and the relative impact of each risk factor.
4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant populations.
5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

CEPH Learning Objectives

All **PFRH MHS students** must attain proficiency in twelve CEPH Learning Objectives:

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
6. Explain the critical importance of evidence in advancing public health knowledge
7. Explain effects of environmental factors on a population's health
8. Explain biological and genetic factors that affect a population's health
9. Explain behavioral and psychological factors that affect a population's health
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
11. Explain how globalization affects global burdens of disease
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health)

Population, Family and Reproductive Health, MHS Online

MHS Online

The MHS Online program in Population, Family and Reproductive Health is designed for part-time working professionals who desire skills to enable them to conduct research and evaluation in Maternal and Child Health (MCH). The program provides students with fundamental understanding of statistical methods and their application; epidemiology; research methods in a selected methodological area (epidemiologic methods, behavior sciences, or health services research and evaluation); leadership; expertise in MCH; and the application of life course perspectives on health.

The program is intended for students with one to two years of public health experience prior to entry. The specialized skills and knowledge gained during the program are essential for the workforce to promote the health of MCH populations.

The department is home to a Center of Excellence in MCH Education, Science, and Practice. Faculty are recognized experts in MCH in the areas of maternal, perinatal, child and adolescent health. Faculty are also experts in population studies and women's, sexual and reproductive health

PFRH has several centers and large initiatives linked to MCH that offer research and evaluation opportunities for students:

- Center for Adolescent Health (https://www.jhsph.edu/research/centers-and-institutes/center-for-adolescent-health/)
- Center for Early Life Origins of Disease (https://www.jhsph.edu/departments/population-family-and-reproductive-health/center-on-early-life-origins-of-disease/)
- Child and Adolescent Health Measurement Initiative (https://www.jhsph.edu/departments/population-family-and-reproductive-health/child-adolescent-health-measurement-initiative/)
- Early Childhood Services Research Program (https://www.jhsph.edu/departments/population-family-and-reproductive-health/early-childhood-services-research-program/)

- Women's, Infants, and Children's Program (https://www.jhsph.edu/departments/population-family-and-reproductive-health/women-infants-children/)

Our online coursework in MCH is highly rated, including MCH Legislation and Policies; Demographic Methods for Public Health; and Life Course Perspectives on Health along with other courses in specific areas of MCH such as Growth and Nutrition in MCH and Infant Mortality.

Students complete the program in 1-3 years, with 64 credits (4 full-terms equivalents of coursework) including: an MHS essay and presentation; five courses in MCH; and schoolwide and departmental requirements.

A certificate in MCH is available at the completion of the program.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Maternal and Child Health Requirements

Code	Title	Credits
Competency 1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course		
PH.380.604	Life Course Perspectives on Health	4
Competency 2. Identifying and assessing the causes and consequences of population change using demographic methods		
PH.380.603	Demographic Methods for Public Health	4
Competency 3. Assessing the principal health concerns for populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	3
OR		
PH.380.623	Adolescent Health and Development	3
Competency 4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in populations relevant to the area of interest		
PH.380.624	Maternal and Child Health Legislation and Programs	4
Competency 5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of relevant populations		
PH.380.642	Child Health and Development	3
OR		
PH.380.744	Nutrition and Growth in Maternal and Child Health	3
OR		
PH.380.623	Adolescent Health and Development	3
OR		
PH.380.747	International Adolescent Health	3
Electives:		
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health	3
PH.380.762	HIV Infection in Women, Children, and Adolescents	4
PH.380.633	Promoting Equity for Adolescents and Emerging Adults: Problem-Solving Seminar	3

CEPH Learning Objectives

Code	Title	Credits
Competency 1. Explain public health history, philosophy and values		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.552.601	Foundational Principles of Public Health	0.5
Competency 2. Identify the core functions of public Health and the 10 Essential Services		
PH.380.624	Maternal and Child Health Legislation and Programs	4
OR		
PH.552.601	Foundational Principles of Public Health	0.5
Competency 3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing populations's health		
PH.380.603	Demographic Methods for Public Health	4
Competency 4. List major causes and trends of morbidity in the US or other community relevant to the school or program		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	3
OR		
PH.552.604	Causes and Trends in Morbidity and Mortality	0.5
Competency 5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.		
PH.340.721	Epidemiologic Inference in Public Health I	5
Competency 6. Explain the critical importance evidence in advancing public health knowledge		
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge	0.5
Competency 7. Explain effects of environmental factors on a population's health		
PH.552.607	Essentials of Environmental Health	0.5
Competency 8. Explain biological and genetic factors that affect a population's health		
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
Competency 9. Explain behavioral and psychological factors that effect a population's health		
PH.380.604	Life Course Perspectives on Health	4
Competency 10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities		
PH.380.604	Life Course Perspectives on Health	4
Competency 11. Explain how globalization affects global burdens of disease		
PH.552.611	Globalization and Population Health	0.5
Competency 12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g. One Health)		
PH.552.612	Essentials of One Health	0.5

Students may select from one of the three methods areas: Behavioral/Social Sciences; Epidemiology; or Health Services Research and Evaluation. The methods areas are along with the list of courses to meet the above competencies are listed below. Elective courses are also listed.
Behavioral/Social Science Specialty Core Requirements

Code	Title	Credits
Study Design (Choose 2 of 3)		
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	4
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	2
PH.550.604	Qualitative Reasoning in Public Health	2
OR CHOOSE ONE		
PH.224.690	Qualitative Research Theory and Methods	3
PH.380.611	Fundamentals of Program Evaluation	4
Data Collection and Analysis (Choose 1)		
PH.340.727	Introduction to Health Survey Research Methods (AND must take 309.616)	2
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.224.690	Qualitative Research Theory and Methods	3
Elective:		
PH.410.605	Fundamental Tools for Promoting Health Equity	3

Epidemiology Specialty Core Requirements

Code	Title	Credits
OPTION 1(340.601 Principles of Epidemiology) Professional Track:		
Study Design(Choose 1)		
PH.340.722	Epidemiologic Inference in Public Health II	4
Data Collection and Analysis (Choose 1)		
PH.340.770	Public Health Surveillance	3
PH.607.724	Applying Household Surveys to Primary Health Care Programs	3
PH.340.727	Introduction to Health Survey Research Methods ((AND must take 340.701))	2
OPTION 2		
Study Design and Data Analysis (take both)		
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
Electives		
PH.340.645	Introduction to Clinical Trials	3
PH.340.861	Clinical Trials: Procedures, Design, and Interpretation of Results	3

Health Services Research Course Requirements

Code	Title	Credits
Study Design(Choose 1)		
PH.380.611	Fundamentals of Program Evaluation	4
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I (AND must take 410.635)	2
Data Collection and Analysis (Choose 1)		
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.340.727	Introduction to Health Survey Research Methods (AND must take 550.640)	2
PH.224.690	Qualitative Research Theory and Methods (AND must take 224.691)	3
Elective		
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research	3
PH.410.605	Fundamental Tools for Promoting Health Equity	3
PH.330.650	Methods in Implementation Science	3

School-wide Requirements

Students must choose the following courses for meeting school-wide competencies:

Code	Title	Credits
Competency #1: Applying statistical methods to address the health of populations		
PH.140.611	Statistical Reasoning in Public Health I	3
AND		
PH.140.612	Statistical Reasoning in Public Health II	3
Competency #2: Applying epidemiological methods to address the health of populations.		
PH.340.721	Epidemiologic Inference in Public Health I	5
Competency #3: Applying ethical concepts and tools to population health research and practice (Must take both courses)		
PH.550.860	Academic & Research Ethics at BSPH	
AND		
PH.221.616	Ethics of Public Health Practice in Developing Countries	2
Recommended Additional Biostatistics Courses		
PH.140.613	Data Analysis Workshop I	2
PH.140.614	Data Analysis Workshop II	2
PH.330.657	Statistics for Psychosocial Research: Measurement	4
PH.140.664	Causal Inference in Medicine and Public Health I	4

MHS Essay and Presentation Guidelines

The Master's Essay is a requirement for graduation from the MHS program in the Department of Population, Family, and Reproductive Health. The goal of the essay is for students to apply the skills and knowledge they have acquired during their academic program to a public health problem or concern of interest to them; a priority for the essay is that it has a research focus even if it does not involve data analysis. In addition to the written essay, students must give a 10-minute public presentation of their essay.

Students should begin thinking about essay topics and format at the end of the first term.

During the last two terms of studies, students will register for PFRH Master's Essay (380.850), designating their first reader as the instructor. Guidelines for credit hours are as follows:

- Term 3: 3-6 credits
- Term 4: 3-5 credits
- Students need to take a minimum of 3 credits of special studies each term for the essay

- If taking more than 3 credits student must meet weekly with 1st reader

The following sections provide detailed guidelines about the essay and presentation.

Essay Readers

Students must have at least one reader for their essay. The following guidelines must be applied:

- The students' reader must be PRFH faculty; faculty with a joint appointment in PFRH also can be a reader.
- Approval is required if a student wishes to select a reader who is not PFRH faculty; a rationale must be given for the choice of the reader and a second reader from PFRH must be selected.

Responsibilities of Students and Readers

Primary Reader

The essay reader has the overall responsibility of working with the student on the essay from the outline to final draft, and on preparation for the presentation. The faculty must be identified as the instructor for the special studies course for the PFRH Master's Essay (380.850). Students must submit outline and essay drafts to the primary reader on key components prior to the last two terms enrolled; these dates are indicated to assure timely completion of the essay.

Second Reader

A second reader may also provide comments on the essay at any stage. A second reader will seldom be needed but may be asked if a student is using data from a study conducted by the reader or at the agency of the reader. If a second reader is external to the department, students are strongly advised to discuss the roles and responsibilities of this reader with their primary reader. Second readers do not need to give approval for the essay, unless the first reader is external to PFRH.

The essay must meet the standards required by faculty of the School. However, student who are using data affiliated with the second reader or the second reader's agency should provide drafts of the essay to this reader and discuss when feedback will be given to the student from the reader.

Choosing a Topic and Format for the Essay

In addition to selecting a topic and readers, students select one of five formats for the essay:

- Research Report
- Analysis of a Public Health Problem or Legislation Position Paper
- Structured Literature Review
- Evaluation of a Program/Project
- Research Proposal

Given the research/academic focus of MHS degree, the essay should include data to support the topic even if it is not a research report. Students may a public health concern or problem which may or may not be in their area of interest.

The student and their adviser must verify the knowledge and skills required for the selected essay format (see Essay Topic Form); for example, students conducting a systematic literature review for their essay must have taken a related course or work with a primary reader with methodological expertise in systematic reviews

Steps to Complete the Essay

Step 1: Identify topic, format, and readers

Students should identify a primary reader whose research interests and expertise are in the topic area or methodology for the essay. Academic advisers must serve as a reader, but do not need to be the primary reader. Advisers serve as a useful resource for discussing potential topics of interest and providing referrals to other faculty members in the department whose expertise may better match the proposed topic of the essay. Other resources for identifying potential primary readers are the Masters Committee Director and Associate Director, academic coordinators, the PFRH website, and school faculty directory.

Step 2: Discuss roles and responsibilities with readers

Once readers have been identified, all students should have a conversation with their readers so that each knows their responsibility for the essay. This discussion is especially important for readers outside PFRH and especially for third readers. A timeline should also be provided to the readers so that each is aware of when feedback should be provided. In general, readers should be given at least a minimum of one week to provide feedback to students. While not required, the student and readers also should discuss plans to publish the essay and the order of authors for the publication. Separate guidelines regarding authorship will be provided to the students.

Step 3: Determine Whether Essay Involves 'Human Subjects Research'

What is 'human subjects research'?

"Human subjects research' is broadly defined to include any activity involving humans that seeks to test a hypothesis or answer a scientific question. This activity can include secondary data analysis and research involving direct contact with participants. All students who plan to undertake human subjects' research must have IRB approval before working with human subjects' data or samples and before contacting human subjects if undertaking primary data collection. The JHBSPH IRB Office (http://www.jhsph.edu/irb (http://www.jhsph.edu/irb/)) is charged with assuring that human subjects research studies conducted in the School comply with internal school policies and external regulations designed to protect human subjects.

After students have identified the data source(s) for research for their essay, they should complete the online IRB Worksheet (http://jhsph.us2.qualtrics.com/SE/?SID=SV_1GrF6WBUcNFZCV6) to determine additional steps (if any) needed for securing IRB approval for the essay, or documenting existing approval.

For additional questions about the IRB process, please visit: https://www.jhsph.edu/offices-and-services/institutional-review-board/faqs-by-topic/

Step 4: Submit the Essay Topic Form

After students have selected an essay topic and format, the Essay Topic Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.viewAll/coid/7100/) must be completed and signed by the student, academic adviser, and primary reader (if different from the adviser). This form will ensure that a student has the needed skills and knowledge to complete the essay. For example, if a student decides to conduct or propose an evaluation of a project or program for the essay, they must have either taken the ‘Fundamentals of Program Evaluation’ course or equivalent or had prior experience conducting an evaluation (formats listed under “MSPH Essay and Presentation Guidelines” section). Students also must indicate whether IRB approval is needed for the essay.

Step 5: Register for 380.850 PFRH Master's Essay

Students should register for 3 to 6 credits of special studies with their **primary reader** using course number 380.850 in the last two terms of the degree program. The number of credits is dependent on the amount of time students think they will spend on data collection, analysis, and writing during each term. Each credit is equivalent to approximately 3 hours of work per week.

Step 6: Submit Outline of Essay to Primary Reader

Students must submit an outline of the essay to the primary reader by the required deadline. The outline should contain all major headings and sub-headings of the specific essay format, with bulleted text on the content of each section. Primary readers must be given at least 1 week for feedback. .

Step 7: Submit First Draft of Essay to Primary Reader

Students must submit a complete draft of their essay to the primary reader by the required deadline. The primary reader should ensure that the draft contains all necessary elements of the essay in the standardized format. Primary readers should provide feedback to the student within 2 weeks of receiving the draft essay.

Note: Students partnering with an organization that is expecting a report may need to write two separate documents in order to meet the expectations of the department’s essay.

Step 8: Submit Second Draft of Essay to Primary and Secondary Readers

Second drafts must be submitted to both the primary and second readers for final edits and recommendations by the required deadline. Both readers should provide feedback to the student within 2 weeks of receiving the second draft. Students should submit a second draft that is of reasonable quality so that faculty can complete their review and provide comments in a timely manner. Students must incorporate comments from each reader in their final draft.

Step 9: Submit Final Draft of Paper to Primary and Secondary Readers for Approval

Students must submit the final draft of their essay to both primary and secondary readers for approval and submission to the Academic Office. Both readers must also submit the Reader Approval Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.viewAll/coid/7100/) for the essay directly to the Academic Office. ***If the essay is not approved by both readers by the deadline, students may not be able to participate in the oral presentation and may be in jeopardy of not graduating.***

The primary reader may nominate the student’s essay for a distinction award if the quality of the essay is deemed to be excellent. In order to be nominated, the essay must be completed by the required deadline.

Step 10: Oral Presentation of Essay

Each student is required to present their essay in a 10-minute PowerPoint presentation at a public seminar before the end of the last term enrolled. The student’s adviser is expected to review draft presentations prior to a practice session. A practice session will be scheduled approximately one week prior to the public seminar with input from doctoral students in the department. No video clips are allowed in the presentation.

Before students can present their essay, they must meet these conditions:

- Any existing incompletes in coursework must be rectified, with confirmation by the student’s adviser and academic coordinator,
- The essay has received final approval from first and second readers,
- All slides have been approved by the primary reader.

Failure to meet any of these conditions before the time of presentation will result in postponement of graduation.

Master’s Essay Deadlines

In preparation for completion of the MHS essay and presentation, students should contact their adviser and/or their primary reader prior to their last two terms enrolled to discuss the essay topic and format of interest. MHS Essays are due early in the last term enrolled. Students should begin work on their paper at the start of the last two terms enrolled, preferably before the term begins, and complete it early in the last term enrolled . Students should begin to consider essay topics and format early term prior to the last two terms enrolled. Essays will be presented at a public seminar in last term enrolled.

General Guidelines for All Essay Formats

The essay should be between 15-20 pages in length, excluding the title page, acknowledgements, tables, references/bibliography, and appendices.

All essays should have a title page including: the title, student’s name, readers (identifying the adviser), and date. Please see the template included in the *Appendices* section at the end of the handbook. You may include an acknowledgments page (does not count toward the total).

Typing guidelines:

- Standard letter size paper 8 ½ by 11
- Double spaced/single sided (can single space block quotations)
- Type size no smaller than 11 pt.
- 1-inch margins all around
- Page numbering: title page, acknowledgments, etc., usually not numbered. Others numbered consecutively to the end of the paper
- Consistent format for all tables, figures, headings, and endnotes and/or bibliography materials

Use APA or AMA format for references; see http://www.apastyle.org/ and http://www.amamanualofstyle.com/.

Essay Formats

The following are specific guidelines for each essay format. If a student prefers a format different from those specified below, they will need approval by their adviser and the Director of the Master’s Program.

Research Report

This format could be based on secondary data analysis (more typical) or primary data collection and analysis. IRB approval is needed for this format. The sections in this format essay are as follows:

- Structured abstract (1 page maximum)
  - Should include the following headings: Background, Objective (s) of study, Methods, Results, Conclusions
- Introduction (1 to 3 pages)
  - Importance of public health concern/problem
  - The magnitude of problem and population affected
  - Knowledge gaps and how the current study fills the gaps
- Methods (2 to 4 pages) *See Methods Section below*
  - Study design
  - Sample/participants
  - Data Sources
  - Measures/Topics [for quantitative analyses, include variable tables that specifies variables and how they are operationalized (e.g., categorical, ordinal, interval); for qualitative analyses, include table with domains and sample questions]
  - Data analysis
- Results
- Discussion with Limitations and Implications for public health practice
- References
- Tables/figures

Analysis of a Public Health Problem or Legislation Position Paper:

Both formats examine a public health problem and recommend either a specific intervention strategy or policy/policies for addressing the problem. The analysis of a public health problem format offers solutions and recommendations related to intervention strategies, while a legislation position paper offers solutions and recommendations related to a policy or a set of policies. Both formats also identify concerns of key stakeholders. The sections in this essay format are as follows:

- Executive summary (2-3 pages) [Should include an Introduction and overview of public health problem and a brief discussion about how the problem could be addressed.]
- Statement of the problem (1 page)
- Magnitude of problem (1-2 pages)
- Causes/determinants of the problem (3-5 pages)
- Alternative policy strategies; and may also include an evaluation of a current policy and its impact along with the discussion of alternative policy strategies (4-6 pages)
- Specific recommendations (2-4 pages)

Structured Literature Review

This format analyzes an important public health problem by examining the empirical literature published on the problem. The sections in this essay format are as follows:

- Structured abstract (1 page maximum)
  - Should include the following headings: Background, Objective (s) of review, Methods, Results, Conclusions
- Introduction (1 to 3 pages)
  - Why is the topic an important public health problem?
  - What is the magnitude of problem and population affected?
  - What are the knowledge gaps and how does the current literature review contribute to field or fill the gaps?
- Methods (1 to 3 pages) *See Methods Section below*
  - Databases used
  - Search criteria
  - Analytic tables describing literature cited
- Results (3 to 6 pages)
- Discussion (3 to 5 pages)
- References
- Tables/figures

Evaluation of a Program/Project

This format involves evaluating/monitoring an existing public health program/project and could include a process, outcome, or impact evaluation. It may also be a proposed evaluation with additional details on the planned design and hypotheses to substitute for results. The sections in this essay format are as follows:

- Introduction (1 to 2 pages)
- Description of program/project (1 to 3 pages)
  - Need (what is the public health problem the program/project is trying to address?)
  - Target audiences (what are the groups/individuals who are targeted for the program/project?)
  - Activities of program/project
- Objectives of program/project (1 page)
- Logic Model of program/project (1 page)
- Evaluation Methodology (3 to 6 pages) *See Methods Section below*
  - Type of evaluation
  - Indicators
  - Data collection methods
  - Sampling strategy and sample size
  - Data analysis
- Anticipated use of results (2 to 5 pages)
- Timetable if proposed project (1 page)

Methods Section for Research Report, Structured Literature Review and Evaluation Formats

The information included in the Methods section should provide enough detail to the reader so that the quality of the study design, sampling methods, data sources, and measures can be clearly evaluated, even if the methods have been reported elsewhere. If the maximum essay length of 20 pages does not permit this level of detail, then students are encouraged to include an appendix describing additional details about the study methods. This appendix should be a supplement and not duplicate material already found in the body of the essay. Referring the reader to previous publications about the methods is not adequate.

Evaluation Criteria for MHS Essay Readers

- The student demonstrates the ability to successfully complete a cohesive and acceptable essay in the timeframe provided applying public health knowledge and skills.
- The student demonstrates the ability to make appropriate inference(s) and draw logical conclusion(s) to inform the field of public health.
- The essay is suitable for publication as a peer-reviewed journal or an organization/government report or is deemed of publishable quality.

Honors

Student essays that demonstrate excellence, as indicated by both the primary and secondary readers, can be nominated for an honorary 'distinction' award if the essay submission deadline is met. Nominations will be accepted from the primary reader. Student essays that receive a distinction award will be selected by the masters committee.

All PFRH MHS students must attain proficiency in the following three (3) competencies:

1. Applying statistical methods to address the health of populations.
2. Applying epidemiological methods to address the health of populations.
3. Applying ethical concepts and tools to population health research and practice.

CEPH Learning Objectives

All **PFRH MHS students** must attain proficiency in the following twelve CEPH Learning Objectives:

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
6. Explain the critical importance of evidence in advancing public health knowledge
7. Explain effects of environmental factors on a population's health
8. Explain biological and genetic factors that affect a population's health
9. Explain behavioral and psychological factors that affect a population's health
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
11. Explain how globalization affects global burdens of disease
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health)

Area of Interest Competencies

All **PFRH MHS students** must attain proficiency in five competencies in maternal and child health:

1. Applying a life course framework to understand population health problems related to their area of interest, including multiple determinants framework for the health of populations across the life course.
2. Identifying and assessing the causes and consequences of population change using demographic methods.
3. Assessing the principal health concerns for the populations relevant to the area of interest , the associated population-based risk factors, and the relative impact of each risk factor.
4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in populations relevant to the area of interest.
5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Population, Family and Reproductive Health, MSPH

MSPH Program Overview

The professional MSPH program in Population, Family and Reproductive Health is intended for individuals with a baccalaureate degree who are interested in issues related to the Department's areas of interest. Details regarding the areas of interest can be found in the student handbook. The department's current areas of interest include:

- Adolescent Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/adolescent-health/)
- Child Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/child-health/)
- Maternal, Fetal, and Perinatal Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/maternal-fetal-perinatal-health/)
- Population and Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/population-and-health/)
- Women's, Sexual and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/women-sexual-and-reproductive-health/)

The two-year curriculum allows students to integrate coursework in life course, population, program management, quantitative methods and core areas with practical knowledge and skills. Additional courses may include program design and evaluation, advocacy, policy, and qualitative methods among others. The two-year curriculum is intended for students with less than 2 years of public health work experience.

MSPH students participate in a 680 hour supervised field placement in domestic and/or international settings during terms one and two of the second year. The field placement can start anytime after the end of term 4 of the first year. The field placement provides the opportunity to integrate formal classroom teaching with practical experience in the student's chosen field. There is no part-time option available for the two-year MSPH program.

Components of the MSPH program include a set of core departmental courses that provide a common theoretical foundation for the work of the entire department. These courses cover biological/developmental, demographic and social science foundations. MSPH students in Population, Family and Reproductive Health also complete a core set of courses determined by the area of study they have selected. All professional MSPH students within the department complete an MSPH Essay and Presentation. The Essay and Presentation are culminating experiences for which students apply newly honed skills and put their academic and experiences in perspective within the broader context of public health.

Graduates of the MSPH program in PFRH go on to careers in organizations such as government ministries, nongovernmental health organizations, state and local health agencies, managed health care organizations, research institutions, health care delivery organizations, advocacy groups and academic institutions.

BA/MSPH

The Johns Hopkins University Krieger School of Arts and Sciences, in conjunction with the Johns Hopkins Bloomberg School of Public Health, offers a major in Public Health Studies for undergraduates interested in careers in public health. The program focuses on the prevention of illness, disease, and health care inequalities, drawing on fundamental knowledge from biology and the social and behavioral sciences.

To build on the existing partnerships of BSPH with KSAS for dual bachelors/master's degree programs, the Department of Population, Family, and Reproductive Health proposes offering early graduate school admission to JHU juniors/seniors. All majors are welcome. Admission will serve as entry to the two-year professional MSPH degree program in the Department.

The MSPH degree provides students with a broad foundation in public health as well as coursework concentrated in the six areas of interest listed above; the program also includes real-world experience in the form of a field placement. The two-year MSPH degree program includes a full year of coursework, a minimum of 680 hours of a full-time field placement, and completion of an original essay and a public presentation of the essay content. The essay can take many forms, including that of a research report, literature review, policy analysis, or grant proposal. Students must begin their field placement during the summer term following the first year of coursework. Up to 16 credits of public health coursework completed inter-divisionally at JHSPH toward their bachelor's degree may also apply toward their 128 credits required for an MSPH degree.

Applications for the MSPH dual degree programs are accepted any time until July 1st between a student's junior and senior years. Students must be accepted prior to the start of their senior year classes. Applications are submitted through SOPHAS EXPRESS. GRE test scores are optional. Students need to achieve a GPA of 3.3 or higher at the time of their application. Admission is contingent on students maintaining the same or higher GPA during their senior year.

Once students complete the bachelor's degree and meet all conditions to enter the MSPH degree program, admitted students will be automatically enrolled in JHSPH starting the fall after completing the bachelor's degree. Students admitted into the dual degree program will receive co-advising from both Schools during their senior year as part of this unique experience.

MSPH Course Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

MSPH students are required to meet schoolwide requirements, CEPH (Council on Education for Public Health) Learning Objectives (12), CEPH requirements (22), departmental requirements, and area of interest competencies (5). During the first year of the MSPH degree program, students will be required to successfully complete all five courses in their area of interest before starting field placement.

Schoolwide Requirements

Students must take PH.550.860, and either PH.306.663 or PH.306.665

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (Terms 1,2,3,4)	0
AND		
PH.306.663	Legal and Ethical Issues in Health Services Management	3
OR		
PH.306.665	Research Ethics and integrity: U.S. and International Issues	3

CEPH Learning Objectives

Many 0.5 and 1.0 credit 552 courses are listed for only one term but may be available in another term, but are not yet listed in the course catalogue as such.

1. Explain public health history, philosophy, and values.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.552.601	Foundational Principles of Public Health (Term 1)	0.5

2. Identify the core functions of Public Health and the 10 Essential Services.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.552.601	Foundational Principles of Public Health (Term 1)	0.5

3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health.

Code	Title	Credits
Must take 380.603 or 552.602; and 552.603 or 224.690		
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4
Or		
PH.552.602	The Role of Quantitative Methods in Public Health (Term 2)	0.5
AND		
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	.5
OR		
PH.224.690	Qualitative Research Theory and Methods	3

4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program.

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
OR		
PH.552.604	Causes and Trends in Morbidity and Mortality	0.5

5. Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc.

Code	Title	Credits
Select one of the following:		
PH.340.721	Epidemiologic Inference in Public Health I (Terms 1,3)	5
OR		
PH.340.751	Epidemiologic Methods 1	5
OR		
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5

6. Explain the critical importance of evidence in advancing public health knowledge.

Code	Title	Credits
Select one of the following:		
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
OR		
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge	0.5

7. Explain effects of environmental factors on a population's health.

Code	Title	Credits
Select one of the following:		
PH.380.616	Child Health Epidemiology (Term 4)	3
OR		
PH.552.607	Essentials of Environmental Health	0.5

8. Explain biological and genetic factors that affect a population's health.

Code	Title	Credits
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (Term 2)	4

9. Explain behavioral and psychological factors that affect a population's health.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4
OR		
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5

10. Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4
OR		
PH.552.610	The Social Determinants of Health	0.5

11. Explain how globalization affects global burdens of disease.

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
OR		
PH.552.611	Globalization and Population Health	0.5

12. Explain an ecological perspective on the connections among human health, animal health, and ecosystem health (e.g., One Health).

Code	Title	Credits
PH.552.612	Essentials of One Health	0.5

CEPH Requirements

C1. Apply epidemiological methods to the breadth of settings and situations in public health practice.

Code	Title	Credits
PH.340.721	Epidemiologic Inference in Public Health I	5

C2a. Select quantitative data collection methods appropriate for a given public health context.

Code	Title	Credits
Select one of the following:		
PH.340.721	Epidemiologic Inference in Public Health I	5
OR		
PH.380.611	Fundamentals of Program Evaluation	4

C2b. Select qualitative data collection methods appropriate for a given public health context.

Code	Title	Credits
Select one of the following:		
PH.224.690	Qualitative Research Theory and Methods (Terms 1,3)	3
PH.550.604	Qualitative Reasoning in Public Health (Terms 1,2)	2
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (Term 1)	0.5
PH.380.611	Fundamentals of Program Evaluation	4

C3a. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate.

Code	Title	Credits
Must take either both courses in the 140.611 series, or all three courses in the 140.621 series		
PH.140.611	Statistical Reasoning in Public Health I	3
AND		
PH.140.612	Statistical Reasoning in Public Health II	3
OR		
PH.140.621	Statistical Methods in Public Health I	4
AND		
PH.140.622	Statistical Methods in Public Health II	4
AND		
PH.140.623	Statistical Methods in Public Health III	4

C3b. Analyze qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate

Code	Title	Credits
Select one of the following:		
PH.224.690	Qualitative Research Theory and Methods	3
PH.550.604	Qualitative Reasoning in Public Health	2
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	.5

C4. Interpret results of data analysis for public health research, policy, or practice.

Code	Title	Credits
Must take either both courses in the 140.611 series, or all three courses in the 140.621 series:		
PH.140.611	Statistical Reasoning in Public Health I	3
AND		
PH.140.612	Statistical Reasoning in Public Health II	3
OR		
PH.140.621	Statistical Methods in Public Health I	4
AND		
PH.140.622	Statistical Methods in Public Health II	4
AND		
PH.140.623	Statistical Methods in Public Health III	4

C5. Compare the organization, structure, and function of health care, public health, and regulatory systems across national and international settings.

Code	Title	Credits
PH.380.624	Maternal and Child Health Legislation and Programs	4

C6. Discuss the means by which structural bias, social inequalities, and racism undermine health and create challenges to achieving health equity at organizational, community, and societal levels.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health	4

C7. Assess population needs, assets and capacities that affect communities' health.

Code	Title	Credits
Select one of the following:		
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth	3
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	4
PH.222.642	Assessment of Nutritional Status	3
PH.410.620	Program Planning for Health Behavior Change	3

C8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs.

Code	Title	Credits
Select one of the following:		
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth	3
PH.380.665	Family Planning Policies and Programs	4
PH.380.771	Understanding and Changing International Reproductive Health Policy	3

C9. Design a population-based policy, program, project, or intervention.

Code	Title	Credits
Select one of the following:		
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth	3
PH.380.665	Family Planning Policies and Programs	4

C10. Explain basic principles and tools of budget and resource management.

Code	Title	Credits
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	1
OR		
PH.312.603	Fundamentals of Budgeting and Financial Management	3

C11. Select methods to evaluate public health programs

Code	Title	Credits
PH.380.611	Fundamentals of Program Evaluation	4

C12. Discuss multiple dimensions of the policy-making process, including the role of ethics and evidence.

Code	Title	Credits
Select one of the following:		
PH.380.771	Understanding and Changing International Reproductive Health Policy	3
PH.380.624	Maternal and Child Health Legislation and Programs	4

C13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs	4
PH.380.665	Family Planning Policies and Programs	4
PH.300.615	The Tools of Public Health Practice	1

C14. Evaluate policies for their impact on public health and health equity.

Code	Title	Credits
Select one of the following:		
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health	3
PH.380.771	Understanding and Changing International Reproductive Health Policy	3

C15. Evaluate policies for their impact on public health and health equity.

Code	Title	Credits
Select one of the following:		
PH.380.771	Understanding and Changing International Reproductive Health Policy	3
PH.380.667	Women's Health Policy	3

C16. Apply principles of leadership, governance, and management, which include creating a vision, empowering others, fostering collaboration, and guiding decision making.

Code	Title	Credits
Select one of the following:		
PH.380.880	Lessons in Leadership: Applications for Population, Family and Reproductive Health I (must take all 4 courses in the series that include 380.880, 380.881, 380.882, and 380.883)	1
OR		
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries Students required to attend a one week in-person seminar in January	4

C17. Apply negotiation and mediation skills to address organizational and community challenges.

Code	Title	Credits
Must take both courses:		
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
AND		
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5

C18. Select communication strategies for different audiences and sectors.

Code	Title	Credits
Select one of the following:		
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	3
PH.410.654	Health Communication Programs I: Planning and Strategic Design If select, 410.654 must also take 410.655	4
PH.410.655	Health Communication Programs II: Implementation and Evaluation If select, 410.654 must also take 410.655	4
PH.301.645	Health Advocacy	3
PH.223.802	Global Disease Epidemiology and Control Program Seminar 2	1
PH.221.802	Health Systems Graduate Seminar 2	1
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	4
PH.222.641	Principles of Human Nutrition in Public Health	4
PH.222.654	Food, Culture, and Nutrition	4

C19. Communicate audience-appropriate public health content, both in writing and through oral presentation.

Code	Title	Credits
Select one of the following:		
PH.301.645	Health Advocacy	3
OR		
PH.260.720	Communications Primer for the Public Health Sciences	1

C20. Describe the importance of cultural competence in communicating public health content.

Code	Title	Credits
Select one of the following:		
PH.301.645	Health Advocacy	3
OR		
PH.260.720	Communications Primer for the Public Health Sciences	1

C21. Perform effectively in interprofessional teams

Code	Title	Credits
PH.552.625	Building Collaborations Across Sectors to Improve Population Health	0.5
AND Must Participate in an Interprofessional Education Event		

C22. Apply systems thinking tools to a public health issue.

Code	Title	Credits
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	3
OR		
PH.552.626	Systems Thinking: Concepts and Methods	0.5

Departmental Requirements

Students must successfully complete master's seminar course in year one, field placement in year two, and master's essay in year two.

Code	Title	Credits
PH.380.816	SS/R: Population, Family and Reproductive Health Master's Seminar This course is taken for 4 consecutive terms (1-4) during year one of MSPH degree program.	1

Code	Title	Credits
PH.380.810	Field Placement in Population, Family and Reproductive Health This course is taken in term 1 of year two	16
AND		
PH.380.810	Field Placement in Population, Family and Reproductive Health This course is taken in term 2 of year two	16

Code	Title	Credits
PH.380.850	PFRH Master's Essay This course is taken in term 3 of year two	3 - 6
AND		
PH.380.850	PFRH Master's Essay This course is taken in term 4 of year two	3 - 6

Areas of Interest Requirements

Students must take a minimum of five required courses from one of the department's areas of interest. The areas of interest include the following:

- Adolescent Health (p. 449)
- Child Health (p. 449)
- Maternal, Fetal and Perinatal Health (p. 450)
- Population and Health (p. 451)
- Women's, Sexual and Reproductive Health (p. 451)

Within a given area of interest, ***a unique course*** must be selected for each of the following competencies:

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course;
2. Identifying and assessing the causes and consequences of population change using demographic methods;
3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor;
4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in populations relevant to the area of interest;
5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of relevant populations.

Courses taken to meet the 12 CEPH objectives can also be used to meet the area of interest competencies and CEPH competencies.

If a student chooses to complete a second area of interest, courses may be double counted across their primary and secondary areas of interest; students must, however, complete the course requirements for at least one area of interest. The department encourages students to select electives from other areas of interest to enhance their breadth and depth of understanding in their chosen and other areas of interest. Areas of interest and their eligible courses are listed in the following tables.

Adolescent Health

Competency

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change using demographic methods;

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.623	Adolescent Health and Development (Term 3)	3
PH.380.747	International Adolescent Health (Term 4)	3

4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2) [1]	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4

[1] This course cannot be used to fulfill both the CEPH Requirements and Area of Interest Requirement.

5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
PH.380.725	The Social Context of Adolescent Health and Development (Term 4)	3

Electives

Code	Title	Credits
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (Term 2)	3
PH.380.721	Schools and Health (Term 2)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.380.761	Sexually Transmitted Infections in Public Health Practice (Term 4)	4
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (Term 3)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (Term 3)	3
PH.380.771	Understanding and Changing International Reproductive Health Policy (Term 4)	3
PH.380.749	Adolescent Sexual and Reproductive Health (Term 4)	3

Child Health

Competency

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change using demographic methods;

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4

PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
PH.380.616	Child Health Epidemiology (Terms 3,4)	3

4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2) [1]	4
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Terms 2,3)	3

1 This course cannot be used to fulfill both the CEPH Requirements and Area of Interest Requirement.

5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.642	Child Health and Development (Term 2)	3
PH.380.744	Nutrition and Growth in Maternal and Child Health (Term 1)	3

Electives

Code	Title	Credits
PH.223.663	Infectious Diseases and Child Survival (Term 3)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (Term 3)	3
PH.330.640	Childhood Victimization: A Public Health Perspective (Term 4)	3
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (Term 3)	3
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health (Term 2)	3
PH.380.721	Schools and Health (Term 2)	3
PH.380.742	Family - Health, Public Health and Policy (Term 3)	3
PH.380.623	Adolescent Health and Development (Term 2)	3
PH.410.752	Children, Media, and Health (Term 3)	3

Maternal, Fetal and Perinatal Health
Competency

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course;

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change using demographic methods;

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4

4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2) [1]	4
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3

1 This course cannot be used to fulfill both the CEPH Requirements and Area of Interest Requirement.

5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 1)	3
PH.380.744	Nutrition and Growth in Maternal and Child Health (Terms 1,2)	3

Electives

Code	Title	Credits
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (Term 2)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health (Term 2,3)	3

PH.120.620	Fundamentals of Reproductive Biology (Term 1)	3
PH.120.620	Fundamentals of Reproductive Biology (Term 2)	3

Population and Health

Competency

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course;

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change using demographic methods;

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2) Course cannot be used to meet two area of interest competencies	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (Term 3) Course cannot be used to meet two area of interest competencies	3

4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant;

Code	Title	Credits
Select one of the following:		
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2) [1]	4
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4

[1] This course cannot be used to fulfill both the CEPH Requirements and Area of Interest Requirement.

5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2) Course cannot be used to meet two area of interest competencies	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (Term 3) Course cannot be used to meet two area of interest competencies	3

Electives

Code	Title	Credits
PH.380.635	Urban Health in Contemporary America (Term 4)	4
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.767	Couples and Reproductive Health (variable credit, Term 1)	3
PH.380.670	Religion, Spirituality and Public Health (Term 3)	3

Women's, Sexual and Reproductive Health

Competency

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change using demographic methods;

Code	Title	Credits
Select one of the following:		
PH.380.600	Principles of Population Change (Term 2)	4
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

3. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
PH.380.666	Women's Health (Term 3)	3

4. Evaluating strategies to promote population health, including health services and systems delivery strategies used to address health concerns in the relevant.

Code	Title	Credits
Select one of the following:		
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.771	Understanding and Changing International Reproductive Health Policy (Term 4)	3
PH.380.667	Women's Health Policy (Term 4)	3
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (Term 1)	4
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3

5. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2)	3

PH.380.668	International Perspectives on Women, Gender, and Health (Term 4)	3

Electives

Code	Title	Credits
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (Term 2)	4
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (Term 2)	3
PH.380.749	Adolescent Sexual and Reproductive Health (Term 4)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.380.623	Adolescent Health and Development (Term 3)	3
PH.410.683	Global Perspectives on LGBT Health (Term 3)	3
PH.340.629	The Epidemiology of LGBTQ Health	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (Term 4)	3
PH.380.628	Public Health Perspectives On Abortion (Term 4)	3
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.410.657	Communication Strategies For Sexual Risk Reduction (Term 4)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.767	Couples and Reproductive Health (variable credit, Term 1)	3
PH.120.620	Fundamentals of Reproductive Biology (Term 2)	3
PH.380.761	Sexually Transmitted Infections in Public Health Practice (Term 4)	4

Field Placement Guidelines

The field placement is an integral part of the MSPH Program in the Department of Population, Family and Reproductive Health. It provides an opportunity for the student to enhance their educational experience by integrating basic understanding of concepts, methods, and skills developed during the first year of the MSPH academic program with the experience of full-time work in an appropriate practice setting. It also provides the opportunity to successfully complete a specified activity and/or product as stated in the field placement objectives.

MSPH students are required to complete a two-term field placement for a minimum of 4 months full-time, or no less than 680 full time work hours. Students must be in good academic standing and have completed the following course work: PFRH Area of Interest courses (5 courses), Quantitative Methods: Biostatistics (2-4 courses), Quantitative Methods: Epidemiology (1 course), Public Health and Health Care Systems Interpersonal Practice (2-3 courses), and Negotiation/Mediation (1 course) -as listed in the CEPH requirements to proceed to the field placement portion of the program.

During terms 5 and 6 of the program, students will register for PFRH Field Placement (380.810) for 16 credits each term. Students are expected to be on campus in the 7th and 8th terms of their academic program when they take courses and complete their culminating Master's Essay and Presentation. Students who wish to extend their field placement must petition the Masters Committee for approval.

Structure of the Field Placement

The field placement may begin right after the end of term 4 of the first year and is usually completed on or before the end of term 2 of the second year. The duration of the placement should be a minimum of four (4) months or 680 full time work hours. This time includes any holidays which are normally observed by the field placement sponsor. To comply with the School's academic calendar, a four-month field placement should begin no later than August 1st.

The student is expected to function as a productive staff member throughout the field placement. While it is considered to be equitable for the student to be properly compensated for their contribution in the form of a salary, stipend, or other such financial support, not all field placements are paid positions.

If the field placement is outside the U.S., a Graduate Student Study Release (http://www.jhsph.edu/student_affairs/TravelAbroad.html) form must be completed and submitted to the Academic Coordinator. Students should also consult the section on International Travel in Part I the student handbook for further requirements about international travel.

Arranging the Placement

The process of arranging the field placement will vary; however, arrangements will be considered formalized when:

- A Work Agreement has been completed and signed by the student, academic adviser and preceptor.
- All arrangements associated with compensation have been agreed on by all principals involved, and contracts pursuant thereto have been completed and filed with the proper financial offices and office.

Selection of the Field Placement Site

Students can seek a field placement in many different types of health and/or welfare organizations. These may include national and state program offices, nonprofit voluntary organizations, or public as well as private agencies with a public health or population focus. The field placement can be domestic, international, or both. Field placement opportunities can be found by searching the PFRH MSPH 1st Year Cohort site on CoursePlus, which includes several possible and available field placement opportunities as well as on the my.jhsph website.

Field placements on the my.jhsph website are organized by domestic and international locations, and by specific location. If a student has a clear sense of where s/he would like to do the field placement, s/he can click on the location and see the various field placements associated with the location. If students are less clear about location for their field placement(s), another starting point is the Popular Field Placements list of previous field placements that have received positive feedback from students.

Another way of finding a field placement is to speak with faculty who share common interests. Some former students have found field placements by working on research projects with a faculty member from the School of Public Health or School of Medicine. Getting advice and assistance from an academic adviser is another useful way of finding opportunities for field placements.

Regardless of how you find your field placement, the following minimum criteria should be followed:

- The preceptor has the time and inclination to supervise the student to facilitate a meaningful learning and work experience;
- The activities and final product are clearly defined;
- Adequate support, supplies, and space are provided for the student; and
- A Work Agreement is signed by preceptor and submitted to the MSPH CoursePlus site.

Student Responsibilities

Students are expected to take an active role in identifying potential field placement opportunities. This approach is important, as it also prepares students for acquiring skills needed to obtain a job after graduation. Students should ensure that their resumes or curriculum vitae is updated and may also be required to write a cover letter to the organization describing the skills they can offer to the organization. Students are expected to show a high level of professionalism when communicating with potential preceptors and discussing the potential scope of work for the field placement. During the course of securing and working on the field placement, students need to be in regular contact with their faculty adviser. The Field Placement Coordinator and the MSPH Academic Program Coordinator also need to be informed about plans a student has for securing a field placement. Students must complete a Work Agreement with their preceptor and approval from their Academic Adviser before the beginning of the Field Placement. To receive credit for the field placement, students must submit a Work Agreement to the MSPH CoursePlus website, and an evaluation form must be completed by the student as well as the preceptor. Students are responsible for assuring that all forms are completed.

If a student plans to either analyze or collect data as part of the field placement, please consult the IRB Website (https://www.jhsph.edu/offices-and-services/institutional-review-board/) and discuss related matters with their advisers.

Field Placement Preceptor

The preceptor supervises the student's progress in completing all goals, objectives, and associated activities throughout the field placement. In addition, the preceptor needs to be available to meet with the student on a regular basis and, when necessary, advise the MSPH Program Director, Dr. Kristin Mmari (kmmari1@jhu.edu), of any problems that may arise. The preceptor is required to submit a performance form at the completion of the field placement.

Faculty Adviser

The faculty adviser may be the primary contact to help identify potential field placement sites. Other faculty and the MSPH Academic Program Coordinator are also available to consult on additional recommendations. The faculty adviser approves the decision about the most appropriate field placement experiences for their advisee. The adviser confers as needed with both the student and the preceptor during the field placement.

PFRH Field Placement Coordinator

The PFRH Field Placement Coordinator is available to discuss the type of field placement of interest to students and to help locate appropriate field placement opportunities. Meeting with the field placement coordinator is particularly important if the faculty adviser does not have contacts in the student's area of interest. In addition, the field placement coordinator can assist students in completing the necessary paperwork and advise them of outside funding sources and deadlines.

Forms for Field Placement

The forms that are required for the field placement include:

- Work Agreement (this is the agreement between the student and the preceptor). The work agreement describes the learning objective of the field placement experience and the deliverables. This is completed prior to the start of the field placement
- Student Evaluation of Preceptor. This is completed by the student at the conclusion of the field placement.
- Preceptor Evaluation of Student. This is completed by the preceptor at the conclusion of the field placement.
- Student evaluation of field placement. This is a written report completed by the student at the conclusion of the field placement.

The Work Agreement

The Work Agreement is the form needed to confirm a field placement; it must be submitted before the field placement begins. It contains important information, including the student's contact information, the contact information of the preceptor, and a list of tasks (referred to as 'work objectives') that the student is expected to perform as part of the field placement. It is important that students carefully define the work objectives, keeping in mind feasibility and realistic expectations.

"Well specified" work objectives describe realistic objectives that are feasible within the time frame of a typical field placement. They also do not over-commit students to a certain task, unlike those found under above the 'vague or poorly specified' work objectives. Avoid using terms and phrases such as 'complete all' or 'conduct all' – as these phrases may create unrealistic expectations, which if not met, may result in poor evaluations. The percentage of time for a given objective also should be realistic; for example, the tasks listed as vague or poorly specified can be very time-consuming; time spent on the task should be clearly in line with the ability to complete them.

To ensure the work agreement is realistic and feasible, students are expected to discuss their work agreements with their advisers and/or the academic coordinator as well as the Field Placement Coordinator.

Confirming the Field Placement

- If you are considering more than one opportunity, inform the contact person at each site about when you will let them know of your decision; **there may be others waiting for the same opportunity.**
- **After you have informed an organization that you have decided not to work with them**, **send a letter thanking them for their time**. If your first choice falls through for some reason, you may have another option.
- **For the placement you select, send a letter** to the individuals with whom you will be working thanking them for their time, conveying your enthusiasm for their field placement offer, and indicating that you will speak with your adviser and be in touch with them about the next steps in setting up the field placement.
- **After speaking with your adviser, send a letter to your preceptor reviewing the steps in finalizing the field placement. The next step is theirs**. It is helpful to include a sample Work Agreement form so the preceptor knows the general guidelines and parameters. The objective is to assure that both students and preceptors have the same understanding of the scope of work. This up-front negotiation with written confirmation avoids later problems. This approach also demonstrates that you are well organized, focused, and follow through on tasks.
- The letter can include a **draft of your objectives for the field placement**. Sharing the objectives will avoid misunderstanding of your proposed contribution, and how you expect to benefit from the experience.
- The letter should include a writing sample, if applicable and if you have not yet provided one, and a d**etailed description of the MSPH**

Field placement, including Preceptor Evaluation Guidelines for the MSPH field placement. As noted above, students are required to submit a signed Work Agreement Form before beginning the field placement (sometimes called a “contract”).
When the work objectives have been completed and agreed on, prepare and sign 2 copies of the Work Agreement for the preceptor to also sign. The preceptor should retain one copy and the other copy must be uploaded to CoursePlus or sent to the Academic Program Manager, via email, for your file.

- **If you sign a contract with an organization**, it represents the official documentation that you have agreed on the scope of work with the organization, and, therefore, must abide with the terms of the contract. If you are not sure about signing such a document, it is critical that you speak to either your academic adviser, the Director of the MSPH program, the MSPH Academic Program Coordinator, or the Field Placement Coordinator for further assistance.

During the Field Placement

- **Maintain regular contact with your faculty adviser. The faculty adviser is a valuable resource for information and guidance throughout your degree program**;
- If you are having difficulties with your field placement it is important to express your concerns to your faculty adviser or field placement coordinator, Dr. Susan Gross (sgross@jhu.edu), to assure that your field placement is a successful and positive experience;
- If you are offered an extension for your field placement that would extend past winter break you must petition the MSPH Committee for an extension (see the Petition to Extend Field Placement Policy).

After the Field Placement

Upon completion of the field placement, each student must prepare a brief, but concise, evaluation of the field placement. This brief narrative (no more than 2 pages) should describe: 1) key strengths of the field placement; 2) weaknesses or challenges encountered; and 3) whether the field placement should be recommended to future MSPH students. Students can submit this report through CoursePlus site.

The student will complete an evaluation report of the preceptor.

The Field Placement preceptor must also complete an evaluation form of the student.

Petition to Extend Field Placement

Under special circumstances, an extension may be granted by the Masters Committee to a student for an existing field placement as a special studies course (380.810). Students must write a formal petition for an extension to the Masters Committee before the end of 2nd term (term 6) of the second year. The petition must include:

- A description about how the extension will enable the student to attain their academic objectives beyond coursework already completed or additional coursework in the 7th and 8th terms of study; students often use the last two terms as an opportunity to take courses to further enhance skills they found lacking during their field placement
- The specific objectives of the extension and the additional skills that will be gained;
- Confirmation of adviser support; and
- A statement indicating the intention to return to campus for MSPH Presentation and to complete MSPH Essay in adherence with MSPH program guidelines

Students can email the petition to the Academic Program Coordinator with the student’s academic adviser copied on the email. No petition will be approved if it is submitted after the end of the 2nd term.

MSPH Essay and Presentation Guidelines

The Master’s Essay is a requirement for graduation from the MSPH program in the Department of Population, Family, and Reproductive Health. The goal of the essay is for students to apply the skills and knowledge they have acquired during their academic program to a public health problem or concern of interest to them. In addition to the written essay, students must give a 10-minute public presentation about the content of their essay.

Students should begin thinking about essay topics and format at the end of the first academic year and should have identified a topic before completing their field placement. During Terms 7 and 8 of the program, students register for PFRH Master’s Essay (380.850), designating their First Reader as the instructor. Guidelines for credit hours are as follows:

- Term 7: 3-6 units
- Term 8: 3-5 units
- Students need to take a minimum of 3 units of special studies
- If taking more than 3 units student must meet weekly with their 1st reader

The following sections provide detailed guidelines about the essay and presentation. The MSPH CoursePlus website has further details about the process.

Essay Readers

Students must have at least one reader for their essay. The following guidelines must be applied: The students’ reader must be PRFH faculty; faculty with a joint appointment in PFRH also can be a reader. Approval is required if a student wishes to select a reader who is not PFRH faculty; a rationale must be given for the choice of the reader and a second reader from PFRH must be selected.

Responsibilities of Students and Readers

Primary Reader

The essay reader is responsible for working with the student on the essay from the outline to final draft, and on preparation for the presentation. The reader must be identified as the instructor for the PFRH Master’s Essay (380.850) in terms 7 and 8. Students must submit outline and essay drafts to their reader on key dates starting in November through April; these dates are indicated to assure timely completion of the essay.

Second Reader

A second reader may also provide comments on the essay at any stage. A second reader will seldom be needed but may be asked if a student is using data from a study conducted by the reader or at the agency of the reader. If a second reader is external to the department, students are strongly advised to discuss the roles and responsibilities of this reader with their primary reader. Second readers do not need to give approval for the essay, unless the first reader is external to PFRH. The essay must meet the standards required by faculty of the School. However, student who are using data affiliated with the second reader or the second reader’s agency should provide drafts of the essay to this reader and discuss when feedback will be given to the student from the reader.

Choosing a Topic and Format for the Essay

In addition to selecting a topic, students may select one of five formats for the essay:

- Research Report
- Analysis of a Public Health Problem or Legislation Position Paper
- Structured Literature Review
- Evaluation of a Program/Project
- Research Proposal

Many students link the essay topic to their Field Placement experience, although it is not a requirement that they do so. For example, students' work on a literature review or a research project as part of their Field Placement may serve as a basis for developing the essay. The essay must represent work completed, for example on a research project, in addition to that completed during the Field Placement. Regardless of whether the topic is based on their Field Placement, students must focus on a public health concern or problem, which may or may not be in their area of interest. Details on the expectations of the essay are given during the 3rd MSPH quarterly luncheon.

The student and their adviser must verify the knowledge and skills required for the selected essay format (see Essay Topic Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.downloadItem/coid/6709/libItemID/376959/)); for example, students conducting a systematic literature review for their essay must have taken a related course or work with a primary reader with methodological expertise in systematic reviews.

Steps to Complete the Essay

Step 1: Identify topic, format, and readers

Students should identify a primary reader whose research interests and expertise are in the topic area or methodology for the essay. Academic advisers must serve as a reader, but do not need to be the primary reader. Advisers can serve as a useful resource for discussing potential topics of interest and providing referrals to other faculty members in the department whose expertise better matches the proposed topic of the essay. Other resources for identifying potential primary readers are the Masters Program Director and Associate Director, academic coordinators, Department website, and school faculty directory.

Step 2: Discuss roles and responsibilities with readers

Once readers have been identified, all students should have a conversation with their readers so that each knows their responsibility for the essay. This discussion is especially important for readers who are outside PFRH and especially for third readers. A timeline should also be provided to the readers so that each is aware of when feedback should be provided. In general, readers should be given at least a minimum of one week to provide feedback to students. Additionally, while not required, the student and readers should discuss plans to publish the essay and the order of authors for the publication. Separate guidelines regarding authorship will be provided to the students.

Step 3: Determine Whether Essay Involves 'Human Subjects Research'

What is 'human subjects research'?

"Human subjects research' is broadly defined to include any activity involving humans that seeks to test a hypothesis or answer a scientific question. This activity can include secondary data analysis and research involving direct contact with subjects. All students who plan to undertake human subjects' research must have IRB approval before working with human subjects' data or samples and before contacting human subjects. The JHBSPH IRB Office (http://www.jhsph.edu/irb (http://www.jhsph.edu/irb/)) is charged with assuring that human subjects research studies conducted in the School comply with internal school policies and external regulations designed to protect human subjects.

For the purposes of the essay, after students have identified the data source(s) for their research, they should complete the online IRB Worksheet (http://jhsph.us2.qualtrics.com/SE/?SID=SV_1GrF6WBUcNFZCV6) to determine the additional steps (if any) needed for securing IRB approval for the essay, or documenting existing approval.

For additional questions about the IRB process, please visit: https://www.jhsph.edu/offices-and-services/institutional-review-board/faqs-by-topic/

Step 4: Submit the Essay Topic Form

After students have selected an essay topic and format, the Essay Topic Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.viewAll/coid/7100/) must be completed and signed by the student, academic adviser, and primary reader (if different from the adviser). This form will ensure that a student has the needed skills and knowledge to complete the essay. For example, if a student decides to conduct an evaluation of a project or a program for the essay, they must have either taken the 'Fundamentals of Program Evaluation' course or had prior experience conducting an evaluation (formats listed under "MSPH Essay and Presentation Guidelines" section). Students also must indicate whether IRB approval is needed for the essay.

Step 5: Register for 380.850 PFRH Master's Essay

Students should register for 3 to 6 units of special studies with their **primary reader** using course number 380.850 in the 7th term and 3 to 6 units in the 8th term.

Step 6: Submit Outline of Essay to Primary Reader

Students must submit an outline of the essay to their primary reader by the required deadline listed above. The outline should contain all major headings and sub-headings of the particular essay format, with bulleted text on the content of each section. Primary readers must be given at least 1 week to provide feedback to the student on the outline. **Failure to meet the outline deadline often results in delay in meeting later deadlines.**

Step 7: Submit First Draft of Essay to Primary Reader

Students must submit a complete draft of their essay to the primary reader by the required deadline. The primary reader should ensure that the draft contains all necessary elements of the essay in the standardized format. Primary readers should provide feedback to the student within 2 weeks of receiving the draft essay. **Failure to meet this deadline often results in delay in completing the essay on time.**

Note: Students partnering with an organization that is expecting a report may need to write two separate documents in order to meet the expectations of the department's essay.

Step 8: Submit Second Draft of Essay to Primary and Secondary Readers

Second drafts must be reviewed by both the primary and second readers for final edits and recommendations. Both readers should provide feedback to the student within 2 weeks of receiving the second draft. Students should submit a second draft in a timely manner and of reasonable quality in order for faculty to complete their review and provide comments to them in a timely manner. Students must incorporate comments from each reader in their final draft.

Step 9: Submit Final Draft of Paper to Primary and Secondary Readers for Approval

Students must submit the final draft of their essay to both primary and secondary readers for approval and submission to the Academic Office. Both readers must also submit the Reader Approval Form (https://courseplus.jhu.edu/core/index.cfm/go/ol:library.viewAll/coid/7100/) for the essay directly to the Academic Office. ***If the essay is not approved by both readers by the deadline, students may not participate in the oral presentation and may be in jeopardy of not graduating. They also will not be eligible for a distinction award.***

Step 10: Oral Presentation of Essay

Each student is required to present their essay in a 10-minute PowerPoint presentation at a public seminar before the end of the 8th term. The student's first reader is expected to review draft presentations prior to a practice session. A practice session should be scheduled approximately one week prior to the public seminar with input from first reader. No video clips are allowed in the presentation. Before students can present their Masters' Essay, they must meet these conditions:

- Any existing incompletes in coursework must be rectified, with confirmation by the student's adviser and academic coordinator
- The essay has received final approval from reader(s)
- PowerPoint presentation has been approved by the reader

Failure to meet any of these conditions before the time of presentation will result in postponement of graduation.

Master's Essay Deadlines

In preparation for completion of the Master's essay and presentation, students should contact their adviser and/or their primary reader no later than the 6th term to discuss the essay topic and format. Master's Essays are due early in the 8th Term. Students should begin work on their paper no later than the start of 7th term, preferably before the term begins, and complete it early in the 8th term. Students should begin to consider essay topics and format during their field placement. Essays will be presented at a seminar in late April/ early May, prior to graduation.

CEPH (Council on Education for Public Health) Competencies

C1. Apply epidemiological methods to the breadth of settings and situations in public health practice

C2a. Select quantitative data collection methods appropriate for a given public health context

C2b. Select qualitative data collection methods appropriate for a given public health context

C3a. Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate

C3b. Analyze qualitative data using biostatistics, informatics, computer-based programming and software, as appropriate

C4. Interpret results of data analysis for public health research, policy, or practice

C5. Compare the organization, structure, and function of health care, public health, and regulatory systems across national and international settings

C6. Discuss the means by which structural bias, social inequities, and racism undermine health and create challenges to achieving health equity at organizational, community, and societal levels

C7. Assess population needs, assets and capacities that affect communities' health

C8. Apply awareness of cultural values and practices to the design or implementation of public health policies or programs

C9. Design a population-based policy, program, project, or intervention

C10. Explain basic principles and tools of budget and resource management

C11. Select methods to evaluate public health programs

C12. Discuss multiple dimensions of the policy-making process, including the role of ethics and evidence

C13. Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes

C14. Advocate for political, social or economic policies and programs that will improve health in diverse populations

C15. Evaluate policies for their impact on public health and health equity

C16. Apply principles of leadership, governance, and management, which include creating a vision, empowering others, fostering collaboration, and guiding decision making

C17. Apply negotiation and mediation skills to address organizational and community challenges

C18. Select communication strategies for different audiences and sectors

C19. Communicate audience-appropriate public health content, both in writing and through oral presentation

C20. Describe the importance of cultural competence in communicating public health content

C21. Perform effectively in interprofessional teams

C22.Apply systems thinking tools to a public health issue

CEPH (Council on Education for Public Health) Learning Objectives

1. Explain public health history, philosophy and values
2. Identify the core functions of public health and the 10 Essential Services
3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health
4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
5. Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.

6. Explain the critical importance of evidence in advancing public health knowledge
7. Explain effects of environmental factors on a population's health
8. Explain biological and genetic factors that affect a population's health
9. Explain behavioral and psychological factors that affect a population's health
10. Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
11. Explain how globalization affects global burdens of disease
12. Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health)

Areas of Interest Competencies

All **PFRH master's students** must attain proficiency in five competencies in their selected PFRH area of interest:

1. Apply a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course;
2. Identify and assess the causes and consequences of population change using demographic methods;
3. Assess the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor;
4. Evaluate strategies to promote population health, including health services and systems delivery strategies used to address health concerns in populations relevant to the area of interest;
5. Apply frameworks specific to the area of interest (beyond life course) for improving the health of relevant populations

Population, Family and Reproductive Health, PhD

PhD Program Overview

This PFRH handbook describes the program of study for PhD students. It is based on the competencies for the program shown below and the 12 foundational learning objectives required for all programs in schools of public health by the Council on Education in Public Health (CEPH). All PFRH PhD students should have a fundamental understanding of statistical methods and their application, epidemiology, research ethics, advanced research methods in a selected methodological area, expertise in an area of interest, as listed below, and the application of life course perspectives on health, demography, and population dynamics to this area of interest. They are also required to take four terms of the first-year doctoral seminar, two terms of the second-year doctoral seminar, and the PFRH Proposal Writing Seminar (until completion of the Preliminary Oral Examination).

The department's current areas of interest include:

- Adolescent Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/adolescent-health/)
- Child Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/child-health/)
- Maternal, Fetal, and Perinatal Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/maternal-fetal-perinatal-health/)
- Population and Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/population-and-health/)
- Women's, Sexual and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/areas-of-interest/women-sexual-and-reproductive-health/)

Program Requirements

During the program, students are required to:

- Successfully complete courses that address the 12 foundational learning objectives required for all programs in schools of public health by CEPH
- Successfully complete all examinations including the comprehensive exam in year two, department preliminary oral examination, schoolwide preliminary oral examination, and final defense examination
- Complete and update an individual development plan for their doctoral studies as they progress through the program and annual reviews of progress (after year two)
- Complete one full year of residency (a minimum of 16 units per term for four consecutive terms)
- Successfully complete a Research Apprenticeship
- Achieve a grade point average (GPA) of 3.0 or higher in all course work
- Achieve a grade B or better in all required PFRH Core courses (life course perspectives on health, demography, and population dynamics as applied to their area of interest)

Students are required to take a minimum of 16 units each term in order to be considered full-time students. Tuition support is contingent on full-time status.

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

School-wide PhD Requirements

Students must choose:

Code	Title	Credits
PH.340.721	Epidemiologic Inference in Public Health I	5
or PH.340.751	Epidemiologic Methods 1	
Select one of the following:		16
PH.140.621 & PH.140.622 & PH.140.623 & PH.140.624	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III and Statistical Methods in Public Health IV	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV	
Select a minimum of 3 units of Research Ethics		3
PH.550.860	Academic & Research Ethics at BSPH	0

Students must complete all courses meeting the Council on Education for Public Health (CEPH) objectives prior to completing the School-wide Preliminary exam.

Total Credits		**24**

COMPETENCY

1. Applying statistical methods to address the health of populations. **(Choose 4 in sequence)**

Code	Title	Credits
Select four of the following:		
PH.140.621	Statistical Methods in Public Health I (Term 1)	4
or PH.140.651	Methods in Biostatistics I	
PH.140.622	Statistical Methods in Public Health II (Term 2)	4
or PH.140.652	Methods in Biostatistics II	
PH.140.623	Statistical Methods in Public Health III (Term 3)	4
or PH.140.653	Methods in Biostatistics III	
PH.140.624	Statistical Methods in Public Health IV (Term 4)	4
or PH.140.654	Methods in Biostatistics IV	

2. Applying epidemiological methods to address the health of populations.

Code	Title	Credits
Select one of the following:		
PH.340.721	Epidemiologic Inference in Public Health I (Terms 1,3)	5
PH.340.751	Epidemiologic Methods 1 (Term 1)	5

3. Applying ethical concepts and tools to population health research and practice.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (Terms 1,2,3,4)	
Select one of the following:		
PH.306.665	Research Ethics and integrity: U.S. and International Issues (Term 3)	3
PH.550.600	Living Science Ethics - Responsible Conduct of Research (Term 1) [1]	1

[1] If students choose PH.550.600 Living Science Ethics - Responsible Conduct of Research, they must also take one of the following courses: PH.306.663 Legal and Ethical Issues in Health Services Management or PH.221.616 Ethics of Public Health Practice in Developing Countries

CEPH Requirements

1. Explain public health history, philosophy, and values.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.552.601	Foundational Principles of Public Health (Terms 1,3)	0.5

2. Identify the core functions of public health and the 10 Essential Services.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.552.601	Foundational Principles of Public Health (Terms 1,3)	0.5

3. Explain the role of quantitative and qualitative methods and sciences in describing and assessing a population's health. **(Must take both)**

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (Term 1)	0.5

4. List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

5. Discuss the science of primary, secondary, and tertiary prevention in population health, including health promotion, screening, etc.

Code	Title	Credits
Select one of the following:		
PH.340.721	Epidemiologic Inference in Public Health I (Terms 1,3)	5
PH.340.751	Epidemiologic Methods 1 (Term 1)	5

6. Explain the critical importance of evidence in advancing public health knowledge.

Code	Title	Credits
Select one of the following:		
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge (Terms 2,4)	0.5

7. Explain effects of environmental factors on a population's health.

Code	Title	Credits
Select one of the following:		
PH.380.616	Child Health Epidemiology (Term 4)	3
PH.552.607	Essentials of Environmental Health (Terms 1,3)	0.5

8. Explain biological and genetic factors that affect a population's health.

Code	Title	Credits
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (Terms 2,4)	0.5

9. Explain behavioral and psychological factors that affect a population's health.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

10. Explain the social, political, and economic determinants of health and how they contribute to population health and health inequities.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

11. Explain how globalization affects global burdens of disease.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

12. Explain an ecological perspective on the connections among human health, animal health, and ecosystem health (eg, One Health).

Code	Title	Credits
PH.552.612	Essentials of One Health (Term 1)	0.5

PFRH Course Requirements

PhD students are required to take four research methods courses in a specific methodological area in addition Epidemiologic Inference **or** Epidemiologic Methods I. These requirements must be completed before taking the PFRH comprehensive examination. The methods areas and course requirements are listed in alphabetical order below. PhD students must also complete doctoral seminars throughout their program.

SOCIAL SCIENCE SPECIALTY CORE REQUIREMENTS

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.340.717	Health Survey Research Methods (Term 2)	4
PH.380.711	Issues in Survey Research Design (Term 3)	3
PH.224.690	Qualitative Research Theory and Methods (Term 3)	3
PH.410.690	Ethnographic Fieldwork (Term 3)	3

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.380.611	Fundamentals of Program Evaluation (Terms 1,3)	4
PH.309.616 & PH.309.617	Introduction to Methods for Health Services Research and Evaluation I and Introduction to Methods for Health Services Research and Evaluation II (Term 3 for 616, Term 4 for 617) [1]	4

[1] PH.309.616 Introduction to Methods for Health Services Research and Evaluation I is a multi-term course. Must take both courses in order to receive a grade for the course.

3. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.410.615	Research Design in the Social and Behavioral Sciences (Term 2)	3
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences (Term 2)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (Term 3)	3

4. Analyzing data using methodological tools appropriate to the study question and available data.

Code	Title	Credits
PH.330.657	Statistics for Psychosocial Research: Measurement (Term 1)	4
PH.140.658	Statistics for Psychosocial Research: Structural Models (Term 2)	4
PH.224.691	Qualitative Data Analysis (Term 4) [1]	3

[1] PH.224.690 Qualitative Research Theory and Methods is a prerequisite for the course PH.224.691 Qualitative Data Analysis.

DEMOGRAPHY SPECIALTY CORE REQUIREMENTS

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.340.717	Health Survey Research Methods (Term 2)	4
PH.380.711	Issues in Survey Research Design (Term 3)	3

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
PH.410.615	Research Design in the Social and Behavioral Sciences (Term 2)	3

3. Analyzing data using methodological tools appropriate to the study question and available data. **(Must take both)**

Code	Title	Credits
PH.380.650	Demographic Methods for Measuring Health and Longevity (Term 3)	4
PH.380.651	Methods and Measures in Population Studies (Term 4)	4

EPIDEMIOLOGY SPECIALTY CORE REQUIREMENTS

Option 1 Professional Track

(PH.340.721 Epidemiologic Inference in Public Health I)

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.340.717	Health Survey Research Methods (Term 2)	4
PH.380.711	Issues in Survey Research Design (Term 3)	3

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
PH.340.722	Epidemiologic Inference in Public Health II (Terms 2,4)	4

3. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.340.645	Introduction to Clinical Trials (Term 2)	3
PH.223.664	Design and Conduct of Community Trials (Term 3)	4
PH.340.728	Advanced Methods for Design and Analysis of Cohort Studies (Term 1)	5

4. Analyzing data using methodological tools appropriate to the study question and available data. **(Must take both)**

Code	Title	Credits
PH.340.770	Public Health Surveillance (Term 2)	3
PH.140.630	Introduction to Data Management (Terms 2,4)	3

Option 2

(PH.340.751 Epidemiologic Methods 1)

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.340.717	Health Survey Research Methods (Term 2)	4
PH.380.711	Issues in Survey Research Design (Term 3)	3

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.340.645	Introduction to Clinical Trials (Term 2)	3
PH.223.664	Design and Conduct of Community Trials (Term 3)	4
PH.340.728	Advanced Methods for Design and Analysis of Cohort Studies (Term 1)	5

3. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations. **Both courses fulfill competency 3 & 4.**

Code	Title	Credits
PH.340.752	Epidemiologic Methods 2 (Term 2)	5
PH.340.753	Epidemiologic Methods 3 (Term 3)	5

4. Analyzing data using methodological tools appropriate to the study question and available data. **Both courses fulfill competency 3 & 4.**

Code	Title	Credits
PH.340.752	Epidemiologic Methods 2 (Term 2)	5
PH.340.753	Epidemiologic Methods 3 (Term 3)	5

HEALTH ECONOMICS SPECIALTY CORE REQUIREMENTS

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.313.603	Economic Evaluation III (Term 3) [1]	3
PH.380.711	Issues in Survey Research Design (Term 3)	3

[1] PH.313.601 Economic Evaluation I and PH.313.602 Economic Evaluation II are pre-requisites for PH.313.603 Economic Evaluation III

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select two of the following:		
PH.313.601	Economic Evaluation I (Term 1) [1]	3
PH.313.653	Advanced Health Economics I (Term 1)	2
PH.313.654	Advanced Health Economics II (Term 2)	2
PH.313.655	Advanced Health Economics III (Term 3)	2
PH.313.656	Advanced Health Economics IV (Term 4)	2
AS.180.600	General Equilibrium Theory (Term 1)	4
AS.180.601	Microeconomic Theory I (Term 2)	4

[1] PH.313.601 Economic Evaluation I and PH.313.602 Economic Evaluation II are pre-requisites for PH.313.603 Economic Evaluation III

3. Analyzing data using methodological tools appropriate to the study question and available data.

Code	Title	Credits
Select one of the following:		
PH.221.644	Econometric Methods for Evaluation of Health Programs (Term 4)	4
PH.309.617 & PH.309.616	Introduction to Methods for Health Services Research and Evaluation II and Introduction to Methods for Health Services Research and Evaluation I (Terms 3,4) [1]	4
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs (Term 4)	4
PH.300.713	Research and Evaluation Methods for Health Policy (Term 3)	3
PH.313.602	Economic Evaluation II (Term 2) [2]	3

[1] Students who elect to take PH.309.616 Introduction to Methods for Health Services Research and Evaluation I must also take PH.309.617 Introduction to Methods for Health Services Research and Evaluation II

[2] PH.313.601 Economic Evaluation I and PH.313.602 ECONOMIC EVALUATION II are pre-requisites for PH.313.603 ECONOMIC EVALUATION III

HEALTH SERVICES RESEARCH AND EVALUATION SPECIALTY CORE REQUIREMENTS

Competency

1. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.

Code	Title	Credits
Select one of the following:		
PH.340.717	Health Survey Research Methods (Term 2)	4
PH.380.711	Issues in Survey Research Design (Term 3)	3

PH.224.690	Qualitative Research Theory and Methods (Term 3)	3
PH.410.690	Ethnographic Fieldwork (Term 3)	3

2. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.380.611	Fundamentals of Program Evaluation (Terms 1,3)	4
PH.309.616 & PH.309.617	Introduction to Methods for Health Services Research and Evaluation I and Introduction to Methods for Health Services Research and Evaluation II (Terms 3,4)	4

3. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.

Code	Title	Credits
Select one of the following:		
PH.223.664	Design and Conduct of Community Trials (Term 3)	4
PH.300.713	Research and Evaluation Methods for Health Policy (Term 3)	3
PH.300.715	Advanced Research and Evaluation Methods in Health Policy (Term 4) [1]	4
PH.221.638	Health Systems Research and Evaluation in Developing Countries (Term 4)	4
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (Term 2)	3
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development (Term 4)	4
PH.313.790	Introduction to Economic Evaluation (Term 4)	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research (Term 3)	3
PH.390.675	Outcomes and Effectiveness Research (Term 4)	3
PH.410.710	Concepts in Qualitative Research for Social and Behavioral Sciences (Term 2)	3
PH.380.612	Applications in Program Monitoring and Evaluation (Term 4)	4

4. Analyzing data using methodological tools appropriate to the study question and available data.

Code	Title	Credits
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries (Term 4)	4
PH.224.691	Qualitative Data Analysis (Term 4) [1]	3
PH.221.644	Econometric Methods for Evaluation of Health Programs (Term 4)	4

[1] PH.224.690 Qualitative Research Theory and Methods is a prerequisite for PH.224.691 Qualitative Data Analysis

PFRH DOCTORAL SEMINARS

Code	Title	Credits
First Year Doctoral Students		
PH.380.817	PFRH First Year Doctoral Seminar Part 1 (Terms 1,2)	1
PH.380.822	PFRH First Year Doctoral Seminar Part 2 (Terms 3,4)	1
Second Year Doctoral Students		
PH.380.823	Research Seminar in Population, Family and Reproductive Health I (Term 1)	2
PH.380.824	Research Seminar in Population, Family and Reproductive Health II (Term 2)	2
PH.380.821	PFRH Proposal Writing Seminar (Term 4) [1]	2
Third Year Doctoral Students		
PH.380.821	PFRH Proposal Writing Seminar (Terms 1,2,3,4)	2

[1] Second year doctoral students also register for 1 credit PH.380.840 Special Studies in PFRH in 3rd Term for PFRH Proposal Writing Seminar

PFRH Areas of Interest Requirements for PhD

Students must take a minimum of seven required courses from one of the department's areas of interest. The courses fulfilling these requirements must be taken ***in addition to*** any departmental **or** schoolwide course requirements. The current areas of interest for students include the following:

- Adolescent Health
- Child Health
- Maternal, Fetal and Perinatal Health
- Population and Health
- Women's, Sexual and Reproductive Health

Doctoral students must take 7 courses to meet the requirements for the areas of interest component of their degree program. Within a given area of interest, a unique course needs to be selected for each of the following competencies:

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course;
2. Identifying and assessing the causes and consequences of population change.
3. Applying demographic methods to the health of populations to the area of interest.
4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.
5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.
6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.
7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations

Courses meeting the health services and systems delivery strategies competency are eligible for all areas of interest, but the department recommends that this course be closely related to the students' chosen area of interest. A unique course must be taken to fulfill each competency. If a student chooses to complete a second area of interest, courses may be double counted across their primary and secondary area of interests; students must, however, complete the course requirements for at least one area of interest. The department encourages students to select electives from other area of interests to enhance the breadth and depth of understanding in their chosen and other area of interests. Area of interests and their eligible courses are listed in the following tables by alphabetical order.

ADOLESCENT HEALTH

Competency

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

3. Applying demographic methods to the health of populations.

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact on each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.623	Adolescent Health and Development (Term 3)	3
PH.380.747	International Adolescent Health (Term 4)	3

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4

6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
PH.380.725	The Social Context of Adolescent Health and Development (Term 4)	3

7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.721	Schools and Health (Term 4)	3

Electives

Code	Title	Credits
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (Term 2)	3
PH.380.721	Schools and Health (Term 4)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.380.761	Sexually Transmitted Infections in Public Health Practice (Term 4)	4
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (Term 3)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (Term 3)	3
PH.380.771	Understanding and Changing International Reproductive Health Policy (Term 4)	3
PH.380.749	Adolescent Sexual and Reproductive Health (Term 4)	3

CHILD HEALTH

Competency

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

3. Applying demographic methods to the health of populations.

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
PH.380.616	Child Health Epidemiology (Term 4)	3

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.

Code	Title	Credits
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4

6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.642	Child Health and Development (Term 2)	3
PH.380.744	Nutrition and Growth in Maternal and Child Health (Term 1)	3

7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.721	Schools and Health (Term 4)	3

Electives

Code	Title	Credits
PH.223.663	Infectious Diseases and Child Survival (Term 3)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (Term 3)	3
PH.330.640	Childhood Victimization: A Public Health Perspective (Term 4)	3
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (Term 3)	3
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health (Term 2)	3
PH.380.742	Family - Health, Public Health and Policy (Term 2)	3
PH.380.623	Adolescent Health and Development (Term 3)	3
PH.410.752	Children, Media, and Health (Term 3)	3

MATERNAL, FETAL AND PERINATAL HEALTH

Competency

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

3. Applying demographic methods to the health of populations.

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.

Code	Title	Credits
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4

6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.744	Nutrition and Growth in Maternal and Child Health (Term 1)	3
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2)	3

7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.721	Schools and Health (Term 4)	3

Electives

Code	Title	Credits
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (Term 2)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health (Term 2)	3

PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.120.620	Fundamentals of Reproductive Biology (Terms 1,2)	3

POPULATION AND HEALTH

Students selecting the Population and Health Area of interest must select the Demography Specialty Core to fulfill the Research Methods Course Requirements.

Competency

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

3. Applying demographic methods to the health of populations.

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2)	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (Term 3)	3

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4

6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2)	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (Term 3)	3
PH.380.756	Poverty, Economic Development, and Health (Term 2)	4

7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.721	Schools and Health (Term 4)	3

Electives

Code	Title	Credits
PH.380.635	Urban Health in Contemporary America (Term 4)	4
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (Term 2)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (Term 4)	3
PH.380.767	Couples and Reproductive Health (Term 1, variable credit)	3

[1] Students selecting the Population and Health Area of interest must select the Demography Specialty Core to fulfill the Research Methods Course Requirements.

WOMEN'S, SEXUAL AND REPRODUCTIVE HEALTH

Competency

1. Applying selected frameworks to understand population health problems, including a multiple determinants framework for the health of populations across the life course.

Code	Title	Credits
PH.380.604	Life Course Perspectives on Health (Terms 1,2)	4

2. Identifying and assessing the causes and consequences of population change.

Code	Title	Credits
PH.380.600	Principles of Population Change (Term 2)	4

3. Applying demographic methods to the health of populations.

Code	Title	Credits
PH.380.603	Demographic Methods for Public Health (Terms 2,3)	4

4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

Code	Title	Credits
Select one of the following:		
PH.380.664	Reproductive and Perinatal Epidemiology (Term 4)	4
PH.380.666	Women’s Health (Term 3)	3

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.771	Understanding and Changing International Reproductive Health Policy (Term 4)	3
PH.380.667	Women's Health Policy (Term 4)	3
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (Term 1)	4

6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.655	Social and Economic Aspects of Human Fertility (Term 2)	3
PH.380.668	International Perspectives on Women, Gender, and Health (Term 4)	3

7. Critiquing health services and systems delivery strategies used to address health concerns in the relevant populations.

Code	Title	Credits
Select one of the following:		
PH.380.661	Clinical Aspects of Maternal and Newborn Health (Term 3)	3
PH.380.760	Clinical Aspects of Reproductive Health (Term 3)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.665	Family Planning Policies and Programs (Term 3)	4
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.380.721	Schools and Health (Term 4)	3

Electives

Code	Title	Credits
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (Term 2)	4
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (Term 2)	3
PH.380.749	Adolescent Sexual and Reproductive Health (Term 4)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (Term 4)	4
PH.410.683	Global Perspectives on LGBT Health (Term 3)	3
PH.340.629	The Epidemiology of LGBTQ Health	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (Term 2)	4
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (Term 4)	3
PH.380.628	Public Health Perspectives On Abortion (Term 4)	3
PH.380.624	Maternal and Child Health Legislation and Programs (Term 2)	4
PH.410.657	Communication Strategies For Sexual Risk Reduction (Term 4)	3
PH.380.767	Couples and Reproductive Health (Term 1, variable credit)	3
PH.380.668	International Perspectives on Women, Gender, and Health (Term 4)	3
PH.120.620	Fundamentals of Reproductive Biology (Terms 1,2)	3

Monitoring Progress of PFRH PhD Students

As of the 2018-2019 academic year, the University Doctoral Board requires that each doctoral student, and Postdoctoral Fellow, should receive an annual review during every year in their program. This review is expected to have 3 components:

1. Student self-assessment and Individual Development Plan (IDP)
2. Monitoring of progress in the program
3. Written feedback to the student/Fellow

For PFRH doctoral students, the IDP self-assessment and Annual Review process embody these three components. With AY2019-2020, first and second-year doctoral students will be asked to complete the IDP, which is described in detail below and will be reviewed as part of meetings of students with their advisers. PFRH encourages doctoral students to meet regularly and frequently with their advisers.

Annual Review

BSPH, and thus PFRH, requires that all doctoral students have a yearly meeting with their academic adviser and other faculty members from PFRH or other BSPH departments. A formal annual review meeting and report is required after the second year of study and takes place annually by mid-November. Faculty who attend the review may change over the course of a student's program. The purpose of the meeting is twofold, serving as an opportunity:

1. for students and faculty to discuss the student's progress and identify resources and potential problems as they progress through the program and
2. ensure that PFRH records on student progress are correct and up-to-date.

Individual Development Plan

The IDP is intended to help PhD students assess their goals, strengths, weaknesses, values, and plans for their future career. They are expected to complete this plan at the beginning of doctoral studies and update it annually. As noted earlier, this IDP is not meant to track progress towards specific degree requirements. This tracking is accomplished by the PFRH department's Annual Review and credentialing process. Rather, the IDP is designed to assist students in considering future career goals and how to best ensure current activities prepare them appropriately for these goals.

If students would like to complete more self-assessment focused IDPs here are a few:

- American Association for the Advancement of Science (AAAS): https://myidp.sciencecareers.org/
- University of Michigan: https://hr.umich.edu/sites/default/files/faculty-idp.pdf
- Stanford University: https://biosciences.stanford.edu/current-students/idp/forms/

An Individual Development Plan helps with self-assessment, planning, and communication:

- An IDP can help students communicate professional development and career planning needs and intentions to others including their adviser, which can lead to helpful advice and resources.
- They can use the IDP to make sure their expectations and those of their adviser are clearly outlined and in agreement so that there are no big surprises, particularly at the end of training.
- The current job market is challenging and research has shown that individuals who perform structured career planning achieve greater career success and satisfaction.
- Some students, especially those early in their studies, may not yet have a firm understanding of where they hope to take their career. The IDP can also help think about strengths and weaknesses as they evolve towards career planning.
- The IDP is meant as a living document, to be modified as students move through the program and solidify their goals and plan.
- The IDP helps to reflect on successes and challenges from the previous year and anticipate any successes and challenges in the coming year(s).
- The questions listed below help as a starting place for thinking; students do not need to respond to all, if some are less relevant, and aspects not included can also be considered.

We hope that you find this opportunity for reflection helpful and welcome feedback on the process.

PFRH Comprehensive Examination

The first and second term doctoral seminars in the second year of the doctoral program of study contribute to preparation for the comprehensive exams. During the first term, all second-year doctoral students participate in an integrated seminar in which they review and critique literature based on readings that span the areas of interest in the department and integrate the core demography courses and life course perspectives in health.

In the second term, students work with faculty members in their area of interest to critically review and evaluate literature specific to the area. The readings address the specific area of interest competencies and methods competencies related to measurement and study design. When appropriate (as determined by seminar leaders), some areas of interest may choose to meet together to critically review and discuss a subset of readings. A practice take-home exam also is reviewed with all second year students at the end of the second tern. All second term, second year doctoral seminars meet on the same pre-determined date and time to provide the opportunity for cross area of interest collaboration. Readings from the first and second term second year doctoral seminars are used as the basis for some oral exam questions.

A two-part exam includes:

1. **Area of interest Specific Written Examination**
   A written take-home exam will be given that tests the students' ability to critically analyze research in their area of interest and to synthesize and integrate both concepts and required methods learned in course work (including doctoral seminars).
2. **Area of interest Oral Examination**
   The oral exam focuses on content and synthesis of core area of interest and public health knowledge, basic research methods, and follow-up questions on the written examination, providing students an opportunity to clarify written responses.

Departmental Preliminary Oral Examination

This exam is intended to review the student's proposed research plan and determine that the student is academically prepared to undertake the schoolwide preliminary oral exam and to carry out thesis research. The examination provides the student with experience in discussing a research proposal in a formal setting that resembles the School's preliminary oral. It also is a mechanism to review the rigor of the proposed research, independent of the oral performance, and to provide the student with constructive commentary on the strengths and weaknesses of the proposed research, as well as strengths and weaknesses in PFRH content and research design and methods in general. Students are expected to begin with a 10-minute PowerPoint presentation summarizing their proposal.

In order to sit for the departmental oral examination a student must have completed all required coursework, and passed the written and oral components of the Department Comprehensive Examination. Students are also expected to complete a thesis proposal in preparation for the exam. This proposal is completed while working closely with their adviser, co-adviser, if there is one, and department faculty, as appropriate, to determine if the thesis proposal is of adequate rigor before proceeding to the oral exam. The faculty adviser (and co-adviser) is expected to have thoroughly reviewed the proposal and have approved its quality prior to scheduling the examination. Other examiners or department faculty are not responsible for approving the proposal prior to the examination, but consultation during the work from faculty other than the adviser is recommended, as appropriate.

In addition to working with their adviser(s), students are expected to take advantage of the proposal writing seminar. It provides an opportunity to receive feedback from fellow students and the seminar instructor about their proposed research and proposal. Examples of proposals are available for student review in the proposal writing course website and provide models of the expected rigor. Sample proposals are also available for faculty review (see Education Office). Students are expected to discuss feedback received during the proposal writing seminar with their adviser (and co-adviser).

The Departmental Oral Examination is typically scheduled at least one month before the Schoolwide Preliminary Oral Examination. It may wise to begin contacting faculty about service on the schoolwide oral exam committee before the departmental oral so that paperwork for the schoolwide exam can be submitted shortly after the departmental oral exam is successfully concluded with an unconditional pass. On the other hand, time between the two exams may be advised for students whose proposal may need additional refinement or for students who may need additional preparation in answering questions in an oral exam.

Schoolwide Preliminary Doctoral Oral Exam

Purpose

The purpose of this examination is to determine whether the student has both the ability and knowledge to undertake significant research in their general area of interest. Specifically, the examiners will be concerned with the student's: (1) capacity for logical thinking; (2) breadth of knowledge in relevant areas; and (3) ability to develop and conduct research leading to a completed thesis. Discussion of a specific research proposal, if available, may serve as a vehicle for determining the student's general knowledge and research capacity. However, this examination is not intended to be a defense of a specific research proposal.

Policy

This exam is a University examination under the jurisdiction of the Graduate Board and is required of all PhD students. The full-time residency requirement must be successfully fulfilled before the Preliminary Oral Examination is requested.

The Examining Committee must:

1. Include five voting members. Two members MUST be from the sponsoring department; one of these is the adviser. A third member from the sponsoring department is optional. (LIMIT of 3 members from sponsoring department; co-advisers are 2 of the 3 members.)
a. The student's adviser of record must serve as a member of the Committee. If a student is in a department where the adviser serves on the committee, the adviser must be among the members present; an alternate may not serve for the adviser. The senior faculty member without a primary appointment in the student's Department will serve as Chair of the Committee and MUST hold the rank of Associate or Full Professor.
b. All faculty members must serve on the Committee representing the department of their primary faculty appointment. The only instance when the faculty member can serve in their joint appointment capacity is if they are the student's adviser.
c. Most often, the committee is comprised of duly appointed faculty members of a University department and must hold, at the time of selection, an appointment of Assistant Professor or higher. Occasionally, one adjunct or one scientist faculty member, but not both, may serve on the Committee. Neither may serve as the Chair.
d. Access to the most current faculty ranks can be found on the school's website at the following address: publichealth.jhu.edu/faculty/directory/list (https://publichealth.jhu.edu/faculty/directory/list/) Contact Erin McEvoy, emcevoy2@jhu.edu, with any issues with this directory.
e. All members of the Committee must be present at the scheduled exam location; teleconference participation is NOT permitted.

2. Be comprised of three Departments of the University, TWO being from the Bloomberg School of Public Health.
3. Must have appropriate alternate members to serve on the committee. The selection of alternates is very important for ensuring the exam can take place at the originally scheduled date/time. If you have two members on your committee from your sponsoring department, you should have one alternate from your sponsoring department and one from a non-sponsoring department. If you have three members on your committee from your sponsoring department, then your two alternates should be from a non-sponsoring department, at least one of which should be of the rank of Associate Professor or higher and from a department other than the chair if one of the committee members is not from the Bloomberg School of Public Health.
The examination should be taken at the earliest feasible time, not later than the end of the student's third year in residence, and before significant engagement in dissertation research. If the student fails the Preliminary Oral Examination and is permitted a re-examination, they must be re-examined within one year.

Final Doctoral Oral Exam

Policy
The oral defense of the thesis shall be conducted by the Committee of Thesis Readers after the adviser agrees that the candidate is ready for the formal defense. The adviser must certify in writing that the thesis is in a form that is ready for defense before the student may distribute the final written document to the thesis readers. During the defense the committee shall evaluate: (a) the originality and publication potential of the research; (b) the candidate's understanding of the details of the methodological and analytic work; and (c) the final quality of the written thesis document.

Conduct of Examination
If one of the officially appointed members of the committee fails to appear on the date fixed for the defense, the previously approved alternate must be prepared to discharge the responsibility of the absent individual. A final oral examination may not be held with fewer than four officially approved faculty members present in the room. The adviser must be among the members present; an alternate may not serve for the adviser. The examination will be open to the public. It is the prerogative of the Examining Committee to decide on the details of conducting the examination. At the conclusion of the formal presentation by the student, the student, public, and unofficial members of the Faculty Examining Committee will be excused. At the conclusion of the examination with only the committee present, the committee will then vote with a closed ballot on the candidate's performance and written thesis, selecting one of the following outcomes:

Acceptable: This choice requires a unanimous vote of the committee indicating an acceptable thesis with only minor corrections. Minor corrections are considered those that can be comfortably completed within two weeks following the exam.

Conditionally Acceptable: If one or more members require substantive changes to the thesis, these changes must be discussed by the committee. Immediately following this discussion, each member who still requires changes will write down the specific nature of the changes and the time expected for the student to complete them. The appropriately revised thesis must be submitted to each member for final approval; the committee shall remain appointed until the chair writes a letter to the associate dean responsible for student academic affairs indicating that all conditions have been met.

Unacceptable: If one or more members feel that the candidate's understanding of the written thesis is inadequate, or that the thesis in its present form is not acceptable for a doctoral dissertation, then the candidate has FAILED. Re-examination would be in order unless there is a unanimous recommendation to the contrary. The re-examination will normally be by the same committee, but a new committee may be selected by the Chair of the Committee on Academic Standards if petitioned by the student.

Public Seminar
As a culminating experience, the doctoral student will present a formal, public seminar. This requirement provides experience for the student in preparing a formal seminar; provides the faculty and department with an opportunity to share in the student's accomplishment; and gives a sense of finality to the doctoral experience on behalf of the student. The presentation is expected to not exceed 25 minutes. Students who choose to give a longer presentation should consult their defense committee about the acceptability of longer presentation.

PhD Schoolwide Program Policy

The Department of Population, Family and Reproductive Health candidates for the degree Doctor of Philosophy (PhD) must fulfill all School requirements, as specified in the PhD Schoolwide Policy (https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Academic_Progr%20ams_03_Doctor_Of_Philosophy_Degree_071717.pdf) last revised July 17, 2017. These include, but are not limited to, a minimum of four consecutive academic terms at the School in full-time residency (some programs require 6 terms), continuous registration throughout their tenure as a PhD student, satisfactory completion of a Departmental Written Comprehensive Examination, satisfactory performance on a University Preliminary Oral Examination, readiness to undertake research, and preparation and successful defense of a thesis based upon independent research.

PhD Students are required to be registered full-time for a minimum of 16 credits per term and courses must be taken for letter grade or pass/fail. *Courses taken for audit do not count toward the 16-credit registration minimum.*

Students having already earned credit at BSPH from a master's program or as a Special Student Limited within the past three years for any of the required courses may be able to use them toward satisfaction of doctoral course requirements.

Completion of Requirements

The University places a seven-year maximum limit upon the period of doctoral study. PFRH students are expected to complete all requirements in an average of 4 - 5 years and must achieve a cumulative GPA of 3.O in order to maintain Satisfactory Academic Progress (SAP). Tuition funding is provided for up to four years. Formal leaves of absence may extend this time.

Unsatisfactory Academic Progress/Cause for Dismissal

A failing grade (F) in two or more courses will be cause for dismissal from the PFRH graduate program. The department will permit a student to remediate one course failure (F). Any student who fails a course will be monitored closely regarding academic progress.

Other causes for dismissal from the program include, but are not limited to, the following:

- Ethics violation
- Failure to pass a re-take examination (Comprehensive, Departmental Oral, Schoolwide Preliminary Oral, and Final Defense Examinations)

Failure to maintain required GPA and to successfully complete all required courses

Departmental Pass/Fail Policy

PFRH requires that doctoral students take all required courses, including required PFRH area of interest and methods courses, for a letter grade. Only elective courses may be taken as Pass/Fail option.

BSPH Courses Taken Prior to Enrollment in Current Degree Program

Students who previously took a course at the School of Public Health who wish to use the course to fulfill a current requirement must have received a "B" or better and taken the course within the last three years of matriculating into their current degree program. Students who took these courses as an undergraduate may use the courses to fulfill course requirements, but may not receive credit for the course to meet the minimum credit requirement for their current degree program.

Course Waiver Policy

Students requesting course waivers must present evidence of prior coursework in the same subject, including, but not limited to, a syllabus and transcript. No waivers will be granted for courses in which the student received less than a B, or did not receive a letter grade. If a waiver is granted, another course in the same subject must be taken as a substitute.

Required PFRH Courses
Students wishing to waive **380.604, Life Course Perspectives on Health**, must petition the instructors and show that they have taken a similar course, demonstrate knowledge of the foundations of a multilevel life course perspective on health, and demonstrate (e.g. through a past course paper) that they understand how to develop a conceptual framework.
Students wishing to waive **Principles of Population Change (380.600) or Demographic Methods for Public Health (380.603)** may do so with the consent of the instructor and with the understanding that they are required to take a higher level course in the same subject area (e.g., Social and Economic Aspects of Human Fertility (380.655) instead of Principles of Population Change or Methods & Measures in Population Studies (380.651)instead of Demographic Methods for Public Health).
Doctoral students may petition the Doctoral Committee, with consent from their academic adviser, to **substitute a course requirement with another course not listed in the requirements.** Students should contact the Education Office with their request; the Education Office will forward the request to the degree program director or course instructor, as appropriate. Evidence of having taken a similar course in a previous graduate program or a rationale for substituting a course must be provided with the petition. The request will then be reviewed by the degree (Master's or Doctoral) program committee.

Required Courses in Other Departments
Students wishing to waive **Epidemiologic Inference (340.721) or Epidemiologic Methods (340.751)** may do so by contacting the Academic Coordinator in the Department of Epidemiology, franBurman@jhu.edu, at the beginning of the 1st term. Students may waive Epidemiologic Inference or Epidemiologic Methods only if they have completed a graduate level course in epidemiology with a grade of B or higher. Students will need to take the waiver exam and receive a score of 85% or better on the exam. Students who do not pass the exam must register for the course. Students who receive a waiver for Epidemiologic Inference must take a higher level course in epidemiologic methods.

The only Biostatistics course that can be waived is **Statistical Methods in Public Health (140.621)**. Students may petition the Department of Biostatistics for a waiver if they can document and demonstrate that they have previously acquired the course competencies. The documentation to grant a waiver requires the title of previous courses(s), name of instructor(s), textbook(s) used, course syllabi, and grade(s) received. After review of this documentation, one or more written waiver examinations may be required. Students wishing to request a waiver should contact the Academic Coordinator in the Department of Biostatistics, margo1@jhu.edu, before the start of the 1st term. Doctoral students are required to take the remainder of the Statistical Methods in Public Health sequence (140.622-624) or Methods in Biostatistics (140.651-654).

Doctoral students may petition the Doctoral Committee, with consent of their academic adviser, **to waive a specific course in the PFRH list of Methods Requirements**, but it must be replaced with a similar or higher-level course. Students should contact the Education Office with their request; the Education Office will forward the request to the Doctoral Committee Chair. Evidence of having taken a similar course in a previous graduate program or a rationale for substituting a course must be provided with the petition. The request will then be reviewed by the Doctoral committee.

Student's Responsibilities Regarding Deadlines

If a student needs to postpone taking an examination or submitting a paper for a PFRH course, the student must make the request in writing in advance to the course instructor explaining the reason for the request. The ruling made by the individual faculty member is final about such requests, and there is no appeal process. Original copies of work should be turned in for assignments. **The use of e-mail for turning in work is at the discretion of the instructor. It is the *student's responsibility* to ensure that the appropriate faculty member actually receives her/is work.**

Special Studies

Special studies provide students with the opportunity for intensive exploration of substantive and methodological issues in their area of interest, under the supervision of a faculty member. Students are encouraged to undertake such opportunities in advance of planning their master's essay or doctoral research. It is expected that doctoral students will begin more specialized studies after they have completed most course and degree requirements, and are developing and implementing a research topic for the thesis. A special-studies form must be completed by students and faculty with whom they are working for special studies that are not taken for development of a doctoral research proposal.. The form includes the objectives for the special studies and the activities and deliverables undertaken to meet the objectives along with a timeline and frequency of meetings.

Institutional Review Board Research Project Approval Procedures

The Institutional Review board (IRB) of the Bloomberg School of Public Health requires review of all faculty and student research involving the use of human subjects.

Before beginning contact with either human or animal subjects for research, students, as all researchers, must obtain the appropriate approval for their projects from either an institutional review board (e.g., the Institutional Review board, IRB) or the Institutional Animal Care and Use Committee (IACUC). In both cases, the faculty mentor must be involved in this process in that the protocol for the research project is submitted under the faculty's name with the student listed as a student investigator. NO contact can be made with humans, human tissue, human samples or human records without prior approval of the protocol by the IRB. NO animals can be purchased for the experimentation without an IACUC protocol approval.

It is important for students to make sure that they are either listed on their mentor's approved protocol or have obtained approval for their research protocol, in collaboration with their mentor before starting their research.

Information about the IRB committee can be obtained at the Office for Research Subjects in Suite W1100 in Bloomberg School of Public Health building. Students who are conducting original and independent research - under the direction of JHMI faculty advisers - that involves human subjects must have their proposed project approved by this committee.

When students are using data and other information that was developed by a previously approved JHMI or IRB research project, a copy of the previous IRB approval must be forwarded to the IRB in addition to a plan of how the data are to be used in secondary data analysis. If the student will be conducting secondary analysis of data from an existing approved study (refer to IRB list), the student and adviser will complete the IRB short form for approval of a secondary data analysis of the approved data set. The IRB still needs to review and approve how the student plans to use the data and report the findings from the analysis of the data.

For field placement activities outside of JHU, the student's adviser will review the proposed set of activities to be conducted during the field placement experience (usually within the first month of work). If it is difficult to distinguish whether the activities are "practice" or "research", the student should consult the IRB website about the activities. If necessary after review of the website, a memo describing the proposed activities should be submitted to the IRB by the student and adviser for an expedited review. The IRB review process should be completed within two weeks and a decision made as to whether the proposed activity is "professional practice" or "research project".

The IRB will advise the student and adviser of their decision and if the scope of the project requires a full IRB application. In the circumstance that the IRB determines that an MSPH or MHS student is planning to conduct an activity that meets the criteria for a research project, the IRB will request completion of a full application for submission to the Institutional Review board. The letter from the IRB and any subsequent communication will be kept in the student's departmental record.

Authorization must also be obtained from the agency/department sponsoring a field placement for the use and dissemination of the data and information in question. If the student plans to publish their work and/or the work is conducted as "research", a full IRB application must be submitted. Guidelines for preparing an application to the Committee on Human Research are available in Room W1100 and on the IRB website, https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/).

Notes: Is it human subjects? Institutional Review Board Research Project Approval Procedures

1. "About" means the data provide information about individual living people, not simply collected from individual living people. Key informant data about agencies or other entities (e.g., asking a hospital administrator about wait times in the ER, asking a drug manufacturer about dispensing patterns) or from experts or opinion leaders about their areas of expertise does not constitute data about individual living people.

2. "Publicly available" means the information is available to anyone, without prior clearance or qualification. Examples of publicly available data include census data, state court records, openly available national household surveys, or data available on the web. If you need a Data Use Agreement, it is not publicly available.

3. Identifiers provide the possibility of linkage to specific individuals. Examples include names, social security numbers, addresses, hospital IDs, or any HIPAA-defined identifiers. Identifiable can also mean that you can reasonably link to a specific individual based on an ensemble of variables. If you retain records that link an individual to a study ID, even if those records are kept in a separate location, then those individuals remain identifiable as long as you keep those records.

4. Can I still submit something I think is NHSR to the IRB for review? Yes! There is some element of risk in making this determination yourself, should you ever be challenged on the decision not to submit by a journal editor or other source. You are welcome to submit any research protocol to the IRB and you will receive a statement with a determination following review. We urge you to do so to protect yourself if the topic is particularly socially or politically sensitive. If you elect to use the flow chart with

attached clarifications, then we recommend printing it out, with notations regarding how you made you ultimate decision, and retain it in your files.

PFRH Teaching Assistant Policy

The Department of Population, Family and Reproductive Health supports full-time graduate students serving in the role of teaching assistants (TA). The department values the educational and learning experience that students gain through participating as a TA in addition to providing monetary compensation to them. The department classifies TA positions into 2 levels: 1.0 FTE TA and 0.5 FTE TA. The expectation for time commitment as well as monetary compensation differs for the two levels. Part-time students are not eligible for TA positions due to FLSA rules.

Information about current TA positions will be sent to students throughout the year. Typically, students should have already taken the course in order to be a TA. Students wishing to serve as a TA in a course should meet with the course instructor prior to agreeing to serve as a TA and discuss the nature of the course as well as the faculty member's expectations. Both should discuss the responsibilities of the TA as well as the tasks the department deems beyond the scope of the TA to be sure there are no misunderstandings about roles. The expected number of hours/week as well as preparation needs should also be addressed. Once a student and faculty member have agreed, they both must sign the TA agreement form; students submits it to the department's payroll office.

The number of hours that a TA actually works may vary substantially from course to course, but it is generally expected that a TA will begin work approximately two weeks prior to the start of the course and continue to work at least 10 days beyond the last class session or until grades are submitted. 1.0 FTE TA is expected to attend each class session. 0.5 FTE TAs may or may not be required to attend class sessions.

Research Apprenticeship

PFRH requires that PhD students undertake one or more research apprenticeship activities with one or more faculty members during their program of study at BSPH. The goal of this requirement is to ensure that PhD students have a structured opportunity to master a specific set of competencies which: a) ensure their competence as public health professionals after graduation and b) represent skills best learned outside a conventional classroom setting in the context of an ongoing research program or project.

PhD students may begin activities aimed at fulfilling these competencies as early in their program of study as they wish. Typically, PhD students begin to plan for this requirement during the second half of their first year and begin the activities after their first year of studies.

PhD students may proceed to their departmental oral exam without completing the research apprenticeship, although PFRH encourages them to complete the requirement and competencies before the departmental oral. PhD students who have not completed the research apprenticeship at the time of their departmental oral exam will be expected at that time to: a) have demonstrated substantial progress toward their completion; and b) have a concrete plan for completion soon thereafter.

Progress towards completing this requirement should be a major component of the discussion at the PhD students' annual reviews (see next section). PhD students master each of the following six competencies by means of one or several research apprenticeships. The competencies are:

1. Critical Review of the Literature: PhD students must demonstrate the ability to synthesize and critically review a body of literature that is more comprehensive than expected for a standard, course term paper.

2. Framing a Research Question: PhD students must demonstrate the ability to identify a "researchable" question.

3. Instrument Development: PhD students must demonstrate the ability to design an instrument for collecting data. This ability may include identification and evaluation of existing instruments, the ability to adapt existing instruments for new modalities (e.g. self-administered questionnaire converted to use in a telephone interview), or creating a new instrument.

4. Data Collection: PhD students must document experience with primary data collection including activities related to data coding and data entry.

5. Data Analysis: PhD students must document experience with analyzing either primary data they collected as part of a supervised research project or data from a secondary source.

6. Manuscript Preparation: PhD students must have substantially participated in the preparation of a published or publishable manuscript prepared in the form of an original peer-reviewed journal article; this requirement does not include papers from thesis research.

PhD students may demonstrate several or even all competencies by means of one research apprenticeship if the activities involved in the apprenticeship are comprehensive. Alternatively, PhD students may undertake several research activities over their program of study, each of which results in mastery of one or more competencies.

When a PhD student masters one or more competencies, s/he must indicate on the apprenticeship form the faculty member who was preceptor for the apprenticeship and the student's adviser, including the signature of each. The original form should be submitted to the Academic Program Administrator who will place it in the student's file and note completion of each competency on the student's tracking sheet. Students who master the competencies one-by-one will typically turn in one form per apprenticeship. It is possible to use previous work to meet one or more of the above competencies, but at least one must be completed during doctoral studies. Supporting documents must be provided to validate the competency when completed in previous work.

PhD students may petition the PFRH Doctoral Committee to certify that they have mastered a competency before they began the program. In such cases, students should attach to their petition documentation of their mastery (e.g. a senior authored journal article or letter testifying to the student's work as project manager of a data collection effort) and a letter from their adviser expressing support for the request. PhD student may arrange their research apprenticeships with any faculty of JHU or, with the approval of their adviser, with a qualified researcher outside JHU.

Annual Reviews Doctoral Students

BSPH requires that all doctoral students have a yearly meeting with their academic adviser and other faculty members from PFRH or other BSPH departments. This process must begin after the second year of study and occurs annually by mid-November. Faculty who attend the review may change over the course of a student's program. The purpose of the meeting is twofold, serving as an opportunity: 1) for students and faculty to discuss the student's progress and identify resources and potential problems as they progress through the program and 2) ensure that PFRH records on student progress are correct and up-to-date.

Until students complete their schoolwide preliminary exam, the annual meeting is generally held with the academic adviser and one other PFRH faculty member, usually someone the student and adviser select together. Faculty members from other BSPH departments are welcome to attend these early meetings if the student and adviser think it would be helpful. After a student has passed the Schoolwide Preliminary Exam, it is expected that the meeting will include the thesis adviser and faculty with whom the student is working, including faculty from outside PFRH, if desired. The meeting may include members of the Schoolwide Preliminary Oral Exam Committee who have agreed to help guide the student's thesis research on an ongoing basis. Other people (e.g. the Academic Program Administrator) may attend if the student and adviser think it would be helpful. A least one other faculty besides the students' advisers (including co-advisers) must participate in the annual review of doctoral students.

Both students and faculty are responsible for insuring that the annual meetings take place, but students are expected to initiate the meeting.

Students are required to provide a brief written progress report (no more than 1 or 2 pages) at least one day in advance of the meeting. If the report is not submitted a day before the meeting and the report is incomplete, then the meeting will need to be rescheduled. This report should list progress toward graduation since the last meeting and include fulfillment of course requirements and other milestones during the student's course of study. A transcript should also be included as part of the review. Students should bring copies of the report for each faculty member attending the meeting as well as a copy of their transcript.

Students who are working outside the country are encouraged, but not required, to return for advisory meetings. These students must submit a written progress report by an appointed time, determined by their adviser, for the year(s) not in residence. The progress and planning report should be longer and more detailed than those submitted by students who attend in person meetings. The adviser should share this report with other faculty (as in the case of in person meetings) and then proceed in the same way as above by scheduling a meeting for the adviser and other faculty to review progress with the student.

Thesis Advisory Committee

The progress of each PhD student is followed regularly after completing the PFRH comprehensive examination at least once a year by a committee consisting of the adviser and two to four other faculty, from inside and/or outside the student's Department. The objective of the Thesis Advisory Committee is to provide continuity in the evaluation of the progress and development of the student's research. Committee membership can change during the research phase.

Procedure

1. The student and her/his adviser, with the consent of the Department Chair, decide on the composition of this committee.
2. The first meeting of the Thesis Advisory Committee is when the student is developing their thesis proposal but should be formed shortly after the student completes the departmental comprehensive examination and well before the departmental preliminary oral examination (when the thesis proposal is presented).
3. Students who are working outside of the country or at distant sites within the country are not required to return for an in-person Thesis Advisory Committee meeting but can hold it virtually.
4. All students will submit yearly written progress reports to their Thesis Advisory Committees, which will read and evaluate them. A written evaluation based on this document will be sent to the student and placed in the student's departmental file. It is the responsibility of the Department to provide the administrative oversight of these committees, to ensure that the committee meets and submits reports. A departmental template for the yearly progress report will be shared.
5. A brief written progress report should be submitted by the student at the time each committee meeting. A written evaluation of the student's progress and development will be prepared by the committee after the meeting and discussed with the student; a copy of the evaluation will be placed in the student's departmental file. A departmental template for the TAC meeting report will be shared.

PhD Program Competencies

DEPARTMENT COMPETENCIES

All **PFRH doctoral students** must attain proficiency in the following three (3) competencies:

1. Applying statistical methods to address the health of populations.
2. Applying epidemiological methods to address the health of populations.
3. Applying ethical concepts and tools to population health research and practice.

DEGREE PROGRAM COMPETENCIES

All **PFRH doctoral students** must attain proficiency in eight PhD-specific competencies:

1. Evaluating and applying study designs for addressing research and evaluation questions about the health of populations.
2. Evaluating and applying rigorous strategies for measurement and data collection across a range of study designs.
3. Analyzing data using methodological tools appropriate to the study question and available data.
4. Interpreting data based on the strength of evidence, recognizing study limitations, and drawing appropriate inferences.
5. Analyzing primary quantitative or qualitative data and participating in the preparation of a peer-reviewed manuscript using the data.
6. Designing an instrument for data collection and implementing the instrument with primary data.
7. Preparing and defending a research proposal addressing a clearly identified research question, including the appropriate research methods and conceptual framework for answering the question.
8. Conducting and presenting original, independent, and publishable research about a clearly identified research question.

AREA OF INTEREST COMPETENCIES

All **PFRH doctoral students** must meet proficiency in seven competencies in their selected area of interest:

1. Applying a life course framework to understand population health problems related to their area of interest, including a multiple determinants framework for the health of populations across the life course.
2. Identifying and assessing the causes and consequences of population change.
3. Applying demographic methods to the health of populations.
4. Assessing the principal health concerns for the populations relevant to the area of interest, the associated population-based risk factors, and the relative impact of each risk factor.

5. Evaluating strategies to promote population health, including the policies and programs that address health concerns and behavior in populations relevant to the area of interest.
6. Applying frameworks specific to the area of interest (beyond life course) for improving the health of the relevant populations.
7. Critiquing health services and systems delivery strategies used to address health concerns in relevant populations.

PFRH Doctoral Seminars

Formal seminars are required for all PFRH doctoral students from the first year until students successfully complete their preliminary oral exam. They are described below. The seminar in the first and second term of the first year is planned based on students' interests.

First-year Doctoral Seminars in Population, Family, and Reproductive Health; First and Second Term Course Objectives:

These seminars are designed to facilitate students' transitions into the PFRH doctoral program, introduce skills to help students succeed in the program, and develop students' ability to formulate scientific questions.

At the end of the seminar, students will be able to:

- Describe the requirements, timeline, and benchmarks of the PFRH doctoral program
- Locate opportunities and resources for doctoral students within PFRH, JHBSPH, and JHU
- Read scientific articles effectively and efficiently
- Describe the nature of scientific questions and how they are identified
- Explain the role of the scientific community in the research process
- Articulate their area of specialization orally and in writing

First-year Doctoral Seminars in Population, Family, and Reproductive Health; Third and Fourth Term Course Objectives:

At the end of these courses, students will be able to:

- Develop a research concept based on their individual interests;
- Link scientific questions with appropriate research designs;
- Discuss strategies for obtaining and managing research funding;
- Evaluate different approaches used to communicate research findings; and
- Create a plan for their research career both as a student and later as a professional.

Second-year Doctoral Seminars in Population, Family, and Reproductive Health; First and Second Term Course Objectives:

At the end of these courses, students will be able to:

- Apply diverse conceptual frameworks to public health issues pertinent to PFRH;
- Critically evaluate empirical articles addressing public health issues related to PFRH;
- Compare and contrast the approaches of various academic disciplines to public health issues of relevance to PFRH; and
- Recognize and critically evaluate common study designs and methods used in research relevant to PFRH.
- Compose and discuss written responses to analytic and conceptual questions about two studies presented as a practice comprehensive exam (second term only)

The first term focuses on integrating life course and demographic methods and approaches across the population area of interests in the department. The second term builds on the first term experience and is specific to the student's chosen area of interest. It also includes a practice written exam for the comprehensive exam.

PFRH Proposal Writing Seminar Course Objectives:

Upon successfully completing this course, students will be able to:

- Develop a research question, study aims, and hypotheses to be used in a dissertation proposal;
- Conduct a literature review which identifies current research and gaps as they relate to the study and research questions and aims;
- Identify an appropriate study design including study population and methodology, both quantitative and qualitative;
- Identify data sets or settings for data collection;
- Examine frameworks and find appropriate frameworks for the study;
- Review analytic methods; develop a feasible timeline for the study; consider ethical issues and IRB approval; and
- Identify potential funding sources.

Doctor of Public Health (DrPH)

Program Overview

The Doctor of Public Health (DrPH) degree is a professional doctoral degree for early to mid-career public health professionals with an MPH or health-related master's degree seeking to secure leadership roles in domestic or international public health agencies and organizations. DrPH graduates are able to synthesize and translate research findings to practice, communicate with and convene diverse partners to effect change across a range of public health settings, and advance programs, policies and services through evidence-based public health practice and research. DrPH alumni hold mid to senior-level positions in city and state public health organizations, non-profits, government agencies, healthcare delivery services, consulting companies, and international Ministries of Health as well as positions within academia.

The DrPH program is built around foundational competencies that focus on leadership and communication, data and analytical skills, management and ethics, policy and program design, as well as education and workforce development. In addition, students develop specialized expertise through a customized program of study or by focusing on one of the following concentrations (and tracks):

- Environmental Health (Environmental Health or Health Security Track)
- Health Equity and Social Justice
- Global Health: Policy & Evaluation
- Health Policy and Management (4 Tracks: Healthcare Management & Leadership, Health Policy, Quality & Patient Safety, or Public Health Informatics Track)
- Implementation Science
- Women's and Reproductive Health

The DrPH program is a flexible, part-time program delivered online and through intensive onsite courses in institutes (for about a week in June and January). Part-time students are required to register for a minimum of 1 credit per term in each of the four regular terms or go on leave of absence, regardless if they register during the institutes or summer term. In addition to coursework, the program requires a practicum, typically performed in the student's place of employment, and a dissertation. Students are anticipated to remain in relevant public health employment throughout their studies. While most students complete the DrPH in 5-7 years, part-time students have up to 9 years to complete the program and full-time students have up to 7 years.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Admissions

In addition to the standard School application materials, DrPH applicants should also possess:

1. An MPH or public health-related Master's degree; and

2. A minimum of 3 years of professional, full-time public health experience in the applicant's area of interest by the application deadline (Dec 1st).

DrPH Program Core Course Requirements

The following core courses from the Johns Hopkins Bloomberg School of Public Health's MPH program are requirements for the DrPH program in order to ensure a strong academic foundation in biostatistics and epidemiology for students. If students have not taken these courses or equivalent ones during their MPH (or other relevant graduate program) at BSPH within the last 5 years for a B or better, they may be required to take these courses or to pass the corresponding non-credit waiver exams. Please note: this coursework is ***in addition to*** the minimum 64 credits required for the DrPH degree.The credits indicated below are term credits.

Code	Title	Credits
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.612	Statistical Reasoning in Public Health II	3
PH.340.618	Epidemiology: the Basics	3

When students matriculate into the DrPH program, their prior coursework will be reviewed and considered for fulfillment of the core course requirements. Students may be asked to submit course descriptions and syllabi for prior coursework in order to evaluate comparability of topics and learning objectives. Matriculating students will be informed which core course requirements they need to address through coursework or waiver exams. The coursework and/or waiver exams may be completed during the DrPH Program; they do not need to be completed prior to matriculation.

Program Registration Requirements & Standards of Academic Performance

Students will be required to successfully complete a minimum of 64 term credits, including 57 didactic credits, a practicum experience, and a doctoral dissertation. There are 29 term credits of required schoolwide foundational and data analysis courses which are designed to develop knowledge, skills and competencies in the CEPH DrPH foundational competencies. These courses are required for all DrPH students. An additional 28 term credits are associated with the student's concentration and track where relevant (Environmental Health, Health Equity and Social Justice, Health Policy and Management, or Implementation Science) or the Customized Concentration.

Students will take a minimum of 7 proposal and dissertation credits usually comprising 2 credits of Special Studies while drafting their proposal in preparation for the preliminary oral exams and a minimum of 5 credits of Thesis Research with their dissertation adviser while drafting their thesis in preparation for their final oral defense.

Students must remain continuously registered, unless they take a Leave of Absence. Students enrolled part-time in the DrPH Program must register for a minimum of one credit per term in each of the traditional four academic terms (1-4), regardless of whether they register for courses during summer term, or winter or summer institutes. This requirement varies for on-site international students.

Students are required to take any core courses and required/elective courses counting toward the required 57 didactic credits of the program for a grade unless the course is only offered Pass/Fail. Elective courses taken beyond the required 57 didactic credits may be taken Pass/Fail or audited.

Students must receive satisfactory grades of C or better in each course required for the DrPH program and maintain a cumulative Grade Point Average (GPA) of at least 3.0 to remain a DrPH candidate in good standing.

DrPH Program Course Requirements

The DrPH program is built around a set of common set of program objectives and CEPH DrPH Foundational Competencies that all students matriculating into the program are required to attain. The DrPH foundational course requirements furnish students with a breadth of skills, knowledge and competencies relevant to public health leadership including data analysis, health policy, management, equity and ethics, with emphasis on leadership and communication. A sequence of problem-solving courses rooted in case studies provides students with opportunities to integrate skills and apply them to real-world problems, while working in diverse, multidisciplinary teams. Additional credits associated with the student's concentration, track, or customized course of study allow more in-depth exploration of specific topical areas and skills.

DrPH Foundational and Data Analysis Course Requirements

Students will pursue the above objectives and competencies through the required foundational courses and by completing a data analysis track of their choosing. All foundational and data analysis courses must be taken for letter grade and students must receive a grade of C or better to successfully complete the requirement. Students are strongly encouraged to take the problem-solving sequence in their first year of the program with their cohort and may choose to take some of their concentration-specific requirements during their first year if they wish.

Foundational Courses Required for the DrPH Program

With the problem-solving seminars below, students must take one of the two offered courses each term; no substitutions are allowed.

Code	Title	Credits
Preparatory		
Introduction to Online Learning		0
Academic & Research Ethics at JHSPH		0
Sexual Harassment Prevention Training		0
Opioid Epidemic Awareness & Education Program		0
Summer Institute On-site		
PH.312.700	Leading Organizations (or)	3

PH.221.607	Essential Skills for Women's Leadership in Global Health (or)	
PH.221.636	High Performing Organizations in Lmic Settings	
First Term Online		
PH.224.630	The Obesity Epidemic Problem Solving Seminar: What We Can Learn from Native American Communities (or)	3
PH.308.615	The Opioid Crisis: Problem Solving Seminar (or)	
PH.180.641	Climate Change and Public Health Problem Solving Seminar: Global Challenges and Solutions for Mitigation, Adaptation, and Sustainability	
1st Year School-wide DrPH Monthly Seminar (no registration required)		0
Second Term Online		
PH.180.621	Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach (or)	3
PH.380.633	Promoting Equity for Adolescents and Emerging Adults: Problem-Solving Seminar (or)	
PH.221.690	Strengthening Primary Health Care Across the World: Problem Solving Seminar	
1st Year School-wide DrPH Monthly seminar (no registration required)		0
Fall, Summer & Winter Institutes On-site (Barcelona/Baltimore)		
PH.308.701	Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners	3
or PH.308.604	Effective Writing for Public Health Change	
Third Term Online		
PH.221.630	Tackling the Intersectoral Challenge of Antimicrobial Resistance: Problem Solving Seminar	3
or PH.330.675	Suicide Prevention: Problem Solving Seminar	
PH.300.750	Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community	3
1st Year School-wide DrPH Monthly Seminar (no registration required)		0
Fourth Term Online		
PH.340.610	The One Health Approach to Epidemiology and Global Public Health: Problem Solving Seminar (or)	3
PH.301.650	Crafting Effective Solutions to Gun Violence: Problem Solving Seminar (or)	
PH.223.630	The Practice of Public Health Through Vaccine Case Studies: Problem Solving Seminar	
1st Year School-wide DrPH Monthly Seminar		0
Variable		
Data Analysis Courses:Select a minimum of six credits; track options and course selections below		6
2nd Year, Terms 1-4 non-credit; register SU term, start of 3rd year		
PH.220.701	School-wide 2nd Year DRPH Seminar	2
Total Credits		**29**

Data Analysis Track Options

DrPH students are required to take a minimum of 6 credits of data analysis courses and may choose from among the three following tracks:

A. Quantitative Track
(Minimum 6 credits)

Code	Title	Credits
PH.140.613	Data Analysis Workshop I (summer and winter institute)	2
PH.140.614	Data Analysis Workshop II (summer and winter institute)	2
PH.140.620	Advanced Data Analysis Workshop (summer and possibly winter instutute)	2
Total Credits		**6**

B. Qualitative Track
(Minimum 6 credits)

Code	Title	Credits
PH.224.690	Qualitative Research Theory and Methods (Online, 1st term)	3
PH.224.691	Qualitative Data Analysis (Online, 2nd term)	3
Total Credits		**6**

C. Mixed Methods Track
(Minimum 6-11 credits)

Students wishing to employ both quantitative and qualitative approaches in their dissertations will need to develop expertise in both quantitative and qualitative methods as well as facility with selecting when to use which method. As a result, students employing this method will need to cover the below course material through a combination of prior coursework, work experience, and/or current coursework.

Code	Title	Credits
Required Courses		
Select from the following options:		6-11
Mixed Methods Course		
PH.330.621	Mixed Methods for Research in Public Health (summer institute)	
Quantitative Courses		
PH.140.613	Data Analysis Workshop I (summer and winter institute)	
PH.140.614	Data Analysis Workshop II (summer and winter institute)	
Qualitative Courses		
PH.410.671	Introduction to Qualitative Research Methods (summer institute)	
PH.410.673	Introduction to Qualitative Data Analysis for Public Health (summer institute)	
Total Credits		**6-11**

DrPH Concentration/Track Competencies & Course Requirements

Students apply to and matriculate into one of six different concentrations (some with tracks) or the Customized Track. Within the Health Policy and Management Concentration, students choose one of four tracks (Healthcare Management & Leadership, Health Policy, Quality & Patient Safety, or Public Health Informatics); in the Environmental Health Concentration, students choose one of two tracks (Environmental Health or Health Security) . Once admitted into a specific concentration (and track where applicable), students will remain in the chosen concentration (and track) throughout the DrPH program. Students who matriculate into the Customized Track must identify a clearly defined field of study.

Students are required to complete 28 didactic term credits associated with their concentration/track or customized program of study. The competencies and required classes for the four concentrations and their associated tracks as well as the approach adopted for customized students are described below.

CUSTOM TRACK

Students pursuing a customized program of study will take the following three courses (10 credits) that emphasize cross-cutting competencies in the areas of 1) program development; 2) program evaluation; and 3) systems thinking:

Code	Title	Credits
PH.410.620	Program Planning for Health Behavior Change	3
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
or PH.380.611	Fundamentals of Program Evaluation	
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	3

Building on these competencies, custom students will work with their advisers and concentration co-directors to select a minimum of 18 didactic credits of customized coursework related to their custom area of interest and to identify two customized competencies corresponding to the learning objectives of two of these courses. This additional coursework can be taken from any of the courses offered at Johns Hopkins University with receipt of the appropriate approval.

Environmental Health Concentration-Environmental Health Track

Competencies for the Environmental Health Track are as follows:

1. Analyze the state of the science and current research and policy issues related to environmental and occupational health.
2. Explain how environmental and occupational health sciences can be used to improve public health practice at local, state, national and international levels.
3. Evaluate environmental and occupational health programs and policies by applying toxicology, biostatistics, epidemiology, risk assessment, risk communication, and risk management principles to program planning, implementation and goals.
4. Design, advocate and provide leadership for effective environmental and occupational health interventions using law, regulation and policy at local, state, national and international levels.
5. Assess and communicate environmental and occupational health risks based on scientific, ethical, environmental justice and community-based principles.

To achieve these competencies students are required to take the following courses:

Code	Title	Credits
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.183.631	Fundamentals of Human Physiology	4
PH.188.680	Fundamentals of Occupational Health	3
or PH.182.623	Occupational Health Management	
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.610	Risk Policy, Management and Communication [1]	3
PH.187.610	Public Health Toxicology	4
PH.550.630	Public Health Biology	3
From the following: 340.666, or 340.680, or 340.636 and 340.701		3
PH.340.680	Environmental and Occupational Epidemiology (Prerequisite: An introductory level course (or higher) in epidemiology)	
or PH.340.66	Foundations of Social Epidemiology	
PH.340.701 & PH.340.636	Epidemiologic Applications of Gis and Epidemiology in Evidence-Based Policy	
Total Credits		**28**

1 Prerequisite: PH.317.600 Introduction to the Risk Sciences and Public Policy

Environmental Health Concentration-Health Security Track

High profile public health emergencies, such as the COVID-19 pandemic, the global spread of Zika virus and the Ebola Epidemic in West Africa have brought wide-spread attention to the field of health security. Each of these events has had severe consequences—from public health outcomes that have extended beyond the illness and deaths directly caused by these viruses, to generational impacts on societies and economies. With risk factors for the emergence of domestic and international health security threats (e.g., globalization, environmental change, urbanization, mass displacement, terrorism, and biotechnology) increasing, there is good reason to expect that the occurrence of health security threats (e.g., emerging infectious diseases, laboratory accidents, deliberate epidemics) will continue to occur and may increase with time. In this track, students will gain skills and training to prevent, detect, and respond to these health security threats.

Competencies for the Health Security Track are as follows:

1. Identify major health security threats; characterize the human, social, economic and political risks they pose to societies; and demonstrate the importance of public health to national security
2. Apply risk assessment principles to program planning, implementation and goals, particularly in the context of emergency response and health security problems
3. Examine the origin and evolution of major US and international organizations and initiatives to prevent, detect, and respond to health security threats; and assess those areas of health security where preparedness is strongest and where additional progress is needed
4. Evaluate the effectiveness of strategies to enhance health security and prevent or mitigate health security threats
5. Synthesize and communicate important health security information in a way that enables political leaders and policy-makers to take appropriate action

To achieve these competencies students are required to take the following courses and at least 6 credits of elective courses listed below (for a total of at least 28 credits):

Code	Title	Credits
Required Courses 19 credits		
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.610	Risk Policy, Management and Communication	3
PH.180.623	Infectious Disease Threats to Global Health Security	3

PH.180.634	Public Health Emergencies: Risk Communication and Decision Science	3
PH.180.624	Biotechnology and Health Security	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities	3
Elective Courses		
Select at least nine credits of the following:		9
PH.187.610	Public Health Toxicology	
PH.221.613	Introduction to Humanitarian Emergencies	
PH.317.605	Methods in Quantitative Risk Assessment	
PH.221.639	Health Care in Humanitarian Emergencies	
PH.317.615	Topics in Risk Assessment	
PH.120.603	Molecular Biology of Pandemic Influenza	
PH.300.650	Crisis and Response in Public Health Policy and Practice	
PH.180.670	Introduction to Public Health Emergency Preparedness	
PH.180.627	Lessons Learned in 1918 Pandemic Flu	
PH.180.630	Chemical and Biological Weapons Threats: Science, Public Health, Policy	
PH.260.606	Major Global Infectious Diseases: Prospects for Control	
PH.301.692	The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health	
PH.221.615	Health Emergencies in Large Populations (H.E.L.P.)	
PH.340.668	Topics in Infectious Disease Epidemiology	
PH.340.765	Professional Epidemiologic Methods: Epidemiologic intelligence and Population Health Assessments	
PH.340.658	Critical Reading of Epidemiologic Literature	
PH.340.636	Epidemiology in Evidence-Based Policy	
PH.223.684	Vector-Borne Diseases in the Tropics	
PH.340.666	Foundations of Social Epidemiology	
Total Credits		**28**

global health policy & evaluation concentration

Competencies for the Global Health Policy and Evaluation (GHPE) Concentration are as follows:

1. Assess global public health burdens and threats, and formulate strategies to solve complex health issues.
2. Describe health systems frameworks, strategies, actors and tools to analyze and evaluate health systems performance and their reforms in global settings with a primary focus in LMICs.
3. Apply key policy frameworks and models in policy development and analyze the role and contribution of actors, culture, equity and context in shaping effective policy with a primary focus in LMICs.
4. Create effective evaluation plans for small and large programs, with a primary focus in LMICs with time, budgetary, human resource capacity, and ethical, data availability and quality considerations.
5. Examine theories and evaluate economic development factors/ investments that affect health, apply analytic tools, and propose evidence informed strategies to improve health outcomes and reduce inequalities in global settings with a primary focus in LMICs.

Students are expected to complete a minimum of 28 credits of concentration-specific courses*. These courses broadly address pedagogy under the following categories:

1. Concentration Core Requirements (4 courses)
2. Evaluation Requirements (2 courses)
3. Economic Development and Health Requirement (1 course)
4. Electives to reach 28 credits

In addition to the requirements described above, students must take additional coursework *(proposed electives)* to make up a total of 28 credits of concentration-specific courses. The proposed elective courses could be taken from any of the course options listed below or from other courses at the School. Courses electives outside the options listed below will require the advisor's approval prior to registration.

Note: Courses taken to fulfill Foundational requirements may not be applied to fulfill Concentration requirements.

Course Requirements and Electives for Global Health Policy and Evaluation Concentration

Code	Title	Credits
Concentration Core Requirements-4 courses		
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.221.650	Health Policy Analysis in Low and Middle income Countries	3
PH.180.623	Infectious Disease Threats to Global Health Security	3
or PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	
PH.221.656	Conceptual and Evidential Foundations of Health Equity and Social Justice (or)	4
PH.410.605	Fundamental Tools for Promoting Health Equity (or)	
PH.340.667	Health Equity Research Methods to Address Social Determinants of Health	
Evaluation Requirements-2 courses		
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.221.626	Introduction to Household Surveys for Evaluation of Primary Health Care Programs in Low- and Middle- Resource Settings (or)	3
PH.221.631	Evaluation Methods for Injury Interventions (or)	
PH.221.705	Monitoring and Evaluation of Health Systems Strengthening in Low and Middle income Countries (or)	
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	
Economic Development and Health Requirement-1 course		
PH.221.663	Globalization and Health: Framework for Analysis	3
Electives		
Select courses from the following to reach 28 concentration credits:		5
PH.221.617	Behavioral Economics in Health Decisions	
PH.221.639	Health Care in Humanitarian Emergencies	

PH.221.640	Design and Implementation of Incident Management Systems in Low- and Middle-income Countries	
PH.221.652	Financing Health Systems for Universal Health Coverage	
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	
PH.223.680	Global Disease Control Programs and Policies	
PH.380.603	Demographic Methods for Public Health	
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	
PH.550.601	Implementation Research and Practice	
Total Credits		**28**

Health Equity & Social Justice Concentration

Competencies for the Health Equity and Social Justice (HESJ) Concentration are as follows:

1. Employ bioethics and human rights concepts relating to equity and social justice in analysis of public health programs and policies.
2. Advocate with and on behalf of disadvantaged and vulnerable individuals and communities to improve their health and wellbeing and build their capacity.
3. Conduct assessments of health equity in communities and systems to identify the behavioral, cultural, social, environmental and organizational determinants that promote or compromise health in disadvantaged groups.
4. Identify evidence-informed strategies, and measurable goals and objectives, to promote health equity and social justice.
5. Implement effective, efficient and culturally sensitive strategies to improve health equity and social justice.

Students are expected to complete a minimum of 28 credits of concentration-specific courses. These courses broadly address pedagogy under the following categories:

1. Concepts, philosophical bases, and methodological issues in HESJ;
2. Design and implementation of interventions (programs, policies and practice) for addressing HESJ issues; and
3. Research and evaluation methods applicable for HESJ.

Students are expected to complete two required courses that address the conceptual and philosophical basis of Health Equity and Social Justice namely

1. PH.221.656 Conceptual and Evidential Foundations of Health Equity and Social Justice (4 credits); and
2. PH.410.605 Fundamental Tools for Promoting Health Equity (3 credits) for a total of 7 credits.

Students also must complete at least **7 credits** from those courses categorized as **“Design and Implementation of Interventions”** and at least **7 credits** from those courses categorized as **“Research and Evaluation Methods”;** see Table 2. This makes a total of 21 credits.

In addition to the 21 credits described above, students must take a **minimum of 7 credits of electives** to make up a total of 28 credits of concentration-specific courses. The elective courses may be selected from any of the course options listed below or from other courses at the School. Elective courses not listed in the options below, will require the approval of the student’s adviser prior to registration.

Note: Courses taken to fulfill Foundational requirements may not be applied to fulfill Concentration requirements.

Course Requirements and Electives for Health Equity and Social Justice Concentration

Code	Title	Credits
Required Courses		
PH.221.656	Conceptual and Evidential Foundations of Health Equity and Social Justice (Alonge, Rubenstein & Barnhill)	4
PH.410.605	Fundamental Tools for Promoting Health Equity (Thorpe & Gaskin)	3
Design and Implementation of Interventions for Addressing Health Equity and Social Justice		
Select a minimum of seven credits from the following:		7
PH.330.647	Childhood Victimization: An Overview of Public Health Efforts	
PH.330.610	Knowledge for Managing County and Local Mental Health, Substance Use, and Developmental Disability Authorities	
PH.221.665	Early Childhood Intervention in Tribal Communities	
PH.221.625	Evaluation of District-Level Primary Health Care Implementation in Low-and Middle-income Settings	
PH.330.658	Mental Health and Psychosocial Support in International Humanitarian Settings	
PH.330.681	Mental Health and Psychosocial Needs of Refugees After Resettlement in High income Countries	
PH.188.694	Health of Vulnerable Worker Populations	
PH.380.768	Selected Topics in Women’s Health and Women’s Health Policy	
PH.410.620	Program Planning for Health Behavior Change	
PH.180.600	Public Health Implications of Health as a Human Right	
PH.410.668	Policy Interventions for Health Behavior Change	
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies	
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy	
PH.380.623	Adolescent Health and Development	
PH.380.750	Migration and Health: Concepts, Rates, and Relationships	
PH.221.688	Social and Behavioral Foundations of Primary Health Care	
PH.221.635	Global Advances in Community-Oriented Primary Health Care	
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children	
PH.380.761	Sexually Transmitted Infections in Public Health Practice	
PH.221.624	Urban Health in Developing Countries	
PH.380.725	The Social Context of Adolescent Health and Development	

PH.330.680	Promoting Mental Health and Preventing Mental Disorders in Low- and Middle-income Countries	
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS	
Research and Evaluation Methods for Health Equity and Social Justice		
Select a minimum of seven credits from the following:		7
PH.309.712	Assessing Health Status and Patient Outcomes	
PH.340.706	Methods and Applications of Cohort Studies	
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	
PH.309.631	Population Health Informatics	
PH.313.790	Introduction to Economic Evaluation	
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	
PH.380.603	Demographic Methods for Public Health	
PH.380.611	Fundamentals of Program Evaluation	
PH.380.604	Life Course Perspectives on Health	
PH.380.711	Issues in Survey Research Design	
PH.380.651	Methods and Measures in Population Studies	
PH.340.666	Foundations of Social Epidemiology	
PH.330.672	Evaluation of Mental Health Service Systems	
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems	
PH.221.722	Quality Assurance Management Methods for Developing Countries	
PH.330.621	Mixed Methods for Research in Public Health	
PH.330.657	Statistics for Psychosocial Research: Measurement	
PH.140.664	Causal Inference in Medicine and Public Health I	
PH.340.613	Design and Conduct of Clinical Trials	
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries	
PH.410.671	Introduction to Qualitative Research Methods	
PH.410.673	Introduction to Qualitative Data Analysis for Public Health	
PH.410.615	Research Design in the Social and Behavioral Sciences	
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I	
Conceptual and Philosophical Bases for Health Equity and Social Justice		
Select electives from the following or from other courses listed above to reach the required 28 credits:		7
PH.410.619	Social Justice: Policy, Practice, and Research	
PH.410.606	Local and Global Best Practices in Health Equity Research Methods	
PH.550.844	Current Issues in Public Health: COVID-19 Pandemic Response	
PH.700.622	Bioethics, Human Rights, and Global Health	
PH.380.604	Life Course Perspectives on Health	
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life	
PH.410.864	Critical Issues in Health Disparities	
Total Credits		**28**

Health Policy & Management Concentration

Students in the Health Policy & Management Concentration may choose one of three tracks:

- Healthcare Management & Leadership
- Health Policy
- Public Health Informatics
- Quality & Patient Safety

Students must complete at least 26 credits of courses within one track per the requirements listed below for each track. While ongoing participation in the seminar is expected throughout the duration of the program, students also register for a total of **two credits** of PH.311.861 Graduate Seminar in Health Care Management and Leadership in term(s) of their choosing to fulfill the 28 concentration credits. Students may in some cases substitute alternative courses for track electives with approval from their academic adviser and track director.

Healthcare Management & Leadership Track

The focus of the Healthcare Management and Leadership Track is on measuring, monitoring and improving the clinical and financial performance of health services organizations, as well as training leaders for organizational change. The track curriculum is based on the Malcolm Baldrige Healthcare Criteria for Performance Excellence framework and targets those who have master's level training related to healthcare management and/or public health.

The competencies for the track in Healthcare Management and Leadership are met through required and elective coursework, a practicum, and the process of writing a dissertation. Upon successful completion, students will have mastered the following track competencies; specifically, students by the end of the program will have the ability to:

1. Enable senior leaders to develop an effective organizational leadership and governance system to deploy shared visions, missions and core values to address societal and community health needs.
2. Utilize strategic assessment and planning skills to identify internal and external issues that may impact health services delivery; apply facilitation skills to ensure the participation of key internal and external organizational stakeholders for both strategy development and deployment.
3. Apply evidence-based tools and frameworks to enhance organizational performance in the human, clinical, financial, information and supply chain domains so as to drive value and improved outcomes.
4. Develop and sustain a culture of excellence that builds upon providing visionary leadership, valuing people, ethics and transparency, societal responsibility and community health, organizational learning and agility, patient/client focused excellence, delivering value and results, management by fact, managing for innovation with a focus on success.
5. Manage data, information and knowledge systematically to improve quality of decision making to enhance quality of care and service delivery.
6. Apply organizational and systems thinking theories to create high performing teams that promote care integration, create value, promote efficiencies and organizational and personal learning.

Required Courses for the Healthcare Management & Leadership Track

Code	Title	Credits
Required Courses		
PH.312.603	Fundamentals of Budgeting and Financial Management	3
PH.312.620	Performance Measurement in Health Care	2
PH.312.621	Strategic Planning (Prerequisites not required for DrPH students.)	3
PH.313.641	Introduction to Health Economics	3
PH.313.790	Introduction to Economic Evaluation	3
Health Informatics		
PH.309.631	Population Health Informatics	3
or PH.312.633	Health Management Information Systems	
Quality and Patient Safety		
Select one of the following:		3
PH.309.712	Assessing Health Status and Patient Outcomes	
PH.309.730	Patient Safety and Medical Errors	
PH.311.615	Quality of Medical Care	
Elective(s)		
Select from the following to complete 26 track credits:		6
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research	
PH.140.607	Multilevel Models	
PH.309.616 & PH.309.617	Introduction to Methods for Health Services Research and Evaluation I and Introduction to Methods for Health Services Research and Evaluation II	
PH.312.604	Quantitative Tools for Managers	
PH.312.617	Fundamentals of Financial Accounting	
PH.312.630	Healthcare Financial Management	
PH.313.793	Extended Exercises in Cost Effectiveness	
PH.340.727	Introduction to Health Survey Research Methods	
PH.380.611	Fundamentals of Program Evaluation	
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	
PH.410.671	Introduction to Qualitative Research Methods	
PH.410.673	Introduction to Qualitative Data Analysis for Public Health	
Total Credits		**26**

Note, for students able to take in-person courses on site in Baltimore during the traditional academic year, additional elective options may be available.

Public Health Informatics Track

The Public Health Informatics track offers training in methods and concepts of informatics for application to public health and population health management. The track curriculum is designed for public health professionals or population health managers who wish to develop an area of expertise or specialization in the emerging field of public health informatics.

The competencies for the track in Public Health Informatics are met through required and elective coursework, a practicum, and the process of writing a dissertation. Upon successful completion, students will have mastered the following track competencies; specifically, students by the end of the program will have the ability to:

1. Analyze the state of the science and current research and policy issues related to the foundation of public health informatics; and, explain how informatics can be leveraged to improve the practice of public health and enhance the overall role of public health organizations.
2. Characterize and critically evaluate the integration of different domains of public health informatics such as bio-surveillance, decision support, predictive modeling, and population risk stratification using clinical informatics systems such as laboratory information systems or electronic health records (EHRs).
3. Evaluate a given public or population health information system based on different criteria such as standardized protocols, common classification systems, governance structures, and embedded decision support systems.
4. Critically analyze and evaluate various informatics solutions for public or population health management interventions based on different criteria such as system architecture, interoperability, standards, human factors, security, privacy, and ethical issues.
5. Articulate the proper informatics management tools for an organization to implement solutions that assure confidentiality, security, integrity and legal compliance while maximizing the availability of information for public and population health use.

Required Courses for the Public Health Informatics Track

Code	Title	Credits
Required Courses		
PH.315.707	Introduction to Biomedical and Public Health Informatics	3
ME.600.905	Applied Clinical Informatics	3
PH.309.631	Population Health Informatics	3
PH.315.703	Leading Change Through Health Informatics	3
PH.315.700	Health Information Systems: Design to Deployment	3
PH.315.709	Health Sciences Informatics, Knowledge Engineering and Decision Support	3
PH.309.635	Population Health: Analytic Methods and Visualization Techniques	3
Elective(s)		
Select from the following to complete 26 track credits:		5
PH.312.633	Health Management Information Systems	
PH.315.708	HIT Standards and Systems Interoperability	
ME.600.907	Database Querying in Health	
ME.600.716	Informatics and the Clinical Research Lifecycle: Tools, Techniques and Processes	
ME.600.721	Introduction to Precision Medicine Data Analysis	
PH.380.603	Demographic Methods for Public Health	
AS.430.604	Spatial Analytics	
Total Credits		**26**

Note, for students able to take in-person courses on site in Baltimore during the traditional academic year, additional elective options may be available. Students in the Public Health informatics Track may take 27 credits of track coursework and 1 credit of 311.Graduate Seminar in Health Care Management & Leadership to fulfill the 28 concentration credits, with the approval of the concentration and track co-directors.

Quality and Patient Safety Track

The Quality and Patient Safety track addresses issues related to quality of healthcare, patient safety, patient centered outcomes, and performance measurement and improvement. The curriculum is designed for public health, clinical and management professionals who wish to develop the expertise to identify challenges in these areas, implement evidence-based interventions and improve care delivery. The curriculum includes a variety of specialized courses in quality, patent safety, patient centered outcomes, performance measurement, human factors and the evaluation of programs and interventions for improving the safety and quality of health care services. The track targets those who have master's level training related to public health, healthcare management and/or clinical sciences.

The competencies for the track in Quality and Patient Safety are met through required and elective coursework, a practicum, and the process of writing a dissertation. Upon successful completion, students will have mastered the following track competencies; specifically, students by the end of the program will have the ability to:

1. Apply quality improvement and evaluation frameworks.
2. Recognize implementation barriers and facilitators to quality and patient safety in the real world.
3. Assess utility of specific quality improvement and patient safety methods.
4. Leverage opportunities for adapting quality and patient safety methods to different types of organizations.
5. Address pitfalls of quality improvement and patient safety activity and research.

Required Courses for the Quality and Patient Safety Track

Code	Title	Credits
Required Courses		
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs	3
PH.309.712	Assessing Health Status and Patient Outcomes	3
PH.309.730	Patient Safety and Medical Errors	3
PH.311.615	Quality of Medical Care	3
PH.312.620	Performance Measurement in Health Care	2
PH.312.621	Strategic Planning	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research	3
Health Informatics		
PH.309.631	Population Health Informatics	3
or PH.312.633	Health Management Information Systems	
Elective(s)		
Select from the following to complete 26 track credits:		3
PH.140.607	Multilevel Models	
PH.309.620	Managed Care and Health insurance	
PH.221.722	Quality Assurance Management Methods for Developing Countries	
PH.309.616 & PH.309.617	Introduction to Methods for Health Services Research and Evaluation I and Introduction to Methods for Health Services Research and Evaluation II	
PH.309.731	Patient Safety in Developing Countries	
PH.312.604	Quantitative Tools for Managers	
PH.312.603	Fundamentals of Budgeting and Financial Management	
PH.340.717	Health Survey Research Methods	
PH.340.727	Introduction to Health Survey Research Methods	
PH.380.611	Fundamentals of Program Evaluation	
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research	
PH.410.671	Introduction to Qualitative Research Methods	
PH.410.673	Introduction to Qualitative Data Analysis for Public Health	
PH.221.636	High Performing Organizations in Lmic Settings	
PH.312.670	Negotiation in Health Care Settings	
Total Credits		**26**

Note, for students able to take in-person courses on site in Baltimore during the traditional academic year, additional elective options may be available.

Implementation Science Concentration

The competencies associated with the Implementation Science concentration include:

1. Participate in and lead collaborative multidisciplinary teams that promote a blending of disciplines to inform and evaluate implementation strategies
2. Integrate diverse perspectives including those from communities and experts into a cogent intervention design and/or implementation strategy for health programs and policies
3. Characterize optimal implementation processes to support iterative cycles of implementation and adaptation based on learning.
4. Integrate didactic and practice-based experience to support methodologically sound evaluation of implementation processes and outcomes to inform implementation
5. Analyze frameworks to improve synthesis and integration of diverse data from multiples sources to inform policy and practice.
6. Present and interpret demographic, statistical, programmatic, and scientific information to inform decision making by policy makers and other professional and lay audiences.

Students are required to take a minimum of 28 credits focused on the Implementation Science concentration. This requirement will be achieved through a set of required and elective course.

Note: Courses taken to fulfill DrPH Foundational Requirements may not be applied to fulfill concentration requirements.

Course Requirements and Electives for Implementation Science Concentration

Code	Title	Credits
Required Courses		
PH.550.601	Implementation Research and Practice (2nd term)	3
PH.340.726	Implementation Research Methods to Address Real World Epidemiological Questions	3
PH.330.650	Methods in Implementation Science (3rd term)	3
Epidemiology or Health, Behavior and Society Special Studies: Implementation Science Concentration Seminar Series (register for only 1 term; Monthly)		1
Methodology and Analysis Courses		
Select nine or more credits from the following:		9

PH.221.722	Quality Assurance Management Methods for Developing Countries (1st term)
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research (1st term)
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches (3rd term)
PH.309.616	Introduction to Methods for Health Services Research and Evaluation I (3rd term)
PH.309.617	Introduction to Methods for Health Services Research and Evaluation II (4th term)
PH.221.622	Using Qualitative Methods for Program Planning and Evaluation (SI)
PH.221.659	Introduction to Health Systems Modeling (SI)
PH.330.621	Mixed Methods for Research in Public Health (SI)
PH.340.613	Design and Conduct of Clinical Trials (SI)
PH.340.674	Causal Inference: Emulating A Target Trial to Assess Comparative Effectiveness (SI)
PH.340.686	Introduction to Systematic Reviews and Meta-Analysis (SI)
PH.340.725	Methods for Clinical and Translational Research (SI)
PH.340.767	Professional Epidemiologic Methods: Topics and Methods for Health Situation Analysis (SI)
PH.410.664	Knowledge Management for Effective Global Health Programs (SI)
Total Credits	**19**

The above courses total a minimum of 19 credits. **In addition**, students are required to take **9 or more credits** from the **following electives or content-specific courses** to complete the required 28 concentration credits:

Code	Title	Credits
PH.390.678	Introduction to Quality Improvement & Knowledge Translation Research	3
PH.221.646	Health Systems in Low and Middle income Countries	3
PH.700.621	Ethics in Clinical Practice: Fundamentals, Problems and Approaches	3
PH.410.755	Health Communication Programs	4
PH.340.861	Clinical Trials: Procedures, Design, and Interpretation of Results	3
PH.340.765	Professional Epidemiologic Methods: Epidemiologic intelligence and Population Health Assessments	2
PH.140.664	Causal Inference in Medicine and Public Health I	4
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs	4
PH.410.755	Health Communication Programs	4
PH.221.625	Evaluation of District-Level Primary Health Care Implementation in Low-and Middle-income Settings	3
PH.221.705	Monitoring and Evaluation of Health Systems Strengthening in Low and Middle income Countries	3
PH.221.711	Managing District Health Systems in Low and Middle Income Countries	3
PH.312.620	Performance Measurement in Health Care	2
PH.340.636	Epidemiology in Evidence-Based Policy	2
PH.301.692	The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health	3
PH.340.663	Epidemiology Workshop: Interpreting and Using Epidemiologic Evidence	2
PH.410.620	Program Planning for Health Behavior Change	3
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs	3

Women's & Reproductive health concentration

The competencies associated with the Women's and Reproductive Health (WRH) concentration include:

1. Assess the principal health concerns for women or mothers and newborns, the associated population-based risk factors, and the relative impact of each risk factor.
2. Apply a life course framework to understanding the determinants of a woman's or reproductive health concern, implications for a woman's health later in life, and the population strategies to address it.
3. Evaluate strategies to promote population-level women's, reproductive, maternal and child health, including healthcare services and systems delivery strategies used to address health concerns in the population.
4. Evaluate research approaches to understand woman's or reproductive health concerns and the implications of the research.
5. Apply frameworks related to women's and reproductive health for improving their health, including gender equity frameworks.
6. Identify and assess the causes and consequences of population change related to women's and reproductive health using demographic methods.

Students are expected to complete a minimum of 28 credits of concentration-specific courses. These courses cover the following six domains:

1. Health Concerns for Women, Mothers, and Newborns (2 courses)
2. Life Course Framework on Women's, Maternal, and Newborn Health (1 course)
3. Promote Population-level Women's, Reproductive, Maternal , and Child Health (1 course)
4. Evaluate Research Approaches (1 course)
5. Apply Frameworks Other Than Life Course (1 course)
6. Population Change and Methods (1 course)

In addition to the requirements described above, students must take additional coursework (*proposed electives*) to make up a total of 28 credits of concentration-specific courses. The proposed elective courses could be taken from any of the course options listed below or from other courses at the School. Courses electives outside the options listed below will require the advisor's approval prior to registration.

Note: Courses taken to fulfill DrPH Foundational Requirements may not be applied to fulfill concentration requirements.

Course Requirements and Electives for Women's and Reproductive Health Concentration

Code	Title	Credits
Health Concerns for Women, Mothers, and Newborns-2 courses		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (or)	3
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (or)	3
PH.380.761	Sexually Transmitted Infections in Public Health Practice (or)	
PH.380.762	HIV Infection in Women, Children, and Adolescents (or)	
PH.380.664	Reproductive and Perinatal Epidemiology (or)	
PH.380.666	Women's Health	
Life Course Framework on Women's, Maternal, and Newborn Health-1 course		
PH.380.604	Life Course Perspectives on Health	4
Promote Population-level Women's, Reproductive, Maternal, and Child Health-1 course		
PH.380.624	Maternal and Child Health Legislation and Programs (or)	4
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (or)	
PH.380.665	Family Planning Policies and Programs (or)	
PH.380.667	Women's Health Policy (0r)	
PH.380.771	Understanding and Changing International Reproductive Health Policy	
Evaluate Research Approaches-1 course		
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (or)	3
PH.380.611	Fundamentals of Program Evaluation (or)	
PH.380.710	Public Health Perspectives on Abortion Policy (or)	
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (or)	
Apply Frameworks Other Than Life Course-1 course		
PH.380.744	Nutrition and Growth in Maternal and Child Health (or)	3
PH.380.655	Social and Economic Aspects of Human Fertility	
Population Change and Methods-1 course		
PH.380.755	Population Dynamics and Public Health (or)	2
PH.380.603	Demographic Methods for Public Health (or)	
PH.380.600	Principles of Population Change	
Electives		
Select courses from the following to reach 28 concentration credits:		6
PH.380.610	Substance Use in Women and Families	
PH.380.620	A Coalition-based SMART Approach to Public Health Advocacy	
PH.380.623	Adolescent Health and Development	
PH.120.620	Fundamentals of Reproductive Biology	
PH.340.727	Introduction to Health Survey Research Methods	
Total Credits		**28**

Comprehensive Written Exam

All students will complete a Comprehensive Written Examination, which is intended to assess students' ability to apply the DrPH foundational competencies, analytic skills, and concentration/track competencies they have acquired through foundational and concentration/track coursework to case studies and/or real-world problems. The comprehensive exam also tests students' abilities to integrate and synthesize across foundational and concentration competency domains.

Students are eligible to take the exam after completing required course work, including both required foundational courses and concentration/track courses with a C or better; students must have a cumulative GPA of 3.0 or better. Students may complete certain concentration/track electives after the exam.

Special Studies Registration Requirements

After completing coursework, part-time students register for a minimum of one credit per term of special studies with their dissertation adviser (in the primary department of their adviser) while preparing their proposals for the Preliminary Oral Examinations.

Full-time and on-site international students should consult with the DrPH Program Office and/or the Office of International Scholars regarding special studies registration requirements.

Practicum

The purpose of the DrPH practicum is to further develop students' leadership and applied skills in relation to students' areas of specialization through a practice-based project developed by the student. The practicum should form an integral part of student learning, complementing the student's course work, special studies and dissertation interests. Typically, the practicum is performed in the student's place of work, but the practicum project must be distinct from the student's daily work activities.

All DrPH students are required to complete a practicum to comply with the Council on Education for Public Health (CEPH) accreditation requirements, regardless of their years of work experience; the program does not grant waivers from the practicum requirement. Students are not required to register for credits to complete the practicum.

Practicum Requirements

It is required that the DrPH student practicum:

1. **Applies and further develops public health skills and competencies:** the objectives of the student's practicum should be clearly identified as part of an integrated, individualized proposal that is approved in advance. Students will identify a minimum of 5 CEPH Foundational and concentration/track competencies in which they wish to achieve high-level skills. The practicum must address a minimum of 1 competency from the CEPH Leadership, Management & Governance domain. The practicum will present an opportunity for the application of these skills and students should ensure that they have taken appropriate coursework to be adequately prepared to conduct the practicum.
2. **Is framed and carried out in a public health context:** the practicum will include population-level activities carried out at, or in collaboration with, an organization or agency to the benefit of the of the organization. Appropriate organizations may include governmental, nongovernmental, non-profit, industrial and for-profit settings. The practicum should not be an academic exercise in which students merely crunch numbers or administer surveys but rather students should be engaged in the larger public health context of their activities, in a "real-world" setting.
3. **Is supervised and supported:** the practicum preceptor will be qualified to evaluate the student's professional competence and will

supervise the student throughout the project within the organization. The preceptor will typically be from an outside organization (i.e. community-based organization, health department, private corporation, etc.), but can be a JHSPH faculty member if appropriate. The preceptor will provide background information, guidance, and feedback with regards to student progress on well-defined learning objectives. The student's adviser will be kept informed of the student's practicum activities and progress, and may provide additional assistance.

4. **Is significant:** the practicum should be more than an opportunity for additional work experience given each student's prior work background. Practicum projects should make a significant contribution to the organization with which the student is collaborating, as well as constitute a significant investment of student time and effort. It is estimated that the typical DrPH student may spend a minimum of 100 hours on practicum projects. Experiences may take the form of one significant large project or several smaller projects. Students may work independently but may also be part of a student team or a team composed of other members of the organization with which they are collaborating. If students are members of a broader team, then their role on the team should be clearly defined.
5. **Is evaluated:** students will be evaluated on their achievement of defined competencies and deliverables by both the preceptor and faculty adviser. As part of the practicum experience, students also will reflect on and evaluate their overall practicum experiences, including their personal and professional reactions to the practicum experience. Clearly identified outputs from the practicum experience (not necessarily written products, but oral presentations or a new management or information system) should be identified in advance.

PRACTICUM Preceptor

Each student should have a preceptor and all preceptors must be approved by the student's Concentration Co-directors prior to the start of the practicum. Current BSPH faculty may act as preceptors where this is appropriate (e.g., if the faculty member is engaged in collaborative work with an outside agency). Other individuals working in relevant practice positions may already have an adjunct position at the school, and thus are "preapproved" as preceptors. When the preceptor does not have a faculty position at the School, their résumé or CV should be submitted to the Concentration Co-Directors, along with the practicum proposal, for approval and submitted to the DrPH Program Office.

The role of the preceptor is to support the student within the organization, and in particular to assist with access to data and other resources needed to complete the practicum; to ensure the practicum aligns with the organization's goals and strategies, and will benefit the organization; to evaluate the student's competencies before and after the practicum; to guide the student throughout the practicum process; to troubleshoot challenges that arise if necessary; and to debrief with the student at the end of the practicum.

PRACTICUM Faculty Adviser

In addition to the practicum preceptor, each student also should consult with a faculty adviser on their practicum project. The student's academic adviser often serves as the faculty adviser to the practicum. This is particularly recommended when the student's practicum addresses a facet of the student's anticipated dissertation research. If a student would like to undertake a practicum outside their adviser's area of expertise, then the student can elect to engage a faculty adviser whose expertise aligns with the practicum area of interest. The role of the faculty adviser is to support the student (not the practicum organization), and in particular to help ensure that the scope of the practicum is appropriate; to evaluate the student's competencies before and after the practicum; to guide the student to resources relevant to the practicum; to troubleshoot challenges that arise if necessary; and to debrief with the student at the end of the practicum.

DrPH Thesis Proposal

Prior to the Comprehensive Written Examination, students should develop a clear understanding of the three thesis options described briefly below. The decision on which format to follow should be made by the time the student begins to draft the proposal. There are strengths particular to each format that should be carefully discussed with the student's adviser.

1. The **traditional doctoral thesis** consists of a statement of the problem and specific aims; a literature review; data and research methods; analyses and results; and a discussion of findings and their implications. The form these take will reflect the specific academic discipline or orientation guiding the student's research.
2. The **manuscript-oriented thesis** is an alternative to the traditional thesis. The manuscript thesis consists of a total of three (or more) papers, linked to the student's research topic.
3. The **workplace challenge** requires the selection of one organization or a combination of several organizations to complete a series of three out of four practice-based analytical projects (organizational assessment, plan for a new program or service, program evaluation or economic evaluation). (*Note:* this option is not available for students pursuing a DrPH in the Environmental Health Concentration).

Once a thesis format has been selected, the student should draft their thesis proposal in preparation for the Preliminary Oral Exams.

DrPH Preliminary Oral Examinations

Required for all DrPH students, the Schoolwide Preliminary Oral Examination is a Bloomberg School of Public Health requirement overseen by the Committee on Academic Standards. The Schoolwide Preliminary Oral Examination is preceded by the Concentration Oral Examination.

Concentration Oral Examination

The purpose of the Concentration Oral Examination is to prepare students and determine their readiness to take the Schoolwide Preliminary Oral Examination. To take the Concentration Oral Exam, students must have successfully passed the Comprehensive Written Exam and drafted a proposal for their thesis project.

Schoolwide Preliminary Oral Examination

The purpose of this examination is to determine whether the student has the ability and knowledge to undertake significant public health problem-solving and analytic research in their general area of interest. Specifically, the examination shall evaluate the student's:

1. Capacity for logical thinking;
2. Breadth and depth of knowledge in public health and evaluative methodologies; and
3. Ability to undertake a research project aimed at addressing a significant public health problem leading to a completed thesis.

Discussion of a specific proposal serves as a vehicle for determining the student's general knowledge and analytical capabilities; however, this examination is not intended to be a defense of a specific proposal. The student will be expected to defend the public health significance of the problem that s/he wishes to examine as well as the methodologies to be used in evaluating solutions to the problem. The examination is conducted by a Committee of four faculty and one practitioner, including the student's adviser.

Eligibility

Students must have completed all core course requirements and didactic credit requirements for the DrPH program with a C or better and a cumulative GPA of 3.0 or higher, and submitted both the practicum proposal and practicum completion forms to be eligible to take the Schoolwide Preliminary Oral Examination.

Timeline and Registration

The examination should be given at the earliest feasible time after completion of the Comprehensive Written Examination and Concentration Oral Examination, and before significant engagement in the student's dissertation work. For part-time students, the School-wide Oral Examination must be completed before the end of their fifth year in the program, while for full-time students this exam must be completed before the end of their third year in the program.

Part-time students will register for one credit per term of special studies credit with their dissertation adviser while preparing for their Preliminary Oral Examinations. After the examination, they will register for one credit per term of thesis research with their dissertation advisers until they complete their Final Oral Exam.

DrPH Thesis

Overview

The focus of the DrPH degree is to facilitate the creation and application of knowledge in the practice of public health. As a culminating and integrative learning experience, all students must complete an original investigation presented in the form of a thesis. The student's thesis should integrate the foundational competencies and the student's concentration-specific competencies. The thesis must be based on original research, worthy of publication, and acceptable to a committee of faculty readers.

The content of the thesis should reflect the focus of the degree program and the student's concentration. The thesis content is to be developed by the student in consultation with their adviser and the Dissertation Advisory Committee. The DrPH thesis shall also meet the following criteria:

1. Address a practical problem confronting a leader in public health practice;
2. Represent original thought and work;
3. Use a rigorous and scientifically defensible analytic component; and
4. Be based on a conceptual model (or models) that relates the work to existing knowledge and to practice.

During the student's application process, various research ideas may have been discussed with faculty members. However, each student's thesis proposal must be developed, reviewed and found acceptable to program faculty while the student is enrolled as a doctoral student at BSPH.

Registration

Following the satisfactory completion of the Schoolwide Preliminary Oral Examination, students must register for thesis research credits with their dissertation adviser. Part-time students are required to register for a minimum of 1 thesis research credit per term. All DrPH students must be registered in the term in which they present their Thesis Seminar and take their Final Oral Exam.

Thesis Format and Content

The decision on which format to follow should be made by the time the student takes the Concentration Oral Examination. There are advantages and disadvantages to each option that should be carefully discussed with the student's adviser. If a decision is made during the writing stage to change the format of the thesis, all members of the thesis advisory committee and/or the thesis readers committee should be informed.

Each of these options is described in greater detail in the following sections.

Option 1: The Traditional Doctoral Thesis

The **traditional doctoral thesis** generally consists of an abstract, five or more chapters, references, and any appendices. The outline of chapters below is merely a guide. The page numbers are rough estimates, and the form of the chapters will vary, reflecting the academic discipline or orientation of the student's research.

All components of the traditional thesis will be judged by the Committee to be either: Acceptable, Acceptable with Revisions, or Unacceptable. Each student, with guidance from their adviser, will rework the thesis draft until all components are judged acceptable.

Option 2: Manuscript-Oriented Thesis

The manuscript-oriented thesis consists of a total of **three (or more) papers, linked to the student's thesis topic.** These papers should be prepared as if for submission to a journal and therefore while the papers may cross-reference each other, each paper should be self-contained and publishable in its own right. Papers prepared in this fashion are typically slightly longer than regular journal articles as they contain slightly more methodological detail and background material than usual.

A manuscript-oriented thesis must meet the following criteria:

1. The doctoral student must be the first author on the three manuscripts used to satisfy this requirement;
2. No manuscript will be accepted as part of the thesis if it was submitted for publication before the student passed the Schoolwide Preliminary Oral Exam; and
3. At least two members of the thesis committee must not be co-authors of any of the manuscripts to avoid conflict of interest if published prior to the Final Oral Exam.

As is true for the traditional doctoral thesis, all components of the manuscript-oriented thesis will be judged to be either: Acceptable, Acceptable with Revisions, or Unacceptable. Each student, with guidance from her/his adviser, will rework the thesis draft until all components are judged acceptable.

Option 3: The 'Workplace Challenge'

In the context of their working environment, students may elect to pursue three out of four following analyses as the basis for their thesis research: 1) organizational assessment; 2) plan for a new program or service; 3) program evaluation; 4) economic evaluation. These analytical pieces may relate to one organization or program that they are closely associated with or could relate to multiple different organizations and programs. In either case, the thesis will need to provide sufficient background information regarding the organization and/or program for the committee of readers to be able to understand the context for the work.

In addition to comprising three of the four analyses described above, a final section of the thesis should discuss implications of the analysis. This section summarizes the lessons learned through the 'workplace challenge' experience, identifies opportunities for improvement from the perspectives of relevant stakeholders, and draws implications for other similar programs or organizations. Students should address the role that leadership played or could have played regarding the projects and/or outcomes observed. For example, what was done and could have been done to enhance, assure, foster or mitigate the outcomes observed?

Thesis Seminar & Final Oral Examination

The Final Oral Examination of the dissertation shall be conducted by the Final Oral Examination Committee after the Thesis Advisory Committee agrees that the candidate is ready for the final defense. The Final Oral Examination Committee is typically composed of the of the same members as the student's Preliminary Oral Exam Committee (four faculty, including the student's adviser, and one practitioner). During the student's defense, the Final Oral Examination Committee shall evaluate the following:

1. Value of the work in terms of its potential practical application;
2. Methodological rigor and original thought demonstrated in the work;
3. Candidate's understanding of the details of the methodological and analytical work; and
4. Final quality of the written thesis document.

As a culminating experience, the doctoral student will present a formal, public thesis seminar online. This requirement provides experience for the student in preparing a formal seminar; provides the faculty and other students with an opportunity to share in the student's accomplishments; and gives a sense of finality to the doctoral experience for the student. The public thesis seminar and Final Oral Examination are typically held on the same day with the seminar being conducted first, followed immediately by the Final Oral Examination and defense. Thesis readers should have at least one month to read and suggest revisions to the thesis prior to the Final Oral Examination. For part-time DrPH students, the Final Oral Examination must be completed within nine years of matriculation, while full-time DrPH students must complete it within seven years of matriculation.

Online Submission of Electronic Theses & Dissertations to The Sheridan Libraries

Submission of electronic dissertation: Submit a PDF copy of the final dissertation to the Johns Hopkins ETD Submission Tool http://etd.library.jhu.edu (https://etd.library.jhu.edu). Instructions for formatting and submitting the dissertation may be found at http://guides.library.jhu.edu/etd (https://guides.library.jhu.edu/etd/). The dissertation needs approval from The Sheridan Libraries before submission to the program.

Dissertation Format Guidelines: Follow the guidelines found on the University's ETD LibGuide (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) when incorporating the examining committee's recommendations and finalizing the dissertation. To ensure that the dissertation meets all the guidelines, an electronic version can be sent to The Sheridan Libraries for review, dissertations@jhu.edu.

Publication Embargo: Students may choose an embargo period of 0, 1, 2, 3, or 4 years during the ETD submissions. This means that The Sheridan Libraries will withhold publication of the dissertation for the period of time chosen. If students wish to publish their dissertation research, the full embargo period of four years is highly recommended, as many journals will not publish research that is already available in electronic format. At a certain point, The Sheridan Libraries does make some dissertation details public (student name, degree, dissertation title, abstract etc.) during the embargo period, but the actual dissertation is hidden from view.

ProQuest/UMI Publication: Optional for all degree programs – On the "Document Information" page, there will be a check-box at the bottom in which the student may request that their thesis/dissertation be published through ProQuest/UMI. Publication through ProQuest/UMI is now optional. There is no additional form to fill out and no fees associated with publication.

DrPH Program Requirements: The program does require submission of an electronic copy of the final dissertation document.

Learning Outcomes

DrPH Program Objectives

The DrPH Program Objectives provide students with a multi-faceted framework enabling students to become ethical public health leaders equipped to confront the world's most pressing public health challenges.

The DrPH Program Objectives are:

1. Identify, synthesize and apply evidence based public health research and theory from a broad range of disciplines and health related data sources for problem solving and to advance programs, policies, and systems promoting population health. *(Data analysis)*
2. Identify and analyze ethical issues including balancing the claims of personal liberty with the responsibility to protect and improve the health of the population; and act on the ethical concepts of social justice and human rights in public health research and practice. *(Ethics)*
3. Influence decision making regarding policies and practices that advance public health using scientific knowledge, analysis, communication and consensus building. *(Policy)*
4. Assess and use communication strategies across diverse audiences to inform and influence individual, organization, community and policy actions to promote the health of the public. *(Communication)*
5. Enable organizations and communities to create, communicate and apply shared visions, missions and values; inspire trust and motivate others; build capacity; improve performance, and enhance the quality of the working environment; and use evidence-based strategies to enhance public health. *(Leadership)*
6. Provide fiscally responsible, strategic, and operational guidance within both public and private health organizations, for achieving individual and community health and wellness. *(Management)*
7. Design and evaluate system-level and programmatic initiatives in multidisciplinary teams so as promote public health outcomes and health equity *(Program design and evaluation)*
8. Assess adult learning needs, and design and deliver training or educational experiences that respond to these needs using the best pedagogical practices available. *(Education)*

CEPH DrPH Foundational Competencies

In addition to the 12 CEPH Foundational Learning Objectives (p. 176), all DrPH students are expected to achieve the following 20 CEPH DrPH Foundational Competencies as they work toward attaining the program's objectives.

The 20 CEPH DrPH Foundational Competencies are:

Data & Analysis

1. Explain qualitative, quantitative, mixed methods and policy analysis research and evaluation methods to address health issues at multiple (individual, group, organization, community and population) levels
2. Design a qualitative, quantitative, mixed methods, policy analysis or evaluation project to address a public health issue
3. Explain the use and limitations of surveillance systems and national surveys in assessing, monitoring and evaluating policies and programs and to address a population's health

Leadership, Management & Governance

4. Propose strategies for health improvement and elimination of health inequities by organizing stakeholders, including researchers, practitioners, community leaders and other partners

5. Communicate public health science to diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies

6. Integrate knowledge, approaches, methods, values and potential contributions from multiple professions and systems in addressing public health problems

7. Create a strategic plan

8. Facilitate shared decision making through negotiation and consensus-building methods

9. Create organizational change strategies

10. Propose strategies to promote inclusion and equity within public health programs, policies and systems

11. Assess one's own strengths and weaknesses in leadership capacities including cultural proficiency

12. Propose human, fiscal and other resources to achieve a strategic goal

13. Cultivate new resources and revenue streams to achieve a strategic goal

Policy & Programs

14. Design a system-level intervention to address a public health issue

15. Integrate knowledge of cultural values and practices in the design of public health policies and programs

16. Integrate scientific information, legal and regulatory approaches, ethical frameworks and varied stakeholder interests in policy development and analysis

17. Propose interprofessional team approaches to improving public health

Education & Workforce Development

18. Assess an audience's knowledge and learning needs

19. Deliver training or educational experiences that promote learning in academic, organizational or community settings

20. Use best practice modalities in pedagogical practices

Graduate Training Programs in Clinical Investigation

About

The Graduate Training Programs in Clinical Investigation (https://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/) (GTPCI) are the first of their kind. A joint venture between the Johns Hopkins Bloomberg School of Public Health (BSPH) and the Johns Hopkins School of Medicine (SOM), GTPCI trains clinicians to be more effective clinical scientists. Participants gain the skills necessary to design and conduct clinical investigations of emerging medical treatments and technologies, and to apply new diagnostic techniques and approaches to the study of human pathophysiology. We train mostly faculty, postdoctoral fellows and other allied health professionals working with human subjects in clinical investigation. Our graduates pursue careers in academia, and as independent clinical investigators at pharmaceutical firms and federal regulatory agencies.

BACKGROUND

In 1989, a Task Force on Clinical Research in the Department of Medicine reported results of a survey in which one-third of our clinical post-doctoral fellows indicated their desire to pursue "full-time clinical research" as a career objective. In the same survey, a large majority of post-doctoral fellows felt they were inadequately trained in clinical trial design (70%), data management (70%), the ethics of human experimentation (69%), and biostatistics (83%). At that time, almost half of the responding post-doctoral fellows expressed an interest in a structured training program in clinical investigation. Discussions on ways to meet this need ensued at the department and SOM levels, and eventually enlarged to include the BSPH. At the same time, concerns about the adverse trends for clinical investigation and about the inadequate supply of qualified clinical investigators were being expressed at the national level. Johns Hopkins' response to these local and national needs was the creation of GTPCI in 1992 and admitted its first students in 1993.

CONCEPT

The program is targeted toward internal physician post-doctoral fellows in clinical departments of the SOM. It involves one year of full-time academic classroom work, followed by at least two years of mentored training in clinical research. In 1996, the University approved expansion of the program to include a PhD degree in Clinical Investigation. Normally, an interested fellow applies for admission during their 1st year of clinical post-doctoral training, or for longer training programs, after completion of more than 80% of required subspecialty training. The 1st year is devoted entirely to a full-time academic curriculum (see below). Thereafter, the student returns to the sponsoring department or division to undertake mentored clinical research and to complete any other requirements for clinical certification. In 1997, a MHS degree option was added for those who seek access to the didactic curriculum without the requirement for a thesis project.

CURRICULUM FOR THE DIDACTIC YEAR

The didactic year begins in the summer with a short course on clinical research methods and a seminar series to explore career objectives and inculcate a broad understanding of clinical investigation. During the four terms of the academic year, students take required courses in: Biostatistics, Epidemiology, and Clinical Investigation. For the Biostatistics and Epidemiology cores, a standard series of courses is drawn from the existing BSPH Graduate Curriculum. Courses in the Clinical Investigation core are specifically designed for students in the GTPCI program and largely taught by SOM faculty. An effort is made to involve as many appropriate role models of successful clinical investigators as possible. This core includes courses on biomedical writing, grant writing and thesis preparation, ethical and regulatory issues, drug development, analytical methodology, outcomes effectiveness research and a seminar series in clinical investigation. A course listing can be found in the Requirements tab and course descriptions (p. 3071) are found here.

All degree students enter into an intensive grant writing/thesis development course during the 3rd and 4th terms of their didactic year, out of which comes a thesis research proposal. All degree students are required to successfully complete a written comprehensive examination at the end of the didactic year. Thereafter, research progress is monitored by a thesis committee according to the rules of the University.

FUNDING

For admission to the PhD degree program, the nominating department or division must guarantee three years of stipend support as well as identify a source for the tuition costs for the didactic year. For many students, existing NIH training grants (T32 or F32) are used to pay stipend and tuition. A limited number of institutional tuition grants are provided by the program. From July 1999, an NIH Curriculum Development Award (CTSA) provides for administrative, development and enrichment costs of the program. Participation in the degree programs can also be funded by an NIH KL2 grant which select applicants competitively each year to be NIH Clinical Research Scholars. They are junior faculty, who receive stipends/salary, full tuition and some research support for at least 2 years. Applications are received each December for awards beginning the following July. Individual K23 (or other K awards) can also be used to fund participation in the program.

EXPERIENCE TO DATE

As of June 2022, 452 students have entered the program: 211 in thesis-degree tracks and 241 in the MHS track. Sixteen new students will matriculate for the 2022-23 academic year. As of June 2022, 376 students have completed their degree requirements and 27 are currently in residence.

Programs

GTPCI POLICIES AND IMPORTANT PROGRAM INFORMATION:

Academic Committee and Sub-Committees:

An Academic Committee (https://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/advisory-council/) appointed from faculties of the SOM and the BSPH establishes policy for the program and oversees students' progress. Appointments are for rotating terms of three years, with the possibility of reappointment. Functional sub-committees have been created for Curriculum, Admission, Research Review, and Visiting Scholars; these committees also contain faculty not on the Academic Committee.

Admissions Committee:

Dale Needham, MD, PhD Chair - Professor of Pulmonary & Critical Care

Gregory Lucas, MD, PhD - Professor of Infectious Disease

Richard F. Ambinder, MD - Professor of Oncology

Khalil Ghanem, MD, PhD - Director, GTPCI Program and Professor of Infectious Disease

Edgar (Pete) Miller, MD, PhD - Professor of Medicine & Epidemiology

Sapna Kudchadkar, MD, PhD - Associate Professor of Pediatrics and Anesthesiology/Critical Care Medicine

Research Review Committee:

Richard Rothman, MD, PhD - Professor of Emergency Medicine

Allan Gelber, MD, PhD, MPH - Professor of Rheumatology

Craig Hendrix, MD - Professor of Clinical Pharmacology

Curriculum & Academic Standards Committee:

Khalil Ghanem, MD, PhD - Director, GTPCI Program and Professor of Infectious Disease

Charles W. Flexner, MD - Associate Director, GTPCI Program and Professor of Clinical Pharmacology

O. Joseph Bienvenu, MD, PhD - Professor of Psychiatry

Frank Lin, MD, PhD - Professor of Otolaryngology

Marie Diener-West, PhD - Chair of MPH Program and Professor of Biostatistics

Visiting Scholars Committee:

N. Franklin Adkinson, Jr., MD - Professor of Allergy & Clinical Immunology

Research Forum Delegate

David Levine, MD - Professor of General Internal Medicine

Program Delegate to Committee on Academic Standards

Khalil Ghanem, MD, PhD - Director, GTPCI Program and Professor of Infectious Disease

CHARGES TO THE STANDING COMMITTEES OF THE GTPCI

The **Admissions Committee** shall: (a) review and recommend to the Academic Committee written criteria for admission to the PhD or MHS program; (b) review and approve admission applications for all degree programs, referring to the Academic Committee difficult or unusual cases; (c) establish criteria for evaluation of requests for early admission; and (d) conduct inquiries or interviews as necessary to reach admission decisions. The Committee is composed of a Chair and 3-4 members of the Academic Committee.

The **Research Review Committee** shall: (a) recommend to the Academic Committee an appropriate advisory system to monitor academic and research performance of GTPCI students; (b) instruct students, advisers, and research preceptors and mentors on the Program's expectations for their roles; (c) monitor thesis research progress by each student; and (d) periodically review written reports of academic advisors, and alert the Program Director/Associate Director and the Academic Committee when problems are identified.

The **Curriculum and Academic Standards Committee** shall: (a) continually review and refine as necessary the curriculum requirements for the PhD and MHS programs; (b) to obtain and review student evaluations of the curriculum components; (c) to review annually academic performance. This Committee is chaired by the Associate Program Director and has 3-4 members.

The **Visiting Scholars Committee** shall: (a) receive and evaluate suggestions for enrichment opportunities for GTPCI programs - these may include lectureships, visiting professorships, short topical programs, internal forums, or other creative ventures which could promote the cause of clinical investigation within JHMI or enrich the training experience of students; (b) organize and implement several such enrichment programs each academic year; (c) recommend to the Academic Committee programs which may build bridges and promote cooperation between JHMI elements concerned with training and nurturing clinical investigation in its broadest definition; this would include the GCRCs, Clinical Trials programs, Welch Center programs, Health Services research groups and others.

TUITION, FEES, AND BILLING GUIDELINES

ALL FELLOWS OR FACULTY ACCEPTED INTO THE GTPCI PROGRAM MUST IDENTIFY ADEQUATE FUNDING TO SUPPORT THEIR STUDIES PRIOR TO MATRICULATION. Students must provide complete support information to the GTPCI Office for tuition, course materials fees, matriculation fees, books and supplies.

The Business Office is responsible for posting all payments to the student accounts. Students will receive on-line statements on the 16th of each month from Student Accounts and Business Services. These statements will reflect all funding that has been applied by the Business Office and any outstanding financial responsibilities. The student is ultimately responsible to ensure all bills are paid.

Continuing PhD students, after the 1st year of full-time coursework, **must maintain continuous registration** for part-time classes or thesis research until completion of the degree. If tuition support is available from grant or other sources, the student is expected to arrange for that payment source to be utilized. If no additional funding exists, scholarship support for continuing students will be provided for up to three credits per term. All additional coursework to be supported by scholarship MUST be submitted to the GTPCI office in July for the upcoming academic year and must be approved prior to registration.

Students are personally responsible for late fees.

Faculty are expected to use tuition remission benefits, via the university tuition remission form (https://hr.jhu.edu/wp-content/uploads/2019/03/trffacandstaff.pdf).

COURSEWORK AND GRADING

The BSPH does not accept transfer credits; however GTPCI will waive required courses if taken within the past five years at BSPH, or if the student can verify via exam or transcript that competencies for that course have been mastered. However, such waivers do not reduce the required number of academic credits for a degree; therefore all courses waived must be substituted with an elective course.

GTPCI will also give academic credit for up to 16 hours of required coursework, completed with an A or B, within the past three years at the BSPH if those credits did not apply to another degree earned. Credit is not given for previously taken elective courses, or coursework not taken for a grade.

Grading Policies:

All core (required) courses (including the five required advanced courses taken in the 2nd and/or 3rd year for PhD students) MUST be taken for a letter grade. Electives may be taken for Pass/Fail, unless the elective is taken in place of a required course, it must be taken for grade.

PhD students must maintain a cumulative GPA of 3.00 to remain in good standing, and must earn a B or better in all required courses. Any grade of C in a required course must be retaken for a B or better or GTPCI can recommend a suitable replacement course for a grade of B or better.

MHS students must maintain a cumulative GPA of 2.75 to remain in good standing. Any grade of D or F in a required course will automatically require that the course be re-taken within one year to improve the grade to at least a B or better.

Courses taken for audit do not count toward the PhD and MHS registration requirements.

SPECIAL STUDIES

Special Studies (390.840) is an ad hoc course to provide educational experiences not available in the formal curriculum. However, it **cannot** generally be substituted for a required course requirement in GTPCI. In rare circumstances, a written course plan with a defined workproduct may be approved by your Academic Adviser and Dr. Ghanem, which can involve directed reading or writing, original research, or clinical or administrative experience. It must be supervised and documented by GTPCI faculty or another approved mentor; documentation can include a clinical protocol, draft manuscript, or other written report of activities. One credit of Special Studies is considered the equivalent of three hours of personal work per week, either in or out of a classroom.

LEAVE OF ABSENCE

Students in need of a Leave of Absence (https://www.jhsph.edu/offices-and-services/student-affairs/resources/student-policies/_documents/Academic_Leave_of_Absence.pdf) must submit a request to the GTPCI Academic Committee, and if approved, the student must complete a LOA form which can be obtained from the Registrar's Office.

How will the didactic (1st) year be affected by missing a term(s)?

Many required GTPCI courses are part of a series of courses or multi-term; therefore enrollment in subsequent terms is contingent upon completion of the preceding course/term. For example, if a student is on LOA in 2nd term and misses the second courses in the Epi and Biostat series, the student can not continue the course series in the 3rd and 4th terms, but must restart the series with the 2nd term in the following year. Other courses that may have Epi and Biostat as prerequisites may also be affected, so the impact on curriculum choices is major when there is a LOA in the didactic year of the GTPCI program.

How will the PhD residency requirement be affected by missing a term(s)?

PhD students are required to complete a minimum of four consecutive full-time terms of 16 credits to fulfill the degree; generally students meet this requirement at the end of the didactic year. If LOA is taken during this time, the student must register full-time (16 credits) upon returning from LOA, even if the term is during the 2nd year when GTPCI PhD students are normally only required to register part-time. Full-time registration must continue until four consecutive terms of 16 credits are completed.

How will the completion of the MHS degree be affected by missing a term(s)?

The inability to take required courses during the didactic year due to a LOA will not allow MHS students to complete the 70 credits of required coursework in one year. Therefore completion of the MHS degree must be extended to a 2nd year.

PARENTAL LEAVE

Students who take Parental Leave (https://hr.jhu.edu/benefits-worklife/time-off/leave-for-new-parents/) must complete a LOA form which can be obtained from the Registrar's Office. Those who take Parental Leave during the didactic year can anticipate the delays in program completion that are detailed in the LOA policy.

Will my KL2, T32, or F32 stipend be affected by taking parental leave?

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According to the National Institutes of Health regulations,
 trainees (KL2, T32, or F32 NRSA awardees) may continue to receive
 stipends up to 15 calendar days of sick leave per year.  Sick
 leave may be used for the medical conditions related to pregnancy
 and childbirth pursuant to the Pregnancy Discrimination Act (42
 USC 2000 e(k)).  Trainees may also receive stipends up to 30
 calendar days of parental leave per year for the adoption or
 the birth of a child when those in comparable training positions
 at the grantee institution have access to paid leave for this
 purpose and the use of parental leave is approved by the program
 director.
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INTERNATIONAL STUDENTS

The GTPCI program may sponsor a student visa for one year of full-time study to complete the MHS program. Ordinarily, visa sponsorship for PhD applicants will be the responsibility of the sponsoring home clinical department, but in unusual and appropriate situations the GTPCI may sponsor or co-sponsor a visa or visa extension for a PhD student. This would be determined on a case by case basis. Please consult the Office of International Services (https://ois.jhu.edu/) (OIS) for proof of funding and other requirements.

Regardless of visa status or sponsorship, all international students are obligated to notify the GTPCI Office immediately of any changes in academic appointment, employment, funding, or payroll. Students must also notify the GTPCI Office of any plans to travel or work outside of the U.S.

It is the sole responsibility of the student to ensure that all visa requirements are being met and valid status maintained. International students are expected to consult the OIS regarding ANY changes in the situation under which they were issued their visa status. They must also notify the OIS of any plans to travel well in advance. The U.S. Department of State should be consulted prior to any travel outside of the U.S. to determine adequate visa processing times or travel advisories.

Generally, ECFMG certification is required of all applicants for thesis-requiring degrees, since clinical credentials are usually needed to undertake clinical investigation; some exceptions may be justified, and will be considered on a case by case basis. If an international student is admitted without having obtained ECFMG certification, they may be required to obtain it during their GTPCI studies. It is the responsibility of the international student to determine if ECFMG is required through a formal request to the program directors.

Foreign applicants are not entitled to U.S. Federal Aid. Therefore they must be sponsored financially by their home organization or government.

Graduate Training Programs in Clinical Investigation, MHS

The MHS degree is a one-year training program for physicians or other health care professionals with an advanced degree who desire rigorous training in patient-oriented research. The MHS degree may also be appropriate for junior Johns Hopkins Medical Institutions (JHMI) faculty or post-doctoral clinical fellows who cannot accommodate the three-year PhD commitment because of departmental constraints or other issues. It is also appropriate for professionals who do not have an academic appointment within JHMI, and for medical students who desire intensive training in clinical investigation.

All students are assigned an academic adviser from among the Academic Committee (https://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/advisory-council/), who will provide academic and career advice and monitor the student's academic performance. Assignments are made during the 1st term of the didactic year, determined on the basis of perceived mutual interests, availability, and sometimes professional background. Each student and assigned adviser are expected to have a face-to-face introductory meeting by the end of 2nd term in the didactic year. The adviser's role is complete once the student has passed the comprehensive examination at the end of the didactic year, and hence satisfied the degree requirements.

Thesis research is not required.

Requirements for the MHS Degree:

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The MHS degree is a non-research requiring degree which is awarded to students who specifically apply for this non-research track and fulfill the following requirements:

- 70 credit hours of course work
- MHS capstone experience
- comprehensive examination

MHS students must commit to a one year, full-time pursuit of completing the coursework as rapidly as possible so the benefits begin to accrue in clinical research activities. In some ***extenuating circumstances*** exceptions may be considered at the discretion of the GTPCI Admissions Committee and Academic Committee prior to admission.

All MHS students are assigned an academic adviser in the 1st term whose role is to provide general academic and career advice and monitor the student's academic performance.

MHS Capstone Experience

The project completed in the "Principles of Grant Writing" course serves as the MHS Capstone project. MHS students will consider the principles of successful clinical research strategies and the requirements of funding agencies. Each student will identify a defined research project, together with a suitable team of mentors and collaborators. With mutual review and criticism, each student will develop a written research proposal in the format of a grant application which will integrate the scientific principles of the GTPCI curriculum. MHS students must satisfactorily complete this class prior to graduation.

GTPCI thesis-degree students may not transfer into the MHS degree, nor receive an MHS degree even though they may have satisfied the nominal requirements.

MHS students who have successfully completed a minimum of 16 credits consecutively, 1st through 4th terms, may formally request a transfer into the PhD degree with the approval of their academic adviser. Requests should be made to the Academic Committee, who will either grant the transfer or determine that the application must be reviewed and approved by the GTPCI Curriculum and Academic Standards Committee.

When the coursework requirements are completed satisfactorily and the comprehensive exam has been passed, the program will recommend approval of the MHS degree.

Comprehensive Examination

Taken after successfully completing the core coursework. It is a 4-hour, in-person, open-notes exam that is distributed at the end of 4th term. One re-take of the exam is allowable; if the exam is not passed on the second attempt, the student will be removed from the program.

Required Coursework

Completion of Introduction to Online Learning (https://courseplus.jhsph.edu/core/index.cfm/go/course.home/cid/90/) is required prior to beginning 1st term.

According to the requirements of the Council on Education for Public Health (CEPH) (p. 176), all BSPH degree students must be grounded in foundational public health knowledge. The courses below meet these requirements: 552.601, 552.603, 552.607, 552.608, 552.609, 552.610, 552.611, 552.612.

Code	Title	Credits
PH.390.750	Introduction to Clinical Research (Optional in Summer prior to matriculation)	2
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.550.860	Academic & Research Ethics at BSPH	
PH.390.673	Ethical and Regulatory Issues in Clinical Research (or 306.665)	3
PH.390.631	Principles of Drug Development	2
PH.390.751	Seminars in Clinical Investigation	2
PH.390.801	Professional Goals and Objectives	1
PH.390.710	Biomedical Writing I	2
PH.390.711	Biomedical Writing II	2
PH.390.721	Principles of Grant Writing I	2
PH.390.722	Principles of Grant Writing II	4
PH.390.703	Presentation Skills	1
PH.140.621	Statistical Methods in Public Health I (or 140.651)	4
PH.140.622	Statistical Methods in Public Health II (or 140.652)	4
PH.140.623	Statistical Methods in Public Health III (or 140.653)	4
PH.140.624	Statistical Methods in Public Health IV (or 140.654)	4
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
In place of 340.754, choose electives: 5 or more total credits, taken for grade		
70 total credits are required: choose electives to reach 70		

Upon successful completion of the Master of Health Science, students will have mastered the following competencies:

- Maintain an understanding and perspective on the importance of excellent and rigorous clinical research in public health and the practice of medicine
- Take a scholarly, comprehensive, and objective approach to the selection and formulation of a clinical research question
- Identify, interpret, and critique relevant clinical literature
- Effectively communicate scientific information to professionals and the lay public
- Demonstrate proficiency in the clinical skills needed to conduct clinical research and manage study subjects
- Provide advice on clinical research methods to professionals within and outside of the academic medical environment
- Identify analytical laboratory techniques and methodologies appropriate to answer a specific research question for a proposed study
- Prepare a scientific proposal
- Develop and write a study protocol using systematic protocol documentation
- Effectively manage a clinical study team
- Develop and implement an ongoing system for data intake and management
- Recruit study participants in an ethical manner
- Monitor study progress
- Analyze data
- Interpret statistical analysis
- Adhere to regulatory requirements

Graduate Training Programs in Clinical Investigation, PhD

The PhD degree is our flagship program for sub-specialty physicians, leading to both clinical board eligibility in a medical discipline and the PhD.

Candidates take one year of full-time didactic instruction after an initial training year in a medical or surgical subspecialty. This provides the scientific grounding for subsequent original research. GTPCI faculty and a preceptor from the fellow's SOM home division or department jointly mentor thesis research. Fellows already enrolled in a clinical fellowship program at Johns Hopkins usually apply during their first year of clinical training.

PhD candidates must complete 90 credit hours of instruction, including one full year of full-time coursework, with additional specialized coursework during the following two years, during which thesis research is conducted. A comprehensive exam is given at the end of the didactic year.

Candidates must satisfy all University requirements for the PhD, including preliminary oral examinations and thesis preparation and defense.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Requirements for the PhD Degree:

- satisfactory completion of 90 credit hours of course work (including thesis research credits)
- 5 additional advanced elective courses to be taken AFTER the 1st year in the 2nd or 3rd years; to include PH.140.642 Design of Clinical Experiments – these courses must be at least 3 credits each and taken for grade. They should be advanced methodically and analytically, and are to build on the knowledge/curriculum learned in the 1st year. Elective courses taken prior to enrolling in GTPCI or in the 1st year do not qualify as one of the 5 advanced electives
- must earn a B or better in all required courses
- continuous registration for the PH.390.855 Research Forum and registration for thesis research each term during the following years
- comprehensive examination at the end of the didactic year
- satisfaction of all university requirements for the PhD, including preliminary oral examination, thesis preparation, and final defense

PhD Residency Requirement

The BSPH requires all PhD students to register full-time for a minimum of 16 credits for 4 consecutive terms. This does not necessarily have to be the first 4 terms of enrollment, but the full-time residency requirement must be fulfilled sometime during the PhD program PRIOR to taking the preliminary oral examination.

Annual Review Requirement – Individual Development Plan (IDP)

The University Doctoral Board requires that each PhD student receive an annual review during every year in their program. This review is expected to have 3 components:

1. Student self-assessment and Individual Development Plan (IDP form)

2. Monitoring of progress in the program

3. Written feedback to the student

Comprehensive Examination

Taken after successfully completing the core coursework. It is a 4-hour, in-person, open-notes exam that is distributed at the end of 4th term. One re-take of the exam is allowable; if the exam is not passed on the second attempt, the student will be removed from the program.

Preliminary Oral Examination

All PhD students must complete the PH.550.600 Living Science Ethics - Responsible Conduct of Research course prior to taking the preliminary oral exam.

The preliminary oral examination should ordinarily take place no later than December following the completion of the didactic year and comprehensive written examination. It is a 2-hour exam that serves to determine whether the student has both the ability and the knowledge to undertake significant research in their general area of interest. Specifically, the exam committee will be concerned with the student's:

1. Capacity for logical thinking

2. Breadth of knowledge in relevant areas

3. Ability to develop and conduct research leading to a completed thesis

Students will provide a 10-15 min. presentation of their research topic, and discussion of this research topic may serve as a vehicle for determining the student's general knowledge, methodological approaches, and research capacity. This examination is not intended to be a defense of a specific research proposal.

When the student's thesis committee agree that a written draft of the dissertation work is acceptable, the student may proceed to schedule the "oral defense" of their thesis. If the thesis committee agree by unanimous vote that the student "passes" their oral thesis defense, they will then recommend to the Graduate Board of the University, the awarding of the PhD degree.

Documentation of Thesis Progress

In addition to the BSPH annual review requirement, GTPCI requires documentation of each thesis degree student's interaction with their thesis committee, as it pertains to their thesis progress. The policy is as follows:

1. Students must convene with their thesis committee within 6 months after completion of the preliminary oral exam and then every 12 months thereafter. A minimum of 3 members must be present for the meeting. Thesis committee members may participate by teleconferencing if necessary to achieve a quorum.
2. It is the student's responsibility to organize the required meeting of the thesis committee.
3. It is the student's responsibility to present the report form at the meeting, obtain committee member signatures, and return the form to the GTPCI Program office.
4. The Program will notify each student and Academic Adviser via e-mail one month prior to the due date.

Documentation Form

1. The form will be distributed for completion to students during the December and May monthly GTPCI Research Forum.
2. Students who are absent from the Research Forum will be notified via e-mail to complete the form and return it to the GTPCI Program Office.

PhD Continuing Course Requirements:

After all required coursework is completed, PhD students must continuously be registered for a minimum of 3 credits per term until graduation.

PhD students are required to register for and attend the monthly PH.390.855 Research Forum every year after the 1st didactic year, until all degree requirements are met or they leave the institution. Students are expected to attend at least six of the eight sessions; if this requirement is not met, completion of a remedial assignment will be required. The Research Forum requirement ceases after passing the final oral thesis defense. The purpose is to provide students with an opportunity to present interim research results and obtain constructive criticisms from their peers and faculty.

The format of the meetings is a brief presentation by the investigator (10-15 minutes) of problems presented by work in progress. Another PhD student will be assigned as a discussant for each presentation, and will comment for 5 minutes after the presentation. This will be followed by questions, answers, and comments (10-15 minutes). The format is NOT intended to be a platform for formal presentation of research results. Instead, its intent is to facilitate critical discussion, and even disagreement that will be helpful to the presenter and other students in attendance as well.

Final Oral Examination (Thesis Defense)

The structure of the defense includes two parts: an initial public presentation of the thesis work, followed by a closed critical examination by the student's thesis committee.

The public seminar should include a 30 minute presentation by the student, followed by a question period of 15 minutes. Public announcement and invitations should be initiated by the student. Afterward, the thesis committee and student will meet privately to continue a critical evaluation of the thesis as needed. Thereafter, the thesis committee will convene in private for voting and discussion, after which they will announce their decision to the student.

Students should schedule a two-hour time block with their thesis committee, and reserve suitable space for both parts of the defense.

The Appointment of Thesis Reader and Final Exam form is DUE ONE MONTH PRIOR TO EXAM DATE.

Exam Committee Members - who can serve for GTPCI

ADKINSON, Franklin - GTPCI or DOM Clinical Immunology

ALEXANDER, Caleb - GTPCI or BSPH Epidemiology

AMBINDER, Richard - GTPCI or SOM Oncology

BANDEEN-ROCHE, Karen - GTPCI or BSPH Biostatistics

BEMBEA, Melania - GTPCI or SOM Anesthesiology/Critical Care Medicine

BIENVENU, Joe - GTPCI or SOM Psychiatry

CELENTANO, David - GTPCI or BSPH Epidemiology

DIENER-WEST, Marie - GTPCI or BSPH Biostatistics

FLEXNER, Charles - GTPCI or DOM Clinical Pharmacology

GELBER, Allan - GTPCI or SOM Rheumatology

GHANEM, Khalil - GTPCI or SOM Infectious Disease

HAUT, Elliott - GTPCI or SOM Surgery

HENDRIX, Craig - GTPCI or DOM Clinical Pharmacology

HOOVER-FONG, J. - GTPCI or SOM Pediatric Genetics

JOHNSTON, Fabian - GTPCI or SOM Surgery and Oncology

KING, Elizabeth - GTPCI or SOM Transplant Surgery

KUDCHADKAR, Sapna - GTPCI or SOM Pediatrics and Anesthesiology/Critical Care Medicine

LEVINE, David - GTPCI or SOM General Internal Medicine

LIN, Frank - GTPCI or SOM Otolaryngology

LUCAS, Greg - GTPCI or SOM Infectious Disease

MILLER, Pete - GTPCI or SOM Medicine and Epidemiology

NEEDHAM, Dale - GTPCI or SOM Pulmonary

ROTHMAN, Richard - GTPCI or SOM Emergency Medicine

SEGEV, Dorry - GTPCI or SOM Surgery

Required Coursework

Completion of Introduction to Online Learning (https://courseplus.jhsph.edu/core/index.cfm/go/course.home/cid/90/) is required prior to beginning 1st term.

According to the requirements of the Council on Education for Public Health (CEPH) (p. 176), all BSPH degree students must be grounded in foundational public health knowledge. The courses below meet these requirements: 552.601, 552.603, 552.607, 552.608, 552.609, 552.610, 552.611, 552.612.

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PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
PH.550.600	Living Science Ethics - Responsible Conduct of Research	1
PH.550.860	Academic & Research Ethics at BSPH	
PH.390.673	Ethical and Regulatory Issues in Clinical Research (or 306.665)	3
PH.390.631	Principles of Drug Development	2
PH.390.751	Seminars in Clinical Investigation	2
PH.390.801	Professional Goals and Objectives	1

PH.390.710	Biomedical Writing I	2
PH.390.711	Biomedical Writing II	2
PH.390.721	Principles of Grant Writing I	2
PH.390.722	Principles of Grant Writing II	4
PH.390.703	Presentation Skills	1
PH.140.621	Statistical Methods in Public Health I (or 140.651)	4
PH.140.622	Statistical Methods in Public Health II (or 140.652)	4
PH.140.623	Statistical Methods in Public Health III (or 140.653)	4
PH.140.624	Statistical Methods in Public Health IV (or 140.654)	4
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses	4
PH.340.751	Epidemiologic Methods 1	5
PH.340.752	Epidemiologic Methods 2	5
PH.340.753	Epidemiologic Methods 3	5
In place of 340.754, choose electives: 5 or more total credits, taken for grade		
16 credits per/term required for 1st-4th terms: choose electives in terms with less than 16		
In 2nd year - must take 5 advanced electives; 3 credits each; taken for grade (including 140.642)		
PH.140.642	Design of Clinical Experiments (1 of 5 advanced electives in 2nd year)	3
PH.390.855	Research Forum (taken each year beginning 2nd year until graduation)	1

In addition to the Schoolwide policies (p. 633), these are the following GTPCI PhD program policies:

Academic Adviser

1. An academic adviser will be appointed during the 1st term from among the Academic Committee (https://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/advisory-council/). Assignments are determined on the basis of perceived mutual interests, availability, and sometimes professional background. Students and their assigned advisers work together with mutual consent. The academic adviser assigned will not be the same person as the research mentor.

2. Each student and assigned adviser are expected to have a face-to-face introductory meeting by the end of 2nd term in the didactic year. This provides an opportunity for at least one detailed discussion regarding career objectives, mentoring arrangements, and thesis development.

3. The academic adviser's responsibility is to: advise student on course work selection and monitor academic performance, provide general mentoring and support for academic issues, and to serve on the student's thesis committee. Students are required to have an introductory meeting no later than the end of 2nd term in the didactic year. Then students are required to contact their academic adviser in June and December in each succeeding research year until a degree is awarded. Each academic adviser will provide brief, written documentation of these contacts to the Program Office.

4. The academic adviser does not function as the student's advocate which is the role of the research mentor. *(Note: BSPH graduate degree documents frequently use the term "adviser" by which is meant the student's GTPCI academic adviser. Both the academic adviser and research mentor must be present during the preliminary oral exam and participate on the thesis committee/final oral examination).*

Thesis Research Mentors

The principal research mentor is a faculty member in the student's home division or department. Unlike the academic adviser, the research mentor knows the scientific and medical disciplines involved in the research and therefore can supervise and critically evaluate the student's research progress. The same individual commonly serves as a mentor for the student's professional and career development. In some thesis projects, especially when new methodology is involved, other research mentors may also need to be involved in assisting and directing the student's thesis research. *The GTPCI Program continually emphasizes the importance of establishing a successful mentoring relationship with the research mentor, and with other key faculty who are important for research training or professional development.*

Thesis Committee

A thesis committee must be established within 3 months of completing the 1st didactic year, and each PhD student will use this committee for research oversight through completion of the thesis. PhD students are required to have 5 member committees, who will also serve for the preliminary oral exam AND the final oral examination.

The Academic adviser, Research Mentor, a second GTPCI representative, a BSPH representative, and another representative outside GTPCI (this can be a SOM person) will serve on the thesis committee. **The sponsoring department is GTPCI** (these are BSPH forms & guidelines, not SOM). Any faculty listed on the Academic Committee (https://www.jhsph.edu/academics/graduate-training-programs-in-clinical-investigation/advisory-council/) or GTPCI Standing Committees can represent GTPCI (the home department). Anyone on the GTPCI committees who has a PRIMARY appointment in BSPH may also represent "outside department BSPH". You may check BSPH faculty appointment status (https://www.jhsph.edu/faculty/directory/list/). Questions regarding thesis committee composition should be directed to the GTPCI Program Coordinator.

BSPH thesis committee forms are available on the BSPH Portal (https://my.jhsph.edu/_login/PS.JHSPH.Login.aspx?ReturnUrl=%2f_layouts%2f15%2fAuthenticate.aspx%3fSource%3d%252FPages%252FDefault%252Easpx&Source=%2FPages%2FDefault%2Easpx). You will need your BSPH e-mail address and password to log in for access to the forms.

Acceptable Doctoral Thesis

During the 2nd term PH.390.801 Professional Goals and Objectives students will initiate the structured process of considering and choosing among a variety of research topics for career development and thesis requirements.

A PhD student is expected to undertake a dissertation project which will represent a novel and substantial contribution to the chosen field of endeavor. The project must be of the student's own design, and the student must be largely responsible for its completion. It must also include primary data collection which is defined as assimilation of new information directly from first-hand sources such as surveys, prospective observations, and/or experimentation. It is compiling data from new or original research that (a) have not been previously published and (b) can be subjected to statistical analyses to address a predefined objective or research question. It can also include hypothesis-driven new laboratory assessments of existing samples from a defined population. Ideally, the thesis project will focus on a single, important research issue.

In unusual circumstances, the thesis project may consist of a series of smaller related studies designed to address a particular clinical or methodological problem.

A doctoral dissertation must adhere to the published University guidelines. As a general guide, the completed doctoral dissertation should consist of two or more units which would be publishable in peer-reviewed journals. For example, the Introduction chapter could be publishable as a rigorous and comprehensive review of the research problem, and individual chapters describing research results should be published as original papers in scientific journals. For dissertations which are more methods-oriented, chapters describing new research methodologies or data collection instruments might also be considered as publishable units. Acceptance of the thesis in partial fulfillment of the requirements for the PhD does not require that manuscripts be submitted or accepted for publication. However, in the opinion of the thesis committee, at least two parts of the thesis must be suitable for publication if submitted to peer-reviewed journals, and prior acceptance or publication will be taken as substantial evidence in favor of this requirement.

The criteria to be applied in evaluating a thesis are: the originality and publication potential of the research, the student's understanding of the details of the methodological and analytic work, the magnitude of the student's contribution to their chosen field of research, and the final quality of the written thesis document.

All thesis submissions MUST adhere to the formatting guidelines outlined by the BSPH. University policy stipulates that "previously published material must be incorporated into a larger argument that unites the whole work. A common thread linking the various parts must be identified and made explicit as the papers are joined into a coherent unit. Introductory, transitional, and concluding sections, as well as a bibliography must be included. Proper credit must be given to co-authors and to the publisher. Written evidence that permission has been granted by the publisher must accompany the dissertation. Discrete, unlinked papers are not acceptable."

IRB Approval for Thesis Projects

Candidates for thesis-requiring degrees must document IRB approval or exemption for their thesis project(s). If the project is exempt, a brief application process to JHMI IRBs will generate a document stating the project is exempt. Either this document, or an approval letter(s) from the IRB must be submitted to the GTPCI office no later than the submission of the thesis for review by the thesis committee. Failure to get prospective IRB approval or exemption will result in the thesis being administratively disapproved.

Important Links

BSPH Thesis Guidelines

JHU Graduate Board Guidelines Applicable to PhD Dissertations

PhD Mentoring **(**https://provost.jhu.edu/education/graduate-and-professional-education/phd-mentoring-policies-and-resources/**)**

ScM Degree (only available to those who are unable to complete the PhD)

The ScM is a thesis-requiring degree which can be awarded to PhD students who cannot fulfill the full set of requirements for a PhD because of curtailed time available, unanticipated research difficulties, or late shifts in thesis projects. Requirements include:

- 70 credit hours of course work including a year of full-time coursework
- comprehensive examination
- continuous registration for the Research Forum following the didactic year
- evidence of original research productivity as evidenced by submission of an acceptable Master's thesis

The written thesis must be based on original research, worthy of publication, and acceptable to the program's Advisory Council and a Committee of Thesis Readers. The document may consist of one or more original manuscripts derived from the student's research and submitted to peer-review journals, or a traditional thesis document with sections on background and introduction, literature review, methods, results, discussion and a copy of all study-related instruments. GTPCI students are not ordinarily accepted for this track initially, but may transfer into it by mutual agreement after matriculation. Students matriculating into the ScM degree program may not transfer into the MHS degree program.

Students who transfer to, or remain in the ScM track, must establish a thesis committee within 3 months of completing the 1st didactic year. Each ScM student will use this committee for research oversight through completion of the thesis. ScM students are required to have 2 members on their thesis committees.

PhD students who are advised or elect for valid reasons to transfer to the ScM program must receive approval from their thesis committee. <u>From the term the ScM transfer is effective, the program provides students with tuition for up to 4 additional non-summer terms to complete the ScM requirements, after which students will be responsible for their own tuition costs.</u> However, the maximum duration of student enrollment may not exceed 4 years from original matriculation into the PhD/ScM program.

<u>However, an automatic transfer to the ScM candidacy will occur if a PhD student does not form a thesis committee and complete the preliminary oral examination by the end of their 3rd academic year.</u> Students matriculating into a thesis-requiring degree program will not be allowed to transfer into the MHS degree program.

Upon successful completion of the Doctor of Philosophy, students will have mastered the following competencies:

- Maintain an understanding and perspective on the importance of excellent and rigorous clinical research in public health and the practice of medicine
- Take a scholarly, comprehensive, and objective approach to the selection and formulation of a clinical research question
- Identify, interpret, and critique relevant clinical literature
- Effectively communicate scientific information to professionals and the lay public
- Demonstrate proficiency in the clinical skills needed to conduct clinical research and manage study subjects
- Provide advice on clinical research methods to professionals within and outside of the academic medical environment
- Identify analytical laboratory techniques and methodologies appropriate to answer a specific research question for a proposed study
- Prepare a scientific proposal
- Develop and write a study protocol using systematic protocol documentation
- Effectively manage a clinical study team

- Develop and implement an ongoing system for data intake and management
- Recruit study participants in an ethical manner
- Monitor study progress
- Analyze data
- Interpret statistical analysis
- Adhere to regulatory requirements

Master of Arts in Public Health Biology, MA

Program Overview

The MAPHB degree is a fully online, part-time degree program focused on biological tenets and research methods that are relevant to current issues in public health. It is an interdepartmental program involving Biochemistry and Molecular Biology, Environmental Health and Engineering, and Molecular Microbiology and Immunology, with required coursework provided through each. The program is designed to provide a solid, conceptual basis for an understanding of the rationale, tools and approaches that are essential for addressing problems in public health.

Summary of Graduation Requirements

- A minimum of 48.5 credit hours to fulfill the degree
- Students are required to complete a thesis research course
- Students must take one course from BMB, EHE, and MMI as detailed in the MAPHB Curriculum section
- All students must maintain minimum academic standards and have satisfactory grades as detailed in the Academic Standards section

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

MAPHB Curriculum

1.

Code	Title	Credits
Required Courses		
Introduction to online Learning (must be completed prior to beginning program)		0
PH.550.630	Public Health Biology	3
PH.550.631	Biological Basis of Public Health	3
PH.550.855	MA Public Health Biology Thesis	5 - 6
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.602	The Role of Quantitative Methods in Public Health	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	0.5
PH.552.604	Causes and Trends in Morbidity and Mortality	0.5
PH.552.605	The Science of Primary Secondary and Tertiary Prevention in Population Health	0.5
PH.552.606	The Critical Importance of Evidence in Advancing Public Health Knowledge	0.5
PH.552.607	Essentials of Environmental Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health	0.5
PH.552.610	The Social Determinants of Health	0.5
PH.552.611	Globalization and Population Health	0.5
PH.552.612	Essentials of One Health	0.5
Total Credits		**16.5-17.5**

Code	Title	Credits
Optional Foundation Courses		
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.612	Statistical Reasoning in Public Health II	3
PH.340.721	Epidemiologic Inference in Public Health I	5
Total Credits		**11**

Code	Title	Credits
Required Course, Environmental Health Sciences		
Choose at least one of the following:		
PH.180.601	Environmental Health	5
PH.180.609	Principles of Environmental Health	4
PH.183.631	Fundamentals of Human Physiology	4
PH.187.610	Public Health Toxicology	4
PH.187.632	Molecular Toxicology	4

Code	Title	Credits
Required Course, Biochemistry and Molecular Biology		
Choose at least one of the following:		
PH.120.600		5
PH.120.601	Biochemistry II: Major Metabolic Pathways	5
PH.120.602	Concepts of Molecular Biology	4
PH.120.613	Nucleic Acid Chemistry	3
PH.120.625	Introduction to Cancer Biology	3

Code	Title	Credits
Required Course, Molecular Microbiology and Immunology		
Choose at least one of the following:		
PH.260.656	Malariology	4
PH.550.603	Fundamentals of Immunology	3
PH.260.600	Introduction to the Biomedical Sciences	4
PH.260.701	Anatomy of Scientific Error	3

Academic Standards

Students must meet minimum academic standards to remain in the MPH Program. A student's failure to meet any of the criteria below is grounds for being placed on academic warning and/or being dismissed from the program.

In core courses, Master's students must receive a 'C' or higher. A student who earns a grade below that threshold in a course listed as a core requirement must, at the next opportunity, make a second attempt to complete the core course by repeating the same course. A grade below the threshold on the second attempt may be grounds for dismissal and must be reported to the School's Committee on Academic Standards. To remain in good academic standing, masters students must maintain a minimum grade point average of 2.75. If a student's GPA falls below the requirement, the student will be placed on academic probation. School policy states that a Master's student cannot graduate with a GPA lower than 2.75.

While students could opt to take a term(s) off, students are required to complete the degree within 4 years of their original start date. Failure to complete the degree within 4 years of the original start day could result in a non-conferral of the degree.

The goal of the MA in Public Health Biology program is to prepare students from diverse backgrounds to apply biological principles to public health issues, conceptualize research questions, interpret results and apply these skills in the context of human health. The specific educational objectives are as follows:

Objectives

Upon successful completion of the MA in Public Health Biology program, students will be able to:

1. Describe the molecular, cellular, immunological, and physiological bases of selected human diseases and conditions;
2. Describe biological principles that underlie the development of disease and its prevention, control and management;
3. Critically evaluate data described in scientific papers and integrate data from multiple papers into coherent theories about the regulation of complex biological processes and diseases;
4. Apply statistical principles to the analysis of biological data and apply findings to the understanding and treatment of human disease;
5. Compose, explain and defend a 20-30 page scholarly thesis that demonstrates a deep understanding of how biological principles and methods are used to understand, treat and/or prevent a particular condition of importance in the public health arena;
6. Communicate effectively with the general public, professionals and other stakeholders on issues related to immunology, biochemistry, molecular biology, environmental health sciences and public health.

Master of Bioethics (MBE)

About

From the ethics of food production to stem cell research, the Johns Hopkins Berman Institute of Bioethics (https://bioethics.jhu.edu/about/what-we-do/) is guiding the conversation about some of the most complex moral and policy issues affecting the health and well-being of people worldwide.

Programs

Master of Bioethics (https://bioethics.jhu.edu/education-training/master-of-bioethics/) (MBE)

Offered in collaboration with the School of Public Health, the MBE is an innovative, interdisciplinary and cross-divisional graduate program that prepares students from diverse backgrounds to investigate and address the bioethics challenges of professional and civic life. The program combines approaches from science and technology, the humanities and arts, and public health and medicine.

Bioethics Certificate Program (p. 578)

Offers focused academic training in specific areas of bioethics and public health. Designed to appeal to:

- Current Johns Hopkins graduate degree students desiring specialization in particular topic areas
- Individuals seeking to learn more about specific areas of public health.

The Berman Institute's Bioethics Certificate Program is geared toward current JHU graduate students, non-degree-seeking students as well as a broader audience.

Summer Institute (https://bioethics.jhu.edu/education-training/training/summer-institute-in-bioethics/)

Explore the fascinating interdisciplinary world of bioethics in an interactive, intensive week-long summer institute. Leading bioethics faculty cover both theory and practical application for fields including public health, the life sciences, medicine, nursing, and law. Prior coursework or experience in bioethics is not required. For more information about the Summer Institute in Bioethics,

Please view our course site (https://bioethics.jhu.edu/education-training/training/summer-institute-in-bioethics/) or contact or Penny White (https://bioethics.jhu.edu/people/profile/penny-white/), Academic Program Administrator at (410) 614-5580.

Curriculum

The program requires successful completion of a minimum of 64 term credits, including a practicum and a thesis seminar. Upon matriculation, each student charts a program of study to meet individual goals.

Full-time students typically complete the degree over four 8-week academic terms plus a few credits during the summer. Part-time students must complete program requirements within four years.

In addition to formal coursework, practicum, and thesis, all students will participate in a variety of supplemental seminars in bioethics, such as the Berman Institute Noontime Seminar Series (https://bioethics.jhu.edu/news-events/events/seminar-series/), Robert H. Levi Symposium, Shallenberger Lecture in Ethics, and the Sheila Hutzler-Rives Memorial Lecture in Palliative Care. These events allow students to interact with a broad network of national and international leaders in bioethics.

Courses

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

PH.700.601 Foundations of Bioethics with Anne Barnhill (https://bioethics.jhu.edu/people/profile/anne-barnhill/) PhD (https://bioethics.jhu.edu/people/profile/anne-barnhill/) and BI Core Faculty
Offers an introduction to central approaches and issues in bioethics. Includes a discussion of the history of the field and the issues that led to its birth and growth internationally. Introduces philosophical, empirical and non-empirical approaches to bioethics and core ethical issues in clinical care, public health, science and research. Provides a foundation for future study in bioethics.

PH.700.602 Hot Topics in Bioethics with Travis Rieder, PhD (https://bioethics.jhu.edu/people/profile/travis-rieder/) and BI Core Faculty
Offers a continuation of the exploration of ethical theory and its use in bioethics begun in "Introduction to Ethical Theory". Utilizes the conceptual and methodological tools from "Ethical Theory" in analyzing topics and cases currently being discussed in bioethics. Although topics change from year to year, common themes include: discussion of legal changes concerning end of life; the ethics of new reproductive technologies; ethical challenges concerning genome-editing

technologies; and global ethical challenges such as climate change and resource allocation.

PH.700.603 Introduction to Ethical Theory with Travis Rieder, PhD
Explores the relationship between philosophical ethical theory and the practical world of bioethics. In particular, examines the classical accounts of moral obligation and virtue in the context of a variety of contemporary bioethical problems. Further presents the distinction between individual bioethics and collective bioethics, with the goal of determining how the theoretical grounding for these fields differ. The motivating questions are both methodological and substantive: First, how does theory contribute to bioethical investigations? And second, does reflection on ethical theory tell us what to do concerning particular, bioethical problems?

PH.700.604 Methods in Bioethics with Jeremy Sugarman, MD, MPH, MA (https://bioethics.jhu.edu/people/profile/jeremy-sugarman/)
Describes the range of methods used in bioethics research and practice, including philosophy, law, history, religion, and quantitative/qualitative research techniques. Emphasizes the strengths and weaknesses of each method in addressing bioethical questions or problems. Illustrates each method with contemporary examples from bioethics and public health. Exposes students to experts in various methods. Presents one cross-cutting example of an issue addressed by all methods. Discusses the challenges of interdisciplinary and multi-disciplinary research.

Expected Courses

To gain a comprehensive view of bioethics, students are expected to take a range of courses during their time at Johns Hopkins. Some of the courses relevant to MBE course of study include:

- Bioethics, Human Rights, and Global Health
- Bioethics and the Law
- Ethics, Policy, and Emerging Biomedical Technologies
- Food Ethics
- Germs, Genes, Patients, & Populations
- Justice Theory and Health
- Understanding Addiction - Philosophy, Science, Ethics
- Vulnerability in Childhood: From Ethics to Advocacy

Focused on the Future

As a graduate of the MBE program, students will be equipped to drive the responsible pursuit of new knowledge and will be prepared to help develop new tools to consider society's thorniest issues through a cross-disciplinary lens.

Advances in health care and scientific research benefit people around the world. From the first ventilator to the first vaccine, scientific and technological discoveries have prolonged life and alleviated human suffering while advancing health-related knowledge. However, such advancements often present challenging ethical questions for individuals and society related to appropriate use, access, safety, rights and obligations.

The MBE program prepares students to make meaningful contributions at the intersection of health sciences and societal impact.

Master of Public Health Program (MPH)

Program Overview

Objectives

The overarching goal of the MPH Program is to provide students with a population perspective on health. The Johns Hopkins MPH Program is designed to:

- prepare students to tackle current and emerging global public health problems
- provide students with critical multidisciplinary training to help solve global health problems
- equip students with foundational public health knowledge and competencies

Students are required to complete a core MPH curriculum that comprises approximately 45-50 of the 80 credits required for graduation. Students have flexibility to customize the remaining elective credits of their curriculum to their areas of interest to achieve an appropriate balance between depth and breadth.

MPH Program Matriculation Dates and Locations

June Cohort (Part-time)

Orientation: Online or Onsite in Baltimore, MD. End of May/Early June.

Johns Hopkins Bloomberg School of Public Health
600 N. Wolfe Street
Baltimore, MD 21205

July Cohort (Full-time)

Orientation: Onsite in Baltimore, MD. Beginning of July.

Johns Hopkins Bloomberg School of Public Health
600 N. Wolfe Street
Baltimore, MD 21205

November Cohort (Part-time)

Orientation: Onsite in Barcelona, Spain. Early November.

Universitat Pompeu Fabra
Ciutadella Campus
Merçè Rodoreda Building
Ramon Trias Fargas, 25-27
08005 Barcelona

January Cohort (Part-time)

Orientation: Online early January.

Johns Hopkins Bloomberg School of Public Health
600 N. Wolfe Street
Baltimore, MD 21205

March Cohort (Part-time)

Orientation: Onsite in Kyoto, Japan. Mid March.

iHope International
Kyoto daiichiseimei-Izumiya Bldg., 5F

Akinonocho 513, Nakagyo-ku
Kyoto 604-0847 Japan

Planning Your Curriculum

MPH students have flexibility in choosing courses and putting together their academic schedule of courses. Students can mix and match online courses, intensive learning Institute courses, on-site courses at our East Baltimore campus, as well as Johns Hopkins courses at other sites.

Catalogue and Academic Calendar

The definitive course directory is https://www.jhsph.edu/courses (https://www.jhsph.edu/courses/) and the current year courses in this catalogue should be used for planning. New students should familiarize themselves with the academic calendar (p. 175) for the term dates and registration periods.

Course Load and Time Commitment

Each credit represents, on average, about a three to four-hour time commitment during each week of the eight-week term. A median course load per 8-week term for a part-time student is about 5-6 credits. Therefore, part-time students can expect an average of 15-18 hours' worth of course-related work per week. Full-time students must be registered for 12 or more credits each term to maintain full-time status. Assuming that each credit of a course equals about three to four hours' worth of work per week, full-time students can expect to dedicate approximately 36 hours of work per week to their MPH courses. No student may exceed twenty-two credits in a single term.

Sequencing Your Curriculum

Required core area courses should be completed early in the program, and the epidemiology core course must be completed during the first year of study. If elective courses have prerequisites, these will be listed in the course description. Some course content, such as biostatistics, is delivered in a specific sequence of courses. Certificates may have specific sequences that participants should follow. The capstone is to be completed at or near the end of the program.

Choosing Electives

Many of MPH program credits will be in elective courses, and even some of the core courses can be chosen from among a variety of options. Here are some places to look for guidance in choosing electives:

- Your faculty adviser
- The course listings for the Summer, Fall and Winter Institutes (p. 498)
- Searches in the course directory, using key words for search terms that pertain to your areas of interest
- The Informal Focus Areas/Formal Concentrations
- The certificate programs offered by BSPH (please see below)

BSPH Certificate Programs

The School offers certificate programs in specific areas of study. MPH students may pursue a certificate program; however, a student in a concentration area should check with the concentration directors to ensure that there is no substantial overlap between the concentration and certificate requirements. For more information, see http://www.jhsph.edu/academics/certificate- programs/ (http://www.jhsph.edu/academics/certificate-%20programs/) and contact the faculty sponsors of the certificate programs listed on the website.

Formal Concentrations Areas

Concentrations and certificate programs differ in that concentrations are intended specifically for MPH students and incorporate faculty advising and the capstone experience within the concentration.

- Aging in Public Health
- Child and Adolescent Health
- Epidemiological and Biostatistical Methods for Public Health and Clinical Research
- Food, Nutrition and Health
- Food Systems
- Global Environmental Sustainability and Health
- Health Leadership and Management
- Health Systems and Policy
- Humanitarian Health
- Infectious Diseases
- Social and Behavioral Sciences in Public Health
- Women's and Reproductive Health

Detailed information about each concentration can be found on the MPH website (https://www.jhsph.edu/academics/degree-programs/master-of-public-health/curriculum/concentrations.html (https://publichealth.jhu.edu/academics/academic-programs/masters-degrees/master-of-public-health-mph/program-options/full-time-format/concentrations/)) and in the student manual for full-time students. Part-time/online students are able to take concentration courses as electives and possibly may participate in the concentration.

On-Campus Work in the Intensive Institutes

Summer Institutes in Baltimore

The Summer Institutes offer short intensive courses in the following areas:

- Health Behavior and Society
- Health Policy & Management
- Environmental Health
- Epidemiology and Biostatistics
- Injury Prevention
- Mental Health
- Tropical Medicine
- American Indian Health
- Health Emergencies in Large Populations

The course schedules for the various Summer Institutes are typically published online in February.

Global Tobacco Control Institute in Baltimore

Two weeks of intensive courses held in Baltimore in October, considered to be part of 1st Term. Offerings are for students pursuing the Global Tobacco Control Certificate.

Fall Institute in Barcelona, Spain

Fall Institute is comprised of several short courses offered in November and is part of 2nd Term. While the Institute is hosted by the Health Policy & Management Department, the courses offered are from multiple departments and the offerings vary from year to year. Courses are held at Universitat Pompeu Fabra in Barcelona and taught in English. The schedule is typically available in late June.

Winter Institute in Baltimore
A variety of one- and two-week course are offered in January. Typically, the offerings include courses in Data Analysis, Tropical Medicine, Native American Health, Health Emergencies, Quality Improvement, and Health Communication, among others. The schedule is typically available in September.

Winter Institute in Washington, DC
All-day courses from one to four days long, pertaining to Health Policy, are offered in January. Courses are held at a Johns Hopkins satellite campus in the DuPont Circle area of Washington. The schedule is typically available in September.

SOURCE

https://www.jhsph.edu/source/

SOURCE is the community engagement and service-learning center for the Johns Hopkins University (JHU) Schools of Public Health, Nursing, and Medicine. Its mission is to engage the Johns Hopkins University health professional schools and Baltimore communities in mutually beneficial partnerships that promote health and social justice. There are multiple ways to engage in a practicum experience through SOURCE supported activities. However, not all SOURCE projects meet the practicum requirements. Subscribe to the SOURCE Weekly Service Scoop to learn more about the latest community involvement opportunities in Baltimore City (https://source.jhu.edu/programs-and-events/service-scoop/).

Getting Advice, Mentoring, and Your Questions Answered

Each MPH student is assigned a faculty adviser. The role of the adviser is to discuss your academic program and progress including your choice of courses considering your educational and professional goals. Your adviser is your first point of contact with the faculty, but students are encouraged to reach out and form relationships with other faculty members as interests evolve. A Faculty Directory is available online (https://publichealth.jhu.edu/faculty/directory/list/?combine=&work_type%5Bprimary%5D=primary).

Once you are assigned an adviser, you should be proactive in contacting them at least once a term. Since faculty advisers are also busy with research studies, lecturing, and frequent travel, the best way to initiate contact is to send your adviser an email to see if you can schedule a time to meet or talk by phone at a mutually convenient time.

Students should use the MPH program office as a source for advice on the day-to-day details of the program, questions regarding program requirements, school policies or administrative procedures.

For specific questions about academic rules and regulations, especially concerning the grading systems, pass/fail options, and add/drop policies, please consult BSPH Academic Policies (p. 633).

MPH Executive Board

The Johns Hopkins MPH Program is governed by the MPH Executive Board composed of faculty from all departments of the Johns Hopkins Bloomberg School of Public Health.

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410-955-4749 (fax)
jhsph.mphprog@jhu.edu
http://www.jhsph.edu/MPH (https://www.jhsph.edu/MPH/)

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Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Summary of Graduation Requirements

- A minimum of 80 credits are required for graduation. Students must complete the MPH core curriculum as detailed in the next section entitled "MPH Core Curriculum (p. 501)."
- At least 60 of the 80 credits must be completed in formal coursework that is not special studies, i.e. independent studies.
- At leave five additional general competencies from Concentration Competencies must be completed.
- All courses that are part of the core curriculum must be taken for a letter grade, if the course is offered for a letter grade.
- All students are required to complete an individualized MPH Goals Analysis.
- All students must complete the MPH Practicum requirement, including course PH.300.615 The Tools of Public Health Practice or PH.300.603 The Tools of Public Health Practice and Decision Making.
- All students must complete PH.260.720 Communications Primer for the Public Health Sciences and an MPH capstone (PH.XXX.800).
- Students are required to complete PH.550.860 Academic & Research Ethics at BSPH during their first term of registration in the program.
- All students must maintain minimum academic standards (p. 500) and have satisfactory grades as detailed in the *Academic Standards* section.

Note: A repeated course may only count once toward the 80-credit requirement. Courses taken for audit do not count towards the 80-credit requirement for graduation.

Special Note on Courses Taken at BSPH While Not Formally Matriculated as an MPH Degree Seeking Student: A limited number of course credits taken at Johns Hopkins prior to matriculation into the MPH Program (e.g., up to 16 as a special student and 40 credits from another degree program) can be applied toward the 80 total credits, provided the courses were completed not more than 5 years prior to the date of matriculation into the MPH Program.

Academic Standards

Students must meet minimum academic standards to remain in the MPH Program. A student's failure to meet any of the criteria below is grounds for being placed on academic warning and/or being dismissed from the program.

1. To maintain good academic standing in the MPH program, students must maintain a minimum cumulative grade point average (GPA) of **2.75**. Students with a GPA falling below 2.75 will be placed on academic warning and will have one term, or 12 additional credits of coursework, to raise the GPA to 2.75 or above. Students not meeting the 2.75 minimum after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA. Students on academic warning must meet with their faculty adviser and the MPH Academic Coordinator prior to registering for courses. Students with a cumulative GPA of less than 2.75 may not register for more than 18 credits per term. Any repeated courses count towards this 18-credit limit. [Note: Students with less than a 2.75 cumulative GPA are not eligible to enroll in the Biostatistics 620 course series or the Epidemiology 750 course series].
2. A student who earns a "D", "U", or "F" grade in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core requirement either by repeating the same course or by completing another course that meets the same core requirement (if available).
3. Students must complete the Public Health Policy/Problem Solving core requirement and the Epidemiology core requirement within the first twelve months of matriculation into the MPH program.
4. Students must complete the Goals Analysis plan within the set timeframe during the first two terms of the program.
5. Students must progress toward degree completion in four years or less, as per their Goals Analysis plan. If additional time is required to complete the degree, it is a student's responsibility to contact in writing (email communication is sufficient) their faculty adviser and their MPH Academic Coordinator to request an extension beyond the four-year limit. An extension request should be submitted to their faculty adviser and their MPH Academic Coordinator at least one term prior to the end of the 4-year limit.

6. Students may not accrue more than 9 credits of “incomplete” coursework at any given time. Students exceeding this limit must immediately contact their faculty adviser and their MPH Academic Coordinator in writing (email communication is sufficient) to discuss their academic situation. Students may not be permitted to register for subsequent terms until the incompletes have been resolved.
7. Students who are inactive (not enrolled in courses) for two terms or more without notifying their MPH Academic Coordinator of their academic plans will be withdrawn from the program. Students who do notify in writing (email communication is sufficient) their MPH Academic Coordinator and faculty adviser of their circumstances may suspend enrollment, assuming that they otherwise have met academic standards.

Academic and Research Ethics at BSPH

Maintaining the highest level of academic and research integrity is an important responsibility of our faculty and students. To help achieve this goal, all students are required to complete the PH.550.860 Academic & Research Ethics at BSPH course. The course examines academic and research ethics at BSPH through a series of online interactive modules:

- Focuses on information about the academic ethics code and responsible conduct of research at the School.
- Explores issues of academic integrity such as proper ethical conduct and referencing, and discusses violations such as plagiarism and cheating, relative to case studies that illustrate situations faced by students and faculty in the academic setting.
- Addresses topics that include responsible conduct of research, authorship, data management, data ownership, guidelines for professional conduct, research fraud or scientific misconduct, federal and institutional guidelines related to research using human and animal subjects and ethical issues involving vulnerable subjects in research.

Students are automatically registered into the *Academic and Research Ethics* course (PH.550.860) when they matriculate into the MPH program. All BSPH students are required to complete this non-credit course by the end of the Institute associated with their Orientation program and matriculation (ie: Summer Institute, Fall Institute or Winter Institute).

The ***BSPH Policy and Procedure Memorandum for Students for Academic Ethics*** can be found at https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Students_01_Academic_Ethics_102606.pdf

MPH Core Curriculum

The core curriculum and associated components of the MPH Program includes grounding in foundational public health knowledge in the profession and science of public health and factors related to human health. All MPH graduates will demonstrate public health competencies that are informed by the critical disciplines in public health (including: biostatistics, epidemiology, social and behavioral determinants of health, management sciences, public health problem-solving, computer applications, demography, environmental health, biological sciences, and public health policy) as well as cross-cutting and emerging public health areas.

The core curriculum also provides an opportunity to apply the skills and competencies acquired during the program to practical public health problems through the MPH practicum experience and the MPH capstone course and project.

The following are required of MPH students, but are not formal courses:

- Goals Analysis Plan requirement (please see section “Goals Analysis”)
- MPH Practicum requirement (please see section “Practicum Experience in Population-based Health”)
- MPH Capstone requirement (please see section "MPH Capstone Project")
- Completion of Interprofessional Education Event

In addition to the above courses, students must also complete additional courses to satisfy the MPH foundational knowledge learning objectives and public health foundational competencies. The tables on the following pages list courses that satisfy the foundational knowledge and competency areas and when they are offered.

Course schedules are subject to change; please check the course directory for the most up-to-date course listing information: https://www.jhsph.edu/courses (https://www.jhsph.edu/courses/)

Listing of MPH Core Curriculum Course Options

Code	Title	Credits
Assessing Population Needs		
Select one of the following:		3-8
PH.221.688	Social and Behavioral Foundations of Primary Health Care	
PH.222.642	Assessment of Nutritional Status	
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth	
PH.410.613	Psychosocial Factors in Health and Illness	
PH.410.614	A New View: Improving Public Health Through innovative Social and Behavioral Tools and Approaches	
PH.410.616	Social and Behavioral Aspects of Public Health	
PH.410.620	Program Planning for Health Behavior Change	
PH.410.654 & PH.410.655	Health Communication Programs I: Planning and Strategic Design and Health Communication Programs II: Implementation and Evaluation	
PH.410.683	Global Perspectives on LGBT Health	
Biologic and Genetic Factors		
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (Required)	0.5
Biology and Public Health		
Appropriate for all students. Provides a broad introduction to public health biology:		
Select one of the following:		2-6
PH.183.631	Fundamentals of Human Physiology	
PH.260.636	Evolution of Infectious Disease	
PH.550.630	Public Health Biology	
PH.550.631	Biological Basis of Public Health	
PH.550.844	Current Issues in Public Health: COVID-19 Pandemic Response	

For students possessing considerable breadth of biological competence, subject to concurrence of the advisor.		
PH.120.603	Molecular Biology of Pandemic Influenza	
PH.120.620	Fundamentals of Reproductive Biology	
PH.120.627	Stem Cells and the Biology of Aging and Disease	
PH.182.640	Food- and Water- Borne Diseases	
PH.187.610	Public Health Toxicology	
PH.222.641	Principles of Human Nutrition in Public Health	
PH.223.689	Biologic Basis of Vaccine Development	
PH.260.606	Major Global Infectious Diseases: Prospects for Control	
PH.260.631	Immunology, Infection and Disease	
PH.260.635	Biology of Parasitism	
PH.260.650	Vector Biology and Vector-Borne Diseases	
PH.260.656	Malariology	
PH.340.612	Epidemiologic Basis for Tuberculosis Control	
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	
PH.340.654	Epidemiology and Natural History of Human Viral Infections	
PH.340.744	Advanced Topics on Control and Prevention of HIV/AIDS	
PH.380.761	Sexually Transmitted Infections in Public Health Practice	
Capstone Project		
PH.260.710	Communication Practice for Health Science Professionals	3
PH.260.720	Communications Primer for the Public Health Sciences (Required)	1
PH.xxx.800	MPH Capstone (Required: course number is affiliated with Capstone Advisor's department)	2
PH.300.860	Special Studies/Research: The Media and the Message: What Public Health Needs to Know about the News	3
Communication Strategies		
Select one of the following:		3-8
PH.222.654	Food, Culture, and Nutrition	
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	
PH.301.645	Health Advocacy	
PH.308.604	Effective Writing for Public Health Change	
PH.308.701	Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners	
PH.380.620	A Coalition-based SMART Approach to Public Health Advocacy	3
PH.317.610	Risk Policy, Management and Communication	
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	
PH.410.654 & PH.410.655	Health Communication Programs I: Planning and Strategic Design and Health Communication Programs II: Implementation and Evaluation	
Environmental Health		
PH.180.601	Environmental Health (Required)	5
Foundational Public Health Knowledge		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health (Required)	0.5
PH.552.610	The Social Determinants of Health (Required)	0.5
PH.552.611	Globalization and Population Health (Required)	0.5
Health Equity		
Select one of the following:		3-4
PH.188.694	Health of Vulnerable Worker Populations	
PH.305.684	Health Impact Assessment	
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	
PH.380.604	Life Course Perspectives on Health	
PH.410.600	Fundamentals of Health, Behavior and Society	
Interprofessional Practice		
PH.552.625 & PH.550.602	Building Collaborations Across Sectors to Improve Population Health and Interprofessional Education Activity (Required)	0.5
Leadership, Goverance, and Management		
Select one of the following:		2-4
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	
PH.221.608	Managing Non-Governmental Organizations in the Health Sector	
PH.312.600	Managing Health Services Organizations	
PH.312.601	Fundamentals of Management for Health Care Organizations	
PH.312.655	Organizational Behavior and Management	
PH.312.700	Leading Organizations	
PH.312.703	Learning Organizations & Knowledge Management	
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries	
PH.380.880 & PH.380.881 & PH.380.882 & PH.380.883	Lessons in Leadership: Applications for Population, Family and Reproductive Health I and Lessons in Leadership: Applications for Population, Family and Reproductive Health II and Lessons in Leadership: Applications for Population, Family and Reproductive Health III and Lessons in Leadership: Applications for Population, Family and Reproductive Health IV	
MPH Studies		
PH.550.867	Introduction to MPH Studies	
Negotiation and Mediation		
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals (Required)	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals (Required)	0.5
Population Dynamics		
PH.380.755	Population Dynamics and Public Health (Required)	2
Public Health Policy/Problem Solving		
Must be completed during the 1st year of the MPH Program		

Select one of the following:		
PH.300.610	Public Health Policy	
PH.550.608	Problem Solving in Public Health (Required)	
Public Health Practice		
Select one of the following:		
PH.300.603	The Tools of Public Health Practice and Decision Making	
PH.300.615	The Tools of Public Health Practice	
Qualitative Methods		
Select one of the following:		0.5-3
PH.224.690	Qualitative Research Theory and Methods	
PH.550.604	Qualitative Reasoning in Public Health	
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	
Quantitative Methods		
Must complete requirements for **both** Biostatistics and Epidemiology		
Biostatistics		
No switching permitted between Biostatistics sequences.		
Select one complete sequence from the following:		6-16
PH.140.611 & PH.140.612	Statistical Reasoning in Public Health I and Statistical Reasoning in Public Health II [1,2]	
PH.140.621 & PH.140.622 & PH.140.623	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III [3]	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV [4]	
Epidemiology		
Must be completed during the 1st year of the MPH program		
Select one of the following:		
PH.340.601	Principles of Epidemiology	
PH.340.721	Epidemiologic Inference in Public Health I	
Resource Management and Budgeting		
Select one of the following:		1-3
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	
PH.312.603	Fundamentals of Budgeting and Financial Management	
PH.318.625	Management of Nonprofit Organizations	
PH.552.621	Basic Resources Management for Public Health	
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	
Systems Thinking		
Select one of the following:		
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	
PH.552.626	Systems Thinking: Concepts and Methods	

Modifications of Core Course Requirements

In some exceptional circumstances, students may be granted a modification of some core requirements if they can demonstrate and document that they have previously acquired the associated core competencies. Even if a modification is granted of a core course, 80 credits are still required for graduation. Modifications or exceptions can only be granted in the following core areas:

- ***Biostatistics:*** Requires taking an examination. Please contact Dr. Marie Diener-West, mdiener@jhu.edu.
- ***Epidemiology:*** Requires taking an examination. Please contact Ms. Allyn Arnold, aarnold2@jhu.edu.
- ***Biology and Public Health:*** Core course exceptions can be requested by contacting Dr. Gary Ketner, gketner1@jhu.edu. Be prepared to submit the title of the course, name of instructor, textbook used, a summary of course syllabi, and grade received.

All other core requirements must be completed with the approved course options only.

Additional General Competencies

Students must select 5 additional general competencies that they plan to develop – separate from the Foundational Public Health competencies. These five additional competencies may expand or enhance the foundational competencies but cannot be the same as them. *Students select their 5 additional competencies from among the > 60 competencies listed in courses required by any of the 12 MPH Concentration Areas.*

- This decision should be made in consultation with your academic adviser.
- Please note that a single course may satisfy multiple competencies.

The Competency Table must be completed and submitted as part of your curriculum plan. You will submit the curriculum plan online. All courses that you select to meet your 5 additional competencies must be completed for degree completion and graduation eligibility.

As you progress through the MPH program, if your course selections change, you must upload a new curriculum plan and competency table to show how these requirements will continue to be met.

Please check https://publichealth.jhu.edu/academics/academic-programs/masters-degrees/master-of-public-health-mph/program-options/full-time-format/concentrations (https://publichealth.jhu.edu/academics/academic-programs/masters-degrees/master-of-public-health-mph/program-options/full-time-format/concentrations/) ***for updated, detailed information on Concentration Competencies and related courses.***

MPH Customized Program of Study and Optional MPH Concentrations

Typically, 40-45 credits of an MPH student's curriculum are based on courses from the required core curriculum. The remainder of the total of 80 credits required for graduation can be accomplished either through a customized program or through one of twelve multidisciplinary concentration areas.

MPH Customized Program

The MPH customized program is for students who desire an understanding of a broad spectrum of public health problems. It is designed for students who want versatility in designing their MPH course electives and may have academic objectives that do not fit precisely into the concentration areas. Students who customize their program of study complete the core MPH requirements and then choose elective courses for the remaining credits (approximately 35-40) in consultation with their faculty academic advisers.

MPH Concentration Areas

There are 12 multidisciplinary concentration areas. The concentration areas are designed for students wishing to have a guided curriculum in an area and the opportunity to interact with other students and faculty who share similar academic interests. Students who elect a concentration must complete several required course credits (approximately 20 credits) as specified by the concentration area over and above the MPH core course requirements.

The pie charts below illustrate the approximate distribution of academic credits associated with a customized plan or an optional concentration. The exact number of credits varies depending on the courses chosen to satisfy core requirements and the specific requirements of the concentration.

The specific number of additional credits required by each concentration is variable. However, as a rough guide, of the 80 credits needed for graduation, approximately half are core MPH requirements that all students must complete, approximately one quarter are course credits required by the concentration area and approximately one quarter of the credits are course electives.

Choosing to Customize or Electing a Concentration

The decision to customize one's program or elect a concentration area depends on the individual student. Specific questions concerning each concentration should be directed to the concentration faculty directors.

Answers to some frequently asked questions are:

- Students may elect only one MPH area concentration area.
- Students may qualify for a concentration and a certificate unless noted otherwise by the concentration directors.
- Students may switch into a new concentration only if they have met the 1st term requirements for that concentration and they must notify the MPH Academic Coordinator (Janet Carn at jcarn1@jhu.edu for full-time; Katie Cruit at kcruit@jhu.edu or Jacob Shaw at jshaw46@jh.edu for part-time) and the Concentration Directors.
- Students are always free to change from a concentration to a customized course of study at any time during the academic year. When changing from a concentration to a customized course of study, students must notify the MPH Academic Coordinator (Janet Carn at jcarn1@jhu.edu for full-time; Katie Cruit at kcruit@jhu.edu or Jacob Shaw at jshaw46@jh.edu for part-time) and the Concentration Directors.
- Students with an interest in international health will have ample opportunity to apply their knowledge to global health and developing country issues either as a customized student or as a student electing any of these concentration areas.
- Students completing a concentration will have a notation placed on their academic transcript.

Academic Advising

Advising assignments are made after a student makes the decision to customize their program or elect a concentration. Students who elect to customize their program of study will be assigned an appropriate faculty academic adviser by the MPH Program Faculty after carefully considering the students' interests and goals. Similarly, upon election of a concentration, a student will be assigned a faculty academic adviser from the concentration area.

Capstone Project

All students complete an MPH capstone project under the direction of a faculty capstone adviser. The MPH capstone experience in a concentration area may be more structured and focused on topics related to the concentration.

Goals Analysis

The purpose of the MPH Individualized Goals Analysis requirement is to:

- Describe the goals and competencies which you aim to achieve during your program.
- Plan your MPH education early in your program with the support and guidance of your academic network adviser.
- Serve as a springboard for discussion of career opportunities as the program progresses.
- The Goals Analysis should be updated as you make changes in focus and direction throughout the MPH program.

The required Goals Analysis will be completed as part of the ***Introduction to MPH Studies*** course and consists of two parts:

- **Part 1 – Self-Assessment**: Complete a self-assessment by:

1. Rating your current skill levels for the Schoolwide and MPH core competencies. Identify the core competencies that you wish to focus on and those that are particularly relevant to your professional future.
2. In your reflection, briefly explain what knowledge, skills, and experiences you bring to the program. Identify your goals for the MPH by explaining what you hope to gain in terms of knowledge, skills, professional and personal contacts, and any additional experiences. This information should be reviewed with your academic network adviser.

- **Part 2 – Curriculum Planning**: Students should work with their academic network adviser to complete their curriculum plan and submit the online Core Curriculum Confirmation Form to the MPH Program office.

1. Develop a term-by-term tentative course plan for your entire MPH program, including the five general competencies and corresponding courses that you will be completing. Your course plan should include the required courses, electives, and special studies you intend to take and when you plan to complete these courses.
2. Once your term-by-term plan has been created, complete the *Core Curriculum Confirmation Form*, indicating your core course selections and your 5 general competency selections. In the reflection section of the form, list any potential plans for a practicum experience and the specific skills you hope to develop through the practicum. Also, briefly describe one or more capstone topics of interest and possible capstone faculty mentors.
3. Once you have submitted the *Core Curriculum Confirmation Form*, then add your Biostatistics sequence selection and your general competency selection to your Degree Audit. This is required for degree completion and graduation. If during your MPH program, your biostatistics sequence or general competency selections change (including joining or leaving a concentration), you must update your

Degree Audit to reflect these changes. All courses that are linked to your 5 general competencies must be completed for degree and graduation eligibility.

The Goals Analysis is intended to be a living document, one which you and your adviser review and update as you make changes in focus and direction throughout the MPH program.

Practicum Experience in Population-based Health

About the Practicum

The intent of the MPH practicum requirement is to engage students in activities aligned with their career goals, as well as activities that demonstrate application of public health concepts and critical thinking relevant to the student's area of specialization. Students will seek out activities that further develop their skill set and add new tools to their professional toolkit. Upon completion of the program, the student will be able to provide evidence of application of these skills to potential employers.

Organizations or agencies that can serve as practicum sites may include local and state public health agencies, community-based organizations, international non-governmental agencies and organizations, data coordinating centers for clinical trials, and BSPH Centers. The Practicum Experience must have some engagement in the larger public health practice implications of the work. This could be completed in a variety of ways, as appropriate to the individual projects. Some examples include, but are not limited to, collaboration with others (e.g., end users, data collectors, etc.) to provide/prepare for data analysis and interpretation, partnerships with other public health organizations (e.g., state health department, community organizations) related to study design or implementation; and obtaining input on the work from stakeholders (population impacted by project, other professionals/researchers completing similar work).

Activities completed *prior* to matriculation to the MPH program do not count towards the MPH practicum requirement.

Helpful Links

Address	Description
https://www.jhsph.edu/offices-and-services/practice-and-training/practicum (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/)/	Practicum Website
https://my.jhsph.edu/Resources/SearchTools/pos/Pages/home.aspx	Practicum Opportunity Site
https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/_documents/Practicum_Examples.pdf	Practicum Examples

General Criteria for MPH Practicum

The following criteria reflect the minimum practicum requirements. Approval from the MPH Practicum Team is required prior to the student initiating each practicum experience. A practicum experience:

1. **Applies public health skills and competencies.** Students identify the public health skills and competencies relevant to their area of interest that are most beneficial to their career advancement. Students apply these skills and competencies in concert with knowledge gained from their coursework.
2. **Is framed and carried out within a public health practice context with an established organization or agency.** The practicum is a population-level focused project conducted in a practice context. Students may engage in activities at an individual level, but the primary purpose of the experience is to gain population-level practical experience at an established organization or agency. Students can not solely complete screenings, administer surveys, perform calculations, etc., but must be engaged in the larger public health practice context of the activities, as well as become familiar with the organization's overall purpose and decision-making process. A literature review or data analysis project alone will not meet the practicum requirement. The student must obtain input from the partnering organization and/or from the stakeholders (e.g., population impacted by project, other professionals/researchers completing similar work). There must be a clear link to how the practicum project makes an impact on the targeted population. Students should also develop a deeper understanding of the organization's mission, hierarchy and practices, as well as the challenges faced (funding, politics, efficiency, etc.) in achieving desired goals.
3. **Is supervised by a qualified preceptor.** The practicum preceptor must be qualified to evaluate the student's professional competence and supervise the student throughout the project. The preceptor is directly engaged in the population-level focused practicum activities. Preceptors can be from an organization outside of Johns Hopkins (e.g. community-based organization, health department, private corporation, etc.), or a BSPH faculty member if the faculty member is directly engaged with or is the lead on a project that meets the practicum criteria. The preceptor works with the student to develop project learning objectives and deliverables, and guides and monitors the student's progress and achievement. The student's faculty academic adviser will be kept informed of the student's practicum activities and progress and may provide additional assistance if warranted.
4. **Is a significant experience (minimum of 100 hours).** The practicum requirement is administered and tracked by the School's MPH Practicum Team. Students must have their proposed practicum project(s) approved prior to initiating their experience. The practicum requirement can be met in a variety of ways including a single experience or a combination of experiences. Students may work independently or in a team. Activities must be completed during the MPH year to be able to count towards the MPH practicum requirement.
5. **An evaluated experience.** Preceptors will evaluate on the achievement of defined learning objectives and deliverables by the preceptors. Additionally, students will reflect on and evaluate their overall practicum experiences, particularly as they relate to their career goals. A minimum grade of "C" must be earned in courses with a practicum component that are taken towards fulfilling the requirement. Students who register for practicum special studies credits are required to earn a "pass" for the experience to count towards the practicum requirement.

Competency-based Learning Objectives for MPH Practicum

Students will need to identify distinct learning objectives for the practicum that address learning and application in at least five competencies competencies from this list (https://www.jhsph.edu/

offices-and-services/practice-and-training/practicum/_documents/MPH%20Practicum%20Competencies.pdf).

Steps to Completing the MPH Practicum

A detailed outline of all steps that students must follow to complete the MPH Practicum, including registration instructions, can be found on the MPH Practicum website (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/for-students/practicum-process.html) as well as in the MPH program manual. All Students must receive approval from the MPH Practicum Team prior to initiating each practicum experience.

Ways to Complete the Practicum Requirement

To meet the practicum requirement, the total practicum hours must be at least 100 hours; one may combine multiple experiences of less than 100 hours, to meet the total.

Completion of the PH.300.615 **or** PH.300.603 TOOLS OF PUBLIC HEALTH PRACTICE **course (required for all MPH students) with a grade of C or higher will earn students 10 practicum hours.**

BSPH APPROVED COURSES WITH A PRACTICUM COMPONENT

Some courses have a real-world practice component, connecting students to outside organizations/agencies. In some cases, the course is centered on a fully developed practice experience that fulfills the practicum requirement for all students who complete the course (i.e. Baltimore Community Practicum, PHASE Internship, and the Health Policy Institute). Other courses may have limited availability or may not fully meet the 100-hour minimum requirement.

For courses that do not fulfill the entire 100-hour practicum requirement, students must combine experiences to complete the practicum requirement in full. Students are expected to complete courses in their entirety with a final letter grade of "C" or better to count towards the practicum requirement.

Please use the following link to view the most current listing of approved practicum courses: http://www.jhsph.edu/offices-and-services/practice-and-training/practicum/for-students/practicum-courses.html

CUSTOMIZED PRACTICUM EXPERIENCES

Students may complete customized practicum experiences coordinated by a BSPH faculty member or in partnership with an outside BSPH preceptor.

<u>Projects with a BSPH faculty member</u>: Projects are developed and coordinated by the BSPH faculty member who may or may not serve as the Preceptor (e.g. in conjunction with a course, research study, grant, etc.). Some potential practicum projects with faculty may be established projects and are listed on the Practicum Opportunity Site. Students can also arrange other experiences with a faculty member.

<u>Projects with an outside non-BSPH preceptor:</u> Projects can be developed in other settings through their own connections, networks, prior work experience, etc. According to the CEPH accreditation document, "Applied practice experiences may involve governmental, non-governmental, non-profit, industrial and for-profit settings or appropriate university-affiliated settings. To be appropriate for applied practice experience activities, university-affiliated settings must be primarily focused on community engagement, typically with external partners. University health promotion or wellness centers may also be appropriate."[1]

Examples of customized projects include but are not limited to:

- programmatic cost effectiveness analysis;
- policy analysis and recommendations development with a local health department;
- budget impact analysis of the financial consequences of adoption of a new vaccine,
- qualitative and quantitative data analysis of poor health outcomes for a specific population;
- health curriculum planning and development of health education materials.

[1] https://ceph.org/assets/2016.Criteria.pdf

Finding Practicum Opportunities

Students may utilize the resources below to identify practicum experiences.

Practicum Opportunity Site – Office of Public Health Practice and Training

<u>https://my.jhsph.edu/Resources/SearchTools/pos/Pages/home.aspx</u>

The Practicum Opportunity Site (POS) lists various potential practicum opportunities (including projects with outside organizations, with BSPH faculty, and practicum courses) that have been identified and vetted by the School's Practicum Team.

SOURCE

http://www.jhsph.edu/source/

SOURCE is the community engagement and service-learning center for the Johns Hopkins University (JHU) Schools of Public Health, Nursing, and Medicine. Its mission is to engage the JHU health professional schools and Baltimore communities in mutually beneficial partnerships that promote health and social justice. There are multiple ways to engage in a practicum experience through SOURCE supported activities, including the SOURCE Service Scholars program, Baltimore Action Projects, Connection Community Consultants, and working directly with a SOURCE partner organization on a project. ***<u>NOTE:</u> Not all SOURCE projects meet the practicum requirements***. Subscribe to the SOURCE Weekly Service Scoop to learn more about the latest community involvement opportunities in Baltimore City (http://source.jhu.edu/programs-and-events/service-scoop/).

Office of Public Health Practice and Training

https://www.jhsph.edu/offices-and-services/practice-and-training/

The Office of Public Health Practice and Training (Practice Office) is a schoolwide office dedicated to promoting excellence in public health practice at the Johns Hopkins Bloomberg School of Public Health. It works in partnership with students, staff, faculty, academic departments, centers, programs, community partners and alumni. The Practice Office also coordinates the MPH practicum. Any questions pertaining to the MPH practicum should be directed to the MPH Practicum Coordinator in the Practice Office. The MPH Practicum Coordinator can provide feedback/guidance on project ideas and also holds regular office hours throughout the year, during which students can drop by for advice.

Certificate Programs

https://www.jhsph.edu/academics/certificate-programs/

There are a few certificate programs that include their own practicum requirement in the curriculum (e.g. *Community-based Public Health*, and *Quality, Patient Safety, and Outcomes Research*). The certificate practicum may fulfill the MPH practicum requirement, upon approval from the practicum team. Please note: Some certificates may have separate practicum paperwork that will need to be completed in addition what you must submit for the MPH practicum.

Key Contact for Practicum
Paulani Mui, MPH Practicum Coordinator
Ph: (410) 502-8952 | Email: practice@jhu.edu

MPH Capstone Project

Overview

The MPH Capstone project is a requirement for graduation for students in the Master's of Public Health Program and is to be completed at the end of or within the final two terms of the program. The MPH Capstone is an opportunity for students to work on public health projects that are of interest to them. The goal is for students to synthesize, integrate and apply the skills and competencies they have acquired throughout the entire MPH program. Completion of the MPH capstone project requires completion of the course, PH.260.720 Communications Primer for the Public Health Sciences, and both a written and oral component to your project.

The project is done under the direction of a faculty member, the MPH capstone adviser. The capstone adviser will often be the student's adviser but does not have to be. Students can identify another faculty member to supervise the capstone, if more appropriate. **The capstone adviser must have a primary or joint appointment in the School of Public Health.** Department affiliation for any faculty member in the School can be determined by going to the Faculty Directory (https://publichealth.jhu.edu/faculty/directory/list/?combine=&work_type%5Bprimary%5D=primary) . If you are uncertain as to your capstone adviser's departmental affiliation, check with your adviser or the MPH Program office.

After identifying a capstone adviser and capstone topic, students are expected to communicate regularly with their capstone adviser about their progress. The iterative process between a student and capstone adviser is an important component in the development and completion of the written project. Please see the capstone completion timeline for specific deadlines.

Requirements

1. ***PH.260.720 Communications Primer for the Public Health Sciences***
   Students must complete the course, PH.260.720 Communications Primer for the Public Health Sciences as part of the MPH Capstone requirement. Students can complete this course at any time during their MPH program, but it ***must be completed no later than the term prior to their capstone presentation***. For example, if you plan to present your capstone project in December (Term 2), you must complete PH.260.720 Communications Primer for the Public Health Sciences no later than Term 1, prior to your capstone presentation.
   Please note: As part of this course, you will be required to present in a LiveTalk session. It will be your responsibility to choose the date and time of your presentation and participate as scheduled.
   This course also requires that your computer have a camera and microphone.
2. ***MPH Capstone – Course Number and Registration***
   Students are required to register for the 2-credit MPH Capstone in the term that the project will be completed – this includes both the written and oral components. For most students this will be 4th term. More information can be found in the "Registering for MPH Capstone" section.
3. ***MPH Capstone - Paper***
   To satisfy the written component, a student must write a paper. The paper must include:
   - An executive summary or structured abstract (limited to 300 words) and references
   - A summary of how the capstone project addresses the areas that you wanted to strengthen, as identified in your MPH Goals Analysis
   - While there are no formal guidelines on the length of the paper, it is expected that the paper will be approximately 20 pages (ranging between 15-25 double-spaced pages) not including references, tables and figures.
     Students who have been approved to pursue an optional MPH concentration should follow any additional specific concentration area requirements for the MPH capstone for that concentration.
4. ***MPH Capstone - Oral Presentation***
   Students are required to give a 15-minute oral presentation (10-minute presentation/5-minute discussion) summarizing their capstone project. Students participating in MPH concentrations sometimes present in an alternate venue that is designated by the concentration directors. Students may, with approval of their faculty capstone advisers, be permitted to present at an alternate venue such as a scientific meeting or academic conference.

Possible Forms That the Capstone Project May Take

The capstone project can take many forms including one of the designs below, an expansion of a course, or an internship or practicum opportunity. The overarching principle used to determine if a capstone project is suitable is whether it provides students the opportunity to apply the skills and competencies acquired in the MPH program to a problem likely to be encountered in public health practice. The topic and format of the capstone project is flexible and is developed through discussions between the student and capstone adviser. Some examples of formats or designs for the capstone project include:

Literature Review
The capstone project would be an analysis of an important public health problem through a survey of current literature on the topic. The project would include sections that clearly describe and assess the problem and its magnitude, evaluate its causes and determinants, and discuss prevention and intervention strategies.

Program Plan
The capstone project would involve the development of a plan to implement a public health program. It would address critical issues such as management, fiscal, ethical and logistical issues.

Program Evaluation
The capstone project would involve the evaluation/monitoring of an existing public health program, such as process evaluation, monitoring of outputs and outcomes, impact assessment, and/or cost analysis.

Policy Analysis
The capstone project would involve analysis of the public health implications of a current or proposed policy. The project could include perspectives on economics and financing, need and demand, politics/ethics/law, or quality/effectiveness.

Research Proposal
The capstone project would simulate a grant proposal or research plan. The project would include a clear statement of the research question, the specific aims of the proposal, review of literature, study design, methods of analysis, implications and significance of the work. The research

question would be one that is encountered in professional work such as the evaluation of a public health intervention.

Research Report

The capstone project could involve the collection, analysis, and/or interpretation of data to address a public health problem. The project could include sections on the research question, study design, data collection procedures, data analysis, interpretation, and significance of findings.

Secondary data analysis

Typically, the capstone research report is in the form of a secondary data analysis, using an existing data set. Please note that the appropriate IRB approval may need to be obtained for any project that uses data gathered from human subjects. Even in cases where the data is de-identified, a determination should be sought from the IRB office (see IRB section for further information).

Primary data analysis

Work for the MPH capstone can also involve the collection of data. Data collection for a capstone is usually in the context of an ongoing study. It is typically not feasible to initiate a new study involving primary data collection and requires special approval in the rare cases where feasible.

Using a course project as an MPH capstone project

Some courses in the School of Public Health require projects that could serve as a basis for an MPH capstone project. Students may use their work from any project-oriented course as a starting basis for their capstone but must build and expand on it for the final capstone project. Building on a project from a course may be helpful to some students because it provides additional structure and support. If a project from a course is used as a starting point for the capstone, the previous work must be placed in the list of references and the adviser will need a copy of the student's original paper. There are numerous courses in the School that are project oriented which could serve as a starting point for the capstone.

Capstone Project Timeline

Timeline for online presentations, August session

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 4th Term
Submit online Capstone Information Form	By early May
Submit final outline to capstone advisor	By late May
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By 3rd week of June
Submit final draft of project to capstone advisor	By 3rd week of July
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	August (see website for current year's date)

Timeline for online presentations, December sessions

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 1st Term
Submit online Capstone Information Form	By early August
Submit final outline to capstone advisor	By 3rd week of September
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By 3rd week of October
Submit final draft of project to capstone advisor	By mid-November
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	December (see website for current year's date)

Timeline for online presentations, May sessions

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 3rd Term
Submit online Capstone Information Form	By early December
Submit final outline to capstone advisor	By early February
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By mid-March
Submit final draft of project to capstone advisor	By mid-April
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	May (see website for current year's date)

Timeline for in-person presentation at May Capstone Symposium

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 3rd Term
Submit online Capstone Information Form	By early December
Submit final outline to capstone advisor	By early February
Register for capstone course for Summer Term	By mid-March

Submit first draft of project to capstone advisor	By late March
Submit final draft of project to capstone advisor	By 3rd week of April
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	May (see website for current year's date)

Timeline for presentation at alternate venue
Students presenting at an alternate venue must adhere to the schedules above, as per the time of year in which the project is completed. Deadlines for completion of the oral presentation are August online, December online, or the May symposium date, depending on the period in which the student is graduating.

Capstone Honors and Awards

The MPH Capstone Awards Committee bestows special honors to the best overall capstone projects. Nominations are accepted from capstone advisers. The winners will be selected by the awards committee based on the written project. Each capstone award winner receives a plaque for excellence. The student with the single overall best capstone project will also receive a $500 award.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Summary of Graduation Requirements

- A minimum of 80 credits are required for graduation. Students must complete the MPH core curriculum as detailed in the next section entitled "MPH Core Curriculum (p. 501)."
- At least 60 of the 80 credits must be completed in formal coursework that is not special studies, i.e. independent studies.
- At leave five additional general competencies from the Focus Area/ Concentration Competencies must be completed.
- All courses that are part of the core curriculum must be taken for a letter grade, if the course is offered for a letter grade.
- All students are required to complete an individualized MPH Goals Analysis within the CoursePlus Portfolio.
- All students must complete the MPH Practicum requirement, including course PH.300.615 The Tools of Public Health Practice or PH.300.603 The Tools of Public Health Practice and Decision Making.
- All students must complete PH.260.720 Communications Primer for the Public Health Sciences and an MPH capstone (PH.XXX.800).
- Students are required to complete PH.550.860 Academic & Research Ethics at BSPH during their first term of registration in the program.
- All students must maintain minimum academic standards (p. 500) and have satisfactory grades as detailed in the *Academic Standards* section.

Note: A repeated course may only count once toward the 80-credit requirement. Classes taken for audit do not count towards the 80-credit requirement for graduation.

Special Note on Courses Taken at BSPH While Not Formally Matriculated as an MPH Degree Seeking Student: A limited number of course credits taken at Johns Hopkins prior to matriculation into the MPH Program (e.g., up to 16 as a special student and 40 credits from another degree program) can be applied toward the 80 total credits, provided the courses were completed not more than 5 years prior to the date of matriculation into the MPH Program.

Academic Standards

Students must meet minimum academic standards to remain in the MPH Program. A student's failure to meet any of the criteria below is grounds for being placed on academic warning and/or being dismissed from the program.

1. To maintain good academic standing in the MPH program, students must maintain a minimum cumulative grade point average (GPA) of **2.75**. Students with a GPA falling below 2.75 will be placed on academic warning and will have one term, or 12 additional credits of coursework, to raise the GPA to 2.75 or above. Students not meeting the 2.75 minimum after one term may be granted additional term(s) on academic warning if academic progress has been shown in the cumulative GPA. Students on academic warning must meet with their faculty advisor and the MPH Academic Coordinator prior to registering for courses. Students with a cumulative GPA of less than 2.75 may not register for more than 18 credits per term. Any repeated courses count towards this 18-credit limit. [Note: Students with less than a 2.75 cumulative GPA are not eligible to enroll in the Biostatistics 620 course series or the Epidemiology 750 course series].
2. A student who earns a "D", "U", or "F" grade in a course that meets a core requirement must, at the next opportunity, make a second attempt to complete the core requirement either by repeating the same course or by completing another course that meets the same core requirement (if available).
3. Students must complete the Public Health Policy/Problem Solving core requirement and the Epidemiology core requirement within the first twelve months of matriculation into the MPH program.
4. Students must complete the Goals Analysis plan within the set timeframe during the first two terms of the program.
5. Students must progress toward degree completion in four years or less, as per their Goals Analysis plan. If additional time is required to complete the degree, it is a student's responsibility to contact in writing (email communication is sufficient) their faculty advisor and their MPH Academic Coordinator to request an extension beyond the four-year limit. An extension request should be submitted to their faculty advisor and their MPH Academic Coordinator at least one term prior to the end of the 4-year limit.
6. Students may not accrue more than 9 credits of "incomplete" coursework at any given time. Students exceeding this limit must immediately contact their faculty advisor and their MPH Academic Coordinator in writing (email communication is sufficient) to discuss their academic situation. Students may not be permitted to register for subsequent terms until the incompletes have been resolved.
7. Students who are inactive (not enrolled in courses) for two terms or more without notifying their MPH Academic Coordinator of their academic plans will be withdrawn from the program. Students who do notify in writing (email communication is sufficient) their MPH Academic Coordinator and faculty advisor of their circumstances may suspend enrollment, assuming that they otherwise have met academic standards.

Academic and Research Ethics at BSPH

Maintaining the highest level of academic and research integrity is an important responsibility of our faculty and students. To help achieve this goal, all students are required to complete the PH.550.860 Academic & Research Ethics at BSPH course. The course examines academic and research ethics at BSPH through a series of online interactive modules:

- Focuses on information about the academic ethics code and responsible conduct of research at the School.
- Explores issues of academic integrity such as proper ethical conduct and referencing, and discusses violations such as plagiarism and cheating, relative to case studies that illustrate situations faced by students and faculty in the academic setting.
- Addresses topics that include responsible conduct of research, authorship, data management, data ownership, guidelines for professional conduct, research fraud or scientific misconduct, federal and institutional guidelines related to research using human and animal subjects and ethical issues involving vulnerable subjects in research.

Students are automatically registered into the *Academic and Research Ethics* course (PH.550.860) when they matriculate into the MPH program. All BSPH students are required to complete this non-credit course by the end of the Institute associated with their Orientation program and matriculation (ie: Summer Institute, Fall Institute or Winter Institute).

The ***BSPH Policy and Procedure Memorandum for Students for Academic Ethics*** can be found at https://my.jhsph.edu/Resources/PoliciesProcedures/ppm/PolicyProcedureMemoranda/Students_01_Academic_Ethics_102606.pdf

thE WELCH SCHOLARSHIP

All new online/part-time MPH students will be awarded the Welch Scholarship. This award is in honor of the Bloomberg School's 100th anniversary and our founding dean William Henry Welch. The Welch Scholarship is designated for tuition costs and is disbursed incrementally for each credit (up to 80 credits). This funding can be used for online, in-person or institute courses.
Please note that the Welch Scholarship is not part of Federal Financial Aid and does not have the same eligibility guidelines. To be eligible for the Welch Scholarship, students must register for no more than 12 credits per term or institute. While the maximum part-time credit load is 11 credits, we can make an exception and award the Welch Scholarship for 12 credits. This is particularly beneficial for international students who may be taking courses in the United States and their visa requires them to take a minimum of 12 credits.

If a part-time/online MPH program student takes more than 12 credits in any Term or Institute, they will not receive the Welch Scholarship and will pay the full-time tuition rate for that term.

MPH Core Curriculum

The core curriculum and associated components of the MPH Program includes grounding in foundational public health knowledge in the profession and science of public health and factors related to human health. All MPH graduates will demonstrate public health competencies that are informed by the critical disciplines in public health (including: biostatistics, epidemiology, social and behavioral determinants of health, management sciences, public health problem-solving, computer applications, demography, environmental health, biological sciences, and public health policy) as well as cross-cutting and emerging public health areas.

The core curriculum also provides an opportunity to apply the skills and competencies acquired during the program to practical public health problems through the MPH practicum experience and the MPH capstone course and project.

The following are required of MPH students, but are not formal courses:

- History of Public Health module (Pre-Orientation activity)
- Goals Analysis Plan requirement (please see section "Goals Analysis and Portfolio")
- MPH Practicum requirement (please section "Practicum Experience in Population-based Health")
- Completion of Interprofessional Education Event as part of course PH.552.625 Building Collaborations Across Sectors to Improve Population Health

In addition to the above courses, students must also complete additional courses to satisfy the MPH foundational knowledge learning objectives and public health foundational competencies. The tables on the following pages list courses that satisfy the foundational knowledge and competency areas and when they are offered.

Course schedules are subject to change; please check the course database for the most up-to-date course listing information: https://www.jhsph.edu/courses (https://www.jhsph.edu/courses/)

Listing of MPH Core Curriculum Course Options

Code	Title	Credits
Assessing Population Needs		
Select one of the following:		3-8
PH.221.688	Social and Behavioral Foundations of Primary Health Care	
PH.222.642	Assessment of Nutritional Status	
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels	
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth	
PH.410.613	Psychosocial Factors in Health and Illness	
PH.410.614	A New View: Improving Public Health Through innovative Social and Behavioral Tools and Approaches	
PH.410.616	Social and Behavioral Aspects of Public Health	
PH.410.620	Program Planning for Health Behavior Change	
PH.410.654 & PH.410.655	Health Communication Programs I: Planning and Strategic Design and Health Communication Programs II: Implementation and Evaluation	
PH.410.683	Global Perspectives on LGBT Health	
Biologic and Genetic Factors		
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (Required)	0.5
Biology and Public Health		
Appropriate for all students. Provides a broad introduction to public health biology:		

Select one of the following:		2-6
PH.183.631	Fundamentals of Human Physiology	
PH.260.636	Evolution of Infectious Disease	
PH.550.630	Public Health Biology	
PH.550.631	Biological Basis of Public Health	
PH.550.844	Current Issues in Public Health: COVID-19 Pandemic Response	
For students possessing considerable breadth of biological competence, subject to concurrence of the advisor:		
PH.120.603	Molecular Biology of Pandemic Influenza	
PH.120.620	Fundamentals of Reproductive Biology	
PH.120.627	Stem Cells and the Biology of Aging and Disease	
PH.182.640	Food- and Water- Borne Diseases	
PH.187.610	Public Health Toxicology	
PH.222.641	Principles of Human Nutrition in Public Health	
PH.223.689	Biologic Basis of Vaccine Development	
PH.260.606	Major Global Infectious Diseases: Prospects for Control	
PH.260.631	Immunology, Infection and Disease	
PH.260.635	Biology of Parasitism	
PH.260.650	Vector Biology and Vector-Borne Diseases	
PH.260.656	Malariology	
PH.340.612	Epidemiologic Basis for Tuberculosis Control	
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS	
PH.340.654	Epidemiology and Natural History of Human Viral Infections	
PH.340.744	Advanced Topics on Control and Prevention of HIV/AIDS	
PH.380.761	Sexually Transmitted Infections in Public Health Practice	
Capstone Project		
PH.260.710	Communication Practice for Health Science Professionals	3
PH.260.720	Communications Primer for the Public Health Sciences (Required)	1
PH.xxx.800	MPH Capstone (Required: course number is affiliated with Capstone Advisor's department)	2
PH.300.860	Special Studies/Research: The Media and the Message: What Public Health Needs to Know about the News	3
Communication Strategies		
Select one of the following:		3-8
PH.222.654	Food, Culture, and Nutrition	
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development	
PH.301.645	Health Advocacy	
PH.308.604	Effective Writing for Public Health Change	
PH.308.701	Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners	
PH.317.610	Risk Policy, Management and Communication	
PH.380.620	A Coalition-based SMART Approach to Public Health Advocacy	
PH.410.650	Introduction to Persuasive Communications: Theories and Practice	
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication	
PH.410.654 & PH.410.655	Health Communication Programs I: Planning and Strategic Design and Health Communication Programs II: Implementation and Evaluation	
Environmental Health		
PH.180.601	Environmental Health (Required)	5
Foundational Public Health Knowledge		
PH.552.601	Foundational Principles of Public Health	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health (Required)	0.5
PH.552.610	The Social Determinants of Health (Required)	0.5
PH.552.611	Globalization and Population Health (Required)	0.5
Health Equity		
Select one of the following:		3-4
PH.188.694	Health of Vulnerable Worker Populations	
PH.305.684	Health Impact Assessment	
PH.318.623	Social Policy for Vulnerable Populations in the U.S.	
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders	
PH.380.604	Life Course Perspectives on Health	
PH.410.600	Fundamentals of Health, Behavior and Society	
Interprofessional Practice		
PH.552.625 & PH.550.602	Building Collaborations Across Sectors to Improve Population Health and Interprofessional Education Activity (Required)	0.5
Leadership, Goverance, and Management		
Select one of the following:		2-4
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	
PH.221.608	Managing Non-Governmental Organizations in the Health Sector	
PH.312.600	Managing Health Services Organizations	
PH.312.601	Fundamentals of Management for Health Care Organizations	
PH.312.655	Organizational Behavior and Management	
PH.312.700	Leading Organizations	
PH.312.703	Learning Organizations & Knowledge Management	
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries	
PH.380.880 & PH.380.881 & PH.380.882 & PH.380.883	Lessons in Leadership: Applications for Population, Family and Reproductive Health I and Lessons in Leadership: Applications for Population, Family and Reproductive Health II and Lessons in Leadership: Applications for Population, Family and Reproductive Health III and Lessons in Leadership: Applications for Population, Family and Reproductive Health IV	
Negotiation and Mediation		
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals (Required)	0.5

PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals (Required)	0.5
Population Dynamics		
PH.380.755	Population Dynamics and Public Health (Required)	2
Public Health Policy/Problem Solving		
Must be completed during the 1st year of the MPH Program		
Select one of the following:		
PH.300.610	Public Health Policy	
PH.550.608	Problem Solving in Public Health (Required)	
Public Health Practice		
Select one of the following:		
PH.300.603	The Tools of Public Health Practice and Decision Making	
PH.300.615	The Tools of Public Health Practice	
Qualitative Methods		
Select one of the following:		0.5-3
PH.224.690	Qualitative Research Theory and Methods	
PH.550.604	Qualitative Reasoning in Public Health	
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health	
Quantitative Methods		
Must complete requirements for **both** Biostatistics and Epidemiology		
Biostatistics		
No switching permitted between Biostatistics sequences.		
Select one complete sequence from the following:		6-16
PH.140.611 & PH.140.612	Statistical Reasoning in Public Health I and Statistical Reasoning in Public Health II [1,2]	
PH.140.621 & PH.140.622 & PH.140.623	Statistical Methods in Public Health I and Statistical Methods in Public Health II and Statistical Methods in Public Health III [3]	
PH.140.651 & PH.140.652 & PH.140.653 & PH.140.654	Methods in Biostatistics I and Methods in Biostatistics II and Methods in Biostatistics III and Methods in Biostatistics IV [4]	
Epidemiology		
Must be completed during the 1st year of the MPH program		
Select one of the following:		
PH.340.601	Principles of Epidemiology	
or PH.340.721	Epidemiologic Inference in Public Health I	
PH.340.721	Epidemiologic Inference in Public Health I	
Resource Management and Budgeting		
Select one of the following:		1-3
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries	
PH.312.603	Fundamentals of Budgeting and Financial Management	
PH.318.625	Management of Nonprofit Organizations	
PH.552.621	Basic Resources Management for Public Health	
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	
Systems Thinking		
Select one of the following:		
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches	
PH.552.626	Systems Thinking: Concepts and Methods	

MODIFICATIONS OF CORE COURSE REQUIREMENTS

In some exceptional circumstances, students may be granted a modification of some core requirements if they can demonstrate and document that they have previously acquired the associated core competencies. Even if a modification is granted of a core course, 80 credits are still required for graduation. Modifications or exceptions can only be granted in the following core areas:

- ***Biostatistics:*** Requires taking an examination. Please contact Dr. Marie Diener-West, mdiener@jhu.edu.
- ***Epidemiology:*** Requires taking an examination. Please contact Ms. Allyn Arnold, aarnold2@jhu.edu.
- ***Biology and Public Health:*** Core course exceptions can be requested by contacting Dr. Gary Ketner, gketner1@jhu.edu. Be prepared to submit the title of the course, name of instructor, textbook used, a summary of course syllabi, and grade received.

All other core requirements must be completed with the approved course options only.

Additional General Competencies

Students must select 5 additional general competencies that they plan to develop – separate from the Foundational Public Health competencies. These five additional competencies may expand or enhance the foundational competencies but cannot be the same as them. Students select their 5 additional competencies from among the > 60 competencies listed in courses required by any of the 12 MPH Focus Areas.

- This decision should be made in consultation with your academic advisor.
- Please note that a single course may satisfy multiple competencies.

The Competency Table must be completed and submitted as part of your curriculum plan. You will submit the curriculum plan online . All courses that you select to meet your 5 additional competencies must be completed for degree completion and graduation eligibility.

As you progress through the MPH program, if your course selections change, you must upload a new curriculum plan and competency table to show how these requirements will continue to be met.

Please check https://publichealth.jhu.edu/academics/academic-programs/masters-degrees/master-of-public-health-mph/program-options/full-time-format/concentrations ***(***https://publichealth.jhu.edu/academics/academic-programs/masters-degrees/master-of-public-health-mph/program-options/full-time-format/concentrations/***)*** ***(***mphprog@jhu.edu***)for updated, detailed information on Focus Area Competencies and related courses.***

Goals Analysis

The purpose of the MPH Individualized Goals Analysis requirement is to:

- Describe the goals and competencies which you aim to achieve during your program.
- Plan your MPH education early in your program with the support and guidance of your academic network adviser.

- Serve as a springboard for discussion of career opportunities as the program progresses.
- The Goals Analysis should be updated as you make changes in focus and direction throughout the MPH program.

The required Goals Analysis will be completed as part of the ***Introduction to MPH Studies*** course and consists of two parts:

- **Part 1 – Self-Assessment**: Complete a self-assessment by:

1. Rating your current skill levels for the Schoolwide and MPH core competencies. Identify the core competencies that you wish to focus on and those that are particularly relevant to your professional future.
2. In your reflection, briefly explain what knowledge, skills, and experiences you bring to the program. Identify your goals for the MPH by explaining what you hope to gain in terms of knowledge, skills, professional and personal contacts, and any additional experiences. This information should be reviewed with your academic network adviser.

- **Part 2 – Curriculum Planning**: Students should work with their academic network adviser to complete their curriculum plan and submit the online Core Curriculum Confirmation Form to the MPH Program office.

1. Develop a term-by-term tentative course plan for your entire MPH program, including the five general competencies and corresponding courses that you will be completing. Your course plan should include the required courses, electives, and special studies you intend to take and when you plan to complete these courses.
2. Once your term-by-term plan has been created, complete the *Core Curriculum Confirmation Form*, indicating your core course selections and your 5 general competency selections. In the reflection section of the form, list any potential plans for a practicum experience and the specific skills you hope to develop through the practicum. Also, briefly describe one or more capstone topics of interest and possible capstone faculty mentors.
3. Once you have submitted the *Core Curriculum Confirmation Form*, then add your Biostatistics sequence selection and your general competency selection to your Degree Audit. This is required for degree completion and graduation. If during your MPH program, your biostatistics sequence or general competency selections change (including joining or leaving a concentration), you must update your Degree Audit to reflect these changes. All courses that are linked to your 5 general competencies must be completed for degree and graduation eligibility.

The Goals Analysis is intended to be a living document, one which you and your advisor review and update as you make changes in focus and direction throughout the MPH program.

Practicum Experience in Population-based Health

About the Practicum

The intent of the MPH practicum requirement is to engage students in activities aligned with their career goals, as well as activities that demonstrate application of public health concepts and critical thinking relevant to the student's area of specialization. Students will seek out activities that further develop their skill set and add new tools to their professional toolkit. Upon completion of the program, the student will be able to provide evidence of application of these skills to potential employers.

Organizations or agencies that can serve as practicum sites may include local and state public health agencies, community-based organizations, international non-governmental agencies and organizations, data coordinating centers for clinical trials, and BSPH Centers. The Practicum Experience must have some engagement in the larger public health practice implications of the work. This could be completed in a variety of ways, as appropriate to the individual projects. Some examples include, but are not limited to, collaboration with others (e.g., end users, data collectors, etc.) to provide/prepare for data analysis and interpretation, partnerships with other public health organizations (e.g., state health department, community organizations) related to study design or implementation; and obtaining input on the work from stakeholders (population impacted by project, other professionals/researchers completing similar work).

Activities completed *prior* to matriculation to the MPH program do not count towards the MPH practicum requirement.

Helpful Links

Address	Description
https://www.jhsph.edu/offices-and-services/practice-and-training/practicum (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/)/	Practicum Website
https://my.jhsph.edu/Resources/SearchTools/pos/Pages/home.aspx	Practicum Opportunity Site
https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/_documents/Practicum_Examples.pdf	Practicum Examples

General Criteria for MPH Practicum

The following criteria reflect the minimum practicum requirements. Approval from the MPH Practicum Team is required prior to the student initiating each practicum experience. A practicum experience:

1. **Applies public health skills and competencies.** Students identify the public health skills and competencies relevant to their area of interest that are most beneficial to their career advancement. Students apply these skills and competencies in concert with knowledge gained from their coursework.
2. **Is framed and carried out within a public health practice context with an established organization or agency.** The practicum is a population-level focused project conducted in a practice context. Students may engage in activities at an individual level, but the primary purpose of the experience is to gain population-level practical experience at an established organization or agency. Students can not solely complete screenings, administer surveys, perform calculations, etc., but must be engaged in the larger public health practice context of the activities, as well as become familiar with the organization's overall purpose and decision-making process. A literature review or data analysis project alone will not meet the practicum requirement. The student must obtain input from the partnering organization and/or from the stakeholders (e.g., population impacted by project, other professionals/researchers completing similar work). There must be a clear link to how the practicum project makes an impact on the targeted population. Students should also develop a deeper understanding of the organization's mission, hierarchy and practices, as well as the challenges faced (funding, politics, efficiency, etc.) in achieving desired goals.

3. **Is supervised by a qualified preceptor.** The practicum preceptor must be qualified to evaluate the student's professional competence and supervise the student throughout the project. The preceptor is directly engaged in the population-level focused practicum activities. Preceptors can be from an organization outside of Johns Hopkins (e.g. community-based organization, health department, private corporation, etc.), or a BSPH faculty member if the faculty member is directly engaged with or is the lead on a project that meets the practicum criteria. The preceptor works with the student to develop project learning objectives and deliverables, and guides and monitors the student's progress and achievement. The student's faculty academic advisor will be kept informed of the student's practicum activities and progress and may provide additional assistance if warranted.
4. **Is a significant experience (minimum of 100 hours).** The practicum requirement is administered and tracked by the School's MPH Practicum Team. Students must have their proposed practicum project(s) approved prior to initiating their experience. The practicum requirement can be met in a variety of ways including a single experience or a combination of experiences. Students may work independently or in a team. Activities must be completed during the MPH year to be able to count towards the MPH practicum requirement.
5. **An evaluated experience.** Preceptors will evaluate on the achievement of defined learning objectives and deliverables by the preceptors. Additionally, students will reflect on and evaluate their overall practicum experiences, particularly as they relate to their career goals. A minimum grade of "C" must be earned in courses with a practicum component that are taken towards fulfilling the requirement. Students who register for practicum special studies credits are required to earn a "pass" for the experience to count towards the practicum requirement.

Competency-based Learning Objectives for MPH Practicum

Students will need to identify distinct learning objectives for the practicum that address learning and application in at least five competencies competencies from this list (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/_documents/MPH%20Practicum%20Competencies.pdf).

Steps to Completing the MPH Practicum

A detailed outline of all steps that students must follow to complete the MPH Practicum, including registration instructions, can be found on the MPH Practicum website (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/for-students/practicum-process.html) as well as in the MPH program manual. All Students must receive approval from the MPH Practicum Team prior to initiating each practicum experience.

Ways to Complete the Practicum Requirement

To meet the practicum requirement, the total practicum hours must be at least 100 hours; one may combine multiple experiences of less than 100 hours, to meet the total.
Completion of the PH.300.615 **or** PH.300.603 TOOLS OF PUBLIC HEALTH PRACTICE **course (required for all MPH students) with a grade of C or higher will earn students 10 practicum hours.**

BSPH APPROVED COURSES WITH A PRACTICUM COMPONENT

Some courses have a real-world practice component, connecting students to outside organizations/agencies. In some cases, the course is centered on a fully developed practice experience that fulfills the practicum requirement for all students who complete the course (i.e. Baltimore Community Practicum, PHASE Internship, and the Health Policy Institute). Other courses may have limited availability or may not fully meet the 100-hour minimum requirement.

For courses that do not fulfill the entire 100-hour practicum requirement, students must combine experiences to complete the practicum requirement in full. Students are expected to complete courses in their entirety with a final letter grade of "C" or better to count towards the practicum requirement.

Please use the following link to view the most current listing of approved practicum courses: http://www.jhsph.edu/offices-and-services/practice-and-training/practicum/for-students/practicum-courses.html

CUSTOMIZED PRACTICUM EXPERIENCES

Students may complete customized practicum experiences coordinated by a BSPH faculty member or in partnership with an outside BSPH preceptor.

Projects with a BSPH faculty member: Projects are developed and coordinated by the BSPH faculty member who may or may not serve as the Preceptor (e.g. in conjunction with a course, research study, grant, etc.). Some potential practicum projects with faculty may be established projects and are listed on the Practicum Opportunity Site. Students can also arrange other experiences with a faculty member.

Projects with an outside non-BSPH preceptor: Projects can be developed in other settings through their own connections, networks, prior work experience, etc. According to the CEPH accreditation document, "Applied practice experiences may involve governmental, non-governmental, non-profit, industrial and for-profit settings or appropriate university-affiliated settings. To be appropriate for applied practice experience activities, university-affiliated settings must be primarily focused on community engagement, typically with external partners. University health promotion or wellness centers may also be appropriate."[1]

Examples of customized projects include but are not limited to:

- programmatic cost effectiveness analysis;
- policy analysis and recommendations development with a local health department;
- budget impact analysis of the financial consequences of adoption of a new vaccine,
- qualitative and quantitative data analysis of poor health outcomes for a specific population;
- health curriculum planning and development of health education materials.

[1] https://ceph.org/assets/2016.Criteria.pdf

Finding Practicum Opportunities

Students may utilize the resources below to identify practicum experiences.

Practicum Opportunity Site – Office of Public Health Practice and Training

https://my.jhsph.edu/Resources/SearchTools/pos/Pages/home.aspx

The Practicum Opportunity Site (POS) lists various potential practicum opportunities (including projects with outside organizations, with BSPH faculty, and practicum courses) that have been identified and vetted by the School's Practicum Team.

SOURCE
http://www.jhsph.edu/source/
SOURCE is the community engagement and service-learning center for the Johns Hopkins University (JHU) Schools of Public Health, Nursing, and Medicine. Its mission is to engage the JHU health professional schools and Baltimore communities in mutually beneficial partnerships that promote health and social justice. There are multiple ways to engage in a practicum experience through SOURCE supported activities, including the SOURCE Service Scholars program, Baltimore Action Projects, Connection Community Consultants, and working directly with a SOURCE partner organization on a project. ***NOTE:* Not all SOURCE projects meet the practicum requirements**. Subscribe to the SOURCE Weekly Service Scoop to learn more about the latest community involvement opportunities in Baltimore City (http://source.jhu.edu/programs-and-events/service-scoop/).

Office of Public Health Practice and Training
https://www.jhsph.edu/offices-and-services/practice-and-training/
The Office of Public Health Practice and Training (Practice Office) is a schoolwide office dedicated to promoting excellence in public health practice at the Johns Hopkins Bloomberg School of Public Health. It works in partnership with students, staff, faculty, academic departments, centers, programs, community partners and alumni. The Practice Office also coordinates the MPH practicum. Any questions pertaining to the MPH practicum should be directed to the MPH Practicum Coordinator in the Practice Office. The MPH Practicum Coordinator can provide feedback/guidance on project ideas and also holds regular office hours throughout the year, during which students can drop by for advice.

Certificate Programs
https://www.jhsph.edu/academics/certificate-programs/
There are a few certificate programs that include their own practicum requirement in the curriculum (e.g. *Community-based Public Health*, and *Quality, Patient Safety, and Outcomes Research*). The certificate practicum may fulfill the MPH practicum requirement, upon approval from the practicum team. Please note: Some certificates may have separate practicum paperwork that will need to be completed in addition what you must submit for the MPH practicum.

Key Contact for Practicum
Paulani Mui, MPH Practicum Coordinator
Ph: (410) 502-8952 | Email: practice@jhu.edu

MPH Capstone Project

Overview

The MPH Capstone project is a requirement for graduation for students in the Master's of Public Health Program and is to be completed at the end of or within the final two terms of the program. The MPH Capstone is an opportunity for students to work on public health projects that are of interest to them. The goal is for students to synthesize, integrate and apply the skills and competencies they have acquired throughout the entire MPH program. Completion of the MPH capstone project requires completion of the course, PH.260.720 Communications Primer for the Public Health Sciences, and both a written and oral component to your project.

The project is done under the direction of a faculty member, the MPH capstone advisor. The capstone advisor will often be the student's advisor but does not have to be. Students can identify another faculty member to supervise the capstone, if more appropriate. **The capstone advisor must have a primary or joint appointment in the School of Public Health.** Department affiliation for any faculty member in the School can be determined by going to the Faculty Directory (https://publichealth.jhu.edu/faculty/directory/list/?combine=&work_type%5Bprimary%5D=primary) . If you are uncertain as to your capstone advisor's departmental affiliation, check with your advisor or the MPH Program office.

After identifying a capstone advisor and capstone topic, students are expected to communicate regularly with their capstone advisor about their progress. The iterative process between a student and capstone advisor is an important component in the development and completion of the written project. Please see the capstone completion timeline for specific deadlines.

Requirements

1. ***PH.260.720 Communications Primer for the Public Health Sciences***
   Students must complete the course, PH.260.720 Communications Primer for the Public Health Sciences as part of the MPH Capstone requirement. Students can complete this course at any time during their MPH program, but it ***must be completed no later than the term prior to their capstone presentation***. For example, if you plan to present your capstone project in December (Term 2), you must complete PH.260.720 Communications Primer for the Public Health Sciences no later than Term 1, prior to your capstone presentation. ***Please note:*** As part of this course, you will be required to present in a LiveTalk session. It will be your responsibility to choose the date and time of your presentation and participate as scheduled.
   This course also requires that your computer have a camera and microphone.
2. ***MPH Capstone – Course Number and Registration***
   Students are required to register for the 2-credit MPH Capstone in the term that the project will be completed – this includes both the written and oral components. For most students this will be 4th term. More information can be found in the "Registering for MPH Capstone" section.
3. ***MPH Capstone - Paper***
   To satisfy the written component, a student must write a paper. The paper must include:
   - An executive summary or structured abstract (limited to 300 words) and references
   - A summary of how the capstone project addresses the areas that you wanted to strengthen, as identified in your MPH Goals Analysis
   - While there are no formal guidelines on the length of the paper, it is expected that the paper will be approximately 20 pages (ranging between 15-25 double-spaced pages) not including references, tables and figures.
     Students who have been approved to pursue an optional MPH concentration should follow any additional specific concentration area requirements for the MPH capstone for that concentration.
4. ***MPH Capstone - Oral Presentation***
   Students are required to give a 15-minute oral presentation (10-minute presentation/5-minute discussion) summarizing their capstone project. Part-time students have the option of presenting online in August, December or May or at the in-person Symposium in May. Students participating in MPH concentrations sometimes present in an alternate venue that is designated by the concentration directors. Students may, with approval of their faculty capstone

advisors, be permitted to present at an alternate venue such as a scientific meeting or academic conference.

Possible Forms That the Capstone Project May Take

The capstone project can take many forms including one of the designs below, an expansion of a course, or an internship or practicum opportunity. The overarching principle used to determine if a capstone project is suitable is whether it provides students the opportunity to apply the skills and competencies acquired in the MPH program to a problem likely to be encountered in public health practice. The topic and format of the capstone project is flexible and is developed through discussions between the student and capstone advisor. Some examples of formats or designs for the capstone project include:

Literature Review
The capstone project would be an analysis of an important public health problem through a survey of current literature on the topic. The project would include sections that clearly describe and assess the problem and its magnitude, evaluate its causes and determinants, and discuss prevention and intervention strategies.

Program Plan
The capstone project would involve the development of a plan to implement a public health program. It would address critical issues such as management, fiscal, ethical and logistical issues.

Program Evaluation
The capstone project would involve the evaluation/monitoring of an existing public health program, such as process evaluation, monitoring of outputs and outcomes, impact assessment, and/or cost analysis.

Policy Analysis
The capstone project would involve analysis of the public health implications of a current or proposed policy. The project could include perspectives on economics and financing, need and demand, politics/ethics/law, or quality/effectiveness.

Research Proposal
The capstone project would simulate a grant proposal or research plan. The project would include a clear statement of the research question, the specific aims of the proposal, review of literature, study design, methods of analysis, implications and significance of the work. The research question would be one that is encountered in professional work such as the evaluation of a public health intervention.

Research Report
The capstone project could involve the collection, analysis, and/or interpretation of data to address a public health problem. The project could include sections on the research question, study design, data collection procedures, data analysis, interpretation, and significance of findings.

Secondary data analysis
Typically, the capstone research report is in the form of a secondary data analysis, using an existing data set. Please note that the appropriate IRB approval may need to be obtained for any project that uses data gathered from human subjects. Even in cases where the data is de-identified, a determination should be sought from the IRB office (see IRB section for further information).

Primary data analysis
Work for the MPH capstone can also involve the collection of data. Data collection for a capstone is usually in the context of an ongoing study. It is typically not feasible to initiate a new study involving primary data collection and requires special approval in the rare cases where feasible.

Using a course project as an MPH capstone project
Some courses in the School of Public Health require projects that could serve as a basis for an MPH capstone project. Students may use their work from any project-oriented course as a starting basis for their capstone but must build and expand on it for the final capstone project. Building on a project from a course may be helpful to some students because it provides additional structure and support. If a project from a course is used as a starting point for the capstone, the previous work must be placed in the list of references and the advisor will need a copy of the student's original paper. There are numerous courses in the School that are project oriented which could serve as a starting point for the capstone.

Capstone Project Timeline

Timeline for online presentations, August session

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 4th Term
Submit online Capstone Information Form	By early May
Submit final outline to capstone advisor	By late May
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By 3rd week of June
Submit final draft of project to capstone advisor	By 3rd week of July
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	August (see website for current year's date)

Timeline for online presentations, December sessions

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 1st Term
Submit online Capstone Information Form	By late August
Submit final outline to capstone advisor	By 3rd week of September
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By 3rd week of October
Submit final draft of project to capstone advisor	By mid-November
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date

Give oral presentation	December (see website for current year's date)

Timeline for online presentations, May sessions

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 3rd Term
Submit online Capstone Information Form	By early December
Submit final outline to capstone advisor	By early February
Register for capstone course for Summer Term	See academic calendar
Submit first draft of project to capstone advisor	By mid-March
Submit final draft of project to capstone advisor	By mid-April
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	May (see website for current year's date)

Timeline for in-person presentation at May Capstone Symposium

Event	Date
Complete PH.260.720: Communications Primer for the Public Health Sciences	No later than 3rd Term
Submit online Capstone Information Form	By early December
Submit final outline to capstone advisor	By early February
Register for capstone course for Summer Term	By mid-March
Submit first draft of project to capstone advisor	By late March
Submit final draft of project to capstone advisor	By 3rd week of April
Upload only the **capstone advisor approved final paper and slides** to drop box. Unapproved papers will not be accepted.	By one week before presentation date
Give oral presentation	May (see website for current year's date)

Timeline for presentation at alternate venue
Students presenting at an alternate venue must adhere to the schedules above, as per the time of year in which the project is completed. Deadlines for completion of the oral presentation are August online, December online, or the May symposium date, depending on the period in which the student is graduating.

Capstone Honors and Awards

The MPH Capstone Awards Committee bestows special honors to the best overall capstone projects. Nominations are accepted from capstone advisors. The winners will be selected by the awards committee based on the written project. Each capstone award winner receives a plaque for excellence. The student with the single overall best capstone project will also receive a $500 award.

Learning Outcomes

Foundational Public Health Knowledge

All MPH students will attain grounding in foundational public health knowledge as measured by the following learning objectives:

Profession & Science of Public Health

- Explain public health history, philosophy and values
- Identify the core functions of public health and the 10 Essential Services
- Explain the role of quantitative methods and sciences in describing and assessing a population's health
- Explain the role of qualitative methods and sciences in describing and assessing a population's health
- List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
- Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
- Explain the critical importance of evidence in advancing public health knowledge

Factors Related to Human Health

- Explain effects of environmental factors on a population's health
- Explain biological factors that affect a population's health
- Explain genetic factors that affect a population's health
- Explain behavioral and psychological factors that affect a population's health
- Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
- Explain how globalization affects global burdens of disease
- Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health)

Foundational Public Health Competencies

All MPH students will demonstrate achievement of the following competencies:

Evidence-based Approaches to Public Health

- Apply epidemiological methods to the breadth of settings and situations in public health practice
- Select quantitative data collection methods appropriate for a given public health context
- Select qualitative data collection methods appropriate for a given public health context
- Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate
- Analyze qualitative data using computer-based programming and software, as appropriate
- Interpret results of data analysis for public health research, policy or practice

Public Health & Health Care Systems

- Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings

- Discuss how structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels

Planning & Management to Promote Health

- Assess population needs, assets and capacities that affect communities' health
- Apply awareness of cultural values and practices to the design or implementation of public health policies or programs
- Design a population-based policy, program, project or intervention
- Explain basic principles and tools of budget and resource management
- Select methods to evaluate public health programs Policy in Public Health
- Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence
- Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
- Advocate for political, social or economic policies and programs that will improve health in diverse populations
- Evaluate policies for their impact on public health and health equity

Leadership

- Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making
- Apply negotiation and mediation skills to address organizational or community challenges

Communication

- Select communication strategies for different audiences and sectors
- Communicate audience-appropriate public health content, both in writing and through oral presentation
- Describe the importance of cultural competence in communicating public health content

Interprofessional Practice

- Perform effectively on interprofessional teams

Systems Thinking

- Apply systems thinking tools to a public health issue

DNP/MPH

About

The Bloomberg School and the School of Nursing of Johns Hopkins University offer the Doctor of Nursing- Executive Track and Master of Public Health (DNP/MPH (https://nursing.jhu.edu/academics/programs/doctoral/dnp/dnp-mph/dnp-mph.html)) dual degree program. This program prepares nurse leaders to take on executive level roles in healthcare and tackle critical public health challenges locally and globally. Students pursue an integrated curriculum with core coursework in nursing and public health, as well as flexibility to choose electives based on individual interests. The program is offered in a part-time, online format and is 3 years in length.

How to Apply

The School of Nursing serves as the student's "home" school and provides all administrative functions including admissions, financial aid, and course registration. Applications for the DNP/MPH must be obtained from and submitted to the School of Nursing and will be reviewed by the admissions committees of both schools. For best consideration, please submit the application by November 1st, the admission priority deadline date at the School of Nursing. Please visit their website for application instructions (https://nursing.jhu.edu/admissions/apply/).

DVM/MPH

About

Veterinary students desiring a Master of Public Health (MPH) may enroll in the MPH program after graduation or after at least two years of veterinary school. Students in the DVM/MPH program will earn a DVM from their veterinary school and an MPH from Johns Hopkins.

In particular, BSPH has partnered with the Ross University School of Veterinary Medicine (RUSVM) to offer combined degrees where JHSPH MPH graduates enter RUSVM to study veterinary medicine and that RUSVM DVM graduates enter the BSPH MPH program. For information on the RUSVM program, visit

https://veterinary.rossu.edu/admissions/dvm-admissions/articulation-agreements/johns-hopkins.html

Veterinary students typically enroll in the MPH program between the 3rd and 4th year of medical school. Coursework must be completed in the 11-month, full-time format (https://www.jhsph.edu/academics/degree-programs/master-of-public-health/program-overview/full-time.html). Learn more about the MPH curriculum.

How to Apply

Requirements (p. 500) are the same as the full-time MPH program. Veterinary students must apply to the program and request a leave of absence from veterinary school. The years of veterinary training will fulfill the two years of health experience required for admission to the School's MPH program. Veterinary students apply to the MPH program (http://www.jhsph.edu/admissions/how-to-apply/) through SOPHAS.

JD/MPH

About

The Juris Doctor and Master's of Public Health (JD/MPH) dual degree program prepares students in the overlapping fields of law, public health, policy and ethics.

Graduates earn a JD degree from their accredited U.S. law school and an MPH degree from the Bloomberg School. Both degrees are awarded upon completion of the program.

Students can enter the program after completing a minimum of two full-time semesters (one year) in law school.

Coursework must be completed in the 11-month, full-time format (https://www.jhsph.edu/academics/degree-programs/master-of-public-health/program-overview/full-time.html). Learn more about the MPH curriculum.

How to Apply

The JD/MPH program applicants must apply to the MPH program (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/how-to-apply/) through SOPHAS and request a leave of absence for one year from law school. Applicants not yet enrolled in law school must apply separately to the Bloomberg School (p. 54) and an accredited U.S. law school.

LLM/MPH

About

The Bloomberg School and the Georgetown University Law Center's O'Neill Institute for National and Global Health Law (https://www.law.georgetown.edu/academics/academic-programs/graduate-programs/degree-programs/global-health/joint-mph-llm.cfm) offer the Master's of Laws and the Master's of Public Health (LLM/MPH) dual degree program.

Students are trained in public health practice and the role of law in solving critical global health challenges. Graduates earn the LLM degree in Global Health Law from Georgetown University and the MPH degree from the Bloomberg School. Both degrees are awarded upon completion of the program.

The dual degree program begins at the Bloomberg School. However, the MPH Practicum requirement is fulfilled during Year 2 by completing the O'Neill Institute Practicum. The MPH program office must approve the practicum proposal.

- Year 1: MPH coursework in the 11-month, full-time format (https://www.jhsph.edu/academics/degree-programs/master-of-public-health/program-overview/full-time.html) in Baltimore, Maryland
- Year 2: LLM coursework, Georgetown University Law Center in Washington, D.C.

How to Apply

Applicants must apply to the Bloomberg School (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/how-to-apply/) using the SOPHAS application and to Georgetown University Law Center separately and simultaneously. The dual degree program requires acceptances from both schools.

Candidates who are not admitted to the dual degree program may still be eligible for admission to either the MPH Program or the LLM in Global Health Law Program, if they satisfy the individual program's admissions requirements.

MBA/MPH with China Europe International Business School

About

The Bloomberg School and the China Europe International Business School (CEIBS) offer the Master's of Business Administration and Master of Public Health (https://www.ceibs.edu/mba/ceibs-johns-hopkins/) (MBA/MPH) dual degree program.

Students pursue complementary studies in public health and international business. They observe first-hand the opportunities and challenges in China's giant health care market, which is vital for future leaders in global health.

Graduates earn the MBA degree from CEIBS and the MPH degree from the Bloomberg School.

Students earn both degrees in 23 months, six months less than if each degree were sought separately. Training includes population-based health, strategic planning, health economics and more.

- Year 1: MBA coursework, CEIBS, Shanghai Campus in China
- Year 2: MPH coursework in the 11-month, full-time format (https://www.jhsph.edu/academics/degree-programs/master-of-public-health/program-overview/full-time.html) in Baltimore, Maryland, U.S.

How to Apply

Requirements and deadlines are the same as the full-time MPH program, however, applicants must apply to CEIBS (http://www.ceibs.edu/mba/application/) and the Bloomberg School (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/how-to-apply/) separately. The application to the MPH program is processed through SOPHAS and applicants should take care to indicate the appropriate year they will begin the MPH program. The admissions committees of both schools review applications independently.

Applicants are required to take either the GRE (preferred) or the GMAT. IELTS and TOEFL scores are waived for students who meet the CEIBS English language requirement.

Meeting CEIBS's pre-MBA working experience requirement, together with the completion of one year MBA at CEIBS satisfies the health experience requirement of the MPH.

MD/MPH

About

The MD/MPH dual degree program provides medical students with a population-based perspective on health and tools to address public health challenges. Two years of training from Johns Hopkins School of Medicine (p. 909) or any accredited U.S. medical school fulfills the two years of health-related work experience required for admission to the Bloomberg School MPH program.

Medical students typically enroll in the MPH program between the 3rd and 4th year of medical school. Coursework must be completed in the 11-month, full-time format (p. 497). Learn more about the MPH curriculum (http://www.jhsph.edu/academics/degree-programs/master-of-public-health/curriculum/).

How to Apply

Requirements (p. 500) are the same as the full-time MPH program. Two years of U.S. medical training will fulfill the two years of health experience required for admission to the MPH program. International medical students must have previous health related experience. Medical students must apply to the MPH program (http://www.jhsph.edu/admissions/how-to-apply/) through SOPHAS and request a leave of absence for one year from medical school.

MD/PhD

About

In partnership with the Johns Hopkins School of Medicine (http://www.hopkinsmedicine.org/som/), the Bloomberg School offers students the opportunity to earn a Doctor of Medicine (MD) alongside a Doctor of Philosophy (PhD) (p. 986) – a rigorous combination that prepares graduates for prestigious careers in academic medicine.

The long-lasting relationship between the School of Medicine and the Bloomberg School – both situated along the same city block here in Baltimore – fosters the ideal environment for this combined six or eight year program.

Students complete two years of medical school before devoting themselves full-time to their PhD studies. After completion of the PhD degree requirements, students then complete their MD degree.

Interested "physician-scientists" should visit the MD/PhD Program's website (https://publichealth.jhu.edu/academics/doctor-of-medicine-and-doctor-of-philosophy-mdphd/)for full details on admission requirements and application procedures.

MPH/MBA

About

The Bloomberg School of Public Health and the Carey Business School of Johns Hopkins University offer the Master's of Public Health and Master's of Business Administration (MPH/MBA) dual degree program.

The MPH/MBA provides experienced professionals with the knowledge and skills to be successful leaders in health-related organizations.

Students pursue an integrated curriculum with both public health and business courses. They are trained in population-based health, strategic planning, health economics and more. The program requires 80 MPH credits and 63 MBA credits, for a minimum of 143 total credits to graduate.

Students complete the dual degree program in nine terms (two years). Tuition per term is based on the full-time rate at the Bloomberg School.

How to Apply

Requirements (p. 500) and deadlines are the same as the full-time MPH program. *Please note: all MPH/MBA applicants must submit a GRE or GMAT score (including applicants who hold an advanced degree).*

Applicants submit only one application for the MPH/MBA through the Bloomberg School (https://publichealth.jhu.edu/offices-and-services/office-of-admissions-services/how-to-apply/). Applications are processed through SOPHAS, and the admissions committees of both schools review applications independently.

Online Programs for Applied Learning (OPAL)

OPAL MAS and Certificate Programs

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

The OPAL post-baccalaureate certificates are designed to combine the academic excellence of Johns Hopkins with the flexibility of a fully online, part-time program. Students can complete a certificate is as little as one year, but have up to three years if needed.

Online Student Experience

What to Expect

Faculty record course lectures in the School's state-of-the-art recording suite. Each lecture goes through a comprehensive production process involving audio editing, technical writing, medical illustration, and quality assurance. Students are able to download videos, along with audio-only (MP3) and slide-only (PDF) versions, and text transcripts for offline review. This gives a lot of flexibility for students to choose the format that works best for their learning style.

Students, faculty, and teaching assistants interact with one another using a variety of asynchronous tools, including discussion forums, collaborative peer assessments, online document editing, and email. Real-time communication occurs during online office hours and/or LiveTalk sessions via Zoom web conferencing.

Preparing Students for Online Learning

Introduction to Online Learning is a free, mandatory prerequisite for all online courses offered. It's open to prospective students and designed to give a thorough view into what the online experience on CoursePlus will be like. It also prepares students and faculty for success on the first day of class since everyone is already acclimated to the technology. Introduction to Online Learning will allow students to:

- Ensure all tools and applications are properly installed
- Troubleshoot any component that may not work properly
- Experience the online tools for peer-to-peer and instructor communication
- Become familiar with the coursework structure and learning management system

The course takes between 1-4 hours to complete, depending on the student's skills working online. With the notable exception of one LiveTalk, students can do the class work on their own schedule. For details on the course, including assignments and requirements for completion, please see the Syllabus page.

Ready to test-drive online courses at BSPH? Register for this course. Students can take this free course at any point before or during the application process!

Programs

Master of Applied Science (MAS) degree programs

- Master of Applied Science in Community-Based Primary Health Care Programs in Global Health (p. 521)
- Master of Applied Science in Global Health Planning and Management (p. 524)
- Master of Applied Science in Humanitarian Health (p. 527)
- Master of Applied Science in Patient Safety and Healthcare Quality (p. 530)
- Master of Applied Science in Population Health Management (p. 532)

- Master of Applied Science in Spatial Analysis for Public Health (p. 534)

Please note: The MAS programs in Community-Based Primary Health Care Programs in Global Health, Global Health Planning and Management and Humanitarian Health are not open to new matriculants in AY22-23. Current students should follow the program requirements in place at the time of their admission. See program sections for additional information or reach out to the OPAL Program Office at OPAL-Office@jhu.edu.

POST-BACCALAUREATE CERTIFICATES

- Certificate in Global Health Practice (p. 594)
- Certificate in Global Tobacco Control (p. 595)
- Certificate in Population Health Management (p. 615)
- Certificate in Spatial Analysis for Public Health (p. 629)

Faculty

The Bloomberg School of Public Health is comprised of over 650 full-time faculty including professors, scientists, lecturers, instructors and researchers. These renowned experts in the field are shaping public health through teaching, research, and application. Faculty contribute to the OPAL programs via course development, teaching, and advising students. Below are a few of the experts students will learn from.

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Gilbert Burnham, MD
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Albert Wu, MD
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Master of Applied Science in Community-Based Primary Health Care Programs in Global Health, MAS

Program Overview

Please note: The Master of Applied Science (MAS) program in Community-based Primary Health Care Programs in Global Health is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online

Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

The MAS program in Community-based Primary Health Care builds on the community health strengths of the Bloomberg School and the Department of International Health, which provides unmatched opportunities for advanced training, focuses on both local and global issues, and prepares students to address public health problems through multidisciplinary approaches that apply the latest scientific knowledge. The program will provide students with the skills to plan, implement, and evaluate community-based public health programs and services in countries throughout the world. Our focus on Primary Health Care is in keeping with the Alma Ata Declaration that is built on active community participation. We hope that as a result of this course students will be able to involve the communities where they work in being active partners in the provision of their own health care.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage students to join this professional networking community.

BSPH OPAL Programs in Global Health (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8676619%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Community-based Primary Health Care Programs in Global Health Contact Information

MAS Program Adviser
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For Program-wide Issues
Elizabeth F. Topper, PhD, MEd, MPH
Senior Lecturer and Director, Online Programs for Applied Learning (OPAL)
Email: etopper@jhu.edu

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Please note: The Master of Applied Science (MAS) program in Community-based Primary Health Care Programs in Global Health is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

Master of Applied Science in Community-based Primary Health Care Programs in Global Health is an interdisciplinary online degree. Faculty at the Bloomberg School of Public Health contribute to the program via course development, teaching, and advising students. The topics and concepts allow graduates to build a diverse skill set focusing on the design, analysis, implementation and evaluation of large-scale community-based primary health care programs.

Students will complete 50.5 credits to graduate. The program is designed to be completed in 8 academic terms - two academic years (Sept-May). In addition to the coursework, students must complete an Integrative Activity, where newly acquired knowledge and skills are used to create an applicable activity (e.g., identifying a problem in community-based primary health care and designing a solution, plan for implementation and evaluation method) – with a final paper that describes the methodology used and the final assessment. Students can complete their degree program in as little as two years, but are allowed up to four years.

If the 2-credit Professional Development Workshop courses are not included in the required curriculum, students are still welcome to take them, in addition to the required degree courses outlined below. Current offerings include Effective Online Searching and Writing for Results. OPAL scholarship funds will apply towards these credits. Students should refer to the online course directory (www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) for additional details.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public health requires students to maintain satisfactory academic progress for the duration of the degree program. For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program, and financial aid status will be affected. Full details of the School's Satisfactory Academic Policy can be found here (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.600.601	Seminars in Public Health	2
PH.606.601	Fundamentals in Global Health Practice	4
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health May be taken during any term offered	0.5
	Credits	**6.5**
Second Term		
PH.604.621	Design and Planning of Primary Health Care Projects	4
PH.600.602	Seminars in Public Health: Advanced Topics	2
or PH.604.641 Disaster Preparedness (2 credits)		
or PH.602.721 Organizing PH: Systems Approach (2 credits)		
	Credits	**6**
Third Term		
PH.600.701	Introduction to Epidemiology	4
PH.604.604	Global Epidemiology Policies and Programs	3
	Credits	**7**
Fourth Term		
PH.600.709	Statistical Concepts in Public Health 1	3
PH.604.771	Social & Cultural Basis for Community and Primary Health Programs	3
	Credits	**6**
Second Year		
First Term		
PH.607.701	Health and Safety Preparation for Global Health Assignments	1
PH.607.704	Essential Medicines, Commodities and Supplies Needed for Community Level Primary Health Care Interventions	2
PH.607.711	Applying Evaluation to More Effectively Reach Communities Through Primary Health Care	3
	Credits	**6**
Second Term		
PH.607.721	Urban Primary Health Care in Low and Middle-income Countries	3
PH.607.724	Applying Household Surveys to Primary Health Care Programs	3
	Credits	**6**
Third Term		
PH.607.735	Planning Training and Learning Programs for Community Health Workers	4
PH.600.612	Professional Development: Writing for Results	2
	Credits	**6**
Fourth Term		
PH.607.751	Building Community Capacity for Primary Health Care in Low and Middle-Income Countries	3
PH.607.880	Integrative Activity in Community-Based Primary Health Care	4
	Credits	**7**
	Total Credits	**50.5**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

This culminating experience will provide Master of Applied Science students with the opportunity to synthesize lessons learned via the application of concepts and techniques. Please note that individual degree programs may have specific guidelines related to their particular Integrative Activity course including, but not limited to the format, presentation, and composition of final course deliverable.

As you begin planning the research for your Integrative Activity within the MAS program, please review the information below and proceed accordingly. Regardless of whether IRB review is required, all OPAL students should apply ethical principles in their interactions with humans and/or their data. Please follow the BSPH Ethical Code for Student Activities that Involve Human Interactions.

1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
2. If you do wish to publish your project while you are a student, you will need to test to see if you are conducting Human Subjects Research (HSR) which would necessitate IRB approval. You can test your project for HSR by using the IRB worksheet or consulting the IRB guidance flowchart. You will need to go to IRB for official/final determination **before** beginning your research in order to be approved for publication. All student-initiated research projects which you intend to publish must have a preliminary review by the IRB Office to determine whether they are human subjects research requiring IRB oversight, unless (1) the student is working with a Principal Investigator (PI) from another institution, or (2) the PI is adding you

as a student investigator to an existing, IRB-approved study. If you are using human subjects data, you must obtain a determination from the BSPH IRB. If you are collecting primary new data, complete the IRB Office Determination Request Form for Primary Data Collection or if you are using existing data, complete the IRB Office Determination Request Form for Secondary Data Analysis in collaboration with your adviser and submit it to the BSPH IRB Office e-mail address jhsph.irboffice@jhu.edu. Be sure to include your adviser in your e-mail submission.

3. If you do not intend to publish the project while you are a student, IRB approval will not be required. However, if you would be interested in publishing it after graduating from JHU, you should note that the *project must meet the ethical standards of your institution and that many institutions will not allow you to present/publish human subjects research without having prior IRB approval*. For this reason, we strongly recommend that you consult your organization now if you think that you may wish to publish in the future.

PROGRAM COMPETENCIES

Please note: The Master of Applied Science (MAS) program in Community-based Primary Health Care Programs in Global Health is not open to new applicants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science in Community-based Primary Health Care Programs in Global Health is an interdisciplinary program. Faculty at the Bloomberg School of Public Health contribute to the program via course development, teaching, and advising students. The topics and concepts allow graduates to build a diverse skill set focusing on the design, analysis, implementation and evaluation of large-scale community-based primary health care programs.

By the end of the program, students should be able to:

A. **Core Global Health Practice Competencies**

1. Apply capacity building processes to global health programming in low and middle-income countries.
2. Identify and collaborate with a wide range of stakeholders whose active participation is required for successful global health programming at community, sub-national, national and regional levels.
3. Apply ethical reasoning to the policy and programming decisions needed for designing and implementing global health programs in low and middle-income countries.
4. Exhibit a health equity and social justice lens in the design and conduct of global health programs.
5. Apply appropriate management processes in the design, implementation and evaluation of global health programs.
6. Demonstrate social, cultural and political awareness of the context in which global health programming takes place.
7. Conduct strategic analysis of factors that influence the success of global health programming.

B. **Community-Based Primary Health Care Competencies**

1. Use community-based approaches to address priority health problems through full participation of community members and groups
2. Design and manage implementation of household surveys that yield relevant health and social data needed to plan community-based PHC programs
3. Analyze local contexts and project implementation designs in order to develop evaluation plans that can be practically applied to community-based PHC programs in middle and low-resource settings
4. Design a community-based primary health care program from the analysis through implementation to evaluation stages
5. Prepare a training plan for front-line and community health workers involved in community-based PHC
6. Conduct a detailed analysis of the demographic, epidemiological and social aspects of a major health need in a low- or middle-income country.

Master of Applied Science in Global Health Planning and Management, MAS

Program Overview

Please note: The Master of Applied Science (MAS) program in Global Health Planning and Management is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

The MAS program in Global Health Planning and Management builds on the Health Systems Strengthening expertise of the Bloomberg School and the Department of International Health, which provides unmatched opportunities for advanced training, focuses on both local and global issues, and prepares students to address public health problems through multidisciplinary approaches that apply the latest scientific knowledge.

The program will provide students with the skills to plan, implement, and evaluate public health programs and services in countries throughout the world. We take a systems approach to understanding how to meet the health needs of communities and local governments/districts. We hope that as a result of this course students will build skills to plan and manage health programs in non-governmental and governmental agencies serving people in under-served areas and low and middle income countries.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage students to join this professional networking community.

BSPH OPAL Programs in Global Health (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8676619%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Community-based Primary Health Care Programs in Global Health Contact Information

MAS Program Adviser
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For Program-wide Issues
Elizabeth F. Topper, PhD, MEd, MPH
Senior Lecturer and Director, Online Programs for Applied Learning (OPAL)
Email: etopper@jhu.edu

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Please note: The Master of Applied Science (MAS) program in Global Health Planning and Management is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science in Global Health Planning and Management is an interdisciplinary program. Faculty at the Bloomberg School of Public Health contribute to the program via course development, teaching, and advising students. Courses equip students with the necessary skills to develop sustainable solutions to advance health initiatives throughout the world. Students are trained in epidemiology and statistics, form practical skills derived from workshops in professional development, and learn to understand critical issues facing the global health field.

Students will complete 51.5 credits to graduate. The program is designed to be completed in 8 academic terms - two academic years (Sept-May). In addition to the coursework, students must complete an Integrative Activity, where newly acquired knowledge and skills are used to create an applicable activity, with a final paper that describes the methodology used and the final assessment. Students can complete their degree program in as little as two years, but are allowed up to four years.

If the 2-credit Professional Development Workshop courses are not included in the required curriculum, students are still welcome to take them, in addition to the required degree courses outlined below. Current offerings include Effective Online Searching and Writing for Results. OPAL scholarship funds will apply towards these credits. Students should refer to the online course directory (www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) for additional details.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public Health requires students to maintain satisfactory academic progress for the duration of the degree program. For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program, and financial aid status will be affected. Full details of the School's Satisfactory Academic Policy can be found here (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	

PH.600.601	Seminars in Public Health	2
PH.606.601	Fundamentals in Global Health Practice	4
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health May be taken during any term offered	0.5
	Credits	**6.5**
Second Term		
PH.604.621	Design and Planning of Primary Health Care Projects	4
PH.600.602	Seminars in Public Health: Advanced Topics	2
or PH.604.731	Humanitarian Management & Leadership (2 credits)	
or PH.604.641	Disaster Preparedness (2 credits)	
	Credits	**6**
Third Term		
PH.600.701	Introduction to Epidemiology	4
PH.604.604	Global Epidemiology Policies and Programs	3
	Credits	**7**
Fourth Term		
PH.600.709	Statistical Concepts in Public Health 1	3
PH.604.771	Social & Cultural Basis for Community and Primary Health Programs	3
	Credits	**6**
Second Year		
First Term		
PH.607.701	Health and Safety Preparation for Global Health Assignments	1
PH.608.705	Emerging Trends in Pharmaceutical Systems Strengthening	3
PH.608.712	Frameworks and Tools for Health Systems in Global Settings	3
	Credits	**7**
Second Term		
PH.608.725	Quality Management Concepts and Tools for Healthcare in Low and Middle income Countries	4
PH.602.721	Organizing for Public Health: A Systems Approach	2
	Credits	**6**
Third Term		
PH.600.612	Professional Development: Writing for Results	2
PH.602.731	Population and Consumer Health Informatics	3
PH.606.651	Seminars in Health Management Information Systems for Low- and Middle-Income Countries	1
	Credits	**6**
Fourth Term		
PH.608.771	Non-Governmental Organizations and the Administration of Global Health Programs	3
PH.608.880	Integrative Activity in Global Health Planning and Management	4
	Credits	**7**
	Total Credits	**51.5**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

This culminating experience will provide Master of Applied Science students with the opportunity to synthesize lessons learned via the application of concepts and techniques. Please note that individual degree programs may have specific guidelines related to their particular Integrative Activity course including, but not limited to the format, presentation, and composition of final course deliverable.

As you begin planning the research for your Integrative Activity within the MAS program, please review the information below and proceed accordingly. Regardless of whether IRB review is required, all OPAL students should apply ethical principles in their interactions with humans and/or their data. Please follow the BSPH Ethical Code for Student Activities that Involve Human Interactions.

1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
2. If you do wish to publish your project while you are a student, you will need to test to see if you are conducting Human Subjects Research (HSR) which would necessitate IRB approval. You can test your project for HSR by using the IRB worksheet or consulting the IRB guidance flowchart. You will need to go to IRB for official/final determination **before** beginning your research in order to be approved for publication. All student-initiated research projects which you intend to publish must have a preliminary review by the IRB Office to determine whether they are human subjects research requiring IRB oversight, unless: (1) the student is working with a Principal Investigator (PI) from another institution, or (2) the PI is adding you as a student investigator to an existing, IRB-approved study. If you are using human subjects data, you must obtain a determination from the BSPH IRB. If you are collecting primary new data, complete the IRB Office Determination Request Form for Primary Data Collection, or if you are using existing data, complete the IRB Office Determination Request Form for Secondary Data Analysis in collaboration with your adviser and submit it to the BSPH IRB Office e-mail address jhsph.irboffice@jhu.edu. Be sure to include your adviser in your e-mail submission.
3. If you do not intend to publish the project while you are a student, IRB approval will not be required. However, if you would be interested in publishing it after graduating from JHU, you should note that the project *must meet the ethical standards of your institution and that many institutions will not allow you to present/publish human subjects research without having prior IRB approval.* For this reason, we strongly recommend that you consult your organization now if you think that you may wish to publish in the future.

PROGRAM COMPETENCIES

Please note: The Master of Applied Science (MAS) program in Global Health Planning and Management is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) in Global Health Planning and Management curriculum is delivered entirely online and designed for working students. Courses equip students with the necessary skills to develop sustainable solutions to advance health initiatives throughout the world. Online students are trained in epidemiology and statistics, form practical skills derived from workshops in professional development, and learn to understand critical issues facing the global health field.

By the end of the program, students should be able to:

A. **Core Global Health Practice Competencies**

1. Apply capacity building processes to global health programming in low and middle-income countries.
2. Identify and collaborate with a wide range of stakeholders whose active participation is required for successful global health programming at community, sub-national, national and regional levels.
3. Apply ethical reasoning to the policy and programming decisions needed for designing and implementing global health programs in low and middle-income countries.
4. Exhibit a health equity and social justice lens in the design and conduct of global health programs.
5. Apply appropriate management processes in the design, implementation and evaluation of global health programs.
6. Demonstrate social, cultural and political awareness of the context in which global health programming takes place.
7. Conduct strategic analysis of factors that influence the success of global health programming.

B. **Global Health Planning and Management Competencies**

1. Apply frameworks, tools, strategies and models to improve the planning and management of global health programs and organizations in low- and middle-income countries.
2. Identify and apply principles and practices of total quality management methods for health systems in developing countries.
3. Utilize systems thinking to determine how societies organize themselves to achieve collective health goals and contribute to policy outcomes in global settings.
4. Demonstrate skills for managing non-governmental organizations in the health sector in LMICs.
5. Utilize appropriate evaluation designs and approaches for public health programs in LMICs and advocate the uptake of program results by policymakers.
6. Conduct a detailed analysis of the demographic, epidemiological and social aspects of a major health need in a low- or middle-income country.

Master of Applied Science in Humanitarian Health, MAS

Program Overview

Please note: The Master of Applied Science (MAS) program in Humanitarian Health is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

Graduates gain necessary tools to adopt and adapt to the rapidly changing roles of the humanitarian professional and to support humanitarian organizations in service delivery, applied research and public health advocacy. The Humanitarian Health Master's program focuses on both local and global issues, and prepares students to address public health problems through multidisciplinary approaches that apply the latest scientific knowledge.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

BSPH OPAL Humanitarian Health (https://www.linkedin.com/groups/8675738/)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Humanitarian Health Contact Information

MAS Program Advisers
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For Program-wide Issues
Elizabeth F. Topper, PhD, MEd, MPH
Senior Lecturer and Director, Online Programs for Applied Learning (OPAL)
Email: etopper@jhu.edu

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Please note: The Master of Applied Science (MAS) program in Humanitarian Health is not open to new matriculants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) in Humanitarian Health curriculum is delivered entirely online and designed for working students. The part-time, 49.5-credit degree program consists of intensive graduate-level coursework culminating in the Integrative Activity, which requires students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates their mastery of the program competencies. Students may complete the degree over a minimum of eight 8-week terms, in two years to a maximum of four years.

Courses reflect the breadth of global public health; online students are trained in epidemiology and biostatistics, form practical skills derived from workshops in professional development, and understand critical issues in the humanitarian and disaster fields.

If the 2-credit Professional Development Workshop courses are not included in the required curriculum, students are still welcome to take them, in addition to the required degree courses outlined below. Current offerings include Effective Online Searching and Writing for Results. OPAL scholarship funds will apply towards these credits. Students should refer to the online course directory (www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) for additional details.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public Health requires students to maintain satisfactory academic progress for the duration of the degree program.

For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program, and financial aid status will be affected. Full details of the School's Satisfactory Academic Policy can be found here (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.600.601	Seminars in Public Health	2
PH.604.601	Public Health Humanitarian Emergencies	4
PH.552.612	Essentials of One Health May be taken during any term offered	0.5
	Credits	**6.5**
Second Term		
PH.604.621	Design and Planning of Primary Health Care Projects	4
PH.604.641	Disaster Preparedness	2
	Credits	**6**
Third Term		
PH.604.651	Introduction of Water, Sanitation and Hygiene in Emergencies	2
PH.600.701	Introduction to Epidemiology	4
	Credits	**6**
Fourth Term		
PH.600.709	Statistical Concepts in Public Health 1	3
PH.604.771	Social & Cultural Basis for Community and Primary Health Programs	3
	Credits	**6**
Second Year		
First Term		
PH.604.701	Assessment Approaches in Humanitarian Settings	3
PH.604.715	Health Needs and Service Provision in Humanitarian Emergencies	3
	Credits	**6**

Second Term		
PH.604.721	Securing Food Assistance and Nutrition in Humanitarian Emergencies	2
PH.604.731	Management and Leadership in Humanitarian Health	2
PH.600.602 or PH.602.721	Seminars in Public Health: Advanced Topics or Organizing for Public Health: A Systems Approach	2
	Credits	**6**
Third Term		
PH.604.741	Human Rights in Humanitarian Emergencies	2
PH.604.751	Mental Health and Psychosocial Support in Low-Resource Humanitarian Emergencies	2
PH.600.612	Professional Development: Writing for Results	2
	Credits	**6**
Fourth Term		
PH.608.771	Non-Governmental Organizations and the Administration of Global Health Programs	3
PH.604.880	Humanitarian Health integrative Activity	4
	Credits	**7**
	Total Credits	**49.5**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

This culminating experience will provide Master of Applied Science students with the opportunity to synthesize lessons learned via the application of concepts and techniques. Please note that individual degree programs may have specific guidelines related to their particular Integrative Activity course including, but not limited to, the format, presentation, and composition of final course deliverable.

As you begin planning the research for your Integrative Activity within the MAS program, please review the information below and proceed accordingly. Regardless of whether IRB review is required, all OPAL students should apply ethical principles in their interactions with humans and/or their data. Please follow the BSPH Ethical Code for Student Activities that Involve Human Interactions.

1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
2. If you do wish to publish your project while you are a student, you will need to test to see if you are conducting Human Subjects Research (HSR) which would necessitate IRB approval. You can test your project for HSR by using the IRB worksheet or consulting the IRB guidance flowchart. You will need to go to IRB for official/final determination **before** beginning your research in order to be approved for publication. All student-initiated research projects which you intend to publish must have a preliminary review by the IRB Office to determine whether they are human subjects research requiring IRB oversight, unless: (1) the student is working with a Principal Investigator (PI) from another institution, or (2) the PI is adding you as a student investigator to an existing, IRB-approved study. If you are using human subjects data, you must obtain a determination from the BSPH IRB. If you are collecting primary new data, complete the IRB Office Determination Request Form for Primary Data Collection or if you are using existing data, complete the IRB Office Determination Request Form for Secondary Data Analysis in collaboration with your adviser and submit it to the BSPH IRB Office e-mail address jhsph.irboffice@jhu.edu. Be sure to include your adviser in your e-mail submission.
3. If you do not intend to publish the project while you are a student, IRB approval will not be required. However, if you would be interested in publishing it after graduating from JHU, you should note that *the project must meet the ethical standards of your institution and that many institutions will not allow you to present/publish human subjects research without having prior IRB approval*. For this reason, we strongly recommend that you consult your organization now if you think that you may wish to publish in the future.

PROGRAM COMPETENCIES

Please note: The Master of Applied Science (MAS) program in Humanitarian Health is not open to new applicants in AY22-23. Students previously admitted to the program should consult the prior catalogue/guidebook under which they were admitted or review the OPAL Student Resources site in CoursePlus. For additional information, please follow up directly with OPAL Office to verify program requirements; OPAL-Office@jhu.edu.

The Master of Applied Science (MAS) in Humanitarian Health curriculum is delivered entirely online and designed for working students. Courses reflect the breadth of global public health; online students are trained in epidemiology and biostatistics, form practical skills derived from workshops in professional development, and understand critical issues in the humanitarian and disaster fields.

By the end of the program, students should be able to:

1. Demonstrate knowledge of humanitarian architecture, including key organizations, international and UN systems, and sectors, including health; water, sanitation, and hygiene (WASH); shelter; nutrition; food security; and protection.
2. Demonstrate knowledge of core humanitarian and human rights principles, treaty instruments, and codes of ethical conduct in humanitarian and disaster settings.
3. Apply skills in assessment, monitoring and evaluation, and research relevant to humanitarian contexts—including qualitative, quantitative and mixed methods.
4. Apply skills in humanitarian health project design, planning and implementation, including awareness of appropriate interventions and how to contextualize them in operational settings.
5. Critically assess and synthesize information relevant to humanitarian health interventions, prioritize decisions and actions, and communicate decisions and actions effectively.
6. Demonstrate key management and leadership skills needed to function in humanitarian and disaster contexts, including developing and maintaining collaborative relationships, operating safely and effectively, adapting and coping, and maintaining professionalism and critical judgment.
7. Apply leadership and management skills, as well as program evaluation methods, to inform decision-making in humanitarian and disaster settings.

Master of Applied Science in Patient Safety and Healthcare Quality, MAS

Program Overview

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

The Patient Safety and Healthcare Quality master's program is an interdisciplinary degree offered by the Johns Hopkins University. It is a first of its kind collaboration between the Bloomberg School of Public Health, Johns Hopkins School of Medicine, Johns Hopkins School of Nursing and the Armstrong Institute for Patient Safety and Quality. It combines coursework from JHU's top-ranked schools with the Armstrong Institute's pioneering advances in patient safety. The program is designed to educate students in the transformative mechanisms and evidence-based protocols that reduce preventable patient harm and improve clinical outcomes.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage students to join this professional networking community.

B (https://www.linkedin.com/groups/8675147/)SPH OPAL Patient Safety and Healthcare Quality (https://www.linkedin.com/groups/8675147/)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

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The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Patient Safety Contact Information

MAS Program Advisers

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For Program-wide Issues

Elizabeth F. Topper, PhD, MEd, MPH
Senior Lecturer and Director, Online Programs for Applied Learning (OPAL)
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Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The Master of Applied Science in Patient Safety and Healthcare Quality is an interdisciplinary degree offered fully online. The topics and concepts educate students in the transformative mechanisms and evidence-based protocols that reduce preventable patient harm and improve clinical outcomes.

Students will complete 48.5 credits to graduate. The program is designed to be completed in two academic years (Sept-May). In addition to the coursework, students must complete an Integrative Activity, where newly acquired knowledge and skills are used to create an applicable activity (e.g., identifying a patient safety or healthcare quality problem and designing a solution, plan for implementation and evaluation method) – with a final paper that describes the methodology used and the final assessment. Students can complete their degree program in as little as two years, but are allowed up to four years.

If the 2-credit Professional Development Workshop courses are not included in the required curriculum, students are still welcome to take them, in addition to the required degree courses outlined below. Current offerings include Effective Online Searching and Writing for Results. OPAL scholarship funds will apply towards these credits. Students should refer to the online course directory (www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) for additional details.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public Health requires students to maintain satisfactory academic progress for the duration of the degree program. For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program, and financial aid status will be affected. Full details of the School's Satisfactory Academic Policy can be found here (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.600.601	Seminars in Public Health	2
PH.603.711	Science of Patient Safety	4
PH.552.612	Essentials of One Health May be taken during any term offered	0.5
	Credits	**6.5**
Second Term		
PH.603.651	Case Studies in Quality and Patient Safety	2
PH.603.701	Introduction to Quality of Care for Practitioners	4
	Credits	**6**
Third Term		
PH.600.612	Professional Development: Writing for Results	2
PH.600.701	Introduction to Epidemiology	4
	Credits	**6**
Fourth Term		
PH.600.709	Statistical Concepts in Public Health 1	3
PH.603.721	Leadership for Change and Patient Safety and Quality Improvement	3
	Credits	**6**
Second Year		
First Term		
PH.600.710	Statistical Concepts in Public Health 2	3
PH.603.702	Quality Improvement Tools	3
	Credits	**6**
Second Term		
PH.600.702	Intermediate Epidemiology	4
PH.600.602	Seminars in Public Health: Advanced Topics	2
	Credits	**6**
Third Term		
PH.603.751	Infection Prevention in Healthcare Settings	2
PH.603.731	Measurement and Evaluation in Quality and Safety	4
	Credits	**6**
Fourth Term		
PH.603.880	Patient Safety and Healthcare Quality integrative Activity	4
PH.603.931	Measurement Lab in Quality & Safety	2
	Credits	**6**
	Total Credits	**48.5**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

This culminating experience will provide Master of Applied Science students with the opportunity to synthesize lessons learned via the application of concepts and techniques. Please note that individual degree programs may have specific guidelines related to their particular Integrative Activity course including, but not limited to, the format, presentation, and composition of final course deliverable.

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1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
2. If you do wish to publish your project while you are a student, you will need to test to see if you are conducting Human Subjects Research (HSR) which would necessitate IRB approval. You can test your project for HSR by using the IRB worksheet or consulting the IRB guidance flowchart. You will need to go to IRB for official/final determination **before** beginning your research in order to be approved for publication. All student-initiated research projects which you intend to publish must have a preliminary review by the IRB Office to determine whether they are human subjects research requiring IRB oversight, unless: (1) the student is working with a Principal Investigator (PI) from another institution, or (2) the PI is adding you as a student investigator to an existing, IRB-approved study. If you are using human subjects data, you must obtain a

determination from the BSPH IRB. If you are collecting primary new data, complete the IRB Office Determination Request Form for Primary Data Collection or if you are using existing data, complete the IRB Office Determination Request Form for Secondary Data Analysis in collaboration with your adviser and submit it to the BSPH IRB Office e-mail address jhsph.irboffice@jhu.edu. Be sure to include your adviser in your e-mail submission.
3. If you do not intend to publish the project while you are a student, IRB approval will not be required. However, if you would be interested in publishing it after graduating from JHU, you should note that *the project must meet the ethical standards of your institution and that many institutions will not allow you to present/publish human subjects research without having prior IRB approval*. For this reason, we strongly recommend that you consult your organization now if you think you may wish to publish in the future.

PROGRAM COMPETENCIES

The Master of Applied Science in Patient Safety and Healthcare Quality is an interdisciplinary degree offered fully online. It spans several divisions across Johns Hopkins University. Faculty at the Bloomberg School of Public Health, the Johns Hopkins School of Medicine and the Johns Hopkins School of Nursing contribute to the program via course development, teaching, and advising students. The topics and concepts educate students in the transformative mechanisms and evidence-based protocols that reduce preventable patient harm and improve clinical outcomes.

By the end of the program, students should be able to:

1. Describe several frameworks and theories for assessing and improving the quality of care
2. Describe current key policy and programmatic areas in quality of care
3. Describe how to assess quality of care for a medical condition
4. Describe key elements of published quality assessment and improvement studies
5. Articulate how to develop a workable quality improvement and evaluation plan
6. Recognize the extent of problems in patient safety in medical care
7. Describe the role of various systems and factors in creating safety and causing errors and adverse events
8. Discuss problems and issues in measuring and reporting safety
9. Demonstrate knowledge of the basics of conducting an incident investigation and disclosing an adverse event
10. Design solutions to improve patient safety
11. Articulate the ethical, legal, and regulatory implications related to patient safety

Master of Applied Science in Population Health Management, MAS

Program Overview

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions.

Population health management has emerged as an important strategy for health care providers and payers. The MAS program in Population Health Management prepares students to examine and respond to both challenges and opportunities to improve health within and across populations. The program is structured to guide health care professionals seeking to transform systems into sustainable models of value-driven accountable care.

The interdisciplinary curriculum also examines the importance of the determinants of health, including medical care, public health, genetics, personal behaviors and lifestyle, and a broad range of social, environmental, and economic factors.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

B (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8673634%2F)SPH OPAL Population Health Management (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8673634%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Population Health Management Contact Information

MAS Program Advisers

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For Program-wide Issues

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Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The Master of Applied Science in Population Health Management is an interdisciplinary program. The Master of Applied Science (MAS) in Population Health Management provides students the opportunity to learn from experts and develop advanced skills in population health leadership and management, informatics, assessment, and social and behavioral techniques to engage communities and improve health.

Students will complete 50 credits to graduate. The program is designed to be completed in eight academic terms - two academic years (Sept-May). In addition to the coursework, students must complete an Integrative Activity, where newly acquired knowledge and skills are used to create an applicable activity (e.g., a service-learning project that showcases the collective impact on an aspect of public health) – with a final paper that describes the methodology used and the final assessment. While courses have no formal prerequisites, second year courses cannot be taken until first year courses are completed.

If the 2-credit Professional Development Workshop courses are not included in the required curriculum, students are still welcome to take them, in addition to the required degree courses outlined below. Current offerings include Effective Online Searching and Writing for Results. OPAL scholarship funds will apply towards these credits. Students should refer to the online course directory (www.jhsph.edu/courses (http://www.jhsph.edu/courses/)) for additional details.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public Health requires students to maintain satisfactory academic progress for the duration of the degree program. For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

Failure to maintain satisfactory academic progress as defined by any of the criteria above may be grounds for dismissal from the program, and financial aid status will be affected. Full details of the School's Satisfactory Academic Policy can be found here (https://publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.602.631	Essentials of Population Health Management	3
PH.602.651	Principles and Applications of Advanced Payment Models in Population Health Management	3
	Credits	**6**
Second Term		
PH.602.671	Collective Impact: Developing and Leading Community Partnerships to Improve Population Health	3
PH.602.681	Applications in Accountable Care: Assessing Quality and Effectiveness of Population Health initiatives	3
	Credits	**6**
Third Term		
PH.602.731	Population and Consumer Health Informatics	3
PH.600.701	Introduction to Epidemiology	4
	Credits	**7**
Fourth Term		
PH.600.709	Statistical Concepts in Public Health 1	3
PH.602.691	Managing Health Across the Continuum: Contemporary Models and Applications of Care Coordination and Management	3
	Credits	**6**
Second Year		
First Term		
PH.602.701	Applied Concepts and Foundations of High Performance for Population Health	3
PH.602.711	Health Behavior: Improving Health Through Health Education/Promotion	3
	Credits	**6**

Second Term		
PH.602.721	Organizing for Public Health: A Systems Approach	2
PH.602.741	Behavioral Economics and Risk: Value-Based Payment Methods and incentives	4
	Credits	**6**
Third Term		
PH.602.751	The Built Environment: Influences and Challenges to Improving Population Health	3
PH.602.761	Value-Based Concepts of Socially-Responsible Leadership	3
	Credits	**6**
Fourth Term		
PH.604.771	Social & Cultural Basis for Community and Primary Health Programs	3
PH.602.880	Population Health Management integrative Activity	4
	Credits	**7**
	Total Credits	**50**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

This culminating experience will provide Master of Applied Science students with the opportunity to synthesize lessons learned via the application of concepts and techniques. Please note that individual degree programs may have specific guidelines related to their particular Integrative Activity course including, but not limited to the format, presentation, and composition of final course deliverable.

As you begin planning the research for your Integrative Activity within the MAS program, please review the information below and proceed accordingly. Regardless of whether IRB review is required, all OPAL students should apply ethical principles in their interactions with humans and/or their data. Please follow the BSPH Ethical Code for Student Activities that Involve Human Interactions.

1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
2. If you do wish to publish your project while you are a student, you will need to test to see if you are conducting Human Subjects Research (HSR) which would necessitate IRB approval. You can test your project for HSR by using the IRB worksheet or consulting the IRB guidance flowchart. You will need to go to IRB for official/final determination **before** beginning your research in order to be approved for publication. All student-initiated research projects which you intend to publish must have a preliminary review by the IRB Office to determine whether they are human subjects research requiring IRB oversight, unless: (1) the student is working with a Principal Investigator (PI) from another institution, or (2) the PI is adding you as a student investigator to an existing, IRB-approved study. If you are using human subjects data, you must obtain a determination from the BSPH IRB. If you are collecting primary new data, complete the IRB Office Determination Request Form for Primary Data Collection or if you are using existing data, complete the IRB Office Determination Request Form for Secondary Data Analysis in collaboration with your adviser and submit it to the BSPH IRB Office e-mail address jhsph.irboffice@jhu.edu. Be sure to include your adviser in your e-mail submission.
3. If you do not intend to publish the project while you are a student, IRB approval will not be required. However, if you would be interested in publishing it after graduating from JHU, you should note that the project *must meet the ethical standards of your institution and that many institutions will not allow you to present/publish human subjects research without having prior IRB approval.* For this reason, we strongly recommend that you consult your organization now if you think that you may wish to publish in the future.

PROGRAM COMPETENCIES

The Master of Applied Science in Population Health Management is an interdisciplinary program. The Master of Applied Science (MAS) in Population Health Management provides students the opportunity to learn from experts and develop advanced skills in population health leadership and management, informatics, assessment, and social and behavioral techniques to engage communities and improve health.

By the end of the program, students should be able to:

1. Apply the essentials of public health practice to identifying determinants of population health that impact health outcomes in a community and design low cost interventions;
2. Apply leadership in the formation and management of health systems organizations that consist of, and rely upon, diverse stakeholders in the organization and delivery of community-based systems of care;
3. Communicate effectively to constituencies both within and outside of the health system;
4. Articulate and apply frameworks for collecting, analyzing and using data to inform decisions, facilitate care coordination and improve health outcomes of targeted populations within and outside the health system;
5. Support state and local public health agency efforts in assessing health needs, quality of services and strategies for health services research.
6. Evaluate payment systems and risk mitigation strategies and develop new structures to function under evolving value-based payment models emphasizing low cost, high quality care;
7. Describe new methods for assessing the health needs of a population, working with stakeholders to establish meaningful targets and applying scientific frameworks for measuring and reporting progress;
8. Apply social and behavioral constructs to develop and enhance community engagement and involvement to improve health;
9. Engage in a population health practicum designed to allow the student to work on a project to integrate clinical care and public health practice around an identified community need.

Master of Applied Science in Spatial Analysis for Public Health, MAS

Program Overview

The Master of Applied Science (MAS) is a fully online, part-time degree designed for working professionals, delivered through the Online Programs for Applied Learning (OPAL). Programs focus on emergent industry sectors in public health and health care that have a need for highly skilled professionals. By building on the strengths of the School, they provide unmatched opportunities for advanced training and focus on both local and global health issues. Students are prepared to create innovative solutions through multidisciplinary approaches that apply the latest scientific knowledge. All MAS programs will culminate in a final Integrative Activity. The goal of this activity is for students to synthesize knowledge and skills obtained through coursework in a final project that demonstrates mastery of program competencies, as applied to real-world public health and health care questions. Students can complete their degree program in as little as two years, but are allowed up to four years.

The MAS program in Spatial Analysis for Public Health is an interdisciplinary program. Faculty at the Bloomberg School of Public Health contribute to the program via course development, teaching, and advising students. The topics and concepts allow graduates to effectively design and conduct public health-related spatial analysis by applying knowledge and tools learned in the program.

Students are equipped with the skills to understand, map, analyze and interpret spatial data as they relate to public health. The program will provide learners with skill-oriented training in spatial analysis taught through a comprehensive spatial science paradigm to include courses in spatial data, geographic information systems and spatial statistics. The program also offers training in epidemiology and biostatistics, courses that reflect the breadth and depth of public health and practical skills derived from workshops in professional development.

LinkedIn Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage students to join this professional networking community.

B (https://www.linkedin.com/groups/8676099/)SPH OPAL Spatial Analysis for Public Health (https://www.linkedin.com/groups/8676099/)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

MAS in Spatial Analysis Contact Information

MAS Program Advisers

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For Program-wide Issues

Elizabeth F. Topper, PhD, MEd, MPH
Senior Lecturer and Director, Online Programs for Applied Learning (OPAL)
Email: etopper@jhu.edu

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

The Master of Applied Science in Spatial Analysis for Public Health is an interdisciplinary program. Faculty at the Bloomberg School of Public Health contribute to the program via course development, teaching, and advising students. The topics and concepts allow graduates to effectively design and conduct public health-related spatial analysis by applying knowledge and tools learned in the program.

Students will complete 50.5 credits to graduate. The program is designed to be completed in 8 academic terms - two academic years (Sept-May). In addition to the coursework, students must complete an Integrative Activity, where newly acquired knowledge and skills are used to create an applicable activity (e.g., design a study, plot the map and analyze the data) – with a final paper that describes the methodology used and the final assessment. Students can complete their degree program in as little as two years, but are allowed up to four years.

Satisfactory Academic Progress (SAP)

The Bloomberg School of Public Health requires students to maintain satisfactory academic progress for the duration of the degree program. For the MAS program, satisfactory academic progress is defined as follows:

Maintaining a minimum cumulative grade point average of 2.75 and grades of C or better in all required courses. Grades of P are sufficient in courses that are graded as Pass/Fail. Students falling below this minimum should consult with the OPAL Program Office and their Academic Adviser in order to develop a course plan to allow them to raise the GPA above 2.75 as soon as possible, in order to return to good academic standing.

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publichealth.jhu.edu/offices-and-services/office-of-student-affairs/financial-aid/federal-aid-policies/).

Program Plan of Study

Students should follow the plan outlined below if they wish to complete the MAS program in two years. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.600.601	Seminars in Public Health	2
PH.601.731	Spatial Analysis for Public Health	4
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health May be taken during any term offered	0.5
	Credits	**6.5**
Second Term		
PH.601.732	Spatial Data Technologies for Mapping	4
PH.600.602	Seminars in Public Health: Advanced Topics	2
	Credits	**6**
Third Term		
PH.600.701	Introduction to Epidemiology	4
PH.600.612	Professional Development: Writing for Results	2
	Credits	**6**
Fourth Term		
PH.600.711	Public Health Statistics I	4
PH.601.931	Spatial Analysis Lab 1	2
	Credits	**6**
Second Year		
First Term		
PH.600.712	Public Health Statistics II	4
PH.600.611	Professional Development Workshops: Effective online Searching	2
	Credits	**6**
Second Term		
PH.600.702	Intermediate Epidemiology	4
PH.601.932	Spatial Analysis Lab 2	2
	Credits	**6**
Third Term		
PH.601.733	Applied Spatial Statistics	4
PH.601.805	Spatial Analysis Journal Club	2
	Credits	**6**
Fourth Term		
PH.601.734	Spatial Applications	4
PH.601.880	Spatial Analysis integrative Activity	4
	Credits	**8**
	Total Credits	**50.5**

Integrative Activity

Online Programs for Applied Learning (OPAL) Integrative Activity: Human Subjects Research and Other Activities

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1. As long as the project is limited to the context of the course, or courses if components of the Integrative Activity is spread among more than one course, there is no need for IRB approval, even if the project involves human subjects research. These types of student projects are considered learning exercises when there is no plan to disseminate beyond the class, School, or affiliated agency.
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PROGRAM COMPETENCIES

The Master of Applied Science in Spatial Analysis for Public Health is an interdisciplinary program. The goal of the MAS in Spatial Analysis for Public Health program is to prepare students from diverse individual and professional backgrounds for positions that utilize spatial data to address public health problems.

By the end of the program, students should be able to:

1. Interpret and critique epidemiologic studies addressing public health problems
2. Apply measures of morbidity and mortality to the evaluation and comparison of the health of populations
3. Synthesize how geography affects public health
4. Obtain and transfer information from spatial data technologies into a database appropriate for mapping
5. Utilize a geographic information system to map and spatially integrate public health related databases
6. Analyze and interpret maps using tools from the field of spatial statistics to describe and interpret distributions of health outcomes in a population
7. Design and implement a spatial analysis protocol for addressing a public health problem

Residency Programs

About

The Bloomberg School offers two residency programs for physicians: a General Preventive Medicine Residency Program and an Occupational and Environmental Medicine Residency Program. Each two-year program is fully accredited by the Accreditation Council for Graduate Medical Education (ACGME). Although the programs are distinct entities, they share a similar structure; the first year is primarily an academic year in which coursework toward the MPH degree is completed. The second year is a practicum year during which residents fulfill rotation requirements in various settings including: public health departments, clinics, local and federal government agencies and sites, corporate sites, and a union site. Completion of either program leads to eligibility for certification by the American Board of Preventive Medicine in either General Preventive Medicine and Public Health or Occupational and Environmental Medicine. These programs appeal to physicians who are interested in a medical career that combines medicine and public health. Completion of either program opens up a world of possibilities and opportunities; many of our alumni are leaders who go on to make an impact in their professions across the country and globe.

Residency Programs

Graduate Medical Education Committee (GMEC) Policies

Johns Hopkins University Bloomberg School of Public Health

POLICIES AND PROCEDURES FOR GRADUATE MEDICAL EDUCATION - AY 22-23

Policy on Eligibility and Selection of Residents

1. To be eligible for appointment to a Johns Hopkins Bloomberg School of Public Health residency program, all applicants must have completed a **minimum** of one clinical year of training in an Accreditation Council for Graduate Medical Education (ACGME) approved clinical residency program.
2. Therefore, residents **must** have met one of the following criteria:
   a. Graduate of medical school in the United States and Canada accredited by either the Liaison Committee on Medical Education (LCME) or the American Osteopathic Association (AOA), **or**
   b. Graduate of medical school outside the United States and Canada who either has a currently valid certificate from the Education Commission for Foreign Medical Graduates or have a full and unrestricted license to practice medicine in a US licensing jurisdiction, **or**
   c. Graduate of medical school outside the United States who has completed a Fifth Pathway program provided by an LCME-accredited medical school.
3. General Preventive Medicine Residency offers the two joint recruitment opportunities. With the exception of these two positions, the Johns Hopkins University Bloomberg School of Public Health does not offer a first postgraduate year of training and does not otherwise participate in the National Residency Matching Program (NRMP).
   a. One transitional internship year position jointly with Mary Imogene Bassett Hospital in Cooperstown, NY, for which fourth-year medical students or other appropriately qualified applicants apply through the NRMP.
   b. One combined family medicine-preventive medicine program with MedStar Franklin Square Medical Center in Baltimore, MD, for which fourth-year medical students or other appropriately qualified applicant apply through the NRMP.
4. Each School of Public Health residency program will select from among its eligible applicants on the basis of their preparedness and ability to benefit from the program to which they are appointed. The criteria for selection include:
   a. aptitude
   b. academic credentials
   c. personal characteristics
   d. ability to communicate
   e. interest in and commitment to chosen field
   f. prior work, research, and other experiences
   g. potential for significant contribution to chosen field
5. Applicants who have not earned an MPH or an equivalent degree that is deemed acceptable by the prospective residency program must also be accepted to the School MPH program. Failure to gain acceptant to the MPH program disqualifies applicants from further consideration.
6. Each Hopkins program must have a formal procedure to review applicants that includes a review of a formal application, transcripts, essays, and letters of recommendations followed by, as appropriate, a personal or telephone interview, and review by an admissions committee. These procedures are established and implemented by the residencies, with oversight by the GMEC.
7. Each residency program will present its list of successful residency candidates to the Graduate Medical Education Committee.

Policy on Evaluation of Resident

1. Each resident will have a confidential folder held in the residency program office and/or an electronic folder housed in a secure BSPH server, that will contain all resident's formal evaluations. This folder will be made available to the resident if requested.
2. Each resident will meet formally with the program director or deputy program director a minimum of two times each year. Written documentation of that evaluation will be retained in the resident's confidential folder.
3. Each residency program has a chief resident, whose duties include being available to residents to informally advise and mentor. The

chief resident will discuss any potential concerns with the program director.

4. The program director at any time can discuss a resident's progress with 1) other residency faculty, 2) the residency advisory/program evaluation committee, or 3) the chair of the Graduate Medical Education Committee.
5. The program director will serve as the resident's faculty adviser and will mentor the resident through the residency program. The director will be available to meet with the resident, at a minimum, at the beginning of each of the five terms.
6. At the beginning of each year of training, the residency program will guide the resident through an exercise to identify their professional goals, decide on academic coursework and appropriate rotations, and write a paper summarizing and elaborating on their goals. This document will include an assessment of a resident's knowledge, skills, and competencies. It will serve as the educational plan for that year.
7. The program director will receive a copy of each resident's academic transcript each term and will review the transcript to assure satisfactory performance. A resident may not be on academic probation for more than one term to remain a resident in good standing.
8. The residency will provide guidance to the resident in developing appropriate practicum rotations.
9. Each practicum rotation preceptor will complete a formal written evaluation of a resident's performance at the completion of the rotation. This evaluation will become part of the resident's permanent file.

Policy on Resident Evaluation of Program (Including MPH Degree)

1. The resident will be required to formally evaluate all aspects of the MPH program, including its faculty.
2. The resident will be required to formally evaluate all practicum rotations that they have completed.
3. Each year, the resident will be required to evaluate all aspects of the residency including its faculty.

Policy on Promotion and Credentialing

1. The names of all residents who successfully complete the first year residency requirements will be submitted to the Graduate Medical Education Committee. After review, the Graduate Medical Education Committee will recommend promotion. All residents will be notified of their status.
2. At the end of the second year, the names of residents who have successfully completed the two-year program will be presented to the Graduate Medical Education Committee for credentialing. After review, the dean of the School will be presented with the names of residents who have successfully completed the requirements of each residency.
3. The residents who have been approved for completion of the residency will receive a certificate stating that they have met the requirements of their residency program. The certificate will be signed by the program director and by the dean of the School.
4. Successful completion of the requirements of the residency fulfils the American Board of Preventive Medicine residency requirements.

Policy on Financial Remuneration and Benefits

The Johns Hopkins Bloomberg School of Public Health provides tuition support, stipend support, medical malpractice insurance, and health, dental, life, and disability insurance consistent with ACGME requirements.

Policy on Professional Liability Insurance

Johns Hopkins Bloomberg School of Public Health residents are provided with liability coverage for the duration of training, and such coverage will provide legal defense and protection against awards from claims reported or filed after the completion of graduate medical education if the alleged acts or omissions of the residents are within the scope of the education program.

The Johns Hopkins University and Johns Hopkins Hospital will provide coverage for liability exposure for all residents for educational activities that they perform within The Johns Hopkins Medical Institutions or external rotations that are within the scope of their training program. The coverage includes legal defense and payment of loss to the extent of maximum judgment within insurance policy limits and also requires participation in the Hospital's Risk Management Program.

Coverage is provided through MCIC Vermont, Inc. It is a claims made policy and provides the insured with "tail coverage" for claims that concern events occurring while the resident was at Hopkins but which are reported after the resident has left residency training. Professional liability coverage is in the amount of $1,000,000 per occurrence; and $3,000,000 annual aggregate.

Insofar as extracurricular employment is not an extension of graduate medical education at Hopkins, medical professional liability insurance coverage is not provided to any trainee for such activities.

Policy on Vacation

The vacation policy is 3 weeks per year for all residents and must be used within the academic year (July 1 – June 30). Unused vacation time for residents does not carry-over beyond the end of the academic year and will not be paid out as a supplement if it is not taken.

Each residency program shall set its own vacation schedule. This vacation schedule shall be set so that a resident is able to complete all of the residency requirements for each of the years. Vacation shall be scheduled to avoid interference with coursework. Each resident must satisfy all attendance requirements of the precepting agency while on rotations.

Policy on Sick Leave

All residents at BSPH are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a resident's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure.

When a resident takes sick leave, they should notify their Program Director and keep them as up to date as feasible. At their discretion, the Program Director may require the resident to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a resident's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the resident and the Program Director to the Program Manager as quickly as possible. If the illness requires an extended absence, the resident may apply for a leave of absence.

New Child Accommodations Policy

(Replaces Former Policy on Parental, Maternity, and Adoption Leave)

For the purposes of this Policy only, "postdoctoral trainees" shall apply to General Preventive Medicine and Occupational and Environmental

Residency trainees at the Johns Hopkins Bloomberg School of Public Health.

Full-time graduate students and postdoctoral trainees may request from their school a “new child accommodation” for 8 weeks. A new child accommodation is designed to make it possible to maintain the parent’s existing status, and to facilitate their return to full participation in coursework, research, teaching, and clinical training in a seamless manner.

Individuals who have teaching or research duties should work collaboratively to support the program’s responsibility in identifying a substitute for any duties or recurring responsibilities for the duration of the accommodation period. Those requesting an accommodation will not be expected to assume sole responsibility for finding their own temporary replacement, but must work with their program and supervisor(s) to delineate the responsibilities to be addressed.

The Policy applies equally to birth and non-birth parents of any gender. Accommodations begin on the day the student or trainee indicates they are no longer fully engaged in their professional and academic activities due to a new child and, to the extent possible, should be requested in advance of the beginning of the accommodation. Retroactive requests (more than one week after the new child accommodation has begun) will not automatically be granted but handled on a case-by-case basis. An accommodation is to be taken continuously and not intermittently and is not to continue beyond the end date of any appointment.

Full-time postdoctoral trainees: Individuals approved for a new child accommodation are guaranteed to retain the rights and privileges as employed postdoctoral trainees. Financial support will remain unchanged during the accommodation period, contingent on the policies of the funding entity supporting the trainee. This accommodation assures that the parent will not lose any financial support during the accommodation period; it does not provide financial support or additional benefits if none was already in place. No appointment period is extended by this accommodation, unless there is an explicit extension of the appointment agreed upon by the appropriate school official.

Postdoctoral trainees in accredited training programs (e.g. Bloomberg School of Public Health residencies) may be required by certifying boards to make up time spent utilizing a new child accommodation in order to sit for the board exam. If additional months of training are necessary to complete program requirements as set by the applicable certifying board, an extended appointment period with salary and benefits will be granted.

Full-time graduate students: Residents who are MPH students approved for a new child accommodation are guaranteed to retain the same rights and privileges as all other students, including remaining registered and matriculated in a degree program. If the student is receiving tuition, stipend support, and benefits from a training grant, fellowship, or scholarship, these will remain unchanged during the accommodation period contingent on the policies of the entity providing funding. Fully-funded students will not lose any financial support during the approved accommodation period, but the accommodation will not provide financial support or additional benefits if none were already in place. Further, students receiving less than full-funding support or who receive wages for other types of employment or federal work-study are not guaranteed such support during the accommodation period. Students should consult the Office of Student Financial Services for questions regarding financial support during accommodation periods.

During this time and to the extent the student can remain enrolled, the student is expected to work with their adviser, program administrator, and department to reschedule course assignments, examinations, and other academic requirements. To the extent that the demands of caring for a new child allow, students are expected to keep up with courses in which they are registered and participate in seminars. Faculty are expected to work with the student to make arrangements for submitting work for completion of requirements, including assigning ‘incomplete’ grades consistent with school policies. Students will be granted a one-term extension of university and departmental requirements and academic milestones. Students in a primarily coursework-only program (e.g., master’s students) or programs with specific course requirements that may only be offered during specific periods of time may have to revise their degree completion timeline based on when courses are offered as part of the normal academic schedule.

For full details, procedures to request new child accommodations, and resources/contacts, please visit the website (https://www.jhu.edu/assets/uploads/2017/06/newchildaccommgradandpostdoc.pdf).

Policy on Medical Leave of Absence

A trainee may request a leave of absence for medical reasons. Leave of absence for medical reasons will be granted for a maximum of 12 consecutive weeks with the approval of the program director and the chair of the Graduate Medical Education Committee (GMEC). Any request for medical leave in excess of 12 weeks will be reviewed by the program director and the GMEC chair and a decision made based upon the circumstances.

Only the treating physician can place a resident on medical leave of greater than two consecutive weeks. Such leave also requires the approval of the program director. A letter stating the nature of the illness and the reason for the period of disability by the attending physician may be required.

Any medical leave that is shorter than two consecutive weeks will be negotiated between the resident and the preceptor. The program director will be made aware of such periods of short-term disability.

It is the responsibility of the program director to keep accurate records of training status so as to have adequate information for board eligibility. The program director will determine whether or not the trainee will be required to spend additional time in training to compensate for the leave period and be eligible for certification for a full training year.

Special Provisions for Pregnancy: For uncomplicated pregnancies and deliveries, it is anticipated that a resident will take an eight week leave as stated in the New Child Accommodations policy. Complicated pregnancies and deliveries will be handled through medical leave.

Effects of Leave of Absence on Training: Reinstatement in the training program is dependent upon the availability of training positions. Where feasible, program directors are encouraged to reinstate trainees in good standing in the next available training position.

Any leave of absence that does not allow a resident to remain a full-time student and to complete all course work and rotations by program and School deadlines may necessitate the extension of training.

It is the responsibility of the program director to keep accurate records of training status so as to have adequate information for board eligibility. The School of Public Health Registrar may need to be informed so that certificates may be accurately prepared. The program director will determine whether or not the trainee will be required to spend additional time in training to compensate for the leave period and be eligible for certification for a full training year.

Remuneration: Remuneration for all leaves will be decided by each program.

Policy on Non-Medical Leave of Absence

A leave of absence for non-medical reasons must be negotiated with the program director and would require an interruption in appointment, without pay. Except in unusual circumstances, a leave of absence may not extend beyond the trainee's period of appointment. During the leave of absence, benefits may be purchased through the School of Public Health Business Office and are the responsibility of the trainee.

Effects of Leave of Absence on Training: Reinstatement in the training program is dependent upon the availability of training positions. Where feasible, program directors are encouraged to reinstate trainees in good standing in the next available training position.

Any leave of absence that does not allow a resident to remain a full-time student and to complete all course work and rotations by program and School deadlines may necessitate the extension of training.

It is the responsibility of the program director to keep accurate records of training status so as to have adequate information for board eligibility. The program director will determine whether or not the trainee will be required to spend additional time in training to compensate for the leave period and be eligible for certification for a full training year.

Remuneration: Remuneration for all leaves will be decided by each program.

Policy on Non-Renewal of Appointment

In instances where a resident's agreement is not going to be renewed, the residency program will provide the resident with a written notice of intent not to renew the resident's agreement no later than four months prior to the end of the resident's current agreement. If the primary reason(s) for the non-renewal occurs within the four months prior to the end of the agreement, the residency program will provide the resident with as much written notice of the intent not to renew as the circumstances reasonably will allow, prior to the end of the agreement.

The Resident/Clinical Fellow may appeal an adverse decision to the Dean of the School of Public Health by notifying them in writing within 7 days of the decision. The Dean may designate another senior official at the school, who has not previously been involved in the case, to hear the appeal.

The review will be limited to review of whether the procedures set forth in this policy were followed and their decision will be final.

Policy on Confidentiality and Conflict of Interest

Responsibility of Residents: During the day-to-day activities of practicum rotations in the residency, residents are entrusted with access to information of several types that is of a sensitive nature. This includes, but is not limited to:

- medical records
- information on legal proceedings
- information on regulatory actions
- proprietary product or trade information

With this trust comes the responsibility to use the information, whether read in paper files, verbally communicated, or in computer databases, in a professional manner and only for the purposes for which the information was intended at the rotation at which it was generated. Always discuss the level of confidentiality of any information or work assignment with the rotation preceptor or residency faculty before sharing it beyond the group where it was originally generated. It is the resident's responsibility to safeguard work assignments and information by keeping the materials, for example, in locked file cabinets or keeping computer files on diskette or otherwise limiting access. Please be aware that breaches of confidentiality may motivate some sites to pursue disciplinary or legal actions.

In addition to concerns about confidential information, residents may also find themselves in situations that involve a conflict of interest. For example, residents may be aware of regulatory or legal proceedings that involve a rotation site, or have knowledge that could affect a regulatory or legal proceeding. Residents who find themselves in such a position should discuss the conflict of interest with their program director, who can provide guidance for addressing the situation.

Responsibility of Rotation Preceptors, Faculty, and Staff: Preceptors, faculty, and staff at residency rotations have an important role in the education of residents. During the course of the residency, residents often learn about or work directly with information at one site that may be of interest to personnel at a second site. Rotation preceptors, faculty, and staff should respect the obligation of the resident to hold certain such information as confidential and should not ask residents to provide information about a second site that was considered to be confidential at that site. In this situation, residents should inform the rotation preceptor, faculty, or staff that the information being requested is confidential and that it cannot be shared.

Policy on Working Conditions

The School will assure that the resident is provided with an environment conducive to an intensive learning experience. The School will provide appropriate faculty and staff to guide all aspects of coursework. The School will have ancillary support staff to allow residents to fulfill all their learning objectives. The School will provide adequate library and computer facilities. The residencies will provide residents with appropriate support services to include resource rooms, phones, and copiers.

The residency will assure that residents have appropriate time with preceptors and ancillary staff. The residency will assure that the residents are provided with workspace and appropriate computers, phones, and copiers. The residency will ensure that appropriate resources are available to promote rotation learning objectives.

Policy on Resident Duty Hours

The Johns Hopkins School of Public Health Preventive Medicine Residency Programs affirm the ACGME Principles regarding duty hours. Both programs are committed to promoting patient safety and resident well-being and to providing a supportive educational environment.

Rotations in both programs generally keep weekday business hours. It is expected that there will be preparation activities (reading and writing) beyond this. Some rotations may require night or weekend coverage. Each residency program that has rotations requiring night or weekend call will set its own policy with regard to the maximum hours per week allowable and the maximum hours consecutively worked allowable. These policies will set the maximum allowable hours based on the number of hours that are required to maintain a high quality of patient care and that will enhance the residency training experience while assuring compliance with ACGME requirements on duty hours.

In setting these policies, each program will adhere to the following ACGME guidelines:

DUTY HOURS

1. Duty hours are defined as all clinical and academic activities related to the residency program, i.e. patient care (both inpatient and outpatient), administrative duties related to patient care, the provision for transfer of patient care, time spent in-house during call activities, and scheduled academic activities such as conferences. Duty hours do not include reading and preparation time spent away from the duty site. Time spent by residents in internal and external moonlighting (as defined by ACGME) must be counted toward the 80-hour maximum limit.
2. Duty hours must be limited to 80 hours per week, averaged over a four-week period, inclusive of all in-house call activities.
3. Residents must be provided with 1 day in 7 free from all educational and clinical responsibilities, averaged over a 4-week period, inclusive of call. One day is defined as one continuous 24-hour period free from all clinical, educational, and administrative activities.
4. Adequate time for rest and personal activities must be provided. This should consist of a 10-hour time period provided between all daily duty periods and after in-house call.

DUTY HOUR EXCEPTIONS

A Review Committee may grant exceptions for up to 10% or a maximum of 88 hours to individual programs based on a sound educational rationale.

1. In preparing a request for an exception the program director must follow the duty hour exception policy from the ACGME Manual on Policies and Procedures.
2. Prior to submitting the request to the Review Committee, the program director must obtain approval of the institution's GMEC and DIO.

ON-CALL ACTIVITIES

The objective of on-call activities is to provide residents with continuity of patient care experiences throughout a 24-hour period. In-house call is defined as those duty hours beyond the normal workday when residents are required to be immediately available in the assigned institution.

1. In-house call must occur no more frequently than every third night, averaged over a four-week period.
2. Continuous on-site duty, including in-house call, must not exceed 24 consecutive hours. Residents may remain on duty for up to 6 additional hours to participate in didactic activities, transfer care of patients, conduct outpatient clinics, and maintain continuity of medical and surgical care as defined in Specialty and Subspecialty Program Requirements.
3. No new patients, as defined in Specialty and Subspecialty Program Requirements, may be accepted after 24 hours of continuous duty.
4. At-home call (pager call) is defined as call taken from outside the assigned institution.
    a. The frequency of at-home call is not subject to the every third night limitation. However, at-home call must not be so frequent as to preclude rest and reasonable personal time for each resident. Residents taking at-home call must be provided with 1 day in 7 completely free from all educational and clinical responsibilities, averaged over a 4-week period.
    b. When residents are called into the hospital from home, the hours residents spend in-house are counted toward the 80-hour limit.
    c. The program director and the faculty must monitor the demands of at-home call in their programs and make scheduling adjustments as necessary to mitigate excessive service demands and/or fatigue. Faculty and residents must be educated to recognize the signs of fatigue and sleep deprivation.

Policy on Extracurricular Activities

The Johns Hopkins Bloomberg School of Public Health ("School") considers graduate medical education to be a full-time educational experience. Consequently, residents should not be diverted from their primary educational responsibilities, and in no instances are residents required to engage in extracurricular patient care activities ("moonlighting"). The Accreditation Council for Graduate Medical Education ("ACGME") has established rules governing the performance of moonlighting activities by residents enrolled in ACGME approved programs, as has the School.

It is understood that occasions may arise in which residents choose to moonlight. These activities must in no way prevent residents from carrying out the full scope of their training responsibilities. Time spent by residents in internal and external moonlighting (as defined by ACGME) must be counted toward the 80-hour maximum limit. Program director will monitor and approve moonlighting hours. If a resident's moonlighting interferes with their Hopkins educational activities the permission for such moonlighting may be withdrawn.

Residents who wish to moonlight must obtain prospective written permission to do so from the program director. The program director will send notification to the DIO about all such approvals. This request must include the proposed moonlighting activity, location, approximate number of hours per week, averaged number of hours per week in training program in last month, location's intent to bill payors and will be made part of the resident's file, and the resident will be monitored for the effect of these activities upon the resident's performance. Adverse effects of moonlighting may lead to withdrawal of permission.

No resident may moonlight in the specialty that is the subject of their training program. No resident may moonlight without having first obtained an unrestricted medical license and, where applicable, controlled dangerous substance registrations in the applicable jurisdiction(s). No resident may moonlight without having first been appropriately credentialed by the applicable facility. Residents who intend to engage in and bill for moonlighting activities (directly or through the proposed employer/contractor) must comply with policies on professional fee billings that apply in the school of medicine, if applicable.

It should be noted that some School of Public Health residents may also be covered by the School of Medicine's extracurricular employment policy. Such residents should be familiar with its policy in this regard.

Residents and clinical fellows performing approved moonlighting activities at any of the Johns Hopkins Medical Institutions will be covered under Johns Hopkins Professional Liability Insurance. However, residents and clinical fellows performing approved moonlighting activities at any hospital/facility other than a Johns Hopkins Medical Institution will not be covered under Johns Hopkins Professional Liability Insurance. A resident or clinical fellow who intends to engage in moonlighting activities at hospitals/facilities other than the Johns Hopkins Medical Institutions must ensure that they will be covered by professional liability insurance at the location at which the moonlighting activities take place. ***Note:* Even though moonlighting hours at a participating institution count toward compliance with the ACGME work hours guidelines, the resident/clinical fellow is not covered by Johns Hopkins Professional Liability Insurance for moonlighting activities at a participating**

institution unless that institution is one of the Johns Hopkins Medical Institutions, as define above.

Policy on Annual Report of Program Director and Residency Advisory/ Program Evaluation Committee

The program director and the chair of the Residency Advisory/Program Evaluation Committee (RAC/PEC) will provide to the Graduate Medical Education Committee (GMEC) an annual written report of the residency. The report will include a summary of resident progress, any changes in the program, and a summary of the most recent institutional review of the program. If there are any deficiencies noted in any aspect of the residency quality, or recommendations for the GMEC based on the annual report, a written plan for correction should be submitted to the GMEC.

Policy on Continued Support for Residents

In the event that the Johns Hopkins Bloomberg School of Public Health ceases to exist, or that a residency program is discontinued or reduced in size, the Graduate Medical Education Committee (GMEC), the Designated Institutional Official (DIO) and the residents enrolled in the program at the time of the event will be notified immediately. Residents will be supported until the completion of their residency, or will be assisted in enrolling in an ACGME-accredited program in which they can continue their education.

Policy on Disaster Planning for the Residency Training Programs

In the event of a widespread emergency affecting operations of some or all of the Johns Hopkins Institutions, the Institutions have adopted emergency plans to guide the institutional response to the specific situation, and the extent to which a particular situation constitutes an emergency will be determined with reference to those Institutional policies and plans. This policy is intended to augment existing plans that are applicable to the institutions affected, focusing specifically on Resident trainees in graduate medical education programs sponsored by The Johns Hopkins Bloomberg School of Public Health. The Institution is guided by the following principles:

1. The University is committed to ensuring a safe, organized, and effective environment for training of its residents;
2. The University recognizes the importance of physicians at all levels of training in the provision of emergency care in the case of a disaster of any kind;
3. Decisions regarding initial and continuing deployment of residents in the provision of service during an emergency will be made taking into consideration of the importance of providing emergency service; the continuing educational needs of the trainees; and the health and safety of the trainees and their families.
4. By the end of the first week following the occurrence of the emergency situation, if the emergency is ongoing:
    a. An assessment will be made of:
        i. the continued need for provision of service by trainees; and
        ii. the likelihood that training can continue on site.
    b. The assessment will be made by:
        i. DIO and the Senior Associate Dean for Academic Affairs
        ii. Program Directors
        iii. In consultation with the University's Vice Provost and Chief Risk Officer
5. By the end of the second week following the occurrence of the emergency situation, if the emergency is ongoing:
    a. The DIO will request an assessment by individual program directors and department chairs regarding their ability to continue to provide training;
    b. The DIO will request suggestions for alternative training sites from program directors who feel they will be unable to continue to offer training at Johns Hopkins;
    c. The DIO will contact the ACGME to provide a status report, and
    d. Those involved in decision making in this period are: DIO, the Senior Associate Dean for Academic Affairs, and Program Directors
    e. Trainees who wish to take advantage of the Leave of Absence Policy or to be released from their Contract will be accommodated.
6. During the third and fourth weeks following the occurrence of the emergency situation, if the emergency is ongoing:
    a. Program directors at alternative training sites will be contacted to determine feasibility of transfers as appropriate;
    b. Transfers will be coordinated with ACGME;
    c. Johns Hopkins program directors will have the lead responsibility for contacting other program directors and notifying the DIO the Senior Associate Dean for Academic Affairs of the transfers;
    d. The DIO will be responsible for coordinating the transfers with ACGME.
7. When the emergency situation is ended:
    a. Plans will be made with the participating institutions to which residents have been transferred for them to resume training at Johns Hopkins;
    b. Appropriate credit for training will be coordinated with ACGME and the applicable Residency Review Committees; and
    c. Decisions as to other matters related to the impact of the emergency on training will be made.

Policy on Physician Impairment

1. **Purpose**
   Impairment of performance by resident physicians can put patients at risk. Impairment shall be managed as a medical/behavioral illness. Implicit in this concept is the existence of criteria permitting diagnosis, opportunity for treatment, and with successful progress toward recovery, the possibility of returning to training in an appropriate capacity. Impairment may result from depression or other behavioral problems, from physical impairment, from medical illness, and from substance abuse and consequent chemical dependency. The goals of this policy are to:
    a. prevent or minimize the occurrence of impairment, including substance abuse, among residents in graduate medical education programs sponsored by The Johns Hopkins Bloomberg School of Public Health,
    b. protect patients from risks associated with care given by impaired resident physicians, and
    c. compassionately confront problems of impairment to effect diagnosis, relief from service responsibilities if necessary, treatment as indicated, and appropriate rehabilitation.
2. **Identification of Impairment**
   Listed below are signs and symptoms of impairment. Isolated instances of any of these may not impair ability to perform adequately, but if they are noted on a continued basis or if multiple signs are observed, reporting may be indicated. The signs and symptoms may include:
    a. Physical signs such as fatigue, deterioration in personal hygiene and appearance, multiple physical complaints, accidents, and eating disorders.
    b. Family stability disturbances.

c. Social changes such as withdrawal from outside activities, isolation from peers, inappropriate behavior, undependability and unpredictability, aggressive behavior and argumentativeness.
d. Professional behavior problems such as unexplained absences, tardiness, decreasing quality or interest in work, inappropriate orders, behavioral changes, altered interaction with other staff and inadequate professional performance.
e. Behavioral signs such as mood changes, depression, slowness, lapses of attention, chronic exhaustion, risk taking behavior, excessive cheerfulness, and flat affect.
f. Drug use indicators such as excessive agitation or edginess, dilated or pinpoint pupils, self-medication with psychotropic drugs, stereotypical behavior, alcohol on breath at work, uncontrolled drinking at social events, blackouts, and binge drinking.

3. **Scope**
   This policy applies to all residents participating in graduate medical education programs sponsored by The Johns Hopkins Bloomberg School of Public Health.
4. **Responsibility**
   It is the responsibility of the program directors and faculty to communicate this policy to their residents and to enforce its provisions. Faculty and residents who suspect that a resident is suffering impairment shall follow this policy and its procedures.
5. **Procedure**
   a. **Education:** To minimize the incidence of impairment, a program has been developed to educate residents about physician impairment, including problems of substance abuse, its incidence and nature and risks to the physician and patients. Education includes knowledge concerning signs and symptoms of impairment. All residents shall be informed at orientation about physician impairment, this policy, and the resources available.
   The University's Policy on Alcohol and Drug Abuse and Drug-Free Environment (https://studentaffairs.jhu.edu/policies-guidelines/university-student-policies/) may be found online.
   All residents shall receive information regarding the counseling and referral resources available at the hospital at which the training program is based. At the Johns Hopkins Medical Institutions, this consists principally of the Faculty and Staff Assistance Program (FASAP) and the Professional Assistance Committee (PAC). At the Johns Hopkins Bayview Medical Center, services are provided through the Community Psychiatry Program.
   b. **Counseling and Management:**
      i. The following services are available to residents and their families:
         1. Assessment and identification of personal, family, or work- related problems
         2. Brief counseling and crisis intervention
         3. Follow-up appointments when indicated
         4. Referral to resources within Johns Hopkins and/or the community
      ii. The following services are available to administrators, managers, and supervisors:
         1. Managerial consultation and coaching
         2. Risk assessments
         3. Educational workshops and programs
         4. Organizational group interventions
   c. **Reporting:** All faculty and residents have a duty to report to an appropriate supervisor, in confidence, concerns about possible impairment both in themselves and in others.
   If a resident is observed and/or suspected to be impaired while engaged in the performance of their duties, the following actions shall occur:
      i. The observer shall report their concern to a responsible supervisor, ultimately the residency program director. The individual making the report does not need to have proof of the impairment, but must state the facts leading to suspicions.
      ii. The person to whom the report is made shall report the concern to the program director. The program director or their designee will investigate the matter, in a confidential process.
      iii. If it is determined that a resident may have an impairment problem, the program director is responsible to refer the resident to a counseling and treatment, such as that offered through the FASAP.
      iv. Failure of the resident to accept referral to counseling or to abide by the treatment program may be considered grounds for disciplinary action and may result in suspension or termination from the program.
      In any event, use of illegal drugs, the un-prescribed use of pharmaceuticals and impairment while on duty are all violations of standards of conduct for which the resident may be disciplined, up to and including, termination from the program.
   d. **Self-Reporting:** The University is eager to assist residents with impairment problems and encourages any resident with impairment problems to contact their program directors or their hospitals' counseling resources for assistance. Residents shall not be subject to punitive actions for voluntarily acknowledging an impairment problem. (Note, however, that this will not excuse violations of other policies for which the resident is subject to disciplinary action.)
   e. **Continuation of Training:** In order for a resident to resume training after a referral, there shall be satisfactory evidence of the successful completion of or participation in an appropriate treatment program. Further, the resident shall agree to a provisional period during which time they may be monitored and/or tested periodically.
   f. **Confidentiality:** The identification, counseling and treatment of an impaired resident are deemed confidential, except as necessary to carry out the policies of the GMEC or University and as required by law.

Policy on Probation, Suspension, and Dismissal of Clinical Residents/Fellows

Introduction

The purpose of this policy is to describe the procedures that should be employed when a resident/clinical fellow fails to meet performance or academic standards for the training program in which they are engaged or is found to have acted in a manner that violates a policy or policies of the Johns Hopkins Bloomberg School of Public Health. It is the policy of the School of Public Health to employ procedural fairness in all matters which may lead to probation, suspension, or termination of Residents/Clinical Fellows. In the interests of all concerned parties the following procedure is to be followed whenever a Resident's/Clinical Fellow's performance or conduct requires that action be taken under this policy.

Definitions

Resident/Clinical Fellow: This policy applies to all trainees appointed as resident or clinical fellow, whether in an ACGME-accredited program, or not.

Additional time: Additional time in the GME training program at a given PGY level or beyond the expiration of the Resident's/Clinical Fellow's appointment may be required to meet the educational objectives and certification requirements of the department or the specialty. The Resident/Clinical Fellow shall be notified in writing of any requirements for additional time. If the Resident/Clinical Fellow contests the decision to require additional time to satisfactorily complete the program or to achieve the goals required for advancement, a Trainee Evaluation Committee shall be convened to review the decision. Salary and benefits for additional time extending beyond the original period of appointment shall be determined based on institutional policies or at the discretion of the DIO.

Administrative Leave: Administrative leave is not intended to replace any leave that a Resident/Clinical Fellow may otherwise be entitled to, including vacation, sick leave, maternity/paternity, or family leave. Non-medical leave of absence, investigatory leave, and suspension are examples of types of leave that fall under the administrative leave category.

Leave of Absence: If a Resident/Clinical Fellow wishes to take a leave of absence for non-medical reasons, this must be negotiated with the Training Program Director and requires an interruption in appointment, without pay. Except in unusual circumstances, a leave of absence may not extend beyond the Resident's/Clinical Fellow's period of appointment. During the leave of absence, benefits may be purchased through the School of Public Health Student Affairs Office and are the responsibility of the Resident/Clinical Fellow. Reinstatement in the training program following non-medical leave of absence is dependent upon the availability of training positions. Where appropriate and feasible, Training Program Directors are encouraged to reinstate Residents/Clinical Fellows in good standing in the next available training position. However, position, salary, and benefits cannot be guaranteed for voluntary interruption in appointment.

Investigatory Leave: A Resident/Clinical Fellow may be placed on investigatory leave in order to review or investigate allegations of deficiencies or concerns. Such leave shall be confirmed in writing, stating the reason(s) for and the expected duration of the leave, and specifying the activities the Resident/Clinical Fellow may engage in during the duration of the leave. The alleged deficiency should be of a nature that warrants removing the Resident/Clinical Fellow from the training program for the period of investigation. The investigation shall be concluded as quickly as possible so that the Resident/Clinical Fellow can either be returned to the program or action can be initiated for remediation, resignation, or termination. Salary and benefits will be continued during investigatory leave. However, waivers of required activities of the program shall not be granted; all program requirements must be fulfilled. Investigatory leave does not constitute an adverse action and does not need to be reported as such.

Suspension: A Resident/Clinical Fellow may be suspended from part or all of their usual and regular assignments in the training program, including clinical and/or didactic duties, when the removal of the Resident/Clinical Fellow from the clinical service or research site is required because of the Resident's/Clinical Fellow's failure to comply with the policies of the program or of the Institution. The Suspension shall be confirmed in writing, stating the reason(s) for the Suspension and its expected duration. Suspension generally should not exceed 60 calendar days and may be coupled with or followed by other academic actions. The Resident's/Clinical Fellow's salary and benefits may continue during the period of Suspension, depending on the circumstances and at the discretion of the Associate Dean for Graduate Medical Education.

Letter of Counseling: A letter of counseling may be issued by the Training Program Director to a Resident/Clinical Fellow to address a deficiency or concern that needs to be remedied or improved. Letters of counseling should describe the nature of the problem and suggestions for remedial actions or changes required on the part of the Trainee. Failure to achieve improvement, or a repetition of the conduct, may lead to a Notice of Concern or other actions. A letter of counseling does not constitute a disciplinary action and may be removed from the Resident's/Clinical Fellow's file after one year with no further incidents or upon the completion of the program if there are no further incidents. In most cases, this will be the first written notification that there is a deficiency in performance or conduct.

Notice of Concern: A Notice of Concern may be issued by the Training Program Director to a Resident/Clinical Fellow to address a deficiency or behavior that needs to be immediately remedied or improved. The Notice of Concern shall be in writing and should describe the nature of the deficiency or behavior and any necessary remedial actions required on the part of the Resident/Clinical Fellow. The Training Program Director shall review the notice of concern with the Resident/Clinical Fellow. Failure to achieve immediate and/or sustained improvement, or a repetition of the conduct, may lead to additional notices or other actions, including probation, suspension, or dismissal. In most cases, the Notice of Concern is used when there has been inadequate improvement after the Letter of Counseling. However, it may be used as the initial notification when there is a problem of greater significance than should be addressed with a Letter of Counseling.

Probation: Probation shall be used for Residents/Clinical Fellows who are in jeopardy of not successfully completing the requirements of the training program or who are not performing or behaving satisfactorily. Conditions of probation shall be communicated to the Resident/Clinical Fellow in writing and should include: a description of the reasons for the probation, an individualized remediation plan, and the expected time frame for the required remedial activity. Failure to correct the deficiency within the specified period of time may lead to an extension of the probationary period or other academic actions. The probationary period should not be less than 30 days and its duration should be appropriate for the issue(s) of concern.

In most cases Probation will be preceded by a Letter of Counseling and/or a Notice of Concern, unless the circumstances warrant more immediate action.

Procedure

When evaluations of a Resident/Clinical Fellow suggest that s/he is not meeting the expectations of the training program, or whenever the Training Program Director is notified that a Resident's/Clinical Fellow's behavior is suspected to have violated a policy of the Johns Hopkins Institutions, the Training Program Director or their representative shall:

- meet with the Resident/Clinical Fellow to discuss the area(s) of concern
- provide counseling, and
- identify appropriate measures for improvement or remediation.

In advance of formal academic or disciplinary action, including Notice of Concern, Probation, Suspension, or Termination, the Training Program Director or preceptor should have written documentation of the date and nature of all previous warnings and other communications given to the Resident/Clinical Fellow whose performance or conduct fails to meet expected standards. A Training Program Director or preceptor should give verbal warnings to an individual Resident/Clinical Fellow in the presence of at least one other individual and the content of the warning and the concern that prompted it must be documented. Training Program Directors and preceptors are expected to provide appropriate counseling and/or attempts at remediation to Residents/Clinical Fellows whose performance is less than satisfactory.

If an offense is so serious that it poses immediate and serious danger to patients, faculty, or staff or to the institutions, immediate suspension prior to procedural review is appropriate.

Trainee Evaluation Committee: An ad hoc Trainee Evaluation Committee shall be appointed by the Training Program Director or Designated Institutional Official to review a Notice of Concern or decision for Probation, Suspension, or Termination. The Trainee Evaluation Committee shall include no fewer than three faculty members of the Graduate Medical Education Committee or recommended by the Graduate Medical Education Committee. The Program Director will offer to appoint a faculty member who will advise the trainee and provide support and guidance to the trainee throughout the process. This individual, if appointed, will not be a voting member of the Trainee Evaluation Committee. The trainee may identify this individual, subject to approval by the Program Director. The Training Program Director shall provide the Trainee Evaluation Committee with documentation of the concerns that led to the academic or disciplinary action, including documentation of previous meetings with the trainee and of prior efforts to counsel the trainee.

The Training Program Director shall inform the Resident/Clinical Fellow of the composition of the Evaluation Committee. The trainee will be offered an opportunity to meet with the Trainee Evaluation Committee, and the Resident/Clinical Fellow should be informed that they may provide the Trainee Evaluation Committee with a written statement responding to the Notice of Concern or, if Probation, Suspension, or Termination has been recommended, providing a statement explaining why s/he feels the Probation, Suspension, or Termination is not warranted.

Within 10 working days of the Training Program Director or Department Chair's delivery of a Notice of Concern or decision for Probation, Suspension, or Termination the Trainee Evaluation Committee shall be provided with all documentation, including the statement from the Resident/Clinical Fellow, if provided, and may request to meet with the Resident/Clinical Fellow. In cases of Probation, Suspension, or Termination the Trainee Evaluation Committee shall reach a decision to uphold the original action or to request an alternate action within 30 days. An oral notification shall be delivered to the Resident/Clinical Fellow within 3 days and in writing within 10 working days of the decision.

In cases of a Notice of Concern or Probation, the Trainee Evaluation Committee shall assist the Training Program Director in determining an appropriate course of remediation and shall review the Resident's/Clinical Fellow's progress periodically to determine whether the trainee has satisfactorily addressed or remediated the concerns that led to academic or disciplinary action.

The Training Program Director or preceptor shall inform the DIO before a Resident/Clinical Fellow is to receive a Notice of Concern or to be placed on Probation, Suspended, or Terminated. A written statement describing the problem, warnings issued, deliberations of the Trainee Evaluation Committee, and the proposed resolution (remediation, Probation, Suspension, Termination, or return to good standing) shall be provided to the DIO. Before taking final action the Training Program Director shall first confer with the DIO, before informing the Resident/Clinical Fellow of the decision.

The training director should consult with counsel on whether the action (probation, suspension, or termination) should be reported to State or Federal Authorities, as applicable.

The Training Program Director or preceptor must provide a specific statement to the Resident/Clinical Fellow as to the action to be taken, i.e., Probation, Suspension, or Termination; effect on salary, benefits, and training certification; and if applicable, whether or not the action taken is reportable to the Board of Physicians.

In cases of Termination, salary, and benefits shall terminate as of the effective date, and training certification shall be granted for the period of months of acceptable service. Health insurance coverage may be maintained under COBRA options so as to provide continuous health care insurance coverage, in which case the Resident/Clinical Fellow is responsible for all premiums.

A Suspension may be imposed with or without pay, and shall result in suspension of training credit during interruption of service. In instances of suspension with pay, benefits coverage shall be continued during the period of Suspension. The Resident/Clinical Fellow suspended without pay shall be responsible for the full premiums of the benefits during the suspension period.

Written decisions shall be hand-delivered to the Resident/Clinical Fellow at a meeting informing them of the decision or sent by overnight delivery service.

The Resident/Clinical Fellow may appeal an adverse decision to the Dean of the School of Public Health by notifying them in writing within 7 days of the decision. The Dean may refer the matter to a senior official of the school with no prior involvement in the case for review. The review will be limited to review of whether the procedures set forth in this policy were followed and their decision will be final.

Policy on Resident Transfer

Residents who are selected for admission into the first year of one of the Preventive Medicine residency program (PM-1) in the Johns Hopkins Bloomberg School of Public Health will be considered to be a transfer resident if they have not completed a full ACGME accredited residency program of three or more years.

The Johns Hopkins Bloomberg School of Public Health Preventive Medicine Residency Program that accepts the transfer resident will obtain a summative evaluation from that resident's prior ACGME training program. If the resident has completed a full residency, the Hopkins Medical Staff Office will contact the prior program director for verification of training as part of the credentialing process.

Policy on Interaction with Vendors/Corporations and Residency Programs

The Johns Hopkins Bloomberg School of Public Health Graduate Medical Education Committee is committed to creating a training environment that fosters a culture in which faculty, staff, and residents exercise independent judgment in all their activities and provide evidence-based, cost-effective care.

Insofar as they support these goals, appropriate interactions with industry that move ideas into development, production, and practice for the welfare of patients, communities, and the betterment of public health are desirable.

To this end, the GMEC will follow the Johns Hopkins Bloomberg School of Public Health Policy on Interaction with Industry and Outside Interests found in the BSPH Office of Academic Affairs Policies & Procedures Manual (https://www.jhsph.edu/offices-and-services/office-of-academic-affairs/).

Policy on Supervision at Rotation Sites

1. Purpose
   The purpose of this policy is to establish standards for independent health care practitioners engaged in the supervision and teaching of GPM and OEM residents and to establish guidelines for resident responsibilities for GPM and OEM residents.
2. Scope
   This policy applies to all independent health care practitioners engaged in the supervision and teaching of residents enrolled in the GPM or OEM post-graduate medical education program at the Johns Hopkins Bloomberg School of Public Health (BSPH). This policy, unless otherwise stated, is applicable to resident supervision at all training sites.
3. Responsibility
   It is the responsibility of the program director and the site preceptors who supervise and teach residents at BSPH and other training sites as well as residents to comply with this policy.
4. Definitions
   Site preceptor - refers to the individual designated as the supervisor of the resident at the training site. This individual may be a physician (to be designated for this policy the **attending physician**), other faculty of the School of Public Health or a senior staff member at the agency serving as the training site.
   Direct supervision - refers to supervision provided by the site preceptor who is physically present and available to the resident being supervised.
   Program Director - The one physician designated with authority and accountability for the operation of the residency/fellowship program.
   Resident - refers to an unlicensed or licensed resident enrolled in a BSPH post-graduate education program, including subspecialty programs, and which are accredited by the Accreditation Council for Graduate Medical Education (ACGME) or an equivalent accreditation process approved by the Johns Hopkins Bloomberg School of Public Health.
5. General Guidelines
   a. The program director, with the assistance of site preceptors, assures that residents are appropriately supervised. Residents are permitted to take on progressively greater responsibility throughout the course of a residency, consistent with individual growth in experience, judgment, knowledge, and technical skill. Site preceptors supervise residents so that the residents assume progressively increasing responsibility according to their level of education, ability, and experience.
   b. Resident supervision will be monitored and ultimately enforced by the governing board of the Johns Hopkins Bloomberg School of Public Health through the quality process, peer review, credentialing, and privileging, or the resident disciplinary process.
6. General Program Responsibilities
   a. The program director, with the assistance of site preceptors, will assess the resident's competence as the basis for determining the minimum level of supervision required for different activities. This assessment includes the evaluation of the resident's technical, patient management (if applicable), and communication skills and capacity to perform as required. The program director communicates the assessment of the resident's competence to the resident at least semi-annually and when significant progress or deficiencies are noted.
   b. The program director will provide each site preceptor with the list of Preventive Medicine competencies (see Attachment A) for use in planning and evaluating the resident's activities at the site.
   c. Site preceptors will be available for supervision to the resident on duty 24 hours per day, 7 days per week. Site preceptors can provide adequate supervision off site as long as their physical presence within a reasonable time can be assured in case of need. The program director assures that a schedule with the name and contact number of the responsible site preceptor(s) is available at all times to program residents.
   d. All patients seen by a resident on an outpatient basis must be seen by, discussed with, or reviewed by the responsible site preceptor.
   e. Attachment B outlines the procedures for monitoring and evaluation of residents.
7. General Site Preceptor Responsibilities
   a. A site preceptor is responsible for and actively involved in clinical, administrative, or research activities at the training site.
   b. A site preceptor at a clinical site is an attending physician who directs the care of each patient and provides the appropriate level of supervision for a resident based on the nature of the patient's condition, the likelihood of major changes in the management plan, the complexity of care, and level of education, ability, experience, and judgment of the resident being supervised.
   c. The attending physician, in consultation with the program director, accords a resident progressive responsibility for the care of the patient based on the resident's clinical experience, judgment, knowledge, technical skill, and capacity to function.
   d. The attending physician advises the program director if they believe a change in the level of the resident's responsibility and supervision should be considered. The overriding consideration must be the safe and effective care of the patient that is the personal responsibility of the attending physician.
   e. The attending physician fosters an environment that encourages questions and requests for support or supervision from the resident, and encourages the resident to call or inform the attending physician of significant or serious patient conditions or significant changes in patient condition.
8. Resident Responsibilities and Requirements
   a. The resident must be aware of their level of training, their specific clinical experience, judgment, knowledge, and technical skill, and any associated limitations. The resident must not independently perform procedures or treatments, or management plans that they are unauthorized to perform or lacks the skill and training to perform.
   b. The resident is responsible for self-monitoring of progress toward achievement of the GPM competencies listed in Attachment A.
   c. The resident is responsible for communicating to the attending physician any significant issues regarding patient care.
      (see Attachment A and Attachment B)

Policy on Transitions of Care
Clinical care in the Johns Hopkins Occupational and Environmental Medicine Residency and General Preventive Medicine Residency is entirely outpatient with direct precepting in the clinical rotation sites. Thus, residents work directly with preceptors in each clinic and in population management. Many clinical encounters are for acute medical issues that do not require prolonged follow-up. Patients are referred back to their primary care providers for ongoing medical care.

At the end of each rotation, residents discuss any outstanding issues that may exist with their faculty preceptor (who is the medical provider ultimately responsible for patient occupational or environmental health care). For ongoing projects, such as at the International Association of Fire Fighters, residents also leave a written sign-out report for the incoming resident who then discusses the report and remaining action items with the preceptors. By directly involving preceptors, this transition process facilitates continuity of care and patient safety while allowing preceptors to assess resident competency in communicating hand-over details. Finally, rotation schedules are sent to preceptors at the start of each year and updated as needed.

Protocol for Faculty Involvement in Clinical Care
The Johns Hopkins School of Public Health Occupational Medicine Residency Program and General Preventive Medicine Residency is committed to promoting patient safety while providing residents with progressive responsibility. A Policy on Supervision currently exists for all preventive medicine rotations, regardless of clinical content. The ACGME Common Program Requirements (VI.A.2) indicate that residency programs must set guidelines for circumstances and events in which residents must communicate with appropriate supervising faculty members. Therefore, this protocol is specifically for clinical activities. Clinical care in the program is entirely outpatient with direct precepting in the clinical rotation sites. Residents work directly with preceptors in each clinic. Residents see patients with a range of complexity, however, all patients are discussed at least briefly with the preceptor. Patients with more complex medical problems will require more detailed discussion and faculty involvement.

Preceptors, including physicians, nurses and nurse practitioners, will have greater involvement for a range of patient needs including, but not limited to, the following:

- Situations in which contact with public health agencies and/or employers is required. For these patients, preceptors will need to direct residents to appropriate contacts and how to approach employers while protecting patient confidentiality to the extent possible under the law.
- Acutely ill patients who present to the occupational health clinic and need to be transferred to the Emergency Department (e.g., chest pain, shortness of breath, deep laceration). Nursing staff, even if not directly precepting, will be involved in the care and transfer of these patients as well.
- Acute work-related injuries, such as needle sticks, that require urgent care and follow-up.

Any deviation from this policy should be reported to the OEMR or GPMR Director promptly. The Director may convey the information to the Designated Institutional Official and the Graduate Medical Education Committee for discussion to facilitate process improvement.

Under the ACGME Common Program Requirements (VI.A.2.e) each resident must know the limits of their scope of authority, and the circumstances under which they are permitted to act with conditional independence. Progression is discussed semi-annually.

Use of M.D. Designation for ECFMG-Certified Medical Graduates
Following the Johns Hopkins School of Medicine procedure, the Johns Hopkins School of Public Health will permit ECFMG-certified medical graduates to use the M.D. designation on an ID badge upon request.

Discrimination and Harassment
The Johns Hopkins University policies on discrimination and harassment apply to the residency programs. The policy may be found on the Johns Hopkins University Office of Institutional Equity (https://oie.jhu.edu/) website.

Sexual Misconduct Policy
The Johns Hopkins University Sexual Misconduct Policy and Procedures apply to the residency program. The policy may be found on the Johns Hopkins University Office of Institutional Equity (https://oie.jhu.edu/) website.

Accommodations for Disabilities
The Johns Hopkins University Americans with Disabilities Act Compliance and Disability Accommodations processes apply to the residency programs. This information may be found on the Johns Hopkins University Office of Institutional Equity (https://oie.jhu.edu/) website.

Resident Grievance Procedure
Purpose
On occasion, disputes arise between residents and other members of the Johns Hopkins University ("University") or Bloomberg School of Public Health ("School") community. Individuals involved in such disputes should first endeavor to resolve the matter informally. After reasonable efforts have been made to do so, residents who believe they have been adversely and unfairly affected in their capacity as residents may use this process to seek formal resolution of a serious situation that cannot be resolved informally and is not otherwise covered under another University or School policies or procedures.

Definitions
The "grievant" is the resident bringing forth the grievance. The "respondent" is the individual against whom the grievance is made.

Grievable Matters
A "grievable" matter is a complaint that a current resident enrolled in a School residency program has been directly and adversely affected in their education, training, or professional activities due to an arbitrary or capricious act, or failure to act, or a violation of a University or School policy or procedure by anyone acting officially or on behalf of the University or School, other than the matters exempted below.

The following matters are not grievable and are excluded from consideration under this policy:

1. Complaints alleging discrimination or harassment on the basis of sex, gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, gender identity or expression, veteran status, or other legally protected characteristic; sexual misconduct, domestic violence, dating violence, or stalking; or that are otherwise within the purview of the University's Office of Institutional Equity ("OIE"). Such complaints must be referred to OIE.

2. Complaints pertaining to general levels of salary, fringe benefits, or other broad areas of financial management and staffing.

3. Complaints, the resolution or remedy of which, would conflict with a policy of the University or School; a policy of The Johns Hopkins Health System (or its affiliate or subsidiary hospitals); federal, state, or local laws or regulations; or any contract to which the University is a party.
4. A complaint pertaining to subject matter within the purview of another University or School policy or procedures, or any standing committee of the University or School, unless the complaint arises from an alleged failure to act or to follow the policies or procedures of the University or School. For example, disputes involving grades, promotions, disciplinary action, and matters covered by the Johns Hopkins Personnel Policy Manual are not grievable.
5. Disputes that are personal in nature and do not involve the Grievant's educational, training, professional, or institutional responsibilities or activities.

Procedures

1. Prior to filing a formal grievance, the grievant should attempt to resolve the situation informally, which may include meeting with the individual against whom the grievance is made, a department chair, an appropriate dean, or others. The Director of the residency program or other responsible official is also available to the grievant for counseling on how best to resolve the situation informally and for handling a grievance made against the resident-in-training.
2. If the matter cannot be resolved to the mutual satisfaction of the parties, a formal grievance may be filed with the Designated Institutional Official ("DIO") within sixty (60) days thereafter or sixty (60) days from the event leading to the grievance, whichever is later. A delay in filing the grievance may constitute grounds for its dismissal.If the grievance is initiated against the DIO, the grievant may instead submit the grievance to the Dean of the School.
3. The grievance must be in writing and include the following:
    a. statement of the grievance;
    b. description of the alleged facts on which the grievance is based;
    c. summary of steps taken to attempt to informally resolve the grievance, if any;
    d. name(s) of the person(s) against whom the grievance is filed;
    e. other facts considered to be pertinent;
    f. the remedy sought; and
    g. any relevant documentation.
4. Upon receipt of a properly submitted grievance, the DIO shall appoint two (2) faculty members without conflicts to first determine whether the grievance presents a grievable issue. The decision regarding grievability will be final and may not be appealed.
5. If the matter is determined not to be grievable, the grievance will be dismissed and the grievant will be notified of the decision in writing, stating the reasons for such decision.If the matter is determined to be grievable, the DIO will then appoint one (1) resident without a conflict to also serve on a Committee with the two faculty and the following procedures shall be followed.
6. The DIO shall inform the grievant of the composition of the committee. The grievant may, within five (5) days, request that the DIO replace one or more members of the Committee upon a reasonable showing of bias or conflict of interest.
7. The Committee shall provide written notification to the grievant and respondent and assemble the relevant documentation and facts. The Committee may request additional information from and/or interviews with the grievant, the respondent, witnesses, and relevant University personnel.
8. The Committee will formulate its findings and recommendations based on a majority vote and will forward its recommendation in writing to the DIO.
9. The DIO will inform the parties to the grievance in writing of the DIO's decision and the reasons for the decision.The DIO's decision will be final.

Administration

A good faith effort will be made to complete the process within 90 days, but this time frame may be extended as reasonably necessary. Legal counsel for any party may not participate in meetings or deliberations pursuant to these procedures. The Office of the General Counsel will not act as the prosecutor or defender of any party, but will act as an impartial legal adviser to the University.

General Preventive Medicine Residency Program

Welcome and Introduction

Welcome to the Johns Hopkins Bloomberg School of Public Health General Preventive Medicine Residency Program. This information is designed to give you an overview of the program and to guide you through the academic and practicum years.

Please use this as a frequent reference for the questions that will come up as you complete your training. The first sections provide an overview of the program, policies, benefits, administrative structure, and governance, and the competency and knowledge areas of preventive medicine. Sections that follow guide the academic and practicum years. The roles and responsibilities of the resident and the program are delineated.

This is not intended as a stand-alone resource. You will find valuable and pertinent information regarding the MPH (p. 497) and the Johns Hopkins Bloomberg School of Public Health (p. 54) in this online catalogue. Many preventive medicine resources are now online and useful websites are also included.

The General Preventive Medicine Residency (GPMR) Clinical Director, Academic Director, Chief Resident, administrative staff, and I are here to provide direction throughout your program. In addition, be sure to talk to faculty and rotation preceptors whose interests, research, and practice activities can help to guide you. These contacts can prove invaluable to your career. Plan to meet frequently with me, and be specific about your interests as well as your uncertainties.

Finally, make the most of your associations with fellow residents and students in the school. You may well find that these relationships are your richest continuing source of support, encouragement, and professional stimulation.

Again, welcome, and my very best wishes for a wonderful training experience and a successful career in the exciting field of preventive medicine!

Clarence Lam, MD, MPH
Director, General Preventive Medicine Residency

Mission Statement

The mission of the Johns Hopkins Bloomberg School of Public Health General Preventive Medicine Residency Program is to prepare physicians in the theoretical, practical, and clinical knowledge and skills essential to leadership roles in the design, management, and evaluation of population-based approaches to health. Fundamental to this mission is the program's commitment to instilling in residents the ability to synthesize clinical and population-based approaches to disease prevention and health promotion, to impact health issues on a broad continuum from local to international in perspective, and to discover and apply knowledge toward the protection of the public's health.

Residency Accreditation

The Johns Hopkins Bloomberg School of Public Health General Preventive Medicine Residency Program is fully accredited by the Residency Review Committee (RRC) of the Accreditation Council for Graduate Medical Education (https://acgme.org/) (ACGME) for Preventive Medicine for both the academic and practicum years of training. The GPMR Program recently underwent an ACGME site visit in 2017 and remains fully accredited.

Program Overview

The mission of the Johns Hopkins Bloomberg School of Public Health General Preventive Medicine Residency Program is to prepare physicians in the theoretical, practical, and clinical knowledge and skills essential to leadership roles in the design, management, and evaluation of population-based approaches to health.

Five key strategies are basic to this mission:

1. to instill in residents the ability to synthesize clinical and population-based approaches to disease prevention and health promotion,
2. to view health issues on a broad continuum from local to international in perspective,
3. to discover and apply knowledge toward the protection of the public's health,
4. to provide residents with the management and epidemiologic skills needed to address the overall health needs of underserved populations, and
5. to provide residents with the clinical skills needed to treat specific diseases that disproportionately affect underserved populations.

The goal of the residency program is to train physicians in the knowledge and skills that will allow them to advance the health of populations and individuals by promoting health-enhancing behaviors and preventing disease and disability. The residency program accepts physicians who have completed their requisite appropriate clinical training, into the academic phase of general preventive medicine training. Residents may join the program having previously earned a Master of Public Health (MPH) or seeking an MPH.

Although the residency does not have an internship year, it does have an arrangement with The Mary Imogene Bassett Hospital (https://www.bassett.org/medical-education/residency-programs/transitional-year/) in Cooperstown, New York, where one resident a year may complete a transitional PGY-1 year before entering the Hopkins GPMR Program. The residency program also trains one combined family medicine-preventive medicine resident per year in conjunction with MedStar Franklin Square Medical Center (https://www.medstarhealth.org/education/affiliated-hospitals-2/medstar-franklin-square-medical-center/combined-family-medicine-preventive-medicine-residency/) in Baltimore, Maryland, for which fourth-year medical students or other appropriately qualified applicants may apply through the National Resident Matching Program.

The GPMR Program is committed to maximizing the educational process for each resident so that each may become a competent preventive medicine physician and meet their professional goals. In addition to the residency director, who supervises and guides all aspects of the residency program and is readily accessible to each resident, the residency program also has a Chief Resident, Academic Director, and Clinical Director who all assist residents with various aspects of the training program.

The PM-1[1] (Preventive Medicine Year 1) year is an opportunity to gain the theoretical knowledge and skills necessary to become a preventive medicine physician, and the PM-2[2] year allows residents to apply the knowledge and skills that they have acquired. The PM-2 year continues to provide didactic education with an emphasis on "real-world" issues. These educational experiences encourage residents to become lifelong learners. Furthermore, they encourage residents to be constantly intellectually inquisitive and to use practical situations to uncover new knowledge. The residency program makes available a variety major textbooks in the field of preventive medicine that are available for reference in the residency on-campus office. In addition, the skills that residents gain in the academic year are used on a regular basis during the practicum rotations.

All residents are expected to attend the annual meeting of the American College of Preventive Medicine (https://www.acpm.org/) (ACPM). Any exceptions must be approved by the Program Director. Residents are encouraged to be involved in national preventive medicine resident activities and Hopkins residents often hold national leadership positions. The residency program provides all residents funds to offset the costs of these prevention-related conferences. The residency program also reimburses the annual membership dues for the ACPM (https://www.acpm.org/) for all residents.

Upon completion of the residency, all residents are expected to sit for the American Board of Preventive Medicine Certifying Examination.

[1] PM-1 may also be referred to as PGY-2 in GPMR documentation
[2] PM-2 may also be referred to as PGY-3 in GPMR documentation

Clinical Overview (PM-1 and PM-2 years)

In accordance with ACGME Preventive Medicine Guidelines, all residents will complete two months (320 hours) of clinical activities during each year of the program. Residents will be training in clinical environments focused on preventive medicine and where patient responsibilities are paramount.

PM-1 (First Year)

The first year (PM-1 year) of the General Preventive Medicine Residency Program is an intensive academic experience. Residents who have not already obtained a Master of Public Health (MPH) prior to coming to GPMR will complete the required coursework during the PM-1 year. Coursework for the MPH is completed in an 11-month program that is divided into 5 terms. The MPH-seeking PM-1 residents spend the majority of their year engaged in the MPH courses, pursuing didactic and independent study that leads to the MPH degree.

Although nearly all of the requirements of the MPH degree are to be completed during the PM- 1 year, **residents will not receive the degree until May of their last year of training**. The MPH degree requires the completion of a practicum experience, and this requirement will be fulfilled through the completion of a PM-2 practicum rotation. While the MPH Capstone can be completed either at the end of either academic year, but it is **encouraged that the Capstone be completed during the PM-1 year**.

Residents select from among 400 courses offered in the School of Public Health. The MPH requirements account for approximately 60% of preventive medicine residents' responsibilities. **Residents will spend approximately 20% of their time completing clinical preventive medicine activities and 20% of their time participating in residency-sponsored seminars and supplemental educational activities (e.g. modules).** Residents may also receive special studies credit for research conducted with a faculty mentor during their academic year. With the depth and breadth provided by the large faculty and the large number of course offerings, residents are able to customize their academic training to be closely aligned with their professional interests. Each resident receives advice on choice of courses from the residency program director, the GPMR Chief Resident, their assigned MPH adviser, and other faculty and students, as needed.

Residents who have previously obtained an MPH degree prior to entering GPMR are required to complete two years of preventive medicine residency training. In the first year, the program will review each MPH-holding GPMR resident's MPH transcript to devise an individualized academic plan. This will ensure that the combination of their prior and Hopkins coursework meets the standards of those residents who are undergoing their MPH academic requirements at the Johns Hopkins Bloomberg School of Public Health. The MPH-holding GPMR residents will also be required to complete the clinical program, and to attend all residency-sponsored seminars and supplemental educational activities. The remainder of the MPH-holding resident's time will be spent working with pre-established practicum rotation sites on a specific project that is mutually agreed upon by the rotation site, the resident, and the GPMR Program.

Residency training and all educational endeavors at the school are based on competencies. Students define their career and educational objectives with the guidance of their advisers and other resources. This process enables students to appropriately select options for fulfilling core requirements, electives that develop the desired competencies, and a focus for a self-directed integrating experience project. Such a resident-centered programmatic orientation and philosophy necessitates a multi-dimensional view of curriculum organization. This multi-dimensional organization facilitates thinking of the program in ways that assure requisite knowledge and skills are addressed across the breadth of the core curriculum within a context that promotes the rapid integration of these skills into professional practice behaviors.

On entry into the program, each resident meets with the program director and then prepares an educational plan that outlines their educational goals for the year, with an emphasis on coursework and residency activities that will maximize their background and allow them to gain competence in the field of preventive medicine. In addition to the in-service exam, this plan serves as the incoming assessment. Each resident will receive a grade report at the end of each term and at the end of the year. They will meet semi-annually with the program director during each year of study to review performance and progress.

The MPH curriculum is organized around the core functions of public health practice as defined by the Institute of Medicine and enhanced by Johns Hopkins: assessment, policy and program development, assurance, and communication. These functions are embodied within the school's problem-solving paradigm. This integrative paradigm serves as an organizing principle for the structure and sequencing of the core (discipline-based) curriculum in the form of a professional practice paradigm that progresses through each of these core functions.

Within each broad discipline area as defined by the Council on Education for Public Health (CEPH), a set of competencies defines the level of mastery expected of all MPH graduates, irrespective of the student's intended focus of study. The MPH Executive Committee also uses these competencies to determine the suitability of courses and combinations of courses to fulfill core area requirements, and the entire matrix is used to identify gaps in the overall program.

The MPH Program also has competencies that transcend disciplinary boundaries and demonstrate synthesis, analysis, and integration of multiple cognitive, attitudinal, and behavioral domains. These competencies include activities that are inherently integrative in nature, requiring students simultaneously to draw upon and selectively and critically utilize the array of knowledge and skills in their possession. These competencies are most closely associated with the behavioral outcomes MPH graduates are expected to manifest in their professional practice activities. In addition, all residents, regardless of whether they are pursuing the MPH degree during their PM-1 year, will be required to take courses that uniquely meet the needs of preventive medicine residents (see (p. 556) Course Requirements). The MPH final project, the Capstone Project, is tailored to the residents' needs and is a project that is the culmination of a practicum or research experience and may be written using the Problem Solving Paradigm.

Other residency activities (e.g. modules) complement the educational experience during the academic year. An extensive summer seminar series introduces residents to role models for careers in public health. Each week throughout the summer, public health and preventive medicine professionals, including School faculty and our own residency graduates, present information on how their own careers have developed and share ongoing activities at the health agencies and organizations where they are employed. In this way, residents learn about potential career paths early in their academic year.

Throughout the first year, residents participate in modules to acquaint them with the breadth and depth of the field of preventive medicine. They gain experiences with modules such as those focused on Problem Solving in Public Health, Public Health Preparedness, Quality Improvement, and Conflict Management and Negotiation. Environmental Health site visits to a water filtration plant, a wastewater treatment plant, and a waste management facility are also part of the PM-1 curriculum. Residents also receive professional development training in skills such as leadership, management, advocacy (including media advocacy), project management, and oral and written presentation skills. The advocacy series culminates with a trip to Capitol Hill where the residents can practice presenting to legislative aides and receive feedback on their presentations.

Another important component of the PM-1 curricula is the opportunity to teach graduate students in the “Problem Solving in Public Health” course. All first year (PM-1) residents serve as teaching assistants for this course. Residents work with professors in the School of Public Health to prepare for this course and receive student feedback on their teaching abilities.

All residents in the PM-1 year are required to complete a direct patient care clinical component that is equivalent to 2 months (320 hours) of clinical interaction. The program has developed these clinical experiences to advance the mission of the preventive medicine residency program and meet ACGME requirements. All clinical experiences are approved by the program director and clinical director. Residents must have a **minimum of two months of direct patient care experience (clinical rotations) during each year of the program**, and all patient care experiences must be supervised (see Supervision section for additional details). Given the structure of the program, this requirement is spread across the year by completing 80 half-days in a clinic (of note, a half-day should equal approximately 4 hours). Residents will track their clinical hours in New Innovations with the goal of obtaining 320 hours each year. Please note that the program does not permit residents to obtain all 320 hours over a one-month period.

The residents spend a large portion of their time together in the first year as they take required courses and participate in didactic resident activities. These activities help to build group cohesiveness and provide a distinct identity for the residents within the MPH class. Residents are encouraged to participate in research projects and often work with faculty on such endeavors. Residents have the chance to be involved in school-wide and residency committees and can participate in many different community-based projects.

PM-1 residents are expected to attend monthly didactic Administrative Rounds if there is no pre-existing conflict with a regularly scheduled course (or with overnight call, for the Franklin Square combined residents). This also applies to PM-1 residents who already have their MPH and are on practicum rotations. Finally, all first year residents are expected to attend the annual Preventive Medicine/Public Health Grand Rounds.

PM-2 (Second Year)

The PM-2 year, the practicum year, is individualized to meet the educational and experiential needs of each resident. Residents plan their rotations to be consistent with their professional goals and to maximize their prior education and experiences. It is expected that residents’ practicum experiences will build on the theoretical models that they studied in their academic year. Residents must complete the practicum year to meet the eligibility requirements for certification by the American Board of Preventive Medicine.

During the practicum year, residents are required to complete at least four practical preventive medicine rotations, including one from each of the following categories:

1. Biostatistics and Epidemiology
2. Management and Administration
3. Occupational/Environmental Health **or** Clinical Preventive Medicine

The content of each rotation is designed to focus on the competencies established for that category of rotation. These competencies were adopted and adapted from competencies developed by national preventive medicine forums to focus on the knowledge and skills needed to function effectively as a preventive medicine specialist in local, state, federal, international, clinical, corporate, and academic settings. Similar to the PM-1 year, all residents in the PM-2 year are required to complete a direct patient care clinical component that is equivalent to 2 months (320 hours) of work.

Practicum year residents also register for 16 credits per term for Special Studies course PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year, which is fulfilled through monthly administrative rounds. (Note: Residents in their third and fourth year of the combined program should follow the instructions provided by the Residency Program Manager regarding their credit requirement in those years.) These monthly rounds (one day a month) provide an ongoing opportunity for residents to receive the didactic portion of their education during their practicum year. The monthly rounds may include journal club, guest lecturers who speak on current topics in public health, professional skill building didactics, and opportunities for residents to present their practicum projects to the group. Other pertinent information, such as information on board preparation and job search techniques may be presented at appropriate times of the academic year. Residents are expected to attend the annual Preventive Medicine/Public Health Grand Rounds if their rotations are within the Baltimore-Washington area.

Resident Benefits

Residents receive a stipend in each year of the program as well as a tuition (https://www.jhsph.edu/admissions/tuition-and-fees/) scholarship for the Master of Public Health program. Residents also receive a comprehensive benefits package which includes health insurance, dental insurance, life insurance, long-term disability, and professional liability insurance. Residents are also provided allowances for conference travel and professional membership, as well as an annual vacation and sick time allotment. These benefits are reviewed annually.

Advisory Committees

Formally established advisory committees play a role in the governance of the General Preventive Medicine Residency. Residency representatives from both years of training, as well as the GPMR Program Director, Clinical Director, Academic Director, and Chief Resident, serve as members of each committee.

Program Evaluation Committee (PEC)

Committee Charge

The goal of the Program Evaluation Committee is to serve as a formal, systematic assessment of the educational components of the residency program, including the examination and monitoring of areas, measures, and progress undertaken to improve the program curriculum.

Committee Membership

- Committee must be composed of at least two members of the program faculty and at least one resident as designated by the program director. (The program director may serve as one of the two faculty members of the Committee.)
- The Program Coordinator will assist in the administrative functions of the committee, which include managing the logistics and scheduling for the Program Evaluation Committee meetings, and recording and retaining of meeting minutes.

Committee Meetings

The Committee will meet at least once per year. Additional meetings may be scheduled at the discretion of the chair.

Committee Accountability

Responsibilities of the Program Evaluation Committee must include:

- Acting as an advisory to the program director, through program oversight.
- Annual review of the program's self-determined goals and progress toward meeting them.
- Guiding ongoing program improvement, including development of new goals, based upon outcomes.
- Review of the current operating environment to identify strengths, challenges, opportunities, and threats as related to the program's missions and aims.
- The Committee is responsible for assessing the following areas for the purpose of program improvement (not to identify individual residents for personal improvement or remediation):
  - Resident performance, including examining cohort-wide data aggregated from transcripts, milestones, resident feedback/ evaluation (including at least one opportunity to evaluate the program confidentially and in writing at least annually), and other materials as deemed necessary.
  - Resident well-being, recruitment and retention, workforce diversity
  - Faculty development, including annual data aggregated from preceptor evaluations, faculty evaluations, and other materials as deemed necessary.
  - Graduate performance, including performance of program graduates on the board certification examination.
  - Program quality, through materials and assessments as deemed necessary.

Documentation of the Annual Program Evaluation:

- The Committee must prepare a written plan of action known as the Annual Program Evaluation (APE) that will identify areas of improvement and ensure that recommendations are measured and monitored annually.
- A consensus for initiatives and recommendations to be documented in the APE should be determined by the end of each Committee meeting. The Program Director and Program Coordinator will be responsible for developing a written plan based on the proceedings of the meeting.
- The APE should be reviewed and approved by the teaching faculty to ensure widespread agreement and support.
- The Program Director will carry out the recommendations as outlined in the APE.
- APE does not need to be submitted to the ACGME but document should be distributed to and discussed with members of the teaching faculty and residents, submitted to the DIO, and retained by the program.

Clinical Competency Committee (CCC) Committee Charge

The goal of the CCC is to review and document residents' progression through the ACGME milestones.

Committee Accountability

The Committee will prepare and assure the reporting of milestones evaluations of each resident semi-annually to the ACGME.

The responsibilities of the CCC include, but are not necessarily limited to, the following:

1. The Committee will meet, review, and advise the Program Director on each resident's progress through the program, including promotion, remediation, and dismissal.
2. The Committee will make a determination of each resident's progress through all preventive medicine milestones.
3. The Committee will prepare and assure the reporting of milestones evaluations of each resident semi-annually to the ACGME.
4. Milestones evaluations for each resident will be entered directly into the ACGME Accreditation Data System (ADS) during both of the following reporting windows: November 1-December 31, and May 1-June 30 (exact dates determined by ACGME).

Committee Channels of Communication

The Clinical Competency Committee will make its recommendation to the GPMR Program Director. The Program Director will ensure milestones evaluations for each resident are entered in to the ACGME Accreditation Data System.

Committee Membership

The Clinical Competency Committee will be composed of at least three members of the program faculty as designated by the Program Director.

Committee Chair

The Program Director will serve as Chair of the Committee.

Committee Meetings

The Clinical Competency Committee will meet at least twice annually each academic year to discharge its responsibilities. Fall meeting to be scheduled in November/December and the Spring meeting to be scheduled in May/June, to coincide with ACGME data reporting requirements. Additional meetings may be scheduled at the discretion of the chair.

Committee Staff

The Program Coordinator will handle the administrative functions of the committee, which include collecting data on each resident, managing the logistics and scheduling for the Clinical Competency Committee (CCC) meeting, and recording the decisions of milestone levels for each resident as determined by the Committee.

Graduate Medical Education Committee (GMEC)

Committee Charge

The Graduate Medical Education Committee shall be responsible for meeting the sponsoring institution responsibilities for preventive medicine education activities in the School, including establishment and implementation of Graduate Medical Education Policies (p. 537) and procedures set forth by the Accreditation Council for Graduate Medical Education (ACGME).

The committee shall advise the School on and monitor the following:

1. Establishment and maintenance of appropriate liaison with residency directors and with the administrators of other institutions participating in programs sponsored by the School of Public Health.
2. Regular review of all ACGME program accreditation letters and action plans for the correction of concerns and areas of noncompliance.

3. Regular review of the Sponsoring Institution's Letter of Report from the ACGME Institutional Review Committee (IRC) and development and monitoring of action plans for the correction of concerns and areas of noncompliance.
4. Review and approval prior to submission to the ACGME of:
    a. all application for ACGME accreditation of new programs and subspecialties;
    b. changes in resident complement;
    c. major changes in program structure or length of training;
    d. additions and deletions of participating institutions used in a program;
    e. appointments of new program directors;
    f. progress reports requested by any Review Committee;
    g. responses to all proposed adverse actions;
    h. requests for increases or any change in resident duty hours;
    i. requests for "inactive status" or to reactivate a program;
    j. voluntary withdrawals of ACGME-accredited programs;
    k. requests for an appeal of an adverse action;
    l. appeal presentations to a Board of Appeal or the ACGME.
5. Establishment and the implementation of policies and procedures for the selection, evaluation, promotion, and dismissal of residents.
6. Establishment and implementation of institutional policies and procedures for discipline and the adjudication of complaints and grievances relevant to the graduate medical programs.
7. Assurance of appropriate and equitable funding for resident positions, including stipends, benefits, and support services.
8. Regular review of ethical, socioeconomic, medical/legal, and cost-containment issues that affect graduate medical education.
9. Assurance of the incorporation of School-wide policies and procedures into the residency programs.
10. Review all resident applicants after acceptance to the programs.
11. Review and monitor the progress of all residents through the academic and practicum years.
12. Establish and implement formal written policies and procedures governing resident duty hours in compliance with the Institutional and Program Requirements.
13. Assure that each program provides a curriculum and evaluation system so that residents demonstrate achievement of general and program-specific competencies.
14. Serve as an appeal or arbitration group if problems arise in the programs.
15. Regular review of all residency training programs in relation to their compliance with institutional policies and the program requirements of the Accreditation Council for Graduate Medical Education Residency Review Committee for Preventive Medicine.
16. Conduct internal reviews of all ACGME-accredited programs to assess their compliance with the Institutional Requirements and the Program Requirements of the ACGME Residency Review Committees

Professional Organizations Related to Preventive Medicine

American Board of Preventive Medicine (https://www.theabpm.org/)

The purpose of the American Board of Preventive Medicine (ABPM) is to grant and issue to qualified physicians who are licensed to practice medicine, certificates of special knowledge in preventive medicine and in one of the specialty areas of aerospace medicine, occupational medicine, or public health and general preventive medicine. It is also its purpose to encourage the study, enhance the standards of practice, and advance the cause of preventive medicine.

All Johns Hopkins preventive medicine residents are expected to sit for the American Board of Preventive Medicine (ABPM) Certifying Examination upon completion of the residency. Information about the board exam, the board study guide materials, and board applications are available at the ABPM website.

American College of Preventive Medicine (https://www.acpm.org/)

The American College of Preventive Medicine (ACPM) is the national professional society for physicians committed to disease prevention and health promotion. ACPM's 2,700 members are engaged in preventive medicine practice, teaching, and research. Many serve on ACPM committees and task forces and represent preventive medicine in national forums, contributing to the organization's role as a major national resource of expertise in disease prevention and health promotion. ACPM was founded in 1954.

Specialists in preventive medicine are uniquely trained in both clinical medicine and public health. They have the skills needed to understand and reduce the risks of disease, disability, and death in individuals and in population groups. Students can find preventive medicine trained physicians working in primary care settings and managed care organizations, in public health and government agencies, in workplaces and in academia.

The ACPM has developed core competencies and performance indicators for preventive medicine residents. The organization also offers a review course for the preventive medicine board exam. In addition, ACPM offers a Lifestyle Medicine Core Competency Online Program.

Resident Physician Section (RPS) of the ACPM: Residents are eligible for Resident Membership of the ACPM throughout their residency training, and for one transitional year after. Resident members may vote and hold office in the Resident Physician Section (RPS). RPS is the national voice of preventive medicine residents on issues that affect training, policy, and education. The College provides RPS members with educational resources and puts them in touch with many of the best clinicians and educators in preventive medicine.

RPS members receive the RPS Newsletter and membership includes an active subscription to the *American Journal of Preventive Medicine*. Members are eligible for discounted rates on annual meeting fees and scholarships to attend the meetings of both parent associations, the American College of Preventive Medicine and the Association for Prevention Teaching and Research. Members are also included in the discussions that occur on the RPS email listserv, which includes over 300 preventive medicine residents.

The residency program pays for membership in RPS for both years of the residency training. After completing registration, residents should submit reimbursement requests for RPS registration with receipts to program staff within 30 days of incurring the expense. Residents in the second year are asked to renew their membership and again submit a receipt for reimbursement.

Many GPMR residents are interested in holding a national position with RPS. Elections are in or around February/March of each year; 1-year terms start in April.

American Public Health Association (https://www.apha.org/)

The American Public Health Association (APHA) is the oldest and largest organization of public health professionals in the world, representing more than 50,000 members from over 50 occupations of public health. APHA has been influencing policies and setting priorities in public health for over 125 years. It brings together researchers, health service providers, administrators, teachers, and other health workers in a unique, multidisciplinary environment of professional exchange, study, and action.

APHA is concerned with a broad set of issues affecting personal and environmental health, including federal and state funding for health programs, pollution control, programs, and policies related to chronic and infectious diseases, a smoke-free society, and professional education in public health. APHA actively serves the public, its members, and the public health profession through its scientific and practice programs, publications, annual meeting, awards program, educational services, and advocacy efforts.

The achievements of APHA are the achievements of the thousands of federal, state, community, and academic health professionals who seek to assure the conditions in which people can be healthy. Whether APHA is proposing solutions based on research, helping to set public health practice standards, or working closely with national and international health agencies to improve health worldwide, its mission is to continue to strive to improve public health for everyone.

Association of American Medical Colleges (https://www.aamc.org/)

The Association of American Medical Colleges is a nonprofit association of medical schools, teaching hospitals, and academic societies. The AAMC seeks to improve the nation's health by enhancing the effectiveness of academic medicine. It assists academic medicine's institutions, organizations, and individuals in three main mission areas: medical education, medical research, and patient care.

The AAMC represents and supports its constituents through a broad array of programs and studies, and the administrative leadership of medical schools and teaching hospitals are served by a variety of professional development groups housed within the AAMC. The AAMC provides services to those entering the medical field, including the American Medical College Application Service (AMCAS), the Electronic Residency Application Service (ERAS), MEDLOANS, and the National Resident Matching Program (NRMP). Its full-time staff of 350 is based in Washington, D.C., and is divided into several offices and divisions, from member services to governmental relations to biomedical and health sciences research.

The AAMC has recently launched an online resource bank for educational materials called the MedEdPORTAL (https://www.mededportal.org/).

Association for Prevention Teaching and Research (https://www.aptrweb.org/)

The Association for Prevention Teaching and Research (APTR) is the national association supporting health promotion and disease prevention educators and researchers. Since 1942, APTR has been in the forefront of advancing, promoting, and supporting health promotion and disease prevention in the education of physicians and other health professionals. APTR members include members of the Association of Preventive Medicine Residents. Individual members include physicians, nurses, public health professionals, and health services researchers. Institutional members include academic departments and programs, health agencies, and schools of public health.

APTR provides essential linkages to bring together individuals and institutions devoted to health promotion and disease prevention education and research. APTR develops vital curriculum, professional development, and communication tools for educators, researchers, residents, and students.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

Requirements and Expectations for All Residents

The General Preventive Medicine Residency (GPMR) Program is a broad, two-year training program of academic and applied learning in a school of public health, accredited by the Accreditation Council for Graduate Medical Education. The primary purpose of the residency is to prepare physicians in the theoretical, practical, and clinical knowledge and skills essential to leadership roles in the design, management, and evaluation of population-based approaches to health – i.e., to prepare physicians to recognize that their primary patient is a population and that their goal is to improve the health of that population in the aggregate. In accordance with the Accreditation Council for Graduate Medical Education Preventive Medicine Program Requirements (https://www.acgme.org/Specialties/Overview/pfcatid/20/), the program consists of Master of Public Health coursework, practicum and clinical rotations, and preventive residency-specific modules.

In pursuit of that purpose, it is fundamental that the residency and the residents work together to help each other meet their respective needs. Residents must speak directly with the Program Director, Clinical Director, Academic Director, and/or Chief Resident regarding their individual needs and must clearly verbalize their expectations. Similarly, residents should bring problems or issues to the attention of the Program Director, Clinical Director, Academic Director, Chief Resident, or Program Manager for assistance. Additionally, residents may submit feedback anonymously to the program through an online comment box: www.tiny.cc/GPMRcommentbox (http://www.tiny.cc/GPMRcommentbox/). This link brings students to a Qualtrics form that allows anyone to submit information to the program. All submissions are completely anonymous – no location information, IP addresses, etc. are collected except for a timestamp and the content a student submits.

REQUIREMENTS AND EXPECTATIONS FOR PM-1 RESIDENTS

To meet the objectives of the residency, residents will fulfill the following roles and responsibilities in securing training in the teaching, research, and practice of preventive medicine. The common knowledge base that all residents should master is most effectively acquired through shared experiences. Among such experiences are summer orientation, the MPH coursework, the clinical program, and participation in first year training modules, residency administrative rounds, Grand Rounds, and other program activities – all of which are designed to enable residents to gain the skills, knowledge, and experience in competencies required for preventive medicine training.

Roles and Responsibilities of Residents

Although it is important that all guidelines be met, the program attempts to accommodate and remains flexible to allow for residents' interests.

1. All residents must know and follow the policies and procedures, including but not limited to the Professional Conduct Code –

Residency Expectations and Requirements and GPMR Attendance Policy.

2. All residents must meet with the principal faculty on a regular basis. These meetings include a formal, written semi-annual evaluation with Program Director, Chief Resident, and Clinical Director as well as periodic meetings with the Academic Director. Evaluation will consist of a discussion of the didactic work, applied work, clinical work, courses, research projects, papers, and related activities in which the resident has been involved. Residents' academic transcripts also will be reviewed as a part of the process. Evaluation of resident's activities includes identification of areas of strength, areas needing additional emphasis, and professional goals. At the conclusion of each meeting there will be a summary of the resident's performance in New Innovation. This information is required for performance evaluation and credentialing of residents. A sample schedule of when these meetings occur is shown below:
   PM-1 Residents:
   August and October: Meet with Academic Director
   December: Semi-annual review with Program Director and Clinical Director
   February and April: Meet with Academic Director

   June: Semi-annual review with Program Director and Clinical Director
3. **For those residents who are pursuing an MPH:**
   a. Complete MPH coursework. Discuss plan for completing Capstone project during PM-1 year or prior to April of PM-2 year.
   b. Remain in satisfactory academic standing in the MPH program in accordance with the standards set by that program or be subject to dismissal from the General Preventive Medicine Residency Program. Any resident dismissed from the MPH program will be dismissed from the residency.
   c. Maintain full-time registration (minimum of 16 credits for GPMR) in all five terms of the academic year.
   d. Maintain a 2.75 GPA for the MPH program.
   e. Complete all core MPH and all GPMR requirements prior to beginning the Practicum Year.
   f. Residents will receive their MPH during the PM-2 year after completing their practicum rotation that fulfills the MPH practicum requirement.
4. **For those residents who have completed an MPH prior to coming to GPMR:**
   a. Participate fully in scheduled PM-1 didactic and educational modules, as well as other educational activities.
   b. Complete all MPH courses identified by the GPMR program as necessary for preventive medicine training.
   c. Maintain a 3.0 GPA in all residency-required courses that are taken for a letter grade.
   d. Maintain full-time student status. Register for up to 16 credits of Special Studies (PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year) per term.
   e. Plan to schedule primarily part-time rotations (3-4 days a week) in consultation with the GPMR Chief Resident and Program Director during the PM-1 year, in order to allow sufficient time to participate in PM-1 activities and to take any required courses. All rotation schedules are subject to final approval of the Program Director.
   f. With prior approval of the Program Director, may schedule one unfunded or partially-funded rotation during the PM-1 year, for a period of up to three months. Other rotations shall be fully funded at the PM-2 rotation fee rates.
   g. Complete a project at each practicum site.
   h. Complete and submit all assigned rotation reports. A resident is required to submit:
      i. A *Rotation Plan* form, which is due **one week** after beginning the rotation.
      ii. A form evaluating the rotation overall (*Resident Evaluation of Rotation/Preceptor*), which is due **one week** after completing the rotation.
      iii. During the last week of a rotation, the resident must meet with the preceptor as part of an "exit interview" and to help facilitate and ensure the timely completion of the *Preceptor's Evaluation of the Resident*. Residents must receive at least a satisfactory evaluation from each rotation preceptor.
5. All residents must complete the clinical component, equivalent to 2 months (320 hours) of work, each year. All clinical experiences must be approved by the Program Director. Residents are required to complete similar rotation evaluation forms for each clinical rotation including;
   a. A Rotation Plan form, which is due **one week** after beginning the rotation.
   b. A form evaluating the rotation overall (Resident Evaluation of Rotation/ Preceptor), which is due **one week** after completing the rotation.
   c. During the last week of a clinical rotation, the resident must meet with the preceptor as part of an "exit interview" and to help facilitate and ensure the timely completion of the Preceptor's Evaluation of the Resident.

Course Requirements

The following is a list of the curriculum requirements for residents during the PM-1 year. *Note that MPH-required courses must be taken for a letter grade; courses taken to fulfill residency requirements may be taken Pass/Fail unless they are also fulfilling MPH requirements*.

All residents must take the following courses (or courses deemed to be equivalent in prior studies) as required by the GPMR Program:

Code	Title	Credits
PH.188.686	Clinical Environmental and Occupational Toxicology	3
PH.188.840	Special Studies and Research Environmental Health & Engineering (INTRO TO PROBLEM SOLVING)	2 - 4
PH.300.651	Introduction to the U.S. Healthcare System	4
PH.305.623	Fundamentals of Clinical Preventive Medicine	3
PH.550.860	Academic & Research Ethics at BSPH	
PH.552.622	Creating, Implementing and Monitoring Budgets for Projects and Programs	1
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
Advanced Epidemiology Course [1]		3-4

[1] An advanced epidemiology course that builds on the knowledge and skills of Epi 1 (may be methods course, applied course, content area

course, etc.) Students should please check with the Program Director if they choose this course.

COURSE suggestions

The following is a list of courses suggested (but not required) for residents during the PM-1 year.

Code	Title	Credits
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
PH.187.610	Public Health Toxicology	4

Residents pursuing an MPH at JHSPH must:

1. Register for one credit of Special Studies (PH.550.880 SS/R: General Preventive Medicine Residency-MPH) during each of the five terms of the MPH year. Regular attendance at all seminars, completion of knowledge assessment quizzes of training modules, and other required residency activities is a condition for receiving a Pass in this course.
2. Complete the MPH Capstone project, which must be in a residency-determined area and format, unless a waiver is given by the Program Director.

All residents who have previously completed an MPH must:

1. Complete any additional coursework required by the GPMR program as necessary for educational enrichment based on an individual academic plan developed upon review of each resident's MPH transcript, per the required course list above.
2. Enroll as full-time student. Register for up to 16 credits of Special Studies (PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year)during each of the five terms of the MPH year. Regular attendance at all seminars, completion of knowledge assessment quizzes of training modules, and other required residency activities is a condition for receiving a Pass in this course.
3. Students should discuss any additional coursework they wish to complete with the GPMR Chief Resident and Program Director.

Educational Plan

Early in the year, first year residents must prepare and submit to the Program Director a written educational plan for the first year of the General Preventive Medicine Residency. Residents who are pursuing an MPH will likely incorporate the MPH Goals Analysis into their educational plan. The deadline for this plan will be announced, but will be well before the MPH deadline. This plan will follow the MPH Goals Analysis guidelines, with the addition of residency-specific information regarding their goals, additional skills, knowledge, competencies students hope to gain from the residency training, and their plans for obtaining these. The plan will include activities outside of the residency itself, such as attendance at professional conferences, research projects, etc. For residents who have already completed an MPH prior to coming to GPMR, a students plan should also include the rotations and other activities they are thinking of completing, and how these will help them in their educational goals. A template for this Plan will be provided.

Advising and Customized Program

As the GPMR Program Director, Dr. Clarence Lam will have responsibility for overseeing overall advising and mentoring of all residents. Dr. Lam will serve as the summer adviser for all PM-1 residents. At the end of the summer term, the MPH office will assign residents in the MPH program to academic advisers based on background and area of interest. In addition, residents in the MPH program must select a Capstone adviser; this adviser may be their MPH academic adviser, the GPMR Program Director, or another faculty member. PM-1 residents who already have an MPH will select an academic adviser in consultation with Dr. Lam based on the resident's area(s) of interest. All PM-1 residents will be expected to meet with Dr. Lam on a semi-annual basis to review their academic performance and professional development within the program.

For PM-2 residents, Dr. Lam will serve as the formal primary faculty adviser for all residents.

In both PM-1 and PM-2 years, all residents will create an individualized academic plan that will meet their professional training needs. PM-1 residents submit both a Goals Analysis to the MPH office and an individualized program-oriented educational plan to the Residency Program Office. PM-2 residents submit this plan to Residency Program Office. This individualized academic plan will be reviewed annually by the Chief Resident and Program Director.

PM-1 residents should elect a *customized* program of study for their MPH degree, although residents may informally follow the sequence of courses for any of the MPH (p. 497) concentrations offered. Residents that wish to apply for and complete an MPH concentration should first receive approval from the Program Director and Chief Resident.

Extracurricular Activities

Crucial to resident learning and success is resident involvement in the opportunities that become available through the MPH and residency programs. Although it is extremely difficult to measure its impact, involvement in classes, in projects, in residency activities, and in the community is the main mechanism for personal growth. We will bring to residents' attention numerous public health-related activities during the year, and residents will hear about many opportunities from other sources.

We expect and strongly encourage residents to:

1. Be involved in as many of these opportunities as their time and energy permit. We encourage residents to engage in at least one preventive medicine research project or preventive medicine practice activity (i.e. community project) either as a part of the residency program or independent of it. Residents also are strongly encouraged to publish any research results and to present them at a residency seminar and national scientific meetings.
2. Serve as visiting instructors in courses when requested.
3. Participate in Special Studies projects that can be organized with faculty and preceptors at the local, state, national, or international health levels in order to gain experience in the solution of practical problems in preventive medicine.
4. Participate actively in departmental and school-wide activities including seminars, required courses, and teaching opportunities.
5. Seek advice and assistance from a faculty member designated as faculty adviser in the planning of both academic and field research experience.
6. Attend preventive medicine/public health national meetings, such as the annual meetings of the American College of Preventive Medicine and the American Public Health Association.

SAMPLE Calendar of Major PM-1 Year Residency Events

Month	Event
July-August	Orientation
	Meet the Professor series
	Public Health Preparedness module
	Journal Club
	Clinical component orientation
September-December	Professional development and skill-building seminars
	Introduction to Problem Solving in Public Health course
	Fundamentals of Clinical Preventive Medicine course (Term 1)
	Creating, Implementing and Monitoring Budgets for Projects and Programs
	Intro to U.S. Healthcare course (also offered in Term 4)
	Public Health Toxicology course (optional course offered in Terms 1 and 2)
	Health Equity sessions
	Clinical program
January Intersession	Advocacy module
	Clinical program
January-May	Clinical Environmental and Occupational Toxicology
	Foundations of Leadership seminar
	Quality Improvement module
	Practicum Rotation selection process, including Meet the Preceptors sessions
	Project Management (biennial)
	Leadership and Management module
	Health Equity sessions
	Colman Grand Rounds
	Clinical program
	TA the Term 3 Online Problem Solving Course
May-June	MPH Capstone Project due
	ACPM Preventive Medicine Conference
	Preparations for second year
	TA the MPH Summer Intersession Problem Solving in Public Health course
	Environmental Health Seminar series with site visits
	Clinical program

PM-1 residents are required to be present and participate in all residency activities through June 30 of that year, except when vacation for the PM-1 course is scheduled.

MPH Capstone

Overview

The MPH capstone project is a graduation requirement for students in the MPH program. The goal is for students to synthesize, integrate, and apply the skills and competencies they have acquired. Completion of the MPH capstone project requires both written and oral components. Additional detailed information is available in the MPH Program guides; some key excerpts are shown below:

- There are no formal guidelines on the length of the paper; range is generally between 15 and 25 double spaced pages.
- The paper must include an executive summary (limited to 300 words) and references.
- The final written project, along with a letter from the faculty capstone supervisor approving the student's project, will be due in the MPH Program Office by a specified date.
- Students should indicate on their MPH Capstone Information form that they will be presenting the oral component with the overall MPH program, scheduled for a Saturday early in May by the MPH program, but should be assigned to the General Preventive Medicine Residency group, which will be moderated by GPMR leadership and faculty.
- During 3rd and 4th terms, students must sign up for at least 1 credit of special studies each term with their capstone supervisor. The capstone supervisor may be their residency adviser, but it can be another faculty member in their area of interest. If a student is working with Dr. Lam as their capstone adviser, they should register for PH.300.800 MPH Capstone Health Policy and Management (MPH Capstone – HPM).
- Although it is encouraged that all residents complete their Capstone during PM-1, residents may seek to complete their Capstone during PM-2.

GPMR Capstone Focus

Preventive medicine residents have a unique opportunity within the School of Public Health to complete multiple "capstones" during residency practicum rotations, with more intensive exposure to chosen areas of interest. The MPH capstone project should contribute to each resident's foundation for engaging in a productive PM-2 year.

The MPH capstone experience in the residency program is designed each year with the goals of meeting all MPH Program educational experiences but also allowing the residents to demonstrate competence in areas that have been a focus of residency seminars during the year. Each year these competencies will vary based on the internal and external environments of public health. The Problem Solving Paradigm may be utilized. All residents will fulfill their MPH oral presentation requirement by presenting at a Capstone Symposium in May. The program faculty and staff will provide specific guidelines as the year progresses.

Rotation Selection Process

Mid-way through their PM-1 year of training, residents begin to plan for the practicum year by reviewing the rotation guidelines, the available established rotations, and other materials such as reports and evaluations submitted by current and former practicum year residents. Rotation Descriptions and Planning Documents can be found in New Innovations.

Calendar for Rotation Selection Process

The selection of rotations follows approximately the schedule below.

Month	Event
Jan-Feb	Rotation information distributed, selection process reviewed, and residents attend Meet the Preceptors sessions to familiarize themselves with established rotation site preceptors and learn more about those rotations
March	Rotation preferences are submitted to program manager
April	Rotation schedule is drafted and refined
April-June	Residents contact preceptors to confirm rotations; program manager finalizes rotation agreements

PM-1 Vacation Guidelines

Residents have 15 vacation days per year. Vacation during the PM-1 year will be determined by the academic calendar and the GPMR-required didactic modules. **The GPMR program schedules modules and learning opportunities for the PM-1 residents during many of the MPH breaks, including spring break, winter intersession, and summer intersession**.

Residents will be provided an annual calendar, which includes holidays, vacation time, and other important residency activities. Please consult the annual calendar carefully and discuss with the Chief Resident before making travel plans. Residents who have completed an MPH prior to coming to GPMR should consult with the GPMR Chief Resident before scheduling vacation; rotation dates will surround the PM-1 vacation schedule as to minimize time away from rotations they will complete during the first year.

All residents will have days off according to Johns Hopkins University holidays:

- Independence Day,
- Labor Day,
- Thanksgiving,
- Winter holidays,
- Martin Luther King, Jr Day
- Memorial Day, and
- Juneteenth.

PM-1 SICK TIME GUIDELINES

All residents at JHSPH are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a resident's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure.

When a resident takes sick leave, they should notify their Program Director and keep them as up to date as feasible. The Program Director may require the resident to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a resident's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the resident and the Program Director to the Program Manager as quickly as possible. If the illness requires an extended absence, the resident may apply for a leave of absence.

PM-2 (Second Year) Information

Requirements and Expectations for PM-2 Residents (Practicum Year)

To meet the objectives of the residency, residents will fulfill the following roles and responsibilities in securing training in the teaching, research, and practice of preventive medicine. The residency believes there is a common knowledge base that all residents should acquire and that this knowledge base will be most effectively acquired through shared experiences. Among such experiences are the earning of the MPH degree, attending Grand Rounds, completing clinical preventive medicine training, and meeting the requirements for rotations and administrative rounds during the second year.

Roles and Responsibilities of Residents

Although it is important that **all** guidelines be met, the residency will do all it can to accommodate residents' interests. However, PM-2 residents must:

1. Know and follow the policies and procedures set out in the General Preventive Medicine Residency Handbook, including but not limited to the Professional Conduct Code – Residency Expectations and Requirements and GPMR Attendance Policy on page 13.
2. Attend all residency activities unless formally excused by the Chief Resident. These activities include monthly Administrative Rounds and Grand Rounds.
   Note: Monthly Administrative Rounds are a requirement of the program. If a student is on an away rotation, they may be excused up to 3 Administrative Rounds.
   Note: Students may submit request to the Program Director to be excused for up to 6 Administrative Rounds; prior approval of the Program Director is required. Students are expected to plan for completing any missed clinical sessions prior to participating in away rotation(s). **Students are not allowed to take a vacation day to miss Administrative Rounds if that is not their scheduled vacation time.**
3. Complete the practicum experience required for the MPH degree.
4. Register for 16 credits of Special Studies (PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year) per term during their Practicum Year.
   (Note: residents in their third and fourth year of the combined program should follow the instructions provided by the Residency Program Manager regarding their credit requirement.)
5. Complete and submit all assigned rotation reports per the Practicum Rotations (p. 559)/Resident Requirements (p. 559) guidelines.
6. Engage in at least one preventive medicine research project or preventive medicine project (e.g. a community project) either as part of the residency program or independent of it.
7. All residents must meet with the principal faculty on a regular basis. These meetings include a formal, written semi-annual evaluation with program director and clinical director as well as periodic meetings with the academic co-directors. Evaluation will consist of a discussion of the didactic work, applied work, clinical work, courses, research projects, papers, and related activities in which the resident has been involved. Residents' academic transcripts also will be reviewed as a part of the process. Evaluation of resident's activities includes identification of areas of strength, areas needing additional emphasis, and professional goals. At the conclusion of each meeting there will be a summary of the resident's performance in New Innovation. This information is required for performance evaluation and credentialing of residents. For residents on rotations outside of the Baltimore/Washington area, evaluations will be conducted by telephone, as appropriate.

PM-2 Residents' meeting expectations :

September: Meet with Academic Director
December: Semi-annual review with Program Director and Clinical Director
March: Meet with Academic Director
May: Semi-annual review with Program Director and Clinical Director

8. Participate in the preventive medicine clinical component – equivalent to 2 months (320 hours) annually. All clinical experiences are subject to approval by the Program Director.

PM-2 Educational Plan

Residents are required to prepare an educational plan for their practicum year, using the following instructions to develop the plan. A template for this plan will also be shared with the residents at the start of the academic year.

1. Referring to the competency descriptions in this packet, students will write a narrative (several pages) that details their educational objectives for the practicum year. Include the knowledge, skills, and competencies they hope to acquire in each of their planned rotations and how they believe each rotation will help them meet their professional goals.
2. Students should include in their narrative the knowledge, skills, and competencies they expect to gain in the residency-sponsored modules, monthly rounds, including didactic sessions, Grand Rounds, and their own readings.
3. Students should include a paragraph on what they expect to be doing in one year, five years, and ten years from now.

Practicum Rotations

The major activity of residents in the practicum year of training is participation in practicum rotations. The following section outlines the guidelines for Practicum Preventive Medicine Rotations. More detailed information can be found in New Innovations.

Resident Requirements

1. Each resident must complete twelve months of rotations consisting of a minimum of four different rotations. Rotations must be two to three months in duration. One month rotations are not permitted; four month rotations must be approved in advance by the program director.
2. Each resident must complete at least one rotation of 2-3 months in
   a. Biostatistics/Epidemiology
   b. Management and Administration/Medical Management, and
   c. Either Occupational/Environmental Health **or** Clinical Preventive Medicine.
3. If a student is on an away rotation (outside of the Baltimore-Washington area), they may be excused for up to 3 Administrative Rounds. Note: students may submit request to the Program Director to be excused for up to 6 Administrative Rounds for participation in an away rotation, though prior approval is required. Students are expected to submit a plan for completing any missed clinical sessions prior to participating in away rotation(s).
4. Each resident must select at least two rotations from the list of established rotations.
5. All residents must attend the monthly Administrative Rounds and Grand Rounds during all months that they are doing rotations in the Baltimore-Washington area. They must be present for the entire day of activities. Residents may not take a vacation day on the day of Administrative Rounds unless that is their regularly scheduled vacation.
6. Based on accreditation requirements, each resident must do at least one rotation in a public health agency. Public health agencies are defined as any local health department, any state health department, any federal health agency (such as NIH, NIAID, ODPHP, AHRQ, FDA), and international health agencies such as PAHO.
7. In order to receive credit for each rotation, a resident is required to submit:
   a. A *Rotation Plan* form, which is due **one week** after beginning the rotation.
   b. A form evaluating the rotation overall (*Resident Evaluation of Rotation/ Preceptor*), which is due **one week** after completing the rotation. These forms are available in electronic format and should be completed and submitted through the New Innovations system. ***Failure to submit these documents as required in a timely fashion may lead to a grade of Incomplete in the Special Studies course*** PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year ***and/or denial of the residency certificate of completion. Disciplinary action will be taken if rotation reports are ≥2 months late.*** The purpose of these reports is to enable the residency to support residents more effectively in the field and to identify and resolve problems in a timely manner. These forms are mandatory as a part of accreditation of the residency.
8. During the last week of a practicum rotation, the resident must meet with the preceptor as part of an "exit interview" and to help facilitate and ensure the timely completion of the *Preceptor's Evaluation of the Resident*.
9. Residents must receive at least a satisfactory evaluation from each rotation preceptor. All rotation schedules are subject to final approval by the director of the residency program.
10. Residents must complete the clinical component, equivalent to 2 months (320 hours) of work. All clinical experiences must be approved by the program director. Residents are required to complete similar rotation evaluation forms for each clinical rotation including:
   a. A *Rotation Plan form*, which is due **one week** after beginning the rotation.
   b. A form evaluating the rotation overall (*Resident Evaluation of Rotation/ Preceptor*), which is due **one week** after completing the rotation.
   c. During the last week of a clinical rotation, the resident must meet with the preceptor as part of an "exit interview" and to help facilitate and ensure the timely completion of the *Preceptor's Evaluation of the Resident*.

New Innovation Evaluation Forms and Due Dates

Evaluation Form	Due Date
Rotation Plan	**One week** after beginning rotation (each rotation)
Resident Evaluation of Rotation/ Preceptor	**One week after** completing rotation (each rotation); This form is confidential between the resident and program.
Preceptor Evaluation of Resident	**One week before** completing rotation (each rotation); Residents encouraged to review with preceptor.
Principal Faculty Assessment of Resident Performance	During Semi-annual and Quarterly meetings; Residents encouraged to review with principal faculty.

Residency Rotation Support

It is the residency program's responsibility to ensure that all practicum year residents receive an equitable stipend. The residency is able to do this because rotation sites support the program through rotation fees. The fee is used to support the cost of the residency program.

PM-2 Vacation Guidelines

JHSPH GPM residents are entitled to **15** business days of vacation during the practicum year plus any standard holidays or office closures that fall during a rotation period. (Residents in the combined family medicine/preventive medicine program receive vacation according to MedStar Franklin Square guidelines per the agreement.) Students should be sensitive to the impact of their vacation absence on their rotation project(s). **Students may not take all 15 days during one rotation.** We suggest that students take no more than 2-3 vacation days in a two-month rotation and no more than 5 days in a three-month rotation, while vacation time taken during a longer rotation may be adjusted accordingly. ***Vacation time must be approved in advance by:***

1. ***the program director*** *(vacation requests must be submitted via New Innovations)* ***and***
2. **by the preceptor.**

Vacation days during a rotation must be reported on a student's end of rotation evaluation report (within New Innovations).

Time taken off to attend required residency activities (including Administrative Rounds and Grand Rounds) should not be counted as vacation days, but students should be sure to inform their preceptor at the start of each rotation that they are required to attend these activities. Days taken off for job interviews or other personal reasons are counted as vacation days. Days taken off to attend conferences are not considered vacation days; however, a student's total conference plus vacation days in one rotation should not exceed the total suggested number of vacation days for rotation's length.

As with any professional work situation, students likely will be responsible for completion of specific projects or other deliverables as part of their rotations and they should plan their time toward that end, regardless of vacation time off. Evening and weekend work, while not routinely required on most rotations, is nevertheless a possibility.

PM-2 sick time GUIDELINES

All residents at JHSPH are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a resident's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure.

When a resident takes sick leave, they should notify their Program Director and Preceptor and keep them as up to date as feasible. The Program Director may require the resident to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a resident's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the resident and the Program Director to the Program Manager as quickly as possible. If the illness requires an extended absence, the resident may apply for a leave of absence.

Practicum Year Reading List

Rotation	Texts to be Utilized
All Rotations	Wallace R, Kohatsu N. Maxcy-Rosenau-Last Public Health and Preventive Medicine, 15th Ed. McGraw-Hill, 2007.
Biostatistics/Epidemiology	Heyman, D.L. Control of Communicable Diseases Manual, 18th Ed. American Public Health Association, Washington, DC.
Clinical Preventive Medicine	The Guide to Clinical Preventive Medicine 2012: https://www.ncbi.nlm.nih.gov/books/NBK115115 (https://www.ncbi.nlm.nih.gov/books/NBK115115/)/
Management & Administration/ Medical Management	Scutchfield, F.D., Keck, C.W. Principles of Public Health Practice, Delmar, Albany, 1997.
	Novick, L.F., Mays G.P. (Eds) Public Health Administration: Principles for Population-Based Management. Aspen Publishers, Gaithersburg, Md., 2001.
Occupational & Environmental Health	Levy, B.S., et al. Occupational and Environmental Health, 5th Ed. Lippincott, Williams & Wilkins, Philadelphia, 2006.
	McCally, M. (Ed.) Life Support: The Environment and Human Health. MIT Press, 2002.

Practicum Year Didactics

Description and Responsibilities

Didactics for practicum year residents are designed to enhance training and provide academic and practical knowledge for critical content areas and/or where gaps are identified in the existing curriculum. Didactic material will be covered at monthly administrative rounds. Each didactic topic will be introduced and discussed with a guest speaker. The residents are responsible for engaging with the speaker and participating in discussions or Q&A.

Practicum year residents must sign up for 16 credits per term for the following special studies course for this didactic component: PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year.

This Preventive Medicine Core Course is designed to expose residents to essential areas in General Preventive Medicine and Public Health. Residents will have been exposed to the content areas of this course during previous training or work experiences. As such, we assume a basic level of familiarity with the course content. The course will be structured around 12 topics. Each topic will consist of introductory comments, didactic materials, and discussion. All residents are required to complete the indicated readings and be active participants in discussion.

Course structure for PH.550.890 SS/R: General Preventive Medicine Residency-Residency Year

Didactic Topics

1. Healthcare Delivery/Health Systems
2. Public Health Nutrition
3. Injury Epidemiology and Prevention

4. Socio-economic Aspects of Public Health
5. Health Promotion
6. Infectious Diseases
7. International Health
8. Occupational Medicine
9. Outbreak and Surveillance System
10. Public Health Practice
11. Global Health
12. Career/Professional Development

Course Objectives by Topics

1. **Health Care Delivery/Health Systems:** To become familiar with basic concepts and organizational design and function of the US healthcare system including Medicaid, Medicare, managed care, and quality assurance.
2. **Public Health Nutrition:** To understand mechanics of micro and macro-nutrition, diagnosis and treatment of over and under-nutrition, anthropometrics, and population-based nutritional interventions.
3. **Injury Control:** To develop a public health approach to injury assessment, management and intervention, and prevention. To learn basic biomechanics of childhood injuries. To learn how to obtain injury information from various sources.
4. **Socio-economic Aspects of Public Health:** To learn major theories of health behavior, the relationship among SES, race, and population–level health determinants, and the implications of these factors for population-based health promotion and primary prevention.
5. **Health Promotion:** To become familiar with principles of providing cost-effective services within clinical encounters. Preventive recommendations for specific disease states will not be addressed but will instead focus on a conceptual framework for the provision of services in private and public practice settings.
6. **Infectious Diseases:** To understand the importance, characteristics, epidemiology, prevention, and treatment of vaccine preventable, sexually transmitted, and other important infectious diseases. To become familiar with the current U.S. Recommended Childhood Immunization Schedule. To gain understanding of vaccine policy.
7. **International Health:** To understand health-related problems and approaches to evaluating, intervening, and promoting health, and preventing diseases in developing countries.
8. **Occupational Medicine:** To understand the historical, legislative framework involving occupational medicine, develop competence in the administration and leadership of an occupational health and safety program, and evaluate and develop therapeutic and preventive interventions for occupational problems.
9. **Outbreak and Surveillance System:** To learn how to investigate an outbreak. To learn how to evaluate and develop good surveillance systems.
10. **Public Health Practice:** To explore the concepts, definitions, and settings of public health practice. To consider the legal and ethical contexts within which public health practice operates. To survey tools available to the public health practice doctor and the challenges they face.
11. **Global Health:** To learn the scope of work for the most important organizations involved in international health. To state the top causes of adult and child morbidity and mortality and the determinants affecting child and adult morbidity and mortality in developing countries. To review the fundamentals involved in disaster relief. To understand the global burden of HIV/AIDS.
12. **Career/Professional Development:** To develop and evaluate residents' curriculum vitae. To provide a venue for residents to self-evaluate their knowledge, skills, and competencies in order to allow them to hone their deficiencies over the remainder of their residency training. To review strategies on networking, interviewing, finding the right first job, negotiating terms, and developing a plan of continuous professional development.

PREVENTIVE MEDICINE IN-SERVICE EXAMINATION

The Preventive Medicine In-Service Examination, provided by the American College of Preventive Medicine (ACPM), is designed for residents in all specialty areas of Preventive Medicine. The material covered in the exam relates to the core (morning) portion of the American Board of Preventive Medicine (ABPM) examination. The exam enables residents and their directors to determine if there are specific areas where more study and experience are needed. It also enables residents to compare themselves with others at the same level nationally. Though it is not intended to be an examination preparation tool, it can be a gauge of how well residents are being trained and prepared for the content of the board examination.

All residents are required to take the annual Preventive Medicine In-Service Examination in each year of training. The exam is given during the summer of each year. The exam is two hours long and all of the questions are "one best response," which is the type of question the American Board of Preventive Medicine now is using in the certifying examination. The Chief Resident and program staff will schedule the exams for both resident cohorts.

Reflecting the content on the core part of the certifying examination, the categories covered are: Epidemiology, Biostatistics, Infectious Disease, Chronic Disease, Occupational Medicine, and Health Services Administration. The number of questions per category is evenly distributed. There are a very few questions on the topic of Health Promotion.

General Textbooks and Resources

- Maxcy, Rosenau, Last - *Public Health and Preventive Medicine*
- Levy and Wegman - *Occupational Health: Recognizing and Preventing Work-Related Diseases*
- McCally - *Life Support: The Environment and Human Health*
- Heymann - *Control of Communicable Diseases Manual*
- Scutchfield, Keck - *Principles of Public Health Practice*
- Novick, Mays - *Public Health Administration: Principles for Population-based Management*
- USPSTF - *Guide to Clinical Preventive Services 2014*
- WWW, scientific and lay literature, and other resources as indicated in specific modules

Program Policies

Residents must abide by the Graduate Medical Education Policies (p. 537) and the School (p. 633) and University (p. 42) Policies.

Additional program-specific policies are outlined in this section.

Professional Conduct Code

The purpose of these guidelines is to foster an atmosphere of professionalism and respect between the GPMR residents, program and staff, and guests (e.g. speakers, lecturers, visitors). Residents' first duty is to the Residency Program (accredited by the Accreditation Council for Graduate Medical Education).

Residency Expectations and Requirements

1. Meet all expectations of the GPMR program, as described in this handbook and elsewhere.
2. Attend all residency activities unless formally excused by the Chief Resident or Program Director. These include, but are not limited to:
    - All residency module activities, journal clubs, seminars, and site visits
    - Monthly administrative rounds
    - In-Service Examination in August
    - Service as teaching assistant for the School of Public Health “Problem Solving in Public Health” courses, including attending the lectures of those intersession courses
    - Additional activities as required by the Program Director or Chief Resident.
3. Attend and participate in all assigned clinical activities and must meet minimum ACGME requirements of 80 shifts per year (4 hours per shift). The Clinical Director must be notified in advance of schedule conflicts or absences. Failure to do so will result in disciplinary action.
4. Notify the Chief Resident well in advance if unable to attend any GPMR activity. Failure to do so in a timely fashion may result in disciplinary action. Absences may only occur within the framework described in the GPMR Activity Attendance section (p. 562), as below.
5. Arrive on time and remain in attendance until the activity is formally closed. Late arrivals and early departures will be treated as unexcused absences.
6. Attend sessions actively - physically, cognitively, psychologically. Unless otherwise specified, we expect residents to refrain from the use of laptop computers, cell phones, tablets, and other digital or distracting devices during residency activities, as distraction detracts from the educational experience and is disrespectful to our invited speakers.
7. If a resident’s performance or conduct is determined to require action, the Residency Program Director will follow the procedures as listed in the Graduate Medical Education Policies (p. 537).
8. Maintain regular communication. Residents are explicitly expected to:
    - Check their JHU email account every day Monday through Friday (except when on vacation). **Read all emails from the Program Director, Chief Resident, and GPMR staff and respond within an appropriate time period (within 48 hours during the work week)**
    - Regularly check the Residency Program calendar for schedules and updates
    - Return all phone calls and text messages from the Program Director, Chief Resident, and staff within 48 hours.
9. Complete readings and submit assignments by specified deadlines.
10. Promptly update GPMR staff with any changes in contact information.
11. Meet individually with the Chief Resident each MPH term or more frequently and meet individually with the Program Director semi-annually to review progress on career development objectives and academic performance.

GPMR Attendance Policy

GPMR training is an educational experience that serves to develop the skills and experiences necessary for a graduating physician to begin a career in preventive medicine and population health and to excel in their own chosen area of the specialty.

As a specialty training program, there are certain core competencies that must be met as part of ACGME accreditation standards. The program expects residents to have a strong motivation to learn about preventive medicine and hopes to create an environment that encourages residents to look forward to activities and events that enhance the breadth and understanding of a resident’s educational experience.

Since repeated absences serve to diminish a resident’s learning opportunities and might even be detrimental to the educational experiences of other residents, this attendance policy has been adopted by the program in order to ensure a positive experience for all residents:

1. GPMR activities include, but are not limited to, those described above.
2. For all residency-required activities and events, attendance will be recorded by the Chief Resident.
3. It is the resident’s responsibility to be up to date on all scheduled GPMR activities and activity updates.
4. Arrive on time or early. Late arrivals demonstrate disorganization and disrespect for one’s peers, and will be treated as unexcused absences and recorded.
5. Remain in attendance until the activity is formally adjourned by the Chief Resident. Early unexcused departures will be treated as unexcused absences.
6. Students should notify the GPMR Chief Resident well in advance if they are unable to attend any GPMR activity. Failure to do so in a timely fashion may result in disciplinary action.
7. Given the wide range of activities and conferences held in the School of Public Health, GPMR understands that residents may desire to attend other activities of professional interest. Residents may be allotted one (1) absence per academic term, in consultation with the Chief Resident and/or Program Director. Permission from the Chief Resident and/or Program Director must be sought well in advance of the desired absence and will only be granted at their discretion. Such professional interest absences can only be used for GPMR lectures. In general, absences will not be allowed for seminar series (such as Problem Solving in Public Health, Public Health Preparedness, etc.), site visits, Administrative Rounds, Grand Rounds, Winter Intersession, or Summer Institute (May-June) activities. Moonlighting is not considered an acceptable reason to miss scheduled residency activities. All moonlighting must be scheduled around residency activities. The moonlighting privilege may be revoked in the event of repeated absences.
8. Excused residents have the same responsibility as their present peers for all activities missed, announcements made, and materials distributed. It is the resident’s responsibility to inquire about and complete any missed assignments. Failure to do so may result in disciplinary action.
9. In the event of unforeseen circumstances that fall outside the control of the resident (e.g., illness), the resident must notify the Chief Resident as soon as possible. Permission for such absences may only be granted at the discretion of the Chief Resident and Program Director after consultation with the resident. In the event that such circumstances occur with frequency, the resident will work with the Chief Resident to develop a remediation plan to account for material that was missed.

10. For repeated absences, sanctions may be imposed according to the following attendance policy:

Number of Absences Per Term	Sanction[1]
First absence	None if prior approval given by Chief Resident
Second absence	Warning and discussion with the Chief Resident
Third absence	Letter in permanent record **and**
	Meeting with the Program Director
Fourth absence	Develop a remediation plan with the consent of the Chief Resident and the approval of the Program Director
Fifth absence	"F" grade for GPMR course **and/or**
	Other sanctions to be determined by the Program Director

[1] Where multiple sanctions are listed, determination is made by the Program Director in consultation with the GPMR Chief Resident.

GPMR Clinical Requirement and Attendance Policy

As part of the ACGME requirements, residents will be training in environments where patient responsibilities are paramount. Similar to other clinical settings, it is not permissible for a student to be absent from their clinical responsibilities without proper notice. (e.g. a student would not find it acceptable if a colleague were absent from patient care duties without notice or coverage while they were in clinic or on the wards.) It is important that students take these responsibilities seriously, and failure to do so is not appropriate behavior.

The procedure and consequences of missed clinical shift are articulated below.

Absences that require at least 2 weeks of notice: this should be reserved for a significant activity that will result in a students absence. This does not include routine activities, meetings with faculty/preceptors, but does include exceptional activities such as presenting at a conference, etc. Students should notify both the Chief Resident and Clinical Director of their potential absence with as much advance notice as possible or as soon as they are aware of the conflict. This request must be approved by the Clinical Director. Students are also responsible for notifying the preceptor for the clinic site and arranging a make-up session.

Less than 2 weeks of notice: This is reserved for illness, family emergencies, and similar circumstances. Students should notify both the Chief Resident and Clinical Director, and this must be approved by the Clinical Director. Students are also responsible for notifying the preceptor for the clinic site and arranging a make-up session.

1st unexcused absence: a formal letter documenting the unexcused absence will be filed in the resident's electronic file. This documentation will be taken into account when drafting letters of recommendation/reference, etc. The resident will be required to meet with the Clinical Director to discuss the absence.

2nd unexcused absence: another formal letter documenting the absence will be included in the resident's file. The resident will be required to meet with both the Clinical Director and Program Director to discuss the absence.

3rd unexcused absence: another formal letter documenting the absence; a meeting with both the Clinical Director and Program Director. The chair of the Graduate Medical Education Committee (Vice Dean for Public Health Practice and Community Engagement) will be formally notified in writing, and the resident may be requested to meet with the Vice Dean.

Additional unexcused absences: disciplinary actions will be determined by the Program Director in consultation with the Clinical Director and chair of the Graduate Medical Education Committee.

Grading Evaluation Policy

Grading is based on presence of residents at administrative rounds, both physically and cognitively, and active participation in discussions and Q&A

SUPERVISION POLICY

Preventive Medicine Competencies

Generic

1. Communicate to target groups including health professionals, the public, and the media, in a clear and effective manner, both orally and in writing, the levels of risk from real or potential hazards, and the rationale for selected interventions
2. Demonstrate the ability to prioritize new or ongoing projects or programs according to their potential impact, as defined by objective, measurable criteria
3. Use information technology for specific applications relevant to Preventive Medicine and Public Health
4. Interpret relevant laws and regulations relating to protection and promotion of the public's health
5. Identify ethical, social, and cultural issues relating to policies, risks, research, and interventions in Public Health and Preventive Medicine contexts
6. Identify the processes by which decisions are made within an organization or agency and their points of influence
7. Identify and coordinate the integrated use of available resources to improve the community's health

Epidemiology and Biostatistics

1. Characterize the health of a community
2. Design and conduct an epidemiologic study
3. Design and operate a surveillance system
4. Select and describe limitations of appropriate statistical analyses as applied to a particular data set
5. Translate epidemiologic findings into a recommendation for a specific intervention to control a public health problem
6. Design and/or conduct an outbreak and/or cluster investigation

Management and Administration

1. Assess data and formulate policy for a given health issue
2. Develop and implement a plan to address a specific health issue or problem
3. Conduct an evaluation or quality assessment based on process and outcome performance measures
4. Manage the operation of a program or project, including human and fiscal resources

Clinical Preventive Medicine

1. Develop, implement, and refine screening programs for groups to identify risks for disease or injury, and opportunities to promote wellness
2. Design and implement clinical preventive services for individuals
3. Implement community-based interventions to modify or eliminate identified risks for disease or injury and to promote wellness
4. Diagnose and manage diseases/injuries/conditions in which prevention plays a key role

Occupational and Environmental Health

1. Assess individual risk for occupational/environmental disorders using an occupational and environmental history
2. Identify occupational and environmental hazards, illnesses, and injuries in defined populations, and assess and respond to identified risks

MONITORING AND EVALUATING RESIDENTS

Definitions:

- **PM-1** = resident in the 13th through the 24th month of preventive medicine training
- **PM-2** = resident in the 25th through 36th month of preventive medicine training

Clinical Skills:

Each resident entering the program as a PM-1 will have completed at least one year of ACGME- accredited clinical residency training. The program director will ascertain from the resident's previous clinical program (or other source as appropriate) that the resident has achieved the six core clinical competencies.

Outpatient Care:

All patients seen by a resident on an outpatient basis must be seen by, discussed with, or reviewed by the responsible site preceptor.

Communication:

Communication with the site preceptor is mandatory in the case of emergent and/or critical incidents or other significant changes in clinical status.

Monitoring/Evaluation:

The goals and objectives as well as the process of evaluation for the training program are discussed at orientation. The goals and objectives are available to all residents and faculty on the residency website. Rotation specific evaluations mirror the goals and objectives for a given rotation. At the end of each rotation, a formal written evaluation is completed for each resident by the site preceptor. A copy of this evaluation is provided to the resident.

Assessment of resident performance will be based on multiple evaluation strategies and may include:

- Direct observation of clinical and interpersonal skills
- Case-based discussion
- Completion of teaching modules
- Review of medical records
- Preparation and delivery of teaching sessions
- Participation in conferences
- Review of patient and/or procedure logs
- Feedback from patients and families
- Feedback from allied health professionals
- Assigned projects such as a clinical research project

Non-compliance with responsibilities or performance problems are generally discovered and addressed in one of the following ways:

1. The site preceptor may address isolated problems with specific individuals. The problem and corrective actions are documented by the site preceptor, who notes the problem, and are transmitted to the program director.
2. Each resident has a faculty mentor who meets with their advisee a minimum of twice a year to review evaluations and provide career counseling. The mentor may be invoked to provide counseling to his/her mentee.
3. The program director reviews all resident evaluations. The Clinical Competency Committee consisting of leadership and key faculty members and as required by ACGME guidelines, meet semi-annually to discuss the progress of each resident. Any identified problems will be discussed and remediation plans will be implemented.
4. Semi-annual, annual, and summary evaluations are completed on each resident in accordance with ACGME-RRC and JHSPH requirements.

In order to be promoted to the PM-2 year, the resident must have demonstrated satisfactory performance in academic coursework and all practicum evaluations must reflect satisfactory performance.

Occupational and Environmental Medicine Residency

Welcome and Introduction

Welcome to the Johns Hopkins Bloomberg School of Public Health Occupational and Environmental Medicine Residency Program. This online resource is designed to give you an overview of the program. It includes information on policies, required competencies, evaluations, and professional resources. Please refer to this information for questions that will come up as you complete your training.

This is not intended as a stand-alone resource. You will find valuable and pertinent information regarding the MPH (p. 497)and the Johns Hopkins Bloomberg School of Public Health (p. 54) in this online catalogue. Additional occupational medicine residency resources and information can be found in New Innovations (a residency management software system) and are available online for our residents to access at any time.

The Program Director, Deputy Program Director and the administrative staff are here to provide direction through your residency. In addition, be sure to talk to faculty and rotation preceptors whose interests, research, and practice activities can help to guide you. These contacts will prove invaluable to your career.

Finally, make the most of your associations with fellow residents and students in the school. You may well find that these relationships are your richest continuing source of support, encouragement, and professional stimulation.

Again, welcome, and our very best wishes for a wonderful training experience and a successful career in the exciting field of occupational and environmental medicine!

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Program Overview

The Johns Hopkins Occupational and Environmental Medicine Residency (OEMR) is a two-year training program leading to eligibility for the certifying examination of the American Board of Preventive Medicine (https://www.theabpm.org/). All residents are expected to become board certified by the American Board of Preventive Medicine after completing residency training. The OEMR is accredited by the Accreditation Council for Graduate Medical Education (https://acgme.org/) (ACGME) and is one of the key programs that make up the Occupational Safety and Health Education and Research Center (https://www.jhsph.edu/research/centers-and-institutes/johns-hopkins-education-and-research-center-for-occupational-safety-and-health/) (ERC) at Johns Hopkins Bloomberg School of Public Health.

The first year of the program includes graduate coursework, participation in departmental activities and conferences, research and clinical activities.

The second year of the program includes practicum rotations, completion of MPH practicum requirement, participation in departmental activities, clinical activities, research and may include additional coursework.

Mission

The Mission of the Johns Hopkins Occupational Medicine Residency Program is to train physicians who will be leaders in occupational and environmental medicine. Our graduates manage and improve the health of populations through:

1. the development and implementation of programs to mitigate occupational or environmental exposure;
2. the direction of clinical care and health management of individuals and populations exposed to chemical, physical, biological, ergonomic, and/or psychological hazards in a variety of occupational and environmental settings and;
3. application of new technologies, new research findings, and new management techniques to improve the health of working populations and minimize disability.

To achieve this level of training, we will provide trainees with superior academic training and practical, experience-based rotations in a wide variety of workplaces, and unparalleled opportunities to engage in research. We will offer residents a unique opportunity to master the tools of evidence-based medicine, and to apply their skills to real-world problems including disability management, employee health and wellness, environmental exposures, and other emerging occupational and environmental medicine issues. We expect that our graduates will become board-certified practitioners with the capability to perform at high levels in any organization, practice, or academic institution. Whatever their career path, our graduates will have the desire and the ability to examine occupational and environmental health problems in fresh ways, and to generate and impart new knowledge for the improvement of public health.

Learning Outcomes

The educational objectives of the residency are to provide residents with:

1. The knowledge and skills necessary to define occupational and environmental medicine/public health problems; design and implement appropriate interventions; and evaluate the outcomes.
2. Appropriate learning environments in which to apply their skills and knowledge.

Faculty

Residency faculty includes: full-time faculty in the Schools of Public Health and Medicine, as well as affiliated faculty throughout the university and at rotation sites. This allows us to capitalize on the great breadth and depth of occupational and environmental medicine expertise in the Baltimore-Washington DC area. The faculty is engaged in a wide range of clinical, research, and management activities.

Aisha Rivera Margarin, MD, MS, is the Program Director of the residency and a Faculty Associate in the Department of Environmental Health and Engineering. She is board-certified in occupational and environmental medicine and general preventive medicine.

Brian S. Schwartz (https://www.jhsph.edu/faculty/directory/profile/624/brian-schwartz/), MD, MS, is the Deputy Program Director of the residency. He is a Professor of Environmental Health and Engineering, Epidemiology, and Medicine, with a joint appointment in the School of Medicine. He is board-certified in internal medicine and occupational and environmental medicine.

Information on other faculty, along with links to individual websites, can be found at the residency website (https://www.jhsph.edu/academics/residency-programs/occupational-and-environmental-medicine-training-program/Meet%20the%20Team/).

Faculty Advisers

Dr. Rivera and Dr. Schwartz will serve as MPH advisers to all residents, who, with their assistance, will be expected to create an individualized curriculum that will meet their professional training needs. A different faculty adviser may be selected depending on resident interest on a case-by-case basis. Residents will elect a customized program of study for their MPH degree that includes the required courses outlined by the MPH and in this online catalogue. Additional options include MPH (p. 497) concentrations, however due to clinical requirements for the residency these are not always feasible.

Miscellaneous Administrative Information

Residency Facilities

Students' Office and Computer Facilities

Located in room W7606, the students' office has a phone, microwave, and a variety of reference materials. This room contains computers with Microsoft Office software and CD-ROM, in addition to wireless network access for laptops. Around the corner from this room, on the same floor, there is a shared departmental space with a refrigerator and coffeemaker. In addition, all residents have access to the computer facilities of the Bloomberg School of Public Health.

Residency Programs Office

The administrative office for the Occupational and Environmental Medicine Residency and the General Preventive Medicine Residency is located in room WB602. This office suite houses the residency programs administrative staff and the chief resident for the General Preventive Medicine Residency, and serves as office, computer, and seminar space for the General Preventive Medicine residents. Residency files for both programs are kept in this office.

Chief Resident

Each year a chief resident is selected by the Program Director and Deputy Program Director based on resident performance, experience, ability to work with others, ideas to improve the program and desire for the leadership opportunity. If multiple residents express an interest in the position, interviews may be arranged by the Program Director and Deputy Program Director. The chief will receive an additional $1,500 in annual stipend for their responsibilities.

Chief Resident Roles and Responsibilities

- Works closely with the OEMR Program Director and Deputy Program Director in all the responsibilities outlined below
- Serves as an advocate and role model for other residents by following program policies, participating in program activities, recommending improvements, and providing advice to other residents
- Serves as a member of the Graduate Medical Education Committee (GMEC) and the Residency Advisory Committee/Program Evaluation Committee (RAC/PEC) and provides feedback on residency policies, programs, and procedures
- Handles delegated administrative duties including but not limited to:
    - Scheduling Monday teaching seminars
    - Coordinating with faculty and residents to schedule administrative rounds
    - Assisting program faculty in organizing and facilitating educational activities, projects, and rotations
- Assists in the OEMR's orientation program for new residents in early July of each year
- Participates in interviews with OEMR applicants in November and December of each year and assists in other recruitment activities as needed (including accompanying applicants in tour and lunch)
- Organizes an annual resident feedback meeting and provides an aggregate summary of recommendations from that meeting to program faculty.

Randy Bass Award

The Randy E. Bass in the amount of $1,500.00 was endowed in 1996 through Dr. Bass' estate. Randy received his MPH from the Johns Hopkins Bloomberg School of Public Health in 1988 and completed the Occupational Medicine Residency in June 1989. Dr. Bass served as a team member in developing final environmental cadmium standards and received the Secretary's Exceptional Achievement Award from the U.S. Department of Labor. He was active in the Occupational Medicine Residency teaching and training programs, and in the teaching of undergraduates. This award benefits a student who demonstrates the same dedication to the field that Randy did during his all too brief career.

Resources for Professional Development

Professional Organizations

The American College of Occupational and Environmental Medicine (http://www.acoem.org/) **(ACOEM)**

ACOEM is one of the major professional organizations for occupational health professionals (mainly physicians). ACOEM offers members a variety of services and publications, including the *Journal of Occupational Medicine, ACOEM Report*, an employment referral service, the Occupational Physicians Scholarship Fund, and many others. ACOEM has a Residents and Recent Graduates section that represents residents' interests to the larger organization. ACOEM sponsors the American Occupational Health Conference (AOHC) in the spring of each year that provides an important networking opportunity. Membership for residents is discounted and includes all of the services and publications.

The ACOEM website has many useful areas including Career Planning (http://acoem.org/Careers/What-Is-OEM/); free Audio Podcasts on OEM Practice Settings and Career Opportunities; and the Knowledge Centers.

There is also a State component, the Maryland College of Occupational/ Environmental Medicine (MCOEM) that sponsors scientific meetings, and residents can become members at the same time they join ACOEM. Attendance at the twice-yearly Saturday morning conferences offered by MCOEM has been a residency requirement in the past, however these are not always held from year to year.

The American Public Health Association (https://www.apha.org/) **(APHA)**

The APHA has an Occupational Health and Safety (OHS) Section that has mainly consisted of academics, researchers, and public health professionals in medicine, nursing, and industrial hygiene, in the past. The APHA sponsors an annual conference (>12,000 annual attendance) and offers many services. The *American Journal of Public Health* comes with membership and publishes good articles relevant to occupational safety and health.

Association of Occupational and Environmental Clinics (http://www.aoec.org/) **(AOEC)**

The AOEC is a network of individuals and clinics across the country, primarily university-based, that practice occupational and environmental medicine. The AOEC has an extensive clinical lending library, including slide sets that can be used to make presentations. It also maintains a database of clinical cases from across the country, and collaborates with Federal agencies and its members to make grant opportunities available on a wide range of topics. COEH is a clinic member.

International Society for Environmental Epidemiology (https://www.iseepi.org/) **(ISEE)**

The ISEE sponsors an annual scientific conference of outstanding quality and the journal *Epidemiology*. Join if you are interested in epidemiology or an academic career.

American College of Preventive Medicine (ACPM)

The ACPM is the preventive medicine physician professional organization.

Journals in Occupational Health

- *Journal of Occupational and Environmental Medicine* – The journal of the ACOEM, this is a standard that is widely read.
- *Occupational and Environmental Medicine* – British journal
- *American Journal of Industrial Medicine*
- *Environmental Research*

- *Environmental Health Perspectives* – A standard for environmental journals, high impact factor, includes the Grand Rounds in Environmental Medicine series
- *American Journal of Epidemiology* – Broad topics, high quality articles including some occupational and environmental epidemiologic research
- *Archives of Environmental & Occupational Health*
- *Scandinavian Journal of Work, Environment, and Health*
- *American Journal of Public Health*- broad

Occupational health research is also irregularly published in the *New England Journal of Medicine, Journal of the American Medical Association, Science, Annals of Internal Medicine, Annals of Epidemiology, Lancet, and British Medical Journal*.

Online Data Sources

National Library of Medicine (NLM) Environmental Health and Toxicology Specialized Information Services - Lots of useful data and databases.

> **TOXLINE** - NLM's on-line bibliographic search system for toxicology and pharmacology
>
> **MEDLINE/PUBMED** - Also from NLM

Welch Library **(**https://welch.jhmi.edu/**) Databases** - Essential source for online articles and other relevant resources. Will be addressed in OEMR seminar conference

National Institution for Occupational Safety and Health **(**https://www.cdc.gov/niosh/**) (NIOSH)**

O **(**https://www.osha.gov/**)**ccupational Safety and Health Administration **(**https://www.osha.gov/**) (OSHA)** - You need to know about new OSHA publications when they become available. When new standards are published in the Federal Register, they contain much information that is deleted when published in final form in the CFR (often ends up as preamble)

The Agency for Toxic Substances and Disease Registry **(**https://www.atsdr.cdc.gov/**)** (ATSDR), part of the Public Health Service in Atlanta, has several publications of great use such as the *Case Studies in Environmental Medicine*

Note: We will have an additional conference on resources.

Program Requirements

Course location and modality is found on the BSPH website (https://publichealth.jhu.edu/academics/course-directory/coursesection-numbers-explained/).

ACGME Milestones

The ACGME Milestones for Occupational Medicine (https://www.acgme.org/Portals/0/PDFs/Milestones/PreventiveMedicineMilestones-PublicHealthandGeneralPreventiveMedicine.pdf) are used to evaluate the progress of each resident from baseline level (level at the beginning of training) through completion of training, with the goal that each resident will attain a level of competency for independent practice in each area. The program also recognizes that some residents may attain a level of advanced expertise in selected areas based upon completing electives and experiences that demonstrate this level of advanced competency. Milestone ratings are based upon evaluation tools, including but not limited to: resident portfolio content related to achievement of ACGME competencies, resident research products, work products from rotations, preceptor feedback documented on rotation and continuity clinic evaluations, and academic transcripts. The milestone ratings are completed by the Clinical Competency Committee which meets twice annually, and are uploaded to the ACGME ADS website twice annually in accordance with ACGME requirements. Milestone ratings are shared with the residents during semi-annual reviews.

Requirements and Expectations for OEM Residents

To meet the objectives of the residency, residents will fulfill the following roles and responsibilities:

Although it is important that **all** guidelines be met, the residency will do all it can to be flexible to allow for residents' interests. However, all residents must:

1. Know and follow the policies and procedures set out in this OEMR online catalog.
2. Read, understand, and respond appropriately to residency communications from the Director, Deputy Director, Chief Resident, and staff.
3. Complete 80 days of clinic in the first year of training per ACGME requirements, and maintain and submit documentation of completion of these clinic days using the "Continuity Clinic Log" form available on the OEMR New Innovations site to the Program Director and Deputy Director at least every 6 months and upon request. During the second year of training, clinical requirements are met through block rotations.
4. Attend all residency activities and fulfill all related requirements unless formally excused by the Deputy Director and/or Director. These activities include, but are not limited to:
    a. Summer orientation
    b. In-Service Examination
    c. Seminars
    d. Special sessions during Winter Intersession and following completion of courses in the 4th Term
    *It is your responsibility to notify the Deputy Director and/or Director at least 2 weeks in advance if you are unable to attend any of the above activities.
5. Meet all MPH and residency requirements, including course requirements of each. Note that *MPH required courses must be taken for a letter grade*.
6. Remain in satisfactory academic standing in the MPH program in accordance with the standards set by that program or be subject to dismissal. Any resident dismissed from the MPH program will be dismissed from the residency.
7. Maintain full-time registration (16 or more credits).
8. Maintain a 3.0 GPA in all residency-required courses in the MPH curriculum.
9. Complete and submit all monthly and final rotation reports. *(Failure to submit these documents as required in a timely fashion may lead to a grade of Incomplete in* PH.550.870 SS/R: OCCUPATIONAL MEDICINE RESIDENCY-PRACTICUM YEAR *and/or denial of the residency certificate of completion.)*
10. Receive at least a satisfactory overall evaluation from each rotation preceptor.
11. Meet with the director of the residency program twice a year, in November-December and April-June, for a formal written evaluation. Each evaluation will consist of a discussion of rotations, conferences, courses, research projects, papers, and related activities in which

the resident has been involved. In addition, transcripts and preceptor evaluations will be reviewed as a part of the process. There will be a summary of the resident's performance. This information is required for performance evaluation and credentialing of residents.

12. Complete their research project.
13. Participate in objective structured clinical evaluations, worksite evaluations, and other learning activities as they arise.
14. In addition, involvement in unique opportunities that become available through the MPH and residency program are crucial to resident learning and success. We encourage residents to be involved in these opportunities as their time and energy permit. Examples include guest lecturing and participating in public health practice projects. We also encourage attendance at national meetings, such as the annual meetings of the American College of Occupational and Environmental Medicine and the American Public Health Association.
15. Complete all USMLE Step examinations by the end of the first year in the program.

MPH Highlights

Residents matriculate in the MPH (p. 497) program of the Johns Hopkins Bloomberg School of Public Health (BSPH). For the MPH degree, courses required of OEM residents fall into two groups:

1. those required by the school for the MPH degree and
2. those required by the residency to achieve ACGME preventive and OEM competencies (https://acgme.org/Specialties/Overview/pfcatid/20/).

The latter also include courses that fulfill American Board of Preventive Medicine (https://www.theabpm.org/) (ABPM) eligibility requirements.

Residents must meet all departmental and graduate school requirements. MPH (p. 497) requirements can be found online.

Example Schedule with Required Courses

Courses listed for each term are required by either the residency or the MPH program, there is a document entitled "OEM courses" in New Innovations that may provide greater clarity on which courses are required by the residency. Residents should review the MPH requirements closely as these may change from year to year. Residents must register for 16 credits in all terms. You do not have to register for resident seminar for credit if you would like to take additional courses. However, you should make sure your courses do not interfere with resident seminar or your clinic. Any concerns should be communicated to Program Director and Deputy Program Director.

MPH Requirements
(80 credit hours are needed for degree, including core, residency requirements and electives), only 20 credits total may be taken in "special studies" courses.

Course	Title	Credits
First Year		
Summer Term		
PH.300.615	The Tools of Public Health Practice	1
PH.380.755	Population Dynamics and Public Health	2
PH.300.610	Public Health Policy	4
PH.306.601	Introduction to Bioethics in Public Health Practice and Research	1
PH.550.867	Introduction to MPH Studies	
PH.550.860	Academic & Research Ethics at BSPH	
PH.340.601	Principles of Epidemiology	5
PH.180.601	Environmental Health	5
PH.188.840	Special Studies and Research Environmental Health & Engineering	1
	Credits	**19**
First Term		
PH.188.680	Fundamentals of Occupational Health (online)	3
PH.140.611	Statistical Reasoning in Public Health I (**Do online but sit in on class as desired**)	3
PH.410.620	Program Planning for Health Behavior Change	3
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health (online)	0.5
PH.552.625	Building Collaborations Across Sectors to Improve Population Health (online)	0.5
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (online)	0.5
PH.552.601	Foundational Principles of Public Health (online)	0.5
PH.188.840	Special Studies and Research Environmental Health & Engineering [1]	1
Electives or additional Special Studies credits (p. 569)		1
	Credits	**13**
Second Term		
PH.187.610	Public Health Toxicology (online)	4
PH.182.621	Introduction to Ergonomics [2]	4
PH.140.612	Statistical Reasoning in Public Health II (online)	3
PH.182.625	Principles of Occupational and Environmental Hygiene	4
PH.380.604	Life Course Perspectives on Health (online)	4
PH.188.840	Special Studies and Research Environmental Health & Engineering (Resident Seminar) [1]	1
*INTERPROFESSIONAL EDUCATIONAL EVENT (required, but not formal course)		
	Credits	**20**
Third Term		
PH.312.600	Managing Health Services Organizations (online)	4
PH.552.621 or PH.552.622	Basic Resources Management for Public Health or Creating, Implementing and Monitoring Budgets for Projects and Programs	1
PH.188.686	Clinical Environmental and Occupational Toxicology	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (online)	4
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals	0.5
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals (online)	0.5

PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (online)	0.5
PH.552.610	The Social Determinants of Health (online)	0.5
PH.552.626	Systems Thinking: Concepts and Methods	0.5
PH.552.611	Globalization and Population Health (online)	0.5
PH.260.720	Communications Primer for the Public Health Sciences (online assigned to 1st, 2nd, or 3rd term according to last name)	1
PH.188.840	Special Studies and Research Environmental Health & Engineering [1]	1
	Credits	**17**
Fourth Term		
PH.186.800	MPH Capstone: Environmental Health & Engineering	2
PH.317.610	Risk Policy, Management and Communication (online)	3
PH.188.681	Onsite Evaluation of Workplace and Occupational Health Programs (worksite evaluation course)	5
PH.340.722	Epidemiologic Inference in Public Health II (online)	4
PH.340.680	Environmental and Occupational Epidemiology (if it is offered online)	4
PH.188.840	Special Studies and Research Environmental Health & Engineering (Resident Seminar) [1]	2
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
	Credits	**22**
	Total Credits	**91**

Second Year

Code	Title	Credits
PH.550.870	SS/R: Occupational Medicine Residency-Practicum Year (16 credits per term)	16
PH.340.680	Environmental and Occupational Epidemiology (4th term)	4

Recommended Electives

Code	Title	Credits
PH.180.629	Environmental and Occupational Health Law and Policy	4
PH.180.611	The Global Environment, Climate Change, and Public Health	4
PH.180.670	Introduction to Public Health Emergency Preparedness	3
PH.182.623	Occupational Health Management	3
PH.140.613 & PH.140.614	Data Analysis Workshop I and Data Analysis Workshop II	4
PH.305.623	Fundamentals of Clinical Preventive Medicine	3
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.182.617	Exposure Sciences for Health Risk Assessment	4

[1] If needed, residents can also get credit for resident seminar by signing up for 1-2 credits of EHE 188.840 to meet the 16 credit hour minimum requirement in any given term. However, some residents may choose not to sign up for resident seminar because either 1) they take additional electives instead or 2) they have a minimum of 16 credit hours with their other courses.

[2] Ergonomics course can be scheduled in first year if schedule allows, however many residents have taken it in second year.

Individualized Learning Plans and MPH Goals Analysis

Each new first year resident prepares an individualized written educational plan for the residency program and a similar, but separate MPH learning plan. Templates for the individualized learning plan can be found in New Innovations, residents are expected to complete the plan for first year prior to the first meeting with the program director. Residents are expected to start on the plan for second year prior to the first semiannual evaluation meeting with the program director. Residents should approach developing their plans seriously and use information from their MPH learning plan with the addition of residency-specific information regarding goals, additional skills, knowledge, and competencies the resident intends to gain from the residency training, and plans for obtaining these. Each plan will outline courses to be taken by the resident to meet their individual educational goals. The residency plan will also include research goals for the resident, and identify specific competencies that the resident will develop during residency training. Dr. Rivera will guide the resident in this process and must approve this document. There are examples of the templates the residents will complete for the MPH in New Innovations as well, however these will be sent to the resident by the MPH program. The resident should download the PDF of the completed MPH goals analysis documents and upload them into their learning portfolio in New Innovations.

Before beginning their second year, residents are required to submit a **residency and professional goals analysis** for the practicum rotations that serves as an individualized learning plan, using a template that will be provided. The plan will include a statement of the resident's professional and career goals (similar to the plan they complete at the beginning of the MPH year), the rotations planned and the competencies to be achieved.

MPH Capstone

The MPH capstone project is a graduation requirement for students in the MPH program. The goal is for students to synthesize, integrate, and apply the skills and competencies they have acquired. While OEMR residents have an opportunity to complete a customized capstone project done in the Occupational Health worksite evaluation course in the 4th term, they should be mindful of any changes that may occur with this course that could affect their opportunity to do a worksite evaluation as a capstone project. Ultimately, residents are responsible for coming up with their capstone project and should think of feasible, alternate projects if unable to complete a worksite evaluation. Residents are responsible for meeting Capstone deadlines and Capstone projects must be approved to make sure they meet the School's requirement.

The link to the School's academic calendar (https://www.jhsph.edu/academics/calendar/2020-2021.html) can be found online.

MPH Practicum

The MPH requires each student complete a practicum experience totaling 100 hours. The practicum should be a programmatic project, ideally focused on quality improvement, where you can apply your public health skills and competencies while supervised by your preceptor. Effective with residents entering into the July 2019 cohort, residents will complete their MPH practicum requirement during the second year of their residency while on a practicum rotation. Each resident will need to submit the practicum learning plan (https://jhsph.co1.qualtrics.com/jfe/form/SV_bpVoc2NnI9DjNFs/) for review and approval *prior* to the start of the rotation activity that you intend to apply towards the practicum. Approval generally takes 1-2 weeks from time of submission, and is required before you begin.

Once approved, residents should register for three credits of PH.186.895 MPH Practicum: EHE for the term they will complete the practicum in. Additional information about the MPH practicum can be found online (https://www.jhsph.edu/offices-and-services/practice-and-training/practicum/).

In particular, residents will note that:

1. Their practicum plans will need to be approved in advance by Paulani Mui, MPH Practicum Coordinator.
2. An MPH practicum generally is not clinic-based.
3. Residents should proactively communicate with the rotation preceptor of the rotation they would like to use toward the practicum requirement to make sure there is an appropriate project and they can complete the MPH forms in a timely manner.

Course Registration

Residents must register for 16 credits in all five terms in both the first and second year of the residency. Residents doing second year rotations should register for rotation credit listed as special studies (PH.550.870 SS/R: Occupational Medicine Residency-Practicum Year).

Seminar Series

Residents attend a variety of weekly seminars while the MPH terms are in session. Seminars start at noon and include:

- Education and Research Center seminars (1st Monday @ noon);
- Departmental Journal Club (2nd and 4th Monday @ noon);
- ESEE Seminar (3rd Monday @ noon);
- Resident seminar (every Monday from 1:30-3:30pm, *summer schedule varies*).

Topics and speakers for resident seminars are coordinated by the chief resident and program directors.

The schedule for resident seminars is posted on New Innovations. These seminars are being held virtually via Zoom but are subject to change. Attendance at Journal club, Departmental noon conferences, ERC, and Resident seminars is required of all residents. Attendance may be waived for residents on out of town rotations with permission of either Dr. Rivera or Dr. Schwartz. In addition, attendance at the annual Mid Atlantic Regional Conference for Occupational and Environmental Medicine (MARCOEM) conference is a residency requirement when it is held at Hopkins. Residents are expected to attend ERC events including the annual Anna Baetjer Lecture hosted by the Department of Environmental Health and Engineering. The Department also hosts a grand rounds and residents are strongly encouraged to attend during their first year and when it does not interfere with their courses or clinical rotations; second year residents are not expected to attend grand rounds while on rotations as they are typically held on campus on Fridays.

Journal Club

Residents are required to attend Journal Club, which meets during the Fall and Spring semesters on Mondays starting at noon. Residents and other graduate students are responsible for presentations at Journal Club. Additional guidelines on how to select an article and give a presentation at Journal Club are available on New Innovations.

Research Requirement

Residents are required to do a research project that results in a manuscript of publishable quality and/or conference presentation. Posters presented at national meetings such as the AOHC fulfill this requirement. Examples of resident research publications are available upon request.

Residents will meet with the Program Director and/or Deputy Director early in the program to define their research projects and advisers. Drs. Rivera and Schwartz will help residents identify an appropriate research preceptor. Residents will work individually with their research preceptor on a mutually chosen topic. The preceptor is responsible for the scientific conduct of the research and for the evaluation of the resident's performance. The resident can devote special studies courses to research activities and manuscript preparation. Residents should carefully define their goals for the research (e.g., acquisition of data analysis skills, review article approaches, learning to prepare manuscripts or grant applications) and choose a research project with a faculty member that will meet these goals. *If a resident needs more structure, they have the option and are encouraged to take courses through the MPH that will give them additional data analysis and research training as well as provide a structured research project as part of the coursework*. Residents are strongly encouraged to publish their research results and present them at national scientific meetings.

If data analysis is the goal, previously collected data should be analyzed. The short length of the residency program precludes projects that involve collection of original data by the resident. Similarly, obtaining IRB approval is also time-consuming and should be avoided. Acceptable research projects involve those for which IRB approval has already been obtained or the project will be approved as exempt by the IRB. A timetable for resident research projects is shown below:

Example Research Project Schedule

Time	Description
August	Resident meets with Program Director and potential research project advisers, identifies research project adviser, defines research project.
October	Research project adviser, project outline, and timetable presented to Program Director for approval.
February-June	Residents present updates on progress of their research project.
Second Year	Residents present seminars on results of research projects at Hopkins and national meetings. The final manuscript may be submitted after receiving comments/edits from adviser, Program Director, and seminar.

Practicum Rotations

Through participation in practicum rotations, residents must acquire and demonstrate the broad clinical and public health skills necessary for occupational and environmental medicine practice. Residency rotations include: required/core, direct patient care, and elective rotations. The preceptor will be available to residents at all times. Precepting during non-clinical, population-based activities will also be direct but contact frequency will be dictated by work requirements. Any deviation from this policy should be reported to the OEMR Deputy Director or Director ASAP.

During first year, residents are assigned to clinics. Each resident is expected to complete an individual learning plan in each of the 2 residency years. The learning plan for second year is done during the second half of first year and is a tool to help residents think about their career goals, the program requirements and available rotations and indicate where they would like to rotate in 2nd year. Residents should verify with the residency staff that there is an agreement between the rotation site and Johns Hopkins. The program director or deputy program director will confirm rotation sites for each resident going into second year prior to the end of the first year. Rotations will not be changed during second year unless there are extenuating circumstances. Prior to starting any rotation, residents should review the specific ACGME-required competencies, goals, and objectives for that rotation. Residents should submit accurate contact information for the rotation preceptor (if there are any changes) to the Residency Program Director and Deputy Program Director. Residents are responsible for rotation evaluations for each rotation. All evaluation forms are distributed through New Innovations (you will receive a notification email of pending evaluations; follow the instructions provided to you during orientation to access New Innovations.) Preceptors will receive the Preceptor Evaluation of Resident through New Innovations prior to the end of the rotation. Residents are responsible for completing evaluations of each rotation and all **rotation evaluations are due a week after the rotation ends**. Each resident is required to continue to attend OEMR seminars and conferences. Residents are responsible for making sure vacation requests are cleared and communicated with their individual rotation sites (e.g., send a friendly email to your preceptor to let them know you're planning on taking vacation and want to make sure it's not a problem for the site) and requesting vacation time through New Innovations.

Any resident who needs an accommodation due to a disability should follow the School's policies for requesting accommodations. Residents should also notify Dr. Rivera ahead of a rotation to make sure the accommodation request is communicated to the rotation site, please keep in mind individual rotation sites may have separate processes for requesting accommodations.

Core Rotations

1. A rotation at Johns Hopkins Division of Occupational Medicine and the University of Maryland Occupational Medicine Program, which also includes industrial hygiene and safety activities - 2 months
2. A union-based rotation (International Association of Fire Fighters) - 2 months
3. A regulatory rotation (OSHA) - 2 months
4. Direct patient care - 4 months in total per year

Elective Rotations

Elective rotations are designed to provide competencies unique to individual resident goals. Elective rotations allow the individual resident to tailor practicum rotations to fit their career objectives. These electives may be clinical, research, or administrative in nature. Established electives have goals/objectives and competency forms already completed, if these are not already completed you will need to develop goals and objectives and a competency form with your rotation preceptor. The elective must be approved by the Program Director or designee. A list of elective options can be found on New Innovations.

How to Confirm A Rotation

1. Get verbal agreement from selected rotation supervisor
2. Get verbal approval from Program Director
3. Ask rotation preceptor to send credentials and contact information to Program Director
4. Create or review (if one already exists) the list of Goals and Objectives, and Competencies and submit to the Program Director
5. Residency manager will coordinate with the rotation site to establish an agreement is one does not already exist

Sample OEMR Rotation Schedule

Rotation Period	Requirement
Year 1	
July-August	Coursework only
September-December	Continuity Clinic (one day per week)
January	FT Clinics with continued Continuity Clinic
February-May	Continuity Clinic (one day per week) with PT academic or OM clinics
End of May-June	FT Clinics with continued Continuity Clinic
Year 2	
July-August	IAFF
September-October	OSHA
November-December	Elective
January-February	JHH/UM
March-April	Elective (e.g., Erickson Living)
May-June	Elective (e.g., OM Clinics: Mercy/ PFC/CorpOHS

Direct Patient Care Clinical Requirement

In accordance with ACGME requirements, all OEM residents will complete 80 days of clinic in an OEM specialty clinic during each year. This is accomplished through weekly continuity clinic to attain patient and programmatic competencies with full-time clinical experiences in January and June at a range of clinics where residents can be assigned including OEM clinics at Johns Hopkins, the University of Maryland, the Center for Occupational and Environmental Neurology, Mercy Health, DC Police and Fire Clinic, CorpsOHS and Occupational Health Consultants. During the second year, residents do 4 months of clinical rotations to fulfill this requirement, the required core JHH/UM rotation is a 2 month rotation but only counts toward one month of clinical rotation time because residents are not in clinic every day. Residents should sign up for at least 3 additional months of clinical rotations in the second year but are encouraged to choose more clinical time.

Continuity Clinic

This clinical experience will be coordinated with the MPH course schedule, and take place in half to full day increments. During weeks when no classes are in session, residents are strongly encouraged to spend full weeks in clinic in order to meet this requirement. The Program Director and Deputy Program Director will supervise the selection and scheduling of clinical time in clinics that meet this ACGME requirement, including but not limited to: the JHH OIC, the UM OEM Clinic, the COEN, Corp OHS, and Occupational Health Consultants. A tracking form shall be used to document clinical experience, and will be reviewed with residents during orientation and periodically reviewed by the Program Director, Deputy Program Director, and Program Manager in order to ensure compliance with this requirement.

Third (Research) Year and Other Training Options

The residency program has limited funding available for an optional third year of training. This position, which is not considered part of the ACGME-approved residency, is designed for those physicians interested primarily in research. The third year option would allow the trainee to pursue an investigation in depth, utilizing the extensive research resources available within the School and the University. Interested physicians should discuss their interest with Dr. Schwartz.

Applicants with prior experience or education in occupational medicine can request special or flexible programs that may involve partial course loads, research, and other special schedules. These requests are also handled individually and interested applicants should express their interest early in the application process. Residents may also earn a PhD or DrPH in occupational health. These degree programs have several requirements and would be expected to add at least 3 years of additional training, and are not a part of the ACGME-approved residency program.

Evaluations

Evaluation of Residency Program

Numerous evaluations are utilized to assess the program and the resident's progress in it. Resident input is an essential part of the evaluation process. Residents have several opportunities to provide written evaluations of the adequacy, quality, and appropriateness of each component of the educational program. Some of these evaluations are provided to the Chair of the Residency Advisory Committee/Program Evaluation Committee on an annual basis.

1. Students evaluate individual courses in the school and evaluations are made available to faculty members. Each resident completes an evaluation of every rotation.
2. Residents complete a comprehensive anonymous evaluation of all aspects of the program at the end of each year through Survey Monkey.
3. The ACGME's anonymous resident survey of the residency program is done annually.
4. The Program Evaluation Committee (PEC), an external group composed of prominent occupational health professionals, meets to evaluate the residency once per year. The program has Residency Advisory Committee that can meet if needed and requested.
5. The Graduate Medical Education Committee (GMEC) meets four times per year and provides input to the program. Residents are welcomed at the meetings.
6. Residents meet every year and provide compiled anonymous feedback to the program.

Evaluation of Residents

Self-evaluations

At the beginning of each year, residents perform a self-evaluation, based on competencies identified by the ACGME. These competencies form the basis of the educational program. Discussions with the Program Director, the self-assessment and the resident's previous experience and training, are used by each resident as they prepare an individual written educational plan. This plan identifies training needs and experiences for the resident, and serves as the basis for course selection over the two years. An update of this document in the second year guides additional rotation selection. Both documents are discussed with and approved by the Program Director and/or Deputy Program Director.

Coursework

Academic grades are evaluated each term. Performance in courses and other activities are monitored and any academic deficiencies are quickly identified and addressed. Resident participation in and presentations at the OEMR conference series are also used by the Program Director and Deputy Program Director to provide additional feedback to residents.

The Clinical Competency Committee and the rotation preceptors discuss resident progress throughout the year. Overall progress of trainees is also used to modify the training program.

In-Service Examination

All residents are required to take the annual Preventive Medicine In-Service Examination in each year of training. The exam is given during the summer of each year. The Preventive Medicine In-Service Examination, provided by the American College of Preventive Medicine (ACPM), is designed for residents in all specialty areas of Preventive Medicine. The material covered in the exam relates to the core (morning) portion of the American Board of Preventive Medicine (ABPM) examination and includes questions on Epidemiology, Biostatistics, Infectious Disease, Chronic Disease, Occupational Medicine, and Health Services Administration. Exam results include individual scores by category, the overall percent correct, and a national comparison with other programs (coded). Results are used to guide programmatic content in the OEMR as well as identify areas of additional concentration for individual residents.

Rotation Evaluations

A fundamental requirement of the residency training program is that the resident be given and demonstrate increasing responsibility for the management of all aspects of occupational and environmental medicine. An evaluation of performance, based on a set of competencies/educational objectives designed for each rotation, is obtained at the completion of each rotation. Preceptors in each rotation are asked to evaluate each resident on their ability to assume responsibility throughout the rotation. Preceptors are encouraged to review these evaluations with the resident in an exit interview at the end of the rotation.

Resident Learning Portfolio and Semi-Annual Evaluation of Residents

All residents meet with the Program Director twice per year for a semi-annual performance evaluation that becomes a permanent part of the resident's file. During the semi-annual performance report meeting with the resident, the resident reviews all written evaluations by preceptors. Residents are responsible for keeping all residency work products such as PowerPoint slide handouts and manuscripts on a flash drive or computer and uploading them to New Innovations prior to semiannual performance evaluation meetings. These materials are reviewed by the Program Director as part of the resident's evaluation to demonstrate progression throughout the residency and become a part of the resident's file. Transcripts, attendance and participation in seminars, special activities and projects, and research efforts are also reviewed and evaluated. The semi-annual performance report is completed by the Residency Program Director and/or Deputy Director, then read and signed by the resident.

Program Policies

Residents must abide by the Johns Hopkins Bloomberg School of Public Health Graduate Medical Education Policies (p. 537) and the School (p. 633)and University (p. 42)Policies. Additional program-specific policies are outlined in this section.

Graduate Medical Education Committee

The Graduate Medical Education Committee (GMEC) of the Johns Hopkins Bloomberg School of Public Health is responsible for monitoring and advising on all aspects of residency education. Voting membership on the committee includes:

1. residents from each of the two residency programs nominated by their peers;
2. the directors of the General Preventive Medicine and Occupational Medicine residency programs;
3. other members of the faculty from each department participating in either of the residency programs; and
4. the accountable institutional official or their designee (the Associate Dean for Professional Education and Programs).

The committee meets a minimum of four times per year and minutes of each meeting are kept.

The GMEC:

- establishes residency policies for graduate medical education **(see Exhibit A)**;
- maintains open and regular communication with the General Preventive Medicine and Occupational Medicine Program Directors and administrators;
- reviews the residency training programs for their compliance with institutional and ACGME policies;
- establishes policies for resident selection, evaluation, promotion, and dismissal;
- establishes policies for grievances;
- reviews resident funding, benefits, and support services;
- reviews resident working conditions; and
- reviews ethical, social, socioeconomic, medical/legal, and cost containment issues that affect graduate medical education.

Each resident receives a Resident Contract (see Exhibit B) which contains the terms and conditions of the trainee's appointment.

Resident Grievances

Residents have a number of options to raise concerns about the residency. In addition to discussing concerns with the Program Director, Deputy Program Director, or Chief Resident and the information listed in the Policies and Procedures for Graduate Medical Education provided to residents, residents can contact the OEMR Residency Advisory Committee/Program Evaluation Committee Chair, currently Dr. Marianne Cloeren to discuss concerns, her contact information is provided in the contacts section of the manual. Residents could also meet Dr. Cloeren in person at luncheons following PEC meetings as well as in her lectures during resident seminar. In addition a member of the PEC is invited to attend resident seminar.

Vacation Policy

Residents are permitted three (3) weeks of vacation time in each training year. During the first year of training, vacation may not be taken when MPH classes are in session or when mandatory training or the in-service examination is scheduled (eg: EPIC training between summer session and first term). Residents must ensure that they meet the 80-day clinic requirement during the first year of training.

During the second year of training, residents should avoid planning vacation during one-month rotation periods and should contact preceptors in advance for approval when planning vacations. A maximum of one week of vacation may be taken from each 2-month required rotation.

Residents in both years are encouraged to discuss vacation plans with the Program Director and/or Deputy Program Director prior to confirming plans.

PROCEDURE FOR FIRST-YEAR RESIDENTS

1. Resident will submit a vacation request through New Innovations at least 2 weeks in advance and alert the Program Director of the request.
2. Program Director will review the request. An approval or denied email will be sent via email to the resident.
3. Vacation Requests reports are available to the Program Director.

PROCEDURE FOR SECOND-YEAR RESIDENTS

1. Resident will submit a vacation request through New Innovations at least 2 weeks in advance and alert the Program Director of the request.
2. Resident will request time off from preceptor.
3. Vacation is granted when approved by Program Director and preceptor.
4. Vacation Requests reports are available to the Program Director.

Sick Leave Policy

All residents at BSPH are entitled to 15 days (three weeks) paid sick leave per year. Days may be used for a resident's own sickness or to care for a family member. Unused days may not be carried over into the following 12-month period and are not payable upon departure.

When a resident takes sick leave, they should notify their Program Director and keep them as up to date as feasible. The Program Director may require the resident to submit verification of the need for sick leave from their healthcare provider to the University Health Service Center for review. Any documents containing a resident's medical information must be kept separate from their academic file. Extended absences (more than two weeks) must be reported by the resident and the Program Director to the Program Manager as quickly as possible. If the illness requires an extended absence, the resident may apply for a leave of absence.

Some Additional Points

1. Rotations generally accommodate sick days in a flexible way, and do not count sick days as vacation days. However, if the number of sick days becomes significant, rotations may count these days towards the vacation allotment.
2. There are no "personal days" allotted to residents. Such days will generally be counted as vacation days unless prior agreements have been reached with the Program Director and the rotation preceptor.
3. There is no special policy for days taken off between the Christmas and New Year holidays. These days are counted as vacation days

during both years of training for both the rotations' and the residents' totals.

Holidays

Residents schedule will reflect the Johns Hopkins University holidays below. Because residents rotate in many locations, residents should discuss any holiday that falls while they are on a rotation with their rotation preceptor ahead of time to ensure the preceptor is aware and is not expecting them in clinic. Additionally, if a rotation site is open, residents should make sure that taking the holiday will not interfere with their ability to meet the clinical requirement.

- New Year's Day
- Martin Luther King
- Memorial Day
- Juneteenth
- Independence Day
- Labor Day
- Thanksgiving Day
- Day after Thanksgiving
- Winter holidays include Christmas Eve, Christmas Day, New Year's Eve, New Year's Day

Conferences

Residents are strongly encouraged to attend a scientific meeting each year. Options to consider include: ACOEM/AOHC fall or spring meeting, the American Public Health Association conference, American College of Preventive Medicine annual meeting, or other occupational/environmental medicine-related content. While the residency encourages residents to attend the American Occupational Health Conference (AOHC), residents may choose to use their conference allowance on a conference that is not AOHC with the pre-approval of the Program Director.

- All conference travel must be pre-approved by the Program Director.
- Conference allowance is to be used toward reasonable expenses of attending occupational medicine-related conferences. The amount of the travel allowance is stated on the Resident Benefits Summary (Exhibit C), which is updated annually. Note: the amount may change each year.
  - If residents do not use all of the conference allowance funds on the conference they select to attend, remaining funds can be applied towards another conference or course travel expense.
- Residents may take up to five working days during each year of the residency to attend a scientific meeting.
- When the Mid Atlantic Regional Conference in Occupational and Environmental Medicine (MARCOEM) is held at the Johns Hopkins Bloomberg School of Public Health, residents are expected to attend. The residency program will support the registration fee; this registration fee is not included in your annual allowance noted on the Benefit Summary Sheet. This does not apply when MARCOEM is held outside of BSPH, the conference is treated like any other conference and the resident should refer to the annual allowance noted on the Benefit Summary.

Reimbursements

- Residents must complete and submit reimbursement requests by carefully following the Johns Hopkins University policy, which can be found on the New Innovations home page on the document titled "Travel and Non-travel Reimbursement Policies and Procedures for BSPH Residency Programs." Please carefully read the policy, particularly in regards to transportation/airline and hotel expenses, **prior** to making purchase.
  - Expenses other than airfare and/or hotel (i.e., registration fees, board review materials or course) must be in accordance with residency policy. Any exceptions must be pre-approved by the Program Director. All requests must be submitted within 30 days of incurring the expense.
  - JHU Policy for airfare and hotel expense reimbursement:
    - Travelers may only request reimbursement for airfare and/or hotel expenses in advance of travel if they book thru Concur using their personal credit card and the University funding source is unrestricted funds.
    - Airfare and/or hotel expenses purchased outside of Concur (1) must be submitted AND approved within 60 days of transaction date AND (2) travel must have been completed. If these guidelines are not followed, reimbursement may be denied or reimbursement may become taxable income.

Attire

CLINICS AND ROTATIONS

Professional attire is expected, for example, business casual. For clinical rotations you should also take your white coat, ID badge, pen, stethoscope, and a small notepad for taking notes of things you may want to remember later. If you have doubts about what to bring with you to your rotation, ask your preceptor.

Rehman et al. Am J Med 2005 provides rationale for professional attire and is discussed in NY Times article: When Young Doctors Strut Too Much of Their Stuff (http://www.nytimes.com/2006/11/21/health/21essa.html)

CLASSES

Comfortable but professional clothing.

SITE VISITS

Attire should be functional and professional. You may be the medical professional consultant, and that role needs to be reflected in what you wear. You also may need your clothing to serve as barrier protection. The following dress guidelines are recommended:

Shirt: Non-revealing professional shirt or blouse. Sleeves may be helpful as some level of protective barrier. Some professionals wear long-sleeved button-down shirts with University logo.

Pants: Trousers or jeans, which cover the entire leg and do not drag on the floor. Khakis or jeans are good options.

Shoes: Closed-toe shoes and/or sturdy boots are always appropriate. Depending on the situation, a steel-toed boot may be required.

Social Media Use

The JHU Bloomberg School of Public Health Social Media Policy (p. 652) may be found on the BSPH website.

The JHU School of Medicine has Social Media Guidelines (https://www.hopkinsmedicine.org/webcenter/social-media-guidelines/) that can be found online. You will need Network Connect open to get in.

Health Insurance Portability and Accountability Act (HIPAA)

Available in the HIPAA (https://intranet.insidehopkinsmedicine.org/privacy_office/) intranet site. You will likely need Network Connect open to get in.

Privacy Regulations means the regulations promulgated by the Secretary of the Department of Health and Human Services to implement portions of HIPAA that concerns the confidentiality of health information, as amended from time to time; these regulations currently include 45 CFR §§ 160 and 164, subparts A and E.

The Johns Hopkins HIPAA Office has posted on its website (https://intranet.insidehopkinsmedicine.org/jhhs_human_resources/hr-bulletin/social-media-policy/) guidance on two topics of significant interest: “Use of Social Networking” and “Portable Electronic Devices.”

This information provides short, practical, and basic advice, and is not meant to be definitive statements on these topics.

Monitoring and Evaluating Residents

Definitions:

- **PM-1** = resident in the 13th through the 24th month of preventive medicine training
- **PM-2** = resident in the 25th through 36th month of preventive medicine training

Clinical Skills:

Each resident entering the program as a PM-1 will have completed at least one year of ACGME-accredited clinical residency training. The program director will ascertain from the resident’s previous clinical program (or other source as appropriate) that the resident has achieved the six core clinical competencies.

Outpatient Care:

All patients seen by a resident on an outpatient basis must be seen by, discussed with, or reviewed by the responsible site preceptor.

Communication:

Communication with the site preceptor is mandatory in the case of emergent and/or critical incidents or other significant changes in clinical status.

Monitoring/Evaluation:

The goals and objectives as well as the process of evaluation for the training program are discussed at orientation. The goals and objectives are available to all residents and faculty on the residency website. Rotation specific evaluations mirror the goals and objectives for a given rotation. At the end of each rotation, a formal written evaluation is completed for each resident by the site preceptor via New Innovations. A copy of this evaluation is provided to the resident.

Assessment of resident performance will be based on multiple evaluation strategies and may include:

- Direct observation of clinical and interpersonal skills
- Case-based discussion
- Completion of teaching modules
- Review of medical records
- Preparation and delivery of teaching sessions
- Participation in conferences
- Review of patient and/or procedure logs
- Feedback from patients and families
- Feedback from allied health professionals
- Assigned projects such as a clinical research project

Non-compliance with responsibilities or performance problems are generally discovered and addressed in one of the following ways:

1. The site preceptor may address isolated problems with specific individuals. The problem and corrective actions are documented by the site preceptor who notes the problem and are transmitted to the program director.
2. Each resident meets with the Program Director a minimum of twice a year to review evaluations and provide career counseling.
3. The program director reviews all resident evaluations. The Clinical Competency Committee consisting of leadership and key faculty members and as required by ACGME guidelines, meet semi-annually to discuss the progress of each resident. Any identified problems will be discussed and remediation plans are implemented.
4. Semi-annual, annual, and summary evaluations are completed on each resident in accordance with ACGME-RRC and BSPH requirements.

In order to be promoted to the PM-2 year, the resident must have demonstrated satisfactory performance in academic coursework and all practicum evaluations must reflect satisfactory performance.

Certificates

Certificate Programs for Which Only Hopkins Students Are Eligible

Certificate Programs for Which Both Hopkins and Non-Degree Students are Eligible

- Health Communication (p. 598)
- Health Education (p. 600)
- Health Finance and Management (p. 601)*
- Healthcare Epidemiology and Infection Prevention and Control (p. 602)
- Humane Sciences and Toxicology Policy (p. 604)
- Injury and Violence Preventio (p. 606)n
- Leadership for Public Health and Healthcare (p. 608)*
- Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) Public Health (p. 609)
- Maternal and Child Health (p. 611)
- Mental Health Policy, Economics and Services (p. 612)
- Pharmacoepidemiology and Drug Safety (p. 613)
- Population and Health (p. 614)
- Product Stewardship and Sustainability (p. 617)*
- Public Health Economics (p. 619)
- Public Health Informatics (p. 620)*
- Public Health Training Certificate for American Indian Health Professionals (p. 623)
- Public Mental Health Research (p. 624)
- Public Health Preparedness (p. 622) *(in AY22-23 only, non-degree students may be able to apply for admission)*
- Quality, Patient Safety, and Outcomes Research (p. 625)*
- Risk Sciences and Public Policy (p. 628)
- Tropical Medicine (p. 631)

Certificate Programs for Which Only Non-Degree Students Are Eligible

- Global Health Practice (p. 594)*
- Global Tobacco Control (p. 595)*
- International Healthcare Management and Leadership (p. 607)*
- Population Health Management (p. 615)*
- Public Health Practice (p. 621)
- Quantitative Methods in Public Health (p. 626)
- Spatial Analysis for Public Health (p. 629)*
- Training Certificate in Public Health (p. 631)*

***Certificate programs with an asterisk may be completed entirely online**

Frequently Asked Questions About Certificate Programs

Who is eligible to apply to a certificate program?

Eligibility requirements vary. Students should review the information for their certificate of interest carefully.

Applicants not currently enrolled in a Johns Hopkins degree program must have earned at least a bachelor's degree from an accredited college or university and have a strong academic record.

Is visa sponsorship provided for international students applying to certificate programs?

Certificate programs completed outside the Summer Institutes do NOT qualify for visa sponsorship. Most international students are advised to consider certificate programs that can be completed online from their country of residence. Legal Permanent Residents and non-immigrants who are otherwise physically present in the US and in a status that allows for study may be eligible to pursue a certificate program in person at the Bloomberg School.

When are courses taught?

The Bloomberg academic year (p. 175) consists of five eight-week terms: two in the fall, two in the spring and one in the summer. Most on-campus Bloomberg courses are taught during the work week (Monday-Friday) between 8:30 and 5:00. The term, venue and time for each course may be found in the BSPH course directory (http://www.jhsph.edu/courses/).

Can certificates be earned part-time?

Non-degree students may earn certificates part-time. Degree students earn the certificate concurrently with their degree or training program.

How long does it take to complete a certificate program?

Certificate program length varies by the number of required term credits, when courses are offered, and each student's schedule.

Students do not need to enroll in certificate courses during consecutive terms, but must complete the program within three years.

Can certificate courses be taken pass/fail?

All required or core certificate courses must be taken for a letter grade unless the course is only offered pass/fail. The certificate program determines whether elective courses may be taken pass/fail. Certificate courses cannot be audited.

How do I register for courses if I am a non-degree student?

The certificate program will inform each applicant of its admission decision. Accepted students will also receive an email with instructions for registering. Students wishing to take an online course must first complete the non-credit/free Introduction to Online Learning (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/).

What is a Notification of Completion?

Please read this page that addresses certificate program completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) for complete information about notifying the School that the certificate program has been completed.

Can courses taken before being accepted into the certificate program be counted towards the certificate?

For students not currently enrolled in a Bloomberg School of Public Health degree program, up to six term credits for courses taken before being admitted to the certificate program may be applied toward the certificate. Bloomberg School degree students should follow the parameters set by their certificate program as far as how many credits may be taken before applying.

Can certificate courses be counted towards a BSPH degree?

Typically, up to 16 term credits taken as a non-degree student may later be applied to a Bloomberg School degree program. The courses must be applicable to the degree and completed no more than five years before matriculating to the degree program. The process is not automatic and the final decision rests with the degree program; if a student is planning to apply to a BSPH degree program upon completion of a certificate program, it's a good idea to contact the degree program first, to verify how many completed academic credits the program will accept.

Upon completion of a certificate program, will I be considered a BSPH alum and have access to alumni privileges?

Only those students who successfully complete a degree program at BSPH are considered alumni. Individuals who complete a certificate program will receive a certificate diploma suitable for framing and display, and a BSPH transcript indicating that they have completed the certificate program.

What is the Tuition for a Certificate Program at BSPH?

Please visit the page on the BSPH website (https://www.jhsph.edu/academics/certificate-programs/tuition/) that addresses certificate program tuition.

How to Apply to a Certificate Program

Different certificate programs are open to different audiences. There are different application processes for students who are currently enrolled in degree programs at Johns Hopkins University (including students enrolled at the Bloomberg School of Public Health) and those who are applying as non-students. Each certificate program has its own eligibility requirements and terms in which it is possible to begin the program. Prospective students should visit the webpage of the program that interests them on the Bloomberg School of Public Health certificate website (https://www.jhsph.edu/academics/certificate-programs/) for complete information about who the program is open to (ie, JHU graduate students, non-degree students, or both), what admissions requirements are necessary, and which start terms are available. If a student is not currently enrolled in a degree program at JHU, they should carefully review the "how to apply (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_admissions.html)" page on the Bloomberg School of Public Health website as well.

Certificate Tuition

Please visit the page on the Bloomberg School website that addresses certificate program tuition.

Completion of a Certificate Program

Individuals currently enrolled in a certificate program should carefully review the completion instructions (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) on the Bloomberg School of Public Health's website. Certificate completions cannot be processed retroactively.

Adolescent Health, Certificate

Adolescent Health Certificate Program

NOTE: This certificate program may be completed entirely online!

OVERVIEW

The certificate program builds on the certificate student's existing clinical knowledge and the clinical, research, and/or program/policy-related skills they are developing through their degree or training program. It focuses on adolescent pregnancy, substance abuse, and violence prevention and on mental health promotion–all of which are strengths of the Bloomberg School of Public Health. Certificate topics include:

- Primary causes of adolescent mortality and morbidity both domestically and globally
- Adolescent growth and development including biological, neurological and cognitive, psychological, emotional, and other developmental processes, as well as cultural contexts in which young people live that impact health and health behavior
- Proximate and distal social environments in which young people mature and the mechanisms by which such environments influence health outcomes
- Ethical issues inherent in working with adolescents who are legal minors
- Policies and legislation that are evidence-based as well as culturally and developmentally appropriate and health promoting (e.g., graduated drivers' licenses)

EDUCATIONAL OBJECTIVES

Students earning the certificate will be able to apply knowledge of adolescent growth and development, positive youth development, and cultural and ethical considerations of youth to design, implement, and evaluate adolescent health-related research, programs, and policies. Upon completing the certificate program, students will be able to::

1. Describe how developmental (biological, cognitive, psychological), environmental (physical and social), and cultural factors do and can be used to influence the health and health-related behaviors of adolescents.
2. Participate in designing research, programs, and/or policies using family-, school-, and/or community-based methodologies that are effective for addressing adolescent health issues and that adhere to ethical standards for adolescents who are legal minors.
3. Use integrated knowledge about 1) the factors influencing adolescent health and 2) effective research, program, and/or policy methodologies to design, conduct, and/or evaluate research and/or to develop, implement, monitor, and/or evaluate programs/policies that are appropriate to address adolescent health issues, prevent unhealthy behaviors, and/or promote healthy ones.

Sponsoring Department

Population, Family and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/)

ADMISSIONS

Contact information and complete admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/adolescent-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577) (https://www.jhsph.edu/academics/certificate-programs/completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (course is offered in all academic terms)	
Required Courses:Students must complete 380.623 AND EITHER 380.725 OR 380.747		
PH.380.623	Adolescent Health and Development (typically offered online in 3rd term)	3
PH.380.725	The Social Context of Adolescent Health and Development (typically offered onsite in 4th term)	3
PH.380.747	International Adolescent Health (typically offered online in 4th term)	3
Elective Courses: Students must complete at least four elective courses (12 credits minimum). Students should complete 3 elective courses from Groups A and B, and one elective course from Group C		
Elective Courses Group A: Sexual and Reproductive Health		
PH.340.629	The Epidemiology of LGBTQ Health (typically offered onsite in 2nd term)	3
PH.380.633	Promoting Equity for Adolescents and Emerging Adults: Problem-Solving Seminar (typically offered online in 2nd term)	3
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (typically offered onsite in 2nd term)	3
PH.380.749	Adolescent Sexual and Reproductive Health (typically offered onsite in 4th term)	3
PH.380.761	Sexually Transmitted Infections in Public Health Practice (typically offered online in 4th term)	4
PH.380.762	HIV Infection in Women, Children, and Adolescents (typically offered online in 4th term)	4
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (typically offered onsite in 4th term)	3
Elective Courses Group B: Other Topics in Adolescent Health		
PH.221.621	Gender and Health: Foundational Theories and Applications (typically offered onsite in 1st term)	2
PH.301.627	Understanding and Preventing Violence (typically offered onsite in 2nd term)	3
PH.305.610	Issues in Injury and Violence Prevention (typically offered onsite in 1st term)	2
PH.330.602	The Epidemiology of Substance Use and Related Problems (typically offered online in 1st and 2nd terms and onsite in 2nd term)	3
PH.330.640	Childhood Victimization: A Public Health Perspective (typically offered onsite in 4th term)	3
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS (typically offered onsite and online in 3rd term)	3
PH.330.674	Suicide As A Public Health Problem (typically offered onsite in 3rd term)	3
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders (typically offered onsite in 3rd term)	3
PH.380.624	Maternal and Child Health Legislation and Programs (typically offered onsite and online in 2nd term)	4
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (typically offered onsite in 3rd term)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (typically offered onsite in 3rd term)	3
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (typically offered onsite in 3rd term and online in 4th term)	3
PH.380.721	Schools and Health (typically offered onsite in 2nd term)	3
PH.410.625	Injury and Violence Prevention: Behavior Change Strategies (typically offered onsite in 4th term)	2
PH.380.880	Lessons in Leadership: Applications for Population, Family and Reproductive Health I (typically offered onsite and online in 4th term)	1
PH.410.752	Children, Media, and Health (typically offered onsite in 3rd term)	3
Elective Courses Group C: Program Evaluation		
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs (typically offered onsite in 2nd term)	4
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels (typically offered onsite in 2nd term)	4
PH.380.611	Fundamentals of Program Evaluation (typically offered onsite in 3rd term and online in 1st term)	4
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (typically offered onsite in 2nd term)	3

Bioethics, Certificate

Certificate Program in Bioethics

EDUCATIONAL OBJECTIVES

1. Describe the essential theories and methods that underpin the ethics of public health, clinical care, science and research;
2. Recognize ethical issues and questions that arise in public health, clinical care, science and research;
3. Articulate and critique policy and scholarly arguments to engage with long-standing and emerging debates in bioethics;
4. Distinguish various ethics advisory functions in practice settings; and
5. Apply ethical theories and methods to real-world ethical dilemmas.

ADMISSIONS

Contact information and complete admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/bioethics-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. Students will complete three required courses totaling 9 credits, and then choose three courses from the Berman Institute course list totaling 9 credits to fulfill the 18-credit requirement to complete the certificate program.

All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. All courses must be completed within a three year period.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) (p. 577)before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion form has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses (9 credits required)		
PH.700.601	Foundations of Bioethics (typically offered onsite in 1st term)	3
PH.700.602	Hot Topics in Bioethics (typically offered onsite in 2nd term)	3
PH.700.603	Introduction to Ethical Theory (typically offered onsite in 1st term)	3
Elective Courses (minimum of 9 credits)		
PH.700.604	Methods in Bioethics (typically offered onsite in 3rd term)	3
PH.700.621	Ethics in Clinical Practice: Fundamentals, Problems and Approaches (typically offered online in 2nd term)	3
PH.700.622	Bioethics, Human Rights, and Global Health (typically offered onsite in 2nd term)	3
PH.700.623	Ethics and Decision-Making in Clinical Practice (typically offered onsite in 2nd term)	3
PH.700.625	Bioethics and the Law (typically offered onsite in 4th term)	3
PH.700.630	Food Ethics (typically offered onsite in 3rd term)	3
PH.700.632	Ethics, Policy, and Emerging Biomedical Technologies (typically offered onsite in 4th term)	3
PH.700.641	Germs, Genes, Patients, and Populations (typically offered onsite in 3rd term)	3
PH.700.642	Vulnerability in Childhood -- from Ethics to Advocacy (typically offered onsite in 4th term)	3
PH.700.840	Bioethics Program Independent Study (typically offered onsite in 1st, 2nd, 3rd, 4th, and Summer terms and Summer Institute)	2

Climate and Health, Certificate

OVERVIEW

Climate change represents one of the most pressing issues of our time, affecting every nation and person. This certificate program covers climate change, its effects on public health, and ways to mitigate the impacts. Courses explore the effects of energy production and climate change on food, water, air and human health, through the lens of social justice.

EDUCATIONAL OBJECTIVES

Students completing the certificate program will be able to:

1. Explain the connection between climate and public health, ranging from temperature-related mortality and increasing rates of disease, to mass migration, food & water shortages, and resulting conflict
2. Describe policies and practices in the US and around the world addressing the impact of climate change on health
3. Summarize the role of various sectors (government, private and non-profit) in addressing climate change's impact on public health
4. Distinguish between climate-related risks in developed countries and those in low- and middle-income countries
5. Evaluate research related to climate change and health
6. Discuss and predict how climate change will affect economics and social structures, including inequities in the risks and benefits associated with climate change
7. Develop and discuss strategies that effectively mitigate and prevent adverse health effects caused by climate change.

ADMISSIONS

Contact information and complete admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/climate-and-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the Bloomberg School of Public Health website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when and where the courses are offered. Students should also check prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
The following 2 courses are required		
PH.180.651	Energy, Environment, and Public Health (typically offered onsite in 3rd term)	2
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term, online in 3rd term)	4
Required: Take one of the following 2 courses:		
PH.180.602	Environment and Health in Low and Middle income Countries (typically offered onsite and online in 3rd term)	2
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health (typically offered onsite in 3rd term)	2
Students must complete one of the following introductory environmental health courses		
PH.180.601	Environmental Health (typically offered online in 3rd term, and onsite in Summer and Summer Institute)	5
PH.180.609	Principles of Environmental Health (typically offered onsite in 1st term)	4
Students must complete one of the following climate and health courses:		
PH.180.607	Climate Change and Public Health (typically offered onsite and online in 3rd term)	3
PH.180.611	The Global Environment, Climate Change, and Public Health (typically offered onsite in 1st term)	4
PH.180.641	Climate Change and Public Health Problem Solving Seminar: Global Challenges and Solutions for Mitigation, Adaptation, and Sustainability (This course targets DrPH students and is typically offered online in 1st term)	3
Students must complete two of the following courses		
PH.180.620	Introduction to Food Systems and Public Health (typically offered online in 1st term)	4
PH.180.625	Community-Driven Epidemiology and Environmental Justice (typically offered onsite in 3rd term)	3
PH.180.626	Environmental Justice and Public Health Practice (typically offered online in 2nd term)	3
PH.180.628	Introduction To Environmental and Occupational Health Law (typically offered online in 4th term)	4
PH.180.670	Introduction to Public Health Emergency Preparedness (typically offered onsite in 4th term)	3
PH.182.640	Food- and Water- Borne Diseases (typically offered onsite in 3rd term)	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities (typically offered online in 4th term)	3
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels (typically offered onsite in 2nd term)	4
PH.305.630	Transportation Policy, Equity and Health (typically offered online in 4th term)	2
PH.317.864	Advanced Topics in Climate Change Policy (typically offered onsite in Fall Institute in Barcelona, Spain)	2
PH.330.609	Climate Change and Mental Health: Research, Practice, and Policy Perspectives (typically offered online in 4th term)	3
PH.330.665	Climate Change and Mental Health (typically offered online in Summer Institute)	1
PH.410.645	Applying the Social Ecological Model in Tobacco Control and Climate Change (typically offered onsite in 3rd term)	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.723	Sustainable Development and Next-Generation Buildings	3
EN.575.735	Energy Policy and Planning Modeling	3

Clinical Trials, Certificate

Certificate Program in Clinical Trials

NOTE: This certificate program may be completed entirely online!

OVERVIEW

Clinical Trials are a key tool in the evaluation of new strategies for prevention and treatment of disease. This certificate program focuses primarily on the design and analysis of randomized clinical trials for evaluation of licensed and non-licensed medical products and other health interventions, the regulatory framework for the conduct and evaluation of data from clinical trials, and ethical principles for the conduct of clinical trials.

EDUCATIONAL OBJECTIVES

After completing the certificate, students will be able to:

1. Summarize the history of clinical trials and describe the role they play in evaluation of health interventions;
2. Explain the key differences, advantages and disadvantages of experimental versus observational study designs;
3. Develop a protocol, consent statement, monitoring plan and data collection plan for a clinical trial;
4. Review and critique manuscripts presenting the results of clinical trials using CONSORT guidelines; and
5. Explain the key ethical principles regarding the design, conduct and analysis of clinical trials

SPONSORING DEPARTMENT

Epidemiology (https://www.jhsph.edu/departments/epidemiology/)

ADMISSIONS

Contact information and complete admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/clinical-trials-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires at least 18 credit units that consist of core courses in clinical trials, epidemiology, and research ethics, as well as elective courses focusing on specific issues in the design, conduct and analysis of clinical trials. The required courses in clinical trials include introductory courses in epidemiology, clinical trials design and interpretation and clinical trials methodology. Students are also required to take at least two additional courses relating to clinical trials, one course in research ethics and one course in biostatistics.

Each student will be required to develop a protocol and plan for obtaining consent, e.g., prototype consent statement, for a randomized clinical trial. The protocol will be 8 to 12 pages long and accompanied by consent statement(s) or other materials appropriate for obtaining consent for a proposed clinical trial. Most students should be able to complete these requirements as a part of one or more class project(s), e.g., 340.648 or 340.861. Alternatively, the student may sign up for 1 to 2 credits of independent study for this project with a faculty member in the Department of Epidemiology, Clinical Trials and Evidence Synthesis Track. The credits for an independent study to work on the protocol and consent statement(s) can be counted towards the 18 credits required for the certificate program.

Students are strongly encouraged to participate in the seminars, research in progress meetings, journal club and other activities sponsored by the Clinical Trials and Evidence Synthesis Track and the Center for Clinical Trials and Evidence Synthesis.

All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Clinical Trials Coursework: Students must complete the following 3 required courses: (340.601 or 340.721 or 340.751), 340.645, and 340.694. Students must also complete 340.861 (Sequence A below) OR 340.633 and 340.648 (Sequence B below).		
Students must complete one of the following 3 courses:		
PH.340.601	Principles of Epidemiology (typically offered onsite in the Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered onsite in 1st term, and online in 1st, 3rd, and Summer terms and Summer Institute)	5
PH.340.751	Epidemiologic Methods 1 (typically offered onsite in 1st term)	5
Students must complete the following 2 courses		
PH.340.645	Introduction to Clinical Trials (typically offered online in 2nd term)	3
PH.340.694	Power and Sample Size for the Design of Epidemiological Studies I (typically offered online in 3rd term and during the Summer and Winter Institutes)	1
Students must complete all courses in either Sequence A or Sequence B		
Sequence A		
PH.340.861	Clinical Trials: Procedures, Design, and Interpretation of Results (typically offered online in 3rd term)	3
Sequence B		
PH.340.633	Data Management in Clinical Trials (typically offered onsite in 3rd term)	3
PH.340.648	Clinical Trials Management (typically offered onsite in 4th term)	3
Students must complete one of the following Biostatistics courses		
PH.140.611	Statistical Reasoning in Public Health I (typically offered online in 1st term and onsite during the Summer Institute)	3
PH.140.621	Statistical Methods in Public Health I (typically offered onsite in 1st term)	4
PH.140.651	Methods in Biostatistics I (typically offered onsite in 1st term)	4
Students must complete one of the following Ethics courses		
PH.306.665	Research Ethics and integrity: U.S. and International Issues (typically offered onsite in 3rd term)	3
PH.390.673	Ethical and Regulatory Issues in Clinical Research (typically offered onsite in 1st term and online in 2nd term)	3
PH.550.600	Living Science Ethics - Responsible Conduct of Research (typically offered onsite in 1st and 4th term)	1
PH.700.621	Ethics in Clinical Practice: Fundamentals, Problems and Approaches (typically offered online in 2nd term)	3
Students must complete at least two of the following elective courses		
PH.140.633	Biostatistics in Medical Product Regulation (typically offered online in 1st term)	2

PH.140.642	Design of Clinical Experiments (typically offered onsite in 3rd term)	3
PH.223.662	Vaccine Development and Application (typically offered onsite in 2nd term)	4
PH.223.664	Design and Conduct of Community Trials (typically offered onsite in 3rd term)	4
PH.223.690	The Design and Analysis of Cluster Randomized Trials (typically offered onsite in 4th term)	2
PH.223.705	Good Clinical Practice: A Vaccine Trials Perspective (typically offered online in 4th term)	4
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses (typically offered onsite in 3rd term)	4
PH.340.619	Topics in Pharmacoepidemiology (typically offered online during the Summer Institute)	2
PH.340.633	Data Management in Clinical Trials	3
PH.340.648	Clinical Trials Management (typically offered onsite in 4th term)	3
PH.340.660	Practical Skills in Conducting Research in Clinical Epidemiology and Investigation (typically offered onsite in 1st term)	3
PH.340.671	Topics in Management of Clinical Trials (typically offered online during the Summer Institute)	2
PH.340.676	Bayesian Adaptive Trials (typically offered onsite during the Summer Institute)	2
PH.340.682	Pharmacoepidemiology Methods (typically offered online in 2nd term)	3
PH.340.684	Pharmacoepidemiology: Drug Utilization (typically offered onsite in 3rd term)	3
PH.340.686	Introduction to Systematic Reviews and Meta-Analysis (typically offered onsite during the Summer Institute)	2
PH.340.840	Special Studies and Research Epidemiology (Note: Students interested in pursuing this option should contact a faculty member before registering; course is typically offered onsite in 1st, 2nd, 3rd and 4th terms)	1 - 22
PH.340.861	Clinical Trials: Procedures, Design, and Interpretation of Results	3
PH.390.631	Principles of Drug Development (typically offered onsite in 1st term)	2
PH.390.750	Introduction to Clinical Research (typically offered onsite in Summer term)	2
One of the following courses, but not both, may be counted towards the certificate program		
AS.410.649	Introduction to Regulatory Affairs	4
AS.410.676	Food And Drug Law	4

Community-Based Public Health, Certificate

Community- Based Public Health Overview

The certificate program in Community-Based Public Health prepares future community public health practitioners and researchers to collaborate. Participants are trained in the skills and knowledge necessary for community-based public health program development, management and evaluation, community-based participatory research (CPBR) and other research in community settings.

EDUCATIONAL OBJECTIVES

To develop students' skills and competencies for careers in both community-based public health practice and research, particularly for applications in underserved urban settings. By marrying training in these two areas, this certificate will prepare future community public health practitioners and researchers to collaborate. The certificate will train recipients in the skills and knowledge necessary for community-based public health program development, management and evaluation, community-based participatory research (CPBR) and other research in community settings.

It will also train students in the following key competencies for community-based public health practice and research, including:

CULTURAL COMPETENCY SKILLS AND ATTITUDES

1. Identify the role of cultural, social, and behavioral factors in determining the delivery of community-based public health
2. Utilize appropriate methods for interacting sensitively, effectively, and professionally with persons from diverse cultural, socioeconomic, educational, racial, ethnic, and professional backgrounds, and persons of all ages and lifestyle preferences
3. Develop and adapt approaches to problems that take into account cultural differences

LINKING SOCIAL AND ENVIRONMENTAL CAUSES OF DISEASE AND COMMUNITY HEALTH

1. Define, assess, and understand the health status of populations, determinants of health and illness, factors contributing to health promotion and disease prevention, and factors influencing the use of health services impacting communities
2. Understand the historical development, structure, and interaction of national and local public health and health care systems
3. Identify and apply research methods appropriate for community-based applications

COMMUNITY DIMENSIONS OF PRACTICE SKILLS AND ATTITUDES

1. Promote the utilization of leadership, team building, negotiation, and conflict resolution skills to build community partnerships and maintain key stakeholders
2. Utilize best practices for engaging in effective community partnerships
3. Identify community assets and available resources

SPONSORING DEPARTMENT

Hea (http://www.jhsph.edu/dept/hbs/)lth, Behavior and Society

ADMISSION

Please review the certificate program page (https://publichealth.jhu.edu/academics/community-based-public-health-certificate-program/) on the

Bloomberg School of Public Health's website for contact information and full information about admission process and requirements.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. Any request to substitute a course that the faculty sponsors consider essential to meet the certificate program competencies must be given serious consideration. The student must propose the course to be substituted and present a rationale for the request. In no case will more than one substitution be permitted. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years. The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. The term may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Note: Students who started the certificate program prior to AY21-22 may count 410.620 Program Planning for Health Behavior Change towards their total credits, since it was included in the curriculum before that year.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required (Core) Courses		
PH.410.630	Implementation and Sustainability of Community-Based Health Programs (typically offered onsite in 4th term)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (typically offered onsite in 2nd term)	3
Any students not enrolled in the School of Nursing are required to take the following practicum course. Students must apply to be accepted into the Baltimore Community Practicum during 1st term; instructor permission is required. Experience prior to enrollment in the student's current degree program is not applicable to the certificate program		
PH.550.864	Baltimore Community Practicum (Please note: This is a multi-term course: students must enroll in both 2nd and 3rd terms onsite)	1 - 4
Elective Courses: Each student must select at least one course from each of the following three groups of courses, for a total minimum of 10 credits		
Group 1: Competency Skills and Attitudes		
NR.110.560	Program Development and Evaluation in Health Care	2
PH.224.690	Qualitative Research Theory and Methods (typically offered onsite in 3rd term and online in terms 1 & 3)	3
PH.224.691	Qualitative Data Analysis (typically offered online in 2nd term)	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (typically offered online in 2nd term)	3
PH.410.690	Ethnographic Fieldwork (typically offered onsite in 1st term)	3
Group 2: Linking Social and Environmental Causes of Disease and Community Health		
PH.221.624	Urban Health in Developing Countries (typically offered online in 4th term)	3
PH.301.615	Seminar in Health Disparities (course is typically offered onsite in term 2)	3
PH.305.607	Public Health Practice (typically offered onsite in 2nd term)	4
PH.380.612	Applications in Program Monitoring and Evaluation (typically offered onsite in 4th term)	4
PH.410.611	Under Pressure: Health, Wealth & Poverty (typically offered onsite in 4th term)	3
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute)	3
Group 3: Community Dimensions of Practice Skills and Attitudes		
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments (typically offered onsite in 3rd term)	4
PH.221.635	Global Advances in Community-Oriented Primary Health Care (typically offered onsite and online in 3rd term)	3
PH.301.645	Health Advocacy (typically offered onsite in 4th term)	3
PH.340.698	Methods For Assessing Power, Privilege, and Public Health in the United States	4
PH.410.861	Graduate Seminar in Community-Based Research (Graduate Seminar in Community-Based Research is typically offered onsite in 2nd and 4th terms)	1
PH.550.601	Implementation Research and Practice (typically offered onsite and online in 2nd term)	3

Demographic Methods, Certificate

Certificate Program in Demographic Methods

OVERVIEW

The certificate is designed to serve two audiences—master's or doctoral degree students at The Johns Hopkins University and interested professionals desiring to gain skills in applying demographic analytic methods to identify or forecast public health problems and evaluate the effectiveness of policies or interventions aimed at mitigating them. Demographic analytic methods are used to calculate denominators of health measures. They, along with epidemiology methods, are used to develop profiles of those at risk for health/disease conditions, evaluate health care interventions, forecast health resource needs, and inform health care policies and planning based on accurate projections of at-risk groups.

EDUCATIONAL OBJECTIVES

Students completing the certificate will gain competency in:

1. Knowledge of the comparative strengths and weaknesses of different methods of demographic analysis
2. Appropriate application of demographic methods to the analysis of a range of population and health issues
3. Critical evaluation of the public health implications of results from applications of different demographic and population analysis methods

ADMISSIONS

Contact information and complete certificate program admissions information is available on the Bloomberg School of Public Health certificate program (https://publichealth.jhu.edu/academics/demographic-methods-certificate-program/)webpage.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (http://www.jhsph.edu/courses/) to confirm when courses are offered, as the term and time may change from what is listed in the table below and some courses are only offered every other year. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Students must complete the following two required courses		
PH.380.603	Demographic Methods for Public Health (typically offered onsite in 2nd term and online in 3rd term)	4
PH.380.605	Advanced Demographic Methods in Public Health (typically offered onsite in 3rd term)	4
Students must complete at least ten credits of elective courses from the list below		
PH.140.640	Statistical Methods for Sample Surveys (typically offered onsite in 3rd term)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (typically offered onsite in 2nd term)	4
PH.221.641	Measurement Methods in Humanitarian Emergencies (typically offered onsite in 2nd term)	2
PH.380.600	Principles of Population Change (typically offered onsite in 2nd term)	4
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (typically offered onsite in 2nd term)	4
PH.380.711	Issues in Survey Research Design (typically offered onsite in 3rd term)	3
PH.380.712	Methods in Analysis of Large Population Surveys (typically offered onsite in 4th term)	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (typically offered onsite in 3rd term)	3

Environmental and Occupational Health, Certificate

Environmental and Occupational Health Certificate Program

NOTE: This certificate program may be complete entirely online!

OVERVIEW

The certificate program educates and trains students to identify major environmental health issues facing public health professionals today. Courses explore the sources of environmental agents, their distribution in community and work environments, transfer routes to humans and possible health effects; the basic biological mechanisms underlying the association between prior exposure and subsequent development of adverse health effects; and control strategies and interventions.

EDUCATIONAL OBJECTIVES

1. Define the major environmental agents that cause adverse effects on human health, and their sources
2. Identify the carriers or vectors that promote the transfer of these agents from the environment to the human
3. Describe various risk management approaches both in the workplace and in the environment
4. Develop and discuss strategies that effectively mitigate and prevent adverse health effects caused by environmental and/or occupational agents and conditions
5. Illustrate how concepts such as exposure assessment, the hierarchy of controls, biological monitoring, medical screening and surveillance are used to prevent occupational injuries and illnesses
6. Identify and describe important current and emerging environmental and/or occupational problems that pose a risk to public health.

CONTACT INFORMATION

Sponsoring Department
Environmental Health and Engineering

ADMISSIONS

Complete information about applying to the certificate program can be found on the Bloomberg School of Public Health certificate program webpage (https://publichealth.jhu.edu/academics/environmental-and-occupational-health-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible, however the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (http://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for pre-requisites and if instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required courses- Students must complete 3 of the following 6 course selections; students may complete either 180.601 or 180.609, but not both		
PH.180.601	Environmental Health (typically offered online in 3rd term, and onsite in Summer and Summer Institutes)	5
PH.180.609	Principles of Environmental Health (typically offered onsite in 1st term)	4
PH.182.625	Principles of Occupational and Environmental Hygiene (typically offered onsite in 2nd term and online in 2nd and 4th terms)	4
PH.187.610	Public Health Toxicology (typically offered online in 2nd term)	4
PH.187.650	Alternative Methods in Animal Testing (typically offered online in 4th term)	3
PH.188.680	Fundamentals of Occupational Health (typically offered online in 1st term)	3
Elective Courses- Students must complete 2-3 courses from the list below to meet the 18 credit minimum required for the certificate program		
Sustainability/Climate Change		
PH.180.607	Climate Change and Public Health (typically offered onsite in 4th term)	3
PH.180.611	The Global Environment, Climate Change, and Public Health (typically offered onsite in 1st term)	4
PH.180.619	Drinking Water and Water Policy: Avoiding Another Flint (typically offered onsite in Summer Institute)	1
PH.180.647	The Health Effects of Indoor and Outdoor Air Pollution (typically offered online in 4th term)	3
PH.180.651	Energy, Environment, and Public Health (typically offered onsite in 3rd term and online in 4th term)	2
PH.180.653	Climate Change: Avoiding Conflict and Improving Public Health (typically offered online in 4th term)	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities (typically offered online in 4th term)	3
PH.185.601	One Health Seminar (typically offered onsite in 4th term)	1
PH.188.682	A Built Environment for A Healthy and Sustainable Future (typically offered online in 4th term)	3
PH.188.688	Global Sustainability & Health Seminar (typically offered onsite in 4th term)	1
Food Systems/Water		
PH.180.606	Case Studies in Food Production and Public Health (typically offered online in 4th term)	4
PH.180.614	Urban Agriculture and Public Health (typically offered onsite in Summer Institute)	2
PH.180.620	Introduction to Food Systems and Public Health (typically offered online in 2nd term)	4
PH.180.644	Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond (typically offered online in 4th term)	2
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments (typically offered onsite in 3rd term)	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health (typically offered onsite in 3rd term)	2
PH.182.640	Food- and Water- Borne Diseases (typically offered onsite in 3rd term)	3
Occupational Hygiene/Safety/Occupational Health		
PH.180.621	Protecting the Environment and Safeguarding Worker Health: A Problem-Based Approach (typically offered online in 2nd term)	3
PH.182.613	Exposure Assessment Techniques for Health Risk Management (typically offered onsite and online in 3rd term)	3
PH.182.614	Industrial Hygiene Laboratory (typically offered onsite in 2nd term and onsite in Summer Institute every other year)	5
PH.182.615	Airborne Particles (typically offered online in 3rd term)	4
PH.182.621	Introduction to Ergonomics (typically offered onsite in 2nd term)	4
PH.182.622	Ventilation and Hazard Control (typically offered online in term 1)	4
PH.182.623	Occupational Health Management (typically offered online in 3rd term)	3
PH.182.625	Principles of Occupational and Environmental Hygiene (typically offered on site in 2nd term and online in 4th term)	4

PH.182.637	Noise and Other Physical Agents in the Environment (typically offered onsite in 2nd term and online in 3rd term)	4
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities (typically offered online in 4th term)	3
PH.188.680	Fundamentals of Occupational Health (typically offered online in 1st term)	3
PH.188.681	Onsite Evaluation of Workplace and Occupational Health Programs (typically offered onsite in 4th term and onsite in Summer Institute every other year)	5
PH.188.694	Health of Vulnerable Worker Populations (typically offered online in 1st term)	3
Health Security/Infectious Diseases		
PH.180.623	Infectious Disease Threats to Global Health Security (typically offered online in 3rd term)	3
PH.180.624	Biotechnology and Health Security (typically offered online in 1st term and onsite in 3rd term)	3
PH.180.627	Lessons Learned in 1918 Pandemic Flu (typically offered onsite in 4th term)	1
PH.180.630	Chemical and Biological Weapons Threats: Science, Public Health, Policy (typically offered onsite in 4th term)	3
PH.180.633	The Sociocultural Dimensions of Disasters (typically offered onsite in 4th term)	3
PH.180.634	Public Health Emergencies: Risk Communication and Decision Science (typically offered online in 1st term and onsite in 4th term)	3
PH.180.670	Introduction to Public Health Emergency Preparedness (typically offered onsite in 4th term)	3
Environmental Law/Environmental Justice		
PH.180.600	Public Health Implications of Health as a Human Right (typically offered onsite in Winter Institute)	2
PH.180.602	Environment and Health in Low and Middle income Countries (typically offered onsite in 3rd term)	2
PH.180.625	Community-Driven Epidemiology and Environmental Justice (typically offered onsite in 3rd term)	3
PH.180.626	Environmental Justice and Public Health Practice (typically offered online in 2nd term)	3
PH.180.628	Introduction To Environmental and Occupational Health Law (typically offered online in 4th term)	4
PH.340.680	Environmental and Occupational Epidemiology (typically offered onsite in 4th term)	4
Toxicology/Physiology/Molecular Mechanisms		
PH.180.632	Introduction to Molecular Toxicology (typically offered online in 4th term)	3
PH.180.637	Refinement of Animal Experimentation: Essential to Reduce Animal Suffering and Enhance Scientific Rigor (typically offered onsite in 3rd term)	2
PH.180.638	Animals in Research: Ethics (typically offered in 4th term)	1
PH.180.640	Molecular Epidemiology and Biomarkers in Public Health (typically offered onsite in 3rd term and online in 4th term)	4
PH.180.650	Fundamentals of Clinical Oncology for Public Health Practitioners (typically offered onsite in 2nd term)	3
PH.183.631	Fundamentals of Human Physiology (typically offered onsite in 2nd term and online in 4th term)	4
PH.183.638	Mechanisms of Cardiopulmonary Control (typically offered onsite in 3rd term)	2
PH.183.642	The Cardiopulmonary System Under Stress (typically offered onsite in 4th term)	2
PH.187.625	Animals in Research: Law, Policy, and Humane Sciences (typically offered online in 4th term)	3
PH.187.633	Introduction to Environmental Genomics and Epigenomics (typically offered onsite in 4th term)	3
PH.187.634	Analysis for Environmental Genomics and Epigenomics (typically offered onsite in 4th term)	1
PH.187.640	Toxicology 21: Scientific Foundations (typically offered onsite in 2nd term)	1
PH.187.645	Toxicology 21: Scientific Applications (typically offered online in 3rd term)	3
PH.187.650	Alternative Methods in Animal Testing (typically offered onsite in 4th term)	3
PH.187.655	Evidence-Based Toxicology (typically offered online in 4th term)	3
PH.187.661	Environmental Health in Neurological and Mental Disorders (typically offered online in 4th term)	3
PH.188.686	Clinical Environmental and Occupational Toxicology (typically offered onsite in 3rd term)	3

Epidemiology for Public Health Professionals, Certificate

Epidemiology for Public Health Professionals

OVERVIEW

The timely detection, investigation, control, and prevention of outbreaks and major long-term public health problems require a well-trained and competent epidemiology workforce as a key component of a national public health infrastructure. The Epidemiology Workforce in State and Local Health Departments - United States, 2010 Weekly March 30, 2012/61(12);205-208

Epidemiology is an integral component of public health practice. The discipline aims to provide the basis to prevent disease and to promote the health of populations through the study of the occurrence and distribution of health-related states or events, including the study of determinants influencing such states. Professional epidemiologic methods, defined as the application of epidemiologic methods to public health practice, entail the combination of analytical methods and applied epidemiology oriented to problem solving in public health. The principal areas of professional epidemiology include epidemiologic assessment of public health data, health situation and trend analyses, public health surveillance and health program impact assessment. These areas are closely linked to the essential public health function and services. This certificate program is intended to provide the concepts, methods and tools needed for the assessment of health situations and trends of population groups.

EDUCATIONAL OBJECTIVES

Upon completion of the core courses in this certificate program, individuals will have gained specialized knowledge and skills on the application of epidemiologic concepts and methods to public health problems, as follows:

1. Understand the place of epidemiology in public health, specifically how epidemiology is used to identify causes of disease, identify populations at high risk for disease, develop preventative methods and evaluate public health strategies.
2. Calculate and interpret basic epidemiologic measures of disease frequency, identify sources of data for measuring health outcomes, and identify key aspects of measurement problems,
3. Identify distinguishing features of fundamental study designs, including randomized trials, cohort and case-control studies, birth cohort and ecologic studies, and pre-post and quasi-experimental studies. Students will be able to describe strengths and limitations of the different study designs, and key sources of confounding and bias in epidemiological studies and
4. Interpret and make inferences from results of epidemiologic studies.

With regard to the usual functions of public health agencies, students will be able to:

1. Identify the Problem Solving Framework for measuring the severity of priority health problems,
2. Recognize the role of routine and public health information systems in epidemiologic assessments,
3. Identify tools and measurements used to monitor the quality of performance of public health information systems,
4. Identify the main indicators for measuring the burden of diseases at global, national and local levels
5. Design health situation analyses: epidemiological profiles and community health status assessments,
6. Interpret measures of health burden, association and effectiveness,
7. Describe the framework of the public health surveillance cycle and sources of information,
8. Design, implement and evaluate disease surveillance systems,
9. Communicate epidemiological information and synthesis to policy makers, professionals, and lay audiences.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/epidemiology-for-public-health-professionals-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework.

Students must successfully complete the core courses, demonstrated by full attendance and participation in all course activities and assignments. The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

The certificate program requires a minimum of 21 term credits comprised of required courses and core elective courses. The certificate curriculum consists of four required courses in epidemiologic methods, and at least two of three core elective courses. Certificate students may take additional elective courses focusing on application of epidemiologic methods to substantive areas, such as infectious diseases and biostatistics methods. Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Students must select either 340.601, 340.721 or 340.751		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer Institute and Summer Term)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered online in 1st, 3rd, Summer and Summer Institute terms and onsite in 1st term)	5
PH.340.751	Epidemiologic Methods 1 (typically offered onsite in 1st term)	5
Students must select either 340.602, 340.722, or 340.752		
PH.340.602	Intermediate Epidemiology (typically offered in Summer Institute and Winter Institute)	3
PH.340.722	Epidemiologic Inference in Public Health II (typically offered onsite and online in 2nd term)	4
PH.340.752	Epidemiologic Methods 2 (typically offered onsite in 2nd term)	5
Students must select either (340.767 and 340.768) or 340.769		
PH.340.767	Professional Epidemiologic Methods: Topics and Methods for Health Situation Analysis (typically offered online in Summer Institute)	2
PH.340.768	Professional Epidemiologic Methods: Decision Making in Health Situation Analysis (typically offered onsite in Summer Institute)	2
PH.340.769	Professional Epidemiology Methods (typically offered onsite in 3rd term)	4
Students must complete either (340.765 and 340.766) or 340.770		
PH.340.765	Professional Epidemiologic Methods: Epidemiologic intelligence and Population Health Assessments (typically offered online in Summer Institute and Winter Institutes)	2
PH.340.766	Professional Epidemiologic Methods: Surveillance (typically offered onsite in Summer Institute)	2
PH.340.770	Public Health Surveillance (typically offered onsite in 2nd term and online in 3rd term and Summer Institute)	3
Required Elective Courses: Students must complete at least two of the following elective courses to complete the certificate program with at least 21 academic credits. Elective substitutions are possible, but require approval in advance from Dr. Carlos Castillo-Salgado. Only one elective course may be substituted		
Students may select either 340.606 or 340.686		

PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses (typically offered onsite in 3rd term)	4
PH.340.686	Introduction to Systematic Reviews and Meta-Analysis (typically offered onsite in Summer Institute)	2
Students may select either 340.653 or 340.693		
PH.340.653	Epidemiologic Inference in Outbreak Investigations (typically offered onsite in 1st term)	3
PH.340.693	Investigation of Outbreaks (typically offered onsite in Summer Institute and Winter Institute)	2
Students may select either 320.717 or 340.727		
PH.340.717	Health Survey Research Methods (typically offered onsite in 2nd term)	4
PH.340.727	Introduction to Health Survey Research Methods (typically offered online in 3rd term and onsite in Summer Institute)	2

Evaluation: International Health Programs, Certificate

Evaluation: International Health Programs OVERVIEW

The certificate program is intended for current master's and doctoral students at JHU planning to work in the field of monitoring and evaluation (M&E) in low- and middle-income countries.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program, individuals will be able to:

1. Evaluate health programs from conception, planning and design through data collection, interpretation, and analysis in low-and-middle-income settings;
2. Create impact models for health programs that reflect program assumptions and the available evidence on intervention effectiveness;
3. Critically evaluate the advantages and disadvantages of various evaluation designs for a given health program;
4. Identify threats to internal and external validity in program evaluation, and develop a plan to mitigate or document these threats;
5. Design, implement and manage data collection activities to measure program inputs, processes, outputs, outcomes, and impacts in low and middle-income settings;
6. Critically assess the quality of existing data on program inputs, processes, outputs, outcomes and impacts, and determine whether these data can be used in the evaluation of a health program in low- and middle-income settings; and
7. Analyze, interpret and use program evaluation data to improve program implementation.

ADMISSIONS

Certificate contact information and complete admissions information is available on the Bloomberg School's certificate program page (https://publichealth.jhu.edu/academics/evaluation-international-health-programs-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 20 term credits. All required and elective courses must be taken for a letter grade, if a letter grade is an option. Students must earn a minimum letter grade of C in each certificate course, and maintain a GPA of 2.75 or higher for the certificate courses. All courses must be completed within a three year period.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion form has been submitted, verified by the certificate program, and processed by the School of Public Health Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Courses- Students are required to complete 4 core courses (14 credits required)		
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs (typically offered onsite in 2nd term)	4
PH.223.632	Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries (typically offered onsite in 4th term)	4
PH.223.866	Special Topics in Program Evaluation in International Health (typically offered onsite in 3rd term)	1
Students must complete either 340.601 or 340.721 o4 340.751		
PH.340.601	Principles of Epidemiology (typically offered onsite in 3rd term, Summer and Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered onsite in 1st term, and online in 1st, 3rd, Summer and Summer Institute)	5
PH.340.751	Epidemiologic Methods 1 (typically offered onsite in 1st term)	5
Elective Courses: students must complete 6 or more credits from among the following courses:		
Note: Up to 3 credits of elective coursework may be substituted for a special topics course only with prior approval from the certificate program's sponsoring faculty.		
General Evaluation Courses		
PH.300.713	Research and Evaluation Methods for Health Policy (typically offered onsite in 3rd term)	3
PH.300.715	Advanced Research and Evaluation Methods in Health Policy (typically offered onsite in 3rd term)	4
PH.318.615	Program Evaluation for Public Policy I (typically offered onsite in 1st term)	3

PH.318.616	Program Evaluation in Public Policy II (typically offered onsite in 2nd term)	3
PH.380.611	Fundamentals of Program Evaluation (typically offered onsite in 3rd term and online in 1st term)	4
Economic Evaluation Courses		
PH.221.644	Econometric Methods for Evaluation of Health Programs (typically offered onsite in 3rd term)	4
PH.313.601	Economic Evaluation I (typically offered onsite and online in 1st term)	3
PH.313.602	Economic Evaluation II (typically offered onsite and online in 2nd term)	3
Methods and Analysis Courses		
PH.140.640	Statistical Methods for Sample Surveys (typically offered onsite in 3rd term)	3
PH.223.664	Design and Conduct of Community Trials (typically offered onsite in 3rd term)	4
PH.340.717	Health Survey Research Methods (typically offered onsite in 2nd term)	4
PH.380.711	Issues in Survey Research Design (typically offered onsite in 3rd term)	3
PH.380.712	Methods in Analysis of Large Population Surveys (typically offered onsite in 4th term)	3
Statistical Methods Courses		
PH.140.664	Causal Inference in Medicine and Public Health I (typically offered onsite in 3rd term and online in 4th term)	4
PH.140.665	Causal Inference in Medicine and Public Health II (typically offered onsite in 4th term)	3

Food Systems, the Environment & Public Health, Certificate

Food Systems, the Environment and Public Health

Please Note: Certificate program may be completed entirely online!

OVERVIEW

Food provides many benefits, from nourishment and well-being to livelihoods. Our food systems are also at the nexus of many of the today's most significant challenges, including climate change, resource scarcity, over- and under-nutrition, and environmental exposures to workers and communities. Inequities are widespread. The certificate program in Food Systems, the Environment, and Public Health is designed for Johns Hopkins University degree students and professionals seeking to deepen their understanding of the critical role of food systems in public health and global environmental change. Students will apply research, communication, policy analysis and advocacy skills to address the public health and equity implications of food systems. The certificate curriculum can be customized to meet the needs of full-time, part-time, and online students.

EDUCATIONAL OBJECTIVES

Students completing the certificate program will be able to:

1. Define and describe the concepts of food systems, food security, food system sustainability, and resilience.

2. Describe how food systems and food production practices affect the public's health, with attention to equity and the historical trends that shaped today's food system.

3. Use a systems perspective to analyze and apply critical thinking to inter-relationships within food systems, specifically among diet, food production, the environment and public health.

4. Analyze strengths and weaknesses of political, social, and economic policies and other interventions to improve food systems.

5. Apply selected skills (such as research methodologies, communication, advocacy and behavior change) to promote healthy and sustainable food systems.

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/food-systems-the-environment-and-public-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Please note: Certificate program may be completed entirely online

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check prerequisites and whether instructor consent is required.

Code	Title	Credits
All students must complete the following courses:		
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
PH.180.620	Introduction to Food Systems and Public Health (typically offered online in 1st term)	4

Core Elective Courses: Students must complete a minimum of two courses from Group A and one from Group B, totaling a minimum of ten credits.		
Group A (Food Systems): Select a minimum of two courses from the following:		
PH.180.605	Food Systems Practicum (typically offered onsite in 2nd term)	4
PH.180.606	Case Studies in Food Production and Public Health (typically offered online in 4th term)	4
PH.180.635	Seafood and Public Health: Global Trade, Nutrition and the Environment (typically offered online in 3rd term)	2
PH.180.644	Food System Resilience to Disasters: COVID-19, Climate Change, and Beyond (typically offered online in 4th term)	2
PH.180.655	Baltimore Food Systems: A Case Study of Urban Food Environments (typically offered onsite in 3rd term)	4
PH.410.608	Applying Systems Thinking to Obesity Prevention (typically offered onsite in Summer Institute)	2
Group B (Food and the Environment): Select a minimum of one course from the following:		
PH.180.607	Climate Change and Public Health (typically offered hybrid in 3rd term)	3
PH.180.611	The Global Environment, Climate Change, and Public Health (typically offered onsite in 1st term)	4
PH.182.640	Food- and Water- Borne Diseases (typically offered onsite in 3rd term)	3
PH.185.600	One Health Tools to Promote and Evaluate Healthy and Sustainable Communities (typically offered online in 4th term)	3
PH.188.682	A Built Environment for A Healthy and Sustainable Future (typically offered online in 4th term)	3
PH.221.611	Food Security and Nutrition in Humanitarian Emergencies (typically offered onsite in 4th term)	2
PH.222.653	Food Technology and Health (typically offered onsite in 4th term)	3
PH.222.654	Food, Culture, and Nutrition (typically offered onsite in 4th term)	4
PH.222.657	Food and Nutrition Policy (typically offered onsite in 1st term)	2
PH.222.662	Obesity in Public Health (typically offered onsite in 2nd term)	3
PH.222.665	Planning for Food Systems and Public Health (typically offered onsite and synchronous online in 3rd term)	3
PH.224.630	The Obesity Epidemic Problem Solving Seminar: What We Can Learn from Native American Communities (typically offered online in 1st term)	3
PH.308.660	Food Industry, Politics and Public Health (typically offered online in 4th term)	3
PH.380.740	Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health (typically offered online in 2nd term)	3
PH.700.630	Food Ethics (typically offered onsite in 3rd term)	3
Additional Recommended Courses: Students may select up to one course below to complete a total of 18 certificate credits		
PH.180.625	Community-Driven Epidemiology and Environmental Justice (typically offered onsite and hybrid in 3rd term)	3
PH.185.601	One Health Seminar (typically offered onsite and synchronous online in 4th term)	1
PH.188.688	Global Sustainability & Health Seminar (typically offered onsite in 2nd and 4th terms. Students may take 2 terms of this course for 2 credits)	1
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches (typically offered online in 2nd term)	3
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels (typically offered onsite in 2nd term)	4
PH.260.848	Community-Based Practice Through Civic Engagement (typically offered online in 4th term)	2
PH.224.690	Qualitative Research Theory and Methods (typically offered online in 1st and 3rd terms, and onsite in 3rd term)	3
PH.305.684	Health Impact Assessment (typically offered online in 3rd term)	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4
PH.317.610	Risk Policy, Management and Communication (typically offered onsite in 2nd term and online in 4th term)	3
PH.410.612	Sociological Perspectives on Health (typically offered hybrid in 1st term)	3
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute and online in 4th term)	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4
PH.410.663	Media Advocacy and Public Health: Theory and Practice (typically offered onsite in 4th term)	3
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy (typically offered onsite in 2nd and 3rd terms and Summer Institute and online in 3rd term)	3
Recommended Courses for Non-Degree Students: Students who are not enrolled in a degree program at BSPH are strongly encouraged to complete one or more of the following courses.These credits cannot count towards Group A or B requirements but can count towards the fulfillment of the 18-credit requirement to complete the certificate program		
PH.552.601	Foundational Principles of Public Health (typically offered online in 1st, 2nd and 3rd terms)	0.5
PH.552.607	Essentials of Environmental Health (typically offered online in 1st, 2nd, and 3rd terms)	0.5
PH.552.610	The Social Determinants of Health (typically offered onsite in 1st, 2nd and 3rd terms)	0.5
PH.552.612	Essentials of One Health (typically offered online in 1st and 4th terms)	0.5

Gender and Health, Certificate

Gender and Health Certificate Program

OVERVIEW

The Certificate Program in Gender and Health will provide concrete training in gender and health with particular focus on gender theories, gender analysis, gender-based violence research methods, gender and sexuality, gender and women's health, gender and men's health, and intersectionality. Gender as applied to public health is a burgeoning field, and many NGOs and multi-lateral organizations have specific gender specialist positions; this Certificate Program is designed to give students the knowledge and skills to work in this area.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program, students will be able to:

1. Explain the role of gender in shaping health inequities and recognize how gender health inequities affect health research and interventions.
2. Apply gender analysis and gender concepts to leading related health topics related to women's, men's and people with other gender identities' health, including sexual/reproductive health and gender-based violence.
3. Incorporate gender analysis into health research and interventions.

SPONSORING DEPARTMENTS

International Health (https://www.jhsph.edu/departments/international-health/)

Population, Family and Reproductive Health

Health, Behavior and Society

ADMISSIONS

Contact information and complete certificate program admission information is available on the certificate program page (https://publichealth.jhu.edu/academics/gender-and-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion form has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: All students should complete 221.621, 221.701 and 380.720; in addition, they should complete either 380.666 or 380.668, AND they should complete either 340.629 or 410.683		
PH.221.621	Gender and Health: Foundational Theories and Applications (typically offered onsite in 1st term)	2
PH.221.701	Applications to Gender Analysis Within Health Research and Interventions (typically offered onsite in 2nd term)	2
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (typically offered onsite in 2nd term)	3
Students should complete either 380.666 or 380.668		
PH.380.666	Women's Health (typically offered onsite in 3rd term)	3
PH.380.668	International Perspectives on Women, Gender, and Health (typically offered onsite in 4th term)	3
Students should complete either 340.629 or 410.683		
PH.340.629	The Epidemiology of LGBTQ Health (typically offered onsite in 2nd term)	3
PH.410.683	Global Perspectives on LGBT Health (typically offered as a hybrid onsite/online course in 3rd term)	3
Elective Courses- Students should complete 5 credits of electives, for a total of 18 credits of certificate program coursework		
PH.306.660	Legal and Public Health Issues in the Regulation of intimacy (typically offered onsite in 4th term)	3
PH.340.629	The Epidemiology of LGBTQ Health (can only count once; typically offered onsite in 2nd term)	3
PH.340.698	Methods For Assessing Power, Privilege, and Public Health in the United States (typically offered onsite in 4th term, every other year)	4
PH.380.604	Life Course Perspectives on Health (typically offered online in 2nd term and onsite in 1st term)	4
PH.380.628	Public Health Perspectives On Abortion (typically offered onsite in 4th term)	3
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (typically offered onsite in 3rd term)	3
PH.380.665	Family Planning Policies and Programs (typically offered onsite in 3rd term)	4
PH.380.666	Women's Health (can only count once; typically offered onsite in 3rd term)	3
PH.380.668	International Perspectives on Women, Gender, and Health (can only count once; typically offered onsite in 4th term)	3
PH.380.760	Clinical Aspects of Reproductive Health (typically offered onsite in 3rd term)	3

PH.380.768	Selected Topics in Women's Health and Women's Health Policy (typically offered online in 1st term)	4
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (typically offered onsite in 3rd term)	3
PH.410.683	Global Perspectives on LGBT Health (can only count once; typically offered as a hybrid onsite/online course in 3rd term)	3

Gerontology, Certificate

OVERVIEW

The Johns Hopkins certificate in Gerontology is awarded to qualified students who have acquired a body of knowledge that is essential for success in this exciting field. The University is known for its several centers of excellence in gerontologic studies. It offers a rich array of aging-related courses, conferences, research projects, and mentors across its medical institutions: the Bloomberg School of Public Health, the School of Nursing, and the School of Medicine. The Johns Hopkins School of Medicine's Division of Geriatric Medicine and Gerontology is considered one of the best in the country, and the continuum of long-term and chronic care, located at the University's Bayview Campus, has been referred to as the most complete in the United States.

EDUCATIONAL OBJECTIVES

1. Increase understanding of the health issues confronting aging populations and commonly used terms, conceptual frameworks, and domains of gerontology study.
2. Provide health professionals with skills for evaluating the health of an aging population.
3. Foster knowledge of constructive interdisciplinary research and practice for improving the quality of health care and long-term services and supports for aging populations.

ADMISSIONS

Complete certificate contact information and admissions information can be found on the Bloomberg School certificate program page (https://publichealth.jhu.edu/academics/gerontology-certificate-program/).

SPONSORING DEPARTMENTS

Health Policy and Management (http://www.jhsph.edu/dept/hpm/)
Epidemiology (http://www.jhsph.edu/dept/epi/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Students must complete all certificate coursework for a letter grade, earn a minimum of a C in each certificate course, and maintain a minimum grade point average of 2.75 for all certificate courses. Students must successfully complete at least 18 credit hours among the required and elective courses. The certificate program length is flexible; it varies from student to student, however, the certificate program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should use the Bloomberg School of Public Health c (https://www.jhsph.edu/courses/)ourse directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required. Prior to registering for any online courses, students must complete Introduction to Online Learning (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/).

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Courses: Students must complete 309.605 and 340.616. They must also complete EITHER 120.627 OR 260.665		
PH.120.627	Stem Cells and the Biology of Aging and Disease (typically offered onsite and online in 3rd term)	3
PH.260.665	Biological Basis of Aging (typically offered onsite in 3rd term, every other year)	3
PH.309.605	Health Issues for Aging Populations (typically offered onsite in 2nd term)	3
PH.340.616	Epidemiology of Aging (typically alternates between being offered onsite and online in 1st term every other year and online in the Summer Institutes)	3
Elective Courses: Students must complete at least 9 credits of elective coursework		
PH.120.627	Stem Cells and the Biology of Aging and Disease (Course may only be completed as an elective if not already completed as one of the required courses. Course is typically offered onsite and online in 3rd term)	3
PH.260.665	Biological Basis of Aging (Course may only be completed as an elective if not already completed as a required course. Course is typically offered onsite in 3rd term every other year)	3
PH.330.618	Mental Health in Later Life (typically offered onsite in 4th term every other year)	3
PH.330.623	Brain and Behavior in Mental Disorders (typically offered onsite in 4th term)	3
PH.330.802	Seminar on Aging, Cognition and Neurodegenerative Disorders (typically offered onsite in 1st, 2nd and 3rd terms, every other year)	2
PH.340.699	Epidemiology of Sensory Loss in Aging (typically offered onsite in 3rd term)	3
PH.380.604	Life Course Perspectives on Health (typically offered virtually in 1st term and online in 2nd term)	4
PH.380.603	Demographic Methods for Public Health (typically offered onsite in 2nd term and online in 3rd term)	4

Students interested in aging may learn about other aging-related training opportunities at Johns Hopkins University's Center on Aging and Health (https://coah.jhu.edu/).

Global Health, Certificate

Global Health Certificate Program

NOTE: Certificate program may be completed entirely online!

OVERVIEW

Global health is the study of the health of populations in a global context, considering its political, social, and economic impact. The certificate program is primarily intended for junior and mid-level professionals practicing or planning to practice in developing countries and interested in expanding their global health skills and knowledge.

The certificate program can be completed entirely with online courses or with a combination of online and on-campus courses.

EDUCATIONAL OBJECTIVES

Upon completion of the Global Health Certificate, individuals will be able to:

1. Describe individual, community, and organizational behaviors and change processes in cross-cultural and developing countries settings as a foundation for planning appropriate primary health care programs;
2. Apply relevant social and behavioral theories to diagnose and understand individual, social network, organizational, community, and policy-maker behaviors associated with the planning, implementation, evaluation, and maintenance of community-based primary health care programs;
3. Describe and critically evaluate the strengths, weaknesses, and sustainability of disease control programs and policies for major causes of death and disability in developing countries and discuss program and policy implementation obstacles and approaches to overcoming them;
4. Apply cultural competence and skills to global and diverse settings related to populations such as refugees, immigrants, and migrant workers;
5. Explain how to work effectively in countries and cultures with differing social and economic perspectives; and
6. Analyze the complexities of the social, economic, medical, political, and environmental factors that affect health.

Sponsoring Department

International Health

Admissions

Complete certificate program admissions information and contact information is available on the certificate program page (https://publichealth.jhu.edu/academics/global-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All certificate coursework must be taken for a letter grade, a minimum grade of C must be earned in all certificate coursework, and a 2.75 or better overall GPA for all certificate coursework is required. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Please note: The Global Health certificate program will not approve any course substitutions or waivers. The curriculum indicated below cannot be altered in any way for individual students.

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the course is offered, and students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must complete three required courses (220.601 AND 221.688 and EITHER 223.680 OR 604.604)		
PH.220.601	Foundations of International Health (typically offered online in 1st and 4th term)	4
PH.221.688	Social and Behavioral Foundations of Primary Health Care (typically offered online in 3rd and Summer terms)	4
PH.223.680	Global Disease Control Programs and Policies (typically offered online in 4th term)	4
OR		
PH.604.604	Global Epidemiology Policies and Programs (typically offered online in 3rd term)	3
Elective Courses: Students must complete at least 6 credits of elective coursework		
PH.221.606	Training Methods and Continuing Education for Health Workers (typically offered online in Summer term)	4
PH.221.612	Confronting the Burden of Injuries: A Global Perspective (typically offered onsite and online in 2nd term)	3
PH.221.620	Applying Summary Measures of Population Health to Improve Health Systems (typically offered onsite in Summer Institutes and online in 2nd term)	3
PH.221.624	Urban Health in Developing Countries (typically offered online in 4th term)	3
PH.221.631	Evaluation Methods for Injury Interventions (typically offered online in 3rd term)	3
PH.221.635	Global Advances in Community-Oriented Primary Health Care (typically offered onsite and online in 3rd term)	3
PH.221.639	Health Care in Humanitarian Emergencies (typically offered online in 1st term and onsite in 2nd term)	3
PH.221.645	Large-scale Effectiveness Evaluations of Health Programs (typically offered onsite in 2nd term)	4

PH.221.646	Health Systems in Low and Middle income Countries (typically offered onsite and online in 2nd term)	3
PH.221.722	Quality Assurance Management Methods for Developing Countries (typically offered onsite and online in 1st term)	4
PH.222.649	International Nutrition (typically offered onsite in 4th term)	3
PH.223.662	Vaccine Development and Application (typically offered onsite in 2nd term)	4
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases (typically offered online in 2nd term)	4
PH.410.640	Global Tobacco Control (typically offered online in 4th term)	3

Global Health Practice, Certificate

OVERVIEW

PLEASE NOTE: THIS PROGRAM CAN ONLY BE COMPLETED VIA FULLY ONLINE COURSES.

The Johns Hopkins Bloomberg School of Public Health offers fully online, part-time master's degree and certificate programs, designed for working professionals. Our Online Programs for Applied Learning (https://www.jhsph.edu/academics/online-programs-and-learning/online-programs-for-applied-learning/) (OPAL) focus on emergent industry sectors that have a resounding need for highly skilled professionals, with one of these sectors being Global Health. Our certificate program in Global Health Practice is geared towards early-to mid-career health professionals in the public, private, and NGO sectors. The certificate program will provide students with an overview of the basic components of global or international health, including health systems, health information, epidemiology/disease control, maternal and child health, and social, cultural, and behavioral factors in health and disease. This innovative program prepares students from diverse personal and professional backgrounds to organize, lead, and support effective global health practice initiatives across the globe.

EDUCATIONAL OBJECTIVES

Upon completion of the Certificate program in Global Health Practice, the individual will acquire skills necessary to:

1. Apply capacity building processes to global health programming in low and middle-income countries;
2. Identify and collaborate with a wide range of stakeholders whose active participation is required for successful global health programming at the community, sub-national, national and regional levels;
3. Apply ethical reasoning to the policy and programming decisions needed for designing and implementing global health programs in low and middle-income countries;
4. Exhibit a health equity and social justice lens in the design and conduct of global health programs;
5. Apply appropriate management processes in the design, implementation and evaluation of global health programs;
6. Demonstrate social, cultural and political awareness of the context in which global health programming takes place;
7. Conduct strategic analysis of factors that influence the success of global health programming.

LinkedIn® Group

We have established a LinkedIn® group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

BSPH OPAL Programs in Global Health (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8676619%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

Admissions

Contact information and complete information about applying to this certificate program can be found on the certificate program page (https://publichealth.jhu.edu/academics/global-health-practice-certificate-program/) on the Bloomberg School of Public Health website.

Program Requirements

Students should follow the plan outlined below if they wish to complete the Certificate program in one year. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met.

The certificate program requires a minimum of 20 term credits and a minimum grade point average (GPA) of 2.75. Students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "C" or higher for courses offered for letter grading. The certificate program length is flexible; it can be completed in as little as one year, and must be completed within three years.

Course of Study

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
Students may complete either 600.601 or 607.704		
PH.600.601 or PH.607.704	Seminars in Public Health or Essential Medicines, Commodities and Supplies Needed for Community Level Primary Health Care Interventions	2
Students must complete 606.601		
PH.606.601	Fundamentals in Global Health Practice	4
	Credits	**6**
Second Term		
PH.604.621	Design and Planning of Primary Health Care Projects	4
	Credits	**4**
Third Term		
PH.604.604	Global Epidemiology Policies and Programs	3
Students may complete 600.701 or 607.735		
PH.600.701 or PH.607.735	Introduction to Epidemiology or Planning Training and Learning Programs for Community Health Workers	4
	Credits	**7**
Fourth Term		
PH.604.771	Social & Cultural Basis for Community and Primary Health Programs (Social and Cultural Basis for Community and Primary Health Programs)	3
	Credits	**3**
	Total Credits	**20**

Notification of Certificate Program Completion

Students in OPAL certificate programs must complete and submit the Notification of Certificate Program Completion form to the OPAL program office **before the end of the add/drop period of the term of your last certificate course**; certificate program completions cannot be processed retroactively. If the deadline is missed, the certificate completion will be processed for the next available term.

For MAS students who did not apply to a certificate but will be completing as part of their degree, they can either apply for completion once the certificate courses are successfully completed, or at the end of their degree program. The certificate cannot be granted or included in the transcript until the form is submitted and verified by the certificate program.

It is preferable to complete the form electronically. Send the completed form to the OPAL program office as an email attachment. Certificates will be ordered for students approximately one month after the end of the term in the summer, spring, and fall. A template form for each of the OPAL certificates can be found in the Online Library of the OPAL Student Resources CoursePlus site. The blank form can be found on the School's website as well. Please **send the completed Notification form to OPAL-Office@jhu.edu** by the deadline noted above. Be sure to complete all personal information on the first page, and the year, term and grade for all completed courses. If needed, we can update the pending grades when they are submitted at the end of the term.

Global Tobacco Control, Certificate

OVERVIEW

PLEASE NOTE: THIS PROGRAM CAN ONLY BE COMPLETED VIA FULLY ONLINE COURSES.

The Johns Hopkins Bloomberg School of Public Health offers fully online, part-time master's degree and certificate programs, designed for working professionals. Our Online Programs for Applied Learning (https://www.jhsph.edu/academics/online-programs-and-learning/online-programs-for-applied-learning/) (OPAL) focus on emergent industry sectors that have a resounding need for highly skilled professionals, with one of these sectors being tobacco control. Tobacco use is the number one preventable cause of death in the world, and it is projected to kill one billion people in the 21st century unless effective tobacco control measures are implemented. In order to reduce and ultimately end the global burden of tobacco-caused death and disease, researchers and public health professionals need to be equipped with the necessary technical skills to support effective policy development and implementation. The overall aim of the fully online certificate program in Global Tobacco Control is to provide formal education to research scientists and public health professionals that equips them with the technical skills necessary to develop and effectively communicate the evidence that is required to support effective tobacco control policy development and implementation.

This fully online certificate program is offered in collaboration with the Institute for Global Tobacco Control (https://www.jhsph.edu/research/centers-and-institutes/institute-for-global-tobacco-control/capacity-building/certificate-program/). Please refer to their website for additional program information, including scholarship eligibility, application requirements and instructions, and deadlines.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program in Global Tobacco Control, the individual will acquire skills necessary to:

1. Describe the history of tobacco use and the tobacco epidemic;
2. Identify the types and sources of tobacco control evidence, including surveillance data, epidemiological studies, intervention-research, and program and policy evaluation studies;
3. Describe the specific activities, strategies and methods that have been undertaken to reduce tobacco use in countries around the world;
4. Discuss, compare and critique current global tobacco control efforts and strategies;
5. Articulate epidemiological, quantitative and qualitative research and evaluation methods using specific tobacco control examples;
6. Describe applied qualitative research techniques used in tobacco control, including direct observational studies, interviewing and focus groups, and analysis of tobacco industry documents;
7. Discuss theories of change and how they apply to tobacco control at individual, organizational and societal levels;
8. Recognize and describe communication approaches that are effective in educating, informing and persuading individuals, communities and policy decision makers concerning tobacco control;

9. Apply specific methods and approaches to improve leadership and management of tobacco control interventions;
10. Discuss tobacco industry strategies that undermine tobacco control interventions;
11. Describe tobacco product regulation in the context of the U.S. and abroad;
12. Apply writing skills to communicate confidently and effectively in a variety of professional formats.

LinkedIn © Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

BSPH OPAL Global Tobacco Control (https://www.linkedin.com/groups/12166025/)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

Admissions

Contact information and complete information about applying to the certificate program is available on the certificate program page (https://publichealth.jhu.edu/academics/global-tobacco-control-certificate-program/) on the Bloomberg School of Public Health website.

Program Requirements

The certificate program requires a minimum of 25 term credits and successful completion of all courses for a letter grade, as well as a minimum grade point average (GPA) of 2.75. Students must earn a grade of C or better in all certificate courses.

Students who are awarded full funding from the Institute for Global Tobacco Control are still considered part-time but they are required to enroll in at least six credits each term. For a student to be successful, it is important that they are able to spend at least four hours a week, per credit hour on course work. Even though the program is intended to be taken on a part-time basis, a student can expect to devote at least 24 hours every week to course work in each term. For students who are fully funded by the IGTC, the certificate program must be completed within 1 year of matriculation. For students who are self-funded, the program length is more flexible; it can be completed in as little as one year, and must be completed within three years.

The student should review the section of the website that addresses completion (p. 577) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

Course of Study

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.605.621	Tobacco Prevention and Control	3
PH.605.651	Strategic Communication Planning	4
	Credits	**7**
Second Term		
PH.605.671	Tobacco Regulatory Science	4
PH.605.701	Leadership in Tobacco Control	2
	Credits	**6**
Third Term		
PH.605.735	Quantitative Methods for Tobacco Control	4
PH.600.612	Professional Development: Writing for Results	2
	Credits	**6**
Fourth Term		
PH.605.745	Qualitative Methods for Tobacco Control	3
PH.605.751	Implementation: Making Change Happen in Tobacco Control	3
	Credits	**6**
	Total Credits	**25**

Notification of Certificate Program Completion

Students in OPAL certificate programs must complete and submit the Notification of Certificate Program Completion form to the OPAL program office **before the end of the add/drop period of the term of your last certificate course**; certificate program completions cannot be processed retroactively. The certificate cannot be granted or included in the transcript until the form is submitted and verified by the certificate program.

It is preferable to complete the form electronically. Send the completed form to the OPAL program office as an email attachment. Certificates will be ordered for students approximately one month after the end of the term in the summer, spring, and fall. A template form for each of the OPAL certificates can be found in the Online Library of OPAL CoursePlus Resources site. The blank form can be found on the School's website as well. Please **send the completed Notification form to OPAL-Office@jhu.edu** by the deadline noted above. Be sure to complete all personal information on the first page, and the year, term and grade for all completed courses. If needed, we can update the pending grades when they are submitted at the end of the term.

Health and Human Rights, Certificate

Certificate Program in Health and Human Rights

EDUCATIONAL OBJECTIVES

The Certificate Program in Health and Human Rights is designed to:

1. Increase understanding among public health professionals regarding the key linkages between human rights and public health.
2. Explore the vital roles of health professionals in promoting human rights, including the right to health, advocating for protection of human rights, researching violations, and building a culture of human rights
3. Build familiarity with international human rights standards and institutions
4. Review how human rights concepts can be brought to bear on public health programs and policies, ranging from developing health system to responding to an epidemic of infectious disease.
5. Review how public health professionals can bring epidemiology and other methods of public health to investigate, analyze, and document abuses of human rights.

SPONSORING DEPARTMENT

Epidemiology (https://www.jhsph.edu/departments/epidemiology/)

ADMISSIONS

Complete certificate program admissions information and contact information is available on the certificate program page (https://publichealth.jhu.edu/academics/health-and-human-rights-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

In addition to the course requirements listed below, any certificate students who do not already complete Epidemiology coursework as part of their degree program must complete at least one Epidemiology course.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required for courses.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required courses:		
PH.340.639	Assessing Epidemiologic Impact of Human Rights Violations (typically offered onsite in 4th term)	2
PH.340.874	Current Topics in Human Rights (typically offered onsite in 1st term)	1
Students must complete two of the following courses:		
PH.180.600	Public Health Implications of Health as a Human Right (typically offered onsite in Winter Institute)	2
PH.180.636	Human Rights and Health Seminar (typically offered onsite in 4th term)	3
PH.340.683	Human Rights in Public Health Practice (typically offered onsite in 3rd term)	2
PH.700.622	Bioethics, Human Rights, and Global Health (typically offered onsite in 2nd term)	3
Students must complete additional elective courses for a total of at least 18 credits, including credits from required courses		
PH.180.626	Environmental Justice and Public Health Practice (typically offered online in 2nd term)	3
PH.221.656	Conceptual and Evidential Foundations of Health Equity and Social Justice (typically offered onsite in Winter Institute)	4
PH.301.615	Seminar in Health Disparities (typically offered onsite in 2nd term)	3
PH.306.670	Issues in LGBTQ Health Policy (typically offered onsite in 2nd term)	3
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life (typically offered onsite in Fall Institute)	3
PH.308.842	SS/R: Emerging Dimensions of Social Determinants of Health Inequalites: A Transdiciplinary Integrated Approach (typically offered onsite in Fall Institute)	3
PH.318.623	Social Policy for Vulnerable Populations in the U.S. (typically offered online in 2nd term)	3
PH.330.667	Mental Health and the Law (typically offered onsite in 3rd term)	3
PH.340.629	The Epidemiology of LGBTQ Health (typically offered onsite in 2nd term)	3
PH.340.692	Prisons, Public Health, and Human Rights (typically offered onsite in 4th term)	2
PH.340.698	Methods For Assessing Power, Privilege, and Public Health in the United States (typically offered onsite in 4th term, every other year)	4

PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (typically offered onsite in 3rd term)	3
PH.380.668	International Perspectives on Women, Gender, and Health (typically offered onsite in 4th term)	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (typically offered onsite in 3rd term)	3
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (typically offered online in 1st term)	4
PH.410.605	Fundamental Tools for Promoting Health Equity (typically offered online in 2nd term)	3
PH.410.606	Local and Global Best Practices in Health Equity Research Methods (typically offered online in 4th term)	4
PH.410.611	Under Pressure: Health, Wealth & Poverty (typically offered onsite in 4th term)	3
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (typically offered onsite in 3rd term)	3
PH.410.683	Global Perspectives on LGBT Health (typically offered onsite in 3rd term)	3
PH.700.622	Bioethics, Human Rights, and Global Health (typically offered onsite in 2nd term)	3
PH.700.644	Justice Theory and Health (typically offered onsite in 4th term)	3
SA.650.766	Corporate Sustainability, Business and Human Rights (Corporate Sustainability, Business and Human Rights is offered by SAIS. Please check that Division for information about when the course is offered)	4

Health Communication, Certificate

Health Communication Certificate Program

EDUCATIONAL OBJECTIVES

Students completing the certificate program will be exposed to and have a basic understanding of the theoretical and applied aspects of Health Communication. Competencies achieved will include, but are not limited to:

1. Awareness of behavior change and communication theories
2. Knowledge of media effects and audiences uses of media/communication modes
3. Recognition of quantitative and qualitative methods used in the study of Health Communication.

Additionally, the Health Communication certificate program will familiarize students with the design and evaluation (formative, process, and summative) of communication messages, campaigns, and programs.

SPONSORING DEPARTMENT

Health, Behavior and Society

ADMISSION

Contact information and information about admissions to the certificate program can be found on the Bloomberg School of Public Health certificate program page (https://publichealth.jhu.edu/academics/health-communication-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. Any request to substitute a course that the faculty sponsors consider essential to meet the certificate program competencies must be given serious consideration. The student must propose the course to be substituted and present a rationale for the request. In no case will more than one substitution be permitted. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years. The student should review the section of the website that addresses completion (https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.jhsph.edu%2Facademics%2Fcertificate-programs%2FJHSPH_certificate_completion.html&data=04%7C01%7Cfturner4%40jhu.edu%7C2ac21a71fd474409a04d08d908a977a5%7C9fa4f438b1e6473b803f86f8aedf0de%7C0%7C0%7C637550346214143948%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLC%7C1000&sdata=mszYnLXcg6%2FcGE4ven%2F8JXG%2FPZeeduIGpU%2BBiyLUdHg%3D&reserved=0)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://nam02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.jhsph.edu%2Fcourses&data=04%7C01%7Cfturner4%40jhu.edu%7C2ac21a71fd474409a04d08d908a977a5%7C9fa4f438b1e6473b803f86f8aedf0de%7C0%7C0%7C637550346214153940%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLC%7C1000&sdata=Zo47nrmABQYDxXXzB%2BY5R%2BoJnofcd2jLYZ1hlQwKUNg%3D&reserved=0) to confirm when courses are offered. The term may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Note: It is STRONGLY RECOMMENDED that students interested in this certificate program take 410.653 (https://www.jhsph.edu/courses/course/410.653/01/2014/18940/) (Contemporary Issues in Health Communication) as a way to familiarize themselves with the different faculty and course offerings in Health Communication.

Note: Students who started the certificate program prior to AY21-22 may count 410.620 Program Planning for Health Behavior Change towards their total credits, since it was included in the curriculum before that year.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	

Required: 18 credits from the following courses:		
PH.180.634	Public Health Emergencies: Risk Communication and Decision Science	3
PH.301.645	Health Advocacy (typically offered onsite in 4th term)	3
PH.312.660	Marketing in Health Care Organizations (typically offered onsite in 3rd term and in Summer Institute)	3
PH.317.610	Risk Policy, Management and Communication (typically offered onsite in 2nd term)	3
PH.380.611	Fundamentals of Program Evaluation (typically offered onsite in 3rd term and online in 1st term)	4
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries (typically offered onsite in 2nd term)	4
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (typically offered online in 2nd term)	3
PH.410.652	Interpersonal Influence in Medical Care (typically offered onsite in 4th term)	2
PH.410.653	Contemporary Issues in Health Communication (typically offered onsite in 1st term)	1
PH.410.654	Health Communication Programs I: Planning and Strategic Design (typically offered onsite in 4th term)	4
PH.410.655	Health Communication Programs II: Implementation and Evaluation (typically offered onsite in 4th term)	4
PH.410.656	Entertainment Education for Behavior Change and Development (typically offered onsite in 4th term)	4
PH.410.663	Media Advocacy and Public Health: Theory and Practice (typically offered onsite in 4th term)	3
PH.410.679	Decolonization, Global Communication, and Public Health (typically offered onsite in 4th term)	3
PH.410.733	Communication Network Analysis in Public Health Programs (typically offered onsite in 4th term)	4
PH.410.752	Children, Media, and Health (typically offered onsite in 3rd term)	3
PH.410.755	Health Communication Programs (typically offered online in 3rd term)	4
PH.410.840	Special Studies and Research in Health Behavior and Society (Must be approved by Dr. Storey; typically offered onsite in 1st, 2nd and 3rd terms)	1 - 22

Health Disparities and Health Inequality, Certificate

Health Disparities and Health Inequality Certificate Program

OVERVIEW

The goal of the certificate program is to train future leaders in research on health disparities and health inequality, and to train individuals to identify the underlying causes of health inequalities and how to develop and implement effective solutions.

EDUCATIONAL OBJECTIVES

Upon successful completion of this certificate program, students will:

1. Become knowledgeable of the current research on health disparities and health inequalities
2. Become knowledgeable on the underlying cause of health inequalities
3. Be able to identify, describe, and be knowledgeable regarding possible solutions to address/reduce health inequalities in different populations

ADMISSIONS INFORMATION

Contact information and complete information about applying to the certificate program can be found on the Bloomberg School of Public Health c (https://www.jhsph.edu/academics/certificate-programs/certificates-for-hopkins-students/health-disparities-and-health-inequality.html)ertificate program webpage (https://publichealth.jhu.edu/academics/health-disparities-and-health-inequality-certificate-program/).

Sponsoring Department

Health Policy and Management (http://www.jhsph.edu/departments/health-policy-and-management/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The requirements for the certificate program consist of taking the required Seminar in Health Disparities course, two terms of the Health Disparities Journal Club course, and taking thirteen or more credits from the elective courses listed below. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the program must be completed within three years.

The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate review committee, and processed by the Registrar.

COURSE OF STUDY

The certificate requires a minimum of 18 academic credits of coursework. Questions regarding the course of study should be directed to the faculty sponsors.

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	

Required Course and Journal Club		
PH.301.615	Seminar in Health Disparities (typically offered onsite in 2nd term)	3
PH.410.864	Critical Issues in Health Disparities (typically offered onsite in 1st, 2nd and 3rd terms)	1
Elective Courses: Students should complete 13 credits of elective coursework		
PH.221.624	Urban Health in Developing Countries (typically offered online in 4th term)	3
PH.224.605	Indigenous Health (typically offered onsite in 4th term)	2
PH.300.652	Politics of Health Policy (typically offered onsite in 4th term)	4
PH.301.660	Connecting Public Health Research with the U.S. Policymaking Process (typically offered onsite in 4th term)	3
PH.301.645	Health Advocacy (typically offered onsite in 4th term)	3
PH.301.635	Policing and Public Health (typically offered online in 1st term)	3
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life (typically offered onsite in Fall Institute)	3
PH.318.623	Social Policy for Vulnerable Populations in the U.S. (typically offered onsite and online in 2nd term)	3
PH.340.629	The Epidemiology of LGBTQ Health (typically offered onsite in 2nd term)	3
PH.340.666	Foundations of Social Epidemiology (typically offered onsite in 2nd term every other year, and online in Summer Institute)	3
PH.340.683	Human Rights in Public Health Practice (typically offered onsite in 3rd term)	2
PH.340.692	Prisons, Public Health, and Human Rights (typically offered onsite in 4th term)	2
PH.340.698	Methods For Assessing Power, Privilege, and Public Health in the United States (typically offered onsite in 4th term, every other year)	4
PH.340.705	Advanced Seminar in Social Epidemiology (typically offered onsite in 3rd term every other year)	4
PH.380.604	Life Course Perspectives on Health (typically offered online in 1st and 2nd terms)	4
PH.380.624	Maternal and Child Health Legislation and Programs (typically offered online in 2nd term)	4
PH.380.635	Urban Health in Contemporary America (typically offered onsite in 4th term)	4
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (typically offered onsite in 3rd term)	3
PH.380.666	Women's Health (typically offered onsite in 3rd term)	3
PH.380.667	Women's Health Policy (typically offered onsite in 4th term)	3
PH.380.756	Poverty, Economic Development, and Health (typically offered onsite in 2nd term every other year)	4
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (typically offered online in 1st term)	4
PH.410.605	Fundamental Tools for Promoting Health Equity (typically offered online in 2nd term)	3
PH.410.606	Local and Global Best Practices in Health Equity Research Methods (typically offered online in 4th term)	4
PH.410.610	Housing Insecurity and Health (typically offered onsite in 4th term)	3
PH.410.611	Under Pressure: Health, Wealth & Poverty (typically offered onsite in 4th term)	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs (typically offered onsite in 4th term)	3
PH.410.631	Introduction to Community-Based Participatory Research: Principles and Methods (typically offered onsite in 2nd term)	3
PH.410.635	Applications of innovative Methods in Local and Global Health Equity Research (typically offered online in term 3 and onsite in Summer Institute)	4
PH.410.660	Latino Health: Measures and Predictors (typically offered onsite in 4th term)	3
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (typically offered onsite in 3rd term)	3
PH.410.861	Graduate Seminar in Community-Based Research (typically offered onsite in 2nd term)	1
Students may also elect to complete a specials studies course, with permission from Dr. Roland Thorpe		

Health Education, Certificate

Health Education Certificate Program

EDUCATIONAL OBJECTIVES

Upon completion of this certificate program, certificate candidates will possess the knowledge and skills necessary to understand and modify the personal and environmental factors that influence health-related behaviors, and by doing so, impact the overall health of individuals and communities. Upon completion of the core courses of the certificate program, students will gain a broad understanding of health education principles, theories, and strategies, and will achieve the competencies considered central to effective health education. After completing core and elective courses, students will be able to:

1. Assess individual and community needs for health education;
2. Plan effective health education programs;
3. Implement health education programs;
4. Evaluate the effectiveness of health education programs;
5. Coordinate provisions of health education services;
6. Act as a resource person; and
7. Communicate health and health education needs, concerns and resources.

SPONSORING DEPARTMENT

Health, Behavior and Society

ADMISSION

Complete certificate program admissions and contact information is available on the Bloomberg School of Public Health certificate program page (https://publichealth.jhu.edu/academics/health-education-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. Any request to substitute a course that the faculty sponsors consider essential to meet the certificate program competencies must be given serious consideration. The student must propose the course to be substituted and present a rationale for the request. In no case will more than one substitution be permitted. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years. The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. The term may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses (9 credits required)		
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite 1st term and Winter Institute)	3
PH.410.630	Implementation and Sustainability of Community-Based Health Programs (typically offered onsite in 4th term)	3
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (typically offered online in 2nd term)	3
Elective Courses (9 credits required)		
PH.380.611	Fundamentals of Program Evaluation (typically offered onsite in 1st term and online in 3rd term)	4
PH.410.600	Fundamentals of Health, Behavior and Society (typically offered onsite in 1st term)	4
PH.410.610	Housing Insecurity and Health (typically offered onsite in 4th term)	3
PH.410.613	Psychosocial Factors in Health and Illness (typically offered onsite in 3rd term)	3
PH.410.615	Research Design in the Social and Behavioral Sciences (typically offered onsite in 2nd term)	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4

Health Finance and Management, Certificate

Health Finance and Management Certificate Program

NOTE: This certificate program may be completed entirely online!

OVERVIEW

The goal of this certificate program is to facilitate the development of knowledge and skills in the areas of management, finance and leadership within healthcare. The primary focus of the program is the U.S. health system. This certificate program can be completed online.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program in Health Finance and Management, students will be able to:

1. Describe the organization and primary financial systems of the U.S. healthcare delivery system
2. Describe current key policy and programmatic health care payment methodologies, and the impact of evolving value-based models.
3. Describe and apply key models (e.g. ACO) to optimize health care organization and delivery.
4. Evaluate various models of management and leadership, and leadership traits and characteristics necessary to meet the needs of complex and collaborative health care delivery systems.
5. Discuss challenges and opportunities related to the use and integration of data, data-gathering, and other aspects of health care information systems to improve efficiency and effectiveness within the health care delivery system.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/health-finance-and-management-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Department

Health Policy and Management (https://www.jhsph.edu/departments/health-policy-and-management/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

A minimum of 18 credits of coursework is required. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements.The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether the instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses		
PH.312.603	Fundamentals of Budgeting and Financial Management (typically offered online in 1st, 2nd, 3rd, 4th and Summer Institute terms)	3
In addition to 312.603, either 221.602 or 312.600 must be completed as well		
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries (typically offered onsite in 1st term)	3
PH.312.600	Managing Health Services Organizations (typically offered online in 3rd term)	4
Elective Courses		
PH.221.608	Managing Non-Governmental Organizations in the Health Sector (typically offered onsite in 3rd term)	3
PH.221.652	Financing Health Systems for Universal Health Coverage (typically offered onsite in 3rd term)	3
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches (typically offered online in 2nd term)	3
PH.221.722	Quality Assurance Management Methods for Developing Countries (typically offered onsite and online in 1st term)	4
PH.300.651	Introduction to the U.S. Healthcare System (typically offered online in 1st and 4th terms)	4
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs (typically offered online in 1st term)	3
PH.309.620	Managed Care and Health insurance (typically offered onsite in 3rd term)	3
PH.309.631	Population Health Informatics (typically offered online in 2nd term)	3
PH.309.730	Patient Safety and Medical Errors (typically offered online in 3rd term)	3
PH.311.615	Quality of Medical Care (typically offered online in 1st term)	3
PH.312.604	Quantitative Tools for Managers (typically offered onsite in 3rd term and Summer Institute)	3
PH.312.617	Fundamentals of Financial Accounting (typically offered online in 1st and Summer terms)	3
PH.312.621	Strategic Planning (typically offered onsite in 3rd term and Summer Institute)	3
PH.312.630	Healthcare Financial Management (typically offered online in 1st term)	3
PH.312.635	Human Resources in Health Organizations (typically offered onsite in 4th term)	2
PH.312.655	Organizational Behavior and Management (typically offered online in 4th term)	2
PH.312.670	Negotiation in Health Care Settings (typically offered onsite in 4th term)	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research (typically offered online in 3rd term)	3
PH.312.700	Leading Organizations (typically offered online in 1st term and Summer Institute, and onsite in 1st term)	3
PH.312.701	Strategic Leadership and Decision Making (typically offered onsite and online in 2nd term)	3
PH.312.702	Leading Change: Building and Empowering Teams (typically offered onsite and online in 3rd term)	3
PH.312.703	Learning Organizations & Knowledge Management (typically offered onsite and online in 4th term)	3
PH.313.643	Health Economics (typically offered in 2nd term)	3
One of the following may be selected as an elective, but not both:		
PH.312.678	Introduction to Healthcare Quality and Patient Safety: A Management Perspective (typically offered onsite in 3rd term)	2
PH.309.731	Patient Safety in Developing Countries (typically offered in Summer Institute)	2

Healthcare Epidemiology and Infection Prevention and Control, Certificate

Healthcare Epidemiology and Infection Prevention and Control

OVERVIEW

The certificate is designed for masters and doctoral students at The Johns Hopkins University and junior and mid-level professionals with an interest in gaining exposure to the expertise and skills utilized by healthcare epidemiologists and infection preventionists. Healthcare epidemiologists and infection preventionists aim to prevent and control healthcare-associated infections, antimicrobial resistant and epidemiologically significant organisms and other adverse outcomes in the healthcare setting by translating research into practice.

Their expertise and activities include epidemiologic and laboratory investigation, surveillance for infections and antimicrobial resistant or significant organisms, policy development and implementation, education and information dissemination, implementation of interventions to prevent transmission or infectious complications, cost-benefit analyses of interventions, and patient-oriented research to inform and improve the science of healthcare epidemiology and infection control and to improve quality-of-care.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program, students will be able to:

1. Demonstrate use and mastery of specific methods relating to hospital epidemiology including surveillance (traditional and computerized), outbreak management, communicable diseases, antibiotic management and resistance, occupational health, quality and performance improvement, patient safety, and ethical considerations.
2. Utilize clinical research study designs as applied to healthcare epidemiology research including, outcomes measurement, risk factor assessment, semi-quantitative methods, survey methods, and qualitative research.
3. Discuss relevant thematic topics including isolation precautions and hand hygiene, infection control in special populations, healthcare system preparedness, and environmental aspects of infection control.
4. Work within groups to design studies, collect data, and effectively communicate results to clinicians and researchers from various disciplines through framing problems scientifically, determining preferred research methods, designing appropriate data collection methods, performing statistical analyses, and interpreting findings.

Sponsoring Department

Department of Epidemiology (https://www.jhsph.edu/departments/epidemiology/)

ADMISSIONS

Contact information and complete certificate admissions information is available on the certificate program (https://publichealth.jhu.edu/academics/healthcare-epidemiology-and-infection-prevention-and-control-certificate-program/) page on the JHSPH website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements.The student's transcripts will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (http://www.jhsph.edu/courses/) to confirm when courses are offered, and students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this onsite noncredit course in their first term of study)	
Required courses: Students must complete the following required courses (see footnote)		
Introductory Epidemiology Requirement: Students must complete either 340.601 or 340.721		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer and Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered onsite in 1st term, and online in 1st, 3rd, Summer and Summer Institute)	5
Students must complete the following required course:		
PH.340.641	Healthcare Epidemiology (typically offered onsite in 2nd term)	4
Required Core Courses: Students must complete at least two of the following core courses		
PH.340.612	Epidemiologic Basis for Tuberculosis Control (typically offered onsite in 1st term, and online in 3rd and Summer Institute)	2
PH.340.627	Epidemiology of Infectious Diseases (typically offered onsite in 2nd term)	4
PH.340.653	Epidemiologic Inference in Outbreak Investigations (typically offered onsite in 1st term)	3
Elective Courses: Students must complete the 18 credit requirement through the following elective courses		
PH.182.625	Principles of Occupational and Environmental Hygiene (typically offered onsite in 2nd term)	4
PH.221.637	Health Information Systems (typically offered online in 2nd term)	3
PH.306.663	Legal and Ethical Issues in Health Services Management (typically offered onsite in 4th term)	3
PH.309.730	Patient Safety and Medical Errors (typically offered onsite in 3rd term)	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4
PH.410.755	Health Communication Programs (typically offered online in 3rd term)	4

Footnote:

JHSPH degree students who earn at least a B grade in one introductory epidemiology and one introductory biostatistics course may use these credits to fulfill the introductory epidemiology requirement; however, they will only be allowed to apply six credits from these courses toward the certificate. They must complete the 4-credit Healthcare Epidemiology course and at least 8 credits of core and elective courses.

Non-degree students may waive the introductory epidemiology requirement by providing a transcript from another institution demonstrating successful completion of at least one graduate level course in epidemiology and one in biostatistics. These students will still be required to complete the Healthcare Epidemiology course (4 credit units) and at least 14 credit units of core and elective courses.

Humane Sciences and Toxicology Policy, Certificate

Humane Sciences and Toxicology Policy Certificate Program

OVERVIEW

The certificate program will introduce, and explain the application of, the “3Rs,” (reduction, replacement and refinement), which are the guiding principles of humane science as well as demonstrate how the use of humane science principles in biomedical research can lead to more robust scientific methodology and knowledge. The program’s course of study covers the scientific principles needed to appreciate humane science and identify and evaluate its implications in biomedical research and public health policy. Persons completing the certificate program will be well equipped to translate new toxicological knowledge into scientifically credible product safety evaluations and hazard assessments and apply these concepts to environmental health decision making.

EDUCATIONAL OBJECTIVES

The educational objectives of this certificate program are:

1. To provide students with an understanding of the principles that govern the relationship between biomedical researchers and laboratory animals;
2. To demonstrate the application of transgenic, in-vitro, computational, non-mammalian and non-animal research in toxicology; and
3. To illustrate the ways in which humane science and alternatives are used in setting regulatory standards and making environmental health policy decisions.

ADMISSIONS

Contact information and complete certificate program admission information is available on the certificate program page (https://publichealth.jhu.edu/academics/humane-sciences-and-toxicology-policy-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION:

The certificate program requires a minimum of 19 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the program must be completed within three years.

Students with prior training in toxicology or biostatistics may contact one of the Faculty Sponsors to discuss the possibility of substituting other coursework for either 187.610 "Public Health Toxicology" OR 140.615 "Statistics for Laboratory Scientists." Such students must complete a minimum of 18 credits of certificate program coursework.

Students should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student’s transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered, and students should check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Courses (students must complete all of the courses listed below but may choose to take either 180.601 or 180.609, not both).		
PH.180.601	Environmental Health (typically offered onsite in Summer and Summer Institute and online in 3rd term)	5
or		
PH.180.609	Principles of Environmental Health (typically offered onsite in 1st term)	4
PH.140.615	Statistics for Laboratory Scientists I (typically offered onsite in 3rd term)	4
PH.180.638	Animals in Research: Ethics (typically offered online in 4th term)	1
PH.187.610	Public Health Toxicology (typically offered onsite in 1st term and online in 2nd term)	4
PH.187.625	Animals in Research: Law, Policy, and Humane Sciences (typically offered online in 4th term)	3
PH.187.650	Alternative Methods in Animal Testing (typically offered online in 4th term)	3

Humanitarian Health, Certificate

Humanitarian Health Certificate Program

EDUCATIONAL OBJECTIVES

This certificate program focuses on humanitarian assistance in the international health context. The program is a major educational activity of the Center for Humanitarian Health. The Center receives technical assistance from the International Committee of the Red Cross, the Pan American Health Organization, the UN High Commission for Refugees, and various humanitarian agencies and organizations. Graduates will be able to:

1. Assess an emergency situation to identify immediate and longer-term assistance needs and additional resources required.
2. Identify specific health (including psychosocial and mental health) needs of populations affected; plan and implement activities to meet these needs, and monitor and evaluate the effectiveness of assistance provided.
3. Understand the principles of organization and administration of relief services in collaboration and cooperation with local and international non-governmental organizations, host governments, military forces and United Nations agencies.
4. Use epidemiologic skills to collect, analyze, and use information about natural and man-made disasters.

5. Plan and implement disaster preparedness, response and mitigation activities.
6. Identify disease outbreaks and to know how to contain them in a timely manner.
7. Know the public health consequences of natural disasters and their management.
8. Outline the basic requirements for a food and nutrition program for a disaster-affected population.
9. Use the basic principles of International Humanitarian Law (IHL) and human rights principles to understand the protection needs of displaced populations and to identify and document abuses.
10. Have a basic understanding of the political environment and use this to explain the various forces that affect population displacement.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/humanitarian-health-certificate-program/)on the Bloomberg School of Public Health website.

Sponsoring Department

International Health (https://www.jhsph.edu/departments/international-health/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student; however, the certificate program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar. In addition, students completing the certificate must submit this form via e-mail to the certificate faculty sponsor.

COURSE OF STUDY

Students should check the course directory (https://www.jhsph.edu/courses/) to confirm when the course is offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses		
PH.221.613	Introduction to Humanitarian Emergencies (typically offered onsite in 1st term)	3
PH.221.639	Health Care in Humanitarian Emergencies (typically offered online in 1st term and onsite in 2nd term)	3
PH.221.695	Seminar in Humanitarian Health (typically offered onsite in 1st, 2nd, and 3rd terms)	0.5
Core Elective Courses: Students must take at least one course (EITHER 221.611 OR 604.721 may be taken, but not both)		
PH.221.611	Food Security and Nutrition in Humanitarian Emergencies (typically offered onsite in 4th term)	2
PH.221.641	Measurement Methods in Humanitarian Emergencies (typically offered onsite in 2nd term)	2
PH.604.641	Disaster Preparedness (typically offered online in 2nd term)	2
PH.604.721	Securing Food Assistance and Nutrition in Humanitarian Emergencies (typically offered online in 2nd term)	2
Other Elective Courses: Students must select from the courses listed below to complete a total of 18 certificate credits. Courses are organized in tracks, but students may opt to select course from a single track to develop a more focused topical or methodological area of expertise, or may select courses from across tracks, as desired.		
Health Track		
PH.180.623	Infectious Disease Threats to Global Health Security (typically offered online in 3rd term)	3
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (typically offered onsite in 2nd term)	4
PH.221.643	Armed Conflict and Health (typically offered onsite in 3rd term)	2
PH.221.661	Project Development for Primary Health Care in Developing Countries (typically offered onsite in 4th term)	4
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (typically offered onsite in 3rd term)	3
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (typically offered online in 4th term)	3
Mental Health Track		
PH.221.634	Stress Management for Relief Workers (typically offered onsite in 2nd term)	2
PH.221.642	Mental Health Aspects of Disaster: Public Health Preparedness and Response (typically offered onsite in 2nd term)	2
PH.224.694	Mental Health Intervention Programming in Low and Middle-Income Countries (typically offered onsite in 3rd term)	3
PH.330.620	Qualitative and Quantitative Methods for Mental Health and Psychosocial Research in Low Resource Settings (typically offered onsite and online in 2nd term)	3
PH.330.680	Promoting Mental Health and Preventing Mental Disorders in Low- and Middle-income Countries (typically offered online in 4th term)	3
Nutrition Track		
PH.222.649	International Nutrition (typically offered onsite in 4th term)	3

Water and Sanitation Track (EITHER 221.623 OR 604.651 may be counted towards the certificate program, but not both)		
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health (typically offered onsite in 3rd term)	2
PH.221.623	Water, Sanitation and Hygiene in Humanitarian Emergencies (typically offered online in 3rd term)	2
PH.604.651	Introduction of Water, Sanitation and Hygiene in Emergencies (typically offered online in 3rd term)	2
Climate Change and Preparedness Track		
PH.180.607	Climate Change and Public Health (typically offered onsite in 4th term and online in Summer term)	3
PH.180.611	The Global Environment, Climate Change, and Public Health (typically offered onsite in 1st term)	4
PH.180.653	Climate Change: Avoiding Conflict and Improving Public Health (typically offered online in 4th term)	3
Human Rights Track		
PH.340.639	Assessing Epidemiologic Impact of Human Rights Violations (typically offered onsite in 4th term)	2
PH.340.683	Human Rights in Public Health Practice (typically offered onsite in 3rd term)	2
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (typically offered onsite in 3rd term)	3
Management and Leadership Track		
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries (typically offered onsite in 3rd term)	3
PH.221.608	Managing Non-Governmental Organizations in the Health Sector (typically offered onsite in 3rd term)	3
PH.221.614	International Political Science for Ph Practitioners (typically offered onsite in 2nd term)	2
PH.221.712	Leadership & Management in Humanitarian Health (typically offered online in 2nd term)	2
PH.312.700	Leading Organizations (typically offered onsite in 1st and Summer Institute terms and online in 1st and Summer Institute terms)	3
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries (typically offered onsite in 2nd term)	4
Qualitative Methods Track		
PH.223.664	Design and Conduct of Community Trials (typically offered onsite in 3rd term)	4
PH.340.770	Public Health Surveillance (typically offered onsite in 2nd term and online in 3rd term and Summer Institute)	3
Spatial Analysis Track		
PH.340.696	Spatial Analysis I: ArcGIS (typically offered onsite in 1st term)	3

Injury and Violence Prevention, Certificate

Injury and Violence Prevention

OVERVIEW

Injury encompasses the undesirable consequences of a wide array of events, including crashes during transport, drowning, poisoning, falls, fires and burns, and intentional causes such as self-harm, homicide, and assault. An increasing recognition of the personal and societal costs of injury has resulted in the establishment of offices and programs especially dedicated to the prevention and control of injury within state and local health departments, as well as at the national level. There is a pressing need for public health professionals with specialized training in the prevention, analysis, and control of intentional and unintentional injuries.

EDUCATIONAL OBJECTIVES

Upon completion of the Certificate in Injury and Violence Prevention, consistent with the core competencies for the field, the student will:

1. Be able to describe and explain the importance of injury and/or violence as a major public health problem;
2. Be able to access, interpret, use, and present injury and/or violence data;
3. Be able to use problem-solving methodology to identify and develop appropriate intervention strategies;
4. Be able to evaluate injury and/or violence prevention activities;
5. Have demonstrated ability to develop, synthesize, and apply this knowledge by compiling an integrated program plan to address an injury and/or problem of interest to them;
6. Be able to stimulate change related to injury and/or violence prevention through policy, enforcement, advocacy, and education;
7. Be able to disseminate information on injury and/or violence prevention to the community, policymakers, leaders, and other key stakeholders, through diverse communication networks;
8. Have acquired in-depth knowledge, skills, and best practices necessary to address at least one specific injury and/or violence prevention topic and one type of intervention strategy.

Admissions

Contact information and complete information about applying to the certificate program is available on the certificate program page (https://publichealth.jhu.edu/academics/injury-and-violence-prevention-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Department

Health Policy and Management (http://www.jhsph.edu/dept/hpm/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

In addition to the 3 required courses, students must complete at least 2 courses in a specific content area of injury and at least 2 courses related to 1 or more injury control strategies. Except for the Graduate Seminar, all required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. Students must successfully complete at least 20 credit hours among the required and elective courses.

The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered, and should also check pre-requisites and whether instructors consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses:		
PH.305.610	Issues in Injury and Violence Prevention (typically offered onsite in 1st term)	2
or		
PH.305.670	Principles and Practice of Injury Prevention (typically offered onsite in Summer Institute)	3
or		
PH.305.865	Advanced Seminar in Injury Prevention (typically offered onsite in Summer Institute)	2
In addition to one of the courses listed above, students are required to complete the following course:		
PH.305.861	Graduate Seminar in Injury Research and Policy (students are required to complete 4 terms of this course; typically offered onsite and virtual in 1st, 2nd, 3rd, 4th term)	1
Students must complete two of these courses on specific injury problems		
PH.221.612	Confronting the Burden of Injuries: A Global Perspective (typically offered onsite and online in 2nd term)	3
PH.301.627	Understanding and Preventing Violence (typically offered onsite and online in 2nd term)	3
PH.301.650	Crafting Effective Solutions to Gun Violence: Problem Solving Seminar (typically offered online in 4th term)	3
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
PH.305.630	Transportation Policy, Equity and Health (typically offered online in 4th term)	2
PH.330.640	Childhood Victimization: A Public Health Perspective (typically offered online in 4th term)	3
PH.330.674	Suicide As A Public Health Problem (typically offered onsite in 3rd and 4th terms and online in 4th term)	3
Students must complete two of the courses listed below in injury control methods:		
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century (typically offered online in 2nd term)	3
PH.301.645	Health Advocacy (typically offered online in 2nd term and onsite in 4th term)	3
PH.306.650	Public Health and the Law (typically offered onsite in 3rd term)	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 1st and 3rd terms)	4
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute and online in 1st term)	3
PH.410.625	Injury and Violence Prevention: Behavior Change Strategies (typically offered onsite in 4th term)	2
PH.410.630	Implementation and Sustainability of Community-Based Health Programs (typically offered onsite in 4th term)	3
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (typically offered online in 2nd term)	3
PH.410.663	Media Advocacy and Public Health: Theory and Practice (typically offered onsite in 4th term)	3
Recommended courses:		
PH.221.631	Evaluation Methods for Injury Interventions (typically offered online in 3rd term)	3
PH.300.713	Research and Evaluation Methods for Health Policy (This course only open to degree seeking MSPH Students in Health Policy; typically offered onsite in 3rd term)	3
PH.305.684	Health Impact Assessment (typically offered online in 3rd term)	3

International Healthcare Management and Leadership, Certificate

International Healthcare Management and Leadership Certificate Program

Please note: Certificate program may be completed entirely online

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program in International Healthcare Management and Leadership the individual will be able to:

1. Evaluate and interpret major themes, issues and trends in global healthcare
2. Apply principles and practices of financial analysis and management in the healthcare field

3. Identify HIT tools and methods for evaluating the quality and effectiveness of health services and population health management
4. Utilize principles of strategic management and competitive analyses to support strategy development for health care organizations
5. Use evidence-based principles to analyze business issues and manage complex operations in international healthcare setting.

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/international-healthcare-management-and-leadership-certificate-program/) on the Bloomberg School of Public Health website.

Requirements for successful completion

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Please note: Certificate program can be completed entirely online

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must complete the following 18 credits of coursework		
PH.221.624	Urban Health in Developing Countries (typically offered online in 4th term)	3
PH.221.646	Health Systems in Low and Middle income Countries (typically offered onsite and online in 2nd term)	3
PH.309.631	Population Health Informatics (typically offered onsite in 2nd term)	3
PH.312.603	Fundamentals of Budgeting and Financial Management (typically offered online in 1st, 2nd, 3rd, 4th, and onsite in Summer Institute)	3
PH.312.700	Leading Organizations (typically offered online in 1st term and online in Summer Institute)	3
PH.312.621	Strategic Planning (typically offered onsite in 1st and 4th terms and Winter and Summer Institutes)	3
Optional Electives, beyond the required 18-credit minimum		
PH.221.722	Quality Assurance Management Methods for Developing Countries (typically offered onsite and online in 1st term)	4
PH.312.604	Quantitative Tools for Managers (typically offered onsite in 3rd term and Summer Institute)	3
PH.312.633	Health Management Information Systems (typically offered online in 3rd term)	3
PH.312.670	Negotiation in Health Care Settings (typically offered onsite in Summer Institute)	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4

Leadership for Public Health and Healthcare, Certificate

Leadership for Public Health and Healthcare

Please Note: Certificate program may be completed entirely online!

OVERVIEW

The Leadership for Public Health and Healthcare certificate program provides evidence-informed coursework specific to leading change through teams and collaboration, strategic decision-making, and the ability to foster a learning environment. This certificate program is intended for public health and healthcare professionals who seek to enhance their skills and confidence to inspire, motivate, and influence change. Graduates of the certificate program will gain requisite skills enabling them to be more effective change agents and leaders within networks focused on improving health and healthcare delivery.

The program can be completed completely online and is designed for full-time students and part-time working professionals who wish to build or enhance knowledge and practice essential leadership skills for the 21st century.

EDUCATIONAL OBJECTIVES

The Leadership Certificate program will prepare current and future health practitioners, researchers, policymakers, and scholars to create ethical and diverse organizational cultures and craft and communicate a shared vision and values to inspire and motivate others to work effectively in understanding the impact of public health issues and implementing evidence-informed, sustainable solutions. Graduates of the Leadership Certificate will be equipped to lead the responsible development of new knowledge and new ways of saving lives and improving health to further progress across core disciplines in science and technology, and public health and medicine in Maryland, and beyond.

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/leadership-for-public-health-and-healthcare-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

Please note: Certificate program may be completed entirely online

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check prerequisites and whether instructor consent is required

Code	Title	Credits
Required Courses		
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
PH.312.700	Leading Organizations (typically offered online and onsite in 1st term)	3
PH.312.701	Strategic Leadership and Decision Making (typically offered online and onsite in 2nd term)	3
PH.312.702	Leading Change: Building and Empowering Teams (typically offered online and onsite in 3rd term)	3
PH.312.703	Learning Organizations & Knowledge Management (typically offered online and onsite in 4th term)	3
Elective Courses- Students Should Choose At Least 2 Courses		
PH.221.602	Applications in Managing Health Organizations in Low and Middle income Countries (typically offered online in 1st term)	3
PH.221.608	Managing Non-Governmental Organizations in the Health Sector (typically offered onsite in 3rd term)	3
PH.221.635	Global Advances in Community-Oriented Primary Health Care (typically offered online in 3rd term)	3
PH.221.639	Health Care in Humanitarian Emergencies (typically offered online in 1st term)	3
PH.221.661	Project Development for Primary Health Care in Developing Countries (typically offered onsite in 1st term)	4
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century (typically offered online in 2nd term)	3
PH.305.607	Public Health Practice (typically offered onsite in 4th term and online in 2nd term)	4
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs (typically offered online in 2nd term)	3
PH.312.600	Managing Health Services Organizations (typically offered onsite in 3rd term)	4
PH.318.625	Management of Nonprofit Organizations (typically offered onsite in 4th term)	3
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries (typically offered online in 2nd term)	4

Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) Public Health, Certificate

Lesbian, Gay, Bisexual, Transgender, and Queer (LGBTQ) Public Health Certificate Program

OVERVIEW

Globally, LGBTQ (Lesbian, Gay, Bisexual, Transgender, and Queer)-focused public health is a growing field of study, but there is a dearth of training opportunities specifically related to social and behavioral factors. The addition of the Post-Baccalaureate Certificate Program in LGBTQ Public Health helps fulfill the School's strategic planning goal of strengthening and expanding diversity in terms of training in the School, and thus continuing as a leading institution for social and behavioral training and research in public health.

EDUCATIONAL OBJECTIVES

Upon successful completion of the certificate program, students will be able to:

1. Assess what is known and unknown in LGBTQ health research and critically read public health literature related to LGBTQ health.
2. Describe a range of psychological and sociological conceptualizations of LGBTQ health, health behavior, stigma, and illness in a cross-cultural context, and integrate these into culturally competent skills and attitudes.
3. Apply an ecological perspective to LGBTQ health, linking individual, social, community and environmental causes of disease and LGBTQ community health through theory and research.
4. Locate and evaluate health disparities both within and facing LGBTQ populations in the context of social behavioral, socio-ecologic, and other theoretical frameworks.
5. Analyze changes in political climates and how legal, policy and structural changes affect the translation of research findings regarding the health of LGBTQ populations.
6. Integrate an ecological perspective on LGBTQ health into the design of effective interventions, translating research findings through communications, advocacy, health policy and the law, to reduce health problems and disparities in LGBTQ populations.

SPONSORING DEPARTMENT

Health, Behavior and Society (https://www.jhsph.edu/departments/health-behavior-and-society/)

ADMISSIONS

Contact information and complete admissions information is available on the Bloomberg School of Public Health certificate program page (https://publichealth.jhu.edu/academics/lesbian-gay-bisexual-transgender-and-queer-lgbtq-public-health-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. Any request to substitute a course that the faculty sponsors consider essential to meet the certificate program competencies must be given serious consideration. The student must propose the course to be substituted and present a rationale for the request. In no case will more than one substitution be permitted. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years. The student should review the section of the website that addresses completion (https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.jhsph.edu%2Facademics%2Fcertificate-programs%2FJHSPH_certificate_completion.html&data=04%7C01%7Cfturner4%40jhu.edu%7C2ac21a71fd474409a04d08d908a977a5%7C9fa4f438b1e6473b803f86f8a%7C0%7C0%7C637550346214143948%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1ha%7C1000&sdata=mszYnLXcg6%2FcGE4ven%2F8JXG%2FPZeeduIGpU%2BBiyLUdHg%3D&reserved=0)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://nam02.safelinks.protection.outlook.com/?url=http%3A%2F%2Fwww.jhsph.edu%2Fcourses&data=04%7C01%7Cfturner4%40jhu.edu%7C2ac21a71fd474409a04d08d908a977a5%7C9fa4f438b1e6473b803f86f8aedf0dec%7C0%7C0%7C637550346214153940%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1ha%7C1000&sdata=Zo47nrmABQYDxXXzB%2BY5R%2BoJnofcd2jLYZ1hlQwKUNg%3D&reserved=0) to confirm when courses are offered. The term may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Note: Students who started the certificate program prior to AY21-22 may count 410.657 Communication Strategies for Sexual Risk Reduction towards their total credits, since it was included in the curriculum before that year.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Core Courses (Students must complete 3 out of the 4 courses, for a minimum of 9 credits):		
PH.306.660	Legal and Public Health Issues in the Regulation of intimacy (typically offered onsite in 4th term)	3
PH.306.670	Issues in LGBTQ Health Policy (typically offered onsite in 2nd term)	3
PH.410.681	Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic (typically offered onsite in 3rd term)	3
PH.410.683	Global Perspectives on LGBT Health (typically offered onsite in 3rd term)	3
PH.340.629	The Epidemiology of LGBTQ Health (typically offered onsite in 2nd term)	3
Key Area 1: Develop LGBTQ cultural competency skills and attitudes (minimum of 2 credits)		
PH.221.621	Gender and Health: Foundational Theories and Applications	2
PH.224.689	Health Behavior Change At the Individual, Household and Community Levels (typically offered onsite in 2nd term)	4
PH.301.615	Seminar in Health Disparities (typically offered onsite in 2nd term)	3
PH.410.652	Interpersonal Influence in Medical Care (typically offered onsite in 4th term)	2
PH.410.864	Critical Issues in Health Disparities (typically offered onsite in 1st, 2nd, 3rd terms)	1
Key Area 2: Linking social and environmental causes of disease and LGBTQ community health through theory and research (minimum 2 credits required):		
PH.221.701	Applications to Gender Analysis Within Health Research and Interventions (typically offered onsite in 2nd term)	2
PH.224.692	Methods in Formative Research and Human Centered Design for Intervention Development (typically offered online in 3rd term)	4
PH.305.684	Health Impact Assessment (typically offered onsite in 3rd term)	3
PH.306.625	Ethical Issues in Health Policy: Public Health and Health Care (typically offered onsite in 2nd term)	3
PH.330.674	Suicide As A Public Health Problem (typically offered onsite in 3rd term)	3
PH.340.627	Epidemiology of Infectious Diseases (typically offered onsite in 2nd term)	4
PH.340.639	Assessing Epidemiologic Impact of Human Rights Violations (typically offered onsite in 4th term)	2
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS (typically offered onsite in 1st term and online in 2nd term)	4
PH.340.666	Foundations of Social Epidemiology (typically offered onsite in 2nd term and online in Summer Institutes)	3
PH.340.683	Human Rights in Public Health Practice (typically offered onsite in 3rd term)	2
PH.380.663	Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies (typically offered onsite in 3rd term)	3
PH.410.612	Sociological Perspectives on Health (typically offered onsite in 1st term)	3
PH.410.613	Psychosocial Factors in Health and Illness (typically offered onsite in 3rd term)	3

PH.410.616	Social and Behavioral Aspects of Public Health (typically offered onsite in Summer Institutes)	4
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute)	3
Key Area 3: Community dimensions of practice skills and attitudes to include communications, advocacy, health policy and the law (minimum of 2 credits)		
PH.301.627	Understanding and Preventing Violence (typically offered onsite in 2nd term)	3
PH.301.692	The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health (typically offered onsite in Winter Institute)	3
PH.308.610	The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life (typically offered in the Fall Institute in Barcelona, Spain)	3
PH.380.623	Adolescent Health and Development (typically offered online in 3rd term)	3
PH.380.725	The Social Context of Adolescent Health and Development (typically offered onsite in 4th term)	3
PH.380.761	Sexually Transmitted Infections in Public Health Practice (typically offered online in 4th term)	4
PH.410.668	Policy Interventions for Health Behavior Change (typically offered onsite in 2nd term)	3
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy (typically offered onsite in 3rd term and online in 3rd and Summer terms)	3
PH.410.677	Theory and Practice in Campaigning and Organizing for Public Health I (typically offered onsite in 3rd term)	4
PH.410.678	Theory and Practice in Campaigning and Organizing for Public Health II (typically offered onsite in 4th term)	4
PH.410.721	Translating Research into Public Health Programs and Policy (typically offered onsite in 4th term)	3

Maternal and Child Health, Certificate

Maternal and Child Health Certificate Program

Upon completion of the required courses of the Maternal and Child Health certificate program, individuals will gain a broad understanding of the field that focuses on the health and welfare of women and children. Competencies addressed include the following:

1. Understanding of the biological, social, and behavioral basis for a MCH program;
2. Knowledge of the historical development of the field of MCH;
3. Knowledge of significant past and current national legislative mandates relative to MCH, including the structure and roles of legislative and administrative bodies at the national, state, and local levels;
4. Ability to define and describe the MCH population in a community;
5. Understanding of the normal patterns of human growth and development;
6. Knowledge of the organization and financing of health systems in the U.S;
7. Understanding of the design, implementation and evaluation of MCH programs domestically and internationally;
8. Ability to identify essential gaps in existing programs serving mothers and children.

SPONSORING DEPARTMENT

Population, Family and Reproductive Health (https://www.jhsph.edu/departments/population-family-and-reproductive-health/)

ADMISSIONS

Complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/maternal-and-child-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. The term and time may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses (8 credits)		
PH.380.604	Life Course Perspectives on Health (typically offered onsite in 1st term and online in 2nd term)	4
PH.380.624	Maternal and Child Health Legislation and Programs (typically offered online and onsite in 2nd term)	4
Elective Courses: Students must take 10 total elective credits.Courses must include at least 2 of the 3 content areas represented by Groups A,B, and C		
Group A (Maternal, Fetal, and Perinatal Health):		

PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (typically offered onsite in 2nd term)	4
PH.380.661	Clinical Aspects of Maternal and Newborn Health (typically offered onsite in 3rd time)	3
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (typically offered onsite in 2nd term)	4
PH.380.664	Reproductive and Perinatal Epidemiology (typically offered onsite in 4th term)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (typically offered online in 4th term)	3
Group B (Child Health):		
PH.223.663	Infectious Diseases and Child Survival (typically offered onsite in 3rd term)	3
PH.380.616	Child Health Epidemiology (typically offered onsite in 4th term)	3
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (typically offered onsite in 3rd term)	3
PH.380.640	Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth (typically offered onsite in 3rd term)	3
PH.380.642	Child Health and Development (typically offered online in 2nd term)	3
PH.380.744	Nutrition and Growth in Maternal and Child Health (typically offered online in 3rd term)	3
Group C (Adolescent Health):		
PH.380.623	Adolescent Health and Development (typically offered online in 3rd term)	3
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (typically offered onsite in 2nd term)	3
PH.380.721	Schools and Health (typically offered onsite in 2nd term)	3
PH.380.725	The Social Context of Adolescent Health and Development (typically offered onsite in 4th term)	3
PH.380.747	International Adolescent Health (typically offered online in 4th term)	3
Group D (Additional Courses to Consider)		
PH.223.686	Child and Public Health in the Tropics (typically offered onsite in Summer and Winter Institutes)	4
PH.330.640	Childhood Victimization: A Public Health Perspective (typically offered onsite in 4th term)	3
PH.330.646	Autism Spectrum Disorder in Public Health (typically offered online in Summer Institute)	2
PH.380.625	Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being (typically offered onsite in 3rd term)	3
PH.380.665	Family Planning Policies and Programs (typically offered onsite in 3rd term)	4
PH.380.666	Women's Health (typically offered onsite in 3rd term)	3
PH.380.667	Women's Health Policy (typically offered onsite in 4th term)	3
PH.380.742	Family - Health, Public Health and Policy (typically offered onsite in 2nd term)	3
PH.380.762	HIV Infection in Women, Children, and Adolescents (typically offered online in 4th term)	4
PH.380.768	Selected Topics in Women's Health and Women's Health Policy (typically offered onsite in 1st term)	4

Mental Health Policy, Economics and Services, Certificate

Mental Health Policy, Economics and Services Certificate Program

OVERVIEW

The certificate program introduces current issues in mental health policy including economic evaluation of mental and substance disorders and their treatments; access to mental health care treatments and utilization patterns; and mental health care financing, insurance, and delivery system issues in the U.S. The certificate program also strives to orient mental health policy, economics, and services training within the broader context of ongoing national health care debates.

It is open to Johns Hopkins University graduate students interested in policy, advocacy and research careers within the field of mental health and junior and mid-level public health professionals interested in expanding their knowledge base and expertise in mental health services and economics and related policy issues.

EDUCATIONAL OBJECTIVES

Students completing the certificate will gain specialized knowledge of policy issues and economics relevant to mental disorders and mental health services. They will be able to:

1. Describe the types, organization and financing of service systems for the mentally ill in the US; strengths and weaknesses of these service systems; and historical and recent trends in the mental health care delivery system
2. Discuss the major legal and political developments in mental health care in the US over the last century and their impact on the diagnosis, treatment, and prevention of mental health illnesses and associated disabilities and co-morbidities
3. Interpret and provide input into the conduct of program evaluations, including economic evaluation of mental health interventions, and the design and implementation of mental health services and policy
4. Use economic theory to predict changes in delivery of, access to, and quality of mental health services in response to changes in national and local policies and incentives
5. Interpret and provide input into the conduct of health systems research related to mental health interventions, services, and policy.

Sponsoring Department

Department of Mental Health (https://www.jhsph.edu/departments/mental-health/)

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/mental-health-policy-economics-and-services-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 19 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.
The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (http://www.jhsph.edu/courses/) to confirm when the courses are offered, and students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must complete the following required courses:		
PH.300.651	Introduction to the U.S. Healthcare System (typically offered onsite in 1st term and online in 4th term)	4
PH.313.790	Introduction to Economic Evaluation (typically offered online in 4th term)	3
PH.330.664	Introduction to Mental Health Services (typically offered onsite in 1st term)	3
PH.330.667	Mental Health and the Law (typically offered onsite in 3rd term)	3
Elective Courses: Students must complete at least two of the following elective courses		
PH.309.716	Advanced Methods in Health Services Research: Analysis (typically offered onsite in 1st term)	3
PH.313.641	Introduction to Health Economics (typically offered online in 3rd term)	3
PH.313.644	Intermediate Health Economics (typically offered onsite in 3rd term)	3
PH.330.603	Psychiatric Epidemiology (typically offered online in 2nd term)	3
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS (typically offered onsite and online in 2nd term)	3
PH.330.628	Gaps and Opportunities in Public Mental Health: A Systems Approach (typically offered onsite in 2nd term)	3

Pharmacoepidemiology and Drug Safety, Certificate

Pharmacoepidemiology and Drug Safety Certificate

OVERVIEW

The Certificate Program in Pharmacoepidemiology and Drug Safety is designed for masters and doctoral degree students enrolled at Johns Hopkins Bloomberg School of Public Health and in other Johns Hopkins University divisions, including the Schools of Medicine and Nursing and the Krieger School of Arts and Sciences. It is also available to early and mid-career public health professionals who wish to expand their knowledge of pharmacoepidemiology and drug safety to inform their work in academic, regulatory, or industry settings.

EDUCATIONAL OBJECTIVES

This certificate program will provide learners with core knowledge of pharmacoepidemiology and drug safety, as well as insights from these fields that can inform the work of policy-makers, patients, clinicians and payers seeking to improve the quality and safety of medication use. Upon completion of the core courses required for the Pharmacoepidemiology certificate program, participants will have the ability to:

1. Identify the processes of drug development;
2. Explain key requirements in biomedical product regulation and their rationale;
3. Participate in the design of studies, both observational and experimental, to assess the effectiveness and safety of drugs;
4. Employ techniques to study the patterns and determinants of drug utilization;
5. Apply methods appropriate to the surveillance for adverse drug events.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/pharmacoepidemiology-and-drug-safety-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 20 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework.

The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered, and students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must take one of the following Epidemiology Series* * Non-degree students may waive the Epidemiology series by providing a transcript from another institution demonstrating successful completion of at least one graduate level course in epidemiology and one in biostatistics. These students must still complete a minimum of 20 term credits of required, core, and elective certificate program coursework. * Bloomberg Degree Students who earn at least a B in one introductory epidemiology (340.601, 340.721 or 340.751) and one biostatistics course (140.611, 140.621, 140.651, or 140.751) may use these courses to fulfill the Epidemiology series requirement		
In Series A, students may choose between either 340.601 or 340.721, and they must also complete 340.722		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer and Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered online in 1st, 3rd, Summer and Summer Institute terms)	5
PH.340.722	Epidemiologic Inference in Public Health II (typically offered onsite in 2nd term, and online in terms 2 and 4)	4
In Series B, students must complete both 340.751 and 340.752		
PH.340.751	Epidemiologic Methods 1 (typically offered onsite in 1st term)	5
PH.340.752	Epidemiologic Methods 2 (typically offered onsite in 2nd term)	5
Required Courses: Students must also complete the following course:		
PH.340.645	Introduction to Clinical Trials (typically offered online in 2nd term)	3
Core Courses: Students must take at least 2 of the following 3 courses:		
PH.340.682	Pharmacoepidemiology Methods (typically offered online in 2nd term)	3
PH.340.684	Pharmacoepidemiology: Drug Utilization (typically offered onsite in 3rd term)	3
PH.390.631	Principles of Drug Development (typically offered onsite in 1st term)	2
Elective Courses: Students complete the 20 credit requirement by selecting among the following:		
PH.140.633	Biostatistics in Medical Product Regulation (typically offered onsite in 1st term)	2
PH.140.664	Causal Inference in Medicine and Public Health I (typically offered onsite in 3rd term and online in 4th term)	4
PH.140.665	Causal Inference in Medicine and Public Health II (typically offered onsite in 4th term)	3
PH.221.610	Pharmaceuticals Management for Under-Served Populations (typically offered onsite in 3rd term)	3
PH.308.630	U.S. Pharmaceutical Policy (typically offered onsite in 4th term)	3
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4
PH.317.610	Risk Policy, Management and Communication (typically offered onsite in 2nd term and online in 4th term)	3
PH.340.617	Pharmacoepidemiology (NB: This course is only appropriate for the certificate program if 340.682 was not taken. Course is typically offered onsite in Summer Institute.)	2
PH.340.722	Epidemiologic Inference in Public Health II (typically offered onsite in 2nd term, and online in terms 2 and 4)	4
PH.340.776	Study Design and Analysis for Causal Inference With Time-Varying Exposures (typically offered onsite in 4th term)	3
AS.410.651	Clinical Development of Drugs and Biologics	4

Population and Health, Certificate

Population and Health

OVERVIEW

The certificate is designed to serve two audiences—masters or doctoral degree students at The Johns Hopkins University and professionals—desiring to expand their knowledge of population dynamics and its linkages with public health issues and their ability to relate population-level concepts and measures of fertility, morbidity and mortality, and migration to health conditions. A population's health is shaped by fertility, mortality and migration patterns; and population numbers themselves provide the denominators of basic measures of public health, such as life expectancy, cause-specific mortality rates, and infection rates. Connecting a population and health perspective with public health epidemiology allows us to measure and assess the aggregate-level structure of and variation in health risks by age, sex, or other major factors and across the human life span.

EDUCATIONAL OBJECTIVES

Students completing the certificate will gain competency in;

1. Knowledge of the components and measures of population dynamics,
2. Knowledge of population dynamics' linkages with public health issues,
3. The ability to relate vital events and duration exposures with risk factors at the individual and population level.

CONTACT INFORMATION

Sponsoring Department

Population, Family and Reproductive Health (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/)

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/population-and-health-certificate-program/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered, and should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this onsite noncredit course in their first term of study)	
Required Courses		
PH.380.600	Principles of Population Change (typically offered onsite in 2nd term)	4
PH.380.603	Demographic Methods for Public Health (typically offered onsite in 2nd term and online in 3rd term)	4
Elective Courses: Students must complete at least 10 (ten) credits of elective coursework		
PH.221.627	Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries (typically offered onsite in 2nd term)	4
PH.380.604	Life Course Perspectives on Health (typically offered onsite in 1st term and online in 2nd term)	4
PH.380.655	Social and Economic Aspects of Human Fertility (typically offered onsite in 2nd term)	3
PH.380.662	Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health (typically offered onsite in 2nd term)	4
PH.380.664	Reproductive and Perinatal Epidemiology (typically offered onsite in 4th term)	4
PH.380.665	Family Planning Policies and Programs (typically offered onsite in 3rd term)	4
PH.380.666	Women's Health (typically offered onsite in 3rd term)	3
PH.380.668	International Perspectives on Women, Gender, and Health (typically offered onsite in 4th term)	3
PH.380.720	Masculinity, Sexual Behavior & Health: Adolescence & Beyond (typically offered onsite in 2nd term)	3
PH.380.750	Migration and Health: Concepts, Rates, and Relationships (typically offered onsite in 3rd term)	3
PH.380.755	Population Dynamics and Public Health (typically offered online in 1st term and onsite in Summer term)	2
PH.380.756	Poverty, Economic Development, and Health (typically offered onsite in 2nd term, every other year)	4
PH.380.765	Preventing Infant Mortality and Promoting the Health of Women, Infants and Children (typically offered online in 4th term)	3
PH.380.767	Couples and Reproductive Health (typically offered onsite in 1st term)	3

Population Health Management, Certificate

OVERVIEW

PLEASE NOTE: THIS PROGRAM CAN ONLY BE COMPLETED VIA FULLY ONLINE COURSES.

The Johns Hopkins Bloomberg School of Public Health offers fully online, part-time master's degree and certificate programs, designed for working professionals. Our Online Programs for Applied Learning (https://www.jhsph.edu/academics/online-programs-and-learning/) (OPAL) focus on emergent industry sectors that have a resounding need for highly skilled professionals.

Population health management has emerged as an important strategy for health care providers and payers. The Certificate in Population Health Management prepares students to examine and respond to both challenges and opportunities to improve health within and across populations. The program is structured to guide health care professionals seeking to transform or create sustainable models of value-driven accountable care.

EDUCATIONAL OBJECTIVES

Upon completion of the Certificate program in Population Health Management, the individual will acquire skills necessary to:

1. Identify determinants of population health that impact health outcomes in a community and apply the essentials of public health practice to design low cost interventions;
2. Lead the formation and management of contemporary health care systems that consist of, and rely upon, diverse stakeholders in the organization and delivery of community-based models of care;
3. Communicate effectively to constituencies both within and outside of the health system;
4. Articulate and apply frameworks for collecting, analyzing, and using data to inform decisions, facilitate care coordination, and improve health outcomes of targeted populations within and outside the health system;
5. Develop effective collaboratives and support state and local public health agency efforts in assessing health needs, quality of services, and strategies for improving health services delivery.

LinkedIn © Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

BSPH OPAL Population Health Management (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8673634%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

Admissions

Contact information and complete information about applying to the certificate program is available on the certificate program page (https://publichealth.jhu.edu/academics/population-health-management-certificate-program/) on the Bloomberg School of Public Health website.

Program Requirements

Students should follow the plan outlined below if they wish to complete the Certificate program in one year. This plan will also allow students to maintain minimum credits needed for financial aid eligibility each term, and to follow any prerequisite sequencing. Courses can be taken at a slower pace if needed, so long as course prerequisites are met. Students should check the course directory (http://www.jhsph.edu/courses/) to confirm when the courses are offered for students in OPAL programs.

The certificate program requires a minimum of 25 term credits and a minimum grade point average (GPA) of 2.75. Students must earn a minimum grade on a set of required program-specific core courses: “Pass” for courses offered only on a pass/fail basis: “C” or higher for courses offered for letter grading. The certificate program length is flexible; it can be completed in as little as one year, and must be completed within three years.

Course of Study

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.602.631	Essentials of Population Health Management	3
PH.602.651	Principles and Applications of Advanced Payment Models in Population Health Management	3
	Credits	**6**
Second Term		
PH.602.671	Collective Impact: Developing and Leading Community Partnerships to Improve Population Health	3
PH.602.681	Applications in Accountable Care: Assessing Quality and Effectiveness of Population Health initiatives	3
	Credits	**6**
Third Term		
PH.600.701	Introduction to Epidemiology	4
PH.602.731	Population and Consumer Health Informatics	3
	Credits	**7**
Fourth Term		
PH.602.691	Managing Health Across the Continuum: Contemporary Models and Applications of Care Coordination and Management	3
PH.600.709	Statistical Concepts in Public Health 1	3
	Credits	**6**
	Total Credits	**25**

Notification of Certificate Program Completion

Students in OPAL certificate programs must complete and submit the Notification of Certificate Program Completion form to the OPAL program office **before the end of the add/drop period of the term of your last certificate course**; certificate program completions cannot be processed retroactively.

For MAS students who did not apply to a certificate but will be completing as part of their degree, they can either apply for completion once the certificate courses are successfully completed, or at the end of their degree program. The certificate cannot be granted or included in the transcript until the form is submitted and verified by the certificate program.

It is preferable to complete the form electronically. Send the completed form to the OPAL program office as an email attachment. Certificates will be ordered for students approximately one month after the end of the term in the summer, spring, and fall. A template form for each of the OPAL certificates can be found in the Online Library of the OPAL Student Resources site in CoursePlus. The blank form can be found on the School’s website as well. Please **send the completed Notification form to OPAL-Office@jhu.edu** by the deadline noted above. Be sure to complete all personal information on the first page, and the year, term and grade for all completed courses. If needed, we can update the pending grades when they are submitted at the end of the term.

Product Stewardship for Sustainability, Certificate

Product Stewardship for Sustainability, Certificate

NOTE: This certificate program may be completed entirely online!

OVERVIEW

The Certificate in Product Stewardship for Sustainability enables professionals to promote responsible design, development, and management of products throughout their life cycle. This certificate program addresses the need for professionals trained in minimizing the health, safety, environmental, and social impacts of a product and its packaging throughout all lifecycle stages, while also maximizing economic benefits. Individuals who complete a Certificate in Product Stewardship for Sustainability will gain competencies that will enable them to manage products and their packaging throughout all lifecycle stages while minimizing human health and ecological impacts.

The certificate program is designed for junior, mid-level, and executive-level professionals (non-degree students) desiring to expand their knowledge of product stewardship to advance their careers. These include working professionals who are already active in the product stewardship field, and those from a wide range of other backgrounds, including environmental health, regulatory compliance, industrial hygiene, occupational health and safety, sustainability, product development, supply chain, and law. The certificate program is also open to masters and doctoral degree students and post-doctoral trainees at the Johns Hopkins Bloomberg School Public Health and the Whiting School of Engineering.

EDUCATIONAL OBJECTIVES

Students completing the certificate program will be able to:

1. Describe the core functions, values and principles of environmental and occupational public health.
2. Identify and characterize product hazards, exposures, and risk through inherent product characteristics, uses, and misuses of products.
3. Identify points in the production and distribution processes that create risks for workers, communities, consumers, and the ecosystem.
4. Select and apply appropriate frameworks to analyze product risks to humans and the environment throughout product supply chains and product lifecycles.
5. Determine and document appropriate and effective systems for ongoing assessment and management of product and business risk.
6. Identify and evaluate current and emerging societal issues, regulatory requirements, and voluntary frameworks that may affect products throughout their lifecycle.
7. Assess risk throughout the products' movement within the supply chain (product trail) to determine if appropriate stewardship systems and risk management activities are in place.
8. Assess and apply best practices to improve product sustainability and competitive advantage while minimizing business risk through management and product development.

Sponsoring Department

Environmental Health and Engineering (https://publichealth.jhu.edu/departments/environmental-health-and-engineering/)

ADMISSIONS

Contact information and complete admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/) on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program in Product Stewardship for Sustainability requires a minimum of 18 term credits (please note that the EN courses below are listed with semester credits, but 3 semester credits is equivalent to 4.5 term credits). All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required. All students must complete the free, online, non-credit course Introduction to Online Learning (https://courseplus.jhu.edu/core/index.cfm/go/course.home/cid/90/) prior to enrolling in online courses.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (course is offered in all academic terms. Students must also complete the free, non-credit online course Introduction to Online Learning)	
Students must complete two of the three EN courses and all of the PH courses on technical competency		
EN.575.623	Industrial Processes and Pollution Prevention (typically offered in the Fall Semester)	3
EN.535.662	Energy and Environment (typically offered in the Fall Semester)	3
EN.575.736	Designing for Sustainability: Applying a Decision Framework (typically offered in the Fall Semester)	3
PH.180.628	Introduction To Environmental and Occupational Health Law (typically offered online in the 4th term)	4
PH.187.640	Toxicology 21: Scientific Foundations (typically offered online in 2nd term)	1
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4

Public Health Advocacy, Certificate

Public Health Advocacy Certificate Program

OVERVIEW

Advocacy—working for policy change and better implementation of existing policies—is crucial to public health. As research and discovery are translated into policies and programs, the accurate interpretation and use of evidence are essential to political leaders, health care providers, potential clients, and the public at large.

Certificate program coursework will allow students to engage deeply with core theories and skills in public health advocacy, and to augment these with an understanding of how to apply these in a variety of policy and geographic settings. The certificate program will complement students' options for training in public health policy making with theoretical and practical insights into the role of advocacy in this process.

EDUCATIONAL OBJECTIVES

The primary goal of the certificate program is to develop students' abilities to translate research into practice, use evidence to inform public health policy, shift social norms and attitudes, and improve public health. The curriculum enables students to understand advocacy methods and apply evidence. Additionally, the program offers practical experience in public health advocacy.

Upon successful completion of the certificate program, students will be able to:

1. Discuss the role of political actors inside and outside governments in developing and implementing health policy

2. Identify other actors in the policy making process and how actors such as the media help shape policy

3. Improve policies and laws and their development, adoption, and implementation

4. Increase and influence better use of resources for interventions and scientific inquiry

5. Set agendas in policy circles and the media environment through higher visibility and understanding of issues

6. Shift public attitudes, behaviors, and social norms toward better public health.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/public-health-advocacy-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Departments

Health Policy and Management (https://publichealth.jhu.edu/departments/health-policy-and-management/)

Health, Behavior and Society (https://publichealth.jhu.edu/departments/health-behavior-and-society/)

Population, Family and Reproductive Health (https://publichealth.jhu.edu/departments/population-family-and-reproductive-health/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html) before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (http://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Core Courses: Students must complete 301.645 and 410.663; students must select either 301.644, 380.620 or 410.672		
PH.301.645	Health Advocacy (typically offered onsite in 4th term)	3
PH.410.663	Media Advocacy and Public Health: Theory and Practice (typically offered onsite in 4th term)	3
PH.301.644	Public Health Advocacy: Grassroots Organizing for Policy Change (typically offered online in Summer Institute)	3
PH.380.620	A Coalition-based SMART Approach to Public Health Advocacy (typically offered onsite in 3rd term)	3
PH.410.672	Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy (typically offered onsite in 3rd term and online in 3rd and Summer terms)	3
Elective Courses: Students must complete a minimum of 9 credits		
PH.221.631	Evaluation Methods for Injury Interventions (typically offered online in 3rd term)	3
PH.221.633	Policy Advocacy in Low and Middle-income Countries: Application for Real World Challenges (typically offered onsite in Summer Institute)	2
PH.221.650	Health Policy Analysis in Low and Middle income Countries (typically offered onsite in 3rd term)	3
PH.300.600	Introduction to Health Policy (typically offered online in 3rd term)	4

PH.300.610	Public Health Policy (typically offered onsite in Summer term)	4
PH.300.650	Crisis and Response in Public Health Policy and Practice (typically offered onsite and online in 3rd term)	3
PH.300.652	Politics of Health Policy (typically offered onsite in 4th term)	4
PH.300.712	Formulating Policy: Strategies and Systems of Policymaking in the 21st Century (typically offered onsite in 2nd term)	3
PH.301.627	Understanding and Preventing Violence (typically offered onsite in 2nd term)	3
PH.306.625	Ethical Issues in Health Policy: Public Health and Health Care (typically offered onsite in 2nd term)	3
PH.306.650	Public Health and the Law (typically offered onsite in 3rd term)	3
PH.308.604	Effective Writing for Public Health Change (typically offered onsite in Summer Institute)	3
PH.308.701	Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners (typically offered online in Summer Institute and Winter Institute)	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research (typically offered online in 3rd term)	3
PH.317.610	Risk Policy, Management and Communication (typically offered onsite in 2nd term and online in 4th term)	3
PH.330.667	Mental Health and the Law (typically offered onsite in 3rd term)	3
PH.380.707	Advocating for Global Reproductive Health (typically offered onsite in Summer Institute)	2
PH.380.771	Understanding and Changing International Reproductive Health Policy (typically offered onsite in 4th term)	3
PH.380.880	Lessons in Leadership: Applications for Population, Family and Reproductive Health I (Must be taken with 380.881, 380.882, and 380.883; course is typically offered onsite in 1st term)	1
PH.380.881	Lessons in Leadership: Applications for Population, Family and Reproductive Health II (Must be taken with 380.880, 380.882, and 380.883; course is typically offered onsite in 2nd term)	1
PH.380.882	Lessons in Leadership: Applications for Population, Family and Reproductive Health III (Must be taken with 380.880, 380.881, and 380.883; course is typically offered onsite in 3rd term)	1
PH.380.883	Lessons in Leadership: Applications for Population, Family and Reproductive Health IV (Must be taken with 380.880, 380.881, and 380.882; course is typically offered onsite in 4th term)	1
PH.410.622	Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries (typically offered onsite in 2nd term)	4
PH.410.642	TOBACCO CONTROL LEADERSHIP (typically offered onsite in 1st term)	2
PH.410.653	Contemporary Issues in Health Communication (typically offered onsite in 1st term)	1
PH.410.668	Policy Interventions for Health Behavior Change (typically offered onsite in 2nd term)	3
PH.550.608	Problem Solving in Public Health (typically offered onsite in Fall and Winter Institutes, and online in 3rd term)	4

Public Health Economics, Certificate

Public Health Economics Certificate Program

OVERVIEW

The certificate program in Public Health Economics is designed for graduate degree students and junior and mid-level professionals pursuing a career in public health, health care, health services, and health policy who wish to use economic tools to improve the health of populations. This certificate program is only available to students who are able to attend classes in Baltimore; it cannot be completed through online and institute courses.

EDUCATIONAL OBJECTIVES

Students who complete the certificate program will be able to:

1. Describe the appropriate role of cost-effectiveness and economic reasoning in the policy making process for health care in the United States and around the world
2. Participate in the conduct of economic evaluations related to new health interventions, and health systems, health services, or public health interventions
3. Perform statistical and other analytic or modeling tasks necessary to complete cost effectiveness analyses
4. Apply economic theory to predict responses to changes in policies and incentives provided by changes in the health system, in health services provision, or in public health
5. Contribute to the interpretation of economic evaluations and analyses for policy purposes

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/public-health-economics-certificate-program/)on the Bloomberg School of Public Health website.

Sponsoring Departments

Health Policy and Management (http://www.jhsph.edu/dept/hpm/)
International Health (http://www.jhsph.edu/dept/IH/)
Population, Family and Reproductive Health (http://www.jhsph.edu/dept/pfrh/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 28 term credits. All courses (except seminar) must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements.The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Statistical Courses: Students must complete one of the following statistical series (A, B, or C)		
Statistical Series A		
PH.140.621	Statistical Methods in Public Health I (typically offered onsite and online in 1st term)	4
PH.140.622	Statistical Methods in Public Health II (typically offered onsite and online in 2nd term)	4
PH.140.623	Statistical Methods in Public Health III (typically offered onsite and online in 3rd term)	4
PH.140.624	Statistical Methods in Public Health IV (typically offered onsite in 4th term)	4
Statistical Series B		
PH.140.651	Methods in Biostatistics I (typically offered onsite in 1st term)	4
PH.140.652	Methods in Biostatistics II (typically offered onsite in 2nd term)	4
PH.140.653	Methods in Biostatistics III (typically offered onsite in 3rd term)	4
PH.140.654	Methods in Biostatistics IV (typically offered onsite in 4th term)	4
Statistical Series C for Applied Economics Program students		
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
Required Health Economics Course: Students must complete Sequences E, F, and G		
Economics Sequence E		
PH.313.601	Economic Evaluation I (typically offered online and onsite in 1st term)	3
Economics Sequence F: Student may select either 313.643 or 313.641		
PH.313.610	Health Economics for Managers (typically offered onsite in 2nd term)	3
PH.313.641	Introduction to Health Economics (typically offered online in 3rd term)	3
PH.313.643	Health Economics (typically offered onsite and online in 2nd term)	3
Economics Sequence G		
PH.313.602	Economic Evaluation II (typically offered onsite and online in 2nd term)	3
Elective Courses: Students should select one elective course from the list below		
PH.221.619	Introduction to Microeconomics (typically offered onsite in 1st term)	3
PH.221.644	Econometric Methods for Evaluation of Health Programs (typically offered onsite in 3rd term)	4
PH.300.651	Introduction to the U.S. Healthcare System (typically offered onsite in 1st term and online in 4th term)	4
PH.309.620	Managed Care and Health insurance (typically offered onsite in 3rd term)	3
PH.309.716	Advanced Methods in Health Services Research: Analysis (typically offered onsite in 1st term)	3
PH.313.603	Economic Evaluation III (typically offered online and online in 3rd term)	3
PH.313.604	Economic Evaluation IV (typically offered onsite in 4th term)	3
PH.313.644	Intermediate Health Economics (typically offered onsite in 3rd term)	3
PH.380.756	Poverty, Economic Development, and Health (typically offered onsite in 2nd term, every other year)	4
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.622	Cost-Benefit Analysis	3

Public Health Informatics, Certificate

Public Health Informatics Certificate Program

Note: This certificate program may be completed entirely online!

OVERVIEW

The goal of the Public Health Informatics (PHI) Certificate Program is to offer grounding in methods and concepts of health informatics and health information technology for application to public health and population health. It is designed for current and future public health professionals who wish to develop PHI expertise or specialization to work in policy or management.

EDUCATIONAL OBJECTIVES

After completion of the certificate program, students will be able to:

1. Articulate strategic direction for public health informatics within an organization;
2. Match data standards to their proper use;
3. Identify knowledge, information, and data needs of project or program users and stakeholders;
4. Describe information system development, procurement, and implementation that meets public health program needs;
5. Evaluate information systems and applications;
6. Recognize use of informatics to integrate clinical health, environmental risk, and population health; and

7. Implement solutions that assure confidentiality, security, and integrity while maximizing availability of information for public health.

ADMISSIONS

Students should refer to the certificate program page (https://publichealth.jhu.edu/academics/public-health-informatics-certificate-program/) on the Bloomberg School of Public Health website for full information about the certificate admissions process, requirements and deadlines, as well as contact information for the program.

Sponsoring Department

Health Policy and Management (https://publichealth.jhu.edu/departments/health-policy-and-management/)

Information about the courses and program requirements is available here (p. 621)**, and admissions instructions are available** here (https://www.jhsph.edu/academics/certificate-programs/certificates-for-hopkins-and-non-degree-students/public-health-informatics.html)**.**

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade and a 2.75 or better overall GPA for all certificate courses is required. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577)before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Please note that although course number 221.649 Introduction to Digital Health in Low- and Middle-Income Countries is no longer offered, certificate students who completed the course previously as part of their certificate program may count it as an elective course towards the total number of credits.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit course in their first term of study; course is typically offered online in 1st, 2nd, 3rd, and 4th terms, as well as Summer, and Summer and Winter Institute)	
Required Courses: 309.631 and EITHER 315.707 OR 312.633		
PH.309.631	Population Health Informatics (course is typically offered online in 2nd term)	3
PH.312.633	Health Management Information Systems (course is typically offered online in term 3)	3
PH.315.707	Introduction to Biomedical and Public Health Informatics (course is typically offered online in term 1)	3
Elective Options (12 academic credits)		
PH.221.637	Health Information Systems (course is typically offered online in term 2)	3
PH.309.635	Population Health: Analytic Methods and Visualization Techniques (course is typically offered online in term 4)	3
PH.315.700	Health Information Systems: Design to Deployment (course is typically offered online in term 3)	3
PH.315.703	Leading Change Through Health Informatics (course is typically offered online in term 2)	3
PH.315.709	Health Sciences Informatics, Knowledge Engineering and Decision Support (course is typically offered online in term 4)	3
PH.315.727	Database Querying in Health (typically offered online in 2nd term)	3
PH.550.714	Secondary Uses of Electronic Health Record Data (course is typically offered online in term 3)	3
Students may complete no more than 2 of the following GIS courses		
PH.340.696	Spatial Analysis I: ArcGIS (course is typically offered onsite in term 1)	3
PH.340.697	Spatial Analysis II: Spatial Data Technologies (course is typically offered onsite in term 2)	2
PH.340.701	Epidemiologic Applications of Gis (course is typically offered online in term 3 and onsite in Summer Institute)	2

Public Health Practice, Certificate

Public Health Practice Certificate Program

EDUCATIONAL OBJECTIVES

The certificate recipient will be able to:

1. Identify, analyze and use available disease and behavioral surveillance data
2. Apply leadership in the management of health systems organizations
3. Communicate effectively to constituencies both within and outside of the health system
4. Determine public health information needs
5. Use appropriate basic statistical, demographic, and epidemiologic techniques to evaluate data with attention to quality control issues
6. Support state and local public health agency efforts in assessing health needs, quality of services, and strategies for health services research
7. Identify and help fill needs for information and responses to new threats to public health.

Admissions

Contact information and complete certificate program admissions information can be found on the Bloomberg School of Public Health certificate program webpage (https://publichealth.jhu.edu/academics/public-health-practice-certificate-program/).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 24 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Courses:		
PH.305.607	Public Health Practice (Course is typically offered onsite in 2nd term and online in 4th term. Please note prerequisite course requirement)	4
PH.550.608	Problem Solving in Public Health (Course is typically offered onsite in Fall, Summer and Winter Institute and online in 3rd term. Please note: This course should be taken first)	4
Required Epidemiology Course: Students must choose either 340.601 or 340.721		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer and Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered online in 1st and 3rd terms and Summer and Summer Institutes and onsite in 1st term)	5
Required Social and Behavioral Courses: Students must select one course		
PH.380.604	Life Course Perspectives on Health (typically offered onsite in 1st term and online in 2nd term)	4
PH.410.616	Social and Behavioral Aspects of Public Health (typically offered onsite in Summer Institute)	4
PH.410.650	Introduction to Persuasive Communications: Theories and Practice (typically offered onsite in 2nd term and Winter Institute)	4
Elective Courses: At least 6 credits of coursework must be taken		
PH.180.620	Introduction to Food Systems and Public Health (typically offered online in 2nd term)	4
PH.220.601	Foundations of International Health (typically offered onsite in 1st term and online in 1st and 4th terms)	4
PH.221.637	Health Information Systems (typically offered online in 2nd term)	3
PH.300.600	Introduction to Health Policy (typically offered online in 1st term)	4

Public Health Preparedness, Certificate

Public Health Preparedness Certificate Program

Students who would like to be trained to identify the major threats to public health; to identify public health issues during emergency situations; and how to integrate the risk sciences, public health practice and public health surveillance systems as they relate to preparedness and emergency response, should apply for this program.

EDUCATIONAL OBJECTIVES

The certificate program in Public Health Preparedness is designed to provide essential tools for public health practitioners to prepare for natural disasters, terrorism or other emerging threats. Specific objectives of the program are to:

1. Identify the major threats to public health and to identify public health issues in disasters
2. Describe the integration of risk sciences, public health practice and public health surveillance as it relates to public health preparedness and terrorism response

Contact Information

Complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/public-health-preparedness-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Department

Health Policy and Management (https://publichealth.jhu.edu/departments/health-policy-and-management/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

All students are required to complete the three core courses (11 credits) and an additional 9 credits from the list of approved courses for a total of 20 credits to complete the certificate. Core courses required for this certificate program may not be waived or substituted. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework.

The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted and verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses		
PH.180.670	Introduction to Public Health Emergency Preparedness (typically offered onsite in 4th term)	3
PH.305.607	Public Health Practice (typically offered onsite in 2nd term and online in 4th term)	4
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered onsite in 1st term and online in 3rd term)	4
Elective Courses- Students must complete 9 credits of coursework from the following list		
PH.187.610	Public Health Toxicology (typically offered onsite in 1st term and online in 2nd term)	4
PH.221.613	Introduction to Humanitarian Emergencies (typically offered onsite in 1st term)	3
PH.223.680	Global Disease Control Programs and Policies (typically offered onsite and online in 4th term)	4
PH.223.687	Vaccine Policy Issues (typically offered onsite in 3rd term)	3
PH.260.606	Major Global Infectious Diseases: Prospects for Control (typically offered onsite in Winter Institute)	2
PH.300.600	Introduction to Health Policy (typically offered online in 1st term and 4th terms)	4
PH.306.625	Ethical Issues in Health Policy: Public Health and Health Care (typically offered onsite in 2nd term)	3
PH.306.650	Public Health and the Law (typically offered onsite in 3rd term)	3
PH.340.651	Emerging Infections (typically offered onsite in 4th term)	2
PH.340.653	Epidemiologic Inference in Outbreak Investigations (typically offered onsite in 1st term)	3
PH.312.700	Leading Organizations (typically offered online 1st term and online in Summer Institute)	3

Public Health Training Certificate for American Indian Health Professionals

Public Health Training Certificate for American Indian Health Professionals

OVERVIEW

The overarching purpose of this public health certificate program is to promote participants' capacity to address American Indian population health disparities through multidisciplinary public health approaches and culturally competent strategies. The certificate program examines four quadrants of influence: physical, behavioral, political, and spiritual/emotional, which, in balance, comprise the sphere of public health for American Indian communities.

The certificate program is offered for credit to graduate students at The Johns Hopkins University Schools of Medicine, Nursing, and Public Health. It is also open to other health care professionals interested in the health of American Indians. The certificate can be earned over a three-year period through condensed format courses taught in January, June, and July in Baltimore.

The Johns Hopkins Center for American Indian Health offers additional training opportunities that are not-for-credit.

EDUCATIONAL OBJECTIVES

Environmental, Cultural, and Political Context

Students completing the certificate program will be able to:

1. Discuss how tribal sovereignty status impacts health policy and management
2. Understand the potential interface of tribal, federal, and private sectors in health system development
3. Discuss and provide examples of inter-relationships between the environment and the public's health
4. Describe the unique impact of mental, social, and emotional health status on tribal community well-being
5. Describe the components of effective community education and health communication campaigns
6. Understand factors affecting early child development unique to tribal communities

Public Health Research Skills

Those completing the certificate will be able to employ public health theory and logic frameworks and apply basic statistical, demographic, and epidemiologic techniques to:

1. Critique published public health research
2. Identify available disease, behavioral, and mental health surveillance data from American Indian communities
3. Identify how community based participatory research can be used to promote American Indian health
4. Understand how to identify health priority needs utilizing community based participatory research methods and to evaluate intervention impacts using health surveillance data from American Indian communities
5. Work with epidemiologists and other researchers to design community based interventions and other data collection efforts appropriate for American Indian communities
6. Recognize good data management practices
7. Understand the importance of research ethics and the composition and function of Institutional Review Boards (IRBs), with specific emphasis on IRB's role in tribal environments

Admissions

Complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/public-health-training-certificate-for-american-indian-health-professionals/) on the BSPH website.

Sponsoring Department

International Health (https://publichealth.jhu.edu/departments/international-health/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

This certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://publichealth.jhu.edu/academics/academic-programs/certificate-programs/)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must complete all three of the following courses		
PH.221.666	Introduction to American Indian Health Research Ethics (typically offered every other year, onsite in Summer Institute)	2
PH.221.667	An Interdisciplinary Approach to Understanding the Health of Native Americans (typically offered onsite in Winter Institute)	3
PH.221.670	Collecting, Analyzing and Using Public Health Data in Native American Communities (typically offered every other year, onsite in Summer Institute)	3
Elective Courses: Students must complete at least 10 credits of elective coursework		
PH.221.664	Prevention of Unintentional Injuries in American Indian Communities (typically offered onsite in Winter Institute, every other year)	2
PH.221.665	Early Childhood Intervention in Tribal Communities (typically offered onsite in Summer Institute, every other year)	2
PH.221.668	COVID-19 & Infectious Disease Outbreaks in Native American Communities (typically offered onsite in Summer Institute)	2
PH.221.669	American Indian Health Policy (typically offered every other year, onsite in Summer Institute)	2
PH.221.671	Introduction to Quantitative and Qualitative Research for American Indian Health (typically offered every other year, onsite in Summer Institute)	2
PH.221.672	Introduction to Data Management Using American Indian Health Data (typically offered every other year, onsite in Summer Institute)	2
PH.221.673	Mental Health in American Indian Communities (typically offered every other year, onsite in Winter Institute)	2

Public Mental Health Research, Certificate

Public Mental Health Research Certificate Program

OVERVIEW

This program is offered through the Department of Mental Health and provides graduate training in understanding the causes and consequences of mental disorders in populations. Courses describe clinical and behavioral features, the incidence and prevalence of disorders, and identify factors that promote or influence the occurrence, persistence, or severity of mental and behavioral disorders. Effective research strategies in public mental health include operationalization of case definitions, measurement in populations, design of prevention strategies, and analytical techniques. The goals are to increase the epidemiologic expertise of psychiatrists and other mental health professionals, and to increase the number of epidemiologists, biostatisticians, and health policy makers, with an interest in psychiatric disorders.

EDUCATIONAL OBJECTIVES

Upon completion of this certificate program, students will have enhanced understanding of the complex field of research in public mental health. After completing core and elective courses, students will be able to:

1. Understand and discuss the organization of diagnoses of mental disorders used in clinical and public health settings, as well as the available modalities for measuring the diagnoses in populations;
2. Realize and discuss the burden of mental disorders in the global population;
3. Recognize and describe the wide range of social and biological etiologic factors related to mental disorders;
4. Evaluate methods of prevention and treatment for mental disorders;
5. Be able to describe the system of treatment for mental disorders in the United States and around the world.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/public-mental-health-research-certificate-program/) on the BSPH website.

Sponsoring Department

Department of Mental Health (https://publichealth.jhu.edu/departments/mental-health/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

This certificate program consists of a minimum of 21 credits in the Department of Mental Health (18 credits for psychiatrists and clinical psychologists who elect to waive 330.617; permission to do so must be granted by the faculty sponsor). All required and elective courses must be taken for a letter grade, unless the course is only offered Pass/Fail; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; however, the certificate program must be completed within three years.

Tuition, application fee, and book costs are subject to change from one academic year to another academic year. The student should review the section of the website that addresses completion (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when courses are offered.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses		
Students are required to complete 330.617		
PH.330.617	Psychopathology for Public Health (Note: Psychopathology for Public Health may be waived by psychiatrists and clinical psychologists, upon permission of the faculty sponsor; in which case, the minimum number of credits in the Department of Mental Health is 18, not 21. Course is typically offered online in 1st term)	3
Students are required to take 330.661 and either 330.603 or 330.669		
PH.330.603	Psychiatric Epidemiology (typically offered onsite in 2nd term and online in 3rd term every other year. Note:either 330.603 or 330.669 may be taken, but not both)	3
PH.330.669	Epidemiology of Major Mental Disorders (typically offered online in Summer Institute)	2
PH.330.661	Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders (typically offered onsite in 3rd term)	3
Students may take either 330.607 or 330.664		
PH.330.607	PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS (typically offered online in 3rd and 4th terms)	3
PH.330.664	Introduction to Mental Health Services (typically offered onsite in 1st term)	3
Elective Courses: Select additional courses from the Department of Mental Health totaling at least 9 more credits; 330.840 and 330.800 may not be used as electives towards this program. 21 credits total are required to complete the certificate program, except in the case of those students who were able to obtain approval to waive 330.617		

Quality, Patient Safety, and Outcomes Research, Certificate

Quality, Patient Safety and Outcomes Research Certificate Program

NOTE: This certificate program can be completed entirely online!

OVERVIEW

The certificate program is designed for graduate students from the Johns Hopkins Schools of Public Health, Medicine, and Nursing and health-related professionals interested in quality, patient safety, and outcomes research.

EDUCATIONAL OBJECTIVES

Those who complete the certificate program will gain competencies in quality, patient safety, and outcomes research; however the program does not provide training in conducting research. Students completing the certificate program will be able to:

Quality

1. Describe several frameworks and theories for assessing and improving the quality of medical care;
2. Describe current key policy and programmatic areas in quality of care;
3. Understand how to assess quality of care for a medical condition;
4. Describe key elements of published quality assessment and improvement studies;
5. Understand how to develop a workable quality improvement and evaluation plan.

Safety

1. Recognize the extent of problems in patient safety in medical care;
2. Describe the role of various systems and factors in creating safety and in causing errors and adverse events;
3. Discuss problems and issues in measuring and reporting safety;
4. Demonstrate knowledge of the basics of conducting an incident investigation and disclosing an adverse event;
5. Design solutions to improve patient safety;
6. Understand the ethical, legal, and regulatory implications related to patient safety.

Patient Outcomes Research

1. Argue for the importance and challenges of using patient and consumer reported measures in research, clinical practice, and program evaluation;
2. Compare the different types of instruments available to measure health related quality of life;
3. Critique the use of commonly used patient reported outcomes in specific applications;
4. Plan the development of a new questionnaire;
5. Understand the role of patient-centered outcomes research in improving health, including its place in the U.S. research portfolio; the importance of stakeholders in the research process, and policy implications related to implementation;
6. Identify study designs and methodologies unique to patient outcomes research.

Admissions

Contact information and complete information about applying to the certificate program is available on the certificate program page (https://publichealth.jhu.edu/academics/quality-patient-safety-and-outcomes-research-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Department

Health Policy and Management (http://www.jhsph.edu/departments/health-policy-and-management/certificates/quality/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 21 term credits, including four required courses, and at least six credits of elective courses. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses: Students must complete the following required courses		
PH.309.712	Assessing Health Status and Patient Outcomes (typically offered online in 3rd term)	3
PH.309.730	Patient Safety and Medical Errors (typically offered online in 2nd term)	3
PH.311.615	Quality of Medical Care (typically offered online in 1st term)	3
PH.312.693	Introduction to Comparative Effectiveness and Outcomes Research (typically offered online in 3rd term)	3
Elective Courses: Students must complete at least nine credits from the following elective courses. Students should select from at least 2 domains, and may select courses from several domains		
Elective Courses:Domain 1: Quality of Care		
PH.221.722	Quality Assurance Management Methods for Developing Countries (typically offered onsite and online in 1st term)	4
PH.309.609	Palliative and Hospice Care: Quality of Care and Health Policy (typically offered onsite in Winter Institute)	2
PH.390.678	Introduction to Quality Improvement & Knowledge Translation Research (typically offered online in 1st term and onsite in 4th term)	3
Elective Courses: Domain 2: Patient Safety		
PH.309.600	Evaluating Quality Improvement and Patient Safety Programs (typically offered onsite in Winter Institute and online in 1st term)	3
PH.309.731	Patient Safety in Developing Countries (typically offered onsite in Summer Institute)	2
PH.312.678	Introduction to Healthcare Quality and Patient Safety: A Management Perspective (typically offered onsite in 3rd term)	2
Elective Courses: Domain 3: Health Economics and Economic Evaluation		
PH.313.790	Introduction to Economic Evaluation (typically offered online in 4th term)	3
Elective Courses: Domain 4: Health Care Management and Informatics		
PH.309.631	Population Health Informatics (typically offed online in 2nd term)	3
PH.312.600	Managing Health Services Organizations (typically offered online in 3rd term)	4
PH.312.620	Performance Measurement in Health Care (Performance Measurement in Health Care is typically offered onsite in Winter and Summer Institutes)	2
PH.312.633	Health Management Information Systems (typically offered online in 3rd term)	3
Elective Courses: Domain 5: Methods		
PH.340.606	Methods for Conducting Systematic Reviews and Meta-Analyses (typically offered onsite in 3rd term)	4
PH.340.686	Introduction to Systematic Reviews and Meta-Analysis (typically offered onsite in Summer Institute)	2
Elective Course: Domain 6: Practicum		
PH.309.864	Quality, Patient Safety, and Outcomes Research Practicum (This course is distinct from what students may have completed for their MPH Capstone and/or MPH Practicum. It is typically offered onsite in 2nd, 3rd and 4th terms)	3

Quantitative Methods in Public Health, Certificate

Quantitative Methods in Public Health Certificate Program

EDUCATIONAL OBJECTIVES

The certificate recipient will be able to:

1. Evaluate the methods used to measure health effects in populations;
2. Interpret basic, quantitative public health measures;
3. Judge policy implications of public health data and research;

4. Be familiar with the difficulties of collecting, interpreting and analyzing data and their implications;
5. Perform a critical review of public health/epidemiologic literature.

ADMISSIONS INFORMATION

For full admissions and contact information, please visit the certificate webpage (https://publichealth.jhu.edu/academics/quantitative-methods-in-public-health-certificate-program/) on the Bloomberg School of Public Health's website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 21 term credits of coursework. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit course in their first term of study)	
Required Courses		
PH.140.611	Statistical Reasoning in Public Health I (offered online in 1st term, in person in Summer Institutes)	3
PH.140.612	Statistical Reasoning in Public Health II (offered online in 2nd term, in person in Summer Institutes)	3
PH.340.663	Epidemiology Workshop: Interpreting and Using Epidemiologic Evidence (2021-2022 course schedule TBA)	2
PH.550.608	Problem Solving in Public Health (usually offered online in 3rd term and in person in Baltimore in Summer and Winter Institute, and in Barcelona, Spain during the Fall Institute)	4
Students must complete either 340.601 or 340.721		
PH.340.601	Principles of Epidemiology (typically offered on-site in Summer and Winter Institutes)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered online in 1st, 3rd, Summer and Summer Institute terms)	5
Students must complete either 340.722 or both 140.613 AND 140.614		
PH.340.722	Epidemiologic Inference in Public Health II (typically offered online in 2nd and 4th terms)	4
or		
PH.140.613	Data Analysis Workshop I (typically offered onsite in 3rd term and Summer and Winter Institutes)	2
and		
PH.140.614	Data Analysis Workshop II (typically offered onsite in 3rd term and in Summer and Winter Institutes)	2

Rigor, Reproducibility and Responsibility in Scientific Practice, Certificate

Rigor, Reproducibility and Responsibility in Scientific Practice Certificate Program

OVERVIEW

The Rigor, Reproducibility and Responsibility certificate program emphasizes research practice and applicable, introductory graduate level training in epistemology, logic, ethics, as well as quantitative and communication skills. The program specifically addresses the "3R" core norms of good scientific practice, applied across the health and science disciplines, which include fundamental and trans-disciplinary application skills in:
• Rigor, critical thinking and objectivity in scientific conduct
• Reproducibility through appropriate, quantitative research methodology
• Responsibility of scientists toward the research community and society

Participants will value the program's specific focus on the philosophical underpinnings that form the fundamental framework of how science works, thereby keeping a broad perspective in mind that allows them to understand the principles underlying good scientific practice research from the bench science to the public health disciplines

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program, students will be able to:

1. Analyze research strategies, techniques, and data in the light of the norms of good scientific practice.
2. Formulate constructive critique of the research presented in the interdisciplinary primary literature.
3. Explain the basics of hypothesis testing, data analysis and visualization in science.
4. Apply fundamental logic and ethics considerations to observational and experimental approaches to study current problems in science and society.
5. Differentiate how causality is established among the scientific disciplines.
6. Appraise how limitations of causal inference can be mitigated in research and practice.
7. Describe the sources of error in scientific practice as well as approaches for error reduction.
8. Evaluate the impact of errors in discovery and innovation.
9. Apply evidence-based strategies to craft clear and concise, written communications.

10. Employ rhetoric and storytelling to strengthen the communication's impact.
11. Recognize the critical role of scientists in society.

SPONSORING DEPARTMENT

MOLECULAR MICROBIOLOGY AND IMMUNOLOGY (https://www.jhsph.edu/departments/w-harry-feinstone-department-of-molecular-microbiology-and-immunology/)

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/rigor-reproducibility-and-responsibility-in-scientific-practice-certificate-program/)on the Bloomberg School of Public Health website.

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade, if a letter grade is an option. Students must earn a minimum letter grade of C in each certificate course, and maintain a GPA of 2.75 or higher for the certificate courses. All courses must be completed within a three year period.

The student should review the section of the website that addresses completion (https://e-catalogue.jhu.edu/public-health/certificates/#courserequirementstext) before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion form has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

Students should check the Bloomberg School of Public Health course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. The term and time may change from what is listed in the table below and some courses are only offered every other year. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses- Students are required to complete 4 core courses (12 credits required)		
PH.260.700	How Do We Know? - Theory and Practice of Science (typically offered online in 1st term, and hybrid in 3rd term)	3
PH.260.701	Anatomy of Scientific Error (typically offered online in 2nd and hybrid in 4th term)	3
PH.260.705	Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences (typically offered online in 3rd term)	3
PH.260.844	Causation (typically offered hybrid in both 2nd and 4th term)	3
Elective Courses (students must complete 6 or more credits from among the following courses, for a minimum of 18 certificate coursework credits)		
PH.260.704	Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles (typically offered online in 1st term and onsite in 3rd term)	3
PH.260.709	Evidence-Based Mentoring	3
PH.260.710	Communication Practice for Health Science Professionals (typically offered online in 2nd and 4th terms)	3
PH.260.715	Unleash Your Writing Superpower: Crafting Clear, Concise and Persuasive Prose (typically offered online in 2nd term)	3
All students are required to complete a capstone paper. The subject of the capstone must be approved in advance by the Certificate program director. Students may request permission to submit as their capstone a paper completed for one of the certificate courses, or, if desired, students may opt to complete PH.260.840 and to complete the capstone paper during this course		
PH.260.840	SS/R: Mol Microbiology & Imm (typically offered online in 1st, 2nd, 3rd, 4th and Summer terms)	1 - 22

Risk Sciences and Public Policy, Certificate

Risk Sciences and Public Policy Certificate Program

OVERVIEW

Risk professionals are under increased pressure to interpret complex environmental and health situations in creative ways. The certificate program provides multidisciplinary education designed to increase awareness of the scientific underpinnings of risk assessment and provide a bridge between science and policy that allows innovative public health solutions to complex problems. Risk assessment methods are applied to address a wide range of environmental and public health issues including chemical, microbiological, radiological exposures, natural and man-made disasters, and to evaluate new technologies. Risk assessors are employed in academic, governmental and non-governmental organizations across multiple sectors such as agriculture, energy, environmental protection, armed forces, public health, and transportation.

EDUCATIONAL OBJECTIVES

Upon conclusion of the Risk Sciences and Public Policy certificate program, the student will:

1. Be able to describe the importance of risk assessment in examining public health problems;
2. Be able to describe the methods of risk assessment and their applicability to public health problems;
3. Be able to discuss the scientific basis for assessing environmental and other public health risks;
4. Be able to complete and document a basic quantitative risk assessment for a chemical exposure;
5. Be familiar with the policy implications of the scientific relationships for reducing public health risks.

Admissions

Complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/risk-sciences-and-public-policy-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Departments

Health Policy and Management (https://publichealth.jhu.edu/departments/health-policy-and-management/)
Environmental Health and Engineering (https://ehe.jhu.edu/)
Epidemiology (https://publichealth.jhu.edu/departments/epidemiology/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 26 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcripts will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program, and processed by the Registrar.

COURSE OF STUDY

The core curriculum consists of four core risk assessment and policy courses as well as three risk science courses that will introduce you to methods of risk assessment and its applications to public policy.

Students should check the BSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for pre-requisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Courses		
PH.317.600	Introduction to the Risk Sciences and Public Policy (typically offered online in 1st and 3rd term)	4
PH.317.605	Methods in Quantitative Risk Assessment (typically offered online in 1st term and onsite in 3rd term)	4
PH.317.610	Risk Policy, Management and Communication (typically offered onsite in 2nd term and online in 4th term)	3
PH.317.615	Topics in Risk Assessment (typically offered online in 2nd term and onsite in 4th term. Of the 4 required courses, this one should be taken last)	2
In addition to the four core courses, students must also take three risk sciences courses, including Public Health Toxicology, one course in Epidemiology and one course in Biostatistics		
PH.187.610	Public Health Toxicology (typically offered online in 2nd term and onsite in 1st term)	4
Students must select one of the following courses in epidemiology:		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer and Summer Institute)	5
PH.340.680	Environmental and Occupational Epidemiology (typically offered onsite in 4th term)	4
PH.340.721	Epidemiologic Inference in Public Health I (typically offered onsite in 1st term, and online in 3rd term and Summer Institutes)	5
PH.340.722	Epidemiologic Inference in Public Health II (typically offered onsite in 2nd term and online in 2nd and 4th term)	4
PH.340.751	Epidemiologic Methods 1 (typically offered onsite in 1st term)	5
PH.340.769	Professional Epidemiology Methods (typically offered onsite in 3rd term)	4
To satisfy the Biostatistics requirement, students must select either (140.612 and 140.613), or 140.616, or 140.622, or 280.345		
PH.140.612	Statistical Reasoning in Public Health II (please note course prerequisites; course must be taken with 140.613; course is typically offered onsite in 2nd term and Summer Institute and online in 2nd term)	3
PH.140.613	Data Analysis Workshop I (course must be taken with 140.612; course is typically offered onsite in Summer and Winter Institutes)	2
PH.140.622	Statistical Methods in Public Health II (course is typically offered onsite and online in 2nd term)	4
PH.140.616	Statistics for Laboratory Scientists II (typically offered onsite in 4th term)	4
AS.280.345	Public Health Biostatistics (This is an undergraduate level course offered at the Johns Hopkins University's Krieger School of Arts and Sciences campus. The course is an acceptable course only for those Johns Hopkins University undergraduates who are accepted into the Risk Sciences and Public Policy certificate program.)	4
Optional Data Analysis Supplement Option for Students who Complete 140.612 Statistical Reasoning in Public Health:		
PH.182.613	Exposure Assessment Techniques for Health Risk Management (typically offered onsite and online in 3rd term)	3
PH.340.701	Epidemiologic Applications of Gis (typically offered onsite in Summer Institute and online in 3rd term)	2

Spatial Analysis for Public Health, Certificate

OVERVIEW

Please note: this program can ONLY be completed via fully online courses.

The Johns Hopkins Bloomberg School of Public Health offers fully online, part-time master's degree and certificate programs, designed for working professionals. Our Online Programs for Applied Learning (https://www.jhsph.edu/academics/online-programs-and-learning/online-programs-for-applied-learning/) (OPAL) focus on emergent industry sectors that have a resounding need for highly skilled professionals, with one of these sectors being Global Health.

Spatial analysis is an emerging field with applications evolving that are vast and paramount, impacting public health at the local and global level. The carefully sequenced courses of the certificate program in Spatial Analysis for Public Health introduce and reinforce a unifying comprehensive spatial science paradigm, to include components of Spatial Data, GIS and Spatial Statistics.

EDUCATIONAL OBJECTIVES

Upon completion of the certificate program in Spatial Analysis for Public Health the individual will be able to:

1. Synthesize how geography affects public health;
2. Obtain and transfer information from spatial data technologies into a database appropriate for mapping;
3. Utilize a geographic information system to map and spatially integrate public health related databases;
4. Analyze maps using tools from the field of spatial statistics to describe and interpret distributions of health outcomes in a population;
5. Design and implement a spatial analysis protocol for addressing a public health problem.

LinkedIn © Group

We have established a LinkedIn group for each of the OPAL program areas in order to strengthen connections between current students, faculty, and alumni of OPAL programs, as well as to facilitate student-to-student peer networking.

Participation is voluntary, but we encourage you to join this professional networking community.

BSPH OPAL Spatial Analysis for Public Health (https://www.linkedin.com/uas/login/?session_redirect=https%3A%2F%2Fwww.linkedin.com%2Fgroups%2F8676099%2F)

Additional Public Health Learning Resources

The Mid-Atlantic Regional Public Health Training Center provides links to many of its online learning resources, as well as external resources, databases and public health organizations. These can be used to supplement learning on a particular topic, or provide background material. Many of these resources are available for free via their website (https://www.jhsph.edu/research/centers-and-institutes/mid-atlantic-public-health-training-center/training_events/online_training.html).

The Welch Medical Library at Johns Hopkins has many resources related to research, writing and documentation on their YouTube channel (https://www.youtube.com/c/WelchMedicalLibrary/).

The School has a number of research and practice related seminar series (https://publichealth.jhu.edu/academics/lecture-series/) that occur throughout the year and contribute to the intellectual community of the School, for students, staff, and faculty. The Bloomberg School has a website (https://publichealth.jhu.edu/practice/resources-for-practitioners/) that provides some additional resources for practitioners as well.

Practitioners can also access dozens of courses from Bloomberg School faculty on Coursera (https://www.coursera.org/jhu/). Practice-focused offerings include courses on topics such as gun violence, food systems, health equity, biostatistics, and epidemiology, among others.

Admissions

Contact information and complete information about applying to the certificate program is available on the certificate program page (https://publichealth.jhu.edu/academics/spatial-analysis-for-public-health-certificate-program/) on the Bloomberg School of Public Health website.

Program Requirements

Students should follow the plan outlined below if they wish to complete the Certificate program in one year. Courses can be taken at a slower pace if needed, so long as course prerequisites are met. Students should check the course directory (http://www.jhsph.edu/courses/) to confirm when the courses are offered for students in OPAL programs.

The certificate program requires a minimum of 18 term credits and a minimum grade point average (GPA) of 2.75. Students must earn a minimum grade on a set of required program-specific core courses: "Pass" for courses offered only on a pass/fail basis: "C" or higher for courses offered for letter grading. The certificate program length is flexible; it can be completed in as little as one year, and must be completed within three years.

Course of Study

Course	Title	Credits
First Year		
First Term		
PH.550.860	Academic & Research Ethics at BSPH	
PH.601.731	Spatial Analysis for Public Health	4
	Credits	**4**
Second Term		
PH.601.732	Spatial Data Technologies for Mapping	4
	Credits	**4**
Third Term		
PH.601.733	Applied Spatial Statistics	4
PH.601.805	Spatial Analysis Journal Club	2
	Credits	**6**
Fourth Term		
PH.601.734	Spatial Applications	4
	Credits	**4**
	Total Credits	**18**

Notification of Certificate Program Completion

Students in OPAL certificate programs must complete and submit the Notification of Certificate Program Completion (https://e-catalogue.jhu.edu/public-health/certificates/Notification_of_Certificate_Program_Completion6-4-2019.pdf) form to the OPAL program office **before the end of the add/drop period of the term of your last certificate course**; certificate program completions cannot be processed retroactively.

It is preferable to complete the form electronically. Send the completed form to the OPAL program office as an email attachment. Certificates will be ordered for students approximately one month after the end of the term in the summer, spring, and fall. A template form for each of the OPAL certificates can be found in the Online Library of the OPAL Student Resources site in CoursePlus. The blank form can be found on the School's website as well. Please **send the completed Notification form to OPAL-Office@jhu.edu** by the deadline noted above. Be sure to complete all personal information on the first page, and the year, term and grade for all completed courses. If needed, we can update the pending grades when they are submitted at the end of the term.

Training Certificate in Public Health

Training Certificate in Public Health

NOTE: This certificate program may be completed entirely online!

EDUCATIONAL OBJECTIVES

Upon completion of the Training Certificate in Public Health, the individual will be able to:

1. Use appropriate statistical methods for critical reading of reports of statistical analysis of public health problems.
2. Apply the basic concepts of epidemiology to the study of the patterns of disease and injury applied to public health.
3. Determine the role of environmental factors affecting the health of a population.
4. Identify the managerial and policy issues associated with the delivery, quality and costs of health care.
5. Identify the social, behavioral, and cultural factors related to population health.

ADMISSIONS INFORMATION

Full certificate admissions and contact information is available on the Bloomberg School of Public Health's certificate program webpage (https://www.jhsph.edu/academics/certificate-programs/certificates-open-to-non-degree-students-only/training-certificate-in-public-health.html).

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate program requires a minimum of 22 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (p. 577)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the course catalogue (https://www.jhsph.edu/courses/) to confirm when the courses are offered. The term and time may change from what is listed in the table below and some courses are only offered every other year. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this noncredit online course in their first term of study)	
Required Courses: Students are strongly encouraged to complete the courses in Epidemiology and Biostatistics prior to taking courses in the remaining three core areas		
Biostatistics: Both courses are required		
PH.140.611	Statistical Reasoning in Public Health I (typically offered onsite in 1st term and Summer Institute, and online in 1st term)	3
PH.140.612	Statistical Reasoning in Public Health II (typically offered online in 2nd term, and onsite in 1st term and Summer Institute)	3
Epidemiology: Select either 340.601 or 340.721		
PH.340.601	Principles of Epidemiology (typically offered onsite in Summer and Summer Institute)	5
PH.340.721	Epidemiologic Inference in Public Health I (typically offered online in 1st and 3rd terms and Summer and Summer Institutes)	5
Environmental Health: Required Course		
PH.180.601	Environmental Health (typically offered online in 3rd term and onsite in Summer and Summer Institutes)	5
Social & Behavioral Sciences: Choose one course		
PH.221.688	Social and Behavioral Foundations of Primary Health Care (typically offered online in 3rd and Summer terms)	4
PH.380.604	Life Course Perspectives on Health (typically offered onsite in 1st term and online in 2nd term)	4
PH.410.620	Program Planning for Health Behavior Change (typically offered onsite in 1st term and Winter Institute and online in 4th term)	3
Management Sciences: Choose one course		
PH.305.607	Public Health Practice (typically offered onsite in 2nd term and online in 4th term)	4
PH.312.600	Managing Health Services Organizations (typically offered online in 3rd term)	4
PH.312.603	Fundamentals of Budgeting and Financial Management (typically offered online in 1st, 2nd, 3rd, 4th terms and Summer term)	3

Tropical Medicine, Certificate

Tropical Medicine Certificate Program

EDUCATIONAL OBJECTIVES

This certificate program is designed to provide training in tropical medicine and related public health issues through a multidisciplinary approach. It is also designed to prepare participants for working with current and emerging health problems in developing countries and health problems of travelers. This program focuses broadly on issues of tropical health and on clinical tropical medicine. Toward the program's conclusion, students will have acquired a strong scientific basis for preventing, diagnosis, treating, and controlling tropical health problems. The curriculum will consist of

1. Specific tropical diseases and detailed case studies stressing diagnosis, treatment, and the implementation of preventive control measures
2. Recent advances in diagnostic methodologies
3. Human behavior associated with the transmission of infection and of local perceptions of the disease
4. Laboratory sessions focusing on diagnostic methods for identification of blood, intestinal, and tissue parasites as well as their vectors.

Sessions include practical lab experience in parasitology and diagnosis.

Admissions

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/tropical-medicine-certificate-program/) on the Bloomberg School of Public Health website.

Sponsoring Departments

International Health (http://www.jhsph.edu/dept/IH/)
Molecular Microbiology and Immunology (http://www.jhsph.edu/dept/MMI/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

A minimum of 18 credits is required for completion. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework.

The certificate program length is flexible; however, the certificate must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements.The student's transcript will not indicate that the certificate was earned until the Notification of Completion has been submitted, verified by the certificate program and processed by the Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) to confirm when the courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Students should complete 18 credits of coursework from the options listed below:		
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health (typically offered onsite in 3rd term)	2
PH.223.660	Tropical Medicine and Parasitology (typically offered onsite in Winter and Summer Institutes)	4
PH.223.667	Chronic Diseases in Low and Middle income Countries: Prevalence and Epidemiology (typically offered online in 3rd term and onsite in Summer Institute)	4
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases (typically offered onsite in 4th term and online in 2nd term)	4
PH.223.684	Vector-Borne Diseases in the Tropics (typically offered onsite in Summer Institutes)	4
PH.223.685	Tuberculosis, HIV and Other Chronic Infections in the Tropics (typically offered onsite in Summer Institute)	4
PH.223.686	Child and Public Health in the Tropics (typically offered onsite in Winter and Summer Institutes)	4
PH.223.688	Intestinal Infections in the Tropics (typically offered onsite in Summer Institute)	4
PH.224.691	Qualitative Data Analysis (typically offered online in 2nd and 4th terms and onsite in 4th term)	3
PH.260.601	Vector-Borne Disease Control (typically offered onsite in 4th term)	3
PH.260.623	Fundamental Virology (typically offered onsite in 1st term)	4
PH.260.631	Immunology, Infection and Disease (typically offered onsite in 2nd term)	3
PH.260.635	Biology of Parasitism (typically offered onsite in 2nd term)	5
PH.260.650	Vector Biology and Vector-Borne Diseases (typically offered onsite in 3rd term)	3
PH.260.656	Malariology (typically offered online in 3rd term)	4
PH.260.658	Advanced Malariology (typically offered onsite in 4th term)	2
PH.340.693	Investigation of Outbreaks (typically offered onsite in Winter and Summer Institutes)	2

Vaccine Science and Policy, Certificate

Vaccine Science and Policy Certificate Program

EDUCATIONAL OBJECTIVES

The certificate program provides a framework for understanding vaccine science and policy, from clinical research to implementation, in both the United States and internationally.
After successfully completing this certificate program, students will be prepared to:

1. Understand the detailed process of developing, preparing, evaluating and using vaccines;
2. Identify, analyze, and critique cutting-edge strategies for approaching vaccine development;
3. Identify and describe the scientific and policy obstacles preventing development of effective vaccines for several important human pathogens;
4. Understand current national and international policy issues in vaccine research, development, manufacturing, supply and utilization;

5. Understand global finance policies and strategies for funding vaccine research and development, for purchasing vaccines, and for the implementation and evaluation of vaccine delivery programs and campaigns;
6. Communicate with the key stakeholders and institutions involved in formulating vaccine policy in the United States and globally;
7. Explain policy and regulatory requirements and their application in clinical vaccine trials to assure quality and protection of human subjects;
8. Explain the Good Clinical Practice standards for the design, conduct, performance, monitoring, auditing, recording, analyses, and reporting of clinical vaccine trials.

ADMISSIONS

Contact information and complete certificate program admissions information is available on the certificate program page (https://publichealth.jhu.edu/academics/vaccine-science-and-policy-certificate-program/)on the Bloomberg School of Public Health website

Sponsoring department

International Health (https://www.jhsph.edu/departments/international-health/)

REQUIREMENTS FOR SUCCESSFUL COMPLETION

The certificate requires a minimum of 18 term credits. All required and elective courses must be taken for a letter grade; a minimum grade of C is required in all certificate coursework and students must maintain a 2.75 or better overall GPA for all certificate coursework. The certificate program length is flexible; it varies from student to student, however, the certificate program must be completed within three years.

The student should review the section of the website that addresses completion (https://www.jhsph.edu/academics/certificate-programs/JHSPH_certificate_completion.html)before completing certificate program requirements. The student's transcript will not indicate that the certificate was earned until the Notification of Completion form has been submitted and verified by the certificate program and processed by the School of Public Health Registrar.

COURSE OF STUDY

Students should check the JHSPH course directory (https://www.jhsph.edu/courses/) for information about when the courses are offered. Students should also check for prerequisites and whether instructor consent is required.

Code	Title	Credits
PH.550.860	Academic & Research Ethics at BSPH (All students are required to complete this online noncredit course in their first term of study)	
Required Course- 2 terms are required		
PH.223.867	Special Topics in Vaccine Science (1 credit per term; typically offered onsite in 2nd and 3rd terms)	1
Core Vaccine Courses (select at least 3 of the 4 core courses)		
PH.223.662	Vaccine Development and Application (typically offered onsite in 2nd term)	4
PH.223.687	Vaccine Policy Issues (typically offered onsite in 3rd term)	3
PH.223.689	Biologic Basis of Vaccine Development (typically offered onsite in 4th term)	3
PH.223.705	Good Clinical Practice: A Vaccine Trials Perspective (typically offered online in 4th term)	4
Elective Vaccine Courses (students should select courses from the following list to complete at least 18 total credits of certificate coursework)		
PH.120.603	Molecular Biology of Pandemic Influenza (typically offered onsite in 2nd term)	3
PH.223.663	Infectious Diseases and Child Survival (typically offered onsite in 3rd term)	3
PH.223.664	Design and Conduct of Community Trials (typically offered onsite in 3rd term)	4
PH.223.680	Global Disease Control Programs and Policies (typically offered onsite and online in 4th term)	4
PH.223.682	Clinical and Epidemiologic Aspects of Tropical Diseases (typically offered onsite in 4th term and online in 2nd term)	4
PH.260.611	Principles of Immunology I (typically offered onsite in 1st term)	4
PH.260.612	Principles of Immunology II (typically offered onsite in 2nd term)	3
PH.260.631	Immunology, Infection and Disease (typically offered onsite in 2nd term)	3
PH.260.656	Malariology (typically offered online in 3rd term)	4
PH.260.717	Graduate Immunology: the Immune Response (typically offered onsite in 4th term)	3
PH.306.665	Research Ethics and integrity: U.S. and International Issues (typically offered onsite in 3rd term)	3
PH.340.627	Epidemiology of Infectious Diseases (typically offered onsite and online in 2nd term)	4
PH.340.646	Epidemiology and Public Health Impact of HIV and AIDS (typically offered onsite in 1st term and online in 2nd term)	4

Policies

Academic

Academic Ethics Code

Code of Academic Ethics

The faculty and students of the Bloomberg School of Public Health have the joint responsibility for maintaining the academic integrity and guaranteeing the high standard of conduct of this institution.

Students enrolled in the Bloomberg School of Public Health assume an obligation to conduct themselves in a manner appropriate to The Johns Hopkins University's mission as an institution of higher education. A student is obligated to refrain from acts which they know, or under the circumstances has reason to know, impair the academic integrity of the University. Violations of academic integrity include, but are not limited to: cheating; plagiarism; knowingly furnishing false information to any agent of the University for inclusion in the academic record; violation of the rights and welfare of animal or human subjects in research; and misconduct as a member of either School or University committees or recognized groups or organizations.

The Academic Ethics Code is contained in the school's Policy and Procedure Memorandum, Students – 1. This can be accessed through the School's website (https://my.jhsph.edu/_login/Wsb.Jhsph.Login.aspx?ReturnUrl=%2f_layouts%2f15%2fAuthenticate.aspx%3fSource%3d%252F&Source=%2F).

All students will be automatically registered for and must complete the School's online, not-for- credit course entitled: Academic and Research Ethics (550.860.82) during their first term of registration. The course can be accessed via CoursePlus and all students will receive notice of their registration from the Office of Records and Registration. Students who do not complete the course during their first term of registration will be blocked from registration for courses in the subsequent term.

The course instructs students on the terms of the academic ethics code and proper conduct of research, and it includes short quizzes which students must pass in order to be in good standing.

The online ethics course (550.860.82) can be accessed at: http://courseplus.jhsph.edu/ under the listing of Extradepartmental Courses.

For issues or concerns on matters related to academic integrity, please contact Professor Jon Vernick (jvernic1@jhu.edu), Director, Office of Academic Integrity (Office HH 594; Tel: 410-955-7982).

THE JOHNS HOPKINS BLOOMBERG SCHOOL OF PUBLIC HEALTH

OFFICE OF THE DEAN

Date Effective: May 9, 1983
Date Revised: April 6, 1993
Date Revised: March 31, 1998
Date Revised: January 21, 2006
Date Revised: October 26, 2006
Last Revision: June 30, 2018

SUBJECT: Academic Ethics Code

TABLE OF CONTENTS

POLICY

The faculty and students of the Bloomberg School of Public Health (the "School") have joint responsibility for maintaining academic integrity in the academic conduct and endeavors of the School.

An ethical code is based upon the support of both faculty and students who are charged with the responsibility to live honorably and to take action when necessary to safeguard the academic integrity of this University. Students enrolled in the School assume an obligation to conduct themselves in a manner appropriate to the Johns Hopkins University's mission as an institution of higher education. A student is obligated to refrain from academic misconduct, as defined below in the Academic Ethics Code. Allegations of academic misconduct will be addressed as set forth in the Academic Ethics Code.

PROCEDURES

Students and faculty should become familiar with the Academic Ethics Code, copies of which are provided in student and faculty publications and materials, posted on the website of the School, and can be obtained from the Director of the Office of Academic Integrity.

Students who enroll in courses at the Bloomberg School of Public Health, but whose home Division is elsewhere within the Johns Hopkins University, will be governed by the applicable Ethics Code of their home Division. For example, Johns Hopkins undergraduate students enrolled at the Krieger School of Arts and Sciences, who engage in an alleged violation of academic ethics while completing a Bloomberg School of Public Health course or activity, will be governed by the appropriate Ethics Code at the Krieger School of Arts and Sciences. BSPH students may enroll in courses in one or more other University divisions or schools. BSPH students are subject to this policy not only when enrolled in BSPH schools, but also when enrolled in courses in other University divisions or schools.

Academic misconduct in the context of those 'outside' courses will be subject to and resolved under this policy. Research Misconduct

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. For a complete definition, refer to The Johns Hopkins University Research Integrity Policy ("Policy") available at https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf. (http://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf) The Policy applies to all University faculty, trainees, students, and staff engaged in the proposing, performing, reviewing, or reporting of research, regardless of funding source. Allegations of research misconduct regarding a student should be referred to the Research Integrity Officer for assessment under that Policy, but may also be directed to the department chair or Dean of the responsible unit where the alleged research misconduct occurred.

Non-Academic Misconduct

All issues of non-academic student misconduct will be subject to the University-wide Student Conduct Code. For more on this policy, please refer to http://studentaffairs.jhu.edu/policies/student-code/. (http://studentaffairs.jhu.edu/policies/student-code/)

ACADEMIC ETHICS CODE

PREAMBLE

It is the joint responsibility of faculty and students of the Johns Hopkins Bloomberg School of Public Health to maintain the academic integrity of the School. An ethical code helps ensure high standards of conduct and integrity prevail in the School community.

An ethical code is based upon the support of the academic community, students, and faculty alike, who are charged with two kinds of responsibility: Each member must live honorably and must also take action when necessary to report known or suspected academic misconduct.

The School has the responsibility to provide students with access to this Code. Electronic access on the School's website or paper copies available in the School's Office of Student Affairs are acceptable means of providing the code. Students have the responsibility to read the Academic Ethics Code, become familiar with its provisions, and complete any required academic ethics training in the time frame specified by the School. Thus, all students will be presumed to have knowledge of the provisions of this code as a consequence of enrollment in the Bloomberg School of Public Health. Lack of familiarity with the provisions of this code will not serve as a defense to any academic misconduct as defined by the code.

ARTICLE ONE. VIOLATIONS OF ACADEMIC INTEGRITY

A student is obligated to refrain from academic misconduct, as defined in this Code.

Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. This includes a wide variety of behaviors such as altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual to gain an unfair academic advantage. Nonexclusive examples of academic misconduct are listed below.

Violations of academic integrity include, but are not limited to: cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual to gain an unfair academic advantage. Nonexclusive examples of academic misconduct are listed below.

ARTICLE TWO. DEFINITIONS

Section One

Cheating is broadly defined as using or attempting to use someone else's work or ideas in a context where you are expected to provide your own. Absent instruction by the faculty member in charge of the course to the contrary, examples of cheating include but are not limited to:

- Fraud, deceit, or dishonesty in an academic assignment, test or examination.
- Use or consultation of unauthorized or inappropriate materials (e.g., notes, books, etc.) on assignments, tests, or examinations.
- Unauthorized discussion of a test or exam during its administration.
- Copying content on an assignment, test or examination from another individual.
- Obtaining a test or examination or the answers to a test or examination before administration of the test or examination.
- Studying from an old test or examination whose circulation is prohibited by the faculty member.
- Use or consultation of unauthorized electronic devices or software (e.g., calculators, cellular phones, computers, tablets, etc.) in connection with assignments or during tests or examinations.
- Use of paper writing services or paper databases.
- Unauthorized collaboration with another individual on assignments, tests or examinations.
- Submission of an assignment, test or examination for a regrade after modifying the original content submitted.
- Permitting another individual to contribute to or complete an assignment, or to contribute to or take a test or examination on the student's behalf.
- Unauthorized submission of the same or substantially similar work, assignment, test or exam to fulfill the requirements of more than one course or different requirements within the same course.
- Tampering with, disabling, or damaging equipment for testing or evaluation.
- Furnishing false information to any agent of the university for inclusion in the academic record.
- Violation of the rights and welfare of animal or human subjects in research.

Section Two

Plagiarism is broadly defined as taking for one's own use the words, ideas, concepts or data of another without proper attribution. Plagiarism includes both direct use or paraphrasing of the words, thoughts, or concepts of another without proper attribution. Proper attribution includes: (1) use of quotation marks or single-spacing and indentation for words or phrases directly taken from another source, accompanied by proper reference to that source and (2) proper reference to any source from which ideas, concepts, or data are taken even if the exact words are not reproduced.

Examples of plagiarism include, but are not limited to:

- Use of material produced by another person without acknowledging its source and proper attribution.
- Use of another person's ideas or words without proper attribution.
- Submission of the same or substantially similar work of another person (e.g., an author, a classmate, etc.).
- Use of the results of another individual's work (e.g., another individual's paper, exam, homework, computer code, lab report, etc.) while representing it as your own.
- Use of paraphrased passages taken from published or unpublished sources without proper attribution.
- Wholesale copying of passages from works of others into homework, essays, term papers, dissertation or other assignment without proper attribution.

- Paraphrasing of another person's characteristic or original phraseology, metaphor, or other literary device without proper attribution.

Section Three

Other forms of academic misconduct include, without limitation: forgery/falsification/lying, facilitating academic dishonesty, unfair competition, and failing to follow applicable polices, procedures, or rules. Examples of these forms of academic misconduct include, without limitation:

Forgery/Falsification/Lying. The following are nonexclusive examples of forgery, falsification and lying:

- Falsification or fabrication of data/information for an assignment, on a test or exam, or in an experiment.
- Citation of nonexistent sources or creation of false information in an assignment.
- Attributing to a source ideas or information that is not included in the source.
- Forgery of university or other official documents (e.g., letters, transcripts, etc.).
- Impersonating a faculty or staff member.
- Request for special consideration from faculty members or university officials based upon false information or deception.
- Fabrication of a reason (e.g., medical emergency, etc.) for needing an extension on or for missing an assignment, test or examination.
- Claiming falsely to have completed and/or turned in an assignment, test, or examination.
- Falsely reporting an academic ethics violation by another student.
- Failing to identify oneself honestly in the context of an academic obligation.
- Providing false or misleading information to an instructor or any other university official.

Facilitating Academic Dishonesty. The following are nonexclusive examples of facilitating academic dishonesty:

- Intentionally or knowingly aiding another student to commit an academic ethics violation.
- Allowing another student to copy from one's own assignment, test, or examination.
- Making available copies of course materials whose circulation is prohibited (e.g., old assignments, texts or examinations, etc.).
- Completing an assignment or taking a test or examination for another student.
- Sharing paper mill/answer bank websites or information with other students.

Unfair Competition. The following are nonexclusive examples of unfair competition:

- Intentionally damaging the academic efforts of another student.
- Stealing another student's academic materials (e.g., books, notes, assignments, etc.).
- Denying university resources needed by another student (e.g., hiding library materials, stealing lab equipment, etc.).

Failing to Follow Applicable Policies, Procedures, Rules

- Failing to follow applicable JHU, divisional/school, program, course, and/or faculty policies, procedures, rules regarding academic ethics.

ARTICLE THREE. RESPONSIBILITIES OF STUDENTS AND FACULTY

Section One

All members of the academic community are responsible for the academic integrity of the University. Students and faculty alike must work together to minimize the possibility of violations of academic integrity.

Section Two

The faculty is responsible for the conduct of examinations, for announcing the ground rules for all work in a course at the beginning of the quarter in which the course is offered, and for the security of examination papers and teaching laboratories. Proctoring is at the discretion of the instructor.

Section Three

A student with knowledge or suspicion of any academic misconduct governed by this Academic Ethics Code is strongly encouraged to promptly report such violation, including the identity of the alleged violator(s), to the appropriate faculty member or to the Director of the Office of Academic Integrity. A student may not make a formal charge directly to the Academic Ethics Board. Formal charges to the Academic Ethics Board must be brought by the appropriate faculty member or by one of the deans responsible for student affairs.

ARTICLE FOUR. THE ACADEMIC ETHICS BOARD

Section One

The Academic Ethics Board (the "Board") consists of six students selected by the Student Assembly, four faculty members appointed by the Dean, the Director of the School's Office of Academic Integrity, and, under extraordinary circumstances, ad hoc members appointed by the Dean in accordance with Article Six, Section Three. The terms of service of members of the Board shall be determined by the Dean. The Dean may replace members of the Board that were appointed by them at their discretion. Reasonable efforts should be made to select students and faculty from diverse disciplines, departments, and, in the case of students, academic programs. At least one member of the Board shall be a full professor.

Section Two

The Board shall elect a chairman from among its members, and shall select other officers and staff as provided in its Bylaws.

Section Three

The Board, acting through the Director of the Office of Academic Integrity, is responsible for the maintenance of the academic integrity in the Bloomberg School of Public Health for all matters concerning adherence to the ethics code, including, but not limited to: (1) receiving reports of suspected violations, (2) consulting with members of the University community on ways to reduce possible violations, (3) appointing hearing panels, (4) maintaining confidential records, (5) orienting new students to the philosophy and terms of the ethics code, and (6) informing faculty and students of its activities.

Section Four

The Board shall find and use effective means to inform faculty and students of its activities on an annual basis.

Section Five

The Board, acting through the Director of the Office of Academic Integrity, shall submit to the office of one of the deans responsible for student affairs a written annual report, which shall not identify by name the individuals involved in its proceedings. The Committee shall disseminate this report to the Dean, faculty, and the Student Assembly.

ARTICLE FIVE. PROCEDURES FOR HANDLING SUSPECTED ACADEMIC MISCONDUCT

Section One

When evidence is found of suspected academic misconduct, the faculty member in charge of the course or activity may review the facts of the case with the student and attempt to resolve the case directly with the student to their mutual satisfaction. Proposed resolutions shall include only those sanctions specifically enumerated in Article Seven, Section One parts (a) - (j). Prior to a proposed resolution, the faculty member in charge of the course or activity has the responsibility to consult with the Director of the Office of Academic Integrity to determine if the student was part of an earlier resolution with a member of the faculty, or if the student was previously the subject of an academic misconduct hearing by a panel of the Academic Ethics Board. If it is determined that the student was part of a previous direct resolution with a faculty member or academic misconduct hearing and the present allegation is unrelated to the earlier allegation, the faculty member must forward the case directly to the Academic Ethics Board. A second or subsequent allegation against a student may not be resolved directly between the faculty member and the student and must be forwarded directly to the Academic Ethics Board.

If both the faculty member and the student agree upon a proposed resolution in accordance with this code, no further action regarding the academic misconduct in question shall be undertaken beyond the agreed upon sanctions. If such an agreement is reached, the resolution shall be communicated to the Director of the Office of Academic Integrity. The student's advisor and the student's academic program director or department chair shall also be notified unless the faculty member chooses not to make this part of the proposed resolution. The faculty member and student may co-sign a memo or other document that the case was resolved to the mutual satisfaction of each party. This resolution will not be placed in the student's permanent academic record unless that was part of the resolution.

A student who engages in a direct resolution forfeits the right to withdraw from the course in question, switch from a graded course to the pass/fail option, or petition for a grade change.

The faculty member shall notify the Academic Ethics Board when:

1. The faculty member cannot reach a resolution with the student;
2. The alleged misconduct is a second or subsequent offense;
3. The faculty member prefers to refer the case to the academic ethics board for resolution rather than attempt to resolve it directly with the student.

In addition to notifying the Board, the faculty member shall communicate the essential facts of the case in writing and all relevant documents to the Board. Reasonable efforts shall be made to make such statements within 30 days of the alleged academic misconduct, or within 30 days of reasonable knowledge.

Section Two

Upon receipt by the Academic Ethics Board of a charge of alleged academic misconduct, the Director of the Office of Academic Integrity, acting on behalf of the Academic Ethics Board, shall provide prompt notice of the charge to the student by hand delivery, electronic communication, or by certified mail, return receipt requested. The notice shall contain:

1. A description of the alleged violation(s) of academic integrity including insofar as possible the time, date, and place of the alleged act(s);
2. Information about when and where the hearing that will take place and the names of the members of the hearing panel and a statement of the right of the student to request recusal of panel members due to conflict of interest or bias;
3. A statement informing the student of the right to inspect in advance of the hearing any documentary evidence intended for use at the hearing as well as the chance to provide documentary evidence intended for use at the hearing;
4. A copy of the academic ethics code and bylaws of the academic ethics board.

Section Three

Upon receipt of a charge of a violation of academic integrity from a faculty member, the Academic Ethics Board, acting through the Director of Office of Academic Integrity, shall appoint a hearing panel, in accordance with

Section Six below, to consider the charge. The panel shall make a determination on whether academic misconduct occurred, in accordance with the procedures in Section Six below, and, if so, shall make a determination on appropriate sanctions in accordance with Article Seven.

Section Four

In the event of a violation of academic integrity in which it is inappropriate for any one faculty member to act as the person bringing the charge, a designee of the Dean or one of the deans responsible for student affairs shall act as the person bringing the charge.

Section Five

If the hearing panel finds that a student has engaged in academic misconduct, the student may appeal the decision of the hearing panel to the Dean of the Bloomberg School of Public Health, or to a designee of the Dean if the Dean was the faculty member making the initial charge of a violation of academic ethics, within 5 days of the decision of the hearing panel. Appeals are permitted only on one of the following grounds:

1. Procedural error that could have substantially affected the determination of responsibility;
2. New information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility.

The appeal must be in the form of a written statement setting forth the grounds for the appeal. All materials collected as part of the proceedings of the Academic Ethics Board hearing shall be provided to the Dean or designee to review in considering the appeal. A full written report of the disposition of each appeal shall be made by the Dean or designee within 14 days to the Academic Ethics Board. In the event that the Dean or designee does overrule the finding of the Hearing Panel, the Dean shall either ask the prior Hearing Panel to reconsider the matter or shall ask that a new Hearing Panel be convened and the alleged violation reexamined and a new hearing conducted. The Dean or designee shall not reverse a penalty imposed by the Academic Ethics Board, nor impose a different penalty.

The Registrar shall be notified immediately of an appeal to the Dean or designee. Transcripts are not to be furnished until resolution of the matter.

ARTICLE SIX. HEARING PANELS

Section One

When required under the procedures of Article Five, the Academic Ethics Board, acting through the Director of the Office of Academic Integrity, shall appoint a hearing panel of disinterested persons from among its members to consider a case. Members of the hearing panel may not be from the same Department as the student subject to the hearing. Hearing panel members shall disclose to the Director of the Office of Academic any factor which might reasonably make them unable to impartially decide either whether the student violated the Ethics Code or the appropriate penalty. Such members shall be excused from serving on the relevant hearing panel at the discretion of the Director of the Office of Academic Integrity.

Section Two

A hearing panel shall consist of five persons and a nonvoting, presiding officer, all ordinarily chosen from the members of the Board, the ratio of faculty and students on the panel being the same as on the Academic Ethics Board (i.e., 3 students, 2 faculty, and non-voting student presiding officer). The Director of the Office of Academic Ethics shall not serve on a hearing panel but shall be available to resolve questions about procedure under this Code that arise during a hearing.

Section Three

Under extraordinary circumstances the Dean may appoint ad hoc members to the Hearing Panel from among full- time faculty or full-time students from the Bloomberg School of Public Health who are not members of the Board. Such a circumstance might occur if a panel could not be constituted in a timely manner from among the members of the Board, if the workload of the Board was unusually heavy, or if enough students and faculty were excused under Section One (above).

Section Four

Hearings of the panel shall be open to the person bringing charges, the student, any witness called by either party during the course of that witness' testimony, the Director of the Office of Academic Integrity, and not more than one representative of the student affiliated with the Bloomberg School of Public Health (faculty, staff, and students of the School). Attorneys representing the student are not permitted at the hearing. Hearings shall be closed to spectators and the press. In the case of related academic misconduct allegations against multiple students, the Director of the Office of Academic Integrity shall make a determination of the optimal methods to conduct the hearing consistent with this Code and its bylaws.

Section Five

The accused shall be presumed not to have engaged in academic misconduct until found to have done so.

Section Six

The decision of the hearing panel on whether academic misconduct occurred shall be based upon a preponderance of the evidence standard and shall be communicated promptly in writing to the Dean of the Bloomberg School of Public Health, the student, and the faculty member bringing the charge(s). A finding that academic misconduct occurred shall also be communicated to the student's adviser and to the student's department chair or academic program head.

A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true.

Section Seven

The vote of at least four of the five voting panel members is required for a finding that academic misconduct occurred.

Section Eight

Hearings shall be conducted in accordance with this PPM, including the Hearing Panel Procedures below.

Section Nine

If the student fails to appear for a hearing after having been duly provided with notice or withdraws from a hearing before its conclusion without the permission of the hearing panel, and if the hearing panel determines that such action is not excused (e.g., because of an unanticipated illness or other unexpected factor that prevents the student from attending), immediate suspension of the accused from the University may be imposed. Such a suspension shall continue until the hearing can be concluded with the student present.

ARTICLE SEVEN. PENALTIES

Section One

This section lists some of the sanctions that may be imposed upon students for violations of this Academic Ethics Code. The School reserves the right, in its discretion, to impose more stringent or different sanctions depending on the facts and circumstances of a particular case. Possible sanctions against students include, without limitation, one or more of the following:

An accused student found to engaged in academic misconduct may have, at the discretion of the Ethics Board, the following comment placed upon the academic transcript: ACADEMIC ETHICS CODE VIOLATION, DATE OF ETHICS BOARD MEETING.

1. Retake of the academic evaluation involved.
2. Score of zero in the academic evaluation involved.
3. Failure in the course.
4. Failure in the course with a notation on the transcript that the grade was for a violation of academic integrity.
5. Failure in the course with suspension from the University for at least one term as specified in the academic calendar.
6. Suspension from the University for at least one term as specified in the academic calendar with a notation on the transcript that the cause was a violation of academic integrity.
7. Failure in the course with suspension from the University for at least one term as specified in the academic calendar and notation on the transcript that the grade was for a violation of academic integrity.
8. Exclusion from a dissertation or thesis of all data collected under conditions that constitute a violation of the rights and welfare of animal or human subjects.
9. Suspension from the University for at least one term as specified in the academic calendar.
10. Expulsion from the University with a notation on the transcript that the cause was a violation of academic integrity.

If a finding has been made that misconduct occurred, before any sanction is imposed, the hearing panel shall determine by review of its confidential records by the Director of the Office of Academic Integrity whether the student has been found to have engaged in any prior violations of the academic ethics code.

A hearing panel shall make every effort to select a penalty appropriate to the severity of the offense, and may take into consideration any appropriate factors, including without limitation any mitigating or aggravating circumstances (such as inappropriate contact by the student with members of the Ethics Board during a Hearing brought to its attention), sanctions previously imposed upon other students for similar violations, as well as any record of or absence of prior academic misconduct. At least three of the five voting members of a hearing panel must vote for a particular sanction for that sanction to be imposed, with the exception of expulsion from the University which requires all five out of five votes.

Section Two

A finding of guilt in the first academic ethics hearing for a student who has previously not engaged in a direct resolution of an academic ethics violation shall result in the penalties selected from among (a) thru (j) or other appropriate penalty as determined by the hearing panel.

A finding of guilt in the first academic ethics hearing held for a student who has previously engaged in an academic ethics violation shall result in the penalties selected from among (b) thru (j) or other appropriate penalty as determined by the hearing panel. A notation on the student's transcript that academic misconduct has occurred must be placed on the transcript for a student who had previously been found to have engaged in academic misconduct in an earlier hearing.

Section Three

A student found to have engaged in academic misconduct in a course forfeits the right to withdraw from the course or to change a graded course to pass/fail, or to petition for a grade change, and any withdrawal from that course or change effected prior to the finding of academic misconduct shall be voided.

ARTICLE EIGHT. RECORDS

Section One

The Academic Ethics Board shall maintain among its records a list of names of students found to be guilty of violations of academic integrity. It is this list that is consulted to determine whether an offense is a first offense or is a second or subsequent offense.

Section Two

The records of the Academic Ethics Board shall be held in a locked file in the Dean's Office.

Section Three

Access to the records of the Academic Ethics Board shall be limited to the Dean of the Bloomberg School of Public Health, to the deans responsible for student affairs, the Director of the Office of Academic Integrity, and to members of the Board.

Section Four

A case file concerning a student (including all relevant documents, recording(s) of the hearing, documentary evidence introduced at hearings, etc.) shall be retained in the Office of the Dean for seven years after the student's last enrollment as a student or after the student otherwise leaves the University and shall then be destroyed.

Section Five

The Director of the Office of Academic Integrity shall maintain a central file of direct settlements of allegations of academic ethics code violations. Records of direct settlements shall be retained for seven years after completion of the case and kept in a central location accessible only to the Director of the Office of Academic Integrity and the deans responsible for student affairs.

ARTICLE NINE. BYLAWS AND AMENDMENTS

Section One

The Academic Ethics Board shall adopt Bylaws to govern its operation.

Section Two

Amendments to this Academic Ethics Code shall take effect when they are adopted in identical language by the General Counsel's Office of the University and the Advisory Board of the School.

HEARING PANEL PROCEDURES

Selection of Hearing Panel and Presiding Official

A hearing panel shall be convened from among the members of the Academic Ethics Board by the Director of the Office of Academic Integrity. Members of the Academic Ethics Board shall be informed of the name of the student and the person bringing the charge(s), and must disqualify themselves if for any reason they believe their ability to consider the charges in an impartial fashion will be affected. One faculty alternate and one student alternate shall be chosen in the same way. Any student or faculty member having the same departmental affiliation as either the accused or the accuser(s) is ineligible from participating on the hearing panel.

All members of the Academic Ethics Board, except the Director of the Office of Academic Integrity, are eligible to serve unless there is potential conflict of interest or bias with respect to the student or the person bringing the charge such as to call into question their ability to make an unbiased determination about the academic misconduct. The presiding official of the hearing panel shall be a student member who is agreed upon by consensus by the members of the hearing panel.

The document "Procedural Conduct of an Academic Ethics Hearing" was developed as a guide for the presiding official, and to acquaint all parties involved as to the procedures that may be reasonably expected during a hearing. A copy may be obtained from the Director of the Office of Academic Integrity or one of the deans responsible for student affairs.

Rights and Responsibilities of Individuals Before a Hearing

Section One

The student shall be notified in writing of a charge of a violation of academic integrity as provided in Article Five, Section Two of the Ethics Board Constitution. Written notice shall be provided to the student either by personal delivery, sent electronically, or sent to the student at the address appearing on University records. The names of hearing panel members, of the presiding official, and of the alternate members of the panel shall be included in the letter of notification. The student has the right to request that a member or members of the hearing panel be excused from service if the student believes the hearing panel member has a conflict of interest or bias that would prevent the panel member from impartially serving. The student shall state their reasons to the Director of the Office of Academic Integrity who shall make the final determination of the panel member's eligibility to serve.

Section Two

The person(s) bringing the charge and the student shall deposit with the Director of the Office of Academic Integrity any documentary evidence to be used at the hearing before the times given in Section Three of this Article.

Section Three

The student may select one person affiliated with the Bloomberg School of Public Health (faculty, staff, or student) to be their representative at the hearing (who may not be an attorney). The student may inspect all documentary evidence and, if practicable, will be furnished with copies of the evidence prior to the hearing. The person bringing the charge(s) may also inspect all documentary evidence provided by the student. If the Bloomberg School of Public Health is in session, inspection shall be permitted at least two days, excluding weekends and brief vacations, before the hearing. If the Bloomberg School of Public Health is not in session, inspection shall be permitted at least one week before the hearing.

Section Four

Security of the documentary evidence is to be maintained by the Director of the Office of Academic Integrity and may be inspected only in the presence of the Director of the Office of Academic Integrity. The evidence shall be deposited in the office of the Dean of the Bloomberg School of Public Health.

Section Five

The hearing panel members shall not be informed of details of the charge before the hearing is convened and shall scrupulously avoid discussing the pending hearing either with the parties concerned, possible witnesses, or any other persons. Panel members shall not discuss the merits of the charges with each other prior to entering into a determination of the charges.

Section Six

The student, the representative of the student, and the person(s) bringing the charge may discuss procedures with the presiding official or Director of the Office of Academic Integrity but may not approach members of the panel concerning any matter directly or indirectly related to the hearing, nor should any member of the hearing panel approach the student or the person(s) bringing the charge for any matter directly or indirectly related to the hearing.

Section Seven

The Dean shall designate a member of their staff in consultation with the presiding official to provide administrative support to the Hearing Panel and Board. This designee shall be free of conflict of interest or bias with respect to the case.

Joinder of Charges

Students charged with misconduct arising from a single incident or occurrence may have their hearings joined at the instance of the Director of the Office of Academic Integrity. Each student shall receive an individual finding on academic misconduct, even if multiple students are accused and are participants in a single hearing.

Charges of academic misconduct against a single student arising from two or more incidents or occurrences may be heard at one hearing at the instance of the Director of the Office of Academic Integrity. When such a joinder of charges is made, the hearing panel shall make separate findings on academic misconduct as to each change and make separate determinations of penalties for each charge. With respect to the determination of penalty under Article Seven, Section Two, the charge which occurs latest in time shall be considered the second or subsequent finding of guilt.

Individuals Present at Hearing

Section One

The presiding official, who shall act as a recorder, the Director of the Office of Academic Integrity, and members of the hearing panel shall be in attendance throughout the hearing.

Section Two

The student and the person bringing the charge(s) shall be present throughout the student's plea, statement, the presentation of evidence, and questioning.

The student may choose to have their representative (the representative is selected in accordance with Section Three above and may not be an attorney) present at the hearing throughout the student's plea, statement, the presentation of evidence, and questioning.

Section Three

The student and person bringing the charge(s) may call witnesses for the purposes of providing evidence or corroboration of evidence. Witnesses shall be present at the hearing only for the purpose of giving testimony and answering questions and only during the duration of their testimony and answering of questions. After testifying, witnesses shall remain available and shall inform the presiding official of their whereabouts and how they may be reached. The responsibility for informing witnesses about the hearing rests with the student and/or the person bringing the charge(s). Witnesses must uphold the confidential nature of the hearing process.

Hearing Procedure

Section One

Record. A full and complete record shall be made of the proceedings by a tape recording or other suitable device. The student shall be furnished a copy of the tape recording at their request for the purpose of preparing an appeal. No record of the panel deliberations shall be made. The hearing panel may, however, prepare a brief written report detailing the reasons for its findings on academic misconduct and for any sanctions imposed. Such reports, maintained by the Director of the Office of Academic Integrity, shall be used only to help establish uniformity of verdicts and penalties and shall be written so as not to divulge, directly or indirectly, the identity of individuals.

Section Two

Plea. After calling the hearing to order and introducing the panel, the presiding official shall read the charge(s) and ask the student to state whether they did or did not engage in academic misconduct.

In the case of more than one charge heard by the panel at a single hearing, if the accused pleads guilty as to any of the charges, the presiding member shall excuse the accuser(s), accused, and the accused's representative. The hearing panel shall then proceed directly to the determination of guilt or innocence for each charge on which a guilty plea has been entered.

For each charge in which the accused enters a plea of innocence, the hearing panel shall proceed with the presentation of the evidence.

Section Three

Presentation of Evidence.

1. If the student asserts that they did not engage in academic misconduct, the person bringing the charge(s) shall present testimony and evidence in support of the charges. After the testimony of each witness, the student, the representative of the

accused, the members of the panel, and the presiding official may ask questions.

2. The student and the representative of the student may then present testimony and evidence in support of the student's innocence. After the testimony of each witness, the person bringing the charge(s), the panel, and the presiding official may ask questions. Any evidence or testimony relevant to the charge(s) specified in the notice may be admitted into evidence and heard and reviewed by the panel.
3. After the presentations of the student and the person bringing the charge(s), any person in attendance, other than witnesses, may recall witnesses for further questioning.
4. At the conclusion of all the evidence and testimony, the student and the person bringing the charge(s) shall each have the opportunity to make a closing statement.
5. Following the closing statements, all individuals except the presiding official and members of the panel are excused. The student and the person bringing the charge(s) shall remain available and shall inform the presiding official of their whereabouts and how they may be reached.

Section Four

Findings. Each member of the panel will be asked to give a preliminary opinion concerning whether academic misconduct occurred for each charge. The case will then be discussed by the panel until each member is ready to vote. In the course of the deliberations the panel may review the documentary evidence or listen to the recording of the hearing or to any parts of the hearing. A single secret ballot will be taken on each charge. At least four votes (out of five) are required for a finding that academic misconduct occurred. The presiding official will count the ballots, maintain an orderly discussion, but will not express an opinion on the merits of the case or vote. The Director of the Office of Academic Integrity may answer questions of procedure based on the Academic Ethics Code but will not express an opinion on the merits of the case or vote. Once a determination has been made, the student, the student's representative, and the person bringing the charge(s) will be asked to return and the finding will be announced.

Section Five

Determination of Penalty. If a determination is made that the student engaged in academic misconduct, the student and the student's representative may present any mitigating circumstances to the panel. Corroborating witnesses of the mitigating circumstances may be called by the student.

If the hearing panel deems it necessary, it may obtain additional testimony from the person bringing the charge(s) or the student. In the course of the deliberations the panel may review the documentary evidence or listen to the recording of the hearing or to any parts of the hearing. After the presiding official and the panel members have no further questions, the student and the student's representative will be excused; and the panel will discuss the possible sanctions until a secret ballot results in a majority vote for a penalty. The presiding official may not vote or express an opinion. The student will be recalled to the hearing and the sanction(s) will be announced.

If the finding is that the student engaged in academic misconduct, the Director of the Office of Academic Integrity will communicate the finding and associated sanction to the student's adviser to the student's academic program head or department chair.

Recesses of the Panel

The presiding official may recess the hearing when it is deemed necessary. During a recess of the hearing no discussion of the case by panel members will be permitted.

ACADEMIC ETHICS BOARD BYLAWS

1. The presiding official on each Hearing Panel shall prepare a synopsis of the case heard by the Panel. Such synopsis shall specify the nature of the charge, the course in which the alleged violation took place, the determination of the hearing panel and penalty imposed, and the outcome of any appeal. The identity of the student and the individual bringing the charge shall not be included in the summary.
2. A breach of confidentiality of a case shall cause the removal of an Academic Ethics Board member by a majority of the Academic Ethics Board.
3. The Ethics Code Hearing Panel Procedures and Bylaws may be amended by the approval of three of the four faculty members and four of the six student members at a meeting of the Ethics Board for which notice has been given at least one week prior to the meeting. The wording of the proposed amendment shall be included with the notice of the meeting.
4. The Academic Ethics Board shall elect officers as needed. Officers shall be elected by a vote of three of the four faculty members and four of the six student members. The term of each office shall expire at the end of each academic year.
5. A member of the Board a Hearing Panel can be removed at any time by a majority vote of the Board.
6. The Director of the Office of Academic Integrity shall maintain a summary of previous Academic Ethics Board cases.
7. The Director of the Office of Academic Integrity shall, as needed, provide an annual orientation for the members of the Board to their duties and responsibilities, the Ethics Code, and the conduct of a hearing.

Academic Leave of Absence

Academic Leave of Absence Policy

June 24, 2019

Academic leave of absence refers and is limited to students in a degree program requiring continuous enrollment and have completed a minimum of one academic term of program coursework, and who, while in good academic standing, are forced to withdraw temporarily from graduate work due to reasons beyond their control, such as illness, military service, financial exigency, or pressing personal reasons justifying an interruption of the degree program. No academic activities may be conducted during leave and this leave may not be used to avoid payment of tuition. Students may be given a leave of absence for other reasons (e.g., medical leave) as noted elsewhere in this *Guidebook*. Students who have had federal financial aid may be subject to additional restrictions and should check with the Financial Aid Office (https://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/). Academic leaves of absence are typically limited to one year except for military service. Students requiring additional terms of leave beyond the one year must complete a new Leave of Absence Application. No more than two years of leave may be granted. The period is regarded as an approved break in study. This does not mean, however, that a student working on a thesis who has completed all other degree requirements is entitled to a leave of absence.

Students planning to request a leave of absence must file an application, which is signed by the departmental chairman, the student's adviser, appropriate staff members in the area of Student Services, and the Office of Records and Registration. The form can be obtained from the departmental academic coordinator. An active file fee of $50 per term is assessed for each term within the leave of absence period. Prior to resuming the degree program, students on leave of absence must notify the department chair, the academic coordinator within their department and the associate director of Records and Registration. Upon return from leave of absence, students must register for a minimum of two successive terms before completion of their degree programs.

Post-doctoral fellows requiring an academic leave of absence should consult with their department academic coordinator to see if this is an appropriate option.

Important
The failure of a student to register without obtaining an approved leave of absence status will be considered a withdrawal. The student considered to be withdrawn must be formally readmitted before resuming a program of study. Upon readmission, a student must be registered for a minimum of two consecutive terms prior to completion of their degree program.

Time Limitations
To maintain degree candidacy:

- Students enrolled in master's degree programs must fulfill all requirements within the time limits prescribed for the program
- Full-time doctoral students must fulfill all requirements within seven calendar years after matriculation. Part-time doctoral students must fulfill all requirements within nine calendar years after matriculation. The academic clock is stopped for periods in which the student is approved for leave of absence

Compliance Line

Compliance Line

November 19, 2018

The mission of Johns Hopkins University is to educate its students and cultivate their capacity for life-long learning, to foster independent and original research, and to bring the benefits of discovery to the world. In service to this mission, the university strives to promote an environment of integrity, ethics and safety. All members of the Johns Hopkins community are expected to uphold these standards, which is why The Johns Hopkins Compliance Line was established. This independently administered hotline allows for anonymous (if desired) reporting of serious concerns or violations of any kind. Examples include violations of regulations for scientific and scholarly actions and breaches of student life policies. Any possible risk involving non-compliance with a law, regulation, or policy should be reported by calling the Compliance Line at 1-844-SPEAK2US (1-844-773-2528) or submitting a report online (https://johnshopkinsspeak2us.tnwreports.com/).

Grade Appeal Policy

11. Grade Appeal Policy

Final Amendment to PPM 1 Academic Programs
Approved January 26, 2017

11.1 Background:

The purpose of this Grade Appeal Policy is to ensure fairness in the assignment of grades for students at the Johns Hopkins Bloomberg School of Public Health. Grades should be based on mastery of course content and/or course learning objectives.

The School recognizes that faculty must be able to exercise their considered academic judgment and expertise in the assigning of a grade. A grade may not be appealed based solely on a difference of opinion between the student and the instructor regarding the content or quality of the student's work.

11.2 Permissible Bases for a Grade Appeal:

Only final course grades may be appealed through this formal process, though students remain free to discuss interim course assignment grades with their course instructor or base an appeal of a final grade on the grade awarded to an interim course assignment. Appeals must be brought within 45 days of the posting of a final course grade to SIS.

The final grade appeal must be based on one or more of the following factors only:

1. An error in the arithmetic computation of the grade;
2. The course Instructor failed to follow a written course policy or grading standards in the course assignment instructions, syllabus, course website, or other course materials or lecture in a manner that affected the final grade.

11.3 Not Covered by this Grade Appeal Process:

A faculty member's decision not to grade, or to penalize the grade of, an assignment submitted past the submission deadline, or an assignment submitted in a manner inconsistent with course instructions (e.g., to an incorrect drop box), may not be appealed unless that decision contradicts a written course policy stated in the course assignment instructions, syllabus, course website, lecture, or other course materials in a manner that affected the final grade.

Disputes regarding changes of grading system (e.g., to or from Pass/Fail to a letter grade) are not covered by this policy.

If the student believes that the faculty member's grading decision is based on animus toward the student or other inappropriate factor, that dispute will not be governed by this Grade Appeal Policy. It will instead be governed by PPM Faculty 8: Professional Misconduct.

Complaints by students involving matters other than course grades are not governed by this Grade Appeal Policy. They may be governed by PPM Students 7: Student Grievance Procedure.

Complaints alleging discrimination or harassment on the basis of race, color, sex, age, religion, sexual orientation, national origin or ethnic origin, or disability, or complaints of sexual harassment are not governed by this Grade Appeal Policy. Complaints of this nature are to be referred to the University's Office of Institutional Equity.

11.4 Process:

Step 1: Contact the Course Instructor
The student must first contact the course Instructor via dated email, within 45 days of the course grade having been posted to the SIS, to attempt to resolve the matter informally.

Step 2: Contact Your Adviser or Other Faculty Member Who Agrees to Assist with a Possible Mediation of the Dispute

If efforts to resolve the matter with the course Instructor informally are unsuccessful, and the student wishes to proceed, the student must next discuss the matter with their adviser, or another faculty member of the student's choice (with that faculty member's agreement), to assist in a possible mediation of the dispute. If the student does not wish to discuss the matter with their adviser, and is unable to identify an alternative faculty member, they may ask the Director of their Academic Program to designate a faculty member with whom to discuss the matter and to assist with a possible mediation of the dispute.

Step 3: Contact the Designee of the Chair of the Department in which the Course is Taught
If the matter remains unresolved following Steps 1 and 2 (above), the student may proceed to Step 3.

Each Department Chair shall designate a faculty or staff member to serve as the contact for that Department's grade appeals. The Chair may designate themselves if they choose.

If the Chair is the instructor for the course in question, they must designate another faculty member for the resolution of the relevant dispute only.

If the course is an interdepartmental course (i.e., with a 550 designation), the Director of the School's Office of Academic Integrity will serve as the decision-maker for an appeal under Step 3.

To initiate Step 3, the student shall first complete the attached form (https://e-catalogue.jhu.edu/public-health/policies/academic/grade-appeal-policy/Grade_Appeal_Form_01262017.pdf) stating the bases for the appeal and attaching a brief summary of the nature of the appeal, the course syllabus, assignment

instructions, relevant information from the course website if any, and any other documentary materials relevant to the dispute.

The Designee of the Chair shall review the materials submitted by the student. If the Designee finds it helpful or necessary to gather additional information from either party, whether in person or in writing (e.g., via email), the designee shall notify both parties and offer each an opportunity to respond.

The Designee shall base their decision solely on whether one of the permissible basis or bases for appeal have been met, based on a preponderance of the evidence, and whether the final grade was affected as a result.

Step 4: Communication of Decision
The Designee of the Chair shall communicate their decision, stating the reason, to the student and course Instructor in writing (via email is permitted.) No further appeal is permissible. The course Instructor shall be responsible for promptly notifying the Registrar of any necessary grade change.

Grading System

Johns Hopkins Bloomberg School of Public Health Grading System

November 19, 2018

Purpose

The grading system at the Bloomberg School serves to document the academic progress of students. The system is designed to recognize superior work and provide indications of serious problems in academic work. Current students are expected to view their grades periodically by logging onto Self Service (https://sis.jhu.edu/sswf/Default.aspx).

Descriptive Interpretation

Two grading systems are used by all instructors in submitting grades. One is a traditional letter grading system and the other is a pass/fail option.

Quality

Grade	Points	Meaning
A	4.0	Excellent
B	3.0	Good
C	2.0	Fair (satisfactory)
D	1.0	Poor
F	0.0	Fail
P	n/a	Pass

In addition, the letter “I” is used to designate incomplete, “W” to indicate withdrawal, “MT” for multiterm courses (grade assigned at the end of a subsequent term), “MR” or “X” in cases where the instructor fails to report grades. (Note: I, MT, MR and X grades are not final grades.)

The designation “AU” indicates audit. Field Placement, Thesis Research, Postdoctoral Research, and Special Studies and Research are graded strictly pass/fail.

No course credit will be acquired for courses in which a grade of AU (audit), I (incomplete) or MR or X (grade not received from course instructor) is received.

No course credit will be acquired for courses in which a grade of F (fail) is received but the grade will be factored into the student's grade point average.

No course credit will be acquired for lower-level undergraduate courses taken interdivisionally at other divisions of the University. Courses numbered below xxx.300 are considered lower level undergraduate, e.g., AS 381.101, Beginning Hindi I.

Because not all divisions of the University share the same grading policies, the grades awarded by faculty are based on the procedures of the course's home division. The grades that appear on students' academic records reflect any appropriate conversions. Interdivisional registrants are advised to direct any questions to the registrar's office at their home division.

Satisfactory Academic Progress

Satisfactory academic progress is measured by the following as they relate to one another:

- To maintain satisfactory academic performance and good academic standing, all masters and certificate students must maintain a minimum grade point average of 2.75 and all doctoral students must maintain a minimum grade point average of 3.00 and grades of A, B, or P (pass) in all courses required by the School or by the student's department
- Written documentation of successful completion of all Bloomberg School and departmental degree requirements within the established time limitations
- Confirmation of satisfactory performance by the student's department and/or adviser as required. Each term the progress of students is reviewed and those students not making satisfactory

progress in terms of the cumulative grade point average and completion of requirements within established deadlines are identified for all academic departments. Students may not graduate unless in good academic standing. Additional policies regarding continuation in a program while not in good academic standing are left to individual programs. Whether a D is considered acceptable to serve as a prerequisite will be determined by the course's sponsoring department

IMPORTANT: Students receiving federal loans and federal work-study funding must adhere to the Federal Satisfactory Academic Progress Policy (https://www.jhsph.edu/offices-and-services/student-affairs/financial-aid/financial-aid-policies/) posted on the Financial Aid Office website.

Pass/Fail Option

Students at the Bloomberg School may elect to take courses on a pass/fail basis only with the consent of their academic adviser. Each department has determined for its own students which courses may be taken on a pass/fail basis. Students should consult their departmental requirements for specific grading requirements when considering the pass/fail option. Students who must submit grades to employers, to funding agencies, or to other academic programs should also consult the appropriate offices before electing the pass/fail option.

Instructors are expected to evaluate student performance without regard to grading status and to give students appropriate feedback regarding their performance throughout the term. A grade of P will be recorded on the official grade roster for those students who have elected the pass/fail option and whose performance would otherwise be rated as A, B, or C. Instructors should assign a grade of 'D' to students who register for a course Pass/Fail and do the equivalent of 'D' work and 'F' for students who do the equivalent of 'F' work.

If an adviser, student, or department needs to know the specific grade a student earns, the student should not enroll as pass/fail. There will be no retroactive changes from regular grading to pass/fail and vice versa. If a student transfers to a program that requires a standard letter grade for a course that the student completed pass/fail, the student must repeat the course or obtain a waiver from the department. After the published add/drop period, a pass/fail change is treated as a registration change with a $50 late charge fee. Under no circumstances can changes be made to registrations during the last two weeks of a term.

Current students are expected to review their registration periodically by logging onto Self Service (https://sis.jhu.edu/sswf/Default.aspx).

Deadlines for filing pass/fail requests will be adhered to without exception. Pass/fail forms cannot be accepted after the published deadline for each term. All students should consider carefully before exercising the pass/fail option. Pass/Fail or letter grades, once elected, may not be reversed on the student's official academic record after the published deadlines.

Incompletes

The designation "incomplete" (I) will be assigned by an instructor and entered on a student's transcript when the requirements for a course have not been completed on time. This is contingent on a mutual arrangement between the instructor and the student as to when the remaining coursework is to be completed. An incomplete must be made up and replaced by a final grade within 120 days after the conclusion of the course, or before graduation, whichever occurs first.

In the event an incomplete is not made up within the above stated time period, a final grade of I/F will be assigned. When a final grade is assigned to an incomplete, the final grade will be shown, but the letter I on the transcript will remain on the transcript as well.

Retake Policy

Students may take a didactic course up to three times. Students may only retake a course if they have earned a "C" or below. If a course is repeated, both grades will be shown on the student's academic record, and the quality points for both will be included in the student's grade point average. Students will only receive degree credit once for a repeated course.

Registration Changes

Changes in course registration may be made without penalty up to the end of the second week in any regular term. For courses offered during the regular summer, summer institute, winter intersession terms or irregularly scheduled courses, course-specific add/drop deadlines will apply. Students must obtain the instructor's approval for each course added to their official registration after the published add/drop period. It is the instructor's prerogative to deny a student's request to add a class during this time. Additionally, changes to and from "audit" are not permitted after the published add/drop period. Instructor permission is not required for a student dropping or withdrawing from a course during the prescribed add/drop period. However, the student's adviser must approve all registration changes. In the event of an approved withdrawal after the course change deadline, the letter W will be entered on the student's transcript. A late change fee of $50 will be assessed for each course change (excluding withdrawal) after the published add/drop period. Furthermore, there will be no refund of tuition for any withdrawals from courses after the published add/drop period. Under no circumstances can changes be made to registrations during the last two weeks of a term.

Current students are expected to review their registration periodically by logging onto Self Service (https://sis.jhu.edu/sswf/Default.aspx).

Students must resolve any registration holds before a registration change can be processed. Students making changes after the published add/drop period should notify the Office of Records and Registration (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/) once a hold has been removed.

Multiterm Courses

All courses at the School adhere to the registration and add/drop dates of the academic calendar. For multi-term courses, enrollment in part I necessitates enrollment in subsequent parts. Students must be enrolled in the Student Information System (SIS). If a student subsequently drops or fails to register for subsequent parts of a multi-term course, a grade of W (withdrawn) will be assigned for the previous part(s). Tuition for the previous part(s) will not be refunded. Students may not register for subsequent parts of the course without having enrolled in previous parts. After the two-week add/drop period, students have another four weeks to withdraw. A grade of W will be assigned for the current term (and previous term[s] if it is a multi-term course) and no tuition (https://www.jhsph.edu/admissions/tuition-and-fees/) will be refunded.

Audits

Audit and credit course registrations will be assessed at the same tuition rate. No course credit will be acquired for courses taken for audit. All courses taken for audit must have the instructor's approval. Courses may not be changed from credit to audit or vice versa after the designated add/ drop period. No exceptions can be made after the add/drop period has ended.

Note: Audited courses count toward tuition calculation and the 22 credit per term limit but do not count toward full-time enrollment status.

Reporting of Grades

Instructors will submit final grades to the Office of Records and Registration (https://www.jhsph.edu/offices-and-services/student-affairs/records-and-registration/) within ten days after the conclusion of the term in which their courses are given. Once a final grade is awarded and entered on a student's transcript, the grade may not be altered without the approval of the Committee on Academic Standards. In the event that this committee approves an alteration for reasons other than error, the original grade will be noted in a transcript comment. Any request for a grade change must be submitted within 120 days of the date upon which a course concludes in accordance with the School's academic calendar (https://www.jhsph.edu/academics/calendar/2018-2019.html). In the case of a graduating student, the grade change must be submitted prior to the last day of the term of graduation.

Grades of "X", MR or blank not resolved within 120 days of the date upon which a course concludes will be processed as withdrawals resulting in a "W" on the transcript. A late change fee of $50 will be assessed and there will be no tuition refund. The Bloomberg School reserves the right to amend the above terms and conditions when in its sole judgment such changes are deemed necessary.

Current students are expected to review their grades periodically by logging onto Self Service (https://sis.jhu.edu/sswf/Default.aspx).

Grade Appeal Policy

Only final course grades may be appealed through this formal process (p. 642), though students remain free to discuss interim course assignment grades with their course instructor or base an appeal of a final grade on the grade awarded to an interim course assignment. Appeals must be brought within 45 days of the posting of a final course grade to SIS.

Graduation Policy

Graduation Policy

November 19, 2018

Degrees are conferred three times a year. Diplomas bear the University conferral date in the summer, fall or spring. The graduation ceremony (https://www.jhsph.edu/student-life/convocation/) is held each May and is open to all graduates of that academic year. The School has its own convocation ceremony, typically conducted a day or two before Commencement, during which time doctoral students are hooded and master's candidates receive their diplomas.

All financial obligations must be satisfied prior to graduation. Diplomas and transcripts will not be issued to those students who have outstanding account balances from any University office.

Interdivisional Registration

Interdivisional Registration

Interdivisional registration permits students in other schools of the University to be admitted to courses at the Bloomberg School of Public Health on a space-available basis without the formalities of application. Likewise, Bloomberg School of Public Health students may enroll interdivisionally in courses offered by other divisions. When a course is taken "interdivisionally" it is part of the student's home academic record. Students wishing to register for courses at another JHU division should complete the SEAM online form (https://support.sis.jhu.edu/case/); final approval for enrollment is determined by the division hosting the course. Students are expected to have met any course registration restrictions and obtained any enrollment approvals prior to submitting the interdivisional request.

Because not all divisions of the University share the same grading policies or academic calendar, interdivisional registrants should consult their home division's Office of Records and Registration to learn the appropriate grade, credit, and term conversions among divisions.

Non-degree students are not eligible to register interdivisionally. Non-degree students interested in taking a course at another division will need to register with that division in a specific student category.

Students and post-doctoral fellows already registered full-time during the nine-month academic year need not pay additional tuition to the host division that has approved the interdivisional registration. Part-time students will be charged at the per credit rate. Interdivisional registration in the regular Summer term is restricted. Students should consult their home division's Office of Records and Registration for more information.

Bloomberg School of Public Health students will receive grades, but will not earn academic credit for courses that are lower-level undergraduate. Courses numbered below xxx.300 are considered lower-level undergraduate (e.g. AS 381.101, Beginning Hindi I).

Enrollments in other University divisions need not be taken "interdivisionally." Those students who want to pursue coursework that has no applicability to the Bloomberg School of Public Health program may register directly with the other University division; fees will be assessed at that division's rates.

Involuntary Leave of Absence

Involuntary Leave of Absence and Condition of Enrollment

November 19, 2018

Introduction

The University is committed to fostering a learning environment that enables students to thrive and participate fully in academic life. There are, however, occasions when a student's health interferes with their ability to take part in the academic community, and at such times the School provides the opportunity for the student to initiate a leave of absence. For instance, a student's mental or emotional health, medical condition, or inappropriate behavior or communication may necessitate a leave of absence or placement of conditions on continuing enrollment. The guidelines and procedures described herein are not intended to address such instances, for which long-standing policy exists. Rather, these guidelines and procedures shall apply in those extraordinary circumstances when a student has not or cannot voluntarily address the issues of concern.

Guidelines for Use

1. Involuntary Leave of Absence

In situations when a leave of absence is indicated, the Associate Dean for Student Affairs will encourage the student to initiate a voluntary leave of absence. If the student declines to do so, the Associate Dean may require an involuntary leave of absence. This step will be taken when necessary to protect the safety of the student or other individuals or to preserve the integrity of the University's learning environment. Such a decision may be based on behavior and/or communication that:

1. Harms or threatens harm to the health or safety of the student or others;
2. Causes or threatens to cause significant damage to the property or resources of the University;
3. Evidences chronic and/or serious drug or alcohol abuse;
4. Significantly disrupts the functioning of the University community.

Condition of Enrollment (COE)

When circumstances indicate that a leave of absence is not appropriate, the Associate Dean for Student Affairs[1] may nevertheless impose certain conditions as a requirement of continued enrollment. This step will be taken only after consultation with those responsible for oversight of the student's program of study.

Procedure

When the Associate Dean for Student Affairs[1] becomes aware, by whatever means, of the potential need for action, the following procedures will be initiated:

1. The Associate Dean will contact the student and describe the issues of concern. If this discussion alleviates all concerns, no further action is needed. Alternatively, procedures outlined below may also be initiated.
2. The Associate Dean may mandate a mental health or physical evaluation of the student. The Associate Dean may also specify conditions under which the student is allowed to remain at the University. Such conditions will be developed in consultation with others charged with oversight of the student's academic program and the Director of the Student Assistance Program. The Associate Dean will provide written notice to the student when such conditions are mandated.
3. If a leave of absence is indicated, and if the student so agrees, procedures governing voluntary leaves of absence shall apply.
4. When a leave of absence is indicated and the student declines to accept a voluntary leave, the Associate Dean will discuss the implications of an involuntary leave of absence. If the student continues to decline, the Associate Dean will initiate an involuntary leave of absence after consultation with those charged with oversight of the student's academic program and the Director of the Student Assistance Program. In urgent situations, the Associate Dean may initiate an involuntary leave of absence immediately. Under these circumstances, such consultation will be undertaken promptly thereafter. When an involuntary leave is imposed, the Associate Dean will provide the student with written notification to this effect. This notification will outline the steps required for re-entry into the academic program and also note other pertinent information regarding the student's status while on leave.

Re-Entry

A student seeking re-entry to the curriculum after a voluntary or involuntary leave as described under this policy will undergo a "fitness for return" evaluation by the Student Assistance Program and/or the appropriate health service (University or Occupational Health Services). Upon re-entry, the Associate Dean may impose conditions under which the student will be allowed to remain at the University (as described in Section III B). The Associate Dean will provide written notice to the student when such conditions are instituted.

Confidentiality

All records related to student leaves of absence and conditions placed on continuing enrollment will be maintained in accordance with applicable law and policy.

Multi-Term Course Policy

Multi-Term Course Policy

For multi-term courses, enrollment in part I necessitates enrollment in subsequent parts. *Students must be enrolled in SIS, the system of record*. If a student subsequently drops or fails to register for subsequent parts of a multi-term course, a grade of W (withdrawn) will be assigned for the first part. Tuition for the first part will not be refunded.

Students may not register for subsequent parts of the course without having enrolled in part I. After the drop period, students have another four weeks to withdraw. A grade of W will be assigned for the current term (and previous term[s] if it is a multi-term course) and no tuition will be refunded.

Post-Doctoral Fellow Student Status

Postdoctoral Fellows – Policy Guidelines and Procedures

From the Office of the Dean

Date Effective: December 19, 1989
Date Revised: December 9, 2004
Date Revised: February 28, 2008

Policy Guidelines

Definition
A Postdoctoral Fellow (PDF) is an individual who has previously earned a doctoral degree or its equivalent and is receiving advanced training in research or professional practice at the School under the aegis of one of the departments and its faculty.

Status
Although the PDF shall not be enrolled in a formal degree program, the fellow may take didactic courses for credit up to a maximum of 16 credits during their entire tenure as a fellow. A PDF is usually enrolled full-time; however, part-time PDF programs are possible depending on individual circumstances. PDF status and/or privileges are not granted to degree candidates who hold a previous doctoral degree.

Admissions
After receiving a completed application form from an applicant, it will be the responsibility of the Admissions Office to assemble a file which is sent to a department for evaluation.

The department reviews the file, rejects or accepts the applicant, communicates the decision to the applicant and the Admissions Office, and returns the file to the Admissions Office. Each department handles postdoctoral fellowship applications slightly differently. For the most current process for each department, refer to the School's website.

Financial Support for Postdoctoral Fellowships

Postdoctoral Fellows are charged a small set fee per term for tuition. The tuition may be supported from an extramural source such as a federal training grant or a private sponsorship. Postdoctoral Fellows without an extramural source of tuition support are eligible for School-wide postdoctoral fellow scholarship funds. The request for scholarship support should be generated by the PDF's department.

Certification

Upon satisfactory completion of the program planned for the PDF, the department chair shall notify the Records and Registration Office so that a certificate of completion may be prepared for the PDF. If a PDF is terminated as unsatisfactory or is withdrawing for personal reasons, the department chair shall report the matter to the Records and Registration Office without delay.

The Records and Registration Office will take the responsibility for having a certificate sent to the PDF following satisfactory completion of his stay at the School and for reporting this certification to the Committee on Academic Standards.

PROCEDURES

1. **Initial Contact**
   a. A prospective PDF may first contact either a department or the Admissions Office.
      i. If a department is contacted first, the department will ask the candidate to complete a PDF application form and submit it to the Admissions Office.
      ii. If the Admissions Office is contacted initially, the PDF application is handled in the same manner as any other application.
      iii. No application fee is required for PDFs.
      iv. If the applicant is already enrolled in another division of the University, that division can forward copies of the original credentials to the Admissions Office.
2. **Admissions Process**
   a. The Admissions Office assembles a file which includes (at least):
      i. a completed standard postdoctoral fellow application form;
      ii. proof of the doctoral degree (an official transcript or a letter from the dean of a school certifying that all requirements for the doctoral degree have been completed satisfactorily);
      iii. a curriculum vitae; and
      iv. one letter of reference from an individual with appropriate knowledge of the applicant.
   b. The file is sent to the department for evaluation.
      i. The department reviews the file and recommends acceptance or rejection of applicant on the review sheet. The form is signed by the department chair.
      ii. For applicants recommended for acceptance, the department adds the following information to file:
         1. beginning date of fellowship; and
         2. name of faculty mentor.
      iii. Applicant file (recommended or not recommended) is returned to Admissions Office.
   c. File of applicant which has been acted upon and endorsed by the department and endorsed by the Committee on Academic Standards.
      i. Following acceptance of applicant by department, the department prepares letter of acceptance including details of financial support with copies to the Admissions Office, the Records and Registration Office, Student Accounts and Business Services Office, Student Financial Services Office, department chair, and mentor.
      ii. If proof of completion of the doctoral degree requirements was provided by a letter from the previous institution, the postdoctoral fellow must also submit an official transcript confirming completion of doctoral degree within two academic terms of the start of their postdoctoral fellowship. Failure to do so will result in dismissal of the postdoctoral fellow.
   d. If applicant is not recommended for admission, the department prepares appropriate letter and copies the Admissions Office.
3. **Financial Aid Process**
   a. The charging of tuition to the PDF budget will be handled through the Distributed Graduate Aid system in the Student Financial Services Office, and automatically disbursed onto the postdoctoral fellow's tuition account. All expenditure processing is handled by the departmental administrative office of the PDF.
   b. Request for Scholarship Funds
      i. A department may request a scholarship for each PDF (new or continuing) who has been formally accepted and who has no other source of tuition payment by completing and submitting an Application for Postdoctoral Scholarship form.
      ii. Upon receipt of the application form, Student Financial Services personnel verify that the PDF has been formally accepted by the School and that no other known source of tuition support exists.
4. **Registration Process**
   a. Initial Registration
      i. The PDF registers in person or online through the Records and Registration Office in the initial term and during each established registration period thereafter. The PDF must maintain continuous registration for each term of research.
         1. The Records and Registration Office receives the file from Admissions and verifies that acceptance letter has been issued and details are in order.
         2. PDF is given all necessary registration materials. The following steps are then taken:
            a. PDF fills out personal data form; and
            b. PDF completes the course registration process. A PDF must register for a minimum of 12 credits per term. The 12 credits may be a combination of Postdoctoral Research (###.830) and courses of interest to the PDF. PDFs are not permitted to earn more than 16 credits of didactic course work for academic credit during their tenure as a postdoctoral fellow. However, this 16 credit limit may be extended for some special postdoctoral training programs if prior approval is obtained from the School's Committee on Academic Standards. Even in cases where an exception to the 16 credit limit has been granted, only 16 credits can be transferred to meet degree program requirements. There is no limit on the number of courses a fellow may audit. The PDF's adviser approves the registration request.
   b. **Continuing Registration**
      i. Each term the Records and Registration Office sends a list to departments with currently enrolled students, including PDFs.
      ii. Responsibility of Department Chair

1. When PDF completes training at the School, the department chair informs the Records and Registration Office.
2. If PDF is being terminated as unsatisfactory or is withdrawing for personal reasons, the department chair should report the matter to the Records and Registration Office without delay. The Records and Registration Office will refer the action to the Committee on Academic Standards as appropriate. It is the department's responsibility to inform the Student Financial Services Office and the Student Accounts and Business Services Office of any actions resulting in withdraw or termination of a postdoctoral fellow.

5. **Certification**
   a. Upon receiving verification on the PDF Status Form from a department chair that a PDF has satisfactorily completed their stay at the School, the Records and Registration Office makes arrangements to have a certificate prepared and forwarded to the PDF.
   b. PDF certification information is included in the Registrar's Report to the Committee on Academic Standards.

Student Grievance Policy

Student Grievance Procedure

From the Office of the Dean
Date Effective: June 25, 2015

Policy

On occasion, disputes arise between students and other members of the Hopkins Bloomberg School of Public Health community. The School encourages individuals involved in such disputes to resolve the matter directly between them. For those disputes that cannot be resolved informally, the following policy has been created to provide students or student groups with a formal process to seek resolution of a grievance. A grievance covered by these procedures is a complaint by a student or group of students alleging that they have been adversely affected in their capacity as students.

Conduct Covered by the Policy

Students may use this process to seek resolution to a situation in which they believe they have been harmed due to an arbitrary or capricious act or failure to act or a violation of a Johns Hopkins University or Hopkins Bloomberg School of Public Health procedure or regulation by an instructor or other member of the faculty or School of Public Health administrator or body.

Some conduct is governed by other policies in the School or by the University at large. As a result, the following are excluded from consideration under this grievance procedure:

1. Complaints alleging discrimination or harassment on the basis of race, color, sex, age, religion, sexual orientation, national origin or ethnic origin or disability or complaints of sexual harassment. Complaints of this nature are to be referred to the University's Office of Institutional Equity.

1. Complaints pertaining to general levels of salary, fringe benefits, or other broad areas of financial management and staffing. Such complaints should be referred to the divisional Human Resources office.
2. Complaints, the resolution or remedy of which, would conflict with a policy approved by the Board of Trustees of the University; a policy of The Johns Hopkins Hospital; federal, state or local laws or regulations; or any contract to which the University or School is a party.
3. A complaint pertaining to a subject matter within the purview of any standing committee of the University or School, unless the complaint arises from a committee's alleged failure to act or to follow the policies or procedures of the University or School. For example, disputes involving student advancement could only be considered under these procedures if the normal procedures for handling these matters were not followed.
4. Disputes regarding grades or other academic evaluation except where an error in recording the grade is alleged. Disputes regarding the incorrect recording of a grade should first be addressed to the Records and Registration Office.
5. Disputes that are personal in nature and do not involve the Grievant's academic activities.

Definitions

A Student is an individual currently enrolled in a degree program or a course for academic credit. A Student Group is any group of students in the School who are a party to the grievance. The Respondent is the faculty member, administrator or staff member named in the grievance as the person or persons responsible for the act or failure to act giving rise to the grievance. The Grievant is the student or student group bringing forth the grievance. The Responsible Dean is the dean assigned to oversee and mediate the grievance.

Procedures

Section One. Prior to filing a grievance under this procedure, a student with a complaint shall meet with the faculty member, administrator or staff member who is responsible for the matter giving rise to the complaint to discuss the issues involved and attempt to resolve the situation to the mutual satisfaction of the parties concerned. At the student's request, a department chair or an appropriate dean may be asked to help in the informal resolution of the complaint. When at all possible, complaints and disputes should be settled through informal means.

Section Two. If the matter is not resolved by the parties involved to their mutual satisfaction, a formal grievance may be filed within 60 days of the alleged adverse action, or within 60 days of the first date by which the student knew or should have known of the adverse action. The grievance must be in writing and include:

1. a statement of the grievance,
2. description of the alleged facts on which the grievance is based,
3. summary of steps taken to resolve the grievance,
4. name(s) of the person(s) thought to be responsible for the grievance,
5. other facts considered to be pertinent to the resolution of the grievance,
6. the remedy sought, and the
7. signature of the Grievant, including all members of a Student Group bringing a grievance.

Section Three. The grievance is addressed to the Associate Dean for Student Affairs (hereafter referred to as the Responsible Dean) who will promptly acknowledge receipt of the grievance.

Section Four. The Responsible Dean shall provide the Respondent(s) with a copy of the grievance and the name(s) of the Grievant(s), and will promptly set up individual meetings with the Grievant(s) and the Respondent(s).

Section Five. The Responsible Dean may ask the Grievant(s) and the Respondent(s) to attempt to mediate the grievance. If mediation is agreed to by all parties, every effort will be made to complete the process within four (4) weeks of the receipt of the grievance, with reasonable accommodation for the travel schedules of any of the parties.

Section Six. At any point in the above process before a grievance is referred to the Student Grievance Board, the Grievant and Respondent may come to mutual agreement on the resolution of the case, which may be mediated by the Responsible Dean. The Grievant and the Respondent will co-sign a memo or other document that the grievance was settled to the mutual satisfaction of each party. A written record is kept of the circumstances and resolution of the grievance for four (4) years. The record shall be kept in a central location accessible only to the Associate Dean for Student Affairs.

Section Seven. If the parties do not agree to mediation, or if mediation does not successfully resolve the grievance, then the Responsible Dean shall convene the Student Grievance Board who will hear the grievance in accordance with these procedures and make recommendations as to a resolution of the grievance if warranted.

Student Grievance Board

The Student Grievance Board is constituted to hear formal grievances in accordance with these procedures. It is designed to give students a recognized role in upholding the standards of professionalism and fair play at the School of Public Health and to give students an opportunity to have their grievances heard by their peers.

The Board reports to the Dean of the School. The Dean will assign a staff member to set up meetings, to circulate materials and otherwise provide administrative support to the Board. The Board is composed of six students and four faculty members. Students are selected by the Student Assembly at the beginning of each academic year from among the full-time student body. Faculty are selected by the Dean of the School from among the full-time faculty. Every effort is made to select students and faculty from diverse disciplines, departments, and—in the case of students—academic programs.

Hearing Panel Procedures

Section One. Upon receipt of a grievance, the Student Grievance Board will designate a Hearing Panel to consider the charges. A student member is designated by the Board to serve as the presiding non-voting officer for each hearing. The Hearing Panel shall consist of five student members (one of whom is the presiding non-voting officer) and three faculty members of the Student Grievance Board.

Section Two. Members of the Student Grievance Board will be excused from a particular Hearing Panel if they cannot be impartial due to the nature of their relationship with either the Grievant or the Respondent, or if they cannot reasonably expect to be available during the period of time when the hearing is expected to take place. The Student Grievance Board may appoint to a Hearing Panel full-time faculty or full-time students who are not members of the Board when an adequate number of members of the Board are unavailable, subject to approval by the available members of the Board.

Section Three. The Grievant and Respondent are informed of the date and time of the hearing, and of the names of the members of the Hearing Panel. Each has the responsibility to inform any witnesses and to obtain any documentary evidence in advance of the hearing.

Section Four. The names of all witnesses and copies of all evidence will be deposited with the Dean of the School or his designee in sufficient time such that both the Grievant and Respondent shall have adequate opportunity to examine the evidence in advance of the hearing, or to be provided with copies of the evidence. If the School is in session, inspection shall be permitted at least two school days before the hearing. If the School is not in session, inspection shall be permitted at least one week before the hearing.

Section Five. Hearings of the Panel shall be open to the Grievant, the Respondent, and not more than one representative of the Grievant and of the Respondent affiliated with the School, subject to University policy, which prohibits representation by outside counsel. In the case of multiple Grievants or Respondents in the same case, the Hearing Panel shall make a determination of the optimal method to conduct the hearing consistent with this Policy. Witnesses may remain in the hearing room only while giving testimony.

Section Six. The Hearing Panel members shall not be informed of details of the grievance before the hearing is convened and shall avoid discussing the pending hearing with the parties concerned, possible witnesses, or any other persons. The Grievant, the Respondent, and their representatives may discuss procedures with the presiding officer but may not approach members of the Panel concerning any matter directly or indirectly related to the hearing.

Section Seven. If a Respondent fails to appear for a hearing after having been duly served with notice or withdraws from a hearing before its conclusion without the permission of the Hearing Panel, the hearing will continue as if the Respondent were present. If a Grievant fails to appear, the grievance will be dismissed as to that Grievant.

Hearing Procedures

Section One. Record. A full and complete record shall be made of the proceedings by a tape recorder or other suitable device. Either party shall be furnished a copy of the tape recording at their request for the purpose of preparing an appeal. No transcript of the deliberations shall be made. The Hearing Panel may, however, prepare a brief written report detailing the reasons for their findings and recommended resolution.

Section Two. After calling the hearing to order and introducing the panel, the presiding official shall read the grievance and ask the Respondent to state whether they agree with it.

Section Three. Presentation of Evidence.

1. If the Respondent disagrees with the grievance, the Grievant shall present testimony and evidence in support of the grievance. After the testimony of each witness, the Respondent, the representatives of the Respondent, the members of the Panel, and presiding official may ask questions.
2. Following the conclusion of the Grievant's presentation, the Respondent and the representative of the Respondent may present testimony and evidence in support of their position, including any evidence of malice in the charge. After the testimony of each witness, the Grievant, the Panel, and the presiding official may ask questions. Any evidence or testimony relevant to the grievance specified in the notice may be admitted into evidence and heard by the Panel.

3. At the conclusion of all the evidence and testimony, the Respondent and the Grievant shall have the opportunity of making a closing statement.
4. Following the closing statements, all individuals except the presiding official and members of the Panel are excused.

Section Four. Determination. The Panel will discuss the case until each member is ready to vote. The decision of the Hearing Panel shall be based upon a preponderance of the evidence, by a majority vote of the Hearing Panel. The decision shall be communicated promptly in writing to the Dean of the School, to the Grievant and to the Respondent.

Section Five. Resolution. If the grievance is upheld, the Panel will discuss the resolution proposed by the Grievant and any other possible resolution until a resolution is identified and agreed to by a majority vote.

Section Six. Implementation of Resolution. The Panel shall promptly notify the Responsible Dean of its findings and recommended resolution. The Responsible Dean shall review the findings and recommended resolution and take the necessary action to implement the resolution.

Appeal Process

The Grievant or Respondent may appeal an adverse decision to the Dean of the School. The Dean shall base a decision to overrule a finding by the Student Grievance Board upon a determination that some procedural impropriety has unacceptably tainted the hearing. Any appeal shall be submitted in writing within five (5) days of the receipt of the decision from the Student Grievance Board, stating the specific reason(s) for the appeal. The Dean shall promptly review the matter, and their decision shall be communicated to the Grievant and Respondent in writing. The Dean's decision shall be final.

Student Grievance Board Bylaws

1. Documentary evidence and tapes of hearings conducted under the Student Grievance Procedure shall be maintained for a period of seven (7) years after completion of the case in the office of the Dean of the School.
2. All records of proceedings at hearings conducted under the Student Grievance Procedure shall be deemed confidential.
3. The presiding official of each case shall prepare a synopsis of the case. Such synopsis shall specify the nature of the charge, the determination of the Hearing Panel and resolution imposed, and the outcome of any appeal. The identity of the Respondent and Grievant shall not be divulged. The synopsis will be kept in the office of the Dean of the School.
4. A breach of confidentiality of a case by a member of the Student Grievance Board shall cause their removal from the Board, and may result in disciplinary action.
5. The Student Grievance Procedure Hearing Panel Procedures and Bylaws may be amended by the approval of three of the four faculty members and four of the six student members at a meeting of the Student Grievance Board for which notice has been given at least one week prior to the meeting. The wording of the proposed amendment shall be included with the notice of the meeting.
6. Other parts of the Student Grievance Procedure may be modified on approval of the School's Advisory Board and Student Assembly.
7. The Student Grievance Board shall elect officers as needed. Officers shall be elected by a vote of three of the four faculty members and four of the six student members. The term of each office shall expire at the end of each academic year.

Research

Animal Research

Animal Research Policy

May 13, 2022

The Bloomberg School is committed to protecting the rights and welfare of animals used in research. All students involved in animal research must first complete an online training module, Animal Care and Use, available through myLearning in the JHU Portal, before beginning work with animals. Specialized training may also be required to carry out certain procedures. Additionally, upon joining a laboratory and before any animal research is initiated, students must be officially added to and approved by the JHU Animal Care and Use Committee (ACUC) as a student investigator on all ACUC protocols and amendments that they will be working on in their home lab or in the lab of a collaborator.

Institutional Animal Care and Use Committee

The care and use of animal subjects is regulated by the Animal Welfare Act, which is implemented by the U.S. Department of Agriculture. The University has one assurance with the federal government (the Office of Laboratory Animal Welfare [OLAW]) and, therefore, the University has one animal care and use committee (http://web.jhu.edu/animalcare/) (IACUC). Faculty from the Bloomberg School, the School of Medicine, and the Homewood campus serve on this committee.

An approved protocol MUST be obtained before animals can be purchased. Questions regarding submission of animal research protocols should be addressed to the IACUC Office at 443-287-3738.

Animal care and procurement is under the purview of Johns Hopkins Research Animal Resources (https://researchanimalresources.jhu.edu/). For those exposed to animals either directly or indirectly, their bedding, waste products, fresh animal tissues or equipment involved in animal use and care, Johns Hopkins requires the following to reduce health risks associated with animal exposures.

Medical

All faculty, staff, postdoctoral fellows, students and contractors who work with or are exposed to animals and/or their body fluids, fresh tissues, bedding or caging must be enrolled in the Animal Exposure Surveillance Program (AESP) (https://www.hopkinsmedicine.org/hse/forms/AESP/Index.html), managed by the Occupational Health Services (https://www.hopkinsmedicine.org/hse/occupational_health/) office, located at 98 N. Broadway, 4th floor.

This program allows Johns Hopkins to:

1. offer you appropriate protection from diseases associated with animal use and care,
2. review your current health status
3. monitor your health during employment.

Vaccinations/testing are performed free of charge by the Occupational Health Services office for the following:

1. Vaccinia vaccination for individuals exposed to non-highly attenuated orthopoxviruses that infect humans including cowpox, vaccinia and vaccinia subspecies (unless medically contraindicated).
2. Rabies vaccination for a limited number of individuals, including Animal Services Staff, those using wild caught animals, dogs (conditioned), some non-human primates and farm animals. If you have already been vaccinated for rabies, blood tests are needed every other year to be sure you are still protected.
3. Hepatitis B vaccination for those individuals who have not already been vaccinated.
4. Biannual tuberculosis (TB) screening is required for anyone who works around non-human primates.

To enroll in the AESP, and to inquire about testing and vaccination, please contact Occupational Health Services at 410-955-6211.

Training and Policies

The Department of Health, Safety and Environment (HSE) provides services and leadership to Johns Hopkins University in the areas of laboratory safety, pre-placement assessment, the use of personal protective equipment, incident and injury reporting, environmental monitoring, the treatment of occupational illness and injuries, fire safety, biological safety, chemical safety, facility and equipment safety, and employee safety training. Questions about policies or how to attend training should be directed to the HSE department at 410-955-5918. Information regarding training, policies and guidance are available online at the HSE homepage (https://www.hopkinsmedicine.org/hse/).

Wearing particular types of clothing (such as surgical gowns, scrubs or smocks) and other items (such as masks or goggles) while working is required for specific jobs in order to protect you from injury or illness. The University will provide these required items to you for use on the job as necessary. Inquiries regarding the appropriate personal protective equipment needed for a specific task can be directed to laboratory supervisors or the HSE department.

All faculty, staff and students must attend the Hazard Communication training session at least once during their employment. Most individuals should have received this training during New Employee Orientation. Questions about how to attend this training should be directed to the HSE department.

All faculty, staff and students with exposure to human or non-human primate blood borne pathogens will be entered in the Blood Borne Pathogen Exposure Control Program. Training is required when hired or before starting work with materials that may contain blood borne pathogens, and must be completed annually thereafter. Questions about how to attend this training should be directed to the HSE department.

All faculty, staff and students who use radioactive isotopes or handle animals (or their cages or bedding) that have been treated with radioactive isotopes must attend the Radiation Safety training session. Questions regarding this training should be directed to the Radiation Safety office at 410-955-3710.

Human Subjects Research

Human Subjects Research

May 12, 2022

The Bloomberg School is committed to protecting the rights and welfare of all individuals participating in research as study participants. To meet this obligation, our Institutional Review Board (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/) provides oversight, guidance and ensures protection of persons participating in research. It is the responsibility of students and faculty to make certain that approval is obtained from the IRB before beginning any research involving human subjects. Applications are submitted online through our PHIRST system. Depending on the type of proposed research, we have two IRBs that review studies on the School’s behalf. The IRB is also responsible for determining whether certain research activities qualify for exempt status under federal regulations and institution policy. All faculty and students who are involved in human subjects research must also meet the compliance training requirements of the Bloomberg School IRB. To support students navigating this process, we have established an IRB Navigator (https://publichealth.jhu.edu/offices-and-services/institutional-review-board-irb/irb-navigator/) available to provide individualized assistance to students, reachable at IRBNav@jh.edu. Please also refer to the IRB website for additional information and specific requirements on conducting human research. For further information or support, please contact the IRB Office at jhsph.irboffice@jhu.edu.

Worker's Comp

Worker’s Compensation

November 19, 2009

If you are injured in the course of conducting research or providing services, you should report the matter to your supervisor promptly. Depending on the circumstances, you may be eligible to file a claim for workers compensation. For more information and to pursue a claim please JHMI’s Health, Safety and Welfare website (https://www.hopkinsmedicine.org/hse/workers_compensation/).

Student Life

Alternative Beverages

Alternative Beverages

November 19, 2018

The University recognizes alcoholism as a treatable disease and encourages affected students to use the services of the Johns Hopkins Student Assistance Program (http://jhsap.org/) (faculty and staff should contact the Faculty and Staff Assistance Program (http://hopkinsworklife.org/employee_assistance/fasap/)) It is University policy to offer non-alcoholic beverages at any University function at which alcohol is served. Refreshments should include several alternatives. All University academic and administrative personnel and directors of catering services should take note of this policy and plan functions accordingly.

Donation Drive Protocol

Donation Drive Policy

November 19, 2018

The Johns Hopkins Bloomberg School of Public Health (JHSPH) permits five major School-wide donation drives per year (1 per each of the School's academic terms) to support outside needs of SOURCE partnering community-based organizations in Baltimore. These drives are coordinated by SOURCE (the community engagement and service-learning center for the JHU Schools of Public Health, Nursing and Medicine) and include a campus-wide food drive, toiletry drive and other collections throughout the year. Clothing drives are excluded from these collections.

This practice ensures the validity and success of these types of events each year, and frees the School's hallways and common spaces for the numerous alumni and friends visiting the School, as well as conferences, speakers, and receptions that occur on school premises on a daily basis. As proponents of advocacy, volunteerism, donating and service with community, we seek to maximize our efforts and integrity in activities with the community.

Any student, student group or department wishing to organize, coordinate or co-sponsor a donation drive should first contact SOURCE at 410-955-3880 or SOURCE@jhu.edu. SOURCE can provide additional support, as well as ensure that drives do not overlap with one another. Those interested in organizing a donation drive should coordinate with SOURCE.

If departments or groups wish to host smaller donation drives, contained within their own departmental spaces and not utilizing common school locations, these activities may be acceptable. Groups should consult with SOURCE to be sure that smaller drives do not conflict with existing campus-wide donation drives.

Social Media Policy

Social Media Policy

November 19, 2018

Social media sites offer powerful means of communicating for faculty, staff, students, alumni and friends of the Johns Hopkins Bloomberg School of Public Health (JHSPH). We strongly encourage JHSPH students to use these platforms to communicate with their classmates, colleagues, and peers; to share news with the larger world; and to join in on conversations about news and happenings in their areas of interest. However, while social media sites create new opportunities to connect with others, students should be mindful of how their communications on personal social media accounts can and will reflect upon the School they attend, or organizations they've joined.

The Communications and Marketing team in the Office of External Affairs (OEA) manages the official social media accounts for JHSPH. The team, through the digital media manager and social media specialist, oversees and implements the School's social media policy, best practices, and daily content creation and distribution. The team also offers consultation and guidance for faculty, staff, students, departments/offices and affiliated groups wanting to update and/or potentially launch social media accounts. Their contact information can be found online (https://www.jhsph.edu/offices-and-services/office-of-external-affairs/contact.html).

Special Events Coordination

Special Events Coordination Policy

November 19, 2018

The External Affairs department coordinates all special events at the School of Public Health. The Special Events Team (SET) will assist you in coordinating all events at the School. Sponsors of student events will meet with the SET in the planning stages in order to ensure the security, safety and smooth coordination of their event. Students holding events are responsible for the appropriate fees and for contacting the Events Manager at sklein1@jhu.edu or at 410-614-1550 no less than a month prior to the event. SET will invite you to attend the Special Event Team meeting two weeks prior to the event to discuss your needs.

In general, student-sponsored events should be held for predominantly public health students and should be in accordance with the academic purposes of the Bloomberg School. "Content Approval" by the Associate Dean for Student Affairs is necessary for all student sponsored events. Additionally, if the event occurs during non-business hours (before 8 a.m. or after 5 p.m. or on weekends), you will need to submit your request in writing to eventrms@jhsph.edu.

Student Fundraising

Student Fundraising

November 19. 2018

Student fundraising is not permitted in JHSPH facilities. Students and/or student groups are not permitted to use the School's name when conducting fundraisers off campus.

CAREY BUSINESS SCHOOL

Our Mission

Johns Hopkins Carey Business School expands the university's pursuit of research, discovery, and education through dynamic learning opportunities, innovative faculty, and interdisciplinary collaborations to help shape leaders who seize opportunities to create lasting commercial and societal value.

Introduction

Johns Hopkins University

Established in 1876, Johns Hopkins University was the first American university dedicated to advanced study and scientific research. Today, Johns Hopkins continues as a leader in teaching, research, and community service and is the single largest university recipient of research and development funds from the federal government. There are 10 divisions within the university.

Johns Hopkins Carey Business School's faculty, administrative staff, and many of its programs are located in Baltimore, Maryland. Programs are also offered in Washington, D.C., as well as online.

The Krieger School of Arts and Sciences and the G.W.C. Whiting School of Engineering are based on the Homewood campus in north Baltimore. The School of Education houses its central administration and some programs in the Homewood campus' Education Building. Additional campus facilities are in Columbia and Montgomery County, Maryland. The School of Medicine, Bloomberg School of Public Health, and School of Nursing occupy a campus in East Baltimore, along with the Johns Hopkins Hospital, a separate but closely allied institution. The Peabody Institute, one of the nation's leading professional schools of music, is also located in Baltimore; the Paul H. Nitze School of Advanced International Studies is in Washington, D.C.; and the Applied Physics Laboratory is in Laurel, Maryland. International academic campuses are located in Nanjing, China; Bologna, Italy; and Singapore.

Johns Hopkins Carey Business School

Before Johns Hopkins was a hospital or a university, Johns Hopkins was a businessman building for what's next.

Even after he made his fortune, he remained committed to creating lasting value. It was that quest to build for what's next that drove Johns to create America's first research university and set a new course for education.

William Polk Carey also saw the chance to create lasting value for business education and pledging his support ensures that the future generations will have the same opportunity, like Johns, to thrive within change and advance society.

That vision of building for tomorrow continues with the Johns Hopkins Carey Business School. Students find their paths. Together, we build for what's next.

Some of the earliest business classes at Johns Hopkins challenged conventional wisdom. From the beginning, Henry L. Gantt—class of 1880 and inventor of the Gantt Chart, became a leading figure in the scientific management movement, presenting cutting-edge and often controversial ideas in his lectures at Johns Hopkins.

In 1916, Johns Hopkins added business and engineering courses for part-time students. Energetic individuals such as Gantt fostered the growth of the new field of business administration and the concept of "working smarter" to enhance efficiency and profits. Following World War II, the Johns Hopkins program produced more CPAs than any other school in Maryland.

Over time, the management science program became the first graduate-level business degree at Johns Hopkins with a focus on applying new findings in quantitative analysis and general systems theory. In 1991, the school developed new programs to address a business landscape incorporating transformed by technological innovation, emerging economies, and escalating politics, including specialized Master of Science programs and Master of Business Administration degree programs.

On December 4, 2006, Johns Hopkins trustees, in response to a gift from businessman William Polk Carey, voted to establish a new business school dedicated to producing innovative leaders with broad, interdisciplinary knowledge. The school was named after Carey's great-great-great-grandfather, James Carey of Loudon, a successful Baltimore merchant during the 18th and 19th centuries. On January 1, 2007, the new Carey Business School opened its doors for the first time.

Carey's $50 million donation, paired with $50 million to be raised by the university, was responsible for launching the Carey Business School. This was the largest gift ever in support of business education at Johns Hopkins.

Curriculum

Current academic programs include the Johns Hopkins MBA (full-time), and the Flexible MBA (part-time), designed to accommodate the needs of working professionals.

Also offered are a wide range of dual MBA programs (in collaboration with other Johns Hopkins schools) in areas such as government, biotechnology, medicine, public health, and design leadership (offered in collaboration with Maryland Institute College of Art). Specialized Master of Science degree programs are offered in business analytics and risk management, finance, health care management, information systems, marketing, and real estate and infrastructure, as well as a variety of graduate certificate programs, and non-credit Executive Education courses.

Full-Time Programs

Part-Time Programs

- Marketing (Part Time), Master of Science (p. 672)
- Real Estate and Infrastructure (Part Time), Master of Science (p. 680)

Dual Degree Programs

- Design Leadership, MBA/MA Dual Degree (p. 665)
- MBA/Applied Economics, MS Dual Degree (p. 673)
- MBA/Biotechnology, MS Dual Degree (p. 674)
- MBA/Communication, MA Dual Degree (p. 674)
- MBA/DNP Dual Degree (p. 675)
- MBA/Government, MA Dual Degree (p. 676)
- MBA/Healthcare Organizational Leadership, MSN Dual Degree (p. 677)
- MBA/JD Dual Degree (p. 679)
- MBA/MA in International Relations (p. 679)
- MBA/MD Dual Degree (p. 679)
- MBA/MPH Dual Degree (p. 680)
- MSF/MBA Dual Degree (p. 680)
- MSF/MBA Dual Degree (p. 680)

Graduate Certificates

- Financial Management, Graduate Certificate (p. 667)
- Financial Management, Graduate Certificate, Investments, Graduate Certificate, Applied Economics, MS (p. 668)
- Investments, Graduate Certificate (p. 671)
- Leadership Development Program, Graduate Certificate (p. 671)

Undergraduate Minor

- Business, Minor (p. 681)

Faculty and Administration

Carey Business School Faculty

To view our faculty directory, visit carey.jhu.edu/faculty-research/faculty-directory/ (http://www.carey.jhu.edu/faculty-research/faculty-directory/)

Carey Business School Administration

Alexander Triantis
Dean

Valerie Y. Suslow
Vice Dean for Faculty and Research

Richard R. Smith
Vice Dean for Education and Global Partnerships

Chris Bauman
Associate Dean for Finance and Administration

Greg Bowden
Associate Dean for Development

Kelly Farmer
Assistant Dean for Recruitment and Admissions

D. Jill Green
Associate Dean for Education and Student Experience

Brian Gunia
Associate Dean for Academic Programs

Justin Habash
Assistant Dean for Teaching and Learning

Kiera Hynninen
Associate Dean for Global Marketing and Communications

Lasse Mertins
Associate Dean for Academic Affairs

Christy Murray
Assistant Dean for Career Development

Oksana Carlson
Associate Dean for Global Collaborations

Pamela Williams
Assistant Dean for Executive Education

Management Council

James Calvin
Professor of Practice

Andrew Ching
Professor

Samartha Phifer
Director of Campus Operations

Karen Sentementes
Executive Director of Human Resources and Talent Management

Mindi Shephard
Director of Institutional Data and Analytics

Johns Hopkins University Administration

President's Cabinet

Ronald J. Daniels
President

Kerry A. Ates
Vice President and Chief of Staff

Branville G. Bard, Jr.
Vice President for Public Safety

Helene T. Grady
Vice President, Chief Financial Officer and Treasurer

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Vice President for Communications

Laurent Heller
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Jeanne Hitchcock
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Sunil Kumar
Provost and Senior Vice President for Academic Affairs

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Interim Vice President for Federal Strategy

Maureen S. Marsh
Secretary of the Board of Trustees

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Vice President for Facilities and Real Estate

Jason T. Perlioni
Vice President, Investments and Chief Investment Officer

Paul Pineau
Vice President and General Counsel

Lainie Rutkow
Senior Advisor to the President for Strategic Initiatives

Fritz W. Schroeder
Vice President for Development and Alumni Relations

Alicia Wilson
Vice President for Economic Development

Christy Wyskiel
Senior Advisor to the President for Innovation and Entrepreneurship, Executive Director of Johns Hopkins Technology Ventures

Dean Zarriello
Interim Vice Provost for Information Technology and Chief Information Officer

Deans and Directors

Fred Bronstein
Dean of the Peabody Institute

James Steinberg
Dean of the Paul H. Nitze School of Advanced International Studies

Christopher S. Celenza
Dean of the Zanvyl Krieger School of Arts and Sciences

Ellen J. MacKenzie
Dean of the Johns Hopkins Bloomberg School of Public Health

Christopher C. Morphew
Dean of the School of Education

Virginia Roach
Executive Director of the Center for Talented Youth

Paul B. Rothman
Frances Watt Baker and Lenox D. Baker Jr. Dean of the School of Medicine

T.E. Schlesinger
Benjamin T. Rome Dean of the G.W.C, Whiting School of Engineering

Ralph D. Semmel
Director of the Applied Physics Laboratory

Sarah L. Szanton
Dean of the School of Nursing

Winston Tabb
Sheridan Dean of University Libraries and Museums

Alexander J. Triantis
Dean of the Carey Business School

Johns Hopkins University Board of Trustees

Trustees Emeriti

Admission

Students seeking admission to a degree or certificate program must submit an online application and all required application documents outlined on the Carey Admissions website at https://carey.jhu.edu/programs/how-to-apply (https://carey.jhu.edu/programs/how-to-apply/), as well as the non-refundable application fee. Materials submitted as part of the application process will not be returned to the applicant. If an applicant does not waive their rights to the recommendation letter submitted on their behalf, they may request one single copy of each letter be emailed to the student (one time request only) **Or** the student can send a self-addressed, postage pre-paid envelope to the Admissions Office to request a single copy.

Johns Hopkins Carey Business School
Office of Admissions
100 International Drive
Baltimore, MD 21202

Materials required to apply (e.g., standardized test scores) and typical profile of admitted students (e.g. years of work experience, prior academic coursework) vary by program. Applicants are encouraged to contact the Office of Admissions or visit carey.jhu.edu/admissions (https://carey.jhu.edu/programs/admissions/) to determine specific admission criteria, suitability of prior degrees, or certification requirements for their desired programs of study. Students who provide fraudulent or misleading information by omitting relevant details during the admission process, or falsifying information will face disciplinary action to include withdrawal of the application. If fraudulent or misleading information is discovered after admission or enrollment, admission may be revoked and students removed from classes/dismissed from the program without a refund for tuition paid.

Applicants interested in admission to the Johns Hopkins Carey Business School may apply to only one master's program and/or certificate at a time and cannot file multiple applications concurrently to Carey. Once a decision has been made and released, if interested, applicants can file additional applications to other programs at Carey. If denied admission, applicants cannot apply again to the same program for the same enrollment term. Denied applicants are not eligible to reapply until the next start period for that particular program. Full-time programs begin once a year in August; part-time programs begin in fall and spring and select part-time programs begin in the summer.

For full-time programs, the Carey Business School reviews applicants by round (i.e. round 1, 2, and 3). Application deadlines and Carey decision dates are clearly indicated online at carey.jhu.edu/programs/admissions/how-to-apply/deadlines (https://carey.jhu.edu/programs/admissions/how-to-apply/deadlines/). Part-time programs at Carey use a rolling admissions process and files are reviewed upon receipt prior to the stated deadline. Application review times vary and are dependent upon the date and time an applicant completes the application file with all required documents. To expedite the process, applicants should utilize an E-transcript service to have official copies of undergraduate and/or graduate transcripts (or course-by-course evaluations for international students) sent before or at the time of submission of their application. E-transcript options include Scrip-Safe (scrip-safe.com (http://www.scrip-safe.com/)), Docufide (parchment.com (http://www.parchment.com/u/auth/login/)), or the National Student Clearinghouse (studentclearinghouse.org (http://www.studentclearinghouse.org)). Paper transcripts will only be accepted for applicants coming from institutions that do not offer an E-transcript option. Please visit carey.jhu.edu/programs/how-to-apply/ (http://www.carey.jhu.edu/programs/how-to-apply/) for more details.

Academic records (transcripts, diplomas, and degree certificates) for degrees earned from non-U.S. institutions must be evaluated by an authorized credential evaluation agency (naces.org/members (https://www.naces.org/members/)). Applicants who earned credits at a non-U.S. institution without earning a degree should submit an official English translation of the transcript from the institution where those credits were earned in lieu of a course-by-course evaluation. See the ***International Credential Evaluation*** section of this catalogue.

All applications to the Carey Business School should be submitted online at carey.jhu.edu/programs/admissions/how-to-apply (https://carey.jhu.edu/programs/admissions/how-to-apply/). Paper applications are no longer accepted. Electronic documents are required and will expedite the process. If hard copy documents must be sent, mail to:

Johns Hopkins Carey Business School
Office of Admissions
100 International Drive
Baltimore, MD 21202

To be eligible for federal financial aid, federal regulations require that students be accepted unconditionally into a 15-credit (or more) degree or certificate program, and maintain an enrollment status of at least half-time each semester. Note that conditionally admitted students who are taking the prerequisite credits necessary for full admission to their program may be considered for limited federal loan assistance for one or two semesters depending on the number of prerequisites required. Loans may not exceed tuition charges for the specific number of required credits, registration or course fees, and a book allowance.

Graduate Degree Requirements

Once admitted to a graduate degree program in the Carey Business School, students must complete all coursework at Johns Hopkins University, except with prior written approval from an advisor. **For more information, see the *Transfer of Graduate Credits* section of this catalogue.** Exceptions are rare, but will be considered on a case-by-case basis.

Graduate students enrolled in master's programs have six years to complete their degree. For information regarding specific degree requirements for each graduate program, please refer to the detailed program descriptions online at carey.jhu.edu/programs (http://www.carey.jhu.edu/programs/).

Master's Programs

Applicants must submit an application for admission, the non-refundable application fee, and all other required supporting documentation (such as letters of recommendation, essay and resume), along with official transcripts from all post-secondary colleges or universities attended. Materials submitted to Admissions will not be returned to the applicant. Applicants to graduate degree programs must hold a bachelor's degree from an accredited college with a minimum cumulative grade point average of 3.00 on a 4.00 scale. Academic records from non-U.S. institutions must be evaluated by an authorized credential evaluation agency (see list in the ***International Credential Evaluation*** section of this catalogue for suggested agencies). Additionally, the admission process may include an interview. Some programs may require an in-person interview while other programs will allow for virtual interviews or interview videos uploaded with the application.

Additional materials are required for international student admission. Please see the ***International Student Admission Policy*** section for details.

Certificate Programs

Applicants to graduate certificate programs must hold a bachelor's degree from an accredited college or university recognized by the U.S. Department of Education with a minimum cumulative grade point average of 3.00 on a 4.00 scale. Additional application requirements vary by certificate program. Students have three years to complete the certificate.

Verification of Credentials

Accuracy is expected in all documents provided by all applicants. Applicants must not make inaccurate statements, submit fabricated credentials, or make material omissions on their applications or during an interview. Applicants must also not submit any false materials related to, or in connection with, seeking admission. Violation of this requirement will result in the application being rejected or withdrawn from consideration or the offer of admission being rescinded.

It is the policy of the Carey Business School to verify all documents and credentials in support of an application. Carey Business School staff and university officials reserve the right to verify the authenticity of any information submitted or provided during the admission process. Essays and letters of recommendation may be traced back to their origin in order to establish authenticity.

If a violation is discovered during the application process an applicant will be withdrawn from admission consideration. If a violation is discovered after an applicant has been admitted, the offer will be rescinded and the student is no longer eligible for enrollment— even if the student has already enrolled and is currently making progress in an academic degree or certificate program. A degree or certificate conferred by the Johns Hopkins Carey Business School may also be rescinded if admission to the School was previously offered based upon falsified or inaccurate information. The application fee and deposit(s), if applicable, are nonrefundable.

International Student Admission Policy

Demonstration of English Language Proficiency by Non-native Speaking Applicants

As one measure of potential for academic success while a student in the Carey Business School, international applicants must demonstrate proficiency in both written and spoken English.

To demonstrate proficiency, applicants must submit either official TOEFL (Test of English as a Foreign Language) scores, official PTE (Pearson Test of English) scores, or official IELTS (International English Language Testing System) scores if the undergraduate degree has not been earned from an accredited institution in the United States (or another country on this list (https://carey.jhu.edu/sites/default/files/2022-03/carey-toefl-ielts-exemptions-2019.pdf)). The preferred minimum TOEFL requirement is 600 (paper-based), 250 (computer-based), or 100 (internet-based). The TOEFL code for the Johns Hopkins Carey Business School is 0834. The preferred IELTS score is 7.0. The preferred PTE score is 70. Applicants will generally be required to provide additional evidence of English proficiency in their applications.

F-1 Visa Applicants

An international applicant requiring a student (F-1) visa to attend school must obtain admission to a degree program well in advance of the start of the semester. The Carey Business School does not issue I-20 forms for provisional acceptance to a degree program, nor does it issue an I-20 for any certificate programs. I-20s are issued, however, for conditional admissions, as well as for Master's degree programs. Applicants who require a student (F-1) visa and who plan to attend Carey Business School must be applying to a full-time program and are highly encouraged to apply by the Round 2 application deadline, which is in January of the year the student plans to enroll. The latest an application can be considered for international students who require a student (F-1) visa and who plan to attend the Carey Business School are April 1st for the fall semester and October 15th for the spring semester.

International applicants needing an F-1 visa are strongly encouraged not to wait until the final deadlines to apply. If applications and other required documents are not received on or before these deadlines. For program application deadline dates, visit carey.jhu.edu/programs/admissions/how-to-apply/deadlines (https://carey.jhu.edu/programs/admissions/how-to-apply/deadlines/).

After receipt of the acceptance letter from the Carey Business School and payment of the non-refundable enrollment deposit (initial deposit for full-time MS programs), international students will be sent an email from the Office of International Services (OIS) with information on the steps required to receive an I-20 form. The email will be sent to the address listed in the student's application. This message will be sent in early March or, if accepted later, within two weeks of payment of the enrollment fee. If the information is not received, please contact OIS at ois@jhu.edu.

Before an I-20 is issued, the international student is required to submit financial documentation to OIS via iHopkins, per the instructions. I-20 forms will not be issued until the student has accepted the offer of admission, the enrollment fee has been paid, and all required documents have been uploaded to iHopkins.

An overview of the process and the documentation required can be found online at JHU Office of International Services (https://ois.jhu.edu/Students/New_Students/).

Specific figures on the estimated expenses and the amount of funding required in order to be issued an I-20 can be found at the JHU Office of International Students - Carey - Expenses (https://ois.jhu.edu/Students/New_Students/#Expenses).

International applicants who hold visa types other than an F-1 visa and wish to enroll as part-time graduate special (non-degree) students should follow the application directions in this section. International graduate students attending other institutions in student (F-1) status during the regular academic year are also welcome to enroll as graduate special (non-degree) students during the summer. For more information, contact the Office of Admissions at 410-234-9220 or carey.admissions@jhu.edu, or OIS at 667-208-7001 or ois@jhu.edu.

Note: Financial aid is not available for international students.

International Credential Evaluation

Applicants who hold degrees from non-U.S. institutions must have their academic records evaluated by an authorized credential evaluation agency (see list of approved agencies below) before they can be considered for admission to a degree or certificate program. For degrees earned at non-U.S. institutions, an official course-by-course evaluation assessing the degree, the overall grade point average, and the courses taken, should be submitted. Final official course-by-course credential evaluations must be the equivalency of a U.S. degree and from a regionally-accredited university or college in the United States. Please do not send official foreign transcripts. Credential evaluations are used to assess a student's coursework against the U.S. grading system and to evaluate courses for possible transfer credit. In addition to submitting official academic records to the Carey Business School, applicants should make arrangements with an authorized credential evaluation agency for an evaluation of the degree, an assessment of the overall grade point average, and a course-by-course evaluation.

Fees and required documentation for evaluations may vary. Applicants are encouraged to contact the agency directly for additional information. We authorize evaluations from any NACES member agency (http://www.naces.org/members/). Our applicants most commonly choose one of the following:

World Education Services, Inc.
P.O. Box 5087
Bowling Green Station
New York, New York 10274-5087
Telephone: 202-331-2925
Fax: 212-739-6100
Email: info@wes.org
Website: wes.org (http://www.wes.org)

Educational Credential Evaluators, Inc.
P.O. Box 514070
Milwaukee, WI 53203-3470
Telephone: 414-289-3400
Email: eval@ece.org
Website: ece.org (http://www.ece.org)

International Education Research Foundation
P.O. Box 3665
Culver City, CA 90231
Telephone: 310-258-9451
Email: info@ierf.org
Website: ierf.org (http://www.ierf.org)

Inactive/Deactivated Certificate or Degree Applications

If it has been longer than one year since a student was admitted and the student did not enroll at the Carey Business School during that time, a new application and all supporting documents must be submitted.

Admission to Other Schools of the University

Carey Business School students who wish to transfer to one of the other schools in the university are required to submit an admission application to that school. Documentation submitted to the Carey Business School will not be forwarded to any other school in the university. Admission to the Carey Business School establishes no claim or priority for admission to any other school in the university.

Deferring Admission

Admitted students must accept the offer of admission and pay the non-refundable enrollment deposit (including initial and final deposits for full-time MS programs) prior to requesting deferral. Once the offer of admission has been accepted and the enrollment fee has been paid, students must submit a written deferral request to carey.admissions@jhu.edu and a deferral request form will be sent back to the student. Once the completed form has been received and processed, the deferral approval will be emailed back to the student. The offer of admission is only valid for a maximum of one year. Scholarships are not deferrable—all scholarship recipients will be reconsidered for a scholarship for the next year.

Conditional Admission

An applicant may be admitted on a conditional basis pending the completion of clearly defined conditions stated in their offer of admission letter. These conditions may include:

- official transcripts with degree conferred,
- official course by course evaluation with degree conferred,
- the completion of MBA Math or other requirements.

To successfully complete the condition, the applicant must fulfill the required condition within the time frame stated in the offer of admission.

Upon successfully meeting all of the conditions, students are notified by email that they are fully admitted to the program to which they have applied. Applicants who do not successfully meet all of the specified conditions within the stated time frame are notified in writing and cannot graduate from the Carey Business School.

Note: Applicants who have been conditionally admitted are not eligible for financial aid.

State-Specific Authorization for Online Courses

State authorization is subject to change according to the states in which the Johns Hopkins Carey Business School is authorized to recruit for online programs. Currently, the Carey Business School is authorized to recruit in most states for online programs. Applicants should, however, contact carey.admissions@jhu.edu if there are questions regarding a particular state.

Degrees and Certificates

The Carey Business School offers a wide array of degree and certificate programs that are listed on the following pages. The listing provides information about each program, from admission requirements to concentration areas. Please consult the school's website carey.jhu.edu/academics (http://www.carey.jhu.edu/academics/) for the most current information about each program. Click on a degree or certificate in the following list to view the description in this catalogue.

Graduate Programs

Full-Time Programs

- Master of Business Administration (p. 662) (54 credits)
- Master of Science in Business Analytics and Risk Management (p. 664) (36 credits)
- Master of Science in Finance (p. 666) (36 credits)
- Master of Science in Health Care Management (p. 669) (36 credits)
- Master of Science in Information Systems (p. 670) (36 credits)
- Master of Science in Marketing (p. 672) (36 credits)
- Master of Science in Real Estate and Infrastructure (p. 681) (36 credits)

Part-Time Programs

- Master of Business Administration (Flexible MBA) (p. 660) (54 credits)

- Master of Science in Business Analytics and Risk Management (p. 663) (36 credits)
- Master of Science in Finance (p. 665) (36 credits)
- Master of Science in Health Care Management (p. 668) (36 credits)
- Master of Science in Marketing (p. 672) (36 credits)
- Master of Science in Real Estate and Infrastructure (p. 680) (36 credits)

Dual Degree Programs

- MBA/JD (p. 679) (54 credits)
- MBA/MD (p. 679) (54 credits)
- MBA/MA in International Relations (118 credits)
- MBA/Doctor of Nursing Practice (p. 675) (66 credits)
- MBA/Master of Public Health (p. 680) (127 credits)
- Communication, MBA/MA (p. 674) (60 credits)
- Design Leadership, MBA/MA (p. 665) (66 credits)
- Government, MBA/MA (p. 676) (60 credits)
- Applied Economics, MBA/MS (p. 673) in (66 credits)
- Biotechnology, MBA/MS (p. 674) (77 credits)
- Nursing Health Systems Management, MBA/MS (p. 677) (65 credits)
- Master of Science in Finance/MBA (p. 680) (30 credits)

Graduate Certificate Programs

- Financial Management (p. 667) (16 credits)
- Investments (p. 671) (16 credits)
- Financial Management or Investments and MS in Applied Economics (p. 668) (38 credits)
- Leadership Development Program (p. 671) (15 credits)

Note: students who are receiving federal financial aid must maintain satisfactory progress by advancing 12 credits per year toward their degree. Graduate and post-master's certificate programs of less than 15 credits do not qualify for financial aid.

Undergraduate Minor

- Business Minor (p. 681)

Business Administration (Flexible), MBA

The Flexible MBA is designed for people with full-time work experience in private sector, governmental, or public sector organizations. The program emphasizes the latest concepts, practices, and skills that professionals need to be effective managers and leaders in a wide variety of organizations.

Program Requirements

The Flexible MBA curriculum consists of Business Foundations courses and electives. Students may earn up to three Specializations but none are required. Students may take any combination of elective courses that meet the credit requirement, whether they count toward a Specialization or not. Specializations are simply a way to think about organizing elective courses and are optional.

Specializations include:

- Business Analytics & Risk Management (BARM) (p. 660)
- Digital Marketing (p. 661)
- Entrepreneurial Marketing (p. 661)
- Entrepreneurship, Innovation & Technology (p. 661)
- Financial Management (p. 661)
- Health Care Management, Innovation & Technology (HMIT) (p. 661)
- Investments (p. 662)
- Public & Private Sector Leadership (p. 662)

Students enrolled in the online Flexible MBA program will be required to take one course with a mandatory residency, which includes a two-day synchronous component, to complete their degree. There will be additional, optional residency courses throughout the program. Onsite residencies will be held at the Carey Business School's Harbor East campus in Baltimore, MD.

Course scheduling allows for completion of the program in less than three years. Students must complete the required 54 graduate credits within six years. A waived course may be replaced with an equivalent number of credits in an advanced course.

Curriculum

The curriculum for the Flexible MBA program includes the following courses. Course sequence and availability of specific electives may vary. All courses are 2 credits unless otherwise noted.

Business Foundations (20 credits)

Code	Title	Credits
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication [1]	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Total Credits		**20**

[1] Designates course with a mandatory two-day residency component for online asynchronous sections

Electives (34 credits)

Students may fulfill this requirement with any Carey course for which they meet the pre-requisites and enrollment criteria. Electives may be used to earn one, two, or three Specializations, but no student is required to earn a Specialization to fulfill program requirements. Courses may count toward multiple Specializations, but no student may earn more than three Specializations.

Specializations (Optional)

BUSINESS ANALYTICS & RISK MANAGEMENT

Code	Title	Credits
Required Courses		
BU.520.620	Advanced Business Analytics [2]	2

BU.510.650	Data Analytics [2]	2
Select three of the following:		6
BU.450.760	Customer Analytics [2]	
BU.520.650	Data Visualization [2]	
BU.520.701	Enterprise Risk Management Frameworks	
BU.230.730	Managing Financial Risk [2]	
BU.450.740	Retail Analytics [2]	
BU.450.765	Social Media Analytics [2]	
BU.610.760	Supply Chain Analytics	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality

DIGITAL MARKETING

Code	Title	Credits
Required Courses		
BU.420.710	Consumer Behavior [2]	2
Select four of the following:		8
BU.450.760	Customer Analytics [2]	
BU.420.720	Customer Relationship Management [2]	
BU.460.700	Integrated Digital Marketing [2]	
BU.410.601	Marketing Research [2]	
BU.450.765	Social Media Analytics [2]	
BU.450.750	Strategic Market Intelligence [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality

ENTREPRENEURIAL MARKETING

Code	Title	Credits
Required Courses		
BU.420.710	Consumer Behavior [2]	2
BU.410.601	Marketing Research [2]	2
Select three of the following:		6
BU.420.730	Advanced Behavioral Marketing	
BU.430.710	Branding and Marketing Communications [2]	
BU.460.710	Business-to-Business Marketing & Channel Strategy [2]	
BU.121.610	Negotiation [2]	
BU.460.730	New Product Development [2]	
BU.430.720	Pricing Analysis	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality

ENTREPRENEURSHIP, INNOVATION & TECHNOLOGY

Code	Title	Credits
Required Courses		
BU.233.730	Entrepreneurial Finance [2]	2
BU.152.710	Entrepreneurial Ventures [2]	2
Select three of the following:		6
BU.152.740	CityLab Catalyst: Business Innovation for Social Impact [2]	
BU.152.745	CityLab Practicum: Social Impact Project [2,3]	
BU.150.710 & BU.150.715	Discovery to Market I and Discovery to Market II [2,3]	
BU.410.601	Marketing Research [2]	
BU.141.710	Effective Teaming [2]	
BU.300.620	Managing Complex Projects [2]	
BU.121.610	Negotiation [2]	
BU.460.730	New Product Development [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality
[3] These courses must be taken in sequence

FINANCIAL MANAGEMENT

Code	Title	Credits
Required Courses		
BU.232.701	Investments [2]	2
BU.230.620	Financial Modeling and Valuation [2]	2
Select three of the following:		6
BU.231.790	Advanced Corporate Finance [2]	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management [2]	
BU.520.710	Big Data Machine Learning [2]	
BU.231.720	Corporate Governance [2]	
BU.210.680	Cost Measurement and Control [2]	
BU.232.770	Cryptos and Blockchain	
BU.510.650	Data Analytics [2]	
BU.232.710	Derivatives [2]	
BU.232.725	Emerging Markets [2]	
BU.233.730	Entrepreneurial Finance [2]	
BU.230.750	Financial Crises and Contagion [2]	
BU.231.710	Financial Institutions [2]	
BU.210.650	Financial Statement Analysis [2]	
BU.232.720	Fixed Income [2]	
BU.230.730	Managing Financial Risk [2]	
BU.231.740	Mergers and Acquisitions [2]	
BU.220.610	The Firm and the Macroeconomy [2]	
BU.232.730	Wealth Management [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality

HEALTH CARE MANAGEMENT, INNOVATION & TECHNOLOGY

Code	Title	Credits
Required Courses		
BU.881.702	Frameworks for Analyzing Health Care Markets [2]	2
BU.883.702	Health Information Technology [2]	2
or BU.881.706	Health Innovation and Evaluation	
Select three of the following:		6
BU.150.710 & BU.150.715	Discovery to Market I and Discovery to Market II [2,3]	

BU.881.701	Fundamentals of Health Care Systems [2]	
BU.883.705	Health Care Financing and Financial Management [2]	
BU.881.703	Health Care Law and Regulation [2]	
BU.883.706	Health Care Organization and Management [2]	
BU.890.713 & BU.890.714	Health Care Strategy Consulting Practicum I and Health Care Strategy Consulting Practicum II [2,3]	
BU.881.706	Health Innovation and Evaluation (may be used as elective if not used as second required course) [2]	
BU.881.705	Health Marketing and Access	
BU.883.703	Medical Devices and Diagnostics [2]	
BU.883.708	Negotiation in Health Care Settings [2]	
BU.883.704	Pharmaceutical Strategy [2]	
BU.881.704	Providers and Payers [2]	
BU.550.620	The U.S. Health Care System: Past, Present, and Future [2]	
BU.883.707	The Wire: Business Solutions for Community Health Improvement [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality
[3] These courses must be taken in sequence

INVESTMENTS

Code	Title	Credits
Required Courses		
BU.232.701	Investments [2]	2
BU.232.710	Derivatives [2]	2
Select three of the following:		6
BU.231.790	Advanced Corporate Finance [2]	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management [2]	
BU.520.710	Big Data Machine Learning [2]	
BU.231.720	Corporate Governance [2]	
BU.210.680	Cost Measurement and Control [2]	
BU.232.770	Cryptos and Blockchain	
BU.510.650	Data Analytics [2]	
BU.232.725	Emerging Markets [2]	
BU.233.730	Entrepreneurial Finance [2]	
BU.230.750	Financial Crises and Contagion [2]	
BU.231.710	Financial Institutions [2]	
BU.230.620	Financial Modeling and Valuation [2]	
BU.210.650	Financial Statement Analysis [2]	
BU.232.720	Fixed Income [2]	
BU.230.730	Managing Financial Risk [2]	
BU.231.740	Mergers and Acquisitions [2]	
BU.220.610	The Firm and the Macroeconomy [2]	
BU.232.730	Wealth Management [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality

PUBLIC & PRIVATE SECTOR LEADERSHIP

Code	Title	Credits
Required Courses		
BU.141.710	Effective Teaming [2]	2
BU.151.770	Power and Politics [2]	2
or BU.121.610	Negotiation	
Select three of the following:		6
BU.131.601	Business Leadership and Human Values [2]	
BU.152.740	CityLab Catalyst: Business Innovation for Social Impact [2]	
BU.152.745	CityLab Practicum: Social Impact Project [2,3]	
BU.151.720	Corporate Strategy [2]	
BU.610.705	Crisis Management [2]	
BU.003.903	Global Immersion:Finance in Europe	
BU.003.893	Leadership Development Expedition	
BU.300.620	Managing Complex Projects [2]	
BU.142.720	Managing in a Diverse & Global World [2]	
BU.121.610	Negotiation (may be used as elective if not used as second required course) [2]	
BU.142.730	Strategic Human Capital [2]	
BU.152.735	Strategy Consulting Practicum [2]	
Total Credits		**10**

[2] Designates courses available in online asynchronous modality
[3] These courses must be taken in sequence

Business Administration (Full Time), MBA

Business Administration (Full-Time), MBA

The full-time Johns Hopkins MBA is a two-year, cohorted program combining a cutting-edge business analytics education with professional leadership skill-building to navigate the complexities of fast-growing markets. The program teaches students to develop strategies and techniques to harness technological advancements and innovation and hone their skills through a curated mix of immersive experiential learning, classroom learning, and co-curricular experiences.

Student can choose between two pathways: Analytics, Leadership, and Innovation or Health, Technology, and Innovation. The pathways overlap at key points in the curriculum, and students will continue to build connections with their peers throughout the program.

The program requires the completion of 54 credits in two years, and cannot be accelerated. Course waivers are not granted in this program.

Requirements

In this full-time MBA (FTMBA) program, students choose between two pathways: Analytics, Leadership, and Innovation (ALI) or Health, Technology, and Innovation (HTI). Students will be expected to commit to a pathway selection at the end of the Fall I semester in year one, prior to taking their first foundational pathway-specific course in Fall II.

Analytics, Leadership, and Innovation (ALI) Pathway

Understanding the application of business analytics alone won't drive innovation. Students translate data insights into innovative solutions. Students will hone their leadership skills to engage the people around them to implement data-driven strategies.

32 Foundational credits

8 Pathway credits

14 Elective credits

Health, Technology, and Innovation (HTI) Pathway

To lead in the health industry, students have to be ready to navigate changing government regulations, new technologies, and increased competition. Students will leverage the power of Johns Hopkins University's health ecosystem and find technology-driven, human-centered solutions to complex health problems. With the Health, Technology, and Innovation pathway, students will build the specialized business-analytics and leadership skills to find technology-driven, human-centered solutions to complex health problems.

32 Foundational credits

10 Pathway credits

12 Elective credits

CURRICULUM

Foundations Week – The Full-Time MBA program kicks off with Foundations Week, Carey's innovative orientation program which takes place in the week prior to Fall I courses commencing. During Foundations Week, students will experience networking sessions with classmates, staff and faculty, alumni, and industry professionals. Students will work through experiential learning modules with Carey's Office of Experiential Learning, explore career opportunities with the Career Development Office, and experience a wide variety of teaming activities.

The NEXT Program - Students will be able to consult with their personalized advising team (faculty member, career coach, and external industry professional) to encourage the synthesis of curricular and co-curricular learning opportunities, to facilitate professional and leadership development, and to help students reach their full potential during their Carey FTMBA journey.

Curriculum

All courses are 2 credits unless otherwise noted.

Required courses

Code	Title	Credits
BU.920.602	Accounting Foundations	2
BU.920.632	Behavioral Science: Design Thinking	1
BU.920.631	Behavioral Science: Leadership and Organizational Behavior	2
BU.920.634	Behavioral Science: Leading Change (Behavioral Science: Leading Change)	2
BU.920.633	Behavioral Science: Negotiating Collaboratively I (Behavioral Science: Negotiating Collaboratively I)	2
BU.920.601	Business Communication	2
BU.920.607	Competitive Strategy	2
BU.920.624	Data Science: Artificial Intelligence (Data Science: Artificial Intelligence)	2
BU.920.623	Data Science: Big Data Consulting Project	2
BU.920.622	Data Science: Econometrics for Market Analysis	2
BU.920.621	Data Science: Statistics	2
BU.920.604	Finance	2
BU.920.816	Innovation Field Project	4
BU.920.605	Marketing Management	2
BU.920.603	Microeconomics and Market Design	2
BU.920.606	Operations Management	2
BU.001.351	Professional Development for Career Success	0
Total Credits		**33**

Analytics, Leadership, and Innovation (ALI) pathway-specific courses

Code	Title	Credits
BU.920.713	Ethical Leadership (Ethical Leadership)	2
BU.920.721	Foundations of Business of Health	2
Students are required to take two of the following Experiential menu courses in their second year.		
BU.920.814	Advising Project Teams (Advising Team Projects)	
BU.920.815	Applied Behavioral Strategy for Organizational and Social Impact (Applied Behavioral Strategy for Organizational and Social Impact)	
BU.920.812	Commercializing Discovery (Commercializing Discovery)	
BU.920.811	Design Lab (Design Lab)	
BU.920.813	Leadership Development Expedition (Leadership Development Expedition)	

Health, Technology, and Innovation (HTI) pathway-specific courses

Code	Title	Credits
BU.920.722	Business Law, Health Law, and Regulations	2
BU.920.812	Commercializing Discovery (Commercializing Discovery)	2
BU.920.811	Design Lab (Design Lab)	2
BU.920.723	Ethics of Business of Health (Ethics of Business of Health)	2
BU.920.721	Foundations of Business of Health	2

Business Analytics and Risk Management (Part Time), Master of Science

The Master of Science in Business Analytics and Risk Management program develops managers and leaders with the knowledge and skills to anticipate and manage risks, while leveraging unique opportunities in chaotic environments. This program is designed to teach how to quantify risks and manage processes to change or respond to those risks.

The program also addresses how to lead and manage organizations during periods of dramatic change or crisis. Coursework provides exposure to a variety of areas of risk management and provides tools to integrate the management of a portfolio of risks that an Enterprise will face.

A Master of Science in Business Analytics and Risk Management provides graduates with the tools and knowledge to:

- Develop a thorough understanding of risk
- Protect shareholder value by managing the downside of risk
- Position the organization to better leverage the upside of uncertain outcomes
- Develop plans to protect reputation, information, financial assets, and personnel
- Improve decision making at all levels of the organization

Program Requirements

The program requires 36 credits. Part-time students must complete the program within six years.

Curriculum

The curriculum for the Master of Science in Business Analytics and Risk Management program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.350.620	Information Systems	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.520.620	Advanced Business Analytics	2
BU.510.650	Data Analytics	2
BU.610.615	Simulation for Business Applications	2
Elective Courses		**12**
Students must complete 6 elective courses. At least 2 of these courses must be from the Quantitative Electives section.		
Quantitative Electives		
Select at least two of the following:		
BU.520.710	Big Data Machine Learning	
BU.232.650	Continuous Time Finance	
BU.450.760	Customer Analytics	
BU.330.780	Data Science and Business Intelligence	
BU.520.650	Data Visualization	
BU.610.630	Pricing and Insuring Risk	
BU.450.740	Retail Analytics	
BU.610.760	Supply Chain Analytics	
BU.330.760	Deep Learning with Unstructured Data	
General Electives:		
BU.132.601	Business Law	
BU.231.720	Corporate Governance	
BU.610.705	Crisis Management	
BU.330.730	Cybersecurity	
BU.520.701	Enterprise Risk Management Frameworks	
BU.230.750	Financial Crises and Contagion	
BU.300.620	Managing Complex Projects	
BU.230.730	Managing Financial Risk	
Total Credits		**36**

Business Analytics and Risk Management, Master of Science

The STEM-designated Master of Science in Business Analytics and Risk Management (BARM) full-time program equips managers to improve decision making processes based on a rigorous treatment of data and information using the management of risk as an underlying guide and framework. This program is designed to teach ways to: quantify multiple dimensions of hard business problems; analyze the structure and data related to those problems; and create rigorous approaches based on that analysis to guide business decisions. In each setting elements of Data Science, Decision Modeling, and Business Analysis are synthesized to facilitate management of both opportunities and risks. Coursework provides exposure to both a variety of analytical tools and aspects of risk management which enable managers to make better decisions for themselves and their organizations.

An MS in Business Analytics and Risk Management provides graduates with the tools and knowledge to:

- Convert raw data into useful information
- Present that information in compelling ways
- Use information to understand complex decision settings
- Create rigorous approaches to problem solving
- Construct persuasive arguments based on careful analysis
- Use information to diagnose problems
- Use analysis to prescribe approaches to improve performance
- Develop ways to predict future performance
- Improve decision making at all levels
- Add value to any organization in need of more analytical expertise

Program Requirements

The program requires 36 credits. Full-time MS students must complete the program in 3 semesters: fall, spring, and summer. Course waivers are not granted in this program.

Curriculum

The curriculum for the MS in BARM program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.350.620	Information Systems	2

BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.520.620	Advanced Business Analytics	2
BU.510.650	Data Analytics	2
BU.610.615	Simulation for Business Applications	2
Elective Courses		**12**
Students must complete 6 elective courses. At least 2 of these courses must be from the Quantitative Electives section.		
Quantitative Electives		
Select at least two of the following:		
BU.520.710	Big Data Machine Learning	
BU.232.650	Continuous Time Finance	
BU.450.760	Customer Analytics	
BU.330.780	Data Science and Business Intelligence	
BU.520.650	Data Visualization	
BU.610.630	Pricing and Insuring Risk	
BU.450.740	Retail Analytics	
BU.610.760	Supply Chain Analytics	
BU.510.615	Python for Data Analysis	
BU.330.760	Deep Learning with Unstructured Data	
General Electives		
BU.132.601	Business Law	
BU.231.720	Corporate Governance	
BU.610.705	Crisis Management	
BU.330.730	Cybersecurity	
BU.520.701	Enterprise Risk Management Frameworks	
BU.230.750	Financial Crises and Contagion	
BU.300.620	Managing Complex Projects	
BU.230.730	Managing Financial Risk	
Total Credits		**36**

Design Leadership, MBA/MA Dual Degree

The MBA/MA in Design Leadership, in partnership with the Maryland Institute College of Art (MICA), enrolls students who want to be transformative business leaders at the highest levels by developing a next-generation approach to management and problem solving. Students' backgrounds are likely to include business management, marketing, engineering, finance, art and design, architecture, fine arts, and other fields. More information is available at https://carey.jhu.edu/programs/dual-degrees/design-leadership-ma-mba (https://carey.jhu.edu/programs/dual-degrees/design-leadership-ma-mba/).

Admission Requirements

Apply to the MBA/MA in Design Leadership through the Carey Business School. For more information, please visit https://carey.jhu.edu/programs/admissions/team (https://carey.jhu.edu/programs/admissions/team/).

Program Requirements

The MBA/MA in Design Leadership program is a 20 to 23-month, 66 credit program of study (42 MBA credits and 24 MA credits) that allows students to combine the skill sets of a traditional MBA with the design expertise increasingly needed in today's complex business world. Dual degree recipients receive both diplomas upon completion of both programs.

MBA Curriculum

The MBA curriculum consists of Business Foundations courses and electives. The curriculum for the MBA program includes the following courses. Students should consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are two credits unless otherwise noted.

Business Foundations

Code	Title	Credits
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Total Credits		**20**

Electives (22 credits)

Students may fulfill this requirement with any Carey course for which they meet the pre-requisites and enrollment criteria with two exceptions. BU.450.730 Design Leadership and BU.475.601 Foundations of Design Leadership do not count toward MBA elective credits within this program.

Electives may be used to earn one or two Specializations, but no student is required to earn a Specialization to fulfill program requirements. Courses may count toward multiple Specializations, but no student in this program may earn more than two Specializations. Students may take any combination of elective courses that meet the credit requirement, whether they combine toward a Specialization or not. Specializations are simply a way to think about organizing elective course options and are optional. See the Flexible MBA portion of this catalogue (p. 660) for details on available Specializations.

Finance (Part Time), Master of Science

The Master of Science in Finance (MSF) program prepares students for careers in financial analysis and management. This rigorous quantitative program relies on current technology and financial methodologies to analyze complex problems.

The coursework stresses the application of contemporary theories in a global context to develop financial modeling and analytical skills for value creation, leading to innovative solutions, while placing an emphasis on social responsibility and ethical conduct in finance as a means to sustainable economic growth and shared prosperity.

The Carey Part-Time MS in Finance program features:

- Johns Hopkins University world-class faculty and experienced practitioners in the field of finance
- A rigorous quantitative curriculum with emphasis on analytical techniques and their role in sophisticated risk pricing and investment decision-making
- Strong theoretical and practical foundations in the analysis of complex financial instruments, portfolio allocation and risk management, corporate finance, company valuation, and corporate governance
- A significant portion of the curriculum devoted to the CFA Institute's Candidate Body of Knowledge, preparing our students to sit for the CFA exams

Program Requirements

The program requires 36 credits. Part-time students must complete the program within six years.

Students enrolled in the online MSF program are required to take the Business Communication course. Asynchronous online sections of this course have a mandatory two-day residency component, which includes synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

Curriculum

The curriculum for the MSF program includes the following courses. Course sequence and availability of specific electives may vary and not all electives are available every term nor in every format. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.210.620	Accounting and Financial Reporting	2
BU.120.601	Business Communication [1]	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.220.620	Business Microeconomics	2
BU.232.701	Investments	2
BU.510.601	Statistical Analysis	2
BU.220.610	The Firm and the Macroeconomy	2
Functional Core		
BU.232.710	Derivatives	2
BU.231.710	Financial Institutions	2
BU.230.620	Financial Modeling and Valuation	2
BU.232.720	Fixed Income	2
Elective Courses		
Select six of the following:		12
BU.231.790	Advanced Corporate Finance	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management	
BU.520.710	Big Data Machine Learning	
BU.231.720	Corporate Governance	
BU.210.680	Cost Measurement and Control	
BU.232.770	Cryptos and Blockchain	
BU.510.650	Data Analytics	
BU.232.725	Emerging Markets	
BU.233.730	Entrepreneurial Finance	
BU.230.750	Financial Crises and Contagion	
BU.210.650	Financial Statement Analysis	
BU.230.730	Managing Financial Risk	
BU.231.740	Mergers and Acquisitions	
BU.232.730	Wealth Management	
Total Credits		**36**

[1] Asynchronous online sections of this course have a mandatory two-day residency component, requiring real time, synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

Finance, Master of Science

The Master of Science in Finance with a STEM-designated concentration in Financial Econometrics helps build the entrepreneurial capacity of students to comprehend global financial markets with its implications on local investment environments.

The Carey MS in Finance program features:

- Johns Hopkins University world-class faculty and experienced practitioners in the field of finance
- A rigorous quantitative curriculum with emphasis on computational, statistical, and econometric techniques and their role in sophisticated financial decision-making
- Strong theoretical and practical foundations in the analysis of complex financial instruments, portfolio allocation and risk management, but also in corporate finance, company valuation, and corporate governance
- A significant portion of the curriculum devoted to the CFA Institute's Candidate Body of Knowledge, preparing our students to sit for the CFA exams
- STEM designation with OPT eligibility for full-time students

Program Requirements

The program requires 36 credits. Full-time MS Finance students must complete the program in three semesters: fall, spring, and summer. Course waivers are not granted in this program.

Curriculum

The curriculum for the MS in Finance program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits unless otherwise noted.

Code	Title	Credits
Business Foundations		
BU.210.620	Accounting and Financial Reporting	2
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.220.620	Business Microeconomics	2
BU.232.701	Investments	2

BU.510.601	Statistical Analysis	2
Functional Core		
BU.232.610	Computational Finance	2
BU.232.650	Continuous Time Finance	2
BU.232.710	Derivatives	2
BU.232.640	Empirical Finance	2
BU.232.720	Fixed Income	2
BU.232.620	Linear Econometrics for Finance	2
BU.232.630	Non-Linear Econometrics for Finance	2
Elective Courses		
Select four of the following:		8
BU.231.790	Advanced Corporate Finance	
BU.210.650	Financial Statement Analysis	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management	
BU.520.710	Big Data Machine Learning	
BU.231.720	Corporate Governance	
BU.232.770	Cryptos and Blockchain	
BU.232.725	Emerging Markets	
BU.233.730	Entrepreneurial Finance	
BU.230.750	Financial Crises and Contagion	
BU.231.710	Financial Institutions	
BU.230.620	Financial Modeling and Valuation	
BU.232.715	Financial Stability	
BU.230.730	Managing Financial Risk	
BU.231.740	Mergers and Acquisitions	
BU.220.610	The Firm and the Macroeconomy	
BU.232.730	Wealth Management	
Total Credits		**36**

Financial Management, Graduate Certificate

The financial markets have evolved dramatically in recent decades through the development of new financial instruments and techniques, integration of global markets, and advancements in information technology. The growth of global financial markets and rapid development of advanced analytical tools make the study of finance increasingly vital. In today's fast-paced, uncertain economic environment, financial managers require a sophisticated, global understanding of theory and analytical tools to make the right decision in a particular financial situation.

This certificate program is designed to prepare a student for a career in corporate financial management. This program is designed to give students a broad, thorough, and up-to-date foundation in finance and the practical tools needed to thrive as effective financial managers. The curriculum provides students with a strong foundation in financial theory, as well as technical skills, and a unique opportunity to develop analytical skills and critical thinking abilities by integrating theory into practice.

Program Requirements

The curriculum for the Graduate Certificate in Financial Management includes the following courses. Course sequence and availability of specific electives may vary. Students are required to complete the Graduate Certificate in Financial Management within three years. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. The certificate consists of eight courses (16 credits). All courses are two credits. Course waivers are not permitted for this certificate.

Code	Title	Credits
Required Courses		
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
BU.231.720	Corporate Governance	2
BU.230.620	Financial Modeling and Valuation	2
BU.232.701	Investments	2
BU.510.601	Statistical Analysis	2
Elective Courses		
Select two of the following:		4
BU.231.790	Advanced Corporate Finance	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management	
BU.520.710	Big Data Machine Learning	
BU.220.620	Business Microeconomics	
BU.210.680	Cost Measurement and Control	
BU.232.770	Cryptos and Blockchain	
BU.510.650	Data Analytics	
BU.232.710	Derivatives	
BU.232.725	Emerging Markets	
BU.233.730	Entrepreneurial Finance	
BU.230.750	Financial Crises and Contagion	
BU.231.710	Financial Institutions	
BU.210.650	Financial Statement Analysis	
BU.232.720	Fixed Income	
BU.230.730	Managing Financial Risk	
BU.231.740	Mergers and Acquisitions	
BU.220.610	The Firm and the Macroeconomy	
BU.232.730	Wealth Management	
Total Credits		**16**

Certificate Policies

Students who are currently enrolled in a part-time degree program at the Carey Business School and wish to add a Graduate Certificate, must do so within the first year of study (no more than one academic year or 3 semesters after their start date). Graduate Certificates are not open to students in full-time programs. Please visit the Changing Degree Program (p. 687) section for details.

Students are only allowed to enroll in one Graduate Certificate program at a time.

Students who are currently enrolled in a part-time degree program at the Carey Business School may add either the Graduate Certificate in Financial Management or the Graduate Certificate in Investments, but not both.

Please note that only six credits earned as a non-degree student may be counted toward a Graduate Certificate from the Carey Business School.

Financial Management, Graduate Certificate, Investments, Graduate Certificate, Applied Economics, MS

Students may pursue an MS in Applied Economics and a Graduate Certificate in Financial Management or in Investments, taught in conjunction with the Zanvyl Krieger School of Arts and Sciences. Those interested, including current students of either school, should apply to the Dual MS Degree in Applied Economics/Graduate Certificate in Financial Management or in Investments through Advanced Academic Programs. The Carey Graduate Certificate in Investments accompanies preparation for the Chartered Financial Analyst (CFA) examination, which is preserved in the Dual Diploma program. Interested students should contact carey.admissions@jhu.edu.

Program Requirements

Students have the opportunity to earn both the MS in Applied Economics and a Graduate Certificate in Financial Management or in Investments for a total of 15 courses, eight at Arts and Sciences (Applied Economics) and seven at Carey. Additional information regarding the MS and Graduate Certificate requirements is available at https://carey.jhu.edu/programs/certificate-programs/ms-applied-economics-financial-management-investments-certificate (https://carey.jhu.edu/programs/certificate-programs/ms-applied-economics-financial-management-investments-certificate/)

Dual degree recipients receive both diplomas upon completion of both programs. Course requirements, which can be pursued simultaneously at both schools, are:

Applied Economics, MS

Code	Title	Credits
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.640	Financial Economics	3
Applied Economics Elective I		3
Applied Economics Elective II		3
Total Credits		**24**

Graduate Certificate in Financial Management

Code	Title	Credits
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
BU.232.701	Investments	2
BU.230.620	Financial Modeling and Valuation	2
BU.231.720	Corporate Governance	2
Carey Finance Elective I		2
Carey Finance Elective II		2
Total Credits		**14**

Graduate Certificate in Investments

Code	Title	Credits
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
BU.232.710	Derivatives	2
BU.232.720	Fixed Income	2
BU.232.701	Investments	2
Carey Finance Elective I		2
Carey Finance Elective II		2
Total Credits		**14**

Students pursuing this dual program may earn either of these graduate certificates, but not both.

Health Care Management (Part Time), Master of Science

The Master of Science in Health Care Management (MSHCM) program prepares students to assess and act on opportunities to innovate and improve productivity in the health care sector. The program is unique in its breadth, in recognition of the fact that the health care sector is large and diverse, comprising a variety of actors in multiple industries including the following:

- Providers: clinics, hospitals, health care services companies;
- Payers: public and private insurance, social insurance;
- Innovators: pharmaceutical manufacturers, device makers, software and hardware makers;
- Institutions: regulators, civil service, civil society, advocacy groups, foundations, and funders.

The MS in Health Care Management program provides students with the most relevant business skills to be effective and efficient leaders who will improve the quality and access to health care at appropriate cost in light of the regulatory, cultural, and ethical context of the relevant health care ecosystem.

The rigorous curriculum of the MS in Health Care Management program at the Johns Hopkins Carey Business School enables students to:

- Apply the most relevant business skills and principles, and make informed decisions based on this knowledge;
- Gain an in-depth understanding of complex health care issues in order to lead and change enterprises;
- Develop the knowledge, confidence, and judgment to anticipate needed changes in a dynamic industry.

Program Requirements

The program requires 36 credits. Part-time students must complete the program within six years.

Students enrolled in the online MSHCM program are required to take the Business Communication course. Asynchronous online sections of this course have a mandatory two-day residency component, requiring real-time, synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

Curriculum

The curriculum for the MSHCM program includes the following courses. Course sequence and availability of specific electives may vary and not all electives are available every term nor in every format. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.520.601	Business Analytics	2
BU.120.601	Business Communication [1]	2
BU.131.601	Business Leadership and Human Values	2
BU.350.620	Information Systems	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.881.707	Accounting for Decision Making in Health Care	2
BU.881.702	Frameworks for Analyzing Health Care Markets	2
BU.883.705	Health Care Financing and Financial Management	2
BU.881.703	Health Care Law and Regulation	2
Elective Courses		
Select seven of the following:		14
BU.555.710	Applied and Behavioral Economics in Health Care	
BU.510.650	Data Analytics	
BU.150.710 & BU.150.715	Discovery to Market I and Discovery to Market II [2]	
BU.883.702	Health Information Technology	
BU.881.701	Fundamentals of Health Care Systems	
BU.883.706	Health Care Organization and Management	
BU.890.713 & BU.890.714	Health Care Strategy Consulting Practicum I and Health Care Strategy Consulting Practicum II [2]	
BU.881.706	Health Innovation and Evaluation	
BU.881.705	Health Marketing and Access	
BU.300.620	Managing Complex Projects	
BU.883.703	Medical Devices and Diagnostics	
BU.883.708	Negotiation in Health Care Settings	
BU.883.704	Pharmaceutical Strategy	
BU.881.704	Providers and Payers	
BU.550.620	The U.S. Health Care System: Past, Present, and Future	
BU.883.707	The Wire: Business Solutions for Community Health Improvement	
Total Credits		**36**

[1] Asynchronous online sections of this course have a mandatory two-day residency component, requiring real time, synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

[2] These courses must be taken in sequence.

Health Care Management, Master of Science

The full-time Master of Science in Health Care Management program prepares students to assess and act on opportunities to innovate and improve productivity in the health care sector. The program is unique in its breadth, in recognition of the fact that the health care sector is large and diverse, comprising a variety of actors in multiple industries including the following:

- Providers: clinics, hospitals, health care services companies;
- Payers: public and private insurance, social insurance;
- Innovators: pharmaceutical manufacturers, device makers, software and hardware makers;
- Institutions: regulators, civil service, civil society, advocacy groups, foundations, and funders.

This is the only business school degree program in the world that can harness the resources, reputation, and experience of Johns Hopkins University and its top-ranked schools of Medicine, Nursing, and Public Health.

The MS in Health Care Management program provides students with the most relevant business skills to be effective and efficient leaders who will improve the quality and access to health care at appropriate cost in light of the regulatory, cultural, and ethical context of the relevant health care ecosystem.

The rigorous curriculum of the MS in Health Care Management program at Johns Hopkins Carey Business School enables students to:

- Apply the most relevant business skills and principles, and make informed decisions based on this knowledge;
- Gain an in-depth understanding of complex health care issues in order to lead and change enterprises;
- Develop the knowledge, confidence, and judgment to anticipate needed changes in a dynamic industry.

Program Requirements

The program requires 36 credits. Full-time MS students must complete the program in 3 semesters: fall, spring, and summer. Course waivers are not granted in this program.

Curriculum

The curriculum for the MS in Health Care Management program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Required Coursework		
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
Core Courses		
BU.881.707	Accounting for Decision Making in Health Care	2
BU.881.702	Frameworks for Analyzing Health Care Markets	2
BU.883.701	Fundamentals of Health Care Operations	2
BU.881.703	Health Care Law and Regulation	2

BU.883.706	Health Care Organization and Management	2
BU.881.706	Health Innovation and Evaluation	2
BU.881.705	Health Marketing and Access	2
BU.881.704	Providers and Payers	2
BU.550.620	The U.S. Health Care System: Past, Present, and Future	2
Health Care Depth Electives		
Select five of the following:		10
BU.555.710	Applied and Behavioral Economics in Health Care	
BU.150.710 & BU.150.715	Discovery to Market I and Discovery to Market II	
BU.883.702	Health Information Technology	
BU.881.701	Fundamentals of Health Care Systems	
BU.883.705	Health Care Financing and Financial Management	
BU.883.703	Medical Devices and Diagnostics	
BU.883.708	Negotiation in Health Care Settings	
BU.883.704	Pharmaceutical Strategy	
BU.881.711	Research and Policy Seminars in Health	
BU.883.707	The Wire: Business Solutions for Community Health Improvement	
Project-Based Courses		
Students will complete a two-part project-based course (2 credits each):		
BU.890.720	Health Care Consulting Practicum I	2
BU.890.725	Health Care Consulting Practicum II	2
Total Credits		**36**

In addition to the elective courses listed above, MS in Health Care Management students can select up to 2 non-health care courses (maximum 4 credits) as part of the 10 elective credits. These courses must be approved by the Academic Program Director and Academic Advisor. Students should contact their advisor for more information.

Information Systems, Master of Science

Information systems and technologies are revolutionizing the way we live and work. The rapid pace of technological advances requires a new generation of talented and tech-savvy business leaders who possess a framework of foundational knowledge to anticipate and manage change and recognize opportunities for business value creation by adapting and implementing new technologies. The Master of Science in Information Systems (MSIS) program prepares students to lead IT initiatives aimed at organizational success, providing secure infrastructure platforms and breakthrough strategic advantage.

The MSIS program is designed for:

- IS professionals who want to advance into leadership roles in their organizations or start their own business or consultancy.
- Business professionals who want to leverage their expertise in functional areas, recognizing that advances in IT are changing every part of an organization.
- Recent graduates who want to learn how information and related technologies can be decisive factors for organizations to succeed in the global marketplace.

The MSIS curriculum reflects the latest IS research and industry best practices.

The program curriculum bridges technology and business with coursework in: artificial intelligence, machine and deep learning, distributed computing, cybersecurity and data vulnerability, data sciences and business intelligence, data networks (telecommunications) infrastructures, emerging technologies, big data analytics, cloud and mobile technologies, IT development and global sourcing strategies, enterprise architecture, and managing complex projects. The MSIS core spans the foundational breadth of information systems and technologies, from hands-on experience with web services to high-level information systems strategy. Elective courses provide students the flexibility to specialize the program to address personal and career objectives.

Program Requirements

The program requires 36 credits. Full-time MS students must complete the program in three semesters: fall, spring, and summer. Course waivers are not granted.

Curriculum

The curriculum for the MSIS program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
BU.350.620	Information Systems	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.330.750	AI: Principles and Business Applications	2
BU.330.790	Applied IS Architecture	2
BU.330.705	Data Networks: Infrastructures & Emerging Technologies	2
BU.330.780	Data Science and Business Intelligence	2
BU.330.740	Large Scale Computing with Hadoop	2
BU.300.620	Managing Complex Projects	2
Elective Courses		
Select seven of the following:		14
BU.210.620	Accounting and Financial Reporting	
BU.350.710	IT and Global Sourcing Strategy	
BU.520.620	Advanced Business Analytics	
BU.520.710	Big Data Machine Learning	
BU.360.701	Competitive Intelligence	
BU.330.730	Cybersecurity	
BU.510.650	Data Analytics	
BU.330.770	Database Management	
BU.330.760	Deep Learning with Unstructured Data	
BU.300.700	Developing Internet Systems and Services	
BU.883.702	Health Information Technology	
BU.142.620	Leadership in Organizations	
BU.410.620	Marketing Management	

BU.680.620	Operations Management	
BU.510.615	Python for Data Analysis	
BU.610.615	Simulation for Business Applications	
Total Credits		**36**

In addition to the elective courses listed above, MSIS students can select up to 2 courses (maximum 4 credits) from any area as part of the 12 elective credits. These courses must be approved by an academic advisor. The advisor-approved electives provide flexibility for students in tailoring their MSIS program.

Investments, Graduate Certificate

Mutual funds, trust departments, brokerage firms, and investment bankers require professionally trained financial managers. Today's fast-paced, technology-driven investment environment demands that market participants understand and employ the latest financial tools and techniques.

The Graduate Certificate in Investments is designed to meet the demands of professionals in the rapidly developing field of investments and finance. The curriculum is both rigorous and contemporary, applying modern investment theory to real-world scenarios. Case studies and projects are used at various points of the curriculum. The certificate program is structured to complement preparation for the Chartered Financial Analyst (CFA) examinations.

Program Requirements

Students have the option of taking courses for the certificate onsite, online, or a combination of both. Students are required to complete the Graduate Certificate in Investments within three years.

The curriculum for the Graduate Certificate in Investments includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. The certificate consists of eight courses (16 credits). All courses are two credits. Course waivers are not permitted for this certificate.

Code	Title	Credits
Required Courses		
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
BU.232.710	Derivatives	2
BU.232.720	Fixed Income	2
BU.232.701	Investments	2
BU.510.601	Statistical Analysis	2
Elective Courses		
Select two of the following:		4
BU.231.790	Advanced Corporate Finance	
BU.210.650	Financial Statement Analysis	
BU.232.790	Advanced Hedge Fund Strategies	
BU.232.750	Advanced Portfolio Management	
BU.520.710	Big Data Machine Learning	
BU.231.720	Corporate Governance	
BU.210.680	Cost Measurement and Control	
BU.232.770	Cryptos and Blockchain	
BU.510.650	Data Analytics	
BU.220.620	Business Microeconomics	
BU.232.725	Emerging Markets	
BU.233.730	Entrepreneurial Finance	
BU.230.750	Financial Crises and Contagion	
BU.231.710	Financial Institutions	
BU.230.620	Financial Modeling and Valuation	
BU.230.730	Managing Financial Risk	
BU.231.740	Mergers and Acquisitions	
BU.220.610	The Firm and the Macroeconomy	
BU.232.730	Wealth Management	
Total Credits		**16**

Certificate Policies

Students who are currently enrolled in a part-time degree program at the Carey Business School and wish to add a Graduate Certificate, must do so within the first year of study (no more than one academic year or 3 semesters after their start date). Graduate Certificates are not open to students in full-time programs. Please visit the Changing Degree Program (p. 687) section for details.

Students are only allowed to enroll in one Graduate Certificate program at a time.

Students who are currently enrolled in a part-time degree program at the Carey Business School may add either the Graduate Certificate in Financial Management or the Graduate Certificate in Investments, but not both.

Please note that only six credits earned as a non-degree student may be counted toward a Graduate Certificate from the Carey Business School.

Leadership Development Program, Graduate Certificate

The Johns Hopkins Carey Business School Leadership Development Program (also known as LDP) is a nationally recognized opportunity for Black, Latinx, Indigenous, and all people of color to advance their leadership skills. After more than a quarter-century of operations and with over 550 graduates to date, the Leadership Development Program offers a curriculum and enriched programming that have enabled aspiring individuals to expand their perspectives, build new strengths, and fully realize their leadership potential.

The courses and activities within the program will propel student success both in business and in community settings as a multicultural manager. LDP students will actively build personal growth, organizational resilience, and focused networking, along with applicable business knowledge and skills for advancement as a decision maker and leader in today's rapidly changing global workplace.

Program Requirements

The depth of the Leadership Development Program experience involves two on-site residencies and online coursework (synchronous) between residencies. LDP students will engage in discussions with corporate, government, and nonprofit leaders and work in teams on real-time entrepreneurship, business, and community-based projects. The Leadership Development Program curriculum features case studies and simulations, while exploring and integrating dimensions of leadership approaches and strategies applicable in the multicultural and multinational environment.

LDP students are required to complete the graduate certificate in the Leadership Development Program in nine months. The certificate consists of six courses (12 credits).

Code	Title	Credits
BU.210.610	Accounting for Decision Making	2
BU.510.601	Statistical Analysis	2
BU.410.620	Marketing Management	2
BU.142.720	Managing in a Diverse & Global World	2
BU.120.650	Business and Leadership Communication	2
BU.142.690	Leadership Theory Into Practice	2
Total Credits		**12**

Residencies

Students in the LDP program are required to take part in two residencies to learn in-person from peers and Carey Business School faculty. Residencies take place once in the fall semester and once in the spring semester. Before each residency, you will receive a reading package with pre-module homework, case studies, and exercises that are required to complete for partial credit toward the next residency. Post-residency work includes online coursework, case studies, and take-home exams that you will complete to receive full credit for the residency.

Certificate Policies

Due to the unique nature and structure of the program, students who are currently enrolled in any degree or Graduate Certificate program at the Carey Business School are not eligible to enroll in the LDP Certificate.

Current LDP students are not eligible to concurrently enroll in any other degree or Graduate Certificate program at the Carey Business School. Students are welcome to apply to a degree or Graduate Certificate program upon completion of LDP.

Marketing (Part Time), Master of Science

The Master of Science in Marketing (MSM) program is deeply committed to the enhancement and facilitation of each student's career by combining a world-class education, with highly valuable practical experience, and the Hopkins mission of providing knowledge to the world to inspire our students to achieve their professional goals and make a positive impact in the world of business.

The MSM curriculum incorporates the latest knowledge and technology in the field. Course offerings provide students with a thorough foundation in marketing theory, analysis, and practical applications. The course sequence maximizes student learning by progressing logically from foundation and core theory to specific practice. The program focuses on the application of marketing theory, current and future trends, and state-of-the-art techniques required by marketing professionals for success in the global market.

Program Requirements

The program requires 36 credits. Part-time students must complete the program within six years.

Students enrolled in the online MSM program are required to take the Business Communication course. Asynchronous online sections of this course have a mandatory two-day residency component, which includes synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

Curriculum

The curriculum for the MSM program includes the following courses. Course sequence and availability of specific electives may vary and not all electives are available every term nor in every format. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.210.620	Accounting and Financial Reporting	2
BU.120.601	Business Communication [1]	2
BU.132.601	Business Law	2
BU.131.601	Business Leadership and Human Values	2
BU.410.620	Marketing Management	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.420.710	Consumer Behavior	2
BU.410.601	Marketing Research	2
BU.450.710	Marketing Strategy	2
Elective Courses		
Select nine of the following:		18
BU.420.730	Advanced Behavioral Marketing	
BU.430.710	Branding and Marketing Communications	
BU.520.601	Business Analytics	
BU.460.710	Business-to-Business Marketing & Channel Strategy	
BU.450.760	Customer Analytics	
BU.420.720	Customer Relationship Management	
BU.510.650	Data Analytics	
BU.450.630	Designing Experiments	
BU.460.700	Integrated Digital Marketing	
BU.460.730	New Product Development	
BU.430.720	Pricing Analysis	
BU.450.740	Retail Analytics	
BU.430.740	Sales Force Management	
BU.450.765	Social Media Analytics	
BU.450.750	Strategic Market Intelligence	
Total Credits		**36**

[1] Asynchronous online sections of this course have a mandatory two-day residency component, requiring real time, synchronous participation. Onsite residencies are held at the Carey Business School's Harbor East campus in Baltimore, MD.

Marketing, Master of Science

The Master of Science in Marketing with a STEM-designated concentration in Marketing Analytics is deeply committed to the enhancement and facilitation of each student's career by combining a world-class education with highly valuable and practical experience, and the Hopkins mission of providing knowledge to the world to inspire our students to achieve their professional goals and make a positive impact in the world of business.

The Marketing Analytics curriculum incorporates the latest knowledge and technology in the field. Course offerings provide students with a thorough foundation in marketing theory, analysis, and practical applications. The course sequence maximizes student learning by progressing logically from foundation and core theory to specific practice. The program focuses on the application of marketing theory, current and future trends, and state-of-the-art techniques required by marketing professionals for success in the global market.

Program Requirements

The program requires 36 credits. Full-time MS students must complete the program in 3 semesters: fall, spring, and summer. Course waivers are not granted in this program.

Curriculum

The curriculum for the MSM program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.520.601	Business Analytics	2
BU.131.601	Business Leadership and Human Values	2
BU.410.620	Marketing Management	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.420.710	Consumer Behavior	2
BU.450.760	Customer Analytics	2
BU.510.650	Data Analytics	2
BU.410.601	Marketing Research	2
BU.450.710	Marketing Strategy	2
BU.430.720	Pricing Analysis	2
BU.450.765	Social Media Analytics	2
BU.450.750	Strategic Market Intelligence	2
Elective Courses		
Select six of the following:		12
BU.210.620	Accounting and Financial Reporting	
BU.420.730	Advanced Behavioral Marketing	
BU.430.710	Branding and Marketing Communications	
BU.120.601	Business Communication	
BU.132.601	Business Law	
BU.460.710	Business-to-Business Marketing & Channel Strategy	
BU.420.720	Customer Relationship Management	
BU.450.630	Designing Experiments	
BU.460.700	Integrated Digital Marketing	
BU.460.730	New Product Development	
BU.450.740	Retail Analytics	
BU.430.740	Sales Force Management	
BU.510.615	Python for Data Analysis	
Total Credits		**36**

MBA/Applied Economics, MS Dual Degree

To allow students to better exploit the strong complementary nature between business and economics, the Carey Business School and the Johns Hopkins Zanvyl Krieger School of Arts and Sciences Applied Economics Program have eliminated the overlap between the MS in Applied Economics and the MBA. This enables students to earn both the MS degree and the MBA for fewer courses than if pursued separately.

Admission Requirements

Apply to the MBA/MS in Applied Economics through the Johns Hopkins Zanvyl Krieger School of Arts and Sciences. For more information, please visit https://advanced.jhu.edu/academics/graduate/ms-applied-economics/ms-applied-economics-mba-dual-degree (https://advanced.jhu.edu/academics/graduate/ms-applied-economics/ms-applied-economics-mba-dual-degree/)

Program Requirements

The program requires 66 credits, 42 credits (16 credits Flex MBA Business Foundation and 26 credits of electives) for the MBA. The 42 credits required for the MBA must be "BU" courses from the Carey Business School. Course scheduling allows for completion of the MBA portion of the program in 32 months. Students must complete the MBA portion within six years. A waived course must be replaced with an equivalent number of credits in an advanced course. Dual degree recipients receive both diplomas upon completion of both programs.

Dual degree recipients receive both diplomas upon completion of both programs. Course requirements, which can be pursued simultaneously at both schools, are:

Code	Title	Credits
Core Courses		
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
Advanced Econometrics Course		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
Elective Courses		
Select three elective courses		9
Total Credits		**24**

MBA Requirements --- Carey Business School

All courses are two credits unless otherwise specified.

Code	Title	Credits
Required Courses (16 credits)		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.150.620	Strategic Management	2
Elective Courses (26 credits)		**26**
Select 13 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria with three exceptions. BU.220.610, BU.220.620, and BU.510.601 may not be used as elective courses toward the MBA degree.		
Total Credits		**42**

MBA/Biotechnology, MS Dual Degree

The MBA/MS in Biotechnology program teaches fundamental and advanced principles of both business and biotechnology that cover accounting, negotiation, finance, and regulatory and legal matters, as well as biochemistry, biostatistics, and bioinformatics. With a perspective informed both by business and science, students work and learn in a team-oriented cohort. They emerge from the program—offered jointly with the Johns Hopkins Zanvyl Krieger School of Arts and Sciences—possessing the expertise and the confidence to become innovative managers in the biotechnology field. More information is available at https://carey.jhu.edu/programs/dual-degrees/mba-master-science-biotechnology (https://carey.jhu.edu/programs/dual-degrees/mba-master-science-biotechnology/).

Admission Requirements

Apply to the MBA/MS in Biotechnology through the Johns Hopkins Zanvyl Krieger School of Arts and Sciences. For more information, please visit https://advanced.jhu.edu/academics/graduate/ms-biotechnology/ms-biotechnology-mba-dual-degree/

Program Requirements

The program requires 82 credits, 42 credits (20 credits Flex MBA Business Foundation and 22 credits of electives) for the MBA and 40 credits in Biotechnology. The 42 MBA credits must be completed with "BU" courses from the Carey Business School. Dual degree recipients receive both diplomas upon completion of both programs.

Biotechnology Requirements

Code	Title	Credits
Core Courses - Required:		
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4
AS.410.603	Advanced Cell Biology	4
AS.410.604	Cellular Signal Transduction	4
Electives (Six courses)		**24**
AS.410.645	Biostatistics (students who take Biostatistics may take one additional Carey Business School elective in place of BU.510.601 Statistical Analysis)	
Total Credits		**40**

MBA Requirements

Code	Title	Credits
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis (Students who complete AS.410.645 Biostatistics may take an additional Carey Business Elective in place of BU.510.601 Statistical Analysis.)	2
BU.150.620	Strategic Management	2
Electives (22 credits)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

MBA/Communication, MA Dual Degree

The Hopkins MBA/MA in Communication prepares managers in public and media relations, advertising, crisis communication, organizational development, and risk communication. It provides managers with the knowledge and skills to solve communication problems in the workplace, use new media to transform existing business practices, reach out to media and clientele, and manage corporate images. This program enables communication professionals to expand their knowledge and skills in business and management, preparing them to lead nonprofit, public sector, or commercial enterprises. Students in these degrees complete both the professional managerial education requirements of the MBA and the advanced disciplinary requirements of a specialized MA in Communication. More information is available at https://carey.jhu.edu/programs/dual-degrees/mba-ma-communication (https://carey.jhu.edu/programs/dual-degrees/mba-ma-communication/).

Admission Requirements

Apply to the MBA/MA in Communication through the Johns Hopkins Zanvyl Krieger School of Arts and Sciences. For information, please visit advanced.jhu.edu/academics/dual-degree-programs/communication-mba (https://advanced.jhu.edu/academics/dual-degree-programs/communication-mba/).

Program Requirements

The program requires 60 credits, 42 credits (20 credits Flex MBA Business Foundation and 22 credits of electives) for the MBA. All 42 MBA credits must come from "BU" courses at the Carey Business School. Course scheduling allows for completion of the MBA portion of the program in 30 months. A waived course must be replaced with an equivalent number of credits in an advanced course. Dual degree recipients receive both diplomas upon completion of both programs.

Program Requirements
MA in Communication Curriculum

Code	Title	Credits
Core Course - Required:		
AS.480.600	Research & Writing Methods	3
Core Courses - Customizable		
Select three of the following:		9
AS.480.601	Foundations of Digital Media	
AS.480.602	Changing Behavior through Communication	
AS.480.604	Theory of Mass Communication Practices	
AS.480.606	Persuasion	
AS.480.804	Practicum	
Electives (Six courses)		18
Total Credits		**30**

MBA Curriculum

All students pursuing this dual degree must take the following courses. Course scheduling allows for completion of the MBA portion of the program in 32 months. Dual degree recipients receive both diplomas upon completion of both programs.

Code	Title	Credits
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Electives (11 courses)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

MBA/DNP Dual Degree

Students may pursue an MBA/Doctor of Nursing Practice offered through the School of Nursing and the Carey Business School. This area of study puts a nurse in rare company alongside leaders of health care or academic institutions setting a course for the future. Graduates of this program will be prepared to create and lead new models of care delivery for communities locally, across the nation, and around the world.

Admission Requirements

Apply through the School of Nursing website. Please visit nursing.jhu.edu/admissions/apply/index.html (https://nursing.jhu.edu/admissions/apply/).

Program Requirements

The program requires 67 credits, including 42 credits for the Flexible MBA (20 credits of Flex MBA Business Foundations and 22 credits of business electives) . All 42 MBA credits must be fulfilled with "BU" courses from the Carey Business School. Students must complete the MBA portion within six years. A waived course must be replaced with an equivalent number of credits in an advanced course. Dual degree recipients receive both diplomas upon completion of both programs.

MBA Curriculum - All courses taken at Carey Business School

Code	Title	Credits
Business Foundations Courses (20 credits)		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
MBA Electives (22 credits)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
DNP Requirements		**25**
Please refer to the School of Nursing section of this catalogue or the Sample Program tab on this entry for details regarding DNP coursework.		
Total Credits		**67**

TYPICAL PROGRAM OF STUDY SEQUENCE

Course	Title	Credits
First Year		
First Semester		
Carey Business School Summer Year 1		
BU.510.601	Statistical Analysis	2
	Credits	**2**
Second Semester		
Carey Business School Fall Term 1 Year 1		
BU.210.620	Accounting and Financial Reporting	2
BU.120.601	Business Communication	2
Carey Business School Fall Term 2 Year 1		
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
	Credits	**8**

Third Semester		
School of Nursing Spring 1 Year 1		
NR.210.802	Advanced Nursing Health Policy	2
Carey Business School Spring Term 1 Year 1		
BU.220.620	Business Microeconomics	2
General Business Elective 1		2
Carey Business School Spring Term 2 Year 1		
BU.520.601	Business Analytics	2
General Business Elective 2		2
	Credits	**10**
Second Year		
First Semester		
Carey Business School/School of Nursing Summer Year 2		
NR.210.886	Problem Discovery	3
General Business Elective 3		2
	Credits	**5**
Second Semester		
School of Nursing Fall Year 2		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
Carey Business School Fall Term 1 Year 2		
BU.410.620	Marketing Management	2
General Business Elective 4		2
Carey Business School Fall Term 2 Year 2		
BU.150.620	Strategic Management	2
General Business Elective 5		2
	Credits	**11**
Third Semester		
School of Nursing Spring Year 2		
NR.210.805	Translating Evidence into Practice	3
NR.210.887	Project Advancement	3
Carey Business School Spring Term 1 Year 2		
BU.680.620	Operations Management	2
Carey Business School Spring Term 2 Year 2		
General Business Elective 6		2
	Credits	**10**
Third Year		
First Semester		
Carey Business School/School of Nursing Summer Year 3		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
General Business Elective 7		2
General Business Elective 8		2
	Credits	**7**
Second Semester		
School of Nursing Fall Year 3		
NR.210.888	Project Application	3
Carey Business School Fall Term 1 Year 3		
General Business Elective 9		2
Carey Business School Fall Term 2 Year 3		
General Business Elective 10		2
	Credits	**7**
Third Semester		
School of Nursing Spring Year 3		
NR.210.889	Project Evaluation and Dissemination	3
NR.210.818	Clinical Data Management and Analyses	2
Carey Business School Spring Term 1 Year 3		
General Business Elective 11		2
	Credits	**7**
	Total Credits	**67**

MBA/Government, MA Dual Degree

The MBA/MA in Government prepares managers to move between the public and private sectors, or work for agencies that span the two. The program combines the public sector management strengths of the MA in Government with the private sector business savvy of the MBA. The MBA/MA in Government bridges the traditional separation of business leadership and public sector management. Advance your knowledge in government and politics, ethics, global economics, financial theory, and management, and set yourself apart from the competition in a career that overlaps public and private sectors. More information is available at https://carey.jhu.edu/programs/dual-degrees/mba-ma-government (https://carey.jhu.edu/programs/dual-degrees/mba-ma-government/).

Admission Requirements

For more information about the MBA/MA in Government with the Johns Hopkins Zanvyl Krieger School of Arts and Sciences, visit https://advanced.jhu.edu/academics/graduate/ma-government/ma-government-mba-dual-degree/

Program Requirements

The program requires 60 credits, 42 credits (20 credits of Flex MBA Business Foundations and 22 credits of electives) for the MBA. All 42 MBA credits must be fulfilled with "BU" courses from the Carey Business School. Course scheduling allows for completion of the MBA portion of the program in 32 months. A waived course must be replaced with an equivalent number of credits in an advanced course. Dual degree recipients receive both diplomas upon completion of both programs.

MA in Government Courses

Code	Title	Credits
Core Course - Required:		
AS.470.602	Government & Politics	3
AS.470.695	Proseminar: Essentials of Public and Private Management	3
Electives (Eight courses)		**24**
Total Credits		**30**

Although not required, the following courses are recommended electives for students in the dual degree program:

Code	Title	Credits
Electives		
AS.470.609	Leadership Skills in the 21st Century	
AS.470.616	Political Ideas, Strategy, and Policy Implementation	
AS.470.622	Money and Politics	
AS.470.630	Congress and the Making of Foreign Policy	

AS.470.638	Negotiating as a Leadership Skill
AS.470.641	Introduction to Advocacy and Lobbying
AS.470.645	The Budgetary Process
AS.470.688	Political Institutions and the Policy Process
AS.470.721	Comparative Federalism: The United States and the European Union
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management
AS.470.736	Methods of Policy Analytics
AS.470.744	Trade and Security

Students wishing to earn a concentration must complete four of their electives in the concentration area. Concentrations are offered in Political Communication, Security Studies, and Democracy and Governance Studies. For MA/MBA students, the thesis requirement is optional. If you wish to write a thesis, you must take:

Code	Title	Credits
AS.470.850	Research and Thesis I: MA in Government	
AS.470.852	Research and Thesis II: MA in Government	
AS.470.800	Research & Thesis III: Government	

These three classes would count toward the eight government electives you must take to complete the MA/MBA. MA/MBA students who successfully complete and defend their thesis will be awarded honors at graduation.

MBA Courses

All dual-degree students are required to complete the following MBA courses. Dual degree recipients receive both diplomas upon completion of both programs.

Code	Title	Credits
Core Course - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Electives (11 courses)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

MBA/Healthcare Organizational Leadership, MSN Dual Degree

Students may pursue an MBA/Master of Science in Nursing in Healthcare Organizational Leadership offered through the School of Nursing and the Carey Business School. This area of study provides thoughtful, strong leaders within health systems the ability to blend an understanding of medical, economic, regulatory, and ethical standards to help set organizational policy and priorities within a high-functioning organization.

Admission Requirements

Apply through the School of Nursing website, please visit nursing.jhu.edu/admissions/apply/index.html (http://nursing.jhu.edu/admissions/apply/).

Program Requirements

The program requires 68 credits, 42 credits (20 credits of Flex MBA Business Foundations and 22 credits of electives) for the Flexible MBA. All 42 MBA credits must be fulfilled with "BU" courses from the Carey Business School. Students must complete the MBA portion within six years. A waived course must be replaced with an equivalent number of credits in an advanced course. Dual degree recipients receive both diplomas upon completion of both programs.

Curriculum

Code	Title	Credits
Core Courses		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
HSM Specialty Courses		
NR.110.560	Program Development and Evaluation in Health Care	2
NR.110.605	Leadership and Management in Health Care	3
NR.110.607	Health Systems Management I (40CL)	3
NR.110.609	Health Systems Management II - Specialty Practice (168CL)	3
NR.110.611	Health Systems Management III - Outcomes Management (168CL)	3
MBA Required Courses – Courses taken at the Carey Business School		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.132.601	Business Law	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.220.620	Economics for Decision Making	2
BU.220.610	The Firm and the Macroeconomy	2
BU.350.620	Information Systems	2
BU.232.701	Investments	2
BU.142.620	Leadership in Organizations	2
BU.410.620	Marketing Management	2
BU.121.610	Negotiation	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
Electives		
BU.XXX.XXX	Business Elective 1	2

BU.XXX.XXX	Business Elective 2	2
BU.XXX.XXX	Business Elective 3	2
BU.XXX.XXX	Business Elective 4	2
BU.XXX.XXX	Business Elective 5	2
BU.XXX.XXX	Business Elective 6	2
Total Credits		**68**

Program Total: 65 Credits [cr]/376 Clinical Hours [CL]

Programs of Study

MSN Healthcare Organizational Leadership/MBA Dual Degree Program of Study: Full Time

All Business courses are taken at the Carey Business School

Course	Title	Credits
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
NR.110.651	Leadership Role Identity and Career Development	2
BU.510.601	Statistical Analysis	2
BU.120.601	Business Communication	2
BU.210.620	Accounting and Financial Reporting	2
	Credits	**14**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
BU.220.620	Business Microeconomics	2
BU.410.620	Marketing Management	2
BU.231.620	Corporate Finance	2
General Business Elective 1		2
	Credits	**16**
Third Semester		
NR.110.656	Healthcare Organizational Leadership Practicum II	3
BU.520.601	Business Analytics	2
General Business Elective 2		2
General Business Elective 3		2
	Credits	**9**
Fourth Semester		
BU.680.620	Operations Management	2
BU.150.620	Strategic Management	2
BU.142.601	Leadership and Organizational Behavior	2
NR.110.657	Healthcare Organizational Leadership Practicum III	4
General Business Elective 4		2
General Business Elective 5		2
General Business Elective 6		2
	Credits	**16**
Fifth Semester		
General Business Elective 7		2
General Business Elective 8		2
General Business Elective 9		2
General Business Elective 10		2
General Business Elective 11		2
	Credits	**10**
	Total Credits	**65**

Program Total: 65 Credits [cr]/504 Clinical Hours [CL]

MSN Healthcare Organizational Leadership/MBA Dual Degree Program of Study: Part Time

All Business courses are taken at the Carey Business School

Course	Title	Credits
First Semester		
BU.510.601	Statistical Analysis	2
BU.120.601	Business Communication	2
NR.110.651	Leadership Role Identity and Career Development	2
	Credits	**6**
Second Semester		
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
	Credits	**7**
Third Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
BU.220.620	Business Microeconomics	2
	Credits	**5**
Fourth Semester		
General Business Elective 1		2
BU.150.620	Strategic Management	2
BU.142.601	Leadership and Organizational Behavior	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
	Credits	**9**
Fifth Semester		
BU.410.620	Marketing Management	2
NR.110.655	Healthcare Organizational Leadership Practicum I	2
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
	Credits	**7**
Sixth Semester		
NR.110.656	Healthcare Organizational Leadership Practicum II	3

BU.520.601	Business Analytics	2
	Credits	**5**
Seventh Semester		
NR.110.657	Healthcare Organizational Leadership Practicum III	4
BU.680.620	Operations Management	2
General Business Elective 1		2
	Credits	**8**
Eighth Semester		
General Business Elective 2		2
General Business Elective 3		2
General Business Elective 4		2
General Business Elective 5		2
	Credits	**8**
Ninth Semester		
General Business Elective 6		2
General Business Elective 7		2
	Credits	**4**
Tenth Semester		
General Business Elective 8		2
General Business Elective 9		2
General Business Elective 10		2
General Business Elective 11		2
	Credits	**8**
	Total Credits	**67**

Program Total: 65 Credits [cr]/504 Clinical Hours [CL]

MBA/JD Dual Degree

The MBA/JD program is a dual degree offered by the University Of Maryland Carey School Of Law and the Johns Hopkins Carey Business School to prepare students for complex challenges in business, industry, commerce, government organizations, and the nonprofit sector. The dual-degree program will provide a unique opportunity to add another dimension to the educational preparation of students who seek management and leadership responsibilities in legal practice, financing and delivery of legal services, development of new legal services, establishing and managing law firms, as well as pursuing a career focused on law and business in national and international organizations and academic institutions. More information is available at https://carey.jhu.edu/programs/dual-degrees/jd-mba (https://carey.jhu.edu/programs/dual-degrees/jd-mba/).

Admission Requirements

Applicants need to apply to both programs separately. For more information on University of Maryland Carey School of Law, please visit https://www.law.umaryland.edu/Prospective-Students/JD (https://www.law.umaryland.edu/Prospective-Students/JD/).

Program Requirements

Students complete 42 credits toward the MBA, which the Johns Hopkins Carey Business School provides, and will accept 12 credits transferred from University of Maryland Carey School of Law to complete the 54-credit degree. Students complete 76 credits which University Of Maryland Carey School Of Law provides toward the JD and will accept 9 credits transferred from Johns Hopkins Carey Business School to complete the 85-credit degree. Dual degree recipients will only receive both diplomas upon completion of both programs.

MBA/MA in International Relations

The MBA and Master in International Relations dual degree will prepare students for a career that requires business and leadership training in addition to a sophisticated understanding of international political, socioeconomic, and cultural issues. Students build expertise through diverse curriculum offerings from two of Johns Hopkins' most innovative institutions. With the Master in International Relations, students will gain both professional and substantive insights by developing an extensive global mindset through functional and regional focus areas. Combine this expertise from one of the best schools for international relations with the leadership and analytical skills gained through the Johns Hopkins MBA. Graduate ready to make a lasting impact across the globe.

Prospective students must submit both an application for the Full-Time MBA from the Johns Hopkins Carey Business School and an application for the MA in International Relations from the Johns Hopkins School of Advanced International Studies. For more details, please visit: https://carey.jhu.edu/programs/admissions/how-to-apply/dual-degrees (https://carey.jhu.edu/programs/admissions/how-to-apply/dual-degrees/).

The MBA and Master in International Relations (MAIR) dual degree curriculum is designed with flexibility paramount across the three years of study. The Johns Hopkins MBA is 54 credits, 12 of which may be applied from the MAIR program. The MAIR program is 64 credits, 16 of which may be applied from the MBA. The MBA/MAIR requires a total of 118 credits.

Students will also have options for how to begin their degree. They may choose to begin with one year of coursework in either the MBA or the MAIR program. The first year of coursework in either program must be completed prior to enrollment in the second year of courses.

MBA/MD Dual Degree

The Johns Hopkins dual-degree MBA/MD program is structured as a five year academic program, with students as full-time members of the medical school and the full-time MBA cohort as they progress through the program.

The program is designed to prepare physicians for leadership roles in medicine and in the health care industry. The proposed dual-degree program will give students a unique educational experience through the Genes to Society (GTS) medical school curriculum and Carey's full-time MBA program. More information is available at https://carey.jhu.edu/programs/dual-degrees/mba-md (https://carey.jhu.edu/programs/dual-degrees/mba-md/).

Admission Requirements

Students applying to the MD/MBA program will be required to meet the admissions criteria of the JHU School of Medicine and be admitted to the MD program. Once students are accepted by the School of Medicine, they have an opportunity to apply for the MBA/MD program. The applications will then be reviewed for business school admission by the Carey Admissions team.

Program Requirements

For the Carey MBA program, students are required to complete 54 credits. Up to 12 credits from the MD electives can be applied to program requirements for the MBA electives, subject to review and approval of the MD/MBA Academic Program Committee. Dual degree recipients receive both diplomas upon completion of both programs.

MBA/MPH Dual Degree

This unique 23-month full-time program of study will enable students to integrate the philosophies, functions, and competencies of the seemingly disparate fields of public health and business. Students in this program will acquire knowledge and skills in the principles of population-based health as well as finance and management, which will enable them to be effective managers and leaders in health-related agencies and organizations. Graduates will be able to assess the public health needs of a defined population; develop, analyze, and implement targeted health policies and programs; lead the process of change within one's own organization and community; manage health care organizations to achieve identified goals; and communicate messages to targeted audiences.

More information is available at https://carey.jhu.edu/programs/dual-degrees/mba-master-public-health (https://carey.jhu.edu/programs/dual-degrees/mba-master-public-health/).

Admission Requirements

Applications for the combined degree program must be obtained from and submitted to the Johns Hopkins Bloomberg School of Public Health and will be reviewed by the admissions committees of both the Johns Hopkins Bloomberg School of Public Health and the Carey Business School. For more information, please visit jhsph.edu/academics/degree-programs/master-of-public-health/academic-overview/combined-degrees-and-programs.html (http://www.jhsph.edu/academics/degree-programs/master-of-public-health/academic-overview/combined-degrees-and-programs.html).

Program Requirements

The program requires 127 credits (MPH and MBA based on School of Public Health credit system). Dual degree recipients receive both diplomas upon completion of both programs.

MSF/MBA Dual Degree

The MS in Finance/MBA is a partnership with the Cheung Kong Graduate School of Business (CKGSB), for students currently pursuing an MBA with CKGSB as well as recent MBA graduates from the school.

MSF/MBA students gain the technical skills to create innovative solutions in all aspects of management and finance. The part-time program is designed for working professionals advancing in their careers, to allow flexibility to take classes online, featuring mostly asynchronous learning activities with a few recommended or required synchronous (real-time) activities.

This program empowers working professionals to hone the skills they need to advance quickly in their careers within a flexible format. A significant portion of the MSF curriculum is devoted to the CFA Institute's Candidate Body of Knowledge, preparing students to sit for the CFA exams.

Who can apply and application process:

First and second year CKGSB MBA students, and alumni who completed their CKGSB MBA degree within the last 2 years, may apply.

New applicants who will be starting the MBA at CKGSB in Fall 2021 may apply to start the MSF/MBA dual program in Fall 2022.

To be qualified to be part of the dual degree program, applicants must be current CKGSB students or alumni from MBA program. Applicants also need to complete the new student application process to JHU Carey https://carey.jhu.edu/programs/admissions/how-to-apply (https://carey.jhu.edu/programs/admissions/how-to-apply/).

Program Requirements

The program requires 30 credits, some of which (up to four credits) may be satisfied using courses transferred from CKGSB. Students are admitted in the Fall semester each year and must follow a 20-month, cohorted program sequence.

Curriculum

The curriculum for the MSF portion of the MSF/MBA is based primarily on the Carey Business School MSF Part-Time curriculum with some adjustments specific to this dual degree program. Students must consult with an academic advisor to ensure they take the approved courses for this program in the approved sequence. All Carey MSF courses are 2 credits.

Real Estate and Infrastructure (Part Time), Master of Science

The Master of Science in Real Estate and Infrastructure (MSREI) part-time program is ideal for mid-career real estate professionals with industry experience. Working with academic and practitioner faculty, students develop the knowledge and skills needed to take advantage of the latest developments in this fast-changing profession. This core curriculum integrates the study of the major disciplines that influence real estate decisions: market analysis, law, investment analysis, finance, and development.

Program Requirements

The program requires 36 credits. Part-time students must complete the program within six years.

Curriculum

The curriculum for the MSREI program includes the following courses. Course sequence and availability of specific electives may vary. Students should consult with an academic advisor to ensure they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.131.601	Business Leadership and Human Values	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.241.735	Infrastructure Development for Sustainable Cities	2
BU.241.740	Project Finance and Public-Private Infrastructure Delivery	2
BU.234.610	Real Estate and Infrastructure Finance	2

BU.242.720	Real Estate Capital Market Analysis	2
BU.241.610	Real Estate Investment and Development	2
BU.132.615	Real Estate Legal Environment	2
BU.242.601	Real Estate Market Feasibility Study	2
Elective Courses		
Select eight of the following:		16
BU.241.750	Advanced Valuation and Investment Analysis	
BU.120.601	Business Communication	
BU.231.620	Corporate Finance	
BU.241.620	Design and Construction Feasibility	
BU.230.640	Development Modeling and Risk Analysis	
BU.241.725	Global Perspectives in Real Estate	
BU.121.610	Negotiation	
BU.242.715	Real Estate and Infrastructure Valuation	
BU.152.725	Real Estate Entrepreneurship	
BU.242.710	Real Estate Funds and Portfolio Management	
BU.242.701	Real Estate Investment Trusts: Analysis and Structuring	
BU.450.740	Retail Analytics	
BU.241.770	Smart Growth, Infrastructure and Real Estate Development	
BU.241.760	Strategic Commercial Leasing	
Capstone		
BU.245.790	Real Estate and Infrastructure Capstone	2
Total Credits		**36**

Real Estate and Infrastructure, Master of Science

The Edward St. John Real Estate Program offers a Master of Science in Real Estate and Infrastructure (MSREI) degree program that provides students with a comprehensive understanding of real estate finance, investment, development, management, and capital markets.

The full-time MSREI program is guided by a faculty composed of Johns Hopkins professors and of Real Estate practitioners from the region's leading investment, development, planning, law, and architectural firms. A supportive network of alumni and business professionals is available to students throughout their 12-month course of study.

The full-time program is designed for students who are prepared to be challenged by a fast pace and heavy course load. The program is ideal for real estate professionals with fewer than eight years of experience. Foundation, core, and elective courses are offered at the Washington D.C. campus. Elective courses are offered in the day, evening, and on Saturdays. Students may choose to structure their Real Estate and Infrastructure Capstone to provide hands-on industry experience.

Program Requirements

The MSREI program requires 36 credits. Full-time MS students must complete the program in 3 semesters: fall, spring, and summer. Course waivers are not granted in this program.

Curriculum

The curriculum for the MSREI program includes the following courses. Course sequence and availability of specific electives may vary. Students must consult with an academic advisor to ensure that they take courses in the approved sequence. All courses are 2 credits.

Code	Title	Credits
Business Foundations		
BU.120.601	Business Communication	2
BU.131.601	Business Leadership and Human Values	2
BU.231.620	Corporate Finance	2
BU.510.601	Statistical Analysis	2
Functional Core		
BU.241.620	Design and Construction Feasibility	2
BU.230.640	Development Modeling and Risk Analysis	2
BU.241.735	Infrastructure Development for Sustainable Cities	2
BU.241.740	Project Finance and Public-Private Infrastructure Delivery	2
BU.234.610	Real Estate and Infrastructure Finance	2
BU.242.720	Real Estate Capital Market Analysis	2
BU.241.610	Real Estate Investment and Development	2
BU.132.615	Real Estate Legal Environment	2
BU.242.601	Real Estate Market Feasibility Study	2
Elective Courses		
Select four of the following:		8
BU.241.750	Advanced Valuation and Investment Analysis	
BU.241.725	Global Perspectives in Real Estate	
BU.242.715	Real Estate and Infrastructure Valuation	
BU.152.725	Real Estate Entrepreneurship	
BU.242.710	Real Estate Funds and Portfolio Management	
BU.242.701	Real Estate Investment Trusts: Analysis and Structuring	
BU.241.770	Smart Growth, Infrastructure and Real Estate Development	
BU.241.760	Strategic Commercial Leasing	
Capstone		
BU.245.790	Real Estate and Infrastructure Capstone	2
Total Credits		**36**

Business, Minor

Please note that after the Spring 2021 semester, all business minor questions and advising will be through the Carey Business School & the Business minor requirements will change. For questions, contact Michael Tyler at Carey_BusinessMinor@jhu.edu

The Carey Business minor offers Johns Hopkins undergraduates a focused, quantitative minor that will prepare them for careers in small companies, major corporations, consultancies, as well as acceptance into graduate business programs.

- The primary objective for the minor is to help students position themselves as leaders among their peers in the private sector, government, the non-profit sector, and the world of social enterprises. At the conclusion of their program, successful students will be able to:
- Enter a variety of careers such as finance, management, real estate, marketing, accounting, and consulting.

- Create, analyze, and implement value propositions about projects and products for the benefit of various audiences, from shareholders to local communities.
- Establish and manage brands and products and also institutions and organizations.
- Build, manage and grow valuable and lasting relationships with clients, customers, shareholders, creditors, and local communities.
- Recognize, understand, capitalize on, and generate changing trends in local and global economies.
- Be responsible business leaders who are engaged citizens of their communities, cities, and countries.

The minor offers an instructional program that combines critical analysis and theoretical grounding in a broad set of required courses and hands-on experience through an experiential capstone course.

The new requirements for the business minor will only apply to students who declare the minor starting in the fall 2021 semester. Students who declared the minor prior to fall 2021, can find the previous minor requirements here: https://engineering.jhu.edu/cle/business-minor/

PROGRAM REQUIREMENTS

- Seven required courses
- One capstone course

COURSE AND CREDIT REQUIREMENT

The Business minor requires a minimum of 24 credits. Business courses are open to all Johns Hopkins Arts & Sciences and Engineering students.

BUSINESS MINOR REQUIRED COURSES

Code	Title	Credits
BU.667.310	Business Analytics and Statistics	3
BU.667.311	Economics for Decision Making	3
BU.667.312	Marketing Management	3
BU.667.313	Principles of Finances	3
BU.667.314	Operations Management	3
BU.667.315	Organizational Management	3
BU.667.400	Business Capstone	3
EN.660.203	Financial Accounting	3
Total Credits		**24**

Policies and Resources

Academic Ethics Policy

Academic Ethics Policy

1. Preamble

   The Johns Hopkins University (University or JHU) and the Carey Business School (Carey or School) maintain a reputation for academic excellence and integrity. As members of this community, we hold ourselves to the highest standards of ethical behavior in our endeavor to create knowledge for the world. All members of our community have a personal and professional responsibility to uphold an environment of excellence, respect, integrity, and leadership in our community and in their academic endeavors at Carey and the University.

2. Statement of Commitment

   Carey expects graduates to be innovative business leaders and exemplary global citizens. The Carey community believes that honesty, integrity, and community responsibility are qualities inherent in an exemplary citizen. The objective of the Academic Ethics Policy (AEP or Policy) is to create an environment of trust and respect among all members of the Carey academic community and hold Carey students accountable to the highest standards of academic integrity and excellence.

   It is the responsibility of every Carey student, faculty member, and staff member to familiarize themselves with the AEP and its procedures. Failure to become acquainted with this information will not excuse any student, faculty, or staff from the responsibility to abide by this Policy. The AEP requires that each student in any course taken at Carey act with honesty and integrity in all academic activities and that each student endeavor to hold their peers to the same standard. The Policy exists to: (1) ensure the highest level of personal and professional conduct by our students, and (2) provide a fair, deliberative, impartial, timely, and efficient process for resolving allegations of academic misconduct.

   Upon witnessing an alleged violation of the AEP, a student, faculty member, or staff member must inform the responsible faculty member (if known) and the Executive Director of Student Affairs of both the alleged violation and the name of the student accused of committing the alleged violation. The report should be in writing, preferably using the reporting form which can be obtained from the Student Affairs Office (carey.student@jhu.edu) or by visiting the AEP webpage (https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy (https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy/)), unless circumstances are such that an immediate oral report should be made (e.g., during a quiz or final examination). If an oral report is made, it should be followed as promptly as possible with a written report. Each member of the Carey community, as a person of integrity, has a personal obligation to adhere to this requirement. It is only by upholding the AEP that members of the entire Carey community can contribute to the School's ability to maintain its high standards and its reputation. Students aware of a violation who fail to report it may also be found in violation of this Policy. Note, the filing of complaints of academic misconduct that the individual knows to be false is prohibited.

   Violations of this Policy are viewed as a serious matter and may result in sanctions and corrective measures as described below.

Carey, in collaboration with students and faculty, offers training and educational opportunities for students to learn about the AEP. Some examples include a virtual tutorial, student and faculty videos, sessions at new student orientations or during the semester, and the student AEP pledge (https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy/pledge (https://carey.jhu.edu/student-experience/school-policies/academic-ethics-policy/pledge/)). All students are expected to familiarize themselves with the AEP and are required to take the AEP pledge in the Student Information System (SIS) after completing the AEP course in the Learning Management System. Failure to complete any training will not excuse any student from responsibility to abide by this Policy. The Academic Ethics Board and the Student Affairs Office are available to answer any inquiries about this Policy at carey.student@jhu.edu or 410-234-9240.

3. Scope

   The AEP applies to all Carey students.

4. Cross-Divisional Enrollments

   Carey students may enroll in courses in one or more other University divisions or schools. Carey students are subject to this policy not only when enrolled in Carey courses, but also when enrolled in courses in other University divisions or schools. Academic misconduct in the context of those "outside" courses will be subject to and resolved under this policy.

5. Non-Academic Misconduct

   All issues of non-academic student misconduct will be subject to the University-wide Student Conduct Code (for more on this code, please refer to https://studentaffairs.jhu.edu/policies-guidelines/student-code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/)).

6. Authority

   Carey Academic Ethics Board

   The Carey Academic Ethics Board (AEB) adjudicates alleged violations of the AEP as described below. The Academic Ethics Board comprises Carey students and faculty, and the Executive Director of Student Affairs (or designee). The faculty representatives are appointed by the Vice Dean for Faculty and Research. Student representatives are selected by the Student Services Office via a nomination and interview process. Those students interested in serving as student Co-Chairs may inform the Student Affairs Office via this process. Based on a review of the pool of interested students, the Executive Director of Student Affairs will appoint the student representatives and Co-Chairs for one-year terms. Student representatives may be reappointed for additional terms. The Academic Ethics Board is comprised of at least ten (10) faculty representatives, ten (10) student representatives, and the Executive Director of Student Affairs (or designee).
   Faculty have the authority to resolve certain first-time offenses, as described in Section 8 below.

   Carey Academic Ethics Board Panel

   The Academic Ethics Board Panel is charged with determining, based on a preponderance of the evidence, whether a student's actions constitute a violation of this Policy and, if so, determining (an) appropriate sanction(s) as described below. The Academic Ethics Board Panel is comprised of one (1) student Co-Chair, two (2) additional students, three (3) faculty representatives, and the Executive Director of Student Affairs (or designee). A majority vote is required for Panel decisions, except that unanimity is required for a sanction of expulsion. The Executive Director of Student Affairs (or designee) does not have voting rights.

   Jurisdiction

   The AEB has jurisdiction over the following, without limitation:

   Removal and Vacancies

   A faculty or student representative may be removed from the Academic Ethics Board or a particular Panel if they have not met the expectations required of a Board member. This decision will be made by the Executive Director of Student Affairs (or designee) with regard to student representatives and by the Vice Dean for Faculty and Research with regard to faculty representatives. Any vacancies in student representatives, including student Co-Chairs, will be filled by the Executive Director of Student Affairs (or designee) and any vacancies in faculty representatives will be filled by the Vice Dean for Faculty and Research.

   - Violations of the Academic Ethics Policy
   - Violations may include, but are not limited to, the following:
     - Cheating, plagiarism, unpermitted collaboration, forgery of academic documents, facilitating academic dishonesty, unfair competition, failure to report a violation, or adhere to policies
     - Improper use of intellectual property

7. Academic Misconduct

   Academic misconduct is prohibited by this Policy. Academic misconduct is defined as any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. This includes a wide variety of behaviors such as cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual(s) to gain an unfair academic advantage. Nonexclusive examples of academic misconduct are listed below.

   - Cheating
     - fraud, deceit, or dishonesty in an academic assignment, text, or examination • use or consultation of unauthorized or inappropriate materials (e.g., notes, books, etc.) on assignments, tests, or examinations
     - unauthorized discussion of a test or examination during its administration
     - copying content on an assignment, test, or examination from another individual(s)
     - obtaining a test or examination or the answers to a test or examination before administration of the test or examination (e.g., either an electronic copy or hard copy)
     - studying from an old test or examination whose circulation is prohibited by the faculty member
     - use or consultation of unauthorized electronic devices or software (e.g., calculators, cellular phones, computers, tablets, etc.) in connection with assignments, tests, or examinations
     - use of paper writing services or paper databases

- unauthorized collaboration with another individual(s) on assignments, tests, or examinations
- submission of an assignment, test, or examination for a re-grade after modifying the original content submitted
- permitting another individual(s) to contribute to or complete an assignment, or to contribute to or take a test or examination on the student's behalf
- unauthorized submission of the same or substantially similar work, assignment, test, or examination (e.g., a paper, etc.) to fulfill the requirements of more than one course or different requirements within the same course
- tampering with, disabling, or damaging equipment for testing or evaluation

- Plagiarism
  - use of material produced by another person without acknowledging its source
  - submission of the same or substantially similar work of another person (e.g., an author, a classmate, etc.) without proper attribution and citation
  - dual submission of an assignment
  - use of the results of another individual's work (e.g., another individual's paper, examination, homework, computer code, lab report, etc.) while representing it as your own
  - improper documentation/acknowledgement of quotations, words, ideas, views, or paraphrased passages taken from published or unpublished sources
  - wholesale copying of passages from works of others into your homework, essay, term paper, or dissertation without acknowledgment
  - paraphrasing of another person's characteristic or original phraseology, metaphor, or other literary device without acknowledgment
- Forgery/Falsification/Lying
  - falsification or fabrication of data/information for an assignment, text, or examination, or in an experiment
  - citation of nonexistent sources or creation of false information in an assignment
  - attributing to a source ideas or information that is not included in the source
  - forgery of University or other official documents (e.g., letters, transcripts, etc.)
  - impersonating a faculty or staff member
  - request for special consideration from faculty members or university officials based upon false information or deception
  - fabrication of a reason (e.g., medical emergency, etc.) for needing an extension on or for missing an assignment, test, or examination
  - claiming falsely to have completed and/or turned in an assignment, test, or examination
  - falsely reporting an academic ethics policy violation by another student
  - failing to identify yourself honestly in the context of an academic obligation
  - providing false or misleading information to a faculty member or any other University official
- Facilitating Academic Dishonesty
  - intentionally or knowingly aiding another student to commit an Academic Ethics Policy violation
  - allowing another student(s) to copy from one's own assignment, test, or examination
  - making available copies of course materials whose circulation is prohibited (e.g., old assignments, texts, or examinations, etc.)
  - completing an assignment or taking a test or examination for another student(s)
  - sharing paper mill/answer bank websites or information with another student(s)
  - any improper use of intellectual property (including unauthorized class recordings)
- Unfair Competition
  - intentionally damaging the academic efforts of another student(s)
  - stealing another student's academic materials (e.g., books, notes, assignments, etc.)
  - denying another student needed University resources (e.g., hiding library materials, stealing lab equipment, etc.)
- Failing to Report Alleged Violation
  - failing to report any known or suspected violation of the AEP
- Failing to Follow Applicable Policies, Procedures, Rules
  - failing to follow applicable JHU, divisional/school, program, course, and/or faculty policies, procedures, and rules regarding academic ethics

8. Faculty-Student Resolution of First-Time Offenses

   If a student is suspected of academic misconduct, the faculty member responsible for the course in which the misconduct allegedly occurred must, if feasible, promptly review the facts of the case with the student. If the faculty member believes that academic misconduct has occurred, the faculty member must first contact the Student Affairs Office (carey.student@jhu.edu) to determine whether the offense is a first or subsequent offense. If a first offense, the faculty member may choose to resolve the case directly with the student in accordance with this section (i.e., the faculty member and student may reach an agreement on the resolution of the alleged misconduct; note that neither the faculty member nor the student are obligated to resolve a complaint under this section). A faculty member may not resolve a second or subsequent offense directly with the student. The maximum sanction that can be imposed by a faculty member in a resolution of a first offense is a zero on the assignment. The faculty member must submit all relevant information regarding any agreement reached with the student to the Student Affairs Office. If such an agreement is reached, the Student Affairs Office will promptly provide the student with a letter outlining the resolution that includes the charges, a summary of the evidence, the findings, and the sanctions agreed upon.

   In addition, the faculty member shall notify the Student Affairs Office when:

   - The faculty member cannot reach an agreement with the student (e.g., the student denies cheating or does not agree with the proposed sanction, etc.)

   - The reported violation is a second or subsequent offense for the same student

- The faculty member prefers to refer the case to the Executive Director of Student Affairs for resolution
- In the case of a first offense, the faculty member believes that the sanction warranted is greater than zero on the assignment In such instances, the case will proceed to the next phase of resolution as outlined in Section 9 below.

9. Hearings

The Executive Director of Student Affairs (or designee) may dismiss a case for a lack of sufficient information or if the alleged conduct does not fall within conduct prohibited by this Policy. Absent these circumstances, the case will be resolved per the proceedings described below.

First-Time Offenses Not Informally Resolved Between a Faculty Member and Student – Administrative Hearing or Academic Ethics Board Panel Hearing

In the case of a first offense that is not resolved between the faculty member and student, the Executive Director of Student Affairs (or designee) shall investigate and recommend one of two options: Administrative Hearing or Academic Ethics Board Panel Hearing. The gathering of case information may include meetings with or requests for statements from the student and witnesses, and review of any related information. In making this recommendation, the Executive Director of Student Affairs (or designee) shall also consider the nature of the alleged misconduct and potential sanctions, prior academic misconduct history of the student (if any), and other relevant information and factors.

Second and Subsequent Offenses

Second and subsequent offenses must be heard by the Academic Ethics Board. For a second or subsequent violation, as a general matter, the only sanctions that may be imposed are suspension or expulsion, provided that the Academic Ethics Board has discretion to impose a lesser sanction in the rare instances when warranted by the facts and circumstances of a particular case.

Administrative Hearing (For First-Time Offenses Only)

An Administrative Hearing involves a meeting between the Executive Director of Student Affairs (or designee, who serves as a "hearing administrator") and the student. The Executive Director of Student Affairs (or designee) may also meet with witnesses and others involved, and obtain and review relevant evidence.

The Executive Director of Student Affairs (or designee) will review the allegations and evidence with the student and give the respondent an opportunity to respond. The Executive Director of Student Affairs (or designee) will then determine based on preponderance of the evidence whether the student is responsible for the alleged Policy violation(s), and, if so, issue (an) appropriate sanction(s).

Academic Ethics Board Panel Hearing

The Academic Ethics Board Panel Hearing is a closed proceeding, meaning that no one other than the Panel members and necessary faculty and staff members may be present (along with, if applicable, the student or witnesses). The student and witnesses called to the hearing will be present in the hearing room only when making a statement or being questioned by the Panel. The student is strongly advised to be present and present their case. If the student does not appear for a hearing, the hearing will be conducted as scheduled in their absence and a determination made that may result in dismissal or other sanctions.

In general, hearings will proceed as follows, although the Academic Ethics Board Panel has discretion to alter the order or manner in which it hears or receives evidence, and to impose time limits on any stage of the process:

Witnesses

The Executive Director of Student Affairs (or designee) or the Academic Ethics Board Panel may request the presence of any witness with relevant information about a case. The student may also request the Panel to hear from witnesses with relevant information. Absent exceptional circumstances, the student should inform the Executive Director of Student Services (or designee) in writing at least three (3) business days in advance of any meeting or hearing of the names of the witnesses and to what they will attest. The Executive Director of Student Affairs (or designee) or Panel may determine whether and if and the extent to which witnesses will be permitted to participate or questioned in any meeting or hearing, including whether their testimony is relevant.

- introductions • summary of reported charges
- opening statement from the Panel indicating the context, charge(s), and evidence
- opening statement from the student
- questioning of the student by the Panel
- questioning of the witnesses, if any, by the Panel
- closing statement from the student

10. General Procedures

In connection with the resolution of alleged Policy violations, a student shall:

The student has the right for a fair and timely hearing in accordance with the AEP. A student may raise the potential conflict of interest about any University personnel or student participating in the resolution process. A student may also decline to participate in the resolution process. The School may, however, continue the process without the student's participation.

Communications under this Policy will be conducted with students primarily through their official University email address, and students are expected to check their official University email on a regular basis.

- be notified in writing of the allegations in advance of any meeting or hearing;
- be notified in writing of the charges, and the date, time, and location of the hearing, and the identity of the hearing administrator and members of the Academic Ethics Board who may sit on the hearing committee in advance of the hearing;
- have the opportunity to review in advance of any meeting or hearing any relevant information to be considered by any faculty member, hearing administrator, or Panel consistent with the

Family Educational Rights and Privacy Act of 1974 (FERPA), as amended, and to protect other confidential information;

- be notified in writing of the outcome of any hearing, namely the findings, determination of responsibility, and any sanctions; and be notified in writing of the outcome of any appeal.

11. Evidentiary Standard

A "preponderance of the evidence" standard will be used to determine responsibility for alleged violations of this Policy. A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true.

12. Appeals

Except in the case of a resolution for first-time offenses with a faculty member, the student may appeal the hearing administrator's or Academic Ethics Board Panel's finding of responsibility and/or sanction(s). A student may file any appeal within five (5) business days of the date of the notice of outcome solely on one or more of the following grounds:

- procedural error that could have materially affected the determination of responsibility or sanction(s);
- new information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility or sanction(s); and
- excessiveness of the sanction(s).

Any appeal must be filed in writing to the Dean via the Office of Student Affairs (email or hard copy). An appeal will involve a review of the file; the appeal does not involve another hearing. The Dean may consult with appropriate University personnel and the Academic Ethics Board Panel in reviewing an appeal. On review of the appeal, the Dean may:

- affirm the decision of the Panel;
- enter a revised determination of responsibility and/or revise the sanction(s); or
- remand the matter to the hearing administrator or Panel to reconsider the determination of responsibility and/or sanction(s); or
- convene a new Panel to consider the case.

The Dean will simultaneously send the appeal determination, with the reasons therefor, to the Office of Student Affairs and to the student. The decision of the Dean is final. No further appeals are permitted.

13. Sanctions

The Academic Ethics Board Panel may impose one or more sanctions (which may include one or more corrective and educational measures that the Panel deems appropriate and commensurate with the Policy violation). In doing so, the Panel may consider:

This section lists some of the sanctions that may be imposed upon students for violations of the AEP. Carey reserves the right, in its discretion, to impose more stringent or different sanctions than those listed below depending on the facts and circumstances of a particular case. Sanctions for academic misconduct under this Policy are generally cumulative in nature.

A student found in violation of the AEP in a course may not avoid the Policy and any potential sanctions by withdrawing from a course.

The following is a non-exhaustive list of possible sanctions and what these sanctions typically mean. The specific conditions imposed under each sanction (e.g., the terms of a suspension, etc.) will depend on the specific facts and circumstances of each case:

Formal Warning
The student is notified in writing that their actions constitute a violation of the AEP, and may be subject to other actions (e.g., re-taking an examination or failure in a course).

Academic
These sanctions may include but are not limited to grade adjustments, including failure on any work within the course or failure in the course itself, requiring extra credit to be completed, or re-submission of an assignment, or re-taking a test or examination. This may include a notation on the student's official Carey academic transcript. For example, if the sanction is an "F" for the course, "F due to Academic Dishonesty" may be permanently noted on the student's official Carey transcript.

Transcript Notations
Academic misconduct may be noted on a student's academic transcript.

Corrective or Educational Measures
The student may, for example, be required to write and submit a reflection paper as an opportunity to learn and reflect and/or be required to engage in other corrective or educational measures.

Probation
The student is notified that further violations of the AEP within the stated period of time will result in the student being considered for immediate suspension or other appropriate disciplinary action. If at the end of the specified time period no further violations have occurred, the student is removed from probationary status.

Suspension
The student is suspended from the University for a specified period of time. A permanent notation of the suspension will be displayed on the student's University records and academic transcript. The conferring of an academic degree may be deferred for the duration of the suspension. A student must request in writing and then receive written permission from the Executive Director of Student Affairs (or designee) prior to re-enrollment or reapplication. Academic work completed at another institution while on suspension will not be recognized for credit transfer.

Expulsion
The student is expelled from the University. Expulsion means the permanent removal of the student from the University. Expulsion includes a forfeiture of all rights and degrees not actually conferred at the time of the expulsion, permanent notation of the expulsion on the student's University records and academic transcript, withdrawal from all courses according to divisional policies, and the forfeiture of tuition and fees. Any student expelled from the University is prohibited future re-application to the University.

- the specific academic misconduct at issue;
- the student's academic misconduct history; and
- other appropriate factors.

14. Records

A case file concerning a student will be retained for the duration of the student's enrollment at Carey plus seven (7) years from the date that the student graduates or otherwise leaves the University.

15. Amendments to the Academic Ethics Policy

Significant amendments to the AEP must be approved by the Vice Dean for Faculty and Research, the Vice Dean for Education, the Dean, and a faculty vote (vote passing with simple majority). Minor amendments to the AEP may be made by the Vice Dean for Faculty and Research or the Vice Dean for Education with notification to the Dean.

Academic Progress and Standards

Program Continuity and Completion

A student must be continuously enrolled in their program. Any student not enrolling and successfully completing courses at the Carey Business School for a period of one year or more must petition to restart their program. In addition, a student must complete all program requirements within six years of starting their first course at the Carey Business School. Any student not completing their program within six years must petition for an extension.

Academic Progress

Graduate students at the Carey Business School must have a minimum 2.85 grade point average to graduate and must maintain at least a 2.85 cumulative grade point average (2.85 on a 4.00 scale) to remain in good academic standing. Students receive credit for courses in which they receive grades lower than a B, except the F grade which does not earn any credits. Students need to repeat any required course in which they receive an F (please refer to Repeating a Course under the Grading Policy for further details).

Graduate students will be placed on academic probation if their cumulative grade point average falls below 2.85. Grades will be reviewed for academic progress at the end of each semester or for full-time programs at the end of each term. Students whose cumulative GPA falls below 2.85 must meet with their advisors to discuss resources such as tutoring or workshops so that they can raise their GPA to assure continued progress toward graduation. A Probation Hold will be placed on the student record for any student with a cumulative GPA below 2.85. Students will be removed from academic probation when their cumulative grade point average reaches 2.85.

If enrolled in a full-time program, students on academic probation who do not raise their cumulative grade point average to 2.85 by the completion of the following semester, or following term if enrolled in a one-year program, may be suspended. After a period of one semester, academically suspended students are required to meet with their academic advisors and may then submit a written petition for reinstatement on a probationary basis.

A student will be dismissed a) when it is not possible for a student to attain the required 2.85 GPA within the school's academic policies, and/or b) when a student fails the same course a second time. Students cannot re-apply to the same academic program from which they were dismissed; however, they can apply to a different academic program, though they are not guaranteed admission.

Note: These policies are for determining satisfactory academic progress. Please review the Financial Aid section of this handbook to determine the standards for satisfactory progress for eligibility to receive or continue to receive financial assistance.

Academic Standards

Johns Hopkins University and the Carey Business School expect the highest academic standards from its students. The awarding of degrees and certificates is based upon satisfactory completion of all degree/certificate requirements with student performance that meets the expectations of the faculty, as well as compliance with University and School regulations. The Academic Board of the Carey Business School reviews all student applications for graduation and makes recommendations for degree/certificate conferral to the president of the University.

The University does not guarantee the awarding of a degree or certificate to students enrolled in any academic program. Any breach of academic standards may result in disciplinary actions against the student(s) involved. Please see the Academic Ethics Policy section for an overview of procedures.

Changing Degree Program

Changing Degree Program

Degree and certificate seeking students in the Carey Business School who wish to change enrollment to another degree or certificate program within the school should contact their Academic Advisor to discuss the process. A new application may be required for applicants seeking to enroll in a new degree program. Students may only request to change enrollment to a different program during the open admission cycle for that program. Students are not automatically admitted to the desired program; their requests will be reviewed by an admissions committee.

Note: Financial aid recipients must notify the Financial Aid office when changing or adding a degree or certificate program. Students in F-1 status must notify the Office of International Services for a new I-20 to reflect the change in program. Students using VA benefits must notify the VA Certifying Official in the Registrar's Office when changing or adding a degree or certificate.

Second Degree Option

Current Full-Time Carey Business School students may pursue a second degree in a number of academic programs. Current Full-Time Master of Science (MS) students at Carey who wish to obtain a second Full-Time MS degree at Carey must complete a minimum of 24 credits in as few as two semesters. Current Full-Time MS students who wish to obtain an MBA degree as the Second Degree Option must complete a minimum of 36 credits in as few as three semesters. Current Full-Time MBA students who wish to obtain a Full-Time Master of Science degree must complete a minimum of 18 credits in as few as two semesters.

Admissions requirements for the second degree:

- Completion of Second Degree Option application (application fee is waived)
- New personal essay (maximum 500 words)
- 1 letter of recommendation
- Updated resume
- Carey Business School transcript

Students cannot begin work on their second degree credits until they have graduated with their first degree. Students cannot earn a second degree in an area of concentration for their first degree.

Note: Any current student who was conditionally admitted to Carey must complete their conditional requirements as noted in their admission letter (such as submission of final transcripts with degree conferred or credential evaluation showing equivalency of a U.S. bachelor's degree).

Adding a Certificate

Students who are currently enrolled in a part-time degree program at the Carey Business School and wish to add a certificate must submit an online application to the Office of Admissions. Students in part-time programs must submit within the first year of study (no more than one academic year or 3 semesters after their start date). Graduate Certificates are not open to students in full-time programs.

Part-time MS in Finance and Flexible MBA students may add either the Graduate Certificate in Financial Management or the Graduate Certificate in Investments, but not both.

Note: Financial aid recipients must notify the Financial Aid office when changing or adding a degree or certificate program. Those in F-1 status must notify the International Services office for a new I-20 to reflect the change in program. Students using VA benefits must notify the VA Certifying Official in the Registrar's Office when changing or adding a degree or certificate.

Grading Policy

Grading Policy

At Carey, we are committed to fostering a learning environment and assessing academic performance based on merit.

Core & Foundation Courses: The grade point average should not exceed 3.35.

A class is considered "Foundation" or "Core" if the course is listed as such, regardless of the percentage of students taking the course as an elective.

Elective Courses: The grade point average should not exceed 3.45.

The grading system used for official grades for all Carey Business School courses is as follows:

- 'A+' is not awarded at any level.
- 'A' is reserved for those who demonstrate extraordinary performance as determined by the instructor.
- 'A-' is awarded only for excellent performance.
- 'B+' and 'B' are awarded for good performance.
- 'B-', 'C+', 'C', and 'C-' are awarded for adequate but substandard performance.
- 'D+', 'D', and 'D-' are not awarded at the graduate level.
- 'F' indicates the student's failure to satisfactorily complete the course work. If laboratory work is part of a course in which an 'F' is received, both the lecture and laboratory work must be repeated unless the instructor in the course indicates otherwise. If the course is not required for graduation, it need not be repeated; the grade, however, remains on the transcript and is calculated into the grade point average.
- An 'I' (Incomplete) grade is used when the instructor is not prepared to give a final grade for the course because of some justifiable delay in the student's completion of specific course work. Both the instructor and the student should complete the Incomplete Grade Contract and submit it to the Registrar's office within 5 business days of the last scheduled class meeting. A final grade is submitted to the Registrar's Office by the instructor after grading the student's completed work. All work must be completed and the final grade submitted within four weeks after the start of the following semester. In the event that the work is not completed within this time frame, a grade of 'F' replaces the 'I' on the student's transcript.
- 'P' indicates successful completion of course work. No quality points assigned.
- 'R' indicates that a course has been repeated. When a course is repeated, both the original and repeated course grades appear on the academic record; however, only the repeated course grade is used in calculating the grade point average. Course credit can be applied toward degree requirements only once, even if a course is repeated. Both the original and repeated course are indicated with an 'R' on the academic record.
- 'W' (Withdrawal) indicates an official withdrawal approved by the Registrar's Office. It is not assigned by the instructor. If a student wishes to withdraw from a course, an add/drop form must be submitted by the deadline in the Withdrawal Schedule.
- 'X' indicates the grade has not yet been submitted by the instructor.

No notation on an official report may be changed except to correct an error or replace an 'I' (Incomplete) grade.

Carey courses may not be audited.

Note: A cumulative GPA below 2.85 would make a student ineligible for graduation. Our Academic Advisors work with students whose GPA falls below this level to develop a plan to maintain good academic standing.

Grade Point Average

Both semester and cumulative grade point averages are noted on a student's academic record. To calculate grade point average (GPA), multiply the number of credits for each course by the quality points associated with the grades received in each course; add up quality points; then add up credits and divide quality points by the number of credits. The quality points used for all official grades at the Carey Business School are listed in the following table.

Grade	Quality Points
A	4.00
A-	3.70
B+	3.30
B	3.00
B-	2.70
C+	2.30
C	2.00
C-	1.70
D+[1]	1.30
D[1]	1.00
D-[1]	0.70
F	0.00

[1] 'D+, 'D', and 'D-' are not awarded at any level.

Grade Appeals

Students wishing to appeal a grade must contact their academic advisor within two weeks of the grade having been assigned by the instructor.

The student's academic advisor will guide the student through the appeal process. After consulting with the academic advisor and receiving a grade appeal form, students will have two weeks to file the grade appeal with the advisor. Appeals must be submitted no later than four weeks from the date the grade was assigned by the instructor. To be successful, a student must show that

1. there was a clerical error; or
2. that criteria different from those in the syllabus were used to award grades; or
3. the instructor used an arbitrary or inconsistent standard.

Examples of arbitrary standards could include differences in political or ethical positions of the instructor and student(s). The student must demonstrate that an accommodation was not reached with the instructor of record, and clearly delineate which appeal criteria are the basis of the petition.

If there is no successful resolution, the appeal will be forwarded to the Chair of the Grade Appeal Committee (GAC). The GAC will investigate and make a determination of the remedy, if warranted. The remedy will be communicated to the Vice Dean for Education, who will inform all parties of the decision.

A student may appeal the decision of GAC to the Dean of the Carey Business School. The dean's role in an appeal of a grade appeal decision is only to assess whether there were procedural errors or whether there is new information that was not considered by the committee that could have materially affected the decision. The Dean has final authority on the appropriate remedy.

Receiving Your Grades

Online: Currently enrolled students can access their semester grades and access/print an official grade report using sis.jhu.edu/sswf (http://sis.jhu.edu/sswf/).

Students who need additional assistance should contact the Office of the Registrar. (https://support.sis.jhu.edu/case/)

Incomplete Grades

An 'I' (Incomplete) grade is used when the instructor is not prepared to give a final grade for the course because of some justifiable delay in the student's completion of specific course work. Both the instructor and the student should complete the Incomplete Grade Contract and submit it to the Registrar's office within 5 business days of the last scheduled class meeting. A final grade is submitted to the Registrar's Office by the instructor after grading the student's completed work. All work must be completed and the final grade submitted within four weeks after the start of the following semester. In the event that the work is not completed within this time frame, a grade of 'F' replaces the 'I' on the student's transcript.

Repeating a Course

A graduate student may improve their cumulative GPA by repeating a maximum of three courses (not to exceed 6 credits) in which the student received a grade of C, C- or F. Although both courses will remain on the student's permanent record, the last grade received will be the grade used to determine credit toward a degree and GPA. The first and second attempt will be recorded with both the grade earned and the symbol R to denote it has been repeated. The repeat must be in the same course and must be taken at the Johns Hopkins Carey Business School.

The repeat will not change notations regarding academic standing or academic discipline in the student's official record for the semester containing the first or second attempt. No course can be repeated more than once.

Note: For federal financial aid recipients, students may only receive federal aid for repeating a course in which an F grade was received.

Graduation

Graduation

The Johns Hopkins University confers degrees at the end of the summer, fall, and spring semesters. The University Commencement and divisional graduation ceremonies are held in May. The Carey Business School also holds a graduation ceremony in August for summer graduates. The May graduation program will include the names of those students who applied to graduate by the deadlines for the 2022-2023 academic year.

A student who expects to receive more than one degree or certificate must complete a separate graduation application for each degree and/or certificate. Applicants are required to apply by the deadline and within the same academic semester they complete their degree requirements. The Graduation Application is available online using SIS (https://sis.jhu.edu/sswf/). Students in dual and joint degree/certificate programs must apply for graduation from both degree/certificate programs. Late applications for the spring semester may need to wait until the following academic year depending on the time the application is submitted. Students planning to graduate should complete all coursework before the semester ends and should not request or receive the grade of 'I' (Incomplete) during their final term.

Deadlines for Submitting the Graduation Application Form for Academic Year 2022-2023

Term	Date
August completion	June 10, 2022
December completion	September 16, 2022
May completion	February 17, 2023

Students who have submitted the Application for Graduation receive an automated application confirmation which is emailed to their JHU email address. Applicant names are placed on the tentative graduation list for the semester in which they anticipate completing their degree requirements. The graduation application is the first step of the degree audit process. To be eligible to graduate, all students must complete the requirements of their Academic Program of Study. For Master candidates, credits may be no older than 6 years; for Graduate Certificate candidates, credits may be no older than 3 years.

The Carey Business School Academic Board meets three times each year to review candidates for graduation. Students completing all requirements at the end of summer session are reviewed by the

Academic Board in August; those finishing at the end of the fall semester are reviewed in December; and those finishing at the end of spring semester are reviewed in May.

Graduation ceremony information is sent via JHU email in March for the May ceremonies. Information is sent in late June for the August ceremony. To receive their diplomas, students must pay all student accounts in full. Additionally, any outstanding charges of misconduct and violations of academic integrity must be settled before a diploma will be released. Johns Hopkins University diplomas indicate the degree (e.g., Master of Business Administration, Master of Science – Finance) without identifying the student's concentration. Students who apply on time and complete their studies will have their diplomas direct mailed, typically within 4-6 weeks after conferral.

Graduation Awards and Honors

Beta Gamma Sigma

Beta Gamma Sigma is the international honor society serving business programs accredited by AACSB International - The Association to Advance Collegiate Schools of Business. Membership in Beta Gamma Sigma is the highest recognition a business student anywhere in the world can receive in a business program accredited by AACSB International. Carey students in the top 20% of their class receive an invitation for membership.

Edward J. Stegman, CPA, Memorial Award

The Edward J. Stegman, CPA, Memorial Award for Excellence in Business Scholarship is named in memory of Edward J. Stegman, founder of Stegman & Company, who taught Business Economics and Accounting at Johns Hopkins University from 1928 until 1945.

Since 1975, over 430 high-achieving graduating students have earned this prestigious award. The Award is currently presented to graduating students with the highest GPA in the full-time MBA program, the full-time MS programs, and the part-time graduate programs.

Attendance Policy

Attendance Policy

Participation in lectures, discussions, and other activities is an essential part of the instructional process. Faculty members often include classroom participation and attendance in student grading and evaluation. Instructors will clearly communicate expectations and grading policy in the course syllabus.

Students are expected to attend class; those who are compelled to miss a class meetings must inform their instructors of the reasons for absences prior to the class meeting. For severe weather-related incidents, hospitalization, etc., a student should present documentation to their advisor to determine that the absence is qualified. The advisor in turn will then contact the instructor who will be responsible for working with the student to make-up any missed coursework.

Students who will miss a class meeting for a religious observance are expected to notify the course instructor and their academic program at the beginning of the term. The student is expected to work with the course instructor to make-up any missed coursework.

Students who expect to miss several class sessions for personal, professional, or other reasons are encouraged to meet with their academic advisors to consider alternative courses prior to registration.

Policies and Procedures for On-Site, Hybrid, and Remote-Live Classes

For information on policies and procedures for on-site, hybrid, and remote-live classes, please visit the policies and procedures website at: https://carey.jhu.edu/student-experience/school-policies/hybrid-classes-policies-and-procedures (https://carey.jhu.edu/student-experience/school-policies/hybrid-classes-policies-and-procedures/).

Carey Inclement Weather Information

In order to maintain the academic integrity of our programs, it is important that any class session that is missed due to weather, instructor illness or other emergency is made up, and that any missed material is covered. However, faculty members have considerable latitude over how the class sessions will be made up and have two options from which to choose.

They may:

- Plan and schedule a virtual class session
- Re-schedule the class period to a designated make-up day (Designated make-up days are scheduled at the end of each 8-week term or semester.)

Whenever a class session is cancelled, each faculty member may choose the appropriate make-up alternative for that particular class. The faculty member must notify the students in the class and the Office of Education about which option will be used to make up the class period.

This policy is designed to address those situations when a single class day has been cancelled. Weather emergencies or other events that result in multiple-day cancellations will be handled on a case-by-case basis. Please call the University Weather Emergency Line at 410-516-7781 or 1-800-548-9004 or visit jhu.edu/alert (https://jhu.edu/alert/) for more information.

Leave of Absence

Leave of Absence

A Leave of Absence (LOA) may be granted to Johns Hopkins Carey Business School students in appropriate circumstances following review of the student's application from the LOA Committee. Students may apply for up to one calendar year and a minimum of one semester of leave when medical conditions, compulsory military service, financial difficulty, or, personal or family hardships prevent them from continuing their graduate studies. To be approved for a LOA, students must complete the Application for Student Leave of Absence (https://forms.office.com/Pages/ResponsePage.aspx?id=OPSkn-axO0eAP4b4rt8N7MlTB5bqvK9Ajfcdvb-STBRURDYySTAyU1IySVJaQ0JUMkxWMEFBRzI0WS4u) and provide proper documentation. International students must submit the application prior to leaving the country to avoid any issues with their visa status.

Leaves should be timed, whenever possible, to come at the end of a term, preferably at the end of a full academic year. During the leave period, a student may not pursue any study at the University. Neither coursework completed at another institution of higher education, nor coursework completed at any division of Johns Hopkins, while on LOA may be used toward completion of the student's academic program requirements. The period of time that a student is on an approved LOA is not counted toward the time of completion of the requirements of their academic program of study. When on an approved LOA the student is not enrolled or registered for the period of leave and therefore is not permitted to use University services or facilities.

All students who are absent for more than one calendar year and who did not obtain an approved LOA will be required to apply for readmission through the Office of Admissions before being considered for re-enrollment. The duration of an unapproved absence is applied toward the maximum time students have to complete their degree requirements.

The Johns Hopkins Carey Business School also reserves the right to place a student on an Involuntary LOA in certain circumstances. Please see ***Involuntary Leave of Absence and Condition of Enrollment Policy*** below.

1. **Process for Requesting a Leave of Absence**
   To apply for a Leave of Absence (LOA), students must complete the Application for Student Leave of Absence (https://forms.office.com/Pages/ResponsePage.aspx?id=OPSkn-axO0eAP4b4rt8N7MlTB5bqvK9Ajfcdvb-STBRURDYySTAyU1IySVJaQ0JUMkxWMEFBRzI0WS4u). International students must ensure that they have discussed their plans with the Office of International Services (https://ois.jhu.edu/) and have obtained appropriate approval.

   Proper documentation addressing one of the permitted reasons a student would qualify for a LOA must accompany the application, as indicated below:
   - Medical Condition: a letter from a medical provider
   - Military Service: a letter or verification from the Armed Forces
   - Personal or Family Hardship: a personal letter
   - Financial Difficulty: a personal letter
     Students will be notified of a final decision by the Registrar's Office. It is highly recommended that students enrolled in the University's student health benefits plan contact the Student Services Office as early as possible to obtain information on how the LOA will affect their enrollment plan.

2. **Process for Returning from a Leave of Absence**
   When returning from a Leave of Absence, the student must complete the Reinstatement Application for Student Leave of Absence (https://forms.office.com/Pages/ResponsePage.aspx?id=OPSkn-axO0eAP4b4rt8N7MlTB5bqvK9Ajfcdvb-STBRUQ1hSTEpNNjZTN0VIU0IzSlBETVhVMzBONy4u) before being permitted to enroll or register for classes. The form must be accompanied by documentation (from one of the sources below) that explains what progress has taken place in the student's absence that would enable them to be successful upon return.
   - Medical Condition: a letter from a medical provider
   - Military Service: a letter or verification from the Armed Forces
   - Personal or Family Hardship: a personal letter
   - Financial Difficulty: a personal letter
     In addition, students applying to return to study should refer to the following timeline:

Semester of Return	Earliest Submission	Latest Submission
Fall 1 or 2	March 15	August 1
Intersession	October 15	December 1
Spring 1 or 2	October 15	January 1
Summer	March 15	May 1

     Students will be notified of a final decision by the Registrar's Office.
     If the student does not return to the academic program immediately after the approved leave ends, and they do not apply for an LOA extension, their student record is made inactive. LOA extensions will be reviewed and approved on a case-by-case basis.
     In order to return to academic work at a later time, the student must formally reapply for admission through the Office of Admissions.

3. **Leave of Absence Refund Policy**
   - If a LOA is approved before the start of a semester, a full refund is provided to the student's account.
   - If a LOA is approved after the first day of classes, the standard Refund Policy will apply to all courses dropped in the specified term (please see Refund Policy in Appendix D Schedules and Charts).
   - No other fees are eligible for refund.
   - To request an exception to the refund schedule, students must submit a General Petition Form (https://carey.jhu.edu/sites/default/files/2021-04/general-petition-form.pdf) to the Registrar's Office.
   - Petitions must be accompanied by documentation of the circumstances leading to the request. Students who experience severe medical conditions, compulsory military service, or personal or family hardships will be considered for 100% tuition refund. The Financial Aid Office is required by federal statute to recalculate federal financial aid eligibility for students who take a leave of absence prior to completing 60% of a payment period or term. Please review the policy (http://carey.jhu.edu/current-students/financial-aid/policies/title-iv-funds/) regarding federal aid (Title IV Funds).

4. **Appeal**
   The student may appeal the reinstatement decision in writing to the Vice Dean for Education within five (5) business days of the date of the notice of the decision. The student may not remain on campus during this time. The appeal may be filed on the sole grounds of:
   - New information is available
   - Incorrect facts were used to determine the decision
   - Procedural impropriety
     The student should provide documentation to support their appeal.

Involuntary Leave of Absence and Condition of Enrollment Policy

There are two types of Involuntary Leaves of Absence:

- Interruption to an Academic Program Plan
- Concerning Student Behavior and/or Communications

Interruption to an Academic Program Plan

Full-time MS students who drop or fail a course only offered in a particular term annually may experience an interruption in their academic program plan, if that course is a prerequisite to future courses. Students who drop or fail required prerequisite courses may be placed on an Involuntary Leave of Absence until the prerequisite course is offered the following year. Graduation date will be affected. International students will need to contact the Office of International Services to determine visa and travel consequences on leave.

Concerning Student Behavior and/or Communications

The University is committed to fostering a learning environment that supports students throughout their time at the University and at the Carey Business School. This policy is not intended to be disciplinary in nature, and is designed to allow the University to respond to certain student behavior and/or communications of concern.

Occasionally, students may experience a disruption in their academic journey due to physical, mental or emotional health difficulties that may necessitate a Leave of Absence. If a student declines to take a Leave of Absence voluntarily, the Involuntary LOA Committee may nevertheless convene and determine if a mandatory Involuntary LOA should be invoked.

The Involuntary LOA Committee has the authority to place a student on an Involuntary Leave of Absence based on behavior and/or communication that the Involuntary LOA Committee reasonably believes:

- May harm or threatens harm to the health or safety of the student or others;
- May cause or threatens to cause significant damage to the property or resources of the University;
- Evidences chronic and/or serious drug or alcohol abuse; and or
- Disrupts the functioning of the University community.

If a student with a disability known to the University exhibits the above behavior or communication, before placing the student on a mandatory leave of absence, the University will do an individualized assessment to determine if there are reasonable accommodations that would permit the student to continue their academic journey at Carey without taking a LOA.

The Executive Director of the Student Affairs Office (or designee) will call upon the Involuntary LOA Committee to review the request. The Involuntary LOA Committee will include, as needed, the Sr. Director for Academics, the Registrar, and/or other Johns Hopkins representatives such as a Johns Hopkins Student Assistance Program (JHSAP) representative (or designees), and be chaired by the Executive Director of Student Affairs (or designee). The Involuntary LOA Committee could consult with the Office of General Council (OGC) as needed.

1. **Involuntary Leave of Absence Procedure**

   When the Involuntary LOA Committee becomes aware, by whatever means, of the potential need for action, the following procedures may be initiated:

   a. The Involuntary LOA Committee will contact the student and describe the issues of concern. If this discussion alleviates concerns appropriately, no further action is needed. Alternatively, procedures outlined below may also be initiated.

   b. The Involuntary LOA Committee may mandate a mental health or physical evaluation of the student. After consulting with others charged with oversight of the student's academic program and the Director of the Student Assistance Program, the Involuntary LOA Committee may take one of the following actions:
      - Permit the student to remain at the University, and specify the conditions under which the student is allowed to remain at the University.
      - If a Leave of Absence is indicated, and the student is in agreement and willing to take a Leave of Absence, the Involuntary LOA Committee will provide the student with written notification outlining the steps required for re-entry into the academic program and also noting other pertinent information regarding the student's status while on leave.
      - If a Leave of Absence is indicated and the student is not willing to take a Leave of Absence, the student may be placed on an Involuntary Leave of Absence.

   c. In urgent situations, the Involuntary LOA Committee may initiate an Involuntary Leave of Absence immediately.

2. **Process for Returning from an Involuntary Leave of Absence**

   A student seeking reinstatement after an Involuntary Leave of Absence, due to concerning Student Behavior and/or communications, will undergo a "fitness for return" evaluation by the Johns Hopkins Student Assistance Program (JHSAP) and/or the appropriate health service (University or Occupational Health Services). The Involuntary LOA Committee will review all relevant documents and recommendations to determine the student's readiness for reinstatement. The Involuntary LOA Committee may impose conditions under which the student will be allowed to return to and remain at the University (as described in Section 1B). The Involuntary LOA Committee will provide written notice to the student of such conditions and will notify the student as to the decision regarding reinstatement. If a student is cleared for reinstatement, the student's Academic Advisor will work with the student to ensure a smooth return.

   A student seeking reinstatement after an Involuntary Leave of Absence due to Academic Program interruption, will follow the same procedures to **Return from a Leave of Absence** as outlined above.

3. **Appealing Denial of Reinstatement**

   In the event that a student's request for reinstatement is denied on grounds of health or safety, the student may appeal the reinstatement decision in writing to the Vice Dean for Education within five (5) business days of the date of the notice of the decision. The student may not remain on campus during this time. The appeal may be filed on the sole grounds of:
   - New information is available
   - Incorrect facts were used to determine the decision
   - Procedural impropriety
     The student should provide documentation to support their appeal.

4. **Confidentiality**
   All records related to student leaves of absence and conditions placed on continuing enrollment will be maintained in accordance with applicable law and policy.

Registration

Registration

The Registrar's Office is available Monday through Friday, 8:30 a.m. - 4:30 p.m. Students may register using one of two convenient methods:

- **Online via SIS:** Online registration is available via SIS self-service (http://sis.jhu.edu/sswf/) to students who are fully admitted and current in their program of study. During registration periods, SIS is available 24 hours a day, 7 days a week.
- **Online Add/Drop Form:** The SEAM's online form (https://support.sis.jhu.edu/case/) may be completed online. When submitted, this form is sent directly to the Registration Team for review and processing when registration in SIS is not available.

Registration Policies

Students are encouraged to register as early as possible during each registration period because a section may close before the end of registration. Please note that all outstanding debts to Johns Hopkins University must be paid in full in order to register for the following semester.

Students may not attend a class without being officially registered for that class. Auditing is not allowed at the Carey Business School.

Students may only register for classes during terms in which they have been formally admitted.

Online courses are typically reserved for students admitted to online programs or programs that require a combination of online and onsite coursework.

Course Schedule

The course schedule is available online (http://sis.jhu.edu/classes/). *Course information posted to this website is subject to change without advanced notice.*

Adding a Course

A student wishing to add a course must do so by the end of the first week of the session. Students may add courses by using one of the registration options mentioned above. It is the responsibility of the student to be aware of the Registration and Refund Deadlines. (https://carey.jhu.edu/student-experience/services-resources/registrar/course-add-drop/) Online add/drop forms must be submitted with sufficient business time for processing prior to the start of the second week of the session.

Waitlists

Students attempting to register for a course that is full (is at its enrollment limit), may be placed on the waitlist by going to SIS self-service. (http://sis.jhu.edu/sswf/) Please note that students may be placed on the waitlist for only one section of a particular course. Students will be contacted via their JHU email address only if an opening occurs prior to the first class meeting of the course. Waitlisting for a course is not an official registration; therefore, no payment is required until a seat in the class is confirmed. Students may not attend classes for sections in which they are waitlisted.

When a seat becomes available in a course that has a waitlist, an email is sent out to waitlisted students' JHU email addresses for however many seats are open. Waitlists do not operate in real time. These emails are sent out each morning Monday-Friday, when applicable. Waitlists do not operate over the weekend.

Dropping a Course

Students may drop a course without financial penalty during the first week of the session via SIS self-service (see Registration and Refund Deadlines (https://carey.jhu.edu/student-experience/services-resources/registrar/course-add-drop/) for exact dates). After the first week of the session, students who drop a course receive a pro-rated tuition refund in accordance with the Registration and Refund Deadlines (https://carey.jhu.edu/student-experience/services-resources/registrar/course-add-drop/) for the session. Tuition refunds are calculated from the date of receipt of the add/drop form in the Registrar's Office. Students dropping a course after the first class meeting should notify the instructor of their decision.

Note: Financial aid recipients will have their aid award adjusted according to credits registered.

Students dropping to less than half-time status may have their aid canceled and will be responsible for any debit balance created. Students using VA benefits should contact the VA Certifying Official in the Registrar's Office when adding or dropping a course

Withdrawing from a Course

To withdraw from a course, students must submit a withdrawal request using the SEAM's online form (https://support.sis.jhu.edu/case/). Students may not withdraw from courses using SIS. Notice to the instructor of intent to withdraw is not sufficient, nor are telephone withdrawals accepted. The last date to withdraw from a class without academic penalty (without receiving the grade of F) is published by the Registrar's Office under the Registration Deadlines (https://carey.jhu.edu/student-experience/services-resources/registrar/course-add-drop/). Students who withdraw after the deadline or stop attending class at any time without properly submitting an official add/drop form receive an 'F' (Failure) for the course. Tuition refunds are calculated from the date of receipt of the add/drop form in the Registrar's Office. International students on an F-1 visa are advised to contact the Office of International Services before withdrawing from or dropping a course.

Note: Federal aid recipients who withdraw from all coursework in a semester may have aid returned to the federal government according to federal "Return of Title IV funds" regulations, a copy of which can be obtained from the Office of Financial Aid. Aid recipients who withdraw from some courses in the semester but not all their courses may have their aid awards adjusted to the reduced cost of attendance. Students who drop to less than half-time status prior to beginning the class may have their federal aid canceled, even if some portions have already been refunded to them for living expenses. Students will receive a bill from the school for the balance due. Withdrawing from classes may also impact future aid eligibility. Financial Aid recipients are advised to consult with their academic advisor and the financial aid staff prior to withdrawing from classes. Students using VA benefits should contact the VA Certifying Official immediately.

Course Load

Full-time students may not enroll in more than 16 credits total per semester.

Part-time students may not enroll in more than 10 credits total per semester, unless approved by an academic advisor.

For Graduate Level Students (Fall and Spring Semesters)

- Not registered – 0 credits
- Less than ½-time – 1 to 4 credits
- Half-time – 5 to 6 credits
- ¾-time – 7 to 8 credits
- Full-time – 9 or more credits

For Graduate Level Students (Summer Only)

- Not registered – 0 credits
- Less than ½-time – 1 to 2 credits
- Half-time – 3 to 4 credits
- ¾-time – 5 credits
- Full-time – 6 or more credits

Independent Study Requests

Matriculated students who wish to study a topic or area not represented in the curriculum may complete an independent study request form. Students may only complete an independent project on a topic that does not duplicate either a course offered at Carey, or coursework transferred from another college or university.

Students must request guidelines and proposal forms from their academic advisor and may not register for the independent study until their proposals are approved in writing by their academic advisor, faculty sponsor, and academic program director. Proposal forms must be submitted by the following deadlines:

- April 1st for Summer semester,
- May 1st for Fall semester,
- November 1st for Spring semester.

Students may not take more than one independent study.

Interdivisional Registration

During the fall and spring terms, degree-seeking graduate students at the Carey Business School may register for courses in another school at Johns Hopkins by submitting a request using the SEAM's online form (https://support.sis.jhu.edu/case/). Students admitted to full-time programs may enroll in courses at other divisions without additional tuition charges during fall and spring semesters, but will be responsible for any additional fees. Students admitted to part-time programs pay the per-credit tuition rate of the school offering the course and any additional fees required.

Students from other divisions in the university may request to enroll in courses offered by the Carey Business School by submitting their registration request via the SEAM's online form (https://support.sis.jhu.edu/case/), including any necessary permission from their academic advisor or the appropriate school program director or advisor. Courses must be taken for a grade. Carey Business School students have priority in registering for Carey Business School courses. Students from other JHU divisions who request to take Carey courses will have their enrollments processed at least 2 weeks prior to the start of the session. All interdivisional students must abide by these policies, procedures, and deadlines. All published prerequisites for the course must be met prior to enrollment.

Undergraduate students from other divisions in the university are not allowed to enroll in graduate-level courses at the Carey Business School.

During the summer session, students do not follow the interdivisional registration procedures noted above. Students from other Johns Hopkins divisions in full-time programs that are not in session who want to enroll in Carey Business School summer courses have to be admitted as a Carey non-degree seeking student. Those students should then follow the registration procedures outlined in the Registration section. For more information, contact the Registrar's Office (https://support.sis.jhu.edu/case/).

Interdivisional registration is not available during the summer for Carey Business School Students. Carey students who would like to take classes at other Johns Hopkins divisions during the summer should contact the Registrar's Office of the other division to confirm enrollment requirements. Students will be responsible for the tuition and fees for summer interdivisional courses.

Note: Financial Aid recipients and students using VA benefits should inform the Office of Financial Aid of any interdivisional registration.

Refunds

Part-Time Students

Students who officially withdraw during an academic term will receive tuition refunds based on the Refund Deadlines (https://carey.jhu.edu/student-experience/services-resources/registrar/course-add-drop/) provided below. Refunds apply only to the tuition portion of a student's charges and are calculated from the date that the school receives an official add/drop form.

Federal aid recipients who withdraw from all coursework may have aid returned to the federal government according to federal "Return of Title IV funds" regulations.

Those partially withdrawing may have their aid awards adjusted to the reduced cost of attendance. Students who drop to less than half-time prior to commencing the courses that require half-time attendance will have their federal aid canceled, even if some portions have already been refunded to them for living expenses. Students receive a bill from the school for any remaining balance due.

If a course is canceled by the school, the tuition is refunded in full. All other refunds approved in the Registrar's Office will be in accordance with the refund schedule. A refund may take 4 to 6 weeks to process. Students will receive refunds according to their original method of payment.

Full-Time Students

Students who officially withdraw prior to an academic term will receive a full tuition refund, excluding Health Insurance and other non-refundable fees.

A full-time student who is academically suspended, receives an honor code violation, and/or is required to leave Carey for a semester or permanently, will not receive a refund for tuition charged at the time of the suspension or departure. A prorated portion of the tuition will be applied to future semesters based on the refund schedule for academically suspended students. If a student fails to return or is dismissed permanently, no refund will be given. In instances where a student is receiving federal financial aid, the aid will be recalculated and refunded to the federal government. The student is still responsible for the entirety of the tuition.

In order to receive the degree for the full-time student's program of study, the student must pay the entire published cost of the tuition, regardless of the number of terms needed to complete the degree.

Exceptions to the Refund Policy: Students who experience events beyond their control may request an exception to the course refund policy by submitting a General Petition Form (https://carey.jhu.edu/sites/default/files/2021-04/general-petition-form.pdf) to the Registrar's Office. Petitions must be submitted in the same semester in which the course was taken and must be accompanied by documentation of the circumstances leading to the request. Students who experience severe medical problems, a death in their immediate family, or who are called into active military duty may receive a 100% refund. Other requests will be reviewed on a case-by-case basis, and refund amounts (if awarded) will be decided by the Registrar. Petitions are reviewed monthly, and notification of the final decision is sent to the student by email.

Student Accounts

Student Accounts

For general inquiries about student accounts, specifically receipt of payments, refunds, online tuition payments, financial holds, 1098-T forms, collections, company billing, and more, please call the Student Accounts Office (SAO) at 410-234-4755 or request support through SEAM's online form (https://support.sis.jhu.edu/case/).

There are multiple tuition payment options. Follow the guidelines to ensure that your tuition is received and any financial aid refunds are disbursed.

Tuition Payments and Penalties

Students with approved financial aid should elect to be electronically billed and will be responsible for any charges not covered by their award. Students enrolled in a Johns Hopkins Carey Business School program should see Schedule A (https://carey.jhu.edu/student-experience/services-resources/student-accounts/schedule-a/) for billing periods and a payment due date. A late payment fee of $250 will be assessed if payment is not received by the due date. Students who choose the monthly payment plan may use Schedule B (https://carey.jhu.edu/student-experience/services-resources/student-accounts/schedule-b/) as a payment guide.

Students with outstanding balances will receive financial holds. A financial hold prohibits students from registering for future courses and receiving services until the balance is paid in full. Students with a financial hold may also be prohibited from participating in Carey-sponsored events, activities, or excursions. Payments from students seeking to register may be kept and applied against prior obligations to the university. Delinquent accounts turned over to the collection agency may be assessed a penalty fee, in addition to the outstanding debt.

Tuition Payment Options

For students in full-time programs:

- Pay online with an electronic check
- Pay with a check by mail
- Pay with a sponsor or employer contract
- Pay via wire transfer
- *Enroll in the Nelnet/Tuition Management Systems (TMS) monthly payment plan

For students in part-time programs:

- Pay online with an electronic check
- Pay with a check by mail
- Pay with a sponsor or employer contract
- Pay by Johns Hopkins University tuition remission (available to University employees and only covers tuition)
- Pay via wire transfer
- *Enroll in the Nelnet/Tuition Management Systems (TMS) monthly payment plan

Payment options are subject to change

Pay your bill electronically

Students are required to have a current Johns Hopkins University email address and a valid Johns Hopkins Enterprise Directory. Notification of outstanding tuition balances will be sent electronically to your Johns Hopkins email account.

Billing statements are emailed the second Wednesday of each month if activity has occurred since the last billing cycle. Students are required to make payment upon notification of this bill or if there is an outstanding balance. Balances not paid by the due date will be assessed a $250 late payment fee. Paper statements are no longer mailed to students.

In order to ensure receipt of your bill, you should update your email address in SIS. For our current billing periods and due dates, seeSchedule A.

Pay your account online

The fastest way to have your tuition payment credited to your student account is to pay via SIS Self Service. To make payments online or view your student account, go to https://sis.jhu.edu/sswf/. #Full-time and part-time students can only use the electronic check option when paying their tuition online.

If you submit a paper or electronic Automatic Clearing House check that is returned by the bank, you will be charged a $35 returned check fee, placed on financial hold, and may be removed from courses for which you are currently registered. Grades, transcripts, and diplomas may be withheld, and you will be prevented from registering for future courses until payment is secured.

Pay with a check, by mail, or in person

Checks for tuition and fees should be made payable to Johns Hopkins University and should reference the student's Hopkins/Person ID. Payments can be mailed to the Student Accounts Shared Services Team:

JHU Third Party Payer & Payment Processing Team (TPP Team)
Johns Hopkins University Garland Hall
B33 3400 N. Charles Street
Baltimore, MD 21218

Paying by check authorizes the school to electronically debit your account. Once the transaction has been completed, the actual check will be destroyed, and checks will not be returned.

If you submit a paper or electronic ACH check that is returned by the bank, you will be charged a $35 returned check fee, placed on financial hold, and may be removed from courses for which you are currently registered. Grades, transcripts and diplomas, and any other services may be withheld, and you will be prevented from registering for future courses until payment is secured. Payments from students seeking to register may be kept and applied against prior obligations to the university.

Make monthly payments

Full-time and part-time students have the option to defer tuition by enrolling in the monthly payment plan. To enroll, contact Nelnet/Tuition Management Systems (TMS) by phone at 1-800-722-4867#or visit their website at careyjhu.afford.com to sign up online.

Payment plans are semester-specific and cannot be used to pay past due balances from previous semesters. Book charges cannot be included in the payment plan.

To enroll in the payment plan, students should have their Hopkins ID and the full amount of tuition, fees, and healthcare insurance premium (if applicable) ready. Intersession courses can be included in the spring semester payment plan. Students must acknowledge the payment options and associated fees. There is an enrollment fee of $55 per semester. *Please note: these fees are not determined or collected by JHU.*

If payment has not been made in accordance with the payment schedule, TMS has the right to assess a $40 late payment fee and/or terminate the agreement.

In addition, if a student is no longer eligible to participate in the monthly payment plan, a $75 termination fee will be charged to the student account by SAO and the student will not be allowed to receive any future services until the account is paid in full.

Employer/sponsor contract

Students with outside organizations sponsoring their tuition and fees are required to submit official documentation and complete a brief acknowledgement section in SIS Self-Service.#Johns Hopkins University Third Party Payer coordinates the sponsor billing process. The TPP team prepares and sends invoices for qualified tuition and manages all correspondence regarding sponsor contracts.

For detailed instructions and information,visit the TPP#website. This website includes information on how to upload the required documentation, FAQs, and contact information for the Johns Hopkins Third Party Payer team.

Johns Hopkins tuition remission

If you are a Johns Hopkins University employee participating in the tuition remission benefit plan:

Tuition remission covers tuition costs for part-time courses only. Fees are not covered.

A completed tuition remission application for each course must be submitted to the Office of Student Accounts. Please upload your application(s) via our SEAM's online form.

If the remission does not cover the entire cost of tuition, you are required to pay the remaining balance at the time of registration. You can select the monthly payment plan to pay for tuition not covered by the tuition remission benefit or choose to be electronically billed.

You can visit thetuition remission section#of the Johns Hopkins Benefits Site for your remission application and other important remission information.

Wire transfer

Please be sure to include your student ID number and/or other identifying information with the wire transfer. Once the wire transfer is completed, notify the Office of Student Accounts.

International students may choose to wire payment information directly to Johns Hopkins University or use our service with Western Union. Information for both options is provided below:

International Wire Transfers - Western Union for International Payments

Johns Hopkins University partners with Western Union Business Solutions to process wire payments from international students. This payment option allows students to pay the university their student account balance in the currency of their choice and provides a simple and secure method for initiating payments electronically. We encourage all international students to choose this cost effective and efficient method of payment.

Begin the wire transfer process#or log on to your SIS Self-Service account.#Go to the billing tab and select "Summary or Statements." The "Pay by International Wire Transfer" link is one of your payment options.

OR

If you are a student or sponsor who would like to wire tuition payments:

U.S. and International Students only:

Johns Hopkins University
M&T Bank
One M & T Plaza
Buffalo, NY 14203
Checking Account
Transit/ Routing /ABA #: 022000046
Account # 970370230
Swift Code: MANTUS33INT
CHIPS ABA #: 0555

US Sponsor Payments ONLY:

Johns Hopkins University
M&T Bank
1 M&T Plaza
Buffalo, NY 14203
Transit/routing/ABA number: 022000046
Account number: 09000522
Duns #001910777
Cage Code: 5L406

International Sponsor Payments only:

Johns Hopkins University
M&T Bank
1 M&T Plaza
Buffalo, NY 14203
SWIFT code: MANTUS33INT
CHIPS ABA number: 0555
IBAN number: N/A
Account number: 09000522
Transit/routing/ABA number: 022000046

Please be sure to include your student ID number or other identifying information with the wire transfer. After the wire transfer is completed, please notify the Student Accounts Office of your payment amount and date of remittance.

Refunds

Tuition refund from dropped or cancelled courses

Students who become eligible to receive a refund as a result of a dropped or cancelled course will be issued a refund to the original method payment. The following exceptions apply:

- Wire transfer or Western Union payments will be refunded in the form of a check, unless otherwise requested.
- Institutional aid awards will be evaluated accordingly for dropped or cancelled courses.
- Financial aid awards will be evaluated for a student refund according to financial aid eligibility requirements.
- Johns Hopkins employee tuition remission will receive a remission benefit reversal of 100 percent. Tuition remission does not cover tuition costs from courses not completed. Please see theBenefits Office#for more information.

Financial aid refund

Once all tuition and fees have been covered by financial aid, students are eligible to receive a refund of the excess aid that remains on their account. If you do not wish to receive a refund, please contact the Student Accounts Office or Financial Aid to discuss your options throughSEAM's online form. Otherwise, the credit balance will be sent to BankMobile#and refunded to you according to your selected refund preference.

Expect to receive a Refund Selection Kit from BankMobile via U.S. mail. You will also receive an email which will be sent to the email address on record with the school. If your address is#not in the U.S., you will not receive a kit. All students, please be sure to review and update your address in SIS. This can be done by logging intoSIS Self-Service. For more information about BankMobile, visit this link: http://bankmobiledisbursements.com/refundchoicessso/

Financial aid

Financial aid at the Carey Business School refers to a broad range of scholarship, grant, and loan programs. When students apply for financial aid, they are generally applying for all of the potential programs for which they might be eligible. Based on the eligibility guidelines for each program, available funding, and the student's own financial resources, students will be offered one or more types of aid. The basic premise behind financial aid is that students (and their families where applicable) are responsible for paying for college costs to the extent that they are able. Financial aid supplements each student's own financial resources.

Learn more about financial aid .

Transfer of Graduate Credit

Transfer of Graduate Credit

The transfer without replacement policy applies to all part-time programs.

The maximum number of credits earned at another accredited college or university, or at another school within Johns Hopkins University, that may be transferred without replacement into a graduate degree program in the Carey Business School in no case can exceed six credits. Any request for transfer credit must be submitted within the first semester. Coursework must be completed within the last 5 years and the student must have a "B+" or better in the completed coursework. Faculty Course Leads make the final decision on course equivalencies, but student should start the process with their academic advisor.

A maximum of 6 credits may be transferred and the combination of transfer credits and course waivers may not exceed 10 credits. The Waiver Exam policy is separate from the Transfer of Graduate Credit policy.

Waiver Exams

Waiver Exams

The Carey Business School anticipates that students will complete all required coursework and credits needed for completion of the degree (or certificate) at Johns Hopkins University. Part-time students who enter Carey with professional work experience and prior completed course work at the undergraduate level in the following areas: **Statistical Analysis** or **Accounting & Financial Reporting** may request a course waiver.

Part-time students seeking a course waiver must have a B+ or better in the undergraduate course and pass a waiver exam offered at the Carey Business School within the first semester of study at Carey. A maximum of 4 credits may be waived with the aforementioned criteria. Students who seek to take a waiver exam must notify their academic advisor. All determinations regarding the grade for the exam (pass or fail) are final and not eligible for appeal. Students who pass the waiver examination must complete the equivalent number of credits in an advanced course. This policy is separate from the ***Transfer of Credit*** policy.

If a student has completed a professional exam (CPA, CFA, et cetera), please consult with the assigned Academic Advisor to receive more information regarding waiver with replacement.

Eligibility, Exam Format and Student Preparation

Waiver exams are available to part-time students only. Students have the option of either completing the courses or waiving the course by passing the waiver exam. Waiver exams may be taken only once.

For more information, students should contact their academic advisor for assistance through the process.

Registering and Scheduling an Exam

Waiver exams are administered in an online Learning Management System format three times a year—in January, May and in August. Students must complete registration three weeks prior to the start of the semester and will have one week to complete the exam.

To register, students must submit an Add/Drop form to their academic advisor, and submit a payment of $100 (fee subject to change without notice) per exam. Any questions pertaining to registration for waiver exams should be directed to the Academic Advising Office at 410-234-9320. Students who are paying with JHU tuition remission should contact their Human Resources Office for clarification regarding the pass/fail policy.

Please note the following:

- Waiver exams are to be taken prior to the semester in which registration occurs.

- Waiver exam course sites are available for a full week, three weeks before the start of the semester.
- Waiver exams are administered through the online Learning Management System format.
- Students must complete the New Student Orientation (NSO) before receiving access to the waiver exam Learning Management System site.
- Registration for waiver exams does not carry over to the next semester. Semesters are defined as: May (summer), August (fall) and January (spring).

PEABODY INSTITUTE

Doctoral Programs

Master's Programs

Joint Degrees

Bachelor's Programs

Minors

Certificate Programs

Non-Degree Programs

Courses

PY.410.419. Orchestral Repertoire - Trombone. 1 Credit.
The development of orchestral skills through low brass sectionals; performance in trombone choir, departmental recitals, and mock orchestral auditions.
Brass majors only

PY.410.420. Orchestral Repertoire - Trombone. 1 Credit.
The development of orchestral skills through low brass sectionals; performance in trombone choir, departmental recitals, and mock orchestral auditions.
Brass majors only

PY.410.453. Orchestral Repertoire - Horn. 1 Credit.
Open to all horn students who wish to experience a variety of performing situations involving solo and orchestral repertoire. Includes a class recital and mock audition each semester.
Brass majors only

PY.410.454. Orchestral Repertoire - Horn. 1 Credit.
Open to all horn students who wish to experience a variety of performing situations involving solo and orchestral repertoire. Includes a class recital and mock audition each semester.
Brass majors only

PY.410.457. Orchestral Repertoire - Trumpet. 1 Credit.
Open to all trumpet students who wish to experience a variety of performing situations involving solo and orchestral repertoire.
Brass majors only

PY.410.458. Orchestral Repertoire - Trumpet. 1 Credit.
Open to all trumpet students who wish to experience a variety of performing situations involving solo and orchestral repertoire.
Brass majors only

PY.410.459. Respiratory Function - Brass. 1 Credit.
Basic techniques of breathing and breath control for brass instruments tailored to the student's instrument with a goal of enhancing one's use of air and efficiency to improve performances. Consists of five private one-hour lessons during the semester. Enrollment is limited to three students per semester.
Brass or Woodwind majors only

PY.410.547. Brass Ensemble (UG). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass.

PY.410.548. Brass Ensemble (UG). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass

PY.410.847. Brass Ensemble (GR). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass.

PY.410.848. Brass Ensemble (GR). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass

PY.310.411. Junior Bach Program. 0.5 - 3 Credits.
Weekly, one-on-one lessons in composition for middle-school students from the St. Ignatius Loyola Academy and Baltimore Leadership School for Young Women. The course culminates in a concert of new student works at the end of each semester.
Open to Composition Majors and those with instructor permission. Non-Composition majors should email the instructor's permission to peabodyregistrar@jhu.edu to be registered.

PY.310.513. Composers of the AACM. 1 Credit.

PY.310.515. Music Now. 2 Credits.
An elective designed to familiarize students with composers, ensembles, and ideas associated with early 21st century music.

PY.310.516. Music Now. 2 Credits.
An elective designed to familiarize students with composers, ensembles, and ideas associated with early 21st century music.

PY.310.545. Composition Seminar (UG). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.546. Composition Seminar (UG). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.691. Composition Portfolio MM. 2 Credits.
The completion of works of major proportions, for full orchestra and chamber ensemble, as required in the Master of Music degree program. Graded on a S/U basis.
Composition majors only.

PY.310.793. Compositions/Commentary. 6 Credits.
The completion of works of major proportions, for full orchestra and chamber ensemble, accompanied by a substantial written commentary, as required in the Doctor of Musical Arts degree program.
Composition majors only.

PY.310.845. Composition Seminar (GR). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.846. Composition Seminar (GR). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.409. Hip Hop Music Production 1. 2 Credits.
A history and workshop course designed to illuminate the history of Hip Hop music.

PY.350.410. Hip Hop Music Production 2. 2 Credits.
Conceived as a follow-up class to "Hip Hop Music Production: History and Practice 1", this course is designed to further explore production styles and techniques of prominent as well as lesser known producers, and to provide students with opportunities to build on production skills learned in "Hip Hop Music Production: History and Practice 1". Students will have the opportunity to produce hip hop in a number of different styles, as well as to learn mixing and mastering techniques used to bring a recording project to completion.
Completion of Hip Hop Music Production 1 needed, PY.350.409[C].

PY.350.463. Introduction to Computer Music. 3 Credits.
A study of the techniques, repertoire, and aesthetics of computer music. Composition and research projects are completed using the resources of the Computer Music Studios. Participation in at least one public program.

PY.350.464. Introduction to Computer Music 2. 3 Credits.
A study of the techniques, repertoire, and aesthetics of computer music. Composition and research projects are completed using the resources of the Computer Music Studios. Participation in at least one public program.
Completion of Introduction to Computer Music 1 needed, PY.350.463[C].

PY.350.465. Introduction to Web Design. 3 Credits.
Designed for music students with limited computer experience, this course will provide the skill and awareness to use the computer, the World Wide Web and Internet technologies to support your musical career from the classroom to the concert stage. (May be used for general and music electives.)

PY.350.466. Introduction to Programming. 3 Credits.
This course is designed for musicians and digital artists who wish to learn Multimedia Programming. We will use the Python programming language to examine techniques and algorithms to manipulate sounds, images, movies, text and web pages. Also, we will learn to acquire and use related open-source programs and libraries to simplify our work. No previous programming experience is required.

PY.350.545. Computer Music Seminar (UG). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.546. Computer Music Seminar (UG). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.691. Master's Thesis. 2 Credits.
A scholarly work describing the author's research activities as required for the Research track of the MM program in Computer Music.
Computer Music majors only.;Completion of or co-enrollment in Research Practicum required, PY.350.842[C].

PY.350.693. Portfolio. 2 Credits.
The completion and submission of works of major proportions that utilize computer technology as required by the Master of Music degree program in Computer Music. The compositions must be written during your tenure at Peabody and be approved by your major teacher and departmental faculty. Graded on a S/U basis.
Computer Music - Composition Track majors only.

PY.350.835. Studio Techniques. 3 Credits.
A course that covers advanced computer music studio techniques, including advanced use of MIDI, analog and digital synthesizer programming, sample editing and processing, Time Code and synchronization, and recording and production techniques. Prerequisite: Introduction to Computer Music or equivalent.
Computer Music majors only.;Completion of Introduction to Computer Music 2 required, PY.350.464[C].

PY.350.837. Digital Music Programming 1. 3 Credits.
This course teaches computer programming theory and skills pertaining to computer music composition, performance, and research. The primary focus of the course is the Max/MSP/Jitter suite of programming tools. Prerequisites: Introduction to Computer Music; Studio Techniques, or equivalent.
Prerequisite(s): Students must co-register in Synthesis Theory 1, PY.350.867[C].
Completion of Introduction to Computer Music required, PY.350.464[C].

PY.350.838. Digital Music Programming 2. 2 Credits.
The purpose of Digital Music Programming II combined with Synthesis Theory II is to learn to implement Digital Audio Signal Processing theories and techniques in various programming environments suited to musical composition, performance and research. In particular, we will study SuperCollider, Pd, Processing, Arduino programming, and reading realtime interfaces. Prerequisites: Synthesis Theory I and Digital Music Programming I. Corequisite: Synthesis Theory II.
Prerequisite(s): Students must co-register in Synthesis Theory 2, PY.350.868[C].
Completion of Digital Music Programming 1 required, PY.350.837[C].

PY.350.840. History of Electroacoustic Music. 3 Credits.
The History of Electroacoustic Music is an overview of the development of electroacoustic music in the twentieth century. Intended for the student with little or no knowledge of this field's history and literature, the course is designed to provide a general familiarity with the major trends and developments as well as to allow for more detailed study on topics of particular interest to the class.
Computer Music majors only.

PY.350.841. Research Practicum. 4 Credits.
An intensive course for those following the computer music research/technology track. Substantial individual projects will be pursued. Enrollment by permission of the instructor.
Computer Music - Research Track majors only. Non-Research Track Computer Music majors may take course with department approval.

PY.350.842. Research Practicum. 4 Credits.
An intensive course for those following the computer music research/technology track. Substantial individual projects will be pursued. Enrollment by permission of the instructor.
Computer Music - Research Track majors only. Non-Research Track Computer Music majors may take course with department approval.;Completion of previous semester required, PY.350.841[C].

PY.350.845. Computer Music Seminar (GR). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.846. Computer Music Seminar (GR). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.867. Synthesis Theory 1. 2 Credits.
This course examines digital signal processing techniques as applied to computer music applications. A primary focus is on the Csound music programming language. Designed for computer music majors and recording arts majors, but open to others with permission of instructor. Prerequisites: Introduction to Computer Music; Studio Techniques, or equivalent.
Prerequisite(s): Students must co-register in Digital Music Programming 1, PY.350.837[C].
Completion of Introduction to Computer Music required, PY.350.464[C].

PY.350.868. Synthesis Theory 2. 2 Credits.
The purpose of Synthesis Theory II combined with Digital Music Programming II is to learn to implement Digital Audio Signal Processing theories and techniques in various programming environments suited to musical composition, performance and research. In particular, we will examine advanced synthesis theory, animation, psychoacoustic principles, algorithmic composition and video processing, and realtime hardware interfaces. Prerequisites: Synthesis Theory I and Digital Music Programming I. Corequisite: Digital Music Programming II.
Prerequisite(s): Students must co-register in Digital Music Programming 2, PY.350.838[C].
Completion of Synthesis Theory 1 required, PY.350.867[C].

PY.330.311. Conducting. 1 Credit.
A basic course in orchestral techniques. Offered fall and spring.

PY.330.411. Conducting (Intermediate). 1 Credit.
Designed for the student who desires more intensive study in conducting. Literature will be sequenced with the more difficult works in the Advanced Conducting course. Prerequisite: Basic Conducting or permission of instructor.

PY.330.412. Conducting (Intermediate). 1 Credit.
Designed for the student who desires more intensive study in conducting. Literature will be sequenced with the more difficult works in the Advanced Conducting course. Prerequisite: Basic Conducting or permission of instructor.

PY.330.413. Conducting (Advanced). 1 Credit.
Designed for the student who desires more intensive study in conducting. Prerequisite: Intermediate Conducting or permission of the instructor.

PY.330.414. Conducting (Advanced). 1 Credit.
Designed for the student who desires more intensive study in conducting. Prerequisite: Intermediate Conducting or permission of the instructor.

PY.330.845. Conducting Seminar. 4 Credits.
A seminar in all aspects of conducting as a profession, from orchestra management to program making. Videotapes of each week's rehearsal with the conductor's orchestra will be discussed. Required of all conducting majors
Graduate Conducting majors only

PY.330.846. Conducting Seminar. 4 Credits.
A seminar in all aspects of conducting as a profession, from orchestra management to program making. Videotapes of each week's rehearsal with the conductor's orchestra will be discussed. Required of all conducting majors.
Graduate Conducting majors only

PY.330.849. Wind Conducting Seminar. 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.850. Wind Conducting Seminar. 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.851. Wind Conducting Seminar (DMA). 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.852. Wind Conducting Seminar (DMA). 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.800.101. Ballet 1a. 3 Credits.
PY.800.101 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.101 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.

PY.800.102. Ballet 1b. 3 Credits.
PY.800.102 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.102 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.

PY.800.103. Modern 1a. 3 Credits.
PY.800.103 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.

PY.800.104. Modern 1b. 3 Credits.
PY.800.104 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 1a required, PY.800.103[C]

PY.800.105. Jazz Dance. 2 Credits.
PY.800.105 consists of a bi-weekly 80-minute long technique studio class in Jazz Dance with possible readings, video viewings, reflection journal and performance attendance with written assignment An intermediate level technique course, PY.800.105 emphasizes movement sequences incorporating isolation and syncopation for the student on an intermediate level.

PY.800.106. West African Dance. 2 Credits.
PY.800.106 consists of a once a week 90-minute long West African Dance studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Exploring movements of traditional dance styles to contemporary, PY.800.106 is an introduction course to West African Dance and Culture. Open to non-majors.

PY.800.107. Afro Fusion. 2 Credits.
PY.800.107 consists of a twice a week 80-minute long Afro Fusion technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Afro Fusion technique providing continued development of the body as an instrument for movement with an emphasis on technique, style and composition. Dance is a continuum of learning. African Diaspora dance is the study of an ever-evolving people rooted in culture. In order to study the dance you must have an understanding of the people.In this course, when we speak of Afro-fusion we are referring to the culture, tradition and experience of people of color. More specifically, we are referring to the people that make up the African Diaspora. Traditionally, in the African community dance is interwoven into the culture of the people. Be it work or play, the body takes on a rhythm and a movement that becomes the dance of the people.Afro-Fusion Dance technique consists of a progression of strengthening exercises that increase skills of coordination, rhythm and flexibility while building core strength and endurance. Traditional styles of West African dance will be seamlessly fused with popular vernacular styles of movement.

PY.800.108. Screen Dance. 2 Credits.
PY.800.108 consists of a once a week 80-minute studio/lab class with possible readings and video viewings. Intensive study of the history, theory and fundamental skills of Screen Dance. This is an elective course that can be taken multiple times for credit.
Open to Dance majors only.

PY.800.109. Gaga. 2 Credits.
PY.800.109 consists of a bi-weekly 80-minute long technique studio class. Gaga--the movement language created by Ohad Naharin, artistic director and choreographer of Batsheva Dance Company in Israel--is a continuous, sensation-based movement class. Students are encouraged to deeply listen to the body and to physical sensations. The research of Gaga is fundamentally physical, and insists on a specific process of embodiment through rich imagery. Gaga is improvisational in nature and focuses on each participant's personal connection to the language. There are no mirrors in Gaga, and there are no observers. The class moves in continuum without breaks for an hour and fifteen minutes.
Open to Dance majors only.

PY.800.110. Tap. 2 Credits.

PY.800.111. Tap 2. 2 Credits.

PY.800.116. Jazz Dance 2. 2 Credits.
Open to Dance majors only.

PY.800.117. Latin Dance Styles. 2 Credits.

PY.800.201. Ballet 2a. 3 Credits.
PY.800.201 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.201 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 1b required, PY.800.102[C]

PY.800.202. Ballet 2b. 3 Credits.
PY.800.202 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.202 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 2a required, PY.800.201[C]

PY.800.203. Modern 2a. 3 Credits.
PY.800.203 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 1b required, PY.800.104[C]

PY.800.204. Modern 2b. 3 Credits.
PY.800.204 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 2a required, PY.800.203[C]

PY.800.301. Ballet 3a. 3 Credits.
PY.800.301 consists of a daily 60-minute long Ballet technique online classes with possible readings, video viewings, reflection journal and performance virtual attendance with written assignment. Designed to further develop technical skills, PY.800.301 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 2b required, PY.800.202[C]

PY.800.302. Ballet 3b. 3 Credits.
Open to Dance majors only.;Completion of Ballet 3a required, PY.800.301[C]

PY.800.303. Modern 3a. 3 Credits.
PY.800.303 consists of a daily 80-minute or 60-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of numerous Modern Dance Techniques, including Muller Polarity Technique, providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 2b required, PY.800.204[C]

PY.800.304. Modern 3b. 3 Credits.
Open to Dance majors only.;Completion of Modern 3a required, PY.800.303[C]

PY.800.401. Ballet 4a. 3 Credits.
Open to Dance majors only.;Completion of Ballet 3b required, PY.800.302[C]

PY.800.402. Ballet 4b. 3 Credits.
Open to Dance majors only.;Completion of Ballet 4a required, PY.800.401[C]

PY.800.403. Modern 4a. 3 Credits.
Open to Dance majors only.;Completion of Modern 3b required, PY.800.304[C]

PY.800.404. Modern 4b. 3 Credits.
Open to Dance majors only.;Completion of Modern 4a required, PY.800.403[C]

PY.800.411. Pilates. 2 Credits.

PY.800.412. Hip Hop. 2 Credits.
Open to Dance majors only.

PY.800.501. Rehearsal/Performance Collaboration Fall. 1 Credit.
PY.800.501 consists of daily/weekly rehearsals with faculty and/or guest choreographers, culminating in a performance of some kind. Designed to further develop performance and technical skills, PY.800.501 focuses on developing & refining proper rehearsal etiquette, memorization proficiency, active listening aptitude, improvisation skills and performance technique.
Open to Dance majors only.

PY.800.502. Rehearsal/Performance Collaboration Spring. 1 Credit.
PY.800.502 consists of daily/weekly rehearsals with faculty and/or guest choreographers, culminating in a performance of some kind. Designed to further develop performance and technical skills, PY.800.502 focuses on developing & refining proper rehearsal etiquette, memorization proficiency, active listening aptitude, improvisation skills and performance technique.
Open to Dance majors only.

PY.800.503. Student Dance Company 1. 2 Credits.
Open to Seniors only. Students must have completed Ballet 3b and Modern 3b.

PY.800.504. Student Dance Company 2. 2 Credits.
Open to Dance majors only.;Open to Seniors only. Must have completed Ballet 3b and Modern 3b.

PY.800.521. Elementary Yoga. 1 Credit.
Elementary Yoga is a gentle movement meditation practice. Asanas (poses) are held for a longer period of time, allowing connective tissues to release and energy to flow through the body. While open to all students, priority will be given to Conservatory Dance majors.

PY.810.201. Somatic Practices 1. 3 Credits.
PY.810.201 is a 3 credit, bi-weekly, 80-minute long Somatics course inclusive of lecture, discussion, guided movement explorations and sequences, readings, presentations and journal reflection.
Open to Dance majors only.

PY.810.202. Somatic Practices 2. 3 Credits.
Open to Dance majors only.;Completion of Somatic Practices 1 required, PY.810.201[C]

PY.810.302. Kiniseology. 3 Credits.
Open to Dance majors only.

PY.810.304. Body Conditioning. 2 Credits.
Dancer specific cross-training & self-care techniques for peak performance and career longevity.
Open to Dance majors only.

PY.820.201. Critical Dance Studies 1. 3 Credits.
Open to Dance majors only.

PY.820.202. Critical Dance Studies 2. 3 Credits.
Open to Dance majors only.;Completion of Critical Dance Studies 1 required, PY.820.201[C]

PY.820.204. The Business of Dance. 1 Credit.

PY.820.301. Dance of the African Diaspora. 3 Credits.
Open to Dance majors only.

PY.820.401. Dance Pedagogy. 3 Credits.
Principles and techniques of the pedagogy of dance, including a survey of contemporary models for movement education. Prerequisites: at least one semester of Somatic Practices and one semester of Choreography. Open to Dance majors only.

PY.830.101. Music for Dance. 3 Credits.
Open to Dance majors only.

PY.830.102. Dance Production. 2 Credits.
PY.830.102 consists of a bi-weekly 80-minute long theory/laboratory class with readings, video viewings, research project and written assignments. An introduction to the fundamental aspects of dance production, PY.830.102 focuses on the various steps to launch a production/dance festival, possibly including such things as fundraising, publicity, lighting, grant writing, creating media content, etc.
Open to Dance majors only.

PY.830.104. Movement as Sound. 2 Credits.

PY.830.110. Choreolab. 2 Credits.
Open to Dance majors only.

PY.830.201. Contact Improvisation. 2 Credits.
Creative exploration of partner and small-group dance forms following shared points of contact.

PY.830.202. Improv/Authentic Movement. 2 Credits.
Open to Dance majors only.

PY.830.203. Contemporary Partnering. 2 Credits.

PY.830.301. Choreography 1. 3 Credits.
This Choreography Course is designed as an opportunity for student artists to explore the interdisciplinary and cross-sector possibilities of embodiment, performance, and dance-making. How might we integrate, interrogate, and influence our worlds of thought and praxis through the power of our crafts? Students will work in movement-based laboratories, and critical discourse, unpacking the cultural and sociopolitical dynamics at work in our institutional, programmatic, relational, and personal frames. Processes will include, Improvisation, Journaling, and Group Sharing that encourage a holistic lens in perceiving, making, and interrogating performance and other art forms.
Improv/Authentic Movement completion required (PY.830.202[C]).;Open to Dance majors only.

PY.830.302. Choreography 2. 3 Credits.
Choreography 1 needed (PY.830.301[C]).;Open to Dance majors only.

PY.830.303. Choreography 3. 3 Credits.

PY.450.619. Accompanying & Coaching Skills 1. 2 Credits.
An in-depth study of basic accompanying and vocal coaching skills, including diction and phonetics, standard aria repertoire, operatic and oratorio coaching, discussion of voice types and the fach system, ornamentation, and musical style. Also incorporates score preparation techniques, strategies for playing orchestral piano reductions, continuo/recitative playing, musical theater styles, synthesizer skills, lead sheet reading, transposition, and improvisation. Prepares students for young artist internship auditions and positions. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.620. Accompanying & Coaching Skills 2. 2 Credits.
A continuation of Accompanying and Coaching Skills 1. An in-depth study of basic accompanying and vocal coaching skills, including diction and phonetics, standard aria repertoire, operatic and oratorio coaching, discussion of voice types and the fach system, ornamentation, and musical style. Also incorporates score preparation techniques, strategies for playing orchestral piano reductions, continuo/recitative playing, musical theater styles, synthesizer skills, lead sheet reading, transposition, and improvisation. Prepares students for young artist internship auditions and positions. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.621. Sonata Class. 2 Credits.
Designed for concentrated study of the sonata and instrumental chamber music literature. Audition/permission of the instructor required.

PY.450.622. Sonata Class. 2 Credits.
Designed for concentrated study of the sonata and instrumental chamber music repertoire. Enrollment by audition or permission of instructor

PY.450.625. Accompanying & Coaching Skills 3. 2 Credits.
A continuation of Accompanying and Coaching Skills 3, this course is designed to build repertoire, interpretation, and coaching skills in the operatic literature. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.626. Accompanying & Coaching Skills 4. 2 Credits.
A continuation of Accompanying and Coaching Skills 3, this course is designed to build repertoire, interpretation, and coaching skills in the operatic literature. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.639. Coaching/Opera Workshop. 1 Credit.
Participation as student coach in the preparation and performance of scenes from the operatic repertoire, in simple stagings with piano accompaniment. Offered on an as- needed basis.
Open to Piano majors only.

PY.450.640. Coaching/Opera Theatre. 1 Credit.
Open to Piano majors only.

PY.450.813. Advanced Accompanying. 2 Credits.
A two-semester course which concentrates on important song repertoire, including music by German, American, English, and French composers.

PY.450.814. Advanced Accompanying. 2 Credits.
A two-semester course which concentrates on important song repertoire, including music by German, American, English, and French composers.

PY.910.501. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.502. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.511. Peabody Hopkins Conservatory Choir. 2 Credits.
Comprised of graduate and undergraduate students, faculty, staff, and community members form across The Peabody Conservatory, Johns Hopkins University, and Greater Baltimore, the Peabody Hopkins Conservatory Choir explores and performs works from the past six centuries, with an emphasis on choral-orchestral repertoire in collaboration with the Peabody Orchestra and guest artists.Open to all current students, faculty, staff, and members of the Baltimore Community. Auditions are held at the start of each semester. please contact the Peabody Ensemble Office for more information.

PY.910.512. Peabody-Hopkins Symphonic Chorus. 2 Credits.
A large ensemble of mixed voices devoted to the study and performance of major choral works of the past seven centuries, sacred and secular, a cappella to symphonic. Open to undergraduate and graduate students, faculty and staff of Peabody and Johns Hopkins, and community members. Placement is by audition.

PY.910.513. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.Open to all current students, by audition. Please contact the Peabody Ensemble Office for more information.

PY.910.514. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.

PY.910.515. Peabody Camerata. 2 Credits.
Peabody's select soprano-alto vocal ensemble (16-32 voices), comprised of graduate and undergraduate musicians, and performing music for treble voices from the 12th century to present, with a focus on 21st-century repertoire. The Camerata shares a commitment to evolving and expanding the treble vocal aesthetic through the creation of new work, and the reimagining of existing repertoires.

PY.910.516. Peabody Camerata. 2 Credits.
Peabody's select soprano-alto vocal ensemble (16-32 voices), comprised of graduate and undergraduate musicians, and performing music for treble voices from the 12th century to present, with a focus on 21st-century repertoire. The Camerata shares a commitment to evolving and expanding the treble vocal aesthetic through the creation of new work, and the reimagining of existing repertoires.Students enrolled in this ensemble also participate in Peabody Chamber Choir-small ensemble twice weekly. Time: T, TH 1:30-3:30 pm

PY.910.527. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.528. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.529. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.530. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.537. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.538. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.547. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.548. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.551. Laptop Ensemble. 2 Credits.
This ensemble serves as a meeting point between acoustic and electronic instruments and various technological devices such as laptops, phones, and Arduinos; musicians from various backgrounds will have the opportunity to participate and collaborate together in music making that is unique to the 21st century.
Open to Composition, Computer Music, or Music for New Media majors only.

PY.910.552. Laptop Ensemble. 2 Credits.
This ensemble serves as a meeting point between acoustic and electronic instruments and various technological devices such as laptops, phones, and Arduinos; musicians from various backgrounds will have the opportunity to participate and collaborate together in music making that is unique to the 21st century.
Open to Composition, Computer Music, or Music for New Media majors only.

PY.910.553. Peabody Jazz Repertoire Ensemble. 2 Credits.
The PRJE performs standard big band repertoire from iconic bands such as the Count Basie and Duke Ellington orchestras. The ensemble will focus on jazz orchestra practices and will cover a wide range of material.

PY.910.554. Peabody Jazz Repertoire Ensemble. 2 Credits.
The PJRE performs standard big band repertoire from iconic bands such as the Count Basie and Duke Ellington orchestras. The ensemble will focus on jazz orchestra practices and will cover a wide range of material.

PY.910.801. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.802. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.811. Peabody Hopkins Conservatory Choir. 2 Credits.
Comprised of graduate and undergraduate students, faculty, staff, and community members form across The Peabody Conservatory, Johns Hopkins University, and Greater Baltimore, the Peabody Hopkins Conservatory Choir explores and performs works from the past six centuries, with an emphasis on choral-orchestral repertoire in collaboration with the Peabody Orchestra and guest artists.Open to all current students, faculty, staff, and members of the Baltimore Community. Auditions are held at the start of each semester. please contact the Peabody Ensemble Office for more information

PY.910.812. Peabody-Hopkins Symphonic Chorus. 2 Credits.
A large ensemble of mixed voices devoted to the study and performance of major choral works of the past seven centuries, sacred and secular, a cappella to symphonic. Open to undergraduate and graduate students, faculty and staff of Peabody and Johns Hopkins, and community members. Placement is by audition.

PY.910.813. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.Open to all current students, by audition. Please contact the Peabody Ensemble Office for more information.

PY.910.814. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.

PY.910.815. Peabody Camerata. 2 Credits.

PY.910.816. Peabody Chamber Choir. 2 Credits.
A select ensemble of mixed voices (16-24vv) committed to the performance of repertoire for chamber choir, and small chamber ensembles, of the past seven centuries, and specializing in early and modern music. The full ensemble rehearses twice weekly, and additionally breaks into one-on-a-part chamber ensembles. Open to undergraduate and graduate students of Peabody and Johns Hopkins. Placement is by audition. Time: M, W 3:30-5:30 pm. Students enrolled in this ensemble also participate in Peabody Chamber Choir-small ensemble twice weekly. Time: T, TH 1:30-3:30 pm

PY.910.827. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.828. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.829. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.830. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.837. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.838. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.847. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.848. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.950.510. West African Drumming. 1 Credit.
PY.950.510/950.810 consists of weekly 2 hour-long lessons covering Djembe Technique, Endurance and Orchestral Drumming.

PY.950.512. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.513. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.523. New Orleans Brass Band. 1 Credit.
The Brass ensemble legacy in New Orleans is the foundation for much of what jazz music and other styles of American music would become in the U.S. The Peabody New Orleans Brass Band will explore the origins and history of the New Orleans Brass tradition while performing music that is both standard current repertoire in the genre.

PY.950.525. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.526. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.527. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.528. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.531. Chamber Ensemble. 1 Credit.
The study and performance of the chamber music literature from all periods of music history and including instrumental groups and combinations of orchestral instruments, keyboard instruments, guitar, early music instruments, and voice, where appropriate. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.532. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.539. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.540. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.541. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.542. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.543. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.544. Harp Ensemble. 1 - 2 Credits.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.549. Pan-American Jazz Ensemble. 1 Credit.
The first semester of this ensemble studies standard pieces by the pioneers of blending Afrodiasporic music from the Americas with jazz since 1930. It also introduces to the fundaments of the Latin-American music language and performs compositions by some of today's most vanguardist jazz artists from this region.

PY.950.550. Latin Jazz Ensemble. 1 Credit.
The second part of this ensemble continues the study and analysis of standard repertoire by the pioneers of Afro-Diasporic jazz since 1930s. It also workshops the traditional rhythmic concepts of these musics and focuses on performing compositions by some of today's most vanguardist jazz artists from the Americas.

PY.950.553. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lutesongs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.554. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lute songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.556. Gospel Choir. 1 Credit.

PY.950.602. Composition/Premier Lab: Guitar. 2 Credits.
A cohort of performers and composers tasked with creating and premiering a new composition.

PY.950.810. West African Drumming. 1 Credit.
PY.950.510/950.810 consists of weekly 2 hour-long lessons covering Djembe Technique, Endurance and Orchestral Drumming.

PY.950.812. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.813. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.823. New Orleans Brass Band. 1 Credit.
The Brass ensemble legacy in New Orleans is the foundation for much of what jazz music and other styles of American music would become in the U.S. The Peabody New Orleans Brass Band will explore the origins and history of the New Orleans Brass tradition while performing music that is both standard current repertoire in the genre.

PY.950.825. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.826. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.827. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.828. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.831. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.832. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.839. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.840. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.841. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.842. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.843. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.844. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.849. Pan-American Jazz Ensemble. 1 Credit.
The first semester of this ensemble studies standard pieces by the pioneers of blending Afrodiasporic music from the Americas with jazz since 1930. It also introduces to the fundaments of the Latin-American music language and performs compositions by some of today's most vanguardist jazz artists from this region.

PY.950.850. Latin Jazz Ensemble. 1 Credit.
The second part of this ensemble continues the study and analysis of standard repertoire by the pioneers of Afro-Diasporic jazz since 1930s. It also workshops the traditional rhythmic concepts of these musics and focuses on performing compositions by some of today's most vanguardist jazz artists from the Americas.

PY.950.853. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lute songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.854. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lutes songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.360.501. Friday Noon:30 Recital Series. 0.5 Credits.
Student performances covering all historical periods and a variety of genre. Attendance required in the first two semesters of undergraduate enrollment.

PY.360.503. Friday Noon:30 (Alt Project). 0.5 Credits.
A concert attendance project required in the third and fourth semesters of undergraduate enrollment.

PY.360.505. Music Speaks. 2 Credits.
Exploration of repertoire to explore the process behind their imagining and creation in an effort to move an audience to a deeper understanding.

PY.470.431. Guitar Literature 1 (UG). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.

PY.470.432. Guitar Literature 2 (UG). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present.
Open to Guitar majors only.;Completion of Guitar Literature 1 (UG) required, PY.470.431[C].

PY.470.545. Guitar Seminar (UG). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required of all guitar majors in all semesters of enrollment.
Open to Guitar majors only.

PY.470.546. Guitar Seminar (UG). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required for guitar majors.
Open to Guitar majors only.

PY.470.585. Guitar Music Skills 1. 1 Credit.
The application of theoretical skills to the guitar, including harmony, rhythm, transposition, and analysis.
Open to Guitar majors only.

PY.470.586. Guitar Music Skills 2. 1 Credit.
The application of theoretical skills to the guitar, including harmony, rhythm, transposition, and analysis.
Open to Guitar majors only.;Completion of Guitar Skills 1 required, PY.470.585[C]

PY.470.587. Guitar Music Skills 3. 1 Credit.
A continuation of 470.585-586 for guitar majors; emphasis on form, analysis, transposition, and sight-reading.
Open to Guitar majors only.;Completion of Guitar Skills 2 required, PY.470.586[C]

PY.470.588. Guitar Music Skills 4. 1 Credit.
A continuation of Guitar Music Skills 3; emphasis on form, analysis, transposition, and sight-reading.
Completion of Guitar Skills 3 required, PY.470.587[C];Open to Guitar majors only.

PY.470.631. Guitar Literature 1 (GR). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.

PY.470.632. Guitar Literature 2 (GR). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.;Completion of Guitar Literature 1 (GR) required, PY.470.631[C].

PY.470.637. Guitar Pedagogy 1. 2 Credits.
A study of guitar instructional principles and procedures for their application. Graduate students enrolled in this course will be required to do more advanced and specialized research and documentation.
Open to Guitar majors only.

PY.470.638. Guitar Pedagogy 2. 2 Credits.
A study of guitar instructional principles and procedures for their application.
Open to Guitar majors only.;Completion of Guitar Pedagogy 1 required, PY.470.637[C].

PY.470.845. Guitar Seminar (GR). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required of all guitar majors in all semesters of enrollment.
Open to Guitar majors only.

PY.470.846. Guitar Seminar (GR). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required for guitar majors.
Open to Guitar majors only.

PY.420.495. Harp Repertoire. 2 Credits.
Individual performances of standard and contemporary repertoire with discussion of both musical and practical aspects of performance.
May include chamber performances. Required for harp majors in each semester.
Harp majors only.

PY.420.496. Harp Repertoire. 2 Credits.
Individual performances of standard and contemporary repertoire with discussion of both musical and practical aspects of performance.
May include chamber performances. Required for harp majors in each semester.
Harp majors only.

PY.420.545. Harp Seminar (UG). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, resume writing. For all majors from sophomore year. Expectations vary with topic, but normally involve preparation as well as participation.
Harp majors only.

PY.420.546. Harp Seminar (UG). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, and résumé writing. Available to all harp majors; minimum of four semesters suggested.
Harp majors only.

PY.420.629. Harp Pedagogy 1. 2 Credits.
Materials covered in the first semester include principles of hand position, fingering, placing, sequencing of materials, and choice of music, as these apply to beginning students at every age level. The second semester consists of continued discussion as above, plus a practicum level in which each member of the class must teach one student for 12 weeks, after which a mini-recital will provide the basis for group evaluation and final discussion. Graduate students are further expected to prepare specialized teaching materials for beginners. May be taken by all majors beginning sophomore year and may be repeated (at least one year is required).
Harp majors only.

PY.420.630. Harp Pedagogy 2. 2 Credits.
Instructional principles and procedures for their application, with an initial focus on young beginners; successive semesters expand to intermediate level. Two semesters of Pedagogy I prerequisite for participation in the Pedagogy II HarpAdventures/Practicum/Outreach program. Required for harp majors starting in the sophomore year, may be taken earlier by permission.
Harp majors only.

PY.420.647. Harp Pedagogy 3. 2 Credits.
Normally added after the second semester of Pedagogy I. Pedagogy II/HarpAdventures is a practicum that provides instructional and administrative experience for Harp Pedagogy students. This course also functions as an ongoing community engagement project and is repeated every semester.
Harp majors only.

PY.420.648. Harp Pedagogy 4. 2 Credits.
Normally added after the second semester of Pedagogy I. Pedagogy II/HarpAdventures is a practicum that provides instructional and administrative experience for Harp Pedagogy students. This course also functions as an ongoing community engagement project and is repeated every semester.
Harp majors only.

PY.420.845. Harp Seminar (GR). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, resume writing. For all majors from sophomore year. Expectations vary with topic, but normally involve preparation as well as participation.
Harp majors only.

PY.420.846. Harp Seminar (GR). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, and résumé writing. Available to all harp majors; minimum of four semesters suggested.
Harp majors only.

PY.380.315. Continuo 1: Figured Bass. 2 Credits.
Designed to develop the skill of continuo playing, fluent reading and improvising from a figured bass, this course uses exercises and repertoire in a cumulative approach. Open to all qualified keyboard students as well as non-keyboard students with proficient keyboard skills and permission of the instructor.

PY.380.337. Baroque Violin/Viola Class. 1 Credit.
An introduction to the playing of early repertoire on period violin or viola and bow. The student will learn the basics of baroque technique and will be introduced to a range of music, from early Baroque to early Classical, and its interpretation from a historical perspective.

PY.380.338. Baroque Violin/Viola Class. 1 Credit.
An introduction to the playing of early repertoire on period violin or viola and bow. The student will learn the basics of baroque technique and will be introduced to a range of music, from early Baroque to early Classical, and its interpretation from a historical perspective.

PY.380.351. Viola Da Gamba Class. 1 Credit.
An introduction to the playing technique of the viola da gamba through easy to intermediate-level ensemble literature. A preparatory step to consort playing and the viol solo literature. Prior string experience is not necessary.

PY.380.352. Viola Da Gamba Class. 1 Credit.
An introduction to the playing technique of the viola da gamba through easy to intermediate-level ensemble literature. A preparatory step to consort playing and the viol solo literature. Prior string experience is not necessary.

PY.380.431. Baroque Oboe Class. 1 Credit.
Students will learn important tenets of 18th century performance practice by looking at major repertoire such as Bach cantatas and Passions, and sonatas and concertos by Handel and Telemann. Focus will be given to relevant examples from J.J. Quantz's 1752 treatise on performance practice. Study may be done entirely on baroque oboe, or a combination of modern oboe with some experimentation on baroque oboe.

PY.380.433. Lute Literature & Notation 1. 2 Credits.
This class will focus on the primary compositional trends and corresponding performance practices of early, middle, high and late baroque music for lute, archlute and theorbo. Each two-hour meeting will be divided into 2 parts: sharing of information from light research assignments and in-class performances of repertoire that demonstrate relevant compositional styles and performance practices, as well as points for consideration when transcribing for classical guitar. Research and performance assignments will be shared among students from week to week. Required for MM guitar majors.

PY.380.434. Lute Literature & Notation 2. 2 Credits.
Intensive study of repertoire and genres for Renaissance lute and vihuela through listening, transcribing, and performance of selected works from French, Italian, and German tablatures. Works of Francesco da Milano and John Dowland will be a main focus. Required for MM guitar majors.

PY.380.435. Viola da Gamba Literature. 1 Credit.
A chronological survey of the viola da gamba and its literature from the 16th to 18th centuries. The class will be an opportunity to become familiar with a rich repertoire little known to non- specialists, and to learn about how the world of the baroque era relates to our own. No prior experience in historical performance is required. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.436. Early Cello Literature. 1 Credit.
A chronological survey of violoncello literature, pedagogical as well as musical, with an emphasis on historical techniques and performance practices of the 17th, 18th, and 19th centuries. No prior experience in historical performance is required, but some familiarity with cello repertoire is expected. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.437. Baroque Violin Literature. 1 Credit.
A chronological survey of the violin and viola literature, pedagogical and musical, from its origins in the 16th century to the high baroque of the 18th century. No prior experience in historical performance is required, but some familiarity with violin repertoire is expected. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.438. Classical Strings Literature. 1 Credit.
A chronological survey of the solo and, especially, chamber music for strings from the time of Leopold Mozart through Beethoven's life and beyond, with consideration of the music's social contexts and performance practices. Included will be an overview of the pedagogical material. No prior experience in historical performance is required. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.439. Baroque Cello Class. 1 Credit.
This course combines the history of the violoncello with hands-on experience. Students have use of Peabody's recently "baroqued" instruments and work with primary source tutorials as an introduction to performance practice. Solo and ensemble playing are integral to the course. The art of bowed continuo playing is stressed and practiced in ensembles with other "original" instruments.

PY.380.440. Baroque Cello Class. 1 Credit.
This course combines the history of the violoncello with hands-on experience. Students have use of Peabody's recently "baroqued" instruments and work with primary source tutorials as an introduction to performance practice. Solo and ensemble playing are integral to the course. The art of bowed continuo playing is stressed and practiced in ensembles with other "original" instruments.

PY.380.441. Baroque Ornamentation 1. 2 Credits.
A detailed two-semester course exploring the varied ornamentation practices of Baroque music from around 1600-1765. Emphasizing original sources, improvisation, and performance practice, students learn to execute, add and improvise ornamentation in styles appropriate to the time and national style. The fall semester focuses on ornamentation in the 17th century in Italy, France, Germany and England. The spring semester can only be taken after completion of the fall semester, and focuses on ornamentation in the 18th century.

PY.380.442. Baroque Ornamentation 2. 2 Credits.
A detailed two-semester course exploring the varied ornamentation practices of Baroque music from around 1600-1765. Emphasizing original sources, improvisation, and performance practice, students learn to execute, add and improvise ornamentation in styles appropriate to the time and national style. The fall semester focuses on ornamentation in the 17th century in Italy, France, Germany and England. The spring semester can only be taken after completion of the fall semester, and focuses on ornamentation in the 18th century.
Completion of Baroque Ornamentation 1 required, PY.380.441[C]

PY.380.443. Baroque Flute Class. 1 Credit.
An introduction to the baroque flute (transverse and common) and to its literature from the 18th century, with attention to questions of style, articulation and ornamentation. This class operates on three tracks: beginning group instruction on baroque flute; private or semi-private lessons for advancing baroque flute players; and performance practice-based coaching of baroque repertoire performed on modern flutes. This class interacts with the annual Bach Marathon. No prior historical performance training is required, but students who are not proficient on modern flute should seek permission from the instructor.

PY.380.444. Baroque Flute Class. 1 Credit.
An introduction to the baroque flute (transverse and common) and to its literature from the 18th century, with attention to questions of style, articulation and ornamentation. This class operates on three tracks: beginning group instruction on baroque flute; private or semi-private lessons for advancing baroque flute players; and performance practice-based coaching of baroque repertoire performed on modern flutes. This class interacts with the annual Bach Marathon. No prior historical performance training is required, but students who are not proficient on modern flute should seek permission from the instructor.

PY.380.445. Continuo 2: Advanced Continuo. 2 Credits.
A continuation of Continuo 1: Figured Bass (380.315). Students build upon the basic skills of reading figured bass by playing a wide range of repertoire with other instrumentalists and singers. Students learn to shape the bass line, develop ensemble skills and improvise creative realizations. Repertoire includes 17th and 18th c. works from Italy, France, Germany and England for instruments or voice, including a focus on recitative.
Completion of Continuo 1 required, PY.380.315[C].

PY.380.447. Early Wind Literature 1. 1 Credit.
A chronological survey of the literature for recorder, flute, and oboe from the beginnings of soloistic composition in the late 16th century through the end of the 18th century, with attention to historical context and performance practice. Includes history and development of the instruments themselves and consideration of how the recorder, flute, and oboe repertoires over-lap, differ, and developed over time. No prior early music experience is necessary.

PY.380.448. Early Wind Literature 2. 1 Credit.
A chronological survey of the literature for recorder, flute, and oboe from the beginnings of soloistic composition in the late 16th century through the end of the 18th century, with attention to historical context and performance practice. Includes history and development of the instruments themselves and consideration of how the recorder, flute, and oboe repertoires over-lap, differ, and developed over time. No prior early music experience is necessary.
Completion of Early Wind Literature 1 required, PY.380.447[C].

PY.380.457. Bach/Weiss/Ornamenting Lute & Guitar. 2 Credits.
A practical course, with the goal of achieving sophisticated, idiomatic ornamentations of high baroque German lute music and their arrangements for classical guitar. Students will apply everything studied directly to their instruments and perform their homework in class. Offered on an as-needed basis.

PY.380.491. Harpsichord Tuning and Maintenance. 1 Credit.
A course in tuning and basic maintenance, with special emphasis on historical temperaments and tuning by ear. Includes some study of the various national styles of construction and development of harpsichords. Majors must pass this course with a grade of B or higher. Offered on an as-needed basis.

PY.380.543. Early Vocal Literature: Baroque. 2 Credits.
Transition from Renaissance to Baroque – monody, opera and oratorio, aria, and recitative. There will be an emphasis on coached, in-class performances.

PY.380.544. Early Vocal Literature: Medieval/Renaissance. 2 Credits.
A study of vocal works and styles from the Middle Ages to the Renaissance, from chant and early polyphony to mass, motet, madrigal, and lute song. There will be an emphasis on coached, in-class performances of chants of Hildegard, medieval motets, English lute songs, and English ballads.

PY.250.001. English Level 1a.
This intensive integrated one-year course for Academic Purposes aims to develop the English language skills of listening, speaking, reading, and writing necessary for success in Peabody classes. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of S in order to proceed with their degree requirements. Attendance is mandatory.

PY.250.002. English Level 1b.
This intensive one-year course develops the English skills of listening, speaking, reading, and writing necessary for success in Peabody classes. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.
PY.250.001[C]

PY.250.007. English Level 2a - Grad Studies.
This intensive course for international graduate students develops English skills for academic success. The first semester emphasizes oral communication, including listening and note taking, class discussion, and conversation; academic vocabulary, reading and writing; and cultural differences in and out of the classroom. The second semester concentrates on expository writing, especially resource-based writing, self-evaluation, and editing; critical reading; and informal and formal presentations. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.

PY.250.008. English Level 2b - Grad Studies.
This intensive course for international graduate students develops English skills for academic success. The first semester emphasizes oral communication, including listening, note taking, class discussion, presentations, academic vocabulary, and cultural differences in and out of the classroom. The second semester concentrates on expository writing, editing, and critical reading. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.
PY.250.007[C]

PY.250.111. Italian 1a. 4 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of Italian. Open to undergraduates only.

PY.250.112. Italian 1b. 4 Credits.
A thorough study of the fundamentals of comprehension, speaking, reading, and writing, this course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of Italian. Portions of the course are conducted online. Open to undergraduates only. Non-voice majors may take this course for elective credit after completing the full Humanities Core Curriculum.
PY.250.111[C]

PY.250.121. German 1a. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of German. Open to undergraduates only.

PY.250.122. German 1b. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of German. Open to undergraduates only.
PY.250.121[C]

PY.250.131. French 1a. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of French. Open to undergraduates only.

PY.250.132. French 1b. 3 Credits.
A thorough study of the fundamentals of comprehension, speaking, reading, and writing, this course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of French. Open to undergraduates only. Non-voice majors may take this course for elective credit after completing the full Humanities Core Curriculum.
PY.250.131[C]

PY.260.021. ESL Writing Intensive 1. 3 Credits.
A year-long course designed for international students who are new to writing in English. Course objectives: teaching students the elements of formal writing, including spelling, grammar, vocabulary, sentence structure, paragraph structure, and the elements of thesis, evidence, and conclusion.

PY.260.022. ESL Writing Intensive 2. 3 Credits.
A year-long course designed for international students new to writing in English. The course introduces foundational writing practices and teaches formal writing skills. Course objectives: teaching students the elements of formal writing, including spelling, grammar, vocabulary, sentence structure, paragraph structure, and the elements of thesis, evidence, and conclusion.
PY.260.021[C]

PY.260.023. Critical Writing Intensive 1. 3 Credits.
A year-long course to prepare students for college-level writing. This course introduces students to foundational academic writing skills in summary, citation, use of evidence, analysis, and argument. Assignments focus on sentence- and paragraph-level coherence, while reinforcing the conventions of standard American English in academic settings.

PY.260.024. Critical Writing Intensive 2. 3 Credits.
A year-long course to prepare students for college-level writing. This course introduces stu-dents to foundational academic writing skills in summary, citation, use of evidence, anal-ysis, and argument. Assignments focus on sentence- and paragraph-level coherence, while reinforcing the conventions of standard American English in academic settings.
PY.260.023[C]

PY.260.115. Core 1. 3 Credits.
Introduction to the practice of analytical thinking and writing in the context of reading foundational historical, philosophical, and/or literary texts. Course objectives: ensuring competence in writing and critical analysis. Students will write four analytical papers (3-4 pages each).

PY.260.216. Core 2. 3 Credits.
Introduction to the basics of writing a research paper. Course objectives: ensuring competence in academic research and writing. Students will select a research topic, find source materials, and complete a formal academic research paper (10-15 pages), with appropriate references properly documented. Prerequisite: Core 1 or approved placement.
PY.260.115[C]

PY.260.241. Art History: European Art Survey, Renaissance - 1855. 3 Credits.
An introduction to the history of art. Open to undergraduates only. Art History 1 surveys European art from the 14th through the mid-19th centuries. It surveys Renaissance painting, sculpture, and architecture in Italy and Northern Europe, its origins in Medieval art, and examines shifts in artistic concepts and forms from the 16th through the mid-18th centuries that led to the emergence of Mannerist, Baroque, and Rococo art. The course concludes with an examination of Neoclassicism, Romanticism, and Realism up through the mid-19th century. Artistic movements, styles and influences relevant to the development of western art will be covered, with the inclusion of some American art traditions as time permits. Additional commentary as it relates to music history will be interwoven.

PY.260.252. Art History: Modernism. 3 Credits.
An introduction to the history of art. Open to undergraduates only. This course offers a survey of avant-garde European and American art from the mid-19th century to the present. Some of the many artistic movements covered include Realism, Impressionism, Post-Impressionism, German Expressionism, Cubism, Dada, Surrealism, De Stijl, early American Modernism, Abstract Expressionism, Pop Art, Minimalism, Conceptual Art, and Postmodernism. Additional commentary as it relates to music history will be interwoven.

PY.260.261. Introduction to Psychology. 3 Credits.
An introduction to the fields and research methods of contemporary psychology, including such topics as biological and social bases of behavior, human development, perception, memory, learning theory, intelligence, and abnormal behavior. Special emphasis will be placed on subjects of importance to music education. Open to undergraduates only.

PY.260.313. Katharine the Great: An Everlasting Film Star. 3 Credits.
How does an artist endure? What makes one star last while another fizzles? Katharine Hepburn, 1907-2003, is ranked by the American Film Institute (AFI) as the "greatest female star in the history of American cinema." She lived as originally as so many of the film heroines she portrayed. This humanities seminar examines the roles and movies that defined the pioneering Hepburn as an actress, a businesswoman, and progressive thinker in American history. Along the way, we will trace pivotal events and cinematic trends in the 20th century contributing to Hepburn's legacy.

PY.260.315. Evil in Philosophy, Film, & Literature. 3 Credits.
What is “evil”? How is it depicted in the arts? –In order to address these questions, our two main readings this semester will be Goethe’s drama Faust and Bulgakov’s novel The Master and Margarita. While Goethe’s work is a tragedy, Bulgakov’s novel is a satirical dark comedy. We will pair these readings with selected philosophical essays depicting, for example, Kant’s theory of “radical evil”, and movies, such as “Hannah Arendt”. The discussion topics in this class will be challenging for their intellectual depth, but at the same time incredible fun and entertaining.

PY.260.330. Asian Representation in Film and TV. 3 Credits.
Depictions of East Asian and Asian-American characters in film and television have evolved since the earliest days of Hollywood. Alongside world events and US immigration patterns, representation shifted and a host of stereotypes emerged. Consider the wise guru, the exotic girlfriend, and the martial arts sidekick among many portrayals. This liberal arts seminar offers historical context and critical tools for analyzing and discussing these representations while gaining acquaintance with a range of films and television series.

PY.260.344. Opera: Research as Rehearsal. 3 Credits.
Interesting opera is created not just by memorizing a score and mindlessly practicing and repeating it. Thoughtful research is also a form of rehearsal. Performance can be enhanced and understanding deepened by studying an opera’s literary sources, mining its historical context, viewing related artworks, and studying its production history. In other words, doing the work of a dramaturge. Every semester in which it is offered, “Research as Rehearsal” will take as its subject an opera currently being rehearsed by the Peabody Opera Theatre Program. This year we will focus on Handel’s Semele, scheduled for performance in March. We will read such texts as Ovid’s Metamorphoses (a literary source for the opera) and excerpts from Euripides’ Bacchae (since Semele is the mother of Dionysus). We will study paintings like Gustav Moreau’s Jupiter et Sémélé and Peter Paul Rubens’ Death of Semele. Since the performance will be staged in a 1920s style, we will read F. Scott Fitzgerald’s Great Gatsby and watch film versions of the novel. We will also investigate the ways in which this opera’s origins in a pagan Greek myth affected its first London reception during the period of Lent and how that in turn affected future rewrites of the opera. Open to Graduates and Undergraduates.

PY.260.359. Core 3. 3 Credits.
Introduction to methods and practices in the humanities, social sciences, or natural sciences. Course objectives: ensuring competence in understanding critical methodol-ogies and academic debate. Students will write two critical assessments involving evidence, evaluation, synthesis, and conclusion (4-6 pages each) and pass a final exam or final project. Students must earn a C+ or better to pass the course. Prerequisite: Core 2 or approved placement.
PY.260.216[C]

PY.260.360. Core 4. 3 Credits.
Sustained consideration of the role of art (music, literature, fine arts, film) in all aspects of society, focusing on particular periods in history or under particular regimes and political structures. Course objectives: ensuring that students have the opportunity to think historically about the role of art and culture in political society and about the economic and cultural systems supporting the creation of art (e.g. patronage, guilds). Students will be required to write one historical “review” of a work of art in historical context (2-3 pages) and one historical research paper (6-8 pages minimum). Students must earn a C+ or better to pass the course. Prerequisite: Core III or approved placement.
Completion of Core 2 required, PY.260.216[C]

PY.570.101. Jazz Seminar. 1 Credit.
Jazz Seminar is a course designed to cover general performance practices, topics, repertoire and varying styles within the genre.
Open to Jazz majors only.

PY.570.102. Jazz Seminar. 1 Credit.
Jazz Seminar is a course designed to cover general performance practices, topics, repertoire and varying styles within the genre.
Open to Jazz majors only.

PY.570.127. Jazz Theory Fundamentals 1. 2 Credits.
Designed to establish and reinforce the fundaments of chord scales, harmonic and melodic functions, ear-training, and writing standard forms in jazz. The course also explores basic jazz theory lingo, terms, and nomenclature, as well as transcription, basic reharmonization techniques, and a brief introduction to composition devices of the 20th century. Prepares students for Jazz Improvisation 1 (570.561) and Jazz Keyboard Studies (570.259-260).
Open to Jazz majors only.

PY.570.128. Jazz Theory Fundamentals 2. 2 Credits.
The second part of Jazz Th. Fund. focuses extensively on analysis and composition of standard and through-composed forms using concepts studied in the 1stpart of the course. It also studies the application of 20th century composition devises, as well as basic re-harmonization techniques, modal writing, and an introduction to standard voicings. Prepares students for Jazz Improvisation, Jazz Theory/Keyboard Lab, Arranging.
Open to Jazz majors only.;Completion of Jazz Theory Fundamentals 1 required, PY.570.127[C].

PY.570.259. Jazz Keyboard Studies 1. 2 Credits.
The introduction of the fundamental grammar, vocabulary, and structure of the jazz idiom through the study of its notational conventions, melodic and harmonic functions, and their application on the piano. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.

PY.570.260. Jazz Keyboard Studies 2. 2 Credits.
The introduction of the fundamental grammar, vocabulary, and structure of the jazz idiomthrough the study of its notational conventions, melodic and harmonic functions, and theirapplication on the piano. Prerequisites: Jazz Fundamentals (570.127–128) or placement byinstructor
Open to Jazz majors only.;Completion of Jazz Keyboard Studies 1 required, PY.570.259[C].

PY.570.359. Advanced Jazz Harmony 1. 2 Credits.
A continuation of the techniques and harmonic concepts studied in Jazz Keyboard Studies 1-2. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor
Open to Jazz majors only.

PY.570.360. Advanced Jazz Harmony 2. 2 Credits.
A continuation of the techniques and harmonic concepts studied in Jazz Keyboard Studies 1-2. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.;Completion of Advanced Jazz Harmony 1 required, PY.570.359[C].

PY.570.361. Jazz Arranging 1. 2 Credits.
A beginning study of the language, techniques, and disciplines employed in arranging music for various jazz ensembles, including orchestration, notation, rhythmic embellishment, melodic ornamentation, chord substitution, and harmonization techniques. . Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.

PY.570.362. Jazz Arranging 2. 2 Credits.
A beginning study of the language, techniques, and disciplines employed in arrangingmusic for various jazz ensembles, including orchestration, notation, rhythmic embellishment,melodic ornamentation, chord substitution, and harmonization techniques. . Prerequisites:Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Arranging 1 required, PY.570.361[C].

PY.570.363. Sight Reading. 1 Credit.
"Sight Reading" is a jazz course that is aimed to help the student better their sight reading, starting at the beginner level and working up to advanced material. Students will read jazz transcriptions from, along with the actual recording to play towards, jazz legends such as Miles Davis, Charlie Parker, Cannonball Adderly, Sonny Rollins and John Coltrane. Upon completion of this course, students will have a better grasp on sight reading material at a much rapid pace."

PY.570.431. Global Improvisation. 2 Credits.
A performance/workshop class designed to encourage musical creativity and provide studentswith techniques and strategies for musical improvisation within a collaborative,supportive, and structured environment. The class will include instruction in many aspectsof improvisation and regular audio and video examples of improvisational music will beused to expose students to the variety of ways in which creative musicians are using improvisation in our rapidly changing musical landscape. The majority of student's time willbe spent playing for each other to build confidence and gain knowledge through personalexperience.

PY.570.459. Jazz Composition 1. 2 Credits.
Practical approaches to composition for jazz forces in the jazz idiom, with an emphasis on analysis of standards and projects for small forces. Open to Jazz majors only.

PY.570.495. Afro-Diasporic Percussion. 1 Credit.
This is a hands-on course open to all majors. Studies part of the extensive repertoire and vocabulary performed by drumming ensembles of Peru, Colombia, Venezuela, Puerto Rico, and Cuba, among others. It also introduces participants to hand-drumming techniques, as well as historical contexts of Afro-Diasporic music in the continent and the application of these languages in contemporary music.

PY.570.561. Jazz Improvisation 1. 2 Credits.
A performance/theory course designed to help students acquire and develop basic language for improvisation through the practical application of information learned in 720 • 127-128 Jazz Fundamentals: chords, scales/modes, melody, rhythm, patterns, harmonic progression, and song forms. Incorporates the performance and examination of several vehicle types, including songs drawn from standard jazz repertoire. Special emphasis will be devoted to the performance and analysis of various improvised solos by master musicians. In addition, development of technical facility, listening/hearing skills, sound, and musical awareness will be addressed. Prerequisites: 570.127-128 Jazz Fundamentals and 570.570 Jazz History or placement by the instructor. Open to Jazz majors only.

PY.570.562. Jazz Improvisation 2. 2 Credits.
A performance/theory course designed to help students acquire and develop basic languagefor improvisation through the practical application of information learned in Jazz Fundamentals(720.127–128). Incorporates the performance and examination of several vehicletypes, including songs drawn from standard jazz repertoire. Special emphasis is devoted tothe performance and analysis of various improvised solos by master musicians. In addition,development of technical facility, listening/hearing skills, sound, and musical awarenesswill be addressed. Open to majors only. Prerequisites: Jazz Fundamentals (570.127–128)and Jazz History (570.570) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 1 required, PY.570.561[C].

PY.570.563. Jazz Improvisation 3. 2 Credits.
The continued development of knowledge and skills acquired in Jazz Improvisation I with emphasis on increased fluency and mastery. Prerequisite: Jazz Improvisation 2 or placement by the instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 2 required, PY.570.562[C].

PY.570.564. Jazz Improvisation 4. 2 Credits.
The continued development of knowledge and skills acquired in Jazz Improvisation I withemphasis on increased fluency and mastery. Open to majors only. Prerequisite: Jazz Improvisation 1-2 (530.561–562) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 3 required, PY.570.563[C]

PY.570.569. Jazz Analysis/History 1. 2 Credits.
This course covers two main areas of focus: people and methods. It surveys the chronological origins and proliferation of jazz through various styles and artists. The development of jazz as an art form will be traced from the acculturation of Africans in America to the present day by learning about its major instrumentalists, ensembles, composers, arrangers, innovators, revivalists, and revisionists. It also explores the techniques and processes that have been employed by jazz musicians to help make it into the highly structured and evolved art form that it is today. Students will read a wide array of primary and secondary sources and listen to a range of recordings — all with the goal of discovering the various processes, meanings, functions, and experiences of jazz. This class places a strong emphasis on developing listening skills.

PY.570.570. Jazz Analysis/History 2. 2 Credits.
This course has two main areas of focus: 1) The People—a survey of the chronological history of jazz through the use of texts, recordings, videos, and guest lecturers. The development of jazz as an art form will be traced from the acculturation of Africans in America to the present day by learning about its major instrumentalists, ensembles, composers, arrangers, innovators, revivalists, and revisionists. 2) The Methods—a survey of the techniques and processes that have been employed by jazz musicians to help make it into the highly structured and evolved art form that it is today. Students will have experience with first-hand performance, arranging, and composing, along with lectures, demonstrations, and extensive discussion.
Completion of Jazz Analysis/History 1 required, PY.570.569[C].

PY.510.112. Introduction to Music Education. 1 Credit.
An overview of music teaching as a profession, including an examination of contemporaryphilosophical and pedagogical trends in music education as well as roles and attitudes ofthe elementary and secondary school music teacher.
Open to Music Education majors only.

PY.510.211. Brass Class. 2 Credits.
Study of the trumpet, trombone, horn, and tuba with an emphasis on methods and materialsfor the instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.212. Woodwinds Class. 3 Credits.
Study of the clarinet, flute, oboe, bassoon, and saxophone with emphasis on methods and materials for instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.213. Basic Instrumental Pedagogy. 1 Credit.
Study of the trumpet, clarinet, and violin to familiarize guitarists, vocalists, and pianists with fundamental concepts of brass, woodwind, and stringed instrument playing. Also includes elementary pedagogy related to those instruments.
Open to Music Education majors only.

PY.510.223. Percussion Class. 1 Credit.
Study of the percussion instruments. Emphasis is on playing techniques, percussion notation,and diagnosis of student problems. Also included are basic maintenance and repairprocedures.
Open to Music Education majors only.

PY.510.237. Secondary Choral Ensemble 1. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondary school choir. Also includes methods of teaching singing in the large ensemble setting.
Open to Music Education majors only.

PY.510.238. Conducting the Secondary Instrumental Ensemble 1. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondaryschool band/orchestra. Also includes methods of teaching wind, string, and percussionplaying in the large ensemble setting. Open to majors only.
Open to Music Education majors only.

PY.510.311. Techniques for Teaching Elementary General Music. 3 Credits.
An eclectic approach to teaching vocal and general music in elementary and middle school. Includes organization of instruction, selection of appropriate materials, theories of learning, childhood development, and basic guitar instruction. Observation and guided teaching in local schools are required. Open to majors only.
Open to Music Education majors only.

PY.510.312. Progressive Methods: Instrumental Music. 3 Credits.
Progressive Methods: Instrumental Music is designed to provide students with opportunities to develop and refine instrumental music teaching skills, strategies, and progressive techniques through teaching experiences in remote and/or in-person classroom and rehearsal settings in the public schools. Educational Psychology Content is now covered in Literacy in the Content Areas I and II. Along with best practices in pedagogy for specific instruments and voice, the weekly practicum experiences will include knowledge and practical application of learning theories, classroom management strategies and development of lesson plans with integrated literacy in the content area knowledge. The Guitar Skills component emphasizes strategies for group class instruction at the secondary level while continuing to develop guitar skills for effective modeling.
Open to Music Education majors only.

PY.510.313. Techniques for Teaching Secondary Instrumental Music. 3 Credits.
Principles of secondary education and activities of Conducting the Secondary InstrumentalEnsemble (510.338), plus independent projects and workshops related to marching bandand jazz ensembles. Open to certification candidates only
Open to Music Education majors only.

PY.510.314. Progressive Methods: Secondary General/Vocal Music. 3 Credits.
A performance-based approach to teaching vocal and general music in secondary schoolsand continued study of an eclectic approach to teaching general music. Includes principlesof secondary education, organization of instruction, selection of appropriate materials, theoriesof learning, and adolescent development. Observation and guided teaching in localschools included. Open to majors only.
Open to Music Education majors only.

PY.510.324. Strings Class. 3 Credits.
Study of the violin, viola, cello, and double bass with emphasis on methods and materials for instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.337. Secondary Choral Ensemble 2. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondary school choir. Also includes methods of teaching singing in the large ensemble setting.
Open to Music Education majors only.

PY.510.338. Conducting the Secondary Instrumental Ensemble 2. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondaryschool band/orchestra. Also includes methods of teaching wind, string, and percussionplaying in the large ensemble setting. Open to majors only.
Open to Music Education majors only.;Completion of previous course required, PY.510.238[C].

PY.510.411. Intern Teaching. 6 - 12 Credits.
Supervised student teaching in public schools daily for one semester (8 weeks in elementary, 7 weeks in secondary).
Open to Music Education majors only.

PY.510.414. Music & the Neurodiverse Learner. 3 Credits.
An overview of inclusive teaching strategies for music educators centered on universal design, accessibility, and intersectionality, framed through a disability justice lens.
Open to Music Education majors only.

PY.510.441. Intern Teaching Seminar. 1 Credit.
Concomitant with 411, the seminar is devoted to discussion of problems related to teaching music in the schools. Special emphasis is on practices in the secondary school.
Open to Music Education majors only.

PY.510.609. Advanced Conducting Techniques for Music Educators. 2 Credits.
Advanced Conducting Techniques for Music Educators is designed to help graduate music education students develop score reading and analysis skills, formulate interpretive ideas, as well as develop conducting techniques to communicate those interpretations discovered during score study.
Open to Music Education majors only.

PY.510.611. Psychology of Music Teaching. 2 Credits.
Application of selected theories of learning to teaching music in the elementary and secondary school. Characteristics of childhood and adolescent development will also be examined with implications for designing appropriate musical instruction.

PY.510.612. Research in Music Education. 2 Credits.
A seminar in research specific to music education. Prepares the teacher to read and interpretmusic education research in professional publications. The course includes an examinationof basic procedures of historical, descriptive, and experimental research in musiceducation. Offered in alternate years.
Open to Music Education majors only.

PY.510.613. History & Philosophy of Music Education. 2 Credits.
A seminar on historical and philosophical perspectives of music education. Includes the study of the history of music education in the United States and various philosophies of music education. Offered in alternate years.
Open to Music Education majors only.

PY.510.614. Supervision & Curriculum Development. 2 Credits.
Supervision and Curriculum Development is designed to examine the role of the music supervisor or department coordinator in the public schools including issues concerning curriculum, class scheduling, staff supervision/evaluation/improvement of instruction, budgets, public relations and research problems in planning and executing a modern program. The course includes the development of curriculum guides and materials with specific focus on individual areas of interest.
Open to Music Education majors only.

PY.510.616. Music Education Independent Study. 1 - 3 Credits.
Elective credit may be granted for graduate courses or workshops in an area of specialization; Orff, Kodaly, Dalcroze, or Suzuki certification; courses included in JHU's Carey Business School or School of Education. Students may also enroll in Music Education Electives through Peabody as an Independent Study, with permission of a Music Education Faculty member.

PY.510.620. Kodaly, Orff, Dalcroze: A General Music Methods Seminar. 2 Credits.
A survey of three major general music methods, Kodaly, Orff, and Dalcroze. other methods will be covered depending on the time left in the course. Primarily for graduate Music Education majors.

PY.510.621. Graduate Practicum. 2 Credits.
Observation and guided teaching in a variety of settings, designed to enhance and expand the teaching skills of the practicing educator. Includes individualized video-taping of teaching demonstrations and follow-up conferences. Practicum experiences are arranged according to student interests and needs and may include teaching and supervisory internships.
Open to Music Education majors only.

PY.510.691. Independent Field Study. 4 Credits.
The Independent Field Study is the culmination of applied academic material gained through the graduate music education coursework. The Field Study, usually completed at the end of the degree program, will be a scholarly document dealing with current issues in music education. It may be a research project, a curriculum development project, a lecture-recital or any other type of project concerned with current music education issues. The pre-requisite: Music Bibliography and Research in Music Education courses ensure that the student has the content knowledge and skills needed to complete original research or a research informed project in their field/area of interest. The purpose of the study is to allow the graduate student to demonstrate their working knowledge of research, writing, teaching, psychology, and philosophy within the field of music education in a scholarly document. The music education instructor of the student's choosing chairs the study.
Open to Music Education majors only.

PY.710.109. Theory 1 Intensive. 3 Credits.
This course includes study of fundamentals, melody, diatonic harmony, and analysis and composition of short homophonic and polyphonic pieces.
Only Undergraduates who test into this course will be allowed to register.

PY.710.110. Theory 2 Intensive. 3 Credits.
A continuation of techniques learned in Theory 1 Intensive and the study of figured bass and chromatic harmony. Also includes an introduction to basic musical forms. Open to undergraduates only.
Completion of Theory Intensive 1 required, PY.710.109[C].

PY.710.111. Theory 1. 3 Credits.
The study of voice leading, melody, figured bass, and diatonic harmony, through analysis and composition. Open to undergraduates only.
Only Undergraduates who test into this course will be allowed to register.

PY.710.112. Theory 2. 3 Credits.
A continuation of techniques learned in Music Theory 1. Studies include non-chord tones and figuration, sequence, tonicization and modulation, chromaticism, and basic principles of form. Open to undergraduates only.
Previous course, Theory 1, needed, PY.710.111[C]

PY.710.113. Theory 1-2. 3 Credits.
This course begins with a reinforcement of chromatic part-writing and voice-leading, and then focuses on two- and three-voice counterpoint in the Baroque style. Placement by examination. Open to undergraduates only.
Only Undergraduates who test into this course will be allowed to register.

PY.710.211. Theory 3. 3 Credits.
This course is a study of music of the Baroque era including invention and fugue, through analysis and model composition. Open to undergraduates only.
Previous course needed, PY.710.112[C] OR PY.710.110[C]

PY.710.212. Theory 4. 3 Credits.
This course centers on music from Viennese Classicism through the emergence of Romanticism, using examples from a variety of genres and formal designs. Open to undergraduates only.
Previous course, Theory 3, needed, PY.710.211[C]

PY.710.214. Theory 3-4. 3 Credits.
A continuation of Music Theory 1–2 (710.113), this class completes the study of the Baroquestyle and moves on to the Classical style and the harmonic, formal, and contrapuntal techniquesin music of the 19th century. Open to undergraduates only.
Completion of Theory 1-2 required, PY.710.113[C].

PY.710.311. Theory 5. 3 Credits.
A study of the music of the late-19th through 21st centuries. Open to undergraduates only.
Completion of previous course needed, PY.710.212[C] OR PY.710.214[C]

PY.710.312. Theory 6. 3 Credits.
Students take one of several specially-designated electives. Open to undergraduates only.
Completion of Theory 5 needed, PY.710.311[C]

PY.710.412. Instrumentation & Arranging. 3 Credits.
A course designed to introduce students to idiomatic writing for orchestral instruments, individually and in standard combinations. Lectures, listening, and score study will be complemented by arranging exercises. Open to Computer Music, Music Education, and Music for New Media majors (others by permission of the instructor). This class may not be used for graduate theory seminar credit.
Open to Computer Music, Music Education, and Music for New Media majors only. Others may take course with permission of instructor.

PY.710.413. Orchestration 1. 3 Credits.
A course for composers and conductors studying instrumental technique and ensemble combinations as demonstrated in orchestral literature, 1750 to the present. Open to conductors and composition majors only. Course must be taken for the entire school year. May not be used for graduate seminar credit.

PY.710.414. Orchestration 2. 3 Credits.
A course for composers and conductors studying instrumental technique and ensemble combinations as demonstrated in orchestral literature, 1750 to the present. Open to conductors and composition majors only. Course must be taken for the entire school year. May not be used for graduate seminar credit.
Completion of Orchestration 1 needed, PY.710.413[C].

PY.710.415. Graduate Theory Review.
An intensive review of the materials and techniques of tonal music, including diatonic and chromatic harmony, part writing, and analysis.

PY.710.462. Music Theory Minor Capstone. 1 - 3 Credits.
This course is required for an undergraduate minor in Music Theory.

PY.710.611. 20th-Century American Symphonic Works. 3 Credits.
This analysis course is for anyone interested in exploring the musical languages expressed within a wide variety of 20th-century American symphonic works. We will explore works by diverse American composers, contextualize their practices via short readings, and develop several analytical approaches to illuminate their music. Special emphasis will be placed on the development of a nuanced foundation from which students will learn to respond critically to the discourse of culturally responsive intersectional analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.612. Mozart. 3 Credits.
This course delves into the music of Wolfgang Amadeus Mozart. We will cover genres including solo sonatas, concertos, chamber music, symphonies, and opera, as well as a range of musical forms. Works will come from both earlier and later periods in Mozart's short life, though the focus will be on his maturity. In some cases we will also briefly examine other contemporary composers in order to better understand what sets Mozart apart and has made him so uniquely beloved. While it is not a performance practice class, we will discuss current understanding of certain performance practice issues in the course of our study, and a range of recordings will be used to demonstrate evolving understandings of this style.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.613. Music And Meaning. 3 Credits.
A consideration of how meaning is conveyed in tonal music. This course includes discussion of semiotic and formalist approaches to characterizing meaning in absolute music, while working towards an inclusive method of analysis considering expressivity as emanating from formal structure
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.614. Why We Get Chills: Music Analysis Meets Cognition. 3 Credits.
This course consults literature in the field of music cognition to explore how it may inform music analysis, which in turn has implications for both performer and listener.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.619. Chamber Music Analysis. 3 Credits.
Analysis of chamber music in various styles, with particular emphasis on works being currently performed in Peabody's chamber music program.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.620. Song Analysis. 3 Credits.
An exploration of the interactions between text and music within the art-song repertoire from various style periods, drawing on theories of drama, linguistics, cognition, and music. Open to graduate students only.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.622. Music Of Scriabin - Pitch Structure/Form. 3 Credits.
The study of musical content in relation to harmonic, tonal, motivic and formal aspects of Scriabin's technique. A significant part of the discussions will be devoted to innovations in pitch structure and form, as well as large-scale musical projects of Scriabin. In particular, we will cover the topics of three stylistic periods in Scriabin's biography, the evolution of his harmony on the examples of harmonic analysis of preludes, etudes, piano miniatures and orchestral compositions. The format of this seminar will include student performances, short presentations and exercises in harmonization.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.624. Amy Beach & Florence Price. 3 Credits.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.625. Dance Music of the Renaissance. 3 Credits.
The study of Renaissance dance as a crucial source for the formation of the common practice styles.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.627. Improvisation for Classical Musicians. 3 Credits.
This course focuses on developing skills in improvisation in Baroque and Classical styles through the understanding of harmony, proper voice leading, good melodic accompaniment, cadence, modulation, and sequence. Topics include melody harmonization, ornamentation and variation, prelude, the free fantasia, and the cadenza. If time permits, chorale setting and fugue. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.629. Music Since 1970. 3 Credits.
Analysis of recent experimental music in a variety of aesthetic styles. Focus will be placed on the structural foundations for these works and its basis in manipulation of time and sonority.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.631. Schubert. 3 Credits.
This seminar will explore Schubert's music in a range of genres, with particular attention to chamber and solo works. Our discussions will be informed by a range of past and present scholars, though our focus will be the scores themselves. Our goal is the development of analytic and persuasive skills, a deeper and clearer understanding of Schubert's style, and, ideally, some sense of how the composer creates his unique 'magic' via distinctive structural and expressive power.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.633. Renaissance Counterpoint. 3 Credits.
An examination through composition of the musical practice of the late Renaissance, including modal theory, species counterpoint, and imitative composition in two and three parts.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.634. Baroque Counterpoint. 3 Credits.
The course concentrates on the contrapuntal practice of J.S. Bach, including analysis and composition of a suite movement, invention, fugue, and chorale-prelude or passacaglia. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.641. Opera Analysis. 3 Credits.
This analysis course is for anyone interested in operatic character development through the use of tonal region, melodic/harmonic growth, development and long-range structural goals. We will explore some of the most beloved characters of opera from the perspective of the musical structures on which they are built. Special emphasis will be placed on developing a nuanced understanding of these characters through the clues buried in the music.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.642. Art of Partimento. 3 Credits.
Partimento is a method of harmony and composition teaching developed in Naples in the 18th Century, which was the basis of conservatory education from the time of Pergolesi though Verdi. It uses figured and unfigured basses as the foundation for extempore and written-out compositions, starting with the simplest chord progression patterns and working up to entire movements. This is a skills-based course in which students will realize examples from the partimento tradition at the keyboard. All students are welcome; keyboard skills required.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.643. Music 1900-1945: German. 3 Credits.
A survey of the important trends in music in the first half of the 20th century. This seminar focuses on the Second Viennese School and Hindemith and examines both the music and the common theoretical tools for its analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.644. Music 1900-1945. 3 Credits.
A survey of important trends in music from the turn of the 20th century. Emphasis on score analysis and listening.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.647. Analysis Early 19c Piano Lit. 3 Credits.
A detailed analysis of representative works from the piano repertoire. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.648. Analysis 19c Piano Lit. 3 Credits.
A detailed analysis of representative works from the piano repertoire. Open to graduate students only.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.649. Music Theory Pedagogy. 3 Credits.
This course investigates and discusses available teaching resources for students who may wish to teach undergraduate theory, including current technology, as well as classroom observation and practice teaching.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.650. Theory Pedagogy Internship. 3 Credits.
This course consists of a semester of supervised teaching for students in Peabody's Master of Music in Music Theory Pedagogy (MM MTP) program.

PY.710.651. Style Analysis of Pierrot Lunaire. 3 Credits.
Analysis of Schoenberg's Pierrot lunaire, its musico-poetic precedent and its lasting impact on dramatic chamber music.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course.

PY.710.658. Expanding the Music Theory Canon. 3 Credits.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C]

PY.710.659. Intersections of Gender & Music Theory. 3 Credits.
This analysis course is for anyone interested in the intersections of gender and music theory. We will explore a wide variety of works by women, contextualize their practices via short readings, and develop creative analytical approaches to illuminate their music. Special emphasis will be placed on living composers and the development of a nuanced analytical tool kit to respond critically and contribute to the discourse of intersectional analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.660. Tonal Composition: Baroque. 3 Credits.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.663. Tonal Analysis Principles. 3 Credits.
A study of techniques for the analysis of common-practice tonal music. A variety of forms, genres, and styles will be explored.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.667. Beethoven String Quartets. 3 Credits.
This course is a study of the string quartets of Beethoven.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.671. Music in Image: Theory of Film Music. 3 Credits.
The study of music in film, emphasizing the emergence of the idea of montage, the question of diegetic and non-diegetic presentations, and the problems of rhythm and meter in both visual and acoustic domains.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.677. Fugue: Bach/Shostakovich. 3 Credits.
This course examines the wide-ranging use of fugue in music from the high baroque to the mid-20th century. The class focuses on the techniques and designs themselves, and how those techniques and designs relate to both the larger works studied and the broader musical styles of the times.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.685. Music Theory Pedagogy Project. 3 Credits.
Designed for Music Theory Pedagogy students, the project will examine a specific aspect of music theory teaching. Students work under the supervision of a faculty advisor. Open to graduate students only. May not be used for seminar credit.

PY.710.687. Well Tempered Clavier Book 1. 3 Credits.
A detailed analysis of the preludes and fugues in Book 1 of Bach's Well-Tempered Clavier.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.688. Well Tempered Clavier Book 2. 3 Credits.
A detailed analysis of the preludes and fugues in Book 2 of Bach's Well-Tempered Clavier.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.692. Wind Music Orchestration. 3 Credits.
This course explores orchestration developments in repertoire for the modern concert wind band. We will focus on developing an understanding the works of several key contributors to the repertoire and engage in stylistic reductions and model orchestration projects.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.715.119. Ear Training 1 Intensive. 2 Credits.
This course focuses upon the development of sight-singing and dictation skills from the diatonic major and minor modes. Open to undergraduate students only.

PY.715.120. Ear Training 2 Intensive. 2 Credits.
This course continues a study of diatonic music through sight-singing and dictation skills, with an increased emphasis on harmonic dictation and subdivisions of the beat. Open to undergraduate students only who have successfully completed Ear Training 1.
Completion of Ear Training/Sightsinging Intensive 1 required, PY.715.119[C].

PY.715.123. Ear Training 1. 2 Credits.
This course focuses upon the development of sight-singing and dictation skills from the diatonic major and minor modes. Open to undergraduate students only.

PY.715.124. Ear Training 2. 2 Credits.
This course continues a study of diatonic music through sight-singing and dictation skills, with an increased emphasis on harmonic dictation and subdivisions of the beat. Open to undergraduate students only who have successfully completed Ear Training 1.
Completion of Ear Training/Sightsinging 1 required, PY.715.123[C]

PY.715.125. Ear Training Perfect Pitch 1. 2 Credits.
A Perfect Pitch accelerated version of 710 • 123 and 710 • 223 that covers the material of the two-year course in one year. Open to undergraduate students only.

PY.715.223. Ear Training 3. 2 Credits.
This course introduces concepts of tonicization and modulation through sight-singing and dictation skills. Additional topics include reading C clefs in Bach chorales, hearing structure in compositions in binary form, and rhythmic techniques such as syncopation. Open to undergraduate students only who have taken or passed out of Ear Training 1+2.
Completion of previous course needed, PY.715.124[C] OR PY.715.120[C].

PY.715.224. Ear Training 4. 2 Credits.
This course continues a study of chromatic music through sight-singing and dictation skills with an increased emphasis on modulating to far-related keys, advanced rhythmic techniques, diatonic modes, and aural study of large-scale forms such as sonata form. Open to undergraduate students only who have successfully completed Ear Training 3.
Completion of Ear Training/Sightsinging 3 required, PY.715.223[C].

PY.715.226. Ear Training Perfect Pitch 2. 2 Credits.
A Perfect Pitch accelerated version of Ear-Training 1 (710.123) and Ear-Training 2 (710.223)that covers the material of the two-year course in one year. Open to undergraduate studentsonly.
Completion of Ear Training/Sightsinging Perfect Pitch 1 required, PY.715.125[C]

PY.715.323. Ear Training 5. 2 Credits.
After a short review of highly chromatic late 19th- and early 20th-century music, this class focuses on atonal music, beginning with the late works of Liszt and Wolf and continuing into the music of today. Open to undergraduates who have successfully completed PY.715.224 (Ear Training 4) or PY.715.226 (Ear Training Perfect Pitch) and all graduate students.
Undergraduates need to have completed PY.715.224[C] or PY.715.226[C]. Graduate students must satisfy the music theory proficiency requirement.

PY.715.425. Ear Training Review.
A graduate review course in the principles of ear-training, dictation, sight-singing, and clefs. Open to graduate students only.

PY.715.426. Ear Training Review Intensive 2.
A graduate review course in the principles of ear-training, dictation, sight-singing, and clefs. Open to graduate students only.

PY.715.155. Keyboard Studies 1. 2 Credits.
A study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.

PY.715.156. Keyboard Studies 2. 2 Credits.
A study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.
Completion of Keyboard Studies 1 required, PY.715.155[C].

PY.715.157. Keyboard Studies 1-2. 2 Credits.
An accelerated study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.

PY.715.255. Keyboard Studies 3. 2 Credits.
A continuation of PY.710.155-156, Keyboard Studies 1 & 2. Emphasis on harmonic and formal analysis as tools for sight-reading and memorization. Repertoire includes solo and duet works, accompaniments, and score-reading. To be taken in conjunction with Music Theory 3-4. Open to undergraduate students only.
Completion of PY.715.156[C] or PY.715.157[C] required.

PY.715.256. Keyboard Studies 4. 2 Credits.
A continuation of 710.155-156, Keyboard Studies 1 & 2. Emphasis on harmonic and formal analysis as tools for sight-reading and memorization. Repertoire includes solo and duet works, accompaniments, and score-reading. To be taken in conjunction with Music Theory 3-4. Open to undergraduate students only.
Completion of Keyboard Studies 3 required, PY.715.255[C].

PY.715.258. Keyboard Studies 3-4. 2 Credits.
An accelerated study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2 or Music Theory 3-4. Open to undergraduate students only.
Completion of Keyboard Studies 1-2 required, PY.715.157[C].

PY.610.321. History of Music 1. 3 Credits.
A survey of music in the Western classical tradition from antiquity to the late 17th century.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.322. History of Music 2. 3 Credits.
A survey of music in the Western classical tradition from the early 18th century to the late 19th century.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.323. History of Music 3. 3 Credits.
A survey of music in the Western classical tradition from the early 20th century to the present day.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.324. Music History in Global Contexts. 3 Credits.

PY.610.414. Musicology Practicum. 1 Credit.

PY.610.601. Music History Review.
A review course covering classical antiquity to the 21st century. Students must earn a passing grade in this course before enrolling in graduate seminars in Musicology. Open to graduate students only. Offered in the summer and fall.

PY.610.605. English Music from Dunstaple to Adès. 3 Credits.
In this seminar we'll explore the roots and developments of English music across nearly seven centuries. Divided into a series of case studies centered around composers, major works, and institutions, this course will investigate English music from a variety of angles. We begin with the organum of the High Middle Ages, explore the Tudor polyphony of the English Reformation, courtly music of the Restoration, Thomas Arne, George Frederic Handel, the English choral revival, Stanford, Elgar, Holst, Vaughan Williams, and Britten. We end our inquiry with the diverse musical paths English music has taken in the last fifty years, finally stopping with Adès's recent opera, The Exterminating Angel. The aim of this course is twofold, to provide students with a clear chronology and to familiarize them with important repertoire, while still addressing critical issues in interaction between music and theology, politics, and gender—to name a few
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.606. Decolonizing Ethnomusicology. 3 Credits.
This course will examine the colonialist underpinnings of ethnomusicology and its persistent effects on current understandings of music in a global context. We will analyze foundational texts in the field, along with newer works that attempt to undo the colonialist legacy upon which the discipline is built.

PY.610.608. George Gershwin's World. 3 Credits.
This course is designed as a series of highlights. We will explore a wide range of musical works and cultural topics related to George Gershwin's life and career. Questions to be posed over the course of the semester will include: Who were Gershwin's colleagues and collaborators? How did Gershwin's music interact with the racial terrain of American culture during the Jim Crow era? And does it continue to engage with issues of race today? How has Gershwin's legacy been shaped by American political and business interests? Did technology play a role in the shaping of his "American" sound? If yes, then how did technology influence Gershwin's creative identity? Students will be asked to lead discussions about Gershwin's compositions, so success is dependent upon setting aside blocks of time on a regular basis to complete the various listening and reading assignments. Written assignments will include creating annotated playlists related to various facets of Gershwin's career and a final research paper/long-form essay that relates to material discussed in class.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.609. Music Therapy from Antiquity to Today. 3 Credits.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.610. Nadia Boulanger. 3 Credits.
Cited as “the most influential teacher since Socrates,” Nadia Boulanger (1887-1979) taught and nurtured generations of young musicians throughout her adult life. Amongrenowned American composers whom she mentored are Aaron Copland, Elliott Carter, Quincy Jones, and Philip Glass. Who was this extraordinary woman who witnessed two world wars and distinguished herself as a legendary pedagogue? What were her teaching methods? How did a Parisienne guide and shape the career trajectories of so many American composers and musicians? This class will explore these questions and many more. In addition to examining history and identifying Boulanger’s impact on the current state of musical composition, our course will initiate an oral history project to capture the accounts of the last generation of musicians to work directly with Boulanger toward preserving her legacy.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.611. American Film Music and Classical Hollywood Style. 3 Credits.
Film and music have always shared an intimate relationship. Classical Hollywood style dominates the American film industry, dictating the look and sound of most films. Yet filmmakers have always challenged this status quo. Through close viewings—and listenings—of film, we will pursue a more concrete understanding of how music guides our film comprehension, explore how American film music continues to develop, and evaluate how these varied approaches shape the societies in which we live. During this course, you will hone your skills as an academic writer by learning to critically evaluate and craft your own arguments about the roles of music/sound in film. Some of the films covered will include King’s Row (1942), Rebecca (1940), Touch of Evil (1958), Vertigo (1958), Breakfast at Tiffany’s (1961), Batman (1989), The Remains of the Day (1993), The Social Network (2010), It Happened on Beale Street (2018), and Midsommar (2019). Our topics of inquiry will include representations of jazz, the role of the acousmatic voice, the use of pre-existing music, auteurism, the musically-politically subversive, musical appropriation, and media convergence with digital technologies. Your work will include readings in which we interact with both current and classic scholarly literature; short writing responses that respond to our films and the issues they raise (15-300 words); a short paper focused on the close reading of a scene (800 words); and a final research project on a film music topic of your choice (3000 words). This final project may take different forms—from a recorded analytical film commentary to a more traditional academic paper. Paired with writing workshops and peer review exercises, you will develop the skills necessary to contribute to the greater academic community, write clearly and logically for your intended audience, and formulate original, persuasive arguments.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.612. Vocal Contests. 3 Credits.
This course examines voice contests across time. While contests such as American Idol have received widespread attention, these competitions must be understood in terms of a much broader trend towards the proliferation of music prizes, both within and outside the classical music tradition. Our course examines the deep history of the current obsession with voice contests, with examples drawn from the Ancient Greece to the current day. Together we will ask: what sustains the power of prizes? What has driven their incredible proliferation since the outset of the twentieth century, when the Nobel, Pulitzer and modern-day Olympic prizes were first awarded? How does prize culture motor the classical- and popular-music industries? And how should musicians best maneuver themselves within modern-day economics of prestige? While the focus of our course is on vocal contests, this course will be of relevance to all those with an interest in how musical value is created—and tastes shaped—by prize-giving institutions.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.613. Stravinsky Perspectives. 3 Credits.
The critical literature addressing the music and aesthetic orientations of Igor Stravinsky (1882–1971) encompasses multiple frames of reference: ritual, discontinuity, octatonicism, neoclassicism, serialism, Russianness, and more. This seminar will sample prominent approaches in scholarship on Stravinsky, tracing several debates and examining representative works.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.614. Mahler and Strauss in America. 3 Credits.
In April 1904, Richard Strauss undertook a whirlwind tour of the United States in which he was heralded as the “lion of the musical hour.” Four years later in January 1908, Gustav Mahler made his own American debut, inaugurating a spectacular but troubled relationship with both the New York Philharmonic and the Metropolitan Opera. Their receptions could not have been more different. In this course we use Strauss and Mahler as a lens through which to understand both German and American art at the Fin de Siècle. We will discuss American concert culture, performance practice, and the phenomenon of the celebrity concert tour. We will explore the works that Strauss and Mahler wrote and premiered in this period and their increasingly divergent careers. Finally, we will investigate how Americans, grappling with European art, tried to define their own.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.616. Sound Memories: Jazz Autobiography and Memoir. 3 Credits.
In the words of Henry Louis Gates, Jr., “The will to power for black Americans was the will to write; and the predominant mode that this writing would assume was the shaping of a black self in words.” What did the shaping of the black self in words mean for those whose primary mode of expression was musical and improvisational? In their autobiographies and memoirs, jazz musicians’ discursive self-invention would appear to be born of materials and processes akin to those of jazz itself: full of polyrhythms, spontaneous riffing, call and response, and turnarounds. This course examines the autobiographies and memoirs of central figures, such as Ethel Waters, Louis Armstrong, Sidney Bechet, Jelly Roll Morton, Duke Ellington, Billie Holiday, Charles Mingus, Dizzy Gillespie, and Miles Davis. We will ask what relationship these texts bear to musical performances and personas: compositionally, aesthetically, and as represented by other media. For example, do they perpetuate or rather stand in opposition to various jazz mythologies such as the musicians’ intuitive genius or sensationalized drug use? What roles do these myths serve? If together jazz autobiographies can be said to constitute a genre, might these sophisticated textual performances comprise a counter-narrative to official histories of jazz and speak a different kind of truth to power? Note: Lara Pellegrinelli is a new adjunct faculty member who is also teaching for Zane Forshee in the Breakthrough Curriculum this spring. It appears that she does not yet have a JHED ID. Patrick Wallen DOES have her contract details (both from Zane and from me). Please let me know what else I may need to do in order to get her into the system and get her course scheduled.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.617. Experimental Music since 1950. 3 Credits.
This course explores the construction of the idea of “experimental” music since around 1950. We will consider the work of numerous individuals, groups, and movements including John Cage and the New York School, the Chicago-based AACM, the Darmstadt circle, the Lower East Side loft jazz scene, Cornelius Cardew and the Scratch Orchestra, and Fluxus. Through the study of recordings (commercial and archival), scores, artists’ writings, and scholarly literature, we will develop historical and aesthetic understanding of the varied practices that helped create the notion of musical experimentalism. Finally, we will study more recent experimental work including that being done in Baltimore at venues such as the Red Room and at festivals such as High Zero.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.618. German Song in the 19th Century. 3 Credits.
This course considers the repertoire of nineteenth-century German art song through a focused study of the works of four major figures: Schubert, Schumann, Brahms, and Wolf. We will address theories of text in music, evolving notions of the song “cycle,” analytical approaches to the lied, and the place of the lied within the social sphere. We will devote particular attention to Schubert’s Die schöne Müllerin and Winterreise, Schumann’s Dichterliebe, and Brahms’s Vier ernste Gesänge.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.619. Music & Leadership. 3 Credits.

PY.610.620. Social Innovation through Music: Health, Education, and Policy. 3 Credits.

PY.610.621. Exoticism on the Musical Stage. 3 Credits.
Creators of musical works have been continually drawn towards the idea of the “other,” wanting to represent on the stage characters that they perceive as culturally different or outside the norms of their own society. This course focuses on musical works for the stage that contain representations of the “other,” examining how text, music, and staging all work in different ways to exoticize certain characters. Works discussed will include Rameau’s Les Indes galantes (1735), Mozart’s Die Zauberflöte (1791), Bizet’s Carmen (1875), Sullivan’s The Mikado (1885), and Bernstein’s West Side Story (1957), as well as more recent adaptations of these works such as Carmen Jones (1943), Carmen: A Hip Hopera (2001), and the upcoming new West Side Story film (2021). We will address the historical contexts of these works, not to excuse them for their stereotyping practices, but to learn the social, economic, and aesthetic contexts that contributed to their original receptions. In addition, we will examine our own responses to these pieces and discuss the ethics of performing these works today.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.622. Beethoven String Quartets. 3 Credits.
This class uses Beethoven’s string quartets as a lens through which to consider larger issues of Beethoven scholarship. We will pair an in-depth study of the works themselves with an examination of a variety of issues important to Beethoven (and to musicological inquiry in general), such as the history and inherited traditions of the string quartet, music in an evolving capitalist marketplace, the notion of the individual Romantic composer-genius, deafness and the late style, and historical performance practice. Throughout, we will consider the specific roles and responsibilities that performers and scholars share in bringing these magnificent works to life.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.624. England's Queen/Opera's Muse. 3 Credits.
Music flourished in the court of Queen Elizabeth I, who reigned from 1558-1603. Composers thrived in all genres: secular and sacred, instrumental and vocal. Centuries later, the legendary monarch inspired opera composers such as Rossini, Donizetti, and Britten to create musical works dramatizing the renaissance queen’s life. This course reviews the masterpieces of English renaissance and also examines the rich operatic works depicting the royal heroine. Topics to be addressed will include nineteenth century continental reception of English history and twentieth century revivals of the Elizabethan lore.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.626. Technologies in the Concert Hall & Opera House. 3 Credits.
n this seminar we consider material and mechanical complexities of musical events. In successive weeks we examine issues such as: how orchestras have historically been directed; auditoriums illuminated; stage machines used and operas surtitled. Our discussion will be grounded in concrete circumstances at particular venues in locations as diverse as Paris, Bayreuth and New York. Together we will examine some core questions: what did material conventions established at individual venues mean for those who produced and consumed musical works; what was at stake when innovations were introduced, and—above all—how do material conventions established in the past continue to have a hold over musical productions today?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.627. Changing Tunes: Pre-Existing Music in Film. 3 Credits.
Music and film have always shared an intimate relationship. From its inception, film has been injected with pre-existing music, including chant, traditional Western composers from Beethoven to Bartók, and more contemporary artists from the Beatles to Beyonce. This music has influenced American and international film industries alike, shaping the look and sound of film. Through close viewings—and listenings—of film, we will investigate the meaning(s) these musical works can acquire as they are re-used and re-purposed. Similarly, we will explore how, through film, pre-existing music can live on, change, and reify the past through contexts beyond the concert consumption with which we may be more familiar. During this course, we will hone your skills as an academic writer by learning to critically evaluate and craft arguments about the roles of music/sound in film. Some of the topics covered include: canonical works from the 18th and 19th centuries, the use of 20th-century avant garde music in horror, representations of jazz, chant and other medieval genres, anachronistic uses, and popular song. Your work will include studying film clips and full-length films; readings; short writing responses (100-200 words); four short papers focused on close readings of scenes or other supplied prompts (1000-1500 words); and a midterm project. Paired with writing workshops and peer review exercises, you will develop the skills necessary to contribute to the greater academic community, write clearly and logically for your intended audience, and formulate original, persuasive arguments.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.628. New Directions in Beethoven Scholarship. 3 Credits.
There would seem to be little left to learn about Beethoven. The common understanding of the composer as a temperamental, solitary genius, cursed with a tragic hearing loss—often credited with spurring him to produce the world's most profound music—has changed little over the past century and a half. What might remain to be studied? This course takes up the challenge, reconsidering the well-known features of the composer's life, work, and legacy through examining trends in Beethoven scholarship of the last 25 years. What did "heroism" sound like in music, and did Beethoven's contemporaries hear the music in this way? What were the political forces behind Beethoven's work? What can we learn by historicizing the notion of "genius"? How can disability studies inflect our understanding of Beethoven's deafness? And what can Beethoven's conversation books—recently published for the first time in English translation—show us about his life? Through asking these questions, we will consider what various historiographical methods, such as microhistory, disability studies, and actor-network theory, have to offer the study of a repertoire most commonly approached through biography. Consideration of these questions will inevitably shed light on the inherited value systems that make up contemporary musical life, many of which are inherited from nineteenth-century Beethoven reception.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.630. Duke Ellington: The Search for an American Sound. 3 Credits.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.631. Sound Studies. 3 Credits.
What do cultural histories of listening tell us about the value we have ascribed to music at various points in time? And how have the invention of media from the musical score to the MP3 altered how we conceive of music as sound? "Sound Studies" is not a course in which we learn about the acoustic properties of noises or pitches (however interesting such matters may be) but rather a historical course, in which we consider how we can enrich our histories of music when we situate music within broader histories of sound. Our seminars, for instance, consider historical moments when we have listened to sound for truth (as when confessions were first recorded) or other forms of concrete information (as when sound was first communicated across phone lines) and examines how these practices did—and sometimes did not—shape ideas about how we should compose, circulate and consume music. Our case studies will be drawn from the medieval era to the current day.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.632. Music and Evolution. 3 Credits.
This course will examine the bio-cultural evolution of music in light of recent interdisciplinary research on the social bases of human cognitive evolution, and explore its implications for current debates in musicology, ethnomusicology, psychology of music, and human cognitive evolution.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.633. Reenacting Orpheus. 3 Credits.
This course addresses retellings of the Orpheus myth from Monteverdi's L'Orfeo (1607) to Mitchell's Hadestown (2010) and Aucoin's Eurydice (2020). We consider why this myth is so compelling to composers and librettists and explore the complexities involved in adapting the same subject for new audiences.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.634. Baroque Performance Practice. 3 Credits.
This class provides a detailed overview of prevalent performance conventions in the Baroque era as revealed by primary sources, as well as some insight into why these matters are important and what drives the early music movement. Required of all Historical Performance MM students.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.636. Three American Composer-Writers: John Cage, Anthony Braxton, Pauline Oliveros. 3 Credits.

PY.610.637. Topics In Music Cognition. 3 Credits.
This introductory course explores relevant research and theory in the emerging domain of music perception and cognition.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.638. Topics In Music Cognition 2. 3 Credits.
This introductory course explores relevant research and theory in the emerging domain of music perception and cognition.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.639. Music in the Multimedia Franchise. 3 Credits.
Music defines our media experiences. Musical themes can likewise go beyond their original audiovisual framework to operate as musical-cultural texts. This online, asynchronous course uses music as a tool to investigate musical branding and the creation of meaning in the media we consume every day. Through close viewings - and listenings - of films, television episodes, video games, commercials, and other media, this course will explore the meaning(s) these media construct and acquire as both they and their music are re-used and re-purposed in multimedia franchises that expand their content into myriads of installments and platforms.

PY.610.640. Topics in Ethnomusicology. 3 Credits.

PY.610.642. Unraveling Ravel: Beyond Bolero. 3 Credits.
Paradoxically accessible and esoteric, Maurice Ravel's music resides in the canonical repertoire of practically every conservatory student. Yet Ravel's relationship to his own musical training was fraught both as a pianist and composer. This course examines the life and works of the French composer whose legacy permeates the practice rooms of Peabody. Beyond a survey of his compositional output, this seminar will examine the era that produced Ravel. France at the turn of the century, Ravel's studies at the Paris Conservatory, and his relationship with his musical contemporaries will all be topics of discussion. All musicians are welcome to take this class.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.643. Popular Music in Global Perspective. 3 Credits.
Popular music(s)—while they often share certain practices of production and distribution—are made, performed, and enjoyed around the world in a wide variety of languages, genres, and contexts. They are also closely tied to a range of social practices, political projects, and economic concerns as varied as the contexts in which these styles are produced and consumed. In this course, we will examine the production, consumption, and circulation of popular musics in multiple national and transnational contexts. We will discuss ways in which a global perspective might complicate common Western understandings of popular music aesthetics, categorization, and participation. Finally, through a series of case studies, we will seek to understand both the breadth of practice in popular musics and how these musics and the values embedded in them may both support and disrupt global patterns of influence, exchange, and domination.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.644. 19thC Performance Practice. 3 Credits.
This class provides a survey of prevalent performance conventions in the nineteenth century as revealed by primary sources, as well as some insight into why these matters are important and what constitutes the so-called Historically Informed Performance (HIP) perspective.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.650. Pink Noise: Women Making Electronic Music. 3 Credits.
How do the innovations of women making electronic music complicate notions of listening, music history, and the nature of music? Instead of conceptualizing gender and technology as discrete, oppositional, and universally open, this seminar explores electronic music through the lens of feminist critical frameworks and musical analyses in tandem with models of listening – notably Deep Listening as promulgated by Pauline Oliveros and Hildegard Westerkamp's approach to "conscious listening." Inspired and guided by Tara Rodgers' seminal anthology of interviews, Pink Noises: Women on Electronic Music and Sound, we discuss the work, struggles, triumphs, and techniques of pioneers including Daphne Oram, Pauline Oliveros, Wendy Carlos, Ruth Anderson, and Adrian Piper. We will also examine contemporary innovators and cyberfeminist speculative futures. Along with readings and seminar discussion, course activities include research presentations, listening sessions, brief performances, and composition projects.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.651. Foundations of Music Research. 2 Credits.
This course introduces research from the roles of consuming and then creating materials with a focus on how research is created, disseminated, and accessed. Scholars analyze and produce a variety research outputs relevant for music researchers and performing professionals. Students engage with secondary and archival research materials, discuss how to publish and disseminate their own research, and explore how information is organized to optimize the use of academic library resources now and post-graduation. Open to MM and undergraduate Musicology minor students only. Fall and spring.

PY.610.652. Applied Ethnomusicology and Public Musicology. 3 Credits.
The disciplines of ethnomusicology and musicology regularly employ a valuable set of intellectual tools for understanding, discussing, contextualizing, and performing music. What value do scholarly insights such as these have outside of the academy and how might they be put to work? "Applied" ethnomusicology and "public" musicology use the scholarly insights of the two fields in service of a range of practical or entrepreneurial projects and writing that addresses a broad audience. In this course, we will discuss a variety of such projects, as well as some of the ethical and practical concerns that arise when scholars engage with their publics. We will practice multiple styles of writing useful to public-facing scholarship, including grant proposals, program notes, and think pieces. Through both discussion and hands-on experience, we will explore the division between strictly academic and public-facing or applied research, questioning the utility and limits of this boundary.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.653. What was Postmodernism?. 3 Credits.
Few –isms have caused more disagreement and general confusion than "postmodernism." Pervasively discussed (at least in some quarters) from the 1970s through the mid-1990s, the term has been considerably less dominant in recent years. Yet music students continue to encounter it in textbooks and survey courses as something like the "official" style of the late twentieth century. It is worth asking, then, just what we are talking about when we talk about postmodernism. This course explores the history of the idea in architecture, literary theory, and historiography, among other fields. Our particular emphasis, however, will be on the notion of postmodernism in music. In addition to reading many of the classics of postmodern theory, we will study a wide range of composers and musicians including George Rochberg, Pamela Z, Mauricio Kagel, DJ Spooky, Alfred Schnittke, Laurie Anderson, George Lewis, The Velvet Underground, Helmut Lachenmann, Arthur Russell, and Marina Rosenfeld among others.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.654. Music of the Arab World. 3 Credits.
Study of the music of the Arab world reveals a rich art music tradition, elaborate melodic and rhythmic systems, a central role for improvisation, and a complex relationship to the sacred realm. This seminar will examine the theory, performance practice, repertories, and cultural and historical contexts of Arabic art music, and incorporate work on aural recognition of modes, rhythmic cycles, genres, and performance phenomena. Building on this foundation, students will also survey the sounds of Islam in the Arab world, aspects of Arab identity in music, and musical change in the twentieth century.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.655. Child Stars. 3 Credits.
Over the last century, the child as performer has played a central—if often unacknowledged—role in the Western cultural imagination. Occupying a third space between "real" children and adults, the child star has functioned as a surface upon which (adult) audiences can project their fears and fantasies about the future, the past, innocence, sexuality, talent, and human nature. This course examines the work that child stars perform for Western society at large, pulling apart the various ways that this enduring and meaningful area of performance acquires cultural, economic, and political significance. We'll focus on the careers of young classical music virtuosi, television and film stars, and the Disney-promoted singers of the last few decades; our readings will draw from labor history, race and gender studies, and theories of children's literature. We will ask the following questions: Why is child stardom generally limited to the performing arts (rather than the visual arts, literature, or musical composition)? Why are contemporary child stars always accompanied by a tragic narrative of "lost" childhood, even as their exceptional status is translated into the kind of wealth and recognition that many adults dream of? And what are the ethical issues in promoting, consuming, and sometimes exploiting children's talent?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.658. Beethoven at Work. 3 Credits.
How did Ludwig van Beethoven compose? Modern-day musicians are extraordinarily fortunate that Beethoven saved his work in various stages of completion. Through his surviving autographs and sketches, we have the ability to trace his early ideas to their eventual fruition. The simple becomes sophisticated; the seemingly vapid can be enlivened or abandoned altogether. Perhaps as inspiring as the grandeur of these compositions in their final form is Beethoven's industry and sheer diligence so clearly evident in the sources. This seminar provides performers an opportunity to examine and analyze Beethoven's compositional process and exposes them to practical research tools. This course also delves into evolving musicological trends by accessing digital archives located throughout the world. A visit to the Library of Congress in Washington DC will be scheduled. All musicians are welcome.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.665. Music and Politics. 3 Credits.
This course examines the many ways that music intersected with the global politics of the twentieth century. Focusing primarily (though not exclusively) on the Cold War period, we will explore arts policy in both capitalist and communist nations; examine the roles music and musicians played in state diplomacy; and ask how music functioned between the poles of protest and complicity. Along the way we will pose larger questions about the complex roles a non-material art form can play in the exercise of power, among them: How can music have a political meaning beyond direct references to a state or ideology? What constitutes political "action"? Can a truly apolitical art exist?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.671. Issues in Ethnomusicology. 3 Credits.
An introduction to the theories and methods of ethnomusicology. Topics include transcription and analysis, fieldwork, performance practice, and intercultural aesthetics.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.672. Ethnomusicology of Western Art Music. 3 Credits.
In this seminar, students will survey an emerging body of writing about the music of the Western classical tradition not as a series of musical works and composer biographies, but as a practice of people making music. One might think of it as an anthropology of art music. Readings will examine conservatory cultures and specific cultural moments of different European, transnational, and global cultures of Western Art Music. Though ethnomusicology typically confines itself to "non-western" or "world" music, the West's classical music tradition is arguably the very first world music. We will also listen to and think about the implications of the work of the transnational community of young practitioners who are making this a global practice in the 21st century.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.674. History of Musical Instruments. 3 Credits.
While the emphasis is on contemporary Western models, the history and technology of precursors and non-Western instruments will be addressed. It is hoped that students will develop a thorough knowledge of the history, technology and performance of their own instruments, as well as an appreciation and some familiarity with all ancient and modern musical instruments. To gain an understanding of the workings of musical instruments, projects will include the construction of instruments from simple ones—constructed from easy recipes and materials readily found around the house— to some requiring more sophisticated formulas and parts. Some of our classes may be held in the Mechanical Engineering Department's Laboratory Space at Wyman Park.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.679. Experiments in Opera since 1970. 3 Credits.
As early as the mid-1920s opera was widely criticized for purportedly being out-of-joint with modernity, irrevocably stuffy, and elitist. By mid-century few composers associated with avant- garde movements were interested in the form. Since the early 1970s, however, there has been a kind of operatic renaissance involving a diverse pool of composers, writers, and artists (although the critiques never stopped). This course surveys an array of the more experimental operas written since 1970 by composers with roots in numerous traditions including serialism, free jazz, fluxus, performance art, and minimalism. We will seek out causes for the operatic turn while exploring how composers, writers, directors, and visual artists have adapted opera to reflect contemporary concerns. Each class will focus on a single work with associated texts by the relevant artists as well as readings drawn from musicology, art history, philosophy, media theory, sociology, linguistics, psychology, and theater studies. In addition to our weekly meetings we will have opportunities to visit composers, opera companies and institutes, venues, and festivals. Composers/librettists/directors covered in the course will include: Igor Stravinsky and W. H. Auden (the sole pre-1970 example); Carla Bley and Paul Haines; Meredith Monk; Gyorgi Ligeti; Robert Wilson and Philip Glass; Karlheinz Stockhausen; Robert Ashley; Anthony Davis and Thulani Davis; Laurie Anderson; Luigi Nono; Anthony Braxton; Heiner Goebbels; Olga Neuwirth and Elfriede Jelinek; and Michel van der Aa.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.683. Expanding the Canon: Women and Minority Composers. 3 Credits.
In this seminar we'll explore the lives and music of twelve female or minority composers with special attention to reception history, and the challenges of expanding the classical canon. Artistic "Canons" are complex, nebulous, and inherently fraught structures, in which cultural establishments reflect and propagate their values. In this course, we will investigate the histories of these canons, and the rationales for the inclusions and, most importantly, exclusions. Our individual case studies are linked by this broader historiographical narrative.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.684. Transnationalism. 3 Credits.
An examination of contemporary world music genres from an ethnomusicological perspective, with emphasis on transnational and global issues.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.689. The Symphonic Century. 3 Credits.
The symphony occupies a prominent place within the history of Western classical music in the “long” nineteenth century. At once a canvas for daring innovations in style and form and a genre strongly allied with notions of “tradition,” the nineteenth-century symphony brings together a complex set of issues that illuminate the broader history of music and musical culture of the past 200 years. This course introduces the iconic works of the symphonic tradition, with a focus on music of Haydn, Mozart, Beethoven, Schubert, Berlioz, Schumann, Mendelssohn, Brahms, Bruckner, and Mahler. As we aim to discover what made this music so remarkable in its time and why so many people still care about it today, we will consider each symphony both as a timeless work of art and as a particular moment in cultural history. Close attention will be given to the techniques of structural listening, and our work will be deeply rooted within the historical, philosophical, and political contexts of the time.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.691. Master’s Essay. 2 Credits.
A scholarly work written under the supervision of a member of the musicology faculty. Required for the Master’s degree in Musicology. Fall and spring.

PY.610.692. Wagner. 3 Credits.
Wagner stands as one of the most famous and controversial exemplars of German musical romanticism. A revolutionary, a composer, a dramaturg, a critic, and––by some metrics––a philosopher, Wagner is an unavoidable voice in the story of opera. In this course we evaluate Wagner’s life, works, and historical context. We evaluate patterns of criticism of reception, all with an aim of honing our skills as readers and writers.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.693. American Music. 3 Credits.
A survey of American Music, from colonial times to the middle of the 20th century. There will be a considerable emphasis on relating musical expressions to changing social/historical conditions. We will examine the roles played by technological developments and the rise of the music business shortly after the American Revolution. Our country’s varied musical styles invite serious study of all modes of performance and dissemination, not just “classical” composition and performance. Active participation in discussion is a requirement of this seminar, as is writing a research paper on a topic of the student’s choice.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.694. Music in Maryland. 3 Credits.
Music in Maryland: from British Colonization through the mid-20th Century: Founded in 1634, Maryland’s diverse geography, economy, and settlement begat a rich music history. This course traces music of the great tobacco plantations of the Chesapeake Bay, with their co-mingled African and British music, through the growth of Baltimore into a center of publishing, concerts, opera, church music, instrument-building and teaching. We will examine the roles played by technological developments and the rise of the music business shortly after the American Revolution, also considering developments in sound recording and broadcast radio. Going well beyond `classical` trends, we will also examine rich popular and folk traditions, such as parlor songs and `Sacred Harp` hymnody. Active participation in discussion is a requirement of this seminar, also required are several writing assignments and an in-class presentation on a topic of the student’s choice.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.755. Masters Research. 2 Credits.
An introduction to methods of research through independent written projects in music history. Required of all musicology majors.

PY.610.756. Masters Research. 2 Credits.
An introduction to methods of research through independent written projects in music history. Required of all musicology majors. Fall and spring.

PY.610.791. Dissertation (DMA). 6 Credits.
A study of an original musical topic, approved by the DMA Committee, culminating in the completion and defense of a scholarly work written under supervision of the student’s academic advisor. Graded on a S/U basis.

PY.610.792. Lecture-Recital Paper. 2 Credits.
A study of a specific musical topic, approved by the DMA Committee and suitable as the basis for a lecture-recital, culminating in a written paper and a public lecture-recital. Fall and spring. Graded on a S/U basis.

PY.610.813. Doctoral Consultation and Research. 2 Credits.
For graduate students working with a faculty member to complete a dissertation or a lecture-recital essay. Registration required each semester following completion of coursework in order to maintain active status in the program.

PY.610.814. Doctoral Consultation and Research. 2 Credits.
For graduate students working to complete a dissertation or a lecture-recital essay. Registration is required each semester following completion of coursework in order to maintain active status in the program. Fall and spring.

PY.610.847. Musicology Colloquium. 3 Credits.
An introduction to doctoral-level academic study at Peabody. Emphasis is on critical thinking, argument from sources, and written and oral presentations. The course features presentations from invited speakers. Open to DMA and MM Musicology students only. Lectures are open to the general public.

PY.610.848. Musicology Colloquium. 3 Credits.
An introduction to doctoral-level academic study at Peabody. Emphasis is on critical thinking, argument from sources, and written and oral presentations. The course features presentations from invited speakers. Open to DMA and MM Musicology students only. Lectures are open to the general public.

PY.320.101. Music for New Media 1. 3 Credits.
A foundation of compositional skills. Students will analyze the work of seminal composers of Western music and learn to compose by mimicking their style. Compositions will be scored and notated for common instruments but realized through software emulation. Software used in class: a digital audio workstation (e.g., Logic Pro) and notation software (e.g., Finale).
Music for New Media majors only.

PY.320.102. Music for New Media 2. 3 Credits.
Further development of compositional skills as they relate to film, TV and video game scoring. Students will analyze historic and contemporary scores, considering the role of music when it is synchronized to picture. Students will be required to make short cues 'inspired by' or as 'clones' of cues from the movies they study. They will examine ways to invoke common cinematic moods using a range of scales/modes, intervals, chord sequences, and instrumental choices. In lab classes they will have time to individually work on simple exercises, making original themes and variations under headphones that they will then share with the rest of the class for critiques. They will have homework time to complete these pieces and be graded on them. Students will delve deeper into sample-based sound libraries, learning how to create simple orchestrations, arranged for common instruments but realized through software emulation. Software used in class: for composition--a digital audio workstation e.g., Logic Pro, Ableton Live, plus the Amadeus orchestral software library etc; for video editing and audio mastering--Avid ProTools.
Music for New Media majors only.;Music for New Media 1, PY.320.101[C], required. Student must have received at least a B- in order to progress.

PY.320.201. Music for New Media 3. 3 Credits.
Students explore the role of sound design by composing soundscapes to accompany moving images, and recording Foley elements. In addition, principals of orchestration studied in the Instrumentation course are applied to software instruments. Students will learn to create an orchestral realization of a composition that sounds as realistic as possible. Final project will be a scene in which they are individually responsible for creating all sound elements except dialogue. Project will model professional work through the use of contracts, timeline development and other project management skills. Prerequisites: Music for New Media 2 and Instrumentation and Arranging; Co-requisite: The Tools of New Media 1.
Music for New Media majors only.;Music for New Media 2, PY.320.102[C], required. Student must have received at least a B- in order to progress.

PY.320.202. Music for New Media 4. 3 Credits.
Students will undertake a semester long research and composition project related to the vast field of composing music for film, TV, or games. This will serve as a guided preparation for the type of projects they may work in their private studies as upperclassman or the capstone project. Each project will be presented to the class, exposing all students to a diverse range of techniques, styles, and conventions – co-developing their vocabulary of scoring. Students will also generate a printed score for a soloist or ensemble to play on one of their compositions and investigate alternative workflows in creating a Main Title or Main Menu Suite.
Music for New Media majors only.;Music for New Media 3, PY.320.201[C], required. Student must have received at least a B- in order to progress.

PY.320.211. The Tools of New Media 1. 2 Credits.
Beyond writing music, music then needs to be implemented to become a part of the soundscape of a game. The ability to implement their music will open up additional opportunities for game composers. Starting with direct implementation in the game engine Unity, students will learn how to create and manipulate objects using the C# programming language. We will then transition into using the middleware audio engine Wwise to create deeper reactivity and variation in our scores.
Music for New Media majors only.;Completion of Introduction to Programming required (PY.350.466[C]).;Music for New Media 2, PY.320.102[C], required. Student must have received at least a B- in order to enroll.

PY.320.212. The Tools of New Media 2. 2 Credits.
How does technology complement and enhance the work of a composer working on film and games? Investigate the key components of modern sample libraries and how best to use them. Use modern synthesizers and samplers to create unique and compelling sonic landscapes to accompany moving images. Through “mock-up” exercises, various aspects of MIDI programming (“virtual orchestration” or “synthestration”) will be explored, culminating in building a moderate sized scoring template.
Music for New Media majors only.;Tools of New Media 1, PY.320.211[C], required. Student must have received at least a B- in order to progress.;Completion of Introduction to Programming required (PY.350.466[C]).

PY.320.301. Mixing Sound for Picture. 3 Credits.

PY.320.419. Internship. 2 Credits.
Music for New Media majors only.

PY.320.495. Music for New Media Capstone. 2 Credits.
The culmination of all course work and private study in the degree, the Capstone Project is equivalent to a recital given by a performance major. By the end of the second year (through instruction in New Media Composition class) students will submit for approval an outline of their intended Capstone Project. Completed projects will be displayed, performed, demonstrated, etc. at the conclusion of their final semester of study.
Music for New Media majors only.

PY.320.501. Music for New Media Seminar. 1 Credit.
A required course for New Media students. Particular attention will be paid to the role of music in media, as well as current industry trends and developments in the field. (1

BU.000.000. Advanced Registration Placeholder. 2 Credits.

SA.000.050. Teaching from a Distance Sandbox 1.

SA.000.051. Teaching from a Distance Sandbox 2.

SA.000.052. Teaching from a Distance Sandbox 3.

SA.000.053. Teaching from a Distance Sandbox 4.

SA.000.054. Teaching from a Distance Sandbox 5.

SA.110.404. MAIA Extended Research Project.
MAIA students may take two courses instead of completing and defending a 15-20,000 word thesis. However, in order to maintain a research component, they must prepare an 8,000 word research paper for one of their courses. This requirement may be similar to the existing requirement for a given course, or may be considered additional to or substitute for existing requirements, as decided by the course professor.

SA.110.405. MAIA Thesis Research.
MAIA students at SAIS Europe may choose to spread their thesis research over a full academic year or do most of the work during the final semester.

SA.110.406. MAIA Thesis Defense. 8 Credits.
The MAIA thesis is a 15-20,000 word research project for which a SAIS Europe faculty member acts as primary supervisor and another professor as second reader who cross-examines the candidate during the defense.

SA.999.202. Principles and Practices of International Negotiation.
Non-Credit Skills Course

PY.540.491. Acting For Opera 1. 1 Credit.
An approach to dramatic characterization through the development of the actor's imagination and expressive range, with special emphasis on the ensemble and projection techniques of the lyric stage.
Open to Voice majors only.

PY.540.492. Acting For Opera 2. 1 Credit.
Acting for Opera is a laboratory for the complete singer-actor. The canon of music-theatre continues to expand, and each genre of music has its own evolving style of performance. As such, students will practice working both from the outside-in (using the face, body, and voice to express ideas and emotions) and from the inside-out (using their imaginations as fuel for strong artistic choices). Readings include historic and contemporary discourses on both acting and rhetoric. Students will prepare monologues, dialogue, and recitative scenes assigned by the instructor, and will be graded upon their individual preparation as well as their ability to work in an ensemble.
Open to Voice majors only.

PY.540.513. Movement 1. 1 Credit.
Develops physical awareness, movement skills, and integration of musical and spatial concepts. Includes introductory dance technique, vocabulary and patterns. Active studies in Dalcroze eurhythmics, choreography, characterization and styles provide further abilities useful in opera.
Open to Voice majors only.

PY.540.514. Movement 2. 1 Credit.
This course develops singers' physical awareness, movement skills, and integration of musical and dramatic content. Areas of study include the dynamics of stage space, gesture as a product of characterization, and knowledge of basic dance forms for the opera stage. Processes draw from somatic studies and Jaques-Dalcroze eurhythmics.
Open to Voice majors only.;Completion of Movement 1 required, PY.540.513[C].

PY.540.515. Movement (GR). 1 Credit.
Graduate Acting students will learn how to decode the important information in each script, libretto, and score in order to translate it into vivid performances. Art (and therefore acting) may be subjective, but everyone can cultivate the skills required to become a better singer-actor. The aim of this class is to empower graduate students to make strong artistic choices by demystifying character, style, and rhetoric.
Open to Voice majors only.

PY.540.521. Opera Seminar. 2 Credits.
An advanced course on acting for the Opera stage. This class counts towards the Vocal Literature course requirement.The purpose of this class is to review, strengthen and apply concepts of stagecraft, acting, and character analysis to the advanced singer interested in singing on the Opera stage. This will be done through "Role Preparation", working exclusively in a given role in an opera. By the end of the semester the student will be able to create from the music and text of the opera role an entire, complete, practical character and performance us.
Open to Voice majors only.

PY.540.522. Opera Seminar. 2 Credits.
An introduction to acting for the Opera stage.
Open to Voice majors only.

PY.540.523. Opera in Action. 2 Credits.
Who gets to make and to experience opera? Opera in Action students will explore these questions and pose their own, using a short opera performance as the catalyst for both classroom and community engagement. Students will work with instructors from various fields to devise activities and foster conversations around music, theatre, and performance. Emphasis will be placed on developing each individual student's musical/dramatic skills in the context of community. Both Voice and Music Education students with a singing background are encouraged to apply.

PY.540.535. Graduate Opera Seminar. 2 Credits.
Individual and group work focusing on language, diction, and the vocal line as it relates to instrumentation and musical texture. Students will explore composers' stylistic, linguistic, and musical choices as the basis for crafting informed interpretations of operatic works in various styles, including 21st-century repertoire. Focus may include both individual arias and role preparation. This course also includes a career overview that encompasses auditions, management, singing in Europe, and professional expectations and standards.
Open to Voice majors only.

PY.540.536. Opera Aria Coaching. 2 Credits.
Bringing an Opera Aria to performance level requires a great deal of 'sleuthing', i.e. detective work. We are who we are in every day life simply by being a living, breathing ever-evolving human being. Our reactions, our personality are ever revealing themselves simply by interacting with the situations and people we encounter. Arias are, however, stories told in a moment in time, in a particular situation that is 'pre-scribed' by a librettist and composer. It is our challenge to find out what the intention of the creators was, what the message to deliver is and what experience brings us to this point. Research, dissection, pondering, in a sense, working backwards to understand the components of an aria will bring us to a point of delivering the message - hopefully - that the team had in mind. Vocal color, word stress, phrasing (both musical and literary) all contribute to a meaningful expression of a character's reaction to a particular situation at a point in time.
Open to Voice majors only.

PY.540.541. Opera Etude Seminar. 1 - 2 Credits.
A course to develop new operatic works by Peabody composers in close collaboration with vocalists. Study includes investigations of vocal function and use; an overview of literature and notational practices; exercises in writing for solo voice and instruments; libretto development; scene improvisation; and discussion of best practices for collaboration. Up to five composers from the fall semester will be chosen to write a 15-minute scene or one-act opera for full production in the spring. **For composers, participation in the fall semester is prerequisite to the spring.** The course is open to composers at the senior-year level or above. Junior-year composers may be enrolled by permission. Singers are enrolled via opera diagnostic auditions at the beginning of the year. Instrumentalists are also invited to participate for credit in both semesters.

PY.540.542. Opera Etude Seminar. 2 Credits.
A course to develop new operatic works by Peabody composers in close collaboration with vocalists. Study includes investigations of vocal function and use; an overview of literature and notational practices; exercises in writing for solo voice and instruments; libretto development; scene improvisation; and discussion of best practices for collaboration. Up to five composers from the fall semester will be chosen to write a 15-minute scene or one-act opera for full production in the spring. **For composers, participation in the fall semester is prerequisite to the spring.** The course is open to composers at the senior-year level or above. Junior-year composers may be enrolled by permission. Singers are enrolled via opera diagnostic auditions at the beginning of the year. Instrumentalists are also invited to participate for credit in both semesters.
Completion of previous course required, PY.540.541[C].

PY.540.552. Stage Directing. 1 Credit.
Open to Voice majors only.

PY.540.639. Opera Workshop. 2 Credits.
An introduction to dramatic characterization as it relates to and is practiced on the Opera stage.
Open to Voice majors only.

PY.540.640. Opera Theater. 2 Credits.
An advanced course on acting for the Opera stage.
Open to Voice majors only.

PY.540.691. Graduate Acting. 1 Credit.
Graduate Acting students will learn how to decode the important information in each script, libretto, and score in order to translate it into vivid performances. Art (and therefore acting) may be subjective, but everyone can cultivate the skills required to become a better singer-actor. The aim of this class is to empower graduate students to make strong artistic choices by demystifying character, style, and rhetoric.

PY.460.423. Organ Literature 1. 3 Credits.
A study of selected organ literature from all periods within the context of history, instrument design, and performance practice.
Open to Organ majors only.

PY.460.424. Organ Literature 2. 3 Credits.
A study of selected organ literature from all periods within the context of history, instrument design, and performance practice.
Open to Organ majors only.;Completion of Organ Literature 1 required, PY.460.423[C].

PY.460.425. Resources for Contemporary Church Musicians 1. 3 Credits.
This course is a survey of liturgics, working with the lectionary, choral literature for the average choir, conducting styles and interpretation, hymnody, and related subjects. The fall semester focuses primarily on liturgics, lectionary and hymnody.
Open to Organ majors only. Non-majors interested in taking the course should send an email to peabodyregistrar@jhu.edu with instructor permission attached.

PY.460.426. Resources for Contemporary Church Musicians 2. 3 Credits.
This course is a survey of liturgics, working with the lectionary, choral literature for the average choir, conducting styles and interpretation, hymnody, and related subjects. The spring semester focuses primarily on conducting, conducting from the console, choral literature, anthem accompaniment, children's choir techniques and repertoire, handbell techniques and repertoire, service planning, practical skills for managing a church music program, and forming a personal philosophy of church music.
Open to Organ majors only. Non-majors interested in taking the course should send an email to peabodyregistrar@jhu.edu with instructor permission attached.;Completion of Resources for Contemporary Church Musicians 1 required, PY.460.425[C].

PY.460.510. Organ for Non-Majors 1. 1 Credit.
Open to everyone with basic keyboard proficiency, this introductory course in service playing will cover organ technique, registration, hymn playing, and accessible literature.

PY.460.511. Organ for Non-Majors 2. 1 Credit.
Open to everyone with basic keyboard proficiency, this introductory course in service playing will cover organ technique, registration, hymn playing, and accessible literature.
Completion of Organ for Non-Majors 1 required, PY.460.510[C].

PY.460.545. Organ Seminar (UG). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. A yearly requirement of organ majors.
Open to Organ majors only.

PY.460.546. Organ Seminar (UG). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. Open to majors only.
Open to Organ majors only.

PY.460.845. Organ Seminar (GR). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. A yearly requirement of organ majors.
Open to Organ majors only.

PY.460.846. Organ Seminar (GR). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. Open to majors only.
Open to Organ majors only.

PY.520.615. Pedagogy Internship. 2 Credits.
The internship is intended to provide a one-year supervised work experience during which students are expected to demonstrate the ability to present well-planned and engaging classes and lessons. The primary focus is to further develop teaching skill in a studio setting.
Open to Pedagogy majors only.

PY.520.617. Internship Seminar. 1 Credit.
The seminar is intended to provide a forum for the following activities and discussion topics: sharing of successful teaching experiences, group review of videotapes, microteaching, discussion of recordkeeping systems, the business of teaching music, motivational techniques for special situations, and the importance of the parent and parent-teacher relationship.
Open to Pedagogy majors only.

PY.520.618. Portfolio Development. 1 Credit.
Guidance in professional portfolio development. The result will be a professional portfolio which is an organized collection of materials which demonstrate the intern's educational philosophy, knowledge of materials, experience in teaching, professional references, audio and video recording of teaching and performance obtained or collected during the first three semesters of graduate work. In addition, students will discuss employment opportunities, practice answering questions frequently used in the interview process and discuss how to effectively use their portfolio to gain a position as a studio instructor..
Open to Pedagogy majors only.

PY.415.567. Chamber Music for Percussion. 1 Credit.
PY.415.567 Consists of 14 hours of coaching per semester with students performing works for both percussion group and mixed ensemble. The most outstanding of these projects will receive a performance on the Peabody Percussion Group Concert.
Percussion majors only.

PY.415.568. Chamber Music for Percussion. 1 Credit.
PY.415.568 Consists of 14 hours of coaching per semester with students performing works for both percussion group and mixed ensemble. The most outstanding of these projects will receive a performance on the Peabody Percussion Group Concert.
Percussion majors only.

PY.450.111. Sightreading 1. 2 Credits.
A course to help foster fluency in the essential skill of transforming written music into sound. Includes score scanning, pattern recognition, and analysis of harmonic, rhythmic, and melodic structures in music from all periods. Required for undergraduate piano and organ majors. Also offered as an elective.

PY.450.112. Sightreading 2. 2 Credits.
A course to help foster fluency in the essential skill of transforming written music intosound. Includes score scanning, pattern recognition, and analysis of harmonic, rhythmic,and melodic structures in music from all periods. Required for undergraduate piano andorgan majors. Also offered as an elective.
Completion of Sightreading 1 required, PY.450.111[C]

PY.450.213. Accompanying 1. 1 Credit.
A course designed to acquaint pianists with the listening skills, flexibility, sensitivity, knowledge of musical style, and interpretative skills required of a collaborative artist. Traditional song literature will be discussed, prepared, and performed within a class setting, with an emphasis on the poetic analysis, musicianship, sound production, and pianistic techniques required for effective collaboration. Open to all qualified keyboard students at any level, this course is required for all undergraduate piano majors.
Must have completed Sightreading 1 2 (PY.450.111[C] AND PY.450.112[C])

PY.450.214. Accompanying 2. 1 Credit.
A course designed to acquaint pianists with the listening skills, flexibility, sensitivity,knowledge of musical style, and interpretative skills required of a collaborative artist. Traditionalsong literature will be discussed, prepared, and performed within a class setting,with an emphasis on the poetic analysis, musicianship, sound production, and pianistictechniques required for effective collaboration. Open to all qualified keyboard students atany level, this course is required for all undergraduate piano majors.
Completion of Accompanying 1 required, PY.450.213[C]

PY.450.411. Keyboard Literature: Baroque. 2 Credits.
A broad survey of the many styles of keyboard music from the early to late Baroque periods, focusing on the different national characteristics of music from England, France, Italy and Germany and how they evolve from the 17th to 18th centuries. Students explore this repertoire on the instrument for which it was written – the harpsichord.

PY.450.412. Keyboard Literature: Classical. 2 Credits.
A survey of the piano music of the Classical period, with emphasis on the works of Haydn,Mozart, and Beethoven. Works will be considered from a range of perspectives, includingstylistic, analytic, historical, and interpretive.

PY.450.413. Keyboard Literature: 19th Century. 2 Credits.
A survey of piano music from the Romantic period. Works will be considered from a rangeof perspectives, including stylistic, analytic, historical, and interpretive.

PY.450.414. Keyboard Literature: 20th/21st C.. 2 Credits.
A survey of the piano music of the 20th century, from its post-romantic roots to the present. Works will be considered from a range of perspectives, including stylistic, analytic, historical, and interpretive.

PY.450.628. New Piano Music. 2 Credits.
A course designed for the study and performance of post-1950 solo piano repertoire. Semesterprojects will include playing for and working with living composers. Guests scheduled toparticipate include composer Curt Cacioppo, pianist Leon Fleisher, and conductor Carl St.Clair. For piano majors only.
Open to Piano majors only.

PY.450.667. Piano Pedagogy 1. 2 Credits.
Exploration of principles, materials, and career development in the teaching of piano. Includes observation of Preparatory teachers and some supervised teaching of pre-college students. Open to majors only.
Open to Piano majors only.

PY.450.668. Piano Pedagogy 2. 2 Credits.
Exploration of principles, materials, and career development in the teaching of piano.Includes observation of Preparatory teachers and some supervised teaching of pre-collegestudents. Required for undergraduate piano majors and for MM Piano majors with Pedagogyemphasis, also offered as an elective. Open to majors only.
Completion of Piano Pedagogy 1 required, PY.450.667[C].;Open to Piano majors only.

PY.450.845. Piano Seminar (DMA). 1 Credit.
A seminar required of all doctoral students. Focus is on preparation for entering the musicprofession, including practice teaching, press kit and resume preparation, discussion of jobsearches, and topics of special interest. Offered in alternate years.
Open to Piano majors only.

PY.715.211. Keyboard Skills 1 - Piano Majors. 2 Credits.
A course in keyboard harmony, including transposition, figured bass, melody harmonization, and analysis. Required for undergraduate piano and organ majors.
Open to Piano, Organ, and Harpsichord majors only.

PY.715.212. Keyboard Skills 2 - Piano Majors. 2 Credits.
A course in keyboard harmony, including transposition, figured bass, melody harmonization, and analysis. Open to majors only. Required for undergraduate piano and organ majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of previous course required, PY.715.211[C].

PY.715.311. Keyboard Skills 3 - Piano Majors. 2 Credits.
A course designed to build score-reading skills at the keyboard. Required for undergraduate piano majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of PY.715.212[C] required.

PY.715.312. Keyboard Skills 4 - Piano Majors. 2 Credits.
A course designed to build score-reading skills at the keyboard. Open to majors only.Required for undergraduate piano majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of PY.715.311[C] required.

PY.715.633. Advanced Keyboard Skills 1 - Piano Majors. 2 Credits.
A course in score-reading, transposition, and figured bass accompaniment. Open to majors only. Required for MM piano majors. Students who completed Peabody's undergraduate courses in keyboard skills (715.155-156 and 715.255-256) with a grade of B or higher are exempt from this course.

PY.715.634. Advanced Keyboard Skills 2 - Piano Majors. 2 Credits.
A course in score-reading, transposition, and figured bass accompaniment. Open to majors and those with significant prior experience only. Required for MM piano majors. Students who completed Peabody's undergraduate courses in keyboard skills (715.155-156 and 715.255-256) with a grade of B or higher are exempt from this course.
Completion of PY.715.633[C] required.

PY.123.111. Exploring Arts Careers. 1 Credit.
This introductory course in Peabody's Breakthrough Curriculum is designed to help students develop a better understanding of their artistic identity and begin to create a context for their art. The class comprises four units -- Place, Purpose, People, and Path -- centered around what it means to be a 21st century artist in Baltimore and beyond. Exploring Arts Careers is a required course for all first-year undergraduates and transfer students.

PY.123.311. Building a Brand and Portfolio. 2 Credits.
Building a Brand and Portfolio is a two-credit course which focuses on career development training. Students will develop a digital portfolio, and conduct and produce an interview with a potential mentor. Digital portfolio will include website, supporting media, artist bio, and resume. Course also covers key professional skills including networking, negotiating, applying for jobs, and financial management.
PY.123.101[C] OR PY.123.111[C]

PY.123.312. Pitching Your Creative Idea (UG). 2 Credits.
Pitching Your Creative Idea, the final course in the Breakthrough Curriculum sequence is a required two-credit course for all third-year undergraduate and first-year master's students. In this project-based course, students develop and practice essential skills for the 21st century performing artist. Through determining and designing an artistic project for a setting external to Peabody, they learn skills in audience research, programming, collaboration, and professionalism, while also building experience advocating publicly for their artistry both verbally and in writing. As the capstone for this class, students create a written grant application and juried proposal, with the option to enter a juried competition for project funding.
Completion of Building a Brand and Portfolio needed, PY.123.311[C].

PY.123.412. Music and Law. 2 Credits.
How does a creative artist make a living — and a life? In this foundational survey course, students will study aspects of law that shape a career in and beyond the arts. Topics include how to get or grant permission to use copyrighted works, how to read a contract, and how to start or join a business. Advanced topics may include negotiation, the analysis of popular music in copyright infringement cases, and current developments in intellectual property law. By learning how copyright law can protect creative works, how contracts can generate income, and how business structures can influence the impact of the artist in society, students will empower themselves to create their future.

PY.123.413. Creativity, Entrepreneurship, and Organizations. 2 Credits.
How do musical compositions make it out into the world? In this practicum, students will get hands-on experience administering the recently discovered archive of a former Peabody composer whose centennial will be in 2021. Participants will help run a not-for-profit corporation, prepare critical and/or performing editions of works, and conclude the term with a recital of these rediscovered compositions. Due to the size of the archive (60+ works), this practicum could repeat each semester and culminate in a centennial concert or festival in 2021.

PY.123.415. Arts Leadership Today. 2 Credits.
Learn through discussion, case studies and hands on practice key aspects of leading and managing an arts organization today including strategic planning, programming, marketing, public relations, fundraising, staffing, budgeting, and community engagement.

PY.123.499. Business of Music Practicum. 1 Credit.
Required for students minoring in the Business of Music.

PY.123.501. Alexander Technique. 2 Credits.
This course is designed to provide students with a practical, experiential understanding of the principles of the Alexander Technique, a process of movement re-education, and the application of those principles to daily activities and to playing an instrument or singing. Much time will be given to the investigation of individual ways of moving. The exploration of this technique will lead students to a quality of movement informed by heightened physical and spatial awareness, improved balance, coordination and breathing, and effortless support. Students will learn how to avoid neck, back and shoulder pain, along with a means of preventing repetitive strain injuries related to playing their instruments.

PY.123.502. Alexander Technique 2. 2 Credits.
This course is for students who have completed PY.123.501 and want to integrate Alexander technique more fully into their performance and practice, as well as daily life. Students who have some other experience with Alexander technique may contact the instructor. During the course, students will deepen their ability to apply the principles of the Alexander Technique to performance and practice, and to choose balanced coordination of their whole selves. Students will learn to be able to rely on their own "Alexander awareness" to access effortless support and balance, to deal with stress, and prevent strain and injury. They will also develop their authentic expression, lively presence, freedom of movement and connection with themselves, their task, and their audience.

PY.123.521. Playing Well 1. 3 Credits.
Offered at the graduate level, this course covers anatomy and movement concepts as applied to music making, with particular attention to those structures at risk for repetitive trauma. This three-credit, 14-week online course is asynchronous, so you can work through the weekly course material when it's convenient for you. Through original and curated videos, assigned reading, participation in discussion boards, and individual assignments, you will learn how musicians use their bodies, exploring the skeletal, muscular, and nervous systems as well as posture and breathing, and analyzing movements that can cause stress and injury.

PY.123.522. Playing Well 2. 3 Credits.
Explores instrumental musicians' playing-related disorders. Topics include an overview of risk factors and injury mechanisms, principles of treatment, medical examinations, and specific injuries and treatments by body region. Students receive information from the expert perspectives of physicians, therapists, and musicians and complete a practical capstone project designed to apply medical and therapeutic knowledge to their work in practice and performance.

PY.123.523. Playing Well 3. 3 Credits.
Three-credit course explores primary and secondary prevention strategies within a framework of prevention, preparedness, response, and recovery. Topics include the importance of exercise, sleep and nutrition; how to plan playing-specific mind and body training and functional conditioning; warm-up, cool-down, unloading, recovery, and regeneration activities as key components of performance training; exposure control to repetition and force through efficient motor learning strategies; and integration of retraining programs in rehabilitation to prevent reinjury.

PY.123.611. Building a Brand and Portfolio. 2 Credits.
Building a Brand and Portfolio is a two-credit course which focuses on career development training. Students will develop a digital portfolio, and conduct and produce an interview with a potential mentor. Digital portfolio will include website, supporting media, artist bio, and resume. Course also covers key professional skills including networking, negotiating, applying for jobs, and financial management.

PY.123.612. Pitching Your Creative Idea (GR). 2 Credits.
Pitching Your Creative Idea, the final course in the Breakthrough Curriculum sequence is a required two-credit course for all third-year undergraduate and first-year master's students. In this project-based course, students develop and practice essential skills for the 21st century performing artist. Through determining and designing an artistic project for a setting external to Peabody, they learn skills in audience research, programming, collaboration, and professionalism, while also building experience advocating publicly for their artistry both verbally and in writing. As the capstone for this class, students create a written grant application and juried proposal, with the option to enter a juried competition for project funding.
Completion of Building a Brand and Portfolio needed, PY.123.611[C].

PY.123.630. Writing About Music. 3 Credits.
Writing About Music is a proseminar to coach structured writing projects in several genres.

PY.310.701. Composition Recital (UG). 2 Credits.
Undergraduate recital for Composition Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.310.721. Composition Recital (DMA). 2 Credits.
Open to DMA Composition Majors only.

PY.330.721. Conducting Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Conducting majors. Final recital for MM Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only

PY.330.722. Conducting Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.721[C], needed.

PY.330.723. Conducting Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.722[C], needed.

PY.330.724. Conducting Recital (GR 4). 2 Credits.
4th recital for AD Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.723[C], needed.

PY.330.725. Conducting Recital (Concerto). 2 Credits.
Concerto recital for DMA Conducting majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only

PY.330.726. Conducting Recital (Chamber). 2 Credits.
Chamber recital for DMA Conducting majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.330.727. Conducting Recital (Lecture). 2 Credits.
Lecture recital for DMA Conducting majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.350.701. Computer Music Recital (UG). 2 Credits.
Undergraduate recital for Computer Music Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.701. Historical Performance Recital (UG). 2 Credits.
Undergraduate recital for Historical Performance Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.721. Historical Performance Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Historical Performance majors. Final recital for MM Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.722. Historical Performance Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.721[C], needed.

PY.380.723. Historical Performance Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.722[C], needed.

PY.380.724. Historical Performance Recital (AD 4). 2 Credits.
4th recital for AD Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.723[C], needed.

PY.380.725. Historical Performance Recital (Concerto). 2 Credits.
Concerto recital for DMA Historical Performance majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.726. Historical Performance Recital (Chamber). 2 Credits.
Chamber recital for DMA Historical Performance majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.380.727. Historical Performance Recital (Lecture). 2 Credits.
Lecture recital for DMA Historical Performance majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.410.701. Brass Recital (UG). 2 Credits.
Undergraduate recital for Brass instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.721. Brass Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Brass instrument majors. Final recital for MM Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.722. Brass Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.721[C], needed.

PY.410.723. Brass Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.722[C], needed.

PY.410.724. Brass Recital (AD 4). 2 Credits.
4th recital for AD Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.723[C], needed.

PY.410.725. Brass Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Brass instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.726. Brass Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Brass instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.410.727. Brass Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Brass instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.415.701. Percussion Recital (UG). 2 Credits.
Undergraduate recital for Percussion Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.721. Percussion Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Percussion majors. Final recital for MM Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.722. Percussion Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.721[C], needed.

PY.415.723. Percussion Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.722[C], needed.

PY.415.724. Percussion Recital (AD 4). 2 Credits.
4th recital for AD Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.723[C], needed.

PY.415.725. Percussion Recital (Concerto). 2 Credits.
Concerto recital for DMA Percussion majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.726. Percussion Recital (Chamber). 2 Credits.
Chamber recital for DMA Percussion majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.415.727. Percussion Recital (Lecture). 2 Credits.
Lecture recital for DMA Percussion majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.420.701. Harp Recital (UG). 2 Credits.
Undergraduate recital for Harp Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.721. Harp Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Harp majors. Final recital for MM Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.722. Harp Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.721[C], needed.

PY.420.723. Harp Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.722[C], needed.

PY.420.724. Harp Recital (AD 4). 2 Credits.
4th recital for AD Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.723[C], needed.

PY.420.725. Harp Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Harp majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.726. Harp Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Harp majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.420.727. Harp Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Harp majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.425.701. Strings Recital (UG). 2 Credits.
Undergraduate Senior recital for String instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.721. Strings Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA String instrument majors. Final recital for MM String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.722. Strings Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.721[C], needed.

PY.425.723. Strings Recital (GR 3). 2 Credits.
3rd recital for AD and DMA String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.722[C], needed.

PY.425.724. Strings Recital (AD 4). 2 Credits.
4th recital for AD String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.723[C], needed.

PY.425.725. Strings Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA String instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.726. Strings Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA String instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.425.727. Strings Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA String instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.430.701. Woodwinds Recital (UG). 2 Credits.
Undergraduate recital for Woodwind instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.721. Woodwinds Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Woodwind instrument majors. Final recital for MM Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.722. Woodwinds Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.721[C], needed.

PY.430.723. Woodwinds Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.722[C], needed.

PY.430.724. Woodwinds Recital (AD 4). 2 Credits.
4th recital for AD Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.723[C], needed.

PY.430.725. Woodwinds Recital (Concerto). 2 Credits.
Concerto recital for DMA Woodwind instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.726. Woodwinds Recital (Chamber). 2 Credits.
Chamber recital for DMA Woodwind instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.430.727. Woodwinds Recital (Lecture). 2 Credits.
Lecture recital for DMA Woodwind instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.450.701. Piano Recital (UG). 2 Credits.
Undergraduate recital for Piano Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.721. Piano Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Piano majors. Final recital for MM Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.722. Piano Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.721[C], needed.

PY.450.723. Piano Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.722[C], needed.

PY.450.724. Piano Recital (AD 4). 2 Credits.
4th recital for AD Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.723[C], needed.

PY.450.725. Piano Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Piano majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.726. Piano Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Piano majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.450.727. Piano Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Piano majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.460.701. Organ Recital (UG). 2 Credits.
Undergraduate recital for Organ Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.721. Organ Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Organ majors. Final recital for MM Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.722. Organ Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.721[C], needed.

PY.460.723. Organ Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.722[C], needed.

PY.460.724. Organ Recital (AD 4). 2 Credits.
4th recital for AD Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.723[C], needed.

PY.460.725. Organ Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Organ majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.726. Organ Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Organ majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.460.727. Organ Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Organ majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.470.309. Guitar Junior Recital. 1 Credit.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.701. Guitar Recital (UG). 2 Credits.
Undergraduate Senior recital for Guitar Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.721. Guitar Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Guitar majors. Final recital for MM Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.722. Guitar Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.721[C], needed.

PY.470.723. Guitar Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.722[C], needed.

PY.470.724. Guitar Recital (AD 4). 2 Credits.
4th recital for AD Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.723[C], needed.

PY.470.725. Guitar Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Guitar majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.726. Guitar Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Guitar majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.470.727. Guitar Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Guitar majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.530.701. Voice Recital (UG). 2 Credits.
Undergraduate recital for Voice Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.721. Voice Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Voice majors. Final recital for MM Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.722. Voice Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.721[C], needed.

PY.530.723. Voice Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.722[C], needed.

PY.530.724. Voice Recital (GR 4). 2 Credits.
4th recital for AD Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.723[C], needed.

PY.530.725. Voice Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Voice majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.726. Voice Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Voice majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.530.727. Voice Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Voice majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.570.701. Jazz Recital (UG). 2 Credits.
Undergraduate recital for Jazz Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.570.721. Jazz Recital (GR 1). 2 Credits.
1st recital for GPD Jazz majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.570.722. Jazz Recital (GR 2). 2 Credits.
2nd recital for GPD Jazz Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.570.721[C], needed.

PY.550.111. Recording 1a - Fundamentals. 2 Credits.
A course designed to introduce the beginning Recording Arts student to components of the recording process, including a detailed analysis of the nature of sound and human perception, digital audio and operation of recording consoles, microphone types and techniques, editing, and other skills. Open to majors and other majors with permission of instructor.
Open to Recording Arts majors. Non-majors who wish to enroll should email the instructor's permission to peabodyregistrar@jhu.edu.

PY.550.112. Recording 1b - Fundamentals. 2 Credits.
A course designed to introduce the beginning Recording Arts student to components of the recording process, a detailed analysis of the nature of sound and human perception, digital audio and operation of recording consoles, microphone types and techniques, editing, and other skills. Open to majors and other majors with permission of instructor.
Completion of Recording 1a with a B- or higher is required, PY.550.111[C].

PY.550.211. Recording 2a - Studio Technology. 2 Credits.
A continuation of Recording I that provides students with an in-depth exploration of the tools and technology associated with the recording process including signal flow, analog and digital theory, signal processing, and recording systems. Open to majors and other majors with permission of instructor
Completion of Recording 1b with a B- or higher is required, PY.550.112[C].

PY.550.212. Recording 2b - Studio Technology. 2 Credits.
A continuation of Recording I that provides students with an in-depth exploration of the tools and technology associated with the recording process including signal flow, analog and digital theory, signal processing, and recording systems. Open to majors and other majors with permission of instructor. Prerequisite: Recording I.
Completion of Recording 2a with a B- or higher is required, PY.550.211C].

PY.550.311. Recording 3a - Classical/Jazz Techniques. 2 Credits.
Building on the Recording I and II courses, students will explore techniques for recording in the "tonmeister" style of engineering, particularly as it relates to microphone techniques for classical and jazz music recording, mixing and editing. Additional topics include surround sound and multitrack production. Open to majors only.
Completion of Recording 2b with a B- or higher is required, PY.550.212[C].

PY.550.312. Recording 3b - Classical/Jazz Mixing and Editing. 2 Credits.
Building on the Recording I and II courses, students will explore techniques for recording in the "tonmeister" style of engineering, particularly as it relates to microphone techniques for classical and jazz music recording, mixing and editing. Additional topics include sur-round sound and multitrack production.
Completion of Recording 3a with a B- or higher is required, PY.550.311[C].

PY.550.411. Recording 4a - Rock/Pop Techniques. 3 Credits.
A continuation of Recording III, this course focuses on contemporary recording techniques associated with rock/pop music production. Topics include multi-track recording, mixing, overdubbing, and headphone monitoring. Open to majors only.
Open to Recording Arts majors only.;Completion of Recording 3b with a B- or higher is required, PY.550.312[C].

PY.550.412. Recording 4b - Rock/Pop Mixing and Editing. 3 Credits.
A continuation of Recording III, this course focuses on contemporary recording techniques associated with rock music production. Topics include multi-track recording, mixing, over-dubbing, and headphone monitoring. Prerequisite: Recording III or permission of instruc-tor.
Completion of Recording 4a with a B- or higher is required, PY.550.411[C].;Open to Recording Arts majors only.

PY.550.419. Recording Internship. 4 Credits.
Undergraduate students work in supervised professional positions in which they will have the opportunity to apply the knowledge and expertise developed during their course of study. The internship requires 320 hours of service in an approved facility. Open to majors only.
Open to Recording Arts majors only.

PY.550.511. Advanced Recording Systems 1. 3 Credits.
Theory and practical application of the tools and techniques used in professional audio recording in all common musical styles. Topics include a review of studio acoustics, human perception of sound, microphone theory and application, signal processing, recording, mixing and mastering. Advanced techniques in Classical, Jazz and Rock music recording, and other styles as time permits. Open to incoming students in the Recording and Production track of the Master of Arts in Audio Sciences program.
Open to Recording Arts majors only.

PY.550.512. Advanced Recording Systems 2. 3 Credits.
Theory and practical application of the tools and techniques used in professional audio recording in all common musical styles. Topics include a review of studio acoustics, human perception of sound, microphone theory and application, signal processing, recording, mixing and mastering. Advanced techniques in classical, jazz and rock music recording, and other styles as time permits. Prerequisite: Acceptance to Recording and Production track of the Master of Arts in Audio Sciences program, or permission of instructor.
Open to Recording Arts majors only.;Completion of Advanced Recording Systems 1 with a B- or higher is required, PY.550.511[C].

PY.550.513. Advanced Studio Production 1. 3 Credits.
Advanced practical training in producing and engineering recordings in a variety of musical styles at a professional level in a masterclass-like environment with an accomplished professional recording engineer. Final capstone projects will be evaluated by a panel of outside producers representing Classical, Jazz and Rock music styles and engineers who are experts in their respective field of professional audio recording, and presented at the end of the year in an open forum attended by all students in the Recording Arts and Sciences department. Open to majors only.
Open to Recording Arts majors only.

PY.550.514. Advanced Studio Production 2. 3 Credits.
Advanced practical training in producing and engineering recordings in a variety of musical styles at a professional level in a masterclass-like environment with an accomplished pro-fessional recording engineer. Final capstone projects will be evaluated by a panel of outside producers representing Classical, Jazz and Rock music styles and engineers who are experts in their respective field of professional audio recording, and presented at the end of the year in an open forum attended by all students in the Recording Arts and Sciences depart-ment. Prerequisite: Recording IV or Advanced Recording Systems.
PY.550.513[C];Open to Recording Arts majors only.

PY.550.515. Musical Acoustics. 3 Credits.
A course concerned with the physics of sound as applied to properties of musical instruments, perception of musical sound, electronic music reproduction, and the spaces in which they perform. Prerequisites for recording arts majors: Basic Recording I and II or equivalent. Prerequisite for non-recording majors: Basic Recording Techniques or equivalent. Open to majors only, others by permission of instructor.

PY.550.516. Electroacoustics. 3 Credits.
This class will cover the basic fundamentals of electro-acoustics subdivided into roughly four units: fundamentals and transducer theory, loudspeakers, headphones and microphones. Prerequisite for Recording Majors: Physics 2.

PY.550.517. Psychoacoustics. 3 Credits.
The course focuses on the basics of the physiological and psychological aspects of hearing with applications to audio and sound systems, architectural acoustics, and musical acoustics. Topics include auditory physiology of the outer and inner ear, masking, critical bands, loudness, duration, binaural hearing, localization, and pitch. Open to majors only.

PY.550.519. Acoustical/Audio Measurements. 3 Credits.
The theory and application of objective acoustical and audio measurements are studied. Measurement techniques used in the evaluation of both physical spaces and electronic equipment are presented. Topics include measurement microphones, sound level meters, noise sources, spectrum and FFT analysis, frequency analysis, reverberation, speech intelligibility, transfer functions, swept sine techniques, audio power measurements, ADC and DAC linearity, harmonic distortion and mixed signal testing.
Completion of Architectural Acoustics 1 required, PY.550.624[C].

PY.550.524. Sound Design/Video Games. 3 Credits.
This course is designed for advanced Composition, Computer Music, and Recording Arts students to study and collaborate on sound design and composition for video games. The class population is made up of 50/50 composers and recording engineers for the purposes of project collaboration. Enrollment by permission of the chair of the department.
Completion of Recording 3b, Advanced Recording Systems 1, or Introduction to Programming required, PY.550.511[C], PY.550.312[C], or PY.350.466[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.610. Audio Science and Technology. 3 Credits.
This course is designed to integrate many of the audio and acoustics concepts discussed in the Master of Arts: Concentration in Recording and Production degree curriculum into an exploration of the electronics and acoustics fundamental to audio engineering. Topics include Current, Voltage, and Power in Audio systems; Reactive Circuit Elements; AC Circuits; Semiconductor Devices; Integrated Circuits; Transistor Based Amplifier Circuits; Power Supply Technology; Embedded Systems, and Audio System Engineering. Additional discussion of Architectural Acoustic Fundamentals, including Large Hall and Small room acoustical design. Co- and Pre-requisites: Introduction to Electrical and Computer Engineering (undergraduate) and Advanced Recording Systems (graduate), or permission of the instructor.

PY.550.611. Consumer Audio Systems. 3 Credits.
An introduction to the world of consumer audio electronics. The playback chain: What it is, how it works, and how it sounds. Lectures and outside-of-class projects will include a topology analysis of and critical listening to the following audio components and technologies: preamplifiers; power amplifiers; loudspeakers; disc players; DACs; music servers; computer audio; turntables, cartridges, tonearms, phono preamplifiers for vinyl disc playback; broadcast and internet radio; home theater configuration; interconnects; receivers; lossy and lossless codecs; multichannel audio and bass management; specifications and measurement; wireless audio profiles and codecs; network audio; active products and DSP; and headphones and headphone amplifiers. At the end of the course students will have a deep understanding of these topics and the ability to aurally discern the musical impact various design topologies have on the playback of recorded sound. Co- and Pre-requisites: Recording III (undergraduate) and Advanced Recording Systems (graduate), or permission of the instructor.
Completion of Audio Science and Technology required, PY.550.610[C].

PY.550.624. Architectural Acoustics 1. 3 Credits.
This class covers the fundamentals of architectural acoustics design. Topics will include: Plane and spherical waves; acoustic impedance and sound energy density; reflection, refraction, and diffusion; sound absorption; acoustic materials; psychoacoustic aspects; room modes; statistical versus geometric acoustics; reverberation theory; coupled-space acoustics; behavior of sound in rooms; and large versus small room acoustics. Open to students in the Acoustical Studies track of the Master of Arts in Audio Sciences program or by permission of instructor.

PY.550.625. Audiovisual System Design. 3 Credits.
The objective of this class is to provide students with an overview of commercial audiovisual systems design. This will include both the considerations required to design audiovisual systems and all the ancillary considerations required to properly integrate these systems with architecture, electrical, mechanical, structural, and IT systems.
Completion of Electroacoustics required, PY.550.516[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.626. Noise Control. 2 Credits.
A continuation of Architectural Acoustics (550 • 624) Topics will include: perceptual aspects of noise control; sound power, noise control criteria and standards; hearing loss prevention; environmental acoustics; airborne sound isolation (transmission loss theory, walls, floors, doors, and windows) structure-borne sound insulation (impact insulation theory and floors); vibration isolation (vibration isolators and design); heating, ventilation, and air conditioning (HVAC) noise control; and noise control applications in buildings. Prerequisites: Physical Acoustics, Architectural Acoustics, or permission of instructor.
Completion of Architectural Acoustics 1 required, PY.550.624[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.627. Acoustical Modeling. 2 Credits.
Basics of computer modeling for room acoustics and sound system design. Topics include general theory and assumptions underlying computer modeling, different types of acoustical models, auralization, small room acoustics, large room acoustics, and sound system computer models. Introduction to popular computer models including Room Sizer, Room Optimizer, EASE, ULYSSES, and ODEON.

PY.550.631. Graduate Acoustics Seminar. 2 Credits.
This course examines professional practices common in the industry, including interaction with clients, design professionals, and contractors; professional ethics and liability; insurance; contracts and fees; and setting and project documentation. Open to majors only.

PY.550.632. Architectural Acoustics 2. 3 Credits.
This class is a continuation of content introduced in PY.550.624: Architectural Acoustics. This course focuses on analysis, design and application, expanding on established foundations and topical content in previous courses. Architectural acoustics applications for Concert Halls, Recital Halls, Spoken-word Theatre Spaces, Lecture and Classroom Spaces, Worship Spaces, Outdoor Performance Venues, Rehearsal and Practice Spaces, Recording and Production Spaces, Cinemas, Sports Venues, Restaurants and/or Office Spaces may be considered. This course is open to students in the MA in Audio Sciences, Acoustical Studies track, or by permission of instructor.
Completion of Architectural Acoustics 1 required, PY.550.624[C].

PY.550.640. Acoustics Design Practicum. 3 Credits.
In this course taken in the final semester of study, students act as acoustical consultants to design or analyze an existing room or sound system using the knowledge gained through prior classes. The students are responsible for complete analysis, measurements, modeling, design documentation, and presentation of the final design in class. Open to majors only.
Completion of Architectural Acoustics 1 and 2 required, PY.550.632[C] AND PY.550.624[C].;Open to Recording Arts and Acoustics majors only.

PY.550.651. Recording for Musicians 1. 2 Credits.
A comprehensive course in recording and associated technologies designed for the musician who wishes to know about the recording arts. The course is taught parallel to Basic Recording I and II but without the required mathematics and physics and is open to upper-level undergraduates and graduate students of all majors.

PY.550.652. Recording for Musicians 2. 2 Credits.
Designed for non-recording majors, this class offers an overview of the recording process starting with a basic understanding of the acoustics of a performance space; through the signal chain of microphones, signal processing, recording, editing, mixing, and loudspeaker and headphone monitors; to the acoustics of the monitoring environment and the human perception of sound. Additional topics include mastering a final product and distribution on CD and through online services. The completion of PY.550.651 is a prerequisite.
PY.550.651[C]

PY.425.449. Orchestral Repertoire - Violin. 1 Credit.
The development of orchestral performance skills for violinists. Emphasis on repertoire and preparation for auditions. Open to majors only.
String majors only.

PY.425.450. Orchestral Repertoire - Violin. 1 Credit.
The development of orchestral performance skills for violinists. Emphasis on repertoireand preparation for auditions. Open to majors only.
String majors only.

PY.425.451. Orchestral Repertoire - Viola. 1 Credit.
The development of orchestral performance skills for violists. Minimum of three students per class. Open to majors only.
String majors only.

PY.425.452. Orchestral Repertoire - Viola. 1 Credit.
The development of orchestral performance skills for violists. Emphasis on repertoire andpreparation for auditions. Open to majors only.
String majors only.

PY.425.465. Orchestral Repertoire - Cello. 1 Credit.
The development of orchestral performance skills for cellists. Emphasis on repertoire and preparation for auditions. Open to majors only.
String majors only.

PY.425.466. Orchestral Repertoire - Cello. 1 Credit.
The development of orchestral performance skills for cellists. Emphasis on repertoire andpreparation for auditions. Open to majors only.
String majors only.

PY.425.467. Orchestral Repertoire - Double Bass. 1 Credit.
The development of orchestral performance skills for double bassists. Open to majors only.
String majors only.

PY.425.468. Orchestral Repertoire - Double Bass. 1 Credit.
The development of orchestral performance skills for double bassists. Open to majors only.
String majors only.

PY.425.641. Violoncello Pedagogy 1. 2 Credits.
Training for prospective cello teachers with study of various pedagogues. Materials covered include setup, left hand, bow hand, sequencing of instruction, and choice of music and activities as they apply to beginning students at every age level. Open to both upper-level undergraduates and graduate majors.
String majors only.

PY.425.642. Violoncello Pedagogy 2. 2 Credits.
Training for prospective cello teachers with study of various pedagogues. Materials coveredinclude setup, left hand, bow hand, sequencing of instruction, and choice of music andactivities as they apply to beginning students at every age level. Open to both upper-levelundergraduates and graduate majors.
String majors only.;Completion of Violoncello Pedagogy 1 required, PY.425.641[C].

PY.425.651. Violin/Viola Pedagogy 1. 2 Credits.
Training for prospective violin/viola teachers with study of various pedagogues. Materials covered include setup, left hand, bow hand, sequencing of instruction and repertoire from the beginning to advanced levels. Observation of violin/viola instructors in the Peabody Preparatory and supervised studio teaching experience. Open to both upper-level undergraduates and graduate violinists and violists in the fall semester and by permission of instructor in the spring semester.
String majors only.

PY.425.652. Violin/Viola Pedagogy 2. 2 Credits.
Training for prospective violin/viola teachers with study of various pedagogues. Materialscovered include setup, left hand, bow hand, sequencing of instruction and repertoire fromthe beginning to advanced levels. Observation of violin/viola instructors in the Peabody Preparatoryand supervised studio teaching experience. Open to both upper-level undergraduatesand graduate majors in the fall semester and by permission of instructor in the springsemester.
String majors only.;Completion of Violin/Viola Pedagogy 1 required, PY.425.651[C].

PY.010.100. Minor Lesson 1/2 Hour. 1 Credit.

PY.010.101. Minor Lesson 1/2 Hr. 1 Credit.

PY.020.100. Minor Lesson 1 Hour. 2 Credits.

PY.020.101. 1 Hr Minor Lesson. 2 Credits.

PY.050.100. Major Lesson 1/2 Hour. 2 Credits.

PY.100.100. Major Lesson 1 HR. 4 Credits.

PY.100.101. Major Lesson 1 HR. 4 Credits.

PY.186.100. Vocal Coaching. 1 Credit.
PY.186.100 consists of weekly half hour-long lessons, designed to develop skills for performing and teaching the art of singing: including repertoire choices, musicianship, language, diction and study methods (background study, wordsmithing, observation, dissection, practicing and organizing), as well as preparation for a jury, hearing, or recital.

PY.380.109. Historical Performance 109 Jury. 1 Credit.
Historical Performance majors only.

PY.380.209. Historical Performance 209 Jury. 1 Credit.
Historical Performance majors only.

PY.380.309. Historical Performance 309 Jury. 1 Credit.
Historical Performance majors only.

PY.410.109. Brass 109 Jury. 1 Credit.
Brass majors only

PY.410.209. Brass 209 Jury. 1 Credit.
Brass majors only

PY.410.309. Brass 309 Jury. 1 Credit.
Brass majors only

PY.415.109. Percussion 109 Jury. 1 Credit.
Percussion majors only.

PY.415.209. Percussion 209 Jury. 1 Credit.
Percussion majors only.

PY.415.309. Percussion 309 Jury. 1 Credit.
Percussion majors only.

PY.420.109. Harp 109 Jury. 1 Credit.
Harp majors only.

PY.420.209. Harp 209 Jury. 1 Credit.
Harp majors only.

PY.420.309. Harp 309 Jury. 1 Credit.
Harp majors only.

PY.425.109. Strings 109 Jury. 1 Credit.
String majors only.

PY.425.209. Strings 209 Jury. 1 Credit.
String majors only.

PY.425.309. Strings Jr Recital/309 Jury. 1 Credit.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.109. Woodwinds 109 Jury. 1 Credit.
Woodwind majors only.

PY.430.209. Woodwinds 209 Jury. 1 Credit.
Woodwind majors only.

PY.430.309. Woodwinds 309 Jury. 1 Credit.
Woodwind majors only.

PY.450.109. Piano 109 Jury. 1 Credit.

PY.450.209. Piano 209 Jury. 1 Credit.
Open to Piano majors only.

PY.450.309. Piano 309 Jury. 1 Credit.

PY.460.109. Organ 109 Jury. 1 Credit.

PY.460.209. Organ 209 Jury. 1 Credit.

PY.460.309. Organ 309 Jury. 1 Credit.

PY.470.109. Guitar 109 Jury. 1 Credit.

PY.470.209. Guitar 209 Jury. 1 Credit.

PY.530.109. Voice 109 Jury. 1 Credit.

PY.530.209. Voice 209 Jury. 1 Credit.

PY.530.309. Voice 309 Jury. 1 Credit.

PY.570.109. Jazz 109 Jury. 1 Credit.

PY.570.209. Jazz 209 Jury. 1 Credit.
Open to Jazz majors only.

PY.570.309. Jazz 309 Jury. 1 Credit.
Open to Jazz majors only.

PY.530.469. Italian Diction. 2 Credits.
This course prepares students to sing artistically in Italian through a combination of dictionstudy, text translation, and performance. Prerequisite: minimum one semester of collegestudy of Italian language or permission of instructor.
Open to Voice majors only.

PY.530.471. Russian Diction. 2 Credits.
A study of Russian vocal music, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.473. Opera Literature. 2 Credits.
A study of selected works in opera from the 17th century to present, with emphasis on compositional styles and traditions of performance. Offered in alternate years.

PY.530.474. Opera Literature. 2 Credits.
A study of selected works in opera from the 17th century to present, with emphasis on compositional styles and traditions of performance.

PY.530.475. English Diction. 2 Credits.
A study of the International Phonetic Alphabet and the English language, with particular attention to American English, its unique sounds and their execution in singing.
Open to Voice majors only.

PY.530.477. German Diction. 2 Credits.
A thorough examination of the phonemic/phonetic system of German pronunciation and its application to singing in that language. The course is designed to give students not only the professional tools to analyze the phonetic problems in German texts (and to transcribe those solutions with the aid of IPA), but also the ability to hear for themselves how those solutions can be applied. Special emphasis is placed on Bühnenaussprach/Hochlautung, noting the differences between speaking and singing in that language, and the resulting choices that the student will need to make in achieving a good and flexible singing pronunciation. The course emphasizes speaking and then singing excerpts from the German vocal repertoire from opera, oratorio, and Lieder.
Open to Voice majors only.

PY.530.478. Czech Diction. 2 Credits.
Open to Voice majors only.

PY.530.483. French Diction. 2 Credits.
A study of French vocal music, its poetry and interpretation, with attention to diction (using the International Phonetic Alphabet) and grammar, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.545. Graduate Diction Review 1.
This two-semester course is an introduction and review of the International Phonetic Alphabet and its application in writing, speaking and singing English, French, German and Italian. Emphasis will be placed on the study of the IPA and its application in each of the four languages. Required for graduate voice students who do not pass the Diction Placement Exam.
Open to Voice majors only.

PY.530.546. Graduate Diction Review 2.
This two-semester course is an introduction and review of the International Phonetic Alphabet and its application in writing, speaking and singing English, French, German and Italian. Emphasis will be placed on the study of the IPA and its application in each of the four languages. Required for graduate voice students who do not pass the Diction Placement Exam.
Open to Voice majors only.;Completion of Graduate Diction Review 1 required, PY.530.545[C].

PY.530.589. Vocal Literature: English/Italian. 2 Credits.
A survey of English and Italian song literature from the Renaissance to Modern day, applyingthe International Phonetic Alphabet (IPA) to specific repertoire. Prerequisite: EnglishDiction and Italian Diction.
Undergraduates need to have completed English and Italian Diction in order to enroll, PY.530.469[C] and PY.530.475[C].;Open to Voice majors only.

PY.530.590. Vocal Literature: German/French. 2 Credits.
A study of selected vocal works and styles in French and German from the 17th century tothe present, with emphasis on compositional trends, traditions of performance, and exposureto a wide variety of literature from both cultures and languages. Prerequisite: GermanDiction and French Diction.
Open to Voice majors only.;Undergraduates need to have completed German and French Diction in order to enroll, PY.530.477[C] and PY.530.483[C].

PY.530.615. Selected Topics in Art Song. 2 Credits.
Performance seminar in 6 units, chosen to represent some important touchstones in the repertoire: John Dowland Songs with Lute (setting a standard); Franz Joseph Haydn Canzonettas (setting a standard); Francis Poulenc: 6 Decades of Song; Charles Ives: The Hidden Innovator; Robert Schumann in 1840: the Amazing “Song Year”; Florence Price: The Uncaged Bird
Open to Voice majors only.

PY.530.617. Singing Bach. 2 Credits.
An introduction to the performance of solo vocal repertoire by J. S. Bach. Singers will study and present representative selections from the St. Matthew Passion, St. John Passion B Minor Mass, Magnificat, Christmas Oratorio, and selected cantatas. The elements of style will be addressed, including the rhetoric of Bach recitative. Cultural and historical context will also be examined.
Open to Voice majors only.

PY.530.645. Musical Theatre Survey. 2 Credits.
Analysis and performance of selected works from the American musical theater, beginning with Jerome Kern and continuing to present-day examples. Offered in alternate years.
Open to Voice majors only.

PY.530.671. Operas of Mozart. 2 Credits.
A study of the music and drama of five principle operas. Offered in alternate years.
Open to Voice majors only.

PY.530.672. Operas of Verdi. 2 Credits.
Open to Voice majors only.

PY.530.679. Advanced French Airs and Melodies. 2 Credits.
An in depth study of French vocal music with an emphasis on style and interpretation, as well as attention to diction (reviewing the International Phonetic Alphabet) and grammar, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.680. Survey of African-American Art Song. 2 Credits.
This seminar critically examines the history, nature, and trajectory of art song by African American composers. As such, we will understand that art song by African American composers is significant to the genre of art song as an entity. Using a Critical Race Theory Lens we will investigate the simultaneity race, gender, sexuality, and class oppression as expressed in musical values and the reception history of these works. Students will be required to musically prepare songs, perform them in class, and create short presentations about relevant stylistic elements of the song and information about the composer.
Open to Voice majors only.

PY.530.683. Vocal Pedagogy. 2 Credits.
A class participation course that includes an introduction to various voice teaching methods and their respective approaches to posture and breathing, registration, resonation, coordination, interpretation, and vocal health; an examination of the anatomy and function of the vocal mechanism; student teaching; teacher observation; repertoire and recital planning. Required for the MM in Voice with Pedagogy Emphasis and the DMA in Voice, Option C; an elective for seniors and other graduate students.
Open to Voice majors only.

PY.530.684. Vocal Pedagogy Lab. 2 Credits.
This semester of vocal pedagogy will be continuation of the introduction of relevant content through in-house and guest lecturers. Elements critical to an effective teaching studio will also be covered. Stimulating class discussion will be a vital part of the students' understanding of class content. Reading assignments accompany each class.
Open to Voice majors only.;Completion of previous course required, PY.530.683[C].

PY.530.685. Verismo Opera. 2 Credits.
Open to Voice majors only.

PY.530.686. Bel Canto Opera. 2 Credits.
Open to Voice majors only.

PY.530.687. Oratorio. 2 Credits.
Participants in this performance seminar will prepare and present representative oratorio repertoire from the 18th century to the present. Students will acquire an understanding of the breadth of styles in this body of repertoire and will complete the course with a list of works of practical value for themselves in the future. The term "oratorio" will be considered broadly, and may include symphonies with voice (e.g. Beethoven 9 and Mahler 2 & 4) but not concert works for solo voice (e.g. Mahler Des Knaben Wunderhorn and Ravel Shéhérezade).
Open to Voice majors only.

PY.530.691. 21st Century Voice 1. 2 Credits.
A performance practice course including score reading, definitions of the technical language of avant garde music, and contemporary vocal techniques. Performance is optional. Offered in alternate years.
Open to Voice majors only.

PY.530.692. 21st Century Voice 2. 2 Credits.
A survey of contemporary vocal literature and notational practices, including discussion oftechniques for learning complex music and coaching of selected repertoire. Students willpresent on topics, techniques, and repertoire. A course for singers, pianists, composers,conductors and others.A continuation of the fall semester. Prerequisite: PY.530.691 or permission of instructor.
Completion of previous course needed, PY.530.691[C].;Open to Voice majors only.

PY.530.695. Advanced Lieder Studies. 2 Credits.
This course is designed to present students with analysis, preparation, and performance of the poetry and music found in German Lieder. Through detailed study of poetry and music, we will trace the development of German song from it's humble origins, to the great song cycles of Schubert, Schumann, Wolf, Mahler, and beyond. Attention will be paid to appropriate diction, style, and practical performance of the German vocal literature.
Open to Voice majors only.

PY.430.455. Orchestral Repertoire - Clarinet. 1 Credit.
The development of orchestral performance skills for clarinet with emphasis on repertoire.
Woodwind majors only.

PY.430.456. Orchestral Repertoire - Clarinet. 1 Credit.
The development of orchestral performance skills for clarinet with emphasis on repertoire.
Woodwind majors only.

PY.430.463. Piccolo Class. 1 Credit.
Woodwind majors only.

PY.430.464. Piccolo Class. 1 Credit.
Covers repertoire from both solo and orchestral literature in order to increase proficiency,familiarity, and comfort with the "little flute." Emphasis on audition preparation and experience.Required material: Jack Wellbaum's Orchestral Excerpts for Piccolo.
Woodwind majors only.

PY.430.519. Orchestral Repertoire - Flute. 1 Credit.
The development of orchestral performance skills for flute with emphasis on repertoire.
Woodwind majors only.

PY.430.520. Orchestral Repertoire - Flute. 1 Credit.
The development of orchestral performance skills for flutists with particular emphasis onstandard orchestral flute solos and how they are traditionally performed for today's ensemblesand conductors, with focus on orchestral audition preparation and the developmentof skills unique to this setting and the demands of this repertoire: employing various stylesof articulation to enhance ensemble playing, learning methods for tuning under differentcircumstances and techniques for projection, exercising improved self-perception andunderstanding, developing knowledge of some acoustic phenomena of other orchestralinstruments, practicing observation as a method for honing one's own performance skills,applying the laws of nature to the process of creative interpretation. We frequently coverstandard excerpts which apply to the entire flute section or parts thereof. Usually the classincludes one Mock Audition per semester. Students practice building listening, observation,and teaching skills as a part of offering support and feedback to colleagues. They willbecome familiar not only with how to audition but also with how to adjudicate auditions.
Woodwind majors only.

PY.430.573. Orchestral Repertoire - Oboe/ EH. 1 Credit.
The development of orchestral performance skills for oboe and English horn with emphasis on repertoire.
Woodwind majors only.

PY.430.574. Orchestral Repertoire - Oboe/ EH. 1 Credit.
The development of orchestral performance skills for oboe and English horn with emphasison repertoire.
Woodwind majors only.

PY.430.575. Orchestral Repertoire - Bassoon. 1 Credit.
The development of orchestral performance skill for bassoon with emphasis on repertoire.
Woodwind majors only.

PY.430.576. Orchestral Repertoire - Bassoon. 1 Credit.
The development of orchestral performance skill for bassoon with emphasis on repertoire.
Woodwind majors only.

PY.430.591. Oboe Reed Making. 1 Credit.
The construction of oboe reeds.
Woodwind majors only.

PY.430.592. Oboe Reed Making. 1 Credit.
The construction of oboe reeds.
Woodwind majors only.

General Information, Procedures and Regulations

General Information, Procedures, and Regulations

In this section:

General Information, Procedures and Regulations

Introduction and Nomenclature

The Peabody Institute was founded in 1857. Music instruction began in 1868, and the first diploma was awarded in 1882. Following a long history of informal collaboration, the institute affiliated with The Johns Hopkins University in 1977 and became a constituent school of the University in 1986.

The title "Peabody Institute" refers to the original name of the institution and the continuing nomenclature in the University's official documents. For most purposes, Peabody operates as two divisions: the Peabody Preparatory and the Peabody Conservatory.

The Peabody Preparatory, founded in 1894, serves approximately 2,000 precollege and continuing education students on four campuses. More information about the Preparatory may be found on their webpages (https://peabody.jhu.edu/preparatory/).

The Peabody Conservatory is the post-secondary or "college" division of Peabody, serving approximately 700 students in five degree programs and three diploma programs, on a historic campus in Baltimore's Mt. Vernon neighborhood.

This is the catalogue of the Conservatory, which awards degrees as "The Conservatory of the Peabody Institute of the Johns Hopkins University," and which may also be addressed as "the Johns Hopkins Peabody Conservatory."

General Information, Procedures and Regulations

Mission

The Peabody Conservatory Mission Statement

The Peabody Conservatory strives to provide aspiring artists with the skills to pursue professional careers in the arts as well as the education to become leaders in the cultural life of their communities.

Strategic Objective

Peabody is building on its rich history of professional artist training at the highest level and has developed a vision for the role of the 21st century artist in society and the training required for artists to meet the new realities and opportunities of that role. Peabody's history, tradition, and pedigree, coupled with its forward-looking view and commitment to challenge traditional assumptions, allow it to take on the real work of what it means to prepare artists for a world that is constantly changing.

General Information, Procedures and Regulations

Accreditation Statement

As a division of The Johns Hopkins University, Peabody is accredited by the Maryland Higher Education Commission (MHEC) and the Middle States Commission on Higher Education (MSCHE).

The Maryland Higher Education Commission
839 Bestgate Road, Suite 400
Annapolis, MD 21401
Telephone: 410.260.450
http://www.mhec.state.md.us/ (https://mhec.state.md.us/Pages/default.aspx)

Middle States Commission on Higher Education
3624 Market St.
Philadelphia, PA 19104-2680
Telephone: 267.284.5000.
http://www.msche.org/ (https://www.msche.org/)

Peabody's Department of Music Education is licensed to grant the degree Bachelor of Music Education by the Maryland State Department of Education:

Maryland State Department of Education
200 West Baltimore Street
Baltimore, MD 21201
Telephone: 410-767-0600
http://www.marylandpublicschools.org (http://www.marylandpublicschools.org/)

The Peabody Conservatory meets the responsibilities of maintaining accreditation in association with the Offices of the Provost of the Johns Hopkins University.

Janet Schreck
Senior Associate Vice Provost For Academic Affairs
265 Garland Hall
3400 N. Charles Street
Baltimore, MD 21218
Telephone: 410-516-5985
https://provost.jhu.edu/members/janet-schreck/

Veterans Educational Benefits

Johns Hopkins is approved by the Maryland Higher Education Commission for the training of veterans, service members, eligible spouses and dependents under the provisions of the various federal laws pertaining to veterans' educational benefits. Johns Hopkins University also complies with Federal Law Section 103 (effective 1 August 2019) which ensures that Johns Hopkins University will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities, or the requirement that an eligible individual borrow additional funds, on any covered individual because of the individual's inability to meet their financial obligations to the institution due to the delayed disbursement funding from VA under Chapter 31 or 33.

Please visit the JHU Veterans Affairs website (https://registrar.jhu.edu/veterans/) for additional information.

General Information, Procedures and Regulations

Links

The Peabody Academic Catalogue is intended to provide information about curricula and policies and procedures related to teaching and learning. Other kinds of information that have previously been collected in the printed catalogue may be found elsewhere.

Consumer Information

In compliance with Title IV, the Higher Education Opportunity Act of 2008, and other Federal and State disclosure laws, the Peabody Institute has listed consumer information for prospective and current students. The most recent information is always available at: the Student Right to Know page (https://peabody.jhu.edu/life-at-peabody/student-right-to-know/)

General Information, Procedures and Regulations

Honor Societies

Music

Peabody chartered the Epsilon Omicron chapter of *Pi Kappa Lambda* in 1988. Pi Kappa Lambda (https://www.pikappalambda.org/about/) is a national honorary society for outstanding juniors, seniors, and graduate students, who are elected annually by the faculty according to the by-laws registered with the Association of College Honor Societies.

Peabody also sponsors membership in *NAfME (National Association for Music Education)*, a national professional organization of music teachers whose membership includes elementary and secondary school music teachers as well as those involved in teacher education at colleges and universities throughout the country. Membership is open to all music education majors.

Dance

Peabody has institutional memberships in the following associations:

- The National Dance Education Organization (https://www.ndeo.org/)
- The Maryland Council for Dance (http://www.mdcouncil4dance.org/)
- The American College Dance Association (https://www.acda.dance/) (ACDA) in the Mid-Atlantic North Region.

Each of these associations host meetings and festivals in which students have the opportunity to take master classes, perform, adjudicate work, and network.

Procedural Information

Procedural Information

In this section:

Procedural Information

Applicability

Students are responsible for understanding all regulations. Students are responsible for completing all applicable requirements for graduation. The Peabody Institute reserves the right to change any provision, requirement, policy, or regulation published within a student's term of residence. However, it may be assumed that, except under the most unusual circumstances, the regulations in force during a student's term of residence are those stated in the year in which the student matriculated.

Academic Petitions

Students with a compelling reason for an exception to an academic regulation, policy, or program requirement in this document should submit an academic petition, located under the "Academic Services" heading in the Peabody Institute Service Desk (https://projects.peabody.jhu.edu/servicedesk/customer/portals/). Petitions will be reviewed by the Petitions Committee in a timely manner.

Procedural Information

Studio Assignments

Students must have a major teacher for the duration of their studies. Studio assignments are arranged prior to matriculation on the basis of student requests and teacher availability. Once a student matriculates into the Conservatory, the student is expected to remain with the same studio teacher for the duration of their program. In instances where there are compelling reasons for requesting a change, a student may submit an academic petition (https://projects.peabody.jhu.edu/servicedesk/customer/portals/) as outlined in Applicability (p. 747). All studio changes require the signature of both the current and new major teacher, as well as the signature of the Associate Dean for Academic Affairs.

If no studio teacher is willing to accept a student, the student will be compelled to withdraw from the Conservatory.

Procedural Information

Course Numbering

The Johns Hopkins University Student Information System (SIS) contains the official listing of Conservatory courses. Course numbers are structured as follows:

The most common divisional codes are:

Code	Name
PY	Peabody
EN	Whiting School of Engineering
AS	Arts and Sciences
BU	Carey Business School

A list of frequently occurring departments:

Code	Department
PY.410	Brass
PY.310	Composition
PY.350	Computer Music
PY.330	Conducting
PY.800	Dance
PY.910	Ensembles - Large
PY.950	Ensembles - Small/Chamber
PY.470	Guitar
PY.420	Harp
PY.380	Historical Performance
PY.570	Jazz
PY.260	Liberal Arts
PY.250	Liberal Arts: Language
PY.510	Music Education
PY.710	Music Theory
PY.715	Music Theory - Keyboard, ET/SS
PY.610	Musicology
PY.320	Music for New Media
PY.540	Opera
PY.460	Organ
PY.520	Pedagogy
PY.415	Percussion
PY.450	Piano/Ensemble Arts
PY.123	Professional Studies
PY.550	Recording Arts and Sciences
PY.425	Strings
PY.100	Studio Lessons
PY.530	Voice
PY.430	Woodwinds

Procedural Information

Large Ensemble Participation

Participation in instrumental or vocal ensembles is integral to Peabody's music curricula.

With the exception of students in the Artist Diploma and Doctor of Musical Arts degree, all music students majoring in orchestral instruments or jazz are required to play in a large ensemble during every semester in which they are enrolled in major lessons. Historical Performance majors, vocalists, pianists, guitarists, composers, Music for New Media students, and computer musicians must also play or sing in large ensembles as dictated by their curricula.

The Ensemble Office manages the personnel, rehearsal, and performance activities of many of the Conservatory's instrumental and vocal ensembles, including orchestral rotations, chorus assignments, Jazz Ensemble, and Conductors Orchestra. The Ensemble Office does not manage the Conservatory's historical performance ensembles chamber music, or Peabody Opera Theatre voice students.

Large Ensemble Registration

Peabody's large instrumental ensembles for orchestral instrument majors are combined into a single course called Large Ensemble, designed to give participating students a wide range of ensemble experiences. Students will not remain in any one particular ensemble for the duration of a given semester or academic year but will instead rotate through a variety of different ensemble configurations. A single letter grade will be issued each semester which reflects a student's participation and achievement in all their ensemble experiences during that semester.

Ensemble	UG	Grad	Day	Time
Large Ensemble	PY.910.501	PY.910.801	MTWThF	3:30 - 5:30PM
Peabody Singers	PY.910.515	PY.910.815	MW	2:30 - 4:00PM
Peabody-Hopkins Chorus	PY.910.511	PY.910.811	MW	4:30 - 6:00PM
Peabody Jazz Ensemble	PY.910.537	PY.910.837	TTh	1:30 - 3:20PM
Baltimore Baroque Band	PY.910.527	PY.910.827	W	7:30 - 10:00PM
Renaissance Ensemble	PY.910.529	PY.910.829	T	6:00 - 10:00PM

The personnel in the Ensemble Office serve as the collective teacher of record for the Large Ensemble course. All rules published by the Ensemble Office constitute a syllabus and course outline for ensemble grading. It is the responsibility of each student participating in ensembles to know and abide by the rules. For the complete Large Ensemble Course Syllabus, which includes the Large Ensemble Attendance and Grading Policy and the Concert Attire Guidelines, see the Ensemble Office website

Procedural Information

Competitions

Peabody sponsors several annual prize competitions, through the generosity of various donors. Students should check competition guidelines, with dates, eligibility, repertoire requirements, procedural details and deadlines with the Concert Office. Previous first-prize winners are not eligible to enter the same competition a second time. Students must be in good academic standing and enrolled in major lessons to be eligible to compete in Peabody competitions.

Competitions Managed by the Concert Office

- **The Virginia Carty DeLillo Composition Competition** is offered biennially to any Conservatory composition major enrolled for lessons. Entrants submit one composition of any style, length, or instrumentation. First prize includes a $1,000 cash award and performance of the winning work at a public Peabody concert, if feasible. Second prize is $500.
- In the **Peggy and Yale Gordon Concerto Competition**, students compete for a $1,500 cash prize and a performance with the Peabody Symphony Orchestra, a recital on the Homewood campus, and additional recitals scheduled by the Yale Gordon Trust. This competition rotates annually in the areas of strings, piano, and orchestral instruments. Second prize is $750.
- **The Macht Orchestral Composition Competition** is for composition majors and is designed to provide a premiere public performance for new works for orchestra. Entries must have been written for a standard symphonic orchestra or chamber orchestra during the student's period of enrollment at Peabody. The works submitted must also have been played through in a Peabody orchestral reading session and the composer must be enrolled for major lessons during the year. Held annually since 2000, the competition winner receives a prize and a performance of the winning work at a Peabody public concert.
- **The Sylvia L. Green Voice Competition** is held biennially for junior, senior, or graduate-level voice students. Doctoral students are eligible if they are enrolled for major lessons. Contestants perform one or more works of chamber orchestra size or larger. Excerpts from opera or oratorio are not acceptable. First prize is $1,500 plus a performance with a large Peabody instrumental ensemble. Second prize is $750.
- **The William Marbury Prize** is awarded each year to an outstanding undergraduate violin student through a juried competition. The competition award includes a major public recital, as well as a $1,000 cash prize. Second prize is $500. Any undergraduate violin major enrolled in a degree or certificate program is eligible to enter this competition upon the major teacher's recommendation.
- **The Harrison L. Winter Piano Competition** was established in 1990 in tribute to a former chairman of Peabody's Board of Trustees. It is scheduled on a two-years on, one-year off basis. The first prize winner receives a $1,000 cash prize and a performance with the Peabody Symphony Orchestra. The second prize is $500.
- **The Vocal Studies Song Competition** is open to sophomores, juniors, seniors, MM, GPD, AD, and DMA students. The applicable language requirements for juries among the various class levels will apply to this competition. Only non-orchestral/non-operatic/non-chamber song repertoire will be permitted. Each singer should present a list of classical songs—4 songs for undergraduate level and 6 songs for graduate level. These songs should represent a variety of languages applicable to their class level requirement. The graduate competitors must include at least one song composed after 1950. All songs are required to be memorized.

Other Competitions

- **The Prix d'Eté Competition** was endowed by Walter Summer in 1994 and established to encourage composition and computer music majors to compose new chamber works exploring new dimensions in performance, instrumentation and multimedia. Held annually, entries in alternate years must demonstrate significant use of music technologies. The first prize includes $1,000, and a performance of the winning work. Details may be obtained from the Computer Music Faculty.
- **The Louis Sudler Prize in the Arts** is a University-wide $1,500 prize offered for excellence in performance, execution or composition in one of the arts as an advocational activity. Peabody seniors may compete in any artistic area except music (i.e. writing, visual arts, dance, film, etc.). Complete information about the Sudler Prize is available on the Sudler Prize website.

Procedural Information

Recitals

Public recitals are required for the completion of all undergraduate and graduate performance degrees and diplomas. All recitals must be scheduled through the procedures established by the Concert Office and in strict observation of the established deadlines. Students must be registered for major lessons during the semester in which they give a degree recital.

Most degree recitals take place on campus. Capstone projects and off campus recitals require the approval of the Major Teacher, Academic Affairs, and the Concert Office. See the Concert Office regulations (https://livejohnshopkins.sharepoint.com/sites/PeabodyStudents/SitePages/Recitals-at-Peabody.aspx) for information on the recital process.

Grades given for off-campus recitals may not be contested.

Students must earn at least a B- on all recitals in order to meet the standards for satisfactory academic progress. Any grade below B- is deemed an unsatisfactory grade and requires the student to retake the recital in the following semester.

Recital Repertoire

Degree recitals are solo recitals of repertoire selected with the approval of the major teacher. All recital repertoire should be new repertoire studied during the student's residency at Peabody. Students are not permitted to perform repertoire learned at previous institutions, performed at the entrance audition for Peabody, or performed at a hearing/jury in the student's current program. Solo performances are normally given from memory.

In instrumental areas other than piano, chamber works may be performed on the recital with the written permission of the major teacher and clearance from the Ensemble Office attesting to the availability of the other performers and the feasibility of the repertoire. Students who wish to perform ensemble works that are contained within the Ensemble Library holdings are allowed to check out the music, subject to availability, by submitting a music requisition form. Music from the Ensemble Library must be returned within one week following the recital.

Students who program works that are only available on a rental basis must make their rental arrangements through the Ensemble Office, which acts as Peabody ombudsman for copyright compliance. Rental parts are rented on a per performance basis, and students may only use rental sets for the exact performance for which they are obtained. An approved music requisition form must be submitted at least six weeks before the recital date. Students may not negotiate directly with music publishers for performances presented at Peabody or under the aegis of Peabody.

All proposed recital programs must meet the minimum-maximum required performance time for the degree in order to be approved by the Office of Academic Affairs and the Concert Office (see below (p. 749) for specific limitations).

Credit, Scheduling and Grades

A degree recital is a course. The course number for a degree recital is listed in the curricula for each degree and diploma. To receive credit for a recital, students must register for the course number through the registration process used for all other courses at Peabody. Unlike other courses, however, a degree recital requires special scheduling. To accommodate all students with an equitable division of resources, all degree recitals must be scheduled and performed within the guidelines set by the Concert Office.

All degree recitals are graded by two faculty members: the major teacher and a second faculty member from the department. Recital grades are submitted to the Office of Academic Affairs and recorded in SIS when received.

Specific Recitals

JUNIOR RECITALS

Students majoring in guitar, violin, violoncello, and viola performance are required to give a junior recital in their third year of study. This junior recital takes the place of the 309 jury. Students in other departments may elect to play a junior recital off-campus or as a non-degree recital (see the requirements for Non-Degree Recitals below) but must still complete a 309 jury.

All junior recitals must be completed before April 1 of each academic year.

Performance Time (in minutes of music) for Junior Recitals

Major	Minimum	Maximum
Guitar	25	60
Jazz	30	60
Violin/Viola	25	60

SENIOR RECITALS

All undergraduate students majoring in performance are required to give a senior recital in their final year of study. All senior recitals must be completed before April 1 of each academic year.

When registering for their senior recital, students should register following the course number:

Code	Title	Credits
Brass		
PY.410.701	Brass Recital (UG)	2
Composition		
PY.310.701	Composition Recital (UG)	2
Computer Music		
PY.350.701	Computer Music Recital (UG)	2
Guitar		
PY.470.701	Guitar Recital (UG)	2
Harp		
PY.420.701	Harp Recital (UG)	2
Historical Performance		
PY.380.701	Historical Performance Recital (UG)	2
Jazz		
PY.570.701	Jazz Recital (UG)	2
Organ		
PY.460.701	Organ Recital (UG)	2
Percussion		
PY.415.701	Percussion Recital (UG)	2
Piano		
PY.450.701	Piano Recital (UG)	2
Strings		
PY.425.701	Strings Recital (UG)	2
Voice		
PY.530.701	Voice Recital (UG)	2
Woodwinds		
PY.430.701	Woodwinds Recital (UG)	2

Performance Time (in minutes of music) for Senior Recitals:

Major	Minimum	Maximum
Composition	50	60
Guitar	50	60
Historical Performance	50	60
Jazz	50	60
Orchestral Instruments	50	60
Piano[1] and Organ	50	60
Voice	45	60

1 Piano senior recitals in piano must include one composition from the 20th or 21st century.

MM RECITALS

MM students majoring in performance are required to perform a departmental hearing at the end of their first year of study and a recital in their second year of study. Students are strongly encouraged to perform their MM recital in their third or fourth semester.

MM students should register with the appropriate recital course number:

Code	Title	Credits
Brass		
PY.410.721	Brass Recital (GR 1)	2
Conducting		
PY.330.721	Conducting Recital (GR 1)	2
Ensemble Arts		
PY.450.721	Piano Recital (GR 1)	2
Guitar		
PY.470.721	Guitar Recital (GR 1)	2
Harp		
PY.420.721	Harp Recital (GR 1)	2
Historical Performance		
PY.380.721	Historical Performance Recital (GR 1)	2
Organ		
PY.460.721	Organ Recital (GR 1)	2
Percussion		

PY.415.721	Percussion Recital (GR 1)	2
Piano [1]		
PY.450.721	Piano Recital (GR 1)	2
Strings		
PY.425.721	Strings Recital (GR 1)	2
Voice		
PY.530.721	Voice Recital (GR 1)	2
Woodwinds		
PY.430.721	Woodwinds Recital (GR 1)	2

1 Piano MM recitals in piano must include one composition from the 20th or 21st century.

MM Recitals should be comprised of 50 to 60 minutes of programmed music.

GPD RECITALS

GPD students majoring in performance are required to play two recitals as part of their diploma requirements. GPD students majoring in voice may use an opera role in lieu of one of the two recitals, but only if the role has been approved by the Voice Department as being of appropriate size and scope. Students must formally register for a GPD recital through the Concert Office and specify the operatic role as the repertoire selection.

Major	Recuital 1	Recital 2
Brass	PY.410.721	PY.410.722
Conducting	PY.330.721	PY.330.722
Guitar	PY.470.721	PY.470.722
Harp	PY.420.721	PY.420.722
Historical Performance	PY.380.721	PY.380.722
Jazz	PY.570.721	PY.570.722
Organ	PY.460.721	PY.460.722
Percussion	PY.415.721	PY.415.722
Piano[1]	PY.450.721	PY.450.722
Ensemble Arts	PY.450.721	PY.450.722
Strings	PY.425.721	PY.425.722
Voice	PY.530.721	PY.530.722
Woodwinds	PY.430.721	PY.430.722

1 GPD recitals in piano may include only one concerto per program.

GPD recitals should be comprised of 50 to 60 minutes of programmed music.

DMA RECITALS

DMA students majoring in performance are required to play a minimum of three recitals. Students must be registered for major lessons during the semester in which a recital is presented. Exceptions to this include only the chamber music recital and the lecture-recital.

DMA students are required to prepare one-page program notes of publishable quality for each recital. These program notes must be approved by a full-time member of the Musicology Department before the recital program will be approved by the Office of Academic Affairs.

DMA students should register with the appropriate recital course numbers:

Major	DMA 1 Solo 1	DMA 2 Solo 2	DMA 3 Solo 3	DMA 4 Concerto	DMA 5 Chamber	DMA 6 Lecture
Brass	PY.410.721	PY.410.722	PY.410.723	PY.410.725	PY.410.726	PY.410.727
Conducting	PY.330.721	PY.330.722	PY.330.723	PY.330.725	PY.330.726	PY.330.727
Guitar	PY.470.721	PY.470.722	PY.470.723	PY.470.725	PY.470.726	PY.470.727
Harp	PY.420.721	PY.420.722	PY.420.723	PY.420.725	PY.420.726	PY.420.727
Historical Performan	PY.330.721	PY.380.722	PY.380.723	PY.380.725	PY.380.726	PY.380.727
Organ	PY.460.721	PY.460.722	PY.460.723	PY.460.725	PY.460.726	PY.460.727
Percussio	PY.415.721	PY.415.722	PY.415.723	PY.415.725	PY.415.726	PY.415.727
Piano	PY.450.721	PY.450.722	PY.450.723	PY.450.725	PY.450.726	PY.450.727
Strings	PY.425.721	PY.425.722	PY.425.723	PY.425.725	PY.425.726	PY.425.727
Voice	PY.530.721	PY.530.722	PY.530.723	PY.530.725	PY.530.726	PY.530.727
Woodwind	PY.430.721	PY.430.722	PY.430.723	PY.430.725	PY.430.726	PY.430.727

DMA recitals should be comprised of 50 to 60 minutes of programmed music.

Lecture-recitals have the same minimum-maximum performance time as the other recitals in the program. However, the musical portion of the recital should not exceed twenty minutes.

AD RECITALS

Students in the AD program are required to present four public recitals, two in each academic year in which they are enrolled in lessons. AD students should register for the following recital course numbers:

Major	AD 1	AD 2	AD 3	AD 4
Brass	PY.410.721	PY.410.722	PY.410.723	PY.410.724
Conducting	PY.330.721	PY.330.722	PY.330.723	PY.330.724
Guitar	PY.470.721	PY.470.722	PY.470.723	PY.470.724
Harp	PY.420.721	PY.420.722	PY.420.723	PY.420.724
Historical Performance	PY.330.721	PY.330.722	PY.330.723	PY.330.724
Organ	PY.460.721	PY.460.722	PY.460.723	PY.460.724
Percussion	PY.415.721	PY.415.722	PY.415.723	PY.415.724
Piano	PY.450.721	PY.450.722	PY.450.723	PY.450.724
Strings	PY.425.721	PY.425.722	PY.425.723	PY.425.724
Voice	PY.530.721	PY.530.722	PY.530.723	PY.530.724
Woodwinds	PY.430.721	PY.430.722	PY.430.723	PY.430.724

Procedural Information

Academic Advising

Advising at Peabody provides students with resources to support their educational journeys. Studio faculty are important mentors to students as they progress through their major studies and develop as young professionals. Peabody Advising supplements this faculty mentorship and is dedicated to partnering with students to shape their academic experiences through on-going conversations about:

- learning opportunities and challenges
- curricular choices that optimize and individualize their Peabody education
- advancement through academic programs
- administrative policies and procedures
- identification and utilization of resources

- time management and study skills
- personal and educational goals

The Peabody Advising Partnership

Peabody Advising and students build relationships that foster students' acquisition of skills and knowledge to thrive at Peabody and prepare for their futures. Student participation in this relationship is integral to its success and students are encouraged to meet regularly with the Director of Advising. Additionally, understanding the roles of students and advising makes for a better advising experience.

WHAT YOU CAN EXPECT FROM PEABODY ADVISING

- To encourage and support the discovery and development of your personal and academic strengths
- To seek to understand your individual concerns and the unique experiences of student artists
- To assist you in learning and navigating successfully academic requirements, policies, procedures and deadlines
- To educate you on campus resources and support services and their relevance to your academic, professional, and personal goals
- To help you to develop active responsibility for your educational career

WHAT PEABODY ADVISING EXPECTS FROM YOU

- To identify and cultivate your interests, goals, and values through participation in the Peabody community
- To communicate concerns that impact your academic, personal, and professional goals
- To share your achievements and important experiences
- To learn and follow academic requirements, policies, procedures, and deadlines
- To act on referrals to campus resources and support services as well as independently seek them out
- To take ultimate responsibility for your educational career

Peabody Advising can help you plan a course of study, brainstorm options, and research opportunities. Finally, if you don't know where to go to get a question answered, Peabody Advising is a great place to start.

Procedural Information

Inter-Institutional Academic Arrangements

Johns Hopkins Interdivisional Registration

Within the Johns Hopkins University system, interdivisional registration (IDR) extends for Peabody students to courses offered by the Krieger School of Arts and Sciences, the Whiting School of Engineering, the Carey Business School, and the School of Education.

Peabody students must request cross-registration through the Office of the Registrar. Credit sought for any other courses taken outside the Conservatory during the period of a student's enrollment must be approved in writing by the Office of Academic Affairs.

Students may submit an Academic Petition to request that Homewood graduate seminars, listed as zero credits, be articulated for Peabody credit.

Undergraduates students with a cumulative GPA of 3.0 are eligible for IDR; all graduate students are eligible for IDR.

Baltimore Collegetown Network

Peabody, as a division of Johns Hopkins, is part of the Baltimore Collegetown Network. Full-time sophomores, juniors, and seniors may take one for-credit course per semester at one of the other participating institutions. A course taken at another school operates by the policies and on the schedule of the host institution, but the grade is articulated to the student's academic record by the policies of the Peabody Conservatory. For more information about taking a class at a nearby college, see: the Baltimore Collegetown website.

Peabody Preparatory

Music and dance non-credit instruction is available through the Peabody Preparatory at 25% discounted rates for Peabody Conservatory students. Students wishing to take non-credit private music lessons must go through placement interviews/auditions. Lessons are scheduled on a space-available basis. For more information on group classes or private lessons, please visit the Preparatory website (https://peabody.jhu.edu/preparatory/ways-to-study/departments/) or contact the Preparatory via email (peabodyprep@jhu.edu) or call 667-208-6640.

Procedural Information

Study Abroad Program

Students interested in studying abroad should make an appointment with the Advising Office to discuss the timely completion of their degree requirements.

Procedural Information

Outside Instruction and Public Performance

Peabody facilities may not be used for private teaching except in cases that are connected in some way with Conservatory or Preparatory programs. A student must secure the approval of their teacher to appear as soloist or ensemble member on programs presented outside the Conservatory. Peabody reserves the right to prohibit such participation if it is considered detrimental to either the student or the school. Students in the harpsichord program are only permitted to use the school's instruments for public performance outside the Conservatory with the permission of their teacher and the Ensemble Office.

Academic Regulations

Academic Regulations

In this section:

Academic Regulations

Applicability

The academic regulations in this section apply to students who have matriculated into a degree or diploma program at the Johns Hopkins Peabody Conservatory. The other schools of the Johns Hopkins University may have different regulations, and Peabody students must abide by those regulations when taking courses on those campuses. However, for Peabody students, courses, performances, and other requirements fulfilled outside the campus of the Peabody Conservatory are assessed, articulated, and recorded within the Conservatory's administrative regulations.

Academic Petitions

Students with a compelling reason for an exception to an academic regulation, policy, or program requirement in this document should submit an academic petition, located under the "Academic Services" heading in the Peabody Institute Service Desk (https://projects.peabody.jhu.edu/servicedesk/customer/portals/). Petitions will be reviewed by the Petitions Committee in a timely manner.

Academic Regulations

Academic Code of Conduct

Statement of Principles

The Peabody Conservatory of the Johns Hopkins University ("Peabody") is committed to academic honesty and ethical conduct.# Each member of the Peabody community is entrusted with two essential responsibilities: to live honorably within the established codes of conduct, and to hold other members of the community to the same high standard of conduct.

In keeping with the educational mission of the Conservatory, acts of misconduct are viewed as an opportunity to teach students to recognize the impact of their behavior on others and the extent of their responsibilities for their actions through counseling, mediation, and/or educational efforts, noting that every act of academic misconduct has consequences and may result in one or more sanctions as described in this policy.

1. SCOPE

The policies and processes of this Peabody Academic Code of Conduct pertain to all students enrolled at the Peabody Institute, including double degree students and joint degree students.

Non-Academic Misconduct

All issues of non-academic student misconduct will be subject to the University-wide Student Conduct Code (http://studentaffairs.jhu.edu/policies/student-code/).

Research Misconduct

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, reviewing or reporting research. For a complete definition, refer to The Johns Hopkins University Research Integrity Policy (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf). The Policy applies to all University faculty, staff, trainees and students engaged in the proposing, performing, reviewing or reporting of research, regardless of funding source. Allegations of research misconduct regarding a student must be referred to the Research Integrity Officer for assessment under that Policy and must also be reported to the Associate Dean for Academic Affairs.

2. CROSS-DIVISIONAL ENROLLMENTS

Peabody Institute students may enroll in courses in one or more other University divisions or schools. Peabody students are subject to this policy not only when enrolled in Peabody courses, but also when enrolled in courses in other University divisions or schools. Academic misconduct in the context of those "outside" courses will be subject to and resolved under this policy.

Students from other divisions of the Johns Hopkins University enrolled in classes at the Peabody Institute will be held to the standards enumerated in this Peabody Academic Code of Conduct, noting that students from outside divisions must also comply with their home division or school academic ethics policy and will be subject to their home division or school procedures for resolution of academic ethics violations in Peabody courses.

3. POLICY VIOLATIONS

Academic misconduct is prohibited by this policy. Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. This includes a wide variety of behaviors such as cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual to gain an unfair academic advantage. Nonexclusive examples of academic misconduct are listed below.

Cheating. The following are nonexclusive examples of cheating:

- fraud, deceit, or dishonesty in an academic assignment, text or examination
- use or consultation of unauthorized materials (e.g., notes, books, etc.) on assignments, tests, or examinations.
- unauthorized discussion of a test or exam during its administration.
- copying content on an assignment, test or examination from another individual.
- obtaining a test or examination or the answers to a test or examination before administration of the test or examination.
- studying from an old test or examination whose circulation is prohibited by the faculty member.
- use or consultation of unauthorized electronic devices or software (e.g., calculators, cellular phones, computers, tablets, etc.) in connection with assignments, tests or examinations.
- use of paper writing services or paper databases.
- unauthorized collaboration with another individual on assignments, tests or examinations.
- submission of an assignment, test or examination for a regrade after modifying the original content submitted.
- permitting another individual to contribute to or complete an assignment, or to contribute to or take a test or examination on the student's behalf.
- tampering with, disabling or damaging equipment for testing or evaluation.
- unauthorized submission of the same or substantially similar work, assignment, test or exam (e.g., a paper, etc.) to fulfill the requirements

of more than one course or different requirements within the same course.

Plagiarism. The following are nonexclusive examples of plagiarism:

- use of material produced by another person without acknowledging its source.
- submission of the same or substantially similar work of another person (e.g., an author, a classmate, etc.).
- use of the results of another individual's work (e.g., another individual's paper, exam, homework, computer code, lab report, etc.) while representing it as your own.
- improper documentation or acknowledgment of quotations, words, ideas, or paraphrased passages taken from published or unpublished sources.
- wholesale copying of passages from works of others into your homework, essay, term paper, or dissertation without acknowledgment.
- paraphrasing of another person's characteristic or original phraseology, metaphor, or other literary device without acknowledgment.

Forgery/Falsification/Lying. The following are nonexclusive examples of forgery, falsification and lying:

- falsification or invention of data/information for an assignment, test or exam, or in an experiment.
- citation of nonexistent sources or creation of false information in an assignment
- attributing to a source ideas or information that is not included in the source.
- forgery of university or other official documents (e.g., letters, transcripts, etc.).
- impersonating a faculty member.
- request for special consideration from faculty members or university officials based upon false information or deception.
- fabrication of a reason (e.g., medical emergency, etc.) for needing an extension on or for missing an assignment, test or examination.
- claiming falsely to have completed and/or turned in an assignment, test or examination.
- falsely reporting an academic ethics violation by another student.
- failing to identify yourself honestly in the context of an academic obligation
- providing false or misleading information to an instructor or any other University official

Facilitating Academic Dishonesty. The following are nonexclusive examples of facilitating academic dishonesty:

- intentionally or knowingly aiding another student to commit an academic ethics violation.
- allowing another student to copy from one's own assignment, test, or examination.
- making available copies of course materials whose circulation is prohibited (e.g., old assignments, texts or examinations, etc.).
- completing an assignment or taking a test or examination for another student.
- sharing paper mill/answer bank websites or information with other students.

Unfair Competition. The following are nonexclusive examples of unfair competition:

- intentionally damaging the academic efforts of another student.
- stealing another student's academic materials (e.g., books, notes, assignments, etc.)
- denying another student needed University resources (e.g., hiding library materials, stealing lab equipment, etc.).

4. FIRST-TIME OFFENSES

If a student is suspected of academic misconduct, the faculty member responsible for the course in which the misconduct allegedly occurred must review the facts of the case promptly with the student. If, after speaking with the student and any witnesses, the faculty member believes that academic misconduct has occurred, the faculty member must first contact the Associate Dean for Academic Affairs or another member of Academic Affairs to determine whether the offense is a first offense, or a second or subsequent offense. If a first offense, the faculty member may settle the case directly with the student, i.e., the faculty member and student may reach an agreement on the resolution of the alleged misconduct. If such an agreement is reached, the faculty member must promptly provide the student with a letter outlining the resolution that includes the charges, a summary of the evidence, the findings, and the sanctions agreed upon, and must also simultaneously provide a copy of that letter to the Associate Dean for Academic Affairs. If, however, the faculty member cannot reach an agreement with the student (e.g., the student denies cheating or does not agree with the proposed sanction, etc.), or the offense is a second or subsequent offense, or if in the case of a first offense, the sanction imposed would be greater than failure in the course, the faculty member must promptly notify the Associate Dean of Academic Affairs in writing of the alleged violations, evidence, including potential witnesses, and other pertinent details of the case. In such instances, the case will proceed to the next phase of resolution as outlined below.

5. HEARINGS

In the case of a first offense that is not resolved between the faculty member and student, or a second or subsequent offense, the Associate Dean for Academic Affairs, or another designee from Academic Affairs, will be assigned to the case and gather information regarding the alleged academic misconduct to determine the appropriate means of resolution. This gathering of information may include without limitation meetings with or requests for statements from the respondent and witnesses, and review of any related information. The Associate Dean for Academic Affairs may dismiss a case for a lack of sufficient information or if the alleged conduct does not fall within conduct prohibited by this policy. Absent these circumstances, the case will be resolved as explained below.

Types of Conduct Proceedings

There are two types of conduct proceedings – an administrative hearing and a panel hearing. The Associate Dean for Academic Affairs (or designee) will, after the initial inquiry, decide whether a case will be resolved through an administrative hearing or a panel hearing. In making this decision, the Associate Dean for Academic Affairs (or designee) will consider the nature of the alleged misconduct and potential sanctions, the complexity of the facts, the prior academic misconduct history of the respondent, and other relevant information and factors.

Administrative Hearing | An administrative hearing involves a meeting between the Associate Dean for Academic Affairs (or designee) and the respondent. The Associate Dean for Academic Affairs (or designee) may also meet with witnesses and others involved and obtain and review relevant evidence. The Associate Dean for Academic Affairs (or designee) will review the allegations and evidence with the respondent and give the respondent an opportunity to respond. The Associate Dean for Academic Affairs (or designee) will determine based on preponderance of the evidence whether the respondent is responsible for the alleged policy violation(s), and, if so, issue (an) appropriate sanction(s).

Panel Hearings | The panel is comprised of trained University students, faculty and staff appointed for annual terms by the Associate Dean of Academic Affairs to hear alleged violations of this policy. The panel, comprised of 3 student members and 3 members of the faculty and/or staff is charged with determining based on a preponderance of the evidence whether a respondent's actions constitute a violation of this policy and, if so, determining (an) appropriate sanction(s). The panel shall make its determination of responsibility and sanctions by majority vote, except that unanimity is required for a sanction of expulsion. The hearing is a closed proceeding, meaning that no one other than the panel members and necessary University personnel, may be present. The respondent and witnesses called to the hearing will be present in the hearing room only when making a statement or being questioned by the panel.

In general, hearings will proceed as follows, although the panel has discretion to alter the order or manner in which it hears or receives evidence, and to impose time limits on any stage of the process:

- introductions
- opening statement from the reporter, if applicable
- opening statement from the respondent
- questioning of the reporter by the panel, if applicable
- questioning of the respondent by the panel
- questioning of the witnesses, if any, by the panel
- closing statement from the reporter, if applicable
- closing statement from respondent

Witnesses

The Director of Advising or panel may request the presence of any witness with relevant information about a case. The respondent may request that relevant witnesses be heard the respondent's behalf. Absent exceptional circumstances, the respondent should inform the Director of Advising in writing at least three (3) days in advance of any meeting or hearing of the names of the witnesses and to what they will attest. The Director of Advising or panel may determine whether and the extent to which witnesses will be permitted to participate or questioned in any meeting or hearing, including whether their testimony is relevant.

6. APPLICABLE PROCEDURES

In connection with the resolution of alleged policy violations, a respondent shall:

- be notified in writing of the allegations in advance of any meeting or hearing;
- be notified in writing of the charges, and the date, time and location of the hearing, and identity of the hearing administrator or panel members in advance of the hearing;
- have the opportunity to review in advance of any meeting or hearing, any information to be considered by any faculty member, administrator or panel consistent with the Family Educational Rights and Privacy Act of 1974, as amended ("FERPA") and to protect other confidential information;
- be notified in writing of the outcome of any hearing, namely the findings, determination of responsibility, and any sanctions; and
- be notified in writing of the outcome of any appeal.

A respondent may raise the potential conflict of any University personnel participating in the resolution process. A respondent may also decline to participate in the resolution process. The University may however continue the process without the respondent's participation.

Communications under this policy will primarily be conducted with students through their official University email address, and students are expected check their official University email on a regular basis.

7. EVIDENTIARY STANDARD

A "preponderance of the evidence" standard will be used to determine responsibility for alleged violations of this policy. A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true.

8. APPEALS

Except in the case of a resolution for first time offenses with a faculty member, the respondent may appeal an administrator or panel's finding of responsibility and/or sanction(s). A respondent must file any appeal within five (5) days of the date of the notice of outcome solely on one or more of the following grounds:

- procedural error that could have materially affected the determination of responsibility or sanction(s);
- new information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility or sanction(s); and
- excessiveness of the sanction(s).

Any appeal must be filed in writing with the Associate Dean for Academic Affairs. An appeal will involve a review of the file and as determined necessary, gathering of information from relevant university personnel or panelists; the appeal does not involve another hearing. On review of the appeal, the Dean or designee may:

- enter a revised determination of responsibility and/or revise sanction(s);
- remand the matter to the administrator or panel to reconsider the determination of responsibility and/or sanction(s); or
- convene a new panel to consider the case.

The Associate Dean of Academic Affairs will simultaneously send the appeal determination, with the reasons therefore, to the administrator or panel, as appropriate, and to the respondent. The decision of the Associate Dean is final. No further appeals are permitted.

9. SANCTIONS

The following factors may be considered in the sanctioning process:

- the specific academic misconduct at issue;
- the respondent's academic misconduct history; and
- other appropriate factors.

This section lists some of the sanctions that may be imposed upon students for violations of this policy. Peabody reserves the right, in its discretion, to impose more stringent or different sanctions depending on the facts and circumstances of a particular case. Sanctions for academic misconduct under policy are generally cumulative in nature.

When a student is found responsible for academic misconduct, the sanction(s) that may be imposed include without limitation one or more of the following:

- Formal warning.
- Retake of the examination, paper or exercise involved.
- Score of zero on the examination, paper or exercise involved.
- Lowering of the course grade.
- Loss of Peabody scholarship for a specific duration or permanently.
- Failure in the course without a notation on the student's transcript that the grade was for violation of academic integrity.
- Failure in the course with a notation on the student's transcript that the grade was for violation of academic integrity.
- Probation.
- Suspension from the Conservatory for a specified period of time without a notation on the student's transcript that the suspension was for violation of academic integrity.
- Suspension from the Conservatory for a specified period of time with a notation on the student's transcript that the suspension was for violation of academic integrity.
- Expulsion.
- Revocation of a degree.
- Other appropriate sanctions or corrective measures.

Definitions

Formal Warning | The student is notified in writing that their actions constitute a violation of this policy, and may be subject to other actions (e.g., re-taking an exam or failure in a course).

Probation | The student is notified that further violations of this policy within the stated period of time will result in the student being considered for immediate suspension or other appropriate disciplinary action. If at the end of the specified time period no further violations have occurred, the student is removed from probationary status.

Suspension | The student is notified that the student is separated from the University for a specified period of time. The student must leave campus and vacate campus residence halls, if applicable, within the time prescribed and is prohibited from University property and events. The conferring of an academic degree may be deferred for the duration of the suspension. A student must receive written permission from the University prior to re-enrollment or re-application. Academic work completed at another institution while on suspension will not be recognized for credit transfer.

Expulsion | Expulsion means the permanent removal of the student from the University. Expulsion includes a forfeiture of all rights and degrees not actually conferred at the time of the expulsion, permanent notation of the expulsion on the student's University records and academic transcript, withdrawal from all courses according to divisional policies, and the forfeiture of tuition and fees. Any student expelled from the University is prohibited from University property and events and future reapplication to the University.

10. RECORDS

If the student is found responsible of academic misconduct, the statement of findings will include any sanctions imposed. A copy of the findings will be copied to the Associate Dean of Academic Affairs. A case file concerning a student will be retained for seven (7) years from date that the student graduates or otherwise leaves the university.

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Revised AY 2016-2017 | August 2017
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Academic Regulations

Program Classification, Status, and Credit Limits

Students are only admitted to degree programs on the basis of scheduled auditions/interviews conducted during the normal admissions cycle and must matriculate in the fall semester that begins the next academic year. Peabody does not defer admissions. In some cases, students may matriculate to a diploma in a spring semester. Extension students may begin study in any semester depending on course and teacher availability.

Multiple Degree Programs or Majors

Students may only pursue multiple majors or multiple degree programs if they are admitted to both programs through the regular admissions process. Students enrolled in multiple programs must complete all requirements specific to both majors and may only overlap credits for supportive courses in music, professional studies, general studies, and electives.

UNDERGRADUATE

Students admitted to the Music Education and Recording Arts Bachelor of Music programs are considered students with multiple majors: a performance (or composition or computer music) major plus Music Education or Recording Arts. No other major may be added to these programs. Similarly, students in the double-degree program with the Krieger School of Arts and Sciences or the Whiting School of Engineering may pursue only one Peabody major.

Bachelor of Music Students majoring in Performance, Composition, Computer Music, and Music for New Media may add a second major, subject to the following conditions:

1. Students must pay for the second major lesson at the rate specially designated in the tuition schedule.
2. Performance majors may not add a second major on the same instrument with a different repertoire or style. Examples include Voice and Historical Performance Voice and Double Bass and Jazz Bass.
3. Students may not combine majors in the same department, such as Violin and Viola or Piano and Organ.
4. Finally, the majors Composition, Computer Music, and Music for New Media are mutually exclusive: no two may be combined. While Composition or Computer Music may be combined with Recording Arts, the Music for New Media may not be combined with Recording Arts.

Undergraduate students may add only one minor. The Performer Certificate may not be combined with any other program. Special instructions for students in the five-year BM/MM or BMRA/MA program are noted in Accelerated Graduate Degrees.

GRADUATE STUDENTS

Graduate students may not pursue two majors that result in two degree recitals in a two-year degree timeframe. Additionally, graduate students may not pursue simultaneously the Master of Music and Master of Arts degrees.

Students in the Master of Music degree may be admitted into Performance Pedagogy, which for the purposes of these rules counts as a second area of focus. Students in the Master of Music degree may apply for a second major in Music Theory Pedagogy or Musicology. Students in the Doctor of Musical Arts degree may be admitted into the Master of Music in Music Theory Pedagogy or the Master of Music in Musicology. Graduate students who previously earned a Master of Music degree elsewhere may not pursue the Master of Music degree at Peabody in the same discipline. Master of Music students pursuing two majors will receive a single, Master of Music degree. Doctor of Musical Arts students in a concurrent Master of Music Theory or Musicology program will receive two degrees (MM and DMA).

The Graduate Performance Diploma, Master of Arts Degree, and the Artist Diploma programs may not be combined with any other program. Students in the Doctor of Musical Arts Program who are also pursuing a Master of Music in Music Theory Pedagogy should refer to the guidelines of their DMA program.

Credit Limits

UNDERGRADUATE STUDENTS

Undergraduate students comprise all students who have matriculated to degree and diploma programs: Bachelor of Music (including Recording Arts and Music Education), Bachelor of Fine Arts, and the Performer's Certificate. Students who have been admitted to the five-year BM/MM program are undergraduate students until their fifth year. These students must enroll in a minimum of 12 credits each semester in order to maintain full-time status and must successfully complete 30 credits each year to demonstrate satisfactory academic progress. Undergraduate students must enroll as full-time students for eight semesters and enroll in major studies in each of those semesters. Any enrollment that puts a student below full-time status must be approved through the academic petition process and may impact financial aid, scholarship, and status for F-1 student visa holders.

Students at the undergraduate level are encouraged to take approximately 18 credits per semester. Undergraduate students may register for a maximum of 25 credits per semester. Some combined degree programs require more credits and students will be allowed to take the extra classes as prescribed by their requirements following an approved Academic Petition. In any other scenario, students with compelling reasons to take classes above the credit limit may petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/) Academic Affairs.

GRADUATE STUDENTS

Graduate students comprise all students who have matriculated to degree and diploma programs: Master of Music, Master of Arts, Doctor of Musical Arts, the Graduate Performance Diploma, and the Artist Diploma. Students who have been admitted to the five-year BM/MM program are graduate students in their fifth year. Note that the credit limits vary for degree and diploma programs. Performance, Conducting, and Composition students are required to remain enrolled in one-hour major lessons for four semesters of full-time study. Musicology and Music Theory Pedagogy majors are required to maintain full-time enrollment for four semesters of study.

GRADUATE DEGREE PROGRAMS

Graduate students in the Master of Music, Master of Arts, and Doctor of Musical Arts program must enroll in a minimum of nine credits each semester in order to maintain full-time status. MM and DMA students must successfully complete 18 credits each year to demonstrate good academic standing. Any enrollment that puts a student below full-time status must be approved through the academic petition process and may impact financial aid, scholarship, and status for F-1 student visa holders.

Students in the MM, MA, or DMA program may register for a maximum of 18 credits per semester including lessons, ensembles, recitals, and a maximum of six credits of graduate seminars each semester. Students who enroll in any Music Theory and Musicology courses beyond the six-credit limit will be administratively withdrawn from those classes. If a student has compelling reasons to take classes above the credit limit, they may petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/) Academic Affairs.

GRADUATE DIPLOMA PROGRAMS

Graduate students enrolled in the Graduate Performance Diploma, and the Artist Diploma programs must enroll in a minimum of four credits each semester in order to maintain full-time status. There is no part-time status for the GPD or AD. In addition to lessons, vocal coachings, ensembles, and recitals, students in the GPD and AD programs are allowed to enroll in a maximum of four additional credits each semester. Students who enroll in any classes beyond the four-credit limit will be administratively withdrawn from those classes. If a student has compelling reasons to take classes above the credit limit, they may petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/) Academic Affairs. Students in the one-year GPD program may enroll in additional credits if required to satisfy elective requirements. Ensembles do not apply to the credit limit.

Classification	Program	Minimum Credits for FT Status per Semester	Maximum Credits Allowed per Semester
Undergraduate Students	Bachelor of Music	12	25
	Bachelor of Fine Arts	12	25
	Performer's Certificate	12	25
Graduate Degree Students	Master of Music	9	18
	Master of Arts	9	18
	Doctor of Musical Arts	9	18
Graduate Diploma Students	Graduate Performance Diploma	4	8
	Artist Diploma	4	8

Academic Regulations

Sources of Credit

Students must earn more than half of the requirements for a degree or diploma at Peabody as a matriculated student. Any credits that are not earned at Peabody require approval for transfer from faculty and the Office of Academic Affairs or the Advising Office.

In every case, a graduating student must have credits earned at Peabody, transferred from a prior school or test provider or articulated from an approved enrollment at another division or institution as follows:

Degree	Credits
BM, BFA	120
MM, MA	30
DMA	60

Academic Credit

Peabody awards credit hours according to the guidelines of the Code of Maryland Regulations and the Middle States Commission on Higher Education For traditional coursework, students receive one credit for one hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately fifteen weeks in one semester. Enrollment in large ensembles accrues credits under the rubric for laboratory courses. Peabody grants two credits for success in large ensembles and has done so since 1985.

While accredited music schools may award as many as six credits for a semester of major lessons, they often do so if the lessons include the equivalent of a final exam. Peabody awards four credits for major lessons and one to two credits for the exam: the jury or recital. The disaggregation of credits for the lessons and the jury/recital is integral to Peabody's assessment of student learning, as noted below.

The Conservatory Curriculum and Assessment Committee in cooperation with the Associate Dean for Academic Affairs assign credit hours for each Conservatory offering as part of the procedure to approve new courses and programs. The same committee is charged with regular assessment of credit-bearing offerings at the course and program level.

Interdivisional and Baltimore Student Exchange Program Credit

Eligible Peabody students may request to take courses at other JHU divisions including: the Krieger School of Arts and Sciences, the Whiting School of Engineering, the Carey Business School, the School of Advanced International Studies (SAIS), and the School of Education.

Credit may also be available through the Baltimore Student Exchange Program (BSEP). To enroll in these courses, students need approval from the Office of the Associate Dean for Academic Affairs or the Director of advising, and, in some instances, from the instructor of the course.

Courses at other divisions and at BSEP institutions follow the grading policies and registration regulations of the host schools. These courses are recorded in the JHU Student Information System (SIS) with grades that factor into semester and cumulative GPAs.

Transfer Credits

Students may transfer credits taken at accredited post-secondary schools or through the accelerated testing of recognized providers (such as the College Board or International Baccalaureate).

Transfer credits are accepted following the submission of necessary documentation to Advising. Peabody can only transfer credits for students who have already matriculated into degree or diploma programs. New students are welcome to contact the Office of Academic Advising before enrolling but will not be able to begin the process of transferring credits until after matriculation.

For undergraduate transfer students, the year of study (sophomore or junior) is determined after the student matriculates, in conjunction with their progress in major coursework. Like most conservatories, Peabody does not accept transfer credits for lessons, juries, recitals, or ensembles. Bachelor of Music performance majors must participate in ensembles in every semester of private lesson instruction, and transfer students must participate in lessons and ensembles for at least two years.

Accepted courses taken outside of Johns Hopkins or BSEP are recorded in SIS without grades.

GRADUATE STUDENTS

New graduate students at Peabody may transfer a maximum of six credits of graduate study completed at other accredited institutions, pending the review and approval of department chairs and the Offices of Academic Affairs and Advising. All credits transferred to a graduate degree or diploma program must have been earned within five years prior to the student's first graduate degree registration at Peabody. Only credits that have not been earned in fulfillment of a previous degree may be transferred. Graduate students continuing from a previous Peabody program may transfer up to nine credits.

UNDERGRADUATE STUDENTS

First-time full-time undergraduate students may transfer a maximum of nine credits through Advanced Placement, International Baccalaureate, or dual enrollment to their degree programs. Undergraduate students in the fields of Recording Arts and Music Education may transfer additional credits of a specialized nature with the permission of their faculty advisors. Additional credits will be accepted for transfer students; however, at least half of all requirements must be earned at Peabody.

Transfer credits are only accepted if:

1. The credits are documented on an official transcript of an approved college.
2. They were not applied to any prior award (such as a degree or diploma)
3. The associated courses were completed with grades of B or better.
4. Faculty chairs and the Offices of Academic Affairs/Advising approve the credits as a substitution for a degree requirement.

Students are encouraged to request approval from the Office of Academic Advising prior to taking courses at other institutions.

UNDERGRADUATE ACCELERATED CREDITS

For undergraduate students, scores of 4 or 5 on select Advanced Placement Examinations, 50 on the CLEP administered by the College Board, or 6 or 7 on the International Baccalaureate Exam may be accepted for transfer credit. Transfer credits for these examinations are only accepted pending the submission of official documentation to the Office of Academic Advising.

See more specific restrictions below.

UNDERGRADUATE MUSIC THEORY

The Department of Music Theory does not accept transfer credits at the undergraduate level. However, advanced placement in music theory is possible based on placement testing at the time of matriculation.

UNDERGRADUATE MUSICOLOGY

The Musicology Department does not accept transfer credits for Advanced Placement courses in Musicology or Music History. However, the Musicology Department will accept up to six credits of courses taken at other accredited institutions. Students should contact the Chair of Musicology and submit an academic petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/) for approval. Students must present a syllabus of topics covered in the course. The faculty may request a graded sample of work completed in the course.

UNDERGRADUATE liberal arts

The Liberal Arts Department accepts a maximum of nine credits of AP, IB, or CLEP credit to fulfill Liberal Arts elective requirements.

UNDERGRADUATE MUSIC EDUCATION

The Music Education department directly oversees the Liberal Arts curriculum for students in the Music Education program. Music Education students should contact the Chair of Music Education about transferring AP or IB credits and consult with the Chair before enrolling in general studies courses at other institutions.

Waived Credits

Like most conservatories, Peabody does not accept transfer credits for the major-lesson enrollments: lessons, juries, recitals, or ensembles. The faculty of a department and placement test results determine the year of study (sophomore or junior).

Diagnostic testing of first year and transfer students may result in advanced placement in a curricular sequence. In such cases, Academic Advising will waive the credits for the courses that should have been taken before class in which a student is placed. Voice students may petition to take language exams in advance of attempting the appropriate course to place out of one or more of the required foreign languages and have those credits waived.

Academic Regulations

Grading System and Regulations

Letter grades are given for major lessons, coursework, ensembles, juries, and recitals. Students may not elect to take a class in a different format: there is no pass/fail option. For the following purposes of assessing academic progress, letter grades are assigned grade points as follows:

Letter Grades	Assigned Grade Points
A	4.00
A-	3.67
B+	3.33
B	3.00
B-	2.67
C+	2.33
C	2.00
C-	1.67
D	1.00
F	0.00

No grade points are assigned for the following non-credit designations:

Letter	Definition
AU	Audit
I	Incomplete
IP	In Progress
W	Withdrawn
NCR	No Credit
P	Pass

The non-credit designations AU, W, NCR, and P are permanent grades for final transcripts. The regulations for auditing courses and In Progress grades can be found below.

Grade Determination

Professors may determine the scale of letter grades appropriate to the class grading percentage and make this scale known in their syllabuses. For most purposes, the following table may be regarded as a useful standard.

Grades Scored Between	Will Equal
95% and 100%	A
90% and less than 95%	A-
87% and less than 90%	B+
84% and less than 87%	B
80% and less than 84%	B-
77% and less than 80%	C+
74% and less than 77%	C
70% and less than 74%	C-
60% and less than 70%	D
0% and less than 60%	F

Grade Point Average

Grade point averages (GPA) are computed each semester and reported as term and cumulative GPA. A GPA is determined by multiplying the grade points for each earned grade by the number of credits for the course; the product is called the number of quality points. Artist Diploma recitals, composition and computer music portfolios, and final documents are not assigned letter grades and are therefore not calculated in a GPA. English as a Second Language courses are not calculated in a GPA, but students are still assigned standard letter grades. A GPA is the total number of quality points divided by the total number of attempted credits.

Example:

Grade & Credits and Weighting:

Class	Letter	Number	Credits	Grade x Credits	Quality Points
Class 1	B	3.00	4	3.00 x 4 credits	12.00
Class 2	A-	3.67	3	3.67 x 3 credits	11.01
Class 3	F	0.00	2	0.00 x 2 credits	0.00
Class 4	C	2.00	3	2.00 x 3 credits	6.00
	Attempted	Credits	12	Total Credits x Grades	29.01

29.01 Quality Points divided by 12 attempted credits = 2.4175
Semester GPA: 2.42. Student receives 10 credits.

Incomplete Grades [1]

The grade I (Incomplete) is a temporary grade that allows a student to complete the course under specific and documented conditions. Students must request the grade of I, and both the instructor and the student must complete the Incomplete Grade Contract in SIS before the last day of classes noted in the academic calendar. Students receiving an incomplete in any course are not eligible for the Dean's List for that semester.

Faculty must submit a grade to the Registrar's Office by the instructor after grading the student's completed work. All work must be completed, and the final grade submitted within four weeks after the start of the following semester as noted on the academic calendar. If the work is not completed within this period, a grade of F replaces the I on the student's transcript.

In Progress Grades [1]

Faculty may record the grade IP (In Progress) for applied work: juries, recitals, lessons, and technique classes in dance. The grade IP requires no contract since completion of this work is required to maintain good academic standing.

Students receiving an IP in any course are not eligible for the Dean's List for that semester and will receive a warning to resolve the grade to return to good academic standing.

The grade IP is also used as placeholder to mark passing semesters for academic commitments with indefinite durations, including DMA Consultation, Graduate Research, and Ear-training Review. For these classes, IP is assigned by default until the requirement is satisfied.

IP GRADE RESOLUTION

A grade of IP must be resolved by the sixth week of the subsequent semester. In general, all work should be submitted to faculty no later than the fourth week of the subsequent semester, although faculty can set earlier deadlines as they deem appropriate. IP grades that are not resolved by the deadline in the subsequent semester of enrollment will be changed to F on the student's permanent record. Students who take a leave of absence following the award of I and IP grades have until the fourth week of the semester of return to submit work. To be approved for graduation, students must satisfy all degree requirements including IP grades.

Failing Grades

At the undergraduate level, the grade of F is a failing grade for coursework. In addition, in the Department of Music Theory, a D is a failing grade. At the graduate level, the grades D and F are failing grades for coursework. Good Academic Standing requires students to earn higher grades in designated enrollments. Music students must earn a B- or better in major enrollments (lessons, juries, recitals, and Music for Media 1-4). Dance students must earn a B- or better in technique and performance classes.

For enrollments that are specifically designated as requiring higher grades in the Academic Standing policy, failure to achieve those grades requires approval to fulfill major area requirements and may delay graduation.

Grade Appeals

If a student disputes a recorded grade, they can appeal the grade through direct communication with the instructor. If the matter cannot be resolved with the instructor, the student may take their appeal to the chair of the department, or in the case of Large Ensembles, to the Large-Ensemble Manager. If the matter cannot be resolved with the chair, the student may submit an academic petition (https://projects.peabody.jhu.edu/servicedesk/customer/portals/). Grade appeals must be initiated within 45 days of the end of the grading period.

Grade Changes

Grades are only changed at the request of the course instructor in order to resolve an IP or I grade or to correct an error in grading. The instructor should request a change of grade by contacting the Conservatory Registrar, who will confer with the Associate Dean for Academic Affairs. Changes of grade should be requested and addressed promptly. Absent extraordinary circumstances—which would require broader consultation with the Conservatory leadership—no grade will be changed after 18 months of being posted to the student's record.

[1] This content was updated on 04/22/2022. Approved by the University Registrar.

Academic Regulations

Dean's List Criteria

The criteria for inclusion on the Dean's List are:

1. Full-time status in an undergraduate degree program.
2. A semester grade point average of 3.67 or higher.
3. No 'In Progress' grades for the semester.

Students who achieve the Dean's List with a semester grade point average of 3.90 or higher are designated "High Honors."

Academic Regulations

Academic Standing

Conservatory students who have matriculated in degree and diploma programs are required to maintain good academic standing. The Office of Academic Affairs reviews academic standing at the end of each semester.

Students who receive federal financial aid are also required to maintain satisfactory academic progress (SAP) as determined by the Financial Aid Office (https://peabody.jhu.edu/audition-apply/financial-aid-scholarships/current-students/policies/).

Note: The interim policies instituted during the 2019-2020 and 2020-2021 Academic Years are no longer in effect.

Academic Standing for Undergraduate Students

GOOD ACADEMIC STANDING

Undergraduate students are considered in good academic standing if they complete 12 credits each semester with a term and cumulative GPA of 2.0. Music students must earn a B- or better in major enrollments (lessons, juries, recitals, and Music for Media 1-4). Dance students must earn a B- or better in technique and performance classes.

ACADEMIC WARNING

Students will receive a letter of academic warning for the following reasons:

- Receiving an F in any class.
- Taking an IP in a major enrollment such as lessons, juries, and recitals for Music students or technique and performance classes for Dance students.

Students who receive a letter of academic warning are still in good academic standing. The Conservatory recognizes that injury and illness may make it necessary to take an IP in a major enrollment. In such cases, a letter of academic warning simply signals the need to plan for a number of outcomes in the following semester. Any student who receives academic warning letters in consecutive semesters will be placed on academic probation.

ACADEMIC PROBATION
Students will be placed on academic probation for the following reasons:

- Earning a term GPA below 2.0.
- Completing fewer than 12 credits.
- Earning a grade below B- in major area enrollments.
- Receiving academic warning letters in consecutive semesters.
- Falling short of the pace to complete the degree in the normative timeframe.
- Failing any course twice.

Student who are placed on academic probation will receive a letter stating the reason for why they are not in good academic standing and are required to complete a self-assessment and meet with Peabody Advising. They must remedy the situation in the subsequent semester of study.

Students on academic probation may not enroll in courses outside of their major area that do not apply to their requirements nor participate in Interdivisional Registration unless required for their major program.

CONTINUED ACADEMIC PROBATION
Students who have been on academic probation will be reclassified as continued academic probation if, after a semester of study, the student has remedied the problem that placed the student on probation but has fallen short of one of the other measures of academic standing. In rare cases, a student may have academic standing extended on the presentation of documentation of treatment from a licensed care provider and in consultation with the Associate Dean for Academic Affairs and the relevant faculty.

ACADEMIC SUSPENSION
Students who have been on probation and do not meet minimum requirements for returning to good academic standing will be evaluated for academic suspension. An academic suspension is a forced separation from enrollment in the next fall or spring semester. Students placed on academic suspension must adhere to the following rules:

- The student may not register for coursework at the Johns Hopkins University.
- The student will have no access to the Peabody Campus or facilities.
- The student may be required to present evidence of successful academic progress at another school with credits to transfer and articulate to the degree program at Peabody.
- The student must return in one year or be administratively withdrawn from the Conservatory.

Additionally, a student who is not on probation but does very poorly in a semester could be considered for suspension if:

- The student earns a term GPA below 1.5.
- The student earns an F in a major enrollment.
- The student earns less than six credits.
- The student fails any course three times.

When a student returns after academic suspension, they are placed on academic probation until they have met the requirements under "Return to Good Academic Standing."

ACADEMIC DISMISSAL
Students who have been suspended for poor academic performance and then return to Peabody and fail to do well enough to return to good standing are dismissed, with no opportunity to return to complete the Peabody degree. Similarly, students may be dismissed without prior suspension if the GPA falls below 1.5 and/or the student earns an F in major enrollments.

RETURN TO GOOD ACADEMIC STANDING
Students are removed from academic action if they complete 12 credits and maintain a 2.0 term and cumulative GPA, and no unauthorized IPs or F grades.

If a student is not in good standing for multiple failures of the same course, there is an additional requirement of the successful completion of the course for a return to good standing.

Academic Standing for Graduate Students

GOOD ACADEMIC STANDING
Graduate students are considered in good academic standing if they complete each semester with a term and cumulative GPA of 3.0.

- Master of Arts students must earn 9 credits each semester.
- Master of Music and Doctor of Musical Arts Students must complete 9 credits each semester and earn a B- or better in lessons, and recitals.
- Graduate Performance Diploma students must earn 4 credits each semester and a B- or better in lessons and recitals.
- Artist Diploma students must earn 4 credits each semester and complete at least one recital each academic year.

ACADEMIC WARNING
Graduate students will receive a letter of academic warning for the following reasons:

- Receiving an F in any class.
- Taking an IP in lessons or a recital

Students who receive a letter of academic warning are still in good academic standing. The Conservatory recognizes that injury and illness may make it necessary to take an IP in a major enrollment. In such cases, a letter of academic warning simply signals the need to plan for a number of outcomes in the following semester. Any student who receives academic warning letters in consecutive semesters will be placed on academic probation.

ACADEMIC PROBATION
Students will be placed on academic probation for the following reasons:

- Earning a term GPA below 3.0.
- Completing fewer than 9 credits.
- Earning a grade below B- in major area enrollments.
- Receiving academic warning letters in consecutive semesters.
- Falling short of the pace to complete the degree in the normative timeframe.

Student who are placed on academic probation will receive a letter stating the reason for why they are not in good academic standing and must remedy the situation in the next fall or spring semester.

CONTINUED ACADEMIC PROBATION

Students who have been on academic probation will be reclassified as continued academic probation if, after a semester of study, the student has remedied the problem that placed the student on probation but has fallen short of one of the other measures of academic standing. In rare cases, a student may have academic standing extended on the presentation of documentation of treatment from a licensed care provider and in consultation with the Associate Dean for Academic Affairs and the relevant faculty.

ACADEMIC SUSPENSION

Students who have been on probation and do not meet minimum requirements for returning to good academic standing will be evaluated for academic suspension. An academic suspension is a forced separation from enrollment in the next fall or spring semester. Students placed on academic suspension must adhere to the following rules:

- The student may not register for coursework at the Johns Hopkins University.
- The student will have no access to the Peabody Campus or facilities.
- The student may be required to present evidence of successful academic progress at another school with credits to transfer and articulate to the degree program at Peabody.
- The student must return in one year or be administratively withdrawn from the Conservatory.

Additionally, a student who is not on probation but does very poorly in a semester could be considered for suspension if:

- The student earns a term GPA below 1.5.
- The student earns an F in a major enrollment.
- The student earns less than six credits.

When a student returns after academic suspension, they are placed on academic probation until they have met the requirements under "Return to Good Academic Standing."

ACADEMIC DISMISSAL

Students who have been suspended for poor academic performance and then return to Peabody and fail to do well enough to return to good standing are dismissed, with no opportunity to return to complete the Peabody degree. Similarly, students may be dismissed without prior suspension if the GPA falls below 1.5 and/or the student earns an F in major enrollments.

RETURN TO GOOD ACADEMIC STANDING

Students are removed from academic action if they complete 12 credits and maintain a 2.2 term and cumulative GPA, and no unauthorized IPs or F grades.

Academic Regulations

Registration Regulations

Auditing

Full-time students may audit no more than one Conservatory course each semester. Students must obtain written instructor approval to audit between the first and sixth week week of the semester as noted on the academic calendar. Students submit the approval to Student Enrollment and Account Management (SEAM) for enrollment processing. Students may not audit courses at other divisions of the University. Once a course is registered as audit, the grade of AU will be assigned which does not count for academic credit or figure into the number of attempted credits. A course registered as audit may not be converted to a letter grade for credit, but a student may be administratively withdrawn from an audit registration at the request of the instructor for not attending.

Change of Major

Students requesting a change of major must qualify for the new major through auditions and interviews with appropriate faculty. To initiate a change of major, a student should complete a 'Change of Major' form available in the Admissions Office. In the case of adding or dropping a Music Education or Recordings Major, students should submit an academic petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/) instead.

Change of Studio

In instances where there are compelling reasons for requesting a change, a student may request a change by submitting an academic petition (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/). See Studio Assignments.

Course Changes and Withdrawals

JHU Student Enrollment and Account Management and the Peabody Registrar's Office process course drops and withdrawals. See Academic Calendar (https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/academic-calendar/) for deadlines.

Repeated Courses

Students must submit an Academic Petition for permission to enroll for a third time in a course that has been failed.

Academic Regulations

Attendance and Absences

Regular attendance is a student responsibility and is expected of all Peabody students. Professors set the attendance policy for each lesson, class, and ensemble. The attendance policy, along with all other rules of the class, may be found in the syllabus that is distributed at the beginning of each semester.

Occasionally, health or personal matters may interfere with a student's ability to attend class. In this situation, students are expected to notify professors as soon as possible about missing class and discuss how to make up missed class time or assignments in compliance with the relevant syllabi.

A serious or extended illness that causes several missed classes, major academic assignments, or examinations, and multiple large ensemble rehearsals, should be verified with documentation from a licensed caregiver. It is the student's responsibility to forward the verification to professors who request it or the Peabody Case Manager. A prolonged illness that interferes substantially with academic requirements for the semester may necessitate a withdrawal from classes or a medical leave of absence.

Occasionally, professional opportunities may interfere with regular attendance. Students should remember that outside performances must be cleared with major teachers (**Outside Instruction and Public Performance**). If an outside performance is approved students should notify professors as soon as possible about missing class and discuss how to make up missed class time or assignments. The same policy also applies to auditions.

In every scenario, the professor makes a final decision about whether or not an absence is excused based on the syllabus. If absences affect a final grade, the student may appeal the grade (and thus the ruling on the absences) through the policy articulated in **Grade Appeals.**

Academic Regulations

Interruption of Degree Work

Aleave of absence (LOA)#is an approved interruption of a degree program that is subject to a fixed duration and/or specific requirements for return. Awithdrawalis a complete departure from the Conservatory and its degree programs and can only be reversed through the mechanisms of re-audition and petition of the relevant academic committee.

Before requesting a leave or withdrawal, it is important that a student connect with the Pebody student case manager.

Leave of Absence

A student must submit a request for a leave (https://portalcontent.johnshopkins.edu/Peabody/conservatory/academicaffairs/forms/leaves_withdrawals.html) of absence. Examples of reasons for a#leave of absenceinclude:#personal#circumstances,#military service (foreign or domestic),#professional opportunities, or missionary work. A student#may opt to take a**medical leave of absence (MLOA)**to#devote their attention to medical care and treatment when physical or mental health difficulties impact their ability to participate in academic activities. Students who take#medical leaves of absence#provide medical documentation to#the Student Case Manager who will#give#support and connect them to resources.

#If the leave is granted, the leave will be made for a fixed duration of either one semester or one year. During that time, the student may not be enrolled as a full-time student at another institution. Any credits earned at another institution during the leave must be approved for transfer by#Academic Advising in consultation with department chairs.

The Peabody Conservatory is not obliged to grant a leave of absence, and students should present compelling personal or professional reasons for requesting an interruption of their regular progress toward the degree. A leave is not granted retroactively, and students must request the leave of absence before postponing their studies. Moreover, a leave is subject to the following conditions:

- The student must be a current student with remaining requirements to complete in a degree or diploma program.
- If the leave is approved before the start of a semester, the student's enrollments will be dropped.
- If the leave is approved after the start of the semester, the student will be withdrawn from enrollments.
- The student must be given clearance for all financial obligations, including but not limited to tuition, instrument loans, library fines, and residence fees. Any refund of tuition will follow the Conservatory refund schedule.
- A student who receives financial aid must make the appropriate arrangements with the Financial Aid office.
- An international student must make visa arrangements with the University's Office of International Students.
- A student requesting a leave is not guaranteed a space in a teacher's studio upon requesting to return to school.
- A student is limited to two total leaves of absence.

Return from LOA and MLOA

To re-enroll, a student on leave mst submit a reinstatement form. Study at the Conservatory may only resume at the scheduled start of a semester.

- Students should submit the academic petition by November 15 for spring re-enrollment.
- Students should submit the academic petition by April 15 for fall re-enrollment.

A student on MLOAwill need to complete reinstatement documentation which#includes:

- Release(s) of Information
- Student Self-Questionnaire
- Treating Provider Letter.

All students returning from a MLOA will work directly with the Student Case Manager to support their appeal in determining their readiness to return.

Extended Leave

Students on a leave of absence must report their status to the Conservatory by the stated dates in order to make arrangements to return or to extend the leave for an additional semester. Students who are granted an extension to a leave beyond the originally stipulated year may be required to re-audition. The maximum duration of a leave with an extension is three semesters.

Students who do not report their status by the above dates will be considered to have abandoned their degree programs and will be withdrawn from the Conservatory.

The Peabody Conservatory has no obligation to former students who abandon degree programs.

Special Circumstances for Leave of Absence

Doctoral students may only take an LOA while completing their residency. On completion of the required coursework, a doctoral student may no longer exercise the leave of absence option but must continue to enroll for Consultation (PY.610.813–814) in order to maintain standing in the program. If a student interrupts a program by failing to register for Consultation or failing to pay the Degree-in-Progress (DIP) fee for more than one year, the student must petition the DMA Committee for readmission. If a petition is approved, all retroactive fees must be paid in order for the reinstatement of status to become effective. Any DMA candidate who fails to register for Consultation will be dismissed from the program.

Double degree students may request a leave from the double degree program. A leave for double degree students is subject to the guidelines of the advising office for the Krieger School of Arts and Sciences or the Whiting School of Engineering. Before taking a leave of absence, students should consult with their major teachers at Peabody.

International students who request a leave should be aware that federal law governing the visa status of F-1 students requires them to vacate the United States for the duration of their leave of absence, unless the leave is granted for reasons of illness or other medical conditions.

Withdrawal

To request withdrawal from the Conservatory, students should submit this webform (https://portalcontent.johnshopkins.edu/Peabody/conservatory/academicaffairs/forms/leaves_withdrawals.html). This action will result in the closure of the student record. If a student withdraws after the drop period and before the end of the semester, the grades for that semester will be recorded as W. If a student has IP grades when they withdraw, they will be marked NCR.

More details including necessart request forms are available on "The Nest" in the Case Management section, under student affairs.

Academic Regulations

Graduation Eligibility

Students anticipating graduation must petition to graduate from the Peabody Conservatory by completing a form provided by the Office of the Registrar. The petition clarifies the student's name for the diploma and reserves or releases space at the commencement ceremony. The petition also initiates several important processes, including a final audit of credits, a clarification of contact information, and a review of the student's account. Students completing in May should submit this petition to the Registrar's Office in the fall semester of the year in which they intend to graduate, and no later than January 15 of that year.

To be approved for graduation, students must satisfy all degree requirements including IP grades, have a minimum 2.0 cumulative grade point average, settle all financial obligations, and resolve any and all outstanding charges of misconduct and violations of academic ethics. No student may participate in the commencement ceremony unless that student is approved for graduation.

Starting in the fall semester 2021 the Peabody Conservatory awards degrees and diplomas diplomas in May, August, and December.[1] Students may complete the requirements for a program after commencement and have their registration status changed to "requirements complete." However, they will not officially graduate from the Conservatory until the following December (or May) commencement.

Students pursuing five-year degree programs should refer to the degree requirements for special clarifications about commencement.

1 Policy updated on November 2, 2021 approved by University Registrar

Degree and Diploma Programs

Degree Programs

The Peabody Conservatory awards five degrees:

- **The Bachelor of Music (BM):** Performance (including Composition (p. 767), Computer Music (p. 768), and Music for New Media (p. 776)), Recording Arts (p. 795), and Music Education (p. 764)
- **The Bachelor of Fine Arts (BFA):** Dance (p. 810)
- **The Master of Music (MM):** Performance (including Composition (p. 814), Computer Music (p. 814), Orchestral Conducting (p. 822), and Wind Conducting (p. 824)), Performance-Pedagogy (p. 825), Music Education (p. 826), Musicology (p. 826), and Music Theory Pedagogy (p. 827)
- **The Master of Arts (MA) in Audio Sciences:** Acoustics (p. 828) and Recording Arts and Sciences (p. 829)
- **The Doctor of Musical Arts (DMA):** Performance (including Composition (p. 830), Orchestral Conducting (p. 832), and Wind Conducting (p. 836)).

Diploma Programs

The Peabody Conservatory also awards three diplomas which are certificates:

- The Performer's Certificate (PC) (p. 840)
- The Graduate Performance Diploma (GPD) (p. 842)
- The Artist's Diploma (AD) (p. 843)

Peabody collaborates with the Johns Hopkins Krieger School of Arts and Sciences and the Whiting School of Engineering to administer an undergraduate double-degree. However, for the purposes of the Peabody catalogue, this degree may be regarded as a modified BM or BFA degree.

Degree and Diploma Programs

Bachelor of Music Degree (BM)

The Bachelor of Music degree program at the Peabody Conservatory is designed to offer gifted students the training to prepare themselves for careers in performance, composition, computer music, music education, recording arts, and related areas of professional activity.

Admission Requirements

Students applying for the Bachelor of Music degree program present transcripts, test scores, and recommendations before playing an audition. The details of this process may be found at the Admissions website. Students applying for the Bachelor of Music degree program should meet the following criteria:

1. The student must be a graduate of an accredited high school or present evidence of equivalent study.
2. General admission requirements as listed for specific degrees and programs are identical for all applicants. However, immigration regulations, varying educational backgrounds, and financial considerations make special procedures necessary in order to help meet the needs of individual students. The detailed instructions sent to each applicant should be studied with utmost care.

Program Requirements

BM Curricular Components

Matriculating first-year students will satisfy between 131 and 161 credits in four years through passing grades, transfer credits, or onsite placement exams. Undergraduate students must be enrolled as full-time students for eight semesters and are required to remain enrolled in one-hour major lessons for all eight semesters.

The applied level of transfer students is determined by faculty and set at the end of the first year of study. Once set, the transfer student must be enrolled as a full-time student in one-hour major lessons until the conclusion of their adjusted final year.

Applied Enrollments

Major Lessons

Undergraduate students must enroll in major lessons through their last semester of the degree time frame (eight semesters for freshmen and the determined number for transfer students).

Any change to studio assignment must be approved by the Associate Dean for Academic Affairs (see Studio Assignments) and students must earn at least a B- in major lessons (see Academic Standing).

Juries and Recitals

The progress of each student is measured by the major department each year. Advancement and assessment are accomplished by an annual departmental examination (a "jury"). Every performance major must play a departmental jury for credit by the end of each school year. Students majoring in Composition, Computer Music, and Music for New Media students participate in weekly seminars with the entire Composition Department that provide ongoing departmental evaluation for each student. Dual Degree students who perform their recitals in their fifth year of study will play four juries and one hearing.

Jury	Description
109	The freshman or 109 jury is considered an advising aid to the student and their teacher in planning the following year's study.
209	The purpose of the 209 jury taken at the end of the sophomore year (fourth semester or credit hour equivalent) is to assess the student's overall progress and to determine whether or not they should continue in the chosen curriculum. On the basis of this jury and the student's overall academic record, the jury committee makes recommendations for the student's remaining years of undergraduate study.
309	The 309 jury is taken at the end of the junior year and is considered an advising aid to the student and their teacher in planning the final year of study, including the senior recital. Students in the departments of violin, viola, guitar, and jazz performance are required to play a "junior" recital at the end of the third year of study. This junior recital takes the place of, and is recorded with the same course number as, the 309 jury. Departments that require a junior recital may also require students to appear for technical examination and/or a demonstration of orchestral excerpts during the regular jury period.

A student who does not play a jury at the end of each academic year or does not earn at least a B- in a jury is not considered to be in good academic standing and will need to replay the jury in the following fall semester.

A graduation recital or comparable capstone project is required of all degree candidates.

Large Ensembles

All undergraduate students majoring in orchestral instruments must participate in Large Ensemble each semester of enrollment for major study as assigned, excluding Jazz majors. All Voice and Organ BM candidates have a six-semester choral requirement. For Voice majors, performance of a major opera role may qualify for Large Ensemble credit. All other non-orchestral BM candidates have a choral obligation as stipulated in their specific degree requirements. Ensemble credits beyond those required may be counted as elective credit. The regulations for performing in large ensembles, which are set by the Ensembles Office, may be found at the Ensemble Office website.

Small Ensembles

String and Percussion majors are required to enroll in four semesters of Chamber Music. Woodwind and Brass majors have a two-semester small ensemble requirement. Jazz majors must comeplete six semesters of small ensemble. A minimum of 10 certified coaching hours and a performance must be completed in order to earn credit. After completing the sight-reading course in the freshman year, Piano majors fulfill Accompanying and Chamber Music requirements specified in the curriculum.

Academic Enrollments

Breakthrough Curriculum

All undergraduates complete the Breakthrough Curriculum. Matriculating BM students take Exploring Arts Careers. In the third year of study, students take Building a Brand and Portfolio and Pitching Your Creative Idea. The culmination of study is the preparation and presentation of a pitch, adjudicated by a panel of faculty and guests that also serves as an entry in a real competition for funding and project support to implement a residency at one of Peabody's partner institutions. Students may attempt to test out of the Building a Brand and Portfolio requirement; information on testing out can be requested from the LAUNCHPad office (https://peabody.jhu.edu/life-at-peabody/career-services/).

Music Theory

With the exception of students in jazz performance, all undergraduate music students have a three-year requirement for Music Theory. The Music Theory program consists of four to six consecutive semesters of courses: Music Theory 1 through Music Theory 6. Students are strongly encouraged to complete all Music Theory requirements in the first three years of study. Simultaneous enrollment in more than one Music Theory course is not permitted except with the express permission of the Chair of Music Theory and the Associate Dean for Academic Affairs. Entering students who are not strong in the fundamentals of music (i.e., rhythm, meter, scales, intervals, keys, triads, and inversions) are encouraged to review their preparatory work during the months prior to the beginning of the academic year. Those who are not able to show proficiency in these areas on the placement exam will be placed in an intensive section. Advanced placement in Music Theory is possible.

Ear Training

Ear-training and Sight-singing classes are closely coordinated with the Music Theory curriculum. Students are strongly encouraged to complete all Ear-training requirements during the first two years of study. Students who are not able to show proficiency on Ear-training placement exams will be placed into an intensive section. Note: students who are placed into a Perfect Pitch section are exempt from the second year of Ear-training.

Keyboard Studies

Keyboard Studies classes are coordinated with the Music Theory and Ear-training curriculum. Students are strongly encouraged to complete all Keyboard Studies requirements during the first two years of study. Placement is determined by individual auditions.

Musicology

Students pursuing the standard BM musicology requirements will complete a total of 12 credits of musicology course work. Students enroll in History of Music 1, History of Music 2, History of Music, Music History in Global Contexts or enroll in three of these four courses plus a musicology elective seminar. Students must complete the first semester of the Liberal Arts Core curriculum (Core 2) before starting the sequence or be in their third year of study. Students may not enroll in more than one musicology survey course per semester, although students may enroll concurrently in their final survey course and an elective. Music Education majors follow a specific sequence of courses designed to accommodate Music Education coursework. Jazz majors take only History of Music 3. Transfer credits in Musicology are considered for approval by the Chair of Musicology and the Associate Dean for Academic Affairs on a case-by-case basis. Jazz majors pursue a concurrent curriculum in the history of Jazz. Students who are enrolled in English as a Second Language courses complete only three History of Music courses and do not complete an elective seminar.

Liberal Arts

Depending on their major, music students are required to fulfill 22-32 credits of Liberal Arts courses, beginning with a two-year Core Curriculum (12 credits). The majority of students will take the Core Curriculum in their first two years of study. Some students may be placed in Writing Intensive for their first year and begin the Core Curriculum in their second year. Students may petition to have Homewood Liberal Arts courses substitute for Core credit. Recording Arts students should see the Recording Arts specific program requirements for their variation of this curriculum.

Humanities Core Curriculum

- PY.260.115 Core 1: Analytical Thinking and Writing (3 credits, fall)
- PY.260.216 Core 2: Writing and Research Methods (3 credits, spring)
- PY.260.359 Core 3: Critical Methods (3 credits, fall)
- PY.260.360 Core 4: Art, Culture, and Society (3 credits, spring)

English as a Second Language (ESL)

Peabody offers intensive English as a Second Language (ESL) courses. Matriculating international students will be tested to determine their level of English proficiency and placed into the ESL curriculum if appropriate. Some Peabody courses require successful completion of ESL courses as a prerequisite. ESL 1 does not count toward fulfillment of degree requirements, and the grades earned are not calculated in the student's GPA; however, the hours are counted as part of the course load for tuition and full-time enrollment determination.

Critical Writing Intensive and ESL Writing Intensive

PY.260.021 ESL Writing Intensive 1 is a yearlong course designed for international students who are new to writing in English. PY.260.023 Critical Writing Intensive 1-PY.260.024 Critical Writing Intensive 2 is a yearlong course to prepare students for college-level writing. Both Writing Intensive courses involve close coordination with faculty members teaching the Core Curriculum and fulfill Liberal Arts electives.

Students enrolled in ESL courses can complete fewer Core courses and Liberal Arts Electives as outlined in their degree audits.

Liberal Arts Electives

Upon completion of the first year of the Liberal Arts Core or by the third year of study, students begin to take Liberal Arts elective courses. Students may fulfill Liberal Arts electives by taking coursework on the Homewood campus.

Electives

Unless otherwise specified, the term elective means class elective. Additional lessons cannot count as electives, but additional ensembles may. Questions about the appropriateness of all other courses for elective credit should be directed to the Office of Academic Advising.

Graduate Seminars

Graduate students in the MM and DMA programs have priority seating in Music Theory and Musicology graduate seminars, as do undergraduates with additional requirements (such as those in the five-year BM/MM program). In general, undergraduate students may only enroll in graduate seminars for elective credit under the following conditions:

- For seminars in Music Theory, students must have successfully completed Theory 1, 2, 3, and 4.
- For seminars in Musicology, students must have successfully completed at least two of the three History of Music survey courses and take the third simultaneously with the seminar.

Even after obtaining the permission of the faculty member, undergraduate students may still be removed from graduate seminar rosters, depending on the needs of the graduate population.

BM Curricula

In this section:

Bachelor of Music in Performance

Composition, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.310.545 & PY.310.546	Composition Seminar (UG) and Composition Seminar (UG) (Eight (8) Semesters Required)	8
PY.310.701	Composition Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.010.100	Minor Lesson 1/2 Hour (Voice or Piano)	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.6xx	Music Theory Advanced Elective [1]	3
PY.710.413 & PY.710.414	Orchestration 1 and Orchestration 2	6
PY.330.311	Conducting	1
PY.350.463 & PY.350.464	Introduction to Computer Music and Introduction to Computer Music 2	6
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	15
Electives		
Electives		3
Total Credits		**151**

[1] Composition majors must complete Music Theory 1-4 before enrolling in a graduate seminar.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.260.115	Core 1	3
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.260.216	Core 2	3
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2

PY.710.211	Theory 3	3
PY.260.359	Core 3	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.260.360	Core 4	3
	Credits	**17**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Voice or Piano)	1
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.350.463	Introduction to Computer Music	3
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Voice or Piano)	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.350.464	Introduction to Computer Music 2	3
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**22**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.010.100	Minor Lesson 1/2 Hour (Voice or Piano)	1
PY.710.6xx	Music Theory Advanced Elective	3
PY.710.413	Orchestration 1	3
PY.330.311	Conducting	1
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.310.701	Composition Recital (UG)	2
PY.010.100	Minor Lesson 1/2 Hour (Voice or Piano)	1
PY.710.414	Orchestration 2	3
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	3
Electives		3
	Credits	**20**
	Total Credits	**151**

Computer Music, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.350.545 & PY.350.546	Computer Music Seminar (UG) and Computer Music Seminar (UG) (Eight (8) Semesters Required) [1]	8
PY.350.701	Computer Music Recital (UG)	2
PY.910.xxx	Large Ensemble	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.412	Instrumentation & Arranging [2]	3
or PY.710.413	Orchestration 1	
or PY.710.414	Orchestration 2	
PY.710.6xx	Advanced Theory Elective [3]	3
PY.350.463 & PY.350.464	Introduction to Computer Music and Introduction to Computer Music 2	6
PY.350.466	Introduction to Programming	3
PY.350.835	Studio Techniques	3
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		

PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Coursework	15
Electives		
Electives		3
Total Credits		**145**

1 Students are welcome to attend Composition Seminar as appropriate to the focus of their work.
2 Students may elect PY.710.413 Orchestration 1-PY.710.414 Orchestration 2 in consultation with the department.
3 Computer Music majors must complete Music Theory 1–4 before enrolling in a graduate Music Theory seminar.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.350.463	Introduction to Computer Music	3
PY.260.115	Core 1	3
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.350.464	Introduction to Computer Music 2	3
PY.260.216	Core 2	3
	Credits	**18**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.260.359	Core 3	3
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.260.360	Core 4	3
	Credits	**15**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.350.466	Introduction to Programming	3
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.350.835	Studio Techniques	3
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**21**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.710.6xx	Advanced Theory Elective	3
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
Electives		3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.350.701	Computer Music Recital (UG)	2
PY.710.412	Instrumentation & Arranging	3
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**16**
	Total Credits	**145**

Guitar, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32

PY.470.545 & PY.470.546	Guitar Seminar (UG) and Guitar Seminar (UG) (Eight (8) Semesters Required)	8
PY.470.109 & PY.470.209	Guitar 109 Jury and Guitar 209 Jury	2
PY.470.309	Guitar Junior Recital	1
PY.470.701	Guitar Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.541 & PY.950.542	Guitar Ensemble and Guitar Ensemble (Six (6) Semesters Required)	6
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.470.585 & PY.470.586 & PY.470.587 & PY.470.588	Guitar Music Skills 1 and Guitar Music Skills 2 and Guitar Music Skills 3 and Guitar Music Skills 4	4
PY.470.431 & PY.470.432	Guitar Literature 1 (UG) and Guitar Literature 2 (UG)	4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	4
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY610.	Musicology Elective or Music History in Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	15
Electives		
Electives [1]		3
Total Credits		**150**

[1] Strongly Suggested: Lute Literature and Notation PY.380.433 Lute Literature & Notation 1-PY.380.434 Lute Literature & Notation 2

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.541	Guitar Ensemble	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.470.585	Guitar Music Skills 1	1
PY.260.115	Core 1	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.109	Guitar 109 Jury	1
PY.950.542	Guitar Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.470.586	Guitar Music Skills 2	1
PY.260.216	Core 2	3
	Credits	**18**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.715.223	Ear Training 3	2
PY.710.211	Theory 3	3
PY.470.587	Guitar Music Skills 3	1
PY.260.359	Core 3	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.209	Guitar 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.715.224	Ear Training 4	2
PY.710.212	Theory 4	3
PY.470.588	Guitar Music Skills 4	1
PY.260.360	Core 4	3
	Credits	**18**

Third Year

First Semester

PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.470.637	Guitar Pedagogy 1	2
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**21**

Second Semester

PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.309	Guitar Junior Recital	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.470.638	Guitar Pedagogy 2	2
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**22**

Fourth Year

First Semester

PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.531	Chamber Ensemble	1
PY.470.431	Guitar Literature 1 (UG)	2
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	3
Electives		3
	Credits	**17**

Second Semester

PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.701	Guitar Recital (UG)	2
PY.950.532	Chamber Ensemble	1
PY.470.432	Guitar Literature 2 (UG)	2
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**19**
	Total Credits	**150**

Harpsichord, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.380.109 & PY.380.209 & PY.380.309	Historical Performance 109 Jury and Historical Performance 209 Jury and Historical Performance 309 Jury	3
PY.380.701	Historical Performance Recital (UG)	2
PY.010.100	Minor Lesson 1/2 Hour (Organ)	2
PY.010.100	Minor Lesson 1/2 Hour (Voice) [1]	2
PY.950.527 & PY.950.528 Baroque Ensemble (Seven (7) Semesters Required)		7
PY.910.527 & PY.910.528	Baltimore Baroque Band and Baltimore Baroque Band (Six (6) Semesters Required)	12
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.380.315 & PY.380.445	Continuo 1: Figured Bass and Continuo 2: Advanced Continuo	4
PY.380.421 & PY.380.422 Harpsichord Literature		2
PY.380.491	Harpsichord Tuning and Maintenance	1
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	18
Electives		
Electives		3
Total Credits		**152**

[1] Or other instrument with the permission of the Department.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
PY.260.115	Core 1	3
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.109	Historical Performance 109 Jury	1
PY.950.527	Baroque Ensemble	1
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
PY.260.216	Core 2	3
	Credits	**16**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.010.100	Minor Lesson 1/2 Hour (Organ)	1
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.715.223	Ear Training 3	2
PY.710.211	Theory 3	3
PY.380.315	Continuo 1: Figured Bass	2
PY.260.359	Core 3	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.209	Historical Performance 209 Jury	1
PY.010.100	Minor Lesson 1/2 Hour (Organ)	1
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.715.224	Ear Training 4	2
PY.710.212	Theory 4	3
PY.380.445	Continuo 2: Advanced Continuo	2
PY.380.491	Harpsichord Tuning and Maintenance	1
PY.260.360	Core 4	3
	Credits	**20**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.010.100	Minor Lesson 1/2 Hour (Voice) [1]	1
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.380.421 Harpsichord Literature 1		1
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.309	Historical Performance 309 Jury	1
PY.010.100	Minor Lesson 1/2 Hour (Voice) [1]	1
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.380.422 Harpsichord Literature 2		1
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**21**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.380.441	Baroque Ornamentation 1	2
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
Electives		3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.701	Historical Performance Recital (UG)	2
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.380.442	Baroque Ornamentation 2	2
PY.330.311	Conducting	1
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**21**
	Total Credits	**152**

Historical Performance, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32

PY.380.109 & PY.380.209 & PY.380.309	Historical Performance 109 Jury and Historical Performance 209 Jury and Historical Performance 309 Jury	3
PY.380.701	Historical Performance Recital (UG)	2
PY.010.100	Minor Lesson 1/2 Hour (Four (4) Semesters Required)	4
PY.950.527 & PY.950.528 Baroque Ensemble (Seven (7) Semesters Required)		7
PY.910.527 & PY.910.528	Baltimore Baroque Band and Baltimore Baroque Band (Six (6) Semesters Required)	12
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
xxx.xxx	Music Instrument Literature	4
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	18
Electives		
Electives		3
Total Credits		**153**

Variations

Baroque Lute/Theorbo Majors

153 credits

Code	Title	Credits
PY.380.433 & PY.380.434	Lute Literature & Notation 1 and Lute Literature & Notation 2 (Major Instrument Literature)	4
PY.380.315 & PY.380.445	Continuo 1: Figured Bass and Continuo 2: Advanced Continuo	4
No Elective Required (-3 credits)		

Renaissance Lute

152 credits

Code	Title	Credits
PY.380.xxx-xxx	HP Strings Literature (Major Instrument Literature)	4
PY.910.527 & PY.910.528	Baltimore Baroque Band and Baltimore Baroque Band (-12 credits)	
PY.910.529 & PY.910.530	Renaissance Ensemble and Renaissance Ensemble (Six (6) Semesters Required)	12
PY.950.527 & PY.950.528	Baroque Ensemble and Baroque Ensemble (-7 credits)	
PY.950.553 & PY.950.554 Renaissance Chamber Ensemble (Seven (7) Semesters Required)		7

Baroque Cello Majors

155 credits

Code	Title	Credits
PY.380.435	Viola da Gamba Literature	1
PY.380.436 Early Cello Lit		1
PY.380.351	Viola Da Gamba Class	1
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Four (4) Semesters Required)	4

Recorder & Baroque Flute

163 credits

Code	Title	Credits
PY.380.447 & PY.380.448	Early Wind Literature 1 and Early Wind Literature 2	2
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble ((90) Recorder; Six (6) Semesters Required)	6
No Elective Required (-3 credits)		

Gamba Majors

156 credits

Code	Title	Credits
PY.380.xxx-xxx	HP Strings Literature (Major Instrument Literature)	4
PY.950.527 & PY.950.528	Baroque Ensemble and Baroque Ensemble (-7 credits)	
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Seven (7) Semesters Required)	2

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
xxx.xxx	Major Instrument Literature	2
PY.260.115	Core 1	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.109	Historical Performance 109 Jury	1
PY.950.527	Baroque Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
xxx.xxx	Major Instrument Literature	2
PY.260.216	Core 2	3
	Credits	**18**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.010.100	Minor Lesson 1/2 Hour	1
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.260.359	Core 3	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.209	Historical Performance 209 Jury	1
PY.010.100	Minor Lesson 1/2 Hour	1
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.260.360	Core 4	3
	Credits	**19**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.010.100	Minor Lesson 1/2 Hour	1
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.610.321	History of Music 1	3
xxx.xxx	Liberal Arts Elective Courses	3
Electives		3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.309	Historical Performance 309 Jury	1
PY.010.100	Minor Lesson 1/2 Hour	1
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**20**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.527	Baroque Ensemble	1
PY.910.527	Baltimore Baroque Band	2
PY.380.441	Baroque Ornamentation 1	2
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.701	Historical Performance Recital (UG)	2
PY.950.528	Baroque Ensemble	1
PY.910.528	Baltimore Baroque Band	2
PY.380.442	Baroque Ornamentation 2	2
PY.330.311	Conducting	1
PH.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**18**
	Total Credits	**150**

Jazz Performance, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.570.101 & PY.570.102	Jazz Seminar and Jazz Seminar (Eight (8) Semesters Required)	8
PY.570.109 & PY.570.209 & PY.570.309	Jazz 109 Jury and Jazz 209 Jury and Jazz 309 Jury	3
PY.570.701	Jazz Recital (UG)	2
PY.570.711	Recording Project	2

PY.910.537 & PY.910.538	Peabody Jazz Ensemble and Peabody Jazz Ensemble (Eight (8) Semesters Required)	16
PY.950.525 & PY.950.526	Jazz Combo and Jazz Combo (Six (6) Semesters Required)	6
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.570.127 & PY.570.128	Jazz Theory Fundamentals 1 and Jazz Theory Fundamentals 2	4
PY.715.123 & PY.715.124	Ear Training 1 and Ear Training 2	4
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.710.111 & PY.710.112	Theory 1 and Theory 2	6
PY.570.259 & PY.570.260	Jazz Keyboard Studies 1 and Jazz Keyboard Studies 2	4
PY.570.359 & PY.570.360	Advanced Jazz Harmony 1 and Advanced Jazz Harmony 2	4
PY.570.361 & PY.570.362	Jazz Arranging 1 and Jazz Arranging 2	4
PY.570.459-460 Jazz Composition 1-2		4
PY.570.561 & PY.570.562 & PY.570.563 & PY.570.564	Jazz Improvisation 1 and Jazz Improvisation 2 and Jazz Improvisation 3 and Jazz Improvisation 4	8
PY.570.569 & PY.570.570	Jazz Analysis/History 1 and Jazz Analysis/History 2	4
PY.610.324	Music Histories in a Global Context	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	15
Electives		
Jazz Electives		4
Electives		3
Total Credits		**157**

Variation

Jazz Voice

143

Code	Title	Credits
PY.910.537 & PY.910.538	Peabody Jazz Ensemble and Peabody Jazz Ensemble (-12 credits)	

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.570.127	Jazz Theory Fundamentals 1	2
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.570.569	Jazz Analysis/History 1	2
PY.260.115	Core 1	3
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.109	Jazz 109 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.570.128	Jazz Theory Fundamentals 2	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.570.570	Jazz Analysis/History 2	2
PY.260.216	Core 2	3
	Credits	**19**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.259	Jazz Keyboard Studies 1	2
PY.570.561	Jazz Improvisation 1	2
PY.260.359	Core 3	3
PY.710.111	Theory 1	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.209	Jazz 209 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.570.260	Jazz Keyboard Studies 2	2
PY.570.562	Jazz Improvisation 2	2
PY.260.360	Core 4	3
PY.710.112	Theory 2	3
	Credits	**19**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1

PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.123.311	Building a Brand and Portfolio	2
PY.570.359	Advanced Jazz Harmony 1	2
PY.570.459 Jazz Composition 1		2
xxx.xxx	Liberal Arts Elective Courses	3
PY.610.324	Music Histories in a Global Context	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.309	Jazz 309 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.570.360	Advanced Jazz Harmony 2	2
PY.570.360 Jazz Composition 2		2
xxx.xxx	Liberal Arts Elective Courses	3
Jazz Electives		2
	Credits	**20**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.361	Jazz Arranging 1	2
PY.570.563	Jazz Improvisation 3	2
xxx.xxx	Liberal Arts Elective Courses	6
Electives		3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.701	Jazz Recital (UG)	2
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.570.362	Jazz Arranging 2	2
PY.570.564	Jazz Improvisation 4	2
PY.570.711	Recording Project	2
xxx.xxx	Liberal Arts Elective Courses	3
Jazz Electives		2
	Credits	**21**
	Total Credits	**157**

Music for New Media, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.320.101 & PY.320.102 & PY.320.201 & PY.320.202	Music for New Media 1 and Music for New Media 2 and Music for New Media 3 and Music for New Media 4	12
PY.320.501 Music for New Media Seminar		8
PY.320.211 & PY.320.212	The Tools of New Media 1 and The Tools of New Media 2	4
PY.050.100	Major Lesson 1/2 Hour (Composition Lessons; Four (4) Semesters Required)	8
PY.910.xxx	Large Ensemble	4
PY.320.495 Music for New Media Capstone		2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & 123 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 1 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.412	Instrumentation & Arranging	3
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History classes or the elective seminar)	3
PY.350.466	Introduction to Programming	3
PY.550.651 & PY.550.652	Recording for Musicians 1 and Recording for Musicians 2	4
PY.550.524	Sound Design/Video Games	3
AS.455.626	Mixing Sound for Picture	3
PY.320.419 Internship [1]		2
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
Liberal Arts Elective Courses [2]		12
Electives		

Electives	6
Total Credits	**137**

[1] Taken in the summer before Senior Year
[2] Recommended: AS.061.145 Introduction to Digital Video Production: Visual Language

Note: Music for New Media students completing the five-year BM/MA program will complete an adjusted BM course of study (p. 829).

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.320.101	Music for New Media 1	3
PY.320.501 Music for New Media Seminar		1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.550.651	Recording for Musicians 1	2
PY.260.115	Core 1	3
	Credits	**17**
Second Semester		
PY.320.102	Music for New Media 2	3
PY.320.502 Music for New Media Seminar		1
PY.715.123	Ear Training 1	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.550.652	Recording for Musicians 2	2
PY.260.216	Core 2	3
	Credits	**16**
Second Year		
First Semester		
PY.320.201	Music for New Media 3	3
PY.320.501 Music for New Media Seminar		1
PY.320.211	The Tools of New Media 1	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.260.359	Core 3	3
	Credits	**16**
Second Semester		
PY.320.202	Music for New Media 4	3
PY.320.502 Music for New Media Seminar		1
PY.320.212	The Tools of New Media 2	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.350.466	Introduction to Programming	3
PY.260.360	Core 4	3
	Credits	**19**
Third Year		
First Semester		
PY.320.501 Music for New Media Seminar		1
PY.050.100	Major Lesson 1/2 Hour	2
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.710.412	Instrumentation & Arranging	3
PY.610.321	History of Music 1	3
Liberal Arts Elective		3
	Credits	**19**
Second Semester		
PY.320.502 Music for New Media Seminar		1
PY.050.100	Major Lesson 1/2 Hour	2
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.550.524	Sound Design/Video Games	3
Liberal Arts Elective		3
	Credits	**19**
Fourth Year		
First Semester		
PY.320.501 Music for New Media Seminar		1
PY.050.100	Major Lesson 1/2 Hour	2
PY.610.323	History of Music 3	3
AS.455.626	Mixing Sound for Picture	3
PY.320.419 Internship		2
Liberal Arts Elective		3
Elective		3
	Credits	**17**
Second Semester		
PY.320.502 Music for New Media Seminar		1
PY.050.100	Major Lesson 1/2 Hour	2
PY.320.495 Music for New Media Capstone		2
PY.610.xxx	Musicology Elective	3
Liberal Arts Elective		3
Elective		3
	Credits	**14**
	Total Credits	**137**

[1] Recommended: AS.061.145 Introduction to Digital Video Production: Visual Language
[2] Taken in the summer before Senior Year

Orchestral Instruments, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
xxx.109-209-309	Departmental Examination	3
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	16
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three, Music History classes or the elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	18
Electives		
Electives		6
Total Credits		**143**

Variations

Strings and Percussion

144 credits

Code	Title	Credits
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2

Flute

142 credits

Code	Title	Credits
PY.430.463 & PY.430.464	Piccolo Class and Piccolo Class [1]	2

[1] Taken as a required elective

Violin, Viola, & Cello

142 credits

PY.425.309 Strings Jr Recital/309 Jury 2 credits (Replaces 309 jury)

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.260.115	Core 1	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.109	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.260.216	Core 2	3
	Credits	**17**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.260.359	Core 3	3
Electives		2
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.209	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.260.360	Core 4	3
	Credits	**17**

Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
Electives		2
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.309	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**18**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.330.311	Conducting	1
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
Electives		2
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble (Small Ensemble)	1
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**18**
	Total Credits	**143**

Organ, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.460.545 & PY.460.546	Organ Seminar (UG) and Organ Seminar (UG) (Eight (8) Semesters Required)	8
PY.460.109 & PY.460.209 & PY.460.309	Organ 109 Jury and Organ 209 Jury and Organ 309 Jury	3
PY.460.701	Organ Recital (UG)	2
PY.910.xxx	Large Ensemble	12
PY.010.100	Minor Lesson 1/2 Hour (Piano Minor; Two (2) Semesters Required)	2
PY.010.100	Minor Lesson 1/2 Hour (Voice Minor; Two (2) Semesters Required)	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.460.425 & PY.460.426	Resources for Contemporary Church Musicians 1 and Resources for Contemporary Church Musicians 2	6
PY.380.315	Continuo 1: Figured Bass	2
PY.460.423 & PY.460.424	Organ Literature 1 and Organ Literature 2	6
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
PY.260.115	Core 1 (PY.610.xxx,PY.610.324::Musicology Elective)	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	15
Elective		
Elective		3
Total Credits		**153**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
PY.260.115	Core 1	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.109	Organ 109 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
PY.260.216	Core 2	3
	Credits	**18**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Piano Minor)	1
PY.715.223	Ear Training 3	2
PY.710.211	Theory 3	3
PY.260.359	Core 3	3
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.209	Organ 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Piano Minor)	1
PY.715.224	Ear Training 4	2
PY.710.212	Theory 4	3
PY.260.360	Core 4	3
	Credits	**17**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Voice Minor)	1
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.380.315	Continuo 1: Figured Bass	2
PY.460.423	Organ Literature 1	3
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**24**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.309	Organ 309 Jury	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour (Voice Minor)	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.460.424	Organ Literature 2	3
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**23**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.460.425	Resources for Contemporary Church Musicians 1	3
PY.330.311	Conducting	1
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.701	Organ Recital (UG)	2
PY.460.426	Resources for Contemporary Church Musicians 2	3
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	3
Elective		3
	Credits	**19**
	Total Credits	**153**

Piano, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.450.109 & PY.450.209 & PY.450.309	Piano 109 Jury and Piano 209 Jury and Piano 309 Jury	3
PY.450.701	Piano Recital (UG)	2
PY.910.xxx	Large Ensemble	8

PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Four (4) Semesters Required)	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.211 & PY.715.212 & PY.715.311 & PY.715.312	Keyboard Skills 1 - Piano Majors and Keyboard Skills 2 - Piano Majors and Keyboard Skills 3 - Piano Majors and Keyboard Skills 4 - Piano Majors	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.450.213 & PY.450.214	Accompanying 1 and Accompanying 2	2
PY.450.411 & PY.450.412 & PY.450.413 & PY.450.414	Keyboard Literature: Baroque and Keyboard Literature: Classical and Keyboard Literature: 19th Century and Keyboard Literature: 20th/21st C.	8
PY.450.667	Piano Pedagogy 1	2
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.260.xxx	Liberal Arts Elective Courses	18
Electives		
Electives [1]		3
Total Credits		**149**

[1] Recommended Electives include: Second Semester of PY.450.668 Piano Pedagogy 2, PY.330.311 Conducting

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
PY.260.115	Core 1	3
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.109	Piano 109 Jury	1
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
PY.260.216	Core 2	3
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.211	Keyboard Skills 1 - Piano Majors	2
PY.710.211	Theory 3	3
PY.450.213	Accompanying 1	1
PY.260.359	Core 3	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.209	Piano 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.224	Ear Training 4	2
PY.715.212	Keyboard Skills 2 - Piano Majors	2
PY.710.212	Theory 4	3
PY.450.214	Accompanying 2	1
PY.260.360	Core 4	3
	Credits	**18**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.123.311	Building a Brand and Portfolio	2
PY.715.311	Keyboard Skills 3 - Piano Majors	2
PY.710.311	Theory 5	3
PY.450.411	Keyboard Literature: Baroque	2
PY.610.321	History of Music 1	3
PY.260.xxx	Liberal Arts Elective Courses	3

Electives		3
	Credits	**25**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.309	Piano 309 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.312	Keyboard Skills 4 - Piano Majors	2
PY.710.312	Theory 6	3
PY.450.412	Keyboard Literature: Classical	2
PY.610.322	History of Music 2	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**23**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.531	Chamber Ensemble	1
PY.450.413	Keyboard Literature: 19th Century	2
PY.450.667	Piano Pedagogy 1	2
PY.610.323	History of Music 3	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.701	Piano Recital (UG)	2
PY.950.532	Chamber Ensemble	1
PY.450.414	Keyboard Literature: 20th/21st C.	2
PY.610.xxx	Musicology Elective	3
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**18**
	Total Credits	**149**

Voice, Bachelor of Music

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.530.109 & PY.530.209 & PY.530.309	Voice 109 Jury and Voice 209 Jury and Voice 309 Jury	3
PY.186.100 & 100 & 100 & 100	Vocal Coaching and Vocal Coaching and Vocal Coaching and Vocal Coaching (Four (4) Semesters Required)	4
PY.530.701	Voice Recital (UG)	2
PY.910.xxx	Large Ensemble	12
PY.910.54x	Opera Performance Elective	1
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.530.475	English Diction	2
PY.530.469	Italian Diction	2
PY.530.477	German Diction	2
PY.530.483	French Diction	2
PY.530.589	Vocal Literature: English/Italian	2
PY.530.590	Vocal Literature: German/French	2
PY.540.491	Acting For Opera 1	1
PY.540.513	Movement 1	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
PY.250.111 & PY.250.112	Italian 1a and Italian 1b	8
PY.250.121 & PY.250.122	German 1a and German 1b	6
PY.250.131 & PY.250.132	French 1a and French 1b	6
Electives		
Electives [1]		6
Total Credits		**157**

[1] Second year language or Vocal Literature elective strongly recommended

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.530.475	English Diction	2
PY.260.115	Core 1	3
PY.540.513	Movement 1	1
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.109	Voice 109 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.530.469	Italian Diction	2
PY.260.216	Core 2	3
	Credits	**19**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.530.477	German Diction	2
PY.260.359	Core 3	3
PY.250.111	Italian 1a	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.209	Voice 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.530.483	French Diction	2
PY.260.360	Core 4	3
PY.540.491	Acting For Opera 1	1
PY.250.112	Italian 1b	4
	Credits	**24**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.710.311	Theory 5	3
PY.530.589	Vocal Literature: English/Italian	2
PY.610.321	History of Music 1	3
PY.250.121	German 1a	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.309	Voice 309 Jury	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.250.122	German 1b	3
	Credits	**19**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.54x	Opera Performance Electives	1
PY.530.590	Vocal Literature: German/French	2
PY.610.323	History of Music 3	3
PY.250.131	French 1a	3
Electives		3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.701	Voice Recital (UG)	2
PY.910.54x	Opera Performance Electives	1
PY.610.xxx	Musicology Elective	3
PY.250.132	French 1b	3
Electives		3
	Credits	**17**
	Total Credits	**158**

Bachelor of Music in Music Education

The Music Education major is designed for the gifted performer who has a special interest in sharing their musical expertise through teaching music in elementary or secondary schools. The goal of this professional preparation program is to provide prospective teachers with the knowledge, skills, and attitudes needed for the effective teaching of music. Graduates of the program are certified to teach music N-12 in Maryland and in all other states with which Maryland shares reciprocity.

The Music Education program awards a Bachelor of Music degree with two majors: Music Education and Performance (or Composition). As such, students are only admitted on the basis of a successful performance audition or composition interview in addition to their Music Education interview. Music Education students receive the same attention to their musical development (applied study, music theory, music history) as students in the performance programs at Peabody and are held to the same standard of excellence.

Program Requirements

The Music Education curriculum has specific general studies requirements as mandated by state and national accrediting agencies. The Music Education department directly oversees the Liberal Arts curriculum for students in the Music Education program. To the extent that these requirements are not satisfied within the Liberal Arts curriculum required of all Peabody undergraduates, students may choose courses offered at the Krieger School of Arts and Sciences. Advanced Placement and transfer credits are subject to the procedures found under the heading Transfer Credits in the Academic Regulations section of the catalogue and are accepted at the discretion of the Music Education Department.

All Music Education students are required to complete 15 weeks of intern teaching in a Maryland public school under the direction of the clinical supervisor. Intern teaching forms a capstone requirement of the curriculum, and students must meet all of the prerequisites and requirements detailed in the Handbook for Intern Teaching, which is assembled and distributed by the Music Education Department.

Below, the requirements for the majors Guitar, Piano and Voice are shown with a Vocal/General Music focus. Students with these majors may adopt the Instrumental concentration with the following substitutions:

Variation: Instrumental Focus

Code	Title	Credits
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.324	Strings Class	3
PY.710.412	Instrumentation & Arranging	3
PY.510.213	Basic Instrumental Pedagogy (- 1 credit)	

- Music Education Composition (p. 784)
- Music Education Guitar (p. 786)
- Music Education Jazz (p. 788)
- Music Education Orchestral Instruments (p. 790)
- Music Education Piano (p. 791)
- Music Education Voice (p. 793)

Composition, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.310.545	Composition Seminar (UG) (Three (3) Semesters Required)	3
PY.310.546	Composition Seminar (UG) (Four (4) Semesters Required)	4
PY.310.701	Composition Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.010.100	Minor Lesson 1/2 Hour (Two (2) Semesters Required)	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.6xx	Music Theory Advanced Elective [1]	3
PY.710.413 & PY.710.414	Orchestration 1 and Orchestration 2	6
PY.350.463 & PY.350.464	Introduction to Computer Music and Introduction to Computer Music 2	6
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337 & PY.510.338	Secondary Choral Ensemble 2 and Conducting the Secondary Instrumental Ensemble 2	4
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.324	Strings Class	3
PY.510.414	Music & the Neurodiverse Learner	3

ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
Liberal Arts Elective Courses		18
Total Credits		**184**

[1] Composition majors must complete Music Theory 1-4 before enrolling in a graduate seminar.

Variation

Vocal/General

171 credits

Code	Title	Credits
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class (-5 credits)	
PY.510.223	Percussion Class (-1 credits)	
PY.510.338	Conducting the Secondary Instrumental Ensemble 2 (-2 credits)	
PY.510.324	Strings Class (-3 credits)	
PY.710.412	Instrumentation & Arranging (-3 credits)	
PY.510.213	Basic Instrumental Pedagogy	1

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.010.100	Minor Lesson 1/2 Hour	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.260.115	Core 1	3
Liberal Arts Elective Courses		3
PY.260.261	Introduction to Psychology	3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.010.100	Minor Lesson 1/2 Hour	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.510.112	Introduction to Music Education	1
PY.260.216	Core 2	3
	Credits	**17**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.610.321	History of Music 1	3
PY.510.211	Brass Class	2
PY.510.237	Secondary Choral Ensemble 1	2
Liberal Arts Elective Courses		3
	Credits	**26**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.610.322	History of Music 2	3
PY.510.212	Woodwinds Class	3
PY.510.223	Percussion Class	1
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
Liberal Arts Elective Courses		3
	Credits	**28**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.710.413	Orchestration 1	3
PY.350.463	Introduction to Computer Music	3
PY.610.323	History of Music 3	3
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.324	Strings Class	3
	Credits	**27**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.710.312	Theory 6	3

PY.710.414	Orchestration 2	3
PY.350.464	Introduction to Computer Music 2	3
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.414	Music & the Neurodiverse Learner	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
Liberal Arts Elective Courses		3
	Credits	**30**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.310.701	Composition Recital (UG)	2
PY.710.6xx Music Theory Advanced Elective		3
PY.610.xxx	Musicology Elective	3
Liberal Arts Elective Courses		6
	Credits	**19**
	Total Credits	**184**

Guitar, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.470.545	Guitar Seminar (UG) (Three (3) Semesters Required)	3
PY.470.546	Guitar Seminar (UG) (Four (4) Semesters Required)	4
PY.470.109 & PY.470.209	Guitar 109 Jury and Guitar 209 Jury	2
PY.470.309	Guitar Junior Recital	1
PY.470.701	Guitar Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.541 & PY.950.542	Guitar Ensemble and Guitar Ensemble (Six (6) Semesters Required)	6
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.470.585 & PY.470.586 & PY.470.587 & PY.470.588	Guitar Music Skills 1 and Guitar Music Skills 2 and Guitar Music Skills 3 and Guitar Music Skills 4	4
PY.470.631 & PY.470.632	Guitar Literature 1 (GR) and Guitar Literature 2 (GR)	4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	4
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.312	Progressive Methods: Instrumental Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
Liberal Arts Elective Courses		18
Total Credits		**176**

Variation

Instrumental

189 credits

Code	Title	Credits
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.324	Strings Class	3
PY.710.412	Instrumentation & Arranging	3
PY.510.213	Basic Instrumental Pedagogy (-1 credits)	

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.541	Guitar Ensemble	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.470.585	Guitar Music Skills 1	1
PY.260.115	Core 1	3
Liberal Arts Elective Courses		3
PY.260.261	Introduction to Psychology	3
	Credits	**24**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.109	Guitar 109 Jury	1
PY.950.542	Guitar Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.470.586	Guitar Music Skills 2	1
PY.510.112	Introduction to Music Education	1
PY.260.216	Core 2	3
	Credits	**19**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.710.211	Theory 3	3
PY.470.587	Guitar Music Skills 3	1
PY.610.321	History of Music 1	3
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237	Secondary Choral Ensemble 1	2
Liberal Arts Elective Courses		3
	Credits	**25**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.209	Guitar 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.710.212	Theory 4	3
PY.470.588	Guitar Music Skills 4	1
PY.610.322	History of Music 2	3
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
Liberal Arts Elective Courses		3
	Credits	**25**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.950.531	Chamber Ensemble	1
PY.710.311	Theory 5	3
PY.470.631	Guitar Literature 1 (GR)	2
PY.470.637	Guitar Pedagogy 1	2
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.309	Guitar Junior Recital	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.470.632	Guitar Literature 2 (GR)	2
PY.470.638	Guitar Pedagogy 2	2
PY.510.312	Progressive Methods: Instrumental Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.510.414	Music & the Neurodiverse Learner	3
Liberal Arts Elective Courses		3
	Credits	**25**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4

ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.701	Guitar Recital (UG)	2
PY.950.532	Chamber Ensemble	1
PY.710.312	Theory 6	3
PY.610.323	History of Music 3	3
PY.610.xxx	Musicology Elective	3
Liberal Arts Elective Courses		6
	Credits	**23**
	Total Credits	**176**

Jazz, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.570.101 & PY.570.102 Jazz Seminar (Seven (7) semesters required)		7
PY.570.109 & PY.570.209 & PY.570.309	Jazz 109 Jury and Jazz 209 Jury and Jazz 309 Jury	3
PY.570.701	Jazz Recital (UG)	2
PY.570.711	Recording Project	2
PY.910.537 & PY.538 Peabody Jazz Ensemble (Seven (7) semesters required)		14
PY.950.525 & PY.950.526	Jazz Combo and Jazz Combo (Four (4) Semesters Required)	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.570.127 & PY.570.128	Jazz Theory Fundamentals 1 and Jazz Theory Fundamentals 2	4
PY.715.123 & PY.715.124	Ear Training 1 and Ear Training 2	4
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.710.111 & PY.710.112	Theory 1 and Theory 2	6
PY.570.259 & PY.570.260	Jazz Keyboard Studies 1 and Jazz Keyboard Studies 2	4
PY.570.359 & PY.570.360	Advanced Jazz Harmony 1 and Advanced Jazz Harmony 2	4
PY.570.361 & PY.570.362	Jazz Arranging 1 and Jazz Arranging 2	4
PY.570.459-460 Jazz Composition 1-2		4
PY.570.561 & PY.570.562 & PY.570.563 & PY.570.564	Jazz Improvisation 1 and Jazz Improvisation 2 and Jazz Improvisation 3 and Jazz Improvisation 4	8
PY.570.569 & PY.570.570	Jazz Analysis/History 1 and Jazz Analysis/History 2	4
PY.610.324	Music Histories in a Global Context	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337 & PY.510.338	Secondary Choral Ensemble 2 and Conducting the Secondary Instrumental Ensemble 2	4
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.324	Strings Class	3
PY.710.412	Instrumentation & Arranging	3
PY.510.414	Music & the Neurodiverse Learner	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
PY.260.xxx	Liberal Arts Elective Courses	18
Total Credits		**188**

Variation

Vocal/General

173 credits

Code	Title	Credits
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class (-5 credits)	
PY.510.223	Percussion Class (-1 credits)	
PY.510.338	Conducting the Secondary Instrumental Ensemble 2 (-2 credits)	
PY.510.324	Strings Class (-3 credits)	

PY.710.412	Instrumentation & Arranging (-3 credits)	
PY.510.213	Basic Instrumental Pedagogy	1

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.570.127	Jazz Theory Fundamentals 1	2
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.570.569	Jazz Analysis/History 1	2
PY.260.115	Core 1	3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.109	Jazz 109 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.570.128	Jazz Theory Fundamentals 2	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.570.570	Jazz Analysis/History 2	2
PY.510.112	Introduction to Music Education	1
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
	Credits	**26**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.570.259	Jazz Keyboard Studies 1	2
PY.570.359	Advanced Jazz Harmony 1	2
PY.570.561	Jazz Improvisation 1	2
PY.510.211	Brass Class	2
PY.510.237	Secondary Choral Ensemble 1	2
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.209	Jazz 209 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.570.260	Jazz Keyboard Studies 2	2
PY.570.360	Advanced Jazz Harmony 2	2
PY.570.562	Jazz Improvisation 2	2
PY.510.212	Woodwinds Class	3
PY.510.223	Percussion Class	1
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**26**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.361	Jazz Arranging 1	2
PY.570.459 Jazz Composition 1		2
PY.570.563	Jazz Improvisation 3	2
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.324	Strings Class	3
xxx.xxx	Liberal Arts Elective Courses	3
PY.610.324	Music Histories in a Global Context	3
	Credits	**28**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.309	Jazz 309 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.362	Jazz Arranging 2	2
PY.570.460 Jazz Composition 2		2
PY.570.564	Jazz Improvisation 4	2
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.414	Music & the Neurodiverse Learner	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.260.xxx	Liberal Arts Elective Courses	3
	Credits	**29**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**14**

Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.701	Jazz Recital (UG)	2
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.710.412	Instrumentation & Arranging	3
PY.570.711	Recording Project	2
PY.260.xxx	Liberal Arts Elective Courses	6
	Credits	**21**
	Total Credits	**188**

Orchestral Instruments, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
xxx.109-209-309	Departmental Examination	3
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	14
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	2
xxx.xxx	Applied Minor	1
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337 & PY.510.338	Secondary Choral Ensemble 2 and Conducting the Secondary Instrumental Ensemble 2	4
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.324	Strings Class	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.710.412	Instrumentation & Arranging	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
Liberal Arts Elective Courses		18
Total Credits		**175**

Variations

Strings and Percussion

177 credits

Code	Title	Credits
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2

Flute

175 credits

Code	Title	Credits
PY.430.463 & PY.430.464	Piccolo Class and Piccolo Class [1]	2

[1] Taken as a required elective

Violin, Viola, & Cello

177 credits

Code	Title	Credits
PY.425.309	Strings Jr Recital/309 Jury (Replaces 309 jury)	1

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.260.115	Core 1	3
PY.260.261	Introduction to Psychology	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.109	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.510.112	Introduction to Music Education	1
PY.260.216	Core 2	3
	Credits	**19**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.610.321	History of Music 1	3
PY.510.211	Brass Class	2
PY.510.237	Secondary Choral Ensemble 1	2
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**25**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.209	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.510.212	Woodwinds Class	3
PY.510.223	Percussion Class	1
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**25**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.324	Strings Class	3
xxx.xxx	Liberal Arts Elective Courses	6
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.309	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
xxx.xxx	Applied Minor	1
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.312	Progressive Methods: Instrumental Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.510.414	Music & the Neurodiverse Learner	3
	Credits	**25**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble (Small Ensemble)	1
PY.610.323	History of Music 3	3
PY.610.xxx	Musicology Elective	3
PY.710.412	Instrumentation & Arranging	3
xxx.xxx	Liberal Arts Elective Courses	6
	Credits	**24**
	Total Credits	**175**

Piano, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.450.109 & PY.450.209 & PY.450.309	Piano 109 Jury and Piano 209 Jury and Piano 309 Jury	3
PY.450.701	Piano Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.211 & PY.715.212 & PY.715.311 & PY.715.312	Keyboard Skills 1 - Piano Majors and Keyboard Skills 2 - Piano Majors and Keyboard Skills 3 - Piano Majors and Keyboard Skills 4 - Piano Majors	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.450.213 & PY.450.214	Accompanying 1 and Accompanying 2	2
PY.450.411 & PY.450.412 & PY.450.413 & PY.450.414	Keyboard Literature: Baroque and Keyboard Literature: Classical and Keyboard Literature: 19th Century and Keyboard Literature: 20th/21st C.	8
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.710.412	Instrumentation & Arranging	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.450.667	Piano Pedagogy 1	2
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.261	Introduction to Psychology	3
xxx.xxx	Liberal Arts Elective Courses	18
Total Credits		**171**

Variation

Instrumental

184 credits

Code	Title	Credits
PY.510.211 & PY.510.212	Brass Class and Woodwinds Class	5
PY.510.223	Percussion Class	1
PY.510.338	Conducting the Secondary Instrumental Ensemble 2	2
PY.510.324	Strings Class	3
PY.710.412	Instrumentation & Arranging	3
PY.510.213	Basic Instrumental Pedagogy (-1 credits)	

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.211	Keyboard Skills 1 - Piano Majors	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
PY.260.115	Core 1	3
Liberal Arts Elective Courses		3
PY.260.261	Introduction to Psychology	3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.109	Piano 109 Jury	1
PY.950.531	Chamber Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.212	Keyboard Skills 2 - Piano Majors	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
PY.510.112	Introduction to Music Education	1

PY.260.216	Core 2	3
	Credits	**19**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.311	Keyboard Skills 3 - Piano Majors	2
PY.710.211	Theory 3	3
PY.450.213	Accompanying 1	1
PY.610.321	History of Music 1	3
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237	Secondary Choral Ensemble 1	2
PY.450.667	Piano Pedagogy 1	2
	Credits	**24**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.209	Piano 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.312	Keyboard Skills 4 - Piano Majors	2
PY.710.212	Theory 4	3
PY.450.214	Accompanying 2	1
PY.610.322	History of Music 2	3
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**25**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.450.411	Keyboard Literature: Baroque	2
PY.450.413	Keyboard Literature: 19th Century	2
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.309	Piano 309 Jury	1
PY.910.xxx	Large Ensemble	2
PY.710.312	Theory 6	3
PY.450.412	Keyboard Literature: Classical	2
PY.610.323	History of Music 3	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.510.414	Music & the Neurodiverse Learner	3
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**24**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.701	Piano Recital (UG)	2
PY.950.532	Chamber Ensemble (Small Ensemble)	1
PY.450.414	Keyboard Literature: 20th/21st C.	2
PY.610.xxx	Musicology Elective	3
PY.710.412	Instrumentation & Arranging	3
xxx.xxx	Liberal Arts Elective Courses	6
	Credits	**21**
	Total Credits	**171**

Voice, Bachelor of Music Education

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.186.100 & 100	Vocal Coaching and Vocal Coaching (Two (2) Semesters Required)	2
PY.530.109 & PY.530.209 & PY.530.309	Voice 109 Jury and Voice 209 Jury and Voice 309 Jury	3
PY.530.701	Voice Recital (UG)	2
PY.910.xxx	Large Ensemble	12
PY.910.54x	Opera Performance Electives	1
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8

PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.530.475	English Diction	2
PY.530.469	Italian Diction	2
PY.530.477	German Diction	2
PY.530.483	French Diction	2
PY.530.589	Vocal Literature: English/Italian	2
PY.530.590	Vocal Literature: German/French	2
PY.540.491	Acting For Opera 1	1
PY.540.513	Movement 1	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
PY.610.xxx	Musicology Elective	3
Music Education		
PY.510.112	Introduction to Music Education	1
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237 & PY.510.238	Secondary Choral Ensemble 1 and Conducting the Secondary Instrumental Ensemble 1	4
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.314	Progressive Methods: Secondary General/Vocal Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
General Studies		
PY.260.115	Core 1	3
PY.250.111 & PY.250.112	Italian 1a and Italian 1b	8
PY.250.121 & PY.250.122	German 1a and German 1b	6
PY.250.131 & PY.250.132	French 1a and French 1b	6
PY.260.261	Introduction to Psychology	3
xxx.xxx	Liberal Arts Elective Courses	3
Total Credits		**176**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.530.475	English Diction	2
PY.260.115	Core 1	3
PY.250.111	Italian 1a	4
PY.260.261	Introduction to Psychology	3
PY.540.513	Movement 1	1
	Credits	**27**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.109	Voice 109 Jury (Departmental Examination)	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.530.469	Italian Diction	2
PY.510.112	Introduction to Music Education	1
PY.250.112	Italian 1b	4
	Credits	**21**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.530.477	German Diction	2
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.237	Secondary Choral Ensemble 1	2
PY.250.131	French 1a	3
PY.540.491	Acting For Opera 1	1
	Credits	**24**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.209	Voice 209 Jury (Departmental Examination)	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.530.483	French Diction	2
PY.610.321	History of Music 1	3
PY.510.238	Conducting the Secondary Instrumental Ensemble 1	2
PY.250.132	French 1b	3
	Credits	**26**

Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.530.589	Vocal Literature: English/Italian	2
PY.610.322	History of Music 2	3
PY.510.337	Secondary Choral Ensemble 2	2
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.250.121	German 1a	3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.309	Voice 309 Jury (Departmental Examination)	1
PY.910.xxx	Large Ensemble	2
PY.530.590	Vocal Literature: German/French	2
PY.610.323	History of Music 3	3
PY.510.314	Progressive Methods: Secondary General/ Vocal Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.250.122	German 1b	3
	Credits	**24**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.701	Voice Recital (UG)	2
PY.910.54x	Opera Performance Elective	1
PY.710.312	Theory 6	3
PY.610.xxx	Musicology Elective	3
xxx.xxx	Liberal Arts Elective Courses	3
	Credits	**17**
	Total Credits	**176**

Bachelor of Music in Recording Arts

The Bachelor of Music in Recording Arts and Sciences program is designed to meet the expanding need for skilled audio technicians, producers, and engineers who possess both technical expertise and a sophisticated knowledge of music. A four-year double major program, the Bachelor of Music in Recording Arts combines an applied performance or a composition major with a technical education in recording technology. Relevant studies in electrical engineering, math, science, and computer science are taken at the Krieger School of Arts and Sciences and the Whiting School of Engineering of The Johns Hopkins University on the Homewood campus.

Program Requirements

The Recording Arts curriculum includes extensive practical experience, in styles ranging from jazz, rock, and popular music to classical opera, chamber, choral and orchestral. In addition to regular laboratory sessions with live musical groups of all styles, students serve as recording engineers for all Peabody performances, including providing the audio feed for those events being streamed live. All recording majors are expected to work in the recording studios throughout the course of their enrollment as part of the College Work Study program. Following their third year, students complete an internship with a company or individual specializing in the area of the industry in which they intend to pursue a career following graduation.

Due to credit and scheduling conflicts, it is not possible to combine the Recording Arts major with the Music Education or Music for New Media majors or the double degree program at the Homewood campus of Johns Hopkins University. However, there are classes available to non-majors, and after graduating with their BM, students can apply for one of the Master of Arts majors: Recording Arts and Sciences, or Acoustics.

Composition, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.310.545 & PY.310.546	Composition Seminar (UG) and Composition Seminar (UG) (Eight (8) Semesters Required)	8
PY.310.701	Composition Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.010.100	Minor Lesson 1/2 Hour (Four (4) Semesters Required)	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		

PY.715.123 & 123 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 1 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.6xx	Music Theory: advanced electives [1]	3
PY.710.413 & PY.710.414	Orchestration 1 and Orchestration 2	6
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Recording Arts		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8
PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [2]		3
Total Credits		**173**

[1] Composition majors must complete Music Theory 1-4 before enrolling in a graduate seminar.

[2] Recommended electives include: Digital system Fundamentals (EN.520.142) or Sound Design for Video Games (PY.550.524)

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering) (KSAS)	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.715.123	Ear Training 1	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**21**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.550.212	Recording 2b - Studio Technology	2

AS.171.102	General Physics: Physical Science Major II (KSAS)	4
	Credits	**22**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour	1
PY.710.311	Theory 5	3
PY.330.311	Conducting	1
PY.610.321	History of Music 1	3
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.010.100	Minor Lesson 1/2 Hour	1
PY.710.312	Theory 6	3
Music Theory Advanced Elective		3
PY.610.322	History of Music 2	3
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
	Credits	**19**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.545	Composition Seminar (UG)	1
PY.010.100	Minor Lesson 1/2 Hour	1
PY.710.413	Orchestration 1	3
PY.610.323	History of Music 3	3
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
Professional Elective		3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.546	Composition Seminar (UG)	1
PY.310.701	Composition Recital (UG)	2
PY.010.100	Minor Lesson 1/2 Hour	1
PY.710.414	Orchestration 2	3
Musicology Elective		3
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**24**
	Total Credits	**173**

Computer Music, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.350.545 & PY.350.546	Computer Music Seminar (UG) and Computer Music Seminar (UG) (Eight (8) Semesters Required) [1]	8
PY.350.701	Computer Music Recital (UG)	2
PY.910.xxx	Large Ensemble	8
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & 123 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 1 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.710.412	Instrumentation & Arranging [2]	3
PY.710.6xx	Advanced Theory Elective [3]	3
PY.350.463 & PY.350.464	Introduction to Computer Music and Introduction to Computer Music 2	6
PY.350.466	Introduction to Programming	3
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Recording Arts		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8

PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [4]		3
Total Credits		**174**

1. Students are welcome to attend Composition Seminar as appropriate to the focus of their work.
2. Students may elect PY.710.413 Orchestration 1-PY.710.414 Orchestration 2 in consultation with the department.
3. Computer Music majors must complete Music Theory 1-4 before enrolling in a graduate seminar.
4. Chosen in consultation with department advisor.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering) (KSAS)	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.715.123	Ear Training 1	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**21**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.350.463	Introduction to Computer Music	3
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
	Credits	**25**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.350.464	Introduction to Computer Music 2	3
PY.550.212	Recording 2b - Studio Technology	2
AS.171.102	General Physics: Physical Science Major II (KSAS)	4
	Credits	**25**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.350.466	Introduction to Programming	3
PY.610.321	History of Music 1	3
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
Professional Elective		3
	Credits	**18**

Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.545	Computer Music Seminar (UG)	1
PY.710.6xx	Advanced Theory Elective	3
PY.610.323	History of Music 3	3
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.546	Computer Music Seminar (UG)	1
PY.350.701	Computer Music Recital (UG)	2
PY.710.412	Instrumentation & Arranging	3
Musicology Elective		3
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**23**
	Total Credits	**174**

Guitar, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.470.545 & PY.470.546	Guitar Seminar (UG) and Guitar Seminar (UG) (Eight (8) Semesters Required)	8
PY.470.109 & PY.470.209	Guitar 109 Jury and Guitar 209 Jury (Departmental Examination)	2
PY.470.309	Guitar Junior Recital	1
PY.470.701	Guitar Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.541 & PY.950.542	Guitar Ensemble and Guitar Ensemble (Six (6) Semesters Required)	6
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.470.585 & PY.470.586 & PY.470.587 & PY.470.588	Guitar Music Skills 1 and Guitar Music Skills 2 and Guitar Music Skills 3 and Guitar Music Skills 4	4
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.470.431 & PY.470.432	Guitar Literature 1 (UG) and Guitar Literature 2 (UG)	4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	4
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Intro Electrical/Computer Engineering		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8
PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [1]		3
Total Credits		**178**

[1] Chosen in consultation with department advisor.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.541	Guitar Ensemble	1
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.470.585	Guitar Music Skills 1	1
PY.710.111	Theory 1	3
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering) (KSAS)	4
	Credits	**24**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.109	Guitar 109 Jury	1
PY.950.542	Guitar Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.470.586	Guitar Music Skills 2	1
PY.710.112	Theory 2	3
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**24**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.470.587	Guitar Music Skills 3	1
PY.710.211	Theory 3	3
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.209	Guitar 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.470.588	Guitar Music Skills 4	1
PY.710.212	Theory 4	3
PY.550.212	Recording 2b - Studio Technology	2
AS.171.102	General Physics: Physical Science Major II (KSAS)	4
	Credits	**23**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.710.311	Theory 5	3
PY.470.431	Guitar Literature 1 (UG)	2
PY.610.321	History of Music 1	3
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.309	Guitar Junior Recital	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.710.312	Theory 6	3
PY.470.432	Guitar Literature 2 (UG)	2
PY.610.322	History of Music 2	3
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
	Credits	**19**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.531	Chamber Ensemble	1
PY.470.637	Guitar Pedagogy 1	2
PY.610.323	History of Music 3	3
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
Professional Elective		3
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.701	Guitar Recital (UG)	2
PY.950.532	Chamber Ensemble	1
PY.470.638	Guitar Pedagogy 2	2
Musicology Elective		3
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3

PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**23**
	Total Credits	**178**

Jazz, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.570.101 & PY.570.102	Jazz Seminar and Jazz Seminar (Eight (8) Semesters Required)	8
PY.570.109 & PY.570.209 & PY.570.309	Jazz 109 Jury and Jazz 209 Jury and Jazz 309 Jury	3
PY.570.701	Jazz Recital (UG)	2
PY.570.711	Recording Project	2
PY.910.537 & PY.910.538	Peabody Jazz Ensemble and Peabody Jazz Ensemble (Eight (8) Semesters Required)	16
PY.950.525 & PY.950.526	Jazz Combo and Jazz Combo (Six (6) Semesters Required)	6
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.570.127 & PY.570.128	Jazz Theory Fundamentals 1 and Jazz Theory Fundamentals 2	4
PY.715.123 & PY.715.124	Ear Training 1 and Ear Training 2	4
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.710.111 & PY.710.112	Theory 1 and Theory 2	6
PY.570.259 & PY.570.260	Jazz Keyboard Studies 1 and Jazz Keyboard Studies 2	4
PY.570.359 & PY.570.360	Advanced Jazz Harmony 1 and Advanced Jazz Harmony 2	4
PY.570.361 & PY.570.362	Jazz Arranging 1 and Jazz Arranging 2	4
PY.570.459-460 Jazz Composition 1-2		4
PY.570.561 & PY.570.562 & PY.570.563 & PY.570.564	Jazz Improvisation 1 and Jazz Improvisation 2 and Jazz Improvisation 3 and Jazz Improvisation 4	8
PY.570.569 & PY.570.570	Jazz Analysis/History 1 and Jazz Analysis/History 2	4
PY.610.324	Music Histories in a Global Context	3
Recording Arts		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8
PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [1]		3
Total Credits		**181**

[1] Chosen in consultation with department advisor.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.570.127	Jazz Theory Fundamentals 1	2
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.570.569	Jazz Analysis/History 1	2
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering) (KSAS)	4
	Credits	**25**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.109	Jazz 109 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.570.128	Jazz Theory Fundamentals 2	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2

PY.570.570	Jazz Analysis/History 2	2
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**25**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.123.311	Building a Brand and Portfolio	2
PY.570.259	Jazz Keyboard Studies 1	2
PY.570.561	Jazz Improvisation 1	2
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
PY.710.111	Theory 1	3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.209	Jazz 209 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.570.260	Jazz Keyboard Studies 2	2
PY.570.562	Jazz Improvisation 2	2
PY.550.212	Recording 2b - Studio Technology	2
AS.171.102	General Physics: Physical Science Major II (KSAS)	4
PY.710.112	Theory 2	3
	Credits	**24**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.359	Advanced Jazz Harmony 1	2
PY.570.361	Jazz Arranging 1	2
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
Professional Elective		3
PY.610.324	Music Histories in a Global Context	3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.309	Jazz 309 Jury	1
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.570.360	Advanced Jazz Harmony 2	2
PY.570.362	Jazz Arranging 2	2
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
	Credits	**15**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.910.537	Peabody Jazz Ensemble	2
PY.950.525	Jazz Combo	1
PY.570.459 Jazz Composition 1		2
PY.570.563	Jazz Improvisation 3	2
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.701	Jazz Recital (UG)	2
PY.910.538	Peabody Jazz Ensemble	2
PY.950.526	Jazz Combo	1
PY.570.460 Jazz Composition 2		2
PY.570.564	Jazz Improvisation 4	2
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**24**
	Total Credits	**179**

Professional Electives

Students choose one advanced elective in consultation with advisor.

Orchestral Instruments, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.xxx.109-209-309	Departmental Examination	3
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	16
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	2
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1

PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Recording Arts		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8
PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [1]		3
Total Credits		**165**

[1] Recommended electives include: Digital Systems Fundamentals (EN.520.142), Sound Design for Video Games (PY.550.524), Consumer Audio Systems (PY.550.611), and Audio System Design (PY.550.610).

Variations

STRINGS AND PERCUSSION
166 credits

Code	Title	Credits
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2

FLUTE
166 credits

Code	Title	Credits
PY.430.463	Piccolo Class [1]	
PY.430.464	Piccolo Class [1]	

[1] Taken as a required elective

VIOLIN & VIOLA
164 credits

PY.425.309 Strings Jr Recital/309 Jury 2 credits (replaces 309 jury)

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering) (KSAS)	4
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.109	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**23**

Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.209	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.550.212	Recording 2b - Studio Technology	2
AS.171.102	General Physics: Physical Science Major II (KSAS)	4
	Credits	**22**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.710.311	Theory 5	3
PY.610.321	History of Music 1	3
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.309	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.710.312	Theory 6	3
PY.610.322	History of Music 2	3
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
Professional Elective		3
	Credits	**19**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.330.311	Conducting	1
PY.610.323	History of Music 3	3
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
	Credits	**18**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	2
Musicology Elective		3
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**21**
	Total Credits	**165**

Piano, Bachelor of Music in Recording Arts

Program Requirements

For common requirements, please see the Bachelor of Music Degree (p. 764) page.

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Eight (8) Semesters Required)	32
PY.450.109 & PY.450.209 & PY.450.309	Piano 109 Jury and Piano 209 Jury and Piano 309 Jury	3
PY.450.701	Piano Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	4
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
Supportive Courses in Music		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.211 & PY.715.212 & PY.715.311 & PY.715.312	Keyboard Skills 1 - Piano Majors and Keyboard Skills 2 - Piano Majors and Keyboard Skills 3 - Piano Majors and Keyboard Skills 4 - Piano Majors	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.450.213 & PY.450.214	Accompanying 1 and Accompanying 2	2

PY.450.411 & PY.450.412 & PY.450.413 & PY.450.414	Keyboard Literature: Baroque and Keyboard Literature: Classical and Keyboard Literature: 19th Century and Keyboard Literature: 20th/21st C.	8
PY.450.667	Piano Pedagogy 1	2
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Recording Arts		
Tech		
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8
PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering) (KSAS)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II (KSAS)	8
Electives		
Professional Electives [1]		3
Total Credits		**174**

[1] Chosen in consultation with department advisor.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.111	Exploring Arts Careers	1
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
PY.550.111	Recording 1a - Fundamentals	2
PY.260.115	Core 1	3
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.109	Piano 109 Jury	1
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
PY.550.112	Recording 1b - Fundamentals	2
PY.260.216	Core 2	3
AS.110.109	Calculus II (For Physical Sciences and Engineering) (KSAS)	4
	Credits	**21**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.311	Building a Brand and Portfolio	2
PY.715.223	Ear Training 3	2
PY.715.211	Keyboard Skills 1 - Piano Majors	2
PY.710.211	Theory 3	3
PY.450.213	Accompanying 1	1
PY.550.211	Recording 2a - Studio Technology	2
AS.171.101	General Physics: Physical Science Major I (KSAS)	4
	Credits	**22**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.209	Piano 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.123.312	Pitching Your Creative Idea (UG)	2
PY.715.224	Ear Training 4	2
PY.715.212	Keyboard Skills 2 - Piano Majors	2
PY.710.212	Theory 4	3
PY.450.214	Accompanying 2	1
PY.550.212	Recording 2b - Studio Technology	2
AS.171.102	General Physics: Physical Science Major II (KSAS)	4
	Credits	**23**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.311	Keyboard Skills 3 - Piano Majors	2
PY.710.311	Theory 5	3
PY.450.411	Keyboard Literature: Baroque	2
PY.610.321	History of Music 1	3
PY.550.311	Recording 3a - Classical/Jazz Techniques	2
EN.520.137	Introduction To Electrical & Computer Engineering	3
	Credits	**22**

Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.309	Piano 309 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.715.312	Keyboard Skills 4 - Piano Majors	2
PY.710.312	Theory 6	3
PY.450.412	Keyboard Literature: Classical	2
PY.610.322	History of Music 2	3
PY.550.312	Recording 3b - Classical/Jazz Mixing and Editing	2
	Credits	**20**
Fourth Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.531	Chamber Ensemble	1
PY.450.413	Keyboard Literature: 19th Century	2
PY.450.667	Piano Pedagogy 1	2
PY.610.323	History of Music 3	3
PY.550.411	Recording 4a - Rock/Pop Techniques	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
Professional Elective		3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.701	Piano Recital (UG)	2
PY.950.532	Chamber Ensemble	1
PY.450.414	Keyboard Literature: 20th/21st C.	2
Musicology Elective		3
PY.550.412	Recording 4b - Rock/Pop Mixing and Editing	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.419	Recording Internship	4
	Credits	**22**
	Total Credits	**174**

Minors

Undergraduate students may pursue a minor in the Business of Music, Historical Performance, Liberal Arts, Music Theory, Musicology, or Directed Studies.

Students may begin taking coursework toward a minor at any time. For Directed Studies, students may be admitted into the minor through the Admissions process or by applying by the end of their fourth semester of study. For all other minors, students may apply beginning in the fourth semester of study, and by the end of the penultimate semester. Students may apply by completing this form (https://projects.peabody.jhu.edu/servicedesk/customer/portal/23/create/230/). Students may apply for only one minor.

Once admitted to the minor, students must maintain good standing in the major area and a 3.5 cumulative GPA for Directed Studies or a 3.33 cumulative GPA for other minors.

Students may begin taking courses at another division of the university beginning in the second semester of study. Students with minors may not exceed enrollment in 25 credits each semester.

Successful completion of a minor will not appear on a diploma but will appear on a final transcript.

Business of Music, Minor

Program Requirements

Students take a customized curriculum with electives in three study areas: Accounting or Business Studies; Non-Profit/Arts Administration; and Communication/Marketing. Students may choose one additional elective from these study areas or an alternative course approved by the faculty. Electives may be taken at the Whiting School of Engineering (WSE), the Carey Business School, or the Krieger School of Arts and Sciences. Students complete the minor with a capstone project.

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/).

Code	Title	Credits
Accounting or Business		
Select one of the following:		3
EN.660.203	Financial Accounting	
EN.660.303	Managerial Accounting	
EN.660.105	Foundations of American Enterprise	
Non-Profit / Arts Admin		
PY.123.415	Arts Leadership Today	2
Communications or Marketing		
Select one of the following:		3
EN.661.110	Professional Writing and Communication	
EN.660.250	Identifying and Capturing Markets	
PY.123.413: Music Publishing and Nonprofit Corporations		
Career-Related Elective		
PY.123.412	Music and Law	2
EN.661.453	Communicating/Web at WSE	3
Capstone		
PY.123.499	Business of Music Practicum	1
Total Credits		**14**

Directed Studies, Minor

Program Requirements

Students develop a Directed Study Plan that emphasizes a specific field beyond music. The plan must be approved by the Chair of Liberal Arts. Courses in the approved plan may replace Core 3 and Core 4 and may fulfill Liberal Arts Electives. Approval may also be granted for minor courses to replace Core 1 and Core 2 if they have sufficient content in text analysis, writing and research methods. Credits earned from AP, IB, or prior study cannot be applied to the Directed Studies minor.

On completion of the Directed Studies Minor, the transcript will indicate the title of the student's Directed Study plan. For example: *Directed Study Minor with Coursework taken in Jewish Studies* or *Directed Study Minor with Coursework taken in Modern Media.*

Coursework at another JHU Division 15 credits	
Coursework at another JHU Division, Peabody, or outside institution credits	6

Coursework taken at outside institutions follows the policies in Sources of Credit (https://e-catalogue.jhu.edu/peabody/general-information-procedures-regulations/academic/sources-of-credit/).

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/).

Historical Performance, Minor

Program Requirements

Students must take at least four credits in applied historical performance, including such courses as Baroque Flute Class, Baroque Violin, Viola da gamba, or Cello, and many others. Minor lessons are available and would fulfill the applied music requirement but are not required. Please note that students taking minor lessons will incur the minor lesson fee for each semester of study. Students must play in Historical Performance Ensembles until earning at least four credits. Finally, students must earn at least 4 credits in Historical Performance coursework chosen in consultation with the faculty.

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/)

Code	Title	Credits
Applied Historical Performance Enrollments		4
Applied Historical Performance Ensembles		4
Historical Performance Elective Coursework		4
Total Credits		**12**

Historical Performance: Voice, Minor

Program Requirements

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/).

Code	Title	Credits
Early Vocal Literature		
PY.380.543	Early Vocal Literature: Baroque	2
PY.380.544	Early Vocal Literature: Medieval/Renaissance	2
Baroque Ornamentation		
PY.380.441	Baroque Ornamentation 1	2
PY.380.442	Baroque Ornamentation 2	2
Historical Performance Ensembles		
PY.910.527 & PY.910.528 Baltimore Baroque Band		3
PY.910.529 & PY.910.530 Renaissance Ensemble		3
Total Credits		**14**

Students approved for this minor are excused from four credits of Chorus and one opera performance elective

Liberal Arts, Minor

Program Requirements

Peabody students wishing to earn a Bachelor of Music or Bachelor of Fine Arts degree with a minor in Liberal Arts must complete six courses at the Krieger School of Arts and Sciences on the Homewood campus with at least three at the 200 level or higher. At least one of the courses must be a writing-intensive course, with the designation “(w)” in the Homewood course listing. Introductory language courses and Homewood music courses may not be used for the minor.

Given the requirements of this minor and the nature of the coursework, the Liberal Arts minor essentially subsumes the Liberal Arts elective requirement of the BM or BFA degree. All students applying for this minor must have their proposed program of study approved by the Associate Dean for Academic Affairs in consultation with the Chair of Liberal Arts.

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/)

Code	Title	Credits
Three Courses at Homewood		
Excluding Introductory Language		9
Three Courses at Homewood		
Courses above .200 (Including one "W")		9
Total Credits		**18**

Music Theory, Minor

Program Requirements

The Music Theory minor cultivates talented undergraduate students through specialized study in music theory. Students take one advanced skills class and three advanced music theory seminars. Students complete the minor with a research paper on a topic chosen in consultation with the department chair and the instructor of a seminar in which they are enrolled.

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/)

Code	Title	Credits
Advanced Skills Class		
PY.715.633	Advanced Keyboard Skills 1 - Piano Majors	2
or PY.715.634	Advanced Keyboard Skills 2 - Piano Majors	
or PY.715.323	Ear Training 5	
Music Theory Seminars		
3 Music Theory Seminars or 2 Music Theory Seminars and one Theory 6 in addition to Theory 6 for the BM		9
Capstone		
PY.710.462	Music Theory Minor Capstone	1
Total Credits		**12**

Musicology, Minor

Program Requirements

The Musicology minor is designed for students with an interest in music history beyond the core requirements. Students should apply for this minor after taking at least one course in the Musicology department. Students approved for the minor will take Music Bibliography and two graduate electives, in addition to the one Musicology elective required of all students: one from the graduate offerings at Peabody and one from the musicology seminars offered on the Homewood campus. Students complete the minor with a personally supervised capstone project.

Any credits taken in pursuit of the Musicology minor may also be applied as general electives for the BM degree. Some of the courses taken for the minor may count as Liberal Arts electives, but only on a case-by-case basis and in consultation with the Associate Dean for Academic Affairs and the Chair of Liberal Arts. With the exception of Founadtions of Music Research, students who matriculate to the five-year BM/MM program or continue in the MM program may not apply elective courses for the minor to their MM if those courses have already been counted as electives for the BM.

Additional information about minor requirements and the application process can be found here (https://e-catalogue.jhu.edu/peabody/bachelor-music-degree/minors/)

Code	Title	Credits
Bibliography		
PY.610.651	Foundations of Music Research	2
Electives		
PY.610.6xx	Peabody Musicology Seminar	3
AS.376.3xx	KSAS Musicology Seminar	3
Capstone		
PY.610.414	Musicology Practicum	1
Total Credits		**9**

Combined Degree Programs

Peabody-Homewood Double Degree Program

Peabody and the Homewood schools of Johns Hopkins University offer the opportunity for a select group academically and musically advanced students to simultaneously pursue a Bachelor of Music degree and either a Bachelor of Arts degree from the Krieger School of Arts and Sciences or a Bachelor of Science degree from the Whiting School of Engineering. Students must be admitted independently to Peabody and one of the Homewood schools and be invited to participate in the double degree program. Students who have begun their junior year of study are not eligible to enter the double degree program nor may students transfer into the program midyear. The double degree program is designed as a five year program, and students must comply with the credit limit of 25 credits per semester.

Students in the double degree program must maintain full-time enrollment in each semester of study, including lessons at Peabody and at least one class at Homewood. Administrative services such as registration, financial aid, and student accounts are provided to double degree students by the Homewood schools. Consequently, students in the double degree program do not receive Peabody merit scholarships or any other form of financial aid from Peabody. Double degree students must enroll in private lessons, at a minimum, and, for instrumental majors, large ensembles to maintain their status as Peabody degree candidates in the double degree program.

Student Status

Students in the double degree program are responsible for meeting the requirements of both degree curricula within the published guidelines of the relevant programs. Students' principal affiliation is with the Krieger School of Arts and Science or the Whiting School of Engineering. All official procedures of registration and records are managed through the Homewood Office of the Registrar. The official transcript for a double degree student, including all courses at both Peabody and Homewood, is maintained by the Homewood Office of the Registrar.

Enrollment Requirements and Limits

Double Degree students must enroll in private lessons each semester. Instrumental majors are required to enroll each semester for large ensembles and private lessons to maintain their status as Peabody degree candidates in the Double Degree Program. Double Degree students must register for no less than one course at Homewood each semester. Peabody Double Degree students are permitted to enroll in a maximum of 25 credits per semester.

Residency Requirement for Peabody Double Degree Students

Peabody Double Degree students must complete at least 48 credits on the Homewood campus, in the Krieger School of Arts & Sciences and/or the Whiting School of Engineering.

Course Changes and Withdrawals from Peabody Courses

Students must follow the deadlines for adding, dropping, or withdrawing from Peabody courses which are published on the Peabody Academic Affairs website at https://peabody.jhu.edu/academics/academic-calendar-resources/.

Course Changes and Withdrawals from Arts and Sciences and Engineering Courses

Students must follow the deadlines and processes for adding, dropping or withdrawing from Arts & Sciences and/or Engineering courses which are published on the Homewood Registrar's Office website (https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/).

Leave of Absence

Double Degree students may request a Leave of Absence (LOA) from the entire program, however, they cannot be granted leave from only one portion of the program. A LOA for Double Degree students is subject to the guidelines of the student's respective academic advising office on the Homewood campus.

Graduation Policies

Double Degree students must petition to graduate from the Peabody Conservatory in accordance with information located at https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/, and also adhere to the policies and procedures for applying to graduate from their Homewood school, Arts and Sciences or Engineering as indicated at ASEN Undergraduate Graduation Policy (p. 1616). Both degrees are awarded simultaneously, and degree conferral is available in May and December of each academic year.

Graduation Closes the Undergraduate Record

Upon graduation, the undergraduate record is closed. The only permitted changes are the resolution of incomplete grades, missing grades, and grade errors. These changes must be resolved by the first Monday after 30 days have lapsed since the degree conferral date. Students wishing to take additional courses at JHU after graduation should refer to Alumni Enrollment policies.

Accelerated Graduate Degrees

Qualified Peabody undergraduates have the option of applying to complete a master's degree in one additional year of study after completion of their bachelor's degree. The selection process takes place at the end of the third year of study. Applications are due by May 1. The admission process includes academic and performance elements as well as recommendations from faculty members. Students selected for the program maintain their initial financial assistance levels throughout the five years of study. Transfer students who will complete the BM in fewer than four years are ineligible for five-year programs.

The selection process for both the BM/MM and BMRA/MA programs is managed by the Office of Academic Affairs. The Associate Dean for Academic Affairs, in consultation with faculty and the administration, makes the final decisions about admittance to the five-year programs. Because the selection process considers the results of the 309 jury, the final decisions are not announced until all spring grades have been recorded.

Five-Year BM/MM Program

Admission Requirements

Undergraduate students may apply for admittance to the BM/MM program in the academic year in which they are scheduled to perform their 309 jury or junior recital (or, for composition majors, in their junior year) by submitting an application (https://peabody.jhu.edu/academics/academic-calendar-resources/academic-affairs/five-year-programs/five-year-program-application/) and faculty recommendations to the Office of Academic Affairs by May 1 of that year.

Admittance to the BM/MM program is limited to outstanding performers with excellent academic records. The minimum requirements for applying are:

1. An average of A- and above in all major lessons and juries
2. A minimum cumulative grade point average of 3.67
3. A recommendation from the major teacher.

Admittance into the BM/MM program includes the proviso that a student's fourth and fifth years of performance or composition study be with a single studio teacher unless there are circumstances that require special arrangements to be made by the Associate Dean for Academic Affairs. Students who wish to complete a BM in performance or composition and then earn an MM in Musicology, Music Theory Pedagogy, or Performance/Pedagogy are also eligible to apply for this program but may be required to complete additional application requirements. Students in the BM/ MM program are not permitted to pursue more than one MM degree. Students admitted to the BM/MM program have 2 semesters of Large Ensemble waived. Students typically begin taking MM coursework in their fourth year of study.

Five-Year BMRA/MA Program

Admission Requirements

Qualified students enrolled in the Bachelor of Music in Recording Arts (BMRA) program have the option of applying to complete a Master of Arts degree in Audio Sciences during a fifth year of study.

Students in the BM Music for New Media program may apply for this program with an adjusted program of study. Adjustments are detailed here (p. 809). Interested students should consult with Peabody Advising and department faculty.

Applications (https://peabody.jhu.edu/academics/academic-calendar-resources/academic-affairs/five-year-programs/five-year-program-application/)and materials must be submitted to Academic Affairs by 1 May during the student's third year of study. Admission to the BMRA/MA does not extend financial aid arrangements beyond a fifth year of study, nor does it guarantee continued major lessons in performance or composition.

Admittance to the BMRA/MA program requires:

- a cumulative GPA of 3.67
- recommendation from the Recording Arts faculty.

Course requirements for the fifth-year MA in Acoustics are listed here (p. 828).

Course requirements for the fifth-year MA in Recording Arts are listed here (p. 829).

Five-Year BM/MA: Music for New Media Variant

Students in the BM program in Music for New Media may apply for the five year BM/MA program with the following adjustments to the BM Music for New Media requirements (p. 776):

Code	Title	Credits
Subtract these courses:		
PY.550.651 & PY.550.652	Recording for Musicians 1 and Recording for Musicians 2	4
PY.260.359 & PY.260.360	Core 3 and Core 4	6
XXX.XXX	Liberal Arts Elective Courses	18
Total Credits Subtracted		*-28*

Code	Title	Credits
Add these courses:		
AS.110.108 & AS.110.109	Calculus I (Physical Sciences & Engineering) and Calculus II (For Physical Sciences and Engineering)	8
AS.171.101 & AS.171.102	General Physics: Physical Science Major I and General Physics: Physical Science Major II	8
PY.550.111 & PY.550.112 & PY.550.211 & PY.550.212	Recording 1a - Fundamentals and Recording 1b - Fundamentals and Recording 2a - Studio Technology and Recording 2b - Studio Technology	8

PY.550.311 & PY.550.312 & PY.550.411 & PY.550.412	Recording 3a - Classical/Jazz Techniques and Recording 3b - Classical/Jazz Mixing and Editing and Recording 4a - Rock/Pop Techniques and Recording 4b - Rock/Pop Mixing and Editing	10
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
PY.550.419	Recording Internship	4
Total Credits Added		*45*

Dance, Bachelor of Fine Arts

The Peabody Conservatory BFA Dance program endeavors to prepare exceptional 21st century performers, choreographers, teachers, and future leaders dedicated to pushing the boundaries between dance and science and expanding the role and relevance of dance in both traditional and non-traditional contexts.

Admission Requirements

Students applying for the Bachelor of Fine Arts degree program present transcripts, test scores, and recommendations before playing an audition. The details of this process may be found at the Admissions website (https://peabody.jhu.edu/audition-apply/). Students applying for the Bachelor of Fine Arts degree program should meet the following criteria:

1. The student must be a graduate of an accredited high school or present evidence of equivalent study.
2. General admission requirements as listed for specific degrees and programs are identical for all applicants. However, immigration regulations, varying educational backgrounds, and financial considerations make special procedures necessary in order to help meet the needs of individual students. The detailed instructions sent to each applicant should be studied with utmost care.

Program Requirements

Dance Core and Performance

All BFA students take Ballet 1-4 and Modern 1-4 concurrently: students dance in both classes in each semester of enrollment. Transfer students are placed at the appropriate level at matriculation. To maintain Good Academic Standing, students must earn at least a B- in Ballet and Modern in each semester of study.

Students are required to participate in rehearsals and performances as assigned. Auditions for performances are held several times each year. All BFA students are required to attend auditions, unless other arrangements have been made with the Chair.

Additional off-campus performances may be scheduled throughout the year.

Dance Theory and Choreography

Dance Theory courses should be taken in the order recommended in the curricular grid, and any substitution must be approved by the Chair. Similarly, the choreography courses should be taken in sequential order: Improv/Authentic Movement (PY.830.202) followed by Choreography 1-3 (PY.830.301-302,404).

Code	Title	Credits
PY.830.202	Improv/Authentic Movement	2
PY.830.301 & PY.830.302	Choreography 1 and Choreography 2	6
PY.830.404 Choreography 3		3

Humanities

All BFA students are required to successfully complete Liberal Arts courses, beginning with a two-year Core Curriculum (12 credits). The majority of Peabody students will take the Core Curriculum in their first two years of study. However, students in need of intense writing instruction will take six credits of Writing Intensive in their first year and begin the Core Curriculum in their second year. ESL 1 does not count toward fulfillment of degree requirements, and the grades earned are not calculated in the student's GPA; however, the hours are counted as part of the course load for tuition and full-time enrollment determination.

 [(https://livejohnshopkins.sharepoint.com/teams/Advising/Shared%20Documents/Academic%20Catalog/AY%2019-20%20Academic%20Catalog%20CCrosso%20Edits%205-27-2020.docx#_msoanchor_1)**Humanities Core Curriculum**

- PY.260.115 Core 1: Analytical Thinking and Writing (3 credits, fall)
- PY.260.216 Core 2: Writing and Research Methods (3 credits, spring)
- PY.260.359 Core 3: Critical Methods (3 credits, fall)
- PY.260.360 Core 4: Art, Culture, and Society (3 credits, spring)

Critical Writing Intensive

PY.260.023 Critical Writing Intensive 1 is a yearlong course designed for students who have inadequate preparation in formal writing skills. Both Writing Intensive courses involve close coordination with faculty members teaching the Core Curriculum. The second semester of Writing Intensive incorporates visits to Core courses in order to familiarize students with the coursework ahead.

liberal arts Electives

Upon completion of the first year of the Liberal Arts core or by the third year of study, students begin to take the appropriate number of Liberal Arts elective courses. While students may take some courses at Homewood or elsewhere, Peabody's Liberal Arts Department provides a variety of courses designed specifically for Peabody students.

Breakthrough Curriculum

All undergraduates complete the Breakthrough Curriculum. Matriculating BFA students take PY.123.111 Exploring Arts Careers. In the third year of study, students take PY.123.311 Building a Brand and Portfolioand PY.123.312 Pitching Your Creative Idea (UG). The culmination of study is the preparation and presentation of a pitch, adjudicated by a panel of faculty and guests that also serves as an entry in a real competition for funding and project support to implement a residency at one of Peabody's partner institutions. Students may attempt to test out of the Building a Brand and Portfolio requirement; information on testing out can be requested from the LAUNCHPad office (https://peabody.jhu.edu/life-at-peabody/career-services/).

Curriculum

Code	Title	Credits
Technique & Performance		
PY.800.101 & PY.800.102 & PY.800.201 & PY.800.202 & PY.800.301 & PY.800.302 & PY.800.401	Ballet 1a and Ballet 1b and Ballet 2a and Ballet 2b and Ballet 3a and Ballet 3b and Ballet 4a	21
PY.800.402 Ballet 4b		3
PY.800.103 & PY.800.104 & PY.800.203 & PY.800.204 & PY.800.303 & PY.800.304 & PY.800.403	Modern 1a and Modern 1b and Modern 2a and Modern 2b and Modern 3a and Modern 3b and Modern 4a	21
PY.800.404 Modern 4b		3
PY.800.501 & PY.800.502	Rehearsal/Performance Collaboration Fall and Rehearsal/Performance Collaboration Spring (Six (6) Semesters Required)	6
PY.800.503	Student Dance Company 1	2
PY.800.504 Student Dance Company 2		2
Dance Theory & Composition		
PY.830.101	Music for Dance	3
PY.810.201 & PY.810.202	Somatic Practices 1 and Somatic Practices 2	6
PY.820.301	Dance of the African Diaspora	3
PY.820.201 & PY.820.202	Critical Dance Studies 1 and Critical Dance Studies 2	6
PY.830.202	Improv/Authentic Movement	2
PY.830.301 & PY.830.302 & PY.830.303	Choreography 1 and Choreography 2 and Choreography 3	9
PY.830.102	Dance Production	2
PY.820.401	Dance Pedagogy	3
The Breakthrough Curriculum		
PY.123.111	Exploring Arts Careers	1
PY.123.311	Building a Brand and Portfolio	2
PY.123.312	Pitching Your Creative Idea (UG)	2
General Studies		
PY.260.115	Core 1	3
PY.260.216	Core 2	3
PY.260.359	Core 3	3
PY.260.360	Core 4	3
Physiology Elective [1]		3
Humanities Coursework		9
Electives		
Electives		9
Total Credits		**130**

[1] Students take one approved course in anatomy or physiology. Options include

- NR.110.200 Nutrition (4 credits, online)
- NR.110.204 Anatomy with Lab (4 credits, online)

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
PY.800.101	Ballet 1a	3
PY.800.103	Modern 1a	3
PY.800.501	Rehearsal/Performance Collaboration Fall	1
PY.830.101	Music for Dance	3
PY.123.111	Exploring Arts Careers	1
PY.260.115	Core 1	3
	Credits	**14**
Second Semester		
PY.800.102	Ballet 1b	3
PY.800.104	Modern 1b	3
PY.800.502	Rehearsal/Performance Collaboration Spring	1
PY.830.102	Dance Production	2
PY.260.216	Core 2	3
Electives		3
	Credits	**15**
Second Year		
First Semester		
PY.800.201	Ballet 2a	3
PY.800.203	Modern 2a	3
PY.800.501	Rehearsal/Performance Collaboration Fall	1
PY.810.201	Somatic Practices 1	3
PY.820.201	Critical Dance Studies 1	3
PY.260.359	Core 3	3
	Credits	**16**
Second Semester		
PY.800.202	Ballet 2b	3
PY.800.204	Modern 2b	3
PY.800.502	Rehearsal/Performance Collaboration Spring	1
PY.810.202	Somatic Practices 2	3
PY.820.202	Critical Dance Studies 2	3
PY.830.202	Improv/Authentic Movement	2
PY.260.360	Core 4	3
	Credits	**18**
Third Year		
First Semester		
PY.800.301	Ballet 3a	3
PY.800.303	Modern 3a	3
PY.800.501	Rehearsal/Performance Collaboration Fall	1
PY.820.301	Dance of the African Diaspora	3
PY.830.301	Choreography 1	3
PY.123.311	Building a Brand and Portfolio	2

Physiology Elective		3
	Credits	**18**
Second Semester		
PY.800.302	Ballet 3b	3
PY.800.304	Modern 3b	3
PY.800.502	Rehearsal/Performance Collaboration Spring	1
PY.830.302	Choreography 2	3
PY.123.312	Pitching Your Creative Idea (UG)	2
Humanities Coursework		3
	Credits	**15**
Fourth Year		
First Semester		
PY.800.401	Ballet 4a	3
PY.800.403	Modern 4a	3
PY.800.503	Student Dance Company 1	2
PY.820.401	Dance Pedagogy	3
Humanities Coursework		3
Electives		3
	Credits	**17**
Second Semester		
PY.800.402 Ballet 4b		3
PY.800.404 Modern 4b		3
PY.800.504 Student Dance Company 2		2
PY.830.303	Choreography 3	3
Humanities Coursework		3
Electives		3
	Credits	**17**
	Total Credits	**130**

Minors

Undergraduate dance students may pursue a minor in Liberal Arts (p. 807) or Directed Studies (p. 806). Minor study is generally coordinated by the Office of Academic Affairs in consultation with the department offering the minor.

Students may begin taking coursework for a minor at any time. Students in the Directed Studies program should see the specific regulations for that program, below. For all other minors, students may apply beginning in the fourth semester of study, and up until the end of the penultimate semester of study. Students apply by completing this form. Once admitted to the minor, students must maintain a 3.33 cumulative GPA and good standing in the major area.

Students may apply for only one minor.

Successful completion of a minor will not appear on a diploma but will appear on a final transcript.

Master of Music Degree (MM)

The program leading to the degree of Master of Music provides for intensive development of performance skills, extensive knowledge of the literature in the major field of study, and achievement of a broadened knowledge of the art.

Students applying for the Master of Music degree program present transcripts, test scores, and recommendations before playing an audition. The details of this process may be found on the Admissions website. Successful applicants must matriculate into the Master of Music degree program in the fall semester of the calendar year in which they auditioned. The Conservatory does not defer entrance into degree programs or allow students to begin in the spring semester. Matriculating MM students must meet the following criteria:

1. A Bachelor of Music degree or the equivalent from an accredited institution.
2. Evidence of a degree recital or an approved equivalent must be submitted in the form of a degree recital program or credit listed on the student's transcript.
3. All entering students are required to take placement examinations in music theory, musicology, and ear-training.
4. Students who are placed in ESL courses in their first semester are only permitted to enroll in graduate seminars in music theory or musicology after satisfactorily completing the remedial coursework into which they are placed.

Program Requirements

MM Curricula

- MM Composition (p. 814)
- MM Computer Music (p. 814)
- MM Conducting, Orchestral (p. 822)
- MM Conducting, Wind (p. 824)
- MM Guitar (p. 815)
- MM Harpsichord (p. 816)
- MM Historical Performance Instruments (p. 816)
- MM Historical Performance Voice (p. 821)
- MM Music Education (p. 826)
- MM Music Theory Pedagogy (p. 827)
- MM Musicology (p. 826)
- MM Organ (p. 823)
- MM Orchestral Instruments (p. 822)
- MM Performance/Pedagogy (p. 825)
- MM Piano (p. 824)
- MM Piano: Ensemble Arts Vocal Accompanying (https://e-catalogue.jhu.edu/peabody/degree-diploma-programs/piano-ensemble-arts-vocal-accompanying-master-music/)
- MM Voice (p. 825)

MM Curricular Components

The Master of Music degree requires between 30 and 50 credit hours. The total number of credits varies by major; a detailed list for each major follows. The requirements for each degree must be satisfied with coursework at Peabody, certified transfer credits, or placement examination. Performance, Conducting, and Composition students are required to remain enrolled in one-hour major lessons for four semesters of full-time study. Musicology and Music Theory Pedagogy majors are required to maintain full-time enrollment for four semesters of study.

New MM students may apply as many as six credits from a previous institution and nine credits from a previous Peabody degree subject to the regulations in Transfer Credits (p. 757).

Review Courses

Deficiencies in the areas of music theory, ear-training, musicology, keyboard skills, or English must be corrected by remedial study at the Conservatory. Review courses do not count toward fulfillment of degree requirements, and the grades earned are not calculated in the student's GPA; however, the hours are counted as part of the course load for tuition and full-time enrollment determination. Students must satisfy any review requirements in Music Theory, and/or Musicology before enrolling in other graduate-level courses in these fields.

All requirements for the Master of Music degree program must be completed within five years of the date of initial registration.

Applied Enrollments

Major Lessons

Master of Music students in performance and composition must enroll in major lessons through their last semester of the degree timeframe. Any change to studio assignment must be approved by the Associate Dean for Academic Affairs (Studio Assignments) and students must earn at least a B- in major lessons (Academic Standing).

Hearings and Recitals

The progress of each student is monitored by the department every year. Advancement and assessment are accomplished by individual lessons and departmental hearings. Every performance major must play a recital or a hearing in each year of study. Recitals are essential learning modalities of a conservatory education but are also for-credit classes. Students must achieve at least a B- for a recital in order to maintain good academic standing. A student must play a recital or hearing in each academic year to maintain good academic standing.

MM performance majors are required to play a recital as the culmination of their degree program.

Portfolios

Degree Candidates majoring in Composition and Computer Music must submit a portfolio of works approved by the major teacher to the Office of Academic Affairs by April 15 of the year in which they intend to graduate. The portfolio must contain only compositions written during the student's time of study at Peabody.

Ensembles

Master of Music students majoring in orchestral instruments must participate in large ensemble each semester of enrollment for major study as assigned. Large ensemble auditions are held during Orientation Week. Large Ensemble credits beyond those required cannot be counted as elective credit. MM students majoring in composition are required to enroll in two semesters of a choral ensemble in the first year of residence. The regulations for performing in large ensembles, which are set by the Ensemble Office, may be found at the Ensemble Office website (https://peabody.jhu.edu/academics/academic-calendar-resources/ensemble-office/).

All graduate instrumental majors in the MM program participate in one or two semesters of chamber music as required by the individual program (this may be studio accompanying for pianists).

Academic Enrollments

Breakthrough Curriculum

All MM students complete the Breakthrough Curriculum. Matriculating MM, students take PY.123.611 Building a Brand and Portfolio and PY.123.612 Pitching Your Creative Idea (GR), in order, and in their first year of study. The culmination of study is the preparation and presentation of a pitch, adjudicated by a panel of faculty and guests and will also serve as an entry in a real competition for funding and project support to implement a residency at one of Peabody's partner institutions. Students may attempt to test out of the Building a Brand and Portfolio requirement; information on testing out can be requested from the LAUNCHPad office (https://peabody.jhu.edu/life-at-peabody/career-services/).

Music Theory and Musicology

MM students are required to take between four and five graduate seminars in music theory and musicology as part of their degree program. Students may enroll in a maximum of six credits of graduate seminars each semester. Students who enroll in any music theory and musicology courses beyond the six-credit limit will be administratively withdrawn from those classes.

As an enrollment prerequisite for all graduate music theory and musicology seminars, students must pass online placement exams offered early in the summer before matriculation. Students may not enroll in a graduate music theory seminar until they have passed the online test or completed the online review class in music theory offered for a tuition charge; students may not enroll in a graduate musicology seminar until they have passed the online test or completed the online review class in musicology offered for a tuition charge. After matriculation, tests are offered at the discretion of the departments.

Students who are placed in ESL courses in their first semester are only permitted to enroll in graduate seminars in music theory or musicology after satisfactorily completing the remedial coursework into which they are placed. As such, placement in ESL may delay completion of the MM degree beyond two years.

Foundations of Music Research

MM students are strongly encouraged to take Foundations of Music Research in their first year of study. International students who test into English as a Second Language Level I (PY.250.001 English Level 1a, PY.250.002 English Level 1b) are not permitted to take PY.610.651 Foundations of Music Research until they have successfully completed their first year of English studies. Exceptions are made only in consultation with the Musicology faculty, the ESL faculty, and the Associate Dean for Academic Affairs.

Electives and Other Requirements

Only courses designated as “G” (Graduate Elective) in the master schedule of classes may be used to fulfill graduate elective requirements. Curricular Practical Training may be used to fulfill a maximum of three elective credits. Questions about the appropriateness of courses for elective credit can be directed to the Advising Office.

For some curricula, certain requirements are not offered for credit. For example, departmental hearings for performers or foreign language exams in voice and musicology do not appear on transcripts. Other requirements do appear on transcripts, but the credits are not applied in fulfillment of a degree, such as remedial coursework. In every case, students must complete all requirements to remain in good standing and complete the Master of Music degree.

Performance Curricula, Master of Music

- MM Conducting, Orchestral (p. 822)
- MM Conducting, Wind (p. 824)
- MM Guitar (p. 815)
- MM Harpsichord (p. 816)
- MM Historical Performance Instruments (p. 816)
- MM Historical Performance Voice (p. 821)
- MM Organ (p. 823)
- MM Orchestral Instruments (p. 822)
- MM Piano (p. 824)
- MM Piano: Ensemble Arts (https://e-catalogue.jhu.edu/peabody/degree-diploma-programs/piano-ensemble-arts-vocal-accompanying-master-music/)
- MM Piano: Ensemble Arts Vocal Accompanying (https://e-catalogue.jhu.edu/peabody/degree-diploma-programs/piano-ensemble-arts-vocal-accompanying-master-music/)
- MM Voice (p. 825)

Composition, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.310.845 & PY.310.846	Composition Seminar (GR) and Composition Seminar (GR) (Required Each Semester)	4
PY.310.691	Composition Portfolio MM	2
PY.910.811 & PY.910.812	Peabody Hopkins Conservatory Choir and Peabody-Hopkins Symphonic Chorus [1]	4
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**47**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.845	Composition Seminar (GR)	1
PY.910.811	Peabody Hopkins Conservatory Choir	2
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.846	Composition Seminar (GR)	1
PY.910.812	Peabody-Hopkins Symphonic Chorus [1]	2
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.845	Composition Seminar (GR)	1
PY.710.6xx	Music Theory Seminars	3
PY.xxx.xxx	Electives	3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.846	Composition Seminar (GR)	1
PY.310.691	Composition Portfolio MM	2
PY.610.6xx	Musicology Seminars	3
	Credits	**10**
	Total Credits	**47**

[1] Composition Students must take Chorus in their first year of study.

Computer Music, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.350.845 & PY.350.846	Computer Music Seminar (GR) and Computer Music Seminar (GR) (Departmental Seminar)	4
PY.xxx.xxx	Capstone Project	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.350.840	History of Electroacoustic Music	3
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.350.837 & PY.350.838	Digital Music Programming 1 and Digital Music Programming 2	6
PY.350.835	Studio Techniques	3
PY.350.867 & PY.350.868	Synthesis Theory 1 and Synthesis Theory 2	4
Total Credits		**53**

Variations

Each degree specifies a capstone project

Code	Title	Credits
CM Composition (53 credits)		
PY.350.693	Portfolio	2
CM Performance/Production (53 credits)		
PY.350.701	Computer Music Recital (UG)	2

CM Research (53 credits)		
PY.350.691	Master's Thesis	2

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.845	Computer Music Seminar (GR)	1
PY.350.837	Digital Music Programming 1	3
PY.350.835	Studio Techniques	3
PY.350.867	Synthesis Theory 1	2
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.846	Computer Music Seminar (GR)	1
PY.710.6xx	Music Theory Seminars	3
PY.350.838	Digital Music Programming 2	3
PY.350.868	Synthesis Theory 2	2
	Credits	**13**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.845	Computer Music Seminar (GR)	1
PY.710.6xx	Music Theory Seminars	3
PY.610.651	Foundations of Music Research	2
PY.123.611	Building a Brand and Portfolio	2
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.350.846	Computer Music Seminar (GR)	1
PY.xxx.xxx	Capstone Project	2
PY.610.6xx	Musicology Seminars	3
PY.350.840	History of Electroacoustic Music	3
PY.123.612	Pitching Your Creative Idea (GR)	2
	Credits	**15**
	Total Credits	**53**

Guitar, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.470.721	Guitar Recital (GR 1)	2
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	2
PY.950.841 & PY.950.842	Guitar Ensemble and Guitar Ensemble	2
PY.470.845 & PY.470.846	Guitar Seminar (GR) and Guitar Seminar (GR) (Required Each Semester)	4
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
PY.470.631 & PY.470.632	Guitar Literature 1 (GR) and Guitar Literature 2 (GR)	4
PY.380.433 & PY.380.434	Lute Literature & Notation 1 and Lute Literature & Notation 2	4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	4
Total Credits		**56**

Variation

Code	Title	Credits
Peabody B.M. Guitar Alumni (56 credits)		
PY.xxx.xxx	Electives	6
Minus:		
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2 (- 4 credits)	
PY.950.841 & PY.950.842	Guitar Ensemble and Guitar Ensemble (- 2 credits)	

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.841	Guitar Ensemble	1
PY.470.845	Guitar Seminar (GR)	1
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.470.631	Guitar Literature 1 (GR)	2
PY.470.637	Guitar Pedagogy 1	2
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.842	Guitar Ensemble	1
PY.470.846	Guitar Seminar (GR)	1
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
PY.470.632	Guitar Literature 2 (GR)	2
PY.470.638	Guitar Pedagogy 2	2
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.531	Chamber Ensemble	1
PY.470.845	Guitar Seminar (GR)	1
PY.710.6xx	Music Theory Seminars	3
PY.380.433	Lute Literature & Notation 1	2
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4

PY.470.721	Guitar Recital (GR 1)	2
PY.950.532	Chamber Ensemble	1
PY.470.846	Guitar Seminar (GR)	1
PY.610.6xx	Musicology Seminars	3
PY.380.434	Lute Literature & Notation 2	2
	Credits	**13**
	Total Credits	**56**

Harpsichord, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.380.721	Historical Performance Recital (GR 1)	2
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band (Four (4) Semesters Required)	8
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.634	Baroque Performance Practice	3
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.380.315 & PY.380.445	Continuo 1: Figured Bass and Continuo 2: Advanced Continuo	4
PY.380.421 - PY.380.422 Harpsichord Literature		2
PY.380.491	Harpsichord Tuning and Maintenance	1
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**60**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.827	Baltimore Baroque Band	2
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.315	Continuo 1: Figured Bass	2
PY.380.421 Harpsichord Literature 1		1
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.828	Baltimore Baroque Band	2
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.380.445	Continuo 2: Advanced Continuo	2
PY.380.422 Harpsichord Literature 2		1
PY.xxx.xxx	Electives	3
	Credits	**17**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.827	Baltimore Baroque Band	2
PY.950.827	Baroque Ensemble	1
PY.610.6xx	Musicology Seminar	3
PY.380.491	Harpsichord Tuning and Maintenance	1
PY.380.441	Baroque Ornamentation 1	2
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.828	Baltimore Baroque Band	2
PY.380.721	Historical Performance Recital (GR 1)	2
PY.950.828	Baroque Ensemble	1
PY.710.6xx	Music Theory Seminars	3
PY.380.442	Baroque Ornamentation 2	2
	Credits	**14**
	Total Credits	**60**

Historical Performance Instruments, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.380.721	Historical Performance Recital (GR 1)	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.634	Baroque Performance Practice	3
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
Total Credits		**36**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4

PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
	Credits	**9**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
	Credits	**7**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**9**
	Total Credits	**36**

Baroque Oboe

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.380.447 & PY.380.448	Early Wind Literature 1 and Early Wind Literature 2	2
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble (Recorder)	2
Total Credits		**52**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminar	3
PY.380.441	Baroque Ornamentation 1	2
PY.380.447	Early Wind Literature 1	1
PY.950.827	Baroque Ensemble	1
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.442	Baroque Ornamentation 2	2
PY.380.448	Early Wind Literature 2	1
PY.950.828	Baroque Ensemble	1
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.910.827	Baltimore Baroque Band	2
PY.950.831	Chamber Ensemble (Recorder)	1
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.910.828	Baltimore Baroque Band	2
PY.950.832	Chamber Ensemble (Recorder)	1
	Credits	**12**
	Total Credits	**52**

Recorder

Code	Title	Credits
Major Area and Supportive Courses		36
PY.380.4xx-4xx	Baroque Flute or Oboe Class	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.380.447 & PY.380.448	Early Wind Literature 1 and Early Wind Literature 2	2
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.910.829 & PY.910.830	Renaissance Ensemble and Renaissance Ensemble	4
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble	2
Total Credits		**54**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.441	Baroque Ornamentation 1	2
PY.380.447	Early Wind Literature 1	1
PY.910.829	Renaissance Ensemble	2
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.380.442	Baroque Ornamentation 2	2
PY.380.448	Early Wind Literature 2	1
PY.910.830	Renaissance Ensemble	2
	Credits	**14**

Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.380.4xx-4xx	Baroque Flute or Oboe Class	1
PY.910.827	Baltimore Baroque Band	2
PY.950.831	Chamber Ensemble (Recorder)	1
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.380.4xx-4xx	Baroque Flute or Oboe Class	1
PY.910.828	Baltimore Baroque Band	2
PY.950.832	Chamber Ensemble (Recorder)	1
	Credits	**13**
	Total Credits	**54**

Traverso

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.380.447 & PY.380.448	Early Wind Literature 1 and Early Wind Literature 2	2
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
Total Credits		**50**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.441	Baroque Ornamentation 1	2
PY.380.447	Early Wind Literature 1	1
PY.950.827	Baroque Ensemble	1
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.442	Baroque Ornamentation 2	2
PY.380.448	Early Wind Literature 2	1
PY.950.828	Baroque Ensemble	1
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.910.827	Baltimore Baroque Band	2
	Credits	**9**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.910.828	Baltimore Baroque Band	2
	Credits	**11**
	Total Credits	**50**

Renaissance Lute

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.433 & PY.380.434	Lute Literature & Notation 1 and Lute Literature & Notation 2	4
PY.910.829 & PY.910.830	Renaissance Ensemble and Renaissance Ensemble (Four (4) Semesters Required)	8
PY.950.853 & PY.950.854	Renaissance Chamber Ensemble and Renaissance Chamber Ensemble	2
Total Credits		**52**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminar	3
PY.910.829	Renaissance Ensemble	2
PY.950.853	Renaissance Chamber Ensemble	1
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour	2
PY.910.829	Renaissance Ensemble	2
PY.950.853	Renaissance Chamber Ensemble	1
	Credits	**14**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.380.433	Lute Literature & Notation 1	2
PY.910.829	Renaissance Ensemble	2
	Credits	**11**

Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.380.434	Lute Literature & Notation 2	2
PY.910.830	Renaissance Ensemble	2
	Credits	**13**
	Total Credits	**52**

Baroque Lute / Theorbo

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour (Renaissance Lute Minor)	2
PY.380.315 & PY.380.445	Continuo 1: Figured Bass and Continuo 2: Advanced Continuo	4
PY.380.433 & PY.380.434	Lute Literature & Notation 1 and Lute Literature & Notation 2	4
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble (Four (4) Semesters Required)	4
Total Credits		**58**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.315	Continuo 1: Figured Bass	2
PY.380.441	Baroque Ornamentation 1	2
PY.950.827	Baroque Ensemble	1
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour (Renaissance Lute Minor)	2
PY.380.445	Continuo 2: Advanced Continuo	2
PY.380.442	Baroque Ornamentation 2	2
PY.950.828	Baroque Ensemble	1
	Credits	**16**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.380.433	Lute Literature & Notation 1	2
PY.910.827	Baltimore Baroque Band	2
PY.950.827	Baroque Ensemble	1
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.380.434	Lute Literature & Notation 2	2
PY.910.828	Baltimore Baroque Band	2
PY.950.828	Baroque Ensemble	1
	Credits	**14**
	Total Credits	**58**

Baroque Violin

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour (Baroque Viola Minor Lessons)	2
PY.380.xxx	Literature Electives	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
Total Credits		**50**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminar	3
PY.380.xxx	Literature Electives	1
PY.380.441	Baroque Ornamentation 1	2
PY.950.827	Baroque Ensemble	1
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour (Baroque Viola Minor Lessons)	2
PY.380.xxx	Literature Electives	1
PY.380.442	Baroque Ornamentation 2	2
PY.950.828	Baroque Ensemble	1
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.910.827	Baltimore Baroque Band	2
	Credits	**9**

Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.910.828	Baltimore Baroque Band	2
	Credits	**11**
	Total Credits	**50**

Baroque Violoncello

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour (Viola da Gamba Minor Lessons)	2
PY.380.xxx	Literature Electives	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble (Viola da Gamba)	2
Total Credits		**52**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.xxx	Literature Electives	1
PY.380.441	Baroque Ornamentation 1	2
PY.950.827	Baroque Ensemble	1
	Credits	**15**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour (Viola da Gamba Minor Lessons)	2
PY.380.xxx	Literature Electives	1
PY.380.442	Baroque Ornamentation 2	2
PY.950.828	Baroque Ensemble	1
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminar	3
PY.910.827	Baltimore Baroque Band	2
PY.950.831	Chamber Ensemble (Viola da Gamba)	1
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminar	3
PY.910.828	Baltimore Baroque Band	2
PY.950.832	Chamber Ensemble (Viola da Gamba)	1
	Credits	**12**
	Total Credits	**52**

Viola da Gamba

Code	Title	Credits
Major Area and Supportive Courses		36
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.xxx	Literature Electives	2
PY.380.441 & PY.380.442	Baroque Ornamentation 1 and Baroque Ornamentation 2	4
PY.910.827 & PY.910.828	Baltimore Baroque Band and Baltimore Baroque Band	4
PY.950.827 & PY.950.828	Baroque Ensemble and Baroque Ensemble	2
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble (Viola da Gamba)	2
PY.910.829 & PY.910.830	Renaissance Ensemble and Renaissance Ensemble	4
Total Credits		**56**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.xxx	Literature Electives	1
PY.380.441	Baroque Ornamentation 1	2
PY.950.827	Baroque Ensemble	1
PY.910.829	Renaissance Ensemble	2
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.050.100	Major Lesson 1/2 Hour	2
PY.380.xxx	Literature Electives	1
PY.380.442	Baroque Ornamentation 2	2
PY.950.828	Baroque Ensemble	1
PY.910.830	Renaissance Ensemble	2
	Credits	**17**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.610.6xx	Musicology Seminars	3
PY.910.827	Baltimore Baroque Band	2

PY.950.831	Chamber Ensemble (Viola da Gamba)	1
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.710.6xx	Music Theory Seminars	3
PY.910.828	Baltimore Baroque Band	2
PY.950.832	Chamber Ensemble (Viola da Gamba)	1
	Credits	**12**
	Total Credits	**56**

Historical Performance Voice, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.186.100 & 100	Vocal Coaching and Vocal Coaching	2
Language and Diction Proficiency [1]		0
PY.950.527 & PY.950.528	Baroque Ensemble and Baroque Ensemble	2
PY.910.529 & PY.910.530	Renaissance Ensemble and Renaissance Ensemble (Four (4) Semesters Required)	8
PY.380.721	Historical Performance Recital (GR 1)	2
Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.634	Baroque Performance Practice	3
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.380.543 & PY.380.544	Early Vocal Literature: Baroque and Early Vocal Literature: Medieval/Renaissance	4
Total Credits		**52**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.527	Baroque Ensemble	1
PY.123.611	Building a Brand and Portfolio	2
PY.910.529	Renaissance Ensemble	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.380.543	Early Vocal Literature: Baroque	2
	Credits	**16**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.528	Baroque Ensemble	1
PY.910.530	Renaissance Ensemble	2
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.634	Baroque Performance Practice	3
PY.380.544	Early Vocal Literature: Medieval/ Renaissance	2
	Credits	**14**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.529	Renaissance Ensemble	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.530	Renaissance Ensemble	2
PY.380.721	Historical Performance Recital (GR 1)	2
PY.610.6xx	Musicology Seminar	3
	Credits	**12**
	Total Credits	**52**

[1] All candidates for the M.M. in voice must meet language and diction standards in French, German, Italian, and English, which will be assessed in early in their first semester of study. Students who are designated for remedial work in language and diction will be reassessed at their graduate hearing at the end of their first year and must demonstrate improvement before performing their recital.

Jazz, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR [1]	16
PY.570.101 & PY.570.102	Jazz Seminar and Jazz Seminar	2
PY.570.711	Recording Project	2
PY.xxx.xxx	Ensemble	8
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Total Credits		**46**

[1] 4 semesters of this course are required

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.xxx.xxx	Ensemble	2
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.101	Jazz Seminar	1
PY.570.721	Jazz Recital (GR 1)	2
PY.xxx.xxx	Ensemble	2
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminar	3
	Credits	**14**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.xxx.xxx	Ensemble	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.570.102	Jazz Seminar	1
PY.570.711	Recording Project	2
PY.xxx.xxx	Ensemble	2
PY.610.6xx	Musicology Seminar	3
	Credits	**12**
	Total Credits	**50**

Conducting: Orchestral, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.330.845 & PY.330.846	Conducting Seminar and Conducting Seminar (Four (4) Semesters Required)	16
PY.330.721	Conducting Recital (GR 1)	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**39**

Course	Title	Credits
First Year		
First Semester		
PY.330.845	Conducting Seminar	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**11**
Second Semester		
PY.330.846	Conducting Seminar	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
Second Year		
First Semester		
PY.330.845	Conducting Seminar	4
PY.710.6xxx	Music Theory Seminars	3
PY.xxx.xxx	Electives	3
	Credits	**10**
Second Semester		
PY.330.846	Conducting Seminar	4
PY.330.721	Conducting Recital (GR 1)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
	Total Credits	**39**

Orchestral Instruments, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.xxx.721	Recital	2
PY.910.xxx	Large Ensemble	8
PY.950.831	Chamber Ensemble	1
or PY.950.832	Chamber Ensemble	
Professional Studies		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**48**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.831 or PY.950.832	Chamber Ensemble or Chamber Ensemble	1
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
PY.xxx.xxx	Electives	3
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.6xx	Large Ensemble	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**9**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.721	Recital	2
PY.910.xxx	Large Ensemble	2
PY.610.6xx	Musicology Seminars	3
	Credits	**11**
	Total Credits	**48**

Variations

Violin, Viola and Cello

49 credits

Code	Title	Credits
PY.950.832	Chamber Ensemble	1

Flute

48 credits

Code	Title	Credits
PY.430.463 or PY.430.464	Piccolo Class [1] Piccolo Class	1

[1] Taken as a required elective

Organ, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.460.721	Organ Recital (GR 1)	2
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**41**

The following courses are recommended and may be required by the department:

Code	Title	Credits
PY.460.425 & PY.460.426	Resources for Contemporary Church Musicians 1 and Resources for Contemporary Church Musicians 2	6
PY.460.423 & PY.460.424	Organ Literature 1 and Organ Literature 2	6

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.831	Chamber Ensemble	1
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
PY.xxx.xxx	Electives	3
	Credits	**13**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.832	Chamber Ensemble	1
PY.710.6xx	Music Theory Seminars	3
	Credits	**8**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.721	Organ Recital (GR 1)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
	Total Credits	**41**

Piano, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.450.721	Piano Recital (GR 1)	2
PY.950.831 & PY.950.832	Chamber Ensemble and Chamber Ensemble	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.715.633 & PY.715.634	Advanced Keyboard Skills 1 - Piano Majors and Advanced Keyboard Skills 2 - Piano Majors [1]	4
PY.710.6xx	Music Theory Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**45**

Variation

Peabody BM/Piano Alum

44 credits

Code	Title	Credits
Minus:		
PY.715.633	Advanced Keyboard Skills 1 - Piano Majors (- 2 credits)	
PY.715.634	Advanced Keyboard Skills 2 - Piano Majors (- 2 credits)	

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.715.633	Advanced Keyboard Skills 1 - Piano Majors [1]	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.831	Chamber Ensemble	1
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
PY.715.634	Advanced Keyboard Skills 2 - Piano Majors [1]	2
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.950.832	Chamber Ensemble	1
PY.710.6xx	Music Theory Seminars	3
PY.XXX.XXX Electives		3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.721	Piano Recital (GR 1)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
	Total Credits	**45**

Conducting: Wind, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.330.721	Conducting Recital (GR 1)	2
PY.330.849 & PY.330.850	Wind Conducting Seminar and Wind Conducting Seminar (Required Each Semester)	4
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
PY.710.692	Wind Music Orchestration [1]	3
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**46**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.849	Wind Conducting Seminar	1
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.850	Wind Conducting Seminar	1
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**10**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.849	Wind Conducting Seminar	1

PY.710.6xx	Music Theory Seminars	3
PY.XXX.XXX	Electives	3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.721	Conducting Recital (GR 1)	2
PY.330.850	Wind Conducting Seminar	1
PY.610.6xx	Musicology Seminars	3
PY.710.692	Wind Music Orchestration [1]	3
	Credits	**13**
	Total Credits	**46**

1 With the permission of the major teacher, students may substitute Orchestration (PY.710.413 Orchestration 1-PY.710.414 Orchestration 2)

Voice, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.186.100 & 100	Vocal Coaching and Vocal Coaching (Two (2) Semesters Required)	2
Language and Diction Proficiencies [1]		
PY.530.721	Voice Recital (GR 1)	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
PY.530.xxx	Vocal Literature Electives [2]	4
Total Credits		**42**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	3
PY.530.xxx	Vocal Literature Electives	2
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.710.6xx	Music Theory Seminars	3
PY.530.xxx	Vocal Literature Elective	2
	Credits	**10**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.721	Voice Recital (GR 1)	2
PY.610.6xx	Musicology Seminars	3
	Credits	**10**
	Total Credits	**42**

1 All candidates for the M.M. in voice must meet language and diction standards in French, German, Italian, and English, which will be assessed in early in their first semester of study. Students who are designated for remedial work in language and diction will be reassessed at their graduate hearing at the end of their first year and must demonstrate improvement before performing their recital.

2 In order to count as a Vocal Literature elective, a course must include in-class performances of repertoire. Approved courses include but are not limited to: Singing in Russian, Russian Songs and Arias, Advanced Lieder Studies, Advanced Vocal Repertoire in French, Arioso and Recitative, Music for the Voice – 20th and 21st Centuries, and Oratorio.

Master of Music: Academic Majors

Performance/Pedagogy, Master of Music

Program Requirements

Pedagogy Concentration

Code	Title	Credits
Pedagogy Practicum		
Select one of the following:		4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	
PY.420.629 & PY.420.647	Harp Pedagogy 1 and Harp Pedagogy 3	
PY.450.667 & PY.450.668	Piano Pedagogy 1 and Piano Pedagogy 2	
PY.425.651 & PY.425.652	Violin/Viola Pedagogy 1 and Violin/Viola Pedagogy 2	
PY.425.641 & PY.425.642	Violoncello Pedagogy 1 and Violoncello Pedagogy 2	
PY.530.683 & PY.530.684	Vocal Pedagogy and Vocal Pedagogy Lab	
PY.520.615	Pedagogy Internship	2
PY.520.617	Internship Seminar	1

PY.520.618	Portfolio Development	1
Total Credits		**8**

Course	Title	Credits
First Year		
First Semester		
Pedagogy Practicum		2
	Credits	**2**
Second Semester		
Pedagogy Practicum		2
	Credits	**2**
Second Year		
First Semester		
PY.520.615	Pedagogy Internship	2
PY.520.617	Internship Seminar	1
	Credits	**3**
Second Semester		
PY.520.618	Portfolio Development	1
	Credits	**1**
	Total Credits	**8**

Music Education, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.510.611	Psychology of Music Teaching	2
PY.510.612	Research in Music Education	2
PY.510.613	History & Philosophy of Music Education	2
PY.510.6xx	Music Education Electives [1]	8
PY.510.691	Independent Field Study	4
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
PY.710.6xx	Music Theory Seminars	6
Total Credits		**32**

Course	Title	Credits
First Year		
First Semester		
PY.510.611	Psychology of Music Teaching	2
PY.510.6xx	Music Education Electives	2
PY.710.6xx	Music Theory Seminar	3
	Credits	**7**
Second Semester		
PY.510.612	Research in Music Education	2
PY.510.6xx	Music Education Electives	2
PY.610.6xx	Musicology Seminars	3
	Credits	**7**
Second Year		
First Semester		
PY.510.613	History & Philosophy of Music Education	2
PY.510.6xx	Music Education Electives	2
PY.710.6xx	Music Theory Seminars	3
PY.610.651	Foundations of Music Research	2
	Credits	**9**
Second Semester		
PY.510.6xx	Music Education Electives	2
PY.610.6xx	Musicology Seminars	3
PY.510.691	Independent Field Study	4
	Credits	**9**
	Total Credits	**32**

[1] Chosen in consultation with department advisor

Musicology, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.610.6xx	Seminars in Musicology	12
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.755 & PY.610.756	Masters Research and Masters Research	4
PY.610.691	Master's Essay	2
xxx.xxx	Applied Minor Lessons or Ensemble	2
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.710.6xx	Music Theory Seminars	6
Electives		
AS.xxx.xxx	Electives [1]	3
Total Credits		**38**

Course	Title	Credits
First Year		
First Semester		
PY.610.6xx	Seminars in Musicology	3
PY.610.847	Musicology Colloquium	3
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
	Credits	**10**
Second Semester		
PY.610.63x	Seminars in Musicology	3
xxx.xxx	Applied Minor Lesson or Ensemble	2
PY.123.612	Pitching Your Creative Idea (GR)	2
	Credits	**7**
Second Year		
First Semester		
PY.610.63x	Seminars in Musicology	3
PY.610.755	Masters Research	2

PY.710.6xx	Music Theory Seminars	3
AS.xxx.xxx	Electives [1]	3
	Credits	**11**
Second Semester		
PY.610.63x	Seminars in Musicology	3
PY.610.756	Masters Research	2
PY.610.691	Master's Essay	2
PY.710.6xx	Music Theory Seminars	3
	Credits	**10**
	Total Credits	**38**

[1] To be selected in consultation with the Chair of Musicology from courses offered at the Krieger School of Arts and Sciences.

Music Theory Pedagogy, Master of Music

Program Requirements

Code	Title	Credits
Major Area		
PY.710.634	Baroque Counterpoint [1]	3
Select two Analysis Courses [2]		6
Select one Twentieth Century Analysis Course [2]		3
PY.710.649	Music Theory Pedagogy	3
PY.710.650	Theory Pedagogy Internship	3
PY.710.685	Music Theory Pedagogy Project	3
The Breakthrough Curriculum		
PY.123.611	Building a Brand and Portfolio	2
PY.123.612	Pitching Your Creative Idea (GR)	2
Supportive Courses in Music		
PY.610.651	Foundations of Music Research	2
PY.610.6xx	Musicology Seminars	6
Electives		
PY.xxx.xxx	Electives	3
Total Credits		**36**

Course	Title	Credits
First Year		
First Semester		
PY.710.634	Baroque Counterpoint	3
PY.710.649	Music Theory Pedagogy	3
PY.123.611	Building a Brand and Portfolio	2
PY.610.651	Foundations of Music Research	2
	Credits	**10**
Second Semester		
Analysis Course		3
PY.123.612	Pitching Your Creative Idea (GR)	2
PY.610.6xx	Musicology Seminars	3
PY.xxx.xxx	Electives	1
	Credits	**9**
Second Year		
First Semester		
Twentieth Century Analysis Course		3
PY.710.650	Theory Pedagogy Internship	3
PY.xxx.xxx	Electives	2
	Credits	**8**
Second Semester		
Analysis Course		3
PY.710.685	Music Theory Pedagogy Project	3
PY.610.6xx	Musicology Seminars	3
	Credits	**9**
	Total Credits	**36**

[1] Students who test out of Baroque counterpoint take PY.710.633 Renaissance Counterpoint

[2] Chosen in consultation with department advisor

Master of Arts Degree (MA)

The Master of Arts programs were developed in conjunction with members of the professional audio and acoustics communities to provide students with the knowledge and skills necessary to work at an advanced level in the field of audio and/or acoustics. The program is intended both for current audio professionals who wish to obtain a post-baccalaureate credential and individuals with a background in science, engineering, technology, and/or music who are seeking additional training in order to gain employment in the audio or acoustics industries.

Admission requires an undergraduate degree in architecture, audio technology, computer sciences, electrical engineering, mechanical engineering, physics, or recording sciences. It is preferred that applicants have completed undergraduate coursework in physics and calculus, or have taken AP or IB level physics and calculus in high school. Additional requirements are a background in music with the ability to play an instrument or sing. Students pursuing Recording Arts and Sciences must take college Music Theory or have taken AP Music Theory (or equivalent). International students must demonstrate competencies in English commensurate with expectations for Peabody's Master of Music degree program.

Program Requirements

- Acoustics (p. 828)
- Recording Arts and Sciences (p. 829)

Students choose from two majors: Acoustics or Recording Arts and Sciences. Core coursework includes Musical Acoustics, Electroacoustics, Psychoacoustics, and Architectural Acoustics. The remaining coursework in each track consists of courses specific to the major chosen by the student, in consultation with their faculty advisor in accordance with background and professional goals.

The Acoustics major is designed to prepare students to work as professionals in the fields of acoustical consulting (with a particular focus on music performance and rehearsal spaces), audiovisual systems design, and acoustical product design. The program provides a thorough grounding in acoustical fundamentals and design practices to enable graduates to begin careers in these specialized fields upon graduation.

The Recording Arts and Sciences major is designed to prepare students to work as professionals in the many specialties within the professional audio field – in particular, recording engineering, music producing, product development, and consumer audio. Alumni have found work in recording studios; film and television score mixing; video game sound design, composition, and coding; radio and television broadcast; consumer electronics; audiovisual system design; and others.

Audio Sciences: Acoustics, Master of Arts

Program Requirements

Curricula

Code	Title	Credits
Major Area		
PY.550.515	Musical Acoustics	3
PY.550.517	Psychoacoustics	3
PY.550.624	Architectural Acoustics 1	3
PY.550.516	Electroacoustics	3
PY.550.519	Acoustical/Audio Measurements	3
PY.550.632	Architectural Acoustics 2	3
PY.550.625	Audiovisual System Design	3
PY.550.626	Noise Control	2
PY.550.627	Acoustical Modeling	2
PY.550.640	Acoustics Design Practicum	3
PY.550.631	Graduate Acoustics Seminar	2
PY.550.633 Graduate Acoustics Seminar 2		2
Supportive Courses in Music		
Professional Electives		6
Music Elective		3
Total Credits		**41**

Course	Title	Credits
First Year		
First Semester		
PY.550.515	Musical Acoustics	3
PY.550.517	Psychoacoustics	3
PY.550.624	Architectural Acoustics 1	3
PY.550.631	Graduate Acoustics Seminar	2
	Credits	**11**
Second Semester		
PY.550.519	Acoustical/Audio Measurements	3
PY.550.632	Architectural Acoustics 2	3
PY.550.625	Audiovisual System Design	3
PY.550.626	Noise Control	2
	Credits	**11**
Second Year		
First Semester		
PY.550.627	Acoustical Modeling	2
PY.550.633 Graduate Acoustics Seminar 2		2
Professional Elective		3
Music Elective		3
	Credits	**10**
Second Semester		
PY.550.516	Electroacoustics	3
PY.550.640	Acoustics Design Practicum	3
Professional Elective		3
	Credits	**9**
	Total Credits	**41**

Five-Year BM/MA Program Requirements: Acoustics

Note: Music for New Media students completing the five-year BM/MA program will complete an adjusted BM course of study (p. 809).

Code	Title	Credits
Major Area		
PY.550.513 & PY.550.514	Advanced Studio Production 1 and Advanced Studio Production 2	6
PY.550.610	Audio Science and Technology	3
PY.550.611	Consumer Audio Systems	3
PY.550.515	Musical Acoustics	3
PY.550.517	Psychoacoustics	3
PY.550.516	Electroacoustics	3
PY.550.624	Architectural Acoustics 1	3
Supportive Courses in Music		
XXX.XXX	Music or Professional Electives [1]	3
Total Credits		**27**

Course	Title	Credits
Fifth Year		
First Semester		
PY.550.513	Advanced Studio Production 1	3
PY.550.610	Audio Science and Technology	3
PY.550.515	Musical Acoustics	3
PY.550.517	Psychoacoustics	3
PY.550.624	Architectural Acoustics 1	3
	Credits	**15**
Second Semester		
PY.550.514	Advanced Studio Production 2	3
PY.550.611	Consumer Audio Systems	3
PY.550.516	Electroacoustics	3
Music or Professional Electives	XXX.XXX	3
	Credits	**12**
	Total Credits	**27**

[1] Consult with advisor

Audio Sciences: Recording Arts and Sciences, Master of Arts

Program Requirements

Curricula

Code	Title	Credits
Major Area		
PY.550.511 & PY.550.512	Advanced Recording Systems 1 and Advanced Recording Systems 2	6
PY.550.513 & PY.550.514	Advanced Studio Production 1 and Advanced Studio Production 2	6
PY.550.610	Audio Science and Technology	3
PY.550.611	Consumer Audio Systems	3
PY.550.515	Musical Acoustics	3
PY.550.517	Psychoacoustics	3
PY.550.516	Electroacoustics	3
PY.550.624	Architectural Acoustics 1	3
Supportive Courses		
XXX.XXX	Music or Professional Electives [1]	6
Total Credits		**36**

Course	Title	Credits
First Year		
First Semester		
PY.550.511	Advanced Recording Systems 1	3
PY.550.610	Audio Science and Technology	3
PY.550.517	Psychoacoustics	3
	Credits	**9**
Second Semester		
PY.550.512	Advanced Recording Systems 2	3
PY.550.611	Consumer Audio Systems	3
Music or Professional Electives	XXX.XXX	3
	Credits	**9**
Second Year		
First Semester		
PY.550.513	Advanced Studio Production 1	3
PY.550.515	Musical Acoustics	3
PY.550.624	Architectural Acoustics 1	3
	Credits	**9**
Second Semester		
PY.550.514	Advanced Studio Production 2	3
PY.550.516	Electroacoustics	3
Music or Professional Electives	XXX.XXX	3
	Credits	**9**
	Total Credits	**36**

[1] Consult with advisor

Five-Year BM/MA Program Requirements: Recording Arts

Note: Music for New Media students completing the five-year BM/MA program will complete an adjusted BM course of study. (p. 809)

Code	Title	Credits
Major Area		
PY.550.515	Musical Acoustics	3
PY.550.624	Architectural Acoustics 1	3
PY.550.516	Electroacoustics	3
PY.550.632	Architectural Acoustics 2	3
PY.550.625	Audiovisual System Design	3
PY.550.626	Noise Control	2
PY.550.627	Acoustical Modeling	2
PY.550.640	Acoustics Design Practicum	3
PY.550.631	Graduate Acoustics Seminar	2
PY.550.633	Graduate Acoustics Seminar 2	2
Total Credits		**26**

Course	Title	Credits
Fifth Year		
First Semester		
PY.550.515	Musical Acoustics	3
PY.550.624	Architectural Acoustics 1	3
PY.550.627	Acoustical Modeling	2
PY.550.631	Graduate Acoustics Seminar	2
	Credits	**10**
Second Semester		
PY.550.516	Electroacoustics	3
PY.550.632	Architectural Acoustics 2	3
PY.550.625	Audiovisual System Design	3
PY.550.626	Noise Control	2
PY.550.640	Acoustics Design Practicum	3
PY.550.633	Graduate Acoustics Seminar 2	2
	Credits	**16**
	Total Credits	**26**

Doctor of Musical Arts (DMA)

The program leading to the degree of Doctor of Musical Arts (DMA) provides students with the highest level of professional training in the art of musical performance or the craft of musical composition. To this end, applied study in the major field is supported by extensive academic work in musicology and music theory. The Doctor of Musical Arts degree certifies that its holder is a sophisticated professional with the requisite skills and understanding to be an effective leader in their field.

Admission Requirements

Students applying for the Doctor of Musical Arts degree program present transcripts, recommendations, and an analytical or historical essay written within the previous two years before: playing a live audition, sitting for an interview, and completing examinations in music theory and musicology. The details of this process may be found at peabody.jhu.edu/admissions (http://www.peabody.jhu.edu/

admissions/). Successful applicants must matriculate into the Doctor of Musical Arts degree program in the fall semester of the calendar year in which they auditioned. The Conservatory does not defer entrance into degree programs or allow students to begin in the spring semester. Students matriculating into the Doctor of Musical Arts degree program should present evidence of a Master of Music degree or its demonstrated equivalent.

Program Requirements

DMA Curricula

- DMA Orchestral Conducting (p. 832)
- DMA Wind Conducting (p. 836)
- DMA Guitar (p. 831)
- DMA Historical Performance Instruments (p. 832)
- DMA Orchestral Instruments (p. 833)
- DMA Organ (p. 834)
- DMA Piano (p. 834)
- DMA Voice (p. 835)

The DMA Guidelines

The procedures for meeting the requirements of the DMA program are listed in the DMA Guidelines, which are published and archived by the Office of Academic Affairs. The DMA Guidelines apply to each student that matriculates in the fall semester of its publication. What follows is an adumbration of the essential requirements.

Residency

The program of study for the Doctor of Musical Arts degree normally requires an attendance of two years. Student must attend full time for at least one year (earning a minimum of 18 credits and a maximum of 36 credits for one academic year. Students in the United States on an F-1 visa must remain full-time for the duration of their studies. All requirements for the Doctor of Musical Arts degree must be completed within seven academic years from the date of initial DMA registration. Exceptions to this regulation may be granted by the Doctoral Committee under extraordinary circumstances.

Degree-in-Progress

After passing the Preliminary Oral Examination, completing all academic requirements, and performing at least two recitals—or the number of recitals prescribed by the department— DMA students achieve Degree-in-Progress (DIP) status. For the purposes of student loans and visas, Degree-in-Progress students are full-time students.

Registration Requirements

Admission to candidacy is determined in part by the results of the three, written qualifying examinations: Major Field, Music History, and Music Theory. All examinations are graded on a “pass/fail” basis. A student who fails any qualifying examinations twice must petition the Doctoral Committee for permission to take the examination a third time.

Written exams are created by the respective faculty advisor in a student’s Advisory Committee and administered by the Office of Academic Affairs. They may be taken during the following periods beginning in the second year of coursework:

- October through November
- January through March (Spring Break)
- 15 May to 15 August

Doctoral Candidacy

On completing all qualifying exams, and any remaining solo, concerto, and/or chamber music recitals (for performance majors), a DMA student is considered a Doctoral Candidate. During the period of candidacy, the student completes Final Oral Exam, the Final Document, and a lecture recital (for Performance Majors). For further details, students should refer to the DMA Guidelines (https://peabody.jhu.edu/academics/degrees-programs/doctor-of-musical-arts/dma-guidelines/).

Degree Advisory Committees

The Office of Academic Affairs oversees the work of DMA students in coordination with the major teacher, an Academic Advisory Committee, and the Doctoral Committee. Some departments assign a group of faculty to grade all recitals for performance majors, which may be considered a second advisory committee, or Major Field Committee.

- The Academic Advisory Committee consists of the major teacher, a Musicology Advisor, and a Music Theory Advisor. This committee is available to the student for consultation and advice concerning curriculum and possible dissertation or paper topics. Members of this committee also submit appropriate questions for the written qualifying examinations and sit on the oral qualifying examination committee. The members of the Academic Advisory Committee are selected by the student but appointed by the Associate Dean for Academic Affairs and must be confirmed before the student becomes a Degree-in-Progress student.
- The Major Field Advisory Committee consists of the major teacher and other faculty members from the specific department. The Major Field Advisory Committee are responsible for approving the student’s repertoire list, approving and jurying all the student’s recitals, and submitting questions for the Major Field qualifying examination. In smaller teaching units, the Major Field Advisory Committee may be the department.
- The Doctoral Committee is a standing committee of the Conservatory Faculty Government that oversees all aspects of each student’s program in coordination with the Office of Academic Affairs. The Doctoral Committee is comprised of eight faculty members Senior Associate Dean of Institute Studies and meets monthly during each academic year.

Composition, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.310.845 & PY.310.846	Composition Seminar (GR) and Composition Seminar (GR) (Required Each Semester)	4
PY.310.793	Compositions/Commentary	6
PY.310.721	Composition Recital (DMA)	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminars	9

PY.710.6xx	Music Theory Seminars	12
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		6
Humanities Elective		3
Total Credits		**65**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.845	Composition Seminar (GR)	1
PY.610.847	Musicology Colloquium	3
PY.710.6xx	Music Theory Seminars	3
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.846	Composition Seminar (GR)	1
PY.610.6xx	Musicology Seminars	3
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**14**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.845	Composition Seminar (GR)	1
PY.610.6xx	Musicology Seminars	3
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.310.846	Composition Seminar (GR)	1
PY.610.6xx	Musicology Seminars	3
PY.710.6xx	Music Theory Seminars	3
Humanities Elective		3
	Credits	**14**
DIP		
PY.310.793	Compositions/Commentary	6
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
PY.310.721	Composition Recital (DMA)	2
	Credits	**12**
	Total Credits	**65**

Guitar, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.470.721	Guitar Recital (GR 1)	2
PY.470.722	Guitar Recital (GR 2)	2
PY.470.723	Guitar Recital (GR 3)	2
PY.470.725	Guitar Recital (DMA Concerto)	2
PY.470.726	Guitar Recital (DMA Chamber)	2
PY.470.727	Guitar Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total Credits		**61**
Dissertation Track		
-Guitar Recital (DMA Concerto) PY.470.725		-2
-Guitar Recital (DMA Chamber) PY.470.726		-2
-Guitar Recital (DMA Lecture) PY.470.727		-2
-Lecture-Recital Paper PY.610.792		-2
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA)	6
Total Credits		**61**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.721	Guitar Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.722	Guitar Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.723	Guitar Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.725	Guitar Recital (DMA Concerto)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3

Humanities Elective		3
	Credits	**15**
DIP		
PY.470.726	Guitar Recital (DMA Chamber)	2
PY.470.727	Guitar Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**61**

Historical Performance Instruments, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.380.721	Historical Performance Recital (GR 1)	2
PY.380.722	Historical Performance Recital (GR 2)	2
PY.380.723	Historical Performance Recital (GR 3)	2
PY.380.725	Historical Performance Recital (Concerto)	2
PY.380.726	Historical Performance Recital (Chamber)	2
PY.380.727	Historical Performance Recital (Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total Credits		**61**
Dissertation Track		
-Historical Performance Recital (Concerto)		-2
-Historical Performance Recital (Chamber)		-2
-Historical Performance Recital (Lecture)		-2
-Lecture-Recital Paper		-2
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA) (Semester of Graduation)	6
Total Credits		**61**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.721	Historical Performance Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.722	Historical Performance Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.723	Historical Performance Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.380.725	Historical Performance Recital (Concerto)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**15**
DIP		
PY.380.726	Historical Performance Recital (Chamber)	2
PY.380.727	Historical Performance Recital (Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**61**

Orchestral Conducting, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.330.847-848 DMA Conducting Seminar		16
PY.330.721	Conducting Recital (GR 1)	2
PY.330.722	Conducting Recital (GR 2)	2
PY.330.723	Conducting Recital (GR 3)	2
PY.330.724	Conducting Recital (GR 4)	2
PY.330.727	Conducting Recital (Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		15

Humanities Elective		3
Total Credits		**62**

Course	Title	Credits
First Year		
First Semester		
PY.330.847	DMA Conducting Seminar	4
PY.330.721	Conducting Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.330.848	DMA Conducting Seminar	4
PY.330.722	Conducting Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		6
	Credits	**15**
Second Year		
First Semester		
PY.330.847	DMA Conducting Seminar	4
PY.330.723	Conducting Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**12**
Second Semester		
PY.330.848	DMA Conducting Seminar	4
PY.330.724	Conducting Recital (GR 4)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**15**
DIP		
PY.470.727	Guitar Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**8**
	Total Credits	**62**

Orchestral Instruments, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.xxx.721	Recital: Solo	2
PY.xxx.722	Recital: Solo	2
PY.xxx.723	Recital: Solo	2
PY.xxx.725	Recital: Concerto	2
PY.xxx.726	Recital: Chamber Music	2
PY.xxx.727	Recital: Lecture	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total Credits		**61**
Dissertation Track		
-Recital: Concerto PY.xxx.725		-2
-Recital: Chamber Music PY.xxx.726		-2
-Recital: Lecture PY.xxx.727		-2
-Lecture-Recital Document PY.610.792		-2
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA) (Semester of Graduation)	6
Total Credits		**61**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.721	Recital: Solo	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.722	Recital: Solo	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.723	Recital: Solo	2
PY.610.xxx	Musicology Seminar	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.725	Recital: Concerto	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**15**
DIP		
PY.xxx.726	Recital: Chamber Music	2
PY.xxx.727	Recital: Lecture	2

PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**61**

Organ, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.460.721	Organ Recital (GR 1)	2
PY.460.722	Organ Recital (GR 2)	2
PY.460.723	Organ Recital (GR 3)	2
PY.460.725	Organ Recital (DMA Concerto)	2
PY.460.726	Organ Recital (DMA Chamber)	2
PY.460.727	Organ Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total		**61**
Dissertation Track		
-Organ Recital (DMA Concerto) PY.460.725		-2
-Organ Recital (DMA Chamber) PY.460.726		
-Organ Recital (DMA Lecture) PY.460.727		-2
-Lecture-Recital Paper PY.610.792		
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA) (Semester of Graduation)	6
Total		**61**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.721	Organ Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.722	Organ Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.723	Organ Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.725	Organ Recital (DMA Concerto)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**15**
DIP		
PY.460.726	Organ Recital (DMA Chamber)	2
PY.460.727	Organ Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**61**

Piano, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.450.721	Piano Recital (GR 1)	2
PY.450.722	Piano Recital (GR 2)	2
PY.450.723	Piano Recital (GR 3)	2
PY.450.725	Piano Recital (DMA Concerto)	2
PY.450.726	Piano Recital (DMA Chamber)	2
PY.450.727	Piano Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.450.845	Piano Seminar (DMA)	1
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total Credits		**62**
Dissertation Track		
-Piano Recital (DMA Concerto) PY.450.725		-2
-Piano Recital (DMA Chamber) PY.450.726		-2

-Piano Recital (DMA Lecture) PY.450.727		-2
-Lecture-Recital Paper PY.610.792		-2
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA) (Semester of Graduation)	6
Total Credits		**62**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.721	Piano Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.722	Piano Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.723	Piano Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
PY.450.845	Piano Seminar (DMA)	1
Electives		3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.725	Piano Recital (DMA Concerto)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**15**
DIP		
PY.450.726	Piano Recital (DMA Chamber)	2
PY.450.727	Piano Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**62**

Voice, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.186.100	Vocal Coaching (Four (4) Semesters Required)	4
PY.530.721	Voice Recital (GR 1)	2
PY.530.722	Voice Recital (GR 2)	2
PY.530.723	Voice Recital (GR 3)	2
PY.530.724	Voice Recital (GR 4)	2
PY.530.726	Voice Recital (DMA Chamber)	2
PY.530.727	Voice Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		9
Humanities Elective		3
Total Credits		**62**

Dissertation Track		
-Voice Recital (DMA/AD 4) PY.530.724		-2
-Voice Recital (DMA Chamber) PY.530.726		-2
-Voice Recital (DMA Lecture) PY.530.727		-2
-Lecture-Recital Paper PY.610.792		-2
PY.610.813	Doctoral Consultation and Research (Six (6) total credits required for Dissertation Track)	2
PY.610.791	Dissertation (DMA) (Semester of Graduation)	6
Total Credits		**62**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.721	Voice Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.722	Voice Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**13**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.723	Voice Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4

PY.186.100	Vocal Coaching	1
PY.530.724	Voice Recital (GR 4)	2
PY.710.6xx	Music Theory Seminars	3
Humanities Elective		3
	Credits	**13**
DIP		
PY.530.726	Voice Recital (DMA Chamber)	2
PY.530.727	Voice Recital (DMA Lecture)	2
PY.610.792	Lecture-Recital Paper	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**10**
	Total Credits	**62**

Wind Conducting, Doctor of Musical Arts

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.330.851 & PY.330.852	Wind Conducting Seminar (DMA) and Wind Conducting Seminar (DMA) (Required Each Semester)	4
PY.330.721	Conducting Recital (GR 1) (or PWE Performance)	2
PY.330.722	Conducting Recital (GR 2)	2
PY.330.723	Conducting Recital (GR 3)	2
PY.330.724	Conducting Recital (GR 4)	2
PY.610.792	Lecture-Recital Paper	2
Supportive Courses		
PY.610.847	Musicology Colloquium	3
or PY.610.848	Musicology Colloquium	
PY.610.6xx	Musicology Seminar	3
PY.710.6xx	Music Theory Seminars	6
PY.610.813	Doctoral Consultation and Research (DIP)	4
Electives		
Electives		12
Humanities Elective		3
Total Credits		**61**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.851	Wind Conducting Seminar (DMA)	1
PY.330.721	Conducting Recital (GR 1)	2
PY.610.847	Musicology Colloquium	3
Electives		3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.852	Wind Conducting Seminar (DMA)	1
PY.330.722	Conducting Recital (GR 2)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
	Credits	**13**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.851	Wind Conducting Seminar (DMA)	1
PY.330.723	Conducting Recital (GR 3)	2
PY.610.6xx	Musicology Seminar	3
Electives		3
	Credits	**13**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.330.852	Wind Conducting Seminar (DMA)	1
PY.330.724	Conducting Recital (GR 4)	2
PY.710.6xx	Music Theory Seminars	3
Electives		3
Humanities Elective		3
	Credits	**16**
DIP		
PY.610.792	Lecture-Recital Paper (Semester of Graduation)	2
PY.610.813	Doctoral Consultation and Research (Required Each Semester)	4
	Credits	**6**
	Total Credits	**61**

Performer's Certificate (PC)

The Performer's Certificate is designed to train students with outstanding musical ability for careers in performance without the academic component of the Bachelor of Music curriculum. Majors are available in guitar, orchestral instruments, organ, piano, and voice.

A student who has matriculated into the Performer's Certificate program may later transfer into the Bachelor of Music degree program with the approval of the Associate Dean for Academic Affairs.

Admission Requirements

The admission requirements for the Performer's Certificate are the same as those for the Bachelor of Music degree program. Students should consult the Peabody website at on the Admissions website (https://peabody.jhu.edu/audition-apply/) for complete information. Pre-screening recordings are required for some majors.

Program Requirements

The Performer's Certificate is normally a three-year course of study, with a minimum residency of two years. At least 80 semester hours of course credit are needed for the completion of requirements. Candidates must participate in ensembles throughout their period of study.

Curricula

- PC Piano (p. 840)
- PC Voice (p. 841)

Guitar, Performer's Certificate

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Six (6) Semesters Required)	24
PY.470.545	Guitar Seminar (UG) (Six (6) Semesters Required)	6
PY.470.109 & PY.470.209	Guitar 109 Jury and Guitar 209 Jury	2
PY.470.701	Guitar Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.541 & PY.950.542	Guitar Ensemble and Guitar Ensemble (Required Each Semester)	6
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Two semesters)	2
Supportive Courses		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156	Keyboard Studies 1 and Keyboard Studies 2	4
PY.470.585 & PY.470.586 & PY.470.587 & PY.470.588	Guitar Music Skills 1 and Guitar Music Skills 2 and Guitar Music Skills 3 and Guitar Music Skills 4	4
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.470.431 & PY.470.432	Guitar Literature 1 (UG) and Guitar Literature 2 (UG)	4
PY.470.637 & PY.470.638	Guitar Pedagogy 1 and Guitar Pedagogy 2	4
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Total Credits		**104**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.950.541	Guitar Ensemble	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.470.585	Guitar Music Skills 1	1
PY.710.111	Theory 1	3
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.109	Guitar 109 Jury	1
PY.950.542	Guitar Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.470.586	Guitar Music Skills 2	1
PY.710.112	Theory 2	3
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.715.223	Ear Training 3	2
PY.470.587	Guitar Music Skills 3	1
PY.710.211	Theory 3	3
PY.610.321	History of Music 1	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.209	Guitar 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.715.224	Ear Training 4	2
PY.470.588	Guitar Music Skills 4	1
PY.710.212	Theory 4	3
PY.610.322	History of Music 2	3
	Credits	**18**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.545	Guitar Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.950.541	Guitar Ensemble	1
PY.950.531	Chamber Ensemble	1
PY.710.311	Theory 5	3
PY.470.431	Guitar Literature 1 (UG)	2
PY.470.637	Guitar Pedagogy 1	2
PY.610.323	History of Music 3	3
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.470.546	Guitar Seminar (UG)	1
PY.470.701	Guitar Recital (UG)	2

PY.910.xxx	Large Ensemble	2
PY.950.542	Guitar Ensemble	1
PY.950.532	Chamber Ensemble	1
PY.710.312	Theory 6	3
PY.470.432	Guitar Literature 2 (UG)	2
PY.470.638	Guitar Pedagogy 2	2
PY.610.xxx	Musicology Elective	3
	Credits	**21**
	Total Credits	**104**

Orchestral Instruments, Performer's Certificate

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Six (6) Semesters Required)	24
xxx.109-209	Departmental Examination	2
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	12
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	4
Supportive Courses		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Total Credits		**91**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.109	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.610.321	History of Music 1	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.209	Departmental Examination	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.610.322	History of Music 2	3
	Credits	**18**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.710.311	Theory 5	3
PY.610.323	History of Music 3	3
	Credits	**12**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.701	Recital	2
PY.910.xxx	Large Ensemble	2
PY.710.312	Theory 6	3
PY.330.311	Conducting	1
PY.610.xxx	Musicology Elective	3
	Credits	**15**
	Total Credits	**91**

Organ, Performer's Certificate

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Six (6) Semesters Required)	24
PY.460.545 & PY.460.546	Organ Seminar (UG) and Organ Seminar (UG) (Six (6) Semesters Required)	6
PY.460.109 & PY.460.209	Organ 109 Jury and Organ 209 Jury	2
PY.460.701	Organ Recital (UG)	2
PY.910.xxx	Large Ensemble	12
Supportive Courses		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.211 & PY.715.212	Keyboard Skills 1 - Piano Majors and Keyboard Skills 2 - Piano Majors	4
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.460.425 & PY.460.426	Resources for Contemporary Church Musicians 1 and Resources for Contemporary Church Musicians 2	6
PY.380.315	Continuo 1: Figured Bass	2
PY.460.423 & PY.460.424	Organ Literature 1 and Organ Literature 2	6
PY.330.311	Conducting	1
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610.324	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Total Credits		**107**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
	Credits	**14**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.109	Organ 109 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
	Credits	**15**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.211	Keyboard Skills 1 - Piano Majors	2
PY.710.211	Theory 3	3
PY.610.321	History of Music 1	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.209	Organ 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.224	Ear Training 4	2
PY.715.212	Keyboard Skills 2 - Piano Majors	2
PY.710.311	Theory 5	3
PY.610.322	History of Music 2	3
	Credits	**18**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.545	Organ Seminar (UG)	1
PY.910.xxx	Large Ensemble	2
PY.710.312	Theory 6	3
PY.460.425	Resources for Contemporary Church Musicians 1	3
PY.380.315	Continuo 1: Figured Bass	2
PY.460.423	Organ Literature 1	3
PY.610.323	History of Music 3	3
	Credits	**21**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.460.546	Organ Seminar (UG)	1
PY.460.701	Organ Recital (UG)	2
PY.910.xxx	Large Ensemble	2
PY.460.426	Resources for Contemporary Church Musicians 2	3
PY.460.424	Organ Literature 2	3
PY.330.311	Conducting	1

PY.610.xxx	Musicology Elective	3
	Credits	**19**
	Total Credits	**104**

Piano, Performer's Certificate

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Six (6) Semesters Required)	24
PY.450.109 & PY.450.209	Piano 109 Jury and Piano 209 Jury	2
PY.450.701	Piano Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble (Small Ensemble)	4
Supportive Courses		
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.211 & PY.715.212 & PY.715.311 & PY.715.312	Keyboard Skills 1 - Piano Majors and Keyboard Skills 2 - Piano Majors and Keyboard Skills 3 - Piano Majors and Keyboard Skills 4 - Piano Majors	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.450.111 & PY.450.112	Sightreading 1 and Sightreading 2	4
PY.450.213 & PY.450.214	Accompanying 1 and Accompanying 2	2
PY.450.411 & PY.450.412 & PY.450.413 & PY.450.414	Keyboard Literature: Baroque and Keyboard Literature: Classical and Keyboard Literature: 19th Century and Keyboard Literature: 20th/21st C.	8
PY.450.667	Piano Pedagogy 1	2
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
Total Credits		**102**

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.715.123	Ear Training 1	2
PY.710.111	Theory 1	3
PY.450.111	Sightreading 1	2
	Credits	**11**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.109	Piano 109 Jury	1
PY.715.124	Ear Training 2	2
PY.710.112	Theory 2	3
PY.450.112	Sightreading 2	2
	Credits	**12**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.223	Ear Training 3	2
PY.715.211	Keyboard Skills 1 - Piano Majors	2
PY.710.211	Theory 3	3
PY.450.213	Accompanying 1	1
PY.450.411	Keyboard Literature: Baroque	2
PY.610.321	History of Music 1	3
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.209	Piano 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.715.224	Ear Training 4	2
PY.715.212	Keyboard Skills 2 - Piano Majors	2
PY.710.212	Theory 4	3
PY.450.214	Accompanying 2	1
PY.450.412	Keyboard Literature: Classical	2
PY.610.322	History of Music 2	3
	Credits	**21**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.950.531	Chamber Ensemble	1
PY.715.311	Keyboard Skills 3 - Piano Majors	2
PY.710.311	Theory 5	3
PY.450.413	Keyboard Literature: 19th Century	2
PY.450.667	Piano Pedagogy 1	2
PY.610.323	History of Music 3	3
	Credits	**19**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.450.701	Piano Recital (UG)	2
PY.910.xxx	Large Ensemble	2
PY.950.532	Chamber Ensemble	1
PY.715.312	Keyboard Skills 4 - Piano Majors	2
PY.710.312	Theory 6	3
PY.450.414	Keyboard Literature: 20th/21st C.	2

PY.610.xxx	Musicology Elective	3
	Credits	**19**
	Total Credits	**102**

Voice, Performer's Certificate

Program Requirements

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Six (6) Semesters Required)	24
PY.186.100	Vocal Coaching (Four (4) Semesters Required)	4
PY.530.109 & PY.530.209	Voice 109 Jury and Voice 209 Jury	2
PY.530.701	Voice Recital (UG)	2
PY.910.xxx	Large Ensemble	8
PY.910.54x	Opera Performance Electives	3
Supportive Courses		
PY.360.501	Friday Noon:30 Recital Series [1]	1
PY.360.503	Friday Noon:30 (Alt Project) [1]	1
PY.715.123 & PY.715.124 & PY.715.223 & PY.715.224	Ear Training 1 and Ear Training 2 and Ear Training 3 and Ear Training 4	8
PY.715.155 & PY.715.156 & PY.715.255 & PY.715.256	Keyboard Studies 1 and Keyboard Studies 2 and Keyboard Studies 3 and Keyboard Studies 4	8
PY.710.111 & PY.710.112 & PY.710.211 & PY.710.212 & PY.710.311 & PY.710.312	Theory 1 and Theory 2 and Theory 3 and Theory 4 and Theory 5 and Theory 6	18
PY.530.475	English Diction	2
PY.530.469	Italian Diction	2
PY.530.477	German Diction	2
PY.530.483	French Diction	2
PY.530.589	Vocal Literature: English/Italian	2
PY.530.590	Vocal Literature: German/French	2
PY.540.513 & PY.540.491	Movement 1 and Acting For Opera 1	2
PY.610.321 & PY.610.322 & PY.610.323	History of Music 1 and History of Music 2 and History of Music 3	9
or PY.610.324	Music Histories in a Global Context	
PY.610.xxx,PY.610	Musicology Elective or Global Contexts (Music History in Global Contexts may be substituted for any one of the three Music History Classes or an elective seminar)	3
General Studies		
PY.250.111 & PY.250.112	Italian 1a and Italian 1b	8
PY.250.121 & PY.250.122	German 1a and German 1b	6
PY.250.131 & PY.250.132	French 1a and French 1b	6
Total Credits		**125**

[1] 2 semesters of this course need to be taken

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.910.xxx	Large Ensemble	2
PY.715.123	Ear Training 1	2
PY.715.155	Keyboard Studies 1	2
PY.710.111	Theory 1	3
PY.530.475	English Diction	2
PY.250.111	Italian 1a	4
PY.540.513	Movement 1	1
	Credits	**20**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.530.109	Voice 109 Jury	1
PY.910.xxx	Large Ensemble	2
PY.715.124	Ear Training 2	2
PY.715.156	Keyboard Studies 2	2
PY.710.112	Theory 2	3
PY.530.469	Italian Diction	2
PY.250.112	Italian 1b	4
	Credits	**20**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.xxx	Large Ensemble	2
PY.715.223	Ear Training 3	2
PY.715.255	Keyboard Studies 3	2
PY.710.211	Theory 3	3
PY.530.477	German Diction	2
PY.540.491	Acting For Opera 1	1
PY.610.321	History of Music 1	3
PY.250.121	German 1a	3
	Credits	**23**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.209	Voice 209 Jury	1
PY.910.xxx	Large Ensemble	2
PY.910.54x	Opera Performance Electives	1
PY.715.224	Ear Training 4	2
PY.715.256	Keyboard Studies 4	2
PY.710.212	Theory 4	3
PY.530.483	French Diction	2
PY.610.322	History of Music 2	3

PY.250.122	German 1b	3
	Credits	**24**
Third Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.910.54x	Opera Performance Electives	1
PY.710.311	Theory 5	3
PY.530.589	Vocal Literature: English/Italian	2
PY.610.323	History of Music 3	3
PY.250.131	French 1a	3
	Credits	**17**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
PY.186.100	Vocal Coaching	1
PY.530.701	Voice Recital (UG)	2
PY.910.54x	Opera Performance Electives	1
PY.710.312	Theory 6	3
PY.530.590	Vocal Literature: German/French	2
PY.610.xxx	Musicology Elective	3
PY.250.132	French 1b	3
	Credits	**19**
	Total Credits	**123**

Graduate Performance Diploma

The Graduate Performance Diploma (GPD) program is designed to meet the needs of highly accomplished graduate-level performers who wish to pursue a more performance-intensive goal without the academic requirements of the MM or DMA.

Admission Requirements

Students may pursue majors in orchestral instruments, guitar, historical performance instruments and voice, jazz, organ, piano, and voice.
 Students applying for the Graduate Performance Diploma degree program present transcripts, test scores, and recommendations before playing an audition. Before matriculating into the Graduate Performance Diploma program, accepted students must produce a Performer's Certificate, an undergraduate degree in music from a recognized institution, or equivalent qualifications. The details of this process may be found on the Admissions website.

Program Requirements

Residency

For students that are new to the Peabody Conservatory, the Graduate Performance Diploma requires four semesters of full-time study. Students who matriculate for this two-year GPD program are expected to complete four semesters of major lessons, two recitals, and eight credits of electives in two years.

Students who begin the GPD after a prior degree program at Peabody (the PC, BM, or MM) are expected to complete the degree in one year and will only receive scholarship for one year. Students who begin a one-year GPD will have two semesters of lessons and, if applicable, two semesters of ensemble waived. All other requirements must be completed.

In all that follows, the two-year GPD refers to students who are new to Peabody and the one-year GPD refers to students who have just completed at prior degree.

GPD students are not permitted to enroll on a part-time basis.

Major Area

Each student taking applied music must demonstrate satisfactory progress as determined by the faculty. Study in the major field must continue through the last semester of enrollment. Any change to studio assignment must be approved by the Associate Dean for Academic Affairs (Studio Assignments).

All GPD students are required to play two recitals as part of their diploma requirements. The following majors have additional options:

- Performance majors in voice may use an opera role in lieu of one of the two recitals, but only if the role has been approved by the Voice Department as being of appropriate size and scope. An approved opera role must be registered as a GPD recital through the Concert Office.
- Performance majors in percussion will play a juried performance of orchestral repertoire as the second recital.
- For all other majors, one of the recitals may be a chamber music recital with the permission of the major applied department.

Any student who does not present a graded recital in a given year will be required to perform at a graded hearing before the department faculty at the end of the spring semester. A student who does not play a recital or hearing in each year of enrollment will not be considered to be in Good Standing (Academic Standing for Graduate Students (p. 752)).

Ensembles

GPD candidates majoring in orchestral instruments must participate in the large ensembles as assigned during each semester of enrollment. Historical performance students play in Historical Performance ensembles. There is no large ensemble requirement for other Graduate Performance Diploma candidates. The regulations for performing in large ensembles, which are set by the Ensemble Office, may be found in the Procedural Regulations section of the catalogue or at the Ensemble Office website (https://peabody.jhu.edu/audition-apply/).

Related Requirements

GPD students may choose electives from Music Theory, Musicology, repertoire studies, Curricular Practical Training, professional studies, or other music courses at or above the 400 level. To enroll in graduate Music Theory and Musicology seminars, students must pass the appropriate placement exams. With the approval of the Associate Dean for Academic Affairs, undergraduate courses with special career relevance to the student may also be accepted. Only courses designated as "G" (Graduate Elective) in the master schedule of classes may be used to fulfill graduate elective requirements, with the exception of small electives which may apply to electives. On Students are limited to four credits of coursework per semester, not including lessons, recitals, and ensembles. Students who enroll in more than four credits will be administratively withdrawn from any classes above the limit. In the areas of music theory and musicology, the student must take the appropriate placement examinations and satisfy any review requirements prior to enrolling in graduate-level courses.

Curricula

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Four (4) Semesters Required)	16
PY.xxx.721	Recital	2
PY.xxx.722	Recital	2
Electives		
xxx.xxx	Electives	8
Total Credits		**28**

Variations

Code	Title	Credits
Orchestral Instruments or Jazz		
36 credits		36
PY.910.xxx	Large Ensemble	8
Voice		
30 credits		30
PY.186.100 & 100	Vocal Coaching and Vocal Coaching	2
Early Music Instruments		
40 credits		40
PY.910.xxx	Large Ensemble	
PY.950.531 & PY.950.532	Chamber Ensemble and Chamber Ensemble	
1-Year GPD Track		
16-32 Credits		
PY.100.100	Major Lesson 1 HR (2 semesters required)	8
PY.910.XXX	Large Ensemble 1 HR (2 semesters required)	4

Course	Title	Credits
First Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.xxx	Electives	2
PY.910.xxx	Large Ensemble (Orchestral Instruments or Jazz)	2
	Credits	**8**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.xxx	Electives	2
PY.xxx.721	Recital	2
PY.910.xxx	Large Ensemble (Orchestral Instruments or Jazz)	2
	Credits	**10**
Second Year		
First Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.xxx	Electives	2
PY.910.xxx	Large Ensemble (Orchestral Instruments or Jazz)	2
	Credits	**8**
Second Semester		
PY.100.100	Major Lesson 1 HR	4
xxx.xxx	Electives	2
PY.xxx.722	Recital	2
PY.910.xxx	Large Ensemble (Orchestral Instruments or Jazz)	2
	Credits	**10**
	Total Credits	**36**

Artist's Diploma

The Artist Diploma is a certificate program reserved for exceptional and experienced performers, with an emphasis on repertoire designed to meet the needs of those who are preparing to embark upon professional careers.

Admission Requirements

Application Requirements

Students may pursue an Artist Diploma in performance with the following majors: Guitar, Historical Performance Instruments and Voice, Orchestral Instruments, Organ, Piano, and Voice. There is no major in Composition and a student may only pursue a major in Conducting under the special circumstance of being appointed to a Baltimore Symphony Orchestra Fellowship.

Students applying for the Artist Diploma degree program present transcripts, test scores, and recommendations before playing a live audition in February. Upon the recommendation of the department, the performer(s) will be scheduled for a second audition with a panel of outside judges on the final day of Audition Week. The details of this process may be found at on the Admissions website (https://peabody.jhu.edu/audition-apply/).

Program Requirements

Residency

The normative case is two years of full-time enrollment. Students must complete one year of continuous full-time residency and four total semesters of full-time enrollment. Scholarship is awarded for a maximum of four semesters, and the program must be completed within five years.

Students enrolled in the program are expected to be active performing members of the Peabody campus community. The Artist Diploma candidate must present four public recitals: two in each academic year in which they are enrolled in lessons. In voice, a major opera role may be considered an appropriate substitute for one or more recitals, subject to approval of the major teacher and the departments involved.

Artist Diploma candidates must complete eight credits of elective coursework. The program also allows for independent study projects in various aspects of career development as appropriate.

Curricula

Code	Title	Credits
Major Area		
PY.100.100	Major Lesson 1 HR (Required Each Semester)	16
PY.xxx.721	Recital	2
PY.xxx.722	Recital	2
PY.xxx.723	Recital	2
PY.xxx.724	Recital	2

Electives	
Electives	8
Total Credits	**32**

Course	Title	Credits
First Year		
First Term		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.721	Recital	2
Electives		2
	Credits	**8**
Second Term		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.722	Recital	2
Electives		2
	Credits	**8**
Second Year		
First Term		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.723	Recital	2
Electives		2
	Credits	**8**
Second Term		
PY.100.100	Major Lesson 1 HR	4
PY.xxx.724	Recital	2
Electives		2
	Credits	**8**
	Total Credits	**32**

Extension Study

Individuals who wish to enroll in private lessons or courses on a non-degree basis may register for such study through the Peabody Extension Division, pending faculty availability and demonstration of appropriate qualifications. Students may also take coursework to be certified for teaching in Maryland Public Schools.

Undergraduate Extension Study

Individuals who wish to enroll in private lessons or courses on an undergraduate non-degree basis may register for such study through the Peabody Extension Division, pending faculty availability and demonstration of appropriate qualifications.

A student who has been dismissed from a degree or certificate program at Peabody may not enroll as an extension student for at least one full semester following dismissal. The student may apply for readmission after that semester, but Peabody is under no obligation to grant readmission. The Conservatory reserves the right to exclude any student whose academic standing or general conduct is considered unsatisfactory. Further information may be obtained from the Registrar's Office.

Graduate Extension Study

Graduate Extension study is designed for individuals who already hold an undergraduate degree or diploma. A Graduate Extension student may make their own arrangements with an applied teacher before making formal application to the Conservatory. A recorded audition is acceptable, but the performing level must be validated by the accepting teacher upon the student's arrival at Peabody before extension status will be confirmed. A Graduate Extension student may be accepted onto a teacher's schedule or into coursework on a space-available basis if the application process is complete before registration.

The student may register for applied study and/or any combination of academic coursework. In the areas of music theory and musicology, the Graduate Extension student must take the appropriate placement examinations and satisfy any review requirement prior to enrolling in graduate-level courses. Lesson, performance, and coursework credits may count toward fulfillment of subsequent graduate diploma or degree requirements, if approved by the major department. Formal application for any change in graduate program must be made with the Admissions Office and all other requirements for entrance must be met. Graduate Extension registrants are eligible to participate in ensembles by audition but generally are not considered for institutional scholarship support.

A student who has been dismissed from a degree or certificate program at Peabody may not enroll as an extension student for at least one full semester following dismissal. The student may apply for readmission after that semester, but Peabody is under no obligation to grant readmission. The Conservatory reserves the right to exclude at any student whose academic standing or general conduct is considered unsatisfactory. Further information may be obtained from the Registrar's Office.

Music Education Certification

Individuals who hold a Bachelor of Music degree from an accredited institution may take classes to be certified by the Maryland State Department of Education (MSDE) to teach in public schools.

- Certification classes are offered as extension classes. There is no enveloping program and students studying for certification are not eligible for financial aid.
- Student taking certification classes are extension students and, by definition, part-time students.#Accordingly, students taking certification classes are always billed at the part-time, per-credit rate. Special tuition rates apply.
- Certification students, as part-time students, are not eligible for an F-1 visa.
- The Music Education faculty may require additional credits beyond minimum requirements to reinforce necessary skills for intern teaching.
- Finally, students who are completing#certification#in addition to another program will be considered extension students, billed at the per-credit rate provided they have completed their lesson and ensemble requirements and played a recital.#For students in majors that do not require lessons and a recital, they may be billed at the part time rate provided they have less#thana full-time semester's worth of remaining requirements for both awards.

Music Education Certification - Instrumental

Certification Requirements

Code	Title	Credits
Music Education		
PY.510.211	Brass Class	2
PY.510.212	Woodwinds Class	3
PY.510.324	Strings Class	3
PY.510.223	Percussion Class	1
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.313	Techniques for Teaching Secondary Instrumental Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
Total Credits		**31**

Course	Title	Credits
First Year		
First Semester		
PY.510.212	Woodwinds Class	3
PY.510.324	Strings Class	3
PY.510.414	Music & the Neurodiverse Learner	3
	Credits	**9**
Second Semester		
PY.510.211	Brass Class	2
PY.510.223	Percussion Class	1
PY.510.312	Progressive Methods: Instrumental Music	3
PY.510.313	Techniques for Teaching Secondary Instrumental Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
	Credits	**12**
Second Year		
First Semester		
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**10**
	Total Credits	**31**

Music Education Certification - Vocal

Certification Requirements

Code	Title	Credits
Music Education		
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.314	Progressive Methods: Secondary General/Vocal Music	3
PY.510.337	Secondary Choral Ensemble 2	2
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.414	Music & the Neurodiverse Learner	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
Total Credits		**25**

Course	Title	Credits
First Year		
First Semester		
PY.510.213	Basic Instrumental Pedagogy	1
PY.510.311	Techniques for Teaching Elementary General Music	3
PY.510.337	Secondary Choral Ensemble 2	2
	Credits	**6**
Second Semester		
PY.510.314	Progressive Methods: Secondary General/ Vocal Music	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
PY.510.414	Music & the Neurodiverse Learner	3
	Credits	**9**
Second Year		
First Semester		
ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
PY.510.411	Intern Teaching	6
PY.510.441	Intern Teaching Seminar	1
	Credits	**10**
	Total Credits	**25**

NITZE SCHOOL OF ADVANCED INTERNATIONAL STUDIES

About Johns Hopkins SAIS

The Johns Hopkins University's Paul H. Nitze School of Advanced International Studies (Johns Hopkins SAIS) is a premier graduate school devoted to the study of international relations. A division of The Johns Hopkins University since 1950, Johns Hopkins SAIS is a truly global institution with a permanent physical presence on three continents: North America, Europe and Asia, in Washington, D.C., Bologna, Italy, and Nanjing, China.

Mission and Vision

Defining International Relations for 75 Years

For 75 years, students have come to the Johns Hopkins University School of Advanced International Studies to build their professional networks, learn from renowned faculty, train with policy practitioners, and gain hands-on work experience.

The school was founded in 1943 by Paul H. Nitze and Christian A. Herter who sought new methods of preparing men and women to cope with the international responsibilities that would be thrust upon the United States following the end of World War II. Scholars and professionals were assembled to teach an academic curriculum emphasizing international relations theory, international economics, and foreign languages. That education, combined with skills training and experiential learning, would prepare students for impact-oriented work in policy and other sectors. In 1955, a campus in Bologna, Italy was established, and in 1986 the school initiated one of the first Western university programs in the People's Republic of China in Nanjing.

Today, guided by the vision of its founders, the school's cadre of expert faculty prepares students for exciting careers across sectors and around the world. With a global alumni network of more than 20,000 graduates, you can be sure to find our alumni taking action in dynamic roles. From private-sector executives to entrepreneurs, leaders of nongovernmental organizations to ambassadors, and international media correspondents to energy consultants, alumni of the school are known for being innovative thinkers and problem-solvers with the economic and policy expertise to address today's most pressing challenges.

Accreditation

Accreditation

The Johns Hopkins University is accredited by the Middle States Commission on Higher Education, 3624 Market Street, Philadelphia, PA 19104, (267) 284-5000. Middle States is an institutional accrediting agency recognized by the U.S. Secretary of Education and the Council for Higher Education Accreditation. Middle States has continuously accredited Johns Hopkins since 1921 and most recently reaffirmed the university's accreditation in 2014 following a decennial self-study and reaccreditation process. In addition to the university's institutional accreditation by Middle States, certain Johns Hopkins schools and/or programs are accredited by specialized accrediting agencies recognized by the U.S. Secretary of Education and/or the Council for Higher Education Accreditation.

State Authorization

The Johns Hopkins University is authorized by the Maryland Higher Education Commission to operate as an institution of higher education in Maryland, offering educational programs beyond secondary education, including programs leading to a degree or certificate. MHEC is responsible for establishing and enforcing policies regarding the integrity, review, and approval of proposals for new and substantively modified academic programs offered by Maryland's public and private colleges and universities.

Doctoral Degrees

Master Degrees

Diploma and Certificate Programs

Academic Policies and Resources

The Red Book

The Johns Hopkins SAIS Student and Academic Handbook (https://sais.jhu.edu/current-students/student-and-academic-handbook/), also known as "The Red Book," is a compilation of policies, regulations and procedures for students. Its purpose is two-fold: to communicate the standards of The Johns Hopkins University that support and guide life at Johns Hopkins SAIS as part of the greater JHU community and to describe the academic policies and procedures that form a framework for conducting the school's teaching mission. Of particular importance is the Honor Code, which sets out the behavioral standards expected of all Johns Hopkins SAIS students.

The information contained in this handbook is not available in any other school publication, and students are responsible for familiarizing themselves with its contents. Questions related to the manual should be directed to Academic Affairs (saisadvising@jhu.edu).

The policies and procedures detailed in The Red Book are subject to revision at any time, and changes are communicated to students only through their assigned JHU e-mail addresses. It is imperative that you activate and monitor this account so as not to miss these and other important announcements and messages throughout the year.

Degrees and Certificates

Doctoral Degrees

Master Degrees

Diploma and Certificate Programs

International Studies, Doctor of Philosophy (PhD)

The Doctor of Philosophy (PhD) program is for individuals who have already earned a Master's degree (or have other substantial research experience) and seek to further their expertise as scholars and practitioners of international relations. PhD students work closely with faculty advisors to develop an academic plan that best supports their dissertation research. Throughout the program students develop a comprehensive understanding of qualitative and quantitative analytical skills, international relations, economics, and regional studies.

PhD students begin their studies in Washington, DC. During the dissertation stage, students can explore opportunities to study at SAIS Europe, the Hopkins Nanjing Center, or at other prominent global institutions.

Johns Hopkins SAIS graduates are sought after by employers in the public, private and nonprofit sectors. Their knowledge of economics, analytical abilities, regional expertise, diplomatic skills, international experience, language proficiency, as well as capacity to apply theory to real-world problems, give students a distinct professional advantage.

PhD Fields of Study

PhD students will have one of the following concentrations (either a policy or region):

International Policy Areas

- American Foreign Policy
- Energy, Resources and Environment
- Global Theory and History
- International Development
- International Relations
- International Political Economy
- Strategic Studies

Regions of the World

- African Studies
- Canadian Studies
- China Studies
- European and Eurasian Studies
- Japan Studies
- Korea Studies
- Latin American Studies
- Middle East Studies
- South Asia Studies
- Southeast Asia Studies

Faculty Advisors

Our faculty experts and scholars are internationally recognized for their scholarship, experience, and quality of teaching. They are award-winning scholars, authors, diplomats, thinkers, and senior ranking officials who are authorities on international economics and international relations and who have expertise in contemporary issues around the world.

All PhD students have a tenured, faculty advisor. The advisor has primary responsibility for coordinating the candidate's research agenda. Another senior member of the dissertation committee or "second reader" monitors the student's research throughout the dissertation project. Both the faculty advisor and the second reader are to be substantively involved in the student's preparation of the prospectus and the dissertation.

While the student will work actively with the first and second readers to prepare a dissertation prospectus, the student should also consult with the three supporting committee members throughout the doctoral research.

Prospective and current PhD students are encouraged to use the Faculty Directory to identify individuals to approach about involvement in their research and dissertation.

Degree Requirements

Campus: Washington, DC

Duration: Five to nine academic years (average 5.5), Full-time

Course delivery: In-person

PhD Program Structure

The PhD is divided into pre-dissertation (resident) and dissertation (non-resident) stages.

In order to earn the degree, students must fulfill all requirements and earn a cumulative GPA of 3.33 or above.

Pre-dissertation, Resident Stage

Pre-dissertation status lasts up to two years for students who have completed the Master of Arts of International Relations (MAIR) degree at Johns Hopkins SAIS and up to three years for those without an MAIR degree from the school. Students complete coursework, comprehensive exams, and defend the dissertation prospectus.

Pre-dissertation students are on-campus full-time taking courses, attending seminars, and/or approved independent study. During this time students are required to take *Research Methodology, and Statistics* and *Econometrics* in addition to coursework agreed to by a faculty advisory. PhD students must successfully pass *Theories and Methods of Qualitative Political Research* and *Research Design and Causal Inference,* plus two other research training courses approved by their faculty advisor. Prerequisites for *Research Design and Causal Inference* include *Statistics for Data Analysis* (waiver exam available) and *Econometrics.*

Within six months of passing the third comprehensive exam, students must prepare a written prospectus of the dissertation and present it in a formal defense that is open to members of the university faculty.

Dissertation, Non-Resident Stage

Students advance to the dissertation stage after successfully defending a prospectus and are not required to be on campus, however are still considered full-time status. Students should defend the dissertation within five years of the prospectus defense.

Comprehensive Exams

PhD students must select three examination areas from among the following:

- American Foreign Policy
- Comparative Politics
- Conflict Management
- Energy, Resources & Environment
- International Development
- International Economics[1]
- International Law
- International Political Economy/ Comparative Political Economy
- International Relations Theory
- Strategic Studies
- Regional Studies:
  - Africa Studies,
  - Asia Studies (China, Korea, Japan, South Asia, Southeast Asia),
  - Canadian Studies,
  - European and Eurasian Studies,
  - Latin American Studies,
  - Middle East Studies

Comprehensive exams from other divisions of Johns Hopkins University may be considered on a case by case basis.

[1] International Economics is not an exam. Consult with the PhD program for additional information.

PhD Dissertation

At the time of application, students will propose a research topic they would like to pursue for their doctoral dissertation. During their course of study, students will hone this topic in consultation with a faculty advisor and defend a prospectus that outlines the dissertation's research questions, mission, and methodology.

The PhD dissertation must be an original and analytical treatment of a subject of conceptual importance that involves the creation of new knowledge and not simply the master of existing knowledge. To conduct the research for, write, and defend the dissertation, a candidate will have a period of five years from the defense of the prospectus. It is understood that in fields with exceptionally difficult languages the process may take longer.

International Affairs, Doctor of

The Doctor of International Affairs (DIA) is designed for experienced professionals with at least five years of work experience who seek to further their expertise through an advanced practitioner's degree involving serious and novel research.

Under the guidance of school experts and scholars, DIA candidates take coursework and conduct research on the issues that most align with their professional interests. The program is delivered on an accelerated timeline and culminates with students defending their doctoral thesis.

Advanced standing is available for students who possess a relevant master's degree allowing the program to be completed in as little as two years – with one year of full-time study and a subsequent part-time, non-resident year focused exclusively on completing their doctoral thesis. Part-time students in the track complete course requirements over two years, followed by the thesis year, totaling three years overall.

Another three-year track is available for those who have not completed a prior, relevant master's degree. Students complete two full-time years of coursework in residence and the final year of this track is also conducted on a part-time, non-resident basis focused exclusively on completing the doctoral thesis.

Degree Requirements

Campus: Washington, DC and Bologna, Italy

Credits: 48-80

Duration: Two to three academic years, with Full- and Part-Time options

Course delivery: In-person

Curriculum

The DIA curriculum emphasizes learning, research, and evaluation. Students gain a deep understanding of foundational theory and learn to apply existing practice and knowledge toward solving real-world problems in fields such as:

- conflict resolution and negotiation
- climate change, energy access, global environmental policy
- sustainable development, foreign aid and global poverty
- human rights and humanitarian affairs, democratization, nation-building
- international political economy, economic development, emerging markets
- American foreign policy, grand strategy, history and statecraft
- defense and security, cybersecurity, and terrorism/ counterterrorism
- regions of the world, and more

During their course of study, students will work individually with a faculty advisor who will guide them through the doctoral thesis process. The final year is completed on a part-time, non-resident basis allowing students to conduct research, write, and defend their thesis.

In order to earn the degree, students must fulfill all requirements and earn a cumulative GPA of 3.33 or above.

Doctoral Degrees: DIA vs. PhD

The DIA is a practitioners' degree where students conduct applied research culminating in a doctoral thesis within their area of professional expertise.

It is different from a traditional PhD, which requires comprehensive exams and is usually thought of as producing an original body of knowledge in preparation for an academic career.

Faculty Advisors

Since the school's inception in 1943, the school's faculty members have been internationally recognized for their scholarship, experience, and quality of teaching. They are award-winning scholars, authors, diplomats, thinkers, and senior-ranking officials who are authorities on international economics and international relations and who have expertise in contemporary issues around the world. DIA advisors may include any Johns Hopkins SAIS faculty scholars or expert practitioners who hold PhD degrees.

Tracks

48 Credits:

Students who possess a relevant master's degree in fields such as political science, public policy, international relations, security studies or other related fields, will receive advanced standing, reducing overall credit requirements to 48. This can be completed in either two (full-time) or three (part-time) years.

Students in the 48-credit track complete 32 credits worth of coursework (usually meaning eight courses) and 16 credits of thesis in the final year. Aside from two DIA research methods courses (8 credits), all other courses are elective.

The final year is completed part-time and does not require residency in Washington, DC. During this year, students complete their research and write a doctoral thesis under the guidance of their faculty advisor.

80 Credits:

Students who do not possess a prior relevant master's degree must enroll in the three-year track.

The first two years follow the path of the school's two-year Master of Arts in International Relations (p. 855) (MAIR) degree. DIA students must take two DIA research methods courses in their second year. The final year of the DIA is completed part-time and does not require residency in Washington, DC. During this year, students complete their research and write a doctoral thesis under the guidance of their faculty advisor.

Students pursuing the 80-credit three-year track can begin their studies at the school's main campus in Washington, DC or at SAIS Europe in Bologna, Italy. Their second year must be completed in Washington, DC.

Students pursuing the 80-credit three-year track will also be conferred the Master of Arts in International Relations (MAIR) degree upon successful completion of the program.

European Public Policy, Master of Arts

The Master of Arts in European Public Policy (MEPP) is a one-year, cohort-based degree program that will prepare students to work with, or for, the institutions of the European Union. This degree program combines rigorous, multi-disciplinary academic and policy-relevant instruction on issues related to EU policies and activities, with hands-on practical training in the skills and techniques required to succeed in the broad EU policy community.

The MEPP builds on the school's strengths in multi-disciplinary analysis by introducing students to a broad array of concepts and tools from history, economics, international relations, law, and political science.

Degree Requirements

Campus: Bologna, Italy

Credits: 42

Duration: One year, Full-time

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Curriculum

During the fall term, students complete 16 credits combining specialized EU studies courses with electives chosen from an array of courses offered at SAIS Europe. Upon completion of exams and other requirements for the fall semester courses in January, MEPP students participate (with other SAIS Europe students) in the SAIS Europe career trek to Brussels which focuses on EU institutions, think tanks and consulting companies specialized in advocacy and public policy (non-credit).

In the spring semester, students take relevant EU courses, including a course on 'Scenarios for the future of Europe' which culminates in a simulation exercise. In addition, students choose one or more courses related to EU affairs, and additional courses from the broad array of courses offered at SAIS Europe in the spring.

Term	Courses	Duration
Summer	(4 credits)	
	Microeconomics Risk and International Trade	4 weeks
	Professional Writing Skills	2 weeks
Fall	(16 credits)	13 weeks
	History of European Integration	
	European Economic Integration	
	Law and Institutions of the European Union	
	Elective	
Intersession	Visit to European institutions with dedicated career contacts	1 week
Spring	(16 credits)	13 weeks
	Scenarios for the Future of Europe, with Simulated Negotations	

	At least one of: European Foreign Policy, European Financial Markets, or Europe and the Mediterranean Middle East	
	Elective(s), if applicable	
Summer	(6 credits)	8 weeks
	EU Simulation Exercise	
	Internship/Capstone Report or Original Research Project consisting of approximately 8,000 words	

Capstone

Students have the option to choose between an eight-week, focused summer internship or an original 8,000-word research paper under the supervision of a Johns Hopkins SAIS faculty member. The capstone must be completed during the second summer term.

Sample Electives

Students can select any elective offered at the SAIS Europe campus including the following courses[1]:

- Basic Issues of Sub-Saharan Africa's Political Development
- Foreign Policy Analysis
- Policies and Politics of the American Emergency State
- Econometrics
- Economic Survey of Latin America: Global Players or Market Strayers
- Financial Derivatives and Risk Management
- Renewable Energy: Markets, Technologies & Projects
- The Twin Pillars of the Gulf: Iran, Saudi Arabia & Their Gulf Neighbors

[1] Courses may vary each academic year.

Global Policy, Master of Arts

This 16-month interdisciplinary program is designed for working professionals with five or more years of experience who wish to continue full-time employment while pursuing their degree. Under the guidance of world-renowned scholars, diplomats and policy makers, students move through the program as a cohort and develop strong professional connections with accomplished and diverse colleagues. This degree program is delivered in Washington DC on an alternating weekend (Friday/Saturday) schedule.

During the 16-month program, students complete a series of core and elective courses on campus, in addition to four application seminars and four multi-day residencies. This format delivers a broad overview of global issues, customized to suit the academic interests of students.

Degree Requirements

Campus: Washington, DC

Credits: 40

Duration: 16 Months

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Curriculum

During the 16-month program, students complete a series of core and elective courses on campus. This format delivers a broad overview of global issues, customized to suit the academic interests of students. It is convenient for working professionals as classes typically meet every other week on Fridays and Saturdays.

The program begins with an optional non-credit foundation course: *Introduction to International Economics*. This is a self-paced online course offered as a resource to admitted students who wish to gain or strengthen foundational concepts in preparation for future coursework. Mastery of the course material is not required or expected—it is simply offered as a supplemental resource.
The MAGP is conferred upon successfully completing 40 credit hours including thirteen (13) courses plus four residencies (three local and one abroad) and four application seminars (running through the first four modules of the program). The 40 credits are divided as follows:

- Cohort Courses (8 courses worth 16 credits; courses are 2 credits each)
- Elective Courses (4 courses worth 8 credits; courses are 2 credits each)
- Application Seminars (4 courses worth 4 credits; courses are 1 credit each)
- Local Residencies (3 courses worth 6 credits; courses are 2 credits each)
- Leading Change in a Global Environment (Capstone/Global Residency Prep) (1 course worth 4 credits)
- Global Residency (1 course worth 2 credits)

Regular courses are graded using the standard grading scale; application seminars and residencies are graded pass/fail.

Term	Courses	Duration
Year 1		
Optional Online Preparatory Course	Introduction to International Economics (0 credits)	Self-Paced
Residency 1	International Policy Residency (2 credits)	August/September (3 days)
Module 1	International Politics	September – November (10 weeks; 5 Fridays & Saturdays)
	Comparative Politics	
	Global Trade & Policy	
	Application Seminar 1	(online)
Module 2	Strategy & the Use of Force	December – February (10 weeks; 5 Fridays & Saturdays)
	Contemporary Issues in American Foreign Policy	

	International Monetary Policy & Banking	
	Application Seminar 2	(online)
Residency 2	Policy Simulation Residency	February (3 days)
Module 3	Conflict Management & Negotiations	March – May (10 weeks; 5 Fridays & Saturdays)
	Topics in International Development	
	Elective	
	Application Seminar 3	(online)
Residency 3	Policy Leadership Residency	May (3 days)
Module 4	Elective	June – August (10 weeks; 5 Fridays & Saturdays)
	Elective	
	Elective	
Summer Break		3 weeks
Year Two		
Module 5	Leading Change in a Global Environment: Residency Project Preparation	September – November (10 weeks; 5 Fridays & Saturdays)
Residency 4 (Abroad)	Global Policy Residency	October (1 week)

Sample Electives

Code	Title	Credits
Politics and Risk		
Economics of Competitor and Adversary Nations		
US Intelligence, Oversight, and the Global Context		
Governance and Development		
Security and Conflict in Latin America		
International Law		

Note: Curriculum and dates are subject to change

Application Seminars & Residencies

Experiential learning is an important component of the MAGP. In addition to academic courses, students participate in application seminars and residencies designed to build policymaking, negotiation, and leadership skills.

Application Seminars are designed to expand classroom learning and provide students with the necessary tools to more effectively embark on the capstone research project in Module 5. The Application Seminars are fully online, asynchronous one-credit courses in the first four academic terms (Fall-Module 1, Winter-Module 2, Spring-Module 3, and Summer-Module 4), as follows:

- Fall: Principles of International Politics
- Winter: Principles of International Political Economy
- Spring: Qualitative Research Methods
- Summer: Capstone Research Design

Residencies are immersive, multi-day exercises that take students outside the classroom and challenge them to apply lessons learned from their coursework. Three of the residencies take place locally (in or driving distance from Washington, DC). For the fourth, students travel abroad.

The four residencies are designed as follows:

- **International Policy** – With instruction from former and current policy makers, students work in teams to research, write and brief policy memos.
- **Policy Simulation** – Students enhance their understanding of international bargaining and negotiating as they take on the role of international leaders and policymakers in a time of crisis.
- **Policy Leadership** – Students participate in a leadership exercise and examine the many challenges of decision-making.
- **Global Policy** – During the final module of the program, students research a policy issue in a target country, conduct one week of intensive field research overseas, and conclude the program by presenting their report and recommendations to policy experts.

Global Risk, Master of Arts

Whether for private companies or public policy design, effective risk analysis requires expertise in the critical factors now driving global change, including technology, climate, politics, regulatory uncertainty, migration, pandemics, and extremism.

Based at the SAIS Europe campus in Bologna, Italy, students in the Master of Arts in Global Risk (MAGR) program develop sophisticated risk management and analysis skills through a comprehensive and interdisciplinary approach. The 13-month, full-time, cohort-based MAGR combines intellectual tools from economics, finance, political science, history, and international relations to create qualified professionals who understand the drivers of instability that characterizes the past decade in world affairs.

The MAGR degree provides students with the skills, concepts, and analytical techniques required to understand and manage global risk factors in public policy and private-sector decision-making. Graduates are currently employed in the private sector in finance, manufacturing, energy, and consulting roles, and working for multilateral and governments.

Degree Requirements

Campus: Bologna, Italy

Credits: 50

Duration: 13 months, Full-time

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Curriculum

The MAGR builds on the school's strengths in multi-disciplinary analysis by introducing students to a broad array of concepts and tools from finance, social sciences and international relations.

Renowned for their interdisciplinary scholarship and innovative work in the field of risk, Johns Hopkins SAIS faculty teach thematic courses to complement the program's more traditional training in quantitative methods.

Term	Courses	Duration
Summer		4 weeks
	Microeconomic Risk and International Trade	
	Introduction to Statistics	
	Math Review for Risk Assessment	
Fall		13 weeks
	Instability and Political Change in Consolidated Democracies	
	Macroeconomic Risk and International Finance	
	Fundamentals of Corporate Finance	
	Risk in Economics and Politics	
	Elective	
Spring		13 weeks
	Strategic Foresight for Political Risk Analysis: Working with Scenarios	
	Quantitative Methods for Risk Assessment	
	Elective	
	Elective	
Capstone		8-12 weeks
	Focused summer internship or an original 10,000-word research paper	

The first summer term begins with an intensive six-week program, with the first two weeks being offered remotely and the last four weeks held on campus in the classrooms. Courses include Microeconomic Risk and International Trade, Introduction to Statistics and a Math Review for Risk Assessment.

During the fall term, students further develop their understanding of economics and begin to also focus on issues in risk related to political and economic-related risk. They explore the methodological problems associated with the analysis of risk and uncertainty and the different approaches to managing risk. They examine how established democratic societies can rapidly become politically unstable and begin to develop quantitative approaches to risk assessment. Students also take a two-credit course in corporate finance which examines the fundamentals of asset evaluation and investment analysis. In addition, they select an elective course giving them the opportunity to study an area of specific interest to them and also engage with student in other degree programs at SAIS Europe.

The spring semester provides the opportunity for students to develop the main tools for geopolitical risk analysis through scenario planning. Moreover, candidates deepen their study of the principal sources of risk at the national and international levels. Students are also introduced to the main techniques for quantitative risk analysis employed in the financial industry. In addition, students take two additional elective courses chosen from the broad array offered in the Spring at SAIS Europe.

Capstone

In the second summer term, students work on their capstone project (off-campus). They may choose between an 8-12 week, focused summer internship or an original 10,000-word research paper under the supervision of a Johns Hopkins SAIS faculty member. The capstone must be completed during their second summer term.

Electives

Students in the MA in Global Risk degree program can select elective courses from among the numerous courses offered at SAIS Europe annually, where courses are available on such topics as European Integration, EU Foreign Policy, Foreign Policy Analysis, Economic Development in Latin America, Europe and the Middle East, Renewable Energy, Energy and Climate Change, Constitutional Development, Political Leadership in the Middle East, Asian Economic Development, East Asian Security, and many more.

Global Risk, Master of Arts (Online)

The MA in Global Risk (online) program at the Johns Hopkins University School of Advanced International Studies (SAIS) prepares students to understand risk models and decision-making frameworks, and then take their insights a step further. By combining both the qualitative and quantitative tools of risk management with critical thinking, regional knowledge and research skills needed for more comprehensive risk analysis and mitigation, Johns Hopkins MA in Global Risk graduates are uniquely positioned to succeed in today’s global environment.

Degree Requirements

Credits: 50

Duration: Two years, Part-Time

Course delivery: Online

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Code	Title	Credits
Courses		
Mathematics & Statistics		
Microeconomics & International Trade Theory		
Static Models for Understanding Risk		
Economics of Global Markets		
Systematic Approaches to Understanding Risk		
Statistical Analysis and Financial Management		
Risk and Crisis in the Global Economy		
Quantitative Models for Risk Assessment		
Regions of the World 1		
Understanding Risk in Complex Environment		
Regions of the World 2		
Capstone		

International Affairs, Master of Arts

This two-year degree program is based at SAIS Europe. The MAIA program provides students with the option to work with faculty advisors to develop and produce an original thesis. Alternatively, students can base their program entirely on coursework, provided they complete at least one course which entails a major research project. MAIA students can pursue both years of the program at SAIS Europe in Bologna, Italy, or they can begin their studies at one of the established cooperative degree partners.

Students are taught under the American system of graduate education and can select courses based on their academic interests.

The close-knit international academic environment of SAIS Europe fosters a sense of community and collaboration and enables students to learn to communicate across borders and cultures.

Cooperative Degree Partners

SAIS Europe offers cooperative two-year degree programs with other leading universities. Students may begin their course of study at either institution, earning a diploma or master's degree from both. Students must apply and be accepted at both institutions.

Students entering SAIS Europe from cooperative degree programs receive advanced standing for courses taken at the partner program (usually 60 ECTS) during the first year. Cooperative degree candidates must then fulfill 32 US graduate credits through a combination of coursework and/or a thesis, in addition to the program's requirements in economics and non-native language proficiency.

As of June 2022, SAIS Europe manages partner programs with the following schools:

Diplomatic Academy of Vienna, Austria

Students who begin their studies in Vienna can apply to spend a second year of study in Bologna at SAIS Europe. Upon successful completion of the relevant requirements, they earn the MAIA from Johns Hopkins SAIS Europe. Those who begin at SAIS Europe can spend a second year of study at the Diplomatic Academy. Upon successful completion of their year at SAIS Europe and the relevant requirements, they can earn the one-year Diploma. At the end of the second year at the DA in Vienna, they can earn a Master of Advanced International Studies (MAIS) from the Diplomatic Academy.

Hopkins Nanjing Center (HNC) and SAIS Europe

This two-year program allows students to complete a Certificate in Chinese and American Studies at the Hopkins-Nanjing Center (HNC) (p. 859), as well as a Master of Arts in International Affairs (MAIA) at SAIS Europe. Students spend one year (fall/spring) at each campus, and may begin their studies at either location. Students apply separately to both programs.

Institut d'Études Politiques de Lille (Sciences Po, Lille, France)

Students pursuing a first year of study for the Master's cycle at Lille can apply to SAIS Europe in Bologna for a second year of study. Upon successful completion of the second year at SAIS Europe and all of the degree requirements of Sciences Po and SAIS Europe, students can earn both a Master's degree from Sciences Po and Master of Arts in International Affairs (MAIA) from Johns Hopkins SAIS. Students who begin at SAIS Europe can earn the Diploma in International Studies and then go on to pursue a Master's at Sciences Po Lille.

McGill's Max Bell School of Public Policy

Students can begin their studies at either SAIS Europe or at McGill's Max Bell School of Public Policy and after completing all the degree requirements, they receive both the MAIA degree from Johns Hopkins SAIS and Master of Public Policy from McGill.

SOAS University of London

Students begin their studies at either SAIS Europe or at SOAS University of London in one of the pre-approved Master of Science programs and after completing the relevant degree requirements you will receive both the MAIA degree from Johns Hopkins SAIS and a Master of Science from SOAS University of London.

(Student from SOAS much be in one of the pre-approved Master of Science (MSc)* programs)

Tel Aviv University (TAU)

Approved degree programs at TAU are Conflict Resolution and Mediation, Cyber Politics and Government, Developing Countries, and Security and Diplomacy.

University of Leiden, The Netherlands

Students pursuing the one-year Master of Arts in International Relations at the University of Leiden can apply to SAIS Europe for a second year of study. Upon successful completion of your second year at SAIS Europe, they can earn both the MA from Leiden and the MAIA from SAIS Europe. Those who begin at SAIS Europe may earn the Diploma in International Studies and then go on to pursue a Master of Arts in International Relations at the University of Leiden.

University of Bologna, Italy

SAIS Europe offers four, two-year cooperative degree programs with the University of Bologna at campuses in Bologna, Forlì and Rimini:

Department of Political Science, Bologna and Forlì. Students who begin the program at the University of Bologna and complete a second year at SAIS Europe can earn both a Laurea Magistrale from the University of Bologna and an MAIA from Johns Hopkins SAIS. Those who complete the first year of study at SAIS Europe can earn a graduate Diploma in International Studies from SAIS Europe and then pursue either the Laurea Magistrale at the University of Bologna.

Resource Economics and Sustainable Development of the School of Economics, Management and Statistics, Rimini.

Students who begin their studies at the University of Bologna, Rimini and complete the second year at SAIS Europe earn both a Laurea Magistrale in Economics and Market Policy and a MAIA from Johns Hopkins SAIS. Vice versa, those who complete the first year of study at SAIS Europe can earn the Diploma and then pursue the Laurea Magistrale in Economics and Market Policy at the University of Bologna, Rimini.

School of Economics, Management and Statistics, Bologna. Those who begin the program at the University of Bologna, Department of Economics, and complete the second year at SAIS Europe can earn both a Laurea Magistrale in Economics and a MAIA from Johns Hopkins SAIS. Students who begin with a first year of study at SAIS Europe and second year at the University of Bologna you will earn both the MAIA degree from Johns Hopkins SAIS Europe and the Laurea Magistrale in Economics from the University of Bologna.

Degree Requirements

Campus: Bologna, Italy

Credits: 64

Duration: Two academic years, Full-time

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Students who spend both years at SAIS Europe may either complete 14 courses (56 credits) and write a thesis of approximately 15,000-20,000 words (8 credits), or complete 16 courses (64 credits), one of which must entail a substantial research project. Approval for the thesis track is conditional on the thesis proposal by the first reader. Students who only spend one year at SAIS Europe as part of a cooperative program complete six courses (24 credits) and a thesis (8 credits) or eight courses (32 credits). MAIA students select courses from the broad array offered each year at SAIS Europe. The program allows students the flexibility to pursue their specific academic interests under the guidance of a faculty advisor.

International Economics

All MAIA candidates must successfully complete the following courses:

- International Economics I or Essentials of Economics I and
- International Economics II or Essentials of Economics II

The Economics I track covers topics in Microeconomics and International Trade Theory and the Economics II track covers topics in Macroeconomics and International Finance. The Essentials courses are more conceptual in nature and require only basic math skills.

Thesis Option

Students who wish to write a thesis must apply in fall of their second year. The application must be approved by a committee, and the thesis proposal must be accepted by the proposed thesis supervisor.

International Economics and Finance, Master of Arts

This challenging 11-month, full-time master's degree program is recognized as a STEM degree, and is offered at the Washington, DC campus. The Master of Arts in International Economics and Finance (MIEF) positions early- to mid-career professionals to excel in rigorous economic and financial analysis roles. The curriculum prepares students to understand advanced economic theories, master professional quantitative economics and econometrics skills, and assess a wide range of international economic and financial scenarios. Students in this cohort-based program take courses together that increase in complexity throughout the year.

Economics knowledge, analytical abilities and the capacity to apply economic analysis to real-world problems give our students a distinct professional advantage. Whether you are interested in pursuing a career in international finance, public policy, economic development, or research, the MIEF program provides students with a firm grasp of the theory and tools of international economics and finance.

Students in the MIEF program are encouraged to work with career counselors in the Office of Global Careers and faculty in the International Economics department to explore career options, attend career treks, build professional networks, and improve professional skills.

Degree Requirements

Campus: Washington, DC

Credits: 56

Duration: 11 months, Full-time

Course delivery: In-person

Curriculum

The MIEF degree is conferred upon successfully completing fourteen courses totaling 56 credit hours. In designing your academic plan, you are required to take the core MIEF courses, but you also choose a combination of international economics electives.

The program requires fourteen core courses, including three quantitative methods courses, five economics electives, skills workshops and the capstone course. Students are required to have a minimum 2.67 cumulative GPA to graduate.

Coursework begins with a six-week summer term starting in mid-July, and follows the school's regular fall and spring semesters with the addition of a January intersession. The capstone course begins in the spring semester and is competed in the summer.

Code	Title	Credits
Summer (6 weeks)		
Advanced Macroeconomics		4
Advanced Microeconomics		4
Quantitative Methods I		4
Fall (14 weeks)		
Quantitative Methods II		4
International Finance		4
International Trade		4
Economics Elective		4
Economics Elective		4
January Intersession (2 weeks)		
Applied Research Project [1]		2
Skills Workshop		1
Skills Workshop		1
Spring (14 weeks)		
Select one of the following Quantitative Methods III courses:		4
Cross-Sectional and Panel Data Econometrics		
Empirical Economic Forecasting and Modeling		
Macro and Financial Time Series Econometrics		
Economics Elective		4
Economics Elective		4
Economics Elective		4
Capstone		
Policy research project (Ongoing)		4
Total Credits		**56**

[1] Applied Research Project begins in the fall semester and continues into the January intersession. Credits are earned at the end of January intersession.

Sample Electives

Code	Title	Credits
Advanced International Macroeconomics		4
Advanced Topics in Trade Theory		4
Business Strategies for Global Financial Institutions		4
Cost-Benefit Analysis		4
Creating Markets in Infrastructure		4
Credit Markets & Credit Risk		4
Development Finance		4
Economic Development		4
Enterprise and Development		4
Financial Decision-Making		4
Game Theory		4
International Economic Policy		4
International Financial Markets		4
International Financial Organizations: Institutions and Analytical Methods		4
Microeconomics of Development		4
Multinational Corporate Finance		4
Organization and Regulation of Infrastructure		4
Project Finance		4
Public-Private Partnerships: Creating Value in Economic & Social Infrastructure		4
Quantitative Global Economics		4
Sustainable Finance and Impact Investing		4
Topics in Growth and Development		4

Note: Course offerings subject to change

Intersession Skills Workshops

Students take two intersession skills workshops to expand their professional skills and knowledge related to careers in international economics. Past workshops have covered working with economic and statistical analysis tools such as EViews, MATLAB, PcGive, R, and Stata, as well as, address topics related to working in strategic consulting, investment banking, and business strategy roles.

Capstone Course

Students apply the knowledge, skills and tools they have learned in the MIEF program to address an international economics issue impacting the public, private or nonprofit sector. Teams present their findings in a detailed presentation to fellow classmates, faculty and outside professionals in mid-June. Examples of topics include current account sustainability, exchange rate exposure, investment case studies, studies on financial markets and growth and debt sustainability studies.

International Relations, Master of Arts

The majority of students at Johns Hopkins SAIS are enrolled in the two-year, full-time Master of Arts in International Relations (MAIR) degree. The program's interdisciplinary coursework emphasizes international economics, policy and regional studies, international relations, and languages. Students can pursue this degree by completing coursework at the Hopkins-Nanjing Center, SAIS Europe, and/or Washington, DC.

Our graduates are in great demand by employers in the public, private and nonprofit sectors. Economics knowledge, analytical abilities, regional expertise, diplomatic skills, language proficiency and the capacity to apply theory to real-world problems give students a distinct professional advantage.

Degree Requirements

Campus: Washington, DC and Bologna, Italy

Credits: 64

Duration: Two academic years, Full-Time

Course delivery: In-person

In order to earn the degree, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above. Students are required to spend a minimum of 3 fall/spring semesters in full-time status (12+ credits). Students must spend at least one full-time semester of study enrolled at the Washington, DC campus.

Core Curriculum (24 credits)

Courses used toward the Core Curriculum may not be double-counted toward any other degree requirement.

World Order and Disorder (4 credits)

Students must complete one of the following courses:

- Theories of International Relations[1]
- Evolution of the International System[1]

Leadership, Ethics, and Decision-making in International Relations (4 credits)

Students must complete one of the following courses:

- American Foreign Policy Since World War II[1]
- Comparative Politics[1]
- Leadership, Ethics, and Decision-making

[1] Students cannot use a non-credit Core Exam to satisfy this requirement and must enroll in the course for credit.

International Economics (8 credits)

Students must complete:

- International Economics I or Essentials of International Economics I
- International Economics II or Essentials of International Economics II

If a student is waived from International Economics I and/or II, the student must take a replacement International Economics and Finance course(s) to fulfill this requirement. A replacement International Economics and Finance course may not be double-counted toward the International Economics and Finance Functional Focus area or any other requirement.

A student may only be waived by passing a waiver exam or having completed the equivalent course as an undergraduate at Johns Hopkins University.

Data Analytics (0-4 credits)

Students must complete:

- Statistical Methods for Data Analytics

Students who complete the non-credit version of this course in Pre-Term have fulfilled this requirement. Students who pass a waiver exam in Statistics must take a second approved Research Methods course.

Research Methods (4-8 credits)
Students must complete one approved Research Methods courses. Students who are waived from Data Analytics must take two Research Methods courses. Sample courses include:

- Applied Econometrics
- Econometrics
- Ethnographic Research Methods
- Macro Econometrics
- Methods in Comparative-International Research
- Practical Research Methods
- Quantitative Research Methods
- Research Design and Causal Inference
- Risk in International Politics and Economics
- Theories & Methods of Qualitative Political Research

Courses offering vary each academic year and are subject to change.

Interdisciplinary Program of Study (40 credits)
Beyond the Core Curriculum, students complete a self-designed interdisciplinary program of study. This must include at least 12 credits from courses within a specific Functional Focus Area and at least 12 credits from courses within a specific Regional Focus Area. Cross-listed courses may only be used toward one focus area. To fulfill both focus area requirements, students must complete at least 6 distinct courses (24 credits).

Functional Focus Areas (12 credits)
- Development, Climate, and Sustainability
- International Economics and Finance[2]
- Security, Strategy, and Statecraft
- States, Markets, and Institutions
- Technology and Culture

Regional Focus Areas (12 credits)
- Africa
- The Americas
- Asia
- China
- Europe and Eurasia
- The Middle East
- United States

Capstone
Capstones may be associated with a for-credit course or a non-credit activity and may not be completed in the student's first year of study. Students must complete one of the options below:

- **For-Credit Course Options (4 credits)**
  - Practicum Course
  - Project Course
  - Study Trip Course
  - Research Seminar Course
- **Non-Credit Options (0 credits)**
  - Internship Research Report
  - Leadership Research Report
  - Expanded Research Paper (affiliated with current course)
  - Expanded Research Paper (not affiliated with current course)

Students may count a for-credit capstone course toward functional or regional focus area requirements if applicable.

Language Proficiency

Students must demonstrate proficiency in a non-native language by passing a proficiency exam. Students must pass all required components of the exam (reading, speaking, listening and, in some cases, writing) to meet the requirement. Students may enroll in non-credit language courses taught at SAIS each semester to help reach the proficiency level.

Non-native English speakers must also fulfill the Non-Native English Speaker requirement by reaching a minimal level of English aptitude via an in-house diagnostic exam or by passing SAIS English language courses. Fulfilling the Non-Native English Speaker requirement does not fulfill the Language Proficiency requirement, which requires greater aptitude.

Professional Development Skills
Students must complete two non-credit professional skills courses. Professional skills courses usually require 4 to 8 hours over two to three sessions. Sample courses include:

- Policy Writing
- Public Square: An Advanced Course in Reading, Writing and Publishing
- Public Speaking: Defining, Developing and Presenting
- Preparing and Delivering a Briefing
- Data Tools and Analysis
- Advanced Excel
- Introduction and Advanced Geographic Information Systems
- Introduction and Advanced Python, R, STATA and Tableau
- Data Analytics for Policy Analysts
- Leadership Lessons: An International Business Career Perspective
- International Negotiation
- Introduction to Financial Intelligence
- Corporate Valuation
- Monitoring and Evaluating for International Development
- Political Risk Analysis

Course offerings vary by semester and are subject to change.

International Studies, Master of Arts

Offered at the Hopkins-Nanjing Center (HNC), this two-year program is the only master's degree fully accredited in both China and the United States.

Students complete coursework and a thesis in Chinese, culminating in a degree jointly awarded by Johns Hopkins SAIS and Nanjing University. Advanced proficiency in Mandarin is required prior to beginning study.

Alumni of the Hopkins-Nanjing Center have played key roles in government, business, journalism, NGOs, and academia. As graduates of the only truly joint target-language US-China graduate school of its kind, HNC alumni are uniquely poised to understand and manage diverse facets of US-China commercial, academic, economic, and political relations.

Degree Requirements

Campus: Nanjing, China

Credits: 64

Duration: Two academic years, Full-Time

Course delivery: In-person

Curriculum and Concentrations

Students in the MAIS program elect to concentrate in one of the following concentration areas:

- Chinese Studies
- Comparative and International Law
- Energy, Resources and Environment
- International Economics
- International Politics

Degree Program Requirements

During their two years (four semesters) of study, MAIS students must complete 64 credits of coursework for the degree. At least 32 credits (excluding MAIS Tutorial and MAIS Thesis Preparation courses) must be taken in Chinese. 24 credits must count towards their area of concentration.

In addition to the courses required for their concentration, students must pass 20 credits in at least two concentrations outside the specific concentration area. All MAIS students must take at least three Area Studies (Chinese and American Studies) courses in order to fulfill the requirement for the minor. Many courses are cross-listed between concentrations and may count for multiple requirements.

MAIS Tutorial - This course is designed to provide MAIS students with practical guidance in planning and carrying out their two-year course of study and helps students consider how their own concentration might be linked to larger issues in Sino-international relations.

MAIS Thesis Preparation - This course provides a forum for discussing progress on thesis work, interacting with visiting scholars and faculty, and measuring progress of their theses.

International Public Policy, Master of

The Master of International Public Policy (MIPP) is designed for experienced professionals, with at least seven years of work experience, who wish to develop advanced analytical and leadership skills.

Studying under world-class scholars and practitioners, students customize their course of study from hundreds of functional, regional, and economic courses to advance their expertise and position themselves for continued professional success.

MIPP students represent diverse employment sectors and geographic regions and bring substantial professional experience into classroom discussions. This program is completed in either one (full-time) or two years (part-time) and is offered at the Washington, DC and SAIS Europe campuses.

Our graduates are in great demand by employers in the public, private and nonprofit sectors. Economics knowledge, analytical abilities, regional expertise, diplomatic skills, language proficiency and the capacity to apply theory to real-world problems give students a distinct professional advantage.

Degree Requirements

Campus: Washington, DC and Bologna, Italy

Credits: 32

Duration:

Full-Time: one academic year, with summer options

Part-Time: two academic years, with summer options

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Curriculum

The MIPP degree consists of eight courses (32 credits). Students work with an academic advisor to design a program of study that is academically rigorous and professionally relevant.

Students may use the ‘focus areas' as outlined for the Master of Arts in International Relations degree (p. 855) to get ideas about how to structure their course plans, but this is not required and focus areas are not recorded on the student's academic record.

Language Studies

MIPP students may elect to take a non-credit language course each semester in one of the languages offered at SAIS. Language courses do not count towards MIPP credit and course requirements.

Strategy, Cybersecurity, and Intelligence, Master of Arts

The Master of Arts in Strategy, Cybersecuirty and Intelligence (MASCI) is a one-year degree that will prepare future leaders and operators for sound decision-making at the strategic, operational, and tactical levels, by enabling them to task, parse, and prepare a wide range of data and raw intelligence.

Students will gain expertise in major strategy and intelligence topics such as terrorism, extremism, cybersecurity, disinformation, political warfare, covert operations, sanctions, special operations, and economic espionage. The program is designed to build the skills to work effectively in careers in the US Department of Defense, US Intelligence Community, and the related private and nonprofit sectors.

Degree Requirements

Campus: Washington, DC

Credits: 40

Duration: 11 Months, Full-Time

Course delivery: In-person

In order to graduate, students must fulfill all degree requirements and earn a cumulative GPA of 2.67 or above.

Sample Course Schedule

Term	Courses	Duration
Pre-Term	Bootcamp (2 credits)	1 week
Fall	Strategy I (4 credits)	15 weeks
	Intelligence I (4 credits)	
	Elective (4 credits)	
	Elective (4 credits)	
January Intersession	Capstone Research Seminar (2 credits)	1 week
Spring	Strategy II (4 credits)	15 weeks
	Intelligence II (4 credits)	
	Elective (4 credits)	
	Elective (4 credits)	
Summer	Capstone (4 credits)	6 weeks

Pre-Term Boot Camp

The Pre-Term Boot Camp is designed to be an identity-forming group experience for the cohort to take place in and around Washington, DC in late August. The boot camp will include an introduction to the program and topics in intelligence, strategy, covert action, military basics, open-source intelligence and policy making, exercises and simulations, an intelligence walk around Washington DC, and a staff ride to a nearby historical battlefield.

Sample Electives*

- Air Power and Strategy
- China's National Security Perspectives
- Conduct of Foreign Policy
- Defense Analysis
- Disinformation
- Economic Sanctions and Statecraft
- Geopolitics of the Middle East
- Global Cyber Threats
- Illicit Finance
- Information Security
- Insurgency and Irregular Warfare
- Intelligence and Cyberspace
- International Bargaining and Negotiation
- International Crises and International Law
- Military Adaptation under Fire
- Operations Analysis
- Psychology and Decision-making in Foreign Policy
- Russia and the West: After the Cold War
- Security Challenges and Military Modernization in South Asia

*subject to change

Capstone

Students will select one of two capstone options, either a thesis or an oral presentation focused on strategic intelligence and national security. Each student will be assigned an advisor early in the capstone process. The advisor will provide or facilitate supervision of the work leading toward the capstone requirement. The thesis is a thoroughly researched and well-sourced research paper. The oral presentation is a thoroughly researched presentation, using any presentation software, presented in a 15-minute briefing, followed by a 30-minute Q&A session with at least two faculty members to probe the briefing's depth and quality. It must be accompanied by an executive summary, which should include a list of references to the best available sources. The Capstone Research Seminar will prepare students for both the capstone thesis and the oral presentation.

Sustainable Energy, Master of Arts (Online)

The Johns Hopkins University School of Advanced International Studies (SAIS) designed the MA in Sustainable Energy (Online) for professionals who want to help shape the future of renewable energy. With a cutting-edge curriculum and world-renowned faculty, few other programs can match the depth or practical experience that the Johns Hopkins SAIS program offers.

Leveraging the expertise of the Johns Hopkins SAIS' faculty and connections to global leaders in sustainable energy, this graduate degree program has been designed to fill key skill gaps across the energy sector — including in consulting, market research, policy, strategic advising and more.

Once enrolled, students gain access to the full breadth of resources available at Johns Hopkins SAIS, including career counseling and personalized job search assistance. Graduates also join the global alumni community of more than 230,000 Johns Hopkins University graduates. As one of the top universities for international relations, Johns Hopkins is recognized worldwide by employers, researchers as well as government and policy organizations.

In addition to online coursework, the program features two experiences at the Johns Hopkins SAIS campus in Washington, DC. These experiences give students the opportunity to connect with their cohort, expert faculty and study directly within the largest hub of energy policy and legislation in the United States. The second on-campus experience consists of the MA in Sustainable Energy capstone presentation and commencement ceremony, where students will participate with the full Johns Hopkins SAIS community in Washington, DC.

Degree Requirements

Credits: 40

Duration: Two years, Part-Time

Course delivery: Online

In order to earn the degree, students must fulfill all requirements and earn a cumulative GPA of 2.67 or above.

Code	Title	Credits
Courses		
Introduction to Sustainable Energy		
Energy and Environmental Policy Analysis		
Economics of Sustainable Energy		
Distributed and Renewable Energy		
Sustainable Energy and Climate Change		
Global Governance of Sustainable Energy		
Sustainable Energy in Economic Development		
Systems Analysis for Sustainable Energy		

Sustainable Energy Finance
Capstone

Chinese and American Studies, Hopkins-Nanjing Center Certificate

The Hopkins-Nanjing Center (HNC) is a one-of-a-kind residential academic community in Nanjing, China, committed to cross-cultural learning, free and open academic inquiry, and advanced bilingual proficiency.

The one-year Certificate in Chinese and American Studies provides students with flexibility in course selection while deepening their knowledge of Sino-global relations.

Our target-language curriculum gives graduates a competitive edge. American and international students take courses in Chinese, while Chinese students are taught primarily in English. A shared residential community deepens cultural ties and creates individuals who are both bilingual and at home in two cultures.

Alumni of the Hopkins-Nanjing Center are renowned for their Chinese-language proficiency and their multidisciplinary approach to understanding international affairs and China studies. They play key roles in government, business, journalism, NGOs, and academia and are uniquely poised to understand and manage diverse facets of US-China commercial, academic, economic, and political relations.

Degree Requirements

Campus: Nanjing, China

Credits: 24

Duration: One academic year, Full-Time

Course delivery: In-person

Curriculum

The one-year certificate gives students flexibility in course selection while deepening their knowledge of Sino-global relations. Courses are offered on topics such as international economics, international politics, Chinese studies, energy, and international law.

Students in the certificate program must complete at least 24 credits of coursework, with 20 of these credits taught in Mandarin. Many students elect to take additional courses taught in English with their Chinese peers.

The certificate is jointly awarded by Johns Hopkins SAIS and Nanjing University.

Certificate + MAIR

Following completion of the one-year Certificate program in Nanjing, some students proceed to continue their graduate studies at Johns Hopkins SAIS with the Master of Arts in International Relations (p. 855). The MAIR portion of study can take as little as an additional academic year to complete. Students can pursue their studies at either campus in Washington DC or SAIS Europe, although at least one semester must be spent in Washington DC.

Students who complete the HNC certificate earn Advanced Standing credits toward their SAIS MAIR. Advanced Standing reduces the total number of credits needed for the MAIR from 64 to 32-40. Advanced Standing credits, however, do not fulfill specific degree requirements and the student may be required to take more than the minimum number of overall credits in order to complete the MAIR.

Students may use up to 2 approved courses taught at the HNC in English toward specific MAIR requirements. Each semester prior to registration, the Office of Academic Advising (DC) will provide a list of approved English language courses and which MAIR requirement the course may fulfill. Students may use up to 2 approved courses taught in Chinese toward the China regional focus area.

Students who complete a course equivalent to a required International Economics course (International Economics I or International Economics 2) are eligible to take a waiver exam but cannot satisfy the International Economics requirements with an HNC course alone. If the student passes a waiver exam(s), the student must complete a replacement International Economics course(s). Students may use one Level 2 HNC Economics course (whether taken in English or Chinese) as a replacement International Economics course. Courses taken at the HNC may not be used to fulfill the Data Analytics requirement, but may qualify a student to take a waiver exam. If the student is waived from the Data Analytics requirement, the student must complete 2 Research Methods courses.

Non-native-Chinese-speaking students who complete the HNC Certificate automatically fulfill Chinese language proficiency.

Certificate + MAIA

Students may also combine the Certificate with the Master of Arts in International Affairs (p. 853). Students in the Certificate + MAIA program spend one year each at the Hopkins-Nanjing Center and SAIS Europe, and may choose to begin their studies at either location. At the HNC, students must complete at least 32 credits of coursework, with at least 20 of these credits taught in Mandarin. Once the Certificate is completed, they receive 32 credits of advanced standing toward the MAIA. Students can complete complete the MAIA in one academic year at SAIS Europe by completing 32 credits.

The MAIA curriculum includes a minimum of two International Economics courses, four elective courses, and a thesis (8 credits). Students can opt to take two additional elective courses in place of the thesis as long as one of the courses produces a research paper.

Non-native Chinese speakers who complete the HNC Certificate are automatically approved for language proficiency in Chinese since their content courses were taught in that language. Native Chinese speaking students can use English for their required non-native language proficiency requirement.

Graduate Certificates

Complete a series of four courses and earn a graduate certificate designed to serve as an important credential for students and professionals seeking to expand on a chosen area of interest without having to pursue a full master's degree.

Certificates are eligible for financial aid and may be completed part-time over multiple semesters or full-time in a fall or spring semester. International applicants to the full-time certificate may qualify for an F-1 student visa.

Courses taken in a Graduate Certificate can be transferred to many of the schools degree programs. Up to 4 courses (16 credits) can transfer to the two-year Master of Arts in International Relations (Washington, DC) or

Master of Arts in International Affairs (Bologna, Italy) degrees. Students may transfer up to 2 courses (8 credits) to the Master of International Public Policy, PhD, Doctor of International Affairs and Diploma programs.

Degree Requirements

Campus: Washington, DC

Credits: 16

Duration: 1 full-time fall/spring semester or flexible part-time enrollment (including summer)

Course delivery: In-person with some online course options

In order to earn a Graduate Certificate, students must fulfill all requirements and earn a cumulative GPA of 2.67 or above.

Certificate in International Studies

The Certificate in International Studies (https://sais.jhu.edu/academics/diploma-certificate-and-non-degree-programs/certificate-international-studies/) allows you to design your own curriculum. Focus your studies in a particular policy area, region of the world or choose courses that give you a broader overview of international relations.

Recommended for:
Students interested in international relations, foreign policy, conflict resolution, international law, human rights, global business strategy or regional studies.

Course Requirements:

- Theories of International Relations
- 3 electives from any area of study (excluding International Economics I, International Economics II, and language courses)

Certificate in International Development

The Certificate in International Development (https://sais.jhu.edu/academics/diploma-certificate-and-non-degree-programs/certificate-international-development/) incorporates an interdisciplinary approach to the study of developing countries. It offers an opportunity to conceptualize development problems through social, political, economic and environmental aspects of development.

Recommended for:
Students interested in human and economic development, social change, health care and education reform, infrastructure and environment.

Course Requirements:

- Comparative Politics
- Introduction to Economic Development (or approved alternative development economics course)
- 2 Electives in International Development

Certificate in International Economics

The Certificate in International Economics (https://sais.jhu.edu/academics/diploma-certificate-and-non-degree-programs/certificate-international-economics/) allows students to research the flow of capital, labor, investment and trade among nations, while obtaining the qualitative and quantitative skills necessary for economic forecasting.

Recommended for:
Students interested in financial analytics, economic consulting, international trade and market research.

Course Requirements:

- International Economics I
- International Economics II
- 2 Electives in International Economics

International Studies, Diploma

The one-year Diploma in International Studies, offered at SAIS Europe in Bologna, Italy, gives students the flexibility to select courses based on their academic interests. The school's multidisciplinary curriculum is rooted in economics, political science, history, and foreign language proficiency and students are taught under the American system of graduate education.

The close-knit international academic environment of SAIS Europe fosters a sense of community and collaboration and enables students to learn to communicate across borders and cultures.

Johns Hopkins SAIS graduates are sought after by employers in the public, private and nonprofit sectors. Their knowledge of economics, analytical abilities, regional expertise, diplomatic skills, international experience, language proficiency, as well as capacity to apply theory to real-world problems, give students a distinct professional advantage.

Degree Requirements

Campus: Bologna, Italy

Credits: 32

Duration: One academic year, Full-time

Course delivery: In-person

In order to earn the Diploma, students must fulfill all requirements and earn a cumulative GPA of 2.67 or above.

Curriculum

Students pursuing the one-year Diploma in International Studies must complete a minimum of eight courses (32 credits) over two consecutive semesters, as well as demonstrate proficiency in a non-native language

The curriculum emphasizes international economics and international relations with options to focus in a broad range of policy areas and geographic regions. Students who wish to pursue economics courses must have completed introductory level Micro- and Macroeconomics prior to the start of the program.

Each year, approximately 70 courses are offered at SAIS Europe on topics such as:

- American Foreign Policy
- Conflict Management
- Energy and Sustainability
- International Development
- International Law
- International Political Economy
- Strategic Studies

- Global Risk
- European and other Regional Studies

Language Requirements

Native English speakers must pass a foreign-language proficiency examination or successfully complete two semester-long courses in one of the languages offered at SAIS Europe:

- Arabic
- French
- German
- Italian
- Portuguese
- Russian
- Spanish

Non-credit language courses do not count toward the number of courses or credits needed for the Diploma.

During the application process, non-native speakers of English will be required to submit a score from one of the following English competency exam: TOEFL, IELTS or the Cambridge C2 Proficiency. This requirement may be waived for individuals who have completed their undergraduate degree in English in a country where English is an official language. However, at the start of the academic year, all non-native English-speaking students at SAIS Europe must take the English proficiency exam, regardless of previous test results, to ensure an adequate level in all skills.

SCHOOL OF EDUCATION

About the School of Education

Established in 2007, the Johns Hopkins School of Education is a national leader in education reform through research and teaching. Grounded in the Johns Hopkins tradition of research and innovation, the School of Education is ranked among the top colleges of education in the nation by U.S. News & World Report as well as and among the top recipients of funded research..

The School of Education offers a rigorous academic environment where candidates can pursue a wide variety of graduate degree and certificate programs, and become experts in elementary and secondary teaching, counseling, administration and supervision, special and gifted education, and education in the health professions. Our candidates represent a wide variety of academic and professional backgrounds, including recent college graduates, professionals from disciplines outside of education seeking a career change, and experienced administrators, counselors, and specialists who want to enhance their skills in the classroom and practice area.

Through an interdisciplinary approach with emphasis on the most challenged urban schools, our programs and applied research have measurably improved the quality of PK-12 education. Our research and policy centers play an integral role in furthering the impact of that approach.

- The **Center for Research and Reform in Education** obtains, analyzes, and distributes the latest research to bring meaningful reform to under-performing public schools.
- The **Center for Safe and Healthy Schools** empowers schools, communities, and policymakers with the knowledge and tools to foster safe and healthy school climates.
- The **Center for Social Organization of Schools** conducts programmatic research, develops curricula, and provides schools with technical assistance to improve education.
- The **Center for Technology in Education** improves the quality of life of children and youth through teaching, research, and leadership in the use of technology.
- The **IDEALS Institute** works to build holistic systems to promote positive developmental outcomes in education, health, and social services for children and adults.
- The **Institute for Education Policy** convenes leaders from diverse viewpoints to share expertise in analyzing and disseminating solutions to our toughest educational issues.

True to Johns Hopkins University's mission to "bring the benefits of discovery to the world," the Johns Hopkins School of Education equips educators and communities—locally and globally—with the latest insight into how learning happens.

The Johns Hopkins School of Education explores the frontiers of knowledge to understand how individual, communal, behavioral, and neurological aspects of human development interact to impact learning. And we are passionate about sharing our findings: with educators, with leaders, with communities, with students. With you.

From individual students to the schools they learn in, from communities to whole populations, quality education is imperative. Nothing less than our future is at stake

Accreditation

The Johns Hopkins University is accredited by the Middle States Commission on Higher Education. All programs leading to professional licensure are approved by the Maryland State Department of Education (MSDE (http://www.marylandpublicschools.org))).

Vision

A Strategic Vision for the Johns Hopkins School of Education

The most important aspect of our vision is our people: students, staff, faculty, and leadership. As a community, we are committed to attracting and retaining a diverse, world-class faculty and staff. We believe in working collaboratively to cultivate a productive, supportive culture, which includes recruiting and promoting candidates from diverse backgrounds and inspiring our community to foster a positive environment.

The schools, organizations, and communities we serve are confronting complex, far-reaching problems. Some are long-standing; others have exploded only recently into our collective consciousness. More than ever, it is clear that these challenges will require deep, empirically informed change.

- Students and clients increasingly are being diagnosed with mental health disorders, challenging educators to move beyond an emphasis on academic achievement to one addressing mental health and social-emotional well-being.
- States and districts are experimenting with policy approaches that emphasize entrepreneurial solutions to school safety and early childhood education, and for-profit startups are competing with nonprofit, traditional providers.
- Education occurs in a context of growing societal and racial inequity—particularly in cities like Baltimore. Through our operation of the Henderson-Hopkins School, we have seen how local challenges reflect global ones.
- Research funders and consumers of research are requiring more rigorous studies that demonstrate the capacity to change practice at scale and make a lasting, positive impact.
- As the challenges and their solutions become more complex, securing financial resources requires more innovation and responsiveness.

Building on the Johns Hopkins School of Education's distinctive strength as a global research leader with a local commitment, as well as its innovative academic programs, research centers, and entrepreneurial spirit, our vision positions the school to address these challenges and take advantage of the opportunities they create.

Together, we deliver world-class research, academic programs, and services that address the constantly evolving needs of the people and organizations we serve, training leaders capable of creating and utilizing cutting-edge knowledge and creating innovative, evidence-based policies, methods, and products to address the challenges these organizations face.

Dispositions

The following dispositions illustrate the school's continued commitment, as a member of Johns Hopkins University, to produce candidates who are aware and ethical in pursuing their chosen practice. All candidates who complete a certificate, master's degree, and/or doctorate in the School of Education will be:

1. **Research Centered**
    a. **Committed to Inquiry and Innovation**
    Candidates will:
        i. be prepared to foster in others and engage in themselves the pursuit of life-long learning, continuous self-reflection, and research within their own practice or beyond;
        ii. maintain fluency in scholarship in their field, professional knowledge, as well as in effective and ethical practices;
        iii. evaluate and effectively implement appropriate new methods and tools; and
        iv. incorporate appropriate knowledge-building technologies in their practice.
    b. **Committed to Being a Reflective Practitioner**
    Candidates will:
        i. actively engage in critical, creative, and metacognitive thinking to support conceptual understanding; and
        ii. engage in independent and interdependent problem solving and experiential approaches to learning.
2. **Collaborative**
    a. **Committed to Creating Positive Climates**
    Candidates will:
        i. promote a climate in which learning is valued and ongoing;
        ii. provide choices to enable all to share in and contribute to social and intellectual life; and
        iii. uphold fair and equitable standards for conduct that encourage responsibility, mutual respect, and civic values, and that safeguard the physical, intellectual, and emotional well-being of each and every member of the community.
    b. **Committed to Active Engagement**
    Candidates will:
        i. actively engage in a community of learners that develop relationships, programs, and projects with colleagues in PK-20 schools and educational agencies designed to improve the quality of education for each and every student and education professional; and
        ii. contribute professionally to the field at local, regional, state, and national levels.
3. **Socially and Culturally Conscious:**
    a. **Committed to Fostering Social Justice**
    Candidates will:
        i. seek to understand their own privileges and/or prejudices; the stereotypes embedded in educational materials, rules/laws, and policies; and the cultural biases that exist in schools and other education-related or societal institutions;
        ii. work toward a global society where equality is recognized as a basic human right;
        iii. promote social and environmental responsibility; and
        iv. empower themselves and others to identify opportunities for growth toward excellence and equity.
    b. **Committed to Developing Cross-Cultural Competence**
    Candidates will:
        i. promote respect for self, students, families, and cultures;
        ii. demonstrate a belief that everyone can learn and value human diversity and equity in the learning environment; and
        iii. examine their own biases and prejudices and develop necessary awareness, attitudes, knowledge, and skills for effectively and respectfully teaching and mentoring people whose cultures differ from their own.
4. **Ethical**
    a. **Committed to Acting Responsibly**
    Candidates will:
        i. act with integrity and be considerate, respectful, punctual, and appropriate in appearance, conduct, and in all interactions with students, families, mentors, and colleagues; and
        ii. be creative and self-reliant in finding appropriate solutions to problems and managing dilemmas.
    b. **Committed to Acting with Integrity**
    Candidates will:
        i. conduct themselves in a professional manner;
        ii. be honest and open to constructive feedback from others, manage situations of conflict and their own stress appropriately, and take responsibility for their own actions; and
        iii. conduct research and practice efforts intended to discover what is rather than to prove what may be anticipated.

Doctoral Programs

Master's Programs

Graduate Certificates

Academic and Student Policies

General Registration Policy

Only students who have been admitted to a program (or as a Graduate Special Student) may register for courses. Students are encouraged to register for courses as early as possible during each registration period since a course may close or be canceled due to low enrollment before the end of registration. Students may not sit in on a class without being officially registered for that class, nor should they contact instructors to request permission to register for or attend a closed course. Students who fail to complete their registration and sit in on a class will not receive a grade or credit for attending the class.

Registration begins several months before each semester. Students who have been admitted to a program may register for courses online using the School of Education's SIS Self-Service website. Registration materials may also be brought to the Education Building. When registering online or by mail, students may choose to pay then or be electronically billed.

When students initially register for courses each semester, they will be charged tuition fees and a **non-refundable** $175 registration fee. Following their initial course registration, students may register for additional courses without being subject to any additional course registration fees. However, if a student registers for the first time within two weeks of the start date of the term (regardless of the first class meeting dates of the individual classes), they will be charged a late registration fee of $100, in addition to the registration fee of $175. Please see Student Accounts (https://education.jhu.edu/student-resources/student-accounts/) for more information.

Registrations are processed as they are received. If a selected course is full, a student may be placed in an alternate course or on a waitlist (if applicable). Additional information regarding registration may be found in the online course schedule, https://sis.jhu.edu/classes/.

Note: Students should use their student JHED ID number to register for courses. All outstanding debts to Johns Hopkins University must be paid in full in order to register for courses.

For additional registration and enrollment related policies, please visit:

- ·Adding a Course (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/adding-a-course/)
- ·Auditing a Course (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/auditing-a-course/)
- ·Course Load (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/course-load/)
- ·Dropping/Withdrawing from a Course (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/droppingwithdrawing-from-a-course/)
- ·Wait Lists (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/waitlists/)
- ·Leaves of Absence (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/leave-of-absence/)
- ·Withdrawal from a Program (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/changingwithdrawing-from-programs/)
- ·Interdivisional Registration (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/interdivisional-registration/)
- ·Refunds (including Exceptions to the Refund Policy) (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/refund-policies/)
- ·Attendance/Participation (https://education.jhu.edu/student-resources/office-of-the-registrar/registration-and-enrollment/attendanceparticipation/)

Academic and Student Conduct Policies

Academic and Student Conduct Policies

Statement of Principles

The purpose of the School of Education's Academic and Student Conduct Policies is to promote and protect the rights, welfare, intellectual integrity, safety, property, and health of all members of the academic community, as well as to promote the orderly operation of the School and to safeguard its property and facilities.

These policies are intended to enhance free exchange of ideas in an academic setting and are to be construed with that interest in mind. They are based on the principle that each student assumes individual responsibility to abide by them. They pertain to any person who is currently enrolled in a School of Education course or program, or who has completed degree or certificate requirements and is awaiting graduation. These policies apply to misconduct committed on University premises or during School of Education related or sponsored activities off School premises.

The School of Education reserves the right to institute disciplinary action whether or not the offense results or may result in action by a civil or criminal court. The School of Education also reserves the right to dismiss at any time a student whose academic standing or general conduct is considered unsatisfactory. Students who have been dismissed for any reason are permanently barred from matriculating in another credit-bearing or non-credit course or program in the School of Education.

All records of academic and student conduct cases, and all supporting documentation, shall be maintained in accordance with University policy and state and federal laws concerning maintenance and disclosure of student records.

Academic Misconduct Policy

Scope

The Johns Hopkins School of Education ("SOE") places the highest value on intellectual integrity and personal trust within our community. All SOE students assume an obligation to conduct themselves in a manner appropriate to the Johns Hopkins University's mission as an institution of higher education and with accepted standards of ethical and professional conduct. Students must demonstrate personal integrity and honesty at all times in completing classroom assignments and examinations, in carrying out their fieldwork or other applied learning activities, and in their interactions with others. Students are obligated to refrain from acts they know or, under the circumstances, have reason to know will impair their integrity or the integrity of the University. Instructors are required to investigate any suspicion of academic misconduct.

Non-Academic Misconduct

All issues of non-academic student misconduct are subject to the University-wide Student Conduct Code (http://studentaffairs.jhu.edu/policies/student-code/).

Research Misconduct

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, reviewing or reporting research. For a complete definition, refer to The Johns Hopkins University Research Integrity Policy (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf). The Policy applies to all University faculty, staff, trainees and students engaged in the proposing, performing, reviewing or reporting of research, regardless of funding source. Allegations of research misconduct regarding a student must be referred to the Research Integrity Officer for assessment under that Policy and must also be reported to the Vice Dean of Academic Affairs.

Interdivisional Enrollments

SOE students may enroll in courses in one or more of the other University divisions or schools. SOE students are subject to this policy not only when enrolled in SOE courses, but also when enrolled in courses in other University divisions or schools. Academic misconduct in the context of those “outside” courses will be subject to and resolved under this policy.

Policy Violations

Academic misconduct is prohibited by this policy. Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community. This includes a wide variety of behaviors such as cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual to gain an unfair academic advantage. Non exclusive examples of academic misconduct are listed below.

Cheating

The following are nonexclusive examples of cheating:

- fraud, deceit, or dishonesty in an academic assignment, text or examination;
- use or consultation of unauthorized materials (e.g., notes, books, etc.) on assignments, tests or examinations;
- unauthorized discussion of a test or examination during its administration (including face- to-face and online examinations in either synchronous or asynchronous formats);
- copying content on an assignment, test or examination from another individual;
- obtaining a test or examination or the answers to a test or examination before administration of the test or examination;
- studying from an old test or examination whose circulation is prohibited by the faculty member;
- use or consultation of unauthorized electronic devices or software (e.g., calculators, cellular phones, computers, tablets, etc.) in connection with assignments, tests or examinations;
- use of paper writing services or paper databases;
- unauthorized collaboration with another individual on assignments, tests or examinations;
- submission of an assignment, test or examination for a regrade after modifying the original content submitted;
- permitting another individual to contribute to or complete an assignment, or to contribute to or take a test or examination on the student’s behalf;
- tampering with, disabling or damaging equipment for testing or evaluation; or
- unauthorized submission of the same or substantially similar work, assignment, test or examination to fulfill the requirements of more than one course or different requirements within the same course, including for courses that a student repeats.

Plagiarism

The following are nonexclusive examples of plagiarism:

- use of material produced by another person without acknowledging its source;
- submission of the same or substantially similar work of another person (e.g., an author, a classmate, etc.);
- use of the results of another individual’s work (e.g., another individual’s paper, examination, homework, computer code, lab report, etc.) while representing it as your own;
- improper documentation or acknowledgment of quotations, words, ideas, or paraphrased passages taken from published or unpublished sources;
- wholesale copying of passages from works of others into your homework, essay, term paper, or dissertation without acknowledgment; or
- paraphrasing of another person’s characteristic or original phraseology, metaphor, or other literary device without acknowledgment.

Forgery/Falsification/Lying

The following are nonexclusive examples of forgery, falsification and lying:

- falsification or invention of data or information for an assignment, test or examination, or in an experiment;
- citation of nonexistent sources or creation of false information in an assignment;
- attributing to a source ideas or information that is not included in the source;
- forgery of university or other official documents (e.g., letters, transcripts, etc.);
- impersonating a faculty member;
- request for special consideration from faculty members or university officials based upon false information or deception;
- fabrication of a reason (e.g., medical emergency, etc.) for needing an extension on or for missing an assignment, test or examination;
- claiming falsely to have completed and/or turned in an assignment, test or examination;
- falsely reporting an academic ethics violation by another student;
- failing to identify yourself honestly in the context of an academic obligation; or providing false or misleading information to an instructor or any other University official.

Facilitating Academic Dishonesty

The following are nonexclusive examples of facilitating academic dishonesty:

- intentionally or knowingly aiding another student to commit an academic ethics violation;
- allowing another student to copy from one’s own assignment, test, or examination;
- making available copies of course materials whose circulation is prohibited (e.g., old assignments, texts or examinations, etc.);
- completing an assignment or taking a test or examination for another student; or

- sharing paper mill/answer bank websites or information with other students.

Unfair Competition

The following are nonexclusive examples of unfair competition:

- intentionally damaging the academic efforts of another student;
- stealing another student's academic materials (e.g., books, notes, assignments, etc.); or
- denying another student needed University resources (e.g., hiding library materials, stealing lab equipment, etc.).

Investigations Allegations of Academic Misconduct

If a student is suspected of academic misconduct, the course instructor must investigate the matter. Instructors should document the potential evidence and all communication with the student concerning the possible infraction. If, after speaking with the student and any potential witnesses, the instructor believes that academic misconduct has occurred, the instructor must contact SOE's Office of the Registrar (copying the Office of Student Affairs) to determine whether the offense is a first-time offense, or a second or subsequent offense. Before making a final decision in a case, instructors should also consult with the faculty member in charge of the student's program and the student's faculty adviser. If the instructor ultimately determines that academic misconduct has occurred, the instructor must complete SOE's Academic Misconduct Form, providing a brief description of the infraction and the action(s) to be taken. These actions could include either imposing a penalty on the student or recommending that the case be referred to the hearing process.

First-time Offenses

For a first-time offense that the instructor does not consider to be egregious—i.e. not worthy of a penalty harsher than the award of an F grade for the entire course—the instructor shall determine the penalty at their discretion. Depending on the severity of the charge, the instructor may choose to 1) reduce the number of points or the grade level awarded for an individual assignment, 2) allow the student to resubmit an assignment, but set a limit on the possible number of points or the grade that the student may earn, 3) award zero points/an F grade for the assignment without granting the student an opportunity to resubmit, 4) award an F grade for the entire course, or 5) impose another type of penalty as s/he deems appropriate (provided that the penalty imposed is not greater than the award of an F grade for the entire course). If the instructor decides to impose another type of penalty (under option #5), the penalty should be determined in consultation with the faculty member in charge of the student's program.

If the student accepts the charge and penalty imposed by the instructor, s/he will sign the consent statement on the Academic Misconduct Form. A student who signs the consent statement admitting the infraction and accepting the penalty imposed cannot subsequently appeal.

If the student disagrees with the academic misconduct charge and/or the penalty proposed by the instructor, s/he must sign the acknowledgement statement on the Academic Misconduct Form, instead of the consent statement, acknowledging that s/he is aware of the instructor's decision. In such cases, the student may appeal the decision to the Vice Dean for Academic Affairs (or designee).

Once both parties have signed the form, it will be placed in the student's record (which the SOE's Office of the Registrar maintains), with a copy sent to the student's adviser, faculty member in charge of the student's program, Office of Student Affairs, and Vice Dean for Academic Affairs.

The process for handling non-egregious first-time offenses should be completed within 30 days of the instructor's identifying the alleged academic misconduct.

For a first-time offense that the instructor considers to be an egregious case of academic misconduct, where a sanction greater than awarding an F grade for the entire course should be considered, as well as for all second or subsequent offenses, the instructor must refer the case directly to the Office of Student Affairs for a hearing process for resolution.

Hearing Process for Second/Subsequent Offenses, Egregious First-time Offenses, and Student Appeals

The following cases shall be referred to the hearing process outlined below:

1. For a second or subsequent offense.
2. For a first-time offense that the instructor considers an egregious case of academic misconduct and where the instructor believes that a penalty greater than the award of an F grade should be considered.
3. For a first-time offense where the students has submitted an appeal to the Vice Dean for Academic Affairs (or designee) disputing the academic misconduct charge and/or the penalty proposed by the instructor.

For options 1 and 2 above—i.e. for a second or subsequent offense, or for a particularly egregious first-time case of alleged academic misconduct where the instructor believes that a sanction greater than awarding an F grade for the entire course should be considered—the instructor shall promptly notify SOE's Office of Student Affairs, submitting the completed Academic Misconduct Form outlining the alleged violation(s), and additionally detailing in writing any available evidence, including potential witnesses, and other pertinent details of the case.

For option 3 above—i.e. where a student disagrees with the instructor's decision and/or the penalty proposed by the instructor—any appeal to the Vice Dean for Academic Affairs (or designee) must be submitted by the student in the form of a letter to the Office of Student Affairs (who will vet the appeal on the Vice Dean's (or designee's) behalf). In submitting an appeal, the student must provide a thorough rationale for the basis of the appeal and include supporting materials as evidence. Such materials would typically consist of the disputed work in question, the signed Academic Misconduct Form, and any correspondence (such as email communications) between the student and the instructor and (where applicable) other persons involved in the case (e.g. communications with the faculty adviser and/or faculty member in charge of the student's program). The appeal form and supporting materials must be received by SOE's Office of Student Affairs within seven working days of the date that the initial Academic Misconduct Form is signed by the instructor and student. The appeal letter and supporting materials should be emailed to soe.studentaffairs@jhu.edu. (The term "academic misconduct appeal" should be referenced in the email subject link.)

For all the options outlined above, SOE's Office of Student Affairs will be assigned to the case and gather information regarding the alleged academic misconduct. This gathering of information may include without limitation 1) meetings with or requests for statements or additional supporting materials from the instructor, student, faculty adviser/faculty member in charge of the student's program, and/or witnesses, 2) review of any related information and supporting materials, and 3) (for student appeals) a determination that the appeal to the Vice Dean for Academic Affairs (or designee) was submitted within the seven-day appeal window.

Following this initial review, the Office of Student Affairs will forward the case and any supporting materials to the Vice Dean for Academic Affairs (or designee) with a recommendation as to whether the case should proceed or be dismissed. The Vice Dean (or designee) may dismiss a case for a lack of sufficient information, because the appeal was not submitted within the seven-day deadline established by this policy, or if the alleged conduct does not fall within conduct prohibited by this policy. Absent these circumstances, the Vice Dean (or designee) will appoint a hearing panel to resolve the case.

Panel Hearings

The hearing panel is composed of faculty and staff appointed for annual terms by the Vice Dean for Academic Affairs (or designee) to hear alleged violations of this policy. The hearing panel must comprise at least three faculty members drawn from the Student Affairs Committee and one representative from the Office of Student Affairs. The hearing panel shall convene within 21 days of its appointment by the Vice Dean (or designee) to consider the case.

The panel is charged with determining based on a preponderance of the evidence whether a student's actions constitute a violation of this policy and, if so, recommending (an) appropriate sanction(s). The panel shall make its determination of responsibility and recommended sanctions by majority vote, except that unanimity is required for a sanction of expulsion. The hearing is a closed proceeding, meaning that no one other than the panel members, and necessary University personnel, may be present.

The student accused of academic misconduct, and any other participants (e.g. the instructor or witnesses) called to the hearing, will be present in the hearing room only when making a statement or being questioned by the panel. Participants may attend the panel hearing remotely (e.g. via telephone or Skype), if unable to attend in person.

Witnesses

The hearing panel may request the presence of any witness with relevant information about a case. The student and/or instructor may request that witnesses with relevant information speak on their behalf. Absent exceptional circumstances, the student/instructor should inform the hearing panel in writing at least three days in advance of any hearing of the names of the witnesses and to what they will attest. The hearing panel may determine whether and the extent to which witnesses will be permitted to participate or questioned in any meeting or hearing, including whether their testimony is relevant.

Decision

Within 14 days of the hearing panel meeting, the representative from the Office of Student Affairs on the hearing panel will notify the Vice Dean of Academic Affairs (or designee) in writing outlining the hearing panel's findings, determination of responsibility, and any recommended sanctions (if applicable). The Vice Dean (or designee) will notify the student in writing of their judgement in relation to both the final determination of responsibility and the sanction (if any) to be imposed, copying the instructor, student's faculty adviser, faculty member in charge of the student's program, and the hearing panel within 14 days of receiving the recommendation from the hearing panel. A copy of the letter will also be placed in the student record maintained by the SOE's Office of the Registrar.

Applicable Procedures

In connection with the resolution of alleged policy violations, the student accused of academic misconduct shall:

- be notified in writing by the Office of Student Affairs of the allegations in advance of any hearing;
- be notified in writing by the Office of Student Affairs of the charges, and the date, time and location of the hearing, and identities of the hearing panel members in advance of the hearing;
- have the opportunity to review in advance of any hearing any information to be considered by any faculty member, administrator or panel consistent with the Family Educational Rights and Privacy Act of 1974, as amended ("FERPA") and to protect other confidential information;
- be notified in writing by the Vice Dean of Academic Affairs (or designee) of the outcome of any hearing, namely the findings, determination of responsibility, and any sanctions; and
- be notified in writing of the outcome of any subsequent appeal to the Dean.

A student accused of academic misconduct may raise the potential conflict of any University personnel participating in the resolution process. The student may also decline to participate in the resolution process. The University may however continue the process without the student's participation.

Communications under this policy will primarily be conducted with students through their official University email address, and students are expected check their official University email on a regular basis.

Evidentiary Standard

A "preponderance of the evidence" standard will be used to determine responsibility for alleged violations of this policy. A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true.

Appeals to the Dean

A student may appeal the hearing panel's finding of responsibility and/or sanction(s). The student must file any appeal within seven working days of the date of the notice of outcome on one or more of the following grounds:

- procedural error that could have materially affected the determination of responsibility or sanction(s);
- new information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility or sanction(s); and
- excessiveness of the sanction(s).

Any appeal must be filed in writing with the SOE Dean (or designee). An appeal will involve a review of the file and as determined necessary, gathering of information from relevant university personnel or panelists; the appeal does not involve another hearing. On review of the appeal, the Dean (or designee) may:

- enter a revised determination of responsibility and/or revise sanction(s);
- remand the matter to the original hearing panel to reconsider the determination of responsibility and/or sanction(s); or
- establish a new hearing panel to consider the case.

The Dean (or designee) will deliver their final decision, with the reasons therefor, in writing to the student within 14 days of receiving the student appeal, simultaneously copying the instructor, the student's faculty adviser, faculty member in charge of the student's program, and hearing panel. A copy of the letter will also be placed in the student record maintained by the SOE's Office of the Registrar. The decision of the Dean (or designee) is final. No further appeals are permitted.

Sanctions

The following factors may be considered in the sanctioning process:

- the specific academic misconduct at issue;
- the respondent's academic misconduct history; and
- other appropriate factors.

This section lists some of the sanctions that may be imposed upon students for violations of this policy. SOE reserves the right, in its discretion, to impose more stringent or different sanctions and corrective measures depending on the facts and circumstances of a particular case. Sanctions and corrective measures for academic misconduct under policy are generally cumulative in nature.

Possible sanctions and corrective measures against students, include without limitation one or more of the following listed below.

Academic Sanctions
Examples of academic sanctions include but are not limited to the following: retaking of the examination, paper or exercise involved; score of zero on the examination, paper or exercise involved; lowering of the course grade; loss of any SOE scholarship for a specific duration or permanently; and failure in the course, including transcript notation of the sanction and/or academic misconduct violation.

Formal Warning
The student is notified in writing that their actions constitute a violation of this policy, and may be subject to other actions (e.g., re-taking an examination or failure in a course).

Probation
The student is notified that further violations of this policy within the stated period of time will result in the student being considered for immediate suspension or other appropriate disciplinary action. If at the end of the specified time period no further violations have occurred, the student is removed from probationary status.

Suspension
The student is notified that the student is separated from the University for a specified period of time. The student must leave campus and vacate campus residence halls, if applicable, within the time prescribed and is prohibited from University property and events. The conferring of an academic degree may be deferred for the duration of the suspension. A student must receive written permission from the University prior to re-enrollment or re-application. Academic work completed at another institution while on suspension will not be recognized for credit transfer.

Expulsion
Expulsion means the permanent removal of the student from the University. Expulsion includes a forfeiture of all rights and degrees not actually conferred at the time of the expulsion, permanent notation of the expulsion on the student's University records and academic transcript, withdrawal from all courses according to divisional policies, and the forfeiture of tuition and fees. Any student expelled from the University is prohibited from University property and events and future reapplication to the University.

Records
A case file concerning a student will be retained by the SOE's Office of the Registrar for seven years from date that the student graduates or otherwise leaves the university.

Policies Governing Student Conduct
All issues of non-academic student misconduct are subject to the University-wide Student Conduct Code (https://studentaffairs.jhu.edu/policies-guidelines/student-code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/)).

Academic Standards

Academic Standards
The requirements for the degrees and certificates offered through the School of Education are subject to change. The School does not guarantee continuation of any particular curriculum or program of study.

The University does not guarantee the award of a degree or certificate to students enrolled in any academic program. The award of degrees and certificates is conditional based on satisfaction of all current degree/certificate and instructional requirements at the time of such award, compliance with the University and School regulations, as well as performance meeting the expectations of faculty. Any breach of academic standards may result in disciplinary actions against the student(s) involved; please see the Academic and Student Conduct Policies section for an overview of grievance and due process procedures.

The School of Education reserves the right to dismiss at any time a student whose academic standing or general conduct is considered unsatisfactory.

Graduate Students
Good Academic Standing
To remain in good academic standing, School of Education graduate students (master's, certificate, and non-degree) must maintain at least a B average (3.0 on a 4.0 scale) throughout their enrollment. In addition, graduate students (master's and certificate) must achieve a minimum cumulative grade point average of 3.0 (on a 4.0 scale) to receive approval for graduation.

Unsatisfactory Academic Standing
A graduate (master's or certificate) student's academic standing is considered unsatisfactory if any of the following outcomes occur:

- The student earns a grade of F for a credit-bearing course. No grade of F in a credit-bearing course may be counted toward a degree or certificate program. [*Note: In the Urban Teachers collaboration program a student who earns an F grade <u>will</u> be automatically dismissed from the program. Please refer to the program handbook for more information.*]
- The student's cumulative grade point average falls below 3.0 (on a 4.0 point scale).
- The student fails to meet other academic expectations as defined by individual programs— for example, performing unsatisfactorily during an internship placement.

Note: No more than one credit-bearing course in which the grade of C+, C, or C- is earned may be counted toward the degree or certificate.

Academic Probation
In the event that any of the above outcomes occur, the following actions are taken:

- The student is placed on academic probation for a period of not less than one semester. While a student can appeal the award of a grade (see Grade Appeals policy), a student cannot appeal the decision to place them on academic probation.
- As part of the terms of academic probation, the student will be placed on a Candidate Improvement Plan that outlines the specific requirements/goals that the student must meet within a designated timeframe in order to be reinstated to good academic standing (e.g. regaining a cumulative grade point average of 3.0).
- Any courses taken during the probationary period must be approved by the student's faculty adviser. If the student originally received an F grade in a required course, the student must repeat the course in which the unsatisfactory grade was earned. (See policies on Failure - F Grades and Repeated Courses.) If the F grade was earned in a course that is not required, the student may take another course that meets with faculty adviser approval.

A student will be released from probation once they have met the following conditions (where applicable): the student has 1) met the all requirements/goals laid out in the Candidate Improvement Plan, 2) completed any required repeated or substitute (for elective) course(s) with a satisfactory grade, 3) regained a cumulative grade point average of 3.0 (on a 4.0 point scale), as required for good academic standing, and 4) met all other conditions of probation set by their faculty adviser or the program.

Academic Dismissal
Students will be automatically dismissed from their academic program in the event that any of the following occur:

- The student fails to meet the requirements/goals laid out in the Candidate Improvement Plan within the designated timeframe and any other conditions set for reinstatement to good academic standing while on academic probation.
- The student earns two or more F grades cumulatively over the course of their entire program of study.

Dismissal decisions based on academic performance are final and cannot be appealed. While a student cannot appeal the School's decision to dismiss them, a student may appeal the award of the original grade(s) that led to the dismissal (see Grade Appeals policy). **Students who have been dismissed for any reason are permanently barred from matriculating in another credit-bearing or non-credit course or program in the School of Education**.

Doctoral Students (EdD and PhD)

Good Academic Standing
To remain in good academic standing, School of Education doctoral students must maintain a 3.25 grade point average (on a 4.0 scale) throughout their enrollment. In addition, doctoral students must achieve a minimum cumulative grade point average of 3.25 (on a 4.0 scale) to receive approval for graduation.

Unsatisfactory Academic Standing
A doctoral student's academic standing is considered unsatisfactory if any of the following outcomes occur:

- The student earns a grade of F for a course. No grade of F may be counted towards a doctoral degree program, and a student may be dismissed from the program.
- The student earns a grade of C+ or lower in any course. No grade of C+ or lower may be counted toward a doctoral degree program. Students receiving a C+ or lower will be required to retake the course (if it is a required course) or take an alternate course (if it was an elective course).
- The student's cumulative grade point average falls below 3.25 (on a 4.0 point scale).
- The student fails to make adequate progress towards the doctoral dissertation. The doctoral committee will consider progress based on expectations set by the program, discussions with the adviser, and input from the student.
- The student fails to meet other academic expectations as defined by individual programs.

Academic Probation
In the event that any of the above outcomes occur, the following actions are taken:

- The student is placed on academic probation for a time period equivalent to 12 credit hours. While a student can appeal the award of a grade (see Grade Appeals policy), a student cannot appeal the decision to place them on academic probation.
- As part of the terms of academic probation, the student will be placed on a Candidate Improvement Plan that outlines the specific requirements/goals (in addition to regaining a cumulative grade point average of 3.25) that the student must meet within a designated timeframe in order to be reinstated to good academic standing.
- Any courses taken during the probationary period must be approved by the student's faculty adviser. If the student received an unsatisfactory grade in a required course, the student must repeat the course in which the unsatisfactory grade was earned. (See policies on Failure (F Grades) and Repeated Courses.) If the unsatisfactory grade was earned in a course that is not required, the student may take another course that meets with faculty adviser approval.

A student will be released from probation once they have met the following conditions (where applicable): the student has 1) met the all requirements/goals laid out in the Candidate Improvement Plan, 2) regained a cumulative grade point average of 3.25 (on a 4.0 point scale), as required for good academic standing, and 3) met all other conditions of probation set by their faculty adviser or the program director.

Academic Dismissal
Students will be automatically dismissed from their academic program, irrespective of their cumulative grade point average at the time, in the event that any of the following occur:

- Fails to meet the requirements/goals laid out in the Candidate Improvement Plan and any other conditions set for reinstatement to good academic standing within 12 credit hours of being placed on academic probation.
- Earns a subsequent grade of C+ or below while on academic probation or having subsequently been reinstated to good standing following academic probation.
- Earns two or more F grades in the same semester or cumulatively over the course of their entire program of study.

- Earns two or more C grades (C+, C, or C-) in the same semester or cumulatively over the course of their entire program of study.
- Earns an F grade and one C grade (C+, C, or C-) in the same semester or cumulatively over the course of their entire program of study.
- Fails to successfully pass comprehensive exams after two attempts.

While a student cannot appeal the School's decision to dismiss them, a student may appeal the award of the original grade(s) (see Grade Appeals policy). Students who have been dismissed for any reason are permanently barred from matriculating in another credit-bearing or non-credit course or program in the School of Education.

Grading System and Academic Records

Grading System and Academic Records

General Grading Policy

The grading scale used for official grades for all School of Education students—graduate, and non-degree—is listed in the table below. Please note the grade of A+ is not assigned at any level.

Each instructor assigns grades according to their own system, which should be explained in the course syllabus. All students must possess acceptable written command of the English language; instructors will consider writing quality when assigning grades, and make referrals for those needing improvement in writing skills.

Grading Scale

Grades / Quality Points

A	4.0
A–	3.7
B+	3.3
B	3.0
B–	2.7
C+	2.3
C	2.0
C–	1.7
F	0.0
I	Incomplete
P	Pass
NP	No Pass (for non-credit courses only)
MR	No grade reported as yet by the instructor, not a failing grade
W	Official withdrawal (not assigned by instructor)
X	Grade not yet submitted by instructor

No notation on an official report may be changed except to correct an error or to replace an "I" (incomplete) grade.

School of Education records are sealed thirty (30) days after the conferral of a degree. After this date, no changes will be made to a student's academic record.

Note: Some programs may have additional grading requirements. For further details, please refer to the individual program descriptions in this catalogue.

Alternative Grading Scale

Some courses may choose to employ a Pass (P)/Fail (F) grading system rather than a letter-based grading scale (as outlined in the above table). In such cases, the award of a Pass (P) grade is equivalent to the award of a "B" grade or above, while the award of a Fail (F), and the consequences thereof, equate to the award of an "F" grade in the letter-based grading scale. The use of the Pass (P)/Fail (F) grading system for courses should be clearly stated in the course syllabus.

NOTE: **Beginning March 2020, Johns Hopkins University was affected by the global COVID-19 pandemic. Grading policies (from the Spring 2020 semester through to the Summer 2021 semester) were modified so that students were allowed to switch any of their courses from a letter grading method to Pass/Fail. During that time, the award of a Pass (P) grade was equivalent to the award of a **"B-" grade or above**.

Note: Pass (P) grades are not considered in the determination of a student's Grade Point Average (GPA). However, for credit-bearing courses, Fail (F) grades awarded on the basis of Pass (P)/Fail (F) grading system will count toward a student's GPA.

Grade Point Average

How to calculate grade point average (GPA):

1. Multiply the number of credits for each course by the quality points (noted on Grading Scale) associated with the grades received in each course.
2. Add quality points.
3. Add credits.
4. Divide quality points by the number of credits.

Failure (F) Grade

An "F" (failure) grade indicates the student's failure to complete satisfactorily the work of the course. No grade of "F" may be counted toward a graduate degree or certificate. If the course in which the "F" is received is not required for graduation, it need not be repeated. However, if the course is required, it must be repeated. If the required course involves laboratory work, both the lecture and laboratory work must be repeated, unless the instructor grants permission for a student to retake only one of these course components when repeating the required course. In all cases in which an "F" grade was received, the failing grade will remain on the transcript and will be calculated into the grade point average, unless the course is repeated. (Per the School of Education's Repeated Courses policy, when a course is repeated, both the original F and repeated course grades appear on the academic record; however, only the repeated course grade is used in calculating the grade point average.)

Withdrawal (W) Grade

The "W" (withdrawal) grade signifies an official withdrawal from a course approved by the Office of the Registrar. It is not assigned by the instructor. Students who wish to withdraw from a course must submit the facsimile Add/Drop Form (downloadable from the School of Education's website at http://education.jhu.edu/student-resources/office-of-the-registrar/forms-and-petitions/ (https://education.jhu.edu/student-resources/office-of-the-registrar/forms-and-petitions/)) in person, by fax at 410-516-9817, or by mail to the Johns Hopkins School of Education, Office of the Registrar, 2800 N. Charles St., Baltimore, MD 21218.

Incomplete (I) Grade

An "I" (incomplete) grade is used when the instructor is not prepared to give a final grade for the course because of some justifiable delay in the student's completion of specific coursework. A final grade is submitted to the Office of the Registrar by the instructor (using the Grade Change Form) after the student's completed work has been graded, provided the work was done within the agreed timeframe, as set by the instructor. In the event that the work is not completed within the agreed timeframe, and no grade is reported by the final day of classes of the subsequent semester (summer, fall, or spring), a grade of "F" automatically replaces the "I" on the student's academic transcript. The Academic Year Calendar details the last date each semester by which any "I" grades recorded in SIS are automatically replaced by "F" grades.

Repeated Courses

Graduate Students

A graduate (master's or certificate) student may voluntarily repeat one course while enrolled in a program; and it can only be a course in which a grade of B- or below was received. The course may be repeated only once.

Note: Students who are placed on academic probation may be required to repeat one or more courses as part of their Candidate Improvement Plan—see policy on Unsatisfactory Academic Standing below. Courses that students are required to repeat as part of their academic probation do not count as "voluntarily" repeated courses.

When a course is repeated, both the original and repeated course grades appear on the academic record; however, only the repeated course grade is used in calculating the grade point average. Course credit may be applied toward degree requirements only once, even if a course is repeated. The repeated course is indicated with an "R" on the academic record. Graduate students should be aware of the following when repeating courses:

- Only one course with a grade of C+, C, or C- will count toward a graduate (non-doctoral) degree program. Graduate students do not receive credit toward their degree or certificate for courses in which subsequent C+, C, or C- grades are earned.
- The number of F grades used to determine academic disciplinary actions includes repeated course grades (see policy on Unsatisfactory Academic Standing).
- Graduate (master's or certificate) students must achieve a minimum cumulative grade point average of 3.0 (on a 4.0 scale) to receive approval for graduation.
- Some programs, particularly at the master's level, may have additional grade requirements for repeated courses—for example, stricter requirements for internship courses. Students should refer to the program page in the Academic Catalogue or the program handbook (where applicable) for more information on program-specific course or grading policies.

Please note that a student may be eligible to receive federal financial aid (Title IV funds) if it is the first time that they are repeating the course.

Grade Appeals

Grades are awarded for an individual student's academic work during each semester based on that individual's mastery of the course content. Grades are determined by faculty through the exercise of their considered academic judgment, and the School of Education's administration will not override an instructor's considered academic judgment when it comes to grade award decisions. Mere disagreement or dissatisfaction with an instructor's evaluation of a student's academic work is not sufficient basis for a grade appeal. Nor may a student appeal an instructor's decision not to grade an assignment that was submitted past the specified submission deadline or if the work was submitted after the instructor has inputted the final course grade in SIS. Students who wish to appeal a grade must follow the steps in the order outlined below.

At each review level, consideration of a grade appeal is limited to an evaluation of whether or not the grade awarded was determined in accordance with the policies/standards outlined in the course syllabus. A course instructor's failure to follow the policies/standards outlined in the course syllabus—for example, a grade calculation error—may be considered evidence that the final course grade was not so determined.

A student who disagrees with the award of a grade on a particular assignment or with the final course grade must discuss the matter with the course instructor as the first step of the appeals process. If the matter remains unresolved following this initial discussion with the course instructor, the student is encouraged to ask their faculty adviser to assist as a mediator to resolve the dispute.

Note: In the event that the course instructor is also the student's faculty adviser, an alternative mediator, such as the program lead, should be identified.

Where final course grades are concerned, if the matter still cannot be resolved, the student may appeal the course instructor's decision to the Vice Dean for Academic Affairs (or designee).

Only final course grades may be appealed to the Vice Dean's level—students may not appeal grades for individual assignments to the Vice Dean's level.

Any appeal to the Vice Dean must be submitted in writing within thirty (30) calendar days after the final course grade has been posted in SIS using SOE's Course Grade Appeal Form (downloadable from the School of Education's website at http://education.jhu.edu/student-resources/office-of-the-registrar/forms-and-petitions/). When submitting an appeal, the student must provide a thorough rationale for the basis of the appeal, detail the steps that have been taken thus far to resolve the issue, and include supporting materials as evidence. The following materials should be included (where applicable) along with the appeal form: copy of the course syllabus; disputed assignment(s) in question; and correspondence between the student, the instructor, and adviser.

The grade appeal form and supporting materials can be mailed with a postmark no later than thirty (30) calendar days after the final course grade has been posted in SIS to the Johns Hopkins School of Education, Office of Student Affairs, 2800 N. Charles St. Baltimore, MD 21218 or emailed to soe.studentaffairs@jhu.edu (soe.students@jhu.edu).

The Office of Student Affairs (OSA) will review the documents to determine whether the appeal falls within the parameters established above and that it includes appropriate supporting materials. The OSA may contact the student, instructor, or adviser for additional materials or clarifications.

If the OSA is not satisfied that the appropriate conditions have been met, it will send a letter informing the student of this finding and will notify the Vice Dean of Academic Affairs of this action. A decision by the OSA to reject an appeal on this basis may not be appealed.

If the OSA is satisfied that the appropriate conditions have been met, it shall forward the grade appeal form and supporting materials to the Vice Dean of Academic Affairs (or designee), who will appoint a faculty hearing committee to review the case. The hearing committee must consist of at least three faculty members drawn from the Student Affairs Committee, plus a representative from the OSA. Following review of the body of evidence, the committee will render a decision within thirty (30) days of receiving the appeal. The OSA will submit a written letter outlining the hearing committee's decision to the Vice Dean of Academic Affairs (or designee).

The Vice Dean of Academic Affairs (or designee) will deliver the hearing committee's judgement in writing to the student, the instructor, faculty adviser, and the program lead within seven (7) days of receiving the hearing committee's decision. A copy of the letter will be placed in the student record maintained by the Office of the Registrar.

A student may, as a final action, appeal the hearing committee's decision in writing to the Dean of the School of Education within seven (7) days of receiving the decision. In such cases, the Dean (or their designee) will determine if the case warrants further consideration. Review of grade appeals at the Dean's level will focus solely on procedural considerations, assuring that internal appeal processes have been followed in accordance with stated policies. At the discretion of the Dean (or designee), a new hearing committee may be appointed to review the case and make a recommendation to the Dean (or designee). Any decision rendered by the Dean (or designee) is final and cannot be appealed further.

For appeals that reach Dean's level review stage, the School of Education shall notify the student in writing that the student's grade appeal has been received. Notification of the final decision by the Dean (or designee) concerning a final course grade appeal will be communicated to the instructor, the student's faculty adviser, and program lead, and placed in the student record maintained by the Office of the Registrar.

Note: School of Education records are sealed thirty (30) days after the conferral of a degree. After this date, no changes will be made to a student's academic record.

Grade Reports, Transcripts, and Academic Record Requests

Grade Reports

Currently enrolled students can access their semester grades and review and update their address information via the SIS Self-Service website.

Transcripts

Students who wish to obtain transcripts of their School of Education academic records should access the School of Education's website (https://education.jhu.edu/student-resources/office-of-the-registrar/transcripts-and-records/) for information on how to order transcripts online, by mail, or in person. Students who wish to obtain transcripts from previously attended colleges and universities should contact those institutions directly.

Photocopies of transcripts received by the School of Education from other domestic educational institutions will not be made available to a student. These documents are submitted specifically for consideration of admission and cannot be made available for any other use. Requests for photocopies of transcripts from international educational institutions, however, will be considered due to the difficulty of obtaining those documents directly.

Note: Transcripts are not issued for a student with an outstanding financial obligation to the University, nor will they be released without a student's signed authorization.

Academic Records Requests

Requests to inspect and/or receive copies of documents (other than transcripts from previous institutions and confidential letters of recommendation) maintained in the academic record of a student may be submitted under the provisions of the Family Educational Rights and Privacy Act of 1974 (FERPA (https://www.jhu.edu/assets/uploads/2017/01/ferpa.pdf)), as amended.

Requests must be submitted in writing with an original signature to the Johns Hopkins School of Education, Office of the Registrar, 2800 N.Charles St., Baltimore, MD 21218. Faxed requests will not be honored. For further information or questions, students should contact the Office of the Registrar at 410-516-9816.

Verification Requests

- Current students may print an enrollment verification certificate through SIS (https://sis.jhu.edu/sswf/) or submit a (https://education.jhu.edu/wp-content/uploads/2017/06/REQUEST-FOR-VERIFICATION-SERVICES818.pdf)Request for Verification Services Form (https://education.jhu.edu/student-resources/office-of-the-registrar/forms-and-petitions/).
- Alumni may request an enrollment or degree verification letter by submitting a Request for Verification Services Form .
- Third-party companies may request enrollment or degree verifications through the National Student Clearinghouse. (http://www.studentclearinghouse.org/)

For more information or assistance, contact the Office of the Registrar at 410-516-9816.

Loan Deferment Requests

Loan deferment is certification of enrollment and is processed by the Office of the Registrar. The School of Education participates in the National Student Clearinghouse, which is an industry- sponsored consortium that was created to simplify the enrollment verification and deferment processes for schools. The Clearinghouse is responsible for providing status and deferment information, on behalf of the school, to guaranty agencies, lenders, servicers, and the Department of Education's National Student Loan Data System (NSLDS).

During the second week of each month, the School electronically transmits a report of students' enrollment status to the Clearinghouse, which, in turn, will supply verification of enrollment to lending agencies. Deferment forms submitted to the Office of the Registrar will be forwarded to the Clearinghouse for processing . Students may call the Clearinghouse at 703-742-4200 if it appears a lender has not accessed the correct information.

Note: Half-time status for graduate students equates to a minimum of 4.5 credits per semester.

Family Educational Rights and Privacy Act

The University maintains its academic records in accordance with the provisions of the Family Educational Rights and Privacy Act of 1974 (commonly known as FERPA), as amended. Please see the University Policy on Family Educational Rights and Privacy (https://registrar.jhu.edu/student-privacy-ferpa/university-policy-on-family-educational-rights-and-privacy/) for more information.

Retention of Records

The academic record includes all documents related to an individual student such as application for admission, letters of recommendation, etc., as well as the record of academic performance commonly referred to as the transcript.

Retention of student records is dependent on an individual's student status within the School of Education.

- Records for individuals who are denied admission are retained for a period of two years.
- Records for students who are admitted to a program but do not register for courses are retained for a period of two years.
- Records for students who are admitted to a program, enroll, but do not complete the program and do not graduate are retained for five years after the last term of enrollment
- Records for students who are admitted to a program and graduate from that program are retained for five years from the date of graduation.

Transcript records are archived permanently in the Office of the Registrar. Documentation pertaining to registration is held only for a period of five years. If any questions should arise regarding documentation of enrollment in a course beyond that five-year period, it will be the student's responsibility to produce proper documentation to support any claim for a change to their record. **However, School of Education records are sealed thirty (30) days after the conferral of a degree. After this date, no changes will be made to a student's academic record.**

Grievances and Complaints

Introduction

When at all possible, complaints and disputes should be resolved through informal discussion by the parties involved or office against whom the student has a complaint or dispute.

The following points provide clarification as to what may not be considered under this grievance procedure.

- **Discrimination and Harassment**. Complaints alleging discrimination or harassment on the basis of race, color, gender, sex, religion, age, sexual orientation, pregnancy, national origin, ethnicity, disability, marital status, or veteran status should be referred to the University's Office of Institutional Equity (http://oie.jhu.edu/discrimination-and-harassment/) (OIE).
- **Disability**. OIE is responsible for the investigation and resolution of disability-related discrimination complaints received from faculty, staff, and students at Johns Hopkins University. For more information about filing an ADA or disability-related grievance, visit the OIE website (http://oie.jhu.edu/ada-compliance/).
- **Sexual Misconduct**. Complaints alleging sexual harassment, sexual assault, or other sexual misconduct will be investigated by OIE (http://oie.jhu.edu/sexual-misconduct/).
- **Grade Disputes**. Disputes involving grades are handled following the processes laid out in the School of Education's grade appeals policy (https://education.jhu.edu/academics/academic-policies/grading-system-academic-records/grade-appeals/).
- **Student Academic Conduct**. Disputes involving academic conduct are handled pursuant to the School of Education's academic misconduct policy (https://education.jhu.edu/academic-policies/academic-student-conduct-policies/).
- **Student Non-Academic Conduct**. Disputes involving student conduct of a non-academic nature are governed by the University's student conduct code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/).

Filing a Formal Grievance

If the type of grievance is not covered by a specific policy above, students may submit a formal grievance (https://policies.jhu.edu/?event=render&mid=764&pid=32463&fid=policy_32463.pdf&_=0.713895637856) to the University

Admission

General Admission Policy

Johns Hopkins University is committed to equal opportunity for its faculty, staff, and students. To that end, the University does not discriminate on the basis of sex, gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, gender identity or expression, veteran status, or other legally protected characteristic. The University is committed to providing qualified individuals access to all academic and employment programs, benefits and activities based on demonstrated ability, performance, and merit without regard to personal factors that are irrelevant to the program involved.

Admission decisions are based on a holistic evaluation of the quality of the applicant's prior academic degrees and record, the essay/statement of purpose, letters of recommendation from professors or others familiar with the applicant's academic work, where required -performance in aptitude and achievement tests, relevant work experience, preparation in the proposed field of study, the appropriateness of the applicant's goals to the graduate program, and for some programs the compatibility of the applicant's research interests with those of the program faculty and the School.

Students must apply online to be admitted to a School of Education degree or certificate program. At a minimum, the application requirements will include:

- A completed online application form and payment of the $80 application fee (unless otherwise waived).
- An essay/statement of purpose (instructions and length will vary by program).
- A CV or résumé.
- Signed letters of recommendation (number determined by individual program).
- Official transcripts from all post-secondary institutions attended.

Official Transcripts

Official transcript(s) from prior undergraduate and graduate (if applicable) institutions are required.

- An official transcript is defined as a transcript received directly from the issuing institution (whether on paper and still in the envelope or a certified electronic copy) that is appropriately signed/authenticated.
- Official transcripts from all post-secondary institutions are required, not only from the institutions that conferred the degree(s). Transcripts must reflect all coursework taken from every post-secondary institution attended, even if you transferred, withdrew, did not graduate, or the coursework appears on other transcripts.

- College seniors in their final academic year should submit current official transcripts from all previous colleges or universities attended directly after completing the online application, followed by a final official transcript showing the award of the baccalaureate degree before the first semester or term enrolled at the School of Education.

Admissions Policy

To qualify for admissions, applicants must meet the below-listed criteria.

- For Master's and graduate certificate programs, applicants for admission must present official transcript evidence of receipt of a four-year baccalaureate degree (or equivalent) from a regionally-accredited institution of higher education.
- For doctoral programs, applicants must present official transcript evidence of receipt of a four-year bachelor's degree (or its equivalent) and a master's degree of appropriate length from a regionally-accredited higher education institution.
- SOE's admissions policy stipulates that a bachelor's degree or higher-level degree must be from an institution of good standing and comparable to a degree from Johns Hopkins University, both in the distribution of academic subject matter and in scholarship achievement.

JHU SOE has the authority to determine whether another institution is of comparable or acceptable standing; in general, national regional accreditation for U.S. institutions and authorization by a national higher education authority for international institutions is considered acceptable.

- For both undergraduate and graduate degrees, the applicant must have earned a minimum cumulative grade point average (GPA) of 3.0 (on a 4.0 scale) in all previous undergraduate and graduate studies (including for incomplete programs of study and programs still in progress).

Note: In exceptional circumstances, the School of Education may consider admitting an applicant whose GPA falls below a 3.0 GPA. Applicants with a sub-3.0 GPA must demonstrate other qualities that suggest they can succeed in a given academic program.

Official records of undergraduate and, where applicable, graduate transcripts must be mailed or delivered through the issuing institution's electronic transcript delivery service to the Office of Admissions. At the same time, other application materials—the essay, CV/ résumé, and signed letters of recommendation—can be uploaded electronically into the online application.

Mailing address:
Johns Hopkins School of Education Office of Admissions
2800 N. Charles Street
Baltimore, MD 21218

Electronic Delivery from issuing institutions & testing providers:
Email soe.admissions@jhu.edu

The Office of Admissions will not accept documentation such as grade reports, student advising reports, screenshots of student accounts, or any other document not released by the Registrar as a substitute for an official, authenticated transcript.

Academic records (transcripts, diplomas, and degree certificates) from non-U.S. institutions must be evaluated by an authorized credential evaluation agency and sent to the Office of Admissions in place of transcripts. A course-by-course evaluation is required for all post-secondary credentials (undergraduate and graduate, if applicable) for academic coursework completed outside the United States and Canada (see International Student Admission Policy).

Note: This does not pertain to students from the United States and Canada spending a semester or year abroad, often referred to as "study abroad."

Supplemental Materials

Applicants should consult the Admissions section of the SOE website and individual program webpages to determine specific admission Criteria, suitability of prior qualifications, or certification requirements for individual programs. Examples of supplemental materials include:

- Third letter of recommendation: A third letter of recommendation can also be included in the recommendation section of the online application.
- Academic writing sample: This should also be uploaded with the online application if required.
- Standardized tests: If required, all test scores must be official scores sent directly from the test administrator to the Office of Admissions and must be received by the stated applicant deadlines.

Official Score Reports and Time Limitations of Standardized Tests

Applicants for admission must have the respective testing agency - Educational Testing Service or the International English Language Testing System (IELTS) - provides the Office of Admissions with official score reports being considered for admission. Candidates are responsible for verifying the identification of the correct JHU School upon selecting the electronic delivery of the official examination score report.

Graduate Record Examinations must have been taken within five years of the start of the desired admission term, and the English language proficiency exam - Test of English as a Foreign Language (TOEFL) or the IELTS proficiency exam - must have been taken within two years of the start of the desired admission term to be considered valid scores for admission consideration.

For the GRE, TOEFL, or other tests administered by Educational Testing Services (ETS), the assigned institution code for the School of Education is as follows:

- GRE Institution code 5470
- TOEFL Institution code 8585

The School of Education's other testing provider institution codes include:

- CLEP Institution Code 3928
- Praxis Institution Code 5332
- SAT Institution Code 3926
- ACT Institution Code 8804

Falsification & Accuracy of Application Materials

The School of Education reserves the right to rescind any offer of admission if any discrepancies are found between uploaded and official academic records and test scores or if altered or forged documents are submitted. All official transcripts from previous institutions (whether a degree has been earned or not) are required to be listed on the online application form and submitted in an official format to the Office of Admissions. Additionally, if any essay, personal statement, or supplemental materials contain plagiarized information, the School of Education will rescind any admission offer. If this information is discovered after enrollment at the institution, disciplinary action may be taken up to and including dismissal from the School.

Admissions Records Maintenance and Disposal

All admissions documents, including academic records sent from other institutions and graduate admission exams, become the property of the Office of Admissions and part of the applicant's official university file. These documents will not be returned to the applicant. Admission credentials are retained for only one year. They are subsequently destroyed if applicants do not register for courses within the period for which the offer of admission is valid, have been denied admission, do not respond to requests for additional information, or fail to submit complete applications.

Admissions Deadlines

Only complete applications will be eligible for review. An application is considered complete when all required application materials are received by the Office of Admissions on or before the designated, posted deadline.

It is the applicant's responsibility to ensure that all materials are in the Office of Admission by the appropriate deadline.

The Office of Admissions reserves the right to deny any application that arrives after the deadline. Should any deadline fall on a weekend or official holiday, the in-office deadline will be the next business day.

Applicants should consult the Admissions, Deadlines & Requirements section of the website to determine specific deadlines for applying. Where listed rolling admission means that completed applications are reviewed until approximately three weeks before the program's start date. Applications will be accepted until programs reach capacity. If a program reaches full capacity, a notice will be posted on the admissions and individual program pages. Applicants applying for federal financial aid or scholarship consideration are recommended to submit a completed application by April.

Admissions Review Process & Timeframe for Notification of Decision

The Office of Admissions receives and processes all applications for admission to School of Education programs and works closely with applicants and the programs areas to verify the status of an application. Each program determines its process for reviewing completed applications. The length of the application review process and timeframe for receiving an admission decision varies from program to program.

Some programs review and make recommendations on a rolling basis; others meet regularly to review applications and make decisions based on a set schedule. Because there is no one standard process programs use to review applications and establish timeframes, the Office of Admissions cannot provide a specific timeframe between submission and receipt of decision for applicants.

Determination of Admissibility

Admission to the School of Education is determined at the individual academic program level. Admission decisions are made after a full review of the materials in the completed application. Programs consider grade point average and, for some programs, standardized test scores. The application review process also considers individual learners' professional experience and other distinctive characteristics.

Qualified applicants may also be contacted to schedule a personal or group admission interview. Students who are found to have provided fraudulent or incomplete information during the admission process may be disqualified or have any offer of admission rescinded.

Admission Decision Notification & Responding to Offers of Admission

Admitted applicants can expect to receive a notification of their decision by email. Applicants will be required to accept or decline the offer of admission using the School of Education's online application portal. The School of Education offers admission with the expectation that students will enroll in courses in the semester for which they are admitted, unless a deferral is granted (see below).

Admissions Deferral Requests

Requests for deferred admission will be considered by a program only after an admission offer has been made and accepted and an enrollment deposit paid (if required by the program). If a deferral is granted, the applicant may not apply to any other School of Education program. A student who requests and is approved to defer admission is considered under an obligation to enroll and attend the academic program the following year. Admitted students may request to defer admission into a program for up to two semesters or one year from their admission semester.

The following SOE programs do not offer admission deferral:

- Doctor of Education Online (EdD)
- Doctor of Philosophy in Education (PhD)
- MS Education Policy
- MS Educational Studies/TFA-TNTP
- MS Educational Studies/Urban Teachers
- MS Education/ International Teaching and Global Leadership cohort
- Graduate Special Students/Non-Degree Seeking

To request a deferral of admission, complete the Deferral Request Form located on the SOE Admissions website. Admitted students cannot defer admission once they have registered for a course in the School of Education. Financial aid and tuition support (e.g., awards) are not automatically deferred. Please contact the Financial Aid Office before requesting a deferral.

Note: Newly admitted students who have registered (matriculated) for a course and intend to withdraw from courses (s) in their first semester should contact the Office of the Registrar - see also Withdrawing from a Course.

Note: Veterans applying for readmission following inactivation/deactivation of a previous admission decision cannot be denied entrance for reasons relating to their service.

Health Insurance for School of Education Students

The School of Education offers full- and part-time certificate and degree-seeking students health, dental, and vision insurance coverage. It is university policy that all full-time students maintain adequate health insurance coverage to protect against unexpected accidents and illnesses. All students enrolled in full-time programs and currently without health insurance coverage should enroll in the Johns Hopkins University Student Health Benefit plan. (*Note: Full-time students with pre-existing health insurance coverage can choose not to enroll in the university plan.*)

International Students with an F-1 or J-1 visa status must purchase the university plan and are enrolled automatically.

The university plan is administered by Wellfleet (https://wellfleetstudent.com/), which has contracted with Cigna's network of providers. The annual coverage period is August 15, 2022, to August 14, 2023. Please note that this is a yearly plan with only one enrollment period.

Students can enroll in the plan via the SIS Self-Service website (look for the "Personal Info" tab and then select "Health Insurance"). Coverage will automatically renew for the spring once a student enrolls in spring semester courses. Students are billed for the premium on their SIS student account and are subject to the payment guidelines of the Office of Student Accounts unless other payment arrangements have been made. Coverage for eligible dependents is available at an additional cost.

Plan Details

For more detailed information about the Johns Hopkins University Student Health Benefit plan, please visit the JHU Student Health benefit site (https://education.jhu.edu/student-resources/office-of-the-registrar/tuition-costs-and-benefits-information/health-insurance-information/) or on the JHU benefits site (https://benefits.jhu.edu/health-and-life/student_health/overview.cfm).

To locate the nearest hospital or health care provider part of the Cigna PPO Network, visit the Cigna website at http://www.cigna.com/ or contact Wellfleet (https://wellfleetstudent.com/) at (877) 657-5044.

For information regarding the vision plan, visit the human resources website (https://hr.jhu.edu/benefits-worklife/health-life/student-health-benefits/eyemed-vision-plan/); for information regarding the new dental plan, visit Delta Dental on the website (https://hr.jhu.edu/benefits-worklife/health-life/student-health-benefits/delta-dental-plan/). Additional resources and cost of coverage information can be found on the JHU benefits website (https://hr.jhu.edu/benefits-worklife/health-life/student-health-benefits/resources-and-cost-of-coverage/) or by contacting JHUStudentBenefits@jhu.edu (JHUStudentBenefits@jhu.edu).

It is the student's responsibility to be an informed consumer, know how the plan works, benefits, providers, payment responsibility, etc. Please note that Wellfleet is the insurer, while Cigna is the provider. All plan questions should be directed to Wellfleet, not Cigna. For more detailed information about the insurance plan or if your academic program does not begin in the fall, visit Wellfleet at https://wellfleetstudent.com/ or call (877) 657-5044 directly. You may also seek support using SEAM's online form. (https://support.sis.jhu.edu/case/)

ID Cards

A copy of your Insurance ID card will be available to print through SIS at the start of the plan period.

If Your Current Non-JHU Insurance Coverage Is Ending

Currently enrolled students whose existing non-JHU health insurance coverage is ending can enroll in the Johns Hopkins University Student Health Benefit plan due to a qualifying life event before the published enrollment date by submitting a copy of the termination letter from their current insurance carrier to soe.registration@jhu.edu. New coverage is available beginning the 15th of each month and continues until the next regular enrollment date.

International Student Admission Policy

Demonstration of English Language Proficiency

Non-U.S. citizens from countries where English is not the official language are required to submit one of the following standardized tests as part of the admissions application process. A waiver for the English language proficiency requirement may be granted for some applicants who meet specific criteria. Please reference the Waiver section below for more information.

Accepted English Language Proficiency Tests

- TOEFL Internet-Based Test
- IELTS Academic or the IELTS Academic indicator Online Test
- JHU J-Test Online

For more information on English Language Proficiency Testing, please visit the International Student Admissions section of the SOE website.

English Language Testing Waiver Request Form

The English language proficiency requirement may be waived if the applicant meets at least one of these criteria:

- Is a citizen or permanent resident of the United States or a citizen of the United Kingdom, Ireland, Australia, New Zealand, or Canada (except Quebec).

Applicants who are citizens of India, Pakistan, the Philippines, Hong Kong, Singapore, etc., are not exempt from the requirement.

- At the time you enroll at Johns Hopkins School of Education, you will have studied in full-time status for at least two academic years in the United States, the United Kingdom, Ireland, Australia, or New Zealand, or with English language instruction in Canada or South Africa. Even if English was the language of instruction at your school, you are not exempt from the requirement if you did not study in one of these countries.

If you qualify for a waiver, you can locate the waiver form in the online application. You will be required to upload a short paragraph explaining the criteria met; you must also submit a transcript that shows you attended college in one of the approved locations and that your academic program was at least two years in length.

International Credential Evaluation

International applicants must hold, or be in the process of obtaining, the equivalent of a 120 credit U.S. baccalaureate degree (four years) from the equivalent of a regionally-accredited institution to be eligible for admission to Johns Hopkins School of Education masters or graduate certificate programs. The determination of degree equivalency to U.S. degrees is at the discretion of the Johns Hopkins School of Education.

Applicants who hold qualifying degrees or have earned credits from institutions outside the United States or English-speaking Canada must have their academic records evaluated by an accredited independent credential evaluation agency before being considered for admission to a degree program.

It is the applicant's responsibility to provide the necessary paperwork and payment to an approved evaluation service and request that an official copy of the report be sent to Johns Hopkins School of Education Office of

Admission directly from the evaluation agency. When selecting the type of evaluation, please select the course by course evaluation option.

Approved International Credential Evaluation Agencies

For international or internationally-educated applicants seeking to obtain a credential evaluation for academic transcripts and degrees, the Johns Hopkins School of Education approves the use of any National Association of Credential Evaluation Services (NACES) approved service. The course by course evaluation allows the School of Education faculty committee reviewers to properly understand your academic success and original transcripts confirm the authenticity of the applicant's degree.

Below is a shortlist of NACES approved agencies. For a complete listing of approved agencies, please visit the NACES website. Note: Applicants are not required to send additional, separate authentic institutional transcripts to the School of Education in addition to those required to be sent to the credential service.

World Education Services (https://www.wes.org/) (WES)

Educational Credential Evaluators (https://www.ece.org/) (ECE)

Educational Perspectives (https://www.edperspective.org/)

Foundation for International Services (https://www.fis-web.com/)

SpanTran (https://spantran.com/web/contact/)

Degrees from Canada

Degrees or credits earned at a Canadian higher education institution do not require international course-by-course evaluation if (1) the transcript is in English and (2) the institution is a member of Universities Canada (formerly the Association of Universities and Colleges of Canada (AUCC) or other accrediting body recognized by the United States Department of Education. If you received a degree from a college or university in English-speaking Canada, please have your institution submit transcripts directly to the Johns Hopkins School of Education Office of Admission.

Evaluation reports may be sent electronically from the evaluation service to: soe.admissions@jhu.edu or by mail to the address below:

Johns Hopkins School of Education Office of Admissions
2800 N. Charles Street
Baltimore, MD 21218

Admissions Policy & Three Year Bachelor's Degrees

The Johns Hopkins University School of Education's admission policy requires that an applicant have a bachelor's degree from a regionally accredited college or university or equivalent as determined by a regional accrediting agency. These accrediting agencies define bachelor's degrees in the U.S. require four years to complete with 120-semester credits. Applicants who have completed accelerated degree programs in less than four years but have earned the equivalent of 120 U.S. semester credits may apply.

Prospective students who have earned a bachelor's degree three years in length and under the equivalent of 120 U.S. semester credits should consult with the Office of Admissions before starting or submitting an online application.

If the School of Education's Office of Admissions receives a transcript or course-by-course evaluation that indicates that an applicant's degree (in progress or completed) is not equivalent to a four-year U.S. bachelor's degree, an applicant will be notified and may have their application inactivated or withdrawn.

The Johns Hopkins School of Education does not currently offer undergraduate courses for applicants to enroll in a fourth year of undergraduate study or bridge program, nor can our Admissions representatives advise applicants with three-year degrees on pathways to completing additional course credits to meet this requirement. We recommend that prospective students in this situation speak to an academic advisor at their bachelor-degree granting institution to determine the best pathway to achieving this outcome.

Admissions Policy for International Students Requiring a Student (F-1) Visa

An international applicant requiring a student (F-1) visa to attend school must obtain full admission to a degree program well before the start of the semester. The School of Education does not issue certificates of eligibility (Form I-20) for:

1. program that is designated as part-time enrollment only
2. a fully online program, or
3. any certificate programs.

The application and other required admission documents must be received by the Office of Admissions on or before the posted application deadlines. If applications and other required documents are not received by the Office of Admissions on or before the deadline, the application will automatically be considered for the next available semester. F-1 students must prove that they can afford all tuition and expenses for the academic year to receive their I-20 documents.

Upon receipt of an acceptance package from the School of Education, the international student who needs to obtain a student (F-1) visa is required to contact the Office of International Services (OIS, https://ois.jhu.edu/) at 667-208-7001 or ois@jhu.edu to request a certificate of eligibility (Form I-20). The I-20 is not automatically sent with the acceptance package. Before an I-20 is issued, the international student is required to send financial documentation and a notarized affidavit of support to:

Johns Hopkins School of Education Office of Admissions
2800 N. Charles Street
Baltimore, MD 21218

To maintain F-1 visa status, students must adhere to the regulations set by the U.S. Citizenship and Immigration Services (USCIS). Failure to abide by any of the regulations could result in students being considered "out-of-status" by USCIS.

Upon arrival at Johns Hopkins, international students on an F-1 visa must visit the OIS and bring passports, I-94 cards, and I-20s. Before leaving the United States for any reason, the I-20 must be signed by an OIS staff member for the student to re-enter the country. It is imperative to schedule an appointment with the OIS four weeks before departure.

Students on an F-1 visa must pursue a full-time course of study in a residential program at the school listed on the currently valid Form I-20 during every academic session or semester, except during official school breaks. Full-time status/entire course of study is defined by the School of Education as being enrolled in minimally nine credits each fall and nine credits each spring semester for graduate study and as being enrolled in minimally 12 credits each fall and 12 credits each spring semester for undergraduate study.

Summer semester courses are not considered when calculating full-time F-1 visa status, although credit earned during summer semester courses may be applied toward a student's degree.

To comply with USCIS regulations, all F-1 students must register for the full course load at the beginning of each fall and each spring semester. Other regulations are outlined in the international student's letter and I-20 Form.

Assisting students with F-1 visas is central to the support for international students provided by OIS. The office can also help students who hold other nonimmigrant visas and direct them to the appropriate resources or government offices. If students are unclear about the type of visa they should obtain, they should visit the USCIS website at www.uscis.gov (http://www.uscis.gov/) (http://www.uscis.gov (http://www.uscis.gov/)) for additional information or contact OIS at 667-208-7001 or ois@jhu.edu with any questions.

All current international students on F-1 visas sponsored by the School of Education are automatically subscribed to the International Service listserv upon the first semester of enrollment. Regular updates are sent regarding visa-related matters and other items of interest to international students.

Note: Federal financial aid is not available for international students.

Note: For summer semester admissions, international applicants may be considered for full-time graduate degree programs only. Applications for part-time degree programs beginning in the summer will not be considered.

International Graduate Special Students (Non-Degree)

International applicants who hold visas other than an F-1 visa and wish to enroll as part-time Graduate Special Students (Non-Degree) should follow the application directions outlined under Graduate Special Students (Non-Degree). International graduate students attending other institutions on student (F-1) visas during the regular academic year are also welcome to enroll as Graduate Special Students (Non-Degree) during the summer.

Graduate Special Students (Non-Degree)

Post-baccalaureate students who wish to take graduate-level credit courses (.500-level and above) but are not interested in earning a degree or certificate may enroll as Graduate Special Students (Non-Degree). Potential Graduate Special Student (Non-Degree) applicants should review the Admissions website and speak to a representative from the Office of Admissions (1-877-548-7631) before applying.

Note: Certain degree program courses are not available for students enrolled as Graduate Special students. Applicants are encouraged to confirm their eligibility and availability of their desired courses before applying for Non-Degree status. The Doctor of Education and Doctor of Philosophy degree programs do not permit Graduate Special students to enroll in doctoral-level courses. Prospective Graduate Special student (Non-Degree) applicants should speak with the Office of Admissions (1-877-548-7631) before applying and review the information located on the Admissions website.

Restrictions for Graduate, Non-Degree Status Students

Students enrolled in the Graduate Special Student (Non-Degree Program status) are not eligible for Federal Financial Aid and do not qualify as matriculated or enrolled in an academic program for loan deferment/forbearance programs.

Students enrolled in the Graduate Special Student (Non-Degree Program status) are not eligible to use their Veteran's benefits.

Students enrolled in the Graduate Special Student (Non-Degree Program status) are not eligible to participate in the JHU Student Health Insurance Program.

Students that have been previously academically dismissed or dismissed for student conduct violations from any SOE program may not reapply under Graduate Special Student [Non-Degree Program status].

Grad Special student non-degree admission does not guarantee later admission as a degree student.

A candidate may not submit a degree and non-degree application for the same entry term.

Per federal regulations, international applicants seeking an immigrant study visa are not eligible for admission under the Graduate Special Student Program status.

Requirements

Graduate Special Students (Non-Degree) must meet all prerequisites for course registration and are subject to School of Education academic standards. Graduate Special Students (Non-Degree) must possess a four-year bachelor's or its equivalent and a graduate degree from an accredited college or university and have earned a minimum cumulative grade point average of at least 3.0 (on a 4.0 scale) in all previous undergraduate and graduate studies (including incomplete programs of study and for programs still in progress). Applicants wishing to register for courses above the .500-level must receive approval from the academic area of emphasis to which the course belongs. Some courses are restricted to degree-seeking students only. Graduate Special Student (Non-Degree) applicants must submit:

- An application online
- A $25 application fee
- Official transcripts from all accredited post-secondary institutions attended.

Graduate Special Student (Non-Degree) applicants will receive an admission decision via email.

Graduate Special Students (Non-Degree) Seeking to Apply to a Full Degree/Certificate Program

Graduate Special Students (Non-Degree) who subsequently wish to enroll in a School of Education degree or certificate program must submit a new application and all required supporting materials (see General Admission Policy). Prior admission as a Graduate Special Student (Non-Degree) does not guarantee subsequent admission to a School of Education degree or certificate program. Any application of credits earned as a Graduate Special Student (Non-Degree) toward a degree or certificate is subject to approval by the program to which the applicant is seeking admission. The number of credits earned by a Graduate Special Student (Non-Degree) that may be applied toward a School of Education degree or certificate varies by program, but in no case shall exceed nine credits. Graduate Special Students (Non-Degree) who do not intend to pursue or apply credits toward a degree or certificate program may register for courses totaling more than nine credits, but in no circumstances can these additional credits be applied toward a School of Education degree or certificate program.

School of Education Alumni Seeking to Enroll as Graduate Special Students (Non-Degree)

Graduate Special Student (Non-Degree) status is well suited for School of Education graduate degree- and certificate-holders who are interested in taking additional courses for personal and professional development, as opposed to pursuing another degree or certificate. School of Education alumni may enroll in other classes by completing the online application. No additional transcripts or application fees are required for this status.

Reapplication and Readmission Policy

If you meet any of the following criteria, you must apply for readmission to the School of Education:

- If you have not registered or been enrolled for three or more consecutive semesters (one full academic year)
- If you officially withdrew from the School
- Applicants who declined a previous offer of admission must submit a new application. The application fee is required

Note: Former School of Education students dismissed for academic or disciplinary reasons are not eligible to re-apply or be considered for readmission to any SOE degree program or non-degree status.

Transfer of Graduate Credits

The maximum number of graduate credits earned at another accredited college or university that may be transferred into a graduate certificate or master's program in the School of Education varies by program, but in no case shall exceed three credits for graduate certificates and six credits for master's degrees. The maximum number of transferable graduate credits allowed for doctoral programs is Thirty-six credits for the EdD program (42 credits in some instances) and 12 credits for the PhD program. Graduate-level credits earned as part of a bachelor's degree program cannot be transferred into an SOE graduate program.

For graduate certificate or master's programs, the School of Education will only accept transfer credits for courses taken no more than five years before a student's acceptance into the program. The final decision regarding whether or not to accept graduate transfer credits, whether earned externally or internally (i.e., via another School of Education or other Johns Hopkins University graduate program), into a School of Education certificate or degree program rests:

(for applicants) with the respective program, or

(for enrolled students) with the faculty adviser or major adviser (for doctoral students), and will be decided upon on a case by case basis.

Only graduate-level credits earned at the grade of "B" or above (or equivalent) may be transferred into a School of Education graduate degree or certificate program.

A matriculated graduate student in the School who, under extraordinary circumstances, wishes to take a course offered by another institution to satisfy School of Education degree requirements must obtain written approval in advance from the Vice Dean for Academic Affairs (or designee). Permission is granted only in exceptional cases.

Changing Programs

Applicants

Applicants to degree or certificate programs who wish to change to another degree or certificate program offered within the School of Education must submit a request in writing to the Office of Admissions at soe.admissions@jhu.edu. The Office of Admissions will determine if a new application is required.

Admitted Students

Students who have already been admitted to a degree or certificate program and who wish to change to another degree or certificate program within the same program area must request the change to be approved by the Program Lead or Department Chair. If an admitted student wishes to change to another degree or certificate program outside the program area where the original offer of admission was granted, s/he must contact the Office of Admissions for further instructions. A program change may require submitting a new application form and any additional admissions materials not required as part of the original application (for example, a writing sample may now be required).

Admitted students seeking to change programs are not automatically admitted to a new program; their requests must be approved by the appropriate person(s) and the decision communicated directly to the student. Financial aid recipients must notify the Financial Aid Office when changing a degree or certificate program.

Adding a Second Master's Degree

Graduates with a School of Education master's degree who subsequently enroll in a second master's program must complete 30 additional credits beyond the first master's program to earn a second master's degree. The second master's program may, however, include specific program requirements that obligate students to take more than the minimum 30 additional credits. (Refer to individual program descriptions for specific credit requirements.) Students should submit an online application. Application requirements (excluding transcripts and fees) such as the essay, CV/résumé, dispositions survey, and signed letters of recommendation can be uploaded electronically using SIS Self-Service or mailed to:

Johns Hopkins School of Education Office of Admissions
2800 N. Charles Street
Baltimore, MD 21218

Note: Students may not enroll in (or apply for admission to enroll in) two master's programs concurrently.

Admission to Other Schools of the University

Students in the School of Education who wish to transfer to one of the other schools in the university (such as Engineering, Public Health, or the Carey Business School) are required to submit an admission application to that school. Admission to the School of Education establishes no claim or priority for admission to any other school in the University. Documents submitted to the School of Education as part of the application process are not transferable to other schools of the University and remain on file within the School of Education for one year.

Graduation

A student who expects to receive a degree or certificate must submit an Application for Graduation Form and graduation fee of $175. If earning both a certificate and a degree in the same academic year, only one graduation fee of $175 needs to be paid. In order to graduate and receive a diploma for completion of a degree or certificate program, students must first have applied to and been admitted into that same program(s) prior to applying to graduate.

Students who are planning to graduate should apply for graduation using the online graduation application form available through SIS Self-Service. The link to the application is in the Registration menu under Program of Study Information. A copy of the graduation form is also available outside of SIS self-service at: https://education.jhu.edu/student-resources/office-of-the-registrar/forms-and-petitions/ .

All students, regardless of whether or not they plan to attend the ceremonies, need to complete this application for graduation approval. **Students must complete separate applications for each degree and/or certificate they expect to receive.** Students who have submitted the Application for Graduation will receive a confirmation email from SIS. Their names are placed on the tentative graduation list for the semester in which they anticipate completing their degree/certificate requirements.

Students who are planning to graduate should complete all coursework on time and should not request or receive the grade of "I" (incomplete) during their final semester. **Note: School of Education records are sealed thirty (30) days after the conferral of a degree. After this date, no changes will be made to a student's academic record. Therefore, it is imperative that students verify all information on their academic record and request any corrections be made before their records are sealed.**

The Johns Hopkins University confers degrees at the end of the summer, fall, and spring semesters. The commencement ceremonies are held in May. The May commencement brochure will include the names of those students who applied to graduate by the designated deadlines for the academic year. (See the application deadlines at the end of this section.)

All graduates will receive their diplomas by mail approximately 4-6 weeks after their degree conferral date. To receive their diplomas, students must pay all student accounts in full and resolve all outstanding charges of misconduct and violations of academic integrity.

The deadlines (which are also listed in the Academic Year Calendar) for submitting the graduation application form and fees are as follows:

Semester	Application Deadline
Summer	May 31 (conferral date August 26, 2022)
Fall	August 29 (conferral date December 30, 2022)
Spring	January 23 (conferral date May 25, 2023)

Note: Johns Hopkins diplomas indicate the degree qualification and major without identifying the student's concentration.

Programs

Doctoral Programs

Education (Online), EdD

To address the dramatically changing landscape of education in the 21st century, which includes new research on the science of learning, advances in technology, and the emergence of a for-profit education sector, the Johns Hopkins School of Education offers an innovative online Doctor of Education degree program. This EdD program is designed to prepare an exceptional corps of educational practitioner-scholars, both nationally and internationally, who can set a high standard for transformational leadership in education, apply evidence-based practices to improve educational outcomes, and meet the vast challenges associated with improving learning outcomes in both public and private educational environments.

For the most up-to-date information about the EdD program, please visit https://education.jhu.edu/academics/edd/. If you have any questions about the EdD program, please contact soe.edd@jhu.edu.

Admission Requirements

At minimum, applicants to the EdD program should hold a master's degree from an accredited college or university. Previous degrees must document high academic achievement (a minimum GPA of 3.0) in an area of study closely associated with the objectives of the program. If the earned degree or credit is from an educational institution abroad, the candidate's academic record must be evaluated by a credential evaluation agency before consideration for admission. Applicants must submit the online admission application form, application fee, official transcripts from all post-secondary institutions attended, a curriculum vitae (résumé), online interview, and two letters of recommendations signed by the recommender. These letters should include the following:

1. A professor with whom the applicant worked in their master's program or an individual from their professional context who can speak to the applicant's competency to conduct rigorous scholarly work, and
2. A colleague/supervisor from the applicant's professional context who can attest to:
   a. the applicant's qualifications to pursue a doctorate,
   b. the applicant's impact on their professional practice, and
   c. knowledge of and support for the applicant's area of research/ Problem of Practice.

District support for the applicant's research within their context of professional practice is an important component of the admission process. Additionally, applicants will submit a personal statement including responses to the following:

- Describe a significant Problem of Practice relevant to your current context of professional practice.
- Indicate the importance of this problem within the educational landscape as well as the candidate's context of professional practice.
- Discuss the potential underlying causes for or contributing factors related to this Problem of Practice.
- Discuss the ways in which this problem aligns with one chosen area of interest.

All applicants who meet the entrance requirements will be asked to submit video and written responses to question prompts.

International students must fulfill the general requirements for admission and complete additional requirements—see https://education.jhu.edu/admission-financial-aid/admissions/international-applicants/.

Note: This program is not eligible for student visa sponsorship.

Students who enter the program are expected to possess an understanding of introductory research methods topics and will be required to successfully complete a series of pre-orientation modules prior to enrollment in the program. All students are expected to show competence in the content areas of these modules.

Please note that for the online EdD program, an offer of admission is for the specific cohort to which an application is submitted. Students may accept or decline the admission offer only; deferring to a future cohort is not an option.

Program Requirements

Program Structure and Requirements

Program requirements include a minimum of 90 graduate credits. Students must enter the program with a master's degree with a minimum of 36 graduate-level credits, which will be transferred into the EdD program. If a student does not have the required 36 master's credits, the student will be admitted on a conditional basis and must complete the additional graduate-level credits at an accredited college or university. Students with post-master's graduate credit in related education content completed prior to admission to the EdD program may petition to transfer in an additional six credits of equivalent coursework with appropriate documentation and with the approval of the EdD program director. Thus, students must complete between 48 and 54 credits at the doctoral level at JHU. The program includes the following required coursework components (subject to change):

- Foundations of Education/Applied Research and Evaluation (24 credit hours)
- Areas of Interest (18 elective credit hours)
- Doctoral Dossier Research (12 credit hours)*

In addition to successfully completing all the coursework requirements, candidates must also satisfy written assessments and an oral comprehensive examination that document attainment of competencies and a Doctoral Dossier research project.

*Students who extend their program of study may be required to enroll in additional independent study credits.

Problems of Practice and Doctoral Dossier

Students examine a Problem of Practice (POP), which is an area of concern they have observed within their professional context. This POP becomes the focus of the student's Doctoral Dossier. The Doctoral Dossier is embedded within the EdD program coursework, which provides students with a unique opportunity to examine an issue important to the organization in which they are employed. Students will demonstrate mastery of first- and second-year competencies through written and oral comprehensive assessments, which will serve as indicators of readiness for conducting their Doctoral Dossier projects.

To begin their Doctoral Dossier process, students will conduct a literature review and systems and stakeholder analyses to be documented in an introductory narrative. This narrative provides the rationale and supporting evidence for the student's decisions to pursue their research topic and their Scholarship of Discovery project, wherein students conduct evidence-based research that leads to knowledge creation. Upon completion of the Scholarship of Discovery project, students will then choose one of two projects to serve as their second and final project:

1) Scholarship of Application: *Demonstrate the application of the research to practice.* The purpose of this project is to a) consider how the research perpetuates and/or disrupts oppression, b) critique relevant systems, structures, and institutions, and c) determine avenues to effectively disseminate evidence to a wider audience and stakeholder group.

2) Scholarship of Integration: *Articulate insights from existing literature.* The purpose includes interpretation and/or identifying and articulating the patterns in which this and others' research fits. Students will present an overview of findings and identify ways to synthesize findings from different disciplines to see areas of convergence and divergence. Trends and new ways of seeing knowledge should be articulated.

Upon completion of their final project, students will create a final reflection, tying all aspects of their narrative and two projects together. The Doctoral Dossier will be presented at a final oral defense before a Doctoral Dossier Panel.

As part of our commitment to social justice, the EdD program does not privilege one form of communication over another. Thus, all components of the Doctoral Dossier can be communicated in a modality of the student's choosing: video, oral, scholarly writing, or public-facing writing.

Typically, we expect that students would complete four years of coursework and independent research concurrently. It is possible that some students may need more than four years to complete their research, in which case they will be required to enroll in at least one credit hour per semester after completion of the required 90 credit hours.

Learning Outcomes

Program Goals

Upon successful completion of the EdD, we expect that graduates will:

- Participate as a self-reflexive, social justice-oriented learner within diverse educational or learning communities.
- Analyze and critique educational practice and research from a social justice and systems perspective.
- Apply relevant methodologies to address critical challenges in education.
- Demonstrate a curiosity for, and a systematic approach to, at least one major topic of study within education resulting in an emerging expertise.
- Integrate research and practice-based knowledge to develop research-informed decisions and opinions about educational experiences, processes, policies, and institutions.
- Communicate effectively to diverse audiences about educational research, experiences, processes, policies, and institutions.

Education, PhD

The overarching goal of the School of Education's PhD in Education program is to develop scholars who will have advanced research skills for improving education practice, with specific emphases on policy analysis and education improvement. The program strives to prepare candidates that are equipped to:

1. meet the myriad challenges associated with systemic education change;
2. apply exceptional content area expertise contextualized within a comprehensive multidisciplinary frame of reference;
3. successfully bridge the theory and research to evidence-based practice gap;
4. be actively involved in public policy development and evaluation;
5. conduct research on complex databases linking educational practices to student outcomes, or lead laboratory- or school-based research programs that inform efforts to improve educational practices and student outcomes; and
6. develop national models of educational practice that guide curriculum development and educator preparation.

For Program updates and more information, please visit https://education.jhu.edu/academics/phd/

Admission Requirements

At minimum, applicants to the PhD program should hold a master's degree from an accredited college or university. Previous degrees must document outstanding academic achievement in an area of study closely associated with the objectives of the program. Applicants must submit the online admission application form, application fee, and official transcripts from all post-secondary institutions attended. If the earned degree or credit is from an educational institution abroad, the candidate's academic record must be evaluated by a credential evaluation agency before consideration for admission. Applicants are required to earn superior scores on the Graduate Record Examination (GRE) (taken within the past five years), present acceptable TOEFL or IELTS scores (if an international student), and demonstrate potential to become top scholars. Additionally, applicants are required to submit a curriculum vitae, a personal statement (outlining professional plans, goals, and expectations related to the PhD program), dispositions survey, and three letters of reference affirming the applicant's qualifications for advanced graduate study and potential for professional development in the field. Selected applicants who meet the entrance requirements will be invited to interview with the doctoral admissions committee.

Program Requirements

Program Structure and Requirements

The program requirements include earning a minimum of 90 graduate credits, of which a minimum of 78 credits must be taken at the doctoral level at Johns Hopkins University. While the program will be tailored to the specific learning needs of each student, it includes the following coursework components:

- Research methods and statistics courses (minimum of 18 credit hours)
- Core seminars (15 credit hours)
- Major and/or minor area electives & readings (minimum of 21 credit hours)
- Research and/or teaching credits (18 credit hours)
- Dissertation research (18 credit hours)

In addition to successfully completing all the coursework requirements, candidates must also satisfy the following program benchmarks:

- research progress,
- written and oral comprehensive examinations,
- dissertation prospectus development and defense,
- dissertation proposal development and Graduate Board Oral Examination,
- PhD candidacy, and
- the dissertation.

Each student will receive an annual written evaluation from the School of Education's Doctoral Studies Committee detailing their progress in meeting the required benchmarks at the end of each spring semester.

All School of Education PhD students will devote at least four years to full-time study and research as a resident student. This period of time will provide opportunity for full engagement and participation in the academic community and allow students to develop and demonstrate the scholarly capabilities required of the degree. The typical program of study is eight semesters, with six semesters devoted to coursework and research/teaching intensive experiences and two semesters devoted primarily to independent dissertation research. Students will typically enroll in 12 hours per semester for the first three years of their program and 9 hours per semester during the fourth year of their program, for a total of 90 credit hours. All students are expected to maintain enrollment as full-time graduate students over the course of the program. With the approval of their major adviser and director of the PhD program, students may transfer up to 12 credit hours of previously completed graduate-level coursework to substitute for selected required courses in the program.

Typically, each year four-to-eight PhD students will be admitted each year to begin classes in the fall semester. The majority of required courses will be delivered on the Baltimore Homewood campus in a face-to-face format, although students may (with approval) enroll in selected elective courses in divisions throughout the university.

Students must complete qualifying exams after completing two years of study. The successful completion of the written documents and oral defense of those documents allows the student to proceed to the dissertation proposal.

Dissertation

The program is designed as an apprenticeship model leading to a traditional research dissertation. The expectation is that students will be developing the skills and background knowledge throughout the program required to pursue a traditional research dissertation. Although the dissertation is not part of the formal coursework, the program is designed to put a student on track to develop an area of expertise as the foundation for an independent research project directed by the adviser. Students are expected to complete and defend a dissertation proposal by the end of the third year of study and use the final year of the program to complete and defend the dissertation. The dissertation is expected to demonstrate mastery of the relevant literature and scholarship in the collection and interpretation of data. The work should be appropriate for publication in high impact journals in the student's area of expertise. The dissertation will be presented at a final oral defense before the student's Dissertation Advisory Committee.

Note: Full tuition assistance and annual stipends are available to support selected outstanding candidates. For more information about the PhD program, please visit https://education.jhu.edu/academics/phd/ .

Learning Outcomes

Program Goals

Graduates will be prepared to fill faculty and research scientist positions at research-intensive universities or secure positions at research institutes and centers that conduct and manage large-scale education-based evaluations. Upon successful program completion we expect that graduates will:

- Be prepared for employment in research/faculty positions at top-tier research institutions.
- Contribute to the interdisciplinary public discourse on education improvement.
- Engage in and promote evidence-based practices through the application of rigorous methodology.
- Link education research to policy and practice.
- Provide leadership in the field by developing an independent line of ethical and culturally responsive research.
- Contribute to development of the next generation of scholars.
- Be able to influence school policy and reform.

Master's Programs

Counseling, Master of Science

The Master of Science (MS) in Counseling degree prepares individuals to be leaders and advocates in the fields of clinical mental health and school counseling. The program follows a nationally recognized, evidence-based curriculum aligned with national and state standards. The program is led by distinguished faculty and boasts a strong support network of school districts and mental health settings. The program's content includes: professional orientation and ethical practice, social and cultural diversity, human growth and development, career development, helping relationships, group work, assessment, and research/program evaluation. Students learn through didactic experiences, small group projects, and applied learning at community- or school-based sites. The Master of Science in Counseling degree program, with concentrations in Clinical Mental Health Counseling and School Counseling, is accredited by the Council for Accreditation of Counseling & Related Educational Programs (CACREP), a specialized accrediting body recognized by the Council for Higher Education Accreditation (CHEA).

Students specialize in one of two concentrations:

- Clinical Mental Health Counseling
- School Counseling

Students have a maximum of five years to complete the program, but are strongly encouraged to follow the prescribed program of study.

Clinical Mental Health Counseling

The concentration in Clinical Mental Health Counseling prepares students to work in a wide range of clinical, community, and human service settings. Upon graduation, candidates gain the knowledge, skills, and academic requirements necessary to begin the licensure process in Maryland and many other states. The Clinical Mental Health Counseling program is accredited by the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). Although the School of Education permits five years for program completion, there are full-time and part-time Clinical Mental Health Counseling sequences. Completion of a 100-hour practicum and 600-hour internship are required in this program. The Clinical Mental Health Counseling program is accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP).

School Counseling

The School Counseling concentration prepares students to work in K-12 schools with an emphasis in urban school settings. The program is approved by the Maryland State Department of Education (MSDE), and graduates are eligible for MSDE certification as school counselors. Students have a maximum of five years to complete the program but are strongly encouraged to follow the prescribed program of study. The School Counseling concentration is also accredited by the Council for Accreditation of Counseling and Related Educational Programs (CACREP). Completion of a 100-hour practicum and 600-hour internship are required in this program.

Admissions Requirements

Clinical Mental Health Counseling

Applicants to the program must hold a bachelor's degree from an accredited college or university and have earned a minimum cumulative grade point average of 3.0 (on a 4.0 scale) in all previous undergraduate and graduate studies (including incomplete programs of study and for programs still in progress). Applicants must submit an application, official transcripts from all accredited post-secondary institutions attended, a résumé or curriculum vitae, an essay, and two letters of recommendation. The content of the essay should address why the candidate wants to be a counselor, the type of contributions the candidate would want to make to the clinical mental health field, a discussion of how the candidate's background and professional experiences may support and/or constrain their becoming an effective counselor, and an exploration of how the candidate's experiences regarding human diversity, volunteerism, travel and/or work have impacted their desire to be a counselor. Selected qualified applicants will be invited to participate in a group admission interview.

School Counseling (Flexible Program)

Applicants to the program must hold a bachelor's degree from an accredited college or university and have earned a minimum cumulative grade point average of at least 3.0 (on a 4.0 scale) in all previous undergraduate and graduate studies (including incomplete programs of study and for programs still in progress). Applicants must submit an application, official transcripts from all accredited post-secondary institutions attended, a résumé or curriculum vitae, a personal statement of goals, and two letters of recommendation. Qualified applicants will be invited to participate in a group admission interview.

Program Requirements

Clinical Mental Health Counseling

The program's plan of study requires 60 graduate credits to be completed through full-time or part-time matriculation and students must successfully pass the Counselor Preparation Comprehensive Examination (CPCE) prior to or during the last semester of their graduate program. With the approval of the program adviser, a student may transfer a maximum of six graduate credits from an accredited college or university if the course directly aligns to the student's degree requirements and is taken within the five-year time limit. Completion of a 100-hour practicum and 600-hour internship are required in this program.

For a complete list of program plan requirements, please visit: https://education.jhu.edu/academics/ms_counseling/#programplan

School Counseling

The program's plan of study requires 60 graduate credits to be completed through full-time or part-time matriculation and students must successfully pass the Counselor Preparation Comprehensive Examination (CPCE) prior to or during the last semester of their graduate program. This degree program has the flexibility that allows students to meet the requirements to be school counselors, as well as coursework toward licensure as a clinical mental health counselor. The Counseling program is approved by the Maryland State Department of Education (MSDE).

With the approval of a faculty adviser, a student may transfer a maximum of six graduate credits from an accredited college or university if the course is directly applicable to the student's program. Completion of a 100-hour practicum and 600-hour internship are required in this program.

For a complete list of program plan requirements, please visit: https://education.jhu.edu/academics/ms_counseling/#programplan

Master of Science in Counseling

Mission Statement

The mission of the Johns Hopkins School of Education Counseling Program is to prepare graduate students to serve as socially just school counselors and clinical mental health counselors who implement theoretical, empirical, and practical frameworks that facilitate client growth and development, introspective awareness, and well-being in a global society.

Programmatic Goals

- Facilitate students' mastery of requisite knowledge, skills, and dispositions aligned with CACREP Standards to deliver counseling services that embody social justice principles, advocacy, multiculturalism, and upholds the worth and human dignity of all clients from culturally diverse backgrounds.
- Support and encourage students to incorporate a developmental approach to promote client wellness across the life span.
- Facilitate students' development of dispositions to serve as social justice advocates and leaders in the profession.
- Cultivate a collaborative learning atmosphere that incorporates cutting edge research and excellent didactic and experiential instruction.

Program Objectives

- **PO1** Graduates will demonstrate the skills and competencies to incorporate a developmental approach to promote student/client holistic well-being across the life span, inclusive of mental health, academic, social/emotional, cultural, and career goals. *(CACREP F.3 Human Growth & Development, F.4 Career Development)*
- **PO2** Graduates will demonstrate the skills and competencies to serve as advocates and leaders in educational and/or mental health settings that value social justice principles, multiculturalism, human dignity and the worth of all clients from culturally diverse backgrounds *(CACREP F.2 Social & Cultural Diversity; 5.G. School Counseling)*
- **PO3** Graduates will demonstrate the skills and competencies to assess needs, develop goals, and counsel students/clients in educational and/or mental health settings from culturally diverse backgrounds. *(CACREP F.5 Counseling & Helping Relationships; F.7 Assessment & Testing)*
- **PO4** Graduates will demonstrate the skills and competencies that reflect the knowledge, roles, and functions of the school and/or mental health counselor. *(CACREP 5.C. Clinical Mental Health Counseling; 5.G. School Counseling)*
- **PO5** Graduates will demonstrate the skills and competencies to effectively facilitate group work with students/clients from diverse backgrounds in educational and mental health settings *(CACREP F.6 Group Counseling & Group Work)*
- **PO6** Graduates will demonstrate the skills and competencies to develop equitable data-driven school counseling programs that meet the unique needs of student populations in educational settings. *(CACREP F.8 Research & Program Evaluation; 5.G. School Counseling)*
- **PO7** Graduates will demonstrate the skills and competencies to develop, apply, and evaluate evidence-based practices that meet the developmental needs of students/clients from diverse backgrounds in educational and mental health settings. *(CACREP F.8 Research and Program Evaluation; 5.G School Counseling; 5.C. Clinical Mental Health Counseling)*
- **PO8** Graduates will demonstrate the skills and competencies to work ethically, legally, and professionally in educational and/or mental health settings *(CACREP F.1. Professional Counseling Orientation & Ethical Practice)*

Education, Master of Science

Digital Age Learning and Educational Technology (Online)

The online 36-credit Master of Science (MS) in Education with a concentration in Digital Age Learning and Educational Technology prepares educators and related professionals to use a broad range of technologies in their multiple roles as teacher, instructional designer, technology coach, researcher, change agent, or leader in the field. The program is aligned with International Society for Technology in Education (ISTE) standards for educators, as well as with learning theories from the National Academies of Science's initiatives on the new science of learning. The knowledge base within the Digital Age Learning and Educational Technology program comes from both existing and emerging methods for effective technology integration and effective leadership, including policy, practice, research, theory, and culturally responsive education. The program's coursework involves project-based learning, discussions, and collaboration. Candidates gain competencies in instructional leadership, instructional and assistive technologies, systems change, data driven decision-making and Universal Design for Learning.

Educational Studies (Online Teach For America and TNTP Options)

The School of Education's partnership programs with Teach For America (TFA) and TNTP are specially designed to support the development of TFA corps members and alumni and TNTP alumni as they work to increase student learning in their classrooms through strategic and comprehensive coursework, professional development, and reflection. Participants in these partnership programs develop classroom skills as teacher leaders in order to make significant academic gains with their students, meet the needs of the whole child, and have a long-term impact in the field of education.

Educational Studies (Urban Teachers Option)

The Urban Teachers program at the Johns Hopkins School of Education prepares new teachers to succeed through a rigorous clinical training model, with the goal of improving student outcomes in high-need schools and training candidates to become highly effective teachers. This four-year collaborative program includes a 14-month residency working in urban schools prior to becoming a lead teacher; 40-43 credits of graduate coursework (depending on the program of study) leading to the award of a Master of Science in Education degree, which is completed in two years and is clinically based, allowing for teachers to practice their skills immediately in the classroom; and three years of coaching and mentoring to assist in developing outstanding practice once in the field.

Educational Studies (Individualized Interdisciplinary Program of Study Option)

This Master of Science (MS) in Education with a concentration in Educational Studies (MS Ed Studies) interdisciplinary program option offers a unique way to earn a master's degree while pursuing one or two areas of specialization—and the JHU School of Education is the only school in Maryland that offers such a degree. The 33–39 credit program is an individualized, interdisciplinary advanced master's degree in an area not covered by other master's degrees offered by the School of Education, allowing students to create a program of study that reflects their area(s) of specialization and personal career goals. This program option is intended for teachers, administrators, and other educational professionals who already possess certification in their field or who do not require certification.

Please note that although a few of the specialization options available to candidates within this master's program option do lead to certification through the applicable graduate certificate program, it is not a program feature of the MS Ed Studies degree itself.

The MS Ed Studies program is open both to school-based candidates and those who are not school-based but have an interest in pursuing one or more areas of specialization. While some courses can be taken online, this program option is not currently offered as a fully online degree. However, interested candidates should contact a program representative to discuss online options.

Gifted Education

The 33-credit Master of Science (MS) in Education with a concentration in Gifted Education is designed to prepare educators and administrators for teaching or leadership roles in the field of gifted education, with an emphasis on research and application of current best practices in the field. Based on the National Association for Gifted Children (NAGC) and Council for Exceptional Children (CEC) standards for teachers of gifted children, candidates will gain knowledge and skills in curriculum, instruction, program development, and assessment to meet the needs of academically talented students. As part of the program, candidates will observe gifted students, design innovative lessons, and learn how to design programs that are appropriate for gifted students' cognitive and affective needs. The program is recognized by the Maryland State Department of Education as meeting the requirements for Gifted and Talented Education Specialist certification in Maryland and satisfies endorsement requirements in many other states.

School Administration and Supervision

This Master of Science (MS) in Education concentration is designed for certified teachers and other certified personnel pursuing leadership positions in kindergarten through grade 12 (K-12) school settings and is approved by the Maryland State Department of Education (MSDE) for certification in school administration and supervision. Designed primarily for those pursuing principalship and supervisor positions, this 39-credit program is aligned with the nationally recognized Professional Standards for Educational Leaders (PSEL), as well as with the Maryland Instructional Leadership Framework outcomes. The program is also appropriate for preparing department chairs, team leaders, or curriculum coordinators.

In addition to the standard School of Education admission requirements, applicants are expected to: be certified teachers or other certified school personnel ; have 27 months teaching experience; be currently employed by a school district or an accredited independent school and be able to identify a person who will serve as a mentor (during final internship course). The mentor must have either Administrator I or II certification and be currently working in an administrative or supervisory capacity. Additionally, the mentor should be willing to coach the intern and to meet on a regular basis to provide assistance to the intern in experiencing the many facets of leadership.

A strong emphasis is placed upon the provision of opportunities for students to develop the skills and competencies that are necessary for successful educational leadership. Students have the opportunity to combine their practical experience with current research regarding best practices in areas such as leadership, curriculum and instruction, school law, technology, and other important curricula areas. The seminar is a capstone course where students synthesize prior learning as well as explore some current issues; the internship provides an opportunity for students to create a portfolio based on hands-on experiences in a school. The internship is completed in the school where the students are assigned to work and is completed under the careful supervision of a certified in-school mentor and a university supervisor.

The program is delivered in a face-to-face mode (with some online courses), and courses are taught at the Baltimore Homewood campus.

Note: As of October 15, 2020 the Maryland State Department of Education (MSDE) requires candidates seeking Administrator I certification to complete 3 credits in Special Education (COMAR 13A.12.04.01). You may earn credits through the School of Education or transfer them in from another accredited institution.

International Teaching and Global Leadership Cohort

The Master of Science in Education — International Teaching and Global Leadership Cohort (ITGL) prepares international educators to become innovative education leaders, with the knowledge and skills to transform schools, systems, and other fast-changing learning environments around the world. The 33-credit cohort (35 credits for TEFL), which includes both core and focus area courses, provides our candidates with the opportunity to build a solid foundation of theory and practice through three semesters of coursework and continuous practical experiences. With exposure to a variety of educational experiences, candidates gain a comprehensive understanding of the different educational models employed in their focus area. This degree prepares candidates to apply their expertise effectively in their home countries.

Creative and Innovative Education

When promising learners are not engaged and challenged, a whole nation can lose tremendous potential. This focus area emphasizes developing effective programs and instruction for creative and innovative learners and instilling those learning skills in all students.

Digital Age Teaching and Learning Technology

Integrating technology into the classroom is the most highly demanded skill in education today. This focus area emphasizes Johns Hopkins expertise in creating leading-edge online tools and implementing new methods to manage educational data.

Early Childhood

Young children learn best through structured, engaged play. This focus area emphasizes implementing evidence-based practices that bring together the latest research in neuroscience and child development to support young students.

Entrepreneur in Education

Promoting innovation in the paradigms, strategies, values and culture in school systems, social entrepreneurial ventures, and education companies is critical in today's educational landscape. This focus area emphasizes preparing international entrepreneurs to be creative and innovative, with the knowledge and skills to become successful leaders in entrepreneurial education around the world.

Science, Technology, Engineering and Mathematics

Instructional leadership in STEM education is a growing need globally. This focus area emphasizes the foundational knowledge necessary to develop and lead STEM educational efforts that support student learning and the pursuit of STEM careers.

Teaching English as a Foreign Language

In a rapidly changing global environment, education leaders play a critical role in promoting intercultural competence and respect for all learners, their languages, and their cultures. This focus area emphasizes research-based instructional practices specifically designed to foster a caring, positive partnership, team, or community that maximizes learner engagement, learning, and achievement.

Education Policy

This 33 to 36 credit master's degree program is focused on the changing landscape of education policy in the 21st century in the wake of No Child Left Behind. The field is looking for leaders with sophisticated skill sets who are able to understand complex federal and state statutes and regulations, to research and report on initiatives, to draft policy and regulatory language; to conduct financial analyses; and to possess a deep understanding of the inequities in education. They must then combine it all with a knowledge of the strongest educational models to shape effective, evidence-based education policies. This program comprises 11 or 12 three-credit courses delivered online. Students can also opt to include a three-credit internship for an experiential learning opportunity.

Admission Requirements

Digital Age Learning and Educational Technology (Online)

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Please visit  https://education.jhu.edu/academics/dalet/   for
 details
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Educational Studies (Online Teach For America and TNTP Options)

Applicants to the program must:

- Meet all schoolwide admissions criteria
- Be a full-time preK-12 teacher by the start of the academic year to which they are applying
- Be in good standing with their respective partner (TFA or TNTP)

Please visit https://education.jhu.edu/academics/educational-studies-tfa-tntp/ for additional details

Educational Studies (Urban Teachers Option)

Those interested in the Johns Hopkins School of Education Urban Teachers collaborative program must go through a two-stage application process:

1. applicants must first apply and be admitted into Urban Teachers; and
2. once accepted into Urban Teachers, candidates must then apply for admission to the Johns Hopkins School of Education's master's degree.

Please visit https://education.jhu.edu/academics/educational-studies-urban-teachers/ (https://education.jhu.edu/academics/educational-studies-urban-teachers/)for additional details

Educational Studies (Individualized Interdisciplinary Program of Study Option)

Prospective students planning to apply to the individualized, interdisciplinary MS Ed Studies program option should consult with a program adviser about which pathway best meets their needs before they apply. Prospective students planning on completing one or two graduate certificates as part of their program of study should apply for admission into the certificate(s) at the same time they apply to the master's program. As part of the application process, applicants must write an essay describing how the program will contribute towards their future plans. The essay for admission into the two-certificate pathway must address how the certificates will work together to foster the prospective student's future plans, and admission to the master's program is contingent upon admission to the two certificates. Students interested in the two-certificate pathway must apply for admission into the master's program before starting the second certificate.

Please visit https://education.jhu.edu/academics/educational-studies-individualized-interdisciplinary/ for additional details

Gifted Education

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Please visit https://education.jhu.edu/academics/gifted/  for
 details
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School Administration and Supervision

Please visit https://education.jhu.edu/academics/_school-administration-and-supervision/ for details

International Teaching and Global Leadership (ITGL)

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Please visit https://education.jhu.edu/academics/msed-itgl/ for
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Education Policy

Please visit https://education.jhu.edu/academics/education-policy/ for details

Program Requirements

Digital Age Learning and Educational Technology (Online)

Program Plan (36 credits)

Code	Title	Credits
Foundational Introductory Course (Required)		
ED.893.508	Technology and the Science of Learning (Note: this course should be taken first)	3
Required Courses		
ED.810.607	Culturally Responsive Teaching	3
ED.893.545	Technology Integration for the 21st Century Learner	3
ED.893.550	Emerging Issues in Digital Age Learning	3
ED.893.601	Evaluation and Research in Digital Age Learning	3
ED.893.632	Data-Driven Decision Making	3
ED.893.634	Technology Leadership for School Improvement	3
ED.893.645	Explorations in Blended and Hybrid Learning	3
ED.893.650	Fundamentals of Design Thinking	3
ED.893.701	Advanced Seminar in Digital Age Learning (Note: take in final term)	3
ED.893.850	Advanced Applications in Digital Age Learning (Note: take in second to last or final term)	3
Elective Courses		
Students may take up to two electives (6 credits) in consultation with their academic advisor. These electives may replace any course with the exception of ED.893.508, ED.893.850, and ED.893.701. Electives may also be taken from outside the program		
ED.893.628	Gaming and Simulations for Learning	3
ED.893.546	Technology for Learner Variability	3
ED.893.600	Maker Education: Cultivating Curiosity, Creativity, and Problem Solving in Thoery and Practice	3
ED.893.651	Computational Thinking for K-12 Educators	3
ED.880.619	Foundations of Online Teaching and Learning	3
ED.880.623	Instructional Design for Online Learning	3

Educational Studies (Online Teach For America and TNTP Options)

Program Requirements

- *Number of Credits Required: 39 or 30 (excluding 9 waived credits)*
- *Waived Credits (9 Credits)*
    - Granted upon proof of successful completion of summer training program through TFA or TNTP. All waivers for successful completion of summer training are subject to approval by JHU each year.

Required Courses (21 Credits)

Code	Title	Credits
ED.813.601	Seminar in Transformational Leadership and Teaching: Part I	1
ED.813.602	Seminar in Transformational Leadership and Teaching: Part II	1
ED.813.603	Seminar in Transformational Leadership and Teaching: Part III	2
ED.813.604	Seminar in Transformational Leadership and Teaching: Part IV	2
ED.813.611	Classroom Management: Part I	1
ED.813.612	Classroom Management: Part II	2
Select one of the following:		3
ED.813.621	Effective Practices in Teaching and Learning I: General Educators	
ED.813.631	Effective Practices in Teaching and Learning I: Special Educators	
ED.813.641	Effective Practices in Teaching and Learning I: ESOL Educators	
Select one of the following:		3
ED.813.622	Effective Practices in Teaching and Learning II: General Educators	
ED.813.632	Effective Practices in Teaching and Learning II: Special Educators	
ED.813.642	Effective Practices in Teaching and Learning II: ESOL Educators	
ED.813.681	Teaching for Transformation I: Secondary Content	3
or ED.813.682	Teaching for Transformation I: Elementary Content	
ED.813.683	Teaching for Transformation II: Secondary Content	3
or ED.813.684	Teaching for Transformation II: Elementary Content	
Elective Courses		

Depending on their program of study, and subject to the approval of their advisor, candidates will take 9 credits of elective courses.		9
Capstone Project		
In addition to the above coursework, candidates are required to develop a capstone portfolio. The capstone is completed near the end of the candidate's program plan.		
ED.813.665	Portfolio Development, Part II: Student Growth	0
Total Credits		**30**

Educational Studies (Urban Teachers Option) Elementary and Special Education Program Plan

Course	Title	Credits
First Year		
Summer Semester		
ED.811.603	Special Education: Promises and Challenges I	1
ED.811.623	Building Productive and Nurturing Classroom Communities I	1
ED.811.670	Race, Culture, and Equity in Urban Education	2
ED.811.671	Reading, Writing, and Language Development	2
ED.811.672	Numbers, Operations, and Algebraic Reasoning	2
Fall Semester		
ED.811.604	Special Education: Promises & Challenges II	1
ED.811.616	Understanding and Managing Behavior	2
ED.811.625	Emergent Literacy	3
ED.811.673	Counting & Cardinality	1
ED.811.674	Small Group Math Practicum	2
Spring Semester		
ED.811.612	Introduction to Assessment and Tiered Instruction,Assessment and Diagnosis for Diverse Learners	1
ED.811.615	Formal Assessment and Designing Individualized Education Programs,Designing and Implementing Individualized Instruction	2
ED.811.628	Intermediate Literacy	2
ED.811.632	Small Group Literacy Practicum	2
ED.811.675	Geometry for Elementary Grades	2
	Credits	**26**
Second Year		
Summer Semester		
ED.811.608	Building Productive and Nurturing Classroom Communities II	1
ED.811.676	Measurement and Data	2
Fall Semester		
ED.811.617	Specialized Instructional Techniques	2
ED.811.630	Supporting Writer's Development	2
ED.811.665	Trauma Informed Teaching Practices	1
Spring Semester		
ED.811.631	Elementary S.T.E.M. Methods	3
ED.811.667	Social Studies Inquiry: Content Area Reading and Writing	2
	Credits	**13**
	Total Credits	**39**

Secondary English Language Arts and Special Education Program Plan

Course	Title	Credits
First Year		
Summer Semester		
ED.811.603	Special Education: Promises and Challenges I	1
ED.811.623	Building Productive and Nurturing Classroom Communities I	1
ED.811.640	Secondary ELA Immersion and Discourse	3
ED.811.670	Race, Culture, and Equity in Urban Education	2
Fall Semester		
ED.811.604	Special Education: Promises & Challenges II	1
ED.811.614	Small Group Practicum (Secondary)	2
ED.811.616	Understanding and Managing Behavior	2
ED.811.644	Genre Study I: Argument and Informational Texts	3
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
Spring Semester		
ED.811.612	Introduction to Assessment and Tiered Instruction,Assessment and Diagnosis for Diverse Learners	1
ED.811.615	Formal Assessment and Designing Individualized Education Programs,Designing and Implementing Individualized Instruction	2
ED.811.643	Writing in the Secondary Classroom	3
ED.811.646	Genre Study II: Poetry, Drama, and the Novel	3
	Credits	**27**
Second Year		
Summer Semester		
ED.811.608	Building Productive and Nurturing Classroom Communities II	1
ED.811.641	Language Acquisition	2
Fall Semester		
ED.811.617	Specialized Instructional Techniques	2
ED.811.642	Reading Diagnosis and Intervention	2
ED.811.677	Motivation and Engagement of Adolescent Readers and Writers	1
Spring Semester		
ED.811.665	Trauma Informed Teaching Practices	1
ED.811.679	Adolescent Development and Urban Youth	1

ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
	Credits	**13**
	Total Credits	**40**

Secondary Mathematics and Special Education Program Plan

Course	Title	Credits
First Year		
Summer Semester		
ED.811.603	Special Education: Promises and Challenges I	1
ED.811.623	Building Productive and Nurturing Classroom Communities I	1
ED.811.650	Secondary Math Immersion	3
ED.811.670	Race, Culture, and Equity in Urban Education	2
Fall Semester		
ED.811.604	Special Education: Promises & Challenges II	1
ED.811.616	Understanding and Managing Behavior	2
ED.811.651	Proportional Reasoning	3
ED.811.653	Math Methods I	2
ED.884.508	Literacy in the Content Areas Part I,Methods of Teaching Reading in the Secondary Content Area, Part I	3
Spring Semester		
ED.811.612	Introduction to Assessment and Tiered Instruction,Assessment and Diagnosis for Diverse Learners	1
ED.811.614	Small Group Practicum (Secondary)	2
ED.811.615	Formal Assessment and Designing Individualized Education Programs,Designing and Implementing Individualized Instruction	2
ED.811.654	Geometrical Thinking	2
ED.811.655	Math Methods II	2
	Credits	**27**
Second Year		
Summer Semester		
ED.811.608	Building Productive and Nurturing Classroom Communities II	1
ED.811.678	Data and Community: Statistics and Probability in Action	2
Fall Semester		
ED.811.617	Specialized Instructional Techniques	2
ED.811.652	Algebra, Functions, and Modeling in the Real World,Algebraic Thinking	3
Spring Semester		
ED.811.665	Trauma Informed Teaching Practices	1
ED.811.679	Adolescent Development and Urban Youth	1

ED.884.510	Literacy in the Content Areas Part 2,Methods of Teaching Reading in the Secondary Content Area, Part II	3
	Credits	**13**
	Total Credits	**40**

Educational Studies (Individualized Interdisciplinary Program of Study Option)

There are two pathways for completing the MS Ed Studies program. One pathway allows a student to combine the deep study of one area of education with an exposure to the breadth of educational theory and practice. It requires the following common core courses:

Code	Title	Credits
ED.880.624	Evaluation and Research in Education (Or ED.881.611 Action Research)	3
ED.881.622	Advanced Instructional Strategies [1]	3
ED.855.610	Seminar in Teacher Leadership	3
Total Credits		**9**

1 Students may be allowed to take an alternative course as a substitute, including online options, subject to faculty adviser approval.

The remainder of the program includes a 15–18 credit specialization (almost always a graduate certificate) and 6–9 credits of electives designed in consultation with a faculty adviser. The combination of the core courses and the electives allows students who choose this pathway to be exposed to several areas of education outside their main specialization.

In the second pathway, students may elect to combine two graduate certificate programs (15–18 credits each). Students then take the Seminar in Teacher Leadership course, a capstone course that includes an independent project tying together the two certificates, to complete the MS Ed Studies. This pathway allows a student to study in depth two areas of educational theory and practice. Students pursuing this pathway are advised to consult with their faculty adviser about the timing of the two certificates.

Note: Students will not receive a diploma for successful completion of the coursework comprising a certificate program if they have not first applied to and been admitted into that same certificate program.

Gifted Education

The program is designed to be completed in six semesters, with students typically taking two courses per semester—though students may elect to take longer. A new cohort begins each year (subject to sufficient enrollments), with courses being delivered online.

Program Plan

Code	Title	Credits
Required Courses		
ED.885.501	The Gifted Learner	3
ED.885.604	Social and Emotional Needs of the Gifted	3
ED.885.512	Twice Exceptional Learners	3
ED.885.505	Creativity in Education	3
ED.885.510	Curriculum, Instruction, and Assessment for Advanced Learners	3

ED.885.519	Seminar I in Gifted Education and Talent Development	3
ED.885.515	Leadership of Gifted Education and Talent Development Programs	3
ED.885.520	Seminar II in Gifted Education and Talent Development	3
ED.885.820	Practicum in Gifted Education and Talent Development [1]	3
Elective Courses		
In addition, students must select and take two 3-credit elective courses, in consultation with their advisor.		6
Total Credits		**33**

1 All candidates employed in Maryland who are seeking Gifted and Talented Education Specialist certification from the Maryland State Department of Education will undertake a semester-long practicum experience as the culminating course of their program. Candidates who are employed in other states outside of Maryland will take an online 3-credit elective course in place of the practicum course in consultation with their advisor.

School Administration and Supervision

Program Plan

Code	Title	Credits
First Sequence of Concentration Requirements		
Must be taken prior to the second sequence.		
ED.851.601	Organization and Administration of Schools	3
ED.851.603	School Law	3
ED.851.705	Effective Leadership	3
ED.851.708	Systemic Change Process for School Improvement	3
ED.852.602	Supervision and Professional Development	3
ED.881.610	Curriculum Theory, Development, and Implementation	3
ED.880.624	Evaluation and Research in Education	3
ED.881.622	Advanced Instructional Strategies	3
Second Sequence of Concentration Requirements		
ED.851.609	Administrative and Instructional Uses of Technology *multiple technology courses available as a substitution. Consult advisor	3
ED.851.616	Issues in K-12 Education Policy	3
Elective Courses		
Select one of the following: *multiple substitutions available. Consult advisor		3
ED.851.512	Politics of Education	
ED.851.630	School, Family, and Community Collaboration for School Improvement I	
ED.882.524	Education of Culturally Diverse Students	
The following courses may be taken only after completing the first sequence of 24 credits:		
ED.851.809	Seminar in Educational Administration and Supervision	3
ED.851.810	Internship in Administration and Supervision	3
Total Credits		**39**

Please note that students must attend an organizational meeting or make arrangements to meet with the program coordinator in the semester prior to registering for the internship.

Note: Students enrolled in the MS in School Administration and Supervision program may not simultaneously enroll in, nor are they eligible to earn, the Graduate Certificate in School Administration and Supervision.

International Teaching and Global Leadership Cohort

Program Plan

Code	Title	Credits
Core Requirements (24 credits)		
ED.887.615	Explorations in Mind, Brain, and Teaching	3
ED.855.619	Global Leadership	3
ED.855.609	*Introduction to Entrepreneurship in Education (Science, Technology, Engineering, and Mathematics (9 credits))*	*3*
ED.813.652	Introduction to Global Education Policy and Analysis	3
ED.881.622	Advanced Instructional Strategies	3
ED.881.611	Action Research for School Improvement	3
ED.855.600	Extended Learning I (0 credit learning experience)	3
ED.855.610	Seminar in Teacher Leadership	3
Creative and Innovative Education Focus (9 credits)		
ED.885.505	Creativity in Education	3
ED.885.501	The Gifted Learner	3
ED.885.510	Curriculum, Instruction, and Assessment for Advanced Learners	3
Digital Age Teaching and Learning Focus (9 credits)		
ED.893.508	Technology and the Science of Learning	3
ED.893.550	Emerging Issues in Digital Age Learning	3
ED.893.628	Gaming and Simulations for Learning	3
Early Childhood Focus (9 credits)		
ED.855.603	The Early Childhood Learner	3
ED.855.608	Comparative High Quality Practices in Early Education	3
ED.855.630	Authentic Assessment and Measuring Child Outcomes and School Readiness	3
Entrepreneur in Education Focus (9 credits)		
ED.855.614	Planning a New Venture in Education	3
ED.855.617	Launching a New Venture in Education (Launching a New Venture in Education)	3
ED.855.618	The Sustainable Venture (The Sustainable Venture)	3
Science, Technology, Engineering, and Mathematics (9 credits)		
ED.855.530	Foundational Concepts of STEM	3
ED.855.540	Integration of STEM Content through the Science of Learning	3
ED.855.550	Leading STEM Instructional Programs & Professional Development	3
Teaching English as a Foreign Language Focus (11 credits)		
ED.855.500	Language Acquisition in TEFL	3
ED.855.501	Language and Culture in TEFL	3
ED.855.510	Building Productive Learning Relationships for TEFL	1

ED.855.502	Program Evaluation and Learner Assessment in TEFL (Program Evaluation and Learner Assessment in TEFL)	3
ED.855.520	Promoting Active Engagement and Learning for TEFL (Promoting Active Engagement and Learning for TEFL)	1
Total Credits: 33 - 35		

Education Policy

Number of Credits Required: 33-36
One-week residency in Washington, D.C., required

Program Plan

Code	Title	Credits
Foundational Introductory Course (3 credit hours)		
ED.820.602	Introduction to Education Policy (includes a 1-week residency in Washington, D.C.)	3
Core Courses (30 credit hours)		
ED.820.600	Introduction to Statistics (will be waived if completed a stats course with a B or better within 5 years of applying to the program)	3
ED.820.601	Intermediate Statistics	3
ED.820.603	Federal Education Policy	3
ED.820.604	Diversity	3
ED.820.605	International Education Policy (International Education Policy)	3
ED.820.606	State and Local Education Policy (State and Local Education Policy)	3
ED.820.607	Understanding Education Research (Understanding Education Research)	3
ED.820.608	Education Finance (Education Finance)	3
ED.820.609	Outside the Schoolhouse (Outside the Schoolhouse)	3
ED.820.610	Capstone Course (Capstone Course)	3
Elective (3 credit hours)		
ED.820.611	Experiential Learning (Experiential Learning (optional))	3
Total Credits		**36**

Note: The Foundational Introductory Course will be taken first, outside of the statistics courses

Learning Outcomes

Digital Age Learning and Educational Technology (Online)

Program Goals

The goals of the program are to:

- Cultivate proactive leadership skills for developing a shared vision for educational technology among all education stakeholders.
- Create systemic plans aligned with a shared vision for school effectiveness and student learning through the infusion of information and communication technology (ICT) and digital learning resources.
- Develop robust and reliable access to current and emerging technologies and digital resources, with equity for all stakeholders.
- Engage in planning and assessment centered on the needs and abilities of students.
- Develop and review policies, financial plans, accountability measures, and incentive structures to support the use of ICT and other digital resources for learning.
- Integrate content standards and related digital curriculum resources that are aligned with and support digital age learning and work.
- Design online and blended learning environments that facilitate digital learning and support communities of inquiry.

Learning Outcomes

Upon successful completion of the program, we expect students will:

- Lead their organization in the effective use of technology for digital learning.
- Establish leadership skills for supporting data driven decision-making.
- Develop skills for advanced technologies—including online and blended learning, mobile learning, multimedia-based instruction, tools for instructional management and assessment, and the integration of technology in Universal Design for Learning (UDL).
- Engage in technology integration—applying the new science of learning, digital-age skills, and a constructivist approach to teaching and learning, as well as the use of authentic assessment strategies, differentiated instruction and appropriate technology tools to accommodate all learners, including students with special needs.
- Build leadership skills through mentoring, consulting, professional development, and systems change.

Educational Studies (Online Teach For America and TNTP Options)

Program Goals

The goals for the program are to develop transformational educators who:

- Track and monitor student progress in an ongoing manner to ensure students make dramatic academic gains.
- Consistently integrate and apply their skills in planning, instructional delivery, and assessment to enhance student learning.
- Impact their classrooms, schools and communities as content experts by providing excellent education to their students and serving as student advocates.
- Advocate for diversity and inspire their students to strengthen their own advocacy skills, in order to develop a deep understanding of themselves as people and learners, and use their learnings to access future opportunities for growth and development.
- Engage various stakeholders in a student’s life to provide holistic, personalized support.
- Become reflective practitioners who have the ability to differentiate, modify, and analyze their own instruction and are able to foster a reflective disposition for continuous learning and improvement.

Educational Studies (Individualized Interdisciplinary Program of Study Option)

Student outcomes depend upon the pathway chosen, but all students who complete the program will:

- Develop an in-depth knowledge of at least one area of education.
- Increase their awareness of the breadth of work in education, either through a second area of specialization or through core educational coursework.
- Complete an independent project in their area(s) of concentration in the capstone course, the Seminar in Teacher Leadership. (Examples include a research project, an action plan, or a professional development plan.)

Gifted Education

Program Goals

The goals of the program are to prepare educators for leadership roles in the field of gifted education who are able to:

- Understand the diverse factors that inform the identification and support of K-12 gifted students.
- Create safe, inclusive, and culturally responsive learning environments that support the social, emotional, and cognitive learning needs of diverse groups of gifted K-12 students.
- Use assessments to identify gifted and talented students, assess their progress and modify interventions accordingly, and provide summative data on their accomplishments.
- Be reflective, ethical professionals who support and advocate for gifted K-12 students through collaboration with families and colleagues, use of community resources, and ongoing professional development.
- Serve as effective leaders in the development and implementation of gifted education and talent development programs.
- Lead efforts to address and eliminate excellence gaps in K-12 settings

School Administration and Supervision

Upon successful completion of the program, we expect students will:

- Demonstrate specific content knowledge regarding school leadership.
- Demonstrate knowledge of skills needed for collaborating with staff and others to create a vision and plan of improvement for a school.
- Demonstrate skills and dispositions that are needed to manage and to lead with respect to human and material resources and the total organization of a school.
- Demonstrate knowledge, skills, and dispositions that promote effective school, family, and community engagement.
- Demonstrate the ability to assess and to understand the larger context in which educators work today.
- Demonstrate knowledge of strategies and procedures for working fairly and justly with all stakeholders in a diverse school environment.
- Demonstrate knowledge of strategies and processes for providing a school instructional program for all students that is evaluated for effectiveness based on student achievement and other relevant factors (i.e., attendance, for example).
- Become reflective practitioners who are skilled in data-based decision making and the use of technology for instructional and administrative purposes.
- Demonstrate skills and strategies related to the safe and orderly operation of a school.

International Teaching and Global Leadership Cohort

Upon successful completion of the program, we expect students will be able to:

- Identify and explain best practices in Science, Technology, Engineering and Mathematics, teaching English as a foreign language, entrepreneurial education, early childhood, creative and innovative education and digital age learning to become successful global education leaders.
- Apply identified best practices in Science, Technology, Engineering and Mathematics, teaching English as a foreign language, entrepreneurial education, early childhood, creative and innovative education and digital age learning to become successful global education leaders.

Education Policy

The goal of our program is to provide the comprehensive, research-based, real-world, and work environment-ready skills and knowledge for students and professionals interested in the field of K-12 education policy.

Student Outcomes

The primary educational outcomes of the program is to prepare graduates to analyze and evaluate education research, translate research into policies, and contribute effectively to governmental agencies, legislative offices, mayor's offices, think tanks, and nonprofits that focus on education.

Upon successful completion of the program, we expect students to be prepared to:

- Analyze and evaluate education research.
- Analyze the structures that comprise public education in different states within the U.S. and in peer nations around the world.
- Analyze national and international educational assessment data.
- Translate research into policy recommendations for different stakeholders (i.e. states, local education bodies, city governments, or non-profits/think tanks).
- Analyze current or proposed federal and state legislation and regulatory language for their potential impact.
- Analyze existing education budgets and funding streams.
- Evaluate proposed policies in terms of their potential impact on underserved or marginalized populations.
- Compose reports, policy memos, op-eds, and policy briefings on educational issues in strong, clear, and empirically based language.

Health Professions (Online), Master of Education

The 34.5-credit Master of Education (M.Ed.) in the Health Professions (MEHP) and the embedded post-master's certificate (*see* Post-Master's Certificate in Evidence-Based Teaching in the Health Professions (https://e-catalogue.jhu.edu/education/programs/evidence-based-teaching-health-professions-post-masters-certificate/) *for more information*) is offered through a partnership among five JHU schools: Education, Medicine, Nursing, Public Health, and Business. The goal of the master's program is to develop interprofessional leaders and change agents who will globally transform health professions education.

The program consists of interprofessional educational experiences designed and delivered by faculty teams from the five partner schools. The master's program includes an educator portfolio built through the various courses of the program and a capstone experience in either educational leadership/professional development or educational research. MEHP Fellows are provided opportunities to engage in deep discussions, team projects, and group presentations in an interactive online community. The course schedule and online format is designed to complement the lives of busy health professionals who want to advance their competence as educators.

This program is designed to serve accomplished health professionals with advanced degrees in medicine, nursing, public health, pharmacy, dentistry, and other allied health fields. The curriculum prepares participants (MEHP Fellows) to become effective educators, educational leaders, and educational researchers. Applicants are required to hold an advanced degree (terminal degree preferred) in a health professions related field. All courses are offered in an online format. MEHP Fellows can complete the post-master's certificate within one-to-two years, and the masters' degree within two-to-four years, depending on whether they complete one or two courses per semester.

MEHP Fellows take the first 18 credits focused on evidence-based teaching as the core for the 34.5-credit MEHP program or as a stand-alone post-master's certificate. The emphasis of the core/certificate is on preparing health professionals to teach effectively. Participants examine learning theories, adult learning and development theories, hypotheses-driven education-based practice, curriculum development, assessment and feedback, instructional strategies, cultural competence, technology integration, and educational scholarship. MEHP Fellows create an educational philosophy to guide their work, conduct curriculum development and assessment projects, and begin to focus on an agenda for their educational scholarship.

Program Requirements

Master's Degree Tracks

To earn the full 34.5-credit master's degree, MEHP Fellows complete the core and one of two 16.5-credit track specialty options—in educational leadership or in educational research. Both options include the continued development of educator's portfolio and a mentored capstone project/research study. The capstone project is designed, implemented, analyzed, and presented in a manuscript aligned with the guidelines for a selected target journal. The manuscript is reviewed and feedback provided in preparation for journal submission.

In the educational leadership development track, MEHP Fellows develop skills in program design, advocacy, and evaluation, leadership skills, program management and faculty evaluation, with elective options in faculty development and grant/proposal writing.

In the research track, MEHP Fellows develop skills in educational research methodology, mixed methods research, educational research design, with elective options in statistics or writing grants and proposals.

Requirements (34.5 credits for the MEHP; 18 credits for the Post-Master's Certificate)

(All courses are three credits unless otherwise indicated.)

Post-Master's Certificate in Evidence-Based Teaching in the Health Professions

(Taken either as a standalone program or as the first part of the 34.5-credit MEHP program.)

Code	Title	Credits
ED.610.610	Foundation to Innovation: Adult Learning	3
ED.880.629	Evidence-Based Teaching	3
ED.880.631	Ensuring Learning through Assessment and Feedback	3
ED.880.633	Curriculum Development	3
ED.880.635	Instructional Strategies I	1.5
ED.880.637	Instructional Strategies II	1.5
ED.880.661	Educational Scholarship: Design	1.5
ED.880.662	Educational Scholarship: Implementation	1.5
Total Credits		**18**

Educational Leadership/Professional Development Track for the MEHP

Code	Title	Credits
Required Courses		
ED.880.639	Development, Management, and Evaluation of Health Professions Education Programs	3
ED.880.641	Leadership Essentials for Health Professions Educators	3
ED.880.642	Leadership Theory in Action for Health Professions Educators	3
ED.880.672	Leadership Capstone in Health Professions Education I: Problem, Gap, Hook, and Methods	1.5
ED.880.673	Leadership Capstone in Health Professions Education II: Implementation and Results	1.5
ED.880.674	Leadership Capstone in Health Professions Education III: Analysis, Discussion, Conclusion, Dissemination	1.5
Electives		
ED.880.610	Writing Grant and Contract Proposals for Health Professions Education	3
or ED.880.643	Mentoring in Health Professions Education Programs	
or ED.880.644	Advanced Simulation Strategies	
or ED.880.652	Survey Design for Research in Health Professions Education	
Total Credits		**16.5**

EDUCATIONAL RESEARCH TRACK FOR THE MEHP

Code	Title	Credits
Required Courses		
ED.880.639	Development, Management, and Evaluation of Health Professions Education Programs	3
ED.883.510	Understanding Educational Research	3
ED.880.665	Mixed Methods Research	3
ED.880.676	Research Capstone in Health Professions Education I: Problem, Gap, Hook, and Methods	1.5
ED.880.677	Research Capstone in Health Professions Education II: Implementation and Results	1.5
ED.880.678	Research Capstone in Health Professions Education III: Analysis, Discussion, Conclusion, Dissemination	1.5
Electives		
ED.880.610	Writing Grant and Contract Proposals for Health Professions Education	3
or ED.880.667	Applied Statistics	
or ED.880.644	Advanced Simulation Strategies	

or ED.880.652	Survey Design for Research in Health Professions Education	
Total Credits		**16.5**

Learning Outcomes

Core/Certificate Program Goals

As part of the core/certificate, participants will:

- Apply evidence-based strategies and methodologies to teach in a variety of settings.
- Use the assessment of learner needs in order to differentiate instruction.
- Effectively plan instruction and teach from an interprofessional perspective.
- Effectively teach as a member of an interprofessional team.
- Provide interdisciplinary learning experiences.
- Incorporate their knowledge of standards and standards-based instructional approaches to teaching.
- Demonstrate collaborative and clinical teaching models.
- Effectively assess learning.
- Effectively integrate technology into instruction.
- Demonstrate understanding of learning principles, theory, and development.
- Function as reflective practitioners.
- Demonstrate how to design, implement, and evaluate curriculum.
- Demonstrate cultural competence with colleagues and learners.
- Advise students effectively.

Educational Leadership/Professional Development Track

MEHP Fellows in the educational leadership/professional development track will:

- Serve as a mentor to others in their institution.
- Build and evaluate professional development programs.
- Evaluate professional development opportunities to improve them.
- Be a change agent in their organization.
- Incorporate the contributions of various health professions.
- Demonstrate negotiation skills.
- Apply cultural competence to educational program development and delivery.

Educational Research Track

MEHP Fellows in the educational research track will:

- Experiment to determine the effectiveness of knowledge transfer.
- Design and implement a scholarly project that uses appropriate methodology to evaluate programs or plan curricula.
- Review the appropriate literature and state the problem to be examined.
- Analyze data from quantitative and qualitative sources.
- Interpret data from quantitative and qualitative sources and identify limitations.
- Disseminate findings.

Special Education, Master of Science

Candidates for the Master of Science (MS) in Special Education may be recent college graduates or professionals experienced in fields other than teaching who wish to develop special education careers. The School of Education offers candidates the following options:

- Part-time master's program with focus in Mild-to-Moderate Disabilities which leads to teacher certification. Students may begin this program in either fall or summer semesters and have a maximum of five years to complete the program requirements.
- Part-time master's programs in two special education areas of focus (Severe Disabilities with Emphasis in Autism Spectrum Disorders and Severe Disabilities with an Emphasis in Applied Behavior Analysis) that do not lead to teacher certification (for students who choose to pursue the Master of Science in Special Education degree but who do not wish to qualify for teacher certification). Students begin during the fall semesters and have a maximum of five years to complete the program requirements.

Master's Programs Leading to Teacher Certification

The following Master of Science in Special Education programs have been approved by the Maryland State Department of Education (MSDE) for Generic Special Education certification:

- Mild to Moderate Disabilities (Elementary/Middle)—grades one through eight.
- Mild to Moderate Disabilities (Secondary/Adult)—grades six through twelve.

Mild to Moderate Disabilities: Elementary/Middle and Secondary/Adult (MSDE Certification—Generic Special Education)

This 39-credit program is designed for individuals who are seeking teacher certification to work with students who have mild to moderate disabilities, including learning disabilities, emotional disturbances, and mild intellectual disabilities. Candidates can start the program during the summer or fall semester and complete the program at their own pace. Candidates in the part-time program option must complete all program requirements within five years.

Special Educator certification options are available at the elementary/middle school (grades one through eight) or secondary/adult levels (grades six through 12). The teacher certification program options provide instruction and applied experiences in legal issues, educational assessment, data-based decision making, instructional programming, behavior management, and collaborative programming among general and special educators. Students learn to apply specialized techniques within a continuum of educational settings, with a particular emphasis on urban settings.

Non-Certification Master's Programs

The School of Education offers a number of program options for students not seeking certification but who want to enhance their skills in a specialized area of special education.

Currently, the School offers two non-certification specializations:

- Severe Disabilities with an Emphasis in Autism Spectrum Disorders option
- Severe Disabilities with an Emphasis in Applied Behavior Analysis

Severe Disabilities with an Emphasis in Autism Spectrum Disorders Option

This 36-credit master's degree program option prepares individuals to teach students on the autism spectrum—ages birth through adult—whose educational priorities include specialized instruction and support in areas of communication, social/emotional skills, cognitive skills, and adaptive/ independence skills.

SEVERE DISABILITIES WITH AN EMPHASIS IN Applied Behavior Analysis

This 36-credit master's degree program option is designed for educators (special educators, general education teachers, behavior specialists, instructional specialists, paraprofessionals, teaching assistants, registered behavior technicians) who are seeking specialized training in special education and evidence-based practice of ABA. Professionals who earn the MS in Special Education-Severe Disabilities with an Emphasis in Applied Behavior Analysis will acquire the competencies to meet the growing needs of students requiring special education and behavioral supports.

Admission Requirements

Master's Programs Leading to Teacher Certification

To be fully admitted, applicants must have earned at least a bachelor's degree from an accredited college or university and have earned a minimum cumulative average GPA of 3.0 (out of 4.0) in all previous undergraduate and graduate studies (including for incomplete programs of study and for programs still progress). Applicants must complete the online application and submit official transcripts from all accredited post-secondary institutions attended, a resume or curriculum vitae, an essay indicating the candidate's professional goals, and two letters of recommendation, plus achieve passing scores on one of the following tests: Praxis I/Core, SAT, ACT or GRE. (Please visit the Maryland State Department of Education (MSDE) website at http://www.marylandpublicschools.org/about/Pages/DEE/Certification/testing_info/praxis1.aspx to view the current state requirements.)

Non-Certification Master's Programs

To be fully admitted, applicants must have at least a bachelor's degree from an accredited college or university and have earned a minimum cumulative average GPA of 3.0 (out of 4.0) in all previous undergraduate and graduate studies (including for incomplete programs of study and for programs still in progress). Applicants must complete an application and submit official transcripts from all accredited post-secondary institutions attended, a résumé or curriculum vitae, an essay indicating your professional goals, dispositions survey, and two letters of recommendation.

Program Requirements

Depending on the specific focus area, students complete 36 to 39 graduate credits for their master's degrees. Students must work with a faculty adviser to develop a program of study that includes required and elective courses. All face-to-face classes are offered at the JHU Applied Physics Lab, in Laurel MD.

Master's Programs Leading to Teacher Certification

Internship Requirements

Students seeking State certification are required to complete two internships during their program. Prior to the first internship, students will be required to undergo a criminal background check. Students wishing to enroll in an internship course must let the special education program coordinator know at least one semester prior to the one in which they plan to complete the internship. Students are responsible for completing all requirements prior to each internship and should frequently review the information shared on the Special Education Program Community Page on our Learning Management System (LMS). The final internship should be completed during the last semester of classes and cannot be taken without first achieving a passing score on the two Praxis II exams.

Students must earn a grade of B or better in each required internship. If a student earns a grade below B in an internship, the student must repeat the internship, and earn a grade of B or A. Students may not register for any other course until they complete the repeated internship. If a student earns a grade below B in subsequent internships, the student may be dismissed from the program.

Program of Study

Depending on the specific area of focus, students complete 36 to 39 graduate credits for their master's degree. Students must work with a faculty adviser to develop a program of study that includes required and prerequisite courses. (*Note: Students who take courses outside their approved program of study do so at their own risk—there is no guarantee that credits earned from unapproved courses will be accepted*.) In addition to coursework, students must successfully complete the internships and graduate student project (with presentation), pass the two Praxis II exams and comprehensive examinations, and fulfill any other program-specific requirements prior to graduation. Upon graduation, students will be eligible to apply for Maryland State certification under the appropriate specialization area.

Mild to Moderate Disabilities: Elementary/Middle and Secondary/Adult (MSDE Certification—Generic Special Education)

Graduates of this program are eligible for certification in generic special education in Maryland. Along with the required coursework, graduate students must achieve qualifying scores on the Praxis/Core I exam (or one of the alternative State approved tests) prior to admission (if not acquired 3.0 GPA in Undergraduate Studies) and pass the Special Education Praxis II exams (Special Knowledge and TRE) prior to the second internship. All students must complete two internships, a Graduate Project (with presentation), and pass all required Praxis and Comprehensive exams before program completion.

Program Plan

Code	Title	Credits
Prerequisite Courses [1]		
ED.871.501	Introduction to Children and Youth with Exceptionalities	3
ED.882.511	Human Growth and Development: A Lifespan Perspective	3
ED.884.502	Assessment of Literacy	3
ED.884.505	Materials for Teaching Literacy (required for Elementary/Middle candidates only)	3
A course in Introductory Processes and Acquisition of Reading		
Focus		
Select one of the following:		39
Elementary/Middle Focus (p. 896)		

Secondary/Adult Focus (p. 896)		
Total Credits		**51**

[1] Prerequisite Courses for both Elementary/Middle (15 credits) and Secondary/Adult Focus (12 credits) (may be taken elsewhere)

Elementary/Middle Focus

Code	Title	Credits
ED.871.510	Legal Aspects, Service Systems, and Current Issues in Special Education (online course)	3
ED.871.511	Instructional Planning and Management in Special Education	3
ED.871.512	Collaborative Programming in Special Education	3
ED.871.513	Applied Behavioral Programming	3
ED.874.512	Characteristics of Students with Mild to Moderate Disabilities: Learning Disabilities, Behavioral Disorders, and Intellectual Disabilities	3
ED.874.513	Educational Assessment of Students with Mild to Moderate Disabilities: Elementary/Middle	3
ED.874.524	Spoken and Written Language: Methods for Students with Mild to Moderate Disabilities	3
ED.874.525	Mathematics: Methods for Students with Mild to Moderate Disabilities	3
ED.874.526	Classroom Management: Methods for Students with Mild to Moderate Disabilities	3
ED.874.541	Reading: Methods for Students with Mild to Moderate Disabilities	3
ED.874.860	Mild to Moderate Disabilities Internship: Induction - Elementary/Middle	3
ED.874.861	Mild to Moderate Disabilities Internship: Culmination - Elementary/Middle	3
ED.892.562	Access to General Education Curriculum with Technology Accommodations (online course)	3
Total Credits		**39**

Secondary/Adult Focus

Code	Title	Credits
ED.871.510	Legal Aspects, Service Systems, and Current Issues in Special Education (online course)	3
ED.871.511	Instructional Planning and Management in Special Education	3
ED.871.512	Collaborative Programming in Special Education	3
ED.871.513	Applied Behavioral Programming	3
ED.874.512	Characteristics of Students with Mild to Moderate Disabilities: Learning Disabilities, Behavioral Disorders, and Intellectual Disabilities	3
ED.874.514	Educational Assessment of Students with Mild to Moderate Disabilities: Secondary/Adult	3
ED.874.526	Classroom Management: Methods for Students with Mild to Moderate Disabilities	3
ED.874.527	Career Assessment and Programming: Education of Students with Mild to Moderate Disabilities	3
ED.874.528	Diversifying the General Education Curriculum: Methods for Secondary Students with Mild to Moderate Disabilities	3
ED.874.542	Reading, English, and Language Arts: Methods for Secondary Students with Mild to Moderate Disabilities	3
ED.874.870	Mild to Moderate Disabilities Internship: Induction - Secondary/Adult	3
ED.874.871	Mild to Moderate Disabilities Internship: Culmination - Secondary/Adult	3
ED.892.562	Access to General Education Curriculum with Technology Accommodations (online course)	3
Total Credits		**39**

Non-Certification Master's Programs

Internship Requirements

Students will be required to complete an internship as part of their master's program. Prior to the internship, students will undergo a criminal background check. Students wishing to enroll in an internship course must let the special education program coordinator know at least one semester prior to the one in which they plan to complete the internship. Students are responsible for completing all requirements prior to each internship and should frequently review the information shared on the Special Education Program Community Webpage in our Learning Management System (LMS).

Students must earn a grade of B or better in each required internship. If a student earns a grade below B in an internship, the student must repeat the internship, and earn a grade of B or A. Students may not register for any other course until they complete the repeated internship. If a student earns a grade below B in subsequent internships, the student may be dismissed from the program.

Program Requirements

Depending on the specific focus area, students complete 36 to 39 graduate credits for their master's degree. Students must work with a faculty adviser to develop a program of study that includes required and elective courses. All students must complete a Graduate Student Project (with presentation) and pass Comprehensive exams before program completion.

Severe Disabilities with an Emphasis in Autism Spectrum Disorders Option

Program Plan

Code	Title	Credits
Prerequisite or Corequisite Courses [1]		
ED.871.501	Introduction to Children and Youth with Exceptionalities	3
ED.882.511	Human Growth and Development: A Lifespan Perspective	3
Required Courses		
ED.871.510	Legal Aspects, Service Systems, and Current Issues in Special Education (online course)	3
ED.871.511	Instructional Planning and Management in Special Education	3
ED.871.512	Collaborative Programming in Special Education	3
ED.871.513	Applied Behavioral Programming	3
ED.877.513	Education of Students with Severe Disabilities: Augmentative Communication Systems (online course)	3
ED.877.514	Community and Independent Living Skills	3
ED.877.550	Inclusive Practices for Autism Spectrum Disorders	3

ED.877.551	Survey of Autism and Other Pervasive Developmental Disorders (online course)	3
ED.877.553	Classroom Programming for Students with Autism (online course)	3
ED.877.555	Teaching Communication and Social Skills (online course)	3
ED.877.810	Internship in Severe Disabilities: Induction	3
ED.87x.xxx	Elective [2]	3

[1] May be taken elsewhere.
[2] Subject to the approval of the faculty adviser.

Severe Disabilities with an Emphasis in Applied Behavior Analysis Program Plan

Code	Title	Credits
ABA Coursework		
ED.873.601	Introduction to Applied Behavior Analysis and Special Education	3
ED.873.602	Research Methods: Evaluation, Measurement and Single Case Design	3
ED.873.603	Behavioral Assessment and Intervention for Challenging Behaviors	3
ED.873.604	Behavioral Assessment and Instructional Strategies	3
ED.873.605	Ethics and Professional Conduct for Behavior Analysts	3
ED.873.606	Applications of Applied Behavior Analysis in the Classroom	3
ED.873.607	Supervision and Consultation in ABA	3
Special Education Coursework		
ED.871.510	Legal Aspects, Service Systems, and Current Issues in Special Education	3
ED.874.512	Characteristics of Students with Mild to Moderate Disabilities: Learning Disabilities, Behavioral Disorders, and Intellectual Disabilities	3
ED.877.513	Education of Students with Severe Disabilities: Augmentative Communication Systems	3
ED.877.550	Inclusive Practices for Autism Spectrum Disorders	3
ED.877.551	Survey of Autism and Other Pervasive Developmental Disorders	3
ED.877.553	Classroom Programming for Students with Autism	3
ED.877.555	Teaching Communication and Social Skills	3
ED.892.562	Access to General Education Curriculum with Technology Accommodations	3
Electives		
ED.873.610	Applied Behavior Analysis Practicum I	3
ED.873.611	Applied Behavior Analysis Practicum II	3
ED.873.612	Applied Behavior Analysis Practicum III	3
ED.873.613	Applied Behavior Analysis IV	3

Learning Outcomes

Master's Programs in Special Education

Program Goals

The goals of the School of Education's Master of Science in Special Education certification programs are to:

- Secure recognition from the Council for Exceptional Children (CEC) and approval by the Maryland State Department of Education (MSDE).
- Graduate highly qualified special educators, as measured by the successful completion of coursework, comprehensive exams, graduate projects and presentations, and required state Praxis exams.
- Graduate highly qualified special educators who possess the requisite competencies to effectively educate students with exceptionalities from a diverse range of backgrounds and needs in a variety of educational settings.

Program Objectives

The learning objectives of the School of Education's MS in Special Education certification programs are to:

- To prepare qualified and credentialed special education professionals who are able to apply evidenced-based strategies across settings in which students with disabilities are served.
- To provide multiple opportunities to bridge research and theory with reflective practice.
- To prepare qualified and credentialed special education professionals who possess and exhibit collaborative and ethical behaviors with students and colleagues.
- To prepare qualified and credentialed special education professionals who have acquired the knowledge to access necessary resources and the professional networks that will further their professional development and support their advocacy for children with disabilities and their families.
- To provide cutting edge research and excellent instruction, as evidenced by faculty scholarship and teaching evaluations.

Learning Outcomes

The learning outcomes for graduates of the School of Education's MS in Special Education certification programs are measured across seven content standard areas, as outlined by the Council for Exceptional Children (CEC, 2015).

ADDITIONAL OUTCOMES FOR THE MS SEVERE DISABILITIES IN EMHASIS IN APPLIED BEHAVIOR ANALYSIS

The broad educational objectives of the Master of Science in Special Education-Applied Behavior Analysis are to prepare educators to become effective teachers and leaders in applied behavior analysis and special education. The specific program learning outcomes are listed below:

- Candidates will define, demonstrate, and apply the concepts and principles of behavior analysis within an educational setting as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will utilize research methods to evaluate and measure the effectiveness of intervention and instructional procedures within an educational setting as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will conduct and complete behavioral assessments in order to identify the effective instructional program or behavior reduction plan in an educational setting as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will design, implement, and evaluate an instructional program based on assessment results to increase a desired behavior/skill for an individual student or a group of students in an educational

setting as evidenced by successful completion of coursework and when elected, practicum requirements.

- Candidates will design, implement, and evaluate a behavior reduction program based on assessment results to decrease inappropriate behaviors for individual students or a group of students in an educational setting as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will define and practice within the Professional and Ethical Compliance Code for Behavior Analysts, as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will be able to implement, manage, and practice applied behavior analysis in an educational setting as evidenced by successful completion of coursework and when elected, practicum requirements.
- Candidates will be able to demonstrate knowledge and skills as outlined by the CEC’s Advanced Specialty Set: Special Education Behavior Intervention Specialist
- With the successful completion of coursework and practicum requirements, candidates will take and successfully complete the Behavior Analyst Certification Board (BACB) exam as evidenced by a passing score (set by the BACB).

Post Master's Certificates

Applied Behavior Analysis, Post–Master’s Certificate

The 21-credit Post-Master’s Certificate in Applied Behavior Analysis (ABA)—designed for special educators, administrators, and school psychologists—offers specific coursework and training in the field of applied behavior analysis. Educators who receive preparation in the evidence-based practice of ABA will be better prepared to meet the needs of a growing population of students requiring special education services. Additionally, the ABA certificate will support the career goals of special education teachers and other school personnel who desire this specialized training. Johns Hopkins University is the only school of education in the state of Maryland to offer this specialized certificate. The program also includes an additional 12 credits of practica (4 elective courses) designed to meet the experience requirements for Concentrated Experience Fieldwork (1500 hours) as outlined by the BACB (www.bacb.com (http://www.bacb.com/)). ABA coursework is delivered using a blended learning program of instructional delivery, providing the opportunity for candidates to choose an in-person or online format.

The Association for Behavior Analysis International (ABAI) has verified the course sequence (https://www.abainternational.org/vcs (https://www.abainternational.org/vcs/)) as meeting the coursework and practicum experience requirements for eligibility to take the Board Certified Behavior Analyst (BCBA) examination.® Applicants will have to meet additional requirements to qualify for board certification. Upon completion of the program, graduates will be eligible to apply for certification as a behavior analyst (BCBA), offered through the BACB. It is expected that all students will pursue BCBA certification upon completion of the program. For more information about BCBA certification, please visit www.bacb.com (https://www.bacb.com/) .

Admission Requirements

Applicants must possess a minimum of a graduate degree (e.g., master’s or doctoral) from an accredited university. Please see the BACB website for more information (www.bacb.com (http://www.bacb.com)). Applications will be accepted throughout the year, with a new cohort scheduled to launch each year in the fall.

Program Requirements

*** Information for students entering program for academic year 2021-2022**

Code	Title	Credits
Requirements (21 Credits)		
ED.873.601	Introduction to Applied Behavior Analysis and Special Education	3
ED.873.602	Research Methods: Evaluation, Measurement and Single Case Design	3
ED.873.603	Behavioral Assessment and Intervention for Challenging Behaviors	3
ED.873.604	Behavioral Assessment and Instructional Strategies	3
ED.873.605	Ethics and Professional Conduct for Behavior Analysts	3
ED.873.606	Applications of Applied Behavior Analysis in the Classroom	3
ED.873.607	Supervision and Consultation in ABA	3
ED.873.610	Applied Behavior Analysis Practicum I	3
ED.873.611	Applied Behavior Analysis Practicum II	3
ED.873.612	Applied Behavior Analysis Practicum III	3
ED.873.613	Applied Behavior Analysis IV	3

Learning Outcomes

Upon successful completion of the coursework and practicum components of the certificate, we expect students will:

- Define, demonstrate, and apply the concepts and principles of behavior analysis within an educational setting.
- Utilize research methods to evaluate and measure the effectiveness of intervention and instructional procedures within an educational setting.
- Conduct and complete behavioral assessments in order to identify the effective instructional program or behavior reduction plan in an educational setting.
- Design, implement and evaluate an instructional program based on assessment results to increase a desired behavior/skill for an individual student or a group of students in an educational setting.
- Design, implement, and evaluate a behavior reduction program based on assessment results to decrease inappropriate behaviors for individual students or a group of students in an educational setting.
- Define and practice following standards outlined by the BACB’s Professional and Ethical Compliance Codes for Behavior Analysts (BACB, 2014).
- Implement, manage, and practice applied behavior analysis in an educational setting.

In addition, upon successful completion of the coursework and practicum requirements, students will be eligible to apply for and take the Behavior Analyst Certification Board (BACB) exam.

Clinical Mental Health Counseling, Post–Master's Certificate

This 15-credit post-master's certificate program prepares counselors and other human services professionals for specialized areas of practice in clinical mental health counseling. The program is designed for students who want to complete the academic requirements for their clinical professional counselor license.

Students develop individualized programs of study with the assistance of a faculty adviser. Applicants are required to have completed a master's degree in counseling or a related field from an accredited institution. An internship is available and encouraged, but not required. When an internship is included in the program of study, students must complete a minimum of a 600-hour internship experience.

Admission Requirements

Applicants are required to have completed a master's degree in counseling or a related field from an accredited institution of higher education and submit official transcripts from all accredited post-secondary institutions attended, a statement of personal and career goals, a detailed résumé or curriculum vitae, and two letters of recommendation.

Note: Letters are not required for students currently enrolled in the School of Education's Clinical Mental Health Counseling or School Counseling master's programs.

Program Requirements

Students develop individualized programs of study in consultation with their faculty adviser. The program must be completed within three years.

Evidence-Based Teaching in the Health Professions, Post–Master's Certificate

The 18-credit Post–Master's Certificate in Evidence-Based Teaching in the Health Professions programs is offered through a partnership among five JHU schools: Education, Medicine, Nursing, Public Health, and Business. The goal of certificate program is to develop interprofessional leaders and change agents who will globally transform health professions education.

The program consists of interprofessional educational experiences designed and delivered by faculty teams from the five partner schools. MEHP Fellows are provided opportunities to engage in deep discussions, team projects, and group presentations in an interactive online community. The course schedule and online format is designed to complement the lives of busy health professionals who want to advance their competence as educators.

This program is designed to serve accomplished health professionals with advanced degrees in medicine, nursing, public health, pharmacy, dentistry, and other allied health fields. The curriculum prepares participants (MEHP Fellows) to become effective educators, educational leaders, and educational researchers. Applicants are required to hold an advanced degree (terminal degree preferred) in a health professions related field. All courses are offered in an online format. MEHP Fellows can complete the post-master's certificate within one-to-two years, depending on whether they complete one or two courses per semester.

The emphasis of the certificate is on preparing health professionals to teach effectively. Participants examine learning theories, adult learning and development theories, hypotheses-driven education-based practice, curriculum development, assessment and feedback, instructional strategies, cultural competence, technology integration, and educational scholarship. MEHP Fellows create an educational philosophy to guide their work, a curriculum development project, and an agenda for their educational scholarship.

Program Requirements

(*All courses are three credits unless otherwise indicated*.)

Code	Title	Credits
ED.610.610	Foundation to Innovation: Adult Learning	3
ED.880.629	Evidence-Based Teaching	3
ED.880.631	Ensuring Learning through Assessment and Feedback	3
ED.880.633	Curriculum Development	3
ED.880.635	Instructional Strategies I	1.5
ED.880.637	Instructional Strategies II	1.5
ED.880.661	Educational Scholarship: Design	1.5
ED.880.662	Educational Scholarship: Implementation	1.5
Total Credits		**18**

Note: See also the related Master of Education in the Health Professions (https://e-catalogue.jhu.edu/education/programs/health-professions-online-master-education/).

Learning Outcomes

Certificate Program Goals

As part of the certificate, participants will:

- Apply evidence-based strategies and methodologies to teach in a variety of settings.
- Demonstrate the assessment of learner needs in order to differentiate instruction.
- Effectively plan instruction and teach from an interprofessional perspective.
- Effectively teach as a member of an interprofessional team.
- Provide interdisciplinary learning experiences.
- Incorporate their knowledge of standards and standards-based instructional approaches to teaching.
- Employ collaborative and clinical teaching models.
- Assess learning.
- Effectively integrate current and emerging technology into instruction.
- Demonstrate understanding of adult learning principles, theory, and development.
- Function as reflective practitioners.
- Design, implement, and evaluate curriculum.

- Enhance cultural competence and understand its applicability to effective teaching, learning and communication.
- Advise students effectively.

Certificate of Advanced Graduate Study

- Counseling, Certificate of Advanced Graduate Study (p. 900)

Counseling, Certificate of Advanced Graduate Study

The Certificate of Advanced Graduate Study in Counseling (CAGS) is an advanced 30-credit, post-master's program. Students develop an individualized program of study, guided by faculty advisers. Applicants must have a master's degree in counseling or a related field from an accredited institution. The CAGS requires a 600-hour internship and is designed for students who need more than 15 credits to gain licensure and for those from nontraditional disciplines such as bereavement, massage therapy, or other fields in which counseling skills are valuable for career advancement.

Admission Requirements

Applicants are required to have completed a master's degree in counseling or a related field from an accredited institution of higher education and submit official transcripts from all accredited post-secondary institutions attended, a statement of personal and career goals, a detailed résumé or curriculum vitae, and two letters of recommendation. (*Note: letters are not required for students currently enrolled in the School of Education's Clinical Mental Health Counseling or School Counseling master's programs*.) Eligible applicants will be invited for an interview with the admission committee.

Program Requirements

Students develop individualized programs with specialized concentrations with their faculty adviser's approval.

Code	Title	Credits
Required Course		
ED.861.713	Advanced Treatment Approaches	3
Elective Courses		
Select 27 credits with the approval of the faculty adviser		27
ED.863.875	Internship in Clinical Mental Health Counseling I (Recommended)	
Total Credits		**30**

Graduate Certificates

- Education of Students with Autism and Other Pervasive Developmental Disorders, Graduate Certificate (p. 900)
- Educational Leadership for Independent Schools, Graduate Certificate (p. 900)
- Gifted Education, Graduate Certificate (p. 901)
- Leadership in Technology Integration (Online), Graduate Certificate (p. 902)
- Mathematics/STEM Instructional Leader (PreK-6) (Online), Graduate Certificate (p. 902)
- Mind, Brain and Teaching (Online), Graduate Certificate (p. 903)
- School Administration and Supervision, Graduate Certificate (p. 903)
- Urban Education, Graduate Certificate (p. 904)

Education of Students with Autism and Other Pervasive Developmental Disorders, Graduate Certificate

This fully online 18-credit certificate is designed for certified educators, educational support personnel, parents, and interested members of the community to gain practical knowledge for supporting children and adults diagnosed with autism. The program addresses the wide range of competencies that are necessary for the provision of effective educational programming for students with autism spectrum disorders and other pervasive developmental disorders.

Program Requirements

Code	Title	Credits
ED.871.510	Legal Aspects, Service Systems, and Current Issues in Special Education	3
ED.877.513	Education of Students with Severe Disabilities: Augmentative Communication Systems	3
ED.877.551	Survey of Autism and Other Pervasive Developmental Disorders	3
ED.877.553	Classroom Programming for Students with Autism	3
ED.877.555	Teaching Communication and Social Skills	3
ED.877.550	Inclusive Practices for Autism Spectrum Disorders	3
Total Credits		**18**

Learning Outcomes

Upon successful completion of the program, we expect students will:

- Describe and define the developmental aspects, theoretical background, descriptive characteristics, and diagnostic characteristics of autism (ASD).
- Define, identify, and implement evidence-based practices to address the educational needs of students with ASD within an educational setting (pre-k through 12th grade).
- Utilize research methods to evaluate and measure the effectiveness of behavioral interventions and instructional procedures within an educational setting (pre-k through 12th grade).
- Design, implement and evaluate an instructional program based on assessment results to increase a desired behavior/skill and decrease undesired behaviors for an individual students or a group of students in an educational setting (pre-k through 12th grade).

Educational Leadership for Independent Schools, Graduate Certificate

This fully online graduate certificate program, offered in collaboration with the Association of Independent Maryland and DC Schools (AIMS), serves the needs of directors, heads of schools, principals, and other professionals responsible for the management of non-public schools. The program is also designed to serve independent schools' teachers who aspire to become administrators in an independent school setting. The certificate program comprises 15 graduate credits, with the option of applying them to the Master of Science in Education with a concentration in Educational Studies.

Admission Requirements

Applicants to this certificate program must be educational professionals employed in a K-12 independent school.

Program Requirements

Code	Title	Credits
ED.851.642	Leadership in Curriculum, Instruction, and Assessment for Independent Schools	3
ED.851.643	Supervision and Professional Development for Personnel in Independent Schools	3
ED.851.644	Public Relations, Marketing, and Fund-raising for Independent Schools	3
ED.851.645	Governance of Independent Schools	3
ED.851.646	Business Management and Finance for Independent Schools	3
Total Credits		**15**

Learning Outcomes

Upon successful completion of the program, we expect students will:

- Gain a deep understanding of their budgets, general principles of budget development, and strategies for communicating budgetary issues to their constituencies.
- Develop budgets for their schools that support faculty and staff in meeting their instructional goals.
- Become more proficient supervisors and professional developers with teachers and staff.
- Become more competent consumers and producers of research that is relevant to their jobs.
- Function more effectively and sensitively with faculty, students, staff, parents, and communities of diverse cultures and socioeconomic status.
- Enhance and refine their management skills, including supervision of personnel, strategic planning, conflict management, and fund raising.
- Improve their application of policy and laws to problems or issues that emerge.
- Become competent instructional leaders through the analysis and use of data about their schools and their communities.
- Build proficiency in the use of technology for instruction and administration.
- Become effective mentors and supervisors for their faculty and staff.
- Work effectively as part of a team and develop teams of teachers who provide participatory and democratic leadership to the school.

Gifted Education, Graduate Certificate

The 18-credit Graduate Certificate in Gifted Education is designed to address the needs of educators who are seeking Gifted and Talented Specialist certification in Maryland.

Candidates will study the foundations of gifted education, characteristics of gifted learners, and hone their knowledge and skills in curriculum, instruction, and assessment to meet the needs of academically talented students in their classrooms. As part of the program, candidates will observe gifted students and design and present lessons that are appropriate for gifted students' cognitive and affective needs. The program is designed to meet all state of Maryland and national standards for teaching gifted education.

Program Requirements

The certificate is designed to be completed in three semesters, with students typically taking two courses per semester—though students may elect to take longer. A new cohort begins each year (subject to sufficient enrollments), with courses being delivered online.

Students may combine this certificate with a second certificate to pursue the Masters of Science in Education-Educational Studies. Students interested in the two-certificate pathway to the master's degree must apply for admission into the master's degree and certificate programs concurrently.

Code	Title	Credits
ED.885.501	The Gifted Learner	3
ED.885.604	Social and Emotional Needs of the Gifted	3
ED.885.512	Twice Exceptional Learners	3
ED.885.505	Creativity in Education	3
ED.885.510	Curriculum, Instruction, and Assessment for Advanced Learners	3
ED.885.820	Practicum in Gifted Education and Talent Development [1]	3
Total Credits		**18**

[1] All candidates employed in Maryland who are seeking Gifted and Talented Education Specialist certification from the Maryland State Department of Education will undertake a semester-long practicum experience as the culminating course of their program.

Learning Outcomes

Program Goals

The goals of the program are to prepare educators who are able to:

- Understand the diverse factors that inform the identification and support of K-12 gifted students.
- Create safe, inclusive, and culturally responsive learning environments that support the social, emotional, and cognitive learning needs of diverse groups of gifted K-12 students.
- Use assessments to identify gifted and talented students, assess their progress and modify interventions accordingly, and provide summative data on their accomplishments.
- Be reflective, ethical professionals who support and advocate for gifted K-12 students through collaboration with families and colleagues, use of community resources, and on-going professional learning.

Leadership in Technology Integration (Online), Graduate Certificate

This 15-credit online graduate certificate program prepares students to become proficient at integrating technology for learning in K-12, higher education, and organizational settings.

Program Requirements

Code	Title	Credits
ED.893.508	Technology and the Science of Learning	3
ED.893.632	Data-Driven Decision Making	3
ED.893.634	Technology Leadership for School Improvement	3
ED.893.645	Explorations in Blended and Hybrid Learning	3
ED.893.850	Advanced Applications in Digital Age Learning	3
Total Credits		**15**

Learning Outcomes

Upon successful completion of the program, students will:

- Develop skills for advanced technologies—including e-learning, telecommunications and multimedia-based instruction, tools for instructional management and assessment, and adaptive computer access.
- Integrate technology for learning—applying the new science of learning, 21st century skills, and a constructivist approach to teaching and learning. Apply authentic assessment strategies, differentiated instruction, and appropriate technology tools to accommodate all learners, including those with special needs.
- Build leadership skills for mentoring, consulting, professional development, and systems change.

Program Goals

The goals of the program are for students to:

- Engage in planning, instructional design, and assessment centered around the needs and abilities of learners in a variety of contexts.
- Develop proactive leadership skills for communicating a shared vision for educational technology among all education stakeholders.

Mathematics/STEM Instructional Leader (PreK-6) (Online), Graduate Certificate

The online 18-credit Mathematics and STEM (Science, Technology, Engineering, and Mathematics) Instructional Leader (PreK-6) graduate certificate programs offer a unique opportunity for elementary teachers to enhance their content knowledge and pedagogical content knowledge and to experience leadership opportunities through engaging in the professional development of their peers. The focus of these two graduate certificate programs is to enrich teachers' subject content knowledge in the area of mathematics and the STEM disciplines, and to build upon their leadership potential through inquiry, dialogue, writing, and reflection. Participants will be eligible to receive a graduate certificate in either Mathematics Instructional Leader or STEM Instructional Leader upon satisfactory completion of the program requirements.

The Graduate Certificate Mathematics Instructional Leader (PreK-6) and Graduate Certificate STEM Instructional Leader (PreK-6) programs are approved by the Maryland State Department of Education (MSDE) for those seeking the Mathematics Instructional Leader (PreK-6) or STEM Instructional Leader (PreK-6) endorsement.

Program Requirements

These two online programs are delivered asynchronously. Students may take one or two courses (3-6 credits in total) each semester. The expected timeframe for completion is between 12 and 24 months.

Mathematics Instructional Leader (Pre-K-6) Certificate Program of Study

Students must first take the following 3-credit courses:

Code	Title	Credits
ED.840.600	Instructional STEM Leadership and Professional Development in the Elementary School	3
ED.840.601	Mathematical Foundations in the Pre-K-6 Classroom	3
ED.840.670	Advanced Methods in the Elementary STEM Classroom	3
ED.840.671	Algebraic and Geometric Thinking in the Pre-K-6 Classroom	3
ED.840.672	Advanced Topics in the Pre-K-6 Mathematics Classroom	3
ED.840.673	Practicum in STEM and Mathematical Instructional Leadership	3
Total Credits		**18**

STEM Instructional Leader (Pre-K-6) Certificate Program of Study

Code	Title	Credits
ED.840.600	Instructional STEM Leadership and Professional Development in the Elementary School	3
ED.840.601	Mathematical Foundations in the Pre-K-6 Classroom	3
ED.840.670	Advanced Methods in the Elementary STEM Classroom	3
ED.840.650	Physical Science in an Integrated Pre-K-6 Classroom	3
ED.840.651	Earth and Space Science in an Integrated Pre-K-6 Classroom	3
or ED.840.652	Life Science in an Integrated Pre-K-6 Classroom	
ED.840.673	Practicum in STEM and Mathematical Instructional Leadership	3
Total Credits		**18**

Learning Outcomes

The learning outcomes of the Mathematics and STEM Instructional Leader (Pre-K-6) certificates are as follows. Students in the program will:

- Enhance their abilities to engage diverse learners in mathematics/STEM content.
- Create equitable learning contexts through which all students will be prepared to engage with mathematics/STEM concepts and skills at the PreK-6 grade level and beyond.

- Understand learning theories and their application to the teaching of mathematics/STEM content and pedagogy.
- Network with other mathematics/STEM educators and professionals.
- Develop the ability to approach the learning of new topics in mathematics/STEM through inclusive, equitable, technology-enhanced, problem-based, and student-centered approaches.
- Understand the development of children's mathematics/scientific knowledge.
- Develop age appropriate learning experiences to foster students' critical thinking and ability to learn through classroom activities that:
  - promote the principles of equity, curriculum, teaching, learning, assessment, and technology (National Council of Teachers of Mathematics, 2000) (Mathematics option), or
  - are interwoven and interdisciplinary (National Science Teachers Association, 2003) (STEM option).
- Apply their learning of effective mathematics/STEM educational practices through the creation, implementation, and modification of content-specific and interdisciplinary mathematics/STEM experiences.
- Evaluate and adapt local curricular materials to incorporate authentic problems related to mathematics/STEM concepts and skills and serve as an instructional resource.

Mind, Brain and Teaching (Online), Graduate Certificate

The 15-credit Graduate Certificate in Mind, Brain, and Teaching is designed for PK-16 teachers and instructors, administrators, and student support personnel, as well as organizational leaders, consultants, and policy makers, seeking to explore how research from the learning sciences has the potential to inform the field of education. Courses will promote integration of diverse disciplines that investigate human learning and development that covers the lifespan.

The certificate builds upon basic and applied research from the fields of cognitive science, psychology and brain science, neurology, neuroscience, and education. It provides educators with knowledge of cognitive development and how emerging research in the brain sciences can inform educational practices and policies.

This program is offered in a fully online format. The timeframe for completion is five consecutive semesters spread over two academic years. Students also have the option of completing the program in three semesters, taking two courses in the fall semester, two in the spring, and the final course in the summer. The courses are offered in a sequential order in a cohort structure. Enrolling in individual courses requires the permission of the faculty adviser.

Program Requirements

Code	Title	Credits
ED.887.615	Explorations in Mind, Brain, and Teaching	3
ED.887.616	Fundamentals of Cognitive Development	3
ED.887.617	Neurobiology of Learning Differences	3
ED.887.618	Cognitive Processes of Literacy & Numeracy	3
ED.887.619	Special Topics in Brain Sciences	3
Total Credits		**15**

Learning Outcomes

Program Goals

This certificate aims to expand graduate students' knowledge and evaluation of theoretical and empirical work in the studies related to the learning sciences. Topics include brain structure and function, cognitive development, learning differences, research and practical application of topics such as emotions, attention, creativity, development of language, motivation, and intelligence, as well as the acquisition of skills and concepts related to arts-integrated pedagogy, mathematics, reading, writing, and problem-solving. Implications for education are considered.

During the program, students will:

- Identify areas in the learning sciences that have relevant application to teaching and learning in formal and informal learning settings. Examples include topics such as emotion and learning, memory, attention, cognitive development, learning differences, literacy, and numeracy.
- Identify basic brain structures and functions.
- Interpret findings from basic and applied research studies.
- Synthesize research findings and consider relevance to educational interventions.
- Apply content from courses to educational and professional practices and policies.

School Administration and Supervision, Graduate Certificate

The 18-credit online graduate certificate program option is designed for school-district employed certified teachers and other certified personnel pursuing leadership positions in kindergarten through grade 12 (K-12) school settings and is approved by the Maryland State Department of Education (MSDE) for certification in school administration and supervision (Administrator I). Program options are also appropriate for preparing department chairs, team leaders, or curriculum coordinators. In addition to the standard School of Education admissions requirements, applicants are expected to be:

1. certified teachers or other certified school personnel with 27 months teaching experience,
2. currently employed by a school district or an accredited independent school, and
3. hold a master's degree
4. Identify a person who will serve as a mentor (during final internship course). The mentor must have either Administrator I or II certification and be currently working in an administrative or supervisory capacity. Additionally, the mentor should be willing to coach the intern and to meet on a regular basis to provide assistance to the intern in experiencing the many facets of leadership.

A strong emphasis is placed upon the provision of opportunities for students to develop the skills and competencies that are necessary for successful educational leadership. The internship is the capstone course; it is completed in the school where the student works and is performed under the careful supervision of an in-school mentor and a university supervisor. Candidates must meet with a faculty adviser before they are fully admitted to this certificate program.

The certificate may be taken as a stand-alone certificate program or combined with another School of Education graduate certificate program to earn a Master of Science in Education with a concentration in Educational Studies.

There are two pathways available for the certificate:

1. a flexible option, open to any school-district employed certified teachers and other certified personnel and
2. an option restricted to JHU Teach For America corps members. For TFA corps members who have taken ED.851.705 Effective Leadership and/or ED.851.603 School Law as electives in the TFA program we will count these courses towards the Graduate Certificate in School Administration and Supervision.

Please note that while the program meets the certification requirements for Maryland, the School of Education cannot guarantee that the coursework will meet state credentialing requirements outside of Maryland. It is the responsibility of candidates who are employed in states other than Maryland to confirm with their state credentialing agency what the certification requirements are for their state and whether there is reciprocity with Maryland.

For more information on the pathways within online certificate option, please visit https://education.jhu.edu/academics/graduate-certificate-programs/school-administration-and-supervision/school-administration-supervision-online/.

Note: As of October 15, 2020 the Maryland State Department of Education (MSDE) requires candidates seeking Administrator I certification to complete 3 credits in special education (COMAR 13A.12.04.01). Students may earn credits through the Johns Hopkins University, School of Education or from another accredited institution. The special education credits may be at the Undergraduate or Graduate level.

Program Requirements

Courses in this certificate option are delivered fully online

Code	Title	Credits
ED.851.601	Organization and Administration of Schools	3
ED.851.603	School Law	3
ED.851.705	Effective Leadership	3
ED.852.602	Supervision and Professional Development	3
ED.881.610	Curriculum Theory, Development, and Implementation	3
ED.851.810	Internship in Administration and Supervision [1]	3
Total Credits		**18**

[1] Please note that students must attend an organizational meeting or make arrangements to speak with the faculty program coordinator in the semester prior to registering for the internship.

[2] As of October 15, 2020 the Maryland State Department of Education (MSDE) requires candidates seeking Administrator I certification to complete 3 credits in special education (COMAR 13A.12.04.01). The credits may be earned through the Johns Hopkins University, School of Education or from another accredited institution. The credits may be taken at the undergraduate or graduate level.

Learning Outcomes

Upon successful completion of the program, we expect students will:

- Demonstrate specific content knowledge regarding school leadership.
- Demonstrate knowledge of skills needed for collaborating with staff and others to create a vision and plan of improvement for a school.
- Demonstrate skills and dispositions that are needed to manage and to lead with respect to human and material resources and the total organization of a school.
- Demonstrate knowledge, skills, and dispositions that promote effective school, family, and community engagement.
- Demonstrate the ability to assess and to understand the larger context in which educators work today.
- Demonstrate knowledge of strategies and procedures for working fairly and justly with all stakeholders in a diverse school environment.
- Demonstrate knowledge of strategies and processes for providing a school instructional program for all students that is evaluated for effectiveness based on student achievement and other relevant factors (i.e., attendance, for example).
- Demonstrate skills and strategies related to the safe and orderly operation of a school.

Urban Education, Graduate Certificate

The 18-credit Graduate Certificate in Urban Education prepares students to work in a variety of capacities serving urban students. It offers three tracks depending on the student's focus: pedagogy, partnerships, or policy. All students take a core three-course sequence focused on

1. understanding the characteristics of urban areas and school systems, and
2. learning a core set of theories around learning, leadership and partnerships.

Program Requirements

The program offers three tracks depending on the student's focus: pedagogy, partnerships, or policy. Students in each track take the same three core courses. Each track also includes two specialized courses. Finally, students take one research course. [*Note: This course counts towards the core coursework in the Master of Science (MS) in Education with a concentration in Educational Studies (Individualized Interdisciplinary Program of Study option) for students seeking to apply Urban Education certificate towards the MS degree program*.] Courses are generally offered online, although sections may be offered at the Baltimore Homewood campus if there is sufficient demand. Students can begin the program in any semester.

Program Plan

Code	Title	Credits
Core Courses		
ED.880.611	The Social Context of Urban Education	3
ED.880.613	Teaching, Learning and Leadership for Successful Urban Schools	3
ED.851.630	School, Family, and Community Collaboration for School Improvement I	3
Tracks		
Select one of the following tracks:		6
Pedagogy Track		
ED.880.603	Educating the Whole Child: Teaching to the Developmental Needs of the Urban Child	

ED.810.607	Culturally Responsive Teaching	
Partnership Track		
ED.851.631	School, Family, and Community Collaboration for School Improvement II	
ED.880.617	Urban School Reform	
Policy Track		
ED.851.512	Politics of Education	
ED.880.617	Urban School Reform	
Research Course		
ED.881.611	Action Research for School Improvement	3
or ED.880.624	Evaluation and Research in Education	
Total Credits		**18**

Learning Outcomes

Through course activities and individual preparation, participants will demonstrate an understanding of and competencies in:

- Understanding the interrelationships of race, class and culture in urban classrooms.
- Communicating effectively within the school and parent community.
- Engaging community resources to enhance learning experiences.
- Building leadership capacity within the school setting.
- Linking school and classroom practices with systemic initiatives.
- Understanding the implications of recent research about urban school reform.

Research and Development Centers

Through their extensive research, partnerships, program development, leadership and service activities, the School of Education's research and development centers play an integral role in furthering the school's mission to support and advance the quality of education and human services for the continuous development of children, youth, and adults. Recognized as national leaders in creating new research-based models of instruction, these centers are making lasting improvements in student achievement and are helping to build high quality education systems that give every child the greatest opportunity to learn and succeed.

Center for Research and Reform in Education

(CRRE) works to improve the quality of education for children in grades preK through middle school. It carries out high-quality evaluation studies and reviews of research on educational programs. The center's work has included local, national, and international evaluations on topics such as effective programs for at-risk students, English language learners, leadership development, and online learning. CRRE is dedicated to providing stakeholders with rigorous evidence on what works in education, and publishes a best evidence website, magazine, newsletter, and blog focused on evidence-based reform. To learn more about the work of the Center for Research and Reform in Education, please visit https://education.jhu.edu/crre/

Center for Social Organization of Schools

Founded more than 50 years ago at Johns Hopkins University, the Center for Social Organization of Schools (CSOS) concentrates its research and development resources on the toughest problems in education—improving low-performing schools and the education they offer their students. The center comprises sociologists, psychologists, social psychologists, and educators who conduct research to improve the education system, as well as staff who develop curricula and provide technical assistance to help put this research into practice in some of the most challenging schools and districts across the country. The center's major programs are Talent Development Secondary (a leading partner in Diplomas Now), the Center on School, Family and Community Partnerships, the Everyone Graduates Center, and the Early Learning Partnership. CSOS also houses the Baltimore Education Research Consortium and Stocks in the Future. To learn more about the work of the Center for Social Organization of Schools, please visit https://education.jhu.edu/csos/.

Center for Technology in Education

The Center for Technology in Education (CTE) strives to improve the quality of life of children and youth, particularly those with special needs, through teaching, research, and leadership in the use of technology. Through a unique partnership, CTE combines the research and teaching resources of the School of Education and the leadership and policy support of the Maryland State Department of Education. The center's emphasis on technology in education is based on the belief that children with special needs have a right to the best possible education in the least restrictive environment, and the belief that technology can transform instruction so that all children can maximize their potential. CTE directs much of its work to expanding educators' awareness and skills so they are able to improve their practice and thereby increase student achievement. To learn more about the work of the Center for Technology in Education, please visit https://education.jhu.edu/cte/ .

Institute for Education Policy

The Johns Hopkins Institute for Education Policy (IEP) is dedicated to integrating the domains of research, policy, and practice to achieve educational excellence for all of America's students. Located at one of the nation's premiere research universities, the institute has direct access to leading national and international scholars. At the same time, located in Baltimore, it shares a home with an urban public school system that embodies many of the deepest challenges facing American education. IEP exists to bridge the gap between outstanding research and urgent need. It is committed to translating research on what narrows America's persistent achievement gaps to those on the front lines of policy and practice. Specifically, IEP connects research to the policies and practices that will ensure all children have access to:

- Deep and intellectually challenging curricula
- Highly-effective educators
- School models that meet students' diverse needs

By delivering the strongest evidence to the policy-makers who set the course and the practitioners who teach and lead, IEP hopes to serve the American children who enter our classrooms every day. To learn more about the work of the institute, please visit https://edpolicy.education.jhu.edu/.

Scholarships

School of Education Scholarships

Aegon USA Inc. Scholarship Fund

Established in 1999 by Aegon USA Inc. to provide scholarship support to School of Education and Public Safety Leadership students who demonstrate financial need.

Marlene K. Barrell Scholarship Fund

Established in 2004 to support graduate students in the School of Education.

BGE Scholarship Fund

This fund was established in 1998 with a generous gift from the Baltimore Gas and Electric Company. Scholarships are awarded to students who demonstrate financial need.

Bloomberg Scholars Program

Established in 1995 with a gift from Michael Bloomberg, ENGR ’64 and former chairman of the JHU Board of Trustees. The Bloomberg Scholars Program provides scholarship support to the School of Education. The competitive awards are made to support outstanding adult part-time students in master’s programs.

Edward Franklin Buchner Fellowship in Education

Established in 1987 by the late Louisa Buchner in honor of the late Dr. Edward Franklin Buchner, professor of education and philosophy and first chairman of the university’s College Courses for Teachers, created in 1909. The fellowship is for doctoral candidates in education at the School of Education.

Dorothy Davis Scholarship for Gifted Education

Established in 1987, this scholarship is for graduate students in gifted and learning disabled education and provides half-tuition scholarships.

Decker-Gabor Scholarship

This scholarship provides tuition assistance for undergraduate and graduate students. Established in 1999 by the late Al Decker, former trustee emeritus, and his wife, Virginia Decker, the scholarship honors Stanley C. Gabor, dean of the school from 1982 until his retirement in 1999.

Linda A. Fedor Memorial Scholarship

Established in 2004 by the Fedor family in memory of their daughter and sister, this scholarship supports an internship in the master’s degree in special education program at the School of Education.

Dean Ralph Fessler 100th Anniversary Scholarship Fund

This fund was established in 2011 to provide financial assistance for students in the School of Education.

Isaac and Fannie Fox Scholarship Fund

Established in 1997 by Lillian Bernice Fox, ‘61, the scholarship supports undergraduate students in memory of her parents.

Lillian Bernice Fox Scholarship Fund

Established in 1997 by Lillian Bernice Fox, ‘61, for undergraduate students.

The Stanley C. Gabor Scholarship Fund

Established in 1999 in honor of Dean Emeritus Gabor at the time of his retirement to provide support to Carey Business School and School of Education students who demonstrate financial need.

The Sheldon D. and Saralynn B. Glass Endowed Counseling Scholarship Fund

Established in 2011 with a generous gift from Dr. Sheldon D. Glass and Mrs. Saralynn B. Glass to provide scholarship funds for full-time students enrolled in the Counseling Fellows Program who demonstrate financial need.

Nancy Grasmick Fellowship Fund

Established in 1998 to provide financial assistance to doctoral students in the School of Education.

David and Bessie Greenberg Scholarship Fund

Established in 2010 by Sheldon and Robin Greenberg to provide financial assistance for practitioners in the fields of law enforcement, fire/EMS, emergency management, public health, the military, security, and related public safety endeavors who pursue their degree(s) through the Division of Public Safety Leadership.

Alma D. Hunt/VCM Grant for Special Education

Established in 1999 by an anonymous donor in honor of the donor’s grandmother (1891–1987), a lady whose humble life and generous spirit were underscored by her compassionate concern to put others first, the grant provides tuition assistance to urban students with demonstrated financial need who are in the internship stage of their special education program in the School of Education.

Jumble-Inn Scholarship

The Jumble-Inn Scholarship was established in 1920 by a gift from the Jumble-Inn Committee to benefit women who teach in Baltimore elementary schools, who are residents of the city, and who are candidates for degrees in education. Preference is given to those in need of financial assistance.

Chester L. and Mary Ruth Kiser Scholarship

Established with a legacy gift in 2017, the Chester L. and Mary Ruth Kiser Scholarship Fund supports students in the School Administration and Supervision program.

Mary Levin Scholarship Fund

Established in 1978 for post-master’s degree students by the late Cecelia L. Bass, ’41, and Leon P. Bass in honor of her sister, the late Mary Levin, former executive secretary to the deans of McCoy College and the Evening College, now separately known as the Carey Business School and the School of Education.

Helen Hassie Lichtenstein Scholarship

Established in 1986 by the late Dr. Arthur Lichtenstein, ’30, ’34, in memory of his wife Helen Hassie Lichtenstein, ’39, this scholarship is awarded annually to a doctoral student at the School of Education who exemplifies a commitment to the field of special education and may need institutional support to further their studies. Dr. and Mrs. Lichtenstein, both alumni of the School of Education, were special education professionals in Baltimore public schools for many years.

Kelvin D. Machemer Scholarship

Established in 2004 by Kelvin D. Machemer to provide scholarship support for part-time students in the School of Education.

Michael-Weinstein Scholarship

Established in 1998 by Joel A. and Bonita M. Weinstein, ’72, in memory of her mother and brother, this fund provides financial assistance to students in the School of Education.

Middendorf Endowed Scholarship

Established in 2017 by the Middendorf Foundation in recognition of the 10th anniversary of the School of Education as a standalone school, the Middendorf Endowed Scholarship provides financial assistance to graduate students in the School of Education.

Richard and Marie Conley Mumma Scholarship Fund

Established in 1997 by the estate of Richard and Marie Conley Mumma, this scholarship provides financial assistance to graduate students. Richard Mumma served as dean of McCoy College and the Evening College from 1951 to 1970.

Helen M. and E. Magruder Passano Jr. Scholarship

Established in 1997 by Helen M. Passano, ’78, and E. Magruder Passano, ’67, ’69, and Waverly Inc., the fund provides need-based scholarships.

Pi Lambda Theta Scholarship

Established in 1980 by the Chi Chapter of Pi Lambda Theta, a national honor and professional association in education, to honor Drs. Florence E. Bamberger and Angela Broening. The fund provides financial assistance for graduate education students at the School of Education. Dr. Bamberger served as director of College Courses for Teachers and the summer session during the 1930s and 1940s.

Eugene H. Ryer Scholarship Fund

Established in 1998 in memory of Eugene H. Ryer, who attended evening courses at Hopkins during the 1930s, by his wife, Catharine H. Ryer, and son, David E. Ryer, ’64. The fund provides financial aid for students in the School of Education.

Aileen and Gilbert Schiffman Fellowship

Established in 1996 by a gift from The Hodson Trust in memory of Gil Schiffman, professor emeritus and former director of the Graduate Division of Education, this fellowship is awarded to School of Education doctoral students.

Sonia Beser Snyder and Naomi Beser Scholarship Fund

Established in 1997 by Sonia Beser Snyder, ’44, in memory of her twin sister, Naomi Beser.

William H. Thomson Scholarship

Dorothy S. Thomson established this fund in memory of her husband to provide financial assistance to worthy students in the School of Education.

Anna McClintock Welch Matching Fund

The family and friends of Anna McClintock Welch established a fund in her honor to assist working undergraduate students who require partial financial aid for their education. The fund matches up to 50 percent of the student’s earned income required to cover tuition, fees, and books. Although this is a scholarship program, the donors of the fund encourage recipients to repay the gift and thereby help students in the future.

Eva Orrick Bandell Wilson Memorial Scholarship

Established in 1967 by Eva Orrick Bandell Wilson, who attended classes in the Evening College, the fund provides aid for students with demonstrated financial need in the School of Education.

Alison P. Wolcott Memorial Scholarship

Established in 2008, for the purpose of advancing the service goals and ideals of Alison Paige Wolcott, to help cover the tuition and fees of a student enrolled in the Master of Arts in Teaching (MAT) program.

State Authorization of Distance Education and Higher Education Agencies in Other States

State Authorization of Distance Education

Johns Hopkins University has been approved by the Maryland Higher Education Commission to participate in the National Council for State Authorization Reciprocity Agreements effective February 22, 2016. NC-SARA is a voluntary, regional approach to state oversight of postsecondary distance education.

Higher Education Agencies in Other States

Contact Information for Student Complaint Processes

Johns Hopkins University distance education students can contact the higher education agency in their state, the District of Columbia, and Puerto Rico with questions, comments, or complaints (see https://provost.jhu.edu/education/accreditation-and-academic-compliance/higher-education-agencies-in-other-states/ for a list of state agencies with contact information). The information provided in this link should not be construed as informative of what agencies regulate Johns Hopkins University or in what states the university is licensed or required to be licensed. States, through the relevant agencies or offices of the Attorney General, will accept complaints regardless of whether an institution is required to be licensed in that state.

Disclosures and Policies

NC-SARA

The following disclosures and policies pertains to students who enroll in Johns Hopkins University distance education programs as a condition of participating in NC-SARA.

The Johns Hopkins University encourages the complainant to seek resolutions to the allegations/grievances within the university’s processes. Complainants are to refer to their specific school in order to familiarize themselves with those policies and/or procedures. If a complainant has exhausted JHU grievance procedures and the grievance has not been resolved, the complainant has the right to file a complaint with the Maryland Higher Education Commission, the state portal agency for SARA. The portal agency is responsible for further consideration and resolution.

Maryland Higher Education Commission
6 North Liberty Street, 10th Floor
Baltimore, MD 21201
410-767-3300

http://www.mhec.state.md.us

Texas

The following disclosure pertains to students who enroll in Johns Hopkins School of Education Master of Science in Education Urban Teachers collaboration program offered in Texas. After exhausting Johns Hopkins' grievance/complaint process, current, former, and prospective students may initiate a complaint with THECB by submitting the required forms along with evidence of their completion of their institution's complaint procedures. Complaints may be submitted using one of the following three options:

- Completing the online student complaint form and uploading the required supporting documentation in Portable Document Format (PDF). To access the online student complaint form, use the "Contact Us" link to submit an email with "Student Complaint Against a Higher Education Institution" selected as the Contact Reason. After submitting your email, wait a few moments for the online student complaint form to be automatically presented for your use.
- Sending the required Student Complaint and Release Forms and supporting documentation as PDF attachments by email to studentcomplaints@thecb.state.tx.us.
- Mailing printed forms and documentation to:
  Texas Higher Education Coordinating Board
  Office of General Counsel
  P.O. Box 12788
  Austin, Texas 78711-2788

Facsimile transmissions of student complaint forms are not accepted.

All submitted student complaint forms must include a signed Family Educational Rights and Privacy Act (FERPA) Consent and Release form and THECB Consent and Agreement Form. Submitted complaints regarding students with disabilities shall also include a signed Authorization to Disclose Medical Record Information form.

Process: The first step in addressing a complaint is to follow Johns Hopkins' complaint procedures. If Johns Hopkins is unable to resolve the matter after you have exhausted their complaint and appeal processes, you may file a complaint with this Agency.

SCHOOL OF MEDICINE

Foreword

Medical and biomedical education is a complex mixture of graduate and professional education. Students are expected to master basic principles and theories as well as to obtain sufficient knowledge and experience to practice in their fields. The education must convey the continually expanding body of medical and biomedical science and prepare students for working during a time of rapid change in technology and societal needs.

To meet these educational goals in the program leading to the M.D. degree, schools of medicine must be at once conservative and creative. They may often seem overly conservative, but this can be attributed to the physician's painfully acquired distrust of panaceas. There is a generally accepted need to preserve certain fundamental principles —the axiom, for example, that the rational practice of medicine rests on a firm understanding of the basic medical sciences. Yet the great advances in medicine, the need to reasonably limit the number of years of formal education, the increasing number and complexity of special fields, and the diversity of interests and talents among students all demand continual examination of our educational aims and process.

Old traditions and new methods are characteristics of the Johns Hopkins University School of Medicine, where medical student education to a large degree was founded in response to the highly variable standards of medical education at the time. Hopkins was the first medical school in the United States to require a college degree for admission to the M.D. program, quite a radical idea when the first class entered over one hundred years ago. A college degree is still required, and current admission policies encourage a broad undergraduate education and permit successful applicants to select from a number of options prior to matriculation. The relative flexibility of the original curriculum foreshadowed the even greater number of choices available today. The wide variety of elective courses in the current medical student curriculum allows students to extend their knowledge in special fields of interest and to schedule elective and required clinical courses in a flexible manner.

In addition to the four-year M.D. program, the School of Medicine provides a number of graduate programs in biomedical sciences and related fields that lead to a Ph.D. or Master's degree. Also, selected students are given the opportunity to work simultaneously towards both the M.D. and the Ph.D. degrees.

The diversity of these educational options is detailed in this catalogue.

Mission Statement

The mission of the Johns Hopkins School of Medicine is to prepare physicians to practice compassionate clinical medicine of the highest standard and to identify and solve fundamental questions in the mechanisms, prevention and treatment of disease, in health care delivery and in the basic sciences.

Medical Education Program Objectives

The aim of the predoctoral medical curriculum at the Johns Hopkins School of Medicine is to prepare a diverse group of physician-leaders to improve the health of a diverse population through patient-centered medical practice and by addressing fundamental questions related to human health and disease; health care delivery; the medical humanities; and the basic sciences. As a measure of their competence, every graduate of the Johns Hopkins University School of Medicine will:

The Science and Practice of Medicine

- Apply scientific principles and a multidisciplinary body of scientific knowledge to the diagnosis, management, and prevention of clinical problems.
- Understand the variation in the expression of health and disease through critical evaluation of biomedical research.

Clinical Competence

- Obtain a sufficient level of medical knowledge to understand the basic facts, concepts, and principles essential to competent medical practice.
- Exhibit the highest level of effective and efficient performance in data gathering, organization, interpretation and clinical decision-making in the prevention, diagnosis, and management of disease.

The Social Context of Medicine

- Identify and respond equitably to the social, behavioral, economic and structural factors that influence health, disease, health care, and biomedical science.

Communication

- Demonstrate effective and compassionate interpersonal communication skill toward patients and families necessary to form and sustain effective medical care.
- Present information and ideas in an organized and clear manner to educate or inform patients, families, colleagues and community.

Professionalism

- Display the personal attributes of compassion, honesty and integrity in relationship with patients, families and the medical community.
- Adhere to the highest ethical standards of judgment and conduct as it applies to the health care milieu.
- Demonstrate a critical self-appraisal in their knowledge and practice of medicine, as well as receive and give constructive appraisal from/ to patients, families, colleagues and other healthcare professionals.

Lifelong Learning

- Understand the limits of personal knowledge and experience and will demonstrate the intellectual curiosity to actively pursue the acquisition of new knowledge and skills necessary to refine and improve their medical practice and/or to contribute to the scientific body of medical knowledge.

Medical Student Promotions

The record of each medical student will be reviewed by the appropriate Committee on Student Promotion at scheduled intervals and action will be taken on each student's status. In addition to maintaining good academic standing, medical students are expected to adhere to the accepted standards of professional behavior in their contacts with fellow students, faculty, patients, staff, and others. A student must satisfactorily complete the work of an academic year in all regards and be in good standing before advancement to the next year.

During years one and two, medical students must pass every course in order to be promoted. In either the first or second year, dismissal is automatic if a student receives two failing grades, one failing and one unsatisfactory grade, or unexcused incompletes in two or more courses.

A medical student may repeat only one year of the first two years of the curriculum. During the repeat year dismissal is automatic if the student receives one failing grade or two unsatisfactory grades.

During the clinical years, a failure in a required course/clerkship will be referred immediately to Promotions Committee for discussion and presentation of a remediation plan, unless the student's overall performance requires consideration of dismissal. The student will be permitted to complete any subsequent required course/clerkship they have begun, but no additional required clerkships can be taken until the failure is remediated. Unsatisfactory performance in two courses/clerkships or failure in a subsequent course will result in dismissal from school at the discretion of the Committee on Student Promotion.

The Committee on Student Promotion may make specific recommendations regarding remediation of grades in any year.

Any student facing a potential adverse decision by the Committee on Student Promotion will be invited to address the Committee along with a School of Medicine faculty advocate of their choosing. A family member who is a School of Medicine faculty member may not serve as a student's faculty advisor. The student must put forth an explanation for the deficient performance, any extenuating circumstances, and any other information relevant to the student's fitness to continue the academic program.

A student who is dismissed or subject to another adverse decision affecting their status in the educational program may appeal to the Dean of the School of Medicine. The Dean's review will be based upon procedural grounds alone to guarantee that due process was afforded the student and that published policies were followed appropriately.

A student who has been dismissed may have the right to petition the Committee on Student Promotion for readmission to the program if there is additional information that might demonstrate the student's ability to successfully meet the academic and professional expectations of the school.

In accordance with the high standard of ethical conduct required of a physician, students are expected to refrain from acts of dishonesty which impair the academic integrity of the University. Students whose behavior appears to be unbefitting a physician will be reviewed by an ad hoc committee of the Advisory Board of the Medical Faculty, and such other persons as may be deemed appropriate. The ad hoc committee will be appointed by the Dean, or, in the Dean's absence, the Vice Dean for Education. This committee will decide on the student's status within the school. Students reviewed under such circumstances will have the opportunity to meet with the ad hoc committee in person prior to a decision. A student whose status is affected by a decision of the ad hoc committee will be afforded an opportunity to appeal to the Dean and, thereafter, to the Provost of the University. A complete description of procedures to be followed in disciplinary matters is located in this catalogue in the section titled "Instruction Leading to the M.D. Degree." It is also available in the Student Affairs Office.

At the end of the Fourth Year the candidate's entire record, including both required and elective work, will be reviewed by the Committee on Student Promotion. Those who have satisfactory records and who are judged by the Committee to have demonstrated evidence of personal fitness for a career in medicine will be recommended to the Advisory Board of the Medical Faculty for the degree of Doctor of Medicine. Students must have resolved all outstanding charges of misconduct and violations of academic ethics to be eligible for graduation.

Special Students/Visiting Students

Under special circumstances a limited number of properly qualified persons may be admitted as special students to courses offered by the School of Medicine. Special students will not ordinarily be accepted for enrollment in the required courses leading to the M.D. degree. Exceptions to this policy require the approval of the Vice Dean for Education. Credit will not be given for such work toward the M.D. degree in this school.

Students enrolled in other medical schools who desire clinical clerkships in the School of Medicine are advised that the School reserves the right to strictly evaluate the pre-clinical and clinical education provided by the applicant's own school. Moreover, since clerkship opportunities are necessarily limited, the School must give first consideration to placement of its own students. As a general rule, clerkships are limited to students in LCME-approved schools. Visiting students are also accepted for research opportunities. Enrollment of visiting students is usually limited to one four week period per academic year.

Information on application, fees, and health insurance requirements may be obtained from the Office of the Registrar.

Enrollment

The School of Medicine enrolls full time students for the M.D., Ph.D., and Masters' degrees. Part-time students are not accepted for the M.D. degree. Under special circumstances part-time students may be accepted for graduate study. Tuition is assessed in relation to period of enrollment as specified in the Tuition and Fees section of this circular.

Students may interrupt their course of study to enroll in a combined degree program. Leave of absence status may be requested if a student wishes to temporarily withdraw from the course of study.

Advanced studies program status is a category of full-time enrollment that recognizes the student who interrupts the usual sequence of study to do an additional year (or years) of research or clinical work at Johns Hopkins or another approved site. Students on Advanced studies program status are assessed a minimal registration fee. The Associate Dean for Medical Student Affairs must approve all requests for leave of absence and advanced studies program status.

Interdivisional Studies

Regularly matriculated students throughout the University are eligible to register for credit courses offered by the basic science departments and selected courses in clinical departments providing prerequisites are met and space is available. Admission to the required courses of the medical curriculum require approval of the course director and the Associate Dean/Registrar.

A tutorial program designed for junior and senior undergraduates offers over 100 tutorials in clinical and basic science departments. Divisional registrars can provide additional information.

Johns Hopkins Bloomberg School of Public Health

Courses in the Johns Hopkins Bloomberg School of Public Health are open to students of the School of Medicine without payment of additional fees if consent is obtained from the course instructor and the administrative officers of the School of Medicine. Interdivisional registration forms must be used to enroll in Bloomberg School courses.

Medical students may elect to pursue the Master of Public Health (MPH) program in the Bloomberg School in conjunction with the medical curriculum. The program will consist of eleven months of required and elective courses in the Bloomberg School. This is exactly the same program followed by other individuals pursuing the MPH degree, as described in the catalogue of that School. The specific elective course program will vary according to the special interests of the individual student.

Medical students integrate this special program into their medical curriculum by taking a year's leave of absence on completion of the second or third year. During that year the student is enrolled full-time in the MPH program in the Bloomberg School. Upon completion of the MPH degree program, the student will return to the School of Medicine. The MPH degree is awarded independently upon completion of all MPH degree requirements.

Tuition support for this program may be applied for through the Bloomberg School.

All applications are subject to the approval of the Admissions Committee of the MPH program in the Bloomberg School. School of Medicine approval for all programs must be obtained from the Associate Dean for Medical Student Affairs. Comparable study arrangements are possible also for medical students in other U.S. medical schools.

Opportunities are available for further training within the departments of the School and in numerous graduate degree programs. For those interested, information concerning these programs may be obtained from Admissions Services in the Bloomberg School.

Doctoral Programs

Masters Programs

Post-Baccalaureate Certificate Programs

Combined Degree Programs

General Information

Conduct in Teacher/Learner Relationships (Student Mistreatment Policy)

Please see The Johns Hopkins University School of Medicine Policy on Conduct in Teacher/Learner Relationships and Learner Mistreatment. (https://hpo.johnshopkins.edu/som/policies/501/37867/policy_37867.pdf?_=0.828167584366)

Faculty Traveling Fellowship and Visiting Scholar Fellowship

The Tilghman Traveling Fellowship: In 1976, Dr. and Mrs. R. Carmichael Tilghman established the Tilghman Traveling Fellowship in the Johns Hopkins University School of Medicine.

The Tilghman Traveling Fellowship will be awarded periodically to young members of the medical faculty, who are native-born citizens of the United States, to assist them during a sabbatical leave of up to one year to travel outside the Baltimore area to pursue new theories, methods, and techniques in their chosen discipline.

The recipients are to be selected by a committee composed of the Dean of the Medical Faculty, the Vice Dean for Faculty, the Vice Dean for Research, the Vice Dean for Clinical Investigation, the Associate Dean for Research Administration, and the Directors of the Departments of Medicine and Pediatrics. Both full and part-time members of all departments in the School of Medicine shall be eligible for consideration. Those whose proposed work during the sabbatical year looks toward clinical application will be given the strongest consideration.

Guidelines are available at https://www.hopkinsmedicine.org/research/resources/offices-policies/ora/funding/tilghman.html. Applications may be submitted at any time, but should be submitted at least 60 days prior to the proposed travel.

The Shing Yuk Yau Memorial Fund: The fund was established in 1984 in memory of Shing Yuk Yau by his family and friends. Its purpose is to help defray traveling expenses for visiting Chinese scholars studying medicine at Hopkins. Preference is given to students and faculty studying subjects relating to the brain. The Fund fosters continuing exchanges between the School of Medicine and the Chinese Academy of Sciences.

Lectureships and Visiting Professorships

The Herter Lectureship: In November 1902, Dr. and Mrs. Christian A. Herter of New York offered to the Medical Department of the Johns Hopkins University the sum of $25,000 "for the formation of a memorial lectureship designed to promote a more intimate knowledge of the researches of foreign investigators in the realm of medical science." This gift was accepted by the Trustees of the University on November 3, 1902. According to the present terms of the gift, some eminent worker in the medical sciences is to be asked each year to deliver lectures at the Johns Hopkins University upon a subject with which they have been identified. The selection of a lecturer is to be left to a committee representing the departments of pathology, physiological chemistry, and clinical medicine, and if "in the judgment of the committee it should ultimately appear desirable to open the proposed lectureship to leaders in medical research in this country, there should be no bar to so doing."

William Sydney Thayer and Susan Read Thayer Lectureship in Clinical Medicine: On May 16, 1927, "a group of admirers of Dr. William Sydney Thayer" donated a fund to the Johns Hopkins University to endow a lectureship to be known as "The William Sydney Thayer and Susan Read Thayer Lectureship in Clinical Medicine".

According to the terms of the gift, the income of this fund is to be used to defray the expenses of one or more annual lecturers on subjects "in Clinical Medicine, Pediatrics, Neurology, or border line branches." The selection of the lecturer or lecturers is to be made by a "Committee composed of those who are from time to time occupying the chairs of Professor of Medicine, Pathology, Pediatrics, and Neurology at the Johns Hopkins Medical School."

Hideyo Noguchi Lectureship: In 1929, Dr. Emanuel Libman of New York generously gave the University $10,000 for the establishment of a lectureship in the History of Medicine. In accordance with Dr. Libman's desires, the lectureship was named after the distinguished investigator, Hideyo Noguchi.

The Dohme Lectureship: In June 1916, Mrs. Charles E. Dohme of Baltimore generously offered to pay annually the sum of $1,000 to the Trustees of the Johns Hopkins University to make it possible to offer each year a course of lectures in memory of her deceased husband, Charles E. Dohme, a well-known pharmaceutical chemist of Baltimore. The purpose of these lectures was to promote the development of a more intimate relationship between chemistry, pharmacy, and medicine. The donations made by Mrs. Dohme for this purpose up to the time of her death in December 1937 made it possible to offer, prior to 1938, thirteen courses of lectures by distinguished scientists from either this country or abroad. Upon her death, the University received from her estate a legacy amounting to the sum of $18,500 after the payment of inheritance taxes to be used as an endowment fund, the income of which is to be devoted to the continuation of these lectures.

The lectureship is open to scientists from any part of the world, and the selection of the lecturer is made by a committee representing the departments of pharmacology, chemistry, and medicine.

The Daniel Coit Gilman Lectureship: Through a generous gift from the Avalon Foundation, the School of Medicine has been able to establish a distinguished lectureship designed to further understanding between medical science and the humanities. The lectureship has been named in honor of the first president of The Johns Hopkins University, Daniel Coit Gilman, who was so influential in establishing the graduate character of the School of Medicine. This lectureship was inaugurated in the academic year 1960-61 with the first Gilman Lecture being appropriately given by Dr. Milton Stover Eisenhower, eighth president of the Johns Hopkins University.

The David M. Gould Lectureship in Radiology: In 1962, friends and former associates of Dr. David M. Gould generously created a lectureship in his memory in the field of Radiology. Dr. Gould was a member of the Johns Hopkins faculty from 1947 to 1955. During this time, he left a lasting impression on students and physicians alike for his warm understanding of their daily problems. His unusual skill as a clinical radiologist, teacher, and investigator was admired and respected by all who knew him. At the time of his early death, Dr. Gould was Professor of Radiology at the University of Colorado. The lecturers are selected from scholars distinguished in clinical radiology or related disciplines in accordance with the action of a committee headed by the Chairman of the Department of Radiology.

The Lawson Wilkins Lectureship: Through generous gifts from the colleagues, the students, and the friends of Dr. Lawson Wilkins, it has been possible to establish a distinguished lectureship designed to commemorate his great contribution to pediatric endocrinology.

The David Barap Brin Visiting Professorship in Medical Ethics: This visiting professorship, established by his family and friends, honors the memory and reflects the interests of David Barap Brin (1957-1980). The purpose of this visiting professorship is to foster the appreciation and understanding of ethical issues in basic and clinical research and patient care.

The Samuel Novey Lectureship in Psychological Medicine: The family, friends, and colleagues of Dr. Samuel Novey wished to establish a lectureship to honor his contributions as practicing physician, and as a teacher of psychiatry and psychoanalysis.

At the time of his death, Dr. Novey was Director of Training at the Sheppard and Enoch Pratt Hospital. He had also for many years been actively engaged in teaching and research at the Johns Hopkins University School of Medicine. Because he held joint appointments in the Departments of Psychiatry and Medicine, it seemed especially appropriate to designate the broad field of psychological medicine as the topic to which the lectures would be addressed.

The Willard Sears Simpkins Lectureship Fund An annual lectureship has been established in memory of Willard Sears Simpkins, a former trustee of the John F. Kennedy Institute. Dr. Frederick L. Richardson, former director of the Institute, was instrumental in assuring this memorial. The lecturers are to be selected from scholars distinguished in clinical or scientific aspects of child development or the related medical sciences. The selection of the lecturers will be left to a committee representing the Department of Pediatrics, Physiology, Neurology, and the Behavioral Sciences.

The Sir Henry Hallett Dale Memorial Lectureship: In 1971, the Burroughs Wellcome Fund generously provided an endowment to the Johns Hopkins University School of Medicine for the establishment of an annual Visiting Professorship of Clinical Pharmacology in honor of the distinguished pharmacologist. The purpose of the lectureship is the promotion of a wider appreciation of the importance of clinical pharmacology and its scientific base.

William F. Rienhoff, Jr. Lectureship: In 1971, a grateful patient announced her intention to endow a lectureship in clinical surgery in honor of Dr. William F. Rienhoff, Jr. Through her generous gifts to the University, the Lectureship was formally established in 1973. The lecturers are to be selected from scholars distinguished in clinical or investigative surgery, and the selection will be made by a committee representing the Section of Surgical Sciences.

The Paul Ehrlich Lectureship: In 1957, Dr. Emanuel Libman of New York generously gave to the School of Medicine a sum of $10,000 for the establishment of a lectureship in honor of Dr. Paul Ehrlich. The lectures under this endowment are given each year by the recipients of the Paul Ehrlich Awards and are presented on Young Investigators' Day.

The Alan Coopersmith Visiting Professorship: The family, colleagues, and friends of Dr. Alan Coopersmith have established a lectureship (or in special circumstances, a visiting professorship) in his memory in the field of Pediatric Hematology-Oncology. Dr. Coopersmith was a member of the Pediatric House Staff (1971-1973) and a Fellow in Pediatric Hematology from 1973 until the time of his death on December 5, 1974. His concern for patients and their problems and his incisive approach to complex clinical situations demonstrated his excellence as a clinician. Also evident was his desire to explore the unknowns of medicine by developing investigative skills in the laboratory. Lecturers will be chosen from distinguished scholars in clinical and/or research Pediatric Hematology-Oncology.

The William M. Shelley Visiting Professorship: Following the accidental death of Dr. William M. Shelley in 1974, his colleagues, friends, and former students generously created a Visiting Professorship in his memory, formally established in 1977. A graduate of the Johns Hopkins School of Medicine and former member of the Pathology house staff, Dr. Shelley served on the Pathology faculty from 1960 to 1970. In recognition of Dr. Shelley's commitment and contributions to teaching and residency training, the Visiting Professor spends several days with the residents and staff of the Department of Pathology in addition to delivering a formal lecture. The Visiting Professor is chosen from scholars distinguished in diagnostic pathology by a committee representing Pathology, Surgery, and Oncology.

The Philip Bard Lectureship: In 1978, the friends, colleagues, and family of Philip Bard donated funds to the Johns Hopkins University to endow a lectureship to be known as the Philip Bard Lecture in Medical Physiology.

According to the terms of this endowment, the income from the fund is to be used to defray the expenses of one or more annual lectures in Physiology, particularly as related to Medical Science. The selection of the lecturer or lecturers is to be made by a committee of those who are from time to time occupying the chairs of Physiology, Biological Chemistry, Pediatrics, and Medicine.

The John Howland Visiting Professorship: During the 1930's, the Harriet Lane Board of Managers set aside funds toward a tribute to Dr. John Howland, who, in 1911, succeeded Dr. Clemens Von Pirquet as Professor of Pediatrics at the Johns Hopkins University. He is widely credited with establishing academic pediatrics as it is known today, and with creating the first successful full-time university clinical department in this country. He was a superb clinician, teacher, and clinical investigator, for example, concerning acidosis and diarrhea, and calcium metabolism in tetany and in rickets. The Visiting Professor is to be selected from leading pediatric clinician investigators, recommended by the Academic Affairs Committee of the Department of Pediatrics.

The Henry G. Kunkel Lectureship: The family, friends, and former students of Henry G. Kunkel have endowed a lectureship in immunology commemorating this outstanding immunologist and clinical investigator. Dr. Kunkel, a graduate of the Johns Hopkins University School of Medicine, was Professor and Senior Physician at the Rockefeller University. During the course of his career, he made outstanding contributions to immunology, genetics, and clinical medicine. His demonstration that myeloma proteins closely resemble normal immunoglobulins laid the foundation upon which the present knowledge of immunoglobulin structure and led to the recognition of IgM and IgA as separate antibody classes. Dr. Kunkel's pioneering work in systemic lupus erythematosus and rheumatoid arthritis contributed in a seminal manner to knowledge of the underlying pathogenesis of these autoimmune diseases.

The Leslie Hellerman Lectureship: The Leslie Hellerman Lectureship was established in 1983 by the Department of Physiological Chemistry (now Department of Biological Chemistry) of the Johns Hopkins University School of Medicine, and by the family, friends, and former students of Professor Hellerman (1896-1981) to honor his memory. In 1927, he joined the Department of Physiological Chemistry and formally retired from his productive career in 1961. His pioneering work related to the structure of enzymes, metallo-enzyme function, and the application of mechanistic organic chemistry to explain enzymatic processes.

The Walter E. Dandy Visiting Professorship: Established in 1985, the Walter E. Dandy Visiting Professorship enables outstanding persons to be invited to spend a short period of time at Johns Hopkins reviewing research, meeting with students and faculty, and delivering the Dandy lecture. Among the goals of the professorship is to increase communication between basic and clinical neuroscientists.

Walter E. Dandy was a Hopkins neurosurgeon, whose outstanding research and neurosurgical abilities were summarized by his colleague Warfield Longcope, Professor of Medicine, who wrote that Dandy "had the genius of Lister combined with the brilliant technique of Horsley. He commanded respect and admiration from everyone who came in contact with him, and for those of us who saw him often, these were combined with great affection."

The Ray A. Kroc and Robert L. Kroc Lectureship: In 1985, The Kroc Foundation endowed a visiting scientist and lectureship. The funds are intended for the advancement of multiple sclerosis and other neurological disease research at Johns Hopkins University. Each year an eminent neuroscientist is invited for a visit of several days to meet informally with colleagues and to present a lecture. The selection of the lecturer is made by a committee chaired by the Director of the Department of Neurology.

The Nicholson J. Eastman Professorship and Lecture: Dr. Nicholson J. Eastman, one of the most influential and important American obstetricians, served for more than 20 years as Obstetrician-in-Chief at The Johns Hopkins Hospital and Director of the Department of Obstetrics in The Johns Hopkins University School of Medicine. Dr. Eastman was responsible in large part for the scientific development of obstetrics, and his numerous publications probably represent the first efforts to scientifically delineate what we now recognize as maternal fetal medicine. On behalf of his former students, residents, and friends, the Johns Hopkins University School of Medicine is happy to perpetuate his contributions to obstetrics and gynecology through the Nicholson J. Eastman Professorship and Lecture.

The Israel Zeligman Lectureship in Dermatology: The Israel Zeligman Lectureship in Dermatology was established in 1983 to honor the contributions of Israel Zeligman, M.D., who had been on the faculty of The Johns Hopkins University School of Medicine since 1946. He had been responsible for the teaching of all the residents that had passed through the Department of Dermatology Residency Program at that time. Dr. Zeligman was highly respected in the private practice of Dermatology, and was one who gave freely of his time to promote the clinical training program at The Johns Hopkins University School of Medicine. The Lectureship is supported by revenues generated by donations from former residents and friends.

The Vernon B. Mountcastle Lectureship: Upon the retirement of Vernon Mountcastle from the Hopkins' faculty in 1992, his friends and colleagues contributed funds to establish a lectureship in his name. The lectureship honors the major contributions of Dr. Mountcastle to neuroscience and to Johns Hopkins University. Each year a world-class researcher is invited to the Medical School to lecture on an area relevant to the neurosciences.

The Albert Lester Lehninger Memorial Lectureship: In 1989, family, friends, and former associates of Dr. Albert L. Lehninger established a lectureship in his memory in the field of biochemistry. Dr. Lehninger served as Professor and DeLamar Professor of the Department of Biological Chemistry from 1952 to 1978. He was then appointed University Professor of Medical Science, a position created to honor his distinguished service to the University, his scientific discoveries, and his teaching and writing achievements. He served in this position until his death in 1986. This Lectureship was inaugurated in 1990.

The Dean's Lecture Series: This series of lectures is designed to bring the work of senior members of the faculty to the attention of the Johns Hopkins community.

The Mary Elizabeth Garrett Lectureship: In 1996, the Women's Leadership Council in cooperation with the Dean's Office inaugurated the Mary Elizabeth Garrett Lectureship. The lectureship honors Ms. Garrett, who, in 1890, provided the final funding necessary to open The Johns Hopkins University School of Medicine with the provision that women be admitted under the same terms as prescribed for men.

The Ira and Jean Belfer Lectureship: The Belfer Lectureship was established in 1992 by Dr. and Mrs. Myron Belfer in honor of his parents, Ira and Jean Belfer. Dr. and Mrs. Belfer created the Ira and Jean Belfer Lectureship to allow leaders in the field of pediatric and adult cardiology to come to Johns Hopkins to share their most recent discoveries.

Ira and Jean Belfer established the Peter Belfer Laboratories at the Johns Hopkins Medical Institutions in 1973 in memory of their youngest son, Peter, who was a patient at Hopkins from the age of 6 months until his death from heart disease in 1991 at the age of 25. Since that time, the Belfer family and their friends have displayed unflagging interest and continued generosity in the support of Belfer Laboratories.

The Professor Carol J. Johns Memorial Lecture in Lung Health and Disease: This lecture was established within the Division of Pulmonary and Critical Care Medicine at the Johns Hopkins School of Medicine following the death of Dr. Johns on February 24, 2000.

This lectureship attests to the esteem in which she was held by the division as well as her commitment to excellence, the humanistic missions of the clinicians, and the contribution of women to medicine.

Loan Funds

Harold L. Amoss Loan Fund In 1956, Mrs. Harold L. Amoss and friends of the late Dr. Amoss established an endowment fund with income to be used for loans to aid deserving medical students.

J. G. Boswell Loan Fund This fund provides loans for medical students.

Class of 1932 Student Loan Fund The Class of 1932 established a long term fund for medical students in January of 1983, recognizing thereby the growing need for financial assistance of this kind.

Class of 1934 Revolving Loan Fund Established in 1985 by a 50th Reunion Class to provide long-term loans to needy medical students.

Class of 1935 Revolving Loan Fund Established in 1985 by a 50th Reunion Class to provide long-term loans to needy medical students.

Class of 1949 Student Loan Fund Established in 1985 by the 35th Reunion Class of 1949 to provide loans to needy medical students.

Class of 1952 Revolving Loan Fund Established in 1987 by the 35th Reunion Classes of 1952 to provide loans to needy medical students.

Class of 1959 Loan Fund Established in 1985 by the Class of 1959 for the 50th Reunion to provide loans to needy medical students.

Daniels Memorial Loan Fund This fund was established in 1980 by Josephine J. Daniels, M.D., Class of 1924, in memory of her husband and medical school classmate, Worth B. Daniels, Sr., an internist who practiced and taught in Washington, D.C. for 50 years. Following Josephine Daniels' death in 1990, their sons requested that her name be added to the Fund, which provides loans for financially needy medical students.

Lydia B. Edwards, M.D. Revolving Loan Fund This fund was established in 1999 to provide Loans to students in their 2nd, 3rd, or 4th year of medical school. Dr. Edwards is a 1932 graduate of the School of Medicine.

Filbert Foundation, Inc. Medical Student Loan Fund A $10,000 revolving loan fund established by the Filbert Company Foundation of Baltimore.

Warfield Firor Loan Fund This fund was established in 1962 to provide loans for medical students.

J. Theron Hunter Loan Fund Established by Dr. J. Theron Hunter, of the Class of 1925, to be used for aid in the form of loans to deserving students in the third and/or fourth year classes of the School of Medicine.

The Johns Hopkins Women's Medical Alumnae Association Student Loan Fund Established in 1971 by The Johns Hopkins Women's Medical

Alumnae Association to provide financial assistance to medical students, preferably women.

Robert Wood Johnson Foundation Loan Fund Established to provide aid to needy medical students who are female, members of designated racial minority groups, and/or from rural areas.

W. K. Kellogg Loan Fund Established in 1942 to provide financial assistance to students in the School of Medicine.

Halford B. and Lillian S. Kneale Loan Fund Dr. Kneale was a member of the Class of 1920 who pursued a distinguished career in Urology. He and Mrs. Kneale planned the Fund, which was established after Dr. Kneale's death in July 1983. It is a source of loans to medical students who, as one of the requirements for a loan, must be in the upper third of their class.

Pearl Konttas, M.D. Loan Fund This Loan Fund was established by Dr. Konttas in 1982. She was a member of the Class of 1923 and, during her professional career, served as a pediatrician.

Gertrude D. Maengwyn-Davies Loan Fund This is an endowed loan fund established in 1986. The income from the fund is to provide loans to deserving graduate and medical students interested in research in the basic health sciences.

George C. McKinstry Medical Loan Fund This fund was established to be used for individuals of character who are in need of assistance to complete their medical education.

The Nannie J. (Mrs. Ashby) Monroe Memorial Loan Fund This fund was established by James Monroe, M.D., JHUSOM '34, in memory of his mother, Nannie J. (Mrs. Ashby) Monroe. It provides loans for needy students in the School of Medicine.

Willey H. Norton Loan Fund The Willey H. Norton Loan Fund was established in July 1983 upon the receipt of a bequest from the estate of Dr. Willey H. Norton. Its purpose is to make loan monies available to financially needy students in the School of Medicine. Dr. Norton was a member of the Class of 1910 who pursued a distinguished career in obstetrics and gynecology.

School of Medicine Loan Fund In 1962, the Trustees of the University set aside $100,000 to be used as revolving loan funds for medical students.

Arnold A. Schwartz Fund A loan fund for students in the School of Medicine established in 1964 under the will of the late Arnold A. Schwartz.

Daniel Marsh Shrewbrooks, M.D. Memorial Loan Fund This fund was established to commemorate the life of Dr. Daniel Marsh Shrewbrooks, a member of the Class of 1915. Its purpose is to provide a loan resource for "deserving and needy students of the Johns Hopkins School of Medicine."

Surdna Foundation Loan Fund This fund was established in 1971 to provide loans for medical students.

Miley B. Wesson Memorial Loan Fund The fund was established in 1999, and provides low interest loans to medical students.

Dr. Lawrence R. Wharton Loan Fund Gifts from a grateful patient of Dr. Wharton have established a loan fund for students in the School of Medicine.

Medical Student Advising

The College Advisory Program (CAP) is a student-faculty learning community that strives to support students in foundational clinical skills training, academic and career advising, and the formation of their professional identities. This work is relationally-anchored with longitudinal connections with faculty and peers both within and across class years. CAP offers students a unique opportunity to not only learn the fundamental skills of medicine, including professionalism and humanism, but to also reflect on the transformative experience of becoming a physician with a trusted advisor and small group of peers.

The program strives to:

- Foster a welcoming learning community for all students
- Recognize and appreciate the diversity of lived experiences and unique interests among the student body
- Provide academic and career advising throughout medical school
- Foster social and supportive connections between students, particularly across levels of training
- Promote students' personal well-being, support deepening self-awareness and reflective skills
- Foster scientific inquiry, innovation, and leadership among students
- Assist students in building networks of connections within and outside of the Hopkins medical community to meet their emerging goals
- Provide role models of humanism, professionalism, clinical skills, and life-long learning about self and work

Students and faculty are organized into four colleges, each named after legendary Johns Hopkins faculty: Daniel Nathans, Florence Sabin, Helen Taussig, and Vivien Thomas. Each college is populated by 120 students (30 from each class) and 6 core faculty from a range of specialties. Incoming students meet their faculty advisors at Orientation and these advisors help students make the transition into medical school, support their learning "the roadmap" of medical education, and facilitate exploring interests in a variety of ways over the years of medical school.

In the first semester, CAP advisors serve as the students' small group preceptor for the Clinical Foundations of Medicine course, working with them on a weekly basis for 16 weeks. CAP faculty do not provide summative evaluations of their own advisees to ensure a safe learning environment. In subsequent years, CAP advisors serve as periodic clinical skills teachers and longitudinal career counselors, helping each student to develop professionally, identifying specialty mentors to satisfy emerging interests, and facilitating meaningful dialog on students' defining experiences in becoming health professionals.

Each college, under student leadership, organizes social and community service activities for its students to enhance vertical integration across classes and create a sense of home for each student. The second floor of the Armstrong Education Building is the geographic home of the Colleges, and each College has a dedicated multi-purpose suite for students on this floor.

Named Professorships

The creation of a Professorship in the School of Medicine indicates that a sum of money has been added to the University endowment to generate income which supports a professor in a particular department.

A date in brackets indicates year the named professorship was established. Anthony F Leva

John Jacob Abel Distinguished Service Professor of Pharmacology and Experimental Therapeutics [1962]: Unoccupied

Funded by a bequest in the will of Mrs. Anne D. Hamilton of Columbus, OH. Dr. Abel was the first Professor of Pharmacology (1893-1937) and a member of the original faculty of the School of Medicine.

Martin D. Abeloff Professorship [2007]: Drew M. Pardoll, M.D., Ph.D.

Funding provided by the Seraph Foundation (Henry and Linda Spires, Trustees) for a professorship in the Department of Oncology for the purpose of advancing outstanding cancer research and treatment. The Director of the Department of Oncology, Dean of the School of Medicine, and Seraph Trustees has the discretion of appointment over current and future faculty to this professorship.

ABCD Charitable Trust Professorship in Schizophrenia [2022]: Unoccupied

This permanent endowment will be used to benefit the Department of Psychiatry & Behavioral Sciences.

Leonard & Madlyn Abramson Professorship in Neurodegenerative Diseases [2004]: Ted M. Dawson, M.D., Ph.D.

Funding provided by Leonard and Madlyn Abramson.

AEGON Professorship in Prostate Cancer Research [2009]: Michael Carducci, M.D.

Funding provided by AEGON.

Aetna U.S. Health Care Professorship in Medical Genetics [1996]: Garry Cutting, M.D.

Funding provided by U.S. Healthcare Corporation.

Mohamad E. Allaf Directorship in Minimally Invasive Urology Surgery [2014]: Mohamad E. Allaf, M.D.

Income from the Principal will be used “for a directorship and research program in minimally invasive urology… This gift is to be utilized by Dr. Mohamad E. Allaf at his discretion for salary support, clinical & research programs or other purposes as determined solely by Dr. Mohamad E. Allaf.” The endowment will be held in the Brady Urological Institute in the School of Medicine.

Elizabeth Plank Althouse Professor for Alzheimer’s Research in Psychiatry and Behavioral Sciences [2006]: Constantine Lyketsos, M.D., M.H.S.

Funding provided for researching the cause, prevention, treatment, and cure of Alzheimer’s Disease.

Andelot Professor of Laryngology and Otology [1962]: David W. Eisele, M.D.

This Professorship was funded by a grant from Mr. Lamont DuPont Copeland of Wilmington, DE, a grateful patient of Dr. John Bordley. The Andelot name was selected by Mr. Copeland.

E. Cowles Andrus Distinguished Professorship in Cardiology [2001]: Edward K. Kasper, M.D.

Funding provided by Miriam Andrus, in memory of her husband, E. Cowles Andrus, M.D.

C. Michael Armstrong Professorship [2000]: Gregg L. Semenza, M.D., Ph.D.

Funding provided by Trustee C. Michael Armstrong to support medical research, with initial focus on stem cell research.

C. Michael and S. Anne Armstrong Professorship in Patient Safety [2014]: Allen Kachalia, M.D., J.D.

Funding provided by Trustee C. Michael Armstrong and his wife, S. Anne Armstrong, to support the director of the Armstrong Institute for Patient Safety and Quality.

Atran Family Foundation Endowed Professorship Fund in IBD Research [2021]: Unoccupied

This gift will benefit basic science research in the IBD section of the Division of Gastroenterology & Hepatology as an endowed gift to be held in perpetuity for a professorship bearing the name of the Atran Family Foundation Professor in IBD Research.

Dr. Frances Watt Baker and Dr. Lenox D. Baker, Jr. Deanship of the School of Medicine [1997]: Paul B. Rothman, M.D.

Dr. Frances Watt Baker and Dr. Lenox D. Baker, Jr. are 1966 graduates of the Johns Hopkins School of Medicine. Dr. Frances Baker is a pediatrician and Dr. Lenox Baker is a cardiothoracic surgeon and a member of the Johns Hopkins University Board of Trustees and the Board of Johns Hopkins Medicine.

Edmund F. and Virginia Ball Professorship in Ophthalmology [2005]: J. Fernando Arevalo, M.D.

Funding provided by Mr. Edmund F. Ball. This gift will be used to support research in macular degeneration and other disorders.

Dr. Freida Derdeyn Bambus Professorship in Ophthalmology [2005]: Hendrick P.N. Scholl, M.D., M.A.

Funding provided by Dr. Freida Derdeyn, a retired teacher who became acquainted with the work of the Wilmer Institute through a local group focusing on macular degeneration.

Theodore and Ingrid Baramki Professorship in Reproductive Endocrinology [1994]: Howard A. Zacur, M.D., Ph.D.

Funding provided by Dr. Theodore Baramki, a member of the faculty of the Department of Gynecology and Obstetrics, and the estate of Clarice Reiss. This gift will be used to fund a professorship in reproductive endocrinology.

Philip Bard Directorship in the Department of Physiology [1999]: Unoccupied

Established through commitments made in 1999 by Roger Greif, Philip Davies, Elizabeth B. O’Connor, Vernon Mountcastle, Timothy Harrison, and various donors in honor of Philip Bard, Professor of Physiology, 1933 to 1964.

The Barry Family Professorship in Translational Medicine [2016]: Kenneth Kinzler, M.D.

The gift will be used to benefit the Sidney Kimmel Comprehensive Cancer Center at Johns Hopkins as an endowed gift to be held in perpetuity for purpose of a professorship bearing the name.

Baxley Professor of Pathology [1901]: Ralph H. Hruban, M.D.

A bequest in the will of Dr. Henry Willis Baxley (1824-1876) provided funding for the first endowed chair in the School of Medicine. Dr. Baxley was a graduate of the University of Maryland in 1859, was a southern sympathizer during the Civil War, and following the war practiced his profession in Baltimore and later in Virginia.

Stanhope Bayne-Jones Professorship in Medicine [1974]: David L. Thomas, M.D.

Mrs. Nannie S. Bayne-Jones provided the funding for this Professorship in honor of her husband. Stanhope Bayne-Jones received his M.D. degree from Johns Hopkins in 1914. As an expert in infectious diseases, he served on the faculty of the University of Rochester and Yale Medical School, and he also served as Dean at Yale. In 1942, he was made a brigadier general in the Army Medical Corps and served in many government posts during and following World War II.

The Sheldon B. Bearman, M.D. Professorship in the Russell H. Morgan Department of Radiology and Radiological Sciences [2020]: Pamela T. Johnson, M.D., FACR

A permanent endowment benefiting the Department of Radiology and Radiological Sciences.

Bendann Family Professorship in Ophthalmology [2011]: Esen K. Akpek, M.D.

An endowment fund at the School of Medicine, the income from the principal will be used for faculty support and the endowment will be held in the Wilmer Eye Institute.

Bendann-Iliff Professorship in Ophthalmology [1995]: Nicholas T. Iliff, M.D.

Established by Constance Bendann in honor of the Bendann Family and Charles E. Iliff, III, one of the pioneers of oculoplastics, the surgical restoration of the function and appearance of the eye.

Dr. Bertram M. Bernheim Research Professorship in Surgery [1987]: Christopher Abularrage, M.D.

Funding for this Professorship was provided by members of the Bernheim family to honor Bertram M. Bernheim, a 1905 graduate of the Johns Hopkins School of Medicine. As a member of the faculty of the Department of Surgery, he was responsible for pioneering research which resulted in significant advancements in vascular surgery and blood transfusion.

The Berry-Brem Professorship in Neurosurgery [2017]: Mark Luciano, M.D.

To support faculty support dedicated to hydrocephalus research in the Department of Neurosurgery. Funding was provided by George and Mary Nell Berry who were long-time donors to the department.

George E. Bigelow, Ph.D. Professorship [2014]: Eric Strain, Ph.D.

To support clinical behavioral pharmacology research and teaching with a primary focus on elucidating the mechanisms of addictive disorders and developing treatments.

Alfred Blalock Chair in Surgery [1992]: John L. Cameron, M.D.

Funding for this Chair was provided by contributions from Dr. Blalock's residents. Dr. Alfred Blalock was Director of the Department of Surgery (1941-1964), and is credited with establishing the field of cardiac surgery. He is best known for the creation of the Blalock-Taussig operation for the treatment of cyanotic congenital heart disease.

Bloomberg-Kimmel Professorship of Cancer Immunotherapy [2018]: Dung Le, M.D.

Inaugural recipient Professorship recognizing leadership in the Bloomberg-Kimmel Institute of Cancer Immunotherapy.

Bloomberg-Kimmel Professorship of Cancer Immunotherapy [2018]: Cynthia Sears, M.D.

Inaugural recipient Professorship recognizing leadership in the Bloomberg-Kimmel Institute of Cancer Immunotherapy.

Bloomberg-Kimmel Professorship of Cancer Immunotherapy [2018]: Jonathan Powell, M.D., Ph.D.

Inaugural recipient Professorship recognizing leadership in the Bloomberg-Kimmel Institute of Cancer Immunotherapy.

Marjorie Bloomberg Tiven Professorship in Neurofibromatosis [2017]: Jaishri Blakeley, M.D.

To benefit the Department of Neurology as an endowed gift to be held in perpetuity and which will support a professor in the Neurofibromatosis Therapeutic Acceleration Program.

John E. Bordley Chair in Otolaryngology/Head and Neck Surgery [1990]: Wayne Koch, M.D.

Funding for this Chair was provided by the McCarthy-Cooper Estate, patients, and residents of Dr. John E. Bordley, who was Director of the Department of Otolaryngology for 17 years (1952-1969).

Boury Professorship in Molecular Biology and Genetics [1937]: Unoccupied

This professorship was funded by a bequest in the will of Mr. Louis J. Boury. Mr. Boury was a native of Baltimore who moved to New York where he became a successful grain merchant.

Frederick Brancati Professorship [2012]: Jeanne M. Clarke, M.D., M.P.H.

The income from the principal will be used for faculty support and held in the Division of Internal Medicine in the Department of Medicine.

Breast Cancer Research Professorship in Oncology [1992]: Vered Stearns, M.D.

Funds were provided by Mr. and Mrs. Jeffrey Legum, Mrs. Naomi Legum, grateful patients and friends.

Henry Brem Professorship in Neurosurgery [2014]: Henry Brem, M.D.

The income from the principal will be used for faculty support and held in the Department of Neurosurgery. The professorship was funded by multiple donors with lead donations from Josh Fidler and Dr. and Mrs. Irving Sherman.

The Patricia B. and William T. Bright Professorship in Mental Wellness [2018]: Susan W. Lehmann, M.D.

The fund will support a master clinician and educator who is dedicated to patient care, teaching, and leadership in child psychiatry or geriatric psychiatry, and the professorship will rotate between these two psychiatry disciplines.

Dana and Albert "Cubby" Broccoli Professorship in Oncology [2001]: Elizabeth M. Jaffee, M.D.

Funded by a gift from the Dana and Albert "Cubby" Broccoli Charitable Foundation to be used to endow a Professorship in Oncology, having an initial focus on research and treatment of breast cancer.

William R. Brody Professorship in Radiology [1992]: Zaver M. Bhujwalla, M.D.

Funding for this Professorship was provided by Dr. William R. Brody, who was the Director of the Department of Radiology from 1987 to 1994. In 1996, Dr. Brody was appointed President of the Johns Hopkins University.

Brown Advisory Colleagues Endowed Corporate Professorship Fund at the Institute for Basic Biomedical Sciences [2021]: Cynthia Wolberger, Ph.D.

Funding will be used to benefit the Institute for Basic Biomedical Sciences as an endowed gift to be held in perpetuity for a professorship bearing the name of the Brown Advisory Colleagues Fund.

Thomas M. Brushart, M.D. Professorship in the Division of Hand Surgery [2000]: Dawn LaPorte, M.D.

Funding provided by Arthur H. and Dorothy M. Thornhill to provide faculty support in the Division of Hand Surgery, Department of Orthopaedic Surgery.

John L. Cameron, M.D. Professorship for Alimentary Tract Diseases in the Department of Surgery [2002]: Unoccupied

Established to support a prominent surgeon who devotes their efforts to determining the causes, encouraging prevention and developing management options for diseases of the alimentary tract.

Benjamin S. Carson, Sr., M.D. and Dr. Evelyn Spiro, R.N. Professorship in Pediatric Neurosurgery [2007]: Alan R. Cohen, M.D.

Funding for this professorship was provided by Mr. and Mrs. Donald Spiro to support the Chief of the Neurosurgery Pediatrics Division.

David J. Carver Professorship in Medicine [1974]: Henry R. Halperin, M.D.

Created by Dr. and Mrs. Samuel P. Asper in honor of Mrs. Asper's father, Dr. Asper was a 1940 graduate of the School of Medicine and a member of the faculty. Previous occupants: Drs. Philip A. Tumulty and William Hazzard.

Tom Clancy Professorship in Ophthalmology [2004]: Zelia M. Correa, M.D., Ph.D.

Funding for this professorship was provided by author Tom Clancy, a friend of Johns Hopkins Medicine and Johns Hopkins Board of Visitors member.

Clayton Professorship in Oncology [1993]: Bert Vogelstein, M.D.

In 1947, Dr. and Mrs. William L. Clayton of Houston, Texas created the Clayton Fund, which was used to support projects in cardiovascular disease under the direction of Dr. Benjamin M. Baker, class of 1927. In 1984, the direction was shifted to studies of colon cancer in the Oncology Center.

Donald S. Coffey Professorship of Urology [2004]: Kenneth J. Pienta, M.D.

Funding provided from the bequest of Mrs. Catherine Iola Michael and of the Mr. J. Smith Michael Unitrust.

James P. Connaughton, M.D. Master Clinician Education and Professor for Child and Adolescent Psychiatry [2015]: Unoccupied

The endowed professorship is in alignment with Dr. James Patrick Connaughton's vision, as founder and director of the Johns Hopkins Children's Mental Healthcare Center. The leader installed in this position will espouse Dr. Connaughton's vision of service to children, community, and teaching the next generation of clinicians while developing the best practices to serve this constituency. This endowment will be held in the Division of Child and Adolescent Psychiatry in the Department of Psychiatry and Behavioral Sciences.

Rear Admiral Ray R. Conner and Laura H. Conner Professorship in Pediatrics in the School of Medicine [1997]: Janet R. Serwint, M.D.

Funding provided by the estate of Admiral Conner. The estate stipulates the holder of the chair shall be the Director of the Harriet Lane Clinic.

Sara Miller Coulson and Frank L. Coulson Professorship in Medicine [2011]: Roy C. Ziegelstein, M.D.

Funding provided from income from the principal, which will be used "in honor of Dr. David Hellmann and that the holder of the chair be a physician who exemplifies Dr. Hellmann's passion for clinical excellence and knowing their patient as a person."

Meridith, John, and Joseph Cross Professorship in Ophthalmology [2014]: Jennifer E. Thorne, M.D., Ph.D.

Income from the principal will be used for an endowment professorship in ocular immunology research. The endowment will be in the Division of Ocular Immunology in the Wilmer Eye Institute.

Michael J. Cudahy Professorship in Cardiology [1994]: James L. Weiss, M.D.

Funding provided by Michael J. Cudahy, the founder of Marquette Electronics, which produces medical, diagnostic, monitoring, and clinical information systems.

Charles Cummings, M.D. Professorship in Otolaryngology - Head and Neck Surgery [2005]: Carole Fakhry, M.D.

Funding provided by various donors.

Harvey Cushing Professorship in Neurosurgery [1981]: Henry Brem, M.D.

Funding provided by Mr. and Mrs. John H. Whitney of New York in honor of Mrs. Whitney's father. Dr. Harvey Cushing, founder of the specialty of neurosurgery, was a member of the Johns Hopkins Department of Surgery from 1897 to 1912.

Dalio Family Professorship in Mood Disorders [2010]: Kay Redfield Jamison, M.D.

Funding provided by the Dalio Family to support the understanding, treatment, and dissemination of knowledge of mood disorders and support the position of the department director/s of the Johns Hopkins Mood Disorders Center.

Walter E. Dandy Professorship in Neurosurgery [2004]: Rafael J. Tamargo, M.D.

Funds provided by Walter E. Dandy, Jr.

Daniel & Gayle D'Aniello Professorship in Orthopaedic Surgery [2020]: Carol Morris, M.D.

The funds will be used to benefit the Department of Orthopaedic Surgery for a professorship bearing the name of David & Gayle D'Aniello Professorship.

Richard Bennett Darnall Chair in Surgery [1964]: Jennifer Lawton, M.D.

Funding provided by a bequest in the will of Mrs. Eugenia B. Darnall, whose husband, Richard Bennett Darnall, was an attorney in Annapolis, Maryland.

DeAcetis Professorship [2021]: Andrew Ewald, Ph.D.

This fund will be used to support a professorship in basic science cancer research in the Institute for Basic Biomedical Sciences at the School of Medicine.

Catherine DeAngelis and Jackie Julio Professorship [2020]: Barry S. Solomon, M.D., M.P.H.

This endowment benefits the Johns Hopkins Children's Center and the Department of Pediatrics.

Eugene DeJuan, Sr. Professorship in Ophthalmic Education [2006]: Fasika Woreta, M.D., M.P.H.

Funds provided by Eugene Dejuan, Sr. to help support the residency program at the Wilmer Eye Institute.

DeLamar Professorship in Biological Chemistry [1919]: Unoccupied

Funding provided by a bequest in the will of Capt. Joseph R. DeLamar, who was born in Holland in 1843, came to America after the Civil War, and engaged in the marine salvage business. In 1878, he moved west, entered the mining business, and became the owner of the Utah Mine and Smelting Co. On the advice of his attorney, he divided his $30 million estate between the "three best medical schools of the day: Johns Hopkins, Harvard, and Columbia."

Martin W. Donner Professorship in Radiology [1988]: Karen Horton, M.D.

Funding provided by contributions of current and former faculty, fellows, and house staff of the Department of Radiology. Dr. Martin W. Donner was Director of the Department of Radiology from 1972 to 1987.

Clarence Doodeman Professorship in Cardiology [2006]: Robert G. Weiss, M.D.

Funding provided by Edward and Loretta Downey to honor Mrs. Downey's father, Mr. Clarence Doodeman.

Andreas C. Dracopoulos Professorship in Ophthalmology [2015]: Daniel Finkelstein, M.D.

Income from the principal will be used "to support the work of Dr. Finkelstein and his successors with a preference for the field of bioethics in ophthalmology.

James T. Dresher, Sr., Professorship in Cardiac Surgery [2003]: James Gammie, M.D.

Funding provided by The Dresher Foundation, Inc., to establish an endowed professorship to honor James Dresher, Sr.

The Jim & Patti Dresher & Dresher Foundation Professorship in Medicine [2021]: Samuel Durso, M.D.

Funding will be used to benefit the Johns Hopkins Bayview Medical Center Department of Medicine as an endowed fund bearing the name of The Jim & Patti Dresher & Dresher Foundation Professor of Medicine. This will be conferred upon the Director of the Department of Medicine at Johns Hopkins Bayview Medical Center.

Drew Family Professorship in Orthopaedic Surgery in honor of Alec John Cosgarea [2016]: Andrew J. Cosgarea, M.D.

Funding providing by Ina and Howard Drew to support the research and clinical work in the area of sports medicine being conducted by Andrew J. Cosgarea, M.D. or his successors.

Harry J. Duffey Family Professor of Palliative Care in Oncology [2011]: Thomas Smith, M.D.

Funding provided by Harry J. Duffey, III. Income will be used to establish a full professorship at the School of Medicine, which will support a leading specialist in retinal diseases and, in particular, age-related macular degeneration and/or low vision.

G. Edward and G. Britton Durell Professorship in Ophthalmology [1998]: Elia J. Duh, M.D.

Funding provided by the Altsheler-Durell Foundation, Inc. to establish a full professorship at the School of Medicine, which will support a leading specialist in retinal diseases, and, in particular, age-related macular degeneration and/or low vision.

George S. and Delores D. Eccles Professorship in Ophthalmology [1998]: Peter A. Campochiaro, M.D.

Funding provided by the Eccles Foundation and by Mrs. Eccles for a professorship in Ophthalmology.

Milton T. Edgerton, M.D. Professorship in Plastic Surgery [2011]: Unoccupied

Funding provided by Dr. Milton T. Edgerton for an endowed professorship for the Director of the Department of Plastic and Reconstructive Surgery.

Jules B. Edlow and Joan Edlow Professorship in Diabetes [2017]: Thomas W. Donner, M.D.

The income from the principal will benefit the Division of Endocrinology in the Department of Medicine as an endowed professorship to be held in perpetuity.

Dr. Dorothy Edwards Professorship in Gynecology and Obstetrics [1986]: Andrew J. Satin, M.D.

Funding provided by a bequest of Dr. Dorothy Edwards, who attended the Johns Hopkins School of Medicine from 1917 to 1921. She was a successful gynecologist in Chicago. She specified that the Professorship be known by her title, first name, and last name.

Akef El Maghraby Professorship in Preventive Ophthalmology [1991]: Sheila K. West, Ph.D.

Funding provided by Dr. Akef El Maghraby.

Paul and Christine Englund Professorship [2017]: Unoccupied

The Englund Professorship was established in honor of the late Paul Englund, Ph.D., who served on the faculty of the Department of Biological Chemistry (1968-2010), and his wife, Christine Schneyer Englund, M.D., an adjunct faculty member in the Division of Endocrinology since 1990. Dr. Englund was known for his work on protozoan parasites that cause tropical diseases. The Englund Professorship supports a distinguished tenured faculty member who is widely recognized in the field of biological chemistry for their outstanding, peer-reviewed basic science research.

Eudowood Professorship in Pediatric Immunology [1986]: Jerry A. Winkelstein, M.D.

Funding provided by the Eudowood endowment. Eudowood was the name of a tuberculosis hospital officially known as The Hospital for Consumptives of Maryland, which joined with other institutions to form the Children's Medical and Surgical Center. The Eudowood endowment is managed by a Board of Directors, which provides funding for this and other professorships.

R. Christian B. Evensen Professorship in Urology at the Brady Urological Institute [2014]: Unoccupied

Funding from the principal will be used to fund the Department of Urology at the Brady Urological Institute.

King Fahd Chair in Molecular Medicine and Pediatric Oncology [1993]: Andrew P. Feinberg, M.D., M.P.H.

Funding provided by the Kingdom of Saudi Arabia. The King Fahd Professorships in the School of Medicine represent "an indication of the mutual human interest and mutual support and friendship between the Kingdom of Saudi Arabia and the United States of America."

King Fahd Professorship in Pediatric Oncology [1993]: Alan D. Friedman, M.D.

Funding provided by the Kingdom of Saudi Arabia. The King Fahd Professorships in the School of Medicine represent "an indication of the mutual human interest and mutual support and friendship between the Kingdom of Saudi Arabia and the United States of America."

Saul and Doris Farber Professorship in Clinical Care and Investigation in Pediatric Oncology [2013]: Allen Chen, M.D., Ph.D., M.H.S.

The income from the principal will be used for ongoing work to cure childhood cancers.

Robert and Maureen Feduniak Professorship in Ophthalmology [2009]: Michael Repka, M.D.

Established by Robert and Maureen Feduniak to support patient care and research related to amblyopia, strabismus, and eye diseases of children.

Warfield M. Firor Chair in Surgery [1969]: Pamela A. Lipsett, M.D.

Funding provided by a bequest of Alice Larsen Fink reflecting her "deep regard for Dr. Firor as a fine surgeon, teacher, and humanitarian." Dr. Warfield M. Firor was a distinguished practicing surgeon in the Department of Surgery.

Ken & Sherrilyn Fisher Professorship in Medicine [2012]: Paul Auwaerter, M.D.

The income from the principal will be used to attract, maintain, and empower a world-class clinician and investigator to focus his efforts on improving clinical care and translational research.

Elliot K. Fishman, M.D. Professorship in Radiology [2018]: Elliot K. Fishman, M.D.

It will be used to benefit the Russell H. Morgan Department of Radiology and Radiological Sciences as an endowed gift and held in perpetuity.

Carol Ann Flanagan Professorship in Breast Imaging [2014]: Unoccupied

The income from the principal will be used for the Professorship and will be held in the Russell H. Morgan Department of Radiology and Radiological Sciences.

John A. Flynn Professorship [2015]: Daniel J. Brotman, M.D.

The income from the principal will be used "to underwrite Dr. Flynn's current and future priorities in medical education and eventually will help advance the careers of young clinicians will see to emulate Dr. Flynn's approach to the field."

Blanket Fort Foundation Endowed Professorship in Pediatric Population Health & Health Equity Research [2022]: Sara B. Johnson, Ph.D., M.P.H.

The gift will be used to benefit the Johns Hopkins Children's Center & Department of Pediatrics as an endowed gift to be held in perpetuity for a professorship bearing a name to be mutually agreed upon by the Donors & the University. This Professorship will support faculty working to address health & education disparities for children.

Nichols J. Fortuin, M.D. Professorship in Cardiology [2008]: Ronald D. Berger, M.D., Ph.D.

Funded by contributions from patients and friends of Dr. Fortuin.

Frank J. Frassica Professorship in Orthopaedic Surgery [2011]: Mei Wan, Ph.D.

Funding provided by departmental unrestricted dollars, as well as donors who consented to move their gifts from unrestricted accounts to the Professorship.

Jonas Friedenwald Professorship in Ophthalmology [2004]: Deepak Edwards, M.D., F.A.C.S.

Named for Jonas Friedenwald, who was an associate professor at Wilmer. He was the father of experimental ophthalmic pathology and made key observations in glaucoma and ocular pharmacology.

James F. Fries Professorship in Medicine [2006]: Lisa A. Cooper, M.D., M.P.H.

Funding provided by James F. Fries, M.D. and Sarah Tilton Fries, M.P.H. to support a faculty member engaged in health outcomes research, clinical epidemiology, and/or health policy research.

Michael J. Garil Fund in Leukemia Survivorship [2014]: Kathy Ruble, Ph.D., MS

The income from the principal will be used to develop a cutting-edge program of care and discovery that will lead to important new approaches to predicting and preventing late effects in patients of all ages with leukemia.

Robert Garrett Professorship in Pediatric Surgery [1964]: David Hackam, M.D.

Funding provided by the Garrett Fund for the surgical treatment of children founded by Mary F. Jacobs.

William Thomas Gerrard, Mario Anthony Duhon, and Jennifer and John Chalsty Professorship in Urology [1998]: William B. Isaacs, Ph.D.

Funding provided by Mr. William Thomas Gerrard and Mr. and Mrs. John Chalsty for the Department of Urology.

James P. Gills Professorship in Ophthalmology [1999]: Neil Bressler, M.D.

Funding by James P. Gills, who trained at Johns Hopkins Hospital.

James Gipson Professorship in Ophthalmology [2012]: Unoccupied

The income from this endowment will be combined with the income from the permanently restricted The James Gipson Professorship in Ophthalmology. Income from the principal will be used to support other faculty.

James Gipson Professorship in Ophthalmology II [2012]: Unoccupied

The income from the principal will be used to support the work of other faculty members and will be held at the Wilmer Eye Institute in the School of Medicine.

The Helen Larson and Charles Glenn Grover Professor in Ophthalmology [2017]: Jeff Mumm, Ph.D.

Funding provided by the Grovers' estate and matched by the State of Maryland E-Nnovation Initiative Fund for the purpose of macular degeneration research at the Wilmer Eye Institute.

Given Foundation Professorship in Pediatrics [1962]: Unoccupied

Funding provided by the Irene Heinz Given and John LaPoute Given Foundation of New York for the purposes of medical research and teaching.

Morton F. Goldberg Professorship in Ophthalmology [1999]: Jennifer Elisseeff, Ph.D.

Funding provided by a number of unrestricted bequests to the Wilmer Institute.

David M. Goldenberg Family Chair in The Institute for Brain Protection Sciences at Johns Hopkins All Children's Hospital [2021]: George Jallo, M.D.

The David M. Goldenberg Family Foundation Chair within the Institute for Brain Protection Sciences at Johns Hopkins All Children's Hospital was established in 2021. This gift was matched 1:1 by the Institute for Brain Protection Services.

David Goldfarb, M.D. Research Professorship in Vascular Surgery [2014]: James Black, III, M.D.

Funding provided by C.R. Bard for endowed professorship om Vascular Surgery.

The Sol Goldman Professorship in Pancreatic Research [2015]: Michael G. Goggins, M.B., M.D.

Established by the Department of Pathology in honor of the Goldman Family to support a faculty member focused on pancreatic cancer research.

Vincent L. Gott, M.D. Professorship [2000]: Brett Mettler, M.D.

Funding provided by various residents, patients, and friends of Vincent L. Gott.

Dr. E. F. Gordon Professorship [2020]: Malcolm V. Brock, M.D.

This endowment benefits the Division of Thoracic Surgery in the Department of Surgery.

Katherine Graham Professorship in Ophthalmology [2002]: Julia Haller, M.D.

Funded by a major bequest from the Katherine Graham estate.

Lou & Nancy Grasmick Professorship in Cardiology [2021]: Wendy Post, M.D.

Funding will be used to benefit the Division of Cardiology as an endowed gift to be held in perpetuity for a professorship bearing the name of Lou & Nancy Grasmick Professorship in Cardiology. It will be filled by a qualified faculty member who has demonstrated a commitment to women professionals inn Cardiology.

Alex Grass Professorship in Oncology [2003]: David S. Ettinger, M.D.

Funding provided by Mr. Alex Grass of Wormsleyburg, PA.

Daniel B. & Florence E. Green Endowed Professorship in Ataxia [2021]: Liana S. Rosenthal, M.D.

This gift will be used to benefit the Department of Neurology as an endowment to be held in perpetuity for a professorship bearing the name of Daniel B. and Florence E. Green Professorship in Ataxia. It is the donor's request that the professorship holder engaged in novel research (including pilot projects) with a basic science & translational focus & whenever possible, that the research explores the changes in the brain which contribute to cerebellar ataxia, including cerebellar ataxia of unknown etiology, and improve the quality-of-life of those with cerebellar ataxia.

Joseph E. Green Professorship in Macular Degeneration and Other Retinal Diseases [1997]: Morton F. Goldberg, M.D.

Funding provided by a bequest from Joseph E. Green to the Department of Ophthalmology, which will support research activities by a faculty member in macular degeneration.

W. Richard Green Professorship of Ophthalmology [2007]: Richard D. Semba, M.D., M.P.H.

Funding provided by various donors to support a faculty member in Ophthalmology.

Erwin and Stephanie Greenberg Professorship of Urology [2017]: David J. McConkey, Ph.D.

Established to benefit the Johns Hopkins Greenberg Bladder Cancer Institute.

John W. Griffin, M.D. Directorship for the Brain Science Institute [2010]: Jeffrey Rothstein, M.D.

Income from the principal will be used to provide faculty support and "advance the work of the Brain Science Institute. Through the support provided…the director will be better able to communicate with and serve a large and diverse neurosciences community, while making decisions efficiently and moving targeted programs along rapidly."

John W. Griffin, M.D. Professorship in Neurology [2015]: Justin McArthur, M.D.

Funded by Jeffrey and Harriet Legum and will be held in Neurology and Brain Sciences.

John G. Griffith, M.D. Professorship [2019]: Jenell S. Coleman, M.D., M.P.H.

Funding provided by Dr. and Mrs. Lawrence Griffith, The Griffith Family and various donors for the support of a professorship in Gynecology honoring former faculty member, Dr. John Griffith.

Burton E. Grossman Professorship in Ophthalmology [1998]: Oliver Schein, M.D.

Funding for this professorship was provided by Dr. and Mrs. Burton Grossman to ensure the integration of the progression of specific ophthalmologic diseases and to develop techniques for preventing these diseases.

Guerrieri Family Professorship in Ophthalmology [1998]: Donald Zack, M.D.

Funded by the Guerrieri Family Foundation for the Center for Genetic Engineering and Molecular Ophthalmology at the Wilmer Institute.

Raj and Kamla Gupta Professorship in Infectious Diseases [2014]: Robert Bollinger, M.D.

The income from the principal will be used for scholarships for faculty support and held in the Division of Infectious Diseases in the Department of Medicine at the School of Medicine.

Willard and Lillian Hackerman Professorship in Oncology [1981]: Marikki K. Laiho, M.D., Ph.D.

Funding provided by Mr. and Mrs. Willard Hackerman. Mr. Hackerman is a graduate of the Johns Hopkins University School of Engineering and was a long-time trustee of the University. He is the CEO of Whiting-Turner Construction Co. and founded the Whiting School of Engineering.

Karl H. Hagen Professorship in Ophthalmology [1998]: Jiang Qian, Ph.D.

Funding provided by Mr. Karl H. Hagen to provide faculty support in the Department of Ophthalmology.

Haller Professorship in Pediatric Neurologic Diseases [1996]: Carl E. Stafstrom, M.D., Ph.D.

Funding provided by a bequest from Miss Virginia Doriot Haller of Salem, VA, whose purpose is to support research with a primary focus on genetic, developmental, and environmental factors in the neurologic diseases of children.

Bayard Halsted Professorship in Cell Biology and Anatomy [1943]: Unoccupied

Funding provided by a bequest in the will of Mr. Edward Bayard Halsted, a retired stock broker in New York City. "The income thereof shall be forever devoted to research work for the advancement of knowledge as to the nature, causes, means of prevention, and cure of such maladies in need of further study and investigation." Previous occupants: Drs. David Bodian and Thomas D. Pollard.

William Stewart Halsted Professorship in Surgery [2000]: Unoccupied

Funding provided by Department of Surgery's Unit Executive Fund.

Jacob Handelsman Professorship in Surgery [2004]: Fabian Johnston, M.D.

Funding provided by grateful patient of Dr. Handelsman.

Joseph S. and Esther Handler Professorship in Nephrology [2017]: Paul A. Welling, M.D.

To benefit the Division of Nephrology in the Department of Medicine as an endowed gift to be held in perpetuity for the advancement of bench research in renal medicine.

Michael and Ann Hankin and Partners of Brown Advisory Professor in Scientific Innovation [2013]: James Berger, Ph.D.

The income from the principal will be used to create a professorship what will be held in the Institute for Basic Biomedical Sciences.

James C. Harris, M.D. Professorship in Developmental Neuropsychiatry & Neurosciences Reseach [2021]: Unoccupied

The gift will be used to benefit the School of Medicine, Department of Psychiatry & Behavioral Sciences, Division of Child & Adolescent Psychiatry as an endowed gift to be held in perpetuity for a professorship.

Elizabeth Treide and A. McGehee Harvey Chair in The History of Medicine [1992]: Harry M. Marks, Ph.D. (Associate Professor)

Funding provided by Dr. and Mrs. Harvey, Dr. Harvey's colleagues in the Department of Medicine, and many friends and relatives of the Harveys. This Professorship was placed in the Department of the History of Medicine to recognize Dr. Harvey's (class of 1934) second interest in history after 27 years as Director of the Johns Hopkins Department of Medicine. Mrs. Harvey (class of 1943) was named to recognize her and other faculty wives for their contributions to this Institution.

Isaac Morris and Lucille Elizabeth Hay Professorship in Embryology [1996]: Peter Devreotes, Ph.D.

Funding provided by a commitment made in 1996 by Elizabeth D. Hay in memory of her parents.

Kyle Haydock Professorship in Oncology [2003]: Donald Small, M.D., Ph.D.

Endowed by author Tom Clancy memorializing a young friend who lost his life to cancer. To be used in perpetuity by a distinguished faculty member in Oncology for the purpose of advancing outstanding childhood cancer research and patient care.

David B. Hellmann, M.D. Endowed Professorship [2021]: David B. Hellmann, M.D.

The gift will be held in perpetuity to support the Johns Hopkins human again process. It will benefit the Johns Hopkins Center for Innovative Medicine in the Department of Medicine, under the direction of Dr. David B. Hellmann.

George J. Heuer Professorship in Neurosurgery [2014]: Allan J. Belzberg, M.D.

Income from the principal will be used to alleviate pain and suffering from neurosurgical diseases, and will be held in the Department of Neurosurgery.

Sherlock Hibbs/Eugene VanDyke Professorship for Research [2004]: Florin Selaru, M.D.

Fund established in the School of Medicine to be used to provide a professorship that will reside in the Dean's Office.

Frank Hinman, Jr. Professorship in Urology [2013]: Bruce J. Trock, Ph.D.

Endowment established from the estate of Dr. Frank Hinman to benefit urologic research at The Brady.

Hoehn-Saric Professorship for OCD and Anxiety [2014]: Gerald Nestadt, M.D., B.Ch., M.P.H.

Income from the principal will benefit the Rudolf Hoehn-Saric, M.D. Professor in OCD/Anxiety Disorders Research. The first recipient, Gerald Nestadt, M.D., Co-director of the OCD Clinic and Professor of Psychiatry and Behavioral Sciences, will use this funding for research in the areas of Obsessive-Compulsive Disorders, Anxiety Disorders, Tourette's and Attention Deficit Disorder. This endowment will be held in the Department of Psychiatry and Behavioral Sciences at the School of Medicine.

Charles J. Homcy, M.D./Simeon G. Margolis, M.D. Professorship [2015]: Alex Kolodkin, Ph.D.

The income from the principal will provide direct salary support for the Homcy/Margolis Professor for research and teaching in the Department of Neurosciences at the school, and the teaching of undergraduate and graduate neuroscience at the Krieger School of Arts and Sciences.

Rita Honey-Hiers Assistant Professorship for Tarlov Cyst Disease [2017]: Timothy F. Witham, M.D.

For faculty support for the professor focusing on Tarlov Cyst Disease in the Department of Neurosurgery. Funding provided by Charlie Scheeler and Mary Ellen Pease and a matching gift from the State of Maryland E-Nnovation grant.

Johns Hopkins Family Professorship in Oncology Research [2004]: Robert Brodsky, M.D.

Funds provided by the descendants of the parents of Johns Hopkins.

The Johns Hopkins Institute for Excellence in Education Professor of Medicine [2014]: Joseph Cofrancesco, M.D.

To be held by the Director of the Institute for Excellence in Education.

John Eager Howard Chair in Endocrinology and Metabolism [1990]: Paul W. Ladenson, M.D.

Funding provided by family, friends, colleagues, and grateful patients of Dr. John Eager Howard (class of 1928), who was a long-time member of the Johns Hopkins faculty and Chief of the Division of Endocrinology. He was a superb internist, as well as investigator. His research contributions include the elucidation of the relationship between unilateral renal disease and high blood pressure, and the role of a protein factor in urine in preventing the formation of kidney stones.

Ralph H. Hruban, M.D. Professorship in Pancreatic Cancer Research [2017]: James R. Eshleman, M.D., Ph.D.

Funding provided by friends of Dr. Ralph Hruban, in gratitude, to support a faculty member focused on pancreatic cancer research in the Department of Pathology.

R. Dale Hughes Professorship in Oncology [1999]: Samuel Denmeade, M.D.

Established through commitments made in 1999 by R. Dale Hughes and Frances M. Hughes and other donors. Mr. Hughes is a grateful patient of the Oncology Center and made this commitment because of the care he has received since 1987.

David S. Hungerford, M.D. Chair in Orthopaedic Surgery at Good Samaritan Hospital [2001]: Unoccupied

Established through a commitment made in 1997 by Good Samaritan Hospital and patients of Dr. David S. Hungerford.

Craig B. Huston Professorship [2013]: Unoccupied

The income from the principal will be used for research in eye diseases and will be held in the Wilmer Eye Institute at the School of Medicine.

Charles E. Iliff III, M.D. Professorship in Ophthalmology [2005]: Unoccupied

Funding for this professorship provided by Dr. Helen Ossofsky-Iliff to honor Dr. Charles Iliff and to provide support for research which will improve the outcome of ophthalmic surgery.

Institute for Excellence in Education Professorship [2014]: Joe Cofrancesco, M.D.

To be held by the Director of the Institute of Excellence in Education.

Julius H. Jacobson, II, M.D. Professorship in Vascular Surgery [1998]: Bruce Perler, M.D.

Funded by Julius H. Jacobson, II, M.D. to establish a chair in vascular surgery in the Department of Surgery.

Jakurski Family Directorship [2013]: Alan Partin, M.D.

Income from the principal will be used to support the Director of the Brady Institute.

Janssen/Strauss-Halbreich Professorship in Digestive and Motility Disorders [1998]: Unoccupied

Funding provided by Janssen Pharmaceutical, Inc., Jeremy and Nancy Halbreich, Theodore H. Strauss, Janie Strauss McGarr and various donors to create a professorship at the Marvin M. Schuster Center for Digestive and Motility Disorders at the Johns Hopkins Bayview Medical Center.

Jonathan & Marcia Javitt Rising Professorship [2021]: Cindy Cai, M.D.

The gift will be used to benefit the Wilmer Eye Institute as an endowed gift to be held in perpetuity for the support of a faculty member at the beginning of their career bearing the name Jonathan and Marcia Javitt Rising Professorship in International Ophthalmology.

Robert D. Jeffs Professorship in Pediatric Urology [2010]: John P. Gearhart, M.D.

Funding provided by the Zanvyl and Isabelle Krieger Fund. Income from the principal will be used for a professorship in pediatric urology. The endowment will be held in the Brady Urological Institute at the School of Medicine.

Jennison-Novak Families Professorship in Neurosurgery [2017]: Chetan Bettegowda, M.D.

Income from the principal will benefit the Department of Neurosurgery as an endowed gift to be held in perpetuity and used toward a professorship bearing the name of The Jennison & Novak Families Professorship.

Allan and Claire Jensen Professorship in Ophthalmology [2022]: Megan Collins, M.D., MPH

This endowment will benefit the Wilmer Eye Institute.

Richard T. & Frances W. Johnson Professorship in Neurology [2021]: Ellen Mowry, M.D., MCR, FAAC, FANA

To be established by commitments made by the family and colleagues of Richard T. Johnson. Dr. Johnson was a member of the Department of Neurology when it was created in 1969 and served for many years as director of the department.

Howard J. Jones, Jr., and Georgeanna Seeger Jones Professorship [2013]: James Segars, M.D.

Funding provided by the estate of Dr. and Mrs. Lonnie Burnett. Income from the principal will be used for the "unrestricted use and benefit…to establish an endowed chaired professorship." The endowment will be held in the Department of Gynecology and Obstetrics at the School of Medicine.

The Dr. Sydney H. Kane, Emma B. Kane, David M. Kane, and Family Endowment Fund [2013]: Unoccupied

The income from the principal will be used for research in newborn medicine and will be held in the Children's Center at the school in honor of the accomplishments of the late Dr. Sydney Kane, a noted neonatologist and research scientist.

Sheikh Khalifa Professor in Stroke Detection and Diagnosis in the Department of Neurology [2020] Argye E. Hillis, M.D., M.A.

Will benefit the Sheikh Khalifa Stroke Institute at the Johns Hopkins School of Medicine. There are two endowments which will provide an annual funding stream, in perpetuity, to advance the goals of the Institute, with a focus on research, teaching & clinical work that can be translated to the UAE whenever possible. The two professorships will provide additional faculty with opportunities and resources to achieve the research objectives of the Sheikh Khalifa Stroke Institute.

Sheikh Khalifa Professor in Stroke Treatment & Recovery [2020]: Preeti Raghavan, M.D.

The funding will benefit the Sheikh Khalifa Stroke Institute at the Johns Hopkins School of Medicine. There are two endowments which will provide an annual funding stream, in perpetuity, to advance the goals of the Institute, with a focus on research, teaching & clinical work that can be translated to the UAE whenever possible. The two endowments, along with a third to be funded in 2021, will support the work of the Director and two Center Directors, and will provide additional faculty with opportunities and resources to achieve the research objectives of the Sheikh Khalifa Stroke Institute.

Earl D. Kidwell, Jr., M.D. Professorship in Ophthalmology [2018]: Unoccupied

The funding will be used to support the academic and research activities of the Johns Hopkins University School of Medicine Department of Ophthalmology in the Wilmer Eye Institute.

Sidney Kimmel Professorship [2014]: Theodore DeWeese, M.D.

The income from principal will be used for an endowed professorship to provide research initiatives within Radiation Oncology & Molecular Radiation Sciences. The endowment will be held in the Department of Radiation Oncology & Molecular Radiation Sciences in the School of Medicine.

KKESH/Wilmer Professorship in International Ophthalmology [2010]: Ashley Behrens, M.D.

The King Khaled Eye Specialist Hospital (KKESH) is the largest eye hospital in the Kingdom of Saudi Arabia, and is one of the top-ranked medical facilities in the Middle East.

Knights Templar Eye Foundation Professor of Ophthalmology (KTEF) [2016]: Unoccupied

An endowed gift to be held in perpetuity to benefit the Wilmer Eye Institute

Henry J. Knott Directorship of the McKusick/Nathans Center for Medical Genetics and Professorship in Medical Genetics [1999]: Ambroise Wonkam, M.D.

Funding provided by Marion I. Knott in honor of her late husband, who served as a Trustee of the Hospital and, with his wife, was an extremely generous supporter of Hopkins.

Marion I. Knott Directorship of the Oncology Center and Professor in Oncology [1999]: William Nelson, M.D.

Funding provided by Marion I. Knott in honor of her late husband, who served as a Trustee of the Hospital and, with his wife, was an extremely generous supporter of Johns Hopkins.

Eric Kobren Professorship in Applied Health Informatics [2019]: Mohamed A. Rehman, M.D.

Funding provided by Eric and Catherine Kobren to endow and sustain the professorship holder, providing resources for research and other academic pursuits.

Catherine Kobren Professorship in Patient Safety and Quality [2019]: Angela Green, Ph.D., RN

Funding provided by Eric and Catherine Kobren to endow and sustain the professorship holder, providing resources for research and other academic pursuits.

Arlene and Robert Kogod Professorship in Mood Disorders in the Department of Psychiatry [2008]: Peter P. Zandi, Ph.D.

Funding will be provided by Arlene and Robert Kogod to provide the financial support and stability for research, education, and clinical activities of individual faculty members in the Department of Psychiatry.

Everett and Margorie Kovler Professorship in Pancreas Cancer Research [2009]: Unoccupied

Funding provided by Everett and Marjorie Kovler to provide support of pancreatic cancer research. The endowment will be held in the Sidney Kimmel Comprehensive Cancer Center at the School of Medicine.

Peter and Judy Kovler Professorship in Breast Cancer Research [2020]: Andrea Richardson, M.D., Ph.D.

Funding provided by Peter and Judy Kovler to support a faculty member focused on breast cancer research in the Department of Pathology.

Zanvyl Krieger Professorship in Pediatric Ophthalmology [1991]: David L. Guyton, M.D.

Funded by a contribution from Mr. Zanvyl Krieger, a 1928 graduate of the Johns Hopkins University, a successful business man, and philanthropist. He is a benefactor of many components of the Johns Hopkins University.

Sachiko Kuno and Ryuji Ueno Innovation Professorship [2014]: Akira Sawa, M.D.

To accelerate clinical and scientific innovation in mental health and brain science in the world.

Maurice E. Langham, Ph.D. Professorship in Ophthalmology [2008]: Albert Jun, M.D.

The income from principal will be used for Professorship in honor of Maurice E. Langham, Ph.D. The endowment will be held in the Wilmer Eye Institute.

Lawson Wilkens Professorship in Pediatric Endocrinology [2005]: Sheela N. Magge, M.D.

To provide professorship support to a faculty member in the division of Pediatric Endocrinology in the Department of Pediatrics.

George LeBoff Professorship for Research in Digestive Diseases [1999]: Mark Donowitz, M.D.

Funding provided by the estate of George LeBoff for support in the Division of Gastroenterology.

Lederer Professorship of Pediatric Epilepsy [1991]: Eileen P.G. Vining, M.D.

Funded by a gift for research in the care and cure of pediatric epilepsy.

L. Douglas Lee & Barbara Levinson-Lee Professorship in Clinical Practice [2021]: Steven J. Kravet, M.D., MBA, FACP

Funding will benefit the Department of Medicine, General Internal Medicine Division to support the office of the President of Johns Hopkins Community Physicians and to elevate the importance of excellence in clinical practice.

L. Douglas Lee & Barbara Levinson-Lee Professorship in Ophthalmology [2021]: Shameema Sikder, M.D.

Funding will benefit the Wilmer Eye Institute.

Legum Professorship in Acute Neurological Medicine [1999]: Daniel Hanley, M.D.

Funding provided by Mr. and Mrs. Jeffrey Legum. Appointment to the Professorship will be made by the Dean on the recommendation of the Chairman of the Department of Neurology. The recipient will be a leader in research of severe brain injury and disease.

Doris Lescher and John Bauernschmidt II Professorship in Ophthalmology [2004]: Unoccupied

Created by Dr. Peter McDonnell by combining the interest from two accounts. Both donors indicated that the income was to be used to support research into retinal diseases.

David Levine Professorship [2004]: Unoccupied

Established to be occupied by the Vice Dean for Clinical Investigations.

Julia L. Levy Ph.D. Professorship in Ophthalmology [2004]: Susan Bressler, M.D.

Funding provided by QLT, Inc. of Vancouver, BC.

Robert L. Levy Chair in Cardiology [1975]: Brian O'Rourke, Ph.D.

Funding provided by a bequest of Dr. Robert L. Levy, a graduate of the School of Medicine in 1913 and a highly respected practicing cardiologist in New York City. Previous occupants: Drs. J. O'Neal Humphries, Myron L. Weisfeldt, and Eduardo Marban.

John R. Lewis Professorship in Pathology [2022]: Unoccupied

Funding provided by anonymous donors in memory of the Honorable John R. Lewis, former United States Representative from Georgia, to support a faculty member in the Department of Pathology who is a member of an under-represented minority group.

Wayne Lewis Professorship in Orthopaedic and Shoulder Surgery [2006]: Edward McFarland, M.D.

Funding provided by Dextra Bank and Trust Co., Ltd. to create a professorship in orthopaedics and shoulder surgery.

Donlin M. Long Chair in Neurosurgery [2003]: Nicholas Theodore, M.D.

Established in 1999 by patients, colleagues, and friends in honor of Donlin Long, who served as Director of the Department of Neurosurgery from 1973 to 2000.

Mason F. Lord Chair in Geriatric Medicine [1996]: Cynthia Boyd, M.D., MPH

Funding provided by an anonymous gift to honor Dr. Mason F. Lord, a 1954 graduate of the School of Medicine, member of the faculty of the Department of Medicine, and Director of the Geriatrics Program at the Baltimore City Hospitals, now the Johns Hopkins Bayview Medical Center.

The Raymond and Anna Lublin Professorship in Medicine [1989]: Jeremey D. Walston, MD.

Funding provided by Dr. and Mrs. Raymond Lublin to support the leader of the Division of Geriatrics in the Department of Medicine. Dr. Lublin was a 1929 graduate of the Johns Hopkins School of Medicine, and practiced general surgery in East Hartford, CT.

Edythe Harris Lucas and Clara Lucas Lynn Chair in Hematology [1992]: Linzhao Cheng, M.D.

Funding provided by Clara Lucas Lynn, a grateful patient of Dr. William R. Bell.

Virginia and Daniel K. Ludwig Chair in Cancer Research [1996]: Stephen Baylin, M.D.

Funding provided by Daniel K. Ludwig, one of the world's great ship owners, who dedicated his fortune to medical research on an international scale for the understanding and eradication of cancer.

Virginia and Daniel K. Ludwig Chair in Clinical Investigation of Cancer [1999]: Ross C. Donehower, M.D.

Funding provided by Daniel K. Ludwig, one of the world's great ship owners, who dedicated his fortune to medical research on an international scale for the understanding and eradication of cancer.

Ian T. MacMillan Family Professorship in Clinical Pancreatic Cancer Research [2008]: Daniel Laheru, M.D.

Funding provided by the MacMillan Family to be used for clinical pancreatic cancer research at the Sidney Kimmel Comprehensive Cancer Center.

David Marine Professorship of Medicine [1985]: Nadia Hansel, M.D., M.P.H.

Funding provided by the estate of Dr. David N. Marine, a 1947 graduate of the Johns Hopkins School of Medicine. He specialized in the study of pulmonary disease and tuberculosis.

E. K. Marshall and Thomas H. Maren Professorship in Pharmacology [1997]: Namandje Bumpus, Ph.D.

Funding provided by Dr. Thomas H. Maren, class of 1951, who was a faculty member in the Department of Pharmacology directed by Dr. Marshall.

J. Willard Marriott, Jr. Professorship in Ophthalmology (Permanent) & J. Willard Marriott, Jr. Professorship in Ophthalmology (Quasi) [2020]: Peter L. Gehlbach, M.D.

The combination of these two endowments will establish a Professorship at the Wilmer Eye Institute at the School of Medicine.

Eli Kennerly Marshall, Jr. Professorship in Oncology [1978]: Unoccupied

E. K. Marshall succeeded Abel as Professor of Pharmacology. This Professorship was initially in the Oncology Division of the Department of Medicine, but moved to Oncology when Oncology became a department.

Bessie Darling Massey Chair in Biomedical Engineering [1971]: Michael I. Miller, Ph.D.

Funding provided by Mr. and Mrs. Massey, grateful patients of John Bordley.

The A. Edward Maumenee Professorship in Ophthalmology [1993]: Harry A. Quigley, M.D.

Funding provided by Mrs. Margaret Mosher and other friends, colleagues, and grateful patients of Dr. Maumenee who was Director of the Wilmer Eye Institute and Director of the Department of Ophthalmology from 1955 to 1979.

Oliver Lee McCabe, III, Ph.D. Professorship in the Neuropsychopharmacology of Consciousness [2020]: Roland R. Griffiths, Ph.D.

This benefits the Department of Psychiatry & Behavioral Sciences. It will be used for the purposes of human research on the effects of psychedelic substances on consciousness, treatment of psychiatric and behavioral disorders, the improvement of public health, and the betterment of humankind.

David Hall McConnell Professorship of Urology [1973]: Occupied by Misop Han, M.D.

Funding provided by Admiral H. P. John Duberg, a grateful patient of Dr. W. W. Scott. Adm. Duberg was married to Dorys McConnell Duberg, a daughter of David Hall McConnell who was the founder of the Avon Corporation.

The Hugh P. McCormick Family Professorship in Endocrinology and Metabolism [2003]: Sherita Hill Golden, M.D.

Funding provided by Hugh P. McCormick of McCormick Spice.

Martha McCrory Professorship in Medicine [2014]: Fred M. Wigley, M.D.

Funding to support a world-class physician whose clinical and research work is focused on efforts to cure scleroderma and provide patient care until that cure is discovered.

The Paul R. McHugh Chair in Motivated Behaviors [1998]: Timothy H. Moran, Ph.D.

Funding provided by Mr. William F. Scandling and various donors in honor of Dr. Paul McHugh, Director of the Department of Psychiatry and Behavioral Sciences.

Victor A. McKusick Professorship in Medicine and Genetics [2004]: Harry C. Dietz, III, M.D.

Funding provided by anonymous donor and friends of Dr. McKusick.

Menowitz/Rosenstein Professorship of Pediatric Respiratory Sciences [2018]: Peter J. Mogayzel, Jr., M.D., Ph.D., MBA

Benefits the Johns Hopkins Children's Center, Department of Pediatrics, in the Eudowood Division of Pediatric Respiratory Sciences (Pediatric Pulmonary Medicine) to be held in perpetuity for a professorship bearing the name.

Eugene Meyer III Professorship in Psychiatry and Medicine [1982]: Glenn J. Treisman, M.D., Ph.D.

Funding provided by Dr. Eugene Meyer, family, and friends. Dr. Meyer, a 1941 graduate of the School of Medicine, trained in Medicine, Psychiatry, and the Professorship supports joint activities in these two departments.

Myra S. Meyer Professorship for Mood Disorders in Psychiatry [2008]: Karen L. Swartz, M.D.

The income from the principal will be used to provide financial support and stability needed for the individual faculty members as it related to research, education and clinical activities in mood disorders.

Harvey M. Meyerhoff Professorship in Bioethics [1999]: Jeremy Sugarman, M.D., Ph.D.

Established by commitment made in 1999 by Harvey M. Meyerhoff, a long time University and Hospital Trustee and the founding Chairman of the Hopkins Health System Board.

Marilyn Meyerhoff Professorship in Thoracic Surgery [2022]: Julie Brahmer, M.D.

The donor intends to recommend that the grant be used to benefit the Sidney Kimmel Comprehensive Cancer Center as an endowed gift to be held in perpetuity for a professorship bearing the name of the Marilyn Meyerhoff Professorship in Thoracic Surgery.

Robert E. Meyerhoff Assistant Professorships [2007]: Michael A. Chattergoon, M.D., Ph.D. and Chiadi E. Ndumele, M.D.

Funding provided to enable Johns Hopkins Medicine to recruit junior faculty members with exceptional promise.

Robert and Jane Meyerhoff Professorship [2018]: Shawn M. Kunisaki, M.D., M.Sc.

Established for the recruitment of a junior faculty member with exceptional promise, and exemplary record of academic achievement in medicine and a demonstrated commitment to increasing opportunities for under-represented minorities and breaking down stereotypes. The ultimate goal will be to enable as many faculty candidates as possible and encourage them to either stay at Johns Hopkins as role models and mentors, or to move on to positions of national leadership, such as department chairs around the country.

Catherine Iola and J. Smith Michael Distinguished Professor in Urology [1988]: Shawn E. Lupold, Ph.D.

Funding provided by Mrs. Catherine Iola Michael and Mr. Smith Michael. Mr. Michael was President and Board Chairman of the First National Bank of Aberdeen, which was later acquired by Equitable Trust Company. Both Mr. Michael and Mrs. Iola Michael grew up in Harford County, Maryland. Mr. Michael died in 1978. This Professorship was established in memory of Mr. J. Smith Michael.

Anne G. Miller and G. Thomas Miller Professor in Medicine in the Center for Innovative Medicine: Scott M. Wright, M.D.

It was the desire of Sarah Miller Coulson with this gift to honor her mother, Anne and to remember her father, Thomas, and to support Dr. Scott Wright in the Center for Innovative Medicine (CIM). This professorship was created also to recognize Scott for his leadership of the Miller-Coulson Academy.

Edward D. Miller Professorship in Anesthesiology Research [2007]: Nicholas A. Flavahan, M.D.

Funding provided from the Johns Hopkins Hospital Endowment Fund, Inc. Funds will be used to support research activities and research infrastructure in the Department of Anesthesiology and Critical Care Medicine.

Neil R. Miller, M.D. Professorship in Ophthalmology [2021}: Unoccupied

This gift will be used to support a faculty member of the Wilmer Eye Institute, Johns Hopkins Medicine.

The Lloyd B. Minor, M.D. Vestibular and Skull Base Sciences Center Director [2020]: John P. Carey, M.D.

This benefits the Department of Otolaryngology-Head & Neck Surgery. It will fund the Lloyd B. Minor, M.D., Vestibular & Skull Base Sciences Center Director.

Michel Mirowski, M.D. Professorship in Cardiology [1998]: Charles J. Lowenstein, M.D.

Funding provided by the Mirowski Family Foundation, Inc., to provide faculty support in the Division of Cardiology in the School of Medicine. The Chair memoralizes Dr. Mirowski, a cardiologist at Johns Hopkins who played a key role in the development of the implanted defibrillator.

Arthur B. and Patricia B. Modell Professorship in Thoracic Surgery [2007]: Stephen C. Yang, M.D.

Funding provided by Mr. and Mrs. B. Modell to honor a faculty member in the Department of Surgery. This gift will allow the Department of Surgery to have a profound impact on the field of thoracic surgery.

C. David Molina, M.D., M.P.H. Chair in Medicine [2014]: Lawrence J. Appel, M.D., M.P.H.

Support for the chair holder who is committed to the health of all communities and to advancing medical well-being of individuals and communities and preventative medicine. Held in the Division of General Internal Medicine.

Russell H. Morgan Professorship in Radiology [1994]: Paul Bottomley, M.D.

Funding provided by friends and colleagues of Dr. Russell H. Morgan, Director of the Department of Radiology from 1946 to 1971.

Richard and Kathleen Morton Chair in Genetic Research [1989]: Unoccupied

Funding provided by Richard F. Morton and Kathleen C. Morton to provide faculty support in the Department of Genetic Medicine. Dr. Richard Morton completed an OB/GYN internship at Hopkins and also served on the School of Public Health faculty. Dr. Kathleen Morton is a pediatrician who served on the School of Medicine faculty and became the first woman named a dean there.

Margaret C. Mosher Professorship in Ophthalmology [2002]: John D. Gottsch, M.D.

Established in 2002 by a one-life gift annuity from the estate of Margaret C. Mosher of Santa Barbara, California.

James B. Murphy Professorship in Oncology [2000]: Richard F. Ambinder, M.D., Ph.D.

Established in 2000 by an anonymous donor in memory of James B. Murphy, Class of 1909.

Harry and Betty Meyerberg/Thomas R. Hendrix Professorship in Gastroenterology [2006]: Steven Meltzer, M.D.

Funding for this professorship provides faculty support in the Division of Gastroenterology in the Department of Medicine.

George T. Nager Professorship in Otolaryngology-Head & Neck Surgery [1999]: Elisabeth Glowatzki, Ph.D.

Funding to support research in the Department of Otolaryngology-Head and Neck Surgery in the School of Medicine.

Daniel Nathans Directorship of the Department of Molecular Biology and Genetics and Professorship in Molecular Biology and Genetics [2000]: Unoccupied

Funds provided by several anonymous donors in honor of Daniel Nathans. Dr. Nathans joined the faculty in 1962 and went on the direct the Department of Microbiology and Molecular Biology and Genetics. He served as interim president of the University from 1995 to 1996. He won the Nobel Prize in medicine in 1978 for his discovery and use of a restriction enzyme as “biochemical scissors” to cut and analyze DNA. In 1993, he received the nation’s highest scientific award, the National Medal of Science. Dr. Nathans died in 1999.

Paul K. Neumann Professorship in Pancreatic Surgery [1998]: Jin He, M.D., Ph.D.

Funding provided by Mark D. and Robin Neumann in memory of Mr. Mark Neumann’s father to support a prominent surgeon in determining the causes, prevention, and management options for pancreatic cancer research.

Noxell Chair in Dermatology [1985]: Sewon Kang, M.D.

Funding provided by the Noxell Foundation. The Noxell Company was a cosmetics company founded and based in Maryland which became a part of the Proctor and Gamble Co.

The Independent Order of Odd Fellows Professorship in Ophthalmology [1963]: Henry D. Jampel, M.D., M.H.S.

Funding provided by a grant for research in eye disease and eye pathology.

Lewis J. Ortt Professorship in Ophthalmology [1989]: Justin Hanes, Ph.D.

Funded by a gift from the Lewis J. Ort family for the support of diagnosis and management of hereditary eye diseases.

William Osler Professorship in Medicine [1978]: Mark Anderson, M.D., Ph.D.

Funding provided by a bequest in the will of Dr. J. Earle Moore, a prominent Baltimore internist and pioneer in the chemotherapy of syphilis. He was director of the Syphilis Clinic at Johns Hopkins. The Professorship is named for the first Director of the Department of Medicine, Dr. William Osler, and has been occupied by Directors of the Department.

The Lawrence C. Pakula, M.D. Professorship Fund [2020]: Frances Northington, M.D.

The gift will be used to benefit the Johns Hopkins Children’s Center & Department of Pediatrics as an endowed gift to be held in perpetuity for a professorship bearing the name of The Lawrence C. Pakula, M.D. Professorship. When possible, the recipient will be involved in the advancement of pediatric residency and/or education programs.

The Sheila Sutland Pakula Professorship for Maternal & Newborn Health [2020]: Nicole A. Shilkofski, M.D., M.Ed.

Benefits the Department of Pediatrics, for maternal and newborn health.

Arnall Patz Distinguished Professorship in Ophthalmology [1993]: Kannan Rangaramanujam, M.D.

Funded by gifts from family, friends, colleagues, and grateful patients of Dr. Arnall Patz, who was Director of the Wilmer Eye Institute and Director of the Department of Ophthalmology from 1979 to 1989.

Helen Golden Paulson Professorship in Gastroenterology [1982]: Anne Marie O’Broin-Lennon, M.D.

Funding provided by the estate of Helen G. Paulson in honor of Dr. Moses Paulson, who was a practitioner of internal medicine and gastroenterology in Baltimore. He was a member of the part-time faculty of the Department of Medicine.

Peavy Endowed Chair for Pediatric Diabetes Care at Johns Hopkins All Children’s Hospital [2019]: Unoccupied

The funding will be used to create an endowed Chair in the Department of Pediatrics with responsibility in Diabetes Care at JCACH. It will be held in perpetuity for a professorship bearing the name of the Peavy Endowed Chair for Diabetes.

Virginia M. Percy and William Algernon Percy Professorship in Orthopaedic Surgery [1979]: Unoccupied

Mrs. Percy was a grateful patient of Dr. Lee H. Riley, Jr.

Aliki Perroti Chair in the Department of Medicine [2006]: David B. Hellmann, M.D.

Funding provided by Mrs. Aliki Perroti. The recipient is to be a superior clinician committed to meeting the medical challenges of the twenty-first century and beyond.

Perry Family Professorship in Clinical & Translational Research at Johns Hopkins All Children's Hospital [2021]: Unoccupied

The Perry Family Endowed Professorship in Clinical & Translational Research was established at Johns Hopkins All Children’s Hospital through an unrestricted gift from the Perry Family Trust & funds from Johns Hopkins All Children’s Foundation.

Ronald R. Peterson Professorship in Medicine [2012]: Chirag Parikh, M.D.

The income of the principal will be used for the benefit of the Chair of Nephrology for Johns Hopkins Medicine.

Henry Phipps Professorship in Psychiatry [1908]: James B. Potash, M.D., M.P.H.

Created by a gift from Mr. and Mrs. Henry Phipps of Philadelphia for whom the Phipps Psychiatric Clinic is named.

Boone Pickens Professorship in Ophthalmology [2005]: Amir Kashani, M.D., Ph.D.

Funding provided by Mr. Boone Pickens of Dallas, Texas out of his respect for and admiration of Dr. Stark.

William V. Pitts Professorship [2020]: Unoccupied

Funding provided by the estate of William V. Pitts to be used to endow and sustain the director of the Johns Hopkins All Children's Heart Institute.

Leslie Plotnick, M.D. Professorship in the Clinical Care and Research of Pediatric Endocrinology [2001]: Unoccupied

Funds provided to fund a professorship in the clinical care and research of Pediatric Endocrinology at the Department of Pediatrics.

Catherine Ellen Poindexter Professorship of Cardiology [2019]: Hugh Calkins, M.D.

The funding will be used to benefit the Division of Cardiology as an endowed gift to be held in perpetuity for a professorship bearing the above name.

Kenneth Jay Pollin Professorship in Cardiology [2013]: Roger Blumenthal, M.D.

Created by Mrs. Irene Pollin. To be held in the Division of Cardiology.

Margery K. and Thomas Pozefsky Professorship in Kidney Transplant Surgery [2007]: Dorry Segev, M.D., Ph.D.

The income from the principal will be used to support a kidney transplant professor pursuing kidney transplant research in the Department of Surgery.

Sachin N. Pradhan, M.D., Ph.D. and Sikta Pradhan, Ph.D. Professorship in Spine Surgery [2020]: Unoccupied

Funded by Sikta Pradhan, Ph.D. and other patients, this professorship is for a spine surgeon in the Department of Orthopaedic Surgery.

Rainey Professorship in Pediatric Hematology [1992]: James F. Casella, M.D.

Funding provided by Dr. and Mrs. Rainey, family, and friends. Dr. Rainey was a 1933 graduate of the Johns Hopkins School of Medicine and practiced internal medicine in Greenville, SC. A family member was a patient of Dr. William Zinkham. Its purpose is to provide stable support for the Division of Pediatric Hematology.

John G. Rangos, Sr. Professorship in Adult Medicine [2001]: Francis M. Giardiello, M.D.

Funding provided by the John G. Rangos, Sr. Charitable Foundation to be designated for terms of at least five years to a physician-scientist both pursuing promising areas of research in gastrointestinal medicine and demonstrating exceptional promise in advancing new discoveries and treatments in the area of colon cancer.

Mark M. Ravitch Endowed Professorship in Surgery [1985]: Jonathan E. Efron, M.D.

Funding provided by friends, patients, and colleagues of Dr. Mark M. Ravitch to promote surgical scholarship. Dr. Ravitch, a 1934 graduate of the Johns Hopkins School of Medicine, trained in surgery with Dr. Alfred Blalock. He held numerous posts in American academic surgery and finished his career as Professor of Surgery at the University of Pittsburgh. He was a general, thoracic, and pediatric surgeon best known for the introduction of surgical stapling and the surgical repair of pectus excavatum.

Rear Admiral Ray & Laura Conner Professorship in Pediatrics [1997]: Barry S. Solomon, M.D., MPH

The purpose of this funding is to provide for the care of indigent children in need of medical care. To accomplish the objective, the President of Johns Hopkins Hospital and the Dean of the Johns Hopkins University School of Medicine shall act jointly as to the specific application of such annual income. It has been decided that the annual income will provide funding for the Director of the Harriet Lane Clinic in the Department of Pediatrics in the School of Medicine.

Rosemarie Hope Reid, M.D. Professorship in PCLT [2021]: Colleen Christmas, M.D.

Funding will be used to benefit the Primary Care Leadership Track in the School of Medicine as an endowed gift to be held in perpetuity for a professorship bearing the name of the Rosemarie Hope Reid Professorship.

Rose-Lee & Keith Reinhard Professorship in Urologic Pathology [2001]: Jonathan I. Epstein, M.D.

Funding provided by Rose-Lee and Keith Reinhard to honor Patrick Walsh, M.D. and to further prostate cancer research by establishing an endowed professorship in the Brady Urological Institute. Dr. Walsh was the Director of the Department of Urology from 1974 to 2004.

Rembrandt Foundation Professorship in Pediatric Palliative Care [2015]: Renee Denise Boss, M.D., M.H.S.

For the purposes of creating a professorship (in Pediatric Palliative Care) at the School of Medicine's Children's Center.

Richman Family Professor for Alzheimer's and Related Diseases [2008]: Gwenn Smith, Ph.D.

Funding provided by the Richman Family for the Department of Psychiatry and Behavioral Sciences for Alzheimer's and related disorders.

Lee H. Riley, Jr., M.D., Chair in Orthopaedic Surgery [1994]: Xu Cao, Ph.D.

Funding provided by the family, friends, colleagues, and patients of Dr. Riley to provide support for a clinical scholar in Orthopaedic Surgery. Dr. Riley was Director of the Department of Orthopaedic Surgery from 1979 to 1991.

Alfredo Riviere and Norma Rodriguez de Riviere Professorship in Endocrinology [1997]: Gary S. Wand, M.D.

Funding provided by Alfredo Riviere and Norma Rodriguez de Riviere for thyroid related research.

David Robinson Professorship in Vestibular Neurology [2022]: David E. Newman-Toker, M.D., Ph.D.

Endowed purpose is being changed to a Professorship which was always the intent of David Robinson, et al. The State of Maryland has awarded the Department of Neurology at $1.8M grant to bolster the fellowship to a full professorship.

Robert A. Robinson Professorship in Orthopaedic Surgery [1972]: James R. Ficke, M.D.

Established by contributions from grateful patients and colleagues of Dr. Robert A. Robinson, who was Director of the Department of Orthopaedic Surgery from 1953 to 1979.

Stephen and Jean Robinson Professorship for Eating Disorders [2014]: Angela S. Guarda, M.D.

To be used for the purposes of clinical care, research and education pertaining to improving the understanding and treatment of eating disorders. Associated with the Because It's You Foundation.

Mark C. Rogers Chair in Anesthesiology and Critical Care Medicine [1993]: Unoccupied

Funding provided by the Unit Executive Fund of the Department of Anesthesiology and Critical Care Medicine. Dr. Mark C. Rogers was Director of the Department of Anesthesiology and Critical Care Medicine from 1980 to 1993.

Mary Jo Rogers Professorship in Cancer Immunology & Melanoma Research in Oncology [2016]: William Sharfman, M.D.

The fund will be used to establish an endowed professorship to support immunotherapy work in melanoma.

Robert and Marion Rosenthal Professorship in Spine Surgery [2013]: Khaled M. Kebaish, M.D., MS, FRCSC

The income from the principal will be used for a leadership fund and held in the Department of Orthopaedic Surgery.

Barbara B. Rubenstein Professorship in Oncology [2002]: Saraswati Sukumar, Ph.D.

Funding provided by Trustee Mark Rubenstein and his children, David, Jonathan, and Hilary in memory of their wife and mother.

David M. Rubenstein Research Professorship [2015]: Paul A. Fuchs, Ph.D.

Income from the principal will be used "to create an endowed chair, the David M. Rubenstein Professor, who will dedicate their research efforts toward the goal of functional hearing restoration in our patients." The endowment will be held in the David M. Rubenstein Hearing Center in the Department of Otolaryngology-Head & Neck Surgery.

Murray B. Sachs Professorship in Biomedical Engineering [2012]: Natalia Trayanova, Ph.D.

Funding provided by Arthur J. Samberg in honor of Murray B. Sachs, Ph.D.

Salisbury Family Professorship in Neurosurgery [2008]: Cameron G. McDougall, M.D.

Funding provided by the Salisbury family.

Samsung Professorship in Medicine [1997]: Gail Daumit, M.D.

Funding provided by the Samsung Corporation to endow a chair in the Department of Medicine, Division of Internal Medicine.

Herman and Walter Samuelson Foundation Professorship in Oncology [1999]: Kenneth R. Cooke, M.D.

Funding provided by The Herman and Walter Samuelson Foundation for the purpose of advancing outstanding cancer research.

D. William Schlott Professorship in Medicine [2001]: Bimal H. Ashar, M.D.

Funding provided by friends, patients, and colleagues of Dr. D. William Schlott.

Bernard L. Schwartz Distinguished Professorship in Urological Oncology [1996]: Christian P. Pavlovich, M.D.

Funding provided by Dr. and Mrs. Bernard Schwartz. Dr. Schwartz is the CEO of Loral Space and Communications, Ltd. and a grateful patient of Johns Hopkins.

Huntington Sheldon, M.D. Professorship in Medical Discovery [2014]: Geraldine Seydoux, Ph.D.

Funding provided by an anonymous donor. The endowment is to be used by the IBBS.

Lawrence Cardinal Shehan Chair in Physical Medicine and Rehabilitation [1993]: Pablo Celnik, M.D.

Funding provided by the Good Samaritan Hospital to support the Director of Physical Medicine and Rehabilitation.

Irving J. Sherman M.D. Professorship in Neurosurgery [2010]: Gregory J. Riggins, M.D.

Funds provided by Mr. and Mrs. Irving Sherman for the Department of Neurosurgery.

The Irving J. & Florence Sherman Professorship Endowed Fund [2021]: Judy Huang, M.D.

The funds will be used to benefit the Department of Neurosurgery as an endowed gift to be held in perpetuity for a professorship bearing the name of The Irving J. and Florence Sherman Professorship in Neurosurgery.

Judy Yin Shih, Ph.D. Professorship in Anxiety Disorders Endowed Professorship [2019]: Unoccupied

Funding will be used to benefit the Department of Psychiatry & Behavioral Sciences to be held in perpetuity for a professorship bearing the name of Soh Chao Shih, Ph.D. Professorship in Anxiety Disorders.

Milton and Muriel Shurr Endowed Directorship [2012]: Unoccupied

Income from the principal will be used to establish an endowed directorship of the General Eye Service and be held in the Wilmer Eye Institute at the School of Medicine.

Raj and Neerah Singh Professorship in Biomedical Engineering [2008]: Raimond L. Winslow, Ph.D.

Funding provided by the Raj and Neerah Singh Charitable Foundation and will be used by the Department of Biomedical Engineering to recruit, retain, or support a distinguished faculty member specializing in computational medicine.

Branna & Irving Sisenwein Professor of Ophthalmology [2018]: Akrit Sodhi, M.D.

Funded from the Sisenwein's estate and matched with an $800,000 grant of the State of Maryland's E-Nnovation Initiative Fund.

W.W. Smith Charitable Trust Professorship in Immunology [2002]: Daniel B. Drachman, M.D.

Established by a grant from the W.W. Smith Charitable Trust as a reflection of Bill Smith's exceptional vision and his desire to enhance medical excellence.

Solomon H. Snyder Professorship in Neurosurgery [2014]: Michael Caterina, M.D., Ph.D.

Income from the principal will be used to “alleviate pain and suffering from neurosurgical diseases.” Will be held in the Department of Neurosurgery.

Alfred Sommer Professorship in Ophthalmology [2004]: Unoccupied

Funds set aside by the Department of Ophthalmology for retinal research.

Lewis Cass Spencer Professorship in Orthopaedic Surgery [1997]: Thomas L. Clemens, Ph.D.

Funding provided by Dr. Rowena Spencer, a member of the class of 1947, in honor of her father, the late Lewis Cass Spencer, M.D., an alumnus of the class of 1911 and the first orthopaedic surgical resident at Johns Hopkins.

Spiegel/Nichols Associate Professorship in Pediatric Urology [2011]: Heather DiCarlo, M.D.

Income from the principal will be used “for an Assistant Professorship”. The endowment will be held in the Division of Pediatric Urology in the Brady Urological Institute at the School of Medicine.

Paul D. Sponseller, M.D. Professorship in Pediatric Orthopaedic Surgery [2003]: Paul Sponseller, M.D.

Funding provided by Dr. and Mrs. David S. Hungerford.

Edward St. John Professorship in Cardiology [2019]: David D. Spragg, M.D.

Funding will be used to benefit the Division of Cardiology as an endowed gift to be held in perpetuity for a professorship bearing the name of the Edward St. John Professorship in Cardiology.

Theodore and Vada Stanley Distinguished Chair in Neurovirology in Pediatrics [1998]: Robert H. Yolken, M.D.

Funding provided by the Stanley Foundation. The endowment will support research in brain disorders, especially schizophrenia and bipolar disorders, which may be caused by infections in infancy and childhood.

Mary Wallace Stanton Professorship for Education [2004]: Roy Ziegelstein, M.D.

Funds provided by donor to endow Professorships in the School of Medicine.

Mary Wallace Stanton Professorship for Faculty Affairs [2004]: Unoccupied

Funds provided by donor to endow Professorships in the School of Medicine.

Walter J. Stark Chair in Ophthalmology [1992]: Walter J. Stark, Jr., M.D.

Funding provided by grateful patients of Dr. Stark: Mrs. Margaret Mosher, Ralph S. O’Connor, Ray Stark, and Mr. and Mrs. Albert Broccoli.

Stermer Family Professorship in Pediatric Inflammatory Bowel Disease [2001]: Maria Oliva-Hemker, M.D.

Funding provided by the Stermer Family for the Director of the IBD Center in the Department of Pediatrics.

Dr. Mary Betty Stevens Professorship in Rheumatology [1989]: Antony Rosen, M.D.

Funding provided by colleagues, friends, and former patients of Dr. Mary Betty Stevens to support a clinical scholar in the Division of Rheumatology. Dr. Stevens, a 1955 graduate of the Johns Hopkins School of Medicine, specialized in clinical rheumatology and directed the division within the Department of Medicine.

Leonard and Helen R. Stulman Professorship in Child and Adolescent Psychiatry [2011]: John Campo, M.D.

An endowment fund at the School of Medicine, the income from the principal will be used for the Stulman Professor and may also help foster cross-collaboration between Johns Hopkins and other community organizations in the field of child and adolescent mental health, and will be held in the Division of Child and Adolescent Psychiatry in the Department of Psychiatry and Behavioral Sciences at the Johns Hopkins School of Medicine.

Sunshine Natural Wellbeing Foundation Professorship in Chronic Fatigue Syndrome and Related Disorders in Pediatrics [2006]: Peter C. Rowe, M.D.

Funding provided to support a deserving faculty member.

Dr. Frank V. Sutland Chair in Pediatric Genetics [1991]: Ada Hamosh, M.D.

Funding provided by Mrs. Frank V. Sutland and family.

Josephine S. Sutland Professorship in Newborn Medicine [2007]: Akhil Maheshwari, M.D.

Funding provided by Mrs. Frank V. Sutland, Dr. Lawrence and Shelia Pakula, and the Louis Gross Foundation.

Diana Sylvestre, M.D. & Charles Homcy M.D. Professorship [2021]: Unoccupied

The gift will be used to benefit the Department of Neuroscience in the Institute for Basic Biomedical Sciences in the School of Medicine as an endowed gift to be held in perpetuity for a professorship bearing the name of the Diana Sylvestre, M.D. & Charles Homcy, M.D. Professorship.

Helen B. Taussig Professorship [1987]: Shelby Kutty, M.D.

Funding provided by the sale of Dr. Taussig’s property on Cape Cod to provide support for the Division of Pediatric Cardiology. Dr. Helen B. Taussig, a 1927 graduate of the Johns Hopkins School of Medicine, founded the specialty of pediatric cardiology. In association with Dr. Alfred Blalock, she developed the first surgical procedure for treatment of cyanotic congenital heart disease (blue baby operation).

Richard W. TeLinde Distinguished Professorship of Gynecological Pathology [1989]: Robert J. Kurman, M.D

Funding provided by the estate of Dr. Richard W. TeLinde, Director of the Department of Gynecology and Obstetrics from 1939 to 1960. He was an advocate of a close relationship between pathology and gynecology, and insisted that there be a pathology unit within the Department of Gynecology and Obstetrics.

Richard W. TeLinde, M.D. and Edward E. Wallach, M.D. Professorship [2015]: Valerie Lynn Baker, M.D.

Funding provided by Howard Jones, Jr., M.D. and the Jones family. Income from the principal will be used for a Professorship. “Preference will be given to those working in gynecologic endocrinology and/or infertility."

Samuel Theobald Professor of Ophthalmology [2015]: Jeremy Nathans, M.D.

Income from the principal (which comes from funds designated to be used for "general purposes without restriction as to the use of income or principal") will be used for an endowed professorship. The endowment will be held in the Wilmer Eye Institute in the School of Medicine.

Therapeutic Cognitive Neuroscience Professorship [2000]: Barry Gordon, M.D., Ph.D.

Funding by an anonymous donor to support wide ranging efforts to improve mental functions in people with brain disorders (The Department of Neurology).

Bloomberg-Kimmel Professor of Cancer Immunotherapy in the Bloomberg Kimmel Institute for Cancer Immunotherapy [2018]: Suzanne Topalian, M.D.

Used to support the Dr. Suzanne Topalian Chair Endowment Fund at the Johns Hopkins Bloomberg-Kimmel Institute.

Richard J. Traystman Professorship in Anesthesiology and Critical Care Medicine [2003]: Sujatha Kannan, M.D.

Endowed Chair of Pediatric Anesthesia and Intensive Care Medicine was renamed to honor Dr. Traystman.

The Leon Troper, M.D. Professorship in Computational Pathology [2020]: Alexander S. Baras, M.D., Ph.D.

Funding provided by Dennis Troper and Susan Wojcicki to support a professorship in computational pathology in the Department of Pathology in memory of Leon Troper, Dennis' father, who was a pathologist.

Philip A. Tumulty Associate Professorship in Medicine [1994]: Stephen D. Sisson, M.D., F.A.C.P.

Established in 1994 by various donors including Helena Hendrickson, a patient of Dr. Schlott.

Thomas and Dorothy Tung Professor in Anesthesiology and Critical Care Medicine [2010]: Cyrus D. Mintz, M.D., Ph.D.

Funded by Dr. Thomas and Dorothy Tung. Income from the principal will support the Tung Professor.

Hans and Ilza Veith Professorship in the History of Medicine [1998]: Unoccupied

Funded by Ilza Veith, Ph.D. to endow the Hans & Ilza Veith Professorship in the History of Medicine at the School of Medicine in memory of Professor Henry A. Siegerist.

Philip Franklin Wagley Chair in Biomedical Ethics [1995]: Ruth Faden, Ph.D.

Funding is provided by Dr. and Mrs. Wagley, family, friends, colleagues, and grateful patients. Dr. Philip F. Wagley, a 1943 graduate of the Johns Hopkins School of Medicine, practiced internal medicine in Baltimore. As a member of the faculty, he directed the course in medical ethics for medical students.

Henry N. Wagner, Jr., M.D. Professorship in Nuclear Medicine [2001]: Martin Pomper, M.D., Ph.D.

Funding provided by two anonymous donors and departmental funds to provide faculty support in the Division of Nuclear Medicine in the Department of Radiology.

A. Earl Walker, M.D. Professorship in Functional Neurosurgery [2008]: William S. Anderson, M.D., Ph.D.

Funding established to provide faculty support in Functional Neurosurgery in the Department of Neurosurgery.

Frank B. Walsh Professor of Neuroophthalmology [1981]: Neil R. Miller, M.D.

Funding provided by friends and trainees. Dr. Frank B. Walsh was the founder of the subspecialty of neuroophthalmology.

Patrick C. Walsh Professorship in Urology [1998]: Arthur L. Burnett, M.D.

Dr. Walsh was the Director of the Department of Urology from 1974 to 2004. Funding was provided by an anonymous donor.

Susan Hill Ward Professorship in Psychedelics & Consciousness [2021]: Matthew W. Johnson, M.D.

Funding will be used to benefit the Department of Psychiatry & Behavioral Sciences as an endowed gift to be held in perpetuity for a professorship bearing the name of "Susan Hill Ward Professorship in Psychedelics and Consciousness" to be used for the purpose of human research on the effects of psychedelic substance, treatment of psychiatric and behavioral disorders & the improvement of public health.

Abraham & Virginia Weiss Professorship in Cardiology [2004]: David A. Kass, M.D.

Funded by the Abraham & Virginia Weiss Trust.

Dr. Myron L. Weisfeldt Professor in the Osler Medical Residency Program [2020]: Unoccupied

The donor intent for this endowment, to be held in perpetuity, is to provide support for the Director of the Osler Medical Residency Program.

Robert Bond Welch Professorship in Ophthalmology [2005]: James T. Handa, M.D.

A group of donors expressed their interest in making their donations in recognition of their respect and admiration for Dr. Robert B. Welch. Dr. Welch obtained his M.D. degree from Johns Hopkins in 1953. He completed his internship and residency at the Wilmer Eye Institute.

William H. Welch Professorship in the History of Medicine [1934]: Jeremy Greene, M.D., Ph.D.

This Professorship honors Dr. William H. Welch, the first Dean of the Johns Hopkins School of Medicine.

Wellcome Professorship in Clinical Pharmacology [1971]: Craig Hendrix, M.D.

Funds were provided by the Burroughs-Wellcome Fund.

Sheila K. West Professorship in Ophthalmology [2018]: Pradeep Y. Ramulu, M.D., M.H.S., Ph.D.

Funding will be used in support of the academic and research activities of the Johns Hopkins University School of Medicine Department of Ophthalmology in the Wilmer Eye Institute.

Charlotte A. Wilson & Margaret K. Whitener Professorship of Ophthalmic Pathology [2017]: Charles G. Eberhart, M.D., Ph.D.

The Charlotte A. Wilson & Margaret K. Whitener Professorship of Ophthalmology was established by the kindness of the estate of Margaret K. Whitener in memory of her mother, Charlotte A. Wilson.

Lawson Wilkens Professorship in Pediatric Endocrinology [2005]: Sally Radovick, M.D.

Funds will be used to support faculty and to honor Dr. Lawson Wilkins, the father of Pediatric Endocrinology.

William Holland Wilmer Professorship in Ophthalmology [1925]: Peter J. McDonnell, III, M.D.

Funding provided by charitable contributions of Col. and Mrs. Henry Breckenridge and the Wilmer Foundation. Dr. Wilmer was the first Director of the Wilmer Eye Institute and the first Director of the Department of Ophthalmology from 1925 to 1934.

Marcella Woll Endowed Professorship [2018]: Laura M. Ensign, Ph.D.

This unrestricted quasi endowment fund will be used for the primary purpose of furthering the search for a cure of macular degeneration at the Wilmer Eye Institute in the School of Medicine. Funded through the Woll estate and matched with a grant from the State of Maryland's E-Nnovation Initiative Fund.

J. Donald Woodruff Chair in Gynecology and Obstetrics [1993]: Unoccupied

Funding provided by colleagues and friends of Dr. J. Donald Woodruff, a 1937 graduate of the Johns Hopkins School of Medicine. Dr. Woodruff was a distinguished teacher and clinician in the Department of Gynecology and Obstetrics from 1942 to 1996.

Alan C. Woods Professorship in Ophthalmology [2002]: Unoccupied

Funding provided by the Department of Ophthalmology Unit Executive Funds.

Zadek Family Professorship in Orthopaedic Surgery [2014]: Lee Riley III, M.D.

Funding from the principal will be used to support the Department of Orthopaedic Surgery.

Drs. David S. and Marilyn M. Zamierowski Directorship of the Johns Hopkins Simulation Center [2008]: Unoccupied

Income from the principal will be used "to endow permanently the Directorship of the Johns Hopkins Simulation Center." The endowment will be held in the School of Medicine.

David S. Zee, M.D. Professorship [2017]: David Zee, M.D.

Paul and Betty Cinquegrana established this professorship through an estate gift to support the work of David Zee, M.D. or his successors, relating to research in the area of vestibular neurology.

Elias A. Zerhouni, M.D. Professorship [2020]: Hanzhang Lu, Ph.D.

The combination of the two endowments are designated to support research in the Russell H. Morgan Department of Radiology and Radiological Sciences.

Office of Medical Student Affairs

The principal objective of the Office of Medical Student Affairs is to serve the needs of the medical students in the many aspects of life in the School of Medicine. A student who has a question about the experience here and who is uncertain as to an appropriate resource for an answer should check with the office. Any medical student needing assistance in adapting to this environment, or advice about personal or professional matters, should visit the Associate or Assistant Deans for Medical Student Affairs. The range of issues that may be addressed is broad, and additional resources will be found when needed.

The Office of Medical Student Affairs plays a major role in the application process for research experiences, extramural rotations, additional courses of study, and residency positions. The office also assists in arrangements for special funding of student projects and works as a liaison with the Johns Hopkins Medical Student Senate and other student groups and services. Notices containing new or more current information on a variety of topics are sent to each student at frequent intervals.

Scholarships

Recognizing the pressing need for financial assistance to students in the School of Medicine, many individuals and organizations have established funds for this purpose. Over the years many students now prominent in the field of medicine have been aided by one or another of these scholarship funds. In each instance the student is informed of the source of this scholarship aid.

Martin D. Abeloff, M.D. Scholarship Fund Established in 2018 by Mrs. Diane Abeloff in honor of her late husband Martin D. Abeloff, M.D.,, Med '66, Mrs. Abeloff earned a Master of Arts in 1967 in the Johns Hopkins Art as Applied to Medicine program and served as a member of the Department of Medicine faculty in 1969. She is devoted to Hopkins and to the Baltimore community.

Vivian B. Allen Scholarship Fund Mrs. Vivian B. Allen (Mrs. Beaumont Allen) established an endowment fund in 1955 to provide tuition aid to medical students with financial need.

Warde B. Allan Fund Established in 1968 by an anonymous gift to honor Warde B. Allan, M.D. for his eminent record at the School of Medicine and among his private patients. The fund is perpetuated by gifts from his family.

Blanche P. Alter, M.D., M.P.H., Endowed Scholarship Fund Created in 2017 by Dr. Alter, Med '67 . Dr. Alter completed her residency in Pediatrics at Johns Hopkins. She created this scholarship in honor of her 50th Reunion, to support merit-based financial aid of non-USA resident medical students.

Alumni Class Scholarships Through the auspices of the Medical Annual Fund, alumni support medical students through class scholarship funds.

Hodge Amemiya Scholarship The Hodge Amemiya Scholarship was set up with a gift from Mr. Hodge Amemiya as a permanent endowment to provide financial assistance to a medical student with preference given, if possible, to those who pursue a career in otolaryngology.

American Medical Association Education and Research Foundation (A.M.A.-E.R.F.) Scholarships The A.M.A.-E.R.F. annually makes grants to medical schools, which at the Johns Hopkins University School of Medicine have been used to support student low interest loans.

Marcia Anderson Memorial Fund An endowed fund established in 1989 by the husband, R. David Anderson, M.D., Class of 1990 and her family in memory of Marcia Anderson. The income is to provide scholarships to students with special needs.

E. Cowles Andrus Fund This endowed fund was established by Mrs. E. Cowles Andrus in memory of her husband, Dr. E. Cowles Andrus, a distinguished Johns Hopkins physician, teacher, and pioneer in the treatment of cardiovascular disease. In recognition of his devotion to Johns Hopkins, this fund provides financial assistance to needy medical students, with preference given to those who are planning a career in cardiovascular medicine.

Ralph and Ellen Anthony Medical Scholarship Fund Ralph and Ellen Anthony, good friends of the School of Medicine, established the Anthony Medical Scholarship Fund in January of 1984 for the purpose of providing scholarship aid to financially needy students in the School of Medicine.

Antoniades Family Scholarship Fund This scholarship was created by Spiro Antoniades, M.D., Med '92 and reflects his desire to pay forward the scholarship he received at the School of Medicine. Dr. Antoniades is a board-certified orthopedic surgeon specializing in spine surgery.

Richard Westcott Appleton Scholarship Fund An endowment fund was established in 1973 in honor of Dr. Richard Westcott Appleton, the income of which is to be awarded to “a medical student of moral worth and intellectual promise.”

Samuel Phillips Asper, M.D. Scholarship Fund Established to honor Dr. Asper, who was a graduate of the School of Medicine (M40) and a renowned Hopkins educator and physician. Preference given to students who intend to pursue a clinical or teaching career in an overseas country.

Dr. Samuel P. Asper and Morris L. Diamond Scholarship Fund Endowed in 2021 through a bequest by Sara Sacks Wegad, this scholarship honors the relationship of Dr. Asper with his patients, including Sara and her brother, Morris. The fund will be used for medical students with demonstrated financial need. Dr. Asper, Med '40, was a renown Hopkins educator and physician. Sara died in 2019 at the age of 99. Marion Diamond is her niece.

Dr. and Mrs. Fred B. Aurin Scholarship Fund Established in 1998 by Fred B. Aurin, M.D. and his wife, this fund will provide scholarship support for medical students, with preference to those from the University of Oklahoma or Texas.

Charles R. Austrian Fund for Medical Education An endowment fund was established in 1956 by friends and colleagues of the late Dr. Austrian, with income allocated to medical education and training of young physicians.

Robert L. Avery, M.D. Endowed Scholarship Fund This endowment fund was established in 2003 by Robert L. Avery, M.D., Med '86, to provide financial assistance to medical students.

Stewart W. Bainum, Sr. Memorial Scholarship Fund This scholarship was established in 2014 by the Bainum family in memory of Stewart Bainum Sr., creator of Manor Care, Inc, and Choice Hotels. This fund will be used to support medical students from diverse backgrounds.

David Graham Baird and Mildred Batchelder Baird Memorial Scholarship Fund The endowed fund was established by the Winfield Baird Foundation to perpetuate the memories of David and Mildred Baird. The income from this fund is to be used to support the needs of students in the School of Medicine.

Stuart B. Baker, M.D., Endowed Scholarship Fund This scholarship was created by Stuart B. Baker, M.D., Med '74, during the 125th anniversary of the School of Medicine.

Frances Ward Banks Memorial Scholarship Fund The Frances Ward Banks Memorial Fund was established by Elizabeth B. Banks in 1992 in memory of her mother. The income from this fund is to be used to support meritorious students in the School of Medicine.

Dr. John W. Barnaby Scholarship Fund This fund was established in 1997 through the estate of Dr. John Barnaby to provide scholarships to deserving medical students.

Jeremiah A. Barondess Scholarship Fund This fund was established in 1999 by Jeremiah A. Barondess, M.D., Med '49, in honor of his 50th graduation anniversary from the School of Medicine. Recipients should be M.D. candidates who also pursue a degree in the history of medicine.

Jennie Lee Batson, M.D., Memorial Scholarship Fund This fund was established in 1999 by members of the class of 1984 upon their 15th Reunion. Dr. Batson was a member of the class of 1984 who died of cancer. The fund provides assistance to needy students.

Dudley Beaumont Memorial Scholarship In 1945, the Trustees of The Louis D. Beaumont Trust contributed to the Johns Hopkins Hospital a fund in memory of a son, Dudley. The Hospital makes an annual contribution from this fund to the School of Medicine for scholarship support.

Thomas Allen Beetham and Ida Covert Beetham Memorial Scholarship Fund The Thomas Allen Beetham and Ida Covert Beetham Memorial Scholarship Fund was established in 1982 by Miss Martha E. Beetham to perpetuate the memories of Thomas and Ida Beetham. Miss Beetham specifically requested that the monies in this endowment fund be used for supporting the scholarship needs of students in the School of Medicine.

Elston L. Belknap Family Scholarship Fund The Elston L. Belknap Family Scholarship was established in July of 1981 by a bequest from Dr. Elston L. Belknap, a graduate of the School of Medicine in the Class of 1923. Its purpose is to provide assistance to deserving students in the School of Medicine, either in the form of loans or as scholarship aid.

Fredericka Berger Benton, M.D. Memorial Scholarship Fund Established in 1995 by John J. Benton, M.D., in memory of his wife. Both were graduates of the Class of 1945. This fund is to be used to provide scholarship aid to medical students with demonstrated financial need.

Barnett Berman, M.D. Scholarship Fund Established in 1999 anonymously by a former student, in recognition of Dr. Berman's long-time service and commitment to Johns Hopkins. Dr. Berman was an associate professor of medicine at Hopkins.

Laura L. & Kenneth I. Berns, M.D., Ph.D., Scholarship Fund Kenneth I. Berns, M.D., Ph.D., A&S '64, Med '66, and his wife, Laura L. Berns, A&S '63 (M.A), established this scholarship in 1999 in honor of his 35th reunion and to recognize his devotion to medicine and his lifelong affiliation with the Johns Hopkins School of Medicine.

John M. Berry, M.D., Scholarship Fund Create in 2005 through the estate of Mrs. Martha Brown Berry to support medical students in memory of her husband, John M. Berry, M.D., Class of 1901.

Laurence H. and Ida Lea Blackburn Endowed Scholarship for Medical Education Established in 2000 by Laurence H. Blackburn, Jr., M.D., and his wife, Rose, in honor of his parents. Dr. Blackburn, Jr. is a 1955 School of Medicine graduate.

Dr. Alfred Blalock Scholarship Fund This scholarship, established in 1966 by Dr. and Mrs. Thomas Harrold, commemorates the great service to human kind and the many contributions of one of Johns Hopkins' most distinguished surgeons, Alfred Blalock, M.D., who developed the blue baby operation designed to correct congenital abnormalities of the heart.

Joseph N. and Elisa Bongiovanni Medical Student Aid Fund This endowed fund was established in 1987 by the estate of Dr. Alfred M. Bongiovanni in honor of his parents. Dr. Bongiovanni was a member of the faculty in the Department of Pediatrics from 1952 to 1955. The income from the fund is to provide financial aid to needy students in the School of Medicine.

Luna Taylor Bradshaw & James S. Taylor, M.D., Scholarship Fund Established in 1997 by the Luna Taylor Bradshaw Trust through the estate of Miss Taylors brother, James S. Taylor, Med 28, in recognition of the tuition assistance Dr. Taylor received in medical school.

The Roslyn and Martin Brecker Scholarship Fund This scholarship was created by a gift from Dahna Brecker-Freidus, M.D. Med '90, and her husband Harris Freidus, in memory of her parents. The fund will provide a student the means to pursue their medical education and afford them the opportunity to practice in the field for which they have a passion. Dr. Brecker-Freidus's goal is that, in the future, students will have the opportunity to earn a medical degree from Johns Hopkins free of debt.

Samuel H. Brethwaite, M.D. Scholarship Fund Dr. Brethwaite was a member of the Class of 1935. The fund was established by his estate in 1998.

William and Wendyce Brody Fund This fund was established in 1992 to fund medical students pursuing a degree in one of the engineering disciplines. Dr. Brody, who became president of Johns Hopkins in 1996, was director of radiology from 1987 to 1994 with faculty appointments in the School of Medicine and the School of Engineering.

Drs. Beth and Warren Bromberg Scholarship Fund Established in 2012, the Drs. Beth and Warren Bromberg Scholarship Fund will provide financial aid to medical students. Both Drs. Bromberg are members of the Class of 1985. This scholarship was created in memory of Dr. Henry Seidel.

Dr. Patrick and Mrs. Judith Brookhouser Scholarship Fund Established in 1999 by Dr. & Mrs. Brookhouser to provide scholarships to needy medical students. Dr. Brookhouser was a member of the class of 1966.

Arnold S. Broudy, M.D., & Regina H. Broudy Scholarship Fund Established in 2001 by Arnold S. Broudy, Med '71, and his wife Regina Broudy, reflecting their devotion to medical excellence and lifelong affiliation with the Johns Hopkins School of Medicine.

Grafton Rayner Browne and Edna Spriggs Browne Scholarship Fund Dr. Grafton Brown died in 1973, leaving a Trust to provide scholarships for Hopkins medical students. Dr. Browne opened the city's first black-owned health clinic in East Baltimore, and dispensed medical care for 50 cents a visit until his death in 1973. He was a member of the Baltimore Chirurgical Society, the Monumental City Medical Society, and the American Medical Society. Dr. and Mrs. Browne enjoyed a long affiliation with Johns Hopkins.

L. Michael and Elizabeth M. Brunt Endowed Scholarship Fund This scholarship was established in 2013 by L. Michael Brunt, M.D. and Elizabeth M. Brunt, M.D. Dr. Michael Brunt is an alumnus of the Class of 1980. Preference to students from the states of Mississippi or Southeastern Missouri.

Art Buchwald Scholarship Fund Established by Mr. Art Buchwald in 1989 in honor of the Centennial of Johns Hopkins Medicine. The income from this fund will provide scholarships for students in the School of Medicine who demonstrate financial need.

Lisa S. Bunin, M.D., Endowed Scholarship Fund This scholarship was created by Lisa S. Bunin, M.D., Med '84, in honor of her 35th Reunion from the School of Medicine in 2018. Dr. Bunin is a board-certified ophthalmologist and oculoplastic surgeon in private practice.

Alden H. and Mary K. Burkholder Scholarship in Medical Education This fund was established in 1996 by Dr. and Mrs. John A. Burkholder in honor of his parents to provide scholarships for qualified medical students. John received his medical degree at Johns Hopkins in 1966, and his brother, Paul, in 1959.

The David P. Byeff and Stephen A. Byeff Scholarship This scholarship was endowed in 2018 by Dr. and Mrs. Peter D. Byeff (Med '74) in honor of their sons, David P. Byeff, J.D. and Stephen A. Byeff, M.A. Dr. Byeff is a private practice oncologist in Connecticut.

The Gail and Peter D. Byeff, M.D. Scholarship Established in 2006 by Dr. and Mrs. Peter Byeff. Dr. Byeff, Med '74, is an active leader and serves on the Hopkins Alumni Council. He is a private practice oncologist in Connecticut.

Douglas G. Carroll, Jr. Student Aid Fund Established in 1976 by Douglas G. Carroll, Jr., M.D., Med '42,to provide financial aid to deserving students in the School of Medicine.

David J. Carver Scholarship Fund An endowed scholarship was established in 1957 by Dr. David J. Carver for students in the School of Medicine. Dr. Carver earned a Ph.D. at the School of Arts and Sciences in 1919. Chinese students are to have preference insofar as there may be qualified applicants; second preference is for students of other Asian nationalities; third preference is for American students.

Centennial Scholarship Jeff Altman, a stand-up comic who resides in California, provided the seed money for this scholarship when he donated the proceeds of a performance at Johns Hopkins back to the institution.

Jerry and Ruth Chang Scholarship Fund Established in 2003 by Helena Chang Chui, M.D., Med '77, in honor of her parents, their accomplishments and their international work in pursuit of peace, in the hope that future generations of physicians will share a global vision that advances peace and health to the many countries of the world

Dean Alan M. Chesney and Dean Thomas B. Turner Scholarship Fund Friends and admirers of Dr. Chesney, Med '12, dean of the School of Medicine from 1929 to 1953, and Dr. Turner, dean of the School of Medicine from 1957 to 1968, established this scholarship in 1975 in their honor. Awards are to be used for scholarships for deserving medical students.

Chew Family Endowed Scholarship Fund Dr. Paul Chew (Med'77, KSAS '73) and his wife, Linda, were the first to take advantage of the new scholarship initiative to mark the Johns Hopkins School of Medicine's 125th anniversary. Dr. Chew held various roles at Johns Hopkins until 1992 culminating with his being named director of the pacemaker clinic.

Clark Foundation Scholarship Fund This scholarship was established in 1983 by the Clark Foundation of New York City.

Lansdale G. and Gladys B. Clagett Scholarship and Loan Fund This fund was created to provide need-based financial aid to medical students.

Class of 1915 Memorial Fund A fund established through gifts and bequests from and as a tribute to the Class of 1915 for the purpose of awarding scholarship aid to a deserving student or students at the Johns Hopkins University School of Medicine.

Class of 1926 and Charles O'Donovan Scholarship Fund Members of the Class of 1926 established this scholarship in 1950 to honor Dr. Charles O'Donovan, Med '25, a pediatrician and member of the Hopkins faculty from 1946 to his death in 1964.

Medical School Class of 1936 Memorial Scholarship Fund This scholarship was established in 1968 in memory of deceased members of the Class of 1936.

Class of 1937 Philip Bard Scholarship Established as an endowed fund by the Class of 1937 in 1987 in honor of their 50th Reunion and in memory of Dr. Philip Bard. Dr. Bard served as director of Physiology and dean of the School of Medicine from 1953 to 1957.

Class of 1946 Scholarship Fund This scholarship was created by three members of the Class of 1946 in honor of their 50th reunion from the School of Medicine, Oliver Massengale, M.D., James K.V. Willson, M.D. and James S. Martin, M.D.

Class of 1947 Scholarship Fund This scholarship was established in 2007 after the death of George P. Thomas, M.D., Med '47, through a planned gift to the School of Medicine in honor of the members of the Class of 1947.

Class of 1954 Scholarship Fund This endowed scholarship for Johns Hopkins medical students was initiated through a gift to recognize the accomplishments of the Class of 1954, and as a tribute to Dr. Robert Zadek. It was funded by Mr. and Mrs. Stephen Mandel, the daughter and son-in-law of Dr. Robert Zadek, Med '54.

Class of 1956 Memorial Fund Endowed in 1971 by members of the Class of 1956, the income to be used to provide scholarships to medical students with financial need.

Class of 1960 Scholarship Fund William D. Kerr, Jr., Med '60, of Winnetka, Illinois, and other members of the Class of 1960, established this scholarship in 1998. Dr. Kerr is a member of the Johns Hopkins University Alumni Council.

Class of 1962 Scholars Fund This scholarship was established in1988 by members from the Class of 1962 to commemorate their 25th Reunion.

Class of 1964 Physician of Letters Merit Scholarship Members of the Class of 1964 established this scholarship in 1991 to provide merit scholarship support.

Class of 1965 Scholarship Fund Endowed by the members of the Class of 1965 in honor of their 25th Reunion, the income to provide scholarships to needy medical students.

Class of 1966 Scholarship Fund Endowed in 1989 by the members of the Class of 1966 in honor of their 25th Reunion, the income to provide scholarships for needy medical students.

Class of 1967 Scholarship Fund This scholarship was created by the Class of 1967 in 2007 in honor of their 40th School of Medicine reunion.

Class of 1969 Memorial Scholarship Fund The Class of 1969 Memorial Scholarship was established to honor the memories of deceased classmates.

Class of 1973/Keith D. Maxwell, M.D., Memorial Scholarship Fund This fund was established in 1999 by members of the Maxwell family and other members of the Class of 1973 in honor of their 25th Reunion and in memory of Keith Maxwell, M.D. Funds provide scholarship support to needy medical students.

Class of 1975 Endowed Scholarship Fund In 2011, the Class of 1975 elected to raise funds in honor of their 35th Reunion to establish the Class of 1975 Endowed Scholarship Fund. The scholarship was fully endowed in 2021.

Class of 1976 Scholarship Fund Endowed by the members of the Class of 1976 in honor of their 25th Reunion, the income to provide scholarships to medical students exhibiting financial need.

Class of 1978 Scholarship Fund Endowed by the Class of 1978 to commemorate their 25th Reunion; the income will provide scholarships to needy medical students in the School of Medicine.

Class of 1980 Scholarship Fund Dr. John T. Thompson and other Class of 1980 School of Medicine alumni established the Class of 1980 Scholarship Fund in 1995 to provide scholarship aid to financially needy medical students.

Class of 1983 Scholarship Fund This fund was created by members of the Class of 1983 upon their 15th Reunion to provide assistance to needy medical students.

Class of 1986 Scholarship Fund Endowed by the members of the Class of 1986 to commemorate their 15th Reunion in 1999, the income to provide scholarship assistance to needy medical students in the School of Medicine.

Class of 1987 Memorial Scholarship Fund Originally named the Gregory L. Plock Loan Fund, family, friends, and former classmates established the fund in 1995 and is in memory of Dr. Plock and other classmates who have died.

Class of 1994 Scholarship Fund Inspired by their 25th Reunion, the Class of 1994 Scholarship was established in 2021 by classmates to show appreciation for the education provided by the School of Medicine.

Harry P. Clause, Jr., MD. Scholarship Dr. Clause, Med '55, created this scholarship through his estate for medical students. He was a thoracic surgeon who served as medical director for Alliant Techsystems until his retirement in 2000. Dr. Clause died in 2008.

Elaine Hefty Cleary Memorial Scholarship Fund Established by The Class of 1985 in memory of Elaine Hefty Cleary, Med '85. Dr. Cleary served on the internal medicine faculty of the University of Colorado and spent her career caring for indigent patients and teaching medical students and residents.

Joanne and William Conway Medical Scholarship Created in 2018 by Mr. and Mrs. William E. Conway, Jr. to benefit students in the School of

Medicine. Mr. Conway is the co-founder and co-executive chairman of The Carlyle Group, one of the world's largest and most successful investment firms.

The Joanne and William Conway Endowed Medical Scholarship As part of Dean Rothman's initiative to eliminate debt by SOM's neediest students, Mr. and Mrs. Conway endowed this scholarship in 2021. Mr. Conway is the co-founder and co-executive chairman of The Carlyle Group, one of the world's largest and most successful investment firms. He is Chair of the Board of Medicine Trustees.

Jewel Hart Coombe/Stephen F. and Paula R. Wetherill Scholarship This fund was established by the family trust of Jewel Hart Coombe as an endowed scholarship fund for Medical Students in the School of Medicine in 2009. Stephen received his bachelors and medical degrees at Johns Hopkins (Med '71) and Jewel was Paula's aunt.

William A. Crawley, M.D., D.D.S, Endowed Scholarship Fund This scholarship was established by William A. Crawley, M.D., Med '79, in honor of his 25th reunion. Dr. Crawley served as both medicine faculty and house staff at JHH.; the income is to be used to provide financial assistance to worthy students in the School of Medicine.

Alvin J. Cummins, M.D. Memorial Scholarship Fund the Alvin J. Cummins, M.D. Endowed Memorial Scholarship was endowed in 2016 by his children. He would be proud to know that this scholarship will help others secure a medical education at the school he loved and considered the finest in the nation.

Richard S. D'Agostino, M.D. Endowed Scholarship Fund This fund was created in 2003 by Dr. D'Agostino, Med' 78, to honor his devotion to medicine and his lifetime affiliation with the School of Medicine. Income from this fund will provide financial assistance to medical students at the School of Medicine.

Virginia Wells Davies Fund The Virginia Wells Davies Fund was established by Virginia Wells Davies in November of 1981. Its purpose is to provide scholarship assistance to financially needy students pursuing the degree of Doctor of Medicine.

Davis Family Foundation Endowed Scholarship The Davis Family Endowed Scholarship was funded in 2016 to provide merit based awards for deserving medical students. A select number of incoming students from the Class of 2020 were the first recipients. Mr. Davis served as a trustee for Johns Hopkins Medicine until 2008.

The Davis Family Foundation Medical Scholarship Supporting Dean Rothman's initiative to enable every School of Medicine student with demonstrated financial need to graduate without medical school debt, Mr. James Davis created this scholarship in 2021 through the Davis Family Foundation. Along with his cousin, Steve Biscotti, Mr. Davis co-founded Aerotek, a staffing agency.

Archibald S. Dean, M.D., and David C. Dean, M.D., Scholarship This scholarship was established by David C. Dean, M.D., Med '56 in honor of his 50th School of Medicine reunion and in memory of his father, Archibald S. Dean, M.D., Class of 1922.

Alfred DeSanctis, M.D., Scholarship Fund for Medical Education Dr. Alfred DeSanctis, Med '51, was a World War II army veteran. Dr. DeSanctis was a surgeon in Cleveland, Ohio until his retirement. He established this scholarship in 2010.

Ernest and Ruth DeSanctis Scholarship Fund Established by Alfred L. DeSanctis, M.D., Med '51, in honor of his parents. Dr. DeSanctis worked with Drs. Blalock and Ravitch. Preference is given to students who have either a liberal arts or humanities degree or have taken similar courses as an undergraduate.

Marguerite T. Doane Scholarship Fund Mrs. Marguerite T. Doane established an endowment fund in 1952 to provide tuition aid to certain students with financial need.

The Oscar and Victoria Dorsch Scholarship for Medical Education This scholarship was established in 2003 by Carole A. Dorsch, M.D., Med '68, in memory of her parents, to provide financial support for medical students at the Johns Hopkins University School of Medicine.

Victoria S. Doust, M.D. Scholarship Fund Established in 1999 by Brewster C. Doust, M.D., to honor the education his wife, Victoria (Med '51), received at Johns Hopkins. Victoria completed her residency at The Johns Hopkins Hospital in Medicine, and met Brewster (an intern) during her training.

Denise Dufer, M.D. Memorial Scholarship Fund Established in 1990 by the family, friends, and colleagues of Dr. Denise Dufer, Class of 1988. This endowed fund is to provide scholarships to needy medical students.

Audrey and Guy DuRivage Scholarship Fund Shall be used to provide scholarship for needy and worthy young men and women who wish to train for and pursue medical careers.

Durrant-Corton Scholarship Fund This scholarship was created in 2019 through a bequest from Rosina Corton. She was born in England, then lived in Canada before making the U.S. her home. She resided in Maryland with her husband Edward, and worked as a nurse in Washington, DC.

Joseph C. Eggleston Memorial Scholarship Fund An endowed fund established in 1989 by family, friends, and colleagues of Dr. Joseph Eggleston, Class of 1962. Dr. Eggleston served on the medical staff in pathology from 1962 to 1989. The income is to provide scholarship assistance to needy medical students in the School of Medicine.

Robert Biggs Ehrman Scholarship Fund Established in 1970 at the death of Mr. Ehrman to provide scholarships for medical students.

Epps Family Fund This scholarship was established in 1999 by physicians Charles H. Epps, Jr. and his wife, Roselyn Payne Epps, SPH '73 (M.P.H.), in honor of their son, Howard R. Epps, Med '89, and in memory of their son Charles H. Epps II, Med '83. Charles H. Epps, Jr., a longtime member of the School of Medicine faculty, is associate professor emeritus of orthopaedic surgery

David L. Epstein, M.D., Scholarship Fund This scholarship was established in 2014 by Susan Matthews Epstein (SON '66) in honor of her late husband, David L. Epstein, M.D., Med '68.

Jean Epstein Memorial Fund This endowment fund was established in 1985 by Mr. and Mrs. Alvin Epstein and the Alvin and Louella Epstein Foundation in memory of Mr. Epstein's sister. The income from this fund provides a scholarship to deserving women who have an interest in neurology.

Nancy Burton Esterly, M.D., Scholarship for Medical Education of Women in Pediatrics and Dermatology This scholarship was established in 2002 by Nancy Burton Esterly, M.D., Med '60. Dr. Esterly retired as the head of Pediatric Dermatology at the Medical College of Wisconsin and is the former head of Pediatric Dermatology at Northwestern University.

Eugenio Fernandez-Cerra, M.D. Scholarship Fund This fund was established in 1999 by Dr. Eugenio Fernandez-Cerra, a 1943 alumnus of the School of Medicine. Preference is given to students from Puerto Rico.

Dr. Edward M. and Marcella Finesilver Memorial Scholarship Fund This fund was established in 1999 by Mrs. Frances Blumenthal in memory of her father, an alumnus of the Class of 1924.

Warfield M. Firor Scholarship An endowed scholarship established in 1989 by the estate of Mrs. Thomasena Allen, longtime secretary to Warfield Firor, A&S '17, Med '21, who was a professor of surgery at Hopkins. The income is to provide financial aid to needy medical students..

Fischer Family Scholarship for Medical Education This scholarship fund recognizes the Hopkins family legacy of Janet Fischer, M.D., Class of 1948; Newton Fischer, M.D., former faculty in Otolaryngology; and Anne Crowe Fischer, M.D., Ph.D., Class of 1991. The purpose of this endowed fund is to provide financial assistance to medical students. It was established in 2002.

Arthur Lawrence Fisher, M.D. Scholarship Fund Established by Ken and Sherri Fisher, in memory of Arthur Lawrence Fisher, School of Medicine alumnus from the class of 1900. The scholarship shall support five Fisher Scholars each year. The scholarship is named for Ken's grandfather.

Theresa and Harold Flowers Scholarship Fund The Theresa and Harold Flowers Scholarship Fund was established in honor of the parents of Dr. Brian Flowers, Med '93, Theresa and Harold, on the occasion of his 15th School of Medicine Reunion..

Waldo Emerson Floyd III Scholarship Fund This scholarship was established in 1975 by Class of 1954 representative Waldo Emerson Floyd, Jr., Med '54, of Macon, Georgia, in honor of his son, Dr. Waldo E. Floyd III, who trained at Hopkins Hospital. Students from the state of Georgia are to have preference insofar as there may be qualified applicants; second preference will be given to students from the southeastern part of the United States.

Eric W. Fonkalsrud, M.D. and Margaret Z. Fonkalsrud Endowed Scholarship Fund This fund was established in 2002 by Eric W. Fonkalsrud, Class of 1957, and his wife, Margaret Fonkalsrud. The couple has a life-long affiliation with the Johns Hopkins School of Medicine. Dr. Fonkalsrud served on the faculty in the School of Medicine's Department of Surgery and as a surgeon at the Johns Hopkins Hospital. The income from this fund will provide financial support to medical students who have demonstrated financial need.

Lay M. Fox Scholarship This scholarship was created in 2012 by estate of Dr. Fox, Med '47, to be used for financial aid for medical school students.

Sharon Fox Scholarship Fund in Memory of Henrietta B. Fox An endowment fund established in 1967 under the will of Mr. Sharon Fox in memory of Henrietta B. Fox, the income from which is to be used for student aid in the School of Medicine.

Bernard S. French Scholarship Fund Established as a bequest from the estate of Sallye Lipscomb French as a memorial to her husband, Bernard S. French, to provide scholarship support at the School of Medicine.

I. Phillips Frohman, M.D. Scholarship Established in 2000 by a gift from Dr. Frohman.

James L. Frost, M.D., and Alice E. Frost Endowed Scholarship Fund This scholarship was funded through a gift from the late James L. Frost, M.D., Med '57, and his wife, Alice E. Frost in 2014.

Bernice and Joseph Fuld Memorial Scholarship Fund This fund was established in 1998 by Stuart L. Fuld, M.D., Class of 1963, and Ulrike L. Fuld. The income is to be used for financial assistance to medical students.

The Arnold D. Gale, M.D. Memorial Scholarship Fund Classmates and friends created this scholarship in 2014 in memory of Arnold (Arnie) D. Gale, M.D. '76. Dr. Gale was a beacon of dedication to all, fighting a lifelong battle against progressive muscular dystrophy.

James R. Gantt, M.D., Medical Education Fund This fund was created in 2018 through a bequest from Mrs. Joan Gantt, widow of James R. Gantt, M.D. (Med '57, KSAS '53). Dr. Gantt was a thoracic surgeon in private practice in Dallas, TX. He died in 2006. Mrs. Gantt died in April 2018.

Dr. J. Alex and M. Arlene Gardner Scholarship Fund This fund was established in 1996 by Dr. and Mrs. J. Alex Gardner to provide scholarship support to students in the School of Medicine, preferably to any acceptable candidate applying for admission to the Johns Hopkins University School of Medicine, from southwestern Michigan.

Dr. and Mrs. Abraham Genecin Memorial Fund This fund was established in 1999 by Mrs. Rita Genecin and other donors to provide assistance to needy medical students.

Gilliam Family Scholarship Fund This endowed fund, established in 2001 by the Gilliam Foundation and Mr. James H. Gilliam, Jr., is to provide financial assistance to Morgan State University graduates enrolled at the Johns Hopkins University School of Medicine, or students from HBC who have demonstrated need.

The Anita Desch Gipe Memorial Scholarship Established in 1999 by the estate of R. Norman Gipe of Heathsville, Virginia, in memory of his wife.

Maurice H. Givens-David E. Rogers Scholarship Fund Established by a gift from the estate of Dr. Maurice H. Givens to provide scholarships for students in the School of Medicine.

Emil Goetsch Fund for Medical Students The income from this endowment, established in 1963, is used for scholarships for medical students.

Morton F. Goldberg, M.D. Scholarship Fund Established in 2003 by Frank E. O'Donnell, Jr., Med '75 to honor Dr. Goldberg's leadership at the Wilmer Eye Institute. Income from this fund will be used to provide assistance to deserving medical students.

Joan and David Goldfarb, M.D., Endowed Scholarship Fund Established in 1995 by David Goldfarb, M.D., A&S '59, Med '63, this fund is to used to provide scholarship assistance to medical students with financial need.

Lillian Ruth Goldman Scholarship Fund Established in 1986 as a bequest from the estate of Lillian Ruth Goldman to provide scholarship assistance to needy and deserving medical students.

Gorham Family Scholarship for Medical Education George W. Gorham, Med '54, and his family, established this fund in 2000 to recognize the medical legacy of his father, L. Whittington Gorham, Med '10, and his grandfather, physician George Elmer Gorham.

Leonard L. Greif Memorial Scholarship Fund Ann Greif and her sons, Leonard L. Greif, Jr., and Roger L. Greif, Med '41, established this fund in

1957 in memory of her husband, Baltimore photographer Leonard L. Greif, Jr.

Norman M. and Eleanor H. Gross Scholarship Fund This fund was established in 2002 by the Norman M and Eleanor H. Gross Trust. Mr. and Mrs. Gross were well known for their care and compassion for others. The Norman M. and Eleanor H. Gross Scholarship Fund provides financially needy students the opportunity to pursue their education at the Johns Hopkins Medical School.

Helen L. and William D. Guynn Memorial Scholarship Fund Established in 1995 in memory of his parents by Robert W. Guynn, M.D., Med '67. The income from this fund will be used to provide scholarship assistance to needy medical students.

Richard D. Hahn Scholarship Fund This endowment fund was established in 1980 by the Myers Family of Baltimore to recognize the competence and compassion with which Dr. Hahn, a member of the Class of 1936, serves his patients. The income from this fund provides a scholarship to a third-year medical student who intends to specialize in internal medicine.

Rowena Sidbury Hall, M.D., Scholarship for Medical Education of Women in Pediatrics This fund was established in 2002 by Rowena Sidbury Hall, Class of 1943 (February), of Silver Spring, Maryland. She served as a member of the faculty in the School of Medicine's Department of Pediatrics and as a pediatrician at the Johns Hopkins Hospital. Preference in award of the scholarship is given to women interested in pediatrics.

Louis Hamman Memorial Scholarship This is an endowed scholarship in memory of the late Dr. Louis Hamman, a graduate of the School of Medicine and for many years a devoted member of the medical faculty. It was established in 1950 through gifts from many of Dr. Hamman's friends. The income is available for a scholarship for a medical student whose financial need and developmental promise justify such an award.

Isabella Harrison, M.D. Scholarship Fund for Medical Education This fund was established in 1999 by Dr. Harrison, a 1938 graduate of the School of Medicine. It is to be awarded to female students interested in surgery.

Charles L. Hartsock Memorial Scholarship Fund This scholarship was established in 1961 in memory of Dr. Charles L. Hartsock, Class of 1920, by members of his family and friends to provide aid to needy and worthy medical students.

A. McGehee Harvey, M.D. Scholarship Fund This scholarship was established in 2012 by the estate of Barbara Ziegler in memory of A. McGehee Harvey, M.D., Professor of Medicine, for financial aid use.

Dr. Lawrence V. and Doris Hastings Scholarship This scholarship was established by Mrs. Doris L. Hastings in memory of her husband, Lawrence V. Hastings, M.D., Med '48.

Morrison Leroy Haviland Scholarship Fund Established in 1978 by Dr. James W. Haviland, Med '36, and his brother Morrison C. Haviland in honor of their father, Morrison Leroy Haviland, a member of the Medical School Class of 1902. This income is to be used for needy medical students.

Dr. George and Catherine Hayes Scholarship Fund Neurosurgeon George J. Hayes, Med '43, and his wife, Catherine, established this fund in 1993 in recognition of his 50th reunion. to provide scholarship assistance to needy medical students.

Edward C. Held, M.D., Scholarship Fund Established in 1996 by Helen Duryea of West Hempstead, NY, in memory of Dr. Held, Med '26. Dr. Held was a family practitioner for more than 60 years, and long-time physician to Miss Duryea's family.

John Helfman Scholarship Fund Established as a bequest from the estate of John Helfman to be used for loans or gifts to needy students in the School of Medicine.

Frank Norman Hillis, Jr. Memorial Scholarship in Medical Education This endowment fund was established in 2002 by Panamerican Consulting International, Ltd. This gift is in memory of Frank N. Hillis, Jr. (d. '99), who was founder of Panamerican Consulting Ltd. Preference is given to students from either Florida or Maryland who wish to specialize in the field of cardiology.

Franklin T. and Jean Hoaglund Scholarship Established in 1994 by Franklin T. Hoaglund, Med '56, former class representative for the Class of 1956, and his wife, Barbro Jean, in honor of Dr. Hoaglund's 50th reunion.

Dorothy D. Hoelzer Scholarship Fund This fund was established in 2002 by the estate of Dorothy D. Hoelzer (d '02) to be used for scholarships for students who would not be able to attend Johns Hopkins Medical School without financial assistance.

The Mary Margaret Hopkins and James E. T. Hopkins Scholarship Fund for Medical Students Initiated in 1993 through a planned gift by James E.T. Hopkins, KSAS '37, Med '41, and his wife, Mary Margaret Hopkins, of Baltimore

Jesse W. and Emma Dieringer Hubbard Memorial Scholarship Fund Jesse Donald Hubbard, Med '51, and John Stanley Hubbard, Med '53, established this fund in 1992 in memory of their parents. This income is used for scholarship aid to needy medical students in the School of Medicine.

George Skaife and Fredericka Louise Hughes Family Scholarship This scholarship was established in 1998 by Mr. William Hughes and Ms. Gail Hughes Deets. It provides scholarship support for students with an interest in geriatrics.

Evelyn H. Hurlburt and Irene H. Sluckis Scholarship Fund This fund was established in 1997 by Mr. Charles O. Banks and Ms. Irene Sluckis to provide scholarship assistance in the School of Medicine.

The John B. Imboden, M.D. and Anne G. Imboden Endowed Scholarship Fund This scholarship was established in 2018 by Anne G. Imboden in memory of her husband, John B. Imboden, M.D., Med '50. After completing his residency at JHH in psychiatry, Dr. Imboden served on faculty at Johns Hopkins in the Department of Psychology and Behavioral Sciences as a psychoanalyst interested in psychosomatic medicine, and then became chief of psychiatry at Sinai Hospital.

Waddie Pennington Jackson Scholarship Fund This scholarship fund was established in 1963 by Dr. W. P. Jackson, Class of 1917, in memory of his wife, Bessie Gills Jackson, income from which is to provide scholarship support for needy students in the School of Medicine.

Stuart and Lynn Janney Fund for Medical Education The Stuart and Lynn Janney Fund for Medical was created in 2017 by Stuart and Lynn Janney. Mr. Janney serves as Trustee for both The Johns Hopkins University and Johns Hopkins Medicine. The fund is to be used to support outstanding medical students.

Edwin Bosley and Dorothy Duncan Jarrett Memorial Fund for Medical Scholarships Established in 1977 by a gift from Mr. and Mrs. Edward Foss Wilson in honor of Dr. Edwin B. Jarrett,, A&S '18, Med '22, and his wife, Dorothy D. Jarrett, of Baltimore to provide endowed scholarships to worthy students in the School of Medicine.

William H. Jarrett II Scholarship Fund This fund was established in 1993 by Dr. William H. Jarrett II, a graduate of the Johns Hopkins University School of Medicine 1958, in honor of his 35th anniversary class. The scholarship monies will be made available to financially needy medical students to help defray their costs of medical education.

Ming K. Jeang, M.D., and Kuan-Teh Jeang, M.D., Ph.D., Endowed Scholarship Fund This fund was established in 2005 by Ming K. Jeang, M.D., Med '80, and Kuan-Teh Jeang, M.D., Med '82, in honor of their lifetime affiliation with the Johns Hopkins School of Medicine.

Dr. Nancy Jenison Scholarship Fund Through a generous bequest from Dr. Nancy Blanche Jenison, a member of the Class of 1911, a scholarship fund was established in 1963 to provide financial assistance for deserving women medical students.

Claire S. Jensen and Allan D. Jensen, M.D., Endowed Scholarship Fund Established in 2004, this scholarship honors the deep devotion Dr. and Mrs. Jensen have to medicine, and their lifetime affiliation with the Johns Hopkins University School of Medicine. Dr. Jensen is a graduate of Krieger (1965) and SOM (1968).

The Johns Hopkins Hospital Women's Board Scholarship Fund The Women's Board of the Johns Hopkins Hospital makes an annual contribution to the School of Medicine to provide financial assistance to deserving students.

Johns Hopkins Medical and Surgical Association Centennial Scholarship and Loan Fund Established in 1989 by the Johns Hopkins Medical and Surgical Association to commemorate the Johns Hopkins Medical Centennial. The fund is to be used to aid deserving students in the School of Medicine.

Morris Joseph Medical Residence Fund Dr. Morris Joseph has created a scholarship fund to defray the cost of a room in Reed Hall for a deserving medical student.

Murray A. Katz, M.D. and Michael S. Katz, M.D. Endowed Scholarship Fund This scholarship was created in 2016 to honor two brothers, Murray A. Katz, M.D., Med '66, and Michael S. Katz, M.D., Med '72. Mrs. Sali Katz, Murray's widow, equally contributed to this fund.

Allen and Florence Kayne Endowed Scholarship Fund Named in honor of Florence Kayne and in memory of her late husband, Allen. Created by Florence Kayne, parent of Richard D. Kayne, M.D., Med '80, in gratitude for his education at the SOM.

Elaine G. & Thomas J. Kennedy Jr., Scholarship Fund Thomas J. Kennedy, Jr., Med '43, and his wife, Elaine Kennedy, established this fund in 1993 in honor of his 50th reunion.

Dr. John T. King, Jr. Scholarship Fund Established in 1978 by a gift from Dr. John T. King, Jr., Med '14, one of Johns Hopkins' most distinguished physicians for more than six decades, to provide endowed scholarships for medical students

Herbert Koteen, M.D. Scholarship Fund This fund was established in honor of Dr. Koteen, Med '39, upon his eightieth birthday by his family. The income is to be used for scholarship aid to financially needy students in the School of Medicine.

Milton B. Kress Scholarship Fund Established in 1987 by a bequest from the estate of Milton Kress. The income from this endowed gift is to be used as scholarships for needy students in the School of Medicine. The students and amounts of each scholarship is to be selected by the Dean of the School of Medicine.

Louis F. Krumrein, M.D. Scholarship Fund Established as a bequest from Dr. Louis F. Krumrein, Class of 1918, for the benefit of deserving students who could not otherwise afford a medical education.

Oliver and Elizabeth Laster Scholarship for Medical Education This fund was established in 2001 by Oliver and Elizabeth Laster of Hewlett, New York. This fund honors their children, Andrew J. Laster, M.D., A&S '75, Med '79; Steven Laster, M.D., Med, '86; and Geraldine Laster Macomber; and memorializes their parents, Alan and Caroline Laster and Dr. Bernard and Hannah Aschner. Drs. Andrew and Steven Laster served as members of the Johns Hopkins Hospital staff in the Department of Medicine. The income is to be used to help medical students finance their education.

Dr. Maurice Lenarsky Scholarship Fund This fund was established in 1991 by Jane Lenarsky in honor of her father Dr. Maurice Lenarsky upon his eightieth birthday. The income is to be used for scholarship aid to financially needy medical students with preference given to fourth year students with an interest in pediatrics.

Norman Lepor, M.D., Scholarship Fund Created in 2007 by Dr. Norman Lepor, Med '82, in honor of his 25th School of Medicine Reunion.

Lai-Sung E. Leung, M.D., Family Scholarship J. Dr. and Mrs. Leung, Med '70, established this scholarship in 2005 in honor of his 35th reunion and his son's graduation from Johns Hopkins University School of Medicine.

Loren G. Lipson, M.D., Endowed Scholarship Fund J. Mario Molina, M.D. created this scholarship in 2018 in memory of his mentor, Loren G. Lipson, M.D., Med'69 (d.2017), and in honor of Dr. Lipson's 50th reunion. Dr. Lipson performed his internship and residency in Internal Medicine.

Dr. Frank H. Logan Scholarship Fund This scholarship was created through bequest from Bettye K. Logan, in memory of her husband Frank H. Logan, M.D., Johns Hopkins SOM Class of 1946. Dr. Logan was a Family Medicine practitioner.

John I. Mandler, M.D. and Marilyn S. Mandler, R.N. Scholarship for Medical Education Established in 2003 by Marilyn Simmons Mandler, SON '56, wife of John I. Mandler, KSAS, '52, Med '56. This scholarship fund will be used to support a medical student with financial need.

Joseph A. Manfredi Scholarship for Medical Education Mr. Manfredi funded this current use scholarship through his estate, having died in 2020 due to complications related to COVID-19 at 85.

Simeon G. Margolis, M.D., Ph.D., and Mary A. Margolis Family Endowed Scholarship Fund This scholarship was established in 2013 by Dr. and Mrs. Margolis. Dr. Margolis is a graduate of the Krieger School of Arts & Sciences '53 and the School of Medicine,'57. Dr. Margolis trained at Johns Hopkins and remained a valued member of the faculty. He is Professor Emeritus of Medicine and Biological Chemistry at the School of Medicine.

Rex R. Martin, M.D. and Ann Y. Martin Scholarship Fund Established in 2000. Dr. Martin is a 1950 graduate of the School of Medicine. This fund is in honor of his 50th graduation anniversary.

Mason Family Endowed Scholarship Fund Raymond A. "Chip" Mason is the founder, and was the Chairman and CEO of Baltimore-based investment firm Legg Mason until his retirement in 2008. He has been a veritable pillar of the community, serving as chair of the Johns Hopkins University, where he remains a trustee emeritus of the university and medical school.

Bessie Darling Massey Scholarship Fund for Medical Students Established in 1967 at the death of Mrs. Bessie Darling Black Massey; the income is to be used for scholarships in the School of Medicine.

Manfred Mayer Scholarship Fund Established in 1985 by the colleagues and friends of Dr. Manfred Mayer to provide scholarships to support needy medical students with special consideration given to displaced persons or refugees.

Robert E. McCue, M.D., Scholarship Fund Mr. Daniel Nickolich created this scholarship in memory of his partner, Dr. Robert E. McCue. Dr. McCue, Med '78, was a researcher and master clinician in neuropsychiatry. He was passionate about medical research, patient care and teaching.

James P. McDonagh Memorial Scholarship Fund This scholarship was created in 2018 by Melissa McDonagh in memory of her father, James, which will support the full cost of attendance for four years of medical school for one medical student. This is the only scholarship at the SOM of its kind.

John Scott McFarland Scholarship Fund An endowment fund established in 1965 under the will of Dr. John S. McFarland, a member of the Class of 1902. The income from the fund is to be used to assist worthy students in the School of Medicine.

John McGee, M.D., and Marjorie L. McGee, M.D., Scholarship Fund This scholarship has been funded through a bequest from the estate of John and Marjorie McGee, both graduates of the School of Medicine, Class of 1944. Drs. McGee did their internship at Hopkins, John's in Surgery and Marjorie's in Medicine.

Gail McGovern Scholarship Fund Gail McGovern serves on the Johns Hopkins University Board of Trustees and established this scholarship in 2020 to be used to benefit the School of Medicine for financial need-based financial aid, in honor of the 125th Anniversary of the School of Medicine. She is the president and CEO of the American Red Cross. A graduate of the Krieger School of Arts and Sciences ('74), Gail has also endowed a scholarship fund for undergraduate students at JHU.

Robert S. McGraw Scholarship Fund This fund was established in 1983 by Dr. McGraw's sister through her family foundation in memory of Robert S. McGraw, Med '54, whose father and brother were also physicians.

Dr. Edwin Leonard McQuade Scholarship Fund The income from this endowment, established in 1954, is used for scholarships for medical students.

Rose Meinhardt Fund An endowed scholarship established by the estate of Rose Meinhardt to provide assistance to needy, deserving, and outstanding students who wish to pursue a career in medical research.

Dorothy Reed Mendenhall Scholarship Fund An endowed fund, to provide an annual scholarship to a deserving woman medical student, was established in 1957 by members of the family of Dr. Dorothy Reed Mendenhall, Class of 1900..

H. Houston Merritt Scholarship Fund Established in 1990 with a gift from the estate of H. Houston Merritt, this fund provides scholarship aid to students in the School of Medicine. Preference is given, whenever possible, to students from the state of North Carolina.

Adolf Meyer Scholarship Established by a former student of Dr. Adolf Meyer, to be used for scholarship aid for students of the School of Medicine.

Mildvan Alumni Endowed Scholarship Fund Established in 2003 by Drs. Patricia Tarr Mildvan, Med '59, Albert S. Mildvan, Med '57, and Donna Mildvan, Med '67, in honor of their devotion to medicine.

Orville and Kathryn Miller Scholarship Fund An endowment fund established in 1965 by Mrs. Orville R. Miller and her son, Mr. Orville Miller, of Portland, Oregon. The income from this fund is to be used to assist students in the Five Year Program with preference to be given to students from the state of Oregon.

Daniel L. Moore, M.D. Scholarship Fund Daniel L. Moore, Med '58, and his wife, Sheila Moore, established this fund in 1993 in honor of his 35th class reunion.

Dr. L. F. Morawetz Scholarship Endowed Scholarships In memory of the late Dr. L. F. Morawetz are available to students in the School of Medicine who are in need of financial support.

William W. More Memorial Scholarship Fund Established in 1995 by Dr. Thomas H. Powell, Med '62, to provide scholarship support to needy students in the School of Medicine.

M. Sandra Morse Scholarship Fund This fund was established in 1993 by M. Sandra Morse to show gratitude for the joy the medical school students had given her during her 29-year tenure as Director of Financial Aid. The endowment income is to be used to provide assistance to financially needy students in the School of Medicine.

Morris J. Moskowitz, M.D. Scholarship Established in 2000 by the estate of Morris J. Moskowitz, M.D., who was a member of the School of Medicine Class of 1922.

Dr. Donald G. and Barbara Mulder Scholarship Fund Donald G. Mulder, Med '52, and his wife, Barbara Mulder, established this fund in 1994 in recognition of Dr. Mulder's medical school experience at Johns Hopkins.

The Murphy-Nogee Family Endowed Scholarship Fund This scholarship was created by Anne M. Murphy, M.D., and Lawrence M. Nogee, M.D., both Med '81, in honor of the 125th anniversary of the School of Medicine. Dr. Murphy is a pediatric cardiologist on staff and faculty at the School of Medicine. Dr. Nogee is also on staff and faculty at the School of Medicine. His specialty is in the Pediatric NICU. Drs. Murphy and Nogee are parents to Julie Nogee, Med 2011 and Daniel Nogee, Med 2015.

Leslie E. Myatt, M.D. and Marion D. Myatt Memorial Scholarship Established by the estate of Mrs. Myatt, in memory of her and her spouse, Leslie, School of Medicine Class of 1921.

Jesse Myers Scholarship Fund Established in 1971 in memory of Jesse Myers, who was killed in an automobile accident while he was a first-year student in the School of Medicine. The fund is to be used to assist minority students at the School of Medicine.

James F. Nabwangu, M.D., Scholarship Fund James F. Nabwangu, M.D., A&S '64, Med '67, established this fund in 1995 to celebrate his 25th class reunion.

Russell A. Nelson Scholarship Fund This fund was established in 2002 by Russell A. Nelson, Med. 1937, of Naples, Florida and his wife, Ruth J.

Nelson, Nurs. 1937, through the Russell A. and Ruth J. Nelson Trust and the Ruth J. Nelson Trust. Dr. Nelson served as a hospital trustee, a faculty member in the Department of Medicine at the School of Medicine, and as president of the Johns Hopkins Hospital. Dr. And Mrs. Nelson both died in 2001. This fund provides scholarship assistance to deserving medical students in the School of Medicine.

Howard and Rosemary Nicholson Scholarship Fund This scholarship was established by Don H. Nicholson, M.D., Med '66, in honor of his parents. The initial endowment was a bequest from his mother. Dr. Nicholson continued his training in residency at Wilmer and retired from practice as an ophthalmologist in 1996.

Nu Sigma Nu Medical Student Scholarship Fund Established in 1985 at the direction of Dr. William Hillis, an alumnus of the School of Medicine and a former member of our faculty. The income is to be used for scholarships to students in the School of Medicine, and it gives recognition to the past contributions of the Nu Sigma Fraternity to the community of the School of Medicine.

John L. O'Day Scholarship Fund Established in 2004 by Steven J. O'Day, Med '88, and Carol Ann O'Day in memory of Dr. O'Day's father, John L. O'Day.

Peter D. Olch, M.D. Memorial Scholarship Fund Oliver N. Massengale, Med '55, established the Peter D. Olch, M.D. Memorial Scholarship in 1995 in memory of Dr. Olch, Med '55, who trained as a surgeon and pathologist and became the deputy director of the medical history division of the National Library of Medicine of the National Institutes of Health.

Dr. E. Paul O'Sullivan Scholarship Fund This fund was established in 1993 by Dr. E. Paul O'Sullivan, a graduate of the School of Medicine in 1943, to provide scholarships to financially needy medical students.

Sheila S. and Dr. Lawrence C. Pakula Scholarship for Medical Education This fund was established in 1998 by Mrs. Sheila Sutland Pakula and her husband, Lawrence C. Pakula, M.D., associate professor of Pediatrics at the Johns Hopkins Children's Center until 2007.

The Emanuel and Patricia M. Papper Scholarship Established through a planned gift in 2003 by Dr. Emanuel Papper who was Dean Emeritus and Professor of Anesthesiology at the University of Miami, School of Medicine. This fund was established to provide tuition scholarships to medical students.

Parents Fund for Medical Students Endowed in 1990 by parents of medical students with financial need.

Edwards A. Park Scholarship Fund An endowment fund, established by friends, former students, and professional colleagues of Dr. Park at the time of his eightieth birthday, December 30, 1957, with income allocated to student scholarships in the School of Medicine. Dr. Park served as director of pediatrics at Johns Hopkins from 1927 - 1946 and is credited with establishing several highly successful specialty clinics in the pediatrics outpatient department.

Gertrude Wills Parker and Edward Milton Parker Endowed Scholarship Fund Established in 1996 by Ronald E. Parker, M.D., to provide scholarship support to students in the School of Medicine.

Dr. John W. and Isabella Hunner Parsons Scholarship Fund An endowment fund was established in 1969 to provide financial assistance to needy and worthy students in the School of Medicine. The fund was established by Mrs. Roger G. Walker in memory of her late parents, Dr. John W. and Isabella Hunner Parsons, and their devotion to and lifelong involvement in the Johns Hopkins University. Dr. Parsons, the recipient of B.A. and M.D. degrees from the John Hopkins University, was an internist, allergist, and member of the School of Medicine faculty. Mrs. Parsons was a Baltimore portrait painter whose paintings hang in the Johns Hopkins University and Hospital.

Samuel H. Payne Scholarship Fund This endowment fund was established in 1977 by Mr. Mosby H. Payne to honor the memory of Samuel Payne and to provide scholarships for deserving students from the state of Virginia.

Willis C. Penney Memorial Scholarship Fund An endowment fund was established in 1986 by Della N. Penney and Susan E. Penney to provide financial assistance to needy and worthy students in the School of Medicine.

Virginia Romberger Reber Pettijohn Scholarship Fund Established in 1995 by the Estate of Virginia R. R. Pettijohn, this fund is to be used to provide scholarship assistance to medical students with financial need.

Ngoc Kim Pham Scholarship Fund The Ngoc Kim Pham Scholarship was created in 2013 by Ngac-Ha Nguyen '93, to honor of her mother, who raised her and a sibling as a single parent. Dr. Nguyen came to the United States from Saigon at age 15. She completed her residency in the Osler Service, and has instilled the importance of education that her mother taught to her two children.

Giacomo and Jan Pirzio-Biroli Scholarship Fund This fund was endowed in 2001 by the estate of Giacomo Pirzio-Biroli, Class of 1951, and his wife, Jan M. Pirzio-Biroli of Mercer Island, Washington. Prior to his death in 1998, Dr. Pirzio-Biroli often expressed his gratitude for the medical education he received after World War II from the Johns Hopkins University School of Medicine. The establishment of this fund, in his memory, will assist future generations of medical students to experience similarly enlightened medical education in the tradition of Johns Hopkins.

Stephen B. Pitcairn Memorial Scholarship Fund The Stephen B. Pitcairn Memorial Scholarship honors the life of Stephen Pitcairn, a medical research technologist at Johns Hopkins who was tragically killed in 2010. Recipients should exemplify Stephen's broad undergraduate interests (non-science major with study abroad) and interest in public health.

Warner M. and Lora Kays Pomerene Fund Established in 1980 with a gift from the estate of Warner M. Pomerene, this fund provides scholarship aid to students in the School of Medicine. Preference is given to the extent possible, to students who plan to become general practitioners in the field of family medicine.

Ethel Withee and Lyde Stuart Pratt Memorial Fund This fund was created in 2011 by Jeanette B. Pratt, R.N. and Loring W. Pratt, M.D. in honor of his parents Ethel Withee Pratt and Lyde Stuart Pratt, Ph.D. Dr. Loren Pratt was a graduate of the School of Medicine in 1943, and completed his residency in otolaryngology here.

Jeanette B. and Loring W. Pratt Scholarship Fund Loring W. Pratt, M.D., Med '43 and his wife Jeanette B. Pratt, R.N. established this fund in 1993 on the occasion of his 50th class reunion. Dr. Loren Pratt was a graduate of the School of Medicine in 1943, and completed his residency in otolaryngology here.

Allen L. and Margaret D. Pusch Scholarship Fund This fund was created by Dr. Allen L. Pusch and his wife, Margaret Pusch in 2014. Dr. Pusch is a graduate of the Class of 1960 School of Medicine (Pathology).

Radiology Fund for Medical Students Scholarship The Russell H. Morgan Department of Radiology and Radiological Science has established a scholarship fund for medical students which is enhanced from time to time by donations deriving from the earnings of the department.

Harry A. Raider Scholarship Fund Established by Mr. Raider to pay the tuition and/or other expenses of worthy students enrolled in the School of Medicine.

Rita Meena Raju Memorial Scholarship for Medical Education Established in 1999. Rita Meena Raju entered Johns Hopkins Medical School in 1993, and died suddenly after a brief illness in 1995. The purpose of this fund is to provide scholarship support to students who exemplify the highest ideals in the medical profession. Donors to the fund include her family and friends.

Randall Scholarship The scholarship fund was endowed in 1961 by an alumnus of the School of Medicine who wished to remain anonymous. The purpose of the Randall Scholarships is to assist able and deserving medical students in a low income bracket. To qualify for renewal of these scholarships, students must maintain academic standing in the highest third of the class.

Rosemarie Hope Reid, M.D. Memorial Fund This fund was established in 1994 in memory of the School of Medicine 1992 graduate Rosemarie Hope Reid by her family, friends, and former classmates. The income is to be used to help medical students finance their educations.

Ferdinand O. Reinhard Medical Scholarship These are endowed scholarships made possible in 1951 by a bequest from the late Dr. Ferdinand O. Reinhard, a graduate of the School of Medicine.

Herbert Remmer Memorial Scholarship Fund This endowment fund was established by Hilda Remmer in 1986. The income from this fund provides scholarships for medical students with preference given to Jewish students.

Dr. Maurice L. Richardson Fund Established as a bequest from the estate of Dr. Maurice L. Richardson. The income from this fund is to be used for scholarships for worthy students in the School of Medicine.

Timothy Leigh Rodgers, M.D., and Pamela Scribner Rodgers Endowed Scholarship Fund This scholarship was created in 2018 by Timothy Leigh Rodgers, M.D., Med '71 and his wife, Pamela Scribner Rodgers, SON '69. Dr. Rodgers is a specialist in Internal Medicine in Santa Barbara, CA.

Louis M. Rosenfeld Scholarship Fund Established in 1990 by the Estate of Madalyn Schwentker Rosenfeld, this fund in memory of Louis M. Rosenfeld's father, Jesse Rosenfeld, his mother, Rose R. Rosenfeld, and his sister, Carolyn Rosenfeld, is to be used to provide students residing in the state of Maryland with scholarship support.

Adam T. Ross, M.D., Memorial Scholarship Fund This scholarship was created by the Class of 1997 in honor of their 15th School of Medicine Reunion and in memory of their classmate, Adam T. Ross, M.D.

Paul B. Rothman, M.D. and Frances J. Meyer, M.D. Merit Scholarship Fund The fund was created in 2017 to recruit and retain talented medical students from diverse backgrounds. Dr. Rothman has served as the Frances Watt Baker, M.D. and Lenox D. Baker, Jr., M.D. Dean of the Medical Faculty since 2012 and reducing student debt has been a main priority of his deanship. Dr. Meyer is an assistant professor of medicine in Gastroenterology at Johns Hopkins Medicine.

Barbara and John Runyan, M.D., Scholarship Fund In gratitude to Johns Hopkins and to ensure that future generations of deserving medical students can attend the alma mater he holds dear, Dr. Runyan, Med '47, and his wife established this scholarship in 2003 through their estate plans.

Stephen J. Ryan, M.D., Fund Stephen J. Ryan, Jr., Med '65, and the W. M. Keck Foundation established this fund in 2001 to commemorate his 35th class reunion.

Florence Rena Sabin Scholarship Fund The Johns Hopkins Women's Medical Alumnae Association, Incorporated established this fund in 1959 in memory of an eminent graduate of the School of Medicine, Class of 1900. The income is available for scholarships for deserving women medical students of academic distinction and promise, preferably a student entering the first year.

Daniel G. Sapir Scholarship Fund Daniel G. Sapir, M.D., Med '60 was a nephrologist, internist and medical educator whose medical career spanned nearly 40 years. In 2002, friends and colleagues of Dr. Sapir began a campaign to raise funds to establish the scholarship. Dr. Sapir had been diagnosed with a terminal illness, and the goal was to raise the funds to honor and to thank him for his extraordinary support, of themselves and their families, over such a long time, and to present it to him in his lifetime. He died in July 2002.

Arun B. Sapre, M.D. Memorial Scholarship Fund An endowed fund established in 1996 by Mrs. Arun B. Sapre, family, friends, and colleagues of Dr. Arun B. Sapre. The income is to provide scholarship assistance to needy medical students in the School of Medicine.

Michael F. Saviano Scholarship Fund Established in 2004 by the estate of Michael F. Saviano. After serving as a Captain in the United States Air Force Medical Corps, Dr. Saviano completed his Otolaryngology training at Hopkins and then started his own practice in San Francisco in 1967.

Morris Schapiro Scholarship Fund An endowment was established by the Morris Schapiro and Family Foundation in February, 1954, to aid needy, promising students. This gift was in commemoration of Mr. Morris Schapiro's seventieth birthday.

Lisa Dunkle Scheffler, M.D., Endowed Fund Established in 2016 by Lisa Dunkle Scheffler, M.D., Med '72, in appreciation for the medical education she received at Johns Hopkins.

Elizabeth Schmiedicke Schiebel Scholarship Fund The Elizabeth Schmiedicke Schiebel Scholarship Fund was established in 1991 with a gift from H. Max Schiebel, Med '33, in memory of his mother. This fund will provide financial support to medical students.

Oscar B. Schier Fund for Medical Student Aid This endowment was established with a gift from the estate of Ida F. Schier in memory of her brother, a Baltimore dairyman and national authority on the handling of milk. The income from this fund provides scholarship aid for financially needy medical students.

Ottilie Schillig Scholarship Fund The monies for the Schillig Scholarship Fund were dedicated during her lifetime by Ottilie Schillig. She asked that this fund be used to provide scholarships for deserving young students and to assist them in obtaining an education as doctors of medicine.

Robert E. Schmieg, Jr., M.D., Memorial Fund The Robert E. Schmieg, Jr., M.D. Memorial Fund was established in 2009 in memory of Robert E. Schmieg, Jr., M.D. Class of 1988, by members of the Class of 1988.

School of Medicine Alumni Scholarship Fund Income from an endowment provided by graduates of the School.

School of Medicine Scholarship Fund By action of the Board of Trustees of the Johns Hopkins University, a capital sum of $400,000 has been set aside, the income from which is to provide financial assistance to needy and deserving students.

Henry M. Seidel, M.D., Scholarship Fund was established by the Class of 1984 and endowed by gifts from the Classes of 1978-1990 to honor Dr. Henry M. Seidel, Associate Dean for Student Affairs. An alumnus of the Class of 1946, Dr. Seidel is recognized for his outstanding service to the students in their career development. The fund will provide scholarships to needy students in the School of Medicine.

Samuel Selinger, M.D. '69 & Rosemary Selinger Endowed Scholarship Fund Dr. Selinger, Med '69, created this scholarship in 2019. For nearly 35 years, Dr. Selinger was a cardiovascular surgeon in Spokane, WA, and now serves that community as an activist and volunteer. Dr. Selinger was Medical Director and Founder of Spokane County Medical Society's Project Access, a program which provides free or low-cost medical care to the uninsured.

Judy and Sam Shaker, M.D., Scholarship Fund Dr. Issam J. (Sam) Shaker, KSAS '64, Med '67, and his wife Judy created this scholarship in 2007 in honor of his 40th reunion from the School of Medicine.

Rosemary Vincent Shaw Scholarship Fund Endowed in 2016 by Dr. Marguerite Shepard to honor her aunt, Rosemary Vincent Shaw. Rosemary was a high school librarian in the New York City public school system and was always concerned for the poor and underserved. She left a life insurance policy to Dr. Shepard which covered the expense of medical school. Dr. Shepard earned her medical degree at Hopkins in 1963, and completed her residency at JHH.

Ezra S. Shaya Fund An endowed fund established by Dr. Ezra S. Shaya, Class of 1954. The income is to provide scholarships to needy medical students.

Jack H. Silveira, M.D., Scholarship Dr. Jack Silviera is a graduate of the School of Medicine, Class of 1957. He created this scholarship in 2009 to commemorate his 50th reunion. Dr. Silveira specializes in Obstetrics and Gynecology.

Dr. Barnard E. Simon and Bitten H. Simon, R.N. Scholarship Fund Established in 2000 through the estate of Dr. Bernard E. Simon to provide scholarships for medical students. Dr. Simon, Class of 1937, was a plastic surgeon whose work with the Hiroshima Maidens, after World War II, won him international acclaim.

J. Morris Slemons Scholarship Fund Established by a bequest from Anne G. Slemons to be used for scholarships for medical students.

Herbert Sloan, M.D. and Doris Edwards Sloan Scholarship for Medical Education This scholarship fund was established in 2003. Income from this fund will provide financial support for deserving medical students.

Elizabeth A. Small Endowment Fund The fund was established by Elizabeth Anne Small, M.D., Med '77, to provide scholarship support for women who are interested in dermatology.

Wladimir Solowiej, M.D. Scholarship Fund This endowment fund was established with a gift from the estate of Dr. Wladimir Solowiej, a Baltimore physician who emigrated from Poland. Although he was never on the staff, Dr. Solowiej nevertheless had high regard for Johns Hopkins. The income from this fund provides two scholarships, one in his name and one in the name of his sister, Augenia Zebrowska.

Alberta Speaks Scholarship Fund Established in 1986 as a bequest from the estate of Alberta Speaks to provide scholarship assistance for needy black students.

Rowena Spencer, M.D. Scholarship Fund This scholarship was created through the estate of Rowena Spencer, M.D. SOM Class of 1947, to provide a scholarship for a medical student to attend Johns Hopkins University School of Medicine, as was afforded to her.

Lisa Marie Sprague Memorial Scholarship Established in 1998 by Arthur Sprague, Class of 1960, and Mrs. Sprague in memory of their daughter.

Paul Luther Stine Memorial Scholarship Fund Established in 1996 from the Estate of Mildred C. Stine, to provide scholarship support to students in the School of Medicine, preference to be given to otherwise eligible applicants who are graduates of Brunswick High School, Frederick County, Maryland, residents of Frederick County, Maryland, or residents of the State of Maryland.

Barry and Evelyn Strauch Scholarship Fund Barry S. Strauch, A&S 1962, Med. 1965, and his wife Evelyn M Strauch established this fund to commemorate his 35th class reunion in 2001. Their gift reflects the couple's devotion to medical excellence and their lifelong affiliation with the Johns Hopkins University School of Medicine. The income is to be used to provide financial assistance to worthy students in the School of Medicine.

Josephine S. Sutland Scholarship for Medical Education Dr. Lawrence C. Pakula and his wife, Sheila Sutland Pakula, established this fund in 1998 in honor of her mother, Mrs. Josephine Sutland.

J.T. Tai & Co. Foundation Scholarship J.T. Tai & Company Foundation is a Chinese non-profit foundation in New York committed to the support of medical students and health care. The foundation was established in 1983 by the late Jun Tsei Tai, the owner of a real estate management company and internationally renowned art dealer in Asian art. Since 1997, it has provided yearly grants to be used for financial aid for students in the School of Medicine

Helen B. Taussig Fund Established in 1986 by the Life Income Gift Annuity of Dr. Helen B. Taussig. The income of this fund is to provide scholarships to needy medical students.

Owsei Temkin Scholarship Fund In 1993 Drs. Barbara and Martin Wasserman, both members of the Class of 1968, established this fund in honor of Dr. Owsei Temkin. This fund provides financial assistance to needy medical students, with preference given to those who have a special interest in the humanities.

Vivien Thomas Fund For Diversity The Vivien Thomas Fund was established in 2004 to increase diversity at The Johns Hopkins University School of Medicine, thus honoring the memory of a heart surgery pioneer by removing for others the economic and racial barriers that often stood in his way

John Thompson Family Endowed Scholarship Fund Established in 2015 to celebrate the three generations of John Thompson's who received medical degrees from SOM. The Thompson's legacy is a long history of applying the knowledge that they gained at the Johns Hopkins University School of Medicine.

Traci L. Thompson, M.D. and Billy M. Thompson, Jr. Scholarship Fund This scholarship was created by Traci Thompson Ferguson, M.D., Med '00, in honor and in memory of her brother, Billy M. Thompson. Dr. Thompson trained in the Osler House Staff. She is now Chief Medical Director at WellCare Health Plans, Inc. in FL.

Jefferson D. Upshaw, Jr., M.D., Endowed Scholarship The Jefferson D. Upshaw, Jr., M.D. Endowed Scholarship Fund was set up through a bequest from Dr. Upshaw, School of Medicine Class of 1954. Behind Dr. Upshaw's gift was a love for his medical school that no amount of money could reflect.

Vander Salm Family Scholarship Fund The Johns Hopkins University gratefully acknowledges the receipt of a gift from Thomas J. Vander Salm, M.D. to establish a permanent named endowed scholarship fund. Dr. Vander Salm graduated from the School of Medicine in 1966. The fund will provide assistance to medical students.

Fernando Vescia, M.D. Scholarship Fund Dr. Fernando G. Vescia, Med '55, KSAS, '51 was born in Egypt to Italian parents, only leaving in 1948 to study medicine. Dr. Vescia was a gastroenterologist in Palo Alto, CA for 32 years. He also taught medical history at Stanford University.

Roger L., M.D. and Mary J. von Heimburg Scholarship Fund Established in 2000. Dr. von Heimburg a graduate of the School of Medicine in 1955, passed away in September 1999. He lived for a long time in Green Bay, Wisconsin and asked that preference be given to students from the Midwest.

William D., M.D., and Selma S. Voorhees Scholarship for Medical Education Established in 2000. Mrs. Selma Voorhees opened the fund in honor of her husband, William, a graduate of the medical class of 1945.

Elmer Wakefield, M.D. Scholarship Fund This fund was established in 1998 by the estate of Dr. Wakefield to provide scholarships for students in need of additional funds to continue their education.

Dr. Arthur Nathan Wang Memorial Scholarship Fund This fund was created in 1988 in honor and in memory of Dr. Arthur Nathan Wang, an alumnus of the School of Medicine. Dr. Wang's promising career as a neurosurgeon was tragically ended early in his life by a fatal accident. The income from the fund each year will provide a scholarship to a needy and deserving student who intends to pursue a career in clinical neurosurgery. In establishing the fund, the family and friends of Dr. Wang hope to help others to complete the contribution to medicine and society begun by him.

Lillian W. and David N. Warfield Scholarship Fund This fund was endowed in December, 2014 through a bequest from Lillian W. Warfield, wife of David N. Warfield. Funds to be used to assist medical students who demonstrate financial need.

James Johnston Waring Memorial Scholarship Fund Through a generous gift from Mrs. James J. Waring, an endowment in memory of her husband has been established in the School of Medicine, the income from which is to be used as a scholarship fund for needy and worthy students. Although a member of the class of 1908, Dr. Waring subsequently received his degree from another school, having found it necessary to withdraw from the Medical School at the end of his junior year. Nevertheless, Dr. Waring was active in Hopkins' alumni affairs until his death in June, 1962.

Frederick and Gladys C. Warring Memorial Scholarship This fund was established in 1996 from the Gladys C. Warring estate to provide scholarships for students in the School of Medicine.

Levi Watkins, Jr., M.D., Endowed Scholarship Fund Levi Watkins was Johns Hopkins' first African American chief resident in cardiac surgery and the cardiac surgeon who performed the world's first implantation of an automatic heart defibrillator in a patient in 1980. This scholarship was established in 2009 to recognize Dr. Watkins' groundbreaking accomplishments, to honor his vision of bringing underrepresented minority medical students to Johns Hopkins, and to provide essential financial assistance.

David R. Weakley, M.D. Scholarship Fund An endowment fund established in 1995 by Dr. David R. Weakley, Med '75, in recognition of his 35th Reunion to provide scholarship support to medical students in the School of Medicine.

Drs. A. Peter and Yvonne Weiss Scholarship Fund in Medical Education Drs. A. Peter Weiss, Med '85, and his wife, Dr. Yvonne Weiss, a former intern in pediatrics at Hopkins, established this fund in 2004 to provide financial assistance to medical students at the School of Medicine.

Margaret Morris Weiss, M.D., and Robert A. Weiss, M.D. Endowed Scholarship Fund This fund was established by Drs. Margaret and Robert Weiss, both members of the Class of 1978, to honor their devotion to medicine and lifetime affiliation with the School of Medicine. Income from this fund will provide financial assistance to medical students.

Clarence S. Weldon, M.D., Endowed Scholarship Fund This fund was established in 2010 in memory of Clarence S. Weldon, M.D., School of Medicine Class of 1955, through gifts made from Ms. Ann Doyle and Ms. Susan Erlinger, daughters of Dr. Weldon, and other colleagues and friends. Dr. Weldon passed away in 2006.

Frances Turner White Fund This fund, established with a gift from the estate of Frances Turner White, provides scholarships for needy and deserving medical students.

Robert T. White, M.D., Scholarship Fund This fund was established in 2004 by Robert T. White, A&S 1947, Med 1952, via the Greater Alliance Foundation, Inc. Dr. White completed his obstetrical residency and gynecological training at Hopkins.

Drs. Shelby Wilkes & Jettie Burnett Scholarship Fund This scholarship was established in 2010 by Drs. Shelby Wilkes and Jettie Burnett, classmates in the School of Medicine, Class of 1975. Dr. Wilkes has had a distinguished career in Ophthalmology in Atlanta, GA, and has written and published numerous scientific articles in major ophthalmologic journals. Dr. Burnett is also an ophthalmologist in Atlanta specializing in diseases and surgery of the cornea, including corneal transplants.

Dr. Raymond Wing Memorial Scholarship Fund This fund was established in 1981 by Mrs. Raymond Wing to honor the memory of her husband, a member of the School of Medicine Class of 1927. It will provide support for students in their first year of study at the School of Medicine.

Winslow Foundation Scholarship Fund Gifts have been received annually since 1974 to fund scholarships for medical students, with preference for residents of Maryland, the District of Columbia, or North Carolina.

Charles Marion Wolfe Scholarship Fund The Fund was established in 1997 through the estate of Doris L. Wolfe in memory of her husband, Charles Marion Wolfe, to be used for a worthy medical student.

Ruth P. Young and Joseph M. Young, M.D. Endowed Scholarship Fund Established in 2004 by Joseph M. Young, Med 1945. After receiving his degree from Hopkins, Dr. Young completed his postdoctoral studies in surgery. He made his career at the Army Veteran's Administration Hospital in Memphis where he served as Chief of Laboratory Services and as a clinical professor of pathology at the University of Tennessee at Memphis until his retirement in 1986..

Evers P. and Adeline E. Zepp Scholarship Fund A fund was established as a bequest from the estate of Adeline E. Zepp to be used in support of the education of medical students.

Harold E. C. Zheutlin Scholarship This fund was created in 1998 by family, friends, and colleagues in memory of Dr. Zheutlin, A&S '38, Med '42, assistant professor of dermatology at Johns Hopkins.

Lionel J. Zheutlin, M.D. Scholarship Fund This fund was established in 1998 in memory of Dr. Zheutlin, a graduate of the Class of 1947. It provides assistance to needy students with preference to those planning careers in pediatrics.

Student Research Scholarships and Awards

Most students at the School of Medicine engage in research projects at some time during their period of residence. The results of original research are often published in leading scientific journals and presented at national meetings of scientific societies. Major contributions have been made by medical students participating in research programs at Johns Hopkins and other institutions. Below are a list of research opportunities, awards, and scholarships offered through the School of Medicine.

Dean's Year of Research - The Dean's Year of Research provides an opportunity for 10 candidates pursuing the M.D. degree at Johns Hopkins to spend one year in an intensive research experience with a faculty member within the School of Medicine. Medical students participating in the program may elect to interrupt their regular medical curriculum to take an additional year devoted to research, thereby delaying their date of graduation by one year. Under this program, you will be placed under the Advanced Studies Program Student status and paid a salary equal to that of a first-year graduate student. The cost of the salary will be shared equally between the Dean's Office and the department in which the student is conducting their research. The cost of your JHU dental insurance premium will be paid by the Dean's Office during your Dean's Year of Research. If you participate in the student health plan, the Dean's Office will also pay your individual health insurance and UHS service fee while you participate in this program. If you are not enrolled in the student health plan, the Dean's Office will cover your plan up to the cost of the student health plan. For more information, please contact the Office of Medical Student Affairs.

Dr. Harold Lamport Research Fund - Mrs. Golden S. Lamport established the Dr. Harold Lamport Research Fund in honor of her husband, a Distinguished Service Professor of Physiology and Biophysics. A renowned investigator and educator, Dr. Lamport contributed to research in physiology, biophysics, and circulation. He was first recognized internationally when he published a series of incisive studies of hemodynamics, including the first comprehensive analysis of the renal afferent and efferent arteriolar resistances in relation to kidney function in health and disease. The Lamport Fund will support the effort of medical students interested in research in the basic science areas of medicine. The Medical Student Research Committee will determine the winner after the annual Medical Student Research Day takes place. The work must be original and must have been performed during a period in which the student was a matriculated student in the medical school pursuing the regular curriculum.

W. Barry Wood Student Research Fund - The W. Barry Wood Student Research Fund was established in 1971 by the family and friends of Dr. W. Barry Wood, Jr. Dr. Wood had a long association with the School of Medicine as student, house officer, Vice President of the University in charge of medical affairs, and Director of the Department of Microbiology. The fund commemorates Dr. Wood's deep commitment to medical research and teaching. The Medical Student Research Committee will determine the winner after the annual Medical Student Research Day takes place.

Brantigan Clinical Research Fund - The fund was established in 1998 by a gift from John W. Brantigan, M.D. The purpose of the fund is to provide financial support for students to conduct research and/or present their findings at professional meetings. Please contact the Office of Medical Student Affairs for more details.

Henry Strong Denison Fund for Medical Research - By agreement dated September 23, 1937, the Johns Hopkins University received from the Henry Strong Denison Medical Foundation, Incorporated, an endowment fund of $100,000, to be known as The Henry Strong Denison Fund for Medical Research in memory of Henry Strong Denison, M.D., 1908. While the gift is made broadly for the support of medical research, the income will be used for the specific purpose of aiding in the training for research of young people deemed by the medical faculty to be especially gifted for a career in medical investigation. To fulfill the provisions of this gift, the income each year may be allocated for awards, scholarships, and stipends for medical students in the School of Medicine. For more information, please contact the Office of Medical Student Affairs.

William L. Straus, Jr., Scholar in Anatomy Award - This fund was established in 1982 by an alumnus to honor Dr. Straus, former associate professor of anatomy and Acting Director of the Department of Anatomy. The donor specified that the award be made to a student with strong interests in basic research, people, and the history of medicine at the Johns Hopkins University School of Medicine and Hospital.

Franklin Paine Mall Prize in Anatomy - The income from an endowment account established by Dr. Miley B. Wesson, an alumnus of the School, is used as an award for a deserving student particularly interested in anatomy. The grant is given in the name of Franklin Paine Mall, the first professor of anatomy in the School of Medicine, as a token of appreciation. Selection is made by the First Year Committee on Student Promotions.

Alan P. Trimakas Award in Cardiovascular Research - This award was established by contributions from the Class of 1979 to honor the memory of their classmate who died on January 15, 1979. In keeping with Dr. Trimakas' intentions to pursue a career in academic cardiology, for which he had shown exceptional ability, this award will be given to a medical student who has demonstrated unusual promise in the area of cardiovascular research. The award will be made during the third year for a student planning an extended commitment to a research project to be completed during the final year of the curriculum. The recipient of this award will be selected by a committee representing the Cardiovascular Division of the Department of Medicine. Applications should be admitted to the director of the division.

Helen and Harold Harrison Award for Outstanding Proficiency in Pediatrics - This award was established by the Alumni/ae of Dr. Harold Harrison's Residency Program in Pediatrics at the Francis Scott Key Medical Center. It is intended to give honor to the outstanding contributions made by the Harrison's over the many years of their tenure at the Johns Hopkins Hospital and the Francis Scott Key Medical Center, and it will, in addition, recognize each year senior students whose efforts in pediatrics have been distinguished.

Sylvan Shane Prize in Anesthesiology and Critical Care Medicine - Dr. Sylvan Shane, a member of the Department of Anesthesiology and Critical Care Medicine at Johns Hopkins from 1980 to 1984, has created an endowment to recognize an outstanding medical student making a career choice in anesthesiology. Dr. Shane's lifetime was devoted toward the search for ways to prevent pain and suffering in patients undergoing surgical procedures. His generous gift is designed to give support and encouragement to graduating medical students who are committed to the same efforts.

William R. McAlpin Research Fund - The purpose of this fund, made possible by a cash award to Dr. Jerome D. Frank from the National Mental Health Association, is to encourage research by students in the Johns Hopkins University School of Medicine and the Johns Hopkins University School of Public Health into any aspect of mental illness and mental health, but with preference given to studies relevant to clinical care, psychotherapy, or public health. Recipients will be selected by a committee composed of the Chairman of the Department of Psychiatry and Behavioral Sciences of the Johns Hopkins School of Medicine, The Chairman of the Department of Mental Hygiene of the Johns Hopkins School of Public Health or persons they designate, and Dr. Frank. To apply for a grant, the student must submit a letter to the chairman of either department stating the amount requested and the reasons for the request, with a supporting letter from a faculty member. Requests will be received and reviewed at any time. The amount of any single grant, or the total multiple grants to any one person, shall not exceed $500.

Leo Kanner Student Research Fund - The Leo Kanner Student Research Fund was established in 1982 by Mrs. June Kanner to encourage medical student research in child psychiatry. Dr. Kanner, the first professor of child psychiatry at Johns Hopkins, was division director from 1930 to 1959 and is often called the Father of Child Psychiatry. Income from the fund is used to provide a student in the School of Medicine the opportunity to participate in a summer research project with a Child Psychiatry faculty member.

Harry C. Saltzstein Prize for Medical Writing - This prize was established in 1990 through an endowment provided by the family of Dr. Saltzstein, a graduate of the Johns Hopkins University School of Medicine, Class of 1914. Dr. Saltzstein was the founder of Sinai Hospital of Detroit as well as its first Chief of Staff. He founded the Bulletin, Sinai Hospital of Detroit and ultimately became its editor. He maintained a life long interest in medical writing. His nephew, Dr. Sidney Saltzstein, graduated from the Johns Hopkins University School of Medicine in 1954. This annual prize will recognize excellence in medical writing by a student of the Johns Hopkins University School of Medicine.

Summer Research Stipends for Medical Students - Summer research stipends are awarded each year if funds are available. These stipends are awarded in the summer after a medical students first year of medical school so they may participate in a research project under the supervision of a Johns Hopkins faculty member. This stipend cannot be used to participate in research at an outside institution. For more information, please contact the Office of Medical Student Affairs.

Tuition

M.D. Candidates

Tuition rates are determined annually by the Board of Trustees. Annual tuition covers studies carried out during the entire 12-month period between enrollments (ordinarily September-August).

All M.D. candidates will be charged at the M.D. rate for a total of four years. Irrespective of the actual scheduling of the medical and graduate portions of their education, students in M.D.-Ph.D. programs will ordinarily be required to pay M.D. rate tuition for the first four years in such programs. Tuition for the remaining years will be assessed annually at the M.D. rate or at the established University Ph.D. rate, whichever is lower. Alternative schedules for payments at the M.D. rate by students in M.D.-Ph.D. programs must be approved by the Vice Dean for Education.

Students who repeat a portion of the M.D. program will be assessed tuition at the annually established rate. Tuition is prorated to period of enrollment.

There is a $25 annual fee for Advanced Studies Program status.

Graduate Students-Ph.D., M.S. and M.A. Candidates

Tuition for each 12 month period (September-August) of enrollment will be at the rate established by the University for Ph.D. candidates.

Visiting Medical Students

Visiting medical students are assessed registration fees based on the elective type, duration of elective, and LCME-accreditation status. Additional information can be found at http://www.hopkinsmedicine.org/som/students/policies/visitors.html.

Part-Time Degree Candidates

These students will be assessed tuition at the part-time rate established for the degree for which they are a candidate.

Special Students (Non-Degree Candidates)

Tuition will be assessed at the part-time rates established by the University for Ph.D. candidates.

Postdoctoral Students (Fellows)

Tuition for postdoctoral students who are not members of the Johns Hopkins Hospital house staff is $800 per annum, pro-rated in relation to period of enrollment. Tuition may be remitted as specified by the Executive Committee of the Board of Trustees.[1]

[1] The policy concerning tuition for fellows and postdoctoral students is based upon action of the Executive Committee of the Board of Trustees on January 19, 1966, as follows: "-where special circumstances do not make payment of such fees feasible, it will be remitted."

Tuition and Other Fees

Medical students matriculating in August 2022 will be charged tuition at the rate of $59,700 per year. The 2022-2023 tuition for graduate students registered in the School of Medicine is $59,700. These tuitions cover all normal charges. The tuition fee is payable in two equal installments, one at the opening of the academic year, and one at the beginning of the second half of the year. Living expenses, health insurance, an $850 annual fee for University Health Services, a $200 imaging fee for first and second year students, and a $740 matriculation fee are in addition to the tuition charge. The matriculation fee is a general University assessment and is collected once only from new students at the time of their initial enrollment as full-time students and/or as degree candidates in the University. Special schedules for payment of fees can be arranged with the Office of Financial Affairs.

Students will not be admitted to the regular courses until they have registered at the Office of the Registrar of the School of Medicine and arranged for payment of their fees for the first half of the academic year. Registration is not required for the second half, but arrangements must be made for the payment of second half tuition before students can be admitted to classes.

A late charge may be imposed in connection with all tuition and fees due to the School of Medicine as follows: Tuition, imaging, and matriculation fees are due and payable at the beginning of each term. The late charge will be 1-1/2% per month of the unpaid balance, and will be added to each unpaid account on the first of each month. For insurance and parking fees, the 1-1/2% late charge will be assessed thirty days after billing and on the monthly anniversary thereafter. When late payments result from delayed receipt of loans for which timely application has been made, the late charge may be waived by the Associate Dean for Student Affairs. All fees and charges must be paid in full in order for a student to be approved for graduation.

Young Investigators’ Day

The Young Investigators’ Day was established in 1978 to recognize student investigators who are trained at Johns Hopkins University School of Medicine and to provide them with a forum for their work. The awards are intended to recognize research undertaken by applicants while registered as students or postdoctoral fellows at the school of medicine.

The Johns Hopkins Medical and Surgical Association Awards for Postdoctoral Investigation were established in 1981 by the School of Medicine to recognize excellence in research by clinical or research fellows in the School of Medicine. These six awards are designated for clinical research, laboratory research with direct clinical relevance, and basic laboratory research. The awards are as follows:

The A. McGehee Harvey Research Award

The Helen B. Taussig Research Award

The Alfred Blalock Research Award

The W. Barry Wood, Jr. Research Award

The Albert L. Lehninger Research Award

The Daniel Nathans Research Award

The Michael A. Shanoff Research Award consisting of an honorarium and a certificate, is made annually to a candidate in the M.D., Ph.D., or M.D.-Ph.D. program in the Johns Hopkins University School of Medicine who, among all similarly eligible students, is considered to have made the most significant research contribution.

The award will be given in recognition of a substantial and sustained contribution to research, preferably undertaken over more than one elective quarter. Thoroughness and originality of research are to be primary considerations in the selection of awardees. Most of the research must have been undertaken during the candidates’ studies at the Johns Hopkins Medical Institutions. The award may be shared by two or more students who have collaborated on a research project. If the award committee finds no meaningful way to distinguish between the relative merit of the contribution and achievement of candidates who have worked on different research projects, then the award may be divided equally between such candidates. The awardee(s) will be selected by a committee comprised of members of the Basic Science and Clinical faculties.

The David Israel Macht Research Award was established in 1982 through an endowment provided by the family of Dr. Macht to commemorate the centenary of his birth. Dr. Macht was a graduate of the Johns Hopkins School of Medicine, Class of 1906 and was a member of the faculty of the Departments of Pharmacology and Medicine from 1910 to the middle 1930’s. He was a versatile and pioneering investigator and had a special interest in opiate alkaloids, the absorption of drugs, and a number of other areas.

The award is intended to recognize excellence in investigation by a student in the School of Medicine, registered in M.D., Ph.D., or combined M.D.-Ph.D programs. The award will consist of an honorarium and a certificate.

The selection of the awardee will be made by a Committee composed of Basic Science and Clinical Faculty members. The award will be awarded annually to a single individual. If, in the opinion of the Committee, no meaningful distinction between the qualities of two essays can be made, the award may be divided among not more than two individuals.

The Martin and Carol Macht Research Award was established in 1993 to recognize outstanding investigation by an M.D. or Ph.D., or M.D.-Ph.D. student in the School of Medicine. Dr. Martin B. Macht received both M.D. and Ph.D. degrees from Johns Hopkins, and was a Trustee of the University for many years. Dr. Carol Macht received M.A. and Ph.D. degrees from Johns Hopkins in the History of Art and Archeology. The award was established through an endowment gift from the Macht family.

The selection of the awardee will be made by a committee composed of basic science and clinical faculty members. The award will be awarded annually to a single individual. If, in the opinion of the Committee, no meaningful distinction between the qualities of two essays can be made, the award may be divided among not more than two individuals. The award consists of an honorarium and certificate.

The Paul Ehrlich Research Awards are made annually to candidates in the Ph.D., M.D., or Masters programs in the Johns Hopkins University School of Medicine. They are given in recognition of contributions to research undertaken during the candidate’s studies at this institution. The award consists of an honorarium and certificate.

The Alicia Showalter Reynolds Research Award was created by the School of Medicine Dean’s Office in 1997, to honor the memory of Alicia Showalter Reynolds, a Ph.D. student in the Department of Pharmacology and Molecular Sciences from 1992 until her untimely death in 1996. It is given in recognition of outstanding research by a Ph.D. candidate in the School of Medicine. The award consists of an honorarium and certificate.

The Mette Strand Research Award was established in 1998 by Dr. Strand's colleagues and friends as a tribute to Dr. Strand, a Professor of Pharmacology and Molecular Sciences. This award honors Dr. Strand's contributions to humanity, her unyielding devotion to science, and her role in training a generation of graduate students. Preference is given to a Ph.D. student. The award consists of an honorarium and certificate.

The Hans Joaquim Prochaska Research Award was established in 1998 by his mentor and friend Paul Talalay to honor the excellence that Dr. Prochaska exemplified, and the distinction he brought to the Hopkins M.D.-Ph.D. program. This award is given annually to a student in the School of Medicine who has made an outstanding discovery with preference given to an M.D.-Ph.D. candidate. The award consists of an honorarium and certificate.

The Bae Gyo Jung Research Award was established by an endowment in 2006 by friends and family in memory of Bae Gyo Jung, who was a predoctoral student in the department of Biological Chemistry. The award consists of an honorarium and certificate.

The Nuper Dinesh Thekdi Research Award was established in 2002 in memory of Nupur Dinesh Thekdi, M.D.-Ph.D. student at Johns Hopkins. The award consists of an honorarium and certificate.

The David Yue Research Award was established in 2015 in memory of Dr. David Yue, who was a Professor of Biomedical Engineering and Neuroscience. The award consists of an honorarium and certificate.

The Paul Talalay Research Award was established in 2017 to honor Dr. Paul Talalay, who was a Professor of Pharmacology and Molecular Sciences and 44 years ago started the Young Investigators' Day Program. The award consists of an honorarium and certificate.

The Physician Scientist Research Award was established in 2018 to recognize the outstanding research contributions by a Physician Scientist at Johns Hopkins School of Medicine. This award is supported by the Johns Hopkins School of Medicine Physician Scientist Training Program. The award consists of an honorarium and certificate.

The Post-baccalaureate Student Award was established in 2021 and is given to a candidate in a Post-baccalaureate program at the Johns Hopkins School of Medicine in recognition of their contributions to research.

The Claude and Barbara Migeon Research Award was established in 2022 to recognize outstanding basic research by graduate students and postdoctoral fellows. Dr. Claude Migeon (1923-2018) served as the director of pediatric endocrinology at the Johns Hopkins University School of Medicine from 1961 to 1994. His early focus on steroid metabolism established the norms of adrenal function in infancy and childhood. He also discovered the genetic cause of some endocrine disorders. Dr. Barbara Migeon is a professor emerita of genetic medicine and pediatrics who is known for pioneering work on the mechanisms and consequences of X-chromosome inactivation in females and its relevance to human disease, and as the founding director of the PhD program in Human Genetics. Both Drs. Migeon have been devoted members of many trainees throughout their careers, and with the award we honor their contributions as both scientists and mentors.

Policies

The Johns Hopkins University sets policies that apply to all students. In addition, the School of Medicine sets policies that pertain to its learners. School of Medicine policies that apply to its graduate and medical students follow.

Graduate Student Policies

School of Medicine policies that apply to graduate students can be found here (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/academics/academic-resources/policy-finder.html).

Medical Student Policies

School of Medicine policies that apply to medical students can be found here (https://www.hopkinsmedicine.org/som/students/policies/).

Graduate Programs

The School of Medicine supports a number of programs of graduate study in the biomedical sciences and related fields. These programs provide opportunities for advanced course work and research training leading to advanced degrees.

Under the direction of the University-wide Doctor of Philosophy Board, opportunities for study for the degree of Doctor of Philosophy are available in the School of Medicine in biochemistry, cellular, and molecular biology; biological chemistry; biomedical engineering; cellular and molecular medicine; cellular and molecular physiology; cross-disciplinary biomedical sciences; functional anatomy and evolution; health sciences informatics; history of science, medicine and technology; human genetics; immunology; molecular biophysics; neuroscience; pathobiology; and pharmacology and molecular sciences. A Master of Arts degree is offered in medical and biological illustration and in history of medicine. A Master of Science degree is offered in anatomy education, applied health sciences informatics, health sciences informatics, and medical physics. The requirements for the different degrees are established by the Doctor of Philosophy Board of the University, the School of Medicine's Committee on Masters and PhD Programs, program faculty, and administrators.

Degree Requirements

Requirements which must be met by all candidates:

For the Doctor of Philosophy degree:

1. A minimum of two consecutive semesters of registration as a full-time, resident graduate student.
2. A certification by a department or program committee that all departmental or committee requirements have been fulfilled.
3. A dissertation approved by at least two referees and certified by them to be a significant contribution to knowledge.
4. A Doctor of Philosophy Board Oral Examination.

Requirements for the different Masters degrees are listed with the individual programs.

Admission information and application materials may be found on the SOM Graduate Program Admissions website (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/).

Program Requirements

Requirements of the individual graduate programs may be found in the program-specific sections of the catalogue. Further information may be obtained by writing to the director of the graduate program, The Johns Hopkins University School of Medicine, Baltimore, Maryland 21205.

Programs

Anatomy Education, MS

The Johns Hopkins University School of Medicine Master of Science in Anatomy Education program is designed to give students the training they need in order to successfully compete for teaching positions in anatomy at the community college level. Because such positions often also require some instruction in physiology and/or histology, introductory courses in these disciplines are also included in the program, along with training in pedagogical techniques. The program is also appropriate for students who wish to go on to research or educational support positions in anatomy, such as anatomy lab manager or surgical research coordinator.

Admission Requirements

- Bachelor's degree from an accredited college or university
- Grade transcripts, personal statement, and two letters of recommendation
- Demonstrated proficiency in written and spoken English, for non-native speakers
- Interview with faculty (via Skype)

This program may also be appropriate for professionals in other disciplines who wish to return for specific training in anatomical education.

Tuition and Fees

A non-refundable application fee of $115 is payable by credit card at the time of application. Tuition at the Johns Hopkins School of Medicine for full-time graduate students during academic year 2022-2023 is $59,700. However, each student admitted to this program will receive a guaranteed scholarship from the School of Medicine, reducing tuition by roughly 30%. The tuition cost with scholarship for academic year 2022-2023 is **$40,000**, payable prior to entry into the program. There is also a one-time matriculation fee of $740.

Resources

For more information on graduate education at the Johns Hopkins University School of Medicine, see:
Johns Hopkins University School of Medicine Graduate Programs (https://www.hopkinsmedicine.org/som/students/graduate-programs/)

Contact Information

anatomyed@jhmi.edu, Program Coordinator

Dr. Elizabeth St. Clair (Elizabeth.StClair@jhmi.edu), Program Director

Dr. Gabriel Bever (gbever1@jhmi.edu), Assistant Program Director

Students admitted to this program are not eligible for F or J immigration sponsorship.

Coursework

All courses (except on-line courses) are held on the campus of the Johns Hopkins University School of Medicine in Baltimore. See below for contact information.

Foundations of Human Anatomy (7 weeks, 7 credits)

Intensive course taught to entering medical students and Ph.D. graduate students; includes lectures, small group activities (imaging, team-based learning, other), and full-body dissection.

Advanced Anatomical Dissection and Research (12 weeks, 5 credits)

Supervised small group cadaveric dissection focusing on more detailed understanding of specific systems and regional anatomy, anatomical variation, clinical correlations, and comparative anatomy. Includes a research project and paper.

Teaching Practicum in Anatomy (8 weeks, 3 credits)

Provides training in lecturing, small group leadership for presentation of anatomy; includes giving one lecture and assisting in labs in Summer Institute in Anatomy.

Introduction to Histology (5 weeks, 2 credits)

Introduction to basics of histology; on-line, using materials developed for medical school course in histology.

Fundamentals of Human Physiology (8 weeks, 4 credits)

Introduction to organ level human physiology, taught through the Johns Hopkins Bloomberg School of Public Health.

The following pedagogical courses are on-line and taught through the interdisciplinary

Johns Hopkins Medical Education in the Health Professions (https://education.jhu.edu/academics/masters-programs/master-of-education-in-the-health-professions/) program:

Instructional Strategies I and II (6 weeks and 1.5 credits each)

Instructional methods in small and large group teaching - team-based, interactive, and case-based; strategies to enhance critical thinking, creativity, and cooperative learning.

Ensuring Learning through Assessment and Feedback (12 weeks, 3 credits)

Design of effective assessment tools; aligning assessments with learning goals and objectives; use of feedback to monitor and evaluate learning.

Evidence-Based Teaching (12 weeks, 3 credits)

Apply evidence-based strategies and methodologies to teach in a variety of settings; assess learner needs to guide instruction; effectively integrate technology into instruction.

Applied Health Sciences Informatics, MS

Overview

The MS Applied is a 60-credit master's degree designed for individuals wanting to obtain practical competencies in biomedical informatics and data science. Using AMIA guidelines, we presume that the health sciences informatician should be capable of developing or leading innovative applications of information technology and information systems that address clinical or public health priorities.

The MS Applied requires that students undertake a 6-course "core" (18 credits total), student seminar (4 credits), electives (30 credits), and capstone (8 credits). The core courses provide a broad overview of foundational content in biomedical & public health informatics, clinical informatics, health information systems, and data science. The student seminar, taken across 4 quarters, provides a forum for students to explore current topics, learn directly from experts in the field, and develop a professional network and support structure. Electives can be chosen from relevant offerings from across the university. The program culminates with a 200-hour, student-designed, faculty-supervised capstone that provides students an opportunity to develop or apply relevant competencies within a professionally-relevant project.

The MS Applied program is offered in online and onsite formats. While the formal requirements for these offerings are the same, there are some important distinctions with regards to the intended audience, visa/citizenship requirements, course availability, and how the capstone is executed.

Online Offering

The Online MS Applied is by far the most popular. This format allows students to continue working full- or part-time while completing the degree requirements within a 36 month window.

While current employment is not a requirement of admission to the online program, most students pursuing this option are working full- or part-time within the health field. Because a Visa is <u>not</u> required for the online program, we consider applicants from all countries. Except in cases where students either live near campus or arrange to spend time in residence in or near Baltimore, students in the online program would only be able to take courses that are offered in an online format. Undertaking a capstone as an online student requires flexibility and the support of the employer.

Students applying to the online offering of this degree should be aware of additional state-specific information for online programs (http://web.jhu.edu/administration/provost/programs_services/accreditation/state_authorization/) and Title IV Gainful Employment Disclosure. (http://dhsi.med.jhmi.edu/content/gainful-employment-disclosure/)

Onsite Offering

The onsite offering of the MS Applied degree is an intensive, full-time, 12-month program of study.

Students in the Onsite MS Applied program are generally either mid-career health professionals looking to transition to an informatics leadership role within their organization *or* they are motivated and technically-capable early-career professionals or recent college graduates focused on obtaining a firm grounding in the field of health informatics. Mid-career professionals are often sponsored by their employer or the U.S. Government. Students in the onsite program can take either online courses or onsite courses. For students in the onsite offering of this program, faculty can provide more direct in-person oversight of the Capstone project.

IMPORTANT NOTES:

1. F1 Visas are not available for the Onsite MS Applied**.** F1 Visas are not required for the Online MS Applied.
2. The "core" courses for the MS Applied are *only* available online. This includes the onsite offering of the degree.
3. For students in the onsite offering of the MS Applied, there are many electives offered on-campus / in-person throughout the Hopkins campuses.
4. Students enrolled in the Onsite MS Applied are expected to complete all degree requirements, including the Capstone, within 12 months.

Admission Criteria

To be considered for the MS Applied, applicants should:

- Hold a terminal degree (master's or doctorate) in a relevant area of health care or public health;
- Hold a bachelor's degree in a relevant area of study, plus 3 to 5 years of related professional work experience; or
- Hold a bachelor's degree in a relevant area of study, plus possess relevant technical and analytic skills

The Admissions Committee considers the undergraduate and/or graduate academic record, statement of purpose, professional experience, letters of recommendation, technical and statistical background, English language proficiency, and the overall motivation and readiness of the individual to pursue graduate studies. Target average GPA is 3.5 or above (on a 4.0 scale).

Relevant areas of study or employment include, but are not limited to: medicine, public health, dentistry, veterinary science, nursing, ancillary therapies, librarianship, biomedical science, computer science, mathematics/statistics, information science, business, and information technology. Those with non-healthcare educational backgrounds are expected to have worked in health care for at least 3 years, with demonstrated abilities in areas like leadership, organizational-level thinking, quality assurance, management, etc.

Applications are made available online through Johns Hopkins School of Medicine's website (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/). Please track the receipt of all supporting materials through the SLATE application system.

Program Requirements

This program consists of 60 quarter course credits, made up of core courses, electives, and a Capstone. There is also an ethics requirement.

Core Curriculum

- Introduction to Public Health and Biomedical Informatics
- Applied Clinical Informatics
- Database Querying in Health
- Introduction to Precision Medicine Data Analytics
- Health Information Systems: Design to Deployment
- Heath Sciences Informatics: Knowledge Engineering and Decision Support
- Student Seminar and Grand Rounds
- Ethics

Biochemistry, Cellular and Molecular Biology, PhD

Fields of Study and Research

The Departments of Biological Chemistry, Biophysics and Biophysical Chemistry, Cell Biology, Molecular Biology and Genetics, Neuroscience, Pharmacology and Molecular Sciences, and Physiology jointly provide a program of study leading to the Ph.D. degree. The objective of the Biochemistry, Cellular and Molecular Biology (BCMB) program is to provide students with the breadth of knowledge and research training that will prepare them for their own independent and productive careers. Strong emphasis is placed on molecular and cellular approaches to fundamental problems in research areas covered by the participating departments. The focus on a broad background in basic science for all students promotes the study of problems of biomedical importance from a mechanistic perspective. The multi-departmental nature of the program fosters a collaborative environment that is ideal for graduate training, and promotes the extensive interaction and collegiality that is a hallmark of Johns Hopkins science.

Training includes a rigorous and broad-based first year curriculum, research rotations in three different laboratories, a proposal-based qualifying exam (along with a proposal-writing workshop), and thesis research in the laboratory of one of more than 100 participating faculty members. Once they join a laboratory, students establish a departmental affiliation and participate in their departmental journal clubs and seminars. At the same time, students continue to maintain their BCMB identity and affiliation in a number of ways. These include attending the annual BCMB retreat, assisting in the recruitment of new students, hosting a one-day symposium with outside speakers, and participating in a monthly student research colloquium (organized by BCMB students for their peers). There is no formal teaching requirement for BCMB students, but many opportunities for gaining teaching experience are available.

Due to the multidisciplinary focus of the BCMB program, students are very well prepared for the full breadth of modern biomedical science careers. Greater than 90% of students in the BCMB program complete the PhD degree. The average time to degree over the last 10 years is 5.7 years. On average, BCMB students publish 4 research papers with 2 as first author.

To date, there are over 700 BCMB graduates; many hold leadership positions in academia, industry, government and other sectors. At least 97% of graduates in the last 5 years are following career paths in laboratory research, medicine, or research-related careers.

The director of the training program in Biochemistry, Cellular, and Molecular Biology is Professor Rachel Green.

Facilities

The lecture halls and the research laboratories are located in the Wood Basic Science Building and the adjoining Physiology, Biophysics, Hunterian, Preclinical Teaching, Ross Building, Miller Research, and Rangos Buildings. Modern equipment and state-of-the-art core facilities are available to students. This includes electron microscopes, confocal microscopes, nuclear magnetic resonance spectrometers, mass spectrometers, HPLC and gas-liquid chromatographs, protein sequencers, peptide synthesizers, oligonucleotide synthesizers, X-ray diffraction equipment, as well as instrumentation for microarray analysis and deep sequencing.

Collaborative Facilities

All seven departments enjoy excellent working relationships with other departments in the medical school and with departments at the Homewood campus.

Financial Support

All students accepted into the BCMB program receive full tuition, health and dental insurance, and stipend support for the duration of their studies.

Admission Requirements

Candidates for admission should show a strong academic foundation with coursework in biology, chemistry, physical sciences, and quantitative analysis. A bachelor's degree from a qualified college or university will be required for matriculation.

The BCMB website (https://bcmb.bs.jhmi.edu/) has up-to-date information on "How to Apply (https://bcmb.bs.jhmi.edu/how-to-apply/)" and "Frequently Asked Questions (https://bcmb.bs.jhmi.edu/faq-2/)." For questions not addressed on these pages, please email bcmb@jhmi.edu (sroot@jhmi.edu).

Program Requirements

Students must successfully complete all eight courses of the "Foundations of Modern Biology" core curriculum, and the Core Discussion course in the first three quarters of year one. During the fourth quarter, students complete two electives, the "BCMB Responsible Conduct in Research" course, and the "Method, Logic and Experimental Design" course. Four additional elective courses are required in the advanced years of study.

An oral examination, conducted as prescribed by the Doctor of Philosophy Board of the University, must be completed before the end of the second year. Subsequently, students are required to participate in annual thesis committee meetings as they work on their thesis project, to review research progress and discuss plans for the next year.

Usually in year five, the student's thesis committee agrees that the student is nearing completion of their research and will be ready to write a dissertation. The student's advisor and one other member from their thesis committee will read and approve the dissertation. The student must present a public seminar on their completed thesis research.

The BCMB program recognizes the importance of students' professional development and career exploration during their graduate studies. In order to better integrate professional development into the training, the BCMB program is formally participating in the “OPTIONS” Career Curriculum offered by the Professional Development and Career Office (PDCO). During the first two years, students attend workshops and panel discussions facilitated by professionals in different fields discussing their career paths, what each profession entails, how the graduate training relates to the required skills and knowledge, and what additional skills would be useful. Several of the speakers are BCMB program alumni, and offer to follow-up with interested students, fostering a sense of community. In year 3, students join an OPTIONS Career Community which comprises six monthly workshops that provide exposure to careers and skills assessment (e.g., Academic Research; Business and Finance; Careers in Drug Development; Science Communication and Advocacy; Teaching; etc.). In year 4 and beyond, students meet with a career coach to create a plan for gaining more career-relevant experiences and/or participate in an internship.

Courses

The first year required courses are as follows:

Code	Title	Credits
ME.800.806	BCMB Computational Biology Bootcamp	1
ME.100.716	Analysis of Macromolecules	2
ME.330.709	Organic Mechanisms in Biology	2
ME.260.709	Molecular Biology and Genomics	1.5
ME.110.733	Principles of Genetics	2
ME.110.728	Cell Structure and Dynamics	1.5
ME.360.728	Pathways and Regulation	2
ME.800.805	BCMB Quantitative Biology Lab	1
ME.800.713	BCMB Responsible Conduct of Research	0.5
ME.800.705	Method, Logic and Experimental Design	1
ME.800.708	BCMB Core Discussion	0.5

Courses are detailed under the course descriptions listed in the entries of the Departments of Biological Chemistry, Biophysics and Biophysical Chemistry, Cell Biology, Molecular Biology and Genetics, Neuroscience, Pharmacology and Molecular Sciences, and Physiology, or as Interdepartmental.

Biological Chemistry, PhD

Program Overview

The Graduate Program in Biological Chemistry (GPBC) is designed to train the next generation of independent research scientists, while simultaneously supporting the professional development and career choices of all our students. The core of our Ph.D.- granting program is learning through research, augmented by an advanced curriculum, supportive mentorship, professional development, and career training. GPBC's focus on discovery-based education is consistent with the founding of Johns Hopkins as the country's first research university and its current position as one of the world's preeminent research universities. The Department of Biological Chemistry is dedicated not only to the advancement of science, but also to the health, well-being, and dignity of its diverse members and the diverse community within which it resides. We recruit, retain and inspire the next generation of diverse trainees, faculty and staff members at our school of medicine and in our health system.

Admissions

Candidates for admission should show a strong academic foundation with coursework in biology, chemistry, physical sciences, and mathematics. A bachelor's degree from a qualified college or university is required.

The Biological Chemistry (https://biolchem.bs.jhmi.edu/) website has up-to-date information on "How to Apply" (https://biolchem.bs.jhmi.edu/application-information/).

Inquires regarding admissions, please contact:
Darlene Sutton (dsutton5@jhmi.edu)
Program Coordinator
(410) 955-3086

Graduate Admissions Office:
Email: GradAdmissions (gradadmissions@jhmi.edu)

For more information about the program, please contact:
Stephen Gould, Ph.D. (sgould@jhmi.edu)
Program Director
(410) 955-3424

Ryuya Fukunaga, Ph.D. (fukunaga@jhmi.edu)
Associate Program Director
(410) 955-3790

Tamara O'Connor, Ph.D. (toconno7@jhmi.edu)
Admissions Director
(410) 955-7134

Daniel Raben, Ph.D. (draben@jhmi.edu)
Associate Admissions Director
(410) 955-1289

Program Requirements

The Graduate Program in Biological Chemistry trains students through a diverse curriculum that emphasizes discovery-driven education. While the focus is on laboratory research, students also benefit from outstanding courses, immersive scientific activities, strong mentorship, professional development, and a commitment to publishing.

Research is the primary activity of GPBC students. Research starts immediately upon matriculation with a series of research rotations, and thereafter continues in their thesis studies.

Courses: Required and elective courses ensure that GPBC students acquire a solid foundation in biomedical research.

Immersive Scientific Activities: Students receive additional training by attending and participating in seminars, journal clubs, symposia, colloquia, and retreats within the Department of Biological Chemistry as well as those offered by other Departments, Centers, Institutes and Schools across the University

Mentorship: GPBC provides multidimensional mentorship from the moment students arrive on campus through and beyond their graduation, with direct support from the student's research advisor(s), co-mentor, Thesis Committee, and GPBC Director.

Professional Development: The GPBC supports the long-term career success of its graduates by providing:

- Outstanding, mechanistically-oriented research training
- OPTIONS career training curriculum
- Full access to all services of the School's Professional Development Office (PDO)

Publishing: Students complete their research requirement by publishing their dissertation, peer-reviewed articles, reviews, etc.

Courses:

The first year required courses are as follows:

- ME.100.716 Analysis of Macromolecules
- ME.330.709 Organic Mechanisms in Biology
- ME.260.709 Molecular Biology and Genomics
- ME.110.733 Principles of Genetics
- ME.110.728 Cell Structure and Dynamics
- ME.360.728 Pathways and Regulation
- 4th Quarter Elective I
- 4th Quarter Elective II
- Rigor, Reproducibility & Experimental Design in Biological Chemistry, Yr. I
- Take and complete first year ethics training

Required courses beyond the first year:
Rigor, Reproducibility & Experimental Design in Biological Chemistry, Yr. 2
Four additional electives

GPBC Activities, By Year
Year 1:
Student orientation day (day 1)
Biological Chemistry Bootcamp (week 1)
Participate in research rotations (3-4 rotations of 2 months-long duration each)
Participate in immersive scientific activities (seminars, journal clubs, colloquia, interest groups, etc.), both required and elective
Select thesis advisor/home laboratory & initiate thesis research

Year 2:
Thesis research
Participate in immersive scientific activities
Write a thesis proposal
Take and pass the Doctoral Board Orals exam
Take and pass the required second-year class:
Rigor, Reproducibility & Experimental Design in Biological Chemistry, Yr. 2
Take and complete second year ethics training
Participate in OPTIONS career development curriculum
Form a thesis committee and identify a co-mentor
With the thesis advisor, draft and sign an individual development plan (IDP)
Participate in Thesis Committee meeting & GPBC Director meeting

Years 3, 4, & 5:
Thesis research
Publish papers
Participate in immersive scientific activities
Take and pass any remaining elective classes
Annually: IDP, Thesis Committee meeting, and GPBC Director meeting
Work with mentors to develop/implement a career plan

Year 5+:
Thesis research, with an emphasis on prompt graduation
Publish the dissertation and peer-reviewed articles
Participate in immersive scientific activities
Hold Thesis Committee meetings & GPBC Director meetings every 6 months
Implement the student's career plan

Biomedical Engineering, PhD

Biomedical Engineering (BME) has emerged as one of the most exciting interdisciplinary research fields in modern science. Biomedical engineers apply modern approaches from the experimental life sciences in conjunction with theoretical and computational methods from the disciplines of engineering, mathematics, and computer science to the solution of biomedical problems of fundamental importance. The Biomedical Engineering Graduate Program of the Johns Hopkins University is designed to train engineers to work at the cutting edge of this exciting discipline. There are two graduate programs in biomedical engineering. The masters program is supported by the Whiting School of Engineering and leads to a Masters of Science degree. The Ph.D. program is supported by the School of Medicine and leads to a Ph.D. in Biomedical Engineering.

Ph.D. in Biomedical Engineering

The cornerstone of the Program is our belief in the importance of in-depth training of students in both life sciences and modern engineering. In-depth training in life sciences is achieved in one of two ways. Many of our incoming Ph.D. students enroll in classes that are part of the first-year basic sciences curriculum of the Johns Hopkins University School of Medicine. That is, they learn human biology with the medical students. This is a unique and intensive curriculum covering a broad range of topics including molecules and cells, human anatomy, immunology, physiology, and neuroscience. This curriculum is an excellent way to build a broad and solid foundation in the life sciences. Alternatively, students may take graduate-level biology and life sciences courses from the many exceptional biosciences departments at Johns Hopkins. This option is often of particular value to students who enter the program already having a strong background in the life sciences. In-depth training in engineering, mathematics, and computer science is achieved through elective courses that are taken in the first and second years.

All students are fully supported during their time in the PhD program. This covers tuition and provides a stipend for the duration of their Ph.D. Because of the interdisciplinary nature of Biomedical Engineering, students can choose to perform their dissertation research in almost any laboratory in the University (subject to the approval of the program directors). Some students choose their research lab before matriculating, and some students have the opportunity to do research rotations among several labs during their first academic year. The opportunities to do research rotations are generously funded by multiple training grants supported by the National Institutes of Health.

Emphasis is placed on original research leading to the doctoral dissertation. The research may be experimental or computational - the breadth of research in Biomedical Engineering is large, and we encourage students to attend various seminars to learn about cutting edge approaches. To explore the current range of research by labs within the

Biomedical Engineering department, see here (https://www.bme.jhu.edu/research/research-areas/); in addition, many of our students work in labs outside the Biomedical Engineering department.

Program Directors

Rachel Karchin, Ph.D. and Patrick Kanold, Ph.D.

Financial Aid

All BME PhD students (regardless of citizenship or national origin) are supported (tuition, stipend, health and dental insurance) for the duration of their PhD. U.S. citizens and Permanent Residents are eligible for support from training grants from the National Institutes of Health (NIH). Students are also encouraged to apply for individual graduate fellowships from the National Science Foundation, NRSA awards from the NIH, and fellowships from private foundations. Only online applications for admission are accepted, and must be received by December 1.

Admission Requirements

Note: up-to-date admissions requirements are maintained on the Biomedical Engineering website *(*https://www.bme.jhu.edu/academics/graduate/phd-program/*), and applications are submitted through the* School of Medicine's application system *(*https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/*).*

The Program accepts applications for the Ph.D. program until December 1st of each year. We typically recruit students in seven areas: Biomedical Data Science, Biomedical Imaging & Instrumentation, Computational Medicine, Genomics & Systems Biology, Immunoengineering, Neuroengineering, and Translational Cell & Tissue Engineering. The program is unique in that it offers the BME student the strengths of one of the best medical schools in the world. If you wish to combine engineering with cutting edge research in medicine, this may be the program for you.

Our students have the option of taking many of the same courses as the medical students, including human anatomy, molecular and cellular biology, immunology, and pharmacology. Our students also take advanced engineering courses. Our admitted students come from many backgrounds and majors, and not all were undergraduate engineering majors. However, all have demonstrated a strong quantitative training, as well as sufficient background in biology (typically at least two introductory courses). Depending on their preferred research focus area, relevant preparation for that focus area should be evident in their application.

The admissions are reviewed by research focus area committees. The applicant should specify which area(s) they are interested in, and write about the kind of research they are considering. The faculty in each area vote and rank the applicants. The final pool of applicants is reviewed and approved by the whole program faculty. We use a holistic review process; for example, the median GPA is typically ~3.8, but we have no minimum GPA or GRE thresholds for review. Don't think that one bad grade or a tough semester stands in your way. We review the whole application and evaluate the potential of the person that wrote it, not just a set of numerical metrics.

Applications should be complete when submitted. In order to be considered a complete application, we must have:

- Official transcripts from each college or university attended. We no longer require applicants to submit official transcripts to OGSA via mail or electronically. Applicants may upload transcripts to the online application for review. Applicants who receive an offer or accept an offer of admission are required to submit official transcripts to OGSA via mail or electronically to GradAdmissions@jhmi.edu
- Previously, we have required official Graduate Record Examination (GRE) scores or MCAT scores, which can be arranged through the Office of Graduate Affairs. As of June 2021, we are actively reviewing this and you should look to the most up-to-date information on the BME website (https://www.bme.jhu.edu/academics/graduate/phd-program/). The GRE code for applying to graduate programs at the Johns Hopkins School of Medicine is 5316. The BME PhD program **does not rely heavily** on the GRE exam in making admission decisions. Research experience, course grades, and recommendations carry more weight.
- Three letters of recommendation – these letters should come directly from faculty members who are acquainted with you and your academic work. These letters should comment on your aptitude and promise for independent research.
- Personal statement – a typewritten statement (one page maximum) indicating the basis of your interest in graduate study and your career objectives. Included should be a discussion of any research experience you have had.
- A CV - this is your opportunity to list all relevant experiences and achievements
- TOEFL scores (for foreign students only; official copy)

Applicants for admission must fulfill the following course prerequisites:

- One year of college-level biology (may include quantitative biology or physiology)
- One semester of organic chemistry is required for students interested in the Immunoengineering or Translational Cell & Tissue Engineering research areas
- Sufficient mathematical training, typically including differential equations or other relevant mathematical preparation

If you are interested in applying and do not yet have the prerequisite courses, you may want to submit your application with an explanatory note indicating that, if accepted, you will make arrangements to take the prerequisites before matriculation. In the past, applicants have taken the prerequisites at their present schools, local community colleges, etc. Courses taken at any accredited college or university are acceptable.

Each applicant must have received a BA or BS degree or its equivalent prior to matriculation. A Master's degree is not required for admission to our program.

Process: The PhD program admissions committee will not consider any application until it is complete. Applicants may check the status of their application by logging into their online account.

Interview: The admissions committee will review completed applications and invite selected applicants to come to Johns Hopkins for a personal interview with faculty. Applicants who are residents of North America must come for an interview to be considered for admission. For residents outside of North America, for whom such a trip is not possible, a Zoom or telephone interview will be conducted. Final admission decisions will be made from the pool of interviewed applicants. Interview invitations will be sent out to applicants via email by the third Monday in January, or earlier if feasible. Videoconference interviews may be conducted, and personal interviews will be conducted on campus in February and/or March.

Acceptance: Applicants will be notified via email by late March with the outcome of their application. A full offer of admission to the program will include a yearly stipend, full tuition, matriculation fee, and individual medical and dental insurance. This applies to every accepted applicant, regardless of citizenship or national origin unless the applicant receives a conditional acceptance. Those offered admission will be asked to communicate their decision as soon as possible. In any case, we must have the applicant's decision by April 15.

Program Requirements

- Complete 30 credits of coursework in life sciences, engineering, mathematics, applied math, and/or computer science. Courses must be passed with a grade of B- or higher. Of the 30 credits, at least 12 credits must be in the life sciences and at least 12 credits must be in quantitative sciences. More detailed requirements can be found at our page on PhD degree requirements (https://www.bme.jhu.edu/academics/graduate/phd-program/phd-degree-requirements/)
- Complete at least 8 hours of face to face research ethics training
- Successfully pass the Doctor of Philosophy Board Oral Examination (this is a University-wide requirement)
- At least one year as a resident student at JHU (this is a University-wide requirement)
- Dissertation must be approved by at least two readers and certified by them to be a significant contribution to knowledge and worthy of publication
- Certification by the Program Director that all requirements have been fulfilled
- Submission of a dissertation to the library that adheres to the Doctor of Philosophy Board Dissertation Guidelines
- The program may determine the allowable time to complete degree requirements but in no case may that time exceed 9 years. Any approved leave of absence would not count toward the 9 years.

Integrated M.D.-Ph.D. Program

Candidates for the Ph.D. in Biomedical Engineering who wish to apply jointly for the M.D. degree must apply directly to the MSTP program (https://mdphd.johnshopkins.edu/) through the School of Medicine. Typically, MSTP students complete their PhD between their 2nd and 3rd medical school years, and in addition can do research during their 1st year summer. Good preparation in biology and chemistry as well as mathematics, engineering, and the physical sciences is essential. Life science graduate requirements are met by the first-year program of the School of Medicine. This program is more arduous than the Ph.D. program alone, but it may have marked advantage for students interested in clinical research and applications in hospital systems and in the delivery of health care. The catalogue for the School of Medicine should be consulted for admissions requirements and procedures.

Information about applying to the combined M.D.-Ph.D. program can be found at the the MSTP program (https://mdphd.johnshopkins.edu/admissions/) website, and applications are reviewed a separate MD-PhD Review Committee; a separate Graduate School application is not necessary, unless the student wishes to also be considered for the PhD program only. If offered admission by the MSTP program, students may choose to take part in the Biomedical Engineering PhD program, as long as they have sufficient background to succeed in the quantitive courses required by the program; matriculants and current MSTP students should schedule a meeting with the Program Director to discuss joining the program.

Biophysics and Biophysical Chemistry, PhD/Molecular Biophysics, PhD

Biophysics and Biophysical Chemistry

In addition to its participation in the Program in Biochemistry, Cellular, and Molecular Biology (BCMB) described earlier, the Department of Biophysics and Biophysical Chemistry provides training for outstanding students with interests in such quantitative areas as crystallography, enzymology, kinetics, protein design, and mathematical computer modeling, which fall outside the scope of the BCMB Program. Two separate training programs are available. The Program in Molecular Biophysics (PMB) is a large training program involving about 35 faculty members from both campuses of the University. The Biophysics and Biophysical Chemistry Program is a small program tightly centered around the Department of Biophysics and Biophysical Chemistry, and is appropriate to applicants with varied interests and diverse training backgrounds. Requirements for these two programs are given below. Applicants should feel free to discuss with the department which program is most appropriate for them.

Molecular Biophysics

The Program in Molecular Biophysics (PMB) was established in 1990 and has evolved continuously over the years to provide its student participants with training in both the fundamental principles of biophysics and contemporary advances in the field. Over 35 faculty, members of 12 departments throughout the University, offer opportunities for learning in diverse and changing areas of research. The carefully designed set of courses and intensive laboratory work integrate various aspects of molecular biophysics into a dynamic curriculum.

Johns Hopkins has long been a leading research institution of world renown. The Hopkins biophysics community is known for its collaborative and congenial atmosphere. Students are encouraged to forge innovative paths by seeking the advice of other biophysicists and forming collaborations that enhance their research. PMB is committed to making the resources of experiment, theory, and computation available to its scientists.

In keeping with an institution of its caliber, a large number of technology hubs and instrumentation facilities are available to Hopkins researchers.

Admission Requirements

Biophysics and Biophysical Chemistry

Candidates for admission to graduate standing should present a Bachelor's degree or equivalent with some undergraduate training beyond the elementary level in at least two of the following areas: chemistry, biology, mathematics, physics, and computer science. Undergraduate courses in physical chemistry, general college physics, differential and integral calculus, and computer science are particularly important. However, deficiencies in some of these subjects can be made up during graduate residency.

Molecular Biophysics

The Program in Molecular Biophysics is a cross-school program with participant laboratories on the School of Medicine campus and the Arts and Sciences and Engineering campus. The program encourages applications from students who have majored in biological sciences, biochemistry, chemistry, engineering, and physics. Backgrounds in related disciplines are welcomed as well.

The program derives its strength from participants with diverse interests. PMB students come from a range of undergraduate disciplines and, therefore, some may require additional courses or tutorials to round off their basic training. Individual needs can be interwoven into the required curriculum. Optimal background includes general chemistry, organic chemistry, physical chemistry, two semesters of college-level physics, biochemistry or molecular biology, and calculus or a high-level math course.

Financial Support

All PMB students receive full financial support including tuition, health insurance, fees, and a 12-month stipend. Assuming satisfactory progress toward the Ph.D., students may expect continued support of tuition, health insurance, and stipend through six years of their graduate study.

Program in Molecular Biophysics graduate students are supported for the first two years by a training grant from the National Institutes of Health. However, this support is limited to U.S. citizens and U.S. permanent residents. To be admitted, International students must have funding from their own government or a formal agency.

Students are encouraged to apply for external sources of funding such as National Science Foundation Predoctoral Fellowships, NIH Predoctoral Fellowships to Promote Diversity in Health-Related Research, and the Association for Women in Science Predoctoral Awards. Students accepted in the PMB have an excellent record of success in pursuing these opportunities.

HOW TO APPLY

Students must complete an online application (https://applygrad.jhu.edu/apply/). The GRE is not required. Materials include three letters of recommendation, transcripts, and a statement of purpose.

The deadline for receipt of complete applications is December 1. Promising applicants will be invited to a Visiting Weekend to meet with faculty on both campuses, talk with students, and have a look around Baltimore.

Visit our website at pmb.jhu.edu (https://pmb.jhu.edu/). Questions pmb@jhu.edu

Program Requirements

Biophysics and Biophysical Chemistry

During the course of graduate study the student must satisfactorily complete the following program of courses in the University or their equivalent at the intermediate or advanced level.

This list does not constitute an inflexible program; exceptions and modifications may be made at the discretion of the department to fit individual backgrounds, needs and interests.

Required Courses

The following three, short courses, and modules in biophysics are required:

Code	Title	Credits
AS.250.685	Proteins & Nucleic Acids	
AS.250.689	Physical Chemistry of Biological Macromolecules	
ME.100.715	Proteins and Nucleic Acids II	3

Additional requirements for the Ph.D. degree are as follows:

Examinations: Applicants must pass a qualifying oral examination as prescribed by the Doctor of Philosophy Board of the University. This examination will normally take place during the second year of residency. After the completion of the thesis, the student must satisfactorily complete a comprehensive oral examination administered by the Department of Biophysics and Biophysical Chemistry.

Dissertation: Completion of an original investigation and presentation of a dissertation is required. The dissertation must be accepted by the department and must be considered worthy of publication by referees nominated by the department.

Molecular Biophysics

Major Research Areas

Protein Folding & Dynamics, Membranes & Membrane Proteins, DNA-Protein Interactions, Structural Biology & Prediction, RNA Biophysics, Enzymes & Metabolic Pathways, Computation & Theory, Protein Design & Evolution, Single Molecule Studies.

Requirements for the Ph.D.

Degree Students must satisfactorily complete required and elective coursework. In addition, students must pass a Doctor of Philosophy Board Oral, a qualifying exam required university-wide, administered at the end of the second year. Students must continue to make satisfactory progress toward completion of their thesis research and meet annually with a thesis review committee in years 3 and 4 and semi-annually beyond year 4. Once thesis research is complete, students must defend their thesis before a final exam committee and present a final thesis seminar.

Required Courses

The methods and tools of biophysics are drawn from physics, chemistry, biology, mathematics and computer science. Consequently, the curriculum is correspondingly broad and rigorous. Four required courses form the core of the PMB curriculum: Physical Chemistry of Biological Macromolecules, Introduction to Computing in Biology, Proteins & Nucleic Acids, Proteins & Nucleic Acids 2 and Modules in Molecular Biophysics, . Students also take a four week course, Introduction to Computing in Biology in fall of their first year. These courses provide a conceptual framework for understanding energetics, dynamics, structure and interactions at the molecular level, practical experience in computational analysis, and exposure to the current frontiers of biophysical research.

Additional Academic Requirements

In addition to coursework, students attend weekly seminars and present one of their own in the third year. Proficiency in biochemistry, cell biology, and molecular biology is tested formally with an oral evaluation at the end of the first year. Tutorials and self-directed study provide alternative avenues for preparing for this evaluation.

The program aims to involve students in research projects from the start. First-year students complete three 7-10-week rotations in laboratories of their choosing. At the end of each rotation period, students present 10-minute talks with their rotation advisors, other faculty and students present. By summer of the first year, a student will have joined a research group and embarked on thesis research. Students are accepted to Ph.D. candidacy after successful completion of a qualifying oral exam at the end of the second year. Beginning in the fifth semester, students meet - (semi-anuualy beyond year 4) with a faculty thesis review committee.

Dissertation

Completion of an original Investigation and presentation of a dissertation are required. The dissertation must be accepted by the program and the results considered worthy of publication by the referees.

Cellular and Molecular Medicine, PhD

The Graduate Training Program in Cellular and Molecular Medicine prepares scientists for laboratory research at the cellular and molecular level with a direct impact on the understanding, diagnosis, treatment, and prevention of human diseases. The Ph.D. graduates of the program obtain rigorous training in scientific research and develop a thorough knowledge of human biology and human diseases.

This program grew out of a need for graduate training at the interface between medicine and the traditional basic science disciplines. Rapid progress in cellular and molecular biology has strongly impacted clinical medicine, offering insights about the fundamental causes of many diseases. Thus, the goal of this program is to train scientists who will make discoveries in the laboratory that can be applied expeditiously to the diagnosis, treatment, and prevention of disease. New technology allows scientists to identify genetic and molecular defects causing or predisposing to disease. The trainees in this program are working precisely at this interface between science and medicine to contribute to the long-term well-being of society.

Facilities

Students will work in well-equipped laboratories of approximately 135 program faculty located throughout the medical school campus. These researchers are supported by many shared facilities including microscopy, molecular biology, and protein chemistry.

Financial Aid

The program is supported by a combination of monies from the Lucille P. Markey Charitable Trust and an NIH training grant. Each student is provided a stipend, health and dental insurance, and tuition throughout their years in the program. The program covers these benefits during the students' first year; in subsequent years, the research advisor is responsible.

Admission Requirements

The mission of the CMM program is to recruit and train outstanding PhD candidates in translational research. We use a holistic approach in evaluating applicants, to ensure the best fit between our training program and trainees. Evidence of prior research experience is paramount in the admissions process, along with letters from research mentors. A bachelor's degree from a qualified college or university is required. Applicants are expected to have taken the following courses: biology, inorganic chemistry, organic chemistry, physical chemistry, physics, and calculus. Cell biology and/or biochemistry is recommended. Passage of the TOEFL is required for all students whose undergraduate instruction was conducted in a language other than English. CMM does not require or review GRE scores in the admissions process.

CMM draws from the top of an extremely strong and deep pool of candidates. Although we do not use score cut-offs, the average accepted student has a GPA of 3.71. Our class size varies between 20-24, and includes in addition to PhD candidates, trainees in dual MD/PhD, DVM/PhD programs and Clinical Fellows. Yield on admissions offers is high, ranging from 45-69%, with an average of 55% of offers resulting in acceptance.

Inquiries regarding admissions should be referred to:

Office of the Graduate Program in Cellular and Molecular Medicine
1830 E. Monument Street, Suite 2-103
Telephone: (410) 614-0391; (410) 614-3640

For questions not addressed on these pages, please email cmm@jhmi.edu.

Program Requirements

Students must complete successfully the following courses:

Code	Title	Credits
ME.800.702	Introduction to the Human Body: Anatomy, Histology, Physiology	5
ME.800.718	Topics in Cellular and Molecular Medicine	1
ME.800.801	Research in Cellular and Molecular Medicine	0
ME.260.708	Fundamentals of Genetics	2
ME.800.703	CMM Core Discussion	1.5
ME.360.728	Pathways and Regulation	2
ME.110.728	Cell Structure and Dynamics	1.5
ME.800.724	Introduction to Clinical Research	1.5
ME.800.709	Cellular and Molecular Basis of Disease	3
ME.800.717	CMM Grant Writing: Nuts and Bolts	1.5
ME.800.789	3B's: Bench to Bedside and Back	1
PH.260.801	Topics in Immunology I	1
ME.260.709	Molecular Biology and Genomics	1.5
PH.260.611	Principles of Immunology I	4

Students are required to take four electives to further broaden their experience in cellular and molecular medicine during the duration of their studies. Mandatory one elective out of the four required must be a **Biostatistics** course. Rigor and Reproducibility in Research (3R's) principles are integrated throughout the program's coursework. The Responsible Conduct of Research ethics training is a graduation requirement. An Ethics refresher course includes attending several Research Integrity Colloquium lectures each year.

Students are expected to perform research rotations in at least three different laboratories culminating with the selection of a thesis advisor to begin original research leading to their doctoral dissertation. All rotations must be performed in the laboratories of CMM faculty members.

Additionally, the program requires students to actively participate in the **OPTIONS Career Curriculum**, managed by the Professional Development and Career Office, that provides protected time for students to develop their career goals and prepare for their future. Through interactive workshops, students discover careers of interest, develop career-specific skills and build a professional network while connecting with fellow trainees with similar interests.

A University-mandated Doctor of Philosophy Board Oral Examination must be completed by the end of the second year of study. Annual thesis committee meetings are held until such time as the thesis committee believes the student is ready to write their doctoral dissertation. The dissertation is based on the student's novel research; a public seminar of thesis work is a graduation requirement.

Cellular and Molecular Physiology, PhD

Researchers in the Department of Physiology (http://physiology.bs.jhmi.edu/) integrate many disciplines to understand the functions of individual systems within a whole organism and the mechanisms that produce and sustain life. Faculty tackle issues such as the molecular control of cell membrane activities, intercellular and intracellular communication, coordinated cell signaling for organ development and mammalian embryonic development. They use computational methods, genetics and post-genomic strategies to study these issues in a variety of organisms, from bacteria and yeast to zebrafish, mice and people. Faculty participate in a number of graduate programs, including the program in Cellular and Molecular Physiology

Why Physiology?

Every modern branch of biomedical research has its physiological roots.

The Department of Physiology has a long-standing tradition of excellence. Our faculty, trainees, and staff seek to understand how the human body works from the head down to the toes and everything in between. Together, we exploit the range of available model systems to understand physiological processes at a mechanistic and integrated level in health with the explicit goal of understanding human disease and identifying potential therapeutics.

Postdoctoral Training

Students who have already been awarded the Ph.D. or M.D. degree may be accepted for postdoctoral research work with members of the faculty.

Admission Requirements

December 8 is the deadline for the receipt of ALL application materials for August admission into the CMP graduate program.

At the time of entry into the program, you must have completed a bachelor's or higher degree. Ordinarily this degree will be in biology, physics, chemistry, mathematics, or engineering, or some combination of these, but exceptions will be made. Scientific research experience is not required but is now common among applicants to our program. Such experience is to your advantage and is widely available to undergraduates willing to take the initiative. If you are planning ahead, consider searching out an experience of this kind.

Regardless of the degree major, the following are entrance requirements: Physics: one year college level course is required; two years of study are recommended. Chemistry: two years are required, and three recommended, of college level courses with laboratory, including inorganic, organic, and physical chemistry. Biology: two years of college level courses, with laboratory. Mathematics: through differential and integral calculus.

Foreign applicants must take the Test of English as a Foreign Language Exam (TOEFL).

In addition to the above, official transcripts or certified records from all university (undergraduate and graduate) study and three letters of recommendation from at least two faculty members who are acquainted with the applicants academic work are required to complete the application for admission. While these requirements will apply for the large majority of applicants, exceptions will be made for unusually well-qualified candidates.

Applications are due by December 8th for August admission. A full application should be completed online. ETS Institutional code: 5316 for TOEFL scores.

The requirements for the application are as follows: (removed detailed information on what these items are)

- Completed Online Application
- Curriculum Vitae
- Statement of Interest and Career Objectives
- Undergraduate Transcripts
- Three (3) Letters of Recommendation
- Application Fee

NOTE: GRE scores are no longer required and if submitted, will not be used in our decision-making process!

How to Apply

To ensure that all required documents are properly submitted, closely follow the directions found at Graduate Program Application Instructions (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/on-campus-programs/).

https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/

When applying for our program you can also apply for up to **four** PhD programs in JHU-SOM and pay for only **one** application fee.

Program Requirements

First Year

The first year curriculum, capped by the program's own Organ Physiology course, is comprehensive in scope and provides each of our students with an incredible foundation of scientific knowledge. Through three 10-week rotations, students select a lab to perform their dissertation research working in a field that excites their curiosity and in an environment that is both nurturing and challenging.

From start to finish, our students' communication skills are continuously honed through regular presentations to the department. Every trainee is encouraged to apply for fellowships and awards, and other career building opportunities.

Courses

In general, students must complete successfully the following basic science courses, given by the School of Medicine:

- Analyses of Macromolecules: Energetics, Structure and Function
- Current Physiology
- Molecular Biology and Genomics
- Principles of Genetics
- Pathways and Regulation
- Cell Structure and Dynamics
- Organ Physiology
- Research
- Primary Source Readings and Analysis

Rotations

- Three laboratory rotations to occur September - beginning of June. Thesis lab decided after rotations.

Second Year

Electives

Four electives must be completed as a part of the degree requirements. These electives can be completed at any time prior to graduation, while enrolled in the CMP program. Selection of these courses are influenced by a student's dissertation project and made in consultation with their mentor. One elective credit is 12-24 classroom hours and must be approved by the Program Director.

Thesis Proposal & Committee

The first thesis meeting must occur no later than August 15th at the end of the second year. A thesis proposal, typically in the format of an NIH fellowship application, is prepared for the first meeting of a student's thesis committee. Thesis meetings to occur yearly or more frequently, if needed.

Examinations

Graduate Board Oral Examination

Each student must pass an oral qualifying exam, which must occur by the end of March of the second year in the program. The goals of the exam are to test the depth and breadth of knowledge as covered in the first-year coursework and to examine the student's ability to design and interpret experiments.

Doctoral Dissertation

Usually in year four or five, the student's thesis committee agrees that the student is nearing completion of their research. When a student receives a "final phase" check at the thesis committee meeting, they are expected to complete any remaining experiments, write their thesis, and get approval from their mentor and reader (another faculty member from the thesis committee) within 6 months. Following completion of the dissertation, the student will present their work at an open seminar. Typically, the student's research is published in one or more scholarly journals prior to the dissertation being written.

Clinical Anaplastology, MS

Clinical Anaplastology:
Design and fabrication of realistic functional facial, ocular, and somatic (body) prostheses

The Master of Science program in Clinical Anaplastology (CA) offers students the knowledge to succeed as clinicians providing facial, ocular, and non-weight bearing somatic (body) prostheses, as well as designing 3D patient-matched models, surgical templates and other 3D printed clinical models. Prostheses are created working with each patient to custom mold, cast, sculpt, and colorize the final wearable device.

Clinical Anaplastology offers a treatment option to patients for whom surgical reconstruction alone cannot restore facial features or the appearance of limbs and digits. Custom prosthetic devices allow patients to resume functional activities of daily living.

The Board for Certification in Clinical Anaplastology (BCCA) Standards for Certification outlines the educational and supervised clinical training requirements for different eligibility pathways. Johns Hopkins supports certification in this profession and our program curriculum was designed in close consultation with identified subject matter experts, BCCA Eligibility requirements, Scope of Practice, Code of Ethics and Standards of Practice, CCA Practice Guidelines, and more (BCCA PDFs webpage). Studying with our faculty, who are Certified Clinical Anaplastologists (CCA) in good standing, can be counted toward the supervised clinical training requirements in accordance with BCCA Eligibility Criteria/ Pathway Guidelines.

Basic medical science courses are offered by the School of Medicine. Clinical Anaplastology courses and rotations are provided by the Department of Art as Applied to Medicine in collaboration with clinical services of the Johns Hopkins Hospital. All degree candidates must satisfy the requirements of Johns Hopkins University, the School of Medicine, and the Department of Art as Applied to Medicine to earn the Master of Science degree.

For detailed information on the CA program, please visit https://medicalart.johnshopkins.edu/msca/.

Admission Requirements

Candidates interested in the Master of Science program in Clinical Anaplastology are encouraged to prepare academically and artistically in the following areas:

- **Bachelor's Degree** (BS, BSc, BA, or similar) with high academic standing in all coursework
- **Science Coursework** (Required of all applicants, taken "for credit" at a degree-granting accredited college or university)
  - Inorganic or General Chemistry
  - Vertebrate Anatomy (with dissection lab)
  - Vertebrate Physiology
  - Organ Histology
- **Art Coursework** or Training (either at college or at an art atelier)
  - Figure or Portrait Drawing
  - Figure or Portrait Sculpting
  - Color Media
  - General Drawing
  - Digital Media (drawing, illustration, or painting)
- **English Writing** Course (GRE, TOEFL, or IELTS may substitute)

Recommended additional art coursework: Color Theory, Digital Media (sculpting, 3D modeling, and / or 3D animation), Art History, and Photography.

Preferred Skills or Previous Exposure

- CPR Certification
- Dental Laboratory Materials / Techniques
- Other anaplastology-related knowledge and skills: prosthetic sculpting, moldmaking, impression taking and casting *(Although previous exposure to these are preferred they are covered as part of the curriculum)*
- 3D scanning, 3D modeling, 3D printing, CAD, and related work

Application Process

Admission to the CA program occurs in two Steps. Full details on the requirements for each Step of the process, along with sample portfolio images and links to forms, are available on the Application Process web page (https://medicalart.johnshopkins.edu/ms-in-clinical-anaplastology-admissions-process/).

Step One - Portfolio and Applicant Profile

To Submit Step One requirements, candidates email FacialProstheticsClinic@jhmi.edu to request a link to a personalized Hopkins OneDrive folder *(HIPAA and FERPA compliant)*. Candidates then upload the Portfolio and Applicant Profile for review.

Step One Requirements:

- **Applicant Profile** PDF
- **Portfolio** - one of the following:
  - Artistic Portfolio
  - Clinical Portfolio*
  - Mixed Portfolio*

**(Candidate must collect authorization from each patient presented. Authorization forms are maintained by the candidate and are <u>not</u> submitted with the portfolio)*

Step Two - Application and Interview

Following Step One, CA faculty invite select candidates to submit the formal School of Medicine Graduate Programs Application and to Interview with the Faculty. *Application instructions will be provided only to those candidates invited to continue*.

Step Two Requirements:

- Transcripts from all colleges and universities attended**
- Statement of Interest in the Program
- Three Letters of Recommendation
- Application Fee
- Interview

***Unofficial transcript uploads are sufficient for the review process. Official transcripts, those mailed or electronically delivered directly from the administration at one school to an office or department at another school, which confirm the type and date a degree(s) was granted are needed from accepted students prior to matriculation into the program.*

Degree Requirements

Graduate Program:

1. Each candidate must successfully complete all courses offered.
2. Each candidate must submit a Capstone Research Project on a subject approved by and with the advice of one of the core faculties in the Spring Semester of the Second Year.

University:

1. A degree candidate's period of attendance in the program will be no less than 18 months.
2. Transfer graduate students must register for a minimum of two consecutive semesters as full-time residents.
3. Certification by the Department or Graduate Program Director that all requirements have been fulfilled.

Program Curriculum

The 22-month curriculum of the Master of Science program in Clinical Anaplastology (CA) is designed to prepare graduates for the field of clinical anaplastology and to become Certified Clinical Anaplastologists (CCA). A long-time leader in the profession, Associate Professor Juan García, MA, CCA (https://medicalart.johnshopkins.edu/juan-r-garcia-ma-cca-associate-professor/), developed the CA program curriculum closely consulting leadership of the Board for Certification in Clinical Anaplastology (BCCA) (https://www.bcca-cca.com/) and BCCA Certification Documents (https://www.bcca-cca.com/bcca-pdfs/), leadership of the International Anaplastology Association (IAA) (https://www.anaplastology.org/), as well as multiple subject matter experts in Clinical Anaplastology and related professions. Graduates of the CA program will follow current BCCA Eligibility Pathway 1 Anaplastology Educational Programs (https://www.bcca-cca.com/_files/ugd/d827e9_9abba48c3781449f8ca2a2ac9d862f78.pdf).

First Year

In the first year, students receive training in 1) Foundational coursework including anatomy, professional standards, materials and methods, 2) Interdisciplinary topics including clinical etiology, surgical functional and psychosocial considerations, and 3) Hands-on skills development such as creating various kinds of prosthetic devices, use of advanced 3D technologies and mold-making/casting methods. Students receive technical training in safe and effectives use of materials, equipment and instrumentation.

Second Year

In the second year, students focus on safe and effective clinical skills development through shadowing and parallel clinical efforts to provide prosthetic and other medical devices. This allows students to build a portfolio of clinical cases. Each student is required to complete a Capstone Research project advised by one of the core faculties. Students receive training in ethics, research integrity, and related topics important to clinical work, professional development and business practices.

Clinical Informatics, Post-Baccalaureate Certificate

Overview

The Post-Baccalaureate Certificate in Clinical Informatics (PBCCI) is a 21-credit certificate that was designed for health professionals who are adding health informatics to their existing scope of practice. The certificate consists of 6 required courses and a 75-hour practicum. The required courses cover a range of topics from applied clinical informatics to precision medicine and public health.

The certificate can be completed in as little as 12 months, although completing in 24 months is more standard if only one course is taken at a time. Students have the option to take as long as 36 months to complete, which is convenient if clinical or other professional priorities change while enrolled. The entire program can be taken remotely and there are no requirements to come to the campus.

NOTE: F1 Visa sponsorship is not available for the PBCCI.

Intended Audience

- Clinicians (physicians, nurses, dentists, doctors of osteopathy, etc.)
- Health specialists, including librarians and information managers seeking health IT skills and clinical data science skills
- Programmers/software engineers working in health IT who would benefit from a grounding in health informatics principles

Students should be aware of additional state-specific information for online programs (http://web.jhu.edu/administration/provost/programs_services/accreditation/state_authorization/) and Title IV Gainful employment disclosure. (http://dhsi.med.jhmi.edu/content/gainful-employment-disclosure/)

Educational Objectives

Upon completion of the PBCCI, students will be prepared to:

- Support or lead development of strategic health informatics initiatives within the clinical enterprise
- Work with clinical medical record data to evaluate evidence based practices
- Participate in or lead development of clinical knowledge management tools
- Support or lead health IT systems development, procurement, and implementation processes

Admissions Criteria

Applicants should have one of the following three qualifications:

- A previous master's or health-related professional degree (MD, BSN, etc.) from an accredited college or university.
- An undergraduate degree from an accredited college or university in a field relevant to Health IT, plus 3 years of experience in a field relevant to health IT.

Applications are made available online through Johns Hopkins School of Medicine's website (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/). Applicants must provide official transcripts, a statement of purpose, 2 letters of recommendation and a CV. Please track the receipt of all supporting materials through the SLATE application system.

Requirements

The Certificate requires 21 quarter course credits including the Practicum. Ethics training is also required.

- Introduction to Public Health and Biomedical Informatics
- Leading Change Through Health IT
- Health Information Systems: Design to Deployment
- HSI: Knowledge Engineering and Decision Support
- Database Querying in Health
- Introduction to Precision Medicine Data Analysis
- Health Sciences Informatics Technology Practicum

Ethics Training

Cross-Disciplinary Program in Biomedical Sciences, PhD

The Cross-Disciplinary Program in Biomedical Science (XDBio) is a graduate program at the Johns Hopkins University School of Medicine aimed at innovating graduate education in the biomedical sciences and facilitating interdisciplinary research training that bridges basic science and medicine.

The Mission of ***XDBio*** is to foster the development of the next generation of scientists who want cross-disciplinary training in biomedicine. The program aims to catalyze and support implementation of the creative ideas of its students, and to accelerate their paths to independent research as they embark on making important discoveries that benefit the human condition.

XDBio students will experience a flexible educational structure with a personalized curriculum guided by each student's individual research interests, prior course work, and future goals. ***XDBio*** students will have access to the rich offering of courses from across the University, and benefit from a mentoring structure that guides independent, interdisciplinary discovery. Students will find themselves embedded in the rigorous, collaborative environment that characterizes Johns Hopkins Medicine and will engage faculty and the broader Hopkins community regularly through research presentations, journal clubs, retreats, and one-on-one and small group interactions.

Johns Hopkins has always been a leader in training the scientists who change the world. With the increasing need for broad sets of approaches to address important biomedical questions, Johns Hopkins is committed to modernizing graduate training in biomedical research and producing exceptionally well-prepared biomedical scientists.

Curriculum

The program has no fixed curriculum. Based on each student's background, coursework, experience and research interests, an individualized program of study will be tailored to each student, maximizing the impact of coursework on the student's chosen thesis area. The student, in consultation with a faculty mentor group, will identify courses offered across the university which will support, complement and enrich their research.

Rotations

XDBio students will carry out rotations in labs at JHU. In consultation with the program, students will identify an anchor mentor within the Institute for Basic Biomedical Sciences prior to matriculating, and rotate in this lab for their first rotation. There is no required number of rotations, and students will work with the program, anchor mentor and faculty mentor group to identify their thesis lab.

Co-mentorship

A core aim of the XDBio program is to facilitate interdisciplinary training as part of each student's thesis work. Co-mentors will be chosen by the student in consultation with the anchor mentor and the faculty mentor group.

Functional Anatomy and Evolution, PhD

Ph.D. in Functional Anatomy and Evolution

The FAE graduate program offers a Ph.D. in Functional Anatomy and Evolution and provides individualized support by world-leading professors for each student in a close-knit department with an excellent faculty to student ratio. Our primary focuses are independent research and teaching human gross anatomy, with research areas covered by faculty and students that range from vertebrate fossils, to primates to recent human remains.
As a result of the interdisciplinary training of the FAE graduate program, our graduates are well equipped to face the challenge of today's

academic job market. For more information on requirements for entry to the program, see our requirements for admission.

Research

All students are required to engage in independent research, and a laboratory research rotation under faculty guidance begins soon after their arrival. Research may utilize our large collection of fossil and extant vertebrates as well as departmental research equipment. Research is further facilitated by our proximity to the collections of recent and fossil vertebrates held at the Smithsonian Institution's National Museum of Natural History in Washington, D.C., which can be accessed by a hour journey on public transport. Baltimore's excellent location offers ease of access to other major museums on the East Coast, as well as several international airports to travel to museums and collections around the world.

Teaching Opportunities

Teaching opportunities are primarily centered around training students to teach human anatomy in a medical school or allied health setting. Students act as laboratory instructors for both the Summer Institute in Anatomy and the School of Medicine Human Anatomy course. These are cadaver-based course, allowing for the highest level of dissection-based experience. The School of Medicine course is taught at the beginning of the third year of the Ph.D. program, while the Summer Institute is taught at the end of both the first and second years. Further teaching opportunities are available through undergraduate courses offered by the departmental faculty.

Prerequisites

The Functional Anatomy and Evolution (FAE) Program will admit well-qualified students to the program for work leading to the degree of Doctor of Philosophy. Applicants should have thorough training in organismic biology, chemistry, physics, and mathematics.

Program Director

Adam D. Sylvester, Ph.D.

Program Requirements

Requirements established by the FAE Program, which must be met by all candidates, are as follows:

1. Complete a minimum of four years of registration as a full-time, resident graduate student. Most candidates require five years.
2. Demonstrate evidence of achievement and promise in a comprehensive oral examination administered by the Doctoral Board, usually at the end of the second year of residence.
3. Demonstrate preparedness to carry out independent research by completing a research rotation project within the first two years.
4. Write a dissertation embodying findings worthy of publication, and certified to be a significant contribution to knowledge by at least two referees from within the department and two referees from outside.
5. Present a final departmental seminar in the field of the dissertation research.

Core Courses

Students must achieve a B- or better in Human Anatomy, Organ Histology, Evolutionary Biology, Biomechanics of the Skeleton, Mammals: Diversity, Structure and Evolution, Primate Evolution, Geometric Morphometrics, and Statistics.

Elective Courses

Students must also take at least four elective courses, to be determined through consultation with FAE faculty, chosen from among those offered by the FAE faculty (including Dinosaurs, Cladistics, and Allometry), as well as elsewhere in the University (e.g., Sedimentary Environments, Climates of the Past, Paleoecology, Behavioral Ecology, Animal Behavior, Geobiology, Isotope Geochemistry).

Rotations

Students must complete a formal research rotation with the faculty during their first two years. The rotation consists of a written formal prospectus/proposal of the research work, a write-up of the research by the student, and an oral presentation to the FAE group.

Fellowships

Predoctoral fellowships covering normal living costs and tuition are available.

Health Sciences Informatics, PhD

The Ph.D. in Health Sciences Informatics offers the opportunity to participate in ground-breaking research projects in clinical informatics and data science at one of the world's finest biomedical research institutions. In keeping with the traditions of the Johns Hopkins University and the Johns Hopkins Hospital, the Ph.D. program seeks excellence and commitment in its students to further the prevention and management of disease through the continued exploration and development of health informatics, health IT, and data science. Resources include a highly collaborative clinical faculty committed to research at the patient, provider, and system levels. The admissions process will be highly selective and finely calibrated to complement the expertise of faculty mentors.

Areas of research:

- Clinical Decision Support
- Global Health Informatics
- Health Information Exchange (HIE)
- Human Computer Interaction
- Multi-Center Real World Data
- Patient Quality & Safety
- Population Health Analytics
- Precision Medicine Analytics
- Standard Terminologies
- Telemedicine
- Translational Bioinformatics

Individuals wishing to prepare themselves for careers as independent researchers in health sciences informatics, with applications experience in informatics across the entire health/healthcare life cycle, should apply for admission to the doctoral program.

Admission Criteria

Applicants with the following types of degrees and qualifications will be considered:

- BA or BS, with relevant technical and quantitative competencies and a record of scientific accomplishment as an undergraduate;
- BA or BS, with relevant technical and quantitative competencies and a minimum of three years professional experience in a relevant field (e.g., biomedical research, data science, public health, etc.); or
- MA, MS, MPH, MLIS, MD, PhD, or other terminal degree, with relevant technical and quantitative competencies

Relevant fields include: medicine, dentistry, veterinary science, nursing, ancillary clinical sciences, public health, librarianship, biomedical science, bioengineering and pharmaceutical sciences, and computer and information science. An undergraduate minor or major in information or computer science is highly desirable.

The application is made available online through Johns Hopkins School of Medicine's website (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/). Please note that paper applications are no longer accepted. The supporting documents listed below must be received by the SOM admissions office by January 15 of the following year. Applications will not be reviewed until they are complete and we have all supporting letters and documentation.

- Curriculum Vitae (including list of peer-reviewed publications and scientific presentations)
- Three Letters of Recommendation
- Statement of Purpose
- Official Transcripts from undergraduate and any graduate studies
- Certification of terminal degree
- You are also encouraged to submit a portfolio of published research, writing samples, and/or samples of website or system development

Please track submission of supporting documentation through the SLATE admissions portal.

Program Requirements

The PhD curriculum will be highly customized based on the student's background and needs. Specific courses and milestones will be developed in partnership with the student's advisor and the PhD Program Director.

The proposed curriculum is founded on four high-level principles:

- Achieving a balance between theory and research, and between breadth and depth of knowledge
- Creating a curriculum around student needs, background, and goals
- Teaching and research excellence
- Modeling professional behavior locally and nationally.

Individualized curriculum plans will be developed to build proficiencies in the following areas:

- Foundations of biomedical informatics: e.g., lifecycle of information systems, decision support
- Information and computer science: e.g., software engineering, programming languages, design and analysis of algorithms, data structures.
- Research methodology: research design, epidemiology, and systems evaluation; mathematics for computer science (discrete mathematics, probability theory), mathematical statistics, applied statistics, mathematics for statistics (linear algebra, sampling theory, statistical inference theory, probability); ethnographic methods.
- Implementation sciences: methods from the social sciences (e.g., organizational behavior and management, evaluation, ethics, health policy, communication, cognitive learning sciences, psychology, and sociological knowledge and methods), health economics, evidence-based practice, safety, quality.
- Specific informatics domains: clinical informatics, public health informatics, analytics
- Practical experience: experience in informatics research, experience with health information technology.

Basic Requirements & Credit Distribution

- 15 "core" quarter credits (5 courses)
- 8 quarter credits of Student Seminar & Grand Rounds
- 60 elective quarter credits
- 6 quarter credits practicum/research rotation
- 36 mentored research quarter credits (12 in year 1, 24 in year 2)
- Research Ethics

Health Sciences Informatics–Research, MS

Overview

Health sciences informatics research involves investigating a range of topics: innovations in the health sciences (e.g., clinical, nursing, public health, and librarianship); understanding information needs; designing and creating information technologies; deploying information solutions; and evaluating information management systems. With the ubiquitous deployment of EHRs and other health information systems in the 2020's, health sciences informatics research also encompasses the application and evaluation of analytic platforms for precision medicine and population health.

The approach at Johns Hopkins is interdisciplinary. Although housed in the School of Medicine, the training program partners with all schools in the health sciences and throughout Hopkins. During rotations and thesis work, MSc Research students will have the opportunity to learn about and/or research topics like the following:

- Clinical Decision Support
- Global Health Informatics
- Health Information Exchange (HIE)
- Human Computer Interaction
- Multi-Center Real World Data
- Patient Quality & Safety
- Population Health Analytics
- Precision Medicine Analytics
- Standard Terminologies
- Telemedicine
- Translational Bioinformatics

The MSc Research program invites applicants from a range of disciplines including public health, clinical care, nursing, and biology, as well as from cognate fields such as computer, library, and information sciences.

Admission Criteria

Applicants with the following degrees and qualifications will be considered:

- BA or BS, with demonstrated technical and mathematical & statistical proficiency;
- BA or BS, and a minimum of three years of professional experience in a relevant field where technical and mathematical & statistical proficiencies were obtained; or
- MA, MS, MPH, MLIS, MD, PhD, or other relevant terminal degree where technical and mathematical & statistical proficiencies were obtained or applied

Relevant fields include public health, medicine, dentistry, veterinary science, nursing, ancillary therapies, librarianship, biomedical science, and computer and information science.

The application is made available online through Johns Hopkins School of Medicine's website (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/). The supporting documents listed below must be uploaded and tracked in the SLATE application system.

- Curriculum Vitae (including any peer-reviewed publications or conference presentations)
- Three letters of recommendation
- Official transcript of school record
- Certification of terminal degree
- Evidence of basic English language proficiency

You may also submit a portfolio of published research, writing samples, or samples of website or system development projects to support your application.

NOTES:

1. "*Technical proficiency*" in this context refers to the ability to work with computers and information systems to solve problems or accomplish tasks beyond word processing, order-entry, etc. Familiarity with at least one programming language is strongly preferred.
2. "*Mathematical & statistical proficiencies*" in this context involves the application of math or statistics to real-word problems or research. While evidence of applying these proficiencies within a professional or work setting would be considered ideal for an applicant, college-level course work in math and statistics will suffice.
3. "Basic *English proficiency*" is a consideration for admissions because of the collaborative nature of academic research.

Program Requirements

The Master of Health Science Informatics Research degree is completed over 24 months and requires 96 course credits including research and thesis preparation. The curriculum will be highly customized based on the student's background and needs, in partnership with the student's advisor and the MSc Program Director.

Year 1 of the curriculum will be focused on laying a solid foundation of research and quantitative methods and exposing students to a range of application areas through rotations and electives.

Year 2 of the curriculum will be focused on undertaking a research-based thesis under the direction of a faculty advisor. During Year 2 students will likely need to take advanced electives related to their thesis research. These advanced electives might focus on specific methods that may need to be applied or specific clinical, public health, or informatics topic areas that are the focus of the research.

Year 1

- Informatics Research Methods (4 course sequence)
- Quantitative Methods (2-4 course sequence of biostatistics, probability, or epidemiology)
- Electives
- Research Rotations & Research Seminar (4 quarters)
- Student Seminar (4 quarters)
- Research Ethics

Year 2

- Thesis Research (4 quarters)
- Advanced Electives
- Student Seminar (4 quarters)

History of Medicine, MA (On-site)

Students matriculated into the MD or graduate programs in the School of Medicine or PhD programs in the School of Public Health may apply to the 1-year MA in the History of Medicine. The work of this program extends over all phases and dimensions of the development of medicine and related sciences, the history of disease, and the historical analysis of related conceptual, cultural, and social problems. Students acquire facility in the methods of historical research and gain a wide acquaintance with the available literature in the history of medicine, science, and related fields of history.

Candidates for the on-site one year Master of Arts in the History of Medicine must be enrolled in the MD or other graduate program at the School of Medicine or School of Public Health. For more information, contact the departmental Director of Graduate Studies:

Graham Mooney, Director of Graduate Studies
Department of the History of Medicine
gmooney3@jhmi.edu

Requirements include the demonstration of competence in the general history of medicine by completing the coursework expected of all full-time first year graduate students in the Department, passing an examination at the end of the first year of study, completion of a satisfactory research essay, and demonstrated reading ability of one foreign language.

Code	Title	Credits
ME.150.699	History of Medicine Elective	0
ME.150.701	Outline of History of Medicine I: Antiquity to Scientific Revolution	4
ME.150.702	The History of Modern Medicine	4
ME.150.713	Oral History Theory and Method	0
ME.150.714	History of Twentieth Century Biomedicine	0
ME.150.734	Media History of Science, Technology, and Medicine	2
ME.150.735	Controlling Epidemics: Historical Perspectives/ Graduate Seminar	3
ME.150.736	Histories of Reproduction	0
ME.150.737	Working with Cases	3

ME.150.738	The Work of Healing: Medicine and Materiality	2
ME.150.739	Medicine, Race, and Colonialism: A Critical History	3
ME.150.801	Research in the History of Medicine: Dissertation	0
ME.150.814	Directed Readings - Ragab	4
PH.550.605	History of Public Health	3
PH.221.605	History of International Health and Development	2
PH.550.609	Life and Death in Charm City: Histories of Public Health in Baltimore, 1750 to the Present	3
AS.070.624	Normal and Pathological	
AS.140.391	Individualized Medicine from Antiquity to the Genome Age	3
AS.140.435	Ways of Knowing: New Histories of Science, Medicine, and Technology	3
AS.140.601	Research Methods/Hist Sci	
AS.140.685	Histories of Reproduction	

History of Medicine, MA (Online)

The Online History of Medicine Program offers an MA Degree for students who want to deepen their knowledge in the history of medicine and develop research skills in the field. Prior to application, please be sure to first review the information below.

The MA Degree provides a wide-ranging and in-depth overview of the history of medicine and offers the opportunity to focus on specific areas of interest. Students work closely with Department faculty to sharpen skills in historical research and writing over a series of twelve courses, culminating in the submission of an original thesis. All courses (except Directed Reading and Directed Research) are 3 credits each for a total of 36 required, plus a thesis. Directed Reading and Directed Research are 1 credit courses; each is taken 3 times. By completion of the degree, students will acquire and be able to demonstrate the following core competencies.

Core Competencies

1. Demonstrate breadth of knowledge of key scholarship in the history of medicine from antiquity to the present, with special proficiency in a chosen field of study.
2. Recognize the ongoing and provisional nature of knowledge and engage the past on its own terms.
3. Identify and critically assess primary and secondary sources, and deploy evidence from those sources to build an historical argument.
4. Choose among multiple tools, methods, and perspectives to investigate and interpret materials from the past.
5. Deploy evidence from primary and secondary sources to build an historical argument.
6. Practice the ethics and standards of historical research and writing that require peer critique, citation, and attribution.
7. Develop, plan and complete an independent research project that makes a significant, original contribution to existing literature in the history of medicine.
8. Apply historical knowledge and perspectives to contribute to public dialogue and professional life.

Applications for the online part-time Certificate or MA in the History of Medicine are accepted for much of the year, but applications are reviewed at three times. See here (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/online-programs/) for details, and to apply.

The application process will ask you to confirm that you have completed our online course 150.722 Introduction to the History of Medicine (https://hopkinshistoryofmedicine.org/online-program-courses/).

In order to apply you will need PDF files of the following:

- Curriculum Vitae (4 page limit)
- A personal statement of interest (1 page limit)
- Writing sample (optional)

The application form will also direct you to submit official transcripts that document your undergraduate degree electronically. Review of applications cannot begin until all required documents and application fees have been received. International students will need to submit translated and validated transcripts via a service such as WES (https://www.wes.org).

If you are applying for the MA, a member of faculty will contact you to arrange an interview by phone or Skype.

The application fee is US $115, payable online.

Click on these links for more details about the Certificate (https://hopkinshistoryofmedicine.org/certificate-in-the-history-of-medicine/) and the MA Degree (https://hopkinshistoryofmedicine.org/ma-degree/). If you are unsure about which to apply for, or need any assistance with the application process, please email us on ihmonline@jhmi.edu. Should you experience technical difficulties with the application portal, check that your browser is updated.

Degree Requirements

- Introduction to the History of Medicine
- All four Survey courses
- Methods in the History of Medicine
- Research seminar (two terms)
- Research Practicum on-site
- Directed Reading
- Directed Research
- One Elective
- Submission and approval of an original thesis

Online MA students who have taken a course before February 1, 2020 count time to completion from acceptance into the MA program. MA students have 5 years from acceptance to complete. Should a student switch from Certificate to Master’s, or vice versa, they will complete according to the timeline of their new program.

Students who have taken their first course after February 1, 2020 will count time to completion from the very first course they do in the program, before acceptance to the MA program. These MA students have 8 years to complete their degree. Should a student switch from one program to the other, they will complete according to the timeline of the new program.

All MA Degree students must complete a free, no credit, online course on Academic and Research Ethics, as well as a Responsible Conduct of Research Module as part of the Research Practicum.

Code	Title	Credits
ME.150.722	Introduction to the History of Medicine	3
ME.150.723	Survey of the History of Medicine 1: Classical Antiquity to the Early Middle Ages	3
ME.150.724	Survey of the History of Medicine 2: Medicine From the Black Death to the Scientific Revolution	3
ME.150.726	History of Medicine Survey 3: Science and the Practice of Medicine	3
ME.150.727	Survey of the History of Medicine 4: Biomedicine and its Consequences	3
ME.150.730	Methods in the History of Medicine	3
ME.150.729	Social and Cultural Histories of Disease	3
ME.150.728	Healing Spaces: Historical Geographies of Medical Practice	3
ME.150.732	Research Seminar B: The History of Medicine in Place	3
ME.150.733	Research Practicum	3
ME.150.817	Directed Reading	1
ME.150.818	Directed Research	1
PH.221.605	History of International Health and Development	2
PH.550.605	History of Public Health	3

History of Medicine, PhD

The PhD program in the History of Medicine is part of the broader Program on the History of Science, Medicine, and Technology jointly run by the Department of the History of Medicine (SOM) and the Department of the History of Science and Technology (KSAS).

The work of the PhD program extends over all phases and dimensions of the development of medicine and related sciences, the history of disease, and the historical analysis of related conceptual, cultural, and social problems. Students acquire facility in the methods of historical research and gain a wide acquaintance with the available literature in the history of medicine, science, and related fields of history. Departmental offerings are particularly strong in the history of medicine and science in early modern Europe and the Islamic world; medicine, science, and technology in the United States in the 19th and 20th centuries, including genetics; history of disease and public health; and studies of health and society in Latin America and Africa. The program offers coverage of racism and gender in the history of medicine, how medical and scientific knowledge is created, and medical practices of the body.

Students enter the PhD program with diverse backgrounds including medicine, science, and history. The Ph.D. program prepares students for scholarly careers in teaching, research, and in non-academic fields. For further information, see our website (https://hopkinshistoryofmedicine.org/admissions/). Students interested in the history of medicine should apply to the Program through the School of Medicine. Those interested in the history of science and technology should apply through the History of Science and Technology Department of the Krieger School of Arts and Sciences. Students who wish to combine medical training with academic training in the history of medicine may also inquire about the M.D.-Ph.D. program by writing:

The Director, M.D.-Ph.D. Program,
School of Medicine,
The Johns Hopkins University,
1830 E. Monument Street, Suite 2-300,
Baltimore, MD 21205.

Financial Aid

The regular department fellowships include tuition, stipend, research allowance and medical insurance.

Admission Requirements

Candidates must be at the post-baccalaureate level. Preference will be given to applicants with training in some aspect of the health sciences or history. For further information applicants should write to:

Graham Mooney, Director of Graduate Studies
Department of the History of Medicine
gmooney3@jhmi.edu

Program Requirements

The student must satisfy the requirements of the University, the School of Medicine, and the Program.

The principal requirement for the Ph.D. degree in the history of medicine is the writing of a dissertation based upon original research and of publishable quality. Prior to embarking on full-time dissertation research, candidates will prepare themselves by a variety of courses, seminars, and guided reading. During the first year of study, students receive a general introduction to historical research and complete a year-long survey in the history of medicine. In their second and third years, candidates prepare three fields of study: one in the Department of the History of Medicine; one in the History Department; and a third field to be determined by the student and the advisor. The specific requirements for such fields are set by the faculty member directing the field, in consultation with the student. These fields entail both broad and intensive reading, and the passing of a comprehensive examination and/or preparation of several historiographic essays. Towards the end of the third year, students must prepare and defend a dissertation prospectus. Candidates must also demonstrate a reading knowledge of two foreign languages before being admitted to formal candidacy for the degree. The final requirement for the Ph.D. degree is completion of a dissertation that is an original contribution to historical knowledge and of a standard suitable for publication. More detailed information can be found on the department website (https://hopkinshistoryofmedicine.org/content/program-requirements/).

Code	Title	Credits
ME.150.699	History of Medicine Elective	0
ME.150.701	Outline of History of Medicine I: Antiquity to Scientific Revolution	4
ME.150.702	The History of Modern Medicine	4
ME.150.713	Oral History Theory and Method	0
ME.150.714	History of Twentieth Century Biomedicine	0
ME.150.734	Media History of Science, Technology, and Medicine	2
ME.150.735	Controlling Epidemics: Historical Perspectives/ Graduate Seminar	3
ME.150.736	Histories of Reproduction	0
ME.150.737	Working with Cases	3
ME.150.738	The Work of Healing: Medicine and Materiality	2
ME.150.739	Medicine, Race, and Colonialism: A Critical History	3
ME.150.801	Research in the History of Medicine: Dissertation	0
ME.150.814	Directed Readings - Ragab	4
PH.550.605	History of Public Health	3

PH.221.605	History of International Health and Development	2
PH.550.609	Life and Death in Charm City: Histories of Public Health in Baltimore, 1750 to the Present	3
AS.070.624	Normal and Pathological	
AS.140.391	Individualized Medicine from Antiquity to the Genome Age	3
AS.140.435	Ways of Knowing: New Histories of Science, Medicine, and Technology	3
AS.140.601	Research Methods/Hist Sci	
AS.140.685	Histories of Reproduction	

History of Medicine, Post-Baccalaureate Certificate (Online)

The Online History of Medicine Program offers a Certificate for those students who wish to explore the history of medicine in depth.

The Certificate provides a rich overview of the field and develops basic skills in historical analysis in a set of six courses. Courses are 3 credits each, for a total of 18 credits required for the Certificate. Students who successfully complete the requirements of the Certificate can have their credits applied to the MA Degree in the History of Medicine, if they are admitted to that program. Students may also apply directly to the MA Program.

For more information on upcoming and available courses, visit our website (https://hopkinshistoryofmedicine.org/content/online-program-courses/).

Admission Requirements

Applications for the online part-time Certificate or MA in the History of Medicine are accepted for much of the year, but applications are reviewed at three times. See here (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/admissions/online-programs/) for details, and to apply.

The application process will ask you to confirm that you have completed our online course 150.722 Introduction to the History of Medicine (https://hopkinshistoryofmedicine.org/introduction-to-the-history-of-medicine/).

In order to apply you will need PDF files of the following:

- Curriculum Vitae (4 page limit)
- A personal statement of interest (1 page limit)
- Writing sample (optional)

The application form will also direct you to submit official transcripts that document your undergraduate degree electronically. Review of applications cannot begin until all required documents and application fees have been received. International students will need to submit translated and validated transcripts via a service such as WES (https://www.wes.org/).

The application fee is US $115, payable online.

Click on these links for more details about the Certificate (https://hopkinshistoryofmedicine.org/certificate-in-the-history-of-medicine/) and the MA Degree (https://hopkinshistoryofmedicine.org/ma-degree/). If you are unsure about which to apply for, or need any assistance with the application process, please email us on ihmonline@jhmi.edu.

Certificate Requirements

- Introduction to the History of Medicine
- Methods in the History of Medicine
- Any two of our four Survey courses
- Two electives (which may include the other 2 Survey courses)

Certificate students must complete a free, no-credit, online course on Academic and Research Ethics.

Current online students (any students who have taken a course before February 1, 2020) count time to completion from acceptance into the Certificate program. Certificate students have 3 years from acceptance to completion. Should a student switch from Certificate to Master's, or vice versa, they will complete according to the timeline of the new program.

Students who have taken their first course after February 1, 2020 will count time to completion from the very first course they do in the program, before acceptance to the Certificate program. Certificate students have 5 years to complete their program. Should a student switch from one program to the other, they will complete according to the timeline of the new program.

Code	Title	Credits
ME.150.722	Introduction to the History of Medicine	3
ME.150.723	Survey of the History of Medicine 1: Classical Antiquity to the Early Middle Ages	3
ME.150.724	Survey of the History of Medicine 2: Medicine From the Black Death to the Scientific Revolution	3
ME.150.726	History of Medicine Survey 3: Science and the Practice of Medicine	3
ME.150.727	Survey of the History of Medicine 4: Biomedicine and its Consequences	3
ME.150.728	Healing Spaces: Historical Geographies of Medical Practice	3
ME.150.729	Social and Cultural Histories of Disease	3
ME.150.730	Methods in the History of Medicine	3
ME.150.728	Healing Spaces: Historical Geographies of Medical Practice	3
ME.150.732	Research Seminar B: The History of Medicine in Place	3
PH.550.605	History of Public Health	3

Human Genetics and Molecular Biology, PhD

Ph.D. Program

The Johns Hopkins Human Genetics Training Program provides a training in all aspects of human genetics and genomics relevant to human biology, health and disease.

The overall objective of the Human Genetics program is to provide our students with a strong foundation in basic science by exposure to a rigorous graduate education in genetics, genomics, molecular biology, cell biology, biochemistry and biostatistics as well as a core of medically-related courses selected to provide knowledge of human biology in health and disease. Advances in human genetics and genomics continue at an astounding rate and increasingly they are being integrated into medical practice. The Johns Hopkins Predoctoral Training Program in Human Genetics (HG) aims to educate highly motivated and capable students with the knowledge and experimental tools that will enable them to answer important questions at the interface between genetics and medicine. Ultimately, our trainees will be the leaders in delivering the promise of genetics to human health.

The Human Genetics Program has also partnered with the Johns Hopkins Bloomberg School of Public Health (JHSPH) and the National Human Genome Research Institute (NHGRI) in establishing the Maryland Genetics, Epidemiology, and Medicine Training Program (MD-GEM). Funded by the Burroughs Wellcome Fund, MD-GEM takes a multidisciplinary approach by combining the expertise of all three institutions, to foster the development of a new generation of scientists. Interested Human Genetics students can participate in this additional training.

This program is also offered as training for medical students in the combined M.D./Ph.D. program. Students apply to the combined program at the time of application to the M.D. program. (See section entitled Medical Scientist Training Program).

Research Facilities

Research laboratories are well equipped to carry out sophisticated research in all areas of genetics. The proximity to renown clinical facilities of the Johns Hopkins Hospital, including the Department of Genetic Medicine, and Oncology Center provides faculty and students with access to a wealth of material for study. Computer and library facilities are excellent. Because the program in human genetics is a university-wide activity, supporting facilities are extensive.

Financial Aid

The program is supported by a limited number of teaching assistantships and predoctoral training funds from the National Institutes of Health. These fellowships, which are restricted to United States citizens and permanent United States residents, cover tuition and provide monthly stipends and are awarded to essentially all students in the program. Students are encouraged, however, to apply for fellowships from outside sources (e.g., the National Science Foundation, Howard Hughes Medical Institute) before entering the program.

Applicants for admission should show a strong academic foundation with coursework in biology, chemistry and quantitative analysis.   Applicants are encouraged to have exposure to lab research or to data science. A bachelor's degree from a qualified college or university will be required for matriculation. We no longer require GREs to be taken.

The Human Genetics site (https://bcmb.bs.jhmi.edu/) has up-to-date information on "How to Apply (https://bcmb.bs.jhmi.edu/how-to-apply/)." For questions not addressed on these pages, please email Sandy Muscelli, the program administrator, at muscelli@jhmi.edu.

Program Requirements

The program includes the following required core courses: Molecular Biology and Genomics, Cell Structure, Computational Bootcamp, Pathways and Regulation, Human Genetics, Evolving Concept of a Gene, Basic Mechanisms of Disease, Genomic Technologies, Rigor and Reproducibility in Research, Molecular Mechanisms of Disease and Systems, Genes and Mechanisms of Disease, some of which are listed in the entries of the departments of Cell Biology, Molecular Biology and Genetics, Biological Chemistry and Cell Biology. Numerous elective courses are available and are listed under sponsoring departments.

Our students must take a minimum of four electives, one of which must provide computational/statistical training.

Our students also take a two-week course in July at the Jackson Labs in Bar Harbor, Maine entitled "Human and Mammalian Genetics and Genomics: The McKusick Short Course" which covers the waterfront from basic principles to the latest developments in mammalian genetics. The faculty numbers about 50 and consists roughly in thirds of JAX faculty, Hopkins faculty and "guest" faculty comprising outstanding mammalian geneticists from other US universities and around the world.

The courses offered by the faculty of the program are listed below. All courses are open to graduate students from any university program as well as selected undergraduates with permission of the course director.

Students must complete three research rotations before deciding on their thesis lab. They must also participate in the Responsible Conduct of Research sessions offered by the Biomedical Program; starting at year 3, students must attend at least two Research Integrity Colloquium lectures per year.

Our students participate in weekly journal clubs, department seminars,monthly Science & Pizza presentations as well as workshops given twice a year on diversity, identity and culture.

At the end of the second year, students take their Doctoral Board Oral Examination. Annual thesis committee meetings must be held following successful completion of this exam.

Average time for completion is 5.5 years.

Code	Title	Credits
ME.710.700	Advanced Topics in Human Genetics	1.5
ME.710.702	Molecular Mechanisms Of Disease	1
ME.710.737	Introduction to Computational Genetics	1
ME.710.738	Human Genetics: Consequences of Mendelian Transmission	0

Graduates from the Human Genetics program pursue careers in academia, medicine, industry, teaching, government, law, as well the private sector. Our trainees are encouraged to explore the full spectrum of professional venues in which their training my provide a strong foundation. Driven by curiosity and a desire for excellence, our trainees stand out as leaders in the chosen arenas of professional life. They are supported in the development of their career plans by a program faculty and administration who are dedicated to their success, and by a myriad of support networks across the Johns Hopkins University, many of which are provided by the Professional Development Career Office of the School of Medicine.

Immunology, PhD

https://gradimmunology.med.som.jhmi.edu/

For more complete information and to apply to the Graduate Program in Immunology see the department website (https://gradimmunology.med.som.jhmi.edu/**).**

The Graduate Program in Immunology began in 1982 with two students and a handful of faculty. Since then we have grown to 36 students currently in training and 46 faculty. The faculty research interests span the entire gamut of Immunology, from basic mechanisms such as somatic hypermutation and gene rearrangement, molecular mechanisms of antigen processing and presentation, molecular signals for immune cell development and differentiation to translational research in the fields of cancer vaccines, allergy, infectious disease, immune engineering, autoimmunity and transplantation.

We are fortunate to have a number of centers of excellence in Basic Immunology and Cellular Engineering, Microbial Immunology, Autoimmunity and Cancer Immunology. This, combined with world-class facilities in genomics, genetics, proteomics, cell imaging and bioinformatics means almost limitless opportunities for students to do cutting edge and creative Immunology research. It is indeed an exciting time for Immunology at Hopkins.

We are able to offer one of the most rigorous and expansive scientific training arenas in the world. The large number of accomplished biomedical scientists, the focus on interdisciplinary training, the availability of state of the art research facilities and a collegial environment gives our students a unique opportunity to develop as the next generation of leaders in Immunology. Recent program graduates have become post-doctoral research fellows in major labs all over the world. Many of our alumni have gone on to significant positions as successful independent researchers at universities, research institutes, government laboratories and biotechnology enterprises. Also, a number have distinguished themselves in public policy, intellectual property and scientific writing. All of our alumni have gone on to fulfilling careers in the biomedical field and for that we are grateful and very proud.

Fellowships

Financial Support:

Students accepted into the program will have their tuition, fees, and medical insurance (including dental and vision) paid. Students will receive a competitve stipend to cover living expenses. Support for the Graduate Program in Immunology is derived from government and private sources and individual research grants.

Note to International Applicants:

We are very much interested in attracting talented students from other countries to our program. However, there are some practical issues that you should be aware of before applying. We have a limited ability to support students who are not citizens or permanent residents of the United States. Our training program is funded by a training grant from the United States government. This grant will only support US citizens or permanent residents. Only very rarely do we have funds that can be used to support citizens of other countries.

We highly recommend that foreign applicants seek other possible means of supporting the cost of graduate study. Support could come from: (a) a scholarship from your government or (b) from a "special" foundation award. In your application, please discuss the possibility of obtaining support from one of these sources. Final admission to the program requires documentation that the appropriate financial resources are available. We highly recommend that you review the NAFSA: Association of International Educators website at www.nafsa.org. NAFSA does not offer financial assistance, but will offer some suggestions to help your search for financial aid for study in the United States.

Acceptance into the Graduate Program in Immunology is dependent on an invited personal interview. Foreign applicants, on invitation, should be prepared to travel to Baltimore, Maryland at their own expense. Once in Baltimore, the program will pay for local transportation, meals and accommodations.

Admission Requirements

Undergraduate Degree

Candidates for admission should hold a bachelor's degree or higher with training in one of the following, or related, areas:
General Biology
Biochemistry
Physics
Calculus
Organic/Inorganic Chemistry
Courses in Immunology, Biochemistry & Molecular Biology are recommended, but not required.

Transcripts

Transcripts of **all** college and university study (undergraduate and graduate) are required and must be uploaded to the application. If you have attended more than one institution, transcripts from each institution must be received for your application to be considered complete. International transcripts must be officially translated into English. If you have not yet completed your Bachelor's degree, upload a copy of your current transcript, showing in-progress courses. Official transcripts for in-progress courses can be uploaded to the online application in the Transcript Upload section when they become available, after you submit. Applicants should also upload a list of any current courses, and courses that will be taken before beginning graduate study that do not appear on their transcripts. Do not mail documents to the Office of Graduate Student Affairs unless requested or admitted.
If admitted, an official transcript from each institution you have attended showing proof of graduation and degree conferral will be required prior to matriculation. To be considered official, final transcripts must be sent: 1) by mail, directly from the institution in a sealed envelope:

Office of Graduate Biomedical Education
1830 E. Monument Street, Suite 620 (https://www.google.com/maps/search/1830+E.+Monument+Street,+Suite+620+%0D%0ABaltimore,+MD+21287/?entry=gmail&source=g)
Baltimore, MD 21287 (https://www.google.com/maps/search/1830+E.+Monument+Street,+Suite+620+%0D%0ABaltimore,+MD+21287/?entry=gmail&source=g)

If your institution is sending an E-transcript, please make sure they are sending the notifications to: Gradadmissions@jhmi.edu

Letters of Recommendation

Three letters of recommendation must be submitted through the online recommendation system. Applicants will need to obtain the name and email address of the recommenders when completing the application. Please request your letters of recommendation from faculty members or other professionals who are acquainted with you and your academic work. These letters should comment on your aptitude and promise for independent research.

GRE (no longer required for admission)

As of October 2019, The Graduate Program in Immunology **will no longer require** the Graduate Record Exam (GRE) for admission.

TOEFL Scores (Test of English as a Foreign Language) and IELTS (International English Language Testing System)

All levels of graduate education at Johns Hopkins require proficiency in the English language. It is highly recommended that applicants for whom English is a second language take the TOEFL/IELTS to demonstrate this proficiency. In general, foreign students admitted to the Graduate Program in Immunology have achieved TOEFL scores over 550.
You are exempt from having to take the TOEFL/IELTS if you hold a degree from a U.S. University/College or have attended a minimum of 2 years at an English speaking University/College. TOEFL/IELTS scores are valid for 2 years from expected entrance date.
Please use the Johns Hopkins School of Medicine code **(5316)** when submitting scores.

Application Fee

Application fee is $115.

Criminal Background Check

All Johns Hopkins University graduate students who are accepted will be subject to criminal background investigations. Generally, all offers of admission to School of Medicine degree programs will be conditioned on satisfactory criminal background investigations.

Program Requirements

In the **first year** of study, each student takes a core set of courses emphasizing basic molecular principles and how they apply to understanding immune function.

Required Coursework

Code	Title	Credits
ME.100.709	Macromolecular Structure and Analysis	1.5
ME.100.710	Biochemical and Biophysical Principles	1.5
ME.110.728	Cell Structure and Dynamics	1.5
ME.250.703	Graduate Immunology	4
ME.250.709	Immunology Course Discussion	1
ME.250.722	Autoimmunity	1
ME.250.804	Introduction to Immunology Research (Parts I and II)	1
ME.260.709	Molecular Biology and Genomics	1.5
ME.260.708	Fundamentals of Genetics	2
ME.260.802	Special Studies and Research	0
ME.360.728	Pathways and Regulation	2
ME.800.707	Computational Biology and Bioinformatics	0.5

Laboratory Rotations

During the first year, each student engages in three short-term research projects. Each project lasts approximately three months and is carried out under the direction of a faculty member. Additional rotations may be scheduled based on student interest. The projects are designed to give you an introduction to experimental research and an opportunity to learn more about specific areas of immunology prior to choosing a thesis laboratory and project. After completing the research rotations, the student will select a mentor for their thesis project.

2nd Year

Elective Courses

Students are required to take five elective courses prior to graduation. Students can begin taking courses in the spring of their first year, but most students opt to start in their second year. There are many available advanced level graduate courses offered in the School of Medicine, Bloomberg School of Public Health, and the Kreiger School of Arts and Sciences. The Immunology Program specifically offers several courses, including Tumor Immunology and Immunotherapy, Immunometabolism, Translational Immunology, HIV Biology and more. Many of these courses utilize small group discussions, in which students read and discuss current and seminal research papers on the selected topic.

Oral Examination

In the fall of the second year of study, trainees will take the Graduate Board Oral Examination. By the time the students take this exam, they will have successfully completed all required coursework. This examination serves as a means of evaluating the student's cumulative knowledge in biochemistry, cellular and molecular biology, biophysics, genetics, and immunology and their preparedness to carry out research for the Ph.D. degree. The exam may cover the student's proposed dissertation topic, but this is not the focus of the exam.

Formation of Thesis Committee

In the spring of the second year of study, students will bring together 4-5 faculty members, including their mentor, to serve as their thesis advisory committee. The purpose of the thesis committee is to help the student move their research forward, provide networking opportunities and career development advice and to ensure the student successfully completes their degree. At the initial meeting, the student will prepare a written research proposal in the form of an NIH grant.

3rd Year and Beyond

Elective Courses

Students are required to take five elective courses prior to graduation. Students can begin taking courses in the spring of their first year, but most students opt to start in their second year. There are many available advanced level graduate courses offered in the School of Medicine, Bloomberg School of Public Health, and the Kreiger School of Arts and Sciences. The Immunology Program specifically offers several courses, including Tumor Immunology and Immunotherapy, Immunometabolism, Translational Immunology, HIV Biology and more. Many of these courses utilize small group discussions, in which students read and discuss current and seminal research papers on the selected topic.

Thesis Meetings

Students are required to have at least ONE thesis meeting per year, but are welcome to have more if desired. At each committee meeting, the student should present their research work, roughly following the format of the written proposal. The discussion can be, and often is, open-ended in nature. The student should be prepared to discuss:
1. Background and significance
2. Specific goals of the research (specific aims)
3. Work accomplished to date, including pertinent experiments that "did not work"
4. Future experiments (long and short term)

Thesis and Final Seminar

Upon completion of the thesis research, each student must prepare a formal written thesis, based on the guidelines provided by the Graduate Board of the University. Two readers must find the written thesis acceptable: the thesis advisor and another member of the Thesis

Advisory Committee. Students must also present a formal public seminar on their research. The program office will schedule the final seminar. All University guidelines for thesis preparation must be met. More detailed information on this process is available in the program office.

Required Program Events

The Graduate Program in Immunology offers a wide range of activities that serve to enrich the training experience. All students are required to participate in the program activities throughout their graduate career and this is a vital aspect of the training program.

Journal Club

Immunology Journal Club is intended to provide all graduate students in the Graduate Immunology Program the habit of reading a diverse range of immunology journal articles early in their graduate careers. Presenters are generally encouraged to present new developments and findings that are less related to their research focus. This will allow participants to explore new areas of immunology, familiarize themselves with key investigators in the immunology field, and to develop sharp and valid criticism of sound experiments. This is an invaluable opportunity to keep abreast of new advances as well as hone one's presentation skills in an informal setting.

Annual Immunology Retreat

The Graduate Program in Immunology holds an annual fall retreat. This is a one-day activity at an off-site location. The day includes poster presentations by all Immunology trainees (3rd year and above), a series of 5-6 short student oral presentations (4th years), and a keynote address by a distinguished invited speaker. This meeting provides students with an excellent opportunity to hone presentation skills in an informal retreat setting.

Immunology Floor Meeting

Students and faculty of the Graduate Program in Immunology gather regularly on Thursdays for the "Immunology Floor Meeting." At these meetings, two speakers from different labs will each give a 30 minute presentation on their research in progress. These presentations are designed to allow for the exchange of ideas in an informal atmosphere. The idea is to have people present, as if they were presenting at lab meeting, so we can exchange ideas at the frontier of our research. These are not to be highly polished presentations but a description of your project as it stands, with people encouraged to talk not just about exciting new results, but also about difficulties, troubleshooting, new techniques being attempted, ideas, etc. The speakers can be graduate students, post-docs, or even faculty members, and we hope the venue will be an excellent opportunity for honing our speaking skills.

Immunology Forum

Students are required to attend the Johns Hopkins Immunology Forum that is scheduled regularly on Tuesdays at 4PM. As an added bonus for the students, we provide lunch for the speaker and the students on Forum days. Seminar speakers come from various institutions in the United States and abroad and meet with faculty and trainees. Immunology students are given the opportunity to invite several speakers each year. On this date, the students extend the invitation, organize the schedule, and take them to dinner. The seminar coordinator will assist in this. Collectively these activities provide a powerful training opportunity, allowing trainees to not only hear an interesting seminar, but also to develop the skills and confidence enabling them to enter into scientific dialogue with a gifted scientist.

Medical and Biological Illustration, MA

The Medical and Biological Illustration (MBI (https://medicalart.johnshopkins.edu/admissions-mbi/)) program offers a robust curriculum (https://medicalart.johnshopkins.edu/curriculum/) designed to prepare future leaders in the medical illustration profession. Accredited since 1970, the MBI program offers courses in visual communication of medicine and life-sciences as well as graduate level science courses in the School of Medicine. Courses are directly related to technical, biological, or medical subject matter. Student assignments require problem solving and individual research. Complete understanding of the topic is required. Expertise in all media communication utilized by clinicians, research scientists, health science personnel, students, patients, and the public is stressed. Applicants must hold a bachelor's degree with courses in premedical sciences, and be able to demonstrate art skills and experience which they obtained through instruction in the fine and applied arts.

Basic medical science courses will be offered by the School of Medicine. Illustration and communications curriculum will be provided by the Department of Art as Applied to Medicine. Students may individualize their study depending on previous training, professional interests, and career objectives. All degree candidates must satisfy the requirements of the University, the School of Medicine, and the Department of Art as Applied to Medicine.

The MBI program is accredited by the Commission on Accreditation of Allied Health Education Programs (CAAHEP (http://www.caahep.org/)) in cooperation with the Accreditation Review Committee for the Medical Illustrator (ARC-MI (https://ami.org/about-ami/ami-leadership/committees/)), which is a Committee of the Association of Medical Illustrators (AMI (https://ami.org/)). Current Accreditation: 2019-2026

Equipment and Fees

Each student is required to own a digital camera, a USB flash memory stick and an external portable hard drive.

Scholarships

Departmental scholarships are awarded to all students enrolled in the program and applied towards tuition fees.

The W. B. Saunders Company Fellowship in Art as Applied to Medicine This fellowship was established in 1964 in honor of Lawrence Saunders upon his retirement after 50 years of distinguished leadership in medical publishing.

The William P. Didusch Scholarship and Loan Fund An endowment for student tuition support in the Department of Art as Applied to Medicine was established in 1973 with a generous gift from Mr. Didusch. A significant contribution was added to this Fund from the estate of Bertha M. Trott whose death in 1973 ended a life filled with dedication and service to urologists at Johns Hopkins and elsewhere. Memorial contributions from friends and colleagues have been added to this Fund since the death of William P. Didusch in 1981.

The Kathleen Mackay Powell Memorial Fund An endowment to assist and benefit students in the field of medical illustration given in memory of Kathleen Mackay Powell who studied in the department (1930-31) under Max Brödel.

The Leon Schlossberg Scholarship Fund This scholarship was established in 1999 in memory of Leon Schlossberg (JHU ’35) and his lifetime association as a medical illustrator for the Department of Surgery and faculty member in Art as Applied to Medicine.

The Elinor Widmont Bodian Scholarship in Medical Art This scholarship fund was established in 2000 by Mrs. Bodian (JHU ’43) and her family to provide financial assistance to students in Medical Illustration.

The Chester Reather Scholarship in Art as Applied to Medicine An endowment established in Art as Applied to Medicine in honor of Chester Reather’s distinguished career as a medical photographer and research associate at The Johns Hopkins University School of Medicine. This fund is used to reward a graduate student with a scholarship for innovative research and creative use of new imaging technology.

The Frank H. Netter, M.D. Memorial Scholarship in Medical Art Frank. H. Netter, M.D. is known world-wide as a medical illustrator who could distill complex medical subject matter into clear, effective teaching images. Dr. Netter was not only a skilled draftsman, but knowledgeable in anatomy, physiology, and pathology through his medical training. Family and friends established this scholarship to recognize a student in Art as Applied to Medicine who displays a similar balance of medical and scientific knowledge with the artistic skills that Dr. Netter exhibited throughout his career. Winners of this award have excelled in their academic courses; displayed exceptional art expression; and most importantly utilized both resources to create well designed and effective didactic illustrations.

The Gwynne M. Gloege Scholarship Fund in Medical Art This scholarship fund was established in 2004 by Gwynne Gloege (JHU ‘56) to provide financial assistance to medical art students.

The Ranice W. Crosby Scholarship Fund An endowment for student tuition support in the Department of Art as Applied to Medicine was established in 2008 with a generous gift from the estate of Mrs. Crosby. Memorial contributions from friends and colleagues have been added to this Fund since her death in 2007.

Awards, Lectureship, and Support

The Annette S. Burgess Award The alumni of the Department of Art as Applied to Medicine contribute funds each year which provide for an annual award given to the student whose ophthalmological illustration is outstanding.

The Ranice W. Crosby Distinguished Achievement Award Through the generosity of alumni, colleagues, and friends, a medallion honoring Ranice W. Crosby, Director of Art as Applied to Medicine from 1943 to 1983, is awarded for scholarly contributions to the advancement of art as applied to the medical sciences. The recipient is selected by a committee at intervals of from one to three years.

The Samson Feldman Visiting Scholar in Art as Applied to Medicine Rossetta A. and Sadie B. Feldman, sisters of Samson Feldman, established a visiting lectureship to honor his life as an artist and lifelong patron of the arts. Lecturers are selected from distinguished scholars in visual communications with the purpose of presenting contemporary views pertaining to medical art. The selection of lecturers are made by a committee representing the Department of Art as Applied to Medicine.

The James M. and Carolyn H. Phelps Fund Support for the preservation and care of the Max Brödel Archives. This fund was established in memory of their parents by the Phelps family.

Admission Requirements

The goal of the Admissions Committee is to find students with intellectual curiosity and a passion to communicate medicine and science through dynamic visuals. We seek candidates who demonstrate high academic performance in science, particularly the life sciences, excellent draftspersonship in an art portfolio, and strong verbal and written communication skills.

Further details on the below Prerequisites can be found on the MBI Admissions web page (https://medicalart.johnshopkins.edu/admissions-mbi/).

Prerequisites

- A **Bachelor's degree** demonstrating a high level of scholarship (BS, BA, BFA, or similar)
- **Exemplary Science Preparation** which includes the following four courses:
  - General Chemistry
  - Vertebrate Anatomy* (with mammalian dissection lab)
  - Vertebrate Physiology*
  - At least one of these *specific* Upper-Level Biological Science courses:
    - Molecular Biology
    - Embryology
    - Immunology
    - Histology
    - Cell Biology (must be upper-level / Junior-Senior level)
- A Strong Art Portfolio (https://medicalart.johnshopkins.edu/sample-portfolio/) demonstrating ability to realistically render directly observed subject matter in the following categories:
  - General Drawing
  - Figure Drawing
  - Color Media
  - Graphic Design
  - Digital Media
- **Excellent Written and Verbal Communication Skills**
  - At least one course in English Composition**

* A two-semester sequence in Human Anatomy and Physiology (course 1 and course 2) may substitute for the Vertebrate Anatomy and Vertebrate Physiology prerequisite courses. A one-semester Human Anatomy and Physiology course may only substitute for one prerequisite.

** GRE or TOEFL scores may substitute for one course in English Composition

Degree Requirements

Graduate Program:

1. Each candidate must successfully complete all courses offered, and must submit a thesis on a subject approved by the program director. The completed thesis must be approved by a university qualified preceptor as worthy of acceptance in partial fulfillment of requirements for the M.A. degree. The candidate’s standing will be reviewed by the Committee on Masters and Ph.D. Programs before they are recommended for degree.
2. The student must satisfactorily complete all science courses: Molecular and Cellular Visualization, Neuroanatomy for the Medical Illustrator, Pathology, and Human Anatomy with Embryology.

3. Students must outline their thesis research and consult with their preceptor by the first quarter of the second year. The thesis will include original investigation and expository illustration, and may also include 3D digital or physical models, 2D or 3D animation, video, or immersive technology.

University:

1. A candidate's period of attendance in the program will be no less than 18 months. Transfer graduate students must register a minimum of two consecutive semesters as full-time residents.
2. Certification by the Department or Graduate Program Director that all requirements have been fulfilled.

Program Curriculum

The Medical and Biological Illustration (MBI) program offers a robust curriculum designed to prepare future leaders in the medical illustration profession. Accredited since 1970, the MBI program offers courses in visual communication of medicine and life-sciences as well as graduate level science courses in the School of Medicine. Courses are directly related to technical, biological, or medical subject matter. Student assignments require problem solving and individual research. Complete understanding of the topic is required. Expertise in all media communication utilized by clinicians, research scientists, health science personnel, students, patients, and the public is stressed.

A complete and updated list of courses is available on the MBI program's Curriculum page (https://medicalart.johnshopkins.edu/curriculum/).

First Year

The academic calendar for first year students begins the first weekday in August. The first year curriculum includes courses in advanced sciences, illustration, animation, 3D modeling, graphic design, instructional design, medical photography and business practices. These core courses encourage research, close observation, accuracy, effective visual communication, exploration of various media, and learning in the sciences that will inform a future in medical illustration.

Code	Title	Credits
ME.120.708	Introduction to Design	0
ME.120.709	Continuous Tone Illustration	1
ME.120.714	Editorial and Conceptual Illustration	8
ME.120.715	Biological Illustration	2
ME.120.716	Medical Sculpture	3
ME.120.717	Communications Media (Graphic Design)	1
ME.120.719	Anatomical Ilustration and Radiological Visualization	1
ME.120.720	Vector Illustration	2
ME.120.721	Raster Tone Illustration	3
ME.120.722	Introduction to 3D Modeling and Animation	2
ME.120.727	Neuroanatomy for the Medical Illustrator	2
ME.120.728	3D Animation	4
ME.120.733	2D Animation	3
ME.120.755	Business Practices for the Medical Illustrator	1
ME.120.807	Design of Interactive Learning Experiences	2
ME.130.600	Human Anatomy	7
ME.120.726	Molecular and Cellular Visualization	3

Second Year

The second year curriculum applies the skills and knowledge acquired in the first year coursework to advanced topics including surgical illustration, scientific writing, website development, interactive media, independent research and thesis, presentations to scientific audiences, and ophthalmological illustration. The second year culminates in the Portfolio course designed to help students transition to professional life.

Code	Title	Credits
ME.120.724	Web Animation, Interactivity and Design	3
ME.120.750	Surgical Illustration	7
ME.120.751	Ophthalmological Illustration	3
ME.120.754	Research and Thesis	11
ME.120.756	Operating Room Sketching	4
ME.120.757	Scientific Communication	1
ME.120.758	The Portfolio	4
ME.300.713	Pathology for Graduate Students: Basic Mechanisms	3

Elective Studies

Students in their Second Year may select from the following courses as an overload to their curriculum with the approval of the director. Hours and course content to be arranged with the Director and Instructor.

Code	Title	Credits
ME.120.801	Advanced Projects in Illustration	0
ME.120.813	Independent Study	1

Seminars are offered throughout the year introducing topics pertinent to the profession. Sample topics: illustration ethics, intellectual property, artist rights, art pricing. Department faculty and guest lecturers.

Medical Physics, MS

The program is designed for full-time students who wish to pursue a career as a medical physicist either as a researcher, as a certified clinical profession or in industry. The program will require successful completion of a minimum of 38 credits for Master's degree and completion of a research thesis (in conjunction with one or more of the faculty). Full-time master's students will complete the program in two years.

Admission Requirements

- B.S. degree or B.A. degree in physics, applied physics, or one of the physical sciences, including physics training at least equivalent to a minor
- Official transcript of school record, personal statement, three letters of recommendation, and curriculum vitae
- Demonstrated proficiency in written and spoken English (TOEFL/ IELTS required for non-native English speakers)
- General GRE exam scores are required (physics GRE is recommended)

Tuition and Fees for the 24 Month Program

A non-refundable application fee of $115 is payable by credit card at time of application. 2022-2023 tuition at the Johns Hopkins School of Medicine for full-time graduate students is $59,700. There is also a one-time matriculation fee of $740.

Resources

For more information on graduate education at the Johns Hopkins University School of Medicine, see: Johns Hopkins University School of Medicine Graduate Programs (https://www.hopkinsmedicine.org/som/education-programs/graduate-programs/)

Contact Information

Ms. Debra Race (drace@jhu.edu), Program Administrator

Dr. George Sgouros (gsgouros@jhmi.edu), Program Director

Program Requirements

This program consists of 38 credits (cr). There is also a research ethics and responsible conduct of research requirement.

Courses

Core Medical Physics Courses (20 Cr)

All Medical Physics students are required to take the following courses:

- Radiological Physics and Dosimetry (3 cr)
- Radiobiology (3 cr)
- Radiation Therapy Physics (3 cr)
- Radiation Protection and Safety (3 cr)
- Fundamentals of Human Physiology (4 cr) Public Health crs
- Medical Imaging Systems (3 cr) Engineering crs
- Research Ethics I and II (0 cr)*
- Responsible Conduct of Research (0 cr)*
- Medical Physics Seminar (.5 cr) *must be taken first three semesters, but only 1 credit can be counted toward degree requirement*

*University requirement for graduation; no credit

OTHER REQUIRED COURSES (6 cr)

All MP students are required to take the following additional courses.

- ME.420.xxx Nuclear Medicine Imaging (3 cr) fall Yr 2
- ME.420.xxx Radiopharmaceutical Imaging and Therapy (3 cr) spring Yr 2

Research Project (6 Cr)

Students are required to take at least 6 cr of independent research project or Master's thesis research.

Elective Courses (6 Cr)

Student shall take 6 (or more) additional credit hours from the following list of courses or other courses as approved by the Program Director.

SOM Medical Physics (EB campus)

- ME.420.xxx Advanced Image Reconstruction (3 cr)
- ME.420.xxx Quantitative Imaging Analysis (3 cr)
- ME 420.xxx Molecular Imaging (3 cr)

PH Biostatistics (EB campus)

- PH.140.615 Statistics for Laboratory Scientists I (4 cr)

Biomedical Engineering (Homewood campus)

- EN.580.640 Systems Pharmacology and Personalized Medicine (4 cr)
- EN.580.674 Introduction to Neuro-Image Processing (3 cr)
- EN.580.679 Principles and Applications of Modern X-ray Imaging and Computed Tomography (3 cr)
- EN.580.693 Imaging Instrumentation (4 cr)

Electrical and Computer Engineering (Homewood campus)

- EN.520.623 Medical Image Analysis (3 cr)
- EN.520.631 Ultrasound and Photoacoustic Beamforming (3 cr)
- EN.520.659 Machine Learning for Medical Applications (3 cr)

Neuroscience, PhD

The Department of Neuroscience offers an interdisciplinary program designed to train doctoral students for independent research and teaching in neuroscience. It is the goal of the program to ensure that candidates for the Ph.D. and M.D./Ph.D. degrees obtain a background covering molecular, cellular, systems, and cognitive approaches to neuroscience, as well as receive training that brings them to the forefront of research in their particular area of interest. A series of core courses in neuroscience, along with advanced electives, seminar series, laboratory rotations, and original independent dissertation research, form the Neuroscience Graduate Training Program.

Students enter the program from different backgrounds and the laboratories in which they elect to work cover different disciplines; therefore, the program is tailored to fit the needs of individual students. The academic year at the Johns Hopkins University School of Medicine is divided into four quarters plus a summer semester. Courses are designed so that students have ample time to become involved in laboratory rotations. These laboratory rotations expose the student to a variety of current research techniques in neuroscience and provide an opportunity for the student to select a laboratory in which to conduct dissertation research. Scheduling of the three rotations is adjusted to make the most convenient schedule for each student. The rotations are usually completed by the end of the first full year in the program. Most students begin their thesis research at the beginning of their second year.

For more information, please visit The Solomon H. Snyder Department of Neuroscience webpage: http://neuroscience.jhu.edu. (http://neuroscience.jhu.edu)

Financial Aid

The program provides tuition remission plus a stipend at or above the National Institutes of Health Predoctoral level for all students. All entering and first-year students are encouraged to apply for individual fellowships such as those sponsored by the National Science Foundation and the Howard Hughes Medical Institute.

Admission Requirements

Applicants should have a B.S. or B.A. with a major in any of the biological or physical sciences. Recommended course requirements for entry into the program are mathematics through calculus, general physics, general biology, general chemistry, and organic chemistry; laboratory research experience is desirable but not required. Students with deficiencies in one or more of these areas may be admitted, provided they remedy the deficiency within their first year of graduate training.

Applications for admission are available online at http://www.neuroscience.jhu.edu. Applicants are required to take the Graduate Record Examination or Medical College Admission Test, and are encouraged to take the examinations in November or earlier. Two letters of recommendation, transcripts of undergraduate grades, and a statement on interest are required. December 8 is the deadline for receipt of the application form and all application materials.

Program Requirements

Courses

A year-long core course provides an integrated overview of molecular and cellular neuroscience, neuroanatomy and systems, and cognitive neuroscience. This course is aimed at providing Neuroscience graduate students with a foundation for posing meaningful questions in their area of interest. In addition to the core course, each student selects advanced electives offered by members of the Neuroscience Training Program or other departments at the Medical School. A list of Neuroscience courses can be found in the department statement on page 219.

Seminar Program

The Neuroscience Training Program conducts several seminar series to ensure that students are exposed to recent work by researchers from across the country and the world as well as by Hopkins faculty and fellows. Graduate trainees participate actively in these series throughout their training, including inviting and hosting three speakers each year. A weekly lecture is given by an outstanding researcher in some field of neuroscience. Seminars are selected so that an overall balance of subject matter is covered yearly. Students are given an opportunity to meet with each speaker for questions and discussion. Weekly lunchtime talks are presented on current literature by graduate students and postdoctoral fellows. Since an ability to communicate scientific work clearly is essential, graduate students receive close guidance in preparing and evaluating their journal club presentations. Once a month, the faculty, postdoctoral fellows, and students from one laboratory present and discuss the ongoing research in that laboratory. This provides an informal setting to discuss research being conducted in the laboratories of the Neuroscience Training Program and gives advanced graduate students and postdoctoral fellows a forum for presenting their work.

Requirements for the PhD Degree

A minimum residency of two academic years is required. During the course of graduate study, the student must successfully complete the required course requirements. An oral examination, conducted as prescribed by the Doctor of Philosophy Board, must be completed by the end of the second year. The student must then conduct original research and describe this research in a written thesis dissertation, which must be approved by the students Thesis Committee and the Doctor of Philosophy Board.

Training Facilities

The Training Program is centered in the Department of Neuroscience. The Training Program utilizes laboratory facilities located in the Department of Neuroscience plus several other basic and clinical departments closely associated with the Neuroscience Department. All of these laboratories are within a short distance of each other. Modern state of the art facilities for research in molecular biology, neurophysiology, pharmacology, biochemistry, cell biology, and morphology are available. The Mind/Brain Institute, located on the Homewood Campus of the University, is a group of laboratories devoted to the investigation of the neural mechanisms of higher mental function and particularly to the mechanisms of perception. All of the disciplines required to address these questions are represented in the Institute. These include neurophysiology, psychology, theoretical neurobiology, neuroanatomy, and cognitive science. All of the faculty in the Mind/Brain Institute are members of the Neuroscience Graduate Program.

Combined M.D./Ph.D. Program

About one quarter of the current predoctoral trainees in the Neuroscience Program are candidates for both Ph.D. and M.D. degrees. Applications for admission to the combined program are considered by the M.D./Ph.D. Committee of the School of Medicine. Application forms for the School of Medicine contain a section requesting information relevant to graduate study. Applicants interested in the combined M.D./Ph.D. program should complete this section also, and indicate specifically their interest in the “Neuroscience Training Program”. If application to the combined M.D./Ph.D. program proves unsuccessful and the applicant wishes to be considered for graduate studies, they must notify the Admissions Office of the Neuroscience Training Program by separate letter.

Pathobiology, PhD

Program Overview

Pathology is an integrative discipline that looks simultaneously at the whole organism and its component cells, tissues, and molecules to study the causes and mechanisms of disease. It is a discipline that strives to understand the mechanisms of disease at fundamental levels, and to apply this understanding to improve management of these diseases in the clinical setting. The **Pathobiology Graduate Program** provides a strong background in pathology and related basic sciences to prepare students for academic, research, teaching, and biotechnology careers.

Program of Study

The Graduate Program in Pathobiology of the Department of Pathology offers a program of study leading to the Ph.D. degree in Pathobiology.

The Program provides students with opportunities to elucidate the mechanisms and origins of human diseases through an integrative approach emphasizing systemic processes based on molecular and cellular pathologic underpinnings. Students are prepared with formalized classroom instruction in all general areas of disease mechanisms and undertake specialized training (including thesis research) one of five programmatic areas: Immunopathology; Microbiology & Infectious Disease; Neoplasia; Neuropathology; Vascular Biology & Hemostasis.

Applicants are not required to designate a specific programmatic area of interest at the time of application or matriculation, and laboratory rotations across multiple disciplines are typical for students in the Program. However, special funding opportunities may be available for applicants with commitment to a particular discipline.

Pathobiology encompasses fundamental and applied studies of the biological basis of disease. Like the discipline of pathology itself, it straddles the traditional basic and clinical sciences. Research in Pathobiology is typically aimed toward the discovery of the basic mechanisms that cause disease with the goal of developing fresh insights leading to improved treatments or preventative measures. Thus, the students in the Pathobiology program are prepared for careers in the translation of basic biological principles to solve specific disease problems.

Learner Mental Health and Well-Being

The health and wellness of students are of utmost importance to us here at Johns Hopkins. Students struggling with anxiety, stress, depression, or other well-being-related concerns, can contact the Johns Hopkins Student Assistance Program (JHSAP at jhsap.org (http://jhsap.org/)). Additional resources are available at https://www.hopkinsmedicine.org/getting-help (https://www.hopkinsmedicine.org/getting-help/).

Students with a disability or any health issue may request accommodations and are encouraged to contact the School of Medicine Disabilities Services Coordinator for graduate students to discuss your specific needs (Kristina Nance, GradDisabilityOffice@jhu.edu).

Diversity and Inclusion

At Johns Hopkins we strive to be a model of a pluralistic society in which we acknowledge, embrace, and engage diverse identities, perspectives, and experiences. We seek to build and buttress an inclusive intellectual and physical environment to ensure that all members of our community know with certainty that they belong at Johns Hopkins. And we aspire to equitably share the benefits and burdens of dismantling persistent systemic barriers to individual and communal success.

We believe, fundamentally, that every person has equal dignity and worth, and our unwavering commitment to diversity, equity, and inclusion is rooted in this predicate principle. These core values are essential to our university's academic, research, and public service missions, and bolster our commitment to excellence. Our search for truth and knowledge for the good of humanity depends on bringing the greatest variety of viewpoints and voices to bear on the challenges before us as students, scholars, staff, neighbors, and citizens.

At the intersection of these values is justice. Over the course of history, our nation and university have breached the ideals of justice by discriminating on the basis of race; ethnicity; sex; gender identity and expression; religious belief and observance; disability; socio-economic status; veteran/military status and other factors. We recognize the painful truth that such discrimination has inflicted multigenerational harm and further disenfranchises members of our society. Although our polity and our institution have made meaningful progress, we are by no means past the injury and loss caused by discriminatory practices.

Johns Hopkins assumes its responsibility as a leading research university to work to achieve diversity, equity, and inclusion, and we hold ourselves accountable for our progress through transparency, open communication, and an ongoing, unflinching assessment of met and unmet needs.

More details and resources can be found at the following link: jhu.edu/diversitystatement (https://jhu.edu/diversitystatement/)

Facilities

Classroom instruction is conducted in the lecture, seminar, and conference rooms of the School of Medicine. Student research is conducted in the state-of-the-art research facilities of program faculty. These fully equipped laboratories support studies ranging from molecular, cellular, and physicochemical analyses through whole animal and informatics-based techniques. The Program takes special advantage of its clinical service laboratories and clinical activities to familiarize students with and provide resources for translational research.

Financial Aid

Candidates accepted into the Program are offered full support providing payment of tuition, health, dental and vision benefits as well as a stipend for the duration of their studies. For more details regarding financial aid opportunities, please visit their page at https://www.hopkinsmedicine.org/som/offices/finaid/.

Admission Requirements

Students typically matriculate in July or August. The following 6 key elements for are required for application and ultimately for admission into the Program:

1. a bachelor's degree from a qualified college or university;
2. your updated CV;
3. coursework with laboratory in inorganic & organic chemistry, general biology, and calculus;
4. transcripts of undergraduate grades;
5. a minimum of three letters of recommendation; and
6. a one-to-two page personal statement including your research and career goals.

GRE Scores Not Required. As of Sept, 2019, when applying to the Graduate Program in Pathobiology, we no longer require the **GRE General or Subject Tests scores**, however if taken, applicants are invited to share their scores.

Underrepresented minority students are strongly encouraged to apply and to contact the program directors for guidance. Personal interviews at Johns Hopkins are preferred.

Inquiries should be directed to:

Stacey R. March, Sr. Academic Program Coordinator
Graduate Program in Pathobiology
The Johns Hopkins University School of Medicine
E-mail: smorgan9@jhmi.edu (pathobio@jhmi.edu)
https://pathology.jhu.edu/education/phd-program (https://pathology.jhu.edu/education/phd-program/)

PROGRAM AND SOM REQUIREMENTS

GRADUATE STUDENT POLICIES

All students are expected to read and follow guidelines stated in current posted policy available at the following link: https://www.hopkinsmedicine.org/som/training/graduate-programs/academics/academic-resources/policy-finder.html

LIST OF PATHOBIOLOGY REQUIREMENTS FOR GRADUATION:

Required Core Courses:

ME.300.800 Research in Pathobiology *(ongoing throughout PhD study)*

ME.800.803 Pathobiology Journal Club *(ongoing throughout PhD study)*

ME.300.713 Pathology for Graduate Students: Basic Mechanisms of Disease

ME.100.716 Analysis of Macromolecules: Energetics, Structure and Function

ME.260.709 Molecular Biology and Genomics

ME.110.733 Principles of Genetics

ME.110.728 Cell Structure and Dynamics

ME.360.728 Pathways and Regulation

ME.250.703 Graduate Immunology

ME.300.710 Pathobiology and Disease Mechanisms

ME.300.714 Pathology for Graduate Students: Cancer

ME.300.716 Pathology for Graduate Students: Immunology and Infectious Disease

ME.300.715 Pathology for Graduate Students: Neuropathology

ME.300.717 Grant Writing 101 *(2nd Year)*

ME.300.711 Introduction to Translational Research I *(during or after 3rd Year)*

ME.300.712 Introduction to Translational Research II *(during or after 3rd Year)*

Research Ethics I and II

Procedures for Choosing Rotations and a Thesis Environment:

1. Each student will complete 3 research rotations prior to selecting a thesis laboratory. A fourth rotation may be completed if desired.
2. Upon starting the rotation, students and their rotation mentors will complete the Rotation Plan form.
3. Upon completion of the rotation, the mentor will provide an evaluation of the student's work.
4. Students will present their rotation work at the Pathobiology Journal Club or at the annual Pathobiology retreat.
5. The 3 required rotations must be completed during the first year and are traditionally completed with Pathobiology faculty members. Outside Pathobiology faculty rotations may been completed, however these must be approved by the program director(s). If a student chooses to undertake their thesis research with an outside faculty member, the faculty member will need to be considered first by the Pathobiology Executive Committee before joining the program faculty.
6. Each research rotation will be about 3 months in length, with the exception of summer rotations. A full-time summer rotation (July-August) will be about 2 months in length.
7. The student must select a thesis advisor no later than 1 year from the date of admission to the program. **In general, students will not be permitted to conduct their thesis research in a laboratory where they have been previously employed. Any exceptions to this policy will be determined by the Pathobiology Executive Committee.
8. Faculty Advisors Groups: each student, along with a group of other students, will be assigned an faculty advisor during the time period between starting the program and choosing a thesis advisor. The group will meet with AT LEAST once every 4 months. These meetings will be initiated by the group's senior student leader (appointed by the Program).

Oral Examination

The Graduate Board Oral Examination tests the breadth and depth of the graduate student's scientific knowledge and readiness to begin thesis research. These exams are administered by the Pathobiology program through an oral examination committee consisting of 3 faculty members. This preliminary oral examination will be scheduled by lottery at the end of the first year meeting with the Program Director. The exam takes place during October after the student has completed all required first year courses. The exam is required for graduation.

Thesis Advisor and Advisory Committee

After the first year is completed, the student will choose an advisor from the Pathobiology faculty. After completing the Oral Examination for the Ph.D. Degree for the School of Medicine Programs, a Thesis Advisory Committee will be formed to monitor the student's thesis research progress. The student, with the consent of their advisor, decides on the composition of the thesis committee. The thesis committee consists of at least three experts in the student's field of study or related fields. Committee members help with research direction and technical challenges, and oversee the student's progress until research is complete and the doctorate is awarded. Students must meet with their Committee at least once per year to review progress.

Electives

All students in their second year and beyond are required to take a one-semester elective course for credit in each academic year. Courses may be taken for a grade or pass/fail. Students may choose a course offered in the Johns Hopkins Medical Institutions, or on the Homewood Campus subject to approval by the Program Director.

Translational Rotations (2 required)

The objectives of these rotations are to give graduate students an interactive exposure with the clinical diagnostic dimension of Pathology. Students should learn the fundamental clinical questions, the current state of the technologies to address these questions, and how basic science can be translated to advances in diagnostic and therapeutic modalities. Students must complete 2 translational rotations as a graduation requirement. These rotations need not require an experimental project involving bench work. If the student wishes to complete such a project, it should be decided jointly between the student and rotation advisor.

Departmental Thesis Seminar

Shortly before your submission of graduation materials, you must present your thesis work to the department in a one-hour talk.

Seminars, Journal Clubs, and Lab Meetings

Graduate students are required to attend the weekly Pathobiology Journal Club Course and all are expected to attend weekly Pathobiology lunch meetings as well as all lab meetings in their mentor/thesis advisor's departments throughout their training period. Students are encouraged to attend the many seminars presented by invited speakers who are involved in cutting edge research.

Pathobiology Annual Retreat:

The annual Pathobiology Retreat (held in early Fall), from 8:00 a.m. to 4:00 p.m. includes a series of short research talks by senior students and poster presentations by second-year and beyond students. Attending keynote speaker(s) will deliver a special lecture and faculty members and alumni will discuss their research. All members of the Pathobiology Graduate Program are expected to participate in this event.

Pathology Young Investigators' Day

The Departmental Young Investigators' Day (held March/April) provides residents, fellows, and students with the opportunity to present their clinical, basic, or translational research efforts. This activity allows faculty, fellows, residents, and students to learn more about the diverse ongoing research in the Pathology department. All fellows, residents, graduate students and medical students working with a faculty member who holds an appointment in the Department of Pathology or the Pathobiology Program are invited to submit abstracts and present posters at the annual event.

Graduate Student Association Poster Session
The Graduate Student Association Poster Session is held every year. This gives the students the opportunity to showcase their research to both faculty and peers.

AWARD OF THE PhD DEGREE AT THE JOHNS HOPKINS UNIVERSITY

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Administrated by the Doctor of Philosophy Board
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From the Doctor of Philosophy Board website:
*The SOM policy is based on NIH guidelines (*https://grants.nih.gov/policy/index.htm (https://grants.nih.gov/policy/)*). Students must receive training that includes a significant small-group component, allowing issues to be openly discussed with fellow students and faculty discussion leaders. A training program should provide at least eight hours of class time -- with at least three hours of face-to-face discussion -- and address at least the following topics:*

1. *The scientist as a responsible member of society*
2. *Research misconduct*
3. *Data acquisition and management*
4. *Authorship and publication practices*
5. *Mentor and trainee responsibilities*
6. *Use of animals in research*
7. *Conflicts of interest*
8. *Collaborative research*
9. *Human subjects if applicable*

It is the responsibility of each program to design a curriculum that satisfies these requirements. Contact the Associate Dean for Graduate Biomedical Education for any questions.

Degree Requirements:
There are three fundamental requirements for the Ph.D. at Johns Hopkins University: dissertation, residence, and oral examination. None of these requirements can be modified or changed without unanimous consent of the schools and the Provost.

1. ***Dissertation:*** *All Ph.D. students must successfully complete a dissertation in accordance with relevant school and program guidelines prior to degree conferral.*
2. ***Residence:*** *All Ph.D. students must have completed two consecutive semester of full-time study prior to degree conferral.*
3. ***Oral Examination:*** *All Ph.D. students must successfully pass a required oral examination conducted by five faculty members. The oral examination must include the chair and at least one other member from outside the candidate's home department.*

It is university policy that all program and university requirements for the Ph.D. must be completed in 9 years or less from start of the doctoral program. The Doctor of Philosophy Board reviews all candidates for the Ph.D. prior to conferral to ensure that the fundamental requirements for the Ph.D. have been met within the time frame delineated.

Over about a 5 year period, our trainees achieve a deep working understanding of the biology of human aging and human diseases, as well as state-of-the-art and high-throughput experimental approaches related to human disease. We accomplish our mission through a curriculum and environment that are **different and unique**. We encourage change, creativity, and out-of-the-box reasoning. The intensive coursework during the first year of training is designed to build a foundation in contemporary molecular, cell and structural biology, signal transduction pathways, neurobiology, genetics and genomics, immunology, and bioinformatics, all filtered through the prism of human pathology and translational medicine. These classes along with 3 lab rotations, and oral presentations based on this work, culminate with the student selection of a thesis lab headed by a faculty member who is accredited for mentor-compliancy by institutional and programmatic review.

A unique aspect of the program is the inclusion of **translational rotations** in a clinical pathology setting; these rotations directly reinforce the humanity, compassion, and importance of the student's research project to the ultimate goal of alleviating suffering caused by human diseases. Most students garner peer-reviewed publications during their training, and some successfully compete for NIH F31 individual training grants. Using coursework, supplemental library-based teaching tools, annual program retreats, as well as weekly journal clubs and discussion, scientific ethics, rigor, reproducibility, transparency and logic, and moral values are inculcated as Kantian categorical imperatives. The outstanding, interdisciplinary, and diverse programmatic and collaborative faculty and resource-rich environment act as catalysts for students to explore, thrive, and consolidate their novel research to launch their careers.

Historically, pathobiology graduates are well-trained biomedical scientists and have successfully embraced varied career paths and leadership positions in **academia (63%)**, **industry (17%)**, medicine, clinical laboratory medicine, entrepreneurship, business, government, and science writing. The Graduate Program in Pathobiology strives for students to have an important, global impact on the pathologic basis of human disease and health-related research.

Pharmacology, PhD

The Department of Pharmacology and Molecular Sciences hosts the Pharmacology Graduate Program, which offers a program of study and research leading to the Ph.D. degree. Research training opportunities within the program cover a broad spectrum of biomedical sciences including chemical biology, immunology, virology, cancer, and neuroscience. The mission of departmental research is to understand the molecular processes underlying physiology and pathology, and to apply this knowledge to discovering new drug targets and developing novel therapeutics. Within the program, students may choose to focus their efforts in any of a large number of specific research areas including signal transduction, structural biology and drug design, NMR spectroscopy, molecular genetics, cancer chemoprevention, viral immunosuppression, cancer immunology, cell-mediated immunity, mechanisms of HIV infection, vaccine development, glycobiology, biomedical mass spectrometry, clinical pharmacology, drug delivery, anti-parasite drug development, histone acetylation and gene regulation, melatonin and circadian rhythm, drug metabolism, Vitamin D pharmacology, natural product biosynthesis, telomerase and chromosome stability, T cell activation and tolerance, DNA repair, DNA topoisomerases, molecular imaging, and the clinical pharmacology of cardiovascular agents. The department is also pleased to host students and award doctoral degrees to M.D./Ph.D. degree candidates and students in other Ph.D. graduate programs in which Pharmacology faculty participate (Biochemistry, Cellular and Molecular Biology, Cellular and Molecular Medicine, Immunology, Neuroscience, and Pathobiology).

Financial Support

Financial support covering normal living costs, individual medical insurance, and tuition is usually provided.

Admission Requirements

Applicants should have a B.A. or B.S. degree with a major in any of the biological or physical sciences. Entering students are expected to have completed college-level courses in chemistry (inorganic, organic, and physical), calculus, and physics; a strong background in biochemistry is particularly desirable. A completed application form, at least three letters of recommendation, undergraduate transcripts, and a statement of interest must be received by December 8th.

Program Requirements

Students in the Pharmacology program are able to select a course of studies uniquely suited to their own career goals. It is usually required that students successfully complete the following courses:

Code	Title	Credits
First Year		
ME.100.716	Analysis of Macromolecules	2
ME.260.709	Molecular Biology and Genomics	1.5
ME.330.709	Organic Mechanisms in Biology	2
ME.110.728	Cell Structure and Dynamics	1.5
ME.360.728	Pathways and Regulation	2
ME.360.720	Organ Physiology	6
ME.330.802	Topics in Pharmacology (Weekly seminar series. Yearly registration is required.)	0.5
ME.330.708	Primary Source Readings and Analysis	0.5
Second Year		
ME.330.707	Graduate Pharmacology I	2
ME.330.715	Graduate Pharmacology II	2
ME.330.714	Essential Grantsmanship: Writing the Research Grant Proposal	1
PH.140.615	Statistics for Laboratory Scientists I	4

Students must also take two advanced elective courses selected from those offered by this or other departments.

During their first year of study, students will complete ~10-week research rotations in addition to their coursework. They will initiate dissertation research by the end of their first year and complete elective courses relevant to their developing interests in subsequent years of training.

During the second year of study, students will be required to pass a qualifying examination conducted as prescribed by the Doctor of Philosophy Board of the University. This examination will probe the depth and breadth of the student's knowledge of the biomedical subjects taught in the core courses.

The candidate is required to present a written dissertation based on original research undertaken while in residence as a graduate student and to present a departmental seminar describing the thesis research.

Combined M.D.-Ph.D. Degrees

Students seeking admission to or who are already participating in the M.D. program in the School of Medicine may participate in a program leading to both the M.D. and the Ph.D. degrees.

Medical Program

Doctor of Medicine, MD

Curriculum

The curriculum is organized to allow each of our graduates to achieve the eleven educational objectives noted in the Mission and Medical Education Program Objectives for the Johns Hopkins University School of Medicine (p. 909). The regular M.D. curriculum comprises four academic years designated First through Fourth Years. The academic requirements of this program can be combined with graduate study leading to a Master's or Ph.D. degree.

The Genes to Society curriculum is highly integrated both vertically and horizontally across the four years. Elective time is available beginning in Quarter 4 of the Second Year. Elective courses are described in the programs of the various departments in the section under Departments and Divisions, Centers, Institutes, and Subjects of Instruction. This information is supplemented by an elective book which is updated annually. Selected students may interrupt the regular curriculum for one or more years in order to pursue special studies.

The study of science basic to the practice of medicine begins in the First Year with four months of Foundations courses, including Foundations of Human Anatomy, Scientific Foundations, Clinical Foundations, and Foundations in Public Health: Epidemiology, Ethics, and the Health Care System. These courses are intended to introduce students to the basic language and concepts of biomedical science, including molecular biology, cell biology, biochemistry, anatomy, and the social and behavioral sciences. During Clinical Foundations, students begin training in the physician-patient medical interview, physical diagnostics, and clinical reasoning. Each student is assigned a college advisor (see Student Advising, page 77) upon entry to medical school, who serves as the instructor in Clinical Foundations, and academic and career advisor for the remainder of the four years.

Following winter break in First Year, students begin an 18-month organ systems-based course, Genes to Society, which presents genetics, molecular biology, advanced anatomy, physiology, pathology, pathophysiology, and clinical presentations related to each organ system. Dermatology, Immunology, Infectious Disease, Hematology/Oncology, Brain, Mind and Behavior, and Nerve and Special Senses are covered in the First Year. One half-day per week is devoted to a precepted clinical experience, the Longitudinal Ambulatory Clerkship, which provides further training in patient-centered interviewing, physical diagnosis, and health care systems.

Beginning with the first week of medical school and periodically in between courses, 3-day TIME (Topics in Interdisciplinary Medicine) courses will focus students on a multidisciplinary topic related to the social and behavioral sciences. The First Year TIME courses are Disparities and Inequalities in Health Care, Obesity, Nutrition, and Behavior Change, High Value Healthcare, Clinical Informatics, Global Health, Pain Care, and Disaster Medicine. Students will have a variety of lecture and small group discussions supplemented by experiential and skill learning in each course. In the afternoons of these TIME courses students will be attending a Scholarly Concentration course in one of five concentrations: Basic Science Research, Clinical Research, Public and Community Health Service, Ethics and the Art of Medicine, and History of Medicine. Beginning as a seminar series, each student will eventually complete a mentored scholarly project by the end of the Second Year of study.

Second Year students return in late August to complete the Genes to Society course in the following organ systems: Pulmonary, Renal, Cardiovascular, GI/Liver, Endocrine, Reproductive, and Musculoskeletal. The Longitudinal Clerkship continues one-half day per week until the winter break. The TIME courses in the Second Year are Substance Abuse Care, Patient Safety, and End-of-Life and Palliative Care. The Genes to Society course ends in February of the Second Year, and is followed by a 3-week Transitions to the Wards course, which provides intensive training in procedural skills, team communication skills, and clinical reasoning in preparation for the hospital-based clerkships that follow.

In the final quarter of the Second year, students begin the core clinical clerkships. These are 8-week rotations in the clinical disciplines of Medicine, Surgery, Pediatrics, Women's Health, 4-week rotations in Neurology and Psychiatry, and a 4.5-week rotation in Emergency Medicine. A week of Translational Medicine is required after each 8-week clerkship; during these weeks, students will return to a discussion of state of the art biomedical investigation. Students may elect to delay one 8-week rotation in the next 5 quarters, but must complete this required core of rotations by the end of the first quarter in Year 4. Two one-month advanced clinical rotations are required prior to graduation: a Subinternship and either the Advanced Critical Care Clerkship or the Advanced Adult Ambulatory Clerkship.

The clinical clerkships are devoted to the study of health and disease in the various clinical departments of the School of Medicine, The Johns Hopkins Hospital, Johns Hopkins Bayview Medical Center, Howard County General Hospital, Johns Hopkins All Children's Hospital, Sinai Hospital of Baltimore, Anne Arundel Medical Center, St. Agnes Hospital, and other affiliated hospitals. Students are introduced to practical clinical problems through instruction and participation in a health care team. Elective courses available in every department range from direct participation in current biomedical research to advanced clinical work. Many clerkships and elective courses may be taken during the summer.

In addition to the advanced clinical clerkships noted above, students are required to complete a 2-week course in the Fourth Year designed to refresh clinical skills and prepare them for internship. This course, Transition to Residency and Internship and Preparation for Life (TRIPLE), is offered twice in the spring of the Fourth Year, and includes simulation-based training, advanced cardiac life support, and advanced communication skills.

The academic year for first year students begins in August and ends in mid-June. There is a winter break in December and a spring break in March.

Between the First and Second Years, there is a summer vacation of eight to nine weeks when students may engage in research or other studies. Students must arrange their schedules to include, between the start of the fourth quarter of the Second Year and graduation in May of the Fourth Year, 7 quarters and 2 weeks of required clinical clerkships and 24.5 weeks of elective work; two additional vacation periods may also be scheduled. At the student's discretion, vacation quarters may be used for research, board preparation, or additional elective study. Graduating students cannot schedule required clerkships during the fourth quarter of the Fourth Year, unless approved by the Associate Dean for Student Affairs.

The total number of students in each class of the regular four year program is 120.

Electives

Programs in which elective study and research leading to graduate degrees are integrated with the medical program are described in a later section ("M.D.-Ph.D. Programs"). A limited number of stipends are available for students who wish to devote one full year to research.

Approval may be granted for elective study at institutions other than the Johns Hopkins University. In such instances, the student must present a description of the elective including goals and objectives to the Associate Dean for Student Affairs for approval. Electives are generally 4-4.5 weeks in length, and may not overlap with required courses for Johns Hopkins School of Medicine students. One of the required 2 $^{1/4}$ elective quarters may be taken at another non-affiliated medical institution. Students desiring to study at other institutions must make final arrangements through the Office of the Registrar of the Johns Hopkins University School of Medicine.

Students visiting other institutions and those who devote their free time to elective courses in this institution will be held responsible for proficient work just as in the case of the required subjects of instruction.

Formal registration for elective quarter programs is through the Office of the Registrar of the School of Medicine. The elective work for the Second through the Fourth Years is denoted by the symbol E (e.g., Neurology E). Such courses are listed numerically by department or sub-department. The catalogue does not list all elective courses. The Elective Book, an up-to-date description of all elective opportunities, is maintained by the Registrar and is available from the Registrar's Office or the following website: http://www.hopkinsmedicine.org/som/students/Academics/electives.html.

Required Work

The required departmental work for each course and core clerkship is usually regarded as a unit. It may be offered and graded as a single course, although the catalogue may indicate various course elements that comprise the whole. Formal registration for all required courses must be made through the Registrar of the School of Medicine.

Requirements for M.D. Degree

To be eligible for the M.D. degree, candidates must successfully complete the prescribed course of study of the First through the Fourth Years.

Preparation for Medical School

The courses taken and the grades earned are but a portion of an applicant's credentials. Certain areas of study (i.e. introductory biology, chemistry, physics and organic chemistry with associated laboratory exercises, and calculus) have traditionally been of value to medical students. Beyond the successful fulfillment of these basic prerequisites the Committee on Admissions is concerned solely with the quality and scope of an applicant's undergraduate educational experience. The field of concentration for undergraduate studies and the selection of additional courses in the sciences and mathematics should be the choice of the student and will not affect the admissions process.

Requirements for Admission

The following general requirements must be met by all applicants:

1. **Accredited Institution**. All applicants must be or have previously been in attendance at an institution on the list entitled "Accredited Institutions of Postsecondary Education," authorized and published by the American Council on Education, One DuPont Circle, N.W., Washington, D.C. 20036. Extension or evening courses taken in fulfillment of premedical course requirements are not acceptable unless they are identical to courses offered in the college's regular academic program. Preparation in foreign universities, in most cases, must be supplemented by a year or more of course work in an accredited United States university. The School of Medicine accepts prerequisites completed at the community college level. The change in policy acknowledges that as part of the holistic review process used to select applicants to interview at Hopkins, many factors are considered. These factors include the rigor of the applicant's course of studies, grades, MCAT scores, clinical and research exposure, letters of recommendation, personal statement, and the applicant's understanding of medicine. In addition, we consider the path the applicants have taken which led to their desire to apply to medical school and become a physician.
2. **Required Academic Work.** A list of specific pre-medical course requirements may be found under Course Requirements for Regular MD and MD-PhD Applicants. In order to assess the classroom performance of an applicant, the Committee on Admission requires that all of the coursework submitted in fulfillment of admission requirements must be evaluated on the basis of a traditional grading system. Such a system must employ a range of numbers or letters to indicate the comparative level of performance. If the applicant has received a grade of Pass/Credit for any of the specified premedical course requirements, the instructor must supply, in writing, a statement evaluating the student's performance in that course. CLEP credits may not be substituted for any course requirement.
3. **Conditions of Admission.** Students admitted to the School of Medicine on a conditional basis (i.e., requirement(s) yet to be completed) must fulfill those conditions prior to matriculation in the School of Medicine.
4. **Standardized Testing.** The Medical College Admissions Test (MCAT) is required for acceptance. The MCAT must be taken no later than September in the year the application is submitted. The oldest MCAT considered will be from four years prior to the year of matriculation.
5. **Letters of Recommendation.** A recommendation from the applicant's college premedical committee or an officially designated premedical advisor is required. If the college does not have a premedical advisor or premedical committee, two letters of recommendation are required from science faculty members in science departments who have taught the applicant and one non-science faculty member who has also taught the applicant. In addition to the letters indicated above, applicants with advanced degrees and/or full-time employment are required to submit recommendations from each component of their education and major work experiences.
6. **Non-U.S. Citizen Applicants.** Preparation in foreign universities, in most cases, must be supplemented by a year or more of course work in an accredited United States university. Official transcripts are required from all colleges attended outside the United States and Canada. Non-U.S. resident students are not eligible for federal or state funds. Financial aid funding is available to all current and newly admitted non-U.S. resident medical students. Financial aid assistance will be provided in the form of institutional loan and/or scholarship.
7. **Application Review.** Following receipt of all required credentials, the committee on admission will review applications and make interview decisions. Applicants selected for interview will be notified by the committee. With the approval of the Assistant Dean, it may be possible to arrange a remote interview when the applicant lives some distance from Baltimore. Notification of acceptances are made between late fall and mid spring.

Application for Admission

Applicants must first submit an online application at American Medical College Application Service (AMCAS). The deadline for submitting an application to AMCAS for Johns Hopkins is October 15th.

Once you have completed your AMCAS application and it is verified, you will be invited to submit the Johns Hopkins University School of Medicine secondary application. The deadline for submission of the secondary application to the M.D.-Ph.D. Program is November 1st. The deadline for submission of the secondary application for the regular M.D. Program is November 1st.

Letters of recommendation to the M.D.-Ph.D. Program must be received by November 15th. Letters of recommendation to the regular M.D. Program must be received by November 15th. All letters of recommendation should be sent to the AMCAS letter service.

Application Fee: The secondary application fee is non-refundable and must be paid online when submitting the secondary application.

The application fee will be waived for applicants who have received an AMCAS fee waiver. Specific details are available in the secondary application instructions.

For the latest information concerning admissions requirements and procedures, please visit our website at: MD Admissions (https://www.hopkinsmedicine.org/som/education-programs/md-program/application-process/how-to-apply.html). Specific questions about applying to the School of Medicine may be answered by calling the Admissions Office at 410-955-3182. Information may also be requested by writing to:

Committee on Admissions,
Johns Hopkins University School of Medicine,
733 N. Broadway, Suite G-49,
Baltimore, MD 21205
or via email at somadmiss@jhmi.edu.

Accepted Applicants: It is the policy of the Johns Hopkins University School of Medicine to require criminal background investigations on accepted students in any professional or graduate program at the School of Medicine, interns, residents, and clinical fellows in any Graduate Medical Education program sponsored by Johns Hopkins, and other clinical and research postdoctoral fellows at the School of Medicine.

School of Medicine Technical Standards for Admission

Technical Standards for Medical Students

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The mission of the Johns Hopkins School of Medicine is to prepare physicians to practice clinical medicine of the highest standard with compassion and to identify and solve fundamental questions in the mechanisms, prevention and treatment of disease, in health care delivery and in the basic sciences.

JHUSOM is committed to diversity and to attracting and educating students who will make the population of health#care professional representative of the national#population.

Although students learn under the supervision of faculty, students interact with patients throughout their medical school education. Patient safety and wellbeing are therefore critical factors in#establishing#requirements involving the physical, cognitive, and interpersonal abilities of candidates for admission, promotion, and graduation. The necessary abilities and characteristics described below are also referred to as technical standards. They are defined in several broad categories#including#observation, communication, motor function, intellectual-conceptual, integrative, quantitative#abilities,#social and behavioral skills, and legal and ethical standards.

JHUSOM will consider for admission any applicant who meets its academic and nonacademic criteria and who#demonstrates#the ability to perform the skills listed in this document, with or without reasonable accommodations.

The stated intention of a medical student to practice only specific areas of clinical medicine, or to pursue a non-clinical career, does not alter the School of Medicine's requirement that all medical students achieve competence in the full curriculum required by the faculty.

Technical Standards

Observation:

Medical students must#acquire#information as presented through demonstrations and experiences in the foundational sciences. Medical students must be able#to#obtain and interpret information through a#comprehensive#assessment of patients,#correctly#interpret diagnostic representations of patients' physiological data, and accurately evaluate#patients' conditions and responses.

Communication:

Medical students must#exhibit#interpersonal skills to enable effective caregiving for patients, including the ability to communicate effectively, with all members of a multidisciplinary health-care team,#patients, and those#supporting#patients. Medical students must be able to#record information clearly and accurately interpret verbal and nonverbal communication.

Motor Functions:

Medical students must be able to perform routine physical examination and diagnostic maneuvers. Medical students must be able to provide general care and emergency treatment for patients, and to respond to emergency situations in a timely manner. These activities require some physical mobility, coordination of both gross and fine motor neuromuscular functions, and balance and equilibrium. Medical students must be able to meet applicable safety standards for the environment, and to follow universal precaution procedures.

Intellectual-Conceptual, Integrative and Quantitative Abilities:

Medical students must be able to effectively interpret,#assimilate, understand, and communicate the complex information required to function within the medical school curriculum both in person and via remote technology, and engage in problem solving individually and in small groups. Medical students must demonstrate the ability to comprehend three-dimensional relationships and adapt to different learning environments and modalities.

Behavioral and Social Attributes:

Medical students must exercise good judgment; attend to the responsibilities necessary for the care#of patients; and develop mature,#sensitive, and effective relationships#with patients. Medical students must demonstrate the skills required to effectively manage heavy workloads, function under stress, adapt to changing environments, display flexibility, and learn to function in the face of the uncertainties inherent in the clinical problems of patients. Medical students are expected to exhibit professionalism, personal accountability, compassion, integrity, concern for others,#and interpersonal skills including the ability to accept and apply feedback and treat all individuals in a respectful manner, regardless of gender identity, age, race, sexual orientation, religion, disability, or any other protected status.

Ethics and Professionalism

Medical students must maintain and display ethical and moral behavior commensurate with the role of a physician in all interactions with patients, faculty, staff, students, and the public. Medical students should understand and function within the legal and ethical aspects of the practice of medicine.

The technical standards delineated above must be met with or without accommodation. Students who, after review of the technical standards, determine that they require reasonable accommodation to fully engage in the program should contact Student Disability Services to confidentially discuss their accommodation needs. Given the clinical nature of our programs, time may be needed to create and implement the accommodations. Accommodations are not retroactive; therefore, timely requests are essential and encouraged.

Equal Access#to the JHUSOM Educational Program

Our core values translate into our work with all students, including those with disabilities.#JHUSOM actively collaborates with students to develop innovative ways to ensure accessibility and creates a respectful accountable culture through our confidential disability services.#JHUSOM is committed to excellence in accessibility; we encourage students with disabilities to#disclose#and seek accommodations.

Candidates with Disabilities

- Candidates who have questions about or want to request accommodations, auxiliary aids and/or services#should#contact Student#Disability#Services (https://www.hopkinsmedicine.org/som/education-programs/md-program/our-students/disability-services.html).
- In accordance with Johns Hopkins' policies which, in turn, embody applicable federal, state, and local laws (e.g., the Americans with Disabilities Act and the Rehabilitation Act), the Medical School does not discriminate in admissions or educational programs against any individual on the basis of their disability or handicap. No otherwise qualified individual with a disability/handicap will be excluded from admission.
- All#candidates#must#be able to perform essential functions in a reasonably independent manner. Their use of senses such as touch, pain, temperature position, pressure, movement, stereognosis, and vibration must be sufficiently intact to enable them to carry out all activities required for a complete medical education. Candidates must have motor function capabilities to meet the demands of medical education and the demands of total patient care. The candidates for the medical degree must be able to independently demonstrate a range of abilities and skills. The use of trained intermediaries#to carry out functions described in the#technical standards will#not be#permitted.#Intermediaries, no matter how well trained,#apply#their own#powers of#selection#and observation, which could affect the student's judgment and performance.

Requests for Accommodations

- A candidate who has#not been#offered admission#to#the School of#Medicine may#disclose#a disability#and#request accommodation#during#the admission#process.**This is not#required#unless the candidate wants to request#an accommodation for the admission process**.
- After admission,#medical students (including#admittees who#have not yet accepted#a place in#a class at the School of#Medicine,#admittees who#have accepted#a place, and matriculating medical students) can#disclose#a disability#and#request accommodation#through the Student Disability Services office (https://www.hopkinsmedicine.org/som/education-programs/md-program/our-students/disability-services.html)#using our on-line registration system (https://hopkins-accommodate.symplicity.com/public_accommodation/). Documentation for accommodations must provide the specific functional limitations in which the student is seeking accommodations for.
- While medical students can#disclose#a disability and request an accommodation at any time during their enrollment, students are encouraged to#disclose#the need for accommodation(s) as soon as possible.#Time for documentation review and arrangement of accommodation(s) is#necessary and#may take#up to four to six weeks.#Accommodations are not retroactive.

Ability to Meet the SOM Technical Standards

Candidates for admission must review and#verify#their ability to meet the#School of Medicine technical standards#when completing the application for admission.

If at any point an enrolled medical student ceases to meet the technical standards of the School of Medicine, they may#choose to work with Student#Disability#Services#to#determine#if reasonable#accommodations#could remove barriers. They also#may work with the Office of Medical Student Affairs to see what other services are available.#Should, despite reasonable accommodation (whether the candidate chooses to use the accommodation or not), a candidate or student's existing or acquired disability interferes with patient or peer safety, or otherwise impede the ability to complete Johns Hopkins School of Medicine's undifferentiated program and advance to graduation, residency, training, or licensure, the candidate may be denied admission or may be separated, discontinued, or dismissed from the program.

Responsibility

Monitoring of the ability of a candidate or student to meet the#technical standards#is the#responsibility#of a continuum of School of Medicine committees, faculty, and the medical student.#For medical students who have matriculated into the School of Medicine, issues related to technical standards are#evaluated#by#the#Pre-Clerkship or Clerkship Student Assessment and Formational#Committee#and the Medical Student Promotions Committee#and#considered on an individual basis.

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Early Decision

We do not accept applications for early decision.

Deferred Admission

The Deferred Admission Plan enables students to diversify their educational and life experiences as they prepare for a career in medicine. Deferred admission may be approved for a period of one to three years to pursue international fellowships (Rhodes, Rotary, Marshall, Watson, Fulbright scholarships, etc.), join the Peace Corps, participate in service assignments in the United States or abroad, teach, or conduct research. Admitted applicants who are interested in deferring their matriculation into the first year class, must submit a written request by May 1st for review and approval by the Deferral Committee. If approved, applicants must complete an AMCAS application by the August 1st deadline of the year prior to matriculation. Please contact the Admissions Office for further information.

Combined Study-M.D.-Ph.D.

The Committee on Admission accepts applications not only from applicants for the M.D. program but from those who are interested in a combined M.D.-Ph.D. degree. Provided with the Johns Hopkins application for the M.D. program is a supplemental form which should be completed by those applicants for the combined degree. Under the section "Graduate Programs" in this catalogue, those departments which offer study leading to a Ph.D. degree are listed. When the application for the M.D. program as well as the "Application Supplement for Admission to Combined M.D.-Ph.D. Study" are received along with all necessary letters of recommendation, they will be reviewed by the Committee on Admission, the M.D.-Ph.D. Committee, and by the appropriate graduate department. If admitted to both degree programs, the student will ordinarily be expected to complete at least the first year of M.D. study before starting full-time Ph.D. work. Students initially accepted for only one of the two degrees are eligible to reapply for study towards the other at a later time. Students enrolled in the M.D. program can make application for a graduate program at any time during the course of their medical training. See section entitled "The Training of Medical Scientists: M.D.- Ph.D. Programs."

Advanced Standing

Due to space limitations, the School of Medicine is unable to admit transfer students.

Doctors of Medicine

Persons who have already received the degree of Doctor of Medicine elsewhere will not be admitted as candidates for that degree from the Johns Hopkins University.

Course Requirements for Regular M.D. and M.D.-Ph.D. Applicants

1. **Biology**
   College Biology with laboratory, one year (8 semester hours)
   The student should have an appreciation for the diversity of life such as viruses, prokaryotes, plants and animals, and a familiarity with the life cycles and metabolic activities of these organisms. The student should attain a basic understanding of the structure and function of the mammalian cell. Included should be a basic understanding of mammalian genetics. Applicants with Advanced Placement (AP) or International Baccalaureate (IB) credits in biology, acceptable to the student's undergraduate college, may be used in fulfillment of the requirement, but they must take one additional semester of an advanced biology with lab. Individuals who have completed their studies in biology more than 4 years prior to their application are strongly advised to take a one semester advanced mammalian biology course. We will accept online prerequisite courses completed at an accredited college or university.
2. **Chemistry**
   General college chemistry with laboratory, one year (8 semester hours)
   Organic Chemistry with laboratory, one semester, and one semester of biochemistry without a laboratory. The student should have knowledge of chemical equilibrium and thermodynamics, acid/base chemistry, the nature of ions in solution and redox reactions, the structure of molecules with special emphasis on bioorganic compounds, reaction rates, binding coefficients, and reaction mechanisms involved in enzyme kinetics. Also important is a basic understanding of the structure of nucleic acids including how they store and transfer information. Applicants with Advanced Placement (AP) or International Baccalaureate (IB) credits in general chemistry acceptable to the student's undergraduate college, may be used in fulfillment of the requirement, but they must take one additional semester of an advanced chemistry with lab. We will accept online prerequisite courses completed at an accredited college or university.
3. **Humanities, Social, & Behavioral Sciences**
4. The study of the humanities, social, and behavioral sciences is an essential foundation for the study of medicine. (24 semester hours) An applicant's educational experience must include at least 24 semester hours in these disciplines. Effective communication skills are essential and candidates must be proficient in spoken and written English and be able to communicate well. Successful passage of the TOEFL examination is required for all students whose undergraduate instruction was conducted primarily in a language other than English. We will accept online prerequisite courses completed at an accredited college or university.
5. **Mathematics**
   Calculus or statistics, one year (minimum of 6 semester hours)
   Mathematics courses should enable the student to develop equations, to interpret graphical representations of function, and to evaluate probability involved in testing hypotheses. Advanced Placement (AP) or International Baccalaureate (IB) credit for calculus, acceptable to the student's undergraduate college, may be used in fulfillment of the math requirement. Regardless of such credit, it is strongly recommended that applicants take at least one semester of statistics or epidemiology. We will accept online prerequisite courses completed at an accredited college or university.
6. **Physics**
   General College Physics with laboratory, one year (8 semester hours)
   The student should have an understanding of the constants and units of physical measurement; Newtonian mechanics; the physical properties of various states of matter such as liquids, solids, and gases; and the basic aspects of electricity, magnetism, and optics. Advanced Placement (AP) or International Baccalaureate (IB) credit for physics, acceptable to the student's undergraduate college, may be used in fulfillment of the physics requirement. We will accept online prerequisite courses completed at an accredited college or university.

Program Requirements

Code	Title	Credits
FIRST YEAR		
ME.800.640	Topics in Interdisciplinary Medicine - Disparities and Inequities in Health and Health Care	0
ME.130.600	Human Anatomy	7
ME.800.638	Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism, Genetics, Pharmacology, Foundations in Histology & Pathobiology, and Neoplasia)	0
ME.800.641	Topics in Interdisciplinary Medicine - Obesity, Nutrition, & Behavior Change	0
ME.800.642	Topics in Interdisciplinary Medicine – Global Health	0
ME.800.639	Genes to Society I (inc. Immunology, Microbiology/Infectious Disease, Hematology, and Dermatology)	0
ME.800.653	Integrative Medicine	0

ME.800.610	Genes to Society II (inc. Brain, Mind, & Behavior, Nervous System and Special Senses)	0
ME.800.621	Clinical Foundations of Medicine	0
ME.800.637	Foundations of Public Health: Epidemiology, Ethics & the Health Care System	0
ME.800.616	Longitudinal Ambulatory Clerkship - 1st year	0
ME.800.623	Scholarly Concentrations	0
ME.800.655	Topics in Interdisciplinary Medicine - High Value Healthcare (Translational Science Courses)	0
ME.800.644	Topics in Interdisciplinary Medicine – Disaster Medicine	0
ME.600.601	Topics in Interdisciplinary Medicine - Clinical Informatics	0
ME.800.643	Topics in Interdisciplinary Medicine – Pain	0
SECOND YEAR		
ME.800.630	Genes to Society III (inc. Cardiovascular, Pulmonary, and Renal)	0
ME.800.633	Scholarly Concentrations - 2nd year	0
ME.800.645	Topics in Interdisciplinary Medicine - Substance Use Disorders	0
ME.800.631	Genes to Society IV (inc. GI, Reproductive, Endocrine, and Musculoskeletal)	0
ME.800.646	Topics in Interdisciplinary Medicine – Patient Safety	0
ME.800.617	Longitudinal Ambulatory Clerkship - 2nd year	0
ME.800.634	Transition to the Wards	0
SECOND, THIRD, OR FOURTH YEAR		
ME.250.606	Medicine Core Clerkship	0
ME.380.600	Surgery Core Clerkship	0
ME.320.600	Pediatrics Core Clerkship	0
ME.200.600	Neurology Core Clerkship	0
ME.370.601	Psychiatry Core Clerkship	0
ME.140.600	Women's Health Core Clerkship (GYN/OB)	0
ME.520.601	Emergency Medicine Core Clerkship	0
ME.800.647	Topics in Interdisciplinary Medicine – End of Life/ Palliative Care	0
Translational Science Courses		
ME.800.648	Topics in Interdisciplinary Medicine – Metabolism	0
ME.800.649	Topics in Interdisciplinary Medicine – Immunology	0
ME.800.650	Topics in Interdisciplinary Medicine – Infectious Disease (Translational Science Courses)	0
ME.800.651	Topics in Interdisciplinary Medicine – Cancer	0
ME.800.652	Topics in Interdisciplinary Medicine - Introduction to Regenerative Medicine	0
ME.800.661	Topics in Interdisciplinary Medicine - Genomic Medicine	0
Required Advanced Clerkship		
ME.250.621	Advanced Ambulatory Clerkship	0
Advanced Clerkship in Critical Care		
Elective Courses totaling 955 hours (24.5 weeks)		
FOURTH YEAR		
ME.800.618	Transition to Residency and Internship and Preparation for Life	0

In addition to the above coursework, students are required to pass the Comprehensive Clinical Skills Exam (CCSE), pass USMLE Step 1, and take USMLE Step2CK.

MD-PhD, Combined Degree

From its inception, the physician-scientist has been a hallmark of Johns Hopkins medicine and the Johns Hopkins School of Medicine. Indeed, the Hopkins tri-emblem represents the three core values of the institution: teaching, patient care, and research.

The Johns Hopkins School of Medicine offers a variety of opportunities for the training of medical scientists. A combined curriculum leading to both MD and PhD degrees enables students who aspire to careers in academic medicine to obtain intensive training in specialized areas of the biomedical sciences in addition to top-flight medical training. The traditional diversity and flexibility of the educational opportunities at Johns Hopkins permit the design of individualized programs to meet the needs of students with a variety of interests, educational backgrounds, and career goals.

To accomplish our training goals, we expect students to fully commit to medical training while in medical school and research training while in graduate school. However, we also take important steps to ensure that students are exposed to the intersection of both worlds early in their training, as well as given the professional and career development advice they need to succeed.

In a word, the MD-PhD curriculum at Johns Hopkins is flexible. Most students decide to complete the first two years of medical school before they begin graduate school and finish the last two years of their medical training after completing their thesis work (see the Timeline below). However, students who want more first-hand experience in clinical medicine before beginning graduate work can elect to complete three years of medical school, followed by their graduate training, and then the last year of medical school. This can give them a better appreciation of the potential clinical relevance of their research. In making a choice, trainees consult extensively with the Program Director, the Dean of Students, members of the MD-PhD Committee, prospective research mentors, and their faculty advisors. Students in the MD-PhD Program are automatically accepted to all graduate programs, so decisions regarding graduate training programs can be made with a strong understanding of each program. The MD-PhD Committee is responsible for program oversight, admissions, and student mentorship (http://mdphd.johnshopkins.edu/mentoring/). On average, students complete MD-PhD training within seven-to-eight years.

Hopkins interdisciplinary organizational structure means each faculty member may be affiliated with several clinical departments, research sections, and graduate programs.

Formal graduate programs in the School of Medicine encompass the following areas: Biochemistry; Cellular, and Molecular Biology; Biological Chemistry; Biomedical Engineering; Molecular Biophysics; Functional Anatomy and Human Evolutionary Studies; Cell Biology; Cellular and Molecular Medicine; History of Medicine; Human Genetics; Immunology; Neuroscience; Pathobiology; Pharmacology and Molecular Sciences, and Cellular and Molecular Physiology. Students are also eligible to obtain their PhD in one of the 11 graduate programs at the Bloomberg School of Public Health or the School of Arts and Sciences on the Homewood Campus. Students may select a thesis mentor from faculty in the Schools of Medicine and Public Health.

The MD-PhD Program also sponsors special seminars and lectures, It also maintains a dedicated library, the Paul Talalay MD-PhD Library, to enrich the educational opportunities of all MD-PhD students. Efforts are made to acquaint MD-PhD candidates with the major advances, concepts, and cutting-edge techniques in contemporary medicine and biomedical sciences. We also create an environment that promotes a more intimate personal contact with successful medical scientists in this institution.

Admission Procedures. Individuals who wish to apply for admission to the combined MD-PhD Program of the School of Medicine must submit an application through AMCAS on which they will indicate the MD-PhD Program. Once the AMCAS application has been verified and submitted to Hopkins, the applicant will receive an invitation to complete the Hopkins Secondary Application. Here the applicant will submit the additional materials required for the combined degree. Hopkins does not allow applicants to apply to both the traditional MD program and the combined program during the same cycle.

All combined-degree applications are reviewed by a separate MD-PhD Review Committee (http://mdphd.johnshopkins.edu/md-phd-committee/) which is comprised of faculty from the basic sciences, clinical arena as well as faculty from the Bloomberg School of Public Health. A separate Graduate School application is **not necessary**. The MD-PhD Committee determines whether or not an interview is indicated. In general, the committee is looking for students with a passion for research and a commitment to medicine. This assessment is based on the applicant's research experience, letters of recommendation, academic performance and extracurricular activities. The Committee considers standardized test scores only in the context of the applicant's other credentials. If an interview is granted, the applicant is notified by the MD-PhD Office and after the applicant accepts, the process for scheduling an interview begins. Interview visits generally occur over two days. Applicants are interviewed by members of the MD-PhD Committee and other faculty members who share their research interests. Applicants have many opportunities to meet with current students and tour the campus during their visit.

All eligible applicants who are admitted to the MD-PhD Program are funded under the NIH Medical Scientist Training Program (MSTP) Award. This program, supported by the National Institutes of Health, provides full tuition, stipend, and medical and dental insurance for students. Due to federal restrictions, only U.S. citizens and permanent residents are eligible for MSTP funding. Approximately 10-12 MD-PhD students matriculate each year.

Students who matriculate to the traditional MD Program but have a clearly demonstrated interest and experience in scientific research, are eligible to apply to the combined MD-PhD Program. These students may apply for admission during the fall of their first or second year of medical school. These qualified applicants are evaluated and placed in the pool for the current application cycle and will be considered for MSTP funding.

Financial Support. The Johns Hopkins School of Medicine Medical Scientist Training Program (MSTP) is supported by a training grant from the National Institutes of Health. A number of exceptional students with unusual accomplishments and commitment to a career in the medical sciences will be selected for traineeships under this program. Such fellowships provide stipend and tuition support for combined medical and graduate study. All students who are admitted to the MD-PhD Program will be considered for these awards.

Graduates of The Johns Hopkins University School of Medicine MD-PhD Program have gone on to become leaders in many areas of academic medicine.

Advice on the scope and opportunities offered by these programs may be obtained from the Director or Administrative Director of the MD-PhD Program.

Subject Areas

Anesthesiology and Critical Care Medicine

At the Johns Hopkins Department of Anesthesiology and Critical Care Medicine, we improve the health of the community and the world by setting the standard of excellence in Patient and Family-Centered Care, Education and Research.

Our Mission is to be the world leader in discovery and innovation; high-value patient and family centered care; and education and professional development. Building on our rich traditions, we will utilize collaborative and inclusive approaches to transform our discipline.

Our commitment to Patient and Family-Centered Care is at the heart of all we do. We count among our ranks many of the world's most respected patient safety leaders.

Faculty members are deeply committed to achieving excellence in Education. Our programs in clinical training, and basic and clinical research are world renowned. Graduates fill the leadership ranks in academic and clinical anesthesiology programs and clinical practices around the globe. The department plays a key role in the training of nurse anesthetists.

Our distinguished Research faculty engage in cutting-edge research in the fields of Cardiovascular Biology, Cerebrovascular Biology, Neuroscience, Pulmonary Medicine, Acute & Chronic Pain, and Perioperative Medicine. In addition, we have innovative programs in Simulation Technology and Health Safety and Outcomes that are models for institutions throughout the world. Our faculty and trainees engage in multidisciplinary projects and collaborations, while taking full advantage of the rich resources of the entire Hopkins community. Learning and discovery are translated into innovation throughout the department.

Anesthesiology is the field of medicine dedicated to managing and treating patients in a dynamic setting while ensuring patient safety and comfort before, during, and after surgery. Anesthesiologists have the ability to work in operating rooms, intensive care units, inpatient floors, outpatient clinics, and as consultants. Unlike most fields of medicine, anesthesiology trains its physicians to be fluent in perioperative medicine, technical skills, critical care, and emergency situations. Anesthesiologists can also be thought of as "the internists of the OR" as the breadth and depth of knowledge crosses all fields of medicine including pathophysiology and pharmacology. They are the experts in airway management along with cardiac and pulmonary resuscitation, pain control and advanced life support. With more patients living longer and with a variety of chronic diseases needing complex surgery, anesthesiologists caring for such patients must be well versed in understanding that particular patient's physiology and be able to anticipate issues regarding their individualized perioperative care.

Because of the nature of the field, anesthesiologists must have a thorough understanding of pharmacology, pathophysiology, and anatomy, and how surgical interventions and medications can affect chronic and acute problems. Furthermore, they are one of the few physicians that are able to simultaneously assess, diagnose, and treat with various interventions on a minute-to-minute basis. You can truly see medicine in action. Not only does the intellectual stimulation and hands-on aspects of the field make it very attractive, the patient interaction can also be very fulfilling. The ability to allay patients' anxieties and fears prior to surgery is very rewarding as surgery can be one of the most frightening experiences many patients have encountered. It is satisfying to be able to assure the patient that you will do everything to ensure their safety and comfort, and that if a critical situation were to arise you are the physician on the team most adept at managing it. In addition to the ability to work in operating rooms, intensive care units, and both inpatient and outpatient settings, there are many options for further specialization within anesthesiology.

The ACGME accredited fellowships include: Cardiothoracic Anesthesia with TEE certification, Critical Care Medicine, Obstetric Anesthesia, Regional Anesthesia, Pain Medicine, and Pediatric Anesthesia. There are also many non-ACGME accredited fellowships that allow physicians to concentrate on particular aspects of the field such as Ambulatory Anesthesia, Trauma Anesthesia, Transplant Anesthesia, Vascular and Thoracic Anesthesia, and Neuroanesthesia. Whatever interests you within the field of medicine, there is a way to incorporate it within a career in anesthesiology.

Elective Opportunities

Curriculum Consultant: Dr. Tina Tran & Dr. Jed Wolpaw. Clinical electives must be approved by the course directors and/or clerkship coordinators.

ME.570.699 Anesthesiology Elective

BASIC CLERKSHIP IN ANESTHESIOLOGY

Students will join the anesthesiology team (anesthesiology residents and faculty) in the general operating rooms, applying physiological and pharmacological principles to peri-operative patient care. Cardiovascular and respiratory physiology will be central to this learning process. Students will learn fundamental airway management skills, including mask ventilation and intubation and will place intravenous and arterial access as well as additional advanced monitoring as dictated by the type of surgery and the patients' co-morbidities. Students will learn the principles of anesthetic management and the interactions between surgery, anesthesiology, and patients' medical co-morbidities including appropriate pre-operative evaluation, intra-op management and post-op transition. Hemodynamic management including intravenous fluid therapy, vasopressor use, and blood product transfusion practice will be emphasized. Students will learn how anesthetic management varies based on patient age, co-morbidities and specific surgical procedure such as abdominal surgery, cardiac surgery and intracranial surgery. Students will engage in didactics, simulation sessions, and group learning sessions with anesthesiology residents. This elective will be interactive and engaging. Students will have optimal hands on learning opportunities. Students will take overnight night call shifts with the anesthesiology team, caring for patients undergoing urgent or emergent surgery. Students will be able to request to work with specific residents or faculty as well as work with different subspecialty teams such as regional, OB, cardiac, pediatric, and pain management teams. More information and resources for the elective can be viewed at http://anesthesiology.hopkinsmedicine.org/anesthesia-clerkship-for-medical-students/. More information about the anesthesiology department can be viewed at http://anesthesiology.hopkinsmedicine.org/. Dr. Wolpaw has developed a podcast to discuss various topics in anesthesiology http://accrac.com/podcast/. Students are encouraged to join the anesthesiology interest group and become medical student members of the American Society of Anesthesiologists (ASA) https://www.asahq.org/member-center/medical-students (https://www.asahq.org/member-center/medical-students/) .

ADVANCED CLINICAL CLERKSHIP IN ANESTHESIOLOGY

This clerkship will allow students who have completed a Basic Anesthesiology Clerkship to expand their experiences in clinical anesthesiology practice. Students may create their own experience by either choosing to spend the clerkship doing general operating room cases or by seeking to gain experience in sub-specialty areas of anesthesiology including cardiac anesthesia, obstetrics anesthesia, neuroanesthesia, pediatric anesthesia, and pain management. The amount of time a student chooses to spend in any one or more of these sub-specialty areas is customizable to meet the student's interests. Student may request additional overnight call shifts and/or subspecialty call shifts such as liver transplant or cardiac surgery calls. This elective is recommended for students who are interested in applying to an Anesthesiology residency program. Students are encouraged to join the Anesthesiology Interest Group (AIG) and become members of the American Society of Anesthesiologists (ASA). Students will have opportunities to teach and mentor medical students currently on the basic anesthesiology clerkship.

ADVANCED CLINICAL CLERKSHIP IN PEDIATRIC ANESTHESIOLOGY

The clerkship in Pediatric Anesthesiology is designed for students interested in pediatrics, pediatric anesthesia, or pediatric surgery, and introduces them to the peri-operative anesthetic management of the pediatric patient. Under close supervision by faculty, fellows and residents, students will learn and apply the principles of preoperative evaluation of children, intra-operative monitoring techniques, pharmacology of anesthetic and related drugs, and immediate postoperative management. In addition, students will be exposed to and participate in anesthetic procedures such as airway management and establishment of vascular access. As the clerkship progresses, students will have the opportunity to participate in cases of increasing complexity. Students will participate in the full range of residency didactics including morning lectures, college days, simulation sessions. Students are assigned to the operating rooms at the Charlotte R. Bloomberg Children's Center and are notified by the OR schedulers of the actual daily assignment the night before. More information about the pediatric anesthesiology department can be viewed at http://anesthesiology.hopkinsmedicine.org/pediatric-anesthesia/. Students are encouraged to review resources on the Society for Pediatric Anesthesiology (SPA) website https://www.pedsanesthesia.org/ .

MANAGEMENT OF PAIN AND SUFFERING

This course is intended for students who have an interest in the assessment and treatment of pain and its attendant emotional manifestations. The focus will be on the use of analgesics, nerve blocks, and behavioral modification. The problems associated with cancer pain will also be part of this experience. It is hoped that this course will provide the student with some tools and insight into the management of pain and suffering in patients presenting either to routine medical practices or to specialty pain clinics. More information about the chronic pain management division can be viewed at http://anesthesiology.hopkinsmedicine.org/pain-medicine-and-pain-research/ and the regional & acute pain management division can be viewed at http://anesthesiology.hopkinsmedicine.org/regional-anesthesia-and-acute-pain-management/. Interested students are encouraged to join the American Society of Regional Anesthesia and Pain Management (ASRA) at https://www.asra.com/.

ANESTHESIOLOGY RESEARCH

Many opportunities exist within the department for research in areas of basic science (molecular, genetic, cell biology, basic pathophysiology, biochemistry), clinical trials, biomedical engineering, information management, outcomes research and data mining, and health policy & safety initiatives. Specific research opportunities should be reviewed on the departmental website. The interested student should contact the faculty member supervising the research prior to registering for the elective. More information about research faculty can be viewed at http://anesthesiology.hopkinsmedicine.org/research-home/ . Interested students are encouraged to join the International Anesthesia Research Society (IARS) at https://iars.org/.

Clinical Electives

Code	Title	Credits
Advanced Clinical Clerkship in Anesthesiology		
Pediatric Intensive Care Subinternship Care		
Basic Clerkship in Anesthesiology		
Advanced Clinical Clerkship in Pediatric Anesthesia		
Management of Pain and Suffering		
Anesthesiology Research		

Biological Chemistry

The Department of Biological Chemistry has two major instructional functions. It provides required and elective instruction in biochemistry for medical students, and also offers organized programs of graduate study in biochemistry and cell biology toward the degree of Doctor of Philosophy. Two graduate programs are available: the departmental graduate program in Biological Chemistry and the joint graduate program in Biochemistry, Cellular and Molecular Biology (BCMB). The BCMB graduate program is a joint effort of the Departments of Biological Chemistry, Molecular Biology and Genetics, Biophysics and Biophysical Chemistry, Pharmacology and Molecular Sciences, Cell Biology, Neuroscience, and Physiology (see Graduate Program Section: Biochemistry, Cellular and Molecular Biology, and Biological Chemistry).

The staff and the facilities of all seven departments provide opportunities to medical students, graduate students, and postdoctoral fellows for carrying out research projects in many different areas of biochemistry and cell biology.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy (see Graduate Programs) (p. 949).

Code	Title	Credits
Biological Chemistry		
ME.800.708	BCMB Core Discussion	.5
ME.340.808	Research-BCMB	0
ME.340.805	Research in Biochemistry and Molecular Biology	0
ME.110.732	Developmental Biology	0
ME.340.702	Current Topics in Biological Chemistry	2
ME.340.709	Fundamentals of Glycobiology	2.5
ME.340.710	Techniques in Glycobiology	4

Other Courses and Elective Opportunities

The courses described below are required for Ph.D. candidates but are available to medical students as elective opportunities.

Curricular Consultants: Elective courses for medical students must be approved by the preceptor; any member of the department may act as preceptor.

Biomedical Engineering

Graduate programs and courses in Biomedical Engineering

The Department of Biomedical Engineering hosts two graduate programs; the School of Medicine Graduate Program leading to the Ph.D. degree is described here (p. 954), and the Whiting School of Engineering Graduate Program leading to the M.S.E. in Biomedical Engineering is described here (https://www.bme.jhu.edu/academics/graduate/masters-programs/masters-program/). Course work in the Graduate Programs is available to qualified medical students on an elective basis. All Biomedical Engineering courses are listed in the

University's SIS catalog (https://sis.jhu.edu/classes/)ue, and have course numbers beginning with EN.580.

Biophysics and Biophysical Chemistry

The department of biophysics and biophysical chemistry provides training for outstanding students with interests in such quantitative areas as crystallography, enzymology, kinetics, protein design, and mathematical computer modeling.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy (see Graduate Programs-Program in Molecular and Computational Biophysics Program).

Code	Title	Credits
Biophysics		
ME.100.801	Research	0
ME.100.807	Research	0
ME.100.804	Topics in Macromolecular Structure and Function I	0
ME.100.705	Computer Modeling Of Biological Macromolecules: Lecture	0
ME.100.712	Computer Modeling Of Biological Macromolecules: Lab	3
ME.100.706	Fundamentals Of Protein Crystallography	0
ME.100.707	Advanced Topics in Protein Crystallography	1
ME.100.709	Macromolecular Structure and Analysis	1.5
ME.100.710	Biochemical and Biophysical Principles	1.5
ME.100.713	Using Structure to Understand Biology	1
ME.100.716	Analysis of Macromolecules	2

Cell Biology

The Department of Cell Biology provides opportunities to medical students, graduate students, and postdoctoral fellows for carrying out research projects in many different areas of cell biology. The Department of Cell Biology has two major instructional functions: It provides required and elective instruction in cell biology and cell physiology for medical students, and offers organised programs of graduate study in cell biology toward the degree of Doctor of Philosophy. Two joint graduate programs are available: 1) Biochemistry, Cellular and Molecular Biology (BCMB) and 2) Cellular and Molecular Medicine (CMM).

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy (see BCMB and CMM Graduate Programs).

Code	Title	Credits
ME.110.728	Cell Structure and Dynamics	1.5
ME.110.733	Principles of Genetics	2
ME.110.726	Nuclear Structure and Human Disease	0
ME.110.732	Developmental Biology	0
ME.800.708	BCMB Core Discussion	.5
ME.800.638	Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism, Genetics, Pharmacology, Foundations in Histology & Pathobiology, and Neoplasia) (Cell Physiology)	0

Dermatology

The Department of Dermatology provides instruction directed at the basic science aspects of the skin and at clinical cutaneous disease during each of the medical school years. The emphasis of the department is upon the pathophysiology of cutaneous reaction patterns, a correlation of skin lesions (gross Pathology) with microscopic changes, the recognition and treatment of diseases that primarily affect the skin, and the identification of skin changes that reflect diseases in other organ systems.

We welcome students to take a dermatology clerkship regardless of the medical discipline they intend to pursue. This should take place after completing several core clerkships including Medicine, Surgery and Pediatrics. We believe students should receive as broad exposure to medicine as possible before taking our introductory clerkship (Clinical Clerkship in Dermatology) and making career decisions. If further experience/learning is desired, we also suggest taking our Advanced Clinical Clerkship in Dermatology. For those students with a career interest in Dermatology, taking electives in related sub-specialties such as Rheumatology, Immunology, and Plastic Surgery are encouraged.

For more information on student electives please click here (https://www.hopkinsmedicine.org/som/students/academics/electives.html).

Program Requirements

Code	Title	Credits
Dermatology-First and Second Years		
Preclinical (first/second) years of Genes to Society (GTS) curriculum		
Elective Opportunities		
Elective courses must be approved by the preceptor; any member of the department may act as preceptor.		
CLINICAL CLERKSHIP IN DERMATOLOGY		
Students may apply towards the end of their 3rd year or in their 4th year of medical school for a clinical elective in dermatology where the focus is placed on intensive exposure to a large number of patients in different clinical settings. Students will spend time exclusively at the Johns Hopkins facilities (Outpatient Center, Greenspring Station, Harriet Lane Pediatrics Center and Johns Hopkins Hospital Dermatology consult service). Our clinical services at these locations provide an excellent opportunity for students to interact with different types of patients and to be exposed to a wide range of skin problems. Parallel to the clinical activities, there are didactic sessions held either in the mornings or on Wednesday. Formal lectures on basic dermatology topics are given by dermatology residents and faculty members. No formal exam is given and grading is based on the evaluations submitted by residents and faculty members and a short oral presentation.		
ME.220.699	Dermatology Elective	0
ADVANCED CLINICAL CLERKSHIP IN DERMATOLOGY		

Students who have already taken the Clinical Clerkship in Dermatology at Johns Hopkins and who are interested in a specific area of dermatology or in dermatology research may benefit from this elective. This elective gives the student the opportunity for more “in depth” participation in specific areas of interest within the department of dermatology under guidance of a faculty mentor. Arrangements have to be made between the interested student and the faculty member who will be mentoring them PRIOR TO BEGINNING THE ELECTIVE. The main objective is active participation in a small clinical research project, or clinical and scholarly work with a faculty member with a certain specialty focus. The faculty mentor will provide the specific schedule. Students are encouraged to participate in all didactic activities including Grand Rounds and faculty lectures during the time spent in the department.

Research Opportunities in the Department of Dermatology

Dr. Crystal Aguh

Ethnic Skin Program and Fellowship

Dr. Nathan Archer

Our research focus is to understand mechanisms of protective innate and adaptive immune responses to skin pathogens, in particular *S. aureus*, and the role of aberrant immune responses and the skin microbiome in the pathogenesis of inflammatory skin diseases, including atopic dermatitis and psoriasis. Our long-term goal is to discover mechanisms that can serve as targets for future immune-based therapies and vaccination strategies.

Dr. Kristin Bibee

Translational research in cancer biology, clinical research on social determinants of health and patient reported outcomes as it relates to dermatologic care, technologic innovations in Dermatology Surgery

Dr. Anna Chien

Translational research in general dermatology; mechanism of skin aging; photobiology

Dr. Luis Garza

Stem cells, Regeneration, Wound healing

Dr. Jun Kang

Clinical and translational research in rheumatologic dermatology and in-patient consultative dermatology. AI and full body photography in dermatology.

Dr. Sewon Kang

Translational research in dermatology

Dr. Shawn Kwatra

During this rotation, students can participate in epidemiologic and translational itch research using a variety of resources. Preference for students with previous experience with R or other coding software.

Dr. Elise Ng

Research areas: AI in dermatologic surgery, scar outcomes, melanoma, investigate factors that impact clinical surgical practice

Dr. Sima Rozati

Translational research in cutaneous lymphoma, oncodermatology

Dr. Inbal Sander

Rheumatologic dermatology diseases, dermatopathology

Dr. Jeffrey Scott

Clinical research in dermatologic surgery and cutaneous oncology, including defining quality and value in Mohs micrographic surgery, patient-reported outcomes and social determinants of skin cancer treatment, and evidence-based management of high-risk and rare skin cancers.

Dr. Daren Simkin

History Of dermatology

Dr. Joel Sunshine

Dr. Sunshine's research focus is in two main areas: (1) developing novel genetic nanomedicines for activation of antitumor responses in melanoma and Merkel cell carcinoma and (2) improving our understanding of the critical mechanisms in the tumor microenvironment (TME) through multiplex immunohistochemistry, with a focus on evaluating the role of antigen presentation in the TME. Potential projects are available in both areas of active investigation.”

Dr. Janis Taube

Current research emphasis involves development of the AstroPath platform for immunotherapy biomarker discovery. Image analysis algorithms from astronomy are applied to pathology specimens from patients with melanoma and other tumor types to help identify spatial, multispectral signatures to help predict which patients are most likely to respond to a given therapeutic regimen. Tumor-immune atlases are generated and links to machine learning/AI algorithms are under development.

Dr. Joy Wan

Epidemiologic and clinical research investigations focused on pediatric dermatology; atopic dermatitis; psychosocial and life impact of chronic skin disease.

Emergency Medicine

Emergency Medicine—Second, Third and Fourth Years

Core Clerkship in Emergency Medicine:

During the Core Clerkship in Emergency Medicine, students will hone your skills in the rapid assessment of undifferentiated patients, become comfortable with stabilizing severely ill and injured patients, and develop their procedural abilities. In the clinical area, students will care for patients with a wide variety of diagnoses, working closely with faculty and residents. Student's educational experience will be enhanced through participation in weekly simulation exercises, resident teaching conferences, and departmental Grand Rounds. Students will learn to make crucial real-time medical decisions, and will leave the clerkship with a skill set that will serve them well in managing common emergencies, regardless of what field of medicine they ultimately pursue.

Emergency Medicine—Third and Fourth Years

Subinternship in Emergency Medicine

APPROVED SUB-I EXPERIENCE

Students in the third and fourth years who wish an in-depth experience in emergency medicine may serve as subinterns in the Adult Emergency Department. This course is about key concepts in the assessment, management, and disposition of patients in the Emergency Department. It builds on what they have learned in their Core Clerkship in Emergency Medicine, allowing them to apply those concepts by serving as the primary provider for acutely ill and injured patients in the ED. What students learn in this clerkship will prepare them not only to evaluate and manage patients in the ED setting, but also to address acute concerns that arise in the care of hospitalized and ambulatory patients. Upon completion of this elective, students will demonstrate competency in the recognition and initial stabilization of life threats in trauma and non-trauma patients. Sub-interns are required to attend departmental conferences. A formal case write-up, in the form of a Blog is required. Visiting applicants limited to LCME-accredited schools only. Due to high demand we are not accepting international medical students for the Advanced Clerkship.

RESEARCH TOPICS IN EMERGENCY MEDICINE

This elective course is offered to any medical student with specific research interests in emergency medicine. Students are given the opportunity to participate in original or on-going research projects with a faculty member in the Department of Emergency Medicine. During the summer a specific course teaches the fundamentals of clinical research while engaging in a research project designed as part of the curriculum.

Research Elective courses must be approved by the course director. Course descriptions and additional details can be found at Electives Book: Johns Hopkins School of Medicine (https://www.hopkinsmedicine.org/som/offices/registrars/med-students/electives.html).

Epidemiology

The Department of Epidemiology is an academic department in the Johns Hopkins University Bloomberg School of Public Health. The Department is loosely divided into eight track or research areas including Cardiovascular and Clinical Epidemiology Program. The department participates in required Epidemiology instruction for first-year students in the School of Medicine. In addition, elective opportunities, both formal courses and tutorials, are available. Interested students should consult the School of Public Health section of the catalogue for information on course offerings and areas of research represented in the department.

A combined M.D.-Ph.D. Program in Epidemiology is available. Interested students should consult the adminsitrator in each school for details. Currently these are Ms. Sharon Welling in SOM and Ms. Fran Burman in JHSPH.

Program Requirements

Other Courses and Elective Opportunites

Research and Tutorials. (same as Epidemiology PH.340.840 Special Studies and Research Epidemiology, School of Public Health). Students may undertake tutorials under the supervision of a member of the Department of Epidemiology faculty. These programs are individually planned and consist of reading in specific areas of epidemiologic and clinical interest or may comprise participation in research activities underway in the department. The School of Public Health follows a term schedule that rarely matches the School of Medicine calendar. Please be cognizant of academic calendars when selecting didactic courses. Degree candidates in the SOM may take course electives in the School of Public Health upon approval by the program directors.

Functional Anatomy and Evolution

Overview

The FAE graduate program offers a Ph.D. in Functional Anatomy and Evolution and provides individualized support by world-leading professors for each student in a close-knit department with an excellent faculty to student ratio. Our primary focuses are independent research and teaching human gross anatomy, with research areas that range from vertebrate fossils, to primates to recent human remains.

The Center for Functional Anatomy and Evolution has traditionally not trained MD-PhD students.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy.

Program Requirements

Code	Title	Credits
Required		
ME.130.600	Human Anatomy	7
ME.130.708	Biomechanics of the Skeleton	0
ME.130.716	Primate Evolution	0
ME.130.742	Geometric Morphometrics	0
ME.130.744	Mammalian Evolution	0
ME.130.746	Evolutionary Theory and Phylogenetic Comparative Methods	0
Other Courses and Elective Opportunities		
Elective courses must be approved by preceptor; any member of the center may be a preceptor.		

Gynecology and Obstetrics

The Core Clerkship in Women's Health (Gynecology & Obstetrics) provides a productive and exciting learning experience through patient care, interaction with women's health providers, simulation, and other formal learning activities. As every physician will encounter female patients in their career, the purpose of this core clerkship includes:

- To introduce students to the depth and breadth of women's health issues
- To experience how OB/GYN merges surgery, medicine, and primary preventive care into a single practice
- To learn how overall mental and physical health interacts with reproductive function

- To gain comfort in taking an appropriate OB/GYN history and performing the breast and pelvic exam
- To introduce the principles of surgery related to women's health

*See **Requirements** for descriptions of our Clinical Sub-internships, Clinical Electives and Research Elective opportunities.*

Clinical elective opportunities must be approved by the Sub-internship Director who will verify availability via the division specific leader.

If interested in other clinical elective opportunities please discuss these specifically with the Sub Internship Director.

Program Requirements

Code	Title	Credits
Second, Third or Fourth Year		
Clinical Clerkship in Women's Health		
Research Elective Opportunities		
Research elective opportunities must be approved by the research preceptor, any member of the department can act as a preceptor.		
Women's Health Electives and Sub Internships		
To participate in Electives and Sub Internships the candidate must have successfully completed the Core Clerkship in Women's Health (GYN/OB)		
Sub Internship in Gynecology		
This clinical experience consists of a sub internship in gynecology. The student will function as a house officer at the first year level. In this capacity, the student will be responsible for the provision of inpatient and outpatient care to the patients who present to the respective services for care.		
Sub Internship in Gynecologic Oncology		
In this clinical experience the student will function as a house officer at the first year level on the gynecologic oncology service. The student will be responsible for providing inpatient and outpatient care to the patients who present to the service for care.		
Sub Internship in Obstetric/Maternal Fetal Medicine		
This clinical experience consists of a sub internship in obstetrics. The student will function as a house officer at the first year level and will be responsible for the provision of both inpatient and outpatient care to the patients who present to the respective services for care. A portion of each week can be spent in prenatal genetics, obstetrical sonography and fetal assessment.		
Sub Internship in Obstetrics and Gynecology at Bayview Medical Center		
This clinical experience consists of a sub internship in General Obstetrics and Gynecology. The student will function as an intern with responsibility for both inpatient and outpatient care. The emphasis will be on management of common OB/GYN problems.		
Clinical Elective in Family Planning & Reproductive Choice		
In this clinical experience, the student will function as a house officer at the first level on the family planning service. Students will participate in contraceptive and pregnancy options counseling. Students will be exposed to a breadth of family planning procedures including IUD insertion, contraceptive implant placement/removal, sterilization, and both medical and surgical abortion. A research component is encouraged.		
Clinical Elective in HIV Infection in Women		
Students will participate in the obstetric and gynecological care of HIV-positive women. A research component is encouraged.		
Clinical Elective in Reproductive Endocrinology		
In this clinical experience the student will function as a house officer at the first year level on the reproductive endocrinology service. The student will be responsible for providing inpatient and outpatient care to the patients who present to the respective services for care. A research component is encouraged.		

Health Sciences Informatics

The Biomedical Informatics & Data Science Section (BIDS) brings together a wide range of resources and expertise in biomedical information management, data science, population health, and technology. Through the educational, research, and service activities of the section, BIDS seeks to advance the development and use of electronic health record systems and other information resources for decision-making, research, and health care delivery. BIDS also seeks to increase the awareness of these resources among the Johns Hopkins community.

Basic research and development involving the application of informatics to a variety of medical and basic science disciplines is also being carried out by individual faculty members of the section, and the results of these efforts are being applied to research and educational initiatives throughout the Johns Hopkins Medical Institutions.

Current research areas of primary and affiliated faculty include: clinical decision support; global health informatics; health information exchange (HIE); human computer interaction; multi-center real world data; patient quality & safety; population health analytics; precision medicine analytics; standard terminologies; telemedicine; and translational bioinformatics.

Programs in Informatics

- Applied Health Science Informatics-MS (p. 951)
- Clinical Informatics, Post Baccalaureate Certificate (p. 961)
- Health Sciences Informatics–Research, MS (p. 964)
- Health Sciences Informatics, PhD (p. 963)

Program Requirements

Please see requirements for the specific Health Sciences Informatics degree and certificate programs.

History of Medicine

The department is organized to give instruction and opportunities for research in the history of medicine and kindred sciences, including the history of public health.

Students enrolled in the MD program in the School of Medicine can take courses in History of Medicine, choose History of Medicine for their Scholarly Concentration, and take electives centering on medical humanities and social medicine.

Graduate Program

Students matriculated into the MD or graduate programs in the School of Medicine or graduate programs in the School of Public Health may apply to the 1-year MA in the History of Medicine.

Program Requirements

History of Medicine courses specifically geared toward MD students include the Scholarly Concentration in the History of Medicine (1st and 2nd year students), a 4-week elective in Medical Humanities and Social Medicine (3rd and 4th year students, every January), and more flexible independent studies on a topic to be agreed upon with appropriate faculty member, throughout the year.

Each year a number of additional electives on varying topics is offered. For more specific information on current course offerings, Scholarly Concentrations, and more, please contact us at myrobbins@jhmi.edu.

Code	Title	Credits
Elective Opportunities		
AS.140.601	Research Methods/Hist Sci	
ME.150.701	Outline of History of Medicine I: Antiquity to Scientific Revolution	4
ME.150.702	The History of Modern Medicine	4
ME.150.713	Oral History Theory and Method	0
ME.150.714	History of Twentieth Century Biomedicine	0
ME.150.801	Research in the History of Medicine: Dissertation	0
ME.150.699	History of Medicine Elective	0

Institute of Genetic Medicine

Constituted in 1999, the McKusick-Nathans Institute of Genetic Medicine became the Department of Genetic Medicine (DGM) in 2019 and is the focal point for patient care; basic, translational, and clinical research; and education in human genetics and genomics at Johns Hopkins. The DGM is a national and international leader in genetic medicine - the integration of our rapidly expanding knowledge of genetics and genomics into the practice of medicine. The goal of genetic medicine is to tailor prevention, diagnosis, and treatment in a manner appropriate for each individual patient. In pursuit of the goal of individualized medicine, the DGM catalyzes interactions between physicians and scientists with diverse and complementary expertise to promote the application of genetic discoveries to human disease and genetics education to the public. Many DGM faculty members have a co-primary appointment in another department in the School of Medicine and serves to introduce and integrate genetics throughout the School and the University. Moreover, our faculty members have considerable strengths and expertise in the areas of genomics, developmental genetics, biochemical genetics, population genetics, computational biology, and the genetics of complex disease. We aim to maintain Hopkins Medicine's leadership role in the medicine of the 21st century, a medicine that increasingly individualized and focused on prevention.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy (see Graduate Programs in Human Genetics)

Residency Program

The Johns Hopkins medical genetics residency programs provide ACGME-accredited clinical residency and comprehensive research training in medical genetics. We offer a categorical training track and four combined training tracks with pediatrics, internal medicine, maternal fetal medicine, and reproductive endocrinology. With successful program completion, trainees are qualified and eligible to sit for the exam leading to board certification by the American Board of Genetics and Genomics (ABMGG). Residents and fellows in combined programs are also eligible and qualify to sit for the exam leading to board certification offered by their prospective specialty (i.e., pediatrics, internal medicine, maternal fetal medicine, and reproductive endocrinology).

Medical Genetics Residency Program is a two-year program designed to train physicians to provide comprehensive diagnostic, management, and counseling services for inherited diseases and the genetic factors pertinent to all diseases. The training experience also emphasizes the role of research in Medical Genetics so that trainees can pursue investigator-initiated research upon completion of the program. A third year of individualized specialty research is recommended.

Combined Pediatrics & Medical Genetics Residency: This 4-year curriculum meets the requirements of the American Board of Pediatrics (ABP) & ABMGG. Trainees are highly encouraged to complete additional mentored research training in medical genetics.

Combined Internal Medicine & Medical Genetics Residency: This 4-year curriculum is structured according to the requirements of American Board of Internal Medicine (ABIM) & ABMGG. Trainees are highly encouraged to complete additional mentored research training in medical genetics.

Combined Maternal Fetal Medicine Fellowship & Medical Genetics Residency: This 4-year curriculum is unique for physicians who have completed an accredited residency in Obstetrics and Gynecology and wish to integrate their Maternal and Fetal Medicine (MFM) fellowship with Medical Genetics residency training.

Combined Reproductive Endocrinology and Infertility Fellowship & Medical Genetics Residency: This 4-year curriculum is unique for physicians who have completed an accredited residency in Obstetrics and Gynecology and wish to integrate their Reproductive Endocrinology and Infertility (REI) fellowship with Medical Genetics residency training.

Medicine

The courses in medicine have been arranged for the student with the goal of preparing them to care for the whole person. This is accomplished through training in several principal objectives. First, their attention is directed to the patient as a person, and they are required to study the special needs of particular human beings and their unique reactions to the disease from which they suffer. Students are trained in the principles of diagnosis and are given opportunities to study disease in the human being, including its treatment and prevention. They are given training in accepted technical methods so that they may employ these fundamental procedures for the intelligent examination of patients. Lastly, students learn the communication skills essential to the care of patients and collaboration with colleagues. The work is essentially practical and the objectives are pursued simultaneously, progressing in complexity and independence from the first through fourth years of medical school. While the students are following these courses, they have an opportunity to spend their time in the inpatient and outpatient units of the Osler Medical Service, Johns Hopkins Bayview, and Sinai Hospital of Baltimore, as well as many clinics in the Baltimore-area community. In addition to the practical instruction, students are expected to read textbooks and consult monographs and original articles for much of their information.

Those students who wish to seek their area of concentration within the Department of Medicine will be assigned to a preceptor who will guide their clinical work, research, reading, and study, on a tutorial basis. It is particularly in the use of “elective time” that the preceptor will advise the student. To fit the interests and ability of the student, considerable flexibility in the choice of elective program will be possible.

Medicine Program

Second, Third or Fourth Year

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Medicine Core Clerkship
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Subinternships

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Subinternship in Internal Medicine - Johns Hopkins Hospital
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Fufills graduation requirements

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Subinternship in Medicine - Johns Hopkins Bayview Medical Center
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Fufills graduation requirements

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Subinternship in Medicine - Johns Hopkins Howard County General
Hospital
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Fufills graduation requirements

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Subinternship in Medicine - Johns Hopkins Hospital Service
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Fufills graduation requirements

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Subinternship in Hospital Medicine - Johns Hopkins Bayview
Medical Center
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Fufills graduation requirements

Electives

Elective in Allergy and Clinical Immunology - Bayview

Elective in Cardiology - JHH or Bayview

Elective in Consultative Endocrinology

Elective in Gastroenterology

Elective in Geriatric Medicine - Bayview

Elective in Infectious Diseases - JHH or Bayview

Elective in Nephrology

Elective in Pharmacology

Elective in Pulmonary Diseases

Elective in Rheumatology

Various other electives and research opportunities

Molecular and Comparative Pathobiology

The Department of Molecular and Comparative Pathobiology provides instruction and consultation in veterinary medicine, experimental techniques, and comparative pathology, with emphasis on the study of disease processes in animals which relate to human health. Postdoctoral training is offered in laboratory animal medicine, comparative pathology, and in retrovirus biology. The department is equipped with medical, surgical, pathology, diagnostic, and research laboratories.

Program Requirements

Code	Title	Credits
Elective Opportunities		
Elective courses must be approved by the preceptor; any member of the department may act as preceptor.		
ME.680.700	One Medicine	0
ME.680.703	Animal Pathology Laboratory	0
ME.680.710	Clinical Conference in Laboratory Animal Medicine	0
ME.680.711	Comparative Pathology Conference	0
ME.680.802	Journal Club for Laboratory Animal Medicine Board Review	0
ME.680.715	Conversations on Research Animal Medicine and Management (CRAMM)	0
ME.680.714	Systems Pathology of Animals	0
ME.680.713	Regulations that Govern Animal Research	0

Molecular Biology and Genetics

Courses taught by the Department of Molecular Biology and Genetics faculty are offered through School of Medicine Core Courses and through the Biochemistry, Molecular, and Cellular Biology (BCMB) graduate program (p. 952).

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy (see Graduate Programs (p. 949)).

ME.260.709 Molecular Biology and Genomics

This course covers the Molecular Biology and Genomics of both prokaryotes (using E. coli as the model organism) and eukaryotes, with a focus on "model organisms" including yeast, flies, worms, mice as well as humans. Both the Molecular Biology (reductionist) perspective and the Genomics (systems biology) perspective will be provided on each topic, and there will be heavy emphasis on mechanism and regulation of fundamental processes in biological information transfer DNA->RNA->protein. This lecture model will cover genes and genomes, transcription and the RNA world, replication, chromosome structure and function and genome instability.

Target Audience: First year graduate students. Post graduates with approval of course director.
Prerequisites: None

Multi-Department Courses

Program Requirements

First and Second Years

Scholarly Concentrations

Scholarly concentrations were designed to provide students an opportunity as early as possible in the curriculum to develop additional expertise in a particular area of interest, and guide students in applying a scholarly approach to an independent mentored project. Students begin by meeting in seminars in their particular area of interest during the intersessions, and subsequently identify a mentor and project timeline. The goal is completion of the project by the end of Year 2. The five areas of concentration from which students may choose are Basic Science, Clinical Research, History of Medicine, Medical Humanities, Bioethics and the Healing Arts, or Public Health and Community Service.

Topics in Interdisciplinary Medicine

Topics in Interdisciplinary Medicine (TIME) courses are designed to present the behavioral and social science content pertinent to the practice of medicine in the 21st century and provide additional clinical skill development in the preclinical years. They are taught by interdisciplinary faculty and placed at times in the calendar when students have no other competing coursework.

Code	Title	Credits
First Year		
ME.800.640	Topics in Interdisciplinary Medicine - Disparities and Inequities in Health and Health Care	0
ME.800.644	Topics in Interdisciplinary Medicine – Disaster Medicine	0
ME.600.601	Topics in Interdisciplinary Medicine - Clinical Informatics	0
ME.800.641	Topics in Interdisciplinary Medicine - Obesity, Nutrition, & Behavior Change	0
ME.800.642	Topics in Interdisciplinary Medicine – Global Health	0
ME.800.643	Topics in Interdisciplinary Medicine – Pain	0
ME.800.655	Topics in Interdisciplinary Medicine - High Value Healthcare	0
Second Year		
ME.800.645	Topics in Interdisciplinary Medicine - Substance Use Disorders	0
ME.800.647	Topics in Interdisciplinary Medicine – End of Life/ Palliative Care	0
ME.800.646	Topics in Interdisciplinary Medicine – Patient Safety	0
ME.800.634	Transition to the Wards	0
Third Year		
Translational Science Intersessions [2]		

[1] In the third quarter, Year 2 students spend two afternoons per week in Transitions to the Wards, a course designed to prepare students for learning in the clinical clerkships that follow. The course uses a combination of small group discussion and team-based learning to explore clinical problem solving, direct observation of advanced physical diagnosis and presentation skills with college faculty, and procedural and simulation exercise. Every student recertifies in Basic Life Support.

[2] The Translational Science Intersessions occur in the last week of each quarter, and are taken by students who have completed one of the eight-week core clerkship rotations in that quarter. Students will generally complete four Translational Science Intersessions during their clinical curriculum. These intersessions are meant to present more advanced understanding of state-of-the-art translational science research with students who have some clinical training. In general the format includes lecture, seminar-type discussions, journal clubs and student presentations with both basic science and clinical faculty. Students choose one small group topic within the general topic to focus the week. One afternoon in each of these weeks is devoted to a discussion of ethics, using a lecture, case presentation and small group presentation led by faculty from the Berman Institute of Bioethics. In the second afternoon session, students participating in the intersessions meet in small groups with their College Advisory Program to discuss critical incidents from the core clerkships

Neurology

Program Requirements

Code	Title	Credits
First Year		
Nervous System and Special Senses		
Second, Third, or Fourth Year		
Neurology Clerkship		
Elective Opportunties		
Elective courses must be approved by the preceptor and the student’s faculty advisor; any member of the department may act as preceptor.		
Neurology Electives		
Neurology Sub I This Sub I is not a graduation requirement		
Pediatric Neurology Sub I This Sub I is not a graduation requirement		
Neuro Critical Care Elective		
Research Electives		

[1] The elective courses offered are given in part for the instruction of house officers and fellows in Neurology. All courses are also open to students of the third and fourth years who wish more experience in clinical and basic neurology, and for students who propose ultimately to become neurologists.

Neuroscience

Overview

The Department of Neuroscience investigates the nervous system using a variety of approaches, including molecular biologic, biophysical, biochemical, neurophysiological, and anatomical strategies.

Program Requirements

Code	Title	Credits
Neuroscience		
ME.440.800	Research in Neuroscience	0
ME.440.801	Readings in Neuroscience (Journal Club)	1
or ME.440.810	Readings In Systems Neuroscience	
ME.440.802	Current Topics in Neuroscience (Research Seminar)	1
or AS.080.630/(	Bodian Seminar Series	
ME.440.811	Neuroscience Cognition I	4.5
ME.440.812	Neuroscience Cognition II	4.5
ME.440.819	Rigor, Reproducibility, and Responsibility in Science	2
ME.440.820	Circuits and Brain Disorders	2
ME.440.724	Neuroscience Career Skills	1
ME.440.823	Grant Writing Skills	1
ME.440.730	Submitting Your First Paper	0.5
ME.440.803	Teaching in Neuroscience	0
Other Courses and Elective Opportunities [1]		
ME.440.705	Cellular and Molecular Basis of Neural Development II	1.5
ME.440.707	Molecular Mechanisms in Synaptic Transmission	2
ME.440.709	Neuropharmacology	1.5
ME.440.711	Cellular and Molecular Basis of Neural Development I: Neuronal Differentiation	1.5
ME.440.715	Trends in the Neurobiology of Aging	.5
ME.440.808	Physiology of Sensory Transduction	1.5
ME.440.814	Research in Neuroscience (BCMB)	0
ME.440.824	Cell Physiology of Visual and Olfactory Transductions	1
ME.440.818	Bioenergetics, Neuroplasticity and Brain Health	1
ME.440.817	Psychedelics	0
ME.440.818	Bioenergetics, Neuroplasticity and Brain Health	1
ME.440.822	Computational Principles of Biological Vision	3
ME.440.804	Directed Readings in Neuroscience	0

[1] In addition to the listed core courses, each student will complete statistics and quantitative methods courses. Each student also selects advanced electives offered by members of the Neuroscience Training Program or other departments at the Medical School. Students in the Neuroscience Training Program are required to complete six elective courses by the end of their second year. These may be a combination of small seminar-style elective courses in neuroscience, listed below, and advanced courses in other fields relevant to their research interests, such as molecular biology, genetics, immunology, biochemistry, biomedical engineering, biostatistics, pharmacology, physiology, anatomy and computer science.

Oncology

Elective Opportunities

Seminar Course: Biology of Cancer

This is an advanced graduate seminar course that is held biannually (rotates with New Approaches to Cancer Prevention and Therapy) in the Spring Semester. Selected timely topics are considered in some detail by world-famous experts, both local and international, using a combination of in-person and zoom-based seminars. Emphasis is placed on the fundamental processes underlying oncogenesis, and factors affecting the progression of various neoplastic diseases. A basic foundation will be developed that will permit the student to approach various aspects of oncology including epidemiology, carcinogenesis, environmental issues, biologic behavior of the neoplastic cell, and the rationale for the use of various treatment modalities with understanding.

Seminar Course: New Approaches to Cancer Prevention and Therapy

This is an advanced graduate seminar course that is held biannually (rotates with Biology of Cancer) in the Spring Semester. Selective timely topics being developed for the management of neoplastic diseases. Emphasis placed on illuminating the chemical and biological basis of therapeutic and translational impact on clinical practice.

Translational Research Conference

This one-hour weekly conference series highlights the most current and promising advances in translational research and provides an opportunity for participants to understand and appreciate how basic science and clinical research can be successfully integrated for translation into clinical treatments.

Fundamentals of Cancer: Cause to Cure

This is a basic graduate-level lecture course that is held in the late summer/fall every other year. The overall goal of this course is to provide clinically-oriented students (primarily residents and fellows) and laboratory-oriented students (primarily graduate students and postdoctoral fellows) with a broad perspective on basic science as they impact important clinical issues, bridging the gap between the laboratory and the clinic. The course is designed to be highly translational, covering fundamental molecular biology of cancer, the processes and pathophysiology of transformation and metastasis, and how targeted screening strategies and therapies for treatment and prevention emerge from new scientific knowledge.

Introduction to Cancer Research

Research experiences are offered on a space-available basis to U.S. and international trained medical students who submit appropriate application materials to the Registrar's Office. Positions are based on limited availability and not guaranteed. Interested and properly qualified students are encouraged to collaborate in clinical and laboratory research projects with members of the staff. Students will participate in research seminars and related teaching sessions. Interviews will be arranged with staff members to develop a mutually agreed-upon plan of study and research. Visiting students should not contact the department directly as the application process must be coordinated through the Registrar's Office. Offered all year; minimum of four weeks (for Johns Hopkins students; nine weeks for visiting students.)

Clinical Clerkship in Bone Marrow Transplantation

The principles and practice of bone marrow transplantation (BMT) will be stressed. Students will work on the inpatient BMT Unit of the Oncology Center and participate in the daily activities of the service including rounds, lectures, seminars, and informal discussions. Under supervision, the student will follow the clinical course of selected inpatients including follow-up marrow graft recipients in the BMT Outpatient Clinic. The student will have the opportunity to become acquainted with the allied disciplines and procedures that relate to clinical BMT, including histocompatibility testing, marrow collection ("harvesting"), and ex vivo marrow processing. A syllabus of pertinent literature will be provided. The student will also be encouraged to conduct and present a BMT-related research/literature review project. Availability/Duration: All year; ½ quarter; visiting medical students must follow JHUSOM quarter dates Prerequisite(s): Core Clerkship in Medicine or Pediatrics

Advanced Clinical Clerkship in Oncology

This elective will acquaint students with the principles and practice of oncology. Each student will serve as an advanced clinical clerk on one of three inpatient units. The student is expected to attend the weekly outpatient clinics, daily rounds with the attending physician as well as two weekly conferences: Oncology Grand Rounds and the Translational Research Conference. Other disease-oriented conferences should be attended as appropriate. Appropriate readings are recommended. Availability/Duration: All year; ½ quarter; visiting medical students must follow JHUSOM quarter dates Prerequisite(s): Core Clerkship in Medicine

Advanced Clerkship In Pediatric Oncology

Students will have the opportunity to help care for children with cancer on the inpatient Pediatric Oncology and Bone Marrow Transplant Services. Patient population includes children with newly diagnosed cancers, bone marrow transplant recipients, as well as those requiring admission related to complications of treatment. Students will be assigned patients to primarily follow along with resident supervision and will become integral members of the inpatient medical team. Additionally, each student will have an outpatient oncology clinic once per week. Core lectures occur at least twice a week. Students also attend weekly conferences including fellows' educational sessions and tumor boards. Availability/Duration: All year; 4 weeks; visiting medical students must follow JHUSOM quarter dates Prerequisite(s): Core Clerkship in Pediatrics and Internal Medicine.

Advanced Laboratory Research

Advanced research under the supervision of an Oncology faculty member. Research fellowships in basic and translational laboratory research on clinically relevant questions are available to students preparing themselves for careers in teaching and research. Availability/Duration: All four quarters; 1 year. Positions are based on limited availability and are not guaranteed. Prerequisite(s): Completion of years one and two

Clinical Clerkship in Medical Oncology at Johns Hopkins Bayview Medical Center

This clinical experience in medical oncology exposes trainees to the multi-disciplinary practice of medical oncology, including inpatient consults and outpatient clinics in solid tumor and malignant hematology. A special feature of the clerkship is the weekly Thoracic Multidisciplinary Clinic with medical, radiation, and surgical oncologists. Availability/Duration: All year; 2-4 weeks; visiting medical students must follow JHUSOM quarter dates Prerequisite(s): There are no absolute prerequisites but completion of a Core Clerkship in Medicine will help the student fully participate in the elective.

Subinternship in Clinical Bone Marrow Transplantation

This clinical elective will provide an in-depth experience in the management of patients undergoing allogeneic or autologous bone marrow transplantation (BMT) in the Johns Hopkins Oncology Center SKCCC. The student subintern will work with the BMT team, which consists of an attending physician, a clinical oncology fellow, a medical resident, and a physician assistant, plus staff members in nursing, nutrition, pharmacy, and social work. The subintern will assume responsibilities for the direct care of selected BMT inpatients, under the guidance of the attending physician and clinical fellow, and will assume night call every fourth night. The subintern is expected to participate in daily work rounds, didactic BMT lectures given by the inpatient attending physician, informal discussions about allied topics and current research activities, graft-versus-host disease walk rounds, and Oncology Center departmental seminars. The student will receive a syllabus of pertinent literature on both the clinical aspects and basic immunobiology of bone marrow transplantation. During this elective, the subintern will also have the opportunity to become acquainted with the allied disciplines and procedures that relate to clinical BMT, including histocompatibility testing, marrow collection ("harvesting"), and ex vivo marrow processing (e.g. lymphocyte depletion, chemotherapeutic treatment, cryopreservation). As part of this subinternship, the student will also be introduced to the basic and clinical research activities of the BMT program. Availability/Duration: Any ½ quarter, including summers; visiting medical students must follow JHUSOM quarter dates Prerequisite(s): Senior students only. Completion of Core Clerkship(s) in Medicine and/or Pediatrics is essential.

Ophthalmology

Program Requirements

Code	Title	Credits
Elective Opportunities		
Elective courses must be approved by the course director listed. Course descriptions and additional details can be found at: https://www.hopkinsmedicine.org/som/students/academics/electivebook.pdf		
Ophthalmology Clinical Electives		
Clinical Elective in Ophthalmology; Dr. Henry Jampel		
Advanced Work and Research in Ophthalmology and Neurosurgery; Dr. Henry Brem		
Clinical Neuro-Ophthalmology: Dr. Neil Miller		
Elective in Oculoplastic Surgery; Dr. Fatemah Rajaii		
Retina/Ophthalmology Clerkship (for Clinician Scientists); Dr. Peter Gehlbach		
Signal Acquisition and Processing in Ophthalmic Optics; Dr. Boris Gramatikov		
Clinical Elective in Ophthalmology at Green Spring Station; Dr. Kraig S. Bower		
Clinical elective in ophthalmology at Odenton and Columbia; Dr. Divya Srikumaran		
Investigating the basis of inherited ocular dystrophies; Dr. S Amer Riazuddin		
Argus II retinal implant, intracortical visual prosthesis and ultra low-vision assessment; Dr. Gislin Dagnelie		
Pediatric ophthalmology and strabismus; Dr. Courtney Kraus		
Clinical Elective In Ocular Immunology, Dr. Meghan Berkenstock		
Research opportunities (contact preceptor to arrange research)		
Medical retina; Dr. Morton Goldberg and Dr. Sharon Solomon		
Cornea and cataract; Drs. Esen Akpek, Allen Eghrari, Irene Kuo, Oliver Schein, Shameema Sikder, Uri Soiberman and Robert Weinberg		
Neuro-ophthalmology; Drs. Neil Miller, Amanda Henderson, and Andrew Carey		

Pathophysiology of Eye-Movement Disorders and Nystagmus; Dr. David Zee
Ocular Tumors; Methods of Diagnosis and Treatment; Dr. James Handa
Ocular Epidemiology: Drs. Harry Quigley, Pradeep Ramulu, Oliver Schein and Sheila West
Refractive eye surgery; Dr. Kraig S. Bower
Sickle-cell eye disease; Dr. Adrienne Scott
Angiogenesis Research and Controlled Drug Delivery; Dr. Henry Brem
Uveitis; Scleritis, Cytomegalovirus Retinitis, Autoimmune Diseases of the Eye; Dr. Richard Semba and Dr. Jennifer Thorne
Surgical Retina: Drs. Peter Campochiaro, Peter Gehlbach, James Handa, and Adrienne Scott
Medical Informatics and Electronic Health Record; Dr. Michael Boland
Retinal Molecular Biology; Dr. Don Zack
Surgical Education; Dr. Shameema Sikder
Pediatric ophthalmology and adult strabismus; Dr. Megan Collins
Pediatric ophthalmology and Public Health and/or Health care policy; Dr. Megan Collins
Medical ethics; Dr. Megan Collins
Engineering in Ophthalmology; Dr. Peter Gehlbach

Pathology

Overview

Electives in Pathology provide students an excellent way of broadening their knowledge of medicine and determining their level of interest in the specialty. Most pathology electives give students first hand knowledge of the central role pathology plays in the diagnosis of disease, and as such, are valuable for students going into almost any clinical specialty.

Both general and subspecialty electives in Pathology are available. Electives in anatomic pathology focus on morphologic and histologic diagnosis, while those in the clinical laboratory illustrate the effective use and interpretation of laboratory testing. Research electives provide insight into basic pathogenesis of disease. Students who have already made a firm decision to enter postgraduate training in Pathology should contact an advisor in the department to gain assistance in planning a balanced elective program.

Courses

Code	Title	Credits
First Year		
Foundations of Histology and Pathobiology Section of Scientific Foundations of Medicine		
Other Courses and Elective Opportunities		
Elective programs must be approved by the preceptor; any member of the department may act as preceptor.		
ME.300.699	Pathology Elective	0
ME.300.712	Introduction to Translational Research Rotation 2	1
ME.680.703	Animal Pathology Laboratory	0
ME.300.713	Pathology for Graduate Students: Basic Mechanisms	3
PH.188.840	Special Studies and Research Environmental Health & Engineering	1-22
PH.260.717	Graduate Immunology: the Immune Response	3

Pediatrics

The core clerkship in Pediatrics is an eight-week experience in which students care for patients in both inpatient and outpatient (ambulatory) settings. The clerkship focuses on general pediatrics, but students participate in the care of patients with sub-specialty needs as well.

After a three-day program of educational sessions/lectures intended to orient students to Pediatrics (PRECEDE), students spend approximately four weeks rotating in an inpatient setting and four weeks rotating in an outpatient setting. Additionally, students are required to complete a one-day rotation at the Kennedy Krieger Institute (http://www.kennedykrieger.org/), an affiliated hospital for children with developmental disabilities and rehabilitation needs.

Throughout the clerkship, there are weekly lectures presented by exceptional faculty. These serve as an aid in preparing students for the National Board of Medical Examiners shelf exam in Pediatrics, which is administered at the end of the clerkship.

Program Requirements

Code	Title	Credits
Second, Third or Fourth Year		
ME.320.600	Pediatrics Core Clerkship	0
Elective Opportunities		
Elective courses must be approved by the preceptor; any member of the department may act as preceptor. [1]		
ME.320.699	Pediatrics Elective	0
Subinternship in the Department of Pediatrics		
Introduction to Pediatric Intensive Care		
Research Activities		
Pediatric Hematology		
Pediatric Endocrinology		
Advanced Clerkship in Pediatric Oncology		
Child and Adolescent Psychiatry		
Pediatric Infectious Diseases		
Pediatric Cardiology		
Developmental Disabilities in School Aged Children		
Adolescent Medicine		
Pediatric Gastroenterology and Nutrition		
Clinical Clerkship in Pediatric Dermatology		
Developmental Pediatrics-Kennedy Krieger Institute.		
Clinical Clerkship in Pediatric Epilepsy		
Clinical Clerkship in Full-Term Nursery		
Research in Pediatric Allergy		
General Pediatrics and Adolescent Medicine Clinical Research		
Healthcare Issues in Homeless Children		
Pediatric Intensive Care Elective		
Clinical Research Elective in Pediatric Infectious Diseases		
Laboratory Elective in Pediatric Infectious Diseases		
Advanced Clerkship in Pediatric Oncology		

[1] These courses are open to students from the second, third and fourth years, unless otherwise noted. Certain of these courses will be given in the alternate year only.

Pharmacology and Molecular Sciences

Division of Clinical Pharmacology

This Division is operated jointly by the Department of Pharmacology and Molecular Sciences and the Department of Medicine as a closely integrated unit.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy. An integrated program leading to both the M.D. and Ph.D. degrees is also available to medical students who are interested in combined medical and scientific training.

Program Requirements

Code	Title	Credits
First Year		
ME.800.786	Scientific Foundations of Medicine: Pharmacology	0
Second Year		
Genes to Society/Pharmacology		
Other Courses and Elective Opportunities		
Courses offered by the Department of Pharmacology and Molecular Sciences are intended for graduate students. Medical students may enroll with prior course director approval. In addition, elective courses must be approved by the preceptor; any member of the department may act as preceptor.		
Pharmacology		
ME.330.709	Organic Mechanisms in Biology	2
ME.330.707	Graduate Pharmacology I	2
ME.330.715	Graduate Pharmacology II	2
ME.330.801	Research	0
ME.330.802	Topics in Pharmacology	0.5
ME.330.804	Mass Spectrometry in an Omics World	1
ME.330.809	Analytical Methods of Clinical Pharmacology	1.5
ME.330.808	Principles of Clinical Pharmacology	1
ME.330.712	Introduction to Glycobiology	1

Physical Medicine and Rehabilitation

Overview

Physical medicine and rehabilitation focuses on restoring the health and functional abilities after illness or injury, such as a stroke, spinal cord injury, heart surgery, amputation, joint replacement, sports injuries, spinal disorders and other conditions.

Electives

Elective courses must be approved by the course director.

Code	Title	Credits
ME.716.699	Physical Medicine & Rehabilitation Elective	0
Elective Opportunities		
Elective courses must be approved by the preceptor; any member of the department may act as preceptor.		
Clinical Clerkship in Rehabilitation Medicine		
Pediatric Rehabilitation		
Medical Student Summer Clinical Experience in PM&R		
Advanced Clerkship in Rehabilitation Research		

Physiology

The Department provides instruction in cellular, organ, and human physiology for graduate students in physiology, and elective opportunities for research in physiology. These courses are open to qualified students at the School of Medicine, house staff, fellows, and members of the staff.

Graduate Program

Students are accepted for graduate work leading to the degree of Doctor of Philosophy.

Program Requirements

Code	Title	Credits
First Year		
ME.360.720	Organ Physiology	6
ME.360.728	Pathways and Regulation	2
Other Courses and Elective Opportunities		
Elective courses must be approved by the Director of the Cellular and Molecular Physiology Graduate Program.		
ME.360.800	Research	0

Psychiatry and Behavioral Sciences

Elective Opportunities

Elective courses must be approved by the preceptor; any member of the department may act as preceptor.

Elective work may be done within the Johns Hopkins Medical Institutions or under the supervision of Hopkins' faculty in affiliated institutions in the Baltimore area. In addition, students may request sponsorship of the department for an assignment to another medical school in the United States or abroad.

In addition to training programs in research and clinical psychiatry, the department offers elective seminars and independent study projects.

It is the policy of the Department of Psychiatry and Behavioral Sciences to maintain flexibility in its elective programs, and to attempt, as much as possible, to design programs that meet the needs of the individual students.

Dr. MacKinnon is the coordinator of electives for first and second-year students. Dr. Parekh and Dr. Gerstenblith coordinate electives for third and fourth-year students. Students are invited to discuss their interests and needs with them, or with any member of this department they may wish to consult.

Although there are numerous clinical and research electives available in the department, they should not be considered as prerequisites for residency training in psychiatry.

For those students who are strongly considering a psychiatry residency, it is recommended they complete a four-week subinternship in psychiatry, as well as devote a majority of their elective time to broaden and deepen their education in the other basic science and clinical areas.

The subinternship experience is good for students who wish to find out if they will like psychiatry as a career before making decisions about entering the field. It is also quite helpful for students who are not going into psychiatry, but realize a broadened clinical experience in this field would be useful in their chosen specialty. Students who may be interested in training in psychiatry should consult Dr. Vinay Parekh (vparekh1@jhmi.edu) and Dr. Avi Gerstenblith (tgerste1@jhmi.edu) as early as possible to discuss their educational plans.

For all students, elective opportunities in psychiatry will allow them to improve their skills and to develop new areas of interest in the field.

The elective programs described on the following pages are representative of opportunities for elective work that are available in this department, but many other opportunities can be developed through direct collaboration of individual students and individual faculty members.

Program Requirements

Code	Title	Credits
First Year		
ME.370.650	Genes to Society - Mind, Brain, Behavior	0
Second Year		
ME.800.645	Topics in Interdisciplinary Medicine - Substance Use Disorders	0
Second, Third, or Fourth Year		
ME.370.601	Psychiatry Core Clerkship	0
Elective Opportunities		
ME.370.801	Research Practicum	0
ME.370.699	Psychiatry Elective	0
Subinternship in Psychiatry		
Community Psychiatry		
Forensic Psychiatry		
Geriatric Psychiatry		
Clinical Research on the Behavioral Pharmacology of Substance Use Disorders		
Assessment and Treatment of Sexual Disorders		
HIV Psychiatry Service		
Research in Molecular Neurobiology of Brain Diseases		
Clinical Neuropsychiatry		
Clinical Research in Neuropsychiatric Disorders		
Research in Eating Disorders		
Clinical Research in Schizophrenia		
Molecular Genetics of Schizophrenia		
Psychosomatic Medicine/Chronic Pain		
ECT and Novel Brain Stimulating Therapies		

Public Health

Courses in the Johns Hopkins Bloomberg School of Public Health are open to students of the School of Medicine without payment of additional fees if consent is obtained from the course instructor and the administrative officers of the School of Medicine. Interdivisional registration forms must be used to enroll in Bloomberg School courses.

Medical students may elect to pursue the Master of Public Health (MPH) program in the Bloomberg School in conjunction with the medical curriculum. The program will consist of eleven months of required and elective courses in the Bloomberg School. This is exactly the same program followed by other individuals pursuing the MPH degree, as described in the catalogue of that School. The specific elective course program will vary according to the special interests of the individual student.

Medical students integrate this special program into their medical curriculum by taking a year's leave of absence on completion of the second or third year. During that year the student is enrolled full time in the MPH program in the Bloomberg School.

All applications are subject to the approval of the Admissions Committee of the MPH program in the Bloomberg School. School of Medicine approval for all programs must be obtained from the Associate Dean for Medical Student Affairs. Comparable study arrangements are possible also for medical students in other U.S. medical schools.

Opportunities are available for further training within the departments of the School and in numerous graduate degree programs. For those interested, information concerning these programs may be obtained from Admissions Services in the Bloomberg School.

Program Requirements

Instruction in public health is available for medical students at the Johns Hopkins Bloomberg School of Public Health, and medical students may wish to consider enrolling in courses offered by the Bloomberg School of Public Health. A combined M.P.H.-M.D. Program is offered.

Radiation Oncology and Molecular Radiation Sciences

Overview

The Department of Radiation Oncology and Molecular Sciences at Johns Hopkins is dedicated to patient-centered, specialized care. Our multidisciplinary teams encompasses radiation oncologists, dosimetrists (experts who calculate the dose of radiation), medical physicists, radiation oncology nurses and radiation therapists who work cooperatively to provide the most advanced treatment options specific to each patient's disease.

Electives

Elective courses must be approved by the course director. Course descriptions and additional details can be found at: https://www.hopkinsmedicine.org/som/students/academics/electivebook.pdf

Code	Title	Credits
ME.510.699	Oncology Elective	0

Radiology and Radiological Science

Program Requirements

Code	Title	Credits
Radiology First Year		
Radiology-Gross Anatomy Correlation		
Radiology Second Year		
Radiology: Transition to Wards		
Elective Opportunities		
Elective courses must be approved by the preceptor. Any member of the department may act as preceptor with the exception of the diagnostic radiology tutorial which is a formal 4.5-week structured elective experience.		
Radiology Electives		
ME.420.699	Radiology Elective	0
Diagnostic Radiology Tutorial		
Special Diagnostic Radiology		
Investigative Radiology		
Physiological Research in Radiology		
Clinical Clerkship and Research Project in Radiotherapy		
Clinical Nuclear Medicine		
Clinical Investigation Involving Human Subjects-Nuclear Medicine		
Special Studies and Research-Nuclear Medicine		
Preceptorship in Diagnostic Radiology		
Interventional Radiology		
Pediatric Radiology		

Section of Surgical Sciences

Program Requirements

General Surgery and Surgical Specialties

The Core Surgical Clerkship is a prerequisite for advanced elective courses in clinical surgery. Research electives may be scheduled with faculty members by arrangement, with the assistance of the faculty advisors or the clerkship director.

Second, Third, or Fourth Year

An eight-week core clinical clerkship will be offered each block and can be taken at any time from the last quarter of the second year through the first quarter of the fourth year. One-half of the block will consist of a clerkship experience in General Surgery. These consist of:

Johns Hopkins Hospital (JHH) Services:

- **Cameron Blue, Cameron Gold, Cameron Green, and Handelsman GI:** Primarily hepatobiliary and pancreatic oncology as well as other GI surgical problems. Laparoscopic/robotic and open surgery
- **Eckhauser:** Colorectal surgery, open and laparoscopic/robotic surgery
- **Halsted:** Trauma as well as emergent and elective general surgery
- **Handelsman BEM (breast, endocrine, melanoma):** Thyroids, parathyroids, adrenals, breast and melanoma
- **Pediatric Surgery:** General surgery, trauma, oncology and thoracic surgery in the pediatric population
- **Ravitch Colorectal:** Colorectal surgery, open and laparoscopic/robotic surgery
- **Ravitch MIS (minimally invasive surgery):** Almost all laparoscopic/robotic, primarily foregut, biliary and hernia surgery

Bayview (BV) – Community hospital where students will work with Johns Hopkins faculty and surgery residents. Students will see laparoscopic and open GI, oncology, hernia and bariatric surgery. Students will spend the entire rotation at Bayview including the subspecialties.

Howard County (HCGH) – Community hospital where students will work directly with Johns Hopkins faculty and surgery residents. Varied breadth of open and laparoscopic general surgery, foregut, hernia, and colorectal surgery cases. The subspecialty rotations will be at JHH.

The other half of the quarter will be divided between two of the following Surgical Specialties: Cardiac Surgery, Neurosurgery, Ophthalmology, Orthopaedic Surgery, Otolaryngology Head & Neck Surgery, Plastic Surgery, Thoracic Surgery, Transplant Surgery, Urological Surgery, and Vascular Surgery.

Outpatient and Ward Work

General Surgery Basic Clerkship: Each student will be assigned to a major teaching service for four weeks. These will include the general surgical services of The Johns Hopkins Hospital, Bayview Medical Center, or Howard County General Hospital. Students assigned to the Johns Hopkins Hospital will do both their general and subspecialty rotations at the Johns Hopkins Hospital. Students assigned to Bayview will do both their general and subspecialty rotations at Bayview. Students assigned to Howard County General Hospital will be assigned to subspecialty rotations at the Johns Hopkins Hospital. All didactics and labs will take place on Wednesdays at JHH. Didactics will cover both general and specialty topics. Weekly preceptor meetings will take place at JHH or BVMC. General Surgery Grand Rounds take place on Thursdays, 7:30 - 8:30 AM.

Cardiac Surgery: Students will be assigned to this department for approximately two weeks at the Johns Hopkins Hospital. Time on the rotation will be split between the Cardiac OR and Cardiac ICU.

Thoracic Surgery: Students will be assigned to this department for approximately two weeks at the Johns Hopkins Hospital.

Transplant Surgery: Students will be assigned to this department for approximately two weeks at the Johns Hopkins Hospital.

Vascular Surgery: Students will be assigned to this department for approximately two weeks at the Johns Hopkins Hospital.

Orthopaedic Surgery: Students will be assigned to this department for approximately two weeks either at the Johns Hopkins Hospital or at the Johns Hopkins Bayview Medical Center.

Otolaryngology Head & Neck Surgery: Students will be assigned to this department for approximately two weeks either at the Johns Hopkins Hospital or at the Johns Hopkins Bayview Medical Center.

Urology: Students will be assigned to this department for approximately two weeks either at the Johns Hopkins Hospital or at the Johns Hopkins Bayview Medical Center.

Plastic Surgery: Students will be assigned to this department for approximately two weeks either at the Johns Hopkins Hospital or at the Johns Hopkins Bayview Medical Center.

Neurosurgery: Students will be assigned to this department for approximately two weeks either at the Johns Hopkins Hospital or at the Johns Hopkins Bayview Medical Center.

Surgical Specialty Conference/Grand Rounds. Varies by specialty.

Elective Opportunities

General Surgery and Surgical Specialties. Elective courses must be approved by the Dr. Alodia Gabre-Kidan. Each department/division has a designated preceptor. A complete list of clinical and research electives can be found here: Electives Book: Johns Hopkins School of Medicine (https://www.hopkinsmedicine.org/som/offices/registrars/med-students/electives.html).

A subinternship in surgery is designed to give the advanced student supervised participation in clinical care of patients. This elective must be applied for at least two months before the starting date to insure appropriate credentialing by the Department of Surgery and the hospital. The Core Surgery Clerkship must be completed prior to an elective or subinternship being started.

Major Clinical Courses

The prerequisite of all major clinical electives is the Surgery Core Clerkship.

Department of General Surgery

Code	Title	Credits
Sub-Internship		
Advanced Clerkship in Surgical Oncology		
Advanced Clinical Clerkship in General Pediatric Surgery		
Advanced Clerkship in Transplantation Surgery		
Advanced Clerkship in General Surgery at Johns Hopkins Bayview Medical Center		
Advanced Clerkship in Vascular Surgery		
Advanced Clinical Clerkship in Surgical Intensive Care		
Advanced Clerkship in Thoracic Surgery		
Advanced Clerkship in Alimentary Tract Surgery		

Department of Neurological Surgery

Code	Title	Credits
Advanced Clinical Clerkship in Neurosurgery		
Subinternship in Neurosurgery		

Department of Orthopaedic Surgery

Code	Title	Credits
Advanced Clinical Clerkship in Spine Surgery		
Advanced Clinical Clerkship in Pediatric Orthopaedics		
Advanced Clinical Clerkship in Adult Limb Reconstruction and Trauma		
Advanced Clinical Clerkship in Adult Orthopaedics at the Union Memorial Hospital		
Advanced Clerkship in Hand SurgeryJohns Hopkins Hand Service		
Advanced Clinical Clerkship in Shoulder Surgery		

Department of Otolaryngology Head and Neck Surgery

Code	Title	Credits
Advanced Clinical Clerkship in Otolaryngology		

Department of Plastic Surgery

Code	Title	Credits
Subinternship in Plastic Surgery		
Advanced Clinical Clerkship in Urology		

Postdoctoral Fellows

Most doctoral recipients spend three to six years following receipt of degree in postdoctoral training. The Johns Hopkins University School of Medicine has an active program of postdoctoral study. Currently there are 2,300 postdoctoral students enrolled, of whom 249 are in the basic medical science departments, 1,179 in clinical science departments, 872 are house officers of the Johns Hopkins Hospital. By actions of the Advisory Board of the Medical Faculty and of the Medical Board of the Hospital, primary responsibility for postdoctoral medical education is placed upon the Medical Faculty. Postdoctoral students, including house officers of the Johns Hopkins Hospital and affiliated hospitals, must register in the School of Medicine and are designated by the title of Fellow of the School of Medicine.

The following sections outline briefly some of the opportunities for postdoctoral education in the Johns Hopkins University School of Medicine.

For specific information, applicants should communicate with the director of the department in which they desire to study, the Associate Dean for Postdoctoral Programs, or the Associate Dean for Graduate Medical Education.

The Johns Hopkins University School of Medicine
733 N. Broadway, Room 137
Baltimore, MD 21205

Postgraduate Study and Fellowships

The School of Medicine offers opportunities for study to a limited number of individuals holding the M.D., Ph.D., or other equivalent doctoral degrees from accredited institutions. All departments and divisions have facilities for postdoctoral students. Candidates desiring to avail themselves of these opportunities for instruction and study must be acceptable to the head of the department in which they wish to work.

It is the policy of the Johns Hopkins University School of Medicine to require criminal background investigations on accepted students in any professional or graduate program at the School of Medicine, interns, residents, and clinical fellows in any Graduate Medical Education program sponsored by Johns Hopkins, and other clinical and research postdoctoral fellows at the School of Medicine.

Residency and fellowship programs are approved by the Maryland Higher Education Commission for veterans' educational benefits.

Postdoctoral/GME Offices

The Offices of Graduate Medical Education and Postdoctoral Affairs, within the Dean's Office of the School of Medicine, are directed by Associate Deans. The offices deal with all house staff of the Johns Hopkins Hospital and all postdoctoral fellows in the School of Medicine. The offices recommend and implement institutional policies covering house staff, in conjunction with the Office of the Vice President for Medical Affairs of the Johns Hopkins Hospital, and for non-house staff postdoctoral fellows. In addition, the Associate Deans and staff are available to all house officers and postdoctoral fellows for personal and career counseling. Additional information regarding the Office of Graduate Medical Education can be found at https://www.hopkinsmedicine.org/som/gme (https://www.hopkinsmedicine.org/som/gme/) and the Office of Postdoctoral Affairs can be found at https://www.hopkinsmedicine.org/som/offices/pda/.

Health and Dental Insurance

All postdoctoral students, their spouses, and dependent children must be covered by health insurance. It is required that postdoctoral students subscribe to the School of Medicine Student Health Program (SHP). Spouses and dependent children may be covered under an alternative insurance plan, subject to review and approval by the School of Medicine Registrar's Office. Foreign or travelers insurance is not accepted.

The dental plan for postdoctoral students covers only the student. The dental plan for the house officer also covers dependents. The house staff health insurance plans are fully subsidized by the Hospital and School of Medicine. The cost of individual health and dental insurance is provided for all non-house staff postdoctoral fellows.

A complete description of benefit plans can be found at https://www.hopkinsmedicine.org/som/offices/registrars/ (under Benefits).

Other Benefits

All house staff and fellows with full-time, primary appointments in the School of Medicine are covered under a long-term disability insurance program and a $100,000 term life insurance policy. These benefits are provided without cost to the trainees. A 403(b) retirement plan allows house staff and fellows to voluntarily tax-shelter a portion of their taxable income received as compensation for services. Income received in the form of fellowships (stipends) is excluded from 403(b) eligibility.

The University Health Service (UHS) provides adult ambulatory care to housestaff and postdoctoral students and spouses (if enrolled in the SHP). The fee for this service is provided by the preceptor.

Fellowships and Fees

Postdoctoral students are usually supported by stipends which accompany the awarding of fellowships. Some sources of the stipend offered to holders of these fellowships lie in the School of Medicine, others in agencies outside the school. Fellowship awards are usually made for one academic year and can be extended for those who wish additional training. Preceptors are expected to abide by the NIH minimum stipend guidelines for years of relevant experience for non-housestaff fellows paid through the Johns Hopkins University payroll system. Postdoctoral students who are not members of the house staff will be assessed tuition at the rate established by the University Board of Trustees for non-M.D. candidates, pro-rated in relation to period of enrollment (see Tuition Policies).

Internships and Residencies

Graduate physicians who are applicants for internship and residency positions at the Johns Hopkins Hospital may direct their inquiries to the director of the department in which they desire to serve, care of:

The Johns Hopkins Hospital
600 N. Wolfe St.
Baltimore, MD 21287

Postdoctoral Courses-Continuing Medical Education

Intensive brief courses are offered annually by various clinical departments. Current and future offerings can be found at https://hopkinscme.cloud-cme.com

SCHOOL OF NURSING

MISSION AND VALUES

The mission of the Johns Hopkins School of Nursing is to improve the health of individuals and diverse communities locally and globally through leadership and excellence in nursing education, research, practice, and service.

The academic rigor of our programs, the extraordinary nursing scholarship of our faculty, and our reputation for shaping nursing graduates who are leaders in their profession position us as one of the top nursing schools in the U.S.

OUR 2020-2025 STRATEGIC PLAN

INNOVATION & EXCELLENCE:

Lead advancements in education, research, practice and service.

COMMUNITY & GLOBAL CAPACITY:

Build educational/practice partnerships to build the health workforce and improve health outcomes through policy, practice, education and research.

TRANSFORMATIONAL TECHNOLOGY:

Leverage technology to advance our mission.

HEALTH POLICY & ADVOCACY:

Increase the focus on health policy in academic programming and increase advocacy and policy engagement.

PEOPLE, PARTNERSHIPS & COLLABORATION:

Strengthen and advance a cohesive and integrated school structure and environment that builds internal and external partnerships.

VIEW STRATEGIC PLAN (http://info.nursing.jhu.edu/strategic-plan/)

Doctoral Programs

Master's Programs

Dual Degrees

Resources

School of Nursing Faculty

A list of full-time faculty can be found at nursing.jhu.edu/faculty_research/faculty (https://nursing.jhu.edu/faculty_research/faculty/).

School of Nursing Leadership

Marie T. Nolan
Interim Dean, Professor

Marie T. Nolan
Executive Vice Dean, Professor

Chris Atkins Godack
Chief of Staff

Deborah Baker
Associate Dean for Health Systems Partnership and Innovation

Allison Benner
Associate Dean for Finance and Administration

Rita D’Aoust
Associate Dean for Teaching and Learning, Associate Professor

Jennifer Dotzenrod
Associate Dean for Enrollment Management and Student Affairs

Michal (Miki) Goodwin
Associate Dean of Clinical Practice

Hae-Ra Han

Associate Dean for Community Programs and Initiatives, Professor

Cheryl Dennison Himmelfarb
Associate Dean for Research, Professor

Gloria Ramsey
Associate Dean for Diversity, Equity, and Inclusion

Nancy Reynolds
Associate Dean for Global Affairs

Sharon Trivino

Associate Dean for Development and Alumni Relations

Vacant
Associate Dean of Faculty Development

Tammy Berwanger
Assistant Dean for Marketing and Communications

Kenneth Dion
Assistant Dean for Business Development and Strategic Relationships

Bobbie Tchopev
Assistant Dean of Organizational Improvement

Admission

Johns Hopkins University is committed to recruiting, supporting, and fostering a diverse community of outstanding faculty, staff, and students. As such, Johns Hopkins does not discriminate on the basis of sex, gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, gender identity or expression, veteran status, or other legally protected characteristic in any student program or activity administered by the university or with regard to admission or employment. Applications are managed through the School of Nursing's Office of Admissions. Admission decisions are made by admissions committees. All admission decisions rendered are final and cannot be appealed.

The school seeks individuals who bring with them a spirit of inquiry, commitment, and motivation toward scholarship and leadership in the nursing profession. The Admissions Committee is interested in each individual and reviews holistically academic records, health care, other professional and community experience, interviews (for some programs), recommendations and expression of goals and interests. Intellectual interests and accomplishments are of primary importance in the admissions decision, and scholastic records are carefully examined. Clarity of goals, character, and achievement are also important.

If Johns Hopkins University receives false, fraudulent, deceitful, or misrepresented information that is material to student admissions as part of your application or application process, you are subject to sanctions, including denial or revocation of admission and revocation of any credits or degree(s) earned at Johns Hopkins. Johns Hopkins University will notate the sanctions imposed on your transcript, and may notify any institution where you seek or intend to enroll, or are enrolled in the future, of the sanctions imposed.

For questions regarding the application process and requirements, contact the Office of Admissions at 410-955-7548 or jhuson@jhu.edu.

Students may apply to only one Johns Hopkins School of Nursing academic program per academic term. To apply to a School of Nursing degree or certificate program, students will complete an online application at www.nursingcas.org (http://www.nursingcas.org/). At a minimum, the application requirements will include:

- Completed online application
- Acknowledgement of the Johns Hopkins University School of Nursing values
- Application fee
- Application essay(s)/Goal Statement
- A CV or résumé
- Three letters of recommendation (academic and professional)
- Official transcripts from all post-secondary institutions attended

Some School of Nursing programs may stipulate additional admission requirements (e.g., BSN, MSN, prerequisite courses, standardized test scores, writing samples, licensure, work experience, timed video response). Qualified applicants may also be contacted to schedule a personal admission interview. Applicants should contact the Office of Admissions at jhuson@jhu.edu or go online to nursing.jhu.edu/admissions/index.html (http://nursing.jhu.edu/admissions/) to determine specific admission criteria for individual programs.

Official GRE scores sent directly from ETS (Educational Testing Service, www.ets.org (http://www.ets.org/)) are required for the DNP/MPH. Official GRE or GMAT scores are required for the MSN/MBA and DNP/MBA programs. The GRE code for the Johns Hopkins University School of Nursing is **5767**.

Please note that the Johns Hopkins School of Nursing utilizes NursingCAS, the Centralized Application Service for Nursing Programs for all application processing. All applicants will be required to submit their application and all supplemental documents through this centralized application system.

NursingCAS
P.O. Box 9201
Watertown, MA 02471
617-612-2880
nursingcasinfo@nursingcas.org
www.nursingcas.org (http://www.nursingcas.org/)

For degrees earned outside the United States (with the exception of English speaking Canada), credits must be evaluated by WES (World Education Services, www.wes.org (http://www.wes.org/)) or Educational Credential Evaluators (www.ece.org (http://www.ece.org/)) with a course-by-course evaluation. Licensed nurses may also have international transcripts evaluated in a full education course-by-course report by the CGFNS (Commission on Graduates of Foreign Nursing Schools, www.cgfns.org (http://www.cgfns.org/)).

For MSN Specialty Tracks, Post-Degree Certificates, and DNP Programs, verification of RN licensure is required. All campus-based students must obtain a Maryland RN license or licensure from a compact state by the time of matriculation.

The Office of Admissions will make every attempt to notify applicants of missing documents; however, the applicant is responsible to ensure all required documents are received and the admissions file is complete by published deadlines. The Admissions Committee reserves the right to request additional information from an applicant, including an interview.

Submitted applications and documents become the property of Johns Hopkins University and will not be returned.

Before an admitted student can enroll at the School, all prerequisite coursework must be completed at a regionally accredited college or university with a grade of **B- or higher** (for the MSN Entry into Nursing Track) or with a grade of **B or higher** (for the MSN Specialty Tracks and DNP). No exceptions will be made.

State Specific Information for Online Programs

Students should be aware of additional state specific information for online programs. The most up-to-date information is available on each individual program's webpage and on the University's Required State Specific Disclosures for Students Enrolled in Online Distance Education Programs (https://provost.jhu.edu/education/accreditation-and-academic-compliance/state-authorization-of-distance-education/). The School of Nursing cannot enroll students in online academic programs who reside in/plan to complete clinical hours in certain states.

Admission Decisions

Applications are processed and files managed through the School of Nursing's Office of Admissions. Admission decisions are made by admissions committees. All admission decisions rendered are final and cannot be appealed. Applicants who are offered admission can expect to receive notification of their decision by email. Applicants will have a deadline by which to accept and deposit or decline the offer of admission using an online response form. For most programs, the response deadline is within three weeks of admission. Only letters or email sent directly from the Office of Admissions may be considered official notifications of admission. The School of Nursing offers admission with the expectation that students will enroll in courses in the semester for which they are admitted, unless a deferral is granted (see below).

Deferrals

For some programs, admitted students may request to defer admission for up to one year from the semester for which they were admitted. Only students who have paid the non-refundable enrollment deposit may seek a deferral. Students cannot defer admission once the semester/term has started in the School of Nursing*. Financial aid and tuition support are not automatically deferred. For questions regarding deferrals, please contact the Office of Admissions at jhuson@jhu.edu. If you wish to defer your attendance, you must submit a written request and explanation to the Director of Admissions. Deferral request decisions are formally communicated by the Director of Admissions to the student via email.

*Students with summer start terms in dual-degree programs at the Bloomberg School of Public Health and Carey Business School can request a deferral up until coursework has started at the partner school.

Application Deadlines

The School of Nursing strongly encourages all applicants to apply by the early or priority application deadline. For the most up-to-date information regarding application deadlines, please visit our website at nursing.jhu.edu/admissions/apply/deadlines.html (https://nursing.jhu.edu/admissions/apply/deadlines.html).

The School of Nursing will process any completed application received by the priority deadline and notify applicants whether they have been admitted or denied admission. While some programs may be willing to consider applications received after the priority application deadline, the School of Nursing cannot guarantee that late applications will be reviewed.

Adding the Post Master's Nursing Education Certificate for Master's Specialty Track and Doctoral Students

Students who are currently enrolled in a Master's Specialty Track or Doctoral degree program at the Johns Hopkins School of Nursing and wish to add the Post Master's Nursing Education Certificate must submit a written request to the Office of Admissions. A second program application is not required.

Note: Financial aid recipients must notify the Financial Aid office when changing or adding a degree or certificate program. Those in F-1 status must notify the International Services office for a new I-20 to reflect the change in program. Students using VA benefits must notify the VA Certifying Official in the Registrar's Office when changing or adding a degree or certificate.

International Applicants

The School of Nursing takes great pride in being world-renowned for nursing education. Below are additional requirements for international applicants to the School of Nursing. For more information on enrolling as an international student, please visit the Office of International Services website at ois.jhu.edu (http://ois.jhu.edu/).

Transcript Evaluation

For degrees earned outside the United States (with the exception of English-speaking Canada), credits must be evaluated by WES (World Education Services, www.wes.org (http://www.wes.org/)) or Educational Credential Evaluators (www.ece.org (http://www.ece.org/)) with a course-by-course evaluation. Licensed nurses may also have international transcripts evaluated in a full education course-by-course report by the CGFNS (Commission on Graduates of Foreign Nursing Schools, www.cgfns.org (http://www.cgfns.org/)).

Standardized Test Requirements

The Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) is required of applicants whose native language is not English. For School of Nursing applicants, the minimum TOEFL score is 100 (Internet-based); the minimum IELTS score is 7. Students may contact the Office of Admissions with questions about a TOEFL/IELTS waiver. Individual programs may require additional evidence to demonstrate English language proficiency. The TOEFL code for NursingCAS is **B506**.

Prerequisite Coursework

U.S. immigration regulations require that students needing an F-1 visa must successfully fulfill all prerequisites before an I-20 can be issued. To allow sufficient time to complete all the steps in the visa process, students must submit an official transcript or official course by course evaluation to the Office of Admissions at least 3 months prior to the beginning of the term in which they wish to begin studies (October for spring term; May for fall term) with final grades of B- or higher for the MSN Entry into Nursing Track.

Financial Aid and Scholarships

All students, regardless of citizenship, are automatically considered for merit-based scholarships. Need-based financial aid is reserved for U.S. citizens and permanent residents only. Students seeking an F-1 or J-1 visa to study in the United States must submit financial documents in English demonstrating proof of funding.

International students may be able to borrow through private education loan programs. However, they must apply with a creditworthy co-borrower who is also a U.S. citizen or permanent resident.

U.S. Employment Opportunities

There are no guarantees of employment for any graduates regardless of citizenship. Current immigration laws do have an impact on hiring practices.

Online Courses

Students sponsored by Johns Hopkins for F-1 or J-1 student status must maintain full-time enrollment status. Additionally, immigration regulations require students to be enrolled in classroom instruction. Only one online/distance course may be counted towards the minimum required courses in any term. Due to these restrictions, some degree programs in the School of Nursing do not qualify for F-1 or J-1 student sponsorship.

Conditions of Matriculation

Compliance Requirements

All enrolled degree/certificate-seeking students must register for and complete a background check, drug screening, required medical compliance, as well as other requirements, regardless of program, online/on-site course attendance status, and clinical/non-clinical course status. The School of Nursing has contracted with CastleBranch (https://jhu.castlebranch.com/JO78/package-selection/) to track and approve all compliance requirements. All enrolled degree/certificate-seeking students must provide all the required compliance documents, and must update documentation as required, in order to remain in compliance throughout the course of their program.

Technical Standards for Admission and Graduation

The curricula of the School of Nursing requires that students engage in diverse and complex experiences directed at achieving competencies, knowledge, skills, attributes, and professional values. Applicants for all academic programs, and enrolled degree-seeking students, must possess certain abilities and skills deemed essential for meeting the professional standards of accrediting agencies.

Admission to the Johns Hopkins School of Nursing is open to all qualified individuals and in accordance with the 1973 Vocational Rehabilitation Act and the American with Disabilities Act. The Johns Hopkins School of Nursing is committed to accommodating the needs of students with documented disabilities, and will do so to the extent possible without compromising the essential components of the curriculum. Questions or concerns regarding these technical standards should be directed to the Associate Dean for Enrollment Management and Student Affairs, (410) 955-7545. The Technical Standards for Admission and Graduation (p. 1082) are available on the catalogue page.

Advising

Academic Advising

All degree and certificate students are assigned an advisor to serve as a resource for information gathering, decision making, and program progression. In the DNP and PhD programs, Faculty Advisor assignments will be made according to the student's program and area of focus. Students will be notified of their advisors prior to orientation. In MSN Programs, professional academic advisors are assigned. Students are ultimately responsible for ensuring they are registered on time and for the correct classes.

Certificates

Healthcare Organizational Leadership, Post-Master's Certificate

The Post-Master's Certificate in Healthcare Organizational Leadership is designed for students with an entry level master's degree in nursing or a non-specialty MSN degree (e.g., nursing education).

Grounded in evidence-based practice, students who pursue this part-time online post-master's certificate in nursing will earn 16-credits and 376 clinical hours. Students can complete clinicals in diverse settings, including hospitals, community or public health agencies, school systems, and correctional facilities. Students who choose to continue their nursing education at JHU can apply the two-credit health finance course to the DNP Executive Track.

Upon completion of the Post-Master's Certificate in Healthcare Organizational Leadership, the graduate is prepared to:

- Apply leadership and management skills to improve services in a variety of health care systems
- Analyze the influences of social and health policy on health care delivery and clinical practice
- Apply for the DNP Executive Track without needing to earn an advanced practice nursing license

Program Requirements

Curriculum

Code	Title	Credits
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
NR.210.806	Health Finance	2
NR.110.656	Healthcare Organizational Leadership Practicum II	3
NR.110.619	Health Care Economics for Management and Practice	2

NR.110.657	Healthcare Organizational Leadership Practicum III	4
Total Credits		**16**

Program Totals: 16 Credits [cr]/376 Clinical Hours [CL]

Program of Study

Course	Title	Credits
First Semester		
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
	Credits	**3**
Second Semester		
NR.110.655	Healthcare Organizational Leadership Practicum I	2
	Credits	**2**
Third Semester		
NR.210.806	Health Finance	2
NR.110.656	Healthcare Organizational Leadership Practicum II	3
	Credits	**5**
Fourth Semester		
NR.110.619	Health Care Economics for Management and Practice	2
NR.110.657	Healthcare Organizational Leadership Practicum III	4
	Credits	**6**
	Total Credits	**16**

Program Total: 16 Credits [cr]

Nursing Education, Post-Master's Certificate

This 12-credit post-master's certificate prepares the student to combine their clinical and/or research expertise with expertise in teaching in preparation for careers in nursing education at all levels of academia and in nursing staff development.

The development of the curriculum is based on the NLN Scope of Practice for Academic Nurse Educators.

Certification: Graduates of the Nursing Education Post-Master's Certificate program are eligible to apply for the NLN Certified Nurse Educator examination once they have met the eligibility requirements. For more information, please visit www.nln.org/certification/index.htm (http://www.nln.org/certification/).

A total of 12 credit hours is required to earn the NECO. The learner chooses four of the 3-credit courses listed in the curriculum. Students may enroll in a 1-3 credit teaching practicum course with permission of the advisor. Students who are currently enrolled in a Master's Specialty Track or Doctoral degree program at the Johns Hopkins School of Nursing and wish to add the Nursing Education Post-Master's Certificate must submit a written request to the Office of Admissions. A second program application is not required.

Program Requirements

Curriculum

The 12-credit program is comprised of four 3-credit courses chosen from the list below. Faculty advise students regarding their individual program plan.

Code	Title	Credits
NR.110.638	Curriculum Theory & Design	3
NR.110.540	Teaching Strategies in Nursing	3
NR.110.730	Evaluation: From Individual to Program	3
NR.110.641	Online Teaching and Learning: Development and Instruction	3
NR.110.543	Teaching Practicum	1 - 3
Total Credits		**13-15**

Program Total: 12 Credits [cr]

Program of Study

Nursing Education Certificate (NECO)

Course	Title	Credits
First Semester		
NR.110.540	Teaching Strategies in Nursing	3
	Credits	**3**
Second Semester		
NR.110.641 or NR.110.730	Online Teaching and Learning: Development and Instruction or Evaluation: From Individual to Program	3
	Credits	**3**
Third Semester		
NR.110.638	Curriculum Theory & Design	3
NR.110.543	Teaching Practicum	1 - 3
	Credits	**4-6**
	Total Credits	**10-12**

Program Total: 12 Credits [cr]

The Teaching Practicum is not required to earn the certificate but, if taken, the Teaching Practicum should be the final course in the sequence.

Each student's plan is customized with their advisor.

Pediatric Acute Care Nurse Practitioner, Post-Master's Certificate

This 13-credit post-master's certificate prepares the currently certified pediatric primary care NP to expand their expertise beyond primary care to the acute care of children. Post Master's Pediatric Acute Care Nurse Practitioner certificate students will learn how to diagnose and treat pediatric acute, critical and chronic care conditions, gain clinical competency, and apply evidence-based practices. Students will experience a vigorous academic program and clinical experiences to provide acute care to children across a variety of care settings and throughout the continuum of care. With access to Hopkins faculty and learning resources, graduates will develop and apply advanced skills in the assessment, diagnosis, and management of health problems encountered in acutely ill children.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Organization of Nurse Practitioner Faculties (NONPF) NP Core Competencies with Curriculum Content (2017)
- The Nurse Practitioner Core Competencies (2014)
- Population-Focused Nurse Practitioner Competencies: Pediatric Acute Care (2013) (NONPF)

Clinical practica and number of clinical hours: Clinical experiences are diverse and occur in a variety of settings. A gap analysis will be done based on previous acute care experiences to determine clinical hours needed to meet the minimum of 500 hours of precepted pediatric acute care clinical (600 hours recommended).

Certification: Certification: Graduates are eligible to apply for the Pediatric Nursing Certification Board's pediatric acute care and pediatric primary care certification exams: http://www.pncb.org/ptistore/control/exams/pnp/step.

Program Requirements

Curriculum

Code	Title	Credits
Specialty Courses		
NR.110.645	Advanced Pediatric Acute Care Topics and Procedures	3
NR.110.648	Pediatric Primary/Acute Care Practicum (112-224CL, repeatable each term) [1]	2-4
NR.110.646	Advanced Pediatric Acute Care Topics	3
NR.110.649	Advanced Pediatric Acute Care Topics and Roles	1
Total Credits		**9-11**

[1] NR.110.648 Pediatric Primary/Acute Care Practicum Students must complete a minimum of 7 credits of Pediatric Acute Care Practicum (clinical) during the program. Based on a gap analysis, some students may need additional clinical hours. Specific credit hours and credit allocation by semester will be determined based on a gap analysis at the program start.

Program of Study

Course	Title	Credits
First Semester		
NR.110.645	Advanced Pediatric Acute Care Topics and Procedures	3
NR.110.648	Pediatric Primary/Acute Care Practicum (224CL)	4
	Credits	**7**
Second Semester		
NR.110.648	Pediatric Primary/Acute Care Practicum (224CL) [1]	4
NR.110.646	Advanced Pediatric Acute Care Topics	3
	Credits	**7**
Third Semester		
NR.110.648	Pediatric Primary/Acute Care Practicum (112CL) [1]	2
NR.110.649	Advanced Pediatric Acute Care Topics and Roles	1
	Credits	**3**
	Total Credits	**17**

[1] NR.110.648 Pediatric Primary/Acute Care Practicum Students must complete a minimum of 7 credits of Pediatric Acute Care Practicum (clinical) during the program. Based on a gap analysis, some students may need additional clinical hours. Specific credit hours and credit allocation by semester will be determined based on a gap analysis at the program start.

Program Total: 17 Credits [cr]/ 560 Clinical Hours [CL]

Psychiatric Mental Health Nurse Practitioner, Post-Master's Certificate

This 17-credit post-master's certificate prepares the student to evaluate and treat mental health, substance use, and co-morbid conditions across the lifespan. Those who earn a Psychiatric Mental Health Nurse Practitioner Certificate will develop the competencies to provide a continuum of care that incorporates health promotion, prevention, treatment, recovery, and maintenance. Graduates work in a variety of settings ranging from specialty behavioral health centers to primary care, collaborate with other health care professionals and community organizations to provide evidence- based integrated care, and advocate to reduce inaccurate and hurtful representations of mental and behavioral conditions.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Organization of Nurse Practitioner Faculties (NONPF) Domains and Core Competencies of Nurse Practitioner Practice (2011)
- The NONPF Psychiatric-Mental Health Competencies (2013)

Certification: Graduates are eligible to apply for the American Nurses Credentialing Center: www.nursingworld.org/our-certifications (https://www.nursingworld.org/our-certifications/).

Program Requirements

Curriculum

Code	Title	Credits
NR.110.573	Neurobiology of Mental Disorders	1
NR.110.574	Clinical Psychopharmacology	2
NR.110.575	Differential Diagnosis of Mental Disorders	2
NR.110.576	Psychotherapeutic Frameworks and Modalities	2
NR.110.577	Psychiatric Mental Health Nurse Practitioner Practicum: Adult/Gero (224CL)	4
NR.110.578	Psychiatric Mental Health Nurse Practitioner Practicum: Peds/Family (224CL)	4

NR.110.579	Integrated Care I	1
NR.110.580	Integrated Care II	1
Total Credits		**17**

Program Totals: 17 Credits [cr]/448-500 Clinical Hours [CL]

Program of Study

Course	Title	Credits
First Semester		
NR.110.573	Neurobiology of Mental Disorders	1
NR.110.574	Clinical Psychopharmacology	2
NR.110.575	Differential Diagnosis of Mental Disorders	2
NR.110.576	Psychotherapeutic Frameworks and Modalities	2
	Credits	**7**
Second Semester		
NR.110.577	Psychiatric Mental Health Nurse Practitioner Practicum: Adult/Gero (224CL)	4
NR.110.579	Integrated Care I	1
	Credits	**5**
Third Semester		
NR.110.578	Psychiatric Mental Health Nurse Practitioner Practicum: Peds/Family (224CL)	4
NR.110.580	Integrated Care II	1
	Credits	**5**
	Total Credits	**17**

Program Total: 17 Credits [cr]/448-500 Clinical Hours [CL]

Additional credits may be required for those who have not completed health assessment through the lifespan.

Doctoral Degrees

- Doctor of Nursing Practice, Advanced Practice Track (p. 1011)
- Doctor of Nursing Practice: Executive Track (p. 1027)
- Nursing, Doctor of Philosophy (p. 1028)
- Doctor of Nursing Practice (DNP): Advanced Practice Track/Doctor of Philosophy in Nursing (PhD) Dual Degree (p. 1036)

Doctor of Nursing Practice, Advanced Practice Track

The Doctor of Nursing Practice program at the Johns Hopkins School of Nursing is accredited by the:

Commission on Collegiate Nursing Education (CCNE)
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

The Doctor of Nursing Practice (DNP) is a practice-focused doctoral program. The mission of the Doctor of Nursing Practice (DNP) program is to prepare expert nurse clinicians, administrators, and executive leaders to improve health and health care outcomes. The focus is on practice that is innovative and evidence-based, reflecting the application of credible research findings. Across the program, the student develops advanced knowledge and skills reflective of the terminal practice doctorate through evidence-based practice in diverse clinical, health care, and academic settings. The goal for this program is to provide educational, clinical, and practicum experiences in a transdisciplinary, collaborative learning environment. Students complete a project that demonstrates clinical scholarship. This DNP Project emphasizes evidence-based approaches for quality and safety improvement in various roles and practice settings.

DNP Advanced Practice Tracks

The DNP Advanced Practice Track option is a post-baccalaureate to DNP program that prepares students for the Nurse Practitioner role with a focus on a specific population (adult-gerontological primary, adult-gerontological acute, pediatric primary, pediatric primary/acute, family primary, or psychiatric mental health), the Clinical Nurse Specialist role focused on a specific population (adult health, adult critical care, or pediatric critical care), or the Nurse Anesthetist role. The length of the program, number of credits, and clinical hours vary according to the role and specialty, ranging from 78 to 88 credits and 784 clinical hours for the Nurse Practitioner or Clinical Nurse Specialist tracks; 88 credits and 2,128 clinical hours for the Nurse Anesthesia track. The balance of the minimum of 1000 practice hours required for the DNP is obtained while conducting the DNP Project.

The DNP Advanced Practice program (Nurse Practitioner and Clinical Nurse Specialist tracks) is online with required on-site course immersions. The Nurse Anesthesia track is a hybrid program. The first year of the program is online and can be completed at a distance* (with 1-2 on-site immersion experiences in Advanced Health Assessment). All Nurse Anesthesia track students are required to be on campus beginning Summer Year 2 of the Plan of Study.

Students matriculated in the JHU School of Nursing are required to satisfy all academic requirements and adhere to all policies of the School. Students are expected to complete degree requirements within six years of enrollment.

Core courses that lay the foundation for advanced practice nursing are listed below. Additional core courses taken by students in the FNP, PNP, and CNS Pediatric Critical Care are so noted in the track descriptions that follow the DNP Advanced Practice Core Curriculum.

DNP Advanced Practice Core Curriculum

Code	Title	Credits
NR.210.600	Advanced Physiology/Pathophysiology (*)	4
NR.210.601	Advanced Health Assessment and Measurement (*)	3
NR.210.602	Clinical Pharmacology (*)	4
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.606	Biostatistics for Evidence-Based Practice (*)	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice (*)	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3

NR.210.610	Health Promotion and Risk Reduction Across the Lifespan (*)	2

Core Totals 27cr (AGPNP, ACNP, CNS ACC, CNS AH); *19cr (Nurse Anesthesia track only)

Additional DNP Advanced Practice Core Courses

Code	Title	Credits
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.210.604	Health Supervision: Birth through Adolescence	2

Core Totals: 30cr (FNP, PNP] 29cr (CNS PCC)
Program Totals 27-30cr/224-336PH

The following DNP core courses are required for all Advanced Practice DNP students. There is variation by specialty track in the minimum number of DNP Practicum credits and associated practicum hours.

DNP Core Curriculum

Code	Title	Credits
NR.210.802	Advanced Nursing Health Policy	2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.805	Translating Evidence into Practice	3
NR.210.806	Health Finance	2
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.818	Clinical Data Management and Analyses	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.886	Problem Discovery	1 - 3
NR.210.887	Project Advancement	1 - 3
NR.210.888	Project Application	1 - 3
NR.210.889	Project Evaluation and Dissemination	1 - 3

Doctor of Nursing Practice Advanced Practice Track DNP Project Progression

DNP students are required to successfully complete a DNP Project Proposal and Final Project.

Learning Outcomes

The Doctor of Nursing Practice (DNP) program outcomes are based upon:

1. The Essentials of Master's Education in Nursing (AACN, 2011)
2. The Essentials of Doctoral Education for Advanced Nursing Practice (AACN, 2006)

A graduate of the Doctor of Nursing Practice (DNP) program:

1. Integrates the art and science of nursing, with ethics and the biophysical, psychosocial, analytical, organizational, and public health sciences to improve patient and population health outcomes
2. Demonstrates organizational and systems leadership for quality and safety in health care systems
3. Critically appraises clinical scholarship and analytical methods for evidence-based practice
4. Applies information systems and technology for the provision and/or transformation of health care
5. Leverages interprofessional collaboration for the improvement of individual and population health outcomes
6. Utilizes population health strategies of risk reduction/illness prevention, health promotion, and health maintenance to reduce healthcare disparities and improve outcomes for diverse individuals and populations
7. Develops leadership for health care policy and advocacy that shapes health care financing, regulation, access, and delivery
8. Demonstrates mastery of the advanced nursing practice/advanced practice nursing role and population competencies

Adult-Gerontological Acute Care Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to utilize evidence-based guidelines while diagnosing and managing health problems of acutely and critically ill individuals across the adult lifespan. Adult-Gerontological Acute Care Nurse Practitioners work in acute and complex care settings such as critical care units, hospitalist or specialty services, and in other settings where patients can be physiologically unstable, technologically dependent, requiring frequent monitoring and intervention, and are highly vulnerable for complications.

The development of the curriculum is based on:

- The Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Task Force on Quality Nurse Practitioner Education and other national advanced practice, specialty focused standards and guidelines (AACN Scope and Standards Acute Care Nurse Practitioner Practice, American Association of Critical Care Nurses 2017)
- The Adult-Gerontology Acute Care and Primary Care Nurse Practitioner Competencies (AACN 2016)

Certification: Graduates of the Adult-Gerontological Acute Care Nurse Practitioner Track are eligible to apply for certification as an Adult-Gerontological Acute Care Nurse Practitioner from the American Association of Critical Care Nurses www.aacn.org/certification/get-certified (http://www.aacn.org/certification/get-certified/) or the American Nurses Credentialing Center www.nursingworld.org/our-certification (http://www.nursingworld.org/our-certification/).

Adult-Gerontological Acute Care Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.210.660	Introduction to Acute Care (56CL)	4
NR.210.661	Advanced Practice in Acute Care I (168CL)	6
NR.210.662	Advanced Practice in Acute Care II (168CL)	4
NR.210.663	Advanced Practice in Acute Care III (168CL)	4
NR.210.664	Advanced Practice in Acute Care IV (224CL)	6
Total Credits		**24**

Track Total [24cr/784CL]

Program of Study

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.806	Health Finance	2
	Credits	**5**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
	Credits	**7**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**8**
Second Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**7**
Third Semester		
NR.210.660	Introduction to Acute Care (56CL)	4
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**6**
Third Year		
First Semester		
NR.210.661	Advanced Practice in Acute Care I (168CL)	6
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
	Credits	**9**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.662	Advanced Practice in Acute Care II (168CL)	4
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.663	Advanced Practice in Acute Care III (168CL)	4
	Credits	**7**
Fourth Year		
First Semester		
NR.210.664	Advanced Practice in Acute Care IV (224CL)	6
NR.210.888	Project Application (56PPR)	2
	Credits	**8**
Second Semester		
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**6**
	Total Credits	**78**

Program Total: 78 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Adult-Gerontological Critical Care Clinical Nurse Specialist, DNP Advanced Practice Track

This track prepares the student to ensure high quality, safe, and cost effective nursing care and patient outcomes for young adults, older adults, and frail elderly across the health-illness continuum. Graduates of the CNS track use their depth of expertise, developed through professional practice and graduate education, to provide, manage, support, and improve the nursing and health care provided to patients with chronic, acute, and critical illnesses. CNSs advance the care of patients, families, groups, and the nursing profession through collaboration, consultation, and teaching. CNSs conduct research, evaluate and apply evidence, and use ethical decision making to solve problems. CNSs operate within three spheres of influence:

- patient/nurse
- nursing practice
- organization/system

The development of the curriculum is based on:

- The Criteria for the Evaluation of Clinical Nurse Specialist Master's, Practice Doctorate, and Post-graduate Certificate Educational Programs (NACNS 2015)
- National CNS competency and standards statements, *Clinical Nurse Specialist Core Competencies* (NACNS 2017)
- *Scope and Standards for Acute Care Clinical Nurse Specialist Practice* (AACN 2014)
- *Adult-Gerontology Clinical Nurse Specialist Competencies* (AACN 2010)
- *Statement on Clinical Nurse Specialist Practice and Education, 3rd Edition* [NACNS, 2019]

Certification: Graduates are eligible to apply for American Nurses Credentialing Center (ANCC) www.nursingworld.org/our-certifications (http://www.nursingworld.org/our-certifications/) or American Association of Critical Care Nurses (AACN) Adult-Gerontology Clinical

Nurse Specialist (CNS) certification https://www.aacn.org/certification/get-certified (https://www.aacn.org/certification/get-certified/).

Clinical Nurse Specialist Track-Specific Curriculum

Code	Title	Credits
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
Total Credits		**23**

Track Totals [23cr/784CL]

Program of Study
DNP Advanced Practice Track: Adult-Gerontological Critical Care Clinical Nurse Specialist Program of Study: 4-year plan

If you are a current student on the 3-year plan, please refer to the academic catalogue for which you entered the School of Nursing.

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
	Credits	**7**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.601	Advanced Health Assessment and Measurement	3
	Credits	**6**
Second Semester		
NR.210.802	Advanced Nursing Health Policy	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**6**
Third Semester		
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**5**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**9**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
	Credits	**9**
Fourth Year		
First Semester		
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2

NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**75**

Program Total: 75 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Adult-Gerontological Health Clinical Nurse Specialist, DNP Advanced Practice Track

This specialty track prepares the student to ensure high-quality, safe, and cost-effective nursing care and patient outcomes for young adults, older adults, and frail elderly across the health-illness continuum.

Graduates of the CNS track use their depth of expertise, developed through professional practice and graduate education, to provide, manage, support, and improve the nursing and health care provided to patients with chronic and acute illnesses. CNSs advance the care of patients, families, groups, and the nursing profession through collaboration, consultation, and teaching. CNSs conduct research, evaluate and apply evidence, and use ethical decision making to solve problems. CNSs operate within three spheres of influence:

- patient/nurse
- nursing practice
- organization/system

The development of the curriculum is based on:

- The Criteria for the Evaluation of Clinical Nurse Specialist Master's, Practice Doctorate, and Post-graduate Certificate Educational Programs (NACNS 2015)
- National CNS competency and standards statements (Clinical Nurse Specialist Core Competencies (NACNS 2017)
- Adult-Gerontology Clinical Nurse Specialist Competencies (AACN 2010).
- Statement on Clinical Nurse Specialist Practice and Education, 3rd Edition (NACNS 2019)

Certification: Graduates are eligible to apply for American Nurses Credentialing Center (ANCC) www.nursingworld.org/our-certifications (http://www.nursingworld.org/our-certifications/) and Adult-Gerontology Clinical Nurse Specialist (CNS) certification https://www.aacn.org/certification/get-certified (https://www.aacn.org/certification/get-certified/).

Clinical Nurse Specialist Track-Specific Curriculum

Code	Title	Credits
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
Total Credits		**23**

Track Totals [23cr/784CL]

Program of Study DNP Advanced Practice Track: Adult-Gerontological Health Clinical Nurse Specialist Program of Study: 4-year plan

If you are a current student on the 3-year plan, please refer to the academic catalogue for which you entered the School of Nursing.

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
	Credits	**7**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.601	Advanced Health Assessment and Measurement	3
	Credits	**6**
Second Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**6**

Third Semester		
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**5**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**9**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
	Credits	**9**
Fourth Year		
First Semester		
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**75**

Program Total: 75 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Adult-Gerontological Primary Care Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to provide person-centered, evidenced-based primary care to young adults (including late adolescents and emancipated minors), adults, and older adults (including young-old, old, and old-old adults). Emphasis is placed on the primary care management of acute episodic and chronic conditions and integration of health promotion and disease prevention throughout the adult lifespan.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Organization of Nurse Practitioner Faculties (NONPF) NP Core Competencies with Curriculum Content (2017)
- Common Advanced Practice Registered Nurse Doctoral-Level Competencies (2017)
- The Nurse Practitioner Core Competencies (2014)
- The Adult-Gerontological Acute Care and Primary Care Nurse Practitioner Competencies (2016)

Certification: Graduates are eligible to apply for one of the following certification exams: the Adult-Gerontology Primary Care Nurse Practitioner exam through the American Nurses Credentialing Center www.nursingworld.org/our-certifications (http://www.nursingworld.org/our-certifications/) or the Adult-Gerontology Primary Care Nurse Practitioner through the American Academy of Nurse Practitioners (https://www.aanpcert.org/ptistore/control/index (https://www.aanpcert.org/ptistore/control/index/))

Adult-Gerontological Primary Care Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.210.640	Clinical Reasoning I: Common Acute Illness	2
NR.210.641	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.642	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.643	Clinical Reasoning IV: Complex Chronic Illness	2
NR.210.644	Clinical Reasoning V: Topics for Nurse Practitioner Practice	2
NR.210.645	Clinical Practicum I: Adult-Gerontological Nurse Practitioner (168CL)	3
NR.210.646	Clinical Practicum II: Adult-Gerontological Nurse Practitioner (168CL)	3
NR.210.647	Clinical Practicum III: Adult-Gerontological Nurse Practitioner (112CL)	2
NR.210.648	Clinical Practicum IV: Adult-Gerontological Nurse Practitioner (112CL)	2
NR.210.649	Clinical Practicum V: Adult-Gerontological Nurse Practitioner (224CL)	4
Total Credits		**24**

Track Total [24cr/784CL]

Program of Study

DNP Advanced Practice Track: Adult-Gerontological Primary Care Nurse Practitioner Program of Study: 4 year plan

If you are a current student on the 3-year plan, please refer to the academic catalogue for which you entered the School of Nursing.

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**9**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
	Credits	**7**
Second Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.640	Clinical Reasoning I: Common Acute Illness	2
	Credits	**7**
Third Semester		
NR.210.641	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.645	Clinical Practicum I: Adult-Gerontological Nurse Practitioner (168CL)	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**7**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.642	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.646	Clinical Practicum II: Adult-Gerontological Nurse Practitioner (168CL)	3
	Credits	**8**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.643	Clinical Reasoning IV: Complex Chronic Illness	2
NR.210.647	Clinical Practicum III: Adult-Gerontological Nurse Practitioner (112CL)	2
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.644	Clinical Reasoning V: Topics for Nurse Practitioner Practice	2
NR.210.648	Clinical Practicum IV: Adult-Gerontological Nurse Practitioner (112CL)	2
	Credits	**7**
Fourth Year		
First Semester		
NR.210.649	Clinical Practicum V: Adult-Gerontological Nurse Practitioner (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**78**

Program Total: 78 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Family Primary Care Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to practice at an advanced level to provide care to individuals and families across the lifespan (including pediatric through geriatric populations). Family primary care nurse practitioners (FNPs) provide the initial, ongoing, and comprehensive care to patients in ambulatory and outpatient settings. FNPs assess, diagnose, and treat acute and chronic illnesses and are responsible and accountable for providing preventative health care, including health promotion, disease prevention, and health education and counseling. As an FNP, these advanced practice nurses are committed to family-centered care within the context of the community.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- Family nurse practitioner population-focused nurse practitioner (NP) competencies defined by the 2008 Consensus Model for APRN Regulations: Licensure, Accreditation, Certification & Education, the National Organization of Nurse Practitioner Faculties (NONPF) NP Core Competencies with Curriculum Content (2017)
- The Nurse Practitioner Core Competencies (2014), and the Family/Across the Lifespan Competencies (2013)

Certification: Graduates are eligible to apply for certification exams through the American Nurses Credentialing Center (ANCC) Certification Program www.nursingworld.org/our-certifications (http://www.nursingworld.org/our-certifications/) or through the American Academy of Nurse Practitioners Certification Program https://www.aanpcert.org/certs/applications (https://www.aanpcert.org/certs/applications/).

Family Primary Care Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.210.620	Clinical Reasoning I: Common Acute Illnesses in Pediatrics	2
NR.210.621	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.622	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.623	Clinical Reasoning IV: Common Acute and Complex Chronic Illnesses in Primary Care in Adults/Geriatrics	2
NR.210.624	Clinical Reasoning V: Clinical Management for the Family Nurse Practitioner - Role Transition and Special Topics in Family Health	2
NR.210.625	Clinical Practicum I: Family Nurse Practitioner (168CL)	3
NR.210.626	Clinical Practicum II: Family Nurse Practitioner (168CL)	3
NR.210.627	Clinical Practicum III: Family Nurse Practitioner (112CL)	2
NR.210.628	Clinical Practicum IV: Family Nurse Practitioner (112CL)	2
NR.210.629	Clinical Practicum V: Family Nurse Practitioner (224CL)	4
Total Credits		**24**

Track Total [24cr/784CL]

Program of Study 3-year and 4-year plans

DNP Advanced Practice Track: Family Primary Care Nurse Practitioner Program of Study: 3 year plan

Course	Title	Credits
First Year		
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**13**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.602	Clinical Pharmacology	4
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
	Credits	**12**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.604	Health Supervision: Birth through Adolescence	2
NR.210.620	Clinical Reasoning I: Common Acute Illnesses in Pediatrics	2
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**10**
Second Year		
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.621	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.625	Clinical Practicum I: Family Nurse Practitioner (168CL)	3
	Credits	**11**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.622	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.626	Clinical Practicum II: Family Nurse Practitioner (168CL)	3

NR.210.887	Project Advancement (56PPR)	2
	Credits	**10**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.623	Clinical Reasoning IV: Common Acute and Complex Chronic Illnesses in Primary Care in Adults/Geriatrics	2
NR.210.627	Clinical Practicum III: Family Nurse Practitioner (112CL)	2
	Credits	**7**
Third Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.806	Health Finance	2
NR.210.624	Clinical Reasoning V: Clinical Management for the Family Nurse Practitioner - Role Transition and Special Topics in Family Health	2
NR.210.648	Clinical Practicum IV: Adult-Gerontological Nurse Practitioner (112CL)	2
NR.210.888	Project Application (56PPR)	2
	Credits	**10**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.629	Clinical Practicum V: Family Nurse Practitioner (224CL)	4
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**8**
	Total Credits	**81**

Program Total: 81 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

DNP Advanced Practice Track: Family Primary Care Nurse Practitioner Program of Study: 4 year plan

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**9**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
	Credits	**8**
Second Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.604	Health Supervision: Birth through Adolescence	2
NR.210.620	Clinical Reasoning I: Common Acute Illnesses in Pediatrics	2
	Credits	**9**
Third Semester		
NR.210.621	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.625	Clinical Practicum I: Family Nurse Practitioner (168CL)	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**7**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.622	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.626	Clinical Practicum II: Family Nurse Practitioner (168CL)	3
	Credits	**8**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.623	Clinical Reasoning IV: Common Acute and Complex Chronic Illnesses in Primary Care in Adults/Geriatrics	2
NR.210.627	Clinical Practicum III: Family Nurse Practitioner (112CL)	2
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3

NR.210.624	Clinical Reasoning V: Clinical Management for the Family Nurse Practitioner - Role Transition and Special Topics in Family Health	2
NR.210.628	Clinical Practicum IV: Family Nurse Practitioner (112CL)	2
	Credits	**7**
Fourth Year		
First Semester		
NR.210.629	Clinical Practicum V: Family Nurse Practitioner (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**81**

Program Total: 81 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Nurse Anesthesia, DNP Advanced Practice Track

This DNP track prepares graduates to become one of the primary anesthesia providers in the country, a certified registered nurse anesthetist (CRNA). All nurse anesthesia programs must be accredited by the Council on Accreditation of Nurse Anesthesia Programs (COA) for graduates to be eligible to take the National Certification Examination (NCE). According to the COA, Practice Doctorate Programs are designed to prepare graduates with competencies for entry into anesthesia practice. Entry-into-practice competencies for the nurse anesthesia professional prepared at the practice doctoral level are those required at the time of graduation to provide safe, competent, and ethical anesthesia and anesthesia-related care to patients across the lifespan for diagnostic, therapeutic, and surgical procedures.

Entry-into-practice competencies should be viewed as the structure upon which nurse anesthetists continue to acquire knowledge, skills, and abilities along the practice continuum that starts at graduation (proficient) and continues throughout their entire professional careers (expert). See https://www.coacrna.org/.

The development of the curriculum is based on the COA Standards for Accreditation of Nurse Anesthesia Programs, Practice Doctorate, revised October, 26, 2018 and the Accreditation Policies and Procedures Manual, revised May, 2019.

CERTIFICATION

After successful completion of the 36-month curriculum, students will be eligible to apply for the National Certification Examination (NCE) through the National Board of Certification and Recertification for Nurse Anesthetists (NBCRNA). Certification to be a CRNA requires a passing score on the national certification exam administered by the NBCRNA. The NBCRNA administers the NCE to measure the knowledge, skills, and abilities necessary for entry-level nurse anesthesia practitioners. The NCE is a variable-length computerized adaptive test for entry into nurse anesthesia practice. See https://www.nbcrna.com/

Nurse Anesthesia Track-Specific Curriculum

Code	Title	Credits
NR.210.670	Human Anatomy	4
NR.210.671	Advanced Pharmacology for Nurse Anesthesiology	3
NR.210.672	Advanced Pathophysiology for Nurse Anesthesiology	4
NR.210.673	Introduction to Anesthesia Equipment, Technology, and Clinical Practice	2
NR.210.674	Professional Aspects of Nurse Anesthesiology Practice	3
NR.210.675	Nurse Anesthesiology Principles I	2
NR.210.676	Nurse Anesthesiology Principles II	3
NR.210.677	Nurse Anesthesiology Principles III	2
NR.210.678	Nurse Anesthesiology Principles IV	2
NR.210.679	Clinical Residency I (336CL)	3
NR.210.687	Clinical Residency II (80CL)	1
NR.210.680	Clinical Residency III (368CL)	3
NR.210.681	Clinical Residency IV (448CL)	4
NR.210.682	Clinical Residency V (448CL)	4
NR.210.688	Clinical Residency VI (80CL)	1
NR.210.683	Clinical Residency VII (368CL)	3
NR.210.684	Seminars in Nurse Anesthesiology I	3
NR.210.685	Seminars in Nurse Anesthesiology II	3
NR.210.686	Advanced Physiology for Nurse Anesthesiology	4
Total Credits		**54**

Track Total [50cr/2,128CL]

Program of Study

Course	Title	Credits
First Year		
First Semester		
NR.210.602	Clinical Pharmacology	4
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.674	Professional Aspects of Nurse Anesthesiology Practice	3
NR.210.806	Health Finance	2
All courses online.		
	Credits	**11**
Second Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.601	Advanced Health Assessment and Measurement (This course has a required immersion component.)	3
NR.210.686	Advanced Physiology for Nurse Anesthesiology	4

All courses online.		
	Credits	**10**
Third Semester		
NR.210.671	Advanced Pharmacology for Nurse Anesthesiology	3
NR.210.672	Advanced Pathophysiology for Nurse Anesthesiology	4
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
All courses online.		
	Credits	**10**
Second Year		
First Semester		
NR.210.675	Nurse Anesthesiology Principles I	2
NR.210.673	Introduction to Anesthesia Equipment, Technology, and Clinical Practice	2
NR.210.886	Problem Discovery	1
NR.210.670	Human Anatomy	4
	Credits	**9**
Second Semester		
NR.210.676	Nurse Anesthesiology Principles II	3
NR.210.679	Clinical Residency I (336CL*)	3
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
	Credits	**9**
Third Semester		
NR.210.687	Clinical Residency II (80CL*)	1
	Credits	**1**
Fourth Semester		
NR.210.887	Project Advancement	1
NR.210.805	Translating Evidence into Practice	3
NR.210.680	Clinical Residency III (368CL*)	3
NR.210.677	Nurse Anesthesiology Principles III	2
	Credits	**9**
Third Year		
First Semester		
NR.210.678	Nurse Anesthesiology Principles IV	2
NR.210.681	Clinical Residency IV (448CL*)	4
NR.210.888	Project Application	1
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
	Credits	**10**
Second Semester		
NR.210.684	Seminars in Nurse Anesthesiology I	3
NR.210.682	Clinical Residency V (448CL*)	4
NR.210.889	Project Evaluation and Dissemination	1
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**10**
Third Semester		
NR.210.688	Clinical Residency VI (80CL*)	1
	Credits	**1**
Fourth Semester		
NR.210.685	Seminars in Nurse Anesthesiology II	3
NR.210.683	Clinical Residency VII (368CL*)	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
	Credits	**8**
	Total Credits	**88**

*DNP practicum hours will be incorporated into this course for the development of the DNP project.

Pediatric Critical Care Clinical Nurse Specialist, DNP Advanced Practice Track

This track prepares the student to ensure high-quality, safe, and cost-effective nursing care and patient outcomes for children across the health-illness continuum. Graduates of the CNS track use their depth of expertise, developed through professional practice and graduate education, to provide, manage, support, and improve the nursing and health care provided to patients with chronic, acute, and critical illnesses. CNSs advance the care of patients, families, groups, and the nursing profession through collaboration, consultation, and teaching. CNSs conduct research, evaluate and apply evidence, and use ethical decision making to solve problems. CNSs operate within three spheres of influence

- patient/nurse
- nursing practice
- organization/system

The development of the curriculum is based on:

- *Statement on Clinical Nurse Specialist Practice and Education, 3rd Edition* [NACNS, 2019]
- *Scope and Standards for Acute Care Clinical Nurse Specialist Practice* [AACN 2014]

Certification

Graduates are eligible to apply for:

- American Nurses Credentialing Center (ANCC) https://www.nursingworld.org/our-certifications/ or
- American Association of Critical Care Nurses (AACN) Pediatric Clinical Nurse Specialist (CNS) certification https://www.aacn.org/certification/get-certified (https://www.aacn.org/certification/get-certified/).

Clinical Nurse Specialist Track-Specific Curriculum

Code	Title	Credits
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3

NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
Total Credits		**23**

Track Totals [23cr/784CL]

Program of Study

DNP Advanced Practice Track: Pediatric Critical Care Clinical Nurse Specialist: 4-year Plan

If you are a current student on the 3-year plan, please refer to the academic catalogue for which you entered the School of Nursing.

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
	Credits	**7**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.603	Human Growth and Development: Birth through Adolescence	1
	Credits	**7**
Second Semester		
NR.210.802	Advanced Nursing Health Policy	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**6**
Third Semester		
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**5**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**9**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
	Credits	**9**
Fourth Year		
First Semester		
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**76**

Program Total: 76 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Pediatric Dual Primary/Acute Care Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to practice at an advanced level to provide evidence-based family centered care to children from birth through adolescence. PNPs prepared in primary and acute care are educationally prepared to care for patients across the entire continuum of health and illness and in a variety of care settings.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Organization of Nurse Practitioner Faculties (NONPF) NP Core Competencies with Curriculum Content (2017)
- The Nurse Practitioner Core Competencies (2014)
- Population-Focused Nurse Practitioner Competencies: Pediatric Acute Care (2013) (NONPF)

Certification: Graduates are eligible to apply for the Pediatric Nursing Certification Board's pediatric acute care and pediatric primary care certification exams: http://www.pncb.org/ptistore/control/exams/pnp/steps (http://www.pncb.org/ptistore/control/exams/pnp/steps/).

Pediatric Dual Primary/Acute Care Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.110.645	Advanced Pediatric Acute Care Topics and Procedures	3
NR.110.646	Advanced Pediatric Acute Care Topics	3
NR.110.648	Pediatric Primary/Acute Care Practicum (56-224CL)	1 - 4
NR.110.649	Advanced Pediatric Acute Care Topics and Roles	1
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (112CL)	2
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (112CL)	2
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (168CL)	3
Total Credits		**25-28**

Program of Study

DNP Advanced Practice Track: Pediatric Dual Primary/Acute Care Nurse Practitioner Program of Study: 4-year plan

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**9**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
	Credits	**8**
Second Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.604	Health Supervision: Birth through Adolescence	2
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
	Credits	**9**
Third Semester		
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (112CL)	2
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**6**

Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (112CL)	2
	Credits	**7**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.887	Project Advancement (56PPR)	2
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (168CL)	3
	Credits	**10**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.110.648	Pediatric Primary/Acute Care Practicum (112CL)	2
NR.110.649	Advanced Pediatric Acute Care Topics and Roles	1
	Credits	**8**
Fourth Year		
First Semester		
NR.110.648	Pediatric Primary/Acute Care Practicum (224CL)	4
NR.110.645	Advanced Pediatric Acute Care Topics and Procedures	3
NR.210.888	Project Application (56PPR)	2
	Credits	**9**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
NR.110.646	Advanced Pediatric Acute Care Topics	3
NR.110.648	Pediatric Primary/Acute Care Practicum (56CL)	1
	Credits	**8**
	Total Credits	**88**

Program Total: 88 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Pediatric Primary Care Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to practice at an advanced level to provide evidence-based family centered care to children from birth through adolescence. Pediatric primary care nurse practitioners (PNPs) provide the initial, ongoing, and comprehensive care to patients in a variety of settings including: private offices, community clinics, newborn nursery, schools and in program-based specialty areas that manage chronically ill patients across the disease spectrum. PNPs assess, diagnose, and treat acute and chronic illnesses and are responsible and accountable for providing preventative health care, including health promotion, disease prevention, and health education and counseling.

The development of the curriculum is based on:

- The National Task Force Criteria for Evaluation of Nurse Practitioner Programs (2016)
- The National Organization of Nurse Practitioner Faculties (NONPF) NP Core Competencies with Curriculum Content (2017)
- The Nurse Practitioner Core Competencies (2014)
- Population-Focused Nurse Practitioner Competencies: Pediatric Primary Care (NONPF 2013)

Certification: Graduates are eligible to apply for the Pediatric Nursing Certification Board's pediatric acute care and pediatric primary care certification exams: http://www.pncb.org/ptistore/control/exams/pnp/steps (http://www.pncb.org/ptistore/control/exams/pnp/steps/).

Pediatric Primary Care Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (168CL)	3
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (168CL)	3
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (112CL)	2
NR.210.638	Clinical Practicum IV: Pediatric Nurse Practitioner (112CL)	2

NR.210.639	Clinical Practicum V: Pediatric Nurse Practitioner (224CL)	4
Total Credits		**24**

Track Totals [24cr/784CL]

Program of Study

DNP Advanced Practice Track: Pediatric Primary Care Nurse Practitioner Program of Study: 4-year plan

If you are a current student on the 3-year plan, please refer to the academic catalogue for which you entered the School of Nursing.

Course	Title	Credits
First Year		
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.806	Health Finance	2
	Credits	**8**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.802	Advanced Nursing Health Policy	2
	Credits	**9**
Third Semester		
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.602	Clinical Pharmacology	4
	Credits	**6**
Second Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
	Credits	**8**
Second Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.604	Health Supervision: Birth through Adolescence	2
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
	Credits	**9**
Third Semester		
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (168CL)	3
NR.210.886	Problem Discovery (56PPR)	2
	Credits	**7**
Third Year		
First Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (168CL)	3
	Credits	**8**
Second Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (112CL)	2
NR.210.887	Project Advancement (56PPR)	2
	Credits	**9**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.210.638	Clinical Practicum IV: Pediatric Nurse Practitioner (112CL)	2
	Credits	**7**
Fourth Year		
First Semester		
NR.210.639	Clinical Practicum V: Pediatric Nurse Practitioner (224CL)	4
NR.210.888	Project Application (56PPR)	2
	Credits	**6**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.889	Project Evaluation and Dissemination (56PPR)	2
	Credits	**4**
	Total Credits	**81**

Program Total: 81 Credits [cr]/784 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

Psychiatric Mental Health Nurse Practitioner, DNP Advanced Practice Track

This track prepares the student to diagnose and manage acute and chronic mental health problems across the lifespan (including pediatric through geriatric populations). The Johns Hopkins School of Nursing includes the use of the Perspectives of Psychiatry as an approach to the understanding and treatment of patients with psychiatric conditions. This inclusion offers systematic consideration of the patient's psychiatric condition from four perspectives: disease, dimensional, behavior, and life story.

Certification: Graduates will be eligible to apply for American Nurses Credentialing Center (ANCC) certification as a board certified psychiatric mental health nurse practitioner (PMHNP-BC).

Psychiatric Mental Health Nurse Practitioner Track-Specific Curriculum

Code	Title	Credits
NR.110.573	Neurobiology of Mental Disorders	1
NR.110.574	Clinical Psychopharmacology	2
NR.110.575	Differential Diagnosis of Mental Disorders	2
NR.110.576	Psychotherapeutic Frameworks and Modalities	2
NR.110.577	Psychiatric Mental Health Nurse Practitioner Practicum: Adult/Gero	1 - 4
NR.110.578	Psychiatric Mental Health Nurse Practitioner Practicum: Peds/Family	1 - 4
NR.XXX.XXX Clinical Practicum III		5
NR.XXX.XXX Clinical Practicum IV		4

Program of Study

Course	Title	Credits
First Year		
First Semester		
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.603	Human Growth and Development: Birth through Adolescence	1
	Credits	**11**
Second Semester		
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.602	Clinical Pharmacology	4
NR.210.604	Health Supervision: Birth through Adolescence	2
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
	Credits	**12**
Third Semester		
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.806	Health Finance	2
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.886	Problem Discovery (56ppr)	2
	Credits	**8**
Second Year		
First Semester		
NR.210.802	Advanced Nursing Health Policy	2
NR.110.574	Clinical Psychopharmacology	2
NR.110.575	Differential Diagnosis of Mental Disorders	2
NR.110.573	Neurobiology of Mental Disorders	1
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.110.576	Psychotherapeutic Frameworks and Modalities	2
	Credits	**12**
Second Semester		
NR.110.577	Psychiatric Mental Health Nurse Practitioner Practicum: Adult/Gero [1]	1-4
NR.110.579	Integrated Care I	1
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.887	Project Advancement (56ppr)	2
NR.210.805	Translating Evidence into Practice	3
NR.xxx.xxx Clinical Practicum (112cl)		2
	Credits	**12-15**
Third Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.110.578	Psychiatric Mental Health Nurse Practitioner Practicum: Peds/Family [1]	1-4
NR.110.580	Integrated Care II	1
NR.XXX.XXX Clinical Practicum II (280cl)		5
	Credits	**10-13**
Third Year		
First Semester		
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.888	Project Application (56ppr)	2
NR.XXX.XXX Clinical Practicum III (280cl)		5
	Credits	**9**
Second Semester		
NR.210.818	Clinical Data Management and Analyses	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.889	Project Evaluation and Dissemination (56ppr)	2
NR.XXX.XXX Clinical Practicum IV (224cl)		4
	Credits	**10**
	Total Credits	**84-90**

Program Total: 84 Credits [cr]/896 Clinical Hours [CL]/224 Project Practicum Hours [PPR]

[1] NR.110.577 & NR.110.578 are variable courses which for the Psychiatric Mental Health Nurse Practitioner, DNP Advanced Practice Track will be counted as 1 credit apiece

Doctor of Nursing Practice: Executive Track

The Doctor of Nursing Practice program at the Johns Hopkins School of Nursing is accredited by the:

Commission on Collegiate Nursing Education (CCNE)
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

The DNP Executive Track option is a post-master's to DNP program that is designed for students to remain in practice while gaining the knowledge, skills, and abilities to lead cross-professional teams in the improvement and provision of informed quality health care. The 40-credit DNP Executive Track is offered online with required on-site course immersions. The program can be completed in six semesters of study. The DNP is designed for nurses involved in an advanced nursing practice role including but not limited to: clinical nurse specialist, nurse practitioner, nurse midwife, nurse anesthetist, public health practitioner, nurse executive, nurse informatician, and health policy analyst. Clinical hours obtained as part of the master's degree can be applied to the DNP program. The student obtains 448 practice hours in association with conduct of the DNP Project, and additional DNP practicum hours to obtain a minimum of 1000 practice hours required for the DNP degree. Students are expected to complete degree requirements within six years of enrollment. The current DNP Program Director is Dr. Kimberly McIltrot, DNP, CPNP, CWOCN, CNE, FAANP, FAAN.

Program Requirements

DNP Executive Track Curriculum

The 40-credit DNP Executive Track includes 19 credits of required DNP core, 12 credits for the required DNP Project, and 9 credits of elective/cognate courses related to the student's focus specialty area. Students who require additional practice hours to fulfill the 1000 practice hours may take additional DNP Practicum course(s) for 1 (56 practice hours) to 2 (112 practice hours) credits to close that gap. Students who are concurrently completing the Nurse Educator Certificate Option (NECO)may utilize all of their NECO credits towards fulfillment of their (9) required electives. Students must complete the program within 6 years.

Code	Title	Credits
NR.210.802	Advanced Nursing Health Policy	2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.805	Translating Evidence into Practice	3
NR.210.806	Health Finance	2
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.818	Clinical Data Management and Analyses	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.886	Problem Discovery	3
NR.210.887	Project Advancement	3
NR.210.888	Project Application	3
NR.210.889	Project Evaluation and Dissemination	3
Electives		9
Total Credits		**40**

Program Totals 40cr/Minimum 448CH

Program of Study

DNP Executive Track

Course	Title	Credits
First Semester		
NR.210.886	Problem Discovery	3
NR.210.806	Health Finance	2
	Credits	**5**
Second Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.802	Advanced Nursing Health Policy	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
	Credits	**7**
Third Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.887	Project Advancement	3
NR.XXX.XXX	Elective (student's choice) [1]	3
	Credits	**9**
Fourth Semester		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.XXX.XXX	Elective (student's choice) [1]	3
	Credits	**8**
Fifth Semester		
NR.210.888	Project Application	3
NR.XXX.XXX	Elective (student's choice) [1]	3
	Credits	**6**
Sixth Semester		
NR.210.889	Project Evaluation and Dissemination	3
NR.210.818	Clinical Data Management and Analyses	2
	Credits	**5**
	Total Credits	**40**

[1] DNP Executive Track students are not permitted to take Electives in the first 2 semesters. A total of 9 elective credits are required. Course credits can range from 1 to 3 and dispersed across semesters 3 through 6.

Program Total: 40 Credits [cr]/1000 Clinical Hours [CL]
(Prior MSN - up to 552 clinical hours plus 448 DNP practicum hours).

Doctor of Nursing Practice Executive Track Scholarly Project Progression

DNP students are required to successfully complete a Project Plan Proposal and DNP Project.

The Doctor of Nursing Practice (DNP) program outcomes are based upon:

1. The Essentials of Master's Education in Nursing (AACN, 2011)
2. The Essentials of Doctoral Education for Advanced Nursing Practice (AACN, 2006)

A graduate of the Doctor of Nursing Practice (DNP) program:

1. Integrates the art and science of nursing, with ethics and the biophysical, psychosocial, analytical, organizational, and public health sciences to improve patient and population health outcomes
2. Demonstrates organizational and systems leadership for quality and safety in health care systems
3. Critically appraises clinical scholarship and analytical methods for evidence-based practice
4. Applies information systems and technology for the provision and/or transformation of health care
5. Leverages interprofessional collaboration for the improvement of individual and population health outcomes
6. Utilizes population health strategies of risk reduction/illness prevention, health promotion, and health maintenance to reduce healthcare disparities and improve outcomes for diverse individuals and populations
7. Develops leadership for health care policy and advocacy that shapes health care financing, regulation, access, and delivery
8. Demonstrates mastery of the advanced nursing practice/advanced practice nursing role and population competencies

Nursing, Doctor of Philosophy

The goal of the PhD program at the Johns Hopkins School of Nursing is to prepare the leaders in nursing science development. Graduates will be prepared for careers as nurse scholars to conduct research that advances the discipline of nursing, health, and health care quality. The school offers an individualized program in selected areas of research congruent with student's area of interest and the expertise of the research faculty. A key feature of the program is an intensive mentored research experience with an active investigator who has an established program of funded research. In addition to the diverse research interests of the School of Nursing faculty, students have access to the entire Johns Hopkins University, which fosters interdisciplinary and international research projects.

Quality is the defining characteristic of academic life at Johns Hopkins and the School of Nursing. Each student completes a core curriculum and works closely with a faculty adviser to complete an individualized course of study that fulfills the student's goals and develops the basis for a program of research. The length of the program is expected to be the equivalent of four to five years of full-time study. Students must complete the program within 7 years. The Doctor of Philosophy of Nursing (DNP) to Doctor of Philosophy Nursing (PhD) pathway* can be done in less than 7 years.

Doctor of Nursing Practice (DNP) to Philosophy in Nursing (PhD) Pathway

This program is a full time PhD program for those who have already completed a DNP Program. Now advance your DNP project's research from clinical implementation to scientific discovery with a PhD in Nursing from Johns Hopkins and get credit for the work you've already done. You may carry over 9 elective credit hours from your DNP program to the PhD program. This reduces the elective credit load to 10 instead of 19 elective credits for the PhD program. With this decreased course load the degree program can potentially be completed in 3 years based on growth from prior DNP work, but that is not a requirement of the program. Please follow the overview, requirements, sample program and learning outcomes as written for the PhD program for all aspects of the DNP to PhD pathway. (https://nursing.jhu.edu/academics/programs/doctoral/phd/dnp-to-phd.html)

Funding for PhD Program

Qualified students interested in the PhD program may be eligible to receive tuition and stipend support through the School of Nursing. Complete information is available by contacting the PhD Program Administrator at SON-PhDProgram@jhu.edu

Please Note: In the following Curriculum and Plans of Study, School of Public Health courses (PH.XXX.XXX) are offered on the quarter system and are depicted here as [credits & units]and count accordingly in each school. The course directory for the Public Health courses (PH) is available at SPH Course Directory (https://www.jhsph.edu/courses/)

Summer Registration

PhD students register for all fall and spring semesters from matriculation to degree completion. The only exceptions are students on an approved leave of absence.

Students will register for the summer semester if they:

1. take a course;
2. complete the preliminary oral exam;
3. defend their dissertation; or
4. graduate (F1 Visa Students).

Students who successfully defended their dissertation within the spring semester, but who will graduate in the summer semester, are not required to register (with the exception of F1 Visa Students).

If a student is not registered for other summer coursework, registering for 1 credit of Dissertation Research is typically sufficient for the summer semester for those students planning their dissertation defense in the summer semester.

Students should work with their faculty mentor, PhD Program Director, and the Registrar's Office to determine their appropriate student status given their activities during the semester. All students should register prior to the first day of classes in all terms.

PhD Program Research Residency Guidelines

The research residency is an important pedagogical aspect of the PhD program regardless of funding source or student status, full or part time. Students should commit to a research residencies each semester – including summer - across the entire period of funding from the JHSON. The purpose of the research residency requirement for the PhD program is to provide full time students with research training. The goal of the research residency is for the student to have experiences in aspects of research that will facilitate embarking on a career of research and scholarship. Given that publication is a vital outcome of any PhD program, the research residency mechanism is an ideal one from which to publish. It is important to point out that not all research training experiences will be the same.

1. Decisions regarding research training experiences ultimately rest with the primary research mentor and the student; however, there are several relevant guidelines, outline on the following page:
   - An average of 15 hours per week (-) should be devoted to the research residency. Ideally, the student will be a part of a research team. Timesheets are available from the PhD Program Administrator to assist in tracking these hours.
   - The range of experiences may include but are not limited to: conceptualization of a study, grant writing, review of literature, data collection, data management, data analysis, preparation of manuscripts, presentations, and laboratory experiences.
   - It is highly desirable that the student participates in a variety of research endeavors throughout the residency. There is benefit to be gained from spending “time at task”.
2. Setting goals and objectives for the research residency:
   - It is important to have realistic and objective goals and outcomes to both ensure that there are meaningful research training experiences and that research training experiences are documented in the student portfolio.
   - The student and mentor shall devise research training goals for full time year around research training experience as well as each semester the student is a research trainee. It is also recommended that the overall goals are reviewed each semester.
   - Measurable outcomes addressing each goal should be articulated and monitored for achievement. Outcomes that are salient may include: the development of protocols, publications, presentations, and objective evidence of the above-mentioned range of experiences or other experiences that are deemed appropriate.
3. It is required that each student include one semester of research training away from the primary mentor during the full-time year around residency during the three-year SON supported course of study and stipend. The decision as to who the student will work with is to rest among the student, primary research mentor and the prospective researcher (Matching students with faculty will be determined collaboratively by the student, primary research mentor, the prospective researcher, and the PhD Program Director.):
   - The development of goals and objectives is similarly important for this research training experience.
   - Evidence of a successful time away from the primary research mentor would include similar measurable outcomes as described above.
   - Exceptions for this requirement can be considered on a case by case basis. Please consult with the PhD Program Director.
4. Given the pedagogical importance, a research residency is also required for part time students with the following considerations:
   - Research residency hours should be proportional to the number of credit hours, e.g., 5 – 10 hour per week
   - Flexibility in the requirements for part time students is important. Examples of times during which research experiences can be suggested include semester breaks, weekends, evenings, and during the summer.
   - The JH requirement for two successive semesters of full time study will facilitate a similar 15 hour per week research experience during this time for part time students.

PhD Program Teaching Residency Guidelines

Every PhD Student will serve as Teaching Assistant (TA) for at least one course without compensation prior to graduation. The required TA experience will be up to 10 hours per week. After completing their required TA residency, students may choose to serve as TA for additional courses for compensation.

The purpose of the TA experience is to advance the student’s socialization into the teaching role of the faculty member. Program Directors will determine the availability of TA positions. Specific learning objectives for the required TA experience will be developed by the student with input from the student’s PhD adviser and the mentoring course coordinator. Learning activities may include but are not limited to:

- Course planning and syllabus development
- Lecturing
- Leading interactive learning exercises,
- Using of information technologies to facilitate learning
- Measuring student mastery of knowledge and skills
- Test construction and item analysis
- Assigning and grading papers
- Development of teaching strategies for a class with students of varying abilities
- Determining student grades
- Evaluating student satisfaction
- Participating in curriculum planning and evaluation meetings
- Working with others to plan and conduct an educational research project.
- Working with others to publish a paper on a course or teaching method.
- Attending a national or international nursing education conference

Students should be able to articulate how their teaching and learning philosophy is grounded in their philosophy of the human person. Other areas of critical inquiry and reflection may include theories of learning; duties of teachers and students; virtues of teachers and students; and the objective of the education of nurses at all three levels.

Students considering The Nurse Educator Certificate Option (NECO) should discuss with their advisor whether to apply one of their teaching residencies to the teaching practicum (NR.110.543 Teaching Practicum) which is optional within the NECO.

Evaluation: Upon completion of each assigned course, graduate TA and the faculty of the graduate TA are expected to submit their evaluations to the Academic Program Administrator. Completed evaluations will be discussed at the PhD Curriculum Committee to monitor the quality of TA experience and also will be shared with relevant Program Directors to be considered for future TA assignments. TAs and the respective faculty member should be encouraged to include metrics in their course evaluation to assess the effectiveness of the TA.

PhD Student Scholarly Progression

PhD students are required to achieve various milestones (see below) in progressing through the program that culminate in the dissertation. These processes serve to assure quality of the scholarship and rigor of the scientific process.

- Annual Review (https://webapps.nursing.jhu.edu/secure/phd_progress/) with Advisor
- Annual Review with Dissertation Committee
- Comprehensive Examination (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Comprehensive_Exam_Application.docx)
- Preliminary Oral Examination (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Preliminary_and_Final_Oral_Exam_Form_Oct_2021.docx)
- Final Defense (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Preliminary_and_Final_Oral_Exam_Form_Oct_2021.docx)

Johns Hopkins University Mentoring Expectations

Please see the new Johns Hopkins University Mentoring Expectations (https://provost.jhu.edu/education/graduate-and-professional-education-resources/phd-mentoring-policies-and-resources/) and the new Johns Hopkins University Policy on Mentoring Commitments for PhD Students and Faculty (https://provost.jhu.edu/wp-content/uploads/2019/08/JHU-Mentorship-Commitments-of-Faculty-Advisors-and-PhD-Students.pdf) from the Provost's Office.

Annual Review with PhD Advisor

1. Conducted in the Spring semester annually as the student prepares to complete an academic year (generally late March – early May)
2. Documents to review:
   a. Individual development plan (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Individual_Development_Plan_writeable_002_.pdf)
   b. NIH Biosketch (https://grants.nih.gov/grants/forms/biosketch.htm)/CV
   c. Clinical research skills checklist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Research_Residency_Goals.docx)
3. Complete online submission of progress (student (https://webapps.nursing.jhu.edu/secure/phd_progress/) and advisor (https://webapps.nursing.jhu.edu/secure/phd_progress/advisor/)) to release registration hold

Annual Review with Dissertation Committee

1. Once the student has entered into candidacy, an annual meeting with the full dissertation committee is highly recommended
2. A review of student progress – academically and scientifically – along with additional development opportunities should be discussed

Challenges in study implementation should be reviewed and the committee should offer support to help the student overcome the challenge or refine the study as appropriate

PhD Comprehensive Examination

PhD **(**https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Comprehensive_Exam_Application.docx**)** Comprehensive Exam **(**https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Comprehensive_Exam_Application.docx**)Application**

1. Student Status: This examination may be taken as early as the first summer following fall admission.
   a. Students must have completed year one required nursing classes and statistics course work, totaling 24 credit hours, to sit for the Comprehensive Examination (with the exception of NR.110.827 Grant Writing and NR.110.891 Responsibilities & Activities of the Nurse Scientist, which need not be taken prior to this examination).
   b. Students must be registered the semester prior to the examination and have all incompletes cleared from their record in order to take the Comprehensive Examination.
2. Purpose: The purpose of the written comprehensive examination is to validate the student's ability and skills to generate, synthesize, and critically analyze knowledge relevant to the discipline of nursing. Questions related to required nursing and statistics courses are administered in the School of Nursing computer lab in two 3-hour segments separated by a 1-hour lunch break.
3. Procedure:
   a. The examination is offered in January and June. Examination dates will be set in November and March. All students are tested on the same day.
   b. Students desiring to take the examination meet with their advisers to review eligibility and assure that all requirements have been met.
   c. With the approval of the adviser, 30 days or more before the scheduled examination, the student completes the "Comprehensive Examination Application Form" and submits it to the PhD Program Director for approval. A copy of the approval form is kept on file in the students' personal folder in the PhD Program Director's office.
   d. The PhD Program Director informs the PhD Curriculum Committee members of those students approved to take the Comprehensive Examination three weeks before the examination.
   e. The PhD program office shall inform those taking the examination of its time and place and shall proctor the examination.
   f. Students not taking the examination when scheduled due to personal reasons are not penalized and need only to reschedule.
4. Structure: The examination consists of a proctored session in two parts of 3 hours each to test knowledge of required nursing program content.
   a. Part A is given in the morning and is to be completed in 3 hours before a lunch break. Part B is given in the afternoon and is to be completed in 3 hours.
   b. Students are required to type answers, print hardcopy, and submit exam answers via email to the Program Administrator from a JHSON computer in the assigned laboratory.
   c. Students may bring what they can carry for reference. The use of reference or bibliography databases (such as endnote or reference manager) is not permitted.
   d. Students should critically analyze and synthesize information in a logical manner, citing major authors.
   e. Students should structure their time to incorporate any needed breaks.
5. Development, Administration, and Grading:
   a. The PhD Curriculum Committee appoints the examination committee at its November and April meetings. The committee includes at least three members, one member having taught in the core theory sequence and one member having taught in the core research design and methods sequence.
   b. The committee convenes and selects the chair.

c. The committee develops integrating questions for the examination focusing on required nursing and statistics courses. The questions should test students' ability to synthesize nursing theory and research and statistics application.
d. The grade for each question is fail, pass, or pass with distinction. To pass the examination, the student must receive a pass or higher score from a majority of the examination committee on all questions. The criteria for adequate completion of the examination are intended to facilitate the judgment of the Comprehensive Examination Committee as to whether the candidate has responded adequately to the questions.
e. The candidate's response should thoroughly address each aspect of each question as well as:
    i. Reflect accurate, consistent, and appropriate application of concepts to the situation presented in the question.
    ii. Show evidence of in-depth application and synthesis of the content of the courses.
    iii. Reflect the appropriate use of references, e.g., statistical texts for statistical issues, and peer-reviewed journal papers.

6. Results:
    a. Students are informed of their results in writing within 30 days after completion of the examination. The letter is copied to the student's adviser, the chair of the PhD Admissions, Progression and Graduation Committee, and the Registrar's Office. If the student fails to pass any component of the Comprehensive Exam, the letter is also copied to the Associate Dean for Academic Affairs.
    b. Further feedback on students' performance may be obtained from their advisers.
    c. A student who fails the examination may repeat it once. The student should contact their academic adviser to discuss their academic difficulties and may be asked to write a letter to the chair of the PhD Admissions, Progression and Graduation Committee communicating any information including their plan for improvement.
    d. The repeat examination must be completed within two years of the original examination.
    e. The appeal process for grades applies to this examination.

PhD Preliminary Oral Examination

PhD Preliminary Oral Exam Form (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Preliminary_and_Final_Oral_Exam_Form_Oct_2021.docx)

1. Student status: PhD students having successfully completed the written Comprehensive Examination must be registered for at least three credits consisting of two credits dissertation advisement plus one credit dissertation seminar in the fall and spring semesters they are progressing toward the degree (see above for summer semester registration requirements). Part-time students who have completed the Comprehensive Examination must register for two credits dissertation advisement plus one credit dissertation seminar each semester they are progressing toward the degree after completing half (11) of the required elective credits. Before undergoing the Preliminary Examination, students must:
    a. complete all required and elective coursework;
    b. have all incompletes cleared from their record;
    c. have completed the Johns Hopkins University Residency requirement of 2 consecutive semesters, fall and spring, full-time study; and
    d. be registered the semester of the examination, this includes summer semester.
2. Preliminary Oral Examination Committee Composition:
    a. At least three of the five faculty members must be tenure track at the rank of assistant professor, associate professor, or full professor. This may include full time or part time faculty, visiting faculty, or emeritus faculty if they also hold the titles of assistant, associate, or full professor.
    b. Three of the five members must be from the candidate's home department (SON). One of these must be at the Associate Professor level or higher.
    c. Two members must be from outside of the candidate's home department (SON)
        - One (1) of the two outside faculty members must be within Johns Hopkins University, full-time tenure track holding rank of Professor, Associate Professor or Emeritus Professor who serves as Chair of the examination committee.
        - One (1) committee member from any department at the University (outside of the SON) or outside of the University pending committee approval
    d. For DNP/PhD students, because the oral exam stands in place of the DNP exam, it is expected that the student's DNP advisor will be a voting member of the committee.
    e. Note: With approval, there is an option for a 6th, non-voting member. This option is likely to be most relevant for DNP/PhD students.

3. Purpose of Preliminary Oral Examination: The purpose of a preliminary examination is to test the depth and breadth of the student's knowledge and reasoning abilities. The scope of such an examination cannot, nor should it be, sharply defined. The examination committee can gain a feeling for the limits of the examination by a review of the candidate's formal course record and by knowledge of the school, group, department, or committee requirements (e.g., whether specific minor as well as major subjects are to be included).

    Preliminary Oral Examinations are closed to all but the candidate and examination committee members. (Students are encouraged to arrange for a "Dry Run" presentation for colleagues and faculty input prior to exam.)
4. Criteria for Selection of Examination Committee Chair and Members (Oral exam forms must be submitted to the Academic Program Administrator at least 60 days before the exam date) The initial review will be conducted by Program Director and APG (Admissions, Progressions and Graduate) Committee Chair. Then the form will go to the APG Committee for final approval. Approval must be received by the student before they can conduct their exam.
    a.

    Chair Selection: The Examination Committee Chair will be the most senior ranking member from outside of the candidate's home department (SON) at JHU. If two outside members have the same rank at JHU, the Chair is the one who has been in that rank the longest.

b. Faculty that do not have an earned Research Doctorate (e.g., DNP, MD), are not tenure-eligible (e.g., Practice-Education Track), or are from outside the University, must have Curriculum Vitae (CV) submitted to School of Nursing PhD Admissions, Progression and Graduation Committee for approval. This approval is only required the first time they serve on a SON committee.
c. Each committee may include only 1 member who is not on faculty at Johns Hopkins University. Faculty members at other institutions and adjunct faculty must be reviewed and approved by the School of Nursing PhD Admissions, Progression and Graduation Committee prior to participation in the Oral Examination.
d. SON faculty members are defined as those having primary appointment in the Johns Hopkins School of Nursing or who are assigned as the Faculty Advisor.

Duties of the Chair

1. Preside at the examination.
2. Determine the scope, character, and conduct of the examination before the questioning begins.
3. Determine time allotments to inside and outside members of the committee.
4. Report the results of the examination to the candidate.
5. Report the results of the examination to the PhD Admissions, Progression and Graduation Committee immediately after the examination on the form provided for this purpose.
   a. Duties of the Members:
      i. Notify the Chair, Faculty advisor and Academic Program Administrator of inability to appear at designated time.
      ii. Participate in the examination process.
   b. Duties of the Alternate:
      i. Notify the Committee chair, faculty advisor and Academic Program Administrator of inability to appear at designated time.
      ii. Participate in the examination process as a committee member if one of the serving members of the committee fails to appear on the date of the examination.
      iii. Alternate members not called to serve as committee members may attend the examination if they wish to do so, but may not ask questions or vote.
   c. Dissertation Committee Optional Role: External Reader: An external reader is an individual with an earned research or clinical doctorate who offers additional content and/or methodological expertise but is not a regular member of the dissertation committee. Attendance at the dissertation oral examination is not required for the external reader. If in attendance, they may participate in the private portion of the exam at the discretion of the chair, but cannot vote on the outcome of the exam. In addition, the external reader may not be present during the voting.
   d. Length of Examination: Examination process will start with a 20-minute presentation on the topic of the student's proposed dissertation research. The chair will ask for questions from the committee. The student will respond until all members of the committee have completed their questions. The committee will vote by private ballot on its evaluation of the examination with majority ruling. (Total examination period is expected to be about 2 hours.)
6. Results of the Examination: Students who successfully pass the examination will become PhD Candidates. The examination may result in one of the following outcomes:
   a. If the candidate receives an unconditional pass (a majority of favorable votes), the committee is to be considered discharged.
   b. If the candidate receives a conditional pass, the removal of the condition is to be reported to the School of Nursing PhD Admissions, Progression and Graduation Committee by the chair in writing, after which the committee is considered discharged.
   c. If the candidate fails, the examination committee, through the chair, is requested to recommend a course for future action:
      i. No re-examination.
      ii. Re-examination by the same committee.
      iii. Re-examination in written form and conducted by the same committee.
      iv. Re-examination by a new committee. If the recommendation is for a new committee, at least one outside member of the original committee shall be appointed to the new committee.

      The committee may recommend whatever action in its judgment seems desirable, taking into consideration the background of the student, their prior performance and future potential, and reactions to oral questioning. The School of Nursing PhD Admissions, Progression and Graduation Committee will be guided by these recommendations and will assume responsibility for whatever actions are taken. Stipulations and/or Re-examination: If there is a recommendation for re-examination, the examination can be repeated once, but only once, and must be repeated within one calendar year. The committee may also make recommendations for the conduct of the proposed research that do not affect the outcome of the examination; the student's adviser will help them incorporate such recommendations into the proposal.

[1] Faculty who do not have an earned Research Doctorate (e.g., DNP, MD), are not tenure-eligible (e.g., Practice-Education Track), or are from outside the University, must have Curriculum Vitae (CV) submitted to School of Nursing PhD Admissions, Progression and Graduation Committee for approval

[2] Each committee may include only 1 member who is not on faculty at Johns Hopkins University. Faculty members at other institutions and adjunct faculty must be reviewed and approved by the School of Nursing PhD Admissions, Progression and Graduation Committee prior to participation in the Oral Examination. Occasionally, one adjunct or one scientist faculty member, but not both, may serve on the Committee. Neither may serve as the Chair.

[3] SON faculty members are defined as those having primary appointment in the Johns Hopkins School of Nursing

[4] Each committee may include only 1 member who is not on faculty at Johns Hopkins University. Faculty members at other institutions and adjunct faculty must be reviewed and approved by the School of Nursing PhD Admissions, Progression and Graduation Committee prior to participation in the Oral Examination. Occasionally, one adjunct or one scientist faculty member, but not both, may serve on the Committee. Neither may serve as the Chair.

PhD Program Dissertation and Final Oral Examination

PhD Program Dissertation and Final Oral Examination Form (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/nursing-phd/Preliminary_and_Final_Oral_Exam_Form_Oct_2021.docx)

1. Student status: PhD candidates in the School of Nursing must be registered for at least 3 credits per semester (not including summer, unless defending during the summer semester) after passing the preliminary oral examination until taking the final oral examination. Specifically, students are to take no less than NR.110.890 Dissertation Seminar Dissertation Seminar, 1 credit, and NR.110.899 Dissertation Dissertation Research, 2 credits, both fall and spring semester unless they are on an approved leave of absence. The student must be registered the semester prior to the examination. All students must complete all requirements for the PhD Degree within seven (7) years of matriculation (excluding any Leaves of Absence).

   Nota Bene: If students are the holders of a research training grant (such as NRSA), they must also comply with the academic requirements of that award.
2. Dissertation and Final Oral Examination Committee Composition: (Oral exam forms must be submitted to the Academic Program Administrator at least 60 days before the exam date) The initial review will be conducted by Program Director and APG (Admissions, Progressions and Graduate) Committee Chair. Then the form will go to the APG Committee for final approval. Approval must be received by the student before they can conduct their exam.
   a. At least three of the five faculty members must be tenure track at the rank of assistant professor, associate professor, or full professor. This may include full time or part time faculty, visiting faculty, or emeritus faculty if they also hold the titles of assistant, associate, or full professor.
   b. Three of the five members must be from the candidate's home department (SON). One of these must be at the Associate Professor level or higher.
   c. Two members must be from outside of the candidate's home department (SON)
      - One (1) of the two outside faculty members must be within Johns Hopkins University, full-time tenure track holding rank of Professor, Associate Professor or Emeritus Professor who serves as Chair of the examination committee.
      - One (1) committee member from any department at the University (outside of the SON) or outside of the University pending committee approval
   d. For DNP/PhD students, because the oral exam stands in place of the DNP exam, it is expected that the student's DNP advisor will be a voting member of the committee.
   e. Note: With approval, there is an option for a 6th, non-voting member. This option is likely to be most relevant for DNP/PhD students.

3. Student Responsibilities:
   a. Consult with the adviser regarding the composition of the Dissertation Committee.
   b. Procure agreement of the faculty members to serve on the Examination Committee and arrange a time suitable to all members (including alternates) at least 60 days before exam.
   c. Initiates Oral Exam for the PhD Degree form to obtain approval of Dissertation Committee composition and members from the PhD Admissions, Progression, and Graduation Committee at least 60 days in advance of the exam. The Oral Exam for the PhD Degree form should be accompanied by CVs of proposed dissertation committee members meeting any of the following criteria: (a) holds a non-Research Doctorate, (b) not tenured or tenure-eligible at Johns Hopkins University, or (c) does not have a primary faculty appointment at Johns Hopkins University. Form and accompanying CV(s) should be submitted to the PhD Admissions, Progression, and Graduation Committee for approval at least 60 days in advance of the scheduled exam.
   d. Obtains JHMIRB approval or Animal Research Committee approval (with adviser as PI of record) before initiating dissertation research.
   e. Executes research under the supervision of dissertation adviser.
   f. Keeps adviser informed of progress while conducting research, requesting meetings with adviser and Dissertation Committee members as appropriate.
   g. Writes the dissertation according to the "SON Guidelines for Writing the PhD Dissertation."
   h. After obtaining adviser's approval, initiates scheduling for Final Oral Examination.
   i. Submit dissertation to Dissertation Committee at least 3 weeks before anticipated Final Oral Examination.
   j. After approval of the dissertation, submit final version to the Sheridan Library's Electronic Thesis & Dissertation (EDT) Program.
   k. Prepares a manuscript to include at least some of the results of the dissertation to be submitted to an appropriate journal before graduation.
4. Purpose of Dissertation and Final Oral Examination: While the purpose of the preliminary oral examination is to test the depth and breadth of the student's knowledge and reasoning abilities in areas germane to the dissertation, the major focus of the final oral examination is the dissertation. Questions should be relevant to or based on the dissertation research including implications of the results.
5. Conduct of the Dissertation and Final Oral Examination
   a. Chair Selection: The Examination Committee chair will be the most senior ranking member of the committee within the University. If two members have the same ranks, the chair is the one who has been in that rank the longest. However, if the most senior member is also the student's adviser, the second most senior-ranked member will be the Examination Committee chair.
   b. Duties of the Chair:
      i. Preside at the examination.
      ii. Determine the scope, character, and conduct of the examination before the questioning begins in concert with the Dissertation Chair (adviser).
      iii. Determine time allotments to members of the committee.
      iv. The chair is responsible for enforcing time limits and not exceeding 2 hours in total.
      v. The student adviser reports the results of the examination to the PhD Program Director and the Executive Vice Dean immediately after the examination on the form provided for this purpose.
   c. Duties of the Members:

   i. Notify the Committee chair, faculty advisor and Academic Program Administrator of inability to appear at designated time.
   ii. Participate in the examination process.
 d. Duties of the Alternate:
   i. Notify the Committee chair, faculty advisor and Academic Program Administrator of inability to appear at designated time.
   ii. Participate in the examination process as a committee member if one of the serving members of the committee fails to appear on the date of the examination.
   iii. Alternate members not called to serve as committee members may attend the examination if they wish to do so, but may not ask questions or vote.

   Dissertation Committee Optional Role – External Reader: An external reader is an individual with an earned research or clinical doctorate who offers additional content and/or methodological expertise but is not a regular member of the dissertation committee. Attendance at the dissertation oral examination is not required for the external reader. If in attendance, they may participate in the private portion of the exam at the discretion of the chair but cannot vote on the outcome of the exam. The external reader is not present during the voting.

   Length of Examination: The examination process will begin with a 30-minute public presentation followed by 30 minutes of questions from the audience (Total of 1 hour for the Public Portion). The committee then meets in private with the candidate for questions (Total Time of 2 hours for the Private Portion). The chair will ask for questions from the committee. The student will respond until all members of the committee have completed their questions. The committee will vote by private ballot on its evaluation of the examination with majority ruling (total time of exam not to exceed 3 hours).
6. Results of the Examination: The examination may result in one of the following outcomes:
 a. If the candidate receives an unconditional pass (a majority of favorable votes), the committee is to be considered discharged.
 b. If the candidate receives a conditional pass, the exact terms of the condition are to be reported on the examination form, i.e., what course(s), if any, need to be taken, in what time frame the condition(s) should be met, and any other pertinent information that will point out clearly to both the student and the faculty how to satisfy the condition(s). As soon as all conditions have been met, the chair of the Examination Committee must report the removal of the condition in writing to the Doctor of Philosophy Board. The committee is then discharged. The removal of the condition is to be reported to the PhD Program Director and the Executive Vice Dean by the Dissertation Committee chair via the written "Reader's Report," after which the committee is considered discharged.
 c. If the candidate fails, the Examination Committee, through the chair, is requested to recommend a course for future action:
   i. No re-examination.
   ii. Re-examination by the same committee.
   iii. Re-examination in written form and conducted by the same committee.
   iv. Re-examination by a new committee. If the recommendation is for a new committee, at least one outside member of the original committee shall be appointed to the new committee.
 d. The two committee members designated by the PhD Admissions, Progression and Graduation Committee as Doctor of Philosophy Board Readers will be responsible for approving the final Readers' Report after the student has finished all revisions. The report shall be submitted to the School of Nursing Registrar's Office with a copy to the PhD Program Director and the Associate Dean for Academic Affairs.

[1] Faculty who do not have an earned Research Doctorate (e.g., DNP, MD), are not tenure-eligible (e.g., Practice-Education Track), or are from outside the University, must have Curriculum Vitae (CV) submitted to School of Nursing PhD Admissions, Progression and Graduation Committee for approval.

[2] Each committee may include only 1 member who is not on faculty at Johns Hopkins University. Faculty members at other institutions and adjunct faculty must be reviewed and approved by the School of Nursing PhD Admissions, Progression and Graduation Committee prior to participation in the Oral Examination. Occasionally, one adjunct or one scientist faculty member, but not both, may serve on the Committee. Neither may serve as the Chair.

Steps of Successful Completion of Final Oral Exam

- Make edits to your written dissertation with guidance from your advisor and committee
- Send a copy of your final abstract and title to the Academic Program Administrator (SON-PhDProgram@jhu.edu)
- Send a copy of your CV and any plans you have after graduation to the Academic Program Administrator (SON-PhDProgram@jhu.edu)
- Follow formatting guidelines here for you dissertation Electronic Thesis Submission: https://www.library.jhu.edu/library-services/electronic-theses-dissertations/formatting-guidelines/
  - Make sure to read the submission check list: https://www.library.jhu.edu/library-services/electronic-theses-dissertations/submission-checklist/
- Submit your dissertation to the library (directions included in link above)
- Submission Deadlines: https://homewoodgrad.jhu.edu/academics/graduate-board/deadlines/
  - You have to submit completed edits of an electronic copy of the dissertation to the Welch library and receive a receipt from the library confirming that the electronic thesis has been accepted by the deadline for the current semester when you defend. If you are unable to do that, then you will have to register for one credit of dissertation seminar for the semester following your defense.
- Forward a copy of the library receipt to the Academic Program Administrator (SON-PhDProgram@jhu.edu)
- Apply to graduate if you haven't already.
  - The application for graduation is available online via SIS. https://sis.jhu.edu/sswf/

Dissertation Guidelines for Manuscript Format

1. Chapter 1
   - Integrated knowledge of field, identification of gaps in the selected science and provision of a theoretical foundation for the research
2. Chapter 5
   - Concise summary tying work together
   - Discussion of the contribution this research makes to the related field of science (new knowledge)
   - Complete list of references
3. Appendices (optional):
   - Analysis not in manuscripts (tables, and/or narrative)
   - Instruments
   - Methods details not in the manuscript

Guidelines

1. A minimum of three manuscripts ready for submission to a peer-reviewed journal
2. Student must be first author
3. Subject must be student's original research
4. Subject to approval of Dissertation Committee
5. Can be a combination of manuscript types, (at least one must be data-based, two data-based manuscripts are encouraged if the data allows for this) such as:
   a. Literature review article
   b. Methodological
   c. Concept analysis and/or theory application
   d. Instrument development
   e. Results

   May also be results from three separate but related experiments
6. Timing: Articles must be produced while the student is matriculated in the SON PhD Program

Example of Reference List Format

American Psychological Association (2010). *Publication Manual of the American Psychological Association*

(6th Ed.). Washington, DC: APA.

Gross, D., Alhusen, J., & Jennings, B.M. (2012). Authorship ethics with the dissertation manuscript option.

Research in Nursing & Health, 35, 431-434.

International Committee on Medical Journal Editors (ICMJE) (2010) *Uniform Requirements for Manuscripts*

Submitted to Biomedical Journals, www.icmje.org/urm_main.html (http://www.icmje.org/urm_main.html), Accessed on November 25, 2012.

Mangiardi J.R. & Pellegrino E.D. (1992). Collegiality: What is it? *Bulletin of the New York Academy of*

Medicine, 68(2), 292-296.

McCammon S.D. & Brody H. (2012). How virtue ethics informs medical professionalism. Health Education

Forum, Nov 9. [Epub ahead of print]

To comply with copyright law, it is important that you do not include journal proofs or printed articles unless you receive permission from the journal in which your work has been published. You should include the word processing format (i.e., MSWord) in the dissertation. Be sure to include the full citation for the manuscript, indicating it has been published, has been accepted for publication, or under review as appropriate.

Program Requirements

Curriculum

Code	Title	Credits
Core Courses [1]		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.809	Quantitative Research Design and Methods	3
NR.110.816	Mixed Methods Research Designs	2
NR.110.827	Grant Writing	1
NR.110.828	Measurement in Health Care Research	2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
Statistics Courses		
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.140.623	Statistical Methods in Public Health III	4
Elective Courses [2]		
NR.110.810	Theory & Concepts of Health Behavior and Health Promotion	3
NR.110.818	Special Topics in Violence Research	1
NR.110.824	Stress and Stress Response	2
NR.110.832	Writing for Publication	1
NR.110.835	Current Issues and Trends in Cardiovascular Health Promotion Research	1
PH.140.624	Statistical Methods in Public Health IV	4
NR.210.823	Special Topics: Qualitative Design and Implementation	1 - 3
Dissertation (3 credits per semester until completion of dissertation)		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation (Research)	2
Total Credits		**46-48**

[1] PhD students will be required to repeat a course if they earn a grade below a B (83%) for core nursing courses, and a grade below a C (73%) in non-nursing core courses. PhD students can repeat more than one course one time.

[2] Electives can be taken through any division of Johns Hopkins University including the School of Public Health, School of Medicine, School of Engineering, and all of the Social Science Departments. Some SON elective courses are offered every other year. Please check with the Academic Program Coordinator regarding course offerings. Independent study credits do not count toward the 19 credits of electives required. Students may apply up to 6 credits of a 500 level course offering (in or outside the SON) toward their doctoral program

requirements. The PhD Curriculum Committee has assigned 9 credits for the completion of the NIH Summer Genetics Institute, which may be applied to the PhD Program elective requirement.

Sample Program of Study

Course	Title	Credits
First Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Second Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Third Semester		
NR.110.827	Grant Writing	1
	Credits	**1**
Fourth Semester		
NR.110.890	Dissertation Seminar [1]	1
NR.110.899	Dissertation (Research) [1]	2
Electives		10
	Credits	**13**
Fifth Semester		
NR.110.890	Dissertation Seminar [1]	1
NR.110.899	Dissertation (Research) [1]	2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
Electives		9
	Credits	**14**
Sixth Semester		
NR.110.899	Dissertation (Research)	1 - 2
	Credits	**1-2**
	Total Credits	**56-57**

1 PhD students will be required to repeat a course if they earn a grade below a B (83%) for core nursing courses, and a grade below a C (73%) in non-nursing core courses. PhD students can repeat more than one course one time.

2 Electives can be taken through any division of Johns Hopkins University including the School of Public Health, School of Medicine, School of Engineering, and all of the Social Science Departments. Some SON elective courses are offered every other year. Please check with the Academic Program Coordinator regarding course offerings. Independent study credits do not count towards the 19 elective credits of electives required. Students my apply up to 6 credits of 500 level course offering (in or outside the SON) toward their doctoral program requirements. The PhD Curriculum has assigned 9 credits for the completion of the NIH Summer Genetics Institute, which may be applied to the PhD Program elective requirement.

Learning Outcomes

Upon graduation from the PhD program, students will:

- Possess knowledge and skills in theoretical, methodological, and analytic approaches that will enable them to conduct research to discover and apply knowledge in nursing science, health, and health care.
- Assume a leadership role in nursing and in the broader arena of health care both nationally and internationally.

Doctor of Nursing Practice (DNP): Advanced Practice Track/Doctor of Philosophy in Nursing (PhD) Dual Degree

The Doctor of Nursing Practice program at the Johns Hopkins School of Nursing is accredited by the:

Commission on Collegiate Nursing Education (CCNE)
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

The DNP Advanced Practice Track/PhD creates rigorously prepared clinical DNP Advanced Practice Track/PhD scholars that offers the profession a ‘best of both worlds’ approach, creating innovative solutions for faculty practice, research, discovery, and translation. By combining the PhD goal of creating leaders in nursing science development with the DNP Advanced Practice Track’s mission to prepare expert nurse clinicians into an integrated curriculum, students receive both outstanding research and clinical practice experience.

The DNP Advanced Practice Track/PhD program is designed to be completed in a 5 year full-time plan of study. This shorter timeframe to achieve two doctoral degrees is accomplished by designing the program to align each educational component with the students desired research focus, creating connections that allow the DNP Advanced Practice Track/PhD student to seamlessly transfer evidence to practice, practice to research, and research to the classroom. The program also highlights both a structured teaching residency and a structured research residency.

Students can complete this program with the following DNP Advanced Practice Tracks:

- DNP Adult-Gerontological Acute Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-acute-care-nurse-practitioner-dnp/) (129 credits/784 clinical hours)
- DNP Adult-Gerontological Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-primary-care-nurse-practitioner-dnp/) (127 credits/784 clinical hours)
- DNP Adult-Gerontological Critical Care Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-critical-care-clinical-nurse-specialist-dnp/) (124 credits/784 clinical hours)

- DNP Adult-Gerontological Health Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-health-clinical-nurse-specialist-dnp/) (124 credits/784 clinical hours)
- DNP Family Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/family-primary-care-nurse-practitioner-dnp/) (132 credits/784 clinical hours)
- DNP Pediatric Critical Care Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/pediatric-critical-care-clinical-nurse-specialist-dnp/) (125 credits/784 clinical hours)
- DNP Pediatric Dual Primary/Acute Care Nurse Practitioner (p. 1023) (131 credits/784 clinical hours)
- DNP Pediatric Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/pediatric-primary-care-nurse-practitioner-dnp/) (130 credits/784 clinical hours)

Students are expected to complete degree requirements within seven years within the school of nursing.

DNP Advanced Practice Track/PhD Program Funding

Qualified students interested in the DNP/PhD program may be eligible to receive up to three years tuition and stipend support through the School of Nursing. Contact the PhD Program Administrator at SON-PhD@jhu.edu (SON-PhDProgram@jhu.edu) for more information.

DNP Advanced Practice Tracks

The DNP Advanced Practice Track option is a post-baccalaureate to DNP program that prepares students for the Nurse Practitioner role with a focus on a specific population (adult-gerontological primary, adult-gerontological acute, pediatric primary, or family primary), or the Clinical Nurse Specialist role focused on a specific population (adult health, adult critical care, or pediatric critical care). The length of the program, number of credits, and clinical hours vary according to the role and specialty, ranging from 74 to 81 credits and 672 to 784 clinical hours. The balance of the minimum of 1000 practice hours required for the DNP is obtained while conducting the Scholarly Project. The DNP Advanced Practice program is online with required on-site course immersions. Students matriculated in the JHU School of Nursing are required to satisfy all academic requirements and adhere to all policies of the School. Students are expected to complete degree requirements within six years of enrollment.

Core courses that lay the foundation for advanced practice nursing are listed below. Additional core courses taken by students in the FNP, PNP, and CNS Pediatric Critical Care are so noted in the track descriptions that follow the Core Curriculum.

Core Curriculum

Code	Title	Credits
Core Courses		
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
NR.210.602	Clinical Pharmacology	4
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.210.604	Health Supervision: Birth through Adolescence	2
Additional Core Courses [1]		
NR.210.802	Advanced Nursing Health Policy	2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.805	Translating Evidence into Practice	3
NR.210.806	Health Finance	2
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
NR.210.818	Clinical Data Management and Analyses	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.210.896	Problem Identification	1
NR.210.897	Project Development	1
NR.210.898	Project Implementation	1
NR.210.899	Project Evaluation	1
NR.210.894	DNP Practicum [2]	1-2
Total Credits		**54-55**

1. The DNP core courses are required for all Advanced Practice DNP students. There is variation by specialty track in the minimum number of DNP Practicum credits and associated practicum hours.
2. NR.210.894 DNP Practicum [4cr/224PH Primary Care NP], [6cr/336PH CNS]

Core Totals 27cr (AGPNP, ACNP, CNS ACC, CNS AH)
Core Totals: 30cr (FNP, PNP] 29cr (CNS PCC)
Program Totals 27-30cr/224-336PH

Doctor of Nursing Practice Advanced Practice Track Scholarly Project Progression

DNP students are required to successfully complete a Scholarly Proposal and Final Project.

Program Requirements

For program requirements for both the DNP and PhD, please refer to the specific program section:

- PhD (p. 1028)
- DNP (p. 1011)
- DNP Advanced Practice Tracks (p. 1011)
- DNP Adult-Gerontological Acute Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-acute-care-nurse-practitioner-dnp/)

- DNP Adult-Gerontological Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-primary-care-nurse-practitioner-dnp/)
- DNP Adult-Gerontological Critical Care Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-critical-care-clinical-nurse-specialist-dnp/)
- DNP Adult-Gerontological Health Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/adult-gerontological-health-clinical-nurse-specialist-dnp/)
- DNP Family Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/family-primary-care-nurse-practitioner-dnp/)
- DNP Pediatric Critical Care Clinical Nurse Specialist (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/pediatric-critical-care-clinical-nurse-specialist-dnp/)
- DNP Pediatric Dual Primary/Acute Care Nurse Practitioner (p. 1023)
- DNP Pediatric Primary Care Nurse Practitioner (https://e-catalogue.jhu.edu/nursing/doctoral-degrees/pediatric-primary-care-nurse-practitioner-dnp/)

Sample Programs of Study

Please Note: In the following Plans of Study, School of Public Health courses (PH.XXX.XXX) are offered on the quarter system and are depicted here as [credits & units] and count accordingly in each school. Course descriptions for the Public Health courses (PH) are available at sis.jhu.edu (http://www.sis.jhu.edu).

DNP Advanced Practice/PhD Dual Degree Adult-Gerontological Acute Care Nurse Practitioner Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**9-10**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
Electives (as needed)		3
	Credits	**7-8**
Tenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.660	Introduction to Acute Care (56CL)	4
Research or Teaching Residency		0
	Credits	**6-7**

Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.661	Advanced Practice in Acute Care I (168CL)	6
Research or Teaching Residency		0
	Credits	**8-9**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.662	Advanced Practice in Acute Care II (168CL)	4
Clinical Research Residency II		1
	Credits	**7-8**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.663	Advanced Practice in Acute Care III (168CL)	4
	Credits	**6-7**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.664	Advanced Practice in Acute Care IV (224CL)	6
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**8-9**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**121-132**

Program Total: 129 Credits [cr]/784 NP Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement.

DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Adult-Gerontological Critical Care Clinical Nurse Specialist Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**9-10**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4

NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Electives (as needed)		3
	Credits	**5-6**
Tenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
Research or Teaching Residency		0
	Credits	**5-6**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Research or Teaching Residency		0
	Credits	**8-9**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Clinical Research Residency II		1
	Credits	**6-7**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**8-9**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management	3
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**5-6**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**116-127**

Program Total: 124 Credits [cr]/672 CNS Clinical Hours [CL]

Minimum of 1000 practice hours is required for the DNP. Dissertation Seminar & Dissertation courses provide additional practice hours to meet requirement. CNS Students may take NR.210.605 Diagnostic Skills and Procedures for Advanced Practice Nursing as 2 credit elective. Please note, this course has an onsite requirement. DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Adult-Gerontological Health Clinical Nurse Specialist Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3

NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**9-10**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Electives (as needed)		3
	Credits	**5-6**
Tenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
Research or Teaching Residency		0
	Credits	**5-6**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Research or Teaching Residency		0
	Credits	**8-9**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Clinical Research Residency II		1
	Credits	**6-7**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**8-9**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management	3
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**5-6**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**116-127**

Program Total: 124 Credits [cr]/672 CNS Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. CNS Students have the option to take NR.210.605 Diagnostic Skills and Procedures for Advanced Practice Nursing *as a 2 credit elective. Please note, this course has an onsite requirement.* DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Adult-Gerontological Primary Care Nurse Practitioner Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2

NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**9-10**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.640	Clinical Reasoning I: Common Acute Illness	2
Electives (as needed)		3
	Credits	**9-10**
Tenth Semester		
NR.210.641	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.645	Clinical Practicum I: Adult-Gerontological Nurse Practitioner (112CL)	2
NR.110.890	Dissertation Seminar	1
Research or Teaching Residency		0
	Credits	**5**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.642	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.646	Clinical Practicum II: Adult-Gerontological Nurse Practitioner (112CL)	2
Research or Teaching Residency		0
	Credits	**6-7**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.643	Clinical Reasoning IV: Complex Chronic Illness	2
NR.210.647	Clinical Practicum III: Adult-Gerontological Nurse Practitioner (112CL)	2
Clinical Research Residency II		1
	Credits	**7-8**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.644	Clinical Reasoning V: Topics for Nurse Practitioner Practice	2
NR.210.648	Clinical Practicum IV: Adult-Gerontological Nurse Practitioner (112CL)	2
	Credits	**6-7**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1

NR.110.899	Dissertation	1 - 2
NR.210.649	Clinical Practicum V: Adult-Gerontological Nurse Practitioner (224CL)	4
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**6-7**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**118-128**

Program Total: 127 Credits [cr]/672 NP Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Family Primary Care Nurse Practitioner Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		4
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**12-13**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
NR.210.604	Health Supervision: Birth through Adolescence	2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.620	Clinical Reasoning I: Common Acute Illnesses in Pediatrics	2
Electives (as needed)		3
	Credits	**9-10**
Tenth Semester		
NR.210.621	Clinical Reasoning II: Common Chronic Illnesses in Adult/Geriatric Health	2
NR.210.625	Clinical Practicum I: Family Nurse Practitioner (168CL)	3

NR.110.890	Dissertation Seminar	1
Research or Teaching Residency		0
	Credits	**6**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.622	Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health	2
NR.210.626	Clinical Practicum II: Family Nurse Practitioner (168CL)	3
Research or Teaching Residency		0
	Credits	**7-8**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.623	Clinical Reasoning IV: Common Acute and Complex Chronic Illnesses in Primary Care in Adults/Geriatrics	2
NR.210.627	Clinical Practicum III: Family Nurse Practitioner (112CL)	2
Clinical Research Residency II		1
	Credits	**7-8**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.624	Clinical Reasoning V: Clinical Management for the Family Nurse Practitioner - Role Transition and Special Topics in Family Health	2
NR.210.628	Clinical Practicum IV: Family Nurse Practitioner (112CL)	2
	Credits	**6-7**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.629	Clinical Practicum V: Family Nurse Practitioner (224CL)	4
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**6-7**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**123-133**

Program Total: 132 Credits [cr]/784 NP [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Pediatric Critical Care Clinical Nurse Specialist Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**10-11**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2

NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**8-9**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Electives (as needed)		3
	Credits	**5-6**
Tenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.650	Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems	3
Research or Teaching Residency		0
	Credits	**5-6**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.651	Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems	3
NR.210.653	Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Research or Teaching Residency		0
	Credits	**8-9**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.654	Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
Clinical Research Residency II		1
	Credits	**6-7**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.652	Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems	3
NR.210.655	Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management (168CL)	3
	Credits	**8-9**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.656	Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management	3
Research or Teaching Residency		0
Final Oral Defense		0
	Credits	**5-6**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Final Oral Defense (as needed)		0
	Credits	**2-3**
	Total Credits	**117-128**

Program Total: 125 Credits [cr]/672 CNS Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. CNS Students have the option to take NR.210.605 Diagnostic Skills and Procedures for Advanced Practice Nursing *as a 2 credit elective. Please note, this course has an onsite requirement.* DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Pediatric Primary Care Nurse Practitioner Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2

NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**10-11**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
NR.210.604	Health Supervision: Birth through Adolescence	2
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**10-11**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
Electives (as needed)		3
	Credits	**9-10**
Tenth Semester		
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (112CL)	2
NR.110.890	Dissertation Seminar	1
Research or Teaching Residency		0
	Credits	**5**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (112CL)	2
Research or Teaching Residency		0
	Credits	**6-7**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (112CL)	2
Clinical Research Residency II		1
	Credits	**7-8**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.210.638	Clinical Practicum IV: Pediatric Nurse Practitioner (112CL)	2
	Credits	**6-7**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.639	Clinical Practicum V: Pediatric Nurse Practitioner (224CL)	4
Research or Teaching Residency		0
Preliminary Orals		0
	Credits	**6-7**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1

NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Preliminary Orals (as needed)		0
	Credits	**2-3**
	Total Credits	**121-131**

Program Total: 130 Credits [cr]/672 NP Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

DNP Advanced Practice/PhD Dual Degree Pediatric Dual Primary/Acute Care Nurse Practitioner Track Program of Study

Course	Title	Credits
First Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
	Credits	**7**
Second Semester		
NR.110.800	Philosophical Perspectives in Health	3
NR.110.809	Quantitative Research Design and Methods	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
	Credits	**14**
Third Semester		
NR.110.814	Scientific Perspectives in Nursing	3
NR.110.815	Qualitative Research Designs and Methods	2
NR.110.816	Mixed Methods Research Designs	2
NR.110.828	Measurement in Health Care Research	2
PH.140.623	Statistical Methods in Public Health III	4
	Credits	**13**
Fourth Semester		
NR.210.806	Health Finance	2
NR.110.827	Grant Writing	1
NR.110.840	Clinical Research Residency I	1
NR.110.841	Clinical Research Residency II	1
Comprehensive Exams		0
	Credits	**5**
Fifth Semester		
NR.210.603	Human Growth and Development: Birth through Adolescence	1
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
NR.210.804	Organizational and Systems Leadership for Quality Care	2
Electives		2
Research Residency		0
Preliminary Orals/NRSA		0
	Credits	**10-11**
Sixth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.110.891	Responsibilities & Activities of the Nurse Scientist	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.805	Translating Evidence into Practice	3
Preliminary Orals/NRSA Submission		0
	Credits	**9-10**
Seventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.602	Clinical Pharmacology	4
NR.210.604	Health Supervision: Birth through Adolescence	2
Electives		2
Research Residency		0
IRB Submission		0
	Credits	**10-11**
Eighth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.600	Advanced Physiology/Pathophysiology	4
NR.210.601	Advanced Health Assessment and Measurement	3
Electives (as needed)		3
	Credits	**12-13**
Ninth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.605	Diagnostic Skills and Procedures for Advanced Practice Nursing	2
NR.210.630	Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics	2
Electives (as needed)		3
	Credits	**9-10**
Tenth Semester		
NR.210.631	Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics	2
NR.210.635	Clinical Practicum I: Pediatric Nurse Practitioner (112CL)	2
NR.110.890	Dissertation Seminar	1
Research or Teaching Residency		0
	Credits	**5**
Eleventh Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2

NR.210.632	Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations)	2
NR.210.636	Clinical Practicum II: Pediatric Nurse Practitioner (112CL)	2
Research or Teaching Residency		0
	Credits	**6-7**
Twelfth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.633	Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant	2
NR.210.637	Clinical Practicum III: Pediatric Nurse Practitioner (168CL)	3
Clinical Research Residency II		1
	Credits	**8-9**
Thirteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
NR.210.634	Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice	2
NR.110.648	Pediatric Primary/Acute Care Practicum (112CL)	2
NR.110.649	Advanced Pediatric Acute Care Topics and Roles	1
	Credits	**7-8**
Fourteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
NR.110.648	Pediatric Primary/Acute Care Practicum (224CL)	4
NR.110.645	Advanced Pediatric Acute Care Topics and Procedures	3
Preliminary Orals		0
	Credits	**9-10**
Fifteenth Semester		
NR.110.890	Dissertation Seminar	1
NR.110.899	Dissertation	1 - 2
Research or Teaching Residency		0
Preliminary Orals (as needed)		0
NR.110.648	Pediatric Primary/Acute Care Practicum (56CL)	1
NR.110.646	Advanced Pediatric Acute Care Topics	3
	Credits	**6-7**
	Total Credits	**130-140**

Program Total: 131 Credits [cr]/784 NP Clinical Hours [CL]

A minimum of 1000 practice hours is required for the DNP. The Dissertation Seminar & Dissertation courses will provide additional practice hours to meet this requirement. DNP/PhD students must take 9 credit elective hours PhD specific coursework to be considered having completed their required electives for the program.

At the completion of the dual degree program, the graduate:

- Functions at the highest level of nursing practice by integrating nursing, public health and medical science with ethics and the biophysical, psychosocial, analytical, organizational, and public health sciences.
- Demonstrates organizational and systems leadership for quality and safety.
- Utilizes clinical scholarship and analytical methods for evidence-based practice.
- Applies information systems and technology for the provision and/or transformation of health care.
- Leverages transdisciplinary collaboration for the improvement of individual and population health outcomes.
- Utilizes strategies of risk reduction/illness prevention, health promotion, and health maintenance for individuals and populations.
- Develops, evaluates, advocates, and provides leadership for health care policy that shapes health care financing, regulation, access, and delivery.
- Possesses knowledge and skills in theoretical, methodological, and analytic approaches that will enable them to conduct and apply research and analytical methods to discover, apply and advance knowledge in nursing science, health, and health care.
- Assumes a leadership role in nursing and in the broader arena of health and health care both nationally and internationally.
- Develops, evaluates, advocates, and provides leadership for health care policy that shapes health care financing, regulation, access, and delivery.
- Provides leadership to address health inequities through creative research and articulation of the value propositions guiding the research.

Dual and Joint Degrees

DNP Executive/MBA Dual Degree

The Doctor of Nursing Practice program at the Johns Hopkins School of Nursing is accredited by the:

Commission on Collegiate Nursing Education (CCNE)
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

The DNP Executive Track/Master of Business Administration is a dual degree post-master's program that is designed for students to gain the knowledge, skills, and abilities to lead cross-professional teams in the improvement and provision of informed quality health care while gaining fundamental business skills.

The 67-credit dual degree DNP Executive/MBA Track is offered in a convenient executive-style format, integrating on-site immersions with online and virtual learning experiences. The dual program is offered by the Johns Hopkins School of Nursing and the Johns Hopkins Carey

Business School. The program can be completed in nine semesters of study.

The DNP Executive/MBA is designed for nurses involved in an advanced nursing practice role including but not limited to:

- clinical nurse specialist
- nurse practitioner
- nurse midwife
- nurse anesthetist
- public health practitioner
- nurse executive
- nurse informatician
- health policy analyst

Clinical hours obtained as part of a master's degree can be applied to the DNP. The student obtains 448 practice hours in association with conduct of the DNP Project in addition to 552 practice hours obtained from the previous advanced nursing practice program, to meet a minimum of 1000. Students are expected to complete DNP Executive/MBA degree requirements within seven years of enrollment.

The development of the nursing curriculum is based on AACN DNP Essentials, AONE Competencies, ANA Scope and Standards of Practice for Nurse Administrators.

Plan of Study Overview

1. Students will have to take only 10 foundational/core MBA courses instead of 15
   a. The remaining 5 courses have been converted to electives to make it more flexible for specialization
2. General: There are a total of 11 general electives
3. Specialization: The students do not have to choose a specialization, but if they want:
   a. They can choose up to 3 specializations
   b. Each specialization comprised of 5 courses (total of 10 credits)
   c. Carey Business School has a total of 8 specializations

https://carey.jhu.edu/programs/mba-programs/flexible-mba (https://carey.jhu.edu/programs/mba-programs/flexible-mba/)

Specializations:

- Business Analytics and Risk Management
- Digital Marketing
- Entrepreneurial Marketing
- Entrepreneurship, Innovation, and Technology
- Financial Management
- Health Care Management
- Innovation and Technology
- Investments
- Public and private sector leadership

Admission Requirements

Apply through the School of Nursing website. Please visit nursing.jhu.edu/admissions/apply/index.html (https://nursing.jhu.edu/admissions/apply/).

Program Requirements

Program of Study

TYPICAL PROGRAM OF STUDY SEQUENCE

Course	Title	Credits
First Year		
First Semester		
Carey Business School Summer Year 1		
BU.510.601	Statistical Analysis	2
	Credits	**2**
Second Semester		
Carey Business School Fall Term 1 Year 1		
BU.210.620	Accounting and Financial Reporting	2
BU.120.601	Business Communication	2
Carey Business School Fall Term 2 Year 1		
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
	Credits	**8**
Third Semester		
School of Nursing Spring 1 Year 1		
NR.210.802	Advanced Nursing Health Policy	2
Carey Business School Spring Term 1 Year 1		
BU.220.620	Business Microeconomics	2
General Business Elective 1		2
Carey Business School Spring Term 2 Year 1		
BU.520.601	Business Analytics	2
General Business Elective 2		2
	Credits	**10**
Second Year		
First Semester		
Carey Business School/School of Nursing Summer Year 2		
NR.210.886	Problem Discovery	3
General Business Elective 3		2
	Credits	**5**
Second Semester		
School of Nursing Fall Year 2		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
Carey Business School Fall Term 1 Year 2		
BU.410.620	Marketing Management	2
General Business Elective 4		2
Carey Business School Fall Term 2 Year 2		
BU.150.620	Strategic Management	2
General Business Elective 5		2
	Credits	**11**
Third Semester		
School of Nursing Spring Year 2		
NR.210.805	Translating Evidence into Practice	3
NR.210.887	Project Advancement	3
Carey Business School Spring Term 1 Year 2		
BU.680.620	Operations Management	2
Carey Business School Spring Term 2 Year 2		

General Business Elective 6		2
	Credits	**10**
Third Year		
First Semester		
Carey Business School/School of Nursing Summer Year 3		
NR.210.817	Analysis and Evaluation of Individual and Population Health Data	3
General Business Elective 7		2
General Business Elective 8		2
	Credits	**7**
Second Semester		
School of Nursing Fall Year 3		
NR.210.888	Project Application	3
Carey Business School Fall Term 1 Year 3		
General Business Elective 9		2
Carey Business School Fall Term 2 Year 3		
General Business Elective 10		2
	Credits	**7**
Third Semester		
School of Nursing Spring Year 3		
NR.210.889	Project Evaluation and Dissemination	3
NR.210.818	Clinical Data Management and Analyses	2
Carey Business School Spring Term 1 Year 3		
General Business Elective 11		2
	Credits	**7**
	Total Credits	**67**

Program Total: 67 Credits [cr]/1000 Clinical Hours [CL]

(Prior MSN - 552 clinical hours plus 448 DNP practicum hours)

The Doctor of Nursing Practice (DNP) program outcomes are based upon:

1. The Essentials of Master's Education in Nursing (AACN, 2011)
2. The Essentials of Doctoral Education for Advanced Nursing Practice (AACN, 2006)

A graduate of the Doctor of Nursing Practice (DNP) program:

1. Integrates the art and science of nursing, with ethics and the biophysical, psychosocial, analytical, organizational, and public health sciences to improve patient and population health outcomes
2. Demonstrates organizational and systems leadership for quality and safety in health care systems
3. Critically appraises clinical scholarship and analytical methods for evidence-based practice
4. Applies information systems and technology for the provision and/or transformation of health care
5. Leverages interprofessional collaboration for the improvement of individual and population health outcomes
6. Utilizes population health strategies of risk reduction/illness prevention, health promotion, and health maintenance to reduce healthcare disparities and improve outcomes for diverse individuals and populations
7. Develops leadership for health care policy and advocacy that shapes health care financing, regulation, access, and delivery
8. Demonstrates mastery of the advanced nursing practice/advanced practice nursing role and population competencies

DNP Executive/ MPH Dual Degree

The Doctor of Nursing Practice program at the Johns Hopkins School of Nursing is accredited by the:

Commission on Collegiate Nursing Education (CCNE)
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

The Master of Public Health program at the Johns Hopkins Bloomberg School of Public Health is accredited by the:

Council on Education for Public Health (CEPH)
1010 Wayne Avenue, Suite 220
Silver Spring, MD 20910
(202) 789-1050

The DNP Executive/MPH dual degree offered through the Johns Hopkins School of Nursing and the Johns Hopkins Bloomberg School of Public Health integrates nursing and population health frameworks to prepare nurse leaders to improve population health and advance health equity. Graduates will be prepared to employ systems-level thinking to address local and global health challenges by shaping policy, interventions, and quality improvements to create lasting change.

The 80-credit dual degree program is offered in a convenient executive-style format, integrating online and virtual learning experiences with on-site immersions. This dual degree option can be completed in three years.

The DNP Executive/MPH is designed for nurses involved in an advanced nursing practice role including but not limited to:

- clinical nurse specialist
- nurse practitioner
- nurse midwife
- nurse anesthetist
- public health practitioner
- nurse executive
- nurse informatician
- health policy analyst

Clinical hours obtained as part of the master's degree can be applied to the DNP program. The student obtains 448 practice hours in association with conduct of the DNP Project in addition to 552 practice hours obtained from the previous advanced nursing practice program, to meet a minimum of 1000 hours. Students are expected to complete DNP Executive/MPH degree requirements within six years of enrollment.

The development of the nursing curriculum is based on AACN DNP Essentials, AONE Competencies, ANA Scope and Standards of Practice for Nurse Administrators.

Plan of Study Overview

1. Streamlined requirements
    a. Fewer required courses at each school
    b. Select courses fulfill requirements across the two programs
    c. Time and credit savings
2. Electives

a. A diverse set of electives is available at JHBSPH

3. Specialization
    a. Students have the opportunity to specialize in their own areas of interest by tailoring their public health coursework. The specialization can inform the combined DNP/MPH project.
4. Combined DNP/MPH projects
    a. Students undertake a combined DNP/MPH project in their third year that synthesizes their knowledge and skills in nursing and population health. The project fulfills criteria for the DNP Executive project as well as the MPH Capstone project.

Admission Requirements

Apply through the School of Nursing website. Please visit nursing.jhu.edu/admissions/apply/index.html (https://nursing.jhu.edu/admissions/apply/).

Program of Study

Course	Title	Credits
First Year		
First Semester		
PH.340.601 or PH.340.721	Principles of Epidemiology (3.5 SON cr) or Epidemiologic Inference in Public Health I	5
PH.221.688	Social and Behavioral Foundations of Primary Health Care (3 SON cr) substitutes DNP Elective	4
PH.300.615	The Tools of Public Health Practice (1 SON cr)	1
PH.550.860	Academic & Research Ethics at BSPH	
PH.550.867	Introduction to MPH Studies	0
7.5 SON Credits		
	Credits	**10**
Second Semester		
NR.210.804	Organizational and Systems Leadership for Quality Care	2
PH.140.611	Statistical Reasoning in Public Health I (Term 1; 2 SON cr) counts towards NR.210.817 Analysis and Evaluation of Individual and Population Health Data (3 cr)	3
PH.380.755	Population Dynamics and Public Health (Term 1; 1.5 SON cr)	2
PH.552.601	Foundational Principles of Public Health (Term 1; 0.5 SON cr)	0.5
PH.552.603	The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health (Term 1; 0.5 SON cr)	0.5
PH.140.612	Statistical Reasoning in Public Health II (Term 2; 2 SON cr) counts towards NR.210.817 Analysis and Evaluation of Individual and Population Health Data (3 cr)	3
PH.380.604	Life Course Perspectives on Health (Term 2; 3 SON cr) substitutes DNP Elective	4
PH.552.610	The Social Determinants of Health (Term 2; 0.5 SON cr)	0.5
12 SON Credits		
	Credits	**15.5**
Third Semester		
PH.550.608	Problem Solving in Public Health (Term 3; 3 SON cr) substitutes DNP Elective	4
PH.180.601	Environmental Health (Term 3; 3.5 SON cr)	5
PH.552.623	Principles of Negotiation and Mediation for Public Health Professionals (Term 3; 0.5 SON cr)	0.5
PH.552.624	Applications of Negotiation and Mediation for Public Health Professionals (Term 3; 0.5 SON cr)	0.5
PH.260.720	Communications Primer for the Public Health Sciences (Term 4; 1 SON cr)	1
PH Elective (Term 4; 2 SON cr)		3
PH Elective (Term 4; 2 SON cr)		3
12.5 SON Credits		
	Credits	**17**
Second Year		
First Semester		
NR.210.886	Problem Discovery (112 practicum hours)	3
NR.210.822	Health Information Systems and Patient Care Technologies	2
PH.550.630	Public Health Biology (2 SON cr)	3
PH Elective (2 SON cr)		3
9 SON Credits		
	Credits	**11**
Second Semester		
NR.210.803	Nursing Inquiry for Evidence-Based Practice	3
PH.552.625	Building Collaborations Across Sectors to Improve Population Health (Term 1; 0.5 SON cr)	0.5
PH.552.609	Psychological and Behavioral Factors That Affect A Population's Health (Term 1; 0.5 SON cr)	0.5
PH Elective (Term 1; 2 SON cr)		3
PH.221.654	Systems Thinking in Public Health: Applications of Key Methods and Approaches (Term 2; 2 SON cr)	3
PH.552.611	Globalization and Population Health (Term 2; 0.5 SON cr)	0.5
PH.550.602	Interprofessional Education Activity	0
8.5 SON Credits		
	Credits	**10.5**
Third Semester		
NR.210.805	Translating Evidence into Practice	3
NR.210.887	Project Advancement (112 practicum hours)	3
NR.210.802	Advanced Nursing Health Policy	2
8 SON Credits		
	Credits	**8**
Third Year		
First Semester		
PH Elective; 3 SON cr		4
PH Elective; 2 SON cr		3

PH Elective; 2 SON cr		3
7 SON Credits		
	Credits	**10**
Second Semester		
NR.210.888	Project Application (112 practicum hours) counts towards MPH Practicum (3 SPH cr)+ Special studies PH.xxx.840 (1 SPH cr)	3
NR.210.806	Health Finance counts towards PH.312.603 Fundamentals of Budgeting and Financial Management (3 SPH cr)	2
PH.552.608	Biologic, Genetic and Infectious Bases of Human Disease (Term 1; 0.5 SON cr)	0.5
PH.410.651	Health Literacy: Challenges and Strategies for Effective Communication (Term 2; 2 SON cr)	3
7.5 SON Credits		
	Credits	**8.5**
Third Semester		
NR.210.889	Project Evaluation and Dissemination (112 practicum hours) substitutes for MPH Capstone Project (2 SPH cr)	3
NR.210.818	Clinical Data Management and Analyses	2
PH.312.600	Managing Health Services Organizations (Term 3; 3 SON cr)	4
8 SON Credits		
	Credits	**9**
	Total Credits	**99.5**

80 Total SON Credits
Notes: Public Health 2-, 3-, 4- and 5-credit courses have been converted to the SON credit system

1000 Clinical Hours required [CL] Clinical hours obtained as part of the master's degree can be applied to the DNP program. The student obtains 448 practice hours in association with conduct of the DNP Project in addition to 552 practice hours obtained from the previous advanced nursing practice program, to meet a minimum of 1000 hours.

All part-time/online MPH students will be automatically registered for a 0 credit "course", *Introduction to MPH Studies* in their first term.

As part of the Interprofessional Practice core requirement, students also are required to attend an Interprofessional Event in the beginning of Term 2. An optional activity can be completed if necessary.

The Doctor of Nursing Practice (DNP) program outcomes are based upon:

1. The Essentials of Master's Education in Nursing (AACN, 2011)
2. The Essentials of Doctoral Education for Advanced Nursing Practice (AACN, 2006)

A graduate of the Doctor of Nursing Practice (DNP) program:

1. Integrates the art and science of nursing, with ethics and the biophysical, psychosocial, analytical, organizational, and public health sciences to improve patient and population health outcomes
2. Demonstrates organizational and systems leadership for quality and safety in health care systems
3. Critically appraises clinical scholarship and analytical methods for evidence-based practice
4. Applies information systems and technology for the provision and/or transformation of health care
5. Leverages interprofessional collaboration for the improvement of individual and population health outcomes
6. Utilizes population health strategies of risk reduction/illness prevention, health promotion, and health maintenance to reduce healthcare disparities and improve outcomes for diverse individuals and populations
7. Develops leadership for health care policy and advocacy that shapes health care financing, regulation, access, and delivery
8. Demonstrates mastery of the advanced nursing practice/advanced practice nursing role and population competencies

The Master of Public Health (MPH) program outcomes are based upon the:

1. Accreditation Criteria for Schools of Public Health and Public Health Programs (CEPH, 2021).

A graduate of the Master of Public Health (MPH) program will attain grounding in foundational public health knowledge as measured by the following learning objectives:

Profession & Science of Public Health

- Explain public health history, philosophy and values
- Identify the core functions of public health and the 10 Essential Services
- Explain the role of quantitative methods and sciences in describing and assessing a population's health
- Explain the role of qualitative methods and sciences in describing and assessing a population's health
- List major causes and trends of morbidity and mortality in the US or other community relevant to the school or program
- Discuss the science of primary, secondary and tertiary prevention in population health, including health promotion, screening, etc.
- Explain the critical importance of evidence in advancing public health knowledge

Factors Related to Human Health

- Explain effects of environmental factors on a population's health
- Explain biological factors that affect a population's health
- Explain genetic factors that affect a population's health
- Explain behavioral and psychological factors that affect a population's health
- Explain the social, political and economic determinants of health and how they contribute to population health and health inequities
- Explain how globalization affects global burdens of disease
- Explain an ecological perspective on the connections among human health, animal health and ecosystem health (e.g., One Health)

And demonstrate achievement of the following competencies:

Evidence-based Approaches to Public Health

- Apply epidemiological methods to the breadth of settings and situations in public health practice
- Select quantitative data collection methods appropriate for a given public health context

- Select qualitative data collection methods appropriate for a given public health context
- Analyze quantitative data using biostatistics, informatics, computer-based programming and software, as appropriate
- Analyze qualitative data using computer-based programming and software, as appropriate

Interpret results of data analysis for public health research, policy or practice

Public Health & Health Care Systems

- Compare the organization, structure and function of health care, public health and regulatory systems across national and international settings
- Discuss how structural bias, social inequities and racism undermine health and create challenges to achieving health equity at organizational, community and societal levels

Planning & Management to Promote Health

- Assess population needs, assets and capacities that affect communities' health
- Apply awareness of cultural values and practices to the design or implementation of public health policies or programs
- Design a population-based policy, program, project or intervention
- Explain basic principles and tools of budget and resource management
- Select methods to evaluate public health programs Policy in Public Health
- Discuss multiple dimensions of the policy-making process, including the roles of ethics and evidence
- Propose strategies to identify stakeholders and build coalitions and partnerships for influencing public health outcomes
- Advocate for political, social or economic policies and programs that will improve health in diverse populations
- Evaluate policies for their impact on public health and health equity

Leadership

- Apply principles of leadership, governance and management, which include creating a vision, empowering others, fostering collaboration and guiding decision making
- Apply negotiation and mediation skills to address organizational or community challenges

Communication

- Select communication strategies for different audiences and sectors
- Communicate audience-appropriate public health content, both in writing and through oral presentation

Describe the importance of cultural competence in communicating public health content

Interprofessional Practice

- Perform effectively on interprofessional teams

Systems Thinking

- Apply systems thinking tools to a public health issue

Healthcare Organizational Leadership, MSN/MBA, Dual Degree

The MSN Healthcare Organizational Leadership Track prepares graduates who are exceptional at patient care and safety as well as effecting change at the health care leadership and corporate levels. With an MSN/MBA from Johns Hopkins, graduates will crunch the data and help set organizational policy and priorities but will always account for the patient—and family—at the other end of every decision. Through this degree, graduates become strong leaders who can blend an understanding for the bottom line—medical, economic, regulatory, ethical—and turn that balancing act into a high-functioning daily routine. The 65 credit dual program is offered by the School of Nursing and the Carey Business School.

The development of the nursing curriculum is based on:

- AACN Masters Essentials
- AONE Competencies
- ANA Scope and Standards of Practice for Nurse Administrators

Clinical practica and number of clinical hours: Clinical practicum in HOL I (112 hours), HOL II (168 hours), and HOL III (224 hours) for a total of 504 clinical hours. Some MBA courses may require a residency component.

Certification: Certification for Nurse Executives and Nurse Executives, Advanced is based on experience and hours of practice, not educational preparation. Graduates are eligible to take a certification exam as a certified nurse manager and leader or nurse executive through the American Nurses Credentialing Center www.nursingworld.org/our-certifications (https://www.nursingworld.org/our-certifications/) and the American Organization of Nurse Executives www.aone.org/resources/certification/about_certifications.shtml (http://www.aone.org/resources/certification/about_certifications.shtml/).

Program Requirements

Curriculum

Code	Title	Credits
Core Courses		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
HOL Specialty Courses		
NR.110.651	Leadership Role Identity and Career Development	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
NR.110.656	Healthcare Organizational Leadership Practicum II	3
NR.110.657	Healthcare Organizational Leadership Practicum III	4
MBA Required Courses – Courses taken at the Carey Business School		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2

BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
MBA Electives (22 credits)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**68**

Program Total: 68 Credits [cr]/504 Clinical Hours [CL]

Programs of Study

MSN Healthcare Organizational Leadership/MBA Dual Degree Program of Study: Full Time

All Business courses are taken at the Carey Business School

Course	Title	Credits
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
NR.110.651	Leadership Role Identity and Career Development	2
BU.510.601	Statistical Analysis	2
BU.120.601	Business Communication	2
BU.210.620	Accounting and Financial Reporting	2
	Credits	**14**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
BU.220.620	Business Microeconomics	2
BU.410.620	Marketing Management	2
BU.231.620	Corporate Finance	2
General Business Elective 1		2
	Credits	**16**
Third Semester		
NR.110.656	Healthcare Organizational Leadership Practicum II	3
BU.520.601	Business Analytics	2
General Business Elective 2		2
General Business Elective 3		2
	Credits	**9**
Fourth Semester		
BU.680.620	Operations Management	2
BU.150.620	Strategic Management	2
BU.142.601	Leadership and Organizational Behavior	2
NR.110.657	Healthcare Organizational Leadership Practicum III	4
General Business Elective 4		2
General Business Elective 5		2
General Business Elective 6		2
	Credits	**16**
Fifth Semester		
General Business Elective 7		2
General Business Elective 8		2
General Business Elective 9		2
General Business Elective 10		2
General Business Elective 11		2
	Credits	**10**
	Total Credits	**65**

Program Total: 65 Credits [cr]/504 Clinical Hours [CL]

MSN Healthcare Organizational Leadership/MBA Dual Degree Program of Study: Part Time

All Business courses are taken at the Carey Business School

Course	Title	Credits
First Semester		
BU.510.601	Statistical Analysis	2
BU.120.601	Business Communication	2
NR.110.651	Leadership Role Identity and Career Development	2
	Credits	**6**
Second Semester		
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
	Credits	**7**
Third Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
BU.220.620	Business Microeconomics	2
	Credits	**5**
Fourth Semester		
General Business Elective 1		2
BU.150.620	Strategic Management	2
BU.142.601	Leadership and Organizational Behavior	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
	Credits	**9**
Fifth Semester		
BU.410.620	Marketing Management	2
NR.110.655	Healthcare Organizational Leadership Practicum I	2

NR.210.607	Context of Health Care for Advanced Nursing Practice	3
	Credits	**7**
Sixth Semester		
NR.110.656	Healthcare Organizational Leadership Practicum II	3
BU.520.601	Business Analytics	2
	Credits	**5**
Seventh Semester		
NR.110.657	Healthcare Organizational Leadership Practicum III	4
BU.680.620	Operations Management	2
General Business Elective 1		2
	Credits	**8**
Eighth Semester		
General Business Elective 2		2
General Business Elective 3		2
General Business Elective 4		2
General Business Elective 5		2
	Credits	**8**
Ninth Semester		
General Business Elective 6		2
General Business Elective 7		2
	Credits	**4**
Tenth Semester		
General Business Elective 8		2
General Business Elective 9		2
General Business Elective 10		2
General Business Elective 11		2
	Credits	**8**
	Total Credits	**67**

Program Total: 65 Credits [cr]/504 Clinical Hours [CL]

Financial Aid

The Office of Student Financial Services assists students in obtaining financing for their education. The school participates in several financial aid programs that will help to pay education expenses. Financial assistance may include loans, grants, scholarships, and work-study funding. An overview of the various aid programs is provided here. If you need assistance with financial aid please visit the SEAM's Online Form (https://support.sis.jhu.edu/case/) or visit our website at nursing.jhu.edu/admissions/financial-aid/index.html (http://nursing.jhu.edu/admissions/financial-aid/).

2022-2023 Program Costs

One-year living expenses provided here are *estimates*, based on average costs. Actual costs may vary. For 2022-2023 planning purposes, a 3% cost-of-living increase should be anticipated, as well as at least a 2% to 3% tuition increase. For the current cost of attendance for each program, please visit nursing.jhu.edu/admissions/financial-aid/forms.html (http://nursing.jhu.edu/admissions/financial-aid/forms.html).

Grants, Scholarships, and Loans

Please note: Some outside scholarships may require a School of Nursing certification. Students needing certification for outside scholarships should contact Student Financial Services.

Helene Fuld Leadership Program for the Advancement of Patient Care Quality and Safety

This program is funded by the Helene Fuld Health Trust. Recipients will benefit from training and intensive, applied experiences in interprofessional clinical environments that provide an enduring foundation for continued excellence in advancing quality and safety in health care delivery. Award recipients will be required to participate in a variety of academic activities in association with the program.

Coverdell Fellows Program

The School of Nursing is proud to offer the Paul D. Coverdell Fellows Program. The program offers individuals who have successfully completed Peace Corps service the opportunity to participate in community nursing practice under the supervision of senior community health nursing faculty. This service is outside that required by the nursing courses.

Students will be paid a stipend for this service. In addition, an effort will be made to individualize the practice site of students based on their previous experiences and future career goals. Coverdell Fellows Scholarships in the amount of up to $15,000 are available to a limited number of returning Peace Corps volunteers. Preference is given to RPCVs who have completed their service within the past 24 months. For information, contact the Office of Admissions at 410-955-7548.

School of Nursing Merit Scholarships

Merit Scholarships are provided to students at the time of admission. They are awarded for the length of a student's program and range from $10,000 to full tuition. Merit awards are awarded from institutional funds and the endowed scholarships listed in this catalogue.

Maryland State Scholarships

The Maryland Higher Education Commission offers grants and scholarships to qualified Maryland residents. Most awards are based in part upon financial need. Specific program information and eligibility criteria can be found at www.mhec.state.md.us (http://www.mhec.state.md.us/) or by phone at 410-260-4565. (Non-Maryland residents should contact the designated state agency (https://www2.ed.gov/about/contacts/state/) for information on funding opportunities available through their state of residency.)

Hal and Jo Cohen Scholars Grant

The Maryland Nurse Support Program II Hal and Jo Cohen Graduate Nursing Scholarships is a competitive grant that awards full tuition for students to complete the graduate education necessary to assume roles as nursing faculty at Maryland institutions of higher education upon graduation. The Cohen Scholars grants selects individuals with a strong intent to pursue and remain in nursing educator as a faculty or hospital based educator in the state of Maryland. Cohen Scholars have a service commitment upon graduation to be a nurse educator.

Eligibility criteria for limited Cohen Scholars grant scholarship include: 1) an individual must be a Maryland or neighboring state resident and be fully admitted, 2) enrolled at a Maryland college or university as a full-time or part-time graduate student in a doctoral program (DNP, PhD) or post-graduate certificate program (nursing education, APRN certificate);

3) strong interest in the nurse educator role; 4) GPA 3.25/4.0, Grant awards have a service obligation component and are by nomination only, subject to the availability of funds and not all eligible applicants may receive an award.

Cohen Scholars grant recipients are expected to complete a required mentoring program and maintain a GPA 3.25/4.0 throughout the education program. The mentoring program includes faculty role preparation (9 credits of nursing education courses, teaching practicum/experience, mentoring activities), professional activities, employment placement, and annual performance reports.

Cohen Scholars grant service commitment includes employment in a nurse educator role within 6 months of education as a faculty or hospital educator. One year of full-time nurse educator experiences is required for each year of tuition support or two years of part-time for each year of tuition support.

Health Resources and Services Administration Scholarships

FACULTY LOAN REPAYMENT PROGRAM

The Faculty Loan Repayment Program provides loan repayment to individuals who have an interest in pursuing a career as a faculty member in a health professions school. Program applicants must be from a disadvantaged background, have an eligible health professions degree or certificate, and have an employment commitment as a faculty member at an approved health professions institution for a minimum of two years. Program participants receive funds (up to $40,000 for two years of service) to repay the outstanding principal and interest of qualifying educational loans.

NURSE FACULTY LOAN PROGRAM (NFLP)

NFLP recipients may receive up to $35,500 per year, which is allotted for tuition, books, and fees. Living expenses are not eligible to be covered by NFLP funding. To qualify for the 85% loan cancellation, NFLP recipients must be employed full-time as a Nursing faculty member over a consecutive four-year period. During this period:

- 20% of the loan is cancelled upon completion of employment for years 1, 2, and 3.
- 25% of the loan is cancelled upon completion of employment year 4.
- 15% of the loan is deferred while the borrower is employed during the four-year period.
- After 4 years, the remaining 15% is repaid over 10 years at an interest rate of 3%.

BALTIMORE TALENT SCHOLARS

The Johns Hopkins School of Nursing (JHSON) is proud to announce the creation of a scholarship program created to benefit the Baltimore community by keeping our most talented students in Baltimore City. In the vision of the Johns Hopkins University Baltimore Scholars program aimed at undergraduate students, the School of Nursing Baltimore Talent Scholars Program will provide four full-tuition scholarships annually to Baltimore City public high school graduates admitted to the JHSON MSN Entry into Nursing Program.

AMERICORPS AWARDS

This program provides educational awards in return for work in community service. Students can work before, during, or after their postsecondary education. Funds can be used either to pay current education expenses or to repay outstanding federal student loans. Information can be obtained from their website at https://www.nationalservice.gov/programs/americorps (https://www.nationalservice.gov/programs/americorps/).

TEACH FOR AMERICA

Through a partnership with Teach for America Hopkins offers waived application fees to Teach for America corps members and alumni. The School of Nursing also offers Individuals who have served in the Teach for America program with a $12,500 scholarship. To qualify for this scholarship students must be admitted to one of the pre-licensure academic programs and they must provide documentation of their service in Teach for America. No application is required.

FEDERAL DIRECT LOAN

This program provides a fixed interest rate loan to eligible students to help cover the cost of higher education. The government charges an origination fee that is deducted from the loan proceeds. Applicants must enroll at least half- time to be considered for a Direct Loan. The School of Nursing participates in two of the three types of Federal Direct Loans:

DIRECT UNSUBSIDIZED LOAN

This program provides a loan of up to $20,500 per year to eligible students. The interest rate for the Direct Unsubsidized Loan is contingent upon the disbursement date:

Disbursement Date	Interest Rate
On July 1, 2021 through June 30, 2022	5.28%
On July 1, 2022 through June 30, 2023	6.54%

Interest accrues from the time the loan is disbursed and continues until it is paid in full. Borrowers may pay the interest while enrolled in school or they can allow it to accrue. Accrued interest will be capitalized, which means it will be added to the principal amount of the loan. The origination fee is currently 1.057%. Updated information about the origination fee will be available at https://studentaid.ed.gov (https://studentaid.ed.gov/) after October 1, 2022.

DIRECT PLUS LOANS

This program provides loans up to the cost of attendance less any other aid a borrower may be receiving. It is based upon the creditworthiness of the borrower. The interest rate for the Direct PLUS Loan is contingent upon the disbursement date:

Disbursement Date	Interest Rate
On July 1, 2021 through June 30, 2022	6.28%
On July 1, 2022 through June 30, 2023	7.54%

Interest accrues from the time the loan is disbursed and continues until it is paid in full. Borrowers may pay the interest while enrolled in school or they can allow it to accrue. Accrued interest will be capitalized, which means it will be added to the principal amount of the loan. The origination fee is currently 4.228%. Updated information about the origination fee will be available at https://studentaid.ed.gov (https://studentaid.ed.gov/) after October 1, 2022.

THE JOHNS HOPKINS HOSPITAL EMPLOYEE SCHOOL OF NURSING TUITION LOAN

Johns Hopkins Health System Corporation / The Johns Hopkins Hospital (JHHSC/JHH) employees who are enrolled at the School of Nursing can finance their tuition through this special loan program with the Johns

Hopkins Federal Credit Union (JHFCU). For more information about this program, contact the JHHSC/JHH Benefits Office at 410-614-6504.

Employment

FEDERAL WORK-STUDY PROGRAM (FWS)

The program provides part-time employment for students who demonstrate financial need. Students who participate in the program earn money to help pay education expenses. The program encourages work that is related to the student's program of study and work in community service. Many community service opportunities are available. The amount of earnings will vary depending upon the employment obtained, rate of pay, and hours worked. Earnings are further limited by the amount of the student's demonstrated need and the availability of FWS funds. To locate current FWS opportunities please visit The University Of Experiential Learning's platform SMILE (https://orchid.hosts.jhmi.edu/stujob/sessmile.cfm). Students will need to login to SMILE to view current opportunities. Information regarding non-Federal Work-Study employment opportunities may be available through the Career Resource Center.

APPLICATION PROCEDURES

To apply for federal student aid for the 2022-2023 school year, applicants must:

- Complete the 2022-23 Free Application for Federal Student Aid (FAFSA)
- If applicable, submit the electronic School of Nursing Student Anticipated Enrollment Form after the FAFSA (students should check their To Do List)
- Be a U.S. citizen, permanent resident, or eligible non-citizen
- Be enrolled in a degree program and maintain satisfactory academic progress
- Be registered at least half-time
- Not owe a refund on a federal student grant or be in default on a federal student loan
- Register with the Selective Service (if required) and have a valid Social Security Number
- Not be convicted under federal or state law of possession or sale of illegal drugs

Application materials are available on our website at www.nursing.jhu.edu/academics/finaid (http://www.nursing.jhu.edu/academics/finaid/). Note that additional documentation may be requested. For optimum consideration, students should complete the application process by March 1 for fall enrollment and October 1 for spring enrollment. To be considered for state funding, students must follow the application guidelines published by their state of residency. Maryland residents must complete the FAFSA by March 1. Listings of state agencies and contact information can be found at www.studentaid.ed.gov (http://www.studentaid.ed.gov/). Once on the website, click on the "Funding your Education" link and then the "State Aid" link.

SATISFACTORY ACADEMIC PROGRESS

In accordance with federal regulations, students who receive Federal Student Aid (FSA) must be in good standing and maintain Satisfactory Academic Progress (SAP) while pursuing their degree or certificate.

Under Federal Title IV law, the school's SAP requirements must meet certain minimum requirements, and be at least as strict as the standards for Good Academic Standing. To remain in good academic standing, students must have a 3.0, meet or exceed 67% of their credits they attempt, and complete their coursework in the defined time for their program. Students on academic probation may also be on Financial Aid Suspension, or they may be on Financial Aid Warning status. The policy applies to new students starting in the 2018-19 academic year receiving Federal Student Aid for semesters/periods of enrollment that begin during or after summer 2018.

The federal regulations require that an institution use three measurements to determine SAP.

- Qualitative – students must maintain a minimum cumulative grade point average or equivalent
- Quantitative – students must maintain a minimum cumulative completion rate of credits attempted
- Maximum timeframe – students must complete their degree or certificate within a maximum timeframe

The standards used to evaluate academic progress are cumulative and, therefore, include all periods of the student's enrollment, including periods during which the student did not receive FSA funds.

PRE-LICENSURE STUDENTS

1. Minimum cumulative grade-point average (GPA) – Qualitatively, on a scale of 4.0, pre-licensure students must maintain a minimum 3.0 cumulative GPA.
2. Minimum cumulative completion rate – Quantitatively, financial aid recipients must maintain a cumulative completion rate equal to or exceeding 67% of the credits attempted.
3. MSN Entry into Nursing students must complete the program within 5 years of matriculation.

MASTER'S SPECIALTY, CERTIFICATE, AND DOCTORATE STUDENTS

1. Minimum cumulative grade-point average (GPA) – Qualitatively, on a scale of 4.0, graduate students must maintain a minimum 3.0 cumulative GPA.
2. Minimum cumulative completion rate – Quantitatively, financial aid recipients must maintain a cumulative completion rate equal to or exceeding 67% of the credits attempted.
3. Students must complete the required course work within the time periods specified below:

Coursework	Time Period
MSN, Specialty Students	6 years from matriculation
MSN, Specialty/MBA Students	7 years from matriculation
Certificate Students	3 years from matriculation
DNP, Advanced Practice Students	6 years from matriculation
DNP Executive Students	6 years from matriculation
DNP, Executive/MBA Students	7 years from matriculation
PhD Students	7 years from matriculation
DNP/PhD Students	8 years from matriculation

TREATMENT OF GRADES AND REPEATED COURSEWORK

Grades	Description
Course Withdrawal - W Grades	Not included in GPA calculation, but are considered a non-completion of attempted coursework

Incomplete Course – I Grade	Not included in the GPA calculation, but are considered a non-completion of attempted coursework until the coursework is completed and final grade is submitted
Audited Course – AU Grade	Not included in the GPA calculation, but are considered a non-completion of attempted coursework until the coursework is completed and final grade is submitted
Satisfactory (S) or Passing (P) Grade	Treated as attempted credits which are earned, but is not included in GPA calculation
Failing – F Grade	Treated as attempted credits that were not earned and is included both in GPA calculation and minimum completion rate
No Grade Reported – X Grade	Not included in the GPA calculation, but is considered a non-completion of attempted coursework until the coursework is completed and final grade is submitted
Course Repeats	Only repeated course grade will be used in GPA calculation; all attempts will be included in the completion rate determinations

All credits accepted for transfer to the student's program of study are taken into consideration as both attempted and earned credits. Grades earned at other institutions are not, however, counted when computing the student's GPA.

Financial aid recipients are reviewed for SAP at the end of each semester of enrollment (summer, fall, winter, spring). Letters are sent to students who do not meet the SAP standards and are either placed in a warning status or lose eligibility.

FINANCIAL AID WARNING STATUS

Students who fail to meet the minimum financial aid Satisfactory Academic Progress standards will be placed on Financial Aid Warning for the subsequent semester/period of enrollment. Students are still eligible for financial aid during the "Warning" semester.

Students applying for financial aid will be placed immediately into **Financial Aid Warning** status if they did not meet SAP standards in the previous period of enrollment prior to applying for aid.

FINANCIAL AID SUSPENSION – LOSING TITLE IV ELIGIBILITY

Students on Financial Aid Warning, who fail to maintain the minimum SAP standard during the warning semester, will be placed on **Financial Aid Suspension** status for subsequent semesters/periods of enrollment. No financial aid will be disbursed during subsequent semesters/periods of enrollment until the student regains financial aid eligibility.

Students applying for financial aid will not be eligible for assistance and will immediately be placed on **Financial Aid Suspension** status if they did not meet the minimum financial aid SAP standards, based on the two previous periods of enrollment prior to applying for financial aid.

Students who do not complete their program within the maximum timeframe lose eligibility for financial aid and are placed on Financial Aid Suspension status.

REINSTATEMENT OF AID AFTER FINANCIAL AID SUSPENSION STATUS

A student may regain eligibility for financial aid after Financial Aid Suspension status only by one of the following methods:

1. The student submits a written letter of appeal and the Financial Aid Appeals Committee grants the appeal. The student is placed on Financial Aid Probation for the next semester/period of enrollment and is eligible for Title IV aid during their Financial Aid Probation status. If the appeal is approved but the Committee has determined that the student will not be able to meet the SAP standards within one semester/period of enrollment, then the student will be placed on Financial Aid Probation with an Academic Plan which, if followed, will ensure the student is able to meet the SAP standards by a specific point in time.
2. The student registers for coursework while on Financial Aid Suspension status, pays for tuition and fees without the help of student financial aid, and does well enough in the coursework to satisfy all the satisfactory academic progress standards at the end of the subsequent semester(s)/period(s) of enrollment.

APPEAL PROCESS

Students who wish to appeal Financial Aid Suspension status must submit an appeal of Financial Aid Suspended status in writing to the Financial Aid Appeals Committee by the date specified in the Financial Aid Suspended notification letter. The Financial Aid Appeals Committee will review the appeal and notify the student in writing of their decision within 14 working days after the Appeals Committee meets and makes its determination. Appeals should include the following:

- The grounds for appeal (i.e., working too many hours, etc.)
- Demonstration that the student understands the reason behind failure to meet the SAP requirements
- Specific plans to rectify the student's current academic status

The Financial Aid Appeals Committee will review the appeal and consult with academic advisers and other involved parties as warranted. If it is determined that the student will not be able to meet the SAP standards by the end of the next semester/period of enrollment but the Committee is in agreement that the student's grounds for appeal are reasonable and the student has a reasonable chance to succeed and graduate, then if the appeal is approved the student will also be placed on an Academic Plan. Students will receive written notification of the decision. All decisions on such appeals are final.

Students who lose eligibility for financial aid due to not meeting the minimum SAP standards more than one time during their program may submit an appeal each time.

ACADEMIC PLAN

Students who lose eligibility and submit an appeal may be placed on an Academic Plan if the appeal is approved. The purpose of an academic plan is to support the student in bringing them back into compliance with the financial aid SAP standards by a specific point in time in order to ensure that the student will be able to successfully complete the degree or certificate program. The academic plan will be specifically tailored to the student and may include milestones and specific requirements such as a reduced course load, specific courses, or tutoring. Students on an academic plan are still responsible to meet the SAP requirements in the subsequent semester/period of enrollment and will lose eligibility if the SAP standards are not met, and need to go through the appeal process in order to regain eligibility. The student's progress in their academic plan will be taken into account in any subsequent appeal process of financial aid eligibility.

Contact the Office of Student Financial Services at 410-955-9840 or SEAM's Online Form (https://support.sis.jhu.edu/case/)for more information.

FINANCIAL AID—RETURN OF TITLE IV FUNDS

The Office of Student Financial Services is required by federal statute to recalculate federal financial aid eligibility for students who withdraw, drop out, are dismissed, or take a leave of absence prior to completing 60% of a payment period or term.

Recalculation of financial aid is based on the percentage of earned aid using the following Federal Return of Title IV Funds formula:

- Percentage of payment period or term completed = number of days completed up to the withdrawal date divided by the total days in the payment period or term. (Any break of five days or more is not counted as part of the days in the term.) This percentage is also the percentage of earned aid.
- Funds are returned to the appropriate federal program based on the percentage of unearned aid using the following formula:
    - Aid to be returned = 100% of the aid that could be disbursed minus the percentage of earned aid multiplied by the total amount of aid that could have been disbursed during the payment period or term.
- Other assistance under this Title for which a Return of funds is required (e.g., LEAP).

If a student earned less aid than was disbursed, the institution would be required to return a portion of the funds and the student would be required to return a portion of the funds. Keep in mind that when Title IV funds are returned, the student borrower may owe a debit balance to the institution.

If a student earned more aid than was disbursed to them, the institution would owe the student a post-withdrawal disbursement which must be paid within 120 days of the student's withdrawal.

The institution must return the amount of Title IV funds for which it is responsible no later than 30 days after the date of the determination of the date of the student's withdrawal.

Refunds are allocated in the following order:

1. Unsubsidized Federal Stafford Loans
2. Subsidized Federal Stafford Loans
3. Unsubsidized Direct Stafford Loans (other than PLUS loans)
4. Subsidized Direct Stafford Loans
5. Federal Perkins Loans
6. Federal Parent (PLUS) Loans
7. Direct PLUS Loans
8. Federal Pell Grants for which a Return of Funds is required
9. Academic Competitiveness Grants for which a Return of Funds is required
10. National Smart Grants for which a Return of Funds is required
11. Federal Supplemental Opportunity Grants for which a Return of Funds is required

Master's Degrees

Entry into Nursing, Master of Science in Nursing

The Master of Science in Nursing programs at the Johns Hopkins School of Nursing are accredited by the Commission on Collegiate Nursing Education (CCNE):

Commission on Collegiate Nursing Education
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930.

The MSN (Entry into Nursing) Program prepares students to become Master's level nurse generalists with advanced knowledge and skills to deliver and direct care to patients with complex conditions on interprofessional teams in a hospital, primary care, or community health setting.

This full-time, five-term program is delivered on-site and prepares students to take the nursing licensure exam (NCLEX) and be licensed as an RN upon graduation. The program emphasizes leadership, global impact, quality and safety, and evidence-based interprofessional education. Students learn from a framework that integrates knowledge from the physical sciences, the humanities, public health, genetics, and organizational sciences into nursing practice. For the MSN (Entry into Nursing) Program, the coursework in each semester builds on the knowledge acquired during the prior semester. MSN (Entry into Nursing) students may not progress to new semester coursework if all previous semester coursework is not successfully completed.

Graduates will be qualified to enter the nursing workforce immediately or continue their studies toward an advanced practice nursing specialty or doctoral degree.

Students must complete the program sequentially, as outlined in the curriculum, within 5 years.

Enhancement Options

Community Outreach

The Johns Hopkins University School of Nursing has an innovative educational curriculum for community-based public health nursing practice. The goals of the project are to increase education in public health nursing practice and to provide a community-based learning experience for students while improving both the delivery of health services to and the health status of the urban Baltimore community. The ultimate objective is to improve health in similar urban communities by increasing the number of nursing graduates who are proactive in urban public health. The School of Nursing operates clinics that are staffed by faculty and students in a transitional housing program, a low-income housing project, a domestic violence shelter, and a Baltimore city K-8 school.

Opportunities for special study credits with selected faculty are available. These offerings provide structured learning experiences while working directly in the community. Whenever feasible, students will be assigned to multidisciplinary teams to enrich the learning experience. Stipends are available for selected students who engage in special community service projects.

Nursing students interested in expanding upon or developing their interest in community-based public health may identify themselves upon matriculation or at any time during their course of study.

Birth Companions

This course focuses on developing initial competence in the Birth Companion role based on the Doula model. The Doula model emphasizes physical, emotional, and informational support to the mother before, during, and after childbirth.

Maternal and child health nursing and community health nursing theories and practices are introduced. Group processing of client and birth companion interactions and care management will be held biweekly. Seminars with experts in the field including lactation consultants, social workers, community health educators, and child birth educators will be included.

Course	Title	Credits
First Semester		
NR.120.501	Professionalism for Nursing in Health Care	3
NR.120.502	Foundations of Nursing Practice	3
NR.120.503	Health Assessment I	3
NR.120.504	Pathophysiology I	3
NR.120.505	Integrated Clinical Management: Common Health Alterations	4
NR.120.537	Community Outreach to Underserved Communities in Urban Baltimore	1
	Credits	**17**
Second Semester		
NR.120.507	Pharmacology	3
NR.120.509	Promoting Health in Older Adults	3
NR.120.511	Integrated Clinical Management: Chronic Health Alterations	4
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan [1]	2
	Credits	**15**
Third Semester		
NR.120.513	Leadership for Professional Nursing [2]	3
NR.120.515	Psychiatric Mental Health [2]	3
NR.120.516	Integrated Clinical Management: Complex Health Alterations	4
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
	Credits	**13**
Fourth Semester		
NR.120.520	Nursing the Childbearing Family [2]	4
NR.120.529	Population and Public Health Nursing	4
NR.120.521	Child Health [2]	4
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
	Credits	**15**
Fifth Semester		
NR.120.527	Integrated Clinical Management: Synthesis Practicum	6
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
Nursing Specialty Elective Course		3
	Credits	**12**
	Total Credits	**72**

[1] This course offered in 3rd term for spring entrants.
[2] These are 7-week courses taken consecutively within the semester
[3] Only 3 elective credits are required in the 5th term

Learning Outcomes

Program outcomes for the MSN (Entry into Nursing) are based upon:

1. The Essentials of Baccalaureate Education of Professional Nursing Practice (AACN, 2008)

2. Essentials of Master’s Education in Nursing (AACN, 2011).

A graduate of the MSN (Entry into Nursing) Program:

1. Integrates knowledge from the sciences, the humanities, public health, genetics, and organizational sciences into nursing practice across diverse settings and populations.

2. Applies nursing process to provide care to and advocate for individuals, families, groups, systems, communities, and populations.

3. Models effective, respectful therapeutic communication in the practice of nursing.

4. Integrates knowledge and skills of organizational and systems leadership for critical decision making, to improve health and health care delivery.

5. Incorporates quality and safety principles to improve care in organizations across diverse settings.

6. Utilizes knowledge of the research process to critique evidence and translate findings to clinical practice.

7. Analyzes information management, information systems, and enabling technologies for the delivery of quality, coordinated, and safe care.

8. Applies knowledge of health care policies, financing, and regulations to influence political/policy making for nursing practice and health care delivery.

9. Coordinates increasingly complex care to improve outcomes and transitions of care through collaboration with interprofessional health care teams.

10. Integrates health promotion and disease prevention principles to provide patient and family-centered care for individuals, families, groups, systems, communities, and populations.

11. Embodies inherent values of the profession into ethical and legal practice of nursing. Exhibits the highest level of personal and professional value-based behaviors.

12. Incorporates knowledge of ecological and social determinants of health into care for individuals, families, groups, communities, systems, and populations.

13. Critically evaluates health issues within a global context.

14. Demonstrates cultural humility in the provision of care to individuals, families, groups, systems, communities, and populations.

15. Synthesizes practice-based knowledge to exercise advanced clinical reasoning and integrated clinical management in nursing practice.

Master of Science in Nursing (MSN) Healthcare Organizational Leadership Track

The MSN in Healthcare Organizational Leadership (HOL) prepares the student to assume leadership positions in various organizations providing direct or indirect healthcare services across the life span and care continuum; government agencies; community-based organizations (public and private); and other healthcare industries (insurance, biomedical, pharmaceutical). Students will acquire competencies essential for effective and transformative leadership in multiple organizational contexts and dynamics at micro, meso, and macro levels. Formation of the student's vision for an impactful leadership career, aspirations for meaningful legacy to the nursing profession, healthcare delivery systems, professional/health-related organizations, and the public health at large are distinctive features of the curriculum, aligned with the Johns Hopkins School of Nursing (JHSON), mission, vision, strategic directions, and attributes of a *Hopkins Nurse*. Furthermore, the HOL curriculum is informed by the real-world practice underpinned by the state-of-the science for nursing leadership, the American Organization of Nursing Leadership (AONL) Nurse Leaders Competencies, and the American Association of Colleges of Nursing (AACN) Essentials: Core Competencies for Professional Nursing Education.

Clinical practica and number of clinical hours: Clinical practicum in HOL I (112 hours), HOL II (168 hours), and HOL III (224 hours) for a total of 504 clinical hours.

Certification: MSN in HOL graduates are eligible to apply for certifications available for nurse leaders/executives through the AONL (https://www.aonl.org/initiatives/certification (https://www.aonl.org/initiatives/certification/)) and the American Nurses Credentialing Center (www.nursingworld.org/our-certifications (http://www.nursingworld.org/our-certifications/)).

The Master of Science in Nursing programs at the Johns Hopkins School of Nursing are accredited by the

Commission on Collegiate Nursing Education (CCNE)
Collegiate Nursing Education
655 K Street, NW, Suite 750
Washington, DC 20001
202-463-6930

All course work in the MSN specialty tracks, both clinical and classroom, is organized around 10 domains, competencies, and sub-competencies for advanced-level nursing education (AACN) and 5 common-core set of competency domains for healthcare leadership (AONL). Students develop progressive understanding and expertise in relation to these domains, and learning is structured to accomplish a related set of outcomes that are considered essential to advanced nursing practice. The MSN in HOL track includes core, professional and theoretical foundations of organizational leadership and management, business of healthcare, and practice of nursing leadership and management roles in multiple healthcare organizational contexts. The MSN in HOL track require 35 to 67 credits (includes MSN/MBA) during a minimum of 16-30 months of full-time study.

Graduates will have completed the educational requirements for appropriate certification. Full-time and part-time study are available.

Students matriculated in the JHU School of Nursing are required to satisfy all academic requirements and adhere to all policies of the School. Students are expected to complete degree requirements within five years of enrollment.

Program Requirements

Curriculum

Code	Title	Credits
Core Courses		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
Additional Courses		
NR.110.651	Leadership Role Identity and Career Development	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
NR.210.806	Health Finance	2
NR.110.654	Foundations of Healthcare Quality and Safety	2
NR.110.656	Healthcare Organizational Leadership Practicum II	3
NR.110.653	Leadership: Organizational Dynamics, Complexities, and Change	3
NR.110.619	Health Care Economics for Management and Practice	2
NR.110.657	Healthcare Organizational Leadership Practicum III	4
Financial Theory Requirement		2
Management Elective		2
Management Elective		2

Program Total: 35 Credits [cr]/ 504 Clinical Hours [CL]

Programs of Study

MSN Healthcare Organizational Leadership Track Program of Study: Full Time

Course	Title	Credits
First Semester		
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3

NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.110.651	Leadership Role Identity and Career Development	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
	Credits	**11**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
	Credits	**8**
Third Semester		
NR.210.806	Health Finance	2
NR.110.654	Foundations of Healthcare Quality and Safety	2
NR.110.656	Healthcare Organizational Leadership Practicum II	3
	Credits	**7**
Second Year		
First Semester		
NR.110.653	Leadership: Organizational Dynamics, Complexities, and Change	3
NR.110.619	Health Care Economics for Management and Practice	2
NR.110.657	Healthcare Organizational Leadership Practicum III	4
	Credits	**9**
	Total Credits	**35**

Program Total: 35 Credits [cr]/504 Clinical Hours [CL]

Please note, curriculum, credit hours, and sequencing are subject to change.

MSN Healthcare Organizational Leadership Track Program of Study: Part Time

Course	Title	Credits
First Semester		
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.110.619	Health Care Economics for Management and Practice	2
	Credits	**5**
Second Semester		
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
	Credits	**6**
Third Semester		
NR.210.806	Health Finance	2
NR.110.654	Foundations of Healthcare Quality and Safety	2
	Credits	**4**
Second Year		
First Semester		
NR.110.651	Leadership Role Identity and Career Development	2
NR.110.652	Leadership and Organizational Culture: Theories & Practice in Contemporary Healthcare	3
	Credits	**5**
Second Semester		
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.110.655	Healthcare Organizational Leadership Practicum I	2
	Credits	**5**
Third Semester		
NR.110.656	Healthcare Organizational Leadership Practicum II	3
	Credits	**3**
Third Year		
First Semester		
NR.110.653	Leadership: Organizational Dynamics, Complexities, and Change	3
NR.110.657	Healthcare Organizational Leadership Practicum III	4
	Credits	**7**
	Total Credits	**35**

Program Total: 35 Credits [cr]/504 Clinical Hours [CL]

Please note, curriculum, credit hours, and sequencing are subject to change.

Graduates of the MSN in Healthcare Organizational Leadership program will be able to:

1. Integrate philosophical foundations of nursing, ethical and legal principles in their scope of practice as nurse-leaders.

2. Use theory and evidence-based leadership and management practices at healthcare organizations' microsystem, mesosystem, and macrosystem.

3. Apply finance, business, and economics principles in operations of healthcare systems or organizations.

4. Design initiatives for improving outcomes at the patient/family, staff/employee, and organizational levels.

5. Demonstrate attributes of a professional, transformative, and visionary nurse-leader.

Outcomes are based upon The Essentials of Master's Education in Nursing (AACN, 2011)

Online Prerequisites for Health Professions

These 11-week courses (https://nursing.jhu.edu/academics/programs/prerequisites/) are designed for students needing prerequisite courses for healthcare professions. The instructor-led courses are delivered using a facilitated teaching approach to engage students and encourage interaction and participation. All students who enroll in these courses are enrolled as non-degree seeking students with the School of Nursing. Courses are competitively priced and available online in the fall, spring, and summer semesters. First-time students need to submit an online application form found at the Online Prerequisites for Health Professions (https://nursing.jhu.edu/academics/programs/prerequisites/) web page.

REGISTRATION

These 11-week courses (https://nursing.jhu.edu/academics/programs/prerequisites/) are designed with students' goals in mind. The instructor-led courses are delivered using a facilitated teaching approach to engage students and encourage interaction and participation. All students who enroll in these courses are enrolled as non-degree seeking students with the School of Nursing. Courses are competitively priced and available online in the fall, spring, and summer semesters. First-time students need to submit an online application form found at the Online Prerequisites for Health Professions (https://nursing.jhu.edu/academics/programs/prerequisites/) web page.

All students pursuing a health-based education can take the following instructor-led prerequisites completely **online** and get a taste of Hopkins Nursing:

- Nutrition
- Human Growth and Development Through the Lifespan
- Biostatistics
- Microbiology with virtual lab*
- Anatomy with virtual lab*
- Physiology with virtual lab*
- Chemistry with virtual lab§
- Biochemistry with virtual lab§

**Virtual labs are accepted at Hopkins Nursing, but not everywhere. Check your university and state licensure requirements for prerequisite courses. For a full list of required courses visit our pre-licensure* Master of Science in Nursing: Entry in Nursing *(*https://nursing.jhu.edu/academics/programs/pre-licensure/masters-entry/*) program webpage.*

§Offered but not required by Johns Hopkins School of Nursing MSN Entry into Nursing program.

Registration Questions? Contact jhuson@jhu.edu (jhuson@jhu.edu?subject=Prerequisite%20Registration%20Question) or look in our FAQS (https://nursing.jhu.edu/academics/programs/prerequisites/faqs.html). Returning students register through the Johns Hopkins University Student Information System. (https://isis.jhu.edu/sswf/)

Students may enroll in up to three prerequisite courses per semester, but should not enroll in more than two lab courses at the same time. Anatomy is to be taken prior to Physiology and may not be taken in the same semester.

TUITION

Tuition is due at time of registration. Payment plan requests can be sent to the Office of Student Enrollment and Account Management (SEAM) by completing* the** SEAM's Online Form **(**https://support.sis.jhu.edu/case/**)to request support.** ***More information on cost of tuition can be found on the Prerequisite Information page ***(***https://nursing.jhu.edu/academics/programs/prerequisites/***).***

When you are enrolled in our prerequisite courses, you are enrolled as a non-degree seeking student and therefore are ineligible for federal student aid via the FAFSA at this time. Financial aid for prerequisite courses must come from private sources. Private sources include private student loans or third-party tuition aid such as that from an Americorps benefit or employer tuition assistance. For more information on using Americorps benefits, employer tuition assistance, or other third-party tuition aid, please contact our Financial Aid department by visiting the SEAM's Online Form (https://support.sis.jhu.edu/case/)to request support or call 1 877-419-5131.

Students may also fund their courses through military assistance/GI Bill. For more information on using your military benefits toward tuition costs for our prerequisite courses, visit the SEAM's Online Form (https://support.sis.jhu.edu/case/)to request support.

Note: If you are receiving some sort of financial assistance in paying tuition costs for your course, you must inform SEAM by visiting the SEAM's Online Form (https://support.sis.jhu.edu/case/)to request support or calling 1 877-419-5131 after registering for courses so that they can make note of this in your record and ensure that you will not be dropped due to nonpayment.

NR.110.200 Nutrition-3 credits
This course will cover the science and fundamentals of human nutrition. Topics covered include nutritional requirements related to changing individual and family needs, food choices, health behaviors, food safety, prevention of chronic disease, and nutrition-related public health in the United States and globally.

NR.110.201 Human Growth and Development through the Lifespan-3 credits
This course provides an overview of major concepts, theories, and research related to human development through the lifespan from the prenatal period to the end of life. Significant factors that influence individual functioning are explored.

NR.110.202 Biostatistics-3 credits
This course provides an introduction to the basic concepts of statistical ideas and methods that aims to equip students to carry out common statistical procedures and to follow statistical reasoning in their fields of study. Principles of measurement, data summarization, and univariate and bivariate statistics are examined. Emphasis is placed on the application of fundamental concepts to real-world situations.

NR.110.203 Microbiology with Lab-4 credits
This course introduces the core concepts and basic principles in microbiology, examining microorganisms and how they interact with humans and the environment. Information regarding classifications of microorganisms, characteristics of different cell types, and processes critical for cell survival is presented. Topics such as bacterial metabolism, microbial nutrition, genetics, anti-microbial approaches, and interaction of pathogenic bacteria with humans are also discussed. The course includes a virtual laboratory component designed to complement lecture topics. The course content provides the foundation of general microbiology necessary for students who are interested in applying to health profession programs.

NR.110.204 Anatomy with Lab-4 credits

This course will introduce components and structures of the human body at the level of gross and microscopic anatomy. Students will learn organ localization in the body and structural features comprising the different body systems. The body systems covered will include the skin, heart, lungs, and brain, among others. Upon completion, students will have an understanding of normal healthy anatomy that will prepare them for professional health programs. This course includes a virtual laboratory component designed to complement lecture topics.

NR.110.205 Physiology with Lab-4 credits
This course will introduce the functions of several human body systems. Students will learn how each part within a body system works together to seamlessly accomplish tasks. We will also discuss regulation of organ function, a critical component of physiology. After an introduction on electrolytes, the physiologic processes we will cover include cardiovasculature, lymphatics, and digestion, among others. Upon completion, students will have an understanding of normal healthy anatomical function that will prepare them for professional health programs. This course includes a virtual laboratory component designed to complement lecture topics.

NR.110.206 Chemistry with Lab-4 credits
This course introduces the core concepts of matter and energy, atomic structure, the periodic system, chemical bonding, nomenclature, stoichiometry, weight relationships, gases, solutions, chemical reactions, thermodynamics and equilibrium. The course includes a virtual laboratory component designed to enhance lecture topics. The course content provides the foundation of general chemistry necessary for students who are interested in applying to health profession programs.

NR.110.207 Biochemistry with Lab-4 credits
Biochemistry is a natural science that investigates life processes at the molecular level. This course begins with an introduction to the structure and function of the four classes of biomolecules: proteins, nucleic acids, carbohydrates, and lipids. In the second half of the course, glycolysis, the citric acid cycle, and oxidative phosphorylation will provide a context for an introduction to the fundamentals of enzyme catalysis, kinetics, bioenergetics, and metabolic regulation. The virtual lab promotes mastery of the lecture content while exploring lab techniques used in biochemical research. Upon completion, students will have a solid background in the science that provides the foundation of the biomedical sciences. Prerequisite: NR.110.206 Chemistry with Lab or the equivalent.

Policies

For current faculty and contact information go to https://e-nextcatalogue.jhu.edu/nursing/policies/Administrative%20Leave/

Academic Integrity Policy

The School of Nursing Academic Integrity Policy (the “Policy”) is based on the shared core values stated in the School’s Values Statement. Each member of the School of Nursing community, whether student, faculty or staff, holds themselves and others to the highest standards based on the values of excellence, respect, diversity, integrity, and accountability.

Each student is obligated to adhere to the highest standards of academic ethics and conduct in their academic endeavors.

The Honor Pledge

The following honor pledge will be included and signed on each examination and assignment:

> *“On my honor, I pledge that I have neither given nor received any unauthorized assistance on this (exam) (assignment) (care plan) (paper) (project).*

The pledge may be completed in several ways such as:

- Student will write and sign the pledge;
- Faculty will preprint the pledge on tests and student will initial it;
- Faculty will include the pledge on an online quiz/test and ask students to indicate their online verification.

Scope

This Policy applies to all matriculated and continuing School of Nursing students in full-time and part-time programs, and non-degree courses.

Cross-Divisional Enrollments

School of Nursing students may enroll in courses in one or more other University divisions or schools. School of Nursing students are subject to this policy not only when enrolled in School of Nursing courses, but also when enrolled in courses in other University divisions or schools.

Academic misconduct in the context of those "outside" courses will be subject to and resolved under this policy.

Research Misconduct

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. For a complete definition, refer to The Johns Hopkins University Research Integrity Policy (“Policy”) available at https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf.

The Policy applies to all University faculty, trainees, students, and staff engaged in the proposing, performing, reviewing, or reporting of research, regardless of funding source. Allegations of research misconduct regarding a student should be referred to the Research Integrity Officer for assessment under that Policy, but may also be directed to the department chair or Dean of the responsible unit where the alleged research misconduct occurred.

Non-Academic Misconduct

All issues of non-academic student misconduct will be subject to the University-wide Student Conduct Code. For more on this policy, please refer to http://studentaffairs.jhu.edu/policies/student-code/.

Policy Violations

Academic misconduct is prohibited by this Policy. *Academic misconduct is any action or attempted action that may result in creating an unfair academic advantage for oneself or an unfair academic advantage or disadvantage for any other member or members of the academic community*. *This includes a wide variety of behaviors such as cheating, plagiarism, altering academic documents or transcripts, gaining access to materials before they are meant to be available, and helping another individual to gain an unfair academic advantage. Nonexclusive examples of academic misconduct are listed below*. All suspicions of academic misconduct, no matter how minor, must be investigated.

Cheating

The following are nonexclusive examples of cheating:

- Fraud, deceit, or dishonesty on an academic assignment, test, or examination
- Use or consultation of unauthorized or inappropriate materials (e.g., notes, books, etc.) on assignments, tests, or examinations
- Unauthorized discussion of a test or exam during its administration
- Copying content on an assignment, test, or examination from another individual
- Obtaining a test or examination or the answers to a test or examination before administration of the test or examination
- Studying from an old test or examination whose circulation is prohibited by the faculty member
- Use or consultation of unauthorized electronic devices or software (e.g., calculators, cellular phones, computers, tablets, etc.) in connection with assignments or during tests or examinations
- Use of paper writing services or paper databases
- Unauthorized collaboration with another individual on assignments, tests, or examinations
- Submission of an assignment, test, or examination for a regrade after modifying the original content submitted
- Permitting another individual to contribute to or complete an assignment, or to contribute to or take a test or examination on the student’s behalf
- Unauthorized submission of the same or substantially similar work, assignment, test, or exam to fulfill the requirements of more than one course or different requirements within the same course
- Tampering with, disabling, or damaging equipment for testing or evaluation

Plagiarism

The following are nonexclusive examples of plagiarism:

- Use of material produced by another person without acknowledging its source
- Use of another person’s ideas or words without giving appropriate credit
- Submission of the same or substantially similar work of another person (e.g., an author, a classmate, etc.)
- Use of the results of another individual’s work (e.g., another individual’s paper, exam, homework, computer code, lab report, etc.) while representing it as your own
- Improper documentation/acknowledgement of quotations, words, ideas, views, or paraphrased passages taken from published or unpublished sources
- Wholesale copying of passages from works of others into homework, essays, term papers, dissertation, or other assignment without acknowledgement
- Paraphrasing of another person’s characteristic or original phraseology, metaphor, or other literary device without acknowledgement

Forgery/Falsification/Lying

The following are nonexclusive examples of forgery, falsification, and lying:

- Falsification or fabrication of data/information for an assignment, on a test or exam, or in an experiment
- Citation of nonexistent sources or creation of false information in an assignment
- Attributing to a source ideas or information that is not included in the source
- Forgery of University or other official documents (e.g., letters, transcripts, etc.)
- Impersonating a faculty or staff member
- Request for special consideration from faculty members or University officials based upon false information or deception
- Fabrication of a reason (e.g., medical emergency, etc.) for needing an extension on or for missing an assignment, test, or examination
- Claiming falsely to have completed and/or turned in an assignment, test, or examination
- Falsely reporting an academic ethics violation by another student
- Failing to identify oneself honestly in the context of an academic obligation
- Providing false or misleading information to an instructor or any other University official

Facilitating Academic Dishonesty

The following are nonexclusive examples of facilitating academic dishonesty:

- Intentionally or knowingly aiding another student to commit an academic ethics violation

- Allowing another student to copy from one's own assignment, test, or examination
- Making available copies of course materials whose circulation is prohibited (e.g., old assignments, texts, or examinations, etc.)
- Completing an assignment or taking a test or examination for another student
- Sharing paper mill/answer bank websites or information with other students

Unfair Competition

The following are nonexclusive examples of unfair competition:

- Intentionally damaging the academic efforts of another student.
- Stealing another student's academic materials (e.g., books, notes, assignments, etc.)
- Denying University resources needed by another student (e.g., hiding library materials, stealing lab equipment, etc.)

Failing to Report Alleged Violation

- Failing to report any known or suspected violation of this Policy

Failing to Follow Applicable Policies, Procedures, Rules

- Failing to follow applicable JHU, divisional/school, program, course, and/or faculty policies, procedures, and/or rules regarding academic ethics

Improper Use of Electronic Devices

- Transmittal or posting of patient/client data or photographs
- Use of electronics in any way to gain an unfair advantage on an assignment/test

Academic Integrity Policy Procedures

Reporting Academic or Professional Ethics Violations

Any member of the faculty, administration, staff, or any student who has reason to suspect or believe a violation of this Policy has occurred is expected to notify the Ethics Board Chair or Associate Dean for Enrollment Management and Student Affairs.

Faculty-Student Resolution of First-Time Offenses

- If a student is suspected of academic misconduct, the faculty member responsible for the course in which the misconduct allegedly occurred must, if feasible, review the facts of the case promptly with the student.
- If, after speaking with the student and any witnesses, the faculty member believes that academic misconduct has occurred, the faculty member must first contact the Associate Dean for Enrollment Management and Student Affairs to determine whether the offense is a first offense, or a second or subsequent offense.
- For a first offense, after faculty consultation with the Associate Dean for Enrollment Management and Student Affairs and/or the Chair of the SON Ethics Board, the faculty member may choose to resolve the case directly with the student, i.e., the faculty member and student may reach an agreement on the resolution of the alleged misconduct. Note, neither the faculty member nor the student is obligated to resolve a complaint under this section. A faculty member may not resolve a second or subsequent offense directly with a student.
- If such an agreement is reached, the faculty member must promptly provide the student with a letter outlining the resolution that includes the charges, a summary of the evidence, the findings, and the sanctions agreed upon, and must also simultaneously provide a copy of that letter to the Associate Dean for Enrollment Management and Student Affairs.
- If, however, the faculty member cannot reach an agreement with the student (e.g., the student denies cheating, does not agree with the proposed sanction, etc.), or the offense is a second or subsequent offense, or, if in the case of a first offense, the sanction imposed would be greater than failure in the course, the faculty member must promptly notify the Associate Dean for Enrollment Management and Student Affairs in writing of the alleged violations, evidence, including potential witnesses, and other pertinent details of the case. In such instances, the case will proceed to an Ethics Board hearing as outlined below.

Ethics Board Hearing

- In the case of a first offense that is not resolved between the faculty member and the student or a second or subsequent offense, the Associate Dean for Enrollment Management and Student Affairs will convene a meeting of the Ethics Board in consultation with the chair of the Ethics Board.
- In advance of the Ethics Board hearing, the student will receive written notification of the hearing date, time, and location.

Ethics Board Selection and Ethics Panel Hearings

The Ethics Board consists of a chair, appointed annually by the Dean or her or his designee; two full-time faculty who teach primarily in one of the following programs—MSN Entry into Nursing Practice, DNP, or PhD, elected by the Faculty Assembly; Program Directors from each academic program; and students representing each academic degree.

For each matter, an Ethics Hearing Panel will be formed. The Ethics Hearing Panel consists of the faculty chairperson of the Ethics Board, the faculty members on the Ethics Board elected by the Faculty Assembly, the program director for the student's program, and two student members. The Associate Dean for Enrollment Management and Student Affairs or designee attends all hearings as a non-voting member of the Ethics Board.

Each student appearing before an Ethics Hearing Panel will have a hearing assistant unless explicitly asking that no hearing assistant be named. The hearing assistant for a student may be their academic advisor or other faculty member either chosen by the student or recommended by the Ethics Board. If desired, the faculty member, staff member, or student who reports the case may also have a hearing assistant of their choice or recommended by the Ethics Board. The assistant may meet with the respective parties to assist in preparation of evidence, testimony, and questions for the hearing. The designated assistants may attend and provide consultation in the hearing while the student or faculty member is present.

Students may request witnesses be present at the hearing. The student must furnish the Ethics Hearing Chair with the names of the witnesses in sufficient time to request the presence of the witnesses. It is within the Hearing Panel's discretion to limit the number of witnesses appearing at the hearing to a reasonable number.

Faculty, staff, or students bringing forth the case are expected to compile evidence and to present their account of the violation during an Ethics hearing. All supporting materials for the hearing must be placed on file in the Office of the Associate Dean for Enrollment Management and Student Affairs. Supporting materials may be submitted directly to the

Associate Dean for Enrollment Management and Student Affairs or indirectly through the assistant or the chairperson.

The Ethics Board will endeavor to convene within 10 working days of receiving the request for a hearing. Legal representation is not permitted at Ethics Board hearings.

In general, hearings will proceed as follows, although the Ethics Hearing Panel has discretion to alter the order or manner in which it hears or receives evidence, and to impose time limits on any stage of the process:

- Introductions
- Opening statement from the reporter, if applicable
- Questioning of the reporter by the panel, if applicable
- Closing statement from the reporter, if applicable
- Opening statement from the student
- Questioning of the student by the panel
- Questioning of the witnesses, if any, by the panel
- Closing statement from student

The reporter, student, or witness is only present in the room with the Ethics Hearing Panel during the time that they are being questioned or responding. At the conclusion of the hearing, all parties are dismissed and the deliberations of the Ethics Hearing Panel will be held in private.

The student is presumed innocent until the Ethics Hearing Panel has made a determination by a preponderance of the evidence that a violation has occurred. A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true. The goal of the Ethics Panel is to reach consensus on the allegation and outcome. If this is not possible, a decision will be made by majority vote.

The Chair of the Ethics Board and the Associate Dean for Enrollment Management and Student Affairs shall, as soon after the hearing as is practicable and reasonable, prepare minutes of the hearing including:

1. Date, place, and time of the hearing,
2. The names of all persons present at the hearing,
3. A short statement of the charge against the student,
4. A summary of the findings of fact and conclusions made by the Ethics Board,
5. A statement of the decision of the Ethics Board,
6. The sanction(s) recommended by the Ethics Board, if applicable

The alleged violator and the initiating party will be informed in writing by the Office of Enrollment Management and Student Affairs of the decision on whether a Policy was violated following the decision of the Ethics Hearing Panel.

Any student found not in violation of all charges of the Academic Integrity Policy will be permitted to make-up missed assignments or clinical time during the time of the hearing and appeal process.

After the hearing, the Associate Dean for Enrollment Management and Student Affairs assists the chair in implementing the Ethics Board's decision. This will include notifying the student and appropriate faculty or School personnel (e.g., Registrar, faculty advisor, course faculty, Executive Vice Dean, appropriate program director).

Sanctions

If a student is determined to be in violation of this Policy, the following factors may be considered in the sanctioning of the process:

- The specific academic misconduct at issue;
- The student's academic misconduct history; and
- Other appropriate factors

This section lists some of the sanctions that may be imposed upon students for violations of this policy. The School of Nursing reserves the right, in its discretion, to impose more stringent or different sanctions than those listed below depending on the facts and circumstances of a particular case. Sanctions for academic misconduct under policy are generally cumulative in nature.

The following is a non-exhaustive list of possible sanctions and what these sanctions typically mean. The specific conditions imposed under each sanction (i.e. the terms of a suspension, etc.) will depend on the specific facts and circumstances of each case.

Formal Warning

The student is notified in writing that their actions constitute a violation of this policy, and may be subject to other actions (e.g., re-taking an exam or failure in a course).

Academic

These sanctions may include but are not limited to grade adjustments, including failure, on any work or course, or re-submission of an assignment. This may include or may not include permanent student record notation. If the sanctions include a notation on the student's transcript, "Grade due to Academic Misconduct" will be noted on the student's official School of Nursing transcript.

Corrective or Educational Measures

The student may be required to engage in other corrective or educational activities.

Probation

The student is notified that further violations of this policy within the stated period of time will result in the student being considered for immediate suspension or other appropriate disciplinary action. If at the end of the specified time period no further violations have occurred, the student is removed from probationary status.

Suspension

The student is notified that they are separated from the University for a specified period of time. The student must leave campus and vacate campus residence halls, if applicable, within the time prescribed and is prohibited from University property and events. The conferring of an academic degree may be deferred for the duration of the suspension. The student must receive written permission from the University prior to re-enrollment or re-application. Academic work completed at another institution while on suspension will not be recognized for credit transfer.

Expulsion

Expulsion means the permanent removal of the student from the University. Expulsion includes a forfeiture of all rights and degrees not actually conferred at the time of the expulsion, permanent notation of the expulsion on the student's University records and academic transcript, withdrawal from all courses according to divisional policies, and the forfeiture of tuition and fees. Any student expelled from the University is prohibited from future reapplication to the University.

Appeals Process

Except in the case of a resolution for first time offenses with a faculty member, the student may appeal a panel's finding of responsibility and/or sanction(s). The student must file any appeal within five (5) days of the date of the notice of outcome on one or more of the following grounds:

- Procedural error that could have materially affected the determination of responsibility or sanction(s);
- New information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility or sanction(s); and
- Excessiveness of the sanction(s)

Any appeal must be filed in writing with the Dean of the School of Nursing or designee. An appeal will involve a review of the file; the appeal does not involve another hearing. On review of the appeal, the Dean of the School of Nursing or designee may:

- Enter a revised determination of responsibility and/or revise sanction(s); or
- Remand the matter to the panel to reconsider the determination of responsibility and/or sanction(s), or
- Convene a new panel to consider the case; or
- Uphold the panel's decision

The Dean of the School of Nursing or designee will simultaneously send the appeal determination, with the reasons therefore, to the chair, as appropriate, and to the student. The decision of Dean of the School of Nursing or designee is final. No further appeals are permitted.

Records

A case file concerning a student will be retained by the Associate Dean for Enrollment Management and Student Affairs for the duration of the student's enrollment at JHU and seven (7) years from date that the student graduates or otherwise leaves the University.

The Associate Dean for Enrollment Management and Student Affairs will provide an overview of the process and procedures of the Ethics Board.

Procedural Rights

In connection with the resolution of alleged policy violations, a student shall:

- Be notified in writing of the allegations in advance of any meeting or hearing;
- Be notified in writing of the charges, and the date, time, and location of the hearing, and identity of the hearing administrator or panel members in advance of the hearing;
- Have the opportunity to review in advance of any meeting or hearing any information to be considered by any faculty member, administrator, or panel in accordance with the University policy on Family Educational Rights and Privacy Act of 1974, as amended ("FERPA") and applicable laws and regulations;
- Be notified in writing of the outcome of any hearing, namely the findings, determination of responsibility, and any sanctions; and
- Be notified in writing of the outcome of any appeal.

A student may raise the potential conflict of any University personnel participating in the resolution process. All such conflicts must be sent in writing to the Associate Dean for Enrollment Management and Student Affairs at least two days prior to the hearing date. A student may also decline to participate in the resolution process. The University may however continue the process without the student's participation.

Communications under this policy will primarily be conducted with students through their official University email address, and students are expected check their official University email on a regular basis.

Academic Standards for Progression

All students must maintain a GPA of 3.0 and can repeat a course with a failing grade in accordance with the program-specific terms below. Students are not permitted to repeat a course for which they have received a passing grade.

- MSN (Entry into Nursing) students will be required to repeat a course if they earn a grade below a C- (70%). Students can repeat one course one time.
- MSN (Advanced Practice) and DNP students will be required to repeat a course if they earn a grade below a B- (80%). Students can repeat one course one time.
- PhD students will be required to repeat a course if they earn a grade below a B (83%) for core nursing courses, and a grade below a C (73%) in non-nursing core courses (biostatistics). PhD students can repeat more than one course one time.

All students taking NR.210.606 Biostatistics for Evidence-Based Practice and NR.210.608 The Research Process and Its Application to Evidence-Based Practice can earn a C- in one of these courses without needing to repeat. If a student earns a C+, C, or C- for both courses, they must repeat one of the two and may not repeat any other course in the program.

Nurse Anesthesia students can earn a C- in NR.210.670 Human Anatomy without needing to repeat the course.

Students will be dismissed from the program at any time if it is mathematically impossible to attain a cumulative GPA of 3.0 by the end of the academic program.

MSN Entry into Nursing students may not progress to new semester coursework if all previous semester coursework is not successfully completed.

In the event that a student does not need to repeat a course but has a cumulative GPA below 3.0, the student will be placed on academic probation, suspended, dismissed, and/or subject to other conditions.

In the event the student is on probation for more than two consecutive semesters because the cumulative GPA remains below a 3.0, the student may be suspended, dismissed, and/or be subject to other conditions, whether or not it is mathematically possible to achieve a cumulative GPA of 3.0 by the time of graduation.

When students need to repeat a course to continue in their respective program of study:

- Student will be placed on academic probation and remain so until the course has been successfully completed.
- Student must take and pass the course the next time it is offered.
- Student may not be able to progress in the program if the course is a prerequisite for subsequent course(s) and/or there is a gap in semester(s) between the next available course offering.
- Student must notify the Office of Financial Aid of any delay of progression.

Academic probation, suspension, and dismissal are a permanent part of the student transcript.

Note that students who are in interdivisional courses and/or are enrolled in a joint or dual program must meet progressions requirements in both schools.

If a student earns a failing grade as defined by their program or has a cumulative GPA below 3.0, the student will be referred to the Progressions Committee.

- The student should meet with their advisor prior to the Progressions Committee meeting to explain any extenuating circumstances regarding the course grade(s). The student is allowed to formulate a written statement to submit to the committee regarding past grades and performance. This letter should be sent privately to the advisor and members of the Progressions Committee. The letter should be available to committee members at least 24 hours prior to the committee meeting.
- As the student representative, the adviser is also allowed to verbally present additional relevant information at the meeting of the Progressions Committee.
- In addition to any above listed outcomes, the Progressions Committee may impose other conditions for continuing in the program.
- The student will receive a letter from the Progressions Committee Chair outlining the decision of the committee.
- A student may appeal decisions of the Progressions Committee in writing to the School of Nursing Executive Vice Dean within 10 business days of the Progressions Committee letter. The student's statement will set forth the grounds for the appeal. The Executive Vice Dean will have access to documents reviewed during the Progressions Committee hearing. The Executive Vice Dean will send a written response to the student. The student may appeal the decision of the Executive Vice Dean to the Dean in writing within 10 business days of the Executive Vice Dean's letter. The decision of the Dean will be final.

Administrative Leave

A student not enrolled or not on an approved LOA will be considered on administrative leave. After 90 days on administrative leave, which begins from the start of the semester with no enrollment, the student will be administratively withdrawn from the program and will be required to reapply for admission.

Exception: Students not enrolled with prior program approval will not be considered on leave (e.g. enrollment not possible because course is only offered once a year).

Students may take one leave of any kind during the course of their program.

Attendance Policy

Students are expected to attend all courses, labs, and clinicals as scheduled. If students miss a clinical, they may be required to pay a fee for make-up clinical time or simulation exercises.

CANVAS and SON IT Help

The Johns Hopkins School of Nursing uses Canvas as it's learning management system (LMS). Canvas provides the opportunity to integrate technology into the teaching and learning process. Faculty members manage their own course content within their Canvas courses, with the technical support of the Course Support Team. Enrolled students can access course documents, submit assignments, complete quizzes and exams, and communicate with instructors and other students through Canvas at canvas.jhu.edu.

SON IT Help Desk & Course Support

The SON Help Desk is located in Room S315 in the SON's main building, and is available during normal business hours (Monday-Friday 8:00 AM – 5:00 PM) for all other technical problems and questions related to basic troubleshooting and operating system issues. They can also provide you with a loaner laptop if you are experiencing a problem with your machine that is preventing you from completing work. You may contact the SON Help Desk anytime, but you will only receive a response during normal business hours. The SON Help Desk can be reached by email at SON-HelpDesk@jhu.edu or by phone at (410) 614-8800. If a student is having general issues with their browser or operating system, or having difficulty logging in to the VPN, Canvas, cloud, etc., the best way to get help is to submit a ticket to the SON Help Desk (https://nursingjhu.qualtrics.com/jfe/form/SV_eK7Zq6ZgMW0Ydbn/).

The Course Support Team is also available for assistance during normal business hours for any issues with accessing course content or troubleshooting a course technology. If a student is experiencing a technical issue in a specific classroom, the best way to get help is to submit a ticket to the Course Support Team (https://nursingjhu.qualtrics.com/jfe/form/SV_4N4ruEfy0jE44QJ/).

Note: To inquire about grades or to request assignment deadline extensions, please contact your instructor directly. Their contact information can be found in the course syllabus.

If you experience an outage or login/password problem, please contact the IT@JH Help Desk at 410-955-HELP. The IT@JH Help Desk can be contacted 24/7, but will only be able to assist with JHED login problems and provide status updates for system-wide outages.

Clinical Placements

All clinical placements are authorized by the Johns Hopkins School of Nursing. There is a process within each course/track where clinical sites and placements are vetted and secured to ensure an excellent clinical experience. A student with a particular placement request should inform the course coordinator when completing the pre-clinical information form. Unless otherwise directed, the student is not to contact the site directly to request a placement. While requests will be considered, no placement or clinical site identified by the student is guaranteed.

On-campus students are assigned clinical sites within the Baltimore/Washington area. Students may be assigned a clinical practice site outside the range of public transportation. It is the responsibility of the student to have reliable transportation to all assigned clinical sites.

Distance students should contact their course coordinator regarding the process for securing a clinical site and preceptor. It is the responsibility of the student to have reliable transportation to all assigned clinical sites.

In some instances, make-up fees may be charged to a student who misses a clinical.

Clinical Warnings

A Clinical Warning is given whenever a student is at risk for not successfully completing a clinical course. This could be the result of not meeting the objectives on the Clinical Evaluation Tool or the inability to achieve clinical competencies. A Clinical Warning may also be given in conjunction with a Notification of Missed Clinical Time if missed clinical time is a factor in preventing a student from meeting the objectives on the Clinical Evaluation Tool or achieving clinical competencies. Clinical Warnings will be given to students at the earliest indication of concern, to enable the student to meet with the Clinical Instructor and Clinical Course Coordinator, so they may develop a plan for the student's successful completion of the clinical course.

A Clinical Warning is a written document, prepared by a faculty member who is responsible for the course, and sent to the student, the student's Faculty or Academic Advisor(s), the Director of the program, the Associate Program Director (if applicable), and additional course faculty who are working directly with the student or course.

Complaint/Grievance Policy

The School of Nursing Formal Complaint/Grievance Policy is based on the shared core values stated in the School's Values Statement. Each member of the School of Nursing community, whether student, faculty, or staff holds themselves to the highest standards based on the values of excellence, respect, diversity, integrity, and accountability.

Definition: A formal student complaint/grievance is defined as a signed statement written by a student alleging discriminatory, arbitrary, or improper treatment.

Process

1. A formal student complaint should be submitted within 10 days of the event causing concern to the relevant course coordinator, program director, or associate dean. The statement should include:
    a. a factual description of the complaint or dispute resulting in the grievance;
    b. names of persons involved if any;
    c. a brief description of all informal attempts at resolution; and
    d. any other information that the student believes to be relevant to the complaint.
2. In addition to the relevant course coordinator, program director, or associate dean, students may contact the Executive Vice Dean of the School of Nursing at any time in the formal complaint/grievance process. The Executive Vice Dean may communicate with relevant faculty or the Associate Dean for Enrollment Management and Student Affairs regarding the complaint. The Executive Vice Dean will not overturn a grade given by a faculty member or decision concerning safety in the clinical setting.
    - Complaint regarding a grade: Complaints involving grades or other evaluation of the student's academic work (excluding Progressions Committee decisions, please see below) may be addressed by this policy only if the evaluation is alleged to be arbitrary or capricious by the student. In the event that informal discussion between the student and instructor(s) fails to resolve a dispute, the student should appeal to the relevant Program Director. The Program Director will consult with the instructor(s) and attempt to resolve any process disputes but the instructor(s) retains the final decision about the grade for the assignment or the course.
3. Documentation of Complaint Response: The faculty or staff responding to the complaint should document the details below and submit this document to the Executive Vice Dean:
    - The date the complaint was formally submitted
    - The nature of the complaint
    - Steps/action taken to resolve the complaint
4. The formal process established here is not meant to supplant attempts at resolving complaints through informal discussion, though there are no circumstances under which a formal complaint/grievance must be settled informally. Whether settled informally or formally, the grievance process should move expeditiously without sacrificing the integrity of the process. Nothing in this policy should be construed to impinge upon the responsibilities of any office and/or regularly constituted body of the University. Moreover, no action may be taken with respect to a formal complaint/grievance that would conflict with a university policy, federal, state, or local law or regulation.

For complaints related to:

- *Decisions of the Progressions Committee* - students should follow the appeal process defined in the School of Nursing's Academic Standards for Progression policy (p. 1068)
- *Academic integrity* - students should follow the School of Nursing's Academic Integrity Policy (p. 1064)
- *Sexual misconduct* - students should follow the University's Sexual Misconduct policy (p. 48)
- *Discrimination and harassment* - students should follow the University's Harassment and Discrimination policy (p. 48)
- *Compliance with the American with Disabilities Act* - students should follow the University's ADA Compliance and Disability Accommodations policy (https://oie.jhu.edu/ada-compliance/)

Compliance

All enrolled degree/certificate-seeking students must register for and complete a background check, drug screening, required medical compliance, as well as other requirements, regardless of program, online/on-site course attendance status, and clinical/non-clinical course status. The School of Nursing has contracted with CastleBranch (https://jhu.castlebranch.com/JO78/package-selection/) to track and approve all compliance requirements. All enrolled degree/certificate-seeking students must provide all the required compliance documents, and must update documentation as required, in order to remain in compliance throughout the course of their program.

The Johns Hopkins University also tracks COVID vaccines, boosters and flu shots through the Vaccine Management System (VMS). All enrolled degree/certificate-seeking students must provide all required compliance documents, and must update documentation as required, in order to remain in compliance throughout the course of their program.

Continuous Enrollment Policy

Each School of Nursing curricular program plan is designed to fulfill learning outcomes and promote staged learning. Degree and certificate students are expected to either follow their program of study and enroll every semester or be on a school-approved Leave of Absence (p. 1074).

A student not enrolled or not on an approved LOA will be considered on administrative leave. After 90 days on administrative leave, which begins from the start of the semester with no enrollment, the student will be administratively withdrawn from the program and will be required to reapply for admission. *Note: Students not enrolled with prior program approval will not be considered on leave (e.g. enrollment not possible because course is only offered once a year).*

Students may take only one leave of any kind while enrolled.

Course Policies

Course Drop or Withdrawal Policy

After the add/drop period, a student, who is not requesting a leave of absence from the program, may only drop or withdraw from one required course one time during their matriculation as a student in the program. If a student drops or withdraws from any additional course, the student will not be able to progress in the program. This does not pertain to a student who is requesting a leave of absence from the program. Changes to a student's program or course load may result in additional time to degree completion and additional tuition charges and fees in subsequent semesters of enrollment.

Process and Transcript Notation

If a class is dropped before 50% of the class is completed, no notation is made on the academic record. The advisor is required to sign the Add/Drop form for all required course drop/withdrawals after the add/drop period, and a copy of the form must be sent to the course coordinator.

After 50% through 70% of the scheduled classes have met, a "W" is recorded on the transcript. The faculty or academic advisor and Program Director are required to sign the Add/Drop form for required course drop/withdrawals at the 50% to 70% completion mark. A copy of the form must be sent to the course coordinator.

After 70% of the scheduled classes have met, the course coordinator will note on the form whether the student is receiving a passing grade for the course at the time of withdrawal. The determination will be based on the grade(s) achieved for all test(s) and other graded requirements that are due on or before that date. A "WP" (Withdrawn Passing) or "WF" (Withdrawn Failing), as appropriate, is recorded on the transcript. The signatures of the course coordinator, the faculty or academic advisor, and the Director of the Program are required on the add/drop form to withdraw from a class after the 70% completion mark.

See the Course Refund Policy (p. 1071) section to determine the amount of tuition to be refunded.

Course Listings and Schedule

The course listing is available online at sis.jhu.edu/classes (http://sis.jhu.edu/classes/). Course schedule descriptions are available at https://nursing.jhu.edu/academics/resources/course_listings/index.html (https://nursing.jhu.edu/academics/resources/course_listings/). Course descriptions are also found by clicking on the course number in the program of study.

Course Refund Policy

Semester/Term Courses

A refund of payments will be made to students withdrawing of their own accord as follows.

Drop Date	Refund
Weeks 1 and 2	100%
Week 3	50%
Weeks 4-6	25%
Week 6 and after	No refund.

Online Prerequisite Courses

A refund of payments will be made to students withdrawing from online prerequisite courses of their own accord as follows. Percentages are calculated from the date the student submits a written statement of withdrawal. No refund will be granted to students dismissed for disciplinary reasons.

Drop Date	Refund
Week 1*	100%
Week 2*	50%
Week 3* and 4*	25%
Week 5 and after	No refund.
Week 8 and after	No refund. "WP" or "WF" will be posted to record

***Note:** For refund purposes, all prerequisite courses run from Tuesday through Monday.

Course Warnings

The purpose of a course warning is to alert a student that they are in jeopardy of not obtaining a passing grade in a course. This mechanism is in place so that an academic success plan may be created to assist the student in the course and prevent possible failure of the course.

A course warning is a written document, prepared by the faculty member who is responsible for the course, and sent to the student, the student's Faculty or Academic Advisor(s), the Program Director, and the relevant Associate Program Director (if any) at midterm of a course. A course warning is not part of the student's permanent record.

Criminal Conduct Policy

Admission to any School of Nursing academic program or other clinical or research postdoctoral fellowships is conditional upon review and acceptance of prospective students' or fellows' criminal background investigation. The University reserves the right to rescind or revoke an offer of admission or appointment to any educational or training program to any individual, or dismiss a student whose criminal background investigation reveals a history of criminal conduct that:

- the University reasonably determines increases the risk of harm to patients or individuals on University or third party premises where a student may be engaged in clinical experiences required by the educational or training program;
- was not accurately disclosed in response to a direct question regarding criminal history on any application for admission or appointment in connection with the program; and/or
- is inconsistent with the high standard of ethical conduct required of all members of the academic community or is otherwise unbefitting a member of the academic community.

Examination Policy

Students are expected to take exams when scheduled. If a student encounters any unexpected extenuating circumstance and is unable to take the exam in the specified time frame, they should contact the course faculty immediately to avoid receiving a zero. The student will be required to provide documentation (i.e., medical excuse, accident report) to support the missed exam. It will be at the faculty member's discretion to offer a make-up exam and decide when it will be offered. The make-up exam may be different from the original exam. Examinations are given in a variety of formats.

Onsite Online Exams Requiring a Proctor

Online exams taken at the SON require students to download and use LockDown Browser software during online examinations. Information will be provided by the instructor.

Offsite using Online Remote Proctoring

Exams requiring a proctor that will be taken remotely for degree or certificate courses require a designated online, remote proctoring service. In some situations, students will be recorded, visually and through audio, during the exam. Students should refer to their course site for further details on the designated remote proctoring service.)

Students must take the online remotely proctored exam using the designated service and its software during the scheduled exam time noted in the online course site.

When taking an online remotely proctored exam, students must abide by the following instructions:

- Use the designated remote proctoring service, and download and test any related required software as noted in the course site **prior** to the scheduled exam time.
- Be sure to have a government-issued or school photo ID, because the remote proctoring service will ask them to present a photo ID to confirm their identity.
- Use a laptop that meets the SON's laptop requirement. Among other system requirements, *a working microphone and webcam are required*.
- Complete the room scan as requested by the remote proctoring service to check for any exam environment violations (e.g., prohibited items such as other persons, books, papers, etc. in the exam environment). Any allowed/prohibited items will be relayed by the course coordinator in the remote proctoring instructions.
- Not access any references, papers, books, notes, calculators, computer applications, or mobile devices unless otherwise noted.
- Place scratch paper and/or a pencil/pen (as permissible) next to their computer before starting the exam if they would like to use them.
- Not allow other persons to be within the exam environment.
- Not use headphones.

Grading Policy

The grading scale below is used to determine conversion of percent score to letter grade:

Range	Letter Grade	Grade Point
97 – 100	A+	4.00
93 – 96	A	4.00
90 – 92	A-	3.70
87 – 89	B+	3.30
83 – 86	B	3.00
80 – 82	B-	2.70
77 – 79	C+	2.30
73 – 76	C	2.00
70 – 72	C-	1.70
67 – 69	D+	1.30
63 – 66	D	1.00
60 – 62	D-	0.70
< 60	F	0.00

JHSON final grades in each course are rounded from the tenth place to the whole number. Semester and final official JHU GPA is rounded from the 1000th place.

Students are not permitted to repeat a course for which they have received a passing grade. For more information regarding repeating courses, please see the Academic Standards for Progressions policy. (p. 1068)

Health Insurance for Students

All students in degree and certificate programs are required to have health insurance coverage. The University will provide information about its student health insurance plan. Students will be automatically enrolled in the Student Health plan but can waive insurance with proof of comparable insurance.

All full-time, on campus, degree-seeking students will have access to University Student Health Services. University Student Health provides students with adult primary care and adult outpatient mental health services.

If you have a health insurance inquiry please visit SEAM's Online Form (https://support.sis.jhu.edu/case/). Information about rates, billing, termination of coverage, etc. is available at https://nursing.jhu.edu/information/current-student/student-affairs/health-safety/index.html

Dental and Vision insurance are not included in the student health plan but can be purchased for an additional fee. The University is offering a dental plan with Delta Dental and a vision plan with EyeMed. Coverage will start on August 15th for returning and newly enrolled students. Coverage will start on January 15th for the newly enrolled spring students. Returning students can enroll in August during open enrollment. *If a student misses open enrollment, they will not be able to enroll during the year.*

Incomplete Coursework

The designation of "I" (Incomplete) will be assigned by a course instructor when course requirements have not been completed on time and the course instructor assesses this as due to unavoidable circumstances.

A student must have successfully completed at least 50% of the coursework in the sequence in which it is offered in the course to be considered for an Incomplete.

For the MSN (Entry into Nursing) Program, the coursework in each semester builds on the knowledge acquired during the prior semester. Therefore, an incomplete or withdrawal from a required course must be completed before the student can progress to the next semester coursework. MSN Entry into Nursing students may not progress to new semester coursework if all previous semester coursework is not successfully completed.

- Students should inform the course instructor as soon as they know that they will not be able to complete the course requirements on time if they intend to request approval for an Incomplete.
- To request approval for an Incomplete, the student must consult with the course coordinator beforehand; discuss the reasons for requesting the incomplete; their proposed plan and date for completing the course requirements. The student must initiate the "Notification of Incomplete Coursework" form, which has been signed by the student, the course instructor, and the student's faculty or academic advisor.
- If the Incomplete is warranted, the course work must be completed by the end of the following semester or summer term for all academic program courses. An Incomplete in a prerequisite course must be resolved before the next course begins.
- The course instructor will submit the Notification of Incomplete Coursework form to the Office of Student Records to be included in the student's record.
- If an "I" is not resolved within the contracted time period, the course grade will be calculated on the completed work. Once a grade is determined, the course instructor will send the assigned grade to the Office of Student Records.
- For prerequisite students, permission is required to register for the next semester when two or more Incompletes are on the student's record.

Independent Study Policy

Students interested in competing an independent study for academic credit should begin the process by discussing the plan with their advisor and contacting an appropriate full-time faculty member of the Johns Hopkins University to supervise and evaluate the work. With Faculty guidance, the student develops the description, objectives, learning activities, and the method for evaluating work.

Registration:
Students must register for independent study to receive credit in that semester. A registration form must be completed and submitted with registration materials. The application for independent study can be found at https://nursing.jhu.edu/academics/documents/student-forms/Independent-Study-form.pdf. The signature of the faculty supervising the independent study and the student's advisor are required on the Independent Study form. In the event that the supervising faculty is also the advisor, signature of the Program Director is also required.

Supervision:
The supervisor must be a full-time member of the faculty of Johns Hopkins University. The faculty supervisor evaluates the work of the student and determines grades and credits.

Independent Study Project:
The subject for an independent study project should fall within the faculty supervisor's academic discipline or area of specialization. Independent study is viewed as individual activity rather than group activity, although it should not preclude students working together on a common project with separate objectives and specified learning activities.

Grading:
The method of grading an independent study project or research should be established jointly by the faculty supervisor and student. The decision should be made before the work begins.

Credit(s):
A maximum of 12 independent study credits can be counted toward the degree with no more than six credits earned in one academic year, and no more than three credits in one semester. In the PhD Program Independent Study credits may not count toward the required electives.

In determining credit to be awarded for an independent study, the faculty supervisor should determine the time to be spent by the student on the project as compared with the assignment of credit.

Involuntary Leave of Absence

Introduction

The University is committed to fostering a learning environment that enables students to thrive and participate fully in academic life. There are, however, occasions when a student's health interferes with their ability to take part in the academic community, and at such times the School provides the opportunity for the student to initiate a leave of absence. For instance, a student's mental or emotional health, medical condition, or inappropriate behavior or communication may necessitate a leave of absence or placement of conditions on continuing enrollment. The guidelines and procedures described herein are not intended to address such instances. Rather, these guidelines and procedures shall apply in those extraordinary circumstances when a student has not or cannot voluntarily address the issues of concern.

Guidelines for Use Involuntary Leave of Absence

In situations when a leave of absence is indicated, the Associate Dean of Enrollment Management and Student Affairs (EMSA) or designee will encourage the student to initiate a voluntary leave of absence. If the student declines to do so, the Associate Dean of EMSA or designee may require an involuntary leave of absence. This step will be taken when necessary to protect the safety of the student or other individuals or to preserve the integrity of the learning environment. Such a decision may be based on behavior and/or communication that:

- Harms or threatens harm to the health or safety of the student or others;
- Causes or threatens to cause significant damage to property or resources;
- Evidences chronic and/or serious drug or alcohol abuse;
- Significantly disrupts the functioning of the community; and/or
- Reflects disorganized or altered thinking incompatible with successful participation in the academic program.

Condition of Enrollment (COE)

When circumstances indicate that a leave of absence is not appropriate, the Associate Dean of EMSA or designee may nevertheless impose certain conditions as a requirement of continued enrollment. This step will be taken only after consultation with those responsible for oversight of the student's program of study.

Procedure

When the Associate Dean of Enrollment Management and Student Affairs (EMSA) or designee becomes aware, by whatever means, of the potential need for action, the following procedures will be initiated:

1. The Associate Dean of EMSA or designee will contact the student and describe the issues of concern. If this discussion alleviates all concerns, no further action is needed. Alternatively, procedures outlined below may also be initiated.
2. The Associate Dean of EMSA or designee may mandate a mental health or physical evaluation of the student. The Associate Dean of EMSA or designee may also specify conditions under which the student is allowed to remain at the University. Such conditions will be developed in consultation with others charged with oversight of the student's academic program, University Health Services, University Mental Health and the Student Assistance Program. The Associate Dean of EMSA or designee will provide written notice to the student when such conditions are mandated.
3. If a leave of absence is indicated, and if the student so agrees, procedures governing voluntary leaves of absence shall apply.
4. When a leave of absence is indicated and the student declines to accept a voluntary leave, the Associate Dean of EMSA or designee will discuss the implications of an involuntary leave of absence. If the student continues to decline, the Associate Dean of EMSA or designee will initiate an involuntary leave of absence after consultation with those charged with oversight of the student's academic program, University Health Services, University Mental Health, and the Student Assistance Program. In urgent situations, the Associate Dean of EMSA or designee may initiate an involuntary leave of absence immediately.

Under these circumstances, such consultation will be undertaken promptly thereafter. When an involuntary leave is imposed, the Associate Dean of EMSA or designee will provide the student with written notification to this effect. Students may take one leave of any kind during the course of their program.

This notification will outline the steps required for re-entry into the academic program and also note other pertinent information regarding the student's status while on leave.

Re-Entry

A student seeking re-entry to the curriculum after a voluntary or involuntary leave as described under this policy will undergo a "fitness for return" evaluation by the Student Assistance Program or University Mental Health and/or the appropriate health service (University or Occupational Health Services). Upon re-entry, the Associate Dean of EMSA or designee may impose conditions under which the student will be allowed to remain at the School. The Associate Dean of EMSA or designee will provide written notice to the student when such conditions are instituted.

Confidentiality

All records related to student leaves of absence and conditions placed on continuing enrollment will be maintained in accordance with applicable law and policy in the Associate Dean of EMSA's Office.

Leave of Absence or Withdrawal

Students must sometimes interrupt their studies for a variety of reasons (academic, personal, or medical). A student may leave the Johns Hopkins School of Nursing (JHSON) by either taking a leave of absence (leaving the school temporarily with the firm and stated intention of returning) or by withdrawing from the school (leaving the school with no intention of returning). Before a student seeks an academic or personal leave of absence, the student must consult with their academic/faculty advisor and/or other resources available to assist with such a decision (Student Affairs, Program Director, etc.) and outline and agree to a program of study upon return.

Medical leave of absence may be granted for physical or mental health reasons with the approval of the Office of the Associate Dean of Enrollment Management and Student Affairs and may require proof of readiness to return to study. The goal of the readiness process is to ensure students are healthy enough to continue in coursework. If possible, before a student seeks a medical leave of absence, the student should consult with their academic/faculty advisor and outline and agree to a program of study upon return.

Leaves of absence are granted for specific time periods, generally up to one year. Students may take one leave of any kind during the course of their program.

The JHSON is required by the Higher Education Act to recalculate the eligibility for federal Title IV student financial assistance for students who withdraw, drop out, are dismissed, or take a leave of absence, prior to completing 60% of a semester. Title IV funds include: Federal Pell Grants, Federal Supplemental Educational Opportunity Grants (SEOG), Federal Work-Study, Federal Perkins Loans, Federal Direct Stafford Loans, Federal Direct Unsubsidized Stafford Loans, and Federal Direct PLUS Loans.

The application of the Return of Title IV Funds Policy may result in funds being due to the JHSON, and students are responsible for any outstanding balance due to the School of Nursing.

A student not enrolled or not on an approved LOA will be considered on administrative leave. After 90 days on administrative leave, which begins from the start of the semester with no enrollment, the student will be administratively withdrawn from the program and will be required to reapply for admission. *Note: Students not enrolled with prior program approval will not be considered on leave (e.g. enrollment not possible because course is only offered once a year).*

Process

To submit a leave of absence (LOA) or withdrawal the student is expected to go through the following steps:

1. Student downloads and completes the Leave of Absence or the Withdrawal form: https://nursing.jhu.edu/academics/documents/student-forms/LOA%20Form.pdf https://nursing.jhu.edu/academics/documents/student-forms/University%20Withdrawal.pdf
2. Student meets with academic/faculty advisor (MSN (Entry into Nursing), Executive DNP, or PhD) or track coordinator (Advanced Practice/Certificate) to discuss this decision and develop a proposed plan of study. If the LOA is a medical LOA, the Associate Dean for Enrollment Management and Student Affairs will work directly with the student to receive medical documentation and determine readiness for return process.

3. The LOA form and proposed plan of study (if applicable) will be signed by the advisor/track coordinator.
4. The adviser/track coordinator submits LOA or withdrawal form and proposed plan of study (if applicable) to the program director for final approval and signature.
5. The Program Director submits the LOA or withdrawal form to the Office of Student Records.
6. Once a leave of absence or withdrawal has been approved the Office of Student Records will finalize this process and will notify all JHSON officials (Advisor, Faculty, Program Director, Financial Aid, Student Accounts, etc.).
7. Once the program director receives notification from the Office of Student Records that the LOA has been finalized, the program director will notify the student and student's advisor/track coordinator.
8. Financial Aid staff will recalculate the eligibility for federal Title IV student financial assistance for the student (if appropriate) and complete the JHU paperwork for this process.

Note:

- Students on a LOA are not permitted to attend classes, use school services or maintain employment as students at the JHSON or other JHU school(s) while their leave is in effect.
- An approved LOA is not counted toward a student's time to degree and does not require the student to make degree progress during the period of the leave.
- A student can request a LOA for up to one year (only). Students who do not return from a LOA (after one year) will be administratively withdrawn from the JHSON by the Office of Student Records.
- Students may take only one leave of any kind while enrolled.
- If a student must take a LOA during the semester/term, the student would be unenrolled for that semester, would lose their tuition and fees for the term, and would not receive credit for their coursework. If the midway point of the course has been reached a "W" will be posted for each course. If 70% of the course has passed then a "WP" or "WF" will be posted, dependent upon the student's performance to date. If the leave occurred near the end of the semester and the student met the conditions for receiving grades of Incomplete, the student might wish to take grades of Incomplete. The student would need to follow current policy for making up Incompletes. The LOA would not affect the time frame allowed for making up "I" grades.

All international students who are in F-1 and J-1 visa status must follow a set of immigration regulations as outlined by the U.S. Government in order to maintain their international student status. Students who are in F-1 and J-1 visit status must meet with the JHU Office of International Student Services to discuss the decision to take a LOA or withdraw from the SON before submitting a completed Leave of Absence or Withdrawal Form.

Students who withdraw from JHSON in good standing may be considered for readmission. Students will be notified in writing by the Director of Admissions of their readmission status.

Letters of Recommendation

Students who need letters of recommendation should contact faculty directly. Requests for letters of recommendation should be sent a minimum of 14 business days prior to the time the letter is needed.

Letters of recommendation prepared by part-time faculty must be co-signed by a full-time faculty member familiar with the student.

For clinical recommendations, requests for letters of recommendation should be made at the end of the clinical rotation. Requests should be directed to the clinical instructor/preceptor and/or clinical course coordinators.

NCLEX

Pre-licensure students will be eligible to take the computerized National Council Licensure Examination (NCLEX) upon completion of all program requirements. The NCLEX is designed to test knowledge, skills, and abilities essential to the safe and effective practice of nursing at the entry level. Examination registration information is provided to pre-licensure students in the fifth semester practicum course. Academic Advisors can provide additional information and guidance.

Non-Degree-Seeking Students

The maximum number of credits that can be applied to a School of Nursing degree program by a non-degree seeking student is six. Students will not be allowed to take courses beyond the six credit limit unless an exception is made by the appropriate program director.

Non-degree seeking students may not enroll in any clinical courses. Courses available to non-degree seeking students are:

- Biostatistics for Evidence-based Practice
- Context of Health Care for Advanced Practice Nursing,
- Philosophical, Theoretical, and Ethical Perspectives of Advanced Nursing Practice
- The Research Process and its Application to Evidence-Based Practice

Non-degree seeking students may apply to a degree program at any time before completing six credits. There is no guarantee that applicants who have taken courses as a non-degree seeking student will be admitted to a degree program. All applicants to a degree program must meet the admission requirements outlined in the Admissions section of this catalogue. Additional courses are under review for possible inclusion in the list of approved courses available to non-degree seeking students. Please check with the Office of Student Records for details.

Notification of Missed Clinical Time

A Notification of Missed Clinical Time is given to a student who is not present for any portion of the clinical hours in a course. Clinical hours also includes laboratory and simulation. Accurate documentation of clinical hours in the program is required for every student. Missed clinical hours include the following:

- the entire clinical time is missed
- the student arrives late for clinical
- the student leaves clinical early

At the discretion of the Clinical Course Coordinator in conjunction with the Clinical Instructor, a clinical make up assignment may be given to a student who misses clinical time. Students may provide documentation of illness or other excuses for missing time, which will be noted. Even with documentation, a Notification of Missed Clinical Time will be sent to the student.

A Notification of Missed Clinical Time is a written document, prepared by a faculty member who is responsible for the course, and sent to the student, the student's Academic Advisor(s), the Director of the program, and additional course faculty who are working directly with the student or course.

Pet Guidelines

The Johns Hopkins School of Nursing is responsible for ensuring the health and safety of all employees and students. As such, and consistent with Johns Hopkins University Policy Number HSE025, The Johns Hopkins School of Nursing prohibits domestic pets or animal companions in restricted access areas* of University buildings, except for service animals or those animals for which express written consent of the facilities director has been given with support from aligned leadership.

In addition, The Johns Hopkins School of Nursing discourages faculty, staff, and students from bringing their household pets to work. Animals may cause serious allergic reactions in some community members, distract working service animals, and some community members may feel threatened or be distracted by the presence of pets.

Individuals not in compliance with this guideline will be completely and solely liable for any injuries or damage to personal property or people caused by the animal. Any repair or cleaning/maintenance costs to The Johns Hopkins School of Nursing caused by an animal will be charged in full to the owner.

The Johns Hopkins School of Nursing **shall not be liable for loss of, or injury to, any animal brought to the school**.

Information regarding violations of this guideline may be submitted via the suggestion boxes located throughout the building or to a manager.

This statement does not pertain to service or assistance animals in the school or clinical practice sites. For information regarding service and assistance animals, see the Service and Assistance Animal Policy at https://oie.jhu.edu/ada-compliance/guidelines-policies-procedures/service-animal-policy/index.html.

*Restricted areas refers to housing potential or known hazards whose entrance is restricted to authorized individuals. That includes, but is not limited to, research, teaching, and clinical laboratories, maintenance shops, mechanical/electrical spaces and construction areas, and any areas where chemicals are handled or stored.

Printing and Copying

To facilitate various program start dates, an annual quota of 1500 prints is allocated to each student on a bi-monthly basis. Students will be given a quota of 250 prints when they are first admitted to the School of Nursing. This quota will then be reset to 250 prints every two months (on January 1, March 1, May 1, July 1, September 1, and November 1). Any unused free prints will not carry over. Any prints or copies beyond 250 within the two month cycle will be billed to the student's SIS billing account at the applicable per page rate (see link below). The printing system allows students to print from their laptop computers (Mac or Windows). Printing wirelessly will require installation of Pharos client software.

Additional information about printing services is available at wiki.nursing.jhu.edu/x/FoAoAg (https://wiki.nursing.jhu.edu/x/FoAoAg/).

Professional Attire Policy

Agreements and contracts with clinical agencies dictate that student nurses follow a specific dress code. With this in mind, all students are required to wear uniforms at all clinical settings, including the School of Nursing labs, and in any international setting. The uniform requirements may be modified at specific sites so that students are in compliance with clinical site policy. Please be mindful of the fact that as a student you are representing Johns Hopkins School of Nursing (JHSON) at all of your clinical sites.

Students must have uniforms available the first week of their initial term.

- The School uniform, patch, name pin, and identification badge will be worn by an individual when functioning in the student role. A student may not wear a School uniform in an employment situation.
- Students must wear the official lab coat and professional attire when visiting a clinical setting to review patient assignments, etc.
- When a lab coat is worn, the name pin must be attached.
- Short white lab coats are not permitted.
- Sneakers, canvas shoes, and Crocs are not permitted. Shoes must be non-permeable.
- No casual attire is permitted in any work setting at any time (i.e. jeans, shorts, sweatshirts, T-shirts, sandals.)
- All scrub tops and lab coats must have the JHSON patch sewn on the left upper sleeve.
- Many community health sites require that students wear dark shoes.
- The long white lab coat may be worn over professional attire in some situations, to be determined by faculty.
- Students with special uniform needs pertaining to cultural or religious requirements should see the Program Director before purchasing uniforms. Accommodations may be made for the student's cultural or religious obligations.
- If scrubs are not required, the long white coat may be worn over professional attire in most situations. The JHSON uniform, name pin, and identification badge must be worn by an individual when functioning in the student role.
- Only one small post earring in each ear is allowed in clinical areas. Dangling or hoop earrings and bracelets are prohibited. Jewelry must be removed from any other visibly pierced location, including the tongue. Either a watch with a second hand or a digital watch that can track seconds is required.
- All tattoos must be covered.
- Hair must be worn above the collar or tied back securely with a small clip or band. Large hair bows or scarves are not permitted. Extreme hair colors are not permitted. For cultural or religious purposes, a solid navy blue, black, or white head-covering may be worn with the uniform scrubs. Men may have beards and mustaches if trimmed neatly. Facial stubble is not permitted.
- Fingernails should be clean, trimmed to no longer than 1/4 inch beyond fingertips, and with either pale or no polish. Fingernails are to be free of ornaments. Fingernail polish is to be free of chips. Artificial fingernails or other nail enhancements are not permitted because of documented outbreaks of infection due to gram negative bacteria associated with artificial nails.
- Makeup, if worn, must be applied in moderation to enhance the natural features and create a professional image. Glitter, sequins, and false eye lashes (including lash extensions) are prohibited.

- For patient and staff health and comfort, the use of all scented products, such as perfume, cologne, after-shave, hairspray, or lotions, are prohibited as they may have adverse effects on patients, visitors, and other employees.

Name Pin, ID Badge, and Uniform Emblem

Name pins are ordered through the Matthews Johns Hopkins Medical Book Center and must be worn on the upper right portion of the uniform. A fee will be assessed for replacement of a name pin. The JHSON picture ID badge is obtained during the orientation process. The picture ID badge should be worn at all times in class or clinic; the name pin should be worn when in a clinical setting.

For MSN Entry into Nursing, the standard uniform consists of the following as determined by a specific course:

- Navy blue uniform pants
- Navy blue uniform skirt
- Navy blue scrub top
- White scrub top
- Black, navy, or white shoes (non-permeable)
- Long white lab coat that includes School of Nursing emblem on the left sleeve and school name embroidered on left breast worn over professional attire.

Students will be notified about the required clinical attire for their specific clinical site by their clinical instructor before the clinical course begins.

All students:

If scrubs are not required, the white lab coat may be worn over professional attire in most situations. The JHSON uniform, name pin, and identification badge must be worn by an individual when functioning in the clinical role.

***Uniforms and pins are available from*:**

You have three options for purchasing uniforms.

- Matthews Book Center – Pricing/Ordering (https://www.webmedbooks.com/hopkinsnursing/default2.aspx)
- Women's Board – Pricing/Ordering (http://www.hanoveruniform.com/sites/hopkins/)
- Scrubin Uniforms - jhu.scrubin.com (https://jhu.scrubin.com/), Access Code: jhu410

Improper Uniform

Faculty members will tell an improperly dressed student to leave the clinical setting and return in proper uniform. The lost clinical time cannot be rescheduled, and a clinical warning may be issued.

Professional Ethics Policy

The School of Nursing Professional Ethics Policy (the "Policy") is based on the shared core values stated in the School's Values Statement. Each member of the School of Nursing community, whether student, faculty or staff, holds themself and others to the highest standards based on the values of excellence, respect, diversity, integrity, and accountability.

Each student is obligated to adhere to the highest standards of professional ethics and conduct in their academic endeavors. In addition, the School of Nursing upholds the professional code of ethics established in the Code of Ethics for Nurses (ANA 2015). Each student is held accountable for adhering to the American Nurses Association Code of Ethics.

The School of Nursing Professional Ethics Policy is grounded in the following principles:

- Act with honesty and integrity in the performance of all academic assignments, examinations and in all interactions with others
- Respect self, faculty, staff, fellow students and members of the health team
- Respect and protect the confidentiality of information
- Advocate for patients' best interest
- Respect the diversity of persons encountered in all interactions
- Respect property
- Respect policies, regulations and laws
- Abstain from the use of substances in the academic and clinical setting that impair judgment or performance

Scope

This Policy applies to all matriculated and continuing School of Nursing students in full-time and part-time programs and non-degree courses.

Cross-Divisional Enrollments

School of Nursing students may enroll in courses in one or more other University divisions or schools. School of Nursing students are subject to this policy not only when enrolled in School of Nursing courses, but also when enrolled in courses in other University divisions or schools. Academic misconduct in the context of those "outside" courses will be subject to and resolved under this policy.

Research Misconduct

Research misconduct is defined as fabrication, falsification, or plagiarism in proposing, performing, or reviewing research, or in reporting research results. For a complete definition, refer to The Johns Hopkins University Research Integrity Policy *(*https://research.jhu.edu/jhura/compliance/research-integrity/*) ("Policy"). The Policy applies to all University faculty, trainees, students, and staff engaged in the proposing, performing, reviewing, or reporting of research, regardless of funding source. Allegations of research misconduct regarding a student should be referred to the Research Integrity Officer for assessment under that Policy, but may also be directed to the department chair or Dean of the responsible unit where the alleged research misconduct occurred*.

Academic Misconduct

All issues of academic student misconduct are subject to the School of Nursing Academic Integrity Policy. For more on this policy, please refer to Academic and Professional Ethics (https://nursing.jhu.edu/information/current-student/student-affairs/academic-professional-ethics.html) webpage.

Non-Academic Misconduct

All issues of non-academic student misconduct will be subject to the University-wide Student Conduct Code. For more on this policy, please refer to http://studentaffairs.jhu.edu/policies/student-code/.

Professional Code of Ethics

Each student enrolled in the Johns Hopkins University School of Nursing is expected to uphold the professional code of ethics established for and by the nursing profession and as defined by the School. Ethics are foundational to the nursing profession. The nursing profession expresses its moral obligations and professional values through the Code of Ethics for Nurses (ANA 2015). Each student should read the American Nurses Association Code of Ethics and is accountable for its contents.

In its Code of Ethics for Nurses, the American Nurses Association states that: "ethics is an essential part of the foundation of nursing. Nursing has a distinguished history of concern for the welfare of the sick, injured, vulnerable and for social justice. This concern is embodied in the provision of care to individuals and the community. Nursing encompasses the prevention of illness, the alleviation of suffering, and the protection, promotion, and restoration of health in the care of individuals, families, groups, and communities."– American Nurses Association Code of Ethics for Nurses with Interpretive Statements (2015)

Nursing students are expected not only to adhere to the morals and norms of the profession, but also to embrace them as part of what it means to be a nurse. The nurse recognizes that their first obligation is to the patient's welfare and that all other needs and duties are secondary; the nursing student adheres to this same value. A code of ethics makes the professional goals, values, and obligations of a nursing student more explicit, assisting the student in the development of their professional ethics.

A nursing student at Johns Hopkins University School of Nursing will strive to act in a professional, ethical manner in accordance with the Code of Ethics for nurses and the JHSON values. Each student will:

- Be responsible for their own learning and clinical practice and honor other students' right to learn and be successful in academic and clinical environments (i.e., develop own knowledge base through study and inquiry; recognize others' right to do well on their written work; have access to reserved material; and have access to their own preparation materials and supplies used in clinical areas).
- Demonstrate respect in verbal and non-verbal behaviors to all others in all clinical and academic settings (e.g., interact with others without using threats of, or commission of, physical harm, verbal abuse, unwanted sexual advances or contact, or other unwarranted physical contact. Arrive to class and clinical sites on time; silence beepers and cell phones in class, etc.).
- Demonstrate ability to meet all standards outlined in the Johns Hopkins School of Nursing Technical Standards for Admissions and Graduation (p. 1082).
- Assess patient status carefully upon assuming responsibility for their care.
- Provide safe, competent care, seeking assistance when personal knowledge and/or skill are not adequate. Avoid use of any substances that would impair clinical ability or judgment (e.g., prepare for clinical assignment to develop required knowledge and skill; review patient's medical record; seek assistance according to course and curricular objectives).
- Provide the same standard of care to all patients and families regardless of race, ethnicity, age, sexual preference, disability, religion, economic status, employment status, or the nature of their health problem(s). Accept that others have the right to their own cultural beliefs and values and respect their choices (e.g., demonstrate compassion and respect for every individual; provide the best quality of care possible to all patients; be non-judgmental of cultural differences).
- Provide patient care without expectation of, or acceptance of, any remuneration over and above salary (if applicable) (e.g., do not accept gratuities or personal gifts of monetary value).
- Document in a thorough, accurate, truthful, and timely manner data that reflects findings from one's own personal assessment, care, interventions, teaching, or the patient's and/or family's response to those activities (e.g., documentation errors are corrected in an acceptable manner, documentation is unaltered, vital signs are recorded at the time they are measured, and late entries are duly noted).
- Act in a manner that contributes to the development and maintenance of an ethical educational and practice environment. Recognize that the primary commitment in clinical practice is to the patient and that respectful interactions are expected (e.g., act as a role model for other students and colleagues; speak up if another student is speaking disrespectfully to classmates or faculty; work through appropriate organizational channels to share concerns about situations that jeopardize patient care or affect the educational environment; advocate patient safety).
- Complete legally required HIPAA training and University or clinical site requirements regarding confidentiality. Use patient data in all school work, papers, presentations, research findings and in the clinical setting in a manner that is accurate, truthful, and confidential. Patient data must have a justifiable reason for its presence. Acknowledge real data gaps that may exist in written work. Identify patient in paper by initials, not full name.
- Refrain from unauthorized use or possession of school or clinical setting's equipment, patient's belongings, or items dispersed or intended for patient use (e.g., do not download University software onto a personal PC or mobile device; do not use a hospital computer terminal for personal use; do not take a patient's prescribed medication for personal use).

Reporting Professional Ethics Violations

Any member of the faculty, administration, staff or any student who has reason to suspect or believe a violation of this Policy has occurred is expected to notify the Ethics Board Chair or Associate Dean for Enrollment Management and Student Affairs.

Faculty/Administrator-Student Resolution of First-Time Offenses

- If a student is suspected of professional misconduct, the faculty member responsible for the course in which the misconduct allegedly occurred must, if feasible, review the facts of the case promptly with the student. If the suspected professional misconduct occurs outside of a course, the Ethics Board Administrator will review the facts with the student,
- If, after speaking with the student and any witnesses, the faculty member or administrator believes that professional misconduct has occurred, the faculty member must first contact the Associate Dean for Enrollment Management and Student Affairs to determine whether the offense is a first offense, or a second or subsequent offense.
  - For a first offense, after faculty consultation with the Associate Dean for Enrollment Management and Student Affairs and/or the Chair of the SON Ethics Board, the faculty member or administrator may choose to resolve the case directly with the

student, i.e., the faculty member/administrator and student may reach an agreement on the resolution of the alleged misconduct. Note, neither the faculty member/administrator nor the student are obligated to resolve a complaint under this section. A faculty member or administrator may not resolve a second or subsequent offense directly with a student.

- If such an agreement is reached, the faculty member/administrator must promptly provide the student with a letter outlining the resolution that includes the charges, a summary of the evidence, the findings, and the sanctions agreed upon, and must also simultaneously provide a copy of that letter to the Associate Dean for Enrollment Management and Student Affairs.
- If, however, the faculty member/administrator cannot reach an agreement with the student (e.g., the student denies charge or does not agree with the proposed sanction, etc.), or the offense is a second or subsequent offense, or if in the case of a first offense, the sanction imposed would be greater than failure in the course, the faculty member must promptly notify the Associate Dean for Enrollment Management and Student Affairs in writing of the alleged violations, evidence, including potential witnesses, and other pertinent details of the case. In such instances, the case will proceed to an Ethics Board hearing as outlined below.

Ethics Board Hearing

- In the case of a first offense that is not resolved between the faculty member/administrator and the student or a second or subsequent offense, the Associate Dean for Enrollment Management and Student Affairs will convene a meeting of the Ethics Board in consultation with the chair of the Ethics Board.
- In advance of the Ethics Board hearing, the student will receive written notification of the hearing date, time, and location.

Ethics Board Selection and Ethics Panel Hearings

The Ethics Board consists of a chair, appointed annually by the Dean or her or his designee; two full-time faculty who teach primarily in one of the following programs—MSN Entry into Nursing Practice, DNP, or PhD, elected by the Faculty Assembly; Program Directors from each academic program; and students representing each academic degree.

For each matter, an Ethics Hearing Panel will be formed. The Ethics Hearing Panel consists of the faculty chairperson of the Ethics Board, the faculty members on the Ethics Board elected by the Faculty Assembly, the program director for the student's program and two student members. The Associate Dean for Enrollment Management and Student Affairs or designee attends all hearings as a non-voting member of the Ethics Board. Each student appearing before an Ethics Hearing Panel will have a hearing assistant unless explicitly asking that no hearing assistant be named. The hearing assistant for a student may be their academic advisor or other faculty member chosen by the student or recommended by the Ethics Board. If desired, the faculty member, staff member or student bring the case may also have a hearing assistant of their choice or recommended by the Ethics Board. The assistant may meet with the respective parties to assist in preparation of evidence, testimony, and questions for the hearing. The designated assistants may attend and provide consultation in the hearing while the student or faculty member is present.

Students may request witnesses be present at the hearing. The student must furnish the Ethics Hearing Chair with the names of the witnesses in sufficient time to request the presence of the witnesses. It is within the Hearing Panel's discretion to limit the number of witnesses appearing at the hearing to a reasonable number.

Faculty, staff or students bringing forth the case are expected to compile evidence and to present their account of the violation during an Ethics hearing. All supporting materials for the hearing must be placed on file in the Office of the Associate Dean for Enrollment Management and Student Affairs. Supporting materials may be submitted directly to the Associate Dean for Enrollment Management and Student Affairs or indirectly through the assistant or the chairperson.

The Ethics Board will endeavor to convene within 10 working days of receiving the request for a hearing. Legal representation is not permitted at Ethics Board hearings.

In general, hearings will proceed as follows, although the Ethics Hearing Panel has discretion to alter the order or manner in which it hears or receives evidence, and to impose time limits on any stage of the process:

- Introductions
- Opening statement from the reporter, if applicable
- Questioning of the reporter by the panel, if applicable
- Closing statement from the reporter, if applicable
- Opening statement from the student
- Questioning of the student by the panel
- Questioning of the witnesses, if any, by the panel
- Closing statement from student

The reporter, student or witness is only present in the room with the Ethics Hearing Panel during the time that they are being questioned or responding. At the conclusion of the hearing, all parties are dismissed and the deliberations of the Ethics Hearing Panel will be held in private.

The student is presumed innocent until the Ethics Hearing Panel has made a determination by a preponderance of the evidence that a violation has occurred. A "preponderance of the evidence" standard is an evidentiary standard that means "more likely than not." This standard is met if the proposition is more likely to be true than not true. The goal of the Ethics Panel is to reach consensus on the allegation and outcome. If this is not possible, a decision will be made by majority vote.

The Chair of the Ethics Board and the Associate Dean for Enrollment Management and Student Affairs shall, as soon after the hearing as practicable and reasonable, prepare minutes of the hearing including:

1. Date, place and time of the hearing,
2. The names of all persons present at the hearing,
3. A short statement of the charge against the student,
4. A summary of the findings of fact and conclusions made by the Ethics Board,
5. A statement of the decision of the Ethics Board,
6. The sanction(s) recommended by the Ethics Board, if applicable

The alleged violator and the initiating party will be informed in writing by the Office of Enrollment Management and Student Affairs of the decision on whether a Policy was violated following the decision of the Ethics Hearing Panel.

Any student found not in violation of all charges of the Academic Integrity Policy will be permitted to make-up missed assignments or clinical time during the time of the hearing and appeal process.

After the hearing, the Associate Dean for Enrollment Management and Student Affairs assists the chair in implementing the Ethics Board's decision. This will include notifying the student and appropriate faculty or School personnel (e.g., Registrar, faculty advisor, course faculty, Executive Vice Dean, appropriate program director).

Sanctions

If a student is determined to be in violation of this Policy, the following factors may be considered in the sanctioning process:

- The specific academic misconduct at issue;
- The student's academic misconduct history; and
- Other appropriate factors.

This section lists some of the sanctions that may be imposed upon students for violations of this policy. The School of Nursing reserves the right, in its discretion, to impose more stringent or different sanctions than those listed below depending on the facts and circumstances of a particular case. Sanctions for academic misconduct under policy are generally cumulative in nature.

The following is a non-exhaustive list of possible sanctions and what these sanctions typically mean. The specific conditions imposed under each sanction (i.e. the terms of a suspension, etc.) will depend on the specific facts and circumstances of each case.

Formal Warning

The student is notified in writing that their actions constitute a violation of this policy, and may be subject to other actions (e.g., re-taking an exam or failure in a course).

Academic

These sanctions may include but are not limited to grade adjustments, including failure, on any work or course, or re-submission of an assignment. This may include or may not include permanent student record notation. If the sanctions include a notation on the student's transcript, "Grade due to Professional Misconduct" will be noted on the student's official School of Nursing transcript.

Corrective or Educational Measures

The student may be required to engage in other corrective or educational activities.

Probation

The student is notified that further violations of this policy within the stated period of time will result in the student being considered for immediate suspension or other appropriate disciplinary action. If at the end of the specified time period no further violations have occurred, the student is removed from probationary status.

Suspension

The student is notified that the student is separated from the University for a specified period of time. The student must leave campus and vacate campus residence halls, if applicable, within the time prescribed and is prohibited from University property and events. The conferring of an academic degree may be deferred for the duration of the suspension. A student must receive written permission from the University prior to re-enrollment or re-application. Academic work completed at another institution while on suspension will not be recognized for credit transfer.

Expulsion

Expulsion means the permanent removal of the student from the University. Expulsion includes a forfeiture of all rights and degrees not actually conferred at the time of the expulsion, permanent notation of the expulsion on the student's University records and academic transcript, withdrawal from all courses according to divisional policies, and the forfeiture of tuition and fees. Any student expelled from the University is prohibited from future reapplication to the University.

Appeals Process

Except in the case of a resolution for first time offenses with a faculty member, the student may appeal a panel's finding of responsibility and/or sanction(s). A student must file any appeal within five (5) days of the date of the notice of outcome on one or more of the following grounds:

- Procedural error that could have materially affected the determination of responsibility or sanction(s);
- New information that was not available at the time of the hearing and that could reasonably have affected the determination of responsibility or sanction(s); and
- Excessiveness of the sanction(s).
- Any appeal must be filed in writing with the Dean of the School of Nursing or designee. An appeal will involve a review of the file; the appeal does not involve another hearing. On review of the appeal, the Dean of the School of Nursing or designee may:
- Enter a revised determination of responsibility and/or revise sanction(s); or
- Remand the matter to the panel to reconsider the determination of responsibility and/or sanction(s), or
- Convene a new panel to consider the case; or
- Uphold the panel's decision

The Dean of the School of Nursing or designee will simultaneously send the appeal determination, with the reasons therefor, to the chair, as appropriate, and to the student. The decision of Dean of the School of Nursing or designee is final. No further appeals are permitted.

Records

A case file concerning a student will be retained by the Associate Dean for Enrollment Management and Student Affairs for the duration of the student's enrollment at JHU and seven (7) years from date that the student graduates or otherwise leaves the University.

The Associate Dean for Enrollment Management and Student Affairs will provide an overview of the process and procedures of the Ethics Board.

Procedural Rights

In connection with the resolution of alleged policy violations, a student shall:

- Be notified in writing of the allegations in advance of any meeting or hearing;
- Be notified in writing of the charges, and the date, time and location of the hearing, and identity of the hearing administrator or panel members in advance of the hearing;
- have the opportunity to review in advance of any meeting or hearing any information to Be considered by any faculty member, administrator or panel in accordance with the University policy on

Family Educational Rights and Privacy Act of 1974, as amended ("FERPA") and applicable laws and regulations;
- Be notified in writing of the outcome of any hearing, namely the findings, determination of responsibility, and any sanctions; and
- Be notified in writing of the outcome of any appeal.

A student may raise the potential conflict of any University personnel participating in the resolution process. All such conflicts must be sent in writing to the Associate Dean for Enrollment Management and Student Affairs at least two days prior to the hearing date. A student may also decline to participate in the resolution process. The University may however continue the process without the student's participation.

Communications under this policy will primarily be conducted with students through their official University email address, and students are expected check their official University email on a regular basis.

Registration Policies and Procedures

The Office of Student Enrollment and Account Management (SEAM) is available to provide assistance to all students pertaining to online registration via SIS. If you need assistance with records & registration, visit the SEAM's Online Form (https://support.sis.jhu.edu/case/)to request support.

Registration

All students must complete registration by the beginning of each term in accordance with instructions issued by the academic program before they can attend classes. Detailed instructions about registration will be provided to all students via email before the registration period each term. If the student has not received this information at least one week prior to the registration period, the Office of Student Enrollment and Account Management (SEAM) should be contacted immediately. Students may not sit in on a class without being officially registered for that class.

Registration Holds

All students must have the approval of their assigned academic advisor before enrolling for any term. Students will not be allowed to register if there are unpaid bills from a previous term. The student is required to pay tuition or make financial arrangements with the Office of Student Enrollment and Account Management (SEAM) before registering for a given term.

Registration will also be blocked if a student is not in compliance with health insurance and student health requirements.

Add/Drop

A student wishing to add or drop a course must do so by the end of the second week of classes. The Add/Drop form is available at nursing.jhu.edu/academics/documents/student-forms/add-drop-form.pdf (http://nursing.jhu.edu/academics/documents/student-forms/add-drop-form.pdf). Please refer to the Course Drop or Withdrawal Policy (p. 1071).

Auditing a Course

To audit a course, the instructor's permission and adviser's approval are required. Students must register for the course as an audit with the Office of Student Enrollment and Account Management (SEAM). The course will be shown on the academic record as an AU and will not be used in determining the grade point average.

Cancelled Courses

If minimum course enrollment is not met, students will be sent a cancellation notice and have the option to enroll in another course with the academic advisor's approval.

Course Withdrawal Notation

- No notation is made on the academic record if a class is dropped before 50% of the class is completed. The signature of the advisor is required.
- After 50% and through 70% of the scheduled classes have met, the signatures of the advisor and the Director of the Program are required to drop a class. A "W" is recorded on the transcript.
- After 70% of the scheduled classes have met, the signatures of the course coordinator, the advisor, and the Director of the Program are required to withdraw from a class. The course coordinator will note on the form whether the student is receiving a passing grade for the course at the time of withdrawal. The determination will be based on the grade(s) achieved for all test(s) and other graded requirements that are due on or before that date. A "WP" (Withdrawn Passing) or "WF" (Withdrawn Failing), as appropriate, is recorded on the transcript. Please refer to the Course Drop or Withdrawal Policy (p. 1071).

Interdivisional Registration

Students may take courses at other divisions of the university. Students must complete an Interdivisional Registration Form (https://nursing.jhu.edu/academics/documents/student-forms/IDR-form.pdf) and submit it for processing to the Office of Student Enrollment and Account Management (SEAM) at the School of Nursing (home division). Prior to submitting the form, students should ensure there are no registration holds on their record, that they have completed any prerequisites for a course, and that they have secured any required permissions for a course at another division. Students must follow the registration deadlines of the host school for any courses taken at another division of the university.

Religious Observance Attendance Policy

The Johns Hopkins School of Nursing (JHSON) has established procedures for students to notify their instructors of an absence necessitated by a religious observance. This policy reflects the School's commitment to being responsive to and respectful of the diversity of the student population.

The School of Nursing recognizes that the various religious traditions observed by our diverse student body include more holidays than can easily be included on a list. In some faiths, observances vary by tradition and country and in accordance with the lunar calendar.

Students who will miss class for a religious observance are expected to notify the course instructor and Program Director within the first two weeks of the semester by submitting a Religious Observance Notification Form (https://nursing.jhu.edu/academics/documents/student-forms/Religious-Observance-Form.pdf) to their faculty or academic advisor.

Student Code of Conduct

The fundamental purpose of the Johns Hopkins University's (the "University" or "JHU") regulation of student conduct is to promote and to protect the health, safety, welfare, property, and rights of all members of the University community as well as to promote the orderly operation of the University and to safeguard its property and facilities. As members of the University community, students accept certain responsibilities which support the educational mission and create an environment in which all students are afforded the same opportunity to succeed academically.

This Johns Hopkins University Student Conduct Code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/) (this "Code") applies to all students, including without limitation undergraduate and graduate students, and student groups and organizations, whether recognized by the University or not, in the following schools and divisions:

- Bloomberg School of Public Health (BSPH)
- Carey Business School (CBS)
- Krieger School of Arts and Sciences (KSAS)
- Paul H. Nitze School of Advanced International Studies (SAIS)
- Peabody Institute (Peabody)
- School of Education (SOE)
- School of Nursing (SON)
- Whiting School of Engineering (WSE)

The schools and divisions above must comply with, and ensure that their policies and procedures comply with, this Code. To the extent there is any inconsistency between divisional policies and procedures and this Code, this Code controls.

For more information on Johns Hopkins University's Student Code of conduct, please visit https://studentaffairs.jhu.edu/policies-guidelines/student-code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/).

Technical Standards for Admission and Graduation

The curricula of the School of Nursing requires that students engage in diverse and complex experiences directed at achieving competencies, knowledge, skills, attributes and professional values. Applicants for all academic programs, and enrolled degree-seeking students, must possess certain abilities and skills deemed essential for meeting the professional standards of accrediting agencies.

Admission to the Johns Hopkins School of Nursing is open to all qualified individuals. In accordance with the 1973 Vocational Rehabilitation Act and the Americans with Disabilities Act. The Johns Hopkins School of Nursing is committed to accommodating the needs of students with documented disabilities, and will do so to the extent possible without compromising the essential components of the curriculum. Questions or concerns regarding these technical standards should be directed to the Associate Dean for Enrollment Management and Student Affairs (410) 955-7545.

Candidates for nursing degrees or certificates must be able to meet the standards (listed below) with or without reasonable accommodation:

Observation: Students must have sufficient capacity to make accurate observations and interpret them in the context of laboratory studies, medication administration and patient care activities. A student must be able to observe a patient accurately at a distance and close at hand. Overall, they must be able to effectively monitor, assess and respond to health needs.

Communication: Students must accurately elicit or interpret information: medical history and other information to evaluate adequately a client or patient's condition. They must accurately convey information and interpretation of information using one or more means of communication (verbal, written, assisted [such as a TTY] and/or electronic) to patients and the health-care team. They must be able to communicate effectively in teams. Students must be able to determine a deeper meaning or significance in what is being expressed. They also must be able to connect with others to sense and stimulate reactions and desired interactions. They must be able to interact effectively with the health-care team and maintain accurate clinical records on patient care.

Clinical Skills: Students are required to possess motor skills sufficient to independently elicit information from patients by palpation, auscultation, percussion, and other manually-based diagnostic procedures. Students should be able to conduct laboratory and diagnostic tests, and carry out physical assessments. Students must possess motor skills required for their specialty's scope of practice. The student must also be able to coordinate fine and gross muscular movements to treat patients in emergency situations. Emergency situations include any circumstance requiring immediate remedy.

Intellectual-Conceptual, Integrative, and Quantitative Abilities: The student must be able to develop and refine problem-solving skills that are critical to practice as a nurse. The student must have the ability to measure, calculate, reason, analyze and synthesize objective and subjective data and to make decisions that reflect consistent and sound clinical judgment. Students must possess good judgment in patient assessment, and the abilities to incorporate new information, comprehend three-dimensional relationships, and retain and recall pertinent information in a timely fashion. This includes decision-making in order to maintain safety and security of patients and to behave appropriately with patients, staff, students, supervisors and faculty.

Behavioral and Social Attributes: Students must possess the physical and emotional health required for the application of their intellectual abilities and the employment of sound judgment in an appropriate and prompt manner. Students must be able to function effectively under physically taxing workloads, and in times of physical and mental stress. Students must display compassion, sensitivity, and concern for others, and maintain professional integrity at all times. Students must be able to adapt to changing environments; display flexibility; accept and integrate constructive criticism and learn to function cooperatively and efficiently in the face of uncertainties inherent in clinical practice. This includes appropriately interacting with individuals, families, and groups from a variety of social, emotional, cultural, and intellectual backgrounds.

Program Specific Requirements: In addition to the areas enumerated above, applicants and students must also possess any abilities and skills deemed essential for their particular program. These areas of enumerated skills and abilities are the minimum attributes required of applicants for admission to the specific nursing program and of students who are candidates for graduation.

Transcripts and Enrollment Verifications

Students who want transcripts of their academic records at the School of Nursing or who want them forwarded elsewhere should submit an online request. Please visit The National Student Clearinghouse Transcript Services website at www.transcriptservices.org (https://studentclearinghouse.org/transcriptservices/) for further information.

Transcripts are issued only at the written request or consent of the student. The only exception to this policy is the issuance of transcripts to other offices or departments within the University.

Official transcripts of work at other institutions that the student has presented for admission or evaluation of credit become the property of the University and cannot be copied or reissued. If a transcript of this work is needed, the student must get it directly from the issuing institution.

Enrollment verifications are provided by the Office of Student Enrollment and Account Management (SEAM) and are processed only at the written request of the student. Please submit your request through the SEAM's Online Form (https://support.sis.jhu.edu/case/).

Current students can visit https://www.studentclearinghouse.org/students/ to obtain a downloadable copy of proof of enrollment.

Transfer of Graduate Credit

A maximum of six graduate-level semester credit hours can be applied to SON programs in the Johns Hopkins School of Nursing for course(s) previously taken from outside the School of Nursing. DNP Executive Program students are required to take 40 credits at JHU. Course(s) must have been completed within five years of starting the degree program at JHSON.

The following SON courses are eligible for transfer review:

Code	Title	Credits
NR.210.606	Biostatistics for Evidence-Based Practice	3
NR.210.607	Context of Health Care for Advanced Nursing Practice	3
NR.210.608	The Research Process and Its Application to Evidence-Based Practice	3
NR.210.609	Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice	3
NR.210.610	Health Promotion and Risk Reduction Across the Lifespan	2
NR.210.802	Advanced Nursing Health Policy	2
NR.210.804	Organizational and Systems Leadership for Quality Care	2
NR.210.806	Health Finance	2
NR.210.822	Health Information Systems and Patient Care Technologies	2
NR.110.654	Foundations of Healthcare Quality and Safety	2
NR.110.619	Health Care Economics for Management and Practice	2

All transfer of credit decisions made by the program director are final.

Students wishing to transfer any course from inside or outside the university must have earned a minimum grade of B in the course. The course must have been completed and grade received prior to enrollment at JHSON. The course must have the equivalent number of credits or higher for transfer review.

The request to transfer credit must be concluded prior to the second semester registration period. If a student needs to take a course outside JHU once they have matriculated at the SON, they must obtain preauthorization prior to registering for the course.

Students who have taken graduate core courses at Johns Hopkins School of Nursing within the last five years do not need to complete the Transfer of Graduate Credit form.

It is the student's responsibility to work with the Office of Financial Aid to determine if any changes to the plan of study will change eligibility for financial aid. Students receiving VA benefits should also contact the Office of Student Records to determine if changes to the plan of study will change eligibility for these benefits.

To begin the process, please download the Transfer of Graduate Credits into JHSON (https://nursing.jhu.edu/academics/documents/student-forms/Transfer-of-Graduate-Credit-Form.pdf) form.

Tuition and Fees

Application Fee

Students submitting an application for admission must pay a $75 application fee directly to NursingCAS. If an applicant has already applied to another program using NursingCAS, each additional program application will be charged a fee of $45.

Enrollment Deposit

A non-refundable $1000 deposit is required of DNP Anesthesia students. All other students submit a non-refundable $500 deposit to enroll in the School of Nursing. The deposit will be credited to the student's tuition account.

Matriculation Fee

A onetime $500 matriculation fee will be charged to the student's account for degree seeking students.

Tuition Payment

Tuition for the upcoming semester must be paid by the billing statement due date. Non-degree-seeking students must pay at time of registration. MasterCard, Visa, Amex, and Discover Card are accepted. Alternate payment plans may only be arranged 30 days prior to the start of the semester. A $55-per-semester charge will be assessed for this service. No payment plans will be allowed for non-degree-seeking students.

Tuition Rates

For current tuition rates, please visit the School of Nursing's website here (https://nursing.jhu.edu/admissions/tuition/).

Tuition and Fee Payment Through SIS (Student Information System)

The Johns Hopkins University provides student account information using SIS (Student Information System) at sis.jhu.edu/sswf/ (https://

sis.jhu.edu/sswf/). This website allows students to view their accounts, make online payments, and update information. SIS is the official means of generating tuition bills to School of Nursing students. Paper bills are no longer mailed to enrolled students.

The self-service system will automatically send an email notification to the student's JHSON email address when a new bill is ready to be viewed online. No sign-up is required. Each registered student is automatically enrolled. It is the student's responsibility to check their student account and pay their tuition promptly.

Student Health Insurance

All students in degree and certificate programs are required to have health insurance coverage. The University will provide information about its student health insurance plan. Students will be automatically enrolled in the insurance plan but can waive insurance with proof of comparable insurance. All on-campus students must have insurance that will fully insure them in Baltimore, Maryland. No out-of-state HMO or out-of-state coverage will be approved.

Health Services Fee

All full-time on-campus matriculated students will pay an $850 annual health services fee and will have unrestricted access to all services at University Health Services.

Late Registration Fee

A student who for any reason does not complete registration until after the prescribed registration period must pay a $50 late registration fee before that registration is finalized by the registrar. Information about late registration fees is included in registration materials distributed by the Office of the Registrar.

Late Payment Fee

The University assesses a 1.5% per month late fee on the unpaid balance for any student whose account is in arrears. Students who have unpaid balances from a previous semester will not be allowed to register for subsequent semesters.

Transcript/Diplomas

JHSON does not charge for transcripts, however, the National Student Clearinghouse does charge a nominal fee for each transcript and for expedited delivery. No transcript will be released if the student has an unpaid student account balance. Diplomas will not be released to students with unpaid student account balances.

Graduation Fee

There is no graduation fee. For students who participate in the graduation ceremony, regalia is required. Students may rent or purchase regalia. Please contact son-graduation@jhu.edu for details.

Returned Check Fee

A $25 service fee will be assessed for any returned check.

If you need assistance with tuition payment, student health insurance or students accounts, please visit the SEAM's Online Form to request support or contact us by phone at 410-955-1243.

WHITING SCHOOL OF ENGINEERING

Click a link below to find out more about programs in the Whiting School of Engineering:

School website: https://engineering.jhu.edu/

Full-time, On-campus Undergraduate and Graduate Programs (Homewood)

About Engineering at Johns Hopkins

Engineering education at Johns Hopkins began with the establishment of an engineering school in 1913. Throughout its history, the Whiting School has maintained close ties with the Krieger School of Arts and Sciences, which has led pioneering education and research since the Faculty of Philosophy was assembled in 1876. The Whiting School of Engineering provides its students with an education and research environment that fosters a lifetime ability to create and apply new knowledge and to contribute to their professions.

The Whiting School offers 10 ABET-accredited programs in engineering leading to the Bachelor of Science degree: biomedical engineering, chemical and biomolecular engineering, civil engineering, computer engineering, computer science, electrical engineering, engineering mechanics, environmental engineering, materials science and engineering, and mechanical engineering. The school also offers B.S. and B.A. degrees in applied mathematics & statistics as well as B.A. degrees in biomedical engineering, computer science, and general engineering. Beginning in the 2022-2023 academic year, the school is also offering a Bachelor of Science degree in Systems Engineering which will seek ABET accreditation when it is eligible to do so.

Our commitment to advanced study and research yields outstanding programs that lead to masters and doctoral degrees. In the descriptions that follow, each department lists its faculty and their research, research facilities, graduate programs, and the elementary and advanced courses they offer. More details can be obtained from the departmental websites, through the Whiting School homepage at http://engineering.jhu.edu (http://engineering.jhu.edu/).

Accreditation

The following Bachelor of Science programs in the Whiting School of Engineering are accredited by the Engineering Accreditation Commission of ABET: Biomedical Engineering, Chemical and Biomolecular Engineering, Civil Engineering, Computer Engineering, Electrical Engineering, Engineering Mechanics, Environmental Engineering, Materials Science and Engineering, and Mechanical Engineering.

The Bachelor of Science program in Computer Science is accredited by the Computing Accreditation Commission of ABET.

Bachelor's Programs

Minors

Certificate Programs

Non-Degree Programs

Masters Programs

Doctoral Programs

Dual Programs

Undergraduate Policies

The policies, procedures, resources, and opportunities included in this section are relevant for undergraduates enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences and the Whiting School of Engineering on the Homewood campus. Please use the links at the right to navigate to your topic of interest.

Academic Policies

The Krieger School of Arts and Sciences and the Whiting School of Engineering offer myriad opportunities for intellectual exploration, academic challenge, and personal growth. To satisfy academic goals and assure progress toward graduation, students should take action and responsibility for the following:

- Seek advice from multiple faculty, and other university professionals,
- Meet with your advisor at least once a semester,
- Learn the information contained within this online catalogue. Failure to do so does not excuse you from responsibility for the rules and procedures,
- Track your completion of degree requirements,
- Consult your advising office and major department about any questions concerning academic policy.

All students are expected to observe the academic policies and practices of the university; personal difficulties, illness, and/or advice contradicting the rules and procedures does not constitute automatic grounds for exemption from these rules or procedures. Written requests for exceptions must be submitted to the student's academic advising office. After review, a student will be notified whether the exception is approved.

Students who have concerns of an academic nature related to teaching or other aspects of course delivery may contact the Vice Dean for Undergraduate or the Vice Dean for Graduate Education of their School.

The University reserves the right to change rules, procedures and other information within this website as appropriate. This website is not to be regarded as a contract. If you have questions, contact your school's advising office.

Requirements for a Bachelor's Degree

There are multiple categories of degree requirements that comprise an undergraduate degree at Hopkins. All approved credit earned through exams or at other colleges and universities may be used to meet: Distribution requirements, Writing-Intensive requirement, Departmental major and minor requirements, and to satisfy course prerequisites.

1. **Total Degree Credit Requirement**
   The total degree credit requirement is considered a distinct degree requirement, and ranges from 120-130 credits depending on the degree. It is not merely a cumulative tally of courses used to satisfy requirement areas 3-5.
2. **Residency Requirement**
   Students are required to complete a minimum number of credits in residency at JHU, therefore a limit is imposed on how many exam and transfer credits can be counted towards the total degree credit requirement.
3. **Distribution Requirement**
   Students must earn a minimum number of credits in academic areas outside of their primary major. The academic areas in the Hopkins curriculum are humanities (H), natural sciences (N), social and behavioral sciences (S), quantitative and mathematical sciences (Q), and engineering (E).
4. **Writing-Intensive Requirement**

To encourage excellence in writing across disciplines, the University requires all bachelor's students to complete writing-intensive courses. These courses are identified by a "W" in the JHU course schedule, and an asterisk (*) on the unofficial transcript.

5. **Departmental Major Requirement, and Minor Requirement**
Every student who earns a bachelor's degree must satisfy the requirements for each of their declared major(s), and minor(s). These requirements may include courses in other disciplines that provide skills and information of importance to professionals in the major field.
6. **First-Year Foundations Requirement (Arts and Sciences students only)**

An undergraduate student's school affiliation, and therefore the First-Year Foundations requirement, is based on the student's primary major. Arts and Sciences first-year students must complete a two-course requirement of a First-Year Seminar and a Reintroduction to Writing course. Arts and Sciences transfer students must complete an approved seminar and the Reintroduction to Writing course (or an equivalent transferred course). A full description of this requirement is available only in the Arts and Sciences catalogue because this requirement is not applicable to Engineering undergraduates even those who have an additional major in Arts and Sciences.

"D" Grade Restriction

University policy allows no more than 18 credits from courses with grades of D or D+ to be counted toward the total degree credit requirement for graduation. Departments may set a lower limit on the number of permissible D or D+ grades for a specific major. Many departments do not accept any D or D+ credits for major requirements.

Ten-Year Degree Completion Limit

A student must fulfill all degree requirements for graduation within 10 academic years from the date of matriculation at the University.

Degree Credit Totals

The Bachelor of Arts degree requires 120 credits.

The Bachelor of Science degree, whether in Arts and Sciences or Engineering, requires from 120 to 130 credits, depending on the major.

No program may require more than 130 credits.

For a degree requiring 120 total credits, a maximum of 20 approved credits from other sources may be counted towards the total degree credit requirement, even if more than 20 credits from external sources have been used to satisfy degree requirement areas of: Distribution, Writing-Intensive, and Departmental Major and/or Minor.

All approved exam credits earned will be posted to the transcript. Up to 12 approved transfer credits will be posted to the transcript. See External Credits (p. 1604) section for details.

Example:

A student has a total of 32 external credits posted to the transcript:

- 8 transfer credits from another university
- 24 credits from AP exams

All 32 of these credits may be applied to requirement areas of: Distribution, Writing-Intensive, and Departmental Major and/or Minor.

If the student's total degree credit requirement is 120, only 20 of those 32 credits will count toward the 120 total degree credit requirement (120-100=20).

If the student changes to a degree program whose total degree credit requirement is 126, only 26 of those 32 credits will count toward the total degree credit requirement (126-100=26).

Residency Requirement for Freshmen

Students who enter the university from high school must complete at least 100 credits at JHU. This includes courses that are taken after matriculation as a degree-seeking student:

- in fall, intersession, spring, or summer at JHU
- in other divisions of the university
- through the Baltimore Student Exchange Program (BSEP) during the fall and spring semesters only
- through an approved study abroad program (up to 30 credits)

In addition, credits earned through JHU courses prior to matriculation as a degree-seeking student are applied to the 100-credit residency requirement.

Students who entered JHU prior to Fall 2014 should view the appropriate archived catalogue.

All students must complete a minimum of four semesters in residence as a full-time student. Students must be in residence for at least two of the final four semesters, including the final semester prior to graduation.

Residency Requirement for Transfer Students

Students who enter the university as transfer students must complete at least 60 credits at JHU. This includes courses that are taken after matriculation as a degree-seeking student:

- in fall, intersession, spring, or summer at JHU
- in other divisions of the university
- through the Baltimore Student Exchange Program (BSEP) during the fall and spring semesters only
- through summer and intersession study abroad programs sponsored by Hopkins departments

In addition, all transfer students must complete at least four full-time semesters in residence at JHU. Study abroad programs offered during fall and spring semesters do not count towards this four-semester requirement. Transfer students must be in residence for at least two of their final four semesters, including the final semester prior to graduation.

Residency Requirement for Peabody Double Degree Students

Students earning a double-degree at Peabody must complete at least 48 credits in either the Krieger School of Arts & Sciences or the Whiting School of Engineering.

Writing Designation Requirements

To encourage excellence in writing, across disciplines, the university requires all undergraduates to take a number of writing-intensive courses. A writing-intensive (W) course is one in which students complete at least 20 pages of finished writing, distributed over multiple assignments, usually 3 or 4 papers, throughout the semester. Instructors respond to students' work in written comments or in conference, or both; and students have at least one opportunity to receive their instructor's feedback on a draft and then revise. A writing-intensive course guides students' practice in writing and makes writing an integral part of the course. The writing-intensive requirement is administered by the University Writing Program.

Writing-intensive courses are indicated by a "W" in the JHU course schedule and an asterisk (*) on a student's unofficial transcript. Courses taken to satisfy the writing requirement must be taken for a letter grade and passed with a grade of C- or better. Writing-intensive courses taken to satisfy major, minor, or distribution requirements may also count toward the writing requirement. All course registrations at the 500 level, which is by definition independent academic work, except for courses that are Honors Thesis and the Senior Essay in English, are not allowed to be writing-intensive.

KSAS Students:

Effective Fall 2022, all students earning a degree from the School of Arts and Sciences must complete Reintroduction to Writing in their first year at Hopkins plus an additional 12 credits in writing-intensive courses through their undergraduate experience for a minimum of 15 writing-intensive credits. Arts and Sciences transfer students will be required to complete the Reintroduction to Writing course in their first year at JHU and encouraged to take it in the first semester. Transfer students who wish to have a similar writing course from a prior institution reviewed to serve as a substitution for this course should speak to the University Writing Program. To ensure seat availability in the course, students should request this review prior to transfer student registration day in the summer.

WSE Students:

Candidates for a B.A. degree in the School of Engineering must complete 12 credits (four courses at least 3 credits each) in writing-intensive courses, while candidates for a B.S. degree in Engineering must complete 6 credits (two courses at least 3 credits each) in writing-intensive courses. Please note, this requirement is based upon a student's degree; students are not required to complete a separate writing requirement for any additional majors.

For information about transferring writing-intensive credits to JHU, please see the External Credits section of Academic Policies.

Academic Area Designation Requirements

The distribution requirement stipulates that students must earn a minimum number of credits in academic areas outside of their primary major. Area designators represent an association between the course and an academic area. Courses with area designators are expected to do more than employ basic techniques, they are to advance knowledge and increase a student's understanding of the theory. Courses that are teaching a basic skill, and therefore do not expose the student to modes of analysis and scholarship that represent the essence of a given discipline, will not be assigned an area designator. If taught within a Homewood academic department, the department is responsible for assigning area designators to their courses. Courses not offered through Homewood academic departments will be reviewed for proposed area designators by the appropriate dean's office.

The academic areas in the Hopkins curriculum are: humanities (H), natural sciences (N), social and behavioral sciences (S), quantitative and mathematical sciences (Q), and engineering (E).

The area designations of courses (H, S, N, Q, and E) are included in the course information in the departmental pages of the catalogue and in the online schedule of classes. The area designation also appears beside the course title on a student's unofficial transcript. When a course has more than one area designation (HS, EN, EQ, etc.), students may use only one of the designations to satisfy the distribution requirement.

Only courses or other credit-bearing opportunities with area designations may be used to satisfy the distribution requirement. Area designators are not assigned to the following:

- Independent study
- Research
- Internships
- Music performance (unless taken as part of a music minor, in which case the course will be designated H)
- Dance performance
- Foreign language elements courses (see additional foreign language rules (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/registration-policies/#restrictionstext))
- Medical tutorials

Area designations can be assigned to courses taken elsewhere, to courses taken in other divisions of the university, or to graduate courses taken by undergraduates. These assignments are made by the appropriate dean's office based on the course content and the recommendations of the faculty. The most useful criteria for determining an appropriate area designator will be the course description and a similar JHU departmental offering.

The following courses at the Peabody Conservatory have H designations:

Area Designator	Code	Title
H	530.411	Keyboard Literature 1
H	530.412	Keyboard Literature 2
H	530.413	Keyboard Literature 3
H	530.414	Keyboard Literature 4
H	530.569	Jazz Analysis/History
H	530.570	Constructive Listening & Analysis/ Jazz History
H	610.321	History of Music 1
H	610.322	History of Music 2
H	610.323	History of Music 3
H	260.115	Core 1
H	260.116	Core 2

Distribution Requirement for Arts & Sciences Students

Students must earn:

- At least 9 credits in humanities
- At least 9 credits in social sciences
- At least 9 credits in natural sciences, quantitative, or engineering

These credits fulfilling the distribution requirement may overlap with major or minor requirements and the writing-intensive requirement.

In Arts and Sciences, courses taken for the distribution requirement may be taken for a letter grade or for Satisfactory/Unsatisfactory credit. Courses passed with a letter grade of D or better, or passed with a Satisfactory grade, will fulfill the distribution requirement. Students who entered JHU prior to Fall 2014 should view the appropriate archived catalogue.

Distribution Requirement for Engineering Students

Students earning a degree in the School of Engineering must complete the following distribution requirement:

18 credits (6 courses at least 3 credits each, except for the two specific course sequences listed below) designated H and/or S. Although language elements courses do not carry an area designator, engineering students may use these courses as substitutes for humanities courses in meeting the distribution requirement.

The following specific course pairings of a 2-credit course and a 1-credit course have been approved to count towards the H/S distribution requirements in place of a single 3-credit course:

Code	Title	Credits
Set One		
EN.660.400	Practical Ethics for Future Leaders	2
EN.660.406	Practical Ethics for Future Leaders - Special Topic	1
Set Two		
EN.660.400	Practical Ethics for Future Leaders	2
EN.520.404	Engineering solutions in a global, economic, environmental, and societal context	1

In Engineering, each department determines whether or not the Satisfactory/Unsatisfactory grading option will be permitted for courses used to satisfy the distribution requirement.

Completing a Major and Minimum Grade Point Average

Every student who earns a bachelor's degree must satisfy the requirements of a major. A major is a structured curriculum, usually within the confines of a particular academic field. Generally, the requirements for a major provide a student with a broad overview of the field through introductory courses, followed by more specialized courses tailored to meet the student's interests in the field. The requirements for the major may also include courses in other disciplines that provide skills and information of importance to professionals in the major field.

Courses that are used to satisfy major requirements must be taken for a letter grade, unless the course is only offered using the Satisfactory/Unsatisfactory grading system (i.e., there is no option for a letter grade). Students must have a grade point average of at least 2.00 in the letter graded courses used to satisfy major requirements. Many majors require a grade of C- or better in required courses.

Departmental Directors of Undergraduate Studies

For every major and minor that is offered at Johns Hopkins, there is a faculty member, or their designee, who serves as the program's Director of Undergraduate Studies (DUS). They are available to answer questions about their major(s) and/or minor(s). The directors also assign faculty advisors to students who declare a major or minor.

Information about KSAS DUS is located at https://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/.

Information about WSE DUS is located at https://engineering.jhu.edu/advising/directors-of-undergraduate-studies/.

Declaring a Major in Arts and Sciences

Students who enter the Krieger School of Arts and Sciences from high school are classified as pre-majors during their freshman year. In April, freshmen in Arts and Sciences will meet with an academic advisor to declare their primary major in Arts and Sciences. To declare a major at a later time, see Changing Majors or Advisors section below. Students must declare a major by April 15th of their sophomore year in order to assure that they will complete requirements for graduation in four years.

Arts and Sciences freshmen may declare second majors and minors offered through the School of Engineering beginning their freshman year until April 15th of their junior year.

Declaring a Major in Engineering

Students who enter the Whiting School of Engineering declare a specific engineering major on their application for admission. A student must take direct action to change the major. To change a major, see Changing Majors or Advisors section below.

Students cannot change their major into Biomedical Engineering. Students must be accepted into the program at the time of admission to the University.

It is recommended that undecided engineering students select a specific major no later than the end of freshman year.

Engineering students may declare a second major or minor offered through either the School of Engineering or the School of Arts and Sciences beginning their freshmen year until April 15th of their junior year.

Changing Majors or Advisors

Once students have declared a major, they may change their major or their faculty advisor by completing the online Program of Study form in SIS. Students cannot change their major into Biomedical Engineering.

Declaring Additional Majors (Optional)

Students who wish to complete the requirements of more than one major are expected to declare the additional major(s) by April 15th of their junior year. Students may add an additional major by completing the online Program of Study form.

A student with a double major receives the degree (B.A./B.S.) associated with the student's primary major. Completing a second major does not entitle the student to a second degree. The completion of additional majors is recorded on the transcript and diploma. When completing a double major, students need only satisfy the distribution requirement affiliated with the school of their primary major.

Declaring a Minor (Optional)

Students who wish to complete the requirements for a minor(s) are expected to declare the minor(s) by April 15th of their junior year. Students may add a minor by completing the online Program of Study Form. The completion of a minor is recorded on the transcript, but the minor does not appear on the diploma.

Official recognition with notation on the academic record is not given for completion of majors or minors at other divisions of the university or at other colleges.

Restrictions Applying to Double Majors and Minors

Within the Hopkins curriculum, requirements for the completion of undergraduate majors and minors are established by academic departments and approved by the Homewood Academic Council, acting on recommendations from the Curriculum Committees of the Krieger and Whiting Schools. Students who fulfill the necessary prerequisites and satisfy the specified course requirements for a major/minor will be certified as having completed that major/minor. While departments are free to designate the range of courses that may satisfy major/minor requirements for their own academic programs, they may not prohibit the use of course work presented for their department's major/minor from being used to satisfy the requirements of other majors or minors. In other words, students may "double count" coursework that independently meets the requirements of more than one major/minor.

Students are encouraged to choose additional areas of study to complement their major. However, students may not choose a minor with an identical name to their major. For example, a student majoring in Africana Studies may not declare a minor in Africana Studies.

Other prohibited combinations include:

1. Students may not major in Molecular and Cellular Biology and Biology.
2. Students majoring in the Natural Sciences Area may only double major or minor in a program outside of the natural sciences
3. Students majoring in Medicine, Science and the Humanities may not double major in Natural Sciences Area.
4. Students majoring in Romance Languages may not major or minor in one of the individual Romance Languages (except for the Spanish for the Professions minor).

Closely-related majors and minors that are allowed include:

1. Economics majors may complete a Financial Economics minor.
2. Spanish majors and Romance Languages Majors may complete the Spanish for the Professions minor.
3. Computer Science majors may complete a Computer Integrated Surgery minor.
4. Cognitive Science majors may complete the Linguistics minor.
5. Students majoring in Environmental Engineering may major in any major offered through the Department of Earth and Planetary Sciences.

The examples provided above may not be an exhaustive list and students who have questions about combinations of related programs should consult an advisor in their respective advising office.

Student Status

Contact Information

All matriculated students are required to have on record with the university accurate local and permanent contact information at all times and may be subject to a registration hold if this information is missing. This includes local address, local telephone number, and valid JHU e-mail address. Parent or legal guardian emergency contact information also must be on record and updated as necessary. This information should be maintained with the Registrar's Office by using SIS for Students (https://sis.jhu.edu/sswf/).

Student Classification (Year of Study)

Student classification refers to the familiar names for the four undergraduate years: freshman, sophomore, junior, and senior. A student's classification is generally determined by the academic year in which the student's cohort began the first year of college. In the first year, students in the cohort are designated freshmen. For students transferring into the university, an official student classification will be assigned by the respective advising office after completion of a final transfer credit evaluation. The number of credits a student has earned does not determine class standing. A student who graduates after three years would graduate as a junior.

For students who have been on leave and missed two or more semesters, classification will be determined by the student's academic advising office when the student returns to the university. If, for example, a student was on leave of absence for an entire academic year, the advising office may assign the student to a cohort one year behind the student's original cohort.

Students are required to register with their cohort, not on the basis of total credits or expected date of graduation. Plans to graduate early are not grounds for registering before a student's cohort. If a student who intends to graduate early is closed out of a required course for the major, the student may petition the department offering the course for approval to add the course. The decision rests with the department.

Full-Time Student Status

Undergraduate students at Johns Hopkins University must be registered for a minimum of 12 credits each semester, unless a student has an approved reduced-course load accommodation through Student Disability Services.

Part-Time Student Status

Students who have not completed degree requirements after eight full-time semesters (or four full-time semesters for transfer students) may register for fewer than 12 credits and pay for courses on a per credit basis with approval of the student's academic advising office. Prior to a ninth semester, a student may not enroll for fewer than 12 credits.

Leaves of Absence

Leaves of absence are granted for specific periods, generally up to one year, and such leaves are regarded as approved interruptions of a student's program. No tuition or fees are charged while on leave. If applicable, students should consult with the Office of Financial Aid prior to requesting a leave of absence. Students may not be eligible for health benefits if enrolled through JHU's Student Health Benefits. For more information, visit https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/ and/or https://finaid.jhu.edu/.

Types of Leaves of Absence

STANDARD LEAVE OF ABSENCE

Students may be granted a standard leave of absence with the approval of the academic advising office for the student's school. Examples of reasons for a standard leave of absence include: military service (foreign or domestic), full-time internships preventing enrollment in courses, or missionary work. The deadline to request a standard leave of absence is the last day to drop classes. Students should contact their respective advising office for directions on how to request a standard leave. During a standard leave of absence, students may not enroll in another institution for the purpose of transferring credits back to JHU.

Students who fail to return to the university when expected will be considered to have withdrawn from the university.

EMERGENCY LEAVE OF ABSENCE

Students may be granted an emergency leave of absence for the purpose of dealing with a personal situation that impacts a student's ability to remain on campus and complete the semester. Examples of situations that might necessitate an emergency leave of absence include: the death of a family member, the need to serve as a caregiver for a family member, or other family emergencies. Students experiencing their own physical or mental health issues should refer to the medical leave of absence option. These emergency leaves are reviewed by the student's respective academic advising office and Student Outreach & Support in the Office of the Dean of Student Life (https://studentaffairs.jhu.edu/student-life/case-management/). During an emergency leave of absence, students may not enroll in another institution for the purpose of transferring credits back to JHU.

MEDICAL LEAVE OF ABSENCE (PHYSICAL OR MENTAL HEALTH)

Students may be granted a medical leave of absence to address their own physical or mental health concerns with the approval of Student Outreach & Support in the Office of the Dean of Student Life (https://studentaffairs.jhu.edu/student-life/case-management/). No tuition or fees are charged while on leave. Students on a medical leave of absence may request permission to take up to two courses totaling 8 credits or less at another institution while on leave. These courses must be pre-approved by following the directions of each school and the restriction of a total of 12 transfer credits remains. Students interested in taking courses while on medical leave of absence should contact KSAS Advising or WSE Advising. Further details are available from Student Outreach & Support on the Medical Leave of Absence website. (https://studentaffairs.jhu.edu/student-life/case-management/medical-leave-absence/)

Note for Peabody Double Degree Students

Peabody double degree students may request a leave of absence from the double degree program, however they cannot be granted a leave of absence from only one portion (Homewood or Peabody) of the program. A double degree student's leave of absence is subject to the guidelines of their respective academic advising office on the Homewood campus.

Withdrawal from the University

A student who wishes to withdraw from the university with no intent to return should consult with their respective academic advising office in order to submit an official notification. An official notification of withdrawal consists of a letter providing brief reason for withdrawal and effective date. The tuition refund schedule is posted on the Students Accounts website (https://studentaffairs.jhu.edu/student-accounts/tuition-fees/).

The academic advising office will inform the Office of the Homewood Registrar, who will circulate the notification to other relevant campus offices, such as Student Accounts, Community Living, Office of Financial Services, Office of International Services, etc.

An enrolled student who leaves the university without notice, or who fails to register by the end of the second week of the semester, may be considered to have withdrawn from the university.

A student who transfers to another institution is automatically considered to have withdrawn from JHU.

In the rare situation where a withdrawn student wishes to return to the university, the student must submit a written request for readmission to their respective advising office for evaluation. Neither readmission nor transfer of credits is guaranteed. A student must be formally readmitted before registering for courses. Readmitted students do not pay another matriculation fee.

A student who wishes to withdraw from the university on a temporary basis and intends to return in a future semester should see the information under Leaves of Absence (p. 1592).

Peabody Double Degree Students

Information about withdrawing from one or both of a student's degree programs is available on the Peabody Double Degree page (p. 808).

Combined Bachelors/Masters Programs

Many departments, institutes, and centers offer undergraduates the opportunity to complete some of the requirements for a master's degree while simultaneously completing requirements for a bachelor's degree. These programs offer early admission to a graduate program, and may enable a student to complete both bachelor's and master's degrees in four years. Other programs are considered five-year programs.

Students in the School of Arts and Sciences or the School of Engineering must be accepted into a combined program no later than the first semester of their senior year, however departments may set an earlier application deadline. Students in a combined program are considered to be full-time students, and are charged full tuition.

Students in a combined program are considered to be graduate students

1. upon completion of undergraduate degree requirements, **or**
2. upon completion of eight full-time semesters as an undergraduate student.

Clearance from a student's respective department is also required.

Additional information about combined programs is available at https://engineering.jhu.edu/academics/combined-bachelors-masters/ and http://homewoodgrad.jhu.edu/academics/combinedconcurrent-bachelors-masters-policies/.

Taking a Course as an Alumnus

JHU alumni who completed their bachelors degree through the Krieger School of Arts and Sciences or the Whiting School of Engineering may take additional courses in those divisions with permission of the advising office of the school from which they graduated. Students should contact the advising office of the school from which they graduated for registration directions. Courses, grades, and credits will appear on a new academic record. Students must follow the rules for earning a second major or a minor after graduating, if applicable.

Students who graduate in fewer than eight semesters may also take courses after graduation as a full-time or part-time student if not completing an additional major or minor. Students who graduate early lose the opportunity to complete additional majors or minors after graduation.

Students should seek assistance of their respective advising office in order to register for a course after graduation.

Finishing a Second Major or a Minor after Graduating

Students who have completed eight or more undergraduate semesters may take an additional course or two after graduation to complete a second major or minor if they have filed an approved plan with their respective advising office *before* their initial graduation date. The courses, grades, and credits will appear on a new academic record. A notation indicating the additional major or minor will be added to the new academic record, but a new diploma will not be issued. Students must notify their respective academic advising office when additional courses taken after graduation satisfy another major or minor.

A plan consists of the following:

1. Written approval from the director of undergraduate studies for the additional major/minor;
2. Description of the remaining requirement(s) to be completed. No more than two courses may be needed and these courses must be completed within one year of a student's initial graduation date;
3. Brief summary of why it is necessary for the student to have their degree conferred before completion of all planned majors or minors; and,
4. Final approval of a plan must be obtained from the student's respective advising office.

Second Degrees

Krieger School of Arts and Sciences and Whiting School of Engineering undergraduate-degree alumni who wish to earn a second bachelor's degree at Hopkins must contact their advising office. Students who receive approval must have already completed the requirements for the first bachelor's degree and complete an additional 60 credits at Hopkins beyond what they have done for the first degree. Alumni must request permission to pursue a second bachelor's degree within ten years of the conferral of the first bachelor's degree. The second bachelor's degree must be completed within ten years from the starting date of the second bachelor's degree.

Registration Policies

Advising and Registration Periods

All students are required to meet with an advisor for each declared major prior to registering for the fall and spring semesters. Advisor alert(s) for each declared major are placed on all students' records in SIS well in advance of the registration period; the alert(s) must be released by the advisor(s) to permit the student to register.

In the School of Arts and Sciences, freshman, first-semester transfer students, and undeclared students meet with their academic advisor beginning six weeks in advance of the registration period. Students with declared majors should contact their faculty advisor to schedule a meeting prior to their registration date.

In the School of Engineering, students meet with their faculty advisors during Engineering Advising Week (early November for spring registration, and early April for fall registration).

Undergraduates register for Spring semester in November, for Intersession in December, for Summer in March, and for Fall semester in April.

Schedule Verification

Students are responsible for verifying their schedules in SIS. Students are encouraged to retain a copy of their schedule for their records. In addition, students are advised to check their schedules after performing online registration changes (adding and/or dropping courses) to ensure accuracy.

Students should review their schedule prior to the add, drop, and withdrawal deadlines. Changes to a student's schedule will not be approved after these deadlines have passed. Failure to review and retain a copy of their registration confirmation will not be considered grounds for approving exceptions to these deadlines.

Intersession and Summer Special Registration Information

Summer and Intersession opportunities, such as JHU-sponsored study abroad courses and career exploration courses, may have special registration deadlines, fees, and procedures. Please see the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites for additional information.

Intersession is a period in January for students and faculty to participate in a variety of courses and activities that are offered for credit, and for non-credit. These offerings are designed to enrich the intellectual and social life of the campus. Registration in Intersession is optional.

For Intersession academic exploration courses, the tuition cost of Homewood KSAS and WSE courses is free to undergraduates who were enrolled full-time in the previous fall semester (including approved study abroad); part-time students must pay tuition. All students must pay relevant fees. Students who are returning from a leave of absence may register for Intersession if they pay tuition per credit hour. Students who register for Hopkins Intersession courses outside of KSAS/WSE are subject to tuition charges determined by the individual school.

Summer courses at JHU are primarily offered during two five-week terms. Some courses run on alternative schedules and may, therefore, have different deadlines. Courses are sponsored by the same academic departments that oversee the university's full-time degree programs. They are designed to reproduce, as closely as possible, similar courses offered during the spring and fall semesters. Tuition charges, and deadline dates, are published on the Summer Programs (https://summerprograms.jhu.edu/) website. Students who register for Hopkins Summer courses outside of KSAS/WSE are subject to tuition charges determined by the individual school.

Late Registration Fees

Registration in the School of Arts and Sciences and the School of Engineering is not permitted after the end of the second week of the semester, except in extraordinary circumstances as approved by the Assistant Dean in their respective academic advising office. The university provides financing alternatives that permit students to register in most financial situations. Visit https://finaid.jhu.edu/ for information on financial support programs offered at JHU.

Students who for any reason do not complete their registration until after the prescribed registration period may be required to pay a late registration fee.

For late registration fees in the Summer, please see the Summer Programs (https://summerprograms.jhu.edu/) website.

Adding a Course

During the fall and spring semesters, students may add a course until the end of the second week of classes and pay no fees to add courses. During this time students may add courses without written approval, unless the course is filled or will cause a credit overload. If the course will cause a credit overload, Arts and Sciences students need approval from the Arts and Sciences Advising Office, while Engineering students will need the approval of their faculty advisor and the approval of the Engineering Advising Office. Approvals for credit overloads can be processed in the SIS by the student's respective advising office which will enable students to add the course(s) online.

An instructor's signature is required to add a course that is filled. By the end of the second week of classes, students should have the schedule they want to keep. As an exception to this policy, students may enroll in Independent Study, Independent Research, Thesis, and/or Internship until the end of the sixth week of the semester.

For fall and spring courses that are scheduled for less than the full semester, the last day to add will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites.

When adding courses in other JHU divisions, or at schools in the Baltimore Student Exchange Program (BSEP), students must follow the deadlines set by the host school or division. In the School of Public Health, the add deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Dropping a Course

Courses may be dropped from the student's record until the end of the sixth week of the semester, provided that the student remains registered for a minimum of 12 credits. For engineering students, faculty advisor approval is required to drop a course after the second week of classes.

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to drop a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

For fall and spring courses that are scheduled for less than the full semester, the last day to drop will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summer.jhu.edu/intersession/) or Summer (https://summer.jhu.edu/) Programs websites.

When dropping courses in other JHU divisions or at schools in the Baltimore Student Exchange Program (BSEP), undergraduates must follow the deadlines set by the host school or division. In the School of Public Health, the drop deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Withdrawing from a Course

After the end of the sixth week and until the end of the eleventh week, a student may withdraw from a course with a W on their academic record. A record of the course will remain on the academic record with a W appearing in the grade column to indicate that the student registered and then withdrew from the course. Students are not allowed to withdraw from a course after the end of the eleventh week of the semester. Course withdrawals must be conducted in person at the Office of the Homewood Registrar using an add/drop form. Engineering students need the signature of their faculty advisor on the add/drop form. No signature is required for Arts and Sciences students to withdraw from a course when the student remains able to earn a minimum of 12 credits.

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to withdraw from a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Even with approval, withdrawing from a course may adversely affect a student's academic standing and/or financial aid satisfactory academic progress, and students should discuss these topics with the respective offices prior to submitting signed add/drop forms to the Office of the Homewood Registrar.

For fall and spring courses that are scheduled for less than the full semester, the last day to withdraw will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites.

When withdrawing from courses in other JHU divisions or at schools in the Baltimore Student Exchange Program (BSEP), undergraduates must follow the deadlines set by the host school or division. In the School of Public Health, the withdrawal deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Full-Time Student Status

Undergraduate students at Johns Hopkins University must be registered for a minimum of 12 credits each semester, unless a student has an approved reduced-course load accommodation through Student Disability Services. Students with reduced course load accommodations approved through the Student Disability Services Office should refer to their website (https://studentaffairs.jhu.edu/disabilities/) for additional information.

Part-Time Student Status

Students who have not completed degree requirements after eight full-time semesters may register for less than 12 credits and pay for courses on a per credit basis with the permission of their respective academic advising office. Prior to a ninth semester, a student may not enroll for fewer than 12 credits.

University Credit Hour Definition

JHU defines a credit hour as a reasonable approximation of the student learning outcome equivalency of an amount of work represented in intended learning outcomes and verified by evidence of student achievement that reasonably approximates not less than, at a minimum, the federal definition:

- One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately 15 weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
- At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

Changes to this definition can be found in University Policies (https://policies.jhu.edu/doc/fetch.cfm/jhiiy1jH/). (https://www.jhu.edu/university-policies/) Graduate-level courses completed by undergraduates are generally awarded the same number of credits as an upper-level undergraduate course (3 credits).

Fall and Spring Semester Credit Requirements and Limits

For Arts and Sciences (AS) students, the average course load is 15 credits per semester for eight semesters. AS freshmen are limited to 17 credits, while AS upperclassmen are limited to 18.5 credits.

For Engineering (EN) students, the standard load is 16-18 credits. EN freshmen are limited to 18 credits (18.5 if including a foreign language), while EN upperclassmen are limited to 19.5 credits.

Peabody Double Degree students are permitted to enroll in a maximum of 25 credits per semester.

Undergraduate students must be registered for a minimum of 12 credits throughout the fall and spring semesters. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Intersession and Summer Credit Limits

Students may take a maximum of 3 credits during Intersession.

During the Summer, students may take a maximum of 14 credits total, with a limit of 7 credits per session.

Exceptions to These Credit Limits

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to drop or withdraw from a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Credit overloads for Arts and Sciences students require approval from AS Academic Advising, and must meet one of the following criteria:

- Seniors in their eighth semester
- Upperclassmen who made Dean's List in the prior semester

Credit overloads for Engineering students are approved on a case-by-case basis, and require Faculty Advisor's signature, then final approval by the EN Advising Office, with review of the student's recent academic performance is a factor in the decision. First-semester EN freshmen are not granted credit overloads.

Restrictions

Registration Alerts

Registration alerts may be applied to student records for a variety of reasons, such as outstanding financial obligations, insurance and health clearances, academic standing, and missing emergency contact information. A student whose registration has been placed on hold for a non-academic reason must obtain clearance from the office or offices that placed the hold on registration. Transcripts will not be released for students with unpaid balances.

Students who have three or more incomplete grades from the previous semester may have a hold placed on registration activity. The student must have approval from their respective advising office to register, add, or drop.

Retaking A Course

Students may retake a course to absolve a grade of C+ or lower. The grade for the second attempt and the associated credits are recorded on the transcript and are calculated into the GPA. The original grade remains along with the notation "R" to indicate the course was retaken, and the original grade does not affect grade point calculations, nor does it carry credit toward graduation. Only the grade in the retaken course accrues credit and applies to the GPA, even when the retaken grade is lower than the original grade. However, if a student drops or withdraws from the subsequent attempt the original grade is calculated into the GPA. A student may retake one course without written permission. Taking the same course a third time or retaking a different course requires written permission of the student's respective academic advising office.

A course originally taken for a letter grade must be retaken for a letter grade. A course taken under the Satisfactory/Unsatisfactory grading option must be retaken under the Satisfactory/Unsatisfactory grading option.

To absolve a grade, the same course must be taken at Hopkins, not at another college or university. In situations where the same course is no longer offered, students may be able to absolve a grade in one of two ways:

1. by repeating a course of comparable content and level, or
2. as an independent study

Both of these options require approval of the department and/or instructor responsible for the course, and the student's respective academic advising office.

Approval for course retake can be processed in the SIS by the student's respective advising office which will enable students to add the course(s) online.

Special Retake Rules Related to Spring 2020, Fall 2020, and Spring 2021.

Due to the COVID-19 pandemic, there were special grading policies in effect during Spring 2020, Fall 2020, and Spring 2021 semester. Students who want to retake a course that was taken in one of those three semesters should refer to the chart below for adjusted retake rules.

Other Restrictions on Absolving a Grade

Grades may not be absolved by retaking a course after graduation.

Grades assigned by the Ethics Board due to an academic ethics violation may not be removed from the academic record by retaking the course.

Prohibition on Registering for Courses that Meet at the Same Time

Registering for two classes that meet at the same time or at overlapping times is not permitted, except as a temporary measure during the first two weeks of the semester when students are still deciding on which classes to take. By the end of the first two weeks of classes, students must resolve time conflicts in their schedules. Students receive a warning about time conflicts during the self-service registration process. Conflicts can be resolved as follows:

- Student must drop one of the conflicting courses by the end of week two of the current semester.
- For any exceptions, student must reach an agreement with the faculty of both conflicting courses. The approval must be documented in student records. Approvals can be submitted via SEAM case management system by student.

If the student does not resolve the conflict, they will be administratively dropped from one of their conflicting courses the 3rd week of the classes of the current term without any further notice. The course which was added later will be subject to this action.

Restrictions on Equivalent Courses and Courses Taken Out of Sequence

Courses that are sequential in nature, e.g., elementary, intermediate, and advanced language courses, or the Calculus sequence, must be taken in their proper order. One exception to this policy is that AS.210.301 Advanced French for Writing and AS.210.302 Advanced French for Speaking may be taken in reverse order with permission of the department.

Credit will be awarded only once for equivalent courses covering the same material. Examples of equivalent courses are Intermediate French and Advanced Intermediate French, and AP Calc AB and Calculus I. This restriction does not apply to the Expository Writing course which may be taken twice. Be aware that departments may change course numbering or titles without changing the course content. Students who believe that they have registered for an equivalent course should consult with their academic advising office. This rules applies to courses offered by either KSAS or WSE, courses at other JHU schools, and courses transferred from other institutions.

The following restrictions apply to overlapping and the sequencing of courses in the Mathematics, and the Applied Mathematics and Statistics Departments:

- Students who earn credit for AS.110.201 Linear Algebra cannot receive credit for the combined course EN.553.291 Linear Algebra and Differential Equations or for the course. AS.110.212 Honors Linear Algebra.
- Students who earn credit for AS.110.405 Real Analysis I cannot receive credit for AS.110.415 Honors Analysis I
- Students who earn credit for AS.110.406 Real Analysis II cannot receive credit for AS.110.416 Honors Analysis II
- Students who earn credit for AS.110.302 Differential Equations and Applications cannot receive credit for EN.553.291 Linear Algebra and Differential Equations.
- Students who earn credit for AS.110.202 Calculus III cannot receive credit for AS.110.211 Honors Multivariable Calculus.
- Students who earn credit for AS.110.311 Methods of Complex Analysis cannot receive credit for AS.110.407 Honors Complex Analysis.
- A student who earns credit in EN.553.291 Linear Algebra and Differential Equations may receive credit for further study of linear algebra or differential equations by enrolling for independent study. Normally students will earn 2 credits for such an independent study, but the number of credits may vary and is to be decided by the faculty sponsor. These students may not earn credit for AS.110.302 Differential Equations and Applications, AS.110.201 Linear Algebra, nor AS.110.212 Honors Linear Algebra.
- Students who earn credit for EN.553.426 Introduction to Stochastic Processes cannot receive credit for EN.553.427 Stochastic Processes and Applications to Finance.

The following restrictions apply courses in the Economics Department:

- Students who earn credit for AS.180.301 Microeconomic Theory may not earn credit for AS.180.401 (when offered).
- Students who earn credit for AS.180.334 Econometrics may not earn credit for AS.180.434 Advanced Econometrics.

Policy on Statistics Courses Sequencing

Undergraduate students at the Homewood Schools of Johns Hopkins University enjoy a wide selection of courses on statistics; however, it is not allowable for a student to be awarded credit for two courses that cover essentially the same material. Likewise, it is not allowable for a student to receive credit for a more basic course after having received credit for a more advanced course in the same subject.

Our statistics courses fall into one of the following four categories, listed in increasing level of sophistication:

1. Non-calculus based, basic (p. 1096)
2. Non-calculus based, intermediate (p. 1096)
3. Calculus based, intermediate (p. 1096)
4. Calculus based, advanced (p. 1096)

A student may take at most one course (or course sequence) from within one of these categories. A student may not take a course in a lower numbered category after having taken a course in a higher numbered category.

Some departments may require their undergraduate majors to take specific statistics courses, however, all students are precluded from receiving credit for two courses that have much the same content, though they may have different emphases. This policy does not imply that a course in one of the above categories may be substituted for another course.

The list below shows the courses and sequences that are allocated to these categories. Examples:

- A student may take EN.553.111 Statistical Analysis I but then may not subsequently take AS.230.205 Introduction to Social Statistics.
- A student who has taken EN.553.310 Probability & Statistics for the Physical Sciences & Engineering may not also take EN.553.311 Probability and Statistics for the Biological Sciences and Engineering or any of the courses in the first two categories.

Category 1: (Non-calculus based, basic course)

Code	Title	Credits
EN.553.111	Statistical Analysis I	4
AS.230.205	Introduction to Social Statistics	4
AP Statistics		

Category 2: (Non-calculus based, intermediate course)

Code	Title	Credits
EN.553.211	Probability and Statistics for the Life Sciences	4
EN.553.230	Introduction to Biostatistics	4
AS.280.345	Public Health Biostatistics	4

Category 3: (Calculus-based, intermediate course)

Code	Title	Credits
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	

Category 4: (Calculus-based, advanced course)

Code	Title	Credits
EN.553.420 & EN.553.430	Introduction to Probability and Introduction to Statistics	4

Some courses do not fall into one of the four categories:

- EN.553.413 Applied Statistics and Data Analysis This course is mostly independent of the other probability/statistics courses, but subsumes enough of the non-calculus, basic course material such that no Category 1 course may be taken after EN.553.413 Applied Statistics and Data Analysis.
- EN.553.112 Statistical Analysis II may be taken after any category 1, 2, or 3 course. However, the preferable sequence is EN.553.111 Statistical Analysis I-EN.553.112 Statistical Analysis II.
- AS.200.200 Research Methods in Psychology and AS.200.201 Design & Statistical Analysis for Psychology comprise a two-semester research methods sequence required of the Psychology major. While the courses introduce some statistical methods, they are not subject to the sequencing restrictions. Students who have completed these courses who wish to continue in statistics should consider a course in category 2 or higher.

Equivalent Statistics Courses

The courses EN.553.310 Probability & Statistics for the Physical Sciences & Engineering and EN.553.311 Probability and Statistics for the Biological Sciences and Engineering are considered equivalent to each other and can be used interchangeably. In accordance with the course retake policy, a grade in one may be absolved by the opposite course.

Important Note About Credit and Grades for Language Courses

Students must take the language elements (or beginning/first year) courses for a letter grade.

Students in the School of Arts and Sciences do not receive an area designation for these elements (beginning/first-year) courses.

Students in the School of Engineering can substitute language elements (or beginning/first-year) courses for humanities courses in meeting the distribution requirement.

Instructor's Permission

Most graduate (600-level and above) courses in the School of Arts and Sciences and the School of Engineering offered in the graduate divisions of the university require undergraduates to obtain permission to register. If permission is required, engineering students need permission from the instructor and their faculty advisor. Arts and Sciences students require permission of the instructor. If online enrollment is not available, students must use an add/drop form to secure the appropriate permissions.

Auditing a Course

Undergraduate students may not audit a course. By the end of the add period, a student may only attend or participate in courses for which they are enrolled.

Registering for Independent Academic Work

Independent Academic Work is the collective term used to encompass independent study, research, and academic internships. Independent study means a program of study and reading under the tutelage of a faculty member. Academic credit for independent study is based on work equivalent to class-based courses. Research involves planning and conducting experiments, collection and analysis of data, and the reporting of results. Academic internships are practical work experiences which have an academic component as certified by a member of the faculty.

All forms of independent academic work require early planning with a faculty sponsor. To receive academic credit, the independent academic work must include activity, exercise, and/or product that can be evaluated by a member of the AS/EN faculty whose field of expertise is closely enough related to the work for the faculty sponsor to competently evaluate the work, and certify that it merits academic credit.

Academic credit for independent academic work must be sponsored by a full-time member of the Homewood faculty. This is the case whether the work is done on-campus or off-campus. The work supervisor and the faculty sponsor may be the same individual. If the faculty sponsor is not the work supervisor, the work supervisor must provide the faculty sponsor with a report on the student's achievements while doing the independent project, and the faculty member must certify how much academic credit the project merits.

Students who wish to pursue independent academic work begin by discussing their ideas with an appropriate faculty sponsor. That discussion must focus on what type of project the student envisions, and what possibilities for academic credit the faculty member envisions. If the student and faculty member agree on the type of project and its academic value, then the student should find a suitable research or work environment for the project.

- No more than three credits may be earned for independent study or research in one semester or summer (sessions I and II combined); only one credit may be earned for an academic internship during one semester or summer.
- No more than 6 credits of any type of independent academic work may be earned in one academic year (see exception for students graduating in their eighth semester or later). The academic year begins with the first summer session and ends at the conclusion of the spring semester.
- Independent work done for academic credit may be paid or unpaid. Credits for research and independent study vary from 1-3 credits, and may be graded with either letter grades (A, B, etc.) or Satisfactory/ Unsatisfactory. Each credit hour should reflect 40 hours of work on the project.
- Credit for an internship is limited to 1 credit, and the grading method is Satisfactory/ Unsatisfactory only.
- Students must register for independent academic work by the end of the sixth week of the semester. Students must adhere to the registration and add/drop deadlines during Intersession, and Summer. In the rare circumstance that a student must change the number of independent academic work credit for which they are registered, the deadline for these changes aligns with the deadline to withdraw from a course. The typical minimum and maximum credit limits must be observed.

Although academic credit is awarded for independent academic work, area designations are not assigned and the credit may not be used to satisfy the distribution requirement. All courses registration at the 500-level, which is by definition undergraduate independent academic work, except for courses that are Honors Thesis and the Senior Essay in English, are not allowed to be writing intensive. The use of credit for independent academic work to satisfy the requirements of a major or minor is subject to prior written approval by the appropriate department or program.

Additional policy information can be found in the Credit Hour Policy (https://policies.jhu.edu/doc/fetch.cfm/jhiiy1jH/).

Language Courses at the School of Advanced International Studies

Course credit, normally between 3 to 5 credits, will be awarded to AS and EN undergraduate students for the following language courses offered by the School of Advanced International Studies (SAIS) in accordance to the University's credit hour policy and in strict adherence to the hours of instruction scheduled: Burmese, Indonesian, Persian, Russian, Thai, and Vietnamese. Supplemental language tutorials will not be included in the course credit calculations.

Registering for Courses in Other JHU Divisions During the Fall and Spring Semesters

Qualified undergraduates may take courses at other divisions of the university as long as the student has not previously earned credit for the content of the course. Students submit an Interdivisional Registration (IDR) form, which is available in the Homewood Registrar's Office, in the Office of Academic Advising, or in the Office of Engineering Advising. Courses taken at other JHU divisions must be taken for a letter grade, unless the course at the host division is offered on an S/U basis only. Approval(s) are required for all AS/EN students as indicated on the IDR form. All students must meet the course requirements as defined by the host division. Additional IDR information is located at https://registrar.jhu.edu/idr/.

Peabody Institute

Peabody Conservatory offers courses that must be taken for grade and credit. Homewood undergraduates who are not enrolled in either the Homewood-based music minor or the Peabody Double Degree program may take only one nonperformance course per semester at the Conservatory, and may also take one performance course concurrently with the approval of the student's respective academic advising office. Performance courses will receive 1 credit per semester unless taken as part of the Peabody Double Degree program.

Students may take private lessons at Peabody. Information is located at https://peabody.jhu.edu/preparatory/registration-financial-aid/placement-information/.

The Conservatory schedule and deadlines can differ from those at Homewood. Students taking courses and lessons at the Conservatory must check these dates in the Peabody schedule of courses located at https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/. Visit https://peabody.jhu.edu/academics/peabody-at-homewood/ for additional information about taking lessons at the Conservatory.

The Carey Business School and The School of Education

Students may register for approved courses in these two schools on a case-by-case basis. In order to register in the Carey Business School or the School of Education, students in Arts and Sciences and Engineering programs should use the Interdivisional Registration Form, available from the Homewood Registrar's Office (https://support.sis.jhu.edu/case-home/), which requires permission of their academic advisor and the appropriate school program director or advisor. Students declared in the Carey Business minor for undergraduates may register for the required courses of the minor through SIS. Courses must be taken for a grade. Note that the Carey Business School and the School of Education students have priority in registering for these schools' courses.

School of Medicine and Bloomberg School of Public Health

Undergraduates may register for courses in the School of Medicine and/or the Bloomberg School of Public Health with the approval of the faculty advisor, the course instructor, and the student's academic advising office. Students must have an adequate background for the courses, and courses must be taken for a grade. Public Health Studies majors taking courses at the Bloomberg School of Public Health require only the Public Health faculty advisor's approval signature and can register for courses through SIS.

Registering for Courses at Other JHU Divisions During the Summer

Degree-seeking students are permitted to IDR enroll during the summer term(s). Students must meet designated course prerequisites and/or be otherwise qualified for the desired course(s) at the following JHU divisions:

- Advanced Academic Programs (AAP) division of the Krieger School of Arts and Sciences
- Bloomberg School of Public Health (excluding offerings through the Summer Institute)
- Engineering for Professionals (EP) division of the Whiting School of Engineering
- Peabody Institute (permission required from Peabody Associate Dean for Academic Affairs)
- School of Advanced International Studies
- School of Education
- School of Medicine

Students should register using the IDR form (https://support.sis.jhu.edu/case-home/), and pay for the course at their home division. The course, along with credits and grade, will appear of the student's home division transcript. Approval from both the home and host divisions is required to ensure that the interdivisional enrollment is appropriate for the student's degree. Summer courses in other divisions must be taken for a grade.

IDR enrollment is not available during the summer term(s) at the Carey Business School, nor the School of Nursing. Students seeking enrollment at either of these schools should pursue enrollment directly with the respective school. In order to ensure a course will transfer to the student's undergraduate academic record, students should follow the transfer credit pre-approval directions available from their advising office.

Registering for Courses through the Baltimore Student Exchange Program (BSEP)

Beginning sophomore year, undergraduates may take one course per semester (fall/spring only) at one of the several area colleges and universities that comprise BSEP. This program includes the following colleges in the Baltimore area: Community Colleges of Baltimore County, Coppin State University, Goucher College, Loyola University Maryland, Maryland Institute College of Art, Morgan State University, Notre Dame of Maryland University, Stevenson University, Towson University, University of Baltimore, and University of Maryland Baltimore County.

Students who have received Air Force ROTC scholarships will register for the required ROTC courses at the University of Maryland College Park using the BSEP institution registration process described in this section.

Courses that are equivalent to those offered at the Homewood campus may not be taken through BSEP. Students register by submitting the BSEP registration form to the Homewood Registrar (https://support.sis.jhu.edu/case-home/). This form is available on the BSEP website (https://baltimorecollegetown.org/colleges/cross-registration/). The faculty advisor's approval is required for all courses. An academic advisor from the student's respective advising office must also approve the form. Submit completed registration materials to the Homewood Office of the Registrar (https://support.sis.jhu.edu/case-home/).

Prior to the start of classes at the host institution, students may report to the host school's registrar for additional assistance (for example, campus maps or id cards). JHU students enrolled through BSEP are not required to complete registration forms at the host institution, and no academic record is established at the host institution. There is no additional fee or tuition charge for courses taken through the BSEP program, except when the host school charges a laboratory or materials fee. In that event, the student pays the fee directly to the host institution.

Courses at these schools must be taken for letter grades. Both grades and credits appear on the Hopkins academic record along with an indication of where the courses were taken. The grades are included in calculations of the grade point average.

Independent undergraduate work, special tutorials, or private study types of courses that consume a large portion of faculty time are generally not included in the BSEP program, nor are weekend or evening courses offered through continuing educational studies programs.

Cooperative Education in Engineering

Engineering students may participate in government or industry-based cooperative education programs. Students who have received an offer from an employer should contact the Engineering Advising Office at 410-516-7395 or wseadvising@jhu.edu.

ROTC

Enrollment in the Johns Hopkins University Department of Military Science ROTC Program prepares students for full- and part-time careers in the U.S. Army and its Reserve Forces, as well as providing leadership and management skills valuable in any profession. Freshmen interested in finding out about the military profession should enroll in a Military Science course. Contact the professor of military science at 410-516-4685 for enrollment procedures and scholarship information. Visithttps://krieger.jhu.edu/rotc/ and https://e-nextcatalog.jhu.edu/arts-sciences/full-time-residential-programs/degree-programs/military-science/ (p. 1970) for additional information.

Final Examination Schedule for Fall and Spring Semesters

The Office of the Homewood Registrar establishes the final examination schedule. In rare cases, the official final exam schedule available on the Homewood Registrar's website may slot three final exams on one day for a student. Students should contact their respective academic advising office for assistance in these instances.

Instructors may administer final examinations only at the officially scheduled time, not during class time or during the reading period. Take-home final examinations, and other final exercises (such as papers) that are expected to be prepared for and completed after classes have concluded are due at the end of scheduled in-class final examination time for the course. All other papers can be due at any deadline during the semester set by the professor, including the reading and final examination periods.

Students who are concerned that any of these policies are being violated by their instructors should notify their respective academic advising office.

The final exam schedule (https://studentaffairs.jhu.edu/registrar/students/course-schedule/) is posted on the Office of the Homewood Registrar's website.

Grading Policies

Grades are submitted to the Homewood Registrar at the end of the semester. Grades can be viewed online by students in SIS. Students may designate authorized users to view final course grades in SIS.

Grades and Grade Point Average Points

Each grade corresponds to a numerical grade point equivalent to allow the computation of a grade point average. S and U grades have no effect on grade point average. The grades and their grade point equivalents are as follows:

Grade	Performance	GPA Points
A+	Excellent	4.0
A	Excellent	4.0
A-	Excellent	3.7
B+	Good	3.3
B	Good	3.0
B-	Good	2.7
C+	Satisfactory	2.3
C	Satisfactory	2.0
C-	Satisfactory	1.7
D+	Passing	1.3
D	Passing	1.0
F	Failure	0.0
S	Satisfactory (C- and above)	N/A
U	Unsatisfactory (D+ and below)	N/A

Other marks are used in special circumstances as follows:

Letter	Definition
FEV	Failure - ethics violation
I/Grade	Incomplete/Reversion Grade (incomplete grade reverts to this letter grade at deadline unless alternate grade is submitted prior to that deadline)
MR	Missing grade roster
MT	Multi-term
NG	No grade given, course completed
W	Official withdrawal
X	No grade reported by instructor

Grade Points and Grade Point Average

To determine the grade point average, multiply the grade point equivalent by the number of credits for the course. Add the products (grade points earned), then divide the total by the number of credits in the computation.

A Sample Calculation of a Grade Point Average

Grade	Credit	Grade Point Equivalent	Grade Points Earned
A-	4	3.7	14.8
B	3	3	9
B-	3	2.7	8.1
C+	3	2.3	6.9
TOTAL	13		38.8
GPA = 38.8/13 = 2.98			

Satisfactory/Unsatisfactory Grades

Undergraduates may select one course each semester and summer (across all summer terms) to take for Satisfactory/Unsatisfactory credit. Students indicate their S/U choice on an add/drop form. Arts and Sciences students need the advising office approval for courses within their major and/or for writing intensive courses. Engineering students need approval from their faculty advisor. Course instructors are unaware of which students in a class are registered for S/U credit. Instructors submit letter grades to the Homewood Registrar for all students in their course.

Students must decide whether to take a course on a S/U basis by the end of the eleventh week of the semester. This deadline applies to all courses, even those which may not have any graded work assigned or returned before the end of the eleventh week.

S/U grades have no effect on a student's grade point average. On the academic transcript, students who earn a grade of C- or above in a S/U course receive Satisfactory credit and a mark of S is entered on the academic record. Students who earn a grade below C- in a S/U course receive no credit and a mark of Unsatisfactory is recorded on the academic record.

Under certain conditions, graduating students in their eighth semester or later may exceed the normal S/U grading limit. See Graduation Policies for details.

Restrictions on Satisfactory/Unsatisfactory Grading

The S/U option applies only to courses in the fall, spring and summer terms in the School of Arts and Sciences and the School of Engineering. Only one course per semester or summer (across all summer terms) may be taken with the S/U grading option. However, an eligible student who registers for a course that is only offered for S/U grading may select an additional course for S/U grading in the same semester. Language elements courses must be taken for a letter grade.

If a student has taken a course for S/U credit and then changes to a major or minor that requires the course, the grade can be changed to a letter grade before graduation with the approval of the student's academic advising office and the director of undergraduate studies for the relevant major or minor. If the S grade is acceptable for the new major or minor, the S grade will not be converted to a letter grade.

Incomplete Grades

Students who are confronted with compelling circumstances beyond their control which interfere with the ability to complete their semester's work during the normal course of a term may request an Incomplete grade (I), a temporary grade, from their instructor.

Incomplete grades may be appropriate under the following conditions:

- the student has completed the majority of the work for the class as determined by the instructor.
- the student has consulted with the course instructor, and together they have created a viable plan to complete the coursework with sufficient time for the instructor to provide the final grade by the specified deadline described below. This conversation must be documented on an Incomplete Grade Contract, which is initiated by the student in SIS.

A student whose situation does not meet these criteria should consult their academic advisor to discuss academic options.

The required elements on the Incomplete Grade Contract are listed below; all of these topics should be included in the conversation between the student and the instructor.

1. The reason for the request for an incomplete grade
2. A description of all outstanding work that must be completed
3. Date the work is due from the student
4. The reversion grade if the student does not complete any of the outstanding work

An instructor is not obligated to approve a student's request for an Incomplete grade. If the instructor agrees to grant an Incomplete grade, the instructor and student must establish a timetable for submitting unfinished work within the relevant deadline stated in this policy below. The instructor must also specify the reversion grade, defined as the grade that will be assigned if no additional work is submitted, on the Incomplete Grade Contract. The student must submit their work to the instructor in enough time for them to review and grade it before the relevant deadline described below.

An Incomplete grade does not affect a student's grade point average and is replaced by the final grade submitted by the professor. If the final grade is not submitted within the relevant deadline stated in this policy below, the Incomplete grade will convert to the reversion grade entered by the instructor.

Incomplete grades cannot be held over to another semester to complete the missing work by retaking the course. Students and instructors do not have an option in this situation.

Under extenuating circumstances, students can petition their course instructors and their Academic Advising Office to extend their Incomplete deadline. The extension can be no longer than the last day of classes of the semester following the semester in which the incomplete was given. See below for additional information on extenuating circumstances.

Process and Deadline for Students in Good Academic Standing
A request for an Incomplete grade must be initiated by the student no later than the last day of classes via the Incomplete Grade Contract available in SIS. Students are expected to consult with the instructor before submitting the Incomplete Grade Contract. Incomplete grades will be treated as failures when evaluating academic standing.

Upon receipt of a student's Incomplete Grade Contract form, the instructor may approve or deny the request, at their discretion.

Instructors are required to submit the new grade to the Office of the Homewood Registrar no later than 45 calendar days after the last day of classes. If the Incomplete grade is not resolved within 45 calendar days after the last day of classes, the Incomplete grade is automatically converted to the reversion grade.

Process and Deadline for Students on Academic Probation
Students on academic probation may initiate an Incomplete Grade Contract in SIS as described above. For students who are on academic probation, Incomplete grades will be treated as failures when evaluating academic standing. For students on academic probation who have a conversation with their academic advising office prior to initiating the Incomplete Grade Contract, the academic standing decision will be finalized after the 45-day calendar day deadline.

Instructors are required to submit the new grade to the Office of the Homewood Registrar no later than 45 calendar days after the last day of classes. If the Incomplete grade is not resolved within 45 calendar days after the last day of classes, the Incomplete grade is automatically converted to the reversion grade.

Process and Deadline for Graduating Students
Students with incomplete grades in required courses at the date of degree conferral will not graduate.

Students with incomplete grades in courses that are not required for degree completion may still graduate. However, the deadline for completion is abbreviated; students must resolve incomplete grades within 30 days of degree conferral when the University closes the undergraduate record. If the work is not finished by the deadline, the reversion grade will be recorded. For the specific deadline relevant to each degree conferral, please consult with advising or the Office of the Homewood Registrar. For more details on incomplete grades and graduation, see Graduation Policies.

Guidelines for Students Regarding Extenuating Circumstances for Requesting an Extension of the Incomplete Grade Deadline

Extenuating circumstances are those circumstance that cause exceptional interference with academic performance, and which are over and above the normal difficulties experienced in life.

Policy on Changing a Grade

Once an instructor has submitted a grade to the Homewood Registrar, grade changes can be made only in the case of error in grading, calculation, or transcription. Students with questions about grading should contact the faculty instructor who has sole authority to assess and assign course grades. If the instructor determines a change is warranted because of error, the change must be submitted to the Homewood Registrar's Office by the end of the subsequent semester. Grade changes for graduating seniors must be submitted by the close of the undergraduate record.

Retaking a Course

Policies about retaking a course are located under registration policies.

First-Year Language Courses: Information about Credit and Grades

Policies about first-year language course are located under registration policies.

Dean's List

Undergraduate students enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences and the Whiting School of Engineering who earn a term grade point average of 3.50 or above in a program of at least 14 credits with at least 12 graded credits will be placed on the Dean's List for academic excellence. Students with the SDS accommodation to be on a reduced course load and are opting to use that accommodation can earn Dean's List if they earned a 3.5 or better in 8-11 credits of which at least 7 are completed with a letter grade. An appropriate notation is made on the student's academic record. The academic advising offices of both schools email Dean's List notification letters to students. The Engineering Advising Office also sends letters to parents/guardians. By request, the University will place notification in your hometown newspaper, should you elect to follow the directions provided with the letter.

Class Rank

The University does not calculate class rank and therefore, cannot provide this information to students or outside parties.

Transcripts

Information about ordering transcripts is available on the Homewood Registrar's website (https://studentaffairs.jhu.edu/registrar/students/transcripts/). Partial transcripts of a student's record will not be issued.

Class Attendance and Absences

Although there are no university regulations concerning attendance, students are expected to attend all courses regularly. When students have missed classes, they should consult with their instructors and/or teaching assistants to explain the reasons for their absence, and to stay on track in the course. Instructors are encouraged to establish their own policies regarding attendance, and it is the student's responsibility to know those policies.

In certain courses regular attendance is given special importance. These may include foreign language courses, as well as introductory courses in Writing Seminars. Instructors in these courses may lower a student's grade for unexcused absences.

If a student is absent from classes over a period of several days without explanation, instructors are encouraged to inform the student's respective academic advising office. In some cases, withdrawing from a course may be considered; however, the student must withdraw from a course before the end of the eleventh week of the semester, and still remain in at least 12 credits.

Absence From Class Due to Illness

The Student Health and Wellness Center (SHWC) does not provide excuses for students who miss individual classes, including required attendance classes or labs. For students who are seen at the SHWC for a serious or extended illness that causes them to miss a number of classes over several days and/or to miss major academic assignments (mid-terms examinations, major presentations), the SHWC will provide verification of the visit to the student directly, and alert the Office of the Dean of Student Life. Verification will not be provided retroactively. It is the student's responsibility to forward the verification to any professors/instructors who request it. For more information, also see this website (https://studentaffairs.jhu.edu/student-life/student-outreach-support/absences-from-class/).

Since the absence from a final examination is excused only for the most serious of circumstances, the SHWC will provide verification of the visit for those students who are seen at the SHWC for treatment at the time of their illness only.

Students should be guided by the following:

1. Ask instructors about expectations for class attendance and what procedures they will follow for students who miss class or assignments. Such policies are determined by each instructor and will differ from course to course.
2. In the event of a missed class or inability to complete course work due to illness, contact the instructor to make necessary arrangements to make up any work.
3. Notify the professor promptly by email. This should be done before the missed class unless it is not possible to do so (for example, if hospitalized or incapacitated). In cases where prior notification is not possible, notify the professor as soon as possible.
4. Misrepresenting personal circumstances to a faculty member, SHWC staff, or any university official constitutes academic dishonesty and is grounds for action by the Academic Ethics Board.

Absence for Religious Holidays

Religious holidays are valid reasons to be excused from class. Students who must miss a class or an examination because of a religious holiday must inform the instructor as early in the semester as possible in order to be excused from class or to make up any work that is missed.

Approved Absences

The university encourages students to participate in varsity athletics and other significant extracurricular activities. Students who must miss a class or an examination because of participation in a scheduled in-season varsity athletic event must notify the course instructor as early in the semester as possible. Approved absences are granted at the discretion of the course instructor. When students must miss a scheduled examination, several solutions have been found by instructors. Students have been permitted to take an examination before leaving for the event, or have had an approved proctor for examinations taken during the athletic event at approximately the same time as the other students in the course. Students have also been allowed to take the examination, or an alternative examination, upon their return from the athletic event.

Academic Standing Policies

New Terminology for Select Academic Actions

Effective with academic review at the end of the Fall 2021 semester, KSAS and WSE have adopted new terminology applicable to all undergraduates. We have introduced the term "academic suspension," and the term "academic dismissal" is now reserved for the third and final failure of a student to return to good academic standing.

Good Academic Standing

Students who maintain a minimum of 12 credits earned and a term GPA of at least 2.0 each semester are considered in good academic standing. In the rare circumstance that a student is given permission prior to the start of the semester to be enrolled in less than 12 credits, that student must complete 100% of the enrolled credits with a term GPA of at least 2.0 to remain in good standing.

Reviewing Academic Standing

Each academic advising office reviews student records at the end of fall and spring semesters to monitor academic standing. Based on this review, students may be placed on academic probation, academically suspended, or academically dismissed.

Satisfactory Academic Progress

Satisfactory Academic Progress (SAP) refers to minimal standards for grades and cumulative credits required to receive financial aid. The SAP policy is available at https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/.

Academic Probation

At the end of each fall and spring semester, the academic advising offices review the records of all undergraduate students to evaluate the academic standing of each student. Students who earn less than 12 credits or earn a term GPA below 2.0 are placed on academic probation. A letter informing a student of this status and the terms of academic probation are sent to the student in January (for fall performance) or June (for spring performance).

The terms of academic probation are as follows: Students must complete at least 12 credits with a minimum term GPA of 2.0 in the next enrolled fall or spring semester. Students may also be required to achieve a cumulative GPA of 2.0 or above in order to be removed from academic probation. In making the GPA calculation, incomplete grades (I) may be calculated as failures (F). In addition, any grade in a satisfactory/unsatisfactory course may be taken into consideration.

Students who do not meet the terms of academic probation will be academically suspended or academically dismissed. In some circumstances, a student may be continued on academic probation instead of being academically suspended or academically dismissed. A student whose term GPA falls below 1.0 or earns less than 6 credits may be academically suspended without having been on academic probation the previous semester.

The advising offices send written notification to students who are placed on academic probation. Incomplete or missing grades may prevent timely notification. Students with a term grade point average below 2.0 or who earned less than 12 credits should consult with an academic advisor about their academic standing, even if they have not received the letter from their advising office.

Students on academic probation may be restricted from registering for the maximum course load. Engineering students on academic probation are permitted a maximum of 14 credits during the probation semester. Students on academic probation are not precluded by the university from continued participation in co-curricular activities or from representing the university in institution-sanctioned activities (including varsity athletics) while on academic probation.

A student's academic performance during the summer term or intersession will not affect their academic standing.

Academic Suspension

A student on academic probation who has not met the terms of probation will be subject to academic suspension from the university for a minimum of one semester and a summer. A student whose term GPA falls below 1.0 or earns less than 6 credits may be academically suspended without having been on academic probation the previous semester.

Students may direct inquiries about the academic suspension process to the Academic Review Committee of their respective advising office. Students who intend to return to the university in a future semester are encouraged to work with their academic advisor to develop a plan for their time away.

When a student is academically suspended from the university, the:

- Office of the Homewood Registrar cancels the student's registration for the next semester, and in accordance with policy authorizes a refund of tuition paid for that semester;
- Office of Student Financial Services suspends financial aid and work-study aid to the student;
- Community Living Office cancels the student's housing contract if the student is in university housing; and,
- Office of International Services performs duties as required by U.S. federal regulations regarding persons not eligible to study at the university.

Reinstatement after Academic Suspension

The terms for reinstating a student who has been academically suspended are established by the Academic Review Committee of their respective advising office.

Students are reinstated on academic probation and must meet those terms in their returning semester or face academic suspension again or academic dismissal.

Students who receive prior approval to complete courses at another college or university during the period of academic suspension are subject to the university's 12-credit limit on the number of transfer credits that can be applied toward graduation.

Reinstatement Requests

To apply for reinstatement, an academically suspended student must submit a written request to their respective advising office. The request should include an analysis of what went wrong during the preceding two semesters of enrollment, a description of activities while not in attendance, and an academic plan for completing all degree requirements. Supplemental materials such as transcripts of courses taken elsewhere, letters of reference from work or volunteer supervisor, and/or letters of support from a mental/physical health care provider may be required. Students are encouraged to contact their academic advisor prior to submitting a written request for reinstatement. Engineering students should use the reinstatement form provided to them at the time of their academic suspension.

Reinstatement and Financial Aid

Academic suspension and financial aid suspension are two distinct actions and must be addressed separately. The Financial Aid Satisfactory Academic Progress (SAP) appeal process can be found online (https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/). This appeal is in addition to the request for reinstatement to your advising office.

Subsequent Academic Suspension

A student who is academically suspended a second time will be required to separate from the university for a minimum of one year.

Academic Dismissal

A student who has been reinstated following a second academic suspension returns to the university on academic probation. Failure to meet the terms of academic probation that semester will result in academic dismissal from the university. Academic dismissal is permanent. Students will not be permitted to apply for reinstatement.

Eligibility for Financial Aid

Degree-seeking students who are eligible to register are also eligible to apply for financial aid. Only U.S. citizens and eligible non-citizens (e.g., permanent residents) are eligible for Federal Title IV financial aid.

Students should be aware that JHU scholarship and grant funds are awarded for a maximum of eight semesters. Under some circumstances, a ninth semester may be awarded on appeal. Federal and state aid may be available for additional semesters.

Satisfactory Academic Progress

Satisfactory Academic Progress (SAP) refers to minimum standards for grades and cumulative credits required to receive financial aid. The SAP policy is available at https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/.

External Credit Policies

It is expected that the majority of credits applied towards degree requirements are earned by completion of courses taught at Johns Hopkins University by our faculty. We do recognize that some students may have other sources of college-level credit that could be applicable to some requirements. This section explains the conditions and restrictions regarding credits earned outside of JHU.

Full details about the application of external credits towards degree requirements can be found at KSAS Requirements for a Bachelor's Degree (p. 1587), and KSAS Residency Requirement (p. 1588), or WSE Requirements for a Bachelor's Degree (p. 1086), and WSE Residency Requirement (p. 1087).

Exam Credit

The information below describes the requirements for students entering JHU in Fall 2022 and after. Students who entered JHU prior to Fall 2022 should view the appropriate archived catalogue (http://e-catalog.jhu.edu/archive/).

If a student enters the university with credit from an exam and then earns credit for an equivalent course at the university, the credits from the exam (and lab course waiver, if applicable) will be disallowed. The credits and grade for the Hopkins course will appear on the academic record. The exam title remains on the record, but the credit value is converted to zero.

To receive credit based on an external exam program, examinations must be taken no later than the year the student is admitted to the university.

Advanced Placement Exams

If a student enters the university with credit from an Advanced Placement Exam and then earns credit for an equivalent course at the university, the credits from advanced placement (and lab course waiver, if applicable) will be disallowed. The credits and grade for the Hopkins course will appear on the academic record. The Advanced Placement Exam title also remains on the record, but the credit value is converted to zero. This policy also applies to IB credit, GCE credit, and credit from foreign exams.

AP Exam	JHU Course	Score	Credit
Biology	AS.020.151 & AS.020.152[1]	5	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105-AS.030.106[2]	5	8
Chemistry	AS.030.101 and lab AS.030.105[2]	4	4
Environmental Science	TR.270.100	4 or 5	4
Computer Science A	EN.500.112[3]	5	3
Macroeconomics	AS.180.101[4]	5	3
Microeconomics	AS.180.102[5]	5	3
Calculus AB	AS.110.108[6]	5	4
Calculus BC	AS.110.108[6]	3 or 4	4
Calculus BC	AS.110.108 and AS.110.109[6]	5	8
Physics C Mechanics	AS.171.101[7]	4 or 5	4
Physics C Electricity and Magnetism	AS.171.102[7]	4 or 5	4
Statistics	EN.553.111	4 or 5	4

1. Biology: Students who are awarded credit for AP Biology are exempt from taking the corresponding lab courses (AS.020.153 General Biology Laboratory I-AS.020.154 General Biology Lab II). The lab courses are waived but no credit is awarded. Students who have credit for AP Biology who earn credit for AS.020.151 General Biology I and/or AS.020.153 General Biology Laboratory I will lose the three credits for AS.020.151 General Biology I. Students who have credit for AP Biology who earn credit for AS.020.152 General Biology II and/or AS.020.154 General Biology Lab II will lose the three credits for AS.020.152 General Biology II.
2. Chemistry: Students who have credit for AP Chemistry and earn credit by taking an introductory chemistry lecture and/or lab at Hopkins will lose all four AP exam credits for the corresponding introductory chemistry lecture/lab combination. Effective fall 2014, students with a score of 4 on the AP Chemistry exam and therefore, have exam credits for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I may not take AS.030.102 Introductory Chemistry II/AS.030.106 Introductory Chemistry Laboratory II without taking AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I at JHU (forfeiting four AP credits). Students with a score of 4 should take AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab in order to complete the introductory chemistry requirements to retain AP credits. Students with a score of 4 who earn credit for AS.030.101 Introductory Chemistry I and AS.030.105

Introductory Chemistry Laboratory I by taking the course will forfeit their AP credits. Students with a score of 5 and therefore have credits for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I and AS.030.102 Introductory Chemistry II/AS.030.106 Introductory Chemistry Laboratory II who earn credit for AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab will lose four AP credits for AS.030.102 Introductory Chemistry II and AS.030.106 Introductory Chemistry Laboratory II. Students who earn credit for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I will forfeit all 8 AP credits.

3 Computer Science: The applicability of AP Computer Science exam credits to the computer programming requirement of a particular major is determined by the academic department responsible for that major. Students may receive credit for either the AP Computer Science A exam or one of the Gateway Computing courses (EN.500.112 Gateway Computing: JAVA, EN.500.113 Gateway Computing: Python, EN.500.114 Gateway Computing: Matlab). Students who have AP Computer Science A credits and earn credit for one of the Gateway Computing courses will lose the three AP Computer Science A exam credits.

4 Macroeconomics: Students who score a 5 on the Macro AP exam are placed out of AS.180.101 Elements of Macroeconomics and receive University credit. However, it does not count as one of the ten courses required for the economics major (or one of the six courses required for the economics minor).

5 Microeconomics: Students who score a 5 on the Micro AP exam, AND who pass a diagnostic test administered by the Economics Department will place out of AS.180.102 Elements of Microeconomics and receive University credit for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor).

6 Calculus: Students may receive credit for Calculus I via only one exam. Students who have AP Calculus I credits who earn credit for AS.110.106 Calculus I (Biology and Social Sciences) will lose four AP credits for AS.110.108 Calculus I (Physical Sciences & Engineering). Students who have AP Calculus II credits who earn credit for AS.110.107 Calculus II (For Biological and Social Science) or AS.110.113 Honors Single Variable Calculus will lose four AP credits for AS.110.109 Calculus II (For Physical Sciences and Engineering).

7 Physics: Students who are awarded credit for AP Physics are exempt from taking the corresponding lab courses (AS.173.111 General Physics Laboratory I and AS.173.112 General Physics Laboratory II). The lab courses are waived but no credit is awarded. Students who have credit for AP Physics who earn credit for AS.171.101 General Physics: Physical Science Major I or AS.171.103 General Physics I for Biological Science Majors or AS.171.107 General Physics for Physical Sciences Majors (AL) will lose four credits for AS.171.101 General Physics: Physical Science Major I. Students who have credit for AP Physics who earn credit for AS.171.102 General Physics: Physical Science Major II or AS.171.104 General Physics/Biology Majors II or AS.171.108 General Physics for Physical Science Majors (AL) will lose four credits for AS.171.102 General Physics: Physical Science Major II. Students who have AP Physics - Mechanics C credit who earn credit for EN.530.123 Introduction to Mechanics I will lose four credits for AS.171.101 General Physics: Physical Science Major I. Students who earn credit for AS.171.105 Classical Mechanics I or AS.171.106 Electricity and Magnetism I may retain their AP Physics credits.

Higher Level International Baccalaureate Courses

The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to IB exam credits.

Subject	JHU Course	Score	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	6 or 7	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	6 or 7	8
Computer Science	TR.601.100	6 or 7	3
Economics	AS.180.101 (Macroeconomics [1]	7	3
Math	AS.110.108 [2]	6 or 7	4
Physics	AS.171.101 (lab AS.173.111 waived with no credit)	6	4
Physics	AS.171.101 & AS.171.102 (labs AS.173.111 & AS.173.112 waived with no credit)	7	8

1 Students will automatically receive three credits for AS.180.101. Students who score a 7 on the Economics IB exam AND who pass a diagnostic test administered by the Economics Department will place out of AS.180.102 Elements of Microeconomics and receive three credits for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor). Interested students should speak to the Director of Undergraduate Studies in the Economics Department for more information.

2 Either IB math HL course, Mathematics: Analysis and Approaches and Mathematics: Applications and Interpretation, will garner credit as described in the chart.

Foreign Certificate Exams

Credit is awarded for some foreign certificate exams as described below. Additional foreign certificate programs, like the German Abitur, may be considered on a case-by-case basis. The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to foreign exam credits.

General Certificate of Education (A-Levels)

Only Advanced A-Levels are awarded credits. AS and O level exams are not eligible for credit. The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to foreign exam credits.

Subject	JHU Course	Grade	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	A or B	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	A or B	8
Economics	AS.180.101 (Macroeconomics)	A *	3
Mathematics	AS.110.108 & AS.110.109	A or B	8
Physics	AS.171.101 (lab AS.173.111 waived with no credit)	B	4
Physics	AS.171.101 & AS.171.103 (labs AS.173.111 & AS.173.112 waived with no credit)	A	8

* Students will automatically receive 3 credits for AS.180.101. Students who receive a grade of A and who pass diagnostic test administrated by the Economics Department will place out of AS.180.102 and receive 3 credits for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor). Interested students should speak to the Director of Undergraduate Studies in the Economics Department for more information.

French Baccalaureate

Credits may be awarded for subjects such as biology, chemistry, math, and physics upon review by the appropriate department. Due to exam revisions beginning in fall 2019, scoring requirements and course equivalencies are not currently available.

Caribbean Advanced Placement Exam

At this time, no scoring or course equivalencies are known for CAPE mathematics options. In Fall 2018, the Physics exam was deemed to be algebra-based and not eligible for credit.

Subject	JHU Course	Grade	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	A or B	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	A or B	8

Exam Credits for Foreign Language

The Modern Languages and Literatures Department does not award any credit for Spanish based on AP/IB exams or other foreign certificate exams.

French, German, and Italian will grant six credits for AP scores of 4 or 5 (IB Exams for 6 or 7) only after a student successfully completes two courses in that same language sequence at the intermediate level or higher. It may be possible to earn credits for French or German from the French Baccalaureate or other additional foreign certificate exams, but scoring requirements and course equivalencies are not currently available. Additional information is available under KSAS Registration Restrictions (p. 1596) and WSE Registration Restrictions.

JHU Placement Exams

Some departments may offer placement exams or other evaluations that allow a student to bypass lower-level content in that department, most commonly mathematics and foreign language. No credit is awarded for these departmental exams or evaluations as they are for placement purposes only. In some cases, a waiver of the bypassed course(s) may be noted on the student's academic record. No academic credit is awarded when a course is waived. Students should contact their respective academic advising office for additional information.

The following content is included on this page:

Transfer Credit Limits

Students Admitted Directly from High School

Students who enter the university from high school may transfer up to 12 credits from approved courses taken at other institutions, whether taken before or after matriculation. The 12-credit limit on transfer credits does not include credit from Hopkins summer courses, Advanced Placement examinations, British General Certificate of Education courses, International Baccalaureate courses, or foreign certificate courses.

Students Admitted as Transfer Students

Students who enter the university as transfer students into the Krieger School of Arts and Sciences may transfer up to 60 credits towards a degree requiring 120 credits. Students earning degrees requiring more than 120 credits in both KSAS and WSE may bring in more than 60 credits; however at least 60 of the total JHU degree credits must be earned in residence as a full-time student at JHU. See the Requirements for a Bachelors' Degree in the KSAS (p. 1587) and WSE (p. 1086) sections of the catalog for additional residency requirements. All transfer students may transfer up to an additional 12 credits after matriculation.

The 12-credit limit on transfer credits does not include credit from Hopkins summer courses, Advanced Placement examinations, British General Certificate of Education courses, International Baccalaureate courses, or foreign certificate courses.

Transfer Credit Rules

The following rules apply to both online courses and courses taken in a traditional classroom setting.

To be eligible for transfer credit, an approved course must be taken for a grade at an approved college and completed with a grade of C or better. In the United States, an approved institution is a 2-year or 4-year college or university that is accredited by one of the following regional accrediting agencies:

- Middle States Commission on Higher Education
- New England Association of Schools and Colleges, Commission on Institution of Higher Education
- North Central Association of Colleges and Schools, The Higher Learning Commission
- Northwest Commission on Colleges and Universities
- Southern Association of Colleges and Schools, Commission on Colleges
- Western Association of Schools and Colleges, Accrediting Commission for Community and Junior Colleges
- Western Association of Schools and Colleges, Accrediting Commission for Senior Colleges and Universities

Transfer credits from non-US academic institutions must be approved on a case-by-case basis by the academic advising offices in the respective schools. Non-US academic institutions must be degree-granting and recognized and authorized to issue academic records by the appropriate national (or regional) bodies in their home countries.

How the Number of Semester Credits is Determined

For courses offered in semester credits at the host institution, courses will be awarded the same number of semester credits at JHU. For example, if a Calculus I course is offered for 5 semester credits at another institution, it will be transferred to JHU as 5 credits, even though our parallel course is a 4-credit course.

Credit for courses earned at a school using the quarter system will be converted to a comparable number of semester credits. One quarter credit is equivalent to 2/3 of a semester credit.

Other unit systems will be convert to semester credits based on the transcript key provided by the host institution. If a key is not available, credits are evaluated such that one year of full-time coursework at the other school is considered proportional to one year of full-time coursework at JHU.

How Transfer Credits are Posted on a JHU Transcript

The following information is included for each course transferred to JHU:

- name of institution where course was taken
- course title
- JHU course equivalent (if any)
- credits awarded

The grades earned in these courses do not appear on the Hopkins record and therefore do not contribute to the grade point average.

How Transfer Credits are Used Towards a JHU Degree

Courses awarded a direct equivalency to a JHU course will be applied towards any major or minor requirement fulfilled by that equivalent course.

Courses not given a direct equivalency but that are assigned an area designator will apply toward the relevant distribution requirement.

Courses not given a direct equivalency may apply towards major or minor requirements at the discretion of the Director of Undergraduate Studies for the program. They may serve as general electives and credit towards the degree.

Restriction on Courses Taken Without a Letter or Numerical Grade

Ungraded or pass/fail courses taken at another institution prior to matriculation at JHU, if approved, may receive credit if the host school states in writing that the mark represents a grade of C or better.

Restriction on Transferring Duplicate Content

A transfer course will not be approved when the course content has significant overlap with other courses the student has already completed. Likewise, transfer students may not take courses at JHU with significant overlap with prior course content. In cases where a department requires a student to do this, the transfer credit will be zeroed out on the transcript.

Entering Freshman with More than Twelve Transferable Credits

Some students enter the university from high school with additional college course work beyond the 12 credits that may be transferred. If these additional courses are equivalent to subjects that the university accepts for credit by Advanced Placement exams, and if the courses are needed to complete requirements for a major or are prerequisites for higher level courses that the student will take at JHU, then students may request that the department waive the comparable courses at JHU. Waivers do not carry semester credits. Students must contact their respective academic advising office for detailed information about how to obtain a waiver.

Credits Earned at JHU Prior to Matriculation, Including the JHU Pre-College Summer Program

A student who takes JHU courses prior to matriculation as a degree-seeking student may receive credit for those courses completed with grades of C or better, but the grades are not included in the undergraduate record. Because these courses were taken at JHU, they are not subject to the 12-credit transfer rule. Credits earned through this program may be applied to the 100-credit JHU residency requirement (applicable to freshmen matriculating fall 2014 and later). Independent Academic Work (research, study, internship) completed prior to matriculation is not eligible, and will not be reflected on the undergraduate record.

Credits Earned at Other JHU Schools in the Summer

Details about policies related to credits earned at other JHU schools during the summer for KSAS students (p. 1598).

Details about policies related to credits earned at other JHU schools during the summer for WSE students (p. 1096).

Credits Earned Through Study Abroad

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered “in-residence” and may be included in the 100-credit JHU residency requirement. A student may be awarded a full-year of credit from Hopkins Departmental Programs courses, or up to 30 credits from study abroad courses taken through Hopkins Approved Programs toward their undergraduate degree. Students who earn more than 30 credits in Hopkins Departmental

Programs may apply these additional credits towards the standard 12 credit transfer credit limit with a 42-credit transfer credit maximum from all study abroad and domestic courses combined. Students will be held to the same course load guidelines that apply to course loads and credit overloads in the full-time undergraduate programs in Arts and Sciences and Engineering.

Students may enroll in a combination of semester and/or summer/intersession abroad programs, but students may not enroll in three consecutive fall/spring semesters abroad.

Transfer of Credits from International Institutions without Pre-Approval
Students who pursue coursework at an international institution without pre-approval may request these credits be transferred after completion. However, these credits will be reviewed and, if acceptable, will be processed as transfer credits, not study abroad credits. Therefore, these credits are subject to the 12 credit transfer maximum.

Deferred Admission
Students who have been accepted to the university may defer admission for up to two years with approval from the director of undergraduate admissions. Freshmen who have deferred admission begin their studies in the fall semester. The purpose of a deferral is to allow students to take time off in order to travel, work, or experience another culture. Deferrals are not granted for the purpose of studying at another institution. Students who wish to pursue academic studies during the deferment period may do so; however, the credits earned during the deferment period will not be applied toward the university's degree requirements.

Special Note for Students on Disciplinary Suspension from Hopkins
While serving a disciplinary suspension, academic work completed at another institution will not be recognized for credit transfer to JHU.

Registering for Courses at Other Colleges and Universities After Matriculation

Students are required to seek pre-approval to transfer credits from courses completed at other institutions. A form for this purpose is available in the advising offices. Directions regarding appropriate signatures and required supplemental materials (typically a detailed course description and/or a course syllabus) are on the form. Courses must be taken for a letter grade and a grade of C or better is required.

In order to transfer credit for previously-approved summer work done elsewhere, students must arrange for an official transcript to be sent to the Office of the Registrar.

International students seeking to take summer courses in their home country must complete International Travel Registration with the Office of Study Abroad prior to submitting pre-approval requests to transfer courses.

Courses at Colleges and Universities in the Baltimore Student Exchange Program (BSEP)
BSEP does not operate during the summer session, therefore courses taken at these institutions during the summer are considered transfer credit and are subject to the same rules and limits as courses from other colleges and universities.

Details about BSEP for KSAS students (p. 1598).

Details about BSEP for WSE students (p. 1096).

Concurrent Registration at JHU and Another Institution
Students may take courses at another institution when registered at JHU and have these courses transfer to JHU only if permission is granted before registering for the courses at another institution. During the fall and spring semesters, students must be registered at JHU for a minimum of 12 credits and the addition of courses at another institution may not exceed our maximum credit limit for the term. During summer term, the total credits across institutions may not exceed the 14 credit maximum. During intersession term, the total credits across institutions may not exceed the 3 credit maximum.

Policies Unique to Students Admitted to JHU as Transfer Students

- Transfer students who completed Advanced Placement or other exams during high school are subject to the same policies as students admitted directly from high school as of the term they matriculate at JHU. We do not transfer exam credits directly from another college or university transcript.
- Students who transfer from the Peabody Conservatory will be granted full credit for performance courses in their major instrument. For performance courses in other instruments, only one credit per semester will be awarded.

Description of Transferable Credit

In order to be transferable, a course does not have to match a currently existing JHU course; however, courses should cover topics that are broadly defined as part of the curriculum at Hopkins. For example, we do not regularly teach a course about horror films. However, since this is a film studies course and we have a major in film and media studies, it's likely that this course would be eligible for transfer. A course can be transferred as either:

1. a direct equivalent to one of our courses, or
2. a generic course affiliated with a field of study.

A course with an identical name at another institution may not transfer as directly equivalent to the course with the same title at JHU.

A maximum of 6 credits may be granted for courses which are in curriculum areas not covered by the fields of study in the School of Arts and Sciences and the School of Engineering.

Additional Details About Course Eligibility for Transfer

- Section One (p. 1107): Common courses not accepted for transfer credit
- Section Two (p. 1108): Common courses with restrictions for transfer credit
- Section Three: (p. 1109) Non-domestic studies
- Section Four (p. 1109): Transferring writing-intensive courses

Section One: Common Courses that will not be Accepted for Transfer Credit
Physical Education or Personal Health and Wellness
Physical Education or Personal Health and Wellness Courses are not accepted.

- However, a maximum of 6 credits in the fields of nutrition, dietetics, or kinesiology may be considered if these courses were part of a curriculum leading to a college degree in the subject.

Study Skills or Career Development
Study Skills or Career Development Courses are not accepted.

- However, courses that are in-depth studies of career paths within a field of study may be considered. Psychology courses in career counseling or learning theory may be accepted.

Math Courses Below the Pre-Calculus Level
Math Courses Below the Pre-Calculus Level are not accepted.

- However, we do accept most introductory statistics courses. We will accept one course designed to review all necessary background for the study of calculus and to introduce the concept of the rate of change of a function.

Theology
Theology Courses are not accepted.

- However, we will consider comparative religion courses or other religion courses that study religion from an academic viewpoint.

Developmental English, English Grammar, or English as a Second Language
Developmental English, English Grammar, or English as a Second Language Courses are not accepted.

- However, we do typically transfer "freshman composition" courses.

Independent Study, Research, or Internship Credits
Independent Study, Research, or Internship Credits are not accepted

- However, hybrid courses that include lectures and graded assignments along with practical experiences are reviewed individually.

Trade Skill
Trade Skill Courses are not accepted.

- Trade skills courses are defined as being part of an educational program leading to a specific trade such as (but not limited to) automotive repair, culinary arts, day care provider, or airplane pilot.

Computer Software
Computer Software Courses are not accepted.

- However, courses that teach some use of software, Internet design and security, basic programming in html or Java, computer aided-design or introduce field-specific software programs may be considered.

Section Two: Common Courses with Restrictions for Transfer Credit
Chemistry
General Chemistry courses intended to serve as a one year sequence for students in the sciences are transferrable. However, because of the variability of these courses, it is often not possible to transfer just one semester of two-semester sequences (or one or two quarters). Syllabi review is required to transfer these courses. Rudimentary introductory chemistry courses intended to prepare students for a year of general chemistry are not transferrable. One-semester chemistry courses intended for non-science majors designed to fulfill general education requirements for non-science student may transfer.

Organic Chemistry Lab
JHU offers a one-semester, three-credit course (AS.030.225 Introductory Organic Chemistry Laboratory or AS.030.227 Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques) that is recognized by medical schools as being equivalent to other institutions' typical year-long introductory organic lab courses that are frequently 1 credit each. To transfer these lab courses from other institutions, students must take both semesters at the other institution, as one semester alone is not transferable. If the course lecture and lab are taught as a single course unit at the other institution, students must take the full year-long sequence of the course lecture and lab in order to transfer the courses to JHU. Our course AS.030.228 Intermediate Organic Chemistry Laboratory is an intermediate level organic chemistry laboratory course intended for only chemistry majors and typically goes beyond other institutions' expectations of students from introductory organic chemistry lab.

Physics
General physics courses, typically covering the topics of mechanics, heat, sound, electricity and magnetism, optics, and modern physics intended to serve as one year of physics study for students in the sciences, may be transferred if the course was taught using the principles of calculus. Those courses that do not require calculus knowledge will not transfer. Rudimentary introductory physics courses intended to prepare students for a year of general physics will not transfer. Introductory one-semester physics or astronomy courses intended for non-science majors, for example those offered to help students fulfill general education requirements, may be transferred.

Finance
We accept transfer credits for corporate finance courses that may include, but are not limited to, understanding the design and functioning of financial markets or modeling financial forecasting and decision making. We do not transfer credit for personal finance courses designed to teach the individual consumer about topics such as money management, budgeting, home mortgages, personal tax, individual insurance, or investing.

Graphic Design
In order to be considered for transfer, graphic design courses must be taught as part of the required curriculum for a major leading to a degree at the offering institution and the course content must include design theory and practices. These carry no area designation. Courses that focus solely on software usage will not transfer.

Website Design
In order to be considered for transfer, website design courses must be taught as part of the required curriculum for a major leading to a degree at the offering institution and the course content must include some programming components. Courses that solely focus on usage of productivity software such as word processing, spreadsheet, presentation, database, graphics editing, accounting, statistical processing, or webpage creation will not transfer.

Internet/Social Media
Marketing courses that discuss the effective use of social media concepts and tools, search engine optimization (SEO) or other analytical market analysis techniques, and content creation and management strategies for marketing campaigns will be considered. However, courses teaching effective use of the internet for personal research or educating the lay person about its structural design or usage of social media will not transfer.

Medical Terminology
In order to transfer a course teaching medical terminology, the course must have:

1. an emphasis on etymology from Latin and Greek (as opposed to just learning word parts per se; i.e. the course has to have some direct and explicit treatment of the ancient languages) and

2. a significant historical/cultural component, involving study of the history of medicine (including at least some ancient material).

American Sign Language
If offered for degree credit at the host institution, courses in American Sign Language may transfer. It is at the discretion of a department if the language may be used to fulfill the foreign language requirements of a major or minor.

College/University Orientation
Credit-bearing courses designed to promote student success may be considered for transfer. Courses should include topics such as: learning strategies, study techniques, career readiness, academic planning, and how to engage in the academic/campus community. Courses focused only on campus-specific topics will not transfer.

Section Three: Non-Domestic Studies
For Those Attending Programs Leading to the Medical Profession
In several countries around the world, students enter higher education programs that lead to a medical degree without the completion of the United States equivalent to a bachelor's degree. We do not transfer credits from these types of programs.

US Citizens Who Studied Abroad Prior to Acceptance as a Transfer Student to JHU
Like our international students who studied internationally before transferring to Johns Hopkins, courses taken abroad by US citizens either through study abroad programs or direct matriculation at international institutions will be processed as transfer credits, not as study abroad credits. A transcript from the originating institution will be required.

Composition Courses not Taught in English
Courses taught in a language other than English that mimic the typical "freshman composition" or "expository writing" courses found in the United States will transfer. These courses will be reviewed for transfer credit as potential courses in our English Department (home of our Expository Writing Program), not as foreign language courses. They may not be used to meet the JHU writing-intensive requirement.

Current JHU Students Studying Internationally in Their Home Country
Study Abroad eligibility restrictions during the academic year for KSAS students (p. 1611).

Study Abroad eligibility restrictions during the academic year for WSE students (p. 1109).

During the summer, courses may be taken in a student's home country or country of citizenship. Students follow the procedures for pre-approval of transfer credits. Such courses are subject to the 12-credit transfer rule.

Courses Unique to China
We do not transfer three commonly required courses: Introduction to Mao Zedong Thoughts, Ideological and Moral Cultivation and Fundamentals of Law, and Principles of Marxism.

Transferring of Writing-Intensive Credits

Section Four: Details About Transferring Writing-Intensive Credit
Students may transfer up to 6 credits of writing-intensive credit for a course(s) under these conditions:

1. The course must meet University criteria (http://krieger.jhu.edu/ewp/writing-requirement/) for a writing intensive course.
2. Students must take the course during the regular academic year, in either fall or spring semester (there is no writing-intensive transfer credit for summer courses).
3. Students must have a grade of B or higher in the course.
4. First-year KSAS students cannot be exempted from the Reintroduction to Writing course based on the transfer of another writing course. KSAS transfer students may have a transfer course evaluated to serve as a substitution for the Reintroduction to Writing course.

Review of transfer and study abroad courses for writing intensive credit is conducted by the University Writing Program and student should reach out to uwp@jhu.edu for directions.

Study Abroad Policies

The Johns Hopkins University views international education as an integral component of its academic mission. Not only does the university actively encourage enrollment of a diverse international and multicultural student body, but it strives to provide students with educational opportunities throughout the world. More than 33% of Johns Hopkins undergraduates study abroad.

For undergraduates in the Krieger School of Arts and Sciences and the Whiting School of Engineering, Johns Hopkins University offers a wide variety of international opportunities including departmentally sponsored intersession and summer programs, semester-based programs, and full-year programs at major universities in Europe, Africa, Latin America, Asia, Oceania, and the Middle East.

JHU accepts credit for coursework taken abroad toward major and minor requirements, as well as toward general graduation requirements. The vast majority of students who study abroad graduate on time. What is more, upon successful completion of a program abroad, students may choose to build upon their international experience in graduate or professional school. The advisors in Pre-Professional Advising and the Life Design Lab work with students to maximize the benefits of a program abroad.

Visit https://studyabroad.jhu.edu/ or call (410) 516-8400 for more information.

Study Abroad Programs

Hopkins offers students two options for study abroad: departmental programs and approved external programs. Some programs managed by Hopkins and most programs managed by third-party providers offer the highest level of on-site support. Exchange programs and direct enrollment programs at foreign universities are well suited to more independent students who have prior experience living abroad. We encourage students to consider their personal background and comfort levels when choosing a study abroad option.

Johns Hopkins Departmental Programs

Many academic departments sponsor study abroad programs that directly support major and minor requirements. Whenever possible, qualified students in these majors are encouraged to participate in departmental programs. Some Hopkins programs offer direct course equivalencies or elective credits in the sponsoring department. Hopkins departmental programs vary with regard to the level of support that students receive while abroad. ***Effective Spring 2023** Grades in courses from these programs will post on students' Hopkins transcript and be included in students' Hopkins grade point average only if the courses are taught by Hopkins faculty or if the curriculum has Hopkins faculty oversight. For courses that do not meet this criteria, the grades will not post on the Hopkins transcript or be included in the Hopkins grade point average.

Johns Hopkins Departmental Programs include the following categories:

- BA/MA programs abroad
- Semester and year programs managed by Hopkins or external organizations
- Johns Hopkins exchange programs
- Johns Hopkins Summer Programs Abroad
- Johns Hopkins Intersession Programs Abroad

Approved External Programs

The Office of Study Abroad and its Faculty Advisory Committee have vetted universities and specialized programs that offer courses in specific areas, disciplines, or locations where departmental programs may not be feasible.

Major/minor credits must be pre-approved by the Hopkins Director of Undergraduate Studies (DUS) for students' majors or minors prior to participation. Grades from the programs will not post on the Hopkins transcript or be included in the Hopkins grade point average.

Approved External Study Abroad Programs include the following categories:

- Direct enrollment in a university abroad
    - Students may transfer credit from approved colleges and universities throughout the world. Where possible, students are strongly encouraged to apply to study at international universities through a third-party provider for guaranteed housing and emergency support. Students take regularly scheduled courses with national and international students.
- Third-Party provider programs
    - These specialized programs provide study abroad opportunities for language acquisition, field experience, research, and disciplinary courses— often in less common locations. Third-party providers offer additional support services, including assistance with applications, visas, travel arranging, housing, course registration, emergencies, and onsite support. Students who wish to study at a university abroad are strongly encouraged to apply through a third-party provider.

Non-Approved Programs

Johns Hopkins does not encourage students to participate in non-approved/unvetted programs. Students with sound academic rationales for participation in an unvetted program are required to petition for approval. Note that non-US academic institutions must be degree-granting and recognized and authorized to issue academic records by the appropriate national (or regional) bodies in their home countries. In addition to academic standards, the review committee will vet the program to ensure it meets standards for health, safety, and emergency support.

Eligibility

Students are required to meet with a study abroad advisor prior to applying to study abroad. All study abroad programs must be approved by the Office of Study Abroad prior to participation in order to receive credit toward Hopkins degree requirements.

Eligibility for study abroad can vary by program type. Students must meet the minimum eligibility requirements of both Johns Hopkins University and the program abroad.

Johns Hopkins Eligibility Requirements

- Term GPA of 3.00 or higher the semester of application.
- Students must complete their last semester prior to graduation in residence at the Homewood Campus.
- Students must be in good academic, disciplinary, and financial standing with the university.
    - **Disciplinary Standing:** Students currently on university probation as a result of Student Conduct Code violations may apply for study abroad, but must have completed their probationary period prior to the start of their program abroad. Students with disciplinary sanctions more severe than university probation (e.g. Deferred Suspension, Suspension, or Expulsion) are not eligible to apply for nor participate in study abroad during the pending sanction. If a university disciplinary sanction occurs between the time of acceptance to and the start of a program abroad, Johns Hopkins will review the disciplinary action and may decide to withdraw the student from their program abroad.
    - **Financial Standing:** Students with a financial hold at the time of registration for their program abroad must be cleared by the Office of Student Accounts. Registration and dispersal of financial aid may be affected if financial holds are not lifted prior to the start of a student's program abroad.
- Leave of Absence: Students may not apply for study abroad while on any type of Leave of Absence. Students must be enrolled in residence at the Homewood Campus the semester prior to studying abroad. Study abroad may not be deferred due to a Leave of Absence, and students will be required to reapply for study abroad upon their return from a Leave of Absence.

Program Eligibility Requirements

Many programs have additional eligibility requirements. In some cases those requirements will be more stringent than the Hopkins eligibility requirements.

The program-specific eligibility requirements might include:

- Language proficiency requirements: if required, students must demonstrate language proficiency at the college level, either through courses taken at a U.S. college or university, or through university-administered placement exams
- Cumulative GPA of 3.0 or higher (e. g. Oxford requires a minimum cumulative GPA of 3.7)
- One year or more of college-level education
- Course prerequisites: students must have met course prerequisites, as determined by the program or host institution

Credit and Residency Requirements for Study Abroad (Students Who Enter JHU from High School)

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered "in-residence" and may be included in the 100-credit JHU residency requirement. A student may be awarded a full year of credit toward their undergraduate degree from courses taken on Hopkins Departmental Programs, or up to 30 credits from courses taken on Hopkins Approved External Programs toward their undergraduate degree. Students who earn more than 30 credits on Hopkins Departmental Programs may apply these additional credits towards the standard 12-credit transfer credit limit with a 42-credit transfer credit maximum for all study abroad and domestic courses combined. Students abroad will be held to the same course load guidelines that apply to course loads and credit overloads in the full-time undergraduate programs in Arts and Sciences and Engineering.

Students may enroll in study abroad in a combination of semester and/or summer/intersession programs abroad, but students may not enroll in three consecutive fall/spring semesters abroad.

Students may participate in summer and intersession programs abroad any term after matriculation and prior to graduation.

Students who enter the university from high school must have completed at least three semesters of undergraduate coursework in Arts and Sciences and/or Engineering at Hopkins prior to enrolling in a semester/academic year program abroad. This means a student may study abroad for a semester, or academic year, beginning with the second semester of their sophomore year through the fall semester of their senior year. An exception to this policy is the Hopkins Oxford St. Anne's College program which offers a full year abroad for sophomore students.

Credit and Residency Requirements for Study Abroad (Transfer Students)

A student may be awarded a full year of credit toward their undergraduate degree from courses taken on Hopkins Departmental Programs, or up to 30 credits from courses taken on Hopkins Approved External Programs. All transfer students must complete at least four full-time semesters in residence at JHU. With the exception of courses taught on Johns Hopkins SAIS Campuses abroad, study abroad programs offered during fall and spring semesters do not count towards this four-semester requirement. Transfer students must be in residence for at least two of their final four semesters, including the final semester prior to graduation.

Students who enter the university as transfer students must complete at least 60 credits at JHU. The only study abroad programs that count toward these 60 credits are courses taught by JHU faculty abroad during summer and intersession or courses taught on one of the Johns Hopkins SAIS Campuses abroad.

Transfer students must have completed at least two semesters of undergraduate coursework in Arts and Sciences and/or Engineering at Hopkins prior to enrolling in a semester/academic year program abroad. Transfer students may participate in summer and intersession programs abroad any term after matriculation and prior to graduation.

Study Abroad in Home Country/Country of Citizenship

International students are encouraged to take full advantage of study abroad opportunities by pursuing studies outside the United States and their home countries. Johns Hopkins will not approve semester or academic year study abroad at locations where students have completed secondary education or where they have lived and/or worked within eight years of matriculation at Johns Hopkins. Students who wish to take courses at universities in their home countries during the fall or spring semesters will be asked to submit a petition for an exception to this policy. Students must present a strong academic rationale for the program.

International students may take courses in their home countries during intersession or summer for transfer credit. There is a two-step process involved with transferring the credits to JHU from an institution within a student's home country.

1. Register the home country study with the Office of Study Abroad (https://jhu-sa.terradotta.com/?FuseAction=Programs.ViewProgramAngular&id=10756)

2. Follow the Transfer Credit process for the appropriate school:

- Krieger School of Arts & Sciences (https://advising.jhu.edu/transfer-courses/current-ksas-undergraduates/)
- Whiting School of Engineering (https://engineering.jhu.edu/advising/advising-questions/)

Academic Policies

Matriculation Status

All students on study abroad programs who have completed the mandatory procedures established by Johns Hopkins prior to departure remain enrolled as full-time, matriculated students. This official status is recorded as off-campus matriculated.

Expectation of Program Completion

Students are required to remain on their programs abroad until their designated "end of the program" as determined by the host institution. The "end of the program" includes mandatory activities, final examinations and revisions that may fall on or after the final day of classes. Students who experience an emergency abroad should follow the directions on the Study Abroad website (https://studyabroad.jhu.edu/about-us/emergencies/).

Students who need to leave a program abroad prior to the "end of the program" for non-emergency reasons must petition and receive approval from the JHU Office of Study Abroad prior to requesting early departure from the host institution. Students must notify the JHU Office of Study Abroad as soon as they are aware of the need to leave a program early. Petitions will not be accepted after the middle of term at the host institution. Once approved by JHU, students are subject to the rules, regulations and protocols governing early departure as defined by the program or host institution.

Students should be aware that final grades and/or credit from the program or host institution may be affected by early departure.

Credits Required for a Semester/Academic Year Abroad

Students are required to enroll in the equivalent of 15 credits per semester while abroad. Students who wish to take fewer than 15 credits, or more than 18.5 (KSAS) credits or 19.5 (WSE) credits, in a semester must submit a petition for approval through the Office of Study Abroad.

Credit for Courses Taken Abroad

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered "in-residence" and may be included in the 100-credit JHU residency requirement. A student may be awarded a full year of credit from Hopkins Departmental Programs courses, or up to 30 credits from study abroad courses taken on Hopkins Approved External Programs toward their undergraduate degree. Students who earn more than 30 credits on Hopkins Departmental Programs may apply these additional credits towards the standard 12-credit transfer credit limit with a 42-credit transfer credit maximum from all study abroad and domestic courses combined. Students abroad will be held to the same maximum course load guidelines that apply to course loads and credit overloads on the Homewood Campus.

As part of the Hopkins application process, students are required to have pre-approval for transfer of credit for all overseas course work prior to studying abroad. Pre-approval of transfer credits toward major and/or minor requirements is granted by the Director of Undergraduate Studies (DUS) in the student's academic department(s). Pre-approval of transfer credit toward distribution requirements is granted by the Director of Study Abroad. Final approval of credit and transfer of courses occurs after students have returned to Hopkins. Transfer of credit for courses taken abroad follows the External Credit Policies (p. 1604) detailed in this catalogue under Undergraduate Academic Policies.

Courses must be completed with a grade equivalent of C or better to be eligible for transfer of credit toward a Hopkins degree. Transcripts from the program abroad should be sent to the Office of Study Abroad for credit evaluation and determination of transfer credit. Students will be notified when their official program transcript has been received.

Students should save electronic copies of syllabi, course descriptions, reading lists, assignments, papers, and examinations. Students may need to submit these to the Office of Study Abroad and/or the DUS for their major(s) and/or minor(s) in order to complete the credit evaluation, and the awarding of transfer credit.

Transfer of Credits from International Institutions without Pre-Approval

Students who pursue coursework at an international institution without pre-approval may request these credits be transferred after completion. However, these credits will be reviewed, and if acceptable, will be processed as transfer credit, not study abroad credit. Therefore, these credits are subject to the 12 credit transfer maximum.

Grades and Transcripts

Courses taken through off-campus programs are entered onto the official Hopkins transcript along with the name of the host institution and the location of the off-campus program.

Hopkins must receive an official transcript, faculty grade report, or the equivalent official evaluation to transfer courses, credits, and/or grades from off-campus programs. Students must take courses for letter or numeric grades at the host institution to be eligible for transfer of credit toward the Hopkins degree. Students will not be eligible to receive credit for courses taken pass/fail on off-campus programs. Students must receive the equivalent of a C (satisfactory) or higher in order to transfer credit from off-campus programs.

Grades from Hopkins Departmental Programs (Select Semester and Year Programs Abroad, Hopkins Summer Abroad and Hopkins Intersession Abroad):
*****Effective Spring 2023: This applies only to courses taught by Hopkins faculty or where the curriculum has Hopkins faculty oversight.*****

- Courses and credits will appear on the JHU transcript as AS/EN/HA with JHU course numbers.
- Grades for courses taught by JHU faculty abroad will post to the JHU transcript and factor into the term and cumulative GPA. They will also appear on the degree audit.
- Grades from courses taken at another institution abroad will be converted to U.S. grade equivalents based on JHU grade conversions in order to determine that a grade of C or better was earned.
- Courses with the HA prefix (HA.xxx.xxx) will be issued letter grades based on the grade conversion. In some cases, an S/U grade may be awarded in lieu of a letter grade, should the academic department determine that this is more appropriate. These grades will post to the JHU transcript and factor into the term and cumulative GPA and will also appear on the degree audit. This is applicable only to the first 30 credits earned through Hopkins Departmental Programs.
- Grades for courses with an AS or EN prefix (EN.xxx.xxx) taken at another institution abroad will be issued the administrative letter grade of SA, which will not post on the JHU transcript; and hence, no grade is calculated in to the term or cumulative GPA. The SA grade will appear on the degree audit. This is applicable to the first 30 credits earned through Hopkins Departmental Programs.
- For programs where more than 30 credits are awarded, the additional credits will be issued an administrative grade of TR and these credits apply towards the student's limit of 12 transfer credits.

*****Effective Spring 2023: Grades from Hopkins Approved Programs (and Hopkins Departmental Semester/Year Programs where courses are not taught or overseen by Hopkins faculty):**

- Courses and credits will appear on the JHU transcript as AS/EN/TR courses with generic department and level designations (e.g. TR.100.300) or a direct equivalency to a JHU course (e.g. AS.020.305).
- Grades from the other institution will be converted to U.S. grade equivalents based on JHU grade conversion in order to determine that a grade of C or better was earned.
- The administrative grade of SA will be issued to each course and it will not post on the JHU transcript; and hence, no grade is calculated into the term or cumulative GPA. The SA grade will appear on the degree audit.
- The maximum number of credits that can be earned in a Hopkins Approved Program is 30.

Housing Policy

Johns Hopkins University vets and approves study abroad programs based on academic quality, cultural immersion, and health/safety practices. Housing is an integral aspect of the abroad experience in that it promotes language and communication skills and provides opportunities for personal growth. In addition, housing organized by program sponsors provides an additional layer of safety and security.

For these reasons, JHU requires the use of program-established housing in homestays, residences, dormitories, or program-provided apartments by all Hopkins students on approved study abroad programs. Furthermore, JHU strongly encourages students to participate in a homestay experience if that option is available. Students who want to arrange independent housing abroad should set up an appointment to meet with a Study Abroad Advisor to discuss options and petition for approval.

Study Abroad at Locations Under U.S. Department of State/CDC Level 3 or 4 Travel Advisories

The U.S. Department of State (DOS) and Centers for Disease Control & Prevention (CDC) issue a Travel Advisory for each country of the world. Travel Advisories follow a consistent format and use plain language to help U.S. citizens find and use important security information. Travel Advisories apply up to four standard levels of advice, describe the risks, and provide clear actions U.S. citizens should take to help ensure their health and safety abroad.

Undergraduate international travel will not be permitted or funded at any locations with a Level 4 “do not travel” designation. Students with a sound academic rationale may petition for an exemption to the policy for sites advising travelers to “reconsider travel” or “avoid non-essential travel” (e.g. DOS Level 3 or CDC Level 3).

Financial Structure of Study Abroad

Departmental Programs (semester/academic year)

Students studying abroad in semester and/or year JHU departmental or exchange programs are charged Hopkins tuition. In most cases, an additional fee is assessed to cover services that might include housing, international health insurance, emergency services, and logistical and academic support. Students are billed through the Homewood Student Accounts Office.

Departmental Programs (intersession/summer)

Students studying abroad in a Hopkins faculty-led summer or intersession program are charged the program fee and billed through the Homewood Student Accounts Office. Fees vary by program, with some including charges for services such as airfare and/or meals.

Approved External Programs (semester/academic year)

Students who study abroad through an approved semester/year external program are charged the cost of their program as established by the host university or provider and a study abroad and registration fee equivalent to 12% of Johns Hopkins tuition. Johns Hopkins is responsible for making direct payments to host universities and providers on behalf of students. Fees will be posted to students’ Hopkins SIS accounts by the Student Accounts Office.

Approved Programs (intersession/summer)

Students who study abroad through an approved intersession or summer external program are charged the cost of their program as established by the host institution or provider and a JHU per-credit study abroad fee. The per-credit study abroad fee is based on a per-credit proration of the JHU 12% study abroad fee (12% of Full-Year Tuition/30 credits = per credit study abroad fee). The per-credit fee will be assessed on the number of credits students wish to apply toward their Johns Hopkins degree, not on the number of credits awarded by the host institution or provider.

Johns Hopkins is generally responsible for making direct payments to host universities and providers on behalf of students. Fees are posted to students’ Hopkins SIS accounts by the Student Accounts Office.

Additional Costs Associated with Any Program Type

Students are responsible for all additional costs that are not included in mandatory fees. Additional costs may include: housing, airfare, personal expenses, meals, visas, and other incidental expenses. Some programs may include costs for many of these services as part of their mandatory fees. In those cases Hopkins will include those fees when making direct payment to the provider on behalf of students.

Billing

Study Abroad fees will be assessed to a student’s SIS account by the Homewood Student Accounts Office. Johns Hopkins makes payments on students’ behalves for tuition and the program deposit.

The Homewood Student Accounts Office posts charges in SIS on or about July 1 for the fall semester, December 1 for intersession, December 1 for the spring semester, and May 1 for summer. Payment arrangements may be made through the Homewood Student Accounts Office.

The Office of Study Abroad creates a program financial budget worksheet for each student which reflects the estimated cost of attendance for their program, and details which fees will be posted on student’s SIS account. The financial budget worksheet should be used to assist students and their parents/guardians in calculating expenses (the cost of attendance) associated with an academic program abroad. Students can find estimated budgets on the specific program pages on the Office of Study Abroad website. Fees are approximate and subject to change. Students should contact the Office of Study Abroad if an estimated budget is not available on the website.

Financial Aid

Johns Hopkins extends portability of federal, state and institutional financial aid to Johns Hopkins Departmental Study Abroad Programs and Approved External Study Abroad Programs for the fall semester, spring semester or academic year. Financial aid, including institutional aid may be applied toward the cost of these programs.

For the semester study abroad, the JHU Grant will not increase, even if the study abroad cost is greater than the cost to attend Hopkins. The JHU Grant for the semester study abroad may decrease if the study abroad cost is less than the cost of attendance at Hopkins. Students’ financial aid will be credited to their SIS account.

Only loan assistance or study abroad scholarships can cover additional expenses. In most cases, financial aid does not apply to summer and intersession programs. Students may be eligible for external study abroad scholarships.

Refund Policy

Students with credit balances may request a refund. Refund requests cannot be processed any earlier than 10 days prior to JHU’s first day of classes for each semester. Refund information is available at https://studentaffairs.jhu.edu/student-accounts/refunds/.

Students should consider study abroad options carefully prior to making a commitment. Students who withdraw from a study abroad program after having committed to either Hopkins or the program provider, are responsible for all non-recoverable costs associated with their program. After receipt of a final billing statement from the student’s program, Hopkins will refund recoverable expenses, excluding non-refundable deposits. Recoverable expenses are determined by the program provider in consultation with JHU.

If for any reason study abroad plans change, the Office of Study Abroad should be contacted immediately so that the financial impact of the voluntary withdrawal can be determined.

Students involuntarily withdrawn or dismissed from a program for cause will receive no refund, may not be eligible for credit for coursework completed on the program abroad and are responsible for any costs incurred by early dismissal.

Should Hopkins cancel or suspend a study abroad program, the Office of Study Abroad will work with students to either refund recoverable costs or apply fees toward alternate academic programs. Should a provider cancel or suspend a program after the on-site program has begun, the Office of Study Abroad will work with the student and the provider to obtain refunds and to assist in making the student academically whole to the extent possible under the given conditions.

Conduct and Ethics

Conduct

Students are responsible for their own actions, activities and behavior while participating on a program abroad. Serious consideration of health and personal circumstances should be taken in to account by students when applying for or accepting a place on a program abroad.

Students are obligated to be aware of and comply with local laws and customs while abroad. Respect of local customs includes the conscious awareness of cultural attitudes toward alcohol use and sexual behavior. As representatives of JHU in other countries, we ask that students behave in a manner that is respectful of the rights and well-being of others.

Conduct considered unacceptable to Johns Hopkins University includes, but is not limited to, excessive consumption of alcohol; loud and/or abusive behavior; sexual harassment; criminal conduct of any kind, including the purchase, sale, possession or use of drugs other than prescribed medication for legal medicinal purposes. Students' must notify JHU Office of Study Abroad of any disciplinary or legal issues while abroad.

Students participating in programs abroad are expected to adhere to the Johns Hopkins University Undergraduate Student Code of Conduct (https://studentaffairs.jhu.edu/policies-guidelines/student-code/), the policies of the program abroad, and the terms set forth in the Study Abroad Conditions of Participation agreement.

Violations of the Code of Conduct, Conditions of Participation and Program Policies

Students who are alleged to have violated the Hopkins Undergraduate Student Conduct Code, the policies of the program, and/or standards of academic integrity while abroad will be reported to the program director, and the JHU Director of Study Abroad. If a violation is determined to have occurred, the program director in collaboration with the JHU Director of Study Abroad will take appropriate disciplinary action, which may include immediate dismissal from the program.

A student dismissed from a program for cause will receive no refund, may not be eligible for credit for coursework completed on the program abroad, and is responsible for any costs incurred by early dismissal.

Students must maintain both academic and disciplinary eligibility through the designated start of their study abroad program. Students' academic and disciplinary records may be reviewed prior to departure. If records indicate a significant decline in GPA, if a cumulative or term GPA falls below JHU or program requirements, and/or if academic and/or disciplinary sanctions are imposed prior to departure, a student may be involuntarily withdrawn from an approved study abroad program.

Academic Ethics

All study abroad students are bound by the Johns Hopkins University Code of Academic Ethics both during the application process and while abroad. Students are obliged to refrain from acts which they know, or under circumstances have reason to know, violate the academic integrity of the University. Violations of academic ethics include, but are not limited to: cheating; plagiarism; submitting the same or substantially similar work to satisfy the requirements of more than one course without permission; submitting as one's own the same or substantially similar work of another; knowingly furnishing false information to any agent of the University for inclusion in academic records; falsification, forgery, alteration, destruction or misuse of official University documents or seal. All students must sign a Conditions of Participation agreement to adhere to this policy as part of the application process.

Institutional Research Board (IRB)

Students whose research will involve human subjects (including research using surveys, focus groups, or interviews) must apply to the Homewood Institutional Review Board (HIRB) (https://homewoodirb.jhu.edu/) for either an exemption or approval. IRBs are federally mandated and serve to ensure that researchers take appropriate measures to minimize risks for participants, inform participants of any risks that may remain, and obtain participant consent.

To obtain permission, a request should be sent via email to the HIRB Office describing the research, including a detailed description of the topic and research methods. If interviews are a part of the research proposal include sample questions and details about how respondent's privacy will be protected. The HIRB Office will contact applicants and inform them if their research is exempt from review or if the proposal will need to undergo the HIRB process. The review process takes two to six weeks.

Graduation Policies

Applying to Graduate

Students who intend to graduate in the next academic year must complete an Application for Graduation as directed by their respective academic advising office. The graduation application deadlines are also posted on the Homewood Registrar's Office website (https://studentaffairs.jhu.edu/registrar/students/graduation/). The university confers degrees three times per academic year, and there is one annual commencement ceremony in May.

Graduating in May

Most students who enter the university directly from high school graduate in May after eight semesters of full-time enrollment. Full-time enrollment is a minimum of 12 credits. Part-time enrollment is not permitted within a student's first eight semesters. Students are required to have full-time status in the semester immediately prior to graduation, and must therefore be enrolled for at least 12 credits in the final semester even if all course and credit requirements could be met with fewer than 12 credits. The May conferral date is the Thursday before Memorial Day which is usually the University-wide Commencement date.

Graduating in August

A small number of students complete their degree during the summer. Students who have completed eight full-time semesters may graduate in the summer if all degree requirements have been satisfied by the degree conferral date (last weekday before the fall term start in August). Students who have not completed eight full-time semesters should see the Graduating Early (p. 1115) policies.

Graduating in December

A small number of students complete their degree at the end of the fall semester, which does not include Intersession. Students may graduate in December if all degree requirements have been satisfied by the degree conferral date (defined as the last weekday in December). Students are required to maintain full-time status (enrolled for at least 12 credits) in their final semester, unless they are in their ninth semester or later.

Note for students who entered as transfer students:

Transfer students are not subject to the eight semester full-time restrictions as listed above. Transfer students must complete at least four full-time semesters at JHU before they are eligible to graduate.

Completing Graduation Requirements

Students are responsible for completing the requirements for a bachelor's degree as indicated for KSAS student (p. 1587)s, and WSE students

(p. 1086). All grades and credits for courses that are required for graduation must be submitted in time to clear students for graduation.

Each student expecting to graduate will receive a final bill from the university. It is university policy that all outstanding accounts must be paid in full before a student's diploma may be released.

Students who have not completed degree requirements after eight full-time semesters (or four full-time semesters for transfer students) of enrollment may register for less than 12 credits, and pay for courses on a per credit basis. With approval of the director of the student's respective academic advising office and the major department (in the case of courses required for the major), these students may take courses elsewhere to meet the remaining graduation requirements, but must observe the 12 credit limit on transfer credit. These students also may have part-time status in the semester when they graduate. If applicable, students should consult with the Office of Financial Aid prior to part-time enrollment. Part-time undergraduate students are not eligible for coverage if enrolled through JHU's Student Health Benefits.

Graduating students who are taking courses through the Baltimore Student Exchange Program (BSEP) or in other divisions of the university must make arrangements with their instructors on the first day of class to have final grades submitted to the host registrar and then to the Homewood Registrar by the Homewood deadline for submitting grades for graduating students. If such an arrangement cannot be made, students should not remain enrolled in the course.

Students who graduate in December may remain in university housing and/or continue to participate in student organizations only if they enroll for a minimum of 6 credits during the following spring semester.

A student will not be graduated with unresolved outstanding charges of misconduct or academic ethics violations.

The university does not guarantee the award of a degree. The award of degree is conditional upon

1. satisfaction of all degree and instructional requirements in effect at the time of matriculation as a degree-seeking student (as published in the relevant annual catalogue),
2. compliance with the current university and divisional regulations
3. performance meeting the bona fide expectations of the faculty.

No member of the faculty is obliged to provide students or graduates with an evaluation or letter of recommendation which does not accurately reflect the faculty member's true opinion and evaluation of the student's academic performance and conduct.

Students who have completed eight or more undergraduate semesters may take an additional course or two after graduation to complete a second major or minor if they have filed an approved plan with their respective advising office *before* their initial graduation date. For additional details, please review the complete policy in the Student Status section, Alumni Enrollment tab.

Graduating Early (less than 8 semesters)

Students are eligible to graduate early at the end of the fall or spring semester if they have completed all requirements for graduation, including the residency requirement. Students graduating early may not use intersession as a final term to complete remaining graduation requirements. Students may not graduate early during the summer except in the circumstances described below:

- Student has at most two incomplete grades in spring semester required courses, or
- Student has one incomplete grade in a spring semester required course and needs one required course in the summer, or
- Student needs one required course in the summer.

These students must meet with their respective academic advising office prior to the May commencement ceremony to file an August conferral plan. This plan requires proof of summer course registration, if applicable.

Students who graduate in fewer than eight semesters may also take courses after graduation as a full-time or part-time student if not completing an additional major or minor. Students who graduate early lose the opportunity to complete additional majors or minors after graduation.

Incomplete Grades and Graduation Status

Students with incomplete grades or missing grades in required courses at the date of conferral will not graduate.

Students who have completed at least eight full-time semesters and have met the residency requirement and who receive one or more incomplete grades in their last semester in attendance, may complete those incomplete grades and are not required to register for additional coursework unless required for their degree.

Students who have completed less than eight full-time semesters and:

- who receive one or two incomplete grades in required course(s) during their intended last spring semester should review the Graduating Early (p. 1115) policies.
- who receive three or more incomplete grades during their intended last spring semester are required to register for another full-time fall semester (at least 12 credits) in order to complete all degree requirements, including the residency requirement.
- who receive incomplete grades in required course(s) during their intended last fall semester must resolve these incomplete grades no later than the December degree conferral date or register for another full-time spring semester (at least 12 credits) in order to complete all degree requirements, including the residency requirement.

Last Semester Option

In their last semester before graduation, students may request that they be excused from taking the final examination in one or more courses. This option is solely at the discretion of the course instructor. This option is not available to students who are graduating early.

S/U Option in the Last Semester

Students in their final semester, who will have completed at least eight full-time semesters of enrollment when they graduate and who are taking more credits than are needed to complete graduation requirements, may take one or more of the extra courses for S/U credit. Engineering students must have the faculty advisor's permission, indicated by their signature on an add/drop form, to request this option. The faculty advisor's signature indicates that the student will have completed all degree requirements without this course. In addition, a signature from the Engineering advising office is needed to confirm that the senior has applied for graduation in their eighth (or later) semester. Arts & Sciences students must obtain approval from the Academic Advising Office.

Independent Work in the Last Semester

Students in their final semester, who will have completed at least eight full-time semesters of enrollment when they graduate and who are taking more credits than are needed to complete graduation requirements, may take up to 6 credits of independent academic work, either graded or S/U. In addition, the usual limit of no more than 6 credits per year of independent academic work will be waived if the additional credits are for extra credit work done in the final semester.

Graduation Closes the Undergraduate Record

Upon graduation, the undergraduate record is closed. The only permitted changes are the resolution of incomplete grades, missing grades, and grade errors. These changes must be resolved by the first Monday after 30 days have lapsed since the degree conferral date. Students wishing to take additional courses at JHU after graduation should refer to Alumni Enrollment policies.

General and Departmental Honors at Conferral

Students may receive general honors, departmental honors, or both at conferral. General Honors are awarded to students with cumulative grade point averages of 3.50 or better. The final determination is made after all grades have been reported. Departments set their own standards for the award of Departmental Honors. Students should consult with the Director of Undergraduate Studies for their major about the requirements for departmental honors.

General and Departmental Honors are noted on a student's academic record following the student's last undergraduate semester before conferral. In addition, honors are noted in the Commencement program. However, because the program is printed several weeks in advance, not all honors are announced in time for inclusion.

Completing Honors in the Major

Students who are completing requirements for Honors in their major must complete all requirements to earn honors before conferral. For example, students may not stay on after graduation to complete an honors thesis, present a poster or give a presentation, or write a final research summary.

Commencement

The university commencement ceremony (https://commencement.jhu.edu/) is held once each year in May.

The student's respective academic advising office determines whether a student has completed all requirements, and clears the student for conferral and participation in Commencement. Students who graduate in August, December, and May are invited to participate in the Commencement Ceremony in May following their degree completion. Students who graduate in August may receive permission to walk in the May ceremony preceding degree completion if they file an August conferral plan with their respective academic advising office. The diploma and degree will not be awarded until all courses are completed successfully and recorded.

Student Life Policies

Student life policies and guidelines assist students in understanding expectations, processes, and procedures during their time at the University. The Office of the Vice Provost for Student Affairs maintains these Policies & Guidelines (https://studentaffairs.jhu.edu/policies-guidelines/).

Graduate Policies

Johns Hopkins University is proud to offer a rigorous and interdisciplinary graduate education taught by faculty who are academic and research leaders in their fields. Across the nine divisions of the university there are approximately 20,000 full-time and part-time graduate students working in over 180 fields of study. Combined with exceptional university facilities and resources, the endeavors of graduate students have contributed to groundbreaking discoveries, expansive and innovative collaborations, and the advancement of knowledge throughout the university and beyond.

The policies, procedures, resources, and opportunities included in this section are relevant for graduate students enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences (KSAS) and the Whiting School of Engineering (WSE) on the Homewood campus.

Student Right to Know Information

The Higher Education Act of 1965, as amended in 2008, includes many student disclosures and reporting requirements by universities. These requirements include statistics and/or information on the following subjects:

1. Retention and graduation rates;
2. Financial assistance available to students and requirements and restrictions imposed on Title IV aid;
3. Crime statistics on campus;
4. Athletic program participation rates and financial support; and
5. Other institutional information including: the cost of attendance, accreditation and academic program data, facilities and services available to disabled students, and withdrawal and refund policies.

For the full Student Right to Know page, please visit: https://homewoodgrad.jhu.edu/student-services/student-right-to-know (https://homewoodgrad.jhu.edu/student-services/student-right-to-know/)

Graduate-Specific Policies

Unless noted specifically otherwise. the below policies apply to both continuing and new students.

Note: Students are subject to any and all policies as listed below, and at http://homewoodgrad.jhu.edu/, and at https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/, and at https://krieger.jhu.edu/, and at https://www.jhu.edu/university-policies/, as well as other JHU policies as defined by academic and/or administrative departments.

Statement of the Rights and Responsibilities of Ph.D. Students, and Policy on Mentoring Commitment at Johns Hopkins University

Ph.D. education is fundamental to the University's teaching and research mission. For an intellectual community of scholars to flourish, it is important to acknowledge the principles that underlie the compact between Ph.D. students, the faculty, and other members of the University community.

It is in this spirit that the Doctor of Philosophy Board, in collaboration with faculty and students from across the University, has articulated a statement of rights and responsibilities for doctoral students at Johns Hopkins (http://web.jhu.edu/administration/provost/initiatives/phd_board/rights_responsibilities/), as well as a separate policy about mentoring commitments for PhD students and their advisors (https://provost.jhu.edu/education/graduate-and-professional-education-resources/phd-mentoring-policies-and-resources/). The principles described in these documents are to be realized in policies and practices established by the various Schools of the University; the Schools will also develop mechanisms to monitor and enforce such policies.

Academic Misconduct and Research Integrity Policies

The Krieger School of Arts and Sciences (KSAS) and the Whiting School of Engineering (WSE) full-time programs and Engineering for Professionals have established the Academic and Research Misconduct Policy to address instances of misconduct by all graduate students enrolled in full-time, part-time or non-degree (special student) Krieger School of Arts and Sciences and Whiting School of Engineering graduate programs.

Procedures for handling allegations of misconduct by full-time and part-time graduate students are available in the Graduate Academic Misconduct Policy. (https://krieger.jhu.edu/hwgradaffairs/wp-content/uploads/sites/35/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf)

Procedures for handling allegations of research misconduct by full-time and part-time graduate students are available in the The University Research Integrity Policy. (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf)

Graduate Student Vacation Policy

To ensure the personal well-being and productivity of our graduate students, safeguard against excessive demands on graduate students' personal time, and introduce a minimum standard across the two Homewood schools regarding leave, the Deans of KSAS and WSE have established guidelines for Graduate Students (not enrolled in a lecture course, etc.) to be able to take leave. A detailed description of the policy can be found here: http://homewoodgrad.jhu.edu/academics/policies/.

Annual Review Policy

Once per academic year, all full#time Homewood graduate programs are required to provide a written review to:

1. all doctoral students, and
2. all master's students conducting thesis research.

Departments should include mention of funding continuation, as appropriate; as well as have a space for discussion about the student's professional development goals, and ways to develop strategies to achieve those goals. This review must include the opportunity for the student to offer self#evaluation. Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawal (https://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

The Whiting School of Engineering has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

PhD Advisor/Good Standing Policy

A PhD student conducting research and/or in the writing phase of their degree program will not be able to remain in good standing with their academic and research progress if they do not have a research/dissertation advisor[1]. As such, a student who is unable to secure a research/dissertation advisor within 4 months of either:

1. a curriculum/program requirement to find an advisor and/or
2. leaving/parting ways with a previous advisor

may be placed on probation or terminated from the PhD program due to a lack of faculty-advised progress.

Note that it is typically not the role of a department to find an advisor for a student, but program Directors of Graduate Study and Chairs/Heads are typically able and willing to offer guidance and suggestions for students who are looking for an advisor. Different programs may have specific policies pertaining to the timeline of advisor assignments and grace periods for students switching advisors, but typically should not have a grace period of less than 2 months for a student to find a new advisor. Students should consult with their departmental Academic Staff and/or Director of Graduate Study for guidance.

This policy applies to both continuing and new students.

[1] A research/dissertation advisor is best defined as a departmentally-approved faculty member under whose guidance a student is conducting research/writing their dissertation and, in many cases, in whose lab/group the student is associated and expected to participate.

Grievance Policy

Any faculty member, postdoctoral fellow or graduate student of either school may grieve an adverse action or failure to act, or for a violation of University, School or departmental policy. Typically a complaint or dispute is brought to the attention of a department chair or center director and is resolved through informal discussion. In some circumstances, the Dean is asked to help in the informal resolution of grievances. The formal procedure set forth below is not meant to supplant attempts at resolving complaints through informal means. When at all possible, complaints and disputes should be settled through informal discussion, though there are no circumstances under which a grievance must be settled informally.

Please note that nothing in our policy should be construed to impinge upon the responsibilities of any office and/or regularly constituted body of the University, and should be applied only after every effort has been made to settle disputes informally. Moreover, no action may be taken with respect to a grievance that would conflict with or modify any policy approved by the Board of Trustees of the University, any policy of the University or WSE/KSAS, any federal, state, or local law or regulation, or any contract to which the University is a party.

The university policy and process on filing a grievance is available here. (https://policies.jhu.edu/?event=render&mid=764&pid=32463&fid=policy_32463.pdf&_=0.713895637856)

Jury and Witness Duty

A KSAS or WSE graduate student receiving stipend/salary from the school (i.e., a teaching assistant, research assistant paid by the university, research assistant paid by an external grant/fellowship or hourly worker) summoned for jury duty or subpoenaed to testify, is authorized to be absent from their university obligations for the actual time required by such service. A graduate student employee (salary/hourly) must present the summons or subpoena to their immediate supervisor before a leave can be issued.

Graduate student employees are eligible for paid leave of absence as a juror or court witness. Federal work study funds, however, cannot be used in these instances -- departments should fund this time using other resources.

Jury duty or duty as a court witness is service and time spent away from a University position as a result of a subpoena issued by a court. Service as a volunteer expert witness or other volunteer court duty is not included in the provisions of this leave.

Homewood Schools Policy for Graduate Student Probation, Funding Withdrawal, and Dismissal

This policy addresses consequences of student underperformance, including funding withdrawal. Students who might lose financial support as a result of the termination of funding from an advisor's sponsor should be given prompt notice, whenever possible.

For comprehensive information see the Graduate Student Probation Funding Withdrawal and Dismissal Policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf). (https://homewoodgrad.jhu.edu/academics/policies/)

Information Technology Policies

All users of Johns Hopkins University computing resources must comply with the University's information technology policies. For the comprehensive policies go to http://it.jhu.edu/policies/itpolicies.html.

G.W.C. Whiting School of Engineering - Specific Policies

See http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/ and https://homewoodgrad.jhu.edu/academics/policies/

Zanvyl Krieger School of Arts and Sciences - Specific Policies

See https://homewoodgrad.jhu.edu/academics/policies/

Academic Policies

Much of the material contained in this section gives details pertaining to Krieger School of Arts and Sciences (KSAS) and/or Whiting School of Engineering (WSE), or University-wide policies. However, there are graduate student issues and policies that are department specific. In those instances, students are referred directly to their department administrator or department handbook for further information.

A Note about PhD Education:

Ph.D. education is fundamental to the University's teaching and research mission. For an intellectual community of scholars to flourish, it is important to acknowledge the principles that underlie the compact between Ph.D. students, the faculty, and other members of the University community.

It is in this spirit that the Doctor of Philosophy Board, in collaboration with faculty and students from across the University, has articulated a statement of rights and responsibilities for doctoral students at Johns Hopkins. The principles described in this document are to be realized in policies established by the various Schools of the University; the Schools will also develop mechanisms to monitor and enforce such policies. For more information see the Statement of the Rights and Responsibilities of PhD Students (http://web.jhu.edu/administration/provost/initiatives/phd_board/rights_responsibilities/).

Annual Review Policy

Feedback and Mentoring are crucial to the success of a graduate student. As such, there is a Homewood Annual Review policy (http://e-catalog.jhu.edu/grad-students/graduate-specific-policies/#annual). At least once per academic year, all full#time Homewood graduate programs are required to provide a written review to: (a) all doctoral students, and (b) all master's students conducting thesis research. Annual reviews should be completed before the start of the next academic year, barring unexpected circumstances.

Departments should include mention of funding continuation, as appropriate; as well as have a space for discussion about the student's professional development goals and ways to develop strategies to achieve those goals. This review must include the opportunity for the student to offer self#evaluation. Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawa (https://homewoodgrad.jhu.edu/academics/policies/)l (http://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

The Whiting School of Engineering has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

Student Enrollment Statuses

Graduate students in the full-time Arts and Sciences and Engineering degree programs based at Homewood are initially enrolled as full-time and are given a Resident status. Prior to a student changing their registration status, approval from the student's degree program and appropriate office(s) must first be secured. Degree-seeking KSAS/WSE graduate students are not permitted to be enrolled in another degree-seeking program outside of JHU.

Residency Requirements

Every full-time program KSAS Master's student must register for a minimum of two consecutive semesters as a full-time, resident graduate student.

Every full-time program WSE Master's student must register as a full-time resident graduate student for at least two semesters (does not have to be consecutive). Combined bachelor's-master's degree students are exempt, as are those who enter a WSE master's degree program after two or fewer semesters following completion of a JHU undergraduate degree.

Every full-time PhD Student (WSE and KSAS) must register for a minimum of two consecutive semesters as a full-time, resident graduate student.

Degree-Seeking Graduate Students

Krieger School of Arts and Sciences

Current Policy for Fall 2022: All KSAS full-time students are required to be enrolled in two courses of any level for credit/letter grade, or one course at the 800-level for credit/letter grade. Graduate students who are full-time students are charged full tuition. The office of the deans must approve any exceptions.

New Credit Hour Policy for KSAS Graduate Students, effective Spring 2023: All KSAS Graduate Students must be enrolled in at least 9 credits to maintain full-time status in each fall and spring semester. Summer term is not a required enrollment term, but PhD students (and master's students conducting research, etc.) are expected to continue working on their degree through the summer. Any JHU funded graduate student working on research/writing for their degree full-time over the summer should enroll in at least 9 credits of their program's summer research/graduate course (students should consult with their academic program for more information). More information on KSAS Gradute Credit Hours is forthcoming and may be found at http://homewoodgrad.jhu.edu (http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/)

Whiting School of Engineering

All WSE Graduate Students enrolled in Homewood-based full-time programs must be enrolled in at least 9 credits to maintain full-time status in each fall and spring semester. Summer term is not a required enrollment term, but PhD students (and occasionally master's students conducting research, etc.) typically are expected to continue working on their degree through the summer. Any JHU funded graduate student working on research/writing for their degree full-time over the summer should enroll in at least 9 credits of their program's summer research/graduate course (students should consult with their academic program for more information). Most graduate students enrolled in research-oriented engineering degree programs (M.A., M.S., M.S.E., Ph.D. etc.) are full-time students. However, part-time study consistent with residency requirements is common with advanced permission in many engineering departments. Students should consult with individual departments and OIS (if visa-sponsored) to determine the requirements for part-time study. Visit http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/ for more information, and for Frequently Asked Questions.

Part-Time Graduate Students

Krieger School of Arts and Sciences

The Krieger School of Arts and Sciences (KSAS) does not offer Part -time status in full-time degree programs.

Whiting School of Engineering

New Whiting Schoool graduate students starting their full-time program in a part-time status are extremely rare, and are only allowed when the chair of a department or the director of a degree program makes a qualified written request to, and receives approval from, the Dean's Office of Academic Affairs.

Students already matriculated in their degree program who wish to change to a part-time status after completing at least one semester of full-time study may ask for permission of their program, and the Office of International Services (https://ois.jhu.edu/) (OIS), when applicable, to change status.

Students will generally not be eligible to switch to part-time status if they are working primarily on the Homewood campus or working full-time on research for their degree. Part-time graduate students must still meet their degree residency requirements (p. 1119) before they receive an advanced degree. Part-time has two major components:

1. a student cannot be part-time without prior approval from their department, and from OIS (when applicable)
2. a part-time student cannot take more than 2 classes in a semester, or they will be automatically put back to full-time status (note that for WSE graduate students, part-time is any credit load below 9 credits (not including 9 credits)).

Process:

Part-Time Non-Visa-Holding Student:

If student is approved by their program to be part-time and is not a visa holder, their program only needs to send an notice to the Homewood Registrar's office to authorize the status change.

Part-Time Visa-Holding Students

Visa-holders (F-1, J-1, etc.) wishing to change their enrollment status to part-time must meet with OIS to determine eligibility. International students cannot be part-time unless they are in their final semester of their degree program. Eligible students must complete both of the below steps:

1. Secure permission from OIS to apply for part-time status (this is a USCIS form, and not an university registration/enrollment form), and
2. Ensure their academic department has submitted documentation to the Homewood Registrar's office to make the official switch to part-time status.

Part-Time Tuition

For current tuition information, visit Homewood Student Accounts at https://studentaffairs.jhu.edu/student-accounts/tuition-fees/.

- Part-time tuition charges are by the course in KSAS.
- WSE graduate students who are part-time in a full-time program are charged a minimum tuition fee up to 3 credits. Any additional credits taken by a WSE graduate student who is part-time in a full-time program will be charged by the credit.*

Part-Time Health Benefits

Students in WSE full-time programs who are in a part-time status are automatically enrolled in student health benefits, and may be responsible for assessed premium(s). Visit https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/ for more information.

Part-Time Payroll

Not all students who are part-time can be on student payroll. Please consult with the Office of Experiential Learning (https://studentaffairs.jhu.edu/studentemployment/) (formerly Office of Student Employment) for more information.

Visiting Graduates

In some cases, graduate students from other institutions of higher education may participate in a visitation or residency at the Homewood Campus. These students are designated as visiting, and are not candidates for a Johns Hopkins graduate degree.

Visiting Graduate Students primarily take courses.

Visiting Graduate Scholars primarily pursue research.

Visiting Non-Degree Learners have already attained a bachelor's degree, are not enrolled at another institution, and wish to take courses at Homewood (KSAS and WSE only) for a maximum of two consecutive semesters.

Visit http://homewoodgrad.jhu.edu/academics/visiting-grad-student-scholar-policies/ for complete information.

Visiting Graduate Application

All visiting students must apply through their intended program of study and through the online application.

Interested Krieger School of Arts and Sciences (KSAS) applicants should visit http://grad.jhu.edu/apply/visiting-students/.

Interested Whiting School of Engineering (WSE) applicants should visit https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/visiting-students-scholars/.

Visiting Graduate Enrollment

Visiting students may be enrolled on a full- or part-time basis with the approval of the chair of the department and the dean of their respective school. Visiting graduate students will be limited to two consecutive terms of either full- or part-time study.

All non-degree visiting graduate students/visiting graduate scholars must register in every semester that they are here for the visiting student course AS.990.890/EN.990.890, there is no tuition charge for this course. Failure to register may result in the student's removal from payroll, loss of health insurance, visa compliance issues, and/or lapses in university services/access.

Combined Bachelor's/Master's Students

Combined Bachelor's/Master's Student refers only to undergraduate students who have been accepted for concurrent study in a KSAS or WSE Homewood-based full-time graduate program while still completing their undergraduate requirements.

Most combined students will switch to graduate status to complete degree requirements. Combined students cannot both apply for and start their combined status in the final semester of their undergraduate status.

Degree Conferral Timing

A student cannot be conferred with their WSE master's/graduate degree before they have been conferred with their JHU bachelor's degree. With prior approval a student may confer with their bachelor's and master's/graduate degrees in the same semester with degree requirement signoff from undergraduate advising and the student's degree programs. Note that there is not a combined diploma, each degree is separately conferred.

Change of Status Process and Timing

In order for a student's status to change from undergraduate to graduate, a Change of Classification Form for Combined Students must be completed. Academic Staff in the student's chosen graduate program are responsible for signature and submission of this form to the Homewood Registrar's office for students who have:

- Completed eight semesters of full-time undergraduate student at JHU (or the equivalent for transfer students), **or**
- Completed undergraduate degree requirements prior to the eighth semester of full-time undergraduate study at JHU (or the equivalent for transfer students).

For complete information, please visit Graduate & Postdoctoral Affairs (https://homewoodgrad.jhu.edu/academics/combinedconcurrent-bachelors-masters-policies/) and WSE Combined Bachelor's/Master's Program (https://engineering.jhu.edu/academics/combined-bachelors-masters/).

Postdoctoral Fellow Appointments

Postdoctoral fellows are at the university to undertake a research program in cooperation with a member of the faculty. All appointments are arranged through the individual departments. Proof of successful PhD completion and eligibility for employment will be required before any appointment may begin.

Visit http://postdoc.jhu.edu/ and https://homewoodgrad.jhu.edu/ for more information.

Graduate Study Abroad (KSAS only)

The category of Graduate Study Abroad (GSA) presumes a continuation of the graduate student's full-time resident status during the period of overseas or off-campus study. GSA students should discuss all plans with their department/advisor in advance. International students should always consult with Office of International Services (https://ois.jhu.edu/) before making any travel plans or status changes. The GSA Application is available here (http://grad.jhu.edu/wp-content/uploads/2014/04/Graduate-Study-Abroad-New-Form.pdf).

Students who are enrolled in the Student Health Benefits Plan (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) are encouraged to contact the Office of the Homewood Registrar prior to leaving campus for coverage details while abroad.

Any student traveling abroad should first register with the Johns Hopkins Travel Registry. For full information regarding the registry, visas, immunizations, and other helpful travel information please visit Johns Hopkins Travel Registry (https://ssc.jhmi.edu/travel/).

GSA students are typically those in the departments of Anthropology, Comparative Thought and Literature, and Modern Languages and Literatures, While the History of Art Department does not have a general requirement of study abroad, many of its graduate students do go abroad to conduct dissertation research.

The use of this category for situations other than those noted above requires the approval of your department chair of the Homewood Graduate Board.

A student on GSA is required to pay 10% of the full-time tuition rate for each semester abroad. The KSAS Dean's Office will pay the remaining 90% tuition balance.

Graduate Study Away for Whiting School of Engineering

Graduate Study Away is a subcategory of the nonresident, fulltime status, and applies to degree-seeking WSE master's and doctoral students engaged in graduate education at a different institution (coursework and/or research) with departmental/advisor approval.

Students in this status typically remain fully supported by PI/department/host facility (NR tuition, stipend, health benefits support provided for student) as long as they remain eligible for payroll at JHU. Graduate Study Away students should discuss all plans with their department/advisor in advance. There is a tuition fee of 10% of the full-time tuition rate for each Nonresident semester.

As this is a **unique subcategory of the nonresident status**, health insurance benefits are not guaranteed (although students may opt to pay on their own for the student health insurance) and semesters away do not count towards the residency requirement. Graduate Study Away students should discuss this with their department/advisor.

Students who are enrolled in the Student Health Benefits Plan (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) are encouraged to contact the Office of the Homewood Registrar prior to leaving campus for coverage details while abroad.

Any student traveling abroad should first register with the Johns Hopkins Travel Registry. For full information regarding the registry, visas, immunizations, and other helpful travel information please visit the Johns Hopkins Travel Registry (https://ssc.jhmi.edu/travel/).

Nonresident (NR) Status

Nonresident (NR) status is a full-time status typically reserved for students who are completing non-coursework degree requirements/experiences off-campus. The Nonresident Application is available here (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/).

Students who are enrolled in University Student Health Benefits (https://studentaffairs.jhu.edu/student-health/insurance/school-insurance-plan/) are encouraged to contact the Office of the Homewood Registrar prior to entering into a NR status.

Additionally, international students should always consult with OIS before making any travel plans or status changes.

Eligibility

NR for Krieger School of Arts and sciences

Graduate students may be eligible for Nonresident Status if they:

- Have completed all coursework and requirements for the graduate degree other than the presentation and defense of the master's essay or doctoral dissertation;
- Have reached the end of their departmental support period or have exhausted support from grants and cannot be fully supported by the department;
- Work 19.9 hours per week or fewer during the academic year if employed by Johns Hopkins University in any capacity (intersession or summer employment can be full-time, however). If working, students must be on salary (not stipend) and paid hourly. NOTE: Research or teaching assistants expected to work more than 19.9 hours per week do not qualify for Nonresident status.

Nonresident students who are enrolled in JHU's health benefits are responsible for paying the premiums themselves if there is no available support from the student's department/advisor. Students on Nonresident status are charged 10% of full-time tuition per semester.

NR for Whiting school of engineering

Full-Time Program PhD and Master's students are generally only eligible to apply for one of the three Nonresident Statuses if they have no outstanding coursework (defined as either assignments/tests required for a class in which a student is currently enrolled or coursework in progress towards resolving an Incomplete grade) or exams (internal and preliminary GBOs for example) to complete:

- **NR WSE PhD/Master's dissertation/thesis/capstone/project completion**: Student is very nearly finished—just has some writing up to do and defend—but needs to leave campus to start work, etc. Expectation is one semester, but two may be allowed. Typically, the student pays the NR tuition, and typically receives no stipend or health benefits support, but there is no prohibition against a program or advisor funding the student.
- **NR WSE PhD/Master's study away**: Student (with or without advisor) has the opportunity to be actively engaged in PhD work but at a non-JHU facility. Student typically remains fully supported by PI/department/host facility (NR tuition, stipend, health benefits support provided for student) as long as the student remains eligible for payroll at JHU. Graduate Study Away students should discuss all plans with their department/advisor in advance.
- **NR WSE PhD/Master's internship/co-op**: Student voluntarily takes time to pursue other pursuits that may be only tangentially relevant to their degree. The expectation is that they will return to campus in a residential capacity to complete their degree. Student typically pays NR tuition, receives no stipend or health benefits support, although there is no prohibition against a program or advisor funding the student. Time in this status is typically one year, but can be renewed for a second year.

NR Restrictions

Nonresident students are permitted access to campus, faculty advising and most JHU services, however, they are not permitted to enroll in courses, with these three exceptions:

1. international students who file for Curricular Practical Training F1 (CPT1) through the OIS may register for a course entitled "Research and Teaching Practicum" (KSAS) or "Engineering Research Practicum" (WSE), and/or
2. enrollment in EN.500.603 Graduate Orientation and Academic Ethics, and/or
3. enrollment in AS.360.625 Responsible Conduct of Research.

Exceptions 2 and 3 and any other rare exceptions are granted by the student's respective Office of Graduate Academic Affairs.

While in Nonresident Status, students are required to online enroll in AS.910.600/EN.910.600 for each semester.

The maximum amount of time that a student may retain Nonresident Status is four semesters for KSAS master's students and ten semesters for KSAS doctoral students, and 1-2 semesters for WSE doctoral and master's students (see WSE-specific nonresident statuses for PhDs and Master's students above). Upon reaching this limit, the student will be required to register for either part-time status (WSE only, as appropriate) or full-time Resident status until degree completion.

NR Application Procedures

Students are required to complete and sign an Application for Nonresident Status (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) indicating that they meet the requirements as stated above. The form should be signed by the department, the OIS (if applicable), and either the WSE Associate Dean for Graduate and Postdoctoral Academic Affairs (or the Vice Dean for Education, or other WSE designee), or the KSAS Vice Dean for Graduate Education (or KSAS designee).

Students should apply for Nonresident status well in advance of the first semester for which it is desired. When requesting a change of status for the current term, such petitions should be submitted no later than the end of the second week of the semester.

Leave of Absence

A Leave of Absence (LOA) is an approved absence from the University during which time students are not charged tuition nor are they required to register. Time spent on an LOA is regarded as an approved break in study and is not counted toward the total time-to-degree. If a student fails to register without obtaining an approved LOA the student will be considered withdrawn from their degree program.

- Students are encouraged to contact the Homewood Registrar's Office prior to applying for an LOA for details regarding health benefits while on LOA.
- Students must schedule a consultation with either Renee Eastwood (rseitz5@jhu.edu) (KSAS) or Christine Kavanagh (christinekavanagh@jhu.edu)/Allison Leventhal (leventhal@jhu.edu) (WSE prior to completing their LOA application.
- International students must contact OIS before filing for LOA.

LOA Eligibility

All KSAS and WSE full-time and part-time program graduate students are eligible for LOA if one of the following conditions prevents them from continuing with their graduate studies (financial difficulty alone is typically not a valid reason for requesting an LOA):

- A documented physical or mental medical condition.
- Compulsory military service.
- Personal Issues that preclude academic engagement over a long period of time or immediate personal/ family hardship.

LOA Tuition and Financial Support

Students on LOA are not charged tuition for the semesters they are granted the leave; the period of leave is simply regarded as an approved interruption of the degree program; however, the University cannot guarantee that financial support will be available when students resume their studies. After taking an LOA, students must re-apply for tuition assistance, research assistantships, fellowships and/or teaching assistantships. Such matters are left to the discretion of the department. Before applying for a LOA, students should consult their department for information regarding funding opportunities upon return from LOA.

LOA Restrictions

Graduate students may apply up to four semesters of LOA (summer terms are not counted) when medical conditions, compulsory military service, or personal or family hardship prevents them from continuing their graduate studies.

Continued approval is based on the reason(s) for the request. Additional information may be requested by the department, or either the WSE Vice Dean for Graduate Education or their designee, or the KSAS Vice Dean for Graduate Education, Centers and Programs or their designee.

Students on LOA are not permitted to use any University student services and/or facilities (e.g., computing labs, library, labs, athletic facilities, etc.), and may not be enrolled at another University.

Students on LOA who wish to continue working at Johns Hopkins are not eligible to be paid through the Student Payroll Office and must therefore be hired through the appropriate divisional Human Resources Department.

No progress toward degree completion or coursework can be made while on LOA.

Students on LOA do not have access to student health benefits. The only exception is for a student on a MLOA (medical leave of absence). Students should consult with their cognizant Dean's Office of Academic Affairs (Renee Eastwood, KSAS; Christine Kavanagh/Allison Leventhal, WSE) for more information.

LOA Application Procedures

To be granted LOA status, students are required to complete and sign a LOA Application form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) and provide a letter stating the reason for their application. The form must be signed by the student's department, the OIS (if applicable), and either the WSE Vice Dean for Graduate Education (or WSE designee), or the KSAS Vice Dean for Graduate Education, Centers and Programs (or KSAS designee).

Students wishing to return from an LOA must complete an Application to Return from LOA form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/). Application deadlines are posted here (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/).

The departure of a student from one of the Homewood Schools without prior arrangement of Nonresident status or Leave of Absence status will be deemed a permanent withdrawal from the student's program. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the University. If readmitted, they do not pay a second application fee, but must satisfy the residency requirement for the degree following readmission (even if previously satisfied), and pay all outstanding fees.

LOA and Academic Probation

If a student needs to take a LOA while they are on an Academic Probation, their probation is paused for the duration of the approved LOA period. Upon the student's return from LOA, their probation is reactivated with the same terms, but the clock for the probation is reset from the date of return to the longer of:

1. the minimum time period dictated by the policy for the appropriate category as noted on the student's original probation letter (such as research, coursework, etc.), or
2. the remainder of the student's probationary period as noted in the student's original probation letter.

If a student was about to be put on probation but files for an LOA before the probation is in place, then their program may choose to either (1) issue an official probation letter noting that the start date will be paused for the duration of the approved LOA period, noting that upon the student's return from LOA, their probation will be implemented with the same terms, or (2) to issue a brief written statement to the student informing them that an official probation letter will be issued to them immediately upon their return from LOA.

Course Information and Academics

The below policies apply to both continuing and new students, unless noted specifically otherwise.

Registration

All students must register before they can attend classes or use university facilities. Detailed instructions about registration will be provided to all students before the registration period each semester/term. If the student has not been notified at least two weeks before the start of classes for any fall or spring semester should immediately contact their respective academic department, and the Office of the Homewood Registrar.

Graduate students who are funded and pursuing their degree work fulltime over the summer months need to register for at least 9 credits of their program's summer research course. This includes nonresident students who are fully funded by their program over the summer. There is no tuition charge for an 800-level course in the summer. Please consult with your academic program for more information.

Students who for any reason do not complete their registration until after the prescribed registration period are required to pay a late registration service fee. The late registration fee schedule is posted under Term Dates & Deadlines (https://studentaffairs.jhu.edu/registrar/students/graduate-registration/) on the Office of the Homewood Registrar's website. Graduate students must obtain permission from the chair of their department to register after the second week of classes.

Students will not be allowed to register if there are unpaid bills from a previous term. The student is required to pay tuition or make financial arrangements with the Office of Student Accounts before registering for a given term.

Visit https://studentaffairs.jhu.edu/registrar/students/graduate-registration/ and https://registrar.jhu.edu/idr/ for more information.

Withdrawal by Lack of Registration

Students who are not registered by the end of the fourth week of a given semester and either

1. have <u>not</u> responded to correspondence from their department, advisor, Office of Academic Affairs, and/or Office of the Homewood Registrar about their intention to remain in the program, **or**
2. h*ave* responded to correspondence but have <u>not</u> made effort to maintain a valid student status (defined as either enrolled or on an approved leave of absence), will have been deemed to have withdrawn themselves from the university and will be processed as a withdrawn student in the student information system (SIS). It is important to note that paying tuition is not the same as registering for classes.

Grades

Grading basis for graduate courses deliberately includes both letter grades and P/F grades. Instructors should have the widest discretion possible in grading graduate students' work; therefore both grading bases are available to the instructor for courses at the graduate level. While policies in most departments vary, most graduate students receive letter grades or Pass/Fail grades for their coursework. Students should consult their department chairs and instructors to determine their grading requirements.

Letter Grades (A through F)

Changing letter grades of A through F to a Passing grade is not permissible at any time.

All other grade change requests (e.g., B to A) are acceptable only within one year of semester end date. Change requests beyond one year can only be changed as a result of clerical error and must be accompanied by a written explanation/justification from the course instructor.

Incomplete Grades (I)

Students who are confronted with compelling circumstances beyond their control that interfere with the ability to complete their semester's work during the normal course of a term may request an incomplete grade from the instructor. Approval of such a request is neither automatic nor guaranteed. Procrastination or distraction by other pursuits are not regarded as compelling circumstances, and extensions in these situations are unfair to students who have completed their course requirements within the allotted time.

If the instructor agrees to grant an incomplete grade, the instructor and student must establish a timetable for submitting the unfinished work, but no later than the end of the third week of the subsequent semester. See below for specific information about graduating students. When entering an incomplete grade in SIS, the instructor must also enter a reversion grade. This is the grade that the student will receive if the missing work is not completed. For example, if the student, based on the coursework completed by the end of the semester, would receive a C+ grade without the missing work, then the grade of I/C+ is entered on the transcript. If the incomplete grade is not resolved within the allowed period (the end of the third week of the subsequent semester), the incomplete grade is automatically converted to the reversion grade (a C+ in this example).

Incomplete grades do not affect a student's grade point average, which is based upon the grades that are available for the term. However, students with two or more incomplete grades on their record at the start of a semester may be prevented from making changes to their registration for the semester without the approval of the student's respective program/graduate affairs office.

Students who are on academic probation are not typically allowed to take incomplete grades in courses and must secure prior approval of their respective program and graduate affairs office for any exceptions.

Students who are in good academic standing have until the end of the third week of the next semester to finish incomplete work. Exceptions to this deadline require a petition from the instructor, and appeal to the student's respective graduate affairs office before the end of the third week of the following semester. When appealing to change the deadline, faculty members must specify a new date for completion of the work which must be before the end of the current semester. Incomplete grades cannot typically be held over into a third semester in order to complete the missing work, nor can incomplete grades be resolved by retaking the course.

Dropping a course with an Incomplete grade is not permissible at any time.

Changing an Incomplete grade to a final grade (A through F, Pass) may be done by the instructor if during the designated timeframe. After that deadline passes, grade change requests must be sent via a grade change form to the student's cognizant Dean's Office of Graduate Academic Affairs (Renee Eastwood, KSAS/Christine Kavanagh, WSE) for review and approval.

Special Rules for Graduating Students

Students with incomplete grades in required courses at the date of degree conferral will not graduate. Students with incomplete grades in courses that are not required for degree completion may still graduate. However, the deadline for completion is abbreviated; students must resolve incomplete grades within 30 days after the date of degree conferral which is when the university closes their graduate record.

In-Progress Grades (IP)

Reserved for courses in which it is expected that the assigned work will require more that one semester to be completed, but the course itself will meet for only one semester, such as graduate seminar courses.

Dropping a course with an IP grade is permissible only with the approval of the instructor, and the Dean's Office.

Changing an IP grade to a final grade (A through F, Pass) is acceptable at any time before the student's departure from the university, and requires the instructor's approval.

Missing Grades (MR, X)

A missing grade (denoted by an MR or an X on the transcript) appears if the instructor has not submitted a grade within the defined grading period for the semester.

- An instructor may submit a Grade Change form directly to the Office of the Homewood Registrar to change a MR or X grade to a final grade.
- Dropping a course with a MR or X grade is not permissible at any time.
- Changing a course with a MR or X grade to Audit is not permissible at any time.

Audit (AU)

When a graduate student enrolls in a course with Audit status, they must reach an understanding with the instructor as to what is required to earn the AU grade notation. If the student does not meet those expectations (e.g., fails to attend class), the instructor will notify the Office of the Homewood Registrar in order for the student to be retroactively dropped from the course. Dropped coursework does not appear on the student's transcript.

Changing a course registration from Audit (student receives no letter grade) to Credit (student receives letter grade), or from Credit to Audit is permissible during the official deadlines for each semester. Registration changes beyond this deadline are not permissible.

Changing a final grade (A through F, Pass, I, IP, MR, or X) to AU is not permissible at any time.

The following ASEN Graduate Courses **cannot** be taken for Audit:

- Graduate Research
- Dissertation Research
- Master's Thesis
- Master's Essay
- Independent Study

These courses can only be taken as P/F or for a letter grade, at the instructor's purview.

Add/Drop

The Homewood Registrar's website (https://studentaffairs.jhu.edu/registrar/students/graduate-registration/) has detailed timelines, deadlines, and approval requirements for add/drops. Note that all withdrawals will be noted with a W on the student's transcript.

The refund schedule (https://studentaffairs.jhu.edu/student-accounts/refunds/) can be found on the Student Account website.

Registration Holds

A registration hold will be placed for students who have not obtained clearance from the Office of International Services (OIS), Student Accounts, Student Health Insurance or Student Health and Wellness Offices. Students should meet with the office that placed the hold so that the hold can be removed. Students who have an advisor's hold on their registration must have their advisor release the hold online.

Transferring Courses

WSE Master's degrees (M.A., M.S., M.S.E) and PhDs

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, two courses completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the undergraduate degree-granting institution that the course was not applied to the undergraduate degree, and with JHU advisor/department approval. Students are encouraged to secure permission to transfer a course as early as possible in their time at JHU to avoid issues.

WSE graduate students may transfer in up to two graduate-level courses from another institution which were completed after the undergraduate degree was conferred, if evidence is provided that the course was not applied to any previous degree, and with JHU advisor/department approval. Students are encouraged to secure permission from their WSE master's/PhD program faculty advisor to transfer a course as early as possible in their time at JHU to avoid issues, and a transcript from any relevant academic institution must be included with conferral completion paperwork submitted to the Academic Affairs office. EXCEPTION: WSE master's students in a department#approved study abroad program can transfer in additional coursework (i.e., beyond two courses), but in total, at least half of the courses/credits applied to the WSE master's degree must be taken/earned at Johns Hopkins. Individual graduate programs reserve the right to enforce stricter policies.

Double Counting Courses

WSE Master's degrees (M.A., M.S., M.S.E) and PhDs

The Whiting School of Engineering (WSE) has established the following policies on double-counting coursework for all students in the full-time

(Homewood) programs and the part-time Engineering for Professionals (EP) programs. If an individual program adopts double-counting policies more strict than these, the program's policies override the school-wide policies. Students are encouraged to refer to individual program policies.

With bachelor's#master's and master's#master's double#counting, across any number of degree programs, a student can reduce the number of master's courses required by up to two (with approval of the programs involved). Beyond that, the remaining courses must be unique to the degree program. With a ten#course master's degree program, for example, eight of those courses must be unique to the program and not applied to a different degree at any level. A student can double#count any number of undergraduate courses to the various master's degrees (but at most, two to each master's program) and they can double#count the same course across any number of degrees pursued (again, with the approval of the programs involved).

WSE Bachelor's-Master's Double Counting

Coursework applied to a bachelor's degree: Students either in a WSE combined (bachelor's/master's) program or seeking a WSE master's degree after having earned a WSE or Krieger School of Arts and Sciences bachelor's degree may double-count two courses (400-level or higher) to both programs with the permission of the master's faculty advisor. WSE master's degree candidates may not double-count courses applied to a bachelor's degree earned at a different institution. Individual graduate programs reserve the right to enforce stricter policies.

Coursework not applied to a bachelor's degree:

For students who are either in a WSE combined bachelor's/master's degree program or have already earned a Whiting School of Engineering or Krieger School of Arts and Sciences bachelor's degree and are seeking a WSE master's degree, any graduate-level coursework (as defined by the WSE graduate program) not applied to the undergraduate degree may be applied to the graduate degree, regardless of when that course was taken (i.e., before or after the undergraduate degree has been conferred) with the permission of the master's faculty advisor.

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, two courses completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the degree-granting institution that the course was not applied to the undergraduate degree, and with advisor approval.

WSE Master's-Master's Double Counting

Coursework applied to a master's degree:
Students pursuing (1) a WSE master's and a master's from any JHU school simultaneously or (2) a WSE master's after having earned a master's from any JHU school may double-count either two semester-length courses or three quarter-length courses across two master's programs, as long as the courses are equivalent to the 400-level or higher in WSE full-time graduate programs. The student must receive approval from both master's degree program faculty advisors if both sets of degree requirements will be completed at the same time. For a student to double-count coursework from two master's degrees whose requirements are met at different times, the student must obtain only the approval of the faculty advisor in the program to be finished second. Individual graduate programs reserve the right to enforce stricter policies.

Timing and Ramifications for Current Students:
This policy will be applied to all students entering a WSE master's program in Fall 2007 and beyond. Any student who has entered a WSE master's program before then will be exempt from this policy and should follow the course arrangement made with their advisor, provided it is in compliance with departmental, school and university requirements.

Declaration of Double-Counted Course:
WSE master's students wishing to double-count courses must submit these courses to the WSE master's program for approval. If it is learned that a student has double-counted a course for the WSE master's degree without permission of the WSE master's program, this program reserves the right to revoke the degree.

Research and Scientific Writing Courses

Through the Center for Leadership Education graduate students may enroll in writing courses designed to assist with dissertation and grant writing. Students may enroll for this course at no additional charge. The course is offered in the fall and spring semesters however, space is limited. For additional information go to https://engineering.jhu.edu/cle/.

Transcripts

Transcripts may be requested from the Office of the Homewood Registrar. A request for one copy is normally processed within one to three business days of receipt of the request. Requests for multiple transcripts require additional processing time. Standard delivery of transcripts is by U.S. Mail first-class. Visit https://registrar.jhu.edu/credentials/transcripts/ for information on ordering transcripts. Partial transcripts of a student's record will not be issued.

Official and/or unofficial transcripts of work at other institutions that the student has presented for admission or evaluation of credit become the property of the university and cannot be copied or reissued. If a transcript of this work is needed, the student must obtain it directly from the issuing institution.

Summer and Intersession Courses

Summer Courses: while most summer courses offered at the Homewood Campus are undergraduate level courses, graduate students may enroll in these courses with permission from their department chair and the course instructor. No financial assistance is available for graduate students who wish to take summer courses. In special cases, graduate students may also take courses at other divisions of the institution.

Graduate students who are funded and pursuing their degree fulltime over the summer months need to register for at least 9 credits of their program's summer research course. This includes nonresident students who are fully funded by their programs over the summer. There is no tuition charge for an 800- level course in the summer. Please consult with your academic program for more information.

Intersession Courses: graduate students are eligible to enroll in Intersession coursework. Grades are generally given on an P/F scale. Some students use this period to participate in research, independent study, or internships. A list of Intersession offerings is published in late November or early December. A special form, available in the Homewood Registrar's Office, is used for Intersession registration. Students should register before winter break. Students who register for research, independent study, or an internship during Intersession must have the approval signature of their faculty sponsor and academic advising office. This opportunity is offered tuition-free.

Visit https://summerprograms.jhu.edu/program/intersession-program/ for more information.

Course Re-Take Policy

At the discretion of the Homewood graduate program, a graduate student may retake a course, but the grade from the initial effort will remain on the transcript. This applies whether the initial effort occurred while the student was an undergraduate student or a graduate student.

Academic Standing

The below policies apply to all new and continuing graduate students in the Homewood Schools, unless specifically noted otherwise.

Academic Review Policy

This policy applies to all full-time KSAS and WSE doctoral students and master's students conducting thesis research. Each graduate program is required to publish its own policies and standards with respect to academic standing. At the end of each semester, all full-time Homewood graduate programs are expected to review the academic records of their graduate students to evaluate academic progress. For more information, please review the Homewood Schools Graduate Student Academic Review Policy (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10).

WSE has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawal (http://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

Probation

Whenever it is determined that a graduate student has failed to meet minimum academic, research, and/or TA requirements, that student may be placed on academic probation.

This change in status requires a formal letter and a meeting between the student and either their faculty advisor, chair, and/or departmental director of graduate studies. The letter should clearly outline the student's academic shortcomings, indicate the corrective measures necessary to remain in the program and state the length of the student's probationary period. Any funding ramifications for the student should be included as well.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Dismissal

Dismissal After Probation

This must be done with a formal letter citing the reason for dismissal and requires a meeting between the student and their faculty advisor or the departmental director of graduate studies. Academic dismissal will be noted on the student's transcript at the request of the program and with the approval of the cognizant Dean. A student may appeal this decision.

Dismissal Without Probation

A student may be dismissed without a formal probation period under three circumstances:

1. Meet the conditions for dismissal based on coursework as stated by the academic program in its department handbook or on its website;
2. Fail an oral or written examination for which successful completion is necessary to continue in the program (as stated in the program's degree requirements), or fail to meet any condition resulting from a qualifying or GBO exam; or
3. Is found to have committed academic or research misconduct and expulsion is the outcome of the deliberations as outlined in the Homewood Graduate Academic Misconduct Policy (https://krieger.jhu.edu/hwgradaffairs/wp-content/uploads/sites/35/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf) or the University Research Integrity Policy (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf). Under these circumstances, programs are expected to follow the same procedures for Dismissal After Probation.

In addition, students are also subject to immediate dismissal on non-academic grounds in accordance with the Johns Hopkins Student Conduct Code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/) as well as all applicable policies at the university policies page. (https://www.jhu.edu/university-policies/)

Academic Dismissal Consequences

When a student is dismissed from the University, several consequences follow:

- The Office of the Homewood Registrar (https://studentaffairs.jhu.edu/registrar/) cancels the student's registration for the next semester, and authorizes a reversal of tuition assessed for that semester. This does <u>not</u> mean that the student directly receives a refund. For example, if the student has been funded by the department, the department would be eligible for the refunded funds. Additionally, any refund amount is subject to the refund schedule (https://studentaffairs.jhu.edu/student-accounts/refunds/) published by the Office of Student Accounts.
- Notation of dismissal may be placed on the student's transcript at the request of the program and with the approval of the cognizant Dean.
- The Office of Student Financial Services (https://finaid.jhu.edu/graduate-aid/) suspends financial aid to the student, and work-study aid.
- The Office of International Services (https://ois.jhu.edu/) performs duties as required by U.S. federal regulations regarding persons not eligible to study at the University.
- Eligibility for student health benefits (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) will end. Please contact the Office of the Homewood Registrar for specific information.
- The student loses access to university services, property, and nonpublic spaces.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-

Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Readmission Following Dismissal

The terms for readmitting a student who has been dismissed for academic reasons are established by individual departments. The readmission process should be described in the dismissal letter, if deemed appropriate. Students who have been dismissed should discuss the readmission process with their advisor. The terms for readmitting a student who has been dismissed for reasons other than academic/research/TA performance are decided by the student's cognizant Dean's Office of Academic Affairs.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Withdrawal

Once a student withdraws from the University, their student transcript is closed, and changes to their academic record will not be permitted. International students must consult with Office of International Services (https://ois.jhu.edu/) to ascertain their visa obligations before withdrawing from the university. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the university. If readmitted, they do not pay a second application fee, but must satisfy the residency requirement for the degree following readmission (even if previously satisfied), and pay all outstanding fees.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc. Note that the same ramifications as listed under 'Academic Dismissal Consequences' apply.

Voluntary Withdrawal

Students wishing to withdraw from the University must file a Termination/Withdrawal Form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) with their Department. Graduate students are encouraged to consult the chair of their department prior to submitting their written notice.

Withdrawal by Lack of Registration

Students who are not registered by the end of the fourth week of a given semester and either

- have not responded to correspondence from their department, advisor, Office of Academic Affairs, and/or Office of the Homewood Registrar about their intention to remain in the program, **or**
- have responded to correspondence but have not made effort to maintain a valid student status (defined as either enrolled or on an approved leave of absence), will have been deemed to have withdrawn themselves from the university and will be processed as a Withdrawn student in the student system (SIS).

It is important to note that paying tuition is not the same as registering for classes. For more information, please see the Student Enrollment Statuses (p. 1618) information under Academic Policies.

Withdrawal Consequences

Any outstanding fees will be followed up with the student/their department by the Office of Student Accounts. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the university.

Commencement and Degree Conferral

The below policies apply to both continuing and new students, unless noted specifically otherwise.

There are three official conferral dates each academic year for the University (December, May, August). The conferral date is printed on the diploma. A formal University Commencement Ceremony is held once per academic year, traditionally in May.

Students who have not satisfied all graduation requirements by the deadlines determined by the Homewood Graduate Board (KSAS PhDs and Master's and WSE PhDs) or the WSE Office of Graduate Education and Lifelong Learning (WSE Master's and D.Eng. students) are not eligible to participate in the university commencement ceremony. Each division may hold their own graduate recognition ceremonies which do not signify degree conferral.

Students who complete their degree requirements (1) in-between conferral periods or (2) in a conferral period before the diploma/transcript is updated may request an official statement of completion from the Office of the Homewood Registrar or the Homewood Graduate Board through their respective divisional graduate education office. Visit https://studentaffairs.jhu.edu/registrar/students/graduation/ for deadlines and official conferral dates.

Upon degree conferral, the graduate's record is closed. No changes thereafter can be made to the graduate's transcript.

A student will not be graduated with unresolved outstanding charges of misconduct or academic ethics violations.

Application for Graduation

All graduate students must submit an online Application to Graduate, through their SIS account, in order to generate degree conferral and receive a diploma. Students should consult with their degree program (academic program staff and/or the director of graduate study in their program), the Homewood Graduate Board's website, and the WSE engineering website respectively to determine current deadlines. The dates of these deadlines change each academic year.

In addition to submitting the general application to graduate, engineering students preparing to graduate from a master's degree must complete paperwork (typically called a degree/master's checklist) indicating the courses they intend to apply to their degree. This paperwork is distributed to students by each department's academic program staff, and once completed should be returned to them for program clearance before they in turn submit the paperwork to the WSE Office of Graduate and Lifelong Learning for final signoff. All double-counting, transfer, and bachelor's/master's course exceptions/allowances must be approved by the student's program prior to the submission of their program's degree checklist.

Completing Graduation Requirements

Departmental graduation requirements vary; therefore, students are encouraged to speak with their departmental academic program staff to learn details of their requirements.

KSAS Master's Degree Completion

All KSAS master's students must complete all of the following steps for the degree to be conferred, and to generate a diploma:

- An Application to Graduate must be submitted to the Office of the Homewood Registrar either online or on paper, depending upon status;
- Completion of registration in the semester that degree requirements are met
- Minimum of two consecutive semesters of registration as a full-time, resident graduate student
- Certification by a department or program committee that all departmental or committee requirements have been fulfilled
- Thesis approved by at least one reader when the department or program requires a thesis
- Submission of the thesis to the MSE Library Electronic Theses and Dissertations (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) when a Master of Arts with essay is being requested

KSAS Master's Time to Degree Policy (https://homewoodgrad.jhu.edu/academics/graduate-board/deadlines/)

WSE Master's Degree Completion

All WSE master's students must complete all of the following steps for the degree to be conferred, and to generate a diploma:

- An Application to Graduate must be submitted to the Office of the Homewood Registrar either online or on paper, depending upon status;
- Minimum of two consecutive semesters of registration as a full-time, resident graduate student;
- Completion of registration in the semester that degree requirements are met;
- Receive a passing grade in Academic Ethics and complete at least the Responsible Conduct of Research online course (students conducting research may need to complete additional requirements);
- Department-specific degree requirements checklist (completion certification) forms must be submitted to and approved by the department academic program staff, and then those forms must then be submitted to the WSE Office of Graduate Education and Lifelong Learning by the published deadline(s);
- If a formal master's essay, capstone, or project is used to complete degree requirements, the student should check with their academic program to determine if they must submit a properly-formatted document to the MSE Library Electronic Theses and Dissertations (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) system by the date listed on the WSE website; the emailed submission receipt (generated by the library) must be included in paperwork forwarded to the WSE Office of Graduate Education and Lifelong Learning.

WSE Master's Time to Degree Policy (https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/)

Visit: http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/ for more information on deadlines and policies.

DOCTORAL DEGREE COMPLETION (KSAS and WSE)

- A minimum of two consecutive semesters of registration as a full-time, resident graduate student;
- Completion of registration in the semester that degree requirements are met;
- Certification by a department or program committee that all school*, departmental, program, and/or committee requirements have been fulfilled;
- A dissertation approved by at least two referees appointed by the department or program committee** and submitted to the library. The dissertation must adhere to the Graduate Board Dissertation Guidelines. (Referees must certify that the dissertation is a significant contribution to knowledge and worthy of publication)
- Successful completion of a Graduate Board oral examination. As determined by the department or program committee, this is classified as either preliminary or a final examination
- Though time-to-degree is determined by the department and may not exceed 9 years, continuation in the program will be based/contingent upon satisfactory academic progress after eight years of enrollment. Any approved leave of absence would not count toward the 9 years. NOTE: the WSE time-to-degree is seven years.

**All Whiting School of Engineering doctoral students must complete training on academic ethics and responsible conduct of research. Krieger School of Arts and Sciences students must complete training on the responsible conduct of research if applicable.*

***Referees (also known as readers) are responsible for signing the 'readers letter/report' that confirms that the dissertation is a significant contribution to knowledge and worthy of publication. At least one referee should be internal to the student's academic program, external referees (to the university) must be approved by the Graduate Board through the same process as external examiners participating in the Graduate Board oral examination.*

Degree Completion Deadlines

Each spring semester, the Homewood Graduate Board and the WSE Office of Graduate Education and Lifelong Learning (for WSE master's and D.Eng. students) issues deadlines for submission of theses and essays, and degree requirements (courses, etc.) completion deadlines for the following academic year. These deadlines must be met for a student to be listed as a degree candidate. Students can access the calendar of deadlines on the Homewood Graduate Board's website (http://homewoodgrad.jhu.edu/academics/graduate-board/deadlines/) (for KSAS master's students, KSAS and WSE PhD students, WSE Master's and D.Eng. students), as well as the website of the WSE Office of Graduate Education and Lifelong Learning (for WSE Masters), or by contacting their department academic program staff.

- Students who complete their master's essay or doctoral dissertation after the end of a semester but before the first day of class of the next semester do not have to register for that next semester. (They will have to file for graduation in that semester, and will not be eligible for student payroll once they are no longer a registered student).
- Graduate students completing a final degree during the first eight weeks of the fall semester or the first four weeks of the spring semester will generate a tuition reimbursement for that semester to whatever entity covered the cost - the student, the department, the advisor, etc. This applies only to students for whom completion of a master's project, master's essay, master's journal submission, or doctoral thesis or for those resolving an incomplete is the sole remaining degree requirement at the start of the final semester.
- If a student completes a Tuition Deferral Form indicating an expectation to complete the degree within a specific grace period,

no payment is required to register for that semester. However, if the grace period deadline is not met that semester's tuition charge will be added to the student's account.

- Note that students who complete in the Grace Period for either the fall or spring semesters (or finish in the summer term), and are registered in the semester/term in which they completed are eligible to stay on student payroll until the degree conferral date.

Grades Towards Degree Completion

Grades must be submitted in SIS by the posted deadline for each semester, including grades for courses that are required for graduation. Graduating students who are taking courses at cooperative schools or other divisions of the University must make arrangements with their instructors on the first day of class to have final grades submitted to the host school's Registrar and then to the Homewood Registrar by the Homewood grade submission deadline. If such an arrangement cannot be made, students should reconsider staying enrolled in the course, as it may risk their ability to confer in their chosen period.

Graduate Board

The Homewood Graduate Board (http://homewoodgrad.jhu.edu/academics/graduate-board/) is responsible for the administration of policies and procedures for the Doctor of Philosophy in the Schools of Arts and Sciences and Engineering.

The Graduate Board oversees:

- Graduate Board Oral (GBO) Examinations for ASEN Ph.D. students: with the approval of the department chair, a GBO may be scheduled at any time during the academic year. Requests for a GBO examination must be submitted to the Graduate Board a minimum of three weeks before the examination is to take place.
- Dissertation/Thesis Instructions: The student is responsible for obtaining and observing the detailed instructions concerning submission of their dissertation/thesis from their departmental office, and the Homewood Graduate Board Office. Visit http://homewoodgrad.jhu.edu/academics/graduate-board/degree-candidacy/ for more information.
- Initial Ph.D. Degree confirmation
- Recommendations for conferral to the Doctor of Philosophy Board
- Vetting and recommending new PhD degree programs to the Doctor of Philosophy Board
- See the Homewood Graduate Post-Doctoral Affairs website (https://homewoodgrad.jhu.edu/) for more information.

Doctor of Philosophy Board

The Doctor of Philosophy Board (http://web.jhu.edu/administration/provost/initiatives/phd_board/) advises the Provost about University-wide issues pertaining to the PhD. It approves new degree programs and sets guidelines and policies that affect all PhD. students. The Board respects the strong tradition of local autonomy of the Schools, and seeks to enhance the visibility and prominence of PhD. education across the University.

The Homewood Graduate Board submits its list of approved KSAS and WSE PhD conferrals to the Doctor of Philosophy Board for final university approval. No PhD degree is officially conferred until after the Doctor of Philosophy Board has approved and recommended conferral to the President of the University, and the President approves.

Dissertation and Thesis/Essay Submission

ETD (Electronic Theses and Dissertations)

An ETD is a digital version of a dissertation that is available to the public via the Internet. Universities and colleges in the United States and abroad have been moving toward this type of publication for the past decade. In the Fall 2013, Johns Hopkins launched its own ETD portal and process.

All thesis and dissertation submissions must be through the ETD process and portal. See the ETD page for more information, deadlines, and instructions. (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/)

The student is responsible for obtaining and observing the detailed instructions concerning submission of their dissertation/thesis from their departmental office, the Homewood Graduate Board Office (http://homewoodgrad.jhu.edu/academics/graduate-board/degree-candidacy/)and ETD guidelines (http://guides.library.jhu.edu/etd/) of the Johns Hopkins Libraries and Museums. Students may also contact the ETD coordinator at etd-support@jhu.edu.

After submitting their dissertation to the ETD Submittal Tool (http://etd.library.jhu.edu), the library will check the dissertation for proper formatting and either approve it or contact the student to make required changes. After the ETD is approved the student will receive an approval confirmation from the system. Students are required to forward this approval email to their departmental academic staff and cc either the Associate Dean for Graduate Education and Lifelong Learning in WSE (Christine Kavanagh) or the Assistant Dean for Graduate and Postdoctoral Academic and Student Affairs in KSAS (Renee Eastwood) as appropriate, with the following items:

- The title of their dissertation typed in the body of the email in title case format with correct spelling and punctuation.
- The degree type and program/department
- A single PDF of the dissertation title page and abstract

The degree requirements are not complete unless the final ETD is submitted to the library by the published deadline and the above information and attachments are provided by the student to the Graduate Board Office via the email to the department and the cognizant Associate or Assistant Dean of Graduate Education and Postdoctoral Academic Affairs.

Graduate Alumni Enrollment

After degree conferral, KSAS and WSE Homewood graduate alumni who wish to enroll for coursework that does not lead to a degree are considered Visiting Graduate Students, and should follow the application and enrollment information located at http://homewoodgrad.jhu.edu/academics/visiting-grad-student-scholar-policies/

Admissions and Finances

Admission

Admission for Full-time, Residential Graduate Programs [1]

Programs of Study Information

Krieger School of Arts and Sciences (KSAS) fulltime, residential graduate programs of study information (p.)

Whiting School of Engineering (WSE) fulltime graduate programs of study (p.)

Please visit specific degree program websites to review their application and degree requirements.

General Application Process and Admissions Inquiries

Krieger School of Arts and Sciences (KSAS) Office of Graduate Admissions and Enrollment (https://grad.jhu.edu/)

Whiting School of Engineering (WSE) Office of Graduate Admissions (https://engineering.jhu.edu/graduate-admissions/)

Admissions/Information for Visiting Graduate Students and Volunteers

The schools of Arts and Sciences, and Engineering recognize and appreciate the contributions of volunteers and visiting graduate students to its mission of education and research and has policies in place to enable both schools to retain and set forth requirements pertaining to volunteers and visiting graduate students.

Interested Krieger School of Arts and Sciences (KSAS) applicants should visit: http://grad.jhu.edu/apply/visiting-students/ and interested Whiting School of Engineering (WSE) applicants should visit https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/visiting-students-scholars/

Costs of Attendance and Financial Aid

Costs of Attendance

See the Office of Student Financial Services' website for financial aid information (https://finaid.jhu.edu/).

See the Office of Student Accounts' website for tuition rates and refund schedule (https://studentaffairs.jhu.edu/student-accounts/tuition-fees/).

Funding, Financial Aid, and Student Loans

Graduate students should contact their department(s) for information concerning funding support availability. Information for the Whiting School is located at https://engineering.jhu.edu/graduate-studies/graduate-financial-aid/. Students who are seeking federal financial aid are required to fill out a new FAFSA form for each year of financial aid. For more information on student loans and work-study opportunities, visit the Student Financial Services website (http://www.jhu.edu/finaid/grads.html (https://finaid.jhu.edu/graduate-aid/)) or visit their office in Garland Hall.

Fellowships

Diversity Fellowships

Johns Hopkins is a community committed to sharing values of diversity and inclusion in order to achieve and sustain excellence. We firmly believe that we can best promote excellence by recruiting and retaining a diverse group of students, faculty and staff and by creating a climate of respect that is supportive of their success. This climate for diversity, inclusion and excellence is critical to attaining the best research, scholarship, teaching, health care, and other strategic goals of the Health System and the University. Taken together these values are recognized and supported fully by the Johns Hopkins Institutions leadership at all levels. Further, we recognize that the responsibility for excellence, diversity and inclusion lies with all of us at the Institutions: leadership, administration, faculty, staff and students.

WSE-Specific Graduate Fellowship Information

The Whiting School of Engineering offers a number of endowed fellowships that provide supplemental financial aid to incoming and current full-time engineering students. Full-time degree seeking graduate students are automatically considered for the fellowships. Visit WSE Graduate Fellowship and Grants (https://engineering.jhu.edu/education/graduate-studies/full-time-graduate-fellowships-grants/) for more information.

KSAS-Specific Graduate Fellowship Information

The Krieger School of Arts and Sciences offers an incredible array of opportunities for student researchers in the areas of natural science, social science, and humanities. Visit the KSAS Research (https://krieger.jhu.edu/research/) page for more information.

Veterans Educational Benefits

Johns Hopkins is approved by the Maryland Higher Education Commission for the training of veterans, service members, eligible spouses and dependents under the provisions of the various federal laws pertaining to veterans' educational benefits. Johns Hopkins University also complies with Federal Law Section 103 (effective Aug. 1, 2019) which ensures that Johns Hopkins University will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities, or the requirement that an eligible individual borrow additional funds, on any covered individual because of the individual's inability to meet their financial obligations to the institution due to the delayed disbursement funding from the VA under Chapter 31 or 33.

Information about veterans' benefits and enrollment procedures may be obtained at https://studentaffairs.jhu.edu/registrar/veterans/ or veterans@jhu.edu the Office of the Registrar, 75 Garland Hall, 410-516-6635.

Initial Enrollment

Once admitted to the university, the student must complete an Application for Program of Education or Training (VA Form 22-1990) from the Department of Veteran Affairs (https://benefits.va.gov/gibill/). A copy of the Certificate of Eligibility, can be sent to the Veterans Desk, veterans@jhu.edu. Additional delivery options can be found at https://studentaffairs.jhu.edu/registrar/veterans/.

The student who is transferring from another university or college will need to submit a Request for Change of Place of Training (VA Form 22-1995) from the Department of Veteran Affairs (https://benefits.va.gov/gibill/). The completed form should be submitted to the VA, and a copy sent to the Veterans Desk at the university.

When enrolling in classes, please select Third Party Payer as your billing method.

Re-enrollment

Students who received veterans' benefits at the university the preceding semester and plan to enroll with no change of objective should inform the Veterans Desk, veterans@jhu.edu at the time of registration that they want to be recertified under the provisions of their eligibility. Please select Third Party Payer as billing method.

Students receiving veterans' benefits must take courses that lead toward the exact objective (usually a specific degree) on the original VA application. Students utilizing veterans' benefits must let the Veteran

School Certifying Official know immediately of any change in their program or status that might affect the amount of their VA payment. If they fail to do so, the Department of Veterans Affairs will seek reimbursement from the student for any overpayment.

Standards of Progress

Continuation of VA payments depends on the student's meeting the university's academic standards for all students. The student must also meet any standards of progress which may be established by VA regulations.

Military TA

For guidance with utilizing Military tuition assistance please contact veterans@jhu.edu or Nancy Carr at ncarr5@jhu.edu .

The College Navigator Tool

Veteran students may go to the College Navigator (https://nces.ed.gov/collegenavigator/) to access a school comparison tool.

Student Life

Johns Hopkins is an active and supportive community, filled with students of different viewpoints, different cultures, and different backgrounds. The thing that brings them all together is their desire to be here and to celebrate everything Johns Hopkins has to offer. The following section details campus resources specifically relevant to the graduate student experience.

Graduate students are encouraged to visit two primary resources for graduate students at Homewood:

1. The Offices of Graduate and Postdoctoral Affairs (https://homewoodgrad.jhu.edu/) (for both Krieger and Whiting Graduate Students)
2. The Homewood Graduate Representative Organization (GRO) (https://studentaffairs.jhu.edu/gro/)

J-Card

The J-Card is the multi-use identification card used for Johns Hopkins students, faculty and staff. It is issued to students after registering for the first time. The Office of ID Card Services is located on the lower level of the Wyman Park building on the Homewood campus.

The card features typical identification information such as the person's name, photograph, classification (student, faculty or staff) and a randomly generated ID number.

The J-Card acts as the individual's library card for the Sheridan Library network. It allows the student to enter the MSE Library beyond Q-Level, to reserve and borrow books, and to pay for photocopies or document printing on library printers.

Students must show their J-Card in order to gain access to any campus computer lab. Additionally, student employees need to present their J-Card to pick up their paychecks from the Student Payroll Office.

The J-Card is also used for identification if a student has purchased a campus dining plan. J-Cash can be used at a number of restaurants and vending machines, on and off-campus. Funds can be added to any J-Card account online, over the phone, or by mail. Money can also be added in-person at various locations on campus. For more J-Card and J-Cash information, visit http://studentaffairs.jhu.edu/jcard/.

Lost or stolen J-Cards should be reported to the Office of ID Card Services by calling (410) 516-5121 (weekdays 8:30 A.M. to 5 P.M.) or the Office of Security by calling (410) 516-4600 (all other times). The account will be temporarily suspended and a new J-Card will need to be issued for a nominal fee.

Bookstore

The University's bookstore is located at the Barnes & Noble in Charles Commons on Saint Paul Street. Students can purchase textbooks and supplies at this location. Please visit their store website (http://johns-hopkins.bncollege.com/webapp/wcs/stores/servlet/BNCBHomePage/?storeId=18053&catalogId=10001&langId=-1) for hours of operation and other pertinent information.

Computer Access

Computers available to all faculty, staff, and students are located in several public computer labs and kiosks across the Homewood Campus. Labs in Krieger Hall, and the Milton S. Eisenhower Library feature extensive software allowing users to print, access email, the internet, and perform other general tasks as well as more advanced computing required for coursework and research. Computer kiosk locations in Krieger Hall, the Mattin Center, Hodson Hall, Levering Hall, and throughout the MSE library have more limited functionality.

The largest of all the Homewood labs is the Krieger Academic Computing Lab, located in 160 Krieger Hall. To gain access to the lab, students must swipe their J-Card at the locked gate. A lab consultant can be contacted during working hours by calling (410) 516-4242 or emailing consult@jhu.edu.

Security, Shuttles and Transportation

Security

The Johns Hopkins University Campus Safety and Security Office is dedicated to establishing and maintaining a safe and secure environment in which to work and visit. The Homewood Communication Center operates 24-hours a day seven days a week at the Homewood Campus. In keeping with the Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act, the Campus Safety and Security Office publishes crime reports and security bulletins. These may be found on the Public Safety Website (https://publicsafety.jhu.edu/).

Campus Security and local emergency services including Baltimore City Police, Fire or Ambulance can be summoned through Homewood's Communication Center from any campus phone by dialing 6-7777. The universal 911 number may also be used to reach Homewood's Communication Center from any on-campus phone. From off-campus, dial (410) 516-4600 to reach security. Crime and safety concerns may be reported to Campus Safety and Security by calling on-campus emergency numbers, (410) 516-7777 or 911. Additional services include the following:

- Anonymous Tip Hotline
- Crime Prevention Tips
- Escorts
- Lost and Found

- Property Registration
- Rape Aggression Defense (RAD)

Visit http://security.jhu.edu/index.html (http://security.jhu.edu/) for more information.

Shuttles and Transportation

Homewood Parking and Transportation provides services to faculty, staff and students. The primary services include:

- Homewood - Peabody - JHMI Shutttle
- Keswick - Homewood - Eastern - JHMI Shuttle
- Homewood - Bayview Express Shuttle
- Carey Business School Shuttle
- Remington Shuttle
- Homewood - Mt. Washington Express Shuttle
- Evening Blue Jay Shuttle Services
- Accessible Services

Visit http://ts.jhu.edu/ for schedules, locations and more information.

Office of University Experiential Learning (Student Employment)

The Office of University Experiential Learning (https://studentaffairs.jhu.edu/studentemployment/) is the human resources and employment center for full-time Homewood students who work for, or wish to work for, the University during their enrollment at Hopkins. The office processes all student paychecks and maintains employment records and supporting documents. The office also supports a web based job search program which students can access through their website. Students on Nonresident status must keep in mind that they can be paid at an hourly rate only, and the number of hours worked on campus may not exceed 19.9 per week.

A student job fair, hosted by the Office of University Experiential Learning, is held annually in September. Students have the opportunity to meet and interview with a variety of on- and off-campus employers at the fair. All tax forms and any other required paperwork must be filed with the Office of University Experiential Learning before students are eligible to receive their first paycheck from the University. Volunteer opportunities and community-service information can also be found at this office.

Federal Work Study (FWS): students who meet certain financial aid requirements have the option of applying for FWS positions. FWS is a federally funded program that allocates funds to the University to pay a portion of the student's salary. Approximately one-third of Hopkins students receive FWS funding. Eligibility for FWS positions is based on both the Free Application for Federal Student Aid (FAFSA) and the JHU Application for Financial Aid. The Office of Student Financial Services (https://finaid.jhu.edu/) determines eligibility based on federal regulations. An FWS award is valid for one academic year. Students must reapply each year. The maximum FWS award is $2,000. Awards may be less, depending on the type and amount of other financial assistance a given student receives. FWS employees are limited to 20 hours of work per week.

Jobs posted on the Office of University Experiential Learning website indicate whether the position is FWS or non-FWS. Job fairs and student-employment orientations also offer opportunities for students seeking FWS employment. Positions are available both on- and off-campus and encompass a wide variety of skills and interests, including lab work, web design, research, and more. Students in FWS positions are not prevented from working other paying jobs.

For more information about the Office of University Experiential Learning or to view current job postings and policies, please visit https://studentaffairs.jhu.edu/studentemployment/.

Tax Information

Student earnings are NOT automatically exempt from tax withholding, including Federal Work-Study earnings. All students are encouraged to complete and submit Tax Withholding Exemption Forms. Visit http://studentaffairs.jhu.edu/studentemployment/student-information/handbook/tax-information/ for more information.

The JHU Tax Office is available for general questions, and to point students to tax resources. The JHU Tax Office is unable to advise specifically on or prepare tax returns for JHU affiliates. Visit http://www.controller.jhu.edu/depts/tax/about_tax.html for more information.

Travel Resources

As graduate students prepare to go overseas for research, or to attend a conference, it is helpful to consider administrative, health, and safety issues before leaving the country. Graduate students are urged to complete the Johns Hopkins Travel Registry. Though this service is optional, travel registration can facilitate faster support in the event of an overseas emergency.

For more information and resources, visit http://homewoodgrad.jhu.edu/student-services/travel-resources/.

Life Design Lab

The Life Design Lab at Homewood has services ranging from resume and curriculum vitae development to on-campus recruiting. As graduate students begin thinking about professional opportunities to pursue with their degree, the Life Design Lab can help explore how skills, values, interests, and personality fit into this decision-making process.

For more information, visit https://studentaffairs.jhu.edu/life-design (https://studentaffairs.jhu.edu/life-design/).

Student Disability Services Office (SDS)

The SDS Office assists the University in compliance with the provisions of the Americans with Disabilities Act of 1990 (ADA), ADA Amendments Act (2008), and Section 504 of the Rehabilitation Act of 1973 for full-time undergraduate and graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering.

Johns Hopkins University does not discriminate on the basis of gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, veteran status, or other legally protected characteristic in any student program, activity administered by the University, admission, or employment.

A person with a disability is defined by the Rehabilitation Act of 1973, and by the Americans with Disabilities Act of 1990, as an individual who has a physical or mental impairment that substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment.

The SDS Office is located at 3510 North Charles Street in the AMRII Building, Suite 0004, and can be reached at (410) 516-4720 or studentdisabilityservices@jhu.edu.

Visit http://studentaffairs.jhu.edu/disabilities/ for more information.

Parking on Campus

Parking is available on campus for graduate students at the San Martin or Decker Garages at monthly rates. Graduate students receiving a paycheck from the University are eligible for payroll deduction to pay for parking. Hang tags for free evening and weekend parking alongside academic buildings are also available. Hang tags can be purchased for a nominal fee which are valid for a maximum of 3 years. Go to the Parking Office located in the South Garage (under Mason Hall and the Decker Quad), with your J-Card, to pick up your hang tag.

Visit http://ts.jhu.edu/Parking/index.html (http://ts.jhu.edu/Parking/) for more information.

In addition to these spaces, there are a number of metered and timed parking zones around campus. Check the ordinances governing these roadside spaces. Many have two-hour time limits.

Orientation and Welcome Events for New Graduate Students

There are many resources available to assist new students in their acclimation to the Johns Hopkins Community. Orientation and Welcome Events information can be found at Kreiger School of Arts and Sciences (http://grad.jhu.edu/student-life/orientation/) and Whiting School of Engineering (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/newly-admitted-students/graduate-student-orientation/). Resources on getting settled in Baltimore as a new graduate student can be found here: https://homewoodgrad.jhu.edu/life-at-hopkins/

Professional Development

The Life Design Lab at Homewood (https://studentaffairs.jhu.edu/life-design/) (formerly the Homewood Career Center) supports and serves all Krieger and Whiting undergraduates and masters students, regardless of post-graduate plans. Life Design educators are embedded within academic departments and centers across the Krieger School of Arts and Sciences, and the Whiting School of Engineering which allows students to more easily access life design programs and courses, experiential learning, and connections with alumni and employers.

The **PHutures Office** is developing a vision, strategy, and plan for enhancing the professional development, life design, alumni connections, employer engagement, and career and mentoring opportunities for doctoral students and Postdoctoral fellows at Johns Hopkins University, with special attention to the Krieger School of Arts and Sciences and the Whiting School of Engineering.

Recreation Center

Membership to the O'Connor Recreation Center is open to all faculty, staff, and students of the university. This includes Johns Hopkins University, Bayview Medical Center, Johns Hopkins Hospital, Johns Hopkins Medical Institutions, and the Applied Physics Lab (APL).

Gym

- Fitness and weight rooms
- Climbing wall
- Fields
- Tennis courts
- Pool (indoor)
- Experiential education
- Fitness classes (yoga, yogalates, Pilates, step aerobics, cardio kick boxing, muscle classes and dance-based classes). **Note**: there may be a fee involved for classes.

Visit https://studentaffairs.jhu.edu/recreation/ or call (410) 516-5229 for more information.

Religious and Spiritual Life

Religious and Spiritual Life promotes and supports spiritual development, theological reflections, religious tolerance and social awareness among students, faculty and staff within the university community. At its heart, it serves as a prophetic and pastoral presence which seeks to enhance the spiritual and ethical educational experience of the whole person mind, body and soul.

Visit https://studentaffairs.jhu.edu/campus-ministries/ or call (410) 516-1880 for more information.

Health and Wellness

Health Benefits

It is University policy that all full-time students in the Schools of Arts and Sciences and Engineering maintain adequate health insurance coverage to provide protection against unexpected accidents and illnesses. As a full-time student, you must either purchase the University plan, or sign a waiver indicating you have health insurance coverage comparable to the University plan. All international students with a F1 or J1 Visa status are ineligible to waive and are required to purchase the university plan. Details about student health benefits offered by the University is available at https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/.

Note: all full-time programs graduate students are auto-enrolled into coverage, and are responsible for following up with the Office of the Homewood Registrar's Health Insurance representative if they want to make changes, or have questions about enrollment in the plan.

Vision and Dental

Fully-funded graduate students are automatically enrolled in the vision/dental annual plan. All other graduate students may enroll in these benefits at their own cost- information can be found in SIS and on the Homewood Registrar's website.

Health and Wellness Center

The Student Health and Wellness Center exists to affirm the clear role of health and wellness in advancing academics. Its primary mission is to maintain and contribute to a healthy and safe learning environment for the student community in the Schools of Arts and Sciences, and Engineering.

Visit https://studentaffairs.jhu.edu/student-health/ or call (410) 516-8270 for more information.

Counseling Center

The Counseling Center serves full-time undergraduate and graduate students from the schools of Arts and Sciences, Engineering, Nursing, and the Peabody Institute. All of these students are encouraged to utilize the services offered by the Counseling Center.

The Counseling Center provides services to assist students in meeting their personal and mental health needs and goals. The Center has the resources to provide individual and group therapy, as well as psychiatric consultations to meet the needs of most students. The Center also offers consultation to students, faculty, staff, and parents on questions about situations and issues related to students and student-life problems.

All services are confidential and free of charge.

Visit https://studentaffairs.jhu.edu/counselingcenter/ or call (410) 516-8278 for more information.

Community Engagement

The Center for Social Concern emphasizes the value of service with others. Volunteers and community members enter into an educational process where both benefit from the interaction, and reciprocal learning is the common ground for all of our initiatives. Our programs and efforts are striving to create a strong community in and around the Johns Hopkins campus.

Visit https://studentaffairs.jhu.edu/socialconcern/ or call (410) 516-4777 for more information.

Housing

Johns Hopkins University does not offer graduate student housing. Prior to or upon arrival, graduate students should secure their own independent housing.

The Baltimore City neighborhood immediately surrounding the Homewood campus is called Charles Village. In addition, there are lots of other proximal areas in which students may consider living including Hampden, Waverly, Roland Park, Guilford, Remington, Mt. Vernon and others.

Incoming graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering who need housing accommodations while looking for a place to live can contact the Community Living Office for information on temporary housing.

Visit http://studentaffairs.jhu.edu/community-living/ or call (410) 516-8597 for more information.

Dining Services

An assortment of entrees, snacks, coffee beverages and other fare is available at a variety of on-campus locations that are open during all three meals and snack-times. Homewood's dining services can accommodate students with dietary restrictions whether that would be kosher, vegetarian, vegan, or other requirements. All locations accept J-Cards and cash, and some accept credit cards.

Off-Campus Dining: there are many restaurants surrounding the campus, and in adjacent neighborhoods. For the "insider's guide" to these venues, please contact the Graduate Representative Organization (GRO), which publishes information and student reviews on these and other Baltimore eateries. Visit the GRO's website at https://studentaffairs.jhu.edu/gro/.

Meal Plans: graduate students may opt to enroll in a meal plan. Meal plans on the Homewood campus are based on a block meal system, designed for both convenience and flexibility. Each block counts as one meal. Blocks expire at the end of each semester. In addition to blocks, points allow students to purchase food at the Levering Food Court, and Blue Jay Café. Points have a dollar-for-dollar value, and roll over from the fall to the spring. Points expire at the end of the spring semester.

Additional information on specific plans, kosher, or other dining options is available through the Community Living Office at http://studentaffairs.jhu.edu/community-living/dining-programs/.

Weather Emergencies

When there is an alteration or curtailment of the operating schedule of the University or a designated unit, an official announcement will be made on the University Emergency Telephone Hotline. As conditions may vary in the geographic areas where Johns Hopkins has campuses, there may be times when the Required Attendance Policy is invoked for some campuses and not others. In addition, conditions may be different on campus than they are in the area where a student lives. In times of bad weather, students should call the University Emergency Telephone Hotline to check on the status of the campus where they work.

- Baltimore - (410) 516-7781
- Outside Baltimore - (800) 548-9004

Each year the University publishes a list of radio and television stations that will be requested to announce operation changes. Because there can be mistakes in the message broadcasted, students can verify the message by calling the University Emergency Telephone Hotline.

Students may also check the JHU emergency resources at https://www.jhu.edu/alert/.

Graduate Student Organizations and Advocacy

There are a variety of graduate student organizations on campus, ranging from cultural, athletic, academic and social. For a sample of what is available to graduate students, please visit http://homewoodgrad.jhu.edu/life-at-hopkins/graduate-student-organizations/. For additional academic, cultural, athletic and social groups/organizations/clubs, please visit https://studentaffairs.jhu.edu/gro/events/list-of-groups/. Every group/organization/club is different, and some may only be open to undergraduate students, or to students from a certain campus, where others may not be bound by similar parameters. For more information, graduate students are encouraged to directly contact any group/organization/club in which they are interested. There are also several offices and student groups on the Homewood Campus that advocate for graduate students on issues both academic and pertaining to student life.

Graduate Representative Organization

The Johns Hopkins University Graduate Representative Organization (GRO) works with specific divisions to represent graduate student interests (health insurance subsidies, compensation) to various levels of the JHU administration. The GRO organizes graduate student orientation, social events, sports activities, funds campus groups, and much, much more. The GRO is proud to have earned the National Association of Graduate-Professional Students' (NAGPS) 2000 – 2001 Outstanding Graduate Student Association award, its highest honor.

The GRO is made up of graduate student representatives from every department at Homewood. This group of representatives, the GRO General Council, elects an Executive Board for an annual term. Together, the Council and Executive Board are responsible for programming, advocating, and facilitating communication for graduate students on the Homewood Campus. The GRO also holds occasional programs with the student government on the Medical Campus.

Visit the GRO at https://studentaffairs.jhu.edu/gro/.

Baltimore, the largest city in Maryland, is the center of a metropolitan area of 1.5 million people. Baltimore is a vital city long known for its ethnic neighborhoods where each wave of immigration to the United States has added to its character. People of many different backgrounds give the city a melting pot vitality that is reflected in the wide variety of restaurants, shops, and festivals. Information about Living in Baltimore is located at https://homewoodgrad.jhu.edu/life-at-hopkins (https://homewoodgrad.jhu.edu/life-at-hopkins/).

Krieger School of Arts and Sciences Contacts

Mary Favret
Vice Dean of Graduate Education, and Centers and Programs
mfavret1@jhu.edu

Renee Eastwood *(Can assist with both student life and academic issues in the KSAS)*
Assistant Dean of Graduate and Postdoctoral Academic and Student Affairs
410-516-8477
rseitz5@jhu.edu

Whiting School of Engineering Contacts

Sri Sarma
Vice Dean of Graduate Education and Lifelong Learning
ssarma2@jhmi.edu

Christine Kavanagh *(Can assist with both student life issues and academic issues in the WSE)*
Associate Dean for Residential Graduate and Postdoctoral Education

Associate Dean for Engineering Program Services
christinekavanagh@jhu.edu

The Office of Institutional Equity

Disability Services and Compliance

The Director of Student Disability Services serves as the central point of contact for information on physical and programmatic access, specific accommodations, resolution of complaints and problems, faculty and staff concerns, and identification of available services. In addition, the office can provide training, consultation, and information regarding disability issues.

Contact: Director (410) 516-8075, studentdisabilityservices@jhu.edu

Graduate students in the Krieger and Whiting Schools can also visit the Disabilities page: http://studentaffairs.jhu.edu/disabilities/.

Discrimination/Compliance

The Office of Institutional Equity Compliance and Education is responsible for the investigation and resolution of discrimination complaints received from faculty, staff, and students at Johns Hopkins University. OIE also provides mediation services for University related issues, as well as, education/training on sexual harassment.

Visit http://oie.jhu.edu/ or call (410) 516-8075 for more information. Information is also available at http://homewoodgrad.jhu.edu/student-services/sexual-assault-and-awareness/.

The Office of International Services (OIS) (https://ois.jhu.edu/) assists Hopkins' international community with visa status and with the challenges of making a transition from one setting to another.

International Graduate Students

Office of International Services (OIS) (https://ois.jhu.edu/)

OIS assists Hopkins' international community with visa status and with the challenges of making a transition from one setting to another.

The OIS staff are prepared to help with daily issues students face in adapting to an academically and culturally different environment. This office should be considered by international students as their primary source for important information regarding their status in the United States.

OIS staff members can answer questions and advise students on immigration regulations, financial concerns, health matters, housing, employment possibilities and other issues relating to an international student's period of stay in the U.S.

ISAH: International Students @ Hopkins

Ambassador Program

The application to serve as an ISAH Ambassador (https://studentaffairs.jhu.edu/oma/international-students/) is open to all undergraduate international students, graduate international students, international postdocs, and globally-conscious domestic students. Between 20-25 international student leaders will be selected from across all campuses to assist with key pillars of the international student experience: orientation, administration, socials, and international education.

International Bridge Program

Studying in a foreign country can be both challenging and exciting. International students often experience a period of cultural adjustment when they first arrive to the United States and specifically Johns Hopkins University.

The I (https://ois.jhu.edu/News_and_Events/Presentations/International_Bridge_Program/)nternational Student Bridge Program is (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/newly-admitted-students/new-international-students/) designed to better support this transition process for new international graduate students through monthly informational seminars and presentations on practical subjects- such as adjusting to graduate school in the US, taxes, credit in the United States, career preparations and enhancing communication and networking skills.

Departments, Program Requirements, and Courses

Course Identification

Courses listed in the catalogue are those the departments plan to offer, however, not every course is available during a given academic year. Necessarily, some courses will be canceled and other courses scheduled. The schedules of graduate and undergraduate courses for a given term are published before the end of the preceding term. In the course listings that follow, the credits shown are for one semester only. Credit hours are not assigned to graduate level courses in the School of Arts and Sciences; many departments instead indicate the hours of class time per week.

Course numbers are comprised of:

- a two-character code, identifying the school
- a three-digit code, identifying the department or program;
- a three-digit course number, with the first digit indicating level.
- Frequently, a course number will be followed by a code letter that identifies an area that is for purposes of the distribution requirements.

Code Numbers

Department and program code numbers for the School of Arts and Sciences and Engineering are as follows:

Code	Name
362	Africana Studies
070	Anthropology
553	Applied Mathematics and Statistics
375	Arabic
136	Archaeology
290	Behavioral Biology
020	Biology
580	Biomedical Engineering
250	Biophysics
540	Chemical and Biomolecular Engineering
660, 663	Center for Leadership Education
030	Chemistry
373	Chinese
560	Civil and Systems Engineering
040	Classics
050	Cognitive Science
300	Comparative Thought and Literature
601	Computer Science
700	Doctor of Engineering
270, 271	Earth and Planetary Science
310	East Asian Studies
180	Economics
520	Electrical and Computer Engineering
662	Engineering Management
060	English
370	English as a Second Language
660	Entrepreneurship & Management
570	Environmental Health & Engineering
061	Film and Media Studies
500	General Engineering
210-216	Modern Languages and Literature
384	Hebrew
381	Hindi
100	History
010	History of Art
140	History of Science and Technology
650	Information Security Institute
360	Interdepartmental
192	International Studies
194	Islamic Studies
378	Japanese
380	Korean
193	Jewish Studies Program
361	Latin American Studies
510	Materials Science and Engineering
110	Mathematics
530	Mechanical Engineering
145	Medicine, Science, and the Humanities
374	Military Science
389	Museum and Society Program
376	Music
130-134	Near Eastern Studies
080	Neuroscience
670	Nanobiotechnology
150	Philosophy
171-173	Physics and Astronomy
190,191	Political Science
661	Professional Communication
200	Psychological and Brain Sciences
280	Public Health Studies
377	Russian
230	Sociology
225	Theater Arts and Studies
371	Visual Arts
363	Women, Gender, and Sexuality
220	Writing Seminars

Course Numbers

Course numbers have the following significance:

Code	Name
100-299	Undergraduate course, lower level
300-499	Undergraduate course, upper level
500-599	Independent study/ research/ internship
600-799	Course offered for advanced degree programs

800-899	Independent study/ research and dissertation, graduate level

Code Letters

The following code letters are a guide to undergraduate distribution area designators and writing requirements:

Code	Name
(E)	Engineering
(H)	Humanities
(N)	Natural Sciences
(Q)	Quantitative Studies
(S)	Social and Behavioral Sciences
(W)	Writing Intensive

Applied Mathematics and Statistics

http://engineering.jhu.edu/ams (http://engineering.jhu.edu/ams/)

The Department of Applied Mathematics and Statistics is devoted to the study and development of mathematical disciplines especially oriented to the complex problems of modern society. A broad undergraduate and graduate curriculum emphasizes several branches of applied mathematics: *Probability*, the mathematical representation and modeling of uncertainty; *Statistics*, the analysis and interpretation of data; *Operations Research*, the design, analysis, and improvement of actual operations and processes; *Optimization*, the determination of best or optimal decisions; *Discrete Mathematics,* the study of finite structures, arrangements, and relations; *Scientific Computation,* which includes all aspects of numerical computing in support of the sciences; and *Financial Mathematics*, the modeling and analysis of financial markets.

Probability and Statistics is treated in the curriculum as a single general area, dealing in a unified way with theory and methodology for probabilistic representation of chance phenomena, applications of stochastic modeling to physical and social sciences, formulation of statistical models, fitting of statistical models to data, and interpretation of data. *Operations Research and Optimization* represents a second general area, dealing in unified fashion with the application of optimization theory, mathematical programming, computer modeling, stochastic modeling, and game theory to planning and policy problems such as scheduling, allocation of resources, and facility location. *Discrete Mathematics* includes the traditional themes of graph theory and combinatorics, as well as newer topics arising from modern technological and theoretical developments. The fourth general area, *Computational and Applied Mathematics*, covers topics pertaining to computing, numerical analysis, advanced matrix analysis, and mathematical modeling. *Financial Mathematics* addresses applications by making use of applied mathematics techniques and models from many of the above-mentioned areas.

In its fundamental role of representing applied mathematics at Johns Hopkins University, the Department of Applied Mathematics and Statistics is complemented by the Department of Mathematics, with its differing emphasis. Located in the School of Engineering, the Department of Applied Mathematics and Statistics fulfills a special integrative role, stemming in part from the affinity of engineers for applied mathematics and in part from the increasing need for interaction between science and engineering. The mathematical sciences, especially the mathematics of modeling, provide a common language and tools through which engineers can develop closer alliances and cooperation with other scientists.

The department’s degree programs include foundational and introductory course work drawing from all areas of the curriculum, along with specialized course work in areas such as probability, statistics, operations research, and optimization. Students, in consultation with their advisors, may develop challenging individual programs. The department emphasizes mathematical reasoning, mathematical modeling, abstraction from the particular, and innovative application all in a problem-oriented setting. The aim is to prepare graduates for professional careers in the mathematical sciences and related areas, in academic institutions as well as in governmental, industrial, and research organizations.

The undergraduate major in applied mathematics and statistics leads to the B.A. and B.S. degrees. The graduate program leads to the M.S.E. and Ph.D. degrees. In addition, under a combined bachelor’s/master’s program, exceptionally able undergraduates may be admitted early to simultaneous graduate work.

Facilities

The department is located in the Wyman Park Building. Office space and liberal access to computing facilities are provided to resident graduate students. A Reading/Commons Room provides the opportunity for informal discussions among faculty and graduate students. The university’s Milton S. Eisenhower Library maintains an excellent collection of literature in the mathematical sciences, including all of the important current journals.

Undergraduate Programs

The undergraduate major in applied mathematics and statistics may serve as preparation for employment as an applied mathematician, for graduate study in applied mathematics or related areas, or as general quantitative training for a career in business, medicine, or other fields. An undergraduate major in applied mathematics and statistics takes an individually tailored program of courses within the department and in the Department of Mathematics (calculus, and perhaps further courses such as differential equations, analysis, complex variables, topology, and modern algebra) and electives in science and engineering. By suitable choice of electives, heavy concentration in a specific field of engineering is possible.

In order to develop a sound program suited to individual needs and interests, the student should consult regularly with the faculty advisor. Additional advisory information may be obtained from the department office.

With the advice and consent of the faculty advisor, each student constructs an individualized program meeting the departmental major requirements. A written copy of the program should be on file with the faculty advisor, with whom it can be revised and updated from time to time.

Graduate Programs

A wide variety of advanced courses, seminars, and research opportunities is available in the Department of Applied Mathematics and Statistics. In addition to graduate programs in probability, statistics, operations research, optimization, discrete mathematics, scientific computation, and financial mathematics, advanced study is possible in interdisciplinary topics in cooperation with other departments, particularly the departments of Biostatistics, Computer Science, Economics, Environmental Health and Engineering, Health Services Administration, Mathematics, and Sociology. A graduate student in the Department of Applied Mathematics and Statistics may thus develop a program that suits their individual interests and objectives.

Requirements for the Bachelor's/Master's Program

Highly motivated and exceptionally well-qualified undergraduates may apply for admission to the combined bachelor's/master's program in applied mathematics and statistics. Interested students should apply no later than the fall semester of their senior year. The requirements for this program consist of those for the bachelor's and master's programs. Further information is available from the department office.

Admission

To be admitted to an advanced degree program in the department, an applicant must show that they have the basic intellectual capacity and has acquired the skills necessary to complete the program successfully within a reasonable period of time. A faculty committee evaluates each applicant's credentials; there are no rigid requirements.

Prospective applicants should submit transcripts of previous academic work, letters of recommendation from persons qualified to evaluate the applicant's academic performance and potential for graduate study, a statement of purpose describing anticipated professional goals, and Graduate Record Examination (GRE) scores (not required for PhD applicants). Foreign students must submit scores from the Test of English as a Foreign Language (TOEFL) or International English Language Testing System (IELTS).

Most applicants have undergraduate majors in quantitative fields such as mathematics, statistics, engineering, or a field in the physical sciences, but any major is permitted. Regardless of the major, completion of a program in undergraduate mathematics at least through advanced calculus and linear algebra is essential to begin the normal graduate program.

Programs

- Applied Mathematics and Statistics, Bachelor of Arts (p. 1154)
- Applied Mathematics and Statistics, Bachelor of Science (p. 1155)
- Applied Mathematics and Statistics, Master of Science in Engineering (p. 1157)
- Applied Mathematics and Statistics, Minor (p. 1159)
- Applied Mathematics and Statistics, PhD (p. 1160)
- Data Science, Master's Degree (p. 1160)
- Financial Mathematics, Master of Science in Engineering (p. 1162)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.553.100. Introduction to Applied Mathematics and Statistics. 1 Credit.
A seminar-style series of lectures and assignments to acquaint the student with a range of intellectual and professional activities performed by applied mathematicians and statisticians. Problems arising in applied mathematics and statistics are presented by department faculty and outside speakers. Recommended Course Background: one semester of Calculus.

EN.553.101. Freshman Experience in Applied Mathematics & Statistics. 1 Credit.
The aim of this course is to provide students with an opportunity to work on a project in a small group setting together with an AMS faculty member. Projects can be varied in nature depending on the faculty member working with a group. The goal of a group could be to develop knowledge of a domain area in which mathematics is applied, to develop knowledge of some technique(s) in applied mathematics, to bring applied mathematics to bear on some application, or to develop knowledge in some foundational topic in mathematics. Faculty will present possible topics to students in the first week of classes. Students will be asked to rank their interests (first choice, second choice, etc.), and will provide their schedules. Based on their preferences, their schedules, and subject to group size limitations, students will be organized into groups of size at most 3, and will be assigned to course sections in the second week of classes. One faculty member will lead each section and will arrange to meet with the group once per week for an hour.

EN.553.111. Statistical Analysis I. 4 Credits.
First semester of a general survey of statistical methodology. Topics include descriptive statistics, introductory probability, conditional probability, random variables, expectation, sampling, the central limit theorem, classical and robust estimation, confidence intervals, and hypothesis testing. Case studies from psychology, epidemiology, economics and other fields serve to illustrate the underlying theory. Some use of Minitab, Excel or R, but no prior computing experience is necessary. Recommended Course Background: four years of high school mathematics. Students who may wish to undertake more than two semesters of probability and statistics should consider EN.553.420-EN.553.430.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.553.211 OR EN.553.230 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.553.413 OR EN.560.435 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.560.348;Statistics Sequence restriction: students who have completed AS.230.205 may not enroll.

EN.553.112. Statistical Analysis II. 4 Credits.
Second semester of a general survey of statistical methodology. Topics include two-sample hypothesis tests, analysis of variance, linear regression, correlation, analysis of categorical data, and nonparametrics. Students who may wish to undertake more than two semesters of probability and statistics should strongly consider the EN.553.420-430 sequence.
EN.553.111 OR AS.230.205 OR AS.280.345 OR credit for AP Statistics

EN.553.122. Chance and Risk. 3 Credits.
The course is intended for humanities and social science majors. It will help students develop an appreciation of probability and randomness, and an understanding of its applications in real life situations involving chance and risk. Applications, controversies, and paradoxes involving risk in business and economics, health and medicine, law, politics, sports, and gambling will be used to illustrate probabilistic concepts such as independence, conditional probability, expectation, correlation, and variance. Class periods will typically include a combination of presentation of new material, an in-class activity, and class discussion. Attendance and class participation will be an important part of the learning experience. Prerequisites: There is no prerequisite beyond high school mathematics. The course is not open to students who have taken calculus.
Students may not have completed AS.110.106 OR AS.110.107 OR AS.110.108 OR AS.110.109 OR AS.110.113 OR AS.110.202 OR AS.110.211

EN.553.171. Discrete Mathematics. 4 Credits.
Introduction to the mathematics of finite systems. Logic; Boolean algebra; induction and recursion; sets, functions, relations, equivalence, and partially ordered sets; elementary combinatorics; modular arithmetic and the Euclidean algorithm; group theory; permutations and symmetry groups; graph theory. Selected applications. The concept of a proof and development of the ability to recognize and construct proofs are part of the course. Recommended Course Background: Four years of high school mathematics.
Prerequisite(s): EN.553.171 may not be taken concurrently with EN.553.471 or EN.553.472 or EN.553.671 or EN.553.672.
EN.553.171 may not be taken after EN.553.471 or EN.553.472 or EN.553.671 or EN.553.672.;Students may not earn credit for EN.553.171 and EN.553.172.

EN.553.172. Honors Discrete Mathematics. 4 Credits.
Introduction to the mathematics of finite systems. Logic; Boolean algebra; induction and recursion; sets, functions, relations, equivalence, and partially ordered sets; elementary combinatorics; modular arithmetic and the Euclidean algorithm; polynomials rings, group theory; permutations groups and Galois theory; graph theory. Selected applications. The concept of a proof and development of the ability to recognize and construct proofs and analyze algorithms are part of the course. Recommended Course Background: Four years of high school mathematics.
EN.553.172 may not be taken after EN.553.471 OR EN.553.472 OR EN.553.671 OR EN.553.672;Students may not earn credit for both EN.553.171 and EN.553.172.

EN.553.211. Probability and Statistics for the Life Sciences. 4 Credits.
This is an introduction to statistics aimed at students in the life sciences. The course will provide the necessary background in probability with treatment of independence, Bayes theorem, discrete and continuous random variables and their distributions. The statistical topics covered will include sampling and sampling distributions, confidence intervals and hypothesis testing for means, comparison of populations, analysis of variance, linear regression and correlation. Analysis of data will be done using Excel.
AS.110.106 OR AS.110.108 OR AS.110.113;Statistics Sequence restriction: Students who have completed any of these courses may not register: EN.550.230 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

EN.553.230. Introduction to Biostatistics. 4 Credits.
A self-contained course covering various data analysis methods used in the life sciences. Topics include types of experimental data, numerical and graphical descriptive statistics, concepts of (and distinctions between) population and sample, basic probability, fitting curves to experimental data (regression analysis), comparing groups in populations (analysis of variance), methods of modeling probability (contingency tables and logistic regression). Prerequisite: 3 years of high school mathematics

EN.553.281. Introduction to Mathematical Computing. 4 Credits.
This course introduces a variety of techniques for solving optimization problems in engineering and science on a computer using MATLAB. Topics include the programming language MATLAB, as well as optimization theory, algorithms, and applications. MATLAB optimization tools will also be explored. Algorithms to be covered will include gradient descent, Newton's method, and the simplex method. Applications will include constrained least squares regression, neural networks, and k-means clustering.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (AS.110.201 OR AS.110.212 OR EN.553.291)

EN.553.291. Linear Algebra and Differential Equations. 4 Credits.
An introduction to the basic concepts of linear algebra, matrix theory, and differential equations that are used widely in modern engineering and science. Intended for engineering and science majors whose program does not permit taking both AS.110.201 and AS.110.302.
AS.110.107 OR AS.110.109 OR AS.110.113

EN.553.310. Probability & Statistics for the Physical Sciences & Engineering. 4 Credits.
An introduction to probability and statistics at the calculus level, intended for engineering and science students planning to take only one course on the topics. Combinatorial probability, independence, conditional probability, random variables, expectation and moments, limit theory, estimation, confidence intervals, hypothesis testing, tests of means and variances, goodness-of-fit. Recommended co-requisite: multivariable calculus.Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
(AS.110.108 AND AS.110.109) OR AS.110.113;Statistics Sequence restriction: Students who have completed any of these courses may not register:EN.553.311 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348

EN.553.311. Probability and Statistics for the Biological Sciences and Engineering. 4 Credits.
An introduction to probability and statistics at the calculus level, intended for students in the biological sciences planning to take only one course on the topics. This coursewill be at the same technical level as EN.553.310. Students are encouraged to consider EN.553.420-430 instead. Combinatorial probability, independence,conditional probability, random variables, expectation and moments, limit theory, estimation, confidence intervals, hypothesis testing, tests of means and variances, andgoodness-of-fit will be covered. Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.Recommended Course Corequisite: AS.110.202
(AS.110.108 AND AS.110.109) OR AS.110.113;Statistics Sequence restriction: students who have completed any of these courses may not register: EN.553.310 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348

EN.553.361. Introduction to Optimization. 4 Credits.
An introductory survey of optimization methods, supporting mathematical theory and concepts, and application to problems of planning, design, prediction, estimation, and control in engineering, management, and science. Study of varied optimization techniques including linear programming, network-problem methods, dynamic programming, integer programming, and nonlinear programming. Students should be familiar with computing and linear algebra. Prerequisite: one year of calculus. Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
(AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212)

EN.553.362. Introduction to Optimization II. 4 Credits.
An introductory survey of optimization methods, supporting mathematical theory and concepts, and application to problems of planning, design, prediction, estimation, and control in engineering, management, and science. Study of varied optimization techniques including linear programming, network-problem methods, dynamic programming, integer programming, and nonlinear programming.
EN.550.361 AND (AS.110.202 OR AS.110.211)

EN.553.371. Cryptology and Coding. 4 Credits.
Computing experience. A first course in the mathematical theory of secure and reliable electronic communication. Cryptology is the study of secure communication: How can we ensure the privacy of messages? Coding theory studies how to make communication reliable: How can messages be sent over noisy lines? Topics include finite field arithmetic, error-detecting and error-correcting codes, data compressions, ciphers, one-time pads, the Enigma machine, one-way functions, discrete logarithm, primality testing, secret key exchange, public key cryptosystems, digital signatures, and key escrow.
(EN.550.171 OR EN.553.172) AND (EN.550.291 OR AS.110.201 OR AS.110.212)

EN.553.385. Numerical Linear Algebra. 4 Credits.
A first course on computational linear algebra and applications. Topics include floating-point arithmetic, algorithms and convergence, Gaussian elimination for linear systems, matrix decompositions (LU, Cholesky, QR), iterative methods for systems (Jacobi, Gauss Seidel), approximation of eigenvalues (power method, QR-algorithm) and also singular values and singular-value decomposition (SVD). Theoretical topics such as vector spaces, inner products, norms, linear operators, matrix norms, eigenvalues, and canonical forms of matrices (Jordan, Schur) are reviewed as needed. Matlab is used to solve all numerical exercises; no previous experience with computer programming is required.
(EN.553.291 OR AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

EN.553.386. Scientific Computing: Differential Equations. 4 Credits.
A first course on computational differential equations and applications. Topics include floating-point arithmetic, algorithms and convergence, root-finding (midpoint, Newton, and secant methods), numerical differentiation and integration, and numerical solution of initial value problems (Runge–Kutta, multistep, extrapolation methods, stability, implicit methods, and stiffness). Theoretical topics such as existence, uniqueness, and stability of solutions to initial-value problems, conversion of higher order/ non-autonomous equations to systems, etc., will be covered as needed. Matlab is used to solve all numerical exercises; no previous experience with computer programming is required.
(AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.302 OR AS.110.306).

EN.553.391. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.
EN.553.291 OR AS.110.201 OR AS.110.211

EN.553.400. Mathematical Modeling and Consulting. 4 Credits.
Creating, analyzing and evaluating optimization and mathematical models using case studies. Project-oriented practice and guidance in modeling techniques, with emphasis on communication of methods and results. Applications may include transportation networks, scheduling, industrial processes, and telecommunications. Computation will be emphasized throughout using MATLAB.
Students may receive credit for EN.550.400/EN.553.400 or EN.553.600, but not both.;EN.553.361 OR EN.553.362

EN.553.401. Introduction to Research. 3 Credits.
Aspects of the research process, including reading journal articles, writing mathematics, LaTeX, literature search, problem identification, problem-solving, oral presentations, Beamer, conference attendance, publication of results, and research ethics. An initial research experience, individually and/or in groups, with students identifying and developing projects in the mathematical sciences. Recent research topics have involved percolation, graph domination, Markov chains, birthday problems, gambler's ruin, integer programming, and rendezvous search problems. Instructor's permission required: Interested students must submit an unofficial transcript, vita, and personal statement to the instructor. Open only to undergraduates.

EN.553.402. Research and Design in Applied Mathematics: Data Mining. 4 Credits.
The course will be project oriented with focus on practical uses of machine learning and data mining. Throughout the semester, teams of 4 will work on topics decided by the students and the instructor.
EN.553.436

EN.553.413. Applied Statistics and Data Analysis. 4 Credits.
An introduction to basic concepts, techniques, and major computer software packages in applied statistics and data analysis. Topics include numerical descriptive statistics, observations and variables, sampling distributions, statistical inference, linear regression, multiple regression, design of experiments, nonparametric methods, and sample surveys. Real-life data sets are used in lectures and computer assignments. Intensive use of statistical packages such as R to analyze data.
Students may receive credit for EN.550.413/EN.553.413 or EN.553.613, but not both.;EN.553.112 OR EN.553.310 OR EN.553.311 OR EN.553.420

EN.553.414. Applied Statistics and Data Analysis II. 3 Credits.
Part II of a sequence on data analysis and linear models. Topics include categorical and discrete data analysis, mixed models, semiparametric and nonparametric regression, and generalized additive models. Applications of these methods using the R environment for statistical computing will be emphasized.
EN.550.413;Students may receive credit for EN.550.414/EN.553.414 or EN.553.614, but not both.

EN.553.420. Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, covariance and correlation, limit theorems. Students initiating graduate work in probability or statistics should enroll in EN.553.620 or EN.553.720. Prerequisites: one year of calculus. Corequisites: multivariable calculus and linear algebra.Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Students may receive credit for EN.550.420/EN.553.420 or EN.553.620, but not both.;AS.110.109 OR AS.110.113;AS.110.201 OR AS.110.202 OR AS.110.211 OR AS.110.212, can be taken concurrently.

EN.553.421. Honors Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, exchangeability, joint distributions, conditional distributions and expectation, covariance and correlation, limit theorems. The honors version of this course will have enrichment exercises that explore and extend ideas learned in the ordinary lecture. Students initiating graduate work in probability or statistics should enroll in EN.550.620. Auditors are not permitted. Recommended Course Background: one year of calculus and mathematical maturity; Co-requisite: multivariable calculus. By permission of the instructor or by recommendation of an AMS faculty member.

EN.553.426. Introduction to Stochastic Processes. 4 Credits.
Mathematical theory of stochastic processes. Emphasis on deriving the dependence relations, statistical properties, and sample path behavior including random walks, Markov chains (both discrete and continuous time), Poisson processes, martingales, and Brownian motion. Applications that illuminate the theory. Students may receive credit for EN.553.426 or EN.553.626.
Prerequisite(s): Students may not enroll in EN.553.420 in the same semester.
(EN.550.420 OR EN.553.620) AND (EN.550.291 OR AS.110.201 OR AS.110.212);Students may receive credit for EN.550.426/EN.553.426 or EN.553.626, but not both.

EN.553.427. Stochastic Processes and Applications to Finance. 4 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science.Students may only earn credit for one of EN.553.427 or EN.553.627.
EN.553.420 OR EN.553.620;Students may receive credit for only one of EN.550.427, EN.553.427, OR EN.553.627

EN.553.428. Stochastic Processes and Applications to Finance II. 4 Credits.
A basic knowledge of stochastic calculus and Brownian motion is assumed. Topics include stochastic differential equations, the Feynman-Kac formula and connections to partial differential equations, changes of measure, fundamental theorems of asset pricing, martingale representations, first passage times and pricing of path-dependent options, and jump processes.
EN.553.427 OR EN.553.627;Students may receive credit for EN.550.428/EN.553.428 or EN.553.628, but not both.

EN.553.430. Introduction to Statistics. 4 Credits.
Introduction to mathematical statistics. Finite population sampling, approximation methods,classical parametric estimation, hypothesis testing, analysis of variance, and regression. Bayesian methods.
(EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.430/EN.553.430 or EN.553.630 or EN.553.431, but not all.

EN.553.431. Honors Introduction to Statistics. 4 Credits.
Introduction to the theory and methodology of mathematical statistics: parametric estimation, including asymptotic properties of estimators and approximation methods; hypothesis testing; analysis of variance; regression; bootstrapping and nonparametrics. Intended for students with a particular interest in the theoretical foundations of statistical procedures.
EN.553.420 AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (AS.110.202 OR AS.110.211);Students may receive credit for only one of EN.553.430, EN.553.431 or EN.553.630.

EN.553.432. Bayesian Statistics. 3 Credits.
The course will cover Bayesian methods for exploratory data analysis. The emphasis will be on applied data analysis in various disciplines. We will consider a variety of topics, including introduction to Bayesian inference, prior and posterior distribution, hierarchical models, spatial models, longitudinal models, models for categorical data and missing data, model checking and selection, computational methods by Markov Chain Monte Carlo using R or Matlab. We will also cover some nonparametric Bayesian models if time allows, such as Gaussian processes and Dirichlet processes.
(EN.553.420 OR EN.553.620) AND (EN.553.430 OR EN.553.431 OR EN.553.630);Students may take only one of EN.550.632, EN.553.432, EN.553.632 or EN.553.732.

EN.553.433. Monte Carlo Methods. 4 Credits.
The objective of the course is to survey essential simulation techniques for popular stochastic models. The stochastic models may include classical time-series models, Markov chains and diffusion models. The basic simulation techniques covered will be useful in sample-generation of random variables, vectors and stochastic processes, and as advanced techniques, importance sampling, particle filtering and Bayesian computation may be discussed.
Students may receive credit for EN550.433/EN.553.433 or EN.553.633, but not both.;EN.553.430 OR EN.553.431 OR EN.553.630

EN.553.436. Introduction to Data Science. 4 Credits.
Today the term Data Science is widely used covering a broad range of topics from mathematics and algorithms to actual data analysis and machine learning techniques. This course provides a thorough survey of relevant methods balancing the theory and the application aspects. Accordingly, the material and the discussions alternate between the methodology along with its underlying assumptions and the implementations along with their applications. We will cover several supervised methods for regression and classification, as well as unsupervised methods for clustering and dimensional reduction. To name a few in chronological order, the topics will include generalized linear regression, principal component analysis, nearest neighbor and Bayesian classifiers, support vector machines, logistic regression, decision trees, random forests, K-means clustering, Gaussian mixtures and Laplacian eigenmaps. The course uses Python and Jupyter Notebook and includes visualization techniques throughout the semester. Time permitting, an introduction to the Structured Query Language (SQL) is provided toward the end of the semester.
Students may receive credit for EN.550.436/EN.553.436 or EN.553.636, but not both.;(AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.550.291)

EN.553.439. Time Series Analysis. 3 Credits.
Time series analysis from the frequency and time domain approaches. Descriptive techniques; regression analysis; trends, smoothing, prediction; linear systems; serial correlation; stationary processes; spectral analysis.
(EN.553.310[C] OR EN.553.311 OR EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.439/EN.553.439 or EN.553.639, but not both.

EN.553.441. Equity Markets and Quantitative Trading. 3 Credits.
This course introduces equity markets from a mathematical point of view. The properties of equities and equity-linked instruments will be described. Several quantitative trading strategies will be studied. Order execution tactics and the effect of market structure will be analyzed. Students will select a specialized aspect of the equity markets to investigate and complete a related independent project.
EN.553.442 OR EN.553.642 or instructor's permission.;Students may receive credit for EN.550.441/EN.553.441 or EN.553.641, but not both.

EN.553.442. Investment Science. 4 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision-making. Topics covered in the course include the basic theory of interest and its application to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory, and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, portfolio evaluation. The student is expected to be comfortable with the use of mathematics as a method of deduction and problem solving. Students may not receive credit for both EN.550.342 and EN.553.442Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Students may receive credit for only one of EN.550.342, EN.550.442, EN.553.442 or EN.553.642;(AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.620 OR EN.553.430 OR EN.553.431 OR EN.553.630)

EN.553.444. Introduction to Financial Derivatives. 4 Credits.
This course will develop the mathematical concepts and techniques for modeling cash instruments and their hybrids and derivatives.
Students may receive credit for EN.550.444/EN.553.444 or EN.553.644, but not both.;AS.110.302 AND EN.553.420

EN.553.445. Interest Rate and Credit Derivatives. 4 Credits.
Advances in corporate finance, investment practice and the capital markets have been driven by the development of a mathematically rigorous theory for financial instruments and the markets in which they trade. This course builds on the concepts, techniques, instruments and markets introduced in EN.553.444. In addition to new topics in credit enhancement and structured securities, the focus is expanded to include applications in portfolio theory and risk management, and covers some numerical and computational approaches.
EN.553.444 OR EN.553.644;Students may receive credit for EN.550.445/EN.553.445 or EN.553.645, but not both.

EN.553.446. Risk Measurement/Management in Financial Markets. 4 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings and compensatory techniques are addressed.
Students may receive credit for EN.550.446/EN.553.446 or EN.553.646, but not both.;EN.553.444 OR EN.553.644

EN.553.447. Quantitative Portfolio Theory and Performance Analysis. 4 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including, Sharpe, Treynor and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement and attribution; Replicating Benchmark Index (RBI) strategies using cash securities / derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management: Passive, Quasi-Passive (Indexing) Semi-Active (Immunization & Dedicated) Active (Scenario, Relative Value, Total Return and Optimization). In addition, risk management and hedging techniques are also addressed.
Students may receive credit for 550.447/553.447 OR EN.553.647, but not both.

EN.553.448. Financial Engineering and Structured Products. 4 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis).
EN.553.442 OR EN.553.642 OR EN.553.444 OR EN.553.644;Students may receive credit for EN.550.448/EN.553.448 or EN.553.648, but not both.

EN.553.449. Advanced Equity Derivatives. 4 Credits.
This course will cover the pricing, trading and risk management of equity derivatives, with emphasis on more exotic derivatives such as path-dependent and multi-asset derivatives. The course will emphasize practical issues: students will build their own pricing and risk management tools, and gain experience simulating the dynamic hedging of a complex derivatives portfolio. Students will practice structuring and selling equity derivative products. Pricing issues such a model selection, unobservable input parameters and calibration will be discussed, and students will learn techniques to manage the often highly nonlinear and discontinuous risks associated with these products. The course will have a significant computing component: both in the classroom and as homework projects, students will use Excel, write VBA macros and write and call C++ routines in the Microsoft Windows environment (which is the most common computing environment used by the financial industry).
Students may receive credit for EN.550.449/EN.553.449 or EN.553.649, but not both.;EN.553.444 OR EN.553.644

EN.553.450. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional “omics” data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful).
(EN.553.420 OR EN.553.620) AND (EN.553.430 OR EN.553.431 OR EN.553.630) OR equivalent courses in probability and statistics.;Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

EN.553.453. Mathematical Game Theory. 4 Credits.
Mathematical analysis of cooperative and noncooperative games. Theory and solution methods for matrix game (two players, zero-sum payoffs, finite strategy sets), games with a continuum of strategies, N-player games, games in rule-defined form. The roles of information and memory. Selected applications to economic, recreational, and military situations. Prereq: Multivariable Calculus, probability, linear algebra.
Students may receive credit for EN.550.453/EN.553.453 or EN.553.653, but not both.;(AS.110.202 OR AS.110.211) AND (EN.550.420 OR EN.553.620) AND (EN.550.291 OR AS.110.201 OR AS.110.212)

EN.553.461. Optimization in Finance. 4 Credits.
A survey of many of the more important optimization methods and tools that are found to be useful in financial applications.
Students may receive credit for EN.550.461/EN.553.461 or EN.553.661, but not both.;EN.553.442 OR EN.553.642 OR EN.553.444 OR EN.553.644

EN.553.463. Network Models in Operations Research. 4 Credits.
In-depth mathematical study of network flow models in operations research, with emphasis on combinatorial approaches for solving them. Introduction to techniques for constructing efficient algorithms, and to some related data structures, used in solving shortest-path, maximum-volume, flow, and minimum-cost flow problems. Emphasis on linear models and flows, with brief discussion of non-linear models and network design.
Students may receive credit for EN.550.463/EN.553.463 or EN.553.663, but not both.;EN.553.361 OR EN.553.661 OR EN.553.761 OR EN.553.461

EN.553.465. Introduction to Convexity. 4 Credits.
Convexity is a simple mathematical concept that has become central in a diverse range of applications in engineering, science and business applications. Our main focus from the applications perspective will be the use of convexity within optimization problems, where convexity plays a key role in identifying the "easy" problems from the "hard" ones. The course will have an equal emphasis on expositing the rich mathematical structure of the field itself (properties of convex sets, convex functions, Helly-Caratheorody-Radon type theorems, polarity/duality, subdifferential calculus, polyhedral theory), and demonstrating how these ideas can be leveraged to model and solve optimization problems (via a detailed study of linear programming and basics of nonlinear convex optimization).
Recommend Course Background: Familiarity with basic real analysis, linear algebra.
Students may receive credit for EN.550.465/EN.553.465 or EN.553.665, but not both.

EN.553.467. Deep Learning in Discrete Optimization. 3 Credits.
The goal of the course is to examine research-level topics in the application of deep-learning techniques to the solution of computational problems in discrete optimization. The first part of the course will cover background material, introducing students to deep learning (focusing on practical aspects) and covering major topics in computational discrete optimization: heuristic methods, dynamic programming, linear programming, cutting planes, column generation, and branch-and-bound. We will then make an in-depth study of research papers where deep learning has been proposed as a solution-technique in discrete optimization, aiming towards discussionsof open research questions. Prerequisites: General mathematical maturity is expected: students should feel comfortable reading on their own Part 1 (Applied Math and Machine Learning Basics) in the text Deep Learning by Goodfellow, Bengio, and Courville.

EN.553.471. Combinatorial Analysis. 4 Credits.
Counting techniques: generating functions, recurrence relations, Polya's theorem. Combinatorial designs: Latin squares, finite geometries, balanced incomplete block designs. Emphasis on problem solving. Recommended Course Background: AS.553.291 or AS.110.201Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Prerequisite(s): EN.553.171 may not be taken concurrently with EN.553.471, EN.553.472, EN.553.671, or EN.553.672.
(AS.110.109 OR AS.110.113) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.471/EN.553.471 or EN.550.671/EN.553.671, but not both.

EN.553.472. Graph Theory. 4 Credits.
Study of systems of "vertices" with some pairs joined by "edges." Theory of adjacency, connectivity, traversability, feedback, and other concepts underlying properties important in engineering and the sciences. Topics include paths, cycles, and trees; routing problems associated with Euler and Hamilton; design of graphs realizing specified incidence conditions and other constraints. Attention directed toward problem solving, algorithms, and applications. One or more topics taken up in greater depth.
Prerequisite(s): EN.550.171 may not be taken concurrently with EN.550.471 or EN.550.472
EN.550.291 OR AS.110.201 OR AS.110.212;Students may receive credit for EN.550.472/EN.553.472 or EN.553.672, but not both.

EN.553.481. Numerical Analysis. 4 Credits.
Brief review of topics in elementary numerical analysis such as floating-point arithmetic, Gaussian elimination for linear equations, inter-polation and approximation. Core topics to be covered: numerical linear algebra including eigenvalue and linear least-squares problems, iterative algorithms for nonlinear equations and least squares problems, and convergence theory of numerical methods. Other possible topics: sparse matrix computations, numerical solution of partial differential equations, finite element methods, and parallel algorithms.
(AS.110.202 OR AS.110.211) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.291 OR AS.110.302 OR AS.110.417 OR EN.553.386 OR EN.553.388 OR EN.553.391);Students may take only one of EN.550.681, EN.553.481, EN.553.681 or EN.553.781.

EN.553.488. Computing for Applied Mathematics. 3 Credits.
The aim of this course is to develop students' programming skills for solving problems commonly encountered in applied mathematics contexts. Specific problems that arise in applications of mathematics and data science (e.g. from finance, data analysis, or the physical sciences) are used to motivate concepts, techniques, and paradigms related to computation and programming. The Python language as well as a large collection of packages will be introduced. Students should be comfortable using computers but no prior programming background is required.
EN.553.310 OR EN.553.311 OR (EN.553.420 AND (EN.553.430 OR EN.553.431));Students may receive credit for EN.550.488/EN.553.488 or EN.553.688, but not both.

EN.553.491. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.

EN.553.492. Mathematical Biology. 3 Credits.
This course will examine the mathematical methods relevant to modeling biological phenomena, particularly dynamical systems and probability. Topics include ordinary differential equations and their simulation; stability and phase plane analysis; branching processes; Markov chains; and stochastically perturbed systems. Biological applications will be drawn from population growth, predator-prey dynamics, epidemiology, genetics, intracellular transport, and neuroscience.
(EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306 OR EN.553.291);Students may receive credit for EN.550.492/EN.553.492 or EN.553.692, but not both.

EN.553.493. Mathematical Image Analysis. 4 Credits.
This course gives an overview of various mathematical methods related to several problems encountered in image processing and analysis, and presents numerical schemes to address them. It will focus on problems like image denoising and deblurring, contrast enhancement, segmentation and registration. The different mathematical concepts shall be introduced during the course; they include in particular functional spaces such as Sobolev and BV, Fourier and wavelet transforms, as well as some notions from convex optimization and numerical analysis. Most of such methods will be illustrated with algorithms and simulations on discrete images, using MATLAB. Prerequisites : linear algebra, multivariate calculus, basic programming in MATLAB. Recommended Course Background: Real analysis
(AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.201 OR AS.110.212);Students may receive credit for EN.550.493/EN.553.493 or EN.553.693, but not both.

EN.553.494. Applied and Computational Multilinear Algebra. 3 Credits.
In this seminar we plan to discuss generalizations of theorems and algorithms from matrix theory to hypermatrices. More specifically the seminar will discuss hypermatrix/tensor algebras, rank, spectra and transforms. Using the python friendly free open-source mathematics software SageMath and the hypermatrix algebra package we will discuss applications of hypermatrices to combinatorics, machine learning and data analysis.Preliminary knowledge of the Python language is not required.
AS.110.201 OR AS.110.212 OR EN.550.291;Students may receive credit for EN.550.494/EN.553.494 or EN.553.694, but not both.

EN.553.500. Undergraduate Research. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged individually between students and faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.501. Senior Thesis. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.502. Undergraduate Independent Study. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged individually between students and faculty. Recent topics and activities: percolation models, data analysis, course development assistance, and dynamical systems.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.506. Capstone Experience in Data Science. 3 - 6 Credits.
Project work for Data Science Master's students. Arranged individually between students and faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.512. Group Undergraduate Research. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged meetings between students and faculty. This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.552. Undergraduate Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.600. Mathematical Modeling and Consulting. 4 Credits.
Creating, analyzing and evaluating optimization and mathematical models using case studies. Project-oriented practice and guidance in modeling techniques, with emphasis on communication of methods and results. Applications may include transportation networks, scheduling, industrial processes, and telecommunications. Computation will be emphasized throughout using MATLAB. Recommend Course Background: EN.553.361 OR EN.553.362.
Students may receive credit for EN.550.400/EN.553.400 or EN.553.600, but not both.

EN.553.601. Introduction to Research. 3 Credits.
Aspects of the research process, including reading journal articles, writing mathematics, LaTeX, literature search, problem identification, problem-solving, oral presentations, Beamer, conference attendance, publication of results, and research ethics. An initial research experience, individually and/or in groups, with students identifying and developing projects in the mathematical sciences. Recent research topics have involved percolation, graph domination, Markov chains, birthday problems, gambler's ruin, integer programming, and rendezvous search problems. Instructor's permission required: Interested students must submit an unofficial transcript, vita, and personal statement to the instructor. Prereq: (553.171 or 553.172) and (553.420 or 553.620). Open only to graduate students.

EN.553.602. Research and Design in Applied Mathematics: Data Mining. 4 Credits.
The course will be project oriented with focus on practical uses of machine learning and data mining. Throughout the semester, teams of 4 will work on topics decided by the students and the instructor.
EN.553.636

EN.553.613. Applied Statistics and Data Analysis. 4 Credits.
An introduction to basic concepts, techniques, and major computer software packages in applied statistics and data analysis. Topics include numerical descriptive statistics, observations and variables, sampling distributions, statistical inference, linear regression, multiple regression, design of experiments, nonparametric methods, and sample surveys. Real-life data sets are used in lectures and computer assignments. Intensive use of statistical packages such as R to analyze data. Recommended Course Background: EN.553.112 or EN.553.310 or EN.553.311 or EN.553.420.
Students may receive credit for EN.550.413/EN.553.413 or EN.553.613, but not both.

EN.553.614. Applied Statistics and Data Analysis II. 3 Credits.
Part II of a sequence on data analysis and linear models. Topics include categorical and discrete data analysis, mixed models, semiparametric and nonparametric regression, and generalized additive models. Applications of these methods using the R environment for statistical computing will be emphasized.
Students may receive credit for EN.550.414/EN.553.414 or EN.553.614, but not both.

EN.553.620. Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, covariance and correlation, limit theorems. Recommended course background: (AS.110.109 or AS.110.113) and previously or concurrently (AS.110.202 or AS.110.201 or AS.110.212).
Students may receive credit for EN.550.420/EN.553.420 or EN.553.620, but not both.

EN.553.626. Introduction to Stochastic Processes. 4 Credits.
Mathematical theory of stochastic processes. Emphasis on deriving the dependence relations, statistical properties, and sample path behavior including random walks, Markov chains (both discrete and continuous time), Poisson processes, martingales, and Brownian motion. Applications that illuminate the theory. Students may receive credit for EN.553.426 or EN.553.626. Recommended course background: (EN.553.291 OR AS.110.201 OR AS.110.212).
Prerequisite(s): Students may not enroll in EN.553.620 in the same semester.
Students may receive credit for EN.550.426/EN.553.426 or EN.553.626, but not both.;EN.553.620

EN.553.627. Stochastic Processes and Applications to Finance. 4 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science. Recommend Course Background: EN.553.620.
Students may receive credit for only one of EN.550.427, EN.553.427, EN.553.627

EN.553.628. Stochastic Processes and Applications to Finance II. 4 Credits.
A basic knowledge of stochastic calculus and Brownian motion is assumed. Topics include stochastic differential equations, the Feynman-Kac formula and connections to partial differential equations, changes of measure, fundamental theorems of asset pricing, martingale representations, first passage times and pricing of path-dependent options, and jump processes.
Students may receive credit for EN.550.428/EN.553.428 or EN.553.628, but not both.

EN.553.630. Introduction to Statistics. 4 Credits.
Introduction to the basic principles of mathematical statistics and data analysis. Emphasis on techniques of application. Classical parametric estimation, hypothesis testing, and multiple decision problems; linear models, analysis of variance, and regression; nonparametric and robust procedures; decision-theoretic setting, Bayesian methods. Recommended Course Background: EN.553.620 AND (AS.110.201 OR AS.110.212 OR EN.553.291).
Students may receive credit for EN.550.430/EN.553.430 or EN.553.630, but not both.

EN.553.632. Bayesian Statistics. 3 Credits.
The course will cover Bayesian methods for exploratory data analysis. The emphasis will be on applied data analysis in various disciplines. We will consider a variety of topics, including introduction to Bayesian inference, prior and posterior distribution, hierarchical models, spatial models, longitudinal models, models for categorical data and missing data, model checking and selection, computational methods by Markov Chain Monte Carlo using R or Matlab. We will also cover some nonparametric Bayesian models if time allows, such as Gaussian processes and Dirichlet processes. Recommended prerequisites: EN.553.620 and (EN.553.630 or EN.553.730)
Students may take only one of EN.550.632, EN.553.432, EN.553.632 or EN.553.732.

EN.553.633. Monte Carlo Methods. 4 Credits.
The objective of the course is to survey essential simulation techniques for popular stochastic models. The stochastic models may include classical time-series models, Markov chains and diffusion models. The basic simulation techniques covered will be useful in sample-generation of random variables, vectors and stochastic processes, and as advanced techniques, importance sampling, particle filtering and Bayesian computation may be discussed. Recommended Course Background: EN.553.630.
Students may receive credit for EN.550.433/EN.553.433 or EN.553.633, but not both.

EN.553.636. Introduction to Data Science. 4 Credits.
Today the term Data Science is widely used covering a broad range of topics from mathematics and algorithms to actual data analysis and machine learning techniques. This course provides a thorough survey of relevant methods balancing the theory and the application aspects. Accordingly, the material and the discussions alternate between the methodology along with its underlying assumptions and the implementations along with their applications. We will cover several supervised methods for regression and classification, as well as unsupervised methods for clustering and dimensional reduction. To name a few in chronological order, the topics will include generalized linear regression, principal component analysis, nearest neighbor and Bayesian classifiers, support vector machines, logistic regression, decision trees, random forests, K-means clustering, Gaussian mixtures and Laplacian eigenmaps. The course uses Python and Jupyter Notebook and includes visualization techniques throughout the semester. Time permitting, an introduction to the Structured Query Language (SQL) is provided toward the end of the semester.
Students may receive credit for EN.550.436/EN.553.436 or EN.553.636, but not both.

EN.553.639. Time Series Analysis. 3 Credits.
Time series analysis from the frequency and time domain approaches. Descriptive techniques; regression analysis; trends, smoothing, prediction; linear systems; serial correlation; stationary processes; spectral analysis. Recommended course background: EN.553.620 and (AS.110.201 OR AS.110.212 OR EN.553.291)
Students may receive credit for EN.550.439/EN.553.439 or EN.553.639, but not both.

EN.553.641. Equity Markets and Quantitative Trading. 3 Credits.
This course introduces equity markets from a mathematical point of view. The properties of equities and equity-linked instruments will be described. Several quantitative trading strategies will be studied. Order execution tactics and the effect of market structure will be analyzed. Students will select a specialized aspect of the equity markets to investigate and complete a related independent project.
Students may receive credit for EN.550.441/EN.553.441 or EN.553.641, but not both.;EN.553.442 or EN.553.642, or instructor's permission

EN.553.642. Investment Science. 4 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision-making. Topics covered in the course include the basic theory of interest and its application to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory, and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, portfolio evaluation. The student is expected to be comfortable with the use of mathematics as a method of deduction and problem solving. Recommended Course Background: (AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430).
Students may receive credit for EN.550.342 or EN.550.442/EN.553.442 or EN.553.642, but not both.

EN.553.643. Energy Markets and Risk Management. 3 Credits.
The course objectives are to provide a deep understanding of commodities markets, with a focus on Energy (Natural Gas, Electricity, Renewable Energy, Crude Oil) and extension to clean energy and corresponding carbon emission markets. The important instruments (Forward, Futures, Options) will be redefined, valued and used in real risk management examples. This course provides an opportunity to bridge the gap between financial models in academy and risk management solutions in complicated energy markets. Students should have a background in probability and financial derivatives.

EN.553.644. Introduction to Financial Derivatives. 4 Credits.
This course will develop the mathematical concepts and techniques for modeling cash instruments and their hybrids and derivatives. Prerequisites: background in Probability and Financial Derivatives.
Students may receive credit for EN.550.444/ EN.553.444 or EN.553.644, but not both.

EN.553.645. Interest Rate and Credit Derivatives. 4 Credits.
Advances in corporate finance, investment practice and the capital markets have been driven by the development of a mathematically rigorous theory for financial instruments and the markets in which they trade. This course builds on the concepts, techniques, instruments and markets introduced in EN.553.644. In addition to new topics in credit enhancement and structured securities, the focus is expanded to include applications in portfolio theory and risk management, and covers some numerical and computational approaches. Recommended Course Background: EN.553.644
Students may receive credit for EN.550.445/EN.553.445 or EN.553.645, but not both.

EN.553.646. Risk Measurement/Management in Financial Markets. 4 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings and compensatory techniques are addressed. Recommended Course Background: EN.553.644.
Students may receive credit for EN.550.446/EN.553.446 or EN.553.646, but not both.

EN.553.647. Quantitative Portfolio Theory and Performance Analysis. 4 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including, Sharpe, Treynor and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement and attribution; Replicating Benchmark Index (RBI) strategies using cash securities / derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management: Passive, Quasi-Passive (Indexing) Semi-Active (Immunization & Dedicated) Active (Scenario, Relative Value, Total Return and Optimization). In addition, risk management and hedging techniques are also addressed.
Students may receive credit for (EN.550.447 OR EN.553.447) OR EN.553.647, but not both.

EN.553.648. Financial Engineering and Structured Products. 4 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis).
Students may receive credit for EN.550.448/EN.553.448 or EN.553.648, but not both.

EN.553.649. Advanced Equity Derivatives. 4 Credits.
This course will cover the pricing, trading and risk management of equity derivatives, with emphasis on more exotic derivatives such as path-dependent and multi-asset derivatives. The course will emphasize practical issues: students will build their own pricing and risk management tools, and gain experience simulating the dynamic hedging of a complex derivatives portfolio. Students will practice structuring and selling equity derivative products. Pricing issues such a model selection, unobservable input parameters and calibration will be discussed, and students will learn techniques to manage the often highly nonlinear and discontinuous risks associated with these products. The course will have a significant computing component: both in the classroom and as homework projects, students will use Excel, write VBA macros and write and call C++ routines in the Microsoft Windows environment (which is the most common computing environment used by the financial industry). Recommended Course Background: EN.553.444.
Students may receive credit for EN.550.449/EN.553.449 or EN.553.649, but not both.

EN.553.650. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional “omics” data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful). Recommended Course Background: EN.553.620 AND EN.553.630.
Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

EN.553.653. Mathematical Game Theory. 4 Credits.
Mathematical analysis of cooperative and noncooperative games. Theory and solution methods for matrix game (two players, zero-sum payoffs, finite strategy sets), games with a continuum of strategies, N-player games, games in rule-defined form. The roles of information and memory. Selected applications to economic, recreational, and military situations. Prereq: Multivariable Calculus, probability, linear algebra. Recommended Course Background: (AS.110.202 OR AS.110.211) AND EN.553.620 AND (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.453/EN.553.453 or EN.553.653, but not both.

EN.553.661. Optimization in Finance. 4 Credits.
A survey of many of the more important optimization methods and tools that are found to be useful in financial applications. Recommended Course Background: EN.553.642 OR EN.553.644.
Students may receive credit for EN.550.461/EN.553.461 or EN.553.661, but not both.

EN.553.663. Network Models in Operations Research. 4 Credits.
In-depth mathematical study of network flow models in operations research, with emphasis on combinatorial approaches for solving them. Introduction to techniques for constructing efficient algorithms, and to some related data structures, used in solving shortest-path, maximum-volume, flow, and minimum-cost flow problems. Emphasis on linear models and flows, with brief discussion of non-linear models and network design. Recommended Course Background: EN.553.361 OR EN.553.761 OR EN.553.661.
Students may receive credit for EN.550.463/EN.553.463 or EN.553.663, but not both.

EN.553.665. Introduction to Convexity. 4 Credits.
Convexity is a simple mathematical concept that has become central in a diverse range of applications in engineering, science and business applications. Our main focus from the applications perspective will be the use of convexity within optimization problems, where convexity plays a key role in identifying the "easy" problems from the "hard" ones. The course will have an equal emphasis on expositing the rich mathematical structure of the field itself (properties of convex sets, convex functions, Helly-Caratheorody-Radon type theorems, polarity/duality, subdifferential calculus, polyhedral theory), and demonstrating how these ideas can be leveraged to model and solve optimization problems (via a detailed study of linear programming and basics of nonlinear convex optimization). Recommend Course Background: Familiarity with basic real analysis, linear algebra.
Students may receive credit for EN.550.465 /EN.553.465 or EN.553.665, but not both.

EN.553.667. Deep Learning in Discrete Optimization. 3 Credits.
The goal of the course is to examine research-level topics in the application of deep-learning techniques to the solution of computational problems in discrete optimization. The first part of the course will cover background material, introducing students to deep learning (focusing on practical aspects) and covering major topics in computational discrete optimization: heuristic methods, dynamic programming, linear programming, cutting planes, column generation, and branch-and-bound. We will then make an in-depth study of research papers where deep learning has been proposed as a solution-technique in discrete optimization, aiming towards discussions of open research questions. Prerequisites: General mathematical maturity is expected: students should feel comfortable reading on their own Part 1 (Applied Math and Machine Learning Basics) in the text Deep Learning by Goodfellow, Bengio, and Courville.

EN.553.669. Large-Scale Optimization For Data Science. 3 Credits.
Optimization formulations and algorithms have long played a central role in data analysis and machine learning. In the era of big data, the need to solve large-scale optimization problems is ubiquitous in essentially all quantitative areas of human endeavor, including industry and science. This course is a mathematically rigorous and comprehensive introduction to the field of large-scale optimization for data science and machine learning, and is based on the latest results and insights. We discuss the most important algorithms in the area, with analysis of their convergence and complexity properties, as well as their practical implementations. Applications of the methods covered in the course can be found virtually in all fields of data science including text analysis, page ranking, speech recognition, image classification, finance and decision sciences. Prerequisites: background in Linear Algebra (or Computational Linear Algebra), Multivariable Calculus, Probability, and a basic knowledge of programming - experience with at least one high-level computing language (e.g.: Python, Matlab, Julia, C, ...).

EN.553.671. Combinatorial Analysis. 4 Credits.
An introduction to combinatorial analysis at the graduate level. Meets concurrently with 553.471. Counting techniques: generating functions, recurrence relations, Polya's theorem. Combinatorial designs: Latin squares, finite geometries, balanced incomplete block designs. Emphasis on problem solving. Recommended Course Background: EN.553.291 or AS.110.201
Students may receive credit for EN.550.471/EN.553.471 or EN.553.671, but not both.

EN.553.672. Graph Theory. 4 Credits.
Study of systems of “vertices” with some pairs joined by “edges.” Theory of adjacency, connectivity, traversability, feedback, and other concepts underlying properties important in engineering and the sciences. Topics include paths, cycles, and trees; routing problems associated with Euler and Hamilton; design of graphs realizing specified incidence conditions and other constraints. Attention directed toward problem solving, algorithms, and applications. One or more topics taken up in greater depth. Recommended Course Background: (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.472/EN.553.472 or EN.553.672, but not both.

EN.553.681. Numerical Analysis. 4 Credits.
Brief review of topics in elementary numerical analysis such as floating-point arithmetic, Gaussian elimination for linear equations, inter-polation and approximation. Core topics to be covered: numerical linear algebra including eigenvalue and linear least-squares problems, iterative algorithms for nonlinear equations and least squares problems, and convergence theory of numerical methods. Other possible topics: sparse matrix computations, numerical solution of partial differential equations, finite element methods, and parallel algorithms.Recommended Course Background: Multivariable calculus, linear algebra, and differential equations.
Students may take only one of EN.550.681, EN.553.481, EN.553.681 or EN.553.781.

EN.553.688. Computing for Applied Mathematics. 3 Credits.
The aim of this course is to develop students' programming skills for solving solve problems commonly encountered in applied mathematics contexts. Specific problems that arise in applications of mathematics and data science (e.g. from finance, data analysis, or the physical sciences) are used to motivate concepts, techniques, and paradigms related to computation and programming. The Python language as well as a large collection of packages will be introduced. Recommended Course Background: EN.553.310 OR EN.553.311 OR (EN.553.420 AND EN.553.430). Students should be comfortable using computers but no prior programming background is required.
Students may receive credit for EN.553.488 or EN.553.688, but not both.

EN.553.691. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.

EN.553.692. Mathematical Biology. 3 Credits.
This course will examine the mathematical methods relevant to modeling biological phenomena, particularly dynamical systems and probability. Topics include ordinary differential equations and their simulation; stability and phase plane analysis; branching processes; Markov chains; and stochastically perturbed systems. Biological applications will be drawn from population growth, predator-prey dynamics, epidemiology, genetics, intracellular transport, and neuroscience. Recommended Course Background: EN.553.620 AND (AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306 OR EN.553.291)
Students may receive credit for EN.550.492/EN.553.492 or EN.553.692, but not both.

EN.553.693. Mathematical Image Analysis. 4 Credits.
This course gives an overview of various mathematical methods related to several problems encountered in image processing and analysis, and presents numerical schemes to address them. It will focus on problems like image denoising and deblurring, contrast enhancement, segmentation and registration. The different mathematical concepts shall be introduced during the course; they include in particular functional spaces such as Sobolev and BV, Fourier and wavelet transforms, as well as some notions from convex optimization and numerical analysis. Most of such methods will be illustrated with algorithms and simulations on discrete images, using MATLAB. Prerequisites : linear algebra, multivariate calculus, basic programming in MATLAB. Recommended Course Background: (AS.110.202 OR AS.110.211) AND (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.493/EN.553.493 or EN.553.693, but not both.

EN.553.694. Applied and Computational Multilinear Algebra. 3 Credits.
In this seminar we plan to discuss generalizations of theorems and algorithms from matrix theory to hypermatrices. More specifically the seminar will discuss hypermatrix/tensor algebras, rank, spectra and transforms. Using the python friendly free open-source mathematics software SageMath and the hypermatrix algebra package we will discuss applications of hypermatrices to combinatorics, machine learning and data analysis. Preliminary knowledge of the Python language is not required. Recommended Course Background: AS.110.212 OR AS.110.201 OR EN.553.291.
Students may receive credit for EN.553.494 or EN.553.694, but not both.

EN.553.701. Real Analysis: Preparation for the Ph.D. Introductory Examination. 4 Credits.
This course is designed to prepare students for the Real Analysis part of the introductory exam of the Department of Applied Mathematics and Statistics. In this course we will cover fundamental topics in real analysis, such as, Set Theory, The Topology of Euclidean Space, Continuous Mappings, Uniform Convergence, Differentiable Mappings, Inverse & Implicit Function Theorems, Integration Theory, Fourier Series, and Basics of Differential Equations.

EN.553.720. Probability Theory I. 4 Credits.
The course objectives are to develop probabilistic reasoning and problem solving approaches, to provide a rigorous mathematical basis for probability theory, and to examine several important results in the theory of probability. Topics include axiomatic probability, independence, random variables and their distributions, expectation, integration, variance and moments, probability inequalities, and modes of convergence of random variables. The course will include introductory measure theory as needed. Students are expected to have previous study of both analysis and probability. This course is the first half of a yearlong sequence. The second semester's course, EN.553.721 Probability Theory II, will cover classical limit theorems, characteristic functions, and conditional expectation. Prerequisite: real analysis (AS.110.405/AS.110.415)
Students may take EN.550.620 or EN.553.720, but not both.

EN.553.721. Probability Theory II. 4 Credits.
Probability at the level of measure theory, focusing on limit theory. Modes of convergence, Poisson convergence, three-series theorem, strong law of large numbers, continuity theorem, central limit theory, Berry-Esseen theorem, infinitely divisible and stable laws. Recommended Course Background: EN.553.720 AND (AS.110.405 OR AS.110.415)

EN.553.722. Introduction to Stochastic Calculus. 3 Credits.
A graduate-level class on stochastic calculus, providing a rigorous introduction on stochastic integrals and differential equations. (AS.110.405 OR EN.553.701) AND EN.553.720

EN.553.729. Topics in Probability. 3 Credits.
This seminar course will discuss the "probabilistic method," with applications to random graphs and percolation theory. Topics include linearity of expectation, first and second moment methods, the local lemma, correlation inequalities, martingale concentration results, the evolution of random graphs, Poisson approximation, stochastic ordering, bond and site percolation models, and the substitution method for bounding percolation thresholds. Students will present at least two short talks on relevant topics or applications of their choice. Prerequisites: 553.620 Introduction to Probability and 553.672 Graph Theory, or equivalents. No auditors permitted.

EN.553.730. Statistical Theory. 4 Credits.
The fundamentals of mathematical statistics will be covered. Topics include: distribution theory for statistics of normal samples, exponential statistical models, the sufficiency principle, least squares estimation, maximum likelihood estimation, uniform minimum variance unbiased estimation, hypothesis testing, the Neyman-Pearson lemma, likelihood ratio procedures, the general linear model, the Gauss-Markov theorem, simultaneous inference, decision theory, Bayes and minimax procedures, chi-square methods, goodness-of-fit tests, and nonparametric and robust methods.
Students may take EN.550.630 or EN.553.730, but not both.

EN.553.731. Statistical Theory II. 3 Credits.
Advanced concepts and tools fundamental to research in mathematical statistics and statistical inference: asymptotic theory;optimality; various mathematical foundations.

EN.553.733. Nonparametric Bayesian Statistics. 3 Credits.
This course covers advanced topics in Bayesian statistical analysis beyond the introductory course. Therefore knowledge of basic Bayesian statistics is assumed (at the level of “A first course in Bayesian statistical methods”, by Peter Hoff (Springer, 2009). The models and computational methods will be introduced with emphasis on applications to real data problems. This course will cover nonparametric Bayesian models including Gaussian process, Dirichlet process (DP), Polya trees, dependent DP, Indian buffet process, etc. Recommended Course Background: EN.553.432 or EN.553.632 or EN.553.732 or permission from the instructor

EN.553.735. Topics in Statistical Pattern Recognition. 3 Credits.
The Dissimilarity Representation for Pattern Recognition. This course will investigate aspects of statistical inference and statistical pattern recognition associated with observing only dissimilarites between entities rather than observing feature vectors associated with the individual entities themselves.

EN.553.736. System Identification and Likelihood Methods. 2 Credits.
The focus of this roundtable-format course will be stochastic modeling as relates to system identification and maximum likelihood. The principles and algorithms being covered in this course have tremendous importance in the world at large. For example, maximum likelihood is arguably the most popular method for parameter estimation in most real-world applications. System identification is the term used in many fields to refer to the process of mathematical model building from experimental data, with a special focus on dynamical systems. The system identification process refers to several important aspects of model building, including selection of the model form (linear or nonlinear, static or dynamic, etc.), experimental design, parameter estimation, and model validation. This course will cover topics such as the maximum likelihood formulation and theory for dynamical systems, the EM (expectation-maximization) algorithm and its variants, Fisher information, common model structures, online versus offline estimation, the role of feedback in identification (i.e., open-loop versus closed-loop estimation), standard and extended Kalman filtering, and uncertainty characterization (e.g., confidence regions). Recommended Course Background: Undergraduate-level matrix theory and ordinary differential equations; graduate-level course in probability and statistics (e.g., 553.430 or equivalent; in particular, students should have prior exposure to maximum likelihood and Bayes’ rule). Prior experience in data analysis and algorithms will be helpful.

EN.553.738. High-Dimensional Approximation, Probability, and Statistical Learning. 3 Credits.
The course covers fundamental mathematical ideas for certain approximation and statistical learning problems in high dimensions. We start with basic approximation theory in low-dimensions, in particular linear and nonlinear approximation by Fourier and wavelets in classical smoothness spaces, and discuss applications in imaging, inverse problems and PDE’s. We then introduce notions of complexity of function spaces, which will be important in statistical learning. We then move to basic problems in statistical learning, such as regression and density estimation. The interplay between randomness and approximation theory is introduced, as well as fundamental tools such as concentration inequalities, basic random matrix theory, and various estimators are constructed in detail, in particular multi scale estimators. At all times we consider the geometric aspects and interpretations, and will discuss concentration of measure phenomena, embedding of metric spaces, optimal transportation distances, and their applications to problems in machine learning such as manifold learning and dictionary learning for signal processing.

EN.553.739. Statistical Pattern Recognition Theory & Methods. 3 Credits.
This biennial course covers topics in the theory, methods, and applications of machine learning from an explicitly statistical perspective. Recommended Course Background: (EN.550.420 OR EN.553.420 OR EN.553.620) AND (EN.550.430 OR EN.553.430 OR EN.553.630)

EN.553.740. Machine Learning I. 3 Credits.
This course is the first part of a two-semester sequence that focuses on theoretical and practical aspects of statistical learning. After introducing background material on inner-product spaces, reproducing kernels and on optimization, the course discusses fundamental concepts of machine learning (such as generalization error, Bayes estimators and the bias vs. variance dilemma) and studies a collection of learning algorithms for classification and regression. The topics that are discussed include linear and kernel regression, support vector machines, lasso, logistic regression, decision trees and neural networks. Students will need a solid background in multivariate calculus, linear algebra, probability and statistics to complete the course.Recommended Course background: 553.620 and 553.630 or higher, and prerequisites for these courses.

EN.553.741. Machine Learning II. 3 Credits.
This course is the second part of a two-semester sequence that focuses on theoretical and practical aspects of statistical learning. The course will have two distinct parts. The first one will discuss some fundamentals of statistical learning theory, including some concentration inequality, generalization bounds and VC dimension. The second one will introduce problems and algorithms for unsupervised data analysis, including dimension reduction, manifold learning and clustering. Recommended course background: 553.740.

EN.553.742. Statistical Inference on Graphs. 3 Credits.
This course provides an introduction to and overview of current research in random graph inference, with a particular focus on spectral methods and their applications to inference for independent-edge random graphs. Topics include concentration inequalities; analysis of matrix perturbations; spectral decompositions of graph adjacency and Laplacian matrices; consistent estimation of latent variables associated to vertices; clustering, community detection, and classification in networks; and multi-sample hypothesis testing for graphs. Emphasis will be on a framework for establishing classical properties---consistency, normality, and efficiency---for estimators of graph parameters. Students will read papers in the literature and are expected to participate actively in class. Recommended prerequisites EN.553.792 and EN.553.630.

EN.553.743. Equivariant Machine Learning. 3 Credits.
This is a graduate course in the topic of equivariant machine learning and graph neural networks. The course will have a fixed schedule with a preselected list of theoretical research papers to discuss each class (2.5 hours once a week). Each week two students will present one paper to the class and discussion will follow. The evaluation will be based on the quality and clarity of the presentations and in-class participation. There will be no homework nor exams.Prerequisites include basic knowledge of machine learning and probability.

EN.553.749. Derivatives Across Asset Classes. 3 Credits.
The first part of the course will review in depth the main instruments in the various asset classes, as well as the founding results on investment decision, capital budgeting and project financing. The second part will analyze the theory of the firm: capital structure, dilution and share repurchase, dividend policy, Modigliani- Miller theorem and will lead to the contingent claim pricing of corporate debt and equity as in Merton (1974) and its extensions . The third part will extend the CAPM to the Arbitrage Pricing Theory of Ross (1976) and its theoretical and operational consequences. The fourth part will be dedicated to the stochastic modelling of the yield curve to price caps, floors and swaptions, and their use in the Asset Liability Management of a bank and insurance company. This course will not begin until mid-October.
Students may take EN.550.649 or EN.553.749, but not both.

EN.553.753. Commodity Markets and Green Energy Finance. 4 Credits.
The first half of this course will be devoted to energy markets, both in terms of the market itself and how to model peculiar features of this business. First we will discuss fossil fuels, including physical and financial natural gas and LNG; crude and refined petroleum commodities; and possibly coal markets. Then the focus will turn to electricity markets, including market structures; energy, capacity and ancillary services markets; characteristics of demand; power plant commitment and dispatch; the “stack” or market supply curve; characteristics of different plants and fuels; regional differences in markets; and hedging techniques from trading vanilla products all the way to complex multi-commodity structures. We will discuss renewable energy sources, their characteristics, economics, and effects on the larger market, as well as emissions markets as a way of removing pollution externalities. The first half will conclude by elaborating on risk management techniques; credit; legislation and regulation; and derivative accounting as time permits. The second half of the course will turn to shipping, metals and agricultural markets. The metal physical markets will be described, the major Exchanges presented (LME, SHFE), as well as the warehousing issues in the case of base metals. The case of precious metals will be singled out, and gold in particular; and finally uranium and rare earths. Agricultural (grains and softs) markets will be presented, together with the crucial issues of biofuels, fertilizers, water, and arable land. In all cases, there will be a large focus on the trading activities – both to hedge and to gain exposure to commodities – in spot and derivative markets. Numerous examples of forward curves will be provided, as well as volatility skews. The valuation of swaps, spread options and Asian options will be (re)derived. Students should have rudimentary knowledge of financial markets. Recommended Course Background: EN.553.620 and AS.110.108

EN.553.761. Nonlinear Optimization I. 3 Credits.
This course considers algorithms for solving various nonlinear optimization problems and, in parallel, develops the supporting theory. The primary focus will be on unconstrained optimization problems. Topics for the course will include: necessary and sufficient optimality conditions; steepest descent method; Newton and quasi-Newton based line-search, trust-region, and adaptive cubic regularization methods; linear and nonlinear least-squares problems; linear and nonlinear conjugate gradient methods. Recommended Course Background: Multivariable Calculus, Linear Algebra, Real Analysis such as AS.110.405
Students may take EN.550.661 or EN.553.761, but not both.

EN.553.762. Nonlinear Optimization II. 3 Credits.
This course considers algorithms for solving various nonlinear optimization problems and, in parallel, develops the supporting theory. The primary focus will be on constrained optimization problems. Topics for the course will include: necessary and sufficient optimality conditions for constrained optimization; projected-gradient and two-phase accelerated subspace methods for bound-constrained optimization; simplex and interior-point methods for linear programming; duality theory; and penalty, augmented Lagrangian, sequential quadratic programming, and interior-point methods for general nonlinear programming. In addition, we will consider the Alternating Direction Method of Multipliers (ADMM), which is applicable to a huge range of problems including sparse inverse covariance estimation, consensus, and compressed sensing. Recommended Course Background: Multivariable Calculus, Linear Algebra, Real Analysis such as AS.110.405.

EN.553.763. Stochastic Search & Optimization. 3 Credits.
An introduction to stochastic search and optimization, including discrete and continuous optimization problems. Topics will include the “no free lunch” theorems, beneficial effects of injected Monte Carlo randomness, algorithms for global and local optimization problems, random search, recursive least squares, stochastic approximation, simulated annealing, evolutionary and genetic algorithms, and statistical multiple comparisons. Recommended Course Background: Graduate course in probability and statistics and knowledge of basic matrix algebra.

EN.553.764. Modeling, Simulation, and Monte Carlo. 3 Credits.
Concepts and statistical techniques critical to constructing and analyzing effective simulations; emphasis on generic principles rather than specific applications. Topics include model building (bias-variance tradeoff, model selection,, Fisher information), benefits and drawbacks of simulation modeling, random number generation, simulation-based optimization, discrete multiple comparisons using simulations, Markov chain Monte Carlo (MCMC), and input selection using optimal experimental design.

EN.553.766. Combinatorial Optimization. 3 Credits.
The main goal of this course is to introduce students to combinatorial optimization techniques. The first part of the course will focus on combinatorial algorithms for classical problems. The next part of the course will show how polyehdral theory can be used to deal with combinatorial optimization problems in a unifying manner. Familiarity with linear programming and algorithms desirable but not strictly required. Recommended Course Background: Linear Algebra.

EN.553.780. Shape and Differential Geometry. 3 Credits.
The purpose of this class is to provide an elementary knowledge of the differential geometry of curves and surfaces, and to place this in relation with the description and characterization of 2D and 3D shapes. Intrinsic local and semi-local descriptors, like the curvature or the second fundamental form will be introduced, with an emphasis on the invariance of these features with respect to rotations, translations, etc. Extension of this point of view to other class of linear transformations will be given, as well as other types of shape descriptors, like moments or medial axes. Recommended Course Background: Calculus III and linear algebra

EN.553.782. Statistical Uncertainty Quantification. 3 Credits.
This course introduces uncertainty quantification (UQ) on mathematical models and data, with emphasis on the use of stochastic processes and probability theory. Topics include computer experiments, designs, conditional probability, Bayesian inference, Gaussian stochastic processes, continuity, reproducing kernel Hilbert space, covariance functions, computer model emulation, parameter estimation, approximation, dynamic linear models, Kalman filter, computation, sensitivity analysis, functional ANOVA, model selection and calibration. Examples of some continuous time processes will be introduced, such as Brownian motion, Brownian bridge, O-U process, with extensions to multi-dimensional input space. Uncertainty analysis of mathematical models will be the focus from both theoretical and computational perspectives. Applications will concentrate on understanding and predicting the behavior of complex systems in science and engineering. Prerequisite EN.553.620 or EN.553.720 Recommended course background: EN.553.630 or EN.553.730.
Students may take EN.550.782 or EN.553.782, but not both.

EN.553.783. Reliability Analysis. 3 Credits.
Reliability is the likelihood that an item will successfully perform to its specified requirements for a stated period of time and understanding its concepts has many applications within various scientific and engineering disciplines. Designed mainly for beginning level graduate students, this course consists of three major components. First, we will revisit some probability principles which will serve as the foundation for this course. Next, we will explore common lifetime models, model selection, and model fitting methods. Finally, we will look at reliability from a systems perspective where the focus will be on system reliability. Students are expected to present their findings on the applications on reliability presented in published works and/or via course projects. Recommended course background: EN.553.620.

EN.553.785. Asymptotic Analysis. 3 Credits.
Asymptotic analysis is a branch of mathematics that emphasizes finding approximate solutions for either small or large parameters, which have many benefits in various scientific and engineering disciplines. This is because, due to the complexity and mathematical formulation of the problem, analytical solutions are either difficult to obtain or impractical. The goal of this course is to introduce students to some of the most frequently used methods consisting of the following main components. First, an introduction to asymptotic sequences and expansions will be provided as well as some common techniques to obtaining asymptotic expansions on integrals. Next, some common transforms and their inverses will be introduced as well as techniques on finding the asymptotic representation of their inverses. Finally, we will examine some techniques for finding asymptotic representations of solutions resulting from ordinary differential equations. Throughout this course students will also be introduced to some special functions as practical examples to demonstrate how these techniques can be applied to provide robust approximations. Recommended Course Background: Differential Equations and either of the following courses AS.110.405, 110.311, or 110.607.

EN.553.790. Neural Networks and Feedback Control Systems. 2 Credits.
This roundtable course is an introduction to two related areas?neural networks (NNs) and control systems based on the use of feedback. Artificial NNs are effective conceptual and computational vehicles for many important applications; feedback control is relevant to virtually all natural and human-made systems. NNs are applied in areas such as system modeling and control, function approximation, time-series filtering/prediction/smoothing, speech/image/signal processing, and pattern recognition. Topics to be covered for NNs include network architecture, learning algorithms, and applications. Specific NNs discussed include perceptrons, feedforward networks with backpropagation, and recurrent networks. This course also provides an introduction to feedback control systems, including the role of feedback in regulating systems and in achieving stability in systems. We consider stochastic (noise) effects in feedback systems. We also consider the interface of NNs and control by discussing how NNs are used in building modern control systems in problems where standard methods are infeasible. Recommended Course Background: Matrix theory, differential equations, and a graduate course in probability and statistics.

EN.553.791. Internship - Financial Mathematics. 2 Credits.
This course is open only to AMS department master's students.

EN.553.792. Matrix Analysis and Linear Algebra. 4 Credits.
A second course in linear algebra with emphasis on topics useful in analysis, economics, statistics, control theory, and numerical analysis. Review of linear algebra, decomposition and factorization theorems, positive definite matrices, norms and convergence, eigenvalue location theorems, variational methods, positive and nonnegative matrices, generalized inverses. Prerequisite: one semester of real analysis.
Students may take EN.550.692 or EN.553.792, but not both.

EN.553.793. Turbulence Theory. 3 Credits.
An advanced introduction to turbulence theory for graduate students in the physical sciences, engineering and mathematics. Both intuitive understanding and exact analysis of the fluid equations will be stressed. Previous familiarity with fluid mechanics is not required, although it could be helpful.

EN.553.794. Turbulence Theory II. 3 Credits.
This course will continue the theoretical investigation of fluid turbulence, directly following on from EN.550.693. Topics to be considered are turbulent vortex dynamics, Lagrangian dynamics, and special topics such as wall-bounded turbulence, free shear flows, two-dimensional and quasigeostrophic turbulence, MHD turbulence, etc. Cross-listed with Physics

EN.553.797. Introduction to Control Theory and Optimal Control. 3 Credits.
A control system is a dynamical system on which one can act through a parameter that can be chosen freely at any point in time. In this class, we will be interested in two main problems. The first one is controllability, which studies conditions for the existence of controls allowing an initial point to be driven to any other point. The second one is optimal control, in which we will study methods to minimize a certain cost over all possible controls, possibly with endpoint constraints. Such problems have many applications in engineering: crossing a river with minimal fuel, planning trajectories of rocket engines etc. Recommended Course Background: Multivariate Calculus, Linear Algebra, Differential Equations. Some familiarity with Optimization is recommended, but not mandatory.

EN.553.799. Topics In Applied Math. 3 Credits.
Machine learning systems have huge capabilities, and they are increasingly being deployed in many real-world applications. Therefore, it is critical to make sure that they are safe and trustworthy. This course focuses on understanding aspects regarding fairness, privacy, explainability, and robustness of machine learning models.The course will cover a list of recent research papers in the field, featuring practical aspects as well as mathematical aspects of these topics. The course not only focuses on the theory of fairness, privacy, explainablity, and robustness of machine learning models, but also it aims to develop students' communication skills.

EN.553.800. Dissertation Research. 3 - 20 Credits.

EN.553.801. Department Seminar. 1 Credit.
A variety of topics discussed by speakers from within and outside the university. Required of all resident department graduate students.

EN.553.802. Graduate Independent Study. 3 Credits.

EN.553.804. Approved External Coursework. 3 - 20 Credits.

EN.553.806. Capstone Experience in Data Science. 3 - 10 Credits.
Project work for Data Science Master's students. Arranged individually between students and faculty.

EN.553.809. Master's Research. 3 - 10 Credits.
Reading, research, or project work for Master's level students. Arranged individually between students and faculty.

EN.553.810. Probability & Statistics. 1 - 4 Credits.
EN.553.721

EN.553.847. Financial Mathematics Masters Seminar. 1 Credit.
This course is only open to students enrolled in the MSE in Financial Mathematics program. Advanced topics chosen according to the interests of the instructor and graduate students. The course will focus on recent research articles in the financial mathematics literature.

EN.553.861. Nonsmooth Optimization Seminar. 3 Credits.
Readings and seminar in nonsmooth optimization. Topics may include nonsmooth, nonconvex analysis (generalized gradient and subdifferentials) and nonsmooth, nonconvex optimization methods.

Cross Listed Courses

Chemical & Biomolecular Engineering

EN.540.468. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306)) OR EN.553.291;Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (S.110.302 OR AS.110.306) OR EN.553.291[C];Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

Computer Science

EN.601.442. Modern Cryptography. 3 Credits.
Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis]
Students may receive credit for only one of EN.600.442, EN.601.442, EN.601.642.;(EN.601.230 OR EN.601.231) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.421)

EN.601.642. Modern Cryptography. 3 Credits.
Same material as 601.442, for graduate students. Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis] Required course background: Probability & Automata/Computation Theory
Students may receive credit for only one of EN.601.442 OR EN.601.642.

Applied Mathematics and Statistics, Bachelor of Arts

Departmental majors can earn either the B.A. or the B.S. degree by meeting the general university requirements and the general requirements of the School of Engineering (see Requirements for a Bachelor's Degree (p. 1086), including Writing Requirement, in this catalogue), and the departmental requirements.

Honors

The Department of Applied Mathematics and Statistics awards departmental honors based on a number of factors, including performance in coursework and research experience. To be eligible for departmental honors a student must:

1. achieve a 3.75 GPA in AMS Department courses (EN.553) used toward major requirements 1-11; and
2. earn a C- or better in an additional one semester course in AMS (EN.553) at the 300-level or higher, or undertake significant research activity (equivalent to a 3-credit course) in applied mathematics. Such research can be conducted as an official research course, or the student may request that the research supervisor provide an assessment to AMS academic staff toward the middle of the semester of intended degree conferral.

Program Requirements

All courses used to meet the following departmental requirements must be taken for a letter grade and passed with grade of C- or higher:

Code	Title	Credits
1. Calculus I, II, and III		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
2. Linear Algebra [1]		
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
or EN.553.291	Linear Algebra and Differential Equations	
3. Differential Equations [1]		
AS.110.302	Differential Equations and Applications	3-4
or EN.553.391	Dynamical Systems	
or EN.540.468	Introduction to Nonlinear Dynamics and Chaos	
EN.553.391	Dynamical Systems	4
EN.553.481	Numerical Analysis	4
EN.553.491	Dynamical Systems	4
4. Computer Languages and Programming		
Select one of the following: [2, 3]		
EN.500.112	Gateway Computing: JAVA	
EN.500.113	Gateway Computing: Python	
EN.500.114	Gateway Computing: Matlab	
EN.553.281	Introduction to Mathematical Computing	
EN.580.242 & EN.580.244	Biological Models and Simulations and Nonlinear Dynamics of Biological Systems	
EN.601.220	Intermediate Programming	
AS.250.205	Introduction to Computing	
5. Numerical Linear Algebra		
EN.553.385	Numerical Linear Algebra	
6. Discrete Mathematics		
Select one of the following:		
EN.553.171	Discrete Mathematics	
EN.553.172	Honors Discrete Mathematics	
EN.553.371	Cryptology and Coding	
EN.553.471	Combinatorial Analysis	
EN.553.472	Graph Theory	
7. Probability and Statistics		
EN.553.420	Introduction to Probability	4
or EN.553.421	Honors Introduction to Probability	
EN.553.430	Introduction to Statistics	4
or EN.553.431	Honors Introduction to Statistics	
8. Optimization		
EN.553.361	Introduction to Optimization	4
9. Area of Focus		
Select two courses from one of the following areas of focus. They must be distinct from those courses used to satisfy requirements 1-2, 4-5, 7-8.		
Probability and Stochastic Processes		
AS.110.405	Real Analysis I	
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.426	Introduction to Stochastic Processes	
EN.553.427	Stochastic Processes and Applications to Finance	
EN.553.433	Monte Carlo Methods	
EN.553.492	Mathematical Biology	
Statistics and Statistical Learning		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.414	Applied Statistics and Data Analysis II	
EN.553.432	Bayesian Statistics	
EN.553.433	Monte Carlo Methods	
EN.553.436	Introduction to Data Science	
EN.553.439	Time Series Analysis	
EN.553.450	Computational Molecular Medicine	
Optimization and Operations Research		
EN.553.362	Introduction to Optimization II	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.453	Mathematical Game Theory	
EN.553.463	Network Models in Operations Research	
EN.553.465	Introduction to Convexity	
EN.553.467	Deep Learning in Discrete Optimization	
Discrete Mathematics		
AS.110.401	Introduction to Abstract Algebra	
EN.553.371	Cryptology and Coding	
EN.553.463	Network Models in Operations Research	
EN.553.471	Combinatorial Analysis	

EN.553.472	Graph Theory	
Financial Mathematics		
EN.553.427	Stochastic Processes and Applications to Finance	
EN.553.428	Stochastic Processes and Applications to Finance II	
EN.553.441	Equity Markets and Quantitative Trading	
EN.553.442	Investment Science	
EN.553.444	Introduction to Financial Derivatives	
EN.553.445	Interest Rate and Credit Derivatives	
EN.553.447	Quantitative Portfolio Theory and Performance Analysis	
EN.553.448	Financial Engineering and Structured Products	
EN.553.449	Advanced Equity Derivatives	
EN.553.488	Computing for Applied Mathematics	
Computational Mathematics		
EN.553.481	Numerical Analysis	
and, one of		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.433	Monte Carlo Methods	
EN.553.467	Deep Learning in Discrete Optimization	
EN.553.493	Mathematical Image Analysis	
10. Scientific Computing		
Select one of the following:		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.432	Bayesian Statistics	
EN.553.433	Monte Carlo Methods	
EN.553.436	Introduction to Data Science	
EN.553.450	Computational Molecular Medicine	
EN.553.463	Network Models in Operations Research	
EN.553.467	Deep Learning in Discrete Optimization	
EN.553.481	Numerical Analysis	
EN.553.488	Computing for Applied Mathematics	
EN.553.493	Mathematical Image Analysis	
EN.553.494	Applied and Computational Multilinear Algebra	
EN.601.433	Intro Algorithms	
EN.601.475	Machine Learning	
EN.601.482	Machine Learning: Deep Learning	
11. Quantitative Studies		
Courses coded Quantitative Studies totaling 40 credits of which at least 18 credits must be in courses numbered 300 or higher. (Courses used to meet the requirements above may be counted toward this total.)		40

[1] A student who earns credit in EN.553.291 Linear Algebra and Differential Equations may not earn credit for AS.110.302 Differential Equations and Applications.

[2] or JHU credit for AP Computer Science A.

[3] Students are strongly encouraged to fulfill this element of the requirement by taking EN.500.113 Gateway Computing: Python, and to do this in their first semester at Johns Hopkins University.

The requirements above together constitute a minimal core program, allowing maximum flexibility in planning degree programs. Students often are able to complete a second major during a four-year program or to proceed to the department's combined bachelor's/master's degree program.

It is highly recommended that students develop a coherent program of study (see below) or at least take additional departmental courses, in order to establish a broad foundation for a career as an applied mathematician. Of particular importance are additional courses in optimization (EN.553.362 (http://e-catalog.jhu.edu/search/?P=EN.553.362) Introduction to Optimization II), stochastic processes (EN.553.426 (http://e-catalog.jhu.edu/search/?P=EN.553.426) Introduction to Stochastic Processes), statistics (EN.553.413 (http://e-catalog.jhu.edu/search/?P=EN.553.413) Applied Statistics and Data Analysis) , dynamical systems (EN.553.391 (http://e-catalog.jhu.edu/search/?P=EN.553.391) Dynamical Systems), mathematical modeling and consulting (EN.553.400 (http://e-catalog.jhu.edu/search/?P=EN.553.400) Mathematical Modeling and Consulting), scientific computing (EN.553.385 (http://e-catalog.jhu.edu/search/?P=EN.553.385) Scientific Computing: Linear Algebra, EN.553.386 (http://e-catalog.jhu.edu/search/?P=EN.553.386) Scientific Computing: Differential Equations), and investment science (EN.553.442 (http://e-catalog.jhu.edu/search/?P=EN.553.442) Investment Science).

Students planning to continue to graduate school in an applied mathematics program are encouraged to consider taking one or more graduate-level courses in probability (EN.553.720 (http://e-catalog.jhu.edu/search/?P=EN.553.720) Probability Theory I, EN.553.721 (http://e-catalog.jhu.edu/search/?P=EN.553.721) Probability Theory II), statistics (EN.553.730 (http://e-catalog.jhu.edu/search/?P=EN.553.730) Statistical Theory, EN.553.731 (http://e-catalog.jhu.edu/search/?P=EN.553.731) Statistical Theory II), optimization (EN.553.761 (http://e-catalog.jhu.edu/search/?P=EN.553.761) Nonlinear Optimization I, EN.553.762 (http://e-catalog.jhu.edu/search/?P=EN.553.762) Nonlinear Optimization II), combinatorics (EN.553.671 (http://e-catalog.jhu.edu/search/?P=EN.553.671) Combinatorial Analysis), graph theory (EN.553.672 (http://e-catalog.jhu.edu/search/?P=EN.553.672) Graph Theory), numerical analysis (EN.553.781 (http://e-catalog.jhu.edu/search/?P=EN.553.781) Numerical Analysis), or matrix analysis (EN.553.792 (http://e-catalog.jhu.edu/search/?P=EN.553.792) Matrix Analysis and Linear Algebra).

Applied Mathematics and Statistics, Bachelor of Science

Departmental majors can earn either the B.A. or the B.S. degree by meeting the general university requirements and the general requirements of the School of Engineering (see Requirements for a Bachelor's Degree (p. 1086), including Writing Requirement, in this catalogue), and the departmental requirements.

Honors

The Department of Applied Mathematics and Statistics awards departmental honors based on a number of factors, including performance in coursework and research experience. To be eligible for departmental honors a student must:

1. achieve a 3.75 GPA in AMS Department courses (EN.553) used toward major requirements 1-12; and
2. earn a C- or better in an additional one semester course in AMS (EN.553) at the 300-level or higher, or undertake significant research activity (equivalent to a 3-credit course) in applied mathematics. Such research can be conducted as an official research course, or the student may request that the research supervisor provide an assessment to AMS academic staff toward the middle of the semester of intended degree conferral.

Program Requirements

All courses used to meet the following departmental requirements must be taken for a letter grade and passed with a grade of C- or higher:

Code	Title	Credits
1. Calculus I, II, and III		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
2. Linear Algebra [1]		
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
or EN.553.291	Linear Algebra and Differential Equations	
or EN.553.391	Dynamical Systems	
or EN.553.481	Numerical Analysis	
3. Differential Equations [1]		
AS.110.302	Differential Equations and Applications	3-4
or EN.553.491	Dynamical Systems	
or EN.540.468	Introduction to Nonlinear Dynamics and Chaos	
4. Computer Languages and Programming		
Select one of the following: [2, 3]		
EN.500.112	Gateway Computing: JAVA	
EN.500.113	Gateway Computing: Python	
EN.500.114	Gateway Computing: Matlab	
EN.553.281	Introduction to Mathematical Computing	
EN.580.242 & EN.580.244	Biological Models and Simulations and Nonlinear Dynamics of Biological Systems	
EN.601.220	Intermediate Programming	
AS.250.205	Introduction to Computing	
5. Numerical Linear Algebra		
EN.553.385	Numerical Linear Algebra	
6. Discrete Mathematics		
Select one of the following:		
EN.553.171	Discrete Mathematics	
EN.553.172	Honors Discrete Mathematics	
EN.553.371	Cryptology and Coding	
EN.553.471	Combinatorial Analysis	
EN.553.472	Graph Theory	
7. Probability and Statistics		
EN.553.420	Introduction to Probability	4
or EN.553.421	Honors Introduction to Probability	
EN.553.430	Introduction to Statistics	4
or EN.553.431	Honors Introduction to Statistics	
8. Optimization		
EN.553.361	Introduction to Optimization	4
9. Area of Focus		
Select two courses from one of the following areas of focus. They must be distinct from those courses used to satisfy requirements 1-2, 4-5, 7-8.		
Probability and Stochastic Processes		
AS.110.405	Real Analysis I	
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.426	Introduction to Stochastic Processes	
EN.553.427	Stochastic Processes and Applications to Finance	
EN.553.433	Monte Carlo Methods	
EN.553.492	Mathematical Biology	
Statistics and Statistical Learning		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.414	Applied Statistics and Data Analysis II	
EN.553.432	Bayesian Statistics	
EN.553.433	Monte Carlo Methods	
EN.553.436	Introduction to Data Science	
EN.553.439	Time Series Analysis	
EN.553.450	Computational Molecular Medicine	
Optimization and Operations Research		
EN.553.362	Introduction to Optimization II	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.453	Mathematical Game Theory	
EN.553.463	Network Models in Operations Research	
EN.553.465	Introduction to Convexity	
EN.553.467	Deep Learning in Discrete Optimization	
Discrete Mathematics		
AS.110.401	Introduction to Abstract Algebra	
EN.553.371	Cryptology and Coding	
EN.553.463	Network Models in Operations Research	
EN.553.471	Combinatorial Analysis	
EN.553.472	Graph Theory	
Financial Mathematics		
EN.553.427	Stochastic Processes and Applications to Finance	
EN.553.428	Stochastic Processes and Applications to Finance II	
EN.553.441	Equity Markets and Quantitative Trading	
EN.553.442	Investment Science	
EN.553.444	Introduction to Financial Derivatives	
EN.553.445	Interest Rate and Credit Derivatives	
EN.553.447	Quantitative Portfolio Theory and Performance Analysis	
EN.553.448	Financial Engineering and Structured Products	

EN.553.449	Advanced Equity Derivatives	
EN.553.488	Computing for Applied Mathematics	
Computational Mathematics		
EN.553.481	Numerical Analysis	
and, one of		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.433	Monte Carlo Methods	
EN.553.467	Deep Learning in Discrete Optimization	
EN.553.493	Mathematical Image Analysis	
10. Scientific Computing		
Select one of the following:		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.432	Bayesian Statistics	
EN.553.433	Monte Carlo Methods	
EN.553.436	Introduction to Data Science	
EN.553.450	Computational Molecular Medicine	
EN.553.463	Network Models in Operations Research	
EN.553.467	Deep Learning in Discrete Optimization	
EN.553.481	Numerical Analysis	
EN.553.488	Computing for Applied Mathematics	
EN.553.493	Mathematical Image Analysis	
EN.553.494	Applied and Computational Multilinear Algebra	
EN.601.433	Intro Algorithms	
EN.601.475	Machine Learning	
EN.601.482	Machine Learning: Deep Learning	
11. Natural Sciences		
Courses coded Natural Sciences. Laboratory courses that accompany Natural Science courses may be used in reaching this total. (Courses used to meet the requirements above may be counted toward this total.)		12
12. Quantitative Studies		
Courses coded Quantitative Studies totaling 40 credits of which at least 18 credits must be in courses numbered 300 or higher. (Courses used to meet the requirements above may be counted toward this total.)		40

[1] A student who earns credit in EN.553.291 (http://e-catalog.jhu.edu/search/?P=EN.553.291) Linear Algebra and Differential Equations may not earn credit for AS.110.302 (http://e-catalog.jhu.edu/search/?P=AS.110.302) Differential Equations and Applications.

[2] or JHU credit for AP Computer Science A.

[3] Students are strongly encouraged to fulfill this element of the requirement by taking EN.500.113 Gateway Computing: Python, and to do this in their first semester at Johns Hopkins University.

The requirements above together constitute a minimal core program, allowing maximum flexibility in planning degree programs. Students often are able to complete a second major during a four-year program or to proceed to the department's combined bachelor's/master's degree program.

It is highly recommended that students develop a coherent program of study (see below) or at least take additional departmental courses, in order to establish a broad foundation for a career as an applied mathematician. Of particular importance are additional courses in optimization (EN.553.362 (http://e-catalog.jhu.edu/search/?P=EN.553.362) Introduction to Optimization II), stochastic processes (EN.553.426 (http://e-catalog.jhu.edu/search/?P=EN.553.426) Introduction to Stochastic Processes), statistics (EN.553.413 (http://e-catalog.jhu.edu/search/?P=EN.553.413) Applied Statistics and Data Analysis) , dynamical systems (EN.553.391 (http://e-catalog.jhu.edu/search/?P=EN.553.391) Dynamical Systems), mathematical modeling and consulting (EN.553.400 (http://e-catalog.jhu.edu/search/?P=EN.553.400) Mathematical Modeling and Consulting), scientific computing (EN.553.385 (http://e-catalog.jhu.edu/search/?P=EN.553.385) Scientific Computing: Linear Algebra, EN.553.386 (http://e-catalog.jhu.edu/search/?P=EN.553.386) Scientific Computing: Differential Equations), and investment science (EN.553.442 (http://e-catalog.jhu.edu/search/?P=EN.553.442) Investment Science).

Students planning to continue to graduate school in an applied mathematics program are encouraged to consider taking one or more graduate-level courses in probability (EN.553.720 (http://e-catalog.jhu.edu/search/?P=EN.553.720) Probability Theory I, EN.553.721 (http://e-catalog.jhu.edu/search/?P=EN.553.721) Probability Theory II), statistics (EN.553.730 (http://e-catalog.jhu.edu/search/?P=EN.553.730) Statistical Theory, EN.553.731 (http://e-catalog.jhu.edu/search/?P=EN.553.731) Statistical Theory II), optimization (EN.553.761 (http://e-catalog.jhu.edu/search/?P=EN.553.761) Nonlinear Optimization I, EN.553.762 (http://e-catalog.jhu.edu/search/?P=EN.553.762) Nonlinear Optimization II), combinatorics (EN.553.671 (http://e-catalog.jhu.edu/search/?P=EN.553.671) Combinatorial Analysis), graph theory (EN.553.672 (http://e-catalog.jhu.edu/search/?P=EN.553.672) Graph Theory), numerical analysis (EN.553.781 (http://e-catalog.jhu.edu/search/?P=EN.553.781) Numerical Analysis), or matrix analysis (EN.553.792 (http://e-catalog.jhu.edu/search/?P=EN.553.792) Matrix Analysis and Linear Algebra).

Applied Mathematics and Statistics, Master of Science in Engineering

Students may elect to work toward the master of science in engineering (M.S.E.) degree in applied mathematics and statistics. All master's degrees in the Department of Applied Mathematics and Statistics ordinarily require a minimum of two semesters of registration as a full-time resident graduate student.

Program Requirements

To obtain departmental certification for the master's degree in Applied Mathematics and Statistics, the student must:

1. Complete satisfactorily at least eight one-semester courses of graduate work in a coherent program approved by the Department Head. All 600-level and 700-level courses (with the exception of seminar and research courses), are satisfactory for this requirement. Certain courses in other departments are also acceptable, and must be approved in advance. At most 3 courses outside the department may be counted toward the Master's degree requirements. WSE courses listed as 1- or 2-credit courses count only as one-half course. Approved KSAS graduate courses count as one-half course if the number of meeting hours per week is 1 or 2 and count as a full course otherwise.

2. Meet either of the following options:
   a. submit an acceptable research report based on an approved project; or
   b. complete satisfactorily two additional one-semester graduate courses, as approved by the faculty advisor and Department Head.
3. Satisfy the computing requirement by receiving a grade of B- or better in one of the following courses:

Code	Title	Credits
AS.110.445	Mathematical and Computational Foundations of Data Science	4
EN.553.600	Mathematical Modeling and Consulting	4
EN.553.613	Applied Statistics and Data Analysis	4
EN.553.632	Bayesian Statistics	3
EN.553.633	Monte Carlo Methods	4
EN.553.636	Introduction to Data Science	4
EN.553.650	Computational Molecular Medicine	4
EN.553.681	Numerical Analysis	4
EN.553.688	Computing for Applied Mathematics	3
EN.553.693	Mathematical Image Analysis	4
EN.553.740	Machine Learning I	3
EN.553.741	Machine Learning II	3
EN.553.743 Graphical Models		
EN.553.753	Commodity Markets and Green Energy Finance	4
EN.553.761	Nonlinear Optimization I	3
EN.553.762	Nonlinear Optimization II	3
EN.553.763	Stochastic Search & Optimization	3
EN.553.780	Shape and Differential Geometry	3
EN.601.675	Machine Learning	3
EN.601.682	Machine Learning: Deep Learning	4

4. Complete an area of focus by taking three courses in one of the following areas. A list of courses that can be counted toward each area of focus will be maintained and updated every year. Some courses from other departments can be eligible to count toward the area of focus. They can be used within the three-course limit specified in point 1, above. This list of courses is based on recent offerings. Not all classes are available every year and substitute classes may be accepted if approved by the advisor and the Academic Affairs Committee.

Code	Title	Credits
Select three courses in one of the following areas:		
Probability Theory		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.626	Introduction to Stochastic Processes	
EN.553.627	Stochastic Processes and Applications to Finance	
EN.553.628	Stochastic Processes and Applications to Finance II	
EN.553.633	Monte Carlo Methods	
EN.553.720	Probability Theory I	
EN.553.721	Probability Theory II	
EN.553.722	Introduction to Stochastic Calculus	
EN.553.763	Stochastic Search & Optimization	
EN.553.764	Modeling, Simulation, and Monte Carlo	
Statistics and Statistical Learning		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.602	Research and Design in Applied Mathematics: Data Mining	
EN.553.613	Applied Statistics and Data Analysis	
EN.553.614	Applied Statistics and Data Analysis II	
EN.553.632	Bayesian Statistics	
EN.553.636	Introduction to Data Science	
EN.553.639	Time Series Analysis	
EN.553.650	Computational Molecular Medicine	
EN.553.730	Statistical Theory	
EN.553.731	Statistical Theory II	
EN.553.733	Nonparametric Bayesian Statistics	
EN.553.735	Topics in Statistical Pattern Recognition	
EN.553.738	High-Dimensional Approximation, Probability, and Statistical Learning	
EN.553.739	Statistical Pattern Recognition Theory & Methods	
EN.553.740	Machine Learning I	
EN.553.741	Machine Learning II	
EN.553.742	Statistical Inference on Graphs	
EN.553.782	Statistical Uncertainty Quantification	
Optimization and Operations Research		
EN.553.600	Mathematical Modeling and Consulting	
EN.553.661	Optimization in Finance	
EN.553.653	Mathematical Game Theory	
EN.553.663	Network Models in Operations Research	
EN.553.665	Introduction to Convexity	
EN.553.667	Deep Learning in Discrete Optimization	
EN.553.761	Nonlinear Optimization I	
EN.553.762	Nonlinear Optimization II	
EN.553.763	Stochastic Search & Optimization	
EN.553.766	Combinatorial Optimization	
EN.553.797	Introduction to Control Theory and Optimal Control	
Computational and Applied Mathematics		
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.681	Numerical Analysis	
EN.553.688	Computing for Applied Mathematics	
EN.553.692	Mathematical Biology	
EN.553.693	Mathematical Image Analysis	
EN.553.780	Shape and Differential Geometry	
EN.553.792	Matrix Analysis and Linear Algebra	
EN.553.793	Turbulence Theory	
Discrete Mathematics		
Select at least one of the following: [1]		4
EN.553.671	Combinatorial Analysis	
EN.553.672	Graph Theory	
EN.553.766	Combinatorial Optimization	
Additional Options:		

EN.601.630	Combinatorics & Graph Theory in Computer Science
EN.601.631	Theory of Computation
EN.601.633	Intro Algorithms
EN.601.634	Randomized and Big Data Algorithms
EN.601.635	Approximation Algorithms
EN.601.645	Practical Cryptographic Systems

5. Students in the AMS MSE program must pass one of the EN.553.801 Department Seminar seminar sections in at least one semester. (Students are encouraged to register in multiple semesters.)
6. Complete training on the responsible and ethical conduct of research. Please see WSE Policy on the Responsible Conduct of Research (https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/).
7. Complete training on academic ethics.

[1] The Discrete Mathematics area of focus requires a minimum of one Applied Mathematics and Statistics course (listed in the first section), but the other two courses may include other listed Applied Mathematics and Statistics offerings or the listed Computer Science offerings. The Computer Science courses can be used within the three-course limit specified in point 1, above.

An overall GPA of 3.0 must be maintained in courses used to meet the program requirements. At most two course grades of C or C+ are allowed to be used and the rest of the course grades must be B- or better.

Each candidate for the master's degree must submit to the department for approval a written program stating how they plan to meet their degree requirements. This should be done early in the first semester of residence.

Doctoral students in other departments may concurrently undertake a master's program in Applied Mathematics and Statistics with the permission of the AMS department through an application review. Application information is available on the department website (http://engineering.jhu.edu/ams/).

Applied Mathematics and Statistics, Minor

The minor in applied mathematics and statistics should be attractive to students majoring in a variety of disciplines, in both the School of Engineering and the School of Arts and Sciences. The minor provides formal recognition of the depth and strength of a student's quantitative knowledge beyond the minimal requirements of their major.

Program Requirements

The requirements of the minor in applied mathematics and statistics are the following:

- Completion of an approved program of study containing at least 18 credits in courses coded Quantitative Studies (Q). The first two courses in calculus (AS.110.106 Calculus I (Biology and Social Sciences) and AS.110.107 Calculus II (For Biological and Social Science)), or (AS.110.108 Calculus I (Physical Sciences & Engineering) and AS.110.109 Calculus II (For Physical Sciences and Engineering)), or AS.110.113 Honors Single Variable Calculus, or their equivalents) may not be used to fulfill this requirement.
- Among the courses comprising the 18 Q credits, there must be
  - at least four courses in the Department of Applied Mathematics and Statistics (each of these must be a 3- or 4-credit course); and
  - at least three 3- or 4-credit courses coded Q at the 300-level or above, of which at least two must be in the Department of Applied Mathematics and Statistics[**]; and
  - an approved course based on a high-level computer language chosen from the list below or one of the courses approved to meet the AMS Master's/PhD Computing Requirement (https://engineering.jhu.edu/ams/computing-course-list/).

Code	Title	Credits
Select one of the following:		3-4
AS.110.445	Mathematical and Computational Foundations of Data Science	
EN.553.385	Numerical Linear Algebra	
EN.553.400	Mathematical Modeling and Consulting	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.432	Bayesian Statistics	
EN.553.433	Monte Carlo Methods	
EN.553.436	Introduction to Data Science	
EN.553.450	Computational Molecular Medicine	
EN.553.463	Network Models in Operations Research	
EN.553.467	Deep Learning in Discrete Optimization	
EN.553.481	Numerical Analysis	
EN.553.488	Computing for Applied Mathematics	
EN.553.493	Mathematical Image Analysis	
EN.553.494	Applied and Computational Multilinear Algebra	
EN.601.433	Intro Algorithms	
EN.601.475	Machine Learning	
EN.601.482	Machine Learning: Deep Learning	

- All courses used to meet AMS departmental minor requirements must be taken for a letter grade and passed with a grade of C- or higher.
- Students may not count all 3 courses, EN.553.310 Probability & Statistics for the Physical Sciences & Engineering/EN.553.311 Probability and Statistics for the Biological Sciences and Engineering, EN.553.420 Introduction to Probability, and EN.553.430 Introduction to Statistics toward minor requirements.
- A student wishing to complete a minor in applied mathematics and statistics may obtain more information from the Applied Mathematics and Statistics website (http://engineering.jhu.edu/ams/).

** A student may count the combination of (AS.110.201 Linear Algebra or AS.110.212 Honors Linear Algebra)
AND AS.110.302 Differential Equations and Applications in place of ONE of the required 300-level courses within the AMS Department

Applied Mathematics and Statistics, PhD

Financial Assistance

A limited number of teaching and research assistantships providing full tuition and a competitive academic year stipend are available to qualified full-time Ph.D. candidates. Furthermore, the following special fellowships are awarded:

- The Rufus P. Isaacs Fellowship, named in honor of a late member of the faculty acclaimed for his contributions to operations research.
- The Charles and Catherine Counselman Fellowship, generously endowed by Hopkins alumnus Charles Counselman.

In addition, summer employment opportunities are often available within the university and in the Baltimore-Washington corridor.

Program Requirements

The objective of the department's Ph.D. program is to produce graduates who are broadly educated in applied mathematics and statistics and who can work at the current frontiers of their chosen specialized disciplines. The introductory phase of graduate study acquaints the student with a spectrum of topics, provides an opportunity to fill gaps in their background, and affords a close view of the doctoral research process and of potential research areas and advisors. Continuation to advanced study and dissertation research is based upon favorable evaluation of preparedness and potential. The progress of students is evaluated at the end of every semester. The culmination of the program is the doctoral dissertation, representing an original and significant contribution to knowledge in applied mathematics.

In addition to fulfilling the university requirement of a minimum of two consecutive semesters of registration as a full-time resident graduate student, completion of academic ethics training and the responsible conduct of research course, the student must accomplish the following to obtain departmental certification for the Ph.D.:

- Pass the Introductory Examination, normally offered immediately before each semester.
- Pass the Ph.D. Candidacy Examination. This oral examination is normally taken in the third year of residency. The scope of the exam will be governed by a syllabus prepared by the student with the help of the student's mentor or advisor.
- Pass the Graduate Board Oral Examination, normally taken in the third year of residence.
- Acquire and hone their teaching and research experience under the supervision of faculty by successfully completing either a TA or RA assignment every semester while a fulltime, resident student.
- Complete at least 12 one-semester courses of graduate work in a coherent program approved by the faculty advisor.
- Demonstrate a working knowledge of the utilization of computers in applied mathematics and statistics.
- Complete a program of original research and its clear exposition in a written dissertation. The dissertation must be approved by at least two faculty readers and be certified by them to be a significant contribution to knowledge and worthy of publication in scholarly journals. The candidate defends the dissertation in a public examination held under the auspices of the department.

Additional details on these items may be found on the department's website.

Course Program

The most common way for students to gain the knowledge and skills to succeed in the Ph.D. program is through course work. In consultation with their advisor, each student will develop a program of proposed course work. The relevant courses for the Ph.D. are of three types: basic graduate-level courses, additional specialized courses appropriate to the student's field of research, and an elective one year course selected to broaden the student in applied mathematics. To promote a well-rounded education and record, all full-time graduate students are expected to enroll in an appropriate number of courses for their stage in the program. Students are required to enroll in and attend EN.553.801 Department Seminar, every semester. Grades of B- or better (or equivalent level of performance in pass/fail courses) are expected of all department Ph.D. graduate students in their course work.

Basic Courses

All students are encouraged to master basic material in:

- probability (EN.553.720 Probability Theory I), statistics (EN.553.730 Statistical Theory), and stochastic processes (EN.553.626 Introduction to Stochastic Processes);
- optimization (EN.553.761 Nonlinear Optimization I);
- matrix analysis (EN.553.792 Matrix Analysis and Linear Algebra); and
- discrete mathematics (EN.553.671 Combinatorial Analysis EN.553.672 Graph Theory).

Normally, a student will have completed at least eight basic courses by the end of the fourth semester of residence.

Specialized Courses

Each student takes advanced courses appropriate to the proposed area of dissertation research, with the approval of the research advisor.

Elective Courses

Students are encouraged to take additional elective course work, either covering one area in depth or covering two areas. Typical areas in other departments are biology, econometrics, mathematical economics, mathematical ecology, computational geometry, systems theory, health systems, mathematics, facility location, psychometrics, and physics. These courses may complement or supplement the student's previous experience, but if a student has no previous experience in an area some elementary course work may be necessary as a prerequisite to acceptable graduate level courses.

Data Science, Master's Degree

Program Requirements

The Data Science Master's program is designed to be completed in three semesters of full-time graduate study. Please see our program website (https://engineering.jhu.edu/ams/data-science-masters-program/) for the most current program requirements and information.

Code	Title	Credits
Core Requirements		
EN.553.636	Introduction to Data Science	4.0
Core Areas		

Select one course in each of the four Core Areas:		12 - 16
==Statistics==		
EN.553.613	Applied Statistics and Data Analysis	4
EN.553.614	Applied Statistics and Data Analysis II	3
EN.553.630	Introduction to Statistics (NOTE: EN.553.630 may not be taken after EN.553.730.)	4
EN.553.632	Bayesian Statistics	3
EN.553.639	Time Series Analysis	3
EN.553.730	Statistical Theory	4
EN.553.731	Statistical Theory II	3
EN.553.733	Nonparametric Bayesian Statistics	3
EN.553.735	Topics in Statistical Pattern Recognition	3
EN.553.738	High-Dimensional Approximation, Probability, and Statistical Learning	3
EN.553.739	Statistical Pattern Recognition Theory & Methods	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
EN.601.677	Causal Inference	3
EN.625.603	Statistical Methods and Data Analysis	3
==Machine Learning==		
EN.520.612	Machine Learning for Signal Processing	3
EN.520.637	Foundations of Reinforcement Learning	3
EN.520.638	Deep Learning	3
EN.520.647	Information Theory	3
EN.520.648	Compressed Sensing and Sparse Recovery	3
EN.520.651	Foundations of Probabilistic Machine Learning	4
EN.520.666	Information Extraction	3
EN.525.724	Introduction to Pattern Recognition	3
EN.535.741	Optimal Control and Reinforcement Learning	3
EN.553.602	Research and Design in Applied Mathematics: Data Mining	4
EN.553.738	High-Dimensional Approximation, Probability, and Statistical Learning	3
EN.553.740	Machine Learning I	3
EN.553.741	Machine Learning II	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
EN.601.634	Randomized and Big Data Algorithms	3
EN.601.674	ML: Learning Theory	3
EN.601.675	Machine Learning	3
EN.601.676	Machine Learning: Data to Models	3
EN.601.677	Causal Inference	3
EN.601.682	Machine Learning: Deep Learning	4
EN.601.779	Machine Learning: Advanced Topics	3
EN.601.780	Unsupervised Learning: From Big Data to Low-Dimensional Representations	3
EN.625.692	Probabilistic Graphical Models	3
==Optimization==		
EN.520.618	Modern Convex Optimization	3
EN.553.665	Introduction to Convexity	4
EN.553.761	Nonlinear Optimization I	3
EN.553.762	Nonlinear Optimization II	3
EN.553.763	Stochastic Search & Optimization	3
EN.553.766	Combinatorial Optimization	3
EN.553.797	Introduction to Control Theory and Optimal Control	3
EN.601.681	Machine Learning: Optimization	3
EN.625.615	Introduction to Optimization	3
==Computing==		
EN.520.617	Computation for Engineers	3
EN.553.688	Computing for Applied Mathematics	3
EN.601.619	Cloud Computing	3
EN.601.620	Parallel Computing for Data Science	3
EN.601.633	Intro Algorithms	3
EN.601.646	Sketching and Indexing for Sequences	3
EN.601.647	Computational Genomics: Sequences	3
EN.685.621	Algorithms for Data Science	3
4 Additional Courses		
Courses listed in the core areas may be taken to complete this requirement, provided they are not double-counted. The following provide additional options, grouped into categories (but the chosen courses may be taken from different categories).		12-16
==Computational Medicine==		
AS.410.633	Introduction to Bioinformatics	4
AS.410.635	Bioinformatics: Tools for Genome Analysis	4
AS.410.671	Gene Expression Data Analysis and Visualization	4
EN.520.659	Machine learning for medical applications	3
EN.553.650	Computational Molecular Medicine	4
EN.580.688	Foundations of Computational Biology and Bioinformatics	3
EN.605.620	Algorithms for Bioinformatics	3
or EN.605.621	Foundations of Algorithms	
EN.601.621	Object Oriented Software Engineering	3
EN.605.653	Computational Genomics	3
==Computer Vision==		
EN.520.614	Image Processing & Analysis	3
EN.520.615	Image Processing & Analysis II	3
EN.520.623	Medical Image Analysis	3
EN.520.646	Wavelets & Filter Banks	3
EN.520.648	Compressed Sensing and Sparse Recovery	3
EN.525.733	Deep Learning for Computer Vision	3
EN.553.693	Mathematical Image Analysis	4
EN.601.661	Computer Vision	3
EN.601.783	Vision as Bayesian Inference	3
==Mathematical Finance==		
EN.553.627	Stochastic Processes and Applications to Finance	4
EN.553.628	Stochastic Processes and Applications to Finance II	4
EN.553.641	Equity Markets and Quantitative Trading	3
EN.553.642	Investment Science	4
EN.553.644	Introduction to Financial Derivatives	4
EN.553.645	Interest Rate and Credit Derivatives	4
EN.553.646	Risk Measurement/Management in Financial Markets	4
EN.553.647	Quantitative Portfolio Theory and Performance Analysis	4
EN.553.648	Financial Engineering and Structured Products	4

EN.553.649	Advanced Equity Derivatives	4
EN.553.753	Commodity Markets and Green Energy Finance	4
PH.140.644	Statistical Machine Learning: Methods, Theory, and Applications	4
==Mathematics of Data Science==		
EN.553.633	Monte Carlo Methods	4
EN.553.738	High-Dimensional Approximation, Probability, and Statistical Learning	3
EN.553.740	Machine Learning I	3
EN.553.741	Machine Learning II	3
EN.553.792	Matrix Analysis and Linear Algebra	4
EN.601.634	Randomized and Big Data Algorithms	3
==Language and Speech==		
EN.520.666	Information Extraction	3
EN.520.680	Speech and Auditory Processing by Humans and Machines	3
EN.601.665	Natural Language Processing	3
EN.601.668	Machine Translation	3
EN.601.769	Events Semantics in Theory and Practice	3
==Additional Courses==		
EN.520.640	Machine Intelligence on Embedded Systems	3
EN.520.650	Machine Intelligence	3
EN.520.665	Machine Perception	3
EN.580.691	Learning, Estimation and Control	3
EN.601.615	Databases	3
EN.601.663	Algorithms for Sensor-Based Robotics (Recommended pre-requisite EN.601.226)	3
EN.601.664	Artificial Intelligence	3
EN.601.666	Information Retrieval and Web Agents	3
EN.650.683	Cybersecurity Risk Management	3
Capstone Experience		
EN.553.806	Capstone Experience in Data Science	3 - 10

In addition to the above course requirements, all data science master's students will complete:

- An online Data Ethics course: Students must take an approved online data ethics course such as the one offered by Coursera (https://www.coursera.org/learn/data-science-ethics/)
- The communication skills requirement (Communication Skills Practicum)
- Course on Responsible Conduct of Research (https://engineering.jhu.edu/research/resources-policies-forms/online-training-course-responsible-conduct-of-research/)
- University Orientation and Academic Ethics

Additional Notes:

- A course grade of B- or better is required to meet all course requirements. Consult the Department/Program website for additional information regarding Minimum Grade Requirements and the Academic Probation Policy.
- Courses cannot be double-counted for different requirements (even if they appear in several core areas).

Financial Mathematics, Master of Science in Engineering

The financial mathematics master's program at Johns Hopkins is offered through the Department of Applied Mathematics and Statistics as a Master of Science in Engineering (MSE). The program takes three semesters to complete, with students starting in the later summer and finishing in mid-December. Students with a strong quantitative undergraduate background are encouraged to apply for admission (https://engineering.jhu.edu/ams/graduate-studies/admissions-criteria-admission-process/) to the program.

The Master's program in Financial Mathematics will provide a solid foundation in applied mathematics, providing the basis for an understanding and appreciation of existing models commonly used in financial applications and inferential and computational tools for developing their solution. The program will also furnish the appropriate insights in Finance where quantitative skills are most germane. The combination of these elements will create a springboard for addressing today's quantitative challenges in finance as well as provide the preparation to meet the challenges of the future.

Program Requirements

For departmental certification for this degree, the student must complete the following courses or approved substitute courses with program approval pursuing either the Area of Focus Track or Legacy Track. Graduate students can also work with their advisors to customize the Area of Focus Track. Please refer to our program website (https://engineering.jhu.edu/ams/graduate-studies/financial-mathematics-masters-program/program-requirements-schedule/) for the most current program requirements and information.

Area of Focus Track

Code	Title	Credits
Core Financial Mathematics Requirement		
EN.553.644	Introduction to Financial Derivatives	4
EN.553.645	Interest Rate and Credit Derivatives	4
Core Applied Mathematics Requirement		
EN.553.613	Applied Statistics and Data Analysis	4
EN.553.627	Stochastic Processes and Applications to Finance	4
EN.553.639	Time Series Analysis	3
Electives [1]		
Select seven elective courses [2]		21
Financial Mathematics Seminar		
EN.553.847	Financial Mathematics Masters Seminar	1
Total Credits		**41**

1. Please see department website for approved electives.
2. One course in Applied Mathematics and Statistics, two courses in Financial Mathematics and four additional courses from the approved electives listing or with prior program approval.

In addition to the above course requirements, all students must complete:

- A computing requirement (EN.553.803.01 Financial Computing Workshop)
- The communication skills requirement (Communication Skills Practicum)

- An internship (typically done during summer after first year in residence)
- Course on Responsible Conduct of Research (https://engineering.jhu.edu/research/resources-policies-forms/online-training-course-responsible-conduct-of-research/)
- University Orientation and Academic Ethics

Legacy Track

Code	Title	Credits
Core Financial Mathematics Requirement		
EN.553.642	Investment Science	4
EN.553.644	Introduction to Financial Derivatives	4
EN.553.645	Interest Rate and Credit Derivatives	4
EN.553.646	Risk Measurement/Management in Financial Markets	4
or EN.553.648	Financial Engineering and Structured Products	
Core Applied Mathematics Requirement		
EN.553.627	Stochastic Processes and Applications to Finance	4
EN.553.633	Monte Carlo Methods	4
EN.553.613	Applied Statistics and Data Analysis	4
EN.553.639	Time Series Analysis	3
EN.553.661	Optimization in Finance	4
Financial Mathematics Seminar (3 semesters)		
EN.553.847	Financial Mathematics Masters Seminar	1
Electives [1]		
Select three elective courses [2]		
Total Credits		**36**

[1] Please see department website for approved electives.
[2] One course in Applied Mathematics and Statistics, one course in Financial Mathematics and one additional course with prior program approval.

In addition to the above course requirements, all students must complete:

- A computing requirement (EN.553.803.01 Financial Computing Workshop)
- The communication skills requirement (Communication Skills Practicum)
- An internship (typically done during summer after first year in residence)
- Course on Responsible Conduct of Research (https://engineering.jhu.edu/research/resources-policies-forms/online-training-course-responsible-conduct-of-research/)
- University Orientation and Academic Ethics

An overall GPA of 3.0 must be maintained in courses used to meet the program requirements. At most two course grades of C or C+ are allowed to be used, and the rest of the course grades must be B- or better.

Biomedical Engineering

http://www.bme.jhu.edu

The faculty and students of the Johns Hopkins Department of Biomedical Engineering, founded more than 50 years ago, are engineering the future of medicine. Consistently ranked the #1 BME program in the nation, we are pushing the boundaries of discovery and innovation, pioneering new and emerging disciplines of biomedical engineering that in turn drive our academic programs.

Biomedical engineering is an interdisciplinary endeavor, and new discoveries and technological advances require a variety of experimental and computational approaches. Our unique positioning within the Johns Hopkins Whiting School of Engineering and the Johns Hopkins School of Medicine provides students and faculty with opportunities to engage with other leading engineers, scientists, and physicians. Together, we are developing the disruptive technologies that will transform the practice of medicine and improve human health. Many of these technologies are currently used in the clinic to diagnose and treat diseases, from cardiac arrhythmias and sepsis to Alzheimer’s and cancer. Examples of Hopkins BME advances include new drug delivery methods, diagnostic imaging devices, artificial organs and orthopedic implants, prosthetic limbs, and patient-specific quantitative models of disease.

Johns Hopkins BME is training the next generation of leaders in biomedical engineering through academic programs at three levels:

1. an undergraduate program, leading to a B.S. degree
2. three master’s programs, leading to an MSE degree in biomedical engineering, with course-based or thesis-based options; an MSE in bioengineering innovation and design; or dual MSE and MS degrees from Johns Hopkins BME and Tsinghua University in Beijing, China, respectively
3. a doctoral program, leading to a Ph.D. degree

At both the undergraduate and graduate levels, we are transforming the BME educational landscape through BME 2.0, an integrative learning experience in which every student is an active participant in our discovery, innovation, and translation efforts. Supported by our personalized advising program, students at all levels will specialize in one of several cutting-edge biomedical engineering focus areas derived from our research expertise. These focus areas include:

- biomedical data science
- computational medicine
- genomics and systems biology
- imaging and medical devices
- immunoengineering
- neuroengineering
- translational cell and tissue engineering

Through project-based courses and hands-on learning experiences, our students will apply their knowledge in these areas to solve real-world clinical, design, and engineering problems. Combined with advanced research and design opportunities, these experiences ensure that our graduates are well prepared for careers in industry, medicine, or research.

Facilities

Situated on both the Homewood and School of Medicine campuses, our research and educational spaces are equipped to support a broad range of interdisciplinary discovery and innovation efforts.

At the School of Medicine campus, faculty members maintain laboratories supplied with a wide variety of equipment in the Traylor, Ross, Rangos, Miller, and Smith research buildings. This location fosters a close association with other basic biomedical science programs and provides access to the clinical environment of one of the nation’s top-ranked hospitals.

The Homewood campus is home to Clark Hall, a dedicated BME space that features research laboratories, classrooms, and conference spaces. Clark Hall also houses the BME Design Studio, a premiere workspace where students can design and develop solutions to clinical and global health challenges. To maintain close ties with clinical collaborators, the Design Studio is connected around-the-clock to similar BME student design spaces located on the School of Medicine campus. BME students at all levels, from freshman to graduate students, are able to work in our design spaces and research labs, ensuring that they can begin practicing the discipline on their very first day at Hopkins.

Additional Johns Hopkins BME amenities include physiology teaching laboratories, microscope facilities, a microfabrication laboratory, tissue culture rooms, a fully-staffed mechanical shop, conference and seminar spaces that allow broadcasting throughout the university, and state-of-the-art 3-D printing facilities designed to support a broad range of prototyping needs.

Our faculty and students also have access to ample resources through our affiliations with several of the Johns Hopkins institutes and centers that have emerged from Hopkins BME research activities. Hotbeds for interdisciplinary scientific collaborations, these centers and institutes, all of which are directed or co-directed by Hopkins BME faculty, include the Institute for Computational Medicine, Center for Imaging Science, Carnegie Center for Surgical Innovation, Translational Tissue Engineering Center, Kavli Neuroscience Discovery Institute, Mathematical Institute for Data Science, and Center for Hearing and Balance. Hopkins BME is also home to the Center for Bioengineering Innovation and Design, which oversees our renowned graduate design program. In addition to these affiliated centers and institutes, our faculty have ongoing collaborations with scientists and physicians throughout the various Johns Hopkins divisions, including the Applied Physics Lab, School of Public Health, Krieger School of Arts and Sciences, and Carey Business School.

The profoundly interdivisional nature of Johns Hopkins BME provides students with access to a wide range of university resources, including computing laboratories, libraries, and core facilities for microscopy, flow cytometry, sequencing and genetics, creating CRISPR/Cas9-based transgenic strains, and more. These amenities allow our students to produce the innovative technologies and groundbreaking research discoveries that result in patents, start-up companies, high-impact publications, and a better standard of health care for people across the globe.

Undergraduate Programs

The mission of the undergraduate programs is to provide state-of-the-art biomedical engineering education to students in order that they may continue their education in graduate, medical, and professional schools or pursue careers in industry. To this end, our responsibility is as much to the future as it is to the present. Through a strong research and educational environment, we strive to empower our students to explore and define their own frontiers as well as instill the ethical principles that will foster rewarding professional endeavors. The B.S. in Biomedical Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org.

The biomedical engineering program normally leads to the bachelor of science degree and requires at least 129 credits. The B.S. program is recommended for students who plan careers in engineering or who plan to attend graduate school in engineering. If a student wishes to take a more flexible program with less emphasis on engineering, a B.A. program is also available. Either the B.S. or the B.A. program can meet the needs of a student who plans graduate study in a nonengineering area.

The undergraduate program provides a strong foundation in mathematics, engineering, and science. It emphasizes preparation for advanced study in an area related to biomedical engineering and is broad enough to accommodate students who plan graduate work in biology, medicine, engineering, biophysics, physiology, or biomedical engineering.

Our fundamental focus is to instill a passion for learning, scientific discovery, innovation and entrepreneurial spirit, and societal impact in an extraordinary group of students who, because of their experiences in our program, will:

- Continue to utilize and enhance their engineering and biological training to solve problems related to health and healthcare that are globally relevant and based on ethically sound principles.
- Demonstrate leadership in their respective careers in biomedical engineering or interrelated areas of industry, government, academia, and clinical practice.
- Engage in life-long learning by continuing their education in graduate or professional school or through opportunities for advanced career or professional training.

Each student plans a curriculum suited to their goals with the assistance of a faculty advisor. Upon completion of the B.S. in biomedical engineering, students will demonstrate:

- an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
- an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
- an ability to communicate effectively with a range of audiences
- an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
- an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
- an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
- an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

The program also encourages individual study and research and gives academic credit for them. Students are welcome to work in laboratories on the Homewood campus or at the Medical Institutions in East Baltimore.

Programs

- Biomedical Engineering, PhD through the School of Medicine (p. 1196)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.580.110. Immersive Summer Program for Education, Enrichment, and Distinction in Biomedical Engineering. 3 Credits.
This cross-disciplinary, project-based course will introduce students to the field of biomedical engineering with particular emphasis on applying engineering principles to solve problems related to human health. Throughout the course, students will learn and implement modern techniques and methodology to address biomedical questions using biological, computational, and design approaches. Students will (1) apply molecular biology, cell culture, and other wet-lab techniques to answer hypothesis-driven experimental questions; (2) apply programming, coding, and machine learning techniques to analyze data and model disease; and (3) work in small groups to identify, design, and prototype solutions to unmet clinical needs. Guest lectures and workshops will round out the course, introducing students to careers in biomedical engineering, enhancing professional development skills, and providing other tools necessary for future success in the field.

EN.580.111. Biomedical Engineering and Design. 2 Credits.
Working in teams with upperclassmen this course (1) introduces biomedical engineering freshmen to an orderly method for analyzing and modeling biological systems, (2) introduces engineering principles to solve design problems that are biological, physiological, and/or medical, and (3) considers the ethical and professional responsibility in developing biomedical engineering solutions to health care challenges. Freshmen are expected to use the informational content being taught in calculus, physics and chemistry and to apply this knowledge to the solution of practical problems encountered in biomedical engineering. BME Freshmen only.
Students must have completed Lab Safety training prior to registering for this class.

EN.580.112. Design Team Health-Tech Project II. 3 Credits.
A two-semester course sequence where freshmen work with groups of BME upperclassmen mentors, and learn to use engineering principles to solve design problems that are biological, physiological, and/or medical. Freshmen are expected to use the informational content being taught in calculus, physics, and chemistry and apply this knowledge to the solution of practical problems encountered in biomedical engineering.

EN.580.151. Structural Biology of Cells. 3 Credits.
Course provides a rigorous foundation in cell structures and pathways relevant to medicine and bioengineering. Interactive lectures will cover molecular components (biological membranes, proteins, DNA, RNA, glycoproteins); electro-chemical gradients across membranes; structure and functions of the cell nucleus and genome; secretory and endocytic pathways; biomechanics, contractility and cell motility; cell adhesions, tissues and the extracellular matrix; signaling structures and networks; stem cells, cell division and cell specialization; heredity, mutations and phenotypes. This course will feature bioengineering principles including shape, localization, timing and feedback in biological systems. Students also take the 1-credit Structural Biology of Cells Lab.

EN.580.153. Structural Biology of Cells Laboratory. 1 Credit.
Students will learn how to analyze biological data in computational labs that focus on protein 3D structural data (Structural Protein Engineering), DNA/genomics data (Genomes to Clinical Phenotypes) and live-cell imaging data (Molecular Tracking in Cells) to gain an integrated understanding of cells, tissues and the molecular basis of disease. This lab accompanies the 3-credit Structural Biology of Cells course to provide a rigorous foundation in cell structures, pathways and strategies relevant to medicine and bioengineering.

EN.580.204. Social Justice: Fndts & Personal Commitments. 3 Credits.
The course will teach historical concepts from the post civil war years to #blacklivesmatter and will cover key periods in the American experience including Reconstruction, Jim Crow, thestruggle for civil rights, and #blacklivesmatter.The course emphasizes an understanding of both policy and practice, and engages students in series of case studies, practical frameworks, selected readings, and guest lectures. Students willcontemplate and study the ways in which racial justice plays out across a variety of contexts,including public spaces, the workplace, school, family and relationships, and public policy. Theseries of guest lectures will be delivered by practitioners and leaders in the movement for racialjustice. Ultimately, the course aims to empower students to advance racial justice through self,individual and systems advocacy. At the end of the course, students can expect to walk awaywith a) a broad understanding of the drivers of structural racism, b) models of advocacy inadvancing policy change, c) individual and institutional core competencies for anti-racistpractices. Recommended background: an authentic interest in racial justice and models for social change, a willingness to engage in candid, constructive, and challenging conversations and a desire to learn tools with practical applications in the workforce, communityorganizing, and social activism.

EN.580.211. Design Team Health-Tech Project I. 3 Credits.
Sophomore-level version of EN.580.311-312 or Perm. Req'd

EN.580.212. Design Team Health-Tech Project II. 3 Credits.
Sophomore-level version of EN.580.111-112. Permission of course directors required.

EN.580.221. Biochemistry and Molecular Engineering. 4 Credits.
This combined lecture and laboratory course will delve into the workings of the cell and the interactions between cells. The emphasis in this course is on quantitative analysis of reactions between molecules, including receptor-ligand and antigen-antibody specificity, enzyme catalysis, genetic information, protein processing and secretion, cell physiology and cell functions. In the laboratory portion of the course students will gain experimental skills in enzyme kinetics, binding (specificity and affinity), DNA analysis techniques (PCR, forensics), metabolism, membrane potentials and molecular neuroscience. The course will be supplemented with discussion and analysis of classic papers in the field as well as the current literature.Recommended background: Structural Biology of the Cell or a strong background in molecular biology and Chemistry.

EN.580.237. Neuro Data Design I. 3 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. This version of Neuro Data Design is designed for students with less coding experience who wish to develop their writing skills.
Area: Writing Intensive

EN.580.238. Neuro Data Design II. 3 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. This version of Neuro Data Design is designed for students with less coding experience who wish to develop their writing skills.
Area: Writing Intensive

EN.580.241. Statistical Physics. 2 Credits.
Basic principles of statistical physics and thermodynamics of biological systems. Topics included quantitative statistical formulation of entropy and its application in thermodynamic optimizationand conversion principles, the Gibbs/Boltzmann distribution, mixing, and phase transitions.Recommended Background: AS.110.108-109, AS.030.101-102, AS 171.101-102 or equivalent.

EN.580.242. Biological Models and Simulations. 2 Credits.
This course introduces students to modeling and analysis of linear biological systems. Topics include viscoelastic materials, pharmacokinetics, reaction-diffusion-convection equation with applications to molecular transport in tissues. The course also introduces students to the Matlab programming language, which allows them to implement the models discussed in the classroom. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.291 Linear Algebra and Differential Equations.

EN.580.243. Linear Signals and Systems. 2 Credits.
An introduction to signals and linear systems. Topics include first and second order systems, linear time variant discrete and continuous systems, convolution, Fourier series, and Fourier transforms.Recommended background: AS.171.102 and AS.110.201, AS.110.302, or 553.291. 110.302 may be taken at the same time.

EN.580.244. Nonlinear Dynamics of Biological Systems. 2 Credits.
Analysis and simulation of nonlinear behavior in biological systems: bifurcations (cell-fate decision), limit cycles (cell-cycle, neuronal excitations), chaos, and maps. Matlab will be used to simulate these systems and motivate nonlinear analytic tools and stability analysis. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.292 Linear Algebra and Differential Equations.

EN.580.246. Systems and Controls. 2 Credits.
An introduction to the analysis and synthesis of controllers for linear systems. topics include LaPlace transforms, input output and state space representations of linear systems, stability, observability, controlability, and PID controller design. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.291 Linear Algebra and Differential Equations.
EN.580.243

EN.580.248. Systems Biology of the Cell. 2 Credits.
Cellular systems biology provides a theoretical and quantitative understanding of the interactions between DNA, RNA, and proteins that create the well-regulated system we call life. This course develops first-principles models for the central dogma of molecular biology: information flow through protein signal transduction pathways, gene regulation by protein-DNA physical interactions, transcription of DNA to RNA, translation of RNA to protein, and feedback regulation that closes the cycle. Topics include complex analysis and contour integrals, spectral transforms, linear models for cell signaling, positive and negative feedback, non-linearities introducted by saturation and cooperativity, information content and combinatorial regulation, and instabilities leading to cell fate specification. Recommended Course Background: Linear Algebra, Systems and Controls and programming.

EN.580.298. Advanded Design Team. 3 Credits.
Sophomore-level version of EN.580.498. This independent course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team’s technical achievements within the context of biomedical instrumentation. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.311. Design Team Health-Tech Project I. 3 Credits.
A two-semester course sequence where juniors and seniors work with a team leader and a group of BME freshmen and sophomores, to solve open-ended problems in biomedical engineering. Upperclassmen are expected to apply their general knowledge and experience, and their knowledge in their concentration area, to teach lower classmen and to generate the solution to practical problems encountered in biomedical engineering.Perm. Req’d.

EN.580.312. Design Team Health-Tech Project II. 3 Credits.
A two semester course sequence where juniors and seniors work with a team leader and a group of BME freshmen and sophomores, to solve open-ended problems in biomedical engineering. Upperclassmen are expected to apply their general knowledge and experience, and their knowledge in their concentration area, to teach lower classmen and to generate the solution to practical problems encountered in biomedical engineering.

EN.580.336. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body. The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Fall semester only. S/U grading only.

EN.580.404. Design Team Project Definition. 0.5 Credits.
This course will train student BME Design Teams to identify and assess project options for their BME Design Team year-long project the subsequent year. Students will learn clinical observation tools, root cause analysis and need filtering. The outcome of the course is the ranking, justification and selection of the Design Team project.

EN.580.408. Design Team Leader Project Management. 1 Credit.
This course prepares undergraduate students to lead teams for the subsequent Design Teams course. This course will teach leadership skills, expose students to project options and clinical sponsors, and prepare them to plan and execute a biomedical design project. Course will meet in the Clark Hall Design Studio and the Carnegie Building (SoM) Design Studio.

EN.580.410. Effective Teaching and Management of Engineering Teams. 2 Credits.
Senior biomedical engineering students will assist the core course instructors and PhD students in managing the sections and recitations and or lab component of a course.Permission required.

EN.580.411. Design Team Health-Tech Project I. 3 Credits.
Perm. Req'd. Senior-level version of EN.580.311-312.

EN.580.412. Design Team Health-Tech Project II. 3 Credits.
Senior-level version of EN.580.311-312. Permission of course directors required

EN.580.413. Design Team Leader I. 1 Credit.
This course is for Design Team leaders actively leading a team for the academic year. This course focuses on development of leadership, communication and team management skills in the context of biodesign.

EN.580.414. Design Team Leader III. 1 Credit.
This course is for Design Team leaders actively leading a team for the academic year. This course focuses on development of leadership, communication and team management skills in the context of biodesign.

EN.580.418. Principles of Pulmonary Physiology. 3 Credits.
This course will provide students with an introduction to concepts in the structure and function of the respiratory system. Topics to be covered will include basic anatomy, lung mechanics, gas exchange, tests of pulmonary function and cardiopulmonary exercise, and the effects of disease on aspects of the respiratory system. Class sessions will mix both lecture and hands-on measurement, and will include discussion of instrumentation used in pulmonary measurements and a field trip to a clinical physiology laboratory at JHH. Recommended background: Chemistry, Physics, and Calculus II, and EN.580.222 Systems and Controls or equivalent.

EN.580.424. Neuroengineering and Lab. 3 Credits.
A laboratory course in which various physiological preparations are used as examples of problems of applying technology in biological systems. The emphasis in this course is on the design of experimental measurements and on physical models of biological systems.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.425. Radiology for Engineers. 3 Credits.
This course provides engineering students with an introductory understanding of the principles and practice of radiology – including a spectrum of specialties in diagnostic radiology as well as procedures in interventional radiology and digital pathology. The course includes lectures, working with real image data, and visits to clinical areas at Johns Hopkins Hospital. Each segment of the course emphasizes clinical perspective on imaging (including scanner technology and image analysis) in relation to anatomy, physiology, and pathology. Each segment is led by an expert in a particular discipline in collaboration with the course director. Recommended course background: 580.472, 601.455The course is open to senior BME undergraduates. Enrollment is limited by permission from the course director. Audits are not allowed.

EN.580.426. Neuroengineering: The Neural Control of Movement. 3 Credits.
This half-semester course will delve into how the brain encodes and controls movement. The emphasis in this course is on the theoretical, computational, and experimental approaches that provide the basis of our understanding of how we interact with the world. Lectures will focus on the neural circuits underlying sensorimotor transformations, population coding, motor learning and plasticity, decision-making, functional brain imaging, brain stimulation, and brain machine interfacing. Students will compare neural imaging techniques. The course will be supplemented with visits to medical campus labs and critical analysis of current literature.
EN.580.424

EN.580.427. Microphysiological Systems and Laboratory. 3 Credits.
This course focuses on the principle and application of biological and engineering fundamentals to design microphysiological systems such as organ/tissue chips, 3D-printed tissues, and organoids. This course will introduce the concept of human organ-on-a-chip and organoid engineering and discuss the latest developments in the field of drug development - the shift from animal testing toward human relevant, high content, high-throughput integrative testing strategies. Students will learn various biofabrication techniques such as microfluidics, microfabrication, and 3D bioprinting to create in vitro miniaturized 3D complex human tissue models that mimic the biochemical, electrical, and mechanical properties of organ or tissue function. This course will also cover a wide range of biomedical applications of microphysiological systems in disease modeling, drug screening, precision medicine, and space biology as well as technology commercialization efforts. This laboratory portion of the course consists of three experiments that will provide students with valuable hands-on experience in design, fabrication and applications of microphysiological systems, including organ-on-a-chip systems (tissue/organ chips), 3-D printed tissue constructs, and organoids. Experiments include 1) the basics of human induced pluripotent stem cell differentiation, 2) tissue/organ chip fabrication, and 3) functional phenotypic analysis and drug testing. Spring semester only. Recommended background: EN.580.441, EN.580.442 and EN.580.452

EN.580.428. Genomic Data Visualization. 3 Credits.
As the primary mode through which analysts and audience members alike consume data, data visualization remains an important hypothesis generating and analytical technique in data-driven research to facilitate new discoveries. However, if done poorly, data visualization can also mislead, bias, and slow down progress. This hands-on course will cover the principles of perception and cognition relevant for data visualization and apply these principles to genomic data, focusing on large-scale single-cell and spatially-resolved omics datasets, using the R statistical programming language. Students will be expected to complete class readings, create weekly data visualizations as homework assignments, and make a major class presentation."

EN.580.430. Systems Pharmacology and Personalized Medicine. 4 Credits.
We have moved beyond the 'one-size-fits-all' era of medicine. Individuals are different, their diseases are different, and their responses to drugs are different too. This variability is not just from person to person; heterogeneity is observed even between tumors within the same person, and between sites within the same tumor. These levels of variability among the human population must be accounted for to improve patient outcomes and the efficiency of clinical trials. Some of the ways in which this is being explored include: drugs are being developed hand-in-hand with the tests needed to determine whether or not they will be effective; tumor fragments excised from patients are being cultured in the lab for high-throughput testing of drugs and drug combinations; data-rich assays such as genomics and proteomics identify thousands of potentially significant differences between individuals; and computational models are being used to predict which therapies will work for which patients. This course will focus on the applications of pharmacokinetics and pharmacodynamics to simulating the effects of various drugs across a heterogeneous population of diseased individuals. Such computational approaches are needed to harness and leverage the vast amounts of data and provide insight into the key differences that determine drug responsiveness. These approaches can also explore the temporal dynamics of disease and treatment, and enable the modification of treatment during recovery. Most of the assignments in this course involve some coding and visualization of data (we use Matlab and R), and students undertake a project to simulate a drug or other treatment of their choice. Recommended background: 110.201 Linear Algebra, 110.302 Differential Equations, and 553.311 Probability and Statistics (or equivalent).

EN.580.431. Introduction to Computational Medicine: Imaging. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. This course will cover computational anatomy. Students will learn how to: model anatomies using magnetic resonance imaging data; compare anatomies via mappings onto anatomical atlases; discover anatomical biomarkers of disease; analyze changes in the connectivity of anatomies in disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: Matlab or Python. This course can be taken in conjunction with EN.580.433 which covers computational physiological medicine.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348)

EN.580.433. Introduction to Computational Medicine: The Physiome. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. Computational physiological medicine: develops computational models of disease at the cellular, tissue, organ, and organism level; develops methods for constraining these models using patient data; applies these models to better treat patients. Students will learn how to: use biophysical laws and data to formulate computational models of physiological systems in health and disease; analyze the behaviors of these models using analytical and simulation approaches; apply models to understand their use in diagnosing and treating disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: C++, Matlab or Python.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348)

EN.580.435. Applied Bioelectrical Engineering. 3 Credits.
This course covers diverse applications of bioelectrical measurements, manipulation and therapy in engineering practice. Topics include functional electrical stimulation, deep brain stimulation, cardiac pacing and defibrillation, tissue ablation and electromanipulation of cells. Students will receive practical training in the simulation of electrical potentials and electric fields in volume conductors, using the finite element package COMSOL. It will be used throughout the course to explore theoretical concepts as well as in a class project. Recommended background: familiarity with MATLAB; cardiac, muscle and brain physiology; and cellular electrophysiology.

EN.580.437. Neuro Data Design I. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended Course Background: numerical programming.

EN.580.438. Neuro Data Design II. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended background: numerical programming.

EN.580.439. Models of the Neuron. 4 Credits.
Single-neuron modeling, emphasizing the use of computational models as links between the properties of neurons at several levels of detail. Topics include thermodynamics of ion flow in aqueous environments, biology and biophysics of ion channels, gating, nonlinear dynamics as a way of studying the collective properties of channels in a membrane, synaptic transmission, integration of electrical activity in multi-compartment dendritic tree models, and properties of neural networks. Students will study the properties of computational models of neurons; graduate students will develop a neuron model using data from the literature. Recommended Course Background: AS.110.302 or equivalent. Meets with EN.580.639.

EN.580.441. Cellular Engineering. 3 Credits.
This course focuses on principles and applications in cell engineering. Class lectures include an overview of molecular biology fundamentals, protein/ligand binding, receptor/ligand trafficking, cell-cell interactions, cell-matrix interactions, and cell adhesion and migration at both theoretical and experimental levels. Lectures will cover the effects of physical (e.g. shear stress, strain), chemical (e.g. cytokines, growth factors) and electrical stimuli on cell function, emphasizing topics on gene regulation and signal transduction processes. Furthermore, topics in metabolic engineering, enzyme evolution, polymeric biomaterials, and drug and gene delivery will be discussed. This course is intended as Part 1 of a two-semester sequence recommended for students in the Cell and Tissue Engineering focus area. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306 or equivalent and AS.030.205Meets with EN.580.641

EN.580.442. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306, AS.030.205Recommended EN.580.441/EN.580.641Co-listed with EN.580.642

EN.580.443. Advanced Orthopaedic Tissue Engineering. 3 Credits.
This course is intended to provide a comprehensive overview on the current state of the field of Orthopaedic Tissue Engineering. Students will apply engineering fundamentals learned in the Tissue Engineering course (EN.580.442/642) with special emphasis on how they apply to bone, cartilage, and skeletal muscle tissue engineering. The development, structure, mechanics, and function of each of these tissues will be discussed. Key articles from the last three decades that focus on stem cell- and cell-free, biomaterial-based approaches to regenerate functional tissues will be presented and analyzed. Practical (regulatory/commercial) considerations that restrict the translation of therapies to the clinic will be discussed.
Grade of B or higher in EN.580.442 OR EN.580.642

EN.580.444. Biomedical Applications of Glycoengineering. 3 Credits.
This course provides an overview of carbohydrate-based technologies in biotechnology and medicine. The course will begin by briefly covering basics of glycobiology and glycochemistry followed by detailed illustrative examples of biomedical applications of glycoengineering. A sample of these applications include the role of sugars in preventative medicine (e.g., for vaccine development and probiotics), tissue engineering (e.g., exploiting natural and engineered polysaccharides for creating tissue or organs de novo in the laboratory), regenerative medicine (e.g., for the treatment of arthritis or degenerative muscle disease), and therapy (e.g., cancer treatment). A major part of the course grade will be based on class participation with each student expected to provide a “journal club” presentation of a relevant paper as well as participate in a team-based project designed to address a current unmet clinical need that could be fulfilled through a glycoengineering approach. Recommended Course Background: EN.580.221 Molecules and Cells.

EN.580.447. Computational Stem Cell Biology. 3 Credits.
This course will provide the student with a mechanistic and systems biology-based understanding of the two defining features of stem cells: multipotency and self-renewal. We will explore these concepts across several contexts and perspectives, emphasizing seminal and new studies in development and stem cell biology, and the critical role that computational approaches have played. The course will start with an introduction to stem cells and a tutorial covering computational basics. The biological contexts that we will cover thereafter include "Cell Identity", "Pluripotency and multipotency", "Stem cells and their niche", "Modeling cell fate decisions", and "Engineering cell fate". This class is heavily weighted by individual computational assignments. The motivation for this strategy is that regularly occurring, moderately-sized computational projects are the most efficient way to impart an understanding of our models of this extraordinary class of cells, and to inspire a sense of excitement and empowerment. Preferred background: familiarity with the UNIX shell. Recommended Background: EN.580.221 - Molecules and Cells or Equivalent.
Students may take EN.580.447 or EN.580.647, but not both.

EN.580.451. Cell and Tissue Engineering Lab. 3 Credits.
Cell and tissue engineering is a field that relies heavily on experimental techniques. This laboratory course will consist of three six experiments that will provide students with valuable hands-on experience in cell and tissue engineering. Students will learn basic cell culture procedures and specialized techniques related to faculty expertise in cell engineering, microfluidics, gene therapy, microfabrication and cell encapsulation. Experiments include the basics of cell culture techniques, gene transfection and metabolic engineering, basics of cell-substrate interactions I, cell-substrate interactions II, and cell encapsulation and gel contraction. Co-listed with EN.530.451. Senior and Graduate students only; others, instructor permission required. Fall semester only. Lab Fee: $100
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.452. Cell and Tissue Engineering Lab. 3 Credits.
This half-semester flipped-content laboratory course will consist of modules that provide students with valuable hands-on experience in cell and tissue engineering. Modules contain experiments including the basics of cell culture techniques, gene transfection, metabolic glycoengineering, and cell encapsulation. Students will collect and analyze their own experimental data, write-up results in publication structured reports, and engage in active discussion of current scientific literature.Students interested in or actively pursuing a Master's degree should prioritize the full semester 580.754 Cell & Tissue Engineering Lab.Textbook Info None.Pre-requisitesStudents must have completed the online "Introductory Laboratory Safety" and "Bloodborne Pathogens" prior to registering for this class. To access these courses, log in to MyLearning and identify these tutorials.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.453. Immunoengineering Principles and Applications. 3 Credits.
This course focuses on the application of engineering fundamentals to design cell/tissue-based systems for modulating immune response in treating disease. Concepts of immune cell development, surveillance, migration, and activation/inhibition will be introduced. Students will learn tissues in the body important for trafficking of immune players to local sites of therapeutic response, as well as techniques used for their characterization. Engineering concepts required to alter immune cell or tissue function will be explored. Emphasis will be placed on synthetic biology methods such as viral or CRISPR-based techniques as well as necessary (pre/post) isolation and adoptive transfer techniques.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.454. Methods in Nucleic Acid Sequencing Lab. 3 Credits.
Sequencing technology is a rapidly progressing field that requires experience in both wet (molecular biology) and dry (computational analysis) techniques. This laboratory course will consist of three experimental modules that will provide students with valuable hands-on experience in DNA sequencing and analysis. Students will learn basic sequencing library preparation, perform sequencing experiments and analyze the resulting data. Experiments include human targeted sequencing, metagenomic sequencing and genome assembly.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.456. Introduction to Rehabilitation Engineering. 3 Credits.
The primary objective of this course is to introduce biomedical engineering students to the challenges of engineering solutions for persons functioning with disabilities and apply that knowledge to the development of a new, improved device to be used for measurement or treatment of an impairment or disability. In order to achieve this goal, the objectives of the fall semester include: gaining a basic appreciation of the modalities used to treat impairments, the opportunities for application of engineering to improve treatment delivery, understanding the science and engineering applied to helping persons with disabilities function in the everyday world and an basic knowledge of the legal, ethical issues and employment opportunities in rehabilitation engineering. By the conclusion of this class, students should be able to: • Understand the breadth and scope of physical impairment and disability, including its associated pathophysiology • Characterize the material and design properties of current evaluation tools for assessment of impairments and adaptations for disability • Characterize the material and design properties of current modalities of treatment of impairments and adaptations for disability • Apply engineering analysis and design principles to critique current solutions for persons with disabilities in order to suggest improvements In the spring semester (in course EN.580.457), students will learn the biomedical engineering design process and its application to persons with disabilities. Working in groups of four to five, teams will work on a project derived from a needs analysis based on their visits to rehabilitation centers in the fall semester. Project will require instructor approval before the beginning of the spring semester. Each project will consist of a proposal for design of a new device or solution to a problem faced by persons with disabilities, preliminary "virtual" (e.g., CAD), and actual proof of concept working prototype.
EN.580.424

EN.580.457. Introduction to Rehabilitation Engineering: Design Lab. 3 Credits.
Students have the opportunity to apply the knowledge they have gained in the fall semest4er of EN.580.456 and their prior coursework to the development of a new, improved device to be used for measurement or treatment of an impairment or disability. In doing so, they will learn the biomedical engineering design process and its application to persons with disabilities. Working in groups of four to five, teams will work on a project derived from a needs analysis based on their visits to rehabilitation centers in the fall semester. Project will require instructor approval before the beginning of the spring semester. Each project will consist of a proposal for design of a new device or solution to a problem faced by persons with disabilities, preliminary "virtual" (e.g., CAD), and actual proof of concept working prototype.
EN.580.456;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.458. Computing the Transcriptome. 3 Credits.
This course will introduce computational tools used in the field of transcriptomics to analyze the genes and transcripts expressed in a living cell. Lectures will cover different practical ways to analyze large data sets generated by high-throughput RNA sequencing (RNA-Seq) experiments, including alignment, assembly, and quantification. The students will learn how to use RNA-seq to answer questions such as: what is the complete set of human genes? How do we reconstruct the splice variants that are transcribed in different cell types and conditions? How do we compute which genes are differentially expressed between different RNA-seq datasets? Prerequisites: (1) Familiarity with Python or Perl, (2) the Unix command-line environment, and (3) a basic understanding of programming in R.

EN.580.459. Seminar in Epigenetic Engineering. 1 Credit.
This is an interactive discussion course on topics in epigenetic engineering introduced by the instructor and the students, on cutting edge molecular and computational methods and applications to developmental biology and human disease research. It will be focused mostly on analysis of current literature as well as ongoing research in the Center for Epigenetics.Background: laboratory course in organic chemistry, biochemistry, or cell biology; introductory statistics; familiarity with R, Python, or Matlab
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.460. Epigenetics at the Crossroads of Genes and the Environment. 1.5 Credits.
This is a seminar-style course focused on cutting edge molecular, cellular, mathematical, and computational biology of mammalian epigenetics and epigenomics in relationship to environmental exposure and human disease. The format is a Socratic-style seminar with three alternating components: (1) “Big Ideas” focused on general principles and especially questions from the students; (2) “Current Literature” focused on how to extract believable information in a reasonable time from current journal articles; and (3) “Methods Development” focused on how methods are invented, including computational genomics and engineering methods, with data analysis by the students.Recommended background: Laboratory course in organic chemistry, biochemistry, or cell biology; introductory statistics; familiarity with R, Python, or Matlab

EN.580.462. Representations of Choice. 3 Credits.
In this course we will examine key computational topics from the nascent fields of decision neuroscience and neuroeconomics. After taking this course students will have an understanding of how the field emerged and will develop a critical appreciation of the advantages and limitations of different analytical approaches. Students will also be able to discuss the current knowledge on processes of valuation, value-learning and decision-making in relation to their computational representations at the behavioral and neural level.Linear Algebra and programming experience (python, matlab, or C) recommended.

EN.580.464. Advanced Data Science for Biomedical Engineering. 4 Credits.
This course covers the basics of data science in biomedical engineering. The main topics include, introductory R, data cleaning, reproducible research, basic statistical inference, machine learning and artificial intillegence. Specific topics include: assessing diagnostic accuracy, basic probability, tidy data principles, prediction and data oriented web-app development using R/shiny. Students taking the course will learn a complete and practical pipeline of going from raw data to a data product. Suggest course background: profeciency in basic programming in at least one language, basic calculus, and linear algebra.

EN.580.471. Principles of Design of BME Instrumentation. 4 Credits.
This core design course will cover lectures and hands-on labs. The material covered will include fundamentals of biomedical sensors and instrumentation, FDA regulations, designing with electronics, biopotentials and ECG amplifier design, recording from heart, muscle, brain, etc., diagnostic and therapeutic devices (including pacemakers and defibrillators), applications in prosthetics and rehabilitation, and safety. The course includes extensive laboratory work involving circuits, electronics, sensor design and interface, and building complete biomedical instrumentation. The students will also carry out design challenge projects, individually or in teams (examples include “smart cane for blind,” “computer interface for quadriplegic”). Students satisfying the design requirement must also register for EN.580.571. Lab Fee: $150. Recommended Course Background: EN.520.345
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.475. Biomedical Data Science. 2 Credits.
This course provides an introduction to data science and machine learning for biomedical engineering. The lectures cover topics in biomedical data processing (convolution, denoising, filtering, edge detection, template matching), biomedical data reduction (feature extraction, principal component analysis), and biomedical data regression, classification (including deep learning), and clustering. Background: Signals and Systems
(AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.553.310 OR EN.553.311 OR EN.560.348 OR EN.553.420)

EN.580.477. Biomedical Data Science Laboratory. 1 Credit.
This course provides an introduction to data science and machine learning for biomedical engineering. The lectures cover topics in biomedical data processing (convolution, denoising, filtering, edge detection, template matching), biomedical data reduction (feature extraction, principal component analysis), and biomedical data regression, classification (including deep learning), and clustering. Recommended Course Background: Signals and Systems, Calculus III, Linear Algebra, Probability and Statistics.

EN.580.479. Principles and Applications of Modern X-ray Imaging and Computed Tomography. 3 Credits.
This course provides students with an intermediate-level understanding of the physics, engineering, algorithms, and applications (clinical, pre-clinical, and industrial) of x-ray imaging and computed tomography (CT). It is intended for senior undergraduates (EN.580.479) and/or graduate students (EN.580.679) in Biomedical Engineering, Computer Science, Electrical and Computer Engineering, or related fields in science and engineering. Topics include the physics of x-ray interaction and detection, image quality assessment, 3D image reconstruction (including analytical, iterative, and deep-learning approaches), and quantitative image data analysis. Guest lectures from clinical experts introduce applications in diagnostic and image-guided procedures. The students conduct experimental and computational projects involving acquisition and processing of x-ray CT data. Recommended background: Signals and Systems or an equivalent course and familiarity with Matlab.

EN.580.480. Precision Care Medicine I. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.
Area: Writing Intensive

EN.580.481. Precision Care Medicine II. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.
Area: Writing Intensive
(EN.580.480 OR EN.580.680)

EN.580.482. Precision Care Medicine III. 3 Credits.
Precision Care Medicine III follows Precision Care Medicine I - II. Registration is open only to those students who have completed these courses and who wish to continue project course work under the mentorship of the Biomedical and Engineering PIs. Students will have regular meetings with their PIs.

EN.580.483. Annotate a Genome. 3 Credits.
The course will present practical and specific understanding of approaches for genome interpretation. Topics will include Common Variants, Rare and Novel Variants, Personal Genomics and the Environment, Ethical considerations in personal genomics, Structural Variation, Pharmacogenetic variants, and Genetic Trait Associations. Students will learn bioinformatic methods to predict the impact of variants and to rapidly pull published information about variants identified in a genome. Students will work in teams to do exercises and programming projects on personal genomics datasets. Recommended Background: prior coursework in Genetics, Intermediate Programming

EN.580.485. Computational Medicine: Cardiology. 2 Credits.
A quantitative, model-oriented investigation of the cardiovascular system. The course will for focus on cardiac electrophysiology, mechanics, and hemodynamics using multi-scale physiology-driven models.

EN.580.487. Computational Medicine: Cardiology Laboratory. 1 Credit.
A laboratory course in which various physiological preparations are used as examples of problems of applying technology in biological systems. The emphasis in this course is on the design of experimental measurements and on physical models of biological systems.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.488. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course is designed to give students a foundation in the basics of statistical and algorithmic approaches developed in computational biology/bioinformatics over the past 30 years, while emphasizing the need to extend these approaches to emerging problems in the field. Topics covered include probabilistic modeling applied to biological sequence analysis, supervised machine learning, interpretation of genetic variants, cancer genomics bioinformatic workflows and computational immuno-oncology. Attending the lab section "Annotate Your Genome" is required.
EN.601.220

EN.580.491. Learning, Estimation and Control. 3 Credits.
The course introduces the probabilistic foundations of learning theory. We will discuss topics in regression, estimation, optimal control, system identification, Bayesian learning, and classification. Our aim is to first derive some of the important mathematical results in learning theory, and then apply the framework to problems in biology, particularly animal learning and control of action. Recommended Course Background: AS.110.201 and AS.110.302

EN.580.493. Imaging Instrumentation. 4 Credits.
This course is intended to introduce students to imaging instrumentation. The class will be lab-oriented, giving hands-on experience with data collection and processing using a configurable optical system. Specific topics will include the programming and control of electromechanical elements, imaging data acquisitions, image formation and processing (e.g. 3D reconstruction), and imaging system analysis and optimization.Recommended Course Background: EN.580.222 Systems and Controls or EN.520.214 Signals and Systems. Programming experience highly desirable.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.494. Build an Imager. 3 Credits.
In this hands-on course, students will build an imaging device and learn to apply signals and systems knowledge in imaging system characterization, optimization, and post-processing. The course includes an introduction to two-dimensional signal processing techniques, basic imaging principles, imaging systems modeling, and optimization methods.
Students must have completed Lab Safety training prior to registering for this class, or permission of the instructor.

EN.580.497. Advanced Design Projects. 3 Credits.
This course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team's technical achievements within the context of biomedical instrumentation.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.498. Advanced Design Projects: Genomics and Systems Biology. 3 Credits.
This course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team's technical achievements within the context of biomedical instrumentation.
Students must have completed Lab Safety training prior to registering for this class.

EN.580.510. Biomedical Engineering Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.550. Biomedical Engineering Group Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group. This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.561. Advanced Focus Area Research: Immunoengineering. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. "Advanced Focus Area Research" is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through "MyLearning" including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.562. Advanced Focus Area Research: Translational Cell and Tissue Eng. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. "Advanced Focus Area Research" is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through "MyLearning" including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.564. Advanced Focus Area Research: Biomedical Data Science. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. "Advanced Focus Area Research" is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors. Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through "MyLearning" including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.565. Advanced Focus Area Research: Imaging and Medical Devices. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.566. Advanced Focus Area Research: Neuroengineering. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors. Recommended Course Background:Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.567. Advanced Focus Area Research: Genomics and Systems Biology. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background:Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.571. Honors Instrumentation. 2 Credits.
Student must have taken 580.471/771. Students will develop a term paper and patent application and carry out a hands-on individual or team project throughout the semester. Previous projects include design of EEG amplifier, voltage clamp and patch clamp, vision aid of blind, pacemaker/defibrillator, sleep detection and alert device, glucose sensor and regulation, temperature controller, eye movement detection and device control, ultrasound ranging and tissue properties, impedance plethysmography, lie detector, blood alcohol detector, pulse oximeter, etc. You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.583. Research For 3+1 Students. 3 Credits.
Research for 3+1 students only. Lab confirmation and registration approval required. Course is graded P/F only.

EN.580.584. Research For 3+1 Students. 3 Credits.
Research for 3+1 students only. Lab confirmation and registration approval required. Course is graded P/F only.

EN.580.601. Special Topics in Bioengineering Innovation and Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field.These seminars are taken in a sequence of summer, fall, and spring. They are required for CBID masters students and are open to those students only.

EN.580.602. Special Topics in Bioengineering Innovation and Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field.For CBID MSE students only. Registration with instructor's permission only.

EN.580.603. Special Topics in Bioengineering Innovation & Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field. For CBID MSE students only.

EN.580.607. Regulation of Medical Devices. 1 Credit.
This course introduces graduate students in Bioengineering Innovation and Design to the medical device regulatory framework, as it pertains to bringing a medical device from concept to market. Topics covered include; FDA Design Controls; Regulatory Approval mechanisms, including the 510k and PMA process; Investigational Device exemption (IDE); planning clinical trials needed for bringing a medical device to market; and postmarket surveillance. Students learn from a series of invited lecturers from the FDA as well as professionals from the medical device industry. This summer course is required for CBID masters students and is not open to any other students.

EN.580.608. Identification and Validation of Medical Device Needs. 6 Credits.
This course teaches the art and skill of identifying medical device opportunities by experiencing real world scenarios in an immersive clinical environment. Students rotate through multiple clinical disciplines and become part of the team of senior clinicians, surgeons, residents, fellows, nurses and medical technologists. They learn to identify unmet medical device needs through direct observations in a variety of clinical settings including the hospital ward and operating room, interviews (with patients, doctors, nurses, hospital administration), literature survey, and more. Concurrently, they learn the process of filtering all observations to a few valid medical device opportunities by assessing the market size, intellectual property landscape, regulatory framework, and competitor dynamics in addition to the clinical impact that such a device could have. The ability to identify a relevant medical device need is an important first step in the medical device innovation cycle; this course aims to provide students with practical hands- on training in that process.

EN.580.610. Intro to Business for Healthcare Innovation & Design. 3 Credits.
This course comprises two distinct, but related, components. The first is a broad introduction to the terms, concepts, and values of business and management. Particular emphasis will be placed on the economic, financial, and corporate contexts of our business culture, and how they impact the organization, strategy, and decision-making of business firms. The second component is an introduction to the sociological and economic forces that shape the development and diffusion of new technologies. This part is primarily designed to provide a framework for determining the commercial viability of new medical devices and the best path for realizing their value, including how to develop a compelling value proposition, analyze markets and competitors, and protect intellectual property. Throughout, the course utilizes individual exercises, case analyses, and team projects. CBID MSE Students Only

EN.580.611. Medical Device Design and Innovation. 4 Credits.
This course introduces you to the process of medical device design and innovation. You will learn the art and skill of identifying medical device opportunities through observations, interviews, and research. Through a combination of lectures, hands on activities, and interactions with clinical stakeholders, you will gain the ability to identify unmet, unarticulated, and underserved needs. Subsequently, you will learn the process of developing well thought out conceptual designs that meet those needs. You will learn to apply an iterative approach towards innovation, by involving and engaging multiple stakeholders and their perspectives throughout the process. Throughout the course modules, you will also follow the journey of several innovative startups/products/ services, that started at JHU-CBID and went through the process outlined in this course.

EN.580.612. Medical Device Design and Innovation. 4 Credits.
For CBID MSE students only.

EN.580.618. Identification and Validation of Global Health Needs. 4 Credits.
Limited to CBID students only

EN.580.619. Bioengineering Innovation and Design - Global Health. 4 Credits.
For CBID MSE students only. Registration with instructor's permission only.

EN.580.620. Principles and Practice of Global Health Innovation and Design. 4 Credits.
For CBID MSE students only. Instructor's Permission Required.

EN.580.623. Insight Informed Innovation II. 3 Credits.
This course is intended to equip students with a structured process and the tools required to:1. Identify opportunities for new medical devices through unmet, unarticulated and underserved stakeholder needs2. Link these insights to an exhaustive set of potential solutions3. Synthesize solutions and features into product conceptsRecommended Course Backgroung: Insight Informed Innovation I (summer)

EN.580.625. Structure and Function of the Auditory and Vestibular Systems. 3 Credits.
This course will cover basic functions of the auditory and vestibular pathways responsible for perception of sound and balance. Topics include: hair cell structure and mechanotransduction, hair cell electromotility and cochlear active force production, hair cell synaptic signaling, cochlear development and role of glia in the inner ear, primary auditory and vestibular stimulus encoding, afferents and the first-order brainstem nuclei, as well as clinical consequences of peripheral damage, physiology of hearing loss, vestibular loss, tinnitus, hair cell regeneration and gene therapy. Moving more centrally, synaptic transmission and signal processing in central neurons, and complex sound perception and movement control will be discussed. Aspects such as speech perception, sound localization, vestibular reflexes, vestibular compensation, and self-motion perception are discussed with an integrated perspective covering perceptual, physiological, and mechanistic data. Grades will be based on participation in class, homework, and first-half and second-half exams (both in class, closed book, short answer/essay types). This course will meet on the School of Medicine campus. Recommended Background: general introduction to Neuroscience. Undergraduates with knowledge in Neuroscience welcome.

EN.580.627. Deep Learning for Medical Imaging. 3 Credits.
Recent advances in machine learning and deep convolutional neural networks in particular, coupled with computational capabilities offered by modern GPUs and increased data availability, have enabled application of deep learning (DL) techniques in medical imaging. Such applications extend beyond image analysis, with increased presence of DL in early stages of the image formation process, including image preprocessing, tomographic image reconstruction, and image postprocessing informed by the requirements of specific clinical tasks. This course will introduce the foundations of deep learning methods used in medical imaging for both image formation and analysis through hands-on assignments and projects in image denoising, tomographic reconstruction, artifacts correction, image segmentation, feature detection/classification, and single/multi-modality registration.Recommended course background: Python and Linear Algebra

EN.580.628. Topics in Systems Neuroscience. 1 Credit.
This course consists of weekly discussions of current literature in systems neuroscience. The selected readings will focus on neural mechanisms for perception, attention, motor behavior, learning, and memory, as studied using physiological, psychophysical, computational, and imaging techniques. Students are expected to give presentations and participate in discussions. Recommended Course Background: AS.110.302, EN.520.214, EN.580.421 or equivalentStudents will have to attend the organizational meeting to be able to enroll. The course is run by the Neuroscience department. Enrollment numbers may be limited by the course directors, and priority will be given to Neuroscience graduate students. Please contact the Neuroscience department for more information and the date of the organizational meeting.

EN.580.631. Introduction to Computational Medicine: Imaging. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. This course will cover computational anatomy. Students will learn how to: model anatomies using magnetic resonance imaging data; compare anatomies via mappings onto anatomical atlases; discover anatomical biomarkers of disease; analyze changes in the connectivity of anatomies in disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: Matlab or Python. This course can be taken in conjunction with EN.580.433 which covers computational physiological medicine.

EN.580.635. Applied Bioelectrical Engineering. 3 Credits.
This course covers diverse applications of bioelectrical measurements, manipulation and therapy in engineering practice. Topics include functional electrical stimulation, deep brain stimulation, cardiac pacing and defibrillation, tissue ablation and electromanipulation of cells. Students will receive practical training in the simulation of electrical potentials and electric fields in volume conductors, using the finite element package COMSOL. It will be used throughout the course to explore theoretical concepts as well as in a class project. Recommended background: familiarity with MATLAB; cardiac, muscle and brain physiology; and cellular electrophysiology.

EN.580.637. Microphysiological Systems. 3 Credits.
This course focuses on the principle and application of biological and engineering fundamentals to design microphysiological systems such as organ/tissue chips, 3D-printed tissues, and organoids. This course will introduce the concept of human organ-on-a-chip and organoid engineering and discuss the latest developments in the field of drug development - the shift from animal testing toward human relevant, high content, high-throughput integrative testing strategies. Students will learn various biofabrication techniques such as microfluidics, microfabrication, and 3D bioprinting to create in vitro miniaturized 3D complex human tissue models that mimic the biochemical, electrical, and mechanical properties of organ or tissue function. This course will also cover a wide range of biomedical applications of microphysiological systems in disease modeling, drug screening, precision medicine, and space biology as well as technology commercialization efforts. This laboratory portion of the course consists of three experiments that will provide students with valuable hands-on experience in design, fabrication and applications of microphysiological systems, including organ-on-a-chip systems (tissue/organ chips), 3-D printed tissue constructs, and organoids. Experiments include 1) the basics of human induced pluripotent stem cell differentiation, 2) tissue/organ chip fabrication, and 3) functional phenotypic analysis and drug testing. Spring semester only. Recommended background: EN.580.441, EN.580.442 and EN.580.452

EN.580.638. Neuro Data Design II. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended background: numerical programming.

EN.580.639. Models of the Neuron. 4 Credits.
Single-neuron modeling, emphasizing the use of computational models as links between the properties of neurons at several levels of detail. Topics include thermodynamics of ion flow in aqueous environments, biology and biophysics of ion channels, gating, nonlinear dynamics as a way of studying the collective properties of channels in a membrane, synaptic transmission, integration of electrical activity in multi-compartment dendritic tree models, and properties of neural networks. Students will study the properties of computational models of neurons; graduate students will develop a neuron model using data from the literature. Differs in that an advanced modeling project using data from the literature is required. Graduate version of EN.580.439. Recommended Course Background: AS.110.302 or equivalent.

EN.580.640. Systems Pharmacology and Personalized Medicine. 4 Credits.
We have moved beyond the 'one-size-fits-all' era of medicine. Individuals are different, their diseases are different, and their responses to drugs are different too. This variability is not just from person to person; heterogeneity is observed even between tumors within the same person, and between sites within the same tumor. These levels of variability among the human population must be accounted for to improve patient outcomes and the efficiency of clinical trials. Some of the ways in which this is being explored include: drugs are being developed hand-in-hand with the tests needed to determine whether or not they will be effective; tumor fragments excised from patients are being cultured in the lab for high-throughput testing of drugs and drug combinations; data-rich assays such as genomics and proteomics identify thousands of potentially significant differences between individuals; and computational models are being used to predict which therapies will work for which patients. This course will focus on the applications of pharmacokinetics and pharmacodynamics to simulating the effects of various drugs across a heterogeneous population of diseased individuals. Such computational approaches are needed to harness and leverage the vast amounts of data and provide insight into the key differences that determine drug responsiveness. These approaches can also explore the temporal dynamics of disease and treatment, and enable the modification of treatment during recovery.Recommended background: 110.201 Linear Algebra, 110.302 Differential Equations, and 553.311 Probability and Statistics (or equivalent).

EN.580.641. Cellular Engineering. 4 Credits.
This course focuses on principles and applications in cell engineering. Class lectures include an overview of molecular biology fundamentals, protein/ligand binding, receptor/ligand trafficking, cell-cell interactions, cell-matrix interactions, and cell adhesion and migration at both theoretical and experimental levels. Lectures will cover the effects of physical (e.g. shear stress, strain), chemical (e.g. cytokines, growth factors) and electrical stimuli on cell function, emphasizing topics on gene regulation and signal transduction processes. Furthermore, topics in metabolic engineering, enzyme evolution, polymeric biomaterials, and drug and gene delivery will be discussed. This course meets with EN.580.441 but includes additional requirements designed for the core curriculum of the RIE (Regnerative and Immune Engineering) track of the BME masters program. The course is also appropriate for Cell & Tissue Engineering Ph.D. students and may be taken by advanced undergraduate students upon permission of the instructor. Prerequisites: Graduate standing with background in cell biology and biochemistry or EN.580.221 or AS20.305 and AS.020.306 (or equivalent) and AS.030.205 or permission of the instructor.

EN.580.642. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed. Co-listed with EN.580.442. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306, AS.030.205, EN.580.441/EN.580.641

EN.580.643. Advanced Orthopaedic Tissue Engineering. 3 Credits.
This course is intended to provide a comprehensive overview on the current state of the field of Orthopaedic Tissue Engineering. Students will apply engineering fundamentals learned in the Tissue Engineering course (580.442/580.642) with special emphasis on how they apply to bone, cartilage, and skeletal muscle tissue engineering. The development, structure, mechanics, and function of each of these tissues will be discussed. Key articles from the lat three decades that focus on stem cell- and cell-free, biomaterial-based approaches to regenerate functional tissues will be presented and analyzed. Practical (regulatory/commercial) considerations that restrict the translation of therapies to the clinic will be discussed. Undergraduate by permission only. Recommend Course Background: EN.580.442 or EN.580.642.

EN.580.644. Biomedical Applications of Glycoengineering. 3 Credits.
This course provides an overview of carbohydrate-based technologies in biotechnology and medicine. The course will begin by briefly covering basics of glycobiology and glycochemistry followed by detailed illustrative examples of biomedical applications of glycoengineering. A sample of these applications include the role of sugars in preventative medicine (e.g., for vaccine development and probiotics), tissue engineering (e.g., exploiting natural and engineered polysaccharides for creating tissue or organs de novo in the laboratory), regenerative medicine (e.g., for the treatment of arthritis or degenerative muscle disease), and therapy (e.g., cancer treatment). A major part of the course grade will be based on class participation with each student expected to provide a “journal club” presentation of a relevant paper as well as participate in a team-based project designed to address a current unmet clinical need that could be fulfilled through a glycoengineering approach. Recommended Course Background: EN.580.221 Molecules and Cells or equivalent (molecular and cell biology), college level calculus and calculus-based general physics.

EN.580.646. Molecular Immunoengineering. 3 Credits.
An in-depth study of the use of biomolecular engineering tools and techniques to manipulate immune function for clinical translation. The course will begin with a brief overview of the immune system, placing a particular emphasis on the molecular-level interactions that determine phenotypic outcomes. The remainder of the curriculum will address ways in which integrative approaches incorporating biochemistry, structural biophysics, molecular biology, and engineering have been used either to stimulate the immune response for applications in cancer and infectious disease, or to repress immune activation for autoimmune disease therapy. Recommended background: Biochemistry and Cell Biology or the BME Molecules and Cells. Those without recommended background should contact the instructor prior to enrolling.

EN.580.647. Computational Stem Cell Biology. 3 Credits.
This course will provide the student with a mechanistic and systems biology-based understanding of the two defining features of stem cells: multipotency and self-renewal. We will explore these concepts across several contexts and perspectives, emphasizing seminal and new studies in development and stem cell biology, and the critical role that computational approaches have played. The course will start with an introduction to stem cells and a tutorial covering computational basics. The biological contexts that we will cover thereafter include "Cell Identity", "Pluripotency and multipotency", "Stem cells and their niche", "Modeling cell fate decisions", and "Engineering cell fate". This class is heavily weighted by individual computational assignments. The motivation for this strategy is that regularly occurring, moderately-sized computational projects are the most efficient way to impart an understanding of our models of this extraordinary class of cells, and to inspire a sense of excitement and empowerment. Preferred background: 580.221 Molecules and Cells or equivalent and familiarity with the UNIX shell.
Students may earn credit for EN.580.447 or EN.580.647, but not both.

EN.580.656. Introduction to Rehabilitation Engineering. 3 Credits.
The primary objective of this course is to introduce biomedical engineering students to the challenges of engineering solutions for persons functioning with disabilities. In order to achieve this goal, other objectives include: gaining a basic appreciation of the modalities used to treat impairments, the opportunities for application of engineering to improve treatment delivery, understanding the science and engineering applied to helping persons with disabilities function in the everyday world and an basic knowledge of the legal, ethical issues and employment opportunities in rehabilitation engineering. By the conclusion of this class, students should be able to: understand the breadth and scope of physical impairment and disability, including its associated pathophysiology; characterize the material and design properties of current evaluation tools for assessment of impairments and adaptations for disability; characterize the material and design properties of current modalities of treatment of impairments and adaptations for disability; apply engineering analysis and design principles to critique current solutions for persons with disabilities in order to suggest improvements.

EN.580.658. Computing the Transcriptome. 3 Credits.
This course will introduce computational tools used in the field of transcriptomics to analyze the genes and transcripts expressed in a living cell. Lectures will cover different practical ways to analyze large data sets generated by high-throughput RNA sequencing (RNA-Seq) experiments, including alignment, assembly, and quantification. The students will learn how to use RNA-seq to answer questions such as: what is the complete set of human genes? How do we reconstruct the splice variants that are transcribed in different cell types and conditions? How do we compute which genes are differentially expressed between different RNA-seq datasets? Prerequisites: (1) Familiarity with Python or Perl, (2) the Unix command-line environment, and (3) a basic understanding of programming in R.

EN.580.664. Advanced Data Science for Biomedical Engineering. 4 Credits.
This course covers the basics of data science in biomedical engineering. The main topics include, introductory R, data cleaning, reproducible research, basic statistical inference, machine learning and artificial intillegence. Specific topics include: assessing diagnostic accuracy, basic probability, tidy data principles, prediction and data oriented web-app development using R/shiny. Students taking the course will learn a complete and practical pipeline of going from raw data to a data product. Suggest course background: profeciency in basic programming in at least one language, basic calculus, and linear algebra.

EN.580.674. Introduction to Neuro-Image Processing. 3 Credits.
Developments in medical image acquisition systems such as magnetic resonance imaging (MRI) and computed tomography (CT) have resulted in large number of clinical images with rich information regarding structure and function of nervous system. A challenging task is to extract clinically relevant information from the raw images that can be used to characterize structural alteration of brain in disease state. This course introduces the underlying physical foundation of different image modalities that are used to study neurological disorders followed by presentation of concepts and techniques that are used to process and extract information from medical images, in particular MRI. Topics that are covered include medical image formats, enhancement, segmentation, registration, and visualization.Suggest Course Background: Mathematical Methods For Engineers or equivalent course, Signals and Systems, and Probability.

EN.580.678. Biomedical Photonics I. 4 Credits.
This course will cover the basic optics principles including geometric, beam and wave description of light. The course will also cover the basic generation and detection techniques of light and the principles of optical imaging and spectroscopy. After the basis is established, we will focus on some commonly employed optical techniques and tools for biomedical research including various optical microscopy technologies, fiber optics, Raman spectroscopy, Fluorescence (lifetime), FRAT, FRET and FCS. The recent development in tissue optics, biomedical optical imaging/spectroscopy techniques (such as OCT, multiphoton fluorescence and harmonics microscopy, Structured Illumination, light scattering, diffuse light imaging and spectroscopy, optical molecular imaging, photo-acoustic imaging) will also be discussed. Representative biomedical applications of translational biomedical photonics technologies will be integrated into the corresponding chapters.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.679. Principles and Applications of Modern X-ray Imaging and Computed Tomography. 3 Credits.
This course provides students with an intermediate-level understanding of the physics, engineering, algorithms, and applications (clinical, pre-clinical, and industrial) of x-ray imaging and computed tomography (CT). It is intended for senior undergraduates (EN.580.479) and/or graduate students (EN.580.679) in Biomedical Engineering, Computer Science, Electrical and Computer Engineering, or related fields in science and engineering. Topics include the physics of x-ray interaction and detection, image quality assessment, 3D image reconstruction (including analytical, iterative, and deep-learning approaches), and quantitative image data analysis. Guest lectures from clinical experts introduce applications in diagnostic and image-guided procedures. The students conduct experimental and computational projects involving acquisition and processing of x-ray CT data. Recommended background: Signals and Systems or an equivalent course and familiarity with Matlab.

EN.580.680. Precision Care Medicine. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.

EN.580.681. Precision Care Medicine. 3 Credits.
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EN.580.480 OR EN.580.680

EN.580.682. Precision Care Medicine III. 3 Credits.
Precision Care Medicine III follows Precision Care Medicine I - II. Registration is open only to those students who have completed these courses and who wish to continue project course work under the mentorship of the Biomedical and Engineering PIs. Students will have regular meetings with their PIs.

EN.580.683. Annotate a Genome. 3 Credits.
The course will present practical and specific understanding of approaches for genome interpretation. Topics will include Common Variants, Rare and Novel Variants, Personal Genomics and the Environment, Ethical considerations in personal genomics, Structural Variation, Pharmacogenetic variants, and Genetic Trait Associations. Students will learn bioinformatic methods to predict the impact of variants and to rapidly pull published information about variants identified in a genome. Students will work in teams to do exercises and programming projects on personal genomics datasets. Recommended Background: prior coursework in Genetics, Intermediate Programming

EN.580.688. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course will introduce probabilistic modeling and information theory applied to biological sequence analysis, focusing on statistical models of protein families, alignment algorithms, and models of evolution. Topics will include probability theory, score matrices, hidden Markov models, maximum likelihood, expectation maximization and dynamic programming algorithms. Homework assignments will require programming in Python. Recommended Course Background: Math through linear algebra and differential equations, EN.580.221 or equivalent, EN.601.226 or equivalent.

EN.580.689. Modern Optical Microscopy: Theory and Practice. 3 Credits.
This course will teach the fundamental theory in optical microscopy, including propagation of eletromagnetic wave, and Fourier optic. The course will also teach how the theoretical framework is practiced and applied in modern microscopy, by in-class demonstration and hands-on lab projects. Background knowledge: Fourier transform, linear algebra. Students may only earn credit for EN.580.489 or EN.580.689.

EN.580.691. Learning, Estimation and Control. 3 Credits.
This course introduces the probabilistic foundations of learning theory. We will discuss topics in regression, estimation, Kalman filters, Bayesian learning, classification, reinforcement learning, and active learning. Our focus is on iterative rather than batch methods for parameter estimation. Our aim is to use the mathematical results to model learning processes in the biological system. Recommended Course Background: Probability and Linear Algebra.

EN.580.693. Imaging Instrumentation. 4 Credits.
This course is intended to introduce students to imaging instrumentation. The class will be lab-oriented, giving hands-on experience with data collection and processing using a configurable optical system. Specific topics will include the programming and control of electromechanical elements, imaging data acquisitions, image formation and processing (e.g. 3D reconstruction), and imaging system analysis and optimization.Recommended Course Background: EN.580.222 Systems and Controls or EN.520.214 Signals and Systems. Programming experience highly desirable.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.697. Neuro Data Design I. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended Course Background: numerical programming.

EN.580.701. CBID Masters Advanced Project. 3 - 10 Credits.
For second year CBID students.

EN.580.702. CBID Masters Advanced Project. 3 - 10 Credits.

EN.580.704. Mathematical Foundations of BME I. 4 Credits.
The course introduces modern techniques in mathematical analysis of biomedical data. Techniques include maximum likelihood, estimation theory via Kalman equation, state-space models, Bayesian estimation, classification of labeled data, support vector machine, dimensionality reduction via principal component analysis, clustering, expectation maximization, and dynamic programming via the Bellman equation.

EN.580.706. Introduction to Biomedical Rodent Surgery Laboratory and Grantsmanship. 3 Credits.
This course has been specifically designed for students interested in understanding the translational aspects of biomedical research and pursuing research as a career. The course aims to introduce diverse yet interlinked research concepts that will equip students with the necessary knowledge and expertise to independently carry out research endeavors in the future. A part of the course includes supervised hands-on in vivo workshops, in which students will learn basic rodent anatomy, physiology and some general experimental procedures. A second component will introduce research methodology, which will enable students to develop their scientific thought process and enhance their critical thinking skills by formulating hypothesis, developing aims, searching PubMed for related literature, understanding ethical guidelines and other regulatory issues. In today’s scenario, scientists also need to have a strong communication ability to ensure that their research is accessible at a global platform. This requires skill and knowledge of scientifically drafting manuscripts, writing grants and articulating business plans as well as effectively presenting their research results (presentation, poster, etc.). We will allocate necessary time to develop this science-art as well. Students’ attendance and active participation will enrich this exciting and interactive course, which is entirely based on in-class learning. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.709. Sparse Representations in Computer Vision and Machine Learning. 3 Credits.
Sparse and redundant representations constitutes a fascinating area of research in signal and image processing. This is a relatively young field that has been taking form for the last 15 years or so, with contributions from harmonic analysis, numerical algorithms and machine learning, and has been vastly applied to myriad of problems in computer vision and other domains. This course will focus on sparsity as a model for general data, generalizing many different other constructions or priors. This idea - that signals can be represented with just "a few" coefficients - leads to a long series of beautiful (and surprisingly, solvable) theoretical and numerical problems, and many applications that can benefit directly from the new developed theory. In this course we will survey this field, starting with the theoretical foundations, and systematically covering the knowledge that has been gathered in the past years. This course will touch on theory, numerical algorithms, and applications in image processing and machine learning. Recommended course background: Linear Algebra, Signals and Systems, Numerical Analysis.

EN.580.710. Ethical Challenges in Biomedical Engineering. 2 Credits.
This course will address the mores of scholarship and responsible practices in conducting biomedical research. Discussions will be focused on the grey areas encountered in considering and determining the best conduct for performing biomedical research and will emphasize how decisions depend on multiple factors and contexts. Issues to be discussed will span the main focus areas in the Biomedical Engineering Department: Cell and Tissue Engineering, Imaging, Genomics, Computational Medicine, Biomedical Data Science, and Neuroscience. Each week a short lecture will be presented by a faculty member, followed by breakdown into small groups for discussion and debate. Course restricted to BME PhD Students Only.

EN.580.721. Systems Bioengineering I. 4 Credits.
A quantitative, model-oriented investigation of the cardiovascular system. Topics are organized in three segments. (1) Molecular/cellular physiology, including electrical signaling and muscle contraction. (2) Systems cardiovascular physiology, emphasizing circuit-diagram analysis of hemodynamics. (3) Cardio-vascular horizons and challenges for biomedical engineers, including heart failure and its investigation/treatment by computer simulation, by gene-array analysis, by stem-cell technology, and by mechanical devices (left-ventricular assist and total-heart replacement). Recommended Course Background: EN.580.221 and EN.580.222

EN.580.722. Systems Bioengineering II. 4 Credits.
A quantitative, model-oriented approach to the study of the nervous system. Topics include functional anatomy of the central and autonomic nervous systems, neurons and networks, learning and memory, structure and function of the auditory and visual systems, motor systems, and neuro-engineering.Recommended Course Background: EN.580.221, EN.580.222, EN.580.223, AS.110.302, EN.580.421; Corequisite: EN.580.424

EN.580.723. Introduction to MRI in Medicine. 3 Credits.
Advances in magnetic resonance Imaging (MRI) have resulted in developing techniques such as diffusion imaging, delayed contrast enhanced imaging, tagged, flow map and many other imaging contrasts. These techniques offer insights into the structure and function of brain and other anatomical regions in the body. With increased availability of these techniques in clinical MRI machines, they are now entering clinical practice for the evaluation of disease. This course presents the underlying physical foundation of MRI, with a focus on more advanced techniques and their application in clinical research and practice. Topics that are covered include foundations of MRI (signal detection and construction, image contrast), diffusion weighted imaging, and cardiac imaging. Attention is also drawn to possible artifacts and pitfalls.Suggested course background: Signals and systems/multi-dimensional digital signal processing, differential equations, linear algebra.

EN.580.725. Radiology for Engineers. 3 Credits.
This course provides engineering students with an introductory understanding of the principles and practice of radiology – including a spectrum of specialties in diagnostic radiology as well as procedures in interventional radiology and digital pathology. The course includes lectures, working with real image data, and visits to clinical areas at Johns Hopkins Hospital. Each segment of the course emphasizes clinical perspective on imaging (including scanner technology and image analysis) in relation to anatomy, physiology, and pathology. Each segment is led by an expert in a particular discipline in collaboration with the course director. Recommended course background: 580.472, 601.455Restricted to BME MSE and BME PhD students only. Others by instructor permission. Audits are not allowed.

EN.580.735. Advanced Seminars in Computational Medicine. 1 Credit.
In this course, students will review current literature on the most salient and interesting topics in the emerging field of Computational Medicine, which is focused on the development of quantitative approaches for understanding the mechanisms, diagnosis and treatment of human disease through applications of mathematics, engineering, and computational science. Whenever possible, the publications considered will be directly relevant to the lectures delivered by visiting scholars in the Institute for Computational Medicine's seminar series. Students will be required to search for the most relevant papers in the current literature; read and critically interpret these papers; conduct interactive teaching sessions with the course instructor, other students, and trainees/faculty from the Institute. Potential topics will include: computational anatomy; computational molecular medicine; computational physiological medicine; and computational healthcare. Evaluation will be by the course instructor (pass/fail). Graduate level. Seniors by permission. All registrants must be approved by the course instructor.

EN.580.736. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body. The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Fall semester only. S/U grading only.

EN.580.737. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body.The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Spring semester only.

EN.580.740. Surgery for Engineers. 3 Credits.
This course provides an introduction to basic principles and emerging techniques in surgery, interventional radiology, and radiation therapy for engineering students. Basic principles include introduction to fundamental surgical approaches and tools as well as sub-specialties, including neurosurgery, orthopaedic surgery, ENT surgery, thoracic surgery, and laparoscopic surgery as well as minimally invasive (body and neurovascular) interventional radiology as well as radiotherapy (external beam and brachytherapy). Introduction to cutting edge and emerging technologies include intraoperative imaging (all modalities), surgical navigation, and robotics. Requisite background for engineering students includes analytic geometry, linear algebra, computing (Matlab, Python, or C++), and basic familiarity with the physics of medical imaging. Safety Training: certificate in Bloodborne Pathogens and HIPAA & Research. Recommended course background: 580.472, 601.455

EN.580.742. Neural Implants and Interfaces. 3 Credits.
This course will focus on invasive neural implants that electrically interface with the peripheral or central nervous system. We will investigate the different types of recording and stimulating neural interface technologies currently in use in patients as well as coverage of the biophysics, neural coding, and hardware. We will also cover computational modeling of neurophysiology in the context of implantable devices and their neural interfaces. A final group project will be required for simulating a neural interface system. Recommended course background includes cell biology, physics with electromagnetics (or electrical circuits), chemistry, differential equations, and computer programming.

EN.580.743. Advanced Topics in Genomic Data Analysis. 3 Credits.
Genomic data is becoming available in large quantities, but understanding how genetics contributes to human disease and other traits remains a major challenge. Machine learning and statistical approaches allow us to automatically analyze and combine genomic data, build predictive models, and identify genetic elements important to disease and cellular processes. This course will cover current uses of statistical methods and machine learning in diverse genomic applications including new genomic technologies. Students will present and discuss current literature. Topics include personal genomics, integrating diverse genomic data types, new technologies such as single cell sequencing and CRISPR, and other topics guided by student interest. The course will include a project component with the opportunity to explore publicly available genomic data. Recommended Course Background: coursework in data science or machine learning.

EN.580.745. Mathematics of Deep Learning. 1.5 Credits.
The past few years have seen a dramatic increase in the performance of recognition systems thanks to the introduction of deep networks for representation learning. However, the mathematical reasons for this success remain elusive. For example, a key issue is that the training problem is nonconvex, hence optimization algorithms are not guaranteed to return a global minima. Another key issue is that while the size of deep networks is very large relative to the number of training examples, deep networks appear to generalize very well to unseen examples and new tasks. This course will overview recent work on the theory of deep learning that aims to understand the interplay between architecture design, regularization, generalization, and optimality properties of deep networks. Recommended background: machine learning (EN.601.475), deep learning (EN.520.438 or EN.601.482), graduate-level matrix analysis and linear algebra (EN.553.792) and graduate-level optimization (EN.553.762).

EN.580.746. Imaging Science Seminar. 1 Credit.
Fall semester only.

EN.580.747. Imaging Science Seminar. 1 Credit.
In this seminar course, students will review current literature on the most salient and interesting topics in the fields of Imaging and Data Science through a series of invited talks by leading experts, from foundational ideas to exciting applications. This course is held concurrently to the seminar series of the Center for Imaging Science (CIS) and the Mathematical Institute for Data Science (MINDS). More information will be periodically updated and posted at the CIS and MINDS websites. Graduate level. Seniors by permission.

EN.580.750. Surgineering: Systems Engineering and Data Science in Interventional Medicine. 3 Credits.
This course provides engineering students with deep clinical immersion in interventional medicine complemented by instruction in systems engineering and data science pertaining to medical technology, information, and workflow. The course involves one-to-one matching of students with Clinical Mentors, who oversee the students' clinical immersion and involvement on clinical teams. Weekly class meetings with visitation by one or more of the Clinical Mentors focus on principles of systems engineering and data science as well as journal articles on emerging topics in technology and information science in interventional medicine. Each student completes a course project that addresses a particular question or challenge in technology integration, data-flow, workflow, patient safety, and quality assurance in one of the clinical areas covered in the course. Prerequisites and CertificatesPrerequisite for the course is 580.740 (Surgery for Engineers), which introduces principles and practice of interventional medicine – including open and minimally invasive surgical approaches as well as interventional radiology and radiation oncology. Students must provide a copy of the following certifications, each available as Hopkins myLearning modules at myJHU:• Bloodborne Pathogens• Fluoroscopy Refresher• Patient Privacy for Workforce Members

EN.580.751. Cell & Tssue Engineering Lab. 4 Credits.
Cell and tissue engineering is a field that relies heavily on experimental techniques. This laboratory course will consist of three six experiments that will provide students with valuable hands-on experience in cell and tissue engineering. Students will learn specialized techniques related to faculty expertise in cell engineering, microfluidics, gene therapy, microfabrication and cell encapsulation. Experiments include the basics of cell culture techniques, gene transfection and metabolic engineering, basics of cell-substrate interactions I, cell-substrate interactions II, and cell encapsulation and gel contraction. This course includes an 'advanced topics' component designed to fulfill toe core curriculum requirements of the RIE (Regenerative and Immune Engineering) track of the BME masters program. Offered the first half of fall semester only.

EN.580.752. Advanced Topics in Regenerative and Immune Engineering. 4 Credits.
This course is designed as part of the core curriculum for the RIE track fo the BME masters program. Topics will be selected based on current methods, basic research, and clinical translation of regenerative medicine and immune engineering technologies. Background Knowledge: EN.580.641, EN.580.642, and EN.580.751 or graduate standing and permission of the instructor.

EN.580.753. Cell and Tissue Engineering Lab Advanced Project. 1 Credit.
This one credit laboratory course provides students with the opportunity to obtain experience in advanced project design and implementation in conjunction with the graduate-level Cell & Tissue Laboratory course (EN.580.754). It is appropriate for students who have previously taken the undergraduate version of this course to fulfill the core curriculum requirement of the RIE (Regenerative and Immune Engineering) track of the BME master's program. Graduate students may also take this course will permission of the instructor to pursue additional 'advanced topics' laboratory modules. The work will be completed over the course of the semester in conjunction with the "advanced topics" component of the regular graduate level version of the lab course.

EN.580.754. Cell & Tissue Engineering Lab. 4 Credits.
This flipped-content laboratory course will consist of modules that provide students with valuable hands-on experience in cell and tissue engineering. Modules contain experiments including the basics of cell culture techniques, gene transfection, metabolic glycoengineering, and cell encapsulation. Students will collect and analyze their own experimental data, write-up results in publication structured reports, and engage in active discussion of current scientific literature. An independent group project based in cellular engineering principles will be designed and presented by the students as a capstone for the course.Students who previously completed 580.452 Cell & Tissue Engineering Lab may NOT register for this class.Textbook Info None.Pre-requisitesStudents must have completed the online “Introductory Laboratory Safety” and “Bloodborne Pathogens” prior to registering for this class. To access these courses, log in to MyLearning and identify these tutorials.

EN.580.771. Principles of the Design of Biomedical Instrumentation. 4 Credits.
This course is designed for graduate students interested in learning basic biomedical instrumentation design concepets and translating these into advanced projects based on their research on current state-of-the-art. They will first gain the basic knowledge of instrumentation design, explore various applications, and critically gain hands-on experience through laboratory and projects. At the end of the course, students would get an excellent awareness of biological or clinical measurement techniques, design of sensors and electronics (or electromechanical/chemical, microprocessor system and their use). They will systematically learn to design instrumentation with a focuson the use of sensors, electronics to design a core instrumentation system such as an ECG amplifier. Armed with that knowledge and lab skills, students will be encouraged to discuss various advanced instrumentation applications, such as brain monitor, pacemaker/defibrillator, or prosthetics. Further, they will be “challenged” to come up with some novel design ideas and implement them in a semester-long design project. Students will take part in reading the literature, learning about the state-of-the-art through journal papers and patents, and discussing, critiquing, and improving on these ideas. Finally, they will be implementing a selected idea into a semester-long advanced group project.Meets with 580.471 Graduate students only
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.775. Build Your Own Prosthesis. 4 Credits.
This is a graduate level hands-on course to learn how to make prosthetic limbs. The course will begin with doing background literature and technology review. The students will then do up to 8 laboratory exercises and then follow up with 4 weeks of hands on project building on one of the laboratories to take the idea to cutting edge research in the field. The laboratory exercises will include 1) Electrodes for muscle (EMG) and brain (EEG) signal recording. 2) Circuits for signal amplification and acquisition. 3) Signal processing of EMG and ECG using conventional spectral and discriminant analysis. 4) Design of Control of prosthetic fingers and hands. 5) Soft robotics – design of a prosthetic finger. 6) Tactile sensor design. 7) Tactile sensing and feedback for prosthesis. 8) Simulation using graphical animation and augmented reality. The projects done by students will be on advanced topics such as: A) Pattern recognition and machine intelligence of EMG decoding for dexterous hand control. B) Design of soft robotic multi-finger hand. C) Sensory perceptions: perceiving light touch to pain. D) Augmented reality learning, training and performance. In addition, the students will visit prosthetics/robotics laboratories, startup company and Applied Physics Lab where upper limb prosthesis development takes place. They will be expected to devote equivalent of 8 hours of hands on laboratory time, and as much time reviewing the literature, writing laboratory reports, and the final project report as a paper and a patent, and do a demonstration and make a full presentation. The course will be self-paced and open to graduate students who will take part in the laboratory and project development, learn by doing, and demonstrate ability to take basic ideas to advanced, novel solutions. Selection will be based on an interview about skills, readiness, and motivation.

EN.580.781. Biomedical Engineering Seminar. 1 Credit.

EN.580.782. Biomedical Engineering Seminar. 1 Credit.

EN.580.788. Biomedical Photonics II. 4 Credits.
This course serves as the continuation of 580.678 (520.678), Biomedical Photonics I. It will cover the advanced topics on biomedical photonics, including, but not limited to, light scattering (Rayleigh and Mie scattering), photon diffusion, polarization (birefringence), fluorescence, lifetime measurements, confocal microscopy, optical coherence tomography, nonlinear microscopy, and super-resolution microscopy. Representative biomedical applications of some of these technologies will be integrated into the relevant chapters. A hand-on lab section (optional) for students to design and build an imaging instrument, space permitting.

EN.580.801. Research in Biomedical Engineering. 3 - 10 Credits.
Graduate Students only

EN.580.802. Research in Biomedical Engineering. 3 - 10 Credits.
Directed research for MSE and PhD students

EN.580.803. Research in Biomedical Engineering. 3 - 10 Credits.
Course is for students conducting research for credit.P/F grading only

EN.580.805. BME MSE Independent Study. 1 Credit.
Independent Study

EN.580.806. CBID Summer Research. 9 Credits.

EN.580.821. Applied Research and Grant Methodology. 3 Credits.
The goal of this course is to guide a student through the process of designing a scientific project as well as evaluating others' projects (i.e., providing "peer review"). Course requirements include attending lectures describing successive stage of project design; providing iterative oral and written reports on your own research proposal/project; as well providing feedback on your colleagues' (i.e., your fellow students in the class) projects and proposals. A final research proposal to be presented in the format of a NIH-style grant application will provide evidence that a student is capable of designing an advanced research project by identifying a significant biomedical problem, developing innovative approaches to solve it, and then designing a practical, relevant, and implementable research plan. This course is often taken in conjunction with – and based upon – an independent project being done by the student in a research laboratory but students without a laboratory position are welcome to take this course based on a hypothetical research project of their choosing.
EN.500.601

EN.580.843. Independent Study: Advances in Immunoengineering. 2 Credits.
This independent study will investigate the diverse and complex fields of engineering and immunology and how it is transforming patient treatment in cancer, autoimmunity, regeneration, and transplantation.

EN.580.850. BME MSE Research Practicum. 6 Credits.
BME MSE Research Practicum For Thesis-Track Students

Cross Listed Courses

Applied Mathematics & Statistics

EN.553.450. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional "omics" data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful).
(EN.553.420 OR EN.553.620) AND (EN.553.430 OR EN.553.431 OR EN.553.630) OR equivalent courses in probability and statistics.;Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

EN.553.650. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional "omics" data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful). Recommended Course Background: EN.553.620 AND EN.553.630.
Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

Computer Science

EN.601.350. Genomic Data Science. 3 Credits.
This course will use a project-based approach to introduce undergraduates to research in computational biology and genomics. During the semester, students will take a series of large data sets, all derived from recent research, and learn all the computational steps required to convert raw data into a polished analysis. Data challenges might include the DNA sequences from a bacterial genome project, the RNA sequences from an experiment to measure gene expression, the DNA from a human microbiome sequencing experiment, and others. Topics may vary from year to year. In addition to computational data analysis, students will learn to do critical reading of the scientific iterature by reading high-profile research papers that generated groundbreaking or controversial results. [Applications] Recommended Course Background: Knowledge of the Unix operating system and programming expertise in a language such as Perl or Python.

EN.601.448. Computational Genomics: Data Analysis. 3 Credits.
Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning.Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Prerequisites: EN.601.226 or other programming experience, probability and statistics, linear algebra or calculus.
Students may receive credit for only one of EN.600.438, EN.600.638, EN.601.448, EN.601.648.

EN.601.461. Computer Vision. 3 Credits.
This course provides an overview of fundamental methods in computer vision from a computational perspective. Methods studied include: camera systems and their modelling, computation of 3-D geometry from binocular stereo, motion, and photometric stereo, and objectrecognition, image segmentation, and activity analysis. Elements of machine vision and biological vision are also included.
Students may receive credit for only one of EN.600.361, EN.600.461, EN.600.661, EN.601.461, EN.601.661.;(EN.553.310 OR EN.553.311 OR ((EN.553.420 OR EN.553.421) AND (EN.553.430 OR EN.553.431)) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.601.220 AS.250.205)

EN.601.476. Machine Learning: Data to Models. 3 Credits.
How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.;EN.600.475/EN.601.475 OR EN.600.675/EN.601.675 or equivalent.

EN.601.676. Machine Learning: Data to Models. 3 Credits.
Same material as EN.601.476, for graduate students. How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Recommended Background: EN.600.475 or EN.601.675 or equivalent. Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.

Electrical & Computer Engineering

EN.520.315. Intro. to Bio-Inspired Processing of Audio-Visual Signals. 3 Credits.
An introductory course to basic concepts of information processing of human communication signals (sounds, images) in living organisms and by machine. Recommended Course Background: EN.520.214 (or EN.580.222) or consent of the instructor.

EN.520.445. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.It is recommended that students take EN.520.344 Digital Signal Processing prior to taking this class.

EN.520.622. Principles of Complex Networked Systems. 3 Credits.
By employing fundamental concepts from diverse areas of research, such as statistics, signal processing, biophysics, biochemistry, cell biology, and epidemiology, this course introduces a multidisciplinary and rigorous approach to the modeling and computational analysis of complex interaction networks. Topics to be covered include: overview of complex nonlinear interaction networks and their applications, graph-theoretic representations of network topology and stoichiometry, stochastic modeling of dynamic processes on complex networks and master equations, Langevin, Poisson, Fokker-Plank, and moment closure approximations, exact and approximate Monte Carlo simulation techniques, time-scale separation approaches, deterministic and stochastic sensitivity analysis techniques, network thermodynamics, and reverse engineering approaches for inferring network models from data.

EN.520.665. Machine Perception. 3 Credits.
This course will cover topics such as Marr-Hildreth and Canny edge detectors, local representations (SIFT, LBP), Markov random fields and Gibbs representations, normalized cuts, shallow and deep neural networks for image and video analytics, shape from shading, Make 3D, stereo, and structure from motion.

General Engineering

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.114. Gateway Computing: Matlab. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.113 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 EN.500.132 OR EN.500.133 OR EN.500.134.

Mechanical Engineering

EN.530.410. Biomechanics of the Cell. 3 Credits.
Mechanical aspects of the cell are introduced using the concepts in continuum mechanics. Discussion of the role of proteins, membranes and cytoskeleton in cellular function and how to describe them using simple mathematical models.

EN.530.426. Biofluid Mechanics. 3 Credits.
Objective: To introduce fundamental concepts associated with the fluid mechanics of biological systems, including physiological flows and organisms living in fluids.

EN.530.448. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties, Recommended Course Background: AS.110.201 and AS.110.302, as well as a class in statics and mechanics.

EN.530.616. Introduction to Linear Systems Theory. 3 Credits.
A beginning graduate course in multi-input multi-output, linear, time-invariant systems. Topics include state-space and input-output representations; solutions and their properties; multivariable poles and zeros; reachability, observability and minimal realizations; stability; system norms and their computation; linearization techniques. Students cannot take EN.530.616 if they have already taken the equivalent courses EN.520.601 OR EN.580.616. No audit option, but contact the instructor if you want to informally sit in on the course. For more information see: 616-introduction-to-linear-systems-theory-fall-2021" target="_blank">https://dscl.lcsr.jhu.edu/530-616-introduction-to-linear-systems-theory-fall-2021
Recommended course background are undergraduate courses in linear algebra, differential equations, and an undergraduate level course in control systems. Students cannot take EN.530.616 if they have already taken EN.520.601 OR EN.580.616.

Robotics

EN.620.745. Seminar in Computational Sensing and Robotics. 1 Credit.
Seminar series in robotics. Topics include: Medical robotics, including computer-integrated surgical systems and image-guided intervention. Sensor based robotics, including computer vision and biomedical image analysis. Algorithmic robotics, robot control and machine learning. Autonomous robotics for monitoring, exploration and manipulation with applications in home, environmental (land, sea, space), and defense areas. Biorobotics and neuromechanics, including devices, algorithms and approaches to robotics inspired by principles in biomechanics and neuroscience. Human-machine systems, including haptic and visual feedback, human perception, cognition and decision making, and human-machine collaborative systems.Cross-listed Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Biomedical Engineering.

For current faculty and contact information go to http://www.bme.jhu.edu/people/completefacultylist.php

Bioengineering Innovation and Design, Master of Science in Engineering

The Center for Bioengineering Innovation and Design (CBID), housed in the Department of Biomedical Engineering, focuses on the design aspect of Biomedical Engineering. This exciting program gives students opportunities to design, develop, build, and test devices that solve some of the most pressing problems facing clinicians today.

The mission of CBID is to:

- Improve human health by developing medical devices that solve important clinical problems
- Educate a new generation of medical device engineers and fellows
- Facilitate technology transfer and industry collaboration

In the graduate program CBID students will learn to identify clinical needs and innovate a novel solution to solve that clinical problem. Working in teams, students work closely with engineering faculty and physicians throughout the medical institution to come up with device ideas, build prototypes, research intellectual property, learn about the regulatory process, write business plans, and present their designs to fellow students, faculty, and outside advisors.

Undergraduate students in BME can also become involved in medical device design by joining an undergraduate design team which works on solving clinical problems by designing innovative devices.

Incorporated in all the BME design curriculum is a focus on technology commercialization. All students, graduate and undergraduate, will interact with clinical and corporate sponsors and have experiences that promote the development of leadership, communications, and marketing skills, thus helping to ensure our graduates' professional success.

The CBID M.S.E. is a one-year program lasting from May through the following May. Please see our website for more information on our programs: http://cbid.bme.jhu.edu.

Information can also be found here: http://www.bme.jhu.edu/graduate/masters-design/ (http://cbid.bme.jhu.edu)

Biomedical Engineering, Bachelor of Arts

Program Requirements

(See also General Requirements for Departmental Majors (p. 1086))

The B.A. in biomedical engineering requires 120 credits. The courses listed below must either be taken for a grade or passed by examination for advanced credit. See the Biomedical Engineering Undergraduate website (https://www.bme.jhu.edu/undergraduate/) for additional information.

Code	Title	Credits
Basic Sciences		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
AS.030.101	Introductory Chemistry I	3
AS.030.102	Introductory Chemistry II	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.106	Introductory Chemistry Laboratory II	1
Mathematics [1]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
Computer Programming		
EN.500.112	Gateway Computing: JAVA	3
or EN.500.113	Gateway Computing: Python	
or EN.500.114	Gateway Computing: Matlab	
Humanities and Social Sciences		
Select courses from a coherent program, with at least 9 credits chosen from one department, including at least one 300-level course. [2]		24
Biomedical Core		
EN.580.111	Biomedical Engineering and Design	2
EN.580.151	Structural Biology of Cells	3
EN.580.153	Structural Biology of Cells Laboratory	1
EN.580.221	Biochemistry and Molecular Engineering	4
EN.580.241	Statistical Physics	2
EN.580.242	Biological Models and Simulations	2
EN.580.243	Linear Signals and Systems	2
EN.580.244	Nonlinear Dynamics of Biological Systems	2
EN.580.246	Systems and Controls	2
EN.580.248	Systems Biology of the Cell	2
EN.580.475	Biomedical Data Science	2
EN.580.477	Biomedical Data Science Laboratory	1
EN.580.485	Computational Medicine: Cardiology	2
EN.580.487	Computational Medicine: Cardiology Laboratory	1
Select two of the following core electives:		6
EN.580.424	Neuroengineering and Lab	
EN.580.427	Microphysiological Systems and Laboratory	
EN.580.452	Cell and Tissue Engineering Lab	
EN.580.453	Immunoengineering Principles and Applications	
EN.580.454	Methods in Nucleic Acid Sequencing Lab	
EN.580.494	Build an Imager	
Electives		
Select at least 25 additional credits needed to complete the 120 credit requirement for the BA degree.		25

1. While not required, EN.553.310 or EN.553.311 Probability and Statistics is highly recommended prior to enrolling in EN.580.475 and EN.580.477 Data Science and Laboratory.
2. At least four semesters of writing intensive courses and at least two semesters of a modern foreign language.

Biomedical Engineering, Bachelor of Science

Students seeking a B.S. degree focus their engineering electives on one of seven subspecialties that incorporates traditional engineering disciplines and biomedical applications. See the Biomedical Engineering Undergraduate website (https://www.bme.jhu.edu/undergraduate/) for additional information.

Program Requirements

(See also General Requirements for Departmental Majors (p. 1086).)

The B.S. degree in biomedical engineering requires 129 credits. The courses listed below must either be taken or passed by examination for advanced credit. All courses used to satisfy degree requirements must be taken for a grade (no satisfactory/unsatisfactory grading may be counted). No more than 6 credits of engineering, science, or mathematics courses in which a grade of D was received may be counted.

Code	Title	Credits
Basic Sciences [1]		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4

or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
AS.030.101	Introductory Chemistry I	3
AS.030.102	Introductory Chemistry II	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.106	Introductory Chemistry Laboratory II	1
Mathematics [2]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
Select one of the following:		3-4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.430	Introduction to Statistics	
EN.553.433	Monte Carlo Methods	
Humanities and Social Sciences		
Select courses to form a coherent program, relevant to the student's goals [3]		18
Biomedical Core		
EN.580.111	Biomedical Engineering and Design	2
EN.580.151	Structural Biology of Cells	3
EN.580.153	Structural Biology of Cells Laboratory	1
EN.580.221	Biochemistry and Molecular Engineering	4
EN.580.241	Statistical Physics	2
EN.580.242	Biological Models and Simulations	2
EN.580.243	Linear Signals and Systems	2
EN.580.244	Nonlinear Dynamics of Biological Systems	2
EN.580.246	Systems and Controls	2
EN.580.248	Systems Biology of the Cell	2
EN.580.475	Biomedical Data Science	2
EN.580.477	Biomedical Data Science Laboratory	1
EN.580.485	Computational Medicine: Cardiology	2
EN.580.487	Computational Medicine: Cardiology Laboratory	1
Select two of the following core electives: [4]		6
EN.580.424	Neuroengineering and Lab	
EN.580.427	Microphysiological Systems and Laboratory	
EN.580.452	Cell and Tissue Engineering Lab	
EN.580.453	Immunoengineering Principles and Applications	
EN.580.454	Methods in Nucleic Acid Sequencing Lab	
EN.580.494	Build an Imager	
Career Exploration in BME [5]		
Focus Area		
Select one of the following:		21
Biomedical Data Science (p. 1189)		
Computational Medicine (p. 1190)		
Genomics and Systems Biology (p. 1191)		
Imaging and Medical Devices (p. 1192)		
Imunoengineering (p. 1193)		
Neuroengineering (p. 1194)		
Translational Cell and Tissue Engineering (p. 1195)		
Design [6]		
Select at least one of the following design sequences:		6
EN.510.433 & EN.510.434	Senior Design Research and Senior Design/Research II (This option must be approved by the Materials Science & Engineering Department)	
EN.520.363	ECE Ideation and Design Lab [7]	
EN.520.463	ECE Ideation and Design Lab [7]	
EN.540.421 & EN.540.432	Project in Design: Pharmacodynamics and Project in Design: Pharmacokinetics	
EN.580.311 & EN.580.312	Design Team Health-Tech Project I and Design Team Health-Tech Project II	
EN.580.411 & EN.580.412	Design Team Health-Tech Project I and Design Team Health-Tech Project II	
EN.580.437 & EN.580.438	Neuro Data Design I and Neuro Data Design II	
EN.580.456 & EN.580.457	Introduction to Rehabilitation Engineering and Introduction to Rehabilitation Engineering: Design Lab	
or EN.585.71	Rehabilitation Engineering II	
EN.580.471 & EN.580.571	Principles of Design of BME Instrumentation and Honors Instrumentation [8]	
EN.580.480 & EN.580.481	Precision Care Medicine I and Precision Care Medicine II	
EN.601.455 & EN.601.456	Computer Integrated Surgery I and Computer Integrated Surgery II	
or EN.601.496	Computer Integrated Surgery II - Teams	
EN.660.345 & EN.660.346	Multidisciplinary Engineering Design 1 and	
Computer Programming		
EN.500.112	Gateway Computing: JAVA	3
or EN.500.113	Gateway Computing: Python	
or EN.500.114	Gateway Computing: Matlab	
Free Electives		
Select 9 credits from any area. This can include Intersession S/U courses as well as other courses taken for S/U or grade and not used to fulfill another requirement.		9

1. Students who receive credit for AP Physics I and/or Physics II will receive a waiver for the laboratory course. This will reduce the required number of credits for Basic Sciences by 1 or 2 credits. Students are still required to complete at least 129 total credits for the degree.
2. Students who take an approved math course and receive 3 credits will have a total of 19 credits. Students are still required to complete at least 129 total credits for the degree.
3. One course in which ethical and social issues related to technology or medicine is recommended. and at least two semesters of writing-intensive courses, see Writing Requirement (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/#writingtext).

4 These courses cannot be double-counted toward the 21-credit focus area requirement. Courses taken in excess of the 6 credit core elective requirement can be counted in a relevant focus area.

5 Career Exploration in BME is a 0-credit self-identified set of career related events (lectures, panels, journal clubs, etc.) beginning in the spring semester of year one and continuing until graduation. Career Exploration is administered through a learning management site; students will be enrolled by the department.

6 Each 2-semester sequence must be taken in its entirety.

7 Course EN.520.363 (juniors) and EN.580.463 (seniors) must be taken in a fall/spring or spring/fall sequence and for a total of 2 semesters to satisfy the BME design requirement. Students interested in longitudinal involvement may take the course up to 5 times.

8 EN.580.571 (2 credits) is offered during the spring semester. Instructor permission required.

Focus Areas

Building on the foundation of the core curriculum, each student is required to take a cohesive sequence of advanced engineering encompassing one of seven Biomedical Engineering focus areas. A student's choice of focus area is made during the sophomore year and is based on their experience with the Biomedical Engineering Core and how they wish to apply their skill, knowledge, and passion:

Biomedical Data Science—involves the analysis of large-scale biomedical datasets to understand how living systems function. Our academic and research programs in Biomedical Data Science center on developing new data analysis technologies in order to understand disease mechanisms and provide improved health care at lower costs. Our curriculum in Biomedical Data Science trains students to extract knowledge from biomedical datasets of all sizes in order to understand and solve health-related problems. Students collaborate with faculty throughout the schools of Medicine and Engineering to develop novel cloud-based technologies and data analysis methods that will improve our ability to diagnose and treat diseases.

Computational Medicine—aims to advance health care by developing computational models of disease, personalizing these models using data from patients, and applying these models to improve the diagnosis and treatment of disease. We are using these patient models to discover novel risk biomarkers, predict disease progression, design optimal treatments, and identify new drug targets for applications such as cancer, cardiovascular disease, and neurological disorders. Our curriculum in Computational Medicine bridges biology with mathematics, engineering, and computational science. Students develop new solutions in personalized medicine by building computational models of the molecular biology, physiology, and anatomy of human health and disease.

Genomics and Systems Biology—connects the information in our genome and epigenome to the function of biological systems, from cells to tissues and organs. We are developing new computational and experimental methods for systematic analysis of genomes, building models that span length and time scales, and using synthetic biology to design new biomedical systems for human health applications. Our curriculum spans the fields of engineering, computer science, biology, and biostatistics. Students develop tools to understand the genetic, molecular, and cellular behaviors that cause disease.

Imaging and Medical Devices—involves the measurement of spatiotemporal distributions over scales ranging from molecules and cells to organs and whole populations. Grounded in mathematics, physics, and biological systems, our academic and research programs in Imaging & Medical Devices center on data-intensive image analysis and new imaging technologies that include optics, ultrasound, X-ray/CT, MRI, and molecular imaging. Our curriculum in Imaging & Medical Devices spans fundamental development of imaging technologies, incorporation of these technologies into instruments, and translation into the clinic. In addition to collecting anatomical data, students learn to use data analysis and computer simulations to generate functional images that allow physicians to understand organs and tissues from the smallest scale to the systems level.

Immunoengineering—harnesses the power of the immune system to treat diseases such as cancer and promote tissue regeneration and healing. Our curriculum trains students in immunoengineering at the molecular, cellular, and systems levels. Particular emphasis is placed on novel materials and methods to harness the body's immune system to fight disease, and to promote tissue repair and healing. Students develop new biomaterials, vaccines, therapeutics, and systems to understand immune cell function and guide immune cell behavior.

Neuroengineering—comprises fundamental, experimental, computational, theoretical, and quantitative research aimed at understanding and augmenting brain function in health and disease across multiple spatiotemporal scales. Our curriculum in Neuroengineering trains students to develop and apply new technologies to understand and treat neurological disorders. Students build tools to define, control, enhance, or inhibit neural networks in precise spatial and temporal domains.

Translational Cell and Tissue Engineering—develops and translates advanced technologies to enhance or restore function at the molecular, cellular, and tissue levels. Hopkins BME is leading an effort in translational cell and tissue engineering that bridges discovery, innovation, and translation through basic science, engineering, and clinical endeavors. Our curriculum spans a variety of novel methods that harness the power of cells, materials, and advanced therapeutics to promote tissue repair and to treat disease. Students develop new techniques and biomaterials to guide cell behavior and reconstruct damaged tissues and organs.

Courses in a focus area must be taken for a total of 21 or more credits. At least 15 credits must come from the relevant upper-level engineering course list; a maximum of six credits from the non-upper-level engineering course lists may be used. Please refer to www.bme.jhu.edu/undergraduate/resources.htm (https://www.bme.jhu.edu/academics/undergraduate/undergraduate-focus-areas-courses/) for applicable courses designed for each focus area by faculty members with research interests appropriate to the area; all faculty members are active participants in shaping the undergraduate curriculum.

Biomedical Data Science Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.520.344	Introduction to Digital Signal Processing	3
EN.520.385	Signals, Systems, & Learning	3
EN.520.412	Machine Learning for Signal Processing	3
EN.520.414	Image Processing & Analysis	3
EN.520.415	Image Process & Analysis II	3
EN.520.432	Medical Imaging Systems	3
EN.520.447	Information Theory	3
EN.530.410	Biomechanics of the Cell	3
EN.540.409	Dynamic Modeling and Control	4

EN.540.414	Computational Protein Structure Prediction and Design	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.540.468	Introduction to Nonlinear Dynamics and Chaos	3
EN.553.361	Introduction to Optimization	4
EN.553.362	Introduction to Optimization II	4
EN.553.371	Cryptology and Coding	4
EN.553.385	Numerical Linear Algebra	4
EN.553.386	Scientific Computing: Differential Equations	4
EN.553.391	Dynamical Systems	4
EN.553.400	Mathematical Modeling and Consulting	4
EN.553.401	Introduction to Research	3
EN.553.413	Applied Statistics and Data Analysis	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.433	Monte Carlo Methods	4
EN.553.436	Introduction to Data Science	4
EN.553.450	Computational Molecular Medicine	4
EN.553.463	Network Models in Operations Research	4
EN.553.467	Deep Learning in Discrete Optimization	3
EN.553.472	Graph Theory	4
EN.553.488	Computing for Applied Mathematics	3
EN.553.492	Mathematical Biology	3
EN.553.493	Mathematical Image Analysis	4
EN.553.630	Introduction to Statistics	4
EN.553.720	Probability Theory I	4
EN.553.721	Probability Theory II	4
EN.553.730	Statistical Theory	4
EN.553.731	Statistical Theory II	3
EN.580.431	Introduction to Computational Medicine: Imaging	2
EN.580.433	Introduction to Computational Medicine: The Physiome	2
EN.580.437	Neuro Data Design I	4
EN.580.438	Neuro Data Design II	4
EN.580.439	Models of the Neuron	4
EN.580.447	Computational Stem Cell Biology	3
EN.580.460	Epigenetics at the Crossroads of Genes and the Environment	1.5
EN.580.462	Representations of Choice	3
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.491	Learning, Estimation and Control	3
EN.580.709	Sparse Representations in Computer Vision and Machine Learning	3
EN.601.315	Databases	3
EN.601.318	Operating Systems	3
EN.601.320	Parallel Programming	3
EN.601.350	Genomic Data Science	3
EN.601.402	Digital Health and Biomedical Informatics	1
EN.601.415	Databases	3
EN.601.433	Intro Algorithms	3
EN.601.434	Randomized and Big Data Algorithms	3
EN.601.443	Security & Privacy in Computing	3
EN.601.446	Sketching and Indexing for Sequences	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.448	Computational Genomics: Data Analysis	3
EN.601.454	Augmented Reality	3
EN.601.455	Computer Integrated Surgery I	4
EN.601.456	Computer Integrated Surgery II	3
EN.601.457	Computer Graphics	3
EN.601.461	Computer Vision	3
EN.601.463	Algorithms for Sensor-Based Robotics	3
EN.601.464	Artificial Intelligence	3
EN.601.465	Natural Language Processing	4
EN.601.466	Information Retrieval and Web Agents	3
EN.601.474	ML: Learning Theory	3
EN.601.475	Machine Learning	3
EN.601.476	Machine Learning: Data to Models	3
EN.601.477	Causal Inference	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.491	Human-Robot Interaction	3
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
EN.601.226	Data Structures	4
EN.601.229	Computer System Fundamentals	3
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3
EN.601.231	Automata & Computation Theory	3
AS.110.311	Methods of Complex Analysis	4
AS.110.405	Real Analysis I	4
AS.110.421	Dynamical Systems	4
AS.110.443	Fourier Analysis	4
Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.		

Computational Medicine Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.520.315	Intro. to Bio-Inspired Processing of Audio-Visual Signals	3
EN.520.385	Signals, Systems, & Learning	3
EN.520.432	Medical Imaging Systems	3
EN.530.343	Design and Analysis of Dynamical Systems	3
EN.530.410	Biomechanics of the Cell	3
EN.530.676	Locomotion Dynamics & Control	3

EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.553.361	Introduction to Optimization	4
EN.553.386	Scientific Computing: Differential Equations	4
EN.553.391	Dynamical Systems	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.436	Introduction to Data Science	4
EN.553.450	Computational Molecular Medicine	4
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.431	Introduction to Computational Medicine: Imaging	2
EN.580.433	Introduction to Computational Medicine: The Physiome	2
EN.580.437	Neuro Data Design I	4
EN.580.438	Neuro Data Design II	4
EN.580.439	Models of the Neuron	4
EN.580.447	Computational Stem Cell Biology	3
EN.580.460	Epigenetics at the Crossroads of Genes and the Environment	1.5
EN.580.462	Representations of Choice	3
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.491	Learning, Estimation and Control	3
EN.580.688	Foundations of Computational Biology and Bioinformatics	3
EN.601.350	Genomic Data Science	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.448	Computational Genomics: Data Analysis	3
EN.601.455	Computer Integrated Surgery I	4
EN.601.456	Computer Integrated Surgery II	3
EN.601.461	Computer Vision	3
EN.601.475	Machine Learning	3
EN.601.476	Machine Learning: Data to Models	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.496	Computer Integrated Surgery II - Teams	3
EN.601.723	Advanced Topics in Data-Intensive Computing	3
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
EN.601.226	Data Structures	4
EN.601.229	Computer System Fundamentals	3
EN.601.231	Automata & Computation Theory	3
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3

Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.

Genomics and Systems Biology Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.510.311	Structure Of Materials	3
EN.510.316	Biomaterials I	3
EN.510.407	Biomaterials II: Host response and biomaterials applications	3
EN.510.436	Biomaterials for Cell Engineering	3
EN.520.315	Intro. to Bio-Inspired Processing of Audio-Visual Signals	3
EN.520.353	Control Systems	4
EN.520.385	Signals, Systems, & Learning	3
EN.520.414	Image Processing & Analysis	3
EN.520.415	Image Process & Analysis II	3
EN.520.432	Medical Imaging Systems	3
EN.520.454	Control Systems Design	3
EN.520.636	Feedback Control in Biological Signaling Pathways	3
EN.530.327	Introduction to Fluid Mechanics	3
EN.530.343	Design and Analysis of Dynamical Systems	3
EN.530.410	Biomechanics of the Cell	3
EN.530.414	Computer-Aided Design	3
EN.530.420	Robot Sensors/Actuators	4
EN.530.426	Biofluid Mechanics	3
EN.530.436	Bioinspired Science and Technology	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.530.448	Biosolid Mechanics	3
EN.540.303	Transport Phenomena I	3
EN.540.304	Transport Phenomena II	4
EN.540.409	Dynamic Modeling and Control	4
EN.540.414	Computational Protein Structure Prediction and Design	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.553.361	Introduction to Optimization	4
EN.553.362	Introduction to Optimization II	4
EN.553.386	Scientific Computing: Differential Equations	4
EN.553.391	Dynamical Systems	4
EN.553.400	Mathematical Modeling and Consulting	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.436	Introduction to Data Science	4
EN.553.450	Computational Molecular Medicine	4
EN.553.467	Deep Learning in Discrete Optimization	3
EN.570.351	Introduction to Fluid Mechanics	3
EN.580.418	Principles of Pulmonary Physiology	3
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.431	Introduction to Computational Medicine: Imaging	2

EN.580.433	Introduction to Computational Medicine: The Physiome	2
EN.580.439	Models of the Neuron	4
EN.580.441	Cellular Engineering	3
EN.580.444	Biomedical Applications of Glycoengineering	3
EN.580.447	Computational Stem Cell Biology	3
EN.580.454	Methods in Nucleic Acid Sequencing Lab	3
EN.580.459	Seminar in Epigenetic Engineering	1
EN.580.460	Epigenetics at the Crossroads of Genes and the Environment	1.5
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.471	Principles of Design of BME Instrumentation	4
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.491	Learning, Estimation and Control	3
EN.580.571	Honors Instrumentation	2
EN.580.625	Structure and Function of the Auditory and Vestibular Systems	3
EN.580.752	Advanced Topics in Regenerative and Immune Engineering	4
EN.580.688	Foundations of Computational Biology and Bioinformatics	3
EN.601.350	Genomic Data Science	3
EN.601.448	Computational Genomics: Data Analysis	3
EN.601.465	Natural Language Processing	4
EN.601.475	Machine Learning	3
EN.601.476	Machine Learning: Data to Models	3
EN.601.482	Machine Learning: Deep Learning	4
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.520.214	Signals and Systems	4
EN.520.216	Introduction To VLSI	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
EN.601.226	Data Structures	4
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
AS.020.303	Genetics	3
AS.080.305	Neuroscience: Cellular and Systems I	3
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3

Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.

Imaging and medical devices Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.510.311	Structure Of Materials	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.314	Electronic Properties of Materials	3
EN.510.316	Biomaterials I	3
EN.510.403	Materials Characterization	3
EN.510.407	Biomaterials II: Host response and biomaterials applications	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.430	Biomaterials Lab	3
EN.520.315	Intro. to Bio-Inspired Processing of Audio-Visual Signals	3
EN.520.340	Introduction to Mechatronics: Sensing, Processing, Learning and Actuation	3
EN.520.344	Introduction to Digital Signal Processing	3
EN.520.349	Microprocessor Lab I	3
EN.520.353	Control Systems	4
EN.520.414	Image Processing & Analysis	3
EN.520.415	Image Process & Analysis II	3
EN.520.417	Computation for Engineers	3
EN.520.424	FPGA Synthesis Lab	3
EN.520.427	Design of Biomedical Instruments and Systems	3
EN.520.432	Medical Imaging Systems	3
EN.520.433	Medical Image Analysis	3
EN.520.435	Digital Signal Processing	3
EN.520.447	Information Theory	3
EN.520.448	Electronics Design Lab	3
EN.520.450	Advanced Micro-Processor Lab	3
EN.520.454	Control Systems Design	3
EN.520.483	Bio-Photonics Laboratory	3
EN.520.491	CAD Design of Digital VLSI Systems I (Juniors/Seniors)	3
EN.520.492	Mixed-Mode VLSI Systems	3
EN.520.495	Microfabrication Laboratory	4
EN.520.631	Ultrasound and Photoacoustic Beamforming	3
EN.520.646	Wavelets & Filter Banks	3
EN.520.651	Foundations of Probabilistic Machine Learning	4
EN.530.381	Engineering Design Process	3
EN.530.414	Computer-Aided Design	3
EN.530.420	Robot Sensors/Actuators	4
EN.530.421	Mechatronics	3
EN.530.424	Dynamics of Robots and Spacecraft	3
EN.530.441	Introduction to Biophotonics	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.530.468	Locomotion Mechanics: Fundamentals	3
EN.530.473	Molecular Spectroscopy and Imaging	3
EN.530.474	Effective and Economic Design for Biomedical Instrumentation	4
EN.530.646	Robot Devices, Kinematics, Dynamics, and Control	4
EN.530.672	Biosensing & BioMEMS	3
EN.540.403	Colloids and Nanoparticles	3
EN.540.440	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.553.361	Introduction to Optimization	4

EN.553.362	Introduction to Optimization II	4
EN.553.391	Dynamical Systems	4
EN.553.413	Applied Statistics and Data Analysis	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.436	Introduction to Data Science	4
EN.553.433	Monte Carlo Methods	4
EN.553.472	Graph Theory	4
EN.553.493	Mathematical Image Analysis	4
EN.553.630	Introduction to Statistics	4
EN.553.761	Nonlinear Optimization I	3
EN.553.762	Nonlinear Optimization II	3
EN.580.425	Radiology for Engineers	3
EN.580.435	Applied Bioelectrical Engineering	3
EN.580.456	Introduction to Rehabilitation Engineering	3
EN.580.457	Introduction to Rehabilitation Engineering: Design Lab	3
EN.585.717	Rehabilitation Engineering II	3
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.471	Principles of Design of BME Instrumentation	4
EN.580.571	Honors Instrumentation	2
EN.580.479	Principles and Applications of Modern X-ray Imaging and Computed Tomography	3
EN.580.491	Learning, Estimation and Control	3
EN.580.493	Imaging Instrumentation	4
EN.580.494	Build an Imager	3
EN.580.678	Biomedical Photonics I	4
EN.580.689	Modern Optical Microscopy: Theory and Practice	3
EN.580.740	Surgery for Engineers	3
EN.580.742	Neural Implants and Interfaces	3
EN.601.315	Databases	3
EN.601.415	Databases	3
EN.601.454	Augmented Reality	3
EN.601.455	Computer Integrated Surgery I	4
EN.601.456	Computer Integrated Surgery II	3
EN.601.461	Computer Vision	3
EN.601.463	Algorithms for Sensor-Based Robotics	3
EN.601.475	Machine Learning	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.496	Computer Integrated Surgery II - Teams	3
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.520.214	Signals and Systems	4
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
EN.530.241	Electronics & Instrumentation	3
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
EN.601.226	Data Structures	4
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
AS.110.405	Real Analysis I	4
AS.110.443	Fourier Analysis	4
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3

Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.

IMMUNoENGINEERING FOCUS AREA

Code	Title	Credits
Upper-Level Engineering Courses		
EN.510.311	Structure Of Materials	3
EN.510.312	Thermodynamics/Materials	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.314	Electronic Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.510.316	Biomaterials I	3
EN.510.403	Materials Characterization	3
EN.510.407	Biomaterials II: Host response and biomaterials applications	3
EN.510.415	The Chemistry of Materials Synthesis	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.430	Biomaterials Lab	3
EN.510.435	Mechanical Properties of Biomaterials	3
EN.510.442	Nanomaterials Lab	3
EN.510.443	Chemistry and Physics of Polymers	3
EN.520.495	Microfabrication Laboratory	4
EN.530.410	Biomechanics of the Cell	3
EN.530.426	Biofluid Mechanics	3
EN.530.436	Bioinspired Science and Technology	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.540.301	Kinetic Processes	4
EN.540.303	Transport Phenomena I	3
EN.540.304	Transport Phenomena II	4
EN.540.306	Chemical & Biomolecular Separation	4
EN.540.402	Metabolic Systems Biotechnology	3
EN.540.403	Colloids and Nanoparticles	3
EN.540.414	Computational Protein Structure Prediction and Design	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.422	Introduction to Polymeric Materials	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.540.440	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.540.465	Engineering Principles of Drug Delivery	3
EN.540.602	Metabolic Systems Biotechnology	3
EN.553.386	Scientific Computing: Differential Equations	4
EN.553.391	Dynamical Systems	4
EN.553.413	Applied Statistics and Data Analysis	4
EN.553.420	Introduction to Probability	4

EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.436	Introduction to Data Science	4
EN.553.433	Monte Carlo Methods	4
EN.553.450	Computational Molecular Medicine	4
EN.553.492	Mathematical Biology	3
EN.580.418	Principles of Pulmonary Physiology	3
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.441	Cellular Engineering	3
EN.580.442	Tissue Engineering	3
EN.580.444	Biomedical Applications of Glycoengineering	3
EN.580.447	Computational Stem Cell Biology	3
EN.580.453	Immunoengineering Principles and Applications	3
EN.580.452	Cell and Tissue Engineering Lab	3
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.454	Methods in Nucleic Acid Sequencing Lab	3
EN.580.646	Molecular Immunoengineering	3
EN.580.752	Advanced Topics in Regenerative and Immune Engineering	4
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
AS.020.303	Genetics	3
AS.020.337	Stem Cells & the Biology of Aging & Disease	2
AS.020.363	Developmental Biology	3
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3
Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.		

Neuroengineering Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.520.315	Intro. to Bio-Inspired Processing of Audio-Visual Signals	3
EN.520.344	Introduction to Digital Signal Processing	3
EN.520.349	Microprocessor Lab I	3
EN.520.353	Control Systems	4
EN.520.385	Signals, Systems, & Learning	3
EN.520.412	Machine Learning for Signal Processing	3
EN.520.424	FPGA Synthesis Lab	3
EN.520.432	Medical Imaging Systems	3
EN.520.445	Audio Signal Processing	3
EN.520.448	Electronics Design Lab	3
EN.520.450	Advanced Micro-Processor Lab	3
EN.520.454	Control Systems Design	3
EN.520.491	CAD Design of Digital VLSI Systems I (Juniors/ Seniors)	3
EN.520.492	Mixed-Mode VLSI Systems	3
EN.520.495	Microfabrication Laboratory	4
EN.530.414	Computer-Aided Design	3
EN.530.420	Robot Sensors/Actuators	4
EN.530.421	Mechatronics	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.530.468	Locomotion Mechanics: Fundamentals	3
EN.530.646	Robot Devices, Kinematics, Dynamics, and Control	4
EN.530.672	Biosensing & BioMEMS	3
EN.540.403	Colloids and Nanoparticles	3
EN.540.440	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.580.424	Neuroengineering and Lab	3
EN.580.426	Neuroengineering: The Neural Control of Movement	3
EN.580.437	Neuro Data Design I	4
EN.580.438	Neuro Data Design II	4
EN.580.441	Cellular Engineering	3
EN.580.442	Tissue Engineering	3
EN.580.452	Cell and Tissue Engineering Lab	3
EN.580.456	Introduction to Rehabilitation Engineering	3
EN.580.457	Introduction to Rehabilitation Engineering: Design Lab	3
EN.585.717	Rehabilitation Engineering II	3
EN.580.471	Principles of Design of BME Instrumentation	4
EN.580.571	Honors Instrumentation	2
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.491	Learning, Estimation and Control	3
EN.580.493	Imaging Instrumentation	4
EN.580.494	Build an Imager	3
EN.580.688	Foundations of Computational Biology and Bioinformatics	3
EN.580.689	Modern Optical Microscopy: Theory and Practice	3
EN.580.742	Neural Implants and Interfaces	3
EN.601.455	Computer Integrated Surgery I	4
EN.601.456	Computer Integrated Surgery II	3
EN.601.475	Machine Learning	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.496	Computer Integrated Surgery II - Teams	3
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.520.214	Signals and Systems	4
EN.520.216	Introduction To VLSI	3
EN.520.230	Mastering Electronics	3
EN.530.254	Manufacturing Engineering	3
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
Non Upper-Level Engineering Courses		

A maximum of 3 credits from this list may count in focus area		
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3
Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.		

translational cell and tissue Engineering Focus Area

Code	Title	Credits
Upper-Level Engineering Courses		
EN.510.311	Structure Of Materials	3
EN.510.312	Thermodynamics/Materials	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.314	Electronic Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.510.316	Biomaterials I	3
EN.510.403	Materials Characterization	3
EN.510.407	Biomaterials II: Host response and biomaterials applications	3
EN.510.415	The Chemistry of Materials Synthesis	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.430	Biomaterials Lab	3
EN.510.435	Mechanical Properties of Biomaterials	3
EN.510.436	Biomaterials for Cell Engineering	3
EN.510.442	Nanomaterials Lab	3
EN.510.443	Chemistry and Physics of Polymers	3
EN.520.495	Microfabrication Laboratory	4
EN.530.410	Biomechanics of the Cell	3
EN.530.426	Biofluid Mechanics	3
EN.530.436	Bioinspired Science and Technology	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.530.448	Biosolid Mechanics	3
EN.530.468	Locomotion Mechanics: Fundamentals	3
EN.530.474	Effective and Economic Design for Biomedical Instrumentation	4
EN.540.301	Kinetic Processes	4
EN.540.303	Transport Phenomena I	3
EN.540.304	Transport Phenomena II	4
EN.540.306	Chemical & Biomolecular Separation	4
EN.540.402	Metabolic Systems Biotechnology	3
EN.540.403	Colloids and Nanoparticles	3
EN.540.414	Computational Protein Structure Prediction and Design	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.540.422	Introduction to Polymeric Materials	3
EN.540.432	Project in Design: Pharmacokinetics	3
EN.540.440	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.540.465	Engineering Principles of Drug Delivery	3
EN.540.602	Metabolic Systems Biotechnology	3
EN.553.391	Dynamical Systems	4
EN.580.418	Principles of Pulmonary Physiology	3
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.435	Applied Bioelectrical Engineering	3
EN.580.441	Cellular Engineering	3
EN.580.442	Tissue Engineering	3
EN.580.444	Biomedical Applications of Glycoengineering	3
EN.580.447	Computational Stem Cell Biology	3
EN.580.452	Cell and Tissue Engineering Lab	3
EN.580.453	Immunoengineering Principles and Applications	3
EN.580.454	Methods in Nucleic Acid Sequencing Lab	3
EN.580.456	Introduction to Rehabilitation Engineering	3
EN.580.457	Introduction to Rehabilitation Engineering: Design Lab	3
EN.585.717	Rehabilitation Engineering II	3
EN.580.643	Advanced Orthopaedic Tissue Engineering	3
EN.580.646	Molecular Immunoengineering	3
Contact the department advising office for course additions.		
200-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
EN.580.212	Design Team Health-Tech Project II	3
EN.580.298	Advanded Design Team	3
Non Upper-Level Engineering Courses		
A maximum of 3 credits from this list may count in focus area		
AS.020.303	Genetics	3
AS.020.337	Stem Cells & the Biology of Aging & Disease	2
AS.020.363	Developmental Biology	3
EN.580.112	Design Team Health-Tech Project II	3
EN.580.211	Design Team Health-Tech Project I	3
Students may use a maximum of 3 research credits (courses coded EN.XXX.5XX) as a non-upper-level engineering course.		

Biomedical Engineering, Master of Science in Engineering

The master's degree program is designed for students who wish to pursue careers in research and development, or as a step toward Ph.D. or M.D./Ph.D. education. The program has two degree options: a course-based plan consisting of 30 credits and a thesis-based track that requires 30 credits plus a thesis project which is completed in a second year.

Admission Requirements

Admission and Financial Aid

Students with undergraduate degrees in engineering are eligible to apply. Exceptional students with degrees in basic sciences may also apply, but would normally have to take a number of courses to overcome deficiencies in their curriculum.

Students do not receive departmental financial aid. However, external financial aid is available for qualified students and partial tuition remission may be available for previous Johns Hopkins students. In addition, thesis-track students (once selected for the thesis track) may be provided with additional financial aid to facilitate the research component of their degree (each financial aid package will be negotiated on an individual basis but typically will include either (or a combination of) tuition waivers or a monthly stipend.

Applications for admission are due by the appointed deadline (December 31st).

For more information and to apply online, go to http://www.bme.jhu.edu/graduate/mse/apply (http://www.bme.jhu.edu/graduate/mse/apply/).

Program Requirements

Course-Based Degree Option

Students must complete at least 30 credits of approved coursework to satisfy the course-based degree option requirements. Students must select a focus area and complete coursework primarily within that discipline. In addition to focus area-specific coursework, MSE students have the option to count up to six credits of research (three credits per semester with a confirmed lab) as well as up to two seminars (typically one credit each) towards their overall 30 credits.

Thesis-based Degree Option

Each student will take 30 credits at the graduate-level (the same as first year students).

Thesis track students must also complete a thesis based on a research topic requiring application of quantitative or applied engineering principles to biomedical engineering.

For more program requirement and master's advising information, please visit the BME Master's homepage (https://www.bme.jhu.edu/academics/graduate/masters-programs/masters-program/).

Biomedical Engineering, PhD through the School of Medicine

The Department of Biomedical Engineering is uniquely positioned within the Johns Hopkins School of Medicine and the Whiting School of Engineering, giving our students access to top clinicians, researchers, and engineers. Our students are passionate about discovery and innovation, with a demonstrated trajectory of laboratory experience, and maturing knowledge of biology, engineering, and science.

In their first year, students have the option to take many of the same courses as medical students, such as human anatomy, neuroscience, and immunology. Students also take advanced engineering and science courses. Students who apply to our program should have a strong background in quantitative sciences – e.g. engineering, physics, mathematics or applied math, as well as sufficient experience in chemistry and biology. Applicants with a strong background in biological sciences who also demonstrate ability and potential in quantitative sciences are also encouraged to apply. Students who receive a rotation offer are free to choose from almost any research lab in the university. To facilitate this process, students do two or more rotations during their first year and typically choose a lab by the end of the summer of their first year. Students who receive an offer to work with specific laboratories forego the rotation process and get into their thesis research from day one.

Emphasis is placed on original research leading to the doctoral dissertation. The research is usually experimental in nature, and students are expected to learn biological experimentation techniques. Nevertheless, experiment or theory can be emphasized in the research as desired by the student.

Financial Aid

All students are admitted with full financial support regardless of citizenship or national origin. This includes a yearly stipend, full tuition, matriculation fee, and individual medical and dental insurance. Students are encouraged to apply for individual fellowships from the National Science Foundation and for NRSA awards from the NIH.

Admission

The School of Medicine program accepts applications for the Ph.D. program until **December 1** of each year. We typically recruit students in seven broad areas: Biomedical Data Science, Computational Medicine, Genomics and Systems Biology, Imaging and Medical Devices, Immunoengineering, Neuroengineering, and Translational Cell and Tissue Engineering. That doesn't mean applicants have to fit into one of these areas; much of the best research comes from interdisciplinary work. These areas will help you review which faculty members might be best suited to be your research mentors, and will form part of the community you join when you matriculate. The program is unique in that it offers the BME student the strengths of one of the best medical schools in the world.

In their first year, our students have the option of taking many of the same courses as the medical students, including human anatomy, molecules and cells, and genes to society. In their second year, our students take advanced engineering courses. Therefore, students that apply to our program need to not only have a strong background in engineering and mathematics, but also sufficient background in chemistry (including organic chemistry) and one year of college-level biology.

The admission process is led by committees organized by the seven focus areas listed above. Applicants should specify in which area (or areas) they are most interested, and describe the kind of research they foresee. Faculty in each area vote and rank the applicants in the initial selection round, and the final pool of applicants is ranked and voted on by the entire faculty.

Applications should be complete when submitted. In order to be considered a complete application we must have:

- A completed online application: https://www.bme.jhu.edu/johns-hopkins-biomedical-engieering/apply/
- **Official transcripts from each college or university attended**—Official transcripts from each college or university attended. Applicants may upload transcripts to the online application for review. Applicants who receive an offer or accept an offer of admission are required to submit official transcripts to OGSA via mail or electronically to gradadmissions@jhmi.edu.
- **Official Graduate Record Examination**—Please review our current GRE guidelines by going to: https://www.bme.jhu.edu/academics/graduate/phd-program/apply-to-the-phd-program/. The BME Ph.D. program does not rely heavily on the GRE exam in making admissions or financial aid decisions. Research experience, course grades, and recommendations carry more weight.
- **Three letters of recommendation**—Three letters of recommendation from faculty members who are acquainted with you and your academic work. These letters should include comments on your aptitude and promise for independent research.
- **Personal Statement**—A typewritten personal statement (one page maximum) indicating the basis of your interest in graduate study and your career objectives. Include discussion of any research experience you have had. Also mention here which faculty members you would

be most interested in working with and why. A separate personal statement on diversity, equity, and inclusion in science is optional.
- **TOEFL scores**—for foreign students only; official copy.

Applicants for admission must fulfill the following course prerequisites:

- One year of college-level biology (may include quantitative biology or physiology)
- One semester of organic chemistry is required for students interested in the Immunoengineering or Translational Cell & Tissue Engineering research areas
- Sufficient mathematical training, typically including differential equations or other relevant mathematical preparation

If you are interested in applying and do not have the prerequisite courses, you may want to submit your application with an explanatory note indicating you have made or will make arrangements to take the prerequisites before you would matriculate, if your application is accepted. In the past, applicants have taken the prerequisites at their present schools, local community colleges, etc. Courses taken at any accredited college or university are acceptable.

Each applicant must have received a B.A. or B.S. degree or its equivalent prior to matriculation. A Masters degree is not required for admission to our program.

Processing

The Ph.D. Program admissions committee will not consider any application until it is complete. Once an application has been received the applicant will be notified if supporting materials are missing.

Interview

The admissions committee will review completed applications and invite selected applicants to interview with our faculty by phone, Zoom, or similar virtual platforms. Applicants must complete the interview process to be considered for admission, and final admissions decisions will be made from the pool of interviewed applicants. Interview invitations will be sent out to applicants via email by mid- to late- January, or earlier if feasible. Virtual interviews will be conducted in early February. Selected students will be invited to an in-person campus visit in early March to meet current faculty and graduate students, as well as learn more about the program the Hopkins BME environment.

Acceptance

Applicants will be notified via email by late March with the outcome of their application. A full offer of admission to the program will include a yearly stipend, full tuition, matriculation fee, and individual medical and dental insurance. This applies to every accepted applicant, regardless of citizenship or national origin unless the applicant receives a conditional acceptance. Those offered admission will be asked to communicate their decision as soon as possible. In any case, we must have the applicant's decision by April 15.

Program Requirements

The first two years are ordinarily devoted to advanced courses in engineering science and in biomedical science. A minimum of 30 credits are required with at least twelve credit hours of course work in engineering, mathematics, or physical sciences and at least twelve credit hours of course work in the life sciences. Engineering, mathematics, and other physical science courses to be taken are arranged between students and their advisors. Each student is assigned a faculty mentor during the first year. This relationship is designed to help students acclimate to the program.

Summers are spent working in a biomedical laboratory to gain experience and to seek out a suitable thesis research area. By the beginning of the third year, students should start original research leading to the dissertation. Students must fulfill a modest teaching requirement during one year of their program. The remaining time is spent in thesis research. The program typically takes five to six years to complete.

The student must pass a preliminary oral examination which will be a Graduate Board examination. This is taken no later than the end of the second year. The student must then conduct original research, describe it in a dissertation, and pass a final oral examination that is a defense of the dissertation. There is a minimum residency requirement of two consecutive academic years.

Integrated M.D./Ph.D. Program

Candidates for the Ph.D. in biomedical engineering who wish to apply jointly for the M.D. degree must apply directly through the School of Medicine. Although the combined programs would normally require at least seven years to execute sequentially, the combined program can ordinarily be completed in six years, with appropriate planning. Good preparation in biology and chemistry as well as mathematics, engineering, and the physical sciences is essential. Life science graduate requirements are met by the first-year program of the School of Medicine. This program is more arduous than the Ph.D. program alone, but it may have marked advantages for students interested in clinical research and applications in hospital systems and in the delivery of health care. The catalogue for the School of Medicine should be consulted for admissions requirements and procedures.

Information about applying to the combined M.D.-Ph.D. program can be found at the MD-PhD website (https://www.bme.jhu.edu/academics/graduate/phd-program/md-phd-program/). Applications submitted for consideration of the combined degree will be reviewed by the Medical School admissions committee. If the Medical School admissions committee accepts the application, it is then passed along to the Biomedical Engineering Ph.D. Program admissions committee for review. A student applying to the combined program who wishes to be considered for the straight Ph.D. program must submit a written request to have their application forwarded to the Biomedical Engineering Ph.D. Program office for admission consideration if their application is not accepted by the Medical School admissions committee.

Center for Leadership Education

http://engineering.jhu.edu/cle (http://engineering.jhu.edu/cle/)

The Center for Leadership Education (CLE) is home to a variety of minors and programs that offer students an opportunity to gain real-world experience in innovation, entrepreneurship, and leadership. CLE academic programs include minors in Accounting and Financial Management, Entrepreneurship and Management, Leadership Studies, and Marketing and Communications, as well as graduate programs including the Professional Development Program and the Masters of Science in Engineering Management.

CLE Experiential Programs Include

Competitions and Other Educational Opportunities

- **HopStart: Hopkins New Venture Challenge:** Students compete for cash prizes for best business plans and pitches in several categories. The competition is open to students at all levels from all divisions of the university. http://hopstart.jhu.edu
- **Case & Pitch Competitions:** Case and pitch competitions hosted by a variety of CLE sponsored, student-run organizations including the Marshal L. Salant Investment Team, the American Marketing Association, the Undergraduate Consulting Club, and TCO Labs, provide students with the opportunity to learn, collaborate, and share ideas with their peers in order to solve a real world business cases, pitch new investments, or create new campaigns. Competitions are designed not only to develop students' professional skills, but also to connect students with Hopkins alumni in a variety of industries.
- **CLE Connect:** Held in the early fall of each year, our annual career event invites professionals from a variety of industries to network with undergraduate and graduate CLE students.
- **Internships:** Students can apply for sponsorship for academic credit of unpaid internships during the spring, summer, or fall semester.
- **Intersession Courses:** Students can gain hands-on learning experiences during intersession trips to New York in the course P.R. and Media in the Big Apple and through study abroad opportunities in Denmark and Israel.
- **HopStone Capital:** HopStone is a student-run venture capital organization that makes investments* in Johns-Hopkins-affiliated startups. Team members will source potential investments, assist startup founders with venture funding pitches, make investment decisions, and assist their portfolio of companies as the execute their business plans. **Investments are structured in the form of grants to companies/founders and will not result in any ownership interest or securities issuances to HopStone.*

Student-Run Organizations

- **American Marketing Association Student Chapter:** The JHU chapter of the national American Marketing Association. https://www.amajhu.com/
- **JHU Enactus:** The JHU chapter of Enactus, a global organization dedicated to addressing social issues through social entrepreneurship. https://www.instagram.com/enactusjhu (https://www.instagram.com/enactusjhu/)
- **JHU Undergraduate Consulting Club:** JHUCC's aim is to help the undergraduate student body at Johns Hopkins learn more about consulting as a career track, by providing events and resources that will give students insight into the field of consulting and connect them with recruiters from firms. https://www.jhucc.com/
- **Marshal Salant Student Investment Team:** The team was founded with a generous $100K donation by alumnus Marshal L. Salant. The team portfolio is currently valued at over $250K. Profits from the portfolio are used to fund student scholarships. https://jhusalant.com/
- **Students Consulting for Non-Profit Organizations**: A national organization of undergraduate students committed to developing communities through pro bono consulting engagements with non-profit organizations. https://jhuscno.wixsite.com/jhuscno (https://jhuscno.wixsite.com/jhuscno/)
- **TCO Labs:** A non-profit organization focused on fostering entrepreneurship at JHU and getting students involved in Baltimore's innovation community. https://tcolabs.org/
- **Women in Business:** Women in Business (WIB) provides the women of Hopkins the opportunities necessary to advance their professional and personal development. https://jhuwib.weebly.com/
- **Product Management Club:** The Johns Hopkins Product Management Club (JHPMC) aims to learn the skills of a software product manager while working on real-world projects with real-time clients. https://www.jhupmc.com/

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.660.105. Foundations of American Enterprise. 3 Credits.
Formerly Introduction to Business, this course is designed as an overview comprising three broad categories: the economic, financial, and corporate context of business activities; the organization and management of firms and organizations; and, the marketing and production of goods and services. Topic specific readings, short case studies and exercises all focus on the bases for managerial decisions as well as the long and short-term implications of those decisions in a global environment. No audits. Coursework will be completed asynchronously. Students are required to attend 1 office hour per week, time TBD based on students' availability.

EN.660.106. Clark Scholars Leadership Challenge. 1 Credit.
The Clark Scholars Leadership Challenge is a one credit pass/fail seminar and is designed specifically for the Clark Scholars at JHU who are interested in developing their leadership skills and applying those skills to Hopkins life. The seminar includes both a classroom component and an experiential component. The classroom content includes leadership topics, discussions with university leaders and serves as an introduction to the history, services and involvement opportunities at Hopkins. The experiential component includes programs such as JHU history, faculty student interaction, visits to other JHU campuses and more! Clark Scholars only. S/U only.

EN.660.200. Principles of Finance. 3 Credits.
This course covers central issues in financial management and corporate finance. Students will learn how financial managers make investment, financing and other decisions and what are the tools they use to reach such decisions. Topics covered include time value of money, risk, valuation, capital structure, capital budgeting, dividend policy and mean-variance portfolio selection. The course provides the analytical tools and the financial theories needed to implement sound financial decisions within a corporation (and outside of a corporation). Ideas are presented in a cohesive way within the framework of the no-arbitrage principle, the fundamental principle shaping all aspects of modern finance. Command of the subject is crucially important for anyone considering a career not only in investment banking, investment management or trading, but also in general management, corporate strategy, management consulting, entrepreneurship, and the non-profit world.
EN.660.105 OR AS.180.102

EN.660.203. Financial Accounting. 3 Credits.
The course in Financial Accounting is designed for anyone who could be called upon to analyze and/or communicate financial results and/or make effective financial decisions in a for-profit business setting. No prior accounting knowledge or skill is required for successful completion of this course. Because accounting is described as the language of business, this course emphasizes the vocabulary, methods, and processes by which all business transactions are communicated. The accounting cycle, basic business transactions, internal controls, and preparation and understanding of financial statements including balance sheets, statements of income and cash flows are covered. No audits. Students are required to attend 1 office hour per week, time TBD based on students' availability.

EN.660.250. Identifying and Capturing Markets. 3 Credits.
In this course, students will learn how to identify individual and organizational market needs through entrepreneurial thinking. Exposure to a broad range of organizations—from startups to more established businesses, and a variety of industry sectors, including information technology, healthcare, biomedical engineering, transportation, mass media and energy—will provide students with insight into the role that marketing plays in an organization's ability to identify, capture and grow these markets.

EN.660.270. Clark Scholar Engineering Design I. 1 Credit.
In this course, Clark Scholar students will learn and practice the first stages of design thinking. Students will engage with both industry and academic professionals to identify new innovation targets for future design projects. Additional topics will include multifaceted problem assessment and project selection for Engineering Design II.

EN.660.300. Managerial Finance. 3 Credits.
This course is designed to familiarize the student with the basic concepts and techniques of financial management practice, including how to leverage Microsoft Excel to make financial decisions. The course begins with a review of accounting, financial statement analysis, and the finance function. The course then moves to discussion of financial planning, data mining, time value of money, pro forma development, and project/investment evaluation. A combination of classroom discussions, problem sets, and case studies will be used.
EN.660.203

EN.660.303. Managerial Accounting. 3 Credits.
This course introduces management accounting concepts and objectives including planning, control, and the analysis of sales, expenses, and profits. Major topics include cost behavior, cost allocation, product costing (including activity based costing), standard costing and variance analysis, relevant costs, operational and capital budgeting, and performance measurement. No audits.
EN.660.203

EN.660.308. Business Law I. 3 Credits.
This course is designed to provide students an introduction to legal reasoning and analysis. Further, this course is for the student who is interested in (a) a broad knowledge of law as it relates to modern business, and/or (b) a survey of business-related aspects of law with a view to further legal studies. This course will provide a self-contained and well-rounded study of business law as well as a foundation for continued education in the legal field. Course topics include, business formation, capitalization, torts, contracts, intellectual property, employment issues, and the sale of a business.
EN.660.105

EN.660.310. Cases in Workplace Ethics. 3 Credits.
This course introduces the student to the theories and concepts relevant to resolving ethical issues at work. Students will learn the reasoning and analytical skills needed to apply ethical frameworks to their decision-making, to identify ethical challenges in management and leadership, and to understand the context within which ethical issues arise. Students will learn to raise ethical questions with their leaders, whether at work or the communities within which they live and work. Students will have influence over their learning outcomes by selecting to focus on, and learn to assess and respond to, challenges specific to their industry, field and/or country of interest.

EN.660.329. Social Entrepreneurship Theory and Practice. Community Based Learning. 3 Credits.
Learn the principles, values and skills necessary to lead and succeed in organizations that make a positive difference in today's world. The course is designed to help students identify and provide opportunities to enhance their leadership skills. A "Blueprint for Success" will provide the framework for students to cultivate their own ideas for new socially conscious entrepreneurial ventures. Students will hear from successful current leaders in the field of social entrepreneurship and be provided the opportunity to network with JHU alumni, faculty and staff who are working or volunteering in for-profit or non-profit entities through occupations that make a difference.
Area: Writing Intensive

EN.660.331. Leading Teams. 3 Credits.
This course will allow students to develop the analytical skills needed to effectively lead and work in teams. Students will learn tools and techniques for problem solving, decision-making, conflict resolution, task management, communications, and goal alignment in team settings. They will also learn how to measure team dynamics and performance, and assess methods for building and sustaining high-performance teams. Students will also explore their own leadership, personality and cognitive styles and learn how these may affect their performance in a team. The course will focus on team-based experiential projects and exercises as well as provide opportunities to individually reflect and write about the concepts explored and skills gained throughout the course. No Audits. Recommended Couse Background: EN.660.332 or EN.660.333.

EN.660.332. Leadership Theory. 3 Credits.
Students will be introduced to the history of Leadership Theory from the "Great Man" theory of born leaders to Transformational Leadership theory of non-positional learned leadership. Transformational Leadership theory postulates that leadership can be learned and enhanced. The course will explore the knowledge base and skills necessary to be an effective leader in a variety of settings. Students will assess their personal leadership qualities and develop a plan to enhance their leadership potential. No audits.
Area: Writing Intensive

EN.660.333. Leading Change. 3 Credits.
In this course, we will use a combination of presentation, discussion, experiential learning, research, and self-reflection to investigate issues surrounding leadership and change in communities and the economy. While considering both for-profit and non-profit entitites, we will pursue topics including understanding and using theories of change, finding competitive advantage and creating strategic plans; making decisions, even in uncertain times; valuing differences; employing leadership styles; giving and receiving feedback; understanding employee relations; creating performance measures; and developing organizational cultures; and using the dynamics of influence. No audits.
Area: Writing Intensive

EN.660.335. Negotiation and Conflict Resolution. 3 Credits.
The focus of this class is the nature and practice of conflict resolution and negotiation within and between individuals and organizations. The primary format for learning in this class is structured experimental exercises designed to expose students to different aspects of negotiation and to build tangible skills through interpersonal exchange. While some class time is devoted to presentations on theories and approaches, the class method primarily relies on feedback from fellow classmates on their observations of negotiation situations and on personal reflections by students after each structured experience. Topics include conflict style, negotiation, and group conflict. No audits. Recommended Course Background: EN.660.105, an additional course in the Entrepreneurship and Management Program or in the social sciences.
EN.660.105

EN.660.340. Management Theory and Practice. 3 Credits.
This course introduces the student to the management process by examining the role of the manager from a traditional and contemporary perspective while applying decision-making and critical-thinking skills to the challenges facing managers in today's globally diverse environment. The course examines the techniques for controlling, planning, and organizing resources and leading the workforce.

EN.660.341. Process Innovation and Quality Management. 3 Credits.
This course focuses on both quantitative and qualitative analytical skills and models essential to operations process design, management, and improvement in both service and manufacturing oriented companies. The objective of the course is to prepare the student to play a significant role in the management of a world-class company which serves satisfied customers through empowered employees, leading to increased revenues and decreased costs. The material combines managerial issues with both technical and quantitative aspects. Practical applications to business organizations are emphasized. Recommended Course Background: EN.660.105 Introduction to Business
Area: Writing Intensive

EN.660.342. Supply Chain Management. 3 Credits.
For a firm to execute its competitive strategy successfully, its supply chain must be able to deliver on the firm's promise to its customers. Therefore, it is important for all managers to have an understanding of key supply chain concepts. With this in mind, the goal of this course is to introduce the main trade-offs involved in supply chain management, and the associated challenges and opportunities.The course consists of two parts: • Supply chain fundamentals: This part focuses on managing the flow of material across the entire supply chain so as to achieve a profitable balance between supply and demand.• Challenges in decentralized supply chains: Almost all supply chains involve self-interested players, who must work together to meet the end customer demand. The theme of the second part is inefficiencies caused by a lack of collaboration among the players in the supply chain. Accordingly, we focus on managing supply chains so as to align the incentives of several inter-dependent players. We also illustrate how supply chains are being transformed due to environmental and social responsibility considerations. Class sessions will feature a combination of case study discussions and lectures. The course emphasizes (i) building spreadsheet-ready models that capture supply chain challenges, (ii) asking what-if questions by applying simulation and optimization tools to these models, and (iii) distilling managerial insights from what-if questions and communicating recommendations based on those insights.

EN.660.343. Operations and Service Management. 3 Credits.
This course aims to (1) direct your attention to fundamental problems and issues confronting all operations managers, (2) provide you with language, concepts, and insights which will help you to deal with these issues in order to gain competitive advantage through operations, and (3) further develop your ability to use analytical approaches and tools to understand and handle various managerial situations. Because the course deals with the management of "processes", it applies to both for-profit and non-profit organizations, to both service and manufacturing organizations, and to virtually any functional area or industry.
EN.660.105 OR AS.180.102

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

EN.660.347. Action Lab. 3 Credits.
Ever feel stuck? In this course you will learn how to take action through prototyping to move your ideas forward. You will learn the theory and practical skills behind prototyping when moving from an idea to a tangible solution. We will prototype to learn, communicate ideas, and mitigate risk using media ranging from cardboard to circuit boards to code... and maybe even TikTokTM. No prior experience required.

EN.660.352. New Product Development. 3 Credits.
New product development is the ultimate interdisciplinary entrepreneurial art, combining marketing, technical, and managerial skills. Students will experience the full breadth of this art. Working in teams, they will conceive of a product and take it through the development process, culminating in a "Shark Tank"-style pitch by the end of the semester.Topics will span the product development cycle: identifying user needs, brainstorming, industrial design, prototyping techniques, survey design for quantitative research, project management, intellectual property law, sustainable design, and product liability. The learning format will include case studies, exercises, projects, and frequent impromptu presentations. No audits.
EN.660.250 OR EN.500.101 OR EN.510.106 OR EN.520.137 OR EN.530.111 OR EN.560.141 OR EN.570.108 OR EN.580.111 OR EN.530.414

EN.660.355. Sports Marketing. 3 Credits.
This course will allow students to apply marketing principles and concepts to the sports marketing environment while gaining an understanding of how event sponsorships, endorsements, licensing and naming rights are used to achieve business objectives. Through case studies and a group project, students will be exposed to a broad range of sports entities including professional sports teams, governing organizations and sports media.
EN.660.250

EN.660.358. International Marketing. 3 Credits.
This course covers product, pricing, promotion, distribution, market research, organization and implementation and control policies relating to international marketing. It also explores the economic, cultural, political and legal aspects of international marketing. Through interactive and application-oriented assignments and cases, students will gain hands-on experience in analyzing and developing marketing strategies for organizations that market both consumer and business products/services internationally. The client-based project allows every student to be part of a global team (students from Universities around the world) that communicates through an on-line platform, and works on actual client deliverables. One or more local international marketers will be invited to speak to the class. Prerequisite: 660.250 Principles of Marketing.
EN.660.250

EN.660.361. Engineering Management & Leadership. 3 Credits.
When engineers become working professionals, especially if they become managers, they must juggle knowledge of and tasks associated with operations, finance, ethics, strategy, team citizenship leadership and projects. While engineers' success may depend on their direct input ¬¬ the sweat of their own brow – managers' success depends on their ability to enlist the active involvement of others: direct reports, other managers, other team members, other department employees, and those above them on the organizational chart. You will learn these concepts and skills in this course.In this course, you will learn about teamwork and people management, and gain an introduction to strategy, finance, and project management. You will practice writing concise persuasive analyses and action plans and verbally defending your ideas. Cross-listed with Mechanical Engineering.Please note that this course will not be available in the spring.

EN.660.363. Leadership & Management in Materials Science and Engineering. 3 Credits.
In this course, you will learn about leadership, social responsibility, strategy, finance, project management and people management specifically in the materials science and engineering fields. You will practice writing concise persuasive analyses and action plans and verbally defending your ideas. You will learn the ethical guidelines for the materials science profession, to resolve team conflicts and co-lead self-managed work teams, and determine how materials science supports society's sustainability goals and the social responsibilities of materials scientists. Our class time will feel like a business meeting, and we will refer to class periods as meetings. When you complete this course, you will be prepared to be a working professional. Your Teaching Team looks forward to seeing you develop into a career engineer, scientist, manager, entrepreneur, professor or other professional over the years.

EN.660.380. Clark Scholar Engineering Design II. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.381. Clark Scholar Engineering Design III. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.For Clark Scholar Junior's only.

EN.660.382. Clark Scholar Engineering Design IV. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.383. Clark Scholar Engineering Design V. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.385. Clark Scholar Engineering Design VI. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.400. Practical Ethics for Future Leaders. 2 Credits.
This is an interdisciplinary course on leadership, decision making, and the application of ethics to real world problems. JHU students are future leaders of innovation across many fields, including but not limited to engineering, business, law, journalism, government, science and medicine. The awesome power of emerging technologies to modify our world - our food supply, our health, even people - will only increase and become more pressing in coming years. The goal of this course is to give students a deep and practical grounding in how leaders make decisions, and in particular difficult decisions where there is no clearly right answer. In this two-credit course, we will cover important concepts in the practical application of ethics; in decision making; and leadership. There is a companion 1- credit course, EN.660.406 which forms a second part of the course, and which will take a deep look at a major ethical issue resulting from the newfound capabilities made possible by emerging technologies. Students of EN.660.400 can choose whether or not to register for EN.660.406. The 660.400 course includes pre-reading, videos, and substantive online discussions, as well as weekly meetings in small sections to further analyze and discuss the material. The 660.400 course spans the first two thirds of the semester, leaving the final third of the semester available for the 1-credit EN.660.406.

EN.660.404. Business Law II. 3 Credits.
Building on the material from Business Law I, topics examined include entrepreneurship, business entities and business formation, principles of agency, real property, personal property, bailments, bankruptcy, secured transactions, employment discrimination, business financing, investor protection, antitrust and environmental law. No audits.
EN.660.205 OR EN.660.308

EN.660.406. Practical Ethics for Future Leaders - Special Topic. 1 Credit.
This is a one-credit course that serves as a companion and second part to the Practical Ethics course EN.660.400, which is a co-requisite for this course. In this one-credit course, we will take a deep look at a major ethical issue resulting from the newfound capabilities made possible by emerging technologies. The students will work together in small groups, across multiple meetings with flexible scheduling, to discuss and make decisions on real-world decisions. Previous years' topics have included: the release of genetically modified mosquitoes in Florida; the presence of human decision-makers 'in the loop' for military and surgical autonomous robots; misinformation and hate speech in social media; protection and sharing of genetic and personal information; and school reopening policies during the coronavirus pandemic. The 660.400 course takes place in the final one-third of the semester, leaving the first two-thirds of the semester available for the 2-credit EN.660.400. Students should register for the same section number in EN.660.406 as they do for EN.660.400.
Previous completion of or concurrent enrollment in EN.660.400 required.

EN.660.410. Computer Science Innovation and Entrepreneurship. 3 Credits.
This course is designed to give students in CS the requisite skills to generate and screen ideas for new venture creation and then prepare a business plan for an innovative technology of their own design. These skills include the ability to incorporate into a formal business case all necessary requirements, including needs identification and validation; business and financial models; and, market strategies and plans. Student teams will present the business plan to an outside panel made up of practitioners, industry representatives, and venture capitalists. In addition, this course functions as the first half of a two course sequence, the second of which will be directed by CS faculty and focus on the actual construction/programming of the business idea.Restricted to Juniors and Seniors majoring in Computer Science or by permission of instructor.

EN.660.411. Corporate Strategy and Business Failure. 3 Credits.
The purpose of this course is to bring together theories of corporate strategy and the tools and techniques of strategy consulting. Students will address these in terms of historical case studies where they will have the opportunity to "fix" famous examples of corporate failure. Students will analyze the political, economic, social, and technological contexts of these cases while applying standard tools to the analysis of competing strategic plans.
EN.660.105

EN.660.414. Financial Statement Analysis. 3 Credits.
This course is designed to increase a student's ability to read and interpret financial statements and related information under both GAAP and IFRS (International Financial Reporting Standards). In addition to a review of the basic financial statements and accounting principles, the course will use industry and ratio analysis in addition to benchmarking and modeling techniques to encourage students to think in a more creative way when analyzing historic information or when forecasting financial statements. Students will assess firm profitability and risk, value assets and use spreadsheet models for financial forecasting and decision making. No audits.
EN.660.203

EN.660.419. Strategy Consulting. 3 Credits.
The purpose of this course is to provide students with a background in, and opportunity to experience, business design and strategy consulting in an organizational setting. Business design is fundamentally about identifying and solving the problems that prevent an organization from moving forward, from realizing its goals. Students will form teams, work with an outside sponsor, and treat the experience as a living case. They will explore the problem presented by the sponsor (client), conduct in-depth interviews to validate the problem, design appropriate solutions, and complete the project by developing an implementation plan. Student teams will formally present all of this to the sponsor at the end of the term. This serves as a capstone for the Entrepreneurship & Management minor.
EN.660.105 AND EN.660.203 AND (EN.661.110 OR EN.661.250) OR Instructor Permission.

EN.660.420. Marketing Strategy. 3 Credits.
This writing intensive course helps students develop skills in formulating, implementing, and controlling a strategic marketing program for a given product-market entry. Using a structured approach to case analysis, students will learn how to make the kinds of strategic marketing decisions that will have a long-term impact on the organization and support these decisions with quantitative analyses. Through textbook readings, students will learn how to identify appropriate marketing strategies for new, growth, mature, and declining markets and apply these strategies as they analyze a series of marketing cases. The supplementary readings, from a broad spectrum of periodicals, are more applied and will allow students to see how firms are addressing contemporary marketing challenges. In addition to analyzing cases individually, each student will be part of a team that studies a case during the latter half of the semester, developing marketing strategy recommendations, including financial projections, and presenting them to the class. No audits.
Area: Writing Intensive
EN.660.250

EN.660.450. Advertising & Integrated Marketing Communication. 3 Credits.
This course builds on the promotional mix concepts covered in Principles of Marketing (EN.660.250) --advertising, public relations, sales promotion and personal selling. Students will learn how marketers are changing the ways they communicate with consumers and the ways in which promotional budgets are allocated--and how this impacts the development of marketing strategies and tactics. Working with a client (provided by EdVenture Partners) that has chosen this JHU class as its "advertising agency" and an actual budget provided by the firm, the class will form small teams to mirror the functional organization of an actual ad agency (market research, media strategy/planning, copywriting/design, public relations, etc.). Studentteams will then develop a promotional plan and corresponding budget to reach the desired targetmarket (JHU undergrads who meet the client's criteria), implement the plan and then evaluate itseffectiveness through pre- and post campaign market research conducted on the target consumer. Note: Not open to students who have taken EN.660.450 as Advertising and Promotion. No audits. (Formerly Advertising and Promotion.)
EN.660.250

EN.660.453. Digital and Social Media Marketing. 3 Credits.
This course explores strategies for monitoring and engaging consumers in digital media. Students will gain practical knowledge about developing, implementing and measuring social media marketing campaigns. They will learn how to analyze what consumers are saying and connect with them by leveraging word of mouth, viral and buzz marketing through sites like Facebook, Twitter and YouTube. A series of assignments build upon each other toward a final social media marketing plan for a selected consumer product or service. Co-listed with EN.661.453.
EN.660.250

EN.660.455. Reimagining The City to Resist Climate Change. 3 Credits.
ncreasing draught and arid lands, recurring intense storms, rising sea levels, failing infrastructure and architecture – communities are experiencing the effects of new and frequent perils that we must confront, mitigate, manage, predict and prevent. How can we reimagine cities – a fundamental structure to human life - to resist these realities? What solutions are we finding? How are cities restructuring, innovating with technology, and developing policy to minimize damage and risk? What makes for resilient communities and systems? What new innovations might we consider? This course, taught in seminar style, addresses these and other questions about resiliency through investigation, reading and discussion.

EN.660.458. Entrepreneurial Opportunities in Sustainable Living. 3 Credits.

EN.660.459. Entrepreneurial Spirits. 3 Credits.
Have you noticed the growth of consumer-focused, alcohol related enterprises? New wineries, breweries, distilleries and cideries abound in response to continuing growth in customer demand. Have you contemplated starting this type of enterprise? If so, this may be a course for you!!!We explore the background, opportunities and challenges in each of these spirit arenas as we investigate questions one must answer to make an informed decision about starting or joining such an enterprise. Among the topics we will study are the styles of products, vessels, production processes, costs/returns, sources of raw materials, laws and regulations, marketing options, food parings, customers and the like.Expect to make several local field trips. Also expect to perform several individual and group assignments, the results of which you will be required to share with classmates.

EN.660.460. Entrepreneurship. 3 Credits.
This course provides students with a solid introduction to the entrepreneurial process of creating new businesses. Students will gain an appreciation for the investors' perspective in assessing opportunities, evaluating strategies, and valuing the new enterprise. The course will cover the principal components of building a successful venture including management, market analysis, intellectual property protection, legal and regulatory issues, operations, entrepreneurial financing, and the role of the capital markets. Course work will include case studies and creation of investor marketing materials. Open to Juniors and Seniors. No Audits. Recommended Course Background: EN.660.203
EN.660.105 OR EN.660.250

EN.660.461. Fundamentals of Product Management. 3 Credits.
This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.660.470. Leadership Studies Capstone. 3 Credits.
The Leadership Studies Capstone provides Leadership Studies minors with the opportunity to design a project for which they will perform a leadership role. Advisors will provide students with guidance throughout the semester. Projects must be defined and presented to the Leadership Studies minor director prior to the start of the student's senior year and approved by the conclusion of the first week of classes. Possible projects include experiential social entrepreneurship, developing an environmental venture, leading educational initiatives, leadership in a JHU-approved student organization, and partnership with a JHU Center, among others. Projects must meet the criteria established in the rubric.

EN.660.475. Innovation Lab. 3 Credits.
This course is designed to provide students with the opportunity to explore the commercial opportunities inherent in a business idea that they bring to the class at the outset. For example, this course could be taken in conjunction with Engineering Design courses. Students who do not come with a pre-existing business idea will have the opportunity to join a team. The course focuses on building the skills to validate the business idea by defining a value proposition, analyzing markets and competitors, and designing a pathway to commercialization. As a part of the process, students will learn how to develop a marketing plan, market entry strategies, business and financial models, as well as strategies for addressing intellectual property, licensing, regulatory reimbursement and manufacturing issues. Undergraduates only.

EN.660.500. Professional Internship. 1 Credit.
Students may qualify for an internship with one of the many local employers with whom CLE works or they may arrange a non-local internship on their own. For non-paid internships only, students may apply for sponsorship for academic credit through CLE. Applications must include a resume, transcript and written essay and will be evaluated on the basis of work experience, GPA, writing sample, and course work. Students are expected to complete two reports assigned by the internship coordinator. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.501. Practicum In Entrepreneurship and Management. 3 Credits.
Students work on an existing business or marketing plan/case project under the close supervision of an Entrepreneurship and Management faculty member. Students must apply by submitting a cover letter, resume, unofficial transcript, and essay describing the business concept/marketing plan. Applications must be approved by both the faculty member and director of CLE. Students are expected to meet regularly with the faculty member and complete assigned readings and projects. Permission required. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.594. Business Internship-Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.603. World Without Waste: Strategy and Innovation for the 21st Century. 3 Credits.
Complex problems require complex solutions. In this course, students will take a practical approach to the development of the skills necessary to identify and assess compelling problems and opportunities, generate innovative solutions, and communicate those solutions to key stakeholders. Students will engage the tools and practices of innovation and strategy consulting and learn from industry professionals on a range of 21st century challenges. For the final project, students will form teams and select an issue, engage with experts, and develop reports and presentations that provide an overview of the current competitive landscape and recommendations for innovative strategies and solutions.

EN.660.614. Financial Statement Analysis. 3 Credits.
This course is designed to increase a student's ability to read and interpret financial statements and related information under both GAAP and IFRS (International Financial Reporting Standards). In addition to a review of the basic financial statements and accounting principles, the course will use industry and ratio analysis in addition to benchmarking and modeling techniques to encourage students to think in a more creative way when analyzing historic information or when forecasting financial statements. Students will assess firm profitability and risk, value assets and use spreadsheet models for financial forecasting and decision making. No audits. MSEM students only.

EN.660.655. Reimagining The City to Resist Climate Change. 3 Credits.
ncreasing draught and arid lands, recurring intense storms, rising sea levels, failing infrastructure and architecture – communities are experiencing the effects of new and frequent perils that we must confront, mitigate, manage, predict and prevent. How can we reimagine cities – a fundamental structure to human life - to resist these realities? What solutions are we finding? How are cities restructuring, innovating with technology, and developing policy to minimize damage and risk? What makes for resilient communities and systems? What new innovations might we consider? This course, taught in seminar style, addresses these and other questions about resiliency through investigation, reading and discussion.

EN.660.661. Fundamentals of Product Management. 3 Credits.
This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.660.675. Innovation Lab. 3 Credits.
This course is designed to provide students with the opportunity to explore the commercial opportunities inherent in a business idea that they bring to the class at the outset. For example, this course could be taken in conjunction with Engineering Design courses. Students who do not come with a pre-existing business idea will have the opportunity to join a team. The course focuses on building the skills to validate the business idea by defining a value proposition, analyzing markets and competitors, and designing a pathway to commercialization. As a part of the process, students will learn how to develop a marketing plan, market entry strategies, business and financial models, as well as strategies for addressing intellectual property, licensing, regulatory reimbursement and manufacturing issues. Graduate Students only.

EN.661.110. Professional Writing and Communication. 3 Credits.
This course teaches students to communicate effectively with a wide variety of specialized and non-specialized audiences. To do this, students will write proposals in response to JHU-, Baltimore-, or Maryland-based initiatives that focus on a specific area of interest. Potential topics include initiatives to improve urban sustainability, resiliency, health disparities, social justice, mental health/well-being, government/municipal services, and other relevant areas. The class emphasizes writing clearly and persuasively, leveraging evidence effectively, working with key stakeholders, creating appropriate visuals and infographics, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating the real-world environment in which most communication occurs. Projects include resumes, cover letters, memos, proposals, technical reports, and slides. All sections are open to students in any discipline or major. NOTE: This section will focus on SOCIAL JUSTICE INITIATIVES.
Area: Writing Intensive

EN.661.111. Professional Writing and Communication for ESL: Higher Education Initiatives. 3 Credits.
This course teaches ESL students to communicate effectively with a wide variety of specialized and non-specialized audiences and will provide ESL-specific help with grammar, pronunciation, and idiomatic expression in these different contexts. To do this, students will write proposals in response to JHU-, Baltimore-, or Maryland-based initiatives that focus on a specific area of interest. Potential topics include initiatives to improve urban sustainability, resiliency, health disparities, social justice, mental health/well-being, government/municipal services, and other relevant areas. The class emphasizes writing clearly and persuasively, leveraging evidence effectively, working with key stakeholders, creating appropriate visuals and infographics, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating the real-world environment in which most communication occurs. Projects include resumes, cover letters, memos, proposals, technical reports, posters, and slides.
Area: Writing Intensive
Students may take EN.661.111, EN.661.110, or EN.661.120, but not more than one.

EN.661.128. Improvisational Techniques for Communication. 3 Credits.
This course can help you learn how to increase your self-confidence, interpersonal skills, emotional intelligence, and personal effectiveness in a wide variety of social settings—both academic and professional. Using scenarios that encourage creative problem solving, collaboration, imaginative movement, radical acceptance, and deep play, this course can help you be more effective in whatever it is you want to do. This course is appropriate for students in any discipline or major.

EN.661.250. Oral Presentations. 3 Credits.
This course is designed to help students push through any anxieties about public speaking by immersing them in a practice-intensive environment. They learn how to speak with confidence in a variety of formats and venues - Including extemporaneous speaking, job interviewing, leading a discussion, presenting a technical speech, and other relevant scenarios. Students learn how to develop effective slides that capture the main point with ease and clarity, hone their message, improve their delivery skills, and write thought-provoking, well-organized speeches that hold an audience's attention. No audits. Not open to students that have taken EN.661.150.
Area: Writing Intensive

EN.661.251. Oral Presentations for International Students. 3 Credits.
This course is designed to help students push through any anxieties about public speaking by immersing them in a practice-intensive environment. They learn how to speak with confidence in a variety of formats and venues - Including extemporaneous speaking, job interviewing, leading a discussion, presenting a technical speech, and other relevant scenarios. Students learn how to develop effective slides that capture the main point with ease and clarity, hone their message, improve their delivery skills, and write thought-provoking, well-organized speeches that hold an audience's attention. This section of Oral Presentations is open only to international students or students who learned English as a second/additional language. No audits.
Area: Writing Intensive
Students may take EN.661.251 OR EN.661.151, but not both.

EN.661.275. Improvisational Techniques for Collaboration. 3 Credits.
In this improv class, students will dive deeper into the world of improvisation, growing their ability to present information and navigate complex group dynamics, exploring third party collaborations and negotiations. Students will use the principles behind improvisation to enhance their success virtually and in the "real world." Each class will include a variety of immersive activities such as mindfulness and movement; journal prompts; group games; peer lead discussions; role play exercises; and personal presentations. The small class size will allow every student to be participatory, create a close knit learning community, and receive ample feedback. At the end of the semester, students will be able to confidently collaborate with their peers and effectively engage their audience.

EN.661.301. Writing for the Law. 3 Credits.
This course teaches students to communicate effectively in various modes of legal discourse that are fundamental to the practice of law. Students will engage in writing nearly every session and will learn the basics of legal writing, editing (both the student's and others' work), and written/oral advocacy skills. Students can expect to work with litigation-related documents such as pleadings, preliminary and dispositive motions, and appellate briefs as well as non-litigation-related documents such as opinion articles, publications, essays, and various business-related contracts.
Area: Writing Intensive

EN.661.306. Special Topics in Professional Writing: Freelance Travel Writing. 3 Credits.
In this course, students will learn the fundamentals of magazine and travel writing as well as best practices for working as a freelance writer. While gaining familiarity with the genre by reading a selection of exemplary magazine articles, students will learn how to brainstorm ideas, plan research, interview skillfully, take useable photos with smartphones, polish pitches to editors, and write/revise/submit work for publication. Students will use Washington, DC, and Baltimore as the basis for most of our their work but can also choose to travel farther afield. At the end of the course, students will create a blog to showcase their articles, profiles, reviews, travel memoirs, and pitches/queries to potential editors.
Recommended: one prior writing course.
Area: Writing Intensive

EN.661.315. Culture of the Engineering Profession. 3 Credits.
This course focuses on building understanding of the culture of engineering while preparing students to communicate effectively with the various audiences with whom engineers interact. Working from a base of contemporary science writing (monographs, non-fiction, popular literature and fiction), students will engage in discussion, argument, case study and project work to investigate: the engineering culture and challenges to that culture, the impacts of engineering solutions on society, the ethical guidelines for the profession, and the ways engineering information is conveyed to the range of audiences for whom the information is critical. Additionally, students will master many of the techniques critical to successful communication within the engineering culture through a series of short papers and presentations associated with analysis of the writings and cases. No audits. WSE juniors and seniors or by instructor approval.
Area: Writing Intensive

EN.661.316. Culture of the Media Profession. 3 Credits.
This course focuses on building understanding of the culture of the media and publishing professions while preparing students to communicate effectively within it. Working from a base of contemporary writing on professions in media, students will engage in discussion, argument, and project work to investigate the culture of media and challenges to that culture, the impacts of media on society, and the ethical guidelines for the profession. Additionally, students will master many of the techniques of critical media production, editing, and publication through a series of short papers and presentations.Students must have previously taken a writing intensive course.
Area: Writing Intensive

EN.661.317. Culture of the Medical Profession. 3 Credits.
This course is designed to engage students in thinking critically and empathetically about key issues encountered by healthcare professionals. The course, taught in seminar style, explores topics ranging from health disparities and healthcare costs to provider-patient communication and socioeconomics of health care by examining cases and readings that highlight the problems that doctors, administrators, researchers, nurses, and other healthcare professionals face on a daily basis. Guest speakers with a range of clinical backgrounds from physicians to social workers also come to class in order to share their path into medicine and daily life as a medical professional. Course content is focused around three specific course goals: 1) teaching students to consider the culture of the medical profession in general as well as the culture of specific institutions and therapeutic areas; 2) equipping students with the framework to understand health care from diverse socioeconomic and cultural contexts; and 3) providing students opportunities to exercise the communication skills required in healthcare settings.
Area: Writing Intensive

EN.661.355. Special Topics in Professional Writing: Blogging about Food and Culture. 3 Credits.
Explore Baltimore's thriving food and restaurant scene while learning the art of criticism and best practices for blogging. In this journalism class taught by former New York Times Magazine editor Sarah Smith, students will study the work of some of the best writers in the field, from Laurie Colwin to Pete Wells, and using that work as a guide, write their own essays, reviews and features, which the class will discuss in a workshop setting. Instruction will include the basics of reporting and research; differences in writing for print and online media; ethics and legal concerns; and practical advice for pitching editors and setting up blogs. Recommended Course Background: At least one previous writing course.
Area: Writing Intensive

EN.661.360. Marketing Your Start-up. 3 Credits.
This course provides students who have an enterprise or business idea with a road map for developing a complete marketing plan for their venture. From conducting industry and competitor analyses to formulating a marketing program with corresponding projections, students will have developed a professional marketing plan upon the conclusion of the course. Lecture content will be supplemented by guest speaker presentations by local entrepreneurs and marketing practitioners.
EN.660.250 OR EN.660.105

EN.661.361. P.R. & Media. 3 Credits.
This course focuses on the ways that organizations, both for-profit and non-profit, manage their communications to deliver strategic, coherent and compelling messages to their varied stakeholders. Using case studies and team-based, real world projects, we will explore topics including public and media relations, corporate image, branding, advertising, internal and external communications, crisis management, investor relations, ethics and social responsibility. In the process, we will consider issues ranging from organizational culture and leadership styles to defining strategy, managing conflict, defending positions and disagreeing agreeably. No audits. Recommended Course Background: AS.220.105, EN.661.110, AS.060.113 or AS.060.114, AS.060.215, EN.660.250, EN.660.105, and EN.661.250
Area: Writing Intensive

EN.661.370. Storytelling with Data. 3 Credits.
In the 21st century, information is being created at an astounding rate. Stories about rates of infection, economic indicators, and societal/cultural trends have become increasingly common and urgent in news cycles. In addition, key decisions that inform and influence policy, regulation, and business strategy rely heavily on data visualizations. In this course, you will learn techniques and methods for displaying data and telling the accurate story your data has to say. You will also learn several design principles necessary for creating compelling data visualizations and presentations. Although the course is not tool-specific, students will work with MS Excel and Tableau. No programming experience is necessary, but students are strongly encouraged to come with a working knowledge of Excel. Students may choose to work with their own dataset or, if they have none, will be given one by the instructor.

EN.661.380. Decision Analytics. 3 Credits.
In this course students learn the procedures and processes that researchers use to determine answers to questions such as how to price a product, how to differentiate one product from another, and how to evaluate customer response to an offering. The materials combine fundamentals of research design with statistics procedures to answer the questions that entrepreneurs and marketing managers must answer as they write business plans, develop their product mix, set prices, create advertising and test products. The course combines case study, simulated situations, lecture, discussion and real-time projects to produce answers using the techniques, tools and procedures typically used in North American enterprises.

EN.661.630. Improving Writing and Communication Skills for Scientists and Engineers. 3 Credits.
This course is designed to help engineers and scientists improve their communication skills in an immersive, practice-intensive environment that includes simulation in a wide variety of scenarios, formats, and venues. Throughout the semester, students will work on polishing a journal article or dissertation chapter. Simultaneously, students will learn how to translate that same material to use in a variety of public speaking modalities—job interviewing, department talks, networking sessions, spontaneous “elevator pitch” opportunities, and other relevant scenarios. The course emphasizes developing clarity, becoming more emotionally intelligent, honing a main message, developing effective slides, improving delivery skills and confidence, and translating technical expertise to a wide variety of audiences. No audits allowed.
Area: Writing Intensive

EN.661.713. Advanced Communication for International Students: Applied Mathematics and Statistics Masters. 1.5 Credits.
This course is designed to help only those international students studying in a special cohort toward a Master’s Degree in Applied Math and Statistics. It teaches advanced ESL students to communicate more effectively with a wide variety of specialized and non-specialized audiences in a professional setting with ESL-specific intensive help in grammar, pronunciation, idiomatic phrasing, and overall clarity for students whose native language is not English. Projects include brown bag lunch presentations, elevator pitches, job interviews, staying-on-the-job cultural notes, and business meetings. Class emphasizes writing clearly and persuasively, creating appropriate visuals, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating real world environments in which most communication occurs. P/F grading only.

EN.662.611. Strategies: Accounting & Finance. 3 Credits.
Accounting is described as the language of business. In building a financial foundation, the vocabulary and processes by which all business decisions are captured and communicated is explored. Topics include the interpretation of financial performance, operational and capital budgeting, variance analysis, cost behavior and product costing. Both ratio analysis and discounted cash flow techniques are used. The course content is integrated with the Strategies for Innovation and Growth (EN.662.692)curriculum in a comprehensive end-of-semester project. Open only to students in the Masters of Science in Engineering Management program

EN.662.644. Fundamentals of Product Management. 3 Credits.
Are you curious about what Product Managers actually do? Are you thinking about applying for internships and jobs in this fast-growing field? This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.662.670. Special Projects in International Consulting. 3 Credits.
Organizational strategy is fundamentally about identifying and solving the problems that prevent an organization from moving forward, from realizing its goals. In the age of Covid-19, the question of industry resilience is a pressing one. Crisis conditions have forced organizations and entire industries to adapt in unforeseen ways. This course will engage students in working with real clients searching for strategic solutions for these newly emerging issues. Students will work in teams with real clients, learn how to do primary research and use design thinking to create value for our client partners. At the end of the term, student teams will formally present their solutions to the client partner.

EN.662.692. Strategies for Innovation & Growth. 3 Credits.
The course is organized into two interconnected parts: innovation and growth, which, together, form the foundation of successful businesses. After successfully completing the course, students should know how to critically analyze businesses and apply an engineering-based thought process to more qualitative problems, as well as understand the elements that can make a company successful. This course will overlap heavily with “Strategies: Accounting and Finance”, and several assignments will require in-depth understanding of the material from that course.MSEM students only.

EN.662.801. MSEM Independent Study. 1 Credit.
Independent study for Master of Science in Engineering Management students

EN.662.802. MSEM Internship. 3 Credits.
MSEM Internship for 3 credits in the management portion of the MSEM program.

EN.662.803. MSEM Graduate Summer Research. 9 Credits.
Summer research course for Engineering Management graduate students.

EN.662.811. M.S. in Engineering Management Seminar. 0.5 Credits.
Professional development seminar for engineering management students featuring outside speakers with engineering management experience. For M.S. in Engineering Management only; P/F only; no audits.

EN.662.812. MSEM Seminar. 1 Credit.
Professional development seminar for engineering management students featuring outside speakers with engineering management experience. For M.S. in Engineering Management only; P/F only; no audits.

EN.663.411. Intro to Zen Meditation. 1.5 Credits.
Interested in meditation but don't know where to start? Curious about Zen philosophy? This course can help. In this class, students will be introduced to the secular practices of Zen meditation--zazen (sitting meditation), kinhin (walking meditaltion), koans (teaching tools), and dharma talks. Each class session will be a mixture of meditation, lecture, how-to demonstration, and discussion. No prior meditation experience is necessary. Students with experience in other styles of meditation are also welcome. Students can bring a cushion/pillow for floor sitting or use a classroom chair for comfort. Class will include readings from Yasutani Roshi's Introductory Lectures on Zazen and Suzuki Roshi's Zen Mind, Beginner's Mind. Class is S/U grading only. No audits. Repeats are allowed.

EN.663.453. Innovation and Design I. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.

EN.663.457. Innovation and Design II. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions, and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.
EN.663.453

EN.663.458. Brewing Science. 1.5 Credits.
Micro-breweries, the fastest growing segment of the manufacturing sector in the US, is an enterprise opportunity for students who are fascinated by fermentation. The class addresses the fundamentals of the science and the manufacturing processes together with enterprise considerations of identifying customers, locations and finances.

EN.663.477. Global Consulting. 1.5 Credits.
Students partner with research teams at the International Iberian Nanotechnology Laboratory through remote meetings to help transition scientific and engineering concepts from lab to life. Consulting projects cover areas including market and competitor analysis, the identification of consumer locations and demographics, and the development of market entry strategies for innovative products and technologies. Students will learn how to navigate the unique nature of international consulting, paying particular attention to building rapport across cultures and technologies. Deliverables come in the form of proposals, memos, comprehensive reports detailing findings and recommendations, and a slide deck of key findings optimized for remote presentations. No prior consulting experience required, but interested juniors and seniors should feel that they can contribute to a professional team.

EN.663.600. Ethical Decision-making in Business and Science. 1.5 Credits.
This course introduces the student to concepts relevant to resolving ethical issues in business, science, and society. Students will learn ethical reasoning skills and frameworks to aid decision-making and to discuss ethical questions with their leaders, whether in a business, consulting or engineering firm, a science lab, or the communities within which they live and work.

EN.663.611. Intro to Zen Meditation. 1.5 Credits.
Interested in meditation but don't know where to start? Curious about Zen philosophy? This course can help. In this class, students will be introduced to the secular practices of Zen meditation--zazen (sitting meditation), kinhin (walking meditation), koans (teaching tools), and dharma talks. Each class session will be a mixture of meditation, lecture, how-to demonstration, and discussion. No prior meditation experience is necessary. Students with experience in other styles of meditation are also welcome. Students can bring a cushion/pillow for floor sitting or use a classroom chair for comfort. Class will include readings from Yasutani Roshi's Introductory Lectures on Zazen and Suzuki Roshi's Zen Mind, Beginner's Mind. Class is P/F grading only. No audits. Repeats are allowed.

EN.663.612. Design Thinking for Your Career. 1.5 Credits.
An engineering education at Hopkins offers unique opportunities to advance your career, intentionally grow your network, develop new professional skills, and land the job of your dreams. This course will use principles of design thinking to help you leverage your Hopkins experience to design a meaningful, fulfilling professional life after JHU. This course will teach you principles to effectively balance academic inquiry, professional development, and personal growth and wellness. Utilizing activities developed at the Johns Hopkins University Life Design Lab, you will have the opportunity to reflect upon your values, identities and aspirations; imagine and prototype possible pathways forward that leverage the resources available at Hopkins; and acquire behaviors, habits, and mindsets to effectively tell your story and build a powerful network. These activities and reflections will serve as the basis of a digital portfolio that you can use as you apply for internships and navigate the job market.

EN.663.615. Building Effective Posters and Slides. 1.5 Credits.
This course teaches techniques in visual communication geared to suit emerging scientists. Students will learn the fundamentals of visual design, including theories of form, color and visual perception. The course will cover principles of typography, grid systems and other methods of establishing visual hierarchy. There will also be a short unit on commercial photography. Students will put this knowledge to work in the classroom to produce slides, conference posters and data visualizations. Grading: P/F or for letter grades.

EN.663.617. Storytelling with Data. 1.5 Credits.
This course explores the process of developing compelling visual stories based on data and information. Students will learn to edit, contextualize, sequence and compare data more effectively. They will also learn to use visual design tools to clarify the message they wish to convey about their data. Topics will include design thinking, visual perception, design theory, color theory, spatial relationships, pattern recognition, page layout, and basic probability and statistic concepts commonly used in the visualization process.

EN.663.618. Professional Presentations. 3 Credits.
This course is designed to help scientists and engineers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded for self-evaluation, and students will receive extensive instructor and peer feedback. MSEM students only. Not open to undergraduates.

EN.663.622. Professional Writing and Communication for Graduate Students. 3 Credits.
This course is designed to help engineers and scientists improve their communication skills in an immersive, practice-intensive environment that includes simulation in a wide variety of scenarios, formats, and venues. Throughout the semester, students will work on polishing a journal article or writing a dissertation chapter, as well as communicating their research to the general public in writing. Simultaneously, students will learn how to translate that same material to use in a variety of public speaking modalities—job interviewing, department talks, networking sessions, spontaneous “elevator pitch” opportunities, and other relevant scenarios. The course emphasizes developing clarity, becoming more emotionally intelligent, honing a main message, developing effective slides, improving delivery skills and confidence, and translating technical expertise to a wide variety of audiences. No audits allowed.
Area: Writing Intensive

EN.663.623. Professional Writing and Communication for International Students: Applied Mathematics and Statistics Masters. 1.5 Credits.
This course will prepare you to be competitive in the world of business by offering you some of the oral and written communication techniques you need to be successful. While working to enhance pronunciation, grammar, idiomatic expressions, and business vocabulary, you will work to speak comfortably in business social settings and meetings and to write effectively in a variety of modes not limited to e-mails, memoranda, resumes, and summary reports. The overall goal for all assignments is to speak and to write in clear, effective English. Moreover, improving oral and written communications will give you confidence, help you to make a good impression, and just maybe give you that “edge” you need to get the job you want or the project you desire once employed. Finally, individual pronunciation conferences will be scheduled with each of you throughout the semester. Applied Mathematics and Statistics Masters students only. P/F only

EN.663.624. Advanced Communication for International Students: Applied Mathematics and Statistics Masters. 3 Credits.
This course is designed to help only those international students studying in a special cohort toward a Master’s Degree in Financial Math. It teaches advanced ESL students to communicate more effectively with a wide variety of specialized and non-specialized audiences in a professional setting with ESL-specific intensive help in grammar, pronunciation, idiomatic phrasing, and overall clarity for students whose native language is not English. Projects include meet-and-greets, effective e-mails, memos, resumes, cover letters, reports, oral presentations, and building an overall comfort level with oral communication in English. Class emphasizes writing clearly and persuasively, creating appropriate visuals, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating real world environments in which most communication occurs. P/F grading only.

EN.663.626. Improvisation for Enhanced Teamwork and Communication. 1.5 Credits.
Following the lead of innovative communities and businesses, this course turns to improvisation techniques to develop communication skills, encourage creative problem solving, and support teamwork. Designed for students without any acting experience, there are no prerequisites to participate. In a non-threatening, judgment-free atmosphere, we begin with improv fundamentals to help students master the subtleties of communication through voice, expression, and body language. As students experiment with imaginative movement and play, they learn to respond spontaneously and confidently to unforeseen challenges. Working together in pairs and small groups, students build trust and operate as fluid and dynamic team members. Throughout the course students build skills to minimize stress, overcome rejection, find comfort in fear, unleash creativity, and trust in their ability to communicate effectively.

EN.663.631. Intellectual Property Law. 1.5 Credits.
Arranged in modules and taught largely through the case method, the course features the following topics: intellectual property; principal-agent relations; and product liability. Not only will participants learn the principles associated with each topic, but also they will master the questions and concerns to use when working with legal counsel on these issues in the future. GRADING: P/F for most students; letter grades for MSEM students.

EN.663.633. Regulatory Writing. 1.5 Credits.
Regulatory writing explores the preparation of clinical documents throughout the life cycle of a (potential) treatment, starting with describing and reporting data from clinical trials, through preparing regulatory submission documents. Clinical documents to be discussed include clinical trial protocols, clinical trial informed consents (ICFs), investigator brochures (IBs), and clinical study reports (CSRs) among others. Essential skills for creating clear and readable documents including basic grammar and usage as well as sentence structure will also be reviewed.

EN.663.634. Improvisation for Communication. 1.5 Credits.
Have you ever botched a job interview? Do you suffer from socially-induced shyness at networking receptions? This class can help! Using techniques rooted in the principles of improvisation and acting, this course can help you learn how to increase your self-confidence, interpersonal skills, emotional intelligence, and personal effectiveness in a wide variety of social settings—both academic and professional. Using scenarios that encourage creative problem solving, collaboration, imaginative movement, radical acceptance, and deep play, this course can help you be more effective in whatever it is you want to do. This course is appropriate for students in any discipline or major.

EN.663.640. Writing Grant and Contract Proposals. 1.5 Credits.
Almost regardless of professional setting, proposals are used to secure work. They are the basis of funding in consulting, academic research, many social enterprises, business-to-business commerce, and government contracting. They require huge amounts of time and energy, yet success is far from guaranteed. In this module, you will master some of the techniques required for proposal writing success. Among the topics addressed are funding sources, writing skills that work, required content for all proposals, creating one voice in shared documents, dealing with “best-and-final negotiations and other important topics. Expect to complete several writing assignments for class including at least part of your own proposal.

EN.663.641. Improving Presentation Skills for International Students. 1.5 Credits.
This course is designed to help scientists and engineers who are non-native English speakers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded.

EN.663.643. Science Outreach: Communicating Science to the Public. 1.5 Credits.
This course teaches students to communicate effectively with a non-specialized audience including the “voting public”, teachers and high school students. Class projects include developing materials for mainstream science news outlet and a hands-on presentation. Class content emphasizes writing clearly for a non-technical audience, creating appropriate visuals and hands-on manipulatives, developing oral presentation skills, giving and receiving feedback, and simulating the real world environment in which most communication occurs. This is a 7-week course and is not open to undergraduates.

EN.663.644. Writing for Clarity. 1.5 Credits.
This half-semester module helps students learn how to communicate more effectively about their own research to a wide variety of audiences. Using a journal article, dissertation chapter, or other technical summary as a basis, students learn how to revise their work to increase clarity, cogency, concision, flow, storytelling, and audience-sensitivity. This course is open to students in any discipline.

EN.663.645. Improving Presentation Skills for Graduate Students. 1.5 Credits.
This course is designed to help scientists and engineers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded for self-evaluation, and students will receive extensive instructor and peer feedback. This is a half-semester course and is not open to undergraduates.

EN.663.652. Emotional and Cultural Competency. 1.5 Credits.
We live in increasingly diverse society and an increasingly connected world. Times require new skills and awareness; “smarts” as defined by IQ is no longer sufficient for success. Instead, an understanding of other cultures, a willingness to explore the positions of various stakeholders in situations, the capacity and willingness to exercise empathy, and the ability to identify and work with the feelings of self and others are keys to successful participation in the workforce. This Module addresses these skills in theoretical and practical ways so as to expand the awareness and capacities of participants.

EN.663.653. Innovation and Design I. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.

EN.663.657. Innovation and Design II. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions, and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.
EN.663.653

EN.663.660. Managing People and Resolving Conflicts. 1.5 Credits.
Have you ever had to deal with a difficult person at work or in the lab? Have you been a member of a team on which team dysfunction was so bad that it makes television sitcoms look normal? Why are some companies much more productive and pleasant to work with than others? Do you understand techniques of persuasion and how to participate effectively in negotiations? These topics are among the ideas we develop and practice in this class, using a combination of seminar style reading and discussion, lecture and in-class activity. Graduate students only. Students may take EN.663.660 OR EN.663.663, but not both.

EN.663.665. Key Skills for Successful Product Managers. 1.5 Credits.
All great product managers utilize a handful of foundational knowledge, skills, and capabilities that anchor them as they navigate the complex world of product management. In this course, we will cover these timeless but critical skills from a uniquely product management perspective. Customer Intelligence - From customer characteristics and market conditions to motivations and unmet needs, product managers are constantly learning about their customers. Relationship Building - Building successful relationships in product management is anchored in trust and confidence among the stakeholders and partners within their product ecosystem. Communication skills - Great product managers are masters at communicating the "why" behind their product and adapting their messages to various audiences. Good Judgment and Decision-Making - Successful decision-making comes from knowing how to avoid biases, find the important insights in a sea of data, and ultimately make decisions based on their best judgment. Fanatical Prioritization - Great product managers are fanatical about doing the things that will be most impactful for the product, the business, and the customer.

EN.663.666. Managing Personal Finances. 1.5 Credits.
The class in Managing Personal Finance is designed to familiarize the student with the basic concepts and quantitative techniques of personal financial planning and financial literacy. The course begins with a discussion of budgeting and the time value of money and moves on to the basic principles of financial planning in the areas of taxation, consumer credit, housing decisions, insurance, investing fundamentals and retirement planning.Graduate students only. No undergrads.

EN.663.667. Decision Analytics Fundamentals. 1.5 Credits.
This course engages students to make better decisions using data and analytical models. Content focuses on analytical reasoning, logic, preparing/managing data bases, designing quantitative models and visualizing data. Three types of quantitative models - clustering, linear regression, and logistic regression - are emphasized. Students are required to use Microsoft Excel (the course does not teach Excel, so prior experience with Excel will be helpful). Throughout the course each concept is taught using case studies.

EN.663.668. Brewing Science. 1.5 Credits.
Micro-breweries, the fastest growing segment of the manufacturing sector in the US, is an enterprise opportunity for students who are fascinated by fermentation. The class addresses the fundamentals of the science and the manufacturing processes together with enterprise considerations of identifying customers, locations and finances.

EN.663.669. Foundations for Sustainable Enterprise. 1.5 Credits.
All organizations need a story - one that informs every single business decision. Get the story right and you have a permanent resource for inspiration and also, grounding for when challenges arise. Lasting businesses do not dream up their narratives for PR purposes. Their stories are smart. They are their organizations' DNA. Taking into account emerging neuroscience around persuasion, real-life corporate case studies and current affairs, this class addresses the critical art of storytelling in building and growing a business.

EN.663.670. Project Management. 1.5 Credits.
Projects are temporary activities devised to achieve very specific goals in a designated timeframe for a specified amount of resources. Often they involve disparate activities, frequently separated by distance and sometimes involving different staff and materials. For the project to successfully meet its objectives, all these items must be planned, coordinated and orchestrated. This module explores the processes and tools available to those who must manage projects to optimize outcomes within the primary constraints of time, quality, scope and budget. Class time involves presentations, examples and discussion.

EN.663.671. Leading Change. 1.5 Credits.
Change happens, like it or not!! It is necessary for progress and the result of innovation, yet change makes individuals and organizations so uncomfortable that most people and groups within organizations vigorously resist change. So the questions become how to cause, how to embrace and how to lead constructive change in our selves, our organizations and our communities – in ways that colleagues and would-be colleagues support and contribute toward success. The primary format for learning in this course is seminar style with reading, researching and sharing of information as well as structured, experiential activities designed to build skills through practice and interpersonal exchange. Class time is devoted to discussion, observation, feedback, additional exercises and presentation. Additionally, participants engage in reflection and explanation of their considerations as the course progresses. GRADING: P/F for most students; letter grades for MSEM students. No undergraduates allowed except enrolled MSEM combined bachelor's/master's students.

EN.663.672. Management and Technology Consulting. 1.5 Credits.
Management consulting, an American innovation in organizational development, now has world-wide practice and effects. Almost every business sector— including private, governmental and NGO's— employs consultants. Consultants must be able to effectively frame problems, understand their context, generate solutions, and protect the client and stakeholders, as well as work in a team environment and deliver a quality product. This class addresses the fundamental skills and expectations of working in this profession through a combination of lecture, discussion and exercise.

EN.663.673. Leading Teams in Virtual, International and Local Settings. 1.5 Credits.
Team-based leadership takes place in many different groups. Basic principles related to all contexts will be discussed. The nuances of leading in teams in different environments including face to face, virtual teams such as Skype, Google Chat, etc., and culturally different/global teams will be explored and practiced. The class environment will be discussion, team and practically based. The primary format for learning in this course is seminar style with reading, researching and sharing of information as well as structured, experiential activities designed to build skills through practice and interpersonal exchange. Class time is devoted to discussion, observation, feedback, additional exercises and presentation. Additionally, participants engage in reflection and explanation of their consideration as the course progresses. Further, participants read several texts and articles as well as perform extensive research in preparation for assignments.

EN.663.674. Fundamentals of Management. 3 Credits.
Managers must juggle knowledge of and tasks associated with operations, finance, information technology, strategy, and projects. Much of managerial success, however, depends less on managers' direct input – the sweat of their brows– than on their ability to enlist the active involvement of others: direct reports, other managers, other team members, and those above them on the organizational chart. It is imperative that managers be adept at influencing those over whom they have no formal authority as well as guiding and directing those who report to them. In this course, you will learn and practice the concepts and skills necessary to manage, direct, and guide others as well as content associated with building strategy and structure in organizations.

EN.663.675. Communicating in a Crisis. 1.5 Credits.
A crisis is a major occurrence with potentially negative consequences. In Chinese, the word "crisis" means "dangerous opportunity," signifying that an individual or an organization can emerge stronger from a crisis – not without damage but stronger – with the right management and communication deployed effectively to the right audiences in the right channel. In this course, we will explore what managing a crisis well actually means. Who do you need to communicate with? What channels are appropriate? What messaging works for different audiences? Using the case method, live simulations, and real-world examples we will distinguish the factors that create opportunities from crises from those that deepen the danger.

EN.663.676. Demand Discovery: Finding and Creating Customer Value. 1.5 Credits.
Do you love your smartphone? You're not alone. Steve Jobs knew how to design products that customers fell in love with. So did Henry Ford. So why is it so hard? This course focuses on real-world methods of discovering and profitably delivering value to customers. At the heart of any successful business is the identification and profitable satisfaction of unique customer needs. And the ongoing process of identifying, developing, and delivering new value propositions is the basis for continued growth. But this formula can be elusive for new ventures and existing businesses alike. The course presents leading edge methods and techniques to identify sources of opportunity, design new value propositions, and develop profitable and scalable business models—all while reducing venture risk. Developed from techniques used by entrepreneurs and innovative product managers, this course teaches key principles of offering development and innovation, through a combination of readings, case studies, and real-world exercises. The course will involve practical projects for students to identify and design offering concepts, as well as to test and price them. It is designed for students interested in business, entrepreneurship, intrapreneurship, product management, technology management, venture capital, and management consulting.

EN.663.677. Global Consulting. 1.5 Credits.
Students partner with research teams at the International Iberian Nanotechnology Laboratory through remote meetings to help transition scientific and engineering concepts from lab to life. Consulting projects cover areas including market and competitor analysis, the identification of consumer locations and demographics, and the development of market entry strategies for innovative products and technologies. Students will learn how to navigate the unique nature of international consulting, paying particular attention to building rapport across cultures and technologies. Deliverables come in the form of proposals, memos, comprehensive reports detailing findings and recommendations, and a slide deck of key findings optimized for remote presentations. Open to juniors and seniors with instructor approval.

EN.663.700. Strategies for Financial Accounting. 1.5 Credits.
Strategies for Financial Accounting is designed for anyone who could be called upon to analyze and/or communicate financial results and/or make effective financial decisions in a for-profit business setting. No prior accounting knowledge or skill is required for successful completion of this course. Because accounting is described as the language of business, this course emphasizes the vocabulary, methods, and processes by which all business transactions are communicated. Generally Accepted Accounting Principles are applied to business transactions and ratio analysis is utilized in the interpretation of financial performance. Priority given to Extended Home2Homewood students; instructor permission only.

EN.663.701. Strategies for Managerial Accounting. 1.5 Credits.
Strategies for Managerial Accounting focuses on communication and decision making within an organization (as opposed to Financial Accounting, which focuses on accounting information for decision-makers external to the firm). This course introduces management accounting concepts and objectives including planning, control, and the analysis of sales, expenses, and profits. Major topics include cost behavior; cost allocation; product costing (including activity-based costing); standard costing and variance analysis; and operational and capital budgeting. Priority given to Extended Home2Homewood students; instructor permission only.

EN.663.702. Leadership Theory and Practice. 1.5 Credits.
This course focuses on learning leadership theories and the ways in which a leader can effectively apply those theories in a variety of settings. Students will be introduced to leadership concepts and objectives including historical context, important case studies analysis as well as the competencies needed to be an exceptional leader. Major topics include self-development, interpersonal development, organizational and group development, and sustainability and transitional development. Priority given to Extended Home2Homewood students; instructor permission only. Online only.

EN.663.704. Communicating Clearly in the Workplace. 1.5 Credits.
This half-semester course focuses on teaching students how to communicate effectively through both written and oral communication modes common in any workplace: emails, memos, proposals, and short presentations. This course must be taken after taking Writing with Clarity. This course is for Extended Home2Homewood students only.Recommended Course Background - Writing with Clarity

EN.663.705. Communicating Effectively as a Leader Capstone. 1.5 Credits.
This half-semester course will be co-taught with Leadership Studies. Students who take this course will build upon and significantly refine the case-based leadership skills they learned in a prior Leadership Studies module. In this course, students will work on a team to research, write, and present a case examining a crisis of leadership from the contemporary world of business. This will happen as a case competition between all teams. This course is for Extended Home2Homewood students only.

EN.663.706. Global Marketing. 1.5 Credits.
Through readings and case analysis, this course will expose students to a range of "uncontrollable" external environmental factors—cultural, competitive, technological, economic, political/legal and geographic—that influence the selection of new markets as well as the "controllable" marketing mix decisions determined by managers to support the launch of products for both consumers and businesses. The culminating group project will allow students to analyze an expansion opportunity and recommend a market entry strategy along with financial projections for a product or service to be launched globally.

For current faculty and contact information go to http://eng.jhu.edu/wse/cle/page/our_people (http://eng.jhu.edu/wse/cle/page/our_people/)

Accounting and Financial Management, Minor

Department website: https://engineering.jhu.edu/cle/accounting-financial-management/

The Accounting & Financial Management program offers Johns Hopkins Arts & Sciences, Engineering, and Peabody students a focused, quantitative minor that will prepare them more effectively for careers in small companies, major corporations, and consultancies as well as acceptance into graduate programs in accountancy.

The objective of the Minor in Accounting and Financial Management is to enable students in all disciplines to complement their major fields of study with academic training that will help them prepare for and compete within this expanding marketplace. The minor is not only relevant for students who plan to seek employment but critical for those who plan to attend graduate programs in accounting immediately after graduation. The Accounting and Financial Management Minor will help the CLE's graduates prepare for career opportunities in several fields that have high salaries and are predicted to grow substantially.

See the Requirements tab above for specific minor requirements.

Program Requirements

- Four core courses: Foundations of American Enterprise, Financial Accounting, Professional Writing & Communication or Oral Presentations, and Decision Analytics
- Three upper-level courses; one course must be at the 400-level.

Code	Title	Credits
Core Requirements		
EN.660.105	Foundations of American Enterprise	3
or EN.660.250	Identifying and Capturing Markets	
EN.660.203	Financial Accounting	3
EN.661.110	Professional Writing and Communication	3
or EN.661.250	Oral Presentations	
EN.661.380	Decision Analytics [1]	3
Upper-Level Electives		
Select three upper-level courses; one course must be at the 400-level [2]		9
AS.180.263	Corporate Finance	
EN.660.300	Managerial Finance	
EN.660.303	Managerial Accounting	
EN.660.414	Financial Statement Analysis	
Total Credits		**21**

1 Decision Analytics can be replaced by one intermediate/advanced calc-based statistics course or two elementary statistics courses.

2 While the CLE currently offers only one 400-level course in this area, students occasionally take advanced classes at other universities.

Students are encouraged to take EN.661.380 Decision Analytics to fulfill the Decision Analytics requirement, but will be allowed to substitute a statistic course(s) by choosing one of the two options listed below. Students can substitute AP Statistics for Stat I, but not Stat II.

Option One: for students who wish to replace Decision Analytics with Statistics:

Code	Title	Credits
Statistical Analysis II (EN.553.112) and one of the following:		4
AS.230.205	Introduction to Social Statistics	
AS.280.345	Public Health Biostatistics	
EN.553.111	Statistical Analysis I	
Total Credits		**4**

Option Two: for students who wish to replace Decision Analytics with Statistics:

Code	Title	Credits
Select one of the following:		3-4
EN.553.211	Probability and Statistics for the Life Sciences	
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
EN.553.413	Applied Statistics and Data Analysis	
EN.553.430	Introduction to Statistics	
EN.560.240	Uncertainty, Reliability and Decision-making	
Total Credits		**3-4**

Course and Grade Rules and Limitations

The Accounting & Financial Management minor requires a minimum of 21 credits.

A maximum of one "S" grade may be applied to the minor.

All courses applied to the A&FM minor must be completed with a grade of C- or above.

Engineering Management, Master of Science

http://engineering.jhu.edu/msem/

The Master of Science in Engineering Management (MSEM) degree program combines advanced course work in highly-specialized technical fields with a professional education in contemporary business, entrepreneurship, and management practices. Graduates of the program will be provided with the educational background to pursue professional management roles in industry.

Facilities

The MSEM program has a dedicated seminar room housed in Wyman. Students are able to study, conduct research and build prototypes within this space.

Graduate Requirements

Please consult directly with the MSEM program director or MSEM academic advisor to confirm the below requirements; changes may have occurred since this annual publication.

Students in the MSEM program take thirteen courses to fulfill degree requirements, with the following guidelines:

- Five advanced courses in the engineering technical track
- Three full-semester fall management courses, a fall and spring MSEM Seminar course, two half-semester required courses in the spring. Plus, students may choose from a list of approved half- semester courses to complete their elective, in addition to EN.662.643, The Practice of Consulting, taken during the intersession.
- No grade lower than C may be applied to the program
- Courses must be at the graduate level (600-level or higher)
- Departments sponsoring technical tracks may impose stricter requirements for course work within the track.
- Students are additionally required to complete EN.500.603 Graduate Orientation and Academic Ethics, and the Responsible Conduct of Research which do not count towards the degree requirements above.

At the discretion of the student’s advisors, a Johns Hopkins MSEM student may be permitted to double-count up to two JHU courses, or apply graduate courses taken at JHU but not applied to a degree, in accordance with conditions in the WSE Policy on Double-Counting Courses.

Advising

MSEM students will receive advising on the technical track from a designated faculty member affiliated with that track. MSEM students will be advised regarding the management track by members of the Center for Leadership Education faculty.

Faculty

Faculty members teaching the technical track courses are listed in their respective engineering departments elsewhere in this catalogue. Faculty members teaching the management track courses are listed in the Center for Leadership Education section of this catalogue.

Program Requirements

Management Track

The Center for Leadership Education has constructed a program tailored to the needs of future engineering managers. MSEM students will participate in a cohort program, which begins each fall, where all students in an entering class will take a suite of management courses together.

Fall semester: a cohort-based management curriculum consisting of three required courses and seminar: Strategies: Accounting & Finance, Strategies: Innovation and Growth and Professional Presentations.

Immersion: The Practice of Consulting during the January term.

Spring Semester: Two-half semester courses and seminar: Managing People and Resolving Conflicts, Leading Change

All MSEM students are required to attend the MSEM Seminar (fall & spring semesters) EN.662.811 M.S. in Engineering Management Seminar/EN.662.812 MSEM Seminar) course while enrolled in the program. This will meet monthly and addresses three important content areas: Innovation and design thinking; personal skills and development especially in the communication arena; and talks with practicing engineering managers. The Engineering Management program reserves the right to change the list of eligible courses at its discretion.

Technical Tracks

In addition to fulfilling the management track requirements, MSEM students must complete the requirements for one of the technical tracks (5 courses). Technical Tracks do not appear on the transcript or diploma. These are:

- Biomaterials
- Chemical & Biomolecular Engineering
- Chemical Product Design
- Civil Engineering
- Communications Science
- Computer Science
- Cybersecurity
- Energy
- Environmental Systems Analysis, Economics and Public Policy
- Fluid Mechanics
- Materials Science and Engineering
- Mechanical Engineering
- Mechanics and Materials
- Nano-Biotechnology
- Nanomaterials and Nanotechnology
- Operations Research
- Probability and Statistics
- Smart Product and Device Design
- Systems Engineering
- Space Systems Engineering, Engineering for Professionals

Please note: the course requirements listed below are a general guide and are subject to change frequently. For degree requirements, please refer to the program manager and the technical track advisor.

Biomaterials

(Sponsored by the Department of Materials Science & Engineering *(*https://e-catalogue.jhu.edu/engineering/materials-science-engineering/*))*

Prerequisites

- UG calculus, chemistry, biology, physics and introductory biomaterials course equivalent to EN.510.316 Biomaterials I

Code	Title	Credits
Required Courses		
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
EN.510.621	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
Total Credits		**6**

Substitutions for required courses can be made at the advisor's discretion.

Electives

- Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee
- See list of pre-approved elective courses or courses off list by petition

List of Pre-approved Electives

Code	Title	Credits
EN.510.400	Introduction to Ceramics	3
EN.510.403	Materials Characterization	3
EN.510.405	Materials Science of Energy Technologies	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.428	Material Science Laboratory I	3
EN.510.429	Materials Science Laboratory II	3
EN.510.430	Biomaterials Lab	3
EN.510.604	Mechanical Properties of Materials	3
EN.510.605	Electrical, Optical and Magnetic Properties of Materials	3
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
EN.510.657	Materials Science of Thin Films	3

Courses not on this list can be used at the advisor's discretion.

Civil Engineering

(Sponsored by the Department of Civil Engineering *(*https://e-catalogue.jhu.edu/engineering/civil-engineering/*))*

The Civil Engineering track for the Master of Science in Engineering Management consists of five courses, with the following guidelines:

Code	Title	Credits
Required Courses		
EN.560.730	Finite Element Methods	3
EN.560.604	Introduction to Solid Mechanics	3
Total Credits		**6**

Substitutions for required courses can be made at the advisor's discretion.

Elective Courses

- Any three courses from 560.6xx or above, or 565.6xx or above (excluding seminar)

Chemical and Biomolecular Engineering

(Sponsored by the Department of Electrical & Computer Engineering *(*https://e-catalogue.jhu.edu/engineering/electrical-computer-engineering/*))*

Required Courses: Any five courses from 540.6xx or above, or 545.6xx or above (excluding seminar)

Substitutions for required courses can be made at the advisor's discretion.

Chemical Product Design

Sponsored by the Department of Chemical and Biomolecular Engineering *(*https://e-catalogue.jhu.edu/engineering/chemical-biomolecular-engineering/*)*

Students must take five courses:

- Two semesters of Chemical and Biomolecular Engineering Design: 540.690-691.
- Two ChemBE Courses (540.6xx)
- One approved elective in Engineering, Science, Math, or Applied Math

Substitutions for courses can be made at the advisor's discretion.

Communications Science

(Sponsored by the Department of Electrical & Computer Engineering *(*https://e-catalogue.jhu.edu/engineering/electrical-computer-engineering/*))*

Students may select any combination of 5 courses in communications and related fields from the list below.

Code	Title	Credits
EN.520.435	Digital Signal Processing	3
EN.520.447	Information Theory	3
EN.520.646	Wavelets & Filter Banks	3
EN.520.651	Foundations of Probabilistic Machine Learning	4
EN.520.652	Filtering and Smoothing	3
EN.520.666	Information Extraction	3
Total Credits		**19**

Alternative selections for required courses are at the advisor's discretion.

Computer Science

(Sponsored by the Department of Computer Science *(*https://e-catalogue.jhu.edu/engineering/computer-science/*))*

Curricular Requirements

Any five regular graduate courses approved by the advisor, 600-level or higher, from the Department of Computer Science, not including the senior thesis.

- Innovation and Design II does not count as a technical course for the Computer Science Track.
- MSEM Students in this track may take no more than three graduate-level courses in one semester.

Cybersecurity

(Sponsored by the Information Security Institute)

Pre-Requisites:

- Entering students are expected to have completed a program of study equivalent to that required by at least an undergraduate minor in computer science and a computer science BS is recommended.
- Applicants from other disciplines must have coursework (or equivalent experience) in Computer System Fundamentals, Programming, Data Structures, and Discrete Math.
- If the necessary background courses are lacking, students must take undergraduate courses to possess these prerequisites. These courses will not count toward the MSEM degree but will appear on the transcript.

Curricular Requirements (5):

- A combination of five graduate courses, 600-level or higher, are taken from the Information Security Institute required as below:
  - Two courses from the Core Technology and/or the Elective Technology course lists;
  - One Core Policy course and one Core Management course;
  - The fifth course from any of the above course categories.
- No more than three graduate-level courses by the Information Security Institute may be taken in one semester by an MSEM student in this track.

Energy

(Sponsored by the Department of *(*https://e-catalogue.jhu.edu/engineering/mechanical-engineering/*)* Environmental Health & Engineering *(*https://ehe.jhu.edu/*))*

Required Courses:

Approval of substitutions for required courses are at the discretion of the technical advisor.
Energy Technology Group: choose at least 1
030.404 Electrochemical Systems for Energy Conversion and Storage
510.405 Materials Science of Energy Technologies
510.627 Photovoltaics and Energy Devices
540.619 Projects in Design: Alternative Energy
540.630 Thermodynamics, Statistical Mechanics and Kinetics
Systems Management Group: choose at least 1
520.629 Networked Dynamical Systems
530.664 Energy Systems Analysis
570.607 Energy Policy and Planning Models
570.697 Risk and Decision Analysis

Electives: (choose up to 3)
030.403 Optoelectronic Materials and Devices: Synthesis, Spectroscopy, and Applications
271.402 Water, Energy and Food
410.777 Biofuels
425.604 Energy and Climate Finance
420.616 Environmental Consequences of Conventional Energy Generation
425.601 Principles and Applications of Energy Technology
425.625 Solar Energy: Science, Technology and Policy
425.640 The Future of the US Electric System in a Carbon-Constrained World
530.629 Simulation and Analysis of Ocean Wave Energy Systems
570.657 Air Pollution
570.695 Environmental Health and Engineering Systems Design
615.448 Alternative Energy Technology
680.697 Global Energy Fundamentals
680.714 Energy, Environment and Development in Developing Countries
680.730 Global Electricity Markets
680.790 Principles of Energy Economics and Finance
680.792 The Water, Energy and Food Nexus
680.855 Life Cycle Assessment
680.852 Energy Poverty
810.761 Energy in the Americas: Conflict, Cooperation and Future Prospects

Other elective courses must be approved at the advisor's discretion.

ENVIRONMENTAL SYSTEMS ANALYSIS, ECONOMICS AND PUBLIC POLICY:

(Sponsored by the Department of *(*https://e-catalogue.jhu.edu/engineering/mechanical-engineering/*)*Environmental Health & Engineering *(*https://ehe.jhu.edu/*))*

Required Courses: (3)
Approval of substitutions for required courses are at the discretion of the technical advisor.
Economics (preferably with calculus). This requirement may be waived by their advisor if the student has already had an intermediate microeconomics course. A list of qualifying courses is available from the advisor.
Mathematics of Decision Making: EN.570.695 Environmental Health and Engineering Systems Design
Policy & Design Making: EN.570.697 Risk and Decision Analysis
OR EN.570.607 Energy Policy and Planning Models
Electives: (4)
Courses not on this list are at the advisor's discretion.
570.496 Urban and Environmental Systems
570.618 Multiobjective Programming and Planning
570.676 Stochastic Programming

Additional Notes:
The student's advisor must approve all courses
All courses must be at the 600-level or above.
No more than one course in Environmental Engineering may be used to fulfill the track and only with careful consultation with the student's advisor.

Other elective courses must be approved at the advisor's discretion.

Fluid Mechanics

(Sponsored by the Department of Materials Science & Engineering *(*p. 1351*))*

Any five courses in Fluid Mechanics or closely related discipline, at the 600-level or higher, as approved by the Faculty advisor.

Materials Science & Engineering

(Sponsored by the Department of Materials Science & Engineering *(*https://e-catalogue.jhu.edu/engineering/materials-science-engineering/*))*

Prerequisites

- UG calculus, chemistry and physics; biology is recommended

Code	Title	Credits
Required Courses		
EN.510.601	Structure Of Materials	3
Total Credits		**3**

Substitutions for required courses can be made at the advisor's discretion.

Electives

- See list of pre-approved elective courses or courses off list by petition

Recommended Structure

Code	Title	Credits
List of Pre-approved Electives		
EN.510.400	Introduction to Ceramics	3
EN.510.403	Materials Characterization	3
EN.510.405	Materials Science of Energy Technologies	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.428	Material Science Laboratory I	3
EN.510.429	Materials Science Laboratory II	3
EN.510.430	Biomaterials Lab	3
EN.510.604	Mechanical Properties of Materials	3
EN.510.605	Electrical, Optical and Magnetic Properties of Materials	3
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
EN.510.657	Materials Science of Thin Films	3

Alternative selections can be made at the advisor's discretion.

Mechanical Engineering

(Sponsored by the Department of Mechanical Engineering *(*https://e-catalogue.jhu.edu/engineering/mechanical-engineering/*))*

Required Courses

Any five courses in Mechanical Engineering or closely related discipline at the 600-level or higher, as approved by the Faculty advisor.

Alternative selections can be made at the advisor's discretion.

Mechanics and Materials

(Sponsored jointly by the Department of Mechanical Engineering *(*https://e-catalogue.jhu.edu/engineering/mechanical-engineering/*) and the* Department of Materials Science & Engineering *(*https://e-catalogue.jhu.edu/engineering/materials-science-engineering/*))*

Code	Title	Credits
Required Courses		
EN.510.601	Structure Of Materials	3
EN.510.604	Mechanical Properties of Materials	3

Substitutions for required courses can be made at the advisor's discretion.

Elective Courses

Any three (3) of the following courses, approved by the faculty advisor:

Code	Title	Credits
EN.510.403	Materials Characterization	3
EN.510.428	Material Science Laboratory I	3
EN.530.405	Mechanics of Advanced Engineering Structures	3
EN.530.414	Computer-Aided Design	3
EN.530.418	Aerospace Structures	3
EN.510.602	Thermodynamics Of Materials	3
EN.510.603	Phase Transformations of Materials	3

Alternative selections can be made at the advisor's discretion.

Nano-Biotechnology

(Sponsored by the Department of Materials Science & Engineering *(*https://e-catalogue.jhu.edu/engineering/materials-science-engineering/*))*

Prerequisites

- UG calculus, chemistry, biology, physics and introductory biomaterials course equivalent to Biomaterials I (EN.510.316)

Code	Title	Credits
Required Courses		
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.607	Biomaterials II: Host response and biomaterials applications [1]	3
Total Credits		**6**

[1] PR: EN.510.316 Biomaterials I or permission

Substitutions for required courses can be made at the advisor's discretion.

Electives

- Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee
- See list of pre-approved elective courses or courses off list by petition

Recommended Structure

Course	Title	Credits
Fall		
EN.510.422	Micro and Nano Structured Materials & Devices	3
Electives: suggest one		
	Credits	**3**
Spring		
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
Electives: suggest one		
	Credits	**3**
	Total Credits	**6**

List of Pre-approved Electives

Code	Title	Credits
EN.510.400	Introduction to Ceramics	3
EN.510.403	Materials Characterization	3
EN.510.405	Materials Science of Energy Technologies	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.428	Material Science Laboratory I	3
EN.510.429	Materials Science Laboratory II	3
EN.510.430	Biomaterials Lab	3
EN.510.604	Mechanical Properties of Materials	3
EN.510.605	Electrical, Optical and Magnetic Properties of Materials	3
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
EN.510.657	Materials Science of Thin Films	3

Alternative selections can be made at the advisor's discretion.

Nanomaterials and Nanotechnology

(Sponsored by the Department of Materials Science & Engineering *(*https://e-catalogue.jhu.edu/engineering/materials-science-engineering/*))*

Prerequisites

- UG calculus, chemistry, and physics

Code	Title	Credits
Required Courses		
EN.510.422	Micro and Nano Structured Materials & Devices	3
Total Credits		**3**

Substitutions for required courses can be made at the advisor's discretion.

Electives

- Electives should be related to Materials Science and Engineering and must be approved by the DMSE graduate committee
- See list of pre-approved elective courses or courses off list by petition

Recommended Structure

Course	Title	Credits
Fall		
EN.510.422	Micro and Nano Structured Materials & Devices (Required)	3
See list of pre-approved elective courses or courses off list by petition		
	Credits	**3**
Spring		
Required: none		

Electives in Spring: suggest two		
	Credits	**0**
	Total Credits	**3**

List of Pre-approved Electives

Code	Title	Credits
EN.510.400	Introduction to Ceramics	3
EN.510.403	Materials Characterization	3
EN.510.405	Materials Science of Energy Technologies	3
EN.510.422	Micro and Nano Structured Materials & Devices	3
EN.510.426	Biomolecular Materials I - Soluble Proteins and Amphiphiles	3
EN.510.428	Material Science Laboratory I	3
EN.510.429	Materials Science Laboratory II	3
EN.510.430	Biomaterials Lab	3
EN.510.604	Mechanical Properties of Materials	3
EN.510.605	Electrical, Optical and Magnetic Properties of Materials	3
EN.510.607	Biomaterials II: Host response and biomaterials applications	3
EN.510.657	Materials Science of Thin Films	3

Operations Research

(Sponsored by the Department of Applied Mathematics & Statistics *(*https://e-catalogue.jhu.edu/engineering/applied-mathematics-statistics/*))*

Substitutions for required courses can be made at the advisor's discretion

Any five courses from the following list, or a substitution as approved by the student's track advisor. As course offerings vary over time, an updated list of acceptable courses will be maintained on the MSEM program website.

Code	Title	Credits
EN.570.496	Urban and Environmental Systems	3
EN.553.426	Introduction to Stochastic Processes	4
EN.553.427	Stochastic Processes and Applications to Finance	4
EN.553.433	Monte Carlo Methods	4
EN.553.463	Network Models in Operations Research	4
EN.553.762	Nonlinear Optimization II	3
EN.553.761	Nonlinear Optimization I	3
EN.553.766	Combinatorial Optimization	3
EN.570.697	Risk and Decision Analysis	3
EN.553.400	Mathematical Modeling and Consulting	4
EN.570.696	Urban and Environmental Systems	3
EN.570.607	Energy Policy and Planning Models	3
EN.553.626	Introduction to Stochastic Processes	4
EN.553.627	Stochastic Processes and Applications to Finance	4
EN.553.628	Stochastic Processes and Applications to Finance II	4
EN.553.633	Monte Carlo Methods	4
EN.553.663	Network Models in Operations Research	4
EN.553.639	Time Series Analysis	3
EN.553.641	Equity Markets and Quantitative Trading	3
EN.553.642	Investment Science	4
EN.553.644	Introduction to Financial Derivatives	4
EN.553.645	Interest Rate and Credit Derivatives	4
EN.553.646	Risk Measurement/Management in Financial Markets	4
EN.553.647	Quantitative Portfolio Theory and Performance Analysis	4
EN.553.648	Financial Engineering and Structured Products	4

Alternative selections can be made at the advisor's discretion.

Innovation and Design II does not count as a technical course.

Probability and Statistics

(Sponsored by the Department of Applied Mathematics & Statistics *(*https://e-catalogue.jhu.edu/engineering/applied-mathematics-statistics/*))*

Admissions Requirements

- One upper-division undergraduate course in probability (equivalent to EN.553.420 Introduction to Probability)
- One upper-division undergraduate course in mathematical statistics (equivalent to EN.553.430 Introduction to Statistics)

Curricular Requirements

Any five (5) of the following courses, approved by the faculty advisor:

553.613 Applied Statistics and Data Analysis I
553.614 Applied Statistics and Data Analysis II
553.620 Introduction to Probability
553.626 Introduction to Stochastic Processes
553.627 Stochastic Processes and Applications to Finance I
553.628 Stochastic Processes and Applications to Finance II
553.629 Introduction to Research in Discrete Probability
553.630 Introduction to Statistics
553.632 Bayesian Statistics
553.633 Monte Carlo Methods
553.636 Introduction to Data Science
553.639 Time Series Analysis
553.688 Computing for Mathematics
553.692 Mathematical Biology
553.693 Mathematical Image Analysis
553.720 Probability Theory I
553.721 Probability Theory II
553.722 Introduction to Stochastic Calculus
553.723 Markov Chains
553.727 Large Deviation Theory
553.729 Topics in Probability: Random Graphs and Percolation
553.730 Statistical Theory I
553.731 Statistical Theory II
553.732 Bayesian Statistics
553.733 Advanced Topics in Bayesian Statistics
553.734 Introduction to Nonparametric Estimation
553.735 Topics in Statistical Pattern Recognition
553.736 System Identification and Likelihood Methods
553.737 Distribution-free Statistics and Resampling Methods
553.738 High-Dimensional Approximation, Probability and Statistical Learning
553.739 Statistical Pattern Recognition Theory & Methods
553.740 Machine Learning I
553.741 Machine Learning II
553.742 Statistical Inference on Graphs

AS.110.653 Stochastic Differential Equations: An Introduction with Applications

Innovation and Design II does not count as a technical course. Substitutions are the discretion of the advisor.

Smart Product and Device Design

(Sponsored jointly by the Department of Mechanical Engineering *(*https://e-catalogue.jhu.edu/engineering/mechanical-engineering/*)* *and the* Department of Electrical & Computer Engineering *(*https://e-catalogue.jhu.edu/engineering/electrical-computer-engineering/*))*

Code	Title	Credits
Required Courses		
EN.530.646	Robot Devices, Kinematics, Dynamics, and Control	4
EN.530.414	Computer-Aided Design	3
or EN.520.491	CAD Design of Digital VLSI Systems I (Juniors/Seniors)	
EN.530.421	Mechatronics	3
Total Credits		**10**

Substitutions for required courses can be made at the advisor's discretion.

Elective Courses
Any two (2) courses approved by the faculty advisor.

Systems Engineering

(Sponsored by the Department of Systems Engineering *(*https://ep.jhu.edu/programs-and-courses/programs/systems-engineering/*))*

Required Courses:

- Two courses with course numbers from EN.560.640-EN.560.659 or EN.560.740–EN.560.759, **or** choose one from both
- *Substitutions for courses can be made at the advisor's discretion.*

Elective Courses
Three courses from any combination of the following:

Code	Title	Credits
EN.560.6xx or above, or EN.565.4xx or above (excluding seminar)		
EN.645.6xx or above (EP Systems Engineering)		
EN.553.761	Nonlinear Optimization I	3
EN.570.497	Risk and Decision Analysis	3.0
EN.553.400	Mathematical Modeling and Consulting	4
EN.570.496	Urban and Environmental Systems	3.0
EN.570.607	Energy Policy and Planning Models	3.0
EN.663.653	Innovation and Design I	3.0
EN.663.657	Innovation and Design II	3.0

- For systems engineering track students only: 605.607 Agile Software Development will count as a management elective.

SPACE SYSTEMS ENGINEERING, ENGINEERING FOR PROFESSIONALS PROGRAM

(Sponsored by the Engineering for Professionals Program)

Required Courses:

- 675.600 Systems Engineering for Space
- 675.601 Fundamentals of Engineering Spaces Systems I

Elective Courses
Three courses from any combination of 675.xxx

- *Substitutions for courses can be made at the advisor's discretion.*

For current faculty and contact information go to http://eng.jhu.edu/wse/cle/page/our_people (http://eng.jhu.edu/wse/cle/page/our_people/)

Entrepreneurship and Management, Minor

http://engineering.jhu.edu/cle (http://engineering.jhu.edu/cle/)

The Entrepreneurship & Management (E&M) program offers Johns Hopkins Arts & Sciences, Engineering, and Peabody students a broad array of courses designed to equip them to lead in professional and academic arenas. Some students simply take a course or two. Many choose to fulfill the seven-course E&M minor, pairing it with their engineering, liberal arts, or public health major. The minor's three core courses, Foundations of American Enterprise, Financial Accounting, and a communications course (either Professional Writing and Communication or Oral Presentations), provide a strong foundation in the fundamentals of entrepreneurship. Students then complete the required work in statistics, two upper-level courses, and a 400-level capstone course to fulfill the minor.

The minor in entrepreneurship and management focuses on leadership and management from a multidisciplinary viewpoint with a quantitative emphasis. The program, part of the Center for Leadership Education (https://e-catalogue.jhu.edu/engineering/leadership-education/), offers students a diversified learning experience that emphasizes the concepts, practices, and skills necessary for effective leadership as managers and entrepreneurs in the public and private sectors.

The primary goal of the program is to provide Hopkins students with the knowledge and skills to become effective leaders and entrepreneurs. Individuals with excellent technical training and abilities often move into management positions or start new ventures. As their careers progress, they will be better prepared for success if they have the ability to understand financial reports, interpret statistical data, organize and effectively lead a team, design strategy, analyze and correct problems in the firm's operations, and understand the dynamics of the marketplace. Thus, the program will help prepare students for entrance into a professional degree program or graduate school; moving more quickly into management positions; starting new ventures; or pursuing careers in finance and business.

Facilities

The CLE Full-time Faculty and staff offices are located on the first and third floors of Wyman Hall.

Course and Grade Rules and Limitations

The E&M minor requires a minimum of 21-26 credits.

A maximum of one "S" course may be applied to the minor.

All courses applied to the E&M minor must be completed with a grade of C- or above.

Program Requirements

The requirements of the minor in entrepreneurship and management can be accessed from the Center for Leadership Education's website under the "Programs" tab (https://engineering.jhu.edu/cle/programs-minors/em_minor/). Students wishing to complete a minor in entrepreneurship and management may also obtain more information by emailing cle@jhu.edu to set up an appointment with the E&M minor advisor.

Core Requirements

Code	Title	Credits
Statistics		**3-8**
These courses expose students to the foundations of statistics that are used extensively in business decision-making. These topics include correlation, estimation, hypothesis testing, linear regression, prediction, and forecasting. Students may take either two elementary statistics courses or one intermediate/advanced calculus-based statistics course from the list below.		
Option One: Two Elementary Statistics Courses. Credit earned for AP Statistics (equivalent to EN.553.111) will satisfy the first of the two required courses.		
First course (select one):		
AS.230.205	Introduction to Social Statistics	
AS.280.345	Public Health Biostatistics	
EN.553.111	Statistical Analysis I	
Second course (select one):		
EN.553.112	Statistical Analysis II	
EN.661.380	Decision Analytics	
Option Two: One Intermediate/Calculus-Based Course (must have Calculus as a prerequisite)		
Select one of the following:		
EN.553.211	Probability and Statistics for the Life Sciences	
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
EN.553.430	Introduction to Statistics	
EN.560.240	Uncertainty, Reliability and Decision-making	
Entrepreneurship and Management Fundamentals		**9**
Students must complete three fundamental courses in entrepreneurship and management. These courses are:		
EN.660.105	Foundations of American Enterprise	
or EN.660.25	Identifying and Capturing Markets	
EN.660.203	Financial Accounting	
EN.661.110	Professional Writing and Communication	
or EN.661.25	Oral Presentations	
Upper-Level Elective Courses in Entrepreneurship and Management		**6**
Students must complete two upper-level courses in entrepreneurship and management. Courses may be chosen from the list below. Students can choose 1 course from the Marketing & Communications electives listed in a separate table below.		
AS.180.263	Corporate Finance	
EN.570.334	Engineering Microeconomics	
EN.660.300	Managerial Finance	
EN.660.303	Managerial Accounting	
EN.660.308	Business Law I	
EN.660.310	Cases in Workplace Ethics	
EN.660.329	Social Entrepreneurship Theory and Practice. Community Based Learning	
EN.660.331	Leading Teams	
EN.660.332	Leadership Theory	
EN.660.333	Leading Change	
EN.660.335	Negotiation and Conflict Resolution	
EN.660.340	Management Theory and Practice	
EN.660.341	Process Innovation and Quality Management	
EN.660.343	Operations and Service Management	
EN.660.345	Multidisciplinary Engineering Design 1	
or EN.660.346		
EN.660.361	Engineering Management & Leadership	
EN.660.363	Leadership & Management in Materials Science and Engineering	
EN.660.400	Practical Ethics for Future Leaders [1]	
EN.660.406	Practical Ethics for Future Leaders - Special Topic	
EN.660.403		
EN.660.404	Business Law II	
EN.660.414	Financial Statement Analysis	
EN.660.455	Reimagining The City to Resist Climate Change	
EN.660.458	Entrepreneurial Opportunities in Sustainable Living	
EN.660.460	Entrepreneurship	
EN.661.301	Writing for the Law	
EN.661.315	Culture of the Engineering Profession	
EN.661.317	Culture of the Medical Profession	
Clark Scholars may also take the following series of one-credit courses, as the equivalent of 1 three-credit course:		
EN.660.106	Clark Scholars Leadership Challenge	
EN.660.270	Clark Scholar Engineering Design I	
EN.660.380	Clark Scholar Engineering Design II	
Entrepreneurship & Management Capstone		**3**
Students must complete one 400-level capstone course. Select one from the following:		
EN.660.403		
EN.660.410	Computer Science Innovation and Entrepreneurship	
EN.660.411	Corporate Strategy and Business Failure	
EN.660.419	Strategy Consulting	
EN.660.459	Entrepreneurial Spirits	
EN.660.460	Entrepreneurship	
EN.663.453	Innovation and Design I	
Total Credits		**21-26**

[1] Students who wish to count EN.660.400 Practical Ethics for Future Leaders toward their E&M elective total must also successfully complete EN.660.406 Practical Ethics for Future Leaders - Special Topic.

Marketing and Communication Courses

Students may use only one Marketing and Communications course as an upper-level elective for the Entrepreneurship and Management minor.

Code	Title	Credits
EN.660.352	New Product Development	3
EN.660.358	International Marketing	3
EN.660.420	Marketing Strategy	3
EN.660.450	Advertising & Integrated Marketing Communication	3
EN.660.453	Digital and Social Media Marketing	3
EN.661.306	Special Topics in Professional Writing: Freelance Travel Writing	3
EN.661.355	Special Topics in Professional Writing: Blogging about Food and Culture	3
EN.661.360	Marketing Your Start-up	3
EN.661.370	Storytelling with Data	3
EN.661.380	Decision Analytics	3

For current faculty and contact information go to http://engineering.jhu.edu/cle/faculty (http://engineering.jhu.edu/cle/faculty/)

Leadership Studies, Minor

https://engineering.jhu.edu/cle/

The Leadership Studies minor offers Johns Hopkins Arts & Sciences, Engineering, and Peabody students a broad array of courses that help them to position themselves as leaders among their peers in entrepreneurial ventures in private industry, government, and academia. The minor offers a multidisciplinary approach that focuses on organizational and contextual aspects of leadership and personal development.

The minor in leadership studies, part of the Center for Leadership Education (https://e-catalogue.jhu.edu/engineering/leadership-education/), offers students a diversified learning experience that emphasizes the concepts, practices, and skills necessary for effective leadership as managers and entrepreneurs in the public and private sectors.

Some students simply take a course or two. Many choose to fulfill the eight-course Leadership Studies minor, pairing it with their engineering, liberal arts, or public health major. The minor's four core courses provide a strong foundation in the fundamentals of entrepreneurial enterprises.

Students can then select any three upper-level courses to complete the minor or elect to focus further in the areas of Social Enterprise, Science Policy, or Leadership for Health Professionals.

The Capstone Experience

In the Leadership Studies capstone experience, students gain hands-on experience through the development of a project in which they practice leadership. Options for the Capstone Experience include (but are not limited to):

- Experiential Social Entrepreneurship
- Developing an Environmental Venture
- Leading Educational Initiatives
- Leadership in a JHU approved student organization

All Capstone Experience projects must be approved by the director of the Leadership Studies minor before enrollment in the Leadership Studies Capstone course. Projects must be team based, require strong communication, exhibit measurable results, and exist within external-facing organizations.

Course and Grade Rules and Limitations

The Leadership Studies minor requires a minimum of 24 credits.

A maximum of one "S" course may be applied to the minor.

All courses applied to the minor must be completed with a grade of C- or above.

Program Requirements

The requirements of the minor in leadership studies can be accessed from the Center for Leadership Education's website under the "Programs" tab (http://eng.jhu.edu/wse/cle/page/ls_minor (https://engineering.jhu.edu/cle/ls_minor/)). Students wishing to complete a minor in leadership studies may also obtain more information by emailing cle@jhu.edu to set up an appointment with the leadership studies minor advisor.

Code	Title	Credits
Core Requirements		
EN.660.105	Foundations of American Enterprise	3
or EN.660.250	Identifying and Capturing Markets	
EN.660.203	Financial Accounting	3
EN.661.110	Professional Writing and Communication	3
or EN.661.250	Oral Presentations	
EN.660.332	Leadership Theory	3
Upper-Level Electives		
Students may choose to complete an optional focus area of upper-level electives in Social Enterprise (see table of elective coursework below). Students not intending to complete a focus area should choose nine credits of coursework from the list below.		9
Non-Focus Area Electives		
EN.660.329	Social Entrepreneurship Theory and Practice. Community Based Learning	
EN.660.331	Leading Teams	
EN.660.333	Leading Change	
EN.660.361	Engineering Management & Leadership	
EN.660.363	Leadership & Management in Materials Science and Engineering	
EN.660.455	Reimagining The City to Resist Climate Change	
EN.660.458	Entrepreneurial Opportunities in Sustainable Living	
EN.660.460	Entrepreneurship	
Optional Social Enterprise Focus Area		
For the Social Enterprise Focus Area, students must complete the following two courses:		
EN.660.329	Social Entrepreneurship Theory and Practice. Community Based Learning	
EN.660.335	Negotiation and Conflict Resolution	
Select one additional course from the list below:		
EN.660.331	Leading Teams	
EN.660.333	Leading Change	
EN.660.363	Leadership & Management in Materials Science and Engineering	
EN.660.455	Reimagining The City to Resist Climate Change	

EN.660.458	Entrepreneurial Opportunities in Sustainable Living	
EN.660.460	Entrepreneurship	
Capstone Experience		
EN.660.470	Leadership Studies Capstone [1]	3
Total Credits		**24**

[1] Must seek approval from Leadership Studies minor director before registering.

Marketing and Communications, Minor

The Marketing & Communications (M&C) program offers Johns Hopkins Arts & Sciences, Engineering, and Peabody students a broad array of courses designed to equip them to lead in the fields of marketing and communications, and complements major courses of study in departments across campus. Students will find courses that allow them to pursue their career goals whether they wish to pursue a career in product or marketing management at a large-scale enterprise or to be more involved in the creative side of the marketing field, including areas such as advertising, public relations, and social media. Marketing and Communications courses are also open to students who choose not to declare the minor.

In our marketing management courses (tagged CLE-MMGMT), students will learn how to manage both the message and the financial impact of marketing campaigns, as well as how to manage a product line from development to launch. In our marketing communications courses (tagged CLE-MCOMM), students will learn how to form marketing messages and to produce creative content and deliverables for a variety of industries.

Course and Grade Rules and Limitations

The Marketing and Communications minor requires 24 credits.

A maximum of one "S" course may be applied to the minor.

All courses applied to the M&C minor must be completed with a grade of C- or above.

Program Requirement

Code	Title	Credits
Core Courses		
Students must complete the following four fundamental courses:		
EN.660.105	Foundations of American Enterprise	3
EN.660.203	Financial Accounting	3
EN.660.250	Identifying and Capturing Markets	3
EN.661.110	Professional Writing and Communication	3
or EN.661.250	Oral Presentations	
Upper-Level Electives		**12**
Students must complete four of the following, at least one at the 400-level:		
EN.660.310	Cases in Workplace Ethics	
EN.660.352	New Product Development	
EN.660.358	International Marketing	
EN.661.360	Marketing Your Start-up	
EN.660.420	Marketing Strategy	
EN.660.450	Advertising & Integrated Marketing Communication	
EN.660.453	Digital and Social Media Marketing	
EN.661.301	Writing for the Law	
EN.661.306	Special Topics in Professional Writing: Freelance Travel Writing	
EN.661.315	Culture of the Engineering Profession	
EN.661.316	Culture of the Media Profession	
EN.661.317	Culture of the Medical Profession	
EN.661.355	Special Topics in Professional Writing: Blogging about Food and Culture	
EN.661.370	Storytelling with Data	
EN.661.380	Decision Analytics	
Total Credits		**24**

Professional Communication Program

https://engineering.jhu.edu/cle/programs-minors/professional-communication-program/

Strong communications skills are the key to success in any discipline. The Professional Communication Program (PCP) offers Johns Hopkins undergraduates a variety of hands-on courses designed to develop their abilities to research, write, speak, and display data persuasively. Starting with the highly popular foundation courses EN.661.110 Professional Writing and Communication and EN.661.250 Oral Presentations, the program expands to specialized workshops and seminars on topics ranging from science and research writing, engineering culture and ethics to entrepreneurship, public relations and social media. PCP students create journals, write blogs, present pitches and posters, and conduct multimedia PR campaigns. All PCP courses are small—19 or fewer students—ensuring that everyone receives the skilled attention necessary to grow as a writer and presenter. Since many of our students are international, PCP offers English as a Second Language (ESL) sections of Professional Writing and Communication and Oral Presentations as well as free ESL tutoring.

For current faculty and contact information go to http://eng.jhu.edu/wse/cle/page/our_people (http://eng.jhu.edu/wse/cle/page/our_people/)

Professional Development Program

The Professional Development Program (PDP) answers the need to broaden graduate education as expressed in many recent academic articles. For example, The Commission on Pathways Through Graduate School noted in their final report that more than one-half of all doctoral degree holders in science, engineering or health fields work outside the academy. And while employers believe these graduates bring value, they cite that many graduates seem to lack skills and knowledge in areas like working on teams, entrepreneurship, communication, and project management.

The Professional Development Program is designed to address these needs. The program currently offers a series of twenty, 8-week courses in topics such as writing grant and contract proposals, managing people, leading teams, and improving presentations. Courses are open to all full time graduate students (masters, PhD and postdoctoral fellows) at Johns Hopkins. A small and growing number of masters degree programs in the Whiting school (only) accept a limited number of these courses as elective credits. Students should speak with their degree advisor to learn more.

For more information, including a current class schedule and a list of all modules, visit: engineering.jhu.edu/pdp (http://engineering.jhu.edu/pdp/)

Chemical and Biomolecular Engineering

http://www.jhu.edu/chembe/

The study of Chemical and Biomolecular Engineering (ChemBE) is dedicated to the design and exploitation of chemistry, biology, mathematics and physics, especially at the molecular level. As a result of the scope and unusual breadth of this rigorous undergraduate program, our students commonly secure employment in industries such as chemical and pharmaceutical production, biomedicine, biotechnology, material design, food, and energy. Graduates may embark on a career to explore new products such as:

- Novel polymers and biodegradable plastics
- Chemicals from agriculture to fine chemicals to oil and gas production
- Renewable Energy Sources and Climate Mitigation
- Environmental Stewardship
- Drugs, Vaccines, Drug Delivery Devices, and Gene Therapy Products
- Machine Learning, Computer Simulation, and Data Science
- Life Cycle Analysis and Techno-Economic Analysis of Processes
- Pharmaceuticals and Therapeutics
- Semiconductor synthesis, reactor design, and device characteristics
- Nanoscale engineering of particles and the construction of nanodevices
- Food, Beverage, Cosmetics, Consumer and Health Care Products, and Engineering
- Financial Engineering, Sales and Marketing, and Consulting

Demands on the skillsets of a modern engineer are high, and graduates must possess a wide range of skills in order to be competitive in a global market. The ChemBE program successfully satisfies these demands. Students take advanced courses in chemistry, physics, mathematics, and biology. Additionally, students are trained in transport, kinetics, chemical separations, and thermodynamics, which are essential to solving real-world engineering problems. Students also hone their professional and communication skills (report writing, oral presentations, and teamwork) in courses involving experimental projects, process design, and product design.

Depending on their interests and future career goals, students can choose topical electives from areas including green engineering, nanotechnology, data analytics, and bioengineering. These courses, along with extensive undergraduate research opportunities offered by our faculty, are designed to prepare graduates for careers in the chemical industry, biotechnology, pharmaceuticals, or microelectronics. The curriculum also offers an outstanding foundation for advanced graduate studies in chemical and biomolecular engineering, biomedical engineering, materials science and engineering, food science, or for medical, law, or business school.

Students also have the opportunity to develop a more in-depth specialty in one or two areas within chemical and biomolecular engineering. Our two tracks are Interfaces and Nanotechnology (IN) and Molecular and Cellular Bioengineering (MCB). A third track in Data Science and Machine Learning (DSML) is under construction for implementation in Fall 2023.

Career Opportunities

Recent graduates of the Chemical and Biomolecular Engineering program can expect to attain the following career milestones within a few years of graduation:

- success in careers in industrial, academic, or governmental organizations in which they apply their chemical and biomolecular engineering skills to solve diverse long-standing or emerging problems.
- excellence in their graduate program, medical school, or other professional education be recognized as future leaders in their chosen field.
- perpetuance of the JHU legacy of passion for learning, technical excellence, community service, and research innovation to foster knowledge creation, lead discovery, and impact society.

The department also offers graduate programs leading to the Master of Science and Ph.D. degrees. These programs emphasize research leading to a written thesis.

Undergraduate students heavily involved in research may be interested in our B.S./M.S.E. program in Chemical and Biomolecular Engineering, which allows students to obtain a master's of science in engineering directly after completion of their bachelors.

Combined Undergraduate/Graduate Program

The B.S./M.S.E. program in Chemical and Biomolecular Engineering allows students to segue directly into the master of science in engineering program immediately after the completion of their bachelor of science degree requirements. The average additional time in the master's program is about 2 additional semesters. For students who qualify academically and have moved into graduate status, the Whiting School of Engineering grants a Dean's Master's Fellowship (50% tuition waiver while in a full-time status in a semester of study (fall/spring))after the completion of eight semesters or having received the Bachelor of Science degree.

For more information visit: https://engineering.jhu.edu/chembe/undergraduate-studies/concurrent-bs-ms/ (https://engineering.jhu.edu/chembe/undergraduate-studies/concurrent-bs-ms/)

Interfaces and Nanotechnology (IN) Track

Interesting and new physics exist at nanometer length scales, as the surface area of an object begins to approach and exceed its volume. In this focus area, students are trained in the fundamental sciences used to solve problems in nanotechnology and interfacial science. Students take a chemistry course in Materials and Surface Characterization, an advanced physical chemistry laboratory course, and two electives such as Colloids and Nanoparticles, and Micro/Nanotechnology.

Molecular and Cellular Bioengineering (MCB) Track

Fields in biotechnology and biomedicine often involve processes at biological, cellular, and molecular levels. Common areas utilizing skills in the MCB focus area include the genetic manipulation of cells for protein and vaccine production, and the study and treatment of diseases such as arteriosclerosis and cancer. Students in this focus area must take a laboratory course in Biochemistry, and two electives such as Metabolic Systems Biotechnology, and Computational Protein Structure Prediction. In addition, students will take the Biomolecular Engineering Laboratory to learn the hands-on skills required for future careers in biological systems at the molecular and cellular level.

Facilities

The offices and state-of-the-art laboratories of Chemical and Biomolecular Engineering are located in Maryland Hall and Croft Hall on the Homewood campus. The research laboratories are well-equipped for studies in the areas of biochemical engineering, cell and tissue engineering, phase equilibria, membrane science, polymer science, interfacial phenomena, separation processes, fluid mechanics, energy, and catalysis. The Milton S. Eisenhower Library on the Homewood campus contains over two million volumes and access to more than 325 electronic journals. The university's other libraries located at the School of Medicine and at the Applied Physics Laboratory are also available to students.

Financial Aid

Undergraduate scholarships and financial assistance are described on the Student Financial Services (http://finaid.johnshopkins.edu/) website. Part-time work is available in the Chemical and Biomolecular Engineering research laboratories on research projects supported by grants and contracts. There also is a federally sponsored work-study program for qualified students.

Financial assistance to graduate students is available in the forms of research assistantships, teaching assistantships, fellowships, and partial or full tuition remission. The financial aid package is specified following acceptance into the graduate program.

Programs

- Chemical and Biomolecular Engineering, Bachelor of Science (p. 1231)
- Chemical and Biomolecular Engineering, Master of Science in Engineering (p. 1235)
- Chemical and Biomolecular Engineering, PhD (p. 1237)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.540.101. Chemical Engineering Today. 1 Credit.
A series of weekly lectures to introduce students to chemical and biomolecular engineering and its role as a profession in addressing contemporary technological, social, ethical, and economic issues in today's world. The lectures will include examples of how chemical and biomolecular engineers apply the principles of physics and chemistry to develop new products, improve process efficiencies, and alleviate the strain on the ecosystem through the design of novel environmentally conscious processes. In addition, the lectures will highlight exciting new areas now being advanced by chemical and biomolecular engineers, such as biochemical engineering, tissue engineering, nanoparticle fabrication, and processing smart polymers for applications in computer technology and as sensors. Freshmen Only.

EN.540.202. Introduction to Chemical & Biological Process Analysis. 4 Credits.
Introduction to chemical and biomolecular engineering and the fundamental principles of chemical process analysis. Formulation and solution of material and energy balances on chemical processes. Reductionist approaches to the solution of complex, multi-unit processes will be emphasized. Introduction to the basic concepts of thermodynamics as well as chemical and biochemical reactions.
(AS.030.101 OR AS.030.103) AND (AS.171.101 OR AS.171.107) AND (AS.030.102 OR AS.030.103 OR AS.110.109 OR AS.171.102)

EN.540.203. Engineering Thermodynamics. 3 Credits.
Formulation and solution of material, energy, and entropy balances with an emphasis on open systems. A systematic problem-solving approach is developed for chemical and biomolecular process-related systems. Extensive use is made of classical thermodynamic relationships and constitutive equations for one and two component systems. Applications include the analysis and design of engines, refrigerators, heat pumps, compressors, and turbines.
AS.110.202;EN.540.202

EN.540.301. Kinetic Processes. 4 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates.
EN.540.203 AND EN.540.303

EN.540.303. Transport Phenomena I. 3 Credits.
Molecular mechanisms of momentum transport (viscous flow), energy transport (heat conduction),and mass transport (diffusion). Isothermal equations of change (continuity, motion, and energy). The development of the Navier Stokes equation. The development of non isothermal and multi component equations of change for heat and mass transfer. Exact solutions to steady state, isothermal unidirectional flow problems, to steady state heat and mass transfer problems. The analogies between heat, mass, and momentum transfer are emphasized throughout the course. Co-requisite: AS.110.302
AS.110.302 OR EN.553.291

EN.540.304. Transport Phenomena II. 4 Credits.
Dimensional analysis and dimensionless groups. Laminar boundary layers, introduction to turbulent flow. Definition of the friction factor. Macroscopic mass, momentum and mechanical energy balances (Bernouilli's equation). Metering of fluids. Convective heat and mass transfer. Heat and mass transfer in boundary layers. Correlations for convective heat and mass transfer. Boiling and condensation. Interphase mass transfer.
EN.540.303 AND (EN.500.113 OR EN.500.133)

EN.540.306. Chemical & Biomolecular Separation. 4 Credits.
This course covers staged and continuous-contacting separations processes critical to the chemical and biochemical industries. Separations technologies studied include distillation, liquid-liquid extraction, gas absorption, membrane ultrafiltration, reverse osmosis, dialysis, adsorption, and chromatography. Particular emphasis is placed on the biochemical uses of these processes and consequently on how the treatment of these processes differs from the more traditional approach.
EN.540.203 AND EN.540.303 AND (EN.500.113 OR EN.500.133);Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.307. Cell Biology for Engineers. 3 Credits.
This course explores fundamental structural details and molecular functions of different parts of the cell. Considerable emphasis is placed on experimental/quantitative approaches to answering these questions. Topics include Central dogma and the nucleus; protein trafficking; ion transporters; cytoskeleton; molecular motors; cell cycle and cell division; signal transduction, cell growth and cancer; cell death, the extracellular matrix; cell adhesion, cell junctions and epithelium; and muscle contraction, cell motility and morphogenesis.
Cell Biology restriction: students who have completed AS.020.306 may not enroll.;AS.020.305

EN.540.309. Product Design Part 1. 3 Credits.
This course guides the student through the steps of product design. Product design concerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill the needs. Students work in small teams to complete a major project demonstrating their understanding of and proficiency in the primary objectives of the course. Students report several times both orally and in writing on their accomplishments. This course is the first part of a two-semester sequence that optionally can be taken instead of EN.540.314 Chemical and Bimolecular Engineering Product Design. The material covered is the same as in EN.540.314, but more time is allowed so that laboratory tests can be performed and/or prototypes can be made. Note that students must take 540.310 to complete this sequence andbefore receiving credits for 540.309.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.303 AND EN.540.490;EN.540.306 AND EN.540.301

EN.540.310. Product Design Part 2. 3 Credits.
This course is the second part of a two semester sequence (with EN.540.309) that optionally can be taken instead of EN.540.314 Chemical and Biomolecular Engineering Product Design. Students continue to work with their team on their product design project. Students report several times both orally and in writing on their accomplishments. The material covered is the same as in EN.540.314, but more time is allowed so that laboratory tests can be performed and/or prototypes can be made. Note that both courses, EN.540.309 and EN.540.310 must be taken to satisfy the Undergraduate degree requirement of the Chemical and Biomolecular Engineering program. The two courses can be started in any term. Recommended Course Background: EN.540.301, EN.540.304, EN.540.311 or EN.540.313 or permission of instructor.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.309

EN.540.311. Projects in ChemE Unit Operations with Experiments. 4 Credits.
This course challenges students with laboratory projects that are not well-defined. Students work in groups to develop an effective approach to experiments. They identify the important operating variables, decide how best to obtain them using measured or calculated values. Based on their results they predict, carryout, analyze and improve experiments. Each student analyzes three of the following projects: distillation, gas absorption, and one of the projects in EN.540.313. In addition to technical objectives, this course stresses oral and written communication.In addition to technical objectives, this course stresses oral and written communication. Students will have additional meeting times with the instructors and outside of class.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.301 AND EN.540.304 AND EN.540.306 AND EN.661.315;EN.540.490 can be taken concurrently with EN.540.311

EN.540.313. Projects in ChemBE Unit Operations with Experiments. 4 Credits.
This course challenges students with laboratory projects that are not well-defined. Students work in groups to develop an effective approach to experiments. They identify the important operating variables, decide how best to obtain them using measured or calculated values. Based on their results they predict, carryout, analyze and improve experiments. Each student analyzes at least two of the following biomolecular projects: bioreactor, biocatalysis and membrane separation and one of the projects in EN.540.311. In addition to technical objectives, this course stresses oral and written communication. In addition to technical objectives, this course stresses oral and written communication. Students will have additional meeting times with the instructors and outside of class.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.301 AND EN.540.304 AND EN.540.306 AND EN.661.315;EN.540.490 can be taken concurrently with EN.540.313

EN.540.314. ChemBE Product Design. 3 Credits.
This course guides the student through the steps of a project in product design. Product design concerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill the needs. It includes the design of a manufacturing process for the product and an estimation of the economic profitability of the concept. Students work in small teams to complete a major project demonstrating their understanding of and proficiency in the primary objectives of the course. Students report several times both orally and in writing on their accomplishments.
EN.540.306 AND EN.540.301;EN.540.303;EN.540.490

EN.540.315. Process Design with Aspen. 2 Credits.
The course guides the students through process design where they study the production of a chemical compound. They select a preferred process and create a flowsheet of the production process. They use Aspen simulation to evaluate the major unit operations of their process. They will carry out a hazard operations analysis on the process and perform an economic analysis when appropriate. Students work in small teams to complete their project and write a report on their work and conclusions.
EN.540.306 AND EN.540.301;EN.540.303;EN.540.490

EN.540.382. Statistical Modeling and Analysis with Python. 2 Credits.
The course introduces several statistical methods, used to analyze and extract useful information from data. Topics covered include descriptive statistics, basic probability theory, error analysis, confidence intervals, hypothesis testing, regression, design of experiments and an introduction to Bayesian Statistics. Students will also learn to perform statistical analysis of data using Python libraries.
(EN.500.113 OR EN.500.133) AND AS.110.202

EN.540.402. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genome-scale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.
AS.020.306 OR (EN.580.440 OR EN.580.441) OR EN.540.307

EN.540.403. Colloids and Nanoparticles. 3 Credits.
Fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hdrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nano- science and technology will be discussed throughout the course with frequent references to recent literature. Meets with EN.540.603

EN.540.405. Modern Data Analysis and Machine Learning for ChemBEs. 3 Credits.
This class will provide an introduction for chemical and biomolecular engineering students to modern methods of measuring and testing hypotheses using experimental or computational data. The course will cover methods of regression and data analysis such as linear and nonlinear regression, Bayesian analysis and principal or independent component analysis. The course will introduce concepts of machine learning including linear and nonlinear separation, neural networks, Gaussian processes and will provide exposure to deep learning concepts. The course will focus generally on image data and will consider topics of image processing, feature extraction and will cover for general data dimensionality reduction. Familiarity with computer programming (ideally Python), statistics and linear algebra are prerequisites.

EN.540.407. Renewable Energy Technologies. 3 Credits.
This course will discuss the recent progress of renewable energy technologies, emphasizing a perspective from chemical engineering. Engineering principles in terms of mass and energy balance, phase equilibrium, kinetics and catalysis, transport, etc. will be applied to analyze the performance of new energy conversion and storage technologies. Topics of interest include solar cells, fuel cells, batteries and biofuels.
EN.540.203 AND EN.540.303 AND EN.540.301

EN.540.409. Dynamic Modeling and Control. 4 Credits.
Introduction to modeling, dynamics, and control. Unsteady state analysis of biomolecular and chemical process control systems. State space and Laplace transform techniques, block diagram algebra, and transfer functions. Feedback and feedforward control. Frequency response and stability analysis. Applications in chemical engineering (chemical reactors and separative processes) as well as biomolecular engineering (biosynthesis, pharmacokinetic modeling and biomolecular modeling based upon central dogma/gene expression). Introduction to nonlinear dynamics.
EN.540.301 AND EN.540.306

EN.540.414. Computational Protein Structure Prediction and Design. 3 Credits.
This class will introduce the fundamental concepts in protein structure, biophysics, optimization and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, design of protein interfaces. Class will consist of lectures and hands-on computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project. Programming experience is recommended.

EN.540.415. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interfacial area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.540.418. Projects in the Design of a Chemical Car. 2 Credits.
Ready to put those concepts from class into practice? Members work over the course of the semester to design and build a chemically powered vehicle that will compete with other college teams at the American Institute of Chemical Engineers (AIChE) Regional Conference. In this course, the students work in small groups to design and construct the chassis along with chemically powered propulsion and break mechanisms within the constraints of the competition. In addition, students will give oral presentation, write reports, and do thorough safety analysis of their prototypes. Both semesters (EN.540.418 and EN.540.419) must be completed with passing grades to receive credit. This course may be repeated.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.419. Projects in the Design of a Chemical Car. 2 Credits.
Ready to put those concepts from class into practice? Members work over the course ofthe semester to design and build a chemically powered vehicle that will compete with other college teams at the American Institute of Chemical Engineers (AIChE) Regional Conference. In this course, the students work in small groups to design and construct the chassis along with chemically powered propulsion and break mechanisms within the constraints of the competition. In addition, students will give oral presentation, write reports, and do thorough safety analysis of their prototypes. Both semesters (EN.540.418 and EN.540.419) must be completed with passing grades to receive credit.

EN.540.421. Project in Design: Pharmacodynamics. 3 Credits.
This is continuation of 540.400 Project in Design: Pharmacokinetics. It is a design course in which the design projects will be to develop pharmacodynamic models of the human body that can be used to understand the physiologic effects of drugs on the body. The course (and software to be developed) will cover the spectrum of ways in which pharmaceuticals affect human physiology. The goal is to develop process models of the human body that will predict pharmaceutical effects as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.Prerequisites540.421 has a prerequisite of 540.400 Pharmacokinetics
EN.540.432

EN.540.422. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society from Nature-made proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high performance materials used in critically demanding areas, such as aviation, aerospace and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources ("green polymer chemistry") will also be covered. Lectures on functional polymers will be focused on their unique properties that are enabled by rational molecular design, controlled synthesis and processing (e.g. supramolecular assembly, and microfabrication). This class of specialty materials can find their use in high performance photovoltaics, batteries, membranes, and composites, and can also serve as "smart" materials for use in coatings, sensors, medical devices, and biomimicry.

EN.540.432. Project in Design: Pharmacokinetics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.540.440. Micro/Nanotechnology: The Science and Engineering of Small Structures. 3 Credits.
The field of micro / nanotechnology has been gaining tremendous momentum as evidenced by an explosive rise in the number of publications, patents and commercial activities. This is an introductory course intended to expose students to the field as well as real world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro and nanofabrication methods and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical and biological applications of emerging micro and nanoscale devices and materials. Co-listed with EN.540.640.Only Undergraduate Seniors and Graduate students may join the course.

EN.540.445. Junk Food Junkies. 3 Credits.
This is a course about how the food we eat affects our health. In particular, the major non-communicable illnesses all are caused by the food we eat causing metabolic dysfunction and metabolic diseases. Currently 70% of the people in the US have metabolic dysfunction and over 50% of us will die from a non-communicable metabolic disease. This course also is about how food companies addict us to eat certain foods and why these addictive foods lead to metabolic dysfunction.

EN.540.465. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered 'chemically' and 'physically/mechanically'. The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include: drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of self-assembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues and immune responses.
Students may take EN.540.465 or EN.540.665, but not both.;EN.540.303

EN.540.468. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306)) OR EN.553.291;Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.490. Introduction to Chemical Process Safety. 1 Credit.
This course covers topics in chemical process safety. Chemical process safety concerns itself with discovery, analysis, and control of risks arising from chemical processes. Starting with the definition of risk and ethical principles that apply to safety-critical situations, we will progress to several types of hazard analysis, discussion of the safety implications of construction materials, incident investigation, fire, toxicity, and the technique called Inherently Safer Design).
EN.540.203 AND EN.540.303;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.501. Interdepartmental Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.502. Undergraduate Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.509. Undergraduate Internship. 1 Credit.
Intership unpaid and approved by ChemBE faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.511. ChemBE Undergraduate Research. 1 - 3 Credits.
Students do individual projects (or in collaboration with faculty and/or graduate students) in areas basic to chemical engineering. This section has weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.600. Chemical and Biomolecular Engineering Seminar I. 1 Credit.
Lectures are presented on current subjects relevant to chemical engineering. Attendance at 80% of departmental seminars is required to receive credit for this class.

EN.540.601. Chemical and Biomolecular Engineering Seminar II. 1 Credit.
Lectures are presented on current subjects relevant to chemical engineering. Attendance at 80% of departmental seminars is required to receive credit for this class.

EN.540.602. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genome-scale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.

EN.540.603. Colloids and Nanoparticles. 3 Credits.
Fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hdrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nano- science and technology will be discussed throughout the course with frequent references to recent literature. Meets with EN.540.403

EN.540.604. Transport Phenomena in Practice. 3 Credits.
Required course for ChemBE Masters students

EN.540.605. Modern Data Analysis and Machine Learning for ChemBEs. 3 Credits.
This class will provide an introduction for chemical and biomolecular engineering students to modern methods of measuring and testing hypotheses using experimental or computational data. The course will cover methods of regression and data analysis such as linear and nonlinear regression, Bayesian analysis and principal or independent component analysis. The course will introduce concepts of machine learning including linear and nonlinear separation, neural networks, Gaussian processes and will provide exposure to deep learning concepts. The course will focus generally on image data and will consider topics of image processing, feature extraction and will cover for general data dimensionality reduction. Familiarity with computer programming (ideally Python), statistics and linear algebra are prerequisites.

EN.540.607. Renewable Energy Technologies. 3 Credits.
This course will discuss the recent progress of renewable energy technologies, emphasizing a perspective from chemical engineering. Engineering principles in terms of mass and energy balance, phase equilibrium, kinetics and catalysis, transport, etc. will be applied to analyze the performance of new energy conversion and storage technologies. Topics of interest include solar cells, fuel cells, batteries and biofuels.

EN.540.614. Computational Protein Structure Prediction and Design. 3 Credits.
This class will introduce the fundamental concepts in protein structure, biophysics, optimization and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, design of protein interfaces. Class will consist of lectures and hands-on computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project. Programming experience is recommended.

EN.540.615. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interfacial area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.540.618. Metabolic Dysfunctions and Related Diseases. 2 Credits.
This course will cover the principles of metabolism in cellular, organismal, and systemic levels and the mechanisms of how metabolic dysfunctions are associated with diseases, including diabetes and cancer. The topics will include but are not limited to the Warburg effect, signaling and metabolism, metabolic crosstalk, metabolic targets for cancer therapy, and state-of-the-art techniques for metabolic analyses. Students must have an understanding of undergraduate-level biochemistry. The grade will be based on attendance, participation in the discussions, and presentations.
EN.540.402 OR EN.540.602

EN.540.621. Project in Design: Pharmacodynamics. 3 Credits.
This is continuation of 540.400 Project in Design: Pharmacokinetics. It is a design course in which the design projects will be to develop pharmacodynamic models of the human body that can be used to understand the physiologic effects of drugs on the body. The course (and software to be developed) will cover the spectrum of ways in which pharmaceuticals affect human physiology. The goal is to develop process models of the human body that will predict pharmaceutical effects as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project. Prerequisites 540.421 has a prerequisite of Pharmacokinetics .
EN.540.632

EN.540.622. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society from Nature-made proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high performance materials used in critically demanding areas, such as aviation, aerospace and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources ("green polymer chemistry") will also be covered. Lectures on functional polymers will be focused on their unique properties that are enabled by rational molecular design, controlled synthesis and processing (e.g. supramolecular assembly, and microfabrication). This class of specialty materials can find their use in high performance photovoltaics, batteries, membranes, and composites, and can also serve as "smart" materials for use in coatings, sensors, medical devices, and biomimicry.

EN.540.628. Supramolecular Materials and Nanomedicine. 3 Credits.
Nanomedicine is a quickly growing area that exploits the novel chemical, physical, and biological properties of nanostructures and nanostructured materials for medical treatments. This course presents basic design principles of constructing nanomaterials for use in drug delivery, disease diagnosis and imaging, and tissue engineering. Three major topics will be discussed, including 1) nanocarriers for drug delivery that are formed through soft matter assembly (e.g., surfactants, lipids, block copolymers, DNA, polyelectrolytes, peptides), 2) inorganic nanostructures for disease diagnosis and imaging (e.g., nanoparticles of gold and silver, quantum dots and carbon nanotubes), and 3) supramolecular scaffolds for tissue engineering and regenerative medicine. Students are expected to learn the physical, chemical and biological properties of each nanomaterial, the underlying physics and chemistry of fabricating such material, as well as their advantages and potential issues when used for biomedical applications. This course will also provide students opportunities for case studies on commercialized nanomedicine products. After this class, students should gain a deeper understanding of current challenges in translating nanoscience and nanotechnology into medical therapies.

EN.540.630. Thermodynamics & Statistical Mechanics. 3 Credits.
In this course we will aim for understanding the thermodynamics of chemical and bio-molecular systems. We will first review classical, macroscopic thermodynamics covering concepts such as equilibrium, stability and the role of thermodynamic potentials. Our goal will be to gain a feel for the generality of thermodynamics. Statistical mechanics provides a link between the mechanics of atoms and macroscopic thermodynamics. We will introduce this branch in two distinct ways: 1) following standard methods of developing concepts such as ensembles and partition functions, and 2) where we will treat the basis of statistical mechanics as a problem in inference. With this foundation, we will consider concepts relevant to understanding the liquid state. Chemical transformations in a liquid are of importance in much of chemistry and biology; quasi-chemical generalizations of the potential distribution theorem will be introduced to present these ideas. We hope to give an overview of modern developments relating equilibrium work to non-equilibrium work, as these are of increasing importance in studies on single molecule systems. Course is open to Chemical and Biomolecular Engineering BS/MS Concurrent and MSE students.

EN.540.631. Kinetic Processes. 4 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates.

EN.540.632. Project in Design: Pharmacokinetics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.540.635. Software Carpentry. 3 Credits.
A 'crash course' intended to teach new graduate students the fundamentals of programming and practical coding skills that will accelerate facility with computational aspects of graduate research. The course covers how computers work from the inside out, with an introduction to the Linux operating system. Programming will be taught primarily in Python, with an emphasis on solving research-related problems. This peer-taught course will cover variables, conditionals, loops, functions, classes, plotting, data structures and algorithms, with some advanced topics (C++, gradient-based minimization, Procrustes, eigenvalue/vector data analysis, embarrassingly parallel `for' loops). No prior programming skills are required, but experience with an introductory computing language will be helpful. Familiarity with differential equations and linear algebra will be assumed.

EN.540.637. Application of Molecular Evolution to Biotechnology. 3 Credits.
One of the most promising strategies for successfully designing complex biomolecular functions is to exploit nature's principles of evolution. This course provides an overview of the basics of molecular evolution as well as its experimental implementation. Current research problems in evolution-based biomolecular engineering will be used to illustrate principles in the design of biomolecules (i.e. protein engineering, RNA/DNA engineering), genetic circuits and complex biological systems including cells. A course in Biochemistry or Molecular Biology is recommendedMeets with EN.540.437Undergraduates with the appropriate background can take the course with permission of the instructor.

EN.540.640. Micro/Nanotechnology: The Science and Engineering of Small Structures. 3 Credits.
The field of micro / nanotechnology has been gaining tremendous momentum as evidenced by an explosive rise in the number of publications, patents and commercial activities. This is an introductory course intended to expose students to the field as well as real world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro and nanofabrication methods and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical and biological applications of emerging micro and nanoscale devices and materials. Co-listed with EN.540.440.

EN.540.652. Advanced Transport Phenomena. 3 Credits.
It is the goal of this course to move the graduate student (and advanced undergraduate student) from the introductory level of transport phenomena (undergraduate) to a level that will allow them to be effective in researching transport-related topics in a variety of biomedical, chemical and biochemical engineering areas. The basic equations that govern mass, momentum, and energy transport will be derived and used to solve problems that demonstrate the physical insight necessary to apply these equations to original situations. Some topics include solution techniques utilizing expansions of harmonic functions, singularity solutions, lubrication theory for flow in confined geometries, boundary layer theory, Stokes flow, forced convection, buoyancy-driven flow, Taylor-Aris dispersion, and reaction-diffusion. Open to PhD students as well as Chemical and Biomolecular Engineering BS/MSE Concurrent and MSE students.

EN.540.665. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered 'chemically' and 'physically/mechanically'. The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include: drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of self-assembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues and immune responses.Recommended prerequisite: Transport Phenomena - EN.540.303 or equivalent
Students may take EN.540.465 or EN.540.665, but not both.

EN.540.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (S.110.302 OR AS.110.306) OR EN.553.291[C];Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.671. Advanced Thermodynamics in Practice. 3 Credits.
In this course, we will discuss the important role that thermodynamics plays in chemical engineering practice. After a short review of the first and second laws, we will examine how thermodynamic concepts affect mass and energy balances. We will discuss the properties of systems containing pure species and mixtures and how to analyze the behavior of ideal and real systems. We will estimate heat effects associated with temperature change, phase change, and chemical reaction. The theory associated with properties of pure fluids will be discussed along its application to flow processes. We will present the framework for understanding solution thermodynamics and mixing. Applications of thermodynamics especially important to chemical engineers, such as vapor-liquid equilibrium in distillation and chemical reaction equilibrium in kinetics and reaction engineering, will be discussed. Examples will serve to illustrate how thermodynamic calculations are an integral part of the design and optimization of chemical processes.

EN.540.673. Advanced Chemical Reaction Engineering in Practice. 3 Credits.
Chemical reaction engineering deals with the analysis on data and the design of equipment in which reactions occur. Reactors may contain one or more phases and be used to conduct chemical or biochemical transformations. The course will cover the fundamental aspects of kinetics, data acquisition, data interpretation, heterogeneous catalysis and heat and mass transfer for each type of reactor. Special emphasis will be placed on the practical application of reaction engineering in the petrochemical, chemical, biochemical and materials industries. The course will make student aware of the needs and opportunities for chemical reaction engineering in industry.

EN.540.674. Advanced Separation and Purification Processes in Practice. 3 Credits.
This course covers separation and purification processes (adsorption, absorption, membranes, distillation, chromatography, etc.) critical to the production of chemicals, materials, clean water, safe food, energy and pharmaceuticals. It also covers separations as applied in recycling and reuse and in mitigation of pollution. Integration of separation processes with reactors for intensified processes and reactive separations are also discussed. Emphasis is given on fundamentals of mass transfer processes and how they can be integrated for process design and process scale assessment.
EN.540.303 AND EN.540.203

EN.540.681. Molecular Kinetics and Catalysis. 3 Credits.
This course discusses chemical reaction kinetics, with an emphasis on understanding the macroscopic reaction phenomena (reaction rates, activation energies, rate constants, etc.) from microscopic molecular dynamics. Topics of interest include reacting chemical mixtures, molecular collision theory, potential energy surfaces, transition state theory, uni- or bi-molecular reaction dynamics, etc. Catalytic mechanisms will be discussed in terms of heterogeneous reactions at solid-gas interface and homogeneous reactions in solution phase. Scenarios of applications will cover examples drawn from petroleum and chemical industries, pharmaceutics, renewable energy technologies (e.g., fuel cells), and biomedicine (enzymatic catalysis).
EN.540.301 AND EN.540.630

EN.540.801. Graduate Research. 3 - 20 Credits.

Cross Listed Courses

Biomedical Engineering

EN.580.646. Molecular Immunoengineering. 3 Credits.
An in-depth study of the use of biomolecular engineering tools and techniques to manipulate immune function for clinical translation. The course will begin with a brief overview of the immune system, placing a particular emphasis on the molecular-level interactions that determine phenotypic outcomes. The remainder of the curriculum will address ways in which integrative approaches incorporating biochemistry, structural biophysics, molecular biology, and engineering have been used either to stimulate the immune response for applications in cancer and infectious disease, or to repress immune activation for autoimmune disease therapy. Recommended background: Biochemistry and Cell Biology or the BME Molecules and Cells. Those without recommended background should contact the instructor prior to enrolling.

Center for Leadership Education

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

General Engineering

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

For current faculty and contact information go to http://www.jhu.edu/chembe/faculty-staff/

Chemical and Biomolecular Engineering, Bachelor of Science

Graduates receive a Bachelor of Science degree in Chemical and Biomolecular Engineering accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org. As permitted under the

ABET guidelines, we continually update our undergraduate programs to include the latest advances in chemical and biomolecular engineering. Such modifications will enable us to offer the best possible educational experience to our undergraduates. For the latest chemical engineering educational programs, potential applicants are referred to our website at http://www.jhu.edu/chembe/

Program Requirements

(See also General Requirements for Departmental Majors (p. 1086))

The Bachelor of Science degree requires a minimum of 128 credits. Additional details are given in the *Chemical and Biomolecular Engineering Undergraduate Advising Manual* available from the department or online (https://engineering.jhu.edu/chembe/academics/undergraduate-studies/undergraduate-academic-program/).

The 128 credits must include:

Code	Title	Credits
Chemical and Biomolecular Engineering Core Courses		
EN.500.113	Gateway Computing: Python	3
EN.540.101	Chemical Engineering Today	1
EN.540.202	Introduction to Chemical & Biological Process Analysis	4
EN.540.203	Engineering Thermodynamics	3
EN.540.301	Kinetic Processes	4
EN.540.303	Transport Phenomena I	3
EN.540.304	Transport Phenomena II	4
EN.540.306	Chemical & Biomolecular Separation	4
EN.540.311	Projects in ChemE Unit Operations with Experiments	4
or EN.540.313	Projects in ChemBE Unit Operations with Experiments	
Select one of the following:		3-6
EN.540.314	ChemBE Product Design	
EN.540.309 & EN.540.310	Product Design Part 1 and Product Design Part 2	
EN.660.345 & EN.660.346	Multidisciplinary Engineering Design 1 and	3
EN.540.315	Process Design with Aspen	2
EN.540.409	Dynamic Modeling and Control	4
EN.540.490	Introduction to Chemical Process Safety [1]	1
Engineering Electives [2]		
Select 5-8 credits of engineering electives		5-8
Physics Courses and Laboratories		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
Basic Chemistry Courses and Laboratories [3]		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
Advanced Chemistry and Biology Courses		
AS.020.305	Biochemistry	3
AS.030.205	Introductory Organic Chemistry I	4
EN.540.307, AS.020.2XX Elective Course, or AS.030.2XX Elective Course [4]		3-5
Select one of the following: [5]		1-3
AS.020.315	Biochemistry Project lab	
AS.030.225	Introductory Organic Chemistry Laboratory	
AS.030.305	Physical Chemistry Instrumentation Laboratory I	
AS.250.253	Protein Engineering and Biochemistry Lab	
Mathematics Requirement [6]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.302	Differential Equations and Applications	4
or EN.553.291	Linear Algebra and Differential Equations	
Humanities and Social Sciences/ Writing Requirements		
EN.661.315	Culture of the Engineering Profession	3
Total Credits		**95-105**

1. Students also must have a grade point average of at least 2.00 in the chemical and biomolecular engineering core courses to graduate. The core courses for GPA calculation comprise all of the above courses except for EN.540.101 Chemical Engineering Today.
2. All courses offered by the Whiting School of Engineering that hold an Area Designation of E, and are taken for a letter-grade (not S/U) are approved as Engineering Electives. Additionally, up to 4 credits of Reasearch, conducted within a WSE department, are approved. In addition to these, other accepted courses are AS.250.302 Modeling the Living Cell, EN.500.132 Bootcamp: Java, EN.500.133 Bootcamp: Python, EN.500.134 Bootcamp: MATLAB. Further exceptions exist to these course; please consult the ChemBE Undergraduate Manual for full stipulations.
3. If you are receiving chemistry credits via AP, IB, or GCE exam, consult your academic advisor to discuss which chemistry course(s) may be appropriate for you.
4. Students need to take 3-5 elective credits beyond the required courses to meet the 13-credit total Advanced Chem/Bio Requirement. These courses must be chosen from the 030 or 020 Departments, should be at the 200-level minimum, and must carry an "N", Natural Sciences, area designation. Additionally, some courses offered by 250 (Biophysics) may be acceptable. MCB Track students must take EN.540.307 Cell Biology for Engineers or AS.020.306 Cell Biology, IN Track students must take AS.030.452 Materials & Surface.
5. Students doing the MCB Track must take either AS.020.315 Biochemistry Project lab, or AS.250.253 Protein Engineering and Biochemistry Lab here. Students doing the IN Track must take AS.030.305 Physical Chemistry Instrumentation Laboratory I here.
6. Calculus is so essential to Chemical Engineering that a grade of C- or better in both Calculus I and Calculus II is required.

- *Humanities and Social Sciences Courses.* Eighteen credits designated as Humanities or Social and Behavioral Sciences are required (6 courses of at least 3 credits each). At least one of these courses must be an advanced course at the 300-level or higher in addition to Culture of Engineering. See the Chemical and Biomolecular Engineering Undergraduate Advising Manual for more details.

- *Writing Courses.* Two writing-intensive courses are required. One of the courses must be EN.661.315 Culture of the Engineering Profession. The courses that are taken to satisfy the university writing requirement must be passed with a grade of C- or better.
- *Undesignated Electives.* A minimum of 128 credits is required for the degree. Therefore, in addition to all the credits taken to fulfill the requirements mentioned in the various sections above (e.g., chemical engineering core courses, engineering electives, basic science, advanced chemistry electives, mathematics requirement, and Humanities and Social and Behavioral Sciences courses) students will need to take some undesignated credits.

Tracks

Students pursuing a degree in Chemical and Biomolecular Engineering have the option of concentrating on specific fields including Interfaces and Nanotechnology and Molecular and Cellular Bioengineering. These focus areas have additional and/or alternate requirements, as described.

Interfaces and Nanotechnology (IN) TRACK

Students must fulfill the following requirements:

- The Advanced Chemistry and Biology laboratory requirement is fulfilled with AS.030.305 Physical Chemistry Instrumentation Laboratory I.
- AS.030.452 Materials & Surface is required and satisfies 3 credits of the Advanced Chemistry and Biology electives.
- Six credits of interfaces and nanotechnology electives are required- See department for a list of approved electives.

Molecular and Cellular Bioengineering (MCB) Track

Students must fulfill the following requirements:

- Students take either AS.020.306 Cell Biology or EN.540.307 Cell Biology for Engineers. It satisfies 3 credits of the Advanced Chemistry and Biology electives.
- The Advanced Chemistry and Biology laboratory requirement is fulfilled with AS.020.315 Biochemistry Project lab or AS.250.253 Protein Engineering and Biochemistry Lab.
- Six credits of bioengineering electives are required. See department for a list of approved electives.
- Students take EN.540.313 Projects in ChemBE Unit Operations with Experiments instead of EN.540.311 Projects in ChemE Unit Operations with Experiments.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I [1]	4
AS.173.111	General Physics Laboratory I	1
EN.540.101	Chemical Engineering Today	1
Optional HEART course or First-Year Seminar		1-3
	Credits	**15-17**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.171.102	General Physics: Physical Science Major II	4
2 Humanities/Social and Behavioral Sciences Electives		6
	Credits	**18**
Second Year		
First Semester		
EN.540.202	Introduction to Chemical & Biological Process Analysis	4
AS.110.302 or EN.553.291	Differential Equations and Applications or Linear Algebra and Differential Equations	4
AS.030.205	Introductory Organic Chemistry I	4
EN.500.113	Gateway Computing: Python	3
	Credits	**15**
Second Semester		
EN.540.203	Engineering Thermodynamics	3
EN.540.303	Transport Phenomena I	3
AS.110.202	Calculus III	4
Humanities/ Social and Behavior Sciences Elective		3
Undesignated Elective		3
	Credits	**16**
Third Year		
First Semester		
EN.540.304	Transport Phenomena II	4
EN.540.490	Introduction to Chemical Process Safety	1
AS.020.305	Biochemistry	3
Advanced Chemistry or Biology Lab [2]		1-3
Engineering Elective		3
Undesignated Elective		3
	Credits	**15-17**
Second Semester		
EN.540.301	Kinetic Processes	4
EN.540.306	Chemical & Biomolecular Separation	4
EN.661.315	Culture of the Engineering Profession	3
Advanced Chemistry or Biology Elective [3]		3
Undesignated Elective		3
	Credits	**17**
Fourth Year		
First Semester		
EN.540.311	Projects in ChemE Unit Operations with Experiments	4
EN.540.409	Dynamic Modeling and Control	4
Engineering Elective		3
Humanities/Social and Behavioral Sciences Elective		3
Undesignated Elective		3
	Credits	**17**
Second Semester		
EN.540.314	ChemBE Product Design	3
EN.540.315	Process Design with Aspen	2
Engineering Elective		3
Humanities/Social and Behavioral Sciences Elective		3

Undesignated Electives		4-6
	Credits	**15-17**
	Total Credits	**128-134**

1 Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.
2 Advanced Chemistry or Biology lab: AS.030.225 Introductory Organic Chemistry Lab, AS.030.305 Physical Chemistry Instrumentation Lab I, AS.020.315 Biochemistry Project Lab, or AS.250.253 Protein Engineering and Biochemistry Lab.
3 Cell Biology for Engineers EN.540.307 or any course designated AS.020 and AS.030 at the 200, 300, 400 level.

Sample Program: Molecular and Cellular Bioengineering Track

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I [1]	4
AS.173.111	General Physics Laboratory I	1
EN.540.101	Chemical Engineering Today	1
Optional HEART course or First-Year Seminar		1-3
	Credits	**15-17**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.171.102	General Physics: Physical Science Major II	4
2 Humanities/Social and Behavioral Sciences Electives		6
	Credits	**18**
Second Year		
First Semester		
EN.540.202	Introduction to Chemical & Biological Process Analysis	4
AS.110.302 or EN.553.291	Differential Equations and Applications or Linear Algebra and Differential Equations	4
AS.030.205	Introductory Organic Chemistry I	4
EN.500.113	Gateway Computing: Python	3
	Credits	**15**
Second Semester		
EN.540.203	Engineering Thermodynamics	3
EN.540.303	Transport Phenomena I	3
AS.110.202	Calculus III	4
Humanities/Social and Behavior Sciences Elective		3
Undesignated Elective		3
	Credits	**16**
Third Year		
First Semester		
EN.540.304	Transport Phenomena II	4
EN.540.490	Introduction to Chemical Process Safety	1
AS.020.315 or AS.250.253	Biochemistry Project lab or Protein Engineering and Biochemistry Lab	1-3
AS.020.305	Biochemistry	3
Engineering Elective		3
Undesignated Elective		3
	Credits	**15-17**
Second Semester		
EN.540.301	Kinetic Processes	4
EN.540.307	Cell Biology for Engineers	3
EN.540.306	Chemical & Biomolecular Separation	4
EN.661.315	Culture of the Engineering Profession	3
Undesignated Elective		3
	Credits	**17**
Fourth Year		
First Semester		
EN.540.313	Projects in ChemBE Unit Operations with Experiments	4
EN.540.409	Dynamic Modeling and Control	4
Bioengineering Elective		3
Humanities/Social and Behavioral Sciences Elective		3
Undesignated Elective		3
	Credits	**17**
Second Semester		
EN.540.314	ChemBE Product Design	3
EN.540.315	Process Design with Aspen	2
Bioengineering Elective		3
Humanities/Social and Behavioral Sciences Elective		3
Undesignated Electives		4-6
	Credits	**15-17**
	Total Credits	**128-134**

1 Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.

Sample Program: Interfaces and Nanotechnology (IN) Track

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I [1]	4
AS.173.111	General Physics Laboratory I	1
EN.540.101	Chemical Engineering Today	1
Optional HEART course or First-Year Seminar		1-3
	Credits	**15-17**

Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.171.102	General Physics: Physical Science Major II	4
2 Humanities/Social and Behavioral Sciences Electives		6
	Credits	**18**
Second Year		
First Semester		
EN.540.202	Introduction to Chemical & Biological Process Analysis	4
AS.110.202 or EN.553.291	Calculus III or Linear Algebra and Differential Equations	4
AS.030.205	Introductory Organic Chemistry I	4
EN.500.113	Gateway Computing: Python	3
	Credits	**15**
Second Semester		
EN.540.203	Engineering Thermodynamics	3
EN.540.303	Transport Phenomena I	3
AS.110.202	Calculus III	4
Undesignated Elective		3
Humanities/Social and Behavioral Sciences Elective		3
	Credits	**16**
Third Year		
First Semester		
EN.540.304	Transport Phenomena II	4
EN.540.490	Introduction to Chemical Process Safety	1
AS.030.452	Materials & Surface	3
AS.020.305	Biochemistry	3
Engineering Elective		3
Undesignated Elective		3
	Credits	**17**
Second Semester		
EN.540.301	Kinetic Processes	4
EN.540.306	Chemical & Biomolecular Separation	4
EN.661.315	Culture of the Engineering Profession	3
AS.030.305	Physical Chemistry Instrumentation Laboratory I	3
Undesignated Elective		3
	Credits	**17**
Fourth Year		
First Semester		
EN.540.311	Projects in ChemE Unit Operations with Experiments	4
EN.540.409	Dynamic Modeling and Control	4
Interfaces/Nanotechnology Elective		3
Humanities/Social and Behavioral Sciences Elective		3
	Credits	**14**
Second Semester		
EN.540.314	ChemBE Product Design	3
EN.540.315	Process Design with Aspen	2
Interfaces/Nanotechnology Elective		3
Humanities/Social and Behavioral Sciences Elective		3
Undesignated Electives		5-6
	Credits	**16-17**
	Total Credits	**128-131**

[1] Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.

Chemical and Biomolecular Engineering, Master of Science in Engineering

Program Overview

Students have several options in pursuing a Master's degree in Chemical and Biomolecular Engineering:

1. **Coursework-Based MSE**: A coursework-only degree in which students take ten 3-credit graduate-level courses (see "All Students' Course Requirements" below for more details). This option typically takes three semesters to complete. It can be shorter for students who began taking graduate-level courses while an undergraduate at Johns Hopkins (see "Combined BS/MSE Program and Students with BS in ChemBE from Johns Hopkins" below for more details).
2. **Essay/Report-Based MSE:**

- Option 1: *Research-Based MSE*: A research-intensive MSE in which students take six 3-credit graduate-level courses and undertake original research. The end product of the research is in the form of an MSE Essay submitted to the university and a presentation open to the department. (See "Essay-Based Students" below for more details.) This option typically takes four semesters and the intervening summer to complete. It can be shorter for students who began working on their research project while an undergraduate at Hopkins (see "Combined BS/MSE Program and Students with BS in ChemBE from Johns Hopkins" below for more details) or for students who do their research through the INBT Co-op Program (see "INBT Industry Co-Op Program" below for more details).
- Option2: *Design-Based MSE*: Similar to the research-based MSE option, except 3–4 semesters of Product Design are taken in addition to the six other graduate-level courses, and the end product is a written report and a presentation open to the department (see "Chemical Product Design Track (Design-Based MSE)" below for more details).

All MSE Students' Course Requirements

- All students are required to **submit their undergraduate transcript** to the Director of Master's Studies **prior** to the beginning of their first term to discuss their course plan. (An unofficial copy is sufficient.)
- Full-time registration for MSE students is at least 9 credits per semester.
- In the first semester: there is a mandatory Academic Ethics module and quiz which is part of every graduate student's degree requirements and must be completed with a passing grade. Students will see the course EN.500.603 Graduate Orientation and Academic Ethics added to their SIS enrollments; do not drop this course! Information will be sent closer to the start of the semester. See

https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/newly-admitted-students/graduate-student-orientation/ for more information.

- Students must enroll in at least one semester of Chemical and Biomolecular Engineering Seminar (EN.540.600 Chemical and Biomolecular Engineering Seminar I in Fall or EN.540.601 Chemical and Biomolecular Engineering Seminar II in Spring) throughout their tenure.
- Students must complete Responsible Conduct of Research training. For complete information, see https://engineering.jhu.edu/research/resources-policies-forms/online-training-course-responsible-conduct-of-research/.
- Students must complete a total of
  - 18 credits (for essay-based and design-based students), typically satisfied by six 3-credit courses,
  - 30 credits (for course-based students), typically satisfied by ten 3-credit courses, of graduate-level (i.e. 600-level and above) courses approved by the student's research advisor and the Director of Master's Studies. The student and research advisor will select these courses to design a curriculum appropriate for the student's research interests and educational goals. The courses must be taken for a letter grade (See "COVID-19 P/F Policy" below for more details). These courses cannot include seminars, independent studies, graduate research, or special studies.
- Students may substitute one of their 3-credit courses with a combination of 1–2-credit courses taken for a letter grade (excluding seminars, independent studies, graduate research, or special studies). This typically applies to courses in taken through the Center for Leadership Education (CLE). (See "Technical Writing Requirement" below.)
- Students are allowed to count 400-level courses towards their MSE degree only if (1) the course is not offered at the 600 level, and (2) the department offering the course considers it to be a graduate-level course in their program. (A letter from that department's head, chair, or graduate program director should be included in the submission of graduation materials.) Courses offered at both the 400 and 600 level must be taken at the 600 level to fulfill MSE course requirements. All ChemBE coursework must be taken at the 600 level.
- Minimum ChemBE course requirement:
  - At least 4 of the 6 courses for essay-based and design-based students or 6 of the 10 courses for course-based students must be in the Chemical and Biomolecular Engineering Department (EN.540.6xx or EN.545.6xx). Three of these courses are MSE core courses (see below).
  - Exceptions to this rule are very rare and must be approved by the Director of Master's Studies. A course from a department other than ChemBE may be allowed to count as one of the four courses only if the course has significant ChemBE content, is 3 credits (or if the student intends to use their one allowable substitution on a set of courses that add up to 3 credits), and is consistent with the student's research interests and educational goals as determined by the student's research advisor and the Director of Masters' Studies.
  - Students in the Design-based MSE track must take Product Design, one per semester for 3–4 semesters. These courses do not count towards the 6 courses.

Core Courses

- Students must take three core courses, one from each of the following categories:
  - Core 1 – Thermodynamics
    - EN.540.671 Advanced Thermodynamics in Practice, typically offered in the Spring semester.
    - With approval from the Director of Masters' Studies and the instructor, this course may be substituted for the more advanced version, EN.540.630 Thermodynamics & Statistical Mechanics, typically offered in the Fall semester.
  - Core 2 – Transport
    - EN.540.604 Transport Phenomena in Practice, typically offered in the Spring semester.
    - With approval from the Director of Masters' Studies and the instructor, this course may be substituted for the more advanced version, EN.540.652 Advanced Transport Phenomena, typically offered in the Fall semester.
  - Core 3 – Kinetics
    - Any one of the following courses:
      - EN.540.602 Metabolic Systems Biotechnology
      - EN.540.615 Interfacial Science with Applications to Nanoscale Systems
      - EN.540.632 Project in Design: Pharmacokinetics
      - EN.540.673 Advanced Chemical Reaction Engineering in Practice
      - EN.540.681 Molecular Kinetics and Catalysis
- Substitutions for the core courses are typically granted for students with backgrounds in ChemBE.
  - Between Core 1 and Core 2, only one of these two Cores may be substituted. (Students in the Combined BS/MSE program may substitute for both Core 1 and Core 2.)
  - Students cannot take both versions of the Core 1 courses and have them both count towards their course requirements, and likewise for Core 2. Multiple courses in Core 3 can be taken for course requirements; these excess courses would fall into elective slots.

Technical Writing Requirement

- Students must take at least one technical writing elective (at least 1 credit) offered by the CLE at JHU. Often, this is taken in addition to the six or ten graduate-level courses, but students may choose to take 3 credits of writing as one of their any-department electives (one 3-credit course or two 1.5-credit courses, typically). These courses include
  - EN.663.622 Professional Writing and Communication for Graduate Students
  - EN.663.640 Writing Grant and Contract Proposals
  - EN.663.644 Writing for Clarity
  - EN.663.645 Improving Presentation Skills for Graduate Students
  - Students who were JHU undergraduates are exempt from this requirement if they took EN.661.315 Culture of the Engineering Profession. (They must still take the full number of graduate-level credits, 18 or 30.)

Good Academic Standing

- Students must maintain a B average (GPA 3.0) in coursework to complete this degree.

- No D grade in ChemBE courses can be counted toward the requirements.
- In any given semester, an F, D, or two C grades will result in probation (C-, C, and C+ all count as C grades). Once on probation, any additional C+ grade or below will result in termination from the program. A student will remain on academic probation until the courses with the D or F have been retaken for a higher grade or, if no D or F grades were present, the student attains a B average in their coursework.

Essay and Report-Based Students

Additional Requirements for Research-Based and Design-Based Students

- Students must enroll in EN.500.601 Research Laboratory Safety in their first semester.
  - Students who were Hopkins undergraduates are exempt from this requirement if they took EN.540.490 Introduction to Chemical Process Safety .
- Students must maintain full-time registration for all semesters. In semesters where students are pursuing research, they may need to register for their advisor's research course (e.g. EN.540.801 Graduate Research, Section XX) for a number of credits equal to the difference between 9 and the number of other courses they are taking. (For example, a student taking one 3-credit course would register for 6 credits of research with their advisor to maintain 9 credits for full-time status.)
- Students must remain in good research standing with their research advisor. Failure to do so will result in probation and transfer to the course-based MSE track.

- Research-Based Students must write an essay based on original research and literature review and present their results at an open seminar attended by faculty and students. The essay must be approved by the departmental graduate committee, which consists of at least (1) the graduate research advisor and (2) a faculty member, one of which must be a faculty member from the Department of Chemical and Biomolecular Engineering (primary or secondary appointment). (See "Essay Presentation" below for more details.)

Alternatives to On-Campus Research:

INBT Industry Co-Op Program

To broaden the practical training for Master of Science in Engineering (MSE) students in the Whiting School of Engineering, the Institute for NanoBioTechnology (INBT) collaborates with major industry partners to offer a credited and paid co-op opportunity to MSE students in the Chemical and Biomolecular Engineering, Materials Science and Engineering, and Mechanical Engineering programs.

ChemBE students pursuing the essay-based track have the opportunity to choose the co-op program as an alternative to conducting research in Hopkins laboratories. Students must apply through the INBT office during their first semester. (This application process is separate from and happens after being admitted to the ChemBE MSE program.)

Each student who is accepted to the program will be assigned a research advisor/mentor at the sponsoring company. The company is expected to develop a list of goals and development objectives for the student. Once the project has been determined, a few weeks prior to the start of the co-op or within the first week, students must find a faculty advisor with primary or secondary appointment in ChemBE. During the six-month co-op period, students will meet with the faculty advisor at least every six weeks for progress updates. At the end of the co-op internship, students will complete an essay and present their results at an open seminar attended by faculty and students. The company mentor can serve as the student's second reader as long as they have a PhD or commensurate work experience.

For more information, please visit the INBT page (https://inbt.jhu.edu/masters/).

Chemical Product Design Track (Design-based MSE)

Chemical and Biomolecular Engineering MSE students pursuing the design-based track and students pursuing an MSEM can choose to focus on Chemical Product Design rather than on traditional engineering science.

- Students in the design-based track work in a group of 3–4 students on a product design project for 3–4 semesters instead of doing research. (Design-based requirements are equivalent to the essay-based requirements plus semesters of Product Design.)
- The group collectively writes a patent application and a value proposition for their product in lieu of a traditional research MSE essay. Instead of submitting the materials to the university, students instead submit them to the Product Design instructor for approval for graduation.
- Students in the MSEM program take 3 engineering science courses and typically work on their product design project for 3–4 semesters.

The Chemical Product Design tracks (for both the MSE and MSEM) will train students how to develop new products based on chemicals or chemical engineering principles.

- The first semester is devoted to exploring how to develop new product ideas and to develop a preliminary product design.
- The second and subsequent semesters are devoted either to building and refining a working prototype of their product or to doing the proof-of-concept experiments to prove that your product design is viable.

The goal is to get your product to Technology Readiness Level 6 by the end of the program.

Additional information can be found in the department MSE Handbook (https://engineering.jhu.edu/chembe/wp-content/uploads/2022/01/2021-22-ChemBE-MSE-Handbook-v20220107.pdf).

Chemical and Biomolecular Engineering, PhD

Program Requirements

The Ph.D. is awarded for original research performed under the guidance of a thesis advisor. The formal requirements for this degree are:

1. Completion of six graduate-level courses, including the four required core and elective courses.
2. Completion of an annual research evaluation each year.
3. Serve as a teaching assistant for at least two required courses.
4. Completion in the first semester of departmental safety requirements (see Handbook for more information).
5. Attend graduate seminars (EN.540.600 Chemical and Biomolecular Engineering Seminar I/EN.540.601 Chemical and Biomolecular

Engineering Seminar II) every semester. Students are expected to enroll and attend department seminars throughout their tenure in the department.

6. Successful completion of the Graduate Board Oral Exam.
7. Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
8. Completion of Responsible Conduct of Research training. For complete information, see https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/online-training-course-for-the-responsible-conduct-of-research/
9. Completion of Academic Ethics (EN.500.603 Graduate Orientation and Academic Ethics)
10. Application for Graduation submitted to Registrar's office.
11. Successful submission of a dissertation for publication through the electronic thesis dissertation system of (ETDS) the Johns Hopkins Library (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/).

Ph.D. Course Work

Students must successfully complete six graduate-level courses including the four required core and elective courses listed below:

Code	Title	Credits
Students must successfully complete six graduate-level courses, including:		
EN.540.630	Thermodynamics & Statistical Mechanics	3
EN.540.652	Advanced Transport Phenomena	3
In their first semester, students are also required to complete:		
EN.500.601	Research Laboratory Safety	1
In addition, students must choose to take at least two courses from the list of strongly recommended electives:		
EN.540.602	Metabolic Systems Biotechnology	3
EN.540.605	Modern Data Analysis and Machine Learning for ChemBEs	3
EN.540.615	Interfacial Science with Applications to Nanoscale Systems (Not Offered AY 21-22)	3
EN.540.673	Advanced Chemical Reaction Engineering in Practice	3
EN.540.674	Advanced Separation and Purification Processes in Practice	3
EN.540.681	Molecular Kinetics and Catalysis	3

Ph.D. Students are strongly encouraged to take the four required courses in the first fall semester. However, students who do not have an undergraduate degree in Chemical Engineering or a closely related field may need additional courses and should discuss an appropriate course plan with the Director of the Graduate Program at the start of their first semester.

The remaining two engineering or science courses are chosen with the help of the student's advisor to design a curriculum appropriate for the student's research interest. These two courses cannot include seminars, independent study, graduate research or special studies. They must be a semester-long letter grade course.

Each of the six courses must be passed with a letter grade of B- or higher. In addition, the student must maintain an overall grade point average (GPA) of 3.0 or better. If the student's GPA falls below 3.0, the student must re-take one or more of the courses and earn a higher grade. All grades remain on graduate students transcripts. If a student receives a grade of C+ or lower in a required core course, the student will be allowed to re-take the course once to achieve a grade of B- or higher. Failure to receive a B- or better the second time may be cause for dismissal from the program. Receipt of grades of C+ or lower in two or more required courses may be cause for dismissal from the program without the opportunity to re-take those courses.

Ph.D. Thesis Criteria and Graduate Board Oral Exam

Candidates must write a dissertation conforming to university requirements that describes the students work and results in detail. A public defense of the dissertation is required, and will be followed by a closed examination session. Because the closed examination session fulfills the university Graduate Board Oral (GBO) examination requirement, all procedures pertaining to GBOs as established by the University Graduate Board must be followed.

Additional information can be found in the department Graduate Handbook (https://engineering.jhu.edu/chembe/wp-content/uploads/sites/11/2018/09/2018-2019-ChemBE-Handbook-Final-9.18.pdf.html).

Civil & Systems Engineering

https://engineering.jhu.edu/case/

Offering academic and research programs at the undergraduate, graduate, and postdoctoral levels, the Department of Civil and Systems Engineering aims to build knowledge and provide tools that will enable students to move the field away from empirical ad hoc approaches into strategies based on scientifically-grounded analysis.

With a foundation rooted in fundamental structural engineering and mechanics, systems thinking, advanced computational methods, and uncertainty quantification, our programs successfully navigate the conflicting objectives inherent in addressing grand societal challenges, such as resilient cities, human safety and security, space exploration, and habitation, decision making and health, and future energy infrastructure.

The department's small size fosters a collegial, close-knit relationship between students, staff, and faculty, giving students a high-quality, comprehensive education where leading civil and systems engineering research in the areas of mechanics of materials, structures, and systems is cross-fertilized with research from other fields. Partnerships and collaborations with the departments of Computer Science, Environmental Health and Engineering, Mechanical Engineering, Biomedical Engineering, Materials Science and Engineering, Applied Mathematics and Statistics, Public Health, and other Johns Hopkins groups provide a wide range of opportunities that rival those of much larger programs.

The department sponsors an undergraduate and graduate seminar series, as well as the Richard J. Carroll endowed lectureship; all of which are designed to bring prominent civil and systems engineers to campus to speak with students and faculty.

Undergraduate Programs

The Civil and Systems Engineering undergraduate programs build the foundation for a lifetime of learning by giving students an education that is unique in its depth, while providing access to faculty and an extraordinary range of educational opportunities beginning in freshman year. Building on the foundation of creative problem-solving skills, teamwork, and independent inquiry, our students pursue a wide array of research and professional experiences that provide exposure to more highly specialized subject matter. Our alumni have successful careers in a variety of fields, including academia, civil and systems engineering practice, law, medicine, technology and finance. With opportunities ranging from using a variety of skills to address a real-life issue during the senior design course to connecting with employers via our annual CaSE Career Fair, CaSE undergraduates are prepared for the workforce, wherever that may be.

Graduate Programs

Powerful computational methods, advanced mathematics, and high-strength materials offer new opportunities and new challenges. The Department of Civil and Systems Engineering offers graduate programs that are based primarily on the mechanics of materials, structures, and systems engineering. Fundamental to these areas is research in solid, structural, stochastic mechanics, operations research, and network modeling. The graduate programs are designed to instill in the student fundamental theoretical concepts, numerical algorithms, and practical knowledge of modern materials, structural, and systems engineering. To be admitted to the program, students are expected to have graduated with an outstanding record in an appropriate undergraduate program.

Facilities

The Department's teaching and research labs are located in Latrobe Hall. Teaching laboratories include a modern multi-use facility for exploring experiments in statics, mechanics of materials, dynamics, and other courses, and a dedicated soil mechanics laboratory. Research laboratories include the Thin-walled Structures Laboratory, Structural Testing Laboratory, Structural Materials at High Temperature Laboratory, and Digital Fabrication and Programmable Matter Laboratory. The Department also possesses an array of modern fabrication equipment, including 3-D printers, modern CNC, and other fabrication facilities for the purposes of building prototypes, specimens and maintaining equipment and experiments. The Civil Engineering High Performance Cluster (CE-HPC) is a medium-scale high-performance computing cluster used primarily for research. We are also pleased to provide an undergraduate Design Studio and computer lab, as well as office space for doctoral students and a graduate student lounge.

Programs

- Civil Engineering, Bachelor of Science (p. 1245)
- Systems Engineering, Bachelor of Science (p. 1248)
- Civil Engineering, Master of Science in Engineering (MSE) (p. 1250)
- Civil Engineering, Minor (p. 1252)
- Civil and Systems Engineering, PhD (p. 1252)
- Systems Engineering, Master of Science in Engineering (MSE) (p. 1255)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.560.100. Civilization Engineered. 3 Credits.
Civilizations have always faced challenges – whether naturally occurring or manmade – and have had to design solutions in order to survive. Our modern civilization is no different; we face major societal challenges related to resilient cities, human safety and security, decision-making and healthcare, energy infrastructure, and space exploration and habitation, among others, and solving these challenges will require an interdisciplinary approach. This course will look to the past – studying the engineering solutions developed by ancient civilizations – and at the current state of affairs – in preparation for designing solutions to the grand challenges of the future.

EN.560.112. Electromagnetism & Sensors Lab. 1 Credit.
Electricity and magnetism underpins much of modern engineering, as an alternative or addendum to classical Physics this, largely, hands-on laboratory course exposes engineers to the principles of electromagnetism and how they are leveraged in the modern world with a focus on their application in infrastructure and sensor networks.

EN.560.141. Perspectives on the Evolution of Structures. 3 Credits.
Why do buildings and bridges look the way they do today? Students will be provided the tools to answer this question for themselves through a study of the history of the design of buildings and bridges throughout the world from both engineering and architectural/aesthetic perspectives. Only simple mathematics is required (no calculus). Students will participate in individual and group critique of structures from engineering, architectural, and social points of view.
Area: Writing Intensive

EN.560.191. CaSE Collaborative. 0.5 Credits.
From sketching to 3D printing, students in this course will work directly with the tools that civil and systems engineers use to plan and communicate their ideas. Hands-on learning activities will help students develop these skills, with an emphasis on communication and collaboration using graphical tools such as CAD and GIS software and physical specimens fabricated with manual construction and 3D printing.

EN.560.192. CaSE Design. 0.5 Credits.
Through this course, students will be introduced to various design principles and further explore the role of civil and systems engineering design in communities and society. Students will work collaboratively with a civil and systems engineering senior design team or research group to explore the impact of their intended design on communities.

EN.560.201. Statics & Mechanics of Materials. 3 Credits.
This course combines statics - the basic principles of classical mechanics applied to the equilibrium of particles and rigid bodies at rest, under the influence of various force systems - with mechanics of materials - the study of deformable bodies and the relationships between stresses and deformations within those bodies. Fundamental concepts in statics include the proper use of free body diagrams, the analysis of simple structures, centroids and centers of gravity, and moments of inertia. The study of mechanics of materials will focus on the elastic analysis of axial force, torsion, and bending members to determine corresponding stresses and strains. Stress transformations and principal stresses will be introduced.For most majors, students are required to register for both 560.201 Statics and Mechanics of Materials and 560.211 Statics and Mechanics of Materials Laboratory.
Prerequisite(s): EN.560.211
AS.171.101 OR AS.171.107 OR (EN.530.123 AND EN.530.124) or instructor permission.

EN.560.211. Statics and Mechanics of Materials Laboratory. 1 Credit.
The complementary laboratory course for and required corequisite to EN.560.201 Statics and Mechanics of Materials. For most majors, students are required to register for both 560.201 Statics and Mechanics of Materials and 560.211 Statics and Mechanics of Materials Laboratory.
Prerequisite(s): EN.560.201
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.560.240. Uncertainty, Reliability and Decision-making. 3 Credits.
Development and applications of the analysis of uncertainty, including basic probability, statistics and decision theory, with applications in various engineering disciplines, with some emphasis on problems in civil and systems engineering.

EN.560.250. Intro to Mathematical Decision Making. 3 Credits.
This first course in mathematical decision-making and optimization uses quantitative approaches to problem solving. The students are introduced to mathematical modeling and its formulations, solutions methods, output analysis, and hands-on solution techniques. An array of practical problems from Energy, Health, Space, Management, Engineering, and other fields are reviewed, and a number of solution methods including but not limited to, linear optimization, integer optimization, convex optimization, decision analysis, and heuristic algorithms are introduced.

EN.560.255. Dynamical Systems. 3 Credits.
This course will introduce students to the modeling and analysis of dynamical systems using analytical, numerical and qualitative (geometric) techniques. The course will focus on dynamical systems arising in mechanics and vibrations, global climate and infectious disease modeling. The following topics will be covered: linear first and second order ODEs, analytical methods, Laplace and Fourier transforms, control systems, numerical integration, finite differences, nonlinear systems, phase plane analysis, stability, bifurcations, chaos.

EN.560.291. CaSE Coding. 0.5 Credits.
Having taken a computing course in the freshman year, students will further develop their programming skills to solve, understand, or automate problems specific to civil and systems engineering.
AS.110.109 AND EN.500.113

EN.560.292. CaSE Research. 0.5 Credits.
An introduction to the research process, students in this project-based course will develop an appreciation for the role of research in our society and will learn the tools indispensable to researchers, including how to conduct literature reviews, how to read and write technical literature, as well as how to formulate and test a research hypothesis. Students will explore the research process through a variety of methods including as an exercise in uncertainty quantification.

EN.560.301. Structural Systems I. 3 Credits.
This course will introduce students to the structural design workflow from concept and ideation to structural modeling and analysis to member and connection design using the reliability-based limit states approach. This first course in a two-course sequence will focus on the analysis and design of structural systems composed primarily of axial force members (e.g. trusses, cables, and arches). Connections to mechanics-based principles will be emphasized and practical applications using common structural materials such as timber, steel, and reinforced concrete will be covered.

EN.560.302. Structural Systems II. 3 Credits.
This second course in the two-course structural systems sequence will reinforce the structural design workflow from concept and ideation to structural modeling and analysis to limit states design, but with a focus on the analysis and design of structural systems composed of bending members (e.g. frames). Connections to mechanics-based principles will again be emphasized and practical applications using common structural materials such as timber, steel, and reinforced concrete will be covered.
EN.560.301 Structural Systems I OR EN.560.325 Structural Design II

EN.560.305. Soil Mechanics. 4 Credits.
Basic principles of soil mechanics. Classification of soils. Compaction theory. Consolidation seepage and settlement analysis. Stress-strain and shear strength of soils. Introduction to earth pressure theories and slope stability analysis.
EN.560.201 AND EN.560.211;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.560.330. Foundation Design. 3 Credits.
Application of soil mechanics theory and soil test results to the analysis and design of foundations for structures; retaining walls; embankments; design of pile and shallow footing foundations; slope stability.
EN.560.305

EN.560.362. Engineering Mechanics and Materials. 3 Credits.
This course will address linear mechanics of solid and fluid media. Concepts will be reinforced through hands-on fabrication, machining and testing of materials, and by the use of finite element models.

EN.560.391. CaSE Careers I. 0.5 Credits.
Civil Engineering Seminar provides students with opportunities to explore the wide range of civil engineering career paths (e.g. consulting, academia, government, industry, and construction) through invited speakers, field trips to design offices / construction sites, and attendance at professional society meetings. Topics related to engineering ethics, professional licensure, and other professional issues are also discussed.

EN.560.392. CaSE Careers II. 0.5 Credits.
Civil Engineering Seminar provides students with opportunities to explore the wide range of civil engineering career paths (e.g. consulting, academia, government, industry, and construction) through invited speakers, field trips to design offices / construction sites, and attendance at professional society meetings. Topics related to engineering ethics, professional licensure, and other professional issues are also discussed.

EN.560.401. Design Theory and Practice. 3 Credits.
Survey of the major theories of engineering design and the contexts in which they have evolved, and are applied. Practice in three dominant schools of modern engineering design: (i) waterfall or sequential design as commonly employed in civil construction; (ii) iterative/spiral design as employed in rapid prototyping or agile development for devices and software; and (iii) human-centric design as employed by engineers challenged to confront individual or social scale needs.

EN.560.421. Architectural Engineering - Form, Function and Technology. 3 Credits.
This course will cultivate broad knowledge of the use of engineering principles in the art of architecture. Fundamental definitions of architecture in the basic provision of shelter and social use are paired with aesthetics and cultural heritage. The course emphasizes structural frameworks and systems within the Civil Engineering curriculum, while expanding upon their critical intersections with the highly varied specialized components and systems of modern architecture, and the corresponding community of specialists that represent them. Topics include a historical view of the evolution of specialization in architecture, a quantitative review of loads and resistance systems, architectural and structural determinants of form, the function and aesthetics of building surface, and an introduction to environmental systems and their role in design sustainability. The class will include a trip to Fallingwater, the house designed by Frank Lloyd Wright, in western Pennsylvania, which stands as an iconic example of American architecture and a complex example of architectural engineering. This course is co-listed with EN.560.621 and EN.565.621.

EN.560.423. Bridge Engineering. 3 Credits.
This course will explore bridge design and analysis by studying local bridges of various forms, materials, and load demands. Topics include an overview of the history of bridge engineering, an introduction to the AASHTO Standard Specifications for Highway Bridges, analysis techniques and load ratings, bridge details, and substructure design.
EN.560.320 AND EN.560.325

EN.560.429. Preservation Engineering: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete).This course will examine structures made of a wide variety of materials and instruct the student how to evaluate their condition, determine their existing capacity, and design repairs and/or reinforcement. The investigation and analysis procedures learned from this course may then be applied to create economical and durable structural alterations that allow for the reuse of older buildings. Site visits near Homewood campus will supplement lectures.
EN.560.320 AND EN.560.325 or equivalent for graduate students.

EN.560.431. Preservation Engineering II: Theory and Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution--namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.Course is co-listed with EN.560.631 and EN.565.631.
EN.560.429 OR Permission from the instructor.

EN.560.434. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented. Course is co-listed with graduate-level EN.560.634.

EN.560.445. Advanced Structural Analysis. 3 Credits.
Matrix methods for the analysis of statistically indeterminate structures such as beams, plane and space trusses, and plane and space frames. Stiffness and flexibility methods. Linear elastic analysis and introduction to nonlinear analysis. Co-listed with EN.560.619.
EN.560.301

EN.560.450. Operations Research. 3 Credits.
An introduction to operations research and its applications. The course will review the basics of mathematical modelling, linear programming, primal and dual Simplex methods, post-optimization analysis, decomposition methods, and heuristic methods along with sample applications. Recommended course background AS.110.201 and AS.110.109 or equivalent. This course is co-listed with EN.560.650.

EN.560.453. An Introduction to Network Modeling. 3 Credits.
Many real-world problems can be modeled using network structures, and solved using tools from network theory. For this reason, network modeling plays a critical role in various disciplines ranging from physics and mathematics, to biology and computer science, and almost all areas of social science. This course will provide an introduction to network theory, network flow algorithms, modeling processes on networks and examples of empirical network applications spanning transport, health and energy systems. Co-listed with EN.560.653.
EN.553.291

EN.560.458. Natural Disaster Risk Modeling. 3 Credits.
This course will introduce the student to disaster risk modeling process, including: structure of catastrophe models and uses in loss estimation and mitigation, study and modeling of hazards (esp. hurricanes and earthquakes; also flood, landslide, and volcanic), vulnerability assessment including simulation of building damage, and estimation of post-disaster injuries and casualties. Additionally topics will include, exposure modeling (building typology distribution), introduction to disaster economic loss modeling, interpretation of risk metrics (return periods, PML, AAL, VaR, TVaR), their uncertainty, and applicability to management and financial decision making process and elements of present and future risk, such as, climate and exposure changes. Students will gain introductory experience in the use of GIS and simulation with Matlab. This course is co-listed with EN.560.658.

EN.560.462. Failure Mechanics in Materials. 3 Credits.
This course provides an overview of the various modes of failure found in structural materials. The concepts will be demonstrated through both experimental demonstrations and finite element models.

EN.560.501. Undergraduate Research. 1 - 3 Credits.
Research in Civil Engineering
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.511. Group Undergraduate Research. 1 - 3 Credits.
This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.526. Independent Study - Civil Engineering. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.601. Applied Math for Engineers. 3 Credits.
This course presents a broad survey of the basic mathematical methods used in the solution of ordinary and partial differential equations: linear algebra, power series, Fourier series, separation of variables, integral transforms.

EN.560.604. Introduction to Solid Mechanics. 3 Credits.
Basic solid mechanics for structural engineers. Stress, strain and constitutive laws. Linear elasticity and viscoelasticity. Introduction to nonlinear mechanics. Static, dynamic and thermal stresses. Specialization of theory to one- and two-dimensional cases: plane stress and plane strain, rods, and beams. Work and energy principles; variational formulations.

EN.560.618. Probabilistic Methods in Civil Engineering and Mechanics. 3 Credits.
Covers probabilistic computational modeling in civil engineering and mechanics: Monte Carlo simulation, sampling methods and variance reduction techniques, simulation of stochastic processes and fields, and expansion methods. Applications to stochastic finite element, uncertainty quantification, reliability analysis, and model verification and validation.

EN.560.619. Advanced Structural Analysis. 3 Credits.
Matrix methods for the analysis of statistically indeterminate structures such as beams, plane and space trusses, and plane and space frames. Stiffness and flexibility methods. Linear elastic analysis and introduction to nonlinear analysis.

EN.560.621. Architectural Engineering - Form, Function and Technology. 3 Credits.
This course will cultivate broad knowledge of the use of engineering principles in the art of architecture. Fundamental definitions of architecture in the basic provision of shelter and social use are paired with aesthetics and cultural heritage. The course emphasizes structural frameworks and systems within the Civil Engineering curriculum, while expanding upon their critical intersections with the highly varied specialized components and systems of modern architecture, and the corresponding community of specialists that represent them. Topics include a historical view of the evolution of specialization in architecture, a quantitative review of loads and resistance systems, architectural and structural determinants of form, the function and aesthetics of building surface, and an introduction to environmental systems and their role in design sustainability. The class will include a trip to Fallingwater, the house designed by Frank Lloyd Wright, in western Pennsylvania, which stands as an iconic example of American architecture and a complex example of architectural engineering. This course is co-listed with EN.560.421 and EN.565.621.

EN.560.623. Bridge Engineering. 3 Credits.
This course will explore bridge design and analysis by studying local bridges of various forms, materials, and load demands. Topics include an overview of the history of bridge engineering, an introduction to the AASHTO Standard Specifications for Highway Bridges, analysis techniques and load ratings, bridge details, and substructure design.

EN.560.629. Preservation Engineering I: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete). This course will examine structures made of a wide variety of materials and instruct the student how to evaluate their condition, determine their existing capacity, and design repairs and/or reinforcement. The investigation and analysis procedures learned from this course may then be applied to create economical and durable structural alterations that allow for the reuse of older buildings. Site visits near Homewood campus will supplement lectures. This course is co-listed with EN.565.628.

EN.560.630. Structural Dynamics. 3 Credits.
Functional and computational examination of elastic and inelastic single degree of freedom systems with classical and non-classical damping subject to various input excitations including earthquakes with emphasis on the study of system response. Extension to multi-degree of freedom systems with emphasis on modal analysis and numerical methods. Use of the principles of structural dynamics in earthquake response.

EN.560.631. Preservation Engineering II: Theory and Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution--namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.This course is co-listed with EN.560.431 and EN.565.631.

EN.560.633. Investigations, Diagnosis, and Rehabilitation. 3 Credits.
Why do buildings deteriorate, and how do we address this problem? This course examines the deterioration (by human and nature) of building materials and systems. Through lectures and a field trip, students will learn how to set up and execute an investigation, study the symptoms, diagnose the problems, determine what kinds of tests are needed, design the necessary repairs, and maintain existing systems. This course is co-listed with Engineering for Professionals EN.565.633.

EN.560.634. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented.
Area: Writing Intensive

EN.560.635. Applied Numerical Modeling for Thermal Structural Analysis. 3 Credits.
This course discusses advanced topics in numerical modeling by the nonlinear finite element method with application to structural systems subjected to thermal loads. Covered topics include heat transfer and structural analyses, computational constitutive modeling, best practices for constructing and interpreting numerical models, and use of numerical modeling to support performance-based structural design. The course includes hands-on projects with a nonlinear finite element software.
At least one graduate-level course in finite element method and one in structural analysis are prerequisites.

EN.560.636. Lateral Forces: Analysis and Design of Building Structures. 3 Credits.
From earthquakes to wind events, lateral forces constitute some of the most extreme loading conditions for which new and existing building structures must be analyzed and designed to resist. This course provides a fundamental yet practical introduction to the development and application of earthquake and wind loadings on building structures, the dynamic response and behavior of structures to lateral forces, and the bases and requirements for ductile design and detailing of steel, concrete, wood, and masonry lateral force resisting elements. The course will build on these analysis and design fundamentals to examine the technical considerations and methodologies for evaluating the lateral force resisting systems of existing, oftentimes monumental, building structures, and for designing and implementing repairs and retrofits to these lateral systems, including the application of Performance Based Design. This course is co-listed with EN.565.636.

EN.560.637. Preservation Engineering in the Urban Context. 3 Credits.
Technical expertise is fundamental to design and construction within and around historic buildings in the urban context. This course will cover topics related to both design and construction. For below-grade engineering, the course will cover underpinning, bracket piles, secant piles, slurry walls, tie-backs and general shoring approaches to building below or adjacent to existing constructions. For upward additions to existing construction, the course covers strengthening techniques (including temporary shoring and bracing, temporary access options, and temporary protection) and the requirements of the International Existing Building Code (IEBC). Each class will provide both technical guides and case studies, offering perspectives from guest speakers practicing the diverse range of professions tasked to meet this challenge. In lieu of a final exam, students will be required to submit a final paper/project.

EN.560.643. Optimization Modeling Foundations. 3 Credits.
The goal of this course is to introduce a series of optimization modeling techniques, including linear, integer, and robust optimization. The course covers theoretical aspects of modeling and solution methods, as well as foundations and tips for practical examples. Enrollees are expected to know basic linear algebra. Familiarity with linear programming, real analysis, and coding is recommended but not required.

EN.560.645. Topics in Optimization: Integer and Robust Optimization. 3 Credits.
The goal of this course is to introduce various advanced topics in optimization, including integer optimization, robust optimization, and inverse optimization. The course covers theoretical aspects of modeling and solution methods, as well as foundations and tips for practical examples. Enrollees are expected to have completed EN.553.761 or a comparable course on Linear Programming.

EN.560.646. Smart Cities. 3 Credits.
In recent years, sustainability progress has resulted mainly from developing and implementing smart, sustainable technology solutions. This course examines opportunities to drive sustainability through technology applications, deemed the “smart city”. Smart city technology ranges from intelligent infrastructure in modern cities to mobile applications that enable the “sharing economy” and facilitate energy access in remote regions of East Africa. This course will not only concern “first-world” problems; we will explore the transformative solutions currently driving growth in emerging markets and the developing world. Students will develop the skills to piece together a sustainable, smart city.

EN.560.650. Operations Research. 3 Credits.
An introduction to operations research and its applications. The course will review the basics of mathematical modelling, linear programming, primal and dual Simplex methods, post-optimization analysis, decomposition methods, and heuristic methods along with sample applications. Course meets with EN.560.450

EN.560.653. An Introduction to Network Modeling. 3 Credits.
Many real-world problems can be modeled using network structures, and solved using tools from network theory. For this reason, network modeling plays a critical role in various disciplines ranging from physics and mathematics, to biology and computer science, and almost all areas of social science. This course will provide an introduction to network theory, network flow algorithms, modeling processes on networks and examples of empirical network applications spanning transport, health and energy systems.

EN.560.656. Space Systems Cybersecurity. 3 Credits.
Our space systems are under attack. Cyberattacks are among the most prevalent threats to space assets. They are often stealthy, inexpensive and highly effective at achieving an adversary's goal – be it data corruption, IP theft or physical destruction of the satellite. Given space systems are complex, composing ground stations, communications and satellites the surface area of attack is vast and considering the constrained computing capacity of space systems, many traditional security mechanisms are not applicable. This course introduces how an adversary would approach attacking a satellite, opportunities for systems engineers to develop cyber-resilient assets and relevant policies and best practices to support space system cybersecurity. Recommended classes - EP 675.600 and 675.601.

EN.560.657. System Dynamics. 3 Credits.
System dynamics is a powerful analytical framework to model and tackle complex problems that involve interactions among several variables and constraints. Fields of applications include engineering, climate change, resilience, logistics, public policy analysis, business, and decision-making. This course introduces the basics of systems thinking and system dynamics modeling and analysis. Students learn to identify and formulate systems, their parts, and interrelations. They are also trained in simulating systems' behavior using specialized software, with attention to the underlying differential equations. The student also learns to examine the suitability of a model, understand the behavior of the simulated system, and devise potential interventions.

EN.560.658. Natural Disaster Risk Modeling. 3 Credits.
This course will: • Introduce the student to disaster risk modeling process, including: - Structure of catastrophe models. Uses in loss estimation and mitigation. - Study and modeling of hazards (esp. hurricanes and earthquakes; also flood, landslide, and volcanic) - Vulnerability assessment: simulation of building damage, and estimation of post-disaster injuries and casualties. - Exposure modeling (building typology distribution). • Introduction to disaster economic loss modeling: - Interpretation of risk metrics (return periods, PML, AAL, VaR, TVaR), their uncertainty, and applicability to management and financial decision making process. - Elements of present and future risk: climate and exposure changes. - Student will gain introductory experience in the use of GIS and simulation with Matlab. This course is co-listed with EN.560.458.

EN.560.661. Additive Manufacturing and Design. 3 Credits.
Additive Manufacturing (AM) removes many geometric constraints imposed by traditional manufacturing processes. Resultingly, systems can be designed to support and improve multiple design objectives, which has the potential to alter the way products are designed. While this allows for the fabrication of more complex and often unprecedented geometries, it also increases the complexity designers face. In addition, engineers must not only understand AM technologies and materials, they must also be able to synthesize its economic and environmental impacts on a manufacturing value chain. Additive Manufacturing and Design will provide an in-depth overview of the most common – and promising – AM technologies, materials, and design methods by including examples from state-of-the-art research. A particular emphasis is placed on Design for Additive Manufacturing (DfAM), where the different topics will converge to fully utilize the newly created design space.
Area: Writing Intensive

EN.560.667. Topology Optimization and Design for Additive Manufacturing. 3 Credits.
This course will discuss the computational design tool of topology optimization and its application to the design of "structures", including structural systems, complaint mechanisms, multifunctional devices, and material architectures. Particular emphasis will be placed on the emerging trend known as Design for Additive Manufacturing (AM), and the role of topology optimization in guiding the design of parts to be fabricated by AM processes (3D printing, Selective Laser Sintering, etc). The course will largely focus on design problems concerned with mechanical properties, with extensions to fluidic, thermal, optical, etc. properties also discussed. The course assumes some familiarity with finite element methods and assumes no prior coursework in optimization.

EN.560.691. Graduate Seminar. 1 Credit.
Graduate students are expected to register for this course each semester. Both internal and outside speakers are included.

EN.560.692. Civil Engineering Graduate Seminar. 1 Credit.
Seminar series of speakers on various aspects of civil engineering. Different speakers are invited each semester. Full time civil engineering graduate students must enroll in the seminar course every semester unless excused by the Department.

EN.560.730. Finite Element Methods. 3 Credits.
Variational methods and mathematical foundations, Direct and Iterative solvers, 1-D Problems formulation and boundary conditions, Trusses, 2-D/ 3D Problems, Triangular elements, QUAD4 elements, Higher Order Elements, Element Pathology, Improving Element Convergence, Dynamic Problems.

EN.560.731. Structural Stability. 3 Credits.
Concepts of stability of equilibrium, stability criteria, work energy and variational methods. Elastic buckling of columns, beams, frames, and plates. Introduction to inelastic and dynamic buckling.

EN.560.740. Optimization and Learning. 3 Credits.
This course offers an optimization perspective of machine learning. We use fundamental, bottom-up optimization methods to introduce formal concepts in machine learning. The course then builds on these fundamentals to show how optimization formulations can be used to improve the performance and interpretation of machine learning models. Applications to energy and healthcare systems will be provided. A background in optimization is preferred, but no background in machine learning is required. Programming experience is a pre-requisite.
Area: Writing Intensive

EN.560.741. Modern Machine Learning: Applicability, Interpretability, and Uncertainty Quantification. 3 Credits.
This course provides a broad overview of the different machine learning methods and their theoretical foundations. We focus on the applicability of each method for appropriate statistical design, the interpretability of simple or well-constrained methods, the explainability of complex models or black boxes, and the quantitative characterization of uncertainties. Theoretical and technical aspects related to model evaluation and actionable predictions will be covered, including feature selection, variable importance, model intercomparisons, and cross validation. Applications to real problems in natural sciences and engineering will be covered.

EN.560.762. Mechanics of Architected Materials. 3 Credits.
This upper level graduate course will focus on the linear and nonlinear mechanics of a wide range of architected materials; we aim to cover: linear elastic properties of 2D and 3D cellular solids, micromechanics and homogenization, localization, microscopic and macroscopic instabilities, natural architected materials (bone, wood, nacre), wave propagation in lattices and phononics, mechanical metamaterials, and nanostructured materials (carbon nanotubes pillars, DNA origami).

EN.560.770. Advanced Finite Element Methods and Multi-Scale Methods. 3 Credits.
Addresses advanced topics in various areas of the finite element methodology. Covers a range of topics, viz. element stability and hourglass control, adaptive methods for linear and nonlinear problems, mixed and hybrid element technology, eigen-value problems, multi-scale modeling for composites and polycrystalline materials. Recommended Course Background: EN.530.730 or EN.560.730

EN.560.772. Non-Linear Finite Elements. 3 Credits.
This course will discuss state of the art theoretical developments and modeling techniques in nonlinear computational mechanics, for problems with geometric and material nonlinearities. Large deformation of elastic-plastic and visco-plastic materials, contact-friction and other heterogeneous materials like composites and porous materials will be considered. A wide variety of applications in different disciplines, e.g. metal forming, composite materials, polycrystalline materials will be considered.

EN.560.775. Bilevel Optimization in Energy Systems. 3 Credits.
This course provides an overview of bilevel optimization in large-scale, regional-level energy systems. Topics covered include Mathematical Programs and Equilibrium Problems with Equilibrium Constraints, Binary Equilibrium, Energy Infrastructure, and Pricing in Electricity Markets. At least one graduate-level course in continuous optimization as well as programming experience are prerequisites.

EN.560.826. Graduate Independent Study. 1 - 3 Credits.
Independent Study.

EN.560.835. Graduate Research. 3 - 20 Credits.

EN.560.836. Graduate Research. 3 - 20 Credits.

Cross Listed Courses

For current faculty and contact information go to https://engineering.jhu.edu/case/faculty/

Civil Engineering, Bachelor of Science

The Department of Civil and Systems Engineering offers an undergraduate program that strives to educate intellectual leaders of the profession by instilling in them a fundamental understanding of the mathematical and physical principles that underlie civil engineering science, an appreciation for the challenges of creative engineering design, and a sense of responsibility for professional service. Civil Engineering is a broad field with many subdisciplines. The Civil Engineering curriculum exposes students to the fields of structural engineering, engineering mechanics, systems engineering, and geotechnical engineering.

ABET Accreditation

The B.S. in Civil Engineering degree program has been accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/), since 1936.

Program Educational Objectives

Consistent with our Educational Mission and the Mission of the Whiting School of Engineering, the Program Educational Objectives (PEOs) for the Civil Engineering program at Johns Hopkins University are to produce graduates who:

- Rise to positions of leadership in their chosen fields, within organizations that require innovative, adaptable, and systems thinkers, and that consider the engineering, societal, and environmental impacts of their decisions.
- Dedicate themselves to lifelong learning, service, and teaching to foster excellence and disseminate knowledge in their chosen fields.
- Innovate and implement resilient, sustainable, and equitable solutions to meet evolving societal challenges.

Student Outcomes

Students graduating with a B.S. in Civil Engineering will have demonstrated:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Annual Student Enrollment and Graduation Data

Continuous Improvement

The department strives to continuously improve its curriculum by using performance criteria to regularly assess its program educational objectives (what it expects its students to attain post-graduation) and its student outcomes (what skills it expects its students to demonstrate). The civil engineering program uses the results of each assessment to continuously improve upon its curriculum and thus ensure that it is meeting the needs of its students.

Financial Aid

Student Financial Services (https://finaid.jhu.edu/undergraduate-aid/financial-aid-at-hopkins/) will help to navigate the financial aid application process and explore the resources available to help your family pay for college now and throughout your time here. In addition, some undergraduate students are employed by departmental faculty to provide assistance on research projects.

Departmental Honors

The Whiting School of Engineering and the Department of Civil Engineering recognize students with exemplary academic records. For graduating students, these awards include General Honors and Departmental Honors:

- General Honors are awarded to students with a cumulative GPA of 3.5 or higher.
- Departmental Honors are awarded to students with a 3.75 GPA or higher in their major-specific courses.

Combined Bachelor's/Master's Programs

The Department of Civil and Systems Engineering offers two options for earning a combined bachelor's/master's degree.

One option combines a **B.S. in Civil Engineering** with a **Master of Science in Engineering (M.S.E.) in Civil Engineering or Systems Engineering**. For students who are admitted to this program, the two degrees typically require five years total to complete. Students who enroll in the combined Bachelor's/Master's program or pursue a master's degree after having earned a the B.S. in Civil Engineering at Hopkins may double-count one advanced course (400-level or higher) towards both the bachelor's and master's degrees with the permission of the master's faculty advisor. More detail on double-counting courses can be found here (https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/).

The other option combines a **B.S. in Civil Engineering** with a Master of Science in Engineering Management (M.S.E.M.) (http://msem.engineering.jhu.edu/). Students are required to submit a formal application through the M.S.E.M. Program (http://msem.engineering.jhu.edu/).

Students enrolled in either the B.S./M.S.E. or B.S./M.S.E.M program are awarded a Dean's Master's Fellowship, covering half their tuition, after they have completed eight semesters of undergraduate study. More information about these programs can be found at http://engineering.jhu.edu/academics/combined-bachelors-masters/. (http://engineering.jhu.edu/academics/combined-bachelors-masters/.html)

Program Requirements

The B.S. degree in Civil Engineering requires 127 credits in Mathematics, Basic Sciences, Humanities, Social Sciences, and Engineering courses.

Code	Title	Credits
BASIC SCIENCES		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I [1]	1
AS.270.103	Introduction to Global Environmental Change	3
EN.560.112	Electromagnetism & Sensors Lab	1
One additional Natural Science elective		3
MATHEMATICS		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
HUMANITIES and SOCIAL SCIENCES [2]		
Select 15 credits of H or S electives		15
CIVIL ENGINEERING FUNDAMENTALS		
EN.500.113	Gateway Computing: Python	3
EN.560.100	Civilization Engineered	3
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.240	Uncertainty, Reliability and Decision-making	3
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.255	Dynamical Systems	3
EN.560.301	Structural Systems I	3
EN.560.302	Structural Systems II	3
EN.560.305	Soil Mechanics	4
EN.560.330	Foundation Design	3
EN.560.362	Engineering Mechanics and Materials	3
EN.560.458	Natural Disaster Risk Modeling	3
EN.560.462	Failure Mechanics in Materials	3
CaSE PROFESSIONAL PRACTICE [3]		
EN.560.401	Design Theory and Practice	3
EN.560.402	(Integrated Design Project)	3
EN.660.361	Engineering Management & Leadership	3
EN.661.110	Professional Writing and Communication	3
CaSE EXPERIENCES		
EN.560.191	CaSE Collaborative	.5
EN.560.192	CaSE Design	.5
EN.560.291	CaSE Coding	.5
EN.560.292	CaSE Research	.5
EN.560.391	CaSE Careers I	.5
EN.560.392	CaSE Careers II	.5
TECHNICAL ELECTIVES		
Technical electives are designed to provide students with opportunities to explore the field of civil engineering in greater depth. To that end, these courses must have E distribution and be at or above the 300-level. 300-level courses with N or Q distribution may be allowed with the faculty advisor's permission.		9
FREE ELECTIVES		
Select 15 credits of free electives		15
Total Credits		**127**

[1] If a student earns AP credit for Physics I, they MUST still take either General Physics Lab I (173.111) or another 1 credit N laboratory course.
[2] This Whiting School requirement recognizes that human-centered engineering design relies not only on strong technical skills, but on an understanding of the humanities and social sciences as well. Any five 3-credit H or S elective courses may be used to fulfill this requirement. See the Distribution tab in the Requirements for a Bachelor's Degree (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/)section for two exceptions to the rule that each H/S distribution course is at least 3 credits. (Note that because Professional Communications has an S distribution credit, only 15 credits are required here, as opposed to the reported 18 required by the Whiting School).
[3] In preparation for CaSE-Professional Practice, students must also take the Fundamentals of Engineering (FE) exam in the spring of their senior year.

Additional Notes:

- No required courses may be taken as Satisfactory/Unsatisfactory (S/U).
- A maximum of 3 credits from the Humanities and Social Science (H/S) requirements may be taken S/U.
- Technical electives may be taken S/U only with the approval of the advisor.
- No more than two grades of D in the required engineering and technical electives may be counted.

Sample Program of Study

This sample illustrates the general sequence of courses; individual programs may vary as a result of AP credits, study abroad, or pursuit of a minor in another department.

Course	Title	Credits
First Year		
Fall		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
EN.560.100	Civilization Engineered	3
EN.560.191	CaSE Collaborative	0.5
H/S Elective		3
Optional HEART course or First Year Seminar		0-3
	Credits	**14.5-17.5**
Spring		
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
EN.500.113	Gateway Computing: Python	3
EN.560.112	Electromagnetism & Sensors Lab	1
EN.560.192	CaSE Design	0.5
EN.661.110	Professional Writing and Communication	3
	Credits	**16.5**
Second Year		
Fall		
EN.553.291	Linear Algebra and Differential Equations	4
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.291	CaSE Coding	0.5
EN.560.240	Uncertainty, Reliability and Decision-making	3
H/S Elective		3
Free Elective		3
	Credits	**17.5**
Spring		
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.255	Dynamical Systems	3
EN.560.292	CaSE Research	0.5
EN.560.301	Structural Systems I	3
Natural Science Elective		3
H/S Elective		3
	Credits	**15.5**
Third Year		
Fall		
AS.110.202	Calculus III	4
AS.270.103	Introduction to Global Environmental Change	3
EN.560.302	Structural Systems II	3
EN.560.391	CaSE Careers I	0.5
H/S Elective		3
Free Elective		3
	Credits	**16.5**
Spring		
EN.560.305	Soil Mechanics	4
EN.560.362	Engineering Mechanics and Materials	3
EN.560.392	CaSE Careers II	0.5
CaSE Technical Elective		3
H/S Elective		3
Free Elective		3
	Credits	**16.5**
Fourth Year		
Fall		
EN.560.330	Foundation Design	3
EN.560.401	Design Theory and Practice	3
EN.560.462	Failure Mechanics in Materials	3
EN.660.361	Engineering Management & Leadership	3
CaSE Technical Elective		3
	Credits	**15**
Spring		
EN.560.402	Integrated Design Project	3
EN.560.458	Natural Disaster Risk Modeling	3
CaSE Technical Elective		3

Free Elective		3
Free Elective		3
	Credits	**15**
	Total Credits	**127-130**

Systems Engineering, Bachelor of Science

Many of the challenges facing modern society require not only new technological solutions, but also efficient, effective, and equitable implementations of these technologies to ensure the betterment of society. Venturing beyond the confines of traditional engineering coursework, the **Bachelor of Science degree in Systems Engineering** is trans-disciplinary and collaborative, connecting mathematics, engineering, social and physical sciences, and medicine.

The program provides students with knowledge of theory, computational methods, and research in the fundamental frameworks of optimization, network theory and uncertainty quantification, providing the tools required to envision solutions to big-picture problems in a range of applications. Examples include monitoring and modeling the COVID-19 outbreak, optimizing hospital resource allocation, optimizing equitable access to food, and designing infrastructure, energy systems, and smart cities that are interconnected, resilient to hazards, and cybersecure.

Students will gain significant experience in collaborative problem solving that will serve them well in a broad range of careers, including those related to future energy infrastructure, smart cities, decision-making in healthcare, data mining and decision making, and cybersecurity of infrastructure.

Financial Aid

Student Financial Services (https://finaid.jhu.edu/undergraduate-aid/financial-aid-at-hopkins/) will help to navigate the financial aid application process and explore the resources available to help your family pay for college now and throughout your time here. In addition, some undergraduate students are employed by departmental faculty to provide assistance on research projects.

Departmental Honors

The Whiting School of Engineering and the Department of Civil Engineering recognize students with exemplary academic records. For graduating students, these awards include General Honors and Departmental Honors:

- General Honors are awarded to students with a cumulative GPA of 3.5 or higher.
- Departmental Honors are awarded to students with a 3.75 GPA or higher in their major-specific courses.

Combined Bachelor's/Master's Programs

The Department of Civil and Systems Engineering offers two options for earning a combined bachelor's/master's degree.

One option combines a **B.S. in Systems Engineering** with a **Master of Science in Engineering (M.S.E.) in Civil or Systems Engineering**. For students who are admitted to this program, the two degrees typically require five years total to complete. Students who enroll in the combined Bachelor's/Master's program or pursue a master's degree after having earned a the B.S. in Civil Engineering at Hopkins may double-count one advanced course (400-level or higher) towards both the bachelor's and master's degrees with the permission of the master's faculty advisor. More detail on double-counting courses can be found here (https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/).

The other option combines a **B.S. in Systems Engineering** with a Master of Science in Engineering Management (M.S.E.M.) (http://msem.engineering.jhu.edu/). Students are required to submit a formal application through the M.S.E.M. Program (http://msem.engineering.jhu.edu/).

Students enrolled in either the B.S./M.S.E. or B.S./M.S.E.M program are awarded a Dean's Master's Fellowship, covering half their tuition, after they have completed eight semesters of undergraduate study. More information about these programs can be found at http://engineering.jhu.edu/academics/combined-bachelors-masters/. (http://engineering.jhu.edu/academics/combined-bachelors-masters/.html)

Requirements

The B.S. degree in Systems Engineering requires 127 credits in Mathematics, Basic Sciences, Humanities, Social Sciences, and Engineering courses.

Code	Title	Credits
BASIC SCIENCES		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I [1]	1
EN.560.112	Electromagnetism & Sensors Lab	1
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.270.103	Introduction to Global Environmental Change	3
MATHEMATICS		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
EN.553.291	Linear Algebra and Differential Equations	4
AS.110.202	Calculus III	4
HUMANITIES AND SOCIAL SCIENCES [2]		
Select 15 credits of H or S electives		15
SYSTEMS ENGINEERING FUNDAMENTALS		
EN.500.113	Gateway Computing: Python	3
EN.500.132	Bootcamp: Java (or other advanced programming course)	1
EN.560.100	Civilization Engineered	3
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.240	Uncertainty, Reliability and Decision-making	3
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.255	Dynamical Systems	3
EN.560.458	Natural Disaster Risk Modeling	3
Systems Engineering Elective (e.g. Thermodynamics or Circuits or Fluid Mechanics or Control Theory)		3
OPTIMIZATION & ANALYTICS ELECTIVES		
Analytics Elective 1 (e.g. Data Structures)		3
Analytics Elective 2 (e.g. Machine Learning)		3

Optimization Elective 1 (e.g. Intro to Optimization I)		3
Optimization Elective 2 (e.g. Intro to Network Modeling)		3
Analytics or Optimization Elective 3		3
CaSE EXPERIENCES		
EN.560.191	CaSE Collaborative	0.5
EN.560.192	CaSE Design	0.5
EN.560.291	CaSE Coding	0.5
EN.560.292	CaSE Research	0.5
EN.560.391	CaSE Careers I	0.5
EN.560.392	CaSE Careers II	0.5
CaSE - PROFESSIONAL PRACTICE		
EN.560.401	Design Theory and Practice	3
EN.560.402	(Integrated Design Project)	3
EN.660.361	Engineering Management & Leadership	3
EN.661.110	Professional Writing and Communication	3
CaSE TECHNICAL ELECTIVES		
Select 9 credits of CaSE technical electives		9
FREE ELECTIVES		
Select 18 credits of free electives		18
Total Credits		**127**

[1] If a student earns AP credit for Physics I, they MUST still take either General Physics Lab I (173.111) or another 1 credit N laboratory course.

[2] This Whiting School requirement recognizes that human-centered engineering design relies not only on strong technical skills, but on an understanding of the humanities and social sciences as well. Any five 3-credit H or S elective courses may be used to fulfill this requirement. See the Distribution tab in the Requirements for a Bachelor's Degree (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/)section for two exceptions to the rule that each H/S distribution course is at least 3 credits. (Note that because Professional Writing & Communication has an S distribution credit, only 15 credits are required here, as opposed to the reported 18 required by the Whiting School).

Additional Notes:

- No required courses may be taken as Satisfactory/Unsatisfactory (S/U)
- A maximum of 3 credits from the Humanities and Social Science (H/S) requirements may be taken S/U
- Technical electives may be taken S/U only with the approval of the advisor.
- No more than two grades of D in the required engineering and technical electives may be counted

Sample Program

Please visit Civil and Systems Engineering website - https://engineering.jhu.edu/case/

Course	Title	Credits
First Year		
Fall		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
EN.560.100	Civilization Engineered	3
EN.560.191	CaSE Collaborative	0.5
Free Elective		3
Optional HEART course or First Year Seminar		0-3
	Credits	**14.5-17.5**
Spring		
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
EN.500.113	Gateway Computing: Python	3
EN.560.112	Electromagnetism & Sensors Lab	1
EN.560.192	CaSE Design	0.5
EN.661.110	Professional Writing and Communication	3
	Credits	**16.5**
Second Year		
Fall		
EN.553.291	Linear Algebra and Differential Equations	4
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.240	Uncertainty, Reliability and Decision-making	3
EN.560.291	CaSE Coding	0.5
H/S Elective		3
Free Elective		3
	Credits	**17.5**
Spring		
EN.500.132	Bootcamp: Java (or other advanced programming course)	1
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.255	Dynamical Systems	3
EN.560.292	CaSE Research	0.5
Systems Engineering Elective (e.g. Thermodynamics, Circuits, Fluid Mechanics, or Control Thry)		3
H/S Elective		3
Free Elective		3
	Credits	**16.5**
Third Year		
Fall		
AS.110.202	Calculus III	4
AS.270.103	Introduction to Global Environmental Change	3
EN.560.391	CaSE Careers I	0.5
Analytics or Optimization Elective		3
H/S Elective		3
Free Elective		3
	Credits	**16.5**
Spring		
EN.560.392	CaSE Careers II	0.5

Analytics or Optimization Elective		3
Analytics or Optimization Elective		3
CaSE Technical Elective		3
H/S Elective		3
Free Elective		3
	Credits	**15.5**
Fourth Year		
Fall		
EN.560.401	Design Theory and Practice	3
EN.660.361	Engineering Management & Leadership	3
CaSE Technical Elective		3
Analytics or Optimization Elective		3
Analytics or Optimization Elective		3
	Credits	**15**
Spring		
EN.560.402	Integrated Design Project	3
EN.560.458	Natural Disaster Risk Modeling	3
CaSE Technical Elective		3
Free Elective		3
Free Elective		3
	Credits	**15**
	Total Credits	**127-130**

Civil Engineering, Master of Science in Engineering (MSE)

Our Master of Science in Engineering (M.S.E.) (https://engineering.jhu.edu/case/graduate-programs/masters-program/) Programs develop a sound understanding of the scientific principles upon which engineering research and practice are based. Different aspects of learning are integrated through classroom, laboratory instruction, and independent study experiences. Graduates of the programs possess critical thinking skills, the ability for both independent and team problem-solving, and a sense of the excitement of engineering creativity and design. The programs also develop communication skills necessary for the graduates to function in teams and to deal with other professions in public and private arenas. Their progressive education furthers student understanding of the context in which engineering is practiced in modern society. Our Master's programs combine fundamental training with real-world experience. Thus, the programs educate leaders for tomorrow, providing the tools and perspectives for a lifetime of learning, opportunities, and professional advancement. Build your knowledge base with coursework in systems, mechanics, structures, computational methods, and uncertainty quantification. Apply that knowledge in our externship program while you network with professional engineers and gain valuable experience with your dream employer.

CaSE currently offers two MSE degree options:

- Civil Engineering (https://engineering.jhu.edu/case/academics/masters-program/mse-civil-engineering/)– focus on mechanics of materials, probabilistic methods, fire engineering, earthquake engineering, structural design, infrastructure design for resilience
- Systems Engineering (https://engineering.jhu.edu/case/graduate-programs/masters-program/m-s-e-systems-engineering/)– focus on network modeling, mathematical modeling, optimization, analysis of complex infrastructure systems, public health, urban resilience

Typically limited financial support is available for M.S.E. students. Funding decisions will be made on an individual basis by the Department of Civil and Systems Engineering and will be communicated during the admissions process.

Requirements for Admissions:

1. Online Application (https://applygrad.jhu.edu/apply/?sr=9aceddc1-d563-4a68-a7b8-a023986c3cb7) in the Slate application system
2. Three Letters of Recommendation

Obtain your recommenders' email addresses and enter them in your online application to request electronic letters of recommendation. The Slate application system will contact your recommender directly via email and will be given instructions about how to proceed. Please use the Slate system and do not have letters of recommendation mailed to the school.

3. Statement of Purpose

The statement (1-3 pages) should outline your background and interests in civil or systems engineering, reasons why you are seeking to pursue a graduate degree, why you believe JHU is a good fit for you, specific career goals, events, or places that have inspired you, etc.

4. CV/Resume

5. GRE scores

6. Transcripts

Official copies of transcripts are not required for application review purposes. Applicants are asked to upload unofficial transcripts in the Academic History portion of this application. If you receive an offer and choose to accept it, you must contact your institution to have your official academic transcripts sent directly to the Office of Engineering Graduate Admissions.

****For international students****

For all foreign academic work we strongly recommend that you submit a professional credential evaluation from World Education Services (WES). (https://www.wes.org/) Credential evaluations allow the departments to better assess your academic records. These evaluations do not replace the transcript, you are still required to upload these documents as instructed.

7. TOEFL/IELTS scores or English Language Proficiency Test Waiver (https://livejohnshopkins-my.sharepoint.com/:w:/g/personal/avanhor3_jh_edu/EbMorU0ALe1El4qtqifthgUBc6GW9F-VhkmCBYy4GbiQsQ/?e=Xl1TJZ) (For international students only)

Visit Information for International Students (https://engineering.jhu.edu/graduate-admissions/international-students/) to read our English Language Proficiency Policy (https://livejohnshopkins-my.sharepoint.com/:w:/g/personal/avanhor3_jh_edu/EbMorU0ALe1El4qtqifthgUBc6GW9F-VhkmCBYy4GbiQsQ/?e=Xl1TJZ) for detailed information, including preferred minimum test scores. You may request an English Language Proficiency Test Waiver by contacting the Engineering Graduate Admissions Office by emailing WSEGrad-Admissions@jhu.edu. Applications require a self-reported score for review. Many applicants see their official scores arrive after the application submission deadline.

8. Admissions Fee – $25. Please see the application fee waiver policy (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/general-application-requirements/)

Optional:

- Personal Statement
- Sample of Work

Program Requirements (Civil Engineering (https://engineering.jhu.edu/case/academics/masters-program/mse-civil-engineering/))

Master of Science in Engineering (MSE) students within the Civil Engineering program must take a total of eight courses that have been approved by the advisor. Seven courses must be technical, but courses may be requested for substitution at the advisor's discretion. Four courses must be taken from civil and systems engineering – EN.560.XXX or EN.565.XXX. One of the eight courses can be a professional development class, such as those offered from the Center for Leadership Education (https://cletest.wse.jhu.edu/).

Master's students are offered two options (different combination of courses, seminars, optional externship (https://engineering.jhu.edu/case/academics/masters-program/externship-program/), and research) to earn their degree. There is also a bachelor's/master's program available (https://engineering.jhu.edu/case/academics/combined-bs-ms/) as well as a Systems Engineering MSE degree (https://engineering.jhu.edu/case/academics/masters-program/mse-systems-engineering/).

Coursework-Only MSE Requirements

The most common path for M.S.E. graduate students is to complete the degree through coursework alone. The M.S.E. degree requirements are as follows*:

1. Minimum course requirements: 8 courses** at the 600-level or above:

- 4 of which must be from civil and systems engineering - EN.560.XXX or EN.565.XXX
- 7 of which must be technical

2. Required courses, but not counted towards minimum course requirements:

- Civil Engineering Graduate Seminar - Fall semester – EN.560.691 Graduate Seminar
- Civil Engineering Graduate Seminar - Spring semester – EN.560.692 Civil Engineering Graduate Seminar
- Academic Ethics short course EN.500.603 Graduate Orientation and Academic Ethics
- Responsible Conduct of Research short course: AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research

3. Acceptable grades: B- and above. Only one course with a grade lower than B- is allowed toward the degree requirements. No grade lower than a C- may be counted toward the course requirements.

4. It is expected that the degree will be completed in one year with the student enrolling in 4 courses per semester, although in select cases students may require a third semester of study. In such cases, the first three semesters must be full-time, while a student enrolling in a fourth semester can be part-time under certain conditions.***

5. CPT internship credits for international students do not count toward the completion of an M.S.E. degree.

6. Transfer credits are not permitted.

*Students must comply with all requirements stipulated by the Whiting School of Engineering Academic Policies and Procedures as outlined at https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/

**Academic advisors, in consultation with the faculty in the department, will determine whether the 8 courses leading to this degree are appropriate and if they have been completed satisfactorily.

***See the department Sr. Academic Program Coordinator or Director of Graduate Studies to determine if you are eligible for part-time status.

Notes:

1. Students are expected to maintain a GPA of 2.6 each semester or will be placed on probation. See the Probation Policy for master's students (https://engineering.jhu.edu/civil/graduate-programs/masters-program/policies-and-procedures/) for more details.

MSE with Thesis Requirements

The M.S.E. with thesis option is primarily intended for students interested in pursuing a Ph.D. after completion of the M.S.E. The requirements are as follows*:

1. Minimum course requirements: 7 courses** at the 600-level or above:

- 4 of which must be from civil and systems engineering - EN.560.XXX or EN.565.XXX
- 6 of which must be technical

2. Required courses, but do not count towards minimum course requirements:

- Research course with the research advisor – Fall semester
- Research course with the research advisor – Spring semester (a two-semester research sequence)
- Civil Engineering Graduate Seminar - Fall semester – EN.560.691 Graduate Seminar
- Civil Engineering Graduate Seminar - Spring semester– EN.560.692 Civil Engineering Graduate Seminar
- Academic Ethics short course EN.500.603 Graduate Orientation and Academic Ethics
- Responsible Conduct of Research short course (required): AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research

3. Acceptable grades: B- and above. Only one course with a grade lower than B- is allowed toward the degree requirements. No grade lower than a C- may be counted toward the course requirements.

4. Final essay that is approved by the research advisor and one additional reader who is required to be a full-time departmental faculty member. Any external reader must be approved by the Department Chair.

5. Research presentation in a public forum attended by two members of the WSE faculty or other faculty approved by the Department Chair.

6. The M.S.E. with thesis program is expected to be completed in 3-4 semesters with the student enrolled in 2-3 courses per semester in addition to research. Summer research is typical but not necessary and is left to the discretion of the student and advisor. The first three semesters must be full-time, while the fourth semester can be part-time under certain conditions.***

7. CPT internship credits for international students do not count toward the completion of a M.S.E. degree.

8. Transfer credits are not permitted.

*Students must comply with all requirements stipulated by the Whiting School of Engineering Academic Policies and Procedures as outlined at https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/

**Academic advisors, in consultation with the faculty in the department, will determine whether the 7 courses leading to this degree are appropriate and if they have been completed satisfactorily.

***See the department Sr. Academic Program Coordinator or Director of Graduate Studies to determine if you are eligible for part-time status.

Notes:

1. Students are expected to maintain a GPA of 2.6 each semester or will be placed on probation. See the Probation Policy for master's students (https://engineering.jhu.edu/civil/graduate-programs/masters-program/policies-and-procedures/) for more details.

Combined Bachelor's/Master's Program

All Combined Bachelor's/Master's students must meet the requirements stipulated above for the respective MSE program (course-only or thesis program) with the following exception:

- The Department of Civil and Systems Engineering will accept one course from JHU undergraduate studies used for the BS degree at the 400-level or above toward the course requirements listed above.

Notes:

1. Required seminars, EN.500.603 Graduate Orientation and Academic Ethics and AS.360.624 Responsible Conduct of Research (Online)/AS.360.625 Responsible Conduct of Research courses are less than 3 credits each and not counted towards minimum course requirements.
2. Students are expected to maintain a GPA of 2.6 each semester or will be placed on probation. See the Probation Policy for master's students (https://engineering.jhu.edu/civil/graduate-programs/masters-program/policies-and-procedures/) for more details.

Civil Engineering, Minor

A minor in Civil Engineering is available for non-departmental majors who would like an overview of the principles of civil engineering. Students wishing to pursue a minor in civil engineering must complete 17-18 credits in addition to the prerequisite courses of AS.171.101 General Physics: Physical Science Major I, AS.110.108 Calculus I (Physical Sciences & Engineering), and AS.110.109 Calculus II (For Physical Sciences and Engineering).

The minor consists of:

- two fundamental civil engineering courses + a lab
- two semesters of CaSE Careers (an undergraduate seminar course)
- three courses in one technical area of your choice (Structural Engineering, Geotechnical Engineering, Mechanics of Materials, and Systems Engineering)

*Students completing courses from the area of Geotechnical Engineering will complete the minor with 18 credits instead of 17; Soil Mechanics is a 4 credit course.

No D grades can be counted toward the minor

Program Requirements

Code	Title	Credits
Civil Engineering Fundamentals		**8**
EN.560.100	Civilization Engineered	3
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.391	CaSE Careers I	.5
EN.560.392	CaSE Careers II	.5
Students must choose to focus in one of the following four technical areas		
Structural Engineering		**9**
EN.560.301	Structural Systems I	3
EN.560.302	Structural Systems II	3
EN.560.445	Advanced Structural Analysis	3
Geotechnical Engineering		**10**
AS.270.220	The Dynamic Earth: An Introduction to Geology	3
EN.560.305	Soil Mechanics	4
EN.560.330	Foundation Design	3
Systems Engineering		**9**
EN.560.240	Uncertainty, Reliability and Decision-making	3
EN.560.250	Intro to Mathematical Decision Making	3
EN.560.458	Natural Disaster Risk Modeling	3
Mechanics of Materials		**9**
EN.530.430	Applied Finite Element Analysis	3
EN.560.362	Engineering Mechanics and Materials	3
EN.560.462	Failure Mechanics in Materials	3

Civil and Systems Engineering, PhD

https://engineering.jhu.edu/case/

The Ph.D. program at the Johns Hopkins University Department of Civil and Systems Engineering (https://engineering.jhu.edu/case/graduate-programs/phd-program/) aims to inspire the leaders of tomorrow to take on the challenge of creating and sustaining the built environment that underpins our society. Our graduate students work with faculty members who are world-renowned leaders in their fields and contribute to research that has a tremendous impact on society. The graduate program focuses on three fundamental areas of Structural Engineering, Mechanics of Materials, and Systems Engineering. Examples of current projects include fracture and fatigue in materials and structural systems, design of additively manufactured architected materials, earthquake engineering, and applying systems approaches to improving patient flow in hospitals and predicting virus outbreak.

Students graduate from the program with a sense of the responsibility that the civil and systems engineering profession accepts for applying the principles of engineering sciences for the betterment of the built environment and society. Its graduates have an appreciation of professional ethics and the value of service to their profession and society through participation in technical activities, and in community, state, and national organizations.

Both undergraduates and masters students are encouraged to apply to the PhD program in Civil and Systems Engineering. Once accepted to the program, students can pursue an area of interest in Systems (https://engineering.jhu.edu/case/research/focus-areas/systems/), Structures (https://engineering.jhu.edu/case/research/focus-areas/structures/), Mechanics of Materials (https://engineering.jhu.edu/case/research/focus-areas/mechanics-materials/). Students don't need a civil engineering degree to apply - students from all technical backgrounds are welcome.

Financial Support

Financial support from the Department of Civil and Systems Engineering for PhD students provides full tuition, health insurance coverage, matriculation fee, and a 12-month stipend for enrollment for the entire duration of the program when PhD students are in a fulltime, resident status.

Admissions

- Apply online (https://applygrad.jhu.edu/apply/?sr=9aceddc1-d563-4a68-a7b8-a023986c3cb7)
- Frequently Asked Questions (https://engineering.jhu.edu/case/admissions/graduate-programs/graduate-admissions-faqs/) on the CaSE Admissions page (https://engineering.jhu.edu/case/admissions/graduate-programs/)
- Full-Time Engineering Graduate Admissions (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/)

Program Requirements

Ph.D. student requirements for the Civil and Systems Engineering Department include:

- 8 Courses at the 600- or 700-level, completed with a grade of B or better
- Department Qualifying Examination (DQE)
- AS.360.625 Responsible Conduct of Research short course
- EN.500.603 Graduate Orientation and Academic Ethics short course
- Final Ph.D. Thesis Defense and Graduate Board Oral Examination (GBO)

There are a number of Whiting School of Engineering policies (https://homewoodgrad.jhu.edu/academics/policies/) related to Ph.D. students.

Typical Timeline for Ph.D. Students

Course	Title	Credits
First Year		
Fall		
Selection of first semester courses (typically 3 or 4) with Director of Graduate Studies or research advisor		
Language/communication testing and placement for International Students		
AS.360.625	Responsible Conduct of Research	
EN.500.603	Graduate Orientation and Academic Ethics	
First semester coursework and research		20
Intersession		
Annual Review by January 31		
Research		
	Credits	**20**
Spring		
Second semester coursework and research		20
Department Qualifying Exam (DQE) (completed in May or June)		
	Credits	**20**
Summer Term		
Research		
	Credits	**0**
Second Year		
Fall		
Research		17
Coursework (typically finishing up this semester)		3
Ph.D. Thesis Committee Meeting encouraged prior to end of Fall semester		
Year 2 Intersession:		
Annual Review by January 31		
Research		
	Credits	**20**
Spring		
Research		20
Coursework (if necessary)		
	Credits	**20**
Summer Term		
Research		
	Credits	**0**
Third Year		
Fall		
Research (Year-round)		20
Ph.D. Thesis Committee Meeting encouraged		
	Credits	**20**
Spring		
Research (Year-round)		20
Intersession		
Research		
	Credits	**20**

Summer Term	
Research	
Credits	**0**
Fourth Year	
Fall	
Year 4 and Beyond:	
Research (Year-round)	20
Ph.D. Thesis Committee Meeting encouraged every Fall prior to the end of the semester	
Annual review completed by January 31	
Credits	**20**
Spring	
Final semester:	
Thesis Defense and Graduate Board Oral Examination (GBO)	
Research	20
Credits	**20**
Total Credits	**160**

Note: Teaching assistant duties may also be assigned during one or more semesters.

Language/Communication Testing and Placement

All Ph.D. students who do not have a prior degree from an English speaking university must take an English Language Assessment. If it is determined at the assessment that the student needs further English language instruction, they will be required to take AS.370.602 American English Pronunciation or equivalent.

Determination of Permanent Advisor

Students are admitted to work with a specific advisor, the faculty member, listed in the offer letter. If several faculty in the Department of Civil and Systems Engineering expressed a strong desire to work with the student, a nominal advisor will be assigned before the first semester to aid in course selection and provide general advice on Ph.D. degree requirements. In this case, a permanent research advisor, from the faculty who expressed interest, will be selected by the end of the first semester.

A Ph.D. student will not be able to remain in good standing with their academic and research progress if they do not have a research advisor. A student who is without a research/dissertation advisor for a period of 3 months may be placed on probation or terminated from the Ph.D. program.

Intersession

Intersession (the period between Fall and Spring terms) is an important time for research. Any leave taken during intersession is subject to the policies outlined in the Leave of Absence Guidelines. (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) Release time (if any) granted in that period must be approved by the advisor.

Department Qualifying Examination (DQE)

The DQE is a comprehensive oral exam to determine whether or not the student is properly prepared to continue in the Ph.D. program. All first-year students studying for a Ph.D. take the DQE towards the end of their second semester, typically in May of the first year. This exam evaluates whether the student is prepared to continue in their Ph.D. studies based on their research progress to date and plans for future research, as well as a grasp of the underlying mathematics and engineering concepts.

Possible outcomes of the exam are Pass, Retake, or Fail. Only an outcome of Pass is considered passing the exam. If the student receives a Retake, they are provided a single retake of the exam, typically in the Fall of the second year. Possible outcomes of this exam retake are Pass or Fail. If the outcome of the exam is Fail, the student may pursue, with approval from the chair, a MSE degree. Financial support for a student beyond a failed DQE is not typical.

Annual Reviews

Reviews of all Ph.D. students in Civil and Systems Engineering must be performed annually prior to January 31, and are consistent with the WSE policy found in the Graduate Student Academic Review Policy. (https://homewoodgrad.jhu.edu/academics/policies/) The review process follows the format given in the annual review form (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/degree-programs/civil-engineering/civil-engineering-phd/Annual_Review_Form.pdf). The completed form must be submitted to the Sr. Academic Program Coordinator by January 31. If this annual review is not completed by this date, the student's funding may be jeopardized.

Ph.D. Thesis Committee

Every Ph.D. student must have a Thesis Committee of at least 3 faculty members. The advisor, in consultation with their student, selects the makeup of the committee, and this information is recorded in the student's file. The student is encouraged to meet with this committee a minimum of once per year. The thesis committee also typically serves as a subset of the actual GBO examination committee and forms the final Ph.D. defense committee. This committee must consist of a minimum of 2 full-time faculty of the Civil and Systems Engineering Department.

Responsible Conduct of Research

Every Ph.D. student of the Whiting School of Engineering is required to take the Responsible Conduct of Research course (details on the requirement can be found on the WSE Policy on the Responsible Conduct of Research Training (http://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/) webpage). For Civil and Systems Engineering students, this should be completed in the Fall or Spring of the first year of studies. Students who do not complete this requirement prior to Fall of their third year of studies may put their funding in jeopardy.

GBO Examination

The University maintains complete guidelines for the Graduate Board Orals here. (https://homewoodgrad.jhu.edu/academics/graduate-board/graduate-board-oral-exams/) The GBO committee consists of 5 members, (3 in department, 2 outside) with 2 alternates (1 in department, 1 outside) and is selected by the Department Chair and the Director of Graduate Studies, who will consult with the student's advisor. The GBO in the Civil and Systems Engineering Department is a Final Exam and therefore held simultaneously with the student's thesis defense. Both students and advisors should be aware that 4-8 weeks advance notice is needed in order to allow for scheduling the exam with the faculty and with the Graduate Board.

The student should provide a copy of the dissertation to the GBO committee at least 2 weeks prior to the exam. The exact format of each GBO examination is specified by the individual Chair of the GBO committee; however, a typical format is described here. The public thesis defense is conducted (see below) followed by a private examination conducted by the GBO committee. The examination questions may be on any topic of the committee members' choosing, but many of the questions relate to the student's research. At the conclusion of the examination, the GBO committee will recommend one of the following outcomes: pass, conditional pass, fail with re-examination, fail (final).

M.S.E. Degree for Ph.D. Students

Ph.D. students may petition for a non-terminal M.S.E. degree following a passed DQE. If a student fails the DQE, they may petition for a terminal M.S.E. degree. In all instances, the student must have satisfied the M.S.E. degree (https://engineering.jhu.edu/case/academics/masters-program/) course requirements.

In instances where the research is highly interdepartmental, the student, with permission of the advisor, may request that the M.S.E. degree be awarded by another department in the Whiting School of Engineering. In such cases, the student must have satisfied M.S.E. degree requirements and receive approval from the awarding department, as well as satisfied M.S.E. degree requirements of the Department of Civil and Systems Engineering and receive approval from our Department Chair. In all cases, the awarding of any JHU M.S.E. degree to a civil and systems engineering Ph.D. student may only occur after the student has completed the DQE.

Thesis Defense

The Thesis Defense, together with the GBO, is the final examination before the conferral of the Ph.D. degree. The student defends their thesis in a seminar setting that is open to the public. The seminar is followed by a comprehensive examination of the student by the GBO committee.

Ethics: The Department of Civil and Systems Engineering is dedicated to upholding the highest standards of academic and research integrity. Plagiarism, and other forms of unethical conduct, are not tolerated. Students are referred to the JHU Graduate Board Policy (http://homewoodgrad.jhu.edu/academics/policies/) webpage and the Whiting School of Engineering's Responsible Conduct of Research Policy (https://engineering.jhu.edu/research/resources-policies-forms/responsible-conduct-of-research-training-for-students-and-postdoctoral-fellows-revised-spring-2020/) for a discussion of ethics and university policies.

Thesis Readers: A committee of at least 3 members is required to read the candidate's dissertation and sign the Readers Letter confirming that the dissertation meets the standards of a Ph.D. thesis. The letter may be signed at the time of the defense if the thesis is found satisfactory or may be signed at a later time if corrections are required. The Advisor in consultation with the department selects the committee members, at least 2 of whom must be full-time faculty of our department. The 3 readers are also expected to serve on the GBO committee. Selection of the readers should be done at the beginning of the semester in which the student plans to graduate. It is the student's responsibility to keep the committee members apprised of all deadline dates.

Scheduling and Pre-Defense: The Defense should be scheduled, at least 4 weeks in advance through the department's Academic Program Coordinator. A complete written dissertation should be given to the GBO committee at least 14 days in advance of the exam. Failure to meet this 2-week deadline will result in rescheduling the Ph.D. defense and GBO exam. A thesis abstract suitable for advertising the defense should be delivered to the Academic Program Coordinator at least 14 days in advance. The date and place of the Defense, along with the thesis abstract, will be circulated by the department at least 5 days prior to the exam.

Post-Defense: Completion of the Ph.D. requirements typically takes 2-8 weeks after a successful defense examination. All data and source codes related to the thesis should be properly archived according to requirements set forth by the Advisor. Any changes or additions specifically requested by the reviewers before or during the defense seminar should be incorporated into the thesis in consultation with the Advisor. A final copy of the thesis must then be made available to the reviewers for inspection no less than 48 hours before the deadline date for filing set by the Graduate Board.

Additional Information: It is the responsibility of the student to be aware of requirements and deadlines. It is suggested that this information be obtained before the start of the semester of intended graduation. All students should plan the timing of the final defense accordingly (making sure to account for the 4-8 week period following the defense) to satisfy any deadlines related to upcoming graduation or exhaustion of funding.

University requirements (https://homewoodgrad.jhu.edu/academics/graduation-guide/) for the thesis can be obtained from the Graduate Board website (https://homewoodgrad.jhu.edu/academics/graduate-board/). Information sheets entitled "Dissertation Requirements" are available to student and contain details on the form, cost, and timing for submitting the thesis. Doctoral Theses must be submitted to both the ETD (Library) and the department. The deadline date for filing is set by the Graduate Board Office. This date also applies to filing with the Whiting School Graduate Committee and with the department. A receipt of ETD approval email must be sent to the Academic Program Coordinator and the Graduate Board/WSE Office of Academic Affairs (for M.S.E students).

For current faculty and contact information go to https://engineering.jhu.edu/case/faculty/

Systems Engineering, Master of Science in Engineering (MSE)

Our Master of Science in Engineering (M.S.E.) (https://engineering.jhu.edu/case/graduate-programs/masters-program/)Programs develop a sound understanding of the scientific principles upon which engineering research and practice are based. Different aspects of learning are integrated through classroom, laboratory instruction, and independent study experiences. Graduates of the programs possess critical thinking skills, the ability for both independent and team problem-solving, and a sense of the excitement of engineering creativity and design. The programs also develop communication skills necessary for the graduates to function in teams and to deal with other professions in public and private arenas. Their progressive education furthers student understanding of the context in which engineering is practiced in modern society. Our Master's programs combine fundamental training with real-world experience. Thus, the programs educate leaders for tomorrow, providing the tools and perspectives for a lifetime of learning, opportunities, and professional advancement. Build your knowledge base with coursework in systems, mechanics, structures, computational methods, and uncertainty quantification. Apply that knowledge in our externship program while you network with professional engineers and gain valuable experience with your dream employer.

CaSE currently offers two MSE degree options:

- Civil Engineering (https://engineering.jhu.edu/case/academics/masters-program/mse-civil-engineering/) – focus on mechanics of materials, probabilistic methods, fire engineering, earthquake engineering, structural design, infrastructure design for resilience
- Systems Engineering (https://engineering.jhu.edu/case/graduate-programs/masters-program/m-s-e-systems-engineering/)– focus on

network modeling, mathematical modeling, optimization, analysis of complex infrastructure systems, public health, urban resilience

Typically limited financial support is available for M.S.E. students. Funding decisions will be made on an individual basis by the Department of Civil and Systems Engineering and will be communicated during the admissions process.

Program Requirements (Systems Engineering (https://engineering.jhu.edu/case/graduate-programs/masters-program/m-s-e-systems-engineering/))

Master of Science in Engineering (MSE) students within the Systems Engineering program must take a total of eight courses that have been approved by their advisor. Three of these must be selected from the below list of required courses. (Other courses may be substituted at the advisor's discretion.) The remaining five courses can be chosen from the list of electives (https://livejohnshopkins-my.sharepoint.com/:b:/g/personal/jader2_jh_edu/Ec8GdrK7ggRDtSvbdQsu9F4BxWNlA-lE2dGiT0iFU-cwgw/?e=NkNaih), and must be advisor-approved. One of the eight courses can be a professional development class, such as those offered by the Center for Leadership Education.

Master's students are offered two options (different combination of courses, seminars, optional externship (https://engineering.jhu.edu/case/academics/masters-program/externship-program/), and research) to earn their degree. There is also a bachelor's/master's program available (https://engineering.jhu.edu/case/academics/combined-bs-ms/) as well as a Civil Engineering MSE degree (https://engineering.jhu.edu/case/academics/masters-program/mse-civil-engineering/).

Course-Only MSE Requirements

The most common path for M.S.E. graduate students is to complete the degree through coursework alone. The M.S.E. degree requirements are as follows*:

1. Minimum course requirements: 8 courses** at the 600-level or above:
    - 3 of which must be from the following list (Substitute courses can be considered at the advisor's discretion):
        - EN.560.653 An Introduction to Network Modeling
        - EN.560.618 Probabilistic Methods in Civil Engineering and Mechanics
        - EN.553.613 Applied Statistics and Data Analysis
        - EN.553.636 Introduction to Data Science
        - EN.553.761 Nonlinear Optimization I
        - EN.601.633 Intro Algorithms
        - EN.601.675 Machine Learning
    - 5 of which are elective
        - Examples of Elective Courses (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/degree-programs/civil-engineering/systems-engineering-mse/Systems-MSE-Elective-Options-Jul20.pdf)
2. Required courses, but not counted towards minimum course requirements:
    - EN.560.691 Graduate Seminar– Fall semester
    - EN.560.692 Civil Engineering Graduate Seminar – Spring semester
    - EN.500.603 Graduate Orientation and Academic Ethics
    - AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research
3. Acceptable grades: B- and above. Only one course with a grade lower than B- is allowed toward the degree requirements. No grade lower than a C- may be counted toward the course requirements.
4. It is expected that the degree will be completed in one year with the student enrolling in 4 courses per semester, although in select cases students may require a third semester of study. In such cases, the first three semesters must be full-time, while a student enrolling in a fourth semester can be part-time under certain conditions.***
5. CPT internship credits for international students do not count toward the completion of a M.S.E. degree
6. Transfer credits are not permitted

*Students must comply with all requirements stipulated by the Whiting School of Engineering Academic Policies and Procedures as outlined at https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/.

**Academic advisors, in consultation with the faculty in the department, will determine whether the 8 courses leading to this degree are appropriate and if they have been completed satisfactorily.

***See the department Sr. Academic Program Coordinator or Director of Graduate Studies to determine if you are eligible for part-time status.

M.S.E. with Thesis Requirements

The M.S.E. with thesis option is intended for students interested in pursuing a Ph.D. The M.S.E. degree requirements are as follows*:

1. Minimum course requirements: 7 courses** at the 600-level or above:
    - 3 of which must be from the following list (Substitute courses can be considered at the advisor's discretion):
        - EN.560.653 An Introduction to Network Modeling
        - EN.560.618 Probabilistic Methods in Civil Engineering and Mechanics
        - EN.553.613 Applied Statistics and Data Analysis
        - EN.553.636 Introduction to Data Science
        - EN.553.761 Nonlinear Optimization I
        - EN.601.633 Intro Algorithms
        - EN.601.675 Machine Learning
    - 4 of which are elective
        - Examples of Elective Courses (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/degree-programs/civil-engineering/systems-engineering-mse/Systems-MSE-Elective-Options-Jul20.pdf)
2. Required courses, but do not count towards minimum course requirements:

- Research course with the research advisor – Fall semester
- Research course with the research advisor – Spring semester (a two-semester research sequence)
- EN.560.691 Graduate Seminar– Fall semester
- EN.560.692 Civil Engineering Graduate Seminar– Spring semester
- EN.500.603 Graduate Orientation and Academic Ethics
- AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research

3. Acceptable grades: B- and above. Only one course with a grade lower than B- is allowed toward the degree requirements. No grade lower than a C- may be counted toward the course requirements.
4. Final essay that is approved by the research advisor and one additional reader who is required to be a full-time departmental faculty member. Any external reader must be approved by the Department Chair
5. Research presentation in a public forum attended by two members of the WSE faculty or other faculty approved by the Department Chair
6. The M.S.E. with thesis program is expected to be completed in 3-4 semesters with the student enrolled in 2-3 courses per semester in addition to research. Summer research is typical but not necessary and is left to the discretion of the student and advisor. The first three semesters must be full-time, while the fourth semester can be part-time under certain conditions.***
7. CPT internship credits for international students do not count toward the completion of the M.S.E. degree
8. Transfer credits are not permitted

*Students must comply with all requirements stipulated by the Whiting School of Engineering Academic Policies and Procedures as outlined at https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/.

**Academic advisors, in consultation with the faculty in the department, will determine whether the 7 courses leading to this degree are appropriate and if they have been completed satisfactorily.

***See the department Sr. Academic Program Coordinator or Director of Graduate Studies to determine if you are eligible for part-time status.

Combined Bachelor's/Master's Program

All Combined Bachelor's/Master's students must meet the requirements stipulated above for the respective MSE program (course-only or thesis program) with the following exception:

- The Department of Civil and Systems Engineering will accept one course from JHU undergraduate studies used for the BS degree at the 400-level or above toward the course requirements listed above.

Notes:

1. Required seminars, EN.500.603 Graduate Orientation and Academic Ethics and AS.360.624 Responsible Conduct of Research (Online)/AS.360.625 Responsible Conduct of Research courses are less than 3 credits each and not counted towards minimum course requirements.
2. Students are expected to maintain a GPA of 2.6 each semester or be placed on probation. See the Probation Policy for master's students (https://engineering.jhu.edu/civil/graduate-programs/masters-program/policies-and-procedures/) for more details.

Requirements:

1. Online Application (https://applygrad.jhu.edu/apply/?sr=9aceddc1-d563-4a68-a7b8-a023986c3cb7) in the Slate application system
2. Three Letters of Recommendation

Obtain your recommenders' email addresses and enter them in your online application to request electronic letters of recommendation. The Slate application system will contact your recommender directly via email and will be given instructions about how to proceed. Please use the Slate system and do not have letters of recommendation mailed to the school.

3. Statement of Purpose

The statement (1-3 pages) should outline your background and interests in civil or systems engineering, reasons why you are seeking to pursue a graduate degree, why you believe JHU is a good fit for you, specific career goals, events, or places that have inspired you, etc.

4. CV/Resume

5. GRE scores

6. Transcripts

Official copies of transcripts are not required for application review purposes. Applicants are asked to upload unofficial transcripts in the Academic History portion of this application. If you receive an offer and choose to accept it, you must contact your institution to have your official academic transcripts sent directly to the Office of Engineering Graduate Admissions.

****For international students****

For all foreign academic work, we strongly recommend that you submit a professional credential evaluation from World Education Services (WES). (https://www.wes.org/) Credential evaluations allow the departments to better assess your academic records. These evaluations do not replace the transcript, you are still required to upload these documents as instructed.

7. TOEFL/IELTS scores or English Language Proficiency Test Waiver (https://livejohnshopkins-my.sharepoint.com/:w:/g/personal/avanhor3_jh_edu/EbMorU0ALe1El4qtqifthgUBc6GW9F-VhkmCBYy4GbiQsQ/?e=Xl1TJZ) (For international students only)

Visit Information for International Students (https://engineering.jhu.edu/graduate-admissions/international-students/) to read our English Language Proficiency Policy (https://livejohnshopkins-my.sharepoint.com/:w:/g/personal/avanhor3_jh_edu/EbMorU0ALe1El4qtqifthgUBc6GW9F-VhkmCBYy4GbiQsQ/?e=Xl1TJZ) for detailed information, including preferred minimum test scores. You may request an English Language Proficiency Test Waiver by contacting the Engineering Graduate Admissions Office by emailing WSEGrad-Admissions@jhu.edu. Applications require a self-reported score for review. Many applicants see their official scores arrive after the application submission deadline.

8. Admissions Fee – $25. Please see the application fee waiver policy (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/general-application-requirements/)

Optional:

- Personal Statement
- Sample of Work

Computational Medicine

https://icm.jhu.edu/

Computational Medicine (CM) is an emerging discipline devoted to the development of quantitative approaches for understanding the mechanisms, diagnosis and treatment of human disease through applications of mathematics, engineering and computational science. The core approach of CM is to develop computational models of the molecular biology, physiology, and anatomy of disease, and apply these models to improve patient care. CM approaches can provide insight into and across many areas of biology, including genetics, genomics, molecular networks, cellular and tissue physiology, organ systems, and whole body pharmacology.

CM research at ICM is sub-divided into four key areas: Computational Molecular Medicine (http://icm.jhu.edu/research-areas-2/computational-molecular-medicine/); Computational Physiological Medicine (http://icm.jhu.edu/research-areas-2/computational-physiological-medicine/); Computational Anatomy (http://icm.jhu.edu/research-areas-2/computational-anatomy/); Computational Healthcare (http://icm.jhu.edu/research-areas-2/computational-healthcare/). Techniques for and applications in each of these four key subareas are introduced during the required core courses, exposing students to the breadth of Computational Medicine, and enabling each student to identify a preferred area of interest:

- **Computational Physiological Medicine** develops mechanistic models of biological systems in disease, and applies the insights gained from these models to develop improved diagnostics and therapies. Therapies could be diverse drugs, electrical stimulation, mechanical support devices and more.
- **Computational Molecular Medicine** harnesses the enormous amount of disease-relevant data produced by next-generation sequencing, microarray and proteomic experiments of large patient cohorts, using statistical models to identify the drivers of disease and the susceptible links in disease networks.
- **Computational Anatomy** uses medical imaging to analyze the variation in structure of human organs in health and disease. Such image analysis has been integrated into clinical workflows to assist in the diagnosis and prognosis of complex diseases.
- **Computational Healthcare** is an emerging field devoted to understanding populations of patients and their interaction with all aspects of the healthcare process.

CM is distinct from Computational Biology in its focus on human health, disease, and treatment; translation to and application in the clinic is a near-term goal of all CM research. Applications of CM are as broad as medicine itself, and include: identification of optimal drugs using associated genomic and proteomic biomarkers; discovery of image-based biomarkers for diagnosis and prognosis; design and dynamic adjustment of individualized non-drug therapies such as deep brain stimulation, cardiac stimulation, and cochlear implants; modeling and learning from patient EHR data to improve patient outcomes and efficiency of care; optimization of healthcare policy decisions by quantitative analysis; and more. CM is one of the pillars of the University's Strategic Initiative in Individualized Health.

Programs

Computational Medicine, Minor

The Institute for Computational Medicine (ICM) (https://icm.jhu.edu/) offers an undergraduate minor in Computational Medicine, the *first* educational program in CM, reflecting Johns Hopkins University's leadership in this field. Like the ICM, the undergraduate minor in Computational Medicine is integrative and multidisciplinary. The ICM Core Faculty who serve as advisors to the undergraduate minor hold primary and joint appointments in multiple Johns Hopkins University departments and schools including Biomedical Engineering, Computer Science, Electrical and Computer Engineering, Mechanical Engineering, Applied Mathematics and Statistics (WSE); Neurosurgery, Emergency Medicine, Medicine, and the Divisions of Cardiology and Health Sciences Informatics (SOM); and Health Policy and Management (BSPH).

With a minor in CM, undergraduates gain a solid grounding in the development and application of computational methods in key areas of medicine. Specifically, undergraduates will understand how mathematical models can be constructed from biophysical laws or experimental data, and how predictions from these models facilitate diagnosis and treatment of a disease. Undergraduates will become conversant with a wide variety of statistical, deterministic and stochastic modeling methods, skills that are essential to the advancement of modern medicine, and are prized both in academic research and industrial research.

Declaring the Minor

Students interested in the minor should contact Sabrina Sengupta, Sr. Academic Coordinator, at ssengu19@jhu.edu to receive guidance about the program and be assigned a minor advisor.

Program Requirements

Minor Prerequisites

Before attempting the minor, undergraduates will have taken the following courses. For a course to count towards the minor, a minimum grade of C- is required:

1. Calculus I
2. Calculus II
3. Probability and Statistics: either a single course covering both (e.g. Probability & Statistics for the Physical Sciences & Engineering (EN.553.310) **or** Probability and Statistics for the Biological Sciences and Engineering (EN.553.311)) or a course devoted to each (e.g., Introduction to Probability (EN.553.420) **and** Introduction to Statistics (EN.553.430)) – this may be taken concurrent with core courses Introduction to Computational Medicine: Imaging (EN.580.431) and Introduction to Computational Medicine: The Physiome (EN.580.433).
4. At least one (1) additional course in mathematics or applied mathematics (at least 3 credits)
5. At least one (1) computer programming course (at least 3 credits)
6. At least one (1) biological sciences course at the 200 level or higher (at least 3 credits). AP Biology credits do not satisfy this requirement.

A list of approved courses for each prerequisite can be found here (https://icm.jhu.edu/academics/undergraduate-programs/undergraduate-minor/).

Core Courses

Code	Title	Credits
EN.580.431	Introduction to Computational Medicine: Imaging [1]	2
EN.580.433	Introduction to Computational Medicine: The Physiome [1]	2
Select one of the following:		3-4
AS.110.445	Mathematical and Computational Foundations of Data Science	4
EN.553.450	Computational Molecular Medicine	4
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.447	Computational Stem Cell Biology	3
EN.580.458	Computing the Transcriptome	3
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
PH.140.628	Data Science for Public Health I	4
or PH.140.629	Data Science for Public Health II	

1. EN.580.431 Introduction to Computational Medicine: Imaging and EN.580.433 Introduction to Computational Medicine: The Physiome cover computational anatomy and physiology.
2. EN.580.464 Advanced Data Science for Biomedical Engineering covers introductory R, data cleaning, reproducible research, basic statistical inference, machine learning, and artificial intelligence.
3. EN.580.488 Foundations of Computational Biology and Bioinformatics introduces probabilistic modeling and information theory applied to biological sequence analysis.
4. EN.580.430 Systems Pharmacology and Personalized Medicine covers applications of pharmacokinetics and pharmacodynamics to simulating the effects of drugs across a population of diseased individuals.
5. EN.601.448 Computational Genomics: Data Analysis covers computational analysis of genomic data with a focus on statistical methods and machine learning.
6. EN.553.450 Computational Molecular Medicine covers measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models.

Distinguished Seminar Series

Students enrolled in the Computational Medicine Minor are required to attend 6 ICM Distinguished Seminars via Zoom prior to graduation. Documentation of seminar attendance is two-fold. For each seminar attended students must:

1. Attend the Zoom seminar synchronously with student's JHU email
2. Complete a Seminar Attendance Form

Elective Courses

Following satisfaction of the prerequisites, to complete the minor undergraduates must take at least 18 credits of CM courses. This includes the core courses plus approved elective courses selected from those listed below. The following restrictions are noted:

1. No more than 3 of the 18 elective credits may consist of independent research in computational medicine or approved CM-related research. Eligibility of independent research as “M”, “C”, “MC”, or neither is at the advisr’s discretion.
2. The 18 credits will be at 300-level or above, and courses must be passed at a C- level or above;
3. At least 1 non-core/elective course must be outside student’s home department;
4. At least 2 non-core/elective courses must have a substantial biology or medicine component, as identified in the list below with an (M) designation;
5. At least 1 non-core course must have a significant component of “applied programming” (distinct from a course on computer language or on programming such as Intermediate Computer Programming in Computer Science) to satisfy the computational component, as identified in the list of electives with a (C) designation;
6. All courses must be passed at a C- level or above;
7. A class may not be counted as both a prerequisite and an elective.

Students may suggest elective courses to be added to the list by making requests to Sabrina Sengupta (ssengu19@jhu. (aflynn12@jhu.edu)d (aflynn12@jhu.edu)eu (aflynn12@jhu.edu)). All suggestions will be reviewed by the CM Minor Curriculum Committee for potential approval.

Code	Title	Credits
Significant Biology/Medicine Component (M)		
EN.530.676	Locomotion Dynamics & Control	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.435	Applied Bioelectrical Engineering	3
EN.580.447	Computational Stem Cell Biology	3
EN.580.460	Epigenetics at the Crossroads of Genes and the Environment	1.5
EN.580.462	Representations of Choice	3
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.689	Modern Optical Microscopy: Theory and Practice	3
EN.601.350	Genomic Data Science	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.448	Computational Genomics: Data Analysis	3
ME.600.721	Introduction to Precision Medicine Data Analysis	1.5
Significant Computational Component (C)		
EN.520.353	Control Systems	4
EN.520.432	Medical Imaging Systems	3
EN.520.433	Medical Image Analysis	3
EN.540.409	Dynamic Modeling and Control	4
EN.540.414	Computational Protein Structure Prediction and Design	3
EN.540.421	Project in Design: Pharmacodynamics	3
EN.553.361	Introduction to Optimization	4
EN.553.386	Scientific Computing: Differential Equations	4
EN.553.436	Introduction to Data Science	4
EN.553.492	Mathematical Biology	3

EN.580.430	Systems Pharmacology and Personalized Medicine	4
EN.580.437	Neuro Data Design I	4
EN.580.438	Neuro Data Design II	4
EN.580.447	Computational Stem Cell Biology	3
EN.580.460	Epigenetics at the Crossroads of Genes and the Environment	1.5
EN.580.462	Representations of Choice	3
EN.580.464	Advanced Data Science for Biomedical Engineering	4
EN.580.480	Precision Care Medicine I	4
EN.580.481	Precision Care Medicine II	4
EN.580.488	Foundations of Computational Biology and Bioinformatics	3
EN.580.491	Learning, Estimation and Control	3
EN.580.689	Modern Optical Microscopy: Theory and Practice	3
EN.601.350	Genomic Data Science	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.448	Computational Genomics: Data Analysis	3
EN.601.455	Computer Integrated Surgery I	4
EN.601.461	Computer Vision	3
EN.601.475	Machine Learning	3
EN.601.476	Machine Learning: Data to Models	3
EN.601.482	Machine Learning: Deep Learning	4
EN.601.723	Advanced Topics in Data-Intensive Computing	3
AS.050.375	Probabilistic Models of the Visual Cortex	3
AS.250.302	Modeling the Living Cell	4
ME.600.721	Introduction to Precision Medicine Data Analysis	1.5
PH.340.677	Infectious Disease Dynamics: Theoretical and Computational Approaches	3
Other Electives		
The following courses may be used to satisfy (M) or (C) requirements, but not both.		
EN.520.315	Intro. to Bio-Inspired Processing of Audio-Visual Signals	3
EN.520.621	Introduction To Nonlinear Systems	3
EN.530.343	Design and Analysis of Dynamical Systems	3
EN.530.616	Introduction to Linear Systems Theory	3
EN.553.391	Dynamical Systems	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.530.410	Biomechanics of the Cell	3

Computational Medicine, Pre-Doctoral Training Program

The Pre-Doctoral Training Program in Computational Medicine, funded by the National Institute of General Medical Sciences under Award Number T32GM119998, supports selected trainees from the departments of Biomedical Engineering and Applied Mathematics & Statistics.

Students chosen for the Ruth L. Kirschstein National Research Service Award institutional training grant will learn through a combination of focused coursework and dissertation research alongside computational medicine training program faculty mentors from across the Johns Hopkins Whiting School of Engineering and the School of Medicine. The program is designed to prepare graduates to fill the growing need for researchers trained in computational medicine in both industry and academia.

Trainees will be part of an exceptional and distinctive community of students and faculty exploring the possibilities of computational medicine. Trainees will learn how to develop models of biological systems in health and disease, constrain these models using data collected from patients, and apply models to deliver improved diagnoses and therapies.

Admission

To Apply

Prospective trainees should apply to the PhD programs of the Departments of Biomedical Engineering (https://www.bme.jhu.edu/) or Applied Mathematics and Statistics (https://engineering.jhu.edu/ams/graduate-studies/admissions-criteria-admission-process/), indicating an interest in pursuing pre-doctoral training in Computational Medicine.

Program Requirements

Program Milestones

Year One

By the end of the first year, trainees will complete the following:

- EN.580.631 Introduction to Computational Medicine: Imaging and EN.580.633 Introduction to Computational Medicine: The Physiome
- EN.580.688 Foundations of Computational Biology and Bioinformatics or EN.553.650 Computational Molecular Medicine or EN.601.448 Computational Genomics: Data Analysis or EN.601.749 Advanced Computational Genomics: Applied Comparative Genomics
- Required home department course work
- At least one CM research rotation in a laboratory of participating Program Faculty
- Choose a research mentor from the Training Program Faculty (https://icm.jhu.edu/academics/graduate-curricum/pre-doctoral-training-program-in-computational-medicine/training-program-faculty/)

Year Two

By the end of the second year, trainees will complete:

- One clinical rotation in the laboratory of a clinician-researcher who works with patient data
- Graduate Board Oral (GBO) examination *or* Doctoral Board Oral (DBO) examination as required by the trainee's home department

Year Three and Beyond

- Graduate Board Oral (GBO) examination *or* Doctoral Board Oral (DBO) examination as required by the trainee's home department (If not completed in Year 2)
- Participate in planning periodic Computational Medicine conference (optional)
- Thesis Defense (approx. 60 months from matriculation)

Additional Requirements

Each year in the program, trainees will attend the CM Journal Club, the Distinguished Seminars in Computational Medicine, and the annual ICM Retreat.

Computer Science

http://cs.jhu.edu/

Computing has grown to be pervasive throughout engineering, science, business, society, and entertainment. Computer Science at Johns Hopkins University (CS@JHU) is a diverse, collaborative, and intensely research-focused (https://www.cs.jhu.edu/research/) department. Our mission in the university is to enhance discovery and innovation in science, engineering and society through computing research and education:

- To advance disciplinary science and engineering in core and applied computing with a applications focus on data intensive science and engineering, medicine, information security, language and robotics
- To enhance computing science research and education broadly in the school and the university through unique course offerings customized to students of varied backgrounds
- To identify and lead new computing-intensive initiatives for the school and the university

There are two dimensions to the field of computer science that establish it as a unique area. CS can be viewed as a stand-alone discipline worthy of study unto itself, and/or as an empowering discipline to be studied in conjunction with other areas. Core CS careers include (but are not limited to) software design and development, computer systems engineering or administration, and information security. Application areas span a wide range of fields and disciplines such as robotics, medical and health informatics, scientific research, data analytics, entrepreneurship, and human/computer interaction to name a few.

Because computer science is a highly diverse and broadly applied field, studies can proceed in many different directions. Accordingly, the undergraduate and graduate programs in the Department of Computer Science at Johns Hopkins are flexible curricula designed to accommodate a wide range of goals. A student at Johns Hopkins can pursue appropriately customized versions of the following computer science programs: minor, bachelor of science, bachelor of arts, masters of science in engineering, and doctor of philosophy. Most of this catalogue section is devoted to details regarding these programs.

Computer science research laboratories are currently active in the following areas at Hopkins: algorithm design and analysis, human-computer interaction, machine learning, data intensive computing, health informatics, computational medicine, computer vision and image processing, computer graphics, geometric modeling, programming languages, artificial intelligence, natural language and speech processing, information retrieval, cryptography and information security, secure and robust systems, storage systems, high-performance and scientific computing, computational genomics, networks and distributed systems, stream processing, robotics, and computer-integrated surgical systems.

Additionally, interdisciplinary research centers in the university have heavy involvement by Computer Science faculty: the Information Security Institute (ISI) (https://isi.jhu.edu/), the Laboratory for Computational Sensing and Robotics (LCSR) (https://lcsr.jhu.edu/), the Center for Language and Speech Processing (CLSP) (https://www.clsp.jhu.edu/), the Institute for Data Intensive Engineering and Science (IDIES) (http://idies.jhu.edu/), the Mathematical Institute for Data Science (MINDS) (https://www.minds.jhu.edu/), the Institute for Computational Medicine (ICM) (https://icm.jhu.edu/), the Center for Computational Biology (CCB) (http://ccb.jhu.edu/), the Institute for Assured Autonomy (IAA) (https://iaa.jhu.edu), and the Malone Center for Engineering in Healthcare (MCEH) (https://malonecenter.jhu.edu/). An important component of the educational process in the department is the opportunity for undergraduate and graduate student participation in the research programs of the faculty. In particular, original research in close association with individual faculty members is emphasized at the graduate level.

There are several closely related programs at the undergraduate and graduate levels which involve significant coursework and faculty involvement from the Department of Computer Science. The Laboratory for Computational Sensing and Robotics (LCSR) offers a minor in robotics and also a minor in computer integrated surgery through the Engineering Research Center for Computer Integrated Surgical Systems and Technology. Details of these programs may be found elsewhere in this catalogue in the section pertaining to the Laboratory for Computational Sensing and Robotics (https://e-catalogue.jhu.edu/engineering/robotics-computational-sensing/). Undergraduates with a strong interest in system design and performance may elect to pursue a bachelor degree in computer engineering (https://e-catalogue.jhu.edu/engineering/electrical-computer-engineering/). This field of study includes coursework in computer science, as well as electrical and computer engineering. Although programmatically shared by both departments, specific goals and requirements of the computer engineering degree may be found in the catalogue section pertaining to the Department of Electrical and Computer Engineering only.

At the graduate level, the LCSR (https://e-catalogue.jhu.edu/engineering/robotics-computational-sensing/) offers a Master of Science in Engineering (M.S.E.) in Robotics, designed for students from a wide variety of engineering, scientific, and mathematical backgrounds to advance their interdisciplinary knowledge in robotics. Details of this program may be found in the LCSR section of this catalogue, or on the web at www.lcsr.jhu.edu/MSE (http://www.lcsr.jhu.edu/MSE/). The M.S.E. in Computer Science offers an official concentration in Human Language and Technology (https://www.clsp.jhu.edu/human-language-technology-masters/) jointly administered through CLSP (https://www.clsp.jhu.edu/).

The CS department also has shared graduate programs with the Johns Hopkins University Information Security Institute (https://isi.jhu.edu/) (ISI) and the Department of Applied Mathematics (https://engineering.jhu.edu/ams/) and Statistics (https://engineering.jhu.edu/ams/):

- ISI and CS have a Dual Masters Program (DMP) combining the Master of Science in Security Informatics (MSSI) and the (MSE CS). The Master of Science in Security Informatics (MSSI) is a specialized graduate program offered through ISI. The field of security informatics is fundamentally based on information security and assurance technologies (hardware, software, and networks) as related to issues such as policy, management, privacy/trust, health care, and law, from both national and international perspectives. Interested students can obtain detailed information regarding the M.S.S.I. online at https://isi.jhu.edu or in the ISI section of this catalogue.
- The Data Science (https://engineering.jhu.edu/ams/data-science-masters-program/) program is a joint program between computer science and applied mathematics that aims to produce the next generation of leaders in data science by emphasizing mastery of the skills needed to translate real-world data-driven problems in

mathematical ones, and then solving these problems by using a diverse collection of scientific tools.

For additional information regarding the academic programs available in Computer Science, and the facilities provided, please consult the sections which follow, or the departmental website cs.jhu.edu (https://cs.jhu.edu).

Combined Undergraduate/Graduate Program

As early as the beginning of their junior year, qualified students may apply for admission to a combined bachelor's/master's program which combines a B.S. or B.A. degree (in any department) with a master of science in engineering degree in Computer Science. This program allows students to simultaneously pursue both an undergraduate and a graduate degree program of study. Generally, the combined B.S./M.S.E. or B.A./M.S.E. program is accomplished in five years, although some students take more or less time. Applicants are judged on the basis of their performance in courses and their letters of recommendation. Double counting of at most two courses is subject to current WSE and departmental policies. Students may not take a 601.3xx or 601.4xx course as an undergraduate and the corresponding 601.6xx course for the M.S.E. degree. Combined students will have a graduate faculty advisor in the Computer Science Department who must approve the courses to be applied toward the master's degree. For information on the requirements of the M.S.E. degree, see the Graduate Programs tab on this page, or ask in the departmental office for the document that lists those requirements.

Facilities

The CS department is primarily housed in Malone Hall, a state-of-the-art, open-concept research facility. Additional department research space is located in the adjacent Hackerman Hall.

The general department computing facilities include numerous workstations and servers. Two undergraduate laboratories combine to provide approximately 24 Linux workstations. One of these is a collaboration room allowing students to work in a team-based environment, with several private breakout rooms as well. Both labs include a networked printer. At the graduate level, there is a Master's Lab consisting of a collaboration area and workstation area, both consisting of several Linux workstations and a networked printer. All Ph.D. students are assigned dedicated desks in their research labs.

Focused research laboratories have significant resources that provide greater specialization, including isolated networks of PCs for security studies, high-performance computing clusters, robots and computer vision systems, a mock operating room equipped with medical robots and imaging equipment, and more.

The general department computing facilities are tied together by our own LAN, and access to specialized hardware in other departments, labs, and institutions is available via the university intranet and the Internet. In addition, the university provides wireless access to the JHU intranet and the Internet, as well as server systems that provide email accounts for all students.

Programs

- Computer Science, Bachelor of Arts (p. 1286)
- Computer Science, Bachelor of Science (p. 1287)
- Computer Science, Master of Science in Engineering (p. 1289)
- Computer Science, Minor (p. 1290)
- Computer Science, PhD (p. 1290)
- Security Informatics, Master of Science (p. 1348)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.601.104. Computer Ethics. 1 Credit.
Students will examine a variety of topics regarding policy, legal, and moral issues related to the computer science profession itself and to the proliferation of computers in all aspects of society, especially in the era of the Internet. The course will cover various general issues related to ethical frameworks and apply those frameworks more specifically to the use of computers and the Internet. The topics will include privacy issues, computer crime, intellectual property law -- specifically copyright and patent issues, globalization, and ethical responsibilities for computer science professionals. Work in the course will consist of weekly assignments on one or more of the readings and a final paper on a topic chosen by the student and approved by the instructor.

EN.601.105. CS First-year Experience. 1 Credit.
This course provides first-year computer science majors with an introduction to the field and department. A variety of faculty members will lead weekly small group discussion sections on topics of interest related to the discipline. Upper-year majors will serve as peer mentors for each group (enrollment by permission only). Satisfactory/Unsatisfactory only; counts as elective credits only, not towards CS course credit requirement.

EN.601.124. The Ethics of Artificial Intelligence and Automation. 3 Credits.
The expansion of artificial intelligence (AI)-enabled use cases across a broad spectrum of domains has underscored the benefits and risks of AI. This course will address the various ethical considerations engineers need to engage with to build responsible and trustworthy AI-enabled autonomous systems. Topics to be covered include: values-based decision making, ethically aligned design, cultural diversity, safety, bias, AI explainability, privacy, AI regulation, the ethics of synthetic life, and the future of work. Case studies will be utilized to illustrate real-world applications. Students will apply learned material to a group research project on a topic of their choice.

EN.601.220. Intermediate Programming. 4 Credits.
This course teaches intermediate to advanced programming, using C and C++. (Prior knowledge of these languages is not expected.) We will cover low-level programming techniques, as well as object-oriented class design, and the use of class libraries. Specific topics include pointers, dynamic memory allocation, polymorphism, overloading, inheritance, templates, collections, exceptions, and others as time permits. Students are expected to learn syntax and some language specific features independently. Course work involves significant programming projects in both languages.
(EN.500.132 OR EN.500.133 OR EN.500.134) OR (EN.500.112 OR EN.500.113 OR EN.500.114)

EN.601.226. Data Structures. 4 Credits.
This course covers the design and implementation of data structures including arrays, stacks, queues, linked lists, binary trees, heaps, balanced trees (e.g. 2-3 trees, AVL-trees) and graphs. Other topics include sorting, hashing, memory allocation, and garbage collection. Course work involves both written homework and Java programming assignments.
EN.500.132 OR (EN.500.112 or EN.601.220) or AP Computer Science or equivalent.

EN.601.229. Computer System Fundamentals. 3 Credits.
We study the design and performance of a variety of computer systems from simple 8-bit micro-controllers through 32/64-bit RISC architectures all the way to ubiquitous x86 CISC architecture. We'll start from logic gates and digital circuits before delving into arithmetic and logic units, registers, caches, memory, stacks and procedure calls, pipelined execution, super-scalar architectures, memory management units, etc. Along the way we'll study several typical instruction set architectures and review concepts such as interrupts, hardware and software exceptions, serial and other peripheral communications protocols, etc. A number of programming projects, frequently done in assembly language and using various processor simulators, round out the course. [Systems].
EN.600.120/EN.601.220

EN.601.230. Mathematical Foundations for Computer Science. 4 Credits.
This course provides an introduction to mathematical reasoning and discrete structures relevant to computer science. Topics include propositional and predicate logic, proof techniques including mathematical induction, sets, relations, functions, recurrences, counting techniques, simple computational models, asymptotic analysis, discrete probability, graphs, trees, and number theory.
EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.500.132 OR EN.500.133 OR EN.500.134 OR EN.601.220;Student may not enroll if taken EN.601.231.

EN.601.231. Automata & Computation Theory. 3 Credits.
This course is an introduction to the theory of computing. topics include design of finite state automata, pushdown automata, linear bounded automata, Turing machines and phrase structure grammars; correspondence between automata and grammars; computable functions, decidable and undecidable problems, P and NP problems, NP-completeness, and randomization.
EN.550.171/EN.553.171 OR EN.553.172;Students may not enroll if taken EN.601.230.

EN.601.270. Open Source Software Engineering (Semesters of Code I). 3 Credits.
The course will provide students a development experience focused on learning software engineering skills to deliver software at scale to a broad community of users associated with open source licensed projects. The class work will introduce students to ideas behind open source software with structured modules on recognizing and building healthy project structure, intellectual property basics, community & project governance, social and ethical concerns, and software economics.
EN.601.220 AND EN.601.226

EN.601.277. Disinformation Self-Defense. 3 Credits.
Scientific, statistical and logical literacy is a necessary skill for evaluating policy proposals, reading news articles with an appropriately critical eye, and making informed choices as consumers and voters. Misunderstanding of claims made in scientific publications, online publishing platforms, and mass media drives, in part, the spread of malicious misinformation and propaganda online. Further, many actors have the means, the motive and the opportunity to mislead the public in a variety of subtle and not so subtle ways. This class will give you tools to discern valid and invalid forms of inference and discourse, and give you tools to communicate precisely, argue appropriately, and stay on top of research and news with an appropriately skeptical attitude. The class will draw on historical and modern literature on linguistic, logical, and probabilistic fallacies, statistical and logical inference, data visualization, cognitive biases, and the scientific method.
(EN.553.171 OR EN.553.172) OR AS.150.118

EN.601.280. Full-Stack JavaScript. 3 Credits.
A full-stack JavaScript developer is a person who can build modern software applications using primarily the JavaScript programming language. Creating a modern software application involves integrating many technologies - from creating the user interface to saving information in a database and everything else in between and beyond. A full-stack developer is not an expert in everything. Rather, they are someone who is familiar with various (software application) frameworks and the ability to take a concept and turn it into a finished product. This course will teach you programming in JavaScript and introduce you to several JavaScript frameworks that would enable you to build modern web, cross-platform desktop, and native/hybrid mobile applications. A student who successfully completes this course will be on the expedited path to becoming a full-stack JavaScript developer.
EN.601.220 OR EN.601.226

EN.601.290. User Interfaces and Mobile Applications. 3 Credits.
This course will provide students with a rich development experience, focused on the design and implementation of user interfaces and mobile applications. A brief overview of human computer interaction will provide context for designing, prototyping and evaluating user interfaces. Students will invent their own mobile applications and implement them using the Android SDK, which is JAVA based. An overview of the Android platform and available technologies will be provided, as well as XML for layouts, and general concepts for effective mobile development. Students will be expected to explore and experiment with outside resources in order to learn technical details independently. There will also be an emphasis on building teamwork skills, and on using modern development techniques and tools.
EN.600.120 AND EN.600.226

EN.601.295. Developing Health IT Applications. 3 Credits.
This course is a project-based introduction to working on successful projects in health care. In the first half of the term, students perform reading and homework assignments designed to introduce: (1) the context of health care delivery and health IT, (2) techniques to overcome challenges to conducting health care data analyses, and (3) techniques to design meaningful applications around health care data. In the second half of the term, students work in small groups to solve a real-world problem of their choosing. Includes exercises in written and oral communication and team building. [Oral starting 2019]
(EN.600.120 OR EN.601.220) AND (EN.600.226 OR EN.601.226)

EN.601.310. Software for Resilient Communities. 3 Credits.
This is a project-based course focusing on the design and implementation of practical software systems. Students will work in small teams to design and develop useful open-source software products that support our communities. Students will be paired with community partners and will aim to develop software that can be used after the course ends to solve real problems facing those partners today. Instructors will connect with the community partners and determine viable project areas prior to the course start. Students will meet with their community partners to analyze the challenges in their project area, agree on a concrete target project outcome, and gather requirements for their project. Based on these requirements, students will design and implement open-source software systems. [Oral]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226

EN.601.315. Databases. 3 Credits.
Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems]
EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.318. Operating Systems. 3 Credits.
This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system.
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.320. Parallel Programming. 3 Credits.
This course prepares the programmer to tackle the massive data sets and huge problem size of modern scientific and enterprise computing. Google and IBM have commented that undergraduate CS majors are unable to "break the single server mindset" (http://www.google.com/intl/en/ press/pressrel/20071008_ibm_univ.html). Students taking this course will abandon the comfort of serial algorithmic thinking and learn to harness the power of cutting-edge software and hardware technologies. The issue of parallelism spans many architectural levels. Even ``single server'' systems must parallelize computation in order to exploit the inherent parallelism of recent multi-core processors. The course will examine different forms of parallelism in four sections. These are: (1) massive data-parallel computations with Hadoop!; (2) programming compute clusters with MPI; (3) thread-level parallelism in Java; and, (4) GPGPU parallel programming with NVIDIA's Cuda. Each section will be approximately 3 weeks and each section will involve a programming project. The course is also suitable for undergraduate and graduate students from other science and engineering disciplines that have prior programming experience. [Systems]
EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.320, EN.600.420, EN.601.320, EN.601.420, EN.601.620.

EN.601.340. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]
(EN.600.226 OR EN.601.226) AND (EN.600.233 OR EN.601.229)

EN.601.350. Genomic Data Science. 3 Credits.
This course will use a project-based approach to introduce undergraduates to research in computational biology and genomics. During the semester, students will take a series of large data sets, all derived from recent research, and learn all the computational steps required to convert raw data into a polished analysis. Data challenges might include the DNA sequences from a bacterial genome project, the RNA sequences from an experiment to measure gene expression, the DNA from a human microbiome sequencing experiment, and others. Topics may vary from year to year. In addition to computational data analysis, students will learn to do critical reading of the scientific iterature by reading high-profile research papers that generated groundbreaking or controversial results. [Applications] Recommended Course Background: Knowledge of the Unix operating system and programming expertise in a language such as Perl or Python.

EN.601.356. Seminar: Computer Integrated Surgery II. 1 Credit.
Students may receive credit for EN.601.456 or EN.601.356, but not both. Lecture only version of EN.601.456 (no project). Recommended Course Background: EN.601.455 or instructor permission required.
EN.601.455 or instructor permission.;Students may receive credit for either EN.601.356 orEN.601.456, but not both.

EN.601.402. Digital Health and Biomedical Informatics. 1 Credit.
Advances in technology are driving a change in medicine, from personalized medicine to population health. Computers and information technology will be critical to this transition. We shall discuss some of the coming changes in terms of computer technology, including computer-based patient records, clinical practice guidelines, and region-wide health information exchanges. We will discuss the underlying technologies driving these developments - databases and warehouses, controlled vocabularies, and decision support.

EN.601.411. Computer Science Innovation & Entrepreneurship II. 3 Credits.
This course is the second half of a two-course sequence and is a continuation of course EN.660.410.01, CS Innovation and Entrepreneurship, offered by the Center for Leadership Education (CLE). In this sequel course the student groups, directed by CS faculty, will implement the business idea which was developed in the first course and will present the implementations and business plans to an outside panel made up of practitioners, industry representatives, and venture capitalists. [General]
EN.660.410

EN.601.414. Computer Networks. 3 Credits.
Topics covered will include application layer protocols (e.g. HTTP, FTP, SMTP), transport layer protocols (UDP, TCP), network layer protocols (e.g. IP, ICMP), link layer protocols (e.g. Ethernet) and wireless protocols (e.g. IEEE 802.11). The course will also cover routing protocols such as link state and distance vector, multicast routing, and path vector protocols (e.g. BGP). The class will examine security issues such as firewalls and denial of service attacks. We will also study DNS, NAT, Web caching and CDNs, peer to peer, and protocol tunneling. Finally, we will explore security protocols (e.g. TLS, SSH, IPsec), as well as some basic cryptography necessary to understand these. Grading will be based on hands-on programming assignments, homeworks and two exams. [Systems]
EN.601.226 AND EN.601.229 or permission.;Students may receive credit for only one of EN.600.344, EN.600.444, EN.601.414, EN.601.614.

EN.601.415. Databases. 3 Credits.
Similar material as EN.601.315 covered in more depth for advanced undergraduates. Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems] (www.cs.jhu.edu/~yarowsky/cs415.html)
EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.417. Distributed Systems. 3 Credits.
Graduate version of 601.317 Systems. Students may receive credit for 601.317 or 601.417 but not both. Recommended Course Background: EN.601.220, EN.601.226
Students may receive credit for only one of 417/617;(EN.600.120 OR EN.601.220) AND (EN.600.226 OR EN.601.226)

EN.601.418. Operating Systems. 3 Credits.
Similar material as EN.601.318, covered in more depth. Intended for advanced undergraduate students. This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system.
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.419. Cloud Computing. 3 Credits.
Clouds host a wide range of the applications that we rely on today. In this course, we study common cloud applications, traffic patterns that they generate, critical networking infrastructures that support them, and core networking and distributed systems concepts, algorithms, and technologies used inside clouds. We will also study how today's application demand is influencing the network's design, explore current practice, and how we can build future's networked infrastructure to better enable both efficient transfer of big data and low-latency requirements of real-time applications. The format of this course will be a mix of lectures, discussions, assignments, and a project designed to help students practice and apply the theories and techniques covered in the course. [Systems] Prerequisites: EN.601.226 or permission. Students can only receive credit for one of 601.419/619. Recommended: a course in operating systems, networks or systems programming.
EN.601.226 (or EN.600.226) AND EN.601.414 or permission from the instructor.;Students may earn credit for EN.601.419 or EN.601.619, but not both.

EN.601.420. Parallel Computing for Data Science. 3 Credits.
This course studies parallelism in data science, drawing examples from data analytics, statistical programming, and machine learning. It focuses mostly on the Python programming ecosystem but will use C/C++ to accelerate Python and Java to explore shared-memory threading. It explores parallelism at all levels, including instruction level parallelism (pipelining and vectorization), shared-memory multicore, and distributed computing. Concepts from computer architecture and operating systems will be developed in support of parallelism, including Moore's law, the memory hierarchy, caching, processes/threads, and concurrency control. The course will cover modern data-parallel programming frameworks, including Dask, Spark, Hadoop!, and Ray. The course will not cover GPU deep-learning frameworks nor CUDA. The course is suitable for second-year undergraduate CS majors and graduate students from other science and engineering disciplines that have prior programming experience and familiarity with Python. [Systems]
EN.601.226 AND EN.601.229;Students may receive credit for only one of EN.600.320, EN.600.420, EN.601.320, EN.601.420, EN.601.620.

EN.601.421. Object Oriented Software Engineering. 3 Credits.
This course covers object-oriented software construction methodologies and their application. The main component of the course is a large team project on a topic of your choosing. Course topics covered include object-oriented analysis and design, UML, design patterns, refactoring, program testing, code repositories, team programming, and code reviews. [Systems or Applications]
EN.601.220 AND EN.601.226 AND (EN.601.280 OR EN.601.290);Students may receive credit for only one of EN.600.321, EN.600.421, EN.601.421, EN.601.621.

EN.601.422. Software Testing & Debugging. 3 Credits.
Studies show that testing can account for over 50% of software development costs. This course presents a comprehensive study of software testing, principles, methodologies, tools, and techniques. Topics include testing principles, coverage (graph coverage, logic coverage, input space partitioning, and syntax-based coverage), unit testing, higher-order testing (integration, system-level, acceptance), testing approaches (white-box, black-box, grey-box), regression testing, debugging, delta debugging, and several specific types of functional and non-functional testing as schedule/interest permits (GUI testing, usability testing, security testing, load/performance testing, A/B testing etc.). For practical topics, state- of-the-art tools/techniques will be studied and utilized. [Systems]
EN.601.290 OR EN.601.421;Students can take EN.601.422 or EN.601.622, but not both.

EN.601.424. Reliable Software Systems. 3 Credits.
Reliability is an essential quality requirement for all artifacts operating in the real-world, ranging from bridges, cars to power grids. Software systems are no exception. In this computing age when software is transforming even traditional mission-critical artifacts, making sure the software we write is reliable becomes ever more important. This course exposes students to the principles and techniques in building reliable systems. We will study a set of systematic approaches to make software more robust. These include but are not limited to static analysis, testing framework, model checking, symbolic execution, fuzzing, and formal verification. In addition, we will cover the latest research in system reliability.
EN.601.220 AND (EN.601.328 OR EN.601.428)

EN.601.426. Principles of Programming Languages. 3 Credits.
Functional, object-oriented, and other language features are studied independent of a particular programming language. Students become familiar with these features by implementing them. Most of the implementations are in the form of small language interpreters. Some type checkers and a small compiler will also be written. The total amount of code written will not be overly large, as the emphasis is on concepts. The ML programming language is the implementation language used. [Analysis] Prerequisites include EN.601.226. No Freshmen or Sophomores.
EN.601.226

EN.601.427. Principles of Programming Languages II. 3 Credits.
This course is designed as a follow-on to Principles of Programming languages. It will cover a wide array of fundamental topics in programming languages, including advanced functional programming, the theory of inductive definitions, advanced operational semantics, advanced type systems, program analysis, program verification, theorem provers and SAT solvers. [Analysis]
EN.601.426

EN.601.428. Compilers & Interpreters. 3 Credits.
Introduction to compiler design, including lexical analysis, parsing, syntax-directed translation, symbol tables, runtime environments, and code generation and optimization. Students are required to write a compiler as a course project. [Systems]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229

EN.601.429. Functional Programming in Software Engineering. 3 Credits.
How can we effectively use functional programming techniques to build real-world software? This course will primarily focus on using the OCaml programming language for this purpose. Topics covered include OCaml basics, modules, standard libraries, testing, quickcheck, build tools, functional data structures and efficiency analysis, monads, streams, and promises. Students will practice what they learn in lecture via functional programming assignments and a final project.
EN.601.226 OR Instructor Permission

EN.601.430. Combinatorics & Graph Theory in Computer Science. 3 Credits.
This is a graduate level course studying the applications of combinatorics and graph theory in computer science. We will start with some basic combinatorial techniques such as counting and pigeon hole principle, and then move to advanced techniques such as the probabilistic method, spectral graph theory and additive combinatorics. We shall see their applications in various areas in computer science, such as proving lower bounds in computational models, randomized algorithms, coding theory and pseudorandomness. [Analysis]Recommended Course Background: probability theory and linear algebra
EN.553.171 OR EN.553.172 OR EN.550.171; probability theory and linear algebra recommended.;Students may receive credit for only one of 430/630

EN.601.433. Intro Algorithms. 3 Credits.
This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis. [Analysis]
EN.601.226 AND (EN.553.171 OR EN.553.172 OR EN.601.230 OR EN.601.231);Students may receive credit for only one of EN.600.363, EN.600.463, EN.601.433, EN.601.633.

EN.601.434. Randomized and Big Data Algorithms. 3 Credits.
The course emphasizes algorithmic design aspects, and how randomization can be a helpful tool. The topics covered include: tail inequalities, linear programming relaxation & randomized rounding, de-randomization, existence proofs, universal hashing, markov chains, metropolis and metropolis-hastings methods, mixing by coupling and by eigenvalues, counting problems, semi-definite programming and rounding, lower bound arguments, and applications of expanders. [Analysis] (www.cs.jhu.edu/~cs464) Recommended Course Background: Probability
((N.600.363 OR EN.600.463) OR (EN.601.433 OR EN.601.633)) AND (EN.550.310 OR EN.553.310 OR EN.553.311 OR EN.550.420 OR EN.550.620) or equivalent.;Students may receive credit for only one of EN.600.464, EN.600.664, EN.601.434, EN.601.634.

EN.601.435. Approximation Algorithms. 3 Credits.
This course provides an introduction to approximation algorithms. Topics include vertex cover, TSP, Steiner trees, cuts, greedy approach, linear and semi-definite programming, primal-dual method, and randomization. Additional topics will be covered as time permits. There will be a final project. Students may receive credit for EN.601.435 or EN.601.635, but not both. [Analysis]
EN.600.363 OR EN.601.433 OR EN.601.633 OR permission.

EN.601.436. Algorithmic Game Theory. 3 Credits.
This course provides an introduction to algorithmic game theory: the study of games from the perspective of algorithms and theoretical computer science. There will be a particular focus on games that arise naturally from economic interactions involving computer systems (such as economic interactions between large-scale networks, online advertising markets, etc.), but there will also be broad coverage of games and mechanisms of all sorts. Topics covered will include a) complexity of computing equilibria and algorithms for doing so, b) (in)efficiency of equilibria, and c) algorithmic mechanism design. [Analysis]
EN.600.363 OR EN.600.463 OR EN.601.433 OR EN.601.633

EN.601.437. Federated Learning and Analytics. 3 Credits.
Federated Learning (FL) is an area of machine learning where data is distributed across multiple devices and training is performed without exchanging the data between devices. FL can be contrasted with classical machine learning settings when data is available in a central location. As such, FL faces additional challenges and limitations such as privacy and communication. For example, FL may deal with questions of learning from sensitive data on mobile devices while protecting privacy of individual users and dealing with low power and limited communication. As a result, FL requires knowledge of many interdisciplinary areas such as differential privacy, distributed optimization, sketching algorithms, compression and more. In this course students will learn basic concepts and algorithms for FL and federated analytics, and gain hands-on experience with new methods and techniques. Students will gain understanding in reasoning about possible trade-offs between privacy, accuracy and communication. [Analysis] ML: DL, linear algebra, probability
EN.601.433/EN.601.633 AND (EN.601.464/EN.601.664 OR EN.601.475/EN.601.675);Students may only earn credit for EN.601.437 OR EN.601.637.

EN.601.440. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]
(EN.601.226 OR EN.600.226) AND (EN.601.229 OR EN.600.233);Students may receive credit for only one of 340/440/640.

EN.601.441. Blockchains and Cryptocurrencies. 3 Credits.
This course will introduce students to cryptocurrencies and the main underlying technology of Blockchains. The course will start with the relevant background in cryptography and then proceed to cover the recent advances in the design and applications of blockchains. This course should primarily appeal to students who want to conduct research in this area or wish to build new applications on top of blockchains. It should also appeal to those who have a casual interest in this topic or are generally interested in cryptography. Students are expected to have mathematical maturity. [Analysis]
EN.601.226 AND (EN.553.211 OR EN.553.310 OR EN.553.311 OR EN.560.348 OR EN.553.420);Students may recieve credit for only one of EN.600.451 OR EN.601.441 OR EN.601.641

EN.601.442. Modern Cryptography. 3 Credits.
Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis]
Students may receive credit for only one of EN.600.442, EN.601.442, EN.601.642.;(EN.601.230 OR EN.601.231) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.421)

EN.601.443. Security & Privacy in Computing. 3 Credits.
Lecture topics will include computer security, network security, basic cryptography, system design methodology, and privacy. There will be a heavy work load, including written homework, programming assignments, exams and a comprehensive final. The class will also include a semester-long project that will be done in teams and will include a presentation by each group to the class. [Applications] Recommended Course Background: A basic course in operating systems and networking, or permission of instructor.
Students may receive credit for only one of EN.600.443, EN.601.443, EN.601.643.;(EN.600.318/EN.601.318 OR EN.600.418/EN.601.418) OR (EN.600.344 OR EN.600.444/EN.601.414) AND (EN.600.233 OR EN.601.229)

EN.601.444. Network Security. 3 Credits.
This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. [Systems]
EN.600.120 AND EN.600.226 AND (EN.600.344 OR EN.600.444) or permission;Students may receive credit for only one of EN.600.424, EN.650.424, EN.601.444, EN.601.644.

EN.601.445. Practical Cryptographic Systems. 3 Credits.
This semester-long course will teach systems and cryptographic design principles by example: by studying and identifying flaws in widely-deployed cryptographic products and protocols. Our focus will be on the techniques used in practical security systems, the mistakes that lead to failure, and the approaches that might have avoided the problem. We will place a particular emphasis on the techniques of provable security and the feasibility of reverse-engineering undocumented cryptographic systems. [Systems]
Students may receive credit for only one of EN.600.454, EN.601.445, EN.601.645.;EN.600.226/EN.601.226 AND EN.600.233/EN.601.229

EN.601.446. Sketching and Indexing for Sequences. 3 Credits.
Many of the world's largest and fastest-growing datasets are text, e.g. DNA sequencing data, web pages, logs and social media posts. Such datasets are useful only to the degree we can query, compare and analyze them. Here we discuss two powerful approaches in this area. We will cover sketching, which enables us to summarize very large texts in small structures that allow us to measure the sizes of sets and of their unions and intersections. This in turn allows us to measure similarity and find near neighbors. Second, we will discuss indexing --- succinct and compressed indexes in particular -- which enables us to efficiently search inside very long strings, especially in highly repetitive texts. [Analysis]
EN.601.226

EN.601.447. Computational Genomics: Sequences. 3 Credits.
Your genome is the blueprint for the molecules in your body. It's also a string of letters (A, C, G and T) about 3 billion letters long. How does this string give rise to you? Your heart, your brain, your health? This, broadly speaking, is what genomics research is about. This course will familiarize you with a breadth of topics from the field of computational genomics. The emphasis is on current research problems, real-world genomics data, and efficient software implementations for analyzing data. Topics will include: string matching, sequence alignment and indexing, assembly, and sequence models. Course will involve significant programming projects. [Applications]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.439, EN.600.639, EN.601.447, EN.601.647.

EN.601.448. Computational Genomics: Data Analysis. 3 Credits.
Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning.Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Prerequisites: EN.601.226 or other programming experience, probability and statistics, linear algebra or calculus.
Students may receive credit for only one of EN.600.438, EN.600.638, EN.601.448, EN.601.648.

EN.601.449. Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm exam, class presentations, and a significant class project. Prerequisites: knowledge of the Unix operating system and programming expertise in a language such as R or Python. [Applications]
Students may receive credit for only one of EN.600.449, EN.600.649, EN.601.749.

EN.601.452. Computational Biomedical Research. 3 Credits.
[Co-listed with AS.020.415] This course for advanced undergraduates includes classroom instruction in interdisciplinary research approaches and lab work on an independent research project in the lab of a Bloomberg Distinguished Professor and other distinguished faculty. Lectures will focus on cross-cutting techniques such as data visualization, statistical inference, and scientific computing. In addition to two 50-minute classes per week, students will commit to working approximately 3 hours per week in the lab of one of the professors. The student and professor will work together to schedule the research project. Students will present their work at a symposium at the end of the semester.

EN.601.454. Augmented Reality. 3 Credits.
Same as EN.601.654, for undergraduate students. This course introduces students to the field of Augmented Reality. It reviews its basic definitions, principles and applications. It then focuses on Medical Augmented Reality and its particular requirements. The course also discusses the main issues of calibration, tracking, multi-modal registration, advance visualization and display technologies. Homework in this course will relate to the mathematical methods used for calibration, tracking and visualization in medical augmented reality. [Applications]
EN.601.220 AND EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.550.291);Students may receive credit for only one of EN.600.484, EN.600.684, EN.601.454, EN.601.654.

EN.601.455. Computer Integrated Surgery I. 4 Credits.
This course focuses on computer-based techniques, systems, and applications exploiting quantitative information from medical images and sensors to assist clinicians in all phases of treatment from diagnosis to preoperative planning, execution, and follow-up. It emphasizes the relationship between problem definition, computer-based technology, and clinical application and includes a number of guest lectures given by surgeons and other experts on requirements and opportunities in particular clinical areas. Recommended Course Background: EN.601.220, EN.601.457, EN.601.461, image processing.
Students may receive credit for only one of EN.600.445, EN.600.645, EN.601.455, EN.601.655.;EN.600.226/EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291) or permission of the instructor.

EN.601.456. Computer Integrated Surgery II. 3 Credits.
This weekly lecture/seminar course addresses similar material to EN.601.455, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from EN.601.455, although it does not have to be. Grades are based both on the project and on classroom recitations. Students who wish to use this course to satisfy the "Team" requirement should register for EN.601.496 instead. Students wishing to attend the weekly lectures as a 1-credit seminar should sign up for EN.601.356. [Applications, Oral]
EN.601.455 or EN.601.655 or permisssion;Students may receive credit for only one of EN.600.446, EN.600.646, EN.601.456, EN.601.656.

EN.601.457. Computer Graphics. 3 Credits.
This course introduces computer graphics techniques and applications, including image processing, rendering, modeling and animation. [Applications]
EN.600.120/601.220 AND EN.600.226/601.226, and linear algebra or permission of instructor.;Students may receive credit for only one of EN.600.357, EN.600.457, EN.601.457, EN.601.657.

EN.601.459. Computational Geometry. 3 Credits.
This course will provide an introduction to computational geometry. It will cover a number of topics in two- and three-dimensions, including polygon triangulations and partitions, convex hulls, Delaunay and Voronoi diagrams, arrangements, and spatial queries. Time-permitting, we will also look at kD-trees, general BSP-trees, and quadtrees. [Analysis]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND (EN.600.363 OR EN.600.463/EN.601.433 OR EN.601.633)

EN.601.461. Computer Vision. 3 Credits.
This course provides an overview of fundamental methods in computer vision from a computational perspective. Methods studied include: camera systems and their modelling, computation of 3-D geometry from binocular stereo, motion, and photometric stereo, and objectrecognition, image segmentation, and activity analysis. Elements of machine vision and biological vision are also included.
Students may receive credit for only one of EN.600.361, EN.600.461, EN.600.661, EN.601.461, EN.601.661.;(EN.553.310 OR EN.553.311 OR ((EN.553.420 OR EN.553.421) AND (EN.553.430 OR EN.553.431)) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.601.220 AS.250.205)

EN.601.462. Introduction to Spatial Computing. 3 Credits.
This course will provide students with a rich understanding of immersive technology and spatial computing as the next wave of computing after personal and mobile computing, and belongs to the devices that can sense the space or are “spatially” aware. It also covers input systems and interaction modalities that have evolved to support human-computer interaction required for immersive environments. It will go through principles of design thinking as a mindset for creating immersive experiences, and students will explore the practical implication of this subject in healthcare, industry, and society through the projects. Background in Computer Vision (EN.601.461/661) is strongly recommended. [Applications]
EN.601.220 AND EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291)

EN.601.463. Algorithms for Sensor-Based Robotics. 3 Credits.
This course surveys the development of robotic systems for navigating in an environment from an algorithmic perspective. It will cover basic kinematics, configuration space concepts, motion planning, and localization and mapping. It will describe these concepts in the context of the ROS software system, and will present examples relevant to mobile platforms, manipulation, robotics surgery, and human-machine systems. [Analysis]
(AS.110.201 OR AS.110.212) AND AS.110.202 AND EN.601.226;Students may receive credit for only one of EN.600.336, EN.600.436, EN.600.636, EN.601.463, EN.601.663.;(EN.553.310 OR EN.553.311 OR EN.553.420)

EN.601.464. Artificial Intelligence. 3 Credits.
This course is recommended for scientists and engineers with a genuine curiosity about the fundamental obstacles in getting machines to perform tasks such as deduction, learning, planning and navigation. It covers methods for automated reasoning, automatic problem solversand planners, knowledge representation mechanisms, game playing, machine learning,and statistical pattern recognition. Strong programming skills are expected, as well asbasic familiarity with probability. Students intending to also take courses in machinelearning (e.g. 601.475/675, 601.476/676, 601.482/682) may find it beneficial to take thiscourse first, or concurrently. [Applications]
Students may receive credit for only one of EN.600.335, EN.600.435, EN.601.464, EN.601.664.;EN.600.226/EN.601.226

EN.601.465. Natural Language Processing. 4 Credits.
This course is an in-depth overview of techniques for processing human language. How should linguistic structure and meaning be represented? What algorithms can recover them from text? And crucially, how can we build statistical models to choose among the many legal answers? The course covers methods for trees (parsing and semantic interpretation), sequences (finite-state transduction such as morphology), and words (sense and phrase induction), with applications to practical engineering tasks such as information retrieval and extraction, text classification, part-of-speech tagging, speech recognition and machine translation. There are a number of structured but challenging programming assignments. [Applications]
Students may receive credit for only one of EN.600.465, EN.601.465, EN.601.665.;EN.600.226/EN.601.226

EN.601.466. Information Retrieval and Web Agents. 3 Credits.
An in-depth, hands-on study of current information retrieval techniques and their application to developing intelligent WWW agents. Topics include a comprehensive study of current document retrieval models, mail/news routing and filtering, document clustering, automatic indexing, query expansion, relevance feedback, user modeling, information visualization and usage pattern analysis. In addition, the course explores the range of additional language processing steps useful for template filling and information extraction from retrieved documents, focusing on recent, primarily statistical methods. The course concludes with a study of current issues in information retrieval and data mining on the World Wide Web. Topics include web robots, spiders, agents and search engines, exploring both their practical implementation and the economic and legal issues surrounding their use. Recommended Course Background: EN.601.226
EN.600.226 OR EN.601.226

EN.601.467. Introduction to Human Language Technology. 3 Credits.
This course gives an overview of basic foundations and applications of human language technology, such as: morphological, syntactic, semantic, and pragmatic processing; machine learning; signal processing; speech recognition; speech synthesis; information retrieval; text classification; topic modelling; informationextraction; knowledge representation; machine translation; dialog systems; etc. [Applications]Pre-req: EN.601.226 Data Structures; knowledge of Python recommended.
EN.601.226 OR EN.600.226

EN.601.468. Machine Translation. 3 Credits.
Google translate can instantly translate between any pair of over fifty human languages (for instance, from French to English). How does it do that? Why does it make the errors that it does? And how can you build something better? Modern translation systems learn to translate by reading millions of words of already translated text, and this course will show you how they work. The course covers a diverse set of fundamental building blocks from linguistics, machine learning, algorithms, data structures, and formal language theory, along with their application to a real and difficult problem in artificial intelligence.
Students may receive credit for only one of EN.600.468, EN.601.468, EN.601.668.;EN.600.226/EN.601.226 and prob/stat.

EN.601.470. Artificial Agents. 3 Credits.
This course covers a number of topics explored in introductory AI, such as knowledge representation, reasoning, and natural language understanding. Unlike introductory AI, we will pursue these topics based on the transformer neural architecture. We will motivate the material through interacting with agents in games: how to build models that understand user commands, how to generate responses back to a user, and how to reason about a synthetic environment to determine a course of action. Assignments will include programming, presentations on readings, and written summaries of readings. [Applications]
(EN.601.475 OR EN.601.675) OR (EN.601.482 OR EN.601.682) OR (EN.601.488 OR EN.601.688) OR (EN.601.486 OR EN.601.686)

EN.601.474. ML: Learning Theory. 3 Credits.
This is an undergraduate level course in machine learning. It will provide a formal and in-depth coverage of topics in statistical and computational learning theory. We will revisit popular machine learning algorithms and understand their performance in terms of the size of the data (sample complexity), memory needed (space complexity), as well as the overall runtime (computational or iteration complexity). We will cover topics including PAC learning, uniform convergence, VC dimension, Rademacher complexity, algorithmic stability, kernel methods, online learning and reinforcement learning, as well as introduce students to current topics in large-scale machine- learning and randomized projections. General focus will be on combining methodology with theoretical and computational foundations. [Analysis]
AS.110.202 AND ((EN.553.420 AND EN.553.430) OR (EN.553.211 OR EN.553.310 OR EN.553.311) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114) OR (EN.601.220 OR AS.250.205 OR EN.580.200 OR EN.601.107)

EN.601.475. Machine Learning. 3 Credits.
Machine learning is subfield of computer science and artificial intelligence, whose goal is to develop computational systems, methods, and algorithms that can learn from data to improve their performance. This course introduces the foundational concepts of modern Machine Learning, including core principles, popular algorithms and modeling platforms. This will include both supervised learning, which includes popular algorithms like SVMs, logistic regression, boosting and deep learning, as well as unsupervised learning frameworks, which include Expectation Maximization and graphical models. Homework assignments include a heavy programming components, requiring students to implement several machine learning algorithms in a common learning framework. Additionally, analytical homework questions will explore various machine learning concepts, building on the pre-requisites that include probability, linear algebra, multi-variate calculus and basic optimization. Students in the course will develop a learning system for a final project. [Analysis or Applications]
Students may receive credit for only one of EN.600.475, EN.601.475, EN.601.675.;Linear Algebra, Probability, Statistics, Calc III, and Intro Computing/Programming - AS.110.202 AND (EN.553.211 OR EN.553.310 OR EN.553.311 OR ((EN.553.420 or EN.553.421) AND (EN.553.430 OR EN.553.431)) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114 OR (EN.601.220 OR EN.600.120) OR AS.250.205 OR EN.580.200 OR (EN.600.107 OR EN.601.107)).

EN.601.476. Machine Learning: Data to Models. 3 Credits.
How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.;EN.600.475/EN.601.475 OR EN.600.675/EN.601.675 or equivalent.

EN.601.477. Causal Inference. 3 Credits.
"Big data" is not necessarily "high quality data." Systematically missing records, unobserved confounders, and selection effects present in many datasets make it harder than ever to answer scientifically meaningful questions. This course will teach mathematical tools to help you reason about causes, effects, and bias sources in data with confidence. We will use graphical causal models, and potential outcomes to formalize what causal effects mean, describe how to express these effects as functions of observed data, and use regression model techniques to estimate them. We will consider techniques for handling missing values, structure learning algorithms for inferring causal directionality from data, and connections between causal inference and reinforcement learning. [Analysis] Pre-requisites: familiarity with the R programming language, multivariate calculus, basics of linear algebra and probability.
EN.601.475 OR (EN.553.211 OR EN.553.311 OR EN.553.420 OR EN.553.421) AND AS.110.202 or permission of instructor.;Students may receive credit for only one of EN.600.477, EN.600.677, EN.601.477, EN.601.677.

EN.601.481. Machine Learning: Optimization. 3 Credits.
Optimization is at the heart of machine learning. Most machine learning problems can be posed as optimization problems. However, unlike mathematical optimization where the focus is on efficient algorithms for finding solutions with a high degree of accuracy as measured by optimality conditions, optimization for machine learning focuses on algorithms that are efficient and generalize well. In this course, we will focus on optimization for problems that arise in machine learning, design and analysis of algorithms for solving these problems, and the interplay of optimization and machine learning. The coursework will include homework assignments and a final project focusing on applying optimization algorithms to real world machinelearning problems. [Analysis or Applications]
EN.601.475 OR (EN.553.211 OR EN.553.310 OR EN.553.311 OR ((EN.553.420 OR EN.553.421) AND (EN.553.430 OR EN.553.431)) AND AS.110.201 AND AS.110.202);Students may receive credit for only one of EN.601.481/681.

EN.601.482. Machine Learning: Deep Learning. 4 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice. [Applications]
EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.420); Python recommended.

EN.601.484. ML: Interpretable Machine Learning Design. 3 Credits.
There are considerable research thrusts that seek to increase the trustworthiness and perceived reliability of machine learning solutions. One such thrust, interpretable machine learning, attempts to reveal the working mechanisms of a machine learning system. However, other than on-task performance, interpretability is not a property of machine learning algorithms, but an affordance: a relationship between interpretable model and the target users in their context. Successful development of machine learning solutions that afford interpretation thus requires understanding of techniques beyond pure machine learning. In this course, we will first review the basics of machine learning and human-centered design. Then, during student team-delivered lectures, we will learn about contemporary techniques to introduce interpretability to machine learning models and discuss recent literature on the topic. In addition to hands-on homework assignments, students will work in groups to design, justify, implement, and test an interpretable machine learning algorithm for a problem of their choosing. Recommended background in (601.454/654, 601.290, 601.490/690 or 601.491/691) and 601.477/677, and coding in Python/PyTorch.
(EN.601.476 OR EN.601.476) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.486. Machine Learning: Artificial Intelligence System Design & Development. 3 Credits.
The field of artificial intelligence (AI) has recently seen a substantial increase in popularity, largely fueled by the successes of training deep neural networks that achieve state-of-the-art performance in a large variety of problems. These successes are not limited to academic benchmarks but have started to impact our everyday lives in the form of products such as Google Lens, Amazon Alexa, and Tesla Autopilot. In order for such AI systems to succeed we must consider its impact on everyday life, its overall capabilities and performance, and the effectiveness of the human-AI interaction. The importance of harmonic interplay between all these components is dramatically highlighted by recent catastrophic events in road transport and aviation. In this project-based course you will work in teams of 3-5 students to 1) Identify a need with high-impact implications on everyday life; 2) Conceptualize and design an AI system targeting this need, and 3) Develop the AI system by refining a demo-able prototype based on feedback received during course presentations. Required course background: (EN.601.475/675 or EN.601.464/664 or EN.601.482/682) and Python programming. Recommended: 601.290 or 601.454/654 or 601.490/690 or 601.491/691 (experience with human computer interface design).
(EN.601.475 OR EN.601.675) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.490. Introduction to Human-Computer Interaction. 3 Credits.
This course is designed to introduce undergraduate and graduate students to design techniques and practices in human-computer interaction (HCI), the study of interactions between humans and computing systems. Students will learn design techniques and evaluation methods, as well as current practices and exploratory approaches, in HCI through lectures, readings, and assignments. Students will practice various design techniques and evaluation methods through hands-on projects focusing on different computing technologies and application domains. This course is intended for undergraduate and graduate students in Computer Science/Cognitive Science/Psychology. Interested students from different disciplines should contact the instructor before enrolling in this course. [Applications]Recommended Background: Basic programming skills.
Students can receive credit for either EN.601.490 or EN.601.690, but not both.

EN.601.491. Human-Robot Interaction. 3 Credits.
This course is designed to introduce advanced students to research methods and topics in human-robot interaction (HRI), an emerging research area focusing on the design and evaluation of interactions between humans and robotic technologies. Students will (1) learn design principles for building and research methods of evaluating interactive robot systems through lectures, readings, and assignments, (2) read and discuss relevant literature to gain sufficient knowledge of various research topics in HRI, and (3) work on a substantial project that integrates the principles, methods, and knowledge learned in this course. [Applications]
EN.601.220/EN.600.120 AND EN.601.226/EN.600.226

EN.601.496. Computer Integrated Surgery II - Teams. 3 Credits.
This weekly lecture/seminar course addresses similar material to 600.455, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project in teams of at least 3 students, under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from 600.455, although it does not have to be. Grades are based both on the project and on classroom recitations. Students who prefer to do individual projects must register for EN.601.456 instead. [Applications, Oral]
EN.601.455 or permission;Students may receive credit for only one of EN.601.456, EN.601.496, OR EN.601.656

EN.601.501. Computer Science Workshop. 1 - 3 Credits.
An applications-oriented, computer science project done under the supervision and with the sponsorship of a faculty member in the Department of Computer Science. Computer Science Workshop provides a student with an opportunity to apply theory and concepts of computer science to a significant project of mutual interest to the student and a Computer Science faculty member. Permission to enroll in CSW is granted by the faculty sponsor after his/her approval of a project proposal from the student. Interested students are advised to consult with Computer Science faculty members before preparing a Computer Science Workshop project proposal.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.503. Independent Study. 1 - 3 Credits.
Individual guided study for undergraduate students under the direction of a faculty member in the department. The program of study, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.507. Undergraduate Research. 1 - 3 Credits.
Individual research for undergraduates under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.509. Computer Science Internship. 1 Credit.
Individual work in the field with a learning component, supervised by a faculty member in the department. The program of study and credit assigned must be worked out in advance between the student and the faculty member involved. Students may not receive credit for work that they are paid to do. As a rule of thumb, 40 hours of work is equivalent to one credit. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.517. Group Undergraduate Research. 1 - 3 Credits.
Independent research for undergraduates under the direction of a faculty member in the department. This course has a weekly research group meeting that students are expected to attend. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.519. Senior Honors Thesis. 3 Credits.
The student will undertake a substantial independent research project under the supervision of a faculty member, potentially leading to the notation "Departmental Honors with Thesis" on the final transcript. Students are expected to enroll in both semesters of this course during their senior year. Project proposals must be submitted and accepted in the preceding spring semester (junior year) before registration. Students will present their work publicly before April 1st of senior year. They will also submit a first draft of their project report (thesis document) at that time. Faculty will meet to decide if the thesis will be accepted for honors. Computer science majors only. Students should have a 3.5 GPA in computer science courses at the end of their junior year and permission of faculty sponsor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.520. Senior Honors Thesis. 1 - 3 Credits.
For computer science majors only, a continuation of EN.601.519.
Recommended Course Background: EN.601.519
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.556. Senior Thesis In CIS. 3 Credits.
EN.600.445 or permission of instructor.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.611. Computer Science Innovation & Entrepreneurship II. 3 Credits.
This course is the second half of a two-course sequence and is a continuation of course EN.660.410.01, CS Innovation and Entrepreneurship, offered by the Center for Leadership Education (CLE). In this sequel course the student groups, directed by CS faculty, will implement the business idea which was developed in the first course and will present the implementations and business plans to an outside panel made up of practitioners, industry representatives, and venture capitalists. [General]
EN.660.410

EN.601.614. Computer Networks. 3 Credits.
Topics covered will include applications layer protocols (e.g. HTTP, FTP, SMTP), transport layer protocols (UDP, TCP), network layer protocols (e.g. IP, ICMP), link layer protocols (e.g. Ethernet) and wireless protocols (e.g. IEEE 802.11). The course will also cover routing protocols such as link state and distance vector, multicast routing, and path vector protocols (e.g. BGP). The class will examine security issues such as firewalls and denial of service attacks. We will also study DNS, Web caching and CDNS, peer to peer, and protocol tunneling. Finally, we will explore security protocols (e.g. TLS, SSH, IPsec), as well as some basic cryptography necessary to understand these. Grading will be based on hands-pn programming assignments, homework and two exams. [Systems]Required course background: C/C++ programming and data structures, or permission.
Students can only receive credit for EN.601.414 or EN.601.614, but not both.

EN.601.615. Databases. 3 Credits.
Same material as 601.415, for graduate students. Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems] (www.cs.jhu.edu/~yarowsky/cs415.html) Required course background: Data Structures
Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.617. Distributed Systems. 3 Credits.
Graduate version of 601.317 Systems. Students may receive credit for 601.317 or 601.417 but not both. Recommended Course Background: EN.601.220, EN.601.226
Students may receive credit for only one of 417/617

EN.601.618. Operating Systems. 3 Credits.
Same material as 601.418, for graduate students. This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system. [Systems] Required course background: Data Structures & Computer System Fundamentals
Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.619. Cloud Computing. 3 Credits.
Clouds host a wide range of the applications that we rely on today. In this course, we study common cloud applications, traffic patterns that they generate, critical networking infrastructures that support them, and core networking and distributed systems concepts, algorithms, and technologies used inside clouds. We will also study how today's application demand is influencing the network's design, explore current practice, and how we can build future's networked infrastructure to better enable both efficient transfer of big data and low-latency requirements of real-time applications. The format of this course will be a mix of lectures, discussions, assignments, and a project designed to help students practice and apply the theories and techniques covered in the course. [Systems] Prerequisites: EN.601.226 or permission. Students can only receive credit for one of 601.419/619. Recommended: a course in operating systems, networks or systems programming.
Students may earn credit for EN.601.419 or EN.601.619, but not both.

EN.601.620. Parallel Computing for Data Science. 3 Credits.
This course studies parallelism in data science, drawing examples from data analytics, statistical programming, and machine learning. It focuses mostly on the Python programming ecosystem but will use C/C++ to accelerate Python and Java to explore shared-memory threading. It explores parallelism at all levels, including instruction level parallelism (pipelining and vectorization), shared-memory multicore, and distributed computing. Concepts from computer architecture and operating systems will be developed in support of parallelism, including Moore's law, the memory hierarchy, caching, processes/threads, and concurrency control. The course will cover modern data-parallel programming frameworks, including Dask, Spark, Hadoop!, and Ray. The course will not cover GPU deep-learning frameworks nor CUDA. The course is suitable for second-year undergraduate CS majors and graduate students from other science and engineering disciplines that have prior programming experience. Required course background: Data Structures, Computer System Fundamentals, and familiarity with Python. [Systems]
Students may receive credit for only one of EN.601.320, EN.601.420, OR EN.601.620.

EN.601.621. Object Oriented Software Engineering. 3 Credits.
Same material as EN.601.421, for graduate students.This course covers object-oriented software construction methodologies and their application. The main component of the course is a large team project on a topic of your choosing. Course topics covered include object-oriented analysis and design, UML, design patterns, refactoring, program testing, code repositories, team programming, and code reviews. [Systems or Applications] Required course background: intermediate programming, data structures, and experience in mobile or web app development. Students may receive credit for only one of 601.421/621.
Students may receive credit for only one of EN.600.321, EN.600.421, EN.601.421, EN.601.621.

EN.601.622. Software Testing & Debugging. 3 Credits.
Studies show that testing can account for over 50% of software development costs. This course presents a comprehensive study of software testing, principles, methodologies, tools, and techniques. Topics include testing principles, coverage (graph coverage, logic coverage, input space partitioning, and syntax-based coverage), unit testing, higher-order testing (integration, system-level, acceptance), testing approaches (white-box, black-box, grey-box), regression testing, debugging, delta debugging, and several specific types of functional and non-functional testing as schedule/interest permits (GUI testing, usability testing, security testing, load/performance testing, A/B testing etc.). For practical topics, state- of-the-art tools/techniques will be studied and utilized. [Systems]
EN.601.290 OR EN.601.421 OR EN.601.621;Students can only take EN.601.422 or EN.601.622, but not both.

EN.601.624. Reliable Software Systems. 3 Credits.
Reliability is an essential quality requirement for all artifacts operating in the real-world, ranging from bridges, cars to power grids. Software systems are no exception. In this computing age when software is transforming even traditional mission-critical artifacts, making sure the software we write is reliable becomes ever more important. This course exposes students to the principles and techniques in building reliable systems. We will study a set of systematic approaches to make software more robust. These include but are not limited to static analysis, testing framework, model checking, symbolic execution, fuzzing, and formal verification. In addition, we will cover the latest research in system reliability. Recommended course background: EN.601.220 AND EN.601.628.
Students may receive credit for EN.601.424 OR EN.601.624, but not both.

EN.601.626. Principles of Programming Languages. 3 Credits.
Same material as EN.601.426, for graduate students. Functional, object-oriented, and other language features are studied independent of a particular programming language. Students become familiar with these features by implementing them. Most of the implementations are in the form of small language interpreters. Some type checkers and a small compiler will also be written. The total amount of code written will not be overly large, as the emphasis is on concepts. The ML programming language is the implementation language used. [Analysis]Required course background: EN.601.226.
Students may only receive credit for EN.601.426 or EN.601.626, but not both

EN.601.627. Principles of Programming Languages II. 3 Credits.
This course is designed as a follow-on to Principles of Programming Languages. It will cover a wide array of fundamental topics in programming languages, including advanced functional programming, the theory of inductive definitions, advanced operational semantics, advanced type systems, program analysis, program verification, theorem provers and SAT solvers.[Analysis]
EN.601.426 OR EN.601.626

EN.601.628. Compilers & Interpreters. 3 Credits.
Introduction to compiler design, including lexical analysis, parsing, syntax-directed translation, symbol tables, runtime environments, and code generation and optimization. Students are required to write a compiler as a course project. [Systems] Required course background: intermediate programming, data structures and computer system fundamentalsRecommended background: automata and computation theory
Students may receive credit for only one of EN.601.428 or 601.628.

EN.601.629. Functional Programming in Software Engineering. 3 Credits.
How can we effectively use functional programming techniques to build real-world software? This course will primarily focus on using the OCaml programming language for this purpose. Topics covered include OCaml basics, modules, standard libraries, testing, quickcheck, build tools, functional data structures and efficiency analysis, monads, streams, and promises. Students will practice what they learn in lecture via functional programming assignments and a final project. Required course background in data structures (601.226)

EN.601.630. Combinatorics & Graph Theory in Computer Science. 3 Credits.
This is a graduate level course studying the applications of combinatorics and graph theory in computer science. We will start with some basic combinatorial techniques such as counting and pigeon hole principle, and then move to advanced techniques such as the probabilistic method, spectral graph theory and additive combinatorics. We shall see their applications in various areas in computer science, such as proving lower bounds in computational models, randomized algorithms, coding theory and pseudorandomness. [Analysis]Recommended Course Background: probability theory and linear algebra
Students may receive credit for only one of 430/630

EN.601.631. Theory of Computation. 3 Credits.
This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, complexity theory, randomized algorithms, inapproximability, interactive proof systems and probabilistically checkable proofs. Students may not take both EN.601.231 and EN.601.631, unless one is for an undergrad degree and the other for grad. [Analysis]Recommended Course Background: EN.553.171 or istructor permission.

EN.601.633. Intro Algorithms. 3 Credits.
Same material as EN.601.433, for graduate students.This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis. [Analysis] Required background: Data Structures and Discrete Math or Automata/Computation Theory
Students may receive credit for only one of EN.600.363, EN.600.463, EN.601.433, EN.601.633.

EN.601.634. Randomized and Big Data Algorithms. 3 Credits.
Same material as 601.434, for graduate students. The course emphasizes algorithmic design aspects, and how randomization can be a helpful tool. The topics covered include: tail inequalities, linear programming relaxation & randomized rounding, de-randomization, existence proofs, universal hashing, markov chains, metropolis and metropolis-hastings methods, mixing by coupling and by eigenvalues, counting problems, semi-definite programming and rounding, lower bound arguments, and applications of expanders. [Analysis] (www.cs.jhu.edu/~cs464) Required course background: EN.600.363 or EN.601.433 or EN.601.633.
Students may receive credit for only one of EN.600.464, EN.600.664, EN.601.434, EN.601.634.

EN.601.635. Approximation Algorithms. 3 Credits.
Graduate version of EN.601.435. Recommended Background: EN.601.633 or equivalent. Students may receive credit for EN.601.435 or EN.601.635, but not both.

EN.601.636. Algorithmic Game Theory. 3 Credits.
Same material as EN.601.436, for graduate students. This course provides an introduction to algorithmic game theory: the study of games from the perspective of algorithms and theoretical computer science. There will be a particular focus on games that arise naturally from economic interactions involving computer systems (such as economic interactions between large-scale networks, online advertising markets, etc.), but there will also be broad coverage of games and mechanisms of all sorts. Topics covered will include a) complexity of computing equilibria and algorithms for doing so, b) (in)efficiency of equilibria, and c) algorithmic mechanism design. [Analysis]
Students may receive credit for EN.601.436 or EN.601.636, but not both.

EN.601.637. Federated Learning and Analytics. 3 Credits.
Federated Learning (FL) is an area of machine learning where data is distributed across multiple devices and training is performed without exchanging the data between devices. FL can be contrasted with classical machine learning settings when data is available in a central location. As such, FL faces additional challenges and limitations such as privacy and communication. For example, FL may deal with questions of learning from sensitive data on mobile devices while protecting privacy of individual users and dealing with low power and limited communication. As a result, FL requires knowledge of many interdisciplinary areas such as differential privacy, distributed optimization, sketching algorithms, compression and more. In this course students will learn basic concepts and algorithms for FL and federated analytics, and gain hands-on experience with new methods and techniques. Students will gain understanding in reasoning about possible trade-offs between privacy, accuracy and communication. [Analysis] Required:: 433/633 (Algo), 475/675 (ML) or 482/682 (ML: DL), linear algebra, probability
Students may receive credit for only one of 601.437 or 601.637

EN.601.640. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]Required background: data structures and computer system fundamentals.
Students may receive credit for only one of 601.640/440/640

EN.601.641. Blockchains and Cryptocurrencies. 3 Credits.
Same as EN.601.441, for graduate students. This course will introduce students to cryptocurrencies and the main underlying technology of Blockchains. The course will start with the relevant background in cryptography and then proceed to cover the recent advances in the design and applications of blockchains. This course should primarily appeal to students who want to conduct research in this area or wish to build new applications on top of blockchains. It should also appeal to those who have a casual interest in this topic or are generally interested in cryptography. Students are expected to have mathematical maturity. Recommended Course Background: EN.601.226 AND (EN.553.310 OR EN.553.420) [Analysis]
Students may receive credit for only one of EN.600.451 OR EN.601.441 OR EN.601.641

EN.601.642. Modern Cryptography. 3 Credits.
Same material as 601.442, for graduate students. Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis] Required course background: Probability & Automata/Computation Theory
Students may receive credit for only one of EN.601.442 OR EN.601.642.

EN.601.643. Security & Privacy in Computing. 3 Credits.
Same material as 601.443, for graduate students. Lecture topics will include computer security, network security, basic cryptography, system design methodology, and privacy. There will be a heavy work load, including written homework, programming assignments, exams and a comprehensive final. The class will also include a semester-long project that will be done in teams and will include a presentation by each group to the class. [Applications] Required Course Background: A basic course in operating systems and networking, or permission of instructor.
Students may receive credit for only one of EN.600.443, EN.601.443, EN.601.643.

EN.601.644. Network Security. 3 Credits.
Same material as 601.444, for graduate students. This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. [Systems]Recommended. Course Background: EN.601.220, EN.601.226 or equivalent
Students may receive credit for only one of EN.600.454, EN.650.454, EN.601.445, EN.601.645.

EN.601.645. Practical Cryptographic Systems. 3 Credits.
Same material as 601.445, for graduate students. This semester-long course will teach systems and cryptographic design principles by example: by studying and identifying flaws in widely-deployed cryptographic products and protocols. Our focus will be on the techniques used in practical security systems, the mistakes that lead to failure, and the approaches that might have avoided the problem.We will place a particular emphasis on the techniques of provable security and the feasibility of reverse-engineering undocumented cryptographic systems. [Systems]
Students may receive credit for EN.600.454/EN.601.445 or EN.601.645, but not both.

EN.601.646. Sketching and Indexing for Sequences. 3 Credits.
Many of the world's largest and fastest-growing datasets are text, e.g. DNA sequencing data, web pages, logs and social media posts. Such datasets are useful only to the degree we can query, compare and analyze them. Here we discuss two powerful approaches in this area. We will cover sketching, which enables us to summarize very large texts in small structures that allow us to measure the sizes of sets and of their unions and intersections. This in turn allows us to measure similarity and find near neighbors. Second, we will discuss indexing --- succinct and compressed indexes in particular -- which enables us to efficiently search inside very long strings, especially in highly repetitive texts. [Analysis]
Students may receive credit for EN.601.446 or EN.601.646, but not both.

EN.601.647. Computational Genomics: Sequences. 3 Credits.
Same material as 601.447, for graduate students. Your genome is the blueprint for the molecules in your body. It's also a string of letters (A, C, G and T) about 3 billion letters long. How does this string give rise to you? Your heart, your brain, your health? This, broadly speaking, is what genomics research is about. This course will familiarize you with a breadth of topics from the field of computational genomics. The emphasis is on current research problems, real-world genomics data, and efficient software implementations for analyzing data. Topics will include: string matching, sequence alignment and indexing, assembly, and sequence models. Course will involve significant programming projects. [Applications]Required course background: Intermediate programming (C/C++) and Data Structures
Students may receive credit for only one EN.601.447/647/747

EN.601.648. Computational Genomics: Data Analysis. 3 Credits.
Same material as EN.601.448, for graduate students. Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning. Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Recommended Course Background: EN.600.226 or other programming experience, probability and statistics, linear algebra or calculus.

EN.601.649. Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm exam, class presentations, and a significant class project. Prerequisites: knowledge of the Unix operating system and programming expertise in a language such as R or Python. [Applications]

EN.601.654. Augmented Reality. 3 Credits.
This course introduces students to the field of Augmented Reality. It reviews its basic definitions, principles and applications. It then focuses on Medical Augmented Reality and its particular requirements. The course also discusses the main issues of calibration, tracking, multi-modal registration, advance visualization and display technologies. Homework in this course will relate to the mathematical methods used for calibration, tracking and visualization in medical augmented reality. Students may also be asked to read papers and implement various techniques within group projects. Recommended Course Background: EN.601.220, EN.601.226, and AS.110.201. [Applications]
Students may receive credit for only one of EN.600.484, EN.600.684, EN.601.454, EN.601.654.

EN.601.655. Computer Integrated Surgery I. 4 Credits.
Same material as 601.455, for graduate students. This course focuses on computer-based techniques, systems, and applications exploiting quantitative information from medical images and sensors to assist clinicians in all phases of treatment from diagnosis to preoperative planning, execution, and follow-up. It emphasizes the relationship between problem definition, computer-based technology, and clinical application and includes a number of guest lectures given by surgeons and other experts on requirements and opportunities in particular clinical areas. [Applications] Required Course Background: data structures and linear algebra or permission.Recommended Course Background: intermediate programming in C/C++, EN.601.457, EN.601.461, image processing.
Students may receive credit for only one of EN.601.455 or EN.601.655.

EN.601.656. Computer Integrated Surgery II. 3 Credits.
Same material as EN.601.456, for graduate students. This weekly lecture/seminar course addresses similar material to EN.601.655, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from EN.601.655, although it does not have to be. Grades are based both on the project and on classroom recitations. Students wishing to attend the weekly lectures as a 1-credit seminar should sign up for EN.601.356. [Applications]
EN.600.445/EN.601.455 OR EN.600.645/EN.601.655 OR permission of the instructor.;Students may receive credit for only one of EN.600.446, EN.600.646, EN.601.456, EN.601.656.

EN.601.657. Computer Graphics. 3 Credits.
Same material as 601.457, for graduate students. This course introduces computer graphics techniques and applications, including image processing, rendering, modeling and animation. [Applications]Permission of instructor is required for students not satisfying a pre-requisite. No Audits.Required course background: EN.601.220 (C++), EN.601.226, linear algebra.
Students may receive credit for only one of EN.601.457 OR EN.601.657.

EN.601.659. Computational Geometry. 3 Credits.
This course will provide an introduction to computational geometry. It will cover a number of topics in two- and three-dimensions, including polygon triangulations and partitions, convex hulls, Delaunay and Voronoi diagrams, arrangements, and spatial queries. Time-permitting, we will also look at kD-trees, general BSP-trees, and quadtrees. [Analysis] Recommended Course Background: EN.601.220 AND EN.601.226 AND (EN.600.363 OR EN.601.433).
Students may earn credit for EN.601.459 or EN.601.659, but not both.

EN.601.661. Computer Vision. 3 Credits.
This course provides an overview of fundamental methods in computer vision from a computational perspective. Methods studied include: camera systems and their modelling, computation of 3¬D geometry from binocular stereo, motion, and photometric stereo, and object recognition, image segmentation, and activity analysis. Elements of machine learning and deep learning are also included. [Applications]Required course background: Intro to Programming, Linear Algebra & prob/stats
Students may receive credit for only one of EN.601.461, EN.601.661, OR EN.601.761.

EN.601.662. Introduction to Spatial Computing. 3 Credits.
This course will provide students with a rich understanding of immersive technology and spatial computing as the next wave of computing after personal and mobile computing, and belongs to the devices that can sense the space or are “spatially” aware. It also covers input systems and interaction modalities that have evolved to support human-computer interaction required for immersive environments. It will go through principles of design thinking as a mindset for creating immersive experiences, and students will explore the practical implication of this subject in healthcare, industry, and society through the projects. Required course background in intermediate programming, data structures, and linear algebra. Computer vision is recommended. [Applications]

EN.601.663. Algorithms for Sensor-Based Robotics. 3 Credits.
Same material as EN.601.463, for graduate students. This course surveys the development of robotic systems for navigating in an environment from an algorithmic perspective. It will cover basic kinematics, configuration space concepts, motion planning, and localization and mapping. It will describe these concepts in the context of the ROS software system, and will present examples relevant to mobile platforms, manipulation, robotics surgery, and human-machine systems. [Analysis] Required course background: Data Structures, Linear Algebra & prob/stats
Students may receive credit for only one of 601.463/663/763

EN.601.664. Artificial Intelligence. 3 Credits.
Same material as EN.601.464, for graduate students. This course is recommended for students, scientists, and engineers with a genuine curiosity about the fundamental obstacles in getting machines to perform tasks such as deduction, learning, planning and navigation. It covers methods for automated reasoning, automatic problem solvers and planners, knowledge representation mechanisms, game playing, machine learning, and statistical pattern recognition. Strong programming skills are expected, as well as basic familiarity with probability. Students intending to also take courses in machine learning (e.g. 601.475/675, 601.476/676, 601.482/682) may find it beneficial to take this course first, or concurrently.Prereq: Data Structures ; Recommended: linear algebra, prob/stat.
Students may receive credit for only one of EN.601.464 OR EN.601.664.

EN.601.665. Natural Language Processing. 3 Credits.
Same material as 601.465, for graduate students. This course is an in-depth overview of techniques for processing human language. How should linguistic structure and meaning be represented? What algorithms can recover them from text? And crucially, how can we build statistical models to choose among the many legal answers? The course covers methods for trees (parsing and semantic interpretation), sequences (finite-state transduction such as morphology), and words (sense and phrase induction), with applications to practical engineering tasks such as information retrieval and extraction, text classification, part-of-speech tagging, speech recognition and machine translation. There are a number of structured but challenging programming assignments. [Applications]Prerequisite: Data Structures and basic familiarity with Python, partial derivatives, matrix multiplication and probabilities.
Students may receive credit for only one of EN.601.465 OR EN.601.665.

EN.601.666. Information Retrieval and Web Agents. 3 Credits.
Same material as EN.601.466, for graduate students. An in-depth, hands-on study of current information retrieval techniques and their application to developing intelligent WWW agents. Topics include a comprehensive study of current document retrieval models, mail/news routing and filtering, document clustering, automatic indexing, query expansion, relevance feedback, user modeling, information visualization and usage pattern analysis. In addition, the course explores the range of additional language processing steps useful for template filling and information extraction from retrieved documents, focusing on recent, primarily statistical methods. The course concludes with a study of current issues in information retrieval and data mining on the World Wide Web. Topics include web robots, spiders, agents and search engines, exploring both their practical implementation and the economic and legal issues surrounding their use. [Applications]

EN.601.667. Introduction to Human Language Technology. 3 Credits.
This course gives an overview of basic foundations and applications of human language technology, such as: morphological, syntactic, semantic, and pragmatic processing; machine learning; signal processing; speech recognition; speech synthesis; information retrieval; text classification; topic modelling; informationextraction; knowledge representation; machine translation; dialog systems; etc. [Applications]Required Background: EN.601.226 Data Structures; knowledge of Python recommended.
Students may receive credit for only one of 601.467/667

EN.601.668. Machine Translation. 3 Credits.
Same material as 601.468, for graduate students. Google translate can instantly translate between any pair of over fifty human languages (for instance, from French to English). How does it do that? Why does it make the errors that it does? And how can you build something better? Modern translation systems learn to translate by reading millions of words of already translated text, and this course will show you how they work. The course covers a diverse set of fundamental building blocks from linguistics, machine learning, algorithms, data structures, and formal language theory, along with their application to a real and difficult problem in artificial intelligence. [Applications] Required course background: Data Structures and prob/stats
Students may receive credit for only one of EN.601.468 OR EN.601.668.

EN.601.670. Artificial Agents. 3 Credits.
This course covers a number of topics explored in introductory AI, such as knowledge representation, reasoning, and natural language understanding. Unlike introductory AI, we will pursue these topics based on the transformer neural architecture. We will motivate the material through interacting with agents in games: how to build models that understand user commands, how to generate responses back to a user, and how to reason about a synthetic environment to determine a course of action. Assignments will include programming, presentations on readings, and written summaries of readings. [Applications]

EN.601.674. ML: Learning Theory. 3 Credits.
This is a graduate level course in machine learning. It will provide a formal and in-depth coverage of topics in statistical and computational learning theory. We will revisit popular machine learning algorithms and understand their performance in terms of the size of the data (sample complexity), memory needed (space complexity), as well as the overall runtime (computational or iteration complexity). We will cover topics including PAC learning, uniform convergence, VC dimension, Rademacher complexity, algorithmic stability, kernel methods, online learning and reinforcement learning, as well as introduce students to current topics in large-scale machine- learning and randomized projections. General focus will be on combining methodology with theoretical and computational foundations. [Analysis]

EN.601.675. Machine Learning. 3 Credits.
Same material as 601.475, for graduate students. Machine learning is subfield of computer science and artificial intelligence, whose goal is to develop computational systems, methods, and algorithms that can learn from data to improve their performance. This course introduces the foundational concepts of modern Machine Learning, including core principles, popular algorithms and modeling platforms. This will include both supervised learning, which includes popular algorithms like SVMs, logistic regression, boosting and deep learning, as well as unsupervised learning frameworks, which include Expectation Maximization and graphical models. Homework assignments include a heavy programming components, requiring students to implement several machine learning algorithms in a common learning framework. Additionally, analytical homework questions will explore various machine learning concepts, building on the pre-requisites that include probability, linear algebra, multi-variate calculus and basic optimization. Students in the course will develop a learning system for a final project. [Applications or Analysis] Required course background: multivariable calculus, probability, linear algebra, intro to computing
Students may receive credit for only one of EN.601.475 OR EN.601.675.

EN.601.676. Machine Learning: Data to Models. 3 Credits.
Same material as EN.601.476, for graduate students. How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Recommended Background: EN.600.475 or EN.601.675 or equivalent. Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.

EN.601.677. Causal Inference. 3 Credits.
"Big data" is not necessarily "high quality data." Systematically missing records, unobserved confounders, and selection effects present in many datasets make it harder than ever to answer scientifically meaningful questions. This course will teach mathematical tools to help you reason about causes, effects, and bias sources in data with confidence. We will use graphical causal models, and potential outcomes to formalize what causal effects mean, describe how to express these effects as functions of observed data, and use regression model techniques to estimate them. We will consider techniques for handling missing values, structure learning algorithms for inferring causal directionality from data, and connections between causal inference and reinforcement learning. [Analysis] Pre-requisites: familiarity with the R programming language, multivariate calculus, basics of linear algebra and probability.
Students may receive credit for only one of EN.601.477 OR EN.601.677.

EN.601.681. Machine Learning: Optimization. 3 Credits.
Same material as EN.601.481, for graduate students. Optimization is at the heart of machine learning. Most machine learning problems can be posed as optimization problems. However, unlike mathematical optimization where the focus is on efficient algorithms for finding solutions with a high degree of accuracy as measured by optimality conditions, optimization for machine learning focuses on algorithms that are efficient and generalize well. In this course, we will focus on optimization for problems that arise in machine learning, design and analysis of algorithms for solving these problems, and the interplay of optimization and machine learning. The coursework will include homework assignments and a final project focusing on applying optimization algorithms to real world machine learning problems. [Analysis or Applications]Required Course Background: EN 601.475/675 Machine Learning or all of the following:1. Linear algebra (vector spaces, normed vectors, inner product spaces, singular value decomposition2. Probability and Statistics (random variables, probability distributions, expectation, mean, variance, covariance, conditional probability, Bayes rule3. Introductory machine learning (classification, regression, empirical risk minimization, regularization)4. Multivariate calculus (partial derivative, gradient, Jacobian, Hessian, critical points
Students may receive credit for only one of EN.601.481/681

EN.601.682. Machine Learning: Deep Learning. 4 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice. [Applications] Recommended Course Background: (AS.110.201 or AS.110.212 or EN.553.291) and (EN.553.310 EN.553.311 or EN.553.420); numerical optimization recommended.
Students may receive credit for EN.601.482 or EN.601.682, but not both.

EN.601.684. ML: Interpretable Machine Learning Design. 3 Credits.
There are considerable research thrusts that seek to increase the trustworthiness and perceived reliability of machine learning solutions. One such thrust, interpretable machine learning, attempts to reveal the working mechanisms of a machine learning system. However, other than on-task performance, interpretability is not a property of machine learning algorithms, but an affordance: a relationship between interpretable model and the target users in their context. Successful development of machine learning solutions that afford interpretation thus requires understanding of techniques beyond pure machine learning. In this course, we will first review the basics of machine learning and human-centered design. Then, during student team-delivered lectures, we will learn about contemporary techniques to introduce interpretability to machine learning models and discuss recent literature on the topic. In addition to hands-on homework assignments, students will work in groups to design, justify, implement, and test an interpretable machine learning algorithm for a problem of their choosing. Required course background: 601.475/675 or 601.464/664 or 601.482/682; coding in Python/PyTorch. Recommended (601.454/654, 601.290, 601.490/690 or 601.491/691) and 601.477/677.

EN.601.686. Machine Learning: Artificial Intelligence System Design & Development. 3 Credits.
The field of artificial intelligence (AI) has recently seen a substantial increase in popularity, largely fueled by the successes of training deep neural networks that achieve state-of-the-art performance in a large variety of problems. These successes are not limited to academic benchmarks but have started to impact our everyday lives in the form of products such as Google Lens, Amazon Alexa, and Tesla Autopilot. In order for such AI systems to succeed we must consider its impact on everyday life, its overall capabilities and performance, and the effectiveness of the human-AI interaction. The importance of harmonic interplay between all these components is dramatically highlighted by recent catastrophic events in road transport and aviation. In this project-based course you will work in teams of 3-5 students to 1) Identify a need with high-impact implications on everyday life; 2) Conceptualize and design an AI system targeting this need, and 3) Develop the AI system by refining a demo-able prototype based on feedback received during course presentations.Required course background: (EN.601.475/675 or EN.601.464/664 or EN.601.482/682) and Python programming. Recommended: 601.290 or 601.454/654 or 601.490/690 or 601.491/691 (experience with human computer interface design).
(EN.601.475 OR EN.601.675) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.690. Introduction to Human-Computer Interaction. 3 Credits.
This course is designed to introduce undergraduate and graduate students to design techniques and practices in human-computer interaction (HCI), the study of interactions between humans and computing systems. Students will learn design techniques and evaluation methods, as well as current practices and exploratory approaches, in HCI through lectures, readings, and assignments. Students will practice various design techniques and evaluation methods through hands-on projects focusing on different computing technologies and application domains. This course is intended for undergraduate and graduate students in Computer Science/Cognitive Science/Psychology. Interested students from different disciplines should contact the instructor before enrolling in this course. [Applications]Recommended Background: Basic programming skills.
Students can receive credit for either EN.601.490 or EN.601.690, but not both.

EN.601.691. Human-Robot Interaction. 3 Credits.
This course is designed to introduce graduate students to research methods and topics in human-robot interaction (HRI), an emerging research area focusing on the design and evaluation of interactions between humans and robotic technologies. Students will (1) learn design principles for building and research methods of evaluating interactive robot systems through lectures, readings, and assignments, (2) read and discuss relevant literature to gain sufficient knowledgeof various research topics in HRI, and (3) work on a substantial project that integrates the principles, methods, and knowledge learned in this course. [Applications] Required course background: EN.601.220 and EN.601.226. Students may receive credit for EN.601.491 or EN.601.691.

EN.601.713. Future Networks. 3 Credits.
This will be a graduate-level networking course. New applications such as ones for metaverse require networking and computing to be imbedded together. This feature is already beginning to be implemented in 5G and 6G networks; 6G will also allow networks to be used as sensors. These advances are enabled by new technologies such as mobile edge computing, software-defined networking (SDN), network slicing, digital twins, and named-data networking (NDN). This course will start with introductory lectures on these topics. Students will be asked to study new papers and do course projects. These activities should result in longer term research projects. Required Course Background: A course in computer networks (e.g., EN.601.414/614 Computer Network Fundamentals or the equivalent), or permission of the instructor. [Systems]

EN.601.714. Advanced Computer Networks. 3 Credits.
This is a graduate-level course on computer networks. It provides a comprehensive overview on advanced topics in network protocols and networked systems. The course will cover both classic papers on Internet protocols and recent research results. It will examine a wide range of topics, e.g., routing, congestion control, network architectures, datacenter networks, network virtualization, software-defined networking, and programmable networks, with an emphasize on core networking concepts and principles. The course will include lectures, paper discussions, programming assignments and a research project. Recommended Course Background: One undergraduate course in computer networks (e.g., EN.601.414/614 Computer Network Fundamentals or the equivalent), or permission of the instructor. The course assignments and projects assume students to be comfortable with programming.

EN.601.717. Advanced Distributed Systems & Networks. 3 Credits.
The course explores the state of the art in distributed systems, networks and Internet research and practice, trying to see what it would take to push the envelop a step further. The course is conducted as a discussion group, where the professor and students brainstorm and pick interesting semester-long projects with high potential future impact. Example areas include robust scalable infrastructure (distributed datacenters, cloud networking, scada systems), real-time performance (remote surgery, trading systems), hybrid networks (mesh networks, 3-4G/Wifi/Bluetooth). Students should feel free to bring their own topics of interest and ideas. Recommended Course Background: a systems course (distributed systems, operating systems, computer networks, parallel programming) or permission of instructor.

EN.601.718. Advanced Operating Systems. 3 Credits.
Students will study advanced operating system topics and be exposed to recent developments in operating systems research. This course involves readings on classic and new papers. Topics include virtual memory management, synchronization and communication, file systems, protection and security, operating system structure and extension techniques, fault tolerance, and history and experience of systems programming. [Systems]
EN.600.318 OR EN.600.418 OR EN.601.318 OR EN.601.418 OR EN.601.618

EN.601.723. Advanced Topics in Data-Intensive Computing. 3 Credits.
The advent of cloud computing has lead to an explosion of storage system and data analysis software, including NoSQL databases, bulk-synchronous processing, graph computing engines, and stream processing. This course will explore scale-out software architectures for data-processing tasks. It will examine the algorithms and data-structures that underlie scalable systems and look at how hardware and networking trends influence the design and deployment of cloud computing. Recommended Course Background: EN.601.320/420 or permission of instructor. [Systems]
EN.600.320 OR EN.600.420 OR EN.601.620

EN.601.740. Language-based Security. 3 Credits.
This course will introduce Language-based Security, an emerging field in cyber security that leverages techniques from compilers and program analysis for security-related problems. Topics include but are not limited to: Control-flow and data-flow graphs, Program slicing, Code property graph (CPG), and Control-flow integrity. Students are expected to read new and classic papers in this area and discuss them in class. Recommended backgrounds are Operating Systems and preferably Compilers.

EN.601.741. Advanced Topics in Secure and Censorship-Resistant Communications. 3 Credits.
Topics will vary from year to year, but will focus on applied cryptography and communications, focused on the development of secure and uncensorable communication mechanisms for communities at risk. This course will include topics such as: communication protocol design and analysis, blockchain-based protocols, anonymous communication, cryptographic backdoors, and other topics. Emphasis in this course is on understanding how cryptographic issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. The course will consist of in-class workshops and interactive discussions. There will be programming assignments and a course project with real world impact. Students will also be expected to read assigned papers and to present at least one research paper and lead a discussion on it. [Systems]
((EN.601.441 OR EN.601.641) OR (EN.601.442 OR EN.601.642) OR (EN.601.445 OR EN.601.645))

EN.601.742. Advanced Topics in Cryptography. 3 Credits.
This course will focus on advanced cryptographic topics with an emphasis on open research problems and student presentations.

EN.601.743. Advanced Topics in Computer Security. 3 Credits.
Topics will vary from year to year, but will focus mainly on network perimeter protection, host-level protection, authentication technologies, intellectual property protection, formal analysis techniques, intrusion detection and similarly advanced subjects. Emphasis in this course is on understanding how security issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. Students will study and present various advanced research papers to the class. There will be homework assignments and a course project. A college level security or crypto course at Hopkins or any other school is required.

EN.601.745. Advanced Topics in Applied Cryptography. 3 Credits.
This reading and project based course will explore the latest research in the area of applied cryptography and cryptographic engineering. Topics covered will include zero knowledge, efficient multiparty computation, cryptocurrencies, and trusted computing hardware. Readings will be drawn from the latest applied cryptography and security conferences. The course will include both reading, critical analysis, presentations and a course programming project. [Analysis or Applications]
EN.600.454 OR EN.601.445 OR EN.601.645 OR EN.600.442 OR EN.601.442 OR EN.601.642

EN.601.749. Advanced Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm & final exam, class presentations, and a significant class project. [Applications] Expected course background: familiarity with UNIX scripting and/or programming.

EN.601.760. FFT in Graphics & Vision. 3 Credits.
In this course, we will study the Fourier Transform from the perspective of representation theory. We will begin by considering the standard transform defined by the commutative group of rotations in 2D and translations in two- and three-dimensions, and will proceed to the Fourier Transform of the non-commutative group of 3D rotations. Subjects covered will include correlation of images, shape matching, computation of invariances, and symmetry detection. Recommended Course Background: AS.110.201 and comfort with mathematical derivations.

EN.601.765. Machine Learning: Linguistic & Sequence Modeling. 3 Credits.
This course surveys formal ingredients that are used to build structured models of character and word sequences. We will unpack recent deep learning architectures that consider various kinds of latent structure, and see how they draw on earlier work in structured prediction, dimensionality reduction, Bayesian nonparametrics, multi-task learning, etc. We will also examine a range of strategies used for inference and learning in these models. Students will beexpected to read recent papers and carry out a research project. [Applications or Analysis]
EN.600.465/EN.601.465 or EN.601.665

EN.601.769. Events Semantics in Theory and Practice. 3 Credits.
This course explores selected topics in the nature of event representations from the perspective of cognitive science, computer science, linguistics, and philosophy. These fields have developed a rich array of scientific theories about the representation of events, and how humans make inferences about them -- we investigate how (and if) such theories could be applied to current research topics and tasks in computational semantics such as inference from text, automated summarization, veridicality assessment, and so on. In addition to classic articles dealing with formal semantic theories, the course considers available machine-readable corpora, ontologies, and related resources that bear on event structure, such as WordNet, PropBank, FrameNet, etc.. The course is aimed to marry theory with practice: students with either a computational or linguistic background are encouraged to participate. [Applications]

EN.601.778. Advanced Topics in Causal Inference. 3 Credits.
This course will cover advanced topics on all areas of causal inference, including learning causal effects, path-specific effects, and optimal policies from data featuring biases induced by missing data, confounders, selection, and measurement error, techniques for generalizing findings to different populations, complex probabilistic models relevant for causal inference applications, learning causal structure from data, and inference under interference and network effects. The course will feature a final project which would involve either an applied data analysis problem (with a causal inference flavor), a literature review, or theoretical work. [Analysis] Recommended Background: EN.600.477/677 or EN.601.477/677

EN.601.779. Machine Learning: Advanced Topics. 3 Credits.
This course will focus on recent advances in machine learning. Topics will vary from year to year. The course will be project focused and involve presenting and discussing recent research papers.

EN.601.780. Unsupervised Learning: From Big Data to Low-Dimensional Representations. 3 Credits.
In the era of data deluge, the development of methods for discovering structure in high-dimensional data is becoming increasingly important. This course will cover state-of-the-art methods from algebraic geometry, sparse and low-rank representations, and statistical learning for modeling and clustering high-dimensional data. The first part of the course will cover methods for modeling data with a single low-dimensional subspace, such as PCA, Robust PCA, Kernel PCA, and manifold learning techniques. The second part of the course will cover methods for modeling data with multiple subspaces, such as algebraic, statistical, sparse and low-rank subspace clustering techniques. The third part of the course will cover applications of these methods in image processing, computer vision, and biomedical imaging. Requistes include Linear Algebra, Optimization, and prior exposure to Machine I.

EN.601.783. Vision as Bayesian Inference. 3 Credits.
This is an advanced course on computer vision from a probabilistic and machine learning perspective. It covers techniques such as linear and non-linear filtering, geometry, energy function methods, markov random fields, conditional random fields, graphical models, probabilistic grammars, and deep neural networks. These are illustrated on a set of vision problems ranging from image segmentation, semantic segmentation, depth estimation, object recognition, object parsing, scene parsing, action recognition, and text captioning. [Analysis orApplications] Required course background: calculus, linear algebra (AS.110.201 or equiv.), probability and statistics (AS.553.311 or equiv.), and the ability to program in Python and C++. Background in computer vision (EN.601.461/661) and machine learning (EN.601.475) suggested but not required.

EN.601.787. Advanced Machine Learning: Machine Learning for Trustworthy AI. 3 Credits.
This course teaches advanced machine learning methods for the design, implementation, and deployment of trustworthy AI systems. The topics we will cover include but are not limit to different types of robust learning methods, fair learning methods, safe learning methods, and research frontiers in transparency, interpretability, privacy, sustainability, AI safety and ethics. Students will learn the state-of-the-art methods in lectures, understand the recent advances by critiquing research articles, and apply/innovate new machine learning methods in an application. There will be homework assignments and a course project.

EN.601.801. Computer Science Seminar. 1 Credit.
Required for all full-time CS PhD students. Recommended for MSE students.

EN.601.803. Masters Research. 3 - 10 Credits.
Permission required. Independent research for masters or pre-dissertation PhD students.

EN.601.805. Graduate Independent Study. 1 - 3 Credits.
Permission required. Individual study in an area of mutual interest to a graduate student and a faculty member in the department.

EN.601.807. Teaching Practicum. 1 Credit.
PhD students will gain valuable teaching experience, working closely with their assigned faculty supervisor. Successful completion of this course fulfills the PhD teaching requirement.(grad students) Permission req'd.

EN.601.808. Selected Topics in CS Education. 1 Credit.
This course will explore current issues and research in computer science education. Topics will be drawn from literature, news items, and participant experience. Current faculty and students with interests in academic careers are encouraged to attend.

EN.601.809. PhD Research. 3 - 20 Credits.

EN.601.810. Diversity and Inclusion in Computer Science and Engineering. 1 Credit.
This reading seminar will focus on the question of diversity and inclusion in Computer Science (in particular) and engineering (in general). We aim to study the ways in which the curriculum, environment, and structure of computer science within academia perpetuates biases alienating female and minoritized students, and to explore possible approaches for diversifying our field. The seminar will meet on a weekly basis, readings will be assigned, and students will be expected to participate in the discussion.

EN.601.814. Selected Topics in Computer Networks. 1 Credit.
In this course, we will read, discuss and present classic papers and current research in computer networks. The topic coverage will vary each semester.

EN.601.817. Selected Topics in Systems Research. 1 Credit.
This course covers latest advances in the research of computer systems including operating systems, distributed system, mobile and cloud computing. Students will read and discuss recent research papers in top systems conferences. Each week, one student will present the paper and lead the discussion for the week. The focus topics covered in the papers vary semester to semester. Example topics include fault-tolerance, reliability, verification, energy efficiency, and virtualization.

EN.601.819. Selected Topics in Cloud Computing and Networked Systems. 1 Credit.
Participants will read and discuss seminal and recent foundational research on cloud and networked systems.

EN.601.826. Selected Topics in Programming Languages. 1 Credit.
This seminar course covers recent developments in the foundations of programming language design and implementation. Topics covered include type theory, process algebra, higher-order program analysis, and constraint systems. Students will be expected to present papers orally.

EN.601.831. CS Theory Seminar. 1 Credit.
Seminar series in theoretical computer science. Topics include algorithms, complexity theory, and related areas of TCS. Speakers will be a mix of internal and external researchers, mostly presenting recently published research papers.

EN.601.833. Seminar in Algorithms. 1 Credit.
This course will explore algorithms and theoretical computer science with a focus on algorithms for massive data. Examples of topics include streaming algorithms, approximation algorithms, online algorithms. Students will be encouraged to select a paper and lead a discussion. External speakers will be invited to present current work as well. This course is a good opportunity for motivated students to learn modern algorithmic methods.Recommended Course Background: EN.601.433 or equivalent.

EN.601.845. Selected Topics in Applied Cryptography. 1 Credit.
In this course students will read, discuss and present current research papers in applied cryptography. Topic coverage will vary each semester. Instructor approval required.

EN.601.849. Selected Topics in Computational Immunogenomics. 1 Credit.
Immunology studies defensive mechanisms of living organisms against external threats. Computational immunogenomics is a new branch of bioinformatics that develops and applies computational approaches to the study and interpretation of immunological data, seeking to answer questions about human adaptive immune responses to various pathogens, including but not limited to flu, HIV, and SARS-CoV-2. In this course, students will attend lectures and present immunogenomics papers in a journal club format.

EN.601.856. Seminar: Medical Image Analysis. 1 Credit.
This weekly seminar will focus on research issues in medical image analysis, including imagesegmentation, registration, statistical modeling, and applications. It will also include selected topicsrelating to medical image acquisition, especially where they relate to analysis. The purpose of thecourse is to provide the participants with a thorough background in current research in these areas, as well as to promote greater awareness and interaction between multiple research groups withinthe University. The format of the course is informal. Students will read selected papers. All students will be assumed to have read these papers by the time the paper is scheduled for discussion. But individual students will be assigned on a rotating basis to lead the discussion on particular papers or sections of papers. Co-listed with En.520.746.

EN.601.857. Selected Topics in Computer Graphics. 1 Credit.
In this course we will review current research in computer graphics. We will meet for an hour once a week and one of the participants will lead the discussion for the week.

EN.601.864. Selected Topics in Multilingual Natural Language Processing. 1 Credit.
This is a weekly reading group focused on Natural Language Processing (NLP) outside of English. Whereas methods have gotten very strong in recent years on English NLP tasks, many methods fail on other languages due to both linguistic differences as well as lack of available annotated resources. This course will focus on Cross-Language Information Retrieval, Cross-Lingual Information Extraction, Multilingual Semantics, Massively Multilingual Language Modeling, and other non-English NLP sub-fields. Students will be expected to read, discuss, and present papers. Required course background: EN.601.465/665.

EN.601.865. Selected Topics in Natural Language Processing. 1 Credit.
A reading group exploring important current research in the field and potentially relevant material from related fields. Enrolled students are expected to present papers and lead discussion.
EN.601.465 OR EN.601.665.

EN.601.866. Selected Topics in Computational Semantics. 1 Credit.
This weekly reading group will review current research and survey articles on the topics of computational semantics, statistical machine translation, and natural language generation. Enrolled students will present papers and lead discussions.

EN.601.868. Selected Topics in Machine Translation. 1 Credit.
Students in this course will review, present, and discuss current research in machine translation. Permission of instructor.

EN.601.875. Selected Topics in Machine Learning. 1 Credit.
This seminar is recommended for all students interested in data intensive computing research areas (e.g., machine learning, computer vision, natural language processing, speech, computational social science). The meeting format is participatory. Papers that discuss best practices and the state-of-the-art across application areas of machine learning and data intensive computing will be read. Student volunteers lead individual meetings. Faculty and external speakers present from time-to-time. Recommended Course Background: machine learning or permission of the instructor.

Cross Listed Courses

Biomedical Engineering

EN.580.488. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course is designed to give students a foundation in the basics of statistical and algorithmic approaches developed in computational biology/bioinformatics over the past 30 years, while emphasizing the need to extend these approaches to emerging problems in the field. Topics covered include probabilistic modeling applied to biological sequence analysis, supervised machine learning, interpretation of genetic variants, cancer genomics bioinformatic workflows and computational immuno-oncology. Attending the lab section "Annotate Your Genome" is required.
EN.601.220

EN.580.688. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course will introduce probabilistic modeling and information theory applied to biological sequence analysis, focusing on statistical models of protein families, alignment algorithms, and models of evolution. Topics will include probability theory, score matrices, hidden Markov models, maximum likelihood, expectation maximization and dynamic programming algorithms. Homework assignments will require programming in Python. Recommended Course Background: Math through linear algebra and differential equations, EN.580.221 or equivalent, EN.601.226 or equivalent.

EN.580.709. Sparse Representations in Computer Vision and Machine Learning. 3 Credits.
Sparse and redundant representations constitutes a fascinating area of research in signal and image processing. This is a relatively young field that has been taking form for the last 15 years or so, with contributions from harmonic analysis, numerical algorithms and machine learning, and has been vastly applied to myriad of problems in computer vision and other domains. This course will focus on sparsity as a model for general data, generalizing many different other constructions or priors. This idea - that signals can be represented with just "a few" coefficients - leads to a long series of beautiful (and surprisingly, solvable) theoretical and numerical problems, and many applications that can benefit directly from the new developed theory. In this course we will survey this field, starting with the theoretical foundations, and systematically covering the knowledge that has been gathered in the past years. This course will touch on theory, numerical algorithms, and applications in image processing and machine learning. Recommended course background: Linear Algebra, Signals and Systems, Numerical Analysis.

EN.580.743. Advanced Topics in Genomic Data Analysis. 3 Credits.
Genomic data is becoming available in large quantities, but understanding how genetics contributes to human disease and other traits remains a major challenge. Machine learning and statistical approaches allow us to automatically analyze and combine genomic data, build predictive models, and identify genetic elements important to disease and cellular processes. This course will cover current uses of statistical methods and machine learning in diverse genomic applications including new genomic technologies. Students will present and discuss current literature. Topics include personal genomics, integrating diverse genomic data types, new technologies such as single cell sequencing and CRISPR, and other topics guided by student interest. The course will include a project component with the opportunity to explore publicly available genomic data. Recommended Course Background: coursework in data science or machine learning.

EN.580.745. Mathematics of Deep Learning. 1.5 Credits.
The past few years have seen a dramatic increase in the performance of recognition systems thanks to the introduction of deep networks for representation learning. However, the mathematical reasons for this success remain elusive. For example, a key issue is that the training problem is nonconvex, hence optimization algorithms are not guaranteed to return a global minima. Another key issue is that while the size of deep networks is very large relative to the number of training examples, deep networks appear to generalize very well to unseen examples and new tasks. This course will overview recent work on the theory of deep learning that aims to understand the interplay between architecture design, regularization, generalization, and optimality properties of deep networks. Recommended background: machine learning (EN.601.475), deep learning (EN.520.438 or EN.601.482), graduate-level matrix analysis and linear algebra (EN.553.792) and graduate-level optimization (EN.553.762).

Center for Leadership Education

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

Electrical & Computer Engineering

EN.520.216. Introduction To VLSI. 3 Credits.
This course teaches the basics of switch-level digital CMOS VLSI design. This includes creating digital gates using MOS transistors as switches, laying out a design using CAD tools, and checking the design for conformance to the Scalable CMOS design rules.Recommended: EN.520.213.
(AS.171.101 AND AS.171.102) OR (AS.171.101 AND AS.171.108) OR (AS.171.102 AND AS.171.107) OR (AS.171.107 AND AS.171.108)

EN.520.349. Microprocessor Lab I. 3 Credits.
This course introduces the student to the programming of microprocessors at the machine level. 68HC08, 8051, and eZ8 microcontrollers are programmed in assembly language for embedded control purposes. The architecture, instruction set, and simple input/output operations are covered for each family. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.142 or equivalent.The lab is open 24/7 and students can still take the class if they are unable to meet during lab time.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.412. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video.
(AS.110.201 AND EN.553.310 AND EN.520.344) OR (AS.110.201 AND EN.553.311 AND EN.520.344) OR (AS.110.201 AND EN.553.420 AND EN.520.344) OR (AS.110.201 AND EN.553.421 AND EN.520.344);Students can only take EN.520.412 OR EN.520.612, not both.

EN.520.424. FPGA Synthesis Lab. 3 Credits.
An advanced laboratory course in the application of FPGA technology to information processing, using VHDL synthesis methods for hardware development. The student will use commercial CAD software for VHDL simulation and synthesis, and implement their systems in programmable XILINX 20,000 gate FPGA devices. The lab will consist of a series of digital projects demonstrating VHDL design and synthesis methodology, building up to final projects at least the size of an 8-bit RISC computer. Projects will encompass such things as system clocking, flip-flop registers, state-machine control, and arithmetic. The students will learn VHDL methods as they proceed through the lab projects, and prior experience with VHDL is not a prerequisite.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.432. Medical Imaging Systems. 3 Credits.
This course provides students with an introduction to the physics, instrumentation, and signal processing methods used in general radiography, X-ray computed tomography, ultrasound imaging, magnetic resonance imaging, and nuclear medicine. The primary focus is on the methods required to reconstruct images within each modality from a signals and systems perspective, with emphasis on the resolution, contrast, and signal-to-noise ratio of the resulting images. Students will additionally engage in hands-on activities to reconstruct medical images from raw data.
EN.520.214 OR EN.580.222 OR (EN.580.243 AND EN.580.246)

EN.520.433. Medical Image Analysis. 3 Credits.
This course covers the principles and algorithms used in the processing and analysis of medical images. Topics include, interpolation, registration, enhancement, feature extraction, classification, segmentation, quantification, shape analysis, motion estimation, and visualization. Analysis of both anatomical and functional images will be studied and images from the most common medical imaging modalities will be used. Projects and assignments will provide students experience working with actual medical imaging data.
EN.550.310 OR EN.550.311 OR EN.560.348

EN.520.447. Information Theory. 3 Credits.
This course will address some basic scientific questions about systems that store or communicate information. Mathematical models will be developed for (1) the process of error-free data compression leading to the notion of entropy, (2) data (e.g. image) compression with slightly degraded reproduction leading to rate-distortion theory and (3) error-free communication of information over noisy channels leading to the notion of channel capacity. It will be shown how these quantitative measures of information have fundamental connections with statistical physics (thermodynamics), computer science (string complexity), economics (optimal portfolios), probability theory (large deviations), and statistics (Fisher information, hypothesis testing).
EN.553.310 OR EN.553.420 OR EN.553.311;Students can earn credit for either EN.520.447 or EN.520.647, but not both.

EN.520.448. Electronics Design Lab. 3 Credits.
An advanced laboratory course in which teams of students design, build, test and document application specific information processing microsystems. Semester long projects range from sensors/actuators, mixed signal electronics, embedded microcomputers, algorithms and robotics systems design. Demonstration and documentation of projects are important aspects of the evaluation process.Recommended: EN.600.333, EN.600.334, EN.520.214, EN.520.216, EN.520.349, EN.520.372, EN.520.490 or EN.520.491.
(EN.520.240 OR EN.520.340 OR EN.520.230 OR EN.520.213) AND AS.110.108 AND AS.110.109 AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108)) AND EN.520.142.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.450. Advanced Micro-Processor Lab. 3 Credits.
This course covers the usage of common microcontroller peripherals. Interrupt handling, timer operations, serial communication, digital to analog and analog to digital conversions, and flash ROM programming are done on the 68HC08, 8051, and eZ8 microcontrollers. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.349
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.491. CAD Design of Digital VLSI Systems I (Juniors/Seniors). 3 Credits.
Juniors and Seniors Only.
Student may take EN.520.491 or EN.520.691, but not both.;AS.110.109 AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND EN.520.142 AND EN.520.142 AND (EN.520.230 OR (EN.520.213 AND EN.520.345 OR EN.520.216))

EN.520.612. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video. Recommended Course Background: AS.110.201, EN.553.310, and EN.520.435.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;Credit may only be earned for EN.520.412 or EN.520.612.

EN.520.637. Foundations of Reinforcement Learning. 3 Credits.
The course will provide a rigorous treatment of reinforcement learning by building on the mathematical foundations laid by optimal control, dynamic programming, and machine learning. Topics include model-based methods such as deterministic and stochastic dynamic programming, LQR and LQG control, as well as model-free methods that are broadly identified as Reinforcement Learning. In particular, we will cover on and off-policy tabular methods such as Monte Carlo, Temporal Differences, n-step bootstrapping, as well as approximate solution methods, including on- and off-policy approximation, policy gradient methods, including Deep Q-Learning. The course has a final project where students are expected to formulate and solve a problem based on the techniques learned in class.

EN.520.666. Information Extraction. 3 Credits.
Introduction to statistical methods of speech recognition (automatic transcription of speech) and understanding. The course is a natural continuation of EN.601.465 but is independent of it. Topics include elementary probability theory, hidden Markov models, and n-gram models using maximum likelihood, Bayesian and discriminative methods, and deep learning techniques for acoustic and language modeling.Recommended Course Background: EN.550.310 AND EN.600.120 or equivalent, expertise in Matlab or Python programming.

EN.520.807. Current Topics in Language and Speech Processing. 1 Credit.
This biweekly seminar will cover a broad range of current research topics in human language technology, including automatic speech recognition, natural language processing and machine translation. The Tuesday seminars will feature distinguished invited speakers, while the Friday seminars will be given by participating students. A minimum of 75% attendance and active participation will be required to earn a passing grade. Grading will be S/U.

General Engineering

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.132. Bootcamp: Java. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.601.107, EN.600.107, or EN.500.112;Students must have completed: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.580.200 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.133. Bootcamp: Python. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only
Not open to students who have completed EN.500.113 or EN.580.200;Students must have completed: EN.500.112 OR EN.500.114 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.134. Bootcamp: MATLAB. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.500.114 OR EN.580.200.;Students must have completed: EN.500.112 OR EN.500.113 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

Information Security Institute

EN.650.624. Network Security. 3 Credits.
This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. Course Background: EN.601.220, EN.601.226, EN.601.418 or equivalent.
Students may only earn credit for one of the following courses: EN.650.624 OR EN.601.444 OR EN.601.644

EN.650.631. Ethical Hacking. 3 Credits.
Cyber security affects every facet of industry and our government, and thus is now a threat to National Security. This course is designed to introduce students to the skills needed to defend computer network infrastructure by exposing them to the hands-on identification and exploitation of vulnerabilities in servers (i.e., Windows and Linux), wireless networks, websites, and cryptologic systems. These skills will be tested by having teams of students develop and participate in instructor lead capture-the-flag competitions. Also included are advanced topics such as shell coding, IDA Pro analysis, fuzzing, and writing or exploiting network-based applications or techniques such as web servers, spoofing, and denial of service.

EN.650.654. Computer Intrusion Detection. 3 Credits.
Intrusion detection supports the on-line monitoring of computer system activities and the detection of attempts to compromise normal services. This course starts with an overview of intrusion detection tasks and activities. Detailed discussion introduces a traditional classification of intrusion detection models, applications in host-centered and distributed environments, and various intrusion detection techniques ranging from statistical analysis to biological computing. This course serves as a comprehensive introduction of recent research efforts in intrusion detection and the challenges facing modern intrusion detection systems. Students will also be able to pursue in-depth study of special topics of interest in course projects.

EN.650.656. Computer Forensics. 3 Credits.
This course introduces the student to the field of applied Computer Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "dead box" (powered off) data extraction and analysis with open-source tools. Topics covered include legal and regulatory issues, forensic imaging and data acquisition from a "dead" system, computer file systems (FAT/NTFS) and data recovery, Windows Registry and configuration records, Windows log analysis and operating system artifacts, memory dump analysis (RAM), software artifacts, computer network forensics, introductory mobile device forensics, case reporting and documentation, end-to-end computer forensic examinations, peer review, and testifying in court.

EN.650.660. Software Vulnerability Analysis. 3 Credits.
Competent execution of security assessments on modern software systems requires extensive knowledge in numerous technical domains and comprehensive understanding of security risks. This course provides necessary background knowledge and examines relevant theories for software vulnerabilities and exploits in detail. Key topics include historical vulnerabilities, their corresponding exploits, and associated risk mitigations. Fundamental tools and techniques for performing security assessments (e.g., software reverse engineering, static analysis, and dynamic analysis) are covered extensively. The format of this course includes lectures and assignments where students learn how to develop exploits to well-known historical vulnerabilities in a controlled environment. Students will complete and demonstrate a project as part of the course.

EN.650.663. Cloud Computing Security. 3 Credits.
Cloud computing promises significant cost savings via economies of scale that typically are not achievable by a single organization. This course examines cloud computing in detail and introduces the security concerns associated with cloud computing. Key topics include service models for cloud computing, virtualization, storage, management, and data processing. Fundamental security principles are introduced and applied to cloud computing environments. The format of this course includes lectures and hands-on assignments. Students will complete a project and present it as part of the course.

EN.650.757. Advanced Computer Forensics. 3 Credits.
This course will analyze advanced topics and state of the art issues in the field of digital forensics. The course will be run in a research seminar format and students will be given both basic and applied research projects in such areas as: intrusion analysis, network forensics, memory forensics, mobile devices, and other emerging issues.

Mechanical Engineering

EN.530.707. Robot System Programming. 4 Credits.
This course seeks to introduce students to open-source software tools that are available today for building complex experimental and fieldable robotic systems. The course is grouped into sections, each of which building on the previous in increasing complexity and specificity: tools and frameworks supporting robotics research, robotics-specific software frameworks, integrating complete robotic systems, and culminates with an independent project of the student's own design using small mobile robots or other robots in the lab. Students will need to provide a computer (with at least a few GB of memory and a several tens of GB of disc space) running Ubuntu (https://www.ubuntu.com or one of its variants such as Xubuntu) and ROS (http://ros.org/). Students should have an understanding of intermediate programming in C/C++ (including data structures and object-oriented programming). Familiarity with Linux programming. Familiarity with software version control systems such as Git, and linear algebra. Students should see the course homepage https://dscl.lcsr.jhu.edu/home/courses/me530707-2019 for more information and to get started with the course. Required Course Prerequisite/Corequisite: EN.530.646 and EN.601.436/663. No audit option.

Robotics

EN.620.745. Seminar in Computational Sensing and Robotics. 1 Credit.
Seminar series in robotics. Topics include: Medical robotics, including computer-integrated surgical systems and image-guided intervention. Sensor based robotics, including computer vision and biomedical image analysis. Algorithmic robotics, robot control and machine learning. Autonomous robotics for monitoring, exploration and manipulation with applications in home, environmental (land, sea, space), and defense areas. Biorobotics and neuromechanics, including devices, algorithms and approaches to robotics inspired by principles in biomechanics and neuroscience. Human-machine systems, including haptic and visual feedback, human perception, cognition and decision making, and human-machine collaborative systems.Cross-listed Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Biomedical Engineering.

For current faculty and contact information go to http://cs.jhu.edu/faculty/

Computer Science, Bachelor of Arts

Undergraduate Programs

(See also General Requirements for Departmental Majors (p. 1086))

The objectives of our bachelor degree programs are to train computer scientists who will be able to:

- Successfully engage in professional practice in the computing sciences or apply computer science tools and techniques to another field of interest.
- Pursue advanced study in the computing sciences.
- Work successfully in both independent and team environments.
- Lead teams and provide vision for innovation.
- Behave in a professional and ethical manner.

A successful major program of study leads to either the Bachelor of Arts in computer science (B.A.) or the Bachelor of Science in computer science (B.S.). Both degree programs require specific courses and/or credits in several key areas: computer science, math, basic science, humanities and social sciences. The Bachelor of Arts is intended for students who prefer a more traditional liberal arts curriculum, and therefore carries stronger requirements in non-technical areas. The Bachelor of Science degree has stronger technical requirements, particularly with respect to computer science course requirements.

Regardless of degree choice, there is much flexibility in how the requirements are fulfilled. Undergraduate majors may choose to pursue a broad selection of computer science and distributional courses, or to pursue a focus area within the field. Current foci primarily reflect departmental and school research strengths: big data, computational biology, fundamentals of computing, information security, natural language processing, robotics, systems and networking; and also include career paths for software engineering and entrepreneurship. Regardless of whether you pursue a particular focus or not, our bachelor programs provide excellent preparation for research within the department, summer internships, and post-graduation industry employment or graduate work.

Additional details regarding undergraduate programs can be found in the department's undergraduate advising manual (https://www.cs.jhu.edu/academic-programs/undergraduate-studies/undergraduate-academics/undergraduate-academic-advising-manual-2021/) or on the website at cs.jhu.edu (https://www.cs.jhu.edu).

Double Majors

It is possible for students to pursue a double major program in which one of the majors is computer science. The computer science requirements are flexible enough to allow for combination with most majors in the Whiting School of Engineering and the Krieger School of Arts and Sciences. In order to declare a first or second major in computer science, students should initiate an on-line request, and then will need to see the Academic Program Coordinator or the Director of Undergraduate Studies to complete the process.

Requirements for the B.A. Degree

To meet the course credit requirements for the B.A. in computer science, the student must complete a minimum of 120 credits. The basic requirements for the B.A. degree are:

Code	Title	Credits
Computer Science		33
Mathematics		16
Basic Sciences		8
Humanities/Social Sciences		18
Foreign Language		6
4 Writing Intensive Courses		
Electives		39
Total Credits		**120**

Details and course recommendations of these distributional requirements are below. These requirements add up to 81 credits and fulfill general university distribution requirements. Except for electives and where noted below, courses should not be taken on a S/U basis. By university policy, no more than 18 D or D+ credits can be counted toward the total credit requirements for a degree.

Code	Title	Credits
Computer Science [1]		
Core: The following foundational courses in computer science must be included in a student's program:		
EN.500.112	Gateway Computing: JAVA (or equivalent)	3
EN.601.220	Intermediate Programming	4
EN.601.226	Data Structures	4
EN.601.229	Computer System Fundamentals	3
EN.601.230	Mathematical Foundations for Computer Science	4
EN.601.433	Intro Algorithms	3
Upper: At least 12 credit hours must be at the 300-level or above, not including EN.601.433.		12
Mathematics		
The following courses must be included:		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
The remaining courses may be chosen from Mathematics (110.xxx) or Applied Math and Statistics (553.xxx). At least one course must be 200-level or above. Strongly recommended: Linear Algebra, Probability & Statistics.		8
Basic Sciences		

Students must take two semesters of core science courses (any combination of Physics, Chemistry, Biology), with their associated labs, totaling at least 8 credits. These courses should be taken for a grade. However, AP credit is an acceptable substitute for these courses and labs.	8
Humanities/Social Sciences	
Six courses in the Humanities/Social Sciences must be taken, with each course at least 3 credits. At least two 3-credit courses at the 300-level or above are required. As befits a B.A. degree, students have ample flexibility to choose courses that broaden the scope of their study, in consultation with their advisors. A subset of the courses selected to satisfy this requirement should demonstrate coherence within an area. Any course with Humanities or Social Sciences area designators may fulfill these distributional requirements. [2]	18
Foreign Language	
At least 6 credits in one foreign language or demonstrated proficiency at the intermediate level are required. These foreign language credits are in addition to the 18 required Humanities/Social Sciences credits.	6
Writing Requirement	
All primary computer science majors pursuing a B.A. degree are required to fulfill the university's requirement of four writing intensive courses, each at least 3 credits. At least one course must be explicitly focused on writing skills in English (eg, courses in professional, fiction or expository writing). Students must receive at least a C- grade in these courses. These courses may overlap other requirement areas.	
Electives	
Electives may be any credit bearing courses, to be chosen by the student with the guidance of their advisor as needed.	39
Total Credits	**120**

1 No more than 3 independent type credits (courses numbered 601.5xx) and no more than 3 credits of short courses (1-credit special topics courses) can be counted toward this requirement. However, B.A. students doing the Senior Honors Thesis (EN.601.519 Senior Honors Thesis-EN.601.520 Senior Honors Thesis) may use an additional 3 credits of independent work toward their CS requirements, for a total of 6 credits.
No courses with grades below C- or with S/U grades may be used to fulfill this requirement unless they are not offered for a grade.
At most 4 S/U credits may be used to fulfill this requirement.

2 See the Distribution tab in the Requirements for a Bachelor's Degree (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/) section for two exceptions to the rule that each H/S distribution course be at least 3 credits.

Computer Science, Bachelor of Science

Undergraduate Programs

(See also General Requirements for Departmental Majors (p. 1086))

The objectives of our bachelor degree programs are to train computer scientists who will be able to:

- Successfully engage in professional practice in the computing sciences or apply computer science tools and techniques to another field of interest.
- Pursue advanced study in the computing sciences.
- Work successfully in both independent and team environments.
- Lead teams and provide vision for innovation.
- Behave in a professional and ethical manner.

A successful major program of study leads to either the Bachelor of Science in computer science (B.S.) or the Bachelor of Arts in computer science (B.A.). Both degree programs require specific courses and/or credits in several key areas: computer science, math, basic science, humanities and social sciences. The Bachelor of Science degree has stronger technical requirements, particularly with respect to computer science course requirements. The Bachelor of Arts is intended for students who prefer a more traditional liberal arts curriculum, and likewise carries stronger requirements in non-technical areas.

Regardless of degree choice, there is much flexibility in how the requirements are fulfilled. Undergraduate majors may choose to pursue a broad selection of computer science and distributional courses, or to pursue a focus area within the field. Current foci primarily reflect departmental and school research strengths: big data, computational biology, fundamentals of computing, information security, natural language processing, robotics, systems and networking; and also include career paths for software engineering and entrepreneurship. Regardless of whether you pursue a particular focus or not, our bachelor programs provide excellent preparation for research within the department, summer internships, and post-graduation industry employment or graduate work.

Additional details regarding undergraduate programs can be found in the department's undergraduate advising manual (https://www.cs.jhu.edu/academic-programs/undergraduate-studies/undergraduate-academics/undergraduate-academic-advising-manual-2021/) or on the website at cs.jhu.edu (https://www.cs.jhu.edu).

Double Majors

It is possible for students to pursue a double major program in which one of the majors is computer science. The computer science requirements are flexible enough to allow for combination with most majors in the Whiting School of Engineering and the Krieger School of Arts and Sciences. In order to declare a first or second major in computer science, students should initiate an on-line request, and then will need to see the Academic Program Coordinator or the Director of Undergraduate Studies to complete the process.

Requirements for the B.S. Degree

The Bachelor of Science in Computer Science degree program is accredited by the Computing Accreditation Commission of ABET, www.abet.org (http://www.abet.org). It provides for the acquisition of the following knowledge base and skill set:

- Analyze a complex computing problem and apply principles of computing and other relevant disciplines to identify solutions.
- Design, implement, and evaluate a computing-based solution to meet a given set of computing requirements in the context of the program's discipline.
- Communicate effectively in a variety of professional contexts.
- Recognize professional responsibilities and make informed judgments in computing practice based on legal and ethical principles.

- Function effectively as a member or leader of a team engaged in activities appropriate to the program's discipline.
- Apply computer science theory and software development fundamentals to produce computing-based solutions.

To meet the course credit requirements for the B.S. in computer science, the student must complete a minimum of 120 credits. The basic requirements for the B.S. degree are as follows:

Code	Title	Credits
Computer Science		40
Mathematics		16
Basic Sciences		8
Humanities/Social Sciences		18
Two Writing Intensive Courses		
Electives		38
Total Credits		**120**

Details and course recommendations for these distributional requirements are below. These requirements add up to 82 credits and fulfill general university and WSE requirements, leaving 38 pure elective credits. Except for electives and where noted below, courses should not be taken on an S/U basis. By university policy, no more than 18 D or D+ credits can be counted toward the total credit requirements for a degree. The Courses and Curriculum Planning section (https://www.cs.jhu.edu/academic-programs/undergraduate-studies/undergraduate-and-graduate-course-information/) of the departmental Course Information webpage has lists of course area designations (Applications, Reasoning, Software, Systems, Theory) and courses approved as "CS other."

Code	Title	Credits
Computer Science [1]		
Ethics: One of these courses must be chosen. Note that only 601.104 and 601.124 may be counted towards the CS credit requirements.		0-3
EN.601.104	Computer Ethics	1
EN.601.124	The Ethics of Artificial Intelligence and Automation (The Ethics of Artificial Intelligence and Automation)	3
EN.660.400	Practical Ethics for Future Leaders	2
Core: The following foundational courses in computer science must be included in a student's program:		
EN.500.112	Gateway Computing: JAVA (or equivalent)	3
EN.601.220	Intermediate Programming	4
EN.601.226	Data Structures	4
EN.601.229	Computer System Fundamentals	3
EN.601.230	Mathematical Foundations for Computer Science	4
EN.601.433	Intro Algorithms	3
Upper: At least 12 additional credit hours must be at the 300-level or above (not including EN.601.433). At least one course in two different classification areas (Applications, Reasoning, Software, Systems) must be chosen in addition to Theory (Algorithms). An exhaustive list of the area classifications for each of our courses may be found on the department's website linked above. They will also be encoded as POS (program of study) tags in SIS. [2]		12
CS Electives: Six additional credits of Computer Science are required. [3]		6
Team: Students must take at least one of the following courses to satisfy the team requirement. The course satisfying this requirement may overlap other requirements.		
EN.601.290	User Interfaces and Mobile Applications	3
EN.601.295	Developing Health IT Applications	3
EN.601.310	Software for Resilient Communities	3
EN.601.411	Computer Science Innovation & Entrepreneurship II	3
EN.601.421	Object Oriented Software Engineering	3
EN.601.447	Computational Genomics: Sequences	3
EN.601.452	Computational Biomedical Research	3
EN.601.490	Introduction to Human-Computer Interaction	3
EN.601.496	Computer Integrated Surgery II - Teams	3
EN.580.437	Neuro Data Design I (counts as "CS other")	4
EN.580.438	Neuro Data Design II (counts as "CS other")	4
Mathematics		
The following courses or equivalent substitutes such as AP credit must be included:		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
The remaining courses must be 200-level or above, chosen from Mathematics (AS.110.xxx) or Applied Math and Statistics (EN.553.xxx), and must include coverage of both probability and statistics. Some highly recommended math electives are: [4]		8
AS.110.201	Linear Algebra	4
EN.553.420	Introduction to Probability	4
EN.553.430	Introduction to Statistics	4
Basic Sciences		
Students must take two semesters of core science courses (any combination of Physics, Chemistry, Biology), with their associated labs, totaling at least 8 credits. These courses should be taken for a grade. However, AP credit is an acceptable substitute for these courses and labs.		8
Humanities/Social Sciences		
As per WSE requirements, six courses in the Humanities and Social and Behavioral Sciences must be taken, with each course at least 3 credits. These courses must have either Humanities ('H') or Social and Behavioral Sciences ('S') area (or both) designators on them. Foreign language courses (without an 'H' or 'S') may also be used to satisfy this requirement. [5]		18
Writing Requirement		
Students are required to fulfill the university's requirement of two writing intensive courses, each at least 3 credits. Students must receive at least a C- grade or better in these writing courses. At least one course must be explicitly focused on writing skills in English (eg, courses in professional, fiction or expository writing). These courses may overlap other requirements.		
General Electives		
Electives may be any credit bearing courses, to be chosen by the student with the guidance of their advisor as needed.		38

[1] No more than 6 independent type credits (courses numbered 601.5xx) and no more than 3 credits of short courses (1-credit special topics courses) can be counted toward this requirement. However, B.S. students doing the Senior Honors Thesis (EN.601.519 Senior Honors Thesis-EN.601.520 Senior Honors Thesis) may use an additional three

credits of independent work toward their CS requirements, for a total of 9 credits.
No courses with grades below C- or with S/U grades can be used to fulfill this requirement unless they are not offered for a grade. At most 4 S/U credits may be applied towards this requirement.

2 Note that course descriptions include old area designators which may have changed in 2019.

3 Up to 6 of the 40 required credits may be from an approved list of relevant courses in other departments, which includes some courses cross-listed in CS. These courses may only count as "CS other" credits, not upper level CS credits (regardless of course level in the other department). See department website for the list.

4 AP Statistics credits may not be used to satisfy these credit requirements; however, they do meet the need for coverage of statistics (not probability).

5 See the Distribution tab in the Requirements for a Bachelor's Degree (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/) section for two exceptions to the rule that each H/S distribution course be at least 3 credits. Note that at most two H/S courses may be taken S/U (if not counted toward the writing requirement); the other four must be taken for a grade.

Computer Science, Master of Science in Engineering

The Master of Science in Engineering Computer Science (M.S.E. CS) is a residential program offered by the Department of Computer Science. The M.S.E. CS offers an official concentration in Human Language and Technology (https://www.clsp.jhu.edu/human-language-technology-masters/); the only CS concentration jointly administered with the Center for Language and Speech Processing. Most students complete the program in three full-time, residential semesters of which two full-time, resident semesters as a graduate student are required. Students interested in part-time/remote (nonresidential) study should refer to the Engineering for Professionals (https://ep.jhu.edu/) program.

Entering students are expected to have completed a program of study equivalent to that required by the B.S. in computer science. Applicants from other disciplines are expected to have coursework (or equivalent experience) in intermediate programming (C++ and Java), data structures, computer system fundamentals, and mathematical foundations for computer science. Upon admission to the M.S.E program, a student is assigned a graduate advisor from the Department of Computer Science who must approve the courses to be applied to the M.S.E. degree.

M.S.E. students are not normally eligible for tuition waivers, but may be able to work on campus up to 19.99 hours per week for hourly rates if they find campus employment through the University (https://studentaffairs.jhu.edu/studentemployment/) Experiential Learning (https://studentaffairs.jhu.edu/studentemployment/) office. While teaching and research assistant positions are available only to enrolled PhD students, there are positions available to M.S.E. students, such as course assistants, or a variety of other roles across the university. The CS course assistant application opens prior to the start of each semester for specific courses in need.

Program Requirements

The Department of Computer Science classifies its courses into five sub-areas: Applications, Reasoning, Software, Systems and Theory. All M.S.E. candidates must complete at least one course (3 class hours/credits each) from each of these five areas. A current listing of courses with area designators (https://livejohnshopkins-my.sharepoint.com/:b:/g/personal/jhoulah1_jh_edu/ESKGUDNnnXVJp0WDsinjuDkBTyLcffFMt46LO53krZA4RQ/?e=KPQe9k) is provided on the departmental website. The areas are also encoded as POS (program of study) tags in SIS. [Note that course descriptions include old area designators which may have changed in 2019.] M.S.E. students must also complete an additional three elective courses (chosen from any CS area or from closely related departments such as Electrical and Computer Engineering, Cognitive Science, Mathematics, or Applied Mathematics and Statistics) approved by the advisor, for a total of eight graduate-level courses.

In addition to the eight courses, a student must elect one of the following options in order to fulfill the degree requirements:

- Two additional (graduate-level) courses in Computer Science, approved by the advisor as above.
- A research project including an approved report (that will be made publicly available) supervised by a faculty member that has a primary or joint appointment in Computer Science or has a Computer Science affiliate as a co-advisor.
- An original, faculty-approved master's thesis, submitted to the Milton S. Eisenhower Library through the ETD process.

PhD students who have satisfied their Ph.D. qualifying course requirements and completed their first qualifying project are deemed to have also met the M.S.E. degree requirements and may be able to confer with the M.S.E. along the way to their PhD (unless more than two course requirements have been satisfied using courses transferred from other institutions). Please refer to the Ph.D. program information for details and timing.

All M.S.E. degree candidates are encouraged to regularly attend the department seminars.

Course Requirement Details

- All courses counted toward the M.S.E. degree requirement must be taken at a graduate-appropriate level. In the Department of Computer Science, this includes courses that are 600-level and above, as well as 400-level courses only for students in the combined B.S./M.S.E. program who have not yet switched to graduate status.
- At most, two courses with grades less than B- may be counted toward the coursework requirements. No courses with grades less than C- may be counted.
- The overall grade point average of the courses counted toward the coursework requirements must be a 3.0 or higher (B average).
- At most, two independent study courses can be counted toward the course requirements.
- Other than independent study courses, no courses with grades of P or S can be counted toward the coursework requirement. Courses with grades of P or S will not be included in the grade point average calculation.
- One of the courses required for the M.S.E. degree, but only one, can be replaced by 3 credits from comparable short courses.
- A majority of the courses counted toward the degree must be taught in the Department of Computer Science.
- At most, two courses can be transferred from graduate programs of other institutions to be counted toward the degree requirements. Such transfer courses must be approved by the student's faculty

advisor and the department. It is the obligation of the student to provide all necessary data to the Department of Computer Science regarding the course(s) for which transfer credit is being requested.

- Students in the combined B.S./M.S.E. program may transfer up to two graduate-qualified courses which also are counted toward the undergraduate degree, as well as any other graduate-qualified courses taken while an undergraduate which are not counted toward the undergraduate degree.
- At most, two courses completed in the Engineering for Professionals program can be counted towards the degree requirements with advisor approval.
- The 1-credit, "Selected Topics" and "Seminar" courses coded 601.8XX and 601.7XX respectively do not count towards degree requirements.
- A grade of D or F can result in probation; a second D or F is cause for being dropped from the program.
- Every student must successfully pass Academic Ethics (EN.500.603 Graduate Orientation and Academic Ethics).
- All master's students are required to complete the online Responsible Conduct of Research course as a baseline (https://engineering.jhu.edu/research/resources-policies-forms/responsible-conduct-of-research-training-for-students-and-postdoctoral-fellows-revised-spring-2020/). Any master's student engaged in research for payment or to help meet degree requirements and receiving payment from NIH training grants or fellowships must take the in person course—AS.360.625 Responsible Conduct of Research. All other students can take the course online—AS.360.624 Responsible Conduct of Research (Online). Instructions for accessing and signing up for the course can be found here: http://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/online-training-course-for-the-responsible-conduct-of-research/ Additional information regarding this training can be found here: http://eng.jhu.edu/wse/page/conduct-of-research-training (http://eng.jhu.edu/wse/page/conduct-of-research-training/). Students will not receive a diploma until the course has been completed.

Computer Science, Minor

Program Requirements

To satisfy the course credit requirements for a minor in computer science, a student must take a minimum of seven courses, each at least 3 credits, for a total of 23 or more credits, earning a minimum grade of C- in each course. These must include three core courses, to provide the student with a foundation, three upper-level courses (300-level and above), to allow the student to pursue an advanced area in depth, and one elective course. All courses must be taken for a grade, not S/U. Note that at most one independent study or research type course may be used towards these requirements.

Code	Title	Credits
Core Courses		
EN.500.112	Gateway Computing: JAVA (or equivalent)	3
EN.601.220	Intermediate Programming	4
EN.601.226	Data Structures	4
Elective Course		**3**
Recommended: 601.229, 601.230, 601.280, 601.290		
Upper-Level Courses		
Minors must take three CS courses (EN.601.xxx) at the 300-level or above. These courses should be chosen to form a cohesive minor and must be approved by the computer science minor advisor. It is strongly recommended that students choose all three courses from within one or two of the five course classification areas of applications, reasoning, software, systems, or theory. [1]		9
Total Credits		**23**

1 A current listing of course area designators is provided on the departmental website. These are also encoded as POS (program of study) tags in SIS. [Note that course descriptions include old area designators which may have changed in 2019.]
Some upper level courses have math pre-requisites as well (Probability/Statistics or Linear Algebra most commonly), so plan ahead.

Students whose primary major is in the Whiting School may use the same courses to satisfy the requirements of the primary major and also those of a computer science minor. Students who plan to fulfill the requirements for a minor must submit an on-line declaration request form before senior year through SIS, and will then be assigned a minor advisor.

Computer Science, PhD

The goal of the Doctor of Philosophy (Ph.D.) program in the Department of Computer Science is to prepare first-rate scholars in computer science. Successful graduates may assume significant positions in academia, research institutes, industry, or government laboratories.

Applications for admission to the Ph.D. program in Computer Science are reviewed by a faculty committee. Although specific criteria isn't rigid, all students admitted must exhibit exceptional intellectual achievements and promise. Applicants must submit letters of recommendation, and (for international applicants) TOEFL/IELTS scores. Visit https://engineering.jhu.edu/graduate-admissions/ for more information on the application process.

For details regarding CS PhD program requirements and policies, please visit the Advising Manual (https://livejohnshopkins-my.sharepoint.com/:b:/g/personal/jhoulah1_jh_edu/Ed-ntEo7yetJhj0dAF1_5bIBaBNtY8rDEAuAoOBT-coBpw/?e=r8tKYc) on our departmental website.

Financial Aid

All full-time CS PhD students are fully-funded for the duration of their PhD career while in a fulltime, resident status- either in the form of a Research Assistantship directed by members of the faculty, a Teaching Assistantship (at least one semester of TA is required), or a fellowship. Support includes full tuition and annual health insurance coverage, as well as a monthly living-stipend during the fall and spring academic semesters (9 months). Students who wish to continue working with their advisor and remain researching/working towards their degree full-time with the University during the summer months will continue to receive their stipend for June, July, and August (as opposed to doing an external internship, etc.).

Program Requirements

University Residency

Two consecutive semesters of residence as a full-time graduate student are required.

Seminar Attendance

All Ph.D. degree candidates are required to enroll and maintain satisfactory attendance in EN.601.801 Computer Science Seminar each semester for the duration of their enrollment in the program. Although seminar attendance is required, the seminar may not be counted toward the qualifying course requirement.

Responsible Conduct of Research and Academic Ethics

All doctoral students are required to take AS.360.625 Responsible Conduct of Research. Students are expected to complete the course by the end of their first year. Failure to do so may result in a loss of funding. Additional information regarding this requirement can be found here: https://engineering.jhu.edu/research/resources-policies-forms/responsible-conduct-of-research-training-for-students-and-postdoctoral-fellows-revised-spring-2020/ . In addition, all doctoral students must complete the course EN.500.603 Graduate Orientation and Academic Ethics.

Qualifying Course Requirements

The Department of Computer Science classifies its courses into five sub-areas: Applications, Reasoning, Software, Systems and Theory. All Ph.D. candidates must complete at least one course (3 class hours/credits each) from each of these five areas. A current listing of courses with area designators (https://livejohnshopkins-my.sharepoint.com/:b:/g/personal/jhoulah1_jh_edu/ESKGUDNnnXVJp0WDsinjuDkBTyLcffFMt46LO53krZA4RQ/?e=KPQe9k) is provided on the departmental website. The areas are also encoded as POS (program of study) tags in SIS. [Note that course descriptions include old area designators which may have changed in 2019.] Ph.D. students must also complete an additional three elective graduate courses (chosen from any CS area or from closely related departments such as Electrical and Computer Engineering, Cognitive Science, Mathematics, or Applied Mathematics and Statistics) for a total of eight courses. Computer Science graduate students may count 600-level and above graduate courses. The coursework program must be approved by the student's faculty advisor. The overall grade point average for these eight courses must be at least equivalent to a B+. No course with a grade of less than C- may be counted toward this Ph.D. qualifying course requirement. Other than independent study courses, no courses with grades of P or S can be counted toward the coursework requirement. Courses with grades of P or S will not be included in the grade point average calculation. One of the courses required for the degree, but only one, may be replaced by 3 credits from comparable short courses. With approval of the student's faculty advisor, up to two courses can be transferred from graduate programs of other institutions; more than two such courses can be transferred with approval of the department. It is the obligation of the student to provide all necessary data to the Department of Computer Science regarding the course(s) for which transfer credit is being requested. Students are expected to complete the course requirements by the end of their second year as a Ph.D. candidate.

Qualifying Project Requirements

A Ph.D. student must complete two projects, each under the supervision and written agreement of a different faculty member. One project must be under the supervision of a faculty member with an appointment in Computer Science, and the second project can be supervised by any tenure-track or research faculty member in any division of Johns Hopkins University, or with advance approval from the department, by an outside researcher. Upon conclusion of each project, the student must write a "Project Report" describing the project in detail. This report will be a public document and will be kept on file in the department office. The supervising faculty member must approve the project report. Students are expected to complete the qualifying projects by the end of their third year as a Ph.D. candidate.

Upon completion of the Ph.D. qualifying course requirements and the first qualifying project, students are ordinarily eligible to receive a master of science in engineering degree. The degree will be awarded upon student request.

Graduate Board Oral Examination (GBO)

This examination is a university requirement, ideally taken in the student's third year. The oral exam is administered by a panel consisting of the research sponsor, two faculty members from the Department of Computer Science, and two from outside the department. The exam seeks to establish the student's readiness to conduct original research in the area of their "Preliminary Research Proposal," which should be distributed to the examiners in advance and presented by the student at the start of the exam.

Part-Time Ph.D.

Two consecutive semesters of residence as a full-time graduate student are required by the university. Attempting to obtain a Ph.D. is a major commitment and involves close coordination with a faculty advisor in the department. Part-time students must be able to establish and maintain these close links, therefore part-time study is by advanced and special permission only.

Departmental Seminar

Ph.D. students must give an official departmental seminar on their research area. This is to be done after the GBO and prior to the dissertation defense, or as part of the dissertation defense.

Dissertation and Defense

Ph.D. students must write a dissertation consisting of original research in their chosen area. They must deliver a public presentation of the dissertation before a dissertation committee consisting of the faculty advisor, a second faculty member in the Department of Computer Science (who must have a primary tenure-track appointment in the Department if the advisor does not), and one or more other members with Ph.D. degrees. In conformity with University requirements, the members of the dissertation committee must submit a referee's letter to the Graduate Board recommending that the dissertation be accepted. Completed dissertations will be formatted and submitted to the Milton S. Eisenhower Library for electronic publication (http://guides.library.jhu.edu/etd/).

Teaching Requirement

All Ph.D. students are required to serve as a Teaching Assistant at least one semester during their program of study. As part of the requirement, the supervising course instructor must give the TA an opportunity to be in front of a group of students at least once during the course. Students are required to sign-up for the course EN.601.807 Teaching Practicum during the semester in which the requirement is being fulfilled, and at the end of the semester their performance will be evaluated by the course instructor.

Student Progress Review

Ph.D. students are reviewed annually by their advisor(s) and the department, and notified in writing as to their standing in the program. Students deemed to not be making satisfactory progress may be placed on probation.

Doctor of Engineering

https://engineering.jhu.edu/doctor-of-engineering/

Johns Hopkins University's Doctor of Engineering (D.Eng.) program provides professional engineers with the advanced technical expertise they need to succeed in industry and the public sector by emphasizing creative problem solving and the innovative application of technical knowledge

- The D.Eng. program is a doctoral-level graduate degree program designed for working engineers and scientists.
- It is a full-time program that is pursued non-residentially with semiannual D.Eng. conferences held at the Homewood Campus in Baltimore twice a year (once in January and once in June).
- The program takes the form of a research collaboration between a student's employer and the Whiting School of Engineering. Students are actively mentored by a primary advisor in the Whiting School as well as a co-advisor at their place of employment.
- Students customize their program (https://engineering.jhu.edu/doctor-of-engineering/about-the-program/program-structure/) to meet their professional goals, and immediately contribute to their current job responsibilities.
- D.Eng. graduates are more knowledgeable, innovative, and creative problem solvers, and are better prepared for technical leadership roles in industry and the public sector.

Programs

- Engineering, Doctor of Engineering (p. 1292)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.700.791. Doctor of Engineering Fundamentals. 10 Credits.
This is an intense, professor-guided, individualized course for D.Eng. students preparing for their Preliminary Examinations. The course instructor is the student's primary advisor and sets therequirements. Successful students pass their Preliminary Examinations upon completing this course. Students may enroll in this course for multiple semesters if necessary.

EN.700.792. Doctor of Engineering Research Proposal. 10 Credits.
The purpose of this course is to synthesize a coherent research proposal for the Doctor of Engineering major project. The course instructor is the student's primary advisor, working withthe student to create the research proposal to be defended in a public presentation and private examination. Students may enroll in this course for multiple semesters if necessary.

EN.700.891. Doctor of Engineering Research. 10 - 20 Credits.
Students enroll in this course upon completion of their Research Proposal Examinations while they are conducting advanced engineering research under the supervision of their advisors. Thenumber of credits awarded will vary based on the amount of time students devote to their research; this is exactly analogous to how we assign credit hours for dissertation research forPh.D. students. Course is for Doctor of Engineering students only. Course is repeatable for credit.

Engineering, Doctor of Engineering

Program Policies

Continuous Enrollment Requirement

All D.Eng. students are required to register in every term (Summer, Intersession) and semester (Fall, Spring) they are in the program, and must complete registration at the beginning of each term in accordance with instruction issued by the registrar. Detailed instructions about registration will be provided to all students before the registration period each term.

Students who, for any reason, do not complete their registration until after the prescribed registration period are required to pay a late registration service fee. The late registration fee schedule is posted every semester on the registrar's website. https://studentaffairs.jhu.edu/registrar/students/graduate-registration (https://studentaffairs.jhu.edu/registrar/students/graduate-registration/)/ (see Term Dates & Deadlines). Graduate students must obtain permission from the chair of their department to register after the second week of classes.

Non-Curricular Program Requirements

In addition to their academic coursework, exams, and research, D.Eng. students must also satisfy three additional requirements:

- EN.500.603 Graduate Orientation and Academic Ethics (an online module)
- AS.360.624 Responsible Conduct of Research (Online) (an online module)
- Title IX Training (through JHU's MyLearning portal)

Please contact Mrs. Mia Brooms with any questions.

Retakes and Probation

Ideally, students in the Doctor of Engineering program will pass their milestone exams on the first attempt. However, students will have a second chance to pass any of their exams should they fail on their first attempt. Failing any exam twice is grounds for dismissal from the Doctor of Engineering program.

D.Eng. students are expected to be fully engaged and make progress toward their degree. Should a student become disengaged, or have a significant period with no progress, the student may be placed on probation. Please see Assistant Dean Christine Kavanagh (christinekavanagh@jhu.edu) for guidance.

Annual Student Review

Doctoral students need to have a clear understanding of their progress and what is expected next in their programs. To this end, D.Eng. students will undergo a formal annual review. This consists of three steps:

- First, the student will be given a self-evaluation in which they should report their accomplishments from the previous year and lay out their expectations for the coming year.
- Second, advisor's evaluation of your research progress and professional development, along with suggestions for improvement.
- Third, documentation that you have discussed Parts 1 and 2 with your advisor.
- Fourth, you will evaluate your advisor and the climate within your cohort and the program.

Semiannual Doctor of Engineering Conference

D.Eng. students are nonresidential and therefore have little opportunity to interact with each other. However, they are expected to come to Baltimore for semi-annual Doctor of Engineering Conferences in June and January. As described earlier, the various milestone examinations take place during these conferences. D.Eng. students are strongly encouraged to attend public portions of each other's oral examinations (proposal and project defenses).

In addition, the conferences provide opportunities for social networking among the students as well as professional development programming.

Advisor or Employer Changes

Loss of funding or an advisor will generally require a leave of absence from the program until the situation is resolved. Students switching employers before the completion of their degree generally encounter difficulty in continuing in the program, as their new employer would need to agree to continuation of the research and in most cases, funding support as well. Students should contact Vice Dean Sri Sarma immediately if they have questions about any of the above issues (and ideally, before any transition).

Selection of Co-Advisor

The external Co-advisor may not be someone who either reports directly or indirectly to the D.Eng. student. In exceptional cases, an external advisor may be someone from another company, or an exception can be made to have all the advisors be from within JHU. Any co-advisor assignments or changes need to be approved by the D.Eng. Oversight Committee.

Funding

The training of a Doctor of Engineering student takes the form of a research contract between the student's employer and the Whiting School of Engineering. Annual tuition is posted on the Homewood Student Accounts website. D. Eng. students cannot be personally liable for these fees, except in the cases of health insurance premiums through the JHU Student Insurance plan facilitated by CHP, and any late fees, library fines, etc.. There will be no additional funding provided to a D.Eng. student by the Whiting School of Engineering/Johns Hopkins University. Students may be admitted to the D.Eng. while funding details are being resolved, however, they cannot start their program until funding is secured. They may file for a deferral for up to a year.

Note that graduate students are subject to these policies and requirements in addition to all university and departmental policies and requirements

Admission Requirements

- Master's degree in a related field
- Significant professional experience

Application Components

- Transcripts from all undergraduate and master's degree programs
- Resume of applicant
- Statement of purpose
- A research proposal (please see our guidelines (https://engineering.jhu.edu/doctor-of-engineering/admissions/admission-requirements/proposal-guidelines/) for the preparation of your proposal)
- Names of potential Whiting School of Engineering advisors
- Letter of support (indicating full financial support as well) from the selected (non-JHU) co-advisor/employer
- Co-advisor's resume or CV
- Two additional letters of recommendation

To be accepted into the D.Eng. program, applicants must receive approval from their primary advisor at the Whiting School of Engineering and the Doctor of Engineering Oversight Committee (https://engineering.jhu.edu/doctor-of-engineering/about-the-program/oversight-committee/).

For full consideration, please apply by the following dates:

- Summer: January 1
- Spring: July 1

Program Requirements

Curriculum

Year One

Doctor of Engineering students are expected to come to Baltimore twice each year: once in January and once in June for the Semiannual Doctor of Engineering Conferences. D.Eng. students may begin their program at either time.

1. **Diagnostic Interview, Syllabus of Study, and Start of Research**
   D.Eng. students begin their program with an extended, in-person meeting with their advisor. This meeting is called the ***Diagnostic Interview***. The student and advisor discuss the proposed project and identify new material for the student to learn (roughly equivalent to two graduate-level courses). This new material should be relevant to the proposed research, especially to guide the student to fill in background material that the advisor anticipates will be needed. Together, the advisor and student lay out a syllabus of study for the coming months. (The syllabus is then approved by the student's three-person supervisory committee.
   The student works to learn the material on the syllabus. This may be done through online courses (such as those offered by our Engineering for Professionals program) or guided independent reading. The advisor and co-advisor are available to the student to answer questions and, if need be, revise the syllabus. The student works on research.
2. **Required Course Enrollment**
   EN.700.791 Doctor of Engineering Fundamentals **10 credits**
   This is an intense, professor-guided, individualized course for D.Eng. students preparing for their Preliminary Examinations. The course instructor is the student's primary advisor and sets the requirements. Successful students pass their Preliminary Examinations upon completing this course. Students may enroll in this course for multiple semesters if necessary.
3. **Preliminary Examination**
   At the student's second Doctor of Engineering Conference (in either January or June, roughly six months from the start of their program) they will be examined on the syllabus developed in the Diagnostic Interview. This ***Preliminary Examination*** is administered by the student's supervisory committee. The format of the exam may be either written or oral at the discretion of the supervisory committee.)
4. **Refining the Written Research Proposal**
   After successfully completing the Preliminary Exam, the student spends the next six months refining the basic proposal in the application into a robust, more specific written research proposal.

Year Two to Degree Completion

1. **Required Course Enrollment**
   EN.700.792 Doctor of Engineering Research Proposal. 10 credits
   The purpose of this course is to synthesize a coherent research proposal for the Doctor of Engineering major project. The course instructor is the student's primary advisor, working with the student to create the research proposal to be defended in a public presentation and private examination. Students may enroll in this course for multiple semesters if necessary.
2. **Proposal Presentation and Examination**
   At the start of the 2nd year in the program, the student stands for the ***Proposal Presentation and Examination***. This is an oral exam is conducted by the supervisory committee plus two additional JHU faculty members. The first portion of the examination is a presentation of the research proposal. This portion of the exam is a public presentation of the research proposal (and other D.Eng. students are encouraged to attend). This is followed by an examination by the five-member panel to assess the student's readiness to engage in the proposed research.

Continued Research, Project Development, and Defense

Upon successful completion of the **Proposal Presentation and Examination**, the student works in earnest to execute the research. Of course, the scope and direction of the research may deviate from the plan originally presented. At this time, the student should register for EN.700.891 Doctor of Engineering Research**. 10 - 20 credits**

Once your advisor and Supervisory Committee deem the research to be sufficient for the degree, you will present your research and project at a public defense conducted by your Supervisory Committee. Typically doctoral students report and archive the fruits of their research by writing a dissertation. D.Eng. students may choose to do likewise, but we allow greater latitude in our program for alternative projects. There are, however, a few required components no matter the format.

All D.Eng. projects must include a written description of the key results, including

- Title Page
- Table of Contents
- Extended Abstract between 10 - 20 pages

D.Eng. projects should include evidence as well, such as in a portfolio comprising:

- Prototypes
- Animations or simulations
- Computer code
- Journal paper submissions
- Invention disclosures/patent applications

Taken together, the portfolio is used to evaluate the depth and quality of the student's work. The design of the portfolio (what is included) is subject to the approval of the student's advisory committee.

Note that the portfolio, as well as its defense, must be public. That is, neither classified nor otherwise restricted material may be used. However, it is reasonable that the student's project may support a proprietary or classified application at the student's home company/agency. Nevertheless, it must be possible for the student to demonstrate their accomplishments in a fully open setting.

Learning Outcomes

There are three overarching educational objectives for D.Eng. students:

- Ability to acquire new, advanced knowledge
- Ability to formulate a research problem/program
- Execution of the proposed research

These objectives are assessed by three milestone examinations, respectively:

- Preliminary Examination
- Proposal Presentation and Examination
- Project Defense

Electrical and Computer Engineering

http://www.ece.jhu.edu/

The Department of Electrical and Computer Engineering at Johns Hopkins is committed to providing a rigorous educational experience that prepares students for further study and successful careers and is dedicated to research that contributes to fundamental knowledge in both analytical and experimental aspects of the field. The mission of our undergraduate programs is to provide a stimulating and flexible curriculum in fundamental and advanced topics in electrical and computer engineering, basic sciences, mathematics, and humanities, in an environment that fosters the development of analytical, computational, and experimental skills and that involves students in design projects and research experiences. At the graduate level, our mission is to provide advanced training that prepares master's graduates to work at the forefront of their chosen specialty and prepares doctoral students for original research that will advance the frontiers of knowledge in their chosen areas.

The department focuses its teaching and research programs in five major areas:

1. Controls, networks, and systems;
2. Image and signal processing;
3. Speech and language processing;
4. Microsystems and computer engineering, and
5. Solid State Electronics and Photonics

The faculty offers undergraduate courses at both the introductory and intermediate levels in these areas, and graduate courses leading to research topics at the forefront of current knowledge. Guided individual study projects available for undergraduates provide opportunities for student participation in activities in the department and in the research programs of the faculty. In the graduate program, original research in close association with individual faculty members is emphasized.

Current Research Activities

Control, Networks, and Systems

Current research in control, networks, and systems includes the design and analysis of robust control algorithms; design, analysis, and performance evaluation of distributed control algorithms for networked dynamical systems; real-time optimization of dynamical systems; multi-time scale optimization decomposition of networked systems. Application domains include systems and synthetic biology, particularly the analysis of signaling pathways in biological systems; power systems, including multi-timescale market design and co-optimization, distributed control design for frequency regulation, real-time congestion management, and low inertia power systems control; information networks, including the design of clock synchronization algorithms, and joint congestion control and multi-path routing for data networks.

Image and Signal Processing

Image analysis efforts currently concern statistical analysis of restoration, learning, and reconstruction algorithms, development of statistical image models for image restoration and segmentation, geometric modeling for object detection and estimation, morphological image analysis, magnetic resonance imaging, ultrasound imaging, and photoacoustic imaging. There is an opportunity for joint work in image analysis and signal processing with faculty in the Department of Radiology and various other departments within the School of Medicine.

Speech and Language Processing

Research in speech processing involves work in all aspects of language or speech science and technology, with fundamental studies underway in areas such as language modeling, pronunciation modeling, natural language processing, neural auditory processing, acoustic processing, optimality theory, and language acquisition. Research starting at the materials used for transduction of acoustic signals, through signal processing involved in extracting relevant information from the acoustic signatures, and leading to the interpretation of the information to extract meaning and/or translating between languages.

Microsystems and Computer Engineering

Computer engineering research activities include work on computer structures (with emphasis on microprocessors), parallel and distributed processing, fault-tolerant computing, analysis of algorithms, VLSI analog architectures for machine intelligence and sensory processing, associative processing, and micropower computing, alternative computation systems and devices, applied neuroscience, hardware-friendly algorithms, and MEMS.

Solid State Electronics & Photonics

Current research activities include work in fiber optic sensors and endoscopic 3-D imaging devices for medical applications, secure optical communications, and semiconductor optoelectronics. Other areas of interest involve the study of the nonlinear interactions of light with matter, laser beam control and steering, and plasmonics. Semiconductor device studies include optical detectors, photovoltaics, silicon photonics, nanophotonics, quantum cascade lasers, high power III-Nitride electronic devices, VLSI circuit design and modeling, and microwave devices and circuits. The study of laser radar and RF photonics is also being pursued. Theoretical and experimental studies involving linear optical properties of various materials and passive remote sensing of the atmosphere are being investigated.

Facilities

The department maintains extensive facilities for teaching and research in Barton Hall, Hackerman Hall, Wyman, and Maryland Hall. The two main teaching labs (Microprocessor & FPGA Lab and the Biophotonics Lab) make extensive use of state-of-the-art design environments such as CADENCE, Xilinx Tools, TI DSP systems, VHDL, and Verilog. In addition, the department includes the computational sensory motor system lab, the cellular signaling control lab, the parallel computing and imaging lab, the photonics and optoelectronics lab, the semiconductor microstructures lab, and the sensory communication and microsystem lab, adaptive and the sensory communication microsystem lab.

Undergraduate Programs

The Department of Electrical and Computer Engineering offers three bachelor's degree programs: a BS in Electrical Engineering, a BS in Computer Engineering (with the close collaboration of the Computer Science Department (https://e-catalogue.jhu.edu/engineering/computer-science/)), and a BA in Electrical Engineering. Students learn the fundamentals of electrical, computer and digital systems, data structures, and circuits, with an emphasis on hands-on experience to complement the theoretical. Both BS degree programs are accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/). However, the BA degree is not accredited through ABET.

Graduate Programs

Graduate students work closely with their faculty advisors to design a plan based on their needs and interests. Our faculty understand industry demands a broad skill set coupled with research and design experience, and our curriculum offers the opportunity to meld theory and practice. Students are required to take at least five classes in ECE and an additional three courses in other engineering disciplines. Students have three options for completing their degree requirements: taking two additional courses; completing a master's essay/thesis; or completing a project. Additional details can be found in the department's *Graduate Student Advising Manual.*

Combined Undergraduate/ Graduate Program

At the end of their sophomore year, students who are majors in electrical and computer engineering may apply for admission to the combined bachelor's/master's program which permits the student to complete their B.S. in electrical engineering while also working on their requirements towards their master of science in electrical engineering. In order to qualify, students must maintain a GPA of 3.5 or higher. The latest deadline to apply for this program is the end of their second to last semester. The application process is explained at https://engineering.jhu.edu/ece/academics/undergraduate-studies/combined-bachelors-masters/.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.520.123. Computational Modeling for Electrical and Computer Engineering. 3 Credits.
In this course, the students will acquire the skills of solving complex real world Electrical and Computer Engineering problems using computational modeling tools. This course will covert two aspects ofsolving those ECE problems. The first aspect consists of learning to map ECE tasks to mathematical models. The second aspect consists of introducing the students to the basic of computational algorithms needed to work with the models, and programming such algorithms in MATLAB.

EN.520.137. Introduction To Electrical & Computer Engineering. 3 Credits.
An introductory course covering the principles of electrical engineering including sinusoidal wave forms, electrical measurements, digital circuits, and applications of electrical and computer engineering. Laboratory exercises, the use of computers, and a design project are included in the course.

EN.520.142. Digital Systems Fundamentals. 3 Credits.
Number systems and computer codes, switching functions, minimization of switching functions, Quine - McCluskey method, sequential logic, state tables, memory devices, analysis, and synthesis of synchronous sequential devices.

EN.520.150. Light, Image and Vision. 3 Credits.
This course is designed for beginning undergraduate students and covers the principle of optics and imaging from the human vision perspective. The topics for the course include the basic principles and properties of light, imaging and image formation, optical imaging and display systems, and human vision. The course include bio-weekly labs that allows students to implement and experience the concepts learned during the lectures.

EN.520.151. ECE Ideation and Design Lab (First Year). 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu. Students must take the class as a graded course. S/U is not an option. For additional info, see link below: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.211. ECE Engineering Team Project. 1 Credit.
This course introduces the student to the basics of engineering team projects. The student will become a member of and participate in the different aspects of an ECE team project over several semesters. (Freshmen and Sophomores)

EN.520.212. ECE Engineering Team Project (Freshmen and Sophomores). 1 Credit.
This course introduces the student to the basics of engineering team projects. The student will participate in an ECE engineering team project as a member. The student is expected to participate in the different aspects of the project over several semesters. (Freshmen and Sophomores)Permission of instructor required.

EN.520.214. Signals and Systems. 4 Credits.
An introduction to discrete-time and continuous-time signals and systems covers representation of signals and linear time-invariant systems and Fourier analysis.
(AS.110.107 OR AS.110.109);AS.110.202 can be taken while taking EN.520.214

EN.520.216. Introduction To VLSI. 3 Credits.
This course teaches the basics of switch-level digital CMOS VLSI design. This includes creating digital gates using MOS transistors as switches, laying out a design using CAD tools, and checking the design for conformance to the Scalable CMOS design rules.Recommended: EN.520.213.
(AS.171.101 AND AS.171.102) OR (AS.171.101 AND AS.171.108) OR (AS.171.102 AND AS.171.107) OR (AS.171.107 AND AS.171.108)

EN.520.219. Introduction to Electromagnetics. 3 Credits.
Vector analysis, electrostatic fields in vacuum and material media, stationary currents in conducting media, magnetostatic fields in vacuum and material media. Maxwell's equations and time-dependent electric and magnetic fields, electromagnetic waves and radiation, transmission lines, wave guides, applications.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.110.109 AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND AS.173.112;AS.110.202 may be taken prior to or while enrolled in EN.520.219.

EN.520.220. Electromagnetic Waves. 3 Credits.
Magnetostatic fields in vacuum and material media. Maxwell's equations and time-dependent electric and magnetic fields, electromagnetic waves and radiation, transmission lines, wave guides, applications.

EN.520.225. Advanced Digital Systems. 3 Credits.
Students are introduced to Hardware Description Languages (HDL) through the assembly of virtual versions of the digital parts used in the previous semester's Digital Systems Fundamentals. From this point on, new components called modules are created as needed to implement larger digital circuits. Increasingly complex digital systems are then created through stages such as desktop calculators, and culminating in the design of microcontrollers and microprocessors.The hardware used for the digital systems designed is a custom board containing a Field Programmable Gate Array (FPGA). This board is configured using software on the student's computer, but is designed to standalone. That is, once configured, it no longer needs to be connected to any host computer.The architecture of these complex digital systems starts with Finite State Machines (FSM). Hierarchical FSMs are then covered, followed by traditional two and three bus microprocessor architectures and digital signal processors.
EN.520.142

EN.520.230. Mastering Electronics. 3 Credits.
With this course, students will have a solid understanding of basic and fundamental electronic concepts and rules and will be able to build and design a wide range of electronic devices. Class lectures cover the fundamental concepts of electronics, followed by laboratory exercises that demonstrate the basic concepts. Topics include phase and frequency response, transistors, operational amplifiers, filters, and other analog circuits. The experiments are done using computer controlled digital oscilloscopes, function generators, and power supplies. Additionally, a project will be completed during the final few weeks of classes. Text book: The Bare Essentials of Electrical Engineering Maryam Al-Othman, John Cole, and Dimitri Peroulis.
Prerequisite(s): EN.520.231
(AS.110.108 AND AS.110.109) AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108) AND AS.173.112);Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.231. Mastering Electronics Laboratory. 2 Credits.
With this course, students will have a solid understanding of basic and fundamental electronic concepts and rules including resistive circuits, loop and node analysis, capacitor/inductor circuits, and transient analysis. Students will be able to build, design, and simulate a wide range of electronic devices; the class will focus on building and designing audio devices. Class lectures cover the fundamental concepts of electronics, followed by laboratory exercises that demonstrate the basic concepts. Students will learn to simulate circuits using SPICE. A final project is required.
Prerequisite(s): EN.520.230 Mastering Electronics
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;(AS.110.108 AND AS.110.109) AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108)) AND AS.173.112)

EN.520.232. Mastering Electronics II. 3 Credits.
With this course, students will further develop their understanding of circuit and electronic concepts and rules and will be able to build and design a wide range of electronic devices. Class lectures cover advanced design concepts of analog CMOS integrated circuits, followed by laboratory exercises that reinforce the concepts. Topics include 2nd order circuits, phase and frequency response, transistors, operational amplifiers, noise, feedback, Bode diagrams, and frequency compensation. The experiments are done using computer controlled digital oscilloscopes, function generators, and power supplies. Additionally, a project will be completed during the final few weeks of classes.
(AS.110.107 OR AS.110.109) AND (EN.500.112 OR EN.500.113 OR EN.500.114)

EN.520.233. Mastering Electronics II Lab. 2 Credits.
For much of the semester, students will be performing a new lab experiment each week. During each student’s scheduled lab section, they will be expected to attend in person and demonstrate the operation of the functioning circuit. The student will be graded based on their functioning circuit, their experimental results, and their demonstration of its operation during their scheduled laboratory period. Each lab will have a simulation component as well as an experimental component. Additionally, one week after the demonstration, the student is required to submit a lab assignment where students will demonstrate data analysis and answer questions about the lab to further their understanding. Students will work individually on all of these components, but are encouraged to ask questions to their classmates and the instructors in the discussion areas on MS Teams. In fact, your participation in these discussions will contribute to your laboratory course participation grade.
(AS.110.107 OR AS.110.109) AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND EN.520.230 AND EN.520.231

EN.520.250. Leading Innovation Design Team. 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu. Students must take the class as a graded course. S/U is not an option.For additional info, see link below: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class.

EN.520.251. ECE Ideation and Design Lab. 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Prerequisite(s): Student can take EN.520.463, EN.520.663, and EN.520.251, but not in the same semester
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.302. Internet of Things Project Lab. 3 Credits.
In this course the student configures, programs, and tests microprocessor modules with wireless interconnectivity for embedded monitoring and control purposes. Several different platforms are explored and programmed in high level languages (HLL). Upon completion, students can use these devices as elements in other project courses.Recommended Course Background: HLL programming and digital logic familiarity; Advanced Microprocessor Lab is a plus.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.315. Intro. to Bio-Inspired Processing of Audio-Visual Signals. 3 Credits.
An introductory course to basic concepts of information processing of human communication signals (sounds, images) in living organisms and by machine. Recommended Course Background: EN.520.214 (or EN.580.222) or consent of the instructor.

EN.520.340. Introduction to Mechatronics: Sensing, Processing, Learning and Actuation. 3 Credits.
Introduction to Mechatronics is mostly hands-on, interdisciplinary design class consisting of lectures about key topics in mechatronics, and lab activities aimed at building basic professional competence. After completing the labs, the course will be focused on a final mini-project for the remainder of the semester. This course will encourage and emphasize active collaboration with classmates. Each team will plan. design, manufacture and/or build, test, and demonstrate a robotic system that meets the specified objectives.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.520.230 AND EN.520.231

EN.520.344. Introduction to Digital Signal Processing. 3 Credits.
Introduction to digital signal processing, sampling and quantization, discrete time signals and systems, convolution, Z-transforms, transfer functions, fast Fourier transform, analog and digital filter design, A/D and D/A converters, and applications of DSP.
EN.520.214 OR EN.580.242 OR EN.580.246

EN.520.349. Microprocessor Lab I. 3 Credits.
This course introduces the student to the programming of microprocessors at the machine level. 68HC08, 8051, and eZ8 microcontrollers are programmed in assembly language for embedded control purposes. The architecture, instruction set, and simple input/output operations are covered for each family. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.142 or equivalent.The lab is open 24/7 and students can still take the class if they are unable to meet during lab time.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.353. Control Systems. 4 Credits.
Modeling, analysis, and an introduction to design for feedback control systems. Topics include state equation and transfer function representations, stability, performance measures, root locus methods, and frequency response methods (Nyquist, Bode).
EN.520.214 OR EN.530.343 OR EN.580.222

EN.520.363. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.370. Introduction to Renewable Energy Engineering. 3 Credits.
This course provides an introduction to the science and engineering of renewable energy technologies. The class will begin with an overview of today's energy landscape and proceed with an introduction to thermodynamics and basic heat engines. Specific technologies to be discussed include photovoltaics, fuel cells and hydrogen, biomass, wind power and energy storage. The class should be accessible to those from a variety of science and engineering disciplines.
(AS.171.101 OR AS.171.105 OR AS.171.107 OR EN.530.123) AND (AS.110.109 OR AS.110.107)

EN.520.385. Signals, Systems, & Learning. 3 Credits.
This course builds on the fundamentals of signal processing to explore state space models and random processes. Topics include LTI systems, feedback, probabilistic models, signal estimation, random processes, power spectral density and hypothesis testing.
(EN.580.222 OR EN.520.214) AND EN.550.310 AND AS.110.201

EN.520.390. Music Signal Processing. 3 Credits.
This course covers the principles and algorithms used in the processing and analysis of music. Topics include music representation, Fourier analysis of signals including both continuous and discrete representations, signal filtering, music synchronization, dynamic time warping, music structure analysis, chord recognition, tempo and beat tracking, tempograms, content-based audio retrieval, and music decomposition. Projects and assignments will be carried out in Matlab and/or Python. Students must have familiarity with music notation, structure, and instruments.
(EN.520.214 OR EN.580.246) AND (EN.500.113 OR EN.500.133);AS.110.201 OR EN.553.291 OR EN.553.310 OR EN.553.311 OR EN.553.420 - student can either have already completed this class or must be concurrently registered at the same time as this course.

EN.520.403. Introduction to Optical Instruments. 3 Credits.
This course is intended to serve as an introduction to optics and optical instruments that are used in engineering, physical, and life sciences. The course covers first basics of ray optics with the laws of refraction and reflection and goes on to description of lenses, microscopes, telescopes, and imaging devices. Following that basics of wave optics are covered, including Maxwell equations, diffraction and interference. Operational principles and performance of various spectrometric and interferometric devices are covered including both basics (monochromatic, Fabry-Perot and Michelson interferometers), and advanced techniques of near field imaging, laser spectroscopy, Fourier domain spectroscopy, laser Radars and others.

EN.520.404. Engineering solutions in a global, economic, environmental, and societal context. 1 Credit.
Students will examine ECE based case studies and will apply decision making theory and leadership theory as it relates to information, communication, healthcare, and energy. The course aims to examine technology as it transitions from old to new, from impossible to possible. It will also evaluate the new hazards that these new technologies may have on the world. The students will have to quantify the good and the bad of each solution and weigh their contribution to Environment, Economy, society and Healthcare. The group will present these case studies to their classmates, justifying the solutions and answers to the ethical dilemmas they faced, and explain the impact of their decisions from an economic, environmental, and global perspective.
Prerequisite(s): EN.660.400

EN.520.412. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video.
(AS.110.201 AND EN.553.310 AND EN.520.344) OR (AS.110.201 AND EN.553.311 AND EN.520.344) OR (AS.110.201 AND EN.553.420 AND EN.520.344) OR (AS.110.201 AND EN.553.421 AND EN.520.344);Students can only take EN.520.412 OR EN.520.612, not both.

EN.520.414. Image Processing & Analysis. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course.
EN.520.214 OR EN.580.222 OR EN.580.243

EN.520.415. Image Process & Analysis II. 3 Credits.
This course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by morphological image processing and analysis, image representation and description, image recognition and interpretation.

EN.520.417. Computation for Engineers. 3 Credits.
Designing algorithms in a finite precision environment that are accurate, fast, and memory efficient is a challenge that many engineers must face. This course will provide students with the tools they need to meet this challenge. Topics include floating point arithmetic, rounding and discretization errors, problem conditioning, algorithm stability, solving systems of linear equations and least-squares problems, exploiting matrix structure, interpolation, finding zeros and minima of functions, computing Fourier transforms, derivatives, and integrals. Matlab is the computing platform.Background in linear algebra, matrices, digital signal processing, Matlab.

EN.520.418. Modern Convex Optimization. 3 Credits.
Convex optimization is at the heart of many disciplines such as machine learning, signal processing, control, medical imaging, etc. In this course, we will cover theory and algorithms for convex optimization problems. The theory part includes convex analysis, convex optimization problems (LPs, QPs, SOCPS, SDPs, Conic Programs), and Duality Theory. We will then explore a diverse array of algorithms to solve convex optimization problems, such as gradient methods, sub-gradient methods, accelerated methods, proximal algorithms, ADMM, and Newton’s method.Text Book: There is no required textbook for the course. For reference, the audience can consult the following textbooks:- Convex Optimization by Stephen Boyd and Lieven Vanderberghe
(AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.113 OR EN.500.133 OR EN.540.382)

EN.520.424. FPGA Synthesis Lab. 3 Credits.
An advanced laboratory course in the application of FPGA technology to information processing, using VHDL synthesis methods for hardware development. The student will use commercial CAD software for VHDL simulation and synthesis, and implement their systems in programmable XILINX 20,000 gate FPGA devices. The lab will consist of a series of digital projects demonstrating VHDL design and synthesis methodology, building up to final projects at least the size of an 8-bit RISC computer. Projects will encompass such things as system clocking, flip-flop registers, state-machine control, and arithmetic. The students will learn VHDL methods as they proceed through the lab projects, and prior experience with VHDL is not a prerequisite.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.427. Design of Biomedical Instruments and Systems. 3 Credits.
The purpose of this course is to teach the students principles of product design for the biomedical market. From an idea to a product and all the stages in-between.The course material will include identification of the need, market survey, patents. Funding sources and opportunities, Regulatory requirements, Reimbursement codes, Business models). Integration of the system into the clinical field. system connectivity. Medical information systems. Medical standards (DICOM, HL-7, ICD, Medical information bus). How to avoid mistakes in system design and in system marketing. Entrepreneurship.The course participants will be divided to groups of 2-3 students each. Each group will be acting as a start-up company throughout the whole semester. Each group will need to identify a need. This can be done by meeting and interviewing medical personnel, at the Johns Hopkins Medical campus or other hospitals, clinics, HMOs, assisted living communities or other related to the medical world. The proposed medical instrument or system can be a combination of instrument and software.Each week, there will be a lecture devoted to the principal subjects mentioned above. Afterwards the students will present their ideas and progress to all class participants. There will be an open discussion for each of the projects. The feedback from class will help the development of the product. Each presentation, document, survey or paper will be kept in the course cloud which will have a folder for each of the groups. The material gathered in this folder will be built gradually throughout the semester. Eventually it will become the product blueprint.At the last week of the semester, the groups will present their product to a panel of experts involved with the biotech industry, in order to “convince” them to invest in their project.Previous years’ projects are listed in this website: (https://jhuecepdl.bitbucket.io).

EN.520.432. Medical Imaging Systems. 3 Credits.
This course provides students with an introduction to the physics, instrumentation, and signal processing methods used in general radiography, X-ray computed tomography, ultrasound imaging, magnetic resonance imaging, and nuclear medicine. The primary focus is on the methods required to reconstruct images within each modality from a signals and systems perspective, with emphasis on the resolution, contrast, and signal-to-noise ratio of the resulting images. Students will additionally engage in hands-on activities to reconstruct medical images from raw data.
EN.520.214 OR EN.580.222 OR (EN.580.243 AND EN.580.246)

EN.520.433. Medical Image Analysis. 3 Credits.
This course covers the principles and algorithms used in the processing and analysis of medical images. Topics include, interpolation, registration, enhancement, feature extraction, classification, segmentation, quantification, shape analysis, motion estimation, and visualization. Analysis of both anatomical and functional images will be studied and images from the most common medical imaging modalities will be used. Projects and assignments will provide students experience working with actual medical imaging data.
EN.550.310 OR EN.550.311 OR EN.560.348

EN.520.435. Digital Signal Processing. 3 Credits.
Methods for processing discrete-time signals. Topics include signal and system representations, z- transforms, sampling, discrete Fourier transforms, fast Fourier transforms, digital filters.

EN.520.438. Deep Learning. 3 Credits.
Deep Learning is emerging as one of the most successful tools in machine learning for feature learning and classification. This course will introduce students to the basics of Neural Networks and expose them to some cutting-edge research. In particular, this course will provide a survey of various deep learning-based architectures such as autoencoders, recurrent neural networks and convolutional neural networks. We will discuss merits and drawbacks of available approaches and identify promising avenues of research in this rapidly evolving field. Various applications related to computer vision and biometrics will be studied. The course will include a project, which will allow students to explore an area of Deep Learning that interests them in more depth.
(EN.520.635 OR EN.520.344[]) AND EN.601.220 AND (EN.553.420 OR EN.553.310 OR EN.553.311)

EN.520.439. Machine Learning for Medical Applications. 3 Credits.
In this course, students will actively learn the basic principles of artificial intelligence and machine learning techniques applied to medical applications, as well as medical concepts common in healthcare environments. Throughout the course, students will explore different types of bio-signals such as electroencephalograms, electrocardiograms, sound, medical imaging, and their associated processing methodologies. The primary objective is to give students the tools they need to be able to develop new artificial intelligence-related ideas in biomedical environments. At the end of the course, students will apply their newly acquired knowledge to complete a cumulative final project dealing with a real-world situation. Students are expected to be familiar with linear algebra. Python coding skills are recommended, as there will be one coding assignment every week.
EN.520.412

EN.520.440. Machine Intelligence on Embedded Systems. 3 Credits.
The second wave of AI is about statistical learning of low dimensional structures from high dimensional data. Inference is done using multilayer, data transforming networks using fixed point arithmetic with parameters that have limited precision known as Deep Neural Networks. In this course students will learn about Machine Learning and AI on embedded systems that have limited computational, storage and communication resources. Students are expected to be familiar with linear algebra and Python as well some familiarity with typical ML frameworks (TensorFlow, Keras e.t.c). A first course in ML is strongly advised. At the end of the course, students will apply their newly acquired knowledge to complete a final project with real world data for machine perception and cognition.
EN.520.412 OR EN.520.612 OR EN.601.475 OR EN.601.675 OR EN.601.676 OR EN.601.482 OR EN.601.682 OR EN.601.486 OR EN.601.686 OR EN.520.439 OR EN.520.659 OR EN.520.650

EN.520.445. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.It is recommended that students take EN.520.344 Digital Signal Processing prior to taking this class.

EN.520.447. Information Theory. 3 Credits.
This course will address some basic scientific questions about systems that store or communicate information. Mathematical models will be developed for (1) the process of error-free data compression leading to the notion of entropy, (2) data (e.g. image) compression with slightly degraded reproduction leading to rate-distortion theory and (3) error-free communication of information over noisy channels leading to the notion of channel capacity. It will be shown how these quantitative measures of information have fundamental connections with statistical physics (thermodynamics), computer science (string complexity), economics (optimal portfolios), probability theory (large deviations), and statistics (Fisher information, hypothesis testing).
EN.553.310 OR EN.553.420 OR EN.553.311;Students can earn credit for either EN.520.447 or EN.520.647, but not both.

EN.520.448. Electronics Design Lab. 3 Credits.
An advanced laboratory course in which teams of students design, build, test and document application specific information processing microsystems. Semester long projects range from sensors/actuators, mixed signal electronics, embedded microcomputers, algorithms and robotics systems design. Demonstration and documentation of projects are important aspects of the evaluation process.Recommended: EN.600.333, EN.600.334, EN.520.214, EN.520.216, EN.520.349, EN.520.372, EN.520.490 or EN.520.491.
(EN.520.240 OR EN.520.340 OR EN.520.230 OR EN.520.213) AND AS.110.108 AND AS.110.109 AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108)) AND EN.520.142.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.450. Advanced Micro-Processor Lab. 3 Credits.
This course covers the usage of common microcontroller peripherals. Interrupt handling, timer operations, serial communication, digital to analog and analog to digital conversions, and flash ROM programming are done on the 68HC08, 8051, and eZ8 microcontrollers. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.349
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.453. Advanced ECE Engineering Team Project. 3 Credits.
The course introduces the student to running an engineering team project. The student will participate in the ECE engineering team project as a leading member. The student is expected to participate in the different aspects of the project over several semesters and manage both team members and the project.(Juniors and Seniors) Permission of instructor is required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.454. Control Systems Design. 3 Credits.
Classical and modern control systems design methods. Topics include formulation of design specifications, classical design of compensators, state variable and observer based feedback. Computers are used extensively for design, and laboratory experiments are included.

EN.520.457. Quantum Mechanics for Engineering. 3 Credits.
Basic principles of quantum mechanics for engineers. Topics include the quantum theory of simple systems, in particular atoms and engineered quantum wells, the interaction of radiation and atomic systems, and examples of application of the quantum theory to lasers and solid-state devices. Recommended Course Background: AS.171.101-AS.171.102 and EN.520.219-EN.520.220

EN.520.462. Leading Innovation Design Team. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.eduFor additional info, see: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class.

EN.520.463. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Prerequisite(s): Students can take 520.251 and 520.663, but not in the same semester as 520.463.
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.465. Machine Perception. 3 Credits.
This course will cover topics such as Marr-Hildreth and Canny edge detectors, local representations (SIFT, LBP), Markov random fields and Gibbs representations, normalized cuts, shallow and deep neural networks for image and video analytics, shape from shading, Make 3D, stereo, and structure from motion.
Students can only receive credit for EN.520.465 or EN.520.665, but not both.;(AS.110.201 OR AS.110.202 OR AS.110.212 OR EN.553.291 OR EN.553.385) AND (EN.553.310 OR EN.553.311 OR EN.553.420) AND (EN.520.385)

EN.520.470. Infra-Red Sensing & Technologies. 3 Credits.
Infrared technologies have evolved over the last sixty, primarily driven by defense applications and needs but have recently perforated into various non-defense markets. It remains critical to many military systems and increasing to autonomous systems in general. This course is intended as an overview of the various technologies that make up an infrared sensor system, it will include some historical perspectives as well as the state of the art and will emphasize the various tradeoffs involved in designing a system for particular applications. In particular, it will cover the following topics that represent the main components: optics, detectors, readout integrated circuits (ROIC) including digital designs, the various wavelength (SWIR, MWIR, LWIR), testing and calibration, image and signal processing, and applications. The course structure will involve lectures, labs, and final project. Lectures will involve guest speakers that are subject matter experts on the various topics.

EN.520.482. Introduction To Lasers. 3 Credits.
This course covers the basic principles of laser oscillation. Specific topics include propagation of rays and Gaussian beams in lens-like media, optical resonators, spontaneous and stimulated emission, interaction of optical radiation and atomic systems, conditions for laser oscillation, homogeneous and inhomogeneous broadening, gas lasers, solid state lasers, Q-switching and mode locking of lasers.
AS.171.102 OR AS.171.108

EN.520.483. Bio-Photonics Laboratory. 3 Credits.
This laboratory course involves designing a set of basic optical experiments to characterize and understand the optical properties of biological materials. The course is designed to introduce students to the basic optical techniques used in medicine, biology, chemistry and material sciences.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.485. Advanced Semiconductor Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the operating principles and performance characteristics of the modern semiconductor devices used in high speed optical communications, optical storage and information display. The emphasis is on device physics andfabrication technology. The devices include heterojunction bipolar transistors, high mobility FET's, semiconductor lasers, laser amplifiers, light-emitting diodes, detectors, solar cells and others.

EN.520.486. Physics of Semiconductor Electronic Devices. 3 Credits.
The course is designed to develop and enhance the understanding of the physical principles of modern semiconductor electronic and opto-electronic devices. The course starts with the basics of band structure of solid with emphasis on group IV and III-V semiconductors as well as two dimensional semiconductors like graphene. It continues with the statistics of carriers in semiconductors and continues to electronic transport properties, followed by optical properties. The course goes on to investigate the properties of two dimensional electronic gas. The second part of the course describes operational principles of bipolar and unipolar transistors, light emitting diodes, photodetectors, and quantum devices.
Students may earn credit for EN.520.486 or EN.520.686, but not both.;AS.171.102 OR AS.171.108

EN.520.491. CAD Design of Digital VLSI Systems I (Juniors/Seniors). 3 Credits.
Juniors and Seniors Only.
Student may take EN.520.491 or EN.520.691, but not both.;AS.110.109 AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND EN.520.142 AND EN.520.142 AND (EN.520.230 OR (EN.520.213 AND EN.520.345 OR EN.520.216))

EN.520.492. Mixed-Mode VLSI Systems. 3 Credits.
Silicon models of information and signal processing functions, with implementation in mixed analog and digital CMOS integrated circuits. Aspects of structured design, scalability, parallelism, low power consumption, and robustness to process variations. Topics include digital-to-analog and analog-to-digital conversion, delta-sigma modulation, bioinstrumentation, and adaptive neural computation. The course includes a VLSI design project. Recommended Course Background: EN.521.491 or equivalent.

EN.520.495. Microfabrication Laboratory. 4 Credits.
This laboratory course is an introduction to the principles of microfabrication for microelectronics, sensors, MEMS, and other synthetic microsystems that have applications in medicine and biology. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Seniors only or Perm. Req'd. Co-listed as EN.580.495 & EN.530.495
AS.171.102 OR AS.171.108

EN.520.498. Senior Design Project. 3 Credits.
Capstone design project, in which a team of students engineers a system and evaluates its performance in meeting design criteria and specifications. Example application areas are micro-electronic information processing, image processing, speech recognition, control, communications, and biomedical instrumentation. The design needs to demonstrate creative thinking and experimental skills, and needs to draw upon knowledge in basic sciences, mathematics, and engineering sciences. Interdisciplinary participation, such as by biomedical engineering, mechanical engineering, and computer science majors, is strongly encouraged. Instructor permission required.

EN.520.504. ECE Undergraduate Independent Study. 1 - 3 Credits.
Individual study, including participation in research, under the guidance of a faculty member in the department. The program of study or research, time required, and credit assigned must be worked out in advance between the student and the faculty member involved. May be taken either term by juniors or seniors.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.506. ECE Undergraduate Research. 1 - 3 Credits.
Independent research under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.516. ECE Group Undergraduate Research. 1 - 3 Credits.
Independent research under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.520. Artificial Intelligence In Medicine Reading Group. 1 Credit.
Course Description: The course will consist of a reading group exploring novel algorithms and papers on artificial intelligence and machine learning in medical applications. In this course, students will analyze the latest techniques and trends in machine learning (ML) for medical applications. They will also actively discuss basic methodologies traditionally employed. Students are expected to be familiar with linear algebra and machine learning. The primary objective is to give students the tools they need to be able to understand new ideas and trends relating to the use of machine learning in biomedical environments and other fields.
EN.520.412 OR EN.520.612 OR EN.520.439;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.571. Speech Technologies Reading Group. 1 Credit.
Reading group that explores novel algorithms and papers on speech technologies
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.603. Introduction to Optical Instruments. 3 Credits.
This course is intended to serve as an introduction to optics and optical instruments that are used in engineering, physical, and life sciences. The course covers first basics of ray optics with the laws of refraction and reflection and goes on to description of lenses, microscopes, telescopes, and imaging devices. Following that basics of wave optics are covered, including Maxwell equations, diffraction and interference. Operational principles and performance of various spectrometric and interferometric devices are covered including both basics (monochromatic, Fabry-Perot and Michelson interferometers), and advanced techniques of near field imaging, laser spectroscopy, Fourier domain spectroscopy, laser Radars and others.

EN.520.605. Advanced Optical and Optoelectronic Instruments and Devices. 3 Credits.
This course is essentially as continuation of 520.403 course “Introduction to Optical Instruments” and it picks where that course ends. The course starts with deeper exploration of light propagation in dispersive and anisotropic media and goes on to study of polarization optics. Then electro-optic and acousto-optic effects and devices based on them are studied. A short review of nonlinear optics includes frequency conversion, multiphoton absorption, Raman and Brillouin scattering. Then we study light propagation in waveguides, starting with coupled mode theory. Integrated devices include modulators, filters, multiplexers-demultiplexers, and others. The last section of the course includes advanced concepts, such as plasmonics, metasurfaces, and Fourier Optics.

EN.520.607. Introduction to the Physics of Electronic Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the basic physical processes taking place in the electronic and optical devices and to prepare students for taking classes in semiconductor devices and circuits, optics, lasers, and microwaves devices, as well as graduate courses. Both classical and quantum approaches are used. Specific topics include theory of molecular bonding; basics of solid state theory; mechanical, transport, magnetic, and optical properties of the metals; semiconductors; and dielectrics.
Students may earn credit for EN.520.607 or EN520.407 but not both.

EN.520.612. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video. Recommended Course Background: AS.110.201, EN.553.310, and EN.520.435.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;Credit may only be earned for EN.520.412 or EN.520.612.

EN.520.613. Advanced Topics in Optical Medical Imaging. 3 Credits.
The course will review the recent advances in photonics technologies for medical imaging and sensing. The course is designed for graduate students with a back ground in optics and engineering. The main topics for the course are: Light Source and Devices for Biomedical Imaging; Fluorescence, Raman, Rayleigh Scatterings; Optical Endoscopy and Virtual biopsy; Novel imaging contrast dyes, nanoparticles, and optical clearing reagents; Label-free optical technologies in clinical applications; Neurophotonics and Optogenetics.

EN.520.614. Image Processing & Analysis. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course.Recommended Prerequisite: EN.520.214 or EN 580.222 or EN 580.243 or equivalent.

EN.520.615. Image Processing & Analysis II. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course. Grad students only.

EN.520.617. Computation for Engineers. 3 Credits.
Designing algorithms in a finite precision environment that are accurate, fast, and memory efficient is a challenge that many engineers must face. This course will provide students with the tools they need to meet this challenge. Topics include floating point arithmetic, rounding and discretization errors, problem conditioning, algorithm stability, solving systems of linear equations and least-squares problems, exploiting matrix structure, interpolation, finding zeros and minima of functions, computing Fourier transforms, derivatives, and integrals. Matlab is the computing platform.

EN.520.618. Modern Convex Optimization. 3 Credits.
Convex optimization is the most general class of optimization problems that are efficiently solvable. These problems arise in a diverse set of applications in machine learning, signal processing, control, medical imaging, etc. In this course, we will cover the modern aspects of convex optimization beyond Linear Programming, such as conic optimization including quadratic programming and semidefinite programming. We will then discuss a diverse array of numerical optimization methods to solve these optimization problems.

EN.520.621. Introduction To Nonlinear Systems. 3 Credits.
Nonlinear systems analysis techniques: phase-plane, limit cycles, harmonic balance, expansion methods, describing function. Liapunov stability. Popov criterion. Recommended Course Background: EN.520.601 or equivalent.

EN.520.622. Principles of Complex Networked Systems. 3 Credits.
By employing fundamental concepts from diverse areas of research, such as statistics, signal processing, biophysics, biochemistry, cell biology, and epidemiology, this course introduces a multidisciplinary and rigorous approach to the modeling and computational analysis of complex interaction networks. Topics to be covered include: overview of complex nonlinear interaction networks and their applications, graph-theoretic representations of network topology and stoichiometry, stochastic modeling of dynamic processes on complex networks and master equations, Langevin, Poisson, Fokker-Plank, and moment closure approximations, exact and approximate Monte Carlo simulation techniques, time-scale separation approaches, deterministic and stochastic sensitivity analysis techniques, network thermodynamics, and reverse engineering approaches for inferring network models from data.

EN.520.623. Medical Image Analysis. 3 Credits.
Graduate version of 520.433. This course covers the principles and algorithms used in the processing and analysis of medical images. Topics include, interpolation, registration, enhancement, feature extraction, classification, segmentation, quantification, shape analysis, motion estimation, and visualization. Analysis of both anatomical and functional images will be studied and images from the most common medical imaging modalities will be used. Projects and assignments will provide students experience working with actual medical imaging data. EN.520.432 OR EN.580.472 AND EN.550.310 OR EN.550.311;Student may earn credit for 520.433 or 520.623, but not both.

EN.520.624. Integrated Photonics. 3 Credits.
This course gives an introduction to integrated photonics. Topics include: material platforms, fabrication approaches, devices and device operation, numerical modeling, nonlinear processes, and applications. Devices discussed include waveguides, resonators, sensors, modulators, detectors, lasers and amplifiers. Recommended Course Background: EN.520.219-EN.520.220, EN.520.495, or equivalent.

EN.520.627. Photovoltaics and Energy Devices. 3 Credits.
This course provides an introduction to the science of photovoltaics and related energy devices. Topics covered include basic concepts in semiconductor device operation and carrier statistics; recombination mechanisms; p-n junctions; silicon, thin film, and third generation photovoltaic technologies; light trapping; and detailed balance limits of efficiency. Additionally, thermophotovoltaics and electrical energy storage technologies are introduced. A background in semiconductor device physics (EN.520.485, or similar) is recommended.

EN.520.628. Satellite Communication System. 3 Credits.
This course presents the fundamentals of satellite communications link design and an in-depth treatment of practical considerations. Existing commercial, civil, and military systems are described and analyzed.Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design. The impact of new technology on future systems in this dynamic field is discussed.Recommended Course Background: Communication Systems Engineering or equivalent or permission of the instructor.

EN.520.629. Networked Dynamical Systems. 3 Credits.
Networks and dynamics are pervasive in our world today. Power systems, the Internet, social networks, and biological systems are only a few of the numerous scenarios in which objects or individuals can affect -and be affected by- other members of a large group. This course examines modeling, analysis and design of networked dynamical systems -i.e., dynamic entities interconnected by a network- as well as various applications of such systems in science and engineering. Topics covered include (algebraic) graph theory, basic models of networked dynamical systems, continuous-time and discrete-time distributed averaging (consensus), coordination algorithms (rendezvous, formation, flocking, and deployment), and distributed algorithm computation and optimization over networks. Some of the motivating applications that will be analyzed are robotic coordination, coupled oscillators, social networks, web PageRank, sensor networks, power grids, and epidemics.Recommended Course Background: Linear Algebra (AS.110.201), Control Systems (EN.520.353), or equivalents, basic Matlab skills, and sufficient mathematical maturity.

EN.520.631. Ultrasound and Photoacoustic Beamforming. 3 Credits.
This course will discuss basic principles of ultrasound and photoacoustic imaging and provide an in-depth analysis of the beamforming process required to convert received electronic signals into a usable image. We will cover basic beamforming theory and apply it to real data. The course will culminate with student projects to design and implement a new beamformer derived from the principles taught in class. Recent projects have focused on the emerging use of deep learning to form a new class of ultrasound and photoacoustic images. Recommended background for students interested in deep learning projects: machine learning (EN.601.475), deep learning (EN.520.438/638 or EN.601.482/682), or equivalent.

EN.520.632. Medical Imaging Systems. 3 Credits.
This course provides students with an introduction to the physics, instrumentation, and signal processing methods used in general radiography, X-ray computed tomography, ultrasound imaging, magnetic resonance imaging, and nuclear medicine. The primary focus is on the methods required to reconstruct images within each modality from a signals and systems perspective, with emphasis on the resolution, contrast, and signal-to-noise ratio of the resulting images. Students will additionally engage in hands-on activities to reconstruct medical images from raw data.

EN.520.633. Intro To Robust Control. 3 Credits.
The subject of this course is robust analysis and control of multivariable systems. Topics include system analysis (small gain arguments, integral quadratic constraints); parametrization of stabilizing controllers; H_{∞} optimization based robust control design; and LTI model order reduction (balanced truncation, Hankel reduction). Recommended Course Background: EN.520.601 or EN.530.616 or EN.580.616

EN.520.635. Digital Signal Processing. 3 Credits.
Methods for processing discrete-time signals. Topics include signal and system representations, z- transforms, sampling, discrete Fourier transforms, fast Fourier transforms, digital filters.

EN.520.636. Feedback Control in Biological Signaling Pathways. 3 Credits.
This course considers examples of the use of feedback control in engineering systems and looks for counterparts in biological signaling networks. To do this will require some knowledge of mathematical modeling techniques in biology, so a part of the course will be devoted to this.

EN.520.637. Foundations of Reinforcement Learning. 3 Credits.
The course will provide a rigorous treatment of reinforcement learning by building on the mathematical foundations laid by optimal control, dynamic programming, and machine learning. Topics include model-based methods such as deterministic and stochastic dynamic programming, LQR and LQG control, as well as model-free methods that are broadly identified as Reinforcement Learning. In particular, we will cover on and off-policy tabular methods such as Monte Carlo, Temporal Differences, n-step bootstrapping, as well as approximate solution methods, including on- and off-policy approximation, policy gradient methods, including Deep Q-Learning. The course has a final project where students are expected to formulate and solve a problem based on the techniques learned in class.

EN.520.638. Deep Learning. 3 Credits.
Deep Learning is emerging as one of the most successful tools in machine learning for feature learning and classification. This course will introduce students to the basics of Neural Networks and expose them to some cutting-edge research. In particular, this course will provide a survey of various deep learning-based architectures such as autoencoders, recurrent neural networks and convolutional neural networks. We will discuss merits and drawbacks of available approaches and identify promising avenues of research in this rapidly evolving field. Various applications related to computer vision and biometrics will be studied. The course will include a project, which will allow students to explore an area of Deep Learning that interests them in more depth.Recommended Course Background: EN.520.435, EN.601.220, and EN.553.420

EN.520.639. Communication Systems Engineering. 3 Credits.
is course provides an overview of analog communications and presents the theory and applications relevant to modern digital communication systems. The course coversconcepts in random signal analysis, lossless ad lossy source coding, quantization, analog and digital modulation schemes, synchronization, channels characterization andcapacity, optimum receivers, and adaptive equalization. We also discuss modern communication techniques related to adaptive antenna array signal processing and systemsincluding SISO, SIMO, MISO and MIMO.

EN.520.640. Machine Intelligence on Embedded Systems. 3 Credits.
The second wave of AI is about statistical learning of low dimensional structures from high dimensional data. Inference is done using multilayer, data transforming networks using fixed point arithmetic with parameters that have limited precision known as Deep Neural Networks. In this course students will learn about Machine Learning and AI on embedded systems that have limited computational, storage and communication resources. Students are expected to be familiar with linear algebra and Python as well some familiarity with typical ML frameworks (TensorFlow, Keras e.t.c). A first course in ML is strongly advised. At the end of the course, students will apply their newly acquired knowledge to complete a final project with real world data for machine perception and cognition.
EN.520.412 OR EN.520.612 OR EN.601.475 OR EN.601.675 OR EN.601.676 OR EN.601.482 OR EN.601.486 OR EN.520.439 OR EN.520.659 OR EN.520.650

EN.520.641. Neuromorphic Circuits and Systems. 3 Credits.
This course covers the analysis, design and simulation of neuromorphic circuits and systems. It will begin with circuits from the advent of the neuromorphic engineering field, span through current designs and considerations, and culminate with a project that involves designing a novel version of such circuits. A good knowledge of VLSI design is required to complete this course.
EN.520.491 OR EN.520.691 OR EN.520.492 OR EN.520.692.

EN.520.644. FPGA Synthesis Lab. 3 Credits.
An advanced laboratory course in the application of FPGA technology to information processing, using VHDL synthesis methods for hardware development. The student will use commercial CAD software for VHDL simulation and synthesis, and implement their systems in programmable XILINX 20,000 gate FPGA devices. The lab will consist of a series of digital projects demonstrating VHDL design and synthesis methodology, building up to final projects at least the size of an 8-bit RISC computer. Projects will encompass such things as system clocking, flip-flop registers, state-machine control, and arithmetic. The students will learn VHDL methods as they proceed through the lab projects, and prior experience with VHDL is not a prerequisite.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.645. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.

EN.520.646. Wavelets & Filter Banks. 3 Credits.
This course serves as an introduction to wavelets, filter banks, multirate signal processing, and time-frequency analysis. Topics include wavelet signal decompositions, bases and frames, QMF filter banks, design methods, fast implementations, and applications. Recommended Course Background: EN.520.435, AS.110.201, C/C++ and Matlab programming experience.

EN.520.647. Information Theory. 3 Credits.
This course will address some basic scientific questions about systems that store or communicate information. Mathematical models will be developed for (1) the process of error-free data compression leading to the notion of entropy, (2) data (e.g. image) compression with slightly degraded reproduction leading to rate-distortion theory and (3) error-free communication of information over noisy channels leading to the notion of channel capacity. It will be shown how these quantitative measures of information have fundamental connections with statistical physics (thermodynamics), computer science (string complexity), economics (optimal portfolios), probability theory (large deviations), and statistics (Fisher information, hypothesis testing).
Students can earn credit for either 520.447 or 520.647, not both.

EN.520.648. Compressed Sensing and Sparse Recovery. 3 Credits.
Sparsity has become a very important concept in recent years in applied mathematics, especially in mathematical signal and image processing, as in inverse problems. The key idea is that many classes of natural signals can be described by only a small number of significant degrees of freedom. This course offers a complete coverage of the recently emerged field of compressed sensing, which asserts that, if the true signal is sparse to begin with, accurate, robust, and even perfect signal recovery can be achieved from just a few randomized measurements. The focus is on describing the novel ideas that have emerged in sparse recovery with emphasis on theoretical foundations, practical numerical algorithms, and various related signal processing applications. Recommended Course Background: Undergraduate linear algebra and probability.

EN.520.649. Introduction to Radar Systems. 3 Credits.
This course introduces the fundamental concepts of the modern radar system architecture and design. Topics include the major subsystems and functions of a typical radar, the radar range equation and its different forms, radar cross section, signal to noise ratio, and radar modes. We will also discuss antennas, propagation, pulse compression, detection, tracking and many other general radar topics.

EN.520.650. Machine Intelligence. 3 Credits.
This course will cover the full range of topics studied in artificial intelligence, with emphasis on the"core competences" of intelligent systems - search, knowledge representation, reasoning under uncertainty, vulnerability, ethics and safety of intelligent systems. Recent applications in engineering and medicine will be highlighted.

EN.520.651. Foundations of Probabilistic Machine Learning. 4 Credits.
The content for EN.520.651 has been revised with greater emphasis on graphical models, parameter estimation and posterior inference. Topics include probability theory, random variables/vectors, hypothesis testing, parameter estimation, directed and undirected graphical models, the EM algorithm, deterministic and stochastic approximations for EM, Markov chains and random sequences. Additional material may be covered as appropriate. The class is theoretical in nature; new concepts are presented via formula derivations and example problems. Homework assignments may require familiarity with Matlab (or an equivalent computational software).

EN.520.652. Filtering and Smoothing. 3 Credits.
This course is intended to give students an opportunity to do directed research in algorithm development that culminates in a MATLAB program. Students will learn about extracting signals from noise using statistical and non-statistical models. Topics include Kalman filtering, smoothing, interpolation (upsampling), spline fitting, and the numerical linear algebra issues that impact these problems. Emphasis is on fast, compact, stable algorithms. The grade is based on the term project and occasional homework. There are no examinations. Class attendance is mandatory.

EN.520.654. Control Systems Design. 3 Credits.
Classical and modern control systems design methods. Topics include formulation of design specifications, classical design of compensators, state variable and observer based feedback. Computers are used extensively for design, and laboratory experiments are included.

EN.520.656. Data Smoothing Using Machine Learning. 3 Credits.
All measurements contain errors (noise). Before the measurements are used, they should be passed through a noise reduction filter. When the noise level is unknown, the filter can be designed using a machine learning method called cross-validation. This course will investigate algorithmic approaches to data smoothing using cross-validation. Students will complete several Matlab projects.

EN.520.657. Design of Biomedical Instruments and Systems. 3 Credits.
The purpose of this course is to teach the students principles of product design for the biomedical market. From an idea to a product and all the stages in-between.The course material will include identification of the need, market survey, patents. Funding sources and opportunities, Regulatory requirements, Reimbursement codes, Business models). Integration of the system into the clinical field. system connectivity. Medical information systems. Medical standards (DICOM, HL-7, ICD, Medical information bus). How to avoid mistakes in system design and in system marketing. Entrepreneurship.The course participants will be divided to groups of 2-3 students each. Each group will be acting as a start-up company throughout the whole semester. Each group will need to identify a need. This can be done by meeting and interviewing medical personnel, at the Johns Hopkins Medical campus or other hospitals, clinics, HMOs, assisted living communities or other related to the medical world. The proposed medical instrument or system can be a combination of instrument and software.Each week, there will be a lecture devoted to the principal subjects mentioned above. Afterwards the students will present their ideas and progress to all class participants. There will be an open discussion for each of the projects. The feedback from class will help the development of the product. Each presentation, document, survey or paper will be kept in the course cloud which will have a folder for each of the groups. The material gathered in this folder will be built gradually throughout the semester. Eventually it will become the product blueprint.At the last week of the semester, the groups will present their product to a panel of experts involved with the biotech industry, in order to “convince” them to invest in their project.Previous years’ projects are listed in this website: (https://jhuecepdl.bitbucket.io).

EN.520.659. Machine learning for medical applications. 3 Credits.
In this course, students will actively learn the basic principles of artificial intelligence and machine learning techniques applied to medical applications, as well as medical concepts common in healthcare environments. Throughout the course, students will explore different types of bio-signals such as electroencephalograms, electrocardiograms, sound, medical imaging, and their associated processing methodologies. The primary objective is to give students the tools they need to be able to develop new artificial intelligence-related ideas in biomedical environments. At the end of the course, students will apply their newly acquired knowledge to complete a cumulative final project dealing with a real-world situation. Students are expected to be familiar with linear algebra. Python coding skills are recommended, as there will be one coding assignment every week. Recommended Course Background: EN.520.412 OR EN.520.612 OR Other machine learning backgrounds.
EN.520.412 OR EN.520.612

EN.520.662. Leading Innovation Design Team. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu

EN.520.663. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.665. Machine Perception. 3 Credits.
This course will cover topics such as Marr-Hildreth and Canny edge detectors, local representations (SIFT, LBP), Markov random fields and Gibbs representations, normalized cuts, shallow and deep neural networks for image and video analytics, shape from shading, Make 3D, stereo, and structure from motion.

EN.520.666. Information Extraction. 3 Credits.
Introduction to statistical methods of speech recognition (automatic transcription of speech) and understanding. The course is a natural continuation of EN.601.465 but is independent of it. Topics include elementary probability theory, hidden Markov models, and n-gram models using maximum likelihood, Bayesian and discriminative methods, and deep learning techniques for acoustic and language modeling.Recommended Course Background: EN.550.310 AND EN.600.120 or equivalent, expertise in Matlab or Python programming.

EN.520.667. Dynamic Implicit Surfaces. 3 Credits.
Course will cover dynamic implicit surfaces that arise in a number of modeling situations where the boundary is implicit. We will discuss a number of techniques used to generate these models, including level set methods and the phase field approach.

EN.520.678. Biomedical Photonics. 3 Credits.
This course will cover the basic optics principles including geometric, beam and wave description of light. The course will also cover the basic generation and detection techniques of light and the principles of optical imaging and spectroscopy. After the basis is established, we will focus on some commonly employed optical techniques and tools for biomedical research including various optical microscopy technologies, fiber optics, Raman spectroscopy, Fluorescence (lifetime), FRAT, FRET and FCS. The recent development in tissue optics, biomedical optical imaging/ spectroscopy techniques (such as OCT, multiphoton fluorescence and harmonics microscopy, Structured Illumination, light scattering, diffuse light imaging and spectroscopy, optical molecular imaging, photo-acoustic imaging) will also be discussed. Representative biomedical applications of translational biomedical photonics technologies will be integrated into the corresponding chapters.

EN.520.680. Speech and Auditory Processing by Humans and Machines. 3 Credits.
The course relevant to building advanced systems for information extraction from speech and auditory signals. It introduces some relevant historical efforts for information processing of speech and audio signals and basic concepts of human auditory perception and human production and perception of speech. The main goal of the course is in implementation of relevant knowledge of human speech information processing in engineering systems for information extraction from speech signals, emphasizing power of the modern data-guided machine learning techniques. Basic knowledge of signal processing is assumed and the previous completion of the EN.520.445 or EN.520.645 is beneficial.

EN.520.682. Introduction to Lasers. 3 Credits.
This course covers the basic principles of laser oscillation. Specific topics include propagation of rays and Gaussian beams in lens-like media, optical resonators, spontaneous and stimulated emission, interaction of optical radiation and atomic systems, conditions for laser oscillation, homogeneous and inhomogeneous broadening, gas lasers, solid state lasers, Q-switching and mode locking of lasers.Recommended Course Background: EN.520.219 and EN.520.220

EN.520.683. Bio-Photonics Laboratory. 3 Credits.
This laboratory course involves designing a set of basic optical experiments to characterize and understand the optical properties of biological materials. The course is designed to introduce students to the basic optical techniques used in medicine, biology, chemistry and material sciences. Graduate version of EN.520.483
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.685. Advanced Semiconductor Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the operating principles and performance characteristics of the modern semiconductor devices used in high speed optical communications, optical storage and information display. The emphasis is on device physics andfabrication technology. The devices include heterojunction bipolar transistors, high mobility FET's, semiconductor lasers, laser amplifiers, light-emitting diodes, detectors, solar cells and others.
Students can only take EN.520.485 or EN.520.685, not both.

EN.520.686. Physics of Semiconductor Electronic Devices. 3 Credits.
The course is designed to develop and enhance the understanding of the physical principles of modern semiconductor electronic and opto-electronic devices. The course starts with the basics of band structure of solid with emphasis on group IV and III-V semiconductors as well as two dimensional semiconductors like graphene. It continues with the statistics of carriers in semiconductors and continues to electronic transport properties, followed by optical properties. The course goes on to investigate the properties of two dimensional electronic gas. The second part of the course describes operational principles of bipolar and unipolar transistors, light emitting diodes, photodetectors, and quantum devices.
Students may earn credit for EN.520.486 or EN.520.686, but not both.

EN.520.691. CAD Design of Digital VLSI Systems I (Grad). 3 Credits.
Graduate students only.

EN.520.692. Mixed-Mode VLSI Systems. 3 Credits.
Silicon models of information and signal processing functions, with implementation in mixed analog and digital CMOS integrated circuits. Aspects of structured design, scalability, parallelism, low power consumption, and robustness to process variations. Topics include digital-to-analog and analog-to-digital conversion, delta-sigma modulation, bioinstrumentation, and adaptive neural computation. The course includes a VLSI design project. Recommended Course Background: EN.521.491 or equivalent.

EN.520.738. Advanced Electronic Lab Design. 3 Credits.
This course is the graduate expansion of the EN.520.448 Electronic Design Lab, which is an advanced laboratory course in which teams of students design, build, test and document application specific information processing microsystems. Semester long projects range from sensors/actuators, mixed signal electronics, embedded microcomputers, algorithms and robotics systems design. Demonstration and documentation of projects are important aspects of the evaluation process. For this graduate expansion, all projects will be based on recently published research from IEEE Transactions. The students will be required to fully research, analyze, implement and demonstrate their chosen topic. The emphasis will be on VLSI microsystems, although other topics will also be considered. Open to graduate students only.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.744. Advanced Topics in Signal Processing and Applied Machine learning for Next Generation Radar. 3 Credits.

EN.520.762. Emerging Models of Computation. 3 Credits.
Advanced seminar course with topics in emerging models of computation. This year (Spring 2019) the course focuses on neurotrophic machine learning, event-based spike based processing and neural computation . The students will learn and use Brian and PyNN for a project in the class. (Permission of instructor required)

EN.520.773. Advanced Topics In Microsytem Fabrication. 4 Credits.
Graduate-level course on topics that relate to microsystem integration of complex functional units across different physical scales from nano to micro and macro. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Topics will include emerging fabrication technologies, micro-electromechanical systems, nanolithography, nanotechnology, soft lithography, self-assembly, and soft materials. Discussion will also include biological systems as models of microsystem integration and functional complexity. Perm. Required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.774. Advanced Topics in Electrical and Computer Engineering. 3 Credits.
Course content varies by instructor and topic. The major focus of this course is to train graduate students in developing or increasing research ability related to new and advanced concepts in electrical engineering. For example, these concepts may include advanced techniques in signal processing and communications, high performance computing, real-time computing and advanced parallel system architectures.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.800. ECE Graduate Independent Study. 1 - 3 Credits.
Individual, guided study under the direction of a faculty member in the department. May be taken either term by graduate students.

EN.520.802. ECE Dissertation Research. 3 - 20 Credits.

EN.520.803. Graduate Summer Research. 9 Credits.

EN.520.806. ECE Master's Research. 3 - 10 Credits.
Independent research for masters students

EN.520.807. Current Topics in Language and Speech Processing. 1 Credit.
This biweekly seminar will cover a broad range of current research topics in human language technology, including automatic speech recognition, natural language processing and machine translation. The Tuesday seminars will feature distinguished invited speakers, while the Friday seminars will be given by participating students. A minimum of 75% attendance and active participation will be required to earn a passing grade. Grading will be S/U.

EN.520.820. Artificial Intelligence In Medicine Reading Group. 1 Credit.
The course will consist of a reading group exploring novel algorithms and papers on artificial intelligence and machine learning in medical applications. In this course, students will analyze the latest techniques and trends in machine learning (ML) for medical applications. They will also actively discuss basic methodologies traditionally employed. Students are expected to be familiar with linear algebra and machine learning. The primary objective is to give students the tools they need to be able to understand new ideas and trends relating to the use of machine learning in biomedical environments and other fields.
EN.520.612 OR EN.520.659 OR EN.520.439

EN.520.871. Speech Technologies Reading Group. 1 Credit.
Reading Group that explores novel algorithms and papers on speech technologies

EN.520.890. Independent Study-Summer. 1 - 3 Credits.

EN.520.895. Electrical & Computer Engineering Seminar. 1 Credit.
Seminar for Electrical & Computer Engineering; required of all doctoral students who have not passed the qualifying exam. Repeatable course.

Cross Listed Courses

Biomedical Engineering

EN.580.678. Biomedical Photonics I. 4 Credits.
This course will cover the basic optics principles including geometric, beam and wave description of light. The course will also cover the basic generation and detection techniques of light and the principles of optical imaging and spectroscopy. After the basis is established, we will focus on some commonly employed optical techniques and tools for biomedical research including various optical microscopy technologies, fiber optics, Raman spectroscopy, Fluorescence (lifetime), FRAT, FRET and FCS.
The recent development in tissue optics, biomedical optical imaging/ spectroscopy techniques (such as OCT, multiphoton fluorescence and harmonics microscopy, Structured Illumination, light scattering, diffuse light imaging and spectroscopy, optical molecular imaging, photo-acoustic imaging) will also be discussed. Representative biomedical applications of translational biomedical photonics technologies will be integrated into the corresponding chapters.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.788. Biomedical Photonics II. 4 Credits.
This course serves as the continuation of 580.678 (520.678), Biomedical Photonics I. It will cover the advanced topics on biomedical photonics, including, but not limited to, light scattering (Rayleigh and Mie scattering), photon diffusion, polarization (birefringence), fluorescence, lifetime measurements, confocal microscopy, optical coherence tomography, nonlinear microscopy, and super-resolution microscopy. Representative biomedical applications of some of these technologies will be integrated into the relevant chapters. A hand-on lab section (optional) for students to design and build an imaging instrument, space permitting.

Center for Leadership Education

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

Computer Science

EN.601.856. Seminar: Medical Image Analysis. 1 Credit.
This weekly seminar will focus on research issues in medical image analysis, including imagesegmentation, registration, statistical modeling, and applications. It will also include selected topicsrelating to medical image acquisition, especially where they relate to analysis. The purpose of thecourse is to provide the participants with a thorough background in current research in these areas, as well as to promote greater awareness and interaction between multiple research groups withinthe University. The format of the course is informal. Students will read selected papers. All students will be assumed to have read these papers by the time the paper is scheduled for discussion. But individual students will be assigned on a rotating basis to lead the discussion on particular papers or sections of papers. Co-listed with En.520.746.

General Engineering

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

Mechanical Engineering

EN.530.421. Mechatronics. 3 Credits.

Students from various engineering disciplines are divided into groups of two to three students. These groups each develop a microprocessor-controlled electromechanical device, such as a mobile robot. The devices compete against each other in a final design competition. Topics for competition vary from year to year. Class instruction includes fundamentals of mechanism kinematics, creativity in the design process, an overview of motors and sensors, and interfacing and programming microprocessors.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.420 OR EN.520.240 OR EN.520.340 or permission of the instructor.

EN.530.616. Introduction to Linear Systems Theory. 3 Credits.

A beginning graduate course in multi-input multi-output, linear, time-invariant systems. Topics include state-space and input-output representations; solutions and their properties; multivariable poles and zeros; reachability, observability and minimal realizations; stability; system norms and their computation; linearization techniques. Students cannot take EN.530.616 if they have already taken the equivalent courses EN.520.601 OR EN.580.616. No audit option, but contact the instructor if you want to informally sit in on the course. For more information see: 616-introduction-to-linear-systems-theory-fall-2021" target="_blank">https://dscl.lcsr.jhu.edu/530-616-introduction-to-linear-systems-theory-fall-2021
Recommended course background are undergraduate courses in linear algebra, differential equations, and an undergraduate level course in control systems. Students cannot take EN.530.616 if they have already taken EN.520.601 OR EN.580.616.

Robotics

EN.620.745. Seminar in Computational Sensing and Robotics. 1 Credit.

Seminar series in robotics. Topics include: Medical robotics, including computer-integrated surgical systems and image-guided intervention. Sensor based robotics, including computer vision and biomedical image analysis. Algorithmic robotics, robot control and machine learning. Autonomous robotics for monitoring, exploration and manipulation with applications in home, environmental (land, sea, space), and defense areas. Biorobotics and neuromechanics, including devices, algorithms and approaches to robotics inspired by principles in biomechanics and neuroscience. Human-machine systems, including haptic and visual feedback, human perception, cognition and decision making, and human-machine collaborative systems.Cross-listed Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Biomedical Engineering.

For current faculty and contact information go to http://www.ece-jhu.org/index.php/people (http://www.ece-jhu.org/index.php/people/)

Computer Engineering, Bachelor of Science

Overview

The Electrical and Computer Engineering (ECE) Department takes a human-centric approach to research and education, with a focus on applications in speech processing, medical imaging, bio-photonics, computer-integrated surgery, renewable energy, human inspired electronic systems for perception and cognition, and other cutting-edge technologies that address real-world problems. Our courses cover wide-ranging topics in three broad areas: signal, systems, and control; electro-physics; and computational systems.

Mission

The Computer Engineering Program at Johns Hopkins is supported by faculty in the Department of Electrical and Computer Engineering and the Department of Computer Science, who are committed to providing a rigorous educational experience that prepares students for further study and to professionally and ethically practice engineering in a competitive global environment. The mission of the program is to provide students with a broad, integrated education in the fundamentals and advanced topics in computer engineering, basic sciences, mathematics, and humanities in an environment that fosters the development of analytical, computational, and experimental skills, and that involves students in design projects and research experiences; and to provide our computer engineering graduates with the tools, skills and competencies necessary to understand and apply today's technologies and become leaders in developing and deploying tomorrow's technologies.

Educational Objectives

The Program Educational Objectives (PEOs) for computer engineering (CE) at the Johns Hopkins University describe what CE graduates are expected to attain within a few years of graduation. The PEOs are determined in consultation with the Electrical and Computer Engineering External Advisory Committee and approved by the ECE faculty.

The educational objectives of the CE program are:

- Our graduates will become successful practitioners in engineering and other diverse careers.
- Some graduates will pursue advanced degree programs in engineering and other disciplines.

ECE Focus Areas for Undergraduate Studies

ECE Students have a lot of flexibility as it relates to their studies. They have the ability to craft a program that is as broad or as specific as they wish. Students who want to deepen their knowledge can do so in seven different areas of the discipline. They are:

1. Computing Systems
2. Integrated Circuits and Microsystems
3. Machine Learning and Artificial Intelligence
4. Medical Imaging
5. Photonics and Optoelectronics
6. Robotics
7. Signals, Systems, and Communication

Classes that fall under each category can be found at https://engineering.jhu.edu/ece/academics/undergraduate-studies/degree-options/study-focus-areas-for-undergraduates/ .

Program Requirements

The Bachelor of Science degree in Computer Engineering requires a minimum of 126 credits, which must include the following:

- *Forty-two (42) credits in Computer Engineering, which must include a minimum of 15 ECE and 15 CS credits and include the following:*

Code	Title	Credits
Electrical and Computer Engineering Courses [*]		
EN.520.123	Computational Modeling for Electrical and Computer Engineering	3
EN.520.142	Digital Systems Fundamentals	3
EN.520.214	Signals and Systems	4
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
Computer Science Courses [*,7]		
EN.601.220	Intermediate Programming	4
EN.601.226	Data Structures	4
EN.601.229	Computer System Fundamentals [8]	3
or EN.520.225	Advanced Digital Systems	
Select at least 4 more credits from CS if you select EN.520.225. EN.500.113 Gateway Computing: Python & EN.500.132 Bootcamp: Java are highly recommended.		4
12 additional credits are needed from ECE or CS. This can be fulfilled by taking Advanced Labs in ECE or CS.		12
Advanced Laboratory and Design Experience Component [*]		
Select 6 credits of ECE (520) or CS (601) courses from the Advanced Labs checklist [1a]		6
Select 6 credits of ECE, CS, or Other Engineering Advanced Labs from the check list. [1b]		6
"Other" Engineering Courses [*]		
Select six (6) credits of engineering courses (with an E designation) from KSAS or School of Engineering departments other than Computer Science, ECE, Applied Mathematics and Statistics, or General Engineering [2]		6
Mathematics Courses [*,3]		
Must include the following:		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
AS.110.201	Linear Algebra	4
or EN.553.291	Linear Algebra and Differential Equations	
EN.553.171	Discrete Mathematics	4
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	4
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.420	Introduction to Probability	
Q Elective from Mathematics or Applied Math & Statistics		4
Basic Sciences [*,4]		
Courses coded NS are not allowed. Must include the following:		
AS.171.101	General Physics: Physical Science Major I	4
AS.171.102	General Physics: Physical Science Major II	4
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
AS.030.101	Introductory Chemistry I	3
N Elective: Any course coded N or EN or QN		3
Humanities and Social Sciences [5]		
Select at least five (5), three-credit courses in humanities (H) and social sciences (S) and the following courses:		15
EN.660.400	Practical Ethics for Future Leaders	2
EN.520.404	Engineering solutions in a global, economic, environmental, and societal context	1
Writing Intensive Courses [*]		
Two (2) writing intensive courses are required (at least 3 credits each). [6]		6
Electives		**3**
Total Credits		**127**

* Must be taken for a letter grade.

1a. Course Options
EN. 520.412, 520.424,520.433, 520.440, 520.448, 520.450, 520.452, 520.453, 52
and 601.496.

1b. Courses include all courses from 1a
and EN. 510.433, 510.434, 530.420, 530.421, 530.474, 530.495, 540.400, 540.4
and 580.493

2 Students can fulfill this requirement by taking 6 credits of approved non-CS/ECE advanced design labs. If this requirement is fulfilled using advanced labs, student should take 6 credits of electives. Courses in this group may not be taken Satisfactory/Unsatisfactory. **Note**: Entrepreneurship and Management courses in the Center for Leadership Education CANNOT be counted as "other engineering courses".

3 Specific courses listed are the only courses accepted. (Calculus I may be waived through an examination taken during freshman orientation. If not waived, it must be taken as a prerequisite to Calculus II.) Courses in this category may not be taken Satisfactory/Unsatisfactory.

4 Courses in this category may not be taken Satisfactory/Unsatisfactory.

5 ECE students beginning prior to Fall 2018 will be permitted to fulfill this requirement by six (6), three credit courses, or by the guidelines provided above. The humanities and social sciences courses are one of the strengths of the academic programs at Johns Hopkins. They represent opportunities for students to appreciate some of the global and societal impacts of engineering, to understand contemporary issues, and to exchange ideas with scholars in other fields. Some of the courses will help students to communicate more effectively, to understand economic issues, or to analyze problems in an increasingly international world. The selection of courses should not consist solely of introductory courses, but should have both depth and breadth. Typically, this means that students should take at least three (3) courses in a specific area or theme, with at least one of them at an advanced level (300 level or higher).

6 These courses may not be taken Satisfactory/Unsatisfactory and require a grade of C- or better. Students may wish to consider a course in Technical Communications to fulfill one of the writing intensive requirements.

7 If you take EN.500.113 Gateway Computing: Python it will count as a CS credit even though it has a general engineering number (EN.500.XXX). Please register for the ECE section of Gateway Computing. EN.500.132 Bootcamp: Java will also count towards CS requirements, not General Engineering.

8 NOTE: Students can take either EN.601.229 Computer System Fundamentals or EN.520.225 Advanced Digital Systems to fulfill this requirement, but shouldn't take both courses.

Please note that all EAC ABET accredited programs require 45 credits of engineering coursework. The credit requirement for this program is met by combining major course work (42 credits) along with "other engineering" course work (3 credits of the additional 6 credits required by ECE). Additional details concerning advising and degree requirements are in the Computer Engineering Advising Manual (https://engineering.jhu.edu/ece/undergraduate-studies/academic-advising/). The B.S. in Computer Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, **http://www.abet.org**.

The sample program shown is very general. Other sample programs focusing on Microsystems, Computer Integrated Surgery, Software, or Robotics can be found in the advising manual.

Course	Title	Credits
First Year		
First Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering) [1]	4
AS.171.101 or AS.171.107	General Physics: Physical Science Major I [2a] or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
EN.500.113	Gateway Computing: Python (CS Elective #1)	3
EN.520.137	Introduction To Electrical & Computer Engineering	3
Optional HEART course [5]		0-1
	Credits	**15-16**
Second Semester		
AS.171.102 or AS.171.108	General Physics: Physical Science Major II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
EN.500.132	Bootcamp: Java	1
EN.520.123	Computational Modeling for Electrical and Computer Engineering	3
EN.520.142	Digital Systems Fundamentals	3
EN.601.220	Intermediate Programming	4
	Credits	**16**
Second Year		
First Semester		
AS.110.201	Linear Algebra	4
AS.030.101	Introductory Chemistry I	3
EN.520.231	Mastering Electronics Laboratory	2
EN.520.230	Mastering Electronics	3
EN.601.229 or EN.520.225	Computer System Fundamentals [3] or Advanced Digital Systems	3
H&S 1		3
	Credits	**18**
Second Semester		
AS.110.202 or AS.110.211	Calculus III or Honors Multivariable Calculus	4
EN.520.214	Signals and Systems [2b]	4
EN.520.216	Introduction To VLSI	3
EN.601.226	Data Structures	4
H&S 2		3
	Credits	**18**
Third Year		
First Semester		
EN.553.171	Discrete Mathematics	4
EN.520.340	Introduction to Mechatronics: Sensing, Processing, Learning and Actuation	3
EN.520.349	Microprocessor Lab I	3
EN.520.404	Engineering solutions in a global, economic, environmental, and societal context	1
EN.660.400	Practical Ethics for Future Leaders	2
ECE Elective		3
	Credits	**16**
Second Semester		
Select one of the following:		4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
EN.553.420	Introduction to Probability	
ECE Elective		2
CS Elective 2		3
Basic Science Elective (N)		3
H&S 4		3
	Credits	**15**
Fourth Year		
First Semester		
Advanced ECE Lab 1		3
Advanced ECE Lab 2		3
"Other Engineering" Elective 1		3
Math Elective		4
H&S 5		3
	Credits	**16**
Second Semester		
Advanced Lab 3 [4]		3
Advanced Lab 4 [4]		3
"Other Engineering" Elective 2		3
H&S 6		3
	Credits	**12**
	Total Credits	**126-127**

1 Most students will take one of the required math courses each semester for the first two to three years. Students can adjust if they have transferred in or earned credit for math courses through AP exams.

2a Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.

2b Please note Calculus III is a prerequisite of EN.520.214: Signals & Systems (second year spring) but it can also be taken as a co-requisite, in the same semester. Please plan schedules with this in mind.

3 If you take EN.520.225 Advanced Digital Systems, be sure to take enough CS electives to reach a minimum of 15 CS credits.

4 ECE/CS or non-ECE/CS Engineering Adv. Lab from checklist can be used here. If a non-ECE/CS Advanced Lab is completed, this also

fulfills the "Other Engineering" requirement. Students can replace the "Other Engineering" Elective with any other class.

5 If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown below, you may consider enrolling in an optional HEART or First-Year Seminar (FYS) course during the fall semester. FYS courses carry course numbers EN.501.XXX.

Learning Outcomes

Students graduating with a B.S. in computer engineering will have demonstrated:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Each student and faculty advisor must consider these objectives in planning a set of courses and projects that will satisfy degree requirements. The sample programs and the program checklist included in this advising manual illustrate course selections that will help students meet the program objectives.

Faculty and others will assess student performance to ensure that our educational objectives are met. Students will have opportunities to assess their own educational progress and achievements in several ways, including exit interviews and alumni surveys. Through regular review processes, including Academic Council departmental reviews, visits by the departmental external advisory board, course evaluations, and ABET visits; students will have opportunities to discuss their educational experiences and expectations. The outcomes of these assessment processes will be used by the faculty to improve the content and delivery of the educational program.

The success of each student's program will depend on effective faculty advising. Every undergraduate student in the Computer Engineering Program must follow a program approved by a faculty advisor.

Electrical and Computer Engineering, Master of Science in Engineering

The department offers a comprehensive and flexible Master of Science in Engineering (M.S.E.) degree program that includes courses from several areas of Electrical and Computer Engineering. In addition, the following specialized M.S.E. focus areas are offered:

1. *Artificial Intelligence and Data Science*
2. *Computational and Biomorphic Systems*
3. *Computational Systems Biology and Bioinformatics*
4. *Computer & Neuromorphic Engineering*
5. *Control Systems*
6. *Language and Speech Processing*
7. *Image Processing and Analysis*
8. *Integrated Circuits and Microsystems*
9. *Photonics and Optoelectronics*
10. *Signal Processing & Machine Learning*

In addition, the department offers an official Concentration in Human Language Technology (https://www.clsp.jhu.edu/human-language-technology-masters/).

More information on these research areas and our current projects can be found at https://engineering.jhu.edu/ece/research/research-areas/ .

Program Requirements

A student who has completed a program of study similar to that required for the B.S. in electrical engineering degree must complete the following requirements for the M.S.E. degree:

- Five courses must come from the full-time ECE department (520.XXX), and be 600 level or above. These courses may not include primarily research/independent study courses (e.g.520.700, 520.800, 520.801, etc.), or seminar courses.
- Three additional courses must be level 600 (WSE) / 400 (KSAS) or above. One course may be a primarily research/independent study course (e.g. 520.800, 520.801, 520.806 etc.)
- One of the following three options must be selected:
  - Complete two additional one-semester graduate (400-799) courses approved by the advisor (one of which must come from the full-time ECE Department (520.XXX);
  - Write an M.S.E. thesis acceptable to a member of our faculty,
  - Complete a special project acceptable to a member of our faculty and writing the corresponding report.
- Successful completion twice of the ECE seminar course (520.895).
- A course (including independent study) is satisfactorily completed if a grade of A, B, C, or P is obtained. No more than one C grade can be counted toward the requirements and a D or F or second C grade results in probation. A second D or F or a third C grade results in termination from our program.
- Students may transfer in up to two courses from outside JHU. These courses must have been completed after the undergraduate degree was conferred, not applied to a degree elsewhere, and must be approved in advance by the department.
- Every graduate course designated Independent Study, Dissertation Research, or Special Studies counted toward the M.S.E. degree must include a written report. A copy of the report will become part of the student's permanent file.
- Every student must register for a minimum of two semesters as a full-time resident graduate student (this rule does not apply to students in the concurrent B.S./M.S.E. program). Full-time resident M.S.E. students must be enrolled in at least 9 credits to maintain fulltime status (in fall/spring semesters).

- Every student must be registered in the semester that degree requirements are met; this includes students who have no courses remaining in which to enroll but must resolve coursework for which an "Incomplete" grade was assigned and those who must complete other academic requirements, such as a language or computing requirement (these students may apply for Nonresident Status).
- Every student must earn the M.S.E. degree within five consecutive academic years (ten semesters). Only semesters during which a student has a university-approved leave of absence are exempt from the ten semester limit; otherwise, all semesters from the beginning of the student's graduate studies – whether the student is resident or not – count toward the ten semester limit.
- Every student must complete training on academic ethics.
- Every student must complete Responsible Conduct of Research. (Please see the WSE Policy on the Responsible Conduct of Research).

Electrical and Computer Engineering, PhD

The Ph.D. in Electrical and Computer Engineering is oriented with an emphasis on scholarship and research rather than formal coursework. Our Ph.D. program is designed to be easily tailored to the needs and interests of individual students. There are no lists of required courses. The program is directed at independent, highly motivated individuals who desire to work closely with faculty members at the forefront of research in a variety of scientific areas, such as:

- Computational and Biomorphic Systems
- Computational Systems Biology and Bioinformatics
- Computer & Neuromorphic Engineering
- Control Systems
- Image Processing and Analysis
- Integrated Circuits and Microsystems
- Language and Speech Processing
- Photonics and Optoelectronics
- Signal Processing & Machine Learning
- Artificial Intelligence and Data Science

The Ph.D. requirements apply to all part-time and full-time students in the program. Time limits, however, are stated in the context of full-time graduate study. Time limits for part-time programs must be individually arranged with the student's advisor and the Associate Chair of Graduate Studies. The Ph.D. degree certifies that the holder has demonstrated research capability. Accordingly, the Ph.D. requirements are used as checkpoints leading the student through this research experience. Because students tend to spend more than ample time on the path to research, several requirements prescribe time limitations. The requirements stated on the requirements tab include university-wide requirements for the Ph.D.

Financial Aid

Once accepted into our program, all Ph.D. candidates are fully funded for the duration of their program while they are in a full time, resident status, through a fellowship or research assistantship which covers full tuition, health insurance, and a stipend of approximately $35,600 annually. As part of their program, students conduct research in their research advisor's lab and sometimes serve as a course assistant for undergraduate or graduate classes.

Ph.D. Program Requirements

University requirements for the Ph.D. degree are listed under Academic Information for Graduate Students (p. 1116). In addition, the department requires satisfactory completion of the Ph.D. departmental qualifying examination and the university Graduate Board oral examination, preparation of a preliminary research proposal, a departmental seminar presentation, and an oral dissertation defense.

The departmental qualifying examination is offered twice yearly. The student must select and complete the examinations posed by three examiners eligible to supervise doctoral dissertations in the Department of Electrical and Computer Engineering, of which at least two must be tenure-track ECE faculty. Each faculty member prepares a set of questions, and the student must select and complete the sets. The respective examiners grade completed examinations, but it is the ECE Department faculty that makes a collective decision on whether the student has adequately fulfilled the Departmental Qualifying Examination requirement. This decision involves the student's cumulative academic performance in the graduate program, as well as performance on the examination. This examination must be passed <u>before the beginning of the fourth semester</u> of full-time graduate study. The departmental qualifying examination cannot be taken more than twice. Failure to pass the exam after two attempts will result in the student being dismissed from the PhD program. If the student passes the examination, the student can select one of those faculty members to oversee the student's research. This selection must be made by the end of the semester in which the exam has been passed. This research advisor then guides the student for the remainder of the student's program leading to the Ph.D. degree. These may include a teaching requirement, particular coursework, a reading program, or a preliminary research project.

The university Graduate Board oral examination is administered by a panel consisting of the research advisor, another faculty member in Electrical and Computer Engineering department, and three faculty members from other departments. Even if the research advisor's primary appointment is outside of ECE, they will still be considered as ECE faculty for this purpose. This examination must be taken before the end of the sixth semester.

In the course of research leading to the Ph.D., the student must submit a preliminary research proposal to the department, and present a departmental seminar. Ph.D. candidates must submit their preliminary research proposal no later than the first week of the seventh semester. The proposal must include a cover page, project summary, project description, and is limited to 15 pages, including references, figures, and tables. This should be scheduled with the academic administrator and on a date chosen that is mutually agreeable to the student and the dissertation committee. It is expected that all committee members will be present during that presentation.

Finally, a public dissertation defense will be conducted before a panel of readers consisting of at least two Electrical and Computer Engineering faculty members. The Dissertation Committee votes on the acceptance of the dissertation. and if it is accepted, then the dissertation is submitted electronically to the library.   Further details concerning Ph.D. requirements are published in a manual for graduate students in Electrical and Computer Engineering.

Electrical Engineering, Bachelor of Arts

Program Requirements

As of Spring 2022 this program no longer accepting new students. Please see other programs from the Electrical & Computer Engineering Department (p. 1295)

To meet the requirements for the B.A. degree, the program must include:

Code	Title	Credits
Humanities and Social Sciences Courses		18
Writing intensive Courses		12
Mathematics or Mathematical Statistics Courses [1]		20
EN.601.220	Intermediate Programming [2]	3-4
or EN.500.113	Gateway Computing: Python	
ECE Courses [3]		30
Additional Credits		37
Total Credits		**120-121**

1. Typically these include AS.110.108 Calculus I (Physical Sciences & Engineering), AS.110.109 Calculus II (For Physical Sciences and Engineering), and AS.110.202 Calculus III or equivalent, and AS.110.201 Linear Algebra. Elementary or pre-calculus courses such as AS.110.105 Precalculus or EN.553.111 Statistical Analysis I-EN.553.112 Statistical Analysis II are not acceptable.
2. If students take EN.500.113 Gateway Computing: Python it will count as a CS credit even though it has a general engineering number (EN.500.XXX). Students should be sure to register for the ECE section of Gateway Computing and take the course for a grade. Bootcamp: Java is also highly recommended if additional CS courses are taken. Bootcamp will count towards major requirements even if it is taken as S/U.
3. Three credits of computer science courses may be counted toward this 30-credit requirement.

Additional information on academic policies and degree requirements can be found in the Undergraduate Academic Policies section of this catalogue.

The student should be aware that the B.A. degree program *is not accredited by the Accreditation Board for Engineering and Technology (ABET).*

Electrical Engineering, Bachelor of Science

Overview

The Electrical and Computer Engineering (ECE) Department takes a human-centric approach to research and education, with a focus on applications in speech processing, medical imaging, bio-photonics, computer-integrated surgery, renewable energy, human inspired electronic systems for perception and cognition, and other cutting-edge technologies that address real-world problems. Our courses cover wide-ranging topics in three broad areas: signal, systems, and control; electro-physics; and computational systems.

Mission

The Electrical Engineering Program at Johns Hopkins is supported by faculty in the Department of Electrical and Computer Engineering who are committed to providing a rigorous educational experience that prepares students for further study and to professionally and ethically practice engineering in a competitive global environment. Electrical Engineering is concerned with a wide variety of topics in signals, systems and communications, photonics and optoelectronics, and computer engineering. The mission of the program is to provide students with a broad, integrated education in the fundamentals and advanced topics in computer engineering, basic sciences, mathematics, and humanities in an environment that fosters the development of analytical, computational, and experimental skills, and that involves students in design projects and research experiences; and to provide our electrical engineering graduates with the tools, skills and competencies necessary to understand and apply today’s technologies and become leaders in developing and deploying tomorrow’s technologies.

Educational Objectives

The Program Educational Objectives (PEOs) for computer engineering (CE) at the Johns Hopkins University describe what CE graduates are expected to attain within a few years of graduation. The PEOs are determined in consultation with the Electrical and Computer Engineering External Advisory Committee and approved by the ECE faculty.

The educational objectives of the CE program are:

- Our graduates will become successful practitioners in engineering and other diverse careers.
- Some graduates will pursue advanced degree programs in engineering and other disciplines.

ECE Focus Areas for Undergraduate Studies

ECE Students have a lot of flexibility as it relates to their studies. They have the ability to craft a program that is as broad or as specific as they wish. Students who want to deepen their knowledge can do so in seven different areas of the discipline. They are:

1. Computing Systems
2. Integrated Circuits and Microsystems
3. Machine Learning and Artificial Intelligence
4. Medical Imaging
5. Photonics and Optoelectronics
6. Robotics
7. Signals, Systems, and Communication

Classes that fall under each category can be found at https://engineering.jhu.edu/ece/academics/undergraduate-studies/degree-options/study-focus-areas-for-undergraduates/ .

Program Requirements

The Bachelor of Science degree in electrical engineering requires a minimum of one hundred and twenty-six (126) credits that must include:

Forty-five (45) credits of ECE courses including the following:

Code	Title	Credits
EN.520.123	Computational Modeling for Electrical and Computer Engineering	3
EN.520.142	Digital Systems Fundamentals	3
EN.520.214	Signals and Systems	4
EN.520.219	Introduction to Electromagnetics	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
Additional Required ECE Electives [1]		**15**
Advanced Laboratory Courses in ECE [2]		**6**
Additional Advanced Lab Credits from Approved List [3]		**6**
Total Credits		**45**

1 Up to six (6) credits of computer science courses may be used to satisfy this requirement. A cumulative GPA of at least 2.0 must be maintained in ECE courses. Courses in this group may not be taken as Satisfactory/Unsatisfactory.

2 You must complete six (6) ECE credits of advanced laboratory, design intensive, or senior design project courses from those listed on the degree planning checklist. However, if you use any courses from CS towards your ECE degree requirements (footnote 1) that are also considered advanced labs, they will count towards that 6 credits of ECE advanced labs. If you do not want to use those credits towards the advanced lab requirement, please notify the academic program coordinator in the department.

3 Students must take a total of 12 credits of advanced laboratory, design intensive, or senior design project courses. A minimum of six (6) credits must come from ECE. The remaining 6 credits of advanced lab can come from any department, as long as the class is listed as an option in this section of the degree audit and degree checksheet.

Six (6) credits of "other engineering" courses (with an E designation) from KSAS or School of Engineering departments other than ECE or Applied Mathematics and Statistics or General Engineering (**Note:** Entrepreneurship and Management courses in the Center for Leadership Education CANNOT be counted as "other engineering courses"). Students must complete enough of the approved non-ECE advanced design labs so that they have at least twelve (12) credits of combined ECE and non-ECE advanced laboratory, design intensive, or senior design project courses. Courses in this group may not be taken Satisfactory/Unsatisfactory.

Code	Title	Credits
Mathematics Department or the Applied Mathematics and Statistics Department [1]		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
AS.110.302	Differential Equations and Applications	4
EN.553.310 & EN.553.311	Probability & Statistics for the Physical Sciences & Engineering and Probability and Statistics for the Biological Sciences and Engineering	4
or EN.553.420	Introduction to Probability	
Total Credits		**20**

1 Courses in this group may not be taken Satisfactory/Unsatisfactory. Elementary or precalculus courses such as AS.110.105 Precalculus or EN.553.111 Statistical Analysis I - are not acceptable.

Code	Title	Credits
Basic Sciences		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
AS.030.101	Introductory Chemistry I	3
Additional N credits		3
Total Credits		**16**

- *Sixteen (16) credits of basic sciences* (physics, chemistry, biology, earth and planetary sciences), which must include AS.171.101 General Physics: Physical Science Major I-AS.171.102 General Physics: Physical Science Major II, AS.173.111 General Physics Laboratory I-AS.173.112 General Physics Laboratory II. Courses in this category may not be taken Satisfactory/Unsatisfactory.
- *At least five (5), three-credit courses in humanities and social sciences, plus* two *(2) additional credits in* EN.660.400 Practical Ethics for Future Leaders *and one (1) credit EN.520.404 Engineering solutions in a global, economic, environmental, and societal context.* ECE students beginning prior to Fall 2018 will be permitted to fulfill this requirement by six (6), three credit courses, or by the guidelines provided above. The humanities and social sciences courses are one of the strengths of the academic programs at Johns Hopkins. They represent opportunities for students to appreciate some of the global and societal impacts of engineering, to understand contemporary issues, and to exchange ideas with scholars in other fields. Some of the courses will help students to communicate more effectively, to understand economic issues, or to analyze problems in an increasingly international world. The selection of courses should not consist solely of introductory courses but should have both depth and breadth. This means that students should take at least three (3) courses in a specific area or theme, with at least one of them at an advanced level (300 level or higher).
- *A programming language requirement* must be met by taking EN.601.220 Intermediate Programming. This class can be used towards the "other engineering" category or can be used as one of the classes that count towards the 45 ECE credit requirement. If a student is required to take Gateway Computing prior to taking Intermediate Programming, they must take EN.500.113 Gateway Computing: Python. This class can also be used towards the "other engineering" category or can be used as one of the classes that count towards the 45 ECE credit requirement. Students are strongly encouraged to take EN.500.132 Bootcamp: Java as well. This course can be used towards major requirements, even though it is listed under S/U grading.
- *Two (2) writing-intensive courses (at least 3 credits each) are required.* The writing-intensive courses may not be taken Satisfactory/Unsatisfactory and require a C- or better grade. Students may wish to consider a course in Technical Communications to fulfill one of the writing-intensive requirements. The course EN.661.315 Culture of

the Engineering Profession, is recommended by the ECE Faculty as a writing-intensive course.

Additional details concerning advising and degree requirements are in the Electrical Engineering Advising Manual (https://engineering.jhu.edu/ece/undergraduate-studies/academic-advising/). The B.S. in Electrical Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, **http://www.abet.org**.

The sample program below is very general. Sample programs with an emphasis on computing systems, integrated circuits and microsystems, machine learning & artificial intelligence, medical imaging, photonics and optoelectronics, robotics, and signals & systems can be found in the undergraduate advising manual and at https://engineering.jhu.edu/ece/academics/undergraduate-studies/degree-options/study-focus-areas-for-undergraduates/.

Course	Title	Credits
First Year		
First Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering) [1]	4
AS.171.101 or AS.171.107	General Physics: Physical Science Major I [2a] or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
EN.520.137	Introduction To Electrical & Computer Engineering	3
EN.500.113	Gateway Computing: Python	3
Optional HEART course [5]		0-1
	Credits	**15-16**
Second Semester		
AS.171.102 or AS.171.108	General Physics: Physical Science Major II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
EN.500.132	Bootcamp: Java	1
EN.520.123	Computational Modeling for Electrical and Computer Engineering	3
EN.520.142	Digital Systems Fundamentals	3
EN.601.220	Intermediate Programming	4
	Credits	**16**
Second Year		
First Semester		
AS.110.202 or AS.110.211	Calculus III or Honors Multivariable Calculus	4
AS.030.101	Introductory Chemistry I	3
EN.520.219	Introduction to Electromagnetics [2b]	3
EN.520.230	Mastering Electronics	3
EN.520.231	Mastering Electronics Laboratory	2
H&S 1		3
	Credits	**18**
Second Semester		
AS.110.201	Linear Algebra	4
AS.110.302	Differential Equations and Applications	4
EN.520.214	Signals and Systems [2b]	4
EN.520.216	Introduction To VLSI	3
EN.520.251	ECE Ideation and Design Lab	1
	Credits	**16**
Third Year		
First Semester		
EN.553.310 or EN.553.420	Probability & Statistics for the Physical Sciences & Engineering [3] or Introduction to Probability	4
EN.520.344	Introduction to Digital Signal Processing	3
EN.520.404	Engineering solutions in a global, economic, environmental, and societal context	1
EN.660.400	Practical Ethics for Future Leaders	2
ECE Elective 2		3
ECE Elective 3		3
	Credits	**16**
Second Semester		
EN.520.353	Control Systems	4
ECE Elective 4		3
Basic Science Elective (N)		3
H&S 3		3
H&S 4		3
	Credits	**16**
Fourth Year		
First Semester		
Advanced ECE Lab 1		3
Advanced ECE Lab 2		3
ECE Elective 5		3
Non-ECE Engineering Elective 1		3
H&S 5		3
	Credits	**15**
Second Semester		
Advanced Lab 3 [4]		3
Advanced Lab 4 [4]		3
ECE Elective 6		2
Non-ECE Engineering Elective 2		3
H&S 6		3
	Credits	**14**
	Total Credits	**126-127**

1 Most students will take one of the required math courses each semester for the first two to three years. Students can adjust if they have transferred in or earned credit for math courses through AP exams.

2a Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.

2b EN.520.219: Introduction to Electromagnetics (second year fall) and EN.520.214: Signals & Systems (second year spring) require Calculus III as a prerequisite or it can be taken as a co-requisite, in the same semester. Please plan schedules with this in mind.

3 EN.553.311 Probability and Statistics for the Biological Sciences and Engineering also fulfills req.

4 Can be fulfilled by ECE advanced lab or other engineering advanced lab from the approved checklist.

5 If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown below, you may consider enrolling

in an optional HEART or First-Year Seminar (FYS) course during the fall semester. FYS courses carry course numbers EN.501.XXX.

Learning Outcomes

Students graduating with a B.S. in electrical engineering will have demonstrated:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Each student and faculty advisor must consider these objectives in planning a set of courses and projects that will satisfy degree requirements. The sample programs and the program checklist included in this advising manual illustrate course selections that will help students meet the program objectives.

Faculty and others will assess student performance to ensure that our educational objectives are met. Students will have opportunities to assess their own educational progress and achievements in several ways, including exit interviews and alumni surveys. Through regular review processes, including Academic Council departmental reviews, visits by the departmental external advisory board, course evaluations, and ABET visits; students will have opportunities to discuss their educational experiences and expectations. The outcomes of these assessment processes will be used by the faculty to improve the content and delivery of the educational program.

The success of each student's program will depend on effective faculty advising. Every undergraduate student in the Electrical Engineering Program must follow a program approved by a faculty advisor.

Energy, Minor

Energy Minor

Energy touches all aspects of the human experience and is central to nearly every global challenge the world faces today, from raising the standards of living around the world to the existential threat of climate change. The scientific basis of energy is inherently multidisciplinary, and social and behavioral sciences are also crucial to understanding the economics and policy driving technology adoption. The Energy minor program addresses the growing need for trained engineers and scientists in the many sectors that develop, manage, and propagate these technologies.

The Energy minor is jointly administered by the Department of Earth and Planetary Sciences in the Krieger School of Arts and Sciences and the Department of Electrical and Computer Engineering in the Whiting School of Engineering and is affiliated with the Ralph O'Connor Sustainable Energy Institute (ROSEI, https://energyinstitute.jhu.edu/) which provides additional support and co-curricular opportunities to students in the program. If you have questions regarding the minor, please direct them to Professor Susanna Thon at susanna.thon@jhu.edu.

Energy Minor Requirements

The Energy minor is designed to allow students majoring in a diverse set of disciplines to develop additional expertise in energy and to position them to become leaders in the energy field, either directly as entering professionals in industry, government laboratories, and other organizations, or as students in the best graduate programs. It consists of 26-29 credits of energy-related courses in four areas: (a) pre-requisite courses, (b) fundamentals, (c) science and policy context, and (d) technical energy electives. There are two options for completing the fundamentals. Option I is recommended for students completing a major that does not require a thermodynamics course. Option II is recommended for students completing a major that requires a thermodynamics course. Students are encouraged to select electives to fit their particular interests and career goals.

Elective courses that can count toward the minor are those focused on science and policy issues related to energy and relevant technical skills and knowledge areas. The joint KSAS and WSE Directors of Undergraduate Studies (DUS) distribute a list of approved courses for the minor each semester, and these courses are denoted with the POS tags ENGY-SCIPOL and ENGY-TECH in the Schedule of Classes. Approval for other appropriate courses can be sought by emailing one of the DUS's. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the minor. Consult the Energy minor's website for additional information: https://energyinstitute.jhu.edu/energy-minor/ (https://energyinstitute.jhu.edu/?page_id=5385&preview=true).

Minor Requirements

Code	Title	Credits
Pre-Requisites		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
Fundamentals: Option I *		
EN.520.370	Introduction to Renewable Energy Engineering	3
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or EN.560.112	Electromagnetism & Sensors Lab	

Fundamentals: Option II *

EN.520.370	Introduction to Renewable Energy Engineering	3
AS.030.301	Physical Chemistry I	2-4
or AS.171.312	Statistical Physics/Thermodynamics	
or AS.250.372	Biophysical Chemistry	
or EN.510.312	Thermodynamics/Materials	
or EN.530.231	Mechanical Engineering Thermodynamics	
or EN.540.203	Engineering Thermodynamics	
or EN.580.241	Statistical Physics	
Science and Policy Context Electives		
Complete a minimum of 6 credits of approved electives with the ENGY-SCIPOL POS-Tag		6
Technical Energy Electives		
Complete a minimum of 6 credits of approved electives with the ENGY-TECH POS-Tag		6
Total Credits		**27-29**

* Students complete either (1) Fundamentals: Option I or (2) Fundamentals: Option II.

Sample Programs of Study

Students majoring in a natural science discipline who do Option I of the fundamentals may follow a curriculum similar to the following:

Course	Title	Credits
First Year		
Fall		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Spring		
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
	Credits	**5**
Second Year		
Fall		
EN.520.370	Introduction to Renewable Energy Engineering	3
	Credits	**3**
Third Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Fourth Year		
Fall		
Technical elective (ENGY-TECH)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
	Total Credits	**29**

Students majoring in an engineering field who do Option II of the fundamentals may follow a curriculum similar to the following:

Course	Title	Credits
First Year		
Fall		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Second Year		
Fall		
EN.520.370	Introduction to Renewable Energy Engineering	3
	Credits	**3**
Spring		
EN.510.312	Thermodynamics/Materials	3
	Credits	**3**
Third Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
Fourth Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
	Total Credits	**27**

Environmental Health and Engineering

https://ehe.jhu.edu/

Housed in both the Whiting School of Engineering and Bloomberg School of Public Health, the Department of Environmental Health and Engineering is the only program of its kind, bringing environmental engineering and public health faculty into a single, collaborative department. The overarching goal of the program is to prepare students to tackle the environmental challenges of the 21st century by both identifying existing and emerging environmental issues and developing innovative policy and technical solutions to address these threats to our environment and mankind.

EHE offers three programs of study, within the Whiting School of Engineering, to prepare students for a future in interdisciplinary scientific collaboration:

- an undergraduate program (Bachelor of Science in Engineering),
- a Master's program with varied tracks, concentrations, and research opportunities, and
- a doctoral degree program.

Drawing from a number of cross-divisional disciplines and approaches, EHE is concerned with identifying, exploring, and ultimately solving environmental problems including (but certainly not limited to):

- air pollution assessment, management and health outcomes
- aquatic chemistry
- bioinformatics
- climate and health
- drinking water, water reuse, and wastewater treatment
- environmental and economic policy, law, and management
- environmental nanotechnology
- energy and water systems
- epidemiology and epigenetics
- microbiology and microbial ecology
- toxicology, physiology, and metabolomics
- evaluation of environmental program impacts
- hazardous and solid waste engineering and management
- hydrology, transport and earth systems
- occupational exposure assessment and health impacts
- particle interaction
- pollutant fate and transport

Interdisciplinary, collaborative practices within our academic programs are necessary in order to most effectively identify and address long-standing, environmental questions and problems. Because of its diversity of interests and association with other departments within the university, EHE is able to offer a broad range of study and research opportunities for both undergraduate and graduate students.

Facilities

Our state of the art labs and facilities are well-equipped for research and study within a vast array of interdisciplinary areas of study. On the Homewood campus, EHE offices and laboratories are located in Ames Hall and at the Stieff Building. In addition to computers for scientific modelling laboratories, EHE has two undergraduate teaching labs and many individual laboratories for environmental engineering and health research. Each lab is equipped with a broad array of state-of-the-art analytical equipment for assessment of biologics and chemicals in water, waste water, and soil.

Extensive computer facilities and high speed computing are available both in the department and the university as a whole for computational and modeling studies.

On the Bloomberg campus, EHE offices and laboratories are located on the 6th and 7th floors of the Public Health building. Laboratories include state-of-the-art equipment and facilities for assessment of hazardous environmental chemicals/toxicants (airborne, waterborne, or foodborne) on human health and the exploration of the physiological, immune, genetic, and/or epigenetic origins of these effects.

Students have access to a broad range of core facilities on both campuses including: Mass Spectrometry and Proteomics, Biostatistics, and Data Management, Computational Biology, Genetics Resource Core, High Throughput Chemical Screening Core, Deep Sequencing and Microarray Cores.

Working with faculty on both campuses, students conduct research in our local, regional, national, and global laboratories and field sites.

Undergraduate Programs

The Department of Environmental Health and Engineering offers:

- an undergraduate Bachelor of Science (B.S.) degree in Environmental Engineering
- five focus areas within the environmental engineering major:
  - Environmental Management and Economics
  - Environmental Engineering and Science
  - Land Air and Water Resources
  - Environmental Health Engineering
  - Energy Systems Analysis
- three minors:
  - a minor in environmental engineering
  - a minor in environmental sciences
  - a minor in engineering for sustainable development
- a five-year combined (B.S./M.S. or B.S./M.S.E.) program.

As part of these minor programs, or as part of other programs of the student's own design, the department offers electives in such areas as ecology, geomorphology, water and wastewater pollution treatment processes, environmental systems analysis, and environmental policy studies.

Program Objectives

The B.S. in Environmental Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/).

ABET Program Educational Objectives

The BSEE Program Educational Objectives focus on objectives that our graduates are expected to attain within a few years of graduation. The objectives were reviewed and approved by our external advisory committee in January 2022. The objectives are stated as follows:

The Program in Environment Engineering educates students to think critically, communicate clearly, and collaborate effectively in the rigorous application of engineering and scientific principles for solving environmental problems. We emphasize the importance of intellectual growth, professional ethics, service to society, and environmental stewardship, equity, and justice. Our graduates are prepared to be successful

- engineering professionals in private and governmental organizations, and
- students in the best graduate programs.

Students graduating with a B.S. in Environmental Engineering will have demonstrated:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics

2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies

Annual Student Enrollment and Graduation Data

Academic Year	Total Enrolled	Total Graduated
2016-17	49	12
2017-18	49	10
2018-19	44	11
2019-20	44	4
2020-21	43	11
2021-22	49	

Continuous Improvement

The Department of Environmental Health and Engineering strives to continuously improve its curriculum by using performance criteria to regularly assess its program educational objectives (what skills it expects its students to demonstrate). The environmental engineering program uses the results of each assessment to continuously improve upon its curriculum and thus ensure that it is meeting the needs of its students.

Our department is noted for our students' exceptionally high pass rate of the "Fundamentals of Engineering" (FE) exam offered by the National Council of Examiners for Engineering and Surveying (NCEES).

Graduate Programs

Because of the department's unique cross-divisional affiliation, EHE is able to offer a wide array of masters and doctoral programs at the intersection of public health and engineering. With programs based both on the Bloomberg School of Public Health's East Baltimore campus and on the Whiting School of Engineering's Homewood campus, our graduate students benefit from expertise that is deep and broad in areas that include the science of chemical, biological and physical processes relevant to environment and health, environmental engineering, environmental and health policy, and data analytics.

Graduates of the department have found jobs in university departments of civil and environmental engineering, economics, biology, chemistry, geography, and geology; in federal, state, and municipal government; in private industry; and in private research and consulting organizations.

Financial Aid

Financial aid is granted on the basis of merit and availability. Criteria for consideration for these awards include academic excellence, professional or research experience, and career commitment to the field. Ph.D. students receive full financial support while in fulltime, resident status. Partial tuition fellowships are offered to qualified master's students.

Furthermore, many students within the department have been awarded graduate research fellowships available to Ph.D. and Masters students through programs administered by the National Science Foundation and the Environmental Protection Agency.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.570.108. Introduction to Environmental Engineering and Design. 3 Credits.
Overview of environmental engineering including water/air quality issues, water supply/ wastewater treatment, hazardous/solid waste management, pollution prevention, global environmental issues, public health considerations/environmental laws, regulations and ethics.Cross-listed with Public Health Studies.

EN.570.110. Introduction to Engineering for Sustainable Development. 3 Credits.

EN.570.201. Environmental Biology and Ecology. 3 Credits.
This course will cover basic topics in environmental biology and ecology for environmental engineering majors. The course will begin by describing the basic building blocks of life, cells and cellular components, which are common to all living things. We will then investigate factors that promote multicellularity, plant and animal physiology, and ecological principles that determine the distribution and function of organisms in the ecosystem.

EN.570.222. Environment and Society. 3 Credits.
Humans make their living in the environment. How we do that changes nature and changes us. This class explores human impacts on the environment, how we have thought about our relationship to nature over the millennia, and contemporary environmental discourses.

EN.570.239. Environmental Engineering Chemistry - Current and Emerging Topics. 3 Credits.
Students will utilize their chemistry knowledge to understand contemporary environmental issues in various media. Lectures will discuss the chemical phenomena leading to and resulting from air and water pollution issues. Climate change impacts to air and water chemistry will also be covered.

EN.570.303. Environmental Engineering Principles and Applications. 3 Credits.
Fundamentals and applications of physical, chemical, and biological processes in the natural environment and engineered systems. The first part of this class will cover material balances, chemical equilibrium, chemical kinetics, vapor pressure, dissolution, sorption, acid-base reactions, transport phenomena, reactor design, and water quality. The second part of this class focuses on the principles and design of water and wastewater treatment processes, such as coagulation, sedimentation, filtration, biological treatment processes, and disinfection.

EN.570.304. Environmental Engineering Laboratory. 3 Credits.
Introduction to laboratory measurements relevant to water supply and wastewater discharge, including pH and alkalinity, inorganic and organic contaminants in water, reactor analysis, bench testing for water treatment, and measurement and control of disinfection by-products. Recommended Course Background: EN.570.210 or Instructor Permission. Prerequisite: EN.570.303.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.303

EN.570.305. Environmental Health and Engineering Systems Design. 4 Credits.
Techniques from systems analysis applied to environmental engineering design and management problems: reservoir management, power plant siting, nuclear waste management, air pollution control, and transportation planning. Design projects are required.

EN.570.320. Case Studies in Climate Change - A Field Course. 2 Credits.
In this interdisciplinary seminar class, we will discuss past, present, and future climate change. We will do so through several case studies on California; Eastern California is a hub of research on past climate change, and arguably few states are being more heavily impacted by current climate change than California. Throughout the first half of the course, we will learn how climate has changed in the past, the magnitude of those changes, the possible causes, and the physical and ecological impacts of past climate change. In the second half of the course, we will contrast past climate change with the impacts and severity of contemporary climate change. We will explore how climate change is stressing water resources, air quality, and ecological resilience across California, and we will critically evaluate how the state’s recent policy initiatives are ameliorating (or exacerbating) these stresses.? This course has a 2-credit co-requisite in the spring semester where we will travel to Eastern California for a week-long field trip. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite spring field trip.

EN.570.321. Case Studies in Climate Change - A Field Course. 2 Credits.
This is the 2 credit co-requisite course for EN.570.320 Case Studies in Climate Change offered in fall. In this course we will travel to Eastern California for a week-long field trip to explore how climate change is stressing water resources, air quality, and ecological resilience across California. We will critically evaluate how the state’s recent policy initiatives are ameliorating (or exacerbating) these stresses. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite.
EN.570.320

EN.570.334. Engineering Microeconomics. 3 Credits.
The course introduces the principles of microeconomics and engineering economics, and applications of those principles to environmental engineering and public policy analysis. The financial and economic implications of engineering designs and control policies are critical to their success. We introduce principles of engineering economics and microeconomics (demand and production theory) and their uses in engineering decision making.

EN.570.349. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced.
EN.570.303

EN.570.350. Environmental Hazards and Health Risks. 3 Credits.
This course explores the concepts, assessment, and control of exposure to biological, physical and chemical hazards in the environment, the risk of adverse health outcomes resulting from such exposures, and the relationship between the exposures and health outcomes. These are placed in the context of the multi-disciplinary scientific field of environmental health as an essential component of the wider field of public health. The course is comprised of lectures, examples, group discussions, and group presentations. The proposed course will fill a gap in content and skill development in the issues and techniques relating to human health risk assessment. This course is targeted toward undergraduates who may not have had any exposure to environmental health science, and provides an introduction to environmental health using the framework of health risk assessment. The course first introduces the concepts of exposure to environmental hazards and biological dose, routes of exposure, statistical characterization of exposure variability in populations, and monitoring networks. The next set of concepts relate to hazard characterization, i.e., adverse health outcomes resulting from such exposures using a variety of types of data including in vitro and in vivo studies, and human epidemiological studies and their strengths and weaknesses. The next segment will deal with the quantitative characterization of the relationship between exposure/dose and the adverse health outcomes, i.e., the dose-response relationships, the metrics used for this, and quantitatively characterizing the health risks of a population. The course will introduce students to several tools including mathematical modeling of exposures and risk, and uncertainty analysis.
(AS.171.101) AND (AS.030.101 AND AS.030.102) AND (AS.110.108 AND AS.110.109)

EN.570.351. Introduction to Fluid Mechanics. 3 Credits.
Introduction to the use of the principles of continuity, momentum, and energy to fluid motion. Topics include hydrostatics, ideal-fluid flow, laminar flow, turbulent flow. Recommended Course Background: Statics, Dynamics, and AS.110.302
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.353. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.406. Environmental History. 3 Credits.
Environmental history explores the interactions between social change and environmental transformation, or the ways in which societies modify landscapes and are themselves affected by geological, climatological and changing ecological conditions. Topics include the relationship between climate change and human evolution, the environmental impacts of market-based commodity production and regional economic specialization; the relationship between urbanization and environmental change; how warfare affects and is affected by environmental conditions.
Area: Writing Intensive

EN.570.411. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.412. Landscape Hydrology and Watershed Analysis. 3 Credits.
The purpose of this class is to understand the landscape-scale controls on the fluxes of water and waterborne materials through watersheds. This class differs from the Hydrology and Hydrologic Modeling classes in its focus on data analysis, and its embrace of the complexity of real landscapes. There will be significant quantitative components to the material taught, but emphasis will be on developing a greater sense of the way that landscapes “function”, and how this function is related to real-world issues of water resources and pollution. Students will gain an understanding of how climate, geologic and ecologic setting, and human impacts control the partitioning of water between different fates, the flowpaths through the landscape and the storage and residence time of water. They will also learn conceptual and practical tools for analyzing hydrologic and other landscape data, and integrating this data in a holistic approach to watershed analysis. The class will be of interest for students intending to go into watershed or landscape management, and anyone wishing to pursue research in hydrology, geomorphology or ecology at landscape and watershed scales. The class will include at least one field trip to an instrumented watershed. GIS skills will be an advantage but are not required.

EN.570.415. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.615.

EN.570.416. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machine learning, to explore data sets, explain phenomena and build predictive models. The course begins with an overview of some traditional analysis approaches including ordinary least squares regression and related topics, notably diagnostic testing, detection of outliers and methods to impute missing data. More recent developments are presented, including ridge regression. Generalized linear models follow, emphasizing logistic regression and including models for polytomous data. Variable subsetting is addressed through stepwise procedures and the LASSO. Supervised machine learning topics include the basic concepts of boosting and bagging and several techniques: Decision Trees, Classification and Regression Trees, Random Forests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and Neural Networks. Unsupervised machine learning approaches are addressed through applications using k-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods for assessing model predictive performance are introduced including Confusion Matrices, k-fold Cross-Validation and Receiver Operating Characteristic Curves. Public health and environmental applications are emphasized, with modeling techniques and analysis tools implemented in R.

EN.570.419. Environmental Engineering Design I. 2 Credits.
Through general lectures and case study examples, this course will expose students to some of the non-technical professional issues that they will face as professional engineers and in their second-semester senior design project.

EN.570.420. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth’s surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed. This course meets with EN.570.657, Air Pollution.

EN.570.421. Environmental Engineering Design II. 3 Credits.
Engineering design process from problem definition to final design. Team projects include written/oral presentations. Students will form small teams that work with local companies or government agencies in executing the project. Recommended Course Background: EN.570.303, EN.570.352, and EN.570.419
EN.570.419

EN.570.422. Resilience of Ecological Systems. 3 Credits.
The ability of ecosystems to recover from natural events and human actions is increasingly being threatened by climate change. This course is a study of ecosystems using mathematical models, with a particular focus on quantifying their resilience. We will model a number of ecosystems, including rainforests, lakes, temperate forests, savannas, and grasslands. We will analyze ecological phenomena that impact public health and commerce. These include lake eutrophication and anoxia, forest fires, and insect outbreaks. We will study whole-earth mathematical models, biodiversity, and models to study the spread and control of pandemics. New this semester will be game theory applications, urban ecosystems and environmental justice. In all cases, potential pro-active and reactive management and control approaches will be evaluated. Mathematical techniques will be introduced and developed in a context-sensitive manner. Undergraduate and graduate students are welcome to enroll. Recommended course background (i.e. potentially useful but not required): EN.553.291 or AS.110.302, or equivalent.

EN.570.426. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes.
EN.570.351 or Equivalent

EN.570.428. Problems in Applied Economics. 3 Credits.
This course focuses on a monetary approach to national income determination and the balance of payments. Money and banking, as well as commodity and financial markets, are dealt with under both central banking, as well as alternative monetary regimes. Particular emphasis is placed on currency board systems. Students learn how to properly conduct substantive economic research, utilizing primary data sources, statistical techniques and lessons from economic history. Findings are presented in the form of either memoranda or working papers of publishable quality. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND AS.180.101 AND AS.180.102

EN.570.429. Methods in Microbial Community Analysis. 3 Credits.
This course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions. Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Open to undergraduates. Co-listed with EN.570.619

EN.570.441. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals.Co-listed with EN.570.641

EN.570.442. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles.
AS.030.101 AND AS.030.102. Course in organic chemistry preferred.

EN.570.443. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.643 (Aquatic and Biofluid Chemistry).

EN.570.445. Physical and Chemical Processes I. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).
EN.570.303 or permission of instructor.

EN.570.446. Biological Process of Wastewater Treatment. 3 Credits.
Fundamentals and application of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater.
Recommended Course Background: EN.570.411

EN.570.448. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes.
Recommended Course Background: EN.570.445 or Permission Required.

EN.570.449. Social Theory for Engineers. 3 Credits.
Engineers work in a social context. This course addresses a number of questions about that social context. How should we understand how societies come about, how they evolve,and why the rules of the game are what they are? What is the relationship between the individual and society, what does it mean to be 'modern,' are there different forms of rationality? How might all this impinge on what it means to be an engineer?
Area: Writing Intensive

EN.570.451. Environmental Dispersion and Transport. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.452. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences.Co-listed with EN.570.652
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.443

EN.570.454. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.470. Applied Economics & Finance. 3 Credits.
This course focuses on company valuations, using a Probabilistic Discounted Cash Flow Model. Students use the model and primary data from financial statements filed with the Securities and Exchange Commission to calculate the value of publically-traded companies. Using Monte Carlo simulations, students also generate forecast scenarios, project likely share-price ranges and assess potential gains/losses. Stress is placed on using these simulations to diagnose the subjective market expectations contained in current objective market prices, and the robustness of these expectations. During the weekly seminar, students company valuations are reviewed and critiqued. A heavy emphasis is placed on research and writing. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND (EN.570.428 OR AS.360.528)

EN.570.490. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.491. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment. Co-listed with EN.570.691

EN.570.492. Wolman Seminar - Undergraduates. 1 Credit.
Undergraduates only with permission of instructor.

EN.570.496. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.497. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.501. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.502. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.504. Financial Market Research. 3 Credits.
This course investigates the workings of financial, foreign exchange, and commodity futures markets. Research is focused on price behavior, speculation, and hedging in these markets. Extensive research and writing of publishable quality are required. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. An approved research proposal is a pre-requisite.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.505. Undergraduate Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.590. Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.597. Undergraduate Research-Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.607. Energy Policy and Planning Models. 3 Credits.
Methods for optimizing operation and design of energy systems and for analyzing market impacts of energy and environmental policies are reviewed, emphasizing both theory and solution of actual models. Review of linear and nonlinear programming and complementarity methods for market simulation. Recommended Course Background: EN.570.493 and EN.570.495 or equivalent.

EN.570.610. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.615. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.415

EN.570.616. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machinelearning, to explore data sets, explain phenomena and build predictive models. The coursebegins with an overview of some traditional analysis approaches including ordinary leastsquares regression and related topics, notably diagnostic testing, detection of outliers andmethods to impute missing data. More recent developments are presented, including ridgeregression. Generalized linear models follow, emphasizing logistic regression and includingmodels for polytomous data. Variable subsetting is addressed through stepwise procedures andthe LASSO. Supervised machine learning topics include the basic concepts of boosting andbagging and several techniques: Decision Trees, Classification and Regression Trees, RandomForests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and NeuralNetworks. Unsupervised machine learning approaches are addressed through applications usingk-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods forassessing model predictive performance are introduced including Confusion Matrices, k-foldCross-Validation and Receiver Operating Characteristic Curves. Public health andenvironmental applications are emphasized, with modeling techniques and analysis toolsimplemented in R. EN.570 616 meets with EN.570.416. Undergraduate (usually Senior) students should sign up for 416 with permission of instructor only.

EN.570.619. Methods in Microbial Community Analysis. 3 Credits.
This graduate level course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions. Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Co-listed with EN.570.429

EN.570.626. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes. Recommended Course Background: A course in Differential Equations or Consent of Instructor.

EN.570.631. Collaborative Modeling for Resolving Water Resources Disputes. 3 Credits.
Overview of collaborative modeling in water resources, Economic issues in water resources disputes, Legal issues in water resources disputes, Biological/Environmental issues in water resources disputes, Water management in the Delaware Basin, Understanding and using the Delaware River Basin Commission's water management tool (an OASIS based model of the Delaware, Multi-objective water management, Understanding management trade-offs, Collaborative processes, Reality based negotiation skills, and Consensus building. Recommended Course Background: A strong interest in utilizing scientific tools to help resolve real-world disputes A background in general science – with at least two of the following disciplines: Biology, chemistry, physics, earth science, economics.

EN.570.641. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals. Co-listed with EN.570.441

EN.570.642. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles. New prerequisites (grad students only): at least one year of undergraduate general chemistry, a course in organic chemistry preferred.

EN.570.643. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.443 (Aquatic and Biofluid Chemistry)

EN.570.644. Physical and Chemical Processes. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).

EN.570.647. Hydrologic Transport in the Environment. 3 Credits.
This course considers the transport of solutes and sediments by water through terrestrial landscapes, with an emphasis on the movement of nutrients and contaminants from the landscape into receiving water bodies like rivers, lakes and estuaries. The course will cover the theoretical approaches (advection-diffusion/dispersion, transit time distributions), the use of active and passive tracers to infer transport processes, analysis of water quality time series, runoff generation and flow pathways in watersheds, and the effect of climate variability on transport. Assessment is based on a semester project and in-class presentations. Seniors interested in joining the class must have Hydrology 570.353 and should contact the instructor.

EN.570.648. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes. Recommended Course Background: EN.570.445 or Permission Required.

EN.570.649. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced. Students should have taken EN.570.303 (or equivalent).

EN.570.650. Seminar on Critical Zone Science. 1 Credit.
Seminar class covering foundational literature and current research in soils, geomorphology, hydrology, ecology, geochemistry, biogeochemistry, and related topics. Each semester will focus on a particular theme. The course is pass-fail, with attendance and engagement required, as well as minimal writing assignments intended to encourage critical thinking.

EN.570.651. Environmental Transport and Dispersion. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.652. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences. Co-listed with EN.570.452
Area: Writing Intensive
EN.570.443 OR EN.570.643 OR permission of instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.653. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.654. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.657. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth's surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed.

EN.570.690. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.691. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment.

EN.570.695. Environmental Health and Engineering Systems Design. 3 Credits.
A collection of systems analytic techniques which are frequently used in the study of public decision making is presented. Emphasis is on mathematical programming techniques. Primarily linear programming, integer and mixed-integer programming, and multiobjective programming. Recommended Course Background: AS.110.106-AS.110.107/AS.110.109

EN.570.696. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.697. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.800. Graduate Independent Study. 1 - 3 Credits.

EN.570.801. Doctoral Research. 3 - 20 Credits.

EN.570.803. Master's Research. 3 - 10 Credits.

EN.570.805. Jensen Internship. 3 Credits.
Restricted internship; reserved for students who have received the Jensen Fellowship.

EN.570.841. Wolman Seminar- Graduates. 1 Credit.

EN.570.873. Environmental Science & Management Seminar. 1 Credit.

EN.570.881. Environmental Engineering Seminar. 1 Credit.

Cross Listed Courses

Center for Leadership Education

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

General Engineering

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

Engineering for Sustainable Development, Minor

Engineers will be increasingly called upon to help devise solutions to the tremendous problems of poverty, inequality, and social and environmental dislocation that afflict major parts of the globe in the 21st century. Working as an engineer in this context involves negotiating highly complex social, economic, and political realities and dealing with a wide range of institutions and actors, including national and local governments, multilateral lenders such as the World Bank, diverse non-governmental organizations (NGOs), and local communities. It also increasingly involves working in interdisciplinary teams with social scientists, public health and medical workers, humanitarian aid workers, bankers, politicians, and the like. “Sustainable” development implies a development path that is socially equitable, culturally sensitive, and environmentally appropriate over a multi-generational time frame.

The minor in Engineering for Sustainable Development exposes engineering students to some of the key issues related to development, methods of information-gathering in diverse and difficult settings, and working effectively with non-engineers on complex problems. The minor is open to undergraduates in any of the engineering disciplines in the Whiting School of Engineering. Students in Arts & Sciences may also pursue the minor with the permission of the program director.

For further information, please contact Erica Schoenberger via email (ericas@jhu.edu) (ericas@jhu.edu)or at 410-516-6158.

Program Requirements

The minor encompasses seven courses. The core course is EN.570.110 Introduction to Engineering for Sustainable Development. Six additional courses will be selected in a program devised in consultation with the minor advisor.

Code	Title	Credits
Core Course		
EN.570.110	Introduction to Engineering for Sustainable Development	3

Of the Six Additional Courses:

- Three must be grouped around a specific theme, region, or within a specific discipline. Themes might include, for example, public health, environment, or economic development. Regions include Africa, Latin America, or Asia. Disciplinary concentrations might be in Anthropology, Economics, Geography, History, Political Science, Public Health, or Sociology.
- Three of the courses must be at the 300-level or above.
- One of the courses must cover methods for gathering and evaluating information in a development context.

Examples include:

Code	Title	Credits
AS.230.202	Research Methods for the Social Sciences	3
AS.280.345	Public Health Biostatistics	4
AS.280.350	Fundamentals of Epidemiology	4

Environmental Engineering, Bachelor of Science

The mission of our undergraduate program is to provide students with a broadly based yet rigorous education in the fundamental subjects central to the field, in a milieu that fosters development of a spirit of intellectual inquiry and the problem-solving skills required to address the open-ended issues characteristic of the real world.

Our B.S. program provides a strong foundation in the physical, chemical, and biological sciences, as well as in mathematics, engineering science, and engineering design. It is broad and flexible enough to accommodate students with a variety of interests in environmental engineering and management. This training should provide an ideal preparation for future employment in business or industry or for subsequent training at the graduate level, either in environmental engineering/science or in a field such as environmental law, public health, or medicine.

Program Requirements

Focus Areas within the Environmental Engineering (EE) Major

Students must select among five different focus areas:

- Environmental Management and Economics
- Environmental Engineering and Science
- Land Air and Water Resources
- Environmental Health Engineering
- Energy Systems Analysis

With the assistance of a faculty advisor, each student will plan a curriculum suited to their ultimate career goals. The program also encourages and supports individual study and research. Program requirements total 125 credits.

Mathematics with a Focus on Applications

Code	Title	Credits
Required Courses		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
or AS.110.302	Differential Equations and Applications	
An advanced course (300-level or higher) in probability and statistics, such as:		4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Any 4 credit probability and statistics course from the Department of Applied Mathematics and Statistics.		
Total Credits		**20**

Basic Science (BS)

Code	Title	Credits
Required Courses		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
EN.570.201	Environmental Biology and Ecology	3
Note: Premedical Students could substitute one of the following for EN.570.201:		
AS.020.305	Biochemistry (and AS.020.315 Biochemistry Project Lab)	
AS.020.306	Cell Biology (and AS.020.316 Cell Biology Lab)	
Total Credits		**16**

Code	Title	Credits
Basic Science Optional Courses (premedical students should also take additional chemistry courses as electives):		
AS.030.205	Introductory Organic Chemistry I	
AS.030.206	Organic Chemistry II	
AS.030.225	Introductory Organic Chemistry Laboratory	
AS.171.102	General Physics: Physical Science Major II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	

Humanities and Social Sciences (HS)

A minimum of six courses totaling 18 credits in Humanities or Social Sciences. The six courses must include:

1. one advisor-approved course that specifically develops writing skills (e.g., a how-to write class),
2. EN.570.334 Engineering Microeconomics, and
3. four additional Humanities and Social Sciences courses with at least two at the 300-level or higher. EN.570.406 Environmental History can be taken as part of these requirements.

Please note that the writing course will fulfill one of the two writing-intensive courses required by the university.

Note: Most medical schools require a year of English literature and/or composition.

Code	Title	Credits
Required Course		
EN.570.334	Engineering Microeconomics	3
Elective Examples for EHE		
EN.570.406	Environmental History	3
Writing Course Examples		
AS.220.105	Introduction to Fiction & Poetry I	3
or AS.220.106	Introduction to Fiction & Poetry II	
EN.661.110	Professional Writing and Communication	3
Total Credits		**12**

[1] Both cannot be counted for H/S credit.

General Engineering (GE)

Code	Title	Credits
Required Courses		
EN.500.113	Gateway Computing: Python	3
or EN.500.114	Gateway Computing: Matlab	
EN.530.231	Mechanical Engineering Thermodynamics [1]	3
or EN.510.312	Thermodynamics/Materials	
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.570.108	Introduction to Environmental Engineering and Design	3
EN.570.351	Introduction to Fluid Mechanics	3
Total Credits		**16**

[1] Students do not need to register for EN.530.231 lab course.

Design Experience and Engineering Laboratory (Senior Design) (D)

Code	Title	Credits
Required Courses		
EN.570.305	Environmental Health and Engineering Systems Design	4
EN.570.419	Environmental Engineering Design I	2

EN.570.421	Environmental Engineering Design II	3
Total Credits		**9**

The Design and Synthesis sequence is a five-credit project course (2 credits fall semester, 3 credits spring semester) and involves a comprehensive study of the engineering design process from problem definition to the final design. The course involves team projects that include written and oral presentations. Students will form small teams that will work with local companies or government agencies in executing the project. Prerequisite: senior standing in the Environmental Engineering major.

Environmental Engineering Requirements (EER)

Code	Title	Credits
Required Courses		
EN.570.239	Environmental Engineering Chemistry - Current and Emerging Topics	3
EN.570.303	Environmental Engineering Principles and Applications	3
EN.570.304	Environmental Engineering Laboratory	3
EN.570.350	Environmental Hazards and Health Risks	3
EN.570.353	Hydrology	3
EN.570.420	Air Pollution	3
Total Credits		**18**

Environmental Engineering Electives (EEE)

1. A minimum of 6 credits of EE electives are required from one of the following Focus Areas

2. Students fulfill the additional 23 elective credits by taking courses from within any of the Focus Areas

A detailed list of recommended electives in each Focus Area is provided below. Students should work with their advisor to choose Focus Areas and elective courses that best prepare them for their career or research goals. Students who wish to count other courses towards the EEE and Focus Area credits must receive written approval from their advisor and the Academic Coordinator prior to registering for the class.

Code	Title	Credits
Environmental Management and Economics		
EN.553.413	Applied Statistics and Data Analysis	4
EN.570.416	Data Analytics in Environmental Health and Engineering	3
EN.570.454	Geostatistics: Understanding Spatial Data	3
EN.570.490	Solid Waste Engineering and Management	3
EN.570.491	Hazardous Waste Engineering and Management	3
EN.570.496	Urban and Environmental Systems	3
EN.570.497	Risk and Decision Analysis	3
EN.570.607	Energy Policy and Planning Models	3
PH.317.600	Introduction to the Risk Sciences and Public Policy [1]	4
PH.317.605	Methods in Quantitative Risk Assessment [1]	4
Environmental Engineering and Science		
EN.570.411	Engineering Microbiology	4
EN.570.415	Current Trends in Environmental Microbiology	3
EN.570.429	Methods in Microbial Community Analysis	3
EN.570.441	Environmental Inorganic Chemistry	3
EN.570.442	Environmental Organic Chemistry	3
EN.570.443	Aquatic and Biofluid Chemistry	3
EN.570.445	Physical and Chemical Processes I	3
EN.570.446	Biological Process of Wastewater Treatment (Recommended course background: EN.570.411)	3
EN.570.448	Physical and Chemical Processes II	3
EN.570.451	Environmental Dispersion and Transport	3
EN.570.490	Solid Waste Engineering and Management	3
EN.570.491	Hazardous Waste Engineering and Management	3
Land Air and Water Resources		
AS.270.323	Ocean Biogeochemical Cycles	3
AS.270.345	Metamorphic Petrology	3
AS.270.618	Remote Sensing of the Environment	
AS.270.641	Present and Future Climate	
AS.270.679	Atmospheric Science	
AS.271.402	Water, Energy, and Food	3
EN.570.349	Water quality of rivers, lakes, and estuaries	3
EN.570.421	Environmental Engineering Design II	3
EN.570.426	Groundwater, Porous Media, and Hydrogeology	3
EN.570.451	Environmental Dispersion and Transport	3
EN.570.454	Geostatistics: Understanding Spatial Data	3
Environmental Health Engineering		
AS.280.345	Public Health Biostatistics	4
AS.280.350	Fundamentals of Epidemiology	4
PH.140.615	Statistics for Laboratory Scientists I [1]	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management [1]	3
PH.182.614	Industrial Hygiene Laboratory [1]	5
PH.182.615	Airborne Particles [1]	4
PH.182.622	Ventilation and Hazard Control [1]	4
PH.182.626	Issues for Water and Sanitation in Tropical Environmental Health [1]	2
PH.182.637	Noise and Other Physical Agents in the Environment [1]	4
PH.182.638	Environmental and Health Concerns in Water Use and Reuse [1]	4
PH.182.640	Food- and Water- Borne Diseases [1]	3
PH.187.610	Public Health Toxicology [1]	4
PH.188.680	Fundamentals of Occupational Health [1]	3
PH.317.600	Introduction to the Risk Sciences and Public Policy [1]	4
Energy Systems Analysis		
AS.270.641	Present and Future Climate	
AS.271.402	Water, Energy, and Food	3
EN.510.405	Materials Science of Energy Technologies	3
EN.520.370	Introduction to Renewable Energy Engineering	3
EN.530.464	Energy Systems Analysis	3
EN.570.497	Risk and Decision Analysis	3
EN.570.607	Energy Policy and Planning Models	3

[1] These courses are offered on the Bloomberg School of Public Health campus. For more information: http://www.jhsph.edu/courses (http://www.jhsph.edu/courses/)

Sample Program of Study

(Focus Area: Environmental Engineering Science) [1]

Note: This program is based on the assumption that students have not previously completed A.P. courses in calculus, physics, chemistry, etc.

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering) (M)	4
AS.030.101	Introductory Chemistry I (BS)	3
AS.030.105	Introductory Chemistry Laboratory I (BS)	1
EN.570.108	Introduction to Environmental Engineering and Design (GE)	3
HS Elective 1		3
Optional HEART or First-Year Seminar		1-3
	Credits	**15-17**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering) (M)	4
AS.030.102	Introductory Chemistry II (BS)	3
AS.030.106	Introductory Chemistry Laboratory II (BS)	1
AS.171.101	General Physics: Physical Science Major I (BS)	4
AS.173.111	General Physics Laboratory I (BS)	1
EN.500.113 or EN.500.114	Gateway Computing: Python ((GE)) or Gateway Computing: Matlab	3
	Credits	**16**
Second Year		
First Semester		
EN.553.291	Linear Algebra and Differential Equations ((M))	4
EN.560.201	Statics & Mechanics of Materials (GE)	3
EN.560.211	Statics and Mechanics of Materials Laboratory ((GE))	1
EN.570.239	Environmental Engineering Chemistry - Current and Emerging Topics ((EER))	3
HS Elective 2		3
	Credits	**14**
Second Semester		
AS.110.202	Calculus III (M)	4
EN.530.231	Mechanical Engineering Thermodynamics ((GE))	3
EN.570.201	Environmental Biology and Ecology ((BS))	3
Probability/Statistics (M)		4
HS Elective 3		3
	Credits	**17**
Third Year		
First Semester		
EN.570.303	Environmental Engineering Principles and Applications ((EER))	3
EN.570.305	Environmental Health and Engineering Systems Design (D)	4
EN.570.351	Introduction to Fluid Mechanics (GE)	3
EN.570.334	Engineering Microeconomics (HS Elective 4)	3
Environmental Engineering Elective (EEE)		3
	Credits	**16**
Second Semester		
EN.570.353	Hydrology ((EER))	3
EN.570.304	Environmental Engineering Laboratory (EER)	3
Environmental Engineering Elective (EEE)		3
Environmental Engineering Elective (EEE)		3
Environmental Engineering Elective (EEE)		3
	Credits	**15**
Fourth Year		
First Semester		
EN.570.350	Environmental Hazards and Health Risks ((EER))	3
EN.570.419	Environmental Engineering Design I (D)	2
HS Elective 5		3
Environmental Engineering Elective (EEE)		3
Environmental Engineering Elective (EEE)		3
Environmental Engineering Elective (EEE)		3
	Credits	**17**
Second Semester		
EN.570.420	Air Pollution ((EER))	3
EN.570.421	Environmental Engineering Design II (D)	3
HS Elective 6		3
Environmental Engineering Elective (EEE)		3
Environmental Engineering Elective (EEE)		3
	Credits	**15**
	Total Credits	**125-127**

Math (M) = 20 credits; Humanities and Social Sciences (HS) = 18 credits; Basic Science (BS) = 16 credits; General Engineering (GE) = 16 credits; Environmental Engineering Requirement (EER) = 18 credits; Environmental Engineering Electives (EEE) = 28 credits; Design (D) = 9 credits

[1] Total Credits is variable due to optional 1-3 credit HEART/First Year Seminar class in the first semester.

Environmental Engineering, Minor

Environmental engineers play particularly pivotal roles as professionals who bridge the gap between understanding complex scientific concepts and helping to formulate public policies that affect the environment. Environmental engineering has become an important aspect of engineering practice in most engineering fields, and the discipline spans the professional spectrum from the private sector through governmental agencies to academia. An undergraduate minor in environmental engineering allows engineering students to pursue an interest in this field and to incorporate aspects of environmental engineering into careers in other engineering disciplines.

Students in any undergraduate major in the Whiting School of Engineering are eligible for admission to the environmental engineering minor program. Students will work with an advisor in the Department of Environmental Health and Engineering to develop a program that meets the requirements for the minor and is consistent with the educational requirements of their major field of engineering study.

Program Requirements

Requirements of the EE minor program consist of:

- a set of required core science and mathematics courses, already common to civil and chemical engineering majors;
- three required courses in environmental engineering (total of 10 credits); and
- three elective courses (total of 9 credits): one taken at the freshman or sophomore level, the second taken at the junior or senior level, plus one additional elective course.

Core Courses (EE Minor)

Advanced placement credits and/or equivalent courses in other schools or departments are acceptable, subject to advisor approval.

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	
AS.110.202	Calculus III	
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	
AS.030.101	Introductory Chemistry I	
AS.030.102	Introductory Chemistry II	
AS.030.105	Introductory Chemistry Laboratory I	
AS.030.106	Introductory Chemistry Laboratory II	
AS.171.101	General Physics: Physical Science Major I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	
AS.173.112	General Physics Laboratory II	

Required Courses (EE Minor)

A total of 19 credits are required in addition to the previously specified core.

Code	Title	Credits
EN.570.303	Environmental Engineering Principles and Applications	3
EN.570.304	Environmental Engineering Laboratory	3
EN.570.305	Environmental Health and Engineering Systems Design	4
Total Credits		**10**

Elective Courses

(Total of 9 credits). One course from each of two groups is required, plus one additional course (3 total required minor electives). Double counting of these courses with specified required courses in the student's major is not allowed. Substitution for one required course may be possible under special circumstances, with the explicit approval of the environmental engineering minor advisor. Additional course electives are possible but require the approval of the environmental engineering minor advisor.

Code	Title	Credits
Group A		
Select one introductory course at the freshman and sophomore level of the following: [1]		
AS.020.151	General Biology I	
AS.270.220	The Dynamic Earth: An Introduction to Geology	
EN.570.108	Introduction to Environmental Engineering and Design	
EN.570.201	Environmental Biology and Ecology	
EN.570.239	Environmental Engineering Chemistry - Current and Emerging Topics	
EN.570.350	Environmental Hazards and Health Risks	
Group B		
Select one of the following: [1]		
AS.030.204	Chemical Structure and Bonding w/Lab	
AS.030.205	Introductory Organic Chemistry I	
AS.030.301	Physical Chemistry I	
EN.540.301	Kinetic Processes	
EN.540.303	Transport Phenomena I	
EN.570.353	Hydrology	
EN.570.411	Engineering Microbiology	
EN.570.442	Environmental Organic Chemistry	
EN.570.443	Aquatic and Biofluid Chemistry	
EN.570.445	Physical and Chemical Processes I	
EN.570.490	Solid Waste Engineering and Management	
EN.570.491	Hazardous Waste Engineering and Management	

[1] Engineering science courses that are developed for juniors and seniors and also introductory graduate-level courses. One course is required.

For further information, contact Dr. Harihar Rajaram, EE Minor Coordinator, 410-516-5421, hrajara1@jhu.edu, or Natalie Van Horn, Senior Academic Program Coordinator, nvanhor2@jhu.edu.

Environmental Sciences, Minor

The environmental sciences minor has been developed to encourage and facilitate studies in environmental sciences by students completing degrees in the other science and engineering disciplines. The environmental sciences (ES) minor requires:

- completion of a set of courses in the core sciences,
- two introductory courses dealing with the environment, and
- three or more upper-level environmental sciences courses, as described.

Faculty Advising

A faculty advisor is assigned to each student in the environmental sciences minor program to assist in planning their academic program and to approve the choice of courses to satisfy the minor. Faculty advisors are available in the following areas:

- **Biological Processes**
  Faculty advisor: Sarah Preheim
- **Physical Processes**
  Faculty advisor: Ciaran Harman
- **Environmental Chemistry**

Faculty advisor: Alan Stone

- **Environmental Systems**
  Faculty advisor: Ben Hobbs

Program Requirements

Core Sciences (ES Minor)

Because of the interdisciplinary nature of environmental science, it is important that professionals from various areas of expertise acquire a common language and set of core concepts to make discussion and cooperation possible. The following courses represent the minimum set of requirements:

Code	Title	Credits
Mathematics (12 credits)		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
At least one of these four courses:		
AS.110.201	Linear Algebra	4
AS.110.202	Calculus III	4
AS.110.302	Differential Equations and Applications	4
EN.553.291	Linear Algebra and Differential Equations	4
Biology (3 credits)		
One course is needed, such as: AS.020.151 General Biology I		3
Chemistry (8 credits)		
AS.030.101	Introductory Chemistry I	3
AS.030.102	Introductory Chemistry II	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.106	Introductory Chemistry Laboratory II	1
Physics (10 credits)		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1

Environmental Sciences

Students must take two introductory courses dealing with the environment and three or more of the upper-level environmental science courses on the following lists, for a total of 15 credits:

Code	Title	Credits
Introductory Courses (6 credits)		
Select two of the following:		6
AS.270.220	The Dynamic Earth: An Introduction to Geology	
AS.270.221	The Dynamic Earth Laboratory	
EN.570.110	Introduction to Engineering for Sustainable Development	
EN.570.201	Environmental Biology and Ecology	
EN.570.239	Environmental Engineering Chemistry - Current and Emerging Topics	
Upper-Level Courses (9-10 credits)		
Select three of the following:		9-10
AS.270.302	Aqueous Geochemistry	
AS.270.350	Sedimentary Geology	
EN.570.303	Environmental Engineering Principles and Applications	
EN.570.350	Environmental Hazards and Health Risks	
EN.570.353	Hydrology	
EN.570.411	Engineering Microbiology	
EN.570.441	Environmental Inorganic Chemistry	
EN.570.443	Aquatic and Biofluid Chemistry	
EN.570.445	Physical and Chemical Processes I	
EN.570.491	Hazardous Waste Engineering and Management	
EN.575.706	Biological Processes for Water & Wastewater Treatment	
Total Credits		**15-16**

Pairing Your Major with the ES Minor

Many of the most creative and productive advances in environmental sciences in recent years have come from scientists trained in traditional disciplines (biology, chemistry, geology, physics, and engineering) who have devoted themselves to the study of environmental problems. Completion of the degree requirements of a traditional discipline provides depth and rigor that, when supplemented with additional academic training in environmental science, can be applied to professional work in a variety of environmental subjects, as the following examples show:

Biological Processes

Response of ecosystems to change, microbial degradation of pollutants, biogeochemical cycling of greenhouse gases. **Illustrative majors:** Biology, Biomedical Engineering, Biophysics, Biochemical Engineering.

Physical Processes

Erosion of hillslopes, rivers, and coastlines; sediment production, transport, and fate; groundwater, movement of contaminant plumes; oceanography; atmospheric physics; aerosol formation; global warming. **Illustrative majors:** Civil Engineering, Chemical and Biomolecular Engineering, Mechanical Engineering, Physics, Earth and Planetary Sciences.

Environmental Chemistry

Environmental fate of pollutants, water and waste water treatment, geochemistry, atmospheric chemistry, ozone depletion, acid rain. **Illustrative majors:** Chemistry, Chemical and Biomolecular Engineering, Earth and Planetary Sciences, Materials Science and Engineering.

Environmental Systems

Environmental modeling, risk assessment, environmental systems design, pollution control strategies. **Illustrative majors:** Civil Engineering, Applied Mathematics and Statistics.

Geography and Environmental Engineering, Master of Arts

Program Requirements

The M.A. degree is open to students with undergraduate degrees in social sciences or the humanities. It requires:

- a minimum of 30 graduate credits including no more than 1 credit of seminar, 1 credit of intersession course work or 1.5 credits from

CLE (with advisor approval), and 6 credits of independent research counting toward the 30 credits.
- at least 50% of the required 30 credits must come from courses within the department.
- students are permitted to apply up to two classes with a grade of “C” toward their degree.
- up to two courses from AAP or EP may be taken and counted to receive a master’s degree as long as there is sufficient rigor and prior approval as deemed by the advisor. Students must have written consent from advisor (an email will suffice) prior to signing up for the course.

M.A. students have the option to complete an independent research project, submitted as a formal essay. Students can focus on one of the department’s areas of interest, study, or research or construct their own program that complements and expands their undergraduate experience; three semesters are typically required to complete the degree. Each program of study is planned by the student in consultation with department faculty and must be approved by the faculty advisor, Erica Schoenberger (ericas@jhu.edu).

For more detailed information about our Graduate programs, including course requirements and research opportunities, visit our website at ehe.jhu.edu **(**http://www.ehe.jhu.edu**)**

Geography and Environmental Engineering, Master of Science

The Geography and Environmental Engineering Master of Science is open to students with undergraduate degrees in engineering, mathematics, biology, chemistry, physics, geology, and other scientific disciplines. The degree is designed to allow students, with the assistance of the their faculty advisor, the opportunity to construct a curriculum that will best suit their individual goals.

Students pursuing this degree may choose between one of the two tracks for the M.S., Environmental Science or Environmental Science and Policy, or may choose to follow any of the M.S.E. track curricula.

Program Requirements

The M.S. degree program includes the following general requirements:

- a minimum of 30 graduate credits including no more than 1 credit of seminar, 1 credit of intersession course work or 1.5 credits from CLE (with advisor approval), and 6 credits of independent research counting toward the 30 credits.
- at least 50% of the required 30 credits must come from courses within the department. The Department of Environmental Health and Engineering's course codes are 570, 180-5, and 187-8.
- students are permitted to apply up to two classes with a grade of “C” toward their degree.
- up to two courses from AAP or EP may be taken and counted to receive a master’s degree as long as there is sufficient rigor and prior approval as deemed by the advisor. Students must have written consent from advisor (an email will suffice) prior to signing up for the course.
- students will earn credits for BSPH courses according to this BSPH-WSE credit conversion:
  - 3 WSE credits for a 4 or 5-credit BSPH course
  - 2 WSE credits for a 2 or 3-credit BSPH course
  - 1 WSE credit for a 1-credit BSPH course

M.S. students have the option to complete an independent research project, submitted as a formal essay. A minimum of two semesters is required to complete the M.S. degree without the research project option. Three to four semesters are typically required to complete the degree with a research project.

M.S. students are strongly recommended to take mathematics-specifically differential equations and computing skills- as prerequisites for the M.S. program. Additionally, M.S. students who choose to follow Environmental Engineering and Science, Data Science and Analytics, Environmental Management and Economics, or Hydrology and Water Resources Engineering concentrations are encouraged to take an introductory fluid mechanics course. Whether introductory fluid mechanics will count towards an M.S. student’s graduation credits is decided on a case-by-case basis by the department. Each individual’s program of study is planned by the student in consultation with department faculty and must be approved by the faculty advisor.

Concentrations for the M.S. Degree

Environmental Science

This concentration provides a broad yet rigorous background for environmental professionals. Using the department’s areas of interest, study, and research as guides and in consultation with their advisors, M.S. students can construct their own concentration that complements and expands their interests and professional goals.

To complete this track, it is recommended to take four courses in environmental science. Suggestions include:

Code	Title	Credits
EN.570.644	Physical and Chemical Processes	3
EN.570.648	Physical and Chemical Processes II	3
EN.575.706	Biological Processes for Water & Wastewater Treatment	3

Other recommended courses include:

Code	Title	Credits
EN.570.615	Current Trends in Environmental Microbiology	3
EN.570.626	Groundwater, Porous Media, and Hydrogeology	3
EN.570.643	Aquatic and Biofluid Chemistry	3
EN.575.645	Environmental Microbiology	3
EN.570.690	Solid Waste Engineering and Management	3
EN.570.691	Hazardous Waste Engineering and Management	3

The final courses will be a project or electives in environmental science that are appropriate to the student’s goals and approved by a faculty adviser.

Environmental Science and Policy

This concentration is similar to Environmental Science but includes economics and systems courses.

Core courses in environmental policy include:

Code	Title	Credits
EN.570.695	Environmental Health and Engineering Systems Design	3
EN.570.697	Risk and Decision Analysis	3

Choose at least two from the following:

Code	Title	Credits
EN.575.645	Environmental Microbiology	3
EN.570.643	Aquatic and Biofluid Chemistry	3
EN.570.691	Hazardous Waste Engineering and Management	3

Choose at least one from the following:

Code	Title	Credits
PH.317.605	Methods in Quantitative Risk Assessment	4
EN.570.607	Energy Policy and Planning Models	3
EN.570.657	Air Pollution	3
EN.570.616	Data Analytics in Environmental Health and Engineering	3

Additional recommended courses:

Code	Title	Credits
EN.570.644	Physical and Chemical Processes	3
EN.570.648	Physical and Chemical Processes II	3

The final courses will be a project or electives in environmental science, engineering, policy, statistics or systems that are appropriate to the student's goals and approved by a faculty advisor.

Geography and Environmental Engineering, Master of Science in Engineering

The Geography and Environmental Engineering, Master of Science in Engineering (MSE) is designed to prepare students with an ABET-accredited undergraduate engineering degree, or equivalent, to enter the workforce as leaders in the field. Students have five tracks to choose from, each with unique curricular requirements.

M.S.E. Tracks

ENVIRONMENTAL ENGINEERING AND SCIENCE
Focuses on the analysis and design of processes that affect the quality of both the natural and built environment. Specific topics include: physical, chemical and biological phenomena relevant to drinking water treatment, waste and wastewater treatment, environmental remediation, air pollution and air quality, and transport and transformation of pollutants in the environment.

HYDROLOGY AND WATER RESOURCES ENGINEERING
Focuses on the role of hydrologic processes in various earth and environmental contexts, including extreme events such as: floods and droughts, climate change impacts, transport within aquatic systems, geomorphology and landscape development, and the analysis, design, and operation of water resources systems.

DATA SCIENCE AND ANALYTICS FOR ENVIRONMENTAL HEALTH AND ENGINEERING
Emphasizes innovative computational, statistical, and "big data" tools with applications to environmental problems in air pollution, energy systems, hydrology, and climate change.

ENVIRONMENTAL MANAGEMENT AND ECONOMICS
Focuses on the use of models of physical and economic systems to analyze and improve the design and operations of public policies, environmental control systems, and infrastructure for energy, transportation, water, and other critical services.

Program Requirements

The following general requirements apply to all M.S.E. students:

- a minimum of 30 graduate credits including no more than 1 credit of seminar, 1 credit of intersession course work or 1.5 credits from CLE (with advisor approval), and 6 credits of independent research counting toward the 30 credits.
- at least 50% of the required 30 credits must come from courses within the department. The Department of Environmental Health and Engineering's course codes are 570, 180-5, and 187-8.
- students are permitted to apply up to two classes with a grade of "C" toward their degree.
- 5-6 required courses and 4-5 recommended elective courses depending on concentration. In order to substitute an alternate course for a recommended elective, students must receive written approval from their advisor prior to registering.
- prerequisites (required) for the M.S.E. program include mathematics: differential equations and computing skills.
- up to two courses from AAP or EP may be taken and counted to receive a master's degree as long as there is sufficient rigor and prior approval as deemed by the advisor. Students must have written consent from advisor (an email will suffice) prior to signing up for the course.
- students will earn credits for BSPH courses according to this BSPH-WSE credit conversion:
  - 3 WSE credits for a 4 or 5-credit BSPH course
  - 2 WSE credits for a 2 or 3-credit BSPH course
  - 1 WSE credit for a 1-credit BSPH course

The M.S.E. program is typically a two semester program based on course work alone. However, M.S.E. students have the option to complete an independent research project, submitted as a formal essay or group project report. An M.S.E. degree with significant research components will usually require three to four semesters for completion and is generally intended for those students planning to work in engineering practice. Each individual's program of study is planned by the student in consultation with department faculty and must be approved by the faculty advisor. M.S.E. students select from the concentrations below.

Tracks for the M.S.E. Degree

ENVIRONMENTAL ENGINEERING AND SCIENCE

This track focuses on the analysis and design of processes that affect the quality of both the natural and built environment.

Code	Title	Credits
Core courses:		
EN.575.645	Environmental Microbiology	3
EN.570.615	Current Trends in Environmental Microbiology	3
EN.570.641	Environmental Inorganic Chemistry	3
EN.570.642	Environmental Organic Chemistry	3

EN.570.643	Aquatic and Biofluid Chemistry	3
EN.570.644	Physical and Chemical Processes	3
EN.575.706	Biological Processes for Water & Wastewater Treatment	3
EN.570.657	Air Pollution	3
AS.270.679	Atmospheric Science	
One course in engineering mathematics or statistical analysis, such as:		
EN.570.616	Data Analytics in Environmental Health and Engineering	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
EN.570.695	Environmental Health and Engineering Systems Design	3
EN.570.697	Risk and Decision Analysis	3
Recommended electives include:		
EN.570.619	Methods in Microbial Community Analysis	3
EN.570.626	Groundwater, Porous Media, and Hydrogeology	3
EN.570.647	Hydrologic Transport in the Environment	3
EN.570.651	Environmental Transport and Dispersion	3
EN.570.652	Experimental Methods in Environmental Engineering and Chemistry	4
EN.570.690	Solid Waste Engineering and Management	3
EN.570.691	Hazardous Waste Engineering and Management	3
AS.270.618	Remote Sensing of the Environment	
AS.270.641	Present and Future Climate	

HYDROLOGY AND Water resources engineering

This track focuses on the role of hydrologic processes in various earth and environmental contexts, including extreme events.

Code	Title	Credits
Core courses:		
EN.570.412	Landscape Hydrology and Watershed Analysis	3
EN.570.653	Hydrology	3
EN.570.651	Environmental Transport and Dispersion	3
One course in applied mathematics, numerical analysis, or engineering mathematics, such as:		
EN.570.695	Environmental Health and Engineering Systems Design	3
EN.570.697	Risk and Decision Analysis	3
EN.530.766	Numerical Methods	3
One course in Data Analytics and Statistical Methods, such as:		
EN.570.616	Data Analytics in Environmental Health and Engineering	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
Recommended electives include:		
EN.570.610	Engineering Microbiology	4
EN.570.615	Current Trends in Environmental Microbiology	3
EN.570.626	Groundwater, Porous Media, and Hydrogeology	3
EN.570.641	Environmental Inorganic Chemistry	3
EN.570.642	Environmental Organic Chemistry	3
EN.570.643	Aquatic and Biofluid Chemistry	3
EN.570.644	Physical and Chemical Processes	3
EN.570.652	Experimental Methods in Environmental Engineering and Chemistry	4
EN.570.690	Solid Waste Engineering and Management	3
EN.575.626	Hydrogeology	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
EN.575.708	Open Channel Hydraulics	3
EN.575.716	Principles of Estuarine Environment: The Chesapeake Bay Science and Management	3
EN.575.728	Sediment Transport and River Mechanics	3
EN.575.730	Geomorphic and Ecologic Foundations of Stream Restoration	3

Data science aNd analytics for ehe

This track emphasizes innovative computational, statistical, and “big data” tools with applications to environmental problems in air pollution, energy systems, hydrology, and climate change.

Code	Title	Credits
Data Science Foundations (2 courses)		
The following two courses are recommended:		
EN.570.616	Data Analytics in Environmental Health and Engineering	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
Students can also take the following courses to fulfill this requirement:		
EN.553.620	Introduction to Probability	4
EN.553.626	Introduction to Stochastic Processes	4
EN.553.630	Introduction to Statistics	4
AS.180.334	Econometrics	3
Environmental Foundations (3 courses)		
Students interested in air pollution and climate should consider the following courses:		
EN.570.657	Air Pollution	3
PH.182.615	Airborne Particles	4
PH.180.607	Climate Change and Public Health	3
AS.270.679	Atmospheric Science	
AS.270.641	Present and Future Climate	
AS.270.618	Remote Sensing of the Environment	
Students interested in hydrology and water resources should consider the following courses:		
EN.570.351	Introduction to Fluid Mechanics	3
EN.570.626	Groundwater, Porous Media, and Hydrogeology	3
EN.570.653	Hydrology	3
EN.570.647	Hydrologic Transport in the Environment	3
EN.570.651	Environmental Transport and Dispersion	3
EN.570.643	Aquatic and Biofluid Chemistry	3
AS.270.618	Remote Sensing of the Environment	
Students interested in energy systems should consider the following courses:		
EN.570.607	Energy Policy and Planning Models	3
EN.570.616	Data Analytics in Environmental Health and Engineering	3
EN.570.654	Geostatistics: Understanding Spatial Data	3
EN.570.697	Risk and Decision Analysis	3
Students interested in health applications should consider the following courses:		

PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
Advanced Data Science (2 courses)		
Students should take two additional courses in statistics, applied match, or computing. Graduate-level courses in the following department will fulfill this requirement: EHE (only Geostatistics fulfills this requirement if not used to fulfill requirements in the Data Science Foundations category), Applied Math and Statistics (e.g., Data Mining, Bayesian Statistics, Seminar in Data Analysis, and other courses), Computer Science (e.g., Parallel Programming, Causal Inference, and other courses), Biostatistics, and Earth & Planetary Sciences (only Inversion Modeling & Data Assimilation or Geoscience Modeling fulfills this requirement).		
Data Science Project (3 credits)		
This requirement is waived if students are conducting master's thesis research for credit.		

ENVIRONMENTAL MANAGEMENT AND ECONOMICS

This track focuses on the use of models of physical and economic systems to analyze and improve the design and operations of public policies, environmental control systems, and infrastructure for energy, transportation, water, and other critical services.

Code	Title	Credits
Core courses		
EN.570.873	Environmental Science & Management Seminar	1
Take 6 courses from the following focus areas:		
Fundamental Decision Frameworks		
EN.570.697	Risk and Decision Analysis	3
PH.318.603	Applied Microeconomics for Policymaking	3
or BU.220.620	Business Microeconomics	
Fundamental Tools		
EN.570.695	Environmental Health and Engineering Systems Design	3
EN.570.616	Data Analytics in Environmental Health and Engineering	3
or EN.570.654	Geostatistics: Understanding Spatial Data	
Fundamentals of Environmental Systems		
EN.570.610	Engineering Microbiology	4
EN.570.643	Aquatic and Biofluid Chemistry	3
EN.570.644	Physical and Chemical Processes	3
EN.570.653	Hydrology	3
EN.570.657	Air Pollution	3
AS.270.679	Atmospheric Science	
Applications		
EN.570.607	Energy Policy and Planning Models	3
EN.570.631	Collaborative Modeling for Resolving Water Resources Disputes	3
EN.560.653	An Introduction to Network Modeling	3
Electives		
Environmental History and Politics (recommend SAIS courses)		
EN.570.406	Environmental History	3
SA.500.104	Climate Change: Science, Economics and Politics	4
Methods		
EN.553.613	Applied Statistics and Data Analysis	4
EN.553.642	Investment Science	4
EN.553.661	Optimization in Finance	4
EN.560.618	Probabilistic Methods in Civil Engineering and Mechanics	3
Economics		
BU.450.630	Designing Experiments	2
PH.318.603	Applied Microeconomics for Policymaking	3
Energy Systems		
EN.510.405	Materials Science of Energy Technologies	3
EN.520.627	Photovoltaics and Energy Devices	3
EN.520.629	Networked Dynamical Systems	3
EN.530.629	Simulation and Analysis of Ocean Wave Energy Systems	3
EN.530.664	Energy Systems Analysis (graduate)	3
EN.540.630	Thermodynamics & Statistical Mechanics	3
AS.030.404	Electrochemical Systems for Energy Conversion and Storage	3
AS.271.402	Water, Energy, and Food	3
AS.410.777	Next Generation Alternative Energies	4
AS.425.604	Energy & Climate Finance	3
AS.425.601	Principles and Applications of Energy Technology	3
AS.425.625	Solar Energy:Science, Technology & Policy	3
SA.500.122	Life Cycle Assessment	4
SA.500.130	The Water, Energy and Food Nexus	4
SA.500.122	Life Cycle Assessment	4
Environmental Health Risk		
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.605	Methods in Quantitative Risk Assessment	4
PH.317.610	Risk Policy, Management and Communication	3

Geography and Environmental Engineering, PhD

A PhD student in the Department of Environmental Health and Engineering will explore the current state of knowledge in their field. Information and ideas developed by others are critically examined and placed in proper context. Subject areas are identified that are important to achieving the goals of the discipline, but which have not been explored or developed. The student will propose new research to improve understanding in this key area.

The goals for students in our Ph.D. program are:

- to develop reasoning skills that can be applied to new and unanticipated issues;
- learn how to pose questions and answer them in a logical manner;
- acquire a depth of understanding and technical knowledge in a particular study area, on par with others worldwide; and
- make a significant contribution to our understanding in this particular study area.

The emphasis in the Ph.D. degree is upon a sound foundation in the fundamentals required in a given area with considerable flexibility in course selection determined by the interests and background of each graduate student. Doctoral students must complete their formal coursework within their first two years of the program. The coursework should cover both the student's principal research area and include some breadth. Students may request to move to non-resident status in their final semester, with the approval of the department and Dean's Office once they have completed all exams and a defense date has been scheduled.

All students must pass departmental and Graduate Board oral examinations for the doctorate. Usually these examinations are taken after two years of academic work. Research leading to the dissertation should make an original contribution to the chosen field of specialization, and the result must be worthy of publication. A final dissertation defense that involves an open seminar and a closed oral examination is required of all EHE doctoral students. More information can be found in the departmental advising manual.

Research in Environmental Health and Engineering is diverse, however we believe all EHE students will gain from participating in courses that provide a foundation before pursuing their unique curriculum.

All EHE doctoral students are required to register for the following department seminars. Additional course requirements are listed in the EHE Graduate Student Handbook (https://publichealth.jhu.edu/departments/environmental-health-and-engineering/programs/graduate-programs/graduate-student-resources/).

Code	Title	Credits
EN.570.841	Wolman Seminar- Graduates (every semester)	1
PH.180.860	EHE Student Seminar & Grand Rounds (once per year in Years 2-4)	1

Doctoral students housed in WSE will also need to complete the following courses:

TA Requirement
Doctoral students are expected to TA a minimum of one semester (or three term-length courses in BSPH) and will enroll in PH.180.613.71 to certify TA requirement completion.

EHE Safety Seminars
Attendance is required at all of the scheduled meetings if any lab or field work is planned. This safety training is required each Fall semester for all students participating in lab-based research or field-based research. If there is a conflict with another class, students should ask the instructor to be excused from the other class. Watch for emails announcing the dates of the safety seminars.

Responsible Conduct of Research (RCR)
All WSE graduate students who conduct research must take the Responsible Conduct of Research training. It is expected that this training is conducted prior to participating in any research, preferably in the first semester of coursework. Students will not be able to graduate until this requirement is satisfied. PhD students must take the in-person version of this course, AS.360.625 Responsible Conduct of Research.

Academic Ethics Course
This WSE requirement is a 20-minute online tutorial to help educate all new graduate students about their academic and ethical responsibilities — all new students are required to complete this and receive a passing grade of four out of four. Students must successfully complete the online tutorial and quiz within the first eight weeks of their first semester in the graduate program. Students are automatically enrolled in the course. Students will not be able to graduate until this requirement is satisfied.

Occupational and Environmental Hygiene, Master of Science

The Master of Science (MS) in Occupational and Environmental Hygiene (OEH) program is a professional degree designed for students interested in developing or advancing professional careers in occupational and environmental risk assessment and management. This program is part of the Department's NIOSH-sponsored Education and Research Center in Occupational Safety and Health. Graduates of the program are employed in consulting, private industry and/or government, and they are also prepared to pursue doctoral studies in environmental health sciences. The program may be undertaken on a full-time or part-time/online basis and both options confer the same degree. Students interested in pursuing the part-time/online program should refer to Engineering for Professionals for more information.

The Master of Science in Occupational and Environmental Hygiene degree program is accredited by the Applied and Natural Sciences Accreditation Commission of ABET (https://www.abet.org/).

Program Educational Objectives

The MS OEH Educational Objectives focus on objectives that our graduates are expected to attain within a few years of graduation. The objectives were reviewed and approved by our external advisory committee on 2/21/2022 and are stated as follows:

The Program in Occupational and Environmental Hygiene educates students to think critically, communicate clearly, and collaborate effectively as they apply the fundamental scientific principles of industrial hygiene to environmental and workplace problems. We emphasize the importance of intellectual growth, professional ethics, and service to society.

The OEH Program has four broad educational objectives. Our efforts are focused on enabling students to:

1. Anticipate, recognize, evaluate, and control factors in the workplace and the environment that may cause illness, injury, or impairment;
2. Build a successful career and obtain professional certification using the comprehensive education and training received;
3. Integrate industrial hygiene techniques, biostatistics, epidemiology, management, and environmental health concepts into a broader occupational/environmental health practice; and
4. Pursue continuing education in research and professional practice of Occupational and Environmental Health.

General Student Outcomes

Students graduating with a MS in Occupational and Environmental Hygiene will have demonstrated an ability to:

1. Identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline;
2. Formulate or design a system, process, procedure, or program to meet desired needs;
3. Develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgement to draw conclusions;
4. Communicate effectively with a range of audiences;

5. Understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts; and
6. Function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Program Outcomes

1. Understand physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and /or stressors with the human body;
2. Anticipate, recognize, evaluate, and control potentially hazardous agents, conditions, and practices in workplace settings;
3. Apply fundamental exposure assessment techniques (both qualitative and quantitative) in workplace settings;
4. Perform industrial hygiene data interpretation of new and existing data including statistical and epidemiological principles;
5. Apply appropriate business and managerial practices to workplace settings;
6. Understand, interpret, and apply occupational and environmental standards and regulations; and
7. Understand fundamental aspects of safety and environmental health.

Students will undertake an appropriate professional experience tailored to the needs of the individual student and complete an Independent Professional Project (IPP) and present the results of the IPP in written form and orally.

For students particularly interested in careers in occupational hygiene the program is accredited by the Applied and Natural Science Accreditation Commission (ANSAC) of the Accreditation Board for Engineering and Technology (ABET), and is designed to prepare students for the Certified Industrial Hygienist (CIH) examination administered by the American Board of Industrial Hygiene (ABIH). Training in the program covers principles of risk assessment and management in the workplace and in the general environment. Coursework includes toxicology, epidemiology, biostatistics, occupational health, occupational and environmental hygiene, air pollution, environmental sampling, exposure assessment, and program management, as well as risk assessment, risk management and risk communication.

Students Seeking Additional Research/Internship Opportunities

Additional laboratory and internship opportunities are assessed on a case-by-case basis and should be discussed with your advisor before starting any work. Students who would like credit for working in a faculty lab can register for 182.845. Students who would like credit for additional internship hours outside of JHU can enroll in 182.810. This is applicable both for domestic students and international students who need to meet visa requirements.

The curriculum for Occupational and Environmental Hygiene is housed at Bloomberg School of Public Health. Please note that the school schedules courses by term rather than semester.

First Year Requirements

Code	Title	Credits
First Term		
PH.140.621	Statistical Methods in Public Health I	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.187.610	Public Health Toxicology	4
PH.188.680	Fundamentals of Occupational Health	3
PH.182.845	EHE MS Special Studies and Research	1
Second Term		
PH.140.622	Statistical Methods in Public Health II	4
PH.182.621	Introduction to Ergonomics	4
PH.182.614	Industrial Hygiene Laboratory	5
PH.182.625	Principles of Occupational and Environmental Hygiene	4
PH.182.845	EHE MS Special Studies and Research	1
Third Term		
PH.140.623	Statistical Methods in Public Health III	4
PH.182.615	Airborne Particles	4
PH.182.623	Occupational Health Management	3
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.182.845	EHE MS Special Studies and Research	1
Electives		
Fourth Term		
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
PH.188.681	Onsite Evaluation of Workplace and Occupational Health Programs	5
PH.182.845	EHE MS Special Studies and Research	1
Electives		
Summer - No registration required		

Second Year Requirements

Code	Title	Credits
First Term (fifth term of program)		
PH.182.622	Ventilation and Hazard Control	4
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.182.810	MS Field Placement	1
PH.182.850	EHE MS Essay	1
PH.182.845	EHE MS Special Studies and Research	1
Electives		
Second Term (sixth term of program)		
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.317.610	Risk Policy, Management and Communication	3
PH.182.850	EHE MS Essay	1 - 16
PH.182.845	EHE MS Special Studies and Research	1
Electives		

In addition, all students are required to complete 550.860.82 Academic & Research Ethics. This online course must be completed during the first term after matriculation.

Note: It is permissible to substitute the online versions of noted courses in place of the face-to-face versions. Online versions of courses are usually offered in different terms and may require rearrangement of other courses. Check with your advisor.

Internship or Independent Professional Project & Essay Requirement

As a requirement of the MS OEH program, each student must complete an independent professional project (IPP) and write a culminating essay that is presented in a formal seminar. The IPP can be completed as part of the internship experience for full-time students or in the context of a student's employment for part-time students. The essay is intended to serve as an integrating experience for the students. The content is based on an occupational or environmental health problem that is pertinent to the educational goals of the student and approved by the advisor. The essay is typically the product of an internship or employment experience. The essay represents a substantive application of professional technical skills through the process of collecting and summarizing data and reviewing appropriate literature. Where possible, students are encouraged to pursue projects that can lead to a publishable manuscript.

The full-time program includes a three-month internship. The internship is designed to provide professional experience tailored to the needs and interests of each student. During the internship, the student is expected to assume independent responsibility for a project, which is described in a culminating paper that serves as a review of the entire educational experience. Internship placements for full-time students are evaluated by asking field mentors to evaluate the student performance and each student to evaluate their internship. Students will register for 182.810 MS Field Placement.

General Engineering

The General Engineering program offers both a B.A. with a major in general engineering and a number of non-departmental courses.

Programs

- General Engineering, Bachelor of Arts (p. 1342)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.500.101. What Is Engineering?. 3 Credits.
This is a course of lectures, laboratories, and special projects. Its objective is to introduce students not only to different fields of engineering but also to the analytic tools and techniques that the profession uses. Assignments include hands-on and virtual experiments, oral presentations of product design, and design/construction/testing of structures. Freshmen only or Permission Required.

EN.500.103. Hopkins Engineering Sampler Seminar. 1 Credit.
This course provides students with an overview of the undergraduate programs in the Whiting School of Engineering. Faculty from various departments will introduce students to their discipline including aspects of their personal research. Freshmen only.

EN.500.109. What is Engineering?-Summer. 3 Credits.
To introduce engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig. Open only to high school students admitted to the Engineering Innovation Summer Program. Undergraduates should refer to EN.500.101.
Students may enroll in and complete EN.500.109 or EN.500.110, but not both.

EN.500.110. Engineering Innovation. 3 Credits.
To introduce engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig. Open only to high school students admitted to the Engineering Innovation Summer Program. Undergraduates should refer to EN.500.101.
Students may enroll in and complete EN.500.109 or EN.500.110, but not both.

EN.500.111. Hopkins Engineering Applications & Research Tutorials. 1 Credit.

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.114. Gateway Computing: Matlab. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.113 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.115. Gateway Data Science. 3 Credits.
This course introduces fundamental data science concepts and techniques. It is intended for all who plan work on data driven projects, and will serve as a prerequisite for advanced courses in data science and machine learning. Topics covered include linear and nonlinear regression, classification, clustering, and dimensionality reduction. Students deploy Python packages on data sets and apply data science methods on engineering and science problems. Course homework involves significant programming. Attendance and participation in class sessions are expected.
(EN.500.112 AND EN.500.133) OR EN.500.113 OR (EN.500.114 AND EN.500.133)

EN.500.130. Biomedical Engineering Innovation. 3 Credits.
To introduce biomedical engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Either Chemistry with Lab or Physics with Lab.

EN.500.132. Bootcamp: Java. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.601.107, EN.600.107, or EN.500.112;Students must have completed: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.580.200 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.133. Bootcamp: Python. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only
Not open to students who have completed EN.500.113 or EN.580.200;Students must have completed: EN.500.112 OR EN.500.114 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.134. Bootcamp: MATLAB. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.500.114 OR EN.580.200.;Students must have completed: EN.500.112 OR EN.500.113 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.501. SAB/JHU General Engineering Research (Abroad). 3 Credits.
General Engineering Research Project Abroad for undergraduate participating on summer projects with NUS, EPFL, SJTU, and DTU. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.500.551. Engineering Research Practicum.

EN.500.601. Research Laboratory Safety. 1 Credit.
This course covers physical, chemical, radiation, and biological hazards typically found in Johns Hopkins University research laboratories. It will use the “RAMP” (Recognize, Assess, Minimize, Prepare) framework originating in (Hill, R.H. Finster, D.C. Laboratory Safety For Chemistry Students, Wiley, 2nd Edition, 2016, 576pp.) and adopted by the American Chemical Society as a core concept for teaching laboratory safety. This framework does not depend on chemistry-specific practices (although it encompasses them as well as other disciplines), so it transfers well to general university-level research. The course also discusses the concepts of Inherently Safer Design of experiments. The course begins with a RAMP analysis of an assigned paper from the literature and concludes with a project analyzing a paper of the student’s choice.

EN.500.602. Seminar: Environmental and Applied Fluid Mechanics. 1 Credit.

EN.500.603. Graduate Orientation and Academic Ethics.

EN.500.851. Engineering Research Practicum. 1 - 9 Credits.

For current faculty and contact information go to http://engineering.jhu.edu/academics/general-engineering/people/

General Engineering, Bachelor of Arts

The Bachelor of Arts in General Engineering is a liberal arts degree that is designed to provide students with both a focus in some area of humanities or social sciences and the fundamental engineering principles needed to understand modern technology, innovations, and engineering practices. It is intended for undergraduate students who desire a background in engineering and technology yet have neither the desire nor the intention to become licensed, professional engineers. These students may, for example, plan to pursue graduate or professional study in architecture, business, law (e.g., intellectual property, patent law), or medicine. They may wish to work in areas which relate to engineering and technology or to thrive in the global industrial economy. The Bachelor of Arts in General Engineering is a true liberal arts degree with an emphasis in engineering.

This degree is not an engineering degree, and is not suitable for employment as a licensed, professional engineer. This program is not accredited by ABET. Students desiring careers as licensed, professional engineers should complete a B.S. degree in one of the engineering disciplines offered by the Whiting School.

The distinctive features of the Bachelor of Arts in General Engineering include:

- *Breadth.* Course requirements for the Bachelor of Arts in General Engineering encourage breadth, including mathematics, natural sciences, humanities and/or social sciences, international studies (language or other courses and experience in a foreign country), and in engineering. The curriculum also allows for many free electives.
- *Flexibility.* This program is designed to allow students, in consultation with their advisor, the flexibility to choose a program of study that matches their interests. The engineering focus area and the humanities and social science requirements may be departmentally based or may follow a theme designed by the student and his/her advisor. Students are encouraged to minor in any area of their choosing.
- *Interdisciplinary Study.* The distribution requirements are ideal for students who seek to understand areas at the interface between technical fields (such as robotics, nanotechnology, and biomaterials)

or the connections between a technical area and a discipline in the humanities or social sciences (for example environment issues and international trade or ethics and biotechnology).

- *International Dimensions of Engineering.* Students are required to develop knowledge of the international dimensions of engineering. They may do this by studying abroad or by taking a combination of language and other classes that develop an understanding of the culture, technology, or society in a foreign country.

Program Requirements

All undergraduate students majoring in the Bachelor of Arts in General Engineering must follow a program approved by their advisor. Candidates must fulfill the overall requirements for the bachelor's degree (p. 1086)described in this catalogue. These include the university writing requirement, distribution requirement and 120 credit minimum. Sample curricula and details on focus areas can be found in the Advising Manual for general engineering (https://engineering.jhu.edu/academics/general-engineering/).

Code	Title	Credits
Mathematics		20
Natural Sciences		14-15
Humanities and Social Sciences		24
International Dimensions of Engineering		9
Engineering Core		13-18
Engineering Focus Area		20
Electives (to ensure a minimum of 120 credits total)		14-20

Mathematics

Mathematics is at the core of modern science and technology and a solid foundation is required to understand how contemporary engineering problems are solved. Students are required to take five courses including:

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
or AS.110.106	Calculus I (Biology and Social Sciences)	
Select one of the following:		4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	
AS.110.113	Honors Single Variable Calculus	
One course in statistics		4
One course at the 200-level or above from either the Applied Mathematics & Statistics or the Mathematics department		4
One elective course at any level from either the Applied Mathematics & Statistics or the Mathematics department		4
Total Credits		**20**

Natural Sciences

Students are required to take four courses and two laboratory courses including:

Code	Title	Credits
Select one of the following: [1]		3-4
AS.171.101	General Physics: Physical Science Major I	
AS.171.103	General Physics I for Biological Science Majors	
AS.171.105	Classical Mechanics I	
AS.171.107	General Physics for Physical Sciences Majors (AL)	
EN.530.123	Introduction to Mechanics I	
AS.030.101	Introductory Chemistry I	3
or AS.020.151	General Biology I	
Two terms of laboratory course [2]		2
Two elective courses (area code N)		6
Total Credits		**14-15**

1 EN.530.123 Introduction to Mechanics I, may be used to satisfy the Natural Sciences requirement if taken in conjunction with EN.530.124 Intro to Mechanics II.

2 Integrated lab from AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab may count as 1 lab.

Humanities and Social Sciences

- *Writing Requirement.* Students must complete at least four (minimum of 12 credits) writing-intensive courses (W). At least one of the courses must be EN.661.110 Professional Writing and Communication.
- *Humanities or Social Science Focus.* A minimum of four courses (12 credits) must be taken as a coherent group in either the humanities or social sciences, of which two are at the advanced (300+) level.
- *Humanities or Social Science Elective.* Three additional courses (9 credits) in either the humanities or social sciences are required. These electives are typically used to take courses in economics and history of science and technology, depending on the courses chosen to fulfill the concentration requirements detailed above.

International Dimensions of Engineering

Because of the importance of the globalization of technology, all students completing the B.A. in general engineering are required to demonstrate competence in being able to address technical issues within the context of another society. This can be done in one of three different ways.

- *S*tudents may study abroad for a minimum of one fall or one spring semester in any foreign country (except Canada). In that country, they must take the equivalent of a minimum of 12 credits which are transferred to their Hopkins transcript. In this case, these credits can satisfy any degree requirements (Humanities or Social Sciences, Engineering Concentration, Mathematics, Free Electives, etc.).
- Students may complete the equivalent of two semesters of the same foreign language (students may not use language courses in their native language to satisfy this requirement) and one additional course which relates to the culture, economy, social structure, or politics of a country to which uses this foreign language (9 credits).
- *S*tudents may demonstrate proficiency in a foreign language by taking an intermediate course in a foreign language (this can include their native tongue) and two additional courses which relate to the culture, economy, social structure, or politics of a country which uses this foreign language (9 credits).

Engineering Core

One course that is an introduction to an engineering discipline. Examples include:

Code	Title	Credits
EN.500.101	What Is Engineering?	3
EN.510.106	Foundations of Materials Science & Engineering	3
EN.520.137	Introduction To Electrical & Computer Engineering	3

EN.530.107 & EN.530.108 & EN.530.111	MechE Undergraduate Seminar I and MechE Undergraduate Seminar II and Intro to MechE Design and CAD	3
EN.540.101	Chemical Engineering Today	1
EN.560.100	Civilization Engineered	3
EN.570.108	Introduction to Environmental Engineering and Design	3

One course (at least 3 credits) in a computer language. Examples include:

Code	Title	Credits
EN.500.112	Gateway Computing: JAVA	3
EN.500.113	Gateway Computing: Python	3
EN.500.114	Gateway Computing: Matlab	3
EN.601.220	Intermediate Programming	4

Three courses in the fundamentals of engineering science (at least one course from three of the following four areas):

Area 1: Circuits/Electronics

Code	Title	Credits
EN.520.230 & EN.520.231	Mastering Electronics and Mastering Electronics Laboratory	5

Area 2: Statics

Code	Title	Credits
EN.560.201	Statics & Mechanics of Materials	3

Area 3: Materials Science

Code	Title	Credits
EN.510.311	Structure Of Materials	3
or EN.530.352	Materials Selection	

Area 4: Thermodynamics

Code	Title	Credits
EN.510.312	Thermodynamics/Materials	3
or EN.530.231	Mechanical Engineering Thermodynamics	
or EN.540.203	Engineering Thermodynamics	

Engineering Focus Area

The engineering focus area must consist of at least six courses (minimum of 20 credits) that are related thematically or departmentally; at least three (3) courses of which must be at the advanced level (300 or above). While examples of focus areas are provided in the Advising Manual, students are encouraged to develop their own focus areas in consultation with their faculty advisor.

Free Electives

Students must complete a minimum of 120 credits in total. The number of courses required will depend on how the International Dimensions requirement is satisfied and on the courses chosen in other areas. Students must select these courses in consultation with their advisor. These free electives are designed to allow students to develop a curriculum of study uniquely suited to their interests.

Students are required to have a minimum cumulative GPA of 2.0 to graduate. Further, a maximum of 12 “D” credits may be counted toward degree requirements. No more than 12 credits completed prior to matriculation or in summer sessions at other accredited colleges or universities may be accepted.

Transfer students are not subject to 12 credits of transfer credit restriction; they must obtain credit for courses they wish to transfer during their first year at Hopkins. University regulations require a minimum of four consecutive full-time semesters and 60 credits earned at JHU for a Hopkins degree.

Information Security Institute

http://isi.jhu.edu/

The Johns Hopkins University Information Security Institute (ISI) is the University’s focal point for research and education in information security, assurance and privacy. Securing cyberspace and our national information infrastructure is more critical now than ever before, and it can be achieved only when the core technology, legal and policy issues are adequately addressed. ISI is committed to a comprehensive approach that includes input from academia, industry and government. The University, through ISI’s leadership, has thus been designated as a Center of Academic Excellence in Information Assurance Education and Research by the National Security Agency and the Department of Homeland Security, and leading experts in the field. Through our broad range of educational opportunities including a ground-breaking graduate program and leading edge research in foundational science and applied technologies, ISI is having a significant impact in the region and nationwide.

Our research in cryptography, networking, wireless, systems evaluation, medical privacy and electronic voting, among other areas is widely circulated among academics and policymakers. Moreover, ISI is instrumental in homeland security efforts across Hopkins, including emergency health preparedness, bio-terrorism and national defense.

The Johns Hopkins University Information Security Institute based in the Whiting School of Engineering provides a broad and holistic perspective to the information security and assurance field relative to both research and education. In addition to a comprehensive collection of programs related to information technology, a range of management, governance, and policy issues are integrated into the Information Security Institute agenda. The breadth of focus provided represents a strength and distinction of the Johns Hopkins University Information Security Institute. Through the involvement of the faculty and resources from the Whiting School of Engineering, the Krieger School of Arts and Sciences, the Bloomberg School of Public Health, the Carey Business School, and the Applied Physics Lab, a variety of innovative as well as international research and educational initiatives in information security and assurance are supported within the Information Security Institute.

Facilities

The computing facilities include a laboratory of shared servers and PC workstations, and customizable machines and special devices for student projects. Various focused research laboratories have additional resources that provide greater specialization than the general lab. The facilities are connected to a secure high-speed network which allows access to specialized hardware in other departments and institutions. The Information Security Institute and Department of Computer Science cooperate in the use of some of these facilities.

Programs

- Security Informatics, Master of Science (p. 1348)
- Security Informatics, Master of Science/Applied Mathematics and Statistics, Master of Science in Engineering Dual Master's Program (p. 1351)
- Security Informatics, Master of Science/Computer Science, Master of Science in Engineering Dual Master's Program (p. 1351)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.650.601. Introduction to Information Security. 3 Credits.
This course exposes students to the cross-disciplinary and broad information security field. It surveys a range of fundamental topics of information security principles, architecture, policy and standard, risk management, cryptography, physical, operation, system and network security mechanisms, and law and ethics, among others. This course includes lectures, case studies, and homework. Students will also complete independent study class projects. Recommended Course Background: Basic knowledge of computer system and information technology.

EN.650.614. Rights In Digital Age. 3 Credits.
This course will examine various legal and policy issues presented by the tremendous growth in computer technology, especially the Internet. The rights that various parties have with respect to creating, modifying, using, distributing, storing, and copying digital data will be explored. The concurrent responsibilities, and potential liabilities, of those parties will also be addressed. The course will focus on intellectual property issues, especially copyright law, and other legal and economic considerations related to the use and management of digital data. Copyright law and its role within the framework of intellectual property law will be presented in a historical context with an emphasis on its applicability to emerging-technology issues. Specifically, the treatment of various works, such as music, film, and photography that were traditionally, analog in nature will be analyzed with respect to their treatment in the digital domain; works that are by their nature digital, such as computer software, will also be analyzed. The current state of U.S. copyright law will be presented, as will relevant international treaties and foreign laws. The goal of the course is to provide those involved or interested in digital rights management with a general awareness of the rights and obligations associated with maintaining and distributing digital data. (This course will be taught in Washington, DC and video-cast on Homewood Campus.)

EN.650.621. Critical Infrastructure Protection. 3 Credits.
This course focuses on understanding the history, the vulnerability, and the need to protect our Critical Infrastructure and Key Resources (CIKR). We will start by briefly surveying the policies which define the issues surrounding CIKR and the strategies that have been identified to protect them. Most importantly, we will take a comprehensive approach to evaluating the technical vulnerabilities of the 18 identified sectors, and we will discuss the tactics that are necessary to mitigate the risks associated with each sector. These vulnerabilities will be discussed from the perspective of ACM, IEEE or other technical journals/articles which detail recent and relevant network-level CIKR exploits. We will cover well known vulnerable systems such the Internet, SCADA or PLC and lesser known systems such as E911 and industrial robot. Also, a class project is required. Recommended Course Background: EN.650.424 or equivalent or permission by instructor.

EN.650.624. Network Security. 3 Credits.
This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. Course Background: EN.601.220, EN.601.226, EN.601.418 or equivalent.
Students may only earn credit for one of the following courses: EN.650.624 OR EN.601.444 OR EN.601.644

EN.650.631. Ethical Hacking. 3 Credits.
Cyber security affects every facet of industry and our government, and thus is now a threat to National Security. This course is designed to introduce students to the skills needed to defend computer network infrastructure by exposing them to the hands-on identification and exploitation of vulnerabilities in servers (i.e., Windows and Linux), wireless networks, websites, and cryptologic systems. These skills will be tested by having teams of students develop and participate in instructor lead capture-the-flag competitions. Also included are advanced topics such as shell coding, IDA Pro analysis, fuzzing, and writing or exploiting network-based applications or techniques such as web servers, spoofing, and denial of service.

EN.650.640. Moral & Legal Foundations of Privacy. 3 Credits.
This course explores the ethical and legal underpinnings of the concept of privacy. It examines the nature and scope of the right to privacy by addressing fundamental questions such as: What is privacy? Why is privacy morally important? How is the right to privacy been articulated in constitutional law?

EN.650.653. Financial Issues in Managing a Secure Operation. 3 Credits.
This course addresses the risks (financial, reputation, business, and third party), costs, ROI, and other business issues concerned in planning and managing a secure operation. Topics include disaster recovery, outsourcing issues; service level agreements; evaluating external security service providers; assessing security total cost of ownership; audit procedures; financial integrity; cost/benefit analyses; back-up and recovery provisions; insurance protection; contingency and business continuity plans; qualitative and quantitative risk analysis; monitoring the security of the enterprise; information economics; performance reporting; automated metrics reporting; responses to threats; effects of security policies and practices on business and customers; preparing a business case for information security investments; and developing cost-effective solutions given constraints in money, assets, and personnel. Case studies and exercises will be used to illustrate financial planning and evaluation of security operations.

EN.650.654. Computer Intrusion Detection. 3 Credits.
Intrusion detection supports the on-line monitoring of computer system activities and the detection of attempts to compromise normal services. This course starts with an overview of intrusion detection tasks and activities. Detailed discussion introduces a traditional classification of intrusion detection models, applications in host-centered and distributed environments, and various intrusion detection techniques ranging from statistical analysis to biological computing. This course serves as a comprehensive introduction of recent research efforts in intrusion detection and the challenges facing modern intrusion detection systems. Students will also be able to pursue in-depth study of special topics of interest in course projects.

EN.650.655. Implementing Effective Information Security Programs. 3 Credits.

This course focuses on the personnel, legal, regulatory and privacy issues that comprise the basic security management areas that must be considered when developing and implementing an effective information security program. Specific topics include security-related legislation, government and industry security frameworks, the identification and management of risk, security controls, defense in depth, critical infrastructure protection, development and implementation of an enterprise wide security strategy, and organizational roles and responsibilities.
Area: Writing Intensive

EN.650.656. Computer Forensics. 3 Credits.

This course introduces the student to the field of applied Computer Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "dead box" (powered off) data extraction and analysis with open-source tools. Topics covered include legal and regulatory issues, forensic imaging and data acquisition from a "dead" system, computer file systems (FAT/NTFS) and data recovery, Windows Registry and configuration records, Windows log analysis and operating system artifacts, memory dump analysis (RAM), software artifacts, computer network forensics, introductory mobile device forensics, case reporting and documentation, end-to-end computer forensic examinations, peer review, and testifying in court.

EN.650.658. Introduction to Cryptography. 3 Credits.

Cryptography has a rich history as one of the foundations of information security. This course serves as the introduction to the working primitives, development and various techniques in this field. It emphasizes reasoning about the constraint and construction of cryptographic protocols that use shared secret key or public key. Students will also be exposed to some current open problems. Permission of instructor only.

EN.650.660. Software Vulnerability Analysis. 3 Credits.

Competent execution of security assessments on modern software systems requires extensive knowledge in numerous technical domains and comprehensive understanding of security risks. This course provides necessary background knowledge and examines relevant theories for software vulnerabilities and exploits in detail. Key topics include historical vulnerabilities, their corresponding exploits, and associated risk mitigations. Fundamental tools and techniques for performing security assessments (e.g., software reverse engineering, static analysis, and dynamic analysis) are covered extensively. The format of this course includes lectures and assignments where students learn how to develop exploits to well-known historical vulnerabilities in a controlled environment. Students will complete and demonstrate a project as part of the course.

EN.650.663. Cloud Computing Security. 3 Credits.

Cloud computing promises significant cost savings via economies of scale that typically are not achievable by a single organization. This course examines cloud computing in detail and introduces the security concerns associated with cloud computing. Key topics include service models for cloud computing, virtualization, storage, management, and data processing. Fundamental security principles are introduced and applied to cloud computing environments. The format of this course includes lectures and hands-on assignments. Students will complete a project and present it as part of the course.

EN.650.672. Security Analytics. 3 Credits.

Security analytics refers to information technology solutions that gather and analyze security events to bring situational awareness and enable IT staff to understand and analyze events that pose the greatest risk. Increasingly, detecting and preventing cyber attacks require sophisticated use of data analytics and machine learning tools. This course will cover fundamental theories and methods in data science, modern security analytical tools, and practical use cases of security analytics. Students of this course learn concepts, tasks, and methods of data science; and how to apply data science to cyber security problems. Students also learn how to use modern software in security analytics. Recommend Course Background: Basic knowledge of statistics; Either python or R programming skill (do not require both).

EN.650.673. Mobile and Wireless Security. 3 Credits.

The past few decades have seen a rapid evolution of wireless LAN and cellular technologies. In addition to wireless access technologies, various types of network layer and application layer mobility protocols have been developed to provide seamless connectivity to mobile users. Maintaining end-to-end security for these mobile users needs to take into account authentication, authorization, integrity and confidentiality as mobile devices change their point-of-attachment. This course will provide an overview of various wireless access technologies, mobility protocol taxonomy and will describe end-to-end security including mobile end point, radio access network, network core, and application services. In addition, this will include hands-on lab experiments to examine security over wireless and mobile networks and a research group project. Overall objective of this course is to impart both theoretical and practical knowledge to the students, and at the same time make them ready for any future research to solve complex problems. Recommended Course Background: Knowledge of TCP/IP, Linux, Fundamentals of Networking

EN.650.681. Global Cybersecurity Trends and Practices. 3 Credits.

This course provides an overview of cybersecurity capabilities and practices in the global community. International organizations engaged in cybersecurity policy and governance and the national strategies of many countries are examined in detail. Students will gain insights into the political, economic, military, and technological components of cybersecurity as practiced in the U.S., UK, China, Russia, and other countries. The course is designed around four general themes: global cyber threats, strategies and policies in response to cyber threats, comparative cybersecurity capabilities of nation-states; and cybersecurity in international politics. Students will also gain an appreciation of key cybersecurity issues like critical infrastructure protection and information sharing in the international context. The course will provide students a broad perspective on the global context of cybersecurity, complementing knowledge gained in other courses in the graduate program. There will be assignments to study key literature and current events, as well as quizzes and a mid-term exam. Students will also conduct research projects that focus on the interaction of technology, policy, strategy, and governance, and present results to the class. EN.650.401/EN.650.601 recommended

EN.650.683. Cybersecurity Risk Management. 3 Credits.
Data breaches, cyber attacks, cybercrime, and information operations in social media continue to increase in frequency and severity, causing businesses and governments to focus more resources on cybersecurity risk management and compliance. Utilizing real-world data breaches and attacks as motivation, this course will provide students knowledge of risk management concepts, frameworks, compliance regimes and best industry practices used to ensure sound cybersecurity practices in government, commercial, and academic organizations. Lab exercises will provide opportunities for students to experience key aspects of the risk management process and help prepare them for post-graduation assignments as cybersecurity professionals. Recommended Course Background: EN.650.601.

EN.650.757. Advanced Computer Forensics. 3 Credits.
This course will analyze advanced topics and state of the art issues in the field of digital forensics. The course will be run in a research seminar format and students will be given both basic and applied research projects in such areas as: intrusion analysis, network forensics, memory forensics, mobile devices, and other emerging issues.

EN.650.836. Information Security Projects. 1 Credit.
All MSSI programs must include a project involving a research and development oriented investigation focused on an approved topic addressing the field of information security and assurance from the perspective of relevant applications and/or theory. There must be project supervision and approval involving a JHUISI affiliated faculty member. A project can be conducted individually or within a team-structured environment comprised of MSSI students and an advisor. A successful project must result in an associated report suitable for on-line distribution. When appropriate, a project can also lead to the development of a so-called "deliverable" such as software or a prototype system. Projects can be sponsored by government/industry partners and affiliates of the Information Security Institute, and can also be related to faculty research programs supported by grants and Contracts. Required course for any full-time MSSI student. Open to MSSI students. Permission required for non-MSSI students.

EN.650.837. Information Security Projects. 1 Credit.
Open to MSSI students Permission Required for non-MSSI students
All MSSI programs must include a project involving a research and development oriented investigation focused on an approved topic addressing the field of information security and assurance from the perspective of relevant applications and/or theory. There must be project supervision and approval involving a JHUISI affiliated faculty member. A project can be conducted individually or within a team-structured environment comprised of MSSI students and an advisor. A successful project must result in an associated report suitable for on-line distribution. When appropriate, a project can also lead to the development of a so-called "deliverable" such as software or a prototype system. Projects can be sponsored by government/industry partners and affiliates of the Information Security Institute, and can also be related to faculty research programs supported by grants and Contracts. Required for MSSI students on full-time status.

EN.650.840. Information Security Independent Study. 3 Credits.
Individual study in an area of mutual interest to a graduate student and a faculty member in the Institute.

Computer Science

EN.601.631. Theory of Computation. 3 Credits.
This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, complexity theory, randomized algorithms, inapproximability, interactive proof systems and probabilistically checkable proofs. Students may not take both EN.601.231 and EN.601.631, unless one is for an undergrad degree and the other for grad. [Analysis]Recommended Course Background: EN.553.171 or istructor permission.

EN.601.633. Intro Algorithms. 3 Credits.
Same material as EN.601.433, for graduate students.This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis. [Analysis] Required background: Data Structures and Discrete Math or Automata/Computation Theory
Students may receive credit for only one of EN.600.363, EN.600.463, EN.601.433, EN.601.633.

EN.601.640. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]Required background: data structures and computer system fundamentals.
Students may receive credit for only one of 601.640/440/640

EN.601.641. Blockchains and Cryptocurrencies. 3 Credits.
Same as EN.601.441, for graduate students. This course will introduce students to cryptocurrencies and the main underlying technology of Blockchains. The course will start with the relevant background in cryptography and then proceed to cover the recent advances in the design and applications of blockchains. This course should primarily appeal to students who want to conduct research in this area or wish to build new applications on top of blockchains. It should also appeal to those who have a casual interest in this topic or are generally interested in cryptography. Students are expected to have mathematical maturity. Recommended Course Background: EN.601.226 AND (EN.553.310 OR EN.553.420) [Analysis]
Students may receive credit for only one of EN.600.451 OR EN.601.441 OR EN.601.641

EN.601.642. Modern Cryptography. 3 Credits.
Same material as 601.442, for graduate students. Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis] Required course background: Probability & Automata/Computation Theory
Students may receive credit for only one of EN.601.442 OR EN.601.642.

EN.601.643. Security & Privacy in Computing. 3 Credits.
Same material as 601.443, for graduate students. Lecture topics will include computer security, network security, basic cryptography, system design methodology, and privacy. There will be a heavy work load, including written homework, programming assignments, exams and a comprehensive final. The class will also include a semester-long project that will be done in teams and will include a presentation by each group to the class. [Applications] Required Course Background: A basic course in operating systems and networking, or permission of instructor.
Students may receive credit for only one of EN.600.443, EN.601.443, EN.601.643.

EN.601.644. Network Security. 3 Credits.
Same material as 601.444, for graduate students. This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. [Systems]Recommended. Course Background: EN.601.220, EN.601.226 or equivalent
Students may receive credit for only one of EN.600.454, EN.650.454, EN.601.445, EN.601.645.

EN.601.645. Practical Cryptographic Systems. 3 Credits.
Same material as 601.445, for graduate students. This semester-long course will teach systems and cryptographic design principles by example: by studying and identifying flaws in widely-deployed cryptographic products and protocols. Our focus will be on the techniques used in practical security systems, the mistakes that lead to failure, and the approaches that might have avoided the problem.We will place a particular emphasis on the techniques of provable security and the feasibility of reverse-engineering undocumented cryptographic systems. [Systems]
Students may receive credit for EN.600.454/EN.601.445 or EN.601.645, but not both.

EN.601.740. Language-based Security. 3 Credits.
This course will introduce Language-based Security, an emerging field in cyber security that leverages techniques from compilers and program analysis for security-related problems. Topics include but are not limited to: Control-flow and data-flow graphs, Program slicing, Code property graph (CPG), and Control-flow integrity. Students are expected to read new and classic papers in this area and discuss them in class. Recommended backgrounds are Operating Systems and preferably Compilers.

EN.601.741. Advanced Topics in Secure and Censorship-Resistant Communications. 3 Credits.
Topics will vary from year to year, but will focus on applied cryptography and communications, focused on the development of secure and uncensorable communication mechanisms for communities at risk. This course will include topics such as: communication protocol design and analysis, blockchain-based protocols, anonymous communication, cryptographic backdoors, and other topics. Emphasis in this course is on understanding how cryptographic issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. The course will consist of in-class workshops and interactive discussions. There will be programming assignments and a course project with real world impact. Students will also be expected to read assigned papers and to present at least one research paper and lead a discussion on it. [Systems]
((EN.601.441 OR EN.601.641) OR (EN.601.442 OR EN.601.642) OR (EN.601.445 OR EN.601.645))

EN.601.742. Advanced Topics in Cryptography. 3 Credits.
This course will focus on advanced cryptographic topics with an emphasis on open research problems and student presentations.

EN.601.743. Advanced Topics in Computer Security. 3 Credits.
Topics will vary from year to year, but will focus mainly on network perimeter protection, host-level protection, authentication technologies, intellectual property protection, formal analysis techniques, intrusion detection and similarly advanced subjects. Emphasis in this course is on understanding how security issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. Students will study and present various advanced research papers to the class. There will be homework assignments and a course project. A college level security or crypto course at Hopkins or any other school is required.

EN.601.745. Advanced Topics in Applied Cryptography. 3 Credits.
This reading and project based course will explore the latest research in the area of applied cryptography and cryptographic engineering. Topics covered will include zero knowledge, efficient multiparty computation, cryptocurrencies, and trusted computing hardware. Readings will be drawn from the latest applied cryptography and security conferences. The course will include both reading, critical analysis, presentations and a course programming project. [Analysis or Applications]
EN.600.454 OR EN.601.445 OR EN.601.645 OR EN.600.442 OR EN.601.442 OR EN.601.642

For current faculty and contact information go to https://www.cs.jhu.edu/academic-programs/graduate-studies/ms-in-security-informatics/

Security Informatics, Master of Science

M.S.S.I. Graduate Program

The flagship educational experience offered by Johns Hopkins University in the area of information security and assurance is represented by the Master of Science in Security Informatics (M.S.S.I.) degree. A wide range of courses is available in support of this unique and innovative graduate program.

The M.S.S.I. is a full-time day program offered on the Homewood Campus in North Baltimore. Most students complete the program in three full-time semesters though some graduate students may finish their degree part-time after completing the required two consecutive semesters of residency as a full-time student.

Combined Undergraduate/ Graduate Program

A combined bachelor's/master's degree program including the M.S.S.I. is also available to Johns Hopkins University students. In this program, by the conclusion of the undergraduate sophomore/junior academic year, a student can apply for combined admission into the M.S.S.I. program. If accepted, the student during each subsequent semester partitions their course load into courses that will count for the undergraduate degree and courses that will count for the M.S.S.I. degree. Usually with one additional year of study, the student can simultaneously satisfy both sets of degree requirements. For more information on the combined bachelor's/master's status, please visit https://engineering.jhu.edu/academics/combined-bachelors-masters/.

Program Requirements

Course Requirements for the M.S.S.I. Degree

The Master of Science in Security Informatics program has a course requirement of a minimum of 10 courses, plus a team-based capstone project including a report and presentation. Students must choose one of two tracks – Technology & Research Track or Policy & Management Track.

All courses supporting the M.S.S.I. are categorized into four areas of Technology, Policy, Health, and Management. Each course may be further classified into Core, Elective or Foundational category.

The Technology & Research Track program of study must satisfy the following course distribution requirements:

- Five Technology courses: at least four Core Technology courses including at least one Core Technology course in Cryptography.
- Three Core Policy/Management/Health courses: at least one Core Policy course and one Core Management course.
- Two additional courses from Core or Elective Technology categories; or when deemed appropriate relative to a student's background, interests, and goals AND with the prior approval of the faculty advisor and the program, from other course areas.

The Policy & Management Track program of study must satisfy the following course distribution requirements:

- Three Technology courses: at least two Core Technology courses including at least one Core Technology course in Cryptography.
- Five Core/Foundational Policy/Health/Management courses: at least one course from each of Core Policy/Management/Health categories and at least one Foundational Management course.
- Two additional courses from Core/Elective Technology or Core/Foundational Policy/Management/Health categories; or when deemed appropriate relative to a student's background, interests, and goals AND with the prior approval of the faculty advisor and the program, from other course areas.

Capstone Project Requirement for the M.S.S.I. Degree

The required M.S.S.I. Capstone Project will include both technology and non-technology components, and will be conducted within a team-structured environment comprising students and faculty mentors (plus external mentors or research assistants if appropriate). These projects can be sponsored by government/industry partners and affiliates, and can also be related to faculty research projects supported by grants and contracts. They should relate to real-world problems and exhibit both theoretical and practical significance. The project must be documented by a report and presentation, as well as other applicable deliverables including but not limited to system prototypes, utility libraries, experimental demonstrations, conference or journal submissions, and so on. It should follow the best practice of software engineering and research ethics including public disclosure of security vulnerability.

Students should actively initiate the project while communicating with a potential faculty mentor. They are expected to develop a project plan before the project starts. In addition to regular project meetings and briefings, a final presentation will be scheduled when the project concludes. The capstone faculty mentor should approve each milestone of the project. When the project is completed with all the deliverables, the faculty mentor determines whether the project is satisfactory for the M.S.S.I. degree requirement.

Additional Course Requirements

- All courses toward the degree requirement must be 600-level or above. Other courses can be used with the approval of the program.
- Courses not found on the area-specific lists (https://www.cs.jhu.edu/academic-programs/graduate-studies/ms-in-security-informatics/mssi-course-distribution/) can be used to meet area requirements with prior approval from the student's advisor and the program.
- At most two independent study courses can be counted toward the course requirements.
- No courses with grades of P may be counted with the exception of independent study courses.
- At most two courses may be transferred from other institutions. The student's faculty advisor and the M.S.S.I Director must approve such transfer courses.
- The overall grade point average of the courses counted towards the coursework requirements must be 3.00 or higher.
- At most two courses with grade less than B- may be counted towards the course work requirements. No courses with grade less than C- may be counted.
- A grade of D or F results in probation. A second D or F is cause for being dropped from the program.
- Completion of EN.500.603 Graduate Orientation and Academic Ethics and Responsible Conduct of Research training (https://engineering.jhu.edu/research/resources-policies-forms/responsible-conduct-of-research-training-for-students-and-postdoctoral-fellows-revised-spring-2020/).

MSSI Courses

Code	Title	Credits
EN.601.640	Web Security	3
EN.601.641	Blockchains and Cryptocurrencies	3
EN.601.642	Modern Cryptography	3
EN.601.643	Security & Privacy in Computing	3
EN.601.644	Network Security	3
EN.601.645	Practical Cryptographic Systems	3
EN.601.740	Language-based Security	3
EN.601.741	Advanced Topics in Secure and Censorship-Resistant Communications	3
EN.601.742	Advanced Topics in Cryptography	3

EN.601.743	Advanced Topics in Computer Security	3
EN.601.745	Advanced Topics in Applied Cryptography	3
EN.650.601	Introduction to Information Security	3
EN.650.614	Rights In Digital Age	3
EN.650.621	Critical Infrastructure Protection	3
EN.650.624	Network Security	3
EN.650.631	Ethical Hacking	3
EN.650.640	Moral & Legal Foundations of Privacy	3
EN.650.653	Financial Issues in Managing a Secure Operation	3
EN.650.654	Computer Intrusion Detection	3
EN.650.655	Implementing Effective Information Security Programs	3
EN.650.656	Computer Forensics	3
EN.650.658	Introduction to Cryptography	3
EN.650.660	Software Vulnerability Analysis	3
EN.650.663	Cloud Computing Security	3
EN.650.672	Security Analytics	3
EN.650.673	Mobile and Wireless Security	3
EN.650.681	Global Cybersecurity Trends and Practices	3
EN.650.683	Cybersecurity Risk Management	3
EN.650.757	Advanced Computer Forensics	3
EN.650.836	Information Security Projects	1
EN.650.837	Information Security Projects	1
EN.650.840	Information Security Independent Study	3

- For seven-week course modules, e.g., several courses offered through the Whiting School of Engineering Center for Leadership Education (CLE) (http://eng.jhu.edu/wse/cle/), two of them count as one course of 3 credit hours.
- For quarter-based courses, e.g., several courses of course numbers starting with ME from the School of Medicine Division of Health Sciences Informatics (http://dhsi.med.jhmi.edu/), two of them are equivalent of one WSE course of 3 credit hours.

Core Technology Courses

Code	Title	Credits
EN.601.640	Web Security	3
EN.601.642	Modern Cryptography	3
EN.601.643	Security & Privacy in Computing	3
EN.601.644	Network Security	3
EN.601.645	Practical Cryptographic Systems	3
EN.601.740	Language-based Security	3
EN.601.741	Advanced Topics in Secure and Censorship-Resistant Communications	3
EN.601.742	Advanced Topics in Cryptography	3
EN.601.743	Advanced Topics in Computer Security	3
EN.601.745	Advanced Topics in Applied Cryptography	3
EN.650.601	Introduction to Information Security	3
EN.650.624	Network Security	3
EN.650.631	Ethical Hacking	3
EN.650.654	Computer Intrusion Detection	3
EN.650.656	Computer Forensics	3
EN.650.658	Introduction to Cryptography	3
EN.650.660	Software Vulnerability Analysis	3
EN.650.663	Cloud Computing Security	3
EN.650.672	Security Analytics	3
EN.650.673	Mobile and Wireless Security	3
EN.650.757	Advanced Computer Forensics	3

Elective Technology Courses

Code	Title	Credits
EN.601.631	Theory of Computation	3
EN.601.633	Intro Algorithms	3
EN.601.641	Blockchains and Cryptocurrencies	3
EN.650.621	Critical Infrastructure Protection	3
EN.650.840	Information Security Independent Study	3
EN.695.637	Introduction to Assured AI and Autonomy	3
EN.695.715	Assured Autonomy	3

Core Policy Courses

Code	Title	Credits
EN.650.614	Rights In Digital Age	3
EN.650.640	Moral & Legal Foundations of Privacy	3
EN.650.681	Global Cybersecurity Trends and Practices	3
EN.595.731	Business Law for Technical Professionals	3
EN.635.672	Privacy Engineering	3

Core Health Courses

A list of School of Medicine courses may be taken to fulfill core health course requirements.[1]

Core Management Courses

Code	Title	Credits
EN.650.653	Financial Issues in Managing a Secure Operation	3
EN.650.655	Implementing Effective Information Security Programs	3
EN.650.683	Cybersecurity Risk Management	3
EN.595.660	Planning and Managing Projects	3
EN.635.775	Cyber Operations, Risk, and Compliance	3
EN.635.776	Building Information Governance	3

Foundational Management Courses

Code	Title	Credits
EN.663.644	Writing for Clarity	1.5
EN.663.645	Improving Presentation Skills for Graduate Students	1.5
EN.663.660	Managing People and Resolving Conflicts	1.5
EN.663.670	Project Management	1.5
EN.663.671	Leading Change	1.5
EN.663.673	Leading Teams in Virtual, International and Local Settings	1.5
EN.663.674	Fundamentals of Management	3

[1] For additional information refer to http://isi.jhu.edu/mssi/course_distribution (https://www.cs.jhu.edu/academic-programs/graduate-studies/ms-in-security-informatics/mssi-course-distribution/)

Security Informatics, Master of Science/Applied Mathematics and Statistics, Master of Science in Engineering Dual Master's Program

A similar DMP has been initiated regarding the M.S.S.I. and the master's program in the Department of Applied Math and Statistics in the WSE. The details of this DMP are similar in principle to those for the M.S.S.I./ M.S.E. in Computer Science, but there are some significant requirement/ curricular differences. Each program should be contacted if a student is interested, and students will need to comply with any application processes for consideration.

Security Informatics, Master of Science/Computer Science, Master of Science in Engineering Dual Master's Program

Students interested in pursuing the above Dual Master's Program (DMP) will have initially entered either the M.S.S.I. program or the M.S.E. program in Computer Science, and then submit a full application through the admissions office for the second program at a later point. A maximum of two courses (approved by the advisors) can be double counted toward each set of course requirements, thereby facilitating the feasibility of completing the DMP in two academic years. In such cases, the designation of the double counted courses would be done in conjunction with one advisor from each department and the Academic Program Administrator. Note that there will be separate degrees/ diplomas awarded upon completion of each program's requirements.

Materials Science and Engineering

http://materials.jhu.edu/

Materials are essential to the construction of any engineering structure, from the smallest integrated circuit to the largest bridge. In almost every technology, the performance, reliability, or cost is determined by the materials used. As a result, the drive to develop new materials and processes (or to improve existing ones) makes materials science and engineering one of the most important and dynamic engineering disciplines.

The central theme of materials science and engineering is that the relationships among the structures, properties, processing, and performance of materials are crucial to their function in engineering structures. Materials scientists seek to understand these fundamental relationships and use this understanding to synthesize new materials or develop new processes for producing existing ones. Materials engineers design or select materials for particular applications and develop improved processing techniques. Since materials scientists and engineers must understand the properties of materials as well as their applications, the field is inherently interdisciplinary and draws on aspects of almost every other engineering discipline as well as physics, chemistry, and, most recently, biology. Because the field encompasses so many different areas, it is often categorized according to types of materials (metals, ceramics, polymers, and semiconductors) or to their applications (biomaterials, electronic materials, magnetic materials, or structural materials).

The department prepares students for successful careers in materials science and engineering, for advanced study in science or engineering, and for professional education in other fields. The goal of the undergraduate program is to provide a rigorous and comprehensive curriculum in materials science and engineering as well as in mathematics, basic sciences, humanities, and social sciences. Our low student-to-faculty ratio allows students close contact with faculty in both classroom and research environments, as well as with other students and researchers in the department. The student is encouraged to proceed at their own rate and to participate in interdisciplinary, interdepartmental, and interschool programs. In the tradition of Johns Hopkins, all of our undergraduate students participate in research, often beginning in their sophomore year, working closely with faculty and graduate students.

In recognition that biomaterials and nanotechnology represent two of the most rapidly developing areas of materials science and engineering, the Department of Materials Science and Engineering offers challenging specializations in biomaterials or nanotechnology within its undergraduate program.

Biomaterials

The field of biomaterials is concerned with the science and engineering of materials in biology and medicine. Engineering materials are increasingly used in applications such as drug delivery and gene therapy, scaffolds for tissue engineering, replacement body parts, and biomedical and surgical devices. Biomaterials is an inherently interdisciplinary field that requires deep understanding of the properties of materials in general, and the interactions of materials with the biological environment. The Biomaterials concentration is designed to provide a firm grounding in the physics, chemistry, and biology of materials, as well as breadth in general engineering, mathematics, humanities, and social science. In addition, students are encouraged to gain hands-on experience in biomaterials research laboratories. The program seeks to educate students to reach the forefront of leadership in the field of biomaterials engineering. While the fundamental principles of materials science still apply, a complete understanding of biomaterials and their interactions with biological environments requires a greater degree of specialization than the standard undergraduate curriculum provides. In recognition of completion of the Biomaterials concentration, a student may elect to have their academic transcript annotated to indicate a specialty in biomaterials.

Nanotechnology

Nanotechnology advances the utilization of materials and devices with extremely small dimensions. Nanotechnology is a visionary field, as micro and nanostructured devices impact all fields of engineering, from microelectronics (smaller, faster computer chips) to mechanical engineering (micromotors and actuators) to civil engineering ("smart," self-healing nanocomposite materials for buildings and bridges) to biomedical engineering (biosensors and tissue engineering). Materials science is central to nanotechnology because the properties of materials can change dramatically when things are made extremely small. This observation is not simply that we need to measure such properties or develop new processing tools to fabricate nanodevices. Rather, our vision is that the wide (and sometimes unexpected!) variety of phenomena associated with nanostructured materials allow us to envision radically new devices and applications that can only be made with nanostructured materials. The Nanotechnology concentration encompasses a curriculum designed to train students in the fundamental interdisciplinary principles of materials science including physics and chemistry, and also to expose students to the forefront of nanomaterials research through elective classes as well as research laboratories. Students in the Nanotechnology concentration will be well-prepared for successful careers in materials engineering across a wide range of disciplines. In recognition of completion of the Nanotechnology concentration, a student may elect to have their academic transcript annotated to indicate a specialty in nanotechnology.

Graduate Curriculum

The graduate curriculum provides students with a broad yet thorough grounding in the fundamentals of materials science and engineering. After completing the core curriculum, students pursuing master and Ph.D. degrees take advanced courses that will allow them to work at the forefront of knowledge in their chosen specialty. Those desiring to conduct original research and advance the frontiers of knowledge pursue a master's essay and/or Ph.D. thesis. To this end, the department has an outstanding and wide-ranging research program, with particular emphasis on nanomaterials, thin films, metastable materials, biomaterials, computational materials science, and materials characterization.

Facilities

The teaching and research facilities of the Department of Materials Science and Engineering are located in Maryland Hall, Krieger Hall, and Croft Hall on the Homewood campus. The Department also administers the Materials Characterization and Processing Facility, which houses advanced tools for electron microscopy, X-ray diffraction, facilities for sample preparation, optical microscopy, and mechanical testing, as well as many other advanced materials tools for research and education. Individual research groups have established laboratories with advanced facilities for materials processing, nanotechnology, and materials characterization. Through collaboration with other departments and national laboratories, students and faculty also have access to a variety of other facilities that enable further cutting-edge advances in their research fields.

Undergraduate Programs

Materials play a central role in the performance and reliability of virtually every technology and living organism. The central theme of materials science and engineering is that the relationships between the structure, properties, processing, and performance of materials are crucial to their function. Materials scientists seek to understand these fundamental relationships, synthesize new materials, develop improved processes for making materials, and understand the role of materials in the functioning of biological organisms. The wide range of problems addressed makes materials science one of the most highly interdisciplinary and dynamic engineering disciplines.

The Materials Science & Engineering faculty strives to maintain the Johns Hopkins University tradition of training a small number of students of the highest quality. We measure our success by the impact our graduates have on the scientific and engineering communities. Our program is designed to provide a solid foundation for future career development for students with diverse career aspirations.

Accreditation

Our BS program in Materials Science and Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/).

Financial Aid

Information about scholarships and other sources of financial assistance for undergraduates is available from the Office of Student Financial Services (https://finaid.jhu.edu/). In addition, the faculty employs a number of undergraduates as laboratory assistants to help with various aspects of their individual research programs.

Graduate Programs

The Department of Materials Science and Engineering (DMSE) offers three graduate degrees: the Ph.D. (Doctor of Philosophy), the M.S.E. (Master of Science in Engineering), and the M.M.S.E. (Master of Materials Science and Engineering). After meeting the two-semester residency requirement, the Ph.D. and the M.S.E. programs can be completed on either a full-time or part-time basis (with advanced approval from the program, the Dean's Office, and as relevant, in compliance with visa/immigration enrollment stipulations). Financial aid is available only for students matriculating as full-time, resident PhD students. The M.S.E. degree may be completed either with or without an essay, as described below.

Hopkins undergraduate students are encouraged to consider completing both the B.S. degree and the M.S.E. degree in a total of five years. This five-year, dual degree option offers additional preparation for the pursuit of Ph.D. programs and careers in materials science and engineering. Students are encouraged to consult their undergraduate advisors to gain information on M.S.E. programs at Hopkins, as well as third- and fourth-year course selections best suited to the pursuit of the M.S.E. degree.

The M.M.S.E. is a terminal master's degree offered through Johns Hopkins Engineering for Professionals (EP) of the Whiting School of Engineering. The degree program consists of 10 courses offered primarily remotely/asynchronously. Students interested in this program should apply through the EP www.ep.jhu.edu (http://www.ep.jhu.edu).

Financial Aid

Merit and need-based grants, work-study opportunities, and federal student loans to undergraduate students are administered by the Office of Student Financial Services (http://www.jhu.edu/finaid/). This office also provides access to federal student loans and work-study opportunities for graduate students.

Master's Degree Students

Students who have graduated with a Johns Hopkins University undergraduate degree automatically earn a Dean's Master's Fellowship covering half of tuition for every semester (fall/spring) of full-time enrollment in a WSE master's degree program, provided they have either: (a) completed eight full-time semesters of study at Johns Hopkins, or (b) have not been enrolled at JHU for at least one year.

Students pursuing a combined bachelor's and master's degree who have not yet completed eight full-time semesters of study at JHU, and have retained undergraduate status, are eligible to continue to apply for undergraduate financial aid through the Office of Student Financial Services.

- GoGrad Graduate Financial Aid (http://www.gograd.org/financial-aid/)
- GoGrad Graduate Scholarships (http://www.gograd.org/financial-aid/scholarships/)
- College Scholarships for Black Students (https://www.affordablecollegesonline.org/college-resource-center/black-students-college-scholarships/)

Students who have completed all the coursework, other than research, required for an MSE degree in Materials Science and Engineering and are in good academic standing may be eligible for a Master's Research Scholarship. Please see the following form for details.

- Materials Research Scholarship with application (https://engineering.jhu.edu/materials/wp-content/uploads/2019/03/Materials-Research-Scholarship-with-application.pdf)

PhD Students

WSE PhD students are fully funded (tuition, health insurance and stipend) for the duration of their PhD program while they are in a fulltime, resident status. Financial aid for full-time PhD candidates is provided directly from the Department of Materials Science and Engineering in the form of research assistantships and fellowships. All applicants to the PhD program are automatically considered for financial aid; there is no separate application.

Assistantships include:

- Full tuition support (100% first year tuition support provided by the Dean's Office, in years 2-6, 80% tuition support from the Dean's office, with the remaining 20% covered either by the student's research advisor or by the department via fellowships)
- Stipend for living expenses (at least $35,600 for the 2022-2023 academic year)
- Individual health insurance

A list of estimated expenses for graduate study is available on the Homewood Graduate Student Affairs (https://homewoodgrad.jhu.edu/life-at-hopkins/costsandfunding/) website.

Qualified PhD students are strongly encouraged to apply for external fellowships. These prestigious awards provide significant flexibility in the choice of advisor and research program. Examples include:

- National Science Foundation Graduate Research Fellowship (http://www.nsfgrfp.org/)
- National Defense Science and Engineering Graduate Fellowship (http://ndseg.asee.org/)
- Hertz Foundation Applied Science Fellowship (http://www.hertzfoundation.org/)
- Computational Sciences Graduate Fellowship (http://www.krellinst.org/csgf/)
- Stewardship Science Graduate Fellowship (http://www.krellinst.org/ssgf/)

Programs

- Materials Science and Engineering, Bachelor of Science (p. 1362)
- Materials Science and Engineering, Master of Science in Engineering (p. 1367)
- Materials Science and Engineering, PhD (p. 1368)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.510.106. Foundations of Materials Science & Engineering. 3 Credits.
Basic principles of materials science and engineering and how they apply to the behavior of materials in the solid state. The relationship between electronic structure, chemical bonding, and crystal structure is developed. Attention is given to characterization of atomic and molecular arrangements in crystalline and amorphous solids: metals, ceramics, semiconductors and polymers (including proteins). The processing and synthesis of these different categories of materials. Basics about the phase diagrams of alloys and mass transport in phase transformations. Introduction to materials behavior including their mechanical, chemical, electronic, magnetic, optical and biological properties.

EN.510.107. Modern Alchemy. 3 Credits.
Can you really turn lead into gold? Converting common substances into useful materials that play important roles in today's technologies is the goal of many modern scientists and engineers. In this course, we will survey selected topics related to modern materials, the processes that are used to make them as well as the inspiration that led to their development. Topics will include the saga of electronic paper, the sticky stuff of gecko feet and the stretchy truth of metal rubber.

EN.510.135. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for freshmen majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems.
Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.136. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for freshmen majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems.
Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.235. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for sophomores majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Sophomores Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.236. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for sophomores majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Sophomores Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.311. Structure Of Materials. 3 Credits.
First of the Introduction to Materials Science series, this course seeks to develop an understanding of the structure of materials starting at the atomic scale and building up to macroscopic structures. Topics include bonding, crystal structures, crystalline defects, symmetry and crystallography, microstructure, liquids and amorphous solids, diffraction, molecular solids and polymers, liquid crystals, amphiphilic materials, and colloids. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.500.113 Gateway Computing: Python.
((AS.110.106 AND AS.110.107) OR (AS.110.108 AND AS.110.109) OR (AS.110.107 AND AS.110.108) OR (AS.110.106 OR AS.110.109)) AND (AS.030.103 OR(AS.030.101 AND AS.030.102)) AND ((AS.171.101 OR AS.171.103 OR AS.171.107) AND (AS.171.102 OR AS.171.104 OR AS.171.108))

EN.510.312. Thermodynamics/Materials. 3 Credits.
Second of the Introduction to Materials Science series, this course examines the principles of thermodynamics as they apply to materials. Topics include fundamental principles of thermodynamics, equilibrium in homogeneous and heterogeneous systems, thermodynamics of multicomponent systems, phase diagrams, thermodynamics of defects, and elementary statistical thermodynamics. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.500.113 - Gateway Computing - MatLab.

EN.510.313. Mechanical Properties of Materials. 3 Credits.
Third of the Introduction to Materials Science series, this course is devoted to a study of the mechanical properties of materials. Lecture topics include elasticity, anelasticity, plasticity, and fracture. The concept of dislocations and their interaction with other lattice defects is introduced. This course contains computational modules; some prior knowledge of computer programming is needed.
EN.500.113 AND EN.510.311

EN.510.314. Electronic Properties of Materials. 3 Credits.
Fourth of the Introduction to Materials Science series, this course is devoted to a study of the electronic, optical and magnetic properties of materials. Lecture topics include electrical and thermal conductivity, thermoelectricity, transport phenomena, dielectric effects, piezoelectricity, and magnetic phenomena. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.
EN.510.311

EN.510.315. Physical Chemistry of Materials II. 3 Credits.
Fifth of the Introduction to Materials Science series, this course covers diffusion and phase transformations in materials. Topics include Fick's laws of diffusion, atomic theory of diffusion, diffusion in multi-component systems, solidification, diffusional and diffusionless transformations, and interfacial phenomena. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.
EN.510.311 AND EN.510.312

EN.510.316. Biomaterials I. 3 Credits.
Sixth of the Introduction to Materials Science series, this course offers an overview of principles and properties of biomedical materials. Topics include properties of materials used in medicine, synthesis and properties of polymeric materials, polymeric biomaterials, natural and recombinant biomaterials, biodegradable materials, hydrogels, stimuli-sensitive materials, and characterizations of biomaterials. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.

EN.510.335. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for freshmen, sophomores, and juniors majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen, sophomores, and juniors, working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. *The team will meet 150 minutes per week at a time to be designated by the instructor.Recommended Course Background: EN.510.101, EN.510.109, or equivalent courses.

EN.510.336. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for juniors majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE juniors working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.
EN.510.335

EN.510.400. Introduction to Ceramics. 3 Credits.
This course will examine the fundamental structure and property relationships in ceramic materials. Areas to be studied include the chemistry and structure of ceramics and glasses, microstructure and property relationships, ceramic phase relationships, and ceramic properties. Particular emphasis will be placed on the physical chemistry of particulate systems, characterization, and the surface of colloid chemistry of ceramics. Recommended Course Background: EN.510.311, EN.510.312, or permission of instructor.

EN.510.402. Dynamics of Soft Materials. 3 Credits.
The structure and properties of soft materials will be studied with the focus on understanding ways to control and measure the dynamics. Soft materials to be studied include colloids, emulsions, dispersions, drops, polymers and gels. We will use experimental tools to study these materials including optical microscopy, rheometers, and atomic force microscopy. Recommended Course Background: EN.510.311 or permission of instructor.

EN.510.403. Materials Characterization. 3 Credits.
This course will describe a variety of techniques used to characterize the structure and composition of engineering materials, including metals, ceramics, polymers, composites and semiconductors. The emphasis will be on microstructural characterization techniques, including optical and electron microscopy, X-ray diffraction, and thermal analysis and surface analytical techniques, including Auger electron spectroscopy, secondary ion mass spectroscopy, X-ray photoelectron spectroscopy, and atomic force microscopy. Working with the JHU museums, we will use the techniques learned in class to characterize historic artifacts.

EN.510.405. Materials Science of Energy Technologies. 3 Credits.
This course examines the science and engineering of contemporary and cutting-edge energy technologies. Materials Science and Mechanical Engineering fundamentals in thisarea will be complemented by case studies that include fuel cells, solar cells, lighting, thermoelectrics, wind turbines, engines, nuclearpower, biofuels, and catalysis. Students willconsider various alternative energy systems, and also to research and engineering of traditional energy technologies aimed at increased efficiency, conservation, and sustainability. Recommended Course Background: undergraduate course in thermodynamics.

EN.510.407. Biomaterials II: Host response and biomaterials applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include biomaterials fabrication and characterization, host reactions to biomaterials, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, and biomaterials for artificial organs.
EN.510.316 or permission of instructor.

EN.510.414. Transmission electron microscopy: principle and practice. 3 Credits.
Introduction to basic principles of electron diffraction, phase contrast and Z-contrast and applications of these principles in microstructural characterization of materials by electron diffraction, high-resolution electron microscopy and scanning transmission electron microscopy. Also listed as EN.510.665.

EN.510.415. The Chemistry of Materials Synthesis. 3 Credits.
Many of the latest breakthroughs in materials science and engineering have been driven by new approaches to their synthesis, which has allowed the preparation of materials with fanciful structures and fascinating properties. This advanced course will explore synthetic approaches to multifunctional and nanostructured materials, ranging from opals to complex polymers to nanowires and quantum dots . Applications include electronics, energetics, and drug delivery. Participants will gain sufficient familiarity with synthesis options to be able to design research programs that rely on them. Emphasis will be placed on broad strategies that lead to material functionality, rather than detailed step-by-step sequences. Some topics will be selected “on the fly” from the most exciting current literature.

EN.510.416. Physical Behavior of Metamaterials. 3 Credits.
The field of metamaterials is a rapidly evolving area within the physical and engineering sciences that relates to diverse applications such as transformation optics for advanced imaging, acoustic noise reduction for architectural spaces and electromagnetic shielding for electronic devices. The goal of metamaterials design is to guide energy transport through specified regions of a material avoiding others that might contain delicate or otherwise susceptible structures that must be shielded. Energy transport can occur via electromagnetic waves, acoustic waves, electrical currents or thermal fluxes. Through rational design of the material micro/meso/macrostructure, any one of these can be effectively directed in the material. The challenge is to engineer materials that respond in a way that approximates the desired design. In this course, the methods for metamaterials design will be investigated along with those aspects of materials science and engineering that allow for the fabrication of these materials. Also listed as EN.510.616
EN.510.31 AND EN.510.314 or their equivalents

EN.510.420. Stealth Science & Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens. Co-listed with EN.510.640

EN.510.422. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material’s property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss their mechanical, electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechanical (MEMS) devices.

EN.510.425. Advanced Materials for Battery. 3 Credits.
This class provides an overview of the basic principles of electrochemical energy storage and the essential roles of advanced materials in batteries. Materials selection and design for the anodes and cathodes of lithium and sodium batteries are introduced on the basis of crystallography and materials chemistry. State-of-the-art operando characterization techniques of battery materials are also discussed in the course. This course is also listed as EN.510.625.
EN.510.311 AND EN.510.312

EN.510.426. Biomolecular Materials I - Soluble Proteins and Amphiphiles. 3 Credits.
This course will examine the fundamental structure, interactions, and function relationship for biological macromolecules. The course will emphasize experimental methods and experimental design, and the physics behind human disease. Topics will include micellization, protein folding and misfolding, and macromolecular interactions. Required Course Pre-Requisites: EN.580.221 & EN.510.312 - Co-listed with EN.510.621
EN.580.221 AND EN.510.312

EN.510.428. Material Science Laboratory I. 3 Credits.
This course focuses on characterizing the microstructure and mechanical properties of structural materials that are commonly used in modern technology. A group of A1 alloys, Ti alloys, carbon and alloy steels, and composite materials that are found, for example, in actual bicycles will be selected for examination. Their microstructures will be studied using optical metallography, scanning electron microscopy, X-ray diffraction, and transmission electron microscopy. The mechanical properties of these same materials will be characterized using tension, compression, impact, and hardness tests. The critical ability to vary microstructure and therefore properties through mechanical and heat treatments will also be demonstrated and investigated in the above materials. Restricted to Materials Science & Engineering juniors only
Prerequisite(s): Corequisites: EN.510.313
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.510.311

EN.510.429. Materials Science Laboratory II. 3 Credits.
This laboratory concentrates on the experimental investigation of electronic properties of materials using basic measurement techniques. Topics include thermal conductivity of metal alloys, electrical conductivity of metals/metal alloys and semiconductors, electronic behavior at infrared wavelengths, magnetic behavior of materials, carrier mobility in semiconductors and the Hall effect in metals and semiconductors. Lab Assignment is by Professor. Recommended Course Background: EN.510.311 or Permission Required.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.430. Biomaterials Lab. 3 Credits.
This laboratory course concentrates on synthesis, processing and characterization of materials for biomedical applications, and characterization of cell-materials interaction. Topics include synthesis of biodegradable polymers and degradation, electrospinning of polymer nanofibers, preparation of polymeric microspheres and drug release, preparation of plasmid DNA, polymer-mediated gene delivery, recombinant protein synthesis and purification, self-assembly of collagen fibril, surface functionalization of biomaterials, cell culture techniques, polymer substrates for cell culture, and mechanical properties of biological materials. Recommended Course Background: EN.510.407
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.433. Senior Design Research. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring or double majoring in materials science and engineering. It is intended to provide a broad exposure to many aspects of planning and conducting independent research. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of the weekly departmental research seminar.Co-listed with EN.510.438 and EN.510.440
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.434. Senior Design/Research II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring or double majoring in materials science and engineering. It is intended to provide a broad exposure to many aspects of planning and conducting independent research. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433Meets with EN.510.439, EN.510.441, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.435. Mechanical Properties of Biomaterials. 3 Credits.
This course will focus on the mechanical properties of biomaterials and the dependence of these properties on the microstructure of the materials. Organic and inorganic systems will be considered through a combination of lectures and readings and the material systems will range from cells to bones to artificial implants. Same course as 510.635.

EN.510.436. Biomaterials for Cell Engineering. 3 Credits.
This course focuses on the development of biomaterials both as new tools to study fundamental biology and as means to direct cell behavior and function for biomedical applications. Topics include the material properties of cells and tissue, biomaterials for recapitulating cell microenvironment, biomaterials for studying and directing cell mechanotransduction, biomaterials for gene editing, biomaterials for immunotherapy, and biomaterials for neuroengineering. This course will have in-depth discussions on recent findings and publications in these areas. This course is also listed as EN.510.636.
(EN.510.316 OR EN.510.407 OR EN.510.610

EN.510.438. Biomaterials Senior Design I. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring in materials science and engineering with the Biomaterials Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on biomaterials. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on experiences in design and research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of departmental research seminars.Co-listed with EN.510.440 and EN.510.433
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.439. Biomaterials Senior Design II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring in materials science and engineering with the Biomaterials Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on biomatreials. During this semester, verbal reporting of project activities and status is emphasized, culminating in student talks presented to a special session of students and faculty. Students also prepare a poster and a written final report summarizing their design and research results. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433 or 510.438 or 510.440Meets with EN.510.434, EN.510.441, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.440. Nanomaterials Senior Design I. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring in materials science and engineering with the Nanotechnology Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on nanotechnology and nanomaterials. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on experiences in design and research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of departmental research seminars. Co-listed with EN.510.433 and EN.510.438
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.441. Nanomaterials Senior Design II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring in materials science and engineering with the Nanotechnology Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on nanotechnology and nanomatreials. During this semester, verbal reporting of project activities and status is emphasized, culminating in student talks presented to a special session of students and faculty. Students also prepare a poster and a written final report summarizing their design and research results. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433 or 510.438 or 510.440Meets with EN.510.434, EN.510.439, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.442. Nanomaterials Lab. 3 Credits.
The objective of the laboratory course will be to give students hands on experience in nanotechnology based device fabrication through synthesis, patterning, and characterization of nanoscale materials. The students will use the knowledge gained from the specific synthesis, characterization and patterning labs to design and fabricate a working nanoscale/nanostructured device. The course will be augmented with comparisons to microscale materials and technologies. These comparisons will be key in understanding the unique phenomena that enable novel applications at the nanoscale. DMSE Seniors or permission of the instructor.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.443. Chemistry and Physics of Polymers. 3 Credits.
The course will describe and evaluate the synthetic routes, including condensation and addition polymerization, to macromolecules with varied constituents and properties. Factors that affect the efficiencies of the syntheses will be discussed. Properties of polymers that lead to technological applications will be covered, and the physical basis for these properties will be derived. Connections to mechanical, electronic, photonic, and biological applications will be made. Also listed as EN.510.643. Recommended Course Background: Organic Chemistry I and one semester of thermodynamics.

EN.510.445. MSE Design Team II. 3 Credits.
This course is the first half of a two-semester course sequence for senior students majoring or double majoring in MSE. This course provides a broad experience to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE seniors, working with a team leader and a group of freshmen, sophomores, and seniors, apply their knowledge in their track area to generate the solution to open-ended problems encountered in MSE. Recommended Course Background: EN.510.101, EN.510.311, EN.510.312, EN.510.428, EN 510.429.
Area: Writing Intensive

EN.510.446. MSE Design Team II. 3 Credits.
This course is the second half of a two-semester course sequence for senior students majoring or double majoring in MSE. This course provides a broad experience to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE seniors, working with a team leader and a group of freshmen, sophomores, and seniors, apply their knowledge in their track area to generate the solution to open-ended problems encountered in MSE. Materials Science & Engineering Seniors Only.Recommended Course Background: EN 510.101, EN 510.311, EN 510.312, EN 510.428, EN 510.429.Meets with EN.510.434, EN.510.439, EN.510.441 and EN.510.448.
EN.510.445

EN.510.447. MSE Design Team Leader. 4 Credits.
This course is the first half of a two-semester course sequence for students majoring or double majoring in MSE. This course provides a leadership experience to various aspects of planning and conducting independent research in a team setting. In this course, MSE seniors assemble and lead a student team consisting of 3 to 6 students, apply their knowledge in their track area, and develop leadership skills to generate the solution to open-ended problems encountered in MSE.Recommended Course Background: EN.510.101, EN.510.311, EN.510.312, EN.510.428, EN 510.429.
Area: Writing Intensive

EN.510.448. MSE Design Team Leader. 4 Credits.
This course is the second half of a two-semester course sequence for students majoring or double majoring in MSE. This course provides a leadership experience to various aspects of planning and conducting independent research in a team setting. In this course, MSE seniors assemble and lead a student team consisting of 3 to 6 students, apply their knowledge in their track area, and develop leadership skills to generate the solution to open-ended problems encountered in MSE. Materials Science & Engineering Seniors Only.Recommended Course Background: EN 510.101, EN 510.311, EN 510.312,EN. 510.428, EN 510.429.Meets with EN.510.434, EN.510.439, EN.510.441, and EN.510.446
EN.510.447

EN.510.450. Three Dimensional Microstructural Characterization of Mateirals. 3 Credits.
An undergraduate level introduction to experimental techniques and data analysis for characterizing the microstructure of materials in three dimensions.Topics to be covered include serial sectioning, principles of optical and scanning-electron microscopy and electron back-scatter diffraction (EBSD), high-energy x-ray diffraction microscopy, and techniques for 3D data reduction, representation, and analysis. Pre-Requisites: 510.311 & 510.313. Also listed as EN.510.701.
EN.510.311 AND EN.510.313

EN.510.451. Recycling for Sustainablility. 3 Credits.
"I'm so confused…which bin do I choose?" Recycling everyday materials and re-using objects made from them have been part of our country's materials-usage landscape for decades. However, as we engineer a sustainable future, recycling will become an ever-increasing component of our strategies for material selection and product design. This course provides an overview of recycling – from the basics of materials recovery, processing and re-use to its economic and environmental impacts. Students will learn about industrial practices associated with recycling and how these relate to our everyday consumer behaviors. Field experiences and laboratory demonstrations will expose students to the realities of recycling. The challenges associated with recycling will be examined to gain a greater understanding of issues related to the use of materials in a sustainable world.

EN.510.457. Materials Science of Thin Films. 3 Credits.
The processing, structure, and properties of thin films are discussed emphasizing current areas of scientific and technological interest. Topics include elements of vacuum science and technology; chemical and physical vapor deposition processes; film growth and microstructure; chemical and microstructural characterization methods; epitaxy; mechanical properties such as internal stresses, adhesion, and strength; and technological applications such as superlattices, diffusion barriers, and protective coatings. Co-listed with EN.510.657

EN.510.467. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.Co-listed with EN.510.667
EN.510.311 AND EN.510.315

EN.510.501. Undergraduate Research/Material Science. 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
Students must have completed Lab Safety training prior to registering for this class.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.502. Research in Materials Science. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.504. Independent Study. 1 - 3 Credits.
Individual programs of study are worked out between students and the professor supervising their independent study project. Topics selected are those not formally listed as regular courses and include a considerable design component.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.597. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.601. Structure Of Materials. 3 Credits.
An introduction to the structure of inorganic and polymeric materials. Topics include the atomic scale structure of metals, alloys, ceramics, and semiconductors; structure of polymers; crystal defects; elementary crystallography; tensor properties of crystals; and an introduction to the uses of diffraction techniques (including X-ray diffraction and electron microscopy) in studying the structure of materials. Recommended Course Background: undergraduate chemistry, physics, and calculus or permission of instructor.

EN.510.602. Thermodynamics Of Materials. 3 Credits.
An introduction to the classical and statistical thermodynamics of materials. Topics include the zeroth law of thermodynamics; the first law (work, internal energy, heat, enthalpy, heat capacity); the second law (heat engines, Carnot cycle, Clausius inequality, entropy, absolute temperature); equilibrium of single component systems (free energy, thermodynamic potentials, virtual variations, chemical potential, phase changes); equilibrium of multicomponent systems and chemical thermodynamics; basics of statistical physics (single and multiple particle partition functions, configurational entropy, third law; statistical thermodynamics of solid solutions); and equilibrium composition-temperature phase diagrams. Recommended Course Background: undergraduate calculus, chemistry, and physics or permission of instructor.

EN.510.603. Phase Transformations of Materials. 3 Credits.
This course presents a unified treatment of the thermodynamics and kinetics of phase transformations from phenomenological and atomistic viewpoints. Phase transformations in condensed metal and nonmetal systems are discussed. Recommended Course Background: EN.510.601 and EN.510.602

EN.510.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.530.604 are not eligible to take EN.510.604.

EN.510.605. Electrical, Optical and Magnetic Properties of Materials. 3 Credits.
An overview of electrical, optical and magnetic properties arising from the fundamental electronic and atomic structure of materials. Continuum materials properties are developed through examination of microscopic processes. Emphasis will be placed on both fundamental principles and applications in contemporary materials technologies. Recommended Course Background: EN.510.601

EN.510.607. Biomaterials II: Host response and biomaterials applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include host reactions to biomaterials and their evaluation, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, biomaterials for cardiovascular applications, biomaterials for orthopedic applications, and biomaterials for artificial organs. Recommended Course Background: Undergraduate chemistry and basic cell biology. Also listed as EN.510.407

EN.510.610. Fundamentals of Biomaterials. 3 Credits.
This course provides an introduction to biomaterials in medicine. Topics include: hard and soft biomaterials, materials science concepts specific to biomaterials, surface thermodynamics, surfactants and surface functionalization, proteins and protein-surface interactions, tissue engineering and regenerative medicine, wound healing and the inflammatory response, and drug delivery systems.Pre-requisites: 510.602 (Thermodynamics of Materials) or permission of instructor.

EN.510.615. Physical Properties of Materials. 3 Credits.
A detailed survey of the relationship between materials properties and underlying microstructure. Structure/property/processing relationships will be examined across a wide spectrum of materials including metals, ceramics, polymers and biomaterials, and properties including electrical, magnetic, optical, thermal, mechanical, chemical and biocompatibility.

EN.510.616. Physical Behavior of Metamaterials. 3 Credits.
The field of metamaterials is a rapidly evolving area within the physical and engineering sciences that relates to diverse applications such as transformation optics for advanced imaging, acoustic noise reduction for architectural spaces and electromagnetic shielding for electronic devices. The goal of metamaterials design is to guide energy transport through specified regions of a material avoiding others that might contain delicate or otherwise susceptible structures that must be shielded. Energy transport can occur via electromagnetic waves, acoustic waves, electrical currents or thermal fluxes. Through rational design of the material micro/meso/macrostructure, any one of these can be effectively directed in the material. The challenge is to engineer materials that respond in a way that approximates the desired design. In this course, the methods for metamaterials design will be investigated along with those aspects of materials science and engineering that allow for the fabrication of these materials. Also listed as EN.510.416

EN.510.621. Biomolecular Materials I - Soluble Proteins and Amphiphiles. 3 Credits.
Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques. Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques. Co-listed with EN.510.426.

EN.510.622. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material's property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss therir mechanical , electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechnanical (MEMS) devices. (Also listed as 510.622/422)

EN.510.624. X-ray Scattering, Diffraction, and Imaging. 3 Credits.
An introduction to the uses of x-rays for structural characterization of materials, including (i) kinematic theory of x-ray scattering and diffraction by single crystals, polycrystals, liquids, and amorphous solids; (ii) principles of Fourier optics with applications to x-ray radiography and phase-contrast x-ray imaging; and (iii) x-ray computed tomography (CT).Prerequisite: 510.601 or equivalent.

EN.510.625. Advanced Materials for Battery. 3 Credits.
This class provides an overview of the basic principles of electrochemical energy storage and the essential roles of advanced materials in batteries. Materials selection and design for the anodes and cathodes of lithium and sodium batteries are introduced on the basis of crystallography and materials chemistry. State-of-the-art operando characterization techniques of battery materials are also discussed in the course. This class is also listed as EN.510.425.
EN.510.601 AND EN.510.602

EN.510.630. Molecular Simulation of Materials. 3 Credits.
Learn the fundamentals necessary to design and implement computer simulations on the molecular level. This course focuses on two widely used techniques: molecular-dynamics and Monte Carlo simulation. Both are introduced in the context of a review of the basic theoretical background. This class will cover the specifics of handling molecular interactions using empirical potentials, applying proper boundary conditions and simulating various equilibrium ensembles and non-equilibrium systems. Lectures will address how to extract transport coefficients, atomic scale correlations and local stresses and strains from simulation data, and computational issues such as algorithmic complexity and efficiency. The final weeks of the course will focus on new and cutting-edge advances in these methods.

EN.510.633. Computational Materials Design. 3 Credits.
This course will cover the use of computational methods to discover and design materials for new technologies. Topics addressed will include structure prediction, materials informatics, and the calculation of material properties from first principles using methods such as density functional theory. Participants will gain hands-on experience with modern computational techniques.

EN.510.636. Biomaterials for Cell Engineering. 3 Credits.
This course focuses on the development of biomaterials both as new tools to study fundamental biology and as means to direct cell behavior and function for biomedical applications. Topics include the material properties of cells and tissue, biomaterials for recapitulating cell microenvironment, biomaterials for studying and directing cell mechanotransduction, biomaterials for gene editing, biomaterials for immunotherapy, and biomaterials for neuroengineering. This course will have in-depth discussions on recent findings and publications in these areas. This course is also listed as EN.510.436.

EN.510.640. Stealth Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens. Co-listed with EN.510.420.

EN.510.643. Chemistry and Physics of Polymers. 3 Credits.
The course will describe and evaluate the synthetic routes, including condensation and addition polymerization, to macromolecules with varied constituents and properties. Factors that affect the efficiencies of the syntheses will be discussed. Properties of polymers that lead to technological applications will be covered, and the physical basis for these properties will be derived. Connections to mechanical, electronic, photonic, and biological applications will be made. Also listed as EN.510.443. Recommended Course Background: Organic Chemistry I and one semester of thermodynamics.

EN.510.657. Materials Science of Thin Films. 3 Credits.
The processing, structure, and properties of thin films are discussed emphasizing current areas of scientific and technological interest. Topics include elements of vacuum science and technology; chemical and physical vapor deposition processes; film growth and microstructure; chemical and microstructural characterization methods; epitaxy; mechanical properties such as internal stresses, adhesion, and strength; and technological applications such as superlattices, diffusion barriers, and protective coatings. Co-listed with EN.510.457

EN.510.658. Electroanalytical Chemistry & Energy Conversion. 3 Credits.
Electrochemical methods are used by researchers in many fields to study topics such as (photo)electrocatalysis, batteries, and chemical sensors. This course will cover the basic theory and applications of electrochemistry to provide students with foundational knowledge of electrified solid-solution interfaces. Fundamental topics including interfacial charge transfer, mass transport, electric double layer structure, electrode kinetics, and analytical methods will be covered. State-of-the-art topics in electrochemistry research will also be discussed.

EN.510.665. Transmission electron microscopy: principle and practice. 3 Credits.
Introduction to basic principles of electron diffraction, phase contrast and Z-contrast and applications of these principles in microstructural characterization of materials by electron diffraction, high-resolution electron microscopy and scanning transmission electron microscopy. Also listed as EN.510.414.

EN.510.667. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.Co-listed with EN.510.467
EN.510.601

EN.510.701. Three-Dimensional Microstructural Characterization of Materials. 3 Credits.
A graduate-level introduction to experimental techniques and data analysis for characterizing the microstructure of materials in three dimensions. Topics to be covered include serial sectioning, principles of optical and scanning-electron microscopy and electron back-scatter diffraction (EBSD), high-energy x-ray diffraction microscopy, and techniques for 3D data reduction, representation, and analysis. EN.510.601 or Permission of instructor.

EN.510.801. Materials Research Seminar. 1 Credit.
The Graduate Research Seminar in the Department of Materials Science and Engineering provides a forum for students to present their latest research results in a formal seminar setting. The course encourages discussion between students in varying disciplines in order to establish new collaborations and develop the shared vocabulary required for interdisciplinary materials science research. Permission Required.

EN.510.802. Materials Research Seminar. 1 Credit.

EN.510.803. Materials Science Seminar. 1 Credit.
The Materials Science Seminar exposes students to a wide array of internationally recognized speakers who discuss topics of cutting-edge Materials Science research. Speakers are selected both to overlap research interests within the department and to expose students to broader trends in contemporary Materials Science.

EN.510.804. Materials Science Seminar. 1 Credit.
Meets with EN.510.434, EN.510.439, EN.510.441, EN.510.446, and EN.510.448.

EN.510.807. Graduate Research In Materials Science. 3 - 20 Credits.
Individual programs of study are worked out between students and the professor supervising their independent study project. Topics selected are those not formally listed as regular courses and include a considerable design component.

EN.510.808. Graduate Research. 3 - 20 Credits.

EN.510.809. Graduate Summer Research Course. 9 Credits.
Graduate Summer Research Course

Cross Listed Courses

Biomedical Engineering

EN.580.441. Cellular Engineering. 3 Credits.
This course focuses on principles and applications in cell engineering. Class lectures include an overview of molecular biology fundamentals, protein/ligand binding, receptor/ligand trafficking, cell-cell interactions, cell-matrix interactions, and cell adhesion and migration at both theoretical and experimental levels. Lectures will cover the effects of physical (e.g. shear stress, strain), chemical (e.g. cytokines, growth factors) and electrical stimuli on cell function, emphasizing topics on gene regulation and signal transduction processes. Furthermore, topics in metabolic engineering, enzyme evolution, polymeric biomaterials, and drug and gene delivery will be discussed. This course is intended as Part 1 of a two-semester sequence recommended for students in the Cell and Tissue Engineering focus area. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306 or equivalent and AS.030.205Meets with EN.580.641

EN.580.442. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306, AS.030.205Recommended EN.580.441/EN.580.641Co-listed with EN.580.642

EN.580.444. Biomedical Applications of Glycoengineering. 3 Credits.
This course provides an overview of carbohydrate-based technologies in biotechnology and medicine. The course will begin by briefly covering basics of glycobiology and glycochemistry followed by detailed illustrative examples of biomedical applications of glycoengineering. A sample of these applications include the role of sugars in preventative medicine (e.g., for vaccine development and probiotics), tissue engineering (e.g., exploiting natural and engineered polysaccharides for creating tissue or organs de novo in the laboratory), regenerative medicine (e.g., for the treatment of arthritis or degenerative muscle disease), and therapy (e.g., cancer treatment). A major part of the course grade will be based on class participation with each student expected to provide a “journal club” presentation of a relevant paper as well as participate in a team-based project designed to address a current unmet clinical need that could be fulfilled through a glycoengineering approach. Recommended Course Background: EN.580.221 Molecules and Cells.

Electrical & Computer Engineering

EN.520.627. Photovoltaics and Energy Devices. 3 Credits.
This course provides an introduction to the science of photovoltaics and related energy devices. Topics covered include basic concepts in semiconductor device operation and carrier statistics; recombination mechanisms; p-n junctions; silicon, thin film, and third generation photovoltaic technologies; light trapping; and detailed balance limits of efficiency. Additionally, thermophotovoltaics and electrical energy storage technologies are introduced. A background in semiconductor device physics (EN.520.485, or similar) is recommended.

General Engineering

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

Mechanical Engineering

EN.530.417. Fabricatology - Advanced Materials Processing. 3 Credits.
The “Fabricatology” is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

EN.530.436. Bioinspired Science and Technology. 3 Credits.
Nature has been a source of inspiration for scientists and engineers and it receives particular attention recently to address many challenges the human society encounter. The course will study novel natural materials/ structures with unique properties, the underlying principles, and the recent development of the bio-inspired materials and systems. From this course, students can learn about ingenious and sustainable strategies of organisms, open eyes about various phenomena in nature, and get inspiration for opening new directions of science and technology.

EN.530.445. Introduction to Biomechanics. 3 Credits.
An introduction to the mechanics of biological materials and systems. Both soft tissue such as muscle and hard tissue such as bone will be studied as will the way they interact in physiological functions. Special emphasis will be given to orthopedic biomechanics. Recommended Course Background: EN.530.215/EN.530.216 and Lab or equivalent. If you have not taken this course or an equivalent, please contact the instructor before registering to ensure you have the appropriate background knowledge to succeed in this course.

EN.530.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.510.604 are not eligible to take EN.530.604.

EN.530.618. Fabricatology - Advanced Materials Processing. 3 Credits.
The "Fabricatology" is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

For current faculty and contact information go to http://materials.jhu.edu/index.php/people/

Materials Science and Engineering, Bachelor of Science

Program Requirements

The Department of Materials Science and Engineering offers a program leading to the Bachelor of Science Degree. The B.S. for the Materials Science and Engineering degree program is accredited by the Engineering Accreditation Commission of ABET, (https://www.abet.org/). The student must meet the general university requirements for the chosen degree as well as the departmental requirements, and must complete the program approved by the student's advisor.

An anticipated individual program of study designed to meet the university and department requirements for the B.S. degree, as well as to reflect the student's interest, should be filed as early as possible during the student's residence. The faculty advisor's signature is required on all course registration and course change forms. As changes are made in the program, it shall be the student's responsibility to see that a revised program is filed with the advisor. Each student must have an approved program on file no later than the semester before they expect to graduate.

See also General university requirements for Departmental majors: https://e-nextcatalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/ (p. 1086)

- Complete program of study outlined by track or concentration (standard track, biomaterials concentration, or nanotechnology concentration).
- Fulfill the university writing requirement; two writing-intensive courses, at least 3 credits each.
- Fulfill the distribution requirement: 18 credits of courses coded (H) or (S), comprised of 6 courses at least 3 credits each. For more information, see the Distribution tab in the Requirements for a Bachelor's Degree (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/).
- Take a minimum of 126 credits.

To meet the course requirements for the B.S. degree in Materials Science and Engineering, the student must complete a minimum of 126 credits, distributed as follows:

Code	Title	Credits
Materials Science Core Classes [1]		30
Upper-Level Materials Science Electives [1]		12
Basic Sciences & Engineering [2]		28
Mathematics [2]		20
Humanities (H) or (S) [2]		18
Science & Engineering Electives [3]		9
Unrestricted Electives [4]		9
Total Credits		**126**

[1] The 42 credits of materials science courses must be passed with a letter grade of C or higher.
[2] All courses must be passed with a letter grade of C- or higher
[3] Three courses of 200- level or above in engineering, natural sciences or mathematics.
A letter grade of C- or higher required if taken for a letter grade; S required if taken S/U
[4] A letter grade of C- or higher require if taken for a letter grade; S required if taken S/U
A student who has taken Foundations of MSE may count it toward one unrestricted elective.

In addition to the degree program in Materials Science and Engineering, students may elect to complete specialized concentrations in biomaterials or nanotechnology. Whether a student chooses to pursue studies following the standard track, the Biomaterials concentration or the Nanotechnology concentration, the course work specified for the degree will provide a firm grounding in the principles of materials science and engineering.

B.S. Degree Options Offered by the Department of Materials Science and Engineering

Standard Track

The Standard Track is intended for those students with general materials science interests. It permits the student to tailor the degree program to specific interests by allowing a broad range of choices for upper-level science and engineering electives.

Biomaterials Concentration

Biomaterials is an exciting and rapidly developing field. Engineered materials are increasingly used in medical applications (such as drug delivery, gene therapy, scaffolds for tissue engineering, replacement body parts, and biomedical and surgical devices) while an understanding of structure-property relationships in natural biomaterials may lead to improved interventions for a wide variety of diseases and injuries. Because it is highly interdisciplinary (involving elements of materials science, engineering, biology, chemistry and medicine), biomaterials as a discipline requires a deep understanding of the properties of materials in general, and the interactions of materials with the biological environment in particular.

The biomaterials concentration is designed to provide a broad basis in the fundamentals of materials science and engineering, as well as a particular emphasis on the principles and applications of biomaterials. While the fundamental principles of materials science still apply, a complete understanding of biomaterials and their interactions with biological environments requires a greater degree of specialization than the standard undergraduate curriculum provides. The biomaterials curriculum includes topics such as biomimetic materials, natural biomaterials, host responses to biomaterials, biocompatibility, and applications of biomaterials, particularly in tissue engineering, drug delivery, and medical devices and implants. Our goal is to train students who can apply these principles to the development of novel materials that benefit human health. In recognition of completion of the Biomaterials concentration, a student may elect to have their academic transcript annotated to indicate a concentration in Biomaterials.

To receive commendation for completion of the Biomaterials concentration, the student must complete three electives, whose subject matter is some aspect of Biomaterials, Molecules and Cells as a Science & Engineering elective, a biomaterials laboratory course, and complete a biomaterials-related senior design project. **Approval of electives must be made by a student's academic advisor prior to taking the courses, and the senior design project must be pre-approved by the senior design instructor.**

Nanotechnology Concentration

Nanotechnology advances the utilization of materials and devices with extremely small dimensions. Nanotechnology is a visionary field, as micro- and nano-structured devices impact all fields of engineering, including microelectronics (smaller, faster computer chips), mechanical engineering (micromotors and actuators), civil engineering ("smart", self-healing nanocomposite materials for buildings and bridges), and biomedical engineering (biosensors and tissue engineering).

Materials science is central to nanotechnology because the properties of materials can change dramatically when things are made extremely small. This observation is not simply that we need to measure such properties or develop new processing tools to fabricate nanodevices. Rather, our vision is that the wide (and sometimes unexpected) variety of phenomena associated with nanostructured materials allow us to envision radically new devices and applications that can only be made with nanostructured materials. The nanotechnology concentration encompasses a curriculum designed to train students in the fundamental interdisciplinary principles of materials science, including physics and chemistry, and also to expose students to the forefront of nanomaterials research through elective classes and research laboratories. In recognition of completion of the Nanotechnology concentration, a student may elect to have their academic transcript annotated to indicate a concentration in nanotechnology.

To receive commendation for completion of the Nanotechnology concentration, the student must complete three electives, whose subject matter is some aspect of nanotechnology, a Nanomaterials Laboratory course, and complete a nanotechnology-related senior design project. **Approval of electives must be made by a student's academic advisor prior to taking the courses, and the senior design project must be pre-approved by the senior design instructor.**

Detailed Description of the B.S. Program

Code	Title	Credits
Materials Science Core Classes [1]		
EN.510.311	Structure Of Materials	3
EN.510.312	Thermodynamics/Materials	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.314	Electronic Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.510.316	Biomaterials I	3
EN.510.428 & EN.510.429	Material Science Laboratory I and Materials Science Laboratory II	6
Select one of the following sequences:		6
EN.510.433 & EN.510.434	Senior Design Research and Senior Design/Research II	
EN.510.438 & EN.510.439	Biomaterials Senior Design I and Biomaterials Senior Design II	
EN.510.440 & EN.510.441	Nanomaterials Senior Design I and Nanomaterials Senior Design II	
EN.510.445 & EN.510.446	MSE Design Team II and MSE Design Team II	
EN.510.447 & EN.510.448	MSE Design Team Leader and MSE Design Team Leader	
Upper-Level Materials Science Electives		
Select 12 credits (each 300 level or higher)		12
Basic Sciences and Engineering [1]		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
AS.030.101	Introductory Chemistry I	3
AS.030.102	Introductory Chemistry II	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.030.106	Introductory Chemistry Laboratory II	1
AS.030.205	Introductory Organic Chemistry I	4
EN.500.113	Gateway Computing: Python	3
EN.660.363	Leadership & Management in Materials Science and Engineering	3
Mathematics [1]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
EN.553.291	Linear Algebra and Differential Equations	4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Humanities (H or S) [1]		
Select 18 credits [3]		18
General Mathematics, Science and Engineering Electives		
Select 9 credits [4]		9
Unrestricted Electives		

Select 9 credits [5]	9
Total Credits	**126**

[1] Must be passed with a letter grade of C or higher.
[2] Introductory language courses, even if not with H or S designator, can substitute for H designated courses.
[3] Three courses of 200-level or above in engineering, natural sciences, or mathematics. At least one of the three electives must be from another department in the Whiting School of Engineering to ensure exposure to another engineering field. Must be passed with a letter grade of D or higher. For the Biomaterials concentration, one of the three electives must be EN.580.221 Biochemistry and Molecular Engineering (students can substitute Cell Biology and Biochemistry for Molecules and Cells). For other students, a possible choice is EN.560.201 Statics & Mechanics of Materials.
[4] Must be passed with a letter grade of D or higher. A student who has taken both AS.030.101 and AS.030.102 may count one of them toward one unrestricted elective.

Total Credits Required for Graduation, Standard Track: 126
- with Biomaterials Concentration: 127 Credits
- with Nanotechnology Concentration: 127 Credits

Sample Program of Study

Sample Undergraduate Programs for Materials Science and Engineering

Standard Track

(For a student beginning with Calculus I)

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.171.101 or AS.171.107	General Physics: Physical Science Major I [1] or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
EN.510.106	Foundations of Materials Science & Engineering ((or First-Year Seminar)) [2, 3]	3
	Credits	**16**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.171.102 or AS.171.108	General Physics: Physical Science Major II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
EN.500.113	Gateway Computing: Python	3
	Credits	**16**
Second Year		
First Semester		
AS.110.202	Calculus III	4
AS.030.205	Introductory Organic Chemistry I	4
EN.510.311	Structure Of Materials	3
Math/Sci/Eng elective		3
H/S Elective		3
	Credits	**17**
Second Semester		
EN.553.291	Linear Algebra and Differential Equations	4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
EN.510.312	Thermodynamics/Materials	3
EN.510.316	Biomaterials I	3
H/S elective		3
	Credits	**17**
Third Year		
First Semester		
EN.510.315	Physical Chemistry of Materials II	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.428	Material Science Laboratory I	3
Math/Sci/Eng elective		3
H/S Elective		3
	Credits	**15**
Second Semester		
EN.510.314	Electronic Properties of Materials	3
EN.510.429	Materials Science Laboratory II	3
Math/Sci/Eng elective		3
H/S elective		3
Unrestricted Elective		3
	Credits	**15**
Fourth Year		
First Semester		
EN.510.433	Senior Design Research	3
510.4##: MSE elective		3
510.4##: MSE elective		3
EN.660.361	Engineering Management & Leadership	3
Unrestricted elective		3
	Credits	**15**
Second Semester		
EN.510.434	Senior Design/Research II	3
510.4##: MSE elective		3
510.4##: MSE elective		3
H/S elective		3
H/S elective		3
	Credits	**15**
	Total Credits	**126**

Biomaterials Concentration

(For a student beginning with Calculus I)

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.171.101 or AS.171.107	General Physics: Physical Science Major I [1] or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
EN.510.106	Foundations of Materials Science & Engineering ((or First-Year Seminar)) [2, 3]	3
	Credits	**16**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.171.102 or AS.171.108	General Physics: Physical Science Major II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
EN.500.113	Gateway Computing: Python	3
	Credits	**16**
Second Year		
First Semester		
AS.110.202	Calculus III	4
AS.030.205	Introductory Organic Chemistry I	4
EN.510.311	Structure Of Materials	3
EN.580.221	Biochemistry and Molecular Engineering (This Math/Sci/Eng elective is required for Biomaterials Concentration)	4
H/S Elective		3
	Credits	**18**
Second Semester		
EN.553.291	Linear Algebra and Differential Equations	4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
EN.510.312	Thermodynamics/Materials	3
EN.510.316	Biomaterials I	3
H/S elective		3
	Credits	**17**
Third Year		
First Semester		
EN.510.313	Mechanical Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.510.428	Material Science Laboratory I	3
Math/Sci/Eng elective		3
H/S Elective		3
	Credits	**15**
Second Semester		
EN.510.314	Electronic Properties of Materials	3
EN.510.429	Materials Science Laboratory II	3
Math/Sci/Eng elective		3
H/S elective		3
Unrestricted Elective		3
	Credits	**15**
Fourth Year		
First Semester		
EN.510.438	Biomaterials Senior Design I	3
510.4##: MSE elective (e.g. Biomolecular Materials)		3
510.4##: MSE elective (e.g. Chemistry & Physics of Polymers)		3
510.4##: MSE Elective (e.g. Biomaterials II)		3
EN.660.361	Engineering Management & Leadership	3
	Credits	**15**
Second Semester		
EN.510.439	Biomaterials Senior Design II	3
510.4##: MSE elective (e.g. Biomaterials Lab)		3
H/S elective		3
H/S elective		3
Unrestricted Elective		3
	Credits	**15**
	Total Credits	**127**

Nanotechnology Concentration

(For a student beginning with Calculus I)

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.171.101 or AS.171.107	General Physics: Physical Science Major I [1] or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
EN.510.106	Foundations of Materials Science & Engineering ((or First-Year Seminar)) [2, 3]	3
	Credits	**16**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.171.102 or AS.171.108	General Physics: Physical Science Major II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
EN.500.113	Gateway Computing: Python	3
	Credits	**16**
Second Year		
First Semester		
AS.110.202	Calculus III	4
AS.030.205	Introductory Organic Chemistry I	4

EN.510.311	Structure Of Materials	3
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
H/S Elective		3
	Credits	**18**
Second Semester		
EN.553.291	Linear Algebra and Differential Equations	4
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
EN.510.312	Thermodynamics/Materials	3
EN.510.316	Biomaterials I	3
H/S elective		3
	Credits	**17**
Third Year		
First Semester		
EN.510.313	Mechanical Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.510.428	Material Science Laboratory I	3
Math/Sci/Eng elective		3
H/S Elective		3
	Credits	**15**
Second Semester		
EN.510.314	Electronic Properties of Materials	3
EN.510.429	Materials Science Laboratory II	3
Math/Sci/Eng elective		3
H/S elective		3
Unrestricted Elective		3
	Credits	**15**
Fourth Year		
First Semester		
EN.510.440	Nanomaterials Senior Design I	3
510.4##: MSE elective (e.g. Nanomaterials Lab)		3
510.4##: MSE elective (e.g. Materials Characterization)		3
EN.660.361	Engineering Management & Leadership	3
Unrestricted elective		3
	Credits	**15**
Second Semester		
EN.510.441	Nanomaterials Senior Design II	3
510.4##: MSE elective (e.g. Micro Nano Materials & Devices)		3
510.4##: MSE elective (e.g. Nanoparticles)		3
H/S elective		3
H/S elective		3
	Credits	**15**
	Total Credits	**127**

[1] Students beginning at the Calculus I level should discuss when to take Physics I and lab with an academic advisor.

[2] Students are encouraged to take EN.510.106 Foundations of Materials Science & Engineering and count it as an unrestricted elective.

[3] If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown below, you may consider enrolling in an optional First-Year Seminar during the fall semester. FYS courses carry course numbers EN.501.XXX.

ABET Objectives and Outcomes

Accreditation

Our BS program in Materials Science and Engineering is accredited by the Engineering Accreditation Commission of ABET, http://www.abet.org (http://www.abet.org/).

Program Objectives

The program has as its objectives that within 3 to 5 years, our graduates will:

- be engaged in advanced education, research, and development in materials science and engineering, including materials discovery and/or processing, and in any professional disciplines that benefit from an understanding of MSE.
- employ elements of the materials research process in their careers including the use of:
  - critical reasoning to identify fundamental issues and establish directions for investigation
  - creative processes to define specific plans for problem solution
  - analytical thought to interpret results and place them within a broader context.
  - application of materials solutions to enhance or radically improve existing and future technology
- demonstrate ethical responsibility and an appreciation for the societal and global impact of their endeavors and maintaining their intellectual curiosity through lifelong learning.

Student Outcomes

Students graduating with a B.S. in Materials Science and Engineering will have demonstrated:

1. an ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics
2. an ability to apply engineering design to produce solutions that meet specified needs with consideration of public health, safety, and welfare, as well as global, cultural, social, environmental, and economic factors
3. an ability to communicate effectively with a range of audiences
4. an ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts
5. an ability to function effectively on a team whose members together provide leadership, create a collaborative and inclusive environment, establish goals, plan tasks, and meet objectives
6. an ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions
7. an ability to acquire and apply new knowledge as needed, using appropriate learning strategies.

Enrollments and Graduates

Academic Year	Total Enrollment	BS Degrees Awarded
2014-2015	75	13
2015-2016	72	21
2016-2017	60	12
2017-2018	73	21
2018-2019	73	20
2019-2020	61	10
2020-2021	69	13

Materials Science and Engineering, Master of Science in Engineering

Advising and Review of Student Performance

Each graduate student will normally have one or more faculty advisors. Students who are entering the M.S.E. program and plan to pursue a degree without an essay will be assigned an *academic* advisor. Students who are entering the M.S.E. program and plan to pursue a degree with an essay will be advised by their *research* advisor. Students who are entering the Ph.D. program will be advised by their research advisor. Students with a research advisor in another department will be assigned an internal academic advisor from among the full-time faculty in the department. Student progress will be assessed regularly by the faculty advisor(s) and the Graduate Program Committee. Students are expected to remain in regular communication with their faculty advisor(s).

Each student's progress will be reviewed annually by the Graduate Program Committee, in consultation with the student's advisor(s). To assist in this evaluation, students are required to submit a form (available from the academic program coordinator) detailing progress toward completion of the degree requirements. This form must be signed by the student's advisor(s) and filed with the Graduate Program Committee each year. The department must be convinced that all academic requirements have been satisfied by the candidate before a recommendation to confer a graduate degree is passed on to the University Graduate Board.

Grade requirements for graduate course work differ according to the degree program, as described below. All graduate students are required to maintain an overall grade point average (GPA) of 3.0 or higher; failure to do so will ordinarily be cause for dismissal from the program. Independent research courses will not be counted toward completion of course requirements.

The department believes that teaching experience is important to professional growth; therefore, a student may be required to serve as a teaching assistant during their academic career.

Fulltime credit enrollment requirement for WSE graduate students:

- All WSE Graduate Students must be enrolled in at least 9 credits to maintain fulltime status (in fall/spring semesters).
- Typically, fulltime WSE PhD students will be enrolled in a combination of WSE classes and/or research for a total of 20 WSE credits per semester (fall/spring).
- Typically, fulltime WSE Masters students will be enrolled in a combination of classes and/or research for a total of 9-10 credits a semester (fall/spring).

Admission Requirements

To be admitted to graduate study in the Department of Materials Science and Engineering, students must submit credentials sufficient to convince the faculty that they have the potential to successfully complete the program requirements. Under the new GRE test, applicants should take the General Test package containing the Mathematical Reasoning test.

Hopkins undergraduate students who plan to pursue a M.S.E. degree in their fifth year are encouraged to submit an application early in their fourth year of study.

Please visit the WSE Graduate Admissions Website (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/) for more information.

Program Requirements

Requirements for the M.S.E. Degree with Essay

The degree of Master of Science in Engineering (M.S.E.) with Essay is awarded subject to the recommendation of the student's advisor and departmental approval, based on satisfactory completion of the following requirements:

Code	Title	Credits
EN.500.603	Graduate Orientation and Academic Ethics	
Materials Science and Engineering		
EN.510.601	Structure Of Materials	3
EN.510.602	Thermodynamics Of Materials	3
EN.510.603	Phase Transformations of Materials	3
Select two 600-level or higher electives in Materials Science and Engineering or related fields		6
Select three 400-level or higher electives in Materials Science and Engineering or related fields [1]		9
Total Credits		**24**

[1] Subject to the following rules:

- Each elective must be worth at least three credits. Multiple courses that add up to three credits may be used in place of one three-credit course with approval from the Master's Degree Committee.
- Up to two of the elective courses may be taken from within the Engineering for Professionals (EP) part-time program.
- Up to two of the electives may be business courses.
- Any elective taken from outside the department (including all EP courses) requires prior approval of the Master's Degree Committee. The Master's Degree Committee will determine the appropriate number of credits for any elective taken outside the Whiting School of Engineering.
- With approval of the Master's Degree Committee, the student can transfer up to two graduate courses from another institution. Students desiring such credit must make the request in writing to the Master's Degree Committee by the end of the first semester after matriculation. This request must include a description of the course, a course syllabus, and documentation of the grade received. Please note that transfer coursework grades do not count towards calculation of the GPA.
- Responsible Conduct of Research training (AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research) in accordance with the Whiting

School of Engineering policy. Details about this requirement, including the criteria for determining whether the online or in-person course must be taken, are provided in the description of the policy.

- Training on academic ethics in accordance with the Whiting School of Engineering policy. This requirement can be satisfied by passing EN.500.603 Graduate Orientation and Academic Ethics.
- A grade of C or better must be achieved in each course to obtain credit.
- A overall grade point average of 3.0 must be maintained, and a grade point average of a 3.0 is required to earn the degree at the end of the program.
- Attendance is required at the weekly Department of Materials Science and Engineering Seminar.

A master's essay or journal publication is required. A master's essay must be approved by one faculty reader and confirmed to the requirements of the Graduate Board. For a journal publication a student must submit to the Master's Degree Committee an article describing their original research that has been published (or accepted for publication) in an archival, peer-reviewed technical journal. The student must be the primary author of the article. Research for the master's essay or journal publication may be conducted with a corporate sponsor through the INBT Co-Op Program.

Admission to the M.S.E. program is through the standard graduate admissions process. The typical duration of the program is 21 months. The student's transcript will reflect a "Master of Science in Engineering with Essay." There is an option to apply for the opportunity to complete an internship/co-op with an essay which may alter completion timelines but is considered part of the degree program.

Requirements for the M.S.E. Degree without Essay

The degree of Master of Science in Engineering (M.S.E.) is awarded subject to the recommendation of the student's advisor and departmental approval, based on satisfactory completion of the following requirements:

Code	Title	Credits
EN.500.603	Graduate Orientation and Academic Ethics	
Materials Science and Engineering		
EN.510.601	Structure Of Materials	3
EN.510.602	Thermodynamics Of Materials	3
EN.510.603	Phase Transformations of Materials	3
Select four 600-level or higher electives in Materials Science and Engineering or related fields [1]		12
Select three 400-level or higher electives in Materials Science and Engineering or related fields [1]		9
Total Credits		**30**

[1] Subject to the following rules:

- Each elective must be worth at least three credits. Multiple courses that add up to three credits may be used in place of one three-credit course with approval from the Master's Degree Committee.
- Up to two of the elective courses may be taken from the Engineering for Professionals (EP) part-time program.
- Up to two of the electives may be business courses.
- Any elective taken from outside the department (including all EP courses) requires prior approval of the Master's Degree Committee. The Master's Degree Committee will determine the appropriate number of credits for any elective taken outside the Whiting School of Engineering.
- With approval of the Master's Degree Committee, the student may transfer up to two graduate courses from another institution. Students desiring such credit must make the request in writing to the Master's Degree Committee by the end of the first semester after matriculation. This request must include a description of the course, a course syllabus, and documentation of the grade received. Please note that transfer coursework grades do not count towards calculation of the GPA.
- Training on academic ethics in accordance with the Whiting School of Engineering policy. This requirement can be satisfied by passing EN.500.603 Graduate Orientation and Academic Ethics.
- A grade of C or better must be achieved in each course to obtain credit.
- Responsible Conduct of Research training (AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research) in accordance with Whiting School of Engineering policy. Details about this requirement, including the criteria for determining whether the online or in-person course must be taken, are provided in the description of the policy (https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/).
- A overall grade point average of 3.0 must be maintained, and a grade point average of a 3.0 is required to earn the degree at the end of the program.
- Attendance is required at the weekly Department of Materials Science and Engineering Seminar.
- Up to two of the elective courses may be Graduate Research in Materials Science (EN.510.807 Graduate Research In Materials Science and EN.510.808 Graduate Research), which may be taken in any session, Fall or Spring). Note that 117 hours of research per course are required for credit.

Admission to the M.S.E. program is through the standard graduate admissions process. The typical duration of the program is 12 months. The student's transcript will reflect a "Master of Science in Engineering."

Materials Science and Engineering, PhD

Admission Requirements

To be admitted to graduate study in the Department of Materials Science and Engineering, students must submit credentials sufficient to convince the faculty that they have the potential to successfully complete the program requirements.

A graduate student pursuing a Ph.D. with the Department of Materials Science and Engineering who is funded by the department as a teaching assistant or research assistant may not enroll simultaneously in a master's program in another department, unless they receive written approval from their advisor, the DMSE Doctoral Program Committee, and the department chair/head.

Please visit the WSE Graduate Admissions website (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/) for more information.

Program Requirements

To receive the Ph.D. degree, the candidate must fulfill the requirements below. The department must be satisfied that all academic requirements have been satisfied by the candidate before a recommendation will be made to the University Graduate Board to confer the Ph.D. degree.

1. **Successful completion of four required courses in materials science and engineering**.

Code	Title	Credits
EN.510.601	Structure Of Materials	3
EN.510.602	Thermodynamics Of Materials	3
EN.510.603	Phase Transformations of Materials (or)	3
EN.510.610	Fundamentals of Biomaterials	3
EN.510.615	Physical Properties of Materials	3

Each of the four required courses must be passed with a letter grade of B- or higher. If a student receives a grade of C+ or lower in a required course, the student may re-take the course once to achieve a grade of B- or higher. Receipt of grades of C+ or lower in two or more required courses will ordinarily be cause for dismissal from the program without the opportunity to re-take those courses.

In addition, the student must maintain an overall GPA of 3.0 or better in the four required courses. If the student's GPA falls below 3.0, the student must re-take one or more of the required courses and earn higher grade(s). Upon doing so the prior grade(s) in those course(s) are replaced and not counted toward the GPA.

Deadline for Completion: The four required courses must be successfully completed (meeting the grade and GPA requirements above) no later than the start of the student's third year after matriculation; failure to do so will result in dismissal from the program. Exception: A student who fails to meet the requirements above due to a low grade in a single required course, and who has not had an opportunity to re-take that course during the first two years, will be permitted to re-take that one course in the third year.
Waiver of required courses: Students may submit a petition to the Doctoral Program Committee to waive one of the required courses under either of the following conditions:

- Students who have an undergraduate degree in Materials Science & Engineering may waive EN.510.615.
- Students who have completed prior graduate-level coursework substantially similar to one of the other courses, EN.510.601 Structure Of Materials, EN.510.602 Thermodynamics Of Materials or EN.510.603 Phase Transformations of Materials or EN.510.610 Fundamentals of Biomaterials may waive that couse.
- Students desiring a waiver of a required course must submit their petition no later than the end of the first semester after matriculation. If the petition requests a waiver on the basis of graduate-level coursework taken elsewhere, documentation of the course level, content (syllabus) and grade received must be included in the petition

2. **Successful completion of three advanced (600-level or higher) elective courses in materials science and engineering or a related field**.

- Elective courses must be completed with a grade of C or higher, but there is no cumulative GPA requirement. Any 600-level or higher regular course in materials science and engineering may be used to fulfill this requirement. Courses from other departments may also be used, but must either appear on the list of approved electives (available from the Academic Program Coordinator) or be approved by the Doctoral Program Committee. Students wishing to use a course not on this list must submit a request to the Doctoral Program Committee no later than the end of the first week of the semester in which the course is taken.

The following courses may not be used to fulfill the Ph.D. elective course:

- Undergraduate courses, unless cross-listed at 600-level or higher
- Graduate Research (EN.510.807 or EN.510.808)
- Courses in part-time graduate programs (Engineering for Professionals in WSE or Advanced Academic Programs in KSAS), unless by rare exception by the Doctoral Program Committee with an endorsement from the student's advisor;
- Seminars (courses with fewer than three contact hours per week

Waiver of elective courses: Students who have completed prior graduate-level coursework may petition the Doctoral Program Committee to waive one of the elective courses. Students desiring such a waiver must submit a petition, no later than the end of the first semester after matriculation, describing the course they wish to use to fulfill this requirement. Documentation of the course level, content (syllabus) and grade received must be included in the petition.
In some cases, an advisor may require a student to complete additional coursework, beyond the four required courses and three electives described above.

3. Coursework required by Whiting School of Engineering policy. These include the following:

1. Responsible Conduct of Research training (AS.360.624 Responsible Conduct of Research (Online) or AS.360.625 Responsible Conduct of Research) in accordance with Whiting School of Engineering policy. Details about this requirement, including the criteria for determining whether the online or in-person course must be taken, are provided in the description of the policy (https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/).
2. Training on academic ethics in accordance with Whiting School of Engineering policy (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/). This requirement can be satisfied by passing EN.500.603 Graduate Orientation and Academic Ethics.
3. Attendance is required at the weekly Department of Materials Science & Engineering Seminar (EN.510.803 or EN.510.804)

4. Teaching Assistant Requirement: Students in their second year in the department will be required to act as teaching assistant for two courses.

5. Successful completion of a comprehensive oral examination. The exam is offered semiannually, usually the week before the beginning of the fall semester and the spring semester. The exam covers three areas of materials science and engineering:

- Structure of Materials
- Thermodynamics of Materials

- Either Kinetics and Phase Transformations in Materials OR Biomaterials (at the student's choice)

Although these subject areas correspond to the four core courses, the topics covered in the exam are not strictly limited to material covered in those courses. Furthermore, each section may include questions related to the properties of materials at a level similar to that covered in EN.510.615 (Physical Properties of Materials).

Additional information about the oral exam is provided in the document *Information for Doctoral Students regarding the oral comprehensive examination*, available from the Academic Program Coordinator.

6. A proposal for a research project to form the basis of the candidate's dissertation.
Each student must write a dissertation proposal (https://engineering.jhu.edu/materials/wp-content/uploads/2021/07/DMSE-thesis-proposal-guidelines.pdf) and present it orally at a public seminar no later than the end of the sixth semester following matriculation. The written dissertation proposal must be submitted to the department no later than two weeks prior to the scheduled date of the oral presentation. The public seminar will be followed by a closed session with a committee consisting of the research advisor and two other faculty members (to be selected in consultation with the advisor). During the closed session, the committee members will ask questions about and provide comments on the proposed plan of research. The thesis proposal is also an examination, with the committee testing the candidate's depth of knowledge in their area of specialization (and not only on the proposed research). Students who do not successfully complete the dissertation proposal requirement by the end of the sixth semester following matriculation will be placed on probation, with a specified time limit (ordinarily no more than six months) within which to complete this requirement and be removed from probation. Students on probation who do not complete the dissertation proposal requirement within the specified time limit will be dismissed from the program.

7. Completion of an original research project, documented in a dissertation that is defended by the candidate in a public presentation.
Candidates must write a dissertation conforming to university requirements that describes their work and results in detail. A public defense of the dissertation is required, and will be followed by a closed examination session. The committee for the closed examination shall consist of five faculty members, chosen by the Doctoral Program Committee, with at least two members being from outside the department. The outcome of the closed examination will be decided by majority vote of the committee. Because the closed examination session fulfills the university Graduate Board Oral (GBO) examination requirement, all procedures pertaining to GBOs as established by the University Graduate Board must be followed.
The committee may impose certain conditions (e.g. changes to the dissertation) for the candidate to meet prior to final certification that they have passed the exam. For this reason, the thesis defense must be scheduled for a date at least two months prior to any personal or university deadline for degree completion. A complete draft of the dissertation must be submitted to all committee members no later than two weeks prior to the defense.
The dissertation in its final form must be read and approved in writing by two members of the committee (the advisor and one other member to be chosen by the committee as a whole).

Mechanical Engineering

http://me.jhu.edu

The Department of Mechanical Engineering offers undergraduate and graduate programs of instruction and research.

A major effort of the department is directed toward the creation of a stimulating intellectual environment in which both undergraduate and graduate students can develop to their maximum potential. Faculty members encourage undergraduate students to participate in both fundamental and applied research along with the graduate students. In most junior and senior undergraduate classes, and in graduate classes, small enrollments permit close contact with faculty members. Students have excellent opportunities to participate actively in the classroom and laboratories and to follow special interests within a subject area.

Undergraduate Programs

The Department of Mechanical Engineering offers two undergraduate programs: the Bachelor of Science in Mechanical Engineering and the Bachelor of Science in Engineering Mechanics. Both programs are accredited by the Engineering Accreditation Commission of ABET. The department offers tracks in biomechanical engineering and aerospace engineering. For additional information regarding both the mechanical engineering and engineering mechanics academic programs, please consult the undergraduate advising manuals, which are available on the departmental website (https://me.jhu.edu/education/undergraduate-studies/advising/).

Mechanical Engineering is of great importance in most contemporary technologies. Examples include aerospace, systems and control, power generation and conversion, fluid machinery, design and construction of mechanical systems, transportation, manufacturing, production, and biomechanics. This wide range of applications is reflected in the four main stems of the undergraduate curriculum: fluid mechanics and thermal systems, mechanics and materials, robotics and control systems, and biomechanics.

Engineering Mechanics is a flexible program that enables students to pursue particular interests while centering on a smaller core of courses. Students may use this flexibility to follow specific interests in physics, mathematics, economics, biology, and other disciplines while receiving a fully-accredited engineering degree.

Design is a major component of both undergraduate programs.
In the two-semester Engineering Design Project course taken by undergraduates during their senior year, students work in small teams to design, construct, and test a mechanical device or system for an industrial sponsor.

For details and an explanation of ABET requirements, visit www.abet.org (https://www.abet.org/).

Graduate Programs

Graduate programs are offered leading to the master's (M.S.E.) and the doctoral (Ph.D.) degrees in Mechanical Engineering. A five-year combined Bachelor's/Master's (B.S./M.S.E.) program is also available.

Combined Undergraduate/Graduate Program

The Mechanical Engineering Department offers a combined five-year bachelor's/master's program for mechanical engineering and engineering mechanics majors. Applications to the B.S./M.S.E. program should be submitted by January 6 for consideration of spring admission and June 16 for possible fall admission, during applicant's junior (third) year.

Financial Aid

Scholarships and other forms of financial aid for undergraduates are described under Admissions and Finances. Selected undergraduates may be employed as laboratory assistants on research projects.

Master's Degree (M.S.E.)

Financial aid in the form of partial tuition coverage is provided to select master's students. All master's students will receive partially-covered health insurance, but most master's students will be responsible for full tuition and other costs.

Ph.D. Degree

WSE PhD students are fully funded (tuition, health insurance and stipend) for the duration of their PhD program while they are in a fulltime, resident status Financial aid is provided through departmental fellowships and research assistantships that cover tuition, health insurance, dental and vision coverage, salary, and a one-time matriculation fee. Research assistantships support graduate students who work with professors on their research contracts and grants.

Competitively-awarded teaching assistant positions that pay a few hundred to a few thousand dollars per semester may be available for graduate students, but are not guaranteed.

Application Submission Deadlines

Applications for graduate study must be received by October 15 for the Spring semester, which occurs January-May; and by December 15 for the Fall semester, which occurs August-December.

Facilities

The Mechanical Engineering department administrative office is located in 223 Latrobe Hall. The teaching and research facilities of the department are located in Latrobe, Clark, Krieger, Wyman, Maryland, Malone, and Hackerman Halls.

The thermal-fluids teaching laboratory in Krieger Hall supports courses in Thermodynamics, Fluid Mechanics, and Thermal Processes. The undergraduate laboratories at the Wyman Park Building support courses in Design and CAD, Electronics and Instrumentation, Mechanics-Based Design, Robot Sensors and Actuators, Mechatronics, and Dynamical Systems. The Senior Design laboratories are used by seniors to construct and test their prototypes in the yearlong design project course.

The many research laboratories within Mechanical Engineering support a variety of focus areas including: turbulence, oceanographic fluid dynamics, turbomachinery, microfluidics, locomotion (sea, land, and air), mechanisms of deformation and damage, impact dynamics, additive manufacturing, polymer mechanics, mechanics of soft tissues, biophotonics, cellular mechanics, bioMEMS, robot and protein kinematics, haptics, medical robots, underwater robots, and autonomous vehicles.

Programs

- Engineering Mechanics, Bachelor of Science (p. 1386)
- Mechanical Engineering, Bachelor of Science (p. 1390)
- Mechanical Engineering, Master of Science in Engineering (p. 1393)
- Mechanical Engineering, PhD (p. 1394)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.530.107. MechE Undergraduate Seminar I. 0.5 Credits.
A series of weekly seminars to inform students about careers in mechanical engineering and to discuss technological, social, ethical, legal, and economic issues relevant to the profession. Part 1 of a year-long sequence.

EN.530.108. MechE Undergraduate Seminar II. 0.5 Credits.
A series of weekly seminars to inform students about careers in mechanical engineering and to discuss technological, social, ethical, legal, and economic issues relevant to the profession. Part 2 of a year-long sequence.

EN.530.111. Intro to MechE Design and CAD. 2 Credits.
This course introduces students to the basic engineering design process and to fundamental concepts and knowledge used in the design of mechanical devices and systems. Students will explore the range of tools utilized in design practice, beginning with the skills of hand-drawing, exploring ways to articulate visual ideas, and concluding with the standards of presentation and CAD tools typical in professional practice.
Prerequisite(s): EN.530.115

EN.530.115. MechE Freshman Lab I. 1 Credit.
Hands-on laboratory complementing EN.530.111, including experiments, mechanical dissections, sketching and CAD, and a cornerstone design project. Experiments and mechanical dissections connect physical principles to practical engineering applications. Sketching and CAD work build the students' design and communication skills. The design project allows students to synthesize a working system by combining knowledge of mechanics and design with practical engineering skills.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.116. MechE Freshman Lab II. 1 Credit.
Hands-on laboratory in which students continue to develop their engineering design skills. Laboratory topics include engines and motors, microcontrollers, and sensors. A design project allows students to synthesize a working system by combining knowledge of mechanics and design with practical engineering skills.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.123. Introduction to Mechanics I. 3 Credits.
This course offers an in-depth study of the fundamental elements of classical mechanics, including particle and rigid body kinematics and kinetics, and work-energy and momentum principles. Part 1 of a year-long sequence.

EN.530.124. Intro to Mechanics II. 2 Credits.
This course offers an in-depth study of the fundamental elements of classical mechanics, statics, mechanics of materials, fluid mechanics, and thermodynamics. Part 2 of a year-long sequence. Restricted to Mechanical Engineering, Engineering Mechanics, Civil Engineering, Undecided Engineering Majors, or permission of instructor.

EN.530.202. Mechanical Engineering Dynamics. 3 Credits.
Basic principles of classical mechanics applied to the motion of particles, system of particles and rigid bodies. Kinematics, analytical description of motion; rectilinear and curvilinear motions of particles; rigid body motion. Kinetics: force, mass, and acceleration; energy and momentum principles. Introduction to vibration.
(EN.530.201 OR EN.560.201) AND (AS.171.101 OR AS.171.107 OR AS.171.105 OR ((EN.530.103 OR EN.530.123) AND EN.530.104)) AND AS.110.109; grade of C- or higher required for EN.530.201 OR EN.560.201;Students must have completed Lab Safety training prior to registering for this class.

EN.530.204. Manufacturing Engineering Theory. 2 Credits.
An introduction to the grand spectrum of the manufacturing processes and technologies used to produce metal and nonmetal components. Topics include casting, forming and shaping, and the various processes for material removal including computer-controlled machining. Simple joining processes and surface preparation are discussed. Economic and production aspects are considered throughout. Students should have knowledge of engineering drawing software like SolidWorks, AutoCAD, or Pro-E.

EN.530.205. Manufacturing Engineering Laboratory. 1 Credit.
This course is the laboratory that supports EN.530.204 Manufacturing Engineering Theory. While concurrent enrollment with EN.530.204 is suggested, it is not required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.204

EN.530.212. MechE Dynamics Laboratory. 1 Credit.
This is the laboratory component to EN.530.202 MechE Dynamics.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.202

EN.530.215. Mechanics-Based Design. 3 Credits.
Stresses and strains in three dimensions, transformations. Combined loading of components, failure theories. Buckling of columns. Stress concentrations. Introduction to the finite element method. Design of fasteners, springs, gears, bearings, and other components.
EN.530.201 OR EN.560.201

EN.530.216. Mechanics Based Design Laboratory. 1 Credit.
This is the laboratory that supports EN.530.215 Mechanics Based Design.
Prerequisite(s): EN.530.215
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.231. Mechanical Engineering Thermodynamics. 3 Credits.
Properties of pure substances, phase equilibrium, equations of state. First law, control volumes, conservation of energy. Second law, entropy, efficiency, reversibility. Carnot and Rankine cycles. Internal combustion engines, gas turbines. Ideal gas mixtures, air-vapor mixtures. Introduction to combustion.
Prerequisite(s): EN.530.232 AND (AS.171.102 OR AS.171.106 OR AS.171.108)
AS.110.109

EN.530.232. Mechanical Engineering Thermodynamics Laboratory. 1 Credit.
This course is the complementary laboratory course and a required corequisite for EN.530.231. Corequisite: EN.530.231There will be four lab sessions, days and times TBA.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.241. Electronics & Instrumentation. 3 Credits.
Introduction to basic analog electronics and instrumentation with emphasis on basic electronic devices and techniques relevant to mechanical engineering. Topics include basic circuit analysis, laboratory instruments, discrete components, transistors, filters, op-amps, amplifiers, differential amplifiers, power amplification, power regulators, AC and DC power conversion, system design considerations (noise, precision, accuracy, power, efficiency), and applications to engineering instrumentation.
AS.171.102 OR AS.171.108 OR AS.171.106;(EN.550.291/EN.553.291) OR (AS.110.201 AND AS.110.302) OR (AS.110.212 AND AS.110.302); students may take the required courses concurrently with EN.530.241.

EN.530.243. Electronics and Instrumentation Laboratory. 1 Credit.
This is the laboratory that supports EN.530.241 Electronics and Instrumentation.
Prerequisite(s): EN.530.241 Electronics and Instrumentation or instructor approval
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.254. Manufacturing Engineering. 3 Credits.
An introduction to the grand spectrum of the manufacturing processes and technologies used to produce metal and nonmetal components. Topics include casting, forming and shaping, and the various processes for material removal including computer-controlled machining. Simple joining processes and surface preparation are discussed. Economic and production aspects are considered throughout. Students must have completed the WSE Manufacturing Basic Shop training prior to registering for this class. Students should have knowledge of engineering drawing software like SolidWorks, AutoCAD, or Pro-E.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.111 OR EN.530.414 or permission of instructor.

EN.530.310. Reverse Engineering and Diagnostics. 3 Credits.
We will disassemble, inspect, diagnose, reverse engineer, repair (if needed) and test the subsystems of the first modern tractor, the iconic Ford N series (9N, 2N or 8N). The systems include power, cooling, electrical, ignition, hydraulic, transmission, steering, fuel, control (governor) and braking. The course is not about tractor repair, but upon successful completion, you will know the tractor's design and function, inside and out and you will be empowered with the confidence to understand and diagnose mechanical systems. Lessons learned will be applicable to other areas of mechanical engineering and will be particularly helpful for Senior Design. We will analyze (reverse engineer) the tractor. For example, given the engine delivers 28 HP at the PTO, how big does the PTO shaft need to be? How big is it? Over/under designed? How was it manufactured? How else could it have been manufactured. What size engine delivers 28 Hp? What fuel consumption is needed? What cooling capacity is needed? Answering such questions will prepare students to ask appropriate questions in senior design. How big/strong do we need to make it? We will also have a functioning N-series tractor that will be 'sabotaged' each week for students to test their logic skills at diagnosing the cause of the malfunction. Course goals include developing diagnostic skills, learning to read electrical and hydraulic schematics and assembly drawings, developing engineering intuition and applying theoretical knowledge to practical problems. No mechanical experience is needed. Students with the least 'hands on' background will have the most to benefit, but even BAJA members have much to gain.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.327. Introduction to Fluid Mechanics. 3 Credits.
This course introduces the fundamental mathematical tools and physical insight necessary to approach realistic fluid flow problems in engineering systems. The topics covered include: fluid properties, fluid statics, control volumes and surfaces, kinematics of fluids, conservation of mass, linear momentum, Bernoulli's equation and applications, dimensional analysis, the Navier-Stokes equations, laminar and turbulent viscous flows, internal and external flows, and lift and drag. The emphasis is on mathematical formulation, engineering applications and problem solving.
EN.530.329;(EN.530.202 OR EN.560.202) AND (AS.110.302 OR EN.553.291 OR AS.110.306)

EN.530.329. Introduction to Fluid Mechanics Laboratory. 1 Credit.
This course is the complementary laboratory course and a required co-requisite for EN.530.327. Corequisite: EN.530.327There will be four lab sessions, days and times TBA.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.334. Heat Transfer. 3 Credits.
Steady and unsteady conduction in one, two, and three dimensions. Elementary computational modeling of conduction heat transfer. External and internal forced convection. Performance and design of heat exchangers. Boiling and condensation. Black-body and gray-body radiation, Stefan-Boltzmann law view factors and some applications.
EN.530.231 AND EN.530.327

EN.530.335. Heat Transfer Laboratory. 1 Credit.
This is the laboratory that supports EN.530.334 Heat Transfer.
Prerequisite(s): EN.530.334
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.343. Design and Analysis of Dynamical Systems. 3 Credits.
Modeling and analysis of damped and undamped, forced and free vibrations in single and multiple degree-of-freedom linear dynamical systems. Introduction to stability and control of linear dynamical systems.
AS.110.108[AND AS.110.109 AND (AS.110.202 OR AS.110.211) AND (EN.550.291 OR (AS.110.302[AND AS.110.201) OR (AS.110.306 AND AS.110.201)) and C- or better or concurrent enrollment in 530.202 or 560.202. MechE Majors must also have taken 530.241;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.344. Design and Analysis of Dynamical Systems Laboratory. 1 Credit.
Prerequisite(s): EN.530.343
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.352. Materials Selection. 4 Credits.
An introduction to the properties and applications of a wide variety of materials: metals, polymers, ceramics, and composites. Considerations include availability and cost, formability, rigidity, strength, and toughness. This course is designed to facilitate sensible materials choices so as to avoid catastrophic failures leading to the loss of life and property.
EN.530.215

EN.530.381. Engineering Design Process. 3 Credits.
This course is to get you into the world of Senior Design, which means into our spaces, into the machine shop and into the mind set of doing design-build-test work. You will be assigned to be an assistant to one of our Senior Design teams. In industrial design practice this is absolutely typical and project teams grow or shrink as the need demands. It is also a good way for younger engineers to learn the ropes. You will have your own portfolio of design work to do, but it will be in the context of a large project where there has already been a lot of progress. You will have to fit in with that larger context – as usual for engineers – while also making your own contributions. There will be a lecture series which will introduce some key ideas and tools of the engineering designer. Rapid sketching of design ideas; more careful hand drawings that are like fast technical drawings; how to generate ideas and then develop the ideas into workable, feasible, affordable, desirable solutions; how to identify prototypes that will show the way forward, and then actually make them; how to work with a team and negotiate about time, deliverables and design detail; how to find parts from commercial suppliers, size them, order them and get them delivered; how to document design work in a fast and effective way. Some of the lectures will be in the form of case studies of excellent design work, and will be student-driven i.e. you will prepare a case study to present to the class which we then discuss.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.403. MechE Senior Design Project I. 4 Credits.
This senior year "capstone design" course is intended to give some practice and experience in the art of engineering design. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed. Recommended Course Background: ME Majors: EN.530.215, EN.530.327; EM & BME Majors: EN.530.215 or EN.530.405, and EN.530.327.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.404. MechE Senior Design Project II. 4 Credits.
The Senior Design Project, a unique two-semester course, is the capstone of Johns Hopkins's Mechanical Engineering Program. In the class, students working in small teams tackle specific design challenges presented by industry, government, and nonprofit organizations. The sponsors provide each team with a budget, access to world-class resources, and technical contacts. Ultimately, each team conceptualizes a novel solution to the sponsor's problem and then designs, constructs, and tests a real-world prototype before presenting the finished product and specifications to the sponsor. The course requires students to draw upon the four years of knowledge and experience they've gained in their engineering studies and put it to practical use. Throughout the year, they produce progress reports as they design, build, and test the device they are developing. Combining engineering theory, budget and time management, and interactions with real clients, the senior design project is critical to students' preparation for the transition from school to the workplace.
Area: Writing Intensive
EN.530.403

EN.530.405. Mechanics of Advanced Engineering Structures. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and structures. We will begin with the mathematical preliminaries used in continuum mechanics: vector and tensor calculus, then introduce kinematics and strain measures, descriptions of stress in a body, frame indifference, conservation laws: mass, momentum, energy balance, and entropy. These concepts will be applied to develop the constitutive equations for solids and fluids, methods for solving boundary values problems that occur in engineering structures, energy methods and foundations of the finite element method.

EN.530.410. Biomechanics of the Cell. 3 Credits.
Mechanical aspects of the cell are introduced using the concepts in continuum mechanics. Discussion of the role of proteins, membranes and cytoskeleton in cellular function and how to describe them using simple mathematical models.

EN.530.414. Computer-Aided Design. 3 Credits.
The course outlines a modern design platform for 3D modeling, analysis, simulation, and manufacturing of mechanical systems using the "Pro/E" package by PTC. The package includes the following components: • Pro/ENGINEER: is the kernel of the design process, spanning the entire product development, from creative concept through detailed product definition to serviceability.• Pro/MECHANICA: is the main analysis and simulation component for kinematic, dynamic, structural, thermal and durability performance.• Pro/NC: is a numeric-control manufacturing package. This component provides NC programming capabilities and tool libraries. It creates programs for a large variety of CNC machine tools.

EN.530.417. Fabricatology - Advanced Materials Processing. 3 Credits.
The "Fabricatology" is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

EN.530.418. Aerospace Structures. 3 Credits.
An introduction to the design of aircraft and spacecraft structures and components. This course will build on skills learned in EN.530.215 and EN.530.352. Recommended Course Background: EN.530.352 or instructor permission.

EN.530.420. Robot Sensors/Actuators. 4 Credits.
Introduction to modeling and use of actuators and sensors in mechatronic design. Topics include electric motors, solenoids, micro-actuators, position sensors, and proximity sensors.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;((AS.171.101 AND AS.171.102) OR (AS.171.107 AND AS.171.108) OR (AS.171.101 AND AS.171.108) OR (AS.171.107 AND AS.171.102) OR (EN.530.103 AND EN.530.104) OR (EN.530.123 AND EN.530.124)) AND ((AS.110.106 OR AS.110.108) AND AS.110.109 AND (AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.302) AND (EN.530.241 OR (EN.520.230 AND EN.520.231)))

EN.530.421. Mechatronics. 3 Credits.
Students from various engineering disciplines are divided into groups of two to three students. These groups each develop a microprocessor-controlled electromechanical device, such as a mobile robot. The devices compete against each other in a final design competition. Topics for competition vary from year to year. Class instruction includes fundamentals of mechanism kinematics, creativity in the design process, an overview of motors and sensors, and interfacing and programming microprocessors.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.420 OR EN.520.240 OR EN.520.340 or permission of the instructor.

EN.530.424. Dynamics of Robots and Spacecraft. 3 Credits.
An introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion, stability theory, and Hamilton's principle.

EN.530.425. Mechanics of Flight. 3 Credits.
Elements of flight dynamics: aerodynamics forces, gliding, cruising, turning, ascending, descending, stability, etc. Review of the pertinent fluid mechanic principles. Application to two-dimensional airfoils and theory of lift. Three-dimensional airfoils. Boundary layers. Effects of compressibility. Subsonic and supersonic flight.

EN.530.426. Biofluid Mechanics. 3 Credits.
Objective: To introduce fundamental concepts associated with the fluid mechanics of biological systems, including physiological flows and organisms living in fluids.

EN.530.427. Intermediate Fluid Mechanics. 3 Credits.
Linear and angular momentum in integral form, applications to turbomachines. The Navier-Stokes equations. Inviscid flow. Laminar viscous flow. Boundary layers. Turbulence. Compressible flows. Projects using computational tools, design of pipe network.

EN.530.430. Applied Finite Element Analysis. 3 Credits.
This course will introduce finite element methods for analysis of solid, structure and biomechanics problems. Following topics will be covered. • Computational solution vs. other solution approaches• Definition of a mechanics problem: governing equations, constitutive equations, boundary and initial conditions. • Procedure to converting a mechanical problem into a computational solution problem.• Understanding and making choices of finite element types to suit problem type.• Finite element solution choices and their application. • Finite element analysis using commercial software ABAQUS. • FE model verification and validation, solution understanding uncertainty. The course will include homework assignments, 2 exams, and a term project. The term project will involve applying FEA to an engineering problem or a research problem, interpretation of results and documenting them in a short report.
EN.550.291 OR AS.110.302

EN.530.432. Jet & Rocket Propulsion. 3 Credits.
The course covers associated aircraft and spacecraft and power generation. The first part reviews the relevant thermodynamics and fluid mechanics, including isentropic compressible flow, Rayleigh and Fanno lines, shock and expansion waves. Subsequently, the performance of various forms of aviation gas turbines, including turbo-jet, turbo-fan, turbo-prop and ram-jet engines are discussed, followed by component analyses, including inlet nozzles, compressors, combustion chambers, turbines and afterburners. Axial and centrifugal turbomachines are discussed on detail, including applications in aviation, power generation and liquid transport. The section on foundations of combustion covers fuels, thermodynamics of combustion, and energy balance. The last part focuses on rockets, including classification, required power for space flight, chemical rocket components, and combustion involving liquid and solid fuels.

EN.530.436. Bioinspired Science and Technology. 3 Credits.
Nature has been a source of inspiration for scientists and engineers and it receives particular attention recently to address many challenges the human society encounter. The course will study novel natural materials/structures with unique properties, the underlying principles, and the recent development of the bio-inspired materials and systems. From this course, students can learn about ingenious and sustainable strategies of organisms, open eyes about various phenomena in nature, and get inspiration for opening new directions of science and technology.

EN.530.438. Aerospace Materials. 3 Credits.
Aircraft materials have a come a long way from the early days of bamboo, muslin and bailing wire, and this course will accentuate processing-structure-property-performance relations is a variety of metallic alloys, ceramics and composites. Materials with applications in aeronautics, space and hypersonics will be emphasized, and topics will include: Al and Ti alloys, Co and Ni- based superalloys, refractory alloys; ceramic, metal and polymer-based composites; thermal protections systems; and dielectric windows and radomes.
EN.530.352

EN.530.441. Introduction to Biophotonics. 3 Credits.
The primary aim for this course is to explore the unique and diverse properties of light that makes it suited for diagnosis, imaging, manipulation and control of biological structure and function from the nanoscale to the tissue level. The course will focus on different optical spectroscopic and microscopic modalities that provide biochemical and morphological information, while introducing new ideas on analysis and interpretation of the acquired data. We will also discuss manipulation methods, including optical tweezers and laser scissors, and low-level light therapy. In all of these areas, the idea is to develop a basic understanding of the subject and to use it for finding solutions to real-world problems in healthcare. Discussions and open exchanges of ideas will be strongly emphasized.

EN.530.443. Fundamentals, Design Principles and Applications of Microfluidic Systems. 3 Credits.
This course will introduce fundamental physical and chemical principles involved in unique microscale phenomena. Topics to be covered include issues associated with being in micrometers in science and engineering, fluid mechanics in micro systems, diffusion, surface tension, surfactants, and interfacial forces, Interfacial hydrodynamics, Mechanical properties of materials in microscale. Students will learn about applications, enabled by the discussed principles.Recommended Pre-Requisites: EN.530.334 Suggested Pre-Requisites: EN.530.328, EN.580.451
EN.530.327 AND EN.530.231

EN.530.445. Introduction to Biomechanics. 3 Credits.
An introduction to the mechanics of biological materials and systems. Both soft tissue such as muscle and hard tissue such as bone will be studied as will the way they interact in physiological functions. Special emphasis will be given to orthopedic biomechanics. Recommended Course Background: EN.530.215/EN.530.216 and Lab or equivalent. If you have not taken this course or an equivalent, please contact the instructor before registering to ensure you have the appropriate background knowledge to succeed in this course.

EN.530.446. Experimental Methods in Biomechanics. 3 Credits.
An introduction to experimental methods used in biomedical research. Standard experimental techniques will be applied to biological tissues, where applicable and novel techniques will be introduced. Topics include strain gauges, extensometers, load transducers, optical kinematic tracking, digital image correlation, proper experimental design, calibration and error analysis. Of particular emphasis will be maintaining native tissue temperature and hydration. Laboratory will include "hands- on" testing.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.448. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties, Recommended Course Background: AS.110.201 and AS.110.302, as well as a class in statics and mechanics.

EN.530.455. Additive Manufacturing. 3 Credits.
The emergence of additive manufacturing (AM) as a viable technology for depositing materials with intricate shapes and architectures enables personal fabrication and threatens to transform global supply chains. This course will give a comprehensive introduction to AM of polymers, metals and ceramics, including: processing fundamentals, processing-structure-property relations and applications. Implications for the design, qualification and introduction of AM products will be addressed, and a variety of applications will be reviewed and used as case studies.Recommended knowledge of Materials Science equivalent to 530.352 Materials Selection. Concurrent enrollment in 530.352 Materials Selection is welcome.

EN.530.464. Energy Systems Analysis. 3 Credits.
This course discusses the grid integration of renewable energy systems. The main emphasis is on grid level effects of renewable energy, particularly wind power systems. It begins with an introduction to basic power system concepts along with power flow analysis (and optimization). Then, important concepts for wind power systems are discussed. Following that, integration issues for wind power at the transmission level and solar cell integration at the distribution level are introduced. The last part of the course will focus on current research in these areas. Students will choose a system to research and present a project or literature review at the end of the term. Prior knowledge of optimization is helpful, but not required. Co-listed with EN530.664

EN.530.468. Locomotion Mechanics: Fundamentals. 3 Credits.
This upper level undergraduate and graduate class will discuss fundamental mechanics of locomotion of both animals and machines, particularly bio-inspired robots. Locomotion emerges from effective physical interaction with an environment; therefore, the ability to generate appropriate forces (besides sensing, control, and planning) is essential to successful locomotion. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How can kangaroos hop faster and fleas jump higher than their muscles allow? Why do race walkers use a peculiar hip movement? How do animals inspire prosthetic feet that helped Blade Runner compete with abled athletes? Why do Boston Dynamics' robots move so well in most modest environments, and why does it still fail in complex terrain? Why do horses walk at low speeds but run at higher speeds? Can T-Rex run or must they walk? Why do larger animals become more erect in their leg posture? Why can a mouse falling from a skyscraper walk away with little injury, but a horse will smash? How can our muscles serve as energy-saving springs, force transmitting struts, and even energy-damping brakes? Why do migrating birds fly in a V-formation? Do Speedo's sharkskin swimsuits really reduce drag? Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics. Nearly all these fundamental studies of interesting biological locomotion phenomena have led to engineering devices that use the same physics principles to move in complex environments, with performance approaching that of animals. Recommended background: Earned B or higher in EN.530.202 (or EN.560.202) Dynamics or equivalent.

EN.530.469. Locomotion Mechanics: Recent Advances. 3 Credits.
This upper level undergraduate and graduate class will discuss recent advances in the mechanics of animal and bio-inspired robot locomotion in complex environments. All of the topics covered are from cutting edge research over the last 20 years, with many still being active research areas. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How do geckos adhere to and climb over almost any surfaces? How do all kinds of animals use tails in novel ways to quickly maneuver in the air and on the ground? How do sandfish lizards burrow into and swim under sand? How do sidewinder snakes crawl up steep sand dunes without triggering an avalanche? How do large ants colonies dig and live in narrow tunnels without trapping themselves in traffic jams? Why do legged and snake robots struggle on sand and rubble, whereas insects, lizards, and snakes traverse similar terrain at ease? Why do insects rotate their wings while flapping to fly? How do soft-bodied worms move and how can we make better soft robots? How do cockroaches survive after squeezing through gaps with pressure several hundreds of their body weight? How do water striders walk on water and why can't we do it?All these fundamental studies of interesting biological locomotion phenomena have led to bio-inspired robots that use the same physics principles to move in complex environments, with performance approaching that of animals.Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics.Recommended background: B or higher in EN.530.202 Dynamics or EN.560.202 Dynamics.Closely-related courses:EN.530.468/668 Locomotion Mechanics: FundamentalsEN.530.676 Locomotion Dynamics and ControlVisit https://li.me.jhu.edu/teaching for more information.

EN.530.470. Space Vehicle Dynamics & Control. 3 Credits.
In this course we study applied spacecraft orbital and attitude dynamics and their impact on other subsystems. In the orbital dynamics part of the course, we discuss some the issues associated with orbital insertion, control and station keeping. Focus is on the two-body problem regime where conic solutions are valid. Orbit perturbations are also considered. For attitude dynamics, different attitude representations such as of direction cosines, quaternions, and angles are introduced. Then we look at the forces and moments acting on space vehicles. Attitude stability and control considerations are introduced.

EN.530.473. Molecular Spectroscopy and Imaging. 3 Credits.
The overarching objective of this course is to understand, employ and innovate molecular spectroscopy and optical imaging tools. The emphasis will be to bridge the domain between molecular spectroscopy, which provides exquisite chemical information, and the imaging capabilities of microscopy to seamlessly traverse between structural and biochemical spaces. The course will build on the foundational principles of light-matter interactions and an understanding of light sources, geometrical and wave optics, and detectors. Using vibrational and fluorescence spectroscopy as the tools of choice, we will discuss the design and fabrication of molecular reporters that offer unprecedented sensitivity, specificity and multiplexing capabilities in imaging of live biological specimen. Finally, we will learn about spectral and image-processing algorithms that have fundamentally changed the nature and quantity of useful information and have directly lead to breakthroughs in super-resolution imaging and multi-modal image fusion. All through the course, the focus will be on the underlying concepts and physical insights as we navigate through a diverse array of biophotonics applications.

EN.530.474. Effective and Economic Design for Biomedical Instrumentation. 4 Credits.
This course is to introduce students to the design, practice, and devices used in biomedical research. The class will be divided into two parts: lecture and lab. In the lectures, students will learn the physics behind the device, the specific requirements of biomedical instruments, and the engineering principles to construct the devices. Lab sessions will focus on designing and building a prototype device. This course aims to forge collaboration between biomedical researchers and mechanical engineers. The goal is to make the devices accessible to the biomedical research community as well as the general public. Economical availability will be one of the critical elements in the device design. Students will be encouraged to build the devices within a healthy budget.PREREQUISITES: Introductory Physics, Programming, and CAD
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.479. Modern Tools and Applications in Experimental Solid Mechanics. 3 Credits.
This course provides students with an introduction to experimental solid mechanics, equipping them with the fundamental knowledge required to design, set up, and interpret laboratory tests to determine the strength, stiffness, fracture toughness, and strains and stresses in solids under quasi-static and dynamic loads. The course is divided into a series of modules, with each module containing a lecture and accompanying laboratory exercises in which students set up and execute experiments and analysis. Module topics include: the basics of experimental measurements, noise, and errors; strain gages; photoelasticity; digital image correlation; impact testing and high-speed imaging; fracture toughness measurements. By the end of the course, students will be able to formulate, design, and execute experiments to characterize the elastic, plastic, and dynamic response of a variety of materials, and compare their measurements with theoretical predictions.
EN.560.201 AND EN.530.215

EN.530.480. Image Processing and Data Visualization. 3 Credits.
The course will be divided into two parts. In the first part, students will learn the basics of image processing, including handling noisy background, creating 2D/3D filters, Fourier domain operations, and building processing pipelines . In the second part, students will learn the importance of data visualization, as well as the skills to use the aids such as virtual reality goggles and haptic devices to help scientists gain insights for data interpretation. Recommended experience programming in Matlab.

EN.530.483. Applied Computational Modeling in Aerodynamics and Heat Transfer. 3 Credits.
Introduction to fundamental principles and applications of the computational modeling in fluid dynamics and heat transfer. Emphasis is on basics of finite-difference methods and hands-on experience in code development as well as the use of a commercial software package (ANSYS CFX) for modeling and simulation. Students will also learn about meshing strategies, post-processing, and critical analysis of simulation results. The concept of numerical errors and the validation and verification will also be emphasized.Recommended Background: (1) Undergraduate or introductory level course in fluid dynamics or heat transfer or transport phenomena or classical mechanics.(2) Basic expertise in writing computer codes (MATLAB or C++ or Fortran or Python).

EN.530.501. Undergraduate Research. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible. All students taking three or more credits of undergraduate research are strongly encouraged to present a research poster at the Johns Hopkins University’s DREAMS Undergraduate Research Day.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.511. Group Undergraduate Research. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible. The professor and students will meet weekly in required meetings. All students taking three or more credits of undergraduate research are strongly encouraged to present a research poster at the Johns Hopkins University's DREAMS Undergraduate Research Day.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.526. Undergrad Independent Study. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.527. Independent Study. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.597. Research - Summer. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.599. Independent Study. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.603. Applied Optimal Control. 3 Credits.
The course focuses on the optimal control of dynamical systems subject to constraints and uncertainty by studying analytical and computational methods leading to practical algorithms. Topics include calculus of variations, nonlinear local optimization, global stochastic search, dynamic programming, linear quadratic (gaussian) control, numerical trajectory optimization, model-predictive control. Advanced topics include approximate dynamic programming and optimal control on manifolds. The methods and algorithms will be illustrated through implementation of various simulated examples. Recommended Course Background: Linear Algebra and Differential Equations; experience with control systems; programming in MATLAB and/or Python.

EN.530.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.510.604 are not eligible to take EN.530.604.

EN.530.605. Mechanics of Solids and Materials. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and materials. We will begin with the mathematical preliminaries of continuum mechanics: vectors and tensors calculus, then introduce the kinematics of deformation and descriptions of stress in a continuum: Eulerian and Lagrangian descriptions, followed by conservation laws: mass, momentum, and energy balance, and entropy. These concepts will be applied to develop the concepts of constitutive relations: frame invariance, material symmetry, and dissipation. The second half of the class will be devoted to elasticity, both classical and finite elasticity, and solution methods for boundary value problems.

EN.530.606. Mechanics of Solids and Materials II. 3 Credits.
An overview of the area of the mechanics of solids and materials, with the intent of providing the foundation for graduate students interested in research that involves these disciplines. The course is based on the principles of continuum mechanics, and covers the fundamental concepts of elasticity, plasticity, and fracture as applied to materials. One objective is to get graduate students to the point that they can understand significant fractions of research seminars and papers in this area. This mathematically rigorous course emphasizes the setup and solution of boundary value problems in mechanics, and attempts to integrate the primary behaviors with deformation and failure mechanisms in materials. Special topics covered may include (depending on the interests of the student body) wave propagation, viscoelasticity, geomechanics or biomechanics.

EN.530.607. Introduction to Wind Energy. 3 Credits.
This project-based course will provide an introduction to wind energy engineering.

EN.530.608. Experimental Fluid Dynamics. 3 Credits.
This course will serve as a virtual tour to many experimental facilities and techniques following the history of fluid dynamics research. Stories of several interesting debates will be told to show that iterations of experimental facilities based on the physics of fluid can lead to major new discoveries that brought a long-lasting impact on the entire field. The course will also focus on the unique opportunities and challenges in this decade thanks to the rapid advance of digital cameras, lasers, computed tomography, fluorescence imaging, as well as diagnostic tools based on X-ray, MRI, and gamma radiation. The course is designed for graduate students at all levels that are interested in fluid dynamics.

EN.530.610. Quantitative Cell Mechanics. 3 Credits.
Application of equilibrium and nonequilibrium concepts in statistical mechanics to biology is presented in some detail. Topics include many-body dynamics and equilibrium ensembles, thermodynamics and phase transitions, free energy functionals, computer simulations of biological systems, nonequilibrium model such as the Langevin equation and the Fokker-Planck equation, kinetic models of biochemical networks, Markov models of stochastic systems and pattern formation in nonequilibrium systems. Emphasis will be on quantitative understanding of biological problems.

EN.530.613. MechE Master's Design Project I. 3 Credits.
This course is intended to give graduate students some practice and experience in the art of engineering design in conjunction with undergraduate students taking MechE Senior Design Project I. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed.Recommended Course Background: C- or higher in both 530.403 and 530.404 MechE Senior Design Project I/II. Students from other universities may ask to be considered if they have taken a course like MechE Senior Design Project i.e. two semesters, design-build-test, ideally with industry connection.

EN.530.614. Master's Design Project II. 3 Credits.
This course is intended to give graduate students some practice and experience in the art of engineering design in conjunction with undergraduate students taking MechE Senior Design Project II. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed.Recommended Course Background: C- or higher in both 530.403 and 530.404 MechE Senior Design Project I/II. Students from other universities may ask to be considered if they have taken a course like MechE Senior Design Project i.e. two semesters, design-build-test, ideally with industry connection.

EN.530.616. Introduction to Linear Systems Theory. 3 Credits.
A beginning graduate course in multi-input multi-output, linear, time-invariant systems. Topics include state-space and input-output representations; solutions and their properties; multivariable poles and zeros; reachability, observability and minimal realizations; stability; system norms and their computation; linearization techniques. Students cannot take EN.530.616 if they have already taken the equivalent courses EN.520.601 OR EN.580.616. No audit option, but contact the instructor if you want to informally sit in on the course. For more information see: 616-introduction-to-linear-systems-theory-fall-2021" target="_blank">https://dscl.lcsr.jhu.edu/530-616-introduction-to-linear-systems-theory-fall-2021
Recommended course background are undergraduate courses in linear algebra, differential equations, and an undergraduate level course in control systems. Students cannot take EN.530.616 if they have already taken EN.520.601 OR EN.580.616.

EN.530.618. Fabricatology - Advanced Materials Processing. 3 Credits.
The “Fabricatology” is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

EN.530.619. Aerospace Structures. 3 Credits.
A graduate-level introduction to the design of aircraft and spacecraft structures and components. This course will build on skills learned in EN.530.215 Mechanics Based Design and EN.530.352 Materials Selection.Recommended Course Background: EN.530.352 (or knowledge of materials selection) or instructor permission.

EN.530.621. Fluid Dynamics I. 3 Credits.
Kinematics. Stress. Conservation of mass, momentum, and energy. Newtonian fluids. The Navier-Stokes equations. Inviscid flows. Laminar viscous flows. Vorticity. Instability. Turbulence. Boundary layers. External flows. Compressible flows. Introduction to non-Newtonian fluids.

EN.530.622. Fluid Dynamics II. 3 Credits.
Kinematics. Stress. Conservation of mass, momentum, and energy. Newtonian fluids. The Navier- Stokes equations. Inviscid flows. Laminar viscous flows. Vorticity. Instability. Turbulence. Boundary layers. External flows. Compressible flows. Introduction to non-Newtonian fluids.

EN.530.624. Dynamics of Robots and Spacecraft (Graduate). 3 Credits.
An introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion, stability theory, and Hamilton's principle.

EN.530.625. Turbulence. 3 Credits.
Fundamental equations of fluid mechanics, Reynolds averaging, and the closure problem. Scaling and self-preservation in boundary-free and wall-bounded shear flows. Isotropic turbulence and spectral theories. Vorticity dynamics, intermittency, and cascade models. Turbulence modeling: one- and two-equation models, Reynolds stress modeling, and large-eddy simulations.

EN.530.627. Intermediate Fluid Mechanics (graduate). 3 Credits.
Linear and angular momentum in integral form, applications to turbomachines. The Navier-Stokes equations. Inviscid flow. Laminar viscous flow. Boundary layers. Turbulence. Compressible flows. Projects using computational tools, design of pipe network.

EN.530.629. Simulation and Analysis of Ocean Wave Energy Systems. 3 Credits.
Aspects of the simulation of a dynamic system are covered in this project-based course. Open-source software packages are used to simulate the hydrodynamics and rigid-body dynamics of an ocean wave-energy conversion project. Topics include: wave-energy converter types (buoyancy, hydrostatic pressure, potential energy, etc.), multi-body coupled dynamics, hydrodynamics, and energy conversion. Prerequisites: dynamics, fluid mechanics, computer programming (any language).

EN.530.632. Convection. 3 Credits.
This course begins with a review of the phenomenological basis of the constitutive models for energy and mass flux. Then, using the transport theorem, general conservation and balance laws are developed for mass, species, energy, and entropy. Scaling analysis is used to determine when simplifications are justified, and simplified cases are solved analytically. Experimental results and correlations are given for more complex situations. Free, mixed, and forced internal and external convection are studied, and convection with a phase change is also explored.

EN.530.636. Bioinspired Science and Technology. 3 Credits.
Nature has been a source of inspiration for scientists and engineers and it receives particular attention recently to address many challenges the human society encounter. The course will study novel natural materials/ structures with unique properties, the underlying principles, and the recent development of the bio-inspired materials and systems. From this course, students can learn about ingenious and sustainable strategies of organisms, open eyes about various phenomena in nature, and get inspiration for opening new directions of science and technology.

EN.530.638. Aerospace Materials. 3 Credits.
Aircraft materials have a come a long way from the early days of bamboo, muslin and bailing wire, and this course will accentuate processing-structure-property-performance relations is a variety of metallic alloys, ceramics and composites. Materials with applications in aeronautics, space and hypersonics will be emphasized, and topics will include: Al and Ti alloys, Co and Ni- based superalloys, refractory alloys; ceramic, metal and polymer-based composites; thermal protections systems; and dielectric windows and radomes.

EN.530.641. Statistical Learning For Engineers. 3 Credits.
Graduate level introductory course on machine learning and reinforcement learning. Artificial intelligence (AI) is rapidly growing in virtually all science and engineering fields. Technologies related to machine learning are at the center of this trend. This course provides a fundamental and core knowledge on machine learning and reinforcement learning, which in turn prepares students so as to self-advance into the state-of-the-art AI technologies in a variety of fields. This course will discuss general aspects of machine and reinforcement learning, which is suitable for students in different fields of interest, though the primary applications include robotics engineering. Topics that will be covered include: core mathematics necessary, core principles for supervised and unsupervised learning (e.g., linear regression, logistic regression, Bayes nets, EM, and so on), and for reinforcement learning (e.g., Markov decision process, dynamic programming, etc.). Homework assignments include both theoretical and computational components.Recommended Course Background:o Course background: Linear Algebra, Multivariate Calculus, Probability, Differential Equations;o Programming: Knowledge of Python (and Matlab)

EN.530.642. Plasticity. 3 Credits.
The theory of the inelastic behavior of metallic materials. Experimental background and fundamental postulates for the plastic stress-strain relations. Mechanisms of plastic flow; single-crystal and polycrystalline plasticity. Boundary value problems. Variational principles, uniqueness and the upper and lower bound theorems of limit analysis. Slip line theory. Dynamic plasticity and wave phenomena. Finite strain plasticity and instability.

EN.530.643. Fundamentals, Design Principles and Applications of Microfluidic Systems. 3 Credits.
This course will introduce fundamental physical and chemical principles involved in unique microscale phenomena. Topics to be covered include issues associated with being in micrometers in science and engineering, fluid mechanics in micro systems, diffusion, surface tension, surfactants, and interfacial forces, Interfacial hydrodynamics, Mechanical properties of materials in microscale. Students will learn about applications, enabled by the discussed principles.Required Pre-Requisites: Knowledge of fluid mechanics and thermodynamics. Recommended Pre-Requisites: heat transfer. Suggested: advanced knowledge of fluid mechanics plus knowledge of cell and tissue engineering.

EN.530.645. Kinematics. 3 Credits.
A theoretical treatment of the kinematics of mechanisms, machines, and robotic manipulators intended for (though not restricted to) graduate students. Topics include parameterizations of spherical motion - Euler angles, Rodrigues parameters, unit quaternions, the matrix exponential; analysis of planar and spatial linkages; robot kinematics - forward and inverse kinematics, singularities, elementary topological issues; theory of wrenches and twists; research issues in robot kinematics - redundancy resolution, grasping and rolling contact, steering of nonholonomic systems. Other advanced topics will be covered as time permits. Recommend Course Background: Undergraduate linear algebra and multivariable calculus.

EN.530.646. Robot Devices, Kinematics, Dynamics, and Control. 4 Credits.
Graduate-level introduction to the mechanics of robotic systems with emphasis on the mathematical tools for kinematics and dynamics of robotic systems. Topics include the geometry and mathematical representation of rigid body motion, manipulator kinematics including forward and inverse kinematics of articulated robot arms, differential kinematics, manipulator dynamics and control. Additional special topics such as trajectory generation, actuation, and design issues will be considered as time permits.

EN.530.647. Adaptive Systems and Control. 4 Credits.
Graduate-level introduction to adaptive identification and control. Emphasis on applications to mechanical systems possessing unknown parameters (e.g., mass, inertia, friction). Topics include stability of linear and nonlinear dynamical systems, Lyapunov stability, input-output stability, adaptive identification, and direct and indirect adaptive control. Required Prerequisites: Calculus I, II, and III; Physics I and II; Linear Algebra; Differential Equations; Graduate linear systems theory such as EN.520.601 Introduction to Linear Systems Theory is required prerequisite. Please see the course home page here for additional information: 647-adaptive-systems-fall-2017" target="_blank">https://dscl.lcsr.jhu.edu/courses/530-647-adaptive-systems-fall-2017. Audit registration not permitted.

EN.530.648. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties, Recommended Course Background: AS.110.201 and AS.110.302, as well as a class in statics and mechanics.

EN.530.649. System Identification. 3 Credits.
This course will cover several fundamental approaches system identification, including spectral, prediction error, subspace, and "online" (adaptive) identification methods. The emphasis will be on LTI systems, but some time will be devoted to system identification for classes of nonlinear dynamical systems, such as those that are linear in parameters.

EN.530.654. Advanced Systems Modeling II. 3 Credits.
A continuation of EN.530.653, this course covers the following topics at an advanced level:Newton's laws of kinematics of systems of particles and rigid bodies; Lagrange's equations forsingle- and multi-degree-of-freedom systems composed of point masses; normal mode analysis and forced linear systems with damping, the matrix exponential and stability theory for linear systems; nonlinear equations of motion; structure, passivity, PD control, noise models and stochastic equations of motion; manipulator dynamics: Newton-Euler formulation, Lagrange, Kane's formulation of dynamics, computing torques with O(n) recursive manipulator dynamics:Luh-Walker-Paul, Hollerbach, O(n) dynamics simulation: Rodriques-Jain-Kreutz, Saha, Fixman. There is also an individual course project that each student must do which relates the topics of this course to his or her research.

EN.530.655. Additive Manufacturing (Graduate). 3 Credits.
The emergence of additive manufacturing (AM) as a viable technology for depositing materials with intricate shapes and architectures enables personal fabrication and threatens to transform global supply chains. This course will give a comprehensive introduction to AM of polymers, metals and ceramics, including: processing fundamentals, processing-structure-property relations and applications. Implications for the design, qualification and introduction of AM products will be addressed, and a variety of applications will be reviewed and used as case studies.Recommended knowledge in Materials Science equivalent to 530.352 Materials Selection.

EN.530.656. Deformation Mechanisms. 3 Credits.
An advanced course on the microscopic mechanisms that control the mechanical behavior of materials. Methods and techniques for measuring, understanding, and modeling: plasticity, creep, shear banding, and fracture will be addressed. Subjects to be covered include dislocation theory and strengthening mechanisms, high temperature diffusion and grain boundary sliding, shear localization, void formation, ductile rupture, and brittle fracture.

EN.530.663. Robot Motion Planning. 3 Credits.
This course provides a graduate-level introduction to robot motion planning. Topics include geometric representation of rigid bodies, configuration space of robots, graph search algorithms, shortest-path motion, and various approaches to motion planning problems (e.g., combinatorial and sampling-based motion planning algorithms, and potential field method). The emphasis is both on mathematical aspects of motion planning (which provides fundamentals in understanding the state-of-the-art planning techniques) and computational implementation of algorithms.

EN.530.664. Energy Systems Analysis (graduate). 3 Credits.
This course discusses the grid integration of renewable energy systems. The main emphasis is on grid level effects of renewable energy, particularly wind power systems. It begins with an introduction to basic power system concepts along with power flow analysis (and optimization). Then, important concepts for wind power systems are discussed. Following that, integration issues for wind power at the transmission level and solar cell integration at the distribution level are introduced. The last part of the course will focus on current research in these areas. Students will choose a system to research and present a project or literature review at the end of the term. Prior knowledge of optimization is helpful, but not required. Co-listed with EN.530.464.

EN.530.668. Locomotion Mechanics: Fundamentals. 3 Credits.
This upper level undergraduate and graduate class will discuss fundamental mechanics of locomotion of both animals and machines, particularly bio-inspired robots. Locomotion emerges from effective physical interaction with an environment; therefore, the ability to generate appropriate forces (besides sensing, control, and planning) is essential to successful locomotion. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How can kangaroos hop faster and fleas jump higher than their muscles allow? Why do race walkers use a peculiar hip movement? How do animals inspire prosthetic feet that helped Blade Runner compete with abled athletes? Why do Boston Dynamics' robots move so well in most modest environments, and why does it still fail in complex terrain? Why do horses walk at low speeds but run at higher speeds? Can T-Rex run or must they walk? Why do larger animals become more erect in their leg posture? Why can a mouse falling from a skyscraper walk away with little injury, but a horse will smash? How can our muscles serve as energy-saving springs, force transmitting struts, and even energy-damping brakes? Why do migrating birds fly in a V-formation? Do Speedo's sharkskin swimsuits really reduce drag? Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics. Nearly all these fundamental studies of interesting biological locomotion phenomena have led to engineering devices that use the same physics principles to move in complex environments, with performance approaching that of animals. Recommended background: Earned B or higher in EN.530.202 (or EN.560.202) Dynamics or equivalent.

EN.530.669. Locomotion Mechanics: Recent Advances. 3 Credits.
This upper level undergraduate and graduate class will discuss recent advances in the mechanics of animal and bio-inspired robot locomotion in complex environments. All of the topics covered are from cutting edge research over the last 20 years, with many still being active research areas. General principles and integration of knowledge from engineering, biology, and physics will be emphasized.Sample topics include: How do geckos adhere to and climb over almost any surfaces? How do all kinds of animals use tails in novel ways to quickly maneuver in the air and on the ground? How do sandfish lizards burrow into and swim under sand? How do sidewinder snakes crawl up steep sand dunes without triggering an avalanche? How do large ants colonies dig and live in narrow tunnels without trapping themselves in traffic jams? Why do legged and snake robots struggle on sand and rubble, whereas insects, lizards, and snakes traverse similar terrain at ease? Why do insects rotate their wings while flapping to fly? How do soft-bodied worms move and how can we make better soft robots? How do cockroaches survive after squeezing through gaps with pressure several hundreds of their body weight? How do water striders walk on water and why can't we do it?All these fundamental studies of interesting biological locomotion phenomena have led to bio-inspired robots that use the same physics principles to move in complex environments, with performance approaching that of animals.Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics.Recommended background: B or higher in EN.530.202 Dynamics or EN.560.202 Dynamics.Closely-related courses:EN.530.468/668 Locomotion Mechanics: FundamentalsEN.530.676 Locomotion Dynamics and ControlVisit https://li.me.jhu.edu/teaching for more information.

EN.530.672. Biosensing & BioMEMS. 3 Credits.
The course discusses the principles of biosensing and introduces micro- and nano-scale devices for fluidic control and molecular/cellular manipulation, measurements of biological phenomena, and clinical applications.

EN.530.673. Introduction to Molecular and Atomistic Modeling and Simulation. 3 Credits.
The course provides an introduction of how material behaves at the molecular and atomistic levels, when they are subjected to changes in pressure and temperature. The behavior of materials at the molecular/atomistic level defines the global/continuum behavioral response of the material subjected to some loading conditions. The course relates concepts of physics to engineering concepts of deformation in materials/structures. At the end of this course, a successful student will be able to:• Perform simple molecular dynamics simulations on materials.• Appreciate suitability and limitation of molecular/atomistic simulations.• Comprehend how molecular and atomistic modeling and simulation are related to define the global/continuum description of materials/structures. • Comprehend concepts of interatomic potentials used to represent different types of bonds in materials.• Understand concepts of wave/particle duality and the role of electrons in the description of properties of a material.• Develop the ability to understand literature in the area of molecular/atomistic modeling and simulation.For molecular simulations, Lammps code (Sandia Labs) will be used by the students and Matlab/Python for post processing. It's a opensource software, so students can install it in their laptops. However, for purpose of running simulations, ARCH will be used. For electronic contributions, Quantum Espresso code will be utilized, which is also opensource. ARCH already has both the software installed in it, so the students will be given temporary access to it to run their codes.

EN.530.674. Effective and Economic Design for Biomedical Instrumentation. 4 Credits.
This course is to introduce students to the design, practice, and devices used in biomedical research. The class will be divided into two parts: lecture and lab. In the lectures, students will learn the physics behind the device, the specific requirements of biomedical instruments, and the engineering principles to construct the devices. Lab sessions will focus on designing and building a prototype device. This course aims to forge collaboration between biomedical researchers and mechanical engineers. The goal is to make the devices accessible to the biomedical research community as well as the general public. Economical availability will be one of the critical elements in the device design. Students will be encouraged to build the devices within a healthy budget.PREREQUISITES: Introductory Physics, Programming, and CAD
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.676. Locomotion Dynamics & Control. 3 Credits.
Graduate course on mechanics and control in locomotion. Topics include modeling (e.g. Lagrangian mechanics), dynamical systems theory (nonholonomic systems, limit-cycle behavior, Poincaré analysis, and Floquet theory), design (control synthesis, mechanical design), and data-driven modeling from animal locomotor control experiments. Prerequisites: A graduate course in linear systems theory (e.g. EN.520.601). Suggested background (not required): 530.475/675.
A graduate course in linear systems theory (e.g. EN.520.601, EN.530.616) or mathematical methods of engineering (e.g. EN.530.761), or permission from the instructor.

EN.530.678. Nonlinear Control and Planning in Robotics. 3 Credits.
The course starts with a brief introduction to nonlinear systems and covers selected topics related to model-based trajectory planning and feedback control. Focus is on applications to autonomous robotic vehicles modeled as underactuated mechanical systems subject to constraints such as obstacles in the environment. Topics include: nonlinear stability, stabilization and tracking, systems with symmetries, differential flatness, backstepping, probabilistic roadmaps, stochastic optimization. Recommended Course Background: multi-variable/differential calculus, AS.110.302, AS.110.201, undergraduate linear control, basic probability theory.

EN.530.679. Modern Tools and Applications in Experimental Solid Mechanics. 3 Credits.
This course provides students with an introduction to experimental solid mechanics, equipping them with the fundamental knowledge required to design, set up, and interpret laboratory tests to determine the strength, stiffness, fracture toughness, and strains and stresses in solids under quasi-static and dynamic loads. The course is divided into a series of modules, with each module containing a lecture and accompanying laboratory exercises in which students set up and execute experiments and analysis. Module topics include: the basics of experimental measurements, noise, and errors; strain gages; photoelasticity; digital image correlation; impact testing and high-speed imaging; fracture toughness measurements. By the end of the course, students will be able to formulate, design, and execute experiments to characterize the elastic, plastic, and dynamic response of a variety of materials, and compare their measurements with theoretical predictions. Recommended Course Background: knowledge of statics, mechanics and materials, and mechanics based design

EN.530.683. Applied Computational Modeling in Aerodynamics and Heat Transfer. 3 Credits.
Introduction to fundamental principles and applications of the computational modeling in fluid dynamics and heat transfer. Emphasis is on basics of finite-difference methods and hands-on experience in code development as well as the use of a commercial software package (ANSYS CFX) for modeling and simulation. Students will also learn about meshing strategies, post-processing, and critical analysis of simulation results. The concept of numerical errors and the validation and verification will also be emphasized.Recommended Background: (1) Undergraduate or introductory level course in fluid dynamics or heat transfer or transport phenomena or classical mechanics.(2) Basic expertise in writing computer codes (MATLAB or C++ or Fortran or Python).

EN.530.684. Orientation Mapping of Crystalline Materials. 3 Credits.
Recent advances in instrumental capabilities are fast making it routine to acquire large 2D and 3D datasets and maps of crystalline materials. SEM-based orientation imaging microscopy (OIM) and transmission Kikuchi diffraction (TKD) and TEM-based precession-assisted crystal orientation mapping (PACOM) provide the means to characterize intra- and inter-grantular details such as grain: orientation, size, shape, neighborhoods and GND distributions. This course will cover the science that underpins these technologies and provide practical experience in gathering, filtering, quantifying and displaying such information. It is motivated by the fact that emergent advances based on the practice of Integrated Materials Science and Engineering (ICMSE) and the Materials Genome Initiative (MGI) are predicated on the availability of physics-based, multi-scale models that are based on such detailed quantitative experimental observations of polycrystalline materials.

EN.530.691. Haptic Interface Design for Human-Robot Interaction. 3 Credits.
This course provides an introduction to haptic interface design and analysis for human-robot interaction involving virtual environments, augmented reality, and teleoperation. Topics include human touch perception, haptic-focused mechatronic design, system modeling and analysis (kinematic and dynamic), human-in-the-loop feedback control, and haptic feedback evaluation. Recommended: coursework or knowledge of Dynamics and knowledge of feedback control, mechatronics, and Matlab.

EN.530.694. Scanning Electron Microscopy 101: Fundamentals of Nanocharacterization and Nanofabrication. 3 Credits.
Over half a century after its formal birth, scanning electron microscope (SEM) has now become a routine instrument that is employed in physical and biological sciences, manufacturing engineering, archeology, forensic science, and more broader fields. SEM typically work as a superb magnifier but actually far beyond that. When a focused electron beam scans over a sample, a variety of signals arise and bring forth information about surface topography, element composition, crystallographic orientation, electronic bands, and so on, all of which can be imaged with micron to sub-nanometer resolution. Recent integration with in situ measurement tools and Focused Ion Beam system further transform SEM into a powerful platform of materials characterization and fabrication. This course is intended as a guidebook for junior scientists and engineers in all fields who have been or will be a SEM user. The basic science and practical experience covered in this course will help them understand what can be achieved from and how to make the best use of the versatile instrument.

EN.530.707. Robot System Programming. 4 Credits.
This course seeks to introduce students to open-source software tools that are available today for building complex experimental and fieldable robotic systems. The course is grouped into sections, each of which building on the previous in increasing complexity and specificity: tools and frameworks supporting robotics research, robotics-specific software frameworks, integrating complete robotic systems, and culminates with an independent project of the student's own design using small mobile robots or other robots in the lab. Students will need to provide a computer (with at least a few GB of memory and a several tens of GB of disc space) running Ubuntu (https://www.ubuntu.com or one of its variants such as Xubuntu) and ROS (http://ros.org/). Students should have an understanding of intermediate programming in C/C++ (including data structures and object-oriented programming). Familiarity with Linux programming. Familiarity with software version control systems such as Git, and linear algebra. Students should see the course homepage https://dscl.lcsr.jhu.edu/home/courses/me530707-2019 for more information and to get started with the course. Required Course Prerequisite/Corequisite: EN.530.646 and EN.601.436/663. No audit option.

EN.530.710. Optical Measurement Techniques. 3 Credits.
Optic-based techniques are being utilized as measurement and data transmission tools in a growing number of applications. The objective of this course is to introduce graduate students with limited background in optics (but with background in graduate-level mathematics) to the fundamentals of optics and their implementation. Topics covered include reflection, refraction, fluorescence, phosphorescence and diffraction of light; review of geometric optics, lenses, lens systems (microscope, telescope), mirrors, prisms; aberrations, astigmatism, coma, and methods to correct them; light as an electromagnetic wave; Fourier optics; spectral analysis of optical systems; coherent and incoherent imaging, holography, interferometry, diffraction grating; lasers, polarization, light detectors; elements of non-liner optics, birefringence; optical fibers, data transmission, and networking.

EN.530.712. Computational Solid Mechanics. 3 Credits.
This course teaches in-depth and hands-on understanding of numerical methods for solid mechanics problems. The course begins with a review of the fundamental concepts of the finite element method for linear boundary value problems (BVP) and initial boundary value problems (IBVP) in solid mechanics. Then more advance methods for nonlinear BVPs are presented and applied to problems of material inelasticity and finite elasticity. Topics covered include the strong and weak statements of the BVP, weighted residual methods, time integration, Newton-type methods for nonlinear problems, and error estimation and convergence. EN.530.606 Mechanics of Solids and Materials II or equivalent AND EN.530.761 Mathematical Methods for Engineers or equivalent or permission of instructor.

EN.530.715. Mesoscale Simulations of Defects in Metals. 3 Credits.
This course focuses on coarse grained simulations of defects and plasticity in crystalline materials. Topics of interest include modeling dislocation plasticity, diffusion of point defects, grain and twin boundaries, precipitates, etc under different loading and boundary conditions.
Either EN.530.605, EN.510.604, or waiver from the instructor. Student must also have background in programing using MATLAB, C, C++, FORTRAN or an equivalent coding language.

EN.530.717. Machine Learning for Solid Mechanics and Materials Engineering. 3 Credits.
Machine learning (ML) and principles of informatics are playing an increasing role in many aspects of solid mechanics and materials engineering. ML techniques enable the extraction of relationships from a large amount of seemingly uncorrelated data and can expedite the process of predicting deformation in solids and the discovery/design of materials. This course provides an introductory overview for graduate students on ML and principles of informatics as well as provide a survey of applications of ML in solid mechanics and materials engineering.

EN.530.721. Medical Robotics System Design. 3 Credits.
The evolution of medical robotics is a new and exciting development. Medical robotics brings together many disparate areas of research such as development and modeling of robotic systems, design, control, safety in medical robotics, regulatory and ethics, haptics (sense of touch), ergonomics, and last but not the least, medicine. The primary goal of this course is to acquaint the students with the fundamentals of robot design, development, and control and different areas of research that lead to the development of medical robotic systems. We will also cover additional topics specific to medical robotics such as medical image guidance. The course will include a project, where students will learn to design, develop, build, and control a medical robot.
EN.530.646

EN.530.726. Hydrodynamic Stability. 3 Credits.
Hydrodynamic linear stability theory is developed and applied to a variety of flow problems using analytical techniques and numerical methods. Necessary and sufficient conditions for flow stability are derived. Canonical examples are used to introduce various concepts including, e.g. temporal and spatial analyses, asymptotic and transient flow response, convective and absolute instability, global methods, and direct stability analysis.

EN.530.732. Fracture Of Materials. 3 Credits.
An advanced examination of fracture mechanisms in ductile and brittle materials. Both the mechanics and the materials aspects are covered with importance placed on the synthesis of the two approaches. Topics include linear elastic fracture mechanics, ductile fracture, the J-integral, atomistic aspects of fracture in polycrystalline materials, fracture in ceramics and polymers, influence of the material microstructure on fracture toughness and ductility in FCC and BCC materials.

EN.530.738. Micromechanics of Heterogeneous and Granular Materials. 3 Credits.
This graduate-level course provides an introduction to the mechanical behavior of heterogeneous and granular materials from a microscopic point of view. The goal of the course is to provide a foundation for graduate students interested in performing research related to the micromechanics of heterogeneous materials and granular materials. The course employs the principles of continuum mechanics and discusses topics including inclusion and defect theory for materials (e.g., Eshelby's inclusion and inhomogeneity problems, strain fields around cracks and voids) and homogenized properties (e.g., average stresses and strains, homogenization and interaction assumptions, bounds on moduli) for heterogeneous materials with defects and voids. The course also applies the principles of continuum mechanics to homogenization of microscale behavior in granular materials (forces and packing structure) for the calculation of macroscale fields (stresses and strains). The course involves the solution of boundary value problems as well as reading and discussion of recent papers in the field.

EN.530.748. Stress Waves, Impacts and Shockwaves. 3 Credits.
Elastic waves in unbounded media. Elastic waveguides. Waves in elastic-plastic and nonlinear elastic materials. Analysis of impact on materials and structures. Impact on various scales, from planetary to microscopic. Shock waves. Impact signatures in materials (time permitting).

EN.530.761. Mathematical Methods of Engineering I. 3 Credits.
This course is a fast-paced overview of some fundamental topics in applied mathematics including: linear algebra and matrix theory, ordinary differential equations, Laplace and Fourier transforms, as well as an introduction to partial differential equations.

EN.530.766. Numerical Methods. 3 Credits.
Comprehensive introduction to the finite-difference method and associated numerical techniques for solving partial differential equations (PDEs) encountered in Engineering and Physics. Homework assignments and Project require substantial computer programming.

EN.530.767. Computational Fluid Dynamics. 3 Credits.
Advanced introduction to finite-difference and finite-volume approaches to modeling incompressible flows. Computer project requiring programming.

EN.530.777. Multiphase Flow. 3 Credits.
An introduction to basic contemporary ideas concerning gas, liquid, and solid-fluid two-phase flows.

EN.530.800. Independent Study. 3 - 20 Credits.
Graduate students pursue research problems with a faculty supervisor. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.

EN.530.801. PhD Graduate Research. 3 - 20 Credits.

EN.530.803. Mechanical Engineering Seminar. 1 Credit.
Open to Mechanical Engineering PhD students in the first three years.

EN.530.807. Graduate Research Seminar in Fluid Mechanics. 1 Credit.

EN.530.809. Mechanics of Materials and Structures Graduate Seminar. 1 Credit.
Cross-listed with Mechanical Engineering.

EN.530.820. MSE All-Course - Graduate Research. 3 - 10 Credits.
This course will provide a Mechanical Engineering graduate-level research experience to those pursuing an "all-course" master's degree, which will help a student engage in research on a specific topic and/or in specific research group under faculty supervision. Prior to course registration, students will submit a research proposal for approval by the research supervisor and the student's faculty advisor. In case the faculty advisor is the same as the research supervisor, the proposal should be submitted to the ME Director of Graduate Studies for approval. The research will be the equivalent of at least three credits, or approximately 120 hours of work in a typical semester.

EN.530.821. Master's Essay - Research and Writing. 3 - 10 Credits.
This course will be taken by Mechanical Engineering students when doing research and/or writing for the Master's Essay.

EN.530.822. Master's Essay - Co-Op. 3 - 10 Credits.
This course will be taken by Mechanical Engineering students when working in a cooperative environment for writing the Master's Essay. Note that "essay" is the official term for a thesis at Johns Hopkins University.

EN.530.897. Graduate Research - Summer. 3 - 20 Credits.

Cross Listed

Biomedical Engineering

EN.580.451. Cell and Tissue Engineering Lab. 3 Credits.
Cell and tissue engineering is a field that relies heavily on experimental techniques. This laboratory course will consist of three six experiments that will provide students with valuable hands-on experience in cell and tissue engineering. Students will learn basic cell culture procedures and specialized techniques related to faculty expertise in cell engineering, microfluidics, gene therapy, microfabrication and cell encapsulation. Experiments include the basics of cell culture techniques, gene transfection and metabolic engineering, basics of cell-substrate interactions I, cell-substrate interactions II, and cell encapsulation and gel contraction. Co-listed with EN.530.451. Senior and Graduate students only; others, instructor permission required. Fall semester only. Lab Fee: $100
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Center for Leadership Education

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

EN.660.361. Engineering Management & Leadership. 3 Credits.
When engineers become working professionals, especially if they become managers, they must juggle knowledge of and tasks associated with operations, finance, ethics, strategy, team citizenship leadership and projects. While engineers' success may depend on their direct input ¬¬ the sweat of their own brow – managers' success depends on their ability to enlist the active involvement of others: direct reports, other managers, other team members, other department employees, and those above them on the organizational chart. You will learn these concepts and skills in this course.In this course, you will learn about teamwork and people management, and gain an introduction to strategy, finance, and project management. You will practice writing concise persuasive analyses and action plans and verbally defending your ideas. Cross-listed with Mechanical Engineering.Please note that this course will not be available in the spring.

Civil and Systems Engineering

EN.560.201. Statics & Mechanics of Materials. 3 Credits.
This course combines statics - the basic principles of classical mechanics applied to the equilibrium of particles and rigid bodies at rest, under the influence of various force systems - with mechanics of materials - the study of deformable bodies and the relationships between stresses and deformations within those bodies. Fundamental concepts in statics include the proper use of free body diagrams, the analysis of simple structures, centroids and centers of gravity, and moments of inertia. The study of mechanics of materials will focus on the elastic analysis of axial force, torsion, and bending members to determine corresponding stresses and strains. Stress transformations and principal stresses will be introduced.For most majors, students are required to register for both 560.201 Statics and Mechanics of Materials and 560.211 Statics and Mechanics of Materials Laboratory.
Prerequisite(s): EN.560.211
AS.171.101 OR AS.171.107 OR (EN.530.123 AND EN.530.124) or instructor permission.

Electrical & Computer Engineering

EN.520.340. Introduction to Mechatronics: Sensing, Processing, Learning and Actuation. 3 Credits.
Introduction to Mechatronics is mostly hands-on, interdisciplinary design class consisting of lectures about key topics in mechatronics, and lab activities aimed at building basic professional competence. After completing the labs, the course will be focused on a final mini-project for the remainder of the semester. This course will encourage and emphasize active collaboration with classmates. Each team will plan. design, manufacture and/or build, test, and demonstrate a robotic system that meets the specified objectives.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.520.230 AND EN.520.231

EN.520.353. Control Systems. 4 Credits.
Modeling, analysis, and an introduction to design for feedback control systems. Topics include state equation and transfer function representations, stability, performance measures, root locus methods, and frequency response methods (Nyquist, Bode).
EN.520.214 OR EN.530.343 OR EN.580.222

EN.520.495. Microfabrication Laboratory. 4 Credits.
This laboratory course is an introduction to the principles of microfabrication for microelectronics, sensors, MEMS, and other synthetic microsystems that have applications in medicine and biology. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Seniors only or Perm. Req'd. Co-listed as EN.580.495 & EN.530.495
AS.171.102 OR AS.171.108

EN.520.773. Advanced Topics In Microsytem Fabrication. 4 Credits.
Graduate-level course on topics that relate to microsystem integration of complex functional units across different physical scales from nano to micro and macro. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Topics will include emerging fabrication technologies, micro-electromechanical systems, nanolithography, nanotechnology, soft lithography, self-assembly, and soft materials. Discussion will also include biological systems as models of microsystem integration and functional complexity. Perm. Required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

General Engineering

EN.500.114. Gateway Computing: Matlab. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.113 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.602. Seminar: Environmental and Applied Fluid Mechanics. 1 Credit.

Materials Science & Engineering

EN.510.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.530.604 are not eligible to take EN.510.604.

Robotics

EN.620.745. Seminar in Computational Sensing and Robotics. 1 Credit.
Seminar series in robotics. Topics include: Medical robotics, including computer-integrated surgical systems and image-guided intervention. Sensor based robotics, including computer vision and biomedical image analysis. Algorithmic robotics, robot control and machine learning. Autonomous robotics for monitoring, exploration and manipulation with applications in home, environmental (land, sea, space), and defense areas. Biorobotics and neuromechanics, including devices, algorithms and approaches to robotics inspired by principles in biomechanics and neuroscience. Human-machine systems, including haptic and visual feedback, human perception, cognition and decision making, and human-machine collaborative systems.Cross-listed Mechanical Engineering, Computer Science, Electrical and Computer Engineering, and Biomedical Engineering.

For current faculty and contact information go to http://www.me.jhu.edu/faculty.html

Engineering Mechanics, Bachelor of Science

B.S. Engineering Mechanics

The mission of the B.S. in engineering mechanics degree program is to provide a rigorous educational experience that prepares a select group of students for leadership positions in the profession and a lifetime of learning. The faculty is committed to maintaining a modern and flexible curriculum which, building on a foundation of basic sciences and mathematics, develops a solid education in the mechanical engineering sciences. The aim of the Engineering Mechanics program is to build competence in the analysis, design, and modeling of fluid and solid systems, to promote a broad knowledge of the contemporary social and economic context, and to develop the communication skills necessary to excel.

The educational objectives for the B.S. in engineering mechanics degree are designed to educate a select group of science-oriented engineers who, after graduation, will be successful and on track to become leaders among their peers:

- ...in the best graduate programs in engineering, science, medical schools, or law schools, and
- ...in industry, government laboratories, and other organizations.

Students graduating with a B.S. in Mechanical Engineering will have demonstrated:

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

The curriculum is intended to enable graduates to explore fundamental questions in many fields of engineering. Emphasis is placed on the basic sciences (mathematics, physics, and chemistry) and on the analysis, modeling, and design aspects of solid and fluid engineering systems. Although specific core courses are required, the student is encouraged and guided by their advisor to select an individual program of study, within ABET guidelines, according to the student's particular goals. This program of study may range from a general study of mechanics or engineering science to more specialized programs in a variety of areas, such as robotics, fluid dynamics, environmental engineering, mechanics of solids, experimental mechanics, dynamical systems, mechanics of materials, or biomechanics.

This flexibility makes the program ideal for double-majors and for those wishing to tailor a strong foundation for graduate work in a wide range of disciplines. All engineering science, engineering mechanics, and technical elective courses must be at the 300-level or higher. Exceptions can be considered in consultation with the faculty advisor, but will be uncommon.

Program Requirements

See also General Requirements (p. 1086) for Departmental Majors and the department's undergraduate advising manuals (https://me.jhu.edu/education/undergraduate-studies/advising/).

The Engineering Mechanics curriculum is structured as follows:

Code	Title	Credits
Mathematics [1]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
Linear Algebra and Differential Equations		4-8
Linear Algebra and Differential Equations can be taken either as a combined course or separate courses. If separate courses are taken, this will result in 8 credits.		
EN.553.291	Linear Algebra and Differential Equations	
AS.110.212	Honors Linear Algebra	
AS.110.201	Linear Algebra	
AS.110.302	Differential Equations and Applications	
Statistics Elective at 300-level or above		
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Other qualified statistics courses can be taken upon the faculty advisor's approval.		
Mathematics elective		4
Basic Science [1]		
AS.030.101	Introductory Chemistry I	3
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
EN.530.123	Introduction to Mechanics I	3
EN.530.124	Intro to Mechanics II	2
Another basic science elective		4
Humanities [2,3,7]		**18**
Select one humanities and/or social science elective that is also writing-intensive		3
Select five humanities and/or social science electives [2]		15
Introductory Engineering and Computing [4]		
EN.530.107	MechE Undergraduate Seminar I	0.5
EN.530.108	MechE Undergraduate Seminar II	0.5
EN.500.114	Gateway Computing: Matlab [5]	3
EN.530.111	Intro to MechE Design and CAD	2
EN.530.115	MechE Freshman Lab I	1
EN.530.116	MechE Freshman Lab II	1
Other Required Engineering Courses		
EN.530.202	Mechanical Engineering Dynamics	3
EN.530.212	MechE Dynamics Laboratory	1
EN.530.215	Mechanics-Based Design	3
or EN.530.405	Mechanics of Advanced Engineering Structures	
EN.530.216	Mechanics Based Design Laboratory	1
EN.530.231	Mechanical Engineering Thermodynamics	3
EN.530.232	Mechanical Engineering Thermodynamics Laboratory	1
EN.530.327	Introduction to Fluid Mechanics	3
EN.530.329	Introduction to Fluid Mechanics Laboratory	1
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
Capstone Design [1,6]		
EN.530.403 & EN.530.404	MechE Senior Design Project I and MechE Senior Design Project II	8
Engineering Science Electives [1]		
Select twelve credits		12
One course in Fluid Mechanics (see below)		
One course in Dynamics (see below)		
One course in Mechanics of Materials (see below)		
One course in Solid Mechanics (see below)		
Engineering Mechanics Electives [1]		
Select one additional elective course in the same area of engineering mechanics (solid mechanics, fluid mechanics, or dynamics, see below).		3
Technical Electives [1]		
Engineering, Quantitative Studies, or Natural Science courses at or above the 300-level, chosen in consultation with the student's advisor from any combination of courses in engineering, basic sciences, or mathematics.		18
Total Credits 126		

1. Grades below C- are not accepted.
2. See the Distribution tab in the Requirements for a Bachelor's Degree section for two exceptions to the rule that each H/S distribution course be at least 3 credits. Visit http://e-catalogue.jhu.edu/undergrad-students/academic-policies/requirements-for-a-bachelors-degree/ for information.
3. One course must be writing intensive. To obtain coherence and depth in these humanities and social science electives, at least six credits must be at the 300-level or higher. While a course grade of C- or higher is preferred, up to 10 credits with a D or D+ grade will be accepted. For examples of areas of concentration and more details, see the undergraduate academic advising manual (https://me.jhu.edu/undergraduate-studies/academic-advising-undergraduate/).
4. Required Engineering Courses (minimum of 26 credits; grades below C- not accepted).
   Alternate introductory courses are available. If EN.530.107 MechE Undergraduate Seminar I/EN.530.108 MechE Undergraduate Seminar II, EN.530.111 Intro to MechE Design and CAD, EN.530.115 MechE Freshman Lab I, and EN.530.123 Introduction to Mechanics I/EN.530.124 Intro to Mechanics II are not taken, students must take one course from the engineering course lists below:

- EN.500.101 What Is Engineering?
- EN.520.137 Introduction To Electrical & Computer Engineering
- EN.570.108 Introduction to Environmental Engineering and Design

[5] Effective the Spring 2020 semester and later, students who scored a “5” on the AP Computer Science exam have the option to take either...
- One of the Gateway Computing courses, in which case their AP CS credits will be forfeited, or...
- EN.601.220 Intermediate Programming, EN.601.226 Data Structures, or another programming course of at least three credits approved by the student’s faculty advisor, in which case the AP Computer Science credits will count toward the student’s core computing requirement (replacing Gateway Computing). EN.601.220 or EN.601.226 could count as a Technical Elective.

[6] EN.530.404 Senior Design is counted as the second writing-intensive course requirement. A grade of C- or higher must be earned for both EN.530.403 and EN.530.404 Senior Design to count toward the degree.

[7] If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown above, you may consider enrolling in an optional First-Year Seminar (FYS) during the fall semester. FYS courses carry course numbers EN.501.xxx.

Fluid mechanics courses may be chosen from courses such as:

Code	Title	Credits
EN.530.418	Aerospace Structures	3
EN.530.425	Mechanics of Flight	3
EN.530.426	Biofluid Mechanics	3
EN.530.427	Intermediate Fluid Mechanics	3
EN.530.430	Applied Finite Element Analysis	3
EN.530.432	Jet & Rocket Propulsion	3
EN.530.438	Aerospace Materials	3
EN.530.443	Fundamentals, Design Principles and Applications of Microfluidic Systems	3
EN.530.464	Energy Systems Analysis	3
EN.530.483	Applied Computational Modeling in Aerodynamics and Heat Transfer	3
EN.530.619	Aerospace Structures	3
EN.530.627	Intermediate Fluid Mechanics (graduate)	3
EN.530.643	Fundamentals, Design Principles and Applications of Microfluidic Systems	3
EN.530.664	Energy Systems Analysis (graduate)	3
EN.530.683	Applied Computational Modeling in Aerodynamics and Heat Transfer	3

Dynamics courses may be chosen from courses such as:

Code	Title	Credits
EN.530.343	Design and Analysis of Dynamical Systems (Students are also invited to take EN.530.344 Design and Analysis of Dynamical Systems Lab [1 credit])	3
EN.530.420	Robot Sensors/Actuators	4
EN.530.421	Mechatronics	3
EN.530.424	Dynamics of Robots and Spacecraft	3
EN.530.470	Space Vehicle Dynamics & Control	3
EN.553.391	Dynamical Systems	4

Mechanics of Materials courses may be chosen from courses such as:

Code	Title	Credits
EN.510.311	Structure Of Materials	3
EN.510.312	Thermodynamics/Materials	3
EN.510.313	Mechanical Properties of Materials	3
EN.510.314	Electronic Properties of Materials	3
EN.510.315	Physical Chemistry of Materials II	3
EN.530.352	Materials Selection	4
EN.530.405	Mechanics of Advanced Engineering Structures	3
EN.530.414	Computer-Aided Design	3
EN.530.417	Fabricatology - Advanced Materials Processing	3
EN.530.418	Aerospace Structures	3
EN.530.438	Aerospace Materials	3
EN.530.455	Additive Manufacturing	3
EN.530.605	Mechanics of Solids and Materials	3
EN.530.606	Mechanics of Solids and Materials II	3
EN.530.619	Aerospace Structures	3
EN.530.638	Aerospace Materials	3
EN.530.655	Additive Manufacturing (Graduate)	3
EN.560.330	Foundation Design	3
EN.560.730	Finite Element Methods	3

Solid Mechanics courses may be chosen from courses such as:

Code	Title	Credits
EN.530.405	Mechanics of Advanced Engineering Structures	3
EN.530.414	Computer-Aided Design	3
EN.530.417	Fabricatology - Advanced Materials Processing	3
EN.530.418	Aerospace Structures	3
EN.530.438	Aerospace Materials	3
EN.530.448	Biosolid Mechanics	3
EN.530.605	Mechanics of Solids and Materials	3
EN.530.606	Mechanics of Solids and Materials II	3
EN.530.619	Aerospace Structures	3
EN.530.638	Aerospace Materials	3
EN.530.655	Additive Manufacturing (Graduate)	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.560.330	Foundation Design	3

Students may not use the satisfactory/unsatisfactory option for required courses, including Humanities and Social Sciences, unless approved by their faculty advisor. The department will accept D or D+ grades only up to a maximum of 10 Humanities and Social Science credits. All undergraduate students must follow a program approved by a faculty member in the department who is selected as the student’s advisor.

Biomechanics Track

Engineering Mechanics (EM) is a highly flexible program offered by the Department of Mechanical Engineering, which is ideal for students who want to specialize in any area of mechanics, including biomechanics. The essence of mechanics is the interplay between forces and motion.

In biology, mechanics is important at the macroscopic, cellular, and subcellular levels. At the macroscopic length scale biomechanics of both soft and hard tissues plays an important role in computer- integrated surgical systems and technologies (e.g., medical robotics). At the cellular level, issues such as cell motility and chemotaxis can be modeled as mechanical phenomena. At the subcellular level, conformational transitions in biological macromolecules can be modeled using molecular dynamics simulation (which is nothing more than computational Newtonian mechanics), statistical mechanics, or using coarse-grained techniques that rely on principles from the mechanics of materials. In addition, much of structural biology can be viewed from the perspective of Kinematics (e.g., finding spatial relationships in data from the Protein Data Bank).

Each student who pursues the biomechanics track within the EM major will, in consultation with their EM advisor, choose the set of technical and EM electives that best matches the student's interests. Many electives from other departments are acceptable. The electives for the EM major are structured as follows:

Engineering Science Electives

Code	Title	Credits
One course in solid mechanics		3
One course in fluid mechanics		3
One course in mechanics of materials		3
One course in dynamics		3
Total Credits		**12**

Engineering Mechanics Electives

Code	Title	Credits
One engineering mechanics elective		3

Technical Electives

Code	Title	Credits
One of these two courses can count as a Technical Elective (optional)		3-4
EN.601.220	Intermediate Programming	
EN.601.226	Data Structures	
Select 14-15 credits from 300-level courses in engineering and the sciences in consultation with the student's faculty advisor		14-15
Total Credits		**17-19**

Examples of bio-oriented courses which can be applied to the above three categories include (but are not limited to):

Code	Title	Credits
EN.520.495	Microfabrication Laboratory	4
EN.530.410	Biomechanics of the Cell	3
EN.530.426	Biofluid Mechanics	3
EN.530.436	Bioinspired Science and Technology	3
EN.530.441	Introduction to Biophotonics	3
EN.530.443	Fundamentals, Design Principles and Applications of Microfluidic Systems	3
EN.530.445	Introduction to Biomechanics	3
EN.530.446	Experimental Methods in Biomechanics	3
EN.530.448	Biosolid Mechanics	3
EN.530.468	Locomotion Mechanics: Fundamentals	3
EN.530.469	Locomotion Mechanics: Recent Advances	3
EN.530.473	Molecular Spectroscopy and Imaging	3
EN.530.474	Effective and Economic Design for Biomedical Instrumentation	4
EN.530.480	Image Processing and Data Visualization	3
EN.530.668	Locomotion Mechanics: Fundamentals	3
EN.530.669	Locomotion Mechanics: Recent Advances	3
EN.530.672	Biosensing & BioMEMS	3
EN.530.674	Effective and Economic Design for Biomedical Instrumentation	4
EN.540.440	Micro/Nanotechnology: The Science and Engineering of Small Structures	3
EN.580.221	Biochemistry and Molecular Engineering	4
EN.580.451	Cell and Tissue Engineering Lab	3
EN.580.452	Cell and Tissue Engineering Lab	3
EN.580.456	Introduction to Rehabilitation Engineering	3
EN.580.457	Introduction to Rehabilitation Engineering: Design Lab	3

This is not a complete list of possible courses that can be taken, and not all of these courses must be taken. Rather, students who wish to pursue the biomechanics track will take at least five courses such as those listed above. These five should be concentrated either at the cellular/subcellular length scale or in macroscopic biomechanics. Note that given the flexibility of the EM program, it would be possible for students to satisfy both of these kinds of tracks simultaneously if they apply all 12 of their elective courses toward this end.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.030.101	Introductory Chemistry I	3
EN.530.107	MechE Undergraduate Seminar I [1]	.5
EN.530.111	Intro to MechE Design and CAD [1]	2
EN.530.115	MechE Freshman Lab I [1]	1
EN.530.123	Introduction to Mechanics I [2]	3
Humanities/Social Sciences Elective [3]		3
	Credits	**16.5**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
EN.500.114	Gateway Computing: Matlab	3
EN.530.108	MechE Undergraduate Seminar II	.5
EN.530.116	MechE Freshman Lab II	1
EN.530.124	Intro to Mechanics II	2
Humanities/Social Sciences Elective		3
Basic Science Elective		3
	Credits	**16.5**
Second Year		
First Semester		
AS.110.202	Calculus III	4
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1

EN.530.231	Mechanical Engineering Thermodynamics	3
EN.530.232	Mechanical Engineering Thermodynamics Laboratory	1
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
	Credits	**17**
Second Semester		
EN.530.202	Mechanical Engineering Dynamics	3
EN.530.212	MechE Dynamics Laboratory	1
EN.530.215	Mechanics-Based Design	3
EN.530.216	Mechanics Based Design Laboratory	1
EN.553.291	Linear Algebra and Differential Equations	4
Humanities/Social Science Elective		3
	Credits	**15**
Third Year		
First Semester		
EN.530.327	Introduction to Fluid Mechanics	3
EN.530.329	Introduction to Fluid Mechanics Laboratory	1
Engineering Science elective		3
Technical Elective		3
Statistics Elective		4
Humanities/Social Sciences Elective		3
	Credits	**17**
Second Semester		
Engineering Science elective		3
Engineering Science elective		3
Technical Elective		3
Mathematics Elective		4
Humanities/Social Sciences Elective		3
	Credits	**16**
Fourth Year		
First Semester		
EN.530.403	MechE Senior Design Project I	4
Engineering Mechanics elective		3
Engineering Science elective		3
Technical Elective		3
Humanities/Social Sciences Elective		3
	Credits	**16**
Second Semester		
EN.530.404	MechE Senior Design Project II	4
Technical Elective		3
Technical Elective		3
Technical Elective		3
	Credits	**13**
	Total Credits	**127**

[1] If EN.530.107 MechE Undergraduate Seminar I, EN.530.111 Intro to MechE Design and CAD, and EN.530.115 MechE Freshman Lab I are not taken, then take Intro to Engineering and Lab I options

[2] If EN.530.123 Introduction to Mechanics I is not taken, then take another intro to mechanics or physics course, per advisor approval

[3] If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown above, you may consider enrolling in an optional First-Year Seminar (FYS) during the fall semester. FYS courses carry course numbers EN.501.xxx.

Mechanical Engineering, Bachelor of Science

B.S. Mechanical Engineering

The mission of the B.S. in mechanical engineering degree program is to provide a rigorous educational experience that prepares a select group of students for leadership positions in the profession and a lifetime of learning. The faculty is committed to maintaining a modern and flexible curriculum which, building on a foundation of basic sciences and mathematics, develops a solid education in the mechanical engineering sciences. The aim of the Mechanical Engineering program is to build competence in the design and development of thermal, fluid, and mechanical systems, to promote a broad knowledge of the contemporary social and economic context, and to develop the communication skills necessary to excel.

The program provides a basic background in thermal and mechanical systems. Laboratory instruction, as well as the senior design project, gives the student hands-on experience. Each student's program of study is planned in consultation with their faculty advisor. Students have the opportunity to complete courses and develop depth in areas of focus within mechanical engineering chosen from fluid mechanics and thermal processes, mechanics of solids and design, heat transfer and energy, robotics, and biomechanics. The student's faculty advisor can provide guidance on these focus areas.

Our primary objective is to educate an exceptional group of engineers who, after graduation, will be:

- ...successful and on track to become leaders among their peers in industry, government laboratories and other organizations, and
- ...advanced students in the best graduate programs.

Students graduating with a B.S. in Mechanical Engineering will have demonstrated:

1. An ability to identify, formulate, and solve engineering problems by applying principles of engineering, science, and mathematics.
2. An ability to apply both analysis and synthesis in the engineering design process, resulting in designs that meet desired needs.
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions.
4. An ability to communicate effectively with a range of audiences.
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts.
6. An ability to recognize the ongoing need for additional knowledge and locate, evaluate, integrate, and apply this knowledge appropriately.
7. An ability to function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Program Requirements

See also General Requirements (p. 1086) for Departmental Majors and the department's undergraduate advising manuals (https://me.jhu.edu/education/undergraduate-studies/advising/).

The Mechanical Engineering curriculum is structured as follows:

Code	Title	Credits
Mathematics [1]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
EN.553.291	Linear Algebra and Differential Equations	4
Statistics Elective at 300-level or above		
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering [2]	4
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Science [1]		
AS.030.101	Introductory Chemistry I	3
EN.530.123	Introduction to Mechanics I	3
EN.530.124	Intro to Mechanics II	2
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
Humanities and Social Sciences		
Select one humanities and/or social science elective that is also writing-intensive [3]		3
Select five humanities and/or social science elective [3,4]		15
Required Engineering Courses [1]		
EN.530.107	MechE Undergraduate Seminar I	0.5
EN.530.108	MechE Undergraduate Seminar II	0.5
EN.530.111	Intro to MechE Design and CAD	2
EN.530.115	MechE Freshman Lab I	1
EN.500.114	Gateway Computing: Matlab (AP Computer Science not accepted)	3
EN.530.116	MechE Freshman Lab II	1
EN.530.202	Mechanical Engineering Dynamics	3
EN.530.212	MechE Dynamics Laboratory	1
EN.530.215	Mechanics-Based Design	3
EN.530.216	Mechanics Based Design Laboratory	1
EN.530.231	Mechanical Engineering Thermodynamics	3
EN.530.232	Mechanical Engineering Thermodynamics Laboratory	1
EN.530.241	Electronics & Instrumentation [5]	3-4
or EN.520.230 & EN.520.231	Mastering Electronics and Mastering Electronics Laboratory	
EN.530.243	Electronics and Instrumentation Laboratory	1
EN.530.254	Manufacturing Engineering (Take either EN.530.254 or [EN.530.204 and EN.530.205])	3
EN.530.327	Introduction to Fluid Mechanics	3
EN.530.329	Introduction to Fluid Mechanics Laboratory	1
EN.530.334	Heat Transfer	3
EN.530.335	Heat Transfer Laboratory	1
EN.530.343	Design and Analysis of Dynamical Systems	3
EN.530.344	Design and Analysis of Dynamical Systems Laboratory	1
EN.530.352	Materials Selection	4
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
EN.660.361	Engineering Management & Leadership	3
Capstone Design [1,7]		
EN.530.403 & EN.530.404	MechE Senior Design Project I and MechE Senior Design Project II	8
Mechanical Engineering Electives [1]		
Select three courses (300-level or higher) in mechanical engineering		9
Technical Electives [1]		
Select three engineering, quantitative studies, or natural sciences courses at or above the 300-level, chosen from any combination of courses in engineering, basic sciences, or mathematics selected in consultation with the student's advisor. [6]		9
Total Credits: 126 - 127		

1. Grades below C- not accepted.
2. Other qualified statistics courses can be taken upon the faculty advisor's approval.
3. Six humanities and/or social science electives, of which one must specifically teach writing as a writing-intensive course. See the Distribution tab in the Requirements for a Bachelor's Degree section for two exceptions to the rule that each H/S distribution course be at least 3 credits. Visit https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/requirements-bachelors-degree/ for information.
4. To obtain coherence and depth in these humanities and social science electives, at least six credits must be at the 300-level or higher. While a course grade of C- or higher is preferred, up to 10 credits with a D or D+ grade will be accepted. For examples of areas of concentration and more details, see the undergraduate academic advising manual (https://me.jhu.edu/education/undergraduate-studies/advising/).
5. EN.520.230 Mastering Electronics is the alternate effective Fall 2017.
6. These courses are intended to complement the mechanical engineering electives. One of the three technical electives may be a computer language course taken at any level.
7. EN.530.404 Senior Design is counted as the second writing-intensive course requirement. A grade of C- or higher must be earned for both EN.530.403 and EN.530.404 Senior Design to count toward the degree.

A program of not less than 125 credits must be completed to be eligible for the bachelor's degree. All undergraduate students must follow a program approved by a faculty member in the department who is selected as the student's advisor.

Aerospace Track

A student may specialize in aerospace engineering once a solid background in the fundamentals of mechanical engineering has been developed through the basic Mechanical Engineering courses. This track requires knowledge and background in several fields including advanced dynamics, flight mechanics, propulsion, aerospace materials and structures, signal processing, control systems, astrophysics and space systems. Students pursuing the Aerospace Engineering Track are required to take at least five of the following courses (which can be counted toward the Mechanical Engineering elective and Technical Elective requirements in the general Mechanical Engineering program):

Code	Title	Credits
Any five of the courses listed below are required. A sixth course from this list, though not required is highly recommended.		
EN.530.418	Aerospace Structures	3
or EN.530.619	Aerospace Structures	
EN.530.424	Dynamics of Robots and Spacecraft	3
or EN.530.624	Dynamics of Robots and Spacecraft (Graduate)	
EN.530.425	Mechanics of Flight	3
EN.530.427	Intermediate Fluid Mechanics	3
EN.530.432	Jet & Rocket Propulsion	3
EN.530.438	Aerospace Materials	3
EN.530.470	Space Vehicle Dynamics & Control	3
EN.530.483	Applied Computational Modeling in Aerodynamics and Heat Transfer	3
EN.530.619	Aerospace Structures	3
EN.530.627	Intermediate Fluid Mechanics (graduate)	3
EN.530.638	Aerospace Materials	3
AS.171.321	Introduction to Space, Science, and Technology	3
AS.270.318	Remote Sensing of the Environment	3
Other courses relevant to the track which don't count toward the requirements include:		
AS.171.118	Stars and the Universe: Cosmic Evolution	
Total Credits		**39**

Biomechanics Track

A student may specialize in biomechanics once a solid background in the fundamentals of mechanical engineering has been developed through the core Mechanical Engineering or Engineering Mechanics courses. The essence of mechanics is the interplay between forces and motion. In biology, mechanics is important at the macroscopic, cellular, and subcellular levels.

At the macroscopic length scale biomechanics of both soft and hard tissues plays an important role in computer-integrated surgical systems and technologies, e.g., medical robotics. At the cellular level, issues such as cell motility and chemotaxis can be modeled as mechanical phenomena. At the subcellular level, conformational transitions in biological macromolecules can be modeled using molecular dynamics simulation, which is nothing more than computational Newtonian mechanics; statistical mechanics, or using coarse-grained techniques that rely on principles from the mechanics of materials.

In addition, much of structural biology can be viewed from the perspective of Kinematics, e.g., finding spatial relationships in data from the Protein Data Bank.

Each student who pursues the Biomechanics track will, in consultation with their academic advisor, choose the set of technical and mechanical engineering course electives that best matches the student's interests. Upon completion of the track, notification of this achievement is placed on the student's academic record and transcript.

A student may specialize in biomechanics once a solid background in the fundamentals of mechanical engineering has been developed through the basic courses. Students pursuing the biomechanics concentration within mechanical engineering are required to take at least four of the following courses. Two among the four should be chosen from the biomechanics-oriented courses, indicated by an asterisk (*).

Code	Title	Credits
EN.520.495	Microfabrication Laboratory	4
EN.530.410	Biomechanics of the Cell [1]	3
EN.530.426	Biofluid Mechanics [1]	3
EN.530.436	Bioinspired Science and Technology	3
EN.530.441	Introduction to Biophotonics	3
EN.530.445	Introduction to Biomechanics [1]	3
EN.530.446	Experimental Methods in Biomechanics [1]	3
EN.530.448	Biosolid Mechanics [1]	3
EN.530.468	Locomotion Mechanics: Fundamentals	3
EN.530.469	Locomotion Mechanics: Recent Advances	3
EN.530.473	Molecular Spectroscopy and Imaging	3
EN.530.474	Effective and Economic Design for Biomedical Instrumentation	4
EN.530.480	Image Processing and Data Visualization	3
EN.530.636	Bioinspired Science and Technology	3
EN.530.643	Fundamentals, Design Principles and Applications of Microfluidic Systems	3
EN.530.668	Locomotion Mechanics: Fundamentals	3
EN.530.669	Locomotion Mechanics: Recent Advances	3
EN.530.672	Biosensing & BioMEMS [1]	3
EN.530.674	Effective and Economic Design for Biomedical Instrumentation	4
EN.580.221	Biochemistry and Molecular Engineering [2]	4
EN.580.424	Neuroengineering and Lab [3]	3
EN.580.451	Cell and Tissue Engineering Lab	3
EN.580.452	Cell and Tissue Engineering Lab	3
EN.580.456	Introduction to Rehabilitation Engineering	3
EN.580.457	Introduction to Rehabilitation Engineering: Design Lab	3

1 Two among the four should be chosen from one of the biomechanics-oriented courses.
2 Prerequisite: AS.030.101 Introductory Chemistry I
3 Prerequisite: EN.580.221 Biochemistry and Molecular Engineering, and AS.110.302 Differential Equations and Applications

Students may not use the satisfactory/unsatisfactory option for required courses, including Humanities and Social Studies. Exceptions can be considered and approved by their faculty advisors. Further, the Department of Mechanical Engineering requires that grades of C- or better be obtained in all required engineering, mathematics, and science courses (i.e. grades of D, D+ or F will not be accepted). The department will accept D or D+ grades only up to a maximum of 10 credits for Humanities and Social Sciences courses.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.030.101	Introductory Chemistry I	3

EN.530.107	MechE Undergraduate Seminar I	.5
EN.530.111	Intro to MechE Design and CAD	2
EN.530.115	MechE Freshman Lab I	1
EN.530.123	Introduction to Mechanics I	3
Humanities/Social Sciences Elective [1]		3
	Credits	**16.5**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
EN.500.114	Gateway Computing: Matlab	3
EN.530.108	MechE Undergraduate Seminar II	.5
EN.530.116	MechE Freshman Lab II	1
EN.530.124	Intro to Mechanics II	2
Humanities/Social Sciences Elective - Writing		3
Humanities/Social Sciences Elective		3
	Credits	**16.5**
Second Year		
First Semester		
AS.110.202	Calculus III	4
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
EN.530.231	Mechanical Engineering Thermodynamics	3
EN.530.232	Mechanical Engineering Thermodynamics Laboratory	1
EN.560.201	Statics & Mechanics of Materials	3
EN.560.211	Statics and Mechanics of Materials Laboratory	1
	Credits	**17**
Second Semester		
EN.530.202	Mechanical Engineering Dynamics	3
EN.530.212	MechE Dynamics Laboratory	1
EN.530.215	Mechanics-Based Design	3
EN.530.216	Mechanics Based Design Laboratory	1
EN.530.241	Electronics & Instrumentation	3
EN.530.243	Electronics and Instrumentation Laboratory	1
EN.553.291	Linear Algebra and Differential Equations	4
	Credits	**16**
Third Year		
First Semester		
EN.530.254	Manufacturing Engineering	3
EN.530.327	Introduction to Fluid Mechanics	3
EN.530.329	Introduction to Fluid Mechanics Laboratory	1
EN.530.352	Materials Selection	4
Statistics Elective		4
	Credits	**15**
Second Semester		
EN.530.334	Heat Transfer	3
EN.530.335	Heat Transfer Laboratory	1
EN.530.343	Design and Analysis of Dynamical Systems	3
EN.530.344	Design and Analysis of Dynamical Systems Laboratory	1
Mechanical Engineering Elective		3
Technical Elective		3
Humanities/Social Sciences Elective		3
	Credits	**17**
Fourth Year		
First Semester		
EN.530.403	MechE Senior Design Project I	4
EN.660.361	Engineering Management & Leadership	3
Mechanical Engineering Elective		3
Technical Elective		3
Humanities/Social Sciences Elective		3
	Credits	**16**
Second Semester		
EN.530.404	MechE Senior Design Project II	4
Mechanical Engineering Elective		3
Technical Elective		3
Humanities/Social Sciences Elective		3
	Credits	**13**
	Total Credits	**127**

[1] If you are bringing in exam or transfer credit that affords you space in the recommended schedule shown above, you may consider enrolling in an optional First-Year Seminar (FYS) during the fall semester. FYS courses carry course numbers EN.501.xxx.

Mechanical Engineering, Master of Science in Engineering

The Master's Degree Program

The department offers a variety of options to earn the master's degree, known as the Master of Science in Engineering degree in Mechanical Engineering.

Essay Option
Students writing an essay will successfully complete a coordinated sequence of eight courses and graduate research, and submit a master's essay (sometimes known as a "thesis"). The degree typically requires three to four semesters of study.

There are two options to complete the essay:

- Conduct Laboratory Research
    - Work with world-renowned engineering professors by conducting original research to produce an essay worthy of publication.
    - Learn more about the Research option here! (https://me.jhu.edu/education/graduate-studies/masters-program/)
- Work in a Cooperative Educational Environment (Co-Op)
    - To broaden the practical training for master's students, the Institute for Nanobiotechnology (INBT) (https://inbt.jhu.edu/) teams with companies to provide an immersive master's industry "co-op" experience (https://inbt.jhu.edu/masters/) in a professional working environment. Goals and objectives are developed for the student in conjunction with faculty and INBT academic advisors, which will be used to complete the master's essay.
    - Learn more about the Co-Op program here! (https://me.jhu.edu/education/graduate-studies/masters-program/)

All-Course Option
Students completing an "all-course" degree will successfully complete a coordinated sequence of ten courses. A master's essay or thesis is not required for this degree, which typically requires three semesters of study.

Both options provide students with an intensive exposure to advanced topics in mechanical engineering and strengthens understanding of engineering fundamentals.

Where Do our Master's Graduates Go?
Visit our Master's Alumni page (https://me.jhu.edu/mse-alumni-by-year/) to see where our graduates have made their mark around the world. You, too, can join this elite group with an admission to our master's degree program!

Admissions

To be admitted to graduate study in the Department of Mechanical Engineering, applicants must submit credentials sufficient to convince the faculty that they will thrive in a program of advanced course work and/or research. Graduate Record Examination scores must be submitted.

Program Requirements

Essay Option: For the Master of Science in Engineering degree at least eight one-semester courses are required. At least four of them must be selected among those listed as graduate courses in this catalogue. The remaining courses can be chosen from .400-level courses in this catalogue, with the advisor's approval. At least three courses must be offered by Mechanical Engineering (EN.530.xxx). All students must follow a course of study approved by their individual advisor.

- *Essay (Research)* - A completed piece of original research will be conducted under the guidance of a full-time faculty member of the department and reported as a master's essay.
- *Essay (Co-Op)* - A co-operative work arrangement will be conducted under the guidance of a full-time faculty member of the department and reported as a master's essay.

All-Course Option: The student must successfully complete a coordinated sequence of ten courses, which requires one year of full-time resident graduate study. At least six of the ten courses must be selected among the graduate courses of this catalogue. At least four courses must be offered by Mechanical Engineering (EN.530.xxx). The intent of this program is to provide the student with an intensive exposure to fundamental and advanced topics within mechanical engineering. Students must follow a course of study approved by their individual advisor.

Details on grade requirements and other departmental academic policy for the M.S.E. degree can be found on the Mechanical Engineering Graduate Advising page (https://me.jhu.edu/education/graduate-studies/advising/).

Mechanical Engineering, PhD

The Ph.D. Program

The Doctor of Philosophy (Ph.D.) normally requires four to five years of full-time study beyond the baccalaureate degree. There is no formal course requirement for a doctoral degree. The student develops a technical program involving both research and course work with the help of their faculty advisor.

PhD candidates must pass the Departmental Qualifying Exam (usually taken at the end of the second semester of graduate study), pass the Graduate Board Oral exam (usually taken during the third year of full-time study), submit a doctoral dissertation, and pass a final dissertation defense.

Admissions

To be admitted to graduate study in the Department of Mechanical Engineering, applicants must submit credentials sufficient to convince the faculty that they will thrive in a program of advanced course work and research. Graduate Record Examination scores must be submitted.

Advising

Each graduate student is assigned to a faculty advisor to map a program for the first year and enter the intellectual life of the department. The student will remain in regular communication with the advisor. The advisor may use a variety of methods to assess the student's progress. It is not necessary that a student have the same advisor in successive years. After serious research for a dissertation has begun, the research supervisor will automatically function as advisor.

All Ph.D. students are required in their first three years, and master's students are encouraged, to attend the weekly Mechanical Engineering Graduate Seminars.

Our Alumni

Where Do our PhD Graduates Go? Visit our PhD Alumni page (https://me.jhu.edu/alumni-giving/phd-alumni-by-year/) to see where our PhD graduates have made their mark around the world. You, too, can join this elite group with an admission to our PhD program!

Program Requirements

In addition to general university requirements, the student must pass two exams. The first is an oral Departmental Qualifying Exam based on core courses. This exam is usually taken after the second semester. The second is a preliminary Graduate Board Oral examination satisfying the Graduate Board requirements. This is a comprehensive examination in which students must demonstrate proficiency at the graduate level in their field of specialization.

Although there are no formal course requirements, students are presumed to be prepared by studies equal to six 600-level courses in their field of specialization and six courses in related fields. All candidates for the doctorate must complete two semesters as a teaching assistant as part of their training. All students are required to follow a course of study approved by their individual advisor.

The final and principal requirement for the doctorate is a piece of original research worthy of publication. Candidates must write a dissertation describing their work in detail and successfully defend it in a final oral presentation and examination, also known as the "dissertation defense."

Additional details on Ph.D. requirements and departmental academic policy for the Ph.D. degree can be found on the Mechanical Engineering Graduate Advising page (https://me.jhu.edu/education/graduate-studies/advising/).

NanoBioTechnology

http://inbt.jhu.edu

The Institute for NanoBioTechnology (INBT) at Johns Hopkins University is an exceptionally diverse, multidisciplinary team of faculty, researchers, and students uncovering new knowledge and creating innovative technologies at the interface of nanoscience, engineering, and medicine. Launched in 2006, INBT aims to revolutionize research by fostering a collaborative environment among engineers, scientist, and clinicians to pioneer new ways to solve some of the complex challenges in healthcare and the environment. The Institute brings together experts from the Bloomberg School of Public Health, School of Medicine, Whiting School of Engineering, Applied Physics Lab, and Krieger School of Arts and Sciences to fulfill their research, education, outreach, and translation initiatives. INBT collaborates with major industry partners through it's Corporate Partnership Program, to help move emerging technologies from laboratory to marketplace, as well as provide a vehicle for open exchange between Hopkins researchers and students with their counterparts in industry. Their headquarters are located in 100 Croft Hall on the Homewood campus, with laboratory facilities and research teams located at several Johns Hopkins locations. Examples of INBT research include the development of new tools and techniques to probe biological systems at the molecular, cellular, and tissue levels, to provide new insight into the mechanisms of disease, and the development of new diagnostic and therapeutic platforms for improved diagnosis, prevention, and treatment of disease. These are achieved through their three research focused platforms: Engineering for Cancer Therapies, Diagnostic Tools Engineered for Early Detection, and Stem Cells and Regenerative Engineering.

INBT education programs foster the next wave of nanobiotechnology innovations. Goals include training scientists and engineers who work between the physical sciences/engineering fields and life sciences/medical fields, as well as creating an entrepreneurial environment. The Nanotechnology for Cancer Research program trains students to study and model cancer motility and the biophysical forces involved in metastasis. Additionally, research opportunities exist through INBT's summer Research Experience for Undergraduates (REU) and International Research Experience for Students (IRES), both funded by NSF.

Programs

- Nano-Biotechnology, Certificate of Advanced Study (p. 1395)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

EN.670.502. INBT Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
Students must have completed Lab Safety training prior to registering for this class.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.670.609. Communication for Scientists and Engineers. 1 Credit.
Developing communications skills is a vital part of the training process to prepare scientists and engineers for successful careers. The course's goal is to provide participants with fundamental training in science communication, focusing on how to present science to a non-expert audience. Students will reach this objective through reading, writing, and classroom activities. Conciseness and clarity are valued in scientific fields, so an emphasis will be on quality rather than quantity of writing. Topics covered generally include: communicating with your target audience, communicating on the web and social media, the editing process, communication resources, and more.
Area: Writing Intensive

EN.670.643. Nanotechnology for Cancer Research Tutorial. 1 Credit.
Students in the NTCR training grant program study and present topics in nanotechnology applied to biology from the scientific literature. For NTCR Fellows only.

Nano-Biotechnology, Certificate of Advanced Study

Certificate of Advanced Study Current Student Information (*not accepting new applications for the 2022-2023 academic year)*

The Nano-Biotechnology Certificate of Advanced Study is recognized by the National Institutes of Health and the National Science Foundation as an innovative new approach to multidisciplinary training, integrating research and education. It combines traditional disciplinary coursework and laboratory training with peer-to-peer teaching, co-advising and professional development. Certificate students have the opportunity to: earn an accredited Certificate of Advanced Study (CAS) in Nanobiotechnology (for students who complete 13 lecture/tutorial/laboratory courses along with at least eight semesters of research from their home department) as they simultaneously work towards earning a PhD from participating departments such as Biomedical Engineering, Materials Science and Engineering, and Physics.

Program Requirements

Nano-Bio certificate students take two core courses and one lab course.They learn alongside other INBT students in cross-disciplinary journal clubs.To enhance their graduate experience, they attend professional development seminars and present research at the annual Nano-Bio Symposium. Students are given the opportunity to participate in research collaborations with industry partners. Students must complete the Nanobiotechnology certificate program course requirements.

Students are expected to present their research at the annual INBT research symposium.Students must also complete all PhD requirements in their home departments.

For additional information, contact Camille Mathis at cmathis@jhu.edu.

Robotics and Computational Sensing

https://lcsr.jhu.edu/

The Laboratory for Computational Sensing and Robotics (LCSR) is one of the most technologically advanced robotics research centers worldwide, and is an international leader in the areas of medical robotics, autonomous systems, and bio-inspiration. Within Johns Hopkins, a premiere research university, the LCSR is a hub for innovative and interdisciplinary robotics engineering, research, and development. The

LCSR brings a core group of scholars and students from the Whiting School of Engineering together with researchers from the Johns Hopkins School of Medicine, the Bloomberg School of Public Health, the Krieger School of Arts and Sciences, the Johns Hopkins University Applied Physics Laboratory and the Kennedy Krieger Institute to focus on the common purpose of creating knowledge and fostering innovation.

Programs

For current faculty and contact information go to https://www.lcsr.jhu.edu/Faculty (https://www.lcsr.jhu.edu/Faculty/)

Computer Integrated Surgery, Minor

The Laboratory for Computational Sensing and Robotics in the Whiting School of Engineering offers a minor in Computer Integrated Surgery (CIS) for full-time, undergraduate students at Johns Hopkins. The minor is particularly well suited for students interested in computer integrated surgery issues who are majoring in a variety of disciplines including biomedical engineering, computer science, computer engineering, electrical engineering, and mechanical engineering. The minor provides formal recognition of the depth and strength of a student's knowledge of the concepts fundamental to CIS beyond the minimal requirements of their major.

Please contact Alison Morrow (alison.morrow@jhu.edu) for more information regarding the minor.

Program Requirements

To satisfy the requirements for the minor in CIS, a student must have a fundamental background in computer programming and computer science, sufficient mathematical background, and also take a minimum of six courses (with a total of at least 18 credits, earning at least a C- in each course) directly related to the concepts relevant to CIS. These six CIS courses must include two fundamental CIS core courses, which provide the student with the fundamental basis for CIS, and four approved upper-level courses (300-level or above) to allow the student to pursue an advanced CIS topic in depth. The additional four upper-level courses must include at least one course designated as an "imaging" course or one course designated as a "robotics" course, as discussed below.

Graduate levels of the same course may be substituted for the undergraduate levels listed below without additional permission.

Code	Title	Credits
Fundamental Computer Science Courses		
EN.500.112	Gateway Computing: JAVA [1]	3
EN.601.226	Data Structures [1]	4
Fundamental Mathematics Courses [2]		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
or AS.110.106	Calculus I (Biology and Social Sciences)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.107	Calculus II (For Biological and Social Science)	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
Select one of the following:		4
EN.553.291	Linear Algebra and Differential Equations	
AS.110.201	Linear Algebra	
AS.110.212	Honors Linear Algebra	
Fundamental Computer Integrated Surgery Courses		
EN.601.455	Computer Integrated Surgery I	4
A design course in CIS [3]		4
Other Courses Related to CIS		
Select at least four other courses related to CIS. Of these, at least one must be in either the Imaging Subgroup or the Robotics Subgroup:		12-15
Imaging		
EN.520.414	Image Processing & Analysis	
EN.520.432	Medical Imaging Systems	
EN.520.433	Medical Image Analysis	
EN.601.461	Computer Vision	
Robotics		
EN.530.420	Robot Sensors/Actuators	
EN.530.421	Mechatronics	
EN.530.603	Applied Optimal Control	
EN.530.646	Robot Devices, Kinematics, Dynamics, and Control	
EN.601.463	Algorithms for Sensor-Based Robotics	
Other		
EN.520.448	Electronics Design Lab	
EN.530.445	Introduction to Biomechanics	
EN.580.471	Principles of Design of BME Instrumentation	
EN.601.454	Augmented Reality	
EN.601.476	Machine Learning: Data to Models	
EN.601.482	Machine Learning: Deep Learning	
Total Credits		**43-46**

[1] Or equivalent experience determined by your CIS minor adviser.

[2] Each math requirement may be satisfied by one of the specific courses listed, or by an equivalent course as determined by CIS advisor.

[3] A design course in CIS. Either EN.601.456 Computer Integrated Surgery II or a design course in biomedical engineering, electrical and computer engineering, or mechanical engineering with substantial CIS content approved by the student's faculty advisor in the CIS minor.

Please visit http://lcsr.jhu.edu/computer-integrated-surgery-minor/ for current course listings.

Robotics, Master of Science in Engineering

For complete and up-to-date M.S.E. information, visit https://lcsr.jhu.edu/mse. (https://lcsr.jhu.edu/mse/)

The Master of Science in Engineering in Robotics (Robotics MSE) program at Johns Hopkins University is designed to advance interdisciplinary robotics knowledge in students coming from a wide variety of engineering, scientific, and mathematical backgrounds.

Johns Hopkins University recognizes the growing need in industry for engineers with the broad multi-disciplinary training and fundamental knowledge needed to develop and deploy advanced robotics systems that function effectively in the real world.

Johns Hopkins University's broad interdisciplinary approach to robotics research makes it uniquely situated to offer such a comprehensive program. The Laboratory for Computational Sensing and Robotics (LCSR), with its reputation as one of the top robotics research sites in the world, particularly in the area of medical robotics, is pleased to offer this MSE in Robotics

Academic Policies

- **Course Grade Requirement:** A course is satisfactorily completed if a grade from A+ to B# is obtained. Up to one C+, C, or C# can be counted toward the degree requirements. A grade of D or F or a second grade below B- results in probation. A second D or F, or a third grade below B- typically results in termination from the program.
- **Transfer Courses:** Standard WSE policy and limitations on M.S.E. transfer credits apply (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/). In addition, use of each transfer course toward satisfaction of a specific Robotics M.S.E. degree requirement must be approved in writing by both the student's faculty advisor and the Robotics M.S.E. Curriculum Committee.
- **Double Counting:** Standard WSE policy and limitations on double counting apply (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/).
- **Duration:** Students must complete degree within 5 years from matriculation in the M.S.E. program. An university-approved leave of absence does not count toward this limit.
- **Graduate Research Courses:** No more than one 1-semester or 3 credits of a graduate research course (e.g., EN.620.801 Robotics MSE Graduate Research) may be counted toward one class in the course-option degree requirements.
- **WSE Engineering Management Courses:** Two (2) 1.5 credit hour courses taken for credit (i.e. a letter grade) may count towards one class of the MSE degree elective requirements if they are pre-approved in writing by the student's academic advisor.
- No more than 2 **WSE Engineering for Professionals (EP) Courses** may count toward the M.S.E. degree elective requirements. All EP courses must be approved in writing by the student's faculty advisor.
- **Residency Requirement:** Minimum residency of two full-time academic semesters at WSE (note that summer and intersession terms do not count towards this requirement).
- **Academic Ethics, Responsible Conduct of Research, Laboratory Safety**: all Robotics M.S.E. students must pass the WSE Academic Ethics course and complete at least the online Responsible Conduct of Research Course. Students conducting research may have additional in-person responsible conduct of research course requirements, as well as will be required to meet laboratory safety training requirements. For more information, please contact the academic staff in the program.

For complete and up-to-date M.S.E. information, visit https://lcsr.jhu.edu/mse/

Admission Requirements

Application Requirements for the M.S.E. in Robotics Degree

- Bachelor's degree in engineering, science, or math. (Or demonstrated knowledge or accomplishment in these fields)
- Graduate Application
- Statement of Purpose – in your short statement of purpose please take a couple of sentences to explain/answer the following:
  - Why are you interested in doing an MSE in Robotics? No need to over-think this: it is fine if it is as simple as wanting to get a job in this field!
  - What do you hope to learn during the Robotics MSE?
  - What do you want to do after you graduate, and how do you see the MSE degree from JHU as assisting in that goal?
- Transcript
- Graduate Record Examination (GRE). Current JHU students may request that this requirement be waived. Such requests will be judged on a case-by-case basis.
- IELTS or TOEFL for international applicants. *Please note:* while the Robotics program accepts both the TOEFL and the IELTS tests, **we strongly prefer the IELTS.**
- Three letters of reference
- $75.00 Application fee
- The Office of Graduate Admissions and Enrollment strongly recommends you submit a professional evaluation from one of the recommended resources (more information here (http://grad.jhu.edu/apply/international-students/)) for any academic work completed outside the USA. At this time, however, LCSR does not require the evaluation for the Robotics MSE application package.

To apply, please fill out the application and submit the required documents here (https://grad.jhu.edu/apply/apply-now/).

In making its final decisions, the Admissions Committee will consider the combination of professional knowledge, academic excellence, letters of reference, and the statement of purpose, as well as GRE, TOEFL, and IELTS scores of the applicants.

Program Requirements

M.S.E. Program Prerequisites

Please see lcsr.jhu.edu/mse/ (https://lcsr.jhu.edu/mse/) for all program prerequisites and requirements.

Math and Physics Proficiency Prerequisites

Proficiency in undergraduate mathematics and physics is expected for all M.S.E. students in the robotics program.

This includes proficiency in:

- Multivariable integral and differential calculus;
- Linear algebra;
- Ordinary differential equations;
- Physics – undergraduate calculus-based mechanics, electricity, and magnetism;
- Probability and statistics.

Proficiency will be assumed in the prerequisites for the core courses.

Computing Proficiency Prerequisites

Proficiency in computer programming is expected for all M.S.E. students in the robotics program.

This includes proficiency in:

- Basic numerical methods using existing programming environments;
- The ability to write well-structured and documented programs in a standard programming language such as C++, Java, or MATLAB.

All incoming M.S.E. students will be assigned an M.S.E. Academic Advisor.

- Course Requirements:
  - **Course Option:** 10 credit-bearing courses that total at least 30 credit-hours.
  - **Essay/Internship* Option:** 8 credit-bearing courses that total at least 24 credit-hours and a Master's Essay or Internship Report* supervised by a WSE faculty member who has been approved by the Robotics M.S.E. Curriculum Committee to serve as a faculty advisor.

At least 6 of these courses must be at the graduate level as defined by the offering department/center. All courses counted toward the MSE degree requirements must be at the 400 level or above. Any dual listed courses (e.g. listed at both the 600 and 400 level) must be taken at the 600 level. All courses counting towards the foundation, track, or elective requirements must be for a letter grade (e.g. no pass/fail). Any exceptions must be approved in writing by your academic advisor and the LCSR Education Director. Non-credit and one-credit courses such as the weekly seminar courses offered by LCSR may not count toward this course requirement.

If you are a combined student (i.e. graduated with your undergraduate degree from JHU) who took required courses at the 400 level during your undergraduate course work, the classes can count as fulfilling the requirement. You will still need to fulfill the requirement of at least six (6) 600 level courses or above to complete the degree.

- **Foundation Course Requirements:** Two core courses and a weekly seminar course.
- **Track Course Requirement:** Four courses fulfilling one of the following track requirements (see website for track course listings):
  - Medical Robotics and Computer Integrated Surgical Systems (has special track requirements, please see website)
  - Perception and Cognitive Systems
  - Automation Science and Engineering
  - Control and Dynamical Systems
  - BioRobotics
  - General Robotics

Courses counted toward the track requirement may not be used to satisfy the elective requirement.

- **Elective Course Requirement:** Four courses, or two courses and a M.S.E. Essay or Internship Report*, fulfilling the elective requirement. Courses may be any engineering or quantitative (designated E or Q in the course catalogue) course, subject to the degree requirement limitations, as approved by the student's M.S.E. academic adviser. Courses counted toward the elective requirement may not be used to satisfy the track requirements.
- **Academic Ethics:** online tutorial required for all incoming M.S.E. students (EN.500.603 Graduate Orientation and Academic Ethics)
- **AS.360.625 Responsible Conduct of Research (online):** Online tutorial required for all incoming MSE students.
- **AS.360.625 Responsible Conduct of Research (in-person)**: may be required for certain research projects. More information: (http://eng.jhu.edu/wse/page/conduct-of-research-training (http://eng.jhu.edu/wse/page/conduct-of-research-training/)).
- **EN.500.601 Research Laboratory Safety** : required for all incoming M.S.E. students.
- **Title IX Training:** Students are auto-enrolled in their first semester.
- **Opioid Training:** Students are auto-enrolled in their first semester.

*Internship option pending final review by Whiting School of Engineering's Graduate Committee.

Learning Outcomes

Program Goals

- To provide students with multi-disciplinary engineering education and training that will enable them to develop and deploy innovative advanced robotics systems that function effectively in real-world applications.
- To develop students' ability to relate individual technical and design elements to the functioning of complete engineered robotic systems.
- To develop students' ability to work effectively within and to lead multi-disciplinary teams.
- To provide students with a basis for life-long learning and professional growth.

Robotics, Minor

The field of robotics integrates sensing, information processing, and movement to accomplish specific tasks in the physical world. As such, it encompasses several topics, including mechanics and dynamics, kinematics, sensing, signal processing, control systems, planning, and artificial intelligence. Applications of these concepts appear in many areas including medicine, manufacturing, space exploration, disaster recovery, ordinance disposal, deep-sea navigation, home care, and home automation.

The faculty of the Laboratory for Computational Sensing and Robotics (LCSR), in collaboration with the academic departments and centers of the Whiting School of Engineering, offers a robotics minor in order to provide a structure in which undergraduate students at Johns Hopkins University can advance their knowledge in robotics while receiving recognition on their transcript for this pursuit. The minor is not "owned" by any one department, but rather it is managed by the LCSR itself. Any student from any department within the university can work toward the minor.

Robotics is fundamentally integrative and multidisciplinary. Therefore, any candidate for the robotics minor must develop a set of core skills that cut across these disciplines, as well as obtain advanced supplementary skills.

Please visit https://lcsr.jhu.edu/robotics-minor/ for current course listings and full minor policies.

Core Skills Include the Following

- Robot kinematics and dynamics (R)
- Systems theory, signal processing and control (S)
- Computation and sensing (C)

Supplementary advanced skills may be obtained in specialized applications, such as space, medicine, or marine systems; or in one of the three core areas listed above.

The full minor course listing, provided below and available at https://lcsr.jhu.edu/robotics-minor/, specifies which courses fulfill these requirements. **Please always check the website for the most up-to-date listing of courses.** Note that **all** core areas must be covered, but that **any** advanced/supplementary courses can be chosen from the list. This allows students to strike a balance between breadth and depth.

Advising

- Students who decide to pursue the minor should first fill out a course plan for the Robotics minor, using the checkout form found here: https://lcsr.jhu.edu/robotics-minor/. This form should be sent to Alison Morrow (alison.morrow@jhu.edu) for review.
- Then, students who decide to pursue the minor should complete the "Request a New major/Minor" form, which can be initiated in SIS Self-Service under the Online Forms screen. Students will be assigned a minor advisor during this process.
- Complete the Requirements Checkout tables in the Check Out sheet, downloadable from https://lcsr.jhu.edu/robotics-minor/. Students should meet with their minor advisor periodically (at least once per year), bringing a copy of this form for review.
- During senior year, students must also note the Robotics Minor on their Application for Graduation.
- When all requirements have been completed, take the completed form to Alison Morrow for review and signature.
- If you have any questions about the minor, please contact Alison Morrow (alison.morrow@jhu.edu) (alison.morrow@jhu.edu).

The minor is managed by the faculty of the LCSR in collaboration with academic departments and centers of the Whiting School of Engineering (https://engineering.jhu.edu/). If you have suggestions/questions regarding the minor, please direct them to Professor Louis Whitcomb at llw@jhu.edu.

Program Requirements

Undergraduates qualify for the minor provided they have taken at least 18 credits (at the 300-level or above, with a C- or above) from an approved list of courses available below and at https://lcsr.jhu.edu/robotics-minor/ with the following requirements and restrictions:

- Between 6 and 12 credits chosen to cover the three core skills (R, S, C).
- At least 6 credits chosen from advanced supplementary skills (Sup).
- At least 3 credits of the 18 must be a laboratory course (Lab) (at least 15 hours of laboratory time that includes working with physical hardware and/or real data).

At most 3 credits of the 18 can be an independent research or individual study with a faculty member on the list of approved faculty advisers.

- At least 6 credits must be primarily listed in a department other than the student's home department (it is acceptable if such a course is cross-listed in the student's home department).
- At most one course up to 3 credits (including independent research or individual study) may be taken S/U, but all other courses must be taken for a letter grade.

Graduate levels of the same course may be substituted for the undergraduate levels listed below without additional permissions.

Course Number/Title	Lab	R	S	C	Sup
520.340 Introduction to Mechatronics		X		X	
520.344 Introduction to Digital Systems Processing			X		X
EN.520.353 Control Systems			X		
EN.520.412 Machine Learning for Signal Processing			X		
EN.520.414 Image Processing & Analysis			X	X	
EN.520.415 Image Process & Analysis II			X	X	
EN.520.417 Computation for Engineers				X	
EN.520.424 FPGA Synthesis Lab				X	X
EN.520.432 Medical Imaging Systems				X	X
EN.520.433 Medical Image Analysis			X		X
EN.520.435 Digital Signal Processing			X		X
EN.520.448 Electronics Design Lab	X			X	X
EN.520.454 Control Systems Design	X		X		X
520.462 Leading Innovation and Design Team					X
520.463 Leading Innovation and Design Team					X
EN.520.601 Linear Systems Theory			X		
EN.520.612 Machine Learning for Signal Processing			X		
530.343 Design and Analysis of Dynamical Systems	X	X	X		
EN.530.420 Robot Sensors/Actuators	X	X		X	
EN.530.421 Mechatronics	X	X		X	
EN.530.424 Dynamics of Robots and Spacecraft		X			X
EN.530.446 Robot Devices, Kinematics, Dynamics, and Control		X	X		X
EN.530.470 Space Vehicle Dynamics & Control		X	X		
EN.530.486 Mechanics of Locomotion		X			X
EN.530.603 Applied Optimal Control		X	X	X	X
EN.530.645 Kinematics		X			X
530.468 Locomotion Mechanics: Fundamentals		X			X
530.469 Locomotion Mechanics: Recent Advances		X	X		
EN.530.678 Nonlinear Control and Planning in Robotics		X	X	X	X
EN.530.682 Haptic Applications	X	X		X	X
530.691 Haptic Interface Design for Human-Robot Interaction		X		X	X
EN.530.707 Robot System Programing	X	X		X	X

EN.550.493 Mathematical Image Analysis			X	X	X
EN.580.471 Principles of Design of BME Instrumentation	X			X	
EN.580.472 Medical Imaging Systems				X	X
580.484 Ultrasound Imaging: theory and Application			X	X	X
EN.580.571 Honors Instrumentation	X			X	X
EN.601.455 Computer Integrated Surgery I	X	X	X		X
EN.601.456 Computer Integrated Surgery II	X	X		X	X
EN.601.461 Computer Vision	X			X	X
EN.601.463 Algorithms for Sensor-Based Robotics		X	X	X	
EN.601.464 Artificial Intelligence				X	X
EN.601.475 Machine Learning				X	X
EN.601.476 Machine Learning: Data to Models				X	X
EN.601.491 Human-Robot Interaction				X	
EN.601.682 Machine Learning: Deep Learning			X	X	
EN.601.760 FFT in Graphics & Vision			X	X	X

Multi-School Programs of Study

At Johns Hopkins University, some programs are offered through a partnership between two or more of the University's nine schools.

- Business Minor (p. 681)
- Peabody Double Degree Program (p. 808)
- Space Science and Engineering Minor (p. 1401)
- Energy Minor (p. 1767)

Business, Minor

Please note that after the Spring 2021 semester, all business minor questions and advising will be through the Carey Business School & the Business minor requirements will change. For questions, contact Michael Tyler at Carey_BusinessMinor@jhu.edu

The Carey Business minor offers Johns Hopkins undergraduates a focused, quantitative minor that will prepare them for careers in small companies, major corporations, consultancies, as well as acceptance into graduate business programs.

- The primary objective for the minor is to help students position themselves as leaders among their peers in the private sector, government, the non-profit sector, and the world of social enterprises. At the conclusion of their program, successful students will be able to:
- Enter a variety of careers such as finance, management, real estate, marketing, accounting, and consulting.
- Create, analyze, and implement value propositions about projects and products for the benefit of various audiences, from shareholders to local communities.
- Establish and manage brands and products and also institutions and organizations.
- Build, manage and grow valuable and lasting relationships with clients, customers, shareholders, creditors, and local communities.
- Recognize, understand, capitalize on, and generate changing trends in local and global economies.
- Be responsible business leaders who are engaged citizens of their communities, cities, and countries.

The minor offers an instructional program that combines critical analysis and theoretical grounding in a broad set of required courses and hands-on experience through an experiential capstone course.

The new requirements for the business minor will only apply to students who declare the minor starting in the fall 2021 semester. Students who declared the minor prior to fall 2021, can find the previous minor requirements here: https://engineering.jhu.edu/cle/business-minor/

PROGRAM REQUIREMENTS

- Seven required courses
- One capstone course

COURSE AND CREDIT REQUIREMENT

The Business minor requires a minimum of 24 credits. Business courses are open to all Johns Hopkins Arts & Sciences and Engineering students.

BUSINESS MINOR REQUIRED COURSES

Code	Title	Credits
BU.667.310	Business Analytics and Statistics	3
BU.667.311	Economics for Decision Making	3
BU.667.312	Marketing Management	3
BU.667.313	Principles of Finances	3
BU.667.314	Operations Management	3
BU.667.315	Organizational Management	3
BU.667.400	Business Capstone	3
EN.660.203	Financial Accounting	3
Total Credits		**24**

Peabody-Homewood Double Degree Program

Peabody and the Homewood schools of Johns Hopkins University offer the opportunity for a select group academically and musically advanced students to simultaneously pursue a Bachelor of Music degree and either a Bachelor of Arts degree from the Krieger School of Arts and Sciences or a Bachelor of Science degree from the Whiting School of Engineering. Students must be admitted independently to Peabody and one of the Homewood schools and be invited to participate in the double degree program. Students who have begun their junior year of study are not eligible to enter the double degree program nor may students transfer into the program midyear. The double degree program is designed as a five year program, and students must comply with the credit limit of 25 credits per semester.

Students in the double degree program must maintain full-time enrollment in each semester of study, including lessons at Peabody and at least one class at Homewood. Administrative services such as registration, financial aid, and student accounts are provided to double degree students by the Homewood schools. Consequently, students in the double degree program do not receive Peabody merit scholarships or any other form of financial aid from Peabody. Double degree students must enroll in private lessons, at a minimum, and, for instrumental majors, large ensembles to maintain their status as Peabody degree candidates in the double degree program.

Student Status
Students in the double degree program are responsible for meeting the requirements of both degree curricula within the published guidelines of the relevant programs. Students' principal affiliation is with the Krieger School of Arts and Science or the Whiting School of Engineering. All official procedures of registration and records are managed through the Homewood Office of the Registrar. The official transcript for a double degree student, including all courses at both Peabody and Homewood, is maintained by the Homewood Office of the Registrar.

Enrollment Requirements and Limits
Double Degree students must enroll in private lessons each semester. Instrumental majors are required to enroll each semester for large ensembles and private lessons to maintain their status as Peabody degree candidates in the Double Degree Program. Double Degree students must register for no less than one course at Homewood each semester. Peabody Double Degree students are permitted to enroll in a maximum of 25 credits per semester.

Residency Requirement for Peabody Double Degree Students
Peabody Double Degree students must complete at least 48 credits on the Homewood campus, in the Krieger School of Arts & Sciences and/or the Whiting School of Engineering.

Course Changes and Withdrawals from Peabody Courses
Students must follow the deadlines for adding, dropping, or withdrawing from Peabody courses which are published on the Peabody Academic Affairs website at https://peabody.jhu.edu/academics/academic-calendar-resources/.

Course Changes and Withdrawals from Arts and Sciences and Engineering Courses
Students must follow the deadlines and processes for adding, dropping or withdrawing from Arts & Sciences and/or Engineering courses which are published on the Homewood Registrar's Office website (https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/).

Leave of Absence
Double Degree students may request a Leave of Absence (LOA) from the entire program, however, they cannot be granted leave from only one portion of the program. A LOA for Double Degree students is subject to the guidelines of the student's respective academic advising office on the Homewood campus.

Graduation Policies
Double Degree students must petition to graduate from the Peabody Conservatory in accordance with information located at https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/, and also adhere to the policies and procedures for applying to graduate from their Homewood school, Arts and Sciences or Engineering as indicated at ASEN Undergraduate Graduation Policy (p. 1616). Both degrees are awarded simultaneously, and degree conferral is available in May and December of each academic year.

Graduation Closes the Undergraduate Record
Upon graduation, the undergraduate record is closed. The only permitted changes are the resolution of incomplete grades, missing grades, and grade errors. These changes must be resolved by the first Monday after 30 days have lapsed since the degree conferral date. Students wishing to take additional courses at JHU after graduation should refer to Alumni Enrollment policies.

Space Science and Engineering

This minor is open to all students in the Whiting School of Engineering and the Krieger School of Arts and Sciences who have the prerequisites for the required courses. The objective of the Minor is to prepare students for a career in Space Science and Space Engineering, either directly as an entering professional in industry, government laboratories and other organizations or as a student in a graduate program. The educational goal of the Minor is to enable students to:

- Apply their understanding and mastery of the fundamental scientific, engineering, and mathematical principles obtained through their major subject of study to space science and space engineering.
- Develop an understanding and capacity for interdisciplinary approaches to technical activities.
- Improve their ability to work in multidisciplinary teams, which are typical in space and other complex technical activities, through interdisciplinary education and internship(s) or equivalent experience(s).

Programs

Space Science and Engineering, Minor

Space Science and Engineering Minor Requirements

- A Proposal and Course Plan, which must be approved by your advisor for the minor (hereafter referred to as the "Advisor"). The proposal must discuss a theme that unites the individual elements of the program (courses and internship(s)) into an intellectual whole.
- Five courses in Science and Engineering. One course is specified (AS.171.321 Introduction to Space, Science, and Technology) and the remaining four are chosen through your Proposal and Course Plan, which must be approved prior to taking the courses by the Advisor. All courses must be taken for a grade rather than satisfactory/unsatisfactory. A grade of C- or better is required. Courses that are named as requirements for the student's major may not be used. However, courses that are not named, but satisfy an elective requirement for the major, may be used.
- An internship or equivalent experience in the field of space science and engineering is required. This must have prior approval from the Advisor.
- A brief report on the internship or equivalent experience to the Advisor.

Course Requirements
Specified Course:

The specified course is 171.321 Introduction to Space Science and Technology. The prerequisites are Physics 171.101-102 or a similar engineering course and Calculus 110.108-109. The course carries 3 credits. The course is co-listed by the Departments of Earth and Planetary Sciences, Materials Science, and Engineering and Mechanical Engineering.

Proposal and Course Plan for the Four Courses:

To ensure that the program is a coherent intellectual activity, you are required to submit a Proposal and Course Plan to your Advisor early in their program, prior to taking the courses. The Proposal and Course Plan will identify a theme that describes the educational goal that you will pursue through your course of study and a list of courses, including alternates, to achieve your goal. Examples of such themes could be "Remote observations of the earth and planets from space vehicles" or "Spacecraft design for astronomy missions." Examples of potential course programs are listed in Section 5 below. A list of suggested candidate courses is listed in Section 6 below. If consistent with the Proposal and Course Plan theme, you may use other courses with the permission of your Advisor. The Course Plan should contain alternative courses in recognition that every course may not be taught every year.

The Proposal should also include ideas for completing the internship requirement discussed below.

Additional Requirements on the Four Courses

- One of the four courses may be at the 200 level, but at least three must be at the 300 level or higher.
- The total credits associated with the courses must be 12 or more.
- At least three of the courses must be in departments other than the department or program of your major.
- Courses cannot be "named" requirements of the major; however, elective courses for the major may be used.

Internship or Equivalent Experience

Practical experience in space science and space engineering can be obtained through an academic internship, non-academic internship or an equivalent experience. This practical experience can be acquired by at least six weeks of full-time effort or the equivalent effort spread over a longer period. This can take place during a summer or during the academic year.

Academic Internships

The Undergraduate Student Handbook describes the regulations governing academic internships. You may find the following quoted material from the Handbook helpful:

- "Academic internships are practical work experiences which have an academic component as certified by a member of the faculty."
- "Academic credit for independent academic work must be sponsored by a full-time member of the Homewood faculty. This is the case whether the work is done on campus or not. The work supervisor and the faculty sponsor may be the same individual. If the faculty sponsor is not the work supervisor, the work supervisor must provide the faculty sponsor with a report on the student's achievements while doing the independent project."
- "Only one credit may be earned for an academic internship during one semester or summer."
- "The grading method is Satisfactory/Unsatisfactory only."
- "Independent work done for academic credit must be unpaid."
- "The use of credit for independent academic work to satisfy the requirements of a major or minor is subject to prior written approval by the appropriate department or program."

Non-academic Internships

These internships are offered by non-academic organizations such as the Space Telescope Science Institute, the Applied Physics Laboratory, and a number of NASA laboratories to provide undergraduate students practical work experience in space science and space engineering. These internships often carry a stipend and are not eligible for academic credit.

Opportunities within the university include the Applied Physics Laboratory, the Center for Astrophysical Sciences, the Space Telescope Science Institute, as well as individual professors and research staff. In addition, local laboratories and companies, such as NASA Goddard Space Flight Center, Lockheed Martin, Northrop Grumman, Orbital Sciences, and other private corporations offer excellent opportunities for internships and summer work experiences.

- Applied Physics Laboratory program for JHU students (https://www.jhuapl.edu/Education/JohnsHopkinsConnection/) – Students should indicate their interest in the Space Department of the JHU APL.
- Space Telescope Science Institute intern program (https://www.stsci.edu/institute/smo/students/)
- NASA (https://www.nasa.gov/centers/goddard/education/internships.html)

Equivalent Experiences

Other activities that meet the spirit of the requirement may be accepted. For example, employment opportunities, often in the summer, can provide practical experience in space science and space engineering.

Prior Approval Required

The student is responsible for identifying and arranging the internship or equivalent experience. However, in order to count toward the Minor, it must be approved in advance by the Advisor. In general, the Advisor will require that the mentor or supervisor be either a space scientist or space engineer.

Required Report on the Internship or Work Experience

In order to have it count toward the Minor, the student must provide a brief report (typically one page) describing the internship or equivalent experience to the Advisor at the beginning of the semester immediately following the activity. The report should give the name of the organization or laboratory (e.g., STScI, JHU-APL, NASA-GSFC), the start date and duration, and the name, position, and email address of the mentor/supervisor. It should include a brief summary describing the activity, a description of new knowledge and skills learned, and information about the overall experience.

For a detailed explanation of the minor and its requirements, including sample programs of study, please visit the Student Handbook for the Minor in Space Science and Engineering (http://spacestudies.jhu.edu/space-minor/).

Part-Time, Online Graduate Programs (Engineering for Professionals)

Dear Students,

The most successful engineers are those who never stand still when it comes to their education and their careers. Rather, it is those engineers who are committed to remaining at the forefront of their professions, who strive continuously to be well versed in the latest technologies, and who have the ability to continuously learn how their fields are evolving and which skills and knowledge are necessary to stay ahead of the curve who will achieve success.

At the Whiting School of Engineering, our Engineering for Professionals programs provide these motivated working engineers—in our region and around the world—with the tools and experiences necessary to enhance their education in ways that will have a direct positive impact on their professional lives.

We provide our engineering students with academic offerings of the highest quality, with all the value and prestige of a Johns Hopkins education. The breadth of our degree and certificate programs, the real-world experience of our faculty, and our state-of-the-art instructional methods enable us to provide students with unparalleled opportunities. At Engineering for Professionals, you will learn from experienced working professionals and outstanding academic faculty. These instructors speak directly to the applications of the course work you will study and continually improve and update content to encompass the very latest in both the theoretical understanding and applications in their areas of expertise.

In addition to the tremendous academic opportunities you will be afforded by enrolling in a Johns Hopkins Engineering for Professionals program, as a student here, you also will become part of a remarkable community. As a student and, later, as an alumnus, you will be a member of the uniquely successful Johns Hopkins family, connected forever to the traditions and achievements of one of the world's most esteemed academic research institutions.

Congratulations on choosing Johns Hopkins.

Sincerely,

Ed Schlesinger
Benjamin T. Rome Dean
Whiting School of Engineering

Contact Information

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Johns Hopkins Engineering for Professionals
3400 North Charles Street,
San Martin Center 1st Floor
Baltimore, MD 21218-2608
410-516-2300
ep.jhu.edu (https://
ep.jhu.edu/)
jhep@jhu.edu
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Information	Phone
General Information and Requests	
Admissions/Registration	410-516-2300
Locations	
Applied Physics Laboratory	240-228-6510
Homewood Campus	410-516-8000
Student Services	
Disability Services	410-516-2328
Financial Aid (146 Garland Hall)	410-516-8028
International Office	667-208-7001
Johns Hopkins Student Assistance Program	443-287-7000
Student Accounts	+1 877-419-5131
Transcripts (75 Garland Hall)	410-516-8080
University Registrar (75 Garland Hall)	410-516-8080
Veterans Certification (75 Garland Hall)	410-516-6635
Online Information	
Application	https://ep.jhu.edu/admissions-aid/apply (https://ep.jhu.edu/admissions-aid/apply/)/
Catalog	https://ep.jhu.edu/student-services/academic-services/academic-catalogs (https://ep.jhu.edu/student-services/academic-services/academic-catalogs/)
Course Schedule	https://apps.ep.jhu.edu/schedule/search (https://apps.ep.jhu.edu/schedule/search/)
Graduation Information	https://ep.jhu.edu/student-services/other-services/graduation-information (https://ep.jhu.edu/student-services/other-services/graduation-information/)
Johns Hopkins Engineering for Professionals Forms	https://ep.jhu.edu/student-services/academic-services/student-forms (https://ep.jhu.edu/student-services/academic-services/student-forms/)
Textbooks	
All Locations	https://ep.jhu.edu/student-services/academic-services/ordering-textbooks (https://ep.jhu.edu/student-services/academic-services/ordering-textbooks/)

Information in this catalogue is current as of publication in July 2022. For all updates, please visit ep.jhu.edu (https://ep.jhu.edu/).

The university reserves the freedom to change without notice any programs, requirements, or regulations published in this catalogue. This catalogue is not to be regarded as a contract. Multiple means of communication may be used by the university for announcing changes of this nature, including, but not exclusive to, e-mail and/or paper notice. Students are responsible for providing current e-mail and mailing address information to the university administrative offices.

Engineering Administration

Whiting School of Engineering

T. E. Schlesinger
Benjamin T. Rome Dean

Sridevi Sarma
Vice Dean, Graduate Education

Harry K. Charles Jr.
Associate Dean, Non-Residential Graduate Education

Johns Hopkins Engineering for Professionals

Dan Horn

Associate Dean

Paul Huckett
Assistant Dean, Learning Design and Innovation

Mary Kay LeMay
Assistant Dean, Marketing and Communications

Marielle Nuzback
Senior Director of Operations

Charise Bell
Director, Marketing and Recruitment

Nathan Graham
Director, Center for Digital and Media Initiatives

Tim Jarrett
Director, Software Engineering

Abby Lattes
Director, Communications

Doug Schiller
Director, Enrollment Management

Sandra Altman
Director, Admissions

Doug Bulkley
Registration Manager

Jessica Rowe
Financial Manager

Heather Stewart
Academic Affairs Manager

Allison Leventhal
Project Manager/Student Disability Services Coordinator

Applied Physics Laboratory Education Center

Harry K. Charles Jr.
Education Center Group Supervisor and Program Manager

Christine M. Morris
Partnership Manager

Tracy K. Gauthier
Education Center Operations Coordinator

Graduate Program Chairs

Hedy V. Alavi
Program Chair, Environmental Engineering
Program Chair, Environmental Engineering and Science
Program Chair, Environmental Planning and Management

David Audley
Program Chair, Financial Mathematics

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Michael Betenbaugh
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Program Chair, Chemical and Biomolecular Engineering

Patrick Binning
Program Chair, Space Systems Engineering

Harry K. Charles Jr.
Program Chair, Applied Physics

Ashutosh Dutta
Program Chair, Electrical and Computer Engineering

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Timothy Galpin
Program Chair, Engineering Management

Eileen Haase
Program Chair, Applied Biomedical Engineering

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Kirsten Koehler
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Program Chair, Occupational and Environmental Hygiene

Andrew Merkle
Program Chair, Systems Engineering

John Piorkowski
Program Chair, Artificial Intelligence
Program Co-Chair, Data Science

Alan Ravitz
Program Chair, Healthcare Systems Engineering

Rachel Sangree
Program Chair, Civil Engineering

David Silberberg
Program Chair, Information Systems Engineering
Program Chair, Robotics and Autonomous Systems

James C. Spall
Program Chair, Applied and Computational Mathematics
Program Co-Chair, Data Science

James Spicer
Program Chair, Materials Science and Engineering

Lanier Watkins
Program Chair, Computer Science
Program Chair, Cybersecurity

Graduate Programs

Graduate students in the Johns Hopkins Engineering for Professionals (JHEP) program constitute one of the nation's largest student bodies in part-time engineering education at the master's-degree level. JHEP courses are continually updated for relevance, addressing industry trends and the latest advances in engineering and applied science fields. Most courses are offered online to afford working professionals the opportunity to advance their education at their convenience. Select courses are also offered on-site in the late afternoon or evening Monday through Thursday. Students receive individual attention from their advisors and instructors and benefit from small classes and well-equipped laboratory, computing, and classroom facilities.

The university is accredited by:

the Middle States Commission on Higher Education

3624 Market Street
Philadelphia, PA
19104-2680
215-662-5606

The Master of Science in Engineering in Systems Engineering program is accredited by the Engineering Accreditation Commission (EAC) of ABET, http://www.abet.org. Applicants need to hold a degree by a program accredited by the EAC of ABET in order to be admitted to the Master of Science in Engineering degree program. Students admitted without a Bachelor of Science degree from an EAC of ABET-accredited program or who did not complete the prerequisites that meet all of the EAC of ABET-accreditation requirements for attainment of student outcomes and for sufficient math, science, and engineering design at the Bachelor of Science level will receive a regionally accredited Master of Science degree.

Degrees and Certificates

The Johns Hopkins University offers a variety of degrees and certificates to students in the Whiting School of Engineering. Requirements for each discipline are detailed in the individual program listings in this catalogue.

Master of Science

Programs are offered in Applied Biomedical Engineering, Applied and Computational Mathematics, Applied Physics, Artificial Intelligence, Computer Science, Cybersecurity, Data Science, Electrical and Computer Engineering, Environmental Engineering and Science, Environmental Planning and Management, Financial Mathematics, Healthcare Systems Engineering, Information Systems Engineering, Mechanical Engineering, Materials Science and Engineering, Occupational and Environmental Hygiene, Space Systems Engineering and Systems Engineering.

Master’s

Programs are offered in Chemical and Biomolecular Engineering, Civil Engineering, Engineering Management, and Environmental Engineering.

Master of Science in Engineering

One program is offered in Systems Engineering.

Joint Degree

A joint degree in Bioinformatics is offered by Johns Hopkins Engineering for Professionals and the Zanvyl Krieger School of Arts and Sciences Advanced Academic Programs. The administration is handled by the Zanvyl Krieger School of Arts and Sciences, and applications for admission to the Master of Science in Bioinformatics must be submitted directly to the Zanvyl Krieger School of Arts and Sciences at bioinformatics.jhu.edu.

Graduate Certificate/Post-Master’s Certificate

These certificates are awarded upon completion of a select number of courses of graduate study within one of the master’s degree discipline areas.

Non-Degree-Seeking/Special Students

Students who wish to enroll in courses but are not interested in pursuing a degree or certificate may enroll as Special Students.

Online Learning

Johns Hopkins Engineering for Professionals has offered online courses since 2001, consistently delivering a unique educational experience that is both academically rigorous and highly practical. Johns Hopkins Engineering for Professionals’ online programs complement the busy schedules of today’s practicing engineers and scientists by allowing students to pursue studies face to face, online, or via a combination of both formats. Courses are consistently being developed for online delivery. The following programs can be completed fully online:

- Applied Biomedical Engineering
- Applied and Computational Mathematics
- Applied Physics
- Artificial Intelligence
- Civil Engineering
- Computer Science
- Cybersecurity
- Data Science
- Electrical and Computer Engineering
- Engineering Management
- Environmental Engineering
- Environmental Engineering and Science
- Environmental Planning and Management
- Financial Mathematics
- Healthcare Systems Engineering
- Information Systems Engineering
- Materials Science and Engineering
- Mechanical Engineering
- Robotics and Autonomous Systems
- Space Systems Engineering
- Systems Engineering

Our custom-built online programs and courses are designed using state-of-art technology and learning tools that create an interactive and engaging online learning experience. Delivered asynchronously, our online courses also include live synchronous time with the course instructor(s) and fellow students. Prospective and current students should consult online learning (https://ep.jhu.edu/programs-and-courses/program-pathways/online/) for the current online course offerings, course schedules, and procedures for online programs.

Online Course Registration

Online course registration adheres to the same schedule followed by on-site courses. Enrollment is granted on a first-come, first-served basis, and new and returning online students are strongly encouraged to register early. The deadline for adding online courses is two weeks after the first day of classes each term. See the Academic Calendar (p. 1407) for exact dates for each term.

Virtual Live Format

This format is a synchronous online course-delivery method. In some cases, all students meet with the instructor fully online (8VL). In other cases, class sessions are held on-site in a classroom, and students have the option to either attend in-person or remote into the classroom via a web-conferencing tool enabling two-way communication and live video feed (3VL).

Online Student Support Services

Johns Hopkins Engineering for Professionals makes every effort to provide online students access to a full range of services and resources comparable to those available to students taking on-site courses. Online students can register, pay their tuition, receive academic advising, purchase course textbooks, access Johns Hopkins University library holdings, view transcripts, and access grades and various other academic services all online. Once admitted, students gain access to the Johns Hopkins portal site, myJH (https://my.jh.edu/portal/web/jhupub/), which provides quick access to many of these services.

Master's Programs

Graduate Certificates

Post-Master's Certificates

Departments

Academic Policies

Academic Calendar

2022 - 2023 Academic Calendar

Summer 2022

Date	Event
03/24/2022	Registration Opens at 10am Eastern Time
05/31/2022	First Day of Classes
06/06/2022	Final Day to Add a Course
06/07/2022	Official Transcript Submission Deadline
06/09/2022	Tuition Payment Deadline
06/20/2022	Holiday
07/04/2022	Holiday
07/31/2022	Graduation Application Deadline
9th Week of Class	Final Day to Withdraw
08/23/2022	Last Day of Classes

Fall 2022

Date	Event
07/07/2022	Registration Opens at 10am Eastern Time
08/29/2022	First Day of Classes
09/04/2022	Final Day to Add a Course
09/05/2022	Holiday
09/11/2022	Official Transcript Submission Deadline
09/14/2022	Tuition Payment Deadline
10/11/2022	Holiday
11/04/2022	Withdraw / Audit Deadline
11/21/2022 - 11/27/2022	Holiday
11/30/2022	Graduation Application Date
12/13/2022	Last Day of Classes

Spring 2023

Date	Event
10/27/2022	Registration Opens at 10am Eastern Time
01/23/2023	First Day of Classes
01/29/2023	Final Day to Add a Course
02/05/2023	Official Transcript Submission Deadline
02/08/2023	Tuition Payment Deadline
03/20/2023 - 03/25/2023	Holiday
04/01/2023	Withdraw / Audit Deadline
04/01/2023	Graduation Application Date
05/09/2023	Last Day of Classes

The EP Refund Policy and drop dates for on-site and online courses can be found in the Tuition and Fees (p. 1413) section.

Graduation Dates

The Whiting School of Engineering Master's Diploma Ceremony is **Tuesday, May 23, 2023.**
The University-Wide Commencement Ceremony is **Thursday, May 25, 2023.**

Academic Regulations

Academic Regulations

The following academic regulations are the general requirements governing study in the Engineering for Professionals program at Johns Hopkins University. Students are expected to be familiar with these requirements and with the specific regulations set forth in the sections relevant to particular programs of study.

Requirements for degree and certificate programs described in this catalogue are subject to change. When this occurs, students may fulfill any set of requirements in force during their time in the program.

Note that only graduates who complete degree requirements prior to the ceremony date will be allowed to participate in Commencement activities.

Advisors and Degree Audit

Once an offer of admission is accepted, students are assigned an advisor. Students are strongly encouraged to contact their advisor prior to registration. Logging of course and program completion as well as viewing of approvals and exceptions approved by a student's advisor can be tracked through the degree audit system (https://ep.jhu.edu/student-services/new-student-orientation/degree-audit/) viewable through SIS (https://sis.jhu.edu/sswf/).

Academic Standing

The university reserves the right to exclude, at any time, a student whose academic standing or general conduct is deemed unsatisfactory.

Master's Degree Candidates

- Only one C-range grade (C+, C, or C–) can count toward the master's degree.
- Program Chairs and advisors may make exceptions to degree requirements at their discretion.

Post-Master's Certificate or Graduate Certificate

- No grade below B– can be counted toward a graduate certificate or post-master's certificate unless otherwise stated in the certificate program requirement.
- Program Chairs and advisors may make exceptions to certificate requirements at their discretion.

ACADEMIC PROBATION For All FULLY ADMITTED AND NON-DEGREE-SEEKING ep students

Any student receiving either one grade of D+, D, or F or two grades of C(+/–) during their program of study will be placed on academic probation. Students placed on probation are permitted to retake any graduate course in which they have earned a grade of C+ or below. Students may attempt no more than two retakes during their program of study at JHEP; this may be on the same course or two different courses. If a grade of B– or above is earned in the repeated course, the probationary status will be removed. Please note that not all courses are offered every term. If an additional grade below B– is received before the course is repeated and successfully completed, the student will be dismissed. Dismissal appeals may be submitted to the JHEP Student Services Office.

There are circumstances described below where students will not be placed on probation but will be immediately dismissed from the program.

ACADEMIC DISMISSAL for all Fully Admitted and Non-Degree-Seeking ep students

The following are causes for dismissal from the program:

- Students already on probation receiving an additional grade of C+ or below
- Students receiving a grade of C(+/–) and a subsequent D+, D, or F
- Students receiving three grades of C(+/–)
- Students receiving two grades of D+, D, or F
- Students receiving grades of D+, D, or F and C(+/–) in the same term

Applicants who have been dismissed or suspended by any college or university, including Johns Hopkins, within the past four years are not eligible for admission.

ACADEMIC DISMISSAL FOR EP Provisional STUDENTS

Provisional students who earn below a B– in a prerequisite course will have their provisional status removed, which will result in their dismissal from their program of study. Students may request to maintain their provisional status by submitting a Statement of Reconsideration to their program coordinator within 10 university business days of receiving a loss of provisional status notice. The student's Statement of Reconsideration must: (1) include an explanation of why they were unsuccessful in the course(s) (e.g., extenuating circumstances out of the student's control, remediation need, etc.), (2) outline why they believe they will be successful taking the course on their second attempt (e.g., extenuating circumstance barriers no longer present, completed remediation, etc.), and (3) list any supporting resources the student intends to employ to ensure earning a B- or better in the future (e.g., attend weekly office hours with the course instructor, seek peer tutoring, etc.). The request and statement will be reviewed by the student's program leadership, and the student will be notified of their decision within 10 university business days. If the student's request is granted, the student will be permitted to retake the course(s) in which a grade below B- was earned. The student is not permitted to take any additional prerequisite courses until the course retake is successfully completed. Provisional students may only submit a Statement of Reconsideration once during their program. If the student's request is denied, the student's provisional status will be removed, and the dismissal will be processed.

Academic Dismissal for EP Conditional Students

Conditional students who earn below a B– in a conditional course will have their conditional status removed, which will result in their dismissal from their program of study.

SATISFACTORY ACADEMIC PROGRESS

Students with full-admit, conditional and provisional enrollment status must continue to make satisfactory academic progress to remain enrolled in the EP program. Satisfactory academic progress is defined as follows, depending on the student's status:

- Full-Admit Status: students must earn at least one final course grade of C– or higher **in at least one of three consecutive terms of enrollment**, including the summer term. The following will not count toward satisfactory academic progress: a grade of F, D, D+; a second (or beyond) grade of C-, C, C+; a course drop; a course withdrawal; a course audit.
- Conditional Status: students must earn one final course grade of B– or higher **in at least one of three consecutive terms of enrollment**, including the summer term. The following will not count toward satisfactory academic progress: a grade of F, D, D+, C-, C, C+; a course drop; a course withdrawal; a course audit.
- Provisional Status: students must earn at least one final course grade of B– or higher **in at least one of three consecutive terms of enrollment**, including the summer term. The following will not count toward satisfactory academic progress: a grade of F, D, D+, C-, C, C+; a course drop; a course withdrawal; a course audit.

Students who fail to make satisfactory academic progress will be withdrawn from their program. To resume study in an EP program,#a withdrawn student#will need to reapply and earn readmission.

Code of Conduct

JHU students must abide by the JHU Code of Conduct (p. 50).

Second Master's Degree

After receiving a master's degree from the programs, students may continue their graduate education in a second field if the appropriate prerequisites of the new program are fulfilled.

To receive a second master's degree, all requirements for the second program must be satisfied. If the following conditions are met, up to two courses taken as part of the first degree may be applied toward the requirements of the second:

- The course(s) must satisfy the requirements of the second degree.
- The student's advisor must approve the course(s) as appropriate to the plan of study.
- The course(s) must fall within the five-year limit for the second degree; i.e., completion of the second degree must fall within five years from the date of the first class counted toward that degree.

Time Limitation

To be counted toward the degree or certificate, all coursework in the program, including transferred and double-counted coursework, must be completed within a five-year time period, which begins with the start of the first course applied to the student's program. Additionally, students must apply for graduation within the same five-year period.

In exceptional cases, courses older than five years may be reviewed for revalidation. Students should refer to the Course Revalidation Policy for more information.

Course Revalidation

Courses older than five years at the time of a student's graduation term cannot be applied toward a student's master's degree program requirements. In exceptional cases, credits may be eligible for revalidation review.

Current Engineering for Professionals students may request a course revalidation review for a maximum of two courses or 20% of the total master's degree coursework requirement. These may be JHU courses or those that received transfer credit at EP. Courses completed more than seven years from the term of the revalidation request cannot be considered.

Revalidation Request Process

Students must submit a written request to their Program Coordinator (https://ep.jhu.edu/student-services/new-student-orientation/program-coordinators-and-advisors/). The request should include the original course syllabus and description. If this is not available, students can substitute a letter or email from the course instructor certifying that no significant change has been made to the course content since the date of student's completion. The revalidation request requires approval from the student's Program Chair.

If the revalidation request is successful, the course will be valid from the date of the revalidation approval.

If the revalidation is not successful, the course will no longer count toward the student's degree requirements. The student will be responsible for completing coursework to replace the expired credits.

Leave of Absence

Students who do not plan to enroll in classes for a period of more than one year must notify the Johns Hopkins Engineering for Professionals admissions office in writing and request a leave of absence for a specified period of time. The appropriate program chair will make the decision to approve or not approve the request. A leave of absence cannot be granted for more than two years.

Students who are granted a leave of absence must resume their studies at the end of the allotted leave time. If warranted, the time permitted to complete program requirements will be extended by the length of time granted for the leave of absence. Students who do not resume their studies after a leave of absence has expired, or who have not enrolled for more than one year without having requested a leave of absence, will assume the status of a student who has withdrawn from the program. Such students must reapply and are subject to the admission requirements in force at the date of the new application. Acceptance is not guaranteed even for students previously admitted. Courses taken prior to the interruption of studies will not count toward requirements if they are not completed within the time allowed for degree completion.

Transferability of Courses

Courses successfully completed through Johns Hopkins Engineering for Professionals may be transferred to other institutions. Transferability is solely at the discretion of the accepting institution.

Transfer Courses

Requests to transfer courses from another institution toward the master's degree and certificate will be considered on an individual basis. A maximum of two Engineering for Professionals master's degree course requirements and one Engineering for Professionals certificate course requirement may be waived with documentation and approval of outside coursework. Any course considered for transfer must apply to the time limitation of the degree or certificate. All coursework in the program must be completed within a specified period, which begins with the start of the first course in the student's program; this includes any courses accepted for transfer. Transfer courses must be graduate-level, credit-bearing from an accredited institution, may not have applied to a degree at an institution outside of JHU, and directly applicable to the student's program of study at Johns Hopkins Engineering for Professionals. In very rare circumstances, where a program has established a non-credit to credit pathway, a student could receive credit for specific alternative learning experiences.

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, coursework completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the degree-granting institution that the course was not applied to the undergraduate degree, and with advisor approval.

Continuing Education Unit (CEU) courses are not eligible for transfer. Requests should be submitted in writing to the student's program coordinator (https://ep.jhu.edu/student-services/new-student-orientation/program-coordinators-and-advisors/). An official transcript and course description for the course to be transferred are both required. Requests to transfer courses cannot be processed if the transcript is not official. The fee for transfer is $490 per course.

After being accepted into a Johns Hopkins Engineering for Professionals program of study, students may not take classes at another institution for transfer back to their Johns Hopkins Engineering for Professionals program. Courses successfully completed at Johns Hopkins Engineering for Professionals may be accepted for transfer credit at other institutions, but such transferability is solely at the discretion of the accepting institution.

Whiting School of Engineering Policy on Double-Counting Courses

The Whiting School of Engineering has established the following policies on double-counting coursework for all students in the full-time (Homewood) programs and the part-time Engineering for Professionals programs. If an individual program adopts double-counting policies more strict than these, the program's policies override the school-wide policies. Students are encouraged to refer to individual program policies.

With bachelor's#master's and master's#master's double#counting, across any number of degree programs, a student can reduce the number of master's courses required by up to two (with approval of the programs involved). Beyond that, the remaining courses must be unique to the degree program. With a ten#course master's degree program, for example, eight of those courses must be unique to the program and not applied to a different degree at any level. A student can double#count any number of undergraduate courses to the various master's degrees (but at most, two to each master's program) and they can double#count the same course across any number of degrees pursued (again, with the approval of the programs involved).

Bachelor's–Master's Double Counting CourseWork Applied to a Bachelor's Degree

Students either in a Whiting School of Engineering combined (bachelor's/master's) program or seeking a Whiting School of Engineering master's degree after having earned a Whiting School of Engineering or Krieger School of Arts and Sciences bachelor's degree may double-count two courses (graduate-level) to both programs with the permission of the master's faculty advisor. Whiting School of Engineering master's degree candidates may not double-count courses applied to a bachelor's degree earned at a different institution. Individual graduate programs reserve the right to enforce stricter policies.

CourseWork Not Applied to a Bachelor's Degree

For students who either are in a Whiting School of Engineering combined bachelor's/master's degree program or have already earned a Whiting School of Engineering or Krieger School of Arts and Sciences bachelor's degree and are seeking a Whiting School of Engineering master's degree, any graduate-level coursework (as defined by the Whiting School of Engineering graduate program) not applied to the undergraduate degree may be applied to the graduate degree, regardless of when that course was taken (i.e., before or after the undergraduate degree has been conferred) with the permission of the master's faculty advisor.

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, coursework completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the degree-granting institution that the course was not applied to the undergraduate degree, and with advisor approval.

Master's–Master's Double Counting CourseWork Applied to a Master's Degree

Students pursuing (1) a Whiting School of Engineering master's and a master's from any JHU school simultaneously or (2) a Whiting School of Engineering master's after having earned a master's from any JHU school may double-count either two semester-length courses or three quarter-length courses across two master's programs as long as the courses are equivalent to the graduate-level or higher in the Whiting School of Engineering full-time graduate programs.

The student must receive approval from both master's degree program faculty advisors if both sets of degree requirements will be completed at the same time. For a student to double-count coursework from two master's degrees whose requirements are met at different times, the student must obtain only the approval of the faculty advisor in the program to be finished second. Individual graduate programs reserve the right to enforce stricter policies.

Timing and Ramifications For Current Students

This policy will be applied to all students entering a Whiting School of Engineering master's program in fall 2007 and beyond. Any student who has entered a Whiting School of Engineering master's program before then will be exempt from this policy and should follow the course arrangement made with their advisor, provided it is in compliance with departmental, school, and university requirements.

Declaration of Double-Counted Course

Whiting School of Engineering master's students wishing to double-count courses must submit these courses to the Whiting School of Engineering master's program for approval. If it is learned that a student has double-counted a course for the Whiting School of Engineering master's degree without permission of the Whiting School of Engineering master's program, this program reserves the right to revoke the degree.

EP Policy on Double-Counting Courses - Certificate to Master's Degree

Students pursuing (1) a WSE-EP post-baccalaureate (graduate) certificate and a WSE-EP master's degree simultaneously, (2) a WSE-EP master's degree after having earned a WSE-EP post-baccalaureate (graduate) certificate, or (3) a WSE-EP post-baccalaureate (graduate) certificate after having earned a WSE-EP master's degree in a different discipline, can double-count up to five applicable courses between the two programs. At least five courses must be unique to the master's degree (i.e., not double-counted).

In all cases, the student must receive approval from program representatives to ensure that these courses meet both certificate and degree requirements. Courses cannot be double-counted toward two certificate programs. Courses cannot be counted toward more than two programs (certificate or degree). Program-approved courses not applied to any certificate or degree from an outside institution or within JHU are not considered double-counted courses. All coursework, including double-counted courses, must be completed within a specified time period. Students should refer to the Time Limitation Policy for more information.

Graduation

Note that only graduates who complete degree requirements prior to the ceremony date will be allowed to participate in Commencement activities.

Students who expect to receive a degree or certificate must submit an application for graduation. The graduation application should be submitted during the final term in which degree requirements will be completed. Instructions for completing the graduation application can be found by logging into SIS and clicking on the program of study.

Students who are planning to graduate should complete all coursework on time and should not request to receive the grade of I (incomplete) during their final semester.

Approximately two months after the semester begins, students who have submitted the application for graduation receive a preliminary letter stating that their names have been placed on the tentative graduation list for the semester in which they anticipate completing their degree requirements.

Commencement information is sent the first week in March. To receive their diplomas, students must pay all student accounts in full and resolve all outstanding charges of misconduct and violations of academic integrity. Students will receive an e-bill notification in the spring from Student Accounts. The e-bill will be sent to the student's JHU e-mail account. For graduation fees, see the Tuition and Fees (https://ep.jhu.edu/admissions-and-aid/tuition-and-fees/). Johns Hopkins University diplomas indicate the school (e.g., Whiting School of Engineering), degree, and major (e.g., Master of Science-Computer Science) without identifying the student's focus area/track or course modality (eg. online).

Honors

Johns Hopkins Engineering for Professionals students will graduate with honors if they have earned an A+, A, or A– in all courses taken between admission and graduation from the degree program. Any other grade except a withdrawal or audit will disqualify students from receiving honors. The designation "Honors" will appear on student transcripts.

Grading System

The following grades are used for the courses:

Letter	Definition
A+, A, A–	Excellent
B+, B, B–	Good
C+, C, C–	Limited Satisfactory
D+, D	Unsatisfactory
F	Failure
I	Incomplete
W[1]	Official Withdrawal
AU[1]	Audit

[1] Grade not assigned by instructors.

A grade of F indicates the student's failure to complete or comprehend the coursework. A course for which an unsatisfactory grade (D+, D, F) or a limited satisfactory grade (C+, C, C-) has been received may be retaken. The original grade is replaced with an R. If the course includes laboratory work, both the lecture and laboratory work must be retaken unless the instructor indicates otherwise. A grade of W is issued to those who have dropped the course after the refund period (the sixth class meeting for on-site courses, sixth week/module for online courses) but before the drop deadline.

The transcript is part of the student's permanent record at the university. No grade may be changed except to correct an error, to replace an incomplete with a grade, or to replace a grade with an R.

The Whiting School assumes that students possess an acceptable written command of the English language. It is proper for faculty to consider writing quality when assigning grades.

Course Auditing

When a student enrolls in an EP course with "audit" status, the student must reach an understanding with the instructor as to what is required to earn the "audit." If the student does not meet those expectations, the instructor must notify the EP Registration Team [EP-Registration@exchange.johnshopkins.edu] in order for the student to be retroactively dropped or withdrawn from the course (depending on when the "audit" was requested and in accordance with EP registration deadlines). All lecture content will remain accessible to auditing students, but access to all other course material is left to the discretion of the instructor.

Incompletes

A grade of incomplete (I) is assigned when a student fails to complete a course on time for valid reasons, usually under circumstances beyond their control.

Conditions for resolving an incomplete are established by the instructor. A final grade must be submitted to the Registrar within four weeks after the start of the following term. A grade of F will be assigned if the incomplete work is not submitted by the deadline. For the academic year 2022–2023, the dates by which final grades for incomplete work must be resolved are as follows:

Term	Date
Summer term	September 26
Fall semester	February 20
Spring semester	June 19

Students who expect to complete degree requirements but have an incomplete are not certified for graduation until the end of the following term.

Grade Reports

At the midpoint of each term, instructors are requested to provide a list of students whose work at that time is unsatisfactory. Students are notified by the Johns Hopkins Engineering for Professionals Student Services staff if their names are reported so they can take corrective action. These early reports are for the benefit of students and their advisors and are not part of the permanent record.

Grades are available online at https://sis.jhu.edu/sswf (https://sis.jhu.edu/sswf/). These reports cannot be requested by telephone or personal inquiry. Students with questions regarding their grade reports or who want their transcripts sent to other institutions should make arrangements with the Office of the Registrar, 410-516-8080 or web.jhu.edu/registrar (https://web.jhu.edu/registrar/).

Grade Appeals

A student's concerns regarding grades must be first discussed thoroughly with their instructor. If the student and the instructor are unable to reach an agreement, the student may appeal the instructor's decision, in writing, to the appropriate program chair, and, finally, to the associate dean. At each review level, evaluation criteria will be limited to

1. verification that there was not an error in recording the grade and
2. verification that the grade was determined on the basis of considered academic judgment.

Grade appeals must be initiated within one semester after completing the course in question.

Student Attendance

Students are expected to regularly attend and be active in all courses in which they are enrolled. Although Johns Hopkins Engineering for Professionals and the university have no specific rules governing absences, the course instructor may announce certain attendance/participation requirements. It is the student's responsibility to be aware of those requirements. Students who know they will be absent from an on-site class or unable to engage in an online class module, especially for an extended period of time, should notify the instructor as far in advance as possible. It is the student's responsibility to discuss missed assignments and exams with the instructor.

Faculty Attendance for On-Site Courses

If an instructor is unavoidably late for class, the site office will attempt to notify students and tell them to wait, if it is practical. If an instructor is unable to meet a class, every attempt will be made by Johns Hopkins Engineering for Professionals staff to inform students of the cancellation, a makeup time for the class (if available), and information regarding assignments. If an instructor informs the Johns Hopkins Engineering for Professionals office of a class cancellation with enough lead time, students will be contacted.

Academic Misconduct

The Homewood and Engineering for Professionals Graduate Academic Misconduct Policy can be found at https://ep.jhu.edu/wseacademicmisconductpolicy (https://ep.jhu.edu/wseacademicmisconductpolicy/). In addition to being familiar with this policy, all EP students are required to complete training on academic ethics as part of their orientation. Students are automatically enrolled once they have registered for their first course with EP.

The Roles of Students and Faculty

Academic misconduct by graduate students is unacceptable. It is the responsibility of all graduate students to adhere to strict standards of integrity in their professional and scholarly activities, as well as to high standards of conduct in their non-academic activities, and students are encouraged to report known or suspected acts of misconduct. It is the responsibility of the faculty and other supervisors of scholarly activities to monitor carefully the academic and other scholarly activities of graduate students under their supervision and to subject these activities to rigorous evaluation.

Procedures for Resolving

If a student is suspected of academic misconduct, the faculty member responsible for the course in which the misconduct allegedly occurred must review the facts of the case promptly with the student. If, after speaking with the student and any witnesses, the faculty member believes that academic misconduct has occurred, the faculty member must immediately contact their Academic Integrity Officer or designee to

1. determine whether the offense is a first offense or a subsequent offense, and
2. review the options and procedures available under this policy.

Copyright Violations

Copying, downloading, or distributing music, videos, software, games, or other copyrighted materials without permission of the owner violates both federal law and university policy and will be submitted for disciplinary action.

Original works fixed in any tangible medium of expression, which includes storage within computers, are copyrighted to the author from the moment of creation. No notice of copyright is required. Except under limited circumstances for limited purposes, you may not make or distribute copies of material belonging to others without their permission. Unless a site specifically grants you permission to download and copy material from the site, you should assume that you cannot do so. You should also assume that all person-to-person sharing of music, programs, videos, and software is a violation of copyright. Copyright violations will be submitted for disciplinary action.

Computer Usage

Because Johns Hopkins University Office of Information Technology updates its policies frequently, please visit the Johns Hopkins University IT website at it.jhu.edu (https://it.johnshopkins.edu/) for the latest information on usage and security. The following includes key elements of the policy, which is posted in all Johns Hopkins Engineering for Professionals computer labs.

Acceptable use of IT resources is use that

- is consistent with Johns Hopkins' missions of education, research, service, and patient care and is legal, ethical, and honest;
- it must respect intellectual property, ownership of data, system security mechanisms, and individuals' rights to privacy and freedom from intimidation, harassment, and annoyance;
- it must show consideration in the consumption and utilization of IT resources; and
- it must not jeopardize Johns Hopkins' not-for-profit status.

Incidental personal use of IT resources is permitted if consistent with applicable Johns Hopkins University and divisional policy, and if such use is reasonable, is not excessive, and does not impair work performance or productivity.

Please visit it.jhu.edu (https://it.johnshopkins.edu/) for additional information on unacceptable use of IT resources.

Registration Policies

Before registering for any engineering classes, each student must apply (https://ep.jhu.edu/admissions-and-aid/admissions/) as a degree or certificate candidate or as a Special Student and must submit appropriate application materials for review. Applications are accepted on a continuing basis.

Payment of tuition is due by the specified deadline listed in the Academic Calendar (p. 1407). Payment may be made by check, credit card, tuition remission, or company contract accompanied by purchase order. Johns Hopkins Engineering for Professionals does not defer payment for companies providing tuition reimbursement at the end of the term. In this instance, students must pay tuition themselves and be reimbursed by their employers. If payment is not made by the deadline date, a late payment fee of $150 will be incurred.

If you have registered and have not paid your balance, an e-mail statement with the balance due to the university will be sent to you on the 16th of each month. This is not a bill. This is a reminder of the debt owed to the university and is a reflection of your account status at the time of the e-mail. Changes in circumstances, for instance, adding or dropping courses, late registration, or late payment fees, may have an effect on the amount that you are responsible to pay.

Students are not permitted to register if there are unpaid bills from a previous term.

Course Schedule

The Johns Hopkins Engineering for Professionals course schedule (https://apps.ep.jhu.edu/schedule/search/), lists the day, time, location, modality, and instructor for each course. All students who have been admitted or enrolled in courses during the previous year will receive notification of the web posting of the course schedule. All relevant registration forms and deadlines can be found on the Johns Hopkins Engineering for Professionals website (https://ep.jhu.edu/).

Course Numbering System

All Whiting School of Engineering courses are numbered in the form EN.605.602, where

- 605 indicates the program—in this example, Computer Science; and
- 602 indicates the course number—in this example, Software Analysis and Design.

Johns Hopkins Engineering for Professionals courses numbered xxx.1xx through xxx.5xx are undergraduate level and will not confer graduate credit.

Course Credit

All courses 600-level and above confer three graduate credit hours.

New Applicants

A new applicant may be approved to register for a class before a formal offer of admission is received. If the student is subsequently accepted to a degree or certificate program, the program committee will determine whether courses taken prior to admission may be counted in fulfillment of degree requirements. Please note that approval to take a course prior to receipt of an admission decision does not guarantee acceptance into the program. A student who has been granted approval to take a course before receiving an admissions decision must adhere to the published refund schedule.

Interdivisional Registration

With approval of their advisors, students may take courses in the full-time programs of the Whiting School of Engineering or in other divisions of the university. Registration for these classes should be submitted by e-mail to ep-registration@jhu.edu. Please note that tuition rates vary by division.

Students in other divisions of Johns Hopkins may register for Johns Hopkins Engineering for Professionals courses, subject to the regulations of their home divisions and availability of space.

Course Enrollment Limits

In order to foster high-quality faculty–student interaction, all courses have enrollment limits. Although every effort is made to offer additional sections of oversubscribed courses, this is not always possible.

Students may ask to be placed on waiting lists if their desired courses are filled, or they may indicate alternative course selections.

The university reserves the right to change instructors or to cancel any course with insufficient enrollment or for reasons beyond the control of the university.

Course Load

Students who are employed full-time are advised to take no more than two courses per term without the permission of their academic advisor.

Auditors

See Course Auditing in the Academic Regulations (p. 1407) section.

Adding and Dropping Courses

Courses may be added or dropped online through SIS (https://sis.jhu.edu/sswf/). Deadlines for completing this procedure are given in the Academic Calendar (p. 1407). Notification to the instructor does not constitute dropping a course. Students who stop attending a course without completing and submitting the drop form will receive an F grade. The refund policy pertaining to dropped courses is described in Tuition and Fees (https://ep.jhu.edu/admissions-and-aid/tuition-and-fees/).

Textbooks

For textbook information, visit (https://ep.jhu.edu/student-services/academic-services/ordering-textbooks/)ep.jhu.edu/textbooks (https://ep.jhu.edu/student-services/academic-services/ordering-textbooks/).

Tuition and Fees

Students whose tuition is paid by contract should begin processing requests with their employers well before registration deadlines to ensure that payment is made as required. Students are ultimately responsible for all costs associated with their registration.

Tuition

A full year of graduate tuition in the Whiting School of Engineering is found at jhu.edu/admissions/tuition (https://jhu.edu/admissions/tuition/). With support from the dean of the Whiting School of Engineering, our students enjoy a substantially decreased out-of-pocket cost (https://ep.jhu.edu/admissions-and-aid/tuition-and-fees/). If you need a receipt for the courses you are taking, please print from your SIS (https://sis.jhu.edu/sswf/) account or contact Student Accounts (https://support.sis.jhu.edu/case/) at +1 877-419-5131.

Graduation Fee

The graduation fee is $100 and is payable upon receipt of an e-bill notification from the office of Student Accounts.

Late Tuition Payment Fee

Tuition payment due dates are indicated in the Academic Calendar (p. 1407). If payment is received after the due date, a late payment fee of $150 will be incurred.

Transfer Credit Fee

Graduate courses completed at another school and approved for transfer are assessed a fee of $490 per course.

Refund Policy

Refunds apply only to the tuition portion of a student's charges and are calculated from the date of drop submission. Telephone drops or withdrawals are not accepted. Refunds are not applicable to any fees. Refunds are not granted to students who have been suspended or dismissed for disciplinary reasons. Tuition refunds are made in accordance with the following schedule.

Drop Date	Refund
On-Site Courses	
Prior to third class meeting	100%
Prior to fourth class meeting	75%
Prior to fifth class meeting	50%
Prior to sixth class meeting	25%
Online Courses	
Prior to third week of class	100%
Prior to fourth week of class	75%
Prior to fifth week of class	50%
Prior to sixth week of class	25%

Students who are enrolled at The Johns Hopkins University for the first time and who are receiving federal student financial aid are subject to a separate refund policy during their first period of enrollment. Refer to the Return of Title IV Funds Policy (https://ep.jhu.edu/student-services/academic-services/refund-policy-and-schedule/) for further information.

Drop or Withdraw with Tuition Refund

Engineering for Professionals students are expected to follow the drop and withdrawal deadlines outlined on the Academic Calendar (p. 1407). In exceptional cases, a Drop or Withdraw with Tuition Refund may be granted based on documented requests in which extenuating circumstances significantly impaired the student's ability to complete the term, and a full or partial tuition refund may be provided. Such circumstances include, but are not limited to, debilitating illness, family hardships, or other significant life changes (e.g., death in a student's immediate family, care for a seriously ill family member, military deployment, etc.).

To be considered for a Drop or Withdraw with Tuition Refund, you must complete the Drop or Withdraw with Tuition Refund request form (https://forms.office.com/Pages/ResponsePage.aspx?id=OPSkn-axO0eAP4b4rt8N7GPXatxOw_hLsskevNs-

_7RUOU9QNjc3WEE4NDNISEY3MlVPVVFTU1paMC4u) and attach any documentation to support your request (e.g., medical documentation, death certificate, obituary, etc.). The request will be reviewed by the associate dean or designee who may consult with the instructor of record. You will be notified of the outcome of your request via email to your @jhu.edu address within 10 university business days. If approved after the semester's drop deadline, the mark of "W" will be recorded as the official grade for the course in lieu of a letter grade.

Drop or Withdraw with Tuition Refund requests and supporting documentation are retained by the Office of Academic Affairs for at least five years and filed separately from the student's other records to maintain confidentiality. Any questions regarding the Drop or Withdraw with Tuition Refund can be directed to EP's Academic Affairs Manager, Heather Stewart (hstewa13@jhu.edu).

Admission Requirements

Admission Requirements

Johns Hopkins Engineering for Professionals encourages all interested students to apply. Qualified students may structure their coursework to pursue a specific degree or certificate program, or they may take courses under the Special Student (i.e., non-degree-seeking) designation if they have met program and course prerequisites. An applicant may be admitted in one of four categories:

1. Graduate Certificate candidate
2. Master's Degree candidate
3. Post-Master's Certificate candidate
4. Special Student

An applicant must meet the general admission requirements appropriate for all graduate study and the specific admission requirements for the desired program. Note that these requirements represent minimum standards for admission; the final decision on an applicant's suitability for a given program is made by the admissions committee for that program. The general application procedures and admission requirements are stated below. Please refer to the individual program sections for additional specific requirements.

Applicants who have been dismissed or suspended by any college or university, including Johns Hopkins, within the past four years are not eligible for admission.

Alternative Status

Students who enroll with an alternative status other than full admit status, such as "provisional" or "conditional" status, are subject to meeting additional requirements before matriculating as a fully admitted student. If students fail to meet the alternative status requirements, they are not eligible to earn full admit status.

Provisional Status

Under this status, a student must complete required prerequisite courses prior to review for full admit status. The student should begin this coursework within one year either at Engineering for Professionals or at another institution, with notification to EP. While completing the required coursework, the student should report their progress to their program coordinator (https://ep.jhu.edu/student-services/new-student-orientation/program-coordinators-and-advisors/). Students must earn a B– or better in prerequisite courses to receive full admission status. A grade below B– will result in the loss of provisional student status, and the student would need to reapply to the program before regaining registration access. Upon completing all prerequisite courses, the student should notify their program coordinator promptly so that their enrollment status can be updated to full admit status. The student should also provide any additional transcripts or grade reports of coursework, if applicable.

Conditional Status

Under this status, a student must earn specific grades or successfully complete specific courses within a specified timeframe. All conditions will be stated in the letter granting the student conditional status. Upon completing all conditional courses, the student should notify their program coordinator promptly so that their enrollment status can be updated to full admit status.

Graduate Certificate Candidates

The graduate certificate is offered in a select number of degree disciplines and is directed toward students who may not need a master's degree, may not have the opportunity to pursue the entire master's degree, or may wish to focus their studies on a set of courses in a specific subject area. The certificate generally consists of four to six courses. The program area of study specifies the selection and number of applicable courses.

General admission requirements for graduate certificate candidates are as follows:

- Except as provided herein, applicants must be in the last semester of undergraduate study at or hold a bachelor's or graduate degree from a US regionally accredited college or university. While there is no automatic prohibition of the admission of students from US nationally accredited colleges or universities, EP retains the right to assess an applicant's courses and/or degrees earned from one of those institutions to determine their academic readiness for the Program. Applicants who hold degrees from international institutions are encouraged to apply and must meet requirements found on EP's International Applicants (https://ep.jhu.edu/admissions-aid/admission-requirements/international-students/) webpage.
- Applicants must submit official transcripts from all post-secondary institutions attended.
- An application form must be submitted online.
- Applicants must also meet any additional program-specific requirements (e.g., a résumé, statement of purpose, letter of recommendation, etc.)

Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies (when reviewing an application, the candidate's academic and professional background will be considered). After acceptance, each student is assigned an advisor with whom they jointly may design a program tailored to individual educational objectives.

Master's Degree Candidates

General admission requirements for master's degree candidates are as follows:

- Except as provided herein, applicants must be in the last semester of undergraduate study at or hold a bachelor's or graduate degree from a US regionally accredited college or university. While there is no automatic prohibition of the admission of students from US nationally accredited colleges or universities, EP retains the right to assess an applicant's courses and/or degrees earned from one of those institutions to determine their academic readiness for the

Program. Applicants who hold degrees from international institutions are encouraged to apply and must meet requirements found on EP's International Applicants (https://ep.jhu.edu/admissions-aid/admission-requirements/international-students/) webpage.

- Applicants must submit official transcripts from all post-secondary institutions attended.
- An application form must be submitted online.
- Applicants must also meet any additional program-specific requirements (e.g., a résumé, statement of purpose, letter of recommendation, etc.).

Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies (when reviewing an application, the candidate's academic and professional background will be considered).

Post-Master's Certificate Candidates

To accommodate students who wish to pursue studies beyond the master's degree, many of the disciplines in the programs offer a certificate of post-master's study. This program is intended to add depth, breadth, or both in the discipline of the student's master's degree or a closely related one.

General admission requirements for post-master's certificate candidates are as follows:

- Except as provided herein, applicants must be in the last semester of graduate study at or hold a graduate degree from a US regionally accredited college or university. While there is no automatic prohibition of the admission of students from US nationally accredited colleges or universities, EP retains the right to assess an applicant's courses and/or degrees earned from one of those institutions to determine their academic readiness for the Program. Applicants who hold degrees from international institutions are encouraged to apply and must meet requirements found on EP's International Applicants (https://ep.jhu.edu/admissions-aid/admission-requirements/international-students/) webpage.
- Applicants must submit official transcripts from all post-secondary institutions attended;
- An application form must be submitted online.
- Applicants must also meet any additional program-specific requirements (e.g., a résumé, statement of purpose, letter of recommendation, etc.).

After acceptance, each student is assigned an advisor with whom they may jointly design a program tailored to individual educational objectives.

Lifelong Learning: Special Students

Qualified students who wish to enhance their knowledge, continue their education, and advance their careers through professional development, but who do not wish to commit to a master's degree or advanced certificate program, are welcome to take classes as special students in the Johns Hopkins Engineering for Professionals program. *Special students are non-degree seeking students who take courses at Johns Hopkins Engineering for Professionals*. If you take classes as a special student and later enroll in a master's degree program at EP, it is possible that the courses you took as a special student will apply to the degree.

General admission requirements for Special Students are as follows:

- a bachelor's degree from a regionally accredited college or university (or a graduate degree in a technical discipline), or in the last semester of undergraduate study;
- official transcripts from all post-secondary institutions attended;
- an application form submitted online; and
- any additional program-specific requirements (e.g., a résumé, statement of purpose, letter of recommendation, etc.).

Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies (when reviewing an application, the candidate's academic and professional background will be considered).

Application Procedures

To be considered for admission to a degree or certificate program or to take courses as a Special Student, an applicant must submit an online application. The application is available online at https://ep.jhu.edu/admissions-aid/apply/. Complete instructions are available on the website.

An application for admission is not reviewed by an admissions committee until the application is complete. Once admitted, please note that official transcripts from all institutions attended must be sent electronically via the Scrip-Safe network. If your institution does not send electronic transcripts, you must request that your institution mail official transcripts directly to Engineering for Professionals. Failure to provide all official transcripts, a résumé (if necessary), and supporting documents will prevent future enrollment beyond the first semester. Please allow four to six weeks for application processing once all materials have been received.

Admission to Other Divisions of the University

Any student who wishes to transfer to another school in the university or to a full-time engineering program must apply to the appropriate department or to the Office of Admissions. Admission to a Johns Hopkins Engineering for Professionals program establishes no claim or priority for admission to other divisions of the university.

International Applicants

Students enrolled in the Home-to-Hopkins programs in Applied and Computational Mathematics, Computer Science, Data Science, and Financial Mathematics may qualify for F-1 or J-1 visa status. No other Engineering for Professionals programs qualify for F-1 or J-1 student sponsorship. Legal Permanent Residents and non-immigrants who are otherwise physically present in the U.S. and in a status that allows for full or part-time study may pursue this program. Those holding student visas granted by other universities are not allowed to register for classes and cannot be accepted as degree candidates or Special Students. For visa information, contact the Johns Hopkins Office of International Services at Homewood at ois.jhu.edu (http://ois.jhu.edu/).

International Credential Evaluation

Applicants who hold degrees or have earned credits from non-US institutions must have their academic records evaluated by World Education Services, Inc., before they can be considered for graduate or Special Student status or admission to a degree/certificate program. In addition to submitting official records to Johns Hopkins Engineering for Professionals, applicants must make arrangements with the credential evaluation agency listed below for an evaluation of the degree, an assessment of the overall grade point average, and a course-by-course evaluation. Applicants are asked to submit their evaluation electronically so that the evaluation is sent directly to Johns Hopkins University.

World Education Services, Inc.
P. O. Box 745
Old Chelsea Station
New York, NY 10113-0745
Telephone: 212-966-6311
Fax: 212-966-6395
E-mail: info@wes.org

English Proficiency

Johns Hopkins requires students to have English proficiency for their courses of study. All international applicants must submit proof of their proficiency in English via the Test of English as a Foreign Language (TOEFL) or the International English Language Testing System (IELTS) before they can be offered admission.

A minimum score of 600 (paper-based), 250 (computer-based), or 100 (Internet-based) is required on the TOEFL; for the IELTS, an overall band score of at least 7.0 is required. The Johns Hopkins Engineering for Professionals admissions office requires official copies of all results.

At the discretion of the admissions office, the applicant may request to waive this requirement based on having at least one of the following:

- A conferred degree from an U.S. institution
- A conferred degree from an institution with English instruction
- More than three years of work experience in the U.S.
- Citizenship from a country where English is the official language

An applicant must contact their program coordinator (https://ep.jhu.edu/student-services/new-student-orientation/program-coordinators-and-advisors/) to request and complete a waiver form.

Requests to Change Program of Study

A student who wishes to change their status (e.g., from Special Student to master's degree candidate) or field of study (e.g., from Engineering Management to Systems Engineering, or from the general Computer Science program to the Communications and Networking concentration) must send a written request to their program coordinator (https://ep.jhu.edu/student-services/new-student-orientation/program-coordinators-and-advisors/). The student must meet all the admission requirements of the new program.

Revocation of Admission

If Johns Hopkins University receives false, fraudulent, deceitful, or misrepresented information that is material to student admissions as part of the application process, the student is subject to sanctions. These sanctions can include denial or revocation of admission and revocation of credits or degree(s) earned at Johns Hopkins University. Johns Hopkins University will notate the imposed sanctions on the student's transcript and may notify other institutions where a student is or seeks to enroll of the imposed sanctions.

Applied and Computational Mathematics

The part-time Applied and Computational Mathematics program prepares working professionals through instruction in mathematical and computational techniques that are fundamentally important and practically relevant.

Courses are offered at the Applied Physics Laboratory and online.

Program Committee

James C. Spall, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory
Research Professor, Department of Applied Mathematics and Statistics
JHU Whiting School of Engineering

Beryl Castello, Program Coordinator
Senior Lecturer, Department of Applied Mathematics and Statistics
JHU Whiting School of Engineering

Stacy D. Hill
Senior Professional Staff
JHU Applied Physics Laboratory

George Nakos
Professor (retired), Mathematics
US Naval Academy

Edward R. Scheinerman
Professor, Applied Mathematics and Statistics
Vice Dean for Faculty
JHU Whiting School of Engineering

J. Miller Whisnant
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Applied and Computational Mathematics, Master of Science (p. 1427)
- Applied and Computational Mathematics, Post-Master's Certificate (p. 1431)

Students Seeking a Doctoral Degree

JHU offers both a PhD and a D.Eng. Students with a long-term interest in pursuing a PhD through the Applied Mathematics and Statistics (AMS) Department in the full-time program should coordinate their course plans with their Applied and Computational Mathematics advisor and with a representative in the AMS Department. Certain courses within Applied and Computational Mathematics may be especially helpful in passing the required entrance examination for the PhD program. Priority of admission is not given to graduates of the Applied and Computational Mathematics program for the PhD program. Students interested in the D.Eng. should contact the program chair or program coordinator.

Courses

EN.625.108. Calculus I.

Differential and integral calculus of functions of one independent variable. Topics include the basic analytic geometry of graphs of functions, and their limits, integrals and derivatives, including the Fundamental Theorem of Calculus. Also, some applications of the integral, like arc length and volumes of solids with rotational symmetry, are discussed. Applications to the physical sciences and engineering will be a focus of this course, as this course is designed to meet the needs of students in these disciplines. Course Note(s): Not for credit. Not eligible for financial aid. Prerequisite(s): Pre-calculus (e.g., AS.110.105 or equivalent)

EN.625.109. Calculus II.

Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the course is designed to meet the needs of students in these disciplines. Prerequisite(s): EN.625.108 Calculus I Course Note(s): Not for credit. Not eligible for financial aid.

EN.625.201. General Applied Mathematics. 3 Credits.

This course is designed for students whose prior background does not fully satisfy the mathematics requirements for admission and/or for students who wish to take a refresher course in applied mathematics. The course provides a review of differential and integral calculus in one or more variables. It covers elementary linear algebra and differential equations, including first- and second-order linear differential equations. Basic concepts of matrix theory are discussed (e.g., matrix multiplication, inversion, and eigenvalues/eigenvectors). Prerequisite(s): Two semesters of calculus. Course Note(s): Not for graduate credit.

EN.625.240. Introduction to Probability and Statistics. 3 Credits.

This course provides an introduction to probability and statistics with applications. Topics consist of combinatorics, random variables, probability distributions, Bayesian inference, hypothesis testing, confidence intervals, and linear regression. Students will develop proficiency in Excel for statistical analysis. Prerequisite(s): One semester of calculus (EN.625.108 or equivalent)

EN.625.250. Multivariable Calculus and Complex Analysis. 3 Credits.

This course covers fundamental mathematical tools useful in all areas of applied mathematics, including statistics, data science, and differential equations. The course covers basic principles in linear algebra, multivariate calculus, and complex analysis. Within linear algebra, topics include matrices, systems of linear equations, determinants, matrix inverse, and eigenvalues/eigenvectors. Relative to multivariate calculus, the topics include vector differential calculus (gradient, divergence, curl) and vector integral calculus (line and double integrals, surface integrals, Green's theorem, triple integrals, divergence theorem and Stokes' theorem). For complex analysis, the course covers complex numbers and functions, conformal maps, complex integration, power series and Laurent series, and, time permitting, the residue integration method. Prerequisite(s): Differential and integral calculus. Course Note(s): Not for graduate credit.

EN.625.251. Introduction to Ordinary and Partial Differential Equations. 3 Credits.

This course is a companion to EN.625.250. Topics include ordinary differential equations, Fourier series and integrals, the Laplace transformation, Bessel functions and Legendre polynomials, and an introduction to partial differential equations. Prerequisite(s): Differential and integral calculus. Students with no experience in linear algebra may find it helpful to take EN.625.250 Multivariable and Complex Analysis first. Course Note(s): Not for graduate credit.

EN.625.252. Linear Algebra and Its Applications. 3 Credits.

This course is a study of linear systems of equations, vector spaces, and linear transformations in the context of applications including basic data fitting, polynomial interpolation and network flow. The following topics and their basic applications are covered: Gaussian elimination, matrix algebra, determinants, eigenvalues and eigenvectors, diagonalization, linear independence, basis and dimension of vector spaces, orthogonality, Gram-Schmidt process and least-squares method. No software is required. Note for those planning to also take EN.625.609 Matrix Theory: EN.625.252 covers a broad range of topics in linear algebra and its applications at an introductory level, while EN.625.609 focuses in depth on the fundamental theoretical properties of matrices and the consequent significant applications. EN.625.252 introduces basic proof writing techniques, theoretical background and knowledge of applications that will be useful for EN.625.609. Prerequisite(s): EN.625.108 Calculus I. Course Note(s): Not for Graduate Credit

EN.625.260. Introduction to Signals and Systems. 3 Credits.

Linear systems that produce output signals of some type are ubiquitous in many areas of science and engineering. This course will consider such systems, with an emphasis on fundamental concepts as well as the ability to perform calculations for applications in areas such as image analysis, signal processing, computer-aided systems, and feedback control. In particular, the course will approach the topic from the perspectives of both mathematical principles and computational learning. The course will also include examples that span different real-world applications in broad areas such as engineering and medicine. The course is designed primarily for students who do not have a bachelor's degree in electrical engineering or a great deal of prior mathematical coursework. The course will be of value to those with general interests in linear systems analysis, control systems, and/or signal processing. The course will deepen a student's appreciation and understanding of differential equations and their solutions. Topics include signal representations, linearity, time-variance, convolution, and Fourier series and transforms. Coverage includes both continuous and discrete-time systems. Prerequisite(s): Differential and integral calculus. Course note(s): Not for graduate credit.

EN.625.601. Real Analysis. 3 Credits.

This course presents a rigorous treatment of fundamental concepts in analysis. Emphasis is placed on careful reasoning and proofs. Topics covered include the completeness and order properties of real numbers, limits and continuity, conditions for integrability and differentiability, infinite sequences, and series. Basic notions of topology and measure are also introduced. Prerequisite(s): Multivariate calculus.

EN.625.602. Modern Algebra. 3 Credits.
This course examines the structures of modern algebra, including groups, linear spaces, rings, polynomials, and fields, and some of their applications to such areas as cryptography, primality testing and the factorization of composite numbers, efficient algorithm design in computing, circuit design, and signal processing. It will include an introduction to quantum information processing. Grading is based on weekly problem sets, a midterm, and a final. Prerequisite(s): Multivariate calculus and linear algebra.

EN.625.603. Statistical Methods and Data Analysis. 3 Credits.
This course introduces statistical methods that are widely used in modern applications. A balance is struck between the presentation of the mathematical foundations of concepts in probability and statistics and their appropriate use in a variety of practical contexts. Foundational topics of probability, such as probability rules, related inequalities, random variables, probability distributions, moments, and jointly distributed random variables, are followed by foundations of statistical inference, including estimation approaches and properties, hypothesis testing, and model building. Data analysis ranging from descriptive statistics to the implementation of common procedures for estimation, hypothesis testing, and model building is the focus after the foundational methodology has been covered. Software, for example R-Studio, will be leveraged to illustrate concepts through simulation and to serve as a platform for data analysis. Prerequisite(s): Multivariate calculus.

EN.625.604. Ordinary Differential Equations. 3 Credits.
This course provides an introduction to the theory, solution, and application of ordinary differential equations. Topics discussed in the course include methods of solving first-order differential equations, existence and uniqueness theorems, second-order linear equations, power series solutions, higher-order linear equations, systems of equations, non-linear equations, SturmLiouville theory, and applications. The relationship between differential equations and linear algebra is emphasized in this course. An introduction to numerical solutions is also provided. Applications of differential equations in physics, engineering, biology, and economics are presented. This course covers more material at greater depth than the standard undergraduate-level ODE course. Prerequisite(s): Two or more terms of calculus are required. Course in linear algebra would be helpful.

EN.625.609. Matrix Theory. 3 Credits.
This course focuses on the fundamental theoretical properties of matrices. Topics will include a rigorous treatment of vector spaces (linear independence, basis, dimension, and linear transformations), orthogonality (inner products, projections, and Gram-Schmidt process), determinants, eigenvalues and eigenvectors (diagonal form of a matrix, similarity transformations, and matrix exponential), singular value decomposition, and the pseudo-inverse. Essential proof writing techniques and logic will be reviewed and then used throughout the course in exams and written assignments. Computer software will be used in some class exercises and homework. Prerequisite(s): Multivariate calculus

EN.625.611. Computational Methods. 3 Credits.
As the need to increase the understanding of real-world phenomena grows rapidly, computer-based simulations and modeling tools are increasingly being accepted as viable means to study such problems. In this course, students are introduced to some of the key computational techniques used in modeling and simulation of real-world phenomena. The course begins with coverage of fundamental concepts in computational methods including error analysis, matrices and linear systems, convergence, and stability. It proceeds to curve fitting, least squares, and iterative techniques for practical applications, including methods for solving ordinary differential equations and simple optimization problems. Elements of computer visualization and Monte Carlo simulation will be discussed as appropriate. The emphasis here is not so much on programming technique, but rather on understanding basic concepts and principles. Employment of higher-level programming and visualization tools, such as MATLAB, reduces burdens on programming and introduces a powerful tool set commonly used by industry and academia. A consistent theme throughout the course is the linkage between the techniques covered and their applications to realworld problems. Prerequisite(s): Multivariate calculus and ability to program in MATLAB, FORTRAN, C++, Java, or other language. Courses in matrix theory or linear algebra as well as in differential equations would be helpful but are not required.

EN.625.615. Introduction to Optimization. 3 Credits.
This course introduces applications and algorithms for linear, network, integer, and nonlinear optimization. Topics include the primal and dual simplex methods, network flow algorithms, branch and bound, interior point methods, Newton and quasi-Newton methods, and heuristic methods. Students will gain experience in formulating models and implementing algorithms using MATLAB. No previous experience with the software is required. Prerequisite(s): Multivariate calculus, linear algebra. Comfort with reading and writing mathematical proofs would be helpful but is not required. Course Note(s): Due to overlap in subject matter in EN.625.615 and EN.625.616, students may not receive credit towards the MS or post-master's certificate for both EN.625.615 and EN.625.616.

EN.625.616. Optimization in Finance. 3 Credits.
Optimization models play an increasingly important role in financial decisions. This course introduces the student to financial optimization models and methods. We will specifically discuss linear, integer, quadratic, and general nonlinear programming. If time permits, we will also cover dynamic and stochastic programming. The main theoretical features of these optimization methods will be studied as well as a variety of algorithms used in practice. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): Due to overlap in subject matter in EN.625.615 and EN.625.616, students may not receive credit towards the MS or post-master's certificate for both EN.625.615 and EN.625.616.

EN.625.617. Intro to Enumerative Combinatorics. 3 Credits.
The most basic question in mathematics is How many? Counting problems arise in diverse areas including discrete probability and the analysis of the run time of algorithms. In this course we present methods for answering enumeration questions exactly and approximately. Topics include fundamental counting problems (lists, sets, partitions, and so forth), combinatorial proof, inclusion-exclusion, ordinary and exponential generating functions, group-theory methods, and asymptotics. Examples are drawn from areas such as graph theory and block designs. After completing this course students will be practiced in applying the fundamental functions (such as factorial, binomial coefficients, Stirling numbers) and techniques for solving a wide variety of exact enumeration problems as well as notation and methods for approximate counting (asymptotic equality, big-oh and littleoh notation, etc.). Prerequisite(s): Linear algebra Course Note(s): This course is the same as EN.605.623 Introduction to Enumerative Combinatorics.

EN.625.618. Discrete Hybrid Optimization. 3 Credits.
Real-world planning, scheduling, and resource allocation problems are often too large and complex to solve using straightforward applications of classic exact optimization methods. Often a hybrid combination of methods is used to decompose large, unwieldy problems into smaller and computationally-tractable sub-problems. This course introduces the theory, algorithms, and a framework for combining multiple optimization techniques to solve large-scale real-world optimization problems. Techniques include integer optimization, constraint programming, network optimization, heuristics, dynamic programming, and reinforcement learning. The class provides the necessary theoretical underpinnings of the techniques, and focuses on selecting and implementing hybrid methods to solve applied problems. Emphasis is mostly on deterministic methods, but includes some stochastic concepts. Students will gain experience in formulating models of real-world problems, implementing solution techniques using IBM CPLEX and other software, and presenting analytic results clearly and concisely. Some previous experience with a scientific computing language (e.g., Python, MATLAB, Julia, R) is expected.
Linear algebra; some knowledge of mathematical set notation; EN.625.603 or other exposure to probability and statistics.

EN.625.620. Mathematical Methods for Signal Processing. 3 Credits.
This course familiarizes the student with modern techniques of digital signal processing and spectral estimation of discrete-time or discrete-space sequences derived by the sampling of continuous-time or continuous-space signals. The class covers the mathematical foundation needed to understand the various signal processing techniques as well as the techniques themselves. Topics include the discrete Fourier transform, the discrete Hilbert transform, the singular-value decomposition, the wavelet transform, classical spectral estimates (periodogram and correlogram), autoregressive and autoregressivemoving average spectral estimates, and Burg maximum entropy method. Prerequisite(s): Mathematics through multivariate calculus, matrix theory, or linear algebra, and introductory probability theory and/or statistics. Students are encouraged to refer any questions to the instructor.

EN.625.623. Introduction to Operations Research: Probabilistic Models. 3 Credits.
This course investigates several probability models that are important to operations research applications. Models covered include Markov chains, Markov processes, renewal theory, queueing theory, scheduling theory, reliability theory, Bayesian networks, random graphs, and simulation. The course emphasizes both the theoretical development of these models and the application of the models to areas such as engineering, computer science, and management science.
Multivariate calculus and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.624. Network Models and Analysis. 3 Credits.
Networks are at the heart of some of the most revolutionary technologies in modern times. They permeate science, technology, business, and nature. We begin this course with an in-depth mathematical study of the network problems traditionally discussed in operations research, with emphasis on combinatorial approaches for solving them. Students will be introduced to efficient algorithms used in solving shortest path, maximum flow, minimum cost flow problems, and related problems. We next focus on mathematically describing different classes of networks – random, small-world, scale free, dynamic – and their applications in modern network science.
probability and statistics (EN.625.603 or similar course), linear algebra and experience with reading and writing proofs as found in EN.625.609 or similar course. While the course is primarily mathematical, students will be expected to work within at least one programming environment (Matlab or Python will be easiest, but Julia, R and others will also be acceptable).

EN.625.633. Monte Carlo Methods. 3 Credits.
This course is an introduction to fundamental tools in designing, conducting, and interpreting Monte Carlo simulations. Emphasis is on generic principles that are widely applicable in simulation, as opposed to detailed discussion of specific applications and/or software packages. At the completion of this course, it is expected that students will have the insight and understanding to critically evaluate or use many state-of-the-art methods in simulation. Topics covered include random number generation, simulation of Brownian motion and stochastic differential equations, output analysis for Monte Carlo simulations, variance reduction, Markov chain Monte Carlo, simulation-based estimation for dynamical (state-space) models, and, time permitting, sensitivity analysis and simulation-based optimization. Course Note(s): This course serves as a complement to the 700-level course EN.625.744 Modeling, Simulation, and Monte Carlo. EN.625.633 Monte Carlo Methods and EN.625.744 emphasize different topics, and EN.625.744 is taught at a slightly more advanced level. EN.625.633 includes topics not covered in EN.625.744 such as simulation of Brownian motion and stochastic differential equations, general output analysis for Monte Carlo simulations, and general variance reduction. EN.625.744 includes greater emphasis on generic modeling issues (bias-variance tradeoff, etc.), simulation-based optimization of real-world processes, and optimal input selection.
Linear algebra and a graduate-level statistics course such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.636. Graph Theory. 3 Credits.
This course focuses on the mathematical theory of graphs; a few applications and algorithms will be discussed. Topics include trees, connectivity, Eulerian and Hamiltonian graphs, matchings, edge and vertex colorings, independent sets and cliques, planar graphs, and directed graphs. An advanced topic completes the course. Prerequisite(s): Familiarity with linear algebra and basic counting methods such as binomial coefficients is assumed. Comfort with reading and writing mathematical proofs is required.

EN.625.638. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as EN.605.647 Neural Networks.

EN.625.641. Mathematics of Finance. 3 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision making. Topics covered in the course include the basic theory of interest and its applications to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, and portfolio evaluation.
Multivariate calculus and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.642. Mathematics of Risk, Options, and Financial Derivatives. 3 Credits.
The concept of options stems from the inherent human desire and need to reduce risks. This course starts with a rigorous mathematical treatment of options pricing, and related areas by developing a powerful mathematical tool known as Ito calculus. We introduce and use the well-known field of stochastic differential equations to develop various techniques as needed, as well as discuss the theory of martingales. The mathematics will be applied to the arbitrage pricing of financial derivatives, which is the main topic of the course. We treat the Black-Scholes theory in detail and use it to understand how to price various options and other quantitative financial instruments. Topics covered in the course include options strategies, binomial pricing, Weiner processes and Ito's lemma, the Black-Scholes-Merton Model, futures options and Black's Model, option Greeks, numerical procedures for pricing options, the volatility smile, the value at risk, exotic options, martingales and risk measures. Course Note(s): This class is distinguished from EN.625.641 Mathematics of Finance: Investment Science (formerly 625.439) and EN.625.714 Introductory Stochastic Differential Equations with Applications, as follows: EN.625.641 Mathematics of Finance: Investment Science gives a broader and more general treatment of financial mathematics, and EN.625.714 Introductory Stochastic Differential Equations with Applications provides a deeper (more advanced) mathematical understanding of stochastic differential equations, with applications in both finance and non-finance areas.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and a graduate-level course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.651. Mathematical Models in Healthcare. 3 Credits.
A firm mathematical foundation for work in biostatistics is provided by a detailed consideration of four mathematical frameworks that can be applied throughout medicine. The class will focus on these framework ideas, which build on earlier coursework in statistics and probability, and their applications. The mathematical frameworks are Markov models, Gaussian processes, logistic regression, and Bayesian networks. The clinical settings to be explored will be associated with treatment, prognosis, and survival within the settings of asthma, diabetes, cancer, and epidemics. While the course is primarily mathematical, students will be expected to work within at least one programming environment (R or Python will be easiest, but Julia, MATLAB, and others will also be supported).
EN.625.603 Statistical Methods and Data Analysis or equivalent. Ability to work within R, Python, Julia, or MATLAB or similar code settings for analysis of data and code development.

EN.625.661. Statistical Models and Regression. 3 Credits.
Introduction to regression and linear models including least squares estimation, maximum likelihood estimation, the Gauss-Markov Theorem, and the Fundamental Theorem of Least Squares. Topics include estimation, hypothesis testing, simultaneous inference, model diagnostics, transformations, multicollinearity, influence, model building, and variable selection. Advanced topics include nonlinear regression, robust regression, and generalized linear models including logistic and Poisson regression.
EN.625.603 Statistical Methods and Data Analysis, multivariate calculus, and basic knowledge of matrix and linear algebra.

EN.625.662. Design and Analysis of Experiments. 3 Credits.
Statistically designed experiments are plans for the efficient allocation of resources to maximize the amount of empirical information supporting objective decisions. Design of experiments is widely applicable to physical, health, and social sciences, business, and government. This course covers the principles and concepts of experimental design and analysis of the general linear model. Design building elements of blocking, randomization, and replication within the context of basic comparative experimentation are extended to concepts of nested and crossed effects, fixed and random effects, aliasing and confounding, and power and sample size. Specific design structures include completely random, randomized block, Latin squares and hypercubes, factorial, fractional factorial, hierarchical/nested, response surface, and space-filling designs. Developing problem solving skills for constructing a variety of designs and making inference on parameters for the associated general linear models are main objectives for the course. Assignments focusing on statistical computation will require suitable statistical software (e.g., RStudio). Assignments focusing on extensive analysis and interpretation will employ JMP.
Multivariate calculus, linear algebra, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given.

EN.625.663. Multivariate Statistics and Stochastic Analysis. 3 Credits.
Multivariate analysis arises with observations of more than one variable when there is some probabilistic linkage between the variables. In practice, most data collected by researchers in virtually all disciplines are multivariate in nature. In some cases, it might make sense to isolate each variable and study it separately. In most cases, however, the variables are interrelated in such a way that analyzing the variables in isolation may result in failure to uncover critical patterns in the data. Multivariate data analysis consists of methods that can be used to study several variables at the same time so that the full structure of the data can be observed and key properties can be identified. This course covers estimation, hypothesis tests, and distributions for multivariate mean vectors and covariance matrices. We also cover popular multivariate data analysis methods including multivariate data visualization, maximum likelihood, principal components analysis, multiple comparisons tests, multidimensional scaling, cluster analysis, discriminant analysis and multivariate analysis of variance, multiple regression and canonical correlation, and analysis of repeated measures data. Coursework will include computer assignments.
Linear algebra, multivariate calculus, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis).

EN.625.664. Computational Statistics. 3 Credits.
Computational statistics is a branch of mathematical sciences concerned with efficient methods for obtaining numerical solutions to statistically formulated problems. This course will introduce students to a variety of computationally intensive statistical techniques and the role of computation as a tool of discovery. Topics include numerical optimization in statistical inference [expectation-maximization (EM) algorithm, Fisher scoring, etc.], random number generation, Monte Carlo methods, randomization methods, jackknife methods, bootstrap methods, tools for identification of structure in data, estimation of functions (orthogonal polynomials, splines, etc.), and graphical methods. Additional topics may vary. Coursework will include computer assignments.
Multivariate calculus, familiarity with basic matrix algebra and EN.625.603 Statistical Methods and Data Analysis.

EN.625.665. Bayesian Statistics. 3 Credits.
In Bayesian statistics, inference about a population parameter or hypothesis is achieved by merging prior knowledge, represented as a prior probability distribution, with data. This prior distribution and data are merged mathematically using Bayes' rule to produce a posterior distribution, and this course focuses on the ways in which the posterior distribution is used in practice and on the details of how the calculation of the posterior is done. In this course, we discuss specific types of prior and posterior distributions, prior/posterior conjugate pairs, decision theory, Bayesian prediction, Bayesian parameter estimation and estimation uncertainty, and Monte Carlo methods commonly used in Bayesian statistical inference. Students will apply Bayesian methods to analyze and interpret several real-world data sets and will investigate some of the theoretical issues underlying Bayesian statistical analysis. R is the software that will be used to illustrate the concepts discussed in class. Course Note(s): Prior experience with R is not required; students not familiar with R will be directed to an online tutorial.
Multivariate calculus, familiarity with basic matrix algebra, and a graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.680. Cryptography. 3 Credits.
An important concern in the information age is the security, protection, and integrity of electronic information, including communications, electronic funds transfer, power system control, transportation systems, and military and law enforcement information. Modern cryptography, in applied mathematics, is concerned not only with the design and exploration of encryption schemes (classical cryptography) but also with the rigorous analysis of any system that is designed to withstand malicious attempts to tamper with, disturb, or destroy it. This course introduces and surveys the ?eld of modern cryptography and will explore the following topics in the field: foundations of cryptography, public key cryptography, probabilistic proof systems, pseudorandom generators, elliptic curve cryptography, and fundamental limits to information operations. Mathematical preliminaries from probability theory, algebra, computational complexity, and number theory will also be covered.
Linear algebra and an introductory course in probability and statistics such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.685. Number Theory. 3 Credits.
This course covers principal ideas of classical number theory, including the fundamental theorem of arithmetic and its consequences, congruences, cryptography and the RSA method, polynomial congruences, primitive roots, residues, multiplicative functions, and special topics. Prerequisite(s): Multivariate calculus and linear algebra.

EN.625.687. Applied Topology. 3 Credits.
The course is both an introduction to topology and an investigation of various applications of topology in science and engineering. Topology, simply put, is a mathematical study of shapes, and it often turns out that just knowing a rough shape of an object (whether that object is as concrete as platonic solids or as abstract as the space of all paths in large complex networks) can enhance one's understanding of the object. We will start with a few key theoretical concepts from point-set topology with proofs, while letting breadth take precedence over depth, and then introduce key concepts from algebraic topology, which attempts to use algebraic concepts, mostly group theory, to develop ideas of homotopy, homology, and cohomology, which render topology "computable." Finally, we discuss a few key examples of real-world applications of computational topology, an emerging field devoted to the study of efficient algorithms for topological problems, especially those arising in science and engineering, which builds on classical results from algebraic topology as well as algorithmic tools from computational geometry and other areas of computer science. The questions we like to ask are: Do I know the topology of my network? What is a rough shape of the large data set that I am working with (is there a logical gap?)? Will the local picture of a part of the sensor field I am looking at give rise to a consistent global common picture? Course Note(s): This course is the same as EN.605.628 Applied Topology.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and an undergraduate-level course in probability and statistics.

EN.625.690. Computational Complexity and Approximation. 3 Credits.
This course will cover the theory of computational complexity and popular approximation and optimization problems and algorithms. It begins with automata theory, languages, and computation followed by important complexity concepts including Turing machines, Karp and Turing reducibility, basic complexity classes, and the theory of NP-completeness. It then discusses the complexity of well-known approximation and optimization algorithms and introduces approximability properties, with special focus on approximation algorithm and heuristic design. The course will specifically target algorithms with practical significance and techniques that can improve performance in real-world implementations.
Introductory probability theory and/or statistics (such as EN.625.603 Statistical Methods and Data Analysis) and undergraduate-level exposure to algorithms and matrix algebra. Some familiarity with optimization and computing architectures is desirable but not necessary.

EN.625.692. Probabilistic Graphical Models. 3 Credits.
This course introduces the fundamentals behind the mathematical and logical framework of graphical models. These models are used in many areas of machine learning and arise in numerous challenging and intriguing problems in data analysis, mathematics, and computer science. For example, the “big data” world frequently uses graphical models to solve problems. While the framework introduced in this course will be largely mathematical, we will also present algorithms and connections to problem domains. The course will begin with the fundamentals of probability theory and will then move into Bayesian networks, undirected graphical models, templatebased models, and Gaussian networks. The nature of inference and learning on the graphical structures will be covered, with explorations of complexity, conditioning, clique trees, and optimization. The course will use weekly problem sets and a term project to encourage mastery of the fundamentals of this emerging area. Course Note(s): This course is the same as EN.605.625 Probabilistic Graphical Models.
Graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.695. Time Series Analysis. 3 Credits.
This course will be a rigorous and extensive introduction to modern methods of time series analysis and dynamic modeling. Topics to be covered include elementary time series models, trend and seasonality, stationary processes, Hilbert space techniques, the spectral distribution function, autoregressive/ integrated/moving average (ARIMA) processes, fitting ARIMA models, forecasting, spectral analysis, the periodogram, spectral estimation techniques, multivariate time series, linear systems and optimal control, state-space models, and Kalman filtering and prediction. Additional topics may be covered if time permits. Some applications will be provided to illustrate the usefulness of the techniques. Course Note(s): This course is also offered in the Department of Applied Mathematics and Statistics (Homewood campus) as EN.553.639.
Graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis) and familiarity with matrix theory and linear algebra.

EN.625.703. Complex Analysis. 3 Credits.
This course presents complex analysis with a rigorous approach that also emphasizes problem solving techniques and applications. The major topics covered are holomorphic functions, contour integrals, Cauchy integral theorem and residue integration, Laurent series, argument principle, conformal mappings, harmonic functions. Several topics are explored in the context of analog and digital signal processing including: Fourier transforms for functions over the reals and the integers, Laplace and z-transforms, Jordan’s lemma and inverse transforms computed via residue integration, reflection principle for lines and circles.
Mathematical maturity, as demonstrated by EN.625.601 Real Analysis, EN.625.604 Ordinary Differential Equations, or other relevant courses with permission of the instructor.

EN.625.710. Fourier Analysis with Applications to Signal Processing and Differential Equations. 3 Credits.
This applied course covers the theory and application of Fourier analysis, including the Fourier transform, the Fourier series, and the discrete Fourier transform. Motivation will be provided by the theory of partial differential equations arising in physics and engineering. We will also cover Fourier analysis in the more general setting of orthogonal function theory. Applications in signal processing will be discussed, including the sampling theorem and aliasing, convolution theorems, and spectral analysis. Prerequisite(s): Familiarity with differential equations, linear algebra, and real analysis.

EN.625.714. Introductory Stochastic Differential Equations with Applications. 3 Credits.
The goal of this course is to give basic knowledge of stochastic differential equations useful for scientific and engineering modeling, guided by some problems in applications. The course treats basic theory of stochastic differential equations, including weak and strong approximation, efficient numerical methods and error estimates, the relation between stochastic differential equations and partial differential equations, Monte Carlo simulations with applications in financial mathematics, population growth models, parameter estimation, and filtering and optimal control problems. Prerequisite(s): Multivariate calculus and a graduate course in probability and statistics, as well as exposure to ordinary differential equations.

EN.625.717. Advanced Differential Equations: Partial Differential Equations. 3 Credits.
This course presents practical methods for solving partial differential equations (PDEs). The course covers solutions of hyperbolic, parabolic, and elliptic equations in two or more independent variables. Topics include Fourier series, separation of variables, existence and uniqueness theory for general higher-order equations, eigenfunction expansions, numerical methods, Green’s functions, and transform methods. MATLAB, a high-level computing language, is used in the course to complement the analytical approach and to motivate numerical methods.
EN.625.604 Ordinary Differential Equations or equivalent graduate-level ODE class and knowledge of eigenvalues and eigenvectors from matrix theory. (Note: The standard undergraduate-level ODE class alone is not sufficient to meet the prerequisites for this class.)

EN.625.718. Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems. 3 Credits.
This course examines ordinary differential equations from a geometric point of view and involves significant use of phase portrait diagrams and associated concepts, including equilibrium points, orbits, limit cycles, and domains of attraction. Various methods are discussed to determine existence and stability of equilibrium points and closed orbits. Methods are discussed for analyzing nonlinear differential equations (e.g., linearization, direct, perturbation, and bifurcation analysis). An introduction to chaos theory and Hamiltonian systems is also presented. The techniques learned will be applied to equations from physics, engineering, biology, ecology, and neural networks (as time permits).
EN.625.604 Ordinary Differential Equations or equivalent graduate-level ordinary differential equations class and knowledge of eigenvalues and eigenvectors from matrix theory. (Note: The standard undergraduate-level ordinary differential equations class alone is not sufficient to meet the prerequisites for this class.) EN.625.717 Advanced Differential Equations: Partial Differential Equations is not required.

EN.625.721. Probability and Stochastic Process I. 3 Credits.
This rigorous course in probability covers probability space, random variables, functions of random variables, independence and conditional probabilities, moments, joint distributions, multivariate random variables, conditional expectation and variance, distributions with random parameters, posterior distributions, probability generating function, moment generating function, characteristic function, random sum, types of convergence and relation between convergence concepts, law of large numbers and central limit theorem (i.i.d. and non- i.i.d. cases), Borel-Cantelli Lemmas, well-known discrete and continuous distributions, homogeneous Poisson process (HPP), non-homogeneous Poisson process (NHPP), and compound Poisson process. This course is proof oriented. The primary purpose of this course is to lay the foundation for the second course, EN.625.722 Probability and Stochastic Process II, and other specialized courses in probability. Note that, in contrast to EN.625.728, this course is largely a non-measure theoretic approach to probability.
Multivariate calculus and EN.625.603 Statistical Methods and Data Analysis or equivalent

EN.625.722. Probability and Stochastic Process II. 3 Credits.
This course is an introduction to theory and applications of stochastic processes. The course starts with a brief review of conditional probability, conditional expectation, conditional variance, central limit theorems, and Poisson Process. The topics covered include Gaussian random vectors and processes, renewal processes, renewal reward process, discrete-time Markov chains, classification of states, birth-death process, reversible Markov chains, branching process, continuous-time Markov chains, limiting probabilities, Kolmogorov differential equations, approximation methods for transition probabilities, random walks, and martingales. This course is proof oriented.
Differential equations and EN.625.721 Probability and Stochastic Process I or equivalent.

EN.625.725. Theory Of Statistics I. 3 Credits.
This course covers mathematical statistics and probability. Topics covered include basic set theory & probability theory utilizing proofs, transformation methods to find distribution of a function of a random variable, expected values, moment generating functions, well-known discrete and continuous distributions, exponential and location-scale family distributions, multivariate distributions, order statistics, hierarchical and mixture models, types of convergence, Delta methods, the central limit theorem, and direct and indirect methods of random sample generation. This course is a rigorous treatment of statistics that lays the foundation for EN.625.726 and other advanced courses in statistics.
Multivariate calculus and EN.625.603 Statistical Methods and Data Analysis or equivalent.

EN.625.726. Theory of Statistics II. 3 Credits.
This course is a continuation of EN.625.725. Topics covered include principles of data reduction: minimal sufficient, ancillary, and complete statistics, estimation methods: method of moments, maximum likelihood, and Bayesian estimation, Cramer-Rao inequality, uniformly minimum variance unbiased estimators, the Neyman-Pearson lemma, the likelihood ratio test, goodnessof-fit tests, methods of finding confidence intervals: inverting a test statistic, pivotal quantities, pivoting CDF, and Bayesian intervals, asymptotic evaluation of point estimators, asymptotic efficiency of MLE, asymptotic hypothesis testing, and asymptotic confidence intervals including large sample intervals based on MLE. This course is proof oriented.
EN.625.725 Theory of Statistics I or equivalent.

EN.625.728. Theory of Probability. 3 Credits.
This course provides a rigorous, measure-theoretic introduction to probability theory. It begins with the notion of fields, sigma fields, and measurable spaces and also surveys elements from integration theory and introduces random variables as measurable functions. It then examines the axioms of probability theory and fundamental concepts including conditioning, conditional probability and expectation, independence, and modes of convergence. Other topics covered include characteristic functions, basic limit theorems (including the weak and strong laws of large numbers), and the central limit theorem.
EN.625.601 Real Analysis and EN.625.603 Statistical Methods and Data Analysis.

EN.625.734. Queuing Theory with Applications to Computer Science. 3 Credits.
Queues are a ubiquitous part of everyday life; common examples are supermarket checkout stations, help desk call centers, manufacturing assembly lines, wireless communication networks, and multi-tasking computers. Queuing theory provides a rich and useful set of mathematical models for the analysis and design of service process for which there is contention for shared resources. This course explores both theory and application of fundamental and advanced models in this field. Fundamental models include single and multiple server Markov queues, bulk arrival and bulk service processes, and priority queues. Applications emphasize communication networks and computer operations but may include examples from transportation, manufacturing, and the service industry. Advanced topics may vary. Course Note(s): This course is the same as EN.605.725 Queuing Theory with Applications to Computer Science.
Multivariate calculus and a graduate course in probability and statistics such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.736. Combinatorial Optimization. 3 Credits.
Combinatorial optimization concerns finding an optimal solution from a discrete set of feasible solutions. In many of these problems, exhaustive enumeration of the solution space is intractable. The main goal of this course is to introduce students to efficient techniques for solving combinatorial optimization problems. The first part of the course will focus on algorithms for classical problems including maximum flow, minimum cut, minimum cost flow, matching theory, bipartite matching via flow, and Edmond's blossom algorithm. The next part of the course will show how polyhedral theory can be used to deal with combinatorial optimization problems in a unifying manner. Topics include basic polyhedral theory, linear programming, integer programming, totally unimodular matrices (TUM), total dual integrality (TDI), and cutting plane theory. Other topics covered may include lattice theory and algorithmic geometry of numbers, semidefinite optimization, matroid theory, and submodular optimization.Course Notes: Familiarity with the basic concepts of Graph Theory (EN.625.636) would be helpful but is not required.
Probability (EN.652.603 or similar course). Linear algebra and experience with reading and writing proofs as found in EN.625.609 or similar course.

EN.625.740. Data Mining. 3 Credits.
The field of data science is emerging to make sense of the growing availability and exponential increase in size of typical data sets. Central to this unfolding field is the area of data mining, an interdisciplinary subject incorporating elements of statistics, machine learning, artificial intelligence, and data processing. In this course, we will explore methods for preprocessing, visualizing, and making sense of data, focusing not only on the methods but also on the mathematical foundations of many of the algorithms of statistics and machine learning. We will learn about approaches to classification, including traditional methods such as Bayes Decision Theory and more modern approaches such as Support Vector Machines and unsupervised learning techniques that encompass clustering algorithms applicable when labels of the training data are not provided or are unknown. We will introduce and use open-source statistics and data-mining software such as R. Students will have an opportunity to see how data mining algorithms work together by reviewing case studies and exploring a topic of choice in more detail by completing a project over the course of the semester.
Multivariate calculus, linear algebra, and matrix theory (e.g., EN.625.609 Matrix Theory), and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis). This course will also assume familiarity with multiple linear regression and basic ability to program.

EN.625.741. Game Theory. 3 Credits.
Game theory is a field of applied mathematics that describes and analyzes interactive decision making when two or more parties are involved. Since finding a firm mathematical footing in 1928, it has been applied to many fields, including economics, political science, foreign policy, and engineering. This course will serve both as an introduction to and a survey of applications of game theory. Therefore, after covering the mathematical foundational work with some measure of mathematical rigor, we will examine many real-world situations, both historical and current. Topics include two-person/N-person game, cooperative/non-cooperative game, static/dynamic game, combinatorial/strategic/coalitional game, and their respective examples and applications. Further attention will be given to the meaning and the computational complexity of finding of Nash equilibrium. Course Note(s): This course is the same as EN.605.726 Game Theory.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.742. Theory of Machine Learning. 3 Credits.
This course introduces various machine learning algorithms with emphasis on their derivation and underlying mathematical theory. Topics include the mathematical theory of linear models (regression and classification), anomaly detectors, tree-based methods, regularization, fully connected neural networks, convolutional neural networks, and model assessment. Students will gain experience in formulating models and implementing algorithms using Python. Students will need to be comfortable with writing code in Python to be successful in this course. At the end of this course, students will be able to implement, apply, and mathematically analyze a variety of machine learning algorithms when applied to real-world data. Course Note(s): Although students will have coding assignments, this course differs from other EP machine learning courses in that the primary focus is on the mathematical foundations underlying the algorithms.
Multivariate calculus, linear algebra (e.g. EN.625.609), and probability and statistics (EN.625.603 or similar course). Comfort with reading and writing mathematical proofs would be helpful but is not required.;Students cannot receive credit for both EN.605.746 and EN.625.742

EN.625.743. Stochastic Optimization & Control. 3 Credits.
Stochastic optimization plays a large role in modern learning algorithms and in the analysis and control of modern systems. This course introduces the fundamental issues in stochastic search and optimization, with special emphasis on cases where classical deterministic search techniques (steepest descent, Newton–Raphson, linear and nonlinear programming, etc.) do not readily apply. These cases include many important practical problems in engineering, computer science, machine learning, and elsewhere, which will be briefly discussed throughout the course. Discrete and continuous optimization problems will be considered. Algorithms for global and local optimization problems will be discussed. Methods such as random search, least mean squares (LMS), stochastic approximation, stochastic gradient, simulated annealing, evolutionary computation (including genetic algorithms), and stochastic discrete optimization will be discussed.
Multivariate calculus, linear algebra, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given. It is recommended that this course be taken only in the last half of a student's degree program.

EN.625.744. Modeling, Simulation, and Monte Carlo. 3 Credits.
Computer simulation and related Monte Carlo methods are widely used in engineering, scientific, and other work. Simulation provides a powerful tool for the analysis of realworld systems when the system is not amenable to traditional analytical approaches. In fact, recent advances in hardware, software, and user interfaces have made simulation a "first-line" method of attack for a growing number of problems. Areas where simulation-based approaches have emerged as indispensable include decision aiding, prototype development, performance prediction, scheduling, and computer-based personnel training. This course introduces concepts and statistical techniques that are critical to constructing and analyzing effective simulations and discusses certain applications for simulation and Monte Carlo methods. A major focus is on the role of optimization in modeling and simulation. Topics include random number generation, simulation-based optimization, model building, bias-variance tradeoff, input selection using experimental design, Markov chain Monte Carlo (MCMC), and numerical integration. Multivariate calculus, familiarity with basic matrix algebra, graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given. It is recommended that this course be taken only in the last half of a student's degree program.

EN.625.800. Independent Study. 3 Credits.
An individually tailored, supervised project on a subject related to applied and computational mathematics. The content and expectations are formalized in negotiations between the student and the faculty sponsor. A maximum of one independent study course may be applied toward the master of science degree or post-master's certificate. This course may not be used towards the ACM MS or PMC if a student also wishes to count 625.801–802 or 625.803–804 towards the MS degree or PMC. This course may only be taken in the second half of a student's degree program. All independent studies must be supervised by a current ACM instructor (exceptions must be approved by the ACM Program Chair) and must rely on material from prior ACM courses. The independent study project proposal form (see https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration.

EN.625.801. Applied and Computational Mathematics Master's Research. 3 Credits.
This is the first in a two-course sequence (EN.625.801 and EN.625.802) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For the sequence 625.801 and 625.802, the student will produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.803 and EN.625.804 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.). Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.801–802 towards the M.S. degree. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
Completion of at least six courses towards the Master of Science, including EN.625.601 Real Analysis and/or EN.625.609 Matrix Theory, EN.625.603 Statistical Methods and Data Analysis, and at least one of the following three two-semester sequences: EN.625.717–EN.625.718 Advanced Differential Equations: Partial Differential Equations and Nonlinear Differential Equations and Dynamical Systems, EN.625.721–EN.625.722 Probability and Stochastic Processes I and II, or EN.625.725–EN.625.726 Theory of Statistics I and II. It is recommended that the sequence represent the final two courses of the degree.

EN.625.802. Applied and Computational Mathematics Master's Research. 3 Credits.
This is the second in a two-course sequence (EN.625.801 and EN.625.802) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For the sequence 625.801 and 625.802, the student will produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.803 and EN.625.804 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.801–802 towards the M.S. degree. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.801

EN.625.803. Applied and Computational Mathematics Master's Thesis. 3 Credits.
This is the first in a two-course sequence (EN.625.803 and EN.625.804) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For sequence 625.803 and 625.804, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.801 and EN.625.802 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.803–804 towards the M.S. degree. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
Completion of at least six courses towards the Master of Science, including EN.625.601 Real Analysis and/or EN.625.609 Matrix Theory, EN.625.603 Statistical Methods and Data Analysis, and at least one of the following three two-semester sequences: EN.625.717–EN.625.718 Advanced Differential Equations: Partial Differential Equations and Nonlinear Differential Equations and Dynamical Systems, EN.625.721–EN.625.722 Probability and Stochastic Processes I and II, or EN.625.725–EN.625.726 Theory of Statistics I and II. It is recommended that the sequence represent the final two courses of the degree.

EN.625.804. Applied and Computational Mathematics Master's Thesis. 3 Credits.
This is the second in a two-course sequence (EN.625.803 and EN.625.804) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For sequence 625.803 and 625.804, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.801 and EN.625.802 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.803–804 towards the M.S. degree. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.803

EN.625.805. Applied and Computational Mathematics Post-Master's Research. 3 Credits.
This is the first in a two-course sequence (EN.625.805 and EN.625.806) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count toward the certificate. For sequence 625.805 and 625.806, the student is to produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.807 and EN.625.808 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.805–806 towards the PMC. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.

EN.625.806. Applied and Computational Mathematics Post-Master's Research. 3 Credits.
This is the second in a two-course sequence (EN.625.805 and EN.625.806) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count toward the certificate. For sequence 625.805 and 625.806, the student is to produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.807 and EN.625.808 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.805–806 towards the PMC. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.805

EN.625.807. Applied and Computational Mathematics Post-Master's Thesis. 3 Credits.
This is the first in a two-course sequence (EN.625.807 and EN.625.808) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics (each course is one semester). A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count towards the certificate. For sequence 625.807 and 625.808, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.805 and EN.625.806 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.807–808 towards the PMC. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.

EN.625.808. Applied and Computational Mathematics Post-Master's Thesis. 3 Credits.
This is the second in a two-course sequence (EN.625.807 and EN.625.808) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics (each course is one semester). A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count towards the certificate. For sequence 625.807 and 625.808, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.805 and EN.625.806 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.807–808 towards the PMC. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.807

Applied and Computational Mathematics, Master of Science

The Applied and Computational Mathematics program is devoted to the study and development of mathematical disciplines especially oriented to the complex problems of modern society. Our curriculum emphasizes several areas of applied mathematics which have been grouped into five focus areas: Applied Analysis, Information Technology and Computation, Operations Research, Probability and Statistics, and Simulation and Modeling.

A focus area is not required for this program. Students may choose to specialize in one of these areas, or tailor their courses to meet their individual needs.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include the following prerequisites:

1. at least one mathematics course beyond multivariate calculus (such as advanced calculus, differential equations, or linear algebra); and
2. familiarity with at least one programming language (e.g., C, C++, FORTRAN, Java, Python, R, or MATLAB).

Applicants whose prior education does not include the prerequisites listed above may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or, with approval, at another regionally accredited institution. In addition to these requirements, a detailed work résumé, statement of purpose, and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of four core courses (including a two-term 700-level course sequence) and six electives. The six electives must include at least four courses from the Applied and Computational Mathematics (ACM) program (625.xxx) with at least two of the four ACM elective courses at the 700-level. At least one of two 700-level electives must not be on the list of core sequence courses (625.717/625.718, 625.721/625.722, and 625.725/625.726).

Home-to-Hopkins

Home-to-Hopkins students are permitted to substitute Homewood Campus courses to help meet EP program course requirements. Students should work with their faculty advisor to develop a course plan that will satisfy the degree requirements.

Code	Title	Credits
Core Courses		
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.601	Real Analysis	3
or EN.625.609	Matrix Theory	
Select one of the following sequences		
EN.625.717 & EN.625.718	Advanced Differential Equations: Partial Differential Equations and Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems [1]	6
EN.625.721 & EN.625.722	Probability and Stochastic Process I and Probability and Stochastic Process II	6
EN.625.725 & EN.625.726	Theory Of Statistics I and Theory of Statistics II	6

[1] courses may be taken in either order

An independent study (EN.625.800 Independent Study), research project (EN.625.801 Applied and Computational Mathematics Master's Research–EN.625.802 Applied and Computational Mathematics Master's Research), or thesis (EN.625.803 Applied and Computational Mathematics Master's Thesis–EN.625.804 Applied and Computational Mathematics Master's Thesis) may be substituted for one or two of the 700-level courses outside of the 700-level core sequence. The course 625.800 Independent Study may not be used towards the ACM M.S. if a student also wishes to count 625.801–802 or 625.803–804 towards the M.S. degree. Overall, given the requirements above, at least four 700- or 800-level ACM courses (625.xxx) must be completed. A student who has taken at least one semester of graduate statistics (outside of Applied and Computational Mathematics) may substitute another 625.xxx course for EN.625.603 Statistical Methods and Data Analysis with approval of the student's advisor. The prior statistics course must be calculus-based and must cover the same general topics as EN.625.603 Statistical Methods and Data Analysis. Focus areas are not required for this program. Only one C-range grade (C+, C, or C–) can count toward the master's degree. Course selections at the 800-level or outside of these core and focus area course lists are subject to advisor approval.

Courses

Code	Title	Credits
Undergraduate-Level Courses		
EN.625.108	Calculus I	0
EN.625.109	Calculus II	0
EN.625.201	General Applied Mathematics	3
EN.625.240	Introduction to Probability and Statistics	3
EN.625.250	Multivariable Calculus and Complex Analysis	3
EN.625.251	Introduction to Ordinary and Partial Differential Equations	3
EN.625.252	Linear Algebra and Its Applications	3
EN.625.260	Introduction to Signals and Systems	3

Students may take selected courses above as desired (e.g., as a refresher) or as required via provisional admissions status. Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. These 100- and 200-level courses are not for graduate credit, and do not count toward the degree or certificate requirements. Note that 625.250 fulfills a requirement for multivariable calculus (calculus III).

Courses by Focus Areas

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. The focus areas are presented as an aid to students in planning their course schedules and are generally applicable to students seeking a master's degree; the more advanced courses within each focus area may also apply to the post-master's certificate. A Focus Area can be selected, but is not required for this program. They do not appear as official designations on a student's transcript or diploma.

Code	Title	Credits
Focus Areas		
Applied Analysis (p. 1428)		
Information Technology and Computation (p. 1429)		
Operations Research (p. 1429)		
Probability and Statistics (p. 1430)		
Simulation and Modeling (p. 1430)		

Applied Analysis

Code	Title	Credits
EN.625.601	Real Analysis	3
EN.625.602	Modern Algebra	3
EN.625.604	Ordinary Differential Equations	3
EN.625.609	Matrix Theory	3
EN.625.611	Computational Methods	3
EN.625.680	Cryptography	3
EN.625.685	Number Theory	3
EN.625.687	Applied Topology	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.703	Complex Analysis	3
EN.625.710	Fourier Analysis with Applications to Signal Processing and Differential Equations	3

EN.625.717	Advanced Differential Equations: Partial Differential Equations	3
EN.625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems	3
EN.625.728	Theory of Probability	3
EN.625.736	Combinatorial Optimization	3
EN.625.800	Independent Study	3
EN.625.801 & EN.625.802	Applied and Computational Mathematics Master's Research and Applied and Computational Mathematics Master's Research	6
EN.625.803 & EN.625.804	Applied and Computational Mathematics Master's Thesis and Applied and Computational Mathematics Master's Thesis	6
EN.625.805 & EN.625.806	Applied and Computational Mathematics Post-Master's Research and Applied and Computational Mathematics Post-Master's Research	6
EN.625.807 & EN.625.808	Applied and Computational Mathematics Post-Master's Thesis and Applied and Computational Mathematics Post-Master's Thesis	6

Information Technology and Computation

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.609	Matrix Theory	3
EN.625.611	Computational Methods	3
EN.625.615	Introduction to Optimization	3
EN.625.616	Optimization in Finance	3
EN.625.617	Intro to Enumerative Combinatorics	3
EN.625.618	Discrete Hybrid Optimization	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.624	Network Models and Analysis	3
EN.625.633	Monte Carlo Methods	3
EN.625.638	Neural Networks	3
EN.625.661	Statistical Models and Regression	3
EN.625.665	Bayesian Statistics	3
EN.625.680	Cryptography	3
EN.625.685	Number Theory	3
EN.625.687	Applied Topology	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.695	Time Series Analysis	3
EN.625.725	Theory Of Statistics I	3
EN.625.726	Theory of Statistics II	3
EN.625.734	Queuing Theory with Applications to Computer Science	3
EN.625.740	Data Mining	3
EN.625.742	Theory of Machine Learning	3
EN.625.743	Stochastic Optimization & Control	3
EN.625.744	Modeling, Simulation, and Monte Carlo	3
EN.625.800	Independent Study	3
EN.625.801 & EN.625.802	Applied and Computational Mathematics Master's Research and Applied and Computational Mathematics Master's Research	6
EN.625.803 & EN.625.804	Applied and Computational Mathematics Master's Thesis and Applied and Computational Mathematics Master's Thesis	6
EN.625.805 & EN.625.806	Applied and Computational Mathematics Post-Master's Research and Applied and Computational Mathematics Post-Master's Research	6
EN.625.807 & EN.625.808	Applied and Computational Mathematics Post-Master's Thesis and Applied and Computational Mathematics Post-Master's Thesis	6

Operations Research

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.609	Matrix Theory	3
EN.625.615	Introduction to Optimization	3
EN.625.616	Optimization in Finance	3
EN.625.617	Intro to Enumerative Combinatorics	3
EN.625.618	Discrete Hybrid Optimization	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.624	Network Models and Analysis	3
EN.625.633	Monte Carlo Methods	3
EN.625.636	Graph Theory	3
EN.625.641	Mathematics of Finance	3
EN.625.642	Mathematics of Risk, Options, and Financial Derivatives	3
EN.625.661	Statistical Models and Regression	3
EN.625.662	Design and Analysis of Experiments	3
EN.625.663	Multivariate Statistics and Stochastic Analysis	3
EN.625.664	Computational Statistics	3
EN.625.665	Bayesian Statistics	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.695	Time Series Analysis	3
EN.625.714	Introductory Stochastic Differential Equations with Applications	3
EN.625.721	Probability and Stochastic Process I	3
EN.625.722	Probability and Stochastic Process II	3
EN.625.725	Theory Of Statistics I	3
EN.625.726	Theory of Statistics II	3
EN.625.734	Queuing Theory with Applications to Computer Science	3
EN.625.736	Combinatorial Optimization	3
EN.625.740	Data Mining	3
EN.625.741	Game Theory	3
EN.625.743	Stochastic Optimization & Control	3
EN.625.744	Modeling, Simulation, and Monte Carlo	3
EN.625.800	Independent Study	3

EN.625.801 & EN.625.802	Applied and Computational Mathematics Master's Research and Applied and Computational Mathematics Master's Research	6
EN.625.803 & EN.625.804	Applied and Computational Mathematics Master's Thesis and Applied and Computational Mathematics Master's Thesis	6
EN.625.805 & EN.625.806	Applied and Computational Mathematics Post-Master's Research and Applied and Computational Mathematics Post-Master's Research	6
EN.625.807 & EN.625.808	Applied and Computational Mathematics Post-Master's Thesis and Applied and Computational Mathematics Post-Master's Thesis	6

Probability and Statistics

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.617	Intro to Enumerative Combinatorics	3
EN.625.620	Mathematical Methods for Signal Processing	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.633	Monte Carlo Methods	3
EN.625.638	Neural Networks	3
EN.625.641	Mathematics of Finance	3
EN.625.642	Mathematics of Risk, Options, and Financial Derivatives	3
EN.625.651	Mathematical Models in Healthcare	3
EN.625.661	Statistical Models and Regression	3
EN.625.662	Design and Analysis of Experiments	3
EN.625.663	Multivariate Statistics and Stochastic Analysis	3
EN.625.664	Computational Statistics	3
EN.625.665	Bayesian Statistics	3
EN.625.680	Cryptography	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.692	Probabilistic Graphical Models	3
EN.625.695	Time Series Analysis	3
EN.625.710	Fourier Analysis with Applications to Signal Processing and Differential Equations	3
EN.625.714	Introductory Stochastic Differential Equations with Applications	3
EN.625.721	Probability and Stochastic Process I	3
EN.625.722	Probability and Stochastic Process II	3
EN.625.725	Theory Of Statistics I	3
EN.625.726	Theory of Statistics II	3
EN.625.728	Theory of Probability	3
EN.625.734	Queuing Theory with Applications to Computer Science	3
EN.625.740	Data Mining	3
EN.625.741	Game Theory	3
EN.625.742	Theory of Machine Learning	3
EN.625.743	Stochastic Optimization & Control	3
EN.625.744	Modeling, Simulation, and Monte Carlo	3
EN.625.800	Independent Study	3
EN.625.801 & EN.625.802	Applied and Computational Mathematics Master's Research and Applied and Computational Mathematics Master's Research	6
EN.625.803 & EN.625.804	Applied and Computational Mathematics Master's Thesis and Applied and Computational Mathematics Master's Thesis	6
EN.625.805 & EN.625.806	Applied and Computational Mathematics Post-Master's Research and Applied and Computational Mathematics Post-Master's Research	6
EN.625.807 & EN.625.808	Applied and Computational Mathematics Post-Master's Thesis and Applied and Computational Mathematics Post-Master's Thesis	6

Simulation and Modeling

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.604	Ordinary Differential Equations	3
EN.625.615	Introduction to Optimization	3
EN.625.616	Optimization in Finance	3
EN.625.618	Discrete Hybrid Optimization	3
EN.625.620	Mathematical Methods for Signal Processing	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.624	Network Models and Analysis	3
EN.625.633	Monte Carlo Methods	3
EN.625.638	Neural Networks	3
EN.625.641	Mathematics of Finance	3
EN.625.642	Mathematics of Risk, Options, and Financial Derivatives	3
EN.625.651	Mathematical Models in Healthcare	3
EN.625.661	Statistical Models and Regression	3
EN.625.662	Design and Analysis of Experiments	3
EN.625.663	Multivariate Statistics and Stochastic Analysis	3
EN.625.664	Computational Statistics	3
EN.625.665	Bayesian Statistics	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.695	Time Series Analysis	3
EN.625.714	Introductory Stochastic Differential Equations with Applications	3
EN.625.717	Advanced Differential Equations: Partial Differential Equations	3
EN.625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems	3
EN.625.721	Probability and Stochastic Process I	3
EN.625.722	Probability and Stochastic Process II	3
EN.625.725	Theory Of Statistics I	3
EN.625.726	Theory of Statistics II	3
EN.625.728	Theory of Probability	3
EN.625.740	Data Mining	3
EN.625.741	Game Theory	3

EN.625.743	Stochastic Optimization & Control	3
EN.625.744	Modeling, Simulation, and Monte Carlo	3
EN.625.800	Independent Study	3
EN.625.801 & EN.625.802	Applied and Computational Mathematics Master's Research and Applied and Computational Mathematics Master's Research	6
EN.625.803 & EN.625.804	Applied and Computational Mathematics Master's Thesis and Applied and Computational Mathematics Master's Thesis	6
EN.625.805 & EN.625.806	Applied and Computational Mathematics Post-Master's Research and Applied and Computational Mathematics Post-Master's Research	6
EN.625.807 & EN.625.808	Applied and Computational Mathematics Post-Master's Thesis and Applied and Computational Mathematics Post-Master's Thesis	6

Electives

Two electives may be from the Applied and Computational Mathematics (ACM) program or from another graduate program provided the courses have significant mathematical content. The following is a list of approved non-ACM electives. Electives from outside of this list must be approved by an advisor.

Code	Title	Credits
EN.525.605	Intermediate Electromagnetics	3
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.616	Communication Systems Engineering	3
EN.525.627	Digital Signal Processing	3
EN.525.645	Modern Navigation Systems	3
EN.525.661	UAV Systems and Control	3
EN.525.707	Error Control Coding	3
EN.525.721	Advanced Digital Signal Processing	3
EN.525.724	Introduction to Pattern Recognition	3
EN.525.762	Introduction to Wavelets	3
EN.525.770	Intelligent Algorithms	3
EN.525.776	Information Theory	3
EN.525.780	Multidimensional Digital Signal Processing	3
EN.535.621	Intermediate Fluid Dynamics	3
EN.555.627	Stochastic Processes and Applications to Finance	3
EN.555.642	Investment Science	3
EN.555.644	Introduction to Financial Derivatives	3
EN.555.645	Interest Rate and Credit Derivatives	3
EN.555.646	Financial Risk Management and Measurement	3
EN.555.647	Quantitative Portfolio Theory & Performance Analysis	3
EN.555.648	Financial Engineering and Structured Products	3
EN.575.608	Optimization Methods for Public Decision Making	3
EN.575.704	Applied Statistical Analysis and Design of Experiments for Environmental Applications	3
EN.585.719	Sparse Representations in Computer Vision and Machine Learning	3
EN.605.621	Foundations of Algorithms	3
EN.605.622	Computational Signal Processing	3
EN.605.633	Social Media Analytics	3
EN.605.645	Artificial Intelligence	3
EN.605.646	Natural Language Processing	3
EN.605.649	Introduction to Machine Learning	3
EN.605.671	Principles of Data Communications Networks	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.729	Formal Methods	3
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.765	Chaos and Its Applications	3
EN.615.769	Physics of Remote Sensing	3
EN.615.775	Physics of Climate	3
EN.685.648	Data Science	3
EN.695.615	Cyber Physical Systems Security	3
EN.695.641	Cryptology	3

*Please refer to the course schedule (*ep.jhu.edu/schedule (http://ep.jhu.edu/schedule/)*) published each term for exact dates, times, locations, fees, and instructors.*

Applied and Computational Mathematics, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in Applied and Computational Mathematics or a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Applied and Computational Mathematics. It is required that applicants have completed courses equivalent to EN.625.603 Statistical Methods and Data Analysis, and at least one of EN.625.601 Real Analysis or EN.625.609 Matrix Theory in prior graduate coursework (in or out of the prior master's degree).

Program Requirements

Five courses must be completed within five years. At least four of the five courses must be from the Applied and Computational Mathematics program and numbered EN.625.680 Cryptography or higher. At least three of these four courses must be at the 700- or 800-level, and at least one of the 700-level courses must be outside of the sequences:

Code	Title	Credits
EN.625.717 & EN.625.718	Advanced Differential Equations: Partial Differential Equations and Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems	6
EN.625.721 & EN.625.722	Probability and Stochastic Process I and Probability and Stochastic Process II	6
EN.625.725 & EN.625.726	Theory Of Statistics I and Theory of Statistics II	6

Students are allowed to take one mathematically oriented elective course from outside the ACM Program. Courses EN.625.601 Real Analysis, EN.625.603 Statistical Methods and Data Analysis, and EN.625.609 Matrix Theory may not be counted toward the certificate.

An independent study (EN.625.800 Independent Study), research project (EN.625.805 Applied and Computational Mathematics Post-Master's Research–EN.625.806 Applied and Computational Mathematics Post-Master's Research), or thesis (EN.625.807 Applied and Computational Mathematics Post-Master's Thesis–EN.625.808 Applied and Computational Mathematics Post-Master's Thesis) may be substituted for one or two of the 700-level courses outside of the 700-level core sequence. The course 625.800 Independent Study may not be used towards the ACM PMC if a student also wishes to count 625.805–806 or 625.807–808 towards the PMC. Only grades of B– or above can count toward the post-master's certificate. Course selections at the 800-level or outside these requirements are subject to advisor approval.

Applied Biomedical Engineering

The part-time Applied Biomedical Engineering program aims to educate and train practicing scientists and engineers to be able to carry out engineering-oriented research and development in the biomedical sciences. In addition to diverse student backgrounds, the program's most valuable strength lies in the active faculty currently involved in research and development.

Courses are offered at the Applied Physics Laboratory, Homewood campus, and online. Various electives are offered through the full-time Department of Biomedical Engineering and the School of Medicine.

Program Committee

Eileen Haase, Program Chair
Associate Teaching Professor, Biomedical Engineering
JHU Whiting School of Engineering

Brock Wester, Vice Program Chair
Senior Professional Staff
JHU Applied Physics Laboratory

Anil Maybhate
Senior Lecturer, Applied Biomedical Engineering
JHU Whiting School of Engineering

Larry Schramm
Professor of Biomedical Engineering
Johns Hopkins School of Medicine

Artin Shoukas
Professor Emeritus
Johns Hopkins School of Medicine

Leslie Tung
Professor of Biomedical Engineering
Johns Hopkins School of Medicine

Programs

- Applied Biomedical Engineering, Graduate Certificate (p. 1438)
- Applied Biomedical Engineering, Master of Science (p. 1439)
- Applied Biomedical Engineering, Post-Master's Certificate (p. 1441)

Courses

EN.585.601. Physiology for Applied Biomedical Engineering I. 3 Credits.
This two-semester sequence is designed to provide the physiological background necessary for advanced work in biomedical engineering. A quantitative model-oriented approach to physiological systems is stressed. First-term topics include the cell and its chemistry, transport and the cell membrane, properties of excitable tissue and muscle, the cardiovascular system, and the respiratory system. The second term course covers anatomy of the nervous system, structure and functions of the auditory and visual systems, motor systems, the kidney and gastrointestinal tract, and the neural and neuroendocrine control of the circulation.

EN.585.602. Physiology for Applied Biomedical Engineering II. 3 Credits.
This two-semester sequence is designed to provide the physiological background necessary for advanced work in biomedical engineering. A quantitative model-oriented approach to physiological systems is stressed. First-term topics include the cell and its chemistry, transport and the cell membrane, properties of excitable tissue and muscle, the cardiovascular system, and the respiratory system. The second term course covers anatomy of the nervous system, structure and functions of the auditory and visual systems, motor systems, the kidney and gastrointestinal tract, and the neural and neuroendocrine control of the circulation.

EN.585.607. Molecular Biology. 3 Credits.
The course is intended to serve as a fundamental introduction to cell and molecular biology. Topics generally included are basic chemistry and biochemistry of the cell; structure, function, and dynamics of macromolecules; cell organization; enzyme kinetics; membranes and membrane transport; biochemistry of cellular energy cycles, including oxidative phosphorylation; replication, transcription, and translation; regulation of gene expression; and recombinant DNA technology. Where appropriate, biomedical application and devices based on principles from cell and molecular biology are emphasized.

EN.585.613. Medical Sensors & Devices. 3 Credits.
This course covers the basic and advanced principles, concepts, and operations of medical sensors and devices. The origin and nature of measurable physiological signals are studied, including chemical, electrochemical, optical, and electromagnetic signals. The principles and devices to make the measurements, including a variety of electrodes and sensors, will be discussed first. This will be followed by a rigorous presentation of the design of appropriate electronic instrumentation. Therapeutic instrumentation such as pacemakers, defibrillators, and prosthetic devices will be reviewed. The final part of this course will cover emerging frontiers of cellular and molecular instrumentation and the use of micro- and nanotechnology in these biotechnology fields. The lectures will be followed by realistic experimentation in two laboratory sessions where students will obtain hands-on experience with electronic components, sensors, biopotential measurements, and testing of therapeutic instrumentation.

EN.585.615. Mathematical Methods. 3 Credits.
The course covers mathematical techniques needed to solve advanced problems encountered in applied biomedical engineering. Fundamental concepts are presented with emphasis placed on applications of these techniques to biomedical engineering problems. Topics include solution of ordinary differential equations using the Laplace transformation, Fourier series and integrals, solution of partial differential equations including the use of Bessel functions and Legendre polynomials and an introduction to complex analysis. Prerequisite(s): Familiarity with multi-variable calculus, linear algebra, and ordinary differential equations.

EN.585.616. Principles of Medical Instrumentation and Devices. 3 Credits.
Biomedical sensors and devices are an integral part of modern medicine and they are becoming increasingly important with the growing need for objectivity and accessibility in diagnostics and therapeutics. The science and technology that goes into the plethora of sensors, although highly interdisciplinary, mainly derives from basic principles in physics and electrical engineering. This course will (re)introduce these principles and illustrate the application of these principles in a number of classes of medical sensors. It will also review some of the basic ideas and constraints that go into making of a medical device and finally touch upon a few nontechnical principles in applications of medical devices. Course Note(s): Desirable background knowledge includes introductory level electrical engineering, circuit design, college level differential and integral calculus, and introductory human physiology.

EN.585.617. Rehabilitation Engineering. 3 Credits.
This course is an introduction to a field of engineering dedicated to improving the lives of people with disabilities. Rehabilitation engineering is the application of engineering analysis and design expertise to overcome disabilities and improve quality of life. A range of disabilities and assistive technologies will be investigated. The relationship between engineering innovation, the engineering design process, the human-technology interface, and the physical medicine and rehabilitation medical community will be explored. This course will require a semester long design project that addresses an unmet technological need. Students will choose a project with the instructor's approval. An engineering solution will be developed over the course of the semester through specification development, design reviews, and interacting with appropriate members of the medical community. There is a required visit to a local rehabilitation facility. For students who complete a software training module, access to a 3D printer will be available with assistance from an experienced designer. Prerequisite(s): An undergraduate engineering degree or permission of the instructor.

EN.585.619. Regulation of Medical Devices. 3 Credits.
Biomedical engineers are uniquely involved in many aspects of product development, from the inception of the idea to its delivery in the marketplace. This course will cover one major aspect of that process—the objectives and mechanisms of the FDA regulatory system governing the clinical use of medical devices in the United States, including regulatory pathways and device classification. Students will both analyze and discuss management of risk, and they will design controls related to cardiovascular, orthopedic, and neurological devices. By the end of the course, students will have a deep understanding of how the regulatory process is involved in every phase of medical device development.

EN.585.621. Advances in Pulmonary Therapeutics. 3 Credits.
Pulmonary diseases like chronic obstructive pulmonary disease cause a significant burden on the healthcare systems all over the world. For a biomedical engineer, it is therefore important to learn about state-of-the-art diagnostic and therapeutic technologies in pulmonary medicine. This online course introduces pathologies of the pulmonary system along with related preclinical and clinical research methodologies. Modules are designed to cover integration of respiratory physiology with molecular biology, biophysics, pathophysiology, medicine, and biomedical engineering. A combination of video lectures, virtual workshops, literature reviews, student presentations, and problem sets will be used in order to foster critical thinking skills required to address current challenges in respiratory medicine.

EN.585.631. Introduction to Biomechanics. 3 Credits.
This course will explore the human body, modeled as a mechanical system, and fundamental mechanical engineering principles that can be applied to answer questions about its structure and function. In this course, students will be introduced to tools, methods and models used in the biomechanics field. Topics covered will include deformable solid mechanics of the bone and soft tissues, fluid mechanics, statics and dynamics in musculoskeletal biomechanics applications, experimental biomechanics models, computational biomechanics models, and biomechanical sensors and signals. Students will be asked to survey and critique biomechanics research literature, solve simple biomechanics problems, and identify classical biomechanics fields and emerging biomechanics frontiers.Prerequisites:A background in physics or mechanical engineering as well as experience working in MATLAB is encouraged.

EN.585.635. Ethics in Biomedical Engineering Research and Management. 3 Credits.
Bioengineering focuses on the development and application of new technologies in biology and medicine. These technologies often have powerful effects on living systems at the microscopic and macroscopic level. They can provide great benefit to society, but they also can be used in dangerous or damaging ways. These effects may be positive or negative, and so it is critical that bioengineers understand the basic principles of ethics when thinking about how the technologies they develop can and should be applied. On a personal level, every bioengineer should understand the basic principles of ethical behavior in the professional setting. The goal of this semester course is to present the issues of professional conduct in the practice of engineering, research, publication, public and private disclosures, and in managing professional and financial conflicts. The course seeks to teach these concepts through didactic presentations, case studies, presentations of methods for problem solving in ethical matters, and classroom debates on contemporary ethical issues. Investigation of cases includes documentation of students' initial thoughts on issues, then systematic reflection on these thoughts through introduction of multiple perspectives, thought papers and in-class discussions. Case studies cover a wide variety of application areas, including genetic engineering, xenotransplantation, using animals in research, rights of patients and research subjects, and BME technology development.

EN.585.641. Cellular Engineering. 3 Credits.

EN.585.642. Network Science for Biomedical Engineers. 3 Credits.
Network science has emerged as a powerful tool for the study of systems which can be modeled as complex networks. In this course we will introduce the mathematical foundations of network science, with applications to biological networks. Students will learn to employ graph theoretic metrics for the analysis and characterization of complex network models. We will also study recent advancements in network science, including extensions to dynamical networks, multilayer networks and graph signal processing and their biomedical applications. After completing this course, students will be equipped with network science tools to analyze biological networks.

EN.585.685. Methods in Neurobiology. 3 Credits.
Neurobiology is the study of cells of the nervous system and the organization of these cells into functional circuits that process information and mediate behavior. In this course we will explore molecular and cellular aspects of neuronal physiology, their organization into higher systems and approach methodologies used to analyze CNS function at different levels. Such techniques will include recent progress in whole brain imaging, advances in fluorescence microscopy and optogenetics, the basics of single-cell sequencing and the use of cellular, organoids or animal models in neuroscience. We will also discuss deviations from neuronal physiology such as during aging or after onset of CNS related pathologies, including neurodegenerative diseases and approaches to cell reprogramming and regeneration in order to recover cellular function.At the end of this course, students will have a broader understanding on techniques used to study neuronal function at a molecular, cellular and systemic level and will have the basics insights to infer which tools are more appropriate depending on the application.
EN.585.601 AND EN.585.602 Physiology for Applied Biomedical Engineering I II

EN.585.702. Medical Device Innovation and Design. 3 Credits.
This course introduces you to the process of medical device design and innovation. You will learn the art and skill of identifying medical device opportunities through observations, interviews, and research. Through a combination of lectures, hands on activities, and interactions with clinical stakeholders, you will gain the ability to identify unmet, unarticulated, and underserved needs. Subsequently, you will learn the process of developing well thought out conceptual designs, that meet those needs. You will learn to apply an iterative approach towards innovation, by involving and engaging multiple stakeholders and their perspectives throughout the process. Throughout the course modules, you will also follow the journey of several innovative startups/products/ services, that started at JHU-CBID and went through the process outlined in this course.

EN.585.703. Applied Medical Image Processing. 3 Credits.
Developments in medical image acquisition systems such as magnetic resonance imaging (MRI), computed tomography (CT), and ultrasound have resulted in a large number of clinical images with rich information regarding structure and function of different organs in the human body. A challenging task would be to extract clinically relevant information from the raw images that can be used to identify disease at an early stage or to monitor response to treatment. This course briefly introduces the underlying physical foundation of different image modalities followed by presentation of concepts and techniques that are used to process and extract information from medical images. Topics that are covered include medical image formats, enhancement, segmentation, registration, and visualization. MATLAB scripting language will be introduced and used to implement basic algorithms.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers is required, or written permission from the instructor. EN.585.704 Principles of Medical Imaging is recommended. Preliminary knowledge of probability, linear algebra, and human anatomy is strongly recommended.

EN.585.704. Principles of Medical Imaging. 3 Credits.
The objective of this online course is to critically compare different modalities of medical imaging by exploring the electromagnetic spectrum and the acoustic spectrum. By the end of this course, students will be able to demonstrate understanding of each modality’s strengths, limitations, and applications. For each modality, we will examine the mathematical and physical foundations of the corresponding spectrum, image formation, image interpretation, image quality, and image processing. We will also evaluate and summarize current and future research trends in medical imaging.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers, or permission from the instructor. An introductory background in physics (electromagnetism) is recommended.

EN.585.708. Biomaterials. 3 Credits.
This course covers the fundamentals of the synthesis, properties, and biocompatibility of metallic, ceramic, polymeric, and biological materials that come in contact with tissue and biological fluids. Emphasis is placed on using biomaterials for both hard and soft tissue replacement, organ replacement, coatings and adhesives, dental implants, and drug delivery systems. New trends in biomaterials, such as electrically conductive polymers, piezoelectric biomaterials, and sol-gel processing are discussed, and the recent merging of cell biology and biochemistry with materials is examined. Case studies and in-class scenarios are frequently used to highlight the current opportunities and challenges of using biomaterials in medicine.

EN.585.709. Biomechanics of Cells and Stem Cells. 3 Credits.
The class starts with introductory lectures on the place of cell mechanics in the broader areas of cell biology, physiology, and biophysics, where the general topics of cell structure, motility, force generation, and interaction with the extracellular matrix are considered. The importance of the cell mechanical properties as indicators of the cell performance under normal and pathological conditions is emphasized. Major experimental techniques, such as micropipette aspiration, atomic force microscopy, and magnetic cytometry, to probe cell mechanical properties are presented. Linear elastic and viscoelastic models are introduced and applied to the interpretation of the mechanical experiments with endothelial cells and fibroblasts. Then the class discusses cell adhesion, spreading, and motility focusing on the experiments and models to estimate traction forces (stresses) produced by the cell. Finally, the effects of various mechanical factors (applied strains or forces, stiffness and viscoelastic properties, surface topography) on stem cell lineage commitment are discussed. Students also read and make presentations on original journal papers covering additional topics, which exposes them to the professional literature and hones their communication skills.

EN.585.710. Biochemical Sensors. 3 Credits.
This course covers the fundamental principles and practical aspects of chemical sensing of physiological signals. The focus of the course is on the electrochemistry and biophysical chemistry of biological sensing elements and their integration with signal transducers. Other topics covered include design and construction of practical sensors, processing and interpretation of signal outputs, and emerging technologies for biosensing.

EN.585.717. Rehabilitation Engineering II. 3 Credits.
This 2-course sequence is an introduction to a field of engineering dedicated to improving the lives of people with disabilities. Rehabilitation engineering is the application of engineering analysis and design expertise to overcome disabilities and improve quality of life. A range of disabilities and assistive technologies will be discussed and investigated. The relationship between engineering innovation, the engineering design process, the human-technology interface, and the physical medicine and rehabilitation medical community will be explored. This course sequence will require a 2-semester long design project that addresses an unmet technological need. Students will choose a project with the instructors' approvals. An engineering solution will be developed over the two courses through specification development, design reviews, and interacting with appropriate members of the medical community. Either live or virtual interaction with a rehab clinic is required. Access to a 3D printer will be available with assistance from an experienced designer.

EN.585.718. Biological Solid & Fluid Mechanics. 3 Credits.
The nonlinear mechanics of the arterial walls is analyzed as an important example of biological solid mechanics. After the introduction of the necessary background on matrices and tensors, the stresses and strains in the arterial wall are defined. Then, the fundamental concept of the strain energy function and its particular forms used in the vascular mechanics are introduced. The experiments (biaxial stretch and inflation-extension) aimed at the estimation of the wall material properties are discussed. In addition to the properties of the normal arterial wall, the mechanics in vascular diseases are studied. First, the stresses and stiffness in atherosclerotic arteries are analyzed, and then the effects of hypertension are discussed. In the second part of the class, the fluid mechanics of blood is studied, including the velocity profiles and shear stress distribution. The non-Newtonian features of blood rheology are presented as well. In the last part of the class, the cells in the blood circulation are considered with the main focus on the red blood cells. The micropipette experiment to estimate the elastic moduli of the red blood cell wall is studied in detail. The recent studies of the red blood cell circulation under pathological conditions (cancer, malaria) are discussed also. In all sections, the latest results of the computational modeling are used to support the main goals of the course. In addition to the regular (weekly) assignments, the students will be given original journal papers to discuss as a group. Finally, the students will be working on a computational project related to one of the major topics of the course.

EN.585.719. Sparse Representations in Computer Vision and Machine Learning. 3 Credits.
Sparse and redundant representations constitute a fascinating area of research in signal and image processing. This is a relatively young field that has been taking form for the last 15 years or so, with contributions from harmonic analysis, numerical algorithms and machine learning, and has been vastly applied to myriad of problems in computer vision and other domains. This course will focus on sparsity as a model for general data, generalizing many different other constructions or priors. This idea - that signals can be represented with just a few coefficients - leads to a long series of beautiful (and surprisingly, solvable) theoretical and numerical problems, and many applications that can benefit directly from the new developed theory. In this course we will survey this field, starting with the theoretical foundations and systematically covering the knowledge that has been gathered in the past years. This course will touch on theory, numerical algorithms, and applications in image processing and machine learning.
Mathematical Methods or equivalent

EN.585.720. Orthopedic Biomechanics. 3 Credits.
This course serves as an introduction to the field of orthopedic biomechanics for the biomedical engineer. Structure and function of the musculoskeletal system in the intact and pathologic states will be reviewed. Further discussion will focus on the design of orthopedic implants for the spine and the appendicular skeleton. Biomechanical principles of fracture repair and joint reconstruction will also be addressed. Peerreviewed journal publications will be used to explore the latest developments in this field.
EN.585.601 and EN.585.602 Physiology for Applied Biomedical Engineering I and II (or equivalent).

EN.585.721. Neural Data Science for Biomedical Engineers. 3 Credits.
In recent years, data science has revolutionized how we make sense and extract information from data. With recent advancements in neuroscience and availability of data, large amounts of data are available for scientists to analyze. In this course we aim to provide data science tools for the challenges encountered in neuroscience datasets, including noise, high dimensions, and lack of ground truth. We will introduce preprocessing pipelines for neural data from multiple modalities, methods for noise reduction, dimensionality reduction, hypothesis testing, spectral analysis, multivariate analysis, and graph theory. At the end of this course, students will be ready to analyze neural data from various recording techniques.

EN.585.722. Neural Connectomics. 3 Credits.

EN.585.724. Neural Prosthetics: Science, Technology, and Applications. 3 Credits.
This course addresses the scientific bases, technologies, and chronic viability of emerging neuroprosthetic devices. Examples include cochlear and retinal implants for sensory restoration, cortical and peripheral nervous system and brain-computer interface devices for deriving motor control and enabling afferent feedback, rehabilitative and therapeutic devices such as deep brain stimulators for Parkinson's disease, functional electrical stimulation systems for spinal cord injuries, and cognitive prosthetic systems for addressing brain trauma. Regulatory (FDA) challenges with emerging technologies and ethical considerations will also be addressed.

EN.585.725. Biomedical Engineering Practice and Innovation. 3 Credits.
This course will cover hands-on experimental and design work primarily in the areas of physiology, cell and tissue engineering, and biomedical instrumentation. In addition to teaching and allowing students to perform state-of-the art experimental techniques, this course will emphasize the business end of biomedical engineering innovation including identification of engineered needs and FDA regulation.
EN.585.601, EN.585.602 and EN.585.615

EN.585.726. Biomimetics in Biomedical Engineering. 3 Credits.
Biomimetics refers to human-made processes, substances, devices, or systems that imitate nature. This course focuses on substances prepared and engineered to meet biomedical uses. It is designed to provide students with: (1) an understanding of the biomimetic process of self-assembly, (2) an introduction to bioengineering biological materials and novel biomimetic materials that include forms and structures useful to bioprocesses, and (3) an understanding of how different instruments may be used for imaging, identification, and characterization of biological and biomimetic materials. Detailed knowledge of biological structure hierarchy is essential for most areas of biomedical engineering, and biological materials are becoming an increasingly important resource in creating new biomimetic materials that possess targeted biological structural and functional properties.

EN.585.729. Cell and Tissue Engineering. 3 Credits.
Cell and tissue engineering are dynamic and rapidly growing fields within biomedical engineering. This course will examine fundamental biological processes and medical engineering tools essential to regenerative medicine both at the singlecell and the whole-organism levels. Topics include stem cell engineering, cell–matrix and cell–scaffold interactions, cell–cell interactions and tissue morphogenesis, wound healing, and in vitro organogenesis. Prerequisite(s): Knowledge of basic molecular and cellular biology, physiology, and math through ordinary differential equations is required.

EN.585.732. Advanced Signal Processing for Biomedical Engineers. 3 Credits.
One of the defining topics for biomedical engineering, signal processing is playing an increasingly important role in modern times, mostly due to the ever-increasing popularity of portable, wearable, implantable, wireless, and miniature medical sensors/ devices. The primary function of all the medical devices is acquisition and analysis of some kind of physiological data, often in a semi continuous real-time manner. From a medical stand point, the benefits that the devices offer pertain to complementing the physician in diagnosis, prognosis, and therapeutics. High-quality signal processing algorithm is a vital part of this process. On the research side, accurate signal processing plays a fundamentally important role in a medical device's validation and translation from bench to bedside. Mastering this important topic can equip the student with skills that can be immediately applied in real-life technological innovations. This new online course will primarily focus on advanced topics in signal processing, including linear and nonlinear analysis of primary electro-physiological signals. Topics will include more traditional Auto-regressive Moving Average Analysis, spectral analysis, and singular value decomposition as well as advanced methods such as entropy computation, dimensionality estimation, state-space reconstruction, recurrence time analysis, parameter estimation, etc. Students will be challenged to write their own algorithms to reproduce select published research results.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering; EN.535.641 Mathematical Methods for Engineers; or written permission from the instructor. Knowledge of MATLAB is strongly recommended.

EN.585.734. Biophotonics. 3 Credits.
This course introduces the fundamental principles of biophotonics and their applications to real-world devices. In a combination of laboratory and classroom exercises, students will design optical systems for evaluation of optical properties of biological media and learn computational methods to simulate light transport in such media. Modern optical measurement techniques including fluorescence spectroscopy, optical coherence tomography, and confocal microscopy will be covered in detail.

EN.585.741. MR Imaging in Medicine. 3 Credits.
Advances in magnetic resonance Imaging (MRI) have resulted in developing techniques such as functional brain imaging, diffusion imaging, delayed contrast enhanced imaging, and tagged imaging. These techniques offer insights into the brain and cardiac structure and function. With increased availability of these techniques in clinical MRI machines, they are now entering clinical practice for the evaluation of neuro and cardiovascular disease. This course presents the underlying physical foundation of MRI, with a focus on more advanced techniques and their application in clinical research and practice. Topics that are covered include functional MRI, diffusion weighted imaging and techniques for mapping white matter fiber bundles, and cardiac cine and tagged imaging. Attention is also drawn to possible artifacts and pitfalls.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers or a written permission from the instructor.

EN.585.742. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed.Prerequisite(s): Knowledge of basic molecular and cellular biology, physiology, and math through ordinary differential equations is required.
EN.585.601 Applied Physiology I, EN.585.602 Applied Physiology II and EN.585.607 Molecular Biology

EN.585.743. Modeling Approaches to Cell and Tissue Engineering. 3 Credits.

EN.585.744. Biomedical Applications of Glycoengineering. 3 Credits.
Glycoengineering refers to the improvement of glycosylated molecules through manipulating their glycans (“glycans” is a broad term referring to sugars attached to proteins or lipids that includes all types of carbohydrates including monosaccharides, oligosaccharides, and polysaccharides). This course will cover the basic glycobiology of sugars and then focus on the manipulation of glycans for therapeutic purposes. Specific biomedical applications covered include the role of glycoengineering in the production and efficacy of therapeutic proteins (e.g., monoclonal antibodies); the impact of dietary sugars on human health; and the prospects for carbohydrate-based therapies for intractable human diseases such as metastatic cancer and neurological disorders such as Alzheimer’s disease. Suggested prerequisites include university level cellular biology, molecular biology, or biochemistry courses.

EN.585.747. Advances in Cardiovascular Medicine. 3 Credits.
This course is designed to provide in-depth instruction in cardiovascular physiology (building on the background provided in EN.585.601 Physiology for Applied Biomedical Engineering I) and cardiovascular responses to pathophysiological and environmental stressors. A quantitative, model-oriented approach to physiological responses is stressed. Students will research and present current advances in cardiovascular devices and procedures.
EN.585.601 Physiology for Applied Biomedical Engineering I; EN.585.602 Physiology for Applied Biomedical Engineering II or written permission from the instructor.

EN.585.751. Immunoengineering. 3 Credits.
Immunoengineering is a quickly growing field where engineering principles are used to better understand the dynamics of the immune system and enhance the efficacy of current immunotherapeutics. This course will provide relevant background in our understanding of various immune responses including to pathogens, self, allergens, cancer, and biomaterials. An in-depth engineering perspective and approach will be taken in the analysis of these responses and the development of novel therapeutics. Topics include systems immunology, genetic engineering, nanotechnology, hydrogels, biomaterials, vaccines, cancer immunotherapy, autoimmunity, tissue engineering, stem cells, viruses, bacteria, etc.

EN.585.761. Bioentrepreneurship. 3 Credits.
Through lectures, discussion, and business planning, students will learn how to assess the feasibility of a life sciences startup venture. Over the course of the semester students will evaluate financial and market opportunities, build financial projections and author a business plan. Students will debate a wide range of important issues facing entrepreneurs. As a class, students will identify opportunity, assess the skills and talents of successful entrepreneurs, and investigate models and approaches that help leaders navigate the uncertainties of entrepreneurship and creating new life science ventures. Projects relating to imaging, instrumentation, or translational tissue engineering would be eligible for inclusion.

EN.585.762. Computational Methods in Biomedical Engineering. 3 Credits.

EN.585.770. Global Health Engineering. 3 Credits.
Most biomedical engineers trained in low-resource settings are absorbed into the labor market as clinical engineers supporting hospitals. Once in hospitals, it has been difficult for these engineers to engage in scalable healthcare strengthening activity because they received siloed training that prevents them from adequately addressing the complex context of healthcare delivery. Additionally, many administrators and clinicians are not able to adequately engage clinical engineers because they are unaware of the scope of their activity and their role in healthcare delivery and healthcare strengthening. This course explores the scope of activity required of clinical engineers and their collaborators in poorly resourced healthcare settings. The objective of the course is to develop the core competencies required for clinical engineers to significantly impact the design and management of medical devices and healthcare systems. Topics include an analysis of the continuous engagement model for clinical engineering in low-resource settings, and the application of biomedical engineering design principles to quality management plans, device management plans, and capacity management plans.Prerequisite: Students should have completed one course within their focus area

EN.585.781. Frontiers in Neuroengineering. 3 Credits.
Neuroscientists and neuroengineers are using state-of-the-art tools for understanding the mysteries of the brain. A suite of new approaches is allowing researchers to tap into the brain activity and to measure the electrical, molecular, cellular, and structural changes that underlie complex behaviors as well as neurological disorders such as Alzheimer’s and Parkinson’s disease. This technological burst, spurred by the recent BRAIN (Brain Research for Advancing Innovative Neurotechnologies) Initiative by the US government, affords a unique educational opportunity at Johns Hopkins-especially with the recently inaugurated Kavli Neuroscience Discovery Institute. This multi-instructor course will give students an opportunity to learn the latest advances in the field of neuroengineering from the best experts on campus who are currently contributing their pioneering research in this field.Prerequisite(s): Written permission from the instructor is required. Completion of all required core courses, as well as the core courses for your chosen focus area, is strongly recommended.

EN.585.783. Introduction to Brain-Computer Interfaces. 3 Credits.
Recent advances in neural interfacing and neural imaging technology and the application of various signal processing methodologies have enabled us to better understand and then utilize brain activity for interacting with computers and other devices. In this course, we will explore these technologies and approaches for acquiring and then translating brain activity into useful information. We will also discuss the components of a brain-computer interface system, including invasive and noninvasive neural interfaces, the clinical and practical applications for a variety of users, and the ethical considerations of interfacing with the brain. Students will investigate the benefits and limitations of commonly used signal processing and machine learning methods (which include independent component analysis, Bayesian inference, dimensionality reduction, and information theoretic approaches), and then apply these methods on real neural data. We aim to equip students with the foundational knowledge and skills to pursue opportunities in the emerging field of brain-computer interfacing.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering; EN.535.641 Mathematical Methods for Engineers; or a written permission from the instructor. EN.585.732 Advanced Signal Processing for Biomedical Engineers and a good knowledge of MATLAB are strongly recommended.

EN.585.785. Computational Medicine: Cardiology. 3 Credits.
The goal of this course is to investigate the cardiovascular system using a quantitative, model-oriented approach. The course will address the unique cardiac features that allow for cardiac electrical conduction and the resulting blood flow in the circulatory system through a series of lectures, selected readings, and assignments. Topics are organized in two segments: (1) Electrophysiology focused on the biophysics of single-cell to organ systems in health and disease, (2) Cardiovascular mechanics and CNS regulation of blood circulation. Students will complete two research-based projects throughout the semester that each investigate emerging engineering technologies that are beginning to reshape the standards of clinical care.

EN.585.786. Psychophysiology. 3 Credits.
The measurement of psychophysiology, the physiological manifestations of psychological states, is practiced by collecting self-reports, by taking readings from instruments, and by assessing behaviors. In this course, we focus on the psychophysiological instrumentation employed in the study of emotion. Each module of this course is concerned with a locus or system of interest (including the face and eyes, and cardiopulmonary and integumentary systems), and is presented in three acts. In Act 1, we first review relevant affect science and physiology. Next, in Act 2, we examine the sensors to measure physiological changes attributable to affect. Concluding each module in Act 3, we discuss interpretation of these measurements. We close the course by considering topics in integrative psychophysiology: fusion across loci and systems, and the study of dyadic interaction.
EN.585.613 Medical Sensors and Devices or EN.585.616 Principles of Medical Instrumentation and Devices are strongly recommended.

EN.585.800. Independent Study I. 3 Credits.
This course is an individually tailored, supervised project that offers the student research experience through work on a special problem related to the student's specialty of interest. The research problem can be addressed experimentally or analytically. A written report is produced on which the grade is based. The applied biomedical engineering project proposal form must be completed prior to registration. Prerequisite(s): Permission of the instructor required.

EN.585.801. Independent Study II. 3 Credits.
The course permits the student to investigate possible research fields or pursue topics of interest through reading or nonlaboratory study under the direction of a faculty member. The applied biomedical engineering directed studies program proposal form must be completed prior to registration. Prerequisite(s): Permission of the instructor required.
EN.585.800 Independent Study I

Applied Biomedical Engineering, Graduate Certificate

Admission Requirements

Applicants must meet the general requirements for admission (p. 1414) to graduate study. Additionally, applicants are expected to hold a degree in engineering or in a related science field. The applicant's prior education must include the following prerequisites:

1. mathematics through ordinary differential equations;
2. calculus-based physics;
3. chemistry; and
4. signals and systems.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution. These prerequisite courses do not count toward the degree or certificate requirements. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

If you are an international applicant (p. 1414), you may have additional admission requirements.

Program Requirements

Four graduate courses must be completed within five years. One course is required from the biological sciences coursed listed below. One course is required from either the advanced mathematics or advanced engineering courses listed below. Two additional courses must come from any 600 or 700-level course (p. 1432) in the Applied Biomedical Engineering program.

Only one C-range grade (C+, C, or C−) can count toward the graduate certificate. Any course selections outside of the four required core courses are subject to advisor approval.

Code	Title	Credits
Biological Sciences		
Choose 1:		
EN.585.601	Physiology for Applied Biomedical Engineering I	3
EN.585.602	Physiology for Applied Biomedical Engineering II	3
EN.585.607	Molecular Biology	3
EN.585.685	Methods in Neurobiology	3
EN.585.710	Biochemical Sensors	3
EN.585.781	Frontiers in Neuroengineering	3
Advanced Mathematics and Advanced Engineering		
Choose 1 Advanced Mathematics Course:		

EN.585.615	Mathematical Methods	3
EN.535.641	Mathematical Methods For Engineers	3
Or Choose 1 Advanced Engineering Course: [1]		
EN.585.703	Applied Medical Image Processing	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.741	MR Imaging in Medicine	3
EN.585.704	Principles of Medical Imaging	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.718	Biological Solid & Fluid Mechanics	3
EN.535.661	Biofluid Mechanics	3
EN.535.663	Biosolid Mechanics	3
EN.605.647	Neural Networks	3

1 Many advanced engineering courses require EN.585.615 or EN.535.641 as a prerequisite.

Applied Biomedical Engineering, Master of Science

A focus area must be chosen for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section.

Applicants are expected to hold a degree in engineering in order to be admitted to the Master of Science in Applied Biomedical Engineering program. Those who majored in a related science or engineering field may also be accepted as candidates, provided their background is judged by the admissions committee to be equivalent to that stated above. Applicant's prior education should include the following prerequisites:

1. mathematics, through ordinary differential equations
2. calculus-based physics
3. chemistry
4. signals and systems

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. All prerequisite courses may be completed at Johns Hopkins Engineering or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered. Students who wish to refresh their knowledge may also take the prerequisite courses.

Program Requirements

Ten courses must be completed within five years. Students are required to choose a focus area to follow. The curriculum consists of five core courses; two biology/physiology courses, one math-based course, and two from the chosen focus area. Students choose five electives (at least four of the ten courses must be at the 700-level or higher). Electives may be substituted for the required core courses if the student has previously completed equivalent graduate-level courses or can demonstrate competency. Electives may be from the Applied Biomedical Engineering (585.xxx) program, or from the Department of Biomedical Engineering (580.xxx) in the full-time program, or preapproved courses listed under the electives. Students may take courses from other programs following approval by the Applied Biomedical Engineering chair or vice chair. All course selections outside of the Applied Biomedical Engineering program requirements are subject to advisor approval.

Courses

Code	Title	Credits
Prerequisite Courses		
EN.525.202	Signals and Systems	3
or EN.625.260	Introduction to Signals and Systems	
EN.625.201	General Applied Mathematics	3

Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

Core Courses

Code	Title	Credits
Select two of the following to demonstrate biology/physiology proficiency: [1]		
EN.585.601	Physiology for Applied Biomedical Engineering I	3
EN.585.602	Physiology for Applied Biomedical Engineering II	3
EN.585.607	Molecular Biology	3
EN.585.685	Methods in Neurobiology	3
EN.585.710	Biochemical Sensors	3
EN.585.781	Frontiers in Neuroengineering	3
Select one of the following to demonstrate math proficiency: [2]		
EN.585.615	Mathematical Methods	3
or EN.535.641	Mathematical Methods For Engineers	
EN.585.642	Network Science for Biomedical Engineers	3
EN.585.703	Applied Medical Image Processing	3
EN.585.704	Principles of Medical Imaging	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.718	Biological Solid & Fluid Mechanics	3
EN.585.721	Neural Data Science for Biomedical Engineers	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.741	MR Imaging in Medicine	3
EN.535.661	Biofluid Mechanics	3
EN.535.663	Biosolid Mechanics	3
EN.605.647	Neural Networks	3
Focus Areas		
Select one of the following:		
Biomechanics (p. 1440)		
Imaging (p. 1440)		
Medical Devices (p. 1440)		
NeuroEngineering (p. 1440)		
Translational Tissue Engineering (p. 1440)		

[1] With advisor approval, BME undergraduate degree recipients may waive this requirement if they have previously covered this material. However, any waived courses must be replaced with an elective course.
[2] With advisor approval, students may waive this requirement if they have previously covered this material. However, any waived courses must be replaced with an elective course.

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a focus area to follow. The focus areas are presented as an aid to students in planning their course schedules and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

BIOMECHANICS

Code	Title	Credits
Core option		
EN.585.631	Introduction to Biomechanics	3
or EN.585.720	Orthopedic Biomechanics	
Select at least one of the following:		
EN.585.725	Biomedical Engineering Practice and Innovation (highly recommended)	3
EN.585.621	Advances in Pulmonary Therapeutics	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.710	Biochemical Sensors	3
EN.585.718	Biological Solid & Fluid Mechanics	3
EN.585.726	Biomimetics in Biomedical Engineering	3
EN.585.747	Advances in Cardiovascular Medicine	3
EN.585.751	Immunoengineering	3
EN.585.761	Bioentrepreneurship	3
EN.585.770	Global Health Engineering	3
EN.535.661	Biofluid Mechanics	3
EN.535.663	Biosolid Mechanics	3

Imaging

Code	Title	Credits
Core Course		
EN.585.704	Principles of Medical Imaging	3
Select at least one of the following:		
EN.585.725	Biomedical Engineering Practice and Innovation (highly recommended)	3
EN.585.616	Principles of Medical Instrumentation and Devices	3
EN.585.703	Applied Medical Image Processing	3
EN.585.710	Biochemical Sensors	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.741	MR Imaging in Medicine	3
EN.585.747	Advances in Cardiovascular Medicine	3
EN.585.761	Bioentrepreneurship	3
EN.585.770	Global Health Engineering	3

Medical devices

Code	Title	Credits
Core Courses		
EN.585.613	Medical Sensors & Devices	3
or EN.585.616	Principles of Medical Instrumentation and Devices	
Select at least one of the following:		
EN.585.725	Biomedical Engineering Practice and Innovation (highly recommended)	3
EN.585.617	Rehabilitation Engineering	3
EN.585.621	Advances in Pulmonary Therapeutics	3
EN.585.642	Network Science for Biomedical Engineers	3
EN.585.720	Orthopedic Biomechanics	3
EN.585.721	Neural Data Science for Biomedical Engineers	3
EN.585.724	Neural Prosthetics: Science, Technology, and Applications	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.734	Biophotonics	3
EN.585.747	Advances in Cardiovascular Medicine	3
EN.585.761	Bioentrepreneurship	3
EN.585.770	Global Health Engineering	3
EN.585.781	Frontiers in Neuroengineering	3
EN.585.783	Introduction to Brain-Computer Interfaces	3
EN.585.786	Psychophysiology	3

neuroengineering

Code	Title	Credits
Core Course		
EN.585.781	Frontiers in Neuroengineering	3
Select at least one of the following:		
EN.585.725	Biomedical Engineering Practice and Innovation (highly recommended)	3
EN.585.642	Network Science for Biomedical Engineers	3
EN.585.685	Methods in Neurobiology	3
EN.585.710	Biochemical Sensors	3
EN.585.721	Neural Data Science for Biomedical Engineers	3
EN.585.724	Neural Prosthetics: Science, Technology, and Applications	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.734	Biophotonics	3
EN.585.761	Bioentrepreneurship	3
EN.585.770	Global Health Engineering	3
EN.585.783	Introduction to Brain-Computer Interfaces	3
EN.585.786	Psychophysiology	3
EN.605.613	Introduction to Robotics	3
EN.605.647	Neural Networks	3

Translational Tissue Engineering

Code	Title	Credits
Core Course		
EN.585.729	Cell and Tissue Engineering	3
Select at least one of the following:		

EN.585.725	Biomedical Engineering Practice and Innovation (highly recommended)	3
EN.585.617	Rehabilitation Engineering	3
EN.585.621	Advances in Pulmonary Therapeutics	3
EN.585.631	Introduction to Biomechanics	3
EN.585.708	Biomaterials	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.710	Biochemical Sensors	3
EN.585.718	Biological Solid & Fluid Mechanics	3
EN.585.720	Orthopedic Biomechanics	3
EN.585.724	Neural Prosthetics: Science, Technology, and Applications	3
EN.585.726	Biomimetics in Biomedical Engineering	3
EN.585.747	Advances in Cardiovascular Medicine	3
EN.585.751	Immunoengineering	3
EN.585.770	Global Health Engineering	3

Electives

Code	Title	Credits
EN.585.613	Medical Sensors & Devices	3
EN.585.616	Principles of Medical Instrumentation and Devices	3
EN.585.617	Rehabilitation Engineering	3
EN.585.619	Regulation of Medical Devices	3
EN.585.621	Advances in Pulmonary Therapeutics	3
EN.585.631	Introduction to Biomechanics	3
EN.585.642	Network Science for Biomedical Engineers	3
EN.585.703	Applied Medical Image Processing	3
EN.585.704	Principles of Medical Imaging	3
EN.585.708	Biomaterials	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.710	Biochemical Sensors	3
EN.585.718	Biological Solid & Fluid Mechanics	3
EN.585.720	Orthopedic Biomechanics	3
EN.585.721	Neural Data Science for Biomedical Engineers	3
EN.585.724	Neural Prosthetics: Science, Technology, and Applications	3
EN.585.726	Biomimetics in Biomedical Engineering	3
EN.585.729	Cell and Tissue Engineering	3
EN.585.732	Advanced Signal Processing for Biomedical Engineers	3
EN.585.734	Biophotonics	3
EN.585.741	MR Imaging in Medicine	3
EN.585.747	Advances in Cardiovascular Medicine	3
EN.585.751	Immunoengineering	3
EN.585.761	Bioentrepreneurship	3
EN.585.770	Global Health Engineering	3
EN.585.781	Frontiers in Neuroengineering	3
EN.585.783	Introduction to Brain-Computer Interfaces	3
EN.585.786	Psychophysiology	3
EN.585.800	Independent Study I	3
EN.585.801	Independent Study II	3
EN.525.786	Human Robotics Interaction	3
EN.580.430	Systems Pharmacology and Personalized Medicine [3]	4
EN.580.451	Cell and Tissue Engineering Lab [3]	3
EN.580.452	Cell and Tissue Engineering Lab [3]	3
EN.580.488	Foundations of Computational Biology and Bioinformatics [3]	3
EN.580.625	Structure and Function of the Auditory and Vestibular Systems [3]	3
EN.580.628	Topics in Systems Neuroscience [3]	1
EN.580.639	Models of the Neuron [3]	4
EN.580.641	Cellular Engineering [3]	4
EN.580.642	Tissue Engineering [3]	3
EN.580.682	Precision Care Medicine III [3]	3
EN.580.688	Foundations of Computational Biology and Bioinformatics [3]	3
EN.580.691	Learning, Estimation and Control [3]	3
EN.580.771	Principles of the Design of Biomedical Instrumentation [3]	4
EN.605.653	Computational Genomics	3
EN.605.656	Computational Drug Discovery,Dev	3
EN.605.755	Systems Biology	3

[3] EN.580.xxx courses are offered during the day through the full-time Department of Biomedical Engineering at the Homewood Campus or at the School of Medicine. Tuition rates for the full-time program differ from the EP tuition rate.

Please refer to the course schedule (ep.jhu.edu/schedule (https://ep.jhu.edu/schedule/)) *published each term for exact dates, times, locations, fees, and instructors*.

Applied Biomedical Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Applied Biomedical Engineering.

Program Requirements

Five courses must be completed within five years. At least four of the five courses must be from the Applied Biomedical Engineering (585.xxx) program, and at least two of the courses must be at the 700-level. Students are allowed to take one elective course. Courses from the full-time program and/or medical school (580.xxx) may be substituted. Only grades of B– and above may count toward the post-master's certificate. Focus areas are not available for students pursuing certificates. All course selections outside of the Applied Biomedical Engineering program are subject to advisor approval.

Applied Physics

The part-time Applied Physics program bridges the gap between pure physics and engineering by providing courses and independent study options covering a wide variety of technical and scientific phenomena. Working professionals develop skills appropriate for their careers in technical research or advanced graduate study. One of the program's strengths is its faculty, who are primarily drawn from the Johns Hopkins Applied Physics Laboratory and government agencies, and other universities. Faculty interests are in materials, ocean sciences, optics, solid-state physics, sensors, and space sciences.

Courses are offered primarily online either in an asynchronous or synchronous mode with a few courses offered face-to-face at the Applied Physics Laboratory.

Program Committee

Harry K. Charles Jr., Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

William E. Torruellas, Vice Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

David L. Porter
Principal Professional Staff
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James B. Spicer
Program Chair, Materials Science and Engineering
Professor, Materials Science & Engineering
JHU Whiting School of Engineering

Michael E. Thomas
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Applied Physics, Master of Science (p. 1447)
- Applied Physics, Post-Master's Certificate (p. 1448)

Courses

EN.615.611. Classical Physics. 3 Credits.
This course provides the graduate student in Applied Physics with a review of the basic core topics in classical physics, presented at an entry graduate level. The basic subfields covered are classical mechanics (including fluids and acoustics), thermal (and statistical) physics, electromagnetism (including plasmas and relativity), and optics. The four major core topics (in italics) are treated in roughly equal depth. For each topic covered, the fundamental physical laws are introduced to establish a rigorous but intuitive understanding of the basic physics, which is reinforced with hands-on demonstrations and relevant homework assignments. A final exam will also cover the core concepts and principles to check the student's understanding of the key concepts presented. In addition, each student will delve into one subtopic of their own choosing, according to their interest and needs, treating it in more depth as an extended homework assignment, which will be submitted in written form and given as a brief oral presentation before the end of the semester. This course will complement the modern physics course as well as the advanced mathematical methods course offered in the Applied Physics program. Prerequisite(s): An undergraduate degree in physics, engineering, or a related field.

EN.615.621. Electric Power Principles. 3 Credits.
This is an introductory course on electric power, its distribution, and its applications. The first half of the course focuses on the physics of electric power and its generation, with an emphasis on distribution and distribution systems. Topics to be covered include AC voltages and currents, transmission lines, mono- and poly-phase systems, and losses due to electromagnetic forces. The second half of the course is directed toward applications. Specific applications covered include system analysis and protection, power electronics, induction and permanent magnet motors, transformers, etc. At least one lecture will be used to bring all the concepts together by studying the implementation of an alternative power generation system using wind turbines. During the course of the term, several research papers on power generation and distribution will be read and summarized by the students. A term paper on an electric power subject may be required. Prerequisite(s): An undergraduate degree in physics, engineering, or a related field.

EN.615.641. Mathematical Methods for Physics and Engineering. 3 Credits.
This course covers a broad spectrum of mathematical techniques essential to the solution of advanced problems in physics and engineering. Topics include ordinary and partial differential equations, contour integration, tabulated integrals, saddlepoint methods, linear vector spaces, boundary-value problems, eigenvalue problems, Green's functions, integral transforms, and special functions. Application of these topics to the solution of problems in physics and engineering is stressed. Prerequisite(s): Vector analysis and ordinary differential equations (linear algebra and complex variables recommended).

EN.615.642. Electromagnetics. 3 Credits.
Maxwell's equations are derived and applied to the study of topics including electrostatics, magnetostatics, propagation of electromagnetic waves in vacuum and matter, antennas, wave guides and cavities, microwave networks, electromagnetic waves in plasmas, and electric and magnetic properties of materials. Prerequisite(s): Knowledge of vector analysis, partial differential equations, Fourier analysis, and intermediate electromagnetics.

EN.615.644. Physics of Space Systems I. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. This class presents the fundamental technical background, current state of the art, and example applications in the development of space systems. Topics include systems engineering, space environment, astrodynamics, propulsion and launch vehicles, attitude determination and control, and space power systems. This course is team taught by experts in their respective fields. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Course Note(s): This course may be taken for 700-level credit with the additional requirement of a research paper. See EN.615.744 Physics of Space Systems I.

EN.615.645. Physics of Space Systems II. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. The course presents the technical background, current state of the art, and example applications in the development of space systems. Topics include spacecraft thermal control, spacecraft configuration and structural design, space communications, risk analysis, command and telemetry systems, spacecraft computer systems, systems integration and test, and space mission operations. This course is team taught by experts in their respective fields. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Although preferable, it is not necessary to have taken EN.615.644 Physics of Space Systems I or EN.615.744 Physics of Space Systems I. Course Note(s): This course may be taken for 700-level credit with the additional requirement of a research paper. See EN.615.745 Fundamentals of Space Systems and Subsystems II.

EN.615.646. Physics of Magnetism. 3 Credits.
This is an introductory course on the magnetic properties of materials and magnetic systems. The emphasis of the course is a mastery of the physics of magnetism along with detailed examples and applications. A basic review of magnetic fields and various classical applications is given. Topics include the physics of paramagnetism, diamagnetism, and ferromagnetism. The magnetism of metals is presented along with discussion of Landau levels and the quantum Hall effect. Various applications are presented in detail, including: magnetic resonance, spectroscopic techniques, magnetoresistance, and spintronics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline. Prior knowledge of electromagnetic interactions would be helpful but is not required.

EN.615.647. Fundamentals of Sensors. 3 Credits.
Students will receive an overview of sensors and methods to build networks and systems using sensors. The physics of detectors including fundamental technologies and sampling interfaces will be discussed. Sensor technologies for chemical, biological, nuclear, and radiological detection will be studied in detail. Evaluation methods will be presented for sensor selection based on application-specific information including sensor performance, environmental conditions, and operational impact. DODAF 2.0 methods will be taught and a project based on several viewpoints will be required and presented. Additional studies will include methods for combining results from various sensors to increase detection confidence. As part of the course, students will be given a threat scenario and will be required to select a sensor suite and networking information to design a hypothetical system considering the threat, sensor deployment cost, and logistics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.648. Alternate Energy Technology. 3 Credits.
Energy availability and its cost are major concerns to every person. Fossil fuels in general and oil in particular are limited and the world's reserves are depleting. The question asked by many is, "Are there alternatives to the fossil fuel spiral (dwindling supplies and rising costs)?" This course addresses these alternative energy sources. It focuses on the technology basis of these alternate energy methods, as well as the practicality and the potential for widespread use and economic effectiveness. Energy technologies to be considered include photovoltaics, solar thermal, wind energy, geothermal and thermal gradient sources, biomass and synthetic fuels, hydroelectric, wave and tidal energy, and nuclear. The associated methods of energy storage will also be discussed. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.651. Statistical Mechanics and Thermodynamics. 3 Credits.
After a brief historical review of thermodynamics and statistical mechanics, the basic principles of statistical mechanics are presented. The classical and quantum mechanical partition functions are discussed and are subsequently used to carry out derivations of the basic thermodynamic properties of several different systems. Topics discussed include Planck's black body radiation derivation and the Einstein-Debye theories of the specific heats of solids. The importance of these topics in the development and confirmation of quantum mechanics is also examined. Other topics discussed include Fermi Dirac and the Bose-Einstein statistics and the cosmic background radiation. The importance of comparisons between theory and data is stressed throughout.

EN.615.653. Classical Mechanics. 3 Credits.
This is an advanced course in classical mechanics that introduces techniques that are applicable to contemporary pure and applied research. The material covered provides a basis for a fundamental understanding of not only quantum and statistical mechanics but also nonlinear mechanical systems. Topics include the Lagrangian and Hamiltonian formulation of classical mechanics, Euler's rigid body equations of motion, Hamilton-Jacobi theory, and canonical perturbation theory. These methods are applied to force-free motion of a rigid body, oscillations of systems of coupled particles, and central force motion including the Kepler problem and scattering in a Coulomb potential. Applications are emphasized through in-class examples and homework. Intermediate mechanics and EN.615.641 Mathematical Methods for Physics and Engineering.

EN.615.654. Quantum Mechanics. 3 Credits.
This course presents the basic concepts and mathematical formalism of quantum mechanics. Topics include the mathematics of quantum mechanics, the harmonic oscillator and operator methods, quantum mechanics in three dimensions and angular momentum, quantum mechanical spin, quantum statistical mechanics, approximation methods, and quantum theory of scattering.
EN.615.641 Mathematical Methods for Physics and Engineering or the equivalent.EN.615.653 Classical Mechanics

EN.615.655. Orbital and Celestial Mechanics. 3 Credits.
This course will focus on the study of orbital and celestial mechanics, using many of the methods that are covered in a traditional advanced mechanics course. We will look primarily at closed form and approximation methods (as opposed to numerical solutions) in a wide variety of problems in orbital and celestial mechanics. Space engineering and applied physics students who take this class will be well-versed in fundamentals that can then be leveraged in more advanced future space applications. Topics will include Newtonian Mechanics, Newtonian Gravitation, Central Force Orbits (with a focus on Keplerian Orbits), Orbital & Interplanetary Maneuvers, Non-inertial Reference Frames, the Lagrangian Formalism, Rigid Body Rotation, the Three Body Problem, Approximation Methods for Orbits, and Lunar Motion. Discussions will include the historical figures in physics who contributed significantly to the topics discussed.
EN.615.641 Mathematical Methods for Physics and Engineering or EN.675.650 Mathematics for Space Systems

EN.615.662. Introduction to Astrophysics. 3 Credits.
In this course we explore the properties of stellar interiors in order to understand stellar structure and evolution. Our emphasis will be on the fundamental physics of matter and radiation at high pressure and temperature. Topics will include star formation by gravitational collapse, thermodynamics of matter and radiation, hydrostatic equilibrium, radiative and convective heat transport, energy production in stars (burning of Hydrogen, Helium, and advanced burning), endpoints of stellar evolution (white dwarfs, neutron stars, and black holes). Familiarity with multi-variable calculus, classical mechanics, thermodynamics, statistical mechanics, and quantum mechanics at the undergraduate level is required.

EN.615.665. Modern Physics. 3 Credits.
This course covers a broad spectrum of topics related to the development of quantum and relativity theories. The understanding of modern physics and its applications is essential to the pursuit of advanced work in materials, optics, and other applied sciences. Topics include the special theory of relativity, particle-like properties of light, wave-like properties of particles, wave mechanics, atomic and nuclear phenomena, elementary particles, statistical physics, solid state, astrophysics, and general relativity.Prerequisite(s): Undergraduate degree in physics or engineering.

EN.615.671. Principles Of Optics. 3 Credits.
This course teaches the student the fundamental principles of geometrical optics, radiometry, vision, and imaging and spectroscopic instruments. It begins with a review of basic, Gaussian optics to prepare the student for advanced concepts. From Gaussian optics, the course leads the students through the principles of paraxial ray-trace analysis to develop a detailed understanding of the properties of an optical system. The causes and techniques for the correction of aberrations are studied. The course covers the design principles of optical Instruments, telescopes, microscopes, etc. The techniques of light measurement are covered in sessions on radiometry and photometry. Prerequisite(s): Undergraduate degree in physics or engineering.

EN.615.680. Materials Science. 3 Credits.
This course covers a broad spectrum of materials-related topics designed to prepare the student for advanced study in the materials arena. Topics include atomic structure, atom and ionic behavior, defects, crystal mechanics, strength of materials, material properties, fracture mechanics and fatigue, phase diagrams and phase transformations, alloys, ceramics, polymers, and composites. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.731. Photovoltaic & Solar Thermal Energy Conversion. 3 Credits.
This is an advanced course in the application of science and technology to the field of solar energy in general and photovoltaic and solar thermal energy systems in particular. The foundations of solar energy are described in detail to provide the student with the knowledge to evaluate and/or design complete solar thermal or photovoltaic energy systems. Topics range from the theoretical physical basics of solar radiation to the advanced design of both photovoltaic and solar thermal energy collectors. A major feature of the course is the understanding and design of semiconducting photovoltaic devices (solar cells). Solar cell topics include semiconductors, analysis of p-n junction, Shockley-Queisser limit, non-radiative recombination processes, antireflection coating, crystalline silicon solar cells, thin-film solar cells, and rechargeable batteries. Solar thermal energy topics include solar heat collectors, solar water heaters, solar power systems, sensible heat energy storage, phase transition thermal storage, etc. The course will also present optimizing building designs for a solar energy system. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.744. Physics of Space Systems I. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. This class presents the fundamental technical background, current state of the art, and example applications in the development of space systems. Topics include systems engineering, space environment, astrodynamics, propulsion and launch vehicles, attitude determination and control, and space power systems. This course is team taught by experts in their respective fields and requires a research paper. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Course Note(s): This course may be taken for 600-level credit with the additional requirement of a research paper. See EN.615.644 Physics of Space Systems I.

EN.615.745. Physics of Space Systems II. 3 Credits.
This course examines the fundamentals necessary to design and develop space experiments and space systems. The course presents the theoretical background, current state of the art, and examples of the disciplines essential to developing space instrumentation and systems. Experts in the field will cover the following topics: spacecraft attitude determination and control, space communications, satellite command and telemetry systems, satellite data processing and storage, and space systems integration and testing. This course requires the completion of a research paper. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Although preferable, it is not necessary to have taken EN.615.644 Physics of Space Systems I or EN.615.744 Physics of Space Systems I Course Note(s): This course is also offered for 600-level credit and does not require completion of a research paper. See EN.615.645 Physics of Space Systems II.

EN.615.747. Sensors and Sensor Systems. 3 Credits.
The primary objective of this course is to present recent advances made in the field of sensors. A broad overview includes optical, infrared, hyperspectral, terahertz, biological, magnetic, chemical, acoustic, and radiation sensors. The course will examine basic sensor operation and the implementation of sensors in measurement systems. Other topics to be covered are physical principles of sensing, interface electronic circuits, and sensor characteristics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.748. Introduction to Relativity. 3 Credits.
After a brief review of the theory of special relativity, the mathematical tools of tensor calculus that are necessary for understanding the theory of general relativity will be developed. Relativistic perfect fluids and their stress-energymomentum tensor will be defined, and Einstein's field equations will be studied. Gravitational collapse will be introduced, and the Schwarzschild Black Hole solution will be discussed.

EN.615.751. Modern Optics. 3 Credits.
This course covers the fundamental principles of modern physical optics and contemporary optical systems. Topics include propagation of light, polarization, coherence, interference, diffraction, Fourier optics, absorption, scattering, dispersion, and image quality analysis. Special emphasis is placed on the instrumentation and experimental techniques used in optical studies.
EN.615.642 Electromagnetics or the equivalent completed or taken concurrently.

EN.615.753. Plasma Physics. 3 Credits.
This course is an introduction to the physical processes that govern the "fourth state of matter", also known as plasma. Plasma physics is the study of ionized gas, which is the state of the matter for 99.9% of the apparent universe, from astrophysical plasmas, to the solar wind and Earth's radiation belts and ionosphere. Plasma phenomena are also relevant to energy generation by controlled thermonuclear fusion. The challenge of plasma physics comes from the fact that many plasma properties result from the long-range Coulomb interaction, and therefore are collective properties that involve many particles simultaneously. Topics to be covered during class include motion of charged particles in electric and magnetic fields, dynamics of fully ionized plasma from both microscopic and macroscopic points of view, magneto-hydrodynamics, equilibria, waves, instabilities, applications to fusion devices, ionospheric, and space physics. .
EN.615.642 Electromagnetics or the equivalent

EN.615.755. Space Physics. 3 Credits.
This course studies the physics and the history of our utilization of space, the challenges and mitigation of making in situ observations in space. Topics include the history of solar system exploration; the solar cycle; the electrodynamics of the solar upper atmosphere responsible for the solar wind; and the solar wind interaction with unmagnetized and magnetized bodies—how this leads to planetary bow shocks, comets, and magnetospheres and how they are studied. Practical issues include penetrating radiation and its effects on spacecraft and man in space, magnetospheric storm disruptions of ground power distribution and spacecraft charging in the presence and absence of solar illumination with particular reference to applying this knowledge in exploring the outer solar system and beyond.
EN.615.642 Electromagnetics or the equivalent.

EN.615.757. Solid State Physics. 3 Credits.
Students examine concepts and methods employed in condensed matter physics with applications in materials science, surface physics, and electronic devices. Topics include atomic and electronic structure of crystalline solids and their role in determining the elastic, transport, and magnetic properties of metals, semiconductors, and insulators. The effects of structural and chemical disorder on these properties are also discussed.
EN.615.654 Quantum Mechanics or the equivalent.

EN.615.760. Physics of Semiconductor Devices. 3 Credits.
This course examines the physical principles underlying semiconductor device operation and the application of these principles to specific devices. Emphasis is placed on understanding device operation, rather than on circuit properties. Topics include elementary excitations in semiconductors such as phonons, photons, conduction electrons, and holes; charge and heat transport; carrier trapping and recombination; effects of high doping; contacts; the pn junction; the junction transistor; surface effects; the MIS diode; and the MOSFET. Nanotechnology as applied to electronics will be discussed. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline. Some familiarity with quantum mechanics would be helpful.

EN.615.761. Intro To Oceanography. 3 Credits.
This course covers the physical concepts and mathematics of the exciting field of oceanography and can be taken as an elective. It is designed for the student who wants to learn more about oceanography. Topics range from fundamental small waves to planetary-scale ocean currents. There will be a strong emphasis on understanding the basic ocean processes. Initial development gives a description of how the ocean system works and the basic governing equations. Additional subjects include boundary layers, flow around objects (seamounts), waves, tides, Ekman flow, and the Gulf Stream. Also studied will be the ocean processes that impact our climate such as El Nino and the Thermohaline Conveyor Belt. Prerequisite(s): Mathematics through calculus.

EN.615.762. Applied Computational Electromagnetics. 3 Credits.
This course introduces the numerical methods and computer tools required for the practical applications of the electromagnetic concepts covered in EN.615.642 to daily-life engineering problems. It covers the methods of calculating electromagnetic scattering from complex air and sea targets (aircraft, missiles, ships, etc.), taking into account the effects of the intervening atmosphere and natural surfaces such as the sea surface and terrain. These methods have direct applications in the areas of radar imaging, communications, and remote sensing. Methods for modeling and calculating long-distance propagation over terrain and in urban areas, which find application in the areas of radar imaging, radio and TV broadcasting, and cellular communications, are also discussed. The numerical toolkit built in this course includes the method of moments, the finite difference frequency and time domain methods, the finite element method, marching numerical methods, iterative methods, and the shooting and bouncing ray method. Prerequisite(s): Knowledge of vector analysis, partial differential equations, Fourier analysis, basic electromagnetics, and a scientific computer language.

EN.615.765. Chaos and Its Applications. 3 Credits.
The course will introduce students to the basic concepts of nonlinear physics, dynamical system theory, and chaos. These concepts will be studied by examining the behavior of fundamental model systems that are modeled by ordinary differential equations and, sometimes, discrete maps. Examples will be drawn from physics, chemistry, and engineering. Some mathematical theory is necessary to develop the material. Practice through concrete examples will help to develop the geometric intuition necessary for work on nonlinear systems. Students conduct numerical experiments using provided software, which allows for interactive learning. Prerequisite(s): Mathematics through ordinary differential equations. Familiarity with MATLAB is helpful. Consult instructor for more information.

EN.615.769. Physics of Remote Sensing. 3 Credits.
This course exposes the student to the physical principles underlying satellite observations of Earth by optical, infrared, and microwave sensors, as well as techniques for extracting geophysical information from remote sensor observations. Topics will include spacecraft orbit considerations, fundamental concepts of radiometry, electromagnetic wave interactions with land and ocean surfaces and Earth's atmosphere, radiative transfer and atmospheric effects, and overviews of some important satellite sensors and observations. Examples from selected sensors will be used to illustrate the information extraction process and applications of the data for environmental monitoring, oceanography, meteorology, and climate studies.

EN.615.772. Cosmology. 3 Credits.
This course begins with a brief review of tensor calculus and principles of the General theory of relativity, the Freidmann equation and the Robertson-Walker metric. Cosmological models including radiation, matter, and the cosmological constant and their properties are discussed. Observational parameters, the role of dark matter, and the cosmic microwave background, and nucleosynthesis in the early universe are studied. The flatness and the horizon problems are introduced and the role of inflation in the early universe is discussed. Finally, we discuss the origins and the role of density fluctuations in formation of large structures leading to the current Cosmological constant Cold Dark Matter model of the universe.
EN.615.748 Introduction to Relativity.

EN.615.775. Physics of Climate. 3 Credits.
To understand the forces that cause global climate variability, we must understand the natural forces that drive our weather and our oceans. This course covers the fundamental science underlying the nature of the Earth's atmosphere and its ocean. This includes development of the basic equations for the atmosphere and ocean, the global radiation balance, description of oceanic and atmospheric processes, and their interactions and variability. Also included will be a description of observational systems used for climate studies and monitoring, fundamentals underlying global circulation, and climate prediction models. Prerequisite(s): Undergraduate degree in physics or engineering or equivalent, with strong background in mathematics through the calculus level.

EN.615.778. Optical System Design and Modelling. 3 Credits.
In this course, students learn to design optical systems and model their performance. Students will use commercially available optical design software to complete their assignments and their design project. We will begin with simple lenses for familiarization with optical design software using CODE V, and then move onto more complicated multi-element lenses and reflective systems. For their design project, students may use any software of their choosing (e.g. OSLO, ZEMAX, OpTalix, SYNOPSYS, their own, etc.). Emphasis is placed on understanding the optical concepts involved in the designs while developing the ability to use design software to properly model optical systems. Upon completion of the course, students are capable of independently pursuing their own optical designs and building optical models of existing systems.
EN.615.671 Principles of Optics

EN.615.780. Optical Detectors & Applications. 3 Credits.
This course examines the physics of detection of incoherent electromagnetic radiation from the infrared to the soft X-ray regions. Brief descriptions of the fundamental mechanisms of device operation are given. A variety of illumination sources are considered to clarify detection requirements, with emphasis on solar illumination in the visible and blackbody emission in the infrared. Practical devices, elementary detection circuits, and practical operational constraints are described. An introduction to solid-state and semiconductor physics follows and is then applied to the photodiode, and later to CCD and CMOS devices. A description and analysis of the electronics associated with photodiodes and their associated noise is given. Description of scanning formats leads into the description of spatially resolving systems (e.g., staring arrays). Emphasis is placed on Charged-Coupled Device and CMOS detector arrays. This naturally leads into the discussion of more complex IR detectors and Readout Integrated Circuits that are based on the CMOS pixel. In addition, descriptions of non-spatially resolving detectors based on photoemission and photo-excitation are provided, including background physics, noise, and sensitivity. Selection of optimum detectors and integration into complete system designs are discussed. Applications in space-based and terrestrial remote sensing are discussed, from simple radiometry and imaging to spectrometry. Prerequisite(s): Undergraduate degree in physics or engineering, preferably with studies in elementary circuit theory, solid-state physics, and optics. Students are expected to be proficient using spreadsheets and/or a programming language such as MATLAB or IDL.

EN.615.781. Quantum Information Processing. 3 Credits.
This course provides an introduction to the rapidly developing field of quantum information processing. In addition to covering fundamental concepts such as two-state systems, measurements uncertainty, quantum entanglement, and nonlocality, the course will emphasize specific quantum information protocols. Several applications of this technology will be explored, including cryptography, teleportation, dense coding, computing, and error correction. The quantum mechanics of polarized light will be used to provide a physical context to the discussion. Current research on implementations of these ideas will also be discussed.
EN.615.654 Quantum Mechanics

EN.615.782. Optics and Matlab. 3 Credits.
This course provides hands-on experience with MATLAB by performing weekly computer exercises revolving around optics. Each module explores a new topic in optics, while simultaneously providing experience in MATLAB. The goal is to bridge the gap between theoretical concepts and real-world applications. Topics include an introduction to MATLAB, review of electromagnetism, ray tracing, 1D Fourier theory and propagation in optical fibers, laser beam propagation, paraxial wave propagation in turbulent media, diffraction and holography, polarization and interferometry, optical waveguides and laser theory and related technologies. Students are expected to complete a semester project that will facilitate investigation of a topic of interest not specifically covered in the course. Course Note(s): No prior experience with MATLAB is required. While a background in optics is helpful, it is not required.

EN.615.800. Applied Physics Project. 3 Credits.
This course is an individually tailored, supervised project that offers the student research experience through work on a special problem related to his or her field of interest. The research problem can be addressed experimentally or analytically, and a written report is produced. It is recommended that all required Applied Physics courses be completed. Open only to candidates in the Master of Science in Applied Physics program. Prerequisite(s): It is recommended that all required Applied Physics courses be completed. The Independent Study/Project proposal form (https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration. Course Note(s): Open only to candidates in the Master of Science in Applied Physics program.

EN.615.802. Directed Studies in Applied Physics. 3 Credits.
In this course, qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or non-laboratory study under the direction of faculty members. Open only to candidates in the Master of Science in Applied Physics program. Prerequisite(s): The Independent Study/Project proposal form (https://ep.jhu.edu/current-students/student-forms/) must be completed and approved prior to registration. Course Note(s): Open only to candidates in the Master of Science in Applied Physics program.

Applied Physics, Master of Science

Concentrations are offered in Materials and Condensed Matter and Photonics. A Concentration can be selected but is not required.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to a graduate program of study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include:

1. mathematics through vector analysis and ordinary differential equations;
2. general physics;
3. modern physics;
4. intermediate mechanics; and
5. intermediate electricity and magnetism.

Applicants whose prior education does not include the prerequisites listed above may still enroll under conditional status, followed by full admission status once they have completed the conditional requirements. Conditional courses will be selected from the suite of Applied Physics graduate course offerings and once satisfactorily completed count towards the student's degree. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered. A résumé is optional.

The intermediate mechanics and intermediate electricity and magnetism requirements may be waived if the applicant has an exceptional academic record and a strong background in mathematics.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of four core courses and six electives. At least four of the courses must be at the 700-level or higher. An Applied Physics elective may be substituted for a required course if the student has previously completed an equivalent graduate-level course. Only one C-range grade (C+, C, or C−) can count toward the master's degree. All course selections outside of the Applied Physics core, elective, and/or the relevant concentration course requirements below are subject to advisor approval.

Courses

Core Courses

Code	Title	Credits
Four Core courses are required. At least three must be from the first six:		
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.642	Electromagnetics	3
EN.615.651	Statistical Mechanics and Thermodynamics	3
EN.615.653	Classical Mechanics	3
EN.615.654	Quantum Mechanics	3
EN.615.665	Modern Physics	3
EN.615.671	Principles Of Optics	3
EN.615.680	Materials Science	3

Electives

Code	Title	Credits
Select six of the following: [1]		
EN.535.614	Fundamentals of Acoustics	3
EN.615.611	Classical Physics	3
EN.615.621	Electric Power Principles	3
EN.615.644	Physics of Space Systems I	3
EN.615.645	Physics of Space Systems II	3
EN.615.646	Physics of Magnetism	3
EN.615.647	Fundamentals of Sensors	3
EN.615.648	Alternate Energy Technology	3
EN.615.662	Introduction to Astrophysics	3
EN.615.731	Photovoltaic & Solar Thermal Energy Conversion	3
EN.615.744	Physics of Space Systems I	3
EN.615.745	Physics of Space Systems II	3
EN.615.747	Sensors and Sensor Systems	3
EN.615.748	Introduction to Relativity	3
EN.615.751	Modern Optics	3
EN.615.753	Plasma Physics	3
EN.615.755	Space Physics	3
EN.615.757	Solid State Physics	3
EN.615.760	Physics of Semiconductor Devices	3
EN.615.761	Intro To Oceanography	3
EN.615.762	Applied Computational Electromagnetics	3
EN.615.765	Chaos and Its Applications	3
EN.615.769	Physics of Remote Sensing	3
EN.615.772	Cosmology	3
EN.615.775	Physics of Climate	3
EN.615.778	Optical System Design and Modelling	3
EN.615.780	Optical Detectors & Applications	3
EN.615.781	Quantum Information Processing	3
EN.615.782	Optics and Matlab	3

EN.615.800	Applied Physics Project	3
EN.615.802	Directed Studies in Applied Physics	3

[1] Up to two courses may be selected with advisor approval from the following programs: Applied and Computational Mathematics, Computer Science, or Electrical and Computer Engineering.

Concentrations

A Concentration can be selected but is not required.

Concentrations are noted on the student's transcript.

Materials and Condensed Matter

Students can elect to concentrate their studies in materials and condensed matter by completing a combination of courses from the Applied Physics (EN.615.xxx), Electrical and Computer Engineering (EN.525.xxx), and Materials Science and Engineering (EN.515.xxx) programs. Applied Physics students specializing in materials and condensed matter must complete three of the core courses plus EN.615.680 Materials Science.

Of the remaining six courses, four or more must be materials and condensed matter courses selected from Applied Physics (EN.615.xxx), Electrical and Computer Engineering (EN.525.xxx), and Materials Science and Engineering (EN.515.xxx) programs.

Code	Title	Credits
Core Courses		
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.642	Electromagnetics	3
EN.615.651	Statistical Mechanics and Thermodynamics	3
EN.615.680	Materials Science	3
Electives		
Select at least four of the following:		
EN.515.617	Nanomaterials	3
EN.515.635	Mechanical Properties of Materials	3
EN.525.606	Electronic Materials	3
EN.525.621	Introduction to Electronics and the Solid State	3
EN.535.684	Modern Polymeric Materials	3
EN.535.732	Fatigue and Fracture of Materials	3
EN.535.748	Stress Waves, Impacts and Shockwaves	3
EN.615.646	Physics of Magnetism	3
EN.615.647	Fundamentals of Sensors	3
EN.615.747	Sensors and Sensor Systems	3
EN.615.757	Solid State Physics	3
EN.615.760	Physics of Semiconductor Devices	3
EN.615.800	Applied Physics Project [1]	3
EN.615.802	Directed Studies in Applied Physics [1]	3

[1] EN.615.800 Applied Physics Project and EN.615.802 Directed Studies in Applied Physics can also be used to allow the student to pursue specialized interests in materials science and condensed matter.

Photonics

Three Applied Physics core courses (EN.615.xxx), one Electrical and Computer Engineering core course (EN.525.xxx), four Photonics electives, and two electives from the program must be completed.

Code	Title	Credits
Core Courses		
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.654	Quantum Mechanics	3
EN.615.671	Principles Of Optics	3
Select one of the following:		
EN.525.613	Fourier Techniques in Optics	3
EN.525.625	Laser Fundamentals	3
EN.525.691	Fundamentals of Photonics	3
Electives		
Select at least four of the following:		
EN.525.613	Fourier Techniques in Optics	3
EN.525.625	Laser Fundamentals	3
EN.525.636	Optics & Photonics Lab	3
EN.525.691	Fundamentals of Photonics	3
EN.525.753	Laser Systems and Applications	3
EN.525.756	Optical Propagation, Sensing, and Backgrounds	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.796	Introduction to High-Speed Optoelectronics	3
EN.525.797	Advanced Fiber Optic Laboratory	3
EN.615.751	Modern Optics	3
EN.615.778	Optical System Design and Modelling	3
EN.615.780	Optical Detectors & Applications	3
EN.615.781	Quantum Information Processing	3
EN.615.782	Optics and Matlab	3
EN.615.800	Applied Physics Project [1]	3
EN.615.802	Directed Studies in Applied Physics [1]	3

[1] EN.615.800 Applied Physics Project and EN.615.802 Directed Studies in Applied Physics can also be used to allow the student to pursue specialized interests in optics.

Please refer to the course schedule (ep.jhu.edu/schedule (http://ep.jhu.edu/schedule/)) published each term for exact dates, times, locations, fees, and instructors.

Applied Physics, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Applied Physics.

Program Requirements

Five courses must be completed within five years. At least four of the five courses must be from the Applied Physics program (EN.615.xxx), and at least two of the courses must be at the 700-level. Students are allowed to take one elective (at the 700-level). Only grades of B– or above can count toward the post-master's certificate. All course selections outside of the Applied Physics program are subject to advisor approval.

Artificial Intelligence

The part-time Artificial Intelligence program will educate and train practicing scientists and engineers to be able to carry out engineering and scientifically oriented research and development using their artificial intelligence knowledge and skills.

The rigorous curriculum will provide engineers and computer scientists with a working knowledge of the theoretical concepts in artificial intelligence and will also provide the students with the knowledge and skills to apply both current and future theoretical concepts to real systems and processes. The course content will be based on the foundational content embodied in the current computer science courses modified to provide relevant examples in the artificial intelligence setting.

Courses are offered online as well as in-person at the Applied Physics Laboratory.

Program Committee

John A. Piorkowski, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

Anthony N. Johnson, Program Manager
Senior Professional Staff
JHU Applied Physics Laboratory

Eleanor Boyle Chlan
Senior Professional Staff (retired)
JHU Applied Physics Laboratory

Diana Gehlaus
Research Fellow
Center for Security and Emerging Technology

Lanier Watkins, Chair CS, CyS
Senior Professional Staff
JHU Applied Physics Laboratory

Programs

- Artificial Intelligence, Graduate Certificate (p. 1450)
- Artificial Intelligence, Master of Science (p. 1450)

Courses

EN.705.601. Applied Machine Learning. 3 Credits.
Machine Learning (ML) is the art of solving a computation problem using a computer without an explicit program. ML is now so pervasive that various ML applications such as image recognition, stock trading, email spam detection, product recommendation, medical diagnosis, predictive maintenance, cybersecurity, etc. are constantly used by organizations around us, sometimes without our awareness.In this course, we will rigorously apply machine learning techniques to real-world data to solve real-world problems. We will briefly study the underlying principles of diverse machine learning approaches such as anomaly detection, ensemble learning, deep learning with a neural network, etc. The main focus will be applying tool libraries from the Python-based Anaconda and Java-based Weka data science platforms to datasets from online resources such as Kaggle, UCI KDD, open source repositories, etc. We will also use Jupyter notebooks to present and demonstrate several machine learning pipelines.
EN.705.621 Introduction to Algorithms OR EN.605.621 Foundations of Algorithms OR EN.685.621 Algorithms for Data Science

EN.705.603. Creating AI-Enabled Systems. 3 Credits.
Achieving the full capability of AI requires a system perspective to effectively leverage algorithms, data, and computing power. Creating AI-enabled systems includes thoughtful consideration of an operational decomposition for AI solutions, engineering data for algorithm development, and deployment strategies. To realize the impact of AI technologies requires a systems perspective that goes beyond the algorithms. The objective of this course is to bring a system perspective to creating AI-enabled systems. The course will explore the full-lifecycle of creating AI-enabled systems starting with problem decomposition and addressing data, design, diagnostic, and deployment phases. The course will also cover ethics and bias in AI systems. The course includes a systems project that will encompass the full-lifecycle with interim milestones throughout the course. Homework assignments will be provided that in involves python programming.

EN.705.612. Values and Ethics in Artificial Intelligence. 3 Credits.
Modern artificial intelligence, and the related area of autonomous systems are becoming so powerful that they raise new ethical issues. This course will prepare professional engineers and developers to thoughtfully engage with the moral, ethical, and cultural aspect of these emerging technology. Topics include: safety considerations for autonomous vehicles, algorithm bias, AI explainability, data privacy, ethical considerations of 'deep fakes', ethics of artificial life, values advocacy within organizations, technological unemployment, and far-future considerations related to AI safety.

EN.705.621. Introduction to Algorithms. 3 Credits.
This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. Topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis.

EN.705.640. Cognitive and Behavioral Foundations for Artificial Intelligence. 3 Credits.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidlyimproving for well-defined tasks and narrow intelligence. Moreover, it has entered all industriesin a myriad of ways. But will AI ever have human-like general intelligence? What does humanlikegeneral intelligence even mean? Why should we even care? This course is designed toanswer these complex questions by giving students working knowledge of the underlyingprinciples and mechanisms of human behavior and cognition, and how they may be applied tosolving current and rising industry challenges. Key topics to be addressed will include vision,audition, language, learning, emotion and social cognition, creativity, and consciousness.Students will apply learned topics to a final group research project on the topic of their choice.

Artificial Intelligence, Graduate Certificate

Admission Requirements

Applicants must meet the general requirements for admission (p. 1414) to graduate study. In addition, applicants for the graduate certificate in Artificial Intelligence will likely have prior educational experience that includes an undergraduate or graduate degree in engineering or computer science. The applicant's prior education must include the following prerequisites:

1. Three semesters or five quarters of calculus, which includes multivariate calculus;
2. One semester/term of linear algebra;
3. One semester/term of probability and statistics;
4. One semester/term in a programming language such as Python;
5. One semester/term of advanced programming such as Data Structures.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. These prerequisite courses do not count toward the degree or certificate requirements. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

If you are an international applicant (p. 1414), you may have additional admission requirements.

Program Requirements

- Four courses must be completed within five years.
- The curriculum consists of four required foundation courses, as listed in the Core Courses (p. 1450) section.
- One or more required courses can be waived by your advisor if you have received a grade of a B− or above in equivalent graduate courses. In this case, you may replace the waived required courses with the same number of other graduate Artificial Intelligence courses and may take these courses after all remaining course requirements have been satisfied.
- Only one C-range grade (C+, C, or C−) can count toward the graduate certificate.
- Any course selections outside of the four required core courses are subject to advisor approval.

Artificial Intelligence, Master of Science

Admission Requirements

Applicants (degree-seeking and special students) must meet the general requirements for admission (p. 1414) to graduate study. In addition, applicants for the Master of Science in Artificial Intelligence will likely have prior educational experience that includes an undergraduate or graduate degree in engineering or computer science. The applicant's prior education must include the following prerequisites:

The applicant's prior education must include the following prerequisites:

1. Three semesters or five quarters of calculus, which includes multivariate calculus;
2. One semester/term of linear algebra;
3. One semester/term of probability and statistics;
4. One semester/term in a programming language such as Python;
5. One semester/term of advanced programming such as Data Structures.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. These prerequisite courses do not count toward the degree or certificate requirements. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

If you are an international applicant (p. 1414), you may have additional admission requirements.

Program Requirements

In order to earn a Master of Science in Artificial Intelligence, the student must complete ten courses (30 credits) within five years. The curriculum consists of four core courses (12 credits) and 6 elective courses (18 credits) from the course lists below. Three courses (9 credits) must be taken at the 700-level. Only one C-range grade (C+ C, C-) can count toward the master's degree. All course selections outside of the Artificial Intelligence program requirements are subject to advisor approval.

Non-degree students in Artificial Intelligence should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level courses may be taken.

Courses

Code	Title	Credits
Prerequisite Courses [1]		
EN.605.202	Data Structures	3
EN.605.206	Introduction to Programming Using Python	3
EN.625.240	Introduction to Probability and Statistics	3
EN.625.250	Multivariable Calculus and Complex Analysis	3
EN.625.252	Linear Algebra and Its Applications	3

[1] Applicants whose prior education does not include the prerequisites listed under Admission Requirements may enroll under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

Core Courses

Code	Title	Credits
A total of 4 core courses are required [1]		
EN.705.621	Introduction to Algorithms	3
OR		
EN.685.621	Algorithms for Data Science	3
Followed by these 3 courses		
EN.705.601	Applied Machine Learning	3
EN.705.603	Creating AI-Enabled Systems	3
EN.605.645	Artificial Intelligence	3

[1] One or more core courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived core courses with the same number of other graduate Artificial Intelligence courses and may take these courses after all remaining core course requirements have been satisfied.

Electives

Code	Title	Credits
Take at least 6 of the following courses		
EN.705.612	Values and Ethics in Artificial Intelligence	3
EN.705.640	Cognitive and Behavioral Foundations for Artificial Intelligence	3
EN.525.661	UAV Systems and Control	3
EN.525.670	Machine Learning for Signal Processing	3
EN.525.724	Introduction to Pattern Recognition	3
EN.525.733	Deep Learning for Computer Vision	3
EN.525.770	Intelligent Algorithms	3
EN.525.786	Human Robotics Interaction	3
EN.605.613	Introduction to Robotics	3
EN.605.617	Introduction to GPU Programming	3
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.633	Social Media Analytics	3
EN.605.635	Cloud Computing	3
EN.605.646	Natural Language Processing	3
EN.605.647	Neural Networks	3
EN.605.662	Data Visualization	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.724	Applied Game Theory	3
EN.605.745	Reasoning Under Uncertainty	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary and Swarm Intelligence	3
EN.625.638	Neural Networks	3
EN.645.651	Integrating Humans and Technology	3
EN.695.637	Introduction to Assured AI and Autonomy	3

Chemical and Biomolecular Engineering

The part-time Chemical and Biomolecular Engineering program allows working professionals to choose from two focus areas, or to study a more traditional curriculum that is supplemented with electives from related engineering fields, the basic sciences, or mathematics. The program offers a professional, non-thesis curriculum for working engineers, but is also suited for those with a science background who are taking their career in a new direction.

Courses are offered at the Homewood campus. Various electives are offered through the full-time Department of Chemical & Biomolecular Engineering.

Program Committee

Michael Betenbaugh, Program Chair
Professor, Department of Chemical & Biomolecular Engineering
JHU Whiting School of Engineering

Paulette Clancy, Department Head
Department of Chemical & Biomolecular Engineering
JHU Whiting School of Engineering

Programs

- Chemical and Biomolecular Engineering, Master of Chemical and Biomolecular Engineering (p. 1455)

Courses

EN.545.203. Engineering Thermodynamics. 3 Credits.
This course covers the formulation and solution of material, energy, and entropy balances, with an emphasis on open systems. A systematic problem-solving approach is developed for chemical process-related systems. Extensive use is made of classical thermodynamic relationships and constitutive equations. Applications include the analysis and design of engines, refrigerators, heat pumps, compressors, and turbines. Prerequisite(s): 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. Corequisite(s): AS.110.202 Calculus III (Calculus of Several Variables). Course Note(s): Not for graduate credit.

EN.545.204. Applied Physical Chemistry. 3 Credits.
The topics in this course include thermodynamic models for multicomponent phase equilibrium including vapor liquid equilibrium, phase diagrams, activity models and colligative properties in both non-electrolyte and electrolyte solutions. A link between average thermodynamic properties and microstates and molecular interactions is made via a discussion of intermolecular forces and the partition function. Also covered are thermodynamic relationships to describe chemical equilibria, and basic concepts in quantum mechanics and statistical mechanics.Prerequisite(s): 540.203 Engineering Thermodynamics and either 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.301. Kinetic Processes. 3 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates. Prerequisite(s): 540.203 Engineering Thermodynamics and 540.303 Transport Phenomena I, and either 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.303. Transport Phenomena I. 3 Credits.
This course provides an introduction to the field of transport phenomena, including molecular mechanisms of momentum transport (viscous flow); energy transport (heat conduction); mass transport (diffusion); isothermal equations of change (continuity, motion, and energy); the development of the Navier-Stokes equation; the development of non-isothermal and multicomponent equations of change for heat and mass transfer; and exact solutions to steady-state, isothermal unidirectional flow problems and to steady-state heat and mass transfer problems. The analogies between heat, mass, and momentum transfer are emphasized throughout the course. Prerequisite(s): A grade of C or better in Calculus I and II and 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.202 is offered through the fulltime Chemical & Biomolecular Engineering Department. Corequisite(s): 500.303 Applied Mathematics I or AS.110.302. Course Note(s): Not for graduate credit.

EN.545.304. Transport Phenomena II. 3 Credits.
Topics covered in this course include dimensional analysis and dimensionless groups, laminar boundary layers, introduction to turbulent flow, definition of the friction factor, macro-scopic mass, momentum and mechanical energy balances (Bernoulli's equation), metering of fluids, convective heat and mass transfer, heat and mass transfer in boundary layers, correlations for convective heat and mass transfer, boiling and condensation, and interphase mass transfer. Prerequisite(s): 540.303 Transport Phenomena I. 540. xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.602. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genomescale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.

EN.545.603. Colloids and Nanoparticles. 3 Credits.
This course explains the fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hydrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nanoscience and technology will be discussed throughout the course, with frequent references to recent literature.

EN.545.604. Transport Phenomena in Practice. 3 Credits.
This course will provide a review of core concepts of transport phenomena (momentum, heat, and mass transfer). Chemical and biomolecular engineering problems that are relevant in the areas of medicine, biomaterials, and physiology will be discussed. Application areas will range from oxygen transport in lungs and delivery in tissues as an example of a gas–fluid interface; Fluid flow and shear stress, with blood as an example of a nonNewtonian fluid; molecular transport using cellular transport as an example; filtration and separation (membranes) using the Kidney as an example; and drug delivery and pharmacokinetics. Prerequisite(s): Previous experience with transport phenomena concepts will be helpful but is not required. Knowledge in vector calculus and differential equations is imperative for this course.

EN.545.606. Chemical & Biomolecular Separation. 3 Credits.
This course covers staged and continuous-contacting separations processes critical to the chemical and biochemical industries. Separations technologies studied include distillation, liquidliquid extraction, gas absorption, membrane ultrafiltration, reverse osmosis, dialysis, adsorption, and chromatography. Particular emphasis is placed on the biochemical uses of these processes and consequently on how the treatment of these processes differs from the more traditional approach. Course Note(s): Only with permission of the instructor. Colisted with 540.306.

EN.545.607. Renewable Energy Technologies. 3 Credits.

EN.545.614. Computational Protein Structure Prediction and Design. 3 Credits.
The prediction of protein structure from the amino acid sequence has been a grand challenge for more than 50 years. With recent progress in research, it is now possible to blindly predict many protein structures and even to design new structures from scratch. This class will introduce the fundamental concepts in protein structure, biophysics, optimization, and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, and design of protein interfaces. Classes will consist of lectures and handson computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project. Prerequisite(s): Programming experience is helpful but not required.

EN.545.615. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interface area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class, we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.545.619. Project in Design: Alternative Energy. 3 Credits.
This course is a group design project (i.e., not a lecture course). In the class, student groups research the various forms of alternative energy and then model a real-world alternativeenergy process. The goal of the project will be to develop a process model that is sufficiently complete and robust that it can be used to understand the important factor in the process design and/or operation. This design project is focused on the role of alternative energy in the US and world economies. The remainder of the course will be devoted to a technical and economic analysis of an alternative energy technology. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group meets separately each week with the instructor. Hence, there are no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 60 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project. Prerequisite(s): 540.202 Introduction to Chemical & Biological Process Analysis; 540.203 Engineering Thermodynamics; 540.301 Kinetic Processes; and 540.305 Modeling and Statistical Analysis of Data for Chemical and Biomolecular Engineers. Course Note(s): Graduate Level. Meets with 540.401 Projects in Design: Alternative Energy.

EN.545.621. Project in Design: Pharmacodynamics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution, and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type and that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there are no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.545.622. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society, from naturemade proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high-performance materials used in critically demanding areas, such as aviation, aerospace, and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources (green polymer chemistry) will also be covered. Lectures on functional polymers will focus on their unique properties that are enabled by rational molecular design, controlled synthesis, and processing (e.g., supramolecular assembly and microfabrication). This class of specialty materials can find their use in high-performance photovoltaics, batteries, membranes, and composites and can also serve as smart materials for use in coatings, sensors, medical devices, and biomimicry.

EN.545.628. Supramolecular Materials and Nanomedicine. 3 Credits.
Nanomedicine is a quickly growing area that exploits the novel chemical, physical, and biological properties of nanostructures and nanostructured materials for medical treatments. This course presents basic design principles of constructing nanomaterials for use in drug delivery, disease diagnosis and imaging, and tissue engineering. Three major topics will be discussed, including (1) nanocarriers for drug delivery that are formed through soft matter assembly (e.g., surfactants, lipids, block copolymers, DNA, polyelectrolytes, peptides); 2) inorganic nanostructures for disease diagnosis and imaging (e.g., nanoparticles of gold and silver, quantum dots and carbon nanotubes); and (3) supramolecular scaffolds for tissue engineering and regenerative medicine. Students are expected to learn the physical, chemical and biological properties of each nanomaterial, the underlying physics and chemistry of fabricating such material, as well as their advantages and potential issues when used for biomedical applications. This course will also provide students opportunities for case studies on commercialized nanomedicine products. After this class, students should have a deeper understanding of current challenges in translating nanoscience and nanotechnology into medical therapies.

EN.545.630. Thermodynamics and Statistical Mechanics. 3 Credits.
In this course we will aim for understanding the thermodynamics of chemical and biomolecular systems. We will first review classical, macroscopic thermodynamics, covering concepts such as equilibrium, stability, and the role of thermodynamic potentials. Our goal will be to gain a feel for the generality of thermodynamics. Statistical mechanics provides a link between the mechanics of atoms and macroscopic thermodynamics. We will introduce this branch in two distinct ways: (1) following standard methods of developing concepts such as ensembles and partition functions, and (2) where we will treat the basis of statistical mechanics as a problem in inference. With this foundation, we will consider concepts relevant to understanding the liquid state. Chemical transformations in a liquid are of importance in much of chemistry and biology; quasi-chemical generalizations of the potential distribution theorem will be introduced to present these ideas. We hope to give an overview of modern developments relating equilibrium work to non-equilibrium work, as these are of increasing importance in studies on single molecule systems. Registration by instructor permission only.

EN.545.632. Project in Design: Pharmacokinetics. 3 Credits.

EN.545.637. Application of Molecular Evolution to Biotechnology. 3 Credits.
One of the most promising strategies for successfully designing complex biomolecular functions is to exploit nature's principles of evolution. This course provides an overview of the basics of molecular evolution as well as its experimental implementation. Current research problems in evolution-based biomolecular engineering will be used to illustrate principles in the design of biomolecules (i.e., protein engineering, RNA/DNA engineering), genetic circuits, and complex biological systems including cells.

EN.545.639. Advanced Topics in Pharmacokinetics and Pharmacodynamics. 3 Credits.
This course involves a semester-long project in pharmacodynamics. Topics are chosen in consultation with instructor.

EN.545.640. Micro- and Nanotechnology. 3 Credits.
The field of micro-/nanotechnology has been gaining tremendous momentum, as evidenced by an explosive rise in the number of publications, patents, and commercial activities. This is an introductory course intended to expose students to the field and real-world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro- and nanofabrication methods, and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical, and biological applications of emerging micro- and nanoscale devices and materials.

EN.545.652. Advanced Transport Phenomena. 3 Credits.
This lecture course introduces students to the application of engineering fundamentals from transport and kinetic processes to vascular biology and medicine. The first half of the course addresses the derivation of the governing equations for Newtonian fluids and their solution in the creeping flow limit. The second half of the course considers how these concepts can be used to understand the behavior of a deformable cell near planar surfaces. Prerequisite(s): Undergraduate Transport Phenomena preferred.

EN.545.660. Polymer Physics. 3 Credits.
This course will cover the physics aspect of macromolecular/ polymeric materials. We will discuss the molecular origin of key physical phenomena, such as chain relaxation, time temperature superposition, free volume, high-strain-rate behavior, phase transitions, flow and fracture, as well as physical aging. Many real-world examples will be used throughout the course. We will also discuss the recent advances in biopolymers, polymers for 3D printing, electro-spinning, and polymers for tissue engineering. Students should have introductory training in materials science.

EN.545.662. Polymer Design and Bioconjugation. 3 Credits.
This course will focus on conventional to most recent inventions on polymer and conjugation chemistry. Weekly lectures will include the reaction strategy, designs and characterization techniques, structure–property relationship, simplistic approaches, and versatile application-oriented solutions to biomaterials and tissue engineering-related challenges. Students will learn how to devise creative strategies and about process design and product development. Prerequisite(s): Preliminary knowledge of organic chemistry is expected. No prerequisites for graduate students.

EN.545.665. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered “chemically” and “physically/mechanically.” The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of selfassembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues; and immune responses.

EN.545.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos. Prerequisite(s): Knowledge of linear algebra and ordinary differential equations (at an undergraduate level); some computing experience is desirable.

EN.545.671. Advanced Thermodynamics in Practice. 3 Credits.
In this graduate-level course, we will cover important principles in thermodynamics and kinetics along with examples relevant to engineering practice. After a short review of the first and second laws of thermodynamics, we will move on to their application in engines and refrigeration. We will discuss the thermodynamic properties of systems consisting of pure species and mixtures and address phase equilibria. With the key thermodynamic concepts in place, we will discuss topics in kinetics, including the fundamentals of reaction rates, rate laws, multiple reactions, and nonelementary reaction kinetics. Finally, we will address how reactor type and properties, transport limitations, and phase equilibria influence reaction rate.

EN.545.672. Green Engineering, Alternative Energy and CO2 Capture/ Sequestration. 3 Credits.
This course inherently combines green engineering, alternative energy and CO2 capture and storage into a concentrated semester lecture. Green Engineering applies the cost-effective design, commercialization, and use of chemical processes in ways that minimize pollution at the source, and reduce impact on human activities and the environment. After general discussion of applying environmental principles into various chemical processes, this course will switch the gear to apply these green engineering ideas into the energy production that has increasing and critical importance to our modern world, how to minimize the pollution and CO2 emission. There are two ways to follow: 1. Alternative Energy, which uses alternative resources rather than the current dominant fossil fuel for energy production. Alternative energy includes solar, hydro, bioenergy, geothermal, tidal, nuclear energy and et al. The detailed production processes, the long term perspective, policy and advantages/ disadvantages over their counterpart, fossil fuel, will be discussed. 2. Fossil fuel with CO2 Capture and Storage. CO2 capture methods such as chemical solvents/chemical looping, membrane, oxy fuel combustion will be discussed and their technical benefits/limitations will be studied. The storage will cover geological methods (coal bed and saline aquifer), enhanced oil recovery, ocean storage, terrestrial and others. The technical details, cost, future trends and national/international policy (carbon taxes/markets) will be discussed in this course.

EN.545.673. Advanced Chemical Reaction Engineering in Practice. 3 Credits.
Chemical reaction engineering deals with the analysis on data and the design of equipment in which reactions occur. Reactors may contain one or more phases and be used to conduct chemical or biochemical transformations. The course will cover the fundamental aspects of kinetics, data acquisition, data interpretation, heterogeneous catalysis, and heat and mass transfer for each type of reactor. Special emphasis will be placed on the practical application of reaction engineering in the petrochemical, chemical, biochemical, and materials industries. The course will make students aware of the needs and opportunities for chemical reaction engineering in industry.

EN.545.691. Chemical Engineering Modeling and Design for Graduate Students. 3 Credits.
This course is one part of a two-semester sequence in chemical and biomolecular engineering product design. It is intended for students in the Chemical and Biomolecular Engineering master's program. This course guides the student through the complex process of new product design. Product designconcerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill needs. Students work in small teams to develop a new product idea, design the product, and then iterate on prototype development. Students report several times on their accomplishments, both orally and in writing. Time is allowed so that laboratory tests can be performed and/ or prototypes can be built.

EN.545.800. Independent Study. 0 - 0 Credits.
Permission of instructor required.

EN.545.801. Indep Study Chem Engr. 0 - 0 Credits.
Permission of instructor required.

Chemical and Biomolecular Engineering, Master of Chemical and Biomolecular Engineering

A focus area is not required for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include the following prerequisites:

1. a bachelor's degree in chemical engineering, or a closely related technical or scientific discipline;
2. mathematics through differential and integral calculus and differential equations; and
3. coursework or proficiency in chemical kinetics, transport phenomena, and thermodynamics.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Program Requirements

Ten courses must be completed within five years. Students may count 400-level courses toward their degree if the course is not offered at the 600-level, and if the department offering the course considers it to be graduate-level, assuming, the student has not taken an equivalent course previously. Courses offered at both the 400- and 600-levels must be taken at the higher level. At least six of the ten courses must be from the Chemical and Biomolecular Engineering program. Exceptions to this must be approved by the program chair. A course from any other program may be allowed to count as one of the six courses only if it has significant chemical and biomolecular engineering content and is consistent with the student's educational goals. Nine of the courses (including the Chemical and Biomolecular Engineering courses) must be STEM related. The tenth course may be chosen from any field of interest to the student. Focus areas are not required for this program. Only one C-range grade (C+, C, or C–) can count toward the master's degree. All other grades must be B– or above. All course selections outside of the Chemical and Biomedical Engineering program courses listed below are subject to advisor approval.

Courses

Code	Title	Credits
Prerequisite Courses [1,2, & 3]		
EN.545.203	Engineering Thermodynamics	3
EN.545.301	Kinetic Processes	3
EN.545.303	Transport Phenomena I	3
or EN.545.304	Transport Phenomena II	
EN.553.291	Linear Algebra and Differential Equations	4

Recommended Core Courses		
EN.545.602	Metabolic Systems Biotechnology	3
EN.545.604	Transport Phenomena in Practice	3
EN.545.615	Interfacial Science with Applications to Nanoscale Systems	3
EN.545.671	Advanced Thermodynamics in Practice	3
EN.545.673	Advanced Chemical Reaction Engineering in Practice	3
A Focus Area can be selected (p. 1456)		

1 Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.
2 Undergraduate courses from other engineering or science disciplines may be substituted if there is significant overlap in material. Permission to substitute or waive course requirements will be at the discretion of the program chair.
3 EN.553.xxx courses are offered through the full-time Department of Applied Mathematics & Statistics.

Focus Areas

Students should work with an advisor to choose an appropriate selection of courses in keeping with their desired focus area (Biotechnology or Nanotechnology) and career goals. Focus areas do not appear as official designations on a student's transcript or diploma.

Additional Representative Courses

Additional relevant courses are available from Chemical and Biomolecular Engineering and other related majors. The following are presented as aid to students in planning their class schedules. The students are encouraged to seek out other courses of relevance to the Master's degree.

Electives

Code	Title	Credits
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4
AS.410.603	Advanced Cell Biology	4
AS.410.645	Biostatistics	4
EN.545.603	Colloids and Nanoparticles	3
EN.545.606	Chemical & Biomolecular Separation	3
EN.545.614	Computational Protein Structure Prediction and Design	3
EN.545.615	Interfacial Science with Applications to Nanoscale Systems	3
EN.545.619	Project in Design: Alternative Energy	3
EN.545.621	Project in Design: Pharmacodynamics	3
EN.545.622	Introduction to Polymeric Materials	3
EN.545.628	Supramolecular Materials and Nanomedicine	3
EN.545.630	Thermodynamics and Statistical Mechanics	3
EN.545.637	Application of Molecular Evolution to Biotechnology	3
EN.545.639	Advanced Topics in Pharmacokinetics and Pharmacodynamics	3
EN.545.640	Micro- and Nanotechnology	3
EN.545.652	Advanced Transport Phenomena	3
EN.545.660	Polymer Physics	3
EN.545.662	Polymer Design and Bioconjugation	3
EN.545.665	Engineering Principles of Drug Delivery	3
EN.545.668	Introduction to Nonlinear Dynamics and Chaos	3
EN.545.672	Green Engineering, Alternative Energy and CO2 Capture/Sequestration	3
EN.545.691	Chemical Engineering Modeling and Design for Graduate Students	3
EN.545.800	Independent Study	0
EN.585.708	Biomaterials	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.710	Biochemical Sensors	3

1 EN.410.xxx courses are offered through the part-time Zanvyl Krieger School of Arts and Sciences' Advanced Academic Programs.
2 EN.520.xxx courses are offered through the full-time Department of Electrical & Computer Engineering.
3 EN.580.xxx courses are offered through the full-time Biomedical Engineering Department.

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) *published each term for exact dates, times, locations, fees, and instructors*.

Civil Engineering

The part-time Civil Engineering program is designed to enable professionals working in the field of civil engineering with the most up-to-date knowledge and skills necessary to design and maintain structures and infrastructure systems - in the face of evolving demands made by both civilization and the environment. With a diverse suite of graduate courses, students may choose to focus their studies in geotechnical engineering, ocean & coastal engineering, or structural engineering, or they may tailor a general civil engineering program to meet their specific needs. Courses are taught primarily online and virtual live (VL), with a few courses offered in person on the Homewood Campus.

Program Committee

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JHU Whiting School of Engineering

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Programs

- Civil Engineering, Graduate Certificate (p. 1459)
- Civil Engineering, Master of Civil Engineering (p. 1460)

Courses

EN.565.604. Structural Mechanics. 3 Credits.
This course presents basic solid mechanics for structural engineers, including stress, strain, and constitutive laws; linear elasticity and visco-elasticity; introduction to nonlinear mechanics; static, dynamic, and thermal stresses; specialization of theory to one- and two-dimensional cases; plane stress and plane strain, rods, and beams; work and energy principles; and variational formulations. Course Note(s): This course is a requirement for the general Civil Engineering program and the Structural Engineering focus area.

EN.565.606. Geotechnical Engineering Principles. 3 Credits.
This course aims to review and reinforce knowledge of soil mechanics and geotechnical engineering principles for application in a variety of structural and civil engineering projects. The course presents examples of geotechnical engineering design problems. The course then discusses the origin of soil and types of soil, and various relations between weight and volume; methods used to characterize the index properties of soil, and classification of soil; theory of compaction; Darcy's law and the role of permeability, and the theory of two-dimensional seepage; stresses induced in soil by footing and other loading; compressibility of soil, and consolidation and consolidation settlements; shear strength of soil and the laboratory methods of determining shear strength parameters; theories of lateral earth pressure and their application to the analysis of retaining walls; fundamentals of slope stability analysis; fundamentals of the bearing capacity analysis of shallow foundations; and methods of subsoil exploration. Prerequisite(s): 560.305 Soil Mechanics or equivalent. 560.305 is offered on-site through the full-time Civil Engineering Department. Course Note(s): This course is a requirement for the general Civil Engineering program.

EN.565.608. BIM Applications in Civil Engineering. 3 Credits.
This course will introduce students to basic building information modeling (BIM) theory with an emphasis on how BIM is used in the design and construction of buildings. Students will learn how to model basic architectural, structural, and MEP systems in buildings using Autodesk Revit and how to schedule various model elements and create 2D drawings from the 3D model. They will be introduced to algorithmically generated content using Autodesk Dynamo.

EN.565.616. Applied Finite Element Methods. 3 Credits.
This course will introduce finite element methods for the analysis of solids and structures. The following topics will be considered: procedure for defining a mechanics problem (governing equations, constitutive equations, boundary and initial value problems); theory and implementation of the finite element method for static analysis using linear elasticity; and the verification/validation of results using finite element analysis software.

EN.565.619. Advanced Structural Analysis. 3 Credits.
The course will focus on matrix implementations of the stiffness method for the analysis of statically indeterminate structures such as plane/space trusses and plane/space frames. Computational aspects of the stiffness method will be discussed with connections made to commercial software. Linear elastic analysis will be the primary focus, but topics in nonlinear analysis will also be introduced.

EN.565.620. Advanced Steel Design. 3 Credits.
This course examines advanced designs of structural steel buildings including consideration of torsion, lateral-torsional buckling, local buckling, plate girder design, connection design, framing systems for seismic design, nonlinear frame behavior, and principles of stability per the Direct Analysis Method. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design.

EN.565.622. Advanced Reinforced Concrete Design. 3 Credits.
This intensive course covers reinforced concrete materials and specifications and includes the following topics: conception, analysis, and design of beams and columns, slabs, foundations and walls with emphasis on the ultimate strength method. Advanced seismic design topics are then covered building from the basic knowledge of reinforced concrete design. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Reinforced Concrete Design.

EN.565.623. Bridge Design and Evaluation. 3 Credits.
Through lectures, design problems and existing bridge examples, this course illustrates basic bridge knowledge from preliminary design to final design of major structural components. The course covers conventional bridges and other bridge types, including concrete segmental box girders, arch bridges, and cable-stayed bridges. The course is not intended to provide students with intensive training in any particular area of bridge design. The course requires problem solving, a term project, and a final exam. A background in reinforced concrete design and steel design is required. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design and Reinforced Concrete Design.

EN.565.626. Design of Wood Structures. 3 Credits.
This course introduces students to the design of wood structures. Wood structures may be constructed of sawn lumber, glulam, or engineered wood products. The primary focus in this class is on light-framed low-rise wood buildings constructed of sawn lumber or glulam, but concepts related to heavy timber-framed structures and tall wood buildings using cross-laminated timber (CLT) are introduced. Structural behavior under gravity and lateral loads is emphasized, as are analysis and design of the components within the gravity and lateral load resisting systems. The current version of the National Design Specification (NDS) for Wood Construction is used. A background in Steel Design or Reinforced Concrete Design is required. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design or Reinforced Concrete Design.

EN.565.628. Preservation Engineering I: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete). This first course in the theory and practice of preservation engineering will include a review of the building code requirements related to work on existing buildings and a discussion of the load paths (both vertical and horizontal) through such structures. Further, this course will begin its review of structural materials with those that were available prior to the Industrial Revolutionnamely masonry and timber. The course will conclude with an overview of the response of wood structures to wind and seismic loads. Wood deterioration mechanisms and structural repair strategies for wood will also be presented.

EN.565.630. Prestressed Concrete Design. 3 Credits.
Topics include prestressed concrete concepts for both pretensioning and post-tensioning: materials, types of prestress, and prestress losses; design of sections for flexure, shear, torsion, and compression; load balancing technique; consideration of partial prestress, composite sections, and slab systems. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Reinforced Concrete Design.

EN.565.631. Preservation Engineering II: Theory & Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution-namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.
EN.565.628 Preservation Engineering I: Theory and Practice

EN.565.633. Investigation, Diagnosis, and Rehabilitation. 3 Credits.
Why do buildings deteriorate? And how do we investigate and diagnose the causes, as well as design and implement appropriate solutions? This course examines the deterioration of building materials and systems caused by both humans and nature. Through weekly lectures and one weekend workshop, students will learn how to plan and execute an investigation, identify the symptoms, determine what tests are needed, diagnose the causes, and design and administer necessary repairs to address deterioration and system deficiencies. Weekly lectures will use a combination of Virtual Live and online formats; a weekend workshop in Baltimore (date TBD) will include hands-on activities and a field trip to a local project site.

EN.565.636. Lateral Forces: Analysis and Design of Building Structures. 3 Credits.
From earthquakes to wind events, lateral forces constitute some of the most extreme loading conditions for which new and existing building structures must be analyzed and designed to resist. This course provides a fundamental yet practical introduction to the development and application of earthquake and wind loadings on building structures, the dynamic response and behavior of structures to lateral forces, and the bases and requirements for ductile design and detailing of steel, concrete, wood, and masonry lateral force resisting elements. The course will build on these analysis and design fundamentals to examine the technical considerations and methodologies for evaluating the lateral force resisting systems of existing, oftentimes monumental, building structures, and for designing and implementing repairs and retrofits to these lateral systems, including the application of Performance Based Design. This course is co-listed with 560.615.

EN.565.637. Preservation Engineering in the Urban Context. 3 Credits.
Technical expertise is fundamental to design and construction within and around historic buildings in the urban context. This course will cover topics related to both design and construction. For below-grade engineering, the course will cover underpinning, bracket piles, secant piles, slurry walls, tie-backs and general shoring approaches to building below or adjacent to existing constructions. For upward additions to existing construction, the course covers strengthening techniques (including temporary shoring and bracing, temporary access options, and temporary protection) and the requirements of the International Existing Building Code (IEBC). Each class will provide both technical guides and case studies, offering perspectives from guest speakers practicing the diverse range of professions tasked to meet this challenge.

EN.565.641. Fundamentals of Construction Management. 3 Credits.

EN.565.658. Natural Disaster Risk Modeling. 3 Credits.
Natural hazards such as floods, earthquakes, and hurricanes exert a heavy toll of victims and economic losses every year. Yet, concentrations of population in hazard-prone-areas, the growth of infrastructure and climate change are aggravating the risk of future losses. Consequently, adequate interventions must be implemented to mitigate the damaging effects of natural hazards. To do this, public agencies, non-profits, and companies formulate mitigation actions such as emergency preparedness plans and building retrofits. Catastrophe models are tools to inform all these efforts, which simulate the socioeconomic risk resulting from the interaction of geophysical events and the spatial distribution of infrastructure.Course note(s): This course is cross-listed with 575.658 Natural Disaster Risk Modeling.

EN.565.664. Advanced Foundation Design. 3 Credits.
This course will introduce the principles and specifics of the geotechnical design of shallow and deep foundations. Topics include design of shallow foundations, including spread footings, combined footings and mat foundations; design of deep foundations, including single piles, pile groups and drilled shafts; design of laterally-loaded piles; construction monitoring and testing methods for driven piles; design of foundations for vibration control; foundations on difficult soils; underpinning; and design of buried culverts.
EN.560.305 Soil Mechanics (or equivalent) or EN.565.606 Geotechnical Engineering Principles.

EN.565.680. Marine Geotechnical Engineering. 3 Credits.
This course introduces students to soil mechanics in the marine environment. Topics covered include the nature of marine sediments, soil behavior due to cyclic loading, marine geotechnical investigations, shallow foundations and dead-weight anchors, pile foundations and anchors, penetration and breakout of objects on the seafloor, and project planning. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken 565.606 Geotechnical Engineering Principles.

EN.565.682. Design of Ocean Structures. 3 Credits.
This course presents a review of structural design theory and practice related to ocean structures. Basic elements of ocean structures are designed using current engineering design codes developed by the American Institute of Steel Construction (AISC) and American Petroleum Institute (API). Topics include ocean environmental forces, material selection, foundation design, and analysis/design of ocean structures.

EN.565.684. Port & Harbor Engineering. 3 Credits.
Planning and engineering of ports and harbors has received renewed worldwide interest as the newest super-large cargo ships push the envelope for channel depth and berth space. This course covers planning of marine terminals and small craft harbors, ship berthing and maneuvering considerations, operational and environmental loads, fender system design, and mooring loads and design principles.

EN.565.686. Sustainable Coastal Engineering. 3 Credits.
This course presents a review of sustainable engineering related to the ocean environment. Sustainable shore protection designs will be investigated such as living shorelines and sills, beach nourishment, and other sustainable methods in order to adapt to coastal hazards such as hurricanes, tsunamis, and sea level rise. Sustainable energy such as coastal wind energy, wave energy, tidal energy, and other sustainable energy sources will be also investigated as alternative energy designs. The importance of sustainable food production will be discussed and aquaculture system designs such as ocean aquaculture, shellfish aquaculture, and other sustainable food production will be studied.

EN.565.720. Special Topics in Civil Engineering Structures. 3 Credits.

EN.565.731. Structural Dynamics. 3 Credits.
This course provides an overview of rigid-body dynamics, free and deterministic forced vibration of undamped and damped single- and multi-degree-of-freedom systems, vibration of continuous systems, approximate methods of analysis, and introduction to random vibration of linear systems. Applications of the principles of structural dynamics to determine a structure's earthquake response are also covered. Instructor assumes that students who enroll in this course have a basic understanding of stiffness and stiffness matrices.
EN.535.641 Mathematical Methods for Engineers.

EN.565.732. Earthquake Engineering. 3 Credits.
Topics for this course include plate tectonics, seismicity of Earth, and engineering seismology-including quantification and classification of earthquake ground motions, dynamics of structures subjected to earthquake loads, design spectra, building code provisions, design concepts and detailing, soilstructure interaction, and response of special structures.

EN.565.734. Wind Engineering. 3 Credits.
This course covers atmospheric circulation, atmospheric boundary layer winds, bluff-body aerodynamics, modeling of wind-induced loads, introduction to random vibration theory, response of structures to fluctuating wind loads, aeroelastic phenomena, wind-tunnel and full-scale testing, computational wind engineering, non-synoptic winds (hurricanes, tornadoes, etc.), and wind-load standards and design applications.

EN.565.736. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented.

EN.565.740. Structural Stability. 3 Credits.

EN.565.762. Ground Improvement Methods. 3 Credits.
This course addresses the selection, cost, design, construction, and monitoring of ground improvement methods for problematic soils and rock. Ground improvement methods covered include wick drains, micropiles, lightweight fill materials, soil nailing, mechanically stabilized slopes and walls, grouting, stone columns, dynamic compaction, and soil mixing. Prerequisite(s): 560.330 Foundation Design or equivalent and 565.606 Geotechnical Engineering Principles. 560.330 is offered on-site through the full-time Civil Engineering Department.
EN.565.606 Geotechnical Engineering Principles.

EN.565.764. Retaining Structures and Slope Stability. 3 Credits.
Topics for this course include earth pressure theories; design and behavior of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures; stability of excavation, cut, and natural slopes; methods of slope stability analysis; effects of water forces; shear strength selection for analysis; and stability and seepage in embankment dams. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken 565.606 Geotechnical Engineering Principles.

EN.565.800. Independent Study in Civil Engineering. 3 Credits.
In this independent study course, qualified students are permitted to pursue short-term research or design projects under the guidance and direction of faculty members.Course prerequisite(s): The Independent Study/Project Form (ep.jhu.edu/student-forms) must be completed and approved prior to registration.Course note(s): This course is open only to candidates in the Master of Civil Engineering program.

EN.565.801. Independent Study in Civil Engineering. 3 Credits.
In this independent study course, qualified students are permitted to pursue short-term research or design projects under the guidance and direction of faculty members.Course prerequisite(s): The Independent Study/Project Form (ep.jhu.edu/student-forms) must be completed and approved prior to registration.Course note(s): This course is open only to candidates in the Master of Civil Engineering program.

Civil Engineering, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree may wish to apply to the Graduate Certificate program in Civil Engineering. Admission requirements for the Graduate Certificate in Civil Engineering are the same as those for the Master of Civil Engineering (p. 1460).

Once matriculated, if a student should later decide to pursue the full master's degree, all successfully completed courses will apply provided they meet program requirements and that the remaining courses to be completed fall within a five-year time limit.

Program Requirements

Five courses must be completed within five years. Each student will work with the program chair to design a program tailored to meet their individual goals. Focus areas are not available for students pursuing certificates. Course selections outside of those included in the Civil Engineering program requirements (p. 1460) list are subject to advisor approval.

Civil Engineering, Master of Civil Engineering

A focus area is not required for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study as outlined in the Admission Requirements (p. 1414). The applicant's prior education must include a degree in civil engineering or a closely related technical discipline. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Applicants with a degree in a field closely related to civil engineering may be accepted to the program provided they demonstrate the successful completion of coursework from a regionally accredited institution including: Calculus I, Calculus II, Linear Algebra and Differential Equations, Physics I, Statics, Mechanics of Materials, Theory of Structures, Soil Mechanics, and Structural Design in Steel and Reinforced Concrete. Applicants whose prior education does not include the prerequisites listed may be accepted to the program with provisional status, followed by full admission status once they have completed the missing prerequisites.

Program Requirements

Ten courses must be completed within five years. Students may either pursue a general civil engineering course of study or choose to focus their studies in one of three areas: structural engineering, geotechnical engineering, or ocean and coastal engineering. A focus area is not required for this program and it does not appear as an official designation on a student's transcript or diploma. Rather, each focus area contains a unique list of elective courses designed to guide students through the program so they are prepared for advancement in one of these specific fields after graduation. The courses required for each of the programs are listed below; any deviations from these requirements must be approved by the program chair. A maximum of one course may be selected from the Engineering Management program.

Program options

Code	Title	Credits
General Civil Engineering Program (p. 1460)		
Focus Areas		
Structural Engineering (p. 1460)		
Geotechnical Engineering (p. 1461)		
Ocean and Coastal Engineering (p. 1461)		

Courses

General Civil Engineering

Code	Title	Credits
Core Courses		
Three core courses are required:		
EN.535.641	Mathematical Methods For Engineers	3
EN.565.604	Structural Mechanics	3
EN.565.606	Geotechnical Engineering Principles	3
Electives		
Select at least four elective courses from the following: [1]		
EN.565.608	BIM Applications in Civil Engineering	3
EN.565.616	Applied Finite Element Methods	3
EN.565.619	Advanced Structural Analysis	3
EN.565.620	Advanced Steel Design	3
EN.565.622	Advanced Reinforced Concrete Design	3
EN.565.623	Bridge Design and Evaluation	3
EN.565.626	Design of Wood Structures	3
EN.565.628	Preservation Engineering I: Theory and Practice	3
EN.565.630	Prestressed Concrete Design	3
EN.565.631	Preservation Engineering II: Theory & Practice	3
EN.565.633	Investigation, Diagnosis, and Rehabilitation	3
EN.565.636	Lateral Forces: Analysis and Design of Building Structures	3
EN.565.637	Preservation Engineering in the Urban Context	3
EN.565.658	Natural Disaster Risk Modeling	3
EN.565.664	Advanced Foundation Design	3
EN.565.680	Marine Geotechnical Engineering	3
EN.565.682	Design of Ocean Structures	3
EN.565.684	Port & Harbor Engineering	3
EN.565.686	Sustainable Coastal Engineering	3
EN.565.731	Structural Dynamics	3
EN.565.732	Earthquake Engineering	3
EN.565.734	Wind Engineering	3
EN.565.736	Structural Fire Engineering	3
EN.565.740	Structural Stability	3
EN.565.762	Ground Improvement Methods	3
EN.565.764	Retaining Structures and Slope Stability	3
EN.565.800	Independent Study in Civil Engineering	3
EN.565.801	Independent Study in Civil Engineering	3

1. Of the remaining three courses, a minimum of two must be fulfilled by elective courses in any of the civil engineering program's focus areas, and a maximum of one course may be fulfilled by a course outside of the elective courses in any of the civil engineering program's focus areas.

Structural Engineering Focus Area

Code	Title	Credits
Core Courses		
Two core courses are required:		
EN.565.604	Structural Mechanics	3
EN.535.641	Mathematical Methods For Engineers	3
Electives		
Select at least four elective courses from the following: [2]		

EN.565.608	BIM Applications in Civil Engineering	3
EN.565.616	Applied Finite Element Methods	3
EN.565.619	Advanced Structural Analysis	3
EN.565.620	Advanced Steel Design	3
EN.565.622	Advanced Reinforced Concrete Design	3
EN.565.623	Bridge Design and Evaluation	3
EN.565.626	Design of Wood Structures	3
EN.565.628	Preservation Engineering I: Theory and Practice	3
EN.565.630	Prestressed Concrete Design	3
EN.565.631	Preservation Engineering II: Theory & Practice	3
EN.565.633	Investigation, Diagnosis, and Rehabilitation	3
EN.565.636	Lateral Forces: Analysis and Design of Building Structures	3
EN.565.637	Preservation Engineering in the Urban Context	3
EN.565.682	Design of Ocean Structures	3
EN.565.731	Structural Dynamics	3
EN.565.732	Earthquake Engineering	3
EN.565.734	Wind Engineering	3
EN.565.736	Structural Fire Engineering	3
EN.565.740	Structural Stability	3

2. Of the remaining four courses, a minimum of three must be fulfilled by elective courses in any of the civil engineering program's focus areas, and a maximum of one course may be fulfilled by a course outside of the elective courses in any of the civil engineering program's focus areas.

GEOTECHNICAL ENGINEERING Focus Area

Code	Title	Credits
Core Courses		
Two core courses are required:		
EN.565.606	Geotechnical Engineering Principles	3
EN.535.641	Mathematical Methods For Engineers	3
Electives		
Select at least four elective courses from the following: [2]		
EN.565.664	Advanced Foundation Design	3
EN.565.680	Marine Geotechnical Engineering	3
EN.565.762	Ground Improvement Methods	3
EN.565.764	Retaining Structures and Slope Stability	3
EN.575.626	Hydrogeology	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
EN.575.640	Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications	3
EN.575.703	Environmental Biotechnology	3

2. Of the remaining four courses, a minimum of three must be fulfilled by elective courses in any of the civil engineering program's focus areas, and a maximum of one course may be fulfilled by a course outside of the elective courses in any of the civil engineering program's focus areas.

Ocean and COASTAL ENGINEERING Focus Area

Code	Title	Credits
Core Courses		
Two core courses are required:		
EN.565.682	Design of Ocean Structures	3
EN.535.641	Mathematical Methods For Engineers	3
Electives		
Select at least four elective courses from the following: [2]		
EN.535.621	Intermediate Fluid Dynamics	3
EN.565.658	Natural Disaster Risk Modeling	3
EN.565.680	Marine Geotechnical Engineering	3
EN.565.684	Port & Harbor Engineering	3
EN.565.686	Sustainable Coastal Engineering	3
EN.575.708	Open Channel Hydraulics	3
EN.575.717	Hydrology	3
EN.575.728	Sediment Transport and River Mechanics	3
EN.565.734	Wind Engineering	3

2. Of the remaining four courses, a minimum of three must be fulfilled by elective courses in any of the civil engineering program's focus areas, and a maximum of one course may be fulfilled by a course outside of the elective courses in any of the civil engineering program's focus areas.

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) *published each term for exact dates, times, locations, fees, and instructors*.

Computer Science

The part-time Computer Science program balances theory with practice, offers an extensive set of traditional and cutting-edge courses, and provides the necessary flexibility to accommodate working professionals with various backgrounds. The program appeals to those with undergraduate degrees in computer science seeking to broaden or deepen their understanding, as well as scientists and engineers who wish to gain deeper insights into the field. The program is also a good option for those with practical computer science experience wishing to formalize their computer science background.

Courses are offered at the Applied Physics Laboratory and online.

Bioinformatics Joint Program

This program is offered jointly by the Zanvyl Krieger School of Arts and Sciences and the Whiting School of Engineering. However, the administration is handled by the Zanvyl Krieger School of Arts and Sciences, and applications for admission to the Master of Science in Bioinformatics program must be submitted directly to Zanvyl Krieger School of Arts and Sciences (bioinformatics.jhu.edu). In addition to supplying official transcripts, applicants must provide a résumé or curriculum vitae and a 500-word statement of purpose. The admissions committee reserves the right to request additional information from applicants, such as GRE scores or letters of recommendation, if needed to assess their candidacy for admission.

Program Committee

Lanier Watkins, Program Chair
Senior Professional Staff
JHU Applied Physics Laboratory

Robert S. Grossman, Vice Program Chair Emeritus
Principal Professional Staff (retired)
JHU Applied Physics Laboratory

Anthony N. Johnson, Program Manager
Senior Professional Staff

JHU Applied Physics Laboratory

Eleanor Boyle Chlan
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National Defense University

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Vanderbilt University

Ralph Semmel
Director
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J. Miller Whisnant
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Computer Science, Master of Science (p. 1479)
- Computer Science, Post-Master's Certificate (p. 1483)

Courses

EN.605.101. Introduction to Python.
Not for a letter grade. Offered pass/fail only. This is a six-week course. The withdrawal deadline is the end of the fourth week. Students must pass each module to pass the course. Course Note(s): Not for graduate credit. This course does not satisfy any admission requirements. Instructor(s): Non-facilitated

EN.605.201. Introduction to Programming Using Java. 3 Credits.
This course enables students without a background in software development to become proficient programmers who are prepared for a follow-on course in data structures. The Java language will be used to introduce foundations of structured, procedural, and object-oriented programming. Topics include input/output, data types, operators, program control flow structures, arrays, strings, and methods. Students will also be introduced to classes, objects, inheritance, polymorphism, exception handling, processing streams and files, collections, wrappers, and generics, and graphical user interfaces. Students will complete several programming assignments and projects to develop their problem-solving skills and to gain experience in detecting and correcting software errors. Prerequisite(s): One year of college mathematics. Course Note(s): Not for graduate credit. A programming methodology course is needed for admission to the Computer Science, Cybersecurity, Data Science, or Information Systems Engineering program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.202. Data Structures. 3 Credits.
This course investigates abstract data types (ADTs), recursion, algorithms for searching and sorting, and basic algorithm analysis. ADTs to be covered include lists, stacks, queues, priority queues, trees, sets, and dictionaries. The emphasis is on the trade-offs associated with implementing alternative data structures for these ADTs. There will be four substantial programming assignments. This course will be taught in a language agnostic fashion. Students may choose to develop their work in Java, C++, or Python (Not for Graduate credit.) Prerequisite(s): One year of college mathematics. 605.201 Introduction to Programming Using Java or 605.206 Introduction to Programming in Python or equivalent. Course Note(s): Not for graduate credit. A course in data structures is needed for admission to the Computer Science, Cybersecurity, and Data Science program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better. A course in data structures is conditionally required for admission to the Information Systems Engineering program. Students who lack this prerequisite can satisfy it by completing this course with a grade of B– or better before taking any course that requires it. A second course in programming is required for admission to the Artificial Intelligence program. Students who lack this prerequisite can satisfy it by completing this course with a grade of B– or better before taking any course that requires it. Students in the Artificial Intelligence program who plan to take the 605.621 Foundations of Algorithms and 605.649 Introduction to Machine Learning Sequence are required to take 605.202 or equivalent.

EN.605.203. Discrete Mathematics. 3 Credits.
This course emphasizes the relationships between certain mathematical structures and various topics in computer science. Topics include set theory, graphs and trees, algorithms, propositional calculus, logic and induction, functions, relational algebra, and matrix algebra. Prerequisite(s): Calculus is recommended. Course Note(s): Not for graduate credit. A mathematics course beyond one year of calculus is needed for admission to the Computer Science, Cybersecurity, or Data Science program. A course in either calculus or discrete mathematics is needed for admission to the Information Systems Engineering program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.204. Computer Organization. 3 Credits.
This course examines how a computer operates at the machine level. Students will develop an understanding of the hardware/ software interface by studying the design and operation of computing system components. In addition, students will program at the assembly language level to understand internal system functionality. Finally, students will become familiar with the machine representations of programs and data, as well as the influence of the underlying hardware system on the design of systems software such as operating systems, compilers, assemblers, and linkers and loaders. Prerequisite(s): 605.202 - Data Structures is recommended. Course Note(s): Not for graduate credit. A course in computer organization is needed for admission to the Computer Science or Cybersecurity program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.205. Molecular Biology for Computer Scientists. 3 Credits.
This course is designed for students who seek to take bioinformatics courses but lack prerequisites in the biological sciences. The course covers essential aspects of biochemistry, cell biology, and molecular biology. Topics include the chemical foundations of life; cell organization and function; the structure and function of macromolecules; gene expression— transcription, translation, and regulation; biomembranes and transmembrane transport; metabolism and cellular energetics; and signal transduction. The application of foundational concepts in developmental biology, neurobiology, immunology, and cancer biology is also introduced. Course Note(s): Not for graduate credit. Several courses in the Bioinformatics track of Computer Science require background in Molecular Biology. Students can fulfill this requirement by completing this course with a grade of B- or better.

EN.605.206. Introduction to Programming Using Python. 3 Credits.
This course is a practical introduction for those interested in learning Python for a wide variety of applications and use cases. The material has been designed to expose you to common techniques and tools you'll be able to exercise immediately. This course assumes no prior development experience and ranges from beginning to intermediate Python concepts including: creating a Python environment, data types, operators/expressions, data and control structures, conditional statements, classes/objects, functions, multi-threaded applications, testing and deployment tools, REST API's, machine learning, and more. You'll also gain valuable experience with tools like PyCharm/ VSCode, Jupyter Notebooks, Git, PyLint, PyDocs/Doxygen, and many more. Each concept is accompanied by real code samples that will be explained in-detail and the assignments will present you with interesting scientific problems to enable you to practice your Python skills for the purpose of solving real, complex problems. The course is textbook-free and provides a number of hand-chosen readings to supplement the lecture materials. Upon completion of the course you will be equipped with knowledge of the skills and tools to begin tackling problems the Pythonic way.Prerequisite(s): One year of college mathematics.Course Note(s): Not for graduate credit. A programming methodology course is needed for admission to the Artificial Intelligence or Data Science programs. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.601. Foundations of Software Engineering. 3 Credits.
Fundamental software engineering techniques and methodologies commonly used during software development are studied. Topics include various life cycle models, project planning and estimation, requirements analysis, program design, construction, testing, maintenance and implementation, software measurement, and software quality. Emphasized are structured and object-oriented analysis and design techniques, use of process and data models, modular principles of software design, and a systematic approach to testing and debugging. The importance of problem specification, programming style, periodic reviews, documentation, thorough testing, and ease of maintenance are covered. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.605.602. Software Analysis and Design. 3 Credits.
This course prepares students to successfully engineer secure software systems by addressing critical security challenges across the entire software development life cycle. Students will learn the practical skills for building secure software from the ground up through hands-on labs and exercises. Key topical areas addressed include security in software requirements, design, and development. Common security pitfalls are highlighted and examined as well as the tools and techniques for identifying and eliminating the security vulnerabilities. Security considerations in Mobile code development are also addressed. Parameterized refinement methods and transduction techniques based on mathematical-based proofs are presented as a means of verifying the correctness of code and modifications to code as well as to validate conformance with functional requirements. Software protection techniques such as code obfuscation and water-marking are explored.

EN.605.603. Object-Oriented and Functional Programming in Kotlin. 3 Credits.
This course introduces object-oriented and functional programming in the new programming language Kotlin. Kotlin runs on multiple platforms and virtually anywhere, compiling to native code, JavaScript, the Android runtime, and the Java Virtual Machine. It easily interacts with other Java code. Through this course, you'll become adept at Kotlin programming, an easier-to-use, safer and more productive language than Java. We'll cover the basics of the language, including data types, functions and collections, object-oriented features such as classes, encapsulation, inheritance, composition, delegation and generics, and functional features such as immutability, higher-order functions and functional chaining. You'll learn how to create multi-threaded applications using coroutines and builders that will simplify the use of your libraries using simple Domain-Specific languages. Students will build several projects in Kotlin.Pre-requisites: Competence in a procedural language (such as C, Pascal, or Visual Basic) or object-oriented language (such as Java or C++). Note that this is not an "introduction to programming" class and cannot substitute for 605.201; we assume familiarity with programming in general.

EN.605.604. Object-Oriented Programming with C++. 3 Credits.
This course provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes, and low-level language features. The course briefly covers the mapping of UML design to C++ implementation and object-oriented considerations for software design and reuse. The course also relates C++ to GUI, databases, and real-time programming. The course material embraces the C++11 language standard with numerous examples demonstrating the benefits of C++11. Prerequisite(s): Knowledge of a high level block structures language.

EN.605.606. Programming with Domain-Specific Languages. 3 Credits.
Domain-specific languages (DSLs) are little languages you write that look and feel like a spoken way to specify data or write code. You can use them for input and output, incorporating the jargon and nomenclature of your subject-matter experts (SMEs), as well as inside your own code to make it more expressive and fluent, and often simpler. You can use them as part of your build process to generate hundreds of classes full of otherwise tedious and error-prone boilerplate code from a small specification in a consistent manner. In this course, we'll design and implement several types of DSLs. We'll write code to edit and import data, allowing SMEs more natural-feeling access to your software. We'll create APIs in multiple programming languages to make it easier and more secure for others to use your libraries. We'll generate code to improve productivity and reliability in your own software. Course Note(s): Examples and assignments in this class will be done in several programming languages. We assume a high comfort level with Java and the ability to adapt to new languages quickly.
EN.605.601 Intro to Software Engineering

EN.605.607. Agile Software Development Methods. 3 Credits.
This course emphasizes the quick realization of system value through disciplined, iterative, and incremental software development techniques and the elimination of wasteful practices. Students will study the full spectrum of agile methods, including Scrum, Extreme Programming, Lean, Kanban, Dynamic Systems Development Method, and Feature-Driven Development. These methods promote teamwork, rich concise communication, and the frequent delivery of running, tested systems containing the highest-priority stakeholder features. Agile methods are contrasted with common workplace practices and traditional, Waterfall-based methods. Examples of agile adoption in industry are covered, along with scaling methods for large-scale development. Assignments and projects are designed to help students apply agile principles and practices in their own professional context. Additional subthemes in the course include enterprise agility, team dynamics, collaboration, software quality, and metrics for reporting progress. Prerequisite(s): EN.605.601 Intro to Software Engineering
EN.605.601 Foundations of Software Engineering

EN.605.608. Software Project Management. 3 Credits.
This course describes the key aspects of a software project. It begins with the job description of a software manager and then addresses those topics germane to successful software development management, including organizing the software development team; interfacing with other engineering organizations (systems engineering, quality assurance, configuration management, and test engineering); assessing development standards; selecting the best approach and tailoring the process model; estimating software cost and schedule; planning and documenting the plan; staffing the effort; managing software cost and schedule during development; risk engineering; and continuous process improvement. Personnel management topics, including performance evaluations, merit planning, skills building, and team building, are also covered. This course introduces software engineers aspiring to become technical team leaders or software project managers to the responsibilities of these roles. For those engineers who have advanced to a software development leadership position, this course offers formal training in software project management. Prerequisite(s): Three to five years technical work experience is recommended.

EN.605.609. DevOps and Secure Software Development. 3 Credits.
This course focuses on three key concepts: Agile Software Development, Infrastructure as Code, and Secure Software Delivery. Throughout this course students will learn how to build modern software systems through version control, automated deployment techniques, and improved documentation. This course gathers the latest publications to instruct students on: source code control, virtualization and containerization (Docker) techniques, build automation tools, software composition management/analysis, cloud security, and application security testing (SAST/DAST/IAST/RASP). The course concludes with a team project where students code a functioning DevSecOps pipeline to automate the assessment of software for security.Prerequisite(s): Prior experience in software development in any language is required. Familiarity with software design, cloud development, and architecture techniques is recommended.

EN.605.611. Foundations of Computer Architecture. 3 Credits.
This course provides a detailed examination of the internal structure and operation of modern computer systems. Each of the major system components is investigated, including the following topics: the design and operation of the ALU, FPU, and CPU; microprogrammed vs. hardwired control, pipelining, and RISC vs. CISC machines; the memory system including caches and virtual memory; parallel and vector processing, multiprocessor systems and interconnection networks; superscalar and super-pipelined designs; and bus structures and the details of low-level I/O operation using interrupt mechanisms, device controllers, and DMA. The impact of each of these topics on system performance is also discussed. The instruction set architectures and hardware system architectures of different machines are examined and compared. The classical Von Neumann architecture is also compared and contrasted with alternative approaches such as data flow machines and neural networks. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.605.612. Operating Systems. 3 Credits.
The theory and concepts related to operating system design are presented from both developer and user perspectives. Core concepts covered include process management, memory management, file systems, I/O system management including device drivers, distributed systems, and multi-user concepts including protection and security. Process management discussions focus on threads, scheduling, and synchronization. Memory management topics include paging, segmentation, and virtual memory. Students will examine how these concepts are realized in several current open-source operating systems, including Linux. Students will complete several assignments that require the design and implementation of operating system programs using a high-level language.

EN.605.613. Introduction to Robotics. 3 Credits.
This course introduces the fundamentals of robot design and development with an emphasis on autonomy. Robot design, navigation, obstacle avoidance, and artificial intelligence will be discussed. Topics covered in robot design include robot structure, kinematics and dynamics, the mathematics of robot control (multiple coordinate systems and transformations), and designing for autonomy. Navigation topics include path planning, position estimation, sensors (e.g., vision, ultrasonics, and lasers), and sensor fusion. Obstacle avoidance topics include obstacle characterization, object detection, sensors and sensor fusion. Topics to be discussed in artificial intelligence include learning, reasoning, and decision making. Students will deepen their understanding through several assignments and the term-long robot development project.

EN.605.614. System Development in the UNIX Environment. 3 Credits.
This course describes how to implement software systems in a UNIX (POSIX-compliant) operating system environment. Students will discuss and learn the complexities, methodologies, and tools in the development of large systems that contain multiple programs. Topics include an overview of the UNIX system and its general-purpose tools, advanced makefile usage, UNIX system calls, UNIX process management, threads, and basic and advanced interprocess communication. Additional topics include source code configuration control, Perl, and debugging techniques.Prerequisite(s): Familiarity with UNIX, experience with C++ or C.

EN.605.615. Compiler Design with LLVM. 3 Credits.
The components of a compiler appear in every software application that handles input from an external source. This course shows how the components of a compiler are built and how they fit together to extract meaning from the input and how the data flows through the compiler's components to become useful to applications. Students will get practical experience in how to use the LLVM tools to build a complete compiler for a subset of the C++ programming language that can target almost any platform. Students will also get experience in developing a "Just In Time" component for an application that will accept code as input into the application while it is running, to be compiled and linked into the application so the application can execute it. Prerequisites: This course has no formal prerequisites, but experience with C++ is highly recommended because LLVM is written in C++, and therefore, all homework will be in C++, and this course is software homework intensive.

EN.605.616. Multiprocessor Architecture & Programming. 3 Credits.
This course addresses how to utilize the increasing hardware capabilities of multiprocessor computer architecture's highperformance computing platforms for software development. The famous Moore's Law is still alive, although it is now realized from increasing the number of CPU cores instead of increasing CPU clock speed. This course describes the differences between single-core and multi-core systems and addresses the impact of these differences in multiprocessor computer architectures and operating systems. Parallel programming techniques to increase program performance by leveraging the multiprocessor system, including multi-core architectures, will be introduced. Additional topics include program performance analysis and tuning, task parallelism, synchronization strategies, shared memory access and data structures, and task partition techniques. The course encourages hands-on experience with projects selected by the student.

EN.605.617. Introduction to GPU Programming. 3 Credits.
This course will teach the fundamentals needed to utilize the ever-increasing power of the GPUs housed in the video cards attached to our computers. For years, this capability was limited to the processing of graphics data for presentation to the user. With the CUDA and OpenCL frameworks, programmers can develop applications that harness this power directly to search, modify, and quickly analyze large amounts of various types of data. Students will be introduced to core concurrent programming principles, along with the specific hardware and software considerations of these frameworks. In addition, students will learn canonical algorithms used to perform high-precision mathematics and data transformations. Class time will be split between lectures and hands-on exercises. There will be two individual projects in both CUDA and OpenCL programming, which will allow students to independently choose demonstrable goals, develop software to achieve those goals, and present the results of their efforts.

EN.605.620. Algorithms for Bioinformatics. 3 Credits.
This follow-on course to data structures (e.g., 605.202 Data Structures) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, minimum spanning trees). Advanced topics are selected from among the following: multithreaded algorithms, matrix operations, linear programming, string matching, computational geometry, and approximation algorithms. Students will form groups to work on difficult problems and also to present an advanced topic at the end of the term. The course will draw on applications from Bioinformatics. Prerequisite(s): 605.202 Data Structures or equivalent, and 605.201 Introduction to Programming Using Java or 605.206 Introduction to Programming in Python or equivalent. 605.203 Discrete Mathematics or equivalent is recommended.Course Note(s): This course does not satisfy the foundation course requirement for Computer Science, Data Science, or Cybersecurity. Students can only earn credit for one of 605.620, 605.621, or 685.621.

EN.605.621. Foundations of Algorithms. 3 Credits.
This follow-on course to data structures (e.g., 605.202) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), recursion and mathematical induction, algorithm analysis and computational complexity (recurrence relations, big-O notation, NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristic, dynamic programming, amortized analysis), and graph algorithms (depth-first and breadth-first search, connectivity, minimum spanning trees, network flow). Advanced topics are selected from among the following: randomized algorithms, information retrieval, string and pattern matching, and computational geometry. Prerequisite(s): EN.605.202 Data Structures or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

EN.605.622. Computational Signal Processing. 3 Credits.
This course introduces algorithms and architectures for the analysis and processing of digital signals, taking the computer science perspective. It emphasizes computational complexity and efficiency and the design and implementation of computer algorithms for processing signals, designing digital filters, and effectively presenting and displaying information. Topics include signal analysis, discrete Fourier transform (definition, applications, and fast algorithms), convolution and correlation, spectral estimation and display, filter design, signal encoding/decoding, time-frequency analysis, Software Defined Radio (SDR), arithmetic computational complexity, and applications Background in signal processing and mathematics will be introduced as needed. EN.605.621 Foundations of Algorithms or equivalent background, some knowledge of complex numbers and linear algebra (vectors and matrices).

EN.605.623. Intro to Enumerative Combinatorics. 3 Credits.
The most basic question in mathematics is How many? Counting problems arise in diverse areas including discrete probability and the analysis of the run time of algorithms.In this course we present methods for answering enumeration questions exactly and approximately. Topics include fundamental counting problems (lists, sets, partitions, and so forth), combinatorial proof, inclusion-exclusion, ordinary and exponential generating functions, group-theory methods, and asymptotics. Examples are drawn from areas such as graph theory and block designs.After completing this course students will be practiced in applying the fundamental functions (such as factorial, binomial coefficients, Stirling numbers) and techniques for solving a wide variety of exact enumeration problems as well as notation and methods for approximate counting (asymptotic equality, big-oh and little-oh notation, etc.).Course prerequisite(s): Linear algebraCourse note(s): This course is the same as 625.617 Introduction to Enumerative Combinatorics.

EN.605.624. Logic: Systems, Semantics, and Models. 3 Credits.
Traditionally, logic is the study of correct reasoning. In the last few decades, logic has become increasingly important to knowledge representation -- a subfield of artificial intelligence concerned with developing representations of the world (often called ontologies) that aid computers in understanding and making sense of data. This course will promote both a theoretical and practical understanding of logic as a stepping stone for working in contemporary knowledge representation. We will begin with a review of categorical, propositional, and predicate logic. We will then survey modal logics, which include systems that represent necessity and probability, as well as other systems that represent time, and moral notions such as obligation and permissibility. The second half of the course will then introduce the semantic web and ontology engineering. Students will explore the top-level ontology Basic Formal Ontology (BFO) and gain familiarity using mereological and temporal relations. In addition, students will create ontologies in the web ontology language (OWL2) and use the language SPARQL to query knowledge graphs. Students will have the option of writing either a research paper or creating an ontology in OWL with slides as part of a final project.

EN.605.625. Probabilistic Graphical Models. 3 Credits.
This course introduces the fundamentals behind the mathematical and logical framework of graphical models. These models are used in many areas of machine learning and arise in numerous challenging and intriguing problems in data analysis, mathematics, and computer science. For example, the “big data” world frequently uses graphical models to solve problems. While the framework introduced in this course will be largely mathematical, we will also present algorithms and connections to problem domains. The course will begin with the fundamentals of probability theory and will then move into Bayesian networks, undirected graphical models, templatebased models, and Gaussian networks. The nature of inference and learning on the graphical structures will be covered, with explorations of complexity, conditioning, clique trees, and optimization. The course will use weekly problem sets and a term project to encourage mastery of the fundamentals of this emerging area. Prerequisite(s): Graduate course in probability and statistics (such as 625.603 Statistical Methods and Data Analysis). Course Note(s): This course is the same as 625.692 Probabilistic Graphical Models.

EN.605.626. Image Processing. 3 Credits.
Fundamentals of image processing are covered, with an emphasis on digital techniques. Topics include digitization, enhancement, segmentation, the Fourier transform, filtering, restoration, reconstruction from projections, and image analysis including computer vision. Concepts are illustrated by laboratory sessions in which these techniques are applied to practical situations, including examples from biomedical image processing. Prerequisite(s): Familiarity with Fourier transforms.

EN.605.627. Computational Photography. 3 Credits.
Computational photography is an emerging research area at the intersection of computer graphics, image processing, and computer vision. As digital cameras become more popular and collections of images continue to grow, we’ve seen a surge in interest in effective ways to enhance photography and produce more realistic images through the use of computational techniques. Computational photography overcomes the limitations of conventional photography by analyzing, manipulating, combining, searching, and synthesizing images to produce more compelling, rich, and vivid visual representations of the world. This course will introduce the fundamental concepts of image processing, computer vision, and computer graphics, as well as their applications to photography. Topics include image formation, filtering, blending, and completion techniques. In addition, the course will discuss different image analysis and rendering techniques including texture analysis, morphing, and nonphotorealistic rendering.

EN.605.629. Programming Languages. 3 Credits.
This course compares and contrasts a wide variety of features of at least twelve programming languages, including programming language history; formal methods of describing syntax and semantics; names, binding, type checking, and scopes; data types; expressions and assignment statements; statement-level control structures; design and implementation of subprograms; exception handling; and support for objectoriented programming. Students will also learn and write fourweek projects in three programming languages (e.g., Python, Perl, and C#).

EN.605.630. Theory of Computation. 3 Credits.
This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, time and space complexity theory, Boolean circuits, and interactive proof systems.

EN.605.631. Statistical Methods for Computer Science. 3 Credits.
Statistical methods are the foundation for data science, artificial intelligence, and much of the field of computer science. Topics include probability, random variables, regression, gradient search, Bayesian methods, graphical methods, and exponential random graph models. Student will have the foundation to excel in future courses in machine learning, data science, algorithms, and more. Practice exercises will develop proficiency in the R programming language.

EN.605.632. Graph Analytics. 3 Credits.
Graphs are a flexible data structure that facilitates fusion of disparate data sets. Applications of graphs have shown steady growth with the development of Internet, cyber, and social networks, presenting large graphs for which analysis remains a challenging problem. This course introduces algorithms and techniques to address large-scale graph analytics. It will blend graph analytics theory, hands-on development of graph analytics algorithms, as well as processing approaches that support the analytics. We will start by introducing graphs, their properties, and example applications, including necessary background on probability and linear algebra. Statistical properties of random and scale-free graphs will be introduced. Graph analytic methods, including centrality measures, graph clustering, partitioning, link inference, and dynamic graph processes such as diffusion, contagion, and opinion formation will be covered. Application of graph analytics to high-dimensional data analysis and data clustering will be discussed. Students will use standard graph interfaces as well as linear algebra-based methods to analyze graphs. Parallelization of analytics to handle larger-scale graphs will be discussed. Students will identify and apply suitable algorithms and analysis techniques to a variety of graph analytics problems, as well as gain experience setting up and solving these problems. There will be hands-on programming assignments.

EN.605.633. Social Media Analytics. 3 Credits.
Today an immense social media landscape is being fueled by new applications, growth of devices (e.g., Smartphones and devices), and human appetite for online engagement. With a myriad of applications and users, significant interest exists in the obvious question, “How does one better understand human behavior in these communities to improve the design and monitoring of these communities?” To address this question a multidisciplinary approach that combines social network analysis (SNA), natural language processing, and data analytics is required. This course combines all these topics to address contemporary topics such as marketing, population influence, etc. There will be several small projects.
Prerequisite(s): Knowledge of Python or R; matrix algebra.
Foundation Prerequisites for Cybersecurity Majors:EN.605.621 AND EN.695.601 AND EN.695.641;Computer Science majors need to complete foundation requirement first.

EN.605.634. Crowdsourcing and Human Computation. 3 Credits.
Crowdsourcing and human computation reverses the typical approach to computing. Rather than using computers to conduct computation that is too difficult for a human, many humans are used to conduct computation that is too difficult for a computer. This course explores computer science topics that lie at the intersection of data science and social psychology. Topics include crowdsourcing, social media, social network analysis, games, gamification, ubiquitous computing, and computersupported cooperative work. Laboratory exercises will involve hands-on data collection and analysis to include Mechanical Turk and require programming in R or Python depending on student preference/proficiency.

EN.605.635. Cloud Computing. 3 Credits.
Cloud computing helps organizations realize cost savings and efficiencies without spending capital resources up front, while modernizing and expanding their IT capabilities. Cloud-based infrastructure is rapidly scalable, secure, and accessible over the Internet —you pay only for what you use. So, enterprises worldwide, big and small, are moving toward cloud-computing solutions for meeting their computing needs, including the use of Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). We have also seen a fundamental shift from shrinkwrapped software to Software as a Service (SaaS) in data centers across the globe. Moreover, providers such as Amazon, Google, and Microsoft have opened their datacenters to third parties by providing low-level services such as storage, computation, and bandwidth. This trend is creating the need for a new kind of enterprise architect, developer, QA, and operational professional—someone who understands and can effectively use cloud-computing technologies and solutions. In this course, we discuss critical cloud topics such as cloud service models (IaaS, PaaS, SaaS); virtualization and how it relates to cloud; elastic computing; cloud storage; cloud networking; cloud databases; cloud security; and architecting, developing, and deploying apps in the cloud. The format of this course will be a mix of lectures, and hands-on demos. Upon completing this course, students will have a deeper understanding of what cloud computing is and the various technologies that make up cloud computing, along with hands-on experience working with a major cloud provider. Prerequisite(s): 605.202 Data Structures.

EN.605.636. Autonomic Computing. 3 Credits.
This course is an introduction to autonomic and self-aware computing systems. It surveys the field of autonomic computing from its first introductory vision to the current time. The course describes autonomic computing and how it provides self-managing systems with their ability to adapt to unpredictable changes in an environment. It concentrates on the self-awareness properties of autonomic systems, the architecture, the monitoring systems that provide the self-awareness, and the adaptation and decision making needed to adapt to changing environments. The course covers the vision of autonomic computing and how autonomic computing differs from automated and autonomous systems. It discusses the self-awareness properties of autonomic systems and their biological inspiration. Architectures of autonomic systems are covered, which includes autonomic managers that are the core of autonomic systems that provide the self-managing nature of autonomic systems. Adaptation, another important aspect of autonomic computing, is discussed as well as what makes an autonomic system self-aware. The course ends with evaluation and assurance of autonomic systems, and future trends in the field. There will be weekly readings and discussions, approximately bi-weekly assignments that go into depth on selected topics, and a final project or research paper. The project can be an implementation of a part of an autonomic computing system, or a research paper that goes into depth on one of the topics covered or a topic that is of interest to the student.

EN.605.641. Principles of Database Systems. 3 Credits.
This course examines the underlying concepts and theory of database management systems. Topics include database system architectures, transaction management, data models, query languages, conceptual and logical database design, and physical organization. The entity-relationship (ER) model, using ER diagram (ERD) and Enhanced ERD, as well as relational models, are investigated in detail. Object-oriented databases are introduced along with legacy systems based on the network. Hierarchical models as well as big data and NoSQL are also briefly described. Mappings from the conceptual level to the logical level, integrity constraints, dependencies, and normalization are studied as a basis for formal design. Theoretical languages such as the relational algebra and the relational calculus are described, and high-level languages such as SQL, triggers and Stored Procedures are discussed. An overview of file organization and access methods is provided as a basis for discussion of query optimization and execution. The course also covers the causes of performance problems and how to improve database application performance during database design and implementation.Course prerequisite(s): 605.202 Data Structures.

EN.605.643. Linked Data and the Semantic Web. 3 Credits.
The World Wide Web Consortium (W3C) is endeavoring to create standards and technology that support a distributed "Web of data." Collectively, these advances allow the systems we develop to work and interact more effectively, through the use of XML-based languages, and information on how various tags relate to real-world objects and concepts. This course covers a range of Semantic Web technologies, including RDF (Resource Description Framework - a model for data interchange) and OWL (Web Ontology Language), as well as domain-specific standards and ontologies (formal specifications of how to represent objects and concepts). Representative applications of RDF, OWL, and ontologies to various problems will be discussed. Students will apply course concepts to an in-depth project in an area of personal or professional interest. Prerequisite(s): 605.202 Data Structures. Course Note(s): This course may be counted toward a threecourse track in Bioinformatics.

EN.605.644. XML Design Paradigms. 3 Credits.
The course explores understanding the tradeoffs among XML grammars and XML techniques to solve different classes of problems. Topics include optimization of XML grammars for different XML technologies; benefits of using different XML schema languages; tradeoffs in using different parsing approaches; benefits of parsing technology vs. XML query; the role of Web 2.0 to deliver functionality through various web services approaches; exploiting XML to drive audio, visual, and tactile displays; the role of XML in multiplying the power of standard web browser technologies; and the role of Web 3.0 to deliver Semantic Web functionality. XML technologies that will be covered include XML Schema, XPath, XSLT, SAX, DOM, XQuery, SOAP, WSDL, JAX-B, JAX-WS, REST, RDF, and OWL.
EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.645. Artificial Intelligence. 3 Credits.
This is a foundational course in Artificial Intelligence. Although we hear a lot about machine learning, artificial intelligence is a much broader field with many different aspects. In this course, we focus on three of those aspects: reasoning, optimization, and pattern recognition. Traditionally, the first was covered under "Symbolic AI" or "Good Old Fashioned AI" and the latter two were covered under "Numeric AI" (or more specifically, "Connectionist AI" or "Machine Learning"). However, despite the many successes of machine learning algorithms, practitioners are increasingly realizing that complicated AI systems need algorithms from all three aspects. This approach falls under the ironic heading "Hybrid AI".
In this course, the foundational algorithms of AI are presented in an integrated fashion emphasizing Hybrid AI. The topics covered include state space search, local search, example based learning, model evaluation, adversarial search, constraint satisfaction problems, logic and reasoning, expert systems, rule based ML, Bayesian networks, planning, reinforcement learning, regression, logistic regression, and artificial neural networks (multi-layer perceptrons). The assignments weigh conceptual (assessments) and practical (implementations) understanding equally. Prerequisite(s): A working knowledge of Python programming is assumed as all assignments are completed in Python.

EN.605.646. Natural Language Processing. 3 Credits.
This course surveys the principal difficulties of working with written language data, the fundamental techniques that are used in processing natural language, and the core applications of NLP technology. Topics covered in the course include language modeling, text classification, labeling sequential data (tagging), parsing, information extraction, question answering, machine translation, and semantics. The dominant paradigm in contemporary NLP uses supervised machine learning to train models based on either probability theory or deep neural networks. Both formalisms will be covered. A practical approach is emphasized in the course, and students will write programs and use open source toolkits to solve a variety of problems.Course prerequisite(s): There are no formal prerequisite courses, although having taken any of 605.649 Introduction to Machine Learning, 605.744 Information Retrieval, or 605.645 Artificial Intelligence is helpful.Course note(s): A working knowledge of Python is assumed. While some of the assigned exercises can be done in any programming language, we will sometimes provide example code in Python, and many of the labs are best solved in Python.

EN.605.647. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as 625.638 Neural Networks.

EN.605.649. Introduction to Machine Learning. 3 Credits.
EN.605.649 - Introduction to Machine LearningAnalyzing large data sets ("Big Data"), is an increasingly important skill set. One of the disciplines being relied upon for such analysis is machine learning. In this course, we will approach machine learning from a practitioner's perspective. We will examine the issues that impact our ability to learn good models (e.g., inductive bias, the curse of dimensionality, the bias-variance dilemma, and no free lunch). We will then examine a variety of approaches to learning models, covering the spectrum from unsupervised to supervised learning, as well as parametric versus non-parametric methods. Students will explore and implement several learning algorithms, including logistic regression, nearest neighbor, decision trees, and feed-forward neural networks, and will incorporate strategies for addressing the issues impacting performance (e.g., regularization, clustering, and dimensionality reduction). In addition, students will engage in online discussions, focusing on the key questions in developing learning systems. At the end of this course, students will be able to implement and apply a variety of machine learning methods to real-world problems, as well as be able to assess the performance of these algorithms on different types of data sets. Prerequisite(s): EN.605.202 – Data Structures or equivalent.

EN.605.651. Principles of Bioinformatics. 3 Credits.
This course is an interdisciplinary introduction to computational methods used to solve important problems in DNA and protein sequence analysis. The course focuses on algorithms but includes material to provide the necessary biological background for science and engineering students. Algorithms to be covered include dynamic programming for sequence alignment, such as Smith-Waterman, FASTA, and BLAST; hidden Markov models, such as the forward, Viterbi, and expectation maximization algorithms; a range of gene-finding algorithms; phylogenic tree construction; and clustering algorithms. Prerequisite(s): Familiarity with probability and statistics; working knowledge of Java, C++, C, Perl, MATLAB or Python; 605.205 Molecular Biology for Computer Scientists or a course in molecular biology; and a course in either cell biology or biochemistry.

EN.605.652. Biological Databases and Database Tools. 3 Credits.
The sequencing of thousands of genomes, including those related to disease states, interest in proteomics, epigenetics, and variation have resulted in an explosive growth in the number of biological databases, as well as the need to develop new databases to handle the diverse new content being generated. The course focuses on the design of biological databases and examines issues such as those related to data modeling, heterogeneity, interoperability, evidence, and tool integration. It also surveys a wide range of biological databases and their access tools and enables students to develop proficiency in their use. Databases introduced include genome and sequence databases such as GenBank and Ensembl, as well as protein databases such as PDB and UniProt. Databases related to RNA, sequence variation, pathways and interactions, metagenomics, and epigenomics are also presented. Tools for accessing and manipulating data from databases such as BLAST, genome browsers, multiple sequence alignment, gene finding, and protein tools are reviewed. The programming language Perl is introduced, along with the use of Perl in obtaining data via web services and in storing data in an SQLite database. Students will use Perl (Python may be used for some assignments), biological databases, and database tools to complete homework assignments. They will also design a database and will write code in the language of their choice to create their own database as a course project.
(For JHEP Students) EN.605.205 Molecular Biology for Computer Scientists or AS.410.634 Practical Computer Concepts for Bioinformatics or equivalent; EN.605.641 Principles of Database Systems or equivalent; EN.605.202 Data Structures and EN.605.201 Introduction to Programming Using Java.

EN.605.653. Computational Genomics. 3 Credits.
This course focuses on current problems of computational genomics. Students will explore bioinformatics software, discuss bioinformatics research, and learn the principles underlying a variety of bioinformatics algorithms. The emphasis is on algorithms that use probabilistic and statistical approaches. Topics include analyzing eukaryotic, bacterial, and viral genes and genomes, genome sequencing and assembling, finding genes in genomes and identifying their biological functions, predicting regulatory sites, and assessing gene and genome evolution. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent and familiarity with probability and statistics.

EN.605.656. Computational Drug Discovery,Dev. 3 Credits.
Recent advances in bioinformatics and drug discovery platforms have brought us significantly closer to the realization of rational drug design and development. Across the pharmaceutical industry, considerable effort is being invested in developing experimental and translational medicine, and it is starting to make a significant impact on the drug discovery process itself. This course examines the major steps of the evolving modern drug discovery platforms, the computational techniques and tools used during each step of rational drug discovery, and how these techniques facilitate the integration of experimental and translation medicine with the discovery/development platforms. The course will build on concepts from a number of areas including bioinformatics, computational genomic/ proteomics, in-silico system biology, computational medicinal chemistry, and pharmaceutical biotechnology. Topics covered in the course include comparative pharmacogenomics, protein/ antibody modeling, interaction and regulatory networks, QSAR/ pharmacophores, ADME/toxicology and clinical biomarkers. Relevant mathematical concepts are developed as needed in the course. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent.

EN.605.657. Statistics for Bioinformatics. 3 Credits.
This course provides an introduction to the statistical methods commonly used in bioinformatics and biological research. The course briefly reviews basic probability and statistics including events, conditional probabilities, Bayes; theorem, random variables, probability distributions, and hypothesis testing and then proceeds to topics more specific to bioinformatics research, including Markov chains, hidden Markov models, Bayesian statistics, and Bayesian networks. Students will learn the principles behind these statistical methods and how they can be applied to analyze biological sequences and data. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent, and 410.645 Biostatistics or another statistics course.

EN.605.661. Computer Vision. 3 Credits.

EN.605.662. Data Visualization. 3 Credits.
This course explores the underlying theory and practical concepts in creating visual representations of large amounts of data. It covers the core topics in data visualization: data representation, visualization toolkits, scientific visualization, medical visualization, information visualization, flow visualization, and volume rendering techniques. The related topics of applied human perception and advanced display devices are also introduced. Prerequisite(s): Experience with data collection/analysis in data-intensive fields or background in computer graphics (e.g., 605.667 Computer Graphics) is recommended.

EN.605.667. Computer Graphics. 3 Credits.
This course examines the principles of computer graphics, with a focus on the mathematics and theory behind 2D and 3D graphics rendering. Topics include graphics display devices, graphics primitives, 2D and 3D transformations, viewing and projection, color theory, visible surface detection and hidden surface removal, lighting and shading, and object definition and storage methods. Practical application of these concepts is emphasized through laboratory exercises and code examples. Laboratory exercises use the C++ programming language and OpenGL on a PC. Prerequisite(s): Familiarity with linear algebra.

EN.605.668. Computer Gaming Engines. 3 Credits.
This course examines the fundamentals of computer game software designed to familiarize the students with a broad understanding of many aspects of computer gaming. The course prioritizes broad coverage over deep coverage. Topics include 2D/3D graphics, input/output, real-time simulations, resource management, vector mathematics, sound, concurrency, and so forth, with an emphasis on cross-platform development. Practical applications of these topics are covered in programming assignments throughout the semester with the goal of developing a simple game of the student's choice. Programming assignments are done in C or C++ on PC, MacOS, or Linux. Prerequisite(s): EN.605.668 – Computer Graphics, Linear Algebra is recommended.

EN.605.671. Principles of Data Communications Networks. 3 Credits.
This course provides an introduction to the field of data communications and computer networks. The course covers the principles of data communications, the fundamentals of signaling, basic transmission concepts, transmission media, circuit control, line sharing techniques, physical and data link layer protocols, error detection and correction, data compression, common carrier services and data networks, and the mathematical techniques used for network design and performance analysis. Potential topics include analog and digital signaling; data encoding and modulation; Shannon channel capacity; synchronous and asynchronously transmission; RS232 physical layer interface standards; FDM, TDM, and STDM multiplexing techniques; inverse multiplexing; analog and digital transmission; V series modem standards; PCM encoding and T1 transmission circuits; LRC, VRC, and CRC error detection techniques; Hamming and Viterbi forward error correction techniques; BSC and HDLC data link layer protocols; Huffman, MNP5, and V.42bis data compression algorithms; circuit, message, packet, and cell switching techniques; public key and symmetric encryption algorithms, authentication, digital signature, and message digest techniques, secure e-mail, PGP, and TSL/SSL security algorithms; Ethernet, Wi-Fi, Optical, and IP networks; reliability and availability; and queuing analysis network performance techniques.

EN.605.673. High-Speed Networking Technologies. 3 Credits.
The Internet has experienced unprecedented growth especially since the 1990s and is continuing to evolve in terms of the information transfer speeds and infrastructure capacities in order to accommodate the growing number of users. The demand for bandwidth-both wired and wireless-and innovative new bandwidth-intensive services is soaring. The use of high-definition video, real-time collaboration, e-commerce, social networking, and other multimedia Web applications is becoming increasingly important to individual users and businesses. The use of mobile broadband and file-sharing applications is rising sharply. Advances in research applications and the evolution to cloud networking are also causing bandwidth pressure on existing networks. This course will provide an in-depth understanding of the Internet architecture and underlying technologies and applications that address the challenges summarized above and provide services to users at high availability, reliability, and flexibility in a cost-effective manner. Specific topics to be discussed in this course include high-speed Internet requirements analysis, Internet architecture and protocols, convergence of mobile and terrestrial networks, high-speed LAN/WAN options and configurations, emerging and future switching and transmission technologies, and network virtualization. The course will also cover unique challenges to management and security of the high-speed Internets and how they are addressed. Other topics include emerging technologies and future trends. EN.605.671 Principles of Data Communications Networks.

EN.605.674. Network Programming. 3 Credits.
Emphasis is placed on the theory and practice associated with the implementation and use of the most common processto-process communications associated with UNIX. The interprocess communications comprise both local and distributed architectures. The distributed communications protocols include those most widely implemented and used: the worldwide Internet protocol suite [the Transmission Control Protocol/ Internet Protocol (TCP/IP), and the U.S. government-mandated International Organization for Standardization (ISO) protocol suite]. Practical skills are developed, including the ability to implement and configure protocol servers (daemons) and their clients. Students are expected to have working knowledge of UNIX.
EN.605.671 Principles of Data Communications Networks, or EN.605.614 System Development in the UNIX Environment .

EN.605.675. Protocol Design. 3 Credits.
This course covers the formal design, specification, and validation of computer and network protocols. Design, implementation, and verification of protocols will be illustrated using the latest simulation tools, such as OPNET and NS2. Protocol examples include the latest wired and wireless networks, such as the IEEE 802.X family, as well as protocols in VoIP, Web 2.0, and network security. The course focuses on protocol specification, structured protocol design, protocol models, and protocol validation. Students will gain hands-on experience using simulation tools to design, validate, and assess protocols.
EN.605.671 Principles of Data Communications Networks or equivalent.

EN.605.677. Internetworking with TCP/IP I. 3 Credits.
This course investigates the underlying technology of the Internet. The presentation begins with a survey of distributed applications operating over the Internet, including the Web, electronic mail, VoIP, instant messaging, file transfers and peerto-peer file sharing. The course investigates the details of the Internet architecture and the TCP/IP protocol suite, covering the protocols that provide communications services to end systems and the management and control protocols that create the Internet from disparate underlying networks and technologies. Communications-related protocols analyzed in detail include the foundational Internet Protocol (IP), the connection-oriented reliable Transmission Control Protocol (TCP), the connectionless User Datagram Protocol (UDP) and the Real-Time Protocol (RTP) for streaming media. To allow the student to understand the control and management of the Internet, the course analyzes protocols that support naming (DNS), addressing and configuration (DHCP), management (SNMP) and the dynamic IP routing protocols RIP, OSPF and BGP.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks.

EN.605.681. Principles of Enterprise Web Development. 3 Credits.
This course examines fundamental aspects of Enterprise Web Development including client, middleware and databases as a foundation for follow on courses. It introduces the student to client side development using HTML 5, CSS and JavaScript. After a brief review of Object Oriented Programming in Java, Swing is used to introduce common user interface design patterns. Network protocols and multithreading concepts using Java transition into server-side technologies like Servlets, JavaserverPages and ReST. Java database development with JDBC and web security are also introduced during the semester. While the class covers development using build tools (Maven), basic IDEs are utilized to facilitate the teaching of concepts and demonstration through examples.Prerequisite(s): 605.202 Data Structures.

EN.605.682. Web Application Development with Java. 3 Credits.
This project-oriented course will enable students to use various techniques for building browser-based applications for dynamically generated websites, e-commerce, web-enabled enterprise computing, and other applications that require web access to server-based resources. Particular attention will be paid to methods for making web-based applications efficient, maintainable, and flexible. The course will use at least two sets of tools: servlets/JSP and a higher-level Java-based framework such as JSF 2.0. Major topics will include handling HTTP request information, generating HTTP response data, tracking sessions, designing custom tag libraries or components, page templating, asynchronously updating pages with Ajax, and separating content from presentation through use of the MVC architecture. Additional topics may include HTML5, database access techniques for web apps, web app security, and dependency injection in web apps (e.g., with the Spring framework). Course Note(s): Formerly 605.682 Web Application Development with Servlets and JavaServer Pages (JSP).
EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.683. Java Enterprise Development: Processes, Tools and Infrastructure. 3 Credits.
The focus of this course is to get the student acclimated to the process and tools used in the design to delivery cycle of an Enterprise Application using Java. It will introduce students to the use of build tools and repositories for creating and maintaining software in a team environment. It will then then cover tools and techniques for improving the quality of Enterprise Software like unit and integration testing, code optimization and profiling. It will also cover techniques for automation of processes in testing and deployment of software; like Continuous Integration and the use and orchestration with virtual containers. The course will also look at some modern integrated development environments and demonstrate how they integrate with the aspects of the class. A sample of tools covered in the class will include Maven, Gradle, JMeter, Postman, Jenkins, Git, JProfiler, Docker, Docker Compose, Eclipse and IntelliJ.
EN.605.681 Principles of Enterprise Web Development with Java

EN.605.684. Agile Development with Ruby on Rails. 3 Credits.
Modern web applications are expected to facilitate collaboration, with user participation being a significant facet of the system. Components such as wikis, blogs, and forums are now commonplace. While feature sets continue to expand, there is continuing pressure to develop and deploy capabilities more quickly to enable organizations to remain competitive. This pressure has led to the development of languages and frameworks geared toward rapid prototyping, with Ruby on Rails being the most popular. Ruby on Rails is a model-view-controller (MVC) framework that enables efficient application development and deployment. Techniques such as convention over configuration and object-relational mapping with ActiveRecord along with enhanced AJAX support offer a simple environment with significant productivity gains. This code-intensive course introduces Ruby on Rails, the patterns it implements, and its applicability to the rapid development of collaborative applications.
EN.605.681 Principles of Enterprise Web Development or equivalent; EN.605.202 Data Structures;Computer Science majors require completion of foundation courses.

EN.605.685. Machine Learning: Deep Learning. 3 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice.

EN.605.686. Mobile Application Development for the Android Platform. 3 Credits.
This project-oriented course will investigate application development for the Android mobile platform. We will explore techniques for building well-structured applications, from local and remote data access using databases and REST APIs, through view models that synchronously and asynchronously manage and expose that data, to a Jetpack Compose user interface layer for a simple specification and testing. Assigned projects include demonstrations of full data flow from database to user interface, use of graphics and user-screen interaction, Google Maps, REST API communication and testing.Prerequisites: Strong comfort with Java and its basic APIs. Comfort with concepts such as callbacks, threads, lists, and maps. 605.603 Object-Oriented and Functional Programming in Kotlin is recommended but not required.Course Notes: This course is taught using Kotlin, the primary language for Android development (and required for Jetpack Compose). Kotlin knowledge is not required for this course, and its basics will be covered from the assumption that students are very comfortable with Java. Tools for developing and testing Android apps are available free of charge. Note that Android emulators may run slowly on some machines; physical Android devices are strongly recommended, but not required, for this course.

EN.605.687. Mobile Application Development for the iOS Platform. 3 Credits.
This project-oriented course will investigate application development on iOS platforms. First, we will cover the main language for iOS, Swift, Apple's in-house, open sourced language for iOS and OS X development, along with tools such as Xcode, Interface Builder, Instruments, and Swift Playgrounds. Second, we will discuss the aspects of creating an application: the application life cycle, user experience and data presentation, user interface elements (including how to use the SwiftUI framework), and application performance. Then, we will discuss the application frameworks that the iOS SDK provides: CoreData, SpriteKit, MapKit, and Notifications, to name just a few. Finally, we will prepare your app for deployment, considering localization and internationalization, accessibility, and iTunes Connect. By the end of the class, students will be able to use Xcode, implement the Model-View-Controller paradigm, use Protocols and Delegates, construct a user interface that operates on many different devices, store and retrieve data on the network, interact with the OS or other applications, distinguish between the various iOS frameworks, and explain the App publication process.Course prerequisite(s): 605.201 Introduction to Programming Using Java or equivalent Java or Objective C experience.Course note(s): Access to a Mac running the current version of macOS is required for this class. Development tools can be downloaded for free from the Mac App Store. Additional hardware (iPhones, iPods, iPads) is strongly suggested, as several class examples and some projects will work best (or only work) on devices. *THIS REQUIREMENT IS SUBJECT TO CHANGE*

EN.605.701. Software Systems Engineering. 3 Credits.
Software Systems Engineering applies engineering principles and the system view to the software development process. The course focuses on the engineering of complex systems that have a strong software component. This course is based on the philosophy that the key to engineering a good software system lies just as much in the process that is followed as in the purely technical regime. The course will show how good a software development process is and how to make a software process better by studying successful techniques that have been employed to produce correct software systems within budget. Topics are explored in a sequence designed to reflect the way one would choose to implement process improvements. These topics include steps to initiate process change, methods to establish control over the software process, ways to specify the development process, methods for quantitative process control, and how to focus on problem prevention. Students will prepare term projects. Prerequisite(s): 605.202 Data Structures; one software engineering course beyond 605.601 Foundations of Software Engineering.

EN.605.702. Service-Oriented Architecture. 3 Credits.
Service-Oriented Architecture (SOA) is a way to organize and use distributed capabilities that may be controlled by different owners. SOA provides a uniform means to offer, discover, interact with, and use capabilities to produce desired effects consistent with specified preconditions and requirements. This course describes SOA concepts and design principles, interoperability standards, security considerations, runtime infrastructure and web services as an implementation technology for SOA. Given the focus on shared capabilities, SOA involves more than technology. Therefore, additional topics will include the impact of SOA on culture, organization, and governance. Prerequisite(s): 605.601 Foundations of Software Engineering and 605.704 Object-Oriented Analysis and Design or equivalent experience are highly recommended. EN.605.601 Foundations of Software Engineering and EN.605.704 Object-Oriented Analysis and Design or equivalent experience are highly recommended.

EN.605.704. Object-Oriented Analysis and Design. 3 Credits.
This course describes fundamental principles of object-oriented modeling, requirements development, analysis, and design. Topics include specification of software requirements; object-oriented static and dynamic analysis approaches using the Unified Modeling Language (UML); object-oriented design; object-oriented reuse and maintainability, including design patterns; software implementation concerns; state models; persistence; and the Object Constraint Language (OCL). Prerequisite(s): While there are no programming assignments in this course, experience in an object-oriented programming language such as C++ or Java is important.

EN.605.705. Software Safety. 3 Credits.
This course describes how to develop and use software that is free of imperfections that could cause unsafe conditions in safety-critical systems. Systems engineering and software engineering techniques are described for developing “safeware,” and case studies are presented regarding catastrophic situations that resulted from software and system faults that could have been avoided. Specific techniques of risk analysis, hazard analysis, fault tolerance, and safety tradeoffs within the software engineering paradigm are discussed. Prerequisite(s): 605.202 Data Structures.

EN.605.707. Software Patterns. 3 Credits.
Software patterns encapsulate the knowledge of experienced software professionals in a manner that allows developers to apply that knowledge to similar problems. Patterns for software are analogous to the books of solutions that enable electrical engineers and civil engineers to avoid having to derive every new circuit or bridge design from first principles. This course will introduce the concept of software patterns, and explore the wide variety of patterns that may be applied to the production, analysis, design, implementation, and maintenance of software. The format of the course will emphasize the discussion of patterns and their application. Each student will be expected to lead a discussion and to actively participate in others. Students will also be expected to introduce new patterns or pattern languages through research or developed from their own experience. Programming exercises performed outside of class will be used enhance discussion and illustrate the application of patterns. EN.605.604 Object-Oriented Programming with C++ or permission of instructor.

EN.605.708. Tools and Techniques of Software Project Management. 3 Credits.
This course examines tools and techniques used to lead software-intensive programs. Techniques for RFP analysis and proposal development are explored, and techniques of size estimation (function points, feature points, and lines-ofcode estimation) and the use of models such as COCOMO to convert size to effort and schedule are described. In addition, conversion of estimated effort to dollars and the effects of fringe, overhead, skill mix profiles, and staffing profiles on total dollar cost are explained. Moreover, techniques for estimating effort and planning the COTS intensive development programs are described, and tools and techniques for measuring process maturity and process efficiency (e.g., CMMi, Lean, Six Sigma, and Kaizen) are addressed. The course also investigates the formation and management of virtual teams, as well as techniques that can be used to ensure success in this environment. Finally, the course addresses topics that require collaboration between the project manager and human resources, such as personnel retention strategies, managing unsatisfactory performance, and formal mentoring programs. Prerequisite(s): Three to five years technical work experience is recommended.

EN.605.715. Software Development for Real-Time Embedded Systems. 3 Credits.
This course examines the hardware and software technologies behind real-time, embedded computer systems. From smart kitchen appliances to sophisticated flight control for airliners, embedded computers play an important role in our everyday lives. Hardware topics include microcomputers and support devices (e.g., flash, ROM, DMA, timers, clocks, A/D, and D/A), as well as common applications (e.g., servo and stepper motor control, automotive sensors, and voice processing). Software topics focus on unique aspects of embedded programming and include interrupts, real-time control, communication, common design patterns, and special test considerations. The course also explores the unique tools that are used to develop and test embedded systems. Labs, beginning with using Bare Metal and Free RTOS on Arduino for simple devices and culminating with using Linux on Raspberry-Pi for Quad-Copter flight control, are developed.

EN.605.716. Modeling and Simulation of Complex Systems. 3 Credits.
This multi-disciplinary course focuses on the application of modeling and simulation principles to complex systems. A complex system is a large-scale nonlinear system consisting of interconnected or interwoven parts (such as a biological organism, an ecological system, the economy, fluids or strongly-coupled solids). The subject is interdisciplinary with foundations in mathematics, nonlinear science, numerical simulations and statistical physics. The course begins with an overview of complex systems, followed by modeling techniques based on nonlinear differential equations, networks, and stochastic models. Simulations are conducted via numerical calculus, analog circuits, Monte Carlo methods, and cellular automata. In the course we will model, program, and analyze a wide variety of complex systems, including dynamical and chaotic systems, cellular automata, and iterated functions. By defining and iterating an individual course project throughout the term, students will gain hands-on experience and understanding of complex systems that arise from combinations of elementary rules. Students will be able to define, solve, and plot systems of linear and non-linear systems of differential equations and model various complex systems important in applications of population biology, epidemiology, circuit theory, fluid mechanics, and statistical physics.Course prerequisite(s): Knowledge of elementary probability and statistics and previous exposure to differential equations. Students applying this course to the MS in Bioinformatics should also have completed at least one Bioinformatics course prior to enrollment.Course note(s): This course may be counted toward a three-course concentration in Bioinformatics.

EN.605.721. Design and Analysis of Algorithms. 3 Credits.
In this follow-on course to 605.621 Foundations of Algorithms, design paradigms are explored in greater depth, and more advanced techniques for solving computational problems are presented. Topics include randomized algorithms, adaptive algorithms (genetic, neural networks, simulated annealing), approximate algorithms, advanced data structures, online algorithms, computational complexity classes and intractability, formal proofs of correctness, sorting networks, and parallel algorithms. Students will read research papers in the field of algorithms and will investigate the practicality and implementation issues with state-of-the-art solutions to algorithmic problems. Grading is based on problem sets, programming projects, and in-class presentations.
EN.605.621 Foundations of Algorithms or equivalent; EN.605.203 Discrete Mathematics or equivalent.

EN.605.724. Applied Game Theory. 3 Credits.
In many organizations in the private and the public sectors, there is a need to support complex decisions that include a game-theoretic aspect. These decisions impact activities ranging from tactical to strategic, and play out in a number of problems, including monitoring and management of ongoing operations, the dynamics of organizational relationships in the competitive environment, and military force planning. This course extends treatment of game theoretic concepts and constructs, and explores their implementation and application, highlighting key issues such as decision space exploration and analysis, visualization, and the creation and use of models for specific domains. Students will have the opportunity to design a course project based on their area of professional or personal interest.

EN.605.725. Queuing Theory with Applications to Computer Science. 3 Credits.
Queues are a ubiquitous part of everyday life; common examples are supermarket checkout stations, help desks call centers, manufacturing assembly lines, wireless communication networks, and multitasking computers. Queuing theory provides a rich and useful set of mathematical models for the analysis and design of service process for which there is contention for shared resources. This course explores both theory and application of fundamental and advanced models in this field. Fundamental models include single- and multipleserver Markov queues, bulk arrival and bulk service processes, and priority queues. Applications emphasize communication networks and computer operations, but may include examples from transportation, manufacturing, and the service industry. Advanced topics may vary. Prerequisite(s): Multivariate calculus and a graduate course in probability and statistics such as 625.603 Statistical Methods and Data Analysis or equivalent. Course Note(s): This course is the same as 625.734 Queuing Theory with Applications to Computer Science.

EN.605.727. Computational Geometry. 3 Credits.
This course covers fundamental algorithms for efficiently solving geometric problems, especially ones involving 2D polygons and 3D polyhedrons. Topics include elementary geometric operations; polygon visibility, triangulation, and partitioning; computing convex hulls; proximity searching, Voronoi diagrams, and Delaunay triangulations with applications; special polygon and polyhedron algorithms such as point containment and extreme point determination; point location in a planar graph subdivision; dimension reduction in data; and robot motion planning around polygon obstacles. Applications to such areas as computer graphics, big data analytics and pattern recognition, geometric databases, numerical taxonomy, and robotics will be addressed. The course covers theory to the extent that it aids in understanding how the algorithms work. Emphasis is placed on algorithm design and implementation. Programming projects are an important part of the coursework. Prerequisite(s): Foundations of algorithms. Some familiarity with linear algebra.
EN.605.621 Foundations of Algorithms. Some familiarity with linear algebra.

EN.605.728. Quantum Computation. 3 Credits.
Quantum computing is no longer a purely theoretical notion. The NSA and NIST are preparing to transition to quantum resistant cryptography. We have now entered the intermediate-scale quantum era, with near-term applications such as quantum machine learning being explored. Scalable quantum computers aren't here yet, but ongoing developments suggest they are on their way. This course provides an introduction to quantum computation for computer scientists: the focus is on algorithms rather than physical devices, and familiarity with quantum mechanics (or any physics at all) is not a prerequisite. Instead, pertinent aspects of the quantum mechanics formalism are developed as needed in class. The course begins with an introduction to the QM formalism. It then develops the abstract model of a quantum computer, and discusses how quantum algorithms enable us to achieve, for some problems, a significant speedup (in some cases an exponential speedup) over any known classical algorithm. This discussion provides the basis for a detailed examination of quantum integer factoring, quantum search, and other quantum algorithms. The course also explores quantum error correction, quantum teleportation, and quantum cryptography. It concludes with a glimpse at what the cryptographic landscape will look like in a world with quantum computers. Required work includes problem sets and a research project. Prerequisites: Some familiarity with linear algebra and with the design and analysis of algorithms or instructor permission.

EN.605.729. Formal Methods. 3 Credits.
All science requires mathematics. Formal methods used in developing computer systems are mathematically based techniques for describing system properties. These formal methods then can provide frameworks within which developers can specify, develop, verify, and prove systems in a systematic, rather than ad hoc manner. According to some researchers, the application of formal specification and verification methods could avoid disasters such as Heartbleed bug, Ariane 5 rocket explosion, and Therac-25 radiation therapy machine harms. This course is an introduction to the vast world of formal methods. The course starts with review of propositional logic, predicate logic, and covers set theoretic specification methods via Z, temporal specification via PTL, grammars, and logic based methods via Caml and Coq proof assistant. Each student will carry out an investigation of an existing formal verification system, applying it to a suitable problem of the student's choice. Among possible projects will be the formal verification of problem solutions such as designing a semaphore, designing a machine learning algorithm, a web interface, a test suite, a sophisticated data structure, or a theorem.

EN.605.731. Survey of Cloud Computing Security. 3 Credits.
The promise of significant cost savings and inherent flexibility of resources are an impetus for the adoption of cloud computing by many organizations. Cloud computing also introduces privacy and security risks that are not traditionally present in a siloed data center. This course focuses on these security concerns and countermeasures for a cloud environment. An overview of cloud computing and virtualization, the critical technology underpinning cloud computing, provides the necessary background for these threats. Additional topics vary but may include access control, identity management, denial of service, account and service hijacking, secure APIs, malware, forensics, regulatory compliance, trustworthy computing, and secure computing in the cloud. This course follows a seminar-style format where students are expected to lead class discussions and write a publication-quality paper as part of a course project.

EN.605.741. Large-Scale Database Systems. 3 Credits.
This course investigates the theory and practice of modern large-scale database systems. Large-scale approaches include distributed relational databases; data warehouses; and non-relational databases including HDFS, Hadoop, Accumulo for query and graph algorithms, and Mahout bound to Spark for machine learning algorithms. Topics discussed include data design and architecture; database security, integrity, query processing, query optimization, transaction management, concurrency control, and fault tolerance; and query formulation, graph algorithms, and machine learning algorithms on large-scale distributed data systems. At the end of the course, students will understand the principles of several common large-scale data systems including their architectures, performance, and costs. Students will also gain a sense of which approach is recommended for different requirements and circumstances.
EN.605.202 Data Structures; EN.605.641 Principles of Database Systems or equivalent. Familiarity with “big-O” concepts and notation is recommended.

EN.605.742. Deep Neural Networks. 3 Credits.
This course provides a practical introduction to deep neural networks (DNN) with the goal to extend student’s understanding of the latest and cutting-edge technology and concepts in deep learning (DL) field. DNNs are simplified representation of neurons in the brain that are suited in complex applications, such as natural language processing (NLP), computer vision (CV), speech processing, and many other predictive models rising from non-linear and unstructured data, including text, images, video, audio. The course starts with a brief review of machine learning (ML) and neural networks (NN), including anatomy of neural networks, model evaluation techniques and feature engineering in Python with TensorFlow (TF) and Keras. It then defines and exemplifies the deep learning with convolutional neural networks (CNN), recurrent neural networks (RNN), long-short term memory (LSTM) networks with attention mechanism, generative adversarial networks (GAN) and deep reinforcement learning (DRL), and transfer learning among other key concepts. This is a hands-on course with significant Python coding requirements. Students will apply neural networks to the computer vision (CV) tasks, natural language processing (NLP) tasks, and domains with structured data. Since DL is a rapidly developing field, the course will also rely on recent seminal publications, which students may be asked to reproduce with small scale datasets as an exercise. Prerequisites: Multivariate calculus, linear algebra, probability/statistics; A neural network OR machine learning course: Examples: EN.605.647, EN.625.638, EN.525.670,EN.605.649, EN.705.601, EN.605.646. A working knowledge of Python is assumed. Prior coding experience data munging, numerical linear algebra, ML, and visualization libraries is highly recommended: Example: Python, Numpy, Pandas, ScikitLearn, Matplotlib.
EN.605.647 Neural Networks

EN.605.743. Advanced Artificial Intelligence. 3 Credits.
Many advanced artificial intelligence systems are using both Machine Learning and Symbolic AI to solve subproblems. This course builds on the foundations of EN.605.645 Artificial Intelligence by delving more deeply into those AI algorithms and approaches that go under the name of Good Old Fashioned AI or Symbolic AI. In this course, we will cover logic programming, expert systems and business rules, fuzzy logic, case based reasoning, and knowledge graphs. We will also explore more advanced versions of planning and reinforcement learning algorithms. The instructor may add additional topics as warranted. Prerequisite(s): EN.605.645 Artificial Intelligence or permission of instructor.
EN.605.645 Artificial Intelligence

EN.605.744. Information Retrieval. 3 Credits.
A multibillion-dollar industry has grown to address the problem of finding information. Commercial search engines are based on information retrieval: the efficient storage, organization, and retrieval of text. This course covers both the theory and practice of text retrieval technology. Topics include automatic index construction, formal models of retrieval, Internet search, text classification, multilingual retrieval, question answering, and related topics in NLP and computational linguistics. A practical approach is emphasized and students will complete several programming projects to implement components of a retrieval engine. Students will also give a class presentation based on an independent project or a research topic from the IR literature. Prerequisite(s): 605.202 Data Structures or permission of the instructor

EN.605.745. Reasoning Under Uncertainty. 3 Credits.
This course is concerned with the problems of inference and decision making under uncertainty. It develops the theoretical basis for a number of different approaches and explores sample applications. The course discusses foundational issues in probability and statistics, including the meaning of probability statement, and the necessity of a rational agent acting in accord with probability theory. We will look at possible generalizations of Bayesian probability, including Dempster-Shafer theory. Next, we will develop algorithms for Bayesian networks—graphical probabilistic models—for exact and approximate inference and consider several application areas. Finally, the course will examine the problem of making optimal decisions under uncertainty. We will explore the conceptual foundations of decision theory and then consider influence diagrams, which are graphical models extending Bayesian networks to the domain of decision analysis. As time permits, we will also look at Bayesian games and Markov decision processes. Pertinent background in probability and theoretical computer science is developed as needed in the course.

EN.605.746. Advanced Machine Learning. 3 Credits.
This course focuses on recent advances in machine learning and on developing skills for performing research to advance the state of knowledge in machine learning. The material integrates multiple ideas from basic machine learning and assumes familiarity with concepts such as inductive bias, the bias-variance trade-off, the curse of dimensionality, and no free lunch. Topics range from determining appropriate data representations and models for learning, understanding different algorithms for knowledge and model discovery, and using sound theoretical and experimental techniques in assessing learning performance. Specific approaches discussed cover nonparametric and parametric learning; supervised, unsupervised, and semi-supervised learning; graphical models; ensemble methods; and reinforcement learning. Topics will be discussed in the context of research reported in the literature within the previous two years. Students will participate in seminar discussions and will present the results of a semester-long research project of their own choosing.
EN.605.649 Introduction to Machine Learning; multivariate calculus;Students cannot receive credit for both EN.605.746 and EN.625.742

EN.605.747. Evolutionary and Swarm Intelligence. 3 Credits.
Recently, principles from the biological sciences have motivated the study of alternative computational models and meta-heuristic approaches to problem solving. Proceeding from a machine learning perspective, this course explores how principles from theories of evolution, natural selection, and swarming behavior can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from evolutionary computation and swarm intelligence for developing software agents capable of solving problems as members of a larger population of agents. Specific topics addressed include representation and schemata; selection, reproduction, and recombination; theoretical models of computational intelligence; optimal allocation of trials (i.e., bandit problems); search, optimization, and machine learning; evolution of programs; population and swarm dynamics; and emergent behavior. Students will participate in seminar discussions and will complete and present the results of an individual project.
EN.605.649 Introduction to Machine Learning; multivariate calculus.

EN.605.751. Algorithms for Structural Bioinformatics. 3 Credits.
This course is an interdisciplinary approach to the concepts, principals, computational methods and algorithms used in structural bioinformatics. It focuses on the fundamental aspects of structural biology along with computational methods and algorithms for studying protein folding, structure prediction and analysis. Algorithms for the prediction and annotation of protein secondary and tertiary structure and for structurestructure comparison will be studied in depth. We will also show how such algorithms and methods can be adapted for use with nucleic acids structure prediction and analysis. Students will apply various software tools and structure-visualization software to protein structure prediction and structurestructure comparison. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent. 605.661 Principles of Bioinformatics is recommended.
EN.605.205 Molecular Biology for Computer Scientists or equivalent. EN.605.661 Principles of Bioinformatics is recommended.

EN.605.755. Systems Biology. 3 Credits.
Systems biology is the study of complex biological systems using theoretical, mathematical, and computational tools and concepts. The advent of genomics, big data, and highpowered computing is allowing better understanding and elucidation of these systems. Central to systems biology is the development of computational models, based on sound statistics, which incorporate biological structures and networks, and can be informed and tested, with data on multiple scales. In this class, students will learn to develop and use different types of models of complex biological systems and how to test and perturb them. Students will learn basic biological system components and dynamics, as well as the data formats, sources, and modeling tools required to interrogate them. Tools will be used relating to functional genomics, evolution, biochemical systems, and cell biology. Students will utilize a model they have developed and available data from public repositories to investigate both a discovery-based project and a hypothesisbased project. Prerequisite(s): Courses in molecular biology (605.205 Molecular Biology for Computer Scientists or 410.602 Molecular Biology) and differential equations.
Courses in molecular biology (EN.605.205 Molecular Biology for Computer Scientists or AS.410.602 Molecular Biology) and differential equations.

EN.605.759. Independent Project in Bioinformatics. 3 Credits.
This course is for students who would like to carry out a significant project in bioinformatics as part of their graduate program. The course may be used to conduct minor research, an in-depth literature survey, or a software implementation related to recent developments in the field. Students who enroll in this course are encouraged to attend at least one industry conference in bioinformatics related to their area of study. To enroll in this course, the student must be within two courses of degree completion and must obtain the approval and support of a sponsoring faculty member. Course Note(s): A student may not receive credit for both 605.759 and 605.802 Independent Study in Computer Science II.

EN.605.767. Applied Computer Graphics. 3 Credits.
This course examines advanced rendering topics in computer graphics. The course focuses on the mathematics and theory behind 3D graphics rendering. Topics include 3D surface representations including fractal geometry methods; visible surface detection and hidden surface removal; and surface rendering methods with discussion of lighting models, color theory, texturing, and ray tracing. Laboratory exercises provide practical application of these concepts. The course also includes a survey of graphics rendering applications (animation, modeling and simulation, and realistic rendering) and software. Students perform laboratory exercises using the C++ programming language.
EN.605.667 Computer Graphics or familiarity with three-dimensional viewing and modeling transformations.;Foundation Prerequisites for Cybersecurity Majors:EN.605.621 AND EN.695.601 AND EN.695.641

EN.605.771. Wired and Wireless Local and Metropolitan Area Networks. 3 Credits.
This course provides a detailed examination of wired and wireless local and metropolitan area network (LAN and MAN) technologies, protocols, and the methods used for implementing LAN- and MAN-based enterprise intranets. The structure and operation of the IEEE 802 media access control (MAC) and physical layer protocols are examined in detail. The 802.2 logical link control, 802.3/Ethernet, 802.4 token bus, and 802.5 token ring protocols are analyzed, and the construction of LAN-based enterprise intranets is examined through a detailed analysis of bridging, routing, and switching techniques. High-speed LAN technologies are discussed through an examination of FDDI, Fast Ethernet, 100VG AnyLAN, ATM LAN Emulation (LANE), and Fibre Channel protocols, along with the new standards for gigabit and 10-gigabit Ethernet. In addition, the 802.6 DQDB and 802.17 Resilient Packet Ring MAN protocols are discussed. Finally, the new and emerging wireless LAN and MAN standards are examined. The 802.11 (Wi-Fi) wireless LAN and 802.15 (Bluetooth) wireless PAN standards are discussed in detail along with the emerging 802.16 (WiMAX) wireless MAN standard. Topics include Manchester and Differential Manchester encoding techniques; bus, star, and ring topologies; optical fiber, coaxial cable, and UTP media; baseband, broadband, and carrierband bus networks; hubs, switched LANs, and full duplex LANs; VLANs and prioritization techniques; transparent and source routing bridge algorithms; packet bursting and carrier extension schemes; wireless spread spectrum and frequency hopping transmission techniques; wireless collision avoidance media access control; and security schemes. Students may use the network lab to configure LAN switches and Cisco routers, as well as to observe the interconnection of LAN networks.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.605.772. Network Security Management. 3 Credits.

Information transfer speeds and infrastructure capacities must continue to evolve to support not only traditional voice and data but also multimedia services such as high-definition video, real-time collaboration, e-commerce, and social networking. While services are provided across terrestrial and mobile networks transparently to users, new technologies such as cloud computing efficiently make the services available to users irrespective of their geographic locations. In this rapidly evolving technological environment, network and security management (NSM) is the key to providing network access and connectivity, ensuring high availability of applications and services, and assuring users of the reliability and security of their transported information. Network Management (NM) encompasses all the activities, methods, operational procedures, tools, communications interfaces, protocols, and human resources pertaining to the operation, administration, maintenance, provisioning, and growth planning of communications networks. Security Management (SM) pertains to monitoring and control of security services and mechanisms including identification, authentication, authorization, access control, confidentiality, intrusion detection, correction, and prevention in order to protect the communications network infrastructure and services. NSM includes setting, monitoring, and maintaining certain performance metrics to ensure high performance levels and quality of service (QoS) to the users, along with support for infrastructure architecture and security planning, design, and implementation. This course examines NSM standards, technologies, tools, industry best practices, and case studies, NSM areas that can be automated through expert systems, current issues, and future trends to adapt to emerging and evolving Internet technologies. Specific Internet and telecommunications standards discussed in depth in this course include SNMPv1, SNMPv2, SNMPv3, RMON, and OSI. Students will apply the standards, architectures, tools, and techniques learned in the course, as well as research state-of-the-art technologies in a team project.
EN.605.771 Wired and Wireless Local and Metropolitan Area Networks, or EN.605.672 Computer Network Architectures and Protocols, or EN.605.677 Internetworking with TCP/IP I, or EN.635.611 Principles of Network Engineering.

EN.605.776. Fourth Generation Wireless Communications: WiMAX and LTE. 3 Credits.

This course compares the WiMAX and LTE fourth-generation (4G) technologies and their performance. An overview of the IEEE 802.16 standards (802.16d/e/j/m/n/p) and WiMAX Forum (Fixed WiMAX vs. Mobile WiMAX, Interoperability certification and Core network) is presented along with the 3GPP standards for LTE and LTE-Advanced as well as LTE network architecture. For WiMAX, the MAC, call flow, 2D resource map, QoS, and scheduling are presented. For LTE, both control plane and data plane protocols for Evolved UMTS Terrestrial Radio Access Network (E-UTRAN) and Evolved Packet Core (EPC) are presented. The topics include protocol architecture, bearer management, signaling, radio resource control (RRC), packet data convergence protocol (PDCP), radio link control (RLC), and MAC. In addition, the role of universal subscriber identity module (USIM), eNodeB, mobility management entity (MME), serving gateway (S-GW), packet data network gateway (P-GW), and home subscription server (HSS) as well as the call flow across these various nodes will be presented. The 2D resource grid along with QoS and scheduling will be explained in detail. The voice over LTE (VoLTE), self-organizing network (SON), LTE-direct, and LTE-Advanced [including coordinated multipoint (CoMP), carrier aggregation, and Intercell interference coordination (ICIC)] will be presented. Finally, spectrum considerations as well as the concept of white space and dynamic spectrum access (DSA) will be discussed. LTE security will be discussed in detail. The course will also highlight some of the Open Source LTE projects, and will discuss the experimental results from various testbeds.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering and another course in the Data Communications and Networking track.

EN.605.777. Internetworking with TCP/IP II. 3 Credits.
This course builds on the foundation established in 605.677, Internetworking with TCP/ IP I. Changes are being made in the infrastructure, operation, and protocols of the Internet to provide the performance and services needed for real-time applications. This course first examines the current architecture and operation of the Internet. The classful addressing concept will be introduced and the mapping of Internet addresses to physical addresses is discussed along with the extensions that have been made to the addressing paradigm, including subnet addressing, classless addressing, and network address translation. The performance enhancements being developed to provide quality of service (QoS) over the Internet and to provide faster routing through the use of IP switching techniques are discussed. Techniques for providing multicasting and mobility over the Internet are examined. Security considerations are addressed by examining Virtual Private Networks and the use of IP Security (IPSec) protocols. The next generation IP protocol (IPv6) is introduced, and the changes and enhancements to the IP protocol operation and to the addressing architecture are discussed in detail. Finally, the development of the Voice Over IP (VoIP) application and the convergence of circuit switching and packet switching are discussed. Topics include subnet addressing, CIDR, DHCP, DNS, NAT, IntServ, DiffServ, RSVP, CIP, MPOA, IP Switching, Tag Switching, MPLS, IP Multicast, IGMP, Reliable Musticast, Multicast Routing Protocols, IP Mobility Home Agents and Foreign Agents, Message Tunneling, Proxy and Gratuitous ARP, VPN Tunneling, PPTP, L2F, L2TP and SOCKSv5, VPN security, IPSec, Encapsulating Security Payload header, Authentication Header, Security Association, IPv6 Addressing, IPv6 protocol and extension headers, Neighbor Discovery, IPv6 Stateless Address Autoconfiguration, DHCPv6, VoIP, H.323 Gateways and Gatekeeper, SIP, SDP, RTP, MGCP, Megaco/H.248.
EN.605.202 Data Structures; EN.605.677 Internetworking with TCP/IP I.

EN.605.779. Network Design and Performance Analysis. 3 Credits.
Networking services are a staple of our daily life. Different types of networks surround us all day long. This ubiquitous networking, thanks to smartphones and tablet computers, gives us the convenience of information at our fingertips. The right network architecture provides the fundamental support for network services, such as the products from Facebook, Google, Apple, etc. This course covers the details of network design and the design process. Starting from requirement specifications, a detail flow analysis is introduced. Examples of different network architecture designs, both in wireline and wireless, will be discussed, including mobile Ad Hoc network (MANET), mesh network, 4G cellular networks, wide area network (WAN), cloud networks, and advanced software define networking (SDN). Performance analyses and network security aspects are considered at every step of the design. Secured architecture covers Virtual Private Network (VPN) and Transport Layer Security (TLS)-based systems, with details on firewall and intrusion detection configurations. The course encourages hands-on projects selected from real network system problems.

EN.605.784. Enterprise Computing with Java. 3 Credits.
This comprehensive course explores core application aspects for developing, configuring, securing, deploying, and testing a Java-based service using a layered set of modern frameworks and libraries that can be used to develop full services. Students will learn thru lecture, examples, and hands-on experience to build multi-tier enterprise services using a configurable set of server-side technologies.The course will specifically cover designing and building components, a data tier, synchronous and asynchronous server-side logic, and integration with the web.The student will also learn to secure the application and tackle various build, testing, and development issues. Specific framework and specification emphasis (e.g., Jakarta EE, Spring, Spring Boot) for designing and developing server-side components will vary per section.
EN.605.202 Data Structures; EN.605.681 Principles of Enterprise Web Development or equivalent. Course Note(s): Students will be assumed to already have strong Java skills and to be comfortable with IDEs.

EN.605.786. Enterprise System Design and Implementation. 3 Credits.
This course explores enterprise architectures for the development of scalable distributed systems. Effective patterns for distributed data access, MVC-based web tiers, and business logic components are explored as students build complex applications. Factors such as caching and clustering that enable distributed systems to scale to handle potentially thousands of users are a primary focus. In addition, creating a reusable blueprint for an enterprise architecture will be discussed. Applications developed utilizing these concepts are selected from current research topics in information retrieval, data visualization, and machine learning.
EN.605.202 Data Structures; EN.605.784 Enterprise Computing with Java, EN.605.707 Software Patterns, or equivalent experience is recommended.

EN.605.787. Front End Web App Development. 3 Credits.
In this course, we build a real web application for a real client. We will go on a field trip to a selected business with a poor website and you get to see the client interview with identifying components of what you need to get out of that interview. We then go through the mockup process and then code the whole site from scratch, utilizing all the concepts we learn in the course. You will learn to create your own responsive design framework, and write your own media queries. In terms of technologies, we cover CSS in depth, including style conflict resolution, selectors types and how they work together, etc.; Twitter Bootstrap Framework (possibly), including the grid system; dive deep into Javascript, including Javascript DOM manipulation; utilize “raw” Ajax without any libraries to help us; and possibly touch on jQuery. We then take a deep dive into a Javascript framework, concentrating on concepts that are prevalent in a lot of modern front end frameworks. Prerequisite(s): Strong/mature programming skills in any programming language.
EN.605.202 Data Structures; EN.605.682 Web Application Development with Java or equivalent servlet and JSP experience.

EN.605.788. Big Data Processing Using Hadoop. 3 Credits.
Organizations today are generating massive amounts of data that are too large and too unwieldy to fit in relational databases. Therefore, organizations and enterprises are turning to massively parallel computing solutions such as Hadoop for help. The Apache Hadoop platform, with Hadoop Distributed File System (HDFS) and MapReduce (M/R) framework at its core, allows for distributed processing of large data sets across clusters of computers using the map and reduce programming model. It is designed to scale up from a single server to thousands of machines, offering local computation and storage. The Hadoop ecosystem is sizable in nature and includes many subprojects such as Hive and Pig for big data analytics, HBase for real-time access to big data, Zookeeper for distributed transaction process management, and Oozie for workflow. This course breaks down the walls of complexity of distributed processing of big data by providing a practical approach to developing applications on top of the Hadoop platform. By completing this course, students will gain an in-depth understanding of how MapReduce and Distributed File Systems work. In addition, they will be able to author Hadoop-based MapReduce applications in Java and also leverage Hadoop subprojects to build powerful data processing applications. Course Note(s): This course may be counted toward a threecourse track in Data Science and Cloud Computing.
EN.605.202 Data Structures; EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.789. Service API Design and Development. 3 Credits.
This comprehensive course explores core aspects for designing, developing, configuring, securing, deploying, and testing Java-based services and service APIs using modern Spring frameworks and libraries. The focus of this course is on APIs for RESTful services and microservices, and interoperation across application components using APIs. The course also introduces the data exchange mechanism and common data formats, as well as security measures and solutions. At the end of this course, students will be able to apply a variety of techniques and will be able to: Apply best design principles, practices and patterns for creating APIs for RESTful services;Document API using YAML and RAML according to OpenAPI/Swagger specification; Create an API management discipline; Implement API security, control API versioning and life cycle stages; Build RESTful services with Spring Framework; Consume RESTful services using JSON and XML data formats; Integrate RESTful API with different data sources through hands-on coding projects; Build, package and deploy RESTful services on cloud-based platform; Conduct API testing using a variety of tools and techniques; Implement security mechanisms for controlling access to deployed services by service consumers using the Spring Security framework. Students will learn through guided lectures and real-world examples. Students will work on assignments and projects where they will apply newly learned techniques and best practices using the iterative approach of enhancing requested capabilities. Course Note(s): Students will be expected to already have a strong foundation in Java programming and to be comfortable with IDEs tools.
EN.605.644 XML Design Paradigms or equivalent XML design and XML processing experience. EN.605.681 Principles of Enterprise Web Development or equivalent.

EN.605.790. Development with React.js. 3 Credits.

EN.605.795. Capstone Project in Computer Science. 3 Credits.
This course permits graduate students in computer science to work with other students and a faculty mentor to explore a topic in depth and apply principles and skills learned in the formal computer science courses to a real world problem. Students will work in self-organized groups of two to five students on a topic selected from a published list. Since students will have selected different courses to meet degree requirements, students should consider the combined strengths of the group in constituting their team. Each team will prepare a proposal, interim reports, a final report, and an oral presentation. The goal is to produce a publication quality paper and substantial software tool. This course has no formal content; each team should meet with their faculty mentor at least once a week and is responsible for developing their own timeline and working to complete it within one semester. The total time required for this course is comparable to the combined class and study time for a formal course.Course prerequisite(s): Seven computer science graduate courses including two courses numbered 605.7xx, all CS foundation courses, and meeting the track requirement; or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.Course note(s): Students may not receive graduate credit for both 605.795 and 605.802 Independent Study in Computer Science II. This course is only offered in the spring.

EN.605.801. Independent Study in Computer Science I. 3 Credits.
This course permits graduate students in computer science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven computer science graduate courses including the foundation courses, three track-focused courses, and two courses numbered 605.7xx, or admission to the post-master's certificate. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.605.802. Independent Study in Computer Science II. 3 Credits.
Students wishing to take a second independent study in computer science should sign up for this course. Prerequisite(s): 605.801 Independent Study in Computer Science I and permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): A student may not receive credit for both 605.759 Independent Project in Bioinformatics and 605.802.
EN.605.801 Independent Study in Computer Science I and permission of a faculty mentor, the student's academic advisor, and the program chair.

Computer Science, Master of Science

A focus area or concentration must be chosen for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission (p. 1414) to graduate study. The applicant's prior education must include the following prerequisites:

1. One year of calculus (2 semesters or 3 quarters);
2. One semester/term of advanced math (discrete math is strongly preferred but linear algebra and differential equations will be accepted);
3. One semester/term of Java (C++ will be accepted but the student must be knowledgeable in Java);
4. One semester/term of data structures;

5. One semester/term of computer organization (e.g., assembly language and machine organization).

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Applicants may submit a detailed resume if they would like their academic and professional background to be considered.

Program Requirements

Ten courses must be completed within five years. Students are required to choose a focus area to follow. The curriculum consists of three foundation courses and five courses from the Computer Science program, which includes selected courses from other programs as indicated in the course lists below. At least three courses must be from the same focus area, at least three must be at the 700-level, and at least one 700-level course must be in the chosen focus area. Up to two electives may be selected. Courses NOT appearing in the course lists below may be considered electives for Computer Science and require prior advisor approval. Transfer courses will be considered electives. Transfer courses must meet all general Engineering for Professionals requirements for transfer, must be directly applicable to Computer Science, and will be considered on a case-by-case basis. Only **one** C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Computer Science program requirements are subject to advisor approval.

Non-degree students in Computer Science should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level Computer Science courses may be taken.

Home-to-Hopkins

Home-to-Hopkins students are permitted to substitute Homewood Campus courses to help meet EP program course requirements. Students should work with their faculty advisor to develop a course plan that will satisfy the degree requirements.

Concentration: Communications and Networking

Ten courses must be completed within five years. The curriculum consists of three foundation courses from the program and seven concentration courses as listed in the Courses by Concentration section, of which a maximum of three may come from the Electrical and Computer Engineering (EN.525.xxx) program. Students are strongly encouraged to take courses from both Computer Science and Electrical and Computer Engineering. Only **one** C-range grade (C+, C, or C–) can count toward the master's degree.

Students lacking an electrical engineering background or equivalent must take EN.525.202 Signals and Systems as an undergraduate prerequisite before taking Electrical and Computer Engineering communications and networking courses.

Concentrations are noted on the student's transcript.

Courses

Code	Title	Credits
Prerequisite Courses [1]		
EN.605.201	Introduction to Programming Using Java	3
EN.605.202	Data Structures	3
EN.605.203	Discrete Mathematics	3
EN.605.204	Computer Organization	3
EN.605.205	Molecular Biology for Computer Scientists	3
EN.605.206	Introduction to Programming Using Python	3
Foundation Courses [2,3]		
EN.605.601	Foundations of Software Engineering	3
EN.605.611	Foundations of Computer Architecture	3
EN.605.621	Foundations of Algorithms	3
Focus Areas and Concentrations		
Select one of the following:		
Artificial Intelligence (p. 1481)		
Bioinformatics (p. 1481)		
Cyber Operations (p.)		
Cybersecurity (p. 1481)		
Data Communications and Networking (p. 1481)		
Data Science and Cloud Computing (p. 1481)		
Database Systems and Knowledge Management (p. 1481)		
Enterprise and Web Computing (p. 1482)		
Human-Computer Interation and Visualization (p. 1482)		
Research (p. 1482)		
Software Engineering (p. 1482)		
Systems (p. 1482)		
Theory (p. 1482)		
Independent Study (p. 1483)		
Communications and Networking Concentration (p. 1483)		

1 Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

2 Students working toward a master's degree in Computer Science are required to take the following three foundation courses before taking any other courses.

3 One or more foundation courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived foundation courses with the same number of other graduate Computer Science courses and may take these courses after all remaining foundation course requirements have been satisfied.

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a focus area to follow and to take at least three courses from the selected focus area, including at least one 700-level course. The focus areas are presented as an aid to students in planning their course selections and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

Artificial Intelligence

Code	Title	Credits
EN.525.670	Machine Learning for Signal Processing	3
EN.525.733	Deep Learning for Computer Vision	3
EN.525.786	Human Robotics Interaction	3
EN.605.613	Introduction to Robotics	3
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.645	Artificial Intelligence	3
EN.605.646	Natural Language Processing	3
EN.605.647	Neural Networks	3
EN.605.649	Introduction to Machine Learning	3
EN.605.673	High-Speed Networking Technologies	3
EN.605.745	Reasoning Under Uncertainty	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary and Swarm Intelligence	3
EN.695.637	Introduction to Assured AI and Autonomy	3
EN.705.603	Creating AI-Enabled Systems	3

Bioinformatics

Code	Title	Credits
EN.605.643	Linked Data and the Semantic Web	3
EN.605.651	Principles of Bioinformatics	3
EN.605.652	Biological Databases and Database Tools	3
EN.605.653	Computational Genomics	3
EN.605.656	Computational Drug Discovery,Dev	3
EN.605.657	Statistics for Bioinformatics	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.751	Algorithms for Structural Bioinformatics	3
EN.605.755	Systems Biology	3
EN.605.759	Independent Project in Bioinformatics	3

Cybersecurity

Code	Title	Credits
EN.605.636	Autonomic Computing	3
EN.605.731	Survey of Cloud Computing Security	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.695.601	Foundations of Information Assurance	3
EN.695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	3
EN.695.612	Operating Systems Security	3
EN.695.614	Security Engineering	3
EN.695.615	Cyber Physical Systems Security	3
EN.695.621	Public Key Infrastructure and Managing E-Security	3
EN.695.622	Web Security	3
EN.695.641	Cryptology	3
EN.695.642	Intrusion Detection	3
EN.695.643	Introduction to Ethical Hacking	3
EN.695.711	Java Security	3
EN.695.712	Authentication Technologies	3
EN.695.721	Network Security	3
EN.695.741	Information Assurance Analysis	3
EN.695.742	Digital Forensics Technologies and Techniques	3
EN.695.744	Reverse Engineering and Vulnerability Analysis	3
EN.695.749	Cyber Exercise	3
EN.695.791	Information Assurance Architectures and Technologies	3

Data Communications and Networking

Code	Title	Credits
EN.605.671	Principles of Data Communications Networks	3
EN.605.674	Network Programming	3
EN.605.675	Protocol Design	3
EN.605.677	Internetworking with TCP/IP I	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.605.772	Network Security Management	3
EN.605.776	Fourth Generation Wireless Communications: WiMAX and LTE	3
EN.605.777	Internetworking with TCP/IP II	3
EN.605.779	Network Design and Performance Analysis	3
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.525.768	Wireless Networks	3

Data Science and Cloud Computing

Code	Title	Credits
EN.605.631	Statistical Methods for Computer Science	3
EN.605.632	Graph Analytics	3
EN.605.633	Social Media Analytics	3
EN.605.634	Crowdsourcing and Human Computation	3
EN.605.635	Cloud Computing	3
EN.605.649	Introduction to Machine Learning	3
EN.605.662	Data Visualization	3
EN.605.724	Applied Game Theory	3
EN.605.725	Queuing Theory with Applications to Computer Science	3
EN.605.731	Survey of Cloud Computing Security	3
EN.605.741	Large-Scale Database Systems	3
EN.605.744	Information Retrieval	3
EN.605.746	Advanced Machine Learning	3
EN.605.788	Big Data Processing Using Hadoop	3
EN.625.741	Game Theory	3
EN.685.648	Data Science	3

Database Systems and Knowledge Management

Code	Title	Credits
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.641	Principles of Database Systems	3
EN.605.643	Linked Data and the Semantic Web	3
EN.605.644	XML Design Paradigms	3
EN.605.645	Artificial Intelligence	3
EN.605.646	Natural Language Processing	3
EN.605.647	Neural Networks	3
EN.605.649	Introduction to Machine Learning	3
EN.605.741	Large-Scale Database Systems	3

EN.605.742	Deep Neural Networks	3
EN.605.744	Information Retrieval	3
EN.605.745	Reasoning Under Uncertainty	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary and Swarm Intelligence	3
EN.685.648	Data Science	3
EN.525.643	Real Time Computer Vision	3
EN.525.733	Deep Learning for Computer Vision	3
EN.705.601	Applied Machine Learning	3

Enterprise and Web Computing

Code	Title	Credits
EN.605.681	Principles of Enterprise Web Development	3
EN.605.682	Web Application Development with Java	3
EN.605.683	Java Enterprise Development: Processes, Tools and Infrastructure	3
EN.605.684	Agile Development with Ruby on Rails	3
EN.605.686	Mobile Application Development for the Android Platform	3
EN.605.687	Mobile Application Development for the iOS Platform	3
EN.605.784	Enterprise Computing with Java	3
EN.605.786	Enterprise System Design and Implementation	3
EN.605.787	Front End Web App Development	3
EN.605.788	Big Data Processing Using Hadoop	3
EN.605.789	Service API Design and Development	3
EN.635.683	E-Business: Models, Architecture, Technologies, and Infrastructure	3

Human–Computer Interaction and Visualization

Code	Title	Credits
EN.605.662	Data Visualization	3
EN.605.667	Computer Graphics	3
EN.605.767	Applied Computer Graphics	3
EN.605.634	Crowdsourcing and Human Computation	3
EN.635.661	Principles of Human Computer Interaction	3

Research

Code	Title	Credits
EN.605.646	Natural Language Processing	3
EN.605.728	Quantum Computation	3
EN.605.745	Reasoning Under Uncertainty	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary and Swarm Intelligence	3
EN.605.795	Capstone Project in Computer Science	3
EN.605.801	Independent Study in Computer Science I	3
EN.605.802	Independent Study in Computer Science II	3
EN.615.781	Quantum Information Processing	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.695.722	Covert Channels	3

Software Engineering

Code	Title	Credits
EN.605.601	Foundations of Software Engineering	3
EN.605.602	Software Analysis and Design	3
EN.605.603	Object-Oriented and Functional Programming in Kotlin	3
EN.605.604	Object-Oriented Programming with C++	3
EN.605.606	Programming with Domain-Specific Languages	3
EN.605.607	Agile Software Development Methods	3
EN.605.608	Software Project Management	3
EN.605.609	DevOps and Secure Software Development	3
EN.605.629	Programming Languages	3
EN.605.701	Software Systems Engineering	3
EN.605.702	Service-Oriented Architecture	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.705	Software Safety	3
EN.605.707	Software Patterns	3
EN.605.708	Tools and Techniques of Software Project Management	3
EN.695.744	Reverse Engineering and Vulnerability Analysis	3

Systems

Code	Title	Credits
EN.605.611	Foundations of Computer Architecture	3
EN.605.612	Operating Systems	3
EN.605.613	Introduction to Robotics	3
EN.605.614	System Development in the UNIX Environment	3
EN.605.615	Compiler Design with LLVM	3
EN.605.616	Multiprocessor Architecture & Programming	3
EN.605.617	Introduction to GPU Programming	3
EN.605.715	Software Development for Real-Time Embedded Systems	3
EN.605.716	Modeling and Simulation of Complex Systems	3

Theory

Code	Title	Credits
EN.605.620	Algorithms for Bioinformatics	3
EN.605.621	Foundations of Algorithms	3
EN.605.622	Computational Signal Processing	3
EN.605.623	Intro to Enumerative Combinatorics	3
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.625	Probabilistic Graphical Models	3
EN.605.626	Image Processing	3
EN.605.627	Computational Photography	3
EN.605.629	Programming Languages	3
EN.605.721	Design and Analysis of Algorithms	3
EN.605.724	Applied Game Theory	3
EN.605.725	Queuing Theory with Applications to Computer Science	3
EN.605.727	Computational Geometry	3
EN.605.728	Quantum Computation	3
EN.605.729	Formal Methods	3
EN.625.687	Applied Topology	3

EN.625.690	Computational Complexity and Approximation	3
EN.625.741	Game Theory	3

Independent Study

Code	Title	Credits
EN.605.801	Independent Study in Computer Science I	3
EN.605.802	Independent Study in Computer Science II	3
EN.605.795	Capstone Project in Computer Science	3

Courses by Concentration

Communications and Networking Concentration

Code	Title	Credits
Prerequisite		
EN.525.202	Signals and Systems [1]	3
Electives		
Select seven of the following: [2]		
EN.525.608	Next Generation Telecommunications	3
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.616	Communication Systems Engineering	3
EN.525.618	Antenna Systems	3
EN.525.620	Electromagnetic Transmission Systems	3
EN.525.638	Introduction to Wireless Technology	3
EN.525.640	Satellite Communications Systems	3
EN.525.641	Computer and Data Communication Networks I	3
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.525.707	Error Control Coding	3
EN.525.708	Iterative Methods in Communications Systems	3
EN.525.722	Wireless and Mobile Cellular Communications	3
EN.525.735	MIMO Wireless Communications	3
EN.525.738	Advanced Antenna Systems	3
EN.525.747	Speech Processing	3
EN.525.751	Software Radio for Wireless Communications	3
EN.525.754	Wireless Communication Circuits	3
EN.525.759	Image Compression, Packet Video, and Video Processing	3
EN.525.761	Wireless and Wireline Network Integration	3
EN.525.768	Wireless Networks	3
EN.525.771	Propagation of Radio Waves in the Atmosphere	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.776	Information Theory	3
EN.525.783	Spread Spectrum Communications	3
EN.525.789	Advanced Satellite Communications	3
EN.525.791	Microwave Communications Lab	3
EN.525.793	Advanced Communication Systems	3
EN.605.671	Principles of Data Communications Networks	3
EN.605.674	Network Programming	3
EN.605.675	Protocol Design	3
EN.605.677	Internetworking with TCP/IP I	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.605.772	Network Security Management	3
EN.605.776	Fourth Generation Wireless Communications: WiMAX and LTE	3
EN.605.777	Internetworking with TCP/IP II	3
EN.695.601	Foundations of Information Assurance	3
EN.695.622	Web Security	3
EN.695.721	Network Security	3

1. This course does not count toward degree or certificate requirements.
2. No more than three courses may come from Electrical and Computer Engineering 525.XXX.

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Computer Science, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in computer science or a closely related technical discipline, such as electrical and computer engineering or applied and computational mathematics, are eligible to apply for the Post-Master's Certificate in Computer Science.

Program Requirements

Five courses must be completed within five years. Four of the five courses must be from the Computer Science program as listed throughout the Courses section, and at least two of these courses must be at the 700-level. Only grades of B– or above can be counted toward the post-master's certificate. Students are allowed to take one elective.

Focus Areas are not applicable for students pursuing certificates. All course selections outside of the Computer Science program requirements are subject to advisor approval.

Cybersecurity

The part-time Cybersecurity program balances theory with practice, providing students with the highly technical knowledge and skills needed to protect and defend information systems from attack. Students choose from focus area that explore cyber attacks from within a system, protect information assets, and identify anomalies and unexpected patterns.

Courses are offered at the Applied Physics Laboratory and online.

Program Committee

Lanier Watkins, Program Chair
Senior Professional Staff
JHU Applied Physics Laboratory

Robert S. Grossman, Vice Program Chair Emeritus
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JHU Applied Physics Laboratory

Anthony N. Johnson, Program Manager
Senior Professional Staff
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Mary Galvin
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John Hurley
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Interim Vice Provost for Strategic Initiatives
Vanderbilt University

Ralph Semmel
Director
JHU Applied Physics Laboratory

J. Miller Whisnant
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

Courses

EN.695.601. Foundations of Information Assurance. 3 Credits.
This course surveys the broad fields of enterprise security and privacy, concentrating on the nature of enterprise security requirements by identifying threats to enterprise information technology (IT) systems, access control and open systems, and system and product evaluation criteria. Risk management and policy considerations are examined with respect to the technical nature of enterprise security as represented by government guidance and regulations to support information confidentiality, integrity and availability. The course develops the student's ability to assess enterprise security risk and to formulate technical recommendations in the areas of hardware and software. Aspects of security-related topics to be discussed include network security, cryptography, IT technology issues, and database security. The course addresses evolving Internet, Intranet, and Extranet security issues that affect enterprise security. Additional topics include access control (hardware and software), communications security, and the proper use of system software (operating system and utilities). The course addresses the social and legal problems of individual privacy in an information processing environment, as well as the computer "crime" potential of such systems. The class examines several data encryption algorithms. Course Note(s): This course can be taken before or after 605.621 Foundations of Algorithms. It must be taken before other courses in the degree.

EN.695.611. Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms. 3 Credits.
While most of the world is preoccupied with high-profile network-based computer intrusions, this online course examines the potential for computer crime and the protection mechanisms employed in conjunction with the embedded computers that can be found within non-networked products (e.g., vending machines, automotive onboard computers, etc.). This course provides a basic understanding of embedded computer systems: differences with respect to network-based computers, programmability, exploitation methods, and current intrusion protection techniques, along with material relating to computer hacking and vulnerability assessment. The course materials consist of a set of eight study modules and five casestudy experiments (to be completed at a rate of one per week) and are augmented by online discussion forums moderated by the instructor. This course also includes online discussion forums that support greater depth of understanding of the materials presented within the study modules.
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance, a basic understanding and working knowledge of computer systems, and access to Intel-based PC hosting a Microsoft Windows environment.

EN.695.612. Operating Systems Security. 3 Credits.
Have you ever wondered how hardware and software faults could affect the security and privacy of a computing environment? Modern general-purpose operating systems have become the lifeline for business and personal use.Throughout the course, students will examine and analyze the modern security mechanisms (e.g. MACs, ASLR, SMEP/SMAP, CFI, PAC, TPMs, and more) and learn the strengths and weaknesses of each approach, ensuring a solid defense against APTs and rootkits. Examining both software and hardware implementations, students will compare how effective these security components are amongst the major OS vendors. As virtualization has become ubiquitous in computing, students will also utilize KVM to build customized virtual machine solutions. Finally, students will examine how these mechanisms compare and are applied to modern mobile operating systems environments.Prerequisite(s): Familiarity with operating system concepts.

EN.695.614. Security Engineering. 3 Credits.
This course covers cybersecurity systems engineering principles of design. Students will learn the foundational and timeless principles of cybersecurity design and engineering. They will learn why theories of security come from theories of insecurity, the important role of failure and reliability in security, the fundamentals of cybersecurity risk assessment, the building blocks of cybersecurity, intrusion detection design, and advanced topics like cybersecurity situational understanding and command and control. The course develops the student's ability to understand the nature and source of risk to a system, prioritize those risks, and then develop a security architecture that addresses those risks in a holistic manner, effectively employing the building blocks of cybersecurity systems— prevention, detection, reaction, and attack-tolerance. The student will learn to think like a cyber-attacker so that they can better design and operate cybersecurity systems. Students will attain the skill of systematically approaching cybersecurity from the top down and the bottom up and have confidence that their system designs will be effective at addressing the full spectrum of the cyber-attack space. The course also addresses how the cybersecurity attack and defense landscape will evolve so that the student is not simply ready to address today's problems, but can quickly adapt and prepare for tomorrow's. The course is relevant at any stage in a student's curriculum: whether at the beginning to enable the student to understand the big picture before diving into the details, at the end as a capstone, or in the middle to integrate the skills learned to date.
EN.695.601 Foundations of Information Assurance.

EN.695.615. Cyber Physical Systems Security. 3 Credits.
The age of Cyber-Physical Systems (CPS) has officially begun. Not long ago, these systems were separated into distinct domains, cyber and physical. Today, the rigid dichotomy between domains no longer exists. Cars have programmable interfaces, Unmanned Aerial Vehicles (UAVs) roam the skies, and critical infrastructure and medical devices are now fully reliant on computer control. With the increased use of CPS and the parallel rise in cyber-attack capabilities, it is imperative that new methods for securing these systems be developed. This course will investigate key concepts behind CPS including: control systems, protocol analysis, behavioral modeling, and Intrusion Detection System (IDS) development. The course will be comprised of theory, computation, and projects to better enhance student learning and engagement . The course will begin with the mathematics of continuous and digital control systems and then shift the focus to the complex world of CPS, where both a general overview for the different domains (Industrial Control, Transportation, Medical Devices, etc.) and more detailed case studies will be provided . Students will complete a number of projects, both exploiting security vulnerabilities and developing security solutions for UAVs and industrial controllers. Several advanced topics will be introduced including behavioral analysis and resilient CPS.Course Notes: There are no prerequisite courses; however, students will encounter many concepts and technologies in a short period of time. Student should have a basic understanding of python programming, networking, matrices, and Windows and Linux operating systems.

EN.695.621. Public Key Infrastructure and Managing E-Security. 3 Credits.
This course describes public key technology and related security management issues in the context of the Secure Cyberspace Grand Challenge of the National Academy of Engineering. Course materials explain Public Key Infrastructure (PKI) components and how the various components support e-business and strong security services. The course includes the basics of public key technology; the role of digital certificates; a case study that emphasizes the content and importance of certificate policy and certification practices; identification challenges and the current status of the National Strategy for Trusted Identities in Cyberspace; and essential aspects of the key management lifecycle processes that incorporate the most recent research papers of the National Institute of Standards and Technology. Students will examine PKI capabilities and digital signatures in the context of the business environment, including applicable laws and regulations. The course also presents the essential elements for PKI implementation, including planning, the state of standards, and interoperability challenges. The course also provides an opportunity for students to tailor the course to meet specific cybersecurity interests with regard to PKI and participate in discussions with their peers on contemporary cybersecurity topics.

EN.695.622. Web Security. 3 Credits.
Information technology security is a broad field. This course focuses on the foundational technologies that build the Web-based Internet (Web) as we know it today. The goal of this course is to guide the learner to adopt a professional security mindset by applying the techniques of threat modeling, risk assessment, and apply the foundational security principles from the two "triad" models: "confidentiality, integrity, and availability" (CIA) and "authentication, authorization, and accounting" (AAA). The self-motivated learner will investigate vulnerabilities, threats, and mitigations with the objective of protecting the data, applications, frameworks, and the supporting complex technology stacks. Security at this level cannot be achieved by technology alone, the course will provide an opportunity to exercise a smart combination of methodologies and techniques that can build confidence and rapport to champion web security within their IT community. Applicable cryptology, digital certificates, and Public Key Infrastructure will be reviewed. Each module will involve hands-on labs that implement local virtual machines, containers, cloud computing environments, and an operative blockchain enabling the learner to probe more deeply into the cybersecurity challenge of each technology solution. The assignments will involve programming and system configuration thus a novice-level exposure of Python, PHP, JavaScript, Linux Commands, basic Internet architecture and common protocols is recommended. Prerequisite(s): 605.202 Data Structures

EN.695.623. Information Security and Privacy. 3 Credits.
As the world becomes more connected and reliant on digital communications, best security practices are required to maintain the privacy of individual and enterprise systems. This course will focus mainly on network perimeter protection, host-level protection, authentication technologies, intellectual property protection, formal analysis techniques, intrusion detection and other current advanced topics. Emphasis in this course is on understanding how security issues impact real-world systems, while maintaining an appreciation for grounding the work in fundamental science. The course will consist of group exercises and interactive discussions. There will be programming assignments and a course project. Students will also be expected to read assigned research papers and lead a presentation and discussion on at least one research paper.

EN.695.634. Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles. 3 Credits.
New technologies within the automotive industry are fusing the physical, digital, and biological worlds to create intelligent vehicles that are designed to enhance occupants' experiences and improve driver safety and efficiency and improve pedestrian safety. The success of these commercial and industrial efforts rest in the principles of assured autonomy. These intelligent technologies exist in a connected ecosystem that includes the Transportation, Energy, and Communication sectors. Examples of the interconnectivity capabilities include: Autonomous Vehicle - transducer, interface, and supporting capabilities; Electric Vehicles - grid connected vehicle charging infrastructure; and Vehicle-to-Vehicle and Vehicle-to-Everything Communication Technologies. This course helps students understand the significance of assured autonomy safety and functional correctness of intelligent vehicles throughout the technology's lifecycle. This course follows a seminar format where students are expected to lead class discussions and write a final report as part of a course project. The course project will teach experimental design and the scientific method. The outcome of the project will be a proposal that, if executed, could result in a workshop-quality publication. Execution of the proposed experiment is encouraged but not required for the class. Proposals will be graded by both the instructor and by classmates. This course is oriented around helping students learn how to make a compelling research contribution to the area of intelligent vehicles and assured autonomy.Students will also learn to critique scientific papers in this research area by reading articles from the literature and analyzing at least one paper in order to lead a class discussion.Prerequisites: This course is suitable for graduate students with little prior experience in the area.

EN.695.637. Introduction to Assured AI and Autonomy. 3 Credits.
In order to drive a future where artificial intelligence (AI) enabled autonomous systems are trustworthy contributors to society, these capabilities must be designed and verified for safe and reliable operation and they must be secure and resilient to adversarial attacks. Further, these AI enabled autonomous systems must be predictable, explainable and fair while seamlessly integrated into complex ecosystems alongside humans and technology where the dynamics of human-machine teaming are considered in the design of the intelligent system to enable assured decision-making. In this course, students are first introduced to the field of AI, covering fundamental concepts, theory, and solution techniques for intelligent agents to perceive, reason, plan, learn, infer, decide and act over time within an environment often under conditions of uncertainty. Subsequently, students will be introduced to the assurance of AI enabled autonomous systems, including the areas of AI and autonomy security, resilience, robustness, fairness, bias, explainability, safety, reliability and ethics. This course concludes by introducing the concept of human-machine teaming. Students develop a contextual understanding of the fundamental concepts, theory, problem domains, applications, methods, tools, and modeling approaches for assuring AI enabled autonomous systems. Students will implement the latest state-of-the-art algorithms, as well as discuss emerging research findings in AI assurance.

EN.695.641. Cryptology. 3 Credits.
This course provides an introduction to the principles and practice of contemporary cryptography. It begins with a brief survey of classical cryptographic techniques that influenced the modern development of the subject. The course then focuses on more contemporary work: symmetric block ciphers and the Advanced Encryption Standard, public key cryptosystems, digital signatures, authentication protocols, and cryptographic hash functions. The course also provides an overview of quantum resistant cryptography and, as time permits, other recent developments such as homomorphic encryption. Complexity theory and computational number theory provide the foundation for much of the contemporary work in cryptology; pertinent ideas from complexity and number theory are introduced, as needed, throughout the course.
EN.695.601 AND EN.605.621OR EN.605.601[C] AND EN.605.611 AND EN.605.621

EN.695.642. Intrusion Detection. 3 Credits.
This course explores the use of network and host based intrusion detection systems (IDS) as part of an organization's overall security posture. A variety of approaches, models, analyzes, and algorithms along with the practical concerns of deploying IDS in an enterprise environment will be discussed. Topics include the products, architectures, and components of IDS, host and network based IDS, network analysis, IDS technologies, Machine Learning, Linux Firewall IPTables, and Tor Networking. The use of ROC (receiver operating characteristic/curves) to discuss false positives, false negatives, precision recall graphs, and missed detection trade - offs as well as discussions of current research topics will provide a comprehensive understanding of when and how IDS can complement host and network security. A variety of IDS tools will be used to collect and analyze potential attacks to include; OSSEC, Tripwire, Snort, Suricata, Neo4j, Zeek (new name Bro), Keras, and Rapid Miner. The course will use virtual machines in labs and assignments to provide hands-on experience with IDS including using test data to quantitatively compare different IDS's.
EN.695.641 Cryptology

EN.695.643. Introduction to Ethical Hacking. 3 Credits.
This course exposes students to the world of ethical computer hacking by discussing foundational concepts, frameworks, and theoretical knowledge that will provide a richer understanding of how and why vulnerable hosts/systems are attacked to motivate and better apply defensive tactics, techniques, and procedures (TTP's). The class looks at fundamental hacking approaches through practical exposure via hands-on assignments, discussions and a quiz. For lab assignments, students are expected to use a computer that will remain air-gapped/off all networks while they complete the deliverable. The course goal is to learn fundamental principles of reconnaissance, scanning, escalation, pivoting, and exploitation that can be leveraged to defend computing infrastructures and systems. Students will primarily use virtual machines in labs to install Kali Linux Tools to include; Lynis, Metasploit Framework, Nmap, SET, WebScarab, Sqlmap, Nessus, John the Ripper, Hydra, Browser Exploitation Framework (BeEF), and Aircrack-ng to provide hands-on experience with Ethical Hacking.
EN.695.601 Foundations of Information Assurance and one of EN.635.611 Principles of Network Engineering or EN.605.671 Principles of Data Communications Networks. Course Note(s): Homework assignments will include programming.

EN.695.644. Computer Forensics. 3 Credits.
This course introduces the student to the field of applied Computer Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "dead-box" (powered-off) data extraction and analysis with open-source tools. Topics covered include legal and regulatory issues, forensic imaging and data acquisition from a "dead" system, computer file systems (FAT/NTFS) and data recovery, Windows Registry and configuration records, Windows log analysis and operating system artifacts, memory dump analysis (RAM), software artifacts, computer network forensics, introductory mobile device forensics, case reporting and documentation, end-to-end computer forensic examinations, peer review, and testifying in court.

EN.695.645. Mobile Device Forensics. 3 Credits.
This course introduces the student to the field of applied Mobile Device Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "live" (powered-on) data extraction and analysis of Linux-based Android mobile devices/cell phones with open-source tools. Topics covered include data extraction from a "live" system; cell phone file systems (EXT/YAFFS) and data recovery; cell phone configuration records; Android/Linux log analysis and operating system artifacts; memory dump analysis (NAND); Android Operating System application artifacts to include SMS/MMS messaging apps, contacts list, calendar, Gmail, browser bookmarks/searches, call logs, picture/video, and GPS/maps; installed application artifacts such as Facebook, Twitter, and TikTok; cell phone network forensics; Subscriber Identity Module (SIM) card analysis; and Secure Digital (SD) card analysis.

EN.695.711. Java Security. 3 Credits.
This course examines security topics in the context of the Java language with emphasis on security services such as confidentiality, integrity, authentication, access control, and nonrepudiation. Specific topics include mobile code, mechanisms for building “sandboxes” (e.g., class loaders, namespaces, bytecode verification, access controllers, protection domains, policy files), symmetric and asymmetric data encryption, hashing, digital certificates, signature and MAC generation/verification, code signing, key management, SSL, and object-level protection. Various supporting APIs are also considered, including the Java Cryptography Architecture (JCA) and Java Cryptography Extension (JCE). Security APIs for XML and web services, such as XML Signature and XML Encryption, Security Assertions Markup Language (SAML), and Extensible Access Control Markup Language (XACML), are also surveyed. The course includes multiple programming assignments and a project.
EN.605.681 Principles of Enterprise Web Development or equivalent. Basic knowledge of XML. EN.695.601 Foundations of Information Assurance or EN.695.622 Web Security would be helpful but is not required.

EN.695.712. Authentication Technologies. 3 Credits.
Authentication plays a strong role in cybersecurity, and is a critical layer underpinning the “CIA triad.” This course will explore current technologies, issues, and policies surrounding practical authentication. Grouped by something you know, something you have, and something you are, topics will include passwords, certificates and public key infrastructures, graphical authentication, smart cards, biometrics, trusted computing, location authentication, identity federation, and a range of other topics determined by class interest. Each topic will be examined from the perspective of technical strengths, weaknesses, mitigations, and human factors, and will include discussions of authentication policies, trends, and privacy perspectives. Related background is developed as needed, allowing students to gain a rich understanding of authentication techniques and the requirements for using them in a secure environment including systems, networks, and the Internet. Students will prepare and present a research project that reflects an understanding of key issues in authentication. Recommended: EN.695.621 Public Key Infrastructure and Managing E-Security.
EN.605.202 Data Structures; 6EN.95.601 Foundations of Information Assurance. EN.695.621 Public Key Infrastructure and Managing E-Security is recommended.

EN.695.715. Assured Autonomy. 3 Credits.
Autonomic systems leverage the growing advances in control, computer vision, and machine learning coupled with technological advances in sensing, computation, and communication. While this emerging highly connected, autonomous world is full of promise, it also introduces safety and security risks that are not present in legacy systems. This course focuses on the complexities inherent in autonomous systems and the multifaceted and multilayered approaches necessary to assure their secure and safe operation. As these systems become more pervasive, guaranteeing their safe operation even during unforeseen and unpredictable events becomes imperative. There are currently no real solutions to provide these runtime guarantees necessitating cutting edge research to provide state awareness, intelligence, control, safety, security, effective human-machine interaction, robust communication, and reliable computation and operation to these systems. This course follows a seminar-style format where students are expected to lead class discussions and write a publication-quality paper as part of a course project.

EN.695.721. Network Security. 3 Credits.
This course covers concepts and issues pertaining to network security and network security architecture and evolving virtualization and related cloud computing security architecture. Topics include mini-cases to develop a network security context. For example, we will assess the NIST (National Institute of Standards and Technology) unified information security framework. This framework is supported by information security standards and guidance, such as a risk management framework (RMF) and continuous monitoring (CM) process. Applied cryptography and information security—encryption algorithms, hash algorithms, message integrity checks, digital signatures, security assessment and authentication, authorization and accounting (AAA), security association, and security key management (generation, distribution, and renewal) —are discussed with consideration given to emerging cryptographic trends, such as the evolution and adoption of NSA's (National Security Agency's) Suite B cryptography. This course presents network and network security architecture viewpoints for selected security issues, including various security mechanisms, different layers of wired/wireless security protocols, different types of security attacks and threats and their countermeasures or mitigation, Next Generation Network (NGN) security architecture that supports the merging of wired and wireless communications, and Internet Protocol version 6 implementation and transition. The course concludes with more comprehensive cases that consider network security aspects of virtualization and cloud computing architecture.
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance and EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.695.722. Covert Channels. 3 Credits.
This course will be a survey course for covert channels and information leakage (side channel) with hands-on investigations into building and defeating covert channels. We will begin with the long history of covert channels dating back to the 1970's up to the present and beyond by looking at current research in this area. We will explore both storage and timing covert channels and information leakage from general purpose computers, mobile devices, and modern industrial control system devices. It is necessary to be able to write code in at least 1 language (python is preferred), be familiar with computer networking and the use of network packet sniffers.
EN.695.642 Intrusion Detection AND intermediate knowledge of Python.

EN.695.737. AI for Assured Autonomy. 3 Credits.
This is an introductory course in Artificial Intelligence It teaches the basic concepts, principles, and fundamental approaches to Artificial Intelligence. Its main topics include AI Fundamentals, Probability and Statistics, Python Essentials, Supervised Machine Learning, Unsupervised Machine Learning, Neural Networks, Reinforcement Learning, Deep Learning, Natural Language Processing, Decision Tree/Search Algorithms and Intro to Assured Autonomous Systems. Prerequisites: The student should have taken an undergraduate level course on, or be otherwise familiar with, operating systems and networks. Prior programming experience with C, Python or Java is highly recommended. Knowledge of algebra and discrete mathematics is also recommended.

EN.695.741. Information Assurance Analysis. 3 Credits.
This course exposes students to the world of information assurance analysis by discussing foundational concepts and frameworks that can be used to analyze various technologies, mediums, protocols and platforms. Analysis is a fundamental part of the information assurance process and effective implementation can inform policy, forensic and incident response procedures, and cyber security practices. Students will be able to perform analysis activities by using the theoretical knowledge gained on case studies, assignments, and hands-on labs resulting in a richer understanding for information assurance. Topics include the collection, use, and presentation of data from a variety of sources (e.g., raw network traffic data, traffic summary records, and log data collected from servers and firewalls). This data is used for a variety of analytical techniques, such as collection approach evaluation, population estimation, hypothesis testing, experiment construction and evaluation, and developing evidence chains for forensic analysis. The course will also cover Internet of Things (IoT's), Artificial Intelligence, Mobile Application Security, addressing, Border Gateway Protocols (BGP), lookups, anonymization, Industrial Control Systems (ICS), as well as analyzing DNS, HTTP, SMTP, and TCP protocols. Students will primarily use SiLK, NetFlow, Wireshark, Splunk, Zeek (new name Bro), Node-Red IoT framework, and TCPDump tools. Students will also be introduced to various IoT and ICS protocols; WNAN, ZigBee, EMV, and SIGFOX, as well as, CIP, MODBUS, DNP3, OPC, HART, BACnet, and ICCP, respectively.
EN.695.601 Foundations of Information Assurance. Familiarity with basic statistical analysis. EN.695.642 Intrusion Detection or EN.695.611 Embedded Computer SystemsVulnerabilities, Intrusions, and Protection Mechanisms is recommended.

EN.695.742. Digital Forensics Technologies and Techniques. 3 Credits.
Digital forensics focuses on the acquisition, identification, attribution, and analysis of digital evidence of an event occurring in a computer or network. This course provides a broader scientific understanding of the technologies and techniques used to perform digital forensics. In particular, various signature extraction techniques, detection, classification, and retrieval of forensically interesting patterns will be introduced. This will be complemented by studying fundamental concepts of data processing technologies like compression, watermarking, steganography, cryptography, and multiresolution analysis. Emerging standards along with issues driving the changing nature of this topic will be explored. Antiforensic techniques that are used to counter forensic analysis will also be covered. Students will be exposed to relevant theory, programming practice, case studies, and contemporary literature on the subject.
EN.605.612 Operating Systems.

EN.695.744. Reverse Engineering and Vulnerability Analysis. 3 Credits.
Have you ever wondered why software vulnerabilities lead to security issues? Or how malicious actors exploit vulnerabilities? The Reverse Engineering course will help answer these questions and more! Throughout the course, students will use industry standard tools and develop customized solutions to help further binary/code analysis. Using real-world vulnerability classes, students will examine how attackers identify flaws in modern software and exploit these flaws bypassing state-of-the-art protection mechanisms found in modern operating systems. Students will also identify how to patch these issues and develop extensions of protection mechanisms to thwart attacks, raising the bar for the attacker and improving the security posture of a system. Using a combination of static analysis, dynamic analysis, fault injection and fuzzing, this course will provide students with the modern skills needed to help stop attackers!Prerequisite(s): Familiarity with computer architecture concepts.

EN.695.749. Cyber Exercise. 3 Credits.
Students will learn about the nature and purpose of cyber exercises and their role in training and assessing people, teams, technology, and procedures. During the course of the semester, students will design a cyber exercise that meets the specific needs of their organization. At the conclusion of the class, students will have a model template they can use to design, build, and execute their own exercise.
EN.695.641 Cryptology

EN.695.791. Information Assurance Architectures and Technologies. 3 Credits.
This course explores concepts and issues pertaining to information assurance architectures and technologies (IAA), such as a three-level enterprise and cybersecurity architecture offered as one of the security common languages from the National Institute of Standards and Technology (NIST). Key NIST Cybersecurity Center of Excellence (NCCoE) Practice guides pertaining to IAA issues are introduced and analyzed. NIST/NCCoE security guidance and metrics for Zero Trust Architecture (ZTA), continuous diagnostics and mitigation (CDM), and artificial intelligence/machine learning (AI/ML) security guidance and metrics are applied to analysis of selected enterprise and cybersecurity programs, such the Department of Defense (DoD) Zero Trust Reference Architecture, Department of Homeland Security (DHS) Cybersecurity & Infrastructure Security Agency (CISA) Trusted Internet Connections Program (CISA TIC), Federal Aviation Administration (FAA) Air Traffic Modernization (NextGen) process, and Food and Drug Administration (FDA) (for approval of medical devices). Cloud computing security architecture issues for IAA technologies including FedRAMP (Federal Resources Analysis and Management Program) authorization are analyzed. Topics include protecting control systems from non-control systems for information technology (IT) and operational technology (OT) enterprise and cybersecurity risk management. For example, these IT/OT interface issues are critical for the NIST Smart Grid Cybersecurity Strategy, Architecture, and High-Level Requirements. IAA analyses include enterprise Internet of Things (IoT) mobility issues and a virtual laboratory project based on selected Amazon Web Services (AWS) security capabilities for Zero Trust Architecture (ZTA).
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance or equivalent, and EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.695.795. Capstone Project in Cybersecurity. 3 Credits.
This course permits graduate students in cybersecurity to work with other students and a faculty mentor to explore a topic in depth and apply principles and skills learned in the formal cybersecurity courses to a real world problem. Students will work in self-organized groups of two to five students on a topic selected from a published list. Since students will have selected different courses to meet degree requirements, students should consider the combined strengths of the group in constituting their team. Each team will prepare a proposal, interim reports, a final report, and an oral presentation. The goal is to produce a publication quality paper and substantial software tool. This course has no formal content; each team should meet with their faculty mentor at least once a week and is responsible for developing their own timeline and working to complete it within one semester. The total time required for this course is comparable to the combined class and study time for a formal course. Course prerequisite(s): Seven cybersecurity graduate courses including two courses numbered 695.7xx, all CyS foundation courses, and meeting the track requirement; or admission to the post-master's certificate program. Students must also have permission of a faculty mentor or academic advisor, and the program chair. Course note(s): Students may not receive graduate credit for both 695.795 and 695.802 Independent Study in Cybersecurity II. This course is only offered in the spring.

EN.695.801. Independent Study in Cybersecurity I. 3 Credits.
This course permits graduate students in cybersecurity to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven Cybersecurity graduate courses including the foundation courses, three track-focused area courses, and two courses numbered at the 700 level or admission to the post-master's certificate program. Students must also have permission from the instructor.
EN.695.601 AND EN.695.401 AND EN.605.421 Foundations of Algorithms

EN.695.802. Independent Study in Cybersecurity II. 3 Credits.
Students wishing to take a second independent study in Cybersecurity should sign up for this course. Prerequisite(s): 695.801 Independent Study in Cybersecurity I and permission of a faculty mentor, the student's academic advisor, and the program chair.
EN.695.801

Cybersecurity, Master of Science

A focus area must be chosen for this program.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission (p. 1414) to graduate study. The applicant's prior education must include the following prerequisites:

1. One year of Calculus (2 semesters or 3 quarters);
2. One semester/term of advanced math (Discrete Math is strongly preferred but Linear Algebra and Differential Equations will be accepted);
3. One semester/term of Java (C++ will be accepted but the student must be knowledgeable in Java);
4. One semester/term of Data Structures;
5. One semester/term of Computer Organization (e.g., assembly language and machine organization).

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Applicants may submit a detailed résumé if they would like their academic and professional background to be considered.

Program Requirements

Ten courses must be completed within five years. Students are required to choose a focus area to follow. The curriculum consists of three foundation courses and five courses from the Cybersecurity program, which includes selected courses from other programs as indicated in the course lists below. At least three courses must be from the same focus area. At least three courses must be at the 700-level, and at least one 700-level course must be in the chosen focus area. Up to two electives may be selected. Courses **not** appearing in the course lists below are considered electives for Cybersecurity, and require prior advisor approval. Transfer courses will be considered electives. Transfer courses must meet all general EP requirements for transfer, must be directly applicable to Cybersecurity, and will be considered on a case-by-case basis. Only **one** C-range grade (C+, C, or C−) can count toward the master's degree. Course selections outside of the foundational and focus area/concentration lists below are subject to advisor approval.

Non-degree students in Cybersecurity should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level courses may be taken.

Courses

Code	Title	Credits
Prerequisite Courses [1]		
EN.605.201	Introduction to Programming Using Java	3
EN.605.202	Data Structures	3
EN.605.203	Discrete Mathematics	3
EN.605.204	Computer Organization	3
EN.605.206	Introduction to Programming Using Python	3
Foundation Courses [2]		
EN.605.621	Foundations of Algorithms [3]	3
EN.695.601	Foundations of Information Assurance [3]	3
EN.695.641	Cryptology [4]	3
Focus Areas		
Select one of the following Focus Areas:		
Analysis (p. 1490)		
Assured Autonomy (p. 1490)		
Networks (p. 1491)		
Systems (p. 1491)		
Independent Study (p. 1491)		

1. Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.
2. One or more foundation courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived foundation courses with the same number of other graduate courses and may take these courses after all remaining foundation course requirements have been satisfied.
3. EN.605.621 Foundations of Algorithms and EN.695.601 Foundations of Information Assurance should be taken before any other courses.
4. EN.695.641 Cryptology should be taken after the other two foundation courses and before any other courses in the Analysis focus area.

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a focus area to follow and to take at least three courses from the selected focus area, including at least one 700-level course. The focus areas are presented as an aid to students in planning their course selections and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

The focus areas each have additional requirements. Applicants should have had a course in networking prior to taking courses in the Networks focus area, a course in operating systems prior to taking courses in the Systems focus area, and a course in both before taking courses in the Analysis focus area. If necessary, EN.605.612 Operating Systems and EN.605.671 Principles of Data Communications Networks can be taken and applied toward the master's degree in Cybersecurity.

Analysis

Code	Title	Credits
EN.695.641	Cryptology	3
EN.695.642	Intrusion Detection	3
EN.695.643	Introduction to Ethical Hacking	3
EN.695.741	Information Assurance Analysis	3
EN.695.742	Digital Forensics Technologies and Techniques	3
EN.695.744	Reverse Engineering and Vulnerability Analysis	3
EN.695.749	Cyber Exercise	3
EN.605.728	Quantum Computation	3
EN.650.656	Computer Forensics [1]	3

1. EN.650.xxx courses are offered through the Information Security Institute.

Assured Autonomy

Code	Title	Credits
EN.695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles	3
EN.695.637	Introduction to Assured AI and Autonomy	3
EN.695.715	Assured Autonomy	3
EN.695.737	AI for Assured Autonomy	3
EN.605.613	Introduction to Robotics	3
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.636	Autonomic Computing	3
EN.605.649	Introduction to Machine Learning	3
EN.605.746	Advanced Machine Learning	3
EN.705.601	Applied Machine Learning	3

Cyber Operations

Code	Title	Credits
EN.605.731	Survey of Cloud Computing Security	3
EN.695.615	Cyber Physical Systems Security	3
EN.695.622	Web Security	3
EN.695.643	Introduction to Ethical Hacking	3
EN.695.741	Information Assurance Analysis	3
EN.695.742	Digital Forensics Technologies and Techniques	3

Networks

Code	Title	Credits
EN.695.621	Public Key Infrastructure and Managing E-Security	3
EN.695.622	Web Security	3
EN.695.721	Network Security	3
EN.695.791	Information Assurance Architectures and Technologies	3
EN.605.671	Principles of Data Communications Networks	3
EN.605.674	Network Programming	3
EN.605.675	Protocol Design	3
EN.605.731	Survey of Cloud Computing Security	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.601.642	Modern Cryptography [1]	3

[1] EN.601.xxx courses are offered through the full-time Department of Computer Science.

Systems

Code	Title	Credits
EN.695.601	Foundations of Information Assurance	3
EN.695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	3
EN.695.612	Operating Systems Security	3
EN.695.614	Security Engineering	3
EN.695.615	Cyber Physical Systems Security	3
EN.695.711	Java Security	3
EN.695.712	Authentication Technologies	3
EN.695.715	Assured Autonomy	3
EN.605.601	Foundations of Software Engineering	3
EN.605.609	DevOps and Secure Software Development	3
EN.605.612	Operating Systems	3
EN.605.621	Foundations of Algorithms	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.715	Software Development for Real-Time Embedded Systems	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.729	Formal Methods	3
EN.601.643	Security & Privacy in Computing [1]	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3

[1] EN.601.xxx courses are offered through the full-time Department of Computer Science.

[2] EN.650.xxx courses are offered through the Information Security Institute.

Independent Study

Code	Title	Credits
EN.695.801	Independent Study in Cybersecurity I	3
EN.695.802	Independent Study in Cybersecurity II	3
EN.695.795	Capstone Project in Cybersecurity	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) *published each term for exact dates, times, locations, fees, and instructors*.

Cybersecurity, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Cybersecurity.

Program Requirements

Five courses must be completed within five years. Four of the five courses must be from the Cybersecurity program as listed throughout the Courses section, and at least two of these courses must be at the 700-level. Only grades of B- or above can be counted toward the post master's certificate. Students are allowed to take one elective.

Focus Areas are not applicable for students pursuing certificates. All course selections, including the elective, are subject to advisor approval.

Data Science

The part-time Data Science program balances theory and applications so that you can advance your career long term.

The rigorous curriculum focuses on the fundamentals of computer science, statistics, and applied mathematics, while incorporating real-world examples. By learning from practicing engineers and data scientists, graduates are prepared to succeed in specialized jobs involving everything from the data pipeline and storage to statistical analysis and eliciting the story the data tells.

Courses are offered online as well as in-person at the Applied Physics Laboratory. The Master of Science degree or Post-Master's Certificate may be completed fully online, fully in person, or via a blend of the two.

Program Committee

John A. Piorkowski, Program Co-Chair
Principal Professional Staff
JHU Applied Physics Laboratory

James C. Spall, Program Co-Chair
Principal Professional Staff
JHU Applied Physics Laboratory
Research Professor, Department of Applied Mathematics and Statistics
JHU Whiting School of Engineering

Anthony N. Johnson, Program Manager

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Stacy D. Hill
Senior Professional Staff
JHU Applied Physics Laboratory

J. Miller Whisnant
Principal Professional Staff
JHU Applied Physics Laboratory

Brian Wilt
Senior Manager, Data Science
Facebook

Programs

- Data Science, Master of Science (p. 1493)
- Data Science, Post-Master's Certificate (p. 1495)

Courses

EN.685.621. Algorithms for Data Science. 3 Credits.
This course provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving data science. Topics include advanced data structures for data science (tree structures, disjoint set data structures), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to complexity classes (P, NP and NP-completeness)), data transformations (FFTs, principal component analysis), design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, ordered and unordered trees). Advanced topics are selected from among the following: approximation algorithms, computational geometry, data preprocessing methods, data analysis, linear programming, multi-threaded algorithms, matrix operations, and statistical learning methods. The course will draw on applications from Data Science. Course Prerequisite(s): EN.605.201 Introduction to Programming Using Java or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): This required foundation course must be taken before other 605.xxx courses in the degree. This course does not satisfy the foundation course requirement for Bioinformatics, Computer Science, or Cybersecurity. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

EN.685.648. Data Science. 3 Credits.
This course will cover the core concepts and skills in the interdisciplinary field of data science. These include problem identification and communication, probability, statistical inference, visualization, extract/transform/load (ETL), exploratory data analysis (EDA), linear and logistic regression, model evaluation and various machine learning algorithms such as random forests, k-means clustering, and association rules. The course recognizes that although data science uses machine learning techniques, it is not synonymous with machine learning. The course emphasizes an understanding of both data (through the use of systems theory, probability, and simulation) and algorithms (through the use of synthetic and real data sets). The guiding principles throughout are communication and reproducibility. The course is geared towards giving students direct experience in solving the programming and analytical challenges associated with data science. The assignments weight conceptual (assessments) and practical (labs, problem sets) understanding equally. Prerequisite(s): A working knowledge of Python scripting and SQL is assumed as all assignments are completed in Python.

EN.685.652. Data Engineering Principles and Practice. 3 Credits.
This course will cover the core concepts and skills for data engineering with a focus on practical use cases. Data Engineering focuses on the ingestion, storage, transformation, and access of data in ways that enable data science applications to use and derive insight from data. Some of the topics that this course will touch on are dimensional modeling of data, non-relational data, data lakes, modern data warehouses, as well as different data modalities. The course will also cover some of the core supporting technologies in the data engineering world: data pipelines, containerization, schedulers, cloud technologies, and modern data engineering tools/stacks.The course is geared towards giving students direct experience in building solutions to problems associated with data engineering.The assignments will focus on the practical application of principles (labs, projects, assignments) while underscoring the understanding of the fundamental principles (assessments).Prerequisite(s): A working knowledge of Python scripting.

EN.685.795. Capstone Project in Data Science. 3 Credits.
This course permits graduate students in data science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven data science graduate courses including two courses numbered 605.7xx or 625.7xx or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): Students may not receive credit for both EN.685.802 Independent Study in Data Science II and EN.685.795.

EN.685.801. Independent Study in Data Science I. 3 Credits.
This course permits graduate students in data science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper suitable to be submitted for publication. Prerequisite(s): Seven data science graduate courses including two courses numbered 605.7xx or 625.7xx or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.685.802. Independent Study in Data Science II. 3 Credits.
Students wishing to take a second independent study in data science should sign up for this course. Prerequisite(s): EN.605.801 Independent Study in Data Science I and permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): Students may not receive credit for both EN.685.795 Capstone Project in Data Science and EN.685.802.

Data Science, Master of Science

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission (p. 1414) to graduate study. The applicant's prior education must include the following prerequisites:

1. Three semesters or five quarters of calculus, which includes multivariate calculus;
2. One semester/term of advanced math (discrete mathematics is strongly preferred but linear algebra and differential equations will be accepted);
3. One semester/term of Java or Python (C++ will be accepted but the student must be at least also somewhat knowledgeable in Java or Python);

Linear Algebra or Differential Equations will be accepted in lieu of Discrete Mathematics. A grade of B– or better must have been earned in each of the prerequisite courses. Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Applicants may submit a detailed résumé if they would like their academic and professional background to be considered.

Undergraduate courses are offered to satisfy computer science and mathematics beyond calculus requirements.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of seven required courses, two Applied and Computational Mathematics (EN.625.6xx) and (EN.625.7XX) electives, at least one of which must be at the 700-level, and one Computer Science elective (EN.605.7xx) at the 700-level. Only **one** C-range grade (C+, C, or C–) can count toward the master's degree. Any grade for a course lower than a C- will not be counted toward the degree. Course selections outside of the foundational, required, and elective course lists below are subject to advisor approval.

Courses applied toward undergraduate or graduate degrees at other institutions (non-JHU) are not eligible for transfer or double counting to a Data Science master's degree or post-master's certificate. Up to two graduate courses taken outside of JHU after an undergraduate degree was conferred and not applied toward a graduate degree may be considered toward the Data Science master's degree subject to advisor approval.

Non-degree students in Data Science should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level Data Science courses may be taken.

Home-to-Hopkins

Home-to-Hopkins students are permitted to substitute Homewood Campus courses to help meet EP program course requirements. Students should work with their faculty advisor to develop a course plan that will satisfy the degree requirements.

Courses

Code	Title	Credits
Prerequisite Courses [1]		
EN.605.206	Introduction to Programming Using Python	3
or EN.605.201	Introduction to Programming Using Java	
EN.625.250	Multivariable Calculus and Complex Analysis	3
EN.605.202	Data Structures	3
EN.605.203	Discrete Mathematics	3
or EN.625.252	Linear Algebra and Its Applications	
or EN.625.251	Introduction to Ordinary and Partial Differential Equations	
Foundation Courses		
EN.685.621	Algorithms for Data Science [2]	3
EN.625.603	Statistical Methods and Data Analysis [2]	3
Required Courses		
EN.685.648	Data Science	3
EN.685.652	Data Engineering Principles and Practice	3
EN.605.662	Data Visualization	3
EN.625.661	Statistical Models and Regression	3
EN.625.615	Introduction to Optimization [3]	3
or EN.625.664	Computational Statistics	
Applied and Computational Mathematics Electives		
Select one of the following:		
EN.625.601	Real Analysis	3
EN.625.609	Matrix Theory	3
EN.625.611	Computational Methods	3
EN.625.615	Introduction to Optimization	3
EN.625.618	Discrete Hybrid Optimization	3

EN.625.620	Mathematical Methods for Signal Processing	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.633	Monte Carlo Methods	3
EN.625.636	Graph Theory	3
EN.625.638	Neural Networks	3
EN.625.641	Mathematics of Finance	3
EN.625.642	Mathematics of Risk, Options, and Financial Derivatives	3
EN.625.663	Multivariate Statistics and Stochastic Analysis	3
EN.625.664	Computational Statistics	3
EN.625.665	Bayesian Statistics	3
EN.625.680	Cryptography	3
EN.625.687	Applied Topology	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.692	Probabilistic Graphical Models	3
EN.625.695	Time Series Analysis	3
EN.625.717	Advanced Differential Equations: Partial Differential Equations	3
EN.625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems	3
EN.625.728	Theory of Probability	3
Select one of the following:		
EN.625.714	Introductory Stochastic Differential Equations with Applications	3
EN.625.721	Probability and Stochastic Process I	3
EN.625.722	Probability and Stochastic Process II	3
EN.625.725	Theory Of Statistics I	3
EN.625.726	Theory of Statistics II	3
EN.625.734	Queuing Theory with Applications to Computer Science	3
EN.625.740	Data Mining	3
EN.625.741	Game Theory	3
EN.625.742	Theory of Machine Learning	3
EN.625.743	Stochastic Optimization & Control	3
EN.625.744	Modeling, Simulation, and Monte Carlo	3
Computer Science Electives		
Select one of the following:		
EN.605.725	Queuing Theory with Applications to Computer Science	3
EN.605.741	Large-Scale Database Systems	3
EN.605.744	Information Retrieval	3
EN.605.745	Reasoning Under Uncertainty	3
EN.605.746	Advanced Machine Learning	3
EN.605.747	Evolutionary and Swarm Intelligence	3
EN.605.788	Big Data Processing Using Hadoop	3

[1] Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

[2] These required foundation courses must be taken or waived before all other courses in their respective programs.

[3] EN.625.616 Optimization in Finance may be substituted.

Students who have been waived from foundation or required courses may replace the courses with the same number of other graduate courses. EN.605.xxx courses must be replaced with EN.605.xxx courses and EN.625.xxx courses must be replaced with EN.625.xxx courses. Students who waive EN.605.641 Principles of Database Systems must replace it with EN.605.741 Large-Scale Database Systems. Students who waive EN.685.621 Algorithms for Data Science must replace it with EN.605.641 Principles of Database Systems or EN.605.649 Introduction to Machine Learning. Students who take outside electives from other programs must meet the specific course prerequisites listed.

Additional Selections

Students waiving required courses may choose from the list of 700-level electives or from the courses below. The replacement course should be from the same field (EN.605.xxx or EN.625.xxx) as the waived course.

Code	Title	Credits
Additional Selections		
EN.605.632	Graph Analytics	3
EN.605.633	Social Media Analytics	3
EN.605.635	Cloud Computing	3
EN.605.645	Artificial Intelligence	3
EN.605.647	Neural Networks	3
EN.605.649	Introduction to Machine Learning	3
EN.605.724	Applied Game Theory	3
EN.625.601	Real Analysis	3
EN.625.609	Matrix Theory	3
EN.625.611	Computational Methods	3
EN.625.618	Discrete Hybrid Optimization	3
EN.625.620	Mathematical Methods for Signal Processing	3
EN.625.623	Introduction to Operations Research: Probabilistic Models	3
EN.625.633	Monte Carlo Methods	3
EN.625.636	Graph Theory	3
EN.625.638	Neural Networks	3
EN.625.641	Mathematics of Finance	3
EN.625.642	Mathematics of Risk, Options, and Financial Derivatives	3
EN.625.662	Design and Analysis of Experiments	3
EN.625.663	Multivariate Statistics and Stochastic Analysis	3
EN.625.665	Bayesian Statistics	3
EN.625.680	Cryptography	3
EN.625.687	Applied Topology	3
EN.625.690	Computational Complexity and Approximation	3
EN.625.692	Probabilistic Graphical Models	3
EN.625.695	Time Series Analysis	3
EN.625.717	Advanced Differential Equations: Partial Differential Equations	3
EN.625.718	Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems	3
EN.625.728	Theory of Probability	3
Independent Study		

EN.685.795	Capstone Project in Data Science	3
EN.685.801	Independent Study in Data Science I	3
EN.685.802	Independent Study in Data Science II	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) *published each term for exact dates, times, locations, fees, and instructors*.

Data Science, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in Data Science or a very closely related field, such as Applied Statistics, are eligible to apply for the Post-Master's Certificate in Data Science. Coursework should have included coursework comparable to at least three of the four required courses in both the Computer Science area and the Applied and Computational Mathematics area, respectively.

Exceptions to these requirements, based on experience, can be made by the program chairs.

Program Requirements

Five courses must be completed within five years. At least two courses must be from the Applied and Computational Mathematics program (EN.625.xxx), and at least two courses must be from the Computer Science program (EN.605.xxx). At least three of the courses must be 700-level with at least one from Computer Science and at least one from Applied and Computational Mathematics. Only grades of B– or above can be counted toward the post-master's certificate. EN.625.603 Statistical Methods and Data Analysis may not be applied to the post-master's certificate. One graduate course taken outside of JHU and not applied toward a graduate or other degree may be considered toward the Data Science Post-Master's Certificate, subject to advisor approval. All course selections outside of the Data Science program requirements are subject to advisor approval.

Electrical and Computer Engineering

The part-time Electrical and Computer Engineering program's strength lies in its faculty, who are drawn from the Applied Physics Laboratory, from government and local industry, and from the full-time Department of Electrical & Computer Engineering. Their active involvement in applied research and development helps to foster students' understanding of the theory and practice of the discipline. Students study the fundamentals of electrical and computer engineering, as well as more specific aspects of current technologies based on a variety of technical groupings of courses.

Courses are offered at the Applied Physics Laboratory and online.

Program Committee

Ashutosh Dutta, Program Chair
Senior Professional Staff
JHU Applied Physics Laboratory

Cleon Davis, Program Vice Chair
Senior Professional Staff
JHU Applied Physics Laboratory

Ramsey Hourani, Program Manager
Senior Professional Staff
JHU Applied Physics Laboratory

Pedro Irazoqui
Department Head, Electrical and Computer Engineering
JHU Whiting School of Engineering

James J. Costabile
CEO
Syncopated Engineering

Jeffrey G. Houser
Electronics Engineer
US Army Research Laboratory

Daniel G. Jablonski
Principal Professional Staff
JHU Applied Physics Laboratory

Ralph Etienne-Cummings
Professor, Electrical and Computer Engineering
JHU Whiting School of Engineering

John E. Penn
Electronics Engineer
US Army Research Laboratory

Raymond M. Sova
Principal Professional Staff
JHU Applied Physics Laboratory

Douglas S. Wenstrand
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Electrical and Computer Engineering, Graduate Certificate (p. 1509)
- Electrical and Computer Engineering, Master of Science (p. 1509)
- Electrical and Computer Engineering, Post-Master's Certificate (p. 1513)

Courses

EN.525.201. Circuits, Devices and Fields. 3 Credits.
This course is intended to prepare students lacking an appropriate background for graduate study in electrical and computer engineering. Fundamental mathematical concepts including calculus, differential equations, and linear algebra are reviewed. Circuit theory for linear and nonlinear devices and components is covered. An introduction to electricity and magnetism is presented along with basic wave propagation theory. Finally, Boolean algebra is studied with applications to digital circuit design and analysis. Prerequisite(s): Two or more semesters of calculus, differential equations, and at least two semesters of calculus-based physics. Course Note(s): Not for graduate credit.

EN.525.202. Signals and Systems. 3 Credits.
This course is intended to prepare students lacking an appropriate background for graduate study in electrical and computer engineering. Signal and system representations and analysis tools in both continuous time and discrete time are covered. Linear time-invariant systems are defined and analyzed. The Fourier transform, the Laplace transform, and the z-transform are treated along with the sampling theorem. Finally, fundamental concepts in probability, statistics, and random processes are considered. Prerequisite(s): Two or more semesters of calculus and differential equations. Course Note(s): Not for graduate credit.

EN.525.603. Advanced Topics in Optical Medical Imaging. 3 Credits.
The course will review the recent advances in photonics technologies for medical imaging and sensing. The course is designed for graduate students with a back ground in optics and engineering. The main topics for the course are: Light Source and Devices for Biomedical Imaging; Fluorescence, Raman, Rayleigh Scatterings; Optical Endoscopy and Virtual biopsy; Novel imaging contrast dyes, nanoparticles, and optical clearing reagents; Label-free optical technologies in clinical applications; Neurophotonics and Optogenetics.

EN.525.605. Intermediate Electromagnetics. 3 Credits.
This course provides a background in engineering electromagnetics required for more advanced courses in the field. Topics include vector calculus, Poisson's and Laplace's equations, Vector potentials, Green's functions, magnetostatics, magnetic and dielectric materials, Maxwell's equations, plane wave propagation and polarization, reflection and refraction at a plane boundary, frequency-dependent susceptibility functions, transmission lines, waveguides, and simple antennas. Practical examples are used throughout the course.

EN.525.606. Electronic Materials. 3 Credits.
Materials and the interfaces between them are the key elements in determining the functioning of electronic devices and systems. This course develops the fundamental parameters of the basic solid material types and their relationships to electrical, thermal, mechanical, and optical properties. The application of these materials to the design and fabrication of electronic components is described, including integrated circuits, passive components, and electronic boards, modules, and systems. Prerequisite(s): An undergraduate degree in engineering, physics, or materials science; familiarity with materials structures and electronic devices.

EN.525.607. Intro to Electronic Packaging. 3 Credits.
Topics include fundamentals of electronic packaging engineering and basic concepts in thermal, mechanical, electrical, and environmental management of modern electronic systems. Emphasis is on high-frequency (and high-speed) package performance and its achievement through the use of advanced analytical tools, proper materials selection, and efficient computer-aided design. Packaging topics include die and lead attachment, substrates, hybrids, surface-mount technology, chip and board environmental protection, connectors, harnesses, and printed and embedded wiring boards. Prerequisite(s): An undergraduate degree in a scientific or engineering area, including familiarity with computer-aided design and engineering analysis methods for electronic circuits and systems.

EN.525.608. Next Generation Telecommunications. 3 Credits.
This course examines voice, data, and video communications through emerging technologies. Considerations include the characteristics and security requirements of the information being encoded, bandwidth requirements and limitations, and transmission standards and equipment. Topics will consider the pragmatics facing the communications system engineer including space, weight, and power. The student will review past and present network architectures and apply trade-off decisions when analyzing new system requirements. Topics include brief histories of telecommunications, speech processing, encoding, digitization, signaling, and transmission; broadband, fiber optics, and wireless network architectures; and encryption, privacy, and security issues. New and disruptive technologies are discussed each offering.
Either an undergraduate degree in electrical engineering or 525.616 Communications Systems Engineering, or consent of the instructor.

EN.525.609. Continuous Control Systems. 3 Credits.
This course examines classical methods of analysis and design of continuous control systems. Topics include system representation by linear time invariant ordinary differential equations, performance measures, sensitivity, stability, root locus, frequency domain techniques, and design methods. Several practical examples are considered. MATLAB is used as a computational tool. Prerequisite(s): Background in linear algebra and linear differential equations.

EN.525.610. Microprocessors for Robotic Systems. 3 Credits.
This course examines microprocessors as an integral part of robotic systems. Techniques required for successful incorporation of embedded microprocessor technology are studied and applied to robotic systems. Students will use hardware in a laboratory setting and will develop software that uses features of the microprocessor at a low level to accomplish the real-time performance necessary in robotic applications. Topics will include microprocessor selection, real-time constraints, sensor interfacing, actuator control, and system design considerations. Prerequisite(s): Experience with C programming and a course in digital systems or computer architecture.

EN.525.612. Computer Architecture. 3 Credits.
This course focuses on digital hardware design for all major components of a modern, reduced-instructionset computer. Topics covered include instruction set architecture; addressing modes; register-transfer notation; control circuitry; pipelining with hazard control; circuits to support interrupts and other exceptions; microprogramming; computer addition and subtraction circuits using unsigned, two's-complement, and excess notation; circuits to support multiplication using Robertson's and Booth's algorithms; circuits for implementing restoring and non-restoring division; squareroot circuits; floating-point arithmetic notation and circuits; memory and cache memory systems; segmentation and paging; input/output interfaces; interrupt processing; direct memory access; and several common peripheral devices, including analog-to-digital and digital-to-analog converters. A mini-project is required.
EN.525.642 FPGA Design using VHDL or prior knowledge of a hardware description language for FPGA design

EN.525.613. Fourier Techniques in Optics. 3 Credits.
In this course, the study of optics is presented from a perspective that uses the electrical engineer's background in Fourier analysis and linear systems theory. Topics include scalar diffraction theory, Fourier transforming and imaging properties of lenses, spatial frequency analysis of optical systems, spatial filtering and information processing, and holography. The class discusses applications of these concepts in non-destructive evaluation of materials and structures, remote sensing, and medical imaging. Prerequisite(s): An undergraduate background in Fourier analysis and linear systems theory.

EN.525.614. Probability & Stochastic Processes for Engineers. 3 Credits.
This course provides a foundation in the theory and applications of probability and stochastic processes and an understanding of the mathematical techniques relating to random processes in the areas of signal processing, detection, estimation, and communication. Topics include the axioms of probability, random variables, and distribution functions; functions and sequences of random variables; stochastic processes; and representations of random processes. Prerequisite(s): A working knowledge of multi-variable calculus, Fourier transforms, and linear systems theory.

EN.525.615. Embedded Microprocessor Systems. 3 Credits.
This course applies microprocessors as an integral element of system design. Techniques required for successful incorporation of microprocessor technology are studied and used. Hardware and software design considerations that affect product reliability, performance, and flexibility are covered. Students use hardware to gain familiarity with machine and assembly language for software generation, interfacing to a microprocessor at the hardware level, and emulation to check out system performance. Topics include security in embedded systems, case studies in system failures, embedded processors in the space environment, communications protocols, hardware/ software system tradeoffs, and SoC/FPGA designs. The course is based on the ARM architecture, and the student will do a series of development and interfacing labs. Prerequisite(s): Some experience in designing and building digital electronic systems, some familiarity with C programming, and a course in digital systems.

EN.525.616. Communication Systems Engineering. 3 Credits.
In this course, students receive an introduction to the principles, performance and applications of communication systems. Students examine analog modulation/demodulation systems (amplitude - AM, DSB & SSB; and angle - PM & FM) and digital modulation/demodulation systems (binary and M-ary) in noise and interference. Sub-topics include filtering, sampling, quantization, encoding and the comparison of coherent & noncoherent detection techniques to improve signal-to-noise ratio (SNR) and bit error rate (BER) performance. Special topics and/or problems will be assigned that provide knowledge of how communication systems work from a system engineering viewpoint in real-world environments. Prerequisite(s): A working knowledge of Fourier transforms, linear systems, and probability theory. Basic working knowledge of MATLAB.

EN.525.618. Antenna Systems. 3 Credits.
This course introduces and explains fundamental antenna concepts for both antennas and antenna arrays. Electromagnetic theory is reviewed and applied to antenna elements such as dipoles, loops, and aperture antennas, as well as antenna arrays. Antenna analysis is presented from a circuit theory point of view to highlight concepts such as reciprocity and the implications for transmit and receive radiation patterns. The importance of two-dimensional Fourier transforms is explained and applied to aperture antennas. Basic array constraints are examined through case studies of uniform, binomial, and general amplitude distributions. The concept of beam squint is explained through examination of constant-phase versus constant-time phase shifters. The Rotman lens is discussed as an example of a common beamformer. The class concludes with an explanation of antenna measurements.
EN.525.605 Intermediate Electromagnetics or EN.615.642 Electromagnetics or permission of the instructor.

EN.525.619. Introduction to Digital Image and Video Processing. 3 Credits.
This course provides an introduction to the basic concepts and techniques used in digital image and video processing. Two-dimensional sampling and quantization are studied, and the human visual system is reviewed. Edge detection and feature extraction algorithms are introduced for dimensionality reduction and feature classification. High-pass and bandpass spatial filters are studied for use in image enhancement. Applications are discussed in frame interpolation, filtering, coding, noise suppression, and video compression. Some attention will be given to object recognition and classification, texture analysis in remote sensing, and stereo machine vision.
EN.525.627 Digital Signal Processing.

EN.525.620. Electromagnetic Transmission Systems. 3 Credits.
This course examines transmission systems used to control the propagation of electromagnetic traveling waves with principal focus emphasizing microwave and millimeter-wave applications. The course reviews standard transmission line systems together with Maxwell's equations and uses them to establish basic system concepts such as reflection coefficient, characteristic impedance, input impedance, impedance matching, and standing wave ratio. Specific structures are analyzed and described in terms of these basic concepts, including coaxial, rectangular, and circular waveguides, surface waveguides, striplines, microstrips, coplanar waveguides, slotlines, and finlines. Actual transmission circuits are characterized using the concepts and analytical tools developed.
Knowledge of intermediate electromagnetics as covered in EN.525.605 Intermediate Electromagnetics.

EN.525.621. Introduction to Electronics and the Solid State. 3 Credits.
Fundamentals of solid state and device physics are presented. Topics in solid-state physics include crystal structure, lattice vibrations, dielectric and magnetic properties, band theory, and transport phenomena. Concepts in quantum and statistical mechanics are also included. Basic semiconductor device operation is described with emphasis on the p-n junction. Prerequisite(s): An undergraduate degree in electrical engineering or the equivalent.

EN.525.623. Principles of RF and Microwave Circuits. 3 Credits.
This course addresses foundational microwave circuit concepts and engineering fundamentals. Topics include electromagnetics leading to wave propagation and generation, the transmission line, and impedance/admittance transformation and matching. Mapping and transformation are presented in the development of the Smith Chart. The Smith Chart is used to perform passive microwave circuit design. Microwave networks and s-matrix are presented; Mason's rules is introduced. Circuits are physically designed using microstrip concepts, taking into consideration materials properties, connectors, and other components.
Students who have completed EN.525.674 are restricted from enrolling in EN.525.623

EN.525.624. Analog Electronic Circuit Design. 3 Credits.
This course examines the use of passive and active components to perform practical electronic functions. Simple circuits are designed and evaluated emphasizing the characteristics and tolerances of actual components. Devices studied include diodes and bipolar and field effect transistors. Circuit designs are studied in relation to the device characteristics, including small signal amplifiers and oscillators, and linear power supply and amplifier circuits. SPICE modeling is available to students. Prerequisite(s): Undergraduate courses in electricity and magnetism, circuit theory, and linear analysis.

EN.525.625. Laser Fundamentals. 3 Credits.
This course reviews electromagnetic theory and introduces the interaction of light and matter with an emphasis on laser theory. A fundamental background is established, necessary for advanced courses in optical engineering. Topics include Maxwell's equations, total power law, introduction to spectroscopy, classical oscillator model, Kramers-Kroenig relations, line broadening mechanisms, rate equations, laser pumping and population inversion, laser amplification, laser resonator design, and Gaussian beam propagation.
EN.525.605 Intermediate Electromagnetics or equivalent.

EN.525.626. Feedback Control in Biological Signaling Pathways. 3 Credits.
This course considers examples of the use of feedback control in engineering systems and looks for counterparts in biological signaling networks. To do this will require some knowledge of mathematical modeling techniques in biology, so a part of the course will be devoted to this.

EN.525.627. Digital Signal Processing. 3 Credits.
This course examines fundamental principles and applications of Digital Signal Processing. Introductory topics include linear, time-invariant systems, discrete-time convolution, and frequency-domain representations of discrete-time signals and systems. Sampling and quantization of continuous-time signals are covered. The Discrete Fourier Transform and efficient algorithms for its computation are studied in detail. The z-transform and its application to linear discrete-time systems analysis is studied. The design of digital filters using the windowing, equiripple, impulse invariance, and bilinear transformation methods is treated, along with the implementation of digital filter difference equations using canonical structures. MATLAB is utilized to demonstrate and implement Digital Signal Processing techniques.Prerequisite(s): A working knowledge of linear systems and Fourier analysis. Familiarity with MATLAB.

EN.525.628. Compressed Sensing and Sparse Recovery. 3 Credits.
In recent years, compressed sensing (CS) has attracted considerable attention in areas of applied mathematics, computer science, and electrical engineering by suggesting that it may be possible to surpass the traditional limits of sampling theory. CS builds upon the fundamental fact that we can represent many signals using only a few non-zero coe?cients in a suitable basis or dictionary. Optimization can then enable recovery of such signals from very few measurements. Beautiful theoretical results show that structured signals, such as sparse vectors and low-rank matrices, can be recovered from relatively small sets of linear observations. These results raise intriguing possibilities for addressing engineering problems in signal and image processing, and beyond. The goal of this course is to provide students with the theoretical understanding, algorithmic tools, and implementation experience needed to use these tools to solve problems in their own area of interest, or even to begin doing novel work in this area.

EN.525.629. Discrete-Time Control Systems. 3 Credits.
This course is the follow-on to Continuous Control Systems (EN.525.609) and presents a comprehensive introduction to the theory and design of discrete-time control systems. Representation, modeling, and analysis of discrete-time / sampled-data systems are first discussed. Then, the design of discrete-time control systems is introduced using both digital design emulation methods (e.g., emulating a continuous-time compensator via zero-pole mapping, hold equivalents, etc.) and direct design (z-transform) methods using root locus and frequency domain synthesis techniques (e.g., Bode, Nyquist). This "classical" approach to discrete-time control representation, analysis and synthesis is followed by a discussion of the "modern" approach which includes discrete-time state-space representation of dynamic systems, controllability, observability, similarity transforms, and pole placement via full state feedback methods. Sample rate selection, relevant hardware and software components, effects of quantization, and control wind-up are also discussed. In this course, each student must review the open literature for relevant (applications-based) discrete-time control publications, and then select, implement (in Matlab, or similar programming platform), and present a discrete-time control systems design project that reflects / emphasizes one or more of the key topics introduced in this course. MATLAB will be used in this course for all design and analysis topics; therefore, it is expected that students taking the course have reasonable familiarity with the Matlab environment.

EN.525.630. Digital Signal Processing Lab. 3 Credits.
This course builds on the theory of digital signal processing. Opportunities are provided to work on specific applications of digital signal processing involving filtering, deconvolution, spectral estimation, and a variety of other techniques. Students may also suggest their own laboratory topics. Laboratory work involves developing signal processing systems on a personal computer and using them with both real and simulated data. Questions related to hardware realizations are also considered.
EN.525.627 Digital Signal Processing.

EN.525.631. Adaptive Signal Processing. 3 Credits.
This course explores the use of adaptive filtering algorithms and structures to learn the optimal filter or estimator and track timevarying system dynamics in order to improve the performance over static, fixed filtering techniques. Adaptive systems are implemented as part of the coursework with application to digital communications, beamforming, control systems, and interference cancellation. The final project involves creating an adaptive equalizer for digital communications over a timevarying channel.
EN.525.627 Digital Signal Processing. Some knowledge of probability is helpful.

EN.525.634. High Speed Digital Design. 3 Credits.
This course will discuss the principles of signal integrity and its applications in the proper design of high-speed digital circuits. As interconnect data rates increase, phenomena that have historically been negligible begin to dominate performance, requiring techniques that were not previously necessary. This course is designed to give the students the theoretical and simulation tools needed to determine where signal integrity issues may arise, how to prevent such problems, and how to resolve problems when they arise in practice. A partial list of topics includes distributed circuits and lossless transmission lines, nonideal transmission line effects, crosstalk mitigation, differential pairs and modal analysis, I/O circuits and logic standards, and signal coding and waveshaping techniques. Prerequisite(s): Thorough knowledge of digital design and circuit theory. Prior coursework in electromagnetics and Laplace transforms will be helpful.

EN.525.636. Optics & Photonics Lab. 3 Credits.
The objective of this course is to develop laboratory skills in optics and photonics by performing detailed experimental measurements and comparing these measurements to theoretical models. Error analysis is used throughout to emphasize measurement accuracy. A partial list of topics include: geometric optics, optical properties of materials, diffraction, interference, polarization, non-linear optics, fiber optics, non-linear fiber optics, optical detectors (pin, APD, PMT), optical sources (lasers, blackbodies, LEDs), phase and amplitude modulators, lidar, fiberoptic communications, and IR radiometry. The specific experiments will depend on hardware availability and student interest.
EN.525.605 Intermediate Electromagnetics or equivalent or permission of the instructor.

EN.525.637. Foundations of Reinforcement Learning. 3 Credits.
The course will provide a rigorous treatment of reinforcement learning by building on the mathematical foundations laid by optimal control, dynamic programming, and machine learning. Topics include model-based methods such as deterministic and stochastic dynamic programming, LQR and LQG control, as well as model-free methods that are broadly identified as Reinforcement Learning. In particular, we will cover on and off-policy tabular methods such as Monte Carlo, Temporal Differences, n-step bootstrapping, as well as approximate solution methods, including on- and off-policy approximation, policy gradient methods, including Deep Q-Learning. The course has a final project where students are expected to formulate and solve a problem based on the techniques learned in class.

EN.525.638. Introduction to Wireless Technology. 3 Credits.
This course introduces students to the modern technology involved with commercial wireless communications systems such as digital cellular 3G, 4G, 5G, wireless local area networks(WLAN) and other communication systems. Various multiple access methods and signal formats are considered and analyzed in detail. Hardware, software and signal processing implementations of system components are presented and analyzed using Matlab in a software based lab environment. Modulation and demodulation architectures are introduced and modeled using computer-based tools. The adaptive signal processing systems at the heart of modern digital wireless systems are a significant and unique part of this course. Prerequisite(s): An undergraduate degree in electrical engineering or the equivalent. Experience with MATLAB will be helpful but is not required.

EN.525.640. Satellite Communications Systems. 3 Credits.
This course presents the fundamentals of satellite communications link design and an in-depth treatment of practical considerations. Existing commercial, civil, and military systems are described and analyzed, including direct broadcast satellites, high throughput satellites, VSAT links, and Earth-orbiting and deep space spacecraft. Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design. The impact of new technology on future systems in this dynamic field is discussed.

EN.525.641. Computer and Data Communication Networks I. 3 Credits.
This course provides a comprehensive overview of computer and data communication networks, with emphasis on analysis and modeling. Basic communications principles are reviewed as they pertain to communication networks. Networking principles covered include layered network architecture, data encoding, static and multiaccess channel allocation methods (for LAN and WAN), ARQ retransmission strategies, framing, routing strategies, transport protocols, and emerging highspeed networks.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.616 Communication Systems Engineering, or equivalents.

EN.525.642. FPGA Design Using VHDL. 3 Credits.
This lab-oriented course covers the design of digital systems using VHSIC Hardware Description Language (VHDL) and its implementation in Field Programmable Gate Arrays (FPGAs). This technology allows cost-effective unique system realizations by enabling design reuse and simplifying custom circuit design. The design tools are first introduced and used to implement basic circuits. More advanced designs follow, focusing on integrating the FPGA with external peripherals, simple signal processing applications, utilizing soft-core processors, and using intellectual property (IP) cores. Prerequisite(s): A solid understanding of digital logic fundamentals.

EN.525.643. Real Time Computer Vision. 3 Credits.
This course introduces students to key computer vision techniques for real-time applications. Students will learn to quickly build applications that enable computers to "see," and make decisions based on still images or video streams. Through regular assignments and in class laboratory exercises (students are advised to bring their own laptop to class), students will build real-time systems for performing tasks including object recognition and face detection and recognition. Key computer vision topics addressed in the course include human and machine vision: how does the brain recognize objects?, and what can we emulate?, camera models and camera calibration; edge, line and contour detection; optical flow and object tracking; machine learning techniques; image features and object recognition; stereo vision; 3D vision; face detection and face recognition. Students will be exposed to the mathematical tools that are most useful in the implementation of computer vision algorithms. Prerequisite(s): Python programming experience, and prior knowledge of linear algebra, geometry, and probability theory is desired.

EN.525.645. Modern Navigation Systems. 3 Credits.
This course explores the use of satellite, terrestrial, celestial, radio, magnetic, and inertial systems for the real-time determination of position, velocity, acceleration, and attitude. Particular emphasis is on the historical importance of navigation systems; avionics navigation systems for high performance aircraft; the Global Positioning System; the relationships between navigation, cartography, surveying, and astronomy; and emerging trends for integrating various navigation techniques into single, tightly coupled systems.

EN.525.646. DSP Hardware Lab. 3 Credits.
This course develops expertise and insight into the development of DSP processor solutions to practical engineering problems through hands-on experience. Structured exercises using DSP hardware are provided and used by the student to gain practical experience with basic DSP theory and operations. Course focus is on realtime, floating-point applications. This course is intended for engineers having EE or other technical backgrounds who desire to obtain practical experience and insight into the development of solutions to DSP problems requiring specialized DSP architectures.
EN.525.627 Digital Signal Processing and C programming experience.

EN.525.648. Introduction to Radar Systems. 3 Credits.
This class introduces the student to the fundamentals of radar system engineering. The radar range equation in its many forms is developed and applied to different situations. Radar transmitters, antennas, and receivers are covered. The concepts of matched filtering, pulse compression, and the radar ambiguity function are introduced, and the fundamentals of radar target detection in a noise background are discussed. Target radar cross-section models are addressed, as well as the effects of the operating environment, including propagation and clutter. MTI and pulsed Doppler processing and performance are addressed. Range, angle, and Doppler resolution/accuracy, as well as fundamental tracking concepts, will also be discussed.
EN.525.614 Probability and Stochastic Processes for Engineers, EN.525.627 Digital Signal Processing, a working knowledge of electromagnetics, and familiarity with MATLAB.

EN.525.651. Introduction to Electric Power Systems. 3 Credits.
This course introduces and explains fundamentals of electrical power systems design and engineering. Phasors and their application to power systems analysis are reviewed. The concept of the per-unit system is introduced and applied to circuit calculations. Transformers and their application to electrical power transmission and distribution systems will be covered. Transmission line parameters, their calculation, and transmission line modeling are introduced. Steady-state operation of transmission lines is modeled and investigated. Power flow analysis computational techniques are covered. Short-circuit analysis and the method of symmetrical components are introduced. The concept of power system protection and the role of automatic relays will be covered. Primary and secondary distribution systems and substations are introduced. Renewable energy generation and the integration of renewable energy into the modern power grid will be introduced. Prerequisite(s): Course in electrical networks and a course in linear algebra and matrix operations. MATLAB required software. Course Note(s): Matlab is required for this course.

EN.525.654. Communications Circuits Lab. 3 Credits.
This online laboratory-based course focuses on modulation/demodulation (MODEM) aspects of wireless communications systems. This course is designed to enhance the student's understanding of fundamental communications waveforms and to present methods commonly used to process them. Students will be exposed to various implementations of MODEM circuits used to process waveforms such as FM, FSK, PSK, and QAM. All work is performed remotely via Internet access to the remote laboratory facility located at the Johns Hopkins University. Following an introduction to this remote laboratory implementation, students will conduct a series of laboratory exercises designed to enhance their understanding of material presented in communications engineering courses. Course modules involve the characterization of waveforms and MODEM circuits through lecture, laboratory exercises, analysis, and online discussion. Materials required for this course include a broadband Internet connection, web browser, word processing software (e.g., MS Word or equivalent), and analysis software (e.g., MATLAB or equivalent) used to process and present data collected.
EN.525.616 Communication Systems Engineering or consent of the instructor.

EN.525.655. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.

EN.525.656. Antenna Design for Space Systems. 3 Credits.
This course presents an engineering approach to the design of antennas for space systems. Students will examine antennas for both large and small space based platforms in earth orbit and beyond. Antenna design is presented in the context of the space environment with particular attention to the flight design and testing cycle, thermal and mechanical considerations, space compatible materials, and high power operation. A primary focus of the course will be single, dual and shaped reflector designs including feed network topologies. Several horn antenna designs including corrugated and multimode horns will be covered as well as feed network components. A variety of other antennas including helices, patches, and arrays will be discussed for applications including: Global Navigation Satellite System (GNSS); Tracking, Telemetry and Command (TT&C); isoflux; smallsat and cubesat antennas. Course Note(s): This course is cross-listed with 675.756 Antenna Design for Space Systems. ECE students can only register for 525.656. Prerequisite(s): An undergraduate- or graduate-level introductory antenna systems course, or with approval of the instructor.

EN.525.658. Digital VLSI System Design. 3 Credits.
An introductory course in digital VLSI design in which students design digital CMOS integrated circuits and systems. The class covers transistor, behavioral, and physical level design using a variety of design tools, including circuit simulation with SPICE, logic synthesis with Verilog HDL, physical layout and automated placement and routing. The class culminates in a final project in which each student designs a more complicated digital system from architecture to final layout. Prerequisite(s): A course in digital design.

EN.525.659. Mixed-Mode VLSI Circuit Design. 3 Credits.
This course focuses on transistor-level design of mixed-signal CMOS integrated circuits. After reviewing fundamentals of MOSFET operation, the course will cover design of analog building blocks such as current-mirrors, bias references, amplifiers, and comparators, leading up to the design of digital-to-analog and analog-to-digital converters. Aspects of subthreshold operation, structured design, scalability, parallelism, low power-consumption, and robustness to process variations are discussed in the context of larger systems. The course will include use of Cadence design software to explore transistor operation and to perform functional-block designs, in the process of incrementally designing a data-converter front-end. Prerequisite(s): Familiarity with MOSFET and transistor level circuit design fundamentals.

EN.525.661. UAV Systems and Control. 3 Credits.
This hardware-supplemented course covers the guidance, navigation-and control principles common to many small fixed-wing and multirotor unmanned aerial vehicles (UAVs). Building on classical control systems and modeling theory, students will learn how to mathematically model UAV flight characteristics and sensors, develop and tune feedback control autopilot algorithms to enable stable flight control, and fuse sensor measurements using extended Kalman filter techniques to estimate the UAV position and orientation. Students will realize these concepts through both simulation and interaction with actual UAV hardware. Throughout the course, students will build a full 6-degree-of-freedom simulation of controlled UAV flight using MATLAB and Simulink. Furthermore, students will reinforce their UAV flight control knowledge by experimenting with tuning and flying actual open-source quadrotor UAVs. Prerequisite(s): Background in control systems (e.g., EN.525.609 Continuous Control Systems) and matrix theory along with a working knowledge of MATLAB. Experience using Simulink is desired. Existing familiarity with C programming language, electronics, and microcontrollers will be helpful but is not required.

EN.525.665. Machine Perception. 3 Credits.
This course will cover machine perception with a focus on computer vision (i.e., feature detection, stereovision, structure from motion, deep learning object detection) as the primary use case. Additional sensor modalities will be addressed (i.e., radar, lidar) along with data fusion (i.e., Kalman filtering, target tracking) in order to provide a broad understanding of multi-modality machine perception.

EN.525.666. Linear System Theory. 3 Credits.
This course covers the structure and properties of linear dynamic systems with an emphasis on the single-input, single-output case. Topics include the notion of state-space, state variable equations, review of matrix theory, linear vector spaces, eigenvalues and eigenvectors, the state transition matrix and solution of linear differential equations, internal and external system descriptions, properties of controllability and observability and their applications to minimal realizations, state-feedback controllers, asymptotic observers, and compensator design using state-space and transfer function methods. An introduction to multi-input, multi-output systems is also included, as well as the solution and properties of timevarying systems. Prerequisite(s): Courses in matrix theory and linear differential equations.

EN.525.670. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify, and retrieve information from different kinds of real world signals such as audio, speech, image, and video. EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers

EN.525.678. Next Generation Mobile Networks and Security with 5G. 3 Credits.
The primary focus of this course is to introduce the next generation mobile networks, including both Cellular and WLAN technologies in great detail, to discuss various types of IP-based mobility protocols, namely Mobile-IP, Mobile IPv6, ProxyMIPv6, SIP-mobility, and Cellular IP, and to explore systems optimization techniques to support seamless handover during Inter RAT handover (e.g., 4G, 5G, and WLAN). Additionally, the course will briefly introduce the principles of cellular communications system and will then move on to describe the evolution of different generations of cellular systems including 2G, 3G, 4G, and 5G as being defined in 3GPP. At the same time it will discuss IEEE WLAN standards as developed by IEEE 802 working group including 802.11 (a, b, g, n) and 802.11 (ax, ay, ac). The Media Independent Handover standard IEEE 802.21 (e.g., integrating WLAN and 3G/4G cellular networks to provide session/service continuity) is also introduced. Further, the course will describe the 4G Long Term Evolution (LTE) in detail, covering its various components—namely Evolved UMTS Terrestrial Radio Access Network (E-UTRAN), EPC (Evolved Packet Network), and IMS (IP Multimedia Subsystem)—and all the associated interfaces and protocols, and the current efforts on 5G evolution and will touch upon various 5G pillars, namely SDN (Software Defined Networking), Network Function Virtualization, Cloud RAN, Network Slicing, Mobile Edge Cloud, and Edge Security. Finally, the course will highlight various standards activities within 3GPP, IEEE, IETF, NGMN, and ITU and will introduce some research problems for future study in the mobility area, presenting various deployment use cases and experimental results from the open-source testbeds.

EN.525.684. Microwave Systems & Receiver Design. 3 Credits.
This course deals with the practical aspects of RF and microwave systems and components. An overview of radar systems is followed by an introduction to communication systems. The majority of the course treats the linear and nonlinear characteristics of individual components and their relation to receiver system performance. Amplifiers, mixers, antennas, filters, and frequency sources are studied, as well as their impact on receiver performance. Top-level receiver designs for a radar system, a wide-band surveillance system, or a communication system application may be studied. Assignments reinforce the course material and may require use of design software. Prerequisite(s): An undergraduate degree in electrical engineering or equivalent.

EN.525.691. Fundamentals of Photonics. 3 Credits.
This course provides the essential background in photonics required to understand modern photonic and fiber-optic systems. Fundamental concepts established in this course are necessary for advanced coursework as well. Topics include: electromagnetic optics, polarization and crystal optics, guided-wave optics, fiber optics, photons in semiconductors, semiconductor photon sources and detectors, electro-optics and acousto-optics. Prerequisite(s): An undergraduate course in electromagnetic theory.

EN.525.707. Error Control Coding. 3 Credits.
This course presents error-control coding with a view toward applying it as part of the overall design of a data communication or storage and retrieval system. Block, trellis, and turbo codes and associated decoding techniques are covered. Topics include system models, generator and parity check matrix representation of block codes, general decoding principles, cyclic codes, an introduction to abstract algebra and Galois fields, BCH and Reed-Solomon codes, analytical and graphical representation of convolutional codes, performance bounds, examples of good codes, Viterbi decoding, BCJR algorithm, turbo codes, and turbo code decoding.
Background in linear algebra, such as EN.625.609 Matrix Theory; in probability, such as EN.525.614 Probability and Stochastic Processes for Engineers; and in digital communications, such as EN.525.616 Communication Systems Engineering. Familiarity with MATLAB or similar programming capability.

EN.525.708. Iterative Methods in Communications Systems. 3 Credits.
Generalization of the iterative decoding techniques invented for turbo codes has led to the theory of factor graphs as a general model for receiver processing. This course will develop the general theory of factor graphs and explore several of its important applications. Illustrations of the descriptive power of this theory include the development of high performance decoding algorithms for classical and modern forward error correction codes (trellis codes, parallel concatenated codes, serially concatenated codes, low-density parity check codes). Additional applications include coded modulation systems in which the error correction coding and modulation are deeply intertwined as well as a new understanding of equalization techniques from the factor graph perspective.
Background in linear algebra, such as EN.625.609 Matrix Theory; in probability, such as EN.525.614 Probability and Stochastic Processes for Engineers; and in digital communications, such as EN.525.616 Communication Systems Engineering. Familiarity with MATLAB or similar programming capability.

EN.525.712. Advanced Computer Architecture. 3 Credits.
This course covers topics essential to modern superscalar processor design. A review of pipelined processor design and hierarchical memory design is followed by advanced topics including the identification of parallelism in processes; multiple diversified functional units in a pipelined processor; static, dynamic, and hybrid branch prediction techniques; the Tomasulo algorithm for efficient resolution of true data dependencies; advanced data flow techniques with and without speculative execution; multiprocessor systems; and multithreaded processors.
EN.525.612 Computer Architecture or equivalent.

EN.525.718. Multirate Signal Processing. 3 Credits.
Multirate signal processing techniques find applications in areas such as communication systems, signal compression, and sub-band signal processing. This course provides an in-depth treatment of both the theoretical and practical aspects of multirate signal processing. The course begins with a review of discrete-time systems and the design of digital filters. Sample rate conversion is covered, and efficient implementations using polyphase filters and cascade integrator comb (CIC) filters are considered. The latter part of the course treats filter bank theory and implementation, including quadrature mirror, conjugate quadrature, discrete Fourier transform, and cosine modulated filter banks along with their relationship to transmultiplexers.
EN.525.627 Digital Signal Processing or equivalent and working knowledge of MATLAB.

EN.525.721. Advanced Digital Signal Processing. 3 Credits.
The fundamentals of statistical signal processing are presented in this course. Topics include matrix factorizations and least squares filtering, optimal linear filter theory, classical and modern spectral estimation, adaptive filters, and optimal processing of spatial arrays.
EN.525.614 Probability and Stochastic Processes for Engineers, EN.525.627 Digital Signal Processing, linear algebra, and familiarity with a scientific programming language such as MATLAB.

EN.525.722. Wireless and Mobile Cellular Communications. 3 Credits.
In this course, students examine fundamental concepts of mobile cellular communications and specifics of current and proposed US cellular systems. Topics include frequency reuse; call processing; propagation loss; multipath fading and methods of reducing fades; error correction requirements and techniques; modulation methods; FDMA, TDMA, and CDMA techniques; microcell issues; mobile satellite systems; GSM, cdmaOne, GPRS, EDGE, cdma2000, W-CDMA, LTE and candidate 5G waveforms.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent and EN.525.616 Communication Systems Engineering.

EN.525.724. Introduction to Pattern Recognition. 3 Credits.
This course focuses on the underlying principles of pattern recognition and on the methods of machine intelligence used to develop and deploy pattern recognition applications in the real world. Emphasis is placed on the pattern recognition application development process, which includes problem identification, concept development, algorithm selection, system integration, and test and validation. Machine intelligence algorithms to be presented include feature extraction and selection, parametric and non-parametric pattern detection and classification, clustering, artificial neural networks, support vector machines, rule-based algorithms, fuzzy logic, genetic algorithms, and others. Case studies drawn from actual machine intelligence applications will be used to illustrate how methods such as pattern detection and classification, signal taxonomy, machine vision, anomaly detection, data mining, and data fusion are applied in realistic problem environments. Students will use the MATLAB programming language and the data from these case studies to build and test their own prototype solutions.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent. A course in digital signal or imageprocessing is recommended, such as EN.525.627 Digital Signal Processing, EN.525.619 Introduction to Digital Image and Video Processing, 525.643 Real-Time Computer Vision, or 525.746 Image Engineering.

EN.525.725. Power Electronics. 3 Credits.
This course is designed to provide students a solid foundation on the fundamentals and principles of power electronics. Analytical modeling and control techniques will be introduced in addition to practical design considerations for switching regulators. Topics include steady state analysis, large and small signal modeling, control loop design, input filter and magnetic design, along with switch realization and efficiency evaluation. Advanced topics such as soft switching and active power factor correction will also be introduced. Each topic will include an in-class modeling and simulation component, utilizing MATLAB/ Simulink, to reinforce concepts and provide the student with a practical design tool for evaluating compliance with typical performance requirements.
EN.525.624 Analog Electronic Circuit Design I or equivalent.

EN.525.726. Applications of Power Electronics Design. 3 Credits.
This course presents applications and practical considerations for the design of power electronic circuits, building on the fundamentals and principles covered in 525.725 Power Electronics. We will go through the step-by-step design and modeling of a synchronous buck converter including the power stage, small-signal model, controller, full simulation, component selection, and magnetics design. Additional topics covered include circuit board layout, peak current mode control, and practical methods of addressing common challenges in power supply circuits. Students gain hands-on experience through lab-based assignments and a design project. All required test equipment will be provided. Students are expected to have basic soldering skills and experience with electronic test equipment (DC power supplies, oscilloscopes, multimeters).

EN.525.728. Detection & Estimation Theory. 3 Credits.
Both hypothesis testing and estimation theory are covered. The course starts with a review of probability distributions, multivariate Gaussians, and the central limit theorem. Hypothesis testing areas include simple and composite hypotheses and binary and multiple hypotheses. In estimation theory, maximum likelihood estimates and Bayes estimates are discussed. Practical problems in radar and communications are used as examples throughout the course.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent.

EN.525.732. Advanced Analog Electronic Circuit Design. 3 Credits.
This course extends the fundamental concepts of practical electronic circuit design developed in the course 525.624 Analog Electronic Circuit Design, beginning with a review of the general feedback method. Students then examine a range of devices, including operational amplifiers, A/D and D/A converters, and comparators. Applications include active filters, sensor conditioning, nonlinear transfer functions, and analog computation. Students explore these topics through a series of assignments supplemented with breadboard-level experimentation. All required test equipment will be provided to the student.
EN.525.624 Analog Electronic Circuit Design or permission of the instructor.

EN.525.733. Deep Learning for Computer Vision. 3 Credits.
Recent technological advances coupled with increased data availability have opened the door for a wave of revolutionary research in the field of Deep Learning. In particular, Deep Neural Networks (DNNs) continue to improve on state-of-the-art performance in many standard computer vision tasks including image classification, segmentation, object recognition, object localization, and scene recognition. With an emphasis on computer vision, this course will explore deep learning methods and applications in depth as well as evaluation and testing methods. Topics discussed will include network architectures and design, training methods, and regularization strategies in the context of computer vision applications. Following a seminar format, students will be expected to read, understand, and present recent publications describing the current state-ofthe-art deep learning methods. Additionally, team projects will give students an opportunity to apply deep learning methods to real world problems.Prerequisite(s): Students should have taken courses in computer vision and machine learning/pattern recognition, have basic familiarity with OpenCV, Python and C++, as well as prior class instruction in neural networks.

EN.525.735. MIMO Wireless Communications. 3 Credits.
This course presents the fundamental concepts and techniques of multiple-input multiple-output (MIMO) communications over wireless communication channels. MIMO communications, which involve the use of multiple antennas at the transmitter and receiver, employ the use of signal processing techniques to enhance the reliability and capacity of communication systems without increasing the required spectral bandwidth. MIMO techniques are currently used or planned in many commercial and military communications systems. Topics include the derivation and application of the theoretical MIMO communications capacity formula; channel fading and multipath propagation; the concepts of transmit and receive space diversity; space-time block coding, with a special emphasis on Alamouti coding; space-time trellis coding; spatial multiplexing; and fundamentals of OFDM modulation and its relation to MIMO communications. Examples and applications will be presented as well as related MATLAB homework assignments.
EN.525.616 Communication Systems Engineering; EN.525.614 Probability and Stochastic Processes for Engineers, or the equivalent. In addition, a working knowledge of MATLAB is required.

EN.525.738. Advanced Antenna Systems. 3 Credits.
This course is designed to follow 525.618 Antenna Systems. Advanced techniques needed to analyze antenna systems are studied in detail. Fourier transforms are reviewed and applied to antenna theory and array distributions. The method of moments is studied and used to solve basic integral equations employing different basis functions. Green's functions for patch antennas are formulated in terms of Sommerfeld-like integrals. Techniques such as saddle-point integration are presented. Topics addressed include computational electromagnetics, Leaky and surface waves, mutual coupling, and Floquet modes. Students should be familiar with complex variables (contour integration), Fourier transforms, and electromagnetics from undergraduate studies.
EN.525.618 Antenna Systems.

EN.525.742. System-on-a-Chip FPGA Design Laboratory. 3 Credits.
This lab-oriented course will focus on the design of large-scale system-on-a-chip (SOC) solutions within field-programmable gate arrays (FPGAs). Modern FPGA densities and commercially available cores enable a single developer to design highly complex systems within a single FPGA. This class will provide the student with the ability to design and debug these inherently complex systems. Topics will include high-speed digital signal processing, embedded processor architectures, customization of soft-core processors, interfacing with audio and video sensors, communications interfaces, and networking. The optimum division of algorithms between hardware and software will be discussed, particularly the ability to accelerate software algorithms by building custom hardware. Many labs will center on a common architecture that includes signal processing algorithms in the FPGA fabric, controlled by an embedded processor that provides user interfaces and network communication. The first section of the course will be spent experimenting with different building blocks for constructing SOCs. Students will spend later class sessions working in teams on self-directed SOC design projects. Industry-standard tools will be used.
EN.525.642 FPGA Design Using VHDL and familiarity with C programming.

EN.525.743. Embedded Systems Development Lab. 3 Credits.
This project-based laboratory course involves the development of embedded system prototypes. Typical projects contain combinations of the following component types: transducers, analog front ends, micro-controllers and processors, FPGAs, digital signal processors, electrical interfaces, wired or wireless connectivity, printed circuit boards required for integration and test, and software/firmware modules needed to operate a designed system. The laboratory activity is a backdrop used to teach key aspects of the development process such as documentation, realistic use of requirements, design partition, integration strategy, interface design, risk mitigation, and design strategies to accommodate available resources. Students will select a project concept and then create an implementation plan that will define the semester's activity. Students may work independently or in teams to define, develop, test, and document their projects. Students are encouraged to select topics based on their interests and learning objectives. All projects are subject to instructor approval.
An undergraduate degree in electrical or computer engineering or computer science, EN.525.612 Computer Architecture, and working knowledge of C or C++ or instructor's approval.

EN.525.744. Passive Emitter Geo-Location. 3 Credits.
This course covers the algorithms used to locate a stationary RF signal source, such as a radar, radio, or cell phone. The topics covered include a review of vectors, matrices, and probability; linear estimation and Kalman filters; nonlinear estimation and extended Kalman filters; robust estimation; data association; measurement models for direction of arrival, time difference of arrival, and frequency difference of arrival; geo-location algorithms; and performance analysis. Most of the course material is developed in planar Cartesian coordinates for simplicity; however, the extension to WGS84 coordinates is provided to equip the students for practical applications. Homework consists of both analytical problems and problems that require computer simulation using software such as MATLAB.
EN.525.614 Probability and Stochastic Processes for Engineers, an undergraduate course in linear algebra/matrix theory, and familiarity with MATLAB.

EN.525.745. Applied Kalman Filtering. 3 Credits.
Theory, analysis, and practical design and implementation of Kalman filters are covered, along with example applications to real-world problems. Topics include a review of random processes and linear system theory; Kalman filter derivations; divergence analysis; numerically robust forms; suboptimal filters and error budget analysis; prediction and smoothing; cascaded, decentralized, and federated filters; linearized, extended, second-order, and adaptive filters; and case studies in GPS, inertial navigation, and ballistic missile tracking.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.666 Linear System Theory or equivalents; knowledge of MATLAB (or equivalent software package).

EN.525.746. Image Engineering. 3 Credits.
The overall goal of the course is to provide the student with a unified view of images, concentrating on image creation, and image processing. Optical, photographic, analog, and digital image systems are highlighted. Topics include image input, output, and processing devices; visual perception; video systems; and fundamentals of image enhancement and restoration. Coding, filtering, and transform techniques are covered, with applications to remote sensing and biomedical problems.
EN.525.627 Digital Signal Processing or equivalent and knowledge of linear systems.

EN.525.747. Speech Processing. 3 Credits.
This course emphasizes processing of the human speech waveform, primarily using digital techniques. Theory of speech production and speech perception as related to signals in time and frequency-domains is covered, as well as the measurement of model parameters, short-time Fourier spectrum, and linear predictor coefficients. Speech coding, recognition, speech synthesis, and speaker identification are discussed. Application areas include telecommunications telephony, Internet VOIP, and man-machine interfaces. Considerations for embedded realization of the speech processing system will be covered as time permits. Several application-oriented software projects will be required.
EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers. Background in linear algebra and MATLAB is helpful.

EN.525.748. Synthetic Aperture Radar. 3 Credits.
This course covers the basics of synthetic aperture radar (SAR) from a signal processing perspective. In particular, the course will examine why there are limiting design considerations for real aperture radar and how a synthetic aperture can overcome these limitations to create high-resolution radar imaging. Various SAR geometries will be considered. Image formation algorithms, such as range Doppler, chirp scaling, omega-K, polar formatting, and backprojection, will be reviewed and, in some cases, coded by the student. Other post-processing techniques, such as motion compensation, aperture weighting (or apodization), autofocus, and multilook, will be reviewed. Advanced topics will include interferometric SAR, polarimetry, continuous wave linear FM (CWLFM) SAR, and moving objects in SAR imagery. Students will work through problems involving radar and SAR processing. Students will also develop SAR simulations, in either MATLAB or Python, based on simple point scatterers in a benign background.
EN.525.648 Introduction to Radar Systems, along with either basic MATLAB or Python skills.

EN.525.751. Software Radio for Wireless Communications. 3 Credits.
Software-defined radio (SDR) has become a common approach to rapid prototyping and deployment of communications equipment. It allows engineers to quickly move from algorithm development to functional prototype, using small form-factor commercial hardware. This course will explore modern SDR technology and implementation techniques. Students will design and implement common radio functions using field-programmable gate arrays (FPGAs) and software frameworks. During the semester, we progress from hardware considerations and basic signal processing techniques to synchronization, digital modulation, and cognitive radio. We finish with a final semester project combining multiple cognitive radio concepts.
EN.525.638 Introduction to Wireless Technology or EN.525.616 Communication Systems Engineering; EN.525.627 Digital Signal Processing; and working knowledge of MATLAB and Simulink.

EN.525.752. Digital Receiver Synchronization Techniques. 3 Credits.
This course explores synchronization techniques in modern digital receivers. Synchronization techniques, from initial detection of a signal to symbol timing recovery, is studied in this course. Students will learn practical synchronization techniques through experimentation and hands-on development. Students develop software to solve synchronization problems relevant to modern wireless communication standards. A semester project involving demodulation and synchronization is required.
EN.525.627 Digital Signal Processing

EN.525.753. Laser Systems and Applications. 3 Credits.
This course provides a comprehensive treatment of the generation of laser light, and its properties and applications. Topics include specific laser systems and pumping mechanisms, nonlinear optics, temporal and spatial coherence, guided beams, interferometric and holographic measurements, and remote sensing.
EN.525.625 Laser Fundamentals.

EN.525.754. Wireless Communication Circuits. 3 Credits.
In this course, students examine modulator and demodulator circuits used in communication and radar systems. A combination of two lectures, three laboratory experiments, and a student design project address the analysis, design, fabrication, and test of common circuits. Signal formats considered include phase and frequency shift keying, as well as the linear modulations used in analog systems. The students will select a project topic of their choosing. The nature and extent of the project will be negotiated with the instructors. The project will consume about two-thirds of the semester and weighs in a similar proportion for the final grade. There are no exams in this course, it is a laboratory and project-based learning experience.
EN.525.616 Communication Systems Engineering or EN.525.624 Analog Electronic Circuit Design or EN.525.654 Communications Circuits Laboratory or permission of the instructor.

EN.525.756. Optical Propagation, Sensing, and Backgrounds. 3 Credits.
This course presents a unified perspective on optical propagation in linear media. A basic background is established using electromagnetic theory, spectroscopy, and quantum theory. Properties of the optical field and propagation media (gases, liquids, and solids) are developed, leading to basic expressions describing their interaction. The absorption line strength and shape and Rayleigh scattering are derived and applied to atmospheric transmission, optical window materials, and propagation in water-based liquids. A survey of experimental techniques and apparatus is also part of the course. Applications are presented for each type of medium, emphasizing remote sensing techniques and background noise. Computer codes such as LOWTRAN, FASCODE, and OPTIMATR are discussed. Prerequisite(s): Undergraduate courses on electromagnetic theory and elementary quantum mechanics. A course on Fourier optics is helpful.

EN.525.759. Image Compression, Packet Video, and Video Processing. 3 Credits.
This course provides an introduction to the basic concepts and techniques used for the compression of digital images and video. Video compression requirements, algorithm components, and ISO Standard video processing algorithms are studied. Image compression components that are used in video compression methods are also identified. Since image and video compression is now integrated in many commercial and experimental video processing methods, knowledge of the compression methods' effects on image and video quality are factors driving the usability of that data in many data exploitation activities. Topics to be covered include introduction to video systems, Fourier analysis of video signals, properties of the human visual system, motion estimation, basic video compression techniques, videocommunication standards, and error control in video communications. Video processing applications that rely on compression algorithms are also studied. A mini-project is required.
EN.525.627 Digital Signal Processing.

EN.525.761. Wireless and Wireline Network Integration. 3 Credits.
This course investigates the integration of wireless and wireline networks into seamless networks. The current telecommunications environment in the United States is first discussed, including the state of technology and regulations as they apply to the wireless and wireline hybrid environment. Then each type of these hybrid networks is discussed, including its components, network services, architecture, and possible evolution, as well as important concepts that support the evolution of networks. The integration of wired network advance intelligence, wireless network mobility, and long distance capabilities are shown to provide many new combinations of wired and wireless services to users.
EN.525.608 Next-Generation Telecommunications or EN.525.616 Communication Systems Engineering, or permission of instructor.

EN.525.762. Introduction to Wavelets. 3 Credits.
This is an introductory course on wavelet analysis, with an emphasis on the fundamental mathematical principles and basic algorithms. We cover the mathematics of signal (function) spaces, orthonormal bases, frames, time-frequency localization, the windowed Fourier transform, the continuous wavelet transform, discrete wavelets, orthogonal and biorthogonal wavelets of compact support, wavelet regularity, and wavelet packets. It is designed as a broad introduction to wavelets for engineers, mathematicians, and physicists.Prerequisite: Competence with multivariable calculus, linear algebra, and a scientific programming language is required, as well as familiarity with Fourier transforms and signal processing fundamentals such as the discrete Fourier transform, convolutions, and correlations.

EN.525.768. Wireless Networks. 3 Credits.
This is a hands-on course that integrates teaching of concepts in wireless LANs as well as offering students, in an integrated lab environment, the ability to conduct laboratory experiments and design projects that cover a broad spectrum of issues in wireless LANs. The course will describe the characteristics and operation of contemporary wireless network technologies such as the IEEE 802.11 and 802.11s wireless LANs and Bluetooth wireless PANs. Laboratory experiments and design projects include MANET routing protocols, infrastructure and MANET security, deploying hotspots, and intelligent wireless LANs. The course will also introduce tools and techniques to monitor, measure, and characterize the performance of wireless LANs as well as the use of network simulation tools to model and evaluate the performance of MANETs.
EN.525.641 Computer and Data Communication Networks or EN.605.671 Principles of Data Communications Networks.

EN.525.770. Intelligent Algorithms. 3 Credits.
Intelligent algorithms are, in many cases, practical alternative techniques for tackling and solving a variety of challenging engineering problems. For example, fuzzy control techniques can be used to construct nonlinear controllers via the use of heuristic information when information on the physical system is limited. Such heuristic information may come, for instance, from an operator who has acted as a “human-inthe-loop” controller for the process. This course investigates a number of concepts and techniques commonly referred to as intelligent algorithms; discusses the underlying theory of these methodologies when appropriate; and takes an engineering perspective and approach to the design, analysis, evaluation, and implementation of intelligent systems. Fuzzy systems, genetic algorithms, particle swarm and ant colony optimization techniques, and neural networks are the primary concepts discussed in this course, and several engineering applications are presented along the way. Expert (rule-based) systems are also discussed within the context of fuzzy systems. An intelligent algorithms research paper must be selected from the existing literature, implemented by the student, and presented as a final project. Prerequisite(s): Student familiarity of system-theoretic concepts is desirable.

EN.525.771. Propagation of Radio Waves in the Atmosphere. 3 Credits.
This course examines various propagation phenomena that influence transmission of radio frequency signals between two locations on earth and between satellite-earth terminals, with a focus on applications. Frequencies above 30 MHz are considered with emphasis on microwave and millimeter propagation. Topics include free space transmission, propagation, and reception; effects on waves traversing the ionosphere; and attenuation due to atmospheric gases, rain, and clouds. Brightness temperature concepts are discussed, and thermal noise introduced into the receiver system from receiver hardware and from atmospheric contributions are examined. Also described are reflection and diffraction effects by land terrain and ocean, multipath propagation, tropospheric refraction, propagation via surface and elevated ducts, scatter from fluctuations of the refractive index, and scattering due to rain. Atmospheric dynamics that contribute to the various types of propagation conditions in the troposphere are described. Prerequisite(s): An undergraduate degree in electrical engineering or equivalent.

EN.525.772. Fiber-Optic Communication Systems. 3 Credits.
This course investigates the basic aspects of fiber-optic communication systems. Topics include sources and receivers, optical fibers and their propagation characteristics, and optical fiber systems. The principles of operation and properties of optoelectronic components, as well as the signal guiding characteristics of glass fibers, are discussed. System design issues include terrestrial and submerged point-to-point optical links and fiber-optic networks.
EN.525.691 Fundamentals of Photonics.

EN.525.774. RF & Microwave Circuits I. 3 Credits.
In this course, students examine RF and microwave circuits appropriate for wireless communications and radar sensing. The course emphasizes the theoretical and experimental aspects of micro-strip design of highly integrated systems. Computer-aided design techniques are introduced and used for the analysis and design of circuits. Circuits are designed, fabricated, and tested, providing a technically stimulating environment in which to understand the foundational principles of circuit development. Couplers, modulators, mixers, and calibrated measurements techniques are also covered.
EN.525.623 Principles of Microwave Circuits or EN.525.620 Electromagnetic Transmission Systems.

EN.525.775. RF & Microwave Circuits II. 3 Credits.
This course builds upon the knowledge gained in 525.774 RF and Microwave Circuits I. Here there is a greater emphasis on designs involving active components. Linear and power amplifiers and oscillators are considered, as well as stability, gain, and their associated design circles. The course uses computer-aided design techniques and students fabricate and test circuits of their own design.
EN.525.774 RF and Microwave Circuits I.

EN.525.776. Information Theory. 3 Credits.
Information theory concerns the fundamental limits for data compressibility and the rate at which data may be reliably communicated over a noisy channel. Course topics include measures of information, entropy, mutual information, Markov chains, source coding theorem, data compression, noisy channel coding theorem, error-correcting codes, and bounds on the performance of communication systems. Classroom discussion and homework assignments will emphasize fundamental concepts, and advanced topics and practical applications (e.g., industry standards, gambling/finance, machine learning) will be explored in group and individual research projects.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent.

EN.525.777. Control System Design Methods. 3 Credits.
This course examines recent multivariable control system design methodologies and how the available techniques are synthesized to produce practical system designs. Both the underlying theories and the use of computational tools are covered. Topics include review of classical control system design and linear system theory, eigenstructure assignment, the linear quadratic regulator, the multivariable Nyquist criterion, singular value analysis, stability and performance robustness measures, loop transfer recovery, H-infinity design, and mu-synthesis. An introduction to nonlinear techniques includes sliding mode control and feedback linearization. Recent papers from the literature are discussed. Each student will be assigned a design project using PC-based design and analysis software.
EN.525.666 Linear System Theory and EN.525.609 Continuous Control Systems or the equivalent.

EN.525.778. Design for Reliability, Testability, and Quality Assurance. 3 Credits.
The design of reliable and testable systems, both analog and digital, is considered at the component, circuit, system, and network levels. Using numerous real-world examples, the trade-offs between redundancy, testability, complexity, and fault tolerance are explored. Although the emphasis is predominantly on electronics, related examples from the aerospace and software industries are included. The concepts of fault lists, collapsed fault lists, and other techniques for reducing the complexity of fault simulation are addressed. A quantitative relationship between information theory, error correction codes, and reliability is developed. Finally, the elements of a practical quality assurance system are presented. In addition to homework assignments, students will conduct an in-depth, quantitative case study of a practical system of personal interest.
EN.525.614 Probability and Stochastic Processes or equivalent.

EN.525.779. RF Integrated Circuits. 3 Credits.
This course covers the RFIC design process focusing on the RF/microwave portion of RFIC. An overview of digital circuits and digital signal processing will be given along with semi-conductor fabrication, device models, and RF/microwave design techniques using a typical SiGe process. Part of the course will involve student design projects using a CAD software to design amplifiers, mixers, etc.
EN.525.774 RF and Microwave Circuits I or equivalent.

EN.525.780. Multidimensional Digital Signal Processing. 3 Credits.
The fundamental concepts of multidimensional digital signal processing theory as well as several associated application areas are covered in this course. The course begins with an investigation of continuous-space signals and sampling theory in two or more dimensions. The multidimensional discrete Fourier transform is defined, and methods for its efficient calculation are discussed. The design and implementation of two-dimensional non-recursive linear filters are treated. The final part of the course examines the processing of signals carried by propagating waves. This section contains descriptions of computed tomography and related techniques and array signal processing. Several application oriented software projects are required.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.627 Digital Signal Processing or equivalents. Knowledge of linear algebra and MATLAB is helpful.

EN.525.783. Spread Spectrum Communications. 3 Credits.
This course presents an analysis of the performance and design of spread-spectrum communication systems. Both direct-sequence and frequency-hopping systems are studied. Topics include pseudonoise sequences, code synchronization, interference suppression, and the application of error-correcting codes. The use of code-division multiple access in digital cellular systems is examined. The relationships between spread spectrum, cryptographic, and error correction systems are explored. The mathematics of pseudo-random sequences used as spreading codes is compared with the mathematics of complex numbers with which students are already familiar.
EN.525.616 Communication Systems Engineering. Students should have knowledge of material covered in EN.525.201 Circuits, Devices, and Fields and EN.525.202 Signals and Systems.

EN.525.786. Human Robotics Interaction. 3 Credits.
This course provides an investigation of human-robot interaction and prosthetic control, with a focus on advanced man-machine interfaces including neural signal processing, electromyography, and motion tracking interfaces for controlling and receiving feedback from robotic devices. The course will also cover human physiology and anatomy, signal processing, intent determination, communications between the human and the device, haptic feedback, and telepresence. It is designed to be a hands-on course with class time spent in the dedicated robotics lab designing interfaces and performing experiments in a Virtual Integration Environment (VIE) and with robotic devices. Additional time in the lab, outside of class time, may be required to complete the course project. Programming for the class will be in MATLAB and Simulink.Prerequisite(s): Linear algebra, ordinary differential equations, and programming experience with Python or MATLAB

EN.525.787. Microwave Monolithic Integrated Circuit (MMIC) Design. 3 Credits.
This course is for advanced students who have a background in microwave circuit analysis and design techniques and are familiar with modern microwave computer-aided engineering tools. The course covers the monolithic implementation of microwave circuits on GaAs, or other III/V, substrates, including instruction on processing, masks, simulation, layout, design rule checking, packaging, and testing. The first part of the course includes information and assignments on the analysis and design of MMIC chips. The second part consists of projects in which a chip is designed, reviewed, and evaluated in an engineering environment, resulting in a design that would be ready for submission to a foundry for fabrication.
EN.525.775 RF and Microwave Circuits II.

EN.525.788. Power Microwave Monolithic Integrated Circuit (MMIC) Design. 3 Credits.
This course covers additional circuit design techniques applicable to MMICs (and microwave circuits in general). It is an extension of EN.525.774/775 RF and Microwave Circuits I and II and EN.525.787 Microwave Monolithic Integrated Circuit (MMIC) Design, although for students with a microwave background, these particular courses are not prerequisites. The topics covered include broadband matching, optimum loads for efficiency and low intermodulation products, odd mode oscillations, details of nonlinear modeling, time domain simulation of nonlinear circuits, and thermal effects. Students do need to have a background in microwave measurements and microwave CAD tools. No project is required, but there is structured homework involving power MMIC design completed by the student using a foundry library.
EN.525.744 RF Microwave Circuits I

EN.525.789. Advanced Satellite Communications. 3 Credits.
This course covers advanced topics in satellite communications systems, including investigations of electromagnetics, quantum physics, relativity, orbital mechanics, information theory, and hardware design relevant to practical system design and analysis. Satellite and ground station antennae, including wire, helical, and loop antennae, parabolic dishes, and multiple spot beam phased arrays, are considered from first principles. Electromagnetic wave propagation models that include reflection, polarization, diffraction, refraction, and ionospheric effects are studied as functions of frequency, including at millimeter and x-ray wavelengths. Modulation, coding, multiplexing, channel capacity, filtering, noise, and error correction, for both analog and digital systems, are treated, enabling accurate analyses at higher frequencies for which convention models may fail. The effects of special and general relativity on Doppler shifts and on-orbit clock errors are introduced. Kepler's laws are derived from first principles and used to build a simple, spreadsheet-based orbital mechanics propagator to model link budget and mission designs from low earth orbit to interplanetary space. Using GPS as a case study, it is shown how each of the above topics plays a critical role in the overall design of a complete satellite system. Course materials are augmented by in-class demonstrations, including component level designs to real-time observation of GPS and geostationary satellites using a portable satcom antenna.
EN.525.616 Communication Systems Engineering and EN.525.640 Satellite Communications Systems. Students should have knowledge of material covered in EN.525.201 Circuits, Devices, and Fields and EN.525.202 Signals and Systems.

EN.525.790. RF Power Amplifier Design Techniques. 3 Credits.
This course addresses foundational power amplifier circuit concepts and engineering fundamentals. The design of high power/high efficiency amplifiers that satisfy specific system requirements (bandwidth, linearity, spectral mask, etc.) are covered. Various device technologies (GaAs, GaN, LDMOS, SiGe), device scaling and modeling, optimum load calculations, amplifier classes (A, B, AB, C, E, F, etc.), waveform engineering, modulation techniques, efficiency enhancement, odd/even mode stability analysis, linearization techniques, power combining, reliability, lifetime calculation, and packaging are studied. The concepts are explored theoretically, and practically using numerous design exercises. This course stresses hands-on design techniques and practical considerations for real-world situations and applications.
EN.525.623 Principles of Microwave Circuits or EN.525.620 Electromagnetic Transmission Systems.

EN.525.791. Microwave Communications Lab. 3 Credits.
Concepts involving the design and fabrication of microwave subsystems are introduced in this laboratory course, including image rejection mixers, local oscillators, phase locked loops, and microstrip filters. A communication project is required, such as design and fabrication of an L-band WEFAX (weather facsimile) receiver or a C-band AMSAT (amateur communications satellite) converter. Modern microwave analyzing instruments are used by the students to evaluate the performance of the project subsystems.
EN.525.774 RF and Microwave Circuits l.

EN.525.793. Advanced Communication Systems. 3 Credits.
This course provides a basic introduction to the various building blocks of a modern digital communications system, focusing on the physical layer (PHY). We will first review basic concepts in digital communications, including Shannon theory, Nyquist sampling theory, optimal detection under Gaussian white noise, and basic modulations. We will then treat several building blocks of a digital receiver, including time and frequency synchronization, adaptive equalization and precoding, and error-correction coding/decoding. We will also introduce some advanced communication technologies such as Orthogonal Frequency-Division Multiplexing (OFDM) and Multiple-Input Multiple-Output (MIMO). Finally we will apply the knowledge to some practical wireless and wired systems.
EN.525.614 Probability and Stochastic Processes for Engineers; EN.525.616 Communication Systems Engineering.

EN.525.796. Introduction to High-Speed Optoelectronics. 3 Credits.
This course provides the student with the fundamental concepts needed to address issues in both the design and test of high-speed optoelectronic systems. This is an emerging field where photonics is combined with high-speed electronics to generate, transmit, and process signals from microwave to terahertz frequencies. The purpose of this course is to introduce fundamental principles and state-of-the-art system applications. Topics include photonic and high-speed electronic principles, analog fiber optic link, principles of low-phase noise microwave sources, photonic methods for generating low-phase noise microwave signals, photonicbased RF signal processing techniques, and ultra-short optical pulse generation techniques. State-of-the-art applications include the low-phase noise opto-electronic oscillator, carrier envelope phase locked laser for time and frequency standards, photonic-based complex radar signal generators, phased-array antenna architectures including true time-delay beam forming and the ALMA radio-telescope array, photonic analog-to-digital converter techniques, electro-optic sampling, and Terahertz signal generation. Prerequisite(s): Bachelor's degree in electrical engineering or physics. An undergraduate course in electromagnetics is required. A course in microwave theory is preferred.

EN.525.797. Advanced Fiber Optic Laboratory. 3 Credits.
The purpose of this laboratory course is to expose students to state-of-the-art applications of fiber optic technologies that include continuous-wave (cw) and pulsed fiber lasers, high-speed digital fiber optic communication systems, microwave photonic links, and non-linear fiber optic signal processing and sensors. The first part of the course will focus on a thorough characterization of fiber laser systems starting with the erbium-doped fiber amplifier and implementing different laser configurations that include multi-mode cw operation, Q-switching and relaxation oscillations, non-linear based mode-locking and single longitudinal mode operation. All of the measurements will be compared to theoretical models. This will provide students with hands-on experience with concepts that are applicable to all laser systems. In the latter part of the course, students will select a few topics that demonstrate both modern fiber optic systems based on cw lasers, external electro-optic modulators and high-speed photodetectors and applications of nonlinear fiber optics using self-phase modulation, stimulated Brillouin scattering, stimulated Raman scattering, and four wave mixing. These topics highlight the breadth of applications of modern fiber optic systems. Again, all of the experiments will be compared to theoretical models.
EN.525.691 Fundamentals of Photonics or EN.615.751 Modern Optics or equivalent.

EN.525.801. Special Project I. 3 Credits.
In individual cases, special arrangements can be made to carry out a project of significant scope in lieu of a formal course. Students should be in the second half of their graduate studies. Further information is available from the program chair. Such arrangements are made relatively infrequently. This course number should be used for the first registration of a student in any special project. Course Note(s): To ensure consideration for any term, project proposals should reach the program chair by the end of the registration period.

EN.525.802. Special Project II. 3 Credits.
This course number should be used for the second registration of a student in any special project. (See course EN.525.801 Special Project I for a further description.) Course Note(s): To ensure consideration for any term, project proposals should reach the program chair by the end of the registration period.

EN.525.803. Electrical and Computer Engineering Thesis. 3 Credits.
First of two-course sequence designed for students in the electrical and computer engineering graduate program who wish to undertake a thesis project after completing all other requirements for their degree. Students work with an advisor to conduct independent research and development in Electrical and Computer Engineering (ECE) leading to a written thesis and oral presentation to a thesis committee. The intent of the research may be to advance the body of knowledge in one of the technology areas in the ECE program. Prerequisite(s): Completion of all other courses applicable to the ECE graduate degree and approval of the ECE program chair and vice chair. The thesis option is appropriate for highly motivated students with strong academic records.

EN.525.804. Electrical and Computer Engineering Thesis. 3 Credits.
Second of two-course sequence designed for students in the electrical and computer engineering graduate program who wish to undertake a thesis project after completing all other requirements for their degree. Students work with an advisor to conduct independent research and development in Electrical and Computer Engineering (ECE) leading to a written thesis and oral presentation to a thesis committee. The intent of the research may be to advance the body of knowledge in one of the technology areas in the ECE program. Prerequisite(s): Completion of all other courses applicable to the ECE graduate degree and approval of the ECE program chair and vice chair. The thesis option is appropriate for highly motivated students with strong academic records.

Electrical and Computer Engineering, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses but not necessarily interested in pursuing a full master's degree are eligible for the Graduate Certificate in Electrical and Computer Engineering. Applicants are required to meet the same requirements for admission (p. 1509) as the master's degree.

If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit. The student must declare their intention prior to completing the certificate.

Program Requirements

Four courses must be completed within five years. At least three of the four courses must be from the Electrical and Computer Engineering (EN.525.xxx) program or the Department of Electrical and Computer Engineering (EN.520.xxx) in the full-time program. Students are allowed to take one elective. Only grades of B– or above can count toward the graduate certificate. All course selections outside of Electrical and Computer Engineering program requirements are subject to advisor approval.

Electrical and Computer Engineering, Master of Science

Concentrations are offered in Communications and Networking as well as Photonics. A Concentration can be selected but is not required.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414). Applicants are expected to hold a degree in electrical and/or computer engineering issued by a program accredited by the Engineering Accreditation Commission (EAC) of ABET, http://www.abet.org, in order to be admitted to the Master of Science in Electrical and Computer Engineering program. Those who majored in a related science or engineering field may also be accepted as candidates, provided their background is judged by the admissions committee to be equivalent to that stated above. Applicants' prior education should include the following prerequisites:

1. mathematics through vector calculus and differential equations,
2. calculus-based physics,

3. linear and non-linear circuits,
4. electromagnetics, and
5. signals and systems

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites beyond calculus are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Exceptions to these requirements can be made by the program chair or admissions committee.

Program Requirements

Ten courses must be completed within five years. At least seven of the ten courses must be from the Electrical and Computer Engineering program (EN.525.xxx) or the Department of Electrical and Computer Engineering (EN.520.xxx) in the full-time program, and at least four of the ten required courses must be at the 700-level or above. Approved transfer courses count as 600-level courses.

At most, three of the ten courses required for the MS degree may be selected from outside the program, subject to advisor approval. Students who take an elective outside of the program typically select from the Applied and Computational Mathematics (EN.625.xxx), Applied Physics (EN.615.xxx), and Computer Science (EN.605.xxx) programs.

Limited opportunity is available for replacement of coursework by appropriate project work (EN.525.801 Special Project I and EN.525.802 Special Project II) or through a graduate thesis (EN.525.803 Electrical and Computer Engineering Thesis and EN.525.804 Electrical and Computer Engineering Thesis). Note that EN.615.641 Mathematical Methods for Physics and Engineering, EN.615.642 Electromagnetics, EN.615.780 Optical Detectors & Applications, and EN.625.743 Stochastic Optimization & Control are counted as Electrical and Computer Engineering courses rather than electives. Only one C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Electrical and Computer Engineering program requirements are subject to advisor approval.

Concentrations

A concentration or focus area is not required for this program.

Communications and Networking

Ten courses must be completed within five years. Of the minimum of seven Electrical and Computer Engineering courses, at least five must be Communications and Networking courses. Of the maximum of three electives, at least two must be Computer Science Communications and Networking courses. Only one C-range grade (C+, C, or C–) can count toward the master's degree.

Concentrations are noted on the student's transcript.

Photonics

Ten courses must be completed within five years. The curriculum consists of four photonics core courses and three additional photonics courses, with the three remaining courses selected to fulfill the MS degree requirements. Only one C-range grade (C+, C, or C–) can count toward the master's degree.

Concentrations are noted on the student's transcript.

Courses

Code	Title	Credits
Prerequisite Courses [1]		
EN.525.201	Circuits, Devices and Fields	3
EN.525.202	Signals and Systems	3
Focus Areas (A Focus Area can be selected)		
Communications and Networking (p. 1510)		
Computer Engineering (p. 1511)		
Electronics and the Solid State (p. 1511)		
Optics and Photonics (p. 1511)		
RF and Microwave Engineering (p. 1511)		
Signal Processing (p. 1511)		
Systems and Controls (p.)		
Concentrations (A Concentration can be selected)		
Communications & Networking (p. 1512)		
Photonics (p. 1513)		

1 Applicants whose prior education does not include the prerequisites listed under Admission Requirements (p. 1509) may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.

Focus Areas

The focus areas offered represent technology groupings that are relevant for students with interests in the selected areas. Students are not required to choose a focus area to follow. They only serve as an aid to students in planning their course schedules. They do not appear as official designations on a student's transcript or diploma.

Communications and Networking

Code	Title	Credits
EN.525.605	Intermediate Electromagnetics	3
EN.525.608	Next Generation Telecommunications	3
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.616	Communication Systems Engineering	3
EN.525.618	Antenna Systems	3
EN.525.620	Electromagnetic Transmission Systems	3
EN.525.627	Digital Signal Processing	3
EN.525.638	Introduction to Wireless Technology	3
EN.525.640	Satellite Communications Systems	3
EN.525.641	Computer and Data Communication Networks I	3
EN.525.654	Communications Circuits Lab	3
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.525.707	Error Control Coding	3
EN.525.708	Iterative Methods in Communications Systems	3
EN.525.722	Wireless and Mobile Cellular Communications	3
EN.525.735	MIMO Wireless Communications	3

EN.525.738	Advanced Antenna Systems	3
EN.525.747	Speech Processing	3
EN.525.751	Software Radio for Wireless Communications	3
EN.525.752	Digital Receiver Synchronization Techniques	3
EN.525.754	Wireless Communication Circuits	3
EN.525.759	Image Compression, Packet Video, and Video Processing	3
EN.525.761	Wireless and Wireline Network Integration	3
EN.525.768	Wireless Networks	3
EN.525.771	Propagation of Radio Waves in the Atmosphere	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.776	Information Theory	3
EN.525.783	Spread Spectrum Communications	3
EN.525.789	Advanced Satellite Communications	3
EN.525.791	Microwave Communications Lab	3
EN.525.793	Advanced Communication Systems	3

Computer Engineering

Code	Title	Credits
EN.525.610	Microprocessors for Robotic Systems	3
EN.525.612	Computer Architecture	3
EN.525.615	Embedded Microprocessor Systems	3
EN.525.634	High Speed Digital Design	3
EN.525.641	Computer and Data Communication Networks I	3
EN.525.642	FPGA Design Using VHDL	3
EN.525.712	Advanced Computer Architecture	3
EN.525.742	System-on-a-Chip FPGA Design Laboratory	3
EN.525.743	Embedded Systems Development Lab	3
EN.525.778	Design for Reliability, Testability, and Quality Assurance	3
EN.525.786	Human Robotics Interaction	3

Electronics and the Solid State

Code	Title	Credits
EN.525.606	Electronic Materials	3
EN.525.607	Intro to Electronic Packaging	3
EN.525.621	Introduction to Electronics and the Solid State	3
EN.525.623	Principles of RF and Microwave Circuits	3
EN.525.624	Analog Electronic Circuit Design	3
EN.525.651	Introduction to Electric Power Systems	3
EN.525.654	Communications Circuits Lab	3
EN.525.658	Digital VLSI System Design	3
EN.525.659	Mixed-Mode VLSI Circuit Design	3
EN.525.725	Power Electronics	3
EN.525.732	Advanced Analog Electronic Circuit Design	3
EN.525.754	Wireless Communication Circuits	3
EN.525.774	RF & Microwave Circuits I	3
EN.525.775	RF & Microwave Circuits II	3
EN.525.779	RF Integrated Circuits	3
EN.525.787	Microwave Monolithic Integrated Circuit (MMIC) Design	3
EN.525.788	Power Microwave Monolithic Integrated Circuit (MMIC) Design	3
EN.525.791	Microwave Communications Lab	3

Optics and Photonics

Code	Title	Credits
EN.525.603	Advanced Topics in Optical Medical Imaging	3
EN.525.613	Fourier Techniques in Optics	3
EN.525.625	Laser Fundamentals	3
EN.525.636	Optics & Photonics Lab	3
EN.525.691	Fundamentals of Photonics	3
EN.525.753	Laser Systems and Applications	3
EN.525.756	Optical Propagation, Sensing, and Backgrounds	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.796	Introduction to High-Speed Optoelectronics	3
EN.525.797	Advanced Fiber Optic Laboratory	3

RF and Microwave Engineering

Code	Title	Credits
EN.525.605	Intermediate Electromagnetics	3
EN.525.618	Antenna Systems	3
EN.525.620	Electromagnetic Transmission Systems	3
EN.525.623	Principles of RF and Microwave Circuits	3
EN.525.648	Introduction to Radar Systems	3
EN.525.654	Communications Circuits Lab	3
EN.525.684	Microwave Systems & Receiver Design	3
EN.525.738	Advanced Antenna Systems	3
EN.525.754	Wireless Communication Circuits	3
EN.525.771	Propagation of Radio Waves in the Atmosphere	3
EN.525.774	RF & Microwave Circuits I	3
EN.525.775	RF & Microwave Circuits II	3
EN.525.779	RF Integrated Circuits	3
EN.525.787	Microwave Monolithic Integrated Circuit (MMIC) Design	3
EN.525.788	Power Microwave Monolithic Integrated Circuit (MMIC) Design	3
EN.525.790	RF Power Amplifier Design Techniques	3
EN.525.791	Microwave Communications Lab	3
EN.615.642	Electromagnetics	3

Signal Processing

Code	Title	Credits
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.619	Introduction to Digital Image and Video Processing	3
EN.525.627	Digital Signal Processing	3
EN.525.630	Digital Signal Processing Lab	3
EN.525.631	Adaptive Signal Processing	3
EN.525.638	Introduction to Wireless Technology	3
EN.525.643	Real Time Computer Vision	3
EN.525.646	DSP Hardware Lab	3
EN.525.648	Introduction to Radar Systems	3
EN.525.655	Audio Signal Processing	3
EN.525.670	Machine Learning for Signal Processing	3

EN.525.718	Multirate Signal Processing	3
EN.525.721	Advanced Digital Signal Processing	3
EN.525.724	Introduction to Pattern Recognition	3
EN.525.728	Detection & Estimation Theory	3
EN.525.733	Deep Learning for Computer Vision	3
EN.525.735	MIMO Wireless Communications	3
EN.525.744	Passive Emitter Geo-Location	3
EN.525.745	Applied Kalman Filtering	3
EN.525.746	Image Engineering	3
EN.525.747	Speech Processing	3
EN.525.748	Synthetic Aperture Radar	3
EN.525.751	Software Radio for Wireless Communications	3
EN.525.759	Image Compression, Packet Video, and Video Processing	3
EN.525.762	Introduction to Wavelets	3
EN.525.780	Multidimensional Digital Signal Processing	3
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.609	Matrix Theory	3
EN.625.620	Mathematical Methods for Signal Processing	3
EN.625.710	Fourier Analysis with Applications to Signal Processing and Differential Equations	3

Systems and Controls

Code	Title	Credits
EN.525.626	Feedback Control in Biological Signaling Pathways	3
EN.520.633	Intro To Robust Control	3
EN.520.636	Feedback Control in Biological Signaling Pathways	3
EN.525.637	Foundations of Reinforcement Learning	3
EN.525.609	Continuous Control Systems	3
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.645	Modern Navigation Systems	3
EN.525.661	UAV Systems and Control	3
EN.525.666	Linear System Theory	3
EN.525.744	Passive Emitter Geo-Location	3
EN.525.745	Applied Kalman Filtering	3
EN.525.770	Intelligent Algorithms	3
EN.525.777	Control System Design Methods	3
EN.535.645	Digital Control and Systems Applications	3
EN.535.726	Robot Control	3
EN.605.613	Introduction to Robotics	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.625.615	Introduction to Optimization	3
EN.625.695	Time Series Analysis	3
EN.625.714	Introductory Stochastic Differential Equations with Applications	3
EN.625.743	Stochastic Optimization & Control	3
EN.695.615	Cyber Physical Systems Security	3

Special Project/Thesis Courses

Code	Title	Credits
EN.525.801	Special Project I	3
EN.525.802	Special Project II	3
EN.525.803	Electrical and Computer Engineering Thesis	3
EN.525.804	Electrical and Computer Engineering Thesis	3

Courses by Concentration

Communications and Networking

Code	Title	Credits
Select five of the following:		
EN.525.608	Next Generation Telecommunications	3
EN.525.614	Probability & Stochastic Processes for Engineers	3
EN.525.616	Communication Systems Engineering	3
EN.525.618	Antenna Systems	3
EN.525.620	Electromagnetic Transmission Systems	3
EN.525.638	Introduction to Wireless Technology	3
EN.525.640	Satellite Communications Systems	3
EN.525.641	Computer and Data Communication Networks I	3
EN.525.654	Communications Circuits Lab	3
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.525.707	Error Control Coding	3
EN.525.708	Iterative Methods in Communications Systems	3
EN.525.722	Wireless and Mobile Cellular Communications	3
EN.525.735	MIMO Wireless Communications	3
EN.525.738	Advanced Antenna Systems	3
EN.525.747	Speech Processing	3
EN.525.751	Software Radio for Wireless Communications	3
EN.525.754	Wireless Communication Circuits	3
EN.525.759	Image Compression, Packet Video, and Video Processing	3
EN.525.761	Wireless and Wireline Network Integration	3
EN.525.768	Wireless Networks	3
EN.525.771	Propagation of Radio Waves in the Atmosphere	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.776	Information Theory	3
EN.525.783	Spread Spectrum Communications	3
EN.525.789	Advanced Satellite Communications	3
EN.525.791	Microwave Communications Lab	3
EN.525.793	Advanced Communication Systems	3
Select two of the following:		
EN.605.671	Principles of Data Communications Networks	3
EN.605.674	Network Programming	3
EN.605.675	Protocol Design	3
EN.605.677	Internetworking with TCP/IP I	3
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.605.772	Network Security Management	3
EN.605.776	Fourth Generation Wireless Communications: WiMAX and LTE	3
EN.605.777	Internetworking with TCP/IP II	3
EN.695.622	Web Security	3

EN.695.641	Cryptology	3
EN.695.721	Network Security	3

Photonics

Code	Title	Credits
Core Courses [1]		
EN.525.613	Fourier Techniques in Optics	3
EN.525.625	Laser Fundamentals	3
EN.525.691	Fundamentals of Photonics	3
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.654	Quantum Mechanics	3
EN.615.671	Principles Of Optics	3
Electives		
Select three of the following: [2]		
EN.525.603	Advanced Topics in Optical Medical Imaging	3
EN.525.636	Optics & Photonics Lab	3
EN.525.753	Laser Systems and Applications	3
EN.525.756	Optical Propagation, Sensing, and Backgrounds	3
EN.525.772	Fiber-Optic Communication Systems	3
EN.525.796	Introduction to High-Speed Optoelectronics	3
EN.525.797	Advanced Fiber Optic Laboratory	3
EN.585.734	Biophotonics	3
EN.615.751	Modern Optics	3
EN.615.778	Optical System Design and Modelling	3
EN.615.780	Optical Detectors & Applications	3
EN.615.781	Quantum Information Processing	3
EN.615.782	Optics and Matlab	3

[1] Only one 615.XXX course is required.
[2] EN.525.801 Special Project I and EN.525.802 Special Project II courses can also be used to allow students to pursue specialized interests in optics.

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Electrical and Computer Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Electrical and Computer Engineering.

Program Requirements

Five courses must be completed within five years. At least four of the five courses must be from the Electrical and Computer Engineering (EN.525.xxx) program or the Department of Electrical and Computer Engineering (EN.520.xxx) in the full-time program and at least two of the four required Electrical and Computer Engineering courses must be 700-level. Students are allowed to take one elective. Only grades of B– or above can count toward the post-master's certificate. All course selections outside of Electrical and Computer Engineering program requirements are subject to advisor approval.

Engineering Management

The part-time Engineering Management program prepares ethically grounded, technically competent professional leaders with the technical, managerial, and leadership skills to produce innovative solutions to technical organizations' challenges. While management courses serve as the core of the program at Johns Hopkins Engineering for Professionals, students work within specialty tracks that span various engineering disciplines or within a technical leadership track. The tracks provide for graduate-level work giving students a unique opportunity to mix their chosen track with engineering management perspectives. For students pursuing a career in the systems acquisition, systems development, or a production domain as a project manager, program manager, or aspirations for general management, the Technical Leadership track is oriented for you. For the functional manager who wants to further develop a mix of management and technical skills, the specialty tracks advance technical skills in your chosen area while enhancing your ability to manage and supervise technical personnel. The curriculum provides a unique opportunity to build both technical and leadership skills in order to contribute to a multi-disciplinary engineering management team. Instructors are experienced technical leaders and executives who discuss real-world challenges in formats that are convenient for professionals working at the nation's top engineering firms and R&D organizations.

Tracks offered: Applied Biomedical Engineering; Applied and Computational Mathematics; Applied Physics; Civil Engineering; Computer Science; Cybersecurity; Data Science; Electrical and Computer Engineering; Healthcare Systems Engineering; Information Systems Engineering; Materials Science and Engineering; Mechanical Engineering; Structural Engineering; Space Systems Engineering; Systems Engineering; and Technical Leadership.

Courses are offered primarily in the distant learning environment. A few courses are available in person at the Applied Physics Laboratory.

Engineering Management Program Committee

Dr. Tim Galpin
Program Chair
JHU Whiting School of Engineering

Rick Blank
Program Manager
JHU Whiting School of Engineering

Ann Kedia
Principal Professional Staff
JHU Applied Physics Laboratory

Dan Regan
Director, Federal Healthcare Business Development
CACI International, Inc.

Dr. Pamela Sheff
Director, Master of Science in Engineering Management Program
JHU Whiting School of Engineering

Stas Tarchalski

Director, IBM (retired)

Programs

- Engineering Management, Master of Engineering Management (p. 1517)

Courses

EN.595.660. Planning and Managing Projects. 3 Credits.
This course concentrates on the general methodology of managing a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the project manager. Topics include career aspects of project management; business factors affecting the project and the manager; project organization, planning, execution, and communications; project life cycle; risk analysis; interface management; design review; design control assessment; reporting; and reaction to critical problems. Students are formed into groups, presented with a scenario that simulates the development of a high-technology system, and assigned to make decisions required of the project manager in the execution of the project. The project manager's decisions must then be effectively communicated (and perhaps defended) to a variety of audiences (represented by other students and faculty) that include top management, the customer, functional management, and members of the project team. Course Note(s): The format for this course is either online or a mixed online/live environment called Virtual Live. For the Virtual Live format, weekly lectures are provided either online or live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Contact the instructors for additional information.

EN.595.662. Technical Organization Management. 3 Credits.
This course reviews the challenges of group management and personnel management in a technical organization. Students examine core functions of a technical group-level manager for planning, organizing, controlling, and leading. The course introduces topics relevant to technical group managers, including ethical leadership, team building, innovation environment, customer responsiveness, recruiting, hiring, compensation, delegation, motivation, performance management, conflict management, and organizational learning. Students address typical organization management situations and apply concepts to address expectations and challenges for a group-level manager in a technical organization.
595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.665. Strategic Communications in Technical Organizations. 3 Credits.
This course covers problems and instruction in human communications within a technical organization. Topics include the nature of difficulties in human communications (perception and cognition, semantics, individual differences in processing information, and listening), techniques for effective oral and written communications and presentations, problems in communication between supervisors and subordinates, assignment of work, and reporting to management and sponsors. Students assume roles in various interpersonal situations, meetings, discussions, and conflicts calling for a supervisor to write letters and memoranda; they also deliver oral presentations and participate in group and one-on-one discussions. This course also includes writing winning proposals and developing a technical strategy aligned with the organization's business strategy.
595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.676. Finance, Contracts, and Compliance for Technical Professionals. 3 Credits.
This course introduces the technical manager to all aspects of business management within an organization, ranging from tactical project planning and control, and contract management to higher level corporate financial and legal topics. Students will be guided through weekly topics in the areas of planning a project, scheduling, tracking and the evaluation/assessment of a project. It will also cover contractual considerations for the technical manager. The course will move from managerial business management to financial accounting topics such as direct and indirect costs, revenues, and profits; indices to financial position; use of financial reports; return on investment, net present value; internal rate of return; and financial management (including cash and funds flow statements). Finally, this course will also use the management approaches and practices above and apply them to the world of contracting and legal analysis. Tactical contracting principles, including acquisition planning, contract award, performance, and termination will be covered. Basic legal principles that a senior technical leader will encounter in their career will also be presented. Course discussions cover corporations and partnerships, professional liability, risk management, intellectual property negotiations, and ethics are presented for students to recognize issues that are likely to arise in the engineering profession and introduces them to the complexities and vagaries of the legal profession.
595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.701. Product and Supply Chain Management for Technical Professionals. 3 Credits.
This course provides foundational knowledge of Product and Supply Chain Management for effective engineering and technical leadership, while giving students a taste for the experience of being a product/supply chain manager. Topics include product management life cycles,? investment strategies and business cases, product types (digital vs. physical vs. cyber-physical), product structures (build to spec vs. build to market), product and services portfolios, cross-organizational structures and governance, product, and services value chains as the basis for the supply chain, mergers and acquisitions, product platforms, and ethics and social responsibility related to products and supply chains. This course also addresses product-as-a-service and agile product/services development.The concepts in the course are reinforced with short case studies, a case-based team project, and fortified by interviews with practicing/retired product and supply chain executives and managers who discuss practical career experiences. Microsoft Teams is used extensively for instructor-student and student-team communication and collaboration.Note: This course is presented in a non-standard combination of asynchronous and synchronous delivery. Lectures are provided asynchronously online. Online (synchronous) attendance is required at bi-weekly seminar-type discussions. These discussions guide the incremental development, launch, sustainment and retirement plan for a product/product portfolio, and include mid-course and semester-end team presentations.
EN.595.660 Planning and Managing Projects,EN.595.662 Technical Organization Management , EN.595.676 Finance, Contracts, and Compliance for Technical Organizations, or instructor permission.

EN.595.727. Advanced Concepts in Agile Technical Management. 3 Credits.
How do highly skilled technical managers and system engineers like you address complex projects with high levels of uncertainty requiring continuous innovation and adaptation? This course will provide you the expertise needed to lead a highly skilled, cross-functional technical workforce capable of successfully executing these most demanding projects. You will participate using an experienced-based style of team-based learning implementing advanced leadership principles designed to deliver game-changing value to your customer. You will learn to apply a blend of agile, lean and design-thinking methods to technical leadership within a complex, evolving system engineering environment while still achieving a set of product requirements and design elements meeting schedule and budget allocations. You will gain critical insight into criteria necessary to assess the relevance of these advanced methods to specific projects and organizational culture. This course is offered through an atypical mix of synchronous and asynchronous delivery environments where you must attend eight (approximately biweekly) fully synchronous online video conferencing sessions. Depending on the Section, these meetings between the full class and instructors typically occur on either Monday or Tuesday evenings and are a mandatory requirement for this course.

EN.595.731. Business Law for Technical Professionals. 3 Credits.
This course addresses legal issues commonly encountered by technical professionals, best practices in identifying and mitigating legal risks, and strategies to avoid costly legal errors and to recognize when professional legal advice is necessary. The course will acquaint students with various areas of the law that can interact to affect a single business transaction and will provide students with legal reasoning skills that can be applied in a technical business environment. Topics include the legal environment of business, contract basics, effective contract negotiations, breach of contract and remedies, intellectual property rights, licensing and technology transfer, protecting confidential and proprietary business information, employment law, Internet law, corporate policies, business ethics, export control regulations, and an overview of the American court system.

EN.595.740. Assuring Success of Aerospace Programs. 3 Credits.
Technical managers, systems engineers, lead engineers, and mission assurance professionals will benefit from this course, which focuses on the leadership of system safety and mission assurance activities throughout the life cycle of a project to achieve mission success. This advanced course provides crucial lessons learned and proven best practices that technical managers need to know to be successful. The integrated application of mission assurance and systems engineering principles and techniques is presented in the context of aerospace programs and is also applicable to other advanced technology research and development programs. Students discuss critical risk-based decision making required from system concept definition and degree auditing through design, procurement, manufacturing, integration and test, launch, and mission operations. Experiences shared by senior aerospace leaders and extensive case studies of actual mishaps explore quality management topics relevant to aircraft, missiles, launch vehicles, satellites, and space vehicles. The course addresses contemporary leadership themes, government policies, and aerospace industry trends in mission assurance requirements, organizational structure, knowledge sharing and communication, independent review, audit, and assessment. Mission assurance disciplines covered include risk management, system safety, reliability engineering, software assurance, supply chain management, parts and materials, configuration management, requirements verification and validation, non-conformance, and anomaly tracking and trending.

EN.595.742. Quality Management in Technical Organizations. 3 Credits.
This course addresses quality management topics and applications vital to steering leadership and business process approaches for various organizations. Course discussions range from the history and development of modern quality programs to the latest in quality and business management, strategic planning, productivity improvement tools, techniques, and the implementation of quality initiatives needed to be successful in today's highly dynamic and competitive global market. Advanced topics related to the principles and application of quality methodologies are presented such as the impact of leadership and corporate culture on quality and the importance of quality during the proposal and contract review process. Students will understand the elements and implementation strategies of quality assurance tools and systems, including benchmarking, process control, quality measurement, supplier quality management, and auditing. Current applications and strategies for implementing effective quality management are introduced including lean manufacturing philosophies, Deming's PDCA cycle, Kaizen continuous improvement processes, and risk management. The course also covers a comprehensive and practical understanding of the implementation of quality management systems such as ISO 9001. As a result of the significant impact that software and system safety now have on today's organizations, sessions dedicated to both topics are also included. Course Note(s): The format for this course is a mixed online/live environment called Virtual Live. Weekly lectures are provided live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Students can also choose to participate in person, in a classroom, at the predesignated day/time. Contact the instructors for additional information.

EN.595.758. Data Science for the Technical Leader. 3 Credits.
The course provides an immersive introduction to data science for scientists and engineers who are in technical leadership positions and recognize the need to lead their organizations into a data-driven future. Through lectures, hands-on exercises, and project assignments, the course illustrates the fundamental concepts of data science and introduces the students to the skills required to apply the tools and techniques through the data science process to problems in support of fulfilling mission objectives. The course exposes the students to data management, data science tools and techniques, the basics of Artificial Intelligence (AI) and Machine Learning (ML), creating and delivering data-driven solutions, evaluating their efficacy, policy, and ethical considerations. Familiarity with desktop operating systems and software, and basic coding/scripting skills are required for the successful completion of this course.

EN.595.762. Leading Technical Organizations. 3 Credits.
The course reviews challenges in the leadership of high-technology organizations at the senior technical management level. Using leadership and organizational behavior theories and practices in conjunction with critical thinking, the student will explore topics that include: senior technical leader roles and responsibilities in relation to ethics, leadership style, motivation, and performance of top management teams. The student will also evaluate leading change, communications and organizational relationships, and the potential effects organizational design and processes play in influencing leader behavior. The student will assume the role of a senior technical leader dealing with typical leadership problems in rapidly changing environments.
EN.595.662 Technical Organization Management (or EN.595.661 Technical Group Management or EN.595.663 Technical Personnel Management)

EN.595.766. Advanced Technology. 3 Credits.
This course emphasizes the impact of recent technological advances on new products, processes, and needs, as well as the role of the technical manager in rapidly evolving technologies. Subject areas and lecture content track current topics of interest, such as trends and developments in microelectronics, communications, computers, intelligent machines, and expert systems. Advanced technologies in application areas such as transportation, space, manufacturing, and biomedicine are also discussed. Students are encouraged to explore new technology areas and share information with each other. The seminar format encourages student participation and culminates in a term paper on a new or emerging technology area. Course Note(s): The format for this course is a mixed online/live environment called Virtual Live. Weekly lectures are provided live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Contact the instructors for additional information.

EN.595.781. Executive Technical Leadership. 3 Credits.
This Capstone course explores the roles and responsibilities of technical executive leaders (VPs of Engineering, Manufacturing, CTO, CIO) in the context of a strategic framework. Topics relevant to technical executives are explored, from leading technical strategy development to tactical operations. The concepts in the course are reinforced using case studies, a team project, and fortified by interviews with practicing/retired technical executives who discuss practical career experiences. The format of this course is very different from other Engineering Management courses. Lectures are provided asynchronously online. Required weekly online seminar-type discussions guide the incremental development of a technical strategy, and include a mid-course team presentation. The semester ends with a Capstone presentation, and an executive roundtable discussion. Students will be evaluated on their application of the principles presented in the course, critical thinking applied to the issues posed in the case study, and teamwork as assessed by both the instructors and peer students. Course Note(s): In the Virtual Live format, weekly lectures are provided asynchronously online for students to view in advance of the weekly seminar sessions. The weekly seminar sessions are held at a predesignated day/time, with students/instructors joining live via web-conference using a personal device. The course also includes one Saturday Capstone session in the Baltimore, MD area at the end of the semester. In-person participation with your team is encouraged. Students unable to attend in person will be able to participate online. The Saturday session consists of student teams presenting their capstone technical strategic plan, issues, actions, and execution plans built around an evolving case study. A roundtable discussion will also be held where students have the opportunity to ask probing questions of visiting executives as part of the Capstone Day experience.
Prerequisite(s): EN.595.660 Planning and Managing Projects, EN.595.662 Technical Organization Management (or EN.595.661 Technical Group Management or EN.595.663 Technical Personnel Management), EN.595.676 Finance, Contracts, and Compliance for Technical Organizations (or EN.595.664 Project Planning and Control or EN.595.666 Financial and Contract Management), EN.595.665 Strategy and Communication in Technical Organizations.

EN.595.793. Applied Innovation for Technical Professionals. 3 Credits.
“Fail fast”, “crowdfunding”, “agile”, “open innovation”—the nature of innovation is radically changing in the 21st century. How can technical professionals thrive amidst the new models, tools and processes that are creating faster cycles of disruption? This course will address challenges faced by technical managers in creating and sustaining innovation across a wide range of organizations and environments: from government labs to Fortune 1,000 companies to small businesses and startups. Students will learn the many issues involved in turning creative ideas into a product or service and how to gain support for projects, demonstrate value of the innovation, scale to a profitable venture, and sustain the innovation through successive competitive life cycles. Students will also learn about the challenges and techniques for sustaining innovative cultures in large organizations and how to foster “intrepreneurship”—the concept of creating innovations within the processes and cultures of an already established organization. Case studies and interviews with experienced senior managers will provide students with the latest real-world insights.
Course Note(s): The weekly seminar-type presentations/discussions are attended via web meeting. Please refer to the course schedule for updated information.

EN.595.802. Directed Studies in Engineering Management. 3 Credits.
In this course qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or nonlaboratory study under the direction of faculty members.
Prerequisite(s): The Independent Study/Project Form (ep.jhu. edu/ student-forms) must be completed and approved prior to registration.
Course Note(s): This course is open only to candidates in the Master of Engineering Management /Technical Leadership track.

Engineering Management, Master of Engineering Management

Master of Engineering Management

A track must be chosen for this program: Applied Biomedical Engineering; Applied and Computational Mathematics; Applied Physics; Civil Engineering; Computer Science; Cybersecurity; Data Science; Electrical and Computer Engineering; Healthcare Systems Engineering, Information Systems Engineering; Materials Science and Engineering; Mechanical Engineering; Space Systems Engineering; Structural Engineering; Systems Engineering; and Technical Leadership.

The part-time Engineering Management program prepares ethically grounded, technically competent professional leaders with the technical, managerial, and leadership skills to produce innovative solutions to technical organizations’ challenges. While management courses serve as the core of the program at Johns Hopkins Engineering for Professionals, students work within specialty tracks that span various engineering disciplines or within a technical leadership track. The tracks provide for graduate-level work giving students a unique opportunity to mix their chosen track with engineering management perspectives. For students pursuing a career in the systems acquisition, systems development, or a production domain as a project manager, program manager, or aspirations for general management, the Technical Leadership track is oriented for you. For the functional manager who wants to further develop a mix of management and technical skills, the specialty tracks advance technical skills in your chosen area while enhancing your ability to manage and supervise technical personnel. The curriculum provides a unique opportunity to build both technical and leaderships skills in order to contribute to a multi-disciplinary engineering management team. Instructors are experienced technical leaders and executives who discuss real-world challenges in formats that are convenient for professionals working at the nation’s top engineering firms and R&D organizations.

Courses are offered primarily in the distant learning environment. A few courses are available in-person at the Applied Physics Lab.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to a graduate program outlined in the Admission Requirements (p. 1414) section and must be accepted into both the Engineering Management program and their respective engineering track program (if pursuing the Technical Leadership track, the applicant only needs to be accepted into the Engineering Management program). The applicant’s prior education must include a degree in a science or an engineering field. In addition to this requirement, a minimum of two years of relevant full-time work experience in the field is required, following the award of an undergraduate degree (note that internship and/or co-op periods do not satisfy this requirement), and a detailed work résumé and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate’s academic and professional background will be considered.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of five core courses and five courses from the selected track. Only one C-range grade (C+, C, or C–) can count toward the master’s degree. All elective course selections outside of the requirements of a student’s track are subject to both the Engineering Management advisor and respective track advisor approval. Finally, tracks are not listed on the student’s transcript.

Please refer to the course schedule (ep.jhu.edu/schedule (https://ep.jhu.edu/schedule/)) *published each term for exact dates, times, locations, fees, and instructors*.

Home-to-Hopkins

Home-to-Hopkins students are permitted to substitute Homewood Campus courses to help meet EP program course requirements. Students should work with their faculty advisor to develop a course plan that will satisfy the degree requirements.

Courses

Code	Title	Credits
Core Courses		
EN.595.660	Planning and Managing Projects	3
EN.595.662	Technical Organization Management [1]	3
EN.595.665	Strategic Communications in Technical Organizations [1]	3
EN.595.676	Finance, Contracts, and Compliance for Technical Professionals [1]	3
EN.595.781	Executive Technical Leadership [2]	3

Courses by Track

Students must pay close attention to prerequisites when selecting courses. Respective track advisors must approve the track program of study.

Applied Biomedical Engineering

Select five courses from the Applied Biomedical Engineering program EN.585.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study. All ABE courses require previous coursework in signal processing, and math through ordinary differential equations.

Applied and Computational Mathematics

Select five graduate-level courses from the Applied and Computational Mathematics program EN.625.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

One course (with significant math content) outside Applied and Computational Mathematics may be taken with track advisor approval.

Applied Physics

Select five graduate-level courses from the Applied Physics program EN.615.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Civil Engineering

Select five graduate-level courses from the Civil Engineering program EN.565.xxx. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Computer Science

Applicants for admission to Computer Science need to have completed a year of calculus and a suitable math beyond calculus (such as discrete mathematics, calculus 3, linear algebra, or differential equations). Java or C++, data structures, and computer organization are also required.

Select five graduate-level courses from the Computer Science program EN.605.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Cybersecurity

Applicants for admission to Cybersecurity need to have completed a year of calculus and a suitable math beyond calculus (such as discrete mathematics, calculus 3, linear algebra, or differential equations). Java or C++, data structures, and computer organization are also required. Select five graduate-level courses from the Cyber Security program EN.695.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Data Science

Select a mix of five graduate-level courses from the Applied and Computational Mathematics program EN.625.xxx, the Computer Science Program EN.605.xxx, and the Data Science program 685.xxx subject to the following three requirements: (1) the ACM and CS/DS courses must be drawn from those listed as part of the DS curriculum in the EP catalogue; (2) at least one course (of the five) must be drawn from ACM (EN.625.xxx) and at least one from CS/DS (EN.605.xxx/EN.685.xxx); and (3) at least two of the five courses must be at the 700 level. Applicants for admission to Data Science need to have completed a year of calculus, discrete mathematics, and calculus 3. Java or C++, and data structures are also required. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Electrical and Computer Engineering

Select five graduate-level courses from the EP Electrical and Computer Engineering (ECE) program EN.525.xxx or full-time ECE program EN.520.xxx. At least two of the courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study. The seven technical focus areas within ECE may be helpful as a guide in selecting courses

Healthcare Systems Engineering

All students are required to take EN.655.662 Intro to Healthcare Systems Engineering, EN.655.767 Healthcare System Conceptual Design, EN.655.768 Healthcare System Design & Integration, and EN.655.769 Healthcare System Test and Evaluation. In addition, select one (1) from the Healthcare Systems Engineering electives specified in the catalogue with track advisor approval. The track advisor will work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Information Systems Engineering

Select five graduate-level courses from the Information Systems Engineering program EN.635.xxx. At least two courses must be at the 700 level. Applicants for admission to Information Systems Engineering need to have completed a semester of calculus or discrete mathematics, another semester of mathematics such as statistics, plus Java or C++. Depending on course selections, data structures may also be required. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Materials Science and Engineering

Select five graduate-level courses from the Materials Science and Engineering program (EN.515.6xx). Materials-related, graduate level courses from other programs can also be used with advisor approval. The advisor for this track will work with each student to determine the appropriate mix of technical courses to fulfill student needs and must approve the program of study.

Mechanical Engineering

All students are required to take EN.535.641 Mathematical Methods For Engineers. This course is typically taken as the first technical course in the program.

In addition, select four graduate-level courses from the Mechanical Engineering program EN.535.xxx. At least two courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Space Systems Engineering

All students are required to take EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I. In addition, select three additional courses from the Space Systems Engineering program EN.675.xxx. The track advisor will work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Structural Engineering

Select five graduate-level courses from the Structural Engineering elective list within the Civil Engineering program EN.565.xxx. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Systems Engineering

Select five graduate-level courses from the Systems Engineering program EN.645.xxx. At least two courses must be at the 700 level. The advisor from the track will have the flexibility to work with each student to determine the appropriate mix of technical courses and must approve the program of study.

Technical Leadership

Select five graduate-level elective courses from the Engineering Management program EN.595.xxx. At least two of these elective courses must be at the 700 level (EN.595.802 Directed Studies in Engineering Management can count as the capstone experience in place of EN.595.781 or as one of the 700-level electives with Chair approval). The Engineering Management advisor will have the flexibility to work with each student to determine the appropriate mix of courses and must approve the program of study.

Code	Title	Credits
EN.595.701	Product and Supply Chain Management for Technical Professionals	3
EN.595.727	Advanced Concepts in Agile Technical Management	3
EN.595.731	Business Law for Technical Professionals	3
EN.595.742	Quality Management in Technical Organizations	3
EN.595.758	Data Science for the Technical Leader	3
EN.595.762	Leading Technical Organizations [3]	3
EN.595.766	Advanced Technology	3
EN.595.793	Applied Innovation for Technical Professionals	3
EN.595.802	Directed Studies in Engineering Management [2, 4]	3
EN.675.740	Assuring Success of Aerospace Programs	3
From the Homewood Residential Engineering Management Program, Center for Leadership Education (CLE) [5]		
EN.663.660	Managing People and Resolving Conflicts	1.5
EN.663.671	Leading Change	1.5
EN.663.673	Leading Teams in Virtual, International and Local Settings	1.5

1 Prerequisite EN.595.660. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

2 Prerequisites: EN.595.660, EN.595.662 (or EN.595.661 or EN.595.663), EN.595.676 (or EN.595.664 or EN.595.666), EN.595.665

3 Prerequisites of EN.595.662 (or EN.595.661 or EN.595.663)

4 Can replace EN.595.781 as required capstone experience with Program Chair approval, or can count as one of the 700-level electives. This course is open only to candidates in the Master of Engineering Management/Technical Leadership track.

5 1/2 semester credit -- two courses required for full-semester equivalent

Environmental Engineering, Science, and Management Programs

The part-time programs in Environmental Engineering, Science, and Management address an array of modern environmental and health issues while capitalizing on environmental protection and remediation solutions made possible by technology. Students enhance their knowledge in these areas through a quantitative program built around the common theme of engineering, science, and health in support of environmental decision-making and management. The strength of the programs lies in a faculty of working professionals and from the nationally renowned full-time Department of Environmental Health and Engineering hosted jointly in the Whiting School of Engineering and the Bloomberg School of Public Health at Johns Hopkins University. All of the environmental degree and certificate programs are offered exclusively online.

Program Committee

Hedy Alavi, Program Chair
Assistant Dean for International Programs
Associate Teaching Professor, Department of Environmental Health and Engineering
JHU Whiting School of Engineering

Kirsten Koehler
Associate Professor, Department of Environmental Health and Engineering
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Harihar Rajaram
Professor and Deputy Chair, Department of Environmental Health and Engineering
JHU Whiting School of Engineering

Gurumurthy Ramachandran
Professor and Deputy Chair, Department of Environmental Health and Engineering

Bloomberg School of Public Health

This committee ensures that instruction in the part-time program is of the highest quality and is continually enhanced in a manner consistent with parallel developments in the full-time program.

Programs

Environmental Engineering

- Environmental Engineering, Graduate Certificate (p. 1531)
- Environmental Engineering, Master of Environmental Engineering (p. 1531)
- Environmental Engineering, Post-Master's Certificate (p. 1533)

Environmental Engineering and Science

- Environmental Engineering and Science, Graduate Certificate
- Environmental Engineering and Science, Master of Science (p. 1533)
- Environmental Engineering and Science, Post-Master's Certificate (p. 1534)

Environmental Planning and Management

- Environmental Planning and Management, Graduate Certificate (p. 1535)
- Environmental Planning and Management, Master of Science (p. 1535)
- Environmental Planning and Management, Post-Master's Certificate (p. 1536)

Climate Change, Energy, and Environmental Sustainability

- Climate Change, Energy, and Environmental Sustainability, Graduate Certificate (p. 1536)

Faculty

The program features highly qualified instructors who are distinguished and experienced professionals. Each holds the highest academic degree in their field of expertise and has demonstrated a strong commitment to excellence in teaching. Many of the outstanding full-time faculty from the renowned full-time Department of Environmental Health and Engineering serve as instructors. The program also includes directors, senior scientists, engineers, researchers, and attorneys affiliated with the US Environmental Protection Agency, American Academy of Environmental Engineers and Scientists, Maryland Department of the Environment, Nuclear Regulatory Agency, National Institute of Health, US Department of Energy, US Department of Defense, and many leading environmental consulting companies.

Courses

Environmental Engineering

EN.575.604. Principles of Environmental Engineering. 3 Credits.
This course provides knowledge of environmental elements with insight into quantitative analysis and design where applicable. Topics include an introduction to environmental engineering and design process, professional associations, engineering licensure, engineering ethics, and environmental justice; dimensional analysis, mass and energy transfer and balances; environmental chemistry; mathematics of growth and decay; risk assessment and management; surface water pollutants, biological and chemical oxygen demands; eutrophication; water supply systems and drinking water standards; wastewater treatment systems and effluent standards; groundwater flow, contaminant transport, and remediation technologies; remedial and corrective actions at contaminated sites; air pollution sources, control technologies, and atmospheric stability; ambient air quality standards and indoor air quality; global temperature, greenhouse effect and warming potential; global energy balance, carbon emission, and stratospheric ozone depletion; hazardous and solid waste management, landfill disposal, combustion, composting, and recycling; medical waste. Overviews of pertinent environmental laws and regulations will be presented where applicable. The course encompasses conceptual design projects for environmental systems and infrastructures. Course Note(s): This is a required course for all students in the Environmental Engineering, Science, and Management Programs who do not possess an undergraduate degree in Environmental Engineering.

EN.575.605. Principles of Water and Wastewater Treatment. 3 Credits.
Water quality objectives and the chemical, physical, and biological processes necessary for designing and managing modern drinking water and wastewater treatment plants are described in the course. The principles of coagulation, flocculation, sedimentation, filtration, biological treatment, solids handling, disinfection, and advanced treatment processes are presented. The course serves as a basis for the more advanced courses: EN.575.745 Physical and Chemical Processes for Water and Wastewater Treatment, EN.575.706 Biological Processes for Water and Wastewater Treatment, and EN.575.746 Water and Wastewater Treatment Plant Design.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics; two semesters of undergraduate chemistry.

EN.575.606. Water Supply and Wastewater Collection. 3 Credits.
This course covers the fundamental but practical issues of water distribution systems and wastewater/stormwater collection systems. Specific topics of interest in water supply include water supply master planning; design of water storage facilities, water mains, and pumping stations; distribution-system water quality; and service connection issues. Topics covered under wastewater/stormwater collection include hydrology and hydraulics of stormwater/wastewater conveyance systems; design of stormwater detention and retention facilities; and collection system control technologies including green infrastructure. Also covered are regulations governing sanitary sewer overflows (SSOs) and combined sewer overflows (CSOs); public health, environmental, and economic impacts of SSOs and CSOs; sewer system evaluation and rehabilitation methods; stormwater best management practices; and the benefits and challenges of water reuse. Through research papers and discussion forums, students examine case studies that illustrate diverse practical situations and stimulate creative ideas for solving real-life design problems.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics.

EN.575.607. Radioactive Waste Management. 3 Credits.
This course covers fundamental aspects of radioactive substances in the environment; remediation processes for these substances; and their eventual storage, processing, and disposal. It provides a basic understanding of radioactivity and its effect on humans and their environment, as well as the techniques for their remediation and disposal. Topics include radioactivity, the nucleoids, interaction of radiation with matter, shielding, dosimetry, biological effects, protection standards, sources of environmental radiation, risk evaluation, fate and transport analysis, cleanup standards, legal requirements, cleanup technologies, waste disposal, and case studies.

EN.575.620. Solid Waste Engineering & Management. 3 Credits.
This course covers engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material. Topics include regulatory aspects and hierarchy of integrated solid waste management; characterization and properties of MSW; municipal wastewater sludge utilization; hazardous waste found in MSW; collection, transfer, and transport of solid waste; separation, processing, combustion, composting, and recycling of waste material; and the landfill method of solid waste disposal, which encompasses guidelines for design, construction, operation, siting, monitoring, remedial actions, and closure of landfills. Permitting and public participation processes, current issues, and innovative approaches are also addressed.

EN.575.623. Industrial Processes and Pollution Prevention. 3 Credits.
This course presents the pollution prevention and waste minimization concepts, terminologies, life cycle impacts, and management strategies. The course introduces available remediation techniques for industrial pollution control and prevention and examines specific applications to industries including biological, chemical, physical, and thermal techniques. Topics include current state of knowledge of pollution prevention approaches to encourage pollution prevention strategies, highlights of selected clean technologies and clean products, technical and economic issues, incentives and barriers to pollution prevention, and the role of different sectors in promoting pollution prevention. Pollution prevention and waste minimization techniques such as waste reduction, chemical substitution, production process modification, and reuse and recycling will be addressed with regard to selected industries.

EN.575.703. Environmental Biotechnology. 3 Credits.
This course examines current applications of biotechnology to environmental quality evaluation, monitoring, remediation, and mitigation of contaminated environments. The scale of technology ranges from the molecular to macrobiotic. Relevant topics of microbiology and plant biology are presented. These provide a foundation for following discussions of microbial removal and degradation of organics, phytoremediation of soil and water contaminated with toxic metals and radionuclides, wetlands as treatment processes, biofilms/biofilters for vapor-phase wastes, and composting in alignment with sustainable development goals considering climate change. Emphasis is placed on modeling and design. Advantages and disadvantages of each application are compared. Case studies are presented in the areas of biosensors in environmental analysis, molecular biology applications in environmental engineering, and genetic engineering of organisms for bioremediation.
Prerequisites: Prior coursework in environmental microbiology, molecular Biology, or biochemical engineering is recommended but not required.

EN.575.706. Biological Processes for Water & Wastewater Treatment. 3 Credits.
This course develops the fundamentals and applications of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater. The principles of activated sludge, aeration and clarifier design, fixed film reactors, anaerobic treatment, solids handling and treatment, land treatment, and nutrient removal are presented. This course uses concepts from microbiology and the basic principles of stoichiometry, energetics, and microbial kinetics are used to support the design of biological unit processes.
EN.575.605 Principles of Water and Wastewater Treatment.

EN.575.715. Environmental Contaminant Dispersion and Transport. 3 Credits.
This course will provide an overview of the basic foundations of pollutant transport and dispersion phenomena in the environment including surface water, atmosphere, and groundwater media. The emphasis of the course will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of tracer breakthrough curves, spatial and temporal moments analysis. Although numerical modeling is not the primary objective of the course, the students will be provided with the knowledge to build a modest computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions presented in the course will require some knowledge of scientific programming. However, the students will gain such competency during the course.Prerequisites: Undergraduate fluid mechanics (570.351 or equivalent) and differential equations.

EN.575.721. Air Quality Control Technologies. 3 Credits.
This is a multidisciplinary course that involves the applications of chemistry, thermodynamics, and fluid mechanics in the selection and design of air pollution control equipment. Topics include the estimation of potential pollutants, chemical characterization of gas streams to be controlled, theory and practice of air pollution control, and design and costing of control technologies. The course emphasizes the design of systems to reduce particulate matter emissions, volatile organic compound (VOC) emissions, nitrogen oxide emissions, and sulfur dioxide emissions.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow; an undergraduate course in thermodynamics.

EN.575.732. Energy Technologies for Solving Environmental Challenges. 3 Credits.
This course covers the science, engineering, and operation of energy technologies - on a stand-alone and systems basis - that will reduce carbon dioxide and other greenhouse gas (GHG) emissions, and lower air pollution, with quantitative analysis where applicable. On the supply side, students will learn about solar radiation and its use for solar photovoltaic (PV) technologies (at a cell, module, and system-level) and concentrated solar power (CSP) with thermal storage, and other renewable energy technologies that use wind, water, and biomass, as well as the use of carbon capture and sequestration (CCS). Energy storage technologies covered to support variable renewable energy (VRE) integration include lithium-ion and other types of batteries, pumped hydro, compressed air energy storage (CAES), and longer-term energy storage from the production of hydrogen, using electrolysis and other low carbon methods. End-use energy technologies covered will include battery electric vehicles (BEV), plug-in hybrid (PHEV) and fuel cell electric vehicles (FCEV), and some examples of the use of low carbon heat sources or feedstocks for industrial processes and combined heat and power (CHP).

EN.575.741. Membrane Filtration Systems and Applications in Water and Wastewater Treatment. 3 Credits.
This course covers fundamentals of membrane filtration technology and application in municipal and industrial water and wastewater treatment. Topics include membrane classification, mechanism of separation/filtration, principle of operation, performance monitoring, maintenance, pilot scale testing, residual disposal, emerging and developing membrane separation technologies, and regulations governing treatment objectives and residual disposal in membrane filtrations systems. This course provides students with in-depth knowledge of the theory, application, and design of membrane filtration systems by engaging them in group assignments and design projects.

EN.575.742. Hazardous Waste Engineering and Management. 3 Credits.
The course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and contaminated sites to protect human health and the environment. Topics include regulatory requirements; hazardous waste generators and transporters; permitting and enforcement of hazardous waste facilities; closure and financial assurance requirements; RCRA Corrective Action and CERCLA/Superfund/Brownfields site remediation processes; groundwater flow and fate and transport of contaminants; physical, chemical, and biological treatment; land disposal restrictions; guidelines for design, construction and closure of hazardous waste landfills; environmental monitoring systems; management of medical waste and treatment options; management of underground and aboveground storage tanks; toxicology and risk assessment; and pollution prevention and waste minimization.

EN.575.745. Physical and Chemical Processes for Water and Wastewater Treatment. 3 Credits.
In this course, mass and momentum transport, aquatic chemistry, and chemical reaction engineering are applied to physical and chemical processes used for water and wastewater treatment. Students also learn the theory and practice of various unit processes including disinfection, oxidation, coagulation, sedimentation, filtration, adsorption, gas transfer, and membrane filtration. The goal is to provide a theoretical understanding of various chemical and physical unit operations, with direct application of these operations to the design and operation of water and wastewater treatment systems. Students will use the concepts learned in this class to better understand the design and operation of engineered and natural aquatic systems.
EN.575.605 Principles of Water and Wastewater Treatment.

EN.575.746. Water and Wastewater Treatment Plant Design. 3 Credits.
This course familiarizes students with appropriate design criteria and the design process for water and wastewater treatment plants. This includes design of treatment processes, cost estimates, and a working design team under project managers. Additional course requirements include oral presentations and writing engineering reports.
EN.575.605 Principles of Water and Wastewater Treatment and either EN.575.706 Biological Processes for Water and Wastewater Treatment or EN.575.745 Physical and Chemical Processes for Water and Wastewater Treatment.and Wastewater Treatment)

EN.575.749. Water Quality of Rivers, Lakes, and Estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. The approaches covered are widely used in the US for TMDL studies and NPDES permitting under the clean water act. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced.Prerequisites: Differential equations

EN.575.761. Measurement and Pseudo-measurement in the Environmental Arena. 3 Credits.
In this course, students will be provided with the knowledge to critically investigate practical, theoretical, mathematical, philosophical, sociological, and legal aspects of measurement and pseudo-measurement in environmental science and related disciplines. Students will explore the theoretical and mathematical bases for quantification and trace the relationship between these bases and the expanding role of quantification and pseudo-quantification in environmental research, policy, and decision making. Three theories of measurement (traditional, representational, and operational) will be presented from historical, technical, and philosophical perspectives. Claims to quantification arising in a number of environmental contexts (such as river systems and hydrology) will be closely examined in light of these divergent measurement paradigms.

EN.575.762. Resilience of Complex Systems. 3 Credits.
This course will present a subset of the mathematical techniques often use to gain an understanding of the response of complex systems to acute events and compound threats. Examples of complex systems include: installations, organizations, communities, etc. With the understanding of resilience as ability to withstand and ‘bounce back’ from major disruptive events, the course will consider resilience as an emergent attribute, and investigate some pre- and post-event approaches to resilience enhancement. The focus of the mathematical modeling techniques presented in this course will be on nonlinear dynamics. We will also discuss relevant variational optimization techniques that can be used to guide measures taken to enhance resilience. The course will include selected applications as case studies; examples include: savanna ecosystems, large installations, communities facing infectious diseases, preparation for and response to coastal storms, etc. Prerequisite(s): Differential Equations.

Environmental Engineering and Science

EN.575.601. Fluid Mechanics. 3 Credits.
This course introduces the principles of continuity, momentum, and energy applied to fluid motion. Topics include fluid properties, cavitation and phase changes, hydrostatics, applications of Reynold Transport Equation to control volume analyses, laminar and turbulent flow, viscous boundary layers, form and surface resistance with applications to flow in conduits and channels, pumps, and turbines. This course requires a team project evaluating the design and operational parameters for fluid systems under safety and environmental constraints.

EN.575.615. Ecology. 3 Credits.
The course examines an introduction to the organization of individual organisms into populations, communities, and ecosystems and interactions between organisms, humans, and the environment. Topics include causation and prediction in ecology; evolution and natural selection; populations and competition; biodiversity, extinction, and conservation; the impact of forest fragmentation and deforestation on diversity, erosion and sedimentation; wetland ecology and restoration; succession, stability, and disturbance; eutrophication and the Chesapeake Bay; island biogeography; and global climate change. An independent project will be required regarding a field site visited by the student; the student will examine an ecological, conservation, or restoration event or issue about that site.

EN.575.619. Principles of Toxicology, Risk Assessment & Management. 3 Credits.
Risk assessment and risk management have become central tools in continued efforts to improve public safety and the environment within the limited resources available. This course introduces the basic concepts of environmental risk assessment, relative risk analysis, and risk perception, including identifying and quantifying human health impacts and evaluating ecological risk. The course describes legislative and regulatory initiatives that are attempting to base decisions on risk assessment, along with the controversy that surrounds such approaches. It also addresses specific federal requirements for risk analysis by industry. The course discusses the realities of using risk assessments in risk management decisions, including the need to balance costs and benefits of risk reduction, issues of environmental equity, accounting for the uncertainties in risk estimates, effective risk communication, and acceptable risk.

EN.575.626. Hydrogeology. 3 Credits.
This course is an introduction to groundwater, geology, and to the interactions with contaminant transport between the two. It provides a basic understanding of geologic concepts and processes, focusing on understanding the formation and characteristics of water-bearing formations. The course also addresses the theory of groundwater flow, the hydrology of aquifers, well hydraulics, groundwater resource evaluation, and contaminant fate and transport in groundwater. The relationship between the geologic concepts/processes and the groundwater resource are discussed. Examples include a discussion of the influence of the geologic environment on the availability and movement of groundwater and on the fate and transport of groundwater contaminants. Geotechnical engineering problems associated with groundwater issues are also covered.Prerequisites: Calculus I, Calculus II, Ordinary Differential Equations.

EN.575.629. Modeling Contaminant Migration through Multimedia Systems. 3 Credits.
This course addresses contamination in several physical media as chemical species that migrate through an integrated environment. Contaminants can be released into air, subsurface or surface water from which chemicals can migrate between these media. Predicting the movement as well as human health and ecological impacts of contaminants between the air, groundwater and surface water media requires consideration of transport and fate processes that occur separately within each medium as well as linkages of contaminant interactions between media. The course presents the basic principles and computational methods for simulation of contaminant transport and kinetic fate processes in air, groundwater and surface water. Course assessments include interactive discussion topics, assignments and a course project. Screening level models will be used to evaluate transport and fate of contaminants in the air, groundwater and surface water media for a course project based on a hypothetical yet realistic case study of an industrial facility in the Washington DC region. Students will be responsible for data setup and coding of equations to create Excel spreadsheet models for contaminant fate and transport in the air and surface water and will be responsible for data setup for application of a public-domain Excel spreadsheet model for subsurface contaminant fate and transport in groundwater. Although there are no formal prerequisites for this course, the instructors strongly recommend that the student have a college-level understanding of calculus and fluid mechanics and have good quantitative skills with engineering calculations. Proficiency with the Microsoft Excel spreadsheet program is critical for data setup, coding of equations for model calculations and creating graphic plots of data and multi-media model results.

EN.575.643. Chemistry of Aqueous Systems. 3 Credits.
This course examines the chemical principles necessary to understand water quality and contaminant fate in natural and engineered aqueous systems. Quantitative problem-solving skills are emphasized. Specific topics include acid-base reactions, carbonate chemistry, oxidation-reduction reactions, and metal speciation. Case studies applying fundamental principles to important environmental phenomena (e.g., eutrophication of surface waters, drinking water treatment, soil/ subsurface contamination, ocean acidification, and geoengineering) are key components of this course.

EN.575.645. Environmental Microbiology. 3 Credits.
This course covers fundamental aspects of microbial physiology and microbial ecology. Specific areas of focus include energetics and yield, enzyme and growth kinetics, cell structure and physiology, metabolic and genetic regulation, microbial/ environmental interactions, and biogeochemical cycles. The goal of this course is to provide a basic understanding and appreciation of microbial processes that may be applicable to environmental biotechnology.

EN.575.704. Applied Statistical Analysis and Design of Experiments for Environmental Applications. 3 Credits.
This course introduces statistical analyses and techniques of experimental design appropriate for use in environmental applications. The methods taught in this course allow the experimenter to discriminate between real effects and experimental error in systems that are inherently noisy. Statistically designed experimental programs typically test many variables simultaneously and are very efficient tools for developing empirical mathematical models that accurately describe physical and chemical processes. They are readily applied to production plant, pilot plant, and laboratory systems. Topics covered include fundamental statistics; the statistical basis for recognizing real effects in noisy data; statistical tests and reference distributions; analysis of variance; construction, application, and analysis of factorial and fractional-factorial designs; screening designs; response surface and optimization methods; and applications to pilot plant and waste treatment operations. Particular emphasis is placed on analysis of variance, prediction intervals, and control charting for determining statistical significance as currently required by federal regulations for environmental monitoring.Prerequisite: Undergraduate statistics is strongly recommended

EN.575.708. Open Channel Hydraulics. 3 Credits.
The course covers application of the principles of fluid mechanics to flow in open channels. Topics include specific energy and momentum basics, uniform flow, flow resistance, gradually varied flow, flow transitions, channel design, channel stability and erosion protection, and hydraulic structures. The course also addresses 1D flow numerical computations in irregular and natural channels, and gradually varied flow modeling using HEC-RAS computer software.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulic and basic geometry and basic calculus.

EN.575.713. Field Methods in Habitat Analysis and Wetland Delineation. 3 Credits.
This course provides students with practical field experience in the collection and analysis of field data needed for wetland delineation, habitat restoration, and description of vegetation communities. Among the course topics are sampling techniques for describing plant species distributions, abundance and diversity, including the quadrat and transect-based, pointintercept, and plot-less methods; identification of common and dominant indicator plant species of wetlands and uplands; identification of hydric soils; and the use of soil, topographic and geologic maps and aerial photography in deriving a site description and site history. Emphasis is placed on wetland vegetation, delineation and restoration. While many of the field examples are centered in the Maryland and Washington, DC region, the format is designed so that the student performs field work in the state, country or region in which he or she would like to specialize.
EN.575.615 Ecology.

EN.575.716. Principles of Estuarine Environment: The Chesapeake Bay Science and Management. 3 Credits.
The course examines the basic physical, chemical, and biological components of the Chesapeake Bay ecosystem and how they interrelate in both healthy and degraded states of an estuary. The course focuses on the tidal waters of the Chesapeake Bay and its tributaries. It also covers the relationships of the bay with the surrounding watershed, atmosphere, and ocean as well as relevance to other coastal systems. Particular emphasis is on to anthropogenic stresses such as nutrient and contaminant pollution, habitat modification, and harvest of fish and shellfish. The most current Chesapeake Bay management issues and policies being pursued at the federal, state, and local levels of government are discussed in depth, including their scientific foundation.

EN.575.717. Hydrology. 3 Credits.
This course introduces the fundamental physical principles that are necessary to understand the occurrence, distribution, and circulation of water near Earth's surface. Students will be introduced to the global hydrological cycle and the influence of climate, geology, and human activity. Students will study the processes of precipitation and evapotranspiration; surface water flow, floods, and storage in natural and artificial reservoirs; groundwater flow; and whole-cycle catchment hydrology. Although less emphasized, water-quality and water resources management issues will be discussed and case studies presented. Throughout the course, a quantitative approach is taken in which mathematical descriptions of hydrological phenomena will frequently be an objective. The course will also provide an introduction to hydrological data acquisition and analysis.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics.

EN.575.720. Air Resources Management and Modeling. 3 Credits.
This course focuses on air pollution management and modeling topics with an emphasis on how air quality models can be used to help inform decision makers. In addition to introducing the fundamentals of air pollution and addressing general modeling considerations, topics covered in this course include the health and environmental effects of key air pollutants, how air quality modeling was used in major studies leading to better air quality, US requirements for air quality modeling studies, and current local, national, and international air pollution issues. Atmospheric physics and chemistry are reviewed as they relate to air pollutant transport and transformation. Specific modeling topics include box and plume models, indoor air quality and monitoring, numerical and statistical models, and climate change modeling and decision making. Specific air pollution problems addressed in the course include those at local, regional, and national scales; air pollution problems from a public health perspective; and approaches for developing air pollution control strategies for various air pollutants. A term-long case study assignment is required that leverages these course elements to address a timely and relevant real-world air pollution scenario.

EN.575.727. Environmental Monitoring and Sampling. 3 Credits.
Environmental monitoring and sampling provides the information needed for assessments of compliance with environmental criteria and regulatory permits, and status/trends to evaluate effectiveness of regulatory controls. Students will prepare a Sampling and Analysis Plan (SAP) as a course project to support a site-specific field data collection study for environmental sampling of air, surface water, groundwater, and soils. An overview of historical/current environmental issues, including public health and environmental impacts, for air, surface water, groundwater, and soil, is presented. An overview of regulatory requirements of federal environmental statutes and assessments of effectiveness of the Clean Water Act, Clean Air Act, Safe Drinking Water Act, CERCLA, and RCRA is presented. The course describes pollutant sources and physical, chemical, biological processes that govern transport and fate of contaminants in air, surface water, groundwater, and soils. The course examines the principles, methods, and strategies for monitoring and sampling of air, surface water, groundwater, and soil. Sampling methods are presented for discrete sampling, automated data acquisition, and remote sensing for air, surface water, groundwater, and soils. SAP requirements for the course project will be presented, including key elements of Quality Assurance Project Plans and Field Sampling Plans. The course presents selected concepts of environmental statistics; an overview of data sources available from EPA, USGS and other agencies for air, surface water, groundwater, and soils; and interpretation of environmental data sets with GIS/mapping, data analysis, and statistical methods to support decision-making, site characterization, and evaluation of status/trends. Students will research online opportunities for “virtual” field trips to observe field sampling methods for air, surface water, groundwater, and soils media.

EN.575.728. Sediment Transport and River Mechanics. 3 Credits.
This course examines the processes of sediment entrainment, transport, and deposition and the interaction of flow and transport in shaping river channels. Topics reviewed include boundary layer flow; physical properties of sediment; incipient, bed-load, and suspended-load motion; bed forms; flow duration; sediment loads; hydraulic roughness; scour and deposition of bed material; bank erosion; sediment budgets; channel classification, and size, shape, planform, and migration of river channels. In addition, the course develops techniques of laboratory, theoretical, and sediment modeling and applies them to problems of sediment transport, channel morphology, and channel change. Prerequisite(s): A course in fluid mechanics or an equivalent course in fluid flow or hydraulics. A course in statistics is strongly encouraged

EN.575.730. Geomorphic and Ecologic Foundations of Stream Restoration. 3 Credits.
This course presents principles from hydrology, sedimentation engineering, geomorphology, and ecology relevant to the design and evaluation of stream restoration projects. A watershed context is emphasized in developing the background needed to assess different design approaches. After developing a common foundation in stream dynamics, the course considers trade-offs among restoration objectives, the merits of analog and predictive approaches, the role of uncertainty in restoration design, and metrics for assessing ecological recovery. The course includes online discussions, design exercises, and review papers and finishes with an assessment of a stream in students’ geographic regions.

EN.575.743. Atmospheric Chemistry. 3 Credits.
Earth’s atmosphere is a vital and fragile component of our environment. This course covers the chemical composition of the atmosphere and the principles of chemistry that control the concentrations of chemical species. Following an introduction to the atmosphere, including its structure and composition, the course investigates basic concepts relating to atmospheric chemical kinetics and photochemistry. This foundation of chemistry and physics is applied to the study of the gas-phase chemistry of the troposphere and the stratosphere including focused study of criteria pollutants such as carbon monoxide (CO), tropospheric and stratospheric ozone (O3), chlorinated fluorocarbons (CFCs), sulfur and nitrogen oxides (NOx and SOx) and particulate matter (PM). Many trace species and their impacts on atmospheric chemistry are investigated. Condensedphase chemistry topics include aqueous-phase chemistry, the chemistry of clouds and fogs and aerosol chemistry (including particulate matter chemistry). The chemistry of climate change and the radiative forcing of atmospheric constituents is studied. The relationship between atmospheric chemistry and air quality is stressed via focusing on negative human health and environmental impacts. The course stresses application of these concepts to current and relevant atmospheric chemistry issues.

EN.575.744. Environmental Chemistry. 3 Credits.
This course focuses on the environmental behavior and fate of anthropogenic contaminants in aquatic environments. Students learn to predict contaminant properties influencing contaminant transfers between hydrophobic phases, air, water, sediments, and biota, based on a fundamental understanding of physico-chemical properties, intermolecular interactions, and basic thermodynamic principles. Mechanisms of important transformation reactions and techniques and quantitative models for predicting the environmental fate or human exposure potential of contaminants are discussed.

EN.575.763. Nanotechnology and the Environment: Applications and Implications. 3 Credits.
This course explores the positives and negatives of nanotechnology: the benefits to use in commercial and environmental applications, as well as considering nanoparticles as an emerging environmental contaminant. The course will analyze nanotechnology through an interdisciplinary outlook for a life-cycle analysis. This analysis will begin with synthesis, manufacturing, unintentional releases, and disposal. We will consider ecological consequences and public health implications of the use of nanotechnology. Students will learn the science behind nanotechnology and how nanoparticle characteristics impact transport in the environment, including human exposure assessment, and a discussion of current measurement tools. Policies regulating nanotechnology and risk assessment will be addressed.

EN.575.801. Independent Project. 3 Credits.
This course provides students with an opportunity to carry out a significant project in the field of environmental engineering, science, technology, planning, or management as a part of their graduate program. The project is individually tailored and supervised under the direction of a faculty member and may involve conducting a semester-long research project, an in-depth literature review, a non-laboratory study, or application of a recent development in the field. The student may be required to participate in conferences relevant to the area of study. To enroll in this course, the student must be a graduate candidate in the Environmental Engineering, Science, and Management Program within the latter half of the degree requirements and must obtain the approval and support of a sponsoring faculty member in the Department of Environmental Health and Engineering. The proposal description and completed required forms must be submitted prior to registration for approval by the student's advisor and the program chair. A maximum of one independent project course may be applied toward the master's degree or post-master's certificate.

Environmental Planning and Management

EN.575.608. Optimization Methods for Public Decision Making. 3 Credits.
This course is an introduction to operations research as applied in the public sector. Public sector operation research involves the development and application of quantitative models and methods intended to help decision makers solve complex environmental and socio-economic problems. The course material is motivated by real-world problems and is presented in an environmental engineering-relevant context. Such problems include air pollution control, water resources management, transportation planning, scheduling, resource allocation, facility location, and biological conservation. Emphasis is placed on skill development in the definition of problems, the formulation of models, and the application of solution methodologies. Methodologies covered in this course include linear programming, integer programming, multiobjective optimization, and dynamic programming.

EN.575.611. Economic Foundations for Public Decision Making. 3 Credits.
The course examines intermediate-level price theory and surveys applications to public-sector decision making. Topics include demand, supply, behavior of the market, and introductory welfare economics. Applications include forecasting, cost-benefit analysis, engineering economics, and public sector pricing.

EN.575.628. Business Law For Engineers. 3 Credits.
This course introduces engineers to the basic legal principles they will encounter throughout their careers. Course discussions cover contracts (formation, performance, breach, and termination), corporations and partnerships, insurance, professional liability, risk management, environmental law, torts, property law, and evidence and dispute resolution. The course emphasizes those principles necessary to provide engineers with the ability to recognize issues that are likely to arise in the engineering profession and introduces them to the complexities and vagaries of the legal profession.

EN.575.635. Environmental Law for Engineers & Scientists. 3 Credits.
This course explores fundamental legal concepts relevant to environmental issues, including the relationship between statutes, regulations, and court decisions. Also included are various forms of enforcement used in environmental rules: command and control, liability, and information disclosure. Specific issues include criminal enforcement, a survey of environmental statutes, regulations and case law, the purpose and misconceptions surrounding environmental audits and assessments, the concept of attorney-client privilege, unauthorized practice of law, and ethical conflicts between the attorney and engineer/scientist roles.

EN.575.637. Environmental Impact Assessment. 3 Credits.
This course examines principles, procedures, methods, and applications of environmental impact assessment. The goal of the course is to promote an understanding of how environmental impact assessment is conducted and used as a valuable tool in the engineering project management decision-making process. Topics include an overview of environmental impact assessment; selection of scientific, engineering, and socioeconomic factors in environmental impact assessment; identification of quantitative and qualitative environmental evaluation criteria; application of traditional and other techniques for assessing impacts of predicted changes in environmental quality; approaches for identifying, measuring, predicting, and mitigating environmental impacts; modeling techniques employed in environmental impact assessment; environmental standards and the environmental impact assessment process; and methodologies for incorporating environmental impact assessment into management decision-making. Students learn to prepare an environmental impact assessment, review and critically analyze an environmental impact statement, use mathematical models for environmental impact prediction, and apply environmental impact assessment as a tool in management decision-making. Case studies of environmental impact assessment for several types of engineering projects are employed.

EN.575.640. Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications. 3 Credits.
Through lectures and laboratory exercises, this course illustrates the fundamental concepts of GIS and remote sensing technologies in the context of environmental engineering. Topics include the physical basis for remote sensing, remote sensing systems, digital image processing, data structures, database design, and spatial data analysis. The course is not intended to provide students with extensive training in particular image processing or GIS packages. However, handson computer laboratory sessions re-enforce critical concepts. Completion of a term project is required.

EN.575.658. Natural Disaster Risk Modeling. 3 Credits.
Natural hazards such as floods, earthquakes, and hurricanes exert a heavy toll of victims and economic losses every year. Yet, concentrations of population in hazard-prone-areas, the growth of infrastructure and climate change are aggravating the risk of future losses. Consequently, adequate interventions must be implemented to mitigate the damaging effects of natural hazards. To do this, public agencies, non-profits, and companies formulate mitigation actions such as emergency preparedness plans and building retrofits. Catastrophe models are tools to inform all these efforts, which simulate the socioeconomic risk resulting from the interaction of geophysical events and the spatial distribution of infrastructure.

EN.575.707. Environmental Compliance Management. 3 Credits.
The course covers compliance with environmental laws and regulations by industry, small business, government facilities, and others. It includes legal responsibilities, environmental management systems, and practices such as audits and information systems and development of corporate policies and procedures that rise to the daunting challenge to harmonize the institution's primary goals with its environmental obligations. Several dimensions of environmental management are discussed: federal, state, and local regulation; scientific/technical factors; public relations and the press; and institutional objectives including economic competitiveness.

EN.575.710. Financing Environmental Projects. 3 Credits.
This course treats the financing of projects from two complementary perspectives: that of a government agency funding source, and that of an environmental utility (water, wastewater, solid waste) that needs funds for its project. It discusses grants, concessionary loans, market loans, and loan guaranties, along with their relative desirability and efficiency. Since grant funding is never available for all projects, the course deals extensively with borrowing/lending. It discusses strategies for maximizing utility income, including appropriate tariff structures and the reform of government subsidy policy from supply-based general subsidies to demand-based targeted subsidies. Operational strategies to maximize income are also discussed, such as techniques to improve billing and collections, reduce losses, and reduce energy costs. Traditional cash flow analyses are used to determine debt service capabilities. Various project cost reduction strategies, such as staging and scaling, are introduced. Grants in the form of upfront project cost buy-downs vs. annual debt service subsidies are compared. Finally, several examples of project financings combining many of the elements introduced during the course are presented and analyzed.

EN.575.711. Climate Change and Global Environmental Sustainability. 3 Credits.
This is a multidisciplinary course that focuses on the critical assessment of science, impacts, mitigation, adaptation, and policy relevant to climate change and global environmental sustainability. The first half of the course introduces students to climate change including impacts and drivers, modeling science, mitigation and adaptation efforts, and social aspects (public opinion, responsibility, etc.). The second half of the class considers how climate change and sustainability relate and explores key sustainability concepts and trade-offs related to sustainability's three pillars of economy, society, and environment. Students will explore course concepts through a combination of materials including news and digital media and press, domestic and international technical reports, and peer-reviewed scientific literature. Discussions will include both physical and social considerations and cover a wide range of sectors (e.g., water, energy) and levels of governance (local, regional, national, international). Students will be required to use both subjective and objective analyses of course concepts through employing critical thinking strategies and active learning. Course assignments will include a combination of discussions, presentations, readings, and interactive exercises.

EN.575.714. Water Resources Management. 3 Credits.
This multidisciplinary course examines the scientific, institutional, and analytical aspects of managing water quantity and quality. Students are provided a historical context that is useful for assessing current policy. The water cycle and basic hydrology are reviewed. The course surveys the laws and regulatory instruments for managing water quantity and quality, which operate across federal, state, and local levels of government. Funding issues associated with water resources management include operating and capital budgets, debt financing, the challenges of pricing, and the role of privatization. The course addresses the management of water supply and demand in the United States by economic sector and by in-stream and off-stream uses. This includes trends in water supply and demand, as well as modeling methods for water supply management. Fundamentals of flood and drought management are covered, with attention given to the context of global climate change and extreme events. The critical role of the general public in water resource management decision making is addressed in the context of structured techniques involving economic analyses, multiobjective analyses, and collaborative decision making. Water quality-based management under the federal Clean Water Act includes the topics of water quality standards, water quality assessments, total maximum daily loads (TMDLs), and ensuing permit requirements. Regional ecological water resources management is addressed for the Susquehanna River and by contrasting the Chesapeake Bay case with other largescale cases.

EN.575.722. Principles of Air Quality Management. 3 Credits.
Air quality management is fundamental to human health and environmental stewardship. This course provides a systematic introduction to the air quality management cycle and how it is applied to protect both outdoor and indoor air quality as well as to mitigate climate change. Air pollutants pose risks at multiple spatial scales—from individual homes to regional and global geographies—and across various timelines—from hours to decades. This course describes the formation, transport, and transformation of air pollution and reviews the historical development of air pollution control programs. As science and technology evolve, the principles of air quality management enhance our ability to protect and restore healthful air quality and address both long-standing and emerging issues. Students will learn how air quality management principles shape and enable a variety of strategies to minimize negative impacts of traditional and newly developed air contaminants. Assignments emphasize analyzing air quality measurements and emissions data as well as comparing and contrasting regulatory approaches. Through a term project students apply knowledge of the principles of air quality management to timely and relevant air quality issues.

EN.575.723. Sustainable Development and Next-Generation Buildings. 3 Credits.
The course will introduce the concepts, applications, and tools for analysis and decision making in support of sustainable environmental development and next-generation communities and building design. Students will be introduced to a variety of challenges related to environmental protection, stewardship, and management of air, soil, and water. The underlying principles of ecological protection, stewardship, reduced environmental footprint, ecosystem capital, sustainable economic development, and globalization impacts will be reviewed. The integration of actions that are ecologically viable, economically feasible, and socially desirable to achieve sustainable solutions will be evaluated. Within this context, the course will explore sustainable building concepts that are intended to provide, throughout their lifetime, a beneficial impact on their occupants and their surrounding environment. Such buildings are optimally integrated on all parameters-initial affordability, timeliness of completion, net life-cycle cost, durability, functionality for programs and persons, health, safety, accessibility, aesthetic and urban design, maintainability, energy efficiency, and environmental sustainability. The principles of LEED building design and certification will also be introduced with a review of example projects. Integrated design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants will be assessed in the broad areas of (1) sustainable site planning, (2) safeguarding water and water efficiency, (3) energy efficiency and renewable energy, (4) conservation of materials and resources, and (5) indoor environmental quality. Also, a further critical element being addressed for a successful sustainable building policy and program is an integrated building planning and design process.

EN.575.731. Water Resources Planning. 3 Credits.
The course will discuss the application and interrelationships among microeconomics, ecology, hydrology, and fields related to the planning and management of water systems. Topics will include flood control, navigation, hydroelectric power, water supply, environmental restoration, multi-objective planning, and urban water resource management. The course will demonstrate the process for planning a water resource project, including identifying the problems and opportunities, inventorying and forecasting conditions, formulating alternative plans, evaluating alternative plans, comparing alternative plans, and selecting a plan. Particular attention will be paid to the appropriate interdisciplinary approach to plan formulation.

EN.575.733. Energy and the Environment. 3 Credits.
This course examines the interrelationships between the environment and the ways in which energy is produced, distributed, and used. Worldwide energy use patterns and projections are reviewed. Particular attention is paid to the electrical and transportation sectors of energy use. Underlying scientific principles are studied to provide a basis for understanding the inevitable environmental consequences of energy use. Topics studied include fossil, nuclear, and existing and potential renewable sources, including hydroelectric, geothermal, tidal, wind, and solar. Transportation options including internal combustion, hybrid, and electric options are quantitatively compared. Use of alternate fuels such as biodiesel and ethanol are evaluated. Emphasis is placed on the environmental impacts of energy sources, including local effects resulting from emissions of nitrogen oxides, sulfur, hydrocarbons, and particulates as well as global effects such as mercury release from coal combustion. Carbon emissions are a continuing theme as each energy technology is studied and its contribution to climate change is assessed. Carbon suppression schemes are examined. Particular attention is paid to consequences and effectiveness of government intervention and regulation. The purpose is to help students understand how energy is converted into useful forms, how this conversion impacts our environment, and how public policy can shape these impacts.

EN.575.734. Smart Growth Strategies for Sustainable Cities. 3 Credits.
This course addresses the concepts, practices, and tools for smart growth sustainable urban planning and provides an understanding of how to apply these to urban communities. The sustainable urban development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present but also for future generations to come. In other words, it is the development and restoration of urban areas that will meet the needs of the present without compromising the ability of future generations to meet their own needs. The course addresses a number of urban design concepts for smart growth and sustainable development, including balanced land use planning principles; importance of an overall transportation strategy; providing urban tree coverage; leveraging public transportation accessibility; providing a spectrum of housing availability; integration of office, retail, and housing units; reduction of urban area environmental footprint; use of recycled, reused, reusable, green, and sustainable products; integration of renewable solar energy and wind power into buildings and government systems; transit-oriented development; innovative low-impact storm water management practices; reduction in urban heat island effects; urban water resource management; and energy efficiency and conservation.

EN.575.735. Energy Policy and Planning Modeling. 3 Credits.
This course provides students with comprehensive knowledge on methods for optimizing operation and design of energy systems and methods for analyzing market impacts of energy and environmental policies with emphasis on both theory and solution of actual models. The course also covers linear and nonlinear programming and complementarity methods for market simulation. Prerequisite(s): Microeconomics or optimization methods (linear programming).

EN.575.736. Designing for Sustainability: Applying a Decision Framework. 3 Credits.
In this course, students will apply a sustainability decision framework, developed by the National Research Council, to an environmental project of their choice. This will include developing a project management plan, a project action plan, and an evaluation and adaptation assessment that will outline how sustainability principles will be incorporated into their project. This applied approach will give students experience in systems thinking, linkages across governmental bodies, development of indicators, use of environmental support tools, transdisciplinary cooperation, and the use of structured decision framework.

EN.575.737. Environmental Security with Applied Decision Analysis Tools. 3 Credits.
This multi-disciplinary course examines current and emerging environmental security issues at multinational, national, and regional scales. These issues are approached from the perspective of decision-making for policy, planning, and management. The course begins with an overview and definitions of environmental security within the context of present global demographic patterns, use of natural resources, and climate change. The theory and principles of multi-criteria decision analysis (MCDA) are reviewed, using environmental security examples to illustrate concepts. Three MCDA methodologies are presented, including multi-attribute weighting, Analytic Hierarchy Process, and outranking, which are commonly used to assist decision makers. The MCDA approach is critiqued from the perspective of measurement theory and guidelines for MCDA use are suggested. With both the social sciences and natural sciences providing a framework, several specific environmental security topics are covered in greater depth: energy; air quality; ecosystems and biodiversity; fresh water; agriculture and food; and sea level rise. Within these topics, students will develop MCDA models for particular policy, planning, and management problems under the guidance of the instructors. The course concludes by considering the prospects for environmental security and sustainability in the coming decades.

EN.575.738. Transportation, Innovation, and Climate Change. 3 Credits.
The world stands at the cusp of an unusually dynamic period in transportation's journey to the future. Legacy technologies coexist with powerful forces pushing forward revolutionary innovation. While cars and other vehicles using conventional fuels are forcing climate change, transportation innovations such as electric and automated vehicles to smart infrastructures are creating new lifestyles where transportation reduces carbon emissions. Transportation innovation creates technological and societal "tipping points" that will transform transport. Nevertheless, the direction and consequences of these "tipping points" are yet to be determined. This course explores transportation innovation at the "systems" level to determine whether or not we are bound to the past or moving actively towards a new future. The course assesses uncertainties regarding the capacity to innovate at a rate that will stimulate sustainability, resilience, and livability. The use of these theories and tools will facilitate a more rigorous approach to anticipating the unintended, synergistic, and circular (feedback) effects of transportation innovation processes. This course covers the following topics: mechanisms of climate change; role and efficacy of climate models; legacy transportation technologies versus revolutionary transportation innovations; assessing alternative climate change futures through existing patterns of technological change; identifying exogenous and endogenous threats; and planning for the future through tools borrowed from a variety of disciplines (e.g., public participation, uncertainty and complexity studies, innovation roadmaps, and portfolio management). Because new policies and practices depend on innovation, the course includes group projects designed to build skills for evaluating the direction of innovation over the short, mid, and long-term and the inherent capacity of a particular locality or region to contribute to systemic technological change.

EN.575.747. Environmental Project Management. 3 Credits.
This course educates students on the key elements of an integrated approach to environmental project management, an endeavor that requires expertise in scientific, engineering, legal, public policy, and project management disciplines. Emphasis is placed on critical factors that are often unique to a major environmental project, such as the uncertainty surrounding scope definition for environmental cleanup projects and the evolving environmental regulatory environment. The students learn to develop environmental project plans, establish project organization and staffing, define management functions, develop time management approaches, resolve project conflicts, determine project effectiveness, and implement integrated project management techniques such as the Program Evaluation and Review Technique and the Critical Path Method as they relate to environmental project management, perform pricing and cost estimating, establish cost control, set priorities, and perform trade-off analyses. The course uses environmental project case studies to examine the integrated nature of environmental project management. Examples of topics to be covered in this case study format include environmental security projects, environmental technology deployment projects, privatization of governmental environmental projects, pollution prevention/waste minimization projects, and environmental review of proposed infrastructure projects.

EN.575.750. Environmental Policy Needs in Developing Countries. 3 Credits.

This course will provide students with a thorough understanding of environmental policy needs in developing countries. The world's fastest growing economies are located in developing countries where rapid urbanization and use of natural resources will require supporting infrastructure. However, there are factors that may encourage or limit this growth, including the country's economic structure, governance, cultural history, demographics, and social structure. Through lectures, research, and group exercises, the students will (1) explore the social, economic, and environmental issues that challenge countries in the developing world as they move toward advancing their economies, infrastructure, and governance systems; (2) analyze how the various issues are interconnected and understand how this interconnectedness may affect environmental policy making; and (3) apply critical thinking to the analysis of environmental policy in order to effectively challenge classical assumptions. The student will be expected to analyze a specific environmental issue facing a developing country or region and develop a policy framework to address this issue.

EN.575.751. Environmental Justice, Climate, and Health Equity. 3 Credits.

Where do we begin in understanding the impact of environmental policy and planning on our natural systems and public health? And how do we broaden the adoption of environmental justice frameworks to environmental design, management, and policy? In this seminar, we'll begin by critically assessing the impact of environmental policy and planning on public health. We'll then examine the contributions of public health, policy, and environmental justice movements towards health inequity in the United States and globally. Lastly, applied public health models and methodologies will provide pragmatic approaches to inform environmental design and management. The seminar draws broadly on research and scholarship from anthropology, public health, and engineering to:?Assess how race, class, and gender influence our experiences and perceptions towards our natural systems, built environments, public health, and policy?Examine innovative public health methodologies integrating qualitative, quantitative, and community-based participatory research to rigorously assess the impact of environmental planning on health and inform equitable, healthy, and sustainable design approaches?Translate public health findings and evidence-based approaches to environmental design to inform and empower policymakers, health professionals, and key community stakeholders to transform environmental conditions

EN.575.752. Environmental Justice and Ethics in Environmental Decision-Making. 3 Credits.

This course focuses on the environmental justice and ethics problems facing environmental engineers, planners, and managers. It explores the foundations of the environmental justice movement, current and emerging issues, and the application of environmental justice analysis to environmental policy and planning. It examines claims made by diverse groups along with the regulatory and government policy responses that address perceived inequity and injustice. The course will study the mechanisms that give rise to class, racial, and other kinds of disparities that impact environmental decision-making. This includes the study of affected constituents, communities, industry, government, environmental activists, policy makers, and scholars, allowing students to learn about the causes and consequences of inequitable distributions of environmental benefits and hazards. Students will learn about various methods for researching environmental justice issues and strategies for formulating policies and collaborating with communities. In this course, students will review environmental justice theories and perspectives through case studies of Black Americans, Hispanic Americans, and Native American Nations. The class will focus mainly on the United States, but will include aspects of international issues and perspectives through research projects.

EN.575.753. Communication of Environmental Information and Stakeholder Engagement. 3 Credits.

This course provides students with the skills for communicating scientific environmental data and sustainable engineering design to stakeholders, including scientists in different fields, policy decision makers, and the interested public. The course covers the importance of clear communication of complex scientific information for the development and acceptance of technologies, public policy, and communitybased environmental initiatives. The key stakeholders for environmental engineers, scientists, and managers are specified. Methods of engagement and designing key messages are defined for global, national, and local issues of student interest. Major types of communication media are covered, including written communication and graphics, online communications in short- and long-form new media, and interactive communications such as surveys and citizen science to involve stakeholders in the creation and analysis of big data and dispersed information. The emphasis of the course is from the point of view of an environmental professional (not a marketing professional) and developing an effective sciencebased communications portfolio to share complex scientific information with a broad range of interested parties.

EN.575.759. Environmental Policy Analysis. 3 Credits.
The course explores the process of analyzing environmental policies to ensure human health, that environmental needs are protected, and that the physical environment is preserved, protected, and restored, if necessary. Emphasis is placed on the need to evaluate and make decisions regarding environmental science, human health, sociopolitical, technological, legal, and economic considerations in a context of incomplete information and uncertain futures. Case studies and policies relating to various contemporary environmental issues, for example hazardous waste disposal, natural resource extraction and preservation of natural resources, are critiqued during the semester. The course will lead students through the various steps of the policy analysis process. Students are expected to evaluate policy alternatives, develop evaluation criteria, and apply qualitative and quantitative methods to determine consequences, trade-offs, and potential synergies relating to these environmental issues. Students will then use these skills to create and execute an individual research project that analyzes an environmental policy relating to a specific issue of interest to them, evaluating potential responses to environmental management problems through analyzing the impacts of each policy alternative.

EN.575.771. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machine learning, to explore data sets, explain phenomena and build models for inference and prediction. The course begins with an overview of some traditional analysis approaches including ordinary least squares regression and related topics, notably diagnostic testing, detection of outliers and methods to impute missing data. Next comes nonlinear regression, and regularization models including ridge regression. Generalized linear models follow, emphasizing logistic regression and including models for polytomous data. Variable subsetting is addressed through stepwise procedures and the LASSO. Supervised machine learning topics include the basic concepts of resampling, boosting and bagging and several techniques: Decision Trees, Classification and Regression Trees, Random Forests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and Neural Networks. Unsupervised approaches are addressed through applications using principal component analysis, k-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods for assessing model predictive performance are introduced including Confusion Matrices, k-fold Cross-Validation and Receiver Operating Characteristic Curves. Environmental and public health applications are emphasized, with modeling techniques and analysis tools implemented in R.

Environmental Engineering

Environmental Engineering

Environmental Engineering, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree, would be eligible for the Graduate Certificate in Environmental Engineering as long as they satisfy the requirements for admission for the Environmental Engineering Master's degree program (p. 1531).

Admitted students have typically earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Significant relevant work experience or a graduate degree in a relevant technical discipline may be considered in lieu of meeting the GPA requirement.

If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit.

Program Requirements

This graduate certificate requires successful completion of five courses within five years. At least three of the five courses must be taken within the Environmental Engineering program.

Only grades of B– or above can count toward the graduate certificate. All course selections outside of the program requirements are subject to advisor approval.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Environmental Engineering, Master of Environmental Engineering

The degree and certificates offered under this program emphasize the design of environmental processes, infrastructures, remediation technologies, and treatment processes.

Admission Requirements

Applicants (degree seeking and special students) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. In order to be admitted into the Master of Environmental Engineering program, applicants need to hold an undergraduate engineering degree issued by a program accredited by the Engineering Accreditation Commission (EAC) of the Accreditation Board for Engineering and Technology (ABET (https://nam02.safelinks.protection.outlook.com/?url=http
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%7C1000&sdata=DfyDpB7TNpct2FIFVkR3FIo3xN2uxlM907l1B%2BuQNkg
%3D&reserved=0)) or pass a Fundamentals of Engineering (FE) exam, administered by the National Council of Examiners for Engineering and Surveying (NCEES (https://nam02.safelinks.protection.outlook.com/?
url=https%3A%2F%2Fncees.org%2Fengineering
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%7C1000&sdata=tmtZr5v4Qu232uZZ
%2FcMx5Nq4BCVDNrgPNOhHXnIO6mo%3D&reserved=0)).

The applicant's prior education must also include successful completion of:

1. mathematics courses that include a calculus sequence and differential equations and
2. successful completion of a course in fluid mechanics or hydraulics is strongly recommended.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Applicants with an undergraduate degree in natural sciences may enroll under provisional status to complete additional undergraduate coursework in engineering fundamentals and design prior to full admission to the program.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of five courses from the Environmental Engineering program and five electives.

Electives may be selected from any of the three environmental areas of study: Environmental Engineering (p. 1532), Environmental Engineering and Science (p. 1533), or Environmental Planning and Management (p. 1535), subject to prerequisite restrictions. Only one C-range grade (C +, C, or C–) can count toward the master's degree.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Courses

Code	Title	Credits
Required Course		
EN.575.604	Principles of Environmental Engineering [1]	3
Environmental Engineering		
Select a minimum of five of the following:		
EN.575.605	Principles of Water and Wastewater Treatment	3
EN.575.606	Water Supply and Wastewater Collection	3
EN.575.607	Radioactive Waste Management	3
EN.575.620	Solid Waste Engineering & Management	3
EN.575.623	Industrial Processes and Pollution Prevention	3
EN.575.703	Environmental Biotechnology	3
EN.575.706	Biological Processes for Water & Wastewater Treatment	3
EN.575.715	Environmental Contaminant Dispersion and Transport	3
EN.575.721	Air Quality Control Technologies	3
EN.575.732	Energy Technologies for Solving Environmental Challenges	3
EN.575.741	Membrane Filtration Systems and Applications in Water and Wastewater Treatment	3
EN.575.742	Hazardous Waste Engineering and Management	3
EN.575.745	Physical and Chemical Processes for Water and Wastewater Treatment	3
EN.575.746	Water and Wastewater Treatment Plant Design	3
EN.575.749	Water Quality of Rivers, Lakes, and Estuaries	3
EN.575.761	Measurement and Pseudo-measurement in the Environmental Arena	3
EN.575.801	Independent Project	3

[1] All students in the Environmental Engineering, Science, and Management Programs who do not possess an undergraduate degree in Environmental Engineering must take 575.604 Principles of Environmental Engineering as one of their required courses.

Electives

Code	Title	Credits
Select up to five of the following electives:		
EN.575.601	Fluid Mechanics	3
EN.575.608	Optimization Methods for Public Decision Making	3
EN.575.611	Economic Foundations for Public Decision Making	3
EN.575.615	Ecology	3
EN.575.619	Principles of Toxicology, Risk Assessment & Management	3
EN.575.626	Hydrogeology	3
EN.575.628	Business Law For Engineers	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
EN.575.635	Environmental Law for Engineers & Scientists	3
EN.575.637	Environmental Impact Assessment	3
EN.575.640	Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications	3
EN.575.643	Chemistry of Aqueous Systems	3
EN.575.645	Environmental Microbiology	3
EN.575.658	Natural Disaster Risk Modeling	3
EN.575.704	Applied Statistical Analysis and Design of Experiments for Environmental Applications	3
EN.575.707	Environmental Compliance Management	3
EN.575.708	Open Channel Hydraulics	3
EN.575.710	Financing Environmental Projects	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.713	Field Methods in Habitat Analysis and Wetland Delineation	3
EN.575.714	Water Resources Management	3
EN.575.716	Principles of Estuarine Environment: The Chesapeake Bay Science and Management	3
EN.575.717	Hydrology	3
EN.575.720	Air Resources Management and Modeling	3
EN.575.723	Sustainable Development and Next-Generation Buildings	3
EN.575.727	Environmental Monitoring and Sampling	3
EN.575.728	Sediment Transport and River Mechanics	3
EN.575.730	Geomorphic and Ecologic Foundations of Stream Restoration	3
EN.575.731	Water Resources Planning	3

EN.575.733	Energy and the Environment	3
EN.575.734	Smart Growth Strategies for Sustainable Cities	3
EN.575.735	Energy Policy and Planning Modeling	3
EN.575.736	Designing for Sustainability: Applying a Decision Framework	3
EN.575.737	Environmental Security with Applied Decision Analysis Tools	3
EN.575.738	Transportation, Innovation, and Climate Change	3
EN.575.743	Atmospheric Chemistry	3
EN.575.744	Environmental Chemistry	3
EN.575.747	Environmental Project Management	3
EN.575.750	Environmental Policy Needs in Developing Countries	3
EN.575.752	Environmental Justice and Ethics in Environmental Decision-Making	3
EN.575.753	Communication of Environmental Information and Stakeholder Engagement	3
EN.575.759	Environmental Policy Analysis	3
EN.575.763	Nanotechnology and the Environment: Applications and Implications	3
EN.575.771	Data Analytics in Environmental Health and Engineering	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Environmental Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Environmental Engineering.

Program Requirements

Five courses must be completed within five years. At least three of the five courses must at the 700-level and be be taken within the Environmental Engineering program (575.7XX).

Only grades of B– or above can count toward the post-master's certificate. All course selections outside of the program requirements are subject to advisor approval.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Environmental Engineering and Science

Environmental Engineering and Science

- Environmental Engineering and Science, Graduate Certificate
- Environmental Engineering and Science, Master of Science (p. 1533)
- Environmental Engineering and Science, Post-Master's Certificate (p. 1534)

Environmental Engineering and Science, Master of Science

The degree and certificates offered under this program emphasizes the fundamental concepts of physics, chemistry, biology, and geology as applied in the context of environmental issues, with less emphasis on design and management.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include:

1. successful completion of one year of college-level calculus, and
2. successful completion of college-level courses in physics, chemistry, biology, geology, statistics, and differential equations is strongly recommended.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Ten courses must be completed within five years. The curriculum consists of five courses from the Environmental Engineering and Science program and five electives.

Electives may be selected from any of the three environmental areas of study: Environmental Engineering (p. 1532), Environmental Engineering and Science (p. 1533), or Environmental Planning and Management (p. 1535), subject to prerequisite restrictions. Only one C-range grade (C+, C, or C–) can count toward the master's degree.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Courses

Code	Title	Credits
Required Course (Students with an undergraduate degree in Environmental Engineering are exempt from this requirement.)		
EN.575.604	Principles of Environmental Engineering [1]	3
Environmental Engineering and Science		
Select a minimum of five from the following:		
EN.575.601	Fluid Mechanics	3
EN.575.615	Ecology	3
EN.575.619	Principles of Toxicology, Risk Assessment & Management	3
EN.575.626	Hydrogeology	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
EN.575.643	Chemistry of Aqueous Systems	3
EN.575.645	Environmental Microbiology	3

EN.575.704	Applied Statistical Analysis and Design of Experiments for Environmental Applications	3
EN.575.708	Open Channel Hydraulics	3
EN.575.713	Field Methods in Habitat Analysis and Wetland Delineation	3
EN.575.716	Principles of Estuarine Environment: The Chesapeake Bay Science and Management	3
EN.575.717	Hydrology	3
EN.575.720	Air Resources Management and Modeling	3
EN.575.727	Environmental Monitoring and Sampling	3
EN.575.728	Sediment Transport and River Mechanics	3
EN.575.730	Geomorphic and Ecologic Foundations of Stream Restoration	3
EN.575.743	Atmospheric Chemistry	3
EN.575.744	Environmental Chemistry	3
EN.575.763	Nanotechnology and the Environment: Applications and Implications	3
EN.575.801	Independent Project	3

[1] All students in the Environmental Engineering, Science, and Management Programs who do not possess an undergraduate degree in Environmental Engineering must take EN.575.604 Principles of Environmental Engineering as one of their required courses.

Electives

Code	Title	Credits
Select up to five of the following electives:		
EN.575.604	Principles of Environmental Engineering	3
EN.575.605	Principles of Water and Wastewater Treatment	3
EN.575.606	Water Supply and Wastewater Collection	3
EN.575.607	Radioactive Waste Management	3
EN.575.608	Optimization Methods for Public Decision Making	3
EN.575.611	Economic Foundations for Public Decision Making	3
EN.575.620	Solid Waste Engineering & Management	3
EN.575.623	Industrial Processes and Pollution Prevention	3
EN.575.628	Business Law For Engineers	3
EN.575.635	Environmental Law for Engineers & Scientists	3
EN.575.637	Environmental Impact Assessment	3
EN.575.640	Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications	3
EN.575.658	Natural Disaster Risk Modeling	3
EN.575.703	Environmental Biotechnology	3
EN.575.706	Biological Processes for Water & Wastewater Treatment	3
EN.575.707	Environmental Compliance Management	3
EN.575.710	Financing Environmental Projects	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.714	Water Resources Management	3
EN.575.715	Environmental Contaminant Dispersion and Transport	3
EN.575.721	Air Quality Control Technologies	3
EN.575.723	Sustainable Development and Next-Generation Buildings	3
EN.575.731	Water Resources Planning	3
EN.575.732	Energy Technologies for Solving Environmental Challenges	3
EN.575.733	Energy and the Environment	3
EN.575.734	Smart Growth Strategies for Sustainable Cities	3
EN.575.735	Energy Policy and Planning Modeling	3
EN.575.736	Designing for Sustainability: Applying a Decision Framework	3
EN.575.737	Environmental Security with Applied Decision Analysis Tools	3
EN.575.738	Transportation, Innovation, and Climate Change	3
EN.575.741	Membrane Filtration Systems and Applications in Water and Wastewater Treatment	3
EN.575.742	Hazardous Waste Engineering and Management	3
EN.575.745	Physical and Chemical Processes for Water and Wastewater Treatment	3
EN.575.746	Water and Wastewater Treatment Plant Design	3
EN.575.747	Environmental Project Management	3
EN.575.749	Water Quality of Rivers, Lakes, and Estuaries	3
EN.575.750	Environmental Policy Needs in Developing Countries	3
EN.575.752	Environmental Justice and Ethics in Environmental Decision-Making	3
EN.575.753	Communication of Environmental Information and Stakeholder Engagement	3
EN.575.759	Environmental Policy Analysis	3
EN.575.761	Measurement and Pseudo-measurement in the Environmental Arena	3
EN.575.771	Data Analytics in Environmental Health and Engineering	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Environmental Engineering and Science, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Environmental Engineering and Science.

Program Requirements

Five courses must be completed within five years. At least three of the five courses must at the 700-level and be be taken within the Environmental Engineering and Science program (575.7XX).

Only grades of B– or above can count toward the post-master's certificate. All course selections outside of the program requirements are subject to advisor approval.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Environmental Planning and Management

Environmental Planning and Management

Environmental Planning and Management, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree, would be eligible for the Graduate Certificate in Environmental Planning and Management as long as they satisfy the requirements for admission for the Environmental Planning and Management Master's degree program (p. 1535).

Admitted students have typically earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Significant relevant work experience or a graduate degree in a relevant technical discipline may be considered in lieu of meeting the GPA requirement.

If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit.

Program Requirements

This graduate certificate requires successful completion of five courses within five years. At least three of the five courses must be taken within the Environmental Planning and Management program.

Only grades of B– or above can count toward the graduate certificate. All course selections outside of the program requirements are subject to advisor approval.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Environmental Planning and Management, Master of Science

The degree and certificates offered under this program emphasize the relationship between environmental engineering, science and public policy analysis. Students will also focus on the role of economic factors in the planning and management of environmental resources using proven decision-making tools.

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include:

1. successful completion of one year of college-level calculus, and
2. successful completion of college-level courses in physics, chemistry, biology, geology, and statistics is strongly recommended.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of five courses from the Environmental Planning and Management program and five electives.

Electives may be selected from any of the three environmental areas of study: Environmental Engineering (p. 1532), Environmental Engineering and Science (p. 1533), or Environmental Planning and Management (p. 1535), subject to prerequisite restrictions. Only one C-range grade (C +, C, or C–) can count toward the master's degree.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Courses

Code	Title	Credits
Required Course (Students with an undergraduate degree in Environmental Engineering are exempt from this requirement.)		
EN.575.604	Principles of Environmental Engineering [1]	3
Environmental Planning and Management		
Select a minimum of five of the following:		
EN.575.608	Optimization Methods for Public Decision Making	3
EN.575.611	Economic Foundations for Public Decision Making	3
EN.575.628	Business Law For Engineers	3
EN.575.635	Environmental Law for Engineers & Scientists	3
EN.575.637	Environmental Impact Assessment	3
EN.575.640	Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications	3
EN.575.658	Natural Disaster Risk Modeling	3
EN.575.707	Environmental Compliance Management	3
EN.575.710	Financing Environmental Projects	3
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.714	Water Resources Management	3
EN.575.722	Principles of Air Quality Management	3
EN.575.723	Sustainable Development and Next-Generation Buildings	3
EN.575.731	Water Resources Planning	3
EN.575.733	Energy and the Environment	3
EN.575.734	Smart Growth Strategies for Sustainable Cities	3

EN.575.735	Energy Policy and Planning Modeling	3
EN.575.736	Designing for Sustainability: Applying a Decision Framework	3
EN.575.737	Environmental Security with Applied Decision Analysis Tools	3
EN.575.738	Transportation, Innovation, and Climate Change	3
EN.575.747	Environmental Project Management	3
EN.575.750	Environmental Policy Needs in Developing Countries	3
EN.575.752	Environmental Justice and Ethics in Environmental Decision-Making	3
EN.575.753	Communication of Environmental Information and Stakeholder Engagement	3
EN.575.759	Environmental Policy Analysis	3
EN.575.771	Data Analytics in Environmental Health and Engineering	3
EN.575.801	Independent Project	3

[1] All students in the Environmental Engineering, Science, and Management Programs who do not possess an undergraduate degree in Environmental Engineering must take EN.575.604 Principles of Environmental Engineering as one of their required courses.

Electives

Code	Title	Credits
Select up to five of the following electives:		
EN.575.601	Fluid Mechanics	3
EN.575.604	Principles of Environmental Engineering	3
EN.575.605	Principles of Water and Wastewater Treatment	3
EN.575.606	Water Supply and Wastewater Collection	3
EN.575.607	Radioactive Waste Management	3
EN.575.615	Ecology	3
EN.575.619	Principles of Toxicology, Risk Assessment & Management	3
EN.575.620	Solid Waste Engineering & Management	3
EN.575.623	Industrial Processes and Pollution Prevention	3
EN.575.626	Hydrogeology	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
EN.575.643	Chemistry of Aqueous Systems	3
EN.575.645	Environmental Microbiology	3
EN.575.703	Environmental Biotechnology	3
EN.575.704	Applied Statistical Analysis and Design of Experiments for Environmental Applications	3
EN.575.706	Biological Processes for Water & Wastewater Treatment	3
EN.575.708	Open Channel Hydraulics	3
EN.575.713	Field Methods in Habitat Analysis and Wetland Delineation	3
EN.575.715	Environmental Contaminant Dispersion and Transport	3
EN.575.716	Principles of Estuarine Environment: The Chesapeake Bay Science and Management	3
EN.575.717	Hydrology	3
EN.575.720	Air Resources Management and Modeling	3
EN.575.721	Air Quality Control Technologies	3
EN.575.727	Environmental Monitoring and Sampling	3
EN.575.728	Sediment Transport and River Mechanics	3
EN.575.730	Geomorphic and Ecologic Foundations of Stream Restoration	3
EN.575.732	Energy Technologies for Solving Environmental Challenges	3
EN.575.741	Membrane Filtration Systems and Applications in Water and Wastewater Treatment	3
EN.575.742	Hazardous Waste Engineering and Management	3
EN.575.743	Atmospheric Chemistry	3
EN.575.744	Environmental Chemistry	3
EN.575.745	Physical and Chemical Processes for Water and Wastewater Treatment	3
EN.575.746	Water and Wastewater Treatment Plant Design	3
EN.575.749	Water Quality of Rivers, Lakes, and Estuaries	3
EN.575.761	Measurement and Pseudo-measurement in the Environmental Arena	3
EN.575.763	Nanotechnology and the Environment: Applications and Implications	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Environmental Planning and Management, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Environmental Planning and Management.

Program Requirements

Five courses must be completed within five years. At least three of the five courses must at the 700-level and be be taken within the Environmental Planning and Management program (575.7XX).

Only grades of B– or above can count toward the post-master's certificate. All course selections outside of the program requirements are subject to advisor approval.

Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Climate Change, Energy, and Environmental Sustainability, Graduate Certificate

As the world's population increases and technological advances accelerate, demands for natural resources and energy continue to threaten Earth's physical and ecological systems. Johns Hopkins Engineering for Professionals' Climate Change, Energy, and Environmental

Sustainability graduate certificate program provides valuable knowledge to engineers, scientists, and managers to design and implement solutions to these environmental, social, and economic challenges. The program provides students with the expertise needed to enter or advance in public and private sector roles related to energy, sustainability, and climate. Students gain advanced knowledge in areas such as climate change, energy planning, alternative energy technologies, transportation innovation to curtail atmospheric pollution, sustainable development, next generation buildings, air resources management, pollution control technologies, and related public health considerations.

Applicants interested in the Climate Change, Energy, and Environmental Sustainability Graduate Certificate Program must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include (1) an undergraduate degree from a regionally accredited four-year college or university and (2) successful completion of one year of college-level calculus. Successful completion of college-level courses in physics, chemistry, biology, geology, and statistics is strongly recommended. Applicants whose prior education does not include the prerequisites listed above may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering for Professionals or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

The Graduate Certificate in Climate Change, Energy, and Environmental Sustainability requires the successful completions of five core courses (15 EP credits or equivalent) selected from the list below. The certificate program must be accomplished within three years. Only grades of B^{-} or above can count toward the graduate certificate. Any deviation from this program, including transfer of courses and any other requisites specified in the student's admission letter, will not be approved by the program chair.

Courses

Code	Title	Credits
EN.575.711	Climate Change and Global Environmental Sustainability	3
EN.575.720	Air Resources Management and Modeling	3
EN.575.721	Air Quality Control Technologies	3
EN.575.723	Sustainable Development and Next-Generation Buildings	3
EN.575.733	Energy and the Environment	3
EN.575.734	Smart Growth Strategies for Sustainable Cities	3
EN.575.735	Energy Policy and Planning Modeling	3
EN.575.736	Designing for Sustainability: Applying a Decision Framework	3
EN.575.738	Transportation, Innovation, and Climate Change	3
EN.575.743	Atmospheric Chemistry	3
EN.575.623	Industrial Processes and Pollution Prevention	3

Financial Mathematics

The Financial Mathematics program aims to equip graduates with the engineering-driven approaches widely used to construct and deploy the financial transactions and processes that, in their context, function as the international financial system and the capital markets. These are the mechanisms enabling the creation/employment of wealth and for the worldwide distribution of well-being within the constraints and intent of global financial policy.

This program is only offered online.

Program Committee

David Audley, Program Chair
Senior Lecturer
JHU Whiting School of Engineering

Programs

Courses

EN.555.627. Stochastic Processes and Applications to Finance. 3 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science.

EN.555.642. Investment Science. 3 Credits.
This is the key introductory course for the financial mathematics program and introduces the major topics of investment finance. The investment universe, its context of markets, and the flow of global capital are introduced. Details of equities, interest, bonds, commodities, forwards, futures, and derivatives are introduced to varying degree. The concepts of deterministic cash flow stream, valuation, term structure theories, risk, and single- and multi-period random cash flows are presented. Here the neoclassical theory of finance is introduced including the topics of efficient markets, the risk-return twins leading to the mean variance Capital Asset Pricing Model (CAPM), the efficient frontier, the intertemporal models, and Arbitrage Pricing Theory (APT). Some introductory models of asset dynamics (including the binomial model), basic options theory, and elements of hedging are also included in this course. Course Note(s): This course is the same as EN.553.642 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.644. Introduction to Financial Derivatives. 3 Credits.
This is the first of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. The basic cash, hybrid, and derivative instruments are reviewed and set in a rigorous mathematical context. This includes equities, bonds, options, forwards, futures, and swaps, as well as their dealer, overthe-counter, and exchange environment. Models of the term structure of interest rates, spot rates and, the forward rate curve are treated; derived from cash instruments (e.g., bonds and interest rates like LIBOR) as well as from derivatives (such as Eurodollar futures and swaps). Principles of static, discrete, continuous and dynamic probabilistic models for derivative analysis (including the Weiner process, Ito's Lemma, and an introduction to risk-neutral valuation) are applied to develop the binomial tree approach to option valuation, the Black-ScholesMerton differential equation, and the Black-Scholes formulas for option pricing. Course Note(s): This course is the same as EN.553.644 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.645. Interest Rate and Credit Derivatives. 3 Credits.
This is the second of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. Focus turns to interest rate derivatives and the credit markets. The martingale approach to risk-neutral valuation is covered, followed by interest rate derivatives and models of the short rate process (including Heath, Jarrow & Morton and the Libor Market Model); analysis of bonds with embedded options and other interest rate derivatives (e.g., caps, floors, swaptions). Credit risk and credit derivatives, including copula models of time to default, credit default swaps, and a brief introduction to collateralized debt obligations will be covered. A major component of this course is computational methods. This includes data and time series analysis (e.g., estimation of volatilities), developing binomial and trinomial lattices and derivative analysis schemes, and numerical approaches to solving the partial differential equations of derivatives. Course Note(s): This course is the same as EN.553.645 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.
EN.555.644 Introduction to Financial Derivatives

EN.555.646. Financial Risk Management and Measurement. 3 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings, and compensatory techniques are addressed. Throughout the course, the environment for risk is considered, be it regulatory or social (e.g., Basel capital accords). A major component of the course are the Value at Risk (VaR) and Conditional VaR measures for market risk in trading operations, including approaches for calculating and aggregating VaR, testing VaR, VaR-driven capital for market risk, and limitations of the VaR-based approach. Asset Liability Management (ALM), where liquidity risk as well as market risk can affect the balance sheet, is analyzed. Here, models for interest rate, spread, and volatility risks are applied to quantify this exposure. Another major component of the course is credit risk. Sources of credit risk, how measured risk is used to manage exposure, credit derivatives, techniques for measuring default exposure for a single facility (including discriminant analysis and Mertonbased simulation), portfolio risk aggregation approaches (including covariance, actuarial, Merton-based simulation, macro-economic default model, and the macro-economic cashflow model - for structured and project finance). Finally, there is a brief introduction to concepts and tools that remain valid for large and extreme price moves, including the theory of copulas and their empirical testing and calibration. Course Note(s): This course is the same as EN.553.646 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.647. Quantitative Portfolio Theory & Performance Analysis. 3 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including Sharpe, Treynor, and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement, and attribution; Replicating Benchmark Index (RBI) strategies using cash securities/derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management (Passive, Quasi-Passive [Indexing] Semi-Active [Immunization & Dedicated] Active [Scenario, Relative Value, Total Return and Optimization]). In addition, risk management and hedging techniques are also addressed. Course Note(s): This course is the same as EN.553.647 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.648. Financial Engineering and Structured Products. 3 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives, and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis). Course Note(s): This course is the same as EN.553.648 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

Financial Mathematics, Master of Science

This program is only offered online.

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include:

1. an undergraduate or graduate degree in a quantitative discipline (e.g., mathematics, engineering, or the sciences) from a regionally accredited college or university and
2. at least two years of experience in finance or a related field is suggested.

Applicants must show competency (generally, through their undergraduate transcripts) in:

1. calculus, through multivariable calculus;
2. linear algebra;
3. differential equations;
4. probability and statistics; and
5. computer programming, which must be demonstrated through coursework, MOOC course completion with verification, or work experience.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered.

Program Requirements

Ten courses must be completed within five years. The curriculum nominally consists of nine core courses and one elective. The elective can be selected from the elective list below or can be any course approved by the student's advisor. Certain course substitutions may be accepted upon approval of the Program Director via the recommendation of a student's advisor. Only one C-range grade (C+, C, or C–) can count toward the master's degree.

Home-to-Hopkins

Home-to-Hopkins students are permitted to substitute Homewood Campus courses to help meet EP program course requirements. Students should work with their faculty advisor to develop a course plan that will satisfy the degree requirements.

Courses

Code	Title	Credits
Core Courses		
EN.555.642	Investment Science	3
or EN.625.641	Mathematics of Finance	
EN.555.644	Introduction to Financial Derivatives	3
EN.555.645	Interest Rate and Credit Derivatives	3
EN.555.646	Financial Risk Management and Measurement	3
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.616	Optimization in Finance	3
EN.625.633	Monte Carlo Methods	3
EN.625.695	Time Series Analysis	3
EN.625.714	Introductory Stochastic Differential Equations with Applications	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Code	Title	Credits
Electives		
EN.555.647	Quantitative Portfolio Theory & Performance Analysis	3
EN.555.648	Financial Engineering and Structured Products	3

Financial Risk Management, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree are eligible for a Graduate Certificate in Financial Risk Management, Quantitative Portfolio Management, or Securitization. Applicants are required to meet the same requirements for admission as the master's degree.

Program Requirements

Four courses must be completed within five years. Only grades of B– or above may be counted toward the certificate.

Graduate Certificate Courses

Code	Title	Credits
Financial Risk Management		
EN.555.644	Introduction to Financial Derivatives	3
EN.555.646	Financial Risk Management and Measurement	3
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.633	Monte Carlo Methods	3

Quantitative Portfolio Management, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree are eligible for a Graduate Certificate in Financial Risk Management, Quantitative Portfolio Management, or Securitization. Applicants are required to meet the same requirements for admission as the master's degree.

Program Requirements

Four courses must be completed within five years. Only grades of B– or above may be counted toward the certificate.

Graduate Certificate Courses

Code	Title	Credits
Quantitative Portfolio Management		
EN.555.644	Introduction to Financial Derivatives	3
EN.555.647	Quantitative Portfolio Theory & Performance Analysis	3
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.616	Optimization in Finance	3

Securitization, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree are eligible for a Graduate Certificate in Financial Risk Management, Quantitative Portfolio Management, or Securitization. Applicants are required to meet the same requirements for admission as the master's degree.

Program Requirements

Four courses must be completed within five years. Only grades of B– or above may be counted toward the certificate.

Graduate Certificate Courses

Code	Title	Credits
Securitization		
EN.555.644	Introduction to Financial Derivatives	3
EN.555.648	Financial Engineering and Structured Products	3
EN.625.603	Statistical Methods and Data Analysis	3
EN.625.633	Monte Carlo Methods	3

Healthcare Systems Engineering

The Healthcare Systems Engineering program at Johns Hopkins University provides engineers and healthcare professionals with the in-depth knowledge and skills necessary to apply systems engineering principles and best practices to address today's healthcare challenges and create healthcare of the future. Students will be well prepared to re-engineer healthcare delivery on a broad scale by using a systems approach. This approach will lead to solutions that seamlessly integrate technology into the cultural and workflow dynamics prevalent in healthcare, while holistically addressing interoperability, security/privacy, safety, cost, performance (i.e., outcomes, etc.), and other key requirements.

Instructors are practicing systems engineers or healthcare professionals who incorporate real-world problem-solving activities and case studies into discussion topics.

Courses are offered online. Selected electives from the Bloomberg School of Public Health are offered in-person for those students that prefer a classroom setting.

Program Committee

Alan Ravitz, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

Conrad Grant
Principal Professional Staff
JHU Applied Physics Laboratory

Adam Sapirstein
Director, Division of Adult Critical Care Medicine
Associate Professor of Anesthesiology and Critical Care Medicine

Michael Grant
Assistant Professor, Johns Hopkins University School of Medicine, Department of Anesthesiology and Critical Care Medicine

Programs

- Healthcare Systems Engineering, Master of Science (p. 1541)

Courses

EN.655.662. Intro to Healthcare Systems Engineering. 3 Credits.
This course introduces students to the fundamental principles of healthcare systems engineering and their application to the development of complex systems. It describes how the systems engineering viewpoint differs from that of the healthcare provider, as well as the essential role that systems engineering plays as an integral component of program management. Topics include integrated systems engineering life cycle purpose and constructs, delineation of different complex system types, requirements analysis, concept definition, system synthesis, design trade-offs, risk assessment, interface definition, engineering design, system integration, and related systems engineering activities. The course defines the breadth and depth of the knowledge that the healthcare systems engineer must acquire concerning the characteristics of the diverse components that constitute the total system. Special topics such as architectures, interfaces, simulation and models, and test and evaluation are discussed in relation to the healthcare systems engineering viewpoint. Students address typical systems engineering problems that highlight important healthcare issues and methods of technical problem resolution.

EN.655.667. Management of Healthcare Systems Projects. 3 Credits.
The course addresses the management of a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the healthcare systems project manager. From the development of a proposal to the delivery of a product and/or service to a customer, the efforts to conceive, plan, budget, schedule, monitor, control/direct, and report the progress of the project are discussed. Throughout the project life cycle, the need for good communications, interface and configuration management, and conflict resolution is emphasized. Students assume the role of project managers who must use management tools such as WBS, EVM, and CPN and who must address typical problems that arise in the conduct of a high-technology systems project.

EN.655.705. Emerging Topics in Health. 3 Credits.

EN.655.767. Healthcare System Conceptual Design. 3 Credits.
This course addresses in detail the healthcare systems engineer's responsibilities and activities during the conceptual phases of a healthcare system development program. Systems engineering tools commonly employed at this stage of a program are presented along with selected problems that illustrate both the applicability and limitations of commonly employed tools and procedures to the solving current healthcare issues. The course steps through conceptual design beginning with analysis of needs and objectives and proceeding to the exploration of concepts and the selection of a concept that best meets goals of performance, timeliness, and affordability. Topics include definition of operational scenarios, functional analysis, risk assessment, system trade-offs, measures of effectiveness, and requirements formulation. Emphasis is on the application of these systems engineering techniques in a team environment to a class project. Students apply systems engineering methods learned from reading and lectures to the development of a realistic system in an ongoing project in a team format.
EN.655.662 Introduction to Healthcare Systems Engineering and EN.655.667 Management of Healthcare Systems Projects, or permission of the student's faculty advisor and the course instructor.

EN.655.768. Healthcare System Design & Integration. 3 Credits.
This course addresses the healthcare systems engineering objectives, responsibilities, and activities during two phases of the system development life cycle: demonstration and validation, and engineering and manufacturing development. Healthcare systems engineering procedures and tools used during these phases are identified and their use illustrated. Topics include the relationship between a system specification and the system design, risk management and patient safety, system design models, healthcare provider and patient integration into the design process, and healthcare design disciplines and practices. The course uses a healthcare system scenario extensively to illustrate systems engineering principles and specific product design issues.
EN.655.767 Healthcare System Conceptual Design or permission of the student's faculty advisor and the instructor.

EN.655.769. Healthcare System Test and Evaluation. 3 Credits.
This course focuses on the application of systems engineering principles to the test and evaluation of healthcare system elements and, ultimately, of the total system. Test requirements, selection of critical test parameters, analysis of test results, and determination of remedial action in the event of discrepancies are all systems engineering functions. Topics include validation and verification, similarities and differences in the nature of hardware and software testing, test tools and test procedures, testing during hardware–software integration, quality assurance test, environmental test, and operational test and evaluation. Student problems include scenario case studies using examples developed in the several previous courses.
EN.655.768 Healthcare System Design and Integration or permission of the student's faculty advisor and the instructor.

EN.655.771. Healthcare Systems. 3 Credits.
This course will cover the fundamental elements of modern healthcare systems, including their structure, processes, and relation to information systems and system interfaces. It also covers the organization, financing, and delivery of healthcare in the United States. It also discusses several potential small and large-scale reforms to the U.S. healthcare system and evaluates their likely effects on healthcare spending, quality of care, and access to care.
EN.655.662 and EN.655.667 or permission of the student's faculty advisor and the instructor.;Course too similar

EN.655.800. Healthcare Systems Engineering Capstone Project. 3 Credits.
This course provides the experience of applying systems engineering principles and skills learned in the formal courses to a specific practical healthcare system project that is suggested by the student and is presented in a formal proposal. The product of the system project is a final report; also required are interim reports and an oral presentation to permit review of the project objectives and approach. A student typically has a mentor who is a member of the Systems Engineering faculty. The program chair and mentor review proposals and reports. The total time required for this course is comparable to the combined class and study time for the formal courses (formerly 645.770). It is self-paced and often takes more than one semester to complete.
EN.655.769 Healthcare System Test and Evaluation and completion of at least 3 of the four required electives and permission of course instructor.

Healthcare Systems Engineering, Master of Science

Admission Requirements

General admission requirements for master's degree candidates and others seeking graduate status are as follows: applicants must be in the last semester of undergraduate study or hold a bachelor's degree from a regionally accredited college or university.

In addition, applicants for the Master of Science in Healthcare Systems Engineering must have a prior educational experience that includes an undergraduate major in engineering, the sciences, or in healthcare. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered. Applicants will typically have at least two years of experience in engineering or the healthcare field. A detailed professional experience résumé must be submitted.

Program Requirements

In order to earn a Master of Science in Healthcare Systems Engineering, the student must complete 30 credits within five years. The curriculum consists of seven required core courses (21 credits) and three elective courses (9 credits). Students are advised to take the first five core courses in sequential order as listed in the course list below and are advised to group core courses sequentially if taking multiple core courses in one term. They may choose to take EN.655.771 Healthcare Systems any time after or concurrently with EN.655.662 Intro to Healthcare Systems Engineering. Students are advised to take EN.655.662 Intro to Healthcare Systems Engineering and EN.655.667 Management of Healthcare Systems Projects prior to taking elective courses. In rare circumstances, a student may take a course out of sequential order with advisor approval. Subject to advisor approval, an elective may be substituted for a core course if the student has previously completed an equivalent graduate-level course. Students are advised to takeEN.655.800 Healthcare Systems Engineering Capstone Project after all other core and elective courses have been completed. A student may take EN.655.800 in the same term as their final elective course with advisor approval. Course selections outside of the core and elective courses listed below must be approved by an advisor prior to selection. Only one grade of C can count toward the master's degree.

Courses

Core Courses

Code	Title	Credits
Required Core Courses (21 credits):		
EN.655.662	Intro to Healthcare Systems Engineering	3
EN.655.667	Management of Healthcare Systems Projects	3
EN.655.767	Healthcare System Conceptual Design	3
EN.655.768	Healthcare System Design & Integration	3
EN.655.769	Healthcare System Test and Evaluation	3
EN.655.771	Healthcare Systems	3
EN.655.800	Healthcare Systems Engineering Capstone Project	3

Electives

Code	Title	Credits
Select 9 credits from the following:		
Applied Biomedical Engineering		
EN.585.613	Medical Sensors & Devices	3
EN.585.619	Regulation of Medical Devices	3
EN.585.770	Global Health Engineering	3
Systems Engineering		
EN.645.631	Introduction to Model Based Systems Engineering	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3
EN.645.742	Management of Complex Systems	3
EN.645.755	Methods in Human-System Performance Measurement and Analysis	3
EN.645.757	Foundations of Modeling and Simulation in Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.771	System of Systems Engineering	3
EN.645.781	Systems Thinking and Systems Dynamics	3
Bloomberg School of Public Health online offerings [1]		
(3 BSPH credits = 2 EP credits and 4 BSPH credits = 3 EP credits)		
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.621	Statistical Methods in Public Health I	4
PH.140.622	Statistical Methods in Public Health II	4
PH.309.631	Population Health Informatics	3
PH.309.730	Patient Safety and Medical Errors	3
PH.312.633	Health Management Information Systems	3
PH.315.700	Health Information Systems: Design to Deployment	3
PH.315.707	Introduction to Biomedical and Public Health Informatics	3
PH.315.708	HIT Standards and Systems Interoperability	3
School of Medicine [2]		

1 Credits shown to the right reflect BSPH credits. To convert to EP credits, use the following relationship (3 BSPH credits = 2 EP credits and 4 BSPH credits = 3 EP credits).

2 An additional elective in the School of Medicine is ME.250.950 - Health Information Systems: Design to Deployment. Please see the School of Medicine offerings.

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Information Systems Engineering

The part-time Information Systems Engineering program balances theory with practice by offering traditional and cutting-edge courses that accommodate working professionals with various backgrounds. The program appeals to engineers, scientists, and analysts by providing them with the opportunity to design large-scale information systems, create business analytics, conduct complex systems analyses, and create sophisticated distributed and secure systems.

Courses are offered at the Applied Physics Laboratory and online.

Program Committee

David Silberberg, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

Anthony N. Johnson, Program Manager
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JHU Applied Physics Laboratory

Yair Amir
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Deborah Dunie
Board Director
SAIC

Deborah Frincke
Associate Labs Director, National Security Programs
Sandia National Laboratories

J. Miller Whisnant
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Information Systems Engineering, Graduate Certificate (p. 1546)
- Information Systems Engineering, Master of Science (p. 1546)
- Information Systems Engineering, Post-Master's Certificate (p. 1548)

Courses

EN.635.601. Foundations of Information Systems Engineering. 3 Credits.
Creating and operating large-scale information systems requires a holistic approach that manages the blending of software, hardware, networks, and security inherent in modern systems. This course introduces key elements and processes required for designing, analyzing, developing, and integrating complex information systems. The course focuses on the systems engineering approach with specific emphasis on design, development, and deployment. Topics covered include requirements engineering, architecture development, security engineering, cost-benefit analysis, information and networking technologies, and operations. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.635.611. Principles of Network Engineering. 3 Credits.
This course provides a introductory technical overview of networking and telecommunications for the engineering practitioner. Topics include voice, data, and video communication system fundamentals, including signaling, frequency concepts, transmission media, multiplexing, spread spectrum, signal encoding, error control, switching, and basic terminology. The OSI and TCP/IP reference models are examined along with the basic concepts of protocols, service interfaces, encapsulation, and layering. The course also covers networking and telecommunication techniques, applications technology, and networking topologies and Internetworking architectures. Specific areas discussed include LAN system fundamentals, such as IEEE 802.3 Ethernet, IEEE 802.11 wireless LANs and IEEE 802.15/Bluetooth; and wide-area systems such as cellular and satellite networks. TCP/IP infrastructure and protocols are extensively covered including IP routing, transport layer protocols, and applications including web, email, and real-time applications such as Voice over IP (VoIP). The course also covers the basic principles and protocols for Network Security (IPsec, SSL/TLS) and Management (SNMP).

EN.635.621. Principles of Decision Support Systems. 3 Credits.
Businesses and organizations are flooded with a variety of data from a vast number of sources. Data analysis and use of data analytics in data-driven decision-making processes has become the go-to strategy for business success and for gaining sustainable competitive advantage.This course will introduce students to the technologies that are generally and collectively called “analytics” used to support effective decision-making processes for business. Course topics will cover the latest trends in analytics, including scalable AI, machine learning, IoT, and smart/robo-collaborative assisting systems, composable data and analytics, data fabric, small data models, and XOps. This course will enable students to apply deep knowledge of predictive, descriptive analytics, big data, and web analytics to the development of the best business solutions for their organizations. They will also know which kinds of analytics to apply to specific decision contexts.

EN.635.627. Intelligent Decision Support Systems. 3 Credits.
Businesses and organizations are flooded with a variety of data from a vast number of sources. Data analysis and use of data analytics in data-driven decision-making processes has become the go-to strategy for business success and for gaining sustainable competitive advantage.This course will introduce students to the technologies that are generally and collectively called “analytics” used to support effective decision-making processes for business. Course topics will cover the latest trends in analytics, including scalable AI, machine learning, IoT, and smart/robo-collaborative assisting systems, composable data and analytics, data fabric, small data models, and XOps. This course will enable students to apply deep knowledge of predictive, descriptive analytics, big data, and web analytics to the development of the best business solutions for their organizations. They will also know which kinds of analytics to apply to specific decision contexts.

EN.635.631. Foundations of Data Analytics. 3 Credits.
This foundation course provides an overview of data analysis process, and introduces students to common techniques for data preprocessing, feature extraction, and the creation of statistical models. In particular, students will develop competence in areas of high importance for data scientists and engineers, such as: exploring the trade-off between bias and variance, selecting and creating features, regularizing models, determining optimal hyperparameters, and evaluating model performance. Multiple datasets and data types (e.g., unstructured text, imagery, and time-varying signals) will be considered with the goal of building student confidence across a spectrum of analysis challenges. Particular topics include linear and non-linear regression, decision trees, various approaches to dimensionality reduction, clustering, topic modeling, Bayesian methods, and neural networks. Prerequisite(s): Programming experience in Python, introductory linear algebra, and probability theory recommended.

EN.635.632. Engineering Data Intensive Systems. 3 Credits.
This course provides students with a solid understanding of the data engineering concepts needed to implement reliable data intensive systems. With the emergence of data science as a new field of study, data engineering has gained prominence as a discipline in its own right. Designing and deploying data intensive applications for production environments require skills and experience beyond data science. We start with the basic building blocks of data models, query languages, storage, retrieval, encoding, and schema evolution. Then we move on to distributed data where we examine the unique challenges faced with implementing distributed data systems and some approaches for mitigating these challenges. Throughout the course we consider reliability, scalability, and performance aspects of data stores, batch processing and streaming systems. To deepen our understanding of these concepts, students will implement data systems on their own personal computers using Docker. The technologies you will be working with include Jupyter Notebook, SQL engines, Apache Avro, Elasticsearch (and Kibana), Apache Spark, and Apache Kafka.
EN.635.601 Foundation of Information Systems Engineering. Prior experience with databases, SQL, and Python is recommended.

EN.635.661. Principles of Human Computer Interaction. 3 Credits.
Well-designed human-computer interaction (HCI) is critical to the success of computer and information systems. This course focuses on the HCI design process and covers the underlying scientific principles, HCI design methodology, and the user-interface technology used to implement HCI. Topics include human cognition, HCI theories, user observation and task analysis, prototyping and evaluation techniques, user interface modalities and graphical user interface components, and accessibility. Selected additional topics may include HCI in website design, support of collaborative work, human interaction with automation, and ubiquitous computing. Student design projects are an integral part of the course. Reading the current HCI research literature is also required.

EN.635.671. Data Recovery & Continuing Operations. 3 Credits.
Data recovery and continuing operations refers to the processes, plans, and technologies required for an enterprise to achieve resiliency given unexpected events that may disrupt IT operations. This course provides an overview of the storage technologies to address backup, disaster recovery, and business continuity. Technologies that address auditing, redundancy, and resiliency in the infrastructure (e.g., networks, power, cooling, etc.) are described. Beyond the technologies, processes and plans for continuing operations are covered, including issues such as business continuity, disaster recovery, and risk management.
EN.635.621 Principles of Decision Support Systems is recommended and may be taken concurrently.

EN.635.672. Privacy Engineering. 3 Credits.
Personal information has become a new class of digital property with immense value in commerce and of intense importance to national security and intelligence. Engineering any information system now requires a professional to protect privacy, preserve the information's functional value, and navigate complex domestic and international legal and engineering rules Students will use new visual modeling and analysis tools for designing and executing privacy solutions in both the commercial and governmental sectors. Students will build a final specification for a privacy solution involving regulated personal information.

EN.635.673. Protecting Critical Infrastructure Against Cyber Attacks. 3 Credits.
Cybersecurity is one of the most critical national issues of our time. The trend for cyber-attacks is rapidly increasing in enterprise networks and is extending into other domains like the Internet of Things (IoT) and Industrial Control Systems (ICS). Our 16 Critical Infrastructures are the powerhouses for our military might and our huge economy, and thus protecting these assets is paramount. This class will: (1) introduce students to the history of the problem of Cybersecurity, (2) introduce students to the 16 Critical Infrastructures, and (3) provide students hands-on experience with developing Cybersecurity technology to assess, defend, and monitor enterprise, IoT, and ICS networks.

EN.635.676. Cybersecurity in Information Systems. 3 Credits.
This course describes the systems security engineering process, focusing on security during the design and implementation of information systems. Topics include architecture and design principles, risk assessment, resiliency, and security metrics. The course addresses emerging topics in cybersecurity including wireless security, cloud security, cross domains and the government standards and processes for secure information systems; surveys many aspects of cybersecurity and its impact on the enterprise; and lays the groundwork to architect and build a natively more secure system that can withstand hacking attacks and continue to deliver basic functionality to the enterprise. We will address the federal government standards and recommendations as well as industry's best practices. Students will cover the basic concepts of information security and research the latest security incidents including external attacks and internal leaks to assess and analyze the exploited vulnerabilities. By learning from current incidents, students can build systems that adapt quickly to emerging threats and potentially continue to serve the enterprise, even while under attack. Additionally, the course addresses the assessment of emerging technologies to determine the potential threats to the enterprise as well as the usability to secure the enterprise. Finally, we will address the subject of legal and ethical access control and the balance between privacy and security.

EN.635.682. Website Development. 3 Credits.
This course covers the design and implementation of websites. Various web standards, as developed by the World Wide Web Consortium and browser manufacturers are studied. HTML5 specifications are covered, including topics such as text control, images, hypertext links, forms, and embedded objects (e.g., video and audio). Cascading style sheets (CSS3), a client-side language (such as JavaScript), and server-side programming are also covered. Design and development topics include ease of use/navigation, download time, maintaining a consistent look and feel across multiple pages, building mobile-friendly websites, and Web server selection and configuration. Additional topics include web tools, privacy and security, XML, JSON, and AJAX.

EN.635.683. E-Business: Models, Architecture, Technologies, and Infrastructure. 3 Credits.
This course explores fundamental aspects of the e-Business (electronic business) phenomenon that is currently sweeping through the global economy, as well as design principles and technology used to build computer-based systems in order to support the notion of e-Business. E-Business (electronic business) is an umbrella term, an interdisciplinary topic encompassing both business and technology. This topic addresses a variety of business activities, business processes, and strategic business functions conducted over the Internet in order to service customers, to collaborate with business partners, and to maintain and sustain competitive advantage in the networking economy. The course introduces contemporary management philosophies as they have come to be used for the marketing, selling, and distribution of goods and services through the Internet and other electronic media. The course explores approaches of defining drivers and use cases of conducting electronic business. This course provides an overview of principles and analysis of different models of electronic business. It enables students to design effective e-Business models built on a foundation of business concepts, knowledge of the e-Business environment, and an understanding of the influence of the Internet on business stakeholders, including customers, suppliers, manufacturers, service makers, regulators, managers, and employees. In this course students undertake value analysis and learn to describe value propositions. Business architecture and software infrastructure used to engineer and build e-Business systems will be explained. The modern information technologies associated with the delivery of business capabilities over the Internet will be discussed. The course content will be reinforced by a variety of assignments.

EN.635.711. Advanced Topics in Network Engineering. 3 Credits.
This course is designed to provide an advanced treatment of key topic areas in networking and telecommunications for students who have mastered the basic principles of network engineering. Key operational systems, protocols, and technologies are explored in local, wide, metro-area, storage, and wireless networking. Major topic areas include advanced LAN/WLAN technologies (Power over Ethernet, IEEE 802.1x authentication, VLANs, link aggregation, etc.), Storage Area Network technologies, Virtualized/Cloud networking, Optical Networking, IPv6, Spanning Tree and Dynamic IP routing protocols, “LastMile” Networking (DSL, Cable Modems, etc.), Label Switching, Multicasting, and Multicast routing, real-time application support mechanisms, Quality of Service protocols, Advanced Transport Layer topics (Congestion Notification, TCP options, etc.), and Network Security (address translation, VPNs, stateful inspection, etc.). A major component of the course will be a design project on one of the topic areas covered in the class.
EN.635.611 Principles of Network Engineering or EN.605.671 Principles of Data Communications Networks or equivalent.

EN.635.775. Cyber Operations, Risk, and Compliance. 3 Credits.
This course provides a solid foundation of potential civil and criminal areas of liability, and certain areas in which compliance and risk management are critical. The overarching theme is detection and reduction of potential legal/cybersecurity risks. We start by exploring the legal and regulatory environment that influences and supports cyber-based activities and programs, focusing on multidisciplinary or integrated views of enterprise risk management. We will address key risk management issues from the legal and cybersecurity aspects and analyze legal/ cybersecurity issues in several of the critical infrastructure sectors, such as the financial services, healthcare and public health, and transportation systems sectors. We also review legal and regulatory compliance issues to address cybersecurity risk management for systems development, acquisition, and operation. This includes material impacting the manner in which the cyber community operates, for example, FITARA (Federal Information Technology Acquisition Reform Act) Enhancement Act of 2017. We then review the authoritative guidance provided by the National Institute of Standards and Technology (NIST) Cybersecurity Framework. The Framework is voluntary for the sixteen critical information sectors and mandatory for the federal government, hence the focus on NIST. Risk management threat detection and avoidance is analyzed from an integrated legal/cybersecurity perspective, including system objectives to avert legal liability and minimize enterprise and human loss. Examples address financial services, healthcare and public health, and transportation (mobile devices and autonomous vehicles) systems, and cyber-physical systems (CPS) or Internet of Things (IoT). The overall constitutional and statutory basis within which all cyber law and policy operates is identified and reviewed.

EN.635.776. Building Information Governance. 3 Credits.
Businesses and government agencies confront increasingly complex rules and standards establishing the requirements for how digital information assets are to be created, stored, maintained, accessed, transmitted, received, and disposed. Information system engineers face enormous compliance risks, functional inefficiencies, and remediation costs if they are unprepared to navigate and master all of the technology, business, and legal rules against which digital information must be governed. All of these variables have become more complex as governments and industry partner more closely in counterterrorism investigations and defenses. This course enables engineers to explore and understand these rules and to develop better leadership skills across teams engaged in designing and managing complex governance projects. Assignments will expose engineers to, and teach them to navigate, the traps that global, cloud-based services present. Students completing the course will be able to contribute effectively to the cutting-edge, demanding projects ahead—“big data” transactions, real-time reporting to official agencies, electronic discovery, privacy, and compliance. Students will be expected to actively participate in class exercises, complete written assignments, and develop and present a final written governance proposal.

EN.635.782. Ethics in Intelligent Systems. 3 Credits.
This course is to fortify and enrich the values-assessment and critical thinking skills of engineers as they grapple with the numerous ethical challenges in their professional and personal lives. To that end, the course will define and delineate some global, macro-level concepts and approaches to ethics; move on to review some ethical issues unique to engineers as they apply intelligent technologies such as artificial intelligence and machine learning to developing complex systems; and finally present some finite cases studies and concrete situations by which to apply these ethical principles. This class will stimulate students to help identify a critical thinking zeitgeist and framework by which to filter, absorb and resolve complex ethical problems and questions in both their professions and at the personal level. This class will be completely value-neutral and hence devoid of any one overarching governing ethical school of thought; thus, we are ecumenical in our approaches. Having said that, the IEEE ethically aligned design standards are noteworthy and very salutary to any exploration. This course will make use of a variety of current, recent historical and classical materials to illustrate major themes.

EN.635.792. Management of Innovation. 3 Credits.
A critical issue for entrepreneurs and technical managers is how to translate opportunity into competitive advantage. This course explores the management of innovation, including the technical transition of applied R&D into products, the planning and launching of new products, and product management. Management of discontinuous technologies will be explored. The impact of competition by the introduction of new discontinuous technology will be addressed. Managing engineers through the creative process, as well as innovation and technological evolution, will be covered. The course includes both formal and guest lectures. Case studies will be used as an important learning vehicle.

EN.635.795. Information Systems Engineering Capstone Project. 3 Credits.
This course is designed for students who would like to conduct a major independent project involving a substantial enterprise information system design that builds upon elements of the ISE curriculum. The project includes requirements analysis, IT architecture design, network design, software integration, decision support applications, and deployment planning. Interim deliverables include presentations to the course advisors. Project proposals are required and a mentor will be assigned to the student. Prerequisite(s): Completion of eight courses in the ISE curriculum, including all ISE foundation courses. Course Note(s): Students may not receive graduate credit for both EN.635.795 and EN.635.802 Independent Study in Information Systems Engineering II.

EN.635.801. Independent Study in Information Systems Engineering I. 3 Credits.
This course permits graduate students in Information Systems Engineering to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper. Prerequisite(s): Seven ISE graduate courses including the foundation courses, three concentration area courses, and two courses numbered 635.7xx; or admission to the Post-Master's Certificate. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.635.802. Independent Study in Information Systems and Technology II. 3 Credits.
Students wishing to take a second independent study in information systems engineering should sign up for this course. Prerequisite(s): EN.635.801 Independent Study in Information Systems Engineering I and permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): Students may not receive graduate credit for both EN.635.802 and EN.635.795 Information Systems Engineering Capstone Project.

Information Systems Engineering, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree are eligible for the Graduate Certificate in Information Systems Engineering. Applicants are required to meet the same requirements for admission as the master's degree (p. 1546).

If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit.

Program Requirements

- Four courses must be completed within five years.
- Three of the four courses must be from the Information Systems Engineering program, as listed throughout the Courses section (p. 1547), which include EN.635.xxx courses plus selected courses from the Computer Science (EN.605.xxx), Cybersecurity (EN.695.xxx), Systems Engineering (EN.645.xxx), and Engineering Management (EN.595.xxx) programs.
- One or more required courses can be waived by your advisor if you have received a grade of a B− or above in equivalent graduate courses. In this case, you may replace the waived required courses with the same number of other graduate Information Systems Engineering courses and may take these courses after all remaining course requirements have been satisfied.
- Focus Areas are not applicable for students pursuing certificates.
- Only one C-range grade (C+, C, or C−) can count toward the graduate certificate.
- Course selections outside of the Information Systems Engineering foundational and focus areas/concentrations are subject to advisor approval.

Information Systems Engineering, Master of Science

A focus area must be chosen for this program.

Admission Requirements

Applicants (degree-seeking and special student) must meet the general requirements for admission (p. 1414) to graduate study. The applicant's prior education must include the following prerequisites:

1. One year of college math (2 semesters or 3 quarters) which must include Discrete Mathematics or Calculus;

2. One semester/term of Java (C++ will be accepted but the student must be knowledgeable in Java);

3. One semester/term of Data Structures is conditionally required for those students seeking to take selected courses from Computer Science and Cybersecurity that require Data Structures.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (all prerequisites are available) or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Applicants may submit a detailed resume if they would like their academic and professional background to be considered.

Program Requirements

Ten courses must be completed within five years. Students are required to choose a focus area to follow. The curriculum consists of three foundation courses and five courses from the Information Systems Engineering (EN.635.xxx) program, which includes selected courses from the Computer Science (EN.605.xxx), Cybersecurity (EN.695.xxx), Systems Engineering (EN.645.xxx), and Engineering Management (EN.595.xxx) programs as listed throughout the Courses section. At least three courses must be from the same focus area, at least three courses must be at the 700-level, and at least one 700-level course must be in the chosen focus area. Up to two electives may be selected from other programs. Course selections outside of the foundational and focus area/concentration lists below are subject to advisor approval. Transfer courses will be considered electives. Transfer courses must meet all general Engineering for Professionals requirements for transfer, must be directly applicable to Information Systems Engineering, and will be considered on a case-by-case basis. Only **one** C-range grade (C+, C, or C−) can count toward the master's degree.

Graduate students who are not pursuing a master's degree in Information Systems Engineering should consult with their advisor to determine which courses must be successfully completed before 600- or 700-level courses may be taken.

Courses

Code	Title	Credits
Prerequisites [1]		
EN.605.101	Introduction to Python	
EN.605.201	Introduction to Programming Using Java	3
EN.605.202	Data Structures	3
EN.605.203	Discrete Mathematics	3
EN.605.206	Introduction to Programming Using Python	3
Foundation Courses		
Students working toward a master's degree in Information Systems Engineering are required to take the following three foundation courses before taking any other courses: [2]		
EN.605.601	Foundations of Software Engineering	3
EN.635.601	Foundations of Information Systems Engineering	3
EN.695.601	Foundations of Information Assurance	3
Focus Areas		
Select one of the following Focus Areas:		
Cybersecurity (p. 1547)		
Data Engineering (p. 1547)		
Enterprise and Web Computing (p. 1548)		
Human-Computer Interaction (p. 1548)		
Information Management (p. 1548)		
Network Engineering (p. 1548)		
Software Engineering (p. 1548)		
Systems Engineering (p. 1548)		
Independent Study and Special Topics (p. 1548)		

1. Applicants whose prior education does not include the prerequisites listed under Admission Requirements may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. All prerequisite courses beyond calculus are available at Johns Hopkins Engineering. These courses do not count toward the degree or certificate requirements.
2. One or more foundation courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived foundation courses with the same number of other graduate courses and may take these courses after all remaining foundation course requirements have been satisfied.

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. Students are required to choose a focus area to follow and to take at least three courses from the selected focus area, including at least one 700-level course. The focus areas are presented as an aid to students in planning their course selections and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

Cybersecurity

This focus area requires Data Structures.

Code	Title	Credits
EN.635.671	Data Recovery & Continuing Operations	3
EN.635.672	Privacy Engineering	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.635.676	Cybersecurity in Information Systems	3
EN.635.775	Cyber Operations, Risk, and Compliance	3
EN.635.776	Building Information Governance	3
EN.695.601	Foundations of Information Assurance	3
EN.695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	3
EN.695.614	Security Engineering	3

Data Engineering

This focus area requires Data Structures.

Code	Title	Credits
EN.635.631	Foundations of Data Analytics	3
EN.635.632	Engineering Data Intensive Systems	3
EN.605.635	Cloud Computing	3
EN.605.662	Data Visualization	3
EN.605.741	Large-Scale Database Systems	3

EN.605.744	Information Retrieval	3
EN.605.788	Big Data Processing Using Hadoop	3

Enterprise and Web Computing

This focus area requires Data Structures.

Code	Title	Credits
EN.635.682	Website Development	3
EN.635.683	E-Business: Models, Architecture, Technologies, and Infrastructure	3
EN.605.681	Principles of Enterprise Web Development	3
EN.605.684	Agile Development with Ruby on Rails	3
EN.605.784	Enterprise Computing with Java	3
EN.605.786	Enterprise System Design and Implementation	3
EN.605.788	Big Data Processing Using Hadoop	3
EN.605.789	Service API Design and Development	3

Human–Computer Interaction

Code	Title	Credits
EN.635.661	Principles of Human Computer Interaction	3
EN.605.662	Data Visualization	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3

Information Management

This focus area requires Data Structures.

Code	Title	Credits
EN.635.621	Principles of Decision Support Systems	3
EN.605.641	Principles of Database Systems	3
EN.605.643	Linked Data and the Semantic Web	3
EN.605.644	XML Design Paradigms	3
EN.605.741	Large-Scale Database Systems	3
EN.605.744	Information Retrieval	3

Network Engineering

Code	Title	Credits
EN.635.611	Principles of Network Engineering	3
EN.635.711	Advanced Topics in Network Engineering	3
EN.605.772	Network Security Management	3
For students with appropriate backgrounds, the following courses may be taken toward the network engineering focus area. Advisor approval and permission of the instructor is required.		
EN.525.678	Next Generation Mobile Networks and Security with 5G	3
EN.605.677	Internetworking with TCP/IP I	3
EN.605.771	Wired and Wireless Local and Metropolitan Area Networks	3
EN.605.776	Fourth Generation Wireless Communications: WiMAX and LTE	3
EN.605.777	Internetworking with TCP/IP II	3

Software Engineering

Code	Title	Credits
EN.605.601	Foundations of Software Engineering	3
EN.605.602	Software Analysis and Design	3
EN.605.604	Object-Oriented Programming with C++	3
EN.605.607	Agile Software Development Methods	3
EN.605.608	Software Project Management	3
EN.605.609	DevOps and Secure Software Development	3
EN.605.701	Software Systems Engineering	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.705	Software Safety	3
EN.605.708	Tools and Techniques of Software Project Management	3

Systems Engineering

Code	Title	Credits
EN.635.601	Foundations of Information Systems Engineering	3
EN.635.792	Management of Innovation	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.662	Introduction to Systems Engineering	3
EN.645.667	Management of Systems Projects	3
EN.645.742	Management of Complex Systems	3
EN.645.753	Enterprise Systems Engineering	3
EN.645.757	Foundations of Modeling and Simulation in Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.767	System Conceptual Design	3
EN.595.660	Planning and Managing Projects	3

Independent Study and Special Topics

Code	Title	Credits
EN.635.795	Information Systems Engineering Capstone Project	3
EN.635.801	Independent Study in Information Systems Engineering I	3
EN.635.802	Independent Study in Information Systems and Technology II	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Information Systems Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Information Systems Engineering.

Program Requirements

Five courses must be completed within five years. Four of the five courses must be from the Information Systems Engineering program, as listed throughout the Courses section (p. 1547), which includes selected courses from the Computer Science (EN.605.xxx), Cybersecurity (EN.695.xxx), Systems Engineering (EN.645.xxx), and Engineering Management (EN.595.xxx) programs. At least one of these courses must be at the 700-level. Only grades of B– or above can be counted toward the post-master's certificate. Students are allowed to take one elective.

Focus Areas are not applicable for students pursuing certificates. Course selections outside of the foundational and focus area/concentration lists below are subject to advisor approval

Materials Science and Engineering

The Materials Science and Engineering Program for professionals allows students to take courses that address current and emerging areas critical to the development and use of biomaterials, electronic materials, structural materials, nanomaterials and nanotechnology, and related materials processing technologies. Students in this program gain an advanced understanding of foundational concepts and are exposed to the latest research that is driving materials-related advances.

Courses are offered at the Applied Physics Laboratory, the Homewood campus, and online.

Program Committee

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JHU Whiting School of Engineering

Dawnielle Farrar-Gaines
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JHU Applied Physics Laboratory

Programs

- Materials Science and Engineering, Master of Science (p. 1551)

Courses

EN.515.601. Structure and Properties of Materials. 3 Credits.
Topics include types of materials, bonding in solids, basic crystallography, crystal structures, tensor properties of materials, diffraction methods, crystal defects, and amorphous materials.

EN.515.602. Thermodynamics and Kinetics of Materials. 3 Credits.
Topics include laws of thermodynamics, equilibrium of single and multiphase systems, chemical thermodynamics, statistical thermodynamics of solid solutions, equilibrium phase diagrams, chemical kinetics, diffusion in solids, nucleation and growth processes, coarsening, and glass transition.

EN.515.603. Materials Characterization. 3 Credits.
This course will describe a variety of techniques used to characterize the structure and composition of engineering materials, including metals, ceramics, polymers, composites, and semiconductors. The emphasis will be on microstructural characterization techniques, including optical and electron microscopy, x-ray diffraction, and acoustic microscopy. Surface analytical techniques, including Auger electron spectroscopy, secondary ion mass spectroscopy, x-ray photoelectron spectroscopy, and Rutherford backscattering spectroscopy. Real-world examples of materials characterization will be presented throughout the course, including characterization of thin films, surfaces, interfaces, and single crystals.

EN.515.605. Electrical, Optical and Magnetic Properties. 3 Credits.
An overview of electrical, optical and magnetic properties arising from the fundamental electronic and atomic structure of materials. Continuum materials properties are developed through examination of microscopic processes. Emphasis will be placed on both fundamental principles and applications in contemporary materials technologies.Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.
EN.515.601 or equivalent.

EN.515.606. Chemical and Biological Properties of Materials. 3 Credits.
An introduction to the chemical and biological properties of organic and inorganic materials. Topics include an introduction to polymer science, polymer synthesis, chemical synthesis, and modification of inorganic materials, biomineralization, biosynthesis, and properties of natural materials (proteins, DNA, and polysaccharides), structure-property relationships in polymeric materials (synthetic polymers and structural proteins), and materials for biomedical applications. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course. Recommended Course Background: undergraduate chemistry and biology or permission of instructor.

EN.515.608. Biomaterials II: Host Response and Biomaterials Applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include host reactions to biomaterials and their evaluation, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, biomaterials for cardiovascular applications, biomaterials for orthopedic applications, and biomaterials for artificial organs. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.611. Computational Molecular Dynamics. 3 Credits.
This course aims to enable the student to understand and predict properties of microscopic systems in materials science, physics, biology, and chemistry. We will cover the basics of molecular simulation methods, and provide an overview of modeling tools for problems of interest. In particular this course will cover both hard and soft matter materials spaces. The course is geared toward students with an interest in molecular modeling, with or without prior experience in the area. At the end of this course, students should have a general knowledge of current state-of-the-art molecular simulation methods, and be able to design, run, and analyze simulations for systems of interest.

EN.515.615. Physical Properties of Materials. 3 Credits.
A detailed survey of the relationship between materials properties and underlying microstructure. Structure/property/ processing relationships will be examined across a wide spectrum of materials including metals, ceramics, polymers and biomaterials, and properties including electrical, magnetic, optical, thermal, mechanical, chemical and biocompatibility. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.616. Introduction To Nanotechnology. 3 Credits.
Nanoscale science and nanotechnology are broad, interdisciplinary areas, encompassing not just materials science but everything from biochemistry to electrical engineering and more. This will be a survey course introducing some of the fundamental principles behind nanotechnology and nanomaterials, as well as applications of nanotechnology. The role of solid-state physics and chemistry in nanotech will be emphasized. Nanoscale tools such as surface probe and atomic force microscopy, nanolithography, and special topics such as molecular electronics will also be covered.

EN.515.617. Nanomaterials. 3 Credits.
Nanomaterials is a survey course that covers concepts and the associated relevant physics and materials science of what makes nanoscale materials so unique. We'll learn about nanoscale characterization (electron and probe microscopy), fabrication at the nanoscale (self-assembly and top-down fabrication), and many current applications of nanomaterials across broad areas from medicine to defense. This course will take an in-depth look at nanomaterials discussed in Introduction to Nanotechnology; however, it stands alone with no prerequisite.

EN.515.620. Nanoparticles. 3 Credits.
Nanoparticles - one-dimensional materials with diameters of nearly atomic dimension - are one of the most important classes of nanostructured materials because their unusual properties that often differ significantly from bulk materials. This course will explore the synthesis, structure and properties of nanoparticles. Applications of nanoparticles in medicine, optics, sensing, and catalysis will be discussed, with an emphasis will be on metal nanoparticles and semiconductor quantum dots. Course Note(s): Part-time students should register for the 515 course.

EN.515.621. Biomolecular Materials I: Soluble Proteins & Amphiphiles. 3 Credits.
Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques.

EN.515.622. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material's property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss their mechanical, electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechanical (MEMS) devices Course Note(s): Part-time students should register for the 515 course.

EN.515.627. Chemistry of Nanomaterials. 3 Credits.
This course introduces the fundamental principles necessary to understand the behavior of materials at length scales larger than atoms or molecules with applications in chemistry and materials science. This course will explore topics such as nanoparticle synthesis and self assembly, ordered porous materials, catalysis, nanostructured thin films, and solar energy conversion. Size dependent properties of nanomaterials will be discussed.

EN.515.628. Introduction to Solid State Chemistry. 3 Credits.
This course focuses on understanding materials properties and their impact on engineering systems. Students in this course will explore the interrelationships among the atomic structure, bonding, and defects, and their influence on the electrical, magnetic, and optical properties of materials. This course will cover topics related to: atomic arrangement; synthesis and processing of materials; characterization using x-ray, thermal and electrochemical methods; specialized topics involving real-world examples drawn from industry including semiconductor processing, energy conversion and storage, and emerging materials-specific technologies.

EN.515.634. Fundamentals of Metamaterials. 3 Credits.
This course introduces the student to the field of metamaterials. The course will begin with a review of basic electromagnetic wave propagation and interaction with matter. The remainder of the course will discuss how metamaterials can be utilized to manipulate electromagnetic fields. Topics will include negative refractive index, perfect lensing, metasurfaces, artificial magnetic conductors, and absorbers.

EN.515.635. Mechanical Properties of Materials. 3 Credits.
This course will consist of a detailed study of the mechanical properties of materials. Topics covered will include stress-strain behavior, elastic and plastic deformation mechanisms, failure mechanisms in quasi-static and dynamic loading conditions, and microstructure-properties relationships. These topics will be discussed as applied to metallic, ceramic, polymeric, and composite materials at bulk and nano scales. The course will also introduce destructive and non-destructive mechanical testing methods. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.636. Chemical Synthesis and Processing of Advanced Materials. 3 Credits.
This is a treatise course on chemical processing of materials. The primary objective of this course is to provide an introduction to various chemical synthesis and formulation techniques for the study of advanced materials including metals, alloys, semiconductors, ceramics, carbons, polymers, coatings, thin films, nanoparticles, and nanostructured materials. The course will discuss both established chemical processing methods and recent advances in materials synthesis and fabrication. Other topics to be covered include thermodynamics and kinetics in chemistry, structure-property relations, and materials characterization techniques.

EN.515.640. Stealth Science and Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens.

EN.515.646. Artificial Intelligence Methods for Materials Science. 3 Credits.
This course will introduce the principles of machine learning and data science, with a focus on applications in materials science. The fundamentals of machine learning will be emphasized along with state-of-the-art techniques. Topics include data visualization, train/test splits, cross-validation, boosting models and convolutional neural networks. Real-world materials science datasets will be used throughout, and different data formats will be considered (e.g., descriptors vs. images). Students will demonstrate their knowledge in a final project that uses data derived from actual applications.

EN.515.654. Introduction to Micro- and Nano-fabrication. 3 Credits.
This course covers the principles of micro- and nano-fabrication processes for creation of electronic/optical/mechanical devices. The course exposes students to clean room etiquette and safety, film deposition, lithography, etching (dry/wet), vacuum systems, oxide growth, etc. and will familiarize students with use of various techniques, systems and equipment commonly encountered in microfabrication facilities. The course includes the necessary background for students so they can specify fabrication processes for particular device designs.

EN.515.655. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.

EN.515.658. Design for Additive Manufacturing. 3 Credits.
This class builds on material covered in the Additive Manufacturing (AM) overview class (515.656) and previous Materials Science and Engineering courses such as Thermodynamics and Kinetics of Materials (515.602). We will learn the design process and design for AM specifically. Students will determine applications and opportunities to apply AM technology and also learn how to evaluate AM designs. Topics will include work flow decisions to determine AM application, design considerations for metal and polymer AM, design for multi-material and functional assembly applications, and AM design evaluation.
EN.515.655 Metal Additive Manufacturing

EN.515.661. Introduction to Polymer Science. 3 Credits.
The goal of this course is to provide students with an introduction to the preparation, properties and manufacturing of polymers. Methods for synthesizing polymers, manufacture of polymers and the techniques used to characterize polymer properties will be presented. The course topics include natural and synthetic giant molecules; inorganic and organic polymers; biomacromolecules; and elastomers, adhesives, coatings, fibers, plastics, blends, caulks, composites, and ceramics. The basic principles that apply to one polymer class can be used to understand all of the other classes and are integrated into the framework of this course.

EN.515.730. Materials Science and Engineering Project. 3 Credits.
This course is an individually tailored, supervised project that offers research experience through work on a special problem related to each student's field of interest. Upon completion of this course, a written essay must be submitted. The faculty advisor will approve the final essay. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Consent of advisor is required.

EN.515.731. Materials Science and Engineering Project. 3 Credits.
This course is an individually tailored, supervised project that offers research experience through work on a special problem related to each student's field of interest. Upon completion of this course, a written essay must be submitted. The faculty advisor will approve the final essay. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Consent of advisor is required.

EN.515.800. Independent Study in Materials Science and Engineering. 3 Credits.
Independent study allows students to take a specialty course on a topic not currently offered within EP but is related to the expertise of a faculty member. Students enrolled in this course are expected to meet with their instructor on a weekly basis and to complete assignments as required including but not restricted to homework, tests and topical essays. Arrangements for this course should be made between the student and the instructor. Final approval is required from the Program Chair. Generally, only one semester of Independent Study will be approved, but a second semester will be granted with justification. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Program Chair approval is required.

EN.515.801. Independent Study in Material Science and Engineering. 3 Credits.
Second semester of independent study. See description for EN.515.800.

Materials Science and Engineering, Master of Science

Students in this degree program may follow requirements for a concentration in Nanotechnology or may choose electives to focus their studies in areas such as Biotechnology or Nanomaterials. However, a concentration or a focus area is not required for the program. Students can fulfill degree requirements taking courses in the Materials Science and Engineering Program along with materials-related courses from other Engineering for Professionals programs.

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include a mathematics sequence through linear algebra and/or differential equations as well as courses in general physics and chemistry. This program is best suited to applicants who have received undergraduate degrees in engineering or science-related fields. Applicants whose prior education does not include the prerequisites listed may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Missing prerequisites may be completed at the Johns Hopkins University or at another regionally accredited institution. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Transcripts from all college studies must be submitted. Professional accomplishments may be included in the application by including a résumé along with letters of reference from the applicant's workplace, but this information is optional. When reviewing an application, the applicant's academic and professional background (if submitted) will be considered.

Program Requirements

A total of ten courses must be completed within five years. The curriculum consists of two core courses and eight electives in materials science and engineering or related fields (400-level or higher with at least five being at the 600- or 700-level). Students may count 400-level courses toward their degree if the course is not offered at the 600-level, and if the department offering the course considers it to be graduate-level, assuming the student has not taken an equivalent course previously. Materials-related elective courses from other programs may be counted towards degree requirements with advisor approval. Students interested in taking the Materials Science and Engineering project courses (EN.515.730 Materials Science and Engineering Project /EN.515.731 Materials Science and Engineering Project) or independent study (EN.515.800 Independent Study in Materials Science and Engineering/EN.515.801 Independent Study in Material Science and Engineering) should discuss their plans with their academic advisor and get prior approval from the program chair. Up to two courses can be from the Engineering Management Program. Only one C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Materials Science and Engineering program are subject to advisor approval.

Concentration

NANOTECHNOLOGY

A total of ten courses must be completed within five years. The curriculum consists of four core courses and six electives in materials science and engineering or related fields (400-level or higher with at least three being at the 600- or 700-level). Materials-related elective courses from other programs may be counted towards degree requirements with advisor approval. Only one C-range grade (C+, C, or C–) can count toward the master's degree.

Concentrations are noted on the student's transcript.

Courses

Code	Title	Credits
Core Courses		
EN.515.601	Structure and Properties of Materials	3
EN.515.602	Thermodynamics and Kinetics of Materials	3
Concentrations and Focus Areas		
A Concentration or Focus Area can be selected (p. 1552)		

Courses by Concentration

NANOTECHNOLOGY

Code	Title	Credits
Core Courses		
EN.515.601	Structure and Properties of Materials	3
EN.515.602	Thermodynamics and Kinetics of Materials	3
EN.515.616	Introduction To Nanotechnology	3
EN.515.617	Nanomaterials	3

Courses by Focus Area

The focus areas offered represent related groups of courses that are relevant for students with interests in the selected areas. The focus areas are presented as an aid to students in planning their course schedules and are only applicable to students seeking a master's degree. They do not appear as official designations on a student's transcript or diploma.

NANOMATERIALS

Code	Title	Credits
EN.515.611	Computational Molecular Dynamics	3
EN.515.620	Nanoparticles	3
EN.515.622	Micro and Nano Structured Materials & Devices	3
EN.515.628	Introduction to Solid State Chemistry	3
EN.515.654	Introduction to Micro- and Nano-fabrication	3
EN.515.730	Materials Science and Engineering Project	3
EN.515.731	Materials Science and Engineering Project	3
EN.525.606	Electronic Materials	3
EN.525.621	Introduction to Electronics and the Solid State	3
EN.530.445	Introduction to Biomechanics [1]	3
EN.530.603	Applied Optimal Control [1]	3
EN.540.403	Colloids and Nanoparticles [2]	3
EN.540.415	Interfacial Science with Applications to Nanoscale Systems [2]	3
EN.585.710	Biochemical Sensors	3
EN.615.641	Mathematical Methods for Physics and Engineering	3
EN.615.665	Modern Physics	3
EN.615.747	Sensors and Sensor Systems	3
EN.615.757	Solid State Physics	3
EN.615.760	Physics of Semiconductor Devices	3
EN.615.780	Optical Detectors & Applications	3

1 EN.530.xxx courses are offered through the full-time Department of Mechanical Engineering.
2 EN.540.xxx courses are offered through the full-time Department of Chemical & Biomolecular Engineering.

BIOTECHNOLOGY

Code	Title	Credits
EN.515.608	Biomaterials II: Host Response and Biomaterials Applications	3
EN.515.621	Biomolecular Materials I: Soluble Proteins & Amphiphiles	3
EN.515.730	Materials Science and Engineering Project	3
EN.515.731	Materials Science and Engineering Project	3
EN.530.445	Introduction to Biomechanics [1]	3

EN.535.663	Biosolid Mechanics	3
EN.535.684	Modern Polymeric Materials	3
EN.580.442	Tissue Engineering [2]	3
EN.580.641	Cellular Engineering [2]	4
EN.585.601	Physiology for Applied Biomedical Engineering I	3
EN.585.602	Physiology for Applied Biomedical Engineering II	3
EN.585.613	Medical Sensors & Devices	3
EN.585.615	Mathematical Methods	3
EN.585.708	Biomaterials	3
EN.585.709	Biomechanics of Cells and Stem Cells	3
EN.585.710	Biochemical Sensors	3
EN.585.729	Cell and Tissue Engineering	3
EN.585.734	Biophotonics	3

[1] EN.530.xxx courses are offered through the full-time Department of Mechanical Engineering.
[2] EN.580.xxx courses are offered through the full-time Department of Biomedical Engineering.

Other Electives

Code	Title	Credits
EN.515.603	Materials Characterization	3
EN.515.605	Electrical, Optical and Magnetic Properties	3
EN.515.615	Physical Properties of Materials	3
EN.515.617	Nanomaterials	3
EN.515.628	Introduction to Solid State Chemistry	3
EN.515.634	Fundamentals of Metamaterials	3
EN.515.635	Mechanical Properties of Materials	3
EN.515.636	Chemical Synthesis and Processing of Advanced Materials	3
EN.515.640	Stealth Science and Engineering	3
EN.515.646	Artificial Intelligence Methods for Materials Science	3
EN.515.655	Metal Additive Manufacturing	3
EN.515.658	Design for Additive Manufacturing	3
EN.515.661	Introduction to Polymer Science	3
EN.515.730/731	Materials Science and Engineering Project	3
EN.525.691	Fundamentals of Photonics	3
EN.535.606	Advanced Strength Of Materials	3
EN.535.635	Introduction to Mechatronics	3
EN.535.731	Engineering Materials: Properties and Selection	3
EN.615.611	Classical Physics	3
EN.615.680	Materials Science	3
EN.615.780	Optical Detectors & Applications	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Mechanical Engineering

The part-time Mechanical Engineering program is designed for working engineers who want to enhance their effectiveness in a complex and rapidly evolving technological and organizational environment. The program broadens and strengthens students' understanding of traditional fundamentals but also introduces them to contemporary applications and technologies.

Courses are offered primarily online, with a few being offered at the Applied Physics Laboratory and the JHU Homewood campus.

Program Committee

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Johns Hopkins University

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Johns Hopkins University

Ahmed Hussein, Program Curriculum Developer
Advanced Research Engineer
Canon Nanotechnologies

Mehran Armand
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Applied Physics Laboratory
Johns Hopkins University

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Mathematics Department
U.S. Naval Academy

Thomas Urban
Principal Professional Staff
Whiting School of Engineering
Johns Hopkins University

Programs

- Mechanical Engineering, Master of Science (p. 1560)
- Mechanical Engineering, Post-Master's Certificate (p. 1563)

Courses

EN.535.603. Applied Optimal Control. 3 Credits.
The course focuses on the optimal control of dynamical systems subject to constraints and uncertainty by studying analytical and computational methods leading to practical algorithms. Topics include calculus of variations, nonlinear local optimization, global stochastic search, dynamic programming, linear quadratic (gaussian) control, numerical trajectory optimization, model-predictive control. Advanced topics include approximate dynamic programming and optimal control on manifolds. The methods and algorithms will be illustrated through implementation of various simulated examples. Recommended Course Background: Linear Algebra and Differential Equations; experience with control systems; programming in MATLAB and/or Python.

EN.535.606. Advanced Strength Of Materials. 3 Credits.
This course reviews stress and strain in three dimensions, elastic and inelastic material behavior, and energy methods. It also covers use of the strength of materials approach to solving advanced problems of torsion and bending of beams. Prerequisite(s): Fundamental understanding of stress and strain and axial, torsion, and bending effects in linear elastic solids.

EN.535.607. Mechanics of Solids and Structures: Theory and Applications I. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and structures. We will begin with the mathematical preliminaries used in continuum mechanics: vector and tensor calculus, then introduce 3D kinematics and strain measures, descriptions of stress in a 3D body, equilibrium, and constitutive rules. These concepts will be applied to develop the constitutive equations for solids, methods for solving boundary values problems that occur in engineering structures, energy methods and foundations of large deformation.

EN.535.608. Hypersonic Technologies and Systems. 3 Credits.
"Hypersonics" is a general term used to describe flight at speeds greater than Mach 5 (or five times the sound speed). The technologies associated with hypersonic flight have been investigated for many decades and applications of hypersonic systems currently include ballistic missiles, re-entry vehicles, launch vehicles, and interceptor missiles. There is currently a resurgence in interest in new hypersonic applications for weapon applications, reusable aircraft, and reusable space launchers. With a view towards the history of hypersonics and developing worldwide trends, this course provides a survey of hypersonic technologies, systems and applications while addressing the underlying fundamental physics, analysis approaches, and design methodologies.

EN.535.609. Topics in Data Analysis. 3 Credits.
This course will provide a survey of standard techniques for the extraction of information from data generated experimentally and computationally. The approach will emphasize the theoretical foundation for each topic followed by applications of each technique to sample experimental data. The student will be provided with implementations to gain experience with each tool to allow the student to then quickly adapt to other implementations found in common data analysis packages. Topics include uncertainty analysis, data fitting, feed-forward neural networks, probability density functions, correlation functions, Fourier analysis and FFT procedures, spectral analysis, digital filtering, and Hilbert transforms. Prerequisite(s): Projects will require some programming experience or familiarity with tools such as MATLAB.

EN.535.610. Computational Methods of Analysis. 3 Credits.
This course will provide an introduction to computational methods of analysis, with the aim of preparing the student to take a real-world problem and break it down to its component parts, perform computational analysis, and report findings in a comprehensive and informative manner. This course introduces the student to several application areas, and the corresponding computational tools, assumptions, and limitations. Throughout the course, the student will solve problems computationally in a hands-on manner, with a particular emphasis on tradeoffs between complexity, cost, and utility.

EN.535.612. Intermediate Dynamics. 3 Credits.
This course develops student's ability to accurately model the dynamics of single and multi-body engineering systems undergoing motion in 3D space. The course begins with formulating the differential geometry and kinematics of curvilinear coordinates to permit kinematic descriptions of relative motion and rotation of rigid bodies and mechanisms subject to common engineering constraints such as substructure interconnections, dry friction, and rolling. Momentum and inertia properties of rigid body dynamics follow. Students are then introduced to analytical dynamics, where Lagrange's equations and Kane's method are derived and studied to facilitate efficient formulation of the equations of motion governing the dynamics of systems subject to conservative and non-conservative forces and engineering constraints. The course also concludes with gyroscopic dynamics with applications to inertial guidance and spacecraft attitude dynamics. Prerequisite(s): Mathematics through calculus and linear algebra.

EN.535.613. Structural Dynamics and Stability. 3 Credits.
This course introduces the propagation of elastic waves, and the loss of stability in engineering structures and systems. In the first part of the course, fundamental physical principles of elasticity and wave mechanics are reviewed and developed to provide students with the capability to model and analyze wave propagation, reflection, and refraction in isotropic and anisotropic engineering structures such as rods, beams, and plates. In the second part of the course, mechanical stability models are studied and applied in terms of dynamic behavior where the combined effects of vibration, gyroscopic motion, impact/shock, and buckling lead to new structural configurations or unstable motions that must often be avoided in design. Applications span nondestructive evaluation, composites, cables, aircraft/space structures, rotordynamics, aeroelasticity, civil engineering structures, and others. Prerequisite(s): Undergraduate or graduate course in vibrations.

EN.535.614. Fundamentals of Acoustics. 3 Credits.
This course introduces the physical principles of acoustics and their application. Fundamental topics include the generation, transmission, and reception of acoustic waves. Applications covered are selected from acoustic arrays, underwater acoustics, architectural acoustics, and biomedical acoustics. Prerequisite(s): Some familiarity with linear algebra, complex variables, and differential equations.

EN.535.618. Fabricatology - Advanced Materials Processing. 3 Credits.
The "Fabricatology" is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent developments in the field such as 3D printing so that they can have a comprehensive knowledge about the subject.

EN.535.620. Fluid Dynamics I. 3 Credits.
This first graduate course in fluid dynamics starts from derivation of the flow equations and examines a number of limiting behaviors. When viscous effects are ignored all together, we obtain the familiar limit of potential flow. Boundary layer theory is introduced to examine the effect of viscosity near surfaces. And in the limit where viscosity is dominant, we obtain what is known as “creeping flow” where inertia can be ignored all together. Our approach will rely on developing the theory and considering classical examples in order to advance our understanding of fluid motion in each of these areas.

EN.535.621. Intermediate Fluid Dynamics. 3 Credits.
This course prepares the student to solve practical engineering flow problems and concentrates on the kinematics and dynamics of viscous fluid flows. Topics include the control volume and differential formulations of the conservation laws, including the Navier-Stokes equations. Students examine vorticity and circulation, dynamic similarity, and laminar and turbulent flows. The student is exposed to analytical techniques and experimental methods, and the course includes an introduction to computational methods in fluid dynamics. It also includes a programming project to develop a numerical solution to a practical fluid flow problem. Prerequisite(s): An undergraduate fluid mechanics course.

EN.535.622. Robot Motion Planning. 3 Credits.
This course investigates the motion planning problem in robotics. Topics include motion of rigid objects by the configurations space and retraction approaches, shortest path motion, motion of linked robot arms, compliant motion, coordinated motion of several objects, robust motion with error detection and recovery, and motion in an unknown environment

EN.535.623. Intermediate Vibrations. 3 Credits.
Course topics include transient and forced vibration of 1- and N-degree-of-freedom systems and an introduction to vibration of continuous systems. Hamilton’s Principle and Lagrange’s equations are used throughout the course to derive the equation(s) of motion. MATLAB is introduced and used to solve the equations of motion and plot the response of the system. This course also addresses common topics in applied vibrations such as the environmental testing, the shock response spectrum, random vibration, vibration isolation, and the design of tuned-mass damper systems. Prerequisite(s): An undergraduate vibrations course.

EN.535.625. Turbulence. 3 Credits.
Fundamental equations of fluid mechanics, Reynolds averaging, and the closure problem. Scaling and self-preservation in boundary-free and wall-bounded shear flows. Isotropic turbulence and spectral theories. Vorticity dynamics, intermittency, and cascade models. Turbulence modeling: one- and two-equation models, Reynolds stress modeling, and large-eddy simulations.

EN.535.627. Computer-Aided Design. 3 Credits.
This course provides a wide-ranging exploration of computer-aided design (CAD) using Creo Parametric (a PTC CAD software, previously called Pro/ENGINEER). Topics include sketching, solid modeling, assembly modeling, detail drafting, geometric dimensioning and tolerancing, advanced modeling, sheet metal modeling, mechanism dynamics, and structural/thermal finite element analysis (FEA).

EN.535.628. Computer-Integrated Design and Manufacturing. 3 Credits.
This course emphasizes the computer automation of design and manufacturing systems. A survey of the automation techniques used for integration in modern design and manufacturing facilities is presented. Discussions are presented related to the system integration of computer-aided design (CAD), computeraided engineering (CAE), computer-aided manufacturing (CAM), robotics, material resource planning, tool management, information management, process control, and quality control. The current capabilities, applications, limitations, trends, and economic considerations are stressed.

EN.535.629. Energy Engineering. 3 Credits.
The course will focus on an analytical system performance technique known as Availability or Exergy Analysis, which is based on the second law of thermodynamics. The course focuses on traditional power and refrigeration systems. However, nontraditional power generation systems will be considered by way of a special project of each student’s choice. It will include an engineering description of the state of the art of the selected topic (e.g., wind or solar power, fuel cell, etc.), and a second law performance analysis of a prototype system will be presented to the class. In addition to the power system topics, the availability analysis will be applied to the combustion and psychrometric processes.

EN.535.630. Kinematics & Dynamics of Robots. 3 Credits.
This course introduces the basic concepts and tools used to analyze the kinematics and dynamics of robot manipulators. Topics include kinematic representations and transformations, positional and differential kinematics, singularity and workspace analysis, inverse and forward dynamics techniques, and trajectory planning and control. Prerequisite(s): The course project and assignments will require some programming experience or familiarity with tools such as MATLAB.

EN.535.631. Intro Finite Element Methods. 3 Credits.
Topics covered by this course include theory and implementation of finite element models for typical linear problems in continuum mechanics including fluid flow, heat transfer, and solid mechanics. Emphasis will be placed on developing a fundamental understanding of the method and its application. Course Note(s): Cannot be counted with 560.730 Finite Element Methods from the full-time Civil Engineering Department.

EN.535.632. Applied Finite Elements. 3 Credits.
This Applied Finite Elements course provides a wide-ranging exploration of the practical applications of finite element analysis (FEA) using both Creo Simulate and Ansys. Creo Simulate’s integration with the Creo Parametric, a computer-aided design (CAD) tool, affords a number of advantages, most notably a remarkable efficiency in performing analyses and the possibility for Simulate to seamlessly manipulate the CAD model in performing design optimizations. Within Simulate, students will learn to perform linear structural static analyses of parts and assemblies. Students will also learn to represent preloaded bolts, create both solid and thin shell meshes, and improve the reliability of FEA results through convergence studies. Within Ansys, and industry standard FEA program, students will revisit the most common types of analyses, making some comparisons back to the results from Creo Simulate. Next, students will then learn to partition CAD geometry into mesh-able volumes then construct high quality hexahedral meshes. Finally, students perform a broad array of other simulation types that include transient structural, nonlinear materials, explicit dynamics, and computational fluid dynamics. Opportunities exist throughout the course to individually apply the techniques covered in ways applicable to students’ personal interests, career, or career ambitions.

EN.535.633. Intermediate Heat Transfer. 3 Credits.
This course covers the following topics: transient heat conduction, forced and free convection in external and internal flows, and radiation processes and properties. Prerequisite(s): An undergraduate heat transfer course.

EN.535.634. Applied Heat Transfer. 3 Credits.
This course focuses on the inevitable tradeoffs associated with any thermodynamic or heat transfer system, which result in a clear distinction between workable and optimal systems. The point is illustrated by means of a number of concrete problems arising in power and refrigeration systems, electronics cooling, distillations columns, heat exchange, and co-generation systems. Prerequisite(s): An undergraduate heat transfer course.

EN.535.635. Introduction to Mechatronics. 3 Credits.
Mechatronics is the integration of mechanisms, electronics, and control. This interdisciplinary course is primarily lab and project based, but also includes lectures to provide background in key underlying principles. The course's main objective is to provide experience designing and prototyping a mechatronic or robotic system to accomplish a specific task or challenge. Topics include mechanism design, motor and sensor integration and theory, programming of microprocessors, mechanics prototyping, and the design process. Students will work in teams to complete a hardware-based final project. Prerequisite(s): Mathematics through calculus and linear algebra.

EN.535.638. Mechanical Packaging for Electronics Systems. 3 Credits.
This course will provide students with a fundamental understanding of the principles and techniques used to design and analyze the mechanical packaging of electronics systems. Lectures will include discussions on practical approaches to the design of enclosures, including manufacturability and assembly as well as analytical approaches to thermal and structural concerns. Upon completion of this course, students will have a clear understanding of the engineering considerations and tradeoffs used in developing rugged mechanical designs for electronics systems to be used in many environments.

EN.535.641. Mathematical Methods For Engineers. 3 Credits.
This course covers a broad spectrum of mathematical techniques needed to solve advanced problems in engineering. Topics include linear algebra, the Laplace transform, ordinary differential equations, special functions, partial differential equations, and complex variables. Application of these topics to the solutions of physics and engineering problems is stressed. Prerequisite(s): Vector analysis and ordinary differential equations.

EN.535.642. Control Systems for Mechanical Engineering Applications. 3 Credits.
This class provides a comprehensive introduction to the theory and application of classical control techniques for the design and analysis of continuous-time control systems for mechanical engineering applications. Topics include development of dynamic models for mechanical, electrical, fluid-flow and process-control systems, introduction to Laplace transforms, stability analysis, time and frequency domain analysis techniques, and classical design methods. The class will use a series of applications that build in complexity throughout the semester to emphasize and reinforce the material.

EN.535.643. Plasticity. 3 Credits.
The theory of the inelastic behavior of metallic materials. Experimental background and fundamental postulates for the plastic stress-strain relations. Mechanisms of plastic flow; single-crystal and polycrystalline plasticity. Boundary value problems. Variational principles, uniqueness and the upper and lower bound theorems of limit analysis. Slip line theory. Dynamic plasticity and wave phenomena. Finite strain plasticity and instability.

EN.535.645. Digital Control and Systems Applications. 3 Credits.
This class will provide a comprehensive treatment of the analysis and design of discrete-time control systems. The course will build upon the student's knowledge of classical control theory and extend that knowledge to the discretetime domain. This course is highly relevant to aspiring control systems and robotics engineers since most control system designs are implemented in micro-processors(hence the discrete-time domain) vice analog circuitry. Additionally, the course will go into advanced control system designs in the state-space domain and will include discussions of modern control design techniques including linear-quadratic optimal control design, pole-placement design, and state-space observer design. The class will use a series of applications that build in complexity throughout the semester to emphasize and reinforce the material.
EN.535.642 Control Systems for Mechanical Engineering Applications.

EN.535.650. Combustion. 3 Credits.
This is a multidisciplinary course involving applications of thermodynamics, fluid mechanics, heat transfer, and chemistry. Course contents include a review of chemical thermodynamics, chemical kinetics, transport theory, and conservation equations; laminar flow in premixed and non-premixed gases; combustion waves; ignition; combustion aerodynamics; multiphase combustion; and turbulent combustion. Selected applications are discussed including gas turbines, spark ignition and diesel engines, jet engines, industrial furnaces, pollutant formation, and control in combustion. Prerequisite(s): Undergraduate-level exposure to thermodynamics, fluid dynamics, differential equations, and basic chemistry.

EN.535.652. Thermal Systems Design and Analysis. 3 Credits.
Thermodynamics, fluid mechanics, and heat transfer principles are applied using a systems perspective to enable students to analyze and understand how interactions between components of piping, power, refrigeration, and thermal management systems affect the performance of the entire system. Following an overview of the fundamental principles involved in thermal and systems analyses, the course will cover mathematical methods needed to analyze the systems and will then explore optimization approaches that can be used to improve designs and operations of the thermal systems to minimize, for example, energy consumption or operating costs. Prerequisite(s): Undergraduate courses in thermodynamics and heat transfer.

EN.535.654. Theory/Appl Struct Anlys. 3 Credits.
This is a course in classical plate and shell structures with an emphasis on both analysis and application. Both differential and energy method approaches are presented. Topics include an introduction to thin plate theory, its application to circular and rectangular plates, buckling, and thermal effects. Classical thin shell theory is also presented. Applications to common plate and shell structures are discussed throughout.

EN.535.659. Manufacturing Systems Analysis. 3 Credits.
This course is a review of the fundamentals of modern manufacturing processes, computer-aided design/ manufacturing tools, flexible manufacturing systems, and robots. The course addresses relationships between process machinery, process conditions, and material properties. Examples of how components are manufactured within hightech industries are presented.

EN.535.660. Precision Mechanical Design. 3 Credits.
This course will provide the student with a fundamental understanding of the principles and techniques used to design precision machines, instruments, and mechanisms. Lectures will include discussions on the implementation and design of mechanisms, bearings, actuators, sensors, structures, and precision mounts used in precision design. Upon completion of this course, students will have a clear understanding of positional repeatability and accuracy, deterministic design, exact constraint design, error modeling, and sources of machine and instrumentation errors.

EN.535.661. Biofluid Mechanics. 3 Credits.
Introduction to fundamental fluid mechanics of physiological systems including the blood flow in the cardiovascular system and the air flow in the laryngeal and respiratory systems. Basic physiology of those systems will be introduced. Fundamental principles and mathematical/physical models for the air and blood flows in the physiological systems and their practical applications will be discussed. Simple computer models with MATLAB will be used in the course.

EN.535.662. Energy and Environment. 3 Credits.
The course focuses on the impacts of energy consumption and generation on the environment. Second law thermodynamic analysis will be used to help understand the quality of different energy sources and to assess whether they are being used to their fullest abilities. Given the attention given to climate change, greenhouse gas emissions from the energy sector will be evaluated. Life Cycle Assessment will be introduced to help understand broader environmental impacts from the acquisition of raw materials to the disposal of devices and equipment. The course will examine the key places where energy is used in the economy (buildings, industry, transportation) then transition to key sources of energy and issues in generation of energy (utilities, nuclear energy, alternative energy, energy storage, water-energy nexus).

EN.535.663. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties.

EN.535.667. Biomechanics of Human Movement. 3 Credits.
This course explores the methods and underlying principles for the modeling and analysis of human motion. The course begins with the fundamentals of human motion from walking through running. Next, the biology and stimuli needed to produce motion through the coordinated action of musculoskeletal system will be covered. Typical methods used to quantify the kinematics and kinetics of motion will be taught along with optimization techniques needed for analysis. Finally, the simulation of muscle driven locomotion will be taught for walking and running, as well as some discussion of the role of assistive devices.

EN.535.670. Advanced Aerodynamics. 3 Credits.
This course provides the basic aerodynamic concepts and tools for aerospace vehicle design and analysis, focusing on physical-based approaches with some introduction to numerical-based methods, where experimental wind tunnel or flight test data are considered as the benchmark results. The physical-based part will emphasize inviscid-incompressible flow followed by inviscid-compressible flow and introducing some basic elements of viscous flow plus a brief introduction to computational fluid dynamics (CFD), as the numerical-based methods.

EN.535.672. Advanced Manufacturing Systems. 3 Credits.
This course examines the effect that new technology, engineering, and business strategies have on transforming US industry into a world-class, competitive force. Emphasis is placed on the state of the art of factory automation and computer-integrated manufacturing. Topics include advanced manufacturing processes, rapid prototyping, intelligent manufacturing controls, and information technology in manufacturing. Technical principles related to advanced manufacturing are presented. Examples of actual production systems illustrate how industry is adopting the latest technology to meet customer requirements for quality, low cost, and flexibility.

EN.535.673. Mechanized Assembly: Hardware and Algorithms. 3 Credits.
Generally speaking, manufacturing engineering consists of two large subtopics: fabrication and assembly. This course covers topics in the design and analysis of mechanized assembly systems such as those used in parts feeding and pick-andplace machines. Specific topics will include: Describing Planar and Spatial Rotations, Planar Linkages (4-Bar, Crank-sliders), Classical Theory of Gears, Differential Geometry Methods, Singularities of Mechanisms and Robots, Spatial Linkage Synthesis and Screw Theory, Transmissions and Spatial Gearing, Automated Parts Transfer (Fences and Bowl Feeders), Assembly Planning, Tolerancing, Parts Entropy, Deployable Mechanism Design.

EN.535.675. Thermal Sciences for the Built Environment. 3 Credits.
This course will explore the energy transfer in building applications through study of fundamental heat and mass transfer, principles of vapor compression systems, and simulation of energy flows using publicly available software. Buildings account for 40% of energy consumption in the United States, so application of the principles of mechanical engineering can greatly lessen the environmental impact of the built environment while providing the comfort expected from occupants. This course will study the interplay between energy and issues such as comfort, durability, and indoor air quality.

EN.535.684. Modern Polymeric Materials. 3 Credits.
This course will cover a broad range of topics in the polymeric materials science and engineering field. We will address the structure and property relationships in thermoplastics, thermoset, amorphous, semicrystalline, oriented and biological polymeric materials; synthesis and processing (including rheology) of polymers; flow and fracture of polymeric materials under different conditions. Modern polymer characterization techniques will be introduced. Frontiers in the recent findings in biopolymers, polymer based 3D printing, polymers for tissue engineering will also be discussed.

EN.535.691. Haptic Interface Design. 3 Credits.
This course provides an introduction to haptic interface design and analysis for human-robot interaction involving virtual environments, augmented reality, and teleoperation. Topics include human touch perception, haptic-focused mechatronic design, system modeling and analysis (kinematic and dynamic), human-in-the-loop feedback control, and haptic feedback evaluation. Recommended: coursework or knowledge of Dynamics and knowledge of feedback control, mechatronics, and Matlab.

EN.535.706. Mechanics of Solids and Structures: Theory and Applications II. 3 Credits.
This course provides an overview of the area of the mechanics of solids and materials, with the intent of providing the foundation for graduate students interested in research that involves these disciplines. The course is based on the principles of continuum mechanics, and covers the fundamental concepts of elasticity, plasticity, and fracture as applied to materials. One objective is to get graduate students to the point that they can understand significant fractions of research seminars and papers in this area. This mathematically rigorous course emphasizes the setup and solution of boundary value problems in mechanics, and attempts to integrate the primary behaviors with deformation and failure mechanisms in materials. This course does not require Mechanics of Solids and Structures: Theory and Applications I as a prerequisite. It is recommended that students taking this course have taken a prior course in Mechanics of Materials, preferably at the upper-level undergraduate level.

EN.535.711. Symmetries of Crystalline Solids. 3 Credits.
This course covers the mathematical techniques necessary for understanding of symmetry of the solid state topics such as lattices, crystals structure and X-ray diffraction experiment. The class uses examples from crystalline solids and crystallography to introduce mathematical concepts and related problem solving skills. Topics include linear algebra and eigenvalues and eigenvectors, tensor operations, symmetry operations, introduction to Fourier analysis, group theory, and crystallographic groups.

EN.535.712. Applied Fluid Dynamics. 3 Credits.
This course will provide a survey of topics in applied fluid dynamics for the practicing engineer. The first topic will concentrate on pipe and duct flow, looking at friction factors, abrupt changes in area, and pipe systems. This is followed by unsteady flows focusing on pressure transients, such as the water hammer. A section on lubrication theory covering wedge and journal bearings is presented. Open channel flows are discussed with emphasis on optimum cross-sectional shape and specific energy. Turbomachinery such as axial and centrifugal pumps, including specific speed and suction limitations, is described. Fluid dynamic drag and lift from streamlined surfaces are presented, including topics such as vortex shedding, terminal velocity, and cavitation. The approach will emphasize the practical foundation needed to solve real-world problems.
EN.535.621 Intermediate Fluid Dynamics. Projects will require some programming experience or familiarity with tools such as MATLAB.

EN.535.720. Analysis and Design of Composite Structures. 3 Credits.
Topics in this course include anisotropic elasticity, laminate analysis, strength of laminates, failure theories, bending, buckling, and vibration of composite plates. The second part of the course is devoted to the applications of the structural analysis of composite structures by means of finite-elements computer codes.

EN.535.724. Dynamics of Robots and Spacecraft. 3 Credits.
This course provides an introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion by using Lagrange’s equations, solutions of equations of motion, Hamilton’s principle, and introduction to stability and control theory.

EN.535.726. Robot Control. 3 Credits.
This course focuses on the theory and methods used for the control of robotic manipulators. Topics include review of basic systems theory, robot position control, model-based trajectory tracking, and force control. Stability properties for each control strategy will be analyzed. Practical implementation issues will also be addressed. Students will simulate different control methods using MATLAB.
EN.535.630 Kinematics and Dynamics of Robots, ordinary differential equations, linear algebra.

EN.535.727. Advanced Machine Design. 3 Credits.
This course provides a broad treatment of stress, strain, and strength with reference to engineering design and analysis. Major emphasis is placed on the analytical and experimental methods of determination of stresses in relationship to the strength properties of machine elements under various loading conditions. Also considered are deflection, post-yield behavior, residual stresses, thermal stresses, creep, and extreme temperature effects as applied to the design of fasteners, shafts, power trains, and rotational machinery.

EN.535.731. Engineering Materials: Properties and Selection. 3 Credits.
Become familiar with different classes of engineering materials and their tradeoffs associated with design criteria such as strength, toughness, corrosion resistance, and fabricability, as well as some common test methods for evaluating material properties. This course will concentrate on metal alloys but will also consider polymers and ceramics. Topics specific to metals will include effects of work hardening and heat treatment, corrosion, and elevated temperature properties. Topics specific to polymers will include viscoelasticity, stress relaxation and creep, and phase transitions. Topics specific to ceramics will include flaw-dominated strength, fracture energy, and statistical determination of strength. The course also includes an introduction to the Ashby method of material selection and optimization.

EN.535.732. Fatigue and Fracture of Materials. 3 Credits.
This course will introduce the theory and application of fracture mechanics. The perspectives of multiple disciplines including mechanics, materials, manufacturing, statistics, and nondestructive evaluation will be integrated to develop a holistic view of design and sustainment of fatigue-limited structures. The course will provide a solid foundation of classic approaches to solving fatigue and fracture problems while simultaneously discussing the underlying physical mechanisms that drive material behavior. These methods will be applied during the latter part of the course in a group project where you work with a team on a simulated failure investigation. You will use your knowledge of fracture mechanics and emerging software tools to develop a safety risk assessment for a simulated aviation mishap. Prerequisites: Undergraduate or introductory courses in materials and mechanics and the ability to write code in MATLAB or another language is highly recommended.

EN.535.734. High temperature Materials. 3 Credits.
This is a treatise course on high temperature materials. The primary objective of this course is to provide an introduction to processing, characterization, and properties of various types of materials suitable for extreme environment applications including alloys, ceramics, composites, and carbons. The course will discuss both established high temperature materials and recent advances in high temperature materials development. Other topics to be covered include thermodynamics and kinetics in materials chemistry and structure-property relations.

EN.535.735. Computational Fluid Dynamics. 3 Credits.
This is a three-branch course covering theory, implementation, and application of computational fluid dynamics (CFD). The theory side covers the basics of CFD, finite volume discretization schemes, time integration, solution of systems of equations, boundary conditions, error analysis and turbulence models. On the implementation side students will implement a number of small-scale CFD solvers and pre-processing tools in order to get a working knowledge of the simulation process. The application side covers the use of a fully featured, readily available CFD solver to study an array of gradually complex flow phenomena.

EN.535.736. Computationl Fluid Mech. 3 Credits.
This course explores engineering applications of computational fluid dynamics with background information on the most common numerical methods: two-dimensional inviscid and viscous flows, boundary layer flows, and an introduction to three-dimensional flows. Applications are illustrated utilizing commercially available codes.
EN.535.621 Intermediate Fluid Dynamics and EN.535.641 Mathematical Methods for Engineers. Some programming experience is also assumed.

EN.535.737. Multiscale Modeling and Simulation of Mechanical Systems. 3 Credits.
The successful design of complex engineering systems requires understanding physical processes that bridge multiple length and time scales. This course will introduce students to the fascinating field of multiscale modeling and provide a foundation for understanding systems/devices at a molecular, microscopic, and macroscopic levels. Through a combination of lectures, case studies and hands-on applications, students will learn (1) the principles that govern engineering systems at various length/time scales, and (2) how to develop, use, and hybridize multiscale simulation tools.

EN.535.741. Optimal Control and Reinforcement Learning. 3 Credits.
This course will explore advanced topics in nonlinear systems and optimal control theory, culminating with a foundational understanding of the mathematical principals behind Reinforcement learning techniques popularized in the current literature of artificial intelligence, machine learning, and the design of intelligent agents like Alpha Go and Alpha Star. Students will first learn how to simulate and analyze deterministic and stochastic nonlinear systems using well-known simulation techniques like Simulink and standalone C++ Monte-Carlo methods. Students will then be introduced to the foundations of optimization and optimal control theory for both continuous- and discrete- time systems. Closed-form solutions and numerical techniques like co-location methods will be explored so that students have a firm grasp of how to formulate and solve deterministic optimal control problems of varying complexity. Discrete-time systems and dynamic programming methods will be used to introduce the students to the challenges of stochastic optimal control and the curse-of-dimensionality. Supervised learning and maximum likelihood estimation techniques will be used to introduce students to the basic principles of machine learning, neural-networks, and back-propagation training methods. The class will conclude with an introduction of the concept of approximation methods for stochastic optimal control, like neural dynamic programming, and concluding with a rigorous introduction to the field of reinforcement learning and Deep-Q learning techniques used to develop intelligent agents like DeepMind's Alpha Go.
EN.535.641 Mathematical Methods for Engineers.

EN.535.742. Applied Machine Learning for Mechanical Engineers. 3 Credits.
This course covers machine learning fundamentals (e.g., optimization, perceptron, and universal approximation), some popular and advanced machine learning techniques (e.g., Supervised, Unsupervised, Probabilistic, Convolutional, and Generative Networks), and supercomputing techniques (with a focus on MARCC) to address mechanical engineering-related machine learning problems. The course requires Python 3+ programming skills; a free 3-hour Python 3+ tutorial will be provided to those who need to learn Python.

EN.535.748. Stress Waves, Impacts and Shockwaves. 3 Credits.
Elastic waves in unbounded media. Elastic waveguides. Waves in elastic-plastic and nonlinear elastic materials. Analysis of impact on materials and structures. Impact on various scales, from planetary to microscopic. Shock waves. Impact signatures in materials (time permitting).

EN.535.750. Biomechanics of the cell: From nano- and micro-mechanics to cell organization and function. 3 Credits.
Mechanical aspects of the cell are introduced. Discussion of the role of proteins, membranes and cytoskeleton in cellular function and how to describe them using simple mathematical models.

EN.535.752. Advanced Flight Dynamics and Control of Aerospace Vehicles. 3 Credits.
This course is an introduction to the mathematical derivation, behavioral insight into and control of the dynamics of aerospace vehicles. The course will cover current vehicles of interest ranging from small unmanned aircraft, to hypersonic aircraft and spacecraft in earth orbit. Starting from first principles in vector math and conservation of linear and angular momentum in inertial and non-inertial (rotating) coordinate systems we will develop the fundamental equations of motion that describe the flight of these vehicles. Because understanding is best achieved through hands on experience students will develop and implement the necessary vector math, transformations, earth environment models and rigid body dynamics in MATLAB; the models you develop will directly parallel and follow the progression of the course ultimately realizing a full nonlinear 6-degree-of-freedom simulation of an aircraft that we will use to investigate and understand the nature of their dynamic motion and to discover and implement control systems to change and improve their natural dynamic response.

EN.535.766. Numerical Methods. 3 Credits.
Comprehensive introduction to the finite-difference method and associated numerical techniques for solving partial differential equations (PDEs) encountered in Engineering and Physics. Homework assignments and Project require substantial computer programming.

EN.535.773. Acoustical Oceanography. 3 Credits.

EN.535.782. Haptic Applications. 3 Credits.
An introduction to the required theoretical and practical background in the design and development of haptic applications. Haptic technology enables users to touch and/or manipulate virtual or remote objects in simulated environments or tele-operation systems. This course aims to cover the basics of haptics through lectures, assignments, and readings on current topics in haptics. Prerequisite(s): Recommended course background: graduate and senior undergraduate students who are enthusiastic to learn about haptics and basic familiarity with MATLAB.

EN.535.800. Independent Study. 3 Credits.
An individually tailored, supervised project on a subject related to mechanical engineering. The content and expectations are formalized in negotiations between the student and the faculty sponsor. This course may only be taken in the second half of a student's master degree program. All independent studies must be supervised by a current ME instructor (exceptions must be approved by the Mechanical Engineering Program Chair) and must rely on material from prior ME courses. The independent study project proposal form (see https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration.

EN.535.801. Independent Study. 3 Credits.

Mechanical Engineering, Master of Science

A focus area must be chosen for this program.

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section.

The applicant's prior education must include a bachelor's degree in Mechanical Engineering or a closely related technical discipline. Applicant's prior education should include the following prerequisites:

1. Three semesters of collage calculus (Calculus I, II and III)
2. Two semesters of collage physics (Physics I and II)
3. A course or practical knowledge of a programing language (such as Python, Matlab, or C++)

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites with a letter grade B- or higher. Missing prerequisites may be completed with Johns Hopkins Engineering or at another regionally accredited institution.

Enrolled students typically have earned a grade point average of at least 3.3 on a 4.0 scale (B+ or above) in their undergraduate studies, though this is not a requirement for admission, nor is it a guarantee. Transcripts from all college studies must be submitted. When reviewing an application, the candidate's academic and professional background will be considered in its totality, and decisions are made on a case-by-case basis. It is strongly advised that applicants submit a maximum of two page curriculum vitae listing their relevant professional background.

Program Requirements

Students can choose one of two options to fulfill their Master's degree requirements: the "All-Course" option or the "Thesis" option. The requirements for both options are summarized below.

All-Course Option:

Students completing the "all-course" option must take a coordinated sequence of ten courses. All courses must be completed within five years from the start of the student's first class. Students are required to choose a focus area to follow. The focus area selected does not appear as an official designation on the student transcript. The curriculum consists of one core course in mathematics, two core courses from Group 1 and three other courses from Group 2 of the student's chosen focus area, and four technical electives. At least two of the four electives must be from a core engineering discipline, and at most two can be chosen from the Engineering Management, Systems Engineering, Space Systems Engineering, Information Systems Engineering, Healthcare Systems Engineering, Cybersecurity, Financial Mathematics, Occupational and Environmental Hygiene, or Environmental Planning and Management programs.

One of the four elective courses can be substituted for EN.535.820 - Masters Graduate Research. This course is intended to give a research experience to those pursuing an "all-course" master's degree. The research must be approved by the student's research supervisor, which can be an academic advisor, a current full-time faculty member at the Department of Mechanical Engineering at Johns Hopkins University, a research staff member at the Johns Hopkins University Applied Physics Laboratory, or an active instructor affiliated with one of the Engineering for Professionals programs. Prior written approval of the advisor and the program chair must be received before enrolling in this course.

Courses from the full-time program (EN.530.XXX) may be substituted for a relevant requirement with advisor approval. One computationally-oriented course is strongly recommended and can serve as a technical elective or as a substitute to one of the three courses required from Group 2 of the student's chosen focus area. Only one C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Mechanical Engineering program are subject to advisor approval.

Thesis Option:

Students completing the “thesis” option must take a coordinated sequence of eight courses and prepare and submit a Master’s thesis. All requirements should be completed within five years. Students are required to choose a focus area to follow. The focus area selected does not appear as an official designation on the student transcript. The curriculum consists of one core course in mathematics, two core courses from those listed in Group 1 and three courses from those listed in Group 2 of the student’s chosen focus area, two technical electives, and a thesis. The thesis should expand the body of theoretical or applied knowledge in the field of the student’s chosen focus area. At least one of the two electives must be from a core engineering discipline, and at most one can be chosen from the Engineering Management, Systems Engineering, Space Systems Engineering, Information Systems Engineering, Healthcare Systems Engineering, Cybersecurity, Financial Mathematics, Occupational and Environmental Hygiene, or Environmental Planning and Management programs. Only one C-range grade (C+, C, or C–) can count toward the master’s degree. All course selections outside of the Mechanical Engineering program are subject to advisor approval.

Students electing to chose the thesis option should get prior written approval from both their academic advisor and the program chair and must work with an approved research advisor. The research advisor can be any current full-time faculty member at the Department of Mechanical Engineering at Johns Hopkins University. Prior written approval should be secured from the program chair if the research advisor will be a research staff member at the Johns Hopkins University Applied Physics Laboratory or an active instructor affiliated with the Engineering for Professionals Mechanical Engineering program. An electronic version of the master thesis should be delivered to the Milton S. Eisenhower (MSE) library after its approval by the thesis committee. The thesis committee consists of the thesis research advisor and one other member who is an expert in the research area of the thesis and to be selected by the program chair. The research work should generally start after the student finishes all the course requirements for their chosen focus area and should not take more than 3 consecutive semesters. While working on the thesis, students must enroll in the two-course sequence EN.535.820 - Master’s Graduate Research and EN.535.821 - Master’s Thesis Writing, where the research advisor serves as the instructor for both. The prerequisite for these courses is the completion of all course requirements in the student's focus area and the approval of the program chair. The approval of the program chair follows the submission of a research proposal by the student that is approved by their research advisor. Hence, the student must contact a research advisor and discuss potential research topics of interest to both parties, conduct a literature survey, and present a maximum of three-page research proposal to be approved by the program chair. The latest a proposal can be submitted for consideration is during the third to last semester of the five-year limit.

Courses from the full-time program (EN.530.XXX) may substitute a relevant requirement with the advisor approval. One computationally-oriented course is strongly recommended and can serve as a technical elective or as a substitute to one of the three courses required from Group 2 of the student’s chosen focus area. Only one C-range grade (C +, C, or C–) can count toward the master’s degree. All course selections outside of the Mechanical Engineering program are subject to advisor approval.

Program Course Requirements

Code	Title	Credits
Core Course		
EN.535.641	Mathematical Methods For Engineers [1]	3
Recommended (At least one of these computationally-oriented courses is strongly recommended in place of one of the three required courses from Group 2)		
EN.535.609	Topics in Data Analysis	3
EN.535.610	Computational Methods of Analysis	3
EN.535.742	Applied Machine Learning for Mechanical Engineers	3
EN.535.766	Numerical Methods	3
Focus Areas		
Select one of the following Focus Areas:		
Biomechanical Engineering (p. 1561)		
Fluid Mechanics and Thermal Science (p. 1562)		
Advanced Manufacturing (p. 1562)		
Robotics, Dynamics, and Controls (p. 1562)		
Solids/Mechanics of Materials (p. 1563)		

1. This course must be taken in the first semester of the student’s program, unless the advisor explicitly allows the student to do otherwise.

Focus Area Courses

Students are required to choose one of five focus areas: Biomechanical Engineering, Fluid Mechanics and Thermal Science, Advanced Manufacturing, Robotics, Dynamics, and Controls, and Solids/Mechanics of Materials. The focus area selected does not appear as an official designation on the student transcript. Each focus area has five required courses. Of these courses, at least two must be completed from Group 1. Post-master’s certificate students are not limited to one focus area but can choose their courses among all the courses offered by the program.

BIOMECHANICAL ENGINEERING

Study the human body, modeled as a mechanical system. Apply fundamental mechanical engineering principles to explore the body’s structure and functions. Use deformable solid mechanics to study bone and soft tissues, fluid mechanics in exploring biofluidics, and statics and dynamics in musculoskeletal biomechanics applications. Learn about the biocompatibility of metallic, ceramic, polymeric, and even other biological materials that come in contact with tissue and biological fluids. Study biomechanical sensors and signals, the design of orthopedic implants, the principles of joint reconstruction, and emerging biomechanics frontiers.

Code	Title	Credits
Group 1 (must select two)		
EN.535.661	Biofluid Mechanics	3
EN.535.663	Biosolid Mechanics	3
EN.535.667	Biomechanics of Human Movement	3
EN.535.750	Biomechanics of the cell: From nano- and micro-mechanics to cell organization and function	3
EN.585.601	Physiology for Applied Biomedical Engineering I	3
EN.585.631	Introduction to Biomechanics	3
Group 2 (must select three)		
EN.515.606	Chemical and Biological Properties of Materials	3

EN.525.786	Human Robotics Interaction	3
EN.535.607	Mechanics of Solids and Structures: Theory and Applications I	3
EN.585.631	Introduction to Biomechanics	3
EN.585.708	Biomaterials	3
EN.585.710	Biochemical Sensors	3
EN.585.720	Orthopedic Biomechanics	3
EN.585.726	Biomimetics in Biomedical Engineering	3
EN.585.729	Cell and Tissue Engineering	3
EN.585.747	Advances in Cardiovascular Medicine	3

FLUID MECHANICS AND THERMAL SCIENCE

Learn to solve practical engineering fluid flow problems. Examine laminar and turbulent flows, plus vorticity and circulation. Understand a variety of experimental methods. Study transient heat conduction from both free and forced convection, in external and internal flows. Learn to perform the tradeoffs studies associated with thermodynamic and head transfer systems that arise in power and refrigeration systems, electronics cooling, distillation columns, heat exchangers, and co-generation systems. Apply computational fluid dynamics (CFD) to an array of complex flow and heat transfer phenomena.

Code	Title	Credits
Group 1 (must select two)		
EN.535.620	Fluid Dynamics I	3
EN.535.621	Intermediate Fluid Dynamics	3
EN.535.633	Intermediate Heat Transfer	3
EN.535.634	Applied Heat Transfer	3
EN.535.735	Computational Fluid Dynamics	3
Group 2 (must select three)		
EN.515.602	Thermodynamics and Kinetics of Materials	3
EN.535.614	Fundamentals of Acoustics	3
EN.535.625	Turbulence	3
EN.535.652	Thermal Systems Design and Analysis	3
EN.535.661	Biofluid Mechanics	3
EN.535.662	Energy and Environment	3
EN.535.670	Advanced Aerodynamics	3
EN.535.737	Multiscale Modeling and Simulation of Mechanical Systems	3
EN.575.601	Fluid Mechanics	3
EN.615.761	Intro To Oceanography	3

ADVANCED MANUFACTURING

Study the automation of design and manufacturing systems including computer-aided design (CAD), computer-aided engineering (CAE), computer-aided manufacturing (CAM), and robotics. Understand the relationships between process machinery, process conditions, and material properties. Learn to design precision machines, instruments, and mechanisms through an understanding of gears, bearings, actuators, and sensors. Develop a clear understanding of positional repeatability and accuracy as well as sources of machine and instrumentation errors. Explore the latest manufacturing processes in high-tech industries.

Code	Title	Credits
Select five of the following of which two must be from Group 1:		
Group 1 (must select two)		
EN.535.628	Computer-Integrated Design and Manufacturing	3
EN.535.659	Manufacturing Systems Analysis	3
EN.535.660	Precision Mechanical Design	3
EN.535.673	Mechanized Assembly: Hardware and Algorithms	3
Group 2 (must select three)		
EN.515.622	Micro and Nano Structured Materials & Devices	3
EN.515.655	Metal Additive Manufacturing	3
EN.515.658	Design for Additive Manufacturing	3
EN.515.661	Introduction to Polymer Science	3
EN.535.623	Intermediate Vibrations	3
EN.535.627	Computer-Aided Design	3
EN.535.633	Intermediate Heat Transfer	3
EN.535.638	Mechanical Packaging for Electronics Systems	3
EN.535.642	Control Systems for Mechanical Engineering Applications	3
EN.535.672	Advanced Manufacturing Systems	3
EN.535.684	Modern Polymeric Materials	3

ROBOTICS, DYNAMICS, AND CONTROLS

Study an array of aspects of robot motion planning including both rigid and compliant motion, coordinated motion, error detection and recovery, and motion in an unknown environment. Analyze the kinematics and dynamics of robotic manipulators. Apply classical control systems to mechanical engineering applications that span mechanical, electrical, fluid-flow, and process control systems. Develop an understanding of advanced control theory that includes reinforcement learning, also known as artificial intelligence and machine learning.

Code	Title	Credits
Group 1 (must select two)		
EN.535.622	Robot Motion Planning	3
EN.535.630	Kinematics & Dynamics of Robots	3
EN.535.642	Control Systems for Mechanical Engineering Applications	3
EN.535.724	Dynamics of Robots and Spacecraft	3
Group 2 (must select three)		
EN.525.609	Continuous Control Systems	3
EN.525.610	Microprocessors for Robotic Systems	3
EN.525.626	Feedback Control in Biological Signaling Pathways	3
EN.525.645	Modern Navigation Systems	3
EN.525.661	UAV Systems and Control	3
EN.525.777	Control System Design Methods	3
EN.525.786	Human Robotics Interaction	3
EN.530.691	Haptic Interface Design for Human-Robot Interaction	3
EN.535.603	Applied Optimal Control	3
EN.535.612	Intermediate Dynamics	3
EN.535.623	Intermediate Vibrations	3
EN.535.726	Robot Control	3
EN.535.627	Computer-Aided Design	3
EN.535.628	Computer-Integrated Design and Manufacturing	3
EN.535.635	Introduction to Mechatronics	3
EN.535.645	Digital Control and Systems Applications	3
EN.535.659	Manufacturing Systems Analysis	3
EN.535.660	Precision Mechanical Design	3
EN.535.673	Mechanized Assembly: Hardware and Algorithms	3

EN.535.741	Optimal Control and Reinforcement Learning	3
EN.535.782	Haptic Applications	3
EN.605.613	Introduction to Robotics	3
EN.605.716	Modeling and Simulation of Complex Systems	3

SOLIDS/MECHANICS OF MATERIALS

Study the deformation and failure of mechanical structures as well as the different classes of engineering materials. Perform tradeoff studies based upon design criteria including strength, toughness, corrosion resistance, manufacturability, and failure. Learn to use material properties to explore stress and strain in 3D, for both elastic and inelastic material behavior. Study transient and forced vibration of multi degree-of-freedom systems and incorporating vibration isolation. Learn to use finite element analysis as an extension of classical methods, performing an array of simulations that include linear and nonlinear structural, modal, buckling, random vibration, and even generative design analyses.

Code	Title	Credits
Group 1 (must select two)		
EN.535.606	Advanced Strength Of Materials	3
EN.535.607	Mechanics of Solids and Structures: Theory and Applications I	3
EN.535.623	Intermediate Vibrations	3
EN.535.632	Applied Finite Elements	3
EN.535.731	Engineering Materials: Properties and Selection	3
Group 2 (must select three)		
EN.515.601	Structure and Properties of Materials	3
EN.515.602	Thermodynamics and Kinetics of Materials	3
EN.515.606	Chemical and Biological Properties of Materials	3
EN.515.611	Computational Molecular Dynamics	3
EN.515.617	Nanomaterials	3
EN.515.622	Micro and Nano Structured Materials & Devices	3
EN.515.627	Chemistry of Nanomaterials	3
EN.515.655	Metal Additive Manufacturing	3
EN.515.658	Design for Additive Manufacturing	3
EN.515.661	Introduction to Polymer Science	3
EN.525.606	Electronic Materials	3
EN.535.612	Intermediate Dynamics	3
EN.535.627	Computer-Aided Design	3
EN.535.643	Plasticity	3
EN.535.660	Precision Mechanical Design	3
EN.535.663	Biosolid Mechanics	3
EN.535.684	Modern Polymeric Materials	3
EN.535.706	Mechanics of Solids and Structures: Theory and Applications II	3
EN.535.711	Symmetries of Crystalline Solids	3
EN.535.732	Fatigue and Fracture of Materials	3
EN.535.748	Stress Waves, Impacts and Shockwaves	3
EN.565.604	Structural Mechanics	3
EN.565.680	Marine Geotechnical Engineering	3
EN.565.682	Design of Ocean Structures	3
EN.565.731	Structural Dynamics	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Mechanical Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related discipline are eligible to apply for the Post-Master's Certificate in Mechanical Engineering.

Program Requirements

Five courses must be completed within five years. At least four of the five courses must be from the Mechanical Engineering (EN.535.XXX) program, and at least two of the courses must be at the 700-level. Certificate students may not enroll in graduate research courses (EN.530.800, EN.535.820, EN.535.821).

Only grades of B– or above can count toward the post-master's certificate. Courses from the full-time program (530.xxx) may be substituted subject to advisor approval. Focus areas are not applicable to students pursuing certificates. Students are free to choose any five courses offered by the Mechanical Engineering program. All course selections outside of the Mechanical Engineering program are subject to advisor approval.

Occupational and Environmental Hygiene

The Occupational and Environmental Hygiene, Master of Science program is a professional degree designed to prepare students to become leading health professionals capable of addressing problems in environmental and occupational settings. Training covers principles of risk analysis and management in the workplace and the general environment. The program includes coursework in the following areas: toxicology, epidemiology, biostatistics, occupational health, air pollution, occupational and environmental hygiene, environmental sampling techniques, program management and risk analysis. Graduates of the program are employed in consulting, private industry and/or government, and they are also prepared to pursue doctoral studies in environmental health sciences. The program may be undertaken on a full-time or part-time/online basis and both options confer the same degree. Students interested in pursuing the full-time option should look under the Whiting School of Engineering full-time residential programs (p. 1339) for more information.

Core Faculty

Kristen Koehler, Occupational and Environmental Hygiene, Program Chair
Associate Professor, Department of Environmental Health and Engineering
JHU Bloomberg School of Public Health

Gurumurthy Ramachandran
Professor, Department of Environmental Health and Engineering
JHU Bloomberg School of Public Health

Ana Maria Rule
Assistant Professor, Department of Environmental Health and Engineering

JHU Bloomberg School of Public Health

Lesliam Quirós-Alcalá
Assistant Professor, Department of Environmental Health and Engineering
JHU Bloomberg School of Public Health

Carla Reinhard, Occupational and Environmental Hygiene, Program Manager
Research Associate, Department of Environmental Health and Engineering
JHU Bloomberg School of Public Health

Occupational and Environmental Hygiene, Master of Science

The Occupational and Environmental Hygiene, Master of Science program is accredited by the Accreditation Board for Engineering and Technology (ABET) Applied and Natural Science Accreditation Commission (ANSAC) and is designed to prepare students to pass the Certified Industrial Hygienist (CIH) examination administered by the American Board of Industrial Hygiene (ABIH).

All Occupational and Environmental Hygiene, Master of Science core curriculum courses are offered through the Bloomberg School of Public Health, so students will need to follow this academic calendar (https://www.jhsph.edu/academics/calendar/2020-2021.html).

The Bloomberg School of Public Health operates on a term system rather than a semester system. There are 4 numbered terms in the regular academic year as well as a summer institute and a winter intersession. The academic terms are 8 weeks in length and the institutes/intersessions are 2 weeks each. Part-time/Online Occupational and Environmental Hygiene, Master of Science students are required to come to campus for courses that do not translate to an online format (laboratory and field trip-based courses). These courses are held during the summer institute and winter intersession. Students will attend 2 summer institutes and one winter intersession over the course of their degree program.

Students must be employed in the industrial hygiene or safety fields since all students are required to complete an independent professional project as part of their degree and in most instances, this is completed at the student's place of employment.

Prior education must include (1) an undergraduate degree from a regionally accredited four-year college or university, (2) successful completion of college-level courses in biology, chemistry, calculus and physics.

Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Courses completed at a local community college are acceptable.

1. Prior education must include:
    - An undergraduate degree from a regionally accredited four-year college or university.
    - Successful completion of college-level courses in biology, chemistry, calculus, and physics. Admitted students typically have earned a minimum grade point average of 3.0 on a 4.0 scale (B or above).
    - If prior education does not include the prerequisites above, the student must complete them before they can be admitted to the program. Courses completed at a local community college are acceptable.
2. The GRE is required for this program; it is one of the ABET-mandated minimum requirements for admitted students. The MCAT is acceptable but not preferred. A waiver may be requested if the applicant has:
    - A graduate degree (master's or doctoral degree), OR
    - Successfully completed the Environmental and Occupational Health, Graduate Certificate (https://publichealth.jhu.edu/academics/environmental-and-occupational-health-certificate-program/)and earned at least a 'B' in all courses taken for the Certificate.
3. Students must be employed in the industrial hygiene or safety fields since all students are required to complete an independent professional project as part of their degree and in most instances, this is completed at the student's place of employment.

Program Requirements

All courses listed below are required for degree completion. Students have up to 5 years to complete the degree requirements. We recommend that students working full time limit their course registration to 1 or 2 courses per term.

The majority of the degree can be completed online, but students are required to come to campus for courses that do not translate to an online format. These courses include a hands-on laboratory course (students learn how to do gas, vapor and particulate sampling, use direct reading instruments, etc.) and a field trip course where students visit industries in the greater Baltimore area (examples are: Domino Sugar, Harley Davidson, Nestles Ice Cream, Vulcan Mine, Ellicott Dredges).

Students who complete the Environmental and Occupational Health, Graduate Certificate (https://ehe.jhu.edu/graduate/masters-programs/master-of-science-in-occupational-and-environmental-hygiene/stepping-stone-to-ms-oeh.html), prior to being admitted to the Occupational and Environmental Hygiene, Master of Science degree may apply all core curriculum courses towards the degree if they received a 'B' or better in all courses.

Students must maintain minimum academic standards (see below). They are also responsible for the following:

- Academic Ethics Course
- Occupational and Environmental Hygiene, Master of Science Part-time/Online Curriculum (all courses are required)
- Independent Professional Project
- Master's essay and presentation

Academic Standards

Students must meet minimum academic standards to remain in the MS OEH Program. Failure to meet any of the criteria below is grounds for dismissal from the program.

For satisfactory academic progress, students must:

1. Maintain a minimum of 2.75 cumulative grade point average.

2. Retake a required course in which they receive a grade of 'D' or 'F.'

If a student receives a grade of 'D' or 'F' twice in the same required course, they may not take the course a third time. If the course is a required course with no other options, the student will be dismissed from the program.

Internship, Culminating Project, Master's Essay and Presentation
The student is expected to assume independent responsibility for a project, the content of which should be based on an occupational or environmental health problem that is pertinent to the educational goals of the student and approved by the advisor (Examples (https://ehe.jhu.edu/graduate/masters-programs/master-of-science-in-occupational-and-environmental-hygiene/degree-requirements.html)).

Part-time/Online students will perform an Independent Professional Project (IPP) at their place of employment in most instances.

To Register for Classes
Please refer to the course schedule using the SIS Class Search (https://sis.jhu.edu/classes/) published each term for exact dates, times, locations, fees, and instructors. Courses can also be found by visiting the Bloomberg School of Public Health Course Directory (https://www.jhsph.edu/courses/).

Email **ep-registration@jhu.edu** to register for classes each term. Include the following information in the email:

- Full name
- Hopkins ID
- email address
- phone number
- course number
- course section
- course title
- term

Required Courses

Code	Title	Credits
PH.140.611	Statistical Reasoning in Public Health I	3
PH.140.612	Statistical Reasoning in Public Health II	3
PH.140.613	Data Analysis Workshop I [1]	2
PH.140.614	Data Analysis Workshop II [1]	2
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
PH.182.614	Industrial Hygiene Laboratory [1]	5
PH.182.615	Airborne Particles	4
PH.182.621	Introduction to Ergonomics	4
PH.182.622	Ventilation and Hazard Control	4
PH.182.623	Occupational Health Management	3
PH.182.625	Principles of Occupational and Environmental Hygiene	4
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.182.810	MS Field Placement	1
PH.182.850	EHE MS Essay [2]	1
PH.182.860	Special Studies Seminar in Occupational and Environmental Hygiene [2]	1
PH.187.610	Public Health Toxicology	4
PH.188.680	Fundamentals of Occupational Health	3
PH.188.681	Onsite Evaluation of Workplace and Occupational Health Programs [1]	5
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.317.610	Risk Policy, Management and Communication	3
PH.340.721	Epidemiologic Inference in Public Health I	5

[1] This course is held on-campus
[2] Two credits are required to complete the degree requirements. Register for this course twice.

Core Curriculum 2022 - 2023

Code	Title	Credits
First Term (Online) Monday, 8/29/2022 - Monday, 10/24/2022		
PH.188.680	Fundamentals of Occupational Health	3
PH.140.611	Statistical Reasoning in Public Health I	3
PH.182.622	Ventilation and Hazard Control	4
Second Term (Online) Wednesday, 10/26/2022 - Friday, 12/23/2022		
PH.187.610	Public Health Toxicology	4
PH.140.612	Statistical Reasoning in Public Health II	3
PH.182.623	Occupational Health Management	3
PH.182.621	Introduction to Ergonomics	4
Winter Institute (East Baltimore Campus) Wednesday, 1/4/2023 - Friday, 1/20/2023		
PH.140.613	Data Analysis Workshop I	2
PH.140.614	Data Analysis Workshop II	2
Third Term (Online) Monday, 1/23/2023 - Friday, 3/17/2023		
PH.317.600	Introduction to the Risk Sciences and Public Policy	4
PH.340.721	Epidemiologic Inference in Public Health I	5
PH.182.615	Airborne Particles	4
PH.182.637	Noise and Other Physical Agents in the Environment	4
PH.182.613	Exposure Assessment Techniques for Health Risk Management	3
Fourth Term (Online) Monday, 3/27/2023 - Friday, 5/19/2023		
PH.182.625	Principles of Occupational and Environmental Hygiene	4
PH.305.615	Occupation Injury Prevention and Safety Policy and Practice	2
PH.317.610	Risk Policy, Management and Communication	3
PH.180.628	Introduction To Environmental and Occupational Health Law	4
PH.182.860	Special Studies Seminar in Occupational and Environmental Hygiene [2]	1
Summer Institute (East Baltimore Campus) Dates to be Announced		
PH.182.614	Industrial Hygiene Laboratory	5
PH.188.681	Onsite Evaluation of Workplace and Occupational Health Programs	5

Other [1]		
PH.182.810	MS Field Placement	1
PH.182.850	EHE MS Essay [2]	1

1 Successful completion of 3 credits related to the Independent Professional Project (IPP) is required for completion of the program. The related course requirements will be undertaken over several terms. Students should register for these classes on the following basis: 1 credit will be awarded for 182.810 upon submission of the IPP proposal and completion of the IPP data collection; 1 credit will be awarded for 182.850 upon submission of a completed draft of the essay; and 1 credit will be awarded for 182.850 upon submission of a final draft of the essay and the formal presentation of a seminar on the IPP to faculty and fellow students. The registration timeline for these courses is decided between the student and their adviser.

2 Two credits are required to complete the degree requirements. Register for this course twice.

Program Educational Objectives

The MS OEH Educational Objectives focus on objectives that our graduates are expected to attain within a few years of graduation. The objectives were reviewed and approved by our external advisory committee on 2/18/2022 and are stated as follows:

The Program in Occupational and Environmental Hygiene educates students to think critically, communicate clearly, and collaborate effectively as they apply the fundamental scientific principles of industrial hygiene to environmental and workplace problems. We emphasize the importance of intellectual growth, professional ethics, and service to society.

The OEH Program has four broad educational objectives. Our efforts are focused on enabling students to:

1. Anticipate, recognize, evaluate, and control factors in the workplace and the environment that may cause illness, injury, or impairment;
2. Build a successful career and obtain professional certification using the comprehensive education and training received;
3. Integrate industrial hygiene techniques, biostatistics, epidemiology, management, and environmental health concepts into a broader occupational/environmental health practice; and
4. Pursue continuing education in research and professional practice of Occupational and Environmental Health.

General Student Outcomes

Students graduating with a MS in Occupational and Environmental Hygiene will have demonstrated an ability to:

1. Identify, formulate, and solve broadly defined technical or scientific problems by applying knowledge of mathematics and science and/or technical topics to areas relevant to the discipline;
2. Formulate or design a system, process, procedure, or program to meet desired needs;
3. Develop and conduct experiments or test hypotheses, analyze and interpret data and use scientific judgement to draw conclusions;
4. Communicate effectively with a range of audiences;
5. Understand ethical and professional responsibilities and the impact of technical and/or scientific solutions in global, economic, environmental, and societal contexts; and
6. Function effectively on teams that establish goals, plan tasks, meet deadlines, and analyze risk and uncertainty.

Students will undertake an appropriate professional experience tailored to the needs of the individual student and complete an Independent Professional Project (IPP) and present the results of the IPP in written form and orally.

Program Outcomes

1. Understand physiological and/or toxicological interactions of physical, chemical, biological, and ergonomic agents, factors, and /or stressors with the human body;
2. Anticipate, recognize, evaluate, and control potentially hazardous agents, conditions, and practices in workplace settings;
3. Apply fundamental exposure assessment techniques (both qualitative and quantitative) in workplace settings;
4. Perform industrial hygiene data interpretation of new and existing data including statistical and epidemiological principles;
5. Apply appropriate business and managerial practices to workplace settings;
6. Understand, interpret, and apply occupational and environmental standards and regulations; and
7. Understand fundamental aspects of safety and environmental health. Students will undertake an appropriate professional experience tailored to the needs of the individual student and complete an Independent Professional Project (IPP) and present the results of the IPP in written form and orally.

Robotics and Autonomous Systems

The Robotics and Autonomous Systems program targets students that want to engineer and build complex robotics systems that operate with various degrees of autonomy. Students will have the opportunity to learn the theory of and actually develop autonomous robotic systems in multiple domains including transportation systems, medical robotics, internet of things, smart cities, and industrial systems. The program emphasizes a holistic approach to robotics and autonomous systems including dynamics and control, perception and cognition, autonomous decision making, human-robot and robot-robot collaboration, policy and ethics.

Program Committee

David Silberberg, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

Robotics and Autonomous Systems, Master of Science

Admission Requirements

Applicants (degree seeking and special student) must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. In addition, applicants for the Master of Science in Robotics and Autonomous Systems will likely have prior educational experience that includes an undergraduate or higher major in mechanical engineering, electrical engineering, computer science, information science, mathematics, systems engineering, basic sciences, or the equivalent. The applicant's prior education must include the following prerequisites:

- Calculus through Multivariable Calculus;
- Linear Algebra;
- Differential Equations; and
- Programming (such as C++, Java, Python, or Matlab.

Students must have taken courses in or demonstrated proficiency in mathematics, engineering, and software development. Applicants whose prior education does not include the prerequisites listed above may still be admitted under provisional status, followed by full admission once they have completed the missing prerequisites. Missing prerequisites may be completed with Johns Hopkins Engineering (some prerequisites beyond calculus are available) or at another regionally accredited institution. These prerequisite courses do not count toward the degree requirements.Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered.

Program Requirements

In order to earn a Master of Science in Robotics and Autonomous Systems, the student must complete ten courses within five years. The curriculum consists of four core courses, three courses from one of the focus areas of the Robotics and Autonomous Systems program, and three courses of electives from any Engineering for Professionals program. Three courses must be taken at the 700-level. One or more core courses can be waived by the student's advisor if a student has received an A or B in equivalent graduate courses. In this case, the student may replace the waived core courses with the same number of other graduate Robotics and Autonomous Systems courses and may take these courses after all remaining core course requirements have been satisfied. Only one grade of C can count toward the master's degree.

Code	Title	Credits
Core Courses		
EN.535.630	Kinematics & Dynamics of Robots	3
EN.535.641	Mathematical Methods For Engineers	3
EN.605.613	Introduction to Robotics	3
EN.605.645	Artificial Intelligence	3

Course by Focus Area

Autonomous Systems

Autonomous systems include both kinetic robotic systems as well as non-kinetic algorithms that perceive themselves and their world, interpret their perceptions and represent them using higher level symbology, develop and compose courses of action to accomplish their goals, execute on their goals, and check on current state to determine if anything has changed and how to respond accordingly. Autonomous systems may work independently or in concert with other autonomous systems. Autonomous operate over a continuum of autonomy ranging from systems that are remotely controlled by a human operator to fully autonomous systems that complete their missions without human oversight.
Students pursuing the Autonomous Systems Focus Area must take three of the following courses.

Code	Title	Credits
EN.525.637	Foundations of Reinforcement Learning	3
EN.605.636	Autonomic Computing	3
EN.605.647	Neural Networks	3
EN.605.649	Introduction to Machine Learning	3
EN.605.715	Software Development for Real-Time Embedded Systems	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.742	Deep Neural Networks	3
EN.605.746	Advanced Machine Learning	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.635.792	Management of Innovation	3
EN.645.742	Management of Complex Systems	3
EN.695.611	Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms	3
EN.695.634	Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles	3
EN.695.637	Introduction to Assured AI and Autonomy	3
EN.695.715	Assured Autonomy	3
EN.705.612	Values and Ethics in Artificial Intelligence	3

Dynamics, Navigation, Decision, and Control

Robots and many autonomous systems have physical embodiment that enables them to move through their environment and are often capable of performing useful work that actively modifies the state of their natural and built environment. The Dynamics, Navigation, Decision, and Control Focus Area is designed to enable a student to specialize in these closely related areas:
Dynamics seeks to elucidate the physics of robot motion and its physical interaction with the world, **Navigation** seeks to answer the question "Where am I?" It is how a robot localizes its position and velocity in relation to other robots and its environment. **Decision and Control** is how robots and autonomous systems use their actuators (propulsors, wheels, legs, wings, thrusters, control surfaces) to make decisions on future motion and to control those motions and interactions.
Students pursuing the Dynamics, Navigation, Decision, and Control Focus Area must take three of the following courses.

Code	Title	Credits
EN.525.610	Microprocessors for Robotic Systems	3
EN.525.637	Foundations of Reinforcement Learning	3
EN.525.642	FPGA Design Using VHDL	3
EN.525.645	Modern Navigation Systems	3
EN.525.661	UAV Systems and Control	3
EN.525.728	Detection & Estimation Theory	3
EN.525.777	Control System Design Methods	3
EN.535.622	Robot Motion Planning	3
EN.535.630	Kinematics & Dynamics of Robots	3

EN.535.642	Control Systems for Mechanical Engineering Applications	3
EN.535.645	Digital Control and Systems Applications	3
EN.535.724	Dynamics of Robots and Spacecraft	3
EN.535.726	Robot Control	3
EN.535.741	Optimal Control and Reinforcement Learning	3
EN.605.716	Modeling and Simulation of Complex Systems	3
EN.605.724	Applied Game Theory	3
EN.605.745	Reasoning Under Uncertainty	3
EN.625.615	Introduction to Optimization	3
EN.625.741	Game Theory	3
EN.625.743	Stochastic Optimization & Control	3

General Robotics

The General Robotics Focus Area is designed to accommodate the student who seeks a broad knowledge in robotics and autonomous systems, or who seeks a focus area unique to their needs in interests in robotics and autonomous systems. In this focus area, a student may choose any three courses listed in the other four focus areas, and three elective courses from among all Engineering for Professionals program (EP) courses. The student must review their course of study plan with their EP advisor and must receive their advisor's approval of the proposed course of study.

Human-Robot and Robot-Robot Teaming

Autonomous vehicle, smart city, robotic, medical, and industrial systems face unprecedented challenges because they interact with a complex ecosystem of intelligent systems whose behaviors are emergent and unpredictable. Further, intelligent systems face the nuanced challenge of acting in fair, ethical, and socially acceptable ways as they team with humans to augment, rather than replace, them. It is critical to develop these systems with the goal of working smoothly with humans and other autonomous systems to maximize their utility and acceptance. Students pursuing the Human-Robot and Robot-Robot Teaming Focus Area must take three of the following courses.

Code	Title	Credits
EN.525.747	Speech Processing	3
EN.525.786	Human Robotics Interaction	3
EN.535.691	Haptic Interface Design	3
EN.535.782	Haptic Applications	3
EN.585.783	Introduction to Brain-Computer Interfaces	3
EN.605.646	Natural Language Processing	3
EN.635.661	Principles of Human Computer Interaction	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3
EN.645.755	Methods in Human-System Performance Measurement and Analysis	3
EN.705.612	Values and Ethics in Artificial Intelligence	3
EN.705.640	Cognitive and Behavioral Foundations for Artificial Intelligence	3

Perception and Cognitive Systems

Robots and autonomous systems typically contain sensory systems that generate immense quantities of raw data representing Images, video, depth-maps, optical flow, movements, etc. Advanced perception and cognitive systems interpret the raw data of sensor signals and transform them into a high-level symbolic and quantitative understanding of its environment. Reasoning systems and other advanced artificial intelligence and machine learning methods interpret the environment in context with its goals to develop plans for performing complex tasks. Students pursuing the Perception and Cognitive Systems Focus Area must take three of the following courses.

Code	Title	Credits
EN.525.637	Foundations of Reinforcement Learning	3
EN.525.643	Real Time Computer Vision	3
EN.525.724	Introduction to Pattern Recognition	3
EN.525.728	Detection & Estimation Theory	3
EN.525.733	Deep Learning for Computer Vision	3
EN.525.746	Image Engineering	3
EN.525.747	Speech Processing	3
EN.525.748	Synthetic Aperture Radar	3
EN.535.741	Optimal Control and Reinforcement Learning	3
EN.605.624	Logic: Systems, Semantics, and Models	3
EN.605.646	Natural Language Processing	3
EN.605.647	Neural Networks	3
EN.605.649	Introduction to Machine Learning	3
EN.605.742	Deep Neural Networks	3
EN.605.746	Advanced Machine Learning	3
EN.705.612	Values and Ethics in Artificial Intelligence	3

Space Systems Engineering

The Space Systems Engineering program is intended for existing or aspiring space engineering professionals and will greatly expand their knowledge, capabilities, and opportunities, preparing students for rewarding careers in the space industry. Students are exposed to all the technical disciplines encountered throughout the space systems development life cycle including mission formulation, concept development, design, integration, test, and mission operations. Students are introduced to the formal systems engineering method, first as applied to entire space missions, and then with ever-increasing technical rigor, as applied to flight and ground systems and subsystems. A diverse array of technical electives permits students to tailor their curriculum to suit their individual professional interests. Students then have the opportunity to immerse themselves into case studies of current topics drawn from relevant real-world programs. Additionally, a hands-on small-spacecraft integration and test course allows students to work on a table-top spacecraft using modern test equipment and spacecraft control software in a laboratory environment. Program faculty are top subject matter experts and practitioners from across the space community, including the Johns Hopkins University Applied Physics Laboratory.

All courses in the Space Systems Engineering program may be completed remotely (online or via virtual live), except for the program capstone EN.675.710 Small Satellite Development and Experimentation, which includes a requirement that students attend a specified residency weekend at the Applied Physics Laboratory (APL) campus to complete the laboratory component. Several synchronous virtual live courses are available with both an APL campus in-person and an online option.

Program Committee

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Principal Professional Staff

JHU Applied Physics Laboratory

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Helmut Seifert
Principal Professional Staff
JHU Applied Physics Laboratory

Programs

- Space Systems Engineering, Master of Science (p. 1574)

Courses

EN.675.600. Systems Engineering for Space. 3 Credits.
This course introduces students to the fundamental principles of systems engineering and their particular application to the development of space systems. It describes how the systems engineering viewpoint differs from that of the engineering specialist, as well as the essential role that systems engineering plays across the mission design life cycle. Topics include requirements analysis, trade studies, concept definition, interface definition, system synthesis, and engineering design. Techniques and analysis methods for making supportable quantitative decisions will also be explored, along with risk assessment and mitigation planning. The importance of thorough systems engineering from the initiation of the project through launch and flight operations will be emphasized. This is intended as the first course in the Space Systems Engineering program curriculum so that the student establishes a firm grasp of the fundamentals of systems engineering as applied to space programs. Examples will be presented from real space missions and programs, with assignments, special topics, and a team project focused on typical space systems engineering problems and applied methods of technical problem resolution. Prerequisite(s): Admission into the SSE program, or with approval of the instructor.
Cannot have already completed EN.645.662 Intro to Systems Engineering

EN.675.601. Fundamentals of Engineering Space Systems I. 3 Credits.
The effective development of space systems is predicated on a firm understanding of the foundational technical and systems engineering components necessary to both comprehend the design task and formulate an appropriate solution. For engineers and technical managers seeking to develop this working knowledge and associated skills, this course will provide an overview of the key elements comprising space systems and an analytic methodology for their investigation. With a strong systems engineering context, topics will include fundamentals on astrodynamics, power systems, communications, command and data handling, thermal management, attitude control, mechanical configuration, and structures, as well as techniques and analysis methods for remote sensing applications. In addition, a number of supplemental topics will be included to provide further breadth and exposure. This is the first course of a two-semester sequence that features a combination of instruction from practitioner subject matter experts, and a team design project.
Completion of EN.675.600 Systems Engineering for Space, or with approval of the instructor.

EN.675.602. Fundamentals of Engineering Space Systems II. 3 Credits.
This course will build on the foundational elements introduced in 675.601 Fundamentals of Engineering Space Systems I, expanding on the breadth and depth of prior subject matter treatment, as well as their integrated application. Classes will again feature a combination of instruction from subject matter experts and a team design project.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.621. Space Environment and Effects. 3 Credits.
This course will introduce and explore design and verification methods for the space environment in general and radiation and plasma environments in particular. Intended as a practical complement to 675.751, Space Weather and Space Systems, this course will focus on mission requirements definition, design features, analyses and ground testing, state-of-the-art engineering models / tools, and national / international standards associated with the design and operation of modern high reliability space systems. Design and operational impacts will consider Total Ionizing Dose (TID), Total Non-Ionizing Dose (TNID), Single Event Effects (SEE), spacecraft charging, material outgassing, atomic oxygen, and Micrometeoroids / Orbital Debris (MMOD). All phases of a program lifecycle will be discussed – from environment definition through operational anomalies and anomaly attribution. Lectures, journal reading, and homework assignments will prepare engineers to quantify and assess risk as well as mitigate space environmental effects. A final project will consider a more detailed analysis of a system of interest to the student.
Completion of EN.675.600 Systems Engineering for Space or with approval of the instructor.

EN.675.622. Spacecraft Hardware Design Considerations. 3 Credits.
This course will focus on the engineering of hardware systems that will reliably perform in the harsh environment of space. This course will cover design considerations, terrestrial based manufacturing, storage, launch, and on-orbit performance of successful hardware systems, as well as failure modes and mitigations for the design engineer, systems engineer or aerospace program manager. Design and manufacturing concerns covering electrical, electronic, and electromechanical components including part selection, materials considerations, radiation ratings and test, packaging, and manufacturing will be covered. The course will also cover the unique environments from terrestrial based to exo-atmospheric driving design and handling considerations relative to spacecraft hardware.

EN.675.641. Space Systems Cybersecurity. 3 Credits.
Our space systems are under attack. Cyberattacks are among the most prevalent threats to space assets. They are often stealthy, inexpensive and highly effective at achieving an adversary's goal – be it data corruption, IP theft or physical destruction of the satellite. Given space systems are complex, composing ground stations, communications and satellites the surface area of attack is vast and considering the constrained computing capacity of space systems, many traditional security mechanisms are not applicable. This course provides an introduction to how an adversary would approach attacking a satellite, opportunities for systems engineers to develop cyber-resilient assets and relevant policies and best practices to support space system cybersecurity.
EN.675.600 and EN.675.601, or with approval of the instructor

EN.675.650. Mathematics for Space Systems. 3 Credits.
This course is designed to teach Mathematical Methods commonly employed for engineering Space Systems. The course will provide a solid technical foundation in mathematics so the students can apply this knowledge to this broad field. Topics will include select, applicable methods from vector calculus, linear algebra, differential equations, transform methods, complex variables, probability, statistics, and optimization. Various applications to real problems related to space systems and technical sub-disciplines will be used during the semester. No prior knowledge of advanced mathematics is assumed and important theorems and results from pure and applied mathematics are taught as needed during the course. Examples and relevant applications will be utilized throughout the course to further clarify the mathematical theory. Prerequisite(s): The course requires working knowledge of college calculus and algebra, or approval of the instructor.

EN.675.691. Electro-Optical Space Systems. 3 Credits.
The goal of this course is to engage the student with multiple design studies of subsystems of space-based electro-optic systems. The technical and scientific elements necessary to be successful with these studies will be presented during the lectures. The concepts and technologies behind elements such as photon detectors, imaging elements over many spectral bands, optical elements and systems typically used in space sensors, and active optical sources will be described. These concepts and technologies will be the fundamental elements used to describe the various sensor types and modalities used in space electro-optical systems. Prerequisite(s): An undergraduate or graduate degree in a quantitative discipline (e.g., engineering, computer science, mathematics, physics, or equivalent), or with approval of the instructor.

EN.675.692. Scientific Instruments for Space. 3 Credits.
This course covers the details for the development of scientific space flight instruments, from the conceptual design phase, all the way to delivery to the space vehicle. The course presents the space environments and the considerations in designing space flight instruments. These design considerations include mechanical, structural, thermal and electrical and how to overcome some of the challenges during the different phases of design, assembly and test of the instruments. Students are introduced to programmatic considerations including budgeting, scheduling, and staffing. The course also covers the importance of identifying, understanding and verifying design requirements at different levels of space flight instrument development. A detailed study of the instrument development cycle is covered during the course, with references to instruments launched to space throughout the history of the space-age.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.701. Applications of Space Systems Engineering. 3 Credits.
The ability to effectively apply knowledge and skills to new problems and situations is critical in the development of space systems. Building upon the foundational systems engineering and technical skills developed through prior coursework, this course will introduce further topics related to areas of active exploration and investigation, as well as practical details pertaining to mission formulation and assessment. Classes will be structured to include both information exchange led by subject matter experts from across the community and active group discourse. In addition, a number of topical case studies will be worked by students in both individual and group formats. Students will be asked to explore, in depth, various advanced areas of space systems engineering challenges and share information with each other in online discussions.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, and EN.675.602 Fundamentals of Engineering Space Systems II, or with approval of the instructor.

EN.675.702. Materials for Space Systems. 3 Credits.
Through online lectures and Blackboard mini cohorts, this course illustrates the fundamental applications of materials to spacecraft design for a systems engineering perspective. Topics include the environments of dynamics, vacuum, thermal, reactive chemicals, radiation, and electrostatics relating to material selection; applications in the material classes of metals, ceramics, polymers, and composites to spacecraft design; design considerations from preliminary design through product verification, launch, and mission operations; and considerations for environment impacts, commons issues encountered, and lessons learned. The course is not intended to cover materials analysis that is taught specific to individual engineering domains, rather it instructs the application of the materials to the space environment with specific industry examples.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.710. Small Satellite Development and Experimentation. 3 Credits.

The capstone course in the Space Systems Engineering Program will introduce practical methods and tools used for evaluating the design and implementation of space systems—with a particular focus on small satellites and CubeSats. This will be principally achieved through a significant experimentation laboratory component intended to reinforce analytical experience with empirical exposure and insight. The laboratory will build on prior foundational understanding of spacecraft subsystem design and performance, through a structured series of experiments and investigations to be conducted in small student teams. It will utilize tabletop satellite simulator kits that are especially designed for hands-on educational purposes, while drawing heavily on the analysis methods and tools developed in the Fundamentals of Engineering Space Systems I/II sequence. All work is aimed at preparing for and executing a single long-residency-weekend exercise, nominally held the 10th week of the semester at the Johns Hopkins University Applied Physics Laboratory. In lieu of meeting during normal class time during the 10th week, the lab will meet the Friday, Saturday, and Sunday immediately following the normal class date. The lab component will have a mandatory set of core hours during a time period running from Friday at 5 p.m. through Sunday at 12 p.m.; students are responsible for their own travel and accommodations, as required. An optional tour of APL space facilities is planned for 4 p.m. on Friday. There will be no further classes following the residency weekend, with only final laboratory deliverables due per provided instructions.

Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, and EN.675.602 Fundamentals of Engineering Space Systems II, or with approval of the instructor.

EN.675.711. Ground System Engineering and Mission Operations. 3 Credits.

This course will focus on the critical functions performed by ground systems and mission operations throughout the space systems life-cycle and their integrated application. Course topics will include planning and sequencing, uplink and control, testing, real-time operations, communications, data management, data analysis, and assessment. Students will learn about end-to-end best practices that pertain to most missions and how ground systems and mission operations concepts are tailored across a diversity of missions. Examples will be presented from real space missions and programs, with assignments, special topics, and a team project focused on typical ground system engineering problems, mission operations challenges, and applied methods of technical problem resolution.

Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.712. Space Mission Formulation. 3 Credits.

This course covers the creative and generative side of space mission engineering. Highly successful space science and exploration missions are the result of close collaboration between scientists who define the highest-level goals and the engineers who provide the means to make the measurements necessary to achieve those goals. In addition, mission formulation teams must understand the external strategic environment that supports a mission, specifically the government sponsors, their funding capabilities, how their priorities get set, and the cycles they go through. This course will help the student develop an understanding of that external environment, the process of collaboration between the scientists and the engineers and their sponsors, and how to frame mission goals and requirements in terms that lead to mission success. The instructors will provide insight into the formulation of scientific investigations, the process of crafting a compelling and accurate narrative for a mission proposal. Topics also include: derivation of mission requirements, launch vehicle capabilities and selection; mission architecture elements; and project flow from pre-proposal through mission confirmation.

Completion of 675.600 Systems Engineering for Space and 675.601 Fundamentals of Engineering Space System, or with approval of the instructor.

EN.675.713. Fault Management and Autonomy: Improving Spacecraft Survivability. 3 Credits.

This course introduces students to the fundamental principles of fault management engineering as it pertains to space systems. It describes how the fault management engineering viewpoint differs from that of systems engineers and engineering specialists, as well as the role that fault management plays throughout the mission design life cycle. Fault management is a systems engineering function that defines the functional requirements distributed throughout the spacecraft (hardware, software, and autonomy) and ground/mission operations that enable the detection, isolation, and recovery from events that upset nominal operations. Students will learn about the principles of fault management architecture (i.e., driving requirements, redundancy concept, safing and modes concept, ground intervention concept, and critical sequences) and how those principles inform the fault management design, the analytical techniques used for fault analysis, trade studies, and requirements allocation, and the role of the fault management engineer from the initiation of the project through design, integration and test, launch, and flight operation. Examples will be presented from real space missions and programs to emphasize the different implementations of fault management systems given the technical, cost, and schedule constraints.

EN.675.600 Systems Engineering for Space AND EN.675.601 Fundamentals of Engineering Space Systems I or with approval of the instructor.

EN.675.723. Ground System Engineering. 3 Credits.
This course will focus on the critical functions performed by ground systems throughout the space systems life-cycle. Course topics will include planning and sequencing, uplink and control, testing, communications, data management, data analysis, assessment, implementation and deployment of ground systems. Students will learn about end-to-end best practices that pertain to most missions and how ground systems concepts are tailored across a diversity of missions. Examples will be from real space missions and programs, with assignments, immersive hands-on laboratory exercises, special topics, and a team project focused on typical ground system engineering problems and applied methods of technical problem resolution. This course offers a more focused, in-depth exploration of ground systems design and implementation than EN.675.711 Ground System Engineering and Mission Operations. Students will only receive credit towards graduation from one of these 2 courses, EN.675.723 or EN.675.711, not both.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, familiarity with software engineering principles and writing software, or with approval of the Instructor.

EN.675.731. Spacecraft Propulsion Systems. 3 Credits.
The intent of this class is to teach the basics of propulsion such that you will be able to make informed decisions about which sort of system would be best for a particular application. To do this, the class starts with a basic primer on the physics of propulsion and then covers key elements of the various types of propulsion systems that are typically used on spacecraft, including chemical and electric systems, and also some types of system not typically used now, but that might be available in the future (e.g., nuclear propulsion, matter/antimatter propulsion). In the class, you are introduced to how a propulsion subsystem is used and how it interacts with the rest of the spacecraft, so it can be seen from a system perspective and not just from the subsystem view. Key pros and cons of each type of system presented are discussed, as well as key constraints and failure modes. Subsystem components and performance characteristics are introduced and then used in examples from actual spacecraft to explain why these systems were selected for flight. Then, you are shown how to specify a propulsion subsystem and trade various subsystem types against each other, how to size them, how to integrate and test them, and ultimately how to fly them.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.732. Advanced Topics in Aerospace Hardware. 3 Credits.
This course focuses on spacecraft hardware topics to include current and emerging technologies including hardware in system configurations such as constellations and for sensing and communication applications. The course is grounded in a hardware and software design understanding of materials and operations in the space environment (design rules, material and component considerations, safe life versus fail safe designs, environmental considerations, among other hardware guidelines). Specific topics in hardware addressed in these studies include Instruments and Detectors (Optical, Radio Frequency, Imagers…), Low Earth Orbit Commercial Constellations and Swarms, Geostationary (GEO) and GEO Transfer Comm and Remote Sensing, Flagship Missions, Cislunar, In Situ Resource Utilization, Landers and Samplers, Subsystem specifics, Hardware, Firmware and Software Interfaces and Launch vehicles.
Completion of?EN.675.600?Systems Engineering for Space and? EN.675.601?Fundamentals of Engineering Space Systems I, EN.675.622 Spacecraft Hardware Design Considerations or with approval of the instructor.

EN.675.740. Assuring Success of Aerospace Programs. 3 Credits.
Technical managers, systems engineers, lead engineers, and mission assurance professionals will benefit from this course, which focuses on the leadership of system safety and mission assurance activities throughout the life cycle of a project to achieve mission success. This advanced course provides crucial lessons learned and proven best practices that technical managers need to know to be successful. The integrated application of mission assurance and systems engineering principles and techniques is presented in the context of aerospace programs and is also applicable to other advanced technology research and development programs. Students discuss critical risk-based decision making required from system concept definition and degree auditing through design, procurement, manufacturing, integration and test, launch, and mission operations. Experiences shared by senior aerospace leaders and extensive case studies of actual mishaps explore quality management topics relevant to aircraft, missiles, launch vehicles, satellites, and space vehicles. The course addresses contemporary leadership themes, government policies, and aerospace industry trends in mission assurance requirements, organizational structure, knowledge sharing and communication, independent review, audit, and assessment. Mission assurance disciplines covered include risk management, system safety, reliability engineering, software assurance, supply chain management, parts and materials, configuration management, requirements verification and validation, non-conformance, and anomaly tracking and trending.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.745. Spacecraft Communications Systems. 3 Credits.

EN.675.751. Space Weather and Space Systems. 3 Credits.
This course will explore the space environment in the context of its impact on space system operations. Topics include the impacts of ionospheric variability on HF propagation, satellite communications, and GPS; impacts of energetic charged particles on spacecraft; impacts of auroral precipitation on radar and communication systems; and impacts of varying geomagnetic activity on power grids and space situational awareness. Lectures and homework assignments will prepare engineers to quantify and mitigate space weather impacts, and a final project will consist of a detailed analysis on a system of interest to the student.
Prerequisite(s): An undergraduate or graduate degree in a quantitative discipline (e.g., engineering, computer science, mathematics, physics, or equivalent), or with approval of the instructor.

EN.675.752. Attitude Determination and Control of Space Systems. 3 Credits.
The Attitude Determination and Control Subsystem, or ADCS, is intimately connected with all the other spacecraft subsystems, and will be studied in the context of the systems engineering of the whole spacecraft and its mission. Students will examine the requirements imposed on the ADCS, and will explore how to meet those requirements. To this end, it starts with a student's understanding of rigid-body dynamics as it relates to spacecraft dynamics and will introduce common and classical approaches to problems encountered in the design of this critical spacecraft subsystem. The course will also include a team design project involving an ADCS for a small spacecraft.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I and EN.675.650 Mathematics for Space or with approval of the instructor.

EN.675.753. Spacecraft Avionics Systems. 3 Credits.
This survey course will focus on the management, engineering development and operation of the spacecraft Avionics system consisting of hardware topics covering Spacecraft Processing; Command Data Handling and Command Execution; Telemetry Acquisition, Conditioning and Conversion and Telemetry Data Handling; Bulk data storage; Fault Management Support; and Timekeeping Support. The course is grounded in computer and data architecture fundamentals with focus on key electronics such as data interfaces, spacecraft processors, volatile and non-volatile memories, field-programmable gate arrays (FPGA), and analog sensors and circuits. Spacecraft Avionics systems topics will be applied through reference design scenarios to illustrate requirements/implementation trades bound by the constraints of the space environment and spacecraft data resource limitations. Topics such as hardware development, integration and test and inflight support will be used to illustrate the difficulties inherent to the spacecraft's Avionics system.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.754. Flight Software for Space Systems. 3 Credits.
This survey course reviews the architectures, designs, and implementations of spacecraft flight software systems. The course provides an overview of typical command and data handling software functions and the open-source tools, frameworks, and applications that can implement them. A semester-long programming assignment is provided to build a working flight software system. Special topics include application to resource-constrained Internet-of-Things (IoT) devices, spacecraft security, and space-based networking. Flight software encompasses the complete set of computer instructions running on every processor on a spacecraft.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, experience programming in C, or with approval of the instructor.

EN.675.756. Antenna Design for Space Systems. 3 Credits.
This course presents an engineering approach to the design of antennas for space systems. Students will examine antennas for both large and small space based platforms in earth orbit and beyond. Antenna design is presented in the context of the space environment with particular attention to the flight design and testing cycle, thermal and mechanical considerations, space compatible materials, and high power operation. A primary focus of the course will be single, dual and shaped reflector designs including feed network topologies. Several horn antenna designs including corrugated and multimode horns will be covered as well as feed network components. A variety of other antennas including helices, patches, and arrays will be discussed for applications including: Global Navigation Satellite System (GNSS); Tracking, Telemetry and Command (TT&C); isoflux; smallsat and cubesat antennas. Prerequisite(s): An undergraduate- or graduate-level introductory antenna systems course, or with approval of the instructor. Course Note(s): This course is cross-listed with 525.656 Antenna Design for Space Systems. SSE students can only register for 675.756.

EN.675.761. Reliability Engineering and Analysis for Space Missions. 3 Credits.
This course covers the principal methods of reliability analysis as it pertains to space systems. These seek to help development teams to anticipate and find design and operational issues. Basic analytical techniques covered include fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; and reliability data collection and analysis. More advanced techniques of risk and reliability modeling of systems include Bayesian methods and applications, estimation of rare event frequencies, uncertainty analysis and propagation methods. These methods and techniques are integrated into quantitative assessments to address hardware, software, and human reliabilities, as well as their dependencies.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.768. Spacecraft Integration and Test. 3 Credits.
This course introduces students to the fundamental principles of developing Integration & Test (I&T) programs for space systems. Topics covered will provide a detailed understanding with practical applications of all phases of Spacecraft I&T starting with the design input/planning phase, staffing/budget phase, subsystem and instrument integration phase, environmental testing phase, and finally the launch campaign phase in the field. Classes will be structured to provide students information exchange sessions with subject matter experts and actual practitioners within the I&T community. Students will learn about all of the Electrical and Mechanical ground support equipment needed to build a spacecraft and the importance of the paperwork and processes used throughout all phases to manage spacecraft systems I&T.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.771. Space Mission Design and Navigation. 3 Credits.
Critical to the development of space missions is the careful analysis and design of the desired path of the space vehicle (mission design) and the determination of the space vehicle's actual state vector (navigation). This course presents these two topics in an integrated manner, intended to provide space engineering professionals with a technical understanding of these complex subjects. Mission Design topics include kinematics, Kepler's Laws, Newton's Law of gravitation, modeling of several fidelity levels of spacecraft trajectory dynamics, and optimization of objective functions and satisfaction of constraints. Navigation topics include dynamics and measurement model formulations, standard estimation algorithms such as the Kalman filter and batch estimators, and performance analysis. This course will focus on the theory from a mathematical derivation perspective, example problems, and practical implementation considerations. This is an algorithm intensive course and students are expected to be comfortable with the following: MATLAB programming (or equivalent), Linear Algebra, Linear Systems, Differential Equations, basic Probability concepts, and Calculus.
Completion of EN.675.600 Systems Engineering for Space; EN.675.601 Fundamentals of Engineering Space Systems I and EN.675.650 Mathematics for Space or with approval of the instructor.

EN.675.772. Verification and Validation of Space Systems. 3 Credits.
A survey course that reviews the specification, verification and validation of spacecraft flight system requirements. The course provides an overview of the requirements gathering process, subsystem allocation, verification methods, typical spacecraft system tests and test events. An overview of the construction of spacecraft comprehensive performance tests and mission scenarios will be part of this course, as well as the development of a requirements verification matrix.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor

EN.675.781. Physics of Space Security. 3 Credits.
The course will analyze the physics of both the offensive and defensive aspects of space control and determine the advantages and disadvantages based on metrics of performance and cost. The course will detail various types of satellite orbits and their application, spacecraft sensors, ground-based sensors and weapons systems available. The course will look at ground-based jamming in technical detail to include link calculations. Next, the course will address laser weapons and high-power microwave devices that could disable or destroy a spacecraft or sensors. The student will look at the physics of both ground-based and space-based attack on spacecraft to include a non-targeted pellet attack. A detailed analysis of the March 27, 2019 Indian ASAT attack (code name Mission Shakti) on the Microsat-R spacecraft to include debris modeling will be undertaken.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.800. Directed Studies in Space Systems Engineering. 3 Credits.
In this course, qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or non-laboratory study under the direction of faculty members. Prerequisite(s): The Independent Study/Project Form (ep.jhu. edu/student-forms) must be completed and approved prior to registration. Course Note(s): This course is open only to candidates in the Master of Science in the Space Systems Engineering program.

Space Systems Engineering, Master of Science

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414) section. The applicant's prior education must include an undergraduate or graduate degree in a quantitative discipline (e.g., engineering, computer science, mathematics, physics, or equivalent) from a regionally accredited college or university. Applicants must show competency in (1) calculus, (2) physics, and (3) computer programming, which must be demonstrated through undergraduate or graduate coursework or equivalent work experience. Applicants whose prior education does not include the prerequisites listed above may still enroll under provisional status, followed by full admission status once they have completed the missing prerequisites. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered. As part of the admission process, the chair or the program coordinator may interview candidates to better evaluate their application.

Program Requirements

A total of ten courses (at least three at the 700-level) must be completed within five years. The curriculum consists of five core courses and five electives chosen by the student in consultation with their advisor. The curriculum is designed to provide maximum flexibility to students, enabling them to customize their five electives based on their educational needs and career goals. Only one C-range grade (C+, C, or C–) can count toward the master's degree. All courses in the Space Systems Engineering program may be completed remotely (online or via virtual-live), except for the program capstone EN.675.710 Small Satellite Development and Experimentation, which includes a requirement that students attend a specified residency weekend at the APL campus to complete the laboratory component.

Courses

Code	Title	Credits
Core Courses		
EN.675.600	Systems Engineering for Space	3
EN.675.601	Fundamentals of Engineering Space Systems I	3
EN.675.602	Fundamentals of Engineering Space Systems II	3
EN.675.701	Applications of Space Systems Engineering	3
EN.675.710	Small Satellite Development and Experimentation	3

ELECTIVES

Code	Title	Credits
EN.675.621	Space Environment and Effects	3
EN.675.622	Spacecraft Hardware Design Considerations	3
EN.675.641	Space Systems Cybersecurity	3
EN.675.650	Mathematics for Space Systems	3
EN.675.691	Electro-Optical Space Systems	3
EN.675.692	Scientific Instruments for Space	3
EN.675.702	Materials for Space Systems	3
EN.675.711	Ground System Engineering and Mission Operations	3
EN.675.712	Space Mission Formulation	3
EN.675.713	Fault Management and Autonomy: Improving Spacecraft Survivability	3
EN.675.723	Ground System Engineering	3
EN.675.731	Spacecraft Propulsion Systems	3
EN.675.732	Advanced Topics in Aerospace Hardware	3
EN.675.740	Assuring Success of Aerospace Programs	3
EN.675.751	Space Weather and Space Systems	3
EN.675.752	Attitude Determination and Control of Space Systems	3
EN.675.753	Spacecraft Avionics Systems	3
EN.675.754	Flight Software for Space Systems	3
EN.675.756	Antenna Design for Space Systems	3
EN.675.761	Reliability Engineering and Analysis for Space Missions	3
EN.675.768	Spacecraft Integration and Test	3
EN.675.771	Space Mission Design and Navigation	3
EN.675.772	Verification and Validation of Space Systems	3
EN.675.781	Physics of Space Security	3
EN.675.800	Directed Studies in Space Systems Engineering	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Systems Engineering

The part-time Systems Engineering program provides students with in-depth knowledge and technical skills that prepare them to further their careers within industry and government. The program addresses the needs of engineers and scientists engaged in all aspects of analysis, design, integration, production, and operation of modern systems. Instructors are practicing systems engineers who employ lectures and readings on theory and practice, and present realistic problem scenarios in which students, individually and collaboratively, apply principles, tools, and skills.

Courses are offered online as well as at the Applied Physics Laboratory.

Program Committee

Andrew C. Merkle, Program Chair
Principal Professional Staff
JHU Applied Physics Laboratory

David A. Flanigan, Vice Chair
Principal Professional Staff
JHU Applied Physics Laboratory

Larry D. Strawser, INCOSE and ASEE Liaison
Adjunct Professor
JHU Whiting School of Engineering

Christian Utara, Program Quality Coordinator
National Director, Air 4.11
Rapid Capability Engineering + Integration Department

James Coolahan, Partnership Development and Outreach Manager
Chief Technology Officer
Coolahan Associates, LLC

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JHU Applied Physics Laboratory

Michael C. Jones
Senior Professional Staff
JHU Applied Physics Laboratory

Garry Roedler
Senior Fellow
Lockheed Martin (retired)

Clifford Whitcomb
Distinguished Professor
Naval Postgraduate School

Philomena Zimmerman
Director for Engineering Tools and Environments
Department of Defense

Programs

- Systems Engineering, Graduate Certificate (p. 1581)
- Systems Engineering, Master of Science (p. 1581)
- Systems Engineering, Master of Science in Engineering (ABET-accredited) (p. 1583)
- Systems Engineering, Post-Master’s Certificate (p. 1584)

Courses

EN.645.621. Engineering and Measuring Influence. 3 Credits.
Systems engineering requires an understanding of how people interact with complex systems. Often times, human interaction makes up a substantial portion of system variance and controlling this variance is critical for system performance. Engineers must design interventions to influence people through all aspects of the system. Emerging technology can be used to understand, measure, and assess the effectiveness of interventions to influence human behavior and performance. This course will introduce students to theories of behavior change and provide hands on experience using technologies to measure human-system interaction and influence. Technologies will include biometric, psycho-physiological, and neuroimaging systems.

EN.645.631. Introduction to Model Based Systems Engineering. 3 Credits.
The Introduction to Model Based Systems Engineering course provides an overview of what Model Based Systems Engineering (MBSE) is and how MBSE techniques can be applied to the Systems Engineering process to manage complexity, reduce risk, and potentially streamline the engineering design and development effort. Students will utilize an industry-leading system modeling tool and develop artifacts applied to real-world case studies that reinforce the MBSE concepts of methodology, language, and tools.
EN.645.662

EN.645.632. Applied Analytics for Model Based Systems Engineering. 3 Credits.
This course is a continuation of Introduction to Model Based Systems Engineering (MBSE), and provides in-depth exposure to building and using industry-leading system modeling tools to apply and analyze real-world case studies. This course will focus on the application of Model Based Systems Engineering through the use of a modeling language, a modeling method and a system modeling tool as part of the systems engineering process to support requirements, design, analysis, specification, and verification and validation activities of the system. Concepts that were developed from the previous course are now analyzed to assist the systems engineer to explore the solution space using MBSE.
EN.645.631 Introduction to Model Based Systems Engineering.

EN.645.650. Foundations of Human Systems Engineering. 3 Credits.
Systems are designed, built, and used by humans. Their purpose is to help people meet their goals and perform their tasks. This course introduces the foundations of HSE from which system requirements and design elements are derived. The objective is to provide students with the knowledge of human capabilities and introduce human systems engineering concepts and design principles. Human capabilities include visual, auditory, and touch senses, motion, cognitive processing, and decision making. Human systems engineering concepts and design principles include human factors engineering; training; maintenance; environmental, safety, and health; survivability; habitability; manpower; and personnel. Prerequisite(s): Admission into the Systems Engineering program.

EN.645.651. Integrating Humans and Technology. 3 Credits.
This class provides a hands-on introduction to human and cognitive systems engineering. Students will learn and apply user-centered research and innovation methods that are used to discover, document and integrate human capabilities, limitations and needs into the systems engineering process, improving the likelihood that the resulting systems are intuitive, efficient, effective and useful. Topics include needs elicitation, workflow analysis, functional allocation, decision making, prototyping, and performance measurement.
EN.645.662 Introduction to Systems Engineering OR EN.655.662 Introduction to Healthcare Systems Engineering OR EN.675.600 Systems Engineering for Space

EN.645.662. Introduction to Systems Engineering. 3 Credits.
This course introduces students to the fundamental principles of systems engineering and their application to the development of complex systems. It describes how the systems engineering viewpoint can be brought to bear to address engineering challenges as well as the essential role of systems engineering in project management. Topics include defining systems, the system development life cycle, and the systems engineering method. These primary topics are decomposed into requirements analysis, functional design, physical design, design validation, concept development, engineering development, and post development. In addition, the tools and methods at the systems engineer's disposal are also covered. These include risk analysis, configuration management, design trade-offs, modeling and simulation, and interface management, as well as how these subjects are linked to systems program management activities. More advanced Systems Engineering topics such as Software Systems, System of Systems, Enterprise Systems, and Agile Systems Engineering are introduced. The course defines the breadth and depth of the knowledge that the systems engineer must acquire concerning the characteristics of the diverse components that constitute the total system. Students will work as a group to develop and present a conceptual system architecture chosen from a list of existing systems in order to gain familiarity with architecting, system modeling, and the relationship between requirements, activities, hardware/software, interfaces, and other system elements.Course prerequisite(s): Admission into the Systems Engineering program.

EN.645.667. Management of Systems Projects. 3 Credits.
The course addresses the management of a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the project manager. From the development of a proposal to the delivery of a product to a customer, the efforts to conceive, plan, budget, schedule, monitor, control/direct, and report the progress of the project are discussed. Throughout the project life cycle, the need for good communications, interface and configuration management, and conflict resolution is emphasized. Students assume the role of project managers who must use management tools such as WBS, EVM, and CPN and who must address typical problems that arise in the conduct of a high-technology systems project. Prerequisite(s): Admission into the Systems Engineering program.

EN.645.669. Systems Engineering of Deployed Systems. 3 Credits.
Systems engineering theory typically focuses on the early design and development phases of a system's life cycle, yet over the life of a system, the bulk of engineering effort and the associated costs are not realized until the operations and support (O&S) phase. This course will examine the importance of designing O&S considerations early in a system's life cycle by identifying the appropriate logistic elements and measures, while introducing the necessary analytical processes and tools to support end-to-end life cycle engineering requirements. Manufacturing and production operations will be presented along with the elements that support a system once it is fielded (maintenance planning, reliability prediction, supply support, training, shipping, and system disposal). The course will also explore the requirements and processes associated with major upgrades to deployed systems and the logistics management techniques that must be implemented during initial fielding and deployment. A class project and real-world case studies will underscore the theory and techniques associated with deployed systems engineering.
EN.645.662 Introduction to Systems Engineering or EN.645.667 Management of Systems Projects. College-level Statistics (College-level Calculus preferred but not required).

EN.645.711. Systems Engineering of Missile Technologies. 3 Credits.
This course emphasizes the key systems engineering processes involved in missile design. Missile technologies including electro-optical and radio-frequency sensors used for target detection; aerodynamics; navigation, guidance, and control; propulsion; warheads; fuzes; and signal and image processing are discussed in conjunction with the critical tradeoffs and methods used to meet operational requirements. The course objectives are demonstrated through a system cost-as-an-independent variable trade and design study that is based on trades of sensor type, guidance type, operational constraints and implementation, and how the system is segregated into different sub-system configurations.

EN.645.742. Management of Complex Systems. 3 Credits.
Traditional systems engineering is usually applied to closed, precise, and recursive systems with the assertion that the methodologies used can be scaled up to more elaborate systems of systems. This course addresses the more realistic and emerging field of complex systems, where multiple current development efforts with disparate and nonlinear attributes characterize the system components. Managing complex systems must account for the likelihood of multiple disciplines, differing scales, often unpredictable future states, irreducible uncertainty, and nonlinear behavior. Customers, corporations, governments, technologies, and systems now must be considered on a global scale with a mix of new and legacy systems. The student will be encouraged to think differently and creatively about the approaches to managing complex systems and to use adaptive strategies and tools. Special attention will be given to risk assessment and management for dynamic systems. Case studies and examples will be drawn from commercial industry and DoD/government systems. Students will be expected to discuss several readings and complete academic papers to explore in depth one or more of the concepts discussed.
EN.645.769 System Test and Evaluation or EN.655.769 or advisor and instructor approval. Course Note(s): Selected as one of the electives in the Master of Science in Engineering or Master of Science program or a required course for the post-master's certificate.

EN.645.753. Enterprise Systems Engineering. 3 Credits.
Enterprise Systems Engineering is a multidisciplinary approach to the application of systems engineering principles and systems thinking to large sociotechnical enterprises as complex adaptive systems. Health, energy, food, disaster response, and global transportation systems are all examples of such systems. Systems engineering has been a critical enabler of development, and is key, to addressing the complexities of the evolution of complex systems and systems of systems.?In this course, we explore systems thinking and systems engineering approaches that can be applied to this new class of broad sociotechnical enterprise.? We will examine the characteristics of this class of enterprise and the challenges for applying systems engineering to this type of complex adaptive system. These enterprises are comprised of multiple independent organizations with their own objectives, resources, and authority structures without top-level cross cutting authority and may possess conflicting objectives. A process model will be created to describe the activities of key enterprise elements and interactions which, along with external factors, influence the evolution of such enterprises. This model will be used to understand the current enterprise composition and dynamics and evaluate the impact of issues or actions as the basis for systems engineering trades or recommendations.??
EN.645.769 System Test and Evaluation or advisor and instructor approval. Course Note(s): Selected as one of the electives in the Master of Science in Engineering or Master of Science program or a required course for the post-master's certificate.

EN.645.755. Methods in Human-System Performance Measurement and Analysis. 3 Credits.
This course focuses on human-systems performance measurement (HsPM) methods used to determine whether human-system requirements are met and if the system's design provides effective and efficient human-system performance. Students will gain knowledge of HsPM study design protocols, data collection tools and methods, analysis techniques and processes, and procedures required to execute studies with human participants. The course will provide students with an understanding of HsPM in the context of system design; workplace design; environment, safety, and occupational health; training; and maintenance. Students will be exposed to heuristic evaluations; modeling and simulation of human tasking, including tools for measuring physical limitations, cognitive load, and fatigue; and system testing with the human element.
EN.645.662 Introduction to Systems Engineering.

EN.645.756. Metrics, Modeling, and Simulation for Systems Engineering. 3 Credits.
This course takes an integrated, in-depth view of foundational statistical concepts, modeling, and simulation techniques. Knowledge of typical system-level key performance parameters and their stochastic characterization is critical to the systems engineering process as the basis for decision-making from early system conceptualization through retirement. Relevant probability and statistics concepts are covered in context of SE decision points. Techniques in experimental design, data collection, analysis, and modeling of system metrics as a function of system use and environment are explored as they pertain to characterizing system, subsystem, and component performance. Finally, implementing models in analytic simulations to support requirements, design, upgrade, and replacement/retirement phases of the SE process provides the systems engineer with a solid foundation for making and justifying difficult decisions.
EN.645.662 Introduction to Systems Engineering, EN.645.667 Management of Systems Projects, and EN.645.767 System Conceptual Design.

EN.645.757. Foundations of Modeling and Simulation in Systems Engineering. 3 Credits.
This course provides an introduction to the field of modeling and simulation (M&S) from the perspective of M&S as an essential tool for systems engineering. The course presents an overview of the M&S discipline, the model/simulation development process, the types of models and simulations used in the various phases of the systems engineering life cycle, and the verification, validation, and accreditation of models and simulation. The strengths and limitations of M&S are explored with respect to the application of M&S use in systems engineering. Examples are given for several types of systems, including both military and civilian systems. Statistical methods used in applying M&S in systems engineering are explained. The Arena process modeling tool is used for some examples, an individual assignment, and a team-based project. Upon completion of the course, the student will be able to explain when M&S will provide meaningful support to a technical program, select the appropriate modeling techniques for a given task, plan the development of a model/simulation and the modeling of its input data, and analyze the results of its execution to support decisions at key milestones of a system's life cycle.
EN.645.662 (462) Introduction to Systems Engineering

EN.645.758. Advanced Systems Modeling and Simulation. 3 Credits.
This course is a continuation of EN.645.757 Foundations of Modeling and Simulation in Systems Engineering and provides in-depth exposure to the field of modeling and simulation (M&S) from the perspective of M&S as an essential tool for systems engineering. Advanced statistical methods are used to conduct requirements-driven simulation analysis and experimentation. The course provides treatment of advanced M&S topics, including verification, validation, and accreditation techniques; methods for simulation interoperability and composability; modeling of the system environment, both natural and man-made; modeling of system costs; and the establishment of collaborative M&S environments. The course also explores continuous and real-time simulation. Students are exposed to the techniques used to form conceptual models of mechanical (both translational and rotational), electrical, fluid, thermal, biological, and hybrid systems. The conceptual models are transformed into mathematical models and implemented in a modern simulation package. State-of-the-art tools are explored, and each student is given the opportunity to conduct a simulation study of a complex system. Each student will present a case study and complete a project. Upon completion of the course, the student will be able to conduct or lead the development of the model of a complex physical system, model the input data, and analyze the results to support decisions at key milestones of a system's life cycle.
EN.645.757 Foundations of Modeling and Stimulation in Systems Engineering

EN.645.761. Systems Architecting. 3 Credits.
As the systems that systems engineers face become more complex, it is no longer sufficient to use "good engineering practices." The complex systems of today need to be architected before design work can begin. This course examines the principles and art of systems architecting when developing both individual systems and systems that are components of a system or federation of systems. The objective is to provide students with the principles, techniques, and hands-on experience of architecting modern, complex systems. Students will learn the latest architecture development techniques using DoD and commercial architectural frameworks, then extend those frameworks to specific problems involving unique systems development environments. Topics include the management of underlying system and data models and the special architecting requirements of command, control, and communications systems. Special attention will be placed on visualizing architecture artifacts-qualitatively and quantitatively evaluating architectures and the systems model they represent-and utilizing system architectures for investment decisions. Case studies from actual experiences will be presented. Course Note(s): Selected as one of the electives in the MSE or MS program or a required course for the post-master's certificate.
EN.645.769 System Test and Evaluation or advisor and instructor approval.

EN.645.764. Software Systems Engineering. 3 Credits.
This course for systems engineers covers software engineering principles, artifacts, and approaches for the development of software systems. Topics include software engineering processes and metrics; real-time, distributed, configurable, and object-oriented software; alignment of software systems with overall system design; software-unique aspects of planning, requirements, architecture analysis, design, implementation, testing, and maintenance; understanding important software engineering constraints (performance, security, networking, etc.); and technology trends in software engineering today.
EN.645.662 Introduction to Systems Engineering or EN.655.662 and EN.645.667 Management of Systems Projects or permission from the student's academic advisor and the course instructor.

EN.645.766. Systems Engineering Advanced Technology. 3 Credits.
This course emphasizes the impact on society of recent technological advances on new products, processes, and needs in systems engineering. The roles of the technical manager, program manager, and especially the systems engineer in these rapidly-evolving technologies are addressed as well. Subject areas and lecture content tracks current topics of interest, including but not limited to, trends and developments in hypersonics, artificial intelligent, nanotechnology, robotics, and genetic engineering. Advanced technologies in application areas such as transportation, space, manufacturing, and biotechnology are also discussed. This course also includes a discussion on the ethics of lethal autonomous weapons. Students are encouraged to explore new technology areas and share information with each other. Students' mastery of concepts culminates in a term paper on a new or emerging technology area as it relates to systems engineering.
EN.645.768

EN.645.767. System Conceptual Design. 3 Credits.
This course addresses in detail the systems engineer's responsibilities and activities during the conceptual phases of a system development program. Systems engineering tools commonly employed at this stage of a program are presented along with selected problems that illustrate both the applicability and limitations of commonly employed tools and procedures. The course steps through conceptual design beginning with analysis of needs and objectives and proceeding to the exploration of alternative concepts and the selection of a concept that best meets goals of performance, timeliness, and affordability. Topics include definition of operational scenarios, functional analysis, risk assessment, system tradeoffs, measures of effectiveness, and requirements formulation. Emphasis is on the application of these systems engineering techniques in a team environment to a class project. Students apply systems engineering methods learned from reading and lectures to the development of a realistic system in an ongoing project in a team format.
EN.645.764 Software Systems Engineering or permission of the student's advisor and the course instructor.

EN.645.768. System Design & Integration. 3 Credits.
This course addresses the systems engineering objectives, responsibilities, and activities during the demonstration and validation and the engineering and manufacturing development phases of a system development program. Systems engineering procedures and tools employed during these phases are identified and their use illustrated. Topics include the relationship between a system specification and the system design, systems engineering management plans, risk management, system development models, customer integration into the design process, and design disciplines and practices. The course uses a system problem scenario extensively to illustrate systems engineering principles and specific product design issues.
EN.645.767 System Conceptual Design or permission of the student's advisor and the instructor.

EN.645.769. System Test & Evaluation. 3 Credits.
This course focuses on the application of systems engineering principles to the test and evaluation of system elements and, ultimately, of the total system. Test requirements, selection of critical test parameters, analysis of test results, and determination of remedial action in the event of discrepancies are all systems engineering functions. Topics include validation and verification, similarities and differences in the nature of hardware and software testing, test tools and test procedures, testing during hardware-software integration, quality assurance test, environmental test, and operational test and evaluation. Student problems include scenario case studies using examples developed in the several previous courses.
EN.645.768 System Design and Integration or permission of the student's advisor and the instructor.

EN.645.771. System of Systems Engineering. 3 Credits.
This course addresses the special engineering problems associated with conceiving, developing, and operating systems composed of groups of complex systems closely linked to function as integral entities. The course will start with the underlying fundamentals of systems' requirements, design, test and evaluation, and deployment, and how they are altered in the multi-system environment. These topics will then be extended to information flow and system interoperability, confederated modeling and simulation, use of commercial off-the-shelf elements, and systems engineering collaboration between different organizations. Advanced principles of information fusion, causality theory with Bayesian networks, and capability dependencies will be explored. Several case studies will be discussed for specific military systems of systems, including missile defense and combatant vehicle design, as well as selected commercial examples.Course Note(s): Selected as one of the electives in the MSE or MS program or a required course for the post-master's certificate.
EN.645.769 System Test and Evaluation or advisor and instructor approval.

EN.645.780. Agile Systems Engineering. 3 Credits.
The development of large, complex software-intensive hardware systems has become extremely challenging for systems engineering. For example, automotive designs are now incorporating more than a hundred interconnected individual integrated control units (ICU), each designed to sense environmental factors, both internal and external to the system, and precisely control electro-mechanical devices, all of which are then networked together with the outside world: collectively this evolving technical domain is called a cyber-physical system (CPS). CPS physical and software mechanisms are deeply entwined, operating on dissimilar spatial and temporal scales that exhibit emergent, individually distinct behaviors, and in some systems can include autonomy and the ability to learn. This tight coupling between hardware components and their information-driven software functionality creates an environment of adaptive complexity requiring deliberate, incremental learning intervals with strong feedback throughout the system's development and sustainment lifecycle. This need for continuous learning, and adapting to this learning, is challenging classic systems engineering principles and processes to incorporate new ideas and methods. Systems design and development organizations are turning to a broad set of Agile and Lean methods to manage risk and uncertainty associated with such complexity: the challenge will be in adapting, transforming and extending classic, proven systems engineering methods in order to achieve the same level of disciplined process and delivered value routinely experienced in more traditional projects. This course involves highly-collaborative teamwork requiring at least eight (8) fully-synchronous Zoom-based conferences in order to present student work as a team: meetings are typically two-hours in length and are designed to be highly-engaged, spirited discussions between students and the instructor(s).
EN.645.662 Introduction to Systems Engineering, EN.645.667 Management of Systems Projects, EN.645.764 Software Systems Engineering, EN.645.767 System Conceptual Design and EN.645.768 System Design and Integration

EN.645.781. Systems Thinking and Systems Dynamics. 3 Credits.
Systems thinking is the ability to perform insightful and comprehensive problem solving of complex systems. Fundamental to systems thinking is system dynamics, an approach used to understand the nonlinear behavior of complex systems over time using stocks, flows, internal feedback-loops, a variety of functions, and time-delays. This course will investigate the needs, motivations, and frameworks of systems thinking employing causal-loop diagram archetypes, as well as establish foundational concepts and approaches for systems thinking problem construction. From these foundations, system dynamic approaches, analytical models-tools, and simulations will be constructed to mature foundational systems thinking problem frameworks for quick, insightful, and quantitative impact-analysis. A variety of systems thinking problems will be addressed through the assembly of causal-loop diagrams, followed by the construction of system dynamics models, with a specific focus on emerging challenges of supply management and healthcare systems engineering and delivery. The course concludes with a series of reflective and inspirational challenges and opportunities, with the goal of solidifying comprehensive systems thinking acumen. This course will use The Fifth Discipline by Peter M. Senge, Thinking in Systems – A Primer by Donella H. Meadows, and Systems Thinking Tools – A User's Refence Guide by Daniel H. Kim as course textbooks. Also, a variety of relevant articles, papers, and recorded video material will be used. Vensim © (freeware version: https://vensim.com/) will be the system dynamics modeling tool used in the course.
EN.645.662 Introduction to Systems Engineering AND EN.645.767 System Conceptual Design

EN.645.782. Foundations of Digital and Mission Engineering. 3 Credits.
This course provides an introduction to Digital Engineering and Mission Engineering, both of which are topics of emerging emphasis, particularly in the U.S. Defense community. The course begins with a review of the systems engineering process, with its technical and technical management processes, as it is applied in the U.S. Department of Defense (DoD) acquisition lifecycle. It then provides an overview of the DoD Digital Engineering Strategy, and discusses key competencies needed for Digital Engineering. As Modeling and Simulation (M&S) and Model Based Systems Engineering (MBSE) are key to the implementation of Digital Engineering, the course discusses fundamental concepts of M&S and how models and simulations are used in the various phases of the systems engineering process. Key MBSE concepts are then presented, along with an overview of the Systems Modeling Language (SysML) and its constituent diagrams, followed by an overview of the Object-Oriented Systems Engineering Method (OOSEM). The course then discusses how to apply these MBSE concepts to analyze several selected real-world case studies. A generic framework for a collaborative environment to support digital engineering is presented, along with how it might be used to support the development of digital twins and digital threads for a system. The underlying concepts and the key methodology elements of Mission Engineering are then described, based on the DoD Mission Engineering Guidebook. Finally, the course examines how and why Digital Engineering supports the implementation of Mission Engineering.
EN.645.662 Introduction to Systems Engineering

EN.645.783. Systems Engineering Process Improvement. 3 Credits.
Through lectures and facilitated teamwork, this course presents the fundamental concepts of continuous process improvement in the context of systems engineering. Students will explore how to define, map, model and simulate, assess, manage, and improve a systems engineering process. This will enable students to lead or contribute to a systems engineering process improvement effort on the job, and to be better prepared for certifying their systems engineering expertise.

EN.645.800. Systems Engineering Master's Project. 3 Credits.
This course provides the experience of applying systems engineering principles and skills learned in the formal courses to a specific practical project that is suggested by the student and is presented in a formal proposal. The product of the system project is a final report; also required are interim reports and an oral presentation to permit review of the project objectives and approach. This is an independent course that has no formal classes; the student is responsible for developing their own project timeline and works to complete it within one semester. A student typically has a mentor who is a member of the systems engineering faculty. The program chair, vice chair, and mentor review proposals and reports. The total time required for this course is comparable to the combined class and study time for the formal courses. Course Note(s): Students who plan to register for this course will need to have a project mentor and a topic for their project and should contact the Systems Engineering Program Office (443-778-6002) four to six weeks prior to the semester start date.
EN.645.769 System Test and Evaluation and an approved project concept from their project mentor and project instructor.

EN.645.801. Systems Engineering Master's Thesis. 3 Credits.
This course is the first of a two-semester requirement designed for students in the Systems Engineering Master's program. Thesis students will conduct independent research in the field of systems engineering, under the guidance of an advisor. The intent of the Master's Thesis research is to advance the body of knowledge and the understanding of systems engineering practices, the improvement of systems engineering practices in industry and in government, the evolution of systems engineering tools and techniques, and the solution of systems development issues in the acquisition of advanced systems. In this course, students will gain a foundation in conducting graduate-level, academic research, including an introduction to research paradigms and methodologies, problem/research question formulation, research design, literature search and critique, proposal preparation, data collection and analysis, research ethics, and the canons of research for engineering and science. At the end of this semester, the student will present their research proposal to their thesis committee. Students interested in pursuing a doctoral degree should enroll in the Thesis Option.Prerequisite(s): Completion of all other courses applicable to the Systems Engineering master's degree. Course Note(s): Students who plan to register for this course will need to contact the Systems Engineering Program Office (443-778-6002) four to six weeks prior to the semester start date.

EN.645.802. Systems Engineering Master's Thesis. 3 Credits.
This course is the second of a two-semester requirement designed for students in the systems engineering master's program. Thesis students will conduct independent research in the field of systems engineering, under the guidance of an advisor. The intent of the Master's thesis research is to advance the body of knowledge and the understanding of systems engineering practices, the improvement of systems engineering practices in industry and in government, the evolution of systems engineering tools and techniques, and the solution of systems development issues in the acquisition of advanced systems. In this semester, the student will conduct the research outlined in the research proposal developed during EN.645.801, with guidance and oversight from their thesis advisor. At the end of the semester, the student will deliver their thesis paper acceptable for publishing in a professional peer-reviewed journal and will present a defense of their research to their Thesis Committee. Students interested in pursuing a doctoral degree should enroll in the Thesis Option. Prerequisite(s): Completion of EN.645.801 Systems Engineering Master's Thesis, the first semester of this two-semester course.

Systems Engineering, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree, are eligible for the Graduate Certificate in Systems Engineering. Applicants are required to meet the same requirements for admission as the master's degree (p. 1581).

Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Significant relevant work experience or a graduate degree in a relevant technical discipline may be considered in lieu of meeting the GPA requirement.

If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit. The student must declare their intention prior to completing the certificate.

Program Requirements

Five courses must be completed within five years. The curriculum consists of the first five core courses. Only grades of B– or above can count toward the graduate certificate.

Code	Title	Credits
EN.645.662	Introduction to Systems Engineering	3
EN.645.667	Management of Systems Projects	3
EN.645.764	Software Systems Engineering	3
EN.645.767	System Conceptual Design	3
EN.645.768	System Design & Integration	3

Systems Engineering, Master of Science

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414). A minimum of one year of relevant full-time work experience in the field is required, and a detailed work résumé and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered.

The Systems Engineering program offers two degree distinctions—a Master of Science in Engineering (MSE) and a Master of Science (MS). In order to be admitted into the MSE program, applicants need to hold a degree issued by a program accredited by the Engineering Accreditation Commission (EAC) of ABET, https://www.abet.org (https://www.abet.org/). Students admitted without a Bachelor of Science degree from an EAC of ABET-accredited program (or who did not complete the prerequisites that meet all of the EAC of ABET-accreditation requirements for the attainment of student outcomes and for sufficient math, science, and engineering design at the Bachelor of Science level) will receive a regionally accredited Master of Science degree. There is no difference in the curriculum for the MSE and MS programs.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of seven or eight core courses and two or three electives, depending on whether the master's project or the master's thesis is selected.

Only one C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Systems Engineering program requirements are subject to advisor approval.

Courses

Required Courses for Master's Degrees

Code	Title	Credits
Required Courses		
EN.645.662	Introduction to Systems Engineering	3
EN.645.667	Management of Systems Projects	3
EN.645.764	Software Systems Engineering	3
EN.645.767	System Conceptual Design	3
EN.645.768	System Design & Integration	3
EN.645.769	System Test & Evaluation	3
EN.645.800	Systems Engineering Master's Project	3-6
or EN.645.801 & EN.645.802	Systems Engineering Master's Thesis and Systems Engineering Master's Thesis	
Electives		
Select three electives from one of the following tracks: [1]		
Systems (p. 1582)		
Cybersecurity (p. 1582)		
Human Systems (p. 1582)		
Modeling and Simulation (p. 1582)		

Project Management (p. 1582)	
Software Systems (p. 1582)	

[1] Students who take the two-semester thesis option only select two from the list of courses by track. Other JHU/WSE courses may be accepted as electives with the approval of the student's advisor. The tracks below represent related groups of courses that are relevant for students with interests in the selected areas.

Tracks

Systems

Code	Title	Credits
EN.645.669	Systems Engineering of Deployed Systems	3
EN.645.742	Management of Complex Systems	3
EN.645.753	Enterprise Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.766	Systems Engineering Advanced Technology	3
EN.645.771	System of Systems Engineering	3
EN.645.780	Agile Systems Engineering	3
EN.645.781	Systems Thinking and Systems Dynamics	3

Cybersecurity

Code	Title	Credits
EN.635.611	Principles of Network Engineering	3
EN.635.672	Privacy Engineering	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.635.676	Cybersecurity in Information Systems	3
EN.635.682	Website Development	3
EN.635.683	E-Business: Models, Architecture, Technologies, and Infrastructure	3
EN.695.601	Foundations of Information Assurance	3
EN.695.621	Public Key Infrastructure and Managing E-Security	3
EN.695.744	Reverse Engineering and Vulnerability Analysis	3

Human Systems

Code	Title	Credits
EN.635.661	Principles of Human Computer Interaction	3
EN.645.621	Engineering and Measuring Influence	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3
EN.645.755	Methods in Human-System Performance Measurement and Analysis	3

Modeling and Simulation

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.645.631	Introduction to Model Based Systems Engineering	3
EN.645.632	Applied Analytics for Model Based Systems Engineering	3
EN.645.756	Metrics, Modeling, and Simulation for Systems Engineering	3
EN.645.757	Foundations of Modeling and Simulation in Systems Engineering	3
EN.645.758	Advanced Systems Modeling and Simulation	3
EN.645.782	Foundations of Digital and Mission Engineering	3

Project Management

Code	Title	Credits
EN.595.662	Technical Organization Management	3
EN.595.665	Strategic Communications in Technical Organizations	3
EN.595.676	Finance, Contracts, and Compliance for Technical Professionals	3
EN.595.727	Advanced Concepts in Agile Technical Management	3

Software Systems

Code	Title	Credits
EN.605.604	Object-Oriented Programming with C++	3
EN.605.607	Agile Software Development Methods	3
EN.605.608	Software Project Management	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.705	Software Safety	3
EN.605.708	Tools and Techniques of Software Project Management	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Learning Outcomes

JHU Systems Engineering Program Educational Objectives

Within 2–5 years after graduation, Master of Science in Engineering in Systems Engineering graduates of Johns Hopkins University will:

1. Attain programmatic or technical leadership roles in systems engineering or the management of complex systems.
2. Employ systems engineering methods and tools throughout the life cycle of complex systems.

JHU Systems Engineering Student Outcomes

Upon completing the Master of Science in Engineering in Systems Engineering Program, students will be able to:

1. Apply technical knowledge in mathematics, science, and engineering to lead the realization and evaluation of complex systems and systems of systems.
2. Demonstrate the ability to conceive of, gather user needs and requirements for, design, develop, integrate, and test complex systems by employing systems engineering thinking and processes within required operational and acquisition system environments.
3. Understand and utilize the life cycle stages of systems development from concept development through manufacturing and operational maintenance.
4. Lead and participate in interdisciplinary teams to manage the cost-effective systems.
5. Communicate complex concepts and methods in spoken and written format.
6. Demonstrate awareness and capability in employing tools and techniques in the systems engineering process.

Systems Engineering, Master of Science in Engineering (ABET-accredited)

Admission Requirements

Applicants must meet the general requirements for admission to graduate study, as outlined in the Admission Requirements (p. 1414). A minimum of one year of relevant full-time work experience in the field is required, and a detailed work résumé and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. When reviewing an application, the candidate's academic and professional background will be considered.

The Systems Engineering program offers two degree distinctions—a Master of Science in Engineering (MSE) and a Master of Science (MS). In order to be admitted into the MSE program, applicants need to hold a degree issued by a program accredited by the Engineering Accreditation Commission (EAC) of ABET, https://www.abet.org (https://www.abet.org/). Students admitted without a Bachelor of Science degree from an EAC of ABET-accredited program (or who did not complete the prerequisites that meet all of the EAC of ABET-accreditation requirements for the attainment of student outcomes and for sufficient math, science, and engineering design at the Bachelor of Science level) will receive a regionally accredited Master of Science degree. There is no difference in the curriculum for the MSE and MS programs.

Program Requirements

Ten courses must be completed within five years. The curriculum consists of seven or eight core courses and two or three electives, depending on whether the master's project or the master's thesis is selected.

Only one C-range grade (C+, C, or C–) can count toward the master's degree. All course selections outside of the Systems Engineering program requirements are subject to advisor approval.

Courses

Required Courses for Master's Degrees

Code	Title	Credits
Required Courses		
EN.645.662	Introduction to Systems Engineering	3
EN.645.667	Management of Systems Projects	3
EN.645.764	Software Systems Engineering	3
EN.645.767	System Conceptual Design	3
EN.645.768	System Design & Integration	3
EN.645.769	System Test & Evaluation	3
EN.645.800	Systems Engineering Master's Project	3-6
or EN.645.801 & EN.645.802	Systems Engineering Master's Thesis and Systems Engineering Master's Thesis	
Electives		
Select three electives from one of the following tracks: [1]		
Systems (p. 1583)		
Cybersecurity (p. 1583)		
Human Systems (p. 1583)		
Modeling and Simulation (p. 1583)		
Project Management (p. 1584)		
Software Systems (p. 1584)		

[1] Students who take the two-semester thesis option only select two from the list of courses by track. Other JHU/WSE courses may be accepted as electives with the approval of the student's advisor. The tracks below represent related groups of courses that are relevant for students with interests in the selected areas.

Tracks

Systems

Code	Title	Credits
EN.645.669	Systems Engineering of Deployed Systems	3
EN.645.742	Management of Complex Systems	3
EN.645.753	Enterprise Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.766	Systems Engineering Advanced Technology	3
EN.645.771	System of Systems Engineering	3
EN.645.780	Agile Systems Engineering	3
EN.645.781	Systems Thinking and Systems Dynamics	3

Cybersecurity

Code	Title	Credits
EN.635.611	Principles of Network Engineering	3
EN.635.672	Privacy Engineering	3
EN.635.673	Protecting Critical Infrastructure Against Cyber Attacks	3
EN.635.676	Cybersecurity in Information Systems	3
EN.635.682	Website Development	3
EN.635.683	E-Business: Models, Architecture, Technologies, and Infrastructure	3
EN.695.601	Foundations of Information Assurance	3
EN.695.621	Public Key Infrastructure and Managing E-Security	3
EN.695.744	Reverse Engineering and Vulnerability Analysis	3

Human Systems

Code	Title	Credits
EN.635.661	Principles of Human Computer Interaction	3
EN.645.621	Engineering and Measuring Influence	3
EN.645.650	Foundations of Human Systems Engineering	3
EN.645.651	Integrating Humans and Technology	3
EN.645.755	Methods in Human-System Performance Measurement and Analysis	3

Modeling and Simulation

Code	Title	Credits
EN.625.603	Statistical Methods and Data Analysis	3
EN.645.631	Introduction to Model Based Systems Engineering	3
EN.645.632	Applied Analytics for Model Based Systems Engineering	3
EN.645.756	Metrics, Modeling, and Simulation for Systems Engineering	3
EN.645.757	Foundations of Modeling and Simulation in Systems Engineering	3

EN.645.758	Advanced Systems Modeling and Simulation	3
EN.645.782	Foundations of Digital and Mission Engineering	3

Project Management

Code	Title	Credits
EN.595.662	Technical Organization Management	3
EN.595.665	Strategic Communications in Technical Organizations	3
EN.595.676	Finance, Contracts, and Compliance for Technical Professionals	3
EN.595.727	Advanced Concepts in Agile Technical Management	3

Software Systems

Code	Title	Credits
EN.605.604	Object-Oriented Programming with C++	3
EN.605.607	Agile Software Development Methods	3
EN.605.608	Software Project Management	3
EN.605.704	Object-Oriented Analysis and Design	3
EN.605.705	Software Safety	3
EN.605.708	Tools and Techniques of Software Project Management	3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Learning Outcomes

JHU Systems Engineering Program Educational Objectives

Within 2–5 years after graduation, Master of Science in Engineering in Systems Engineering graduates of Johns Hopkins University will:

1. Attain programmatic or technical leadership roles in systems engineering or the management of complex systems.
2. Employ systems engineering methods and tools throughout the life cycle of complex systems.

JHU Systems Engineering Student Outcomes

Upon completing the Master of Science in Engineering in Systems Engineering Program, students will be able to:

1. Apply technical knowledge in mathematics, science, and engineering to lead the realization and evaluation of complex systems and systems of systems.
2. Demonstrate the ability to conceive of, gather user needs and requirements for, design, develop, integrate, and test complex systems by employing systems engineering thinking and processes within required operational and acquisition system environments.
3. Understand and utilize the life cycle stages of systems development from concept development through manufacturing and operational maintenance.
4. Lead and participate in interdisciplinary teams to manage the cost-effective systems.
5. Communicate complex concepts and methods in spoken and written format.
6. Demonstrate awareness and capability in employing tools and techniques in the systems engineering process.

Systems Engineering, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Systems Engineering.

Program Requirements

Five courses must be completed within five years. The curriculum consists of four advanced courses and one elective.The one elective can be one 700-level course in a program approved by the student's advisor. Only grades of B– or above can count toward the post-master's certificate.

Courses for Post-Master's Certificate

Code	Title	Credits
Advanced Courses		
EN.645.742	Management of Complex Systems	3
EN.645.753	Enterprise Systems Engineering	3
EN.645.761	Systems Architecting	3
EN.645.771	System of Systems Engineering	3
Electives		
Select one of the following:		
One approved 700-level courses		3

Please refer to the course schedule (ep.jhu.edu/schedule (https://apps.ep.jhu.edu/schedule/search/)) published each term for exact dates, times, locations, fees, and instructors.

Technical Management

Programs

Effective Fall 2020, Technical Management, Master of Science will be retired as a separate program and replaced with a Technical Leadership track within Engineering Management (p. 1517). Technical Management students in the application pipeline or already in the program will be eligible to complete their Master's degree according to the catalogue in place at the time of their acceptance or roll over into the new program.

Technical Management, Graduate Certificate

Admission Requirements

Applicants who are interested in taking graduate-level courses, but not necessarily interested in pursuing a full master's degree are eligible for the Graduate Certificate in Technical Management. Applicants are required to meet the same requirements for admission (p. 1414) as the master's degree. The applicant's prior education must include a degree in a science or an engineering field. In addition to this requirement, a minimum of two years of relevant full-time work experience in the field is required, following the award of an undergraduate degree (note that internship and/or co-op periods do not satisfy this requirement), and a detailed work résumé and transcripts from all college studies must be submitted. Admitted students typically have earned a grade point average of at least 3.0 on a 4.0 scale (B or above) in the latter half of their undergraduate studies. Significant relevant work experience or a graduate degree in a relevant technical discipline may be considered in lieu of meeting the GPA requirement. If the student should decide to pursue the full master's degree, all courses will apply to the master's degree provided they meet program requirements and fall within a five-year time limit.

Program Requirements

Five courses must be completed within five years. The curriculum consists of the same core courses for the Master of Engineering Management degree.

Core Courses

Code	Title	Credits
EN.595.660	Planning and Managing Projects	3
EN.595.662	Technical Organization Management	3
EN.595.665	Strategic Communications in Technical Organizations	3
EN.595.676	Finance, Contracts, and Compliance for Technical Professionals	3
EN.595.781	Executive Technical Leadership	3

Technical Management, Post-Master's Certificate

Admission Requirements

Applicants who have already completed a master's degree in a closely related technical discipline are eligible to apply for the Post-Master's Certificate in Technical Management. Applicants must meet EP Post-Master's Certificate admission requirements (p. 1414). A minimum of two years of relevant full-time work experience in the field is also required, following the award of an undergraduate degree (note that internship and/or co-op periods do not satisfy this requirement), and a detailed work résumé and transcripts from all college studies must be submitted.

Program Requirements

Five courses must be completed within five years. The curriculum consists of the same core courses for the Master of Engineering Management degree.

Core Courses

Code	Title	Credits
EN.595.660	Planning and Managing Projects	3
EN.595.662	Technical Organization Management	3
EN.595.665	Strategic Communications in Technical Organizations	3
EN.595.676	Finance, Contracts, and Compliance for Technical Professionals	3
EN.595.781	Executive Technical Leadership	3

ZANVYL KRIEGER SCHOOL OF ARTS AND SCIENCES

Click a link below to find out more about programs in the Krieger School of Arts & Sciences.

Division website: https://krieger.jhu.edu/ (https://krieger.jhu.edu/)

Full-time, On-campus Undergraduate and Graduate Programs (Homewood)

The Zanvyl Krieger School of Arts and Sciences is one of the core divisions of Johns Hopkins University's Homewood campus. Our mission is the creation of new knowledge and the education of our students, undergraduate and graduate alike. Comprising 22 academic departments and more than 30 centers, programs, and institutes, the Krieger School is home to students interested in the humanities, natural sciences, social sciences, and the arts. The excellence of these programs dates back to 1876, when Daniel Coit Gilman assembled a faculty of philosophy of international distinction. Today, inquiry and discovery remain the engine and fuel that drive teaching and learning in the school. The departmental and program descriptions that follow are notable illustrations of the interdisciplinary offerings and opportunities available for a student to structure a unique field of study in the humanities, natural sciences, quantitative studies, and behavioral sciences.

Bachelor's Programs

Minors

Non Degree Programs

Combined Bachelor's/Master's Programs

Master's Programs

Doctoral Programs

Undergraduate Policies

The policies, procedures, resources, and opportunities included in this section are relevant for undergraduates enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences and the Whiting School of Engineering on the Homewood campus. Please use the links at the right to navigate to your topic of interest.

Academic Policies

The Krieger School of Arts and Sciences and the Whiting School of Engineering offer myriad opportunities for intellectual exploration, academic challenge, and personal growth. To satisfy academic goals and assure progress toward graduation, students should take action and responsibility for the following:

- Seek advice from multiple faculty, and other university professionals,
- Meet with your advisor at least once a semester,
- Learn the information contained within this online catalogue. Failure to do so does not excuse you from responsibility for the rules and procedures,
- Track your completion of degree requirements,
- Consult your advising office and major department about any questions concerning academic policy.

All students are expected to observe the academic policies and practices of the university; personal difficulties, illness, and/or advice contradicting the rules and procedures does not constitute automatic grounds for exemption from these rules or procedures. Written requests for exceptions must be submitted to the student's academic advising office. After review, a student will be notified whether the exception is approved.

Students who have concerns of an academic nature related to teaching or other aspects of course delivery may contact the Vice Dean for Undergraduate or the Vice Dean for Graduate Education of their School.

The University reserves the right to change rules, procedures and other information within this website as appropriate. This website is not to be regarded as a contract. If you have questions, contact your school's advising office.

Requirements for a Bachelor's Degree

There are multiple categories of degree requirements that comprise an undergraduate degree at Hopkins. All approved credit earned through exams or at other colleges and universities may be used to meet: Distribution requirements, Writing-Intensive requirement, Departmental major and minor requirements, and to satisfy course prerequisites.

1. **Total Degree Credit Requirement**
   The total degree credit requirement is considered a distinct degree requirement, and ranges from 120-130 credits depending on the degree. It is not merely a cumulative tally of courses used to satisfy requirement areas 3-5.
2. **Residency Requirement**
   Students are required to complete a minimum number of credits in residency at JHU, therefore a limit is imposed on how many exam and transfer credits can be counted towards the total degree credit requirement.
3. **Distribution Requirement**
   Students must earn a minimum number of credits in academic areas outside of their primary major. The academic areas in the Hopkins curriculum are humanities (H), natural sciences (N), social and behavioral sciences (S), quantitative and mathematical sciences (Q), and engineering (E).
4. **Writing-Intensive Requirement**
   To encourage excellence in writing across disciplines, the University requires all bachelor's students to complete writing-intensive courses. These courses are identified by a "W" in the JHU course schedule, and an asterisk (*) on the unofficial transcript.
5. **Departmental Major Requirement, and Minor Requirement**
   Every student who earns a bachelor's degree must satisfy the requirements for each of their declared major(s), and minor(s). These requirements may include courses in other disciplines that provide skills and information of importance to professionals in the major field.
6. **First-Year Foundations Requirement (Arts and Sciences students only)**

An undergraduate student's school affiliation, and therefore the First-Year Foundations requirement, is based on the student's primary major. Arts and Sciences first-year students must complete a two-course requirement of a First-Year Seminar and a Reintroduction to Writing course. Arts and Sciences transfer students must complete an approved seminar and the Reintroduction to Writing course (or an equivalent transferred course). A full description of this requirement is available only in the Arts and Sciences catalogue because this requirement is not applicable to Engineering undergraduates even those who have an additional major in Arts and Sciences.

"D" Grade Restriction

University policy allows no more than 18 credits from courses with grades of D or D+ to be counted toward the total degree credit requirement for graduation. Departments may set a lower limit on the number of permissible D or D+ grades for a specific major. Many departments do not accept any D or D+ credits for major requirements.

Ten-Year Degree Completion Limit

A student must fulfill all degree requirements for graduation within 10 academic years from the date of matriculation at the University.

Degree Credit Totals

The Bachelor of Arts degree requires 120 credits.

The Bachelor of Science degree, whether in Arts and Sciences or Engineering, requires from 120 to 130 credits, depending on the major.

No program may require more than 130 credits.

For a degree requiring 120 total credits, a maximum of 20 approved credits from other sources may be counted towards the total degree credit requirement, even if more than 20 credits from external sources have been used to satisfy degree requirement areas of: Distribution, Writing-Intensive, and Departmental Major and/or Minor.

All approved exam credits earned will be posted to the transcript. Up to 12 approved transfer credits will be posted to the transcript. See External Credits (p. 1604) section for details.

Example:

A student has a total of 32 external credits posted to the transcript:

- 8 transfer credits from another university
- 24 credits from AP exams

All 32 of these credits may be applied to requirement areas of: Distribution, Writing-Intensive, and Departmental Major and/or Minor.

If the student's total degree credit requirement is 120, only 20 of those 32 credits will count toward the 120 total degree credit requirement (120-100=20).

If the student changes to a degree program whose total degree credit requirement is 126, only 26 of those 32 credits will count toward the total degree credit requirement (126-100=26).

Residency Requirement for Freshmen

Students who enter the university from high school must complete at least 100 credits at JHU. This includes courses that are taken after matriculation as a degree-seeking student:

- in fall, intersession, spring, or summer at JHU
- in other divisions of the university
- through the Baltimore Student Exchange Program (BSEP) during the fall and spring semesters only
- through an approved study abroad program (up to 30 credits)

In addition, credits earned through JHU courses prior to matriculation as a degree-seeking student are applied to the 100-credit residency requirement.

Students who entered JHU prior to Fall 2014 should view the appropriate archived catalogue.

All students must complete a minimum of four semesters in residence as a full-time student. Students must be in residence for at least two of the final four semesters, including the final semester prior to graduation.

Residency Requirement for Transfer Students

Students who enter the university as transfer students must complete at least 60 credits at JHU. This includes courses that are taken after matriculation as a degree-seeking student:

- in fall, intersession, spring, or summer at JHU
- in other divisions of the university

- through the Baltimore Student Exchange Program (BSEP) during the fall and spring semesters only
- through summer and intersession study abroad programs sponsored by Hopkins departments

In addition, all transfer students must complete at least four full-time semesters in residence at JHU. Study abroad programs offered during fall and spring semesters do not count towards this four-semester requirement. Transfer students must be in residence for at least two of their final four semesters, including the final semester prior to graduation.

Residency Requirement for Peabody Double Degree Students

Students earning a double-degree at Peabody must complete at least 48 credits in either the Krieger School of Arts & Sciences or the Whiting School of Engineering.

Writing Designation Requirements

To encourage excellence in writing, across disciplines, the university requires all undergraduates to take a number of writing-intensive courses. A writing-intensive (W) course is one in which students complete at least 20 pages of finished writing, distributed over multiple assignments, usually 3 or 4 papers, throughout the semester. Instructors respond to students' work in written comments or in conference, or both; and students have at least one opportunity to receive their instructor's feedback on a draft and then revise. A writing-intensive course guides students' practice in writing and makes writing an integral part of the course. The writing-intensive requirement is administered by the University Writing Program.

Writing-intensive courses are indicated by a "W" in the JHU course schedule and an asterisk (*) on a student's unofficial transcript. Courses taken to satisfy the writing requirement must be taken for a letter grade and passed with a grade of C- or better. Writing-intensive courses taken to satisfy major, minor, or distribution requirements may also count toward the writing requirement. All course registrations at the 500 level, which is by definition independent academic work, except for courses that are Honors Thesis and the Senior Essay in English, are not allowed to be writing-intensive.

KSAS Students:

Effective Fall 2022, all students earning a degree from the School of Arts and Sciences must complete Reintroduction to Writing in their first year at Hopkins plus an additional 12 credits in writing-intensive courses through their undergraduate experience for a minimum of 15 writing-intensive credits. Arts and Sciences transfer students will be required to complete the Reintroduction to Writing course in their first year at JHU and encouraged to take it in the first semester. Transfer students who wish to have a similar writing course from a prior institution reviewed to serve as a substitution for this course should speak to the University Writing Program. To ensure seat availability in the course, students should request this review prior to transfer student registration day in the summer.

WSE Students:

Candidates for a B.A. degree in the School of Engineering must complete 12 credits (four courses at least 3 credits each) in writing-intensive courses, while candidates for a B.S. degree in Engineering must complete 6 credits (two courses at least 3 credits each) in writing-intensive courses. Please note, this requirement is based upon a student's degree; students are not required to complete a separate writing requirement for any additional majors.

For information about transferring writing-intensive credits to JHU, please see the External Credits section of Academic Policies.

Academic Area Designation Requirements

The distribution requirement stipulates that students must earn a minimum number of credits in academic areas outside of their primary major. Area designators represent an association between the course and an academic area. Courses with area designators are expected to do more than employ basic techniques, they are to advance knowledge and increase a student's understanding of the theory. Courses that are teaching a basic skill, and therefore do not expose the student to modes of analysis and scholarship that represent the essence of a given discipline, will not be assigned an area designator. If taught within a Homewood academic department, the department is responsible for assigning area designators to their courses. Courses not offered through Homewood academic departments will be reviewed for proposed area designators by the appropriate dean's office.

The academic areas in the Hopkins curriculum are: humanities (H), natural sciences (N), social and behavioral sciences (S), quantitative and mathematical sciences (Q), and engineering (E).

The area designations of courses (H, S, N, Q, and E) are included in the course information in the departmental pages of the catalogue and in the online schedule of classes. The area designation also appears beside the course title on a student's unofficial transcript. When a course has more than one area designation (HS, EN, EQ, etc.), students may use only one of the designations to satisfy the distribution requirement.

Only courses or other credit-bearing opportunities with area designations may be used to satisfy the distribution requirement. Area designators are not assigned to the following:

- Independent study
- Research
- Internships
- Music performance (unless taken as part of a music minor, in which case the course will be designated H)
- Dance performance
- Foreign language elements courses (see additional foreign language rules (https://e-catalogue.jhu.edu/engineering/full-time-residential-programs/undergraduate-policies/academic-policies/registration-policies/#restrictionstext))
- Medical tutorials

Area designations can be assigned to courses taken elsewhere, to courses taken in other divisions of the university, or to graduate courses taken by undergraduates. These assignments are made by the appropriate dean's office based on the course content and the recommendations of the faculty. The most useful criteria for determining an appropriate area designator will be the course description and a similar JHU departmental offering.

The following courses at the Peabody Conservatory have H designations:

Area Designator	Code	Title
H	530.411	Keyboard Literature 1
H	530.412	Keyboard Literature 2
H	530.413	Keyboard Literature 3

H	530.414	Keyboard Literature 4
H	530.569	Jazz Analysis/History
H	530.570	Constructive Listening & Analysis/ Jazz History
H	610.321	History of Music 1
H	610.322	History of Music 2
H	610.323	History of Music 3
H	260.115	Core 1
H	260.116	Core 2

Distribution Requirement for Arts & Sciences Students

Students must earn:

- At least 9 credits in humanities
- At least 9 credits in social sciences
- At least 9 credits in natural sciences, quantitative, or engineering

These credits fulfilling the distribution requirement may overlap with major or minor requirements and the writing-intensive requirement.

In Arts and Sciences, courses taken for the distribution requirement may be taken for a letter grade or for Satisfactory/Unsatisfactory credit. Courses passed with a letter grade of D or better, or passed with a Satisfactory grade, will fulfill the distribution requirement. Students who entered JHU prior to Fall 2014 should view the appropriate archived catalogue.

Distribution Requirement for Engineering Students

Students earning a degree in the School of Engineering must complete the following distribution requirement:

18 credits (6 courses at least 3 credits each, except for the two specific course sequences listed below) designated H and/or S. Although language elements courses do not carry an area designator, engineering students may use these courses as substitutes for humanities courses in meeting the distribution requirement.

The following specific course pairings of a 2-credit course and a 1-credit course have been approved to count towards the H/S distribution requirements in place of a single 3-credit course:

Code	Title	Credits
Set One		
EN.660.400	Practical Ethics for Future Leaders	2
EN.660.406	Practical Ethics for Future Leaders - Special Topic	1
Set Two		
EN.660.400	Practical Ethics for Future Leaders	2
EN.520.404	Engineering solutions in a global, economic, environmental, and societal context	1

In Engineering, each department determines whether or not the Satisfactory/Unsatisfactory grading option will be permitted for courses used to satisfy the distribution requirement.

Completing a Major and Minimum Grade Point Average

Every student who earns a bachelor's degree must satisfy the requirements of a major. A major is a structured curriculum, usually within the confines of a particular academic field. Generally, the requirements for a major provide a student with a broad overview of the field through introductory courses, followed by more specialized courses tailored to meet the student's interests in the field. The requirements for the major may also include courses in other disciplines that provide skills and information of importance to professionals in the major field.

Courses that are used to satisfy major requirements must be taken for a letter grade, unless the course is only offered using the Satisfactory/Unsatisfactory grading system (i.e., there is no option for a letter grade). Students must have a grade point average of at least 2.00 in the letter graded courses used to satisfy major requirements. Many majors require a grade of C- or better in required courses.

Departmental Directors of Undergraduate Studies

For every major and minor that is offered at Johns Hopkins, there is a faculty member, or their designee, who serves as the program's Director of Undergraduate Studies (DUS). They are available to answer questions about their major(s) and/or minor(s). The directors also assign faculty advisors to students who declare a major or minor.

Information about KSAS DUS is located at https://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/.

Information about WSE DUS is located at https://engineering.jhu.edu/advising/directors-of-undergraduate-studies/.

Declaring a Major in Arts and Sciences

Students who enter the Krieger School of Arts and Sciences from high school are classified as pre-majors during their freshman year. In April, freshmen in Arts and Sciences will meet with an academic advisor to declare their primary major in Arts and Sciences. To declare a major at a later time, see Changing Majors or Advisors section below. Students must declare a major by April 15th of their sophomore year in order to assure that they will complete requirements for graduation in four years.

Arts and Sciences freshmen may declare second majors and minors offered through the School of Engineering beginning their freshman year until April 15th of their junior year.

Declaring a Major in Engineering

Students who enter the Whiting School of Engineering declare a specific engineering major on their application for admission. A student must take direct action to change the major. To change a major, see Changing Majors or Advisors section below.

Students cannot change their major into Biomedical Engineering. Students must be accepted into the program at the time of admission to the University.

It is recommended that undecided engineering students select a specific major no later than the end of freshman year.

Engineering students may declare a second major or minor offered through either the School of Engineering or the School of Arts and

Sciences beginning their freshmen year until April 15th of their junior year.

Changing Majors or Advisors

Once students have declared a major, they may change their major or their faculty advisor by completing the online Program of Study form in SIS. Students cannot change their major into Biomedical Engineering.

Declaring Additional Majors (Optional)

Students who wish to complete the requirements of more than one major are expected to declare the additional major(s) by April 15th of their junior year. Students may add an additional major by completing the online Program of Study form.

A student with a double major receives the degree (B.A./B.S.) associated with the student's primary major. Completing a second major does not entitle the student to a second degree. The completion of additional majors is recorded on the transcript and diploma. When completing a double major, students need only satisfy the distribution requirement affiliated with the school of their primary major.

Declaring a Minor (Optional)

Students who wish to complete the requirements for a minor(s) are expected to declare the minor(s) by April 15th of their junior year. Students may add a minor by completing the online Program of Study Form. The completion of a minor is recorded on the transcript, but the minor does not appear on the diploma.

Official recognition with notation on the academic record is not given for completion of majors or minors at other divisions of the university or at other colleges.

Restrictions Applying to Double Majors and Minors

Within the Hopkins curriculum, requirements for the completion of undergraduate majors and minors are established by academic departments and approved by the Homewood Academic Council, acting on recommendations from the Curriculum Committees of the Krieger and Whiting Schools. Students who fulfill the necessary prerequisites and satisfy the specified course requirements for a major/minor will be certified as having completed that major/minor. While departments are free to designate the range of courses that may satisfy major/minor requirements for their own academic programs, they may not prohibit the use of course work presented for their department's major/minor from being used to satisfy the requirements of other majors or minors. In other words, students may "double count" coursework that independently meets the requirements of more than one major/minor.

Students are encouraged to choose additional areas of study to complement their major. However, students may not choose a minor with an identical name to their major. For example, a student majoring in Africana Studies may not declare a minor in Africana Studies.

Other prohibited combinations include:

1. Students may not major in Molecular and Cellular Biology and Biology.
2. Students majoring in the Natural Sciences Area may only double major or minor in a program outside of the natural sciences
3. Students majoring in Medicine, Science and the Humanities may not double major in Natural Sciences Area.
4. Students majoring in Romance Languages may not major or minor in one of the individual Romance Languages (except for the Spanish for the Professions minor).

Closely-related majors and minors that are allowed include:

1. Economics majors may complete a Financial Economics minor.
2. Spanish majors and Romance Languages Majors may complete the Spanish for the Professions minor.
3. Computer Science majors may complete a Computer Integrated Surgery minor.
4. Cognitive Science majors may complete the Linguistics minor.
5. Students majoring in Environmental Engineering may major in any major offered through the Department of Earth and Planetary Sciences.

The examples provided above may not be an exhaustive list and students who have questions about combinations of related programs should consult an advisor in their respective advising office.

First Year Foundations

Effective Fall 2022, all new Arts and Sciences students will be required to complete two foundational courses: (1) a First-Year Seminar (AS.001.xxx) and (2) Reintroduction to Writing (AS.004.101).

First-Year Students:

All KSAS students who enter Hopkins must take a First-Year Seminar (FYS) in the fall of their first year. Each FYS will be unique based on the interest of the faculty teaching the course, but all of the 12-person seminars are intended to help new students cultivate intellectual curiosity, develop critical thinking skills, encourage meaningful civil exchange among students across disciplinary interests, and foster faculty-student interaction.

FYS courses, numbered AS.001.xxx, are graded S/U and may also count towards a University distribution requirement assuming the course carries an area designator. They are not designated writing intensive. After enrolling in an FYS, students may not drop their FYS without adding a different one. Students who earn a U grade in their FYS or switch to AS from EN after the add period ends in the fall of their first-year must take a 19-person or small seminar in a later semester. These courses must be offered by KSAS and carry an area designator of H or S.

The second foundation requirement is the completion of Reintroduction to Writing (AS.004.101). This introductory level writing course is designed to help students with a foundation of academic writing, as well as to provide a rhetorical framework for adapting their writing skills to future contexts, audiences, and genres. The courses will share certain features, but each section will have its own distinct theme and assignments. This course must be taken for a letter grade and passed with a C- or higher.

Transfer Students:

All KSAS transfer students will be required to take at JHU a 19-person or smaller seminar in lieu of a FYS. These courses must be offered by KSAS and carry an area designator of H or S and can be identified in one of two ways:

1) A course that has only one section and the seat limit is 19 or less.

2) A course that has multiple sections, each section seat limit is 19 or less, and the sections never meet combined into a larger lecture course.

Students may take the seminar either for a letter grade or graded S/U. The course additionally may fulfill a writing, distribution, or major or minor requirements (excluding Reintroduction to Writing). If also intended to be used to fulfill a writing requirement, the seminar must be taken for a letter grade.

Like first-year students, transfer students must complete a Retrointroduction to Writing (AS.004.101) course and they are strongly encouraged to complete this requirement in their first semester at JHU. This course must be taken for a letter grade and passed with a C- or higher. Transfer students who wish to have a similar writing course from a prior institution reviewed to serve as a substitution for this course should speak to the University Writing Program. To ensure remaining seat availability in the course at JHU, students must request this review prior to transfer student registration day in the summer.

Student Status

Contact Information

All matriculated students are required to have on record with the university accurate local and permanent contact information at all times and may be subject to a registration hold if this information is missing. This includes local address, local telephone number, and valid JHU e-mail address. Parent or legal guardian emergency contact information also must be on record and updated as necessary. This information should be maintained with the Registrar's Office by using SIS for Students (https://sis.jhu.edu/sswf/).

Student Classification (Year of Study)

Student classification refers to the familiar names for the four undergraduate years: freshman, sophomore, junior, and senior. A student's classification is generally determined by the academic year in which the student's cohort began the first year of college. In the first year, students in the cohort are designated freshmen. For students transferring into the university, an official student classification will be assigned by the respective advising office after completion of a final transfer credit evaluation. The number of credits a student has earned does not determine class standing. A student who graduates after three years would graduate as a junior.

For students who have been on leave and missed two or more semesters, classification will be determined by the student's academic advising office when the student returns to the university. If, for example, a student was on leave of absence for an entire academic year, the advising office may assign the student to a cohort one year behind the student's original cohort.

Students are required to register with their cohort, not on the basis of total credits or expected date of graduation. Plans to graduate early are not grounds for registering before a student's cohort. If a student who intends to graduate early is closed out of a required course for the major, the student may petition the department offering the course for approval to add the course. The decision rests with the department.

Full-Time Student Status

Undergraduate students at Johns Hopkins University must be registered for a minimum of 12 credits each semester, unless a student has an approved reduced-course load accommodation through Student Disability Services.

Part-Time Student Status

Students who have not completed degree requirements after eight full-time semesters (or four full-time semesters for transfer students) may register for fewer than 12 credits and pay for courses on a per credit basis with approval of the student's academic advising office. Prior to a ninth semester, a student may not enroll for fewer than 12 credits.

Leaves of Absence

Leaves of absence are granted for specific periods, generally up to one year, and such leaves are regarded as approved interruptions of a student's program. No tuition or fees are charged while on leave. If applicable, students should consult with the Office of Financial Aid prior to requesting a leave of absence. Students may not be eligible for health benefits if enrolled through JHU's Student Health Benefits. For more information, visit https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/ and/or https://finaid.jhu.edu/.

Types of Leaves of Absence

STANDARD LEAVE OF ABSENCE

Students may be granted a standard leave of absence with the approval of the academic advising office for the student's school. Examples of reasons for a standard leave of absence include: military service (foreign or domestic), full-time internships preventing enrollment in courses, or missionary work. The deadline to request a standard leave of absence is the last day to drop classes. Students should contact their respective advising office for directions on how to request a standard leave. During a standard leave of absence, students may not enroll in another institution for the purpose of transferring credits back to JHU.

Students who fail to return to the university when expected will be considered to have withdrawn from the university.

EMERGENCY LEAVE OF ABSENCE

Students may be granted an emergency leave of absence for the purpose of dealing with a personal situation that impacts a student's ability to remain on campus and complete the semester. Examples of situations that might necessitate an emergency leave of absence include: the death of a family member, the need to serve as a caregiver for a family member, or other family emergencies. Students experiencing their own physical or mental health issues should refer to the medical leave of absence option. These emergency leaves are reviewed by the student's respective academic advising office and Student Outreach & Support in the Office of the Dean of Student Life (https://studentaffairs.jhu.edu/student-life/case-management/). During an emergency leave of absence, students may not enroll in another institution for the purpose of transferring credits back to JHU.

MEDICAL LEAVE OF ABSENCE (PHYSICAL OR MENTAL HEALTH)

Students may be granted a medical leave of absence to address their own physical or mental health concerns with the approval of Student Outreach & Support in the Office of the Dean of Student Life (https://studentaffairs.jhu.edu/student-life/case-management/). No tuition or fees are charged while on leave. Students on a medical leave of absence may request permission to take up to two courses totaling 8 credits or less at another institution while on leave. These courses must be pre-approved by following the directions of each school and the restriction of a total of 12 transfer credits remains. Students interested in taking courses while on medical leave of absence should contact KSAS Advising or WSE Advising. Further details are available from Student Outreach & Support on the Medical Leave of Absence website. (https://studentaffairs.jhu.edu/student-life/case-management/medical-leave-absence/)

Note for Peabody Double Degree Students

Peabody double degree students may request a leave of absence from the double degree program, however they cannot be granted a leave of absence from only one portion (Homewood or Peabody) of the program. A double degree student's leave of absence is subject to the guidelines of their respective academic advising office on the Homewood campus.

Withdrawal from the University

A student who wishes to withdraw from the university with no intent to return should consult with their respective academic advising office in order to submit an official notification. An official notification of withdrawal consists of a letter providing brief reason for withdrawal and effective date. The tuition refund schedule is posted on the Students Accounts website (https://studentaffairs.jhu.edu/student-accounts/tuition-fees/).

The academic advising office will inform the Office of the Homewood Registrar, who will circulate the notification to other relevant campus offices, such as Student Accounts, Community Living, Office of Financial Services, Office of International Services, etc.

An enrolled student who leaves the university without notice, or who fails to register by the end of the second week of the semester, may be considered to have withdrawn from the university.

A student who transfers to another institution is automatically considered to have withdrawn from JHU.

In the rare situation where a withdrawn student wishes to return to the university, the student must submit a written request for readmission to their respective advising office for evaluation. Neither readmission nor transfer of credits is guaranteed. A student must be formally readmitted before registering for courses. Readmitted students do not pay another matriculation fee.

A student who wishes to withdraw from the university on a temporary basis and intends to return in a future semester should see the information under Leaves of Absence (p. 1592).

Peabody Double Degree Students

Information about withdrawing from one or both of a student's degree programs is available on the Peabody Double Degree page (p. 808).

Combined Bachelors/Masters Programs

Many departments, institutes, and centers offer undergraduates the opportunity to complete some of the requirements for a master's degree while simultaneously completing requirements for a bachelor's degree. These programs offer early admission to a graduate program, and may enable a student to complete both bachelor's and master's degrees in four years. Other programs are considered five-year programs.

Students in the School of Arts and Sciences or the School of Engineering must be accepted into a combined program no later than the first semester of their senior year, however departments may set an earlier application deadline. Students in a combined program are considered to be full-time students, and are charged full tuition.

Students in a combined program are considered to be graduate students

1. upon completion of undergraduate degree requirements, **or**
2. upon completion of eight full-time semesters as an undergraduate student.

Clearance from a student's respective department is also required.

Additional information about combined programs is available at https://engineering.jhu.edu/academics/combined-bachelors-masters/ and http://homewoodgrad.jhu.edu/academics/combinedconcurrent-bachelors-masters-policies/.

Taking a Course as an Alumnus

JHU alumni who completed their bachelors degree through the Krieger School of Arts and Sciences or the Whiting School of Engineering may take additional courses in those divisions with permission of the advising office of the school from which they graduated. Students should contact the advising office of the school from which they graduated for registration directions. Courses, grades, and credits will appear on a new academic record. Students must follow the rules for earning a second major or a minor after graduating, if applicable.

Students who graduate in fewer than eight semesters may also take courses after graduation as a full-time or part-time student if not completing an additional major or minor. Students who graduate early lose the opportunity to complete additional majors or minors after graduation.

Students should seek assistance of their respective advising office in order to register for a course after graduation.

Finishing a Second Major or a Minor after Graduating

Students who have completed eight or more undergraduate semesters may take an additional course or two after graduation to complete a second major or minor if they have filed an approved plan with their respective advising office *before* their initial graduation date. The courses, grades, and credits will appear on a new academic record. A notation indicating the additional major or minor will be added to the new academic record, but a new diploma will not be issued. Students must notify their respective academic advising office when additional courses taken after graduation satisfy another major or minor.

A plan consists of the following:

1. Written approval from the director of undergraduate studies for the additional major/minor;
2. Description of the remaining requirement(s) to be completed. No more than two courses may be needed and these courses must be completed within one year of a student's initial graduation date;
3. Brief summary of why it is necessary for the student to have their degree conferred before completion of all planned majors or minors; and,

4. Final approval of a plan must be obtained from the student's respective advising office.

Second Degrees

Krieger School of Arts and Sciences and Whiting School of Engineering undergraduate-degree alumni who wish to earn a second bachelor's degree at Hopkins must contact their advising office. Students who receive approval must have already completed the requirements for the first bachelor's degree and complete an additional 60 credits at Hopkins beyond what they have done for the first degree. Alumni must request permission to pursue a second bachelor's degree within ten years of the conferral of the first bachelor's degree. The second bachelor's degree must be completed within ten years from the starting date of the second bachelor's degree.

Registration Policies

Advising and Registration Periods

All students are required to meet with an advisor for each declared major prior to registering for the fall and spring semesters. Advisor alert(s) for each declared major are placed on all students' records in SIS well in advance of the registration period; the alert(s) must be released by the advisor(s) to permit the student to register.

In the School of Arts and Sciences, freshman, first-semester transfer students, and undeclared students meet with their academic advisor beginning six weeks in advance of the registration period. Students with declared majors should contact their faculty advisor to schedule a meeting prior to their registration date.

In the School of Engineering, students meet with their faculty advisors during Engineering Advising Week (early November for spring registration, and early April for fall registration).

Undergraduates register for Spring semester in November, for Intersession in December, for Summer in March, and for Fall semester in April.

Schedule Verification

Students are responsible for verifying their schedules in SIS. Students are encouraged to retain a copy of their schedule for their records. In addition, students are advised to check their schedules after performing online registration changes (adding and/or dropping courses) to ensure accuracy.

Students should review their schedule prior to the add, drop, and withdrawal deadlines. Changes to a student's schedule will not be approved after these deadlines have passed. Failure to review and retain a copy of their registration confirmation will not be considered grounds for approving exceptions to these deadlines.

Intersession and Summer Special Registration Information

Summer and Intersession opportunities, such as JHU-sponsored study abroad courses and career exploration courses, may have special registration deadlines, fees, and procedures. Please see the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites for additional information.

Intersession is a period in January for students and faculty to participate in a variety of courses and activities that are offered for credit, and for non-credit. These offerings are designed to enrich the intellectual and social life of the campus. Registration in Intersession is optional.

For Intersession academic exploration courses, the tuition cost of Homewood KSAS and WSE courses is free to undergraduates who were enrolled full-time in the previous fall semester (including approved study abroad); part-time students must pay tuition. All students must pay relevant fees. Students who are returning from a leave of absence may register for Intersession if they pay tuition per credit hour. Students who register for Hopkins Intersession courses outside of KSAS/WSE are subject to tuition charges determined by the individual school.

Summer courses at JHU are primarily offered during two five-week terms. Some courses run on alternative schedules and may, therefore, have different deadlines. Courses are sponsored by the same academic departments that oversee the university's full-time degree programs. They are designed to reproduce, as closely as possible, similar courses offered during the spring and fall semesters. Tuition charges, and deadline dates, are published on the Summer Programs (https://summerprograms.jhu.edu/) website. Students who register for Hopkins Summer courses outside of KSAS/WSE are subject to tuition charges determined by the individual school.

Late Registration Fees

Registration in the School of Arts and Sciences and the School of Engineering is not permitted after the end of the second week of the semester, except in extraordinary circumstances as approved by the Assistant Dean in their respective academic advising office. The university provides financing alternatives that permit students to register in most financial situations. Visit https://finaid.jhu.edu/ for information on financial support programs offered at JHU.

Students who for any reason do not complete their registration until after the prescribed registration period may be required to pay a late registration fee.

For late registration fees in the Summer, please see the Summer Programs (https://summerprograms.jhu.edu/) website.

Adding a Course

During the fall and spring semesters, students may add a course until the end of the second week of classes and pay no fees to add courses. During this time students may add courses without written approval, unless the course is filled or will cause a credit overload. If the course will cause a credit overload, Arts and Sciences students need approval from the Arts and Sciences Advising Office, while Engineering students will need the approval of their faculty advisor and the approval of the Engineering Advising Office. Approvals for credit overloads can be processed in the SIS by the student's respective advising office which will enable students to add the course(s) online.

An instructor's signature is required to add a course that is filled. By the end of the second week of classes, students should have the schedule they want to keep. As an exception to this policy, students may enroll in Independent Study, Independent Research, Thesis, and/or Internship until the end of the sixth week of the semester.

For fall and spring courses that are scheduled for less than the full semester, the last day to add will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://

studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites.

When adding courses in other JHU divisions, or at schools in the Baltimore Student Exchange Program (BSEP), students must follow the deadlines set by the host school or division. In the School of Public Health, the add deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Dropping a Course

Courses may be dropped from the student's record until the end of the sixth week of the semester, provided that the student remains registered for a minimum of 12 credits. For engineering students, faculty advisor approval is required to drop a course after the second week of classes.

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to drop a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

For fall and spring courses that are scheduled for less than the full semester, the last day to drop will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summer.jhu.edu/intersession/) or Summer (https://summer.jhu.edu/) Programs websites.

When dropping courses in other JHU divisions or at schools in the Baltimore Student Exchange Program (BSEP), undergraduates must follow the deadlines set by the host school or division. In the School of Public Health, the drop deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Withdrawing from a Course

After the end of the sixth week and until the end of the eleventh week, a student may withdraw from a course with a W on their academic record. A record of the course will remain on the academic record with a W appearing in the grade column to indicate that the student registered and then withdrew from the course. Students are not allowed to withdraw from a course after the end of the eleventh week of the semester. Course withdrawals must be conducted in person at the Office of the Homewood Registrar using an add/drop form. Engineering students need the signature of their faculty advisor on the add/drop form. No signature is required for Arts and Sciences students to withdraw from a course when the student remains able to earn a minimum of 12 credits.

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to withdraw from a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Even with approval, withdrawing from a course may adversely affect a student's academic standing and/or financial aid satisfactory academic progress, and students should discuss these topics with the respective offices prior to submitting signed add/drop forms to the Office of the Homewood Registrar.

For fall and spring courses that are scheduled for less than the full semester, the last day to withdraw will vary based upon course length and start date. Please see the Homewood Registrar's Office (https://studentaffairs.jhu.edu/registrar/students/registration/) website for details. For Intersession and Summer deadlines, please refer to the Intersession (https://summerprograms.jhu.edu/program/intersession-program/) or Summer (https://summerprograms.jhu.edu/) Programs websites.

When withdrawing from courses in other JHU divisions or at schools in the Baltimore Student Exchange Program (BSEP), undergraduates must follow the deadlines set by the host school or division. In the School of Public Health, the withdrawal deadlines are based on the quarter system, not the semester system that is used in other JHU divisions. Interdivisional Registration information is located at https://registrar.jhu.edu/idr/

Full-Time Student Status

Undergraduate students at Johns Hopkins University must be registered for a minimum of 12 credits each semester, unless a student has an approved reduced-course load accommodation through Student Disability Services. Students with reduced course load accommodations approved through the Student Disability Services Office should refer to their website (https://studentaffairs.jhu.edu/disabilities/) for additional information.

Part-Time Student Status

Students who have not completed degree requirements after eight full-time semesters may register for less than 12 credits and pay for courses on a per credit basis with the permission of their respective academic advising office. Prior to a ninth semester, a student may not enroll for fewer than 12 credits.

University Credit Hour Definition

JHU defines a credit hour as a reasonable approximation of the student learning outcome equivalency of an amount of work represented in intended learning outcomes and verified by evidence of student achievement that reasonably approximates not less than, at a minimum, the federal definition:

- One hour of classroom or direct faculty instruction and a minimum of two hours of out-of-class student work each week for approximately 15 weeks for one semester or trimester hour of credit, or 10 to 12 weeks for one quarter hour of credit, or the equivalent amount of work over a different amount of time; or
- At least an equivalent amount of work as required in paragraph (1) of this definition for other academic activities as established by the institution, including laboratory work, internships, practica, studio work, and other academic work leading to the award of credit hours.

Changes to this definition can be found in University Policies (https://policies.jhu.edu/doc/fetch.cfm/jhiiy1jH/). (https://www.jhu.edu/

university-policies/) Graduate-level courses completed by undergraduates are generally awarded the same number of credits as an upper-level undergraduate course (3 credits).

Fall and Spring Semester Credit Requirements and Limits

For Arts and Sciences (AS) students, the average course load is 15 credits per semester for eight semesters. AS freshmen are limited to 17 credits, while AS upperclassmen are limited to 18.5 credits.

For Engineering (EN) students, the standard load is 16-18 credits. EN freshmen are limited to 18 credits (18.5 if including a foreign language), while EN upperclassmen are limited to 19.5 credits.

Peabody Double Degree students are permitted to enroll in a maximum of 25 credits per semester.

Undergraduate students must be registered for a minimum of 12 credits throughout the fall and spring semesters. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Intersession and Summer Credit Limits

Students may take a maximum of 3 credits during Intersession.

During the Summer, students may take a maximum of 14 credits total, with a limit of 7 credits per session.

Exceptions to These Credit Limits

Unless a student is authorized by the Office of Student Disability Services for reduced course load, any request to drop or withdraw from a course that would result in the student being unable to earn a minimum of 12 credits in a fall or spring semester requires a signature from their respective academic advising office. Students who are authorized for reduced course load through the Office of Student Disability Services require approval from that office.

Credit overloads for Arts and Sciences students require approval from AS Academic Advising, and must meet one of the following criteria:

- Seniors in their eighth semester
- Upperclassmen who made Dean's List in the prior semester

Credit overloads for Engineering students are approved on a case-by-case basis, and require Faculty Advisor's signature, then final approval by the EN Advising Office, with review of the student's recent academic performance is a factor in the decision. First-semester EN freshmen are not granted credit overloads.

Restrictions

Registration Alerts

Registration alerts may be applied to student records for a variety of reasons, such as outstanding financial obligations, insurance and health clearances, academic standing, and missing emergency contact information. A student whose registration has been placed on hold for a non-academic reason must obtain clearance from the office or offices that placed the hold on registration. Transcripts will not be released for students with unpaid balances.

Students who have three or more incomplete grades from the previous semester may have a hold placed on registration activity. The student must have approval from their respective advising office to register, add, or drop.

Retaking A Course

Students may retake a course to absolve a grade of C+ or lower. The grade for the second attempt and the associated credits are recorded on the transcript and are calculated into the GPA. The original grade remains along with the notation "R" to indicate the course was retaken, and the original grade does not affect grade point calculations, nor does it carry credit toward graduation. Only the grade in the retaken course accrues credit and applies to the GPA, even when the retaken grade is lower than the original grade. However, if a student drops or withdraws from the subsequent attempt the original grade is calculated into the GPA. A student may retake one course without written permission. Taking the same course a third time or retaking a different course requires written permission of the student's respective academic advising office.

A course originally taken for a letter grade must be retaken for a letter grade. A course taken under the Satisfactory/Unsatisfactory grading option must be retaken under the Satisfactory/Unsatisfactory grading option.

To absolve a grade, the same course must be taken at Hopkins, not at another college or university. In situations where the same course is no longer offered, students may be able to absolve a grade in one of two ways:

1. by repeating a course of comparable content and level, or
2. as an independent study

Both of these options require approval of the department and/or instructor responsible for the course, and the student's respective academic advising office.

Approval for course retake can be processed in the SIS by the student's respective advising office which will enable students to add the course(s) online.

Special Retake Rules Related to Spring 2020, Fall 2020, and Spring 2021.

Due to the COVID-19 pandemic, there were special grading policies in effect during Spring 2020, Fall 2020, and Spring 2021 semester. Students who want to retake a course that was taken in one of those three semesters should refer to the chart below for adjusted retake rules.

Other Restrictions on Absolving a Grade

Grades may not be absolved by retaking a course after graduation.

Grades assigned by the Ethics Board due to an academic ethics violation may not be removed from the academic record by retaking the course.

Prohibition on Registering for Courses that Meet at the Same Time

Registering for two classes that meet at the same time or at overlapping times is not permitted, except as a temporary measure during the first two weeks of the semester when students are still deciding on which classes to take. By the end of the first two weeks of classes, students must resolve time conflicts in their schedules. Students receive a warning about time conflicts during the self-service registration process. Conflicts can be resolved as follows:

- Student must drop one of the conflicting courses by the end of week two of the current semester.

- For any exceptions, student must reach an agreement with the faculty of both conflicting courses. The approval must be documented in student records. Approvals can be submitted via SEAM case management system by student.

If the student does not resolve the conflict, they will be administratively dropped from one of their conflicting courses the 3rd week of the classes of the current term without any further notice. The course which was added later will be subject to this action.

Restrictions on Equivalent Courses and Courses Taken Out of Sequence

Courses that are sequential in nature, e.g., elementary, intermediate, and advanced language courses, or the Calculus sequence, must be taken in their proper order. One exception to this policy is that AS.210.301 Advanced French for Writing and AS.210.302 Advanced French for Speaking may be taken in reverse order with permission of the department.

Credit will be awarded only once for equivalent courses covering the same material. Examples of equivalent courses are Intermediate French and Advanced Intermediate French, and AP Calc AB and Calculus I. This restriction does not apply to the Expository Writing course which may be taken twice. Be aware that departments may change course numbering or titles without changing the course content. Students who believe that they have registered for an equivalent course should consult with their academic advising office. This rules applies to courses offered by either KSAS or WSE, courses at other JHU schools, and courses transferred from other institutions.

The following restrictions apply to overlapping and the sequencing of courses in the Mathematics, and the Applied Mathematics and Statistics Departments:

- Students who earn credit for AS.110.201 Linear Algebra cannot receive credit for the combined course EN.553.291 Linear Algebra and Differential Equations or for the course. AS.110.212 Honors Linear Algebra.
- Students who earn credit for AS.110.405 Real Analysis I cannot receive credit for AS.110.415 Honors Analysis I
- Students who earn credit for AS.110.406 Real Analysis II cannot receive credit for AS.110.416 Honors Analysis II
- Students who earn credit for AS.110.302 Differential Equations and Applications cannot receive credit for EN.553.291 Linear Algebra and Differential Equations.
- Students who earn credit for AS.110.202 Calculus III cannot receive credit for AS.110.211 Honors Multivariable Calculus.
- Students who earn credit for AS.110.311 Methods of Complex Analysis cannot receive credit for AS.110.407 Honors Complex Analysis.
- A student who earns credit in EN.553.291 Linear Algebra and Differential Equations may receive credit for further study of linear algebra or differential equations by enrolling for independent study. Normally students will earn 2 credits for such an independent study, but the number of credits may vary and is to be decided by the faculty sponsor. These students may not earn credit for AS.110.302 Differential Equations and Applications, AS.110.201 Linear Algebra, nor AS.110.212 Honors Linear Algebra.
- Students who earn credit for EN.553.426 Introduction to Stochastic Processes cannot receive credit for EN.553.427 Stochastic Processes and Applications to Finance.

The following restrictions apply courses in the Economics Department:

- Students who earn credit for AS.180.301 Microeconomic Theory may not earn credit for AS.180.401 (when offered).
- Students who earn credit for AS.180.334 Econometrics may not earn credit for AS.180.434 Advanced Econometrics.

Policy on Statistics Courses Sequencing

Undergraduate students at the Homewood Schools of Johns Hopkins University enjoy a wide selection of courses on statistics; however, it is not allowable for a student to be awarded credit for two courses that cover essentially the same material. Likewise, it is not allowable for a student to receive credit for a more basic course after having received credit for a more advanced course in the same subject.

Our statistics courses fall into one of the following four categories, listed in increasing level of sophistication:

1. Non-calculus based, basic (p. 1597)
2. Non-calculus based, intermediate (p. 1597)
3. Calculus based, intermediate (p. 1597)
4. Calculus based, advanced (p. 1598)

A student may take at most one course (or course sequence) from within one of these categories. A student may not take a course in a lower numbered category after having taken a course in a higher numbered category.

Some departments may require their undergraduate majors to take specific statistics courses, however, all students are precluded from receiving credit for two courses that have much the same content, though they may have different emphases. This policy does not imply that a course in one of the above categories may be substituted for another course.

The list below shows the courses and sequences that are allocated to these categories. Examples:

- A student may take EN.553.111 Statistical Analysis I but then may not subsequently take AS.230.205 Introduction to Social Statistics.
- A student who has taken EN.553.310 Probability & Statistics for the Physical Sciences & Engineering may not also take EN.553.311 Probability and Statistics for the Biological Sciences and Engineering or any of the courses in the first two categories.

Category 1: (Non-calculus based, basic course)

Code	Title	Credits
EN.553.111	Statistical Analysis I	4
AS.230.205	Introduction to Social Statistics	4
AP Statistics		

Category 2: (Non-calculus based, intermediate course)

Code	Title	Credits
EN.553.211	Probability and Statistics for the Life Sciences	4
EN.553.230	Introduction to Biostatistics	4
AS.280.345	Public Health Biostatistics	4

Category 3: (Calculus-based, intermediate course)

Code	Title	Credits
EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	4

or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	

Category 4: (Calculus-based, advanced course)

Code	Title	Credits
EN.553.420 & EN.553.430	Introduction to Probability and Introduction to Statistics	4

Some courses do not fall into one of the four categories:

- EN.553.413 Applied Statistics and Data Analysis This course is mostly independent of the other probability/statistics courses, but subsumes enough of the non-calculus, basic course material such that no Category 1 course may be taken after EN.553.413 Applied Statistics and Data Analysis.
- EN.553.112 Statistical Analysis II may be taken after any category 1, 2, or 3 course. However, the preferable sequence is EN.553.111 Statistical Analysis I-EN.553.112 Statistical Analysis II.
- AS.200.200 Research Methods in Psychology and AS.200.201 Design & Statistical Analysis for Psychology comprise a two-semester research methods sequence required of the Psychology major. While the courses introduce some statistical methods, they are not subject to the sequencing restrictions. Students who have completed these courses who wish to continue in statistics should consider a course in category 2 or higher.

Equivalent Statistics Courses

The courses EN.553.310 Probability & Statistics for the Physical Sciences & Engineering and EN.553.311 Probability and Statistics for the Biological Sciences and Engineering are considered equivalent to each other and can be used interchangeably. In accordance with the course retake policy, a grade in one may be absolved by the opposite course.

Important Note About Credit and Grades for Language Courses

Students must take the language elements (or beginning/first year) courses for a letter grade.

Students in the School of Arts and Sciences do not receive an area designation for these elements (beginning/first-year) courses.

Students in the School of Engineering can substitute language elements (or beginning/first-year) courses for humanities courses in meeting the distribution requirement.

Instructor's Permission

Most graduate (600-level and above) courses in the School of Arts and Sciences and the School of Engineering offered in the graduate divisions of the university require undergraduates to obtain permission to register. If permission is required, engineering students need permission from the instructor and their faculty advisor. Arts and Sciences students require permission of the instructor. If online enrollment is not available, students must use an add/drop form to secure the appropriate permissions.

Auditing a Course

Undergraduate students may not audit a course. By the end of the add period, a student may only attend or participate in courses for which they are enrolled.

Registering for Independent Academic Work

Independent Academic Work is the collective term used to encompass independent study, research, and academic internships. Independent study means a program of study and reading under the tutelage of a faculty member. Academic credit for independent study is based on work equivalent to class-based courses. Research involves planning and conducting experiments, collection and analysis of data, and the reporting of results. Academic internships are practical work experiences which have an academic component as certified by a member of the faculty.

All forms of independent academic work require early planning with a faculty sponsor. To receive academic credit, the independent academic work must include activity, exercise, and/or product that can be evaluated by a member of the AS/EN faculty whose field of expertise is closely enough related to the work for the faculty sponsor to competently evaluate the work, and certify that it merits academic credit.

Academic credit for independent academic work must be sponsored by a full-time member of the Homewood faculty. This is the case whether the work is done on-campus or off-campus. The work supervisor and the faculty sponsor may be the same individual. If the faculty sponsor is not the work supervisor, the work supervisor must provide the faculty sponsor with a report on the student’s achievements while doing the independent project, and the faculty member must certify how much academic credit the project merits.

Students who wish to pursue independent academic work begin by discussing their ideas with an appropriate faculty sponsor. That discussion must focus on what type of project the student envisions, and what possibilities for academic credit the faculty member envisions. If the student and faculty member agree on the type of project and its academic value, then the student should find a suitable research or work environment for the project.

- No more than three credits may be earned for independent study or research in one semester or summer (sessions I and II combined); only one credit may be earned for an academic internship during one semester or summer.
- No more than 6 credits of any type of independent academic work may be earned in one academic year (see exception for students graduating in their eighth semester or later). The academic year begins with the first summer session and ends at the conclusion of the spring semester.
- Independent work done for academic credit may be paid or unpaid. Credits for research and independent study vary from 1-3 credits, and may be graded with either letter grades (A, B, etc.) or Satisfactory/ Unsatisfactory. Each credit hour should reflect 40 hours of work on the project.
- Credit for an internship is limited to 1 credit, and the grading method is Satisfactory/ Unsatisfactory only.
- Students must register for independent academic work by the end of the sixth week of the semester. Students must adhere to the registration and add/drop deadlines during Intersession, and Summer. In the rare circumstance that a student must change the number of independent academic work credit for which they are registered, the deadline for these changes aligns with the deadline to withdraw from a course. The typical minimum and maximum credit limits must be observed.

Although academic credit is awarded for independent academic work, area designations are not assigned and the credit may not be used to satisfy the distribution requirement. All courses registration at the 500-level, which is by definition undergraduate independent academic work, except for courses that are Honors Thesis and the Senior Essay in English, are not allowed to be writing intensive. The use of credit for independent academic work to satisfy the requirements of a major or minor is subject to prior written approval by the appropriate department or program.

Additional policy information can be found in the Credit Hour Policy (https://policies.jhu.edu/doc/fetch.cfm/jhiiy1jH/).

Language Courses at the School of Advanced International Studies

Course credit, normally between 3 to 5 credits, will be awarded to AS and EN undergraduate students for the following language courses offered by the School of Advanced International Studies (SAIS) in accordance to the University's credit hour policy and in strict adherence to the hours of instruction scheduled: Burmese, Indonesian, Persian, Russian, Thai, and Vietnamese. Supplemental language tutorials will not be included in the course credit calculations.

Registering for Courses in Other JHU Divisions During the Fall and Spring Semesters

Qualified undergraduates may take courses at other divisions of the university as long as the student has not previously earned credit for the content of the course. Students submit an Interdivisional Registration (IDR) form, which is available in the Homewood Registrar's Office, in the Office of Academic Advising, or in the Office of Engineering Advising. Courses taken at other JHU divisions must be taken for a letter grade, unless the course at the host division is offered on an S/U basis only. Approval(s) are required for all AS/EN students as indicated on the IDR form. All students must meet the course requirements as defined by the host division. Additional IDR information is located at https://registrar.jhu.edu/idr/.

Peabody Institute

Peabody Conservatory offers courses that must be taken for grade and credit. Homewood undergraduates who are not enrolled in either the Homewood-based music minor or the Peabody Double Degree program may take only one nonperformance course per semester at the Conservatory, and may also take one performance course concurrently with the approval of the student's respective academic advising office. Performance courses will receive 1 credit per semester unless taken as part of the Peabody Double Degree program.

Students may take private lessons at Peabody. Information is located at https://peabody.jhu.edu/preparatory/registration-financial-aid/placement-information/.

The Conservatory schedule and deadlines can differ from those at Homewood. Students taking courses and lessons at the Conservatory must check these dates in the Peabody schedule of courses located at https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/. Visit https://peabody.jhu.edu/academics/peabody-at-homewood/ for additional information about taking lessons at the Conservatory.

The Carey Business School and The School of Education

Students may register for approved courses in these two schools on a case-by-case basis. In order to register in the Carey Business School or the School of Education, students in Arts and Sciences and Engineering programs should use the Interdivisional Registration Form, available from the Homewood Registrar's Office (https://support.sis.jhu.edu/case-home/), which requires permission of their academic advisor and the appropriate school program director or advisor. Students declared in the Carey Business minor for undergraduates may register for the required courses of the minor through SIS. Courses must be taken for a grade. Note that the Carey Business School and the School of Education students have priority in registering for these schools' courses.

School of Medicine and Bloomberg School of Public Health

Undergraduates may register for courses in the School of Medicine and/or the Bloomberg School of Public Health with the approval of the faculty advisor, the course instructor, and the student's academic advising office. Students must have an adequate background for the courses, and courses must be taken for a grade. Public Health Studies majors taking courses at the Bloomberg School of Public Health require only the Public Health faculty advisor's approval signature and can register for courses through SIS.

Registering for Courses at Other JHU Divisions During the Summer

Degree-seeking students are permitted to IDR enroll during the summer term(s). Students must meet designated course prerequisites and/or be otherwise qualified for the desired course(s) at the following JHU divisions:

- Advanced Academic Programs (AAP) division of the Krieger School of Arts and Sciences
- Bloomberg School of Public Health (excluding offerings through the Summer Institute)
- Engineering for Professionals (EP) division of the Whiting School of Engineering
- Peabody Institute (permission required from Peabody Associate Dean for Academic Affairs)
- School of Advanced International Studies
- School of Education
- School of Medicine

Students should register using the IDR form (https://support.sis.jhu.edu/case-home/), and pay for the course at their home division. The course, along with credits and grade, will appear of the student's home division transcript. Approval from both the home and host divisions is required to ensure that the interdivisional enrollment is appropriate for the student's degree. Summer courses in other divisions must be taken for a grade.

IDR enrollment is not available during the summer term(s) at the Carey Business School, nor the School of Nursing. Students seeking enrollment at either of these schools should pursue enrollment directly with the respective school. In order to ensure a course will transfer to the student's undergraduate academic record, students should follow the transfer credit pre-approval directions available from their advising office.

Registering for Courses through the Baltimore Student Exchange Program (BSEP)

Beginning sophomore year, undergraduates may take one course per semester (fall/spring only) at one of the several area colleges and universities that comprise BSEP. This program includes the following colleges in the Baltimore area: Community Colleges of Baltimore County, Coppin State University, Goucher College, Loyola University Maryland, Maryland Institute College of Art, Morgan State University, Notre Dame of Maryland University, Stevenson University, Towson University, University of Baltimore, and University of Maryland Baltimore County.

Students who have received Air Force ROTC scholarships will register for the required ROTC courses at the University of Maryland College Park using the BSEP institution registration process described in this section.

Courses that are equivalent to those offered at the Homewood campus may not be taken through BSEP. Students register by submitting the BSEP registration form to the Homewood Registrar (https://support.sis.jhu.edu/case-home/). This form is available on the BSEP website (https://baltimorecollegetown.org/colleges/cross-registration/). The faculty advisor's approval is required for all courses. An academic advisor from the student's respective advising office must also approve the form. Submit completed registration materials to the Homewood Office of the Registrar (https://support.sis.jhu.edu/case-home/).

Prior to the start of classes at the host institution, students may report to the host school's registrar for additional assistance (for example, campus maps or id cards). JHU students enrolled through BSEP are not required to complete registration forms at the host institution, and no academic record is established at the host institution. There is no additional fee or tuition charge for courses taken through the BSEP program, except when the host school charges a laboratory or materials fee. In that event, the student pays the fee directly to the host institution.

Courses at these schools must be taken for letter grades. Both grades and credits appear on the Hopkins academic record along with an indication of where the courses were taken. The grades are included in calculations of the grade point average.

Independent undergraduate work, special tutorials, or private study types of courses that consume a large portion of faculty time are generally not included in the BSEP program, nor are weekend or evening courses offered through continuing educational studies programs.

Cooperative Education in Engineering

Engineering students may participate in government or industry-based cooperative education programs. Students who have received an offer from an employer should contact the Engineering Advising Office at 410-516-7395 or wseadvising@jhu.edu.

ROTC

Enrollment in the Johns Hopkins University Department of Military Science ROTC Program prepares students for full- and part-time careers in the U.S. Army and its Reserve Forces, as well as providing leadership and management skills valuable in any profession. Freshmen interested in finding out about the military profession should enroll in a Military Science course. Contact the professor of military science at 410-516-4685 for enrollment procedures and scholarship information. Visithttps://krieger.jhu.edu/rotc/ and https://e-nextcatalog.jhu.edu/arts-sciences/full-time-residential-programs/degree-programs/military-science/ (p. 1970) for additional information.

Final Examination Schedule for Fall and Spring Semesters

The Office of the Homewood Registrar establishes the final examination schedule. In rare cases, the official final exam schedule available on the Homewood Registrar's website may slot three final exams on one day for a student. Students should contact their respective academic advising office for assistance in these instances.

Instructors may administer final examinations only at the officially scheduled time, not during class time or during the reading period. Take-home final examinations, and other final exercises (such as papers) that are expected to be prepared for and completed after classes have concluded are due at the end of scheduled in-class final examination time for the course. All other papers can be due at any deadline during the semester set by the professor, including the reading and final examination periods.

Students who are concerned that any of these policies are being violated by their instructors should notify their respective academic advising office.

The final exam schedule (https://studentaffairs.jhu.edu/registrar/students/course-schedule/) is posted on the Office of the Homewood Registrar's website.

Grading Policies

Grades are submitted to the Homewood Registrar at the end of the semester. Grades can be viewed online by students in SIS. Students may designate authorized users to view final course grades in SIS.

Grades and Grade Point Average Points

Each grade corresponds to a numerical grade point equivalent to allow the computation of a grade point average. S and U grades have no effect on grade point average. The grades and their grade point equivalents are as follows:

Grade	Performance	GPA Points
A+	Excellent	4.0
A	Excellent	4.0
A-	Excellent	3.7
B+	Good	3.3
B	Good	3.0
B-	Good	2.7
C+	Satisfactory	2.3
C	Satisfactory	2.0
C-	Satisfactory	1.7
D+	Passing	1.3
D	Passing	1.0
F	Failure	0.0
S	Satisfactory (C- and above)	N/A
U	Unsatisfactory (D+ and below)	N/A

Other marks are used in special circumstances as follows:

Letter	Definition
FEV	Failure - ethics violation
I/Grade	Incomplete/Reversion Grade (incomplete grade reverts to this letter grade at deadline unless alternate grade is submitted prior to that deadline)
MR	Missing grade roster
MT	Multi-term
NG	No grade given, course completed
W	Official withdrawal
X	No grade reported by instructor

Grade Points and Grade Point Average

To determine the grade point average, multiply the grade point equivalent by the number of credits for the course. Add the products (grade points earned), then divide the total by the number of credits in the computation.

A Sample Calculation of a Grade Point Average

Grade	Credit	Grade Point Equivalent	Grade Points Earned
A-	4	3.7	14.8
B	3	3	9
B-	3	2.7	8.1
C+	3	2.3	6.9
TOTAL	13		38.8
GPA = 38.8/13 = 2.98			

Satisfactory/Unsatisfactory Grades

Undergraduates may select one course each semester and summer (across all summer terms) to take for Satisfactory/Unsatisfactory credit. Students indicate their S/U choice on an add/drop form. Arts and Sciences students need the advising office approval for courses within their major and/or for writing intensive courses. Engineering students need approval from their faculty advisor. Course instructors are unaware of which students in a class are registered for S/U credit. Instructors submit letter grades to the Homewood Registrar for all students in their course.

Students must decide whether to take a course on a S/U basis by the end of the eleventh week of the semester. This deadline applies to all courses, even those which may not have any graded work assigned or returned before the end of the eleventh week.

S/U grades have no effect on a student's grade point average. On the academic transcript, students who earn a grade of C- or above in a S/U course receive Satisfactory credit and a mark of S is entered on the academic record. Students who earn a grade below C- in a S/U course receive no credit and a mark of Unsatisfactory is recorded on the academic record.

Under certain conditions, graduating students in their eighth semester or later may exceed the normal S/U grading limit. See Graduation Policies for details.

Restrictions on Satisfactory/Unsatisfactory Grading

The S/U option applies only to courses in the fall, spring and summer terms in the School of Arts and Sciences and the School of Engineering.

Only one course per semester or summer (across all summer terms) may be taken with the S/U grading option. However, an eligible student who registers for a course that is only offered for S/U grading may select an additional course for S/U grading in the same semester. Language elements courses must be taken for a letter grade.

If a student has taken a course for S/U credit and then changes to a major or minor that requires the course, the grade can be changed to a letter grade before graduation with the approval of the student's academic advising office and the director of undergraduate studies for the relevant major or minor. If the S grade is acceptable for the new major or minor, the S grade will not be converted to a letter grade.

Incomplete Grades

Students who are confronted with compelling circumstances beyond their control which interfere with the ability to complete their semester's work during the normal course of a term may request an Incomplete grade (I), a temporary grade, from their instructor.

Incomplete grades may be appropriate under the following conditions:

- the student has completed the majority of the work for the class as determined by the instructor.
- the student has consulted with the course instructor, and together they have created a viable plan to complete the coursework with sufficient time for the instructor to provide the final grade by the specified deadline described below. This conversation must be documented on an Incomplete Grade Contract, which is initiated by the student in SIS.

A student whose situation does not meet these criteria should consult their academic advisor to discuss academic options.

The required elements on the Incomplete Grade Contract are listed below; all of these topics should be included in the conversation between the student and the instructor.

1. The reason for the request for an incomplete grade
2. A description of all outstanding work that must be completed
3. Date the work is due from the student
4. The reversion grade if the student does not complete any of the outstanding work

An instructor is not obligated to approve a student's request for an Incomplete grade. If the instructor agrees to grant an Incomplete grade, the instructor and student must establish a timetable for submitting unfinished work within the relevant deadline stated in this policy below. The instructor must also specify the reversion grade, defined as the grade that will be assigned if no additional work is submitted, on the Incomplete Grade Contract. The student must submit their work to the instructor in enough time for them to review and grade it before the relevant deadline described below.

An Incomplete grade does not affect a student's grade point average and is replaced by the final grade submitted by the professor. If the final grade is not submitted within the relevant deadline stated in this policy below, the Incomplete grade will convert to the reversion grade entered by the instructor.

Incomplete grades cannot be held over to another semester to complete the missing work by retaking the course. Students and instructors do not have an option in this situation.

Under extenuating circumstances, students can petition their course instructors and their Academic Advising Office to extend their Incomplete deadline. The extension can be no longer than the last day of classes of the semester following the semester in which the incomplete was given. See below for additional information on extenuating circumstances.

Process and Deadline for Students in Good Academic Standing
A request for an Incomplete grade must be initiated by the student no later than the last day of classes via the Incomplete Grade Contract available in SIS. Students are expected to consult with the instructor before submitting the Incomplete Grade Contract. Incomplete grades will be treated as failures when evaluating academic standing.

Upon receipt of a student's Incomplete Grade Contract form, the instructor may approve or deny the request, at their discretion.

Instructors are required to submit the new grade to the Office of the Homewood Registrar no later than 45 calendar days after the last day of classes. If the Incomplete grade is not resolved within 45 calendar days after the last day of classes, the Incomplete grade is automatically converted to the reversion grade.

Process and Deadline for Students on Academic Probation
Students on academic probation may initiate an Incomplete Grade Contract in SIS as described above. For students who are on academic probation, Incomplete grades will be treated as failures when evaluating academic standing. For students on academic probation who have a conversation with their academic advising office prior to initiating the Incomplete Grade Contract, the academic standing decision will be finalized after the 45-day calendar day deadline.

Instructors are required to submit the new grade to the Office of the Homewood Registrar no later than 45 calendar days after the last day of classes. If the Incomplete grade is not resolved within 45 calendar days after the last day of classes, the Incomplete grade is automatically converted to the reversion grade.

Process and Deadline for Graduating Students
Students with incomplete grades in required courses at the date of degree conferral will not graduate.

Students with incomplete grades in courses that are not required for degree completion may still graduate. However, the deadline for completion is abbreviated; students must resolve incomplete grades within 30 days of degree conferral when the University closes the undergraduate record. If the work is not finished by the deadline, the reversion grade will be recorded. For the specific deadline relevant to each degree conferral, please consult with advising or the Office of the Homewood Registrar. For more details on incomplete grades and graduation, see Graduation Policies.

Guidelines for Students Regarding Extenuating Circumstances for Requesting an Extension of the Incomplete Grade Deadline

Extenuating circumstances are those circumstance that cause exceptional interference with academic performance, and which are over and above the normal difficulties experienced in life.

Policy on Changing a Grade

Once an instructor has submitted a grade to the Homewood Registrar, grade changes can be made only in the case of error in grading, calculation, or transcription. Students with questions about grading should contact the faculty instructor who has sole authority to assess and assign course grades. If the instructor determines a change is warranted because of error, the change must be submitted to the Homewood Registrar's Office by the end of the subsequent semester. Grade changes for graduating seniors must be submitted by the close of the undergraduate record.

Retaking a Course

Policies about retaking a course are located under registration policies.

First-Year Language Courses: Information about Credit and Grades

Policies about first-year language course are located under registration policies.

Dean's List

Undergraduate students enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences and the Whiting School of Engineering who earn a term grade point average of 3.50 or above in a program of at least 14 credits with at least 12 graded credits will be placed on the Dean's List for academic excellence. Students with the SDS accommodation to be on a reduced course load and are opting to use that accommodation can earn Dean's List if they earned a 3.5 or better in 8-11 credits of which at least 7 are completed with a letter grade. An appropriate notation is made on the student's academic record. The academic advising offices of both schools email Dean's List notification letters to students. The Engineering Advising Office also sends letters to parents/guardians. By request, the University will place notification in your hometown newspaper, should you elect to follow the directions provided with the letter.

Class Rank

The University does not calculate class rank and therefore, cannot provide this information to students or outside parties.

Transcripts

Information about ordering transcripts is available on the Homewood Registrar's website (https://studentaffairs.jhu.edu/registrar/students/transcripts/). Partial transcripts of a student's record will not be issued.

Class Attendance and Absences

Although there are no university regulations concerning attendance, students are expected to attend all courses regularly. When students have missed classes, they should consult with their instructors and/or teaching assistants to explain the reasons for their absence, and to stay on track in the course. Instructors are encouraged to establish their own policies regarding attendance, and it is the student's responsibility to know those policies.

In certain courses regular attendance is given special importance. These may include foreign language courses, as well as introductory courses in Writing Seminars. Instructors in these courses may lower a student's grade for unexcused absences.

If a student is absent from classes over a period of several days without explanation, instructors are encouraged to inform the student's respective academic advising office. In some cases, withdrawing from a course may be considered; however, the student must withdraw from a course before the end of the eleventh week of the semester, and still remain in at least 12 credits.

Absence From Class Due to Illness

The Student Health and Wellness Center (SHWC) does not provide excuses for students who miss individual classes, including required attendance classes or labs. For students who are seen at the SHWC for a serious or extended illness that causes them to miss a number of classes over several days and/or to miss major academic assignments (mid-terms examinations, major presentations), the SHWC will provide verification of the visit to the student directly, and alert the Office of the Dean of Student Life. Verification will not be provided retroactively. It is the student's responsibility to forward the verification to any professors/ instructors who request it. For more information, also see this website (https://studentaffairs.jhu.edu/student-life/student-outreach-support/absences-from-class/).

Since the absence from a final examination is excused only for the most serious of circumstances, the SHWC will provide verification of the visit for those students who are seen at the SHWC for treatment at the time of their illness only.

Students should be guided by the following:

1. Ask instructors about expectations for class attendance and what procedures they will follow for students who miss class or assignments. Such policies are determined by each instructor and will differ from course to course.
2. In the event of a missed class or inability to complete course work due to illness, contact the instructor to make necessary arrangements to make up any work.
3. Notify the professor promptly by email. This should be done before the missed class unless it is not possible to do so (for example, if hospitalized or incapacitated). In cases where prior notification is not possible, notify the professor as soon as possible.
4. Misrepresenting personal circumstances to a faculty member, SHWC staff, or any university official constitutes academic dishonesty and is grounds for action by the Academic Ethics Board.

Absence for Religious Holidays

Religious holidays are valid reasons to be excused from class. Students who must miss a class or an examination because of a religious holiday must inform the instructor as early in the semester as possible in order to be excused from class or to make up any work that is missed.

Approved Absences

The university encourages students to participate in varsity athletics and other significant extracurricular activities. Students who must miss a class or an examination because of participation in a scheduled in-season varsity athletic event must notify the course instructor as early in the semester as possible. Approved absences are granted at the discretion of the course instructor. When students must miss a scheduled examination, several solutions have been found by instructors. Students have been permitted to take an examination before leaving for the event, or have had an approved proctor for examinations taken during the athletic event at approximately the same time as the other students in the course. Students have also been allowed to take the examination, or an alternative examination, upon their return from the athletic event.

Academic Standing Policies

New Terminology for Select Academic Actions

Effective with academic review at the end of the Fall 2021 semester, KSAS and WSE have adopted new terminology applicable to all undergraduates. We have introduced the term "academic suspension," and the term "academic dismissal" is now reserved for the third and final failure of a student to return to good academic standing.

Good Academic Standing

Students who maintain a minimum of 12 credits earned and a term GPA of at least 2.0 each semester are considered in good academic standing. In the rare circumstance that a student is given permission prior to the start of the semester to be enrolled in less than 12 credits, that student must complete 100% of the enrolled credits with a term GPA of at least 2.0 to remain in good standing.

Reviewing Academic Standing

Each academic advising office reviews student records at the end of fall and spring semesters to monitor academic standing. Based on this review, students may be placed on academic probation, academically suspended, or academically dismissed.

Satisfactory Academic Progress

Satisfactory Academic Progress (SAP) refers to minimal standards for grades and cumulative credits required to receive financial aid. The SAP policy is available at https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/.

Academic Probation

At the end of each fall and spring semester, the academic advising offices review the records of all undergraduate students to evaluate the academic standing of each student. Students who earn less than 12 credits or earn a term GPA below 2.0 are placed on academic probation. A letter informing a student of this status and the terms of academic probation are sent to the student in January (for fall performance) or June (for spring performance).

The terms of academic probation are as follows: Students must complete at least 12 credits with a minimum term GPA of 2.0 in the next enrolled fall or spring semester. Students may also be required to achieve a cumulative GPA of 2.0 or above in order to be removed from academic probation. In making the GPA calculation, incomplete grades (I) may be calculated as failures (F). In addition, any grade in a satisfactory/ unsatisfactory course may be taken into consideration.

Students who do not meet the terms of academic probation will be academically suspended or academically dismissed. In some circumstances, a student may be continued on academic probation instead of being academically suspended or academically dismissed. A student whose term GPA falls below 1.0 or earns less than 6 credits may be academically suspended without having been on academic probation the previous semester.

The advising offices send written notification to students who are placed on academic probation. Incomplete or missing grades may prevent timely notification. Students with a term grade point average below 2.0 or who earned less than 12 credits should consult with an academic advisor about their academic standing, even if they have not received the letter from their advising office.

Students on academic probation may be restricted from registering for the maximum course load. Engineering students on academic probation are permitted a maximum of 14 credits during the probation semester. Students on academic probation are not precluded by the university from continued participation in co-curricular activities or from representing the university in institution-sanctioned activities (including varsity athletics) while on academic probation.

A student's academic performance during the summer term or intersession will not affect their academic standing.

Academic Suspension

A student on academic probation who has not met the terms of probation will be subject to academic suspension from the university for a minimum of one semester and a summer. A student whose term GPA falls below 1.0 or earns less than 6 credits may be academically suspended without having been on academic probation the previous semester.

Students may direct inquiries about the academic suspension process to the Academic Review Committee of their respective advising office. Students who intend to return to the university in a future semester are encouraged to work with their academic advisor to develop a plan for their time away.

When a student is academically suspended from the university, the:

- Office of the Homewood Registrar cancels the student's registration for the next semester, and in accordance with policy authorizes a refund of tuition paid for that semester;
- Office of Student Financial Services suspends financial aid and work-study aid to the student;
- Community Living Office cancels the student's housing contract if the student is in university housing; and,
- Office of International Services performs duties as required by U.S. federal regulations regarding persons not eligible to study at the university.

Reinstatement after Academic Suspension

The terms for reinstating a student who has been academically suspended are established by the Academic Review Committee of their respective advising office.

Students are reinstated on academic probation and must meet those terms in their returning semester or face academic suspension again or academic dismissal.

Students who receive prior approval to complete courses at another college or university during the period of academic suspension are subject to the university's 12-credit limit on the number of transfer credits that can be applied toward graduation.

Reinstatement Requests

To apply for reinstatement, an academically suspended student must submit a written request to their respective advising office. The request should include an analysis of what went wrong during the preceding two semesters of enrollment, a description of activities while not in attendance, and an academic plan for completing all degree requirements. Supplemental materials such as transcripts of courses taken elsewhere, letters of reference from work or volunteer supervisor, and/or letters of support from a mental/physical health care provider may be required. Students are encouraged to contact their academic advisor prior to submitting a written request for reinstatement. Engineering students should use the reinstatement form provided to them at the time of their academic suspension.

Reinstatement and Financial Aid

Academic suspension and financial aid suspension are two distinct actions and must be addressed separately. The Financial Aid Satisfactory Academic Progress (SAP) appeal process can be found online (https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/). This appeal is in addition to the request for reinstatement to your advising office.

Subsequent Academic Suspension

A student who is academically suspended a second time will be required to separate from the university for a minimum of one year.

Academic Dismissal

A student who has been reinstated following a second academic suspension returns to the university on academic probation. Failure to meet the terms of academic probation that semester will result in academic dismissal from the university. Academic dismissal is permanent. Students will not be permitted to apply for reinstatement.

Eligibility for Financial Aid

Degree-seeking students who are eligible to register are also eligible to apply for financial aid. Only U.S. citizens and eligible non-citizens (e.g., permanent residents) are eligible for Federal Title IV financial aid.

Students should be aware that JHU scholarship and grant funds are awarded for a maximum of eight semesters. Under some circumstances, a ninth semester may be awarded on appeal. Federal and state aid may be available for additional semesters.

Satisfactory Academic Progress

Satisfactory Academic Progress (SAP) refers to minimum standards for grades and cumulative credits required to receive financial aid. The SAP policy is available at https://finaid.jhu.edu/undergraduate-aid/apply-for-aid/undergraduate-sap/.

External Credit Policies

It is expected that the majority of credits applied towards degree requirements are earned by completion of courses taught at Johns Hopkins University by our faculty. We do recognize that some students may have other sources of college-level credit that could be applicable to some requirements. This section explains the conditions and restrictions regarding credits earned outside of JHU.

Full details about the application of external credits towards degree requirements can be found at KSAS Requirements for a Bachelor's Degree (p. 1587), and KSAS Residency Requirement (p. 1588), or WSE Requirements for a Bachelor's Degree (p. 1086), and WSE Residency Requirement (p. 1087).

Exam Credit

The information below describes the requirements for students entering JHU in Fall 2022 and after. Students who entered JHU prior to Fall 2022 should view the appropriate archived catalogue (http://e-catalog.jhu.edu/archive/).

If a student enters the university with credit from an exam and then earns credit for an equivalent course at the university, the credits from the exam (and lab course waiver, if applicable) will be disallowed. The credits and grade for the Hopkins course will appear on the academic record. The exam title remains on the record, but the credit value is converted to zero.

To receive credit based on an external exam program, examinations must be taken no later than the year the student is admitted to the university.

Advanced Placement Exams

If a student enters the university with credit from an Advanced Placement Exam and then earns credit for an equivalent course at the university, the credits from advanced placement (and lab course waiver, if applicable) will be disallowed. The credits and grade for the Hopkins course will appear on the academic record. The Advanced Placement Exam title also remains on the record, but the credit value is converted to zero. This policy also applies to IB credit, GCE credit, and credit from foreign exams.

AP Exam	JHU Course	Score	Credit
Biology	AS.020.151 & AS.020.152[1]	5	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105-AS.030.106[2]	5	8
Chemistry	AS.030.101 and lab AS.030.105[2]	4	4
Environmental Science	TR.270.100	4 or 5	4
Computer Science A	EN.500.112[3]	5	3
Macroeconomics	AS.180.101[4]	5	3
Microeconomics	AS.180.102[5]	5	3
Calculus AB	AS.110.108[6]	5	4
Calculus BC	AS.110.108[6]	3 or 4	4
Calculus BC	AS.110.108 and AS.110.109[6]	5	8
Physics C Mechanics	AS.171.101[7]	4 or 5	4
Physics C Electricity and Magnetism	AS.171.102[7]	4 or 5	4
Statistics	EN.553.111	4 or 5	4

[1] Biology: Students who are awarded credit for AP Biology are exempt from taking the corresponding lab courses (AS.020.153 General Biology Laboratory I-AS.020.154 General Biology Lab II). The lab courses are waived but no credit is awarded. Students who have credit for AP Biology who earn credit for AS.020.151 General Biology I and/or AS.020.153 General Biology Laboratory I will lose the three credits for AS.020.151 General Biology I. Students who have credit for AP Biology who earn credit for AS.020.152 General Biology II and/or AS.020.154 General Biology Lab II will lose the three credits for AS.020.152 General Biology II.

[2] Chemistry: Students who have credit for AP Chemistry and earn credit by taking an introductory chemistry lecture and/or lab at Hopkins will lose all four AP exam credits for the corresponding introductory chemistry lecture/lab combination. Effective fall 2014, students with a score of 4 on the AP Chemistry exam and therefore, have exam credits for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I may not take AS.030.102 Introductory Chemistry II/AS.030.106 Introductory Chemistry Laboratory II without taking AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I at JHU (forfeiting four AP credits). Students with a score of 4 should take AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab in order to complete the introductory chemistry requirements to retain AP credits. Students with a score of 4 who earn credit for AS.030.101 Introductory Chemistry I and AS.030.105 Introductory Chemistry Laboratory I by taking the course will forfeit their AP credits. Students with a score of 5 and therefore have credits for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I and AS.030.102 Introductory Chemistry II/AS.030.106 Introductory Chemistry Laboratory II who earn credit for AS.030.103 Applied Chemical Equilibrium and Reactivity w/lab will lose four AP credits for AS.030.102 Introductory Chemistry II and AS.030.106 Introductory Chemistry Laboratory II. Students who earn credit for AS.030.101 Introductory Chemistry I/AS.030.105 Introductory Chemistry Laboratory I will forfeit all 8 AP credits.

[3] Computer Science: The applicability of AP Computer Science exam credits to the computer programming requirement of a particular major is determined by the academic department responsible for that major. Students may receive credit for either the AP Computer Science A exam or one of the Gateway Computing courses (EN.500.112 Gateway Computing: JAVA, EN.500.113 Gateway Computing: Python, EN.500.114 Gateway Computing: Matlab). Students who have AP Computer Science A credits and earn credit for one of the Gateway Computing courses will lose the three AP Computer Science A exam credits.

[4] Macroeconomics: Students who score a 5 on the Macro AP exam are placed out of AS.180.101 Elements of Macroeconomics and receive University credit. However, it does not count as one of the ten courses required for the economics major (or one of the six courses required for the economics minor).

[5] Microeconomics: Students who score a 5 on the Micro AP exam, AND who pass a diagnostic test administered by the Economics Department will place out of AS.180.102 Elements of Microeconomics and receive University credit for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor).

[6] Calculus: Students may receive credit for Calculus I via only one exam. Students who have AP Calculus I credits who earn credit for AS.110.106 Calculus I (Biology and Social Sciences) will lose four AP credits for AS.110.108 Calculus I (Physical Sciences & Engineering). Students who have AP Calculus II credits who earn credit for AS.110.107 Calculus II (For Biological and Social Science) or AS.110.113 Honors Single Variable Calculus will lose four AP credits for AS.110.109 Calculus II (For Physical Sciences and Engineering).

[7] Physics: Students who are awarded credit for AP Physics are exempt from taking the corresponding lab courses (AS.173.111 General Physics Laboratory I and AS.173.112 General Physics Laboratory II). The lab courses are waived but no credit is awarded. Students who have credit for AP Physics who earn credit for AS.171.101 General Physics: Physical Science Major I or AS.171.103 General Physics I for Biological Science Majors or AS.171.107 General Physics for Physical Sciences Majors (AL) will lose four credits for AS.171.101 General Physics: Physical Science Major I. Students who have credit for AP Physics who earn credit for AS.171.102 General Physics: Physical Science Major II or AS.171.104 General Physics/Biology Majors II or AS.171.108 General Physics for Physical Science Majors (AL) will

lose four credits for AS.171.102 General Physics: Physical Science Major II. Students who have AP Physics - Mechanics C credit who earn credit for EN.530.123 Introduction to Mechanics I will lose four credits for AS.171.101 General Physics: Physical Science Major I. Students who earn credit for AS.171.105 Classical Mechanics I or AS.171.106 Electricity and Magnetism I may retain their AP Physics credits.

Higher Level International Baccalaureate Courses

The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to IB exam credits.

Subject	JHU Course	Score	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	6 or 7	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	6 or 7	8
Computer Science	TR.601.100	6 or 7	3
Economics	AS.180.101 (Macroeconomics) [1]	7	3
Math	AS.110.108 [2]	6 or 7	4
Physics	AS.171.101 (lab AS.173.111 waived with no credit)	6	4
Physics	AS.171.101 & AS.171.102 (labs AS.173.111 & AS.173.112 waived with no credit)	7	8

1. Students will automatically receive three credits for AS.180.101. Students who score a 7 on the Economics IB exam AND who pass a diagnostic test administered by the Economics Department will place out of AS.180.102 Elements of Microeconomics and receive three credits for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor). Interested students should speak to the Director of Undergraduate Studies in the Economics Department for more information.
2. Either IB math HL course, Mathematics: Analysis and Approaches and Mathematics: Applications and Interpretation, will garner credit as described in the chart.

Foreign Certificate Exams

Credit is awarded for some foreign certificate exams as described below. Additional foreign certificate programs, like the German Abitur, may be considered on a case-by-case basis. The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to foreign exam credits.

General Certificate of Education (A-Levels)

Only Advanced A-Levels are awarded credits. AS and O level exams are not eligible for credit. The rules regarding credit forfeiture described in the Advanced Placement Exam section above also apply to foreign exam credits.

Subject	JHU Course	Grade	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	A or B	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	A or B	8
Economics	AS.180.101 (Macroeconomics)*	A	3
Mathematics	AS.110.108 & AS.110.109	A or B	8
Physics	AS.171.101 (lab AS.173.111 waived with no credit)	B	4
Physics	AS.171.101 & AS.171.103 (labs AS.173.111 & AS.173.112 waived with no credit)	A	8

* Students will automatically receive 3 credits for AS.180.101. Students who receive a grade of A and who pass diagnostic test administrated by the Economics Department will place out of AS.180.102 and receive 3 credits for it. However, it does not count as one of the ten courses required for the economics major (or one of the six courses for the economics minor). Interested students should speak to the Director of Undergraduate Studies in the Economics Department for more information.

French Baccalaureate

Credits may be awarded for subjects such as biology, chemistry, math, and physics upon review by the appropriate department. Due to exam revisions beginning in fall 2019, scoring requirements and course equivalencies are not currently available.

Caribbean Advanced Placement Exam

At this time, no scoring or course equivalencies are known for CAPE mathematics options. In Fall 2018, the Physics exam was deemed to be algebra-based and not eligible for credit.

Subject	JHU Course	Grade	Credit
Biology	AS.020.151 & AS.020.152 (labs AS.020.153 & AS.020.154 waived with no credit)	A or B	6
Chemistry	AS.030.101 & AS.030.102 and labs AS.030.105 & AS.030.106	A or B	8

Exam Credits for Foreign Language

The Modern Languages and Literatures Department does not award any credit for Spanish based on AP/IB exams or other foreign certificate exams.

French, German, and Italian will grant six credits for AP scores of 4 or 5 (IB Exams for 6 or 7) only after a student successfully completes two courses in that same language sequence at the intermediate level or higher. It may be possible to earn credits for French or German from the French Baccalaureate or other additional foreign certificate exams, but scoring requirements and course equivalencies are not currently available. Additional information is available under KSAS Registration Restrictions (p. 1596) and WSE Registration Restrictions.

JHU Placement Exams

Some departments may offer placement exams or other evaluations that allow a student to bypass lower-level content in that department, most commonly mathematics and foreign language. No credit is awarded for these departmental exams or evaluations as they are for placement purposes only. In some cases, a waiver of the bypassed course(s) may be noted on the student's academic record. No academic credit is awarded when a course is waived. Students should contact their respective academic advising office for additional information.

The following content is included on this page:

Transfer Credit Limits

Students Admitted Directly from High School

Students who enter the university from high school may transfer up to 12 credits from approved courses taken at other institutions, whether taken before or after matriculation. The 12-credit limit on transfer credits does not include credit from Hopkins summer courses, Advanced Placement examinations, British General Certificate of Education courses, International Baccalaureate courses, or foreign certificate courses.

Students Admitted as Transfer Students

Students who enter the university as transfer students into the Krieger School of Arts and Sciences may transfer up to 60 credits towards a degree requiring 120 credits. Students earning degrees requiring more than 120 credits in both KSAS and WSE may bring in more than 60 credits; however at least 60 of the total JHU degree credits must be earned in residence as a full-time student at JHU. See the Requirements for a Bachelors' Degree in the KSAS (p. 1587) and WSE (p. 1086) sections of the catalog for additional residency requirements. All transfer students may transfer up to an additional 12 credits after matriculation. The 12-credit limit on transfer credits does not include credit from Hopkins summer courses, Advanced Placement examinations, British General Certificate of Education courses, International Baccalaureate courses, or foreign certificate courses.

Transfer Credit Rules

The following rules apply to both online courses and courses taken in a traditional classroom setting.

To be eligible for transfer credit, an approved course must be taken for a grade at an approved college and completed with a grade of C or better. In the United States, an approved institution is a 2-year or 4-year college or university that is accredited by one of the following regional accrediting agencies:

- Middle States Commission on Higher Education
- New England Association of Schools and Colleges, Commission on Institution of Higher Education
- North Central Association of Colleges and Schools, The Higher Learning Commission
- Northwest Commission on Colleges and Universities
- Southern Association of Colleges and Schools, Commission on Colleges
- Western Association of Schools and Colleges, Accrediting Commission for Community and Junior Colleges
- Western Association of Schools and Colleges, Accrediting Commission for Senior Colleges and Universities

Transfer credits from non-US academic institutions must be approved on a case-by-case basis by the academic advising offices in the respective schools. Non-US academic institutions must be degree-granting and recognized and authorized to issue academic records by the appropriate national (or regional) bodies in their home countries.

How the Number of Semester Credits is Determined

For courses offered in semester credits at the host institution, courses will be awarded the same number of semester credits at JHU. For example, if a Calculus I course is offered for 5 semester credits at another institution, it will be transferred to JHU as 5 credits, even though our parallel course is a 4-credit course.

Credit for courses earned at a school using the quarter system will be converted to a comparable number of semester credits. One quarter credit is equivalent to 2/3 of a semester credit.

Other unit systems will be convert to semester credits based on the transcript key provided by the host institution. If a key is not available, credits are evaluated such that one year of full-time coursework at the other school is considered proportional to one year of full-time coursework at JHU.

How Transfer Credits are Posted on a JHU Transcript

The following information is included for each course transferred to JHU:

- name of institution where course was taken
- course title
- JHU course equivalent (if any)
- credits awarded

The grades earned in these courses do not appear on the Hopkins record and therefore do not contribute to the grade point average.

How Transfer Credits are Used Towards a JHU Degree

Courses awarded a direct equivalency to a JHU course will be applied towards any major or minor requirement fulfilled by that equivalent course.

Courses not given a direct equivalency but that are assigned an area designator will apply toward the relevant distribution requirement.

Courses not given a direct equivalency may apply towards major or minor requirements at the discretion of the Director of Undergraduate Studies for the program. They may serve as general electives and credit towards the degree.

Restriction on Courses Taken Without a Letter or Numerical Grade

Ungraded or pass/fail courses taken at another institution prior to matriculation at JHU, if approved, may receive credit if the host school states in writing that the mark represents a grade of C or better.

Restriction on Transferring Duplicate Content

A transfer course will not be approved when the course content has significant overlap with other courses the student has already completed. Likewise, transfer students may not take courses at JHU with significant overlap with prior course content. In cases where a department requires a student to do this, the transfer credit will be zeroed out on the transcript.

Entering Freshman with More than Twelve Transferable Credits

Some students enter the university from high school with additional college course work beyond the 12 credits that may be transferred. If these additional courses are equivalent to subjects that the university accepts for credit by Advanced Placement exams, and if the courses are needed to complete requirements for a major or are prerequisites for higher level courses that the student will take at JHU, then students may request that the department waive the comparable courses at JHU. Waivers do not carry semester credits. Students must contact their respective academic advising office for detailed information about how to obtain a waiver.

Credits Earned at JHU Prior to Matriculation, Including the JHU Pre-College Summer Program

A student who takes JHU courses prior to matriculation as a degree-seeking student may receive credit for those courses completed with grades of C or better, but the grades are not included in the undergraduate record. Because these courses were taken at JHU, they are not subject to the 12-credit transfer rule. Credits earned through this program may be applied to the 100-credit JHU residency requirement (applicable to freshmen matriculating fall 2014 and later). Independent Academic Work (research, study, internship) completed prior to matriculation is not eligible, and will not be reflected on the undergraduate record.

Credits Earned at Other JHU Schools in the Summer

Details about policies related to credits earned at other JHU schools during the summer for KSAS students (p. 1598).

Details about policies related to credits earned at other JHU schools during the summer for WSE students (p. 1096).

Credits Earned Through Study Abroad

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered “in-residence” and may be included in the 100-credit JHU residency requirement. A student may be awarded a full-year of credit from Hopkins Departmental Programs courses, or up to 30 credits from study abroad courses taken through Hopkins Approved Programs toward their undergraduate degree. Students who earn more than 30 credits in Hopkins Departmental Programs may apply these additional credits towards the standard 12 credit transfer credit limit with a 42-credit transfer credit maximum from all study abroad and domestic courses combined. Students will be held to the same course load guidelines that apply to course loads and credit overloads in the full-time undergraduate programs in Arts and Sciences and Engineering.

Students may enroll in a combination of semester and/or summer/intersession abroad programs, but students may not enroll in three consecutive fall/spring semesters abroad.

Transfer of Credits from International Institutions without Pre-Approval

Students who pursue coursework at an international institution without pre-approval may request these credits be transferred after completion. However, these credits will be reviewed and, if acceptable, will be processed as transfer credits, not study abroad credits. Therefore, these credits are subject to the 12 credit transfer maximum.

Deferred Admission

Students who have been accepted to the university may defer admission for up to two years with approval from the director of undergraduate admissions. Freshmen who have deferred admission begin their studies in the fall semester. The purpose of a deferral is to allow students to take time off in order to travel, work, or experience another culture. Deferrals are not granted for the purpose of studying at another institution. Students who wish to pursue academic studies during the deferment period may do so; however, the credits earned during the deferment period will not be applied toward the university’s degree requirements.

Special Note for Students on Disciplinary Suspension from Hopkins

While serving a disciplinary suspension, academic work completed at another institution will not be recognized for credit transfer to JHU.

Registering for Courses at Other Colleges and Universities After Matriculation

Students are required to seek pre-approval to transfer credits from courses completed at other institutions. A form for this purpose is available in the advising offices. Directions regarding appropriate signatures and required supplemental materials (typically a detailed course description and/or a course syllabus) are on the form. Courses must be taken for a letter grade and a grade of C or better is required.

In order to transfer credit for previously-approved summer work done elsewhere, students must arrange for an official transcript to be sent to the Office of the Registrar.

International students seeking to take summer courses in their home country must complete International Travel Registration with the Office of Study Abroad prior to submitting pre-approval requests to transfer courses.

Courses at Colleges and Universities in the Baltimore Student Exchange Program (BSEP)

BSEP does not operate during the summer session, therefore courses taken at these institutions during the summer are considered transfer credit and are subject to the same rules and limits as courses from other colleges and universities.

Details about BSEP for KSAS students (p. 1598).

Details about BSEP for WSE students (p. 1096).

Concurrent Registration at JHU and Another Institution

Students may take courses at another institution when registered at JHU and have these courses transfer to JHU only if permission is granted before registering for the courses at another institution. During the fall and spring semesters, students must be registered at JHU for a minimum of 12 credits and the addition of courses at another institution may not exceed our maximum credit limit for the term. During summer term, the total credits across institutions may not exceed the 14 credit maximum. During intersession term, the total credits across institutions may not exceed the 3 credit maximum.

Policies Unique to Students Admitted to JHU as Transfer Students

- Transfer students who completed Advanced Placement or other exams during high school are subject to the same policies as students admitted directly from high school as of the term they matriculate at JHU. We do not transfer exam credits directly from another college or university transcript.
- Students who transfer from the Peabody Conservatory will be granted full credit for performance courses in their major instrument. For performance courses in other instruments, only one credit per semester will be awarded.

Description of Transferable Credit

In order to be transferable, a course does not have to match a currently existing JHU course; however, courses should cover topics that are broadly defined as part of the curriculum at Hopkins. For example, we do not regularly teach a course about horror films. However, since this is a film studies course and we have a major in film and media studies, it’s likely that this course would be eligible for transfer. A course can be transferred as either:

1. a direct equivalent to one of our courses, or
2. a generic course affiliated with a field of study.

A course with an identical name at another institution may not transfer as directly equivalent to the course with the same title at JHU.

A maximum of 6 credits may be granted for courses which are in curriculum areas not covered by the fields of study in the School of Arts and Sciences and the School of Engineering.

Additional Details About Course Eligibility for Transfer

Section One: Common Courses that will not be Accepted for Transfer Credit

Physical Education or Personal Health and Wellness

Physical Education or Personal Health and Wellness Courses are not accepted.

- However, a maximum of 6 credits in the fields of nutrition, dietetics, or kinesiology may be considered if these courses were part of a curriculum leading to a college degree in the subject.

Study Skills or Career Development

Study Skills or Career Development Courses are not accepted.

- However, courses that are in-depth studies of career paths within a field of study may be considered. Psychology courses in career counseling or learning theory may be accepted.

Math Courses Below the Pre-Calculus Level

Math Courses Below the Pre-Calculus Level are not accepted.

- However, we do accept most introductory statistics courses. We will accept one course designed to review all necessary background for the study of calculus and to introduce the concept of the rate of change of a function.

Theology

Theology Courses are not accepted.

- However, we will consider comparative religion courses or other religion courses that study religion from an academic viewpoint.

Developmental English, English Grammar, or English as a Second Language

Developmental English, English Grammar, or English as a Second Language Courses are not accepted.

- However, we do typically transfer "freshman composition" courses.

Independent Study, Research, or Internship Credits

Independent Study, Research, or Internship Credits are not accepted

- However, hybrid courses that include lectures and graded assignments along with practical experiences are reviewed individually.

Trade Skill

Trade Skill Courses are not accepted.

- Trade skills courses are defined as being part of an educational program leading to a specific trade such as (but not limited to) automotive repair, culinary arts, day care provider, or airplane pilot.

Computer Software

Computer Software Courses are not accepted.

- However, courses that teach some use of software, Internet design and security, basic programming in html or Java, computer aided-design or introduce field-specific software programs may be considered.

Section Two: Common Courses with Restrictions for Transfer Credit

Chemistry

General Chemistry courses intended to serve as a one year sequence for students in the sciences are transferrable. However, because of the variability of these courses, it is often not possible to transfer just one semester of two-semester sequences (or one or two quarters). Syllabi review is required to transfer these courses. Rudimentary introductory chemistry courses intended to prepare students for a year of general chemistry are not transferrable. One-semester chemistry courses intended for non-science majors designed to fulfill general education requirements for non-science student may transfer.

Organic Chemistry Lab

JHU offers a one-semester, three-credit course (AS.030.225 Introductory Organic Chemistry Laboratory or AS.030.227 Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques) that is recognized by medical schools as being equivalent to other institutions' typical year-long introductory organic lab courses that are frequently 1 credit each. To transfer these lab courses from other institutions, students must take both semesters at the other institution, as one semester alone is not transferable. If the course lecture and lab are taught as a single course unit at the other institution, students must take the full year-long sequence of the course lecture and lab in order to transfer the courses to JHU. Our course AS.030.228 Intermediate Organic Chemistry Laboratory is an intermediate level organic chemistry laboratory course intended for only chemistry majors and typically goes beyond other institutions' expectations of students from introductory organic chemistry lab.

Physics

General physics courses, typically covering the topics of mechanics, heat, sound, electricity and magnetism, optics, and modern physics intended to serve as one year of physics study for students in the sciences, may be transferred if the course was taught using the principles of calculus. Those courses that do not require calculus knowledge will not transfer. Rudimentary introductory physics courses intended to prepare students for a year of general physics will not transfer. Introductory one-semester physics or astronomy courses intended for non-science majors, for example those offered to help students fulfill general education requirements, may be transferred.

Finance

We accept transfer credits for corporate finance courses that may include, but are not limited to, understanding the design and functioning of financial markets or modeling financial forecasting and decision making. We do not transfer credit for personal finance courses designed to teach the individual consumer about topics such as money management, budgeting, home mortgages, personal tax, individual insurance, or investing.

Graphic Design

In order to be considered for transfer, graphic design courses must be taught as part of the required curriculum for a major leading to a degree at the offering institution and the course content must include design theory and practices. These carry no area designation. Courses that focus solely on software usage will not transfer.

Website Design

In order to be considered for transfer, website design courses must be taught as part of the required curriculum for a major leading to a degree at the offering institution and the course content must include some programming components. Courses that solely focus on usage of productivity software such as word processing, spreadsheet, presentation, database, graphics editing, accounting, statistical processing, or webpage creation will not transfer.

Internet/Social Media

Marketing courses that discuss the effective use of social media concepts and tools, search engine optimization (SEO) or other analytical market analysis techniques, and content creation and management strategies for marketing campaigns will be considered. However, courses teaching effective use of the internet for personal research or educating the lay person about its structural design or usage of social media will not transfer.

Medical Terminology

In order to transfer a course teaching medical terminology, the course must have:

1. an emphasis on etymology from Latin and Greek (as opposed to just learning word parts per se; i.e. the course has to have some direct and explicit treatment of the ancient languages) and
2. a significant historical/cultural component, involving study of the history of medicine (including at least some ancient material).

American Sign Language

If offered for degree credit at the host institution, courses in American Sign Language may transfer. It is at the discretion of a department if the language may be used to fulfill the foreign language requirements of a major or minor.

College/University Orientation

Credit-bearing courses designed to promote student success may be considered for transfer. Courses should include topics such as: learning strategies, study techniques, career readiness, academic planning, and how to engage in the academic/campus community. Courses focused only on campus-specific topics will not transfer.

Section Three: Non-Domestic Studies

For Those Attending Programs Leading to the Medical Profession

In several countries around the world, students enter higher education programs that lead to a medical degree without the completion of the United States equivalent to a bachelor's degree. We do not transfer credits from these types of programs.

US Citizens Who Studied Abroad Prior to Acceptance as a Transfer Student to JHU

Like our international students who studied internationally before transferring to Johns Hopkins, courses taken abroad by US citizens either through study abroad programs or direct matriculation at international institutions will be processed as transfer credits, not as study abroad credits. A transcript from the originating institution will be required.

Composition Courses not Taught in English

Courses taught in a language other than English that mimic the typical "freshman composition" or "expository writing" courses found in the United States will transfer. These courses will be reviewed for transfer credit as potential courses in our English Department (home of our Expository Writing Program), not as foreign language courses. They may not be used to meet the JHU writing-intensive requirement.

Current JHU Students Studying Internationally in Their Home Country

Study Abroad eligibility restrictions during the academic year for KSAS students (p. 1611).

Study Abroad eligibility restrictions during the academic year for WSE students (p. 1109).

During the summer, courses may be taken in a student's home country or country of citizenship. Students follow the procedures for pre-approval of transfer credits. Such courses are subject to the 12-credit transfer rule.

Courses Unique to China

We do not transfer three commonly required courses: Introduction to Mao Zedong Thoughts, Ideological and Moral Cultivation and Fundamentals of Law, and Principles of Marxism.

Transferring of Writing-Intensive Credits

Section Four: Details About Transferring Writing-Intensive Credit

Students may transfer up to 6 credits of writing-intensive credit for a course(s) under these conditions:

1. The course must meet University criteria (http://krieger.jhu.edu/ewp/writing-requirement/) for a writing intensive course.
2. Students must take the course during the regular academic year, in either fall or spring semester (there is no writing-intensive transfer credit for summer courses).
3. Students must have a grade of B or higher in the course.
4. First-year KSAS students cannot be exempted from the Reintroduction to Writing course based on the transfer of another writing course. KSAS transfer students may have a transfer course evaluated to serve as a substitution for the Reintroduction to Writing course.

Review of transfer and study abroad courses for writing intensive credit is conducted by the University Writing Program and student should reach out to uwp@jhu.edu for directions.

Study Abroad Policies

The Johns Hopkins University views international education as an integral component of its academic mission. Not only does the university actively encourage enrollment of a diverse international and multicultural student body, but it strives to provide students with educational opportunities throughout the world. More than 33% of Johns Hopkins undergraduates study abroad.

For undergraduates in the Krieger School of Arts and Sciences and the Whiting School of Engineering, Johns Hopkins University offers a wide variety of international opportunities including departmentally sponsored intersession and summer programs, semester-based programs, and full-year programs at major universities in Europe, Africa, Latin America, Asia, Oceania, and the Middle East.

JHU accepts credit for coursework taken abroad toward major and minor requirements, as well as toward general graduation requirements. The vast majority of students who study abroad graduate on time. What is more, upon successful completion of a program abroad, students may choose to build upon their international experience in graduate or professional school. The advisors in Pre-Professional Advising and the Life Design Lab work with students to maximize the benefits of a program abroad.

Visit https://studyabroad.jhu.edu/ or call (410) 516-8400 for more information.

Study Abroad Programs

Hopkins offers students two options for study abroad: departmental programs and approved external programs. Some programs managed by Hopkins and most programs managed by third-party providers offer the highest level of on-site support. Exchange programs and direct enrollment programs at foreign universities are well suited to more independent students who have prior experience living abroad. We encourage students to consider their personal background and comfort levels when choosing a study abroad option.

Johns Hopkins Departmental Programs

Many academic departments sponsor study abroad programs that directly support major and minor requirements. Whenever possible, qualified students in these majors are encouraged to participate in departmental programs. Some Hopkins programs offer direct course equivalencies or elective credits in the sponsoring department. Hopkins departmental programs vary with regard to the level of support that students receive while abroad. ***Effective Spring 2023** Grades in courses from these programs will post on students' Hopkins transcript and be included in students' Hopkins grade point average only if the courses are taught by Hopkins faculty or if the curriculum has Hopkins faculty oversight. For courses that do not meet this criteria, the grades will not post on the Hopkins transcript or be included in the Hopkins grade point average.

Johns Hopkins Departmental Programs include the following categories:

- BA/MA programs abroad
- Semester and year programs managed by Hopkins or external organizations
- Johns Hopkins exchange programs
- Johns Hopkins Summer Programs Abroad
- Johns Hopkins Intersession Programs Abroad

Approved External Programs

The Office of Study Abroad and its Faculty Advisory Committee have vetted universities and specialized programs that offer courses in specific areas, disciplines, or locations where departmental programs may not be feasible.

Major/minor credits must be pre-approved by the Hopkins Director of Undergraduate Studies (DUS) for students' majors or minors prior to participation. Grades from the programs will not post on the Hopkins transcript or be included in the Hopkins grade point average.

Approved External Study Abroad Programs include the following categories:

- Direct enrollment in a university abroad
    - Students may transfer credit from approved colleges and universities throughout the world. Where possible, students are strongly encouraged to apply to study at international universities through a third-party provider for guaranteed housing and emergency support. Students take regularly scheduled courses with national and international students.
- Third-Party provider programs
    - These specialized programs provide study abroad opportunities for language acquisition, field experience, research, and disciplinary courses— often in less common locations. Third-party providers offer additional support services, including assistance with applications, visas, travel arranging, housing, course registration, emergencies, and onsite support. Students who wish to study at a university abroad are strongly encouraged to apply through a third-party provider.

Non-Approved Programs

Johns Hopkins does not encourage students to participate in non-approved/unvetted programs. Students with sound academic rationales for participation in an unvetted program are required to petition for approval. Note that non-US academic institutions must be degree-granting and recognized and authorized to issue academic records by the appropriate national (or regional) bodies in their home countries. In addition to academic standards, the review committee will vet the program to ensure it meets standards for health, safety, and emergency support.

Eligibility

Students are required to meet with a study abroad advisor prior to applying to study abroad. All study abroad programs must be approved by the Office of Study Abroad prior to participation in order to receive credit toward Hopkins degree requirements.

Eligibility for study abroad can vary by program type. Students must meet the minimum eligibility requirements of both Johns Hopkins University and the program abroad.

Johns Hopkins Eligibility Requirements

- Term GPA of 3.00 or higher the semester of application.
- Students must complete their last semester prior to graduation in residence at the Homewood Campus.
- Students must be in good academic, disciplinary, and financial standing with the university.
    - **Disciplinary Standing:** Students currently on university probation as a result of Student Conduct Code violations may apply for study abroad, but must have completed their probationary period prior to the start of their program abroad. Students with disciplinary sanctions more severe than university probation (e.g. Deferred Suspension, Suspension, or Expulsion) are not eligible to apply for nor participate in study abroad during the pending sanction. If a university disciplinary sanction occurs between the time of acceptance to and the start of a program abroad, Johns Hopkins will review the disciplinary action and may decide to withdraw the student from their program abroad.
    - **Financial Standing:** Students with a financial hold at the time of registration for their program abroad must be cleared by the Office of Student Accounts. Registration and dispersal of financial aid may be affected if financial holds are not lifted prior to the start of a student's program abroad.
- Leave of Absence: Students may not apply for study abroad while on any type of Leave of Absence. Students must be enrolled in residence at the Homewood Campus the semester prior to studying abroad. Study abroad may not be deferred due to a Leave of Absence, and students will be required to reapply for study abroad upon their return from a Leave of Absence.

Program Eligibility Requirements

Many programs have additional eligibility requirements. In some cases those requirements will be more stringent than the Hopkins eligibility requirements.

The program-specific eligibility requirements might include:

- Language proficiency requirements: if required, students must demonstrate language proficiency at the college level, either through courses taken at a U.S. college or university, or through university-administered placement exams
- Cumulative GPA of 3.0 or higher (e. g. Oxford requires a minimum cumulative GPA of 3.7)
- One year or more of college-level education
- Course prerequisites: students must have met course prerequisites, as determined by the program or host institution

Credit and Residency Requirements for Study Abroad (Students Who Enter JHU from High School)

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered "in-residence" and may be included in the 100-credit JHU residency requirement. A student may be awarded a full year of credit toward their undergraduate degree from courses taken on Hopkins Departmental Programs, or up to 30 credits from courses taken on Hopkins Approved External Programs toward their undergraduate degree. Students who earn more than 30 credits on Hopkins Departmental Programs may apply these additional credits towards the standard 12-credit transfer credit limit with a 42-credit transfer credit maximum for all study abroad and domestic courses combined. Students abroad will be held to the same course load guidelines that apply to course loads and credit overloads in the full-time undergraduate programs in Arts and Sciences and Engineering.

Students may enroll in study abroad in a combination of semester and/or summer/intersession programs abroad, but students may not enroll in three consecutive fall/spring semesters abroad.

Students may participate in summer and intersession programs abroad any term after matriculation and prior to graduation.

Students who enter the university from high school must have completed at least three semesters of undergraduate coursework in Arts and Sciences and/or Engineering at Hopkins prior to enrolling in a semester/academic year program abroad. This means a student may study abroad for a semester, or academic year, beginning with the second semester of their sophomore year through the fall semester of their senior year. An exception to this policy is the Hopkins Oxford St. Anne's College program which offers a full year abroad for sophomore students.

Credit and Residency Requirements for Study Abroad (Transfer Students)

A student may be awarded a full year of credit toward their undergraduate degree from courses taken on Hopkins Departmental Programs, or up to 30 credits from courses taken on Hopkins Approved External Programs. All transfer students must complete at least four full-time semesters in residence at JHU. With the exception of courses taught on Johns Hopkins SAIS Campuses abroad, study abroad programs offered during fall and spring semesters do not count towards this four-semester requirement. Transfer students must be in residence for at least two of their final four semesters, including the final semester prior to graduation.

Students who enter the university as transfer students must complete at least 60 credits at JHU. The only study abroad programs that count toward these 60 credits are courses taught by JHU faculty abroad during summer and intersession or courses taught on one of the Johns Hopkins SAIS Campuses abroad.

Transfer students must have completed at least two semesters of undergraduate coursework in Arts and Sciences and/or Engineering at Hopkins prior to enrolling in a semester/academic year program abroad. Transfer students may participate in summer and intersession programs abroad any term after matriculation and prior to graduation.

Study Abroad in Home Country/Country of Citizenship

International students are encouraged to take full advantage of study abroad opportunities by pursuing studies outside the United States and their home countries. Johns Hopkins will not approve semester or academic year study abroad at locations where students have completed secondary education or where they have lived and/or worked within eight years of matriculation at Johns Hopkins. Students who wish to take courses at universities in their home countries during the fall or spring semesters will be asked to submit a petition for an exception to this policy. Students must present a strong academic rationale for the program.

International students may take courses in their home countries during intersession or summer for transfer credit. There is a two-step process involved with transferring the credits to JHU from an institution within a student's home country.

1. Register the home country study with the Office of Study Abroad (https://jhu-sa.terradotta.com/?FuseAction=Programs.ViewProgramAngular&id=10756)

2. Follow the Transfer Credit process for the appropriate school:

- Krieger School of Arts & Sciences (https://advising.jhu.edu/transfer-courses/current-ksas-undergraduates/)
- Whiting School of Engineering (https://engineering.jhu.edu/advising/advising-questions/)

Academic Policies

Matriculation Status

All students on study abroad programs who have completed the mandatory procedures established by Johns Hopkins prior to departure remain enrolled as full-time, matriculated students. This official status is recorded as off-campus matriculated.

Expectation of Program Completion

Students are required to remain on their programs abroad until their designated "end of the program" as determined by the host institution. The "end of the program" includes mandatory activities, final examinations and revisions that may fall on or after the final day of classes. Students who experience an emergency abroad should follow the directions on the Study Abroad website (https://studyabroad.jhu.edu/about-us/emergencies/).

Students who need to leave a program abroad prior to the "end of the program" for non-emergency reasons must petition and receive approval from the JHU Office of Study Abroad prior to requesting early departure from the host institution. Students must notify the JHU Office of Study Abroad as soon as they are aware of the need to leave a program early. Petitions will not be accepted after the middle of term at the host institution. Once approved by JHU, students are subject to the rules, regulations and protocols governing early departure as defined by the program or host institution.

Students should be aware that final grades and/or credit from the program or host institution may be affected by early departure.

Credits Required for a Semester/Academic Year Abroad

Students are required to enroll in the equivalent of 15 credits per semester while abroad. Students who wish to take fewer than 15 credits, or more than 18.5 (KSAS) credits or 19.5 (WSE) credits, in a semester must submit a petition for approval through the Office of Study Abroad.

Credit for Courses Taken Abroad

For the purposes of fulfilling university residency requirements, up to 30 credits from study abroad courses are considered "in-residence" and may be included in the 100-credit JHU residency requirement. A student may be awarded a full year of credit from Hopkins Departmental Programs courses, or up to 30 credits from study abroad courses taken on Hopkins Approved External Programs toward their undergraduate degree. Students who earn more than 30 credits on Hopkins Departmental Programs may apply these additional credits towards the standard 12-credit transfer credit limit with a 42-credit transfer credit maximum from all study abroad and domestic courses combined. Students abroad will be held to the same maximum course load guidelines that apply to course loads and credit overloads on the Homewood Campus.

As part of the Hopkins application process, students are required to have pre-approval for transfer of credit for all overseas course work prior to studying abroad. Pre-approval of transfer credits toward major and/or minor requirements is granted by the Director of Undergraduate Studies (DUS) in the student's academic department(s). Pre-approval of transfer credit toward distribution requirements is granted by the Director of Study Abroad. Final approval of credit and transfer of courses occurs after students have returned to Hopkins. Transfer of credit for courses taken abroad follows the External Credit Policies (p. 1604) detailed in this catalogue under Undergraduate Academic Policies.

Courses must be completed with a grade equivalent of C or better to be eligible for transfer of credit toward a Hopkins degree. Transcripts from the program abroad should be sent to the Office of Study Abroad for credit evaluation and determination of transfer credit. Students will be notified when their official program transcript has been received.

Students should save electronic copies of syllabi, course descriptions, reading lists, assignments, papers, and examinations. Students may need to submit these to the Office of Study Abroad and/or the DUS for their major(s) and/or minor(s) in order to complete the credit evaluation, and the awarding of transfer credit.

Transfer of Credits from International Institutions without Pre-Approval

Students who pursue coursework at an international institution without pre-approval may request these credits be transferred after completion. However, these credits will be reviewed, and if acceptable, will be processed as transfer credit, not study abroad credit. Therefore, these credits are subject to the 12 credit transfer maximum.

Grades and Transcripts

Courses taken through off-campus programs are entered onto the official Hopkins transcript along with the name of the host institution and the location of the off-campus program.

Hopkins must receive an official transcript, faculty grade report, or the equivalent official evaluation to transfer courses, credits, and/or grades from off-campus programs. Students must take courses for letter or numeric grades at the host institution to be eligible for transfer of credit toward the Hopkins degree. Students will not be eligible to receive credit for courses taken pass/fail on off-campus programs. Students must receive the equivalent of a C (satisfactory) or higher in order to transfer credit from off-campus programs.

Grades from Hopkins Departmental Programs (Select Semester and Year Programs Abroad, Hopkins Summer Abroad and Hopkins Intersession Abroad):
*****Effective Spring 2023: This applies only to courses taught by Hopkins faculty or where the curriculum has Hopkins faculty oversight.*****

- Courses and credits will appear on the JHU transcript as AS/EN/HA with JHU course numbers.

- Grades for courses taught by JHU faculty abroad will post to the JHU transcript and factor into the term and cumulative GPA. They will also appear on the degree audit.
- Grades from courses taken at another institution abroad will be converted to U.S. grade equivalents based on JHU grade conversions in order to determine that a grade of C or better was earned.
- Courses with the HA prefix (HA.xxx.xxx) will be issued letter grades based on the grade conversion. In some cases, an S/U grade may be awarded in lieu of a letter grade, should the academic department determine that this is more appropriate. These grades will post to the JHU transcript and factor into the term and cumulative GPA and will also appear on the degree audit. This is applicable only to the first 30 credits earned through Hopkins Departmental Programs.
- Grades for courses with an AS or EN prefix (EN.xxx.xxx) taken at another institution abroad will be issued the administrative letter grade of SA, which will not post on the JHU transcript; and hence, no grade is calculated in to the term or cumulative GPA. The SA grade will appear on the degree audit. This is applicable to the first 30 credits earned through Hopkins Departmental Programs.
- For programs where more than 30 credits are awarded, the additional credits will be issued an administrative grade of TR and these credits apply towards the student's limit of 12 transfer credits.

*****Effective Spring 2023: Grades from Hopkins Approved Programs (and Hopkins Departmental Semester/Year Programs where courses are not taught or overseen by Hopkins faculty):**

- Courses and credits will appear on the JHU transcript as AS/EN/TR courses with generic department and level designations (e.g. TR.100.300) or a direct equivalency to a JHU course (e.g. AS.020.305).
- Grades from the other institution will be converted to U.S. grade equivalents based on JHU grade conversion in order to determine that a grade of C or better was earned.
- The administrative grade of SA will be issued to each course and it will not post on the JHU transcript; and hence, no grade is calculated into the term or cumulative GPA. The SA grade will appear on the degree audit.
- The maximum number of credits that can be earned in a Hopkins Approved Program is 30.

Housing Policy

Johns Hopkins University vets and approves study abroad programs based on academic quality, cultural immersion, and health/safety practices. Housing is an integral aspect of the abroad experience in that it promotes language and communication skills and provides opportunities for personal growth. In addition, housing organized by program sponsors provides an additional layer of safety and security.

For these reasons, JHU requires the use of program-established housing in homestays, residences, dormitories, or program-provided apartments by all Hopkins students on approved study abroad programs. Furthermore, JHU strongly encourages students to participate in a homestay experience if that option is available. Students who want to arrange independent housing abroad should set up an appointment to meet with a Study Abroad Advisor to discuss options and petition for approval.

Study Abroad at Locations Under U.S. Department of State/CDC Level 3 or 4 Travel Advisories

The U.S. Department of State (DOS) and Centers for Disease Control & Prevention (CDC) issue a Travel Advisory for each country of the world. Travel Advisories follow a consistent format and use plain language to help U.S. citizens find and use important security information. Travel Advisories apply up to four standard levels of advice, describe the risks, and provide clear actions U.S. citizens should take to help ensure their health and safety abroad.

Undergraduate international travel will not be permitted or funded at any locations with a Level 4 “do not travel” designation. Students with a sound academic rationale may petition for an exemption to the policy for sites advising travelers to “reconsider travel” or “avoid non-essential travel” (e.g. DOS Level 3 or CDC Level 3).

Financial Structure of Study Abroad

Departmental Programs (semester/academic year)
Students studying abroad in semester and/or year JHU departmental or exchange programs are charged Hopkins tuition. In most cases, an additional fee is assessed to cover services that might include housing, international health insurance, emergency services, and logistical and academic support. Students are billed through the Homewood Student Accounts Office.

Departmental Programs (intersession/summer)
Students studying abroad in a Hopkins faculty-led summer or intersession program are charged the program fee and billed through the Homewood Student Accounts Office. Fees vary by program, with some including charges for services such as airfare and/or meals.

Approved External Programs (semester/academic year)
Students who study abroad through an approved semester/year external program are charged the cost of their program as established by the host university or provider and a study abroad and registration fee equivalent to 12% of Johns Hopkins tuition. Johns Hopkins is responsible for making direct payments to host universities and providers on behalf of students. Fees will be posted to students' Hopkins SIS accounts by the Student Accounts Office.

Approved Programs (intersession/summer)
Students who study abroad through an approved intersession or summer external program are charged the cost of their program as established by the host institution or provider and a JHU per-credit study abroad fee. The per-credit study abroad fee is based on a per-credit proration of the JHU 12% study abroad fee (12% of Full-Year Tuition/30 credits = per credit study abroad fee). The per-credit fee will be assessed on the number of credits students wish to apply toward their Johns Hopkins degree, not on the number of credits awarded by the host institution or provider.

Johns Hopkins is generally responsible for making direct payments to host universities and providers on behalf of students. Fees are posted to students' Hopkins SIS accounts by the Student Accounts Office.

Additional Costs Associated with Any Program Type
Students are responsible for all additional costs that are not included in mandatory fees. Additional costs may include: housing, airfare, personal expenses, meals, visas, and other incidental expenses. Some programs may include costs for many of these services as part of their mandatory fees. In those cases Hopkins will include those fees when making direct payment to the provider on behalf of students.

Billing
Study Abroad fees will be assessed to a student's SIS account by the Homewood Student Accounts Office. Johns Hopkins makes payments on students' behalves for tuition and the program deposit.

The Homewood Student Accounts Office posts charges in SIS on or about July 1 for the fall semester, December 1 for intersession, December 1 for the spring semester, and May 1 for summer. Payment arrangements may be made through the Homewood Student Accounts Office.

The Office of Study Abroad creates a program financial budget worksheet for each student which reflects the estimated cost of attendance for their program, and details which fees will be posted on student's SIS account. The financial budget worksheet should be used to assist students and their parents/guardians in calculating expenses (the cost of attendance) associated with an academic program abroad. Students can find estimated budgets on the specific program pages on the Office of Study Abroad website. Fees are approximate and subject to change. Students should contact the Office of Study Abroad if an estimated budget is not available on the website.

Financial Aid
Johns Hopkins extends portability of federal, state and institutional financial aid to Johns Hopkins Departmental Study Abroad Programs and Approved External Study Abroad Programs for the fall semester, spring semester or academic year. Financial aid, including institutional aid may be applied toward the cost of these programs.

For the semester study abroad, the JHU Grant will not increase, even if the study abroad cost is greater than the cost to attend Hopkins. The JHU Grant for the semester study abroad may decrease if the study abroad cost is less than the cost of attendance at Hopkins. Students' financial aid will be credited to their SIS account.

Only loan assistance or study abroad scholarships can cover additional expenses. In most cases, financial aid does not apply to summer and intersession programs. Students may be eligible for external study abroad scholarships.

Refund Policy
Students with credit balances may request a refund. Refund requests cannot be processed any earlier than 10 days prior to JHU's first day of classes for each semester. Refund information is available at https://studentaffairs.jhu.edu/student-accounts/refunds/.

Students should consider study abroad options carefully prior to making a commitment. Students who withdraw from a study abroad program after having committed to either Hopkins or the program provider, are responsible for all non-recoverable costs associated with their program. After receipt of a final billing statement from the student's program, Hopkins will refund recoverable expenses, excluding non-refundable deposits. Recoverable expenses are determined by the program provider in consultation with JHU.

If for any reason study abroad plans change, the Office of Study Abroad should be contacted immediately so that the financial impact of the voluntary withdrawal can be determined.

Students involuntarily withdrawn or dismissed from a program for cause will receive no refund, may not be eligible for credit for coursework completed on the program abroad and are responsible for any costs incurred by early dismissal.

Should Hopkins cancel or suspend a study abroad program, the Office of Study Abroad will work with students to either refund recoverable costs or apply fees toward alternate academic programs. Should a provider cancel or suspend a program after the on-site program has begun, the Office of Study Abroad will work with the student and the provider to obtain refunds and to assist in making the student academically whole to the extent possible under the given conditions.

Conduct and Ethics

Conduct

Students are responsible for their own actions, activities and behavior while participating on a program abroad. Serious consideration of health and personal circumstances should be taken in to account by students when applying for or accepting a place on a program abroad.

Students are obligated to be aware of and comply with local laws and customs while abroad. Respect of local customs includes the conscious awareness of cultural attitudes toward alcohol use and sexual behavior. As representatives of JHU in other countries, we ask that students behave in a manner that is respectful of the rights and well-being of others.

Conduct considered unacceptable to Johns Hopkins University includes, but is not limited to, excessive consumption of alcohol; loud and/or abusive behavior; sexual harassment; criminal conduct of any kind, including the purchase, sale, possession or use of drugs other than prescribed medication for legal medicinal purposes. Students' must notify JHU Office of Study Abroad of any disciplinary or legal issues while abroad.

Students participating in programs abroad are expected to adhere to the Johns Hopkins University Undergraduate Student Code of Conduct (https://studentaffairs.jhu.edu/policies-guidelines/student-code/), the policies of the program abroad, and the terms set forth in the Study Abroad Conditions of Participation agreement.

Violations of the Code of Conduct, Conditions of Participation and Program Policies

Students who are alleged to have violated the Hopkins Undergraduate Student Conduct Code, the policies of the program, and/or standards of academic integrity while abroad will be reported to the program director, and the JHU Director of Study Abroad. If a violation is determined to have occurred, the program director in collaboration with the JHU Director of Study Abroad will take appropriate disciplinary action, which may include immediate dismissal from the program.

A student dismissed from a program for cause will receive no refund, may not be eligible for credit for coursework completed on the program abroad, and is responsible for any costs incurred by early dismissal.

Students must maintain both academic and disciplinary eligibility through the designated start of their study abroad program. Students' academic and disciplinary records may be reviewed prior to departure. If records indicate a significant decline in GPA, if a cumulative or term GPA falls below JHU or program requirements, and/or if academic and/or disciplinary sanctions are imposed prior to departure, a student may be involuntarily withdrawn from an approved study abroad program.

Academic Ethics

All study abroad students are bound by the Johns Hopkins University Code of Academic Ethics both during the application process and while abroad. Students are obliged to refrain from acts which they know, or under circumstances have reason to know, violate the academic integrity of the University. Violations of academic ethics include, but are not limited to: cheating; plagiarism; submitting the same or substantially similar work to satisfy the requirements of more than one course without permission; submitting as one's own the same or substantially similar work of another; knowingly furnishing false information to any agent of the University for inclusion in academic records; falsification, forgery, alteration, destruction or misuse of official University documents or seal. All students must sign a Conditions of Participation agreement to adhere to this policy as part of the application process.

Institutional Research Board (IRB)

Students whose research will involve human subjects (including research using surveys, focus groups, or interviews) must apply to the Homewood Institutional Review Board (HIRB) (https://homewoodirb.jhu.edu/) for either an exemption or approval. IRBs are federally mandated and serve to ensure that researchers take appropriate measures to minimize risks for participants, inform participants of any risks that may remain, and obtain participant consent.

To obtain permission, a request should be sent via email to the HIRB Office describing the research, including a detailed description of the topic and research methods. If interviews are a part of the research proposal include sample questions and details about how respondent's privacy will be protected. The HIRB Office will contact applicants and inform them if their research is exempt from review or if the proposal will need to undergo the HIRB process. The review process takes two to six weeks.

Graduation Policies

Applying to Graduate

Students who intend to graduate in the next academic year must complete an Application for Graduation as directed by their respective academic advising office. The graduation application deadlines are also posted on the Homewood Registrar's Office website (https://studentaffairs.jhu.edu/registrar/students/graduation/). The university confers degrees three times per academic year, and there is one annual commencement ceremony in May.

Graduating in May

Most students who enter the university directly from high school graduate in May after eight semesters of full-time enrollment. Full-time enrollment is a minimum of 12 credits. Part-time enrollment is not permitted within a student's first eight semesters. Students are required to have full-time status in the semester immediately prior to graduation, and must therefore be enrolled for at least 12 credits in the final semester even if all course and credit requirements could be met with fewer than 12 credits. The May conferral date is the Thursday before Memorial Day which is usually the University-wide Commencement date.

Graduating in August

A small number of students complete their degree during the summer. Students who have completed eight full-time semesters may graduate in the summer if all degree requirements have been satisfied by the degree conferral date (last weekday before the fall term start in August). Students who have not completed eight full-time semesters should see the Graduating Early (p. 1617) policies.

Graduating in December

A small number of students complete their degree at the end of the fall semester, which does not include Intersession. Students may graduate in December if all degree requirements have been satisfied by the degree conferral date (defined as the last weekday in December). Students are required to maintain full-time status (enrolled for at least 12 credits) in their final semester, unless they are in their ninth semester or later.

Note for students who entered as transfer students:

Transfer students are not subject to the eight semester full-time restrictions as listed above. Transfer students must complete at least four full-time semesters at JHU before they are eligible to graduate.

Completing Graduation Requirements

Students are responsible for completing the requirements for a bachelor's degree as indicated for KSAS student (p. 1587)s, and WSE students (p. 1086). All grades and credits for courses that are required for graduation must be submitted in time to clear students for graduation.

Each student expecting to graduate will receive a final bill from the university. It is university policy that all outstanding accounts must be paid in full before a student's diploma may be released.

Students who have not completed degree requirements after eight full-time semesters (or four full-time semesters for transfer students) of enrollment may register for less than 12 credits, and pay for courses on a per credit basis. With approval of the director of the student's respective academic advising office and the major department (in the case of courses required for the major), these students may take courses elsewhere to meet the remaining graduation requirements, but must observe the 12 credit limit on transfer credit. These students also may have part-time status in the semester when they graduate. If applicable, students should consult with the Office of Financial Aid prior to part-time enrollment. Part-time undergraduate students are not eligible for coverage if enrolled through JHU's Student Health Benefits.

Graduating students who are taking courses through the Baltimore Student Exchange Program (BSEP) or in other divisions of the university must make arrangements with their instructors on the first day of class to have final grades submitted to the host registrar and then to the Homewood Registrar by the Homewood deadline for submitting grades for graduating students. If such an arrangement cannot be made, students should not remain enrolled in the course.

Students who graduate in December may remain in university housing and/or continue to participate in student organizations only if they enroll for a minimum of 6 credits during the following spring semester.

A student will not be graduated with unresolved outstanding charges of misconduct or academic ethics violations.

The university does not guarantee the award of a degree. The award of degree is conditional upon

1. satisfaction of all degree and instructional requirements in effect at the time of matriculation as a degree-seeking student (as published in the relevant annual catalogue),
2. compliance with the current university and divisional regulations
3. performance meeting the bona fide expectations of the faculty.

No member of the faculty is obliged to provide students or graduates with an evaluation or letter of recommendation which does not accurately reflect the faculty member's true opinion and evaluation of the student's academic performance and conduct.

Students who have completed eight or more undergraduate semesters may take an additional course or two after graduation to complete a second major or minor if they have filed an approved plan with their respective advising office *before* their initial graduation date. For additional details, please review the complete policy in the Student Status section, Alumni Enrollment tab.

Graduating Early (less than 8 semesters)

Students are eligible to graduate early at the end of the fall or spring semester if they have completed all requirements for graduation, including the residency requirement. Students graduating early may not use intersession as a final term to complete remaining graduation requirements. Students may not graduate early during the summer except in the circumstances described below:

- Student has at most two incomplete grades in spring semester required courses, or
- Student has one incomplete grade in a spring semester required course and needs one required course in the summer, or
- Student needs one required course in the summer.

These students must meet with their respective academic advising office prior to the May commencement ceremony to file an August conferral plan. This plan requires proof of summer course registration, if applicable.

Students who graduate in fewer than eight semesters may also take courses after graduation as a full-time or part-time student if not completing an additional major or minor. Students who graduate early lose the opportunity to complete additional majors or minors after graduation.

Incomplete Grades and Graduation Status

Students with incomplete grades or missing grades in required courses at the date of conferral will not graduate.

Students who have completed at least eight full-time semesters and have met the residency requirement and who receive one or more incomplete grades in their last semester in attendance, may complete those incomplete grades and are not required to register for additional coursework unless required for their degree.

Students who have completed less than eight full-time semesters and:

- who receive one or two incomplete grades in required course(s) during their intended last spring semester should review the Graduating Early (p. 1617) policies.
- who receive three or more incomplete grades during their intended last spring semester are required to register for another full-time fall semester (at least 12 credits) in order to complete all degree requirements, including the residency requirement.
- who receive incomplete grades in required course(s) during their intended last fall semester must resolve these incomplete grades no later than the December degree conferral date or register for another full-time spring semester (at least 12 credits) in order to complete all degree requirements, including the residency requirement.

Last Semester Option

In their last semester before graduation, students may request that they be excused from taking the final examination in one or more courses. This option is solely at the discretion of the course instructor. This option is not available to students who are graduating early.

S/U Option in the Last Semester

Students in their final semester, who will have completed at least eight full-time semesters of enrollment when they graduate and who are taking more credits than are needed to complete graduation requirements, may take one or more of the extra courses for S/U credit. Engineering students must have the faculty advisor's permission, indicated by their signature on an add/drop form, to request this option. The faculty advisor's signature indicates that the student will have completed all degree requirements without this course. In addition, a signature from the Engineering advising office is needed to confirm that the senior has applied for graduation in their eighth (or later) semester. Arts & Sciences students must obtain approval from the Academic Advising Office.

Independent Work in the Last Semester

Students in their final semester, who will have completed at least eight full-time semesters of enrollment when they graduate and who are taking more credits than are needed to complete graduation requirements, may take up to 6 credits of independent academic work, either graded or S/U. In addition, the usual limit of no more than 6 credits per year of independent academic work will be waived if the additional credits are for extra credit work done in the final semester.

Graduation Closes the Undergraduate Record

Upon graduation, the undergraduate record is closed. The only permitted changes are the resolution of incomplete grades, missing grades, and grade errors. These changes must be resolved by the first Monday after 30 days have lapsed since the degree conferral date. Students wishing to take additional courses at JHU after graduation should refer to Alumni Enrollment policies.

General and Departmental Honors at Conferral

Students may receive general honors, departmental honors, or both at conferral. General Honors are awarded to students with cumulative grade point averages of 3.50 or better. The final determination is made after all grades have been reported. Departments set their own standards for the award of Departmental Honors. Students should consult with the Director of Undergraduate Studies for their major about the requirements for departmental honors.

General and Departmental Honors are noted on a student's academic record following the student's last undergraduate semester before conferral. In addition, honors are noted in the Commencement program. However, because the program is printed several weeks in advance, not all honors are announced in time for inclusion.

Completing Honors in the Major

Students who are completing requirements for Honors in their major must complete all requirements to earn honors before conferral. For example, students may not stay on after graduation to complete an honors thesis, present a poster or give a presentation, or write a final research summary.

Commencement

The university commencement ceremony (https://commencement.jhu.edu/) is held once each year in May.

The student's respective academic advising office determines whether a student has completed all requirements, and clears the student for conferral and participation in Commencement. Students who graduate in August, December, and May are invited to participate in the Commencement Ceremony in May following their degree completion. Students who graduate in August may receive permission to walk in the May ceremony preceding degree completion if they file an August conferral plan with their respective academic advising office. The diploma and degree will not be awarded until all courses are completed successfully and recorded.

Student Life Policies

Student life policies and guidelines assist students in understanding expectations, processes, and procedures during their time at the University. The Office of the Vice Provost for Student Affairs maintains these Policies & Guidelines (https://studentaffairs.jhu.edu/policies-guidelines/).

Graduate Policies

Johns Hopkins University is proud to offer a rigorous and interdisciplinary graduate education taught by faculty who are academic and research leaders in their fields. Across the nine divisions of the university there are approximately 20,000 full-time and part-time graduate students working in over 180 fields of study. Combined with exceptional university facilities and resources, the endeavors of graduate students have contributed to groundbreaking discoveries, expansive and innovative collaborations, and the advancement of knowledge throughout the university and beyond.

The policies, procedures, resources, and opportunities included in this section are relevant for graduate students enrolled in the full-time degree programs in the Zanvyl Krieger School of Arts and Sciences (KSAS) and the Whiting School of Engineering (WSE) on the Homewood campus.

Student Right to Know Information

The Higher Education Act of 1965, as amended in 2008, includes many student disclosures and reporting requirements by universities. These requirements include statistics and/or information on the following subjects:

1. Retention and graduation rates;
2. Financial assistance available to students and requirements and restrictions imposed on Title IV aid;
3. Crime statistics on campus;
4. Athletic program participation rates and financial support; and
5. Other institutional information including: the cost of attendance, accreditation and academic program data, facilities and services available to disabled students, and withdrawal and refund policies.

For the full Student Right to Know page, please visit: https://homewoodgrad.jhu.edu/student-services/student-right-to-know (https://homewoodgrad.jhu.edu/student-services/student-right-to-know/)

Academic Policies

Much of the material contained in this section gives details pertaining to Krieger School of Arts and Sciences (KSAS) and/or Whiting School of Engineering (WSE), or University-wide policies. However, there are graduate student issues and policies that are department specific. In those instances, students are referred directly to their department administrator or department handbook for further information.

A Note about PhD Education:

Ph.D. education is fundamental to the University's teaching and research mission. For an intellectual community of scholars to flourish, it is important to acknowledge the principles that underlie the compact between Ph.D. students, the faculty, and other members of the University community.

It is in this spirit that the Doctor of Philosophy Board, in collaboration with faculty and students from across the University, has articulated a statement of rights and responsibilities for doctoral students at Johns Hopkins. The principles described in this document are to be realized in policies established by the various Schools of the University; the Schools will also develop mechanisms to monitor and enforce such policies. For more information see the Statement of the Rights and Responsibilities of PhD Students (http://web.jhu.edu/administration/provost/initiatives/phd_board/rights_responsibilities/).

Annual Review Policy

Feedback and Mentoring are crucial to the success of a graduate student. As such, there is a Homewood Annual Review policy (http://e-catalog.jhu.edu/grad-students/graduate-specific-policies/#annual). At least once per academic year, all full#time Homewood graduate programs are required to provide a written review to: (a) all doctoral students, and (b) all master's students conducting thesis research. Annual reviews should be completed before the start of the next academic year, barring unexpected circumstances.

Departments should include mention of funding continuation, as appropriate; as well as have a space for discussion about the student's professional development goals and ways to develop strategies to achieve those goals. This review must include the opportunity for the student to offer self#evaluation. Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawa (https://homewoodgrad.jhu.edu/academics/policies/)l (http://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

The Whiting School of Engineering has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

Student Enrollment Statuses

Graduate students in the full-time Arts and Sciences and Engineering degree programs based at Homewood are initially enrolled as full-time and are given a Resident status. Prior to a student changing their registration status, approval from the student's degree program and appropriate office(s) must first be secured. Degree-seeking KSAS/WSE graduate students are not permitted to be enrolled in another degree-seeking program outside of JHU.

Residency Requirements

Every full-time program KSAS Master's student must register for a minimum of two consecutive semesters as a full-time, resident graduate student.

Every full-time program WSE Master's student must register as a full-time resident graduate student for at least two semesters (does not have to be consecutive). Combined bachelor's-master's degree students are exempt, as are those who enter a WSE master's degree program after two or fewer semesters following completion of a JHU undergraduate degree.

Every full-time PhD Student (WSE and KSAS) must register for a minimum of two consecutive semesters as a full-time, resident graduate student.

Degree-Seeking Graduate Students

Krieger School of Arts and Sciences

Current Policy for Fall 2022: All KSAS full-time students are required to be enrolled in two courses of any level for credit/letter grade, or one course at the 800-level for credit/letter grade. Graduate students who are full-time students are charged full tuition. The office of the deans must approve any exceptions.

New Credit Hour Policy for KSAS Graduate Students, effective Spring 2023: All KSAS Graduate Students must be enrolled in at least 9 credits to maintain full-time status in each fall and spring semester. Summer term is not a required enrollment term, but PhD students (and master's students conducting research, etc.) are expected to continue working on their degree through the summer. Any JHU funded graduate student working on research/writing for their degree full-time over the summer should enroll in at least 9 credits of their program's summer research/graduate course (students should consult with their academic program for more information). More information on KSAS Gradute Credit Hours is forthcoming and may be found at http://homewoodgrad.jhu.edu (http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/)

Whiting School of Engineering

All WSE Graduate Students enrolled in Homewood-based full-time programs must be enrolled in at least 9 credits to maintain full-time status in each fall and spring semester. Summer term is not a required enrollment term, but PhD students (and occasionally master's students conducting research, etc.) typically are expected to continue working on their degree through the summer. Any JHU funded graduate student working on research/writing for their degree full-time over the summer should enroll in at least 9 credits of their program's summer research/graduate course (students should consult with their academic program for more information). Most graduate students enrolled in research-oriented engineering degree programs (M.A., M.S., M.S.E., Ph.D. etc.) are full-time students. However, part-time study consistent with residency requirements is common with advanced permission in many engineering departments. Students should consult with individual departments and OIS (if visa-sponsored) to determine the requirements for part-time study. Visit http://homewoodgrad.jhu.edu/academics/wse-graduate-credit-hours/ for more information, and for Frequently Asked Questions.

Part-Time Graduate Students

Krieger School of Arts and Sciences

The Krieger School of Arts and Sciences (KSAS) does not offer Part -time status in full-time degree programs.

Whiting School of Engineering

New Whiting Schoool graduate students starting their full-time program in a part-time status are extremely rare, and are only allowed when the chair of a department or the director of a degree program makes a qualified written request to, and receives approval from, the Dean's Office of Academic Affairs.

Students already matriculated in their degree program who wish to change to a part-time status after completing at least one semester of full-time study may ask for permission of their program, and the Office of International Services (https://ois.jhu.edu/) (OIS), when applicable, to change status.

Students will generally not be eligible to switch to part-time status if they are working primarily on the Homewood campus or working full-time on research for their degree. Part-time graduate students must still meet their degree residency requirements (p. 1618) before they receive an advanced degree. Part-time has two major components:

1. a student cannot be part-time without prior approval from their department, and from OIS (when applicable)
2. a part-time student cannot take more than 2 classes in a semester, or they will be automatically put back to full-time status (note that for WSE graduate students, part-time is any credit load below 9 credits (not including 9 credits)).

Process:

Part-Time Non-Visa-Holding Student:

If student is approved by their program to be part-time and is not a visa holder, their program only needs to send an notice to the Homewood Registrar's office to authorize the status change.

Part-Time Visa-Holding Students

Visa-holders (F-1, J-1, etc.) wishing to change their enrollment status to part-time must meet with OIS to determine eligibility. International students cannot be part-time unless they are in their final semester of their degree program. Eligible students must complete both of the below steps:

1. Secure permission from OIS to apply for part-time status (this is a USCIS form, and not an university registration/enrollment form), and
2. Ensure their academic department has submitted documentation to the Homewood Registrar's office to make the official switch to part-time status.

Part-Time Tuition

For current tuition information, visit Homewood Student Accounts at https://studentaffairs.jhu.edu/student-accounts/tuition-fees/.

- Part-time tuition charges are by the course in KSAS.
- WSE graduate students who are part-time in a full-time program are charged a minimum tuition fee up to 3 credits. Any additional credits taken by a WSE graduate student who is part-time in a full-time program will be charged by the credit.*

Part-Time Health Benefits

Students in WSE full-time programs who are in a part-time status are automatically enrolled in student health benefits, and may be responsible for assessed premium(s). Visit https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/ for more information.

Part-Time Payroll

Not all students who are part-time can be on student payroll. Please consult with the Office of Experiential Learning (https://studentaffairs.jhu.edu/studentemployment/) (formerly Office of Student Employment) for more information.

Visiting Graduates

In some cases, graduate students from other institutions of higher education may participate in a visitation or residency at the Homewood Campus. These students are designated as visiting, and are not candidates for a Johns Hopkins graduate degree.

Visiting Graduate Students primarily take courses.

Visiting Graduate Scholars primarily pursue research.

Visiting Non-Degree Learners have already attained a bachelor's degree, are not enrolled at another institution, and wish to take courses at Homewood (KSAS and WSE only) for a maximum of two consecutive semesters.

Visit http://homewoodgrad.jhu.edu/academics/visiting-grad-student-scholar-policies/ for complete information.

Visiting Graduate Application

All visiting students must apply through their intended program of study and through the online application.

Interested Krieger School of Arts and Sciences (KSAS) applicants should visit http://grad.jhu.edu/apply/visiting-students/.

Interested Whiting School of Engineering (WSE) applicants should visit https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/visiting-students-scholars/.

Visiting Graduate Enrollment

Visiting students may be enrolled on a full- or part-time basis with the approval of the chair of the department and the dean of their respective school. Visiting graduate students will be limited to two consecutive terms of either full- or part-time study.

All non-degree visiting graduate students/visiting graduate scholars must register in every semester that they are here for the visiting student course AS.990.890/EN.990.890, there is no tuition charge for this course. Failure to register may result in the student's removal from payroll, loss of health insurance, visa compliance issues, and/or lapses in university services/access.

Combined Bachelor's/Master's Students

Combined Bachelor's/Master's Student refers only to undergraduate students who have been accepted for concurrent study in a KSAS or WSE Homewood-based full-time graduate program while still completing their undergraduate requirements.

Most combined students will switch to graduate status to complete degree requirements. Combined students cannot both apply for and start their combined status in the final semester of their undergraduate status.

Degree Conferral Timing

A student cannot be conferred with their WSE master's/graduate degree before they have been conferred with their JHU bachelor's degree. With prior approval a student may confer with their bachelor's and master's/graduate degrees in the same semester with degree requirement signoff from undergraduate advising and the student's degree programs.
Note that there is not a combined diploma, each degree is separately conferred.

Change of Status Process and Timing

In order for a student's status to change from undergraduate to graduate, a Change of Classification Form for Combined Students must be completed. Academic Staff in the student's chosen graduate program are responsible for signature and submission of this form to the Homewood Registrar's office for students who have:

- Completed eight semesters of full-time undergraduate student at JHU (or the equivalent for transfer students), **or**
- Completed undergraduate degree requirements prior to the eighth semester of full-time undergraduate study at JHU (or the equivalent for transfer students).

For complete information, please visit Graduate & Postdoctoral Affairs (https://homewoodgrad.jhu.edu/academics/combinedconcurrent-bachelors-masters-policies/) and WSE Combined Bachelor's/Master's Program (https://engineering.jhu.edu/academics/combined-bachelors-masters/).

Postdoctoral Fellow Appointments

Postdoctoral fellows are at the university to undertake a research program in cooperation with a member of the faculty. All appointments are arranged through the individual departments. Proof of successful PhD completion and eligibility for employment will be required before any appointment may begin.

Visit http://postdoc.jhu.edu/ and https://homewoodgrad.jhu.edu/ for more information.

Graduate Study Abroad (KSAS only)

The category of Graduate Study Abroad (GSA) presumes a continuation of the graduate student's full-time resident status during the period of overseas or off-campus study. GSA students should discuss all plans with their department/advisor in advance. International students should always consult with Office of International Services (https://ois.jhu.edu/) before making any travel plans or status changes. The GSA Application is available here (http://grad.jhu.edu/wp-content/uploads/2014/04/Graduate-Study-Abroad-New-Form.pdf).

Students who are enrolled in the Student Health Benefits Plan (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) are encouraged to contact the Office of the Homewood Registrar prior to leaving campus for coverage details while abroad.

Any student traveling abroad should first register with the Johns Hopkins Travel Registry. For full information regarding the registry, visas, immunizations, and other helpful travel information please visit Johns Hopkins Travel Registry (https://ssc.jhmi.edu/travel/).

GSA students are typically those in the departments of Anthropology, Comparative Thought and Literature, and Modern Languages and Literatures, While the History of Art Department does not have a general requirement of study abroad, many of its graduate students do go abroad to conduct dissertation research.

The use of this category for situations other than those noted above requires the approval of your department chair of the Homewood Graduate Board.

A student on GSA is required to pay 10% of the full-time tuition rate for each semester abroad. The KSAS Dean's Office will pay the remaining 90% tuition balance.

Graduate Study Away for Whiting School of Engineering

Graduate Study Away is a subcategory of the nonresident, fulltime status, and applies to degree-seeking WSE master's and doctoral students engaged in graduate education at a different institution (coursework and/or research) with departmental/advisor approval.

Students in this status typically remain fully supported by PI/department/host facility (NR tuition, stipend, health benefits support provided for student) as long as they remain eligible for payroll at JHU. Graduate Study Away students should discuss all plans with their department/advisor in advance. There is a tuition fee of 10% of the full-time tuition rate for each Nonresident semester.

As this is a **unique subcategory of the nonresident status**, health insurance benefits are not guaranteed (although students may opt to pay on their own for the student health insurance) and semesters away do not count towards the residency requirement. Graduate Study Away students should discuss this with their department/advisor.

Students who are enrolled in the Student Health Benefits Plan (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) are encouraged to contact the Office of the Homewood Registrar prior to leaving campus for coverage details while abroad.

Any student traveling abroad should first register with the Johns Hopkins Travel Registry. For full information regarding the registry, visas, immunizations, and other helpful travel information please visit the Johns Hopkins Travel Registry (https://ssc.jhmi.edu/travel/).

Nonresident (NR) Status

Nonresident (NR) status is a full-time status typically reserved for students who are completing non-coursework degree requirements/experiences off-campus. The Nonresident Application is available here (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/).

Students who are enrolled in University Student Health Benefits (https://studentaffairs.jhu.edu/student-health/insurance/school-insurance-plan/) are encouraged to contact the Office of the Homewood Registrar prior to entering into a NR status.

Additionally, international students should always consult with OIS before making any travel plans or status changes.

Eligibility

NR for Krieger School of Arts and sciences

Graduate students may be eligible for Nonresident Status if they:

- Have completed all coursework and requirements for the graduate degree other than the presentation and defense of the master's essay or doctoral dissertation;
- Have reached the end of their departmental support period or have exhausted support from grants and cannot be fully supported by the department;
- Work 19.9 hours per week or fewer during the academic year if employed by Johns Hopkins University in any capacity (intersession or summer employment can be full-time, however). If working, students must be on salary (not stipend) and paid hourly. NOTE: Research or teaching assistants expected to work more than 19.9 hours per week do not qualify for Nonresident status.

Nonresident students who are enrolled in JHU's health benefits are responsible for paying the premiums themselves if there is no available support from the student's department/advisor. Students on Nonresident status are charged 10% of full-time tuition per semester.

NR for Whiting school of engineering

Full-Time Program PhD and Master's students are generally only eligible to apply for one of the three Nonresident Statuses if they have no outstanding coursework (defined as either assignments/tests required for a class in which a student is currently enrolled or coursework in progress towards resolving an Incomplete grade) or exams (internal and preliminary GBOs for example) to complete:

- **NR WSE PhD/Master's dissertation/thesis/capstone/project completion**: Student is very nearly finished—just has some writing up to do and defend—but needs to leave campus to start work, etc. Expectation is one semester, but two may be allowed. Typically, the student pays the NR tuition, and typically receives no stipend or health benefits support, but there is no prohibition against a program or advisor funding the student.
- **NR WSE PhD/Master's study away**: Student (with or without advisor) has the opportunity to be actively engaged in PhD work but at a non-JHU facility. Student typically remains fully supported by PI/department/host facility (NR tuition, stipend, health benefits support provided for student) as long as the student remains eligible for payroll at JHU. Graduate Study Away students should discuss all plans with their department/advisor in advance.
- **NR WSE PhD/Master's internship/co-op**: Student voluntarily takes time to pursue other pursuits that may be only tangentially relevant to their degree. The expectation is that they will return to campus in a residential capacity to complete their degree. Student typically pays NR tuition, receives no stipend or health benefits support, although there is no prohibition against a program or advisor funding the student. Time in this status is typically one year, but can be renewed for a second year.

NR Restrictions

Nonresident students are permitted access to campus, faculty advising and most JHU services, however, they are not permitted to enroll in courses, with these three exceptions:

1. international students who file for Curricular Practical Training F1 (CPT1) through the OIS may register for a course entitled "Research and Teaching Practicum" (KSAS) or "Engineering Research Practicum" (WSE), and/or
2. enrollment in EN.500.603 Graduate Orientation and Academic Ethics, and/or
3. enrollment in AS.360.625 Responsible Conduct of Research.

Exceptions 2 and 3 and any other rare exceptions are granted by the student's respective Office of Graduate Academic Affairs.

While in Nonresident Status, students are required to online enroll in AS.910.600/EN.910.600 for each semester.

The maximum amount of time that a student may retain Nonresident Status is four semesters for KSAS master's students and ten semesters for KSAS doctoral students, and 1-2 semesters for WSE doctoral and master's students (see WSE-specific nonresident statuses for PhDs and Master's students above). Upon reaching this limit, the student will be required to register for either part-time status (WSE only, as appropriate) or full-time Resident status until degree completion.

NR Application Procedures

Students are required to complete and sign an Application for Nonresident Status (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) indicating that they meet the requirements as stated above. The form should be signed by the department, the OIS (if applicable), and either the WSE Associate Dean for Graduate and Postdoctoral Academic Affairs (or the Vice Dean for Education, or other WSE designee), or the KSAS Vice Dean for Graduate Education (or KSAS designee).

Students should apply for Nonresident status well in advance of the first semester for which it is desired. When requesting a change of status for the current term, such petitions should be submitted no later than the end of the second week of the semester.

Leave of Absence

A Leave of Absence (LOA) is an approved absence from the University during which time students are not charged tuition nor are they required to register. Time spent on an LOA is regarded as an approved break in study and is not counted toward the total time-to-degree. If a student fails to register without obtaining an approved LOA the student will be considered withdrawn from their degree program.

- Students are encouraged to contact the Homewood Registrar's Office prior to applying for an LOA for details regarding health benefits while on LOA.
- Students must schedule a consultation with either Renee Eastwood (rseitz5@jhu.edu) (KSAS) or Christine Kavanagh (christinekavanagh@jhu.edu)/Allison Leventhal (leventhal@jhu.edu) (WSE prior to completing their LOA application.
- International students must contact OIS before filing for LOA.

LOA Eligibility

All KSAS and WSE full-time and part-time program graduate students are eligible for LOA if one of the following conditions prevents them from continuing with their graduate studies (financial difficulty alone is typically not a valid reason for requesting an LOA):

- A documented physical or mental medical condition.
- Compulsory military service.
- Personal Issues that preclude academic engagement over a long period of time or immediate personal/ family hardship.

LOA Tuition and Financial Support

Students on LOA are not charged tuition for the semesters they are granted the leave; the period of leave is simply regarded as an approved interruption of the degree program; however, the University cannot guarantee that financial support will be available when students resume their studies. After taking an LOA, students must re-apply for tuition assistance, research assistantships, fellowships and/or teaching assistantships. Such matters are left to the discretion of the department. Before applying for a LOA, students should consult their department for information regarding funding opportunities upon return from LOA.

LOA Restrictions

Graduate students may apply up to four semesters of LOA (summer terms are not counted) when medical conditions, compulsory military service, or personal or family hardship prevents them from continuing their graduate studies.

Continued approval is based on the reason(s) for the request. Additional information may be requested by the department, or either the WSE Vice Dean for Graduate Education or their designee, or the KSAS Vice Dean for Graduate Education, Centers and Programs or their designee.

Students on LOA are not permitted to use any University student services and/or facilities (e.g., computing labs, library, labs, athletic facilities, etc.), and may not be enrolled at another University.

Students on LOA who wish to continue working at Johns Hopkins are not eligible to be paid through the Student Payroll Office and must therefore be hired through the appropriate divisional Human Resources Department.

No progress toward degree completion or coursework can be made while on LOA.

Students on LOA do not have access to student health benefits. The only exception is for a student on a MLOA (medical leave of absence). Students should consult with their cognizant Dean's Office of Academic Affairs (Renee Eastwood, KSAS; Christine Kavanagh/Allison Leventhal, WSE) for more information.

LOA Application Procedures

To be granted LOA status, students are required to complete and sign a LOA Application form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) and provide a letter stating the reason for their application. The form must be signed by the student's department, the OIS (if applicable), and either the WSE Vice Dean for Graduate Education (or WSE designee), or the KSAS Vice Dean for Graduate Education, Centers and Programs (or KSAS designee).

Students wishing to return from an LOA must complete an Application to Return from LOA form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/). Application deadlines are posted here (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/).

The departure of a student from one of the Homewood Schools without prior arrangement of Nonresident status or Leave of Absence status will be deemed a permanent withdrawal from the student's program. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the University. If readmitted, they do not pay a second application fee, but must satisfy the residency requirement for the degree following readmission (even if previously satisfied), and pay all outstanding fees.

LOA and Academic Probation

If a student needs to take a LOA while they are on an Academic Probation, their probation is paused for the duration of the approved LOA period. Upon the student's return from LOA, their probation is reactivated with the same terms, but the clock for the probation is reset from the date of return to the longer of:

1. the minimum time period dictated by the policy for the appropriate category as noted on the student's original probation letter (such as research, coursework, etc.), or
2. the remainder of the student's probationary period as noted in the student's original probation letter.

If a student was about to be put on probation but files for an LOA before the probation is in place, then their program may choose to either (1) issue an official probation letter noting that the start date will be paused for the duration of the approved LOA period, noting that upon the student's return from LOA, their probation will be implemented with the same terms, or (2) to issue a brief written statement to the student informing them that an official probation letter will be issued to them immediately upon their return from LOA.

Course Information and Academics

The below policies apply to both continuing and new students, unless noted specifically otherwise.

Registration

All students must register before they can attend classes or use university facilities. Detailed instructions about registration will be provided to all students before the registration period each semester/term. If the student has not been notified at least two weeks before the start of classes for any fall or spring semester should immediately contact their respective academic department, and the Office of the Homewood Registrar.

Graduate students who are funded and pursuing their degree work fulltime over the summer months need to register for at least 9 credits of their program's summer research course. This includes nonresident students who are fully funded by their program over the summer. There is no tuition charge for an 800-level course in the summer. Please consult with your academic program for more information.

Students who for any reason do not complete their registration until after the prescribed registration period are required to pay a late registration service fee. The late registration fee schedule is posted under Term Dates & Deadlines (https://studentaffairs.jhu.edu/registrar/students/graduate-registration/) on the Office of the Homewood Registrar's website. Graduate students must obtain permission from the chair of their department to register after the second week of classes.

Students will not be allowed to register if there are unpaid bills from a previous term. The student is required to pay tuition or make financial arrangements with the Office of Student Accounts before registering for a given term.

Visit https://studentaffairs.jhu.edu/registrar/students/graduate-registration/ and https://registrar.jhu.edu/idr/ for more information.

Withdrawal by Lack of Registration

Students who are not registered by the end of the fourth week of a given semester and either

1. have not responded to correspondence from their department, advisor, Office of Academic Affairs, and/or Office of the Homewood Registrar about their intention to remain in the program, **or**
2. h*ave* responded to correspondence but have not made effort to maintain a valid student status (defined as either enrolled or on an approved leave of absence), will have been deemed to have withdrawn themselves from the university and will be processed as a withdrawn student in the student information system (SIS). It is important to note that paying tuition is not the same as registering for classes.

Grades

Grading basis for graduate courses deliberately includes both letter grades and P/F grades. Instructors should have the widest discretion possible in grading graduate students' work; therefore both grading bases are available to the instructor for courses at the graduate level.

While policies in most departments vary, most graduate students receive letter grades or Pass/Fail grades for their coursework. Students should consult their department chairs and instructors to determine their grading requirements.

Letter Grades (A through F)

Changing letter grades of A through F to a Passing grade is not permissible at any time.

All other grade change requests (e.g., B to A) are acceptable only within one year of semester end date. Change requests beyond one year can only be changed as a result of clerical error and must be accompanied by a written explanation/justification from the course instructor.

Incomplete Grades (I)

Students who are confronted with compelling circumstances beyond their control that interfere with the ability to complete their semester's work during the normal course of a term may request an incomplete grade from the instructor. Approval of such a request is neither automatic nor guaranteed. Procrastination or distraction by other pursuits are not regarded as compelling circumstances, and extensions in these situations are unfair to students who have completed their course requirements within the allotted time.

If the instructor agrees to grant an incomplete grade, the instructor and student must establish a timetable for submitting the unfinished work, but no later than the end of the third week of the subsequent semester. See below for specific information about graduating students. When entering an incomplete grade in SIS, the instructor must also enter a reversion grade. This is the grade that the student will receive if the missing work is not completed. For example, if the student, based on the coursework completed by the end of the semester, would receive a C+ grade without the missing work, then the grade of I/C+ is entered on the transcript. If the incomplete grade is not resolved within the allowed period (the end of the third week of the subsequent semester), the incomplete grade is automatically converted to the reversion grade (a C+ in this example).

Incomplete grades do not affect a student's grade point average, which is based upon the grades that are available for the term. However, students with two or more incomplete grades on their record at the start of a semester may be prevented from making changes to their registration for the semester without the approval of the student's respective program/graduate affairs office.

Students who are on academic probation are not typically allowed to take incomplete grades in courses and must secure prior approval of their respective program and graduate affairs office for any exceptions.

Students who are in good academic standing have until the end of the third week of the next semester to finish incomplete work. Exceptions to this deadline require a petition from the instructor, and appeal to the student's respective graduate affairs office before the end of the third week of the following semester. When appealing to change the deadline, faculty members must specify a new date for completion of the work which must be before the end of the current semester. Incomplete grades cannot typically be held over into a third semester in order to complete the missing work, nor can incomplete grades be resolved by retaking the course.

Dropping a course with an Incomplete grade is not permissible at any time.

Changing an Incomplete grade to a final grade (A through F, Pass) may be done by the instructor if during the designated timeframe. After that deadline passes, grade change requests must be sent via a grade change form to the student's cognizant Dean's Office of Graduate Academic Affairs (Renee Eastwood, KSAS/Christine Kavanagh, WSE) for review and approval.

Special Rules for Graduating Students

Students with incomplete grades in required courses at the date of degree conferral will not graduate. Students with incomplete grades in courses that are not required for degree completion may still graduate. However, the deadline for completion is abbreviated; students must resolve incomplete grades within 30 days after the date of degree conferral which is when the university closes their graduate record.

In-Progress Grades (IP)

Reserved for courses in which it is expected that the assigned work will require more that one semester to be completed, but the course itself will meet for only one semester, such as graduate seminar courses.

Dropping a course with an IP grade is permissible only with the approval of the instructor, and the Dean's Office.

Changing an IP grade to a final grade (A through F, Pass) is acceptable at any time before the student's departure from the university, and requires the instructor's approval.

Missing Grades (MR, X)

A missing grade (denoted by an MR or an X on the transcript) appears if the instructor has not submitted a grade within the defined grading period for the semester.

- An instructor may submit a Grade Change form directly to the Office of the Homewood Registrar to change a MR or X grade to a final grade.
- Dropping a course with a MR or X grade is not permissible at any time.
- Changing a course with a MR or X grade to Audit is not permissible at any time.

Audit (AU)

When a graduate student enrolls in a course with Audit status, they must reach an understanding with the instructor as to what is required to earn the AU grade notation. If the student does not meet those expectations (e.g., fails to attend class), the instructor will notify the Office of the Homewood Registrar in order for the student to be retroactively dropped from the course. Dropped coursework does not appear on the student's transcript.

Changing a course registration from Audit (student receives no letter grade) to Credit (student receives letter grade), or from Credit to Audit is permissible during the official deadlines for each semester. Registration changes beyond this deadline are not permissible.

Changing a final grade (A through F, Pass, I, IP, MR, or X) to AU is not permissible at any time.

The following ASEN Graduate Courses **cannot** be taken for Audit:

- Graduate Research
- Dissertation Research
- Master's Thesis
- Master's Essay
- Independent Study

These courses can only be taken as P/F or for a letter grade, at the instructor's purview.

Add/Drop

The Homewood Registrar's website (https://studentaffairs.jhu.edu/registrar/students/graduate-registration/) has detailed timelines, deadlines, and approval requirements for add/drops. Note that all withdrawals will be noted with a W on the student's transcript.

The refund schedule (https://studentaffairs.jhu.edu/student-accounts/refunds/) can be found on the Student Account website.

Registration Holds

A registration hold will be placed for students who have not obtained clearance from the Office of International Services (OIS), Student Accounts, Student Health Insurance or Student Health and Wellness Offices. Students should meet with the office that placed the hold so that the hold can be removed. Students who have an advisor's hold on their registration must have their advisor release the hold online.

Transferring Courses

WSE Master's degrees (M.A., M.S., M.S.E) and PhDs

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, two courses completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the undergraduate degree-granting institution that the course was not applied to the undergraduate degree, and with JHU advisor/department approval. Students are encouraged to secure permission to transfer a course as early as possible in their time at JHU to avoid issues.

WSE graduate students may transfer in up to two graduate-level courses from another institution which were completed after the undergraduate degree was conferred, if evidence is provided that the course was not applied to any previous degree, and with JHU advisor/department approval. Students are encouraged to secure permission from their WSE master's/PhD program faculty advisor to transfer a course as early as possible in their time at JHU to avoid issues, and a transcript from any relevant academic institution must be included with conferral completion paperwork submitted to the Academic Affairs office. EXCEPTION: WSE master's students in a department#approved study abroad program can transfer in additional coursework (i.e., beyond two courses), but in total, at least half of the courses/credits applied to the WSE master's degree must be taken/earned at Johns Hopkins. Individual graduate programs reserve the right to enforce stricter policies.

Double Counting Courses

WSE Master's degrees (M.A., M.S., M.S.E) and PhDs

The Whiting School of Engineering (WSE) has established the following policies on double-counting coursework for all students in the full-time (Homewood) programs and the part-time Engineering for Professionals (EP) programs. If an individual program adopts double-counting policies more strict than these, the program's policies override the school-wide policies. Students are encouraged to refer to individual program policies.

With bachelor's#master's and master's#master's double#counting, across any number of degree programs, a student can reduce the number of master's courses required by up to two (with approval of the programs involved). Beyond that, the remaining courses must be unique to the degree program. With a ten#course master's degree program, for example, eight of those courses must be unique to the program and not applied to a different degree at any level. A student can double#count any number of undergraduate courses to the various master's degrees (but at most, two to each master's program) and they can double#count the same course across any number of degrees pursued (again, with the approval of the programs involved).

WSE Bachelor's-Master's Double Counting

Coursework applied to a bachelor's degree: Students either in a WSE combined (bachelor's/master's) program or seeking a WSE master's degree after having earned a WSE or Krieger School of Arts and Sciences bachelor's degree may double-count two courses (400-level or higher) to both programs with the permission of the master's faculty advisor. WSE master's degree candidates may not double-count courses applied to a bachelor's degree earned at a different institution. Individual graduate programs reserve the right to enforce stricter policies.

Coursework not applied to a bachelor's degree:

For students who are either in a WSE combined bachelor's/master's degree program or have already earned a Whiting School of Engineering or Krieger School of Arts and Sciences bachelor's degree and are seeking a WSE master's degree, any graduate-level coursework (as defined by the WSE graduate program) not applied to the undergraduate degree may be applied to the graduate degree, regardless of when that course was taken (i.e., before or after the undergraduate degree has been conferred) with the permission of the master's faculty advisor.

For students who earned an undergraduate degree outside of the Whiting School of Engineering or the Krieger School of Arts and Sciences, two courses completed before the undergraduate degree was conferred can only be applied to a Whiting School of Engineering master's degree if evidence is provided by the degree-granting institution that the course was not applied to the undergraduate degree, and with advisor approval.

WSE Master's-Master's Double Counting

Coursework applied to a master's degree:
Students pursuing (1) a WSE master's and a master's from any JHU school simultaneously or (2) a WSE master's after having earned a master's from any JHU school may double-count either two semester-length courses or three quarter-length courses across two master's programs, as long as the courses are equivalent to the 400-level or higher in WSE full-time graduate programs. The student must receive approval from both master's degree program faculty advisors if both sets of degree requirements will be completed at the same time. For a student to double-count coursework from two master's degrees whose requirements are met at different times, the student must obtain only the approval of the faculty advisor in the program to be finished second. Individual graduate programs reserve the right to enforce stricter policies.

Timing and Ramifications for Current Students:
This policy will be applied to all students entering a WSE master's program in Fall 2007 and beyond. Any student who has entered a WSE master's program before then will be exempt from this policy and should follow the course arrangement made with their advisor, provided it is in compliance with departmental, school and university requirements.

Declaration of Double-Counted Course:

WSE master's students wishing to double-count courses must submit these courses to the WSE master's program for approval. If it is learned that a student has double-counted a course for the WSE master's degree without permission of the WSE master's program, this program reserves the right to revoke the degree.

Research and Scientific Writing Courses

Through the Center for Leadership Education graduate students may enroll in writing courses designed to assist with dissertation and grant writing. Students may enroll for this course at no additional charge. The course is offered in the fall and spring semesters however, space is limited. For additional information go to https://engineering.jhu.edu/cle/.

Transcripts

Transcripts may be requested from the Office of the Homewood Registrar. A request for one copy is normally processed within one to three business days of receipt of the request. Requests for multiple transcripts require additional processing time. Standard delivery of transcripts is by U.S. Mail first-class. Visit https://registrar.jhu.edu/credentials/transcripts/ for information on ordering transcripts. Partial transcripts of a student's record will not be issued.

Official and/or unofficial transcripts of work at other institutions that the student has presented for admission or evaluation of credit become the property of the university and cannot be copied or reissued. If a transcript of this work is needed, the student must obtain it directly from the issuing institution.

Summer and Intersession Courses

Summer Courses: while most summer courses offered at the Homewood Campus are undergraduate level courses, graduate students may enroll in these courses with permission from their department chair and the course instructor. No financial assistance is available for graduate students who wish to take summer courses. In special cases, graduate students may also take courses at other divisions of the institution.

Graduate students who are funded and pursuing their degree fulltime over the summer months need to register for at least 9 credits of their program's summer research course. This includes nonresident students who are fully funded by their programs over the summer. There is no tuition charge for an 800- level course in the summer. Please consult with your academic program for more information.

Intersession Courses: graduate students are eligible to enroll in Intersession coursework. Grades are generally given on an P/F scale. Some students use this period to participate in research, independent study, or internships. A list of Intersession offerings is published in late November or early December. A special form, available in the Homewood Registrar's Office, is used for Intersession registration. Students should register before winter break. Students who register for research, independent study, or an internship during Intersession must have the approval signature of their faculty sponsor and academic advising office. This opportunity is offered tuition-free.

Visit https://summerprograms.jhu.edu/program/intersession-program/ for more information.

Course Re-Take Policy

At the discretion of the Homewood graduate program, a graduate student may retake a course, but the grade from the initial effort will remain on the transcript. This applies whether the initial effort occurred while the student was an undergraduate student or a graduate student.

Academic Standing

The below policies apply to all new and continuing graduate students in the Homewood Schools, unless specifically noted otherwise.

Academic Review Policy

This policy applies to all full-time KSAS and WSE doctoral students and master's students conducting thesis research. Each graduate program is required to publish its own policies and standards with respect to academic standing. At the end of each semester, all full-time Homewood graduate programs are expected to review the academic records of their graduate students to evaluate academic progress. For more information, please review the Homewood Schools Graduate Student Academic Review Policy (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10).

WSE has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawal (http://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

Probation

Whenever it is determined that a graduate student has failed to meet minimum academic, research, and/or TA requirements, that student may be placed on academic probation.

This change in status requires a formal letter and a meeting between the student and either their faculty advisor, chair, and/or departmental director of graduate studies. The letter should clearly outline the student's academic shortcomings, indicate the corrective measures necessary to remain in the program and state the length of the student's probationary period. Any funding ramifications for the student should be included as well.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Dismissal

Dismissal After Probation

This must be done with a formal letter citing the reason for dismissal and requires a meeting between the student and their faculty advisor or the departmental director of graduate studies. Academic dismissal will be noted on the student's transcript at the request of the program and with the approval of the cognizant Dean. A student may appeal this decision.

Dismissal Without Probation

A student may be dismissed without a formal probation period under three circumstances:

1. Meet the conditions for dismissal based on coursework as stated by the academic program in its department handbook or on its website;
2. Fail an oral or written examination for which successful completion is necessary to continue in the program (as stated in the program's degree requirements), or fail to meet any condition resulting from a qualifying or GBO exam; or
3. Is found to have committed academic or research misconduct and expulsion is the outcome of the deliberations as outlined in the Homewood Graduate Academic Misconduct Policy (https://krieger.jhu.edu/hwgradaffairs/wp-content/uploads/sites/35/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf) or the University Research Integrity Policy (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf). Under these circumstances, programs are expected to follow the same procedures for Dismissal After Probation.

In addition, students are also subject to immediate dismissal on non-academic grounds in accordance with the Johns Hopkins Student Conduct Code (https://studentaffairs.jhu.edu/policies-guidelines/student-code/) as well as all applicable policies at the university policies page. (https://www.jhu.edu/university-policies/)

Academic Dismissal Consequences

When a student is dismissed from the University, several consequences follow:

- The Office of the Homewood Registrar (https://studentaffairs.jhu.edu/registrar/) cancels the student's registration for the next semester, and authorizes a reversal of tuition assessed for that semester. This does <u>not</u> mean that the student directly receives a refund. For example, if the student has been funded by the department, the department would be eligible for the refunded funds. Additionally, any refund amount is subject to the refund schedule (https://studentaffairs.jhu.edu/student-accounts/refunds/) published by the Office of Student Accounts.
- Notation of dismissal may be placed on the student's transcript at the request of the program and with the approval of the cognizant Dean.
- The Office of Student Financial Services (https://finaid.jhu.edu/graduate-aid/) suspends financial aid to the student, and work-study aid.
- The Office of International Services (https://ois.jhu.edu/) performs duties as required by U.S. federal regulations regarding persons not eligible to study at the University.
- Eligibility for student health benefits (https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/) will end. Please contact the Office of the Homewood Registrar for specific information.
- The student loses access to university services, property, and nonpublic spaces.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Readmission Following Dismissal

The terms for readmitting a student who has been dismissed for academic reasons are established by individual departments. The readmission process should be described in the dismissal letter, if deemed appropriate. Students who have been dismissed should discuss the readmission process with their advisor. The terms for readmitting a student who has been dismissed for reasons other than academic/research/TA performance are decided by the student's cognizant Dean's Office of Academic Affairs.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc.

Withdrawal

Once a student withdraws from the University, their student transcript is closed, and changes to their academic record will not be permitted. International students must consult with Office of International Services (https://ois.jhu.edu/) to ascertain their visa obligations before withdrawing from the university. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the university. If readmitted, they do not pay a second application fee, but must satisfy the residency requirement for the degree following readmission (even if previously satisfied), and pay all outstanding fees.

Please see the full policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf) for more information on process, appeals, etc. Note that the same ramifications as listed under 'Academic Dismissal Consequences' apply.

Voluntary Withdrawal

Students wishing to withdraw from the University must file a Termination/Withdrawal Form (https://homewoodgrad.jhu.edu/academics/graduate-board/enrollment-status-change-forms/) with their Department. Graduate students are encouraged to consult the chair of their department prior to submitting their written notice.

Withdrawal by Lack of Registration

Students who are not registered by the end of the fourth week of a given semester and either

- have not responded to correspondence from their department, advisor, Office of Academic Affairs, and/or Office of the Homewood Registrar about their intention to remain in the program, **or**
- have responded to correspondence but have not made effort to maintain a valid student status (defined as either enrolled or on an approved leave of absence), will have been deemed to have withdrawn themselves from the university and will be processed as a Withdrawn student in the student system (SIS).

It is important to note that paying tuition is not the same as registering for classes. For more information, please see the Student Enrollment Statuses (p. 1618) information under Academic Policies.

Withdrawal Consequences

Any outstanding fees will be followed up with the student/their department by the Office of Student Accounts. Students who withdraw from their program must be formally readmitted, at the discretion of the department, before they may return to the university.

Degree Requirements

The below policies apply to both continuing and new students, unless noted specifically otherwise.

Academic Requirements for Graduate Degrees

Information for degrees administered by the Homewood Graduate Board is located at https://homewoodgrad.jhu.edu/academics/graduate-board/degree-requirements/.

Information for degrees administered by the Doctor of Philosophy Board is located at https://provost.jhu.edu/education/graduate-and-professional-education/doctor-philosophy-board/.

Doctor of Philosophy (KSAS and WSE)

In addition to any departmental/divisional PhD requirements, PhD students must meet the following to be considered eligible to apply for graduation:

- A minimum of two consecutive semesters as a full-time, resident graduate student.
- Completion of registration in the semester during which degree requirements are met *(note: students completing in a Summer term generally should have been registered for the summer graduate research course, but it is allowable if the last official semester of registration is the Spring semester immediately prior to degree conferral)*.
- Certification by a department or program committee that all school, departmental, program, and/or committee requirements have been fulfilled.
- A dissertation approved by at least two referees appointed by the department or program committee, and submitted to Electronic Theses & Dissertations (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/).
- Successful completion of a Graduate Board Oral (GBO) examination as determined by the department or program committee. This is classified as either a preliminary or a final examination.
- Though time-to-degree is determined by the department, and may not exceed 12 years, continuation in the program will be based/contingent upon satisfactory academic progress after eight years of enrollment.

PhD Advisor/Good-Standing Policy

A PhD student conducting research and/or in the writing phase of their degree program will not be able to remain in good standing with their academic and research progress if they do not have a research/dissertation advisor.

KSAS Master's Degrees (M.A., M.F.A., M.S.)

- A minimum of two consecutive semesters as a full-time, resident graduate student.
- Completion of registration in the semester during which requirements are met.
- Certification by a department or program committee that all requirements have been fulfilled.
- A thesis approved by at least one referee and submitted to the Commercial Binding Office when the department requires a thesis.

- Meets the requirements of the school's time-to-degree policy. (http://homewoodgrad.jhu.edu/academics/graduate-board/degree-requirements/)

WSE Master's Degrees (M.A., M.S., M.S.E., M.S.E.M.)

- Every student must register as a full-time graduate student for at least two semesters or satisfy an equivalent requirement approved by the appropriate department. (Combined bachelor's-master's degree students are exempt, as are those who enter a WSE master's degree program after two or fewer semesters following completion of a JHU undergraduate degree.)
- Every student must be registered in the semester during which degree requirements are met; this includes students who have no courses remaining in which to enroll but must resolve coursework for which an Incomplete grade was assigned.
- Every student must provide certification by a department or program committee that all departmental or committee requirements have been fulfilled.
- If the student is submitting a formal essay to the MSE Library to help complete master's degree requirements, the essay must be approved by at least one reader. (See the Homewood Academic Council Faculty Status table, under "Thesis Supervision of Graduate Students," to determine who may serve as the reader/advisor. Additional readers, if required by program, need only program approval.)
- All courses applied to the master's degree must be at the 400-level or higher. At their discretion, individual graduate programs may institute a higher course level as the minimum for their own students.
- Every student must earn the master's degree within five consecutive academic years (10 semesters). Only semesters during which a student has a university-approved leave of absence are exempt from the 10-semester limit; otherwise, all semesters from the beginning of the student's graduate studies—whether the student is resident or not—count toward the 10-semester limit.
- Every student must complete training on academic ethics (EN.500.603 Graduate Orientation and Academic Ethics).
- Every student must complete training on the responsible and ethical conduct of research, if applicable. (Please see the WSE Policy on the Responsible Conduct of Research (https://engineering.jhu.edu/wse-research/resources-policies-forms/responsible-conduct-of-research/).)

Time to Degree (TTD)

The time-to-degree (TTD) limit for degree candidates is typically determined by a specific program. However, JHU's general policy requires that TTD not exceed nine years for Ph.D. candidates, and five years for WSE and KSAS terminal master's candidates.

The TTD count begins with the first semester of registration as a matriculated student. Time spent on an approved LOA will not be counted toward the graduate student's TTD. Students unable to complete degree requirements within the required time limit are required to withdraw from the University.

Full TTD policies for WSE and KSAS can be found at http://homewoodgrad.jhu.edu/academics/graduate-board/new-grad-board-residency-page/ and https://provost.jhu.edu/education/graduate-and-professional-education/doctor-philosophy-board/.

Co-tutelle de Thèse

JHU will recognize dissertation research and subsequent dissertation submission for the purposes of a degree from JHU alone. It will sign no agreement that supports the concept of a student submitting the same work to different universities to receive two distinct degrees.

The University, however, wants to promote international exchange and in this spirit the Graduate Board has agreed to accommodate students with a desire to include faculty from a foreign university to participate in their research and defense process. Upon submission and review of a current curriculum vitae, the Graduate Board will allow one advisor to be a faculty member of a foreign university and in certain cases will allow the committee to be expanded to include other faculty from a foreign university as long as the majority represent JHU. The University will provide no funds to cover expenses. Funding for travel would be up to the department or the foreign university.

All proposed co-tutelle agreements are to be submitted to the Graduate Board for review.

Commencement and Degree Conferral

The below policies apply to both continuing and new students, unless noted specifically otherwise.

There are three official conferral dates each academic year for the University (December, May, August). The conferral date is printed on the diploma. A formal University Commencement Ceremony is held once per academic year, traditionally in May.

Students who have not satisfied all graduation requirements by the deadlines determined by the Homewood Graduate Board (KSAS PhDs and Master's and WSE PhDs) or the WSE Office of Graduate Education and Lifelong Learning (WSE Master's and D.Eng. students) are not eligible to participate in the university commencement ceremony. Each division may hold their own graduate recognition ceremonies which do not signify degree conferral.

Students who complete their degree requirements (1) in-between conferral periods or (2) in a conferral period before the diploma/transcript is updated may request an official statement of completion from the Office of the Homewood Registrar or the Homewood Graduate Board through their respective divisional graduate education office. Visit https://studentaffairs.jhu.edu/registrar/students/graduation/ for deadlines and official conferral dates.

Upon degree conferral, the graduate's record is closed. No changes thereafter can be made to the graduate's transcript.

A student will not be graduated with unresolved outstanding charges of misconduct or academic ethics violations.

Application for Graduation

All graduate students must submit an online Application to Graduate, through their SIS account, in order to generate degree conferral and receive a diploma. Students should consult with their degree program (academic program staff and/or the director of graduate study in their program), the Homewood Graduate Board's website, and the WSE engineering website respectively to determine current deadlines. The dates of these deadlines change each academic year.

In addition to submitting the general application to graduate, engineering students preparing to graduate from a master's degree must complete paperwork (typically called a degree/master's checklist) indicating the courses they intend to apply to their degree. This paperwork is distributed to students by each department's academic program staff, and once completed should be returned to them for program clearance before they in turn submit the paperwork to the WSE Office of Graduate and Lifelong Learning for final signoff. All double-counting, transfer, and bachelor's/master's course exceptions/allowances must be approved by the student's program prior to the submission of their program's degree checklist.

Completing Graduation Requirements

Departmental graduation requirements vary; therefore, students are encouraged to speak with their departmental academic program staff to learn details of their requirements.

KSAS Master's Degree Completion

All KSAS master's students must complete all of the following steps for the degree to be conferred, and to generate a diploma:

- An Application to Graduate must be submitted to the Office of the Homewood Registrar either online or on paper, depending upon status;
- Completion of registration in the semester that degree requirements are met
- Minimum of two consecutive semesters of registration as a full-time, resident graduate student
- Certification by a department or program committee that all departmental or committee requirements have been fulfilled
- Thesis approved by at least one reader when the department or program requires a thesis
- Submission of the thesis to the MSE Library Electronic Theses and Dissertations (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) when a Master of Arts with essay is being requested

KSAS Master's Time to Degree Policy (https://homewoodgrad.jhu.edu/academics/graduate-board/deadlines/)

WSE Master's Degree Completion

All WSE master's students must complete all of the following steps for the degree to be conferred, and to generate a diploma:

- An Application to Graduate must be submitted to the Office of the Homewood Registrar either online or on paper, depending upon status;
- Minimum of two consecutive semesters of registration as a full-time, resident graduate student;
- Completion of registration in the semester that degree requirements are met;
- Receive a passing grade in Academic Ethics and complete at least the Responsible Conduct of Research online course (students conducting research may need to complete additional requirements);
- Department-specific degree requirements checklist (completion certification) forms must be submitted to and approved by the department academic program staff, and then those forms must then be submitted to the WSE Office of Graduate Education and Lifelong Learning by the published deadline(s);
- If a formal master's essay, capstone, or project is used to complete degree requirements, the student should check with their academic program to determine if they must submit a properly-formatted document to the MSE Library Electronic Theses and Dissertations (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/) system by the date listed on the WSE website; the emailed submission receipt (generated by the library) must be included in paperwork forwarded to the WSE Office of Graduate Education and Lifelong Learning.

WSE Master's Time to Degree Policy (https://engineering.jhu.edu/education/graduate-studies/graduate-academic-policies-procedures/)

Visit: http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/ for more information on deadlines and policies.

DOCTORAL DEGREE COMPLETION (KSAS and WSE)

- A minimum of two consecutive semesters of registration as a full-time, resident graduate student;
- Completion of registration in the semester that degree requirements are met;
- Certification by a department or program committee that all school*, departmental, program, and/or committee requirements have been fulfilled;
- A dissertation approved by at least two referees appointed by the department or program committee** and submitted to the library. The dissertation must adhere to the Graduate Board Dissertation Guidelines. (Referees must certify that the dissertation is a significant contribution to knowledge and worthy of publication)
- Successful completion of a Graduate Board oral examination. As determined by the department or program committee, this is classified as either preliminary or a final examination
- Though time-to-degree is determined by the department and may not exceed 9 years, continuation in the program will be based/contingent upon satisfactory academic progress after eight years of enrollment. Any approved leave of absence would not count toward the 9 years. NOTE: the WSE time-to-degree is seven years.

**All Whiting School of Engineering doctoral students must complete training on academic ethics and responsible conduct of research. Krieger School of Arts and Sciences students must complete training on the responsible conduct of research if applicable.*

***Referees (also known as readers) are responsible for signing the 'readers letter/report' that confirms that the dissertation is a significant contribution to knowledge and worthy of publication. At least one referee should be internal to the student's academic program, external referees (to the university) must be approved by the Graduate Board through the same process as external examiners participating in the Graduate Board oral examination.*

Degree Completion Deadlines

Each spring semester, the Homewood Graduate Board and the WSE Office of Graduate Education and Lifelong Learning (for WSE master's and D.Eng. students) issues deadlines for submission of theses and essays, and degree requirements (courses, etc.) completion deadlines for the following academic year. These deadlines must be met for a student to be listed as a degree candidate. Students can access the calendar of deadlines on the Homewood Graduate Board's website (http://homewoodgrad.jhu.edu/academics/graduate-board/deadlines/) (for KSAS master's students, KSAS and WSE PhD students, WSE Master's and D.Eng. students), as well as the website of the WSE Office of Graduate Education and Lifelong Learning (for WSE Masters), or by contacting their department academic program staff.

- Students who complete their master's essay or doctoral dissertation after the end of a semester but before the first day of class of the next semester do not have to register for that next semester. (They will have to file for graduation in that semester, and will not be eligible for student payroll once they are no longer a registered student).

- Graduate students completing a final degree during the first eight weeks of the fall semester or the first four weeks of the spring semester will generate a tuition reimbursement for that semester to whatever entity covered the cost - the student, the department, the advisor, etc. This applies only to students for whom completion of a master's project, master's essay, master's journal submission, or doctoral thesis or for those resolving an incomplete is the sole remaining degree requirement at the start of the final semester.
- If a student completes a Tuition Deferral Form indicating an expectation to complete the degree within a specific grace period, no payment is required to register for that semester. However, if the grace period deadline is not met that semester's tuition charge will be added to the student's account.
- Note that students who complete in the Grace Period for either the fall or spring semesters (or finish in the summer term), and are registered in the semester/term in which they completed are eligible to stay on student payroll until the degree conferral date.

Grades Towards Degree Completion

Grades must be submitted in SIS by the posted deadline for each semester, including grades for courses that are required for graduation. Graduating students who are taking courses at cooperative schools or other divisions of the University must make arrangements with their instructors on the first day of class to have final grades submitted to the host school's Registrar and then to the Homewood Registrar by the Homewood grade submission deadline. If such an arrangement cannot be made, students should reconsider staying enrolled in the course, as it may risk their ability to confer in their chosen period.

Graduate Board

The Homewood Graduate Board (http://homewoodgrad.jhu.edu/academics/graduate-board/) is responsible for the administration of policies and procedures for the Doctor of Philosophy in the Schools of Arts and Sciences and Engineering.

The Graduate Board oversees:

- Graduate Board Oral (GBO) Examinations for ASEN Ph.D. students: with the approval of the department chair, a GBO may be scheduled at any time during the academic year. Requests for a GBO examination must be submitted to the Graduate Board a minimum of three weeks before the examination is to take place.
- Dissertation/Thesis Instructions: The student is responsible for obtaining and observing the detailed instructions concerning submission of their dissertation/thesis from their departmental office, and the Homewood Graduate Board Office. Visit http://homewoodgrad.jhu.edu/academics/graduate-board/degree-candidacy/ for more information.
- Initial Ph.D. Degree confirmation
- Recommendations for conferral to the Doctor of Philosophy Board
- Vetting and recommending new PhD degree programs to the Doctor of Philosophy Board
- See the Homewood Graduate Post-Doctoral Affairs website (https://homewoodgrad.jhu.edu/) for more information.

Doctor of Philosophy Board

The Doctor of Philosophy Board (http://web.jhu.edu/administration/provost/initiatives/phd_board/) advises the Provost about University-wide issues pertaining to the PhD. It approves new degree programs and sets guidelines and policies that affect all PhD. students. The Board respects the strong tradition of local autonomy of the Schools, and seeks to enhance the visibility and prominence of PhD. education across the University.

The Homewood Graduate Board submits its list of approved KSAS and WSE PhD conferrals to the Doctor of Philosophy Board for final university approval. No PhD degree is officially conferred until after the Doctor of Philosophy Board has approved and recommended conferral to the President of the University, and the President approves.

Dissertation and Thesis/Essay Submission

ETD (Electronic Theses and Dissertations)

An ETD is a digital version of a dissertation that is available to the public via the Internet. Universities and colleges in the United States and abroad have been moving toward this type of publication for the past decade. In the Fall 2013, Johns Hopkins launched its own ETD portal and process.

All thesis and dissertation submissions must be through the ETD process and portal. See the ETD page for more information, deadlines, and instructions. (https://www.library.jhu.edu/library-services/electronic-theses-dissertations/)

The student is responsible for obtaining and observing the detailed instructions concerning submission of their dissertation/thesis from their departmental office, the Homewood Graduate Board Office (http://homewoodgrad.jhu.edu/academics/graduate-board/degree-candidacy/)and ETD guidelines (http://guides.library.jhu.edu/etd/) of the Johns Hopkins Libraries and Museums. Students may also contact the ETD coordinator at etd-support@jhu.edu.

After submitting their dissertation to the ETD Submittal Tool (http://etd.library.jhu.edu), the library will check the dissertation for proper formatting and either approve it or contact the student to make required changes. After the ETD is approved the student will receive an approval confirmation from the system. Students are required to forward this approval email to their departmental academic staff and cc either the Associate Dean for Graduate Education and Lifelong Learning in WSE (Christine Kavanagh) or the Assistant Dean for Graduate and Postdoctoral Academic and Student Affairs in KSAS (Renee Eastwood) as appropriate, with the following items:

- The title of their dissertation typed in the body of the email in title case format with correct spelling and punctuation.
- The degree type and program/department
- A single PDF of the dissertation title page and abstract

The degree requirements are not complete unless the final ETD is submitted to the library by the published deadline and the above information and attachments are provided by the student to the Graduate Board Office via the email to the department and the cognizant Associate or Assistant Dean of Graduate Education and Postdoctoral Academic Affairs.

Graduate Alumni Enrollment

After degree conferral, KSAS and WSE Homewood graduate alumni who wish to enroll for coursework that does not lead to a degree are considered Visiting Graduate Students, and should follow the application and enrollment information located at http://homewoodgrad.jhu.edu/academics/visiting-grad-student-scholar-policies/

Admissions and Finances

Admission

Admission for Full-time, Residential Graduate Programs [1]

Programs of Study Information

Krieger School of Arts and Sciences (KSAS) fulltime, residential graduate programs of study information (p.)

Whiting School of Engineering (WSE) fulltime graduate programs of study (p.)

Please visit specific degree program websites to review their application and degree requirements.

General Application Process and Admissions Inquiries

Krieger School of Arts and Sciences (KSAS) Office of Graduate Admissions and Enrollment (https://grad.jhu.edu/)

Whiting School of Engineering (WSE) Office of Graduate Admissions (https://engineering.jhu.edu/graduate-admissions/)

Admissions/Information for Visiting Graduate Students and Volunteers

The schools of Arts and Sciences, and Engineering recognize and appreciate the contributions of volunteers and visiting graduate students to its mission of education and research and has policies in place to enable both schools to retain and set forth requirements pertaining to volunteers and visiting graduate students.

Interested Krieger School of Arts and Sciences (KSAS) applicants should visit: http://grad.jhu.edu/apply/visiting-students/ and interested Whiting School of Engineering (WSE) applicants should visit https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/how-to-apply/visiting-students-scholars/

Costs of Attendance and Financial Aid

Costs of Attendance

See the Office of Student Financial Services' website for financial aid information (https://finaid.jhu.edu/).

See the Office of Student Accounts' website for tuition rates and refund schedule (https://studentaffairs.jhu.edu/student-accounts/tuition-fees/).

Funding, Financial Aid, and Student Loans

Graduate students should contact their department(s) for information concerning funding support availability. Information for the Whiting School is located at https://engineering.jhu.edu/graduate-studies/graduate-financial-aid/. Students who are seeking federal financial aid are required to fill out a new FAFSA form for each year of financial aid. For more information on student loans and work-study opportunities, visit the Student Financial Services website (http://www.jhu.edu/finaid/grads.html (https://finaid.jhu.edu/graduate-aid/)) or visit their office in Garland Hall.

Fellowships

Diversity Fellowships

Johns Hopkins is a community committed to sharing values of diversity and inclusion in order to achieve and sustain excellence. We firmly believe that we can best promote excellence by recruiting and retaining a diverse group of students, faculty and staff and by creating a climate of respect that is supportive of their success. This climate for diversity, inclusion and excellence is critical to attaining the best research, scholarship, teaching, health care, and other strategic goals of the Health System and the University. Taken together these values are recognized and supported fully by the Johns Hopkins Institutions leadership at all levels. Further, we recognize that the responsibility for excellence, diversity and inclusion lies with all of us at the Institutions: leadership, administration, faculty, staff and students.

WSE-Specific Graduate Fellowship Information

The Whiting School of Engineering offers a number of endowed fellowships that provide supplemental financial aid to incoming and current full-time engineering students. Full-time degree seeking graduate students are automatically considered for the fellowships. Visit WSE Graduate Fellowship and Grants (https://engineering.jhu.edu/education/graduate-studies/full-time-graduate-fellowships-grants/) for more information.

KSAS-Specific Graduate Fellowship Information

The Krieger School of Arts and Sciences offers an incredible array of opportunities for student researchers in the areas of natural science, social science, and humanities. Visit the KSAS Research (https://krieger.jhu.edu/research/) page for more information.

Veterans Educational Benefits

Johns Hopkins is approved by the Maryland Higher Education Commission for the training of veterans, service members, eligible spouses and dependents under the provisions of the various federal laws pertaining to veterans' educational benefits. Johns Hopkins University also complies with Federal Law Section 103 (effective Aug. 1, 2019) which ensures that Johns Hopkins University will not impose any penalty, including the assessment of late fees, the denial of access to classes, libraries, or other institutional facilities, or the requirement that an eligible individual borrow additional funds, on any covered individual because of the individual's inability to meet their financial obligations to the institution due to the delayed disbursement funding from the VA under Chapter 31 or 33.

Information about veterans' benefits and enrollment procedures may be obtained at https://studentaffairs.jhu.edu/registrar/veterans/ or veterans@jhu.edu the Office of the Registrar, 75 Garland Hall, 410-516-6635.

Initial Enrollment

Once admitted to the university, the student must complete an Application for Program of Education or Training (VA Form 22-1990) from the Department of Veteran Affairs (https://benefits.va.gov/gibill/). A copy of the Certificate of Eligibility, can be sent to the Veterans Desk, veterans@jhu.edu. Additional delivery options can be found at https://studentaffairs.jhu.edu/registrar/veterans/.

The student who is transferring from another university or college will need to submit a Request for Change of Place of Training (VA Form 22-1995) from the Department of Veteran Affairs (https://benefits.va.gov/gibill/). The completed form should be submitted to the VA, and a copy sent to the Veterans Desk at the university.

When enrolling in classes, please select Third Party Payer as your billing method.

Re-enrollment

Students who received veterans' benefits at the university the preceding semester and plan to enroll with no change of objective should inform the Veterans Desk, veterans@jhu.edu at the time of registration that they want to be recertified under the provisions of their eligibility. Please select Third Party Payer as billing method.

Students receiving veterans' benefits must take courses that lead toward the exact objective (usually a specific degree) on the original VA application. Students utilizing veterans' benefits must let the Veteran School Certifying Official know immediately of any change in their program or status that might affect the amount of their VA payment. If they fail to do so, the Department of Veterans Affairs will seek reimbursement from the student for any overpayment.

Standards of Progress

Continuation of VA payments depends on the student's meeting the university's academic standards for all students. The student must also meet any standards of progress which may be established by VA regulations.

Military TA

For guidance with utilizing Military tuition assistance please contact veterans@jhu.edu or Nancy Carr at ncarr5@jhu.edu .

The College Navigator Tool

Veteran students may go to the College Navigator (https://nces.ed.gov/collegenavigator/) to access a school comparison tool.

Graduate-Specific Policies

Unless noted specifically otherwise. the below policies apply to both continuing and new students.

Note: Students are subject to any and all policies as listed below, and at http://homewoodgrad.jhu.edu/, and at https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/, and at https://krieger.jhu.edu/, and at https://www.jhu.edu/university-policies/, as well as other JHU policies as defined by academic and/or administrative departments.

Statement of the Rights and Responsibilities of Ph.D. Students, and Policy on Mentoring Commitment at Johns Hopkins University

Ph.D. education is fundamental to the University's teaching and research mission. For an intellectual community of scholars to flourish, it is important to acknowledge the principles that underlie the compact between Ph.D. students, the faculty, and other members of the University community.

It is in this spirit that the Doctor of Philosophy Board, in collaboration with faculty and students from across the University, has articulated a statement of rights and responsibilities for doctoral students at Johns Hopkins (http://web.jhu.edu/administration/provost/initiatives/phd_board/rights_responsibilities/), as well as a separate policy about mentoring commitments for PhD students and their advisors (https://provost.jhu.edu/education/graduate-and-professional-education-resources/phd-mentoring-policies-and-resources/). The principles described in these documents are to be realized in policies and practices established by the various Schools of the University; the Schools will also develop mechanisms to monitor and enforce such policies.

Academic Misconduct and Research Integrity Policies

The Krieger School of Arts and Sciences (KSAS) and the Whiting School of Engineering (WSE) full-time programs and Engineering for Professionals have established the Academic and Research Misconduct Policy to address instances of misconduct by all graduate students enrolled in full-time, part-time or non-degree (special student) Krieger School of Arts and Sciences and Whiting School of Engineering graduate programs.

Procedures for handling allegations of misconduct by full-time and part-time graduate students are available in the Graduate Academic Misconduct Policy. (https://krieger.jhu.edu/hwgradaffairs/wp-content/uploads/sites/35/2018/08/Homewood-WSE_KSAS_-WSE-EP_KSAS-AAP-Graduate-Academic-Misconduct-Policy-2018SU.pdf)

Procedures for handling allegations of research misconduct by full-time and part-time graduate students are available in the The University Research Integrity Policy. (https://www.jhu.edu/assets/uploads/2017/08/university_research_integrity_policy.pdf)

Graduate Student Vacation Policy

To ensure the personal well-being and productivity of our graduate students, safeguard against excessive demands on graduate students' personal time, and introduce a minimum standard across the two Homewood schools regarding leave, the Deans of KSAS and WSE have established guidelines for Graduate Students (not enrolled in a lecture course, etc.) to be able to take leave. A detailed description of the policy can be found here: http://homewoodgrad.jhu.edu/academics/policies/.

Annual Review Policy

Once per academic year, all full#time Homewood graduate programs are required to provide a written review to:

1. all doctoral students, and
2. all master's students conducting thesis research.

Departments should include mention of funding continuation, as appropriate; as well as have a space for discussion about the student's professional development goals, and ways to develop strategies to achieve those goals. This review must include the opportunity for the student to offer self#evaluation. Students who fail to attain a program's minimum level of performance may be placed on academic probation or dismissed using the procedures outlined in the Homewood Schools Policy for Graduate Student Probation, Dismissal, and Funding Withdrawal (https://homewoodgrad.jhu.edu/academics/policies/). In making these decisions, particularly that of dismissal, the program will take into consideration extenuating circumstances beyond the student's control.

The Whiting School of Engineering has established a Guide to Effective Annual Reviews (https://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/#accordion-panel-10) to assist both advisors and students make these annual reviews a useful tool in the development of each student.

PhD Advisor/Good Standing Policy

A PhD student conducting research and/or in the writing phase of their degree program will not be able to remain in good standing with their academic and research progress if they do not have a research/dissertation advisor[1]. As such, a student who is unable to secure a research/dissertation advisor within 4 months of either:

1. a curriculum/program requirement to find an advisor and/or
2. leaving/parting ways with a previous advisor

may be placed on probation or terminated from the PhD program due to a lack of faculty-advised progress.

Note that it is typically not the role of a department to find an advisor for a student, but program Directors of Graduate Study and Chairs/Heads are typically able and willing to offer guidance and suggestions for students who are looking for an advisor. Different programs may have specific policies pertaining to the timeline of advisor assignments and grace periods for students switching advisors, but typically should not have a grace period of less than 2 months for a student to find a new advisor. Students should consult with their departmental Academic Staff and/or Director of Graduate Study for guidance.

This policy applies to both continuing and new students.

[1] A research/dissertation advisor is best defined as a departmentally-approved faculty member under whose guidance a student is conducting research/writing their dissertation and, in many cases, in whose lab/group the student is associated and expected to participate.

Grievance Policy

Any faculty member, postdoctoral fellow or graduate student of either school may grieve an adverse action or failure to act, or for a violation of University, School or departmental policy. Typically a complaint or dispute is brought to the attention of a department chair or center director and is resolved through informal discussion. In some circumstances, the Dean is asked to help in the informal resolution of grievances. The formal procedure set forth below is not meant to supplant attempts at resolving complaints through informal means. When at all possible, complaints and disputes should be settled through informal discussion, though there are no circumstances under which a grievance must be settled informally.

Please note that nothing in our policy should be construed to impinge upon the responsibilities of any office and/or regularly constituted body of the University, and should be applied only after every effort has been made to settle disputes informally. Moreover, no action may be taken with respect to a grievance that would conflict with or modify any policy approved by the Board of Trustees of the University, any policy of the University or WSE/KSAS, any federal, state, or local law or regulation, or any contract to which the University is a party.

The university policy and process on filing a grievance is available here. (https://policies.jhu.edu/?event=render&mid=764&pid=32463&fid=policy_32463.pdf&_=0.713895637856)

Jury and Witness Duty

A KSAS or WSE graduate student receiving stipend/salary from the school (i.e., a teaching assistant, research assistant paid by the university, research assistant paid by an external grant/fellowship or hourly worker) summoned for jury duty or subpoenaed to testify, is authorized to be absent from their university obligations for the actual time required by such service. A graduate student employee (salary/hourly) must present the summons or subpoena to their immediate supervisor before a leave can be issued.

Graduate student employees are eligible for paid leave of absence as a juror or court witness. Federal work study funds, however, cannot be used in these instances -- departments should fund this time using other resources.

Jury duty or duty as a court witness is service and time spent away from a University position as a result of a subpoena issued by a court. Service as a volunteer expert witness or other volunteer court duty is not included in the provisions of this leave.

Homewood Schools Policy for Graduate Student Probation, Funding Withdrawal, and Dismissal

This policy addresses consequences of student underperformance, including funding withdrawal. Students who might lose financial support as a result of the termination of funding from an advisor's sponsor should be given prompt notice, whenever possible.

For comprehensive information see the Graduate Student Probation Funding Withdrawal and Dismissal Policy (https://homewoodgrad.jhu.edu/wp-content/uploads/sites/35/2019/11/2018-Homewood-Graduate-Student-Probation-Funding-Withdrawal-and-Dismissal-Policy.pdf). (https://homewoodgrad.jhu.edu/academics/policies/)

Information Technology Policies

All users of Johns Hopkins University computing resources must comply with the University's information technology policies. For the comprehensive policies go to http://it.jhu.edu/policies/itpolicies.html.

G.W.C. Whiting School of Engineering - Specific Policies

See http://engineering.jhu.edu/graduate-studies/academic-policies-procedures-graduate/ and https://homewoodgrad.jhu.edu/academics/policies/

Zanvyl Krieger School of Arts and Sciences - Specific Policies

See https://homewoodgrad.jhu.edu/academics/policies/

Student Life

Johns Hopkins is an active and supportive community, filled with students of different viewpoints, different cultures, and different backgrounds. The thing that brings them all together is their desire to be here and to celebrate everything Johns Hopkins has to offer. The following section details campus resources specifically relevant to the graduate student experience.

Graduate students are encouraged to visit two primary resources for graduate students at Homewood:

1. The Offices of Graduate and Postdoctoral Affairs (https://homewoodgrad.jhu.edu/) (for both Kreiger and Whiting Graduate Students)

2. The Homewood Graduate Representative Organization (GRO) (https://studentaffairs.jhu.edu/gro/)

J-Card

The J-Card is the multi-use identification card used for Johns Hopkins students, faculty and staff. It is issued to students after registering for the first time. The Office of ID Card Services is located on the lower level of the Wyman Park building on the Homewood campus.

The card features typical identification information such as the person's name, photograph, classification (student, faculty or staff) and a randomly generated ID number.

The J-Card acts as the individual's library card for the Sheridan Library network. It allows the student to enter the MSE Library beyond Q-Level, to reserve and borrow books, and to pay for photocopies or document printing on library printers.

Students must show their J-Card in order to gain access to any campus computer lab. Additionally, student employees need to present their J-Card to pick up their paychecks from the Student Payroll Office.

The J-Card is also used for identification if a student has purchased a campus dining plan. J-Cash can be used at a number of restaurants and vending machines, on and off-campus. Funds can be added to any J-Card account online, over the phone, or by mail. Money can also be added in-person at various locations on campus. For more J-Card and J-Cash information, visit http://studentaffairs.jhu.edu/jcard/.

Lost or stolen J-Cards should be reported to the Office of ID Card Services by calling (410) 516-5121 (weekdays 8:30 A.M. to 5 P.M.) or the Office of Security by calling (410) 516-4600 (all other times). The account will be temporarily suspended and a new J-Card will need to be issued for a nominal fee.

Bookstore

The University's bookstore is located at the Barnes & Noble in Charles Commons on Saint Paul Street. Students can purchase textbooks and supplies at this location. Please visit their store website (http://johns-hopkins.bncollege.com/webapp/wcs/stores/servlet/BNCBHomePage/?storeId=18053&catalogId=10001&langId=-1) for hours of operation and other pertinent information.

Computer Access

Computers available to all faculty, staff, and students are located in several public computer labs and kiosks across the Homewood Campus. Labs in Krieger Hall, and the Milton S. Eisenhower Library feature extensive software allowing users to print, access email, the internet, and perform other general tasks as well as more advanced computing required for coursework and research. Computer kiosk locations in Krieger Hall, the Mattin Center, Hodson Hall, Levering Hall, and throughout the MSE library have more limited functionality.

The largest of all the Homewood labs is the Krieger Academic Computing Lab, located in 160 Krieger Hall. To gain access to the lab, students must swipe their J-Card at the locked gate. A lab consultant can be contacted during working hours by calling (410) 516-4242 or emailing consult@jhu.edu.

Security, Shuttles and Transportation

Security

The Johns Hopkins University Campus Safety and Security Office is dedicated to establishing and maintaining a safe and secure environment in which to work and visit. The Homewood Communication Center operates 24-hours a day seven days a week at the Homewood Campus. In keeping with the Jeanne Clery Disclosure of Campus Security Policy and Campus Crime Statistics Act, the Campus Safety and Security Office publishes crime reports and security bulletins. These may be found on the Public Safety Website (https://publicsafety.jhu.edu/).

Campus Security and local emergency services including Baltimore City Police, Fire or Ambulance can be summoned through Homewood's Communication Center from any campus phone by dialing 6-7777. The universal 911 number may also be used to reach Homewood's Communication Center from any on-campus phone. From off-campus, dial (410) 516-4600 to reach security. Crime and safety concerns may be reported to Campus Safety and Security by calling on-campus emergency numbers, (410) 516-7777 or 911. Additional services include the following:

- Anonymous Tip Hotline
- Crime Prevention Tips
- Escorts
- Lost and Found
- Property Registration
- Rape Aggression Defense (RAD)

Visit http://security.jhu.edu/index.html (http://security.jhu.edu/) for more information.

Shuttles and Transportation

Homewood Parking and Transportation provides services to faculty, staff and students. The primary services include:

- Homewood - Peabody - JHMI Shutttle
- Keswick - Homewood - Eastern - JHMI Shuttle
- Homewood - Bayview Express Shuttle
- Carey Business School Shuttle
- Remington Shuttle
- Homewood - Mt. Washington Express Shuttle
- Evening Blue Jay Shuttle Services
- Accessible Services

Visit http://ts.jhu.edu/ for schedules, locations and more information.

Office of University Experiential Learning (Student Employment)

The Office of University Experiential Learning (https://studentaffairs.jhu.edu/studentemployment/) is the human resources and employment center for full-time Homewood students who work for, or wish to work for, the University during their enrollment at Hopkins. The office processes all student paychecks and maintains employment records and supporting documents. The office also supports a web based job search program which students can access through their website. Students on Nonresident status must keep in mind that they can be paid at an hourly rate only, and the number of hours worked on campus may not exceed 19.9 per week.

A student job fair, hosted by the Office of University Experiential Learning, is held annually in September. Students have the opportunity to meet and interview with a variety of on- and off-campus employers at the fair. All tax forms and any other required paperwork must be filed with the Office of University Experiential Learning before students are eligible to receive their first paycheck from the University. Volunteer opportunities and community-service information can also be found at this office.

Federal Work Study (FWS): students who meet certain financial aid requirements have the option of applying for FWS positions. FWS is a federally funded program that allocates funds to the University to pay a portion of the student's salary. Approximately one-third of Hopkins students receive FWS funding. Eligibility for FWS positions is based on both the Free Application for Federal Student Aid (FAFSA) and the JHU Application for Financial Aid. The Office of Student Financial Services (https://finaid.jhu.edu/) determines eligibility based on federal regulations. An FWS award is valid for one academic year. Students must reapply each year. The maximum FWS award is $2,000. Awards may be less, depending on the type and amount of other financial assistance a given student receives. FWS employees are limited to 20 hours of work per week.

Jobs posted on the Office of University Experiential Learning website indicate whether the position is FWS or non-FWS. Job fairs and student-employment orientations also offer opportunities for students seeking FWS employment. Positions are available both on- and off-campus and encompass a wide variety of skills and interests, including lab work, web design, research, and more. Students in FWS positions are not prevented from working other paying jobs.

For more information about the Office of University Experiential Learning or to view current job postings and policies, please visit https://studentaffairs.jhu.edu/studentemployment/.

Tax Information

Student earnings are NOT automatically exempt from tax withholding, including Federal Work-Study earnings. All students are encouraged to complete and submit Tax Withholding Exemption Forms. Visit http://studentaffairs.jhu.edu/studentemployment/student-information/handbook/tax-information/ for more information.

The JHU Tax Office is available for general questions, and to point students to tax resources. The JHU Tax Office is unable to advise specifically on or prepare tax returns for JHU affiliates. Visit http://www.controller.jhu.edu/depts/tax/about_tax.html for more information.

Travel Resources

As graduate students prepare to go overseas for research, or to attend a conference, it is helpful to consider administrative, health, and safety issues before leaving the country. Graduate students are urged to complete the Johns Hopkins Travel Registry. Though this service is optional, travel registration can facilitate faster support in the event of an overseas emergency.

For more information and resources, visit http://homewoodgrad.jhu.edu/student-services/travel-resources/.

Life Design Lab

The Life Design Lab at Homewood has services ranging from resume and curriculum vitae development to on-campus recruiting. As graduate students begin thinking about professional opportunities to pursue with their degree, the Life Design Lab can help explore how skills, values, interests, and personality fit into this decision-making process.

For more information, visit https://studentaffairs.jhu.edu/life-design (https://studentaffairs.jhu.edu/life-design/).

Student Disability Services Office (SDS)

The SDS Office assists the University in compliance with the provisions of the Americans with Disabilities Act of 1990 (ADA), ADA Amendments Act (2008), and Section 504 of the Rehabilitation Act of 1973 for full-time undergraduate and graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering.

Johns Hopkins University does not discriminate on the basis of gender, marital status, pregnancy, race, color, ethnicity, national origin, age, disability, religion, sexual orientation, veteran status, or other legally protected characteristic in any student program, activity administered by the University, admission, or employment.

A person with a disability is defined by the Rehabilitation Act of 1973, and by the Americans with Disabilities Act of 1990, as an individual who has a physical or mental impairment that substantially limits one or more major life activities, has a record of such an impairment, or is regarded as having such an impairment.

The SDS Office is located at 3510 North Charles Street in the AMRII Building, Suite 0004, and can be reached at (410) 516-4720 or studentdisabilityservices@jhu.edu.

Visit http://studentaffairs.jhu.edu/disabilities/ for more information.

Parking on Campus

Parking is available on campus for graduate students at the San Martin or Decker Garages at monthly rates. Graduate students receiving a paycheck from the University are eligible for payroll deduction to pay for parking. Hang tags for free evening and weekend parking alongside academic buildings are also available. Hang tags can be purchased for a nominal fee which are valid for a maximum of 3 years. Go to the Parking Office located in the South Garage (under Mason Hall and the Decker Quad), with your J-Card, to pick up your hang tag.

Visit http://ts.jhu.edu/Parking/index.html (http://ts.jhu.edu/Parking/) for more information.

In addition to these spaces, there are a number of metered and timed parking zones around campus. Check the ordinances governing these roadside spaces. Many have two-hour time limits.

Orientation and Welcome Events for New Graduate Students

There are many resources available to assist new students in their acclimation to the Johns Hopkins Community. Orientation and Welcome Events information can be found at Kreiger School of Arts and Sciences (http://grad.jhu.edu/student-life/orientation/) and Whiting School of Engineering (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/newly-admitted-students/graduate-student-orientation/). Resources on getting settled in Baltimore as a new graduate student can be found here: https://homewoodgrad.jhu.edu/life-at-hopkins/

Professional Development

The Life Design Lab at Homewood (https://studentaffairs.jhu.edu/life-design/) (formerly the Homewood Career Center) supports and serves all Krieger and Whiting undergraduates and masters students, regardless of post-graduate plans. Life Design educators are embedded within academic departments and centers across the Krieger School of Arts and Sciences, and the Whiting School of Engineering which allows students to more easily access life design programs and courses, experiential learning, and connections with alumni and employers.

The **PHutures Office** is developing a vision, strategy, and plan for enhancing the professional development, life design, alumni connections, employer engagement, and career and mentoring opportunities for doctoral students and Postdoctoral fellows at Johns Hopkins University, with special attention to the Krieger School of Arts and Sciences and the Whiting School of Engineering.

Recreation Center

Membership to the O'Connor Recreation Center is open to all faculty, staff, and students of the university. This includes Johns Hopkins University, Bayview Medical Center, Johns Hopkins Hospital, Johns Hopkins Medical Institutions, and the Applied Physics Lab (APL).

Gym

- Fitness and weight rooms
- Climbing wall
- Fields
- Tennis courts
- Pool (indoor)
- Experiential education
- Fitness classes (yoga, yogalates, Pilates, step aerobics, cardio kick boxing, muscle classes and dance-based classes). **Note**: there may be a fee involved for classes.

Visit https://studentaffairs.jhu.edu/recreation/ or call (410) 516-5229 for more information.

Religious and Spiritual Life

Religious and Spiritual Life promotes and supports spiritual development, theological reflections, religious tolerance and social awareness among students, faculty and staff within the university community. At its heart, it serves as a prophetic and pastoral presence which seeks to enhance the spiritual and ethical educational experience of the whole person mind, body and soul.

Visit https://studentaffairs.jhu.edu/campus-ministries/ or call (410) 516-1880 for more information.

Health and Wellness

Health Benefits

It is University policy that all full-time students in the Schools of Arts and Sciences and Engineering maintain adequate health insurance coverage to provide protection against unexpected accidents and illnesses. As a full-time student, you must either purchase the University plan, or sign a waiver indicating you have health insurance coverage comparable to the University plan. All international students with a F1 or J1 Visa status are ineligible to waive and are required to purchase the university plan. Details about student health benefits offered by the University is available at https://studentaffairs.jhu.edu/registrar/students/student-health-benefits/.

Note: all full-time programs graduate students are auto-enrolled into coverage, and are responsible for following up with the Office of the Homewood Registrar's Health Insurance representative if they want to make changes, or have questions about enrollment in the plan.

Vision and Dental

Fully-funded graduate students are automatically enrolled in the vision/dental annual plan. All other graduate students may enroll in these benefits at their own cost- information can be found in SIS and on the Homewood Registrar's website.

Health and Wellness Center

The Student Health and Wellness Center exists to affirm the clear role of health and wellness in advancing academics. Its primary mission is to maintain and contribute to a healthy and safe learning environment for the student community in the Schools of Arts and Sciences, and Engineering.

Visit https://studentaffairs.jhu.edu/student-health/ or call (410) 516-8270 for more information.

Counseling Center

The Counseling Center serves full-time undergraduate and graduate students from the schools of Arts and Sciences, Engineering, Nursing, and the Peabody Institute. All of these students are encouraged to utilize the services offered by the Counseling Center.

The Counseling Center provides services to assist students in meeting their personal and mental health needs and goals. The Center has the resources to provide individual and group therapy, as well as psychiatric consultations to meet the needs of most students. The Center also offers consultation to students, faculty, staff, and parents on questions about situations and issues related to students and student-life problems.

All services are confidential and free of charge.

Visit https://studentaffairs.jhu.edu/counselingcenter/ or call (410) 516-8278 for more information.

Community Engagement

The Center for Social Concern emphasizes the value of service with others. Volunteers and community members enter into an educational process where both benefit from the interaction, and reciprocal learning is the common ground for all of our initiatives. Our programs and efforts are striving to create a strong community in and around the Johns Hopkins campus.

Visit https://studentaffairs.jhu.edu/socialconcern/ or call (410) 516-4777 for more information.

Housing

Johns Hopkins University does not offer graduate student housing. Prior to or upon arrival, graduate students should secure their own independent housing.

The Baltimore City neighborhood immediately surrounding the Homewood campus is called Charles Village. In addition, there are lots of other proximal areas in which students may consider living including

Hampden, Waverly, Roland Park, Guilford, Remington, Mt. Vernon and others.

Incoming graduate students in the Krieger School of Arts and Sciences and the Whiting School of Engineering who need housing accommodations while looking for a place to live can contact the Community Living Office for information on temporary housing.

Visit http://studentaffairs.jhu.edu/community-living/ or call (410) 516-8597 for more information.

Dining Services

An assortment of entrees, snacks, coffee beverages and other fare is available at a variety of on-campus locations that are open during all three meals and snack-times. Homewood's dining services can accommodate students with dietary restrictions whether that would be kosher, vegetarian, vegan, or other requirements. All locations accept J-Cards and cash, and some accept credit cards.

Off-Campus Dining: there are many restaurants surrounding the campus, and in adjacent neighborhoods. For the "insider's guide" to these venues, please contact the Graduate Representative Organization (GRO), which publishes information and student reviews on these and other Baltimore eateries. Visit the GRO's website at https://studentaffairs.jhu.edu/gro/.

Meal Plans: graduate students may opt to enroll in a meal plan. Meal plans on the Homewood campus are based on a block meal system, designed for both convenience and flexibility. Each block counts as one meal. Blocks expire at the end of each semester. In addition to blocks, points allow students to purchase food at the Levering Food Court, and Blue Jay Café. Points have a dollar-for-dollar value, and roll over from the fall to the spring. Points expire at the end of the spring semester.

Additional information on specific plans, kosher, or other dining options is available through the Community Living Office at http://studentaffairs.jhu.edu/community-living/dining-programs/.

Weather Emergencies

When there is an alteration or curtailment of the operating schedule of the University or a designated unit, an official announcement will be made on the University Emergency Telephone Hotline. As conditions may vary in the geographic areas where Johns Hopkins has campuses, there may be times when the Required Attendance Policy is invoked for some campuses and not others. In addition, conditions may be different on campus than they are in the area where a student lives. In times of bad weather, students should call the University Emergency Telephone Hotline to check on the status of the campus where they work.

- Baltimore - (410) 516-7781
- Outside Baltimore - (800) 548-9004

Each year the University publishes a list of radio and television stations that will be requested to announce operation changes. Because there can be mistakes in the message broadcasted, students can verify the message by calling the University Emergency Telephone Hotline.

Students may also check the JHU emergency resources at https://www.jhu.edu/alert/.

Graduate Student Organizations and Advocacy

There are a variety of graduate student organizations on campus, ranging from cultural, athletic, academic and social. For a sample of what is available to graduate students, please visit http://homewoodgrad.jhu.edu/life-at-hopkins/graduate-student-organizations/. For additional academic, cultural, athletic and social groups/organizations/clubs, please visit https://studentaffairs.jhu.edu/gro/events/list-of-groups/. Every group/organization/club is different, and some may only be open to undergraduate students, or to students from a certain campus, where others may not be bound by similar parameters. For more information, graduate students are encouraged to directly contact any group/organization/club in which they are interested. There are also several offices and student groups on the Homewood Campus that advocate for graduate students on issues both academic and pertaining to student life.

Graduate Representative Organization

The Johns Hopkins University Graduate Representative Organization (GRO) works with specific divisions to represent graduate student interests (health insurance subsidies, compensation) to various levels of the JHU administration. The GRO organizes graduate student orientation, social events, sports activities, funds campus groups, and much, much more. The GRO is proud to have earned the National Association of Graduate-Professional Students' (NAGPS) 2000 – 2001 Outstanding Graduate Student Association award, its highest honor.

The GRO is made up of graduate student representatives from every department at Homewood. This group of representatives, the GRO General Council, elects an Executive Board for an annual term. Together, the Council and Executive Board are responsible for programming, advocating, and facilitating communication for graduate students on the Homewood Campus. The GRO also holds occasional programs with the student government on the Medical Campus.

Visit the GRO at https://studentaffairs.jhu.edu/gro/.

Baltimore, the largest city in Maryland, is the center of a metropolitan area of 1.5 million people. Baltimore is a vital city long known for its ethnic neighborhoods where each wave of immigration to the United States has added to its character. People of many different backgrounds give the city a melting pot vitality that is reflected in the wide variety of restaurants, shops, and festivals. Information about Living in Baltimore is located at https://homewoodgrad.jhu.edu/life-at-hopkins (https://homewoodgrad.jhu.edu/life-at-hopkins/).

Krieger School of Arts and Sciences Contacts

Mary Favret
Vice Dean of Graduate Education, and Centers and Programs
mfavret1@jhu.edu

Renee Eastwood *(Can assist with both student life and academic issues in the KSAS)*
Assistant Dean of Graduate and Postdoctoral Academic and Student Affairs
410-516-8477
rseitz5@jhu.edu

Whiting School of Engineering Contacts

Sri Sarma
Vice Dean of Graduate Education and Lifelong Learning

ssarma2@jhmi.edu

Christine Kavanagh *(Can assist with both student life issues and academic issues in the WSE)*
Associate Dean for Residential Graduate and Postdoctoral Education

Associate Dean for Engineering Program Services
christinekavanagh@jhu.edu

The Office of Institutional Equity

Disability Services and Compliance

The Director of Student Disability Services serves as the central point of contact for information on physical and programmatic access, specific accommodations, resolution of complaints and problems, faculty and staff concerns, and identification of available services. In addition, the office can provide training, consultation, and information regarding disability issues.

Contact: Director (410) 516-8075, studentdisabilityservices@jhu.edu

Graduate students in the Krieger and Whiting Schools can also visit the Disabilities page: http://studentaffairs.jhu.edu/disabilities/.

Discrimination/Compliance

The Office of Institutional Equity Compliance and Education is responsible for the investigation and resolution of discrimination complaints received from faculty, staff, and students at Johns Hopkins University. OIE also provides mediation services for University related issues, as well as, education/training on sexual harassment.

Visit http://oie.jhu.edu/ or call (410) 516-8075 for more information. Information is also available at http://homewoodgrad.jhu.edu/student-services/sexual-assault-and-awareness/.

The Office of International Services (OIS) (https://ois.jhu.edu/) assists Hopkins' international community with visa status and with the challenges of making a transition from one setting to another.

International Graduate Students

Office of International Services (OIS) (https://ois.jhu.edu/)

OIS assists Hopkins' international community with visa status and with the challenges of making a transition from one setting to another.

The OIS staff are prepared to help with daily issues students face in adapting to an academically and culturally different environment. This office should be considered by international students as their primary source for important information regarding their status in the United States.

OIS staff members can answer questions and advise students on immigration regulations, financial concerns, health matters, housing, employment possibilities and other issues relating to an international student's period of stay in the U.S.

ISAH: International Students @ Hopkins

Ambassador Program

The application to serve as an ISAH Ambassador (https://studentaffairs.jhu.edu/oma/international-students/) is open to all undergraduate international students, graduate international students, international postdocs, and globally-conscious domestic students. Between 20-25 international student leaders will be selected from across all campuses to assist with key pillars of the international student experience: orientation, administration, socials, and international education.

International Bridge Program

Studying in a foreign country can be both challenging and exciting. International students often experience a period of cultural adjustment when they first arrive to the United States and specifically Johns Hopkins University.

The I (https://ois.jhu.edu/News_and_Events/Presentations/International_Bridge_Program/)nternational Student Bridge Program is (https://engineering.jhu.edu/admissions/graduate-admissions/full-time-programs/newly-admitted-students/new-international-students/) designed to better support this transition process for new international graduate students through monthly informational seminars and presentations on practical subjects- such as adjusting to graduate school in the US, taxes, credit in the United States, career preparations and enhancing communication and networking skills.

Departments, Program Requirements, and Courses

Course Identification

Courses listed in the catalogue are those the departments plan to offer, however, not every course is available during a given academic year. Necessarily, some courses will be canceled and other courses scheduled. The schedules of graduate and undergraduate courses for a given term are published before the end of the preceding term. In the course listings that follow, the credits shown are for one semester only. Credit hours are not assigned to graduate level courses in the School of Arts and Sciences; many departments instead indicate the hours of class time per week.

Course numbers are comprised of:

- a two-character code, identifying the school
- a three-digit code, identifying the department or program;
- a three-digit course number, with the first digit indicating level.
- Frequently, a course number will be followed by a code letter that identifies an area that is for purposes of the distribution requirements.

Code Numbers

Department and program code numbers for the School of Arts and Sciences and Engineering are as follows:

Code	Name
362	Africana Studies
070	Anthropology
553	Applied Mathematics and Statistics
375	Arabic
136	Archaeology
290	Behavioral Biology
020	Biology
580	Biomedical Engineering
250	Biophysics

540	Chemical and Biomolecular Engineering
660, 663	Center for Leadership Education
030	Chemistry
373	Chinese
560	Civil and Systems Engineering
040	Classics
050	Cognitive Science
300	Comparative Thought and Literature
601	Computer Science
700	Doctor of Engineering
270, 271	Earth and Planetary Science
310	East Asian Studies
180	Economics
520	Electrical and Computer Engineering
662	Engineering Management
060	English
370	English as a Second Language
660	Entrepreneurship & Management
570	Environmental Health & Engineering
061	Film and Media Studies
500	General Engineering
210-216	Modern Languages and Literature
384	Hebrew
381	Hindi
100	History
010	History of Art
140	History of Science and Technology
650	Information Security Institute
360	Interdepartmental
192	International Studies
194	Islamic Studies
378	Japanese
380	Korean
193	Jewish Studies Program
361	Latin American Studies
510	Materials Science and Engineering
110	Mathematics
530	Mechanical Engineering
145	Medicine, Science, and the Humanities
374	Military Science
389	Museum and Society Program
376	Music
130-134	Near Eastern Studies
080	Neuroscience
670	Nanobiotechnology
150	Philosophy
171-173	Physics and Astronomy
190,191	Political Science
661	Professional Communication
200	Psychological and Brain Sciences
280	Public Health Studies
377	Russian
230	Sociology
225	Theater Arts and Studies
371	Visual Arts
363	Women, Gender, and Sexuality
220	Writing Seminars

Course Numbers

Course numbers have the following significance:

Code	Name
100-299	Undergraduate course, lower level
300-499	Undergraduate course, upper level
500-599	Independent study/ research/ internship
600-799	Course offered for advanced degree programs
800-899	Independent study/ research and dissertation, graduate level

Code Letters

The following code letters are a guide to undergraduate distribution area designators and writing requirements:

Code	Name
(E)	Engineering
(H)	Humanities
(N)	Natural Sciences
(Q)	Quantitative Studies
(S)	Social and Behavioral Sciences
(W)	Writing Intensive

Anthropology

http://anthropology.jhu.edu/

The Anthropology Department specializes in socio-cultural anthropology: the study of social and cultural forms of human life using ethnographic, historical, and comparative methods. Faculty in our department are engaged in research that addresses topics considered traditional such as the study of ethnicity, language, religion, family and kinship, or medical pluralism, and also new and emergent issues such as those relating to childhood, technological imaginaries, biomedicine, ecology, state, violence, and popular economies. In all cases, the acute awareness of shifting contexts in which institutions are embedded and the impact of global, regional, and national politics on social life is built into the methodology and the theory engaged by faculty and students. Faculty in our department have research expertise in the Americas, South Asia, the Middle East, and sub-Saharan Africa. Our research is oriented toward the investigation of a number of cross-cutting themes of trans-regional concern rather than a comprehensive coverage of global cultural areas.

The department’s distinctive orientation to anthropology can be characterized in terms of its orientation to non-European anthropological and philosophical traditions, alongside the dominant anthropologies which have been seen as definitive of the discipline in the past. In terms of specific topics, faculty in our department are engaged in research on violence, social suffering and theories of everyday life; the material and moral force of the state; money and value; environments; new kinship; anthropology of religion and secularism; anthropology of medicine; media and visual anthropology; health and well-being; and anthropology of language.

The department offers a B.A. program and a Ph.D. program. The B.A. prepares students either to continue to various employment opportunities or degree in anthropology (and related fields) or to develop anthropological skills and imagination as complementary to pre-professional training, such as medicine, engineering, and international relations. Undergraduate course work offers an introduction to the basic methodologies and theories of contemporary anthropology through discussion and directed research on these and other topical issues. Student advising helps interested students to develop concentrations, through sequences of complementary courses tailored to their own interests, including electives outside the department. In addition, majors have the option to pursue an honors program.

Undergraduate majors in anthropology are required to do ten courses, six electives, at least four of which must be taken at 300-level or higher, and one of which can be a cross-listed course taught outside the department. After consultation with faculty, majors can take an independent study course that will count toward the major. All anthropology majors must also meet a foreign language requirement (intermediate level). Native speakers of another language, or those fluent in a language not taught at the university, can devise a plan to meet this requirement in consultation with the department. Students wishing to write an honors thesis are also required to do two additional courses in which they work on their dissertation topics. Minors are required to take five courses, two required courses and three electives, at least two electives must be 300 level or higher.

The core curriculum for majors develops a step-wise sequence from the freshman seminar to the senior honors option. We offer an elective 100-level Freshman Seminar that introduces anthropological approaches to a broad range of contemporary issues. Here, we hope to develop curiosity in anthropology as a way of knowing the world, and to encourage critical reflection by students on their own life experiences. Our 100-level introductory course, Invitation to Anthropology, is geared toward freshmen and sophomores. The objective of this course is twofold: to offer anthropological knowledge and analytic skills to a broad range of students, and to prepare potential majors for further training in social theory and fieldwork methods. Following from this introductory course, our 200-level Ethnographies course furthers student understanding of essential themes through close attention to classic and contemporary ethnographic works in the discipline. The 300-level Methods course is an additional requirement for majors, deepening students' capacity to link theory and method, preparing students to carry out field research, and guiding students in the writing up and presentation of original research. Building on these foundations, the 400-level Logic of Anthropological Inquiry course, also required of majors, is a thematic capstone course that demands an extended engagement with classic debates and encourages integrative thinking across the range of anthropology courses taken. Majors in anthropology may decide to pursue an honors thesis based on an extended research project. They should discuss their interest in writing a thesis with their faculty advisor in their sophomore year and before the summer of their junior year. Drawing from their previous course preparation and working closely with a faculty advisor, such students spend one summer conducting field research, one semester conducting secondary literature review, and the final semester writing their honors thesis.

Outside of the core curriculum, both majors and minors may take a wide variety of courses. Thematic courses are highly varied and reflect faculty interests, usually including (in any one year) courses in religion and philosophy; medical, legal, economic and linguistic anthropology; and study of diverse areas of the world. Courses on the state, law, and money offer a critical and comparative approach for students aiming toward political, economic, and legal careers. Courses in medical anthropology serve pre-med and public health students. Philosophical and theoretical courses are attractive to humanities students. We see teaching and research as integrally linked, and invite undergraduate students to envisage research as they take introductory and advanced courses in anthropology.

The training of graduate students focuses on providing students with a vocabulary and grammar to engage in anthropological reasoning in socio-cultural anthropology and with skills in research methods. The department emphasizes training in anthropological theory in relation to new developments in other disciplines within the social sciences; understanding of regions in terms of cross-cutting questions rather than geographical questions alone; and the capability to place a problem within a broad history of anthropology that is engaged through multiple national and regional traditions.

Our faculty brings into the classroom an extraordinary range of personal and professional experiences. We are proud to have one of the most diverse faculties in the discipline worldwide, both in terms of gender and ethnic or national origins. Their collective fieldwork experience spans the world, including the Americas, the Middle East, sub-Saharan Africa, and South Asia.

Facilities

In addition to the regular departmental colloquium where invited speakers from JHU and other campuses around the world present their ongoing research, the department holds one or two special symposia every year, including one organized by graduate students. The department also invites a distinguished scholar each year to present the Sidney W. Mintz Lecture. The purpose of the Mintz lectures is to integrate scholarly and social concerns, focusing on questions of political and economic inequality, racism, gender, and ethnic differences from an interdisciplinary perspective. Previous lectures have subsequently been published in Current Anthropology.

The Baltimore-Washington area is unusually rich in library, archival, and museum resources relating to anthropology. In addition to the excellent collection in the Milton S. Eisenhower Library, the William H. Welch Medical Library, and other libraries at Johns Hopkins, major anthropological holdings are available at the Smithsonian Institution, the Library of Congress, and the other specialized libraries and museums in nearby Washington, D.C. Students can use the Smithsonian Institution's ethnological and library collection through a cooperative arrangement.

Financial Aid

Undergraduate majors and non-majors are eligible to apply for a Provost's Undergraduate Research Award to support special research and write-up projects in their senior year.

Graduate fellowships and teaching assistantships are available, and most students admitted receive support. Stipends are currently offered at $33,000 per year plus fellowships that cover tuition and health insurance. Some additional funds are usually available on a competitive basis for summer field research (including travel grants from the Institute for Global Studies, the Program for the Study of Women, Gender, and

Sexuality, and the Program for Latin American Studies), and for special language-learning needs. Write-up students may apply for a Dean's Teaching Fellowship.

Programs

- Anthropology, Bachelor of Arts (p. 1651)
- Anthropology, Minor (p. 1652)
- Anthropology, PhD (p. 1652)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.070.125. Technology and Politics in Native North America. 3 Credits.
How have biodiversity protection measures, cultural heritage NGOs, genomic science, and transnational media altered the lives of Indigenous groups in North America in the twenty-first century? What does "recognition" mean for these people, and how does it actually work in practice? This course will explore the emergence of new spaces and technologies of Indigenous politics and their new roles in shaping everyday experiences, from Inuit communities in Arctic Canada to urban centers in the United States.
Area: Writing Intensive

AS.070.132. Invitation to Anthropology. 3 Credits.
This course invites students to explore the intellectual tools anthropology offers for understanding humanity in its multiple manifestations. We will examine anthropological concepts and methods, and engage in critical analysis of a range of topics including language, exchange, class, kinship, race, community, gender and sexuality, magic and religion, and capitalism.
Area: Writing Intensive

AS.070.140. Anthropology of Food. 3 Credits.
This introductory course investigates what we eat and, as a consequence, who we are. By taking a cross-cultural perspective, students will examine the politics of food production, the values associated with food preparation, and the material and social dynamics of food consumption. Through readings, films, field trips, demonstrations, and tastings, the course offers an interdisciplinary and dynamic pedagogical approach to analyzing cooking and eating—activities central to daily life and social forms more broadly. Local- and global-level issues will be addressed as students explore histories, economics, social issues, and identity formation related to food.

AS.070.154. Maps and Mapping. 3 Credits.
This course explores maps as cultural documents and ethnographic sites. Students will learn how cultural understandings of space, time, and the visible world shape cartographic conventions. Through mapping exercises we will explore how ethnographer can use maps to theorize the nature of political, cultural, and economic life.

AS.070.201. Picturizing Climate Change. 3 Credits.
Climate change is represented in many pictures, such as those of tables, graphs, iconic photographs and filmic images. It materializes in many objects and qualities in our everyday lives, such as emissions, heat, solar grids and taxes. Artists attempt to picturize climate through photographs, installations and performance art. In this class we will examine these myriad representations, materializations and artistic efforts to see what ethical, political and aesthetic issues are at stake within them. We will ask to what concerns and desires does climate change give expression?
Area: Writing Intensive

AS.070.212. Minorites in South Asia. 3 Credits.
This course will introduce first-year students to the anthropology of modern South Asia from the lens of its varied minorities. We will interrogate ideas of nation, community, tradition, and belonging across the region to understand contemporary dilemmas of diversity, heterogeneity, and cultural citizenship.
Area: Writing Intensive

AS.070.213. Data and Society. 3 Credits.
This course explores the context, experience, and consequences of data proliferation in the contemporary moment. Both experts and laypeople generate and study data at unprecedented rates to make decisions, communicate with each other, and process their environments. How do data advance or constrain our social, political, and economic relationships at large? How is knowledge transformed when it is mediated by large volumes of data? What are the consequences of trusting sociopolitical decisions to data-processing algorithms? What happens when everyday users generate data about themselves and volunteer their data to for-profit entities? The course consists of different modules zeroing in on topics ranging from the economy, to public health, climate change, media, and the law. Each module consists of lectures and seminar-type discussions, as well as interactions with invited speakers. Students will be expected to actively participate in all discussions and develop one independent project. The course content and activities tie into the 2019-2021 Sawyer Seminar on "Precision and Uncertainty in a World of Data" led by the Departments of Anthropology and the History of Medicine.
Area: Writing Intensive

AS.070.216. Militarization & Mental Health. 3 Credits.
The course explores contemporary approaches to illness and disease in which somatic expressions reflect broader histories of political violence. The readings in the course will challenge students to consider the ways in which the contours of the human body, its interior as well as its dynamic relations with the milieu are touched by structures of violence and histories of militarization. This will enable students to understand the varying expressions in which illness is expressed in the interactions between medical professionals and patients in clinical and non-clinical settings..
Area: Writing Intensive

AS.070.221. Cityness: Anthropology and the Urban Experience. 3 Credits.
This course is an introduction to urban anthropology through the study of diverse "urban experiences," to explore how they are shaped by power relations as well as resistance. We will read about crowds and anonymity, finance and poverty, media and public space to understand how they change through the evolution of technology, shifts in capital investment and flows of migration. We will examine the scope and limitations of classical (Western) notions of foundational studies city life. We will also explore how the notion of "cityness" better captures the variety of affects and dynamics of contemporary urban everyday life.
Area: Writing Intensive

AS.070.223. Engaging Plants: Human-Plant Relations in Anthropology. 3 Credits.
With their biogeochemical power of rearranging elements, plants have sustained and proliferated life on Earth. Accordingly, humans have cultivated different relations with plants, from domestication to sciences, from agriculture to industrialized plantation, across space and time. Planetary ecological crises have radically pushed us to reconsider not simply what it means to be human but also what it means to live as an “earthling” within the complicated, fast-changing webs of life and nonlife, which are fundamentally intertwined with the vegetal forms of life. This course will explore anthropologically-informed diagnoses and prognoses of the various ways of engaging plants. Specifically, we will delve into standard forms through which humans have engaged plants, institutional frameworks that have given rise to these forms, and alternatives to these forms and institutions
Area: Writing Intensive

AS.070.239. Hinduism and Ethics: The Epics. 3 Credits.
We will read sections of the two major epics Ramayana and Mahabharata to see how issues of morality and ethics are posed in these texts and the disputations around these issues.
Area: Writing Intensive

AS.070.241. African Cities. 3 Credits.
Over the past two decades, African cities have absorbed rapid population increase without accompanying economic growth. Students will review the major challenges of this mode of urbanization and explore the vibrant ways residents have sought to meet them. Following anthropology’s commitment to lived experience, we will track these issues through the twists and turns of everyday life, and consider what they may say about urbanity more broadly in the 21st century. Topics include livelihood, the built environment, conflict and membership, and popular culture.
Area: Writing Intensive

AS.070.253. Introduction to Medical Anthropology. 3 Credits.
Is illness bound within an individual body, or is it entangled with our relations? What are the ethics and politics of the doctor/patient relation? How are medical technologies changing the way we experience illness and healing? How have global institutions responded to the problems posed by disease and development? Drawing on ethnography, film, and literature, this course introduces students to how anthropologists have explored and researched problems related to health and illness.
Area: Writing Intensive

AS.070.267. Culture, Religion and Politics in Iran. 3 Credits.
This is an introductory course for those interseted in gaining basic knowledge about contemporary Iran. The focus will be on culture and religion and the ways they in which they become interwoven into different kinds of political stakes.
Area: Writing Intensive

AS.070.273. Ethnographies. 3 Credits.
What does it mean to translate the field onto the page? This course explores the craft of ethnography and its relationship to anthropological knowledge. Reading a series of classic and contemporary works, and engaging in our own writing experiments, we attend to the knotty problem of rendering lived experience, attending to narrative, voice, structure, and the relationship between description and analysis.
Area: Writing Intensive

AS.070.281. Home and Belonging. 3 Credits.
In this course we will examine different conceptions and experiences of "home" through studies of domesticity, kinship and household in diverse cultural settings. Reading anthropological analysis of urban built environment and locality, we will explore the notions of home and homeland, as realms of care, intimacy and belonging yet also as sites of subjection, discrimination and gender/racial inequality.
Area: Writing Intensive

AS.070.295. Conflict and Security in a Global World. 3 Credits.
Students will be introduced to problems of global governance in the context of transnational conflicts, changing nature of war, new epidemics and pandemics, and the threats of planetary extinction. What are the ways security is imagined and what kinds of political passions are mobilized for security of people versus security of states.
Area: Writing Intensive

AS.070.317. Methods. 3 Credits.
This course aims to teach basic fieldwork skills: Choosing and entering a community; establishing contacts; learning to listen and to ask questions and locating archival material that might be relevant. It is a hands-on course that increases student familiarity with various neighborhoods such as the Arts District in Baltimore. Recommended Course Background: two or more prior courses in anthropology (not cross-listed courses). Course is a requirement for anthropology major.
Area: Writing Intensive
AS.070.132 OR AS.070.273

AS.070.324. Latin America in a Fracturing World. 3 Credits.
This course examines the multiple and overlapping crises afflicting Latin America today through an ethnographic lens. Featuring conversations with authors of recent work on the region’s most pressing issues, we will explore the contours of knowledge production itself under conditions of precarity and violence. Discussions will include the retrenchment of borders, migration crises, the state management of life and death, the resurgence of authoritarianism, food insecurity, and resource conflicts.
Area: Writing Intensive

AS.070.329. An Introduction to Reality. 3 Credits.
Reality is a key concept we often think with more than we think about. And yet reality is not a self-evident thing. This seminar explores a central paradox in the concept of reality: as a totality—an ‘everything’—nonetheless produced and maintained from a partial and situated practice of making. The course begins with historical examinations of reality-making and -undoing then proceeds to approaches from anthropological theory and ethnography. It looks critically at the role of scientific knowledge, technological development, and capitalist and socialist ideological regimes in making realities in their own image. The course puts forth the case that anthropology is uniquely situated to understand how systems of knowledge come into being and stabilize a social order while investigating the inherent contestability and fragility of those systems.
Area: Writing Intensive

AS.070.330. Sheltering in Places: Architecture and Anthropology in Conversation. 3 Credits.
What is the relation between social life and shelter? How do the kinds of buildings we move through shape our sense of what is important, beautiful, or possible? Why do some buildings feel good and others bad? And how do buildings evolve as people inhabit, repurpose, repair or degrade them over time? The course begins with philosophical reflections on spheres, shells, and containers in relation to childhood and memory. It then explores the long interdisciplinary conversation between architecture and anthropology, focusing on the social and cultural dimensions of built structures. Finally, it considers how architectural practice is responding to contemporary challenges of migration, pandemics, and climate change.
Area: Writing Intensive

AS.070.332. Reverberations Of The Korean War. 3 Credits.
This course will takes the reverberations of the Korean War to examine the ways in which catastrophic violence is absorbed into and corrodes social life. Particular attention is paid to the transnational nature of conflict, how boundaries around peace and war are established, and how recent scholarly and artistic work on the Korean War has critically engaged dominant frameworks of memory and trauma. Readings will draw from fiction, ethnography, historiography and will also include film. This course also draws from the public syllabus on Ending the Korean War.
Area: Writing Intensive

AS.070.334. Contemporary Anthropology. 1 Credit.
Students are invited to attend, for credit, the departmental research colloquium in anthropology. The colloquium meets most (but not all) Tuesday afternoons during the semester. Students are expected to attend and listen, encouraged to ask questions when they wish, and to write one brief reflection on contemporary trends in the field, based on what they have observed during these sessions. Prerequisite: Students must have completed one Anthropology course previously This course does not apply to Anthropology major or minors towards their minimum department requirement. It counts towards your total credit requirement to degree..

AS.070.336. Ethnographic Perspectives on Brazil. 3 Credits.
This seminar offers an examination of Brazilian culture and politics through close readings of classic and contemporary ethnography. The course will track how anthropologists have approached the complexities and contradictions of Brazilian society. And, conversely, we investigate how studies in Brazil have prompted challenges to and generated innovations in anthropological thought.
Area: Writing Intensive

AS.070.337. Invisible Cities. 3 Credits.
This year marks the 50th anniversary of the publication of Invisible Cities by the Italian writer Italo Calvino. The curious little book, a kind of re-imagining of Marco Polo’s travels as a parable about the tensions between description and abstraction, has enchanted countless readers and directly inspired projects in architecture, performance art, and the social sciences. This course embarks in a close reading of Invisible Cities to enliven engagements with urban anthropology.?We will explore the hidden and uncanny in urban worlds as an inroads into discussions of theory and ethnographic inquiry.
Area: Writing Intensive

AS.070.342. Common Ground: Shared Resources, Social Economies. 3 Credits.
This course explores the idea and practice of the commons through various sites and objects (money, work, natural resources, urban land, knowledge and culture, etc.). We will examine the promise and limitations of local, grassroots social and economic forms of organization that propose alternatives to the market economy. Focusing on workers, consumers and housing cooperatives; community currencies; urban gardens; self-help associations; fair trade organizations and knowledge networks; we will enquire how these social economies propose autonomous forms of living together, and sharing resources, property and labor.
Area: Writing Intensive

AS.070.359. Korean War. 3 Credits.
This course takes the Korean War as a site to both explore: 1) contemporary historical and political transformations in East Asia and globally and 2) the ways in which violence, catastrophic loss, and separation are woven into everyday life. It will explore the Korean War through film, fiction, historiography, and draw on comparative materials in anthropology
Area: Writing Intensive

AS.070.363. Religious Freedom and Prisons in America. 3 Credits.
"Although we often think of religious freedom as a fixed philosophical doctrine of Enlightenment liberalism, it is a concept continually being (re)made from the ground up in increasingly important ways that today affect national politics and the judiciary. Nowadays, religious freedom has cultivated oppositional meanings: it holds together both a freedom from and to supersede government regulation; where actions in the name of religious freedom seek both to separate from government and to radically engage it as a theological force. We begin by taking this tension as a provocation to look locally and draw widely from a variety of ethnographic, historical, philosophical, literary, and other present-day texts and media, which will deepen how we understand the significant scope of what is at play and at stake in contemporary America and its politics. Through our readings and discussions, we will better grasp how religious freedom and its legal interpretations have grown from the bottom up, moving through local policies, social geographies and institutions, such as churches and prisons, as much as through any singular adherence to transcendent philosophical doctrine. While this class is an overarching exploration of how American Christianity has developed, it will pay particular attention to the Alabama and Louisiana prison systems and their distinctive religious histories. And we will focus on how the varied conceptual forms of religious freedom relate to the social geographies, religious discourses, literary texts, and media produced in and through ideas of the American South."
Area: Writing Intensive

AS.070.367. Science and Technology in Africa. 3 Credits.
This course explores the role of science and technology in the making of African histories and politics. We will examine precolonial iron-working, healing, and weaving; the ways guns and railroads functioned as tools of empire; the role of hydroelectric dams in postcolonial nation building; and the rise of digital communication and payment systems in the present. Throughout, we will challenge commonsense distinctions between the material and the spiritual, designers and users, wealth and people.
Area: Writing Intensive

AS.070.368. Law and Infrastructure. 3 Credits.
Students will learn to read legal judgement and decipher how law is used to make and contest claims over infrastructure.
Area: Writing Intensive

AS.070.369. Media Artist in Residence Jane Jin Kaisen. 3 Credits.
Media Artist in Residence Jane Jin Kaisen is a team-taught class between Clara Han (Anthropology) and Bernadette Wegenstein (MLL). In this class we will prepare the artist residency of Jane Jin Kaisen, a visual artist born in Jeju Island, South Korea and raised in Denmark. In the first part of the semester, we will cover theoretical questions raised in Jane Jin Kaisen's work such as cross-cultural adoption, diaspora, migration, war, gender and sexuality, and translation. In the second part we will involve students practically in questions of media arts curation for the artist's exhibit planned for April 2-9, 2022, at the Parkway Theatre, featuring three of her recent and acclaimed installations and films: The Woman, the Orphan, and the Tiger (2010), Apertures/ Rifts (2016), and Community of Parting (2019. In this class students will be closely involved with JHU's Center for Advanced Media Studies (CAMS), and the Baltimore Stavros Niarchos Parkway Theatre's artistic director Christy LeMaster. They will also meet the artist Jane Jin Kaisen during her residency.
Area: Writing Intensive

AS.070.373. Housing Matters. 3 Credits.
This course will collectively craft an anthropological critique of housing, both as a social concern and as an object of public policy and urban planning. As a key component of the structure and functioning of cities, housing is instrumental to urban governance, segregation, and citizenship, as well as to cultures of consumption and class formation, identities, solidarities and the imagination of alternative social orders. We will study several ethnographies to examine how the material and social effects of housing shape the politics of difference, rights, markets and property relations, consumption and activism in the US urban context.
Area: Writing Intensive

AS.070.375. Technology, Trust, and Expertise. 3 Credits.
How does an idea or an observation become a "fact"? How does one study "science" anthropologically? This course will introduce students to the field of science and technology studies (STS) by asking how different societies have defined the relationship between experimentation, knowledge, and power. Through ethnographic portraits of laboratories, clinics, toxic landscapes, and virtual simulations, we will explore how scientists and other experts have understood their relationships with other citizens, the state, and the physical environment.
Area: Writing Intensive

AS.070.376. Social Ecology. 3 Credits.
This course will explore social and cultural dimensions of contemporary ecological problems, thinking between ecological anthropology, environmental philosophy, and activist literature and media. It will be taught as a community-based learning course in partnership with the Center for Social Concern and a Baltimore environmental organization. Coursework will be organized on a collaborative studio basis and a project-based approach.Recommended Course Background: One prior course in either Anthropology or Environmental Studies.

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

AS.070.380. Slumworld: Life in informal Settlements. 3 Credits.
One quarter of the planet's urban population lives today in slums, shantytowns, favelas, chawls, colonias and other forms of rudimentary settlements (according to UN Habitat). Despite their prevalence throughout the world, these places are still depicted as spaces of informality and abjection, rather than as sites of emergence ofinnovative - even if disadvantaged-, makeshift ways of producing the city. This course will combine ethnographic and geographical literature, as well as works of fiction and film to explore the lives of squatters and slum-dwellers in many regions of the world and examine in what way their practices, forms of dwelling, sociality, conflict and cooperation are constitutive of the urban experience.
Area: Writing Intensive

AS.070.381. Addiction: An anthropological approach to substance dependence in the U.S.. 3 Credits.
This course offers an advanced examination of the interpersonal, institutional, and societal dimensions of addiction in the United States. The course will be divided into four sections. This first section tracks the evolution of addiction from a moral problem of the will to a formal, biomedical disease category over the course of the 20th century. This section introduces the problem of addiction within the societal context of the United States, exploring questions of political governance, social control, and issues of race, class, and gender inequality. It asks the question: what is the social life of addiction in the United States? The second section of the course will ground these broad inquiries in the urban U.S. by examining how addiction overlaps with mass incarceration, poverty, and homelessness in the U.S. city. Over the course of this section, we will engage and reframe the crack crisis of the late 20th century. The third section of the course will shift our attention to the rural United States and how addiction overlays unemployment, social isolation, and the urbanization of the U.S. Through this social and institutional lens, the third course section will explore the contemporary opioid crisis and draw comparisons with the crack crisis. The course concludes with an examination of the personal dimensions of the addiction experience and explores substance dependence in the realms of kinship, love, and personal understandings of recovery.
Area: Writing Intensive

AS.070.389. Precarity in South Korea through TV and Film:Aesthetics and everyday life. 3 Credits.
This seminar explores how precarity in South Korea gains expression in the medium of TV and film. In particular, this seminar will focus on how the moving image brings the viewer into the texture of everyday life. We will focus on the TV show Misaeng and include films such as Parasite and Burning. TV and film will be paired with readings on the transformations of intimate life in contemporary South Korea and comparative work on precarity.
Area: Writing Intensive

AS.070.402. Sustainable Design Studio. 4 Credits.
Environmental justice issues require sustainable design solutions founded on social scientific practice, technical expertise, and solidarity with community partners. Building on theoretical and methodological knowledge gained in the Fall 2020 Sustainable Design course (AS.070.433/633), the Sustainable Design Studio will bring together students, members of Baltimore social justice organizations, and practitioners from a variety of disciplines to work in collaboration to research and design solutions to complex social-ecological problems faced by partner organizations. This studio class provides students with practical, project-based design experience through community collaboration. Instructor permission required.

AS.070.403. Public Anthropology. 3 Credits.
Recent years have seen a renewed commitment to public work in anthropology, in terms of writing, presentation, and activist engagement. This course will focus on recent ethnographic work in a public vein, examining questions of medium, voice, and responsibility, as well as contexts of circulation and reception. We will explore what it means to pursue anthropology with a broader public in mind.

AS.070.407. Design Anthropology. 3 Credits.
From casinos to canoes, algorithms to animal traps, our worlds are bursting with intentional objects. The word design has come to evoke the prestige of such objects, and their power to shape our collective habits and sensations. This course explores the anthropology of designed artifacts and their complex social trajectories. Beginning with philosophical investigations into the relationship between materials, form, and craft, we will proceed through ethnographic case studies of design as expert discourse and ordinary practice. Ultimately we will consider the affinities between the ethnography and design as open-ended and not entirely predictable engagements with the world.
Area: Writing Intensive

AS.070.413. Reading Marx. 3 Credits.
This seminar offers a close reading of selected works of Karl Marx, along with supplemental secondary literature. We will explore how the central pillars of Marx's thought--including dialectical materialism, critical political economy, and utopian socialist thought—shape his critical method in interrogating the logic of capital.
Area: Writing Intensive

AS.070.419. Logic of Anthropological Inquiry. 3 Credits.
Anthropology is an endeavor to think with the empirical richness of the world at hand, a field science with both literary and philosophical pretensions. This course grapples with the nature of anthropological inquiry, reading classic works in the discipline as well as contemporary efforts to reimagine its foundations. Required for anthropology majors.
Area: Writing Intensive

AS.070.424. Normal and Pathological. 3 Credits.
This seminar explores the shifting lines of the normal and the pathological and the constitution of disease in the complex of medicine, public health, and the social. Readings include the works of Canguilhem and Foucault, historical monographs and ethnographies. Students will have the opportunity to develop substantial research or review papers throughout the course of the seminar.
Area: Writing Intensive

AS.070.425. Anthropology of Epidemics. 3 Credits.
In this course we will examine how forms of governance, politics, expert knowledge, and citizen actions are implicated in the emergence and management of epidemics.
Area: Writing Intensive

AS.070.426. Kinship: Old and New. 3 Credits.
We wil track the transformations in kinship theory in relation to wider changes in legal theory, biomedicine, and the relation between state and family. In particular we will ask how the concepts of sovereignty, gift, exchange, human and non-human milieus affect notions of relations.Co-listed with AS.070.639
Area: Writing Intensive

AS.070.433. Development without Displacement: Sustainable Design Practicum. 4 Credits.
This year-long course will create a space for students to join in the collective struggle to build equitable and sustainable urban futures in Baltimore. The course is co-taught by community organizer Shashawnda Campbell (South Baltimore Community Land Trust) and anthropologist Anand Pandian (Johns Hopkins University). Students will gain first-hand exposure to environmental conditions, community needs, and organizing efforts in south Baltimore, working closely together with community members in developing collaborative and interdisciplinary projects in sustainable design. Team projects will continue in the spring. Class sessions will take place mainly in south Baltimore, and meeting times include transportation to/from the Homewood campus.Admission by permission of instructor. Apply at this link: https://tinyurl.com/ykjauf84

AS.070.435. New War/ Civil Conflicts/ Policing. 3 Credits.
This is an advanced course in which we will interrogate the boundaries between war, civil conflict and techniques of policing. Students should be prepared to work through texts of an interdisciplinary character.
Area: Writing Intensive

AS.070.465. Concepts: How to Read Hindu and Islamic Texts. 3 Credits.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

AS.070.472. Rumors, Conspiracy Theories And Disinformation. 3 Credits.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

AS.070.495. Householding on a Warming Earth. 3 Credits.
The household appears as commonsensical to us. It is where people, most often those of a family, reside together, sharing its resources, labor and collective fate. However, anthropologists have been arguing against this commonsense since it emerged in the 1950s. Yet the household is back again in climate change policy discussions as being most vulnerable to the problems associated with climate change, such as, temperature extremes, food insecurity, exacerbated disease, enhanced competition and violence. How might anthropological debates and controversies relating to households and householding as an activity within the context of war, famine and migration, provide important insights into today's urgencies?
Area: Writing Intensive

AS.070.503. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.504. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.508. Directed Readings. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.561. Senior Essay-Fall. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.562. Senior Essay - Spring. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.596. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.602. Sustainable Design Studio.
Environmental justice issues require sustainable design solutions founded on social scientific practice, technical expertise, and solidarity with community partners. Building on theoretical and methodological knowledge gained in the Fall 2020 Sustainable Design course (AS.070.433/633), the Sustainable Design Studio will bring together students, members of Baltimore social justice organizations, and practitioners from a variety of disciplines to work in collaboration to research and design solutions to complex social-ecological problems faced by partner organizations. This studio class provides students with practical, project-based design experience through community collaboration. Instructor permission required.

AS.070.603. Public Anthropology.
Recent years have seen a renewed commitment to public work in anthropology, in terms of writing, presentation, and activist engagement. This course will focus on recent ethnographic work in a public vein, examining questions of medium, voice, and responsibility, as well as contexts of circulation and reception. We will explore what it means to pursue anthropology with a broader public in mind. Cross-listed with AS.070.403

AS.070.607. Schelling and Anthropology.
The 18th century German philosopher Schelling has been hugely influential on 20th century thought (Freud, Heidegger, Nancy, Zizek, Pierce) but remains unknown outside of philosophical circles. This neglect is unfortunate given that he has so much to offer anthropological inquiries into the relations between mind and matter, nature and culture, theology and mythology among other topics. This course places Schelling's writings and commentaries on his work alongside anthropological texts and figures to explore lines of productive conversation. The theme of a romanticism appropriate to our present will be consistently explored throughout the course.
Area: Writing Intensive

AS.070.613. Reading Marx.
This seminar offers a close reading of selected works of Karl Marx, along with supplemental secondary literature. We will explore how the central pillars of Marx's thought--including dialectical materialism, critical political economy, and utopian socialist thought—shape his critical method in interrogating the logic of capital.
Area: Writing Intensive

AS.070.616. Proseminar.
This course will consist of close reading of anthropological and philosophical texts to tracesome important aspects of the underlying presuppositions of social theory. We will try to see how regions generate both data and theory; and also see how some abiding concerns around the relation between structural formations and formations of subjects are expressed in classical and current anthropological thought.

AS.070.617. Methods.
The seminar will offer a forum for students to reflect on preliminary field research and think further about problems of ethnographic method. We will proceed in the manner of a workshop for ongoing projects. Open to anthropology graduate students only.

AS.070.619. Logic of Anthropological Inquiry.
Anthropology is an endeavor to think with the empirical richness of the world at hand, a field science with both literary and philosophical pretensions. This course grapples with the nature of anthropological inquiry, reading classic works in the discipline as well as contemporary efforts to reimagine its foundations. Required for anthropology majors.

AS.070.624. Normal and Pathological.
This seminar explores the shifting lines of the normal and the pathological and the constitution of disease in the complex of medicine, public health, and the social. Readings include the works of Canguilhem and Foucault, historical monographs and ethnographies. Students will have the opportunity to develop substantial research or review papers throughout the course of the seminar.
Area: Writing Intensive

AS.070.625. Anthropology of Epidemics.
In this course we will examine how forms of governance, politics, expert knowledge, and citizen actions are implicated in the emergence and management of epidemics.

AS.070.629. Play, Performance, And Personhood.
To approach social life as performative marked a pivotal moment in anthropology and related disciplines, and even as an implicit framework it continues to undergird more recent theoretical orientations. Revisiting foundational works in ethnography and critical theory and tracing their resonances in contemporary turns and experiments, this seminar explores play and performance as both subject and method.

AS.070.633. Development without Displacement: Sustainable Design Practicum.
This year-long course will create a space for students to join in the collective struggle to build equitable and sustainable urban futures in Baltimore. The course is co-taught by community organizer Shashawnda Campbell (South Baltimore Community Land Trust) and anthropologist Anand Pandian (Johns Hopkins University). Students will gain first-hand exposure to environmental conditions, community needs, and organizing efforts in south Baltimore, working closely together with community members in developing collaborative and interdisciplinary projects in sustainable design. Team projects will continue in the spring of 2023. Class sessions will take place mainly in south Baltimore, and meeting times include transportation to/from the Homewood campus.

AS.070.635. New War/ Civil Conflicts/ Policing.
This is an advanced course in which we will interrogate the boundaries between war, civil conflict and techniques of policing. Students should be prepared to work through texts of an interdisciplinary character."
Area: Writing Intensive

AS.070.639. Kinship: Old and New.
We will track the transformations in kinship theory in relation to wider changes in legal theory, biomedicine, and the relation between state and family. In particular, we will ask how the concepts of sovereignty, gift, exchange, human and non-human milieus affect notions of relations.Open to undergraduate anthropology majors with instructors approval..Co-listed with AS.070.426

AS.070.640. Invisible Cities.
This year marks the 50th anniversary of the publication of Invisible Cities by the Italian writer Italo Calvino. The curious little book, a kind of re-imagining of Marco Polo's travels as a parable about the tensions between description and abstraction, has enchanted countless readers and directly inspired projects in architecture, performance art, and the social sciences. This course embarks in a close reading of Invisible Cities to enliven engagements with urban anthropology.?We will explore the hidden and uncanny in urban worlds as an inroads into discussions of theory and ethnographic inquiry.
Area: Writing Intensive

AS.070.659. Proposal Writing.
The seminar will offer a forum for students to discuss research projects, prepare grant proposals and think further about issues of ethnographic methodology and writing. Open to Anthropology graduate students only.
Area: Writing Intensive

AS.070.664. n the Shadow of War: Korea, Violence, and Poverty.
This seminar will explore how violence and catastrophe are embedded in everyday life in Korea. It will focus on how to interconnect the catastrophic with the everyday, and focus on the level of the household and on forms of state knowledge of the population and the unit called "the family". This is a research seminar. Students are expected to discuss their research in depth each week and should be prepared to write a significant research paper during the course.
Area: Writing Intensive

AS.070.665. Concepts: How to Read Hindu and Islamic Texts.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

AS.070.672. Rumors, Conspiracy Theories And Disinformation.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

AS.070.673. Readings of Foucault.
We will do a close reading of selected texts of Foucault to track the concepts of power, subjectivity, government, and care of the self.

AS.070.674. Readings in Anthropology.
In this course we will engage classical texts from the anthropological archives and explore debates and contemporary salience.
Area: Writing Intensive

AS.070.676. Semiotics and its Discontents.
The relationship between speakers, communities, and forms of language-in-use (ritual, everyday life, oral literature) can only partly be captured by conceptions of language as a sign system. In this course, we will review structuralist approaches most closely identified with semiotics and move on to explore the concept of "presence" and its explanatory potential for anthropological attempts in understanding language.
Area: Writing Intensive

AS.070.682. Readings in Anthropology.
This course introduces classical texts from the anthropological archives in relation to contemporary debates in the discipline. In this year's iteration, our readings and discussion will explore the idea of a public and engaged anthropology.

AS.070.687. Romanticism and Anthropology.
The word "romantic" has long carried negative connotations within anthropology meaning the tendency to idealize, exoticize, or seek out the irrational. Instead, through a focus on the themes of magic, art, myth, nature and creativity, we suggest that romantic philosophy has offered and continues to offer much of interest for contemporary anthropology. Drawing on select readings in philosophy and anthropology, we will explore the suppressed romantic legacy of anthropology. This is an undergraduate and graduate combined course. Recommended Course Background: Undergraduates have to have taken at least one anthropology course (any level) to register. Or else they need the permission of the instructor.
Area: Writing Intensive

AS.070.691. The Anthropological Tone in Philosophy.
This course will ask: what constitutes an anthropological tone in philosophy? We will take up classical topics such as rule following, everyday life, skepticism, concept formation, realism, and signification in selected texts of anthropology and philosophy for understanding if these crisscross and overlap.
Area: Writing Intensive

AS.070.698. Defining Region.
This course is open to anthropology graduate students only and is to be run on a workshopmodel. It is to help those students writing their regional essay for the comprehensive exams toacquire expertise in regional debates and literature relevant to their field research. Our understanding of regions is one of cross-cutting concepts and questions rather than geographical framings alone. After identifying a concept or question, each student will create an annotated bibliography, trace the shape of arguments as they emerge within the readings, create an outline and work toward a draft of the final essay.

AS.070.801. Dissertation Research.

AS.070.802. Dissertation Research.

AS.070.803. Summer Research.
Summer Research for doctoral students

AS.070.866. Directed Readings and Research.

AS.070.867. Directed Reading and Research.

AS.070.871. Directed Reading and Research.

AS.070.872. Directed Readings and Research.

AS.070.874. Directed Readings and Research.

AS.070.886. Dir Readings & Research.

AS.070.892. Directed Readings and Research.

Cross Listed Courses

Comparative Thought and Literature

AS.300.301. Women and Work in the US. 3 Credits.
This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women's labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women's work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

First Year Seminars

AS.001.131. FYS: Techno - Anthropology. 3 Credits.
This course offers an introduction to anthropological perspectives on technology. We begin the human body as our most basic technology, and survey various tradecraft (fire and animal domestication, time-keeping, inscription, sailing) that have adapted us to diverse environments. We then examine the consequences of industrial technology, with its emphasis on automation, standardization and scaling. Finally, we turn to the rise of information technology such as social media, and the ways it has transformed senses of communication and place. Throughout we attend to the complex interplay of technological power and social organization.
Area: Writing Intensive

AS.001.183. FYS: What Does It Mean to Be Religious? Creativity, Experience, and the Individual. 3 Credits.
What do we mean when we say that something or someone is "religious?" Our First-Year Seminar unpacks this question through a comparative approach, and pays special attention to the ways in which this term has been applied to the study of Islamic cultures and Muslim experience. Through an exploration of the categories of experience, creativity and the individual, we offer a less presumptuous and more open-ended way of imagining the many things it may mean to be religious.

History

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.365. Culture & Society in the High Middle Ages. 3 Credits.
This course will cover the period commonly known as the High Middle Ages, that is, the civilization of Western Europe in the period roughly from 1050 to 1350. . It is a period of exceptional creativity in the history of Western Europe and in medieval history specifically, a time when many of the most characteristic institutions of Europe came into being.
Area: Writing Intensive

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, "virgins" in paradise, the sexual slavery of Yazidi women…. This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

History of Art

AS.010.339. Sex, Death, and Gender: The Body in Premodern Art, Medicine, and Culture, c. 1300-1600. 3 Credits.
To what extent was the body and its depiction a site of contestation, identification, or desire in the Middle Ages and Renaissance? If the body in the West since the 1800s is seen to have been shaped by the rise of photography and film, the institutionalization of biomedicine, and the establishment of techniques of surveyance and mechanization, then how was the body represented, disciplined, and experienced in the preceding centuries? In an age of unprecedented encounter with non-European bodies, what did it mean to describe and categorize bodies by race, region, or religion? These are some of the major questions this class seeks to answer, which is fundamentally interdisciplinary as it draws upon insights and methods from anthropology and the history of medicine and history of science to investigate how the body has been represented and imagined in the visual arts. The bodies of the suffering Christ, the female mystic, the dissected cadaver, the punished criminal, and the non-European 'Other' will loom large as we work to problematize notions of a normative body, whether in the premodern world or in the contemporary one. While most readings and lectures will concern the body and its representation in the Christian West during the later Middle Ages and Renaissance, students are encouraged to work on a topic of their choosing from any geographical area 1000-1800 CE for their research papers.
Area: Writing Intensive

AS.010.382. The Politics of Display in South Asia. 3 Credits.
Through an examination of colonial exhibitions, the rise of national, regional, and archaeological museums, and current practices of display and representation in institutions, we will explore how the image of South Asia has been constructed in the colonial, modern, and contemporary eras. We will engage with the politics of representation, spectacle, and the economies of desire as related to colonialism and the rise of modernity. Readings from postcolonial theory, museum studies, anthropology, history, and art history.
Area: Writing Intensive

AS.010.634. Rethinking the Renaissance: Alternatives to "Early Modernity".
"The Renaissance" as a periodization under attack, and its persistance; the hermeneutics of the Pre-Modern Image since Panofsky; the critique of Eurocentrism; challenges to and recuperations of iconology, assessing the contributions of semiotics, psycholanalysis and queer theory.

Interdepartmental

AS.360.623. Latin America in a Globalizing World.
An interdisciplinary seminar on Latin America's role in global economic processes, from both historical and contemporary perspectives. Participants will engage with scholarly and primary texts as well as share written work. The Fall 2022 seminar will examine the topic of Latin American political thought.

Islamic Studies

AS.194.202. Never Forget: Muslims, Islamophobia, and Dissent after 9/11. 3 Credits.
In partnership with the social justice organization Justice for Muslims Collective, this community-engaged course and oral history project will explore how diverse Muslim communities navigated and contested belonging and political and cultural agency amidst state-sponsored violence and national debates on race, gender, citizenship and national security after 9/11 and during the ongoing War on Terror. Through history, ethnography, first-person narratives, film, fiction, and online resources, students will learn about the impact of 9/11 on American Muslim communities. This includes cultural and political resistance to imperialism, racism, and Islamophobia as well as to intersectional inequities within Muslim communities that were intensified in the context of Islamophobia. Students will learn about community activism and organizing from JMC, and complete a participatory action research project with the organization. This project is an oral history archive that will address gaps in the documentation of movement histories when it comes to early organizing against War on Terror policies by Muslim communities and communities racialized or perceived as Muslim. Students will be trained to record stories of resistance among leaders who organized and responded at the local and national-level in the Greater Washington region, to support the building of an archive that will shape a wide variety of future organizing and advocacy efforts.

AS.194.305. Cultures of Pilgrimage in Islam. 3 Credits.
The hajj pilgrimage to Mecca is one of the pillars of Islam. But Muslims around the world also take part in many other pilgrimages, from the massive annual Shi'a pilgrimage to Karbala to the smaller ziyarat "visits" to Sufi saint shrines, to travel to centers of Islamic learning, to pilgrimage to isolated natural features like mountains, trees, valleys. What are the theologies that propel the act of travel in Islam? How are cities, architectures, economies shaped by these cultures? And how are these traditions affected by the wars and colonial projects that plague many Muslim-majority countries in the contemporary world? Readings in this course will draw from anthropology, philosophy, Islamic interpretive texts (tafsir), and travelogues.
Area: Writing Intensive

Medicine, Science and the Humanities

AS.145.219. Science Studies and Medical Humanities: Theory and Methods. 3 Credits.
The knowledge and practices of science and medicine are not as self-evident as they may appear. When we observe, what do we see? What counts as evidence? How does evidence become fact? How do facts circulate and what are their effects? Who is included in and excluded from our common-sense notions of science, medicine, and technology? This course will introduce students to central theoretical concerns in Science and Technology Studies and the Medical Humanities, focusing on enduring problematics that animate scholars. In conjunction with examinations of theoretical bases, students will learn to evaluate the methodological tools used in different fields in the humanities to study the production and circulation of scientific knowledge and the structures of medical care and public health. This problem-centered approach will help students understand and apply key concepts and approaches in critical studies of science, technology, and medicine.
Area: Writing Intensive

AS.145.220. Health, Medicine, Gender, and Sexuality. 3 Credits.
This course invites students to take the perspective of gender and sexuality on health and medicine. In this course, we do not see gender and sexuality as a separate domain of health. Instead, we will learn how a gender perspective is in fact crucial for critically exposing the ways in which medicine is interpenetrated by social life and by law. For example, what technologies and discourses constitute "the normal"? How is sexuality braided into disease surveillance? How do we understand the lawfare on the terrain of reproductive rights? What aspects of disease are suppressed in dominant forms of knowledge production, due to the undervaluation of gendered forms of experience? We will take cases involving HIV/AIDS; reproductive justice and rights; poverty, marginality and queer kinship; and household patterns of care.

AS.145.360. Incarceration and Health: Critical Perspectives. 3 Credits.
Can care exist in a space of punishment? Institutions of incarceration are inherently spaces of violence and social control and, in the U.S.'s current context of mass incarceration, racial oppression. Yet prisons, jails, and detention centers are required to provide individuals access to health care. How can we understand this convergence of care for the body and psyche with multiple forms of carceral violence? This course will examine modes of health and health care inside institutions of incarceration as they are situated within broader socio-political contexts that shape society's over-reliance on incarceration as a means of social and racialized control. Drawing on history, anthropology, sociology, legal theory, critical race studies, and public health, the course will explore the everyday realities inside institutions of incarceration as they relate to suffering and care and how those are connected to policies and processes of subjugation outside the institutions' walls. Case studies for examining these relationships include pregnancy, COVID-19, addiction, and mental illness behind bars. Students will engage with concepts such as disciplinary power, biopower, carceral and anti-carceral feminism, theories of care, medical abolition, and dual loyalty. While the course will primarily focus on the U.S. context, we will also draw comparisons to non-U.S. settings. Throughout the course we will seek to understand how institutions of incarceration are not, as popularly understood, isolated places "elsewhere," but implicitly porous with so-called free society—and therefore as exemplars for understanding the connections among health, inequality, and state institutions.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.641. Women Filmmakers from the Margins.
Filmmaking remains an overwhelmingly male-dominated profession, but women are making significant inroads, and in so doing are leaving their distinctive mark on the medium. In this seminar we will examine the films of a group of women auteurs (those who write and direct their own films) who have endeavored to speak from the margins—be they social, geographical, or sexual—and whose work has challenged mainstream cinematic norms. The filmmakers whose work we will analyze may include Jane Campion, Australia; Aurora Guerrero, Mexico-USA; Claudia Llosa, Peru; Mira Nair, India-USA; Marialy Rivas, Chile; So Yong Kim, Korea.
Area: Writing Intensive

AS.211.748. Media Theory in the Age of Big Data.
This seminar will explore some key themes in contemporary media theory in an age when five tech giants have succeeded in infiltrating the daily lives of global citizens to an unprecedented degree in history. We will study the impact of this saturation on socioeconomic inequality as well as the implications of an almost total loss of privacy.Among the strategies of resistance to the capacity for surveillance these companies have developed we will focus in particular on current examples of feminist media art and voices from the global and cultural periphery as well as tendencies in these practices to emphasize a return to interpersonal connections and the embodied here and now. As case studies we nay include #metoo, slo-film movements from Southern Bahia in Brazil, and the financing and distribution of art films by mega media companies like Netflix.

AS.211.754. Modernist Primitivism.
This course will explore the aesthetics and politics of primitivism in European modernity, focusing on the visual arts and literature in German and Yiddish, but looking at the wider European context, including France and Russia. We will begin with the backgrounds of primitivism in Romanticism, looking especially at its ethnographic and colonial sources. We will then focus on the presence of anthropological and ethnographic discourses within various registers of modernist thought, literature, and visual culture, with special attention to visual and literary primitivism. Our central concerns will include: the attempt to create a modernist aesthetics grounded in ethnography; the primitivist critique of modernity; the place of primitivism in the historical avant-garde; the development of the notion of “culture” in modernity; and the aesthetics of modern ethnic and national identity. Key thinkers, artists, and writers to be considered include Herder; Gauguin; Picasso; Wilhelm Worringer; Carl Einstein; Hannah Höch; and Emil Nolde.

AS.215.406. Novelist Intellectuals. 3 Credits.
What does a novelist’s op-ed about economics have to do with her literary writing? In what ways does a fiction writer’s essays on the environment inform how we read her novels? What happens when we find the political opinions of a writer objectionable? This undergraduate seminar will consider what the Spanish writer Francisco Ayala termed “novelist intellectuals,” that is, literary writers who actively participate in a society’s public sphere. Considering writers from Madrid to New York, from London to Buenos Aires, we will ask how one should hold a novelist’s fictional and non-fictional writings in the balance and explore ways of reading that allow us to consider the public intellectual side and the aesthetic side of a novelist together.

AS.215.412. Populism. 3 Credits.
What do Hugo Chávez, Marine Le Pen, and Donald Trump have in common? According to many from across the political spectrum, they are all populists. But what is populism, exactly, and how can it describe such disparate phenomena as left-wing social movements, xenophobic anti-immigrant policies, and economic redistribution? This advanced seminar will examine the history, culture, and political theory of populism. We will pay special attention to the resurgence of populism after the Great Recession and examine a number of cases from Latin America, Europe, and the United States.

AS.215.417. Literature of the Great Recession. 3 Credits.
The Great Recession—sometimes called the financial crisis or the economic crisis of 2008—brought financial markets to a halt and created significant political turmoil across the North Atlantic. But its impact on culture, and literature especially, has often been ignored. This seminar will travel across Europe, from Dublin to Madrid, from London to Reykjavík in order to examine how literature has registered this most recent economic crisis. We will focus on how crisis is narrated and the ways in which literary works have managed to provide a voice for marginalized social, economic, and political demands.

AS.215.718. Contemporaneity and Crisis.
How should one study contemporary literature and culture? Is “the contemporary” a period in and of itself? Does it require a distinct conceptual approach? This graduate seminar will examine various approaches that have emerged since Michel Foucault called his genealogies a “history of the present.” We will pay special attention to contemporary literature and culture’s most distinguishing feature today: crisis. Considering theories of crisis and “the contemporary” together, the course will explore how living in a time of overlapping crises—economic, political, social, cultural, environmental, and others—affects the way we interpret the world.

Near Eastern Studies

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.
A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.214. The Origins of Civilization: A Cross-Cultural Perspective. 3 Credits.
One of the most significant transformations in human history was the “urban revolution” in which cities, writing, and social classes formed for the first time. In this course, we compare five areas where this development occurred: China, Mesopotamia, the Indus Valley, Egypt, and Mesoamerica (Mexico/Guatemala/Honduras/Belize). In each region, we review the physical setting, the archaeological and textual evidence, and the theories advanced to explain the rise (and eventual collapse) of these complex societies.

AS.133.304. Let's Play! Games from Ancient Egypt and Beyond. 3 Credits.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.616. Let's Play! Games from Ancient Egypt and Beyond.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

Program in Museums and Society

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

Sociology

AS.230.367. Islamic Finance. 3 Credits.
Today, Islamic finance is a global industry comprising nearly $3 trillion in assets, with hubs from Kuala Lumpur to Dubai to London. But half a century ago, nothing called “Islamic finance” existed. So where did Islamic finance come from? Why is it growing so fast? And what does it mean for finance to be Islamic? We discuss the ban on usury in Islam and other religious and philosophical traditions, finance in early and medieval Islamic societies, petrodollars and the birth of Islamic banking in the 1970s, the rise of Islamic capital markets since 2000, contemporary shariah-compliant financial structures, and the constitution of piety through financial practice.

Study of Women, Gender, & Sexuality

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.330. Ecofeminist Debates: Gender and Sexuality Beyond the Global West. 3 Credits.
This course develops an interdisciplinary and comparative approach to introduce students to ecofeminism through a special focus on its inflections in non-western contexts. Through class discussions and sustained writing engagement, we will develop an understanding of the history of ecofeminism, including theoretical debates linking gender perspectives with political mobilization, as well as ecofeminism's enduring influence on new intellectual and political movements.

AS.363.345. Zora Neale Hurston: Ethnography as Method. 3 Credits.
While many recognize Zora Neale Hurston's creative literary work, her methodological innovations are often overshadowed. This course will examine Hurston's contributions to theorizing the African diaspora and creative use of ethnography.Dr. Amarilys Estrella, the 2020-2021 ACLS Emerging Voices Postdoc, will teach this course. For more info on Dr. Estrella, see https://history.jhu.edu/directory/amarilys-estrella/

For current faculty and contact information go to http://anthropology.jhu.edu/people/

Anthropology, Bachelor of Arts

Anthropology Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587))

To complete an anthropology major, students must complete a total of 30 credits (10 courses) in Anthropology and foreign language through the intermediate level. Only with permission of the director of undergraduate studies may students use one class taken at another institution not directly equivalent to a JHU course towards the major. Students must take completed course materials to the director of undergraduate studies to discuss if a non-equivalent transfer course can apply towards the major. Majors must receive a grade of C or better in all major requirements and no major requirements may be taken satisfactory/unsatisfactory. Complete major requirements are:

Code	Title	Credits
Required Courses		
AS.070.132	Invitation to Anthropology	3
AS.070.273	Ethnographies	3
AS.070.317	Methods	3

AS.070.419	Logic of Anthropological Inquiry	3
Anthropology Electives [1]		
Two 100-400 level courses in the Anthropology Department		6
Four 300- or 400-level courses in the Anthropology Department		12
Foreign Language		
Foreign language through the second semester of the intermediate level. Native speakers of another language, or those fluent in a language not taught at the university, can devise a plan to meet this requirement in consultation with the department.		14
Total Credits		**44**

[1] One cross-listed course taught outside the Anthropology Department may apply towards the major. With permission, one independent study may apply towards the major.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.070.132	Invitation to Anthropology	3
Foreign language		4
	Credits	**7**
Second Semester		
AS.070.1xx-4xx: Anthropology elective		3
Foreign language		4
	Credits	**7**
Second Year		
First Semester		
AS.070.1xx-4xx: Anthropology elective		3
Foreign language		3
	Credits	**6**
Second Semester		
AS.070.273	Ethnographies	3
Foreign language		3
	Credits	**6**
Third Year		
First Semester		
AS.070.317	Methods	3
AS.070.3xx-4xx: Anthropology elective		3
	Credits	**6**
Second Semester		
AS.070.419	Logic of Anthropological Inquiry	3
AS.070.3xx-4xx: Anthropology elective		3
	Credits	**6**
Fourth Year		
First Semester		
AS.070.3xx-4xx: Anthropology elective		3
	Credits	**3**
Second Semester		
AS.070.3xx-4xx: Anthropology elective		3
	Credits	**3**
	Total Credits	**44**

Honors Thesis in Anthropology

Students with at least a 3.5 GPA (major GPA) by their junior year are encouraged to write a senior thesis by registering for the two-semester Senior Essay (AS.070.561 Senior Essay-Fall and AS.070.562 Senior Essay - Spring) under the guidance of a faculty advisor.

Anthropology, Minor

Anthropology Minor Requirements

A minor in anthropology is available to undergraduate students in any major. Minors must receive a grade of C or better in all courses applying towards the minor requirements and all courses for the minor must be taken for a letter grade (no satisfactory/unsatisfactory grading). One cross-listed course taught outside the Anthropology Department may apply towards the minor; all other courses must be taken in the department. Only one course taken at another institution that is not directly equivalent to a JHU course may apply towards the minor and this course requires permission of the Director of Undergraduate Studies to apply. If one of these is accepted, the student may not take a cross-listed course.

Code	Title	Credits
Required Courses		
AS.070.132	Invitation to Anthropology	3
AS.070.317	Methods	3
Anthropology Electives [1]		
Two 100-400 level courses in the Anthropology Department		6
Two 300-400 level courses in the Anthropology Department		6
Total Credits		**18**

[1] One cross-listed course taught outside the Anthropology Department may apply towards the minor.

Anthropology, PhD

The graduate program in anthropology leads to the Ph.D. degree. By admitting a small cohort each year, the Department of Anthropology encourages close working relationships between students and faculty and the opportunity for students to develop their anthropological interests in ways that are uniquely suited to them to become researchers, scholars, and teachers. We also encourage and help develop students wishing to pursue non-academic research careers in keeping with the needs of the contemporary world.

Program Requirements

Students will usually spend three years in residence, one year or more conducting field research, and a final year completing the dissertation. Requirements include:

- A total of twelve courses to be completed in the first three years. The first of these courses is Proseminar and is a requirement for incoming students.
- Students will sit a three-hour exam near the end of their first year. Incoming graduate students will be provided with a reading list at the start of the summer before the academic year to initiate their self-directed growth as anthropologists and to help them prepare for the exam.

- Students are expected to conduct exploratory fieldwork during the first summer. They are to write a proposal for this fieldwork and discuss their work upon return in a departmental methodology workshop. This workshop accompanies the Methods course, which is a requirement for students in their second year.
- For the comprehensive exams, students are required to write two essays (one conceptual and one on their study area). These essays will ideally also help develop their dissertation research proposal. The essays should preferably be completed by the end of the second year. A course called Regions has been developed to assist students in writing the essays.
- Students are also encouraged to take the Proposal Writing course offered and to apply for fieldwork grants from external agencies.
- A student should be able to demonstrate a reading knowledge of at least one foreign language relevant to their field of study before completing the comprehensive exams.
- A Post-Field course will be offered to those returning from the field to help them begin writing their dissertation, along with relevant professionalization workshops as needed. Post-field students are required to give a seminar on their research in the departmental colloquia series.

For further information about graduate study in anthropology, contact the academic program administrator in the Department of Anthropology or visit the departmental website at http://anthropology.jhu.edu.

Archaeology

http://krieger.jhu.edu/archaeology/

The major in archaeology is an interdepartmental program that introduces students to archaeological theory, the analysis of archaeological materials, and the results of archaeological research in prehistoric and early historic periods in the Old and New Worlds. Archaeology studies human societies through examination of their material culture (physical remains), considering such issues as human subsistence, interaction with climate and physical environment, patterns of settlement, political and economic organization, and religious activity and thought. The field allows for the study of the entirety of human experience from its beginnings to the present day, in every region of the world and across all social strata.

Students in the major will have the opportunity to study and conduct research on materials stored in The Johns Hopkins Archaeological Museum, which consists of a diverse and extensive assemblage of artifacts from ancient Greece, Rome, Egypt, Mesopotamia, Palestine, and Mesoamerica. Opportunities may also be available to study materials in the Classical, Egyptian, and Near Eastern collections in the Walters Art Museum.

Programs

- Archaeology, Bachelor of Arts (p. 1658)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.136.101. Introduction To Archaeology. 3 Credits.
An introduction to archaeology and to archaeological method and theory, exploring how archaeologists excavate, analyze, and interpret ancient remains in order to reconstruct how ancient societies functioned. Specific examples from a variety of archaeological projects in different parts of the world will be used to illustrate techniques and principles discussed.

Cross Listed Courses

Anthropology

AS.070.132. Invitation to Anthropology. 3 Credits.
This course invites students to explore the intellectual tools anthropology offers for understanding humanity in its multiple manifestations. We will examine anthropological concepts and methods, and engage in critical analysis of a range of topics including language, exchange, class, kinship, race, community, gender and sexuality, magic and religion, and capitalism.
Area: Writing Intensive

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

AS.070.419. Logic of Anthropological Inquiry. 3 Credits.
Anthropology is an endeavor to think with the empirical richness of the world at hand, a field science with both literary and philosophical pretensions. This course grapples with the nature of anthropological inquiry, reading classic works in the discipline as well as contemporary efforts to reimagine its foundations. Required for anthropology majors.
Area: Writing Intensive

Behavioral Biology

AS.290.101. Human Origins. 3 Credits.
This course examines the origins of human structure, function and behavior from an evolutionary perspective. It includes study of the evolution, behavior and behavioral ecology of nonhuman primates, hominid evolution (including the paleontological and archaeological records), and the origins of human cognition, social behavior and culture.

Biology

AS.020.379. Evolution. 3 Credits.
This course takes a broad look at the impact of natural selection and other evolutionary forces on evolution. Emphasis is placed on what we can learn from genome sequences about the history of life, as well as current evolutionary pressures.Recommended Course Background: AS.020.306, AS.020.330, or permission required

Classics

AS.040.111. Ancient Greek Civilization. 3 Credits.
The course will introduce students to major aspects of the ancient Greek civilization, with special emphasis placed upon culture, society, archaeology, literature, and philosophy.

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

AS.040.348. Worlds of Homer. 3 Credits.
Through texts, art, and archaeological remains, this course examines the various worlds of Homer--those recalled in the Iliad and Odyssey, those within which the epics were composed, and those born of the poet's unique creative work. Class will make museum visits. Ancient texts read in translation..

AS.040.400. The Archaeology of Cyprus: Investigating a Mediterranean Island World in the JHU Museum. 3 Credits.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Class involves regular analysis of artifacts based in the Archaeological Museum.

Earth & Planetary Sciences

AS.270.202. Introduction to Ecology. 3 Credits.
Ecology is the study of organisms and their environment. This course focuses on the patterns of distribution and abundance of organisms. Topics include population dynamics and regulation, competition, predation, host-parasite interactions, patterns of species diversity, community succession, the flow of energy and matter through ecosystems. We will also discuss the role of natural and human disturbances in shaping communities.
AS.270.103 OR AS.020.151

AS.270.205. Introduction to Geographic Information Systems and Geospatial Analysis. 3 Credits.
The course provides a broad introduction to the principles and practice of Geographic Information Systems (GIS) and related tools of Geospatial Analysis. Topics will include history of GIS, GIS data structures, data acquisition and merging, database management, spatial analysis, and GIS applications. In addition, students will get hands-on experience working with GIS software.

Environmental Health and Engineering

EN.570.406. Environmental History. 3 Credits.
Environmental history explores the interactions between social change and environmental transformation, or the ways in which societies modify landscapes and are themselves affected by geological, climatological and changing ecological conditions. Topics include the relationship between climate change and human evolution, the environmental impacts of market-based commodity production and regional economic specialization; the relationship between urbanization and environmental change; how warfare affects and is affected by environmental conditions.
Area: Writing Intensive

First Year Seminars

AS.001.148. FYS: Dining and drinking in the ancient Mediterranean world. 3 Credits.
This First-Year Seminar focuses on the cultures of dining and drinking in the ancient Greek and Roman worlds, with excursions into the foodways of other ancient societies abutting the Mediterranean basin. We will investigate the social practices and values that are associated with conviviality in these societies, and how such practices and values change over time. We will consider the kinds of communities that these practices construct, and how and to what extent different kinds of people are included, excluded, or placed in a social hierarchy by their participation in these practices. Special attention will be given to feasting as represented in the Homeric poems, especially the Odyssey; to the Archaic and Classical Greek symposion; and to the Roman convivium and other dining forms extending to late Antiquity. Fueling our investigation and underpinning our discussions will be a wide variety of ancient Greek and Roman texts (to be read in English translation); images and representations of ancient dining in diverse visual media, including Greek vase painting, Roman wall painting, and mosaics; and archaeological evidence for the spaces, settings, and implements of ancient dining and drinking. Throughout, we will engage with key scholarship on aspects of this topic. The seminar includes visits to the Walters Art Museum, the Baltimore Museum of Art, and the Johns Hopkins Archaeological Museum, all of which house objects that illuminate our inquiry. It may also involve screenings of films or clips featuring modern imaginative reconstructions of ancient dining events.

History

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

History of Art

AS.010.204. Italian Art in the Middle Ages. 3 Credits.
This course explores key monuments of medieval art and architecture in Italy from c. 400 until 1350. We will concentrate on historical, functional, and aesthetical aspects that lead to the creation of single monuments and art works. Emphasis is given to the analysis of "sacred space" by means of architecture, painted, and sculptural decoration, as well as ritual performances. Another focus is laid on the emergence on the political dimension of art for the creation of civic identity as well as in the context of the late medieval courts. We raise questions about the importance of materiality and science for the creation of medieval art works.
Area: Writing Intensive

AS.010.205. Art of Mesoamerica. 3 Credits.
This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.240. Art and the Environment in the Ancient Eastern Mediterranean. 3 Credits.
What is the relationship between art and the environment? What are “geoaesthetics?” This course explores the interrelationships between ecosystem and creative responses and practices in the ancient Eastern Mediterranean. Specifically, the class will examine the intersections between artistic and architectural practices and the natural environment during the New Kingdom in ancient Egypt, the Neo-Assyrian period in ancient Mesopotamia, and the Minoan Bronze Age in the ancient Aegean.

AS.010.307. Diplomats, Dealers, and Diggers: The Birth of Archaeology and the Rise of Collecting from the 19th c. to Today. 3 Credits.
The development of archaeology in the Middle East – its history of explorers, diplomats, missionaries and gentlemen-scholars – profoundly shaped the modern world, from the creation of new museums and the antiquities market to international relations and terrorism.

AS.010.309. The Idea of Athens. 3 Credits.
This thematic course will explore the art, architecture, material culture, and textual evidence from the ancient city of Athens, the many cultures and social positions that made up the ancient city, and the idea of the city as something far beyond its reality. We will take a number of field trips to museums in the area and some of your assignments will be based in local museums.

AS.010.315. Art of the Assyrian Empire, 1000-600 BCE. 3 Credits.
From 900 to 609 BCE, the Assyrian Empire dominated the ancient Near Eastern world, stretching from western Iran to the Mediterranean and Egypt. In concert with imperial expansion came an explosion of artistic production ranging from palace wall reliefs to small-scale luxury objects. This course provides an integrated picture of the imperial arts of this first world empire, situating it within the broader social and political contexts of the first millennium BCE. In its conquest of foreign lands, this powerful state came in contact with and appropriated a diversity of cultures, such as Phoenicia, Egypt, and Greece, which we will also study.

AS.010.349. Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE. 3 Credits.
The arts of Egypt, Greece and the Near East are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. From 2000 to 500 BCE (the Middle/Late Bronze and Iron Ages), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Egyptians, Near Easterners, Greeks and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war, imperialism, and colonization.
AS.010.301 - Titled "Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE" - Students who have taken that course in 2014 or prior are not permitted to take this course.

AS.010.350. Body and Soul: Medicine in the Ancient Americas. 3 Credits.
This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

AS.010.364. Babylon: Myth and Reality. 3 Credits.
Babylon – the name resonates even today, from the biblical whore of Revelation to sci-fi. It evokes exotic places and time long past. But what do we really know about the ancient city and the civilization that flourished there thousands of years ago? The first part of this course examines the archaeological city of Babylon, located in the modern state of Iraq, and considers its artistic and architectural achievements in the context of Mesopotamian history. The second part of the class explores the ongoing impact of Babylon in the cultural imagination of later periods, from the Classical and biblical authors, to European artists, Hollywood movies, science fiction, and contemporary political movements.

AS.010.365. Art of the Ancient Andes. 3 Credits.
The ancient visual arts of Andean South America and their respective cultural contexts form the basis of this course. In conjunction with the Baltimore Museum of Art and the Johns Hopkins Archaeological Museum students will have access to collections for study.

AS.010.366. Native American Art. 3 Credits.
The works of Native American artists are examined and discussed in their respective social and historical contexts. Such works include Hopewell stone sculpture, Mimbres pictorial painting, and Tlingit guardian figures. We examine the concept of sacred landscape through analysis of monumental earthworks and effigy mounds, Anasazi architecture, and rock art. In conjunction with the Baltimore Museum of Art (BMA), and Johns Hopkins Special Collections, students will have access to collections for study.

AS.010.389. The Stone and the Thread. 3 Credits.
Advanced inquiry into imperial Inka architecture and fiber arts.
Area: Writing Intensive

AS.010.390. Ancient Americas Object Workshop. 3 Credits.
Analysis of ancient Americas collection held in the Johns Hopkins Archaeological Museum.
Area: Writing Intensive
AS.010.105 OR AS.010.407 OR AS.010.398 OR AS.010.365 OR AS.010.389 OR AS.010.366 OR AS.010.214 or in consultation with professor prior to registration.

AS.010.398. Tombs for the Living. 3 Credits.
Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.407. Ancient Americas Metallurgy. 3 Credits.
This course addresses the technology, iconography and social significance of metals and draws on case studies from the Americas. Collections study in museums.

AS.010.444. Classics Research Lab: Antioch Recovery Project (ARP). 3 Credits.
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term "narcissism". Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard's Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

Near Eastern Studies

AS.130.101. Ancient Near Eastern Civilizations. 3 Credits.
Review of important issues in ancient Near Eastern history and culture from the Neolithic era to the Persian period. Included will be an examination of the Neolithic agricultural revolution, the emergence of cities, states and writing, and formation of empires. Cultures such as Sumer and Akkad, Egypt, the Hittites, Israelites, Assyrians, Babylonians, and Persians will be discussed.

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.
A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.177. World Prehistory: An Anthropological Perspective. 3 Credits.
How and why did our nomadic hunting and gathering ancestors become farmers? What led agricultural societies to build cities, develop writing, religious institutions, wage war, and trade for exotic goods? This course surveys prehistory and ancient history from the origins of human culture to the emergence civilization. Although prehistory and ancient history yield evidence of tremendous cultural diversity this course emphasizes common elements of past human experience, culture, and culture change. These include the origins of modern humans and their adjustment to a variety of post-ice age environments, shifts from hunting and gathering to agricultural lifeways, and the initial development of the world's earliest cities and civilizations.

AS.130.203. Archaeology of Africa: From Human Origins to the Emergence of Civilizations. 3 Credits.
This course examines Africa's ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.130.214. The Origins of Civilization: A Cross-Cultural Perspective. 3 Credits.
One of the most significant transformations in human history was the "urban revolution" in which cities, writing, and social classes formed for the first time. In this course, we compare five areas where this development occurred: China, Mesopotamia, the Indus Valley, Egypt, and Mesoamerica (Mexico/Guatemala/Honduras/Belize). In each region, we review the physical setting, the archaeological and textual evidence, and the theories advanced to explain the rise (and eventual collapse) of these complex societies.

AS.130.223. Ancient Revolutions: The Archaeology of Culture Change. 3 Credits.
The last 250,000 years have seen many moments that could be referred to as "revolutions" in art, technology, or other aspects of human society. The "Human Revolution" of the Upper Paleolithic saw the birth of artistic ability and symbolic thinking in hominids. We call the transition from hunting and gathering to settled agriculture the "Neolithic Revolution," while the "Urban Revolution" gave us complex societies and urban life. Times of dynamic change gave rise to important aspects of our shared behavioral and societal identity. They have become the subject not only of much archaeological investigation, but also of popular discourse about the human past. This class will explore famous cultural "revolutions" by looking at the causes and consequences of these important changes. We will evaluate the archaeological evidence, and through it interrogate the term "revolution" itself. What do we mean when we speak of "revolutions?" Are there other ways to think of past social and technological change, and when, if ever, do we truly see "revolutions" in the human condition in the ancient past?

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.247. Digging for Legitimacy Archaeology, Museums, and Ideology. 3 Credits.
Archaeology was born out of Western Colonial endeavors into Africa, the Middle East, Asia, and the Americas. Large scale excavations conducted by the United Kingdom, France, Germany, Italy, and the United States resulted in the removal and transfer of valuable (culturally and monetarily) material culture from local stewards and stakeholders to the West. To this day the discipline of archaeology is still saddled by its colonial past and the Hollywood interpretation of archaeologists as saviors of ancient treasures. Today, most interaction between people and ancient objects is facilitated via the museum. In this course we will explore 19th- 21st century archaeological and museum practices and the role they play in modern narratives of identity and representation in the America and the Middle East. Students will engage with the historical, legal, economic, and ethical implications of archaeology and analyze how political, religious, cultural, and academic institutions have leveraged archaeology and cultural artifacts to reify and legitimize their pursuits and ideologies.

AS.130.248. Up the Nile: New Approaches to the History of Egyptology and Nubiology. 3 Credits.
King Tut, Napoleon, Champollion, Ozymandias, Nefertiti: the history of Egyptology is filled with big characters, huge monuments, and glimmering objects. But it is also made up of colonialist practices, looted sites, and forgotten scholarly contributions. "Up the Nile" examines the antiquarian, colonialist, racist, Western-centric, and patriarchal roots of modern Egyptology and Nubiology, and addresses how scholars and enthusiasts alike are continuing to grapple with these lasting legacies and biases. This class investigates how the Egyptians and Nubians thought of their own histories, as well as how other ancient cultures viewed the cultures of the Nile. It moves roughly chronologically, tracing understudied and marginalized voices from the Islamic, Medieval, and Ottoman periods into the 20th and 21st centuries. It examines the origins of scholarship, modern collecting, Egyptomania, and museums, delving into the problems and repercussions that still haunt us today. "Up the Nile" will engage with important and difficult aspects regarding Egyptology's and Nubiology's colonialist, racist, and sexist past and present. It asks: who decides who writes history, then and now?

AS.130.334. Egyptian Funerary Arts in the Archaeological Museum. 3 Credits.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.130.353. Space Archaeology: An Introduction to Satellite Remote Sensing, GIS and GPS. 3 Credits.
This course introduces technologies archaeologists use to map ancient landscapes. These include Geographic Information Systems (GIS) mapping software, advanced Global Positioning System (GPS) receivers, and various types of satellite imagery. Taught together with AS.131.653.

AS.130.354. Archaeological Method and Theory. 3 Credits.
Climate change, population growth, war - what questions do archaeologists ask about the ancient past, how do they collect relevant evidence, and how do they arrive at satisfying answers to their questions? This course will review major theoretical currents in archaeology including evolutionary, cultural-historical, processual and post-processual approaches and discuss the future of archaeology as a scientific and humanistic discipline. Basic techniques for analyzing major categories of artifacts such as lithics, ceramics, archaeobotanical, and zooarchaeological materials will also be introduced.

AS.130.357. Geographic Information Systems in Archaeology. 3 Credits.
Applications of GIS in archaeology have recently expanded dramatically and GIS has now become an indispensable tool for archaeological research worldwide. This course will introduce the major applications of Geographic Information Systems (GIS) in archaeology. These include the history of GIS in archaeology, air photography and satellite imagery, predictive modeling, hydrological modeling, viewsheds, and least-cost routes. It will grapple with theoretical issues manifest in archaeological GIS including conflicts between environment and social understandings of the ancient past, and will foster discussion of issues that affect outcomes of analyses including spatial scale and boundary delineation choices that can dramatically influence results. Students will learn the basics of ESRI's ArcGIS software. Taught with AS.131.657.

AS.130.364. Archaeology of Arabia. 3 Credits.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.131.664.

AS.130.376. Ancient Magic and Ritual. 3 Credits.
This course will introduce students to the vast body of rituals that were practiced and performed in antiquity, with a particular emphasis on rituals from ancient Mesopotamia, Egypt, and the Hebrew Bible. In addition to examining rituals from a comparative perspective, anthropological and sociological studies of ritual will be read and discussed to shed light on the social, cultural, and political significance of ritual in the ancient world and beyond.
Area: Writing Intensive

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.240. Archaeological Museum Practicum: Collections Management. 3 Credits.
Students will learn current procedures for surveying, cataloguing, documenting and rehousing collections using objects from the Archaeological Museum. This is a hands-on practicum course working closely with museum staff.

AS.389.250. Conservation of Material Culture: Art, Artifacts and Heritage Sites. 3 Credits.
This course will introduce students to the field of art conservation through the study of paintings, paper, books, objects, contemporary sculpture and historic preservation. Topics covered will include: methods of manufacture, agents of deterioration, preservation initiatives, conservation treatment and ethics, and conservation science. Cross-listed with History of Art.Class usually meets at 1:30 - 3:50 PM, except for days with field trips.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.275. Interpreting Hopkins as Historic Site. 3 Credits.
This hands-on course explores interpretive strategies for historic sites and culminates in the production of original, research-based, outdoor interpretive exhibits on the Homewood Campus.

AS.389.280. Of and For Everyone: Diversity, Equity, Inclusion and Access in the Museum. 3 Credits.
How are museums responding to the pressures to be more equitable, inclusive, and accessible towards public audiences and their staff? Students go behind the scenes of the Smithsonian, Baltimore Museum of Industry and Baltimore Museum of Art to meet with working groups and staff charged with transforming their institutions. Includes site visits, hands-on experiences and research on best practices.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

For current faculty and contact information go to http://krieger.jhu.edu/archaeology/faculty-directory/

Archaeology, Bachelor of Arts

Archaeology Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Requirements for the major include 13 courses (39 credits). These can be selected from a diversity of offerings available from different departments. In addition, students must take a core of three courses consisting of Introduction to Archaeology, World Prehistory, and Archaeological Method and Theory. Except for some field experiences, majors must complete all courses required for the major for a letter grade and receive a grade of C- or higher.

Code	Title	Credits
Core Courses		
AS.136.101	Introduction To Archaeology	3
AS.130.177	World Prehistory: An Anthropological Perspective	3
AS.130.354/ AS.131.654	Archaeological Method and Theory	3
Any Anthropology course numbered AS.070.1xx-4xx		3
Six archaeology courses, both regionally specific and/or methodologically/theoretically advanced (POS-Tag ARCH-ARCH)		18
Three additional related courses, to be decided in conjunction with the student's advisor, pertinent to the archaeological issues the student has focused on. (POS-Tag ARCH-RELATE)		9
Significant archaeological field experience (consult faculty advisor)		
Total Credits		**39**

Sample Program of Study

In addition to the example plan as shown below, students are required to complete significant archaeological field experience. This is commonly done during the summer(s) after sophomore and/or junior year(s).

Course	Title	Credits
First Year		
First Semester		
AS.136.101	Introduction To Archaeology	3
	Credits	**3**
Second Semester		
AS.130.177	World Prehistory: An Anthropological Perspective	3
	Credits	**3**
Second Year		
First Semester		
AS.070.1xx-4xx Anthropology course		3
Archaeology course #1		3
	Credits	**6**
Second Semester		
AS.130.354	Archaeological Method and Theory	3
Archaeology course #2		3
	Credits	**6**
Third Year		
First Semester		
Archaeology course #3		3
Additional related course #1		3
	Credits	**6**
Second Semester		
Archaeology course #4		3
Additional related course #2		3
	Credits	**6**
Fourth Year		
First Semester		
Archaeology course #5		3

Additional related course #3	3
Credits	**6**
Second Semester	
Archaeology course #6	3
Credits	**3**
Total Credits	**39**

Honors Program

Archaeology majors have the option of writing an honors thesis under the supervision of a faculty member. The thesis is based on an original research problem developed in conjunction with that faculty member. Successful completion of the thesis (B+ or higher) will result in the conferring of a BA with honors.

Students must pass 6 credits (2 semesters: AS.130.510 Archaeology Major Honors Thesis I and AS.130.511 Archaeology Major Honors Thesis II) of honors thesis to earn honors in the Archaeology Major. These credits are in addition to and exceed the number of credits needed for the major.

Students who are interested in pursuing an honors thesis should begin to discuss possibilities with a faculty advisor as early as possible and no later than during the second semester of Junior year. A proposal for the thesis must be approved by the faculty advisor before the student registers for the courses and no later than the end of the second semester of the Junior year.

The student will work closely with the faculty advisor, setting a timeline for completing research and submitting drafts of the thesis. A full draft of the thesis is due by the end of March of the Senior year, if the student wants to be listed as receiving honors on the commencement program. The final version of the thesis must be handed in by the last day of classes.

Learning Outcomes

1. Acquire the basic skills for understanding theory, interpretation, and methods in archaeology.
2. Develop an ability to analyze archaeological data through the reading and interpretation of archaeological publications and study of primary data.
3. Conduct analyses and interpretations of material culture in precise, well-organized, and persuasive language, both orally and in writing.
4. Acquire interdisciplinary knowledge of different past human cultures.
5. Gain significant knowledge of the material culture of at least one region or thematic issue.
6. Acquire on-site experience and expertise in archaeological method through fieldwork.

Behavioral Biology Program

http://krieger.jhu.edu/behavioralbiology (http://krieger.jhu.edu/behavioralbiology/)

The David S. Olton Behavioral Biology Program seeks to establish a greater understanding of the relations of brain and behavior through an interdisciplinary program of study. Students in the Behavioral Biology Program examine the complex interplay between environment and behavior, and the processes and mechanisms that underlie behavior. One goal of the program is for students to learn how to integrate scientific discoveries from the wide array of scientific fields of inquiry that contribute to the study of behavioral biology, from molecular biology to sociology.

The interdisciplinary characteristics of the Behavioral Biology Program provide an excellent preparation for post-graduate work. For those interested in the health professions, behavioral biology can be integrated into a premedical curriculum that will provide a broad, humanistic perspective. For those who wish to pursue scientific careers in psychopharmacology, behavioral neuroscience, and physiological psychology, the program provides excellent preparation. Students interested in the fields of organismal or integrative biology should also consider this major.

Many students ask about the similarities and differences between the behavioral biology major and the neuroscience major. Both of these programs are interdepartmental, and a majority of professors teach courses that are listed for both majors. Behavioral Biology majors can explore many aspects of the biology of behavior, including the neural mechanisms of behavior (which obviously overlaps with the neuroscience major), but also biomechanical, evolutionary, ecological, and social aspects of behavior. The behavioral biology major also has fairly liberal course requirements which provide students with an opportunity to explore more choices in their liberal arts education. Students majoring in neuroscience focus directly on the brain and on neural function/mechanisms. Generally speaking, the systems Neuroscience focus area in the neuroscience major has the most overlap with behavioral biology.

Programs

- Behavioral Biology, Bachelor of Arts (p. 1661)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.290.101. Human Origins. 3 Credits.
This course examines the origins of human structure, function and behavior from an evolutionary perspective. It includes study of the evolution, behavior and behavioral ecology of nonhuman primates, hominid evolution (including the paleontological and archaeological records), and the origins of human cognition, social behavior and culture.

AS.290.303. Animal Communication Lab. 3 Credits.
This course examines animal communication in all modalities (especially sound, sight, and scent) across taxa. Students will learn how to design experiments, analyze results and write scientific papers in publication form. The course is held in a computer laboratory and on some occasions at “field” locations on or adjacent to campus.
AS.200.208 OR AS.200.344

AS.290.304. Comparative Neuroanatomy. 3 Credits.
This course examines the phylogenetic and developmental history of the central nervous system across the vertebrate tree of life, with emphasis on the deep history of those features that characterize the human brain. We will study how our understanding of non-human vertebrates (both model and non-model organisms) can provide important insights into the structure and function of the modern human brain.
(AS.080.305 AND AS.080.306) OR AS.200.141

AS.290.400. Comparative Neural Systems and Behavior Research Discussions. 0.5 Credits.
This course is required concurrently with research in the Comparative Neural Systems Research and Behavior lab. During the scheduled meetings we will discuss scientific papers, policies and procedures, research ethics and other information related to activities in the lab. At the end of the semester, students will present their research in groups. This course is only open to students doing research in the Neural Systems and Behavior Lab.

AS.290.420. Human Sexual Orientation. 3 Credits.
This course will examine the historical and current theories of sexual orientation and sexual variation development by examining the biological, psychological and social contributing factors that influence the development of sexual orientations and variations along with treatment and modification of problematic sexual behaviors. Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester. Priority given to Behavioral Biology majors. Note: For credit towards a Psychology major, students should register for AS.200.204 Human Sexuality, rather than this course.
Prerequisite(s): Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester.
Students may receive credit for either AS.200.204 or AS.290.420, but not both.

AS.290.490. Senior Seminar: Behavioral Biology. 1 Credit.
Great ideas in Behavioral Biology. Discussion of classic and cutting edge articles in the original literature. Student presentations and reaction papers. Capstone course for senior Behavioral Biology majors.
AS.290.101 AND AS.200.208 AND AS.200.208 AND AS.200.208, or Instructor permission.;(AS.290.101 AND AS.200.208 AND AS.200.141) or Instructor permission.

AS.290.500. Connections in Behavioral Biology. 0.5 Credits.
In this seminar, students discuss the intellectual merit of current or potential future research, internship and outreach activities in Behavioral Biology. This course is designed to 1) expose Behavioral Biology majors to new knowledge in the field, 2) provide the opportunity to develop oral and written communication skills, and 3) build community among students in the major. Students will make oral presentations and write a short paper/news piece or prepare a webpage.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.501. Behavioral Biology Research - Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.502. Research-Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.503. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.504. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.505. Behavioral Biology DUS Approved Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.519. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.520. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.590. Behavioral Biology Internship. 1 - 3 Credits.
TBA
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.594. Behavioral Biology Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.595. Behavioral Biology Research - Freshmen. 1 - 3 Credits.
TBA
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.596. Behavioral Biology Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.597. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Biology

AS.020.153. General Biology Laboratory I. 1 Credit.
This course reinforces the topics covered in AS.020.151. Students participate in a semester-long project, identifying bacteria from Homewood campus soils using molecular biology techniques. Other laboratory exercises cover aspects of evolution, genomics and biochemistry. Cross-listed with Behavioral Biology. Student must have enrolled in AS.020.151 either this term or in past terms. Students who have credit for AP Biology but take General Biology Lab I will lose four credits of AP Biology credit. Cross-listed with Behavioral Biology.
AS.020.151 can be taken prior to or at the same time as AS.020.153.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

First Year Seminars

AS.001.165. FYS: Biology in Deep Time. 3 Credits.
This First-Year Seminar will explore seminal ideas in macroevolutionary theory through both classic and cutting-edge studies. Topics would include the relationship between evolution and development, how fossils shape our understanding of biological systems, and the logical basis of evolutionary inference. Students will also gain an appreciation for the historical development of these ideas and their application in modern science and beyond.

Neuroscience

AS.080.301. Behavioral Assessment of Animal Models of Cognition and Neuropsychiatric Disorders. 3 Credits.
What does a rat exploring it's environment tell us about memory? How can a mouse help us better understand schizophrenia? This course will focus on procedures that are routinely used to study behavior in animal models of cognition and neuropsychiatric disorders. Topics will include motor function, emotional and motivational states, disorders such as dementia and schizophrenia, among others. Throughout the course, we will read and discuss original research articles to illustrate and compare some of the measures and results from the various procedures.
AS.200.141 OR AS.080.105 OR (AS.080.305 and AS.080.306), OR by instructor permission.

AS.080.304. Neuroscience Learning and Memory. 3 Credits.
This course is an advanced survey of the scientific study of learning and memory. Different perspectives will be used to review the science of learning and memory including the cellular-molecular basis of synaptic plasticity, the functional circuitry involved in learning and memory and memory systems in the brain. The course is designed to provide a deep understanding of the issues and current debates in learning and memory research and focuses specifically on animal models of memory and memory impairment. This is an interactive lecture course with a strong emphasis on student participation.
AS.200.141 OR (AS.080.305 AND AS.080.306) OR (AS.020.312 AND AS.020.306) or instructor permission.

AS.080.308. Neuroeconomics. 3 Credits.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience.
AS.080.306 OR AS.200.141 OR AS.020.312

AS.080.328. Behavioral Neuroscience Lab. 3 Credits.
Class designed to give students first-hand knowledge of the behavioral procedures and techniques used to study behavior in the field of neuroscience. Students will gain hands-on experience by carrying out some of the behavioral tasks used to assess animals under specific behavioral domains, discuss why certain aspects (i.e. genotype, environment conditions, group size, etc.) are important factors to consider when designing, planning, and carrying out such experiments, and learn the relevance of behavioral research in translational medicine.
AS.200.141 OR AS.200.302 OR AS.080.301 OR (AS.080.305 AND AS.080.306) or permission by instructor.

Psychological & Brain Sciences

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.

AS.200.208. Animal Behavior. 3 Credits.
This course examines how and why animal behaviors are produced across the animal kingdom. Neurobiological, hormonal and developmental mechanisms and adaptive function of behaviors are examined in an evolutionary context. Behaviors include survival, acquiring food, reproduction, communication, parental care, and cooperation. Students will also learn how to develop hypotheses and predictions for scientific questions and interpret graphical results.
AS.200.141 OR Permission of Instructor.

AS.200.334. Human Memory Psychology. 3 Credits.
This class will survey the behavioral and biological science of human memory. Historical perspectives as well as modern controversies will be discussed. Intersections with other fields such as law, education, medicine, and technology will be highlighted. The course will be a mixture of lectures and group discussions.

AS.200.344. Behavioral Endocrinology. 3 Credits.
This course examines both the evolution and mechanisms of hormonal effects on behavior across animals, including humans. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, stress and social behavior. Additionally, this course emphasizes developing skills in hypothesis testing and critically assessing the scientific literature. Cross-listed with Behvioral Biology and Neuroscience.
(AS.200.141 OR AS.080.306) OR (AS.020.151 AND AS.020.152) or instructor's permission

For current faculty and contact information go to http://krieger.jhu.edu/behavioralbiology/faculty_directory/

Behavioral Biology, Bachelor of Arts

Behavioral Biology Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The core program of the behavioral biology major provides background and breadth in:

1. The life sciences (e.g., animal behavior, evolution)
2. The natural sciences (e.g., biology, chemistry and physics) and mathematics (e.g., calculus and statistics)
3. The social and behavioral sciences (e.g. psychology and anthropology)

The exact courses to be taken are determined by the student in conjunction with the faculty advisor. A grade of C- or better is required for courses fulfilling major requirements and courses may not be taken satisfactory/unsatisfactory. Hopkins undergraduates may enter the Behavioral Biology Program at any time, provided all requirements can be completed before graduation.

Additional information regarding the Behavioral Biology Program is available through our website at http://krieger.jhu.edu/behavioralbiology (http://krieger.jhu.edu/behavioralbiology/). You may also contact our Academic Program Administrator, Linda White, linda.m.white@jhu.edu or 410-516-6196.

Requirements for the behavioral biology major are as follows:

Code	Title	Credits
Mathematics, Chemistry, and Physics Courses		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.171.113	Subatomic World	
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
Biology Courses [1]		
Students must have 2 of the following Biology Options. Students can use any combination of the following:		
AS.020.151 & AS.020.153	General Biology I and General Biology Laboratory I	4
AS.020.152 & AS.020.154	General Biology II and General Biology Lab II	4
AS.020.303 & AS.020.340	Genetics and Developmental Genetics Lab	5
or AS.020.315	Biochemistry Project lab	
AS.020.305 & AS.020.315	Biochemistry and Biochemistry Project lab	4
AS.020.306 & AS.020.316	Cell Biology and Cell Biology Lab	4
AS.020.374 & AS.020.377	Comparative Physiology and Comparative Physiology Lab	4
Introductory Statistics		
Students must complete 1 of the following:		
AS.280.345	Public Health Biostatistics	4
EN.553.211	Probability and Statistics for the Life Sciences	4
EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	4
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
EN.553.111 & EN.553.112	Statistical Analysis I and Statistical Analysis II	8
Behavioral Biology Core Courses (Offered "F" = Fall, "S" = Spring)		
AS.200.141	Foundations of Brain, Behavior and Cognition (F & S)	3
AS.290.101	Human Origins (S)	3
AS.200.208	Animal Behavior (F)	3
AS.080.250	Neuroscience Laboratory (F & S)	3
Behavioral Biology Elective Courses [2]		
Three courses (3 credits each) designated "biobehavioral (BEHB-BIOBEH)		9
Two courses (3 credits each) designated "social science" (BEHB-SOCSCI)		6
AS.290.490	Senior Seminar: Behavioral Biology	1
Behavioral Biology Research/Internship Courses [3]		
Three credits (one semester) of Research, Internship, Independent Study or Intersession Galapagos trip		3
AS.290.500	Connections in Behavioral Biology	.50
Total Credits		**102.5**

[1] For students with AP Biology credit, they may use only one course and its lab from those credits towards this requirement. Therefore, these student must take at least one biology course and its lab at JHU. Students who elect to take General Biology I or II with its lab will lose the corresponding AP credits. Students should also refer to AP credit policies for additional details around the use of AP Biology credits.

[2] Students should refer to the program website (http://krieger.jhu.edu/behavioralbiology/courses/) or the schedule of classes to identify elective choices.

[3] Students must be registered in one of the following: AS.290.501, AS.290.502, AS.290.503, AS.290.504, AS.290.505, AS.290.506, AS.290.507, AS.290.508, AS.290.519, AS.290.520, AS.290.572, AS.290.590, AS.290.594, AS.290.595, AS.290.596, AS.290.597 OR AS.290.236 Program Abroad: Ecuador and Galapagos Islands: Tropical Biology & Evolution

Sample Program

This is only *one of many* possible course sequences that students may elect to follow.

Course	Title	Credits
First Year		
First Semester		
AS.200.141	Foundations of Brain, Behavior and Cognition	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
	Credits	**11**
Second Semester		
AS.290.101	Human Origins	3
AS.110.107	Calculus II (For Biological and Social Science)	4
AS.030.102	Introductory Chemistry II	3

AS.030.106	Introductory Chemistry Laboratory II	1
	Credits	**11**
Second Year		
First Semester		
AS.200.208	Animal Behavior	3
Biology Option 1		3-4
Biology Lab Option 1		1-2
EN.553.211	Probability and Statistics for the Life Sciences	4
	Credits	**11-13**
Second Semester		
Biology Option 2		3-4
Biology Lab Option 2		1-3
BB Elective (BEHB-SOCSCI)		3
	Credits	**7-10**
Third Year		
First Semester		
AS.080.250	Neuroscience Laboratory [3]	3
AS.171.103	General Physics I for Biological Science Majors	4
AS.173.111	General Physics Laboratory I	1
BB Elective (BEHB-BIOBEH)		3
Research or Internship		3
AS.290.500	Connections in Behavioral Biology	.50
	Credits	**14.5**
Second Semester		
AS.171.104	General Physics/Biology Majors II	4
AS.173.112	General Physics Laboratory II	1
BB Elective (BEHB-SOCSCI)		3
	Credits	**8**
Fourth Year		
First Semester		
AS.290.490	Senior Seminar: Behavioral Biology [4]	1
BB Elective (BEHB-BIOBEH)		3
	Credits	**4**
Second Semester		
BB Elective (BEHB-BIOBEH)		3
	Credits	**3**
	Total Credits	**69.5-74.5**

[3] AS.080.250 Neuroscience Laboratory can be taken anytime after AS.200.141 Foundations of Brain, Behavior and Cognition

[4] AS.290.490 Senior Seminar: Behavioral Biology can be taken either Fall or Spring of senior year.

Honors in Behavioral Biology

Students receive recognition at graduation and notation on their JHU transcripts.

Requirements:

- Cumulative and Major GPA of at least 3.5
- 6 credits of research
- An **Honors Thesis** that is based on their 6 credits of required research and is approved by their research mentor.

During the semester prior to graduation, students must submit verification of their mentor-approved Honors Thesis. Details on the format of the requirement can be found on the departmental website. Schedule a meeting with your faculty advisor if you are seeking departmental honors.

Bioethics

The practice of medicine, the development of public health policies, and advances in the biomedical sciences raise fundamental moral and philosophical issues. The bioethics program is designed to provide students with an understanding of these issues, and the background and the conceptual tools to think about them clearly. The program is a collaboration between the Johns Hopkins Berman Institute of Bioethics and the Department of Philosophy, and draws on the resources of both.

Programs

- Bioethics, Minor (p. 1663)

For current faculty and contact information go to http://www.bioethicsinstitute.org/people/faculty (http://www.bioethicsinstitute.org/people/faculty/)

Bioethics, Minor

Bioethics Minor Requirements

The practice of medicine, the development of public health policies, and advances in the biomedical sciences raise fundamental moral and philosophical issues. The bioethics program is designed to provide students with an understanding of these issues, and the background and the conceptual tools to think about them clearly. The program is a collaboration between the Johns Hopkins Berman Institute of Bioethics and the Department of Philosophy, and draws on the resources of both.

Code	Title	Credits
AS.150.219	Introduction to Bioethics	3
AS.150.220	Introduction to Moral Philosophy	3
Select one of the following:		6-8
AS.020.151 & AS.020.152	General Biology I and General Biology II	
AS.020.305 & AS.020.306	Biochemistry and Cell Biology	
EN.580.151 & EN.580.153 & EN.580.221	Structural Biology of Cells and Structural Biology of Cells Laboratory and Biochemistry and Molecular Engineering	
At least two upper-level (300- or 400-level) seminars offered by the bioethics program (AS.150.3xx+ with POS-Tag PHIL-BIOETH)		6
Two additional bioethics seminars not counted in fulfillment of the previous requirement approved by the program's advisory committee. [1]		6
Total Credits		**24-26**

[1] Pre-approved courses fulfilling this requirement will have the POS-Tag PHIL-BIOETH in their course description.

All courses must be taken for letter grades and receive a grade of C- or higher.

For more information, please contact Professor Hilary Bok.

Biology

http://www.bio.jhu.edu

The Department of Biology offers a broad program of undergraduate, graduate, and postgraduate study in the biological sciences. Included among the areas in which instruction and research opportunities are available are biochemistry and biophysics, cell biology, molecular biology, microbiology, developmental biology, genetics, neuroscience, and immunology.

Undergraduate Programs

The Biology Department offers two degree options for undergraduate students, a Bachelor of Arts degree for biology majors and a Bachelor of Science degree for molecular and cellular biology majors.

Teaching Opportunities

Since most biology Ph.D.'s will teach at some time during their careers, experience in teaching is considered an essential part of the Ph.D. program. The minimum teaching requirement is three contact hours a week for one year in the laboratory sections of undergraduate courses. Further teaching experience is gained through the preparation and presentation of reports in seminars and journal clubs. The department stresses organization of material and clarity of presentation.

Facilities

The lecture rooms, teaching laboratories, and research facilities of the Biology Research Complex (consisting of Seeley G. Mudd Hall and Undergraduate Teaching Laboratories) offer a thoroughly modern research facility for molecular biology.

Financial Aid

The department has fellowship funds for the support of graduate students. Awards are granted for tuition and living expenses. Laboratory fees and research expenses are paid by the department.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.020.115. Bioenergetics. 2 Credits.
This course is a combination of lectures, student presentations and group discussions that address fundamental principles and also contemporary issues examining the way all forms of Life on Earth are ultimately dependent on sunlight to satisfy their food and energy requirements. We examine the steps from the capture of Physical energy (photons), to the development of electrochemical potentials and finally, to their utilization by cellular organelles towards the synthesis of the chemical "currency" that fuels all biological processes (biosynthesis, cell communication, movements, etc.). Special emphasis will be on current developments in biotechnologies that utilize microbial populations to supply us with fuels and also to clean up environmental hazards. The course will also consider ways to extract lessons from Nature's successful designs and harmonious adaptations so that we, in the long run, can utilize them towards a minimization of our negative impact on the environment.Note: Freshmen and Sophomores only, with good foundations in any two of the following: Physics, Chemistry, Biology, Biophysics.

AS.020.120. Introduction to Laboratory Research. 1 Credit.
In this program, you will be introduced to a variety of biochemical and molecular biological laboratory techniques. These will include DNA analysis by restriction enzyme mapping, amplification of DNA segments by PCR, lipid analysis by chromatography. Additionally, you will visit a variety of biological laboratories to observe actual research projects.Recommended Course Background in Chemistry and Biology is strongly recommended.

AS.020.125. Microbe Hunters- Student-sourcing Antibiotic Discovery. 3 Credits.
This is an introductory course open to all students regardless of intended major. No science background is required. This course covers concepts of biology taught through the lens of microbes and antibiotic resistance. Using environmental samples students actively engage in the hunt for novel antimicrobials. Broader concepts include the meaning of disease, how that meaning has changed over time, and the implications of widespread antibiotic resistance for society. This is a research-based project lab course in which students participate as part of an international consortium of undergraduates at other colleges. Students will isolate and characterize antibiotic-producing bacteria from the environment using modern molecular biological techniques. The course includes a lecture and two lab meetings per week.

AS.020.132. Medical School Intensive. 1 Credit.
Learn the basic knowledge and techniques related to surgery, internal medicine, pediatrics, emergency medicine, and biomedical science by participating in interactive lectures and labs. You and your fellow high-school students will explore new aspects of this critical field at one of the nation's leading institutions as you are taught and guided by experts in the field of medicine.

AS.020.134. Introduction to Surgery. 1 Credit.
Students will be introduced to the fundamentals of a surgical practice. Students will also acquire skills used in the assessment and treatment of surgical conditions.

AS.020.135. Project Lab: Phage Hunting. 2 Credits.
This is an introductory course open to all freshman regardless of intended major. No science background is required. This is the first semester of a year-long research-based project lab course in which students will participate in a nation-wide program in collaboration with undergraduates at other colleges. Students will isolate and characterize novel bacteriophages (viruses that infect bacteria) from the environment using modern molecular biological techniques. The course includes two lab meetings per week. Continues in the spring. Each semester provides 2 credit hours of Natural Sciences (N) distribution credits and/or counts 2 hours toward the research requirement for the Molecular and Cellular Biology degree. No textbook is required. Freshmen only.

AS.020.136. Phage Hunting II. 1 Credit.
This is an introductory course open to all freshman regardless of intended major. No science background is required. This is the second semester of a year-long research-based project lab course in which students will participate in a nation-wide program in collaboration with undergraduates at other colleges. In the spring semester, students will annotate the genome of a bacteriophage isolated and characterized by a student in AS.020.135, in preparation for submission to a database and eventual publication. Enrollment by permission of the instructor only. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.020.137 or permission of instructor

AS.020.137. Phage Discovery Lab. 1 Credit.
In this small-section introductory research lab course, students are introduced to basic microbiological techniques as they isolate and characterize a bacteriophage, a virus that infects bacteria, from an environmental sample. One meeting per week. No textbook required.
Not open to anyone who has taken AS.020.135;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.151. General Biology I. 3 Credits.
This course is an introduction to biology from an evolutionary, molecular and cellular perspective. Specific topics and themes include evolutionary theory, the structure and function of biological molecules, mechanisms of harvesting energy, cell division, classical genetics and gene expression.

AS.020.152. General Biology II. 3 Credits.
This course builds on the concepts presented and discussed in General Biology I. The primary foci of this course will be on the diversity of life and on the anatomy, physiology, and evolution of plants and animals. There will be a special emphasis on human biology.
AS.020.151

AS.020.153. General Biology Laboratory I. 1 Credit.
This course reinforces the topics covered in AS.020.151. Students participate in a semester-long project, identifying bacteria from Homewood campus soils using molecular biology techniques. Other laboratory exercises cover aspects of evolution, genomics and biochemistry. Cross-listed with Behavioral Biology. Student must have enrolled in AS.020.151 either this term or in past terms. Students who have credit for AP Biology but take General Biology Lab I will lose four credits of AP Biology credit. Cross-listed with Behavioral Biology.
AS.020.151 can be taken prior to or at the same time as AS.020.153.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.154. General Biology Lab II. 1 Credit.
This course reinforces the topics covered in AS.020.152. Laboratory exercises explore subjects ranging from evolution to anatomy and physiology. Students participate in a project using molecular biology techniques to determine whether specific foods are made from genetically engineered plants.Cross-listed with Behavioral Biology
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.161. Current Events in Biology I. 1 Credit.
In this lively and collaborative course, students discuss current events and controversies in biology ranging from bioterrorism to the health of the Chesapeake Bay.

AS.020.162. Current Events in Biology II. 1 Credit.
Students will discuss current events and controversies in biology, ranging from genetic engineering to nanotechnology in medicine.

AS.020.303. Genetics. 3 Credits.
Presentation of the principles of heredity and variation, and their application to evolution and development; physico-chemical nature of the gene; problems of recombination; gene action.

AS.020.304. Molecular Biology. 3 Credits.
This course will focus on the ways that nucleic acids direct the synthesis of nucleic acids and proteins. Emphasis will be on modern techniques to study these fundamental processes and important biological molecules. This course fulfills a core requirement for biology majors and molecular and cellular biology majors. This course does not fulfill the elective requirement for biology or molecular and cellular biology majors.

AS.020.305. Biochemistry. 3 Credits.
The molecules responsible for the life processes of animals, plants, and microbes will be examined. The structures, biosynthesis, degradation, and interconversion of the major cellular constituents including carbohydrates, lipids, proteins, and nucleic acids will illustrate the similarity of the biomolecules and metabolic processes involved in diverse forms of life.Sophomores, Juniors, and Seniors Only.
AS.030.205 OR AS.030.212 OR EN.540.202, may be taken concurrently.

AS.020.306. Cell Biology. 3 Credits.
How the molecules of living systems are organized into organelles, cells, tissues, and organisms will be explored, as well as how the activities of all of these are orchestrated and regulated to produce “life”—a phenomenon greater than the sum of its parts. Considerable emphasis is placed on experimental approaches to answering these questions. Topics covered include biological membranes, cytoskeletal elements, cell locomotion, membrane and protein traffic, the nucleus, signal transduction, the cell cycle, the extracellular matrix, epithelial structure and function. Sophomores, juniors, and seniors only. Recommended Course Background: (AS.020.151 or AS.020.305) or equivalent knowledge of biomolecules or AS.020.303.
Cell Biology restriction: students who have completed EN.540.307 may not enroll..

AS.020.312. Introduction to the Human Brain. 3 Credits.
This course explores the outstanding problem of biology: how knowledge is represented in the brain. Relating insights from cognitive psychology and systems neuroscience with formal theories of learning and memory, topics include (1) anatomical and functional relations of cerebral cortex, basal ganglia, limbic system, thalamus, cerebellum, and spinal cord; (2) cortical anatomy and physiology including laminar/columnar organization, intrinsic cortical circuit, hierarchies of cortical areas; (3) activity-dependent synaptic mechanisms; (4) functional brain imaging; (5) logicist and connectist theories of cognition; and (6) relation of mental representations and natural language.
AS.020.306 OR EN.540.307

AS.020.314. The Biology of Disease. 3 Credits.
Explore the current understanding of the biology of diseases in this upper-level elective! Each week, a new faculty member will present one class in a lecture style, followed by one class in an interactive discussion style. The faculty member will describe a disease and the fundamental biology relating to that disease and discuss the current state of the field, how their research influenced understanding of the disease, and progress towards treatments. The topics will build upon the basic concepts covered in genetics, cell biology, and molecular biology, and introduce topics related to biochemistry and developmental biology. The class will discuss a wide range of diseases including vision disorders, neurodegenerative diseases, and cancer. Class assessment will be based on homework involving asking questions about the seminar, writing brief summaries of seminars and discussions, and a final project related to topics and techniques from the semester. Open to juniors and seniors.
AS.020.303 AND AS.020.306

AS.020.315. Biochemistry Project lab. 1 Credit.
This research project laboratory investigates the flow of energy through biological systems using focused examination of key cellular energy-conversion processes. Students will be introduced to the broad field of biochemistry research through computational structural analysis, directed mutation, recombinant protein production, and enzymatic analysis. Participants will be trained in biochemical laboratory techniques and expected to contribute their findings to the scientific community using formal, academic communications.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.020.305 OR AS.250.307 OR AS.250.315. These may be taken concurrently.

AS.020.316. Cell Biology Lab. 1 Credit.
The Cell Biology Laboratory will use projects with the nematode C. elegans and mouse 3T3 cells in culture to illustrate experimental systems which are used in cell biology. Light microscopy, fluorescence microscopy, RNA interference, fluorescence-activated cell sorting, Western blotting and the culture of nematodes and cells are techniques which will be used. Because we will be using growing organisms, there will be at least one week when students will have to visit the lab the day after their section meets to complete an experiment.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;Students may have previously taken AS.020.306 prior to enrolling in AS.020.316 OR students may concurrently enroll in AS.020.306 ANDAS.020.316 OR students must have previously completed both EN.540.202 and AS EN.540.307 prior to enrolling in as.020.316.

AS.020.319. Human Genome Variation. 2 Credits.
Human Genome Variate (HGV) exposes students to the power of genomics for understanding human evolutionary history, biological traits, and medical conditions. HGV incorporates basic population genetics, direct-to-consumer DNA tests, and emerging research on human populations and their ancestors. Social and ethical issues related to the use of genetic information are also discussed.
AS.020.303

AS.020.320. Cell Division Mechanisms and Regulation. 3 Credits.
This course will focus upon the molecular mechanisms that underpin the reproduction of eukaryotic cells. General topics will include chromosome duplication, mitotic spindle action, cytokinesis, meiosis, cell cycle control, damage repair and checkpoints, and aberrant regulation characteristic of cancer. Most readings will be from recent research manuscripts and review articles. Classes will consist of a mix of lectures and student oral presentations.
AS.020.306

AS.020.321. Human Genome Variation with Computational Lab. 3 Credits.
This option combines the main course and computational lab components of HGV. HGV exposes students to the power of genomic studies for understanding human evolutionary history, biological traits, and genetic conditions. HGV incorporates basic population genetics, direct-to-consumer DNA tests, and emerging research on human populations and their ancestors. What does real human genomic data look like? How are these data analyzed in practice? Supplementing the main course, the computational lab component will explore public datasets and bioinformatic tools used to analyze human genomic data to better understand how patterns in these data can be used to test hypotheses about evolution and human phenotypes.
AS.020.303;Students who have taken AS.020.319 are not eligible to take AS.020.321.

AS.020.323. Computation Lab: Human Genome Variation. 1 Credit.
This is a stand-alone version of the HGV computational lab. This computation lab course is offered only to students who have completed AS.020.319 (Human Genome Variation without lab). What does real human genomic data look like? How are these data analyzed in practice? Supplementing the main course, this computational lab will explore public datasets and bioinformatic tools used to analyze human genomic data to better understand how patterns in these data can be used to test hypotheses about evolution and human phenotypes.
AS.020.319

AS.020.329. Microbiology. 2 Credits.
This course explores the physiology and genetics of microorganisms within an evolutionary and ecological framework. Concepts in microbiology will be supported by molecular studies of microbial evolution and microbial communities including that of the human microbiome. Recommended Course Background: AS.020.305

AS.020.331. Human Genetics. 3 Credits.
Will examine the growing impact of human genetics on the biological sciences, on law and medicine, and on our understanding of human origins. Topics include structure and evolution of human genome, genetic and physical mapping of human chromosomes, molecular genetics of inherited diseases and forensic genetics.
AS.020.303

AS.020.337. Stem Cells & the Biology of Aging & Disease. 2 Credits.
This will be a team-taught lecture course that focuses on the properties of stem cells, their possible role in cancer (breast and prostate), stem cell aging, and the potential utilization of stem cells for therapy. Topics will include: mechanisms of stem cell renewal, stem cell potency, the impact of the stem cell niche, stem cells and the hematopoietic system, stem cells and the neural system, stem cells in the male and female gonads, induced pluripotent stem cells and cellular reprogramming, stem cell changes with aging, and ethical and policy issues in stem cell research and use. Most lectures will be research-oriented. Students will be expected to read and critically analyze current literature, with an emphasis on the experimental bases from which our current understandings derive.
AS.020.305 (Biochemistry) or AS.020.306 (Cell Biology) or EN.580.221 (Molecules and Cells) or EN.540.307 (Cell Biology for Engineers) or permission of instructor.

AS.020.340. Developmental Genetics Lab. 3 Credits.
CRISPR (clustered regularly-interspaced short palindromic repeat) is one of the greatest advances in biology in the past decade, providing researchers with the tools to precisely and affordably edit genomes and physicians a new tool to cure disease. However, the ability to edit plant and animal genomes, including human genomes, comes with significant ethical considerations. This course will utilize a hybrid classroom-laboratory approach to provide students with both a comprehensive knowledge of the CRISPR system and a deeper understanding of how gene function is studied. At the end of the semester, you will not only understand how CRISPR works, but also have a better understanding of the power of genetics to illuminate molecular mechanisms of protein function.
AS.020.303 can be taken prior to or during enrollment in AS.020.340.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.344. Virology. 3 Credits.
This course will cover basic principles of viral replication and pathogenesis, as well as the host response to viral infection. It will then focus on several viruses of interest, including HIV-1, Influenza, Human Papilloma Virus, and SARS-CoV-2.
AS.020.304 OR AS.020.306

AS.020.347. AIDS. 3 Credits.
AIDS is the world's deadliest infectious disease. This course will cover the biology of human immunodeficiency virus (HIV, the infectious agent that causes AIDS), the effects of HIV on the immune system, the pharmacology of the anti-viral agents that are used to suppress HIV infection, and the ongoing quest for an HIV vaccine. Because HIV drugs cannot cure HIV-infected individuals and no HIV vaccine yet exists, we will also study the long-term consequences of HIV infection including opportunistic infections, comorbid conditions, and the HIV-related cancers Kaposi's Sarcoma and AIDS-Related lymphoma. Recommended Course Background: AS.020.306
AS.020.306

AS.020.350. Introduction to Clinical Medicine. 2 Credits.
Perm. Req'd. Post-Bac Students Only

AS.020.351. Cancer Biology. 3 Credits.
While the "war on cancer" has produced modest victories with respect to clinical outcomes, our knowledge of the cellular mechanisms of cancer is now vast and represents one of the most significant scientific achievements of the past 40 years. Key aspects of cancer biology will be covered with a combination of textbook and original literature readings. Topics will include cancer cell characteristics, oncogenes, tumor suppressor genes, apoptosis, metastasis and immuno-surveillance of cancer cells. Application of our knowledge to the rational treatment of cancer will also be discussed.
Cell Biology 020.306 or permission of instructor

AS.020.361. Advanced Research Lab in Cell and Molecular Biology. 2 Credits.
An intensive research laboratory course on single-molecule, live-cell imaging of chromatin and epigenetic factors designed for undergraduate students with interests in biochemistry, molecular, cellular and computational biology. The course introduces the use of advanced fluorescence microscopy to visualize the single-molecule dynamic behaviors and spatial distributions of important nuclear proteins and chromatin factors in living cells of Saccharomyces cerevisiae as a model for conserved epigenetic regulators in humans. Students will learn and apply imaging and computational tools to localize and track single protein molecules in real time and calculate their diffusive parameters. Students are expected to interpret and integrate data to acquire conceptual insights on chromatin functions, e.g. how chromatin proteins, enzymes, and large protein complexes are distributed in nuclear space and time. After course completion, there is a further option for post-course research in the Wu laboratory.Open to advanced sophomores or upper level students with permission of Professor Carl Wu (wuc@jhu.edu)
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.362. Single Molecule Approaches to Biology. 3 Credits.
This course examines how recently developed single-molecule methods have enhanced our understanding of cellular processes. The ability to observe and manipulate individual biological macromolecules has revolutionized our understanding of the machines and processes that enable life. The course will provide an overview of single-molecule approaches and discuss relevant publications that exemplify how these methodologies are applied to biological problems. For each approach, key concepts will be introduced in a lecture/discussion, followed by a student-led presentation of a related publication.Recommended coursework: Physics II
AS.020.305 OR AS.250.316

AS.020.363. Developmental Biology. 3 Credits.
This class will explore the development of animals from a single fertilized egg into a fullyformed organism. We will emphasize experimental methods to understand the molecular mechanisms controlling development.
AS.020.306 AND (AS.020.330 OR AS.020.303)

AS.020.364. Molecular and Cellular Mechanisms of Reproduction. 2 Credits.
This course will address current research in the cellular and molecular biology of fundamental reproductive processes. The topics covered will vary from year to year, based on current issues in the scientific literature. The focus will be on cellular and molecular mechanisms involved in the synthesis and actions of hormones, gametogenesis, fertilization, pathologies of the reproductive tracts, developmental origins of reproductive health and disease, contraception, and infertility. The emphasis will be on defining cellular and molecular mechanisms that regulate reproductive processes, identifying the hypotheses tested in scientific papers and the strengths and limitations of experimental methods used to test the hypotheses, and evaluating and integrating data described in scientific papers. Classes will consist of a mix of lectures and student oral presentations.Recommended coursework: Reproductive Physiology
AS.020.306

AS.020.367. Primate Adaptation and Evolution. 3 Credits.
A close look at our closest relatives, the primates. Topics include: evolutionary theory, primate evolution, primate behavior and ecology, human evolution, and modern human variation.

AS.020.374. Comparative Physiology. 3 Credits.
This class examines animal physiology from an evolutionary and comparative viewpoint. The goal is to examine the commonalities, as well as unique differences, in how various animal organisms address the necessary life functions. Topics will include metabolism, neural systems, respiration, muscle systems, water and salt homeostasis, thermal regulation, and reproduction
AS.020.305

AS.020.377. Comparative Physiology Lab. 1 Credit.
This course examines the physiological principles that guide animal life processes. As a complement to the Comparative Animal Physiology lecture course, this Laboratory examines fundamental physiological principles through hands-on investigations of animal physiology using zebrafish and mussel as model systems and research-grade data acquisition systems.
AS.020.374, students may enroll concurrently.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.379. Evolution. 3 Credits.
This course takes a broad look at the impact of natural selection and other evolutionary forces on evolution. Emphasis is placed on what we can learn from genome sequences about the history of life, as well as current evolutionary pressures.Recommended Course Background: AS.020.306, AS.020.330, or permission required

AS.020.380. Chromatin, Chromosomes and The Cell Nucleus. 3 Credits.
The course will present analysis of the structural basis of the genome organization in a eukaryotic nucleus and the utilization of its genomic content. We start with the analysis of the fluctuations of the structure of the double helix in response to its cellular microenvironment that yield DNA structural and functional polymorphism. Next we will deal with the mechanics of DNA compaction into chromatin and the differentiation of the chromatin structure at the level of the nucleosome via histone variants and posttranslational modifications and chromatin-based epigenetics. We will next move to chromosomal territories, chromosomal imprinting and chromosome inactivation. Finally, a few lectures will focus on selected topics of special interests that bridge current basic discoveries with potential medical applications such as the nature of telomeres and telomerase-related diseases; the role of histone octamer tails in epigenetics; transcription factors and the regulated expression of the genome. Whenever possible. paradigms will be used that correlate chromatin differentiation to certain human diseases.
AS.020.305 OR AS.020.306; AS.020.303 with approval of the instructor only.

AS.020.382. A Biophysical View of Biology. 3 Credits.
The objective of this course is to develop in students a strong, intuitive, and physically based sense of how fundamental biological processes work—that is, the sizes, shapes, motions, interactions, and cellular functions of biological molecules. Topics will include cell and population growth, diffusion, enzyme kinetics, the qualitative and quantitative aspects of the synthesis, structure, and function of proteins and nucleic acids, least squares equation fitting, Bayesian statistics, and the fluctuation test. The biophysical constraints that dictate the form of the immune system and constraints relevant to development will be discussed.

AS.020.384. Fundamentals of Drug Discovery. 3 Credits.
The creation and implementation of new approaches to the drug discovery and development process is a very active area of research. Currently, only one compound out of 5,000 that enter preclinical studies becomes a drug. Moreover, the development process is time consuming, lasting more than ten years on average. The rate of failure is extremely high. It has become evident that this field is in urgent need of revolutionary changes. This course will cover drug discovery issues ranging from the identification of hits to their optimization as drug candidates. Current as well as novel and proposed approaches aimed at accelerating discovery, potency optimization, selectivity, pharmacokinetics and other drug properties will be discussed.
AS.020.305 AND AS.020.306

AS.020.385. Epigenetics. 3 Credits.
Course description: This course emphasizes epigenetic regulatory mechanisms including DNA methylation, histone modifications, histone variants, non-coding RNA regulation, and chromatin remodeling, etc. We will discuss the broad impact of epigenetic regulation in various biological events, ranging from stem cell activity, small RNAs' and long non-coding RNAs' function, to transgenerational epigenetic inheritance and human diseases. We will mainly use recent literatures to discuss various topics. There are both students' presentation and writing components for this course. Students will be assigned a series of papers for their presentation and faculty will meet with student presenters ahead of the time to go through the presentation content.
AS.020.303 OR AS.020.330

AS.020.401. Master's Seminar: Molecular & Cellular Biology I. 3 Credits.
This is a weekly seminar designed for graduate students enrolled in the B.A./M.S. and Ph.D. programs. The seminar involves student presentations of research and discussion of topics of current interest in the field. BA/MS candidates only.

AS.020.402. Master's Seminar: Molecular and Cellular Biology II. 3 Credits.
This is a weekly seminar designed for students enrolled in the BA/MS program. The seminar involves student presentations of research and discussion of topics of current interest in the field. BA/MS students only.

AS.020.410. Teaching and Learning in Biology. 1 Credit.
This course is by instructor permission only and exclusively for students who are invited and accepted to be learning assistants for other Biology courses. The course will focus on discussing education and application of current best teaching practices to Biology classes.

AS.020.441. Mentoring in General Biology. 1 Credit.
To become a mentor, students must have successfully completed AS.020.151/152, must apply using the form on the Biology Dept. website (https://bio.jhu.edu/undergraduate/courses/), and must be accepted by the instructors. The deadline to apply is April 15th. S/U

AS.020.442. Mentoring in General Biology. 1 Credit.
This course provides students who have taken General Biology I & II the opportunity to mentor new students in General Biology I & II. Mentors collaborate with faculty on how to lead effective sessions, create study materials for students, help student teams complete team assignments, and generally help students understand difficult concepts and principles in biology. Mentors must have a firm command of the topics covered in biology and must meet with both faculty and students through the course of the semester. To become a mentor, students must have successfully completed AS.020.151/AS.020.152, must apply using the form on the Biology Department website, and must be accepted by the instructors.

AS.020.502. Introduction Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.503. Independent Research in Biology. 1 - 3 Credits.
Planning and conducting original laboratory investigations on biological problems, collection and analysis of data, reporting of results. Permission of full-time faculty member in Biology dept.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.504. Independent Research in Biology. 1 - 3 Credits.
Perm. Req'd. Freshmen or Sophomores only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.505. Internship - Biology. 0 - 3 Credits.
An independent course of study may be pursued under the direction of an adviser on those topics not specifically listed in the form of regular courses. Consent of adviser required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.506. Internship - Biology. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.508. Literature Research in Biology. 2 Credits.
Graduating students in the Molecular and Cellular Biology major will fulfill their research credit requirement by researching a topic in the modern scientific literature and writing a review of that topic. The topics will be self-chosen by pairs of students, who will then work together with guidance from the instructor. Intended for graduating students, not those who can fulfill this requirement at a later date with in-person research.

AS.020.511. Independent Study. 3 Credits.
An independent course of study may be pursued under the direction of an adviser on those topics not specifically listed in the form of regular courses. Perm. Req'd.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.512. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.513. Research Problems. 3 Credits.
Planning and conducting original laboratory investigations on biological problems, collection and analysis of data, reporting of results. Juniors and Seniors Only. Recommended Course Background: Permission of full-time faculty member in Biology dept.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.514. Research Problems. 1 - 3 Credits.
Perm. Req'd.Juniors and Seniors only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.551. Mentored Research. 9 Credits.
This courses provide BA/MS students with intensive research experience for a full academic year. Students in the program work under the direction of a research mentor on an original research project, produce a written report in the form of a thesis, and make a presentation of the work to the Biology Department. BA/MS or BS/MS candidates only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.553. Mentored Research. 9 Credits.
BA/MS candidates only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.597. Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.601. Current Research in Bioscience.
This course involves 30 minute sessions with each member of the training faculty. It is designed to acquaint incoming graduate students with the research topics and research philosophy of each laboratory. This should help students choose future rotations. More generally the course provides a range of perspectives on the future of specific fields and strategies for success in science. First year Biology Graduate students only

AS.020.605. Computational Simulation and Analysis of Protein Stability and Interactions.
This course deals with the development of computer code for the simulation and non-linear least squares analysis of experimental macromolecular data including protein stability (chemical and temperature denaturation, single and multiple domain proteins); different types of binding (single site, multiple sites, independent and cooperative binding); linkage between conformational equilibrium and binding; enzyme kinetics and inhibition; kinetics of protein denaturation/aggregation. The course will use Python as the programing language.Requirements for this course include: 1) Basic Python programing skills; 2) Calculus; 3) Students must have a basic understanding of conformational equilibrium, binding equilibrium and enzyme kinetics. If not sure, please talk to the Instructor.

AS.020.607. Quantitative Biology Bootcamp.
Quantitative and computational methods have become essential to modern biological research. The goal of this course is to provide an introduction to basic skills that will enable students to employ these methods. Students will learn how to work in a command line shell and use software to perform analyses of large biological datasets.Students will learn basic programming using the Python language.Throughout the course students will apply the skills learned to practical analysis problems emphasizing parsing and working with biological data formats, exploratory data analysis and visualization, and numerical and statistical methods. This course is only open to first-year students in the CMDB program.

AS.020.608. Graduate Course in Optical Microscopy.
An introduction to optical microscopy from basic principles to advanced techniques. The course will involve both lectures and practical experience on a number optical microscopes available within the IIC, other core facilities and labs in the university.

AS.020.612. Introduction to the Human Brain.
This course explores the outstanding problem of biology; how knowledge is represented in the brain. Relating insights from cognitive psychology and systems neuroscience with formal theories of learning and memory, topics include (1) anatomical and functional relations of cerebral cortex, basal ganglia, limbic system, thalamus, cerebellum, and spinal cord; (2) cortical anatomy and physiology including laminar/columnar organization, intrinsic cortical circuit, hierarchies of cortical areas; (3) activity-dependent synaptic mechanism; (4) functional brain imaging; (5) logicist and connectist theories of cognition; and (6) relation of mental representations and natural language. Co-listed with AS.020.312.

AS.020.617. Quantitative Biology Lab 1.
This computer lab is designed for first year CMDB graduate students to enhance their quantitative skills for fall core courses.This course will cover quantitative and computational analysis of biological datasets, emphasizing molecular biology. In a hands on lab setting, students will carry learn to perform essential analyses including assembly of genomes, detection of DNA methylation, analysis of transcription factor binding and motifs, detecting genome variation, measuring expression of genes, and understanding genome evolution.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.618. Quantitative Biology Lab II.
This computer lab is a continuation of the fall quantitative biology lab for CMDB graduate students. This semester will cover quantitative and computational modeling of selected topics from biophysics, cellular biology, and developmental biology
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.619. Thesis Proposal Preparation.
This is an elective course for 2nd year PhD students in the CMDB program only. The goal of the course is to help students prepare written thesis proposals. Students will also gain practical experience in peer review, with additional lectures on using their proposals to prepare applications for the NIH National Research Service Award (F31). Because of the considerable time commitment required, students may not enroll in the course without explicit approval from their thesis advisors.

AS.020.629. Microbiology.
This course explores the physiology and genetics of microorganisms within an evolutionary and ecological framework. Concepts will be supported by primary literature exploring microbial evolution and microbial communities including that of the human microbiome.

AS.020.630. Human Genetics.
Will examine the growing impact of human genetics on the biological sciences, on law and medicine, and on our understanding of human origins. Topics include structure and evolution of human genome, genetic and physical mapping of human chromosomes, molecular genetics of inherited diseases and forensic genetics.

AS.020.637. Genomes & Development.
This course covers gametogenesis, embryogenesis, post-embryonic development, genetic analysis, developmental genetics, model developmental systems, and cell determination. Biology graduate students only except with written permission from the instructor.

AS.020.643. Graduate Virology.
This course will cover basic principles of viral replication and pathogenesis, as well as the host response to viral infection. It will then focus on several viruses of interest, including HIV-1, Influenza, Human Papilloma Virus, and SARS-CoV-2.

AS.020.644. RNA.
A graduate seminar course that will explore RNA from its beginning in the primordial RNA world to its present-day roles in gene regulation in bacteria, mammals, and viruses. Topics will include: The early RNA world, Riboswitches, Ribozymes, evolution of protein synthesis, splicing, telomerase, RNA interference, microRNAs, long non-coding RNAs, Viral non-coding RNAs, and RNA therapeutics.Biology PHD students only. MCB MS students with instructor's permission during ADD/DROP Period.

AS.020.662. Single Molecule Approaches to Biology.
This course examines how recently developed single-molecule methods have enhanced our understanding of cellular processes. The ability to observe and manipulate individual biological macromolecules has revolutionized our understanding of the machines and processes that enable life. The course will provide an overview of single-molecule approaches and discuss relevant publications that exemplify how these methodologies are applied to biological problems. For each approach, key concepts will be introduced in a lecture/discussion, followed by a student-led presentation of a related publication.

AS.020.668. Advanced Genetics and Molecular Biology.
This course examines modern concepts in genetics and molecular biology. The coursefocuses on the mechanisms controlling replication, recombination, transcriptional, posttranscriptional, translational, and posttranslational regulation. Lectures will have threeparts: a student-led paper presentation, a discussion about the concepts surrounding atopic, and a discussion of modern techniques to experimentally probe the topic.Biology PHD students only.

AS.020.674. Quantitative Biology and Biophysics.
Students will be given instruction in the concepts of physical and quantitative biology. Students will learn to simulate biological processes, identify the relationship between data and models, and will learn to fit biological data. Note: Friday classes will be held in UTL 398.

AS.020.675. Graduate Comparative Physiology.
This course addresses the basic principles that underlie physiological processes in animals. Framed in an evolutionary context, processes ranging from respiration, circulation, neural control, movement, excretion and metabolism will be understood in terms of core principles that also apply to humans. Emphasis is placed on the physical and chemical principles underlying the comparative biology of how different animals solve physiological problems.

AS.020.684. Fundamentals of Drug Discovery and Development.
The creation and implementation of new approaches to the drug discovery and development process is a very active area of research. Currently, only one compound out of 5,000 that enter preclinical studies becomes a drug. Moreover, the development process is time consuming, lasting more than ten years on average. The rate of failure is extremely high. It has become evident that this field is in urgent need of revolutionary changes. This course will cover drug discovery issues ranging from the identification of hits to their optimization as drug candidates. Current as well as novel and proposed approaches aimed at accelerating discovery, potency optimization, selectivity, pharmacokinetics and other drug properties will be discussed. Grad students only.

AS.020.686. Advanced Cell Biology.
All aspects of cell biology are reviewed and updated in this intensive course through critical evaluation and discussion of the current scientific literature. Topics include protein trafficking, membrane dynamics, cytoskeleton, signal transduction, cell cycle control, cell physiology, and the integration of these processes in neurons. Recommended Course Background: AS.020.306

AS.020.688. PhD Excels.
This course provides foundational and multi-tiered training in career strategy and professional development. Through synchronous and asynchronous classes, students will learn to assess and develop the skills needed to transition into a career and align them to their strengths, values and interests. By engaging in small group discussions, experiential learning activities and networking with alumni experts, students will enhance self-knowledge and confidence to explore wider career opportunities. Biology 3rd year and above students only

AS.020.689. PhD Excels II.
This is the second course in a two-part series that provides foundational and multi-tiered training in career strategy and professional development. Through synchronous and asynchronous classes, students will learn to assess and develop the skills needed to transition into a career and align them to their strengths, values and interests. By engaging in small group discussions, experiential learning activities and networking with alumni experts, students will enhance self-knowledge and confidence to explore wider career opportunities. This course provides in-depth understanding of specific career paths based on the career exploration covered in 020.688. Biology 3rd year and above students only.
AS.020.688

AS.020.699. CMDB Responsible Conduct in Research.
This course involves discussions of ethical conduct and the responsible practice of scientific research.Department signature only; restricted to graduate students in Biology PhD students only.

AS.020.753. Logic and Methods in Modern Biology.
The purpose of this course is to gain experience in critical thinking about the logic and methods used in modern biological research. The main approach will be the critical reading, presentation, and discussion of primary research papers, and the preparation and presentation of a research proposal. It is held once a week on the NIH Bethesda campus. Grad students only.
AS.020.637 AND AS.020.668 AND AS.020.674

AS.020.801. Research – Biological Problems.
Independent research for the Ph.D. dissertation. Biology Ph.D. students only

AS.020.802. Research-Biological Problems.
Biology Graduate students only.

AS.020.803. Summer Graduate Research.
Summer independent research for CMDB graduate students only.

AS.020.823. Introduction to Biology Research.
First year Biology Graduate Students only

AS.020.824. Introduction to Biology Research.
First year Biology Graduate Students only

AS.020.825. Introduction to Research.
Open to first year Biology graduate students only.

AS.020.826. Introduction to Biology Research.
Open to first year Biology graduate students only.

Cross Listed Courses

Biochemistry and Molecular Biology

PH.120.852. Core Research Literature. 1 - 2 Credits.

Provides a complement to the BCMB core curriculum. Student reads research papers relating to a core lecture topic. Discussions are led by a student while a faculty member from Biochemistry or MMI act as facilitator. Helps students to develop skills in reading the primary literature and provides an introduction to the experimental paradigms underlying the concepts presented in the core course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

Biology

AS.020.153. General Biology Laboratory I. 1 Credit.

This course reinforces the topics covered in AS.020.151. Students participate in a semester-long project, identifying bacteria from Homewood campus soils using molecular biology techniques. Other laboratory exercises cover aspects of evolution, genomics and biochemistry. Cross-listed with Behavioral Biology. Student must have enrolled in AS.020.151 either this term or in past terms. Students who have credit for AP Biology but take General Biology Lab I will lose four credits of AP Biology credit. Cross-listed with Behavioral Biology. AS.020.151 can be taken prior to or at the same time as AS.020.153.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Biophysics

AS.250.351. Reproductive Physiology. 2 Credits.

Focuses on reproductive physiology and biochemical and molecular regulation of the female and male reproductive tracts. Topics include the hypothalamus and pituitary, peptide and steroid hormone action, epididymis and male accessory sex organs, female reproductive tract, menstrual cycle, ovulation and gamete transport, fertilization and fertility enhancement, sexually transmitted diseases, and male and female contraceptive methods. Introductory lectures on each topic followed by research-oriented lectures and readings from current literature.

Biostatistics

PH.140.636. Scalable Computational Bioinformatics. 4 Credits.

Introduces the computational hardware and programming model upon which analysis tools and languages are based. Introduces and uses three main languages (Python, Perl, SQL) and their underlying rationale to develop computer science concepts such as data structures, algorithms, computational complexity, regular expressions, and knowledge representation. Draws examples and exercises from high-throughput sequence analysis, proteomics and modeling of biological systems. Reinforces key concepts through lectures with live computer demonstrations, weekly readings, and programming exercises. Has students working with a High Performance Compute Cluster and the Amazon cloud.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

Chemistry

AS.030.623. Molecular Synthetic Biology.

Principles and methods for the design and optimization of new biological systems, from a molecular perspective. Topics include: introduction to genetic parts and modern methods for their assembly; synthesis and incorporation of nucleic acids at the level of nucleotides, genes, and genomes; design of genetic programs; library generation and screening; directed evolution and its application to create new proteins and metabolic pathways; computational design of protein and RNA?using physical and bioinformatic approaches; non-canonical amino acids and genetic code expansion. This course will also feature critical evaluation of the primary literature in this fast-paced field, and practical experience with relevant software and computational tools.

Computer Science

EN.601.448. Computational Genomics: Data Analysis. 3 Credits.

Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning.Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Prerequisites: EN.601.226 or other programming experience, probability and statistics, linear algebra or calculus.
Students may receive credit for only one of EN.600.438, EN.600.638, EN.601.448, EN.601.648.

EN.601.749. Advanced Computational Genomics: Applied Comparative Genomics. 3 Credits.

The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm & final exam, class presentations, and a significant class project. [Applications] Expected course background: familiarity with UNIX scripting and/or programming.

Extradepartmental Studies

PH.550.630. Public Health Biology. 3 Credits.

Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.631. Biological Basis of Public Health. 3 Credits.

Discusses molecular, biochemical, cellular and immunological methodology and approaches for the mechanistic understanding, treatment and prevention of human diseases, and for understanding disease susceptibility. The focus will be on the application of biological methods and approaches to such critical issues as infectious disease, cancer, neurodegenerative disease, COPD, environmental toxicant effects on early development, and reproductive anomalies and their treatment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.855. MA Public Health Biology Thesis. 5 - 6 Credits.
Provides an opportunity for students to, in consultation with a faculty mentor from the Dept of Biochem and Molecular Bio, Environmental Health or Molecular Microbiology and Immunology, prepare a critical, scholarly paper on an agreed upon subject area.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.605. The Science of Primary Secondary and Tertiary Prevention in Population Health. 0.5 Credits.
Provides a broad understanding of the different levels of public health prevention: primary, secondary, and tertiary and discusses the impact of each level on prevention in population health. Emphasizes the role of epidemiology in prevention and control; compares and contrasts the descriptive epidemiology, natural history, and pathologic and biologic characteristics as well as factors related to their etiology. Presents the impacts of recent advances in human genomics/genetics, immunology and metabolism on prevention strategies for chronic and acute disease. Introduces basic principles, theories, and methods in the field of prevention science. Identifies public health interventions that operate at multiple ecological levels, including the community, family, and individual. Introduces the role of resilience. Discusses case studies related to the prevention of different physical, mental, behavioral and infectious disease health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.606. The Critical Importance of Evidence in Advancing Public Health Knowledge. 0.5 Credits.
Emphasizes the need to establish the credibility of the evidence, based on the rigor of the methods used in generating it (e.g., type of studies, rules of causality, the nature of errors) before employing evidence to advance knowledge, practice, or policy. Discusses the bases for debate about recommendations for particular interventions that impact a population’s health, how to weigh their benefits and harms, the ethics of scientific conduct, and effective communication in building evidence. Uses illustrative case examples, such as breast and prostate cancer screening, vaccines for measles and cervical cancer, nutritional sodium reductions, and the opioid epidemic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.608. Biologic, Genetic and Infectious Bases of Human Disease. 0.5 Credits.
Focuses on the basics of cellular and molecular biology, genetics, and infectious agents. Explains concepts that link basic biology to disease and population health. Illustrates application of biologic and genetic principles to population health using case studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

First Year Seminars

AS.001.154. FYS: Phage Hunters - Discovering novel bacteriophages. 3 Credits.
We often think of bacteria in the context of dangerous or annoying infections. However, bacteria themselves can be infected by even smaller and more abundant entities: viruses called bacteriophages. This First-Year Seminar will combine readings and discussion of the fundamental biology of phages and their role in controlling populations of bacteria, with lab work to discover new phages from the Johns Hopkins campus. Phages identified in this class will be added to the Science Education Alliance’s archive which is comprised of phages from over 100 academic institutions worldwide and is a resource for phage biologists and physicians directly involved in developing phages as a treatment for disease.

AS.001.165. FYS: Biology in Deep Time. 3 Credits.
This First-Year Seminar will explore seminal ideas in macroevolutionary theory through both classic and cutting-edge studies. Topics would include the relationship between evolution and development, how fossils shape our understanding of biological systems, and the logical basis of evolutionary inference. Students will also gain an appreciation for the historical development of these ideas and their application in modern science and beyond.

AS.001.176. FYS: Microbe Hunters - Student-sourcing Antibiotic Discovery. 3 Credits.
This First-Year-Seminar covers concepts of biology taught through the lens of microbes and antibiotic resistance. Using environmental samples, students actively engage in the hunt for novel antimicrobials. Broader concepts include the meaning of disease, how that meaning has changed over time, and the implications of widespread antibiotic resistance for society. This is a research-based project lab course in which students participate as part of an international consortium of undergraduates at other colleges. Students will isolate and characterize antibiotic-producing bacteria from the environment using modern molecular biological techniques. This seminar is open to all students, regardless of major. No prior lab experience necessary.

AS.001.186. FYS: Tuberculosis. 3 Credits.
Mycobacterium tuberculosis is an extremely successful intracellular bacterial pathogen able to manipulate phagocytic cells and its own metabolism to survive within a host. The molecular mechanisms of this survival and resistance to antibiotics will be studied. Freshmen only.

AS.001.191. FYS: From Genes to DNA & Back. 3 Credits.
This First-Year Seminar analyzes issues and questions like: How did we arrive at the concept of the “gene”? What are the early observations that gave substance to this concept? How did we arrive at the “one gene, one enzyme” dogma? What is the chemical nature of the gene? Is DNA enough for regulated gene expression? Is it “all in our genes”? What is genetic plasticity and epigenetics? What about genomics and proteomics? In the course of our analyses we bring together observations, and experimental results and ideas not only from biological sciences (Genetics, Cell and Developmental Biology and Genetics) but also from Physics, Sociology, Politics and Philosophy. We do all this in order to clarify how observations turn to ideas, then dogmas and even biases that distort the true meaning of objective Sciences.

Interdepartmental

AS.360.339. Planets, Life and the Universe. 3 Credits.

This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.616 OR AS.171.333 OR AS.171.699 OR AS 270.335 OR AS.360.671

AS.360.671. Planets, Life and the Universe.

Replace description with the following--"This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.616 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.

International Health

PH.223.686. Child and Public Health in the Tropics. 4 Credits.

Introduces students to the major global causes of child mortality and the strategies and interventions to reduce child mortality. Includes specific topics: malaria, HIV, measles, pneumonia, diarrhea, neonatal disorders and nutritional deficiencies. Additional topics may include maternal mortality, eye diseases, demography and anthropometry. Focuses on and emphasizes a theme through the different lectures, with the tension and balance between horizontal approaches to child survival, such as Integrated Management of Childhood Illness (IMCI), and vertical programs such as disease eradication programs. Discusses several papers published as part of the Lancet Child Survival and Lancet Neonatal Survival series, and gain hands-on experience applying different child survival strategies using the Lives Saved Tool (LiST).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.689. Biologic Basis of Vaccine Development. 3 Credits.

Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

Molecular Microbiology and Immunology

PH.260.844. Causation. 3 Credits.

Acquaints students with the central concept of causation across the biomedical and public health disciplines. Discusses how cause and effect relationships govern today's research and evidence-based decision-making based on the social, physical, political, and economic determinants of health. Compares how fields and sub-disciplines in biomedicine and public health approach causation using research case examples that illustrate major morbidity and mortality-related health problems. Examines strategies to mitigate the limitations of causal inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

Neuroscience

AS.080.301. Behavioral Assessment of Animal Models of Cognition and Neuropsychiatric Disorders. 3 Credits.

What does a rat exploring it's environment tell us about memory? How can a mouse help us better understand schizophrenia? This course will focus on procedures that are routinely used to study behavior in animal models of cognition and neuropsychiatric disorders. Topics will include motor function, emotional and motivational states, disorders such as dementia and schizophrenia, among others. Throughout the course, we will read and discuss original research articles to illustrate and compare some of the measures and results from the various procedures.
AS.200.141 OR AS.080.105 OR (AS.080.305 and AS.080.306), OR by instructor permission.

AS.080.304. Neuroscience Learning and Memory. 3 Credits.

This course is an advanced survey of the scientific study of learning and memory. Different perspectives will be used to review the science of learning and memory including the cellular-molecular basis of synaptic plasticity, the functional circuitry involved in learning and memory and memory systems in the brain. The course is designed to provide a deep understanding of the issues and current debates in learning and memory research and focuses specifically on animal models of memory and memory impairment. This is an interactive lecture course with a strong emphasis on student participation.
AS.200.141 OR (AS.080.305 AND AS.080.306) OR (AS.020.312 AND AS.020.306) or instructor permission.

AS.080.305. Neuroscience: Cellular and Systems I. 3 Credits.

(Formerly Nervous Systems I) Neuroscience: Cellular and Systems I is a fully integrated, two-semester course that surveys the cellular and molecular biology of neurons as well as the structure and function of the nervous system. Students must register for Neuroscience: Cellular and Systems II offered in the second term. Course open to JHU undergraduates only.
AS.080.203 OR AS.050.203 OR AS.200.141 OR AS.080.105 OR AS.050.105 or instructor permission.

AS.080.308. Neuroeconomics. 3 Credits.

Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience.
AS.080.306 OR AS.200.141 OR AS.020.312

AS.080.328. Behavioral Neuroscience Lab. 3 Credits.
Class designed to give students first-hand knowledge of the behavioral procedures and techniques used to study behavior in the field of neuroscience. Students will gain hands-on experience by carrying out some of the behavioral tasks used to assess animals under specific behavioral domains, discuss why certain aspects (i.e. genotype, environment conditions, group size, etc.) are important factors to consider when designing, planning, and carrying out such experiments, and learn the relevance of behavioral research in translational medicine.
AS.200.141 OR AS.200.302 OR AS.080.301 OR (AS.080.305 AND AS.080.306) or permission by instructor.

Psychological & Brain Sciences

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.

AS.200.208. Animal Behavior. 3 Credits.
This course examines how and why animal behaviors are produced across the animal kingdom. Neurobiological, hormonal and developmental mechanisms and adaptive function of behaviors are examined in an evolutionary context. Behaviors include survival, acquiring food, reproduction, communication, parental care, and cooperation. Students will also learn how to develop hypotheses and predictions for scientific questions and interpret graphical results.
AS.200.141 OR Permission of Instructor.

AS.200.334. Human Memory Psychology. 3 Credits.
This class will survey the behavioral and biological science of human memory. Historical perspectives as well as modern controversies will be discussed. Intersections with other fields such as law, education, medicine, and technology will be highlighted. The course will be a mixture of lectures and group discussions.

AS.200.344. Behavioral Endocrinology. 3 Credits.
This course examines both the evolution and mechanisms of hormonal effects on behavior across animals, including humans. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, stress and social behavior. Additionally, this course emphasizes developing skills in hypothesis testing and critically assessing the scientific literature. Cross-listed with Behvioral Biology and Neuroscience.
(AS.200.141 OR AS.080.306) OR (AS.020.151 AND AS.020.152) or instructor's permission

For current faculty and contact information go to http://www.bio.jhu.edu/Directory/TenuredPlusTenureTrack.aspx

Biology, Bachelor of Arts

Biology Major Requirements (B.A.)

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The B.A. degree in biology is designed to provide students with a thorough grounding in modern biology, with special emphasis on the molecular aspects of the discipline.

All courses required for the biology major must be taken for a letter grade (not S/U) and be passed with a grade of C- or better with one exception. The department will accept one passing grade below C- in the senior year provided that the average for all formal lecture and laboratory courses is at least 2.0.

Code	Title	Credits
Mathematics		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.110.113	Honors Single Variable Calculus	
Physics		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
Chemistry		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
AS.030.225	Introductory Organic Chemistry Laboratory	3
or AS.030.227	Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques	
Biology		
AS.020.151	General Biology I	3
AS.020.152	General Biology II	3
AS.020.303	Genetics	3
AS.020.304	Molecular Biology	3
AS.020.306	Cell Biology	3
AS.020.363	Developmental Biology	3
AS.020.305	Biochemistry	3
AS.020.315	Biochemistry Project lab	2-3
or AS.250.253	Protein Engineering and Biochemistry Lab	
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.020.340	Developmental Genetics Lab	3
AS.020.316	Cell Biology Lab	1
Electives		
At least three courses totaling at least seven credits (see POS-Tag BIOL-UL in the Schedule of Classes) from the courses approved by the Director of Undergraduate Studies. At least one course must be taught by the Biology Department (AS.020.xxx) and be a 2 or 3 credit course.		8
Total Credits		**72-73**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.106	Calculus I (Biology and Social Sciences)	4
AS.020.151	General Biology I	3
AS.020.153	General Biology Laboratory I	1
	Credits	**12**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.107	Calculus II (For Biological and Social Science)	4
AS.020.152	General Biology II	3
AS.020.154	General Biology Lab II	1
	Credits	**12**
Second Year		
First Semester		
AS.030.205	Introductory Organic Chemistry I	4
AS.030.225 or AS.030.227	Introductory Organic Chemistry Laboratory or Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques	3
AS.020.304	Molecular Biology	3
	Credits	**10**
Second Semester		
AS.020.303	Genetics	3
AS.020.340	Developmental Genetics Lab	3
AS.030.206	Organic Chemistry II	4
	Credits	**10**
Third Year		
First Semester		
AS.020.305	Biochemistry	3
AS.020.315 or AS.250.253	Biochemistry Project lab or Protein Engineering and Biochemistry Lab	1
AS.171.103 or AS.171.101	General Physics I for Biological Science Majors or General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Second Semester		
AS.020.306	Cell Biology	3
AS.020.316	Cell Biology Lab	1
AS.171.104 or AS.171.102	General Physics/Biology Majors II or General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
Upper Level Biology Elective		2-3
	Credits	**11-12**
Fourth Year		
First Semester		
Upper Level Biology Elective		2-3
	Credits	**2-3**
Second Semester		
AS.020.363	Developmental Biology	3
Upper Level Biology Elective		2-3
	Credits	**5-6**
	Total Credits	**71-74**

Honors in Biology

Students completing the B.A. in Biology are eligible to receive their degree with honors.

The B.A. in biology with honors requires, in addition to the regular requirements for the B.A. in biology, a 3.5 GPA for natural sciences and quantitative studies courses, two semesters of research, a presentation of a poster describing the independent research, and a recommendation from the research sponsor.

The research requirement must be completed under the direction of a faculty member in a department associated with the Johns Hopkins University or the Johns Hopkins Medical Institutions. If the student's research director for independent research is not a member of the Department of Biology, a Biology faculty member must serve as a sponsor and approve the recommendation from the research director.

Biology, Bachelor of Arts/Master of Science

The Biology Department offers a combined B.A./M.S. or B.S./M.S. degree in Molecular and Cellular Biology. The combined degree is open only to Johns Hopkins University undergraduates majoring in Biology or Molecular and Cellular Biology.

Admission Requirements

Admission to the Molecular and Cellular Biology M.S. program is selective. Hopkins Biology majors and Molecular and Cellular Biology majors who have achieved a minimum overall grade point average of 3.2, and a minimum natural science grade-point average of 3.0, and have had at least two semesters of previous research experience may apply for admission during their junior or senior year. Students with a GPA below the minimum requirement will be considered under special circumstances. Admission decisions are made by the Molecular and Cellular Biology M.S. Program Committee, on the basis of:

1. academic record,
2. a written proposal for a project to be completed in the Mentored Research Program,
3. letters of support and recommendation,
4. an interview if required.

Program Requirements

Students must complete all requirements for the B.A. or B.S. degree and the following requirements.

Code	Title	Credits
Four additional advanced or specialized courses, at least two of which are at the 600-level or above. [1]		
AS.020.401	Master's Seminar: Molecular & Cellular Biology I	3
AS.020.402	Master's Seminar: Molecular and Cellular Biology II	3
AS.020.551	Mentored Research	9
AS.020.552 Mentored Research		3
AS.020.553	Mentored Research	9
Final report and presentation [2]		
Teaching [3]		
Total Credits		**27**

1 Eligible courses are listed on the Biology Department website.
2 The Mentored Research Program culminates in the preparation of a written report of the research project in the form of a thesis. The written report and an oral presentation of the work are evaluated by a Thesis Committee. Passing performance, as judged by the committee, is required for the M.S. degree.
3 Teaching is an integral component of the master's degree. The teaching requirement is fulfilled as a teaching assistant for lecture and/or lab courses for two semesters.

Students admitted to the combined program will be awarded the M.S. degree if they complete the requirements listed above, receive a grade of B or better in all courses during the duration of the program, and achieve passing performance on the final written report and oral presentation of the research project completed during the research year as judged by the Thesis Committee.

Cellular, Molecular, Developmental Biology and Biophysics, PhD

A program of study leading to the Ph.D. degree is open to students who are candidates for, or who already have, the bachelor's or master's degree in the biological or physical sciences. To be admitted, the applicant should have had either a thorough training in the fundamentals of biology and both organic chemistry and general physics, or a broad training in the physical sciences and mathematics. Special attention is given to the applicant's quality of scholarship and their promise as an investigator.

Teaching Opportunities

Since most biology Ph.D.'s will teach at some time during their careers, experience in teaching is considered an essential part of the Ph.D. program. The minimum teaching requirement is three contact hours a week for one year in the laboratory sections of undergraduate courses. Further teaching experience is gained through the preparation and presentation of reports in seminars and journal clubs. The department stresses organization of material and clarity of presentation.

Facilities

The lecture rooms, teaching laboratories, and research facilities of the Biology Research Complex (consisting of Seeley G. Mudd Hall and Undergraduate Teaching Laboratories) offer a thoroughly modern research facility for molecular biology.

Financial Aid

The department has fellowship funds for the support of graduate students. Awards are granted for tuition and living expenses. Laboratory fees and research expenses are paid by the department.

Carnegie Institution for Science, Department of Embryology

The Carnegie Institution's Department of Embryology is located on the Homewood campus, close to the Biology research complex. Members of this group hold part-time appointments in the Department of Biology and participate in the training of graduate students. With the approval of both the department and the Carnegie staff, a number of graduate students in biology conduct thesis research in the Carnegie laboratory. The interests of the Carnegie staff include developmental and molecular biology.

Program Requirements

In addition to the general university requirements for an advanced degree (see Academic Information for Graduate Students (p. 1618)), doctoral candidates must meet the following departmental requirements:

- Nine core courses and four 600- and 700-level electives.
- At least one year of laboratory teaching during the period of graduate residence.
- A high level of achievement in a comprehensive written proposal and oral examination covering proficiency in the field of the student's research interest and various areas of biology and related fields.
- A dissertation based on a program of independent research, a public seminar followed by an oral examination by the thesis committee.

All graduate students are required to complete the five core courses during the first year. In addition, students are required to complete four elective courses before graduation chosen from the list below of 600-level electives and 700-level seminars offered each semester. At least two out of the four courses must be 600-level.

Code	Title	Credits
Core Courses, Fall Semester		
AS.020.601	Current Research in Bioscience	
AS.020.607	Quantitative Biology Bootcamp	
AS.020.617	Quantitative Biology Lab 1	
AS.020.686	Advanced Cell Biology	
AS.020.668	Advanced Genetics and Molecular Biology	
AS.020.699	CMDB Responsible Conduct in Research	
Core Courses, Spring Semester		
AS.020.674	Quantitative Biology and Biophysics	
AS.020.637	Genomes & Development	
AS.020.618	Quantitative Biology Lab II	

Molecular & Cellular Biology, Bachelor of Science/Master of Science

The Biology Department offers a combined B.A./M.S. or B.S./M.S. degree in Molecular and Cellular Biology. The combined degree is open only to Johns Hopkins University undergraduates majoring in Biology or Molecular and Cellular Biology.

Admission Requirements

Admission to the Molecular and Cellular Biology M.S. program is selective. Hopkins Biology majors and Molecular and Cellular Biology majors who have achieved a minimum overall grade point average of 3.2, and a minimum natural science grade-point average of 3.0, and have had at least two semesters of previous research experience may apply for admission during their junior or senior year. Students with a GPA below the minimum requirement will be considered under special circumstances. Admission decisions are made by the Molecular and Cellular Biology M.S. Program Committee, on the basis of:

1. academic record,
2. a written proposal for a project to be completed in the Mentored Research Program,
3. letters of support and recommendation,
4. an interview if required.

Program Requirements

Students must complete all requirements for the B.A. or B.S. degree and the following requirements.

Code	Title	Credits
Four additional advanced or specialized courses, at least two of which are at the 600-level or above. [1]		
AS.020.401	Master's Seminar: Molecular & Cellular Biology I	3
AS.020.402	Master's Seminar: Molecular and Cellular Biology II	3
AS.020.551	Mentored Research	9
AS.020.552 Mentored Research		3
AS.020.553	Mentored Research	9
Final report and presentation [2]		
Teaching [3]		
Total Credits		**27**

[1] Eligible courses are listed on the Biology Department website.
[2] The Mentored Research Program culminates in the preparation of a written report of the research project in the form of a thesis. The written report and an oral presentation of the work are evaluated by a Thesis Committee. Passing performance, as judged by the committee, is required for the M.S. degree.
[3] Teaching is an integral component of the master's degree. The teaching requirement is fulfilled as a teaching assistant for lecture and/or lab courses for two semesters.

Students admitted to the combined program will be awarded the M.S. degree if they complete the requirements listed above, receive a grade of B or better in all courses during the duration of the program, and achieve passing performance on the final written report and oral presentation of the research project completed during the research year as judged by the Thesis Committee.

Molecular and Cellular Biology, Bachelor of Science

Molecular and Cellular Biology Major Requirements (B.S.)

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Biology Department offers a B.S. degree in molecular and cellular biology. The B.S. program is designed to provide a rigorous preparation for advanced study in the biomedical sciences. The program is tailored not only to students planning to enter Ph.D. programs or obtain employment in the biotechnology industry but also for premedical students.

All courses required for the molecular and cellular biology major must be taken for a letter grade (not S/U) and be passed with a grade of C- or better with one exception. The department will accept one passing grade below C- in senior year provided that the average for all formal lecture and laboratory courses is at least 2.0.

Code	Title	Credits
Mathematics		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
Physics		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.173.112	General Physics Laboratory II	1
Chemistry		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
AS.030.225	Introductory Organic Chemistry Laboratory	3
or AS.030.227	Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques	
Biology		
AS.020.303	Genetics	3
AS.020.304	Molecular Biology	3
AS.020.306	Cell Biology	3
AS.020.363	Developmental Biology	3
AS.020.305	Biochemistry	3
AS.020.315	Biochemistry Project lab	2-3
or AS.250.253	Protein Engineering and Biochemistry Lab	
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.020.340	Developmental Genetics Lab	3
AS.020.316	Cell Biology Lab	1
Electives		

At least four courses totaling at least 12 credits (see POS-Tag BIOL-UL in the Schedule of Classes) from the courses approved by the Director of Undergraduate Studies. At least one course must be taught by the Biology Department (AS.020.xxx) and be a 2 or 3 credit course.	12
Research	
Research (totaling at least 6 credits) *	6
Total Credits	**76-77**

* The supervised research will include participation in group meetings and writing a summary of accomplished work at the end of the year.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.106	Calculus I (Biology and Social Sciences)	4
	Credits	**8**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.107	Calculus II (For Biological and Social Science)	4
AS.020.303	Genetics	3
AS.020.340	Developmental Genetics Lab	3
	Credits	**14**
Second Year		
First Semester		
AS.030.205	Introductory Organic Chemistry I	4
AS.030.225 or AS.030.227	Introductory Organic Chemistry Laboratory or Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques	3
AS.020.304	Molecular Biology	3
	Credits	**10**
Second Semester		
AS.020.306	Cell Biology	3
AS.020.316	Cell Biology Lab	1
AS.030.206	Organic Chemistry II	4
	Credits	**8**
Third Year		
First Semester		
AS.020.305	Biochemistry	3
AS.020.315 or AS.250.253	Biochemistry Project lab or Protein Engineering and Biochemistry Lab	1
AS.171.103 or AS.171.101	General Physics I for Biological Science Majors or General Physics: Physical Science Major I	4
Upper Level Biology Elective		2-3
AS.173.111	General Physics Laboratory I	1
	Credits	**11-12**
Second Semester		
AS.020.363	Developmental Biology	3
AS.171.104 or AS.171.102	General Physics/Biology Majors II or General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
Upper Level Biology Elective		2-3
	Credits	**10-11**
Fourth Year		
First Semester		
Upper Level Biology Elective		2-3
Upper Level Biology Elective		2-3
Research		3
	Credits	**7-9**
Second Semester		
Upper Level Biology Elective (if needed)		2-3
Research		3
	Credits	**5-6**
	Total Credits	**73-78**

Honors in Molecular and Cellular Biology

Students completing the B.S. in molecular and cellular biology major are eligible to receive their degree with honors.

The B.S. in molecular and cellular biology with honors requires, in addition to the regular requirements for the major, a 3.5 GPA for natural sciences and quantitative studies courses, a presentation of a poster describing the independent research, and a recommendation from the research sponsor.

The research requirement must be completed under the direction of a faculty member in a department associated with the Johns Hopkins University or the Johns Hopkins Medical Institutions. If the student's research director for independent research is not a member of the Department of Biology, a Biology faculty member must serve as a sponsor and approve the recommendation from the research director.

Biophysics

http://biophysics.jhu.edu/

The Department of Biophysics offers programs leading to the B.A., M.A., and Ph.D. degrees. Biophysics is appropriate for students who wish to develop and integrate their interests in the physical and biological sciences.

Research interests in the Department cover experimental and computational, molecular and cellular structure, function, and biology, membrane biology, and biomolecular energetics. The teaching and research activities of the faculty bring its students in contact with biophysical scientists throughout the university. Regardless of their choice of research area, students are exposed to a wide range of problems of biological interest. For more information, and for the most up-to-date list of course offerings and requirements, consult the department web page at biophysics.jhu.edu (http://biophysics.jhu.edu/).

Research Activities of Primary Faculty

Protein Engineering and Biophysics (Dr. Garcia-Moreno)

To understand how biological macromolecules work, or to design and engineer new ones, it is necessary to understand in detail the relationship between structure and energetics. We study this problem in our lab by analysis of the connection between structure, thermodynamic stability, and dynamics of proteins with a combination of computational and experimental methods. The approach depends heavily on the application of NMR spectroscopy, X-ray crystallography, and equilibrium thermodynamics. The experiments contribute the physical insight needed to guide the development of computational methods for structure-based energy calculations, as well as the data required to benchmark these methods. We are focused on problems of protein electrostatics because electrostatic energy is the most useful metric for correlating structure with function in all the most important energy transduction processes in biological systems. We focus on the engineering of proteins with pH sensing.

Biophysics of RNA (Dr. Woodson)

The control of cell growth and type depends on the ability of RNA to fold into complex three-dimensional structures. RNA catalysts are good models for studying the physical principles of RNA folding, and the assembly of protein-RNA complexes such as the ribosome. Changes in RNA three-dimensional structure are monitored by fluorescence spectroscopy, "X-ray footprinting," and neutron scattering. Bacterial and yeast expression systems are used to study intracellular folding of RNA.

Protein Folding, Notch Signaling (Dr. Barrick)

The folding of proteins into their complex native structures is critical for proper function in biological systems. This spontaneous process of self-assembly is directed by physical chemistry, although the rules are not understood. We are using repeat-proteins, linear proteins with simple architectures, to dissect the energy distribution, sequence-stability relationship, and kinetic routes for folding. We are also using consensus sequence design to explore how sequence statistices represented in multiple sequence alignments can be used to engineer protein stability, structure, and function. In addition, we are studying the molecular mechanisms of Notch signaling, a eukaryotic transmembrane signal transduction pathway. The transmission of information across the membranes of cells is essential for cell differentiation and homeostasis; signaling errors result in disease states including cancer. We are focusing on interactions between proteins involved in Notch signaling using modern biophysical methods. Thermodynamics of association and allosteric effects are determined by spectroscopic, ultracentrifugation, and calorimetric methods. Atomic structure information is being obtained by NMR spectroscopy. The ultimate goal is to determine the thermodynamic partition function for a signal transduction system and interpret it in terms of atomic structure.

NMR Spectroscopy (Dr. Lecomte)

Many proteins require stable association with an organic compound for proper functioning. One example of such "cofactor" is the heme group, a versatile iron-containing molecule capable of catalyzing a broad range of chemical reactions. The reactivity of the heme group is precisely controlled by interactions with contacting amino acids. Structural fluctuations within the protein are also essential to the fine-tuning of the chemistry. We are studying how the primary structure of cytochromes and hemoglobins codes for heme binding and the motions that facilitate function. The method of choice is nuclear magnetic resonance spectroscopy, which we use to obtain detailed structural and dynamic representations of proteins with and without bound heme. The ultimate goal is to understand the evolution of chemical properties in heme proteins and how to alter them.

Structural and Energetic Principles of Membrane Proteins (Dr. K. Fleming)

Membrane proteins must fold to unique native conformations and must interact in specific ways to form complexes essential for life. Currently, the chemical principles underlying these processes are poorly understood. Thermodynamic and kinetic studies on membrane proteins with diverse folds and oligomeric states are carried out with the goal of discovering the physical basis of stability and specificity for membrane proteins. Our research results in a quantitative understanding of sequence-structure-function relationships that can ultimately be used to describe membrane protein populations in both normal and disease states, to design novel membrane proteins, and to develop therapeutics that modulate membrane protein functions in desirable ways.

Chromatin Remodeling (Dr. Bowman)

Chromatin, the physical packaging of eukaryotic chromosomes, plays a major role in determining the patterns of gene silencing and expression across the genome. Chromatin remodelers are multicomponent protein machines that establish and maintain various chromatin environments through the assembly, movement, and eviction of nucleosomes. At present, the molecular mechanisms by which chromatin remodelers alter chromatin structure are not understood. Our long-term goal is to gain a molecular understanding of the remodeling process and in particular how remodeling is coupled to the transcriptional machinery. Our strategy is to couple structure determination with functional studies to determine how different components of a chromatin remodeler cooperate and interact with the nucleosome substrate.

Theoretical Biophysics (Dr. Johnson)

Protein interaction networks capture the cooperation required by proteins to carry out complex functions in the cell. The ability of proteins to assemble to form transient or permanent complexes and transmit signals or nutrients depends on their concentrations, their binding partners, and their spatial and temporal dynamics in the cell. Using computation and theory, we are building models to accurately simulate these multi-protein assembly processes, such as those occurring in endocytosis, that are critical to cell survival. We complement these detailed simulations with coarse-grained models to extend to larger protein interaction networks and characterize the role of network topology on protein binding specificity and dynamics.

Single Molecule Biophysics (Dr. Ha)

Our research is focused on pushing the limits of single-molecule detection methods to study complex biological systems. We develop state-of-the-art biophysical techniques (e.g., multicolor fluorescence, super-resolution imaging, combined force and fluorescence spectroscopy, vesicular encapsulation, single-molecule pull-down) and apply them to study diverse protein–nucleic acid and protein-protein complexes, and mechanical perturbation and response of these systems both in vitro and in vivo.

Quantitative Analysis of Gene Expression in Single Molecule and Single Cell (Dr. Myong)

Our research is focused on dissecting biological pathways that control and modulate gene expression profiles that are pertinent to human diseases. We develop single molecule and single cell platforms to examine potential rate-limiting steps that contribute to modulating transcription and translation. In particular, we investigate RNA interference pathway and G-quadruplex DNA mediated promoter activity. In collaboration, we are also studying telomeric DNA processing and chromatin remodeling. Together, we seek to shed light on molecular orchestration and mechanism that govern the Central Dogma of Biology.

Cellular Physics (Dr. Camley)

I work on the physics of cell biology, trying to understand how cells can respond to signals, crawl through complex environments, and work together to move and measure signals. I am also interested in the dynamics of subcellular processes like the cell membrane's motion and intracellular transport. These problems link the physics of soft, fluctuating materials to biological questions like how a white blood cell can find a wound. My group uses a wide range of computational and analytical methods to model organelles, cells, and tissues, ranging from stochastic hydrodynamics to phase field and reaction-diffusion modeling.

Biophysics Theory and Modeling (Dr. Zhang)

The interior of a cell is organized in both space and time by non-membrane bound compartments, many of which form via liquid-liquid phase separation. These phase-separated condensates play key roles in processes ranging from transcription to translation, metabolism, signaling, and more. Unlike conventional phase separation, e.g. the demixing of oil and water, the underlying interactions that drive biomolecular phase separation are complex, typically involving both specific and non-specific interactions and often among multiple components. These interactions are regulated by the cell in ways that allow condensates to carry out specific biological functions, yet the complexity of these interactions poses challenges to understanding how the microscopic features of biomolecules lead to the macroscopic properties and functions of condensates. We utilize physical, mathematical, and computational tools and work closely with experimental groups to understand such emergent connections. In addition, we are broadly interested in the complex behaviors of biomolecules and their assemblies across scales, from RNA folding and DNA bending, to macromolecular transport through nuclear pore complexes and intracellular space, to genome organization.

Facilities

The department shares state-of-the-art equipment for X-ray diffraction analysis, NMR spectroscopy, solution biophysical studies, and numerically intensive computer simulations with other biophysics units and departments within the University. In addition, the Department houses a full complement of equipment for molecular biological and biochemical work, and for various kinds of spectroscopy.

Undergraduate Program

The undergraduate major in biophysics is intended for the student interested in advanced study of biophysics or the related fields of biochemistry, quantitative or computational biology, molecular biology, physiology, pharmacology, and neurobiology. The biophysics major fulfills all typical science premedical requirements with the exception of Organic Chemistry Lab (AS.030.225 Introductory Organic Chemistry Laboratory or AS.030.227 Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques). The student majoring in biophysics, with the advice of a member of the department, chooses a program of study that will include foundation courses in biology, chemistry, and physics followed by advanced studies in biophysics, and independent research. The biophysics major requires that students earn a grade of "C" or greater for all courses required in the major. A student who earns a grade of "C-" or below must repeat the course and earn a better grade.

Doctoral Programs

The Thomas C. Jenkins Department of Biophysics offers three Ph.D. programs (Jenkins, PMB and CMDB, see below). The annual application deadline is December 1.

Financial Aid

Two National Institutes of Health training grants currently provide stipend and tuition support: one is for students who enroll in PMB and the other is for those who enter CMDB. Students supported by these training grants must be U.S. citizens or permanent residents. In addition, several research assistantships funded by grants and contracts awarded to faculty by outside agencies may be available to qualified students. University fellowships providing remission of tuition are also available. Graduate students in biophysics are eligible for and encouraged to apply for various nationally administered fellowships, such as National Science Foundation fellowships. Information on these and other support mechanisms can be obtained through the fellowship advisor at the applicant's college or from the National Research Council:

Attn: Fellowships
1000 Thomas Jefferson St.
Washington, D.C., 20007.

It is anticipated that financial support covering normal living costs and tuition will be made available to accepted students. Support for foreign students is extremely limited.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.250.105. Science and Film. 2 Credits.
From the origins of cinema to the present, science and technology have remained the most reliably popular subjects for filmmakers and audiences alike. This course will address that enduring fascination, exploring the meanings and uses of science and technology in film through guest lectures and discussion of cinematic examples both recent and historic. Lectures and discussion will focus on a range of questions: How does film both reflect and shape our understanding of scientific concepts and technologies, from artificial intelligence to genetic engineering? How does science fiction reveal contemporary cultural anxieties and address ethical questions? How “fictional” is the science in science fiction film, and how have science fiction films inspired science and technology? What can we learn about “real” science from the movies? In addition to exploring science through film, students will learn the tools of film analysis through lecture, close viewing, and completion of a series of short written responses. In lieu of a short written response, student may choose to work in a team to create a short (1-3 minute) video response. Possible scientific topics: Genetics and Bioethics, Psychological and Brain Sciences, Artificial Intelligence and Robotics, Climate Change and Public Health and Astrophysical and Planetary Sciences. Possible films to be discussed: 2001: A Space Odyssey, Eternal Sunshine of the Spotless Mind, Blade Runner, GATTACA, The Martian, Interstellar, WALL-E, Children of Men and more. Attendance at weekly screenings at the Parkway Theater is required.

AS.250.205. Introduction to Computing. 3 Credits.
This course is useful for many disciplines not only the life sciences. It will introduce students to basic computing concepts and tools useful in many applications. Students will learn to work in the Unix environment, and write bash shells scripts. They will learn to program using the Python programming language, including Python libraries for graphing, fitting and for numerical and statistical computing, such as NumPy, SciPy, and Matplotlib. At the end of the semester, students will complete a project coupling all components of the semester together. Brief lectures followed by extensive hands-on computer laboratories with examples from many disciplines. No prerequisites. Course offered every semester.
You cannot take AS.250.205 if you have already taken AS.250.206.

AS.250.253. Protein Engineering and Biochemistry Lab. 3 Credits.
This laboratory examines the relationship between genes and proteins in the context of disease and evolution. It is a research project lab in which the structural and functional consequences of mutations are determined for a model protein. Students will learn basic protein science and standard biochemical techniques and methods in protein engineering. They will perform experiments in site-directed mutagenesis, protein purification, and structural, functional and physical characterization of proteins. No prerequisites. Courses offered in Fall and Spring semesters.
Area: Writing Intensive
You cannot take AS.250.253 if you have already taken AS.250.254.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.254. Protein Biochemistry and Engineering Laboratory. 4 Credits.
A project laboratory where students will use the techniques of protein engineering to attempt to modify existing proteins to endow them with new structural or physical properties. This course will provide an introduction to standard biochemistry laboratory practice and to protein science, including experiments in site-directed mutagenesis, protein purification and characterization of proteins in regard to structure, function and stability.
You cannot take AS.250.254 if you have already taken AS.250.253.

AS.250.302. Modeling the Living Cell. 4 Credits.
Previously titled "Models and Algorithms in Biophysics." Introduction to physical and mathematical models used to represent biophysical systems and phenomena. Students will learnalgorithms for implementing models computationally and perform basic implementations. We will discuss the types of approximations made to develop useful models of complex biological systems, and the comparison of model predictions with experiment.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.310. Exploring Protein Biophysics using Nuclear Magnetic Resonance (NMR) Spectroscopy. 3 Credits.
NMR is a spectroscopic technique which provides unique, atomic level insights into the inner workings of biomolecules in aqueous solution and solid state. A wide variety of biophysical properties can be studied by solution state NMR, such as the three dimensional structures of biological macromolecules, their dynamical properties in solution, interactions with other molecules and their physical and chemical properties which modulate structure-function relationships (such electrostatics and redox chemistry). NMR exploits the exquisite sensitivity of magnetic properties of atomic nuclei to their local electronic (and therefore, chemical) environment. As a result, biophysical properties can be studied at atomic resolution, and the global properties of a molecule can be deconstructed in terms of detailed, atomic level information. In addition, interactions between nuclei can be exploited to enhance the information content of NMR spectra via multidimensional (2D and 3D) spectroscopy. Since these properties can be studied in solution, NMR methods serve as an effective complement to X-Ray crystallography and electron microscopy. In this course, we will learn about the basics of NMR spectroscopy, acquire 1D and 2D NMR spectra and use various NMR experiments to characterize and probe biophysical properties of proteins at an atomic level.
((AS.030.101 AND AS.030.105) OR (AS.030.103 OR AS.030.204)) AND (AS.030.370 OR AS.250.372) AND (AS.020.305 OR AS.030.315 OR AS.250.315) AND AS.030.205 or permission of the instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.315. Biochemistry I. 3 Credits.
Foundation for advanced classes in Biophysics and other quantitative biological disciplines. This class is the first semester of a two semester course in biochemistry. Topics in Biochemistry I include chemical and physical properties of biomolecules and energetic principles of catabolic pathways. Co-listed with AS.030.315
If you have completed AS.250.307 you may not register for AS.250.315.;(AS.030.206 OR AS.030.212) AND (AS.250.372 OR AS.030.301)

AS.250.316. Biochemistry II. 3 Credits.
Biochemical anabolism, nucleic acid structure, molecular basis of transcription, translation and regulation, signal transduction with an emphasis on physical concepts and chemical mechanisms. Format will include lectures and class discussion of readings from the literature.
(AS.250.315 OR AS.030.315 OR AS.020.305) AND (AS.030.206 OR AS.030.212) or permission of the instructor.

AS.250.320. Macromolecular Binding. 3 Credits.
All biological processes require the interactions of macromolecules with each other or with ligands that activate or inhibit their activities in a controlled manner. This course will discuss theoretical principles, logic, approaches and practical considerations used to study these binding processes from a quantitative perspective. Topics will include thermodynamics, single and multiple binding equilibria, linkage relationships, cooperativity, allostery, and macromolecular assembly. Some biophysical methods used in the study of binding reactions will be discussed. Computer simulation and analysis of binding curves will be used to analyze binding data, and binding schemes and examples from the scientific literature will be reviewed and discussed.Recommended Course Background: AS.250.372 Biophysical Chemistry
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.335. Single Molecule & Cell Biophysics. 3 Credits.
This (elective) course offers an introduction to the field of single molecule and single cell biophysics to second and third year undergraduate students in biophysics. We will examine technologies such as single molecule fluorescence, force measurements and single cell fluorescence detections that enable high precision molecular visualizations in vitro and in cells. In addition, we will cover topics of genome engineering, cell mechanics and optogenetics toward the end of the semester. Each student is expected to read two articles assigned for each week and submit a written summary. All students will take turns presenting the assigned articles to class.

AS.250.351. Reproductive Physiology. 2 Credits.
Focuses on reproductive physiology and biochemical and molecular regulation of the female and male reproductive tracts. Topics include the hypothalamus and pituitary, peptide and steroid hormone action, epididymis and male accessory sex organs, female reproductive tract, menstrual cycle, ovulation and gamete transport, fertilization and fertility enhancement, sexually transmitted diseases, and male and female contraceptive methods. Introductory lectures on each topic followed by research-oriented lectures and readings from current literature.

AS.250.372. Biophysical Chemistry. 4 Credits.
Course covers classical and statistical thermodynamics, spanning from simple to complex systems. Major topics include the first and second law, gases, liquids, chemical mixtures and reactions, partition functions, conformational transitions in peptides and proteins, ligand binding, and allostery. Methods for thermodynamic analysis will be discussed, including calorimetry and spectroscopy. Students will develop and apply different thermodynamic potentials, learn about different types of ensembles and partition functions. Students will learn to use Pythonand will use it for data fitting and for statistical and mathematical analysis. Background: Calculus, Introductory Organic Chemistry, and Introductory Physics.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.381. Spectroscopy and Its Application in Biophysical Reactions. 3 Credits.
Continues Biophysical Chemistry (AS.250.372). Fundamentals of quantum mechanics underlying various spectroscopies (absorbance, circular dichroism, fluorescence, NMR); application to characterization of enzymes and nucleic acids.
AS.250.372

AS.250.383. Molecular Biophysics Laboratory. 3 Credits.
An advanced inquiry based laboratory course covering experimental biophysical techniques to introduce fundamental physical principles governing the structure/function relationship of biological macromolecules. Students will investigate a “model protein”, staphylococcal nuclease, the “hydrogen atom” of biophysics. Using a vast library of variants, the effect of small changes in protein sequence will be explored. A variety of techniques will be used to probe the equilibrium thermodynamics and kinetic properties of this system; chromatography, spectroscopy (UV-Vis, fluorescence, circular dichroism, nuclear magnetic resonance), calorimetry, analytical centrifugation, X-ray crystallography, mass spectroscopy, and computational methods as needed for analysis. These methods coupled with perturbations to the molecular environment (ligands, co-solvents, and temperature) will help to elucidate protein function. Prerequisite: Introduction to Scientific Computing (250.205) or equivalent. Biophysical Chemistry (250.372 or 020.370) or equivalent. Course taught in Fall and Spring.
Area: Writing Intensive
(AS.250.372 OR AS.030.370) AND AS.250.205;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.403. Advanced Seminar in Bioenergetics. 3 Credits.
The trait shared by all living systems is the capacity to perform energy transduction. This biophysics/biochemistry course examines the physico-chemical and structural basis of biological energy transduction. Emphasis is on understanding the molecular and cellular logic of the flow of energy in living systems. The course explores the connection between fundamental physical requirements for energy transduction and the organization, evolution and possibly even the origins of biological molecules, cells, and organisms. Implications for planet earth¹s energy balance and for the design of synthetic organisms and of artificial energy transducing machines will be discussed, time permitting. Recommended Course Background: One semester of Biochemistry. Recommended Course Background: One semester of Biochemistry
Area: Writing Intensive

AS.250.410. Genome Maintenance and Genome Engineering. 3 Credits.
Advanced seminar for biophysics undergraduates. We focus on topics of genome maintenance via telomere regulation and genome engineering by CRISPR-Cas systems. The course will have lecture, scientific article reading, small and large group discussion.

AS.250.411. Advanced Seminar in Structural Biology of Chromatin. 3 Credits.
Focus is on structural and physical aspects of DNA processes in cells, such as nucleosomal packaging, DNA helicases, RNA polymerase, and RNA inhibition machinery. Topics are meant to illustrate how the structural and chemical aspects of how proteins and nucleic acids are studied to understand current biological questions. Recommended Course Background: Biochemistry I (AS.250.315) and Biochemistry II (AS.250.316) or Biochemistry (AS.020.305) and Intro to Biophys Chem (AS.250.372)
Area: Writing Intensive

AS.250.420. Advanced Seminar in Macromolecular Binding. 3 Credits.
All biological processes require the interactions of macromolecules with each other or with ligands that activate or inhibit their activities in a controlled manner. This is a literature and skills-based course that will discuss theoretical principles, logic, approaches and practical considerations used to study these binding processes from a quantitative perspective. Topics will include thermodynamics, single and multiple binding equilibria, linkage relationships, cooperativity, allostery, and macromolecular assembly. Some biophysical methods used in the study of binding reactions will be discussed. Simulation and analysis of binding scenarios will be used to analyze illustrate binding schemes, and examples from the scientific literature will be reviewed and discussed. Basic working knowledge of Python is helpful. The writing component will be in one of the common formats employed in the professional biophysics field.Recommended Course Background: AS.250.372 Biophysical Chemistry
Area: Writing Intensive

AS.250.421. Advanced Seminar in Membrane Protein Structure, Function & Pharmacology. 3 Credits.
Topics are meant to illustrate the physical basis of membranes and membrane proteins towards understanding their functions and pharmacological importance including aspects of drug design as it relates to membranes. Contemporary issues in the field will be covered using primary literature articles, structural manipulations in pymol, and computational binding simulations.Recommended Course Background: AS.030.205, AS.250.307, and AS.250.372
Area: Writing Intensive

AS.250.514. Research in Protein Design and Evolution. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.250.520. Introduction to Biophysics Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.250.521. Research in Biophysics. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.;AS.250.520

AS.250.601. Biophysics Seminar.
Graduate students only. Students and invited speakers present current topics in the field.

AS.250.602. Biophysics Seminar.
Graduate students only. Students and invited speakers present current topics in the field.

AS.250.610. Savvy Science Seminars.
Oral presentations are one of the main forms by which scientists communicate their results. Whether in the context of the classroom, the relatively informal lab meeting or as an invited speaker at an international colloquium, the ability to effectively present scientific results is an important skill to master. This course will cover the planning and execution steps necessary to produce an engaging oral presentation. Students will learn to articulate the big biological questions, tell a story that stimulates interest in their chosen subject, and effectively convey their experimental findings. Key methodological steps in planning will guide students on how to create slides with compelling visuals, and how to use technology to their advantage. Students will each prepare, present, and receive feedback on a 15-minute talk on their thesis project in the style of the Biophysical Society short talks. In addition, each student will receive and evaluate a video of their presentation so they can see themselves through the eyes of others.

AS.250.615. Biophysics Writing Workshop.
A series of writing workshops designed to help Biophysics Graduate Students develop a proposal of thesis work. Each student will write a specific aims page and a full (6 page) proposal.

AS.250.620. Optical Spectroscopy.
Basics of absorbance, CD, and fluorescence spectroscopy; calorimetric methods.

AS.250.621. X-ray Diffraction.
Basics of X-ray diffraction methods

AS.250.622. Statistics and Data Analysis.
Basics of statistics and data analysis

AS.250.623. Macromolecular Simulation.
Basics of molecular dynamics

AS.250.624. NMR Spectroscopy.
Basics of NMR spectroscopy

AS.250.625. Single Molecule Measurements.
Basic Principles of Single Molecule Measurements
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.648. Physics of Cell Biology: From Mechanics to Information.
Cells are actively-driven soft materials but also efficient sensors and information processors. This course will cover the physics of those cellular functions, from the mechanics of DNA to the sensing of chemical signals. Questions answered include: How does polymer physics limit how quickly chromosomes move? Why do cells use long, thin flagella to swim? What limits the accuracy of a cell's chemotaxis?Some experience with partial differential equations required. No biology knowledge beyond the high school level necessary. Some problem sets will require minimal programming.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.649. Introduction to Computing in Biology.
In this four week, intensive introductory course, students will gain a practical working knowledge of UNIX and Python programming languages and packages for analyzing data from biochemical and biophysical experiments. Brief daily lectures are followed by extensive hands-on experience in the computer laboratory.

AS.250.685. Proteins & Nucleic Acids.
The structure of proteins, DNA and RNA, and their functions in living systems. Students are required to participate in class discussions based on readings from the primary scientific literature. Co-requisite: AS 250.649 Introduction to Computing in Biology. Instructor permission for undergraduates.
Prerequisite: AS.250.649,may be taken concurrently.

AS.250.689. Physical Chemistry of Biological Macromolecules.
Introduction to the principles of thermodynamics and kinetics as applied to the study of the relationship between structure, energy dynamics, and biological function of proteins and nucleic acids. Topics include of classical, chemical, and statistical thermodynamics, kinetics, theory of ligand binding, and conformational equilibria.

AS.250.801. Dissertation Research.

AS.250.802. Dissertation Research.

AS.250.803. Summer Dissertation Research.
Graduate Independent Academic Work

ME.100.300. Research Practicum. 0 Credits.
N/A

ME.100.600. Scientific Foundations of Medicine-Macromolecules. 0 Credits.

ME.100.699. Biophysics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Biophysics.
Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.100.705. Computer Modeling Of Biological Macromolecules: Lecture. 0 Credits.
Lecture will offer an introduction to the mathematical aspects of computer representation and manipulation of macromolecules

ME.100.706. Fundamentals Of Protein Crystallography. 0 Credits.
An introductory course designed to present the core knowledge and theoretical underpinnings of protein crystallography necessary to function in the laboratory. Assigned readings and problem sets will be given.

ME.100.707. Advanced Topics in Protein Crystallography. 1 Credit.
An introductory course designed to present the core knowledge and theoretical underpinnings of protein crystallography necessary to function in the laboratory. Assigned readings and problem sets will be given.

ME.100.708. Proteins and Nucleic Acids. 0 Credits.

ME.100.709. Macromolecular Structure and Analysis. 1.5 Credits.
The course will cover the structure and properties of biological macromolecules and the key methods used to study them, including X-ray crystallography, nuclear magnetic resonance, spectroscopy, microscopy, and mass spectrometry.

ME.100.710. Biochemical and Biophysical Principles. 1.5 Credits.
The physical and chemical principles underlying biological processes are presented and discussed. Topics include thermodynamics, chemical equilibrium, chemical and enzymatic kinetics, electrochemistry, physical chemistry of solutions, and structure and properties of water. Elementary concepts of statistical thermodynamics will be introduced as a way of correlating macroscopic and microscopic properties.

ME.100.712. Computer Modeling Of Biological Macromolecules: Lab. 3 Credits.
The laboratory course will familiarize students with practical aspects of molecular modeling. It teaches the necessary tools to create and manipulate computer generated models of biological-interest molecules. Techniques such as comparative modeling will be introduced.

ME.100.713. Using Structure to Understand Biology. 1 Credit.
The goal of this course is to teach students how to make use of structural information in the PDB using commonly available tools that are accessible to the non-expert. Students will learn how to read a structure paper, understand structure quality and limits of interpretation, and use coordinates from the Protein Data Bank to explore a structure and make figures. Topics covered will include non-covalent interactions, modeling point mutants, identifying binding pockets, making homology models, and calculating electrostatic surface potentials. Classes will combine lectures, hand-on computer demonstrations and critical reading of papers. A final project will require a short write-up and presentation that implements the programs and principles learned in the class

ME.100.714. Single-Molecule Single-Cell Biophysics. 1 Credit.
This elective course offers an introduction to the field of single molecule and single cell biophysics to graduate students in Johns Hopkins University and will be delivered in the School of Medicine. We will examine technologies such as single molecule fluorescence and force measurements, super-resolution imaging and single cell fluorescence detections that enable high precision molecular visualizations in vitro and in cells.

ME.100.715. Proteins and Nucleic Acids II. 3 Credits.
Critical reading and analysis of primary source literature is vital to scientific discourse and discovery. Students will be responsible for analyzing and critiquing papers in diverse topics and systems ranging from replication, transcription, and translation to enzyme mechanism, drug resistance, innate immunity, and signaling. Methods covered will include structural, biochemical, single-molecule, single-cell, and genomic approaches. Students will deliver analytic presentations on at least two ground-breaking papers relevant to these areas, and will be expected to actively participate in class discussion of experimental methodology and logic of other papers assigned in the course.

ME.100.716. Analysis of Macromolecules. 2 Credits.
The course will cover (1) macromolecules, (2) physical chemical principles dictating their biological behavior, and (3) methods to study them. Lectures will focus on practical application of the methods, experimental design, data collection, and elementary aspects of data analysis.

ME.100.801. Research. 0 Credits.
Thesis research

ME.100.804. Topics in Macromolecular Structure and Function I. 0 Credits.
This is the first part of a seminar course covering a variety of topics involving the structure and function of proteins and nucleic acids. Recent topics have included: protein folding, evolutionary significance of introns, protein-DNA interactions, solution structure of peptides, prospects for designing novel proteins, and two-dimensional NMR.

ME.100.807. Research. 0 Credits.
Thesis Research

ME.100.808. Topics in Macromolecular Structure and Function II. 0 Credits.
This is the second part of a seminar course covering a variety of topics involving the structure and function of proteins and nucleic acids. Recent topics have included: protein folding, evolutionary significance of introns, protein-DNA interactions, solution structure of peptides, prospects for designing novel proteins, and two-dimensional NMR.

Cross Listed Courses

Biology

AS.020.674. Quantitative Biology and Biophysics.
Students will be given instruction in the concepts of physical and quantitative biology. Students will learn to simulate biological processes, identify the relationship between data and models, and will learn to fit biological data. Note: Friday classes will be held in UTL 398.

First Year Seminars

AS.001.119. FYS: The Nature of Nature. 3 Credits.
To understand nature, we normally apply the scientific method to dissect complexity and to identify general principles and natural laws. Fortunately, science is not the only avenue for understanding and appreciating the fundamental character of the natural world and the logic of life. This is precisely how the Greeks, without the benefit of the technological and mathematical armamentarium at our disposal today, simply by identifying critical questions, laid the foundation for modern science and contributed insight that has stood the test of time. In this First-Year Seminar, we will emulate the Greeks. We will examine the nature of nature by asking questions about phenomena we experience in our daily lives. We will read brief sources from popular science and engage in weekly conversations. For the students with backgrounds in science, these conversations are an opportunity to discover the elusive continuity and connectivity between elements in nature that siloed science education all too often obfuscates. The students without science in their background will come to understand the forces that shape our world and our lives, and discover rich links between science and humanistic thinking.

Physics & Astronomy

AS.171.648. Physics of Cell Biology: From Mechanics to Information.
Cells are actively-driven soft materials – but also efficient sensors and information processors. This course will cover the physics of those cellular functions, from the mechanics of DNA to the sensing of chemical signals. Questions answered include: How does polymer physics limit how quickly chromosomes move? Why do cells use long, thin flagella to swim? What limits the accuracy of a cell's chemotaxis?Some experience with partial differential equations required. No biology knowledge beyond the high school level necessary. Some problem sets will require minimal programming.

For current faculty and contact information go to http://biophysics.jhu.edu/people/

Biophysics, Bachelor of Arts

Biophysics Major Requirements

(See also Requirements for a Bachelor's Degree (p. 1587).)

Code	Title	Credits
Chemistry		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
Physics		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or AS.173.116	Electricity and Magnetism Laboratory	
Mathematics		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
One additional Math elective is required. See "Math List" below.		4
Biophysics		
AS.250.205	Introduction to Computing	3
AS.250.315	Biochemistry I	3
AS.250.372	Biophysical Chemistry	4
AS.250.381	Spectroscopy and Its Application in Biophysical Reactions	3
AS.250.383	Molecular Biophysics Laboratory (Writing Intensive)	3
Research (6 credits required) [1]		
AS.250.520	Introduction to Biophysics Research [2]	3
Major Electives		
Three Courses from List #1		9-12
Three Courses from List #2		9-12
One Course from the Advanced Seminar List		3
Total Credits		**82-88**

1. All students will be expected to present their research in poster or oral format at the Biophysics Department Research Symposium in April. In most cases, students will present in their senior year. Research for credit in Intersession will not count towards this requirement.
2. This course is taken twice in 2 different semesters with both semesters being graded S/U for 3 credits. Students who take AS.250.520 during summer should register for 3 credits (typically completed over 10 weeks). In this case, an S/U grade will be given after completing all summer research.

Math List (Select one from this list as required Math Elective)

Code	Title	Credits
AS.110.201	Linear Algebra	4
AS.110.212	Honors Linear Algebra	4
EN.553.211	Probability and Statistics for the Life Sciences	4
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
EN.553.291	Linear Algebra and Differential Equations	4
Any 300 level course or higher with approval of faculty advisor		

List #1 (Select 3 from this list as Major Electives)

Code	Title	Credits
AS.250.253	Protein Engineering and Biochemistry Lab	3-4
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.250.316	Biochemistry II	3
AS.171.201	Special Relativity/Waves	4
AS.171.202	Modern Physics	4
or AS.171.310	Biological Physics	
EN.601.226	Data Structures [1]	4
EN.601.220	Intermediate Programming	4

1 Upper level computer science or bio-computing course can replace these courses with approval from advisor

List #2 (Select 3 from this list as Major Electives)

Code	Title	Credits
AS.250.253	Protein Engineering and Biochemistry Lab	3-4
or AS.250.254	Protein Biochemistry and Engineering Laboratory	
AS.250.302	Modeling the Living Cell	4
AS.250.316	Biochemistry II	3
AS.250.320	Macromolecular Binding	3
AS.250.403	Advanced Seminar in Bioenergetics	3
AS.171.201	Special Relativity/Waves	4
AS.171.202	Modern Physics	4
or AS.171.310	Biological Physics	
Any course 300-level or higher in Biology, Chemistry, Math, Physics, or Computer Science that is 3 credits or more.		3

Advanced Seminar List (Select one from this list as Advanced Seminar Requirement)

Code	Title	Credits
AS.250.335	Single Molecule & Cell Biophysics	3
AS.250.403	Advanced Seminar in Bioenergetics	3
AS.250.411	Advanced Seminar in Structural Biology of Chromatin	3
AS.250.421	Advanced Seminar in Membrane Protein Structure, Function & Pharmacology	3
AS.250.410	Genome Maintenance and Genome Engineering	3

Scheduling conflicts occasionally arise due to schedule changes in the departments of Physics, Biology, and Chemistry. Prospective biophysics majors should consult with the departmental undergraduate advisor to determine how the conflicts can be resolved.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.250.205	Introduction to Computing	3
	Credits	**11**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
	Credits	**8**
Second Year		
First Semester		
AS.030.205	Introductory Organic Chemistry I	4
AS.110.202	Calculus III	4
AS.171.103	General Physics I for Biological Science Majors	4
AS.173.111	General Physics Laboratory I	1
	Credits	**13**
Second Semester		
AS.030.206	Organic Chemistry II	4
AS.171.104	General Physics/Biology Majors II	4
AS.173.112	General Physics Laboratory II	1
Required Math Elective		4
	Credits	**13**
Third Year		
First Semester		
AS.250.253	Protein Engineering and Biochemistry Lab	3
AS.250.315	Biochemistry I	3
AS.250.372	Biophysical Chemistry	4
AS.250.520	Introduction to Biophysics Research	3
	Credits	**13**
Second Semester		
AS.250.381	Spectroscopy and Its Application in Biophysical Reactions	3
Elective from List #1		3-4
Elective from List #2		3-4
AS.250.520	Introduction to Biophysics Research	3
	Credits	**12-14**
Fourth Year		
First Semester		
AS.250.521	Research in Biophysics (optional)	3
Elective from List #1		3-4
Elective from List #2		3-4
Required Advanced Seminar Course		3
	Credits	**12-14**

Second Semester		
AS.250.383	Molecular Biophysics Laboratory	3
Elective from List #1		3-4
Elective from List #2		3-4
	Credits	9-11
	Total Credits	91-97

A Note on Writing Courses

The Krieger School of Arts & Sciences requires 12 credits of writing-intensive coursework. Although many humanities and social science courses have a writing designation, a few courses within the major also fulfill the requirement. Current examples include:

Code	Title	Credits
AS.250.335	Single Molecule & Cell Biophysics	3.0
AS.250.383	Molecular Biophysics Laboratory	3.0
AS.250.403	Advanced Seminar in Bioenergetics	3.0
AS.250.411	Advanced Seminar in Structural Biology of Chromatin	3.0
AS.250.421	Advanced Seminar in Membrane Protein Structure, Function & Pharmacology	3.0

Fulfilling some of the writing requirement with one or more biophysics courses requires advanced planning because not all of these courses are offered every year.

Honors in Biophysics

The Jenkins Biophysics department offers outstanding students the opportunity to earn departmental honors in Biophysics. This honors distinction appears on the student’s transcript upon graduation. If the honors requirements are approved prior to early April, an “Honors” distinction will additionally appear in the commencement program.

The requirements for departmental honors in biophysics are two-fold:

- The student must maintain an overall GPA of 3.5 or greater
- The student must write and receive approval of an Honors paper that is based on their 6 credits of required research.

Generally, the Honors paper must be submitted no later than March 1 of the senior year to meet the commencement deadline. Details on the format of the Honors paper can be found on the departmental website. Schedule a meeting with your Jenkins faculty adviser if you are interested in seeking departmental honors.

Ete Z. Szüts Undergraduate Research Travel Award

This award, named in honor of a Ph.D. graduate student from this department, will provide funds for up to 80 percent of the transportation costs of undergraduate research students in biophysics to attend a scholarly meeting. Recipients must be sponsored by a member of the departmental faculty who will be at the same meeting. Schedule a meeting with your Jenkins faculty adviser if you are interested in the Szuts Travel Award.

H. Keffer Hartline Award for Excellence in Undergraduate Research in Biophysics

This award honors a senior Biophysics Major for excellence in undergraduate research in Biophysics. Recipients are selected by Biophysics Faculty.

Detlev W. Bronk Award for Outstanding Scholarship in Biophysics

This award honors a senior Biophysics major for outstanding academic achievement in Biophysics. Recipients are selected by Biophysics Faculty.

Biophysics, Fifth-Year Master’s Degree

The T. C. Jenkins Department of Biophysics offers outstanding undergraduate biophysics majors the opportunity to advance their education through a combined, 5-year B.A., M.A. program. Candidates for this program must be current biophysics undergraduates with a departmental GPA of 3.5 or greater and a strong research history. All bachelor’s requirements must be completed before matriculating into the Master’s program.

Students in this program will be required to take courses such as:

Code	Title	Credits
AS.250.685	Proteins & Nucleic Acids	3
AS.250.689	Physical Chemistry of Biological Macromolecules	3
Total Credits		6

These courses account for about half of the student’s time. The remaining effort is spent on a substantial research project. A Master’s thesis describing the research being carried out is also required.

Biophysics, PhD - Jenkins Biophysics Program

The Jenkins Biophysics Program is designed for students interested in obtaining a doctorate in biophysics. Students joining this program carry out their doctoral research with a faculty member in the Department of Biophysics (http://biophysics.jhu.edu/people/). This program is financially supported through departmental funds, and therefore can support international students who are ineligible for NIH training grants.

Admission Requirements

The annual application deadline is December 1.

Please see the Biophysics website (https://biophysics.jhu.edu/graduate/jenkins-biophysics-program/) for requirements and how to apply to the Jenkins program.

Program Requirements

The following courses are required:

Code	Title	Credits
AS.250.610	Savvy Science Seminars	
AS.250.620	Optical Spectroscopy (Optical Spectroscopy)	
AS.250.621	X-ray Diffraction	
AS.250.622	Statistics and Data Analysis	
AS.250.623	Macromolecular Simulation	
AS.250.624	NMR Spectroscopy	
AS.250.625	Single Molecule Measurements	
AS.250.649	Introduction to Computing in Biology	

AS.250.685	Proteins & Nucleic Acids
AS.250.689	Physical Chemistry of Biological Macromolecules

In addition to classes, students are required to attend seminars given by outside speakers invited by the Biophysics Department, given on a weekly basis. Meeting and hearing about the work of others provides an excellent opportunity to observe different styles of communicating science, learn about career paths of others, and of course find out what key scientific questions are being pursued in different fields.

Teaching is an important mission of the Department of Biophysics. Students in the Jenkins Biophysics Program are required to serve as teaching assistants (TAs) for four semesters, which lasts the first two years. The TAs provide essential help in running laboratory and computer-based undergraduate courses, and it is through these assistantships that graduate students can be given financial support necessary for tuition and stipends.

After being admitted to the program, students must pass a Graduate Board Oral (GBO) exam to continue their dissertation research at Johns Hopkins University. This exam is traditionally taken in the spring of the second year. The exam committee consists of five faculty members, and the student provides oral answers. While generally focused on biophysics, questions can also extend to topics in biology, chemistry, and physics. Students who feel they may lack a strong background in certain areas are encouraged to improve their knowledge by taking elective classes and self-study during the first two years.

Biophysics, PhD - Program in Molecular Biophysics

The Program in Molecular and Biophysics (PMB), which began in 1990, brings together Johns Hopkins faculty at the Homewood and Medical School campuses. Its goal is to prepare students to deal with interdisciplinary problems in molecular biophysics and structural biology. For more information, see PMB Web page at pmb.jhu.edu (http://pmb.jhu.edu).

Admission Requirements

The annual application deadline is December 1.

All applicants must have a B.S. or a B.A. degree. Applications from students in any branch of science are welcome; however, we are particularly eager to attract applicants with undergraduate majors in physics, chemistry, mathematics, or relevant areas of engineering. There are no required undergraduate courses. Instead, applications are examined holistically for general strength of scientific background. The Graduate Record Examination, including a subject test, is no longer required for application or admission, but can be included if the applicant chooses.

Please use the Johns Hopkins University online application, selecting biophysics under the School of Arts & Sciences. Supplementary materials (letters of recommendation, optional GRE scores, statement, etc.) should be submitted along with the main application using the Johns Hopkins Arts & Sciences SLATE admissions portal.

Program Requirements

Programs are developed individually for each student, and due account is taken of previous training.

The following courses are required:

Code	Title	Credits
AS.250.610	Savvy Science Seminars	
AS.250.620	Optical Spectroscopy (Optical Spectroscopy)	
AS.250.621	X-ray Diffraction	
AS.250.622	Statistics and Data Analysis	
AS.250.623	Macromolecular Simulation	
AS.250.624	NMR Spectroscopy	
AS.250.625	Single Molecule Measurements	
AS.250.649	Introduction to Computing in Biology	
AS.250.685	Proteins & Nucleic Acids	
AS.250.689	Physical Chemistry of Biological Macromolecules	
ME.100.715	Proteins and Nucleic Acids II (At the School of Medicine)	3

Students must demonstrate strength in the following four areas: biological sciences, chemistry, mathematics, and physics. Typically, incoming students already have strength in at least two of these areas from undergraduate training. Deficiencies will be remedied through additional course work or self-study. Students must pass a proficiency exam in biological sciences at the end of their first year. In the mathematics and physics areas, students will be required to have knowledge of calculus through multivariable calculus, and one year of calculus-based physics, respectively. In the chemistry area, students are required to have basic chemistry, organic chemistry, and physical chemistry. In biological sciences, students are required to have knowledge of biochemistry and cell and molecular biology.

Additional academic requirements include completion of three 8-10 week laboratory rotations and passing the Graduate Board Oral Preliminary Examination, to be given near the end of the second year. Responsible Conduct of Research instruction is required throughout the duration of graduate studies. Students are also required to have several thesis reviews, including a research proposal presentation in the third year that is open to the public.

Completion of an original investigation and presentation of a dissertation are required. The dissertation must be accepted by the program and be considered worthy of publication by the referees. Students must then pass an oral examination on their dissertation and related topics.

Biophysics, PhD - The Program in Cell, Molecular Developmental Biology and Biophysics

The Program in Cell, Molecular Developmental Biology and Biophysics (CMDB) gives students a strong background in modern biology and physical biochemistry. This combination prepares students to study complex biological phenomena using quantitative physical methods. The training faculty reside in the T. C. Jenkins Department of Biophysics, the Biology Department, and the Carnegie Institutions Department of Embryology, all located on the Johns Hopkins Homewood campus. Students take core graduate courses in cell, molecular, and developmental biology, and in biophysics, and complete four eight-week rotations their first year. Other requirements include the Graduate Board Oral Preliminary Examination, given before the end of the second year, and successful defense of the dissertation.

For more information about CMDB, please check its website (cmdb.jhu.edu). Interested applicants can apply online via the program website or by U. S. mail to:

Alecia Flynn (aflynn12@jh.edu)
Graduate Admissions Coordinator
CMDB Program
Department of Biology
Johns Hopkins University
3400 N. Charles Street
Baltimore, MD 21218
410-516-5502

Financial Aid

Two National Institutes of Health training grants currently provide stipend and tuition support: one is for students who enroll in PMB and the other is for those who enter CMDB. Students supported by these training grants must be U.S. citizens or permanent residents. In addition, several research assistantships funded by grants and contracts awarded to faculty by outside agencies may be available to qualified students. University fellowships providing remission of tuition are also available. Graduate students in biophysics are eligible for and encouraged to apply for various nationally administered fellowships, such as National Science Foundation fellowships. Information on these and other support mechanisms can be obtained through the fellowship advisor at the applicant's college or from the National Research Council:

Attn: Fellowships
1000 Thomas Jefferson St.
Washington, D.C., 20007.

It is anticipated that financial support covering normal living costs and tuition will be made available to accepted students. Support for foreign students is extremely limited.

Center for Africana Studies

http://krieger.jhu.edu/africana/

The Center for Africana Studies (CAS) offers a rigorous focus on African-descended peoples and their cultures across the globe. Over the past millennium, the contribution, traditions, and values of African, African-American, and African Diaspora cultures helped create the modern and pre-modern world. Africana Studies, as a field of study, grew from the activist and scholarly traditions of Black Studies and the blending of peoples and ideas between Europe, Africa, and the Americas. It therefore offers a broad, multidisciplinary approach to history and culture centered on the interests, conditions, philosophies, conceptual schemes, and value systems of African-descended people everywhere. Our courses focus on the human experience in the context of social, political, demographic, cultural, religious, and economic systems. They also offer a unique perspective on racism, colonialism, capitalism, and geography that properly situates the importance of people of color to the making of the modern world.

Africana Studies offers a multidisciplinary curriculum that expands the scope and range of traditional academic disciplines to the presence, roles, cultural contributions, experiences, and particular interests of African peoples and their descendants.

Programs

- Africana Studies, Bachelor of Arts (p. 1700)
- Africana Studies, Minor (p. 1701)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.362.102. Anti-Racism 101. 3 Credits.
What is Anti-Racism? How do we identify racism's presence and effects, and how do we direct social and civic resources to end it? In this Freshman Seminar, students will learn from a series of faculty experts and invited guests about the history, workings, and legacies of racism. They'll also study present-day and past approaches – attempted and theorized – to abolish racism in the modern world.

AS.362.109. Introduction to African American Literature- Part II. 3 Credits.
This course will offer students an introduction to the central novels, plays, short stories, essays and poetry that have constituted African American Literature from 1930-1980. By focusing on representative works that span each of the major periods from the Harlem Renaissance to the Black Arts Movement, we will continue to consider the question of race and representation. How does one represent the race? And, for whom should black authors write – a white audience in order to change their minds about black people, or to black people for their pleasure and edification? Over the course of the semester, we will trace the various ways early- to late- 20th century black writers sometimes borrowed from earlier literary traditions and, at other times, developed new ones. In addition, we will hone in on the major debates and central texts that have come to define African American Literature and explore how it has long served as a creative, political, and intellectual enterprise.

AS.362.111. Introduction to African American Studies. 3 Credits.
This course introduces students to the interdisciplinary field of African American Studies, with attention to the literature, film, culture, history, and politics of black life in the United States. Our reading list will likely include texts by David Walker, Frederick Douglass, Frances E.W. Harper, Sutton Griggs, W.E.B. Du Bois, James Baldwin, Amiri Baraka, Toni Morrison, and others.

AS.362.112. Introduction to Africana Studies. 3 Credits.
This course introduces students to the field of Africana Studies. It focuses on the historical experience, intellectual ideas, theories, and cultural production of African-descended people. We will consider how people of the black diaspora remember and encounter Africa. We will explore, too, how such people have lived, spoken, written, and produced art about colonialism and enslavement, gender and mobility, violence and pleasure. This course will be thematically organized and invite you to center your own stories about black people within your understanding of the modern world and its making.

AS.362.115. Introduction to Police and Prisons. 3 Credits.
This introductory course will examine policing and prisons in the United States and beyond, with a focus on racial inequality. It will consist of three parts. First, we will define key concepts in police and prison studies. Then, we will explore the contemporary state of prisons and policing in the United States and look at debates around the rise of "mass incarceration" and aggressive forms of policing in the final third of the 20th century. Third, we will explore policing and prison in other parts of the globe in the contemporary moment, highlighting similarities and differences from the U.S. case. What can studying the instruments of social control in other societies reveal about our own? Students will develop an understanding of major trends, keywords, and debates in the literature on policing and prisons, with particular reference to race and racism.

AS.362.118. Cutting Through the Gaze: An Introduction to Social Justice Cinema. 2 Credits.
This course will introduce students to the fundamentals of community-engaged documentary filmmaking with a focus on both theory and practice. It will examine documentary filmmaking as an educational tool for raising social- and racial- justice issues from an African diasporic and global perspective. The course is taught by award-winning professional documentary filmmakers. Students will produce their own 3-5 minute film or audio podcast. Students will select their documentary film topic, conduct their own research, and move from pre-production into production. No prior experience in filmmaking is required for this course.

AS.362.123. Introduction to African American Literature (Part 1). 3 Credits.
This course will survey African American Literature from the 19th century to the late 20th century. We will turn to prose, poetry, and drama to explore the various ways black writes have engaged U.S. culture, history, and politics.
Area: Writing Intensive

AS.362.160. Land, Labour and Environmental Rights and Struggles in Contemporary Africa. 3 Credits.
'Africa rising' has become an influential, albeit contested, narrative used by institutions like the International Monetary Fund and World Economic Forum to describe the rapid economic growth in 21st century Africa. This rapid 'economic growth has been accompanied by another type of 'Africa Rising' – a mushrooming of social protest and popular uprisings across the continent. The course will introduce important theoretical perspectives, debates, and examples to equip students to critically examine contemporary social dynamics through the interconnected themes of land, labor and environmental rights and struggles that have gripped the African continent. What has given rise to these awakenings? Who are the actors involved in these actions? What are their demands and strategies? What lessons does it hold for social movement theory and development more broadly? The first section focuses on land reclamation movements, the new wave of 'land grabs' and responses from below. The second section presents the role of labour movements and its intersection with popular uprisings. The third section considers responses from communities and movements to the ecological destruction and climate change.

AS.362.201. African American Poetry and Poetics. 3 Credits.
In this course, we will follow the development of black poetry primarily as it has evolved in the United States. Beginning with the first published African American writers of the eighteenth century and ending with several important poets writing and performing today, we will consider the shape of the African American poetic tradition as commonly anthologized and as defined by our own theoretically-informed readings of the assigned literature. Attention will be given to both canonical and neglected literary movements and groups. Readings will include poetry and essays by Frances E.W. Harper, James Weldon Johnson, Langston Hughes, Gwendolyn Brooks, Amiri Baraka, Harryette Mullen, Tracie Morris, and others.

AS.362.203. Passing in American Culture. 3 Credits.
This course will examine film and literary narratives of "passing" in 20th century America. We will study texts that feature people who cross social boundaries of race, class, sexuality, and gender, and consider what "passing" reveals about American social mobility.
Area: Writing Intensive

AS.362.204. Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture. 3 Credits.
In Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture, students will learn about key historical, intellectual, and political aspects of white supremacy as a system or racial domination, and anti-black racism as a central feature of that global system. This class will explore the historical forms that white supremacy has taken—from colonialism and plantation slavery to Jim Crow, gentrification, and mass incarceration—racial ideologies, and how modern political systems have hinged on racial oppression. Most important, we will explore how black people have responded to the structures and ideologies of white supremacy, their thinking about freedom, being, and rights, and their efforts to fit into the worlds in which they found themselves, to improve those societies, and those projects that sought radical alternatives to the an anti-black world.
Area: Writing Intensive

AS.362.216. The politics of contemporary black film. 3 Credits.
Over the past few years films such as Black Panther, Get Out, and Black KKKlansman have been both critical and economic successes, significantly changing how we think of "black films" as a genre. What do these films tell us about what it means to be black at this specific moment in time? How is what these films tell us shaped by how they are produced? How do the circulation of concepts like "Wakanda Forever!" shape political imaginations? When we watch these films how are our own ideas change? As a particularly powerful form of popular culture, film not only entertains, but it educates, and in some instances propagandizes. This is no less true of black films than it is of non-black ones. In this class we will examine a range of recent popular black films with an eye to examining the politics of their production, circulation, and consumption.

AS.362.271. Hip Hop Culture: From the Boogie Down to Black Lives Matter. 3 Credits.
Hip hop has become one of the most influential youth cultural movements of the past 40 years. It has moved from being a geographically-isolated African American and Puerto Rican musical scene to influencing every aspect of American and international youth culture, including music, visual culture, language, and politics. How did hip hop develop? Where did it come from, who made it, and why? What do the images and messages of hip hop culture mean, how has it changed our world, and who cares? We will approach these questions by delving into the historical, aesthetic, socioeconomic, and political dimensions of hip hop culture. Classes will historically explore specific themes, either examining issues that hip hop has dealt with (e.g., police brutality) or employing theoretical frameworks that we can use to help us think more critically about hip hop (e.g., subcultural theory).

AS.362.301. Black Women Writers. 3 Credits.
This course will introduce students to a variety of works written by black women of the Diaspora with a focus on the U.S. We will consider how women have theorized power, engaged history, and creatively imagined both the past and the present.
Area: Writing Intensive

AS.362.305. Black Periodical Studies. 3 Credits.
This course explores the ways in which nineteenth- and twentieth-century black periodical culture fostered (and, at times, hampered) the literary and cultural production of the African diaspora. Authors will likely include Frederick Douglass, "Ethiop (William J. Wilson)," Frances E.W. Harper, Pauline Hopkins, W.E.B. Du Bois, Marcus Garvey, Jean Toomer, Langston Hughes, Richard Bruce Nugent, and others.
Area: Writing Intensive

AS.362.309. Performing the Archive 2022: 200 Years of US-Liberia Migration. 3 Credits.
This seminar will explore some of the pivotal historical and contemporary connections between the US and Liberia since the first Black American settlers arrived in West Africa with the American Colonization Society in 1822. This course asks: What are implications of these stories of migration and reception for how we make sense of global anti-Blackness in the contemporary moment? How does performance provoke new questions about shared histories of those impacted by colonialism and the transatlantic slave trade? Why is a more in-depth understanding of 19th century Black political thought and the precolonial West African indigenous category necessary for developing theory on the political economy of race today? Through the lens of performance studies, students will analyze the documents in the American Colonization Society archive, to reimagine these early encounters as informed by historical documentation including folklore and pan-Africanist theory. Through exploring a range of historical and contemporary materials that center the problematic "indigenous/settler" binary, students will engage in a dramaturgical process which presents powerful possibilities for unlearning historical misrepresentations. In particular, students will develop theater-based projects that interrogate the spatio-temporal connections between the stories of both, free Blacks and those who were enslaved in Maryland and manumitted to go to Liberia, and the contemporary politics of Liberia-US migration.

AS.362.311. Black Utopias. 3 Credits.
In this course, we will read literary and historical texts that present visions of black utopia. Authors include "Ethiop" (William J. Wilson), Marcus Garvey, Octavia Butler, Toni Morrison, and others.
Area: Writing Intensive

AS.362.315. Black Against Empire. 3 Credits.
This course will examine the confrontation of Black social movements with imperialism in the twentieth century. How, we will ask, have key Black internationalist thinkers conceptualized and defined diaspora, capitalism, imperialism, war, and the global? What have been the effects of war and repression, as well as economic growth and globalization, on Black internationalism? Readings may include texts by W.E.B. Du Bois, Angela Y. Davis, Frantz Fanon, Ashley Farmer, Claudia Jones, Robin D.G. Kelley, Claude McKay, Huey P. Newton, Walter Rodney, Malcolm X, etc. Students will complete a research paper on a topic of their own choosing related to Black internationalism in the twentieth century.
Area: Writing Intensive

AS.362.402. Arts and Social Justice Practicum. 3 Credits.
This course provides students with an opportunity to explore art and social justice and its history in Baltimore and the Black Arts Movement through the creation of student-led artistic projects. Students will examine their creative practices and how they can be used to advocate for change. Local artist and scholars will share their expertise providing lived experiences of using art as a call to action. At the end of the semester, students will present their projects in a public showcase of student work through film, poetry, photography, painting and other visual media. (No prior artistic training necessary.)

AS.362.413. African American Representations in the Western. 3 Credits.
The course will investigate American cinematic representations of African Americans, slavery (and more specifically its absence), the Civil War, and racial formation along the United States' southwestern frontier in films produced from the 1950s through the contemporary period. The course closely examines American cinematic fantasies of the western frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, strongly shaping the production of American masculine ideals. The course will also take decided note of the national shift from liberal "Great Society Programs" of the 1960s to the conservative "neoliberal" social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between blackness and whiteness, civilization and savagery, belonging and alienation, and metropolis and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion. Films include "Buck and the Preacher," "The Battle of Algiers," "Sgt. Rutledge," and "Django Unchained."
Area: Writing Intensive

AS.362.510. Senior Honors in Africana Studies I. 3 Credits.
The first semester of Senior Honors in Africana Studies, conducted as an Independent Study. Interested students should submit an application to the CAS Director of Undergraduate Studies.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.362.511. Senior Honors in Africana Studies II. 3 Credits.
The second semester of Senior Honors in Africana Studies, conducted as an Independent Study. Only students who have successfully completed AS.362.510 Senior Honors In Africana Studies I will be allowed to register.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.362.590. Independent Study for Africana Studies. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.241. African Cities. 3 Credits.
Over the past two decades, African cities have absorbed rapid population increase without accompanying economic growth. Students will review the major challenges of this mode of urbanization and explore the vibrant ways residents have sought to meet them. Following anthropology's commitment to lived experience, we will track these issues through the twists and turns of everyday life, and consider what they may say about urbanity more broadly in the 21st century. Topics include livelihood, the built environment, conflict and membership, and popular culture.
Area: Writing Intensive

AS.070.367. Science and Technology in Africa. 3 Credits.
This course explores the role of science and technology in the making of African histories and politics. We will examine precolonial iron-working, healing, and weaving; the ways guns and railroads functioned as tools of empire; the role of hydroelectric dams in postcolonial nation building; and the rise of digital communication and payment systems in the present. Throughout, we will challenge commonsense distinctions between the material and the spiritual, designers and users, wealth and people.
Area: Writing Intensive

AS.070.602. Sustainable Design Studio.
Environmental justice issues require sustainable design solutions founded on social scientific practice, technical expertise, and solidarity with community partners. Building on theoretical and methodological knowledge gained in the Fall 2020 Sustainable Design course (AS.070.433/633), the Sustainable Design Studio will bring together students, members of Baltimore social justice organizations, and practitioners from a variety of disciplines to work in collaboration to research and design solutions to complex social-ecological problems faced by partner organizations. This studio class provides students with practical, project-based design experience through community collaboration. Instructor permission required.

Economics

AS.180.252. Economics of Discrimination. 3 Credits.
This course examines labor market discrimination by gender, race and ethnicity in the United States. What does the empirical evidence show, and how can we explain it? How much of the difference in observed outcomes is driven by differences in productivity characteristics and how much is due to discrimination? How have economists theorized about discrimination and what methodologies can be employed to test those theories? What has been the impact of public policy in this area; how do large corporations and educational institutions respond; and what can we learn from landmark lawsuits? The course will reinforce skills relevant to all fields of applied economics, including critical evaluation of the theoretical and empirical literature, the reasoned application of statistical techniques, and analysis of current policy issues.
Area: Writing Intensive
AS.180.102

AS.180.355. Economics of Poverty/Inequality. 3 Credits.
This course focuses on the economics of poverty and inequality. It covers the measurement of poverty and inequality, facts and trends over time, the causes of poverty and inequality with a focus on those related to earnings and the labor market, and public policy toward poverty and inequality, covering both taxation and government expenditure and programs. By the nature of the material, the course is fairly statistical and quantitative. Students should have an intermediate understanding of microeconomic concepts. Basic knowledge of regression analysis is also helpful.
Area: Writing Intensive
AS.180.301

English

AS.060.129. Writing Africa Now. 3 Credits.
This course surveys post-2000 literary and cultural production from sub-Saharan Africa. Topics will include debates over genre and fiction's relevance to African experience, legacies of canonical writing about independence, urban Africa as violent or "tragic" landscape, and problems of scale and geographical context. Readings by authors such as Adichie, Wainaina, Duiker, and Vladislavic, and students will be introduced to the main print and online arteries of African intellectual discussion. This class is for non-majors and does not count towards the English major or minor.
Area: Writing Intensive

AS.060.220. Clint Eastwood, Race and the American Western. 3 Credits.
Drawing from the body of work engaging and recording the Hollywood gunfighter and outlaw folk-hero Clint Eastwood, the course will investigate American cinematic representations of slavery and its absence, the Civil War, and racial formation along the United States' southwestern frontier in films produced from the 1950s through the contemporary period. A focus on the cultural icon Clint Eastwood enables a close examination of American cinematic fantasies of the frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, particularly the creation of American masculine ideals. The course will also take decided note of the national shift from liberal "Great Society Programs" of the 1960s to the conservative "neoliberal" social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between civilization and savagery, belonging and alienation, and metropolitan and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion.

AS.060.327. "All Art is Propaganda". 3 Credits.
This course will explore black literature written as protest. We will examine how, in the face of threats to black life, Frances E.W. Harper, Richard Wright, Amiri Baraka, and others have realized versions of W.E.B. Du Bois's objective: "all art is propaganda and ever must be, despite the wailing of the purists."
Area: Writing Intensive

AS.060.328. Malcolm and Martin: An Introduction to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their recorded speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.365. Malcolm and Martin: An Intro to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.617. Black Print Culture.
Students interested in black print culture will engage in intensive archival research, both collaborative and individual, using the Sheridan Library's Rare Book and Manuscript collections. Texts include poems, printed lectures, pamphlets, novels, periodicals, ephemera, correspondence, etc., alongside relevant critical and theoretical reading.
Area: Writing Intensive

Film and Media Studies

AS.061.328. Gangster Films. 3 Credits.
The bad guy as hero from Little Caesar to Goodfellas. Film screenings Th 7:30-10:00 PM, Sun 7:00-9:30 PM. Lab fee: $40.

First Year Seminars

AS.001.163. FYS: Black Baltimore Archives - From Frederick Douglass to Billie Holiday. 3 Credits.
Black Baltimore Archives is an intense exploration (and excavation) of local African American history and narrative. Using the lives of Baltimore's most prominent artists-Frederick Douglass and Billie Holiday-this First-Year Seminar will explore questions connected to creating the historical record, assembling visual and sonic representations of black life, and the challenges that access and preservation pose to sustaining black community. We will visit the Afro-American Newspaper archives, the Maryland Center for History and Culture, the Maryland State Archives, and Morgan State University special collections, among other key archival repositories. Students will participate in a national conference and a local jazz event.

AS.001.177. FYS: The Right to the City - Race, Class, and Struggle in Baltimore. 3 Credits.
Over the past decade, cities have become more important than ever before. Protests against policing, against increasing inequality, as well as attempts to rollback societal shifts all have the city as its core. While some suggest these struggles represent larger struggles over the relationship between labor and capital, Black Radical thinkers connect these struggles to anti-black racism. In the wake of one world challenging movement – Black Lives Matter – and one world altering crisis – the Covid-19 pandemic - this First-Year Seminar will reflect critically on these two traditions of thinking about the city by using Baltimore as a case study. This class will be taught alongside similar courses at other universities, offering students a deep dive into Baltimore.

History

AS.100.108. Making America: Black Freedom Struggles to 1896. 3 Credits.
From slave revolts on the West African coast to national conventions and civil war, people of African descent have defined freedom and struggle in terms of kinship, diasporic connection, and fighting antiblack violence. This course explores the arc of that history and its role in the making of America.

AS.100.122. Introduction to History of Africa (since 1880). 3 Credits.
An introduction to the African past since 1880.
Area: Writing Intensive

AS.100.123. Introduction to African History: Diversity, Mobility, Innovation. 3 Credits.
Introduction to three major themes in African history, from the precolonial era to the present.
Area: Writing Intensive

AS.100.190. Modern African American History, 1896 – present. 3 Credits.
This course introduces students to the defining social, political, and cultural moments that reflect the experience of African Americans in the United States, 1896 – present. Topics include the Great Migration, the Harlem Renaissance, the Black Freedom Struggle, African American politics, urban rebellion, mass incarceration, Hip Hop culture, the current movement for Black Lives, and more.

AS.100.231. Worlds of Hip Hop. 3 Credits.
Worlds of Hip-Hop explores hip-hop as an arts movement whose forms, conventions, and standards responded to the specific political and social conditions to address questions of freedom and community.

AS.100.251. West African History. 3 Credits.
This course explores the rich history of West Africa and its place in the broader world. Topics include the environmental history of the Sahara desert, West African empires, and the rise of Nollywood and contemporary culture.
Area: Writing Intensive

AS.100.275. Passing in American Culture. 3 Credits.
This course explores passing narratives – stories that feature people who cross race, class, ethnic, or gender boundaries. We will consider what passing narratives can teach us about power and identity, especially as power is presumed to reside in the self and race is presumed to no longer matter.

AS.100.282. Race & Power in Modern South Africa. 3 Credits.
Overview of modern South African history, with a focus on the origins of the racial state and the development of black liberation movements.

AS.100.301. America after the Civil Rights Movement. 3 Credits.
This course explores the history of late twentieth-century America by examining the social, economic, and political legacies of 1960s civil rights protest for the 1970s, 1980s, and 1990s.
Area: Writing Intensive

AS.100.323. America in the 1960s. 3 Credits.
The years between 1959, when the course begins, and 1971, when it ends, were tumultuous and divisive. This course explores the political, racial, and cultural struggles of a half century ago.
Area: Writing Intensive

AS.100.354. Playing in the White: Black Writers, the Literary Colorline and Writing Whiteness. 3 Credits.
This course will turn to known and not-so-known black writers during the early to mid-twentieth century who defied literary expectation and wrote stories that featured or focused on whiteness. We will consider what whiteness offered black writers and the political work that their literary experimentations did for a white American publishing industry.

AS.100.393. Think Globally, Research Locally: Early Maryland and the World. 3 Credits.
A research-intensive seminar, this course uses the rich history of Maryland to approach broader themes in early modern American and global history including colonialism, slavery, revolution, race, gender, and sex.

AS.100.394. Brazilian Paradoxes: Slavery, Race, and Inequality in Brazil (from a Portuguese Colony to the World's 8th Largest Economy). 3 Credits.
Place of contrasts, Brazil has a multi-ethnic cultural heritage challenged by social and racial inequalities. Its political life remains chaotic. We will examine these problems through Brazilian history and culture.

AS.100.397. The Trouble with "Diversity". 3 Credits.
Through archival, literary, and other cultural texts, this course considers the history of "diversity" as both a practice and concept, beginning with the arrival of "colorblindness" in the 1890s and moving through recent approaches to institutionalized multiculturalism.
Area: Writing Intensive

AS.100.430. Gender and Sexuality in African History. 3 Credits.
An upper-level history reading seminar with a focus on histories of gender and sexuality in colonial and postcolonial Africa.

AS.100.444. Migrants and Refugees in Africa. 3 Credits.
A history of forced and voluntary migration and displacement in Africa, its causes and consequences, with a focus on refugees and labor migrants since 1960.

AS.100.486. Jim Crow in America. 3 Credits.
This course explores the history, politics, and culture of legalized racial segregation in the United State between the mid-nineteenth and twentieth centuries – a regime commonly known as "Jim Crow."
Area: Writing Intensive

AS.100.713. Black Womanhood.
What does a usable history of black womanhood (black queer and trans womanhood inclusive) look like? How do we imagine, create, and narrate black women's stories? Black women's history across time and space.

History of Art

AS.010.305. The Ethiopia at the Crossroads. 3 Credits.
Ethiopia played a foundational role in modern-day civilization and culture: as the find site of Lucy, the earliest bipedal hominid, the seat of the Queen of Sheba's kingdom, the second country in the world to adopt Christianity in the early 4th century CE, and the nexus of exchange between Africa, Europe, and Asia. In fall 2023, The Walters Art Museum will mount the exhibition tentatively titled, Ethiopia at the Crossroads, which addresses Ethiopia's relationship and artistic exchange with its surrounding cultures, including South Arabia, Nubia, Egypt, Byzantium, Armenia, Italy, and India. It also discusses the impact of Ethiopian art beyond its borders, bringing works of Ethiopian contemporary art into dialogue with the historical Ethiopian art that these artists draw upon in their work. The exhibition covers approximately 1,750 years of Ethiopian history with a special focus on the art of the medieval period, broadly conceived. The course will also offer insights into how a museum exhibition is developed from the initial concept to the physical presentation in the galleries.

History of Science, Medicine, and Technology

AS.140.227. Race, Racism and Medicine. 3 Credits.
How can we think about the interconnections between racism, theories of race and the practice of medicine? Living at a moment when racial disparities in health outcomes in the United States are still very stark, this course will provide a historically grounded approach to thinking about the roles that race and racism have played in healthcare, the production of health disparities as well as the role of medicine in the development of racist thought. While much of this course will focus geographically within the United States, this class will also explore global histories of medicine, encountering questions of race and medicine in Africa, the South Pacific and Asia. In addition to the analysis of primary source documents and historical texts, students will also be introduced to theoretical approaches to the study of race and racism from W.E.B. Dubois, Sylvia Wynter, Frantz Fanon and others.
Area: Writing Intensive

Islamic Studies

AS.194.210. Race, Gender, Citizenship: Being Muslim in America. 3 Credits.
This course explores how American Muslims navigate and contest complex notions of belonging in the context of national conversations on race, gender, citizenship, and national security. With a focus on specific case studies that range from Black Muslim movements of the early twentieth century to the ongoing War on Terror, the course adds complexity to the public conversation on what it means to be Muslim - and what it means to be American. We will draw on history, ethnography, first-person narratives, films, blogs, documentaries and fiction. As a Community Engaged course, the class will include site visits and learning with and from Muslim communities in Baltimore.

AS.194.230. African-Americans and the Development of Islam in America. 3 Credits.
Muslims have been a part of the American fabric since its inception. A key thread in that fabric has been the experiences of enslaved Africans and their descendants, some of whom were Muslims, and who not only added to the dynamism of the American environment, but eventually helped shape American culture, religion, and politics. The history of Islam in America is intertwined with the creation and evolution of African American identity. Contemporary Islam in America cannot be understood without this framing. This course will provide a historical lens for understanding Islam, not as an external faith to the country, but as an internal development of American religion. This course will explicate the history of early Islamic movements in the United States and the subsequent experiences of African-Americans who converted to Islam during the first half of the twentieth century. We will cover the spiritual growth of African American Muslims, their institutional presence, and their enduring impact on American culture writ large and African-American religion and culture more specifically.

Modern Languages and Literatures

AS.210.290. Accelerated Portuguese. 4 Credits.
NO PREVIOUS KNOWLEDGE OF PORTUGUESE IS REQUIRED. This accelerated one-semester course covers all content for Elementary Portuguese. Upon the successful completion of this course with a grade of C or higher, students may enroll in 210.277 Intermediate Portuguese. Encourages rapid acquisition by intensive exposure to the language through immersion activities, videos and culture. The course will cover relevant aspects of the Portuguese language grammar. Students will be encouraged to use the language through communicative activities, listening and writing activities. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory/ Unsatisfactory basis.

AS.210.391. Advanced Portuguese I: Language and Literature. 3 Credits.

This third-year course focuses on reading, writing, and oral expression. Students will read two complete works by major Brazilian, Portuguese, and/or Afro-Portuguese writers each semester, followed by intense writing and oral discussion on the topics covered. Grammar will be reviewed as necessary. All classes are conducted in Portuguese. Prereq: 210.278, placement test or instructor approval.
Area: Writing Intensive
AS.210.278 or equivalent score on placement test or instructor approval.

AS.211.394. Brazilian Culture & Civilization. 3 Credits.

Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor's permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

AS.211.423. Black Italy. 3 Credits.

Over the last three decades Italy, historically a country of emigrants—many of whom suffered from discrimination in the societies they joined—became a destination for hundreds of thousands of migrants and refugees from various countries, and particularly from Africa. Significant numbers of these immigrants came to Italy as a result of the country's limited, though violent colonial history; others arrive because Italy is the closest entry-point to Europe. How have these migratory flows challenged Italian society's sense of itself? How have they transformed the notion of Italian national identity? In recent years, growing numbers of Afro- and Afro-descendant writers, filmmakers, artists and Black activists are responding through their work to pervasive xenophobia and racism while challenging Italy's self-representation as a 'White' country. How are they forcing it to broaden the idea of 'Italianess'? How do their counternarratives compel Italy to confront its ignored colonial past? And, in what way have Black youth in Italy embraced the #Blacklivesmatter movement? This multimedia course examines representation of blackness and racialized otherness, whiteness, and national identity through literary, film, and visual archival material in an intersectional framework. Examining Italy's internal, 'Southern question,' retracing Italy's colonial history, and recognizing the experiences of Italians of immigrant origins and those of immigrants themselves, we'll explore compelling works by writers and filmmakers such as Igiaba Scego, Gagriella Ghermandi, Maza Megniste, Dagmawi Yimer, and others.

AS.212.413. For the Record: Jazz Cultures of Modern France. 3 Credits.

Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in music criticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.

AS.215.442. Whose Caribbean and the Epic of Race. 3 Credits.

We will study literary claims of epic colonial possession and aesthetic dispossession through close readings of five works in reverse chronological order: V.S. Naipaul's late historical novel, A Way in the World (1994); Derek Walcott's transoceanic poem, Omeros (1990); Alejo Carpentier's short anti-Enlightenment moral tale, El reino de este mundo (1949) and his short tale in celebration of Afro Cuban wizardry, Viaje a la semilla (1944); Aimé Césaire's prose poetry, mixed chronicle, Cahier d'un retour au pays natal, or Notebook of a Return to the Native Land (1939-1947). We will address questions of temporality and historicity (Heidegger) and a base-materialist political blocking of wild dreams as attainable through translation (Bataille). Such formal and epistemic problems will draw us into issues of race across the colonial spectrum of Caribbean histories.

Near Eastern Studies

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.

A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.203. Archaeology of Africa: From Human Origins to the Emergence of Civilizations. 3 Credits.

This course examines Africa's ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.130.400. Introduction To Middle Egyptian. 3 Credits.

Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2055-1650 B.C.). In the second semester, literary texts and royal inscriptions will be read. Course meets with AS.133.600.

AS.131.613. Archaeology of Africa: From Human Origins to the Emergence of Civilizations.

This course examines Africa's ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

Philosophy

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

Political Science

AS.190.255. Race and Racism in International Relations. 3 Credits.
This course introduces students to the foundational importance of race and racism to the construction of our contemporary global order. Topics include the Crusades, European imperialism, eugenics, Apartheid, freedom struggles, decolonization, and global development.

AS.190.284. Classics of Political Theory: Political Freedom. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, and the relationship between freedom, responsibility and political judgment. Spanning texts ancient, modern and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past possible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.311. Disposable People: Race, Immigration and Biopolitics. 3 Credits.
This course will explore theories and practices of race and immigration in order to illuminate the proliferation of populations regarded as disposable in contemporary politics. We will pay special attention to the contestable criteria used to determine eligibility for membership in the human race. We shall also examine how political power influences the relays between citizenship status and those whose lives are worthy of protection, and those who should be allowed to die.

AS.190.339. American Racial Politics. 3 Credits.
Recommended Course Background: AS.190.214

AS.190.340. Black Politics I. 3 Credits.
This course is a survey of the bases and substance of politics among black Americans and the relation of black politics to the American political system up to the end of Jim Crow. The intention is both to provide a general sense of pertinent issues and relations over this period as a way of helping to make sense of the present and to develop criteria for evaluating political scientists' and others' claims regarding the status and characteristics of black American political activity.

AS.190.342. Black Politics II. 3 Credits.
Recommended Course Background: AS.190.340.

AS.190.372. Decolonizing Politics. 3 Credits.
This course introduces students to the colonial logics that underpin key categories and concepts in Political Science. Working through four sub-fields – political theory, political behavior, comparative politics and international relations, the course also introduces students to alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to explain the stuff of Political Science via anti-colonial logics.

AS.190.380. The American Welfare State. 3 Credits.
This course analyzes the distinctive US welfare state in historical and comparative perspective. We begin with a survey of the policy context, an historical overview from the poorhouses through the Great Society, and a tour of welfare states across the rich democracies. We then survey developments – and explain the actual workings of policy – across jobs, education, welfare, pensions, and health care. We explore the institutional and political factors behind their divergent trajectories through conservative revival and the age of Trump. Students will write a seminar paper exploring policy development over time in a program or area of their choosing. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students may take AS.190.380 or AS.360.380, but not both.

AS.190.384. Urban Politics & Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations. Cross-listed with Africana Studies

AS.190.385. Urban Politics and Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations. Cross listed with Africana Studies.

AS.190.404. Race and Debt: Living on Borrowed Time. 3 Credits.
This is an advanced undergraduate seminar that explores how racial stigma functions as a marker of being always already in debt. In view of the legacies of settler-colonialism, imperialism and chattel slavery, how is it that those from whom so much has been taken are nevertheless regarded as perpetually in debt? We shall examine the moral, economic and racialized logics of power through which a range of political subjects come to be regarded as ungrateful "takers" as opposed to "makers," and owing a debt to society. In so doing, we will investigate how temporality functions as a tool of power by considering how the indebted are made vulnerable to precarity, discipline, and disposability—in effect, forced to live life on borrowed time.
Area: Writing Intensive

AS.190.410. Beyond Bob Marley: Exploring the Rastafari Movement in the Greater Baltimore Area. 3 Credits.
This course uses a community based learning approach to inquire into the presence of the Rastafari community in the Baltimore area. Most people will have heard of Rastafari through the music of Bob Marley. People might not know, however, that Rastafari emerges out of and has been part of a global history of liberation struggles. This course is co-taught with a local Rastafari organization. You will be intellectually and practically equipped to take part in a project of original research on the Rastafari presence in the Baltimore region, starting with the demonization of the movement in the 1980s "war on drugs" and including the movement's response.

AS.190.419. Race and Segregated Time. 3 Credits.
This course explores how time, and not just space, is segregated along racial lines. We shall examine how racial injustices are experienced as impositions on human time, how resistance to racial inequality has often been figured in temporal terms, and what it means to think in untimely ways that challenge how the extended lifespans of racially dominant groups is contingent upon the foreshortened lifetimes of racial others. Readings will bring political theory into contact with contemporary experiences of race, such as: criminal (in)justice, environmental racism and the proliferation of human disposability. Recommended Course Background: One Political Theory course.
Area: Writing Intensive

AS.190.437. Race and Ethnic Politics in the United States. 3 Credits.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the “struggle with difference” within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.191.303. Critical Race Theory, Law, and Criminal Justice. 3 Credits.
In this course, students will gain a foundational understanding of critical race theory, including its genesis in legal theory. The course will examine its relationship and importance to social movements, including through key concepts like intersectionality. The course will also use critical race theory to grapple with law, racial segregation, and the criminal justice system in the United States.
Area: Writing Intensive

Program in Museums and Society

AS.389.280. Of and For Everyone: Diversity, Equity, Inclusion and Access in the Museum. 3 Credits.
How are museums responding to the pressures to be more equitable, inclusive, and accessible towards public audiences and their staff? Students go behind the scenes of the Smithsonian, Baltimore Museum of Industry and Baltimore Museum of Art to meet with working groups and staff charged with transforming their institutions. Includes site visits, hands-on experiences and research on best practices.

AS.389.314. Commemoration, Mourning, and Race: The Stories of Mount Auburn Cemetery. 3 Credits.
In partnership with Mount Auburn Cemetery in Baltimore, owned and operated by the Sharp Street Memorial United Methodist Church, this community-engaged course will address the African American cemetery in general, and the Mount Auburn Cemetery in particular, as a place of multiple meanings: a sacred site of private mourning, a public place of commemoration, a representation of racism, an historic accomplishment. This course will require on-site research that contributes to the cemetery’s interests.

AS.389.348. Queer Oral History. 3 Credits.
Students learn to conduct, analyze, and interpret their own oral histories as they contribute to a wide-ranging project documenting queer worldmaking in the Baltimore-Washington D.C. region. We engage with scholarship from performance studies, queer of color critique, LGBTQ history, and public humanities to consider the politics of storytelling and the promises of public-facing oral history projects. Students have the option of developing podcasts, multimedia projects, and public humanities proposals as their final assignment.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

Public Health Studies

AS.280.120. Lectures on Public Health and Wellbeing in Baltimore. 1 Credit.
An introduction to Urban Health with Baltimore as a case study: wellbeing, nutrition, education, violence and city-wide geographic variation. Lectures by JH Faculty, local government/service providers and advocates.

Sociology

AS.230.205. Introduction to Social Statistics. 4 Credits.
This course will introduce students to the application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research. Special Note: Required for IS GSCD track students.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR EN.550.310 OR EN.550.311 OR EN.550.413 OR EN.550.420 OR EN.550.420 OR EN.550.420 OR EN.560.435 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.560.348;Statistics Sequence Restriction: Students who have completed EN.550.111 OR EN.550.113 may not enroll.

AS.230.219. Land, Labor and Environmental Movements in Contemporary Africa. 3 Credits.
The course examines the new wave of social protest and popular uprisings in contemporary Africa through the interconnected themes of land, labor, and environmental movements.Attention will be placed on the early 21st century.

AS.230.244. Race and Ethnicity in American Society. 3 Credits.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.265. Research Tools for Global Sociology and Development. 3 Credits.
This course will introduce students to a range of software programs that are critical for conducting social scientific research in the 21st century. Students will develop competency in the use of computer programs for statistical analysis, database management, the creation of maps and timelines, and the presentation of research reports. The course uses examples from ongoing social science faculty research projects at Johns Hopkins on global inequality and international development. Required for GSCD track students.Course previously titled "Research Tools and Technologies for the Social Sciences"

AS.230.304. (Making Space For) Black Thought. 3 Credits.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, Sadiya Hartman, Walter Rodney, Derek Walcott, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.313. Space, Place, Poverty & Race: Sociological Perspectives on Neighborhoods & Public Housing. 3 Credits.
Recent national conversations about racial segregation, inequality and the affordable housing crisis raise many important questions—this course focuses on several of these questions, through the lens of urban sociology and housing policy. There are three main areas we will focus on in the course: 1) Understanding the role of racial segregation, neighborhood and housing effects on children and family life; 2) Research methods for studying urban poverty and neighborhoods; and 3) Programs, policies and initiatives designed to house the poor, alleviate concentrated spatial poverty, and increase residential choice. We will primarily focus on issues related to urban poverty in large cities, comparing the patterns of residential mobility and neighborhood characteristics for white and Black Americans. We will utilize archival data, qualitative interviews, census data, and quasi/experimental data to gather evidence about neighborhoods, housing, and policies, as well as their impacts. We will also explore interactive online applications that facilitate the study of neighborhoods (e.g. American Community Survey, GIS with Social Explorer). A statistics/public policy background is helpful, but not required.
Area: Writing Intensive

AS.230.316. African American Family. 3 Credits.
This course is an examination of sociological theories and studies of African-American families and an overview of the major issues confronting African-American family life. The contemporary conditions of black families are explored, as well as the historical events that have influenced the family patterns we currently observe. Special attention will be given to social policies that have evolved as a result of the prominence of any one perspective at a given point in time.

AS.230.320. Education & Inequality: Individual, Contextual, and Policy Perspectives. 3 Credits.
Area: Writing Intensive

AS.230.323. Qualitative Research Practicum. 3 Credits.
This course provides "hands on" research experience applying sociological research tools and a sociological perspective to problems of substance. Qualitative observational and/or interviewing methods will be emphasized. Students will design and carry out a research project and write a research report. This course fulfills the "research practicum" requirement for the Sociology major.
Area: Writing Intensive

AS.230.357. Baltimore and Beyond. 3 Credits.
This course uses the city of Baltimore as a lens through which to explore issues of urban inequality. We will focus on Baltimore's history of racial segregation and concentrated poverty, and its effect on the social and economic well-being of the city and its residents, with attention to education, employment, health and crime. Students will learn how to employ Census data, GIS approaches, and sociological research to inform questions about population change, inequality and the distribution of resources across the city and metropolitan region. Students will also work on one or more policy relevant studies based in Baltimore, including: a project on abandoned and vacant housing, a desegregation intervention, and a longitudinal study of inner city youth. Finally, students will become familiar with Baltimore City's programs and policy approaches to addressing the city's most pressing problems, and will design innovative and effective and innovative solutions as part of their course assignments. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students that took AS.360.357 may not take AS.230.357

AS.230.366. Black Social Thought and Social Movements. 3 Credits.
This course will examine the reciprocal relationship between Black social thought and social movements. How have social movements informed thinkers who grapple with questions of freedom and liberation in racially and economically stratified societies, and how have their ideas affected movement tactics? This course will look at 20th century movements and investigate connections between theory and practice through concepts like civil disobedience, internal colonialism, Black feminism, Black internationalism, and others.
Area: Writing Intensive

AS.230.397. The Political Economy of Drugs and Drug Wars. 3 Credits.
In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

Study of Women, Gender, & Sexuality

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.306. Feminist and Queer Theory: Race, Class, Gender, Sexuality-Intersectional Feminist Theory. 3 Credits.
In this course, we will get to know intersectional feminist philosophy through the lens of a Black feminist epistemology. What does this mean? That means that we will focus on how the contributions of Black feminist authors can bring out the specific political and philosophical nature of an intersectional theoretical framework.

AS.363.416. WGS Internship/Practicum: Feminist Animals: Sex, Nature, and Nonhumans. 3 Credits.
Introducing feminist approaches to ecology and nonhumans, this course considers the interconnections between heteropatriarchal domination and the domination of nonhuman animals and ecologies. What different sensibilities and ways of seeing sex and gender open up when attention shifts to nonhumans? What tensions within and between feminism, animal liberation, and ecological concern come to the fore when each approach is alongside the others? How does the study of nonhumans extend the promise of feminism, and vice versa? In responding to these questions, we will see the real breadth of issues that the theory and practice of feminism can address.
Area: Writing Intensive

Theatre Arts & Studies

AS.225.305. A History of Black Performance and Drama. 3 Credits.
A survey of the history of the Black Performer and Performance. In exploring the art of storytelling from ancient African civilizations, students will critically engage and discuss the origins, aesthetics, characteristics, and practices of Black performers, and their often-unacknowledged contributions and influence upon mainstream performance throughout the history of the world.

Writing Seminars

AS.220.422. Readings in Fiction: Race, Passing, and Performance. 3 Credits.
This course will explore the context and craft of racial passing texts in the U.S, asking students to think critically about literal passing narratives and their persistence over time, and more broadly about how we write about cultural passing, codeswitching, and identity as conscious performance. We'll start with texts that ground us in the genre—Chopin, Larsen, Fauset, Ellison, and Morrison—and read our way into contemporary texts, potentially including work by Danzy Senna, Mat Johnson, Brit Bennett, Min Jin Lee, and Marcelo Hernandez Castillo. Students will write a critical paper, a craft paper, and a short story or novella.
Area: Writing Intensive
AS.220.200

For current faculty and contact information go to http://krieger.jhu.edu/africana/directory/index.html (http://krieger.jhu.edu/africana/directory/)

Africana Studies, Bachelor of Arts

Africana Studies Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

Students who choose to major in Africana Studies must complete at least 33 credit hours in Africana Studies. All courses must be taken for a letter grade and be completed with a grade of C- or better.

Code	Title	Credits
Core Courses		
Select three of the following:		9
AS.362.112	Introduction to Africana Studies	
AS.100.122	Introduction to History of Africa (since 1880)	
AS.100.123	Introduction to African History: Diversity, Mobility, Innovation	
AS.362.111	Introduction to African American Studies	
Electives		
Twelve credits of 300-level or higher Africana Studies courses		12
Twelve credits at any level of Africana Studies courses		12
Total Credits		**33**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
Core course #1		3
	Credits	**3**
Second Semester		
Core course #2		3
	Credits	**3**
Second Year		
First Semester		
Core course #3		3
Africana studies course at any level		3
	Credits	**6**
Second Semester		
Africana studies course at any level		3
Africana studies course at any level		3
	Credits	**6**
Third Year		
First Semester		
Africana studies course at 300-level or higher		3
Africana studies course at 300-level or higher		3
	Credits	**6**
Second Semester		
Africana course at any level		3
	Credits	**3**
Fourth Year		
First Semester		
Africana studies course at 300-level or higher		3
	Credits	**3**
Second Semester		
Africana studies course at 300-level or higher		3
	Credits	**3**
	Total Credits	**33**

Honors

To be considered for honors in Africana Studies, students should have strong academic records and a promising potential research project. Honors students are required to undertake a two-semester independent course of study in their senior year during which they will prepare an honors thesis in consultation with a faculty advisor in the student's particular area of interest. For the first semester of honors, students may take either a senior honors seminar in a relevant discipline, subject to approval from the director of undergraduate studies, or an independent study with a faculty member of their choice (AS.362.510 Senior Honors in Africana Studies I: Senior Thesis in Africana Studies I). Upon successful completion of the first semester of honors, students will take an independent study (AS.362.511 Senior Honors in Africana Studies II: Senior Thesis in Africana Studies II) in their second semester. Both semesters of Senior Thesis in Africana Studies may count as electives toward the Africana studies major or minor. Those interested in pursuing honors should submit an application, including a research topic proposal, by May of their junior year.

Africana Studies, Minor

Africana Studies Minor Requirements

Students who wish to minor in Africana Studies must complete a minimum of 18 credits, including two core courses and electives. Three of the electives must be upper-level courses. All course must be taken for a letter grade and be completed with a grade of C- or better.

Code	Title	Credits
Core Courses		
Select two of the following:		6
AS.362.111	Introduction to African American Studies	
AS.362.112	Introduction to Africana Studies	
AS.100.122	Introduction to History of Africa (since 1880)	
AS.100.123	Introduction to African History: Diversity, Mobility, Innovation	
Electives		
Three credits at any level of Africana Studies courses		3
Nine credits of 300-level or higher Africana Studies courses		9
Total Credits		**18**

Center for Language Education

http://krieger.jhu.edu/cle (http://krieger.jhu.edu/cle/)

The Center for Language Education (CLE) was established in 1992 and presently offers foreign-language courses in Arabic, Chinese, Haitian Creole, Hindi, Japanese, Korean, and Russian.

The CLE also offers American Sign Language (ASL); as well as non-credit English as a Second Language (ESL) courses, English for International Teaching Assistants (ITAs), and a Summer English Language Program for JHU affiliates and visiting students. The Summer ESL Program consists of advanced classes in Pronunciation and Intonation, Communication and Presentation, and Writing in the Sciences and Humanities.

Grading and Course Progression for Languages Offered by the Center for Language Education

CLE language classes may be taken satisfactory/unsatisfactory only at the intermediate level and above. A student earning below C+ in a course is not eligible to pass to the next higher level course. Students are granted credit for each semester course successfully completed, regardless of enrollment or performance in a subsequent course.

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.370.115. First Year American Sign Language. 3 Credits.
Designed for students who have no previous knowledge of ASL. Students will learn fingerspelling, words, facial expressions, and classifiers to be able to communicate at a basic level with other signers. The curriculum will cover sentence structures such as questions, commands, and other conversational phrases. Mastery will include knowledge of Deaf community and Deaf cultural practices.

AS.370.602. American English Pronunciation.
This course focuses on improving students' perception and pronunciation of American English through learning articulation, phonetics, and phonology. Students learn the basics of anatomy of speech production in order to understand how difficult sounds and sound contrasts are made. Students also learn the International Phonetic Alphabet (IPA) to help them distinguish sound contrasts that are difficult depending on the individual students' native languages. Moving beyond individual sounds, students learn how sounds change depending on what word or phrase they appear in and when they appear in fast or colloquial speech. Finally, students learn and practice intonation appropriate for various types of statements and questions.

AS.370.603. Public Speaking in Academia.
This course is intended for international Teaching Assistants (ITAs) with advanced English skills and satisfactory pronunciation who wish to further improve their communication and public speaking skills, as well as better understand the cultural norms of the American academia. Students refine their pronunciation and intonation, practice designing and giving presentations, learn the basics of conversation and e-mail etiquette in America, as well as the norms of interacting with college students, professors, and colleagues in various academic situations such as classes, office hours, lab meetings, and scientific meetings. This course is appropriate as a follow-up to American English Pronunciation (AS 370.602) or as a stand-alone course for students with satisfactory pronunciation. This course can also be repeated for additional practice or taken concurrently with American English Pronunciation.

AS.370.604. Advanced Grammar and Academic Writing.
In this course, students will read and analyze the content, structure, and style of a wide range of academic and professional writing in order to improve their own essays, articles, reports, theses, critiques, and proposals using those features. They will learn to explain, support, compare and argue their ideas effectively through attention to organization, vocabulary, and style. Grammar will be infused into the course as it applies to revision and editing of written work and consistency within various types of writing. Students will use a variety of strategies to improve skills in idea development, organization, word choice, sentence fluency, voice, grammar and mechanics. Writing tasks will be integrated with content, vocabulary, and grammar from various texts.

AS.373.111. First Year Heritage Chinese. 3 Credits.
This course is designed for students who were raised in an environment in which Chinese is spoken by parents or guardians at home and for those who are familiar with the language and possess native-like abilities in comprehension and speaking. The course therefore focuses on reading and writing (including the correct use of grammar). Cross-listed with East Asian Studies

AS.373.112. First Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Lab required. Continuation of AS.373.111. Recommended Course Background: AS.373.111 or permission required.
AS.373.111 or or instructor permission

AS.373.115. First Year Chinese. 5 Credits.
This course is designed primarily for students who have no prior exposure to Chinese. The objective of the course is to help students build a solid foundation of the four basic skills---listening, speaking, reading, and writing in an interactive and communicative learning environment. The emphasis is on correct pronunciation, accurate tones and mastery of basic grammatical structures. Note: Students with existing demonstrable skills in spoken Chinese should take AS.373.111-112. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.373.116. First Year Chinese II. 5 Credits.
Introductory course in Modern Standard Chinese. Goals: mastery of elements of pronunciation and control of basic vocabulary of 800-900 words and most basic grammatical patterns. Students work first with Pin-Yin system, then with simplified version of written Chinese characters. Continuation of AS.373.115. Note: Student with existing demonstrable skills in spoken Chinese should take AS.373.111-112. Recommended Course Background: AS.373.115 or permission required.
AS.373.115 or instructor permission]

AS.373.211. Second Year Heritage Chinese. 3 Credits.
This course is designed for students who finished AS.373.112 with C+ and above (or equivalent). Students in this course possess native-like abilities in comprehension and speaking. The course focuses on reading and writing. Cross-listed with East Asian Studies
AS.373.112 or equivalent.

AS.373.212. Second Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Continuation of AS.373.211. Recommended Course Background: AS.373.211 or permission required.
AS.373.211 or instructor permission

AS.373.215. Second Year Chinese. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Cross-listed with East Asian Studies
AS.373.116 or equivalent

AS.373.216. Second Year Chinese II. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Recommended Course Background: AS.373.215 or Permission Required.Cross-listed with East Asian Studies
AS.373.215 or instructor permission.

AS.373.313. Third Year Heritage Chinese. 3 Credits.
This course is designed for those who have already taken AS.373.212 or equivalent. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be introduced on a regular basis.Cross-listed with East Asian Studies
AS.373.211 AND AS.373.212 or instructor's permission

AS.373.314. Third Year Heritage Chinese II. 3 Credits.
This course is a continuation of AS.373.313. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be included on a regular basis. Recommended Course Background: AS.373.313 or Permission Required. Lab required.
AS.373.313 or equivalent

AS.373.315. Third Year Chinese. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible and written assignments will be given. Cross-listed with East Asian Studies
AS.373.216 or instructor permission

AS.373.316. Third Year Chinese II. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible, and written assignments will be given. Continuation of AS.373.315. Recommended Course Background: AS.373.315 or permission required.
AS.373.315 or instructor permission

AS.373.415. Fourth Year Chinese. 3 Credits.
This course is designed for students who finished AS.373.316 with a C + or above (or equivalent). Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students are supposed to be able to understand most of the readings with the aid of a dictionary, so that class discussion is not focused primarily on detailed explanation of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content.Cross-listed with East Asian Studies
AS.373.316 or instructor permission

AS.373.416. Fourth Year Chinese II. 3 Credits.
Continuation of AS.373.415. Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students should understand most of the readings with the aid of a dictionary, so that class discussion need not focus primarily on detailed explanations of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content. Recommended Course Background: AS.373.415 or Permission Required. Cross-listed with East Asian Studies
AS.373.415 or instructor permission

AS.373.491. 5th Year Chinese. 3 Credits.
Fifth Year Chinese is designed for students who finished fourth year regular or third year heritage Chinese course at JHU or its equivalent and wish to achieve a higher advanced proficiency level in Chinese. The goal of the course is to help students further develop their listening, speaking, reading and writing skills cohesively and to enhance students' understanding of Chinese culture and society through language learning.
AS.373.416 OR AS.373.314 or equivalent

AS.373.492. Fifth Year Chinese II. 3 Credits.
Fifth Year Chinese is designed for students who finished fourth year regular or third year heritage Chinese course at JHU or its equivalent and wish to achieve a higher advanced proficiency level in Chinese. The goal of the course is to help students further develop their listening, speaking, reading and writing skills cohesively and to enhance students' understanding of Chinese culture and society through language learning.
AS.373.491 or equivalent

AS.373.493. Fundamentals of Chinese Grammar. 2 Credits.
This course is designed for students who have already studied 1st Year Chinese grammar and wish to develop a thorough knowledge of Chinese grammar in order to advance all aspects of language skills to a higher level. It is also appropriate for graduate students who need to be able to read materials written in Chinese. The goal of the course is to provide students with a thorough knowledge of Chinese grammar; therefore, knowledge of vocabulary in depth is not requisite. In addition, since this is not a language course that places equal focus on all four skills (speaking, listening, writing, and reading), there will be no conversation practice – this is a lecture course on grammar. Pass-fail grade option only. Must have at least 5 students enrolled to run.
AS.373.115

AS.373.501. Independent Study - Chinese. 0 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.373.503. Chinese Independent Study. 1 Credit.
Chinese independent course work.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.375.115. First Year Arabic. 5 Credits.
Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of studyNo Satisfactory/ Unsatisfactory

AS.375.116. First Year Arabic II. 4 Credits.
Continuation of AS.375.115. Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of study. May not be taken Satisfactory/ Unsatisfactory
AS.375.115 or instructor permission

AS.375.215. Second Year Arabic. 4 Credits.
Designed to bring students up to competency level required for third/ fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.115-116 or equivalent.
AS.375.116 or equivalent

AS.375.216. Second Year Arabic II. 4 Credits.
Continuation of AS.375.215. Designed to bring students up to competency level required for third/fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.215 or permission required.
AS.375.215 or instructor permission

AS.375.301. Third Year Arabic. 3 Credits.
Designed to enhance students' ability to read, discuss, and write about various topics covered in traditional and contemporary Arabic texts. Recommended Course Background: AS.375.216 or equivalent.
AS.375.116 or instructor permission

AS.375.302. Third Year Arabic II. 3 Credits.
Designed to enhance students' ability to read, discuss, and write about various topics covered in traditional and contemporary Arabic texts. Continuation of AS.375.301. Recommended Course Background: AS.375.301or permission required.
AS.375.301 or instructor permission

AS.375.401. Fourth Year Arabic. 2 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course.
AS.375.302 or equivalent

AS.375.402. Fourth Year Arabic II. 3 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course. Continuation of AS.375.401. Recommended Course Background: AS.375.302 or equivalent.
AS.375.401 or equivalent.

AS.375.501. Independent Study-Arabic. 0 - 3 Credits.

AS.375.502. Independent Study-Arabic. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.375.802. Independent Study -- Arabic.

AS.377.115. First Year Russian. 4 Credits.
This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Russian. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory. Students may not have completed AS.377.131 AND AS.377.132 under the previous JHU/Goucher program.

AS.377.116. First Year Russian II. 4 Credits.
A continuation of AS.377.115. This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Russian. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory.
AS.377.115

AS.377.215. Second Year Russian. 3 Credits.
This course is designed for students who have finished AS.377.116 with C+ or above, or by a placement exam. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency higher than that learned in First Year Russian.

AS.377.216. Second Year Russian II. 3 Credits.
Continuation of AS.377.215. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency higher than that learned in First Year Russian.
AS.377.215

AS.377.315. Third Year Russian. 3 Credits.
This course offers advanced training in spoken as well as written Russian. It is designed for students who have basic Russian language proficiency acquired through AS.377.216 or equivalent. Advanced level of grammatical structures will be learned and practiced through communicative tasks.

AS.377.316. Third Year Russian II. 3 Credits.
Continuation of AS.377.315. This course offers advanced training in spoken as well as written Russian. Advanced level of grammatical structures will be learned and practiced through communicative tasks.
AS.377.315

AS.377.395. Readings in Russian Studies. 2 Credits.
The course examines aspects of Russian culture through Russian literature. Readings include a wide range of texts. In this particular course, we will read a play by a Soviet writer and watch a video recording of a contemporary stage show by the Moscow Art Theater. Participation in the course would require reading authentic Russian texts, extensive classroom discussions, and frequent writing assignments. (All texts and videos are in Russian.) Pre-req: 377.315-316 or by permission

AS.377.397. Readings in Russian Studies II. 2 Credits.
The course examines aspects of Russian culture through Russian literature. Readings include a wide range of texts. Participation in the course would require reading authentic Russian texts, extensive classroom discussions, and frequent writing assignments. (All texts and videos are in Russian.) Pre-req: 377.315-316 or by permission
AS.377.315 OR AS.377.316 OR AS.377.395 or permission of instructor

AS.378.115. First Year Japanese. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the year, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 150 kanji in context. Knowledge of grammar will be expanded significantly in AS.373.215. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.378.116. First Year Japanese II. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the fall term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 60 kanji in context. Knowledge of grammar will be expanded significantly in 2nd year Japanese. May not be taken Satisfactory/Unsatisfactory. Recommended Course Background: AS.378.115
Prereq: AS.378.115 or instructor permission

AS.378.215. Second Year Japanese. 5 Credits.
Training in spoken and written language, increasing their knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.115 and AS.378.116 or equivalent.
AS.378.116 or equivalent

AS.378.216. Second Year Japanese II. 5 Credits.
Continuation of Beginning Japanese and Intermediate Japanese I. Training in spoken and written language, increasing students' knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.215 or equivalent.
AS.378.215 or instructor permission

AS.378.315. Third Year Japanese. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Cross-listed with East Asian Studies
AS.378.215 AND AS.378.216 or instructor permission

AS.378.316. Third Year Japanese II. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Lab required. Continuation of AS.378.315. Recommended Course Background: AS.378.315 or equivalent.
AS.378.315 or equivalent.

AS.378.396. Fundamentals of Japanese Grammar. 2 Credits.
This course is designed for students who have already studied 1st Year Japanese grammar and wish to develop a thorough knowledge of Japanese grammar in order to advance all aspects of language skills to a higher level. It is also appropriate for graduate students who need to be able to read materials written in Japanese. The goal of the course is to provide students with a thorough knowledge of Japanese grammar; therefore, knowledge of vocabulary (including kanji) in depth is not requisite. In addition, since this is not a language course that places equal focus on all four skills (speaking, listening, writing, and reading), there will be no conversation practice – this is a lecture course on grammar. 2 credits. Pass-fail grade option only
AS.378.115 AND AS.378.116 or Instructor Permission

AS.378.415. Fourth Year Japanese. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Recommended Course Background: AS.378.315 and AS.378.316 or equivalent.
AS.378.316 or equivalent

AS.378.416. Fourth Year Japanese II. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Lab required. Recommended Course Background: AS.378.415
AS.378.415 or equivalent.

AS.378.493. Grammar and Readings in Japanese Studies. 2 Credits.
This course is designed for graduate students (in East Asian Studies, Public Health, History of Medicine, History,etc.) and undergraduate students with a strong interest in developing a thorough knowledge of Japanese grammar from both linguistic and cultural perspectives in depth well beyond regular language courses in order to advance reading and comprehension of materials written in Japanese without use of a dictionary. We first review the primary components of Japanese grammar, such as tense, aspect, particles, conditionals, passive and causative, etc., followed by readings of articles demonstrating particular grammatical items. Specific strategies and techniques are also introduced, followed by practice. Class materials include a broad spectrum of native materials, including novels, newspapers, scholarly articles, essays, and historical papers. A diverse range of articles and essays are selected by students to introduce and enforce various ways of reading Japanese effectively. 2 credits. Pass-fail grade option only.

AS.379.115. First Year Haitian-Creole. 3 Credits.
This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Haitian-Creole. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory.

AS.379.116. First Year Haitian Creole II. 3 Credits.
A continuation of AS.379.115. This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Haitian-Creole. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills.
AS.379.115

AS.380.101. First Year Korean. 5 Credits.
Introduces the Korean alphabet, hangeul. Covers basic elements of the Korean language, high-frequency words and phrases, including cultural aspects. Focuses on oral fluency reaching Limited Proficiency where one can handle simple daily conversations. No Satisfactory/ Unsatisfactory.
Cross-listed with East Asian Studies

AS.380.102. First Year Korean II. 5 Credits.
Focuses on improving speaking fluency to Limited Proficiency so that one can handle simple daily conversations with confidence. It provides basic high-frequency structures and covers Korean holidays. Continuation of AS.380.101. Recommended Course Background: AS.380.101 or permission required.
AS.380.101 or instructor permission

AS.380.201. Second Year Korean. 4 Credits.
Aims for improving oral proficiency and confident control of grammar with vocabulary building and correct spelling intended. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness. Project due on Korean cities. Existing demonstrable skills in spoken Korean preferred.
AS.380.101 AND AS.380.102 or instructor permission

AS.380.202. Second Year Korean II. 4 Credits.
Aims for improving writing skills with correct spelling. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness, including discussion on family tree. Continuation of AS.380.201. Recommended Course Background: AS.380.201 or equivalent.
AS.380.201 or equivalent

AS.380.301. Third Year Korean. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose, from easy essays to difficult short stories. Vocabulary refinement and native-like grasp of grammar explored. Project due on Korean culture. Cross-listed with East Asian Studies
AS.380.202 or equivalent

AS.380.302. Third Year Korean II. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose. By reading Korean newspapers and professional articles in one's major, it enables one to be well-versed and truly literate. Continuation of AS.380.301. Cross-listed with East Asian StudiesPrerequisite: AS.380.301 or equivalent.
AS.380.301 or instructor permission

AS.380.401. Fourth Year Korean. 2 Credits.
This course is designed for those who have finished AS 380.302 or beyond advanced mid level of competency in Korean in four skills. By dealing with various topics on authentic materials including news, articles on websites, short stories, this course aims to help students enhance not only linguistics knowledge and skills, but also current issues in Korea. It is expected that, by the end of the term, students will be able to discuss a variety of topics and express opinions fluently in both spoken and written language.
AS.380.302 or instructor permission

AS.380.402. Fourth Year Korean II. 2 Credits.
This course is designed for those who have finished AS 380.302 or beyond advanced mid level of competency in Korean in four skills. By dealing with various topics on authentic materials including news, articles on websites, short stories, this course aims to help students enhance not only linguistics knowledge and skills, but also current issues in Korea. It is expected that, by the end of the term, students will be able to discuss a variety of topics and express opinions fluently in both spoken and written language.
AS.380.401 or equivalent

AS.381.101. First Year Hindi I. 3 Credits.
Course focuses on acquisition of additional vocabulary and grammatical structures in culturally authentic contexts, listening, speaking, reading, and writing comprehension. No Satisfactory/ Unsatisfactory

AS.381.102. First Year Hindi II. 3 Credits.
This course prepares students to function in everyday situations in the Hindi speaking world. Focuses on the acquisition of basic vocabulary and grammatical structures in culturally authentic contexts through listening, speaking, reading, and writing comprehension. Hindi reading and writing is taught in its original Dayva-nagari script. Oral-aural drills in class and work in the Language Lab is required.
AS.381.101 or instructor permission

AS.381.201. Second Year Hindi I. 3 Credits.
Course provides refinement of basic language skills in cultural context. Emphasis will be on expansion of vocabulary and grammatical structures and further development of communicative skills. Recommended Course Background: AS.381.101, AS.382.102
AS.381.102 or equivalent

AS.381.202. Second Year Hindi II. 3 Credits.
Course provides refinement of basic language skills in cultural context. Emphasis will be on expansion of vocabulary and grammatical structures and further development of communicative skills. Continuation of AS.381.201. Recommended Course Background: AS.381.201 or permission required.
AS.381.201 or instructor permission

AS.381.301. Third Year Hindi I. 3 Credits.
Learn to converse in Hindi through Hindi songs, films, and media. Promotes the active use of Hindi in culturally authentic contexts. Development of fluency in oral and written communication is emphasized. Not offered every semester.
Area: Writing Intensive
AS.381.201 AND AS.381.202 or instructor permission

Cross Listed Courses

East Asian Studies

AS.310.316. First Year Classical Chinese: Philosophers, Poets and Fantasists: An Introduction to Chinese Literature in the Original Classical Texts. 3 Credits.
We will read arguments, anecdotes and stories, beginning with the philosophers of the ancient period, including the imaginative paradigms of the Daoist writer Zhuangzi, and continue with the strange writings allied with shamanism and goddess-worship. We will continue with the fantastical writers of the medieval world and finish with anecdotes of the strange from the Ming and Qing. Because this is a language as well as a literature class, in addition to literary content and social history as background, we will emphasize grammar and vocabulary. Class preparation will require language exercises, translations, readings in English and there will be a final translation/research paper.
(AS.373.115 AND AS.373.116) OR (AS.373.111 AND AS.373.112) OR (AS.378.115 OR AS.378.116) or Instructor permission.

Modern Languages and Literatures

AS.210.120. Elementary Modern Hebrew. 3 Credits.
Elementary Modern Hebrew is the first exposure to the language as currently used in Israel in all its functional contexts. All components of the language are discussed: reading, writing, listening, and speaking. Simple idiomatic sentences and short texts in Hebrew are used. Students learn the Hebrew alphabet, words and short sentences. Cultural aspects of Israel will be intertwined throughout the course curriculum.

AS.210.121. Modern Hebrew for Beginners II. 3 Credits.
Hebrew for Beginners 106 is a continuation of Hebrew 105 and as such, students are required to have a foundation in Hebrew. The course will enhance and continue to expose students to Hebrew grammar, vocabulary, and syntax. All components of the Hebrew language will be emphasized in this course; we will highlight verbs, adjectives, and the ability to read longer texts. Speaking in Hebrew will also be highlighted to promote students' engagement and communication. Cultural aspects of the language will be incorporated into lessons as well.
AS.384.115 OR AS.210.120

AS.210.220. Intermediate Modern Hebrew I. 3 Credits.
Intermediate Modern Hebrew enhances and enforces previous knowledge of Hebrew as acquired from previous foundational coursework and/or experience. Grammatical aspects of the language such as past and present tenses as well as combined and complex sentence syntax and construction would be applied. Reading comprehension and writing skills will be emphasized. Modern Israeli cultural links and facets of the Hebrew language will also be introduced to inform the holistic understanding of the modern language.
AS.384.116 OR AS.210.121 or equivalent

AS.210.221. Intermediate Modern Hebrew II. 3 Credits.
Intermediate Hebrew level II is a continuation of the course Hebrew 205 and as such is a requirement for entry. In the course, grammatical aspects of the language will be introduced in the focus of past and future tenses. Combined and complex sentences with proper syntax and reading comprehension and writing skills will be required. Modern Israeli cultural aspects of the Hebrew language will be introduced as well and will be part of the holistic understanding of the modern language.
AS.384.215 OR AS.210.220

AS.210.320. Advanced Modern Hebrew I. 3 Credits.
Advanced Modern Hebrew I will focus on conversational and interactive language skills to expose learners to attributes of different genres and layers of the language. Students will be introduced to various original texts and lingual patterns to better understand and formulate proper syntax. The course will include contemporary readings from Israeli journalism and essays, along with other relevant Hebrew resources to inform class discussions and students' reflective writings. Israeli cultural aspects will be integral to the course curriculum.
AS.384.216 OR AS.210.221 or equivalent

AS.210.321. Modern Hebrew via the Lens of Israeli Cinema. 3 Credits.
This course will expand students' fluencies in Modern Hebrew through Hebrew-dialogic Israeli and Palestinian cinema, examining and comparing several layers of a contemporary Hebrew-speaking society. For this class, students will view, discuss, and write about films with Hebrew as the primary spoken language. Through aural interpretation and subtitles, students will understand, analyze, and reflectively discuss the diversity of Hebrew-speaking cultures within society and the provenance and intentionalities of the dialects exhibited throughout a given film. Linguistic nuance, slang, and interpretive aspects of Hebrew as shown in the chosen films will prompt students to examine this modality of the expression of contemporary Hebrew. The course will be taught primarily in Hebrew and will be open to students who have matriculated to at least 200-level coursework of Modern Hebrew.
AS.384.315 OR AS.210.320 or instructor permission

For current faculty and contact information go to http://krieger.jhu.edu/cle/people/

Chemistry

https://chemistry.jhu.edu/

The Department of Chemistry, in conjunction with other departments of the university, offers a broad education and the opportunity to do research in chemistry and related fields. The great diversity of the field of chemistry, ranging between physics and biology, is reflected in the research interests of the faculty. Undergraduate chemistry majors usually go on to graduate study in chemistry, chemical engineering, biology, oceanography, geochemistry, biophysics, environmental sciences, or medicine, while others enter the chemical industry. The Ph.D. in chemistry leads to professional careers in colleges and universities, research institutes, industry, and government laboratories.

Facilities

The department is well-equipped with instrumentation, both shared and in individual faculty research laboratories, to perform modern chemical research. The Departmental Instrumentation Facility houses the following pieces of major instrumentation:

- Bruker Avance 400 MHz FT-NMR spectrometers (2), one located in the Instrumentation Facility in Remsen Hall and the other on the first floor of the new chemistry building.
- Bruker Avance 300 MHz FT-NMR spectrometer.
- Bruker Avance III 400 MHz FT-NMR spectrometer and Fourier 300 FT-NMR spectrometer with an automatic sample changer are located in the undergraduate teaching laboratory.
- VG70S magnetic sector mass spectrometer, with EI, and CI ionization.
- VG70SE magnetic sector mass spectrometer, with FAB ionization.
- Finnigan LCQ ion trap mass spectrometer with electrospray ionization (APCI available as an option).
- Finnigan LCQ Fleet ion trap Mass Spectrometer with ESI ionization and HPLC inlet.
- Bruker Autoflex III Maldi-ToF-Tof Mass spectrometer with Maldi ionization and collision cell.
- Shimadzu QP2010SE GC-MS with EI ionization.
- Waters Acquity / Xevo G2 UPLC-Q-ToF MS with ESI and APCI ionisation.
- Bruker EMX EPR spectrometer equipped with a liquid helium cryostat and variable temperature controller.
- Thermo Nicolet Nexus 670 FT-IR spectrophotometer with a Nicolet Golden Gate ATR accessory.
- Jasco P-1010 polarimeter.
- Xcalibur3 X-ray diffractometer with CCD area detector (located on the second floor of the new chemistry building).
- Protein Technologies Symphony Quartet Peptide Synthesizer.
- SuperNova X-ray diffractometer (dual hi-flux micro-focus Mo and Cu sources) with Atlas CCD area detector (located on the second floor of the new chemistry building).

NMR spectrometers suitable for studies of biological macromolecules are located in the Biomolecular NMR Center, located in an underground facility in front of the new chemistry building. The instruments include two 600, and an 800 MHz FT-NMR spectrometers.

A variety of different mass spectral techniques are available in the expanding Mass Spectrometry Facility. High-resolution mass spectra of submitted samples are obtained on a service basis by a staff member using two magnetic sector instruments equipped with EI, CI, and FAB ionization methods. MALDI-TOF, GC/MS, and electrospray instruments are also available and operated by students and researchers following training by the facility staff.

The X-ray Diffractometer Facility is operated by a staff member. The instruments are suitable for detailed molecular-level structural characterization of new organic or inorganic compounds.

The department shares with the Physics and Astronomy Department the use of the Physical Sciences Machine Shop, located in the Bloomberg Center. Electronics construction and repair is handled by a staff member in the Departmental Instrumentation Facility.

Undergraduate Program

Programs for undergraduate majors can be tailored to individual interests so that a major in chemistry is excellent preparation not only for further work in chemistry, but also for any field that rests on a chemical foundation. It is a good choice for a premedical student interested in medical research.

Programs

- Chemistry, Bachelor of Arts (p. 1716)
- Chemistry, PhD (p. 1717)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.030.101. Introductory Chemistry I. 3 Credits.
The fundamental principles of chemistry, including atomic and molecular structure, bonding, elementary thermodynamics, equilibrium and acids and bases, are introduced in this course. Can be taken with Introductory Chemistry Laboratory – I unless lab has been previously completed. Note: Students taking this course and the laboratory 030.105 may not take any other course in the summer sessions and should devote full time to these subjects. High school physics and calculus are strongly recommended as prerequisites. First and second terms must be taken in sequence. Students not enrolled in college (unless they are rising freshmen) may not take this course.

AS.030.102. Introductory Chemistry II. 3 Credits.
Continuation of AS.030.101 emphasizing chemical kinetics, chemical bonding. Topics: energy levels and wave functions for particle-in-a-box and hydrogen atom and approximate wave functions for molecules including introduction to hybrid orbitals. Note: Appropriate adjusting caps should be used to ensure both sections are approximately the same size
AS.030.101 OR AS.030.107;Students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.102.

AS.030.103. Applied Chemical Equilibrium and Reactivity w/lab. 4 Credits.
This course is designed for students who have scored a 4 or 5 on the AP Chemistry Exam or who have scored a 6 or 7 HL IB Chemistry Exam. This course will review an advanced introductory chemistry sequence in a single semester. Chemical equilibrium, reactivity and bonding will be covered. These topics will be explored through laboratory experiments and problem solving, and discussing these principles in the context of current research. For details on chemistry placement and exam credit policies, please see http://www.advising.jhu.edu/placement_chemistry.phpStudents who have previously enrolled in AS.030.101 or AS.030.105 may not earn credit for AS.030.103 and students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.102/AS.030.106.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.104. Applications of Chemistry in Medicine. 1 Credit.
Chemistry is one of the oldest scientific disciplines through major contributions have been made in various fields such as health care, medicine, pharmaceutical sciences, materials and polymer science and forensic chemistry, to name a few. The development of new drugs involves chemical analysis and synthesis of new compounds. Chemistry also plays a vital role in the development and growth of several consumer-based industries such as pigments and paints, pharmaceuticals, cosmetics and oil and natural gas. In this program, students will be introduced to applications of chemistry in medicine and pharmaceutical sciences. Prerequisite: Background in chemistry and biology. Learning Objectives (LO) In this program, students will: ? Expand the breadth and depth of understanding of specific applications of chemistry in medicine, including acids and bases, buffers, spectroscopy, nuclear chemistry, chemical analysis and drug synthesis and purification? Research problems related to applications of chemistry in medicine? Demonstrate ability to interpret and explain different aspects of chemical and physical properties of drugs ? Provide working knowledge of biochemistry and how it is directly related to understanding disease and drug therapy ? Discuss and describe various instrumental and spectroscopic tools to detect and treat diseases

AS.030.105. Introductory Chemistry Laboratory I. 1 Credit.
Laboratory work includes quantitative analysis and the measurement of physical properties. Open only to those who are registered for or have successfully completed Introductory Chemistry 030.101.
Students must have completed or be enrolled in AS.030.101 OR EN.510.101 to register for AS.030.105.;Students enrolled in AS.030.105 may not enroll in AS.030.115, AS.030.103, or AS.030.107.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.106. Introductory Chemistry Laboratory II. 1 Credit.
Laboratory work includes some quantitative analysis and the measurement of physical properties. Open only to those who are registered for or have completed Introductory Chemistry II (AS.030.102). Permission required for pre-college students.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.107 OR (AS.030.105 AND (AS.030.101 OR EN.510.101));Students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.106.

AS.030.112. Chemistry with Problem Solving I.
This course is for students who have had moderate or limited exposure to the subject. Special emphasis is placed on scientific problem-solving skills. There are two discussion sections per week, including one devoted exclusively to interactive quantitative problem solving. A typical student may have taken a year of descriptive chemistry as a high school sophomore, but has not been exposed to the problem-solving mathematical approach used in university-level science courses. Taken concurrently with AS.030.101 and AS.030.102.Students who have received an AP4 or higher are not considered eligible for this course and should not enroll.
AS.030.101 OR AS.030.102

AS.030.113. Chemistry with Problem Solving II. 2 Credits.
This course is for students who have had moderate or limited exposure to the subject. Special emphasis is placed on scientific problem-solving skills. There are two discussion sections per week, including one devoted exclusively to interactive quantitative problem solving. A typical student may have taken a year of descriptive chemistry as a high school sophomore, but has not been exposed to the problem-solving mathematical approach used in university-level science courses. Taken concurrently with AS.030.101 and AS.030.102.

AS.030.204. Chemical Structure and Bonding w/Lab. 4 Credits.
An introduction to the synthesis, structure, and reactivity of inorganic compounds. Modern approaches to chemical bonding, including molecular orbital, ligand field, and crystal field theories, will be applied to understanding the physical and chemical properties of inorganic materials. Other topics to be discussed include magnetic properties, electronic spectra, magnetic resonance spectra, and reaction kinetics. The integrated laboratory will cover basic synthetic, measurement, and calculation methods of inorganic chemistry.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.102 OR AS.030.103 OR an AP score of 5

AS.030.205. Introductory Organic Chemistry I. 4 Credits.
The fundamental chemistry of the compounds of carbon. Methods of structure determination and synthesis. The mechanisms of typical organic reactions and the relations between physical and chemical properties and structures.
AS.030.102 OR AS.030.103 OR EN.510.101 OR AS.030.204.

AS.030.206. Organic Chemistry II. 4 Credits.
Continuation of AS.030.205 Organic Chemistry I with special emphasis on organic synthesis and related synthetic methods. Students may not simultaneously enroll for AS.030.212 and AS.030.206.
Prerequisite(s): Students may not simultaneously enroll for AS.030.212 and AS.030.206.
AS.030.205

AS.030.212. Honors Organic Chemistry II. 4 Credits.
Second semester undergraduate organic chemistry from a more advanced prospective, emphasizing connections to modern examples from biochemistry (protein and DNA structure, chemical logic of metabolism, enzyme mechanisms), catalysis, materials (polymer synthesis, supramolecular chemistry), medicine (drug structure and function) and more. The standard topics of second semester organic chemistry (e.g. reactivity of aromatic and carbonyl-containing molecules) will all be covered, but amplified and enriched with topics as noted. Students may not simultaneously enroll in AS.030.212 and AS.030.206. Prereq: Must receive a B or better in the first semester (AS.030.205)
Must receive a B or better in the first semester (AS.030.205)

AS.030.225. Introductory Organic Chemistry Laboratory. 3 Credits.
Laboratory work includes fundamental laboratory techniques and preparation of representative organic compounds. Open only to those who are registered for or have completed Introductory Organic Chemistry. Note: This one-semester course is offered each term. Introductory Organic Chemistry I/II requires one semester of the laboratory.
Prerequisite(s): Students may not simultaneously enroll for AS.030.225 and AS.030.227
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.205, earned credit or concurrent enrollment.;((EN.510.101 OR (AS.030.101 AND AS.030.102) OR AS.030.107) AND (AS.030.105 AND AS.030.106)) OR AS.030.103 permission of instructor for freshmen.

AS.030.227. Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques. 3 Credits.
This is a project lab designed for Chemistry Majors who are concurrently enrolled in AS.030.205.Techniques for the organic chemistry laboratory including methods of purification, isolation, synthesis, and analysis will be explored through a project focused on chemical chirality. Students may not simultaneously enroll for AS.030.225 and AS.030.227.
Prerequisite(s): Students may not simultaneously enroll for AS.030.225 and AS.030.227.
AS.030.205 may be taken at the same time or prior to enrolling in AS.030.227.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.228. Intermediate Organic Chemistry Laboratory. 3 Credits.
Lab skills already acquired in AS.030.225 will be further developed for synthesis, isolation, purification, and identification of organic compounds. Spectroscopic techniques, applications will be emphasized. Recommended Course Background: AS.030.225
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.205 AND (AS.030.225 OR AS.030.227);(AS.030.206 OR AS.030.212)

AS.030.245. Quantitative Analytical Laboratory. 3 Credits.
This is a 3 credit lab that will serve as an introduction into analytical techniques and quantitative methods. There will be a 1 hour of pre-lab lecture component to this course to discuss the lab for that day.
((AS.030.101 AS.030.102) OR AS.030.103) AND AS.030.205

AS.030.301. Physical Chemistry I. 3 Credits.
The laws of thermodynamics, their statistical foundation, and their application to chemical phenomena. Students should have knowledge of general physics, general chemistry, and calculus (two semesters recommended). Freshmen by permission only.

AS.030.302. Physical Chemistry II. 3 Credits.
Introduction to quantum mechanics, its application to simple problems for which classical mechanics fails. Topics: Harmonic oscillator, hydrogen atom, very approximate treatments of atoms and molecules, and theoretical basis for spectroscopy. Recommended Course Background: AS.030.301

AS.030.305. Physical Chemistry Instrumentation Laboratory I. 3 Credits.

This course is designed to illustrate the principles of physical chemistry and to introduce the student to techniques and instruments used in modern chemical research. Chemistry majors are expected to take this sequence of courses, rather than AS.030.307. Chemistry majors only. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module..

AS.030.306. Physical Chemistry Instrumentation Laboratory II. 3 Credits.

Designed to illustrate the principles of physical chemistry, introduce the student to spectroscopic techniques and instruments used in modern chemical research. Chemistry majors are expected to take this course rather than 030.307.

Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.301 OR AS.030.302;AS.030.305

AS.030.315. Biochemistry I. 4 Credits.

Foundation for advanced classes in Biophysics and other quantitative biological disciplines. Lecture and computer laboratory. This class is the first semester of a two semester course in biochemistry. Topics in Biochemistry I include chemical and physical properties of biomolecules and energetic principles of catabolic pathways. Computer labs include extensive use of molecular graphics and modelling of reaction kinetics and pathway flux. Co-listed with AS.250.315

AS.030.206 OR AS.030.212;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.356. Advanced Inorganic Lab. 3 Credits.

Laboratory designed to illustrate the principles and practice of inorganic chemistry through the synthesis and characterization of transition metal and organometallic compounds. Methods used include vacuum and inert atmosphere techniques. Instrumental approaches and modern spectroscopic techniques are applied to the characterization of compounds generated. It is strongly recommended that students have taken or are taking one of the following courses: AS.030.204, AS.030.442, AS.030.449, or AS.030.472.

AS.030.228

AS.030.371. Chemistry for Connoisseurs. 3 Credits.

This course will survey the structural and physical properties of chemicals often considered as part of the “finer things in life” including topical discussions of the chemistries of food, drink, art, cosmetics and clothing, among others. Despite the pretentious name, the general theme of the course is to put chemical identities onto the things we interact with on a daily basis but most likely take for granted at a molecular level. Current event topics in consumer chemistry will also be covered as they arise. Students will have the chance to research topics of interest. The course material will be enriched by the contributions from special guest lecturers and occasional field trips.

Area: Writing Intensive

AS.030.205 or equivalent

AS.030.403. Optoelectronic Materials and Devices: Synthesis, Spectroscopy, and Applications. 3 Credits.

This course provides an introduction to the vast chemistry and physics of solid-state materials. The course begins with a fundamental description of bonding in crystalline solids and calculation of electronic band structure. We then extend our discussion to methods for the synthesis of low-dimensional materials and hierarchical structures, including quantum dots (0D), nanowires (1D), graphene and graphene analogs (2D), and thin-film superlattices. An in-depth discussion of spectroscopic and characterization techniques for solid-state materials will follow and focus on some of the foundational studies of quantum devices and cooperative phenomena. At this stage we will describerecent advances in electron-microscopy (e.g. aberration-corrected and energy filtered TEM, atom-probe tomography) that are revolutionizing the structural, compositional, and electronic characterization of materials. The course will conclude with a survey of contemporary topics in solid-state and nanomaterials science, including functional devices and circuits, assembly, energy conversion and catalysis, and biological sensing.Recommended Course Background: AS.030.301 and AS.030.402 are preferred, but instructor approval may be granted in lieu of these courses.

AS.030.404. Electrochemical Systems for Energy Conversion and Storage. 3 Credits.

This course will be focused on the fundamentals and applications of electrochemical methods in catalysis, charge transport, and energy conversion and storage. Topics that will be covered are basic electrochemical techniques, homogenous and heterogeneous (photo)electrocatalysis, fuel cells, and charge storage devices. The class will conclude with a group report and presentation on a recent development in the field of energy catalysis, conversion, and storage. Course topics include: 1) Fundamentals of electrochemistry, 2) Potential sweep methods and current-controlled techniques, 3) Impedance analysis, 4) Electrochemistry coupled with other characterization methods, 5) Electrocatalysis and photoelectrochemical catalysis, 6) Basics in fuel cells and current technologies (alkaline, polymer exchange membrane, solid oxide…), 7) Basics in batteries and current technologies (Pb acid, Li-based, other metals…)Recommended Course Background: AS.030.204 or AS.030.449 or AS.030.472, or instructor approval for undergraduate students. No pre-requisites for graduate students

AS.030.405. Introduction to Computational Chemistry. 3 Credits.

This course provides an introduction to the state-of-the-art computational chemistry.The course integrates the basics about molecular electronic structure theories and the corresponding computational aspects and practice in chemical applications. The discussions of theories cover the modern quantum-chemical methods, ranging from mean-field methods (Hartree-Fock method and density-functional theory) to post mean-field methods for treating electron-correlation effects (configuration interaction and coupled cluster). Demonstrative calculations and computer lab practice are designed to deal with the computation of energetic properties (e.g., heat of formation,bond dissociation energy, reaction activation energy, etc) and structural properties (geometry, vibrational frequencies, etc) of representative molecular systems using standard quantum chemistry program package (the Gaussian program, most probably). The class will conclude with a report and presentation on a piece of recent computational work pertinent to the student’s research interests.

AS.030.415. Bioinorganic and Organometallic Chemistry. 3 Credits.
This course will cover key concepts of Bioinorganic chemistry (including metalloenzymes, synthetic catalysts, drugs, and molecular sensors) and Organometallic Chemistry (types of ligands, interactions with metals) and their applications in catalysis and bioinorganic chemistry. A background in organic chemistry and physical chemistry I is strongly recommended.
(AS.030.101 AND AS.030.102) AND (AS.030.205 AND AS.030.206)

AS.030.417. Metallo(bio)chemistry of Molecular Oxygen. 1.5 Credits.
This advanced (but descriptive) course focuses on how transition metals of the first row, i.e., iron, manganese and copper), process molecular oxygen (O2) in metalloenzymes and coordination complexes. Chemical behavior discussed will be reversible O2-binding (e.g., blood dioxygen carriers and their synthetic analogs), insertion of one or both atoms of molecular oxygen into organic substrates (i.e., oxygenase activity), or oxidase (bio)chemistry, wherein the metal ion center facilitates O2-reduction to hydrogen peroxide or water. The focus will be on the metal's role and mechanism of action. Practical societal applications will also be discussed.
AS.030.449 or equivalent

AS.030.421. Data Science Tools for the Chemical and Materials Sciences. 3 Credits.
Advances in measurement techniques and simulations have driven an explosion in the variety, quality, and quantity of data collected when investigating chemical and materials processes. Advances in computing have led to the practicality of machine learning (ML) and related analytical methods to explore and extract meaning from this cornucopia of data, and data science has been called the fourth pillar of the scientific method. This course will provide an introduction to modern tools of data science, including the Python programming language, Jupyter notebooks, ML algorithms and their practical implementation, and high performance computing, with specific emphasis on applying these tools to data of chemical relevance, including UV/Vis, IR and NMR spectra, 3-D micro computed tomography, and physical property data including specific heat, magnetization, and resistivity.

AS.030.424. Molecular Synthetic Biology. 3 Credits.
Synthetic Biology is changing the world around us. This course is designed to help you to understand these powerful emerging technologies and the science behind it, and to help prepare you if you want to contribute toward these exciting developments.
Area: Writing Intensive
AS.030.315 OR AS.020.305

AS.030.441. Spectroscopic Methods of Organic Structure Determination. 3 Credits.
The course provides fundamental theoretical background for and emphasizes practical application of ultraviolet/visible and infrared spectroscopy, proton and carbon-13 nuclear magnetic resonance and mass spectrometry to the structure proof of organic compounds.

AS.030.442. Organometallic Chemistry. 3 Credits.
An introduction to organometallic chemistry beginning with structure, bonding, and reactivity and continuing into applications to fine chemical synthesis and catalysis. Required Course Background: Organic chemistry-I and -II. Level: Upper level Undergraduate AND Graduate Students

AS.030.449. Chemistry of Inorganic Compounds. 3 Credits.
Physical and chemical properties of inorganic, coordination and organometallic compounds are discussed in terms of molecular orbital, ligand field and crystal field theories. Emphasis on structure and reactivity of these inorganic compounds. Other topics: magnetic properties, electronic spectra, magnetic resonance spectra, reaction kinetics.

AS.030.451. Spectroscopy. 3 Credits.
Spectroscopy and structure of molecules starting from rotational, vibrational and electronic spectra of diatomic molecules and extending to polyatomic molecules as time permits.Recommended Course Background: AS.030.302 or permission of instructor.

AS.030.452. Materials & Surface. 3 Credits.
The chemistry associated with surfaces and interfaces as well as a molecular level understanding of their essential roles in many technological fields. The first half of this course addresses various analytical techniques used to study surfaces including X-ray, photoelectron spectroscopy, and scanning tunneling microscopy. The second half of this course uses a number of case studies to illustrate the application of surface analytical techniques in contemporary research.

AS.030.453. Intermediate Quantum Chemistry. 3 Credits.
The principles of quantum mechanics are developed and applied to chemical problems.
(AS.030.301 OR AS.030.370 OR AS.250.372) AND AS.030.302

AS.030.454. Electrochemistry for Energy Conversion and Storage. 1.5 Credits.
This half-semester course introduces fundamental concepts in electrochemistry and the application of electrochemical methods for chemical research. The goal of this course is to enable students to practice electrochemistry in laboratory for any field. We will discuss how to use electrochemistry as an analytical technique in your toolbox for understanding chemical reactions as well as the role of electrochemistry in energy conversion and storage.
AS.030.204 OR AS.030.449 OR AS.030.472 OR Instructor Permission.

AS.030.456. Chemical Applications of Group Theory. 3 Credits.
This class will introduce group theory in the chemical/physical context. In addition to the fundamentals of (practical/applied) group theory, this course will explore how the tools of group theory enable powerful, general statements to be made about the behavior of chemical systems from the atomics scale to the macroscale, often without requiring detailed calculations or knowledge of most microscopic details. It is particularly targeted at upper level chemistry and physics undergraduates who have a basic knowledge of quantum mechanics and a brief familiarity with linear algebra.

AS.030.501. Independent Research in Physical Chemistry I. 3 Credits.
Research under the direction of members of the physical chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.502. Independent Research in Physical Chemistry. 1 - 3 Credits.
Research under the direction of members of the physical chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.503. Independent Research in Inorganic Chemistry I. 3 Credits.
Research under the direction of members of the inorganic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.504. Independent Research in Inorganic Chemistry. 1 - 3 Credits.
Research under the direction of members of the inorganic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.505. Independent Research in Organic Chemistry I. 3 Credits.
Research under the direction of members of the organic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.506. Independent Research in Organic Chemistry I. 1 - 3 Credits.
Research under the direction of members of the organic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.507. Independent Research in Biochemistry. 3 Credits.
Research under the direction of members of the biochemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.509. Independent Research in Biochemistry II. 3 Credits.
Research under the direction of members of the biochemistry faculty.
Recommended Course Background: AS.030.507-AS.030.508 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.510. Independent Research in Biochemistry II. 1 - 3 Credits.
Research under the direction of members of the biochemistry faculty.
Recommended Course Background: AS.030.507-AS.030.508 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.511. Independent Research in Materials Chemistry. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.512. Independent Research in Materials Chemistry. 1 - 3 Credits.
Research under the direction of the materials chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.513. Independent Research in Medical Science. 3 Credits.
Research under the direction of members of the medical faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.514. Independent Research in Medical Science. 3 Credits.
Research under the direction of members of the medical faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.516. Independent Research in Chemical Biology II. 1 - 3 Credits.
Research under the direction of Chemical Biology faculty. Permission of instructor required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.521. Independent Research in Inorganic Chemistry II. 3 Credits.
Research under the direction of the inorganic chemistry faculty.
Recommended Course Background: AS.030.503-AS.030.504 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.522. Independent Research in Inorganic Chemistry II. 1 - 3 Credits.
Research under the direction of the inorganic chemistry faculty.
Recommended Course Background: AS.030.503-AS.030.504 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.523. Independent Research in Physical Chemistry II. 3 Credits.
Research under the direction of the physical chemistry faculty.
Recommended Coures Background: AS.030.501-AS.030.502 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.525. Independent Research in Organic Chemistry II. 3 Credits.
Research under the direction of the organic chemistry faculty.
Recommended Course Background: AS.030.505-AS.030.506 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.526. Independent Research in Organic Chemistry II. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.527. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.530. Independent Research in Inorganic and Materials Chemistry. 1 - 3 Credits.
Research under the direction of members of the Inorganic Chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.540. Independent Research in Solid State and Materials Chemistry. 1 - 3 Credits.
Research under the direction of memebers of the Physical Chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.593. Research-Organic Chemistry I. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.597. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.601. Statistical Mechanics.
An introduction to statistical mechanics of cooperative phenomena using lattice gases and polymers as the main models. Covered topics: phase transitions and critical phenomena, scaling laws, and the use of statistical mechanics to describe time dependent phenomena.

AS.030.610. Chemical Kinetics.
The molecular mechanism of elementary physical and chemical rate processes will be studied. Topics such as elastic scattering, collisional vibrational and rotational energy transfer, chemically reactive collisions, and the theory of unimolecular decay will be covered.

AS.030.613. Chemistry-Biology Interface Program Forum I.
Chemistry-Biology Interface (CBI) program students and faculty will meet weekly in a forum that will host presentations from CBI faculty and students as well as invited guest speakers. These meetings will serve as a valuable opportunity for students to develop presentation skills and interact with CBI students and faculty. Enrollment is required for first- and second-year CBI students, and is recommended for advanced-year graduate students.

AS.030.614. Chemical-Biology Program Interface Forum II.
Chemistry-Biology Interface (CBI) program students and faculty will meet weekly in a forum that will host presentations from CBI faculty and students as well as invited guest speakers. These meetings will serve as a valuable opportunity for students to develop presentation skills and interact with CBI students and faculty. Enrollment is required for first and second year CBI students, and is recommended for advanced year graduate students.

AS.030.615. Bioinorganic Chemistry.

AS.030.616. The Chemistry of Transition Metals in Biology.
This course will cover fundamental principles in inorganic chemistry, biochemistry, and spectroscopy that are important to the field of bioinorganic chemistry. Current topics in bioinorganic chemistry will be covered, including metalloenzyme structure and function and related synthetic model systems. An emphasis will be placed on the role of transition metals in these systems, and their chemical mechanisms. The collection and interpretation of data from modern bioinorganic spectroscopic tools (e.g. UV-vis, EPR, raman, Mössbauer, X-ray absorption) will be discussed in the context of these current topics.

AS.030.617. Metallo(bio)chemistry of Molecular Oxygen.
This advanced (but descriptive) course focuses on how transition metals of the first row, i.e., iron, manganese and copper), process molecular oxygen (O2) in metalloenzymes and coordination complexes. Chemical behavior discussed will be reversible O2-binding (e.g., blood dioxygen carriers and their synthetic analogs), insertion of one or both atoms of molecular oxygen into organic substrates (i.e., oxygenase activity), or oxidase (bio)chemistry, wherein the metal ion center facilitates O2-reduction to hydrogen peroxide or water. The focus will be on the metal's role and mechanism of action. Practical societal applications will also be discussed.

AS.030.619. Chemical Biology I.
Parts I and II constitute the core course of the Chemistry-Biology Interface (CBI) Program. An introduction to the structure, synthesis, reactivity, and function of biological macromolecules (proteins, nucleic acids, carbohydrates, and lipids) will be provided using the principles of organic and inorganic chemistry. Discussion will incorporate a broad survey of molecular recognition and mechanistic considerations, and introduce the tools of molecular and cellular biology that are utilized in research at the interface of chemistry with biology and medicine. Recommended Course Background: AS.030.206 or equivalent.

AS.030.620. Chemical Biology II.
Selected topics of current importance in chemical biology are covered. They include protein engineering and proteomics, cell signaling, protein-nucleic acid interactions (e.g. replication, transcription, DNA repair), catalytic RNA and the ribosome, biosynthesis of natural products, mechanisms of drug action, combinatorial chemistry and chemical genetics, and in vitro selection. Recommended Course Background: AS.030.619 or permission required.

AS.030.621. Literature-Organic Chemistry.

AS.030.622. Seminar: Literature of Chemistry.
Seminars are presented by advanced graduate students on topics from current chemical journals. Most first-year graduate students are expected to attend for credit. Undergraduates may take the course on a satisfactory/unsatisfactory basis.

AS.030.623. Molecular Synthetic Biology.
Principles and methods for the design and optimization of new biological systems, from a molecular perspective. Topics include: introduction to genetic parts and modern methods for their assembly; synthesis and incorporation of nucleic acids at the level of nucleotides, genes, and genomes; design of genetic programs; library generation and screening; directed evolution and its application to create new proteins and metabolic pathways; computational design of protein and RNA?using physical and bioinformatic approaches; non-canonical amino acids and genetic code expansion. This course will also feature critical evaluation of the primary literature in this fast-paced field, and practical experience with relevant software and computational tools.

AS.030.625. Advanced Mechanistic Organic Chemistry I.
The course covers the application of techniques in physical chemistry to the study of organic reaction mechanisms. Topics include chemical bonding and structure, stereochemistry, conformational effects, molecular orbital theory, methods to determine reaction mechanisms, reactive intermediates, and photochemistry. Recommended Course Background: AS.030.205-AS.030.206

AS.030.626. Advanced Mechanistic Organic Chemistry II.
This course covers advanced organic reactions and their mechanisms. Emphasis is given both to methods of postulating mechanisms for rationalizing reaction results and to the use of mechanistic thinking for designing reactions and reagents. This course is intended to be taken in sequence with AS.030.425. Recommended Course Background: AS.030.205-AS.030.206

AS.030.630. Molecular Photophysics and Photochemistry.
This course will introduce fundamental physical, chemical, and analytical concepts underlying light-induced chemical and (molecular-based) material processes. The final weeks of this course will build from these core concepts to survey molecular photoresponses and their consequences or applications in environmental chemistry, chemical biology, and materials science.

AS.030.633. Bioorganic and Natural Product Chemistry.
This is a natural products chemistry course organized according to the major natural product groups and emphasizing their origins, fundamental chemistry and applications in medicine. The organization is part traditional lecture and part case studies, like law school or business school, involving your participation in independent research, short essays and presentations. The last Workshops will be elective on your part as to topic with approval from C.A.T. Mixed in will be examples of organic and chemoenzymatic synthesis and biomimetic synthesis, relevant aspects of cofactor and enzyme function and their engineering, spectroscopic and kinetic tools.

AS.030.635. Principles of Magnetic Resonance.
This course develops the basic theoretical concepts underlying the fields of NMR (Nuclear Magnetic Resonance) and EPR (electron spin/paramagnetic resonance). From this foundation, a broad range of different applications will be surveyed. This includes applications to multidimensional solution state NMR spectroscopy, EPR spectroscopy, as well as hybrid electron/nuclear magnetic resonance applications such as dynamic nuclear polarization (DNP).

AS.030.636. Principles of Multidimensional NMR Spectroscopy.
This course is intended to be of general interest to those wanting to broaden their spectroscopy skills and will cover the theoretical and practical aspects of multidimensional NMR spectroscopy. This includes approaches to optimization of data acquisition and post-acquisition data processing as well as the development of the theoretical background needed to understand and design NMR pulse sequences.

AS.030.648. Biocatalysis: Fundamentals, Recent Advances, and Industrial Applications.
Biocatalysis is a rapidly evolving field that adapts biology's mechanisms for innovation to offer revolutionary solutions for chemical production. This course features an in-depth coverage of various topics in biocatalysis with examples of how biocatalysis has reshaped various aspects of modern industries including food manufacturing, pharmaceuticals, consumer products, and biomaterials. This course also provides an overview of common enzyme classes used in bioindustries with extensive discussions of their catalytic mechanisms and engineering. Integrated within the course will be reviewing of important literatures, assessment of critical industrial biocatalytic processes, and hands-on experience of common bioinformatic and computational tools for new enzyme discovery.

AS.030.652. A Theoretical and Experimental Approach to X-ray Crystallography.
The X-ray course will provide a complete approach to X-ray structure to determination (mostly concerned with snall molecules) and its uses in Chemistry. The first segment of this course will cover all theoretical aspects of X-ray crystallography, i.e. crystals and crystallixation, the nature of X-rays, the diffraction phenomenon of X-rays by crystals, symmetry and space groups, crystal structure analysis. Additionally, the course will provide laboratory experience for the students, involving hands-on instrumentation, experimental methodology to X-ray structure determination, structure solution/refinement, data analyses and publishing data. The course is aimed for graduate students with a strong interest in organic/inorganic chemistry, materials sciences, and physics. Undergraduate students with a major in chemistry are also encouraged to participate.

AS.030.676. Modern Synthetic Methods in Total Synthesis.
An exploration of modern synthetic methods in the context of total synthesis.

AS.030.677. Advanced Organic Synthesis I.
The reactions and principles involved in the synthesis of simple and complex organic compounds. Discussion of famous natural product syntheses and practice in developing rational designs for organic syntheses. Problems in the design of syntheses and in the use of chemical literature.

AS.030.678. Advanced Organic Synthesis II.
Advanced discussion of organic stereochemistry & its application to problems in asymmetric reactions and catalysis will be presented. Emphasis will be placed on the latest reports in the literature, especially with respect to the development of new catalytic, asymmetric processes.

AS.030.681. Nucleic Acids: Fundamental Chemistry and Applications.
The course will begin with an overview of nucleic acid structure, synthesis and reactivity. Subsequent topics will include nucleic acid damage & repair, expanding the genetic code, the role of nucleic acids in epigenetics and applications in biotechnology, such as the development of nucleic acid sensors.

AS.030.691. Hardware, Software and Materials Chemistry.
The course is designed to provide the essential principles and concepts underlying the modern study of the structure and properties of solids in bulk crystals, thin films, and nanoscale objects. Topics include basic crystallography, structure determination by x-ray, neutron, and electron diffraction, fundamental concepts of bonding in solids, lattice dynamics, electronic band structure, magnetism, and strongly correlated electron behavior. Particular emphasis is placed on the impact of the structure, dimensionality, and electron count on electrical and magnetic properties (electric conduction, superconductivity, thermoelectricity, etc). More course info available at http://occamy.chemistry.jhu.edu.. Cross-listed with Physics and Astronomy

AS.030.800. Summer Independent Research.
This course is for active Chemistry PhD students during summer terms

AS.030.802. Independent Research.
Research under the direction of the chemistry faculty.

AS.030.897. Dissertation Research.
Open to AS Chemistry Graduate Students only.

Cross Listed Courses

Biophysics

AS.250.310. Exploring Protein Biophysics using Nuclear Magnetic Resonance (NMR) Spectroscopy. 3 Credits.

NMR is a spectroscopic technique which provides unique, atomic level insights into the inner workings of biomolecules in aqueous solution and solid state. A wide variety of biophysical properties can be studied by solution state NMR, such as the three dimensional structures of biological macromolecules, their dynamical properties in solution, interactions with other molecules and their physical and chemical properties which modulate structure-function relationships (such electrostatics and redox chemistry). NMR exploits the exquisite sensitivity of magnetic properties of atomic nuclei to their local electronic (and therefore, chemical) environment. As a result, biophysical properties can be studied at atomic resolution, and the global properties of a molecule can be deconstructed in terms of detailed, atomic level information. In addition, interactions between nuclei can be exploited to enhance the information content of NMR spectra via multidimensional (2D and 3D) spectroscopy. Since these properties can be studied in solution, NMR methods serve as an effective complement to X-Ray crystallography and electron microscopy. In this course, we will learn about the basics of NMR spectroscopy, acquire 1D and 2D NMR spectra and use various NMR experiments to characterize and probe biophysical properties of proteins at an atomic level.
((AS.030.101 AND AS.030.105) OR (AS.030.103 OR AS.030.204)) AND (AS.030.370 OR AS.250.372) AND (AS.020.305 OR AS.030.315 OR AS.250.315) AND AS.030.205 or permission of the instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.315. Biochemistry I. 3 Credits.

Foundation for advanced classes in Biophysics and other quantitative biological disciplines. This class is the first semester of a two semester course in biochemistry. Topics in Biochemistry I include chemical and physical properties of biomolecules and energetic principles of catabolic pathways. Co-listed with AS.030.315
If you have completed AS.250.307 you may not register for AS.250.315.; (AS.030.206 OR AS.030.212) AND (AS.250.372 OR AS.030.301)

AS.250.316. Biochemistry II. 3 Credits.

Biochemical anabolism, nucleic acid structure, molecular basis of transcription, translation and regulation, signal transduction with an emphasis on physical concepts and chemical mechanisms. Format will include lectures and class discussion of readings from the literature.
(AS.250.315 OR AS.030.315 OR AS.020.305) AND (AS.030.206 OR AS.030.212) or permission of the instructor.

AS.250.372. Biophysical Chemistry. 4 Credits.

Course covers classical and statistical thermodynamics, spanning from simple to complex systems. Major topics include the first and second law, gases, liquids, chemical mixtures and reactions, partition functions, conformational transitions in peptides and proteins, ligand binding, and allostery. Methods for thermodynamic analysis will be discussed, including calorimetry and spectroscopy. Students will develop and apply different thermodynamic potentials, learn about different types of ensembles and partition functions. Students will learn to use Pythonand will use it for data fitting and for statistical and mathematical analysis. Background: Calculus, Introductory Organic Chemistry, and Introductory Physics.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Extradepartmental Studies

PH.550.631. Biological Basis of Public Health. 3 Credits.

Discusses molecular, biochemical, cellular and immunological methodology and approaches for the mechanistic understanding, treatment and prevention of human diseases, and for understanding disease susceptibility. The focus will be on the application of biological methods and approaches to such critical issues as infectious disease, cancer, neurodegenerative disease, COPD, environmental toxicant effects on early development, and reproductive anomalies and their treatment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.855. MA Public Health Biology Thesis. 5 - 6 Credits.

Provides an opportunity for students to, in consultation with a faculty mentor from the Dept of Biochem and Molecular Bio, Environmental Health or Molecular Microbiology and Immunology, prepare a critical, scholarly paper on an agreed upon subject area.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

First Year Seminars

AS.001.104. FYS: The Science of Color. 3 Credits.

This First-Year Seminar is designed to introduce students to the fundamental physical and chemical origins of color and how we perceive them - from the vivid palette provided by the natural world to the brightly colored clothing we wear. Beginning with the basic principles of light and color, we will embark on an interdisciplinary investigation of color, including, but not limited to: color chemistry; color in biology; the physiology of the eye; how color affects human psychology; the history of color and light; and the use of color in art. Discover the physical and chemical explanations behind several noteworthy phenomena such as sunsets, color-blindness, rainbows, fireworks, chameleons and the Aurora Borealis.

AS.001.105. FYS: The Science Behind the Fiction. 3 Credits.

In this First-Year Seminar, we will seek to answer questions including: could you forge Beskar? What would it take to make a light saber? Is "Image, enhance" really possible? What is possible today? What might be possible in the future? And, what may never be possible, as it violates the laws of nature as we know them? We will take an empiricist approach, gathering data on the needed properties via screenings and related research, and then applying physical principles to reveal feasibility.

AS.001.152. FYS: When Chemistry Changed History. 3 Credits.

The past is littered with discoveries that have altered the course of civilization. In this First-Year Seminar, we will take a deep dive into chemical discoveries that changed history, discussing how they work as well as their impact on society. Topics will range from dirt warfare, to the link between gun powder and workers' rights, to how cats biochemically domesticated humans.

Molecular Microbiology and Immunology

PH.260.844. Causation. 3 Credits.

Acquaints students with the central concept of causation across the biomedical and public health disciplines. Discusses how cause and effect relationships govern today's research and evidence-based decision-making based on the social, physical, political, and economic determinants of health. Compares how fields and sub-disciplines in biomedicine and public health approach causation using research case examples that illustrate major morbidity and mortality-related health problems. Examines strategies to mitigate the limitations of causal inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

For current faculty and contact information go to http://chemistry.jhu.edu/people/

Chemistry, Bachelor of Arts

Chemistry Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Majors must complete all courses required for the major for a letter grade and receive a grade of C- or higher. Requirements of the chemistry major are:

Code	Title	Credits
Core Courses		
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.030.206	Organic Chemistry II	4
or AS.030.212	Honors Organic Chemistry II	
AS.030.227	Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques [1]	3
or AS.030.225	Introductory Organic Chemistry Laboratory	
AS.030.228	Intermediate Organic Chemistry Laboratory	3
AS.030.301	Physical Chemistry I	3
AS.030.305	Physical Chemistry Instrumentation Laboratory I	3
AS.030.302	Physical Chemistry II	3
AS.030.306	Physical Chemistry Instrumentation Laboratory II	3
AS.030.449	Chemistry of Inorganic Compounds [2]	3
AS.030.356	Advanced Inorganic Lab	3
Courses Outside the Department		
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or AS.173.116	Electricity and Magnetism Laboratory	
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
or AS.110.106	Calculus I (Biology and Social Sciences)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.107	Calculus II (For Biological and Social Science)	
or AS.110.113	Honors Single Variable Calculus	
Advanced Elective Courses		
Three credits of advanced chemistry courses beyond AS.030.305-AS.030.306 [3]		3
Nine credits of advanced chemistry courses, or science electives at the 300-level or higher approved by a Department of Chemistry advisor, and/or mathematics beyond Calculus II		9
Total Credits		**70**

1. Fall semester of AS.030.227 Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques restricted to Chemistry majors.
2. Course must be completed before AS.030.356 Advanced Inorganic Lab.
3. None of the advanced course requirements may be fulfilled with research.

Lecture and laboratory courses should be taken in sequence. In particular, AS.030.228 Intermediate Organic Chemistry Laboratory must be taken before AS.030.356 Advanced Inorganic Lab. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards these requirements without permission of the Director of Undergraduate Studies.

To allow maximum flexibility in choosing electives, students should complete both physics and organic chemistry by the end of the sophomore year. AS.030.449 Chemistry of Inorganic Compounds and AS.020.305 Biochemistry or AS.250.315 Biochemistry I are required for an American Chemical Society accredited degree.

Sample Program of Study

A typical program might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.106	Calculus I (Biology and Social Sciences)	4
	Credits	**8**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.107	Calculus II (For Biological and Social Science)	4
	Credits	**8**
Second Year		
First Semester		
AS.030.205	Introductory Organic Chemistry I	4
AS.030.225 or AS.030.227	Introductory Organic Chemistry Laboratory or Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques	3
AS.171.101 or AS.171.103 or AS.171.107	General Physics: Physical Science Major I or General Physics I for Biological Science Majors or General Physics for Physical Sciences Majors (AL)	4
AS.173.111	General Physics Laboratory I	1
	Credits	**12**
Second Semester		
AS.030.206	Organic Chemistry II	4
AS.030.228	Intermediate Organic Chemistry Laboratory	3

AS.171.102 or AS.171.104 or AS.171.108	General Physics: Physical Science Major II or General Physics/Biology Majors II or General Physics for Physical Science Majors (AL)	4
AS.173.112	General Physics Laboratory II	1
	Credits	**12**
Third Year		
First Semester		
AS.030.301	Physical Chemistry I	3
Science or math elective		3
	Credits	**6**
Second Semester		
AS.030.302	Physical Chemistry II	3
AS.030.305	Physical Chemistry Instrumentation Laboratory I	3
Science or math elective		3
	Credits	**9**
Fourth Year		
First Semester		
AS.030.449	Chemistry of Inorganic Compounds	3
AS.030.306	Physical Chemistry Instrumentation Laboratory II	3
Upper level chemistry elective		3
	Credits	**9**
Second Semester		
AS.030.356	Advanced Inorganic Lab	3
Science or math elective		3
	Credits	**6**
	Total Credits	**70**

Honors in Chemistry

To recognize exceptional performance, both in formal course work and in research, chemistry majors can receive a degree with honors. Honors in Chemistry may be achieved by one of two paths. 1: A student with a GPA of 3.75 or higher in (N) and (Q) courses or 2: A student with a 3.5 GPA in (N) and (Q) courses and with at least 2 semesters of research with a Chemistry faculty member or an approved advisor. These students must write a summary of their research and fill out the Honors Clearance form and the GPA worksheet (see: https://advising.jhu.edu/student-roadmap/seniors/honors/). Turn in these forms to the Director of Undergraduate Studies.

Chemistry, PhD

Johns Hopkins University was the first American institution to emphasize graduate education and to establish a PhD program in chemistry. Founding Chair Ira Remsen initiated a tradition of excellence in research and education that has continued until this day. The Hopkins graduate program is designed for students who desire a PhD in chemistry while advancing scientific knowledge for humankind.

The graduate program provides students with the background and technical expertise required to be leaders in their field and to pursue independent research.

Graduate students' advancement is marked by entrance exams, coursework, teaching, seminars, oral examinations, and an individual research project that culminates in a thesis dissertation. The thesis research project represents an opportunity for graduate students to make a mark on the world. Working in conjunction with a faculty member or team, individually tailored thesis projects enable students to think independently about cutting-edge research areas that are of critical importance. Thesis research is the most important step toward becoming a PhD scientist, and our program provides an outstanding base with a proven track record of success.

Graduate students make up the heart of the Chemistry Department, and the department strives to support students' individual needs. Each student is carefully advised and classes are traditionally quite small. Multidisciplinary research and course offerings that increase scientific breadth and innovation are hallmarks of the program. In addition to academic and technical development, our department also offers several outlets for professional and social development.

Admission Requirements

Application materials include:

- Academic transcripts
- Three letters of recommendation
- Statement of Purpose
- Resume/CV
- The GRE General Test is required. However, this requirement can be waived for individuals for whom personal circumstances make it difficult or impossible to access the GRE General Test at this present time. If so, please let the Academic Affairs Administrator (information below) be aware of these circumstances, and the application will be given full consideration.
- The GRE Chemistry Subject is Test is recommended, but not required.
- The application fee is $75. However, fee waivers may be requested for applicants that have documentation showing they are a part of SACNAS, MARCC, oSTEM and many other organizations. To access the full list to see if you qualify, go to the Krieger Graduate Admission and Enrollment (http://krieger.jhu.edu/graduate-admissions/apply/how-to-apply/#fees) page.

Assistance with the application process is available. Candidates with questions about the application process, or requests for a GRE General Test waiver (or on other matters related to the application) should contact the Admissions Committee's Academic Affairs Administrator (chem.grad.adm@jhu.edu).

There are no fixed requirements for admission. Undergraduate majors in chemistry, biology, earth sciences, mathematics, or physics may apply as well as all well-qualified individuals who will have received a BA degree before matriculation. A select number of applicants will be invited to visit campus to tour our facilities and interact with our faculty members and their lab members over a weekend in March.

For further information about graduate study in chemistry visit the Chemistry Department website (https://chemistry.jhu.edu/).

Program Requirements

Normally, the minimum course requirement for both the M.A. and the Ph.D. degrees is six one-semester graduate courses in chemistry and related sciences. Exceptionally well-prepared students may ask for a reduction of these requirements.

Requirements for the Ph.D. degree include a research dissertation worthy of publication, and a knowledge of chemistry and related material as demonstrated in an oral examination. Each student must teach for at least one year.

Below is a list of the core Chemistry courses for graduate level students.

Code	Title	Credits
AS.030.442	Organometallic Chemistry	3
AS.030.449	Chemistry of Inorganic Compounds	3
AS.030.451	Spectroscopy	3
AS.030.452	Materials & Surface	3
AS.030.453	Intermediate Quantum Chemistry	3
AS.030.601	Statistical Mechanics	
AS.030.610	Chemical Kinetics	
AS.030.619	Chemical Biology I	
AS.030.625	Advanced Mechanistic Organic Chemistry I	
AS.030.626	Advanced Mechanistic Organic Chemistry II	
AS.030.677	Advanced Organic Synthesis I	

Classics

http://classics.jhu.edu

Classics has long been at the heart of humanistic studies at Johns Hopkins University: the very first person appointed to the faculty of the newly founded University in 1876 was Basil L. Gildersleeve, a professor of Greek. The university adopted the most effective model of scholarship at the time-the German seminar, which combined teaching with research-as the basis for training students at Johns Hopkins. This revolutionary structure was central to the new model of the "research university" that Johns Hopkins University pioneered.

Today, the Department of Classics at Johns Hopkins University seeks to maintain and enhance this tradition of leadership and innovation. Members of the current faculty are highly interdisciplinary. We combine philological historical, iconographical, and comparative methods in our investigations of the cultures, broadly conceived, of ancient Greece and Rome, with additional expertise in Reception Studies (aka "The Classical Tradition") and in the post-classical use of Greek and Latin.

The undergraduate and graduate programs reflect these characteristics. They are founded upon intensive study of ancient Greek and Latin language and literature, but also require rigorous work in such fields as ancient history, art, archaeology, and philosophy, while allowing considerable flexibility to accommodate individual interests. These programs aim to produce broad, versatile scholars who have a holistic view of ancient cultures and of the evidence by which those cultures are comprehended.

The Classics department enjoys close ties with several local and regional institutions whose missions include the study of the ancient world, including the Walters Art Museum, with its world-class collection of antiquities and manuscripts; the Baltimore Museum of Art, with its Roman mosaics; and the Center for Hellenic Studies in Washington, D.C. Internationally, it is a member of the American School of Classical Studies in Athens, the American Academy in Rome, and the Intercollegiate Center for Classical Studies in Rome.

The department's main scholarly resource is the Milton S. Eisenhower Library, which has broad and deep holdings in the various fields of classical antiquity. The department also has access to a significant collection of Greek, Roman, and Etruscan antiquities, housed in the Johns Hopkins Archaeological Museum, located alongside its own quarters in Gilman Hall.

Undergraduate Programs

The department offers undergraduate courses in Greek and Latin languages and literature, ancient history, classical art and archaeology, Greek and Roman civilizations, history of sexuality and gender, ancient philosophy, mythology, and classical reception. These courses are open to all students in the university, regardless of their academic year or major field of interest.

Programs

- Classics, Bachelor of Arts (p. 1726)
- Classics, Bachelor of Arts/Master of Arts (p. 1727)
- Classics, Minor (p. 1728)
- Classics, PhD (p. 1728)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.040.102. The Art and Archaeology of Early Greece. 3 Credits.
This course explores the origins and rise of Greek civilization from the Early Bronze Age to the Persian Wars (ca. 3100-480 B.C.), focusing on major archaeological sites, sanctuaries, material culture, and artistic production.

AS.040.103. The Roman Empire. 3 Credits.
This introductory course examines the history, society, and culture of the Roman state in the Imperial age (ca. 31 BCE-ca. 500 CE), during which it underwent a traumatic transition from an oligarchic to a monarchic form of government, attained its greatest territorial expanse, produced its most famous art, architecture, and literature, experienced vast cultural and religious changes, and finally was transformed into an entirely different ("late antique") form of society. All readings in English.

AS.040.104. The Roman Republic: History, Culture, and Afterlife. 3 Credits.
This introductory level course examines the history, society, and culture of the Roman state in the Republican period (509-31 BCE), during which it expanded from a small city-state to a Mediterranean empire. We also consider the Republic's importance for American revolutionaries in the 18th century. All readings in English.

AS.040.105. Elementary Ancient Greek. 4 Credits.
This course provides a comprehensive, intensive introduction to the study of ancient Greek. During the first semester, the focus will be on morphology and vocabulary. Cannot be taken Satisfactory/ Unsatisfactory.

AS.040.106. Elementary Ancient Greek. 4 Credits.
Course provides comprehensive, intensive introduction to the study of ancient Greek. The first semester's focus is morphology and vocabulary; the second semester's emphasis is syntax and reading. Course may not be taken Satisfactory/ Unsatisfactory.
AS.040.105

AS.040.107. Elementary Latin. 3 Credits.
This course provides a comprehensive, intensive introduction to the study of Latin for new students, as well as a systematic review for those students with a background in Latin. Emphasis during the first semester will be on morphology and vocabulary. Course may not be taken Satisfactory/Unsatisfactory.

AS.040.108. Elementary Latin. 3 Credits.
Course provides comprehensive, intensive introduction to the study of Latin for new students as well as systematic review for students with background in Latin. The first semester's emphasis is on morphology and vocabulary; the second semester's focus is on syntax and reading. Course may not be taken Satisfactory/Unsatisfactory.
AS.040.107

AS.040.111. Ancient Greek Civilization. 3 Credits.
The course will introduce students to major aspects of the ancient Greek civilization, with special emphasis placed upon culture, society, archaeology, literature, and philosophy.

AS.040.114. Science Fiction Before the Modern Era: Exploring the Ancient Scientific. 3 Credits.
Science Fiction has classically been considered a product – and even a hallmark – of the modern world. But this course opens up the world of ancient scientific fictions. From philosophical myth and utopia to the imaginary worlds of fantastical travelogues and novelistic adventures in outer space, these narratives take us deep into the scientific imagination of the ancient Greeks and Romans. We will examine how these invented worlds reflected critically and creatively on aspects of contemporary society, including political and cosmic structures; conflicts between religion and philosophy; death and the after-life; the body, sexuality and technology. We will also examine the influence these fictions had on lunar narratives of the (early) modern period, including Kepler's Dream and Richard Adams Locke's great lunar hoax of 1835.

AS.040.121. Ancient Greek Mythology: Art, Narratives, and Modern Mythmaking. 3 Credits.
This course focuses on major and often intricate myths and mythical patterns of thought as they are reflected in compelling ancient visual and textual narratives. Being one of the greatest treasure troves of the ancient world, these myths will further be considered in light of their rich reception in the medieval and modern world (including their reception in the modern fields of anthropology and philosophy).

AS.040.126. Religion, Music and Society in Ancient Greece. 3 Credits.
Emphasis on ancient Greek ritual, music, religion, and society; and on cultural institutions such as symposia (drinking parties) and festivals.

AS.040.129. Reading Homer's Odyssey. 3 Credits.
This course aims to provide an in-depth exploration of Homer's Odyssey (in translation). We will study the poem's roots in a tradition of ancient oral poetry, gain a fuller understanding of how it was interpreted within different historical contexts, and examine the poem's fascination with topics such as gender, class, tales of exploration and colonization, truth and lies and identity.

AS.040.145. Story and Argument from Homer to Petrarch. 3 Credits.
Stories entertain us, but we also tell them to make a point. This course will explore the ways that stories were used to make points by Greek and Latin authors from Homer to Petrarch, while also looking at, and comparing them to, the techniques of argument contemporaneous thinkers were developing. This is a course about narrative and rhetoric but also about how and in what way stories matter.

AS.040.152. Medical Terminology. 3 Credits.
This course investigates the Greek and Latin roots of modern medical terminology, with additional focus on the history of ancient medicine and its role in the development of that terminology.

AS.040.204. Greek Myth and Anime: Cross-cultural Concepts of Man and Divinity. 3 Credits.
This course will examine the reception of the Classics in Japanese popular culture anime. We will view how characters, creatures, and beings from Greco-Roman myth are presented in anime, with special attention to concepts such as human beings, humanity, and divinity. Dean's Teaching Fellowship course.
Area: Writing Intensive

AS.040.205. Intermediate Ancient Greek. 3 Credits.
Reading ability in classical Greek is developed through a study of various authors.
AS.040.105 AND AS.040.106 or equivalent

AS.040.206. Intermediate Ancient Greek. 3 Credits.
Reading ability in classical Greek is developed through a study of various authors.
AS.040.205

AS.040.207. Intermediate Latin. 3 Credits.
Although emphasis is still placed on development of rapid comprehension, readings and discussions introduce student to study of Latin literature, principally through texts of various authors.
AS.040.107 AND AS.040.108 or equivalent

AS.040.208. Intermediate Latin. 3 Credits.
Reading ability in Latin is developed through the study of various authors, primarily Cicero (fall) and Vergil (spring).
AS.040.207

AS.040.212. Race Before Race: Ethnic Difference in the Ancient Mediterranean. 3 Credits.
This course explores how ancient Mediterranean cultures on three continents theorized and negotiated ethnic difference, with an eye toward classical Greece and Rome's role in the later invention of race.
Area: Writing Intensive

AS.040.213. The Painted Worlds of Early Greece: Fantasy, Form and Action. 3 Credits.
This course explores the creation and role of early Aegean wall painting. Found primarily in palaces, villas and ritual spaces, these paintings interacted with architecture to create micro-worlds for social activities taking place in their midst. Their subjects range—from mythological to documentary, from ornamental to instructive. They depict dance and battle, fantastical beasts and daily life. We examine their complex relationship to lived reality as well as the activities that surrounded them, from their crafting, to performance of rituals, to their role in "international" relations.
Area: Writing Intensive

AS.040.216. Exploring the Ancient Astronomical Imagination. 3 Credits.
This course takes us on an exploratory journey through the ancient astronomical imaginary. We will focus on ancient Greek and Roman ideas about the structure of the cosmos, the substance and nature of the stars, the Earth's place and role in the universe, ancient attempts to map the stars, and ancient beliefs about the significance of cosmic phenomena for events in the human world. The course will culminate in the extraordinary ancient tradition of lunar fictions, which are our earliest imaginative accounts of life on other worlds. Come join us for a voyage to the stars!

AS.040.217. A Clash of (Ancient) Civilizations? The Jews in the Graeco-Roman World. 3 Credits.
Judaism and Hellenism have been traditionally opposed to one another: the Jewish calendar celebrates the triumph of the Maccabees against the Hellenizers at Hannukah, and mourns the destruction of the Jerusalem Temple by the Romans on Tisha Be-Av. However, the relationship between the Jewish people and the Graeco-Roman world can hardly be reduced to a military confrontation. Did these apparently opposite worlds influence one another? How were the Jews viewed among the Greeks and the Romans and the many other ethnic groups living in the ancient Mediterranean, and how did they view Greek and Latin culture? What did they have to offer on the international, multilingual 'cultural market' of the Graeco-Roman world? Through a selection of ancient texts and modern scholarship, this course analyzes the vicissitudes of the Jewish people and of Judaism from the Hellenistic Age to the Late Antique, throughout the centuries in which Greeks, Romans and Jews found themselves living "under one roof". All readings in English. Dean's Teaching Fellowship course.

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

AS.040.232. Island Archaeology: The Social Worlds of Crete, Cyprus and the Cyclades. 3 Credits.
Islands present highly distinctive contexts for social life. We examine three island worlds of the third and second millennia BCE through their archaeological remains, each with its particularities. These are places where water had a unique and powerful meaning, where boat travel was part of daily life, where palaces flourished and where contact with other societies implied voyages of great distance across the sea. Class combines close study of material culture and consideration of island-specific interpretive paradigms; students work with artifacts in the JHU Archaeological Museum.

AS.040.245. Heroes: The Ancient Greek Way. 3 Credits.
Students will acquire more in-depth knowledge of Ancient Greek literature by reading and discussing its most important and famous texts, from the Iliad and the Odyssey to tragedy to philosophy. Knowledge of Greek is not required.
AS.040.111 OR AS.040.121

AS.040.300. The Ancient Novel. 3 Credits.
In this course we will follow the fortunes of the ancient Greek and Roman novels.
AS.040.103 OR AS.040.104 OR AS.040.111 OR AS.040.112 OR AS.040.121 OR AS.040.133 OR AS.040.245

AS.040.302. Greek Tragedy: Human Passions and Divine Power. 3 Credits.
This course introduces students to the significance of Greek theater in its original context and to masterpieces of Greek tragedy such as Medea, Oedipus the King, and The Bacchae. Readings will be in English. No Greek is required. Recommended Course Background: AS.040.111 Ancient Greek Civilization, AS.040.121 Ancient Greek Mythology, or some exposure to ancient Greek culture.

AS.040.305. Advanced Ancient Greek. 3 Credits.
This course aims to increase proficiency and improve comprehension of the ancient Greek language. Intensive reading of ancient Greek texts, with attention to grammar, idiom, translation, etc. Reading of prose or verse authors, depending on the needs of students. Specific offerings vary. Co-listed with AS.040.705.
AS.040.205 AND AS.040.206 or equivalent

AS.040.306. Advanced Ancient Greek. 3 Credits.
This course aims to increase proficiency and improve comprehension of the ancient Greek language. Intensive reading of ancient Greek texts, with attention to grammar, idiom, translation, etc. Reading of prose or verse authors, depending on the needs of students. Specific offerings vary. Co-listed with AS.040.702.
AS.040.205 AND AS.040.206 or equivalent

AS.040.307. Advanced Latin Prose. 3 Credits.
This course aims to increase proficiency and improve comprehension of the Latin language. Intensive reading of Latin texts, with attention to grammar, idiom, translation, etc. Specific offerings vary. Co-listed with AS.040.707.
AS.040.207 AND AS.040.208 or equivalent

AS.040.308. Advanced Latin Poetry. 3 Credits.
The aim of this course is to increase proficiency and improve comprehension of the Latin language. Intensive reading of Latin texts, with close attention to matters of grammar, idiom, and translation. Co-listed with AS.040.710.
AS.040.207 AND AS.040.208 or equivalent

AS.040.348. Worlds of Homer. 3 Credits.
Through texts, art, and archaeological remains, this course examines the various worlds of Homer--those recalled in the Iliad and Odyssey, those within which the epics were composed, and those born of the poet's unique creative work. Class will make museum visits. Ancient texts read in translation..

AS.040.400. The Archaeology of Cyprus: Investigating a Mediterranean Island World in the JHU Museum. 3 Credits.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Class involves regular analysis of artifacts based in the Archaeological Museum.

AS.040.407. Survey of Latin Literature I: Beginnings to the Augustan Age. 3 Credits.
This intensive Latin survey is designed for very advanced undergraduate students--normally those who have completed two semesters of Advanced Latin (AS.040.307/308)--and PhD students preparing for their Latin translation exam. In this course, the first half of a year-long sequence, we will read substantial texts of major Republican and some Augustan authors. The weekly pace is designed to inculcate greater speed and accuracy in Latin reading, and provide significant coverage of various kinds of texts.Recommended background: AS.040.307-308 or equivalent
AS.040.307 AND AS.040.308 or permission of instructor.

AS.040.408. Survey of Latin Literature II: Early Empire to the Post-Classical Period. 3 Credits.
This intensive Latin survey is designed for very advanced undergraduate students (normally those who have completed the regular undergraduate sequence through the advanced level) and PhD students preparing for their Latin translation exam. In this course, the second half of a year-long sequence, we will read substantial texts of major Imperial authors, as well as a selection of works from Late Antiquity and the Post-Classical period. The weekly pace is designed to inculcate greater speed and accuracy in Latin reading and to provide significant coverages of various kinds of texts. Prior completion of AS.040.407 preferred but not required.
AS.040.307 AND AS.040.308 or equivalent.

AS.040.417. Survey of Greek Literature I: Homer to the Classical Period. 3 Credits.
We shall read an extensive selection of major texts of Greek literature from Homer to the classical period.

AS.040.418. Survey of Greek Literature II: Hellenistic Period to Imperial Period. 3 Credits.
We shall read, in the original Greek, major authors of Greek Literature from the Hellenistic period to the Imperial period.

AS.040.420. Classics Research Lab. 3 Credits.
This course gives participants a unique opportunity to engage directly in empirical research and its interpretation and dissemination. Topics vary. There are no prerequisites, but potential students should contact the instructor for permission to enroll.

AS.040.501. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.520. Honors Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.600. The Archaeology of Cyprus: Investigating a Mediterranean Island World in the JHU Museum.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Class involves regular analysis of artifacts based in the Archaeological Museum.

AS.040.601. Cosmopoetics: Aratus, Manilius and the Literature of the Stars.
This seminar will explore two ancient Greek/Roman poems about the stars: Aratus' ancient Greek poem Phaenomena (3rd century BCE) – which was second only to the Homeric epics in terms of popularity among ancient readers - Manilius' Latin poem, Astronomica (1st century CE) - and ancient catasterism-literature (myths about figures who are converted into stars). Key points for discussion will include the politics and poetics of mapping the night sky, intersections with the scientific/philosophical tradition, the didactic voice, the interpretation of celestial phenomena and the stars' perceived influence on terrestrial events, and the extraordinarily rich visual tradition that accompanies Aratus' poem and the katasterismoi in particular. The seminar will include sessions working on early astronomical materials from our Special Collections. In order to guarantee maximum accessibility, we will approach these texts in translation, and extra provision will be made for Classics students and others who wish to study the texts in the original Greek and Latin language.

AS.040.603. Homer's Odyssey.
This seminar proposes an in-depth exploration of Homer's Odyssey. One of the monumental epics of ancient Greek and a foundational text of world-literature, the Odyssey examines, through one man's quest to make his way home, profound questions concerning the nature of identity, the meaning of suffering, the importance of sharing stories, and the strange allure of poetry itself. We will study Books 1-12 of the poem in the original Greek in order to gain advanced understanding of its language and style. Emphasis will also be placed on the study of commentaries and scholarship in order to enhance our understanding of the poem's themes, the transmission of the text, and the historical, literary and social contexts in which-and in response to which-it grew.

AS.040.605. Orality and Writing in the Literary Culture of the Early Roman Empire.
This graduate seminar focuses on the oral practices that constitute "literary culture" in Rome in the first and second centuries CE: declamation, recitation, disputation emerging from reading, and the relationship of these practices to both literary "publication" and to arenas of traditional oratory such as the courts and the Senate. Weekly assignments will include substantial readings in Latin.

AS.040.608. Neo-Latin.
This seminar will introduce participants to the reading, editing, translation, and interpretation of humanist Latin, with training in the ancillary skills of paleography, codicology, and textual criticism.

AS.040.610. Biography and the Hero.
This graduate seminar will involve a close reading and study Plutarch's Life of Romulus, particularly in relation to the paired Life of Theseus. We will examine Plutarch's frameworks and principles for "life writing" in general, as well as his understanding and application of the traditional concepts of the Greek "hero" and Roman exemplum, to shed light on his poetics in this mythistorical "biography."

AS.040.611. Labor in Latin Literature.
This graduate seminar examines work and labor in Latin literature, beginning with a close reading of Vergil's Georgics in Latin. We will pay particular attention to the female, enslaved, and non-human labor that elite male authors silence or sublimate, as well as the interpretive and methodological challenges that arise. Students will co-design the reading list; lead discussions around texts, topics and theories relevant to their research; and workshop one abstract, one grant proposal, and one conference paper each. Reading ability in Latin is required.

AS.040.613. Things with Lives in the Ancient Mediterranean.
With a focus on material culture from the ancient Mediterranean, this seminar explores the diversity of ways in which objects may be understood to have lives or to be active elements of humans' lived experience. The seminar meets in the Archaeological Museum, where we can pair direct examination of objects with an exploration of multiple theoretical approaches and interests, such as object biography and agency, affordance theory, object-oriented ontologies, material animacies, embodiment, ecological and enactive perception, and the ongoing post-depositional existences of archaeological material. Students will eventually select an object as the focus of an individual research project.

AS.040.614. Ancient Allegorical Interpretations of Greek Literature.
We shall look at several allegorical readings offered in antiquity to interpret myths and literary works, especially, but not only, the epics of Homer.

AS.040.622. Angelo Poliziano: Renaissance Humanism and Classical Antiquity.
This course will survey works in Latin and the vernacular by the fifteenth-century Florentine humanist Angelo Poliziano, with particular attention to his correspondence, and with recourse to a variety of theoretical approaches, from classical reception theory to queer theory. Good reading ability in classical Latin is required; the same in Italian is ideal but not required.

AS.040.626. Plato and Poetry.
This graduate seminar will explore Plato's contributions to the "old quarrel" between poetry and philosophy, encompassing such topics as the relationship between poetic inspiration and human reason, the role of literature in pedagogy, and the metaphysical implications of poetic fiction. We will focus on several Greek texts from the Platonic corpus related to these themes, as well as some later sources that engage with Platonic ideas.

AS.040.637. Competition in the Early Roman Empire.
A well-documented feature of the middle to late Roman republic is the ferocious competitiveness of the aristocracy, and the governing class in particular. These people competed for prestige and glory on the battlefield, for offices and honors in government and administration, for visibility in public building, in forensic oratory in the courts, in deliberative oratory in various assemblies, and sometimes in literary production. Less well-understood is how the competitiveness of this group manifested itself in the early imperial age, as the emergence of the emperor shut down competition in some of these arenas and fundamentally changed the character of the competition in others. This seminar considers how some old arenas changed under the Imperial regime, and examines new forms that aristocratic competition assumed to make up for the arenas that had altogether disappeared.

AS.040.638. Ancient Literary Criticism.
This course covers essential Greek and Latin texts (e.g. Plato, Aristotle, Horace, Plutarch) and the commentary tradition (e.g. scholia to Homer and other important authors). Focus is on poetic texts, with some prose.

AS.040.641. Reception of the Greek Novel.
In this course, we will follow the fortunes of the Greek novels from the Byzantine period onward, focusing especially on Heliodorus' _Aethiopica_. Knowledge of Greek is highly desirable but not required.

AS.040.702. Reading Ancient Greek Poetry.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.306.

AS.040.705. Reading Ancient Greek Prose.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.305.
Recommended Course Background: AS.040.205-AS.040.206.

AS.040.707. Reading Latin Prose.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.307.

AS.040.710. Reading Latin Poetry.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.308.
Recommended Course Background: AS.040.207-AS.040.208.

AS.040.801. Independent Study.

AS.040.802. Independent Study.

AS.040.806. Master's Thesis Research.

AS.040.807. Master's Thesis Research.

AS.040.809. Exam Preparation.
Study in preparation for a comprehensive oral exam, required to become a PhD candidate, and consisting of three fields in classics and related areas.

AS.040.810. Exam Preparation.
Study in preparation for a comprehensive oral exam, required to become a PhD candidate, and consisting of three fields in classics and related areas

AS.040.814. Dissertation Research.
No Audits.

AS.040.815. Dissertation Research.
No Audits.

Cross Listed Courses

Archaeology

AS.136.101. Introduction To Archaeology. 3 Credits.
An introduction to archaeology and to archaeological method and theory, exploring how archaeologists excavate, analyze, and interpret ancient remains in order to reconstruct how ancient societies functioned. Specific examples from a variety of archaeological projects in different parts of the world will be used to illustrate techniques and principles discussed.

English

AS.060.604. Philology.
An examination of the many ways (both as old and then 'New', but also as the subject of a key 'return') that 'philology' has been claimed as the master category of literary study. The nuts and bolts of older philological procedures as well as the broadest theoretical claims for the term will be attended to.
Area: Writing Intensive

AS.060.629. The History of the Book.
The course will account for the major transformations in the media used for writing from the scroll to the web as well as the rich account of this history and its theorizations.
Area: Writing Intensive

First Year Seminars

AS.001.121. FYS: Socrates and his Intellectual Context. 2 Credits.
This First-Year Seminar will focus on the figure of Socrates. Socrates wrote nothing, so we depend on others for our knowledge of him. We will examine the ways he is portrayed by several different authors, including Plato. We will also examine some other ideas around in his time - some of which were pretty radical - and consider how he may have reacted to them. Finally, we will examine his influence on later thought.

AS.001.148. FYS: Dining and drinking in the ancient Mediterranean world. 3 Credits.

This First-Year Seminar focuses on the cultures of dining and drinking in the ancient Greek and Roman worlds, with excursions into the foodways of other ancient societies abutting the Mediterranean basin. We will investigate the social practices and values that are associated with conviviality in these societies, and how such practices and values change over time. We will consider the kinds of communities that these practices construct, and how and to what extent different kinds of people are included, excluded, or placed in a social hierarchy by their participation in these practices. Special attention will be given to feasting as represented in the Homeric poems, especially the Odyssey; to the Archaic and Classical Greek symposion; and to the Roman convivium and other dining forms extending to late Antiquity. Fueling our investigation and underpinning our discussions will be a wide variety of ancient Greek and Roman texts (to be read in English translation); images and representations of ancient dining in diverse visual media, including Greek vase painting, Roman wall painting, and mosaics; and archaeological evidence for the spaces, settings, and implements of ancient dining and drinking. Throughout, we will engage with key scholarship on aspects of this topic. The seminar includes visits to the Walters Art Museum, the Baltimore Museum of Art, and the Johns Hopkins Archaeological Museum, all of which house objects that illuminate our inquiry. It may also involve screenings of films or clips featuring modern imaginative reconstructions of ancient dining events.

AS.001.161. FYS: Books, Authenticity, and Truth. 3 Credits.

We are living through a crisis in how we take in information. Bombarded by information of all sorts coming at us on phones, tablets, and computer screens, it can be difficult to make sense of it all and harder still to determine whether something is true or false, authentic or inauthentic. The scale and speed of the change in media that we are undergoing is unprecedented in human history. Nevertheless, people in the past have faced moments of crisis – moments when writing seemed unreliable, when the format of written information changed, and when new publication formats forced reevaluations of the nature of truth. This First-Year Seminar will take us from Greco-Roman antiquity to the modern age, with stops along the way in the European Middle Ages, Renaissance, and Enlightenment. We will read selected texts that illuminate the place of writing, books, and the search for truth, think about the structure of libraries in the western Middle Ages and Renaissance, do extensive hands-on work with rare books, and visit other repositories of information, all toward the end of evaluating how the history of books and information can help us in our current quest to make sense of our world.

AS.001.179. FYS: Race Before Race - Difference and Diversity in the Ancient Mediterranean. 3 Credits.

How did the Greeks, Romans, and other ancient Mediterranean peoples understand human difference and diversity? How did they form their senses of self in relation to others and articulate kinship and commonalities across ethnic lines? Did skin color, birthplace, language, and lineage matter in constructing social hierarchies? How did their concepts of class and citizenship, beauty and belonging, differ from ours? Did they have anything akin to modern constructions of race and racism, blackness and whiteness, the 'west' and the 'rest'? If not, when and why were such ideas invented, and how was Greco-Roman culture conscripted in their support? Finally and crucially, what can we do to make "classics" today more equitable, inclusive, and accurate to the multicultural reality of the ancient Mediterranean? This First-Year Seminar examines these questions, and many more, through the literature, art, and history of ancient Greece and Rome, with forays into Egypt, Persia, Judea, and northern Europe. It will introduce you to the diversity of the ancient Mediterranean world, hone your ability to critically interpret and discuss art, literature, and scholarship, and explore how systems of categorizing human difference have historically served power. This course will give you a wider historical lens through which to understand race, racecraft, the "classics," and "Western civilization," revealing all to be dynamic and historically situated discourses that have been used to exert authority, to include or exclude, and to build communities. It will also build student community and comfort discussing sensitive subjects through a combination of field trips, guest lectures, movie nights, and communal meals.

AS.001.180. FYS: Lunar Histories. 3 Credits.

This First-Year Seminar will take us on an exploratory journey through the history of our Moon, both as a physical body in its own right and as a formative presence in the cultural imagination. As we examine theories about the Moon's nature and role in the cosmos - from antiquity to our modern period, and from science to make-believe - we will delve deep into perplexing questions such as the relationship between scientific and imaginative thought, the role played by conspiracy-theory and hoax in our society, the origins of speculation about extraterrestrial life, and what it means to map and write the history of other worlds... This seminar will include sessions of practical observation of the Moon from the JHU Observatory.

History

AS.100.416. History through Things: Objects, Circulation, and Encounters in the Medieval World. 3 Credits.

Objects from the past offer a powerful window into a set of experiences not recorded in texts. We will follow objects and things as they appear in lists, letters, and descriptions, as they travel surprising routes, and bring to life the medieval world before 1400.
Area: Writing Intensive

AS.100.672. Medieval Materialities: Objects, Ontologies, Texts and Contexts.

We will use the meanings and methodologies of "materiality" to examine the medieval world, by analyzing objects, texts, networks, patterns of circulation and appropriation, aesthetics and enshrinement, production and knowledge communities.

History of Art

AS.010.252. Sculpture and Ideology in the Middle Ages. 3 Credits.
This lecture course will offer a selective, thematic exploration of the art of sculpture as practiced in the Middle Ages, from the fall of the Roman empire in the 4th century CE to height of the Gothic era. The primary concern will be to analyze sculpture in all of its forms – monumental free-standing, architectural, liturgical, and commemorative – as the primary medium utilized by patrons, both private and corporate, to display political messages to an ever growing public.

AS.010.309. The Idea of Athens. 3 Credits.
This thematic course will explore the art, architecture, material culture, and textual evidence from the ancient city of Athens, the many cultures and social positions that made up the ancient city, and the idea of the city as something far beyond its reality. We will take a number of field trips to museums in the area and some of your assignments will be based in local museums.

AS.010.431. Obsessed with the Past: the Art and Architecture of Medieval Rome. 3 Credits.
In antiquity, Rome became the capital of an empire, its growing status reflected in its sophisticated urban planning, its architecture, and the arts. While an abundance of studies explores the revival of this glorious past in the Renaissance, this seminar discusses various ways of the reception of antiquity during the medieval period. We address the practice of using "spolia" in medieval architecture, the appropriation of ancient pagan buildings for the performance of Christian cult practices, the continuation of making (cult)images and their veneration, the meaning and specific visuality of Latin script (paleography and epigraphy) in later medieval art. We discuss the revival and systematic study of ancient knowledge (f. ex. medicine, astronomy, and the liberal arts), in complex allegorical murals. As we aim to reconstruct the art and architecture of medieval Rome, this course discusses ideas and concepts behind different forms of re-building and picturing the past, as they intersect with the self-referential character of a city that is obsessed with its own history.
Area: Writing Intensive

AS.010.606. Approaches to Ancient Art.
The discipline of art history has passed through a number of major methodological and theoretical shifts since its inception (and in particular, over the last thirty years). Foundational disciplinary methods derive principally from the arts of Classical Greece, the Renaissance and contemporary periods. As the discipline embraces an enlarged field of inquiry, particularly drawing upon developments in anthropology, material culture studies, feminism, queer theory, and political theory, additional avenues for understanding the arts of the ancient world are emerging. The seminar focuses on how art historical method and theory – both foundational and emergent – might be profitably applied to the subfields of the ancient Near East and eastern Mediterranean (understood in the broadest sense).
Area: Writing Intensive

AS.010.625. Art and Interaction in the Bronze Age Eastern Mediterranean.
The arts of the Near East, Aegean and Egypt are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. During the Bronze Age (3000 to 1200 BCE), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Near Easterners, Greeks, Egyptians and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war and imperialism.Students are not expected to have extensive knowledge of all the areas, although some experience in at least one of them will be helpful. The course will interweave establishing a knowledge base necessary to tackle this topic with broader conceptual concerns and interdisciplinary approaches (art historical, archaeological, anthropological, and historical).There will be a final paper.

AS.010.660. The Hegemony of Bodies.
Bodies—material, artistic, political, cartographic—and their breakdown, form the focus of this seminar. Situating this inquiry in the ancient Mediterranean, we will analyze the human body as an organizing term, giving rise to a robust set of practices and performances. We will consider the conception of atoms as bodies in motion, the role of direct democracy and assembly as they intersect with artistic practices of both figuration and other non-figural corpora, and the emerging body of medical knowledge that would eventually be gathered under the Hippocratic corpus. The Mediterranean sea itself as it connects with other bodies of water and forged connections between different land bodies will also be among the topics we explore. While organized around the ancient Mediterranean and its afterlives, students from all formations are very welcome.

Interdepartmental

AS.360.133. Freshman Seminar: Great Books at Hopkins. 3 Credits.
Students attend lectures by an interdepartmental group of Hopkins faculty and meet for discussion in smaller seminar groups; each of these seminars is led by one of the course faculty. In lectures, panels, multimedia presentations, and curatorial sessions among the University's rare book holdings, we will explore some of the greatest works of the literary and philosophical traditions in Europe and the Americas. Close reading and intensive writing instruction are hallmarks of this course; authors for Fall 2020 include Homer, Plato, Dante, John Donne, George Herbert, Christina Rosetti, Mary Shelley, Friederick Nietzsche, Isaac Bashevis Singer, Frederick Douglass.
Area: Writing Intensive

Medicine, Science and the Humanities

AS.145.101. Death and Dying in Art, Literature, and Philosophy: Introduction to Medical Humanities. 3 Credits.

In this course, four essential aspects of the theme of death and dying will be examined: Death and Medicine; Emotional Responses to Death; Burying and Commemorating the Dead; and Conceptions of Death. Specific topics relating to each of these aspects that will be covered include illness and causes of death; prevention of death; suicide; death and grief; burial practices; mourning the dead; public commemoration of the dead; life after death; and death and rebirth. Students will explore these topics from a historical-anthropological perspective with Paul Delnero, a specialist in the history and culture of the ancient Near East (Near Eastern Studies); from a literary perspective, by reading and writing poetry relating to these subjects with the acclaimed poet James Arthur (Writing Seminars); and from a musical perspective, through direct encounters with the music and creative process of the award-winning composer, Michael Hersch (Peabody).
Area: Writing Intensive

Modern Languages and Literatures

AS.211.374. Gendered Voices. 3 Credits.

The course will explore the notion of 'voice' in order to show how poetry, literature, philosophy, and music have been dealing with it throughout the ages. In particular, by focusing on classical figures such as the Sirens, Circe and Echo, as well as by considering the seminal discussions of the 'voice' in Plato and Aristotle, the course will address the gendered nature of the voice as a tool to seduce and manipulate the human mind. More specifically, the course will discuss the ways in which male, female, queer, gendered and un-gendered voices embody different functions. Course materials include classical, medieval and early modern sources as well as later rewritings of myths concerned with the voice by authors such as Jules Verne, Karen Blixen, Giuseppe Tomasi di Lampedusa, and Italo Calvino. A selection of theoretical works (e.g. Cavarero, Silverman, Dollar, Butler) will also be discussed. The course is taught in English and all materials will be available in English translation; Italian majors and minors should enroll in section 2.
Area: Writing Intensive

AS.211.477. Renaissance Witches and Demonology. 3 Credits.

Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did "The Witch" go from being "monstrous" to being "admirable" and even "sexy"? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.211.606. Literature and Truth: Forgery and Fakes.

Forgery is an eternal problem. It is a literary tradition in its own right, with connections to politics, Classics, religion, philosophy, and literary theory. Spurious writings impinge on social and political realities to a degree rarely confronted by criticism. This course offers a reading of the sort traditionally reserved for canonical works of poetry and prose fiction, spotlighting forgery's imaginative vitality and its sinister impact on scholarship. Students will study manuscripts and incunabula drawn from JHU's Bibliotheca Fictiva, the world's premier collection of literary forgeries.
Area: Writing Intensive
Students cannot have taken AS.214.606.

AS.211.714. Ariadne's Threads: Metamorphosing Mythologies.

Abandoned by Theseus, Ariadne lamenting on the shore of Naxos embodies one of the most powerful tropes in literature and the arts. The fate of the heroine who helped Theseus out of the labyrinth became herself a thread (indeed, an inexhaustible series of threads) running across the ages and populating the imagination of poets, painters, composers. After exploring in detail the classical sources that canonized Ariadne's myth (Catullus, Carmina, 64; Ovid, Heroides, 10) as well as references to the myth found in other classical authors (Homer, Hesiod, Pausanias, Plutarch, Propertius), we will turn to the reception of Ariadne in literature and music (Ariosto, Rinuccini-Monteverdi, Haydn, Nietzsche, Strauss-Von Hofmannsthal). The analysis of the various case studies will focus on the rhetorical and poetical devices used by poets and composers to reenact the vocal features of Ariadne's lament.

AS.211.753. The Renaissance Comic Romance.

In the fifteenth and sixteenth centuries, Italian and French humanists transformed the medieval adventure stories of Charlemagne's and Arthur's knights. The course concentrates on Luigi Pulci's earthy, bourgeois Morgante, Teofilo Folengo's Macaronic (Latin/Italian dialect) Baldus, and Rabelais's encyclopedic Gargantua and Pantagruel, combining close analysis of their linguistic and narrative fabric with examples of their influence on later comic narrative masterpieces.
Area: Writing Intensive

Near Eastern Studies

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.

How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.133.304. Let's Play! Games from Ancient Egypt and Beyond. 3 Credits.

The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.616. Let's Play! Games from Ancient Egypt and Beyond.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

Philosophy

AS.150.201. Introduction To Greek Philosophy. 3 Credits.
A survey of the earlier phase of Greek philosophy. Socrates, Plato, and Aristotle will be discussed, as well as two groups of thinkers who preceded them, usually known as the pre-Socratics and the Sophists.

AS.150.401. Greek Philosophy: Plato and His Predecessors. 3 Credits.
A study of pre-Socratic philosophers, especially those to whom Plato reacted; also an examination of major dialogues of Plato with emphasis upon his principal theses and characteristic methods. Cross-listed with Classics.
Area: Writing Intensive

AS.150.402. Aristotle. 3 Credits.
A study of major selected texts of Aristotle.
Area: Writing Intensive

AS.150.403. Hellenistic Philosophy. 3 Credits.
A study of later Greek philosophy, stretching roughly from the death of Aristotle to the Roman imperial period. Epicureans, Stoics, and Skeptics will be the main philosophical schools examined.
Area: Writing Intensive

AS.150.406. Tragedy and Living Well. 3 Credits.
This course revisits the idea of tragedy as represented in Ancient Greek thought for the purpose of approaching questions of flourishing and ethical living from a different angle.
Area: Writing Intensive

Program in Museums and Society

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

For current faculty and contact information go to http://classics.jhu.edu/people/

Classics, Bachelor of Arts

https://classics.jhu.edu/

Classics Major Requirements

(See also Requirements for a Bachelor's Degree (p. 1587).)

The department offers undergraduate courses in Greek and Latin languages and literature, ancient history, classical art and archaeology, Greek and Roman civilizations, history of sexuality and gender, ancient philosophy, mythology, and classical reception. These courses are open to all students in the university, regardless of their academic year or major field of interest.

The B.A. program in classics is highly flexible, accommodating a variety of interests in and approaches to the ancient world. Possible areas of emphasis include language and literature, ancient philosophy, art and archaeology, and ancient history. With assistance from their faculty advisors, students are required to build an intellectually substantial and coherent curriculum.

Students must take all courses for a letter grade and earn a C or better in major requirements. Students are strongly encouraged to complete a course in ancient Greek civilization (usually AS.040.111 Ancient Greek Civilization) and a course in Roman civilization (usually AS.040.103 The Roman Empire or AS.040.104 The Roman Republic: History, Culture, and Afterlife). Certain courses taken in other departments may count toward the major, if cross-listed, or with the approval of the Director of Undergraduate Studies (DUS). Advanced undergraduates may participate in graduate seminars, with the approval of the DUS and the professor.

The requirements for the Classics major are:

Code	Title	Credits
Greek or Latin Language Courses		
Six Greek or Latin language courses (with at least two courses in each language)		18
Classics Electives		
Six courses offered through the Classics Department or cross-listed in Classics		18
Total Credits		**36**

A student with prior Latin or Greek proficiency may enroll directly in an intermediate or advanced level course, and the prerequisite lower-level courses may be waived, provided that this enrollment is first approved by the Director of Undergraduate Studies, Department Chair, or the faculty member overseeing the course in which the student wishes to enroll. The student must still take six Greek and/or Latin courses in the department, according to the requirements given above, but a maximum of two waived courses may be counted toward the six further "Classics electives" required by the major, making it possible for students with experience in Latin or Greek to meet the program requirements more quickly.

Sample Program of Study

This sample program assumes no previous language experience; students who know some Latin and/or Greek may begin at a higher level with faculty approval.

Many Classics majors study abroad during the junior year; for these students, the four-year plan may vary in shape depending on the courses offered by the study abroad program chosen. Students intending to pursue graduate study in classics will need to do more work in Greek and Latin language than the major minimally requires: most graduate programs expect successful applicants to have studied one language for at least three years and the other for at least two. Therefore, students interested in graduate work should be engaged in a language-intensive curriculum by the end of the sophomore year.

Course	Title	Credits
First Year		
First Semester		
AS.040.107	Elementary Latin [1]	3
AS.040.103 or AS.040.104	The Roman Empire (Classics elective #1) or The Roman Republic: History, Culture, and Afterlife	3
	Credits	**6**
Second Semester		
AS.040.108	Elementary Latin [1]	3
Classics elective #2		3
	Credits	**6**
Second Year		
First Semester		
AS.040.207	Intermediate Latin [1]	3
AS.040.111	Ancient Greek Civilization (Classics elective #3)	3
	Credits	**6**
Second Semester		
AS.040.208	Intermediate Latin [1]	3
	Credits	**3**
Third Year		
First Semester		
AS.040.105	Elementary Ancient Greek	4
Classics elective #4		3
See below regarding study abroad during the junior year [2]		
	Credits	**7**
Second Semester		
AS.040.106	Elementary Ancient Greek	4
	Credits	**4**
Fourth Year		
First Semester		
Classics elective #5		3
	Credits	**3**
Second Semester		
Classics elective #6		3
	Credits	**3**
	Total Credits	**38**

1. Greek courses may be substituted for Latin courses, and vice versa, according to the interests and goals of the student. This sample program assumes no previous language experience; students who know some Latin and/or Greek may begin at a higher level with faculty approval.
2. Many Classics majors study abroad during the junior year; for these students, the four-year plan may vary in shape depending on the courses offered by the study abroad program chosen.

Honors in Classics

Classics majors have the opportunity to graduate with honors by writing an honors thesis (15,000-20,000 words) in close consultation with a faculty member. Three credits of "honors thesis research" are awarded in the spring semester of the senior year. (These credits may not be used to fulfill the basic requirements for the Classics BA, which must be met independently of any honors thesis work.)

Entrance to the Classics Honors program is contingent on outstanding performance in previous Classics courses. Students wishing to pursue an honors thesis are expected to consult with the Director of Undergraduate Studies by March 15 of the junior year to allow for adequate advising, planning, and identification of an appropriate honors thesis advisor.

A typical timeline for honors thesis research is as follows: research begins in the summer before the senior year (or earlier); further research and writing continues through the fall, with a draft of the thesis submitted early in the spring semester and a final version submitted in April.

The Evangelia Davos Prize

The Classics Department awards the Evangelia Davos Prize each year to the classics major or minor whose work in Greek studies is outstanding.

Study Abroad

The Department of Classics is a member of the Intercollegiate Center for Classical Studies in Rome and can provide information on other year-long, semester-long, or summer programs in Greece and Italy (e.g., the College Year in Athens and the summer session of the American School of Classical Studies at Athens). Interested students, especially classics majors and minors, are encouraged to consider these options for studying overseas.

BA/MA Program

The department offers a master's degree for current Hopkins undergraduate students. Admission to the BA/MA program is restricted to current Johns Hopkins University undergraduate classics majors and is based on outstanding performance in previous classics courses. See the program page for more information.

Classics, Bachelor of Arts/Master of Arts

https://classics.jhu.edu/

The department offers a master's degree for current Hopkins undergraduate students. Admission to the BA/MA program is restricted to current Johns Hopkins University undergraduate classics majors and is based on outstanding performance in previous classics courses.

Admission Requirements

Admission to the B.A./M.A. program is restricted to current Johns Hopkins University undergraduate Classics majors and is based on outstanding performance in previous Classics courses.

The BA/MA program in Classics enables students to graduate with both degrees at the end of five years of study. Students interested in pursuing the BA/MA program are expected to declare their interest during the spring semester of their junior year. Prior to application, students must consult with the Director of Undergraduate Studies, their faculty adviser, and the department administrator. A formal graduate application must be submitted no later than November 15 of the fall semester of the senior year in order for admission to the program in the spring of the senior year, thus meeting the requirement for concurrent status. In the senior (fourth) year, students are to devise a program of study that would best prepare them to do advanced work in their final (fifth) year, in particular addressing any weakness in one or the other classical language. All requirements for the B.A. must be completed by the end of the fourth year.

Program Requirements

In the MA (fifth) year, students must complete the following:

Code	Title	Credits
Two graduate seminars in the Classics Department		6
Four semesters (12 credits) of Latin and/or Greek, at least six credits of which must be at the advanced level		12
A thesis of 20,000 to 25,000 words representing original research. The thesis will be supervised by a member of the Classics Department faculty and graded by the supervisor and a second reader from Classics or an outside department.		

Highly qualified students who expect to complete requirements for the Classics major in their junior year may be eligible to pursue and complete the combined BA/MA degree in their fourth year of study. Please contact the Director of Undergraduate Studies for further information on this option.

The B.A. and M.A. degrees are conferred concurrently at the end of the M.A. year. Please note that the department does not award degrees during the summer; students are expected to complete the degree requirements in conformance with the university Graduate Board spring deadlines. Specific departmental and Graduate Board deadlines are communicated to the student in due course.

Classics, Minor

https://classics.jhu.edu/

Classics Minor Requirements

The requirements for the minor in classics are extremely flexible. Courses are selected, in consultation with the Director of Undergraduate Studies, to meet the needs and interests of the student. Minors may wish to pursue the study of one ancient language, or create a curriculum that meshes with their other academic pursuits. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. All courses must be taken for letter grades and receive a grade of C or higher.

Code	Title	Credits
Classics Courses		
6 courses offered through the Classics Department or cross-listed in Classics *		18

* Each course must be at least 3 credits.

Classics, PhD

https://classics.jhu.edu/

Admission Requirements

Application information may be obtained from the Graduate Admissions website or by contacting the department chair,

Department of Classics
Johns Hopkins University
113 Gilman Hall
3400 North Charles Street
Baltimore, MD 21218
Telephone: 410-516-7556
Fax: 410-516-4848
email: classics@jhu.edu

The application deadline is on or about January 15. For the precise date, please refer to the Graduate Admissions website (http://grad.jhu.edu).

Program Requirements

To receive a Ph.D. in Classics at Johns Hopkins University, students must successfully complete a range of seminar work and examinations and then write a substantial dissertation. This program in Classics is designed to be completed in five years, of which the first three are dedicated to seminar work and examinations, and the last two to the dissertation. Assuming satisfactory progress toward the Ph.D., all students admitted to the program receive competitive stipend support, health insurance and full tuition remission, in order to make it possible to complete the program in a timely manner. This support takes the form of a fellowship for the first two years, and teaching for at least two of the remaining years. The department may also able to offer teaching opportunities in the summer, as well as support for summer travel geared toward research or professional development. All students, upon reaching dissertation level, are encouraged to apply for outside funding. If outside funding is obtained, the Johns Hopkins fellowship may be held in reserve for an additional year. A detailed outline of the Ph.D. program, including a prospectus of all seminars and exams, can be found on the Classics Department website (http://classics.jhu.edu).

Cognitive Science

http://www.cogsci.jhu.edu

Cognitive science is the study of the human mind and brain, focusing on how the mind represents and manipulates knowledge and how mental representations and processes are realized in the brain. Conceiving of the mind as an abstract computing device instantiated in the brain, cognitive scientists endeavor to understand the mental computations underlying cognitive functioning and how these computations are implemented by neural tissue. Cognitive science has emerged at the interface of several disciplines. Central among these are cognitive psychology, linguistics, and portions of computer science and artificial intelligence; other important components derive from work in the neurosciences, philosophy, and anthropology. This diverse ancestry has brought into cognitive science several different perspectives and methodologies. Cognitive scientists endeavor to unite such varieties of perspectives around the central goal of characterizing the structure of human intellectual functioning. It is this common object of inquiry that integrates traditionally separate disciplines into the unified field of cognitive science.

Programs in cognitive science at Johns Hopkins University reflect the interdisciplinary nature of the subject, requiring the student to approach the study of the mind/brain from several different investigative perspectives. Programs in cognitive science draw on courses offered by several other departments as well.

Facilities

The department is located in Krieger Hall. Laboratory and office space is provided for graduate students. The department's research facilities are provided by the following laboratories:

- Cognitive and Brain Sciences Lab (Rapp)
- Cognitive Neuroscience Lab (McCloskey)
- Cognitive Neuroscience and Machine Learning Lab (Bonner)
- Computational Cognitive Neuroscience (Isik)
- Computational Linguistics Lab (Smolensky)
- Language Acquisition Lab (Legendre)
- Language and Cognition Lab (Landau)
- Phonetics/Phonology Lab (Wilson)
- Semantics Lab (Rawlins)
- Integrated Experimental/Theoretical Grammar Research (IGERT) Lab and Library

Department members also conduct research in the F.M. Kirby Center for Functional Brain Imaging at the Kennedy Krieger Institute and in other laboratories at Johns Hopkins School of Medicine.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.050.102. Language and Mind. 3 Credits.
Introductory course dealing with theory, methods, and current research topics in the study of language as a component of the mind. What it is to "know" a language: components of linguistic knowledge (phonetics, phonology, morphology, syntax, semantics) and the course of language acquisition. How linguistic knowledge is put to use: language and the brain and linguistic processing in various domains.

AS.050.105. Introduction to Cognitive Neuropsychology. 3 Credits.
When the brain is damaged or fails to develop normally, even the most basic cognitive abilities (such as the ability to understand words, or perceive objects) may be disrupted, often in remarkable ways. This course explores a wide range of cognitive deficits, focusing on what these deficits can tell us about how the normal brain works. Topics include brain anatomy and causes of brain damage, reading and spelling deficits, unilateral spatial neglect, hemispheric disconnection, cortical plasticity, and visual perception of location and orientation. Students read primary sources: journal articles that report deficits and discuss their implications.

AS.050.116. Visual Cognition. 3 Credits.
How do humans make sense of the visual world around them? This course will provide an introductory survey of current research, methods, and theories in visual cognition. We will draw upon topics in cognitive psychology, cognitive neuroscience, cognitive neuropsychology, and artificial intelligence.

AS.050.135. Speech & Voice. 3 Credits.
Course on human speech production and perception, covering topics including anatomy and physiology of the vocal tract, phonetic analysis, language acquisition and impairments, and speech technologies.

AS.050.202. Introduction to Computational Cognitive Science. 3 Credits.
How does the mind work? Cognitive science addresses this question from a multidiscliplinary perspective, drawing upon methods and ideas from psychology, neurophysiology, neuroscience, philosophy, linguistics, and computer science. Within this framework, computational cognitive science has two related goals. The first is to create computational models of human cognition, computer programs that simulate certain aspects of the mind. The second is to understand how to produce intelligent behavior in machines, taking cues from humans. The computational frameworks we will discuss include symbolic structured representations, probabilistic inference and artificial neural networks, as applied to concept learning, language and vision. While this class does not have formal prerequisites, some programming experience (e.g., AS 250.205 Introduction to Computing or equivalent) and mathematical preparation (e.g., AS.110.107 Calculus II or equivalent) are essential.An optional, hands-on lab (AS.050.212) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.

AS.050.203. Neuroscience: Cognitive. 3 Credits.
This course surveys theory and research concerning how mental processes are carried out by the human brain. Currently a wide range of methods of probing the functioning brain are yielding insights into the nature of the relation between mental and neural events. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Methods surveyed include electrophysiological recording techniques such as EEG, ERP, single/multiple unit recording and MEG; functional imaging techniques such as PET and fMRI; and methods that involve lesioning or disrupting neural activity such as cortical stimulation, animal lesion studies, and the study of brain-damaged individuals.It's strongly recommended that students have background in one of the following courses: AS.050.101 OR AS.050.105 OR AS.200.141.

AS.050.206. Bilingualism. 3 Credits.
Do children get confused when they grow up exposed to more than one language? Is it possible to forget one's native language? Are the first and second language processed in different areas of the brain? How does brain damage impact the different languages of a polyglot? Does knowing a second language affect non-linguistic cognitive processing? This course will address questions such as these through an exploration of mental and neural processes underlying bilingual and multilingual language processing. Also offered as AS.050.606.

AS.050.212. Introduction to Computational Cognitive Science Lab. 0.5 Credits.
This course is a hands-on lab supplement for Introduction to Computational Cognitive Science. While this lab is optional, it is highly recommended to students with less extensive computational and mathematical experience.
Prerequisite(s): Must be registered for AS.050.202 in order to register for this optional lab.

AS.050.233. Lost in Space: How Humans Learn, Think, and Talk About the World Around Us. 3 Credits.
The ability to perceive, navigate, and explain space around us is essential in our everyday life: every day humans find their favorite coffee mug, make their way to work, hang their coat, and give directions to dinner guests with relative ease. How is this assorted set of tasks accomplished? How does the human mind structure the space around us and recognize the spatial relations between various objects? What happens when this ability is impaired? This course will attempt to answer these questions by sampling key concepts, theories, and experimental findings from a diverse set of disciplines, including neuroscience, psychology, and linguistics. We will get an overview of spatial cognition from multiple perspectives and draw analogies between different research paradigms.

AS.050.236. Neurolinguistics. 3 Credits.
This course provides an introductory survey of the cognitive neuroscience of language – a multidisciplinary field in the intersection of Linguistics, Psycholinguistics, and Neuroscience. We will explore current research on the neural bases of the perception, production, and acquisition or human language in neuro-typical and impaired individuals.

AS.050.311. Written Language: Normal Processing and Disorders. 3 Credits.
This course surveys both the historical development of written language as well as current cognitive theories that account for the manner in which the written language is represented and processed by readers/writers of a language. Issues regarding the relationship between the written and spoken language, the neural bases of written language, the acquisition of written language skills, as well as acquired and developmental disorders of reading and writing will be examined.
Area: Writing Intensive
AS.050.102 OR AS.050.105 OR AS.050.203 OR AS.080.203

AS.050.315. Cognitive Neuropsychology of Visual Perception: The Malfunctioning Visual Brain. 3 Credits.
When we think about our ability to see, we tend to think about our eyes, but in fact vision happens mostly in the brain. This course explores the remarkable perceptual deficits that occur when the visual regions of the brain are damaged or fail to develop normally, focusing on what these perceptual malfunctions tell us about normal visual perception. Topics include visual system anatomy and physiology; functional specialization in the lower visual system as revealed by cerebral achromatopsia (color blindness resulting from brain damage) and akinetopsia (impaired motion perception); cortical plasticity in the visual system; spatial deficits in perception and action; and the implications of high-level visual deficits, including prosopagnosia (impaired face recognition), Charles Bonnet syndrome (complex visual hallucinations in blind areas of the visual field), blindsight (accurate responding to visual stimuli despite apparent inability to see them), and aphantasia (lack of visual imagery).
AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.101 OR AS.200.110 OR AS.200.211 or instructor's permission.

AS.050.317. Semantics I. 3 Credits.
This is an introduction to the study of meaning in natural language. We address the conceptual and empirical issues in semantic theory and introduce some formal machinery that has been developed to deal with such problems. After discussing foundational questions, we turn to formal semantics and pragmatics, as well as their interfaces with syntax and the lexicon. Specific topics include presupposition, type-driven composition, quantification, lexical aspect, argument structure, and lexical representations of meaning.
AS.050.107 OR AS.050.102 or AS.050.240 or instructor's permission.

AS.050.320. Syntax I. 3 Credits.
Introduces the basic methods and means of analysis used in contemporary syntax investigations, practicing with data from different languages. Also offered as AS.050.620.
AS.050.102 OR AS.050.240 or equivalent/see instructor.

AS.050.325. Phonology I. 3 Credits.
An introduction to the basic principles underlying the mental representation and manipulation of language sounds and their relation to human perception and vocal articulation: how units of sound are both decomposable into elementary features and combined to form larger structures like syllables and words. The role of rules and constraints in a formal theory of phonological competence and in accounting for the range of variation among the world's languages. Also offered as AS.050.625.

AS.050.326. Foundations of Cognitive Science. 3 Credits.
This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion. Also offered as AS.050.626.
Area: Writing Intensive

AS.050.332. Developmental Cognitive Neuroscience. 3 Credits.
In-depth examination of the current literature on cognitive development in the context of developmental cognitive neuroscience. Please see course prerequisites. Meets with AS.050.632.
AS.050.101 OR AS.050.339 OR AS.200.132 OR AS.050.105 OR Instructor's Permission.

AS.050.333. Psycholinguistics. 3 Credits.
This course provides a broad survey of current research on language processing in adult native speakers and language learners. Topics include speech perception, word recognition, and sentence production and comprehension. We will discuss the nature of representations that are being constructed in real-time language use, as well as how the mental procedures for constructing linguistic representations could be studied by various behavioral and physiological measures. Also offered as AS.050.633.
AS.050.102 OR AS.050.240 OR AS.050.317 OR AS.050.320 OR AS.050.325 or instructor's permission.

AS.050.339. Cognitive Development. 3 Credits.
This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.348. First Language Acquisition. 3 Credits.
This course provides an introduction to the fields of first and second language acquisition by looking at questions such as the following: Can the grammar of a native language be learned solely on the basis of noticing statistical correlations among words? How does native language acquisition explain — or is explained by — the universal properties, shared by all languages, of words and grammars? How does being exposed to multiple languages from birth affect language acquisition and what happens when a child is not exposed to any language early in life? Does the same cognitive mechanism guide language learning in children and adults? What factors account for individual differences in ease and ultimate attainment when a second language is learned later in life? Is it possible to become indistinguishable from a native speaker in a foreign language? What changes take place in the brain when a new language is learned? Also offered as AS.050.648.
(AS.050.240 OR AS.050.320 OR AS.050.325) AND (AS.050.102 OR AS.050.206)

AS.050.349. Second Language Acquisition. 3 Credits.
First language acquisition is natural and seemingly effortless. The situation is reversed when one tries to learn another language. This course discusses in what ways first and second language acquisition (SLA) differ and how individual differences of the learners as well as external factors contribute to the variability observed in rates and ultimate proficiency of second language learning in children and adults. We will discuss such topics as Universal Grammar access in early and late SLA, first language influence, critical periods, possibility of native-like attainment, and language attrition.
(AS.050.240 OR AS.050.320 OR AS.050.325) AND (AS.050.348 OR AS.050.102 OR AS.050.206)

AS.050.352. Applying Cognitive Neuroscience to Artificial Intelligence Part I. 3 Credits.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidly improving for well-defined tasks and narrow intelligence. Moreover, it has entered all industries in a myriad of ways. But will AI ever have human-like general intelligence? What does humanlike general intelligence even mean? Why should we even care? This course is designed to answer these complex questions by giving students working knowledge of the underlying principles and mechanisms of human behavior and cognition, and how they may be applied to solving current and rising industry challenges. Key topics to be addressed will include vision, audition, language, learning, emotion and social cognition, creativity, and consciousness. Each topic addressed will cover latest advancements within cognitive neuroscience, with relevant applied case studies. Students will apply learned topics to a final group research project on the topic of their choice.

AS.050.353. Applying Cognitive Neuroscience to Artificial Intelligence Part II. 3 Credits.
As a myriad of artificial intelligence enabled autonomous systems enter into our lives and change how we live, we must ask: can we trust these systems? In this course we will take a human-centered perspective on assured autonomy and identify why and how insights from human perception and cognition can guide solutions for reliable, resilient, and robust autonomous systems. We will address bias, ethics, explanability, and safety by focusing on specific case studies from autonomous vehicles, cybersecurity, healthcare, fashion, law enforcement, and military systems. Students will apply learned material to a semester-long group research project on a topic of their choice.

AS.050.358. Language & Thought. 3 Credits.
Have you ever wondered about the relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too and this course will survey the current thinking on this matter. Classical papers such as those by Whorf and Sapir, more recent philosophical papers by people such as Fodor and Dennett, and recent empirical work by linguists and psycholingists on the relationship between language and thinking in development and in adults will be covered. Discussions will focus on the theoretically possible relationships between language and thought and the empirical data that speak to these. Juniors and seniors only. Freshmen and sophomores by permission of instructor only.
AS.050.102 OR AS.050.320 OR AS.050.325 or instructor permission.

AS.050.360. Computational Psycholinguistics. 3 Credits.
How do we understand and produce sentences in a language we speak? How do we acquire the knowledge that underlies this ability? Computational psycholinguistics seeks to address these questions using a combination of two approaches: computational models, which aim to replicate the processes that take place in the human mind; and human experiments, which are designed to test those models. The perspective we will take in this class is that the models and experimental paradigms do not only advance our understanding of the cognitive science, but can also help us advance artificial intelligence and language technologies. While computational psycholinguistics spans all levels of linguistic structure, from speech to discourse, our focus in this class will be at the level of the sentence (syntax and semantics). The course will assume familiarity with programming and computational modeling frameworks in cognitive science, as covered by Introduction to Computational Cognitive Science or equivalent. Also offered as AS.050.660.An optional, hands-on lab (AS.050.361) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.
(AS.050.102 OR AS.050.240 OR AS.050.317 OR AS.050.320) AND (AS.050.202 OR EN.601.465) or Instructor Permission.

AS.050.361. Computational Psycholinguistics Lab. 0.5 Credits.
This course is an optional hands-on lab supplement for Computational Psycholinguistics. While this lab is optional, it is highly recommended to students with less extensive computational and mathematical experience.
Prerequisite(s): Must be registered for AS.050.360 or AS.050.660 in order to register for this optional lab.

AS.050.365. Cracking the code: Theory and modeling of information coding in neural activity. 3 Credits.
One of the most foundational concepts in neuroscience is the idea that neural activity encodes information about an animal's sensory environment and internal mental states. This idea is closely connected to the concept of mental representation in cognitive science and philosophy, whereby the mind is proposed to contain internal symbols that represent things in the external world. There have been many fascinating discoveries about how neural signals encode information, but we are still far from a comprehensive theory of neural representation. Recent major developments in neuroscience and machine learning have opened up a new world of possibilities for investigating the underlying principles of information coding in the brains of humans and other animals.
In this course, we will discuss primary research articles on neural representation and information processing, and students will implement computational analyses that address issues in these domains. We will mostly focus on vision as a system that illustrates broader principles of information processing in the human brain. The reading material will include work from philosophy, neuroimaging, electrophysiology, and computational modeling. The topics covered include mental and neural representation, neural tuning, population coding, information theory, encoding and decoding models, dimensionality reduction, computational models, deep learning, and other applications of machine learning in neuroscience. Enrollment is limited to Juniors and Seniors. While this class does not have formal prerequisites, programming experience (e.g., AS 250.205 Introduction to Computing) and mathematical preparation (e.g., AS.110.107 Calculus II) are essential. It is also highly recommended that students have previously taken introductory courses in cognitive or systems neuroscience (e.g., AS.050.203 Neuroscience: Cognitive) and machine learning or neural network modeling (e.g., AS.050.372 Foundations of Neural Network Theory).

AS.050.370. Mathematical Models of Language. 3 Credits.
This course will be devoted to the study of formal systems that have proven useful in the cognitive science of language. We will discuss a wide range of mathematical structures and techniques and demonstrate their applications in theories of grammatical competence and performance. A major goal of this course is bringing students to a point where they can evaluate the strengths and weaknesses of existing formal theories of cognitive capacities, as well as profitably engage in such formalization, constructing precise and coherent definitions and rigorous proofs. Also offered as AS.050.670.
AS.050.102 OR AS.050.202

AS.050.371. Bayesian Inference. 3 Credits.
This course introduces techniques for computational modeling of aspects of human cognition, including perception, categorization, and induction. Possible topics include maximum likelihood and Bayesian inference, structured statistical models (including hierarchical and graphical models), nonparametric models. The course emphasizes the close connections among data analysis, theory development, and modeling, with examples drawn from language and vision. Also offered as AS.050.671.

AS.050.372. Foundations of Neural Network Theory. 4 Credits.
Introduction to continuous mathematics for cognitive science, with applications to biological and cognitive network models: real and complex numbers, differential and integral multi-variable calculus, linear algebra, dynamical systems, numerical optimization. Recommended course background in Calculus I. This is a basic-level course not appropriate for students with significant math background. tudents who have completed both Calc III (AS.110.202 or AS.110.211) and Linear Algebra (AS.110.201 or AS.110.212 or EN.553.291) or an equivalent combination may not register. Also offered as AS.050.672.
Students who have completed both (AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.553.291) or an equivalent combination may not register.

AS.050.375. Probabilistic Models of the Visual Cortex. 3 Credits.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modeling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Required Background: Calculus I and experience in a programming language (Python preferred).
AS.110.106 OR AS.110.108

AS.050.383. Computational Social Cognition. 3 Credits.
Humans are a fundamentally social species with amazing capabilities beyond that of any other biological or artificial system. Yet the cognitive and neural computations underlying our vast social abilities are largely unknown. Advances in naturalistic neuroscience paradigms and machine learning are revolutionizing the way cognitive scientists study social cognition. This course will explore new research in computational social cognition, drawing from topics in cognitive neuroscience, development, and artificial intelligence. Our goal is to understand the motivation, methodology and implications of recent research. The class will be heavily focused on social vision, but will also explore other aspects of social cognition including theory of mind and moral reasoning.
AS.050.203 OR AS.080.203 OR AS.050.202 or equivalent.

AS.050.500. Practicum in Language Disorders- Community Based Learning. 2 Credits.
This course provides the opportunity to learn about adult aphasias, language disorders which are one of the most common consequences of stroke. You will receive training in supportive communication techniques and work as a communication partner with an individual with aphasia for two hours per week. Three class meetings for orientation and reading assignments will be held on campus; training and practicum will be conducted at a local aphasia support center. Independent mode of transportation required. Co-listed as AS.080.505 in Neuroscience. Find out more about the practicum site at https://www.leagueforpeople.org/scale.
A- or Better in AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.311 or instructor's permission.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.503. Research in Cognitive Science/Freshmen. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.504. Research Cognitive Science-Freshmen. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.505. Readings in Cognitive Science/Sophomores. 1 - 3 Credits.
Research current topics in cognitive science.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.506. Readings Cognitive Science-Sophomores. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.507. Research in Cognitive Science/Sophomores. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.508. Research Cognitive Science - Sophomores. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.510. Cognitive Science Internship. 1 Credit.
For internships in cognitive science-related fields. Graded S/U only. Student cannot recieve credit for paid internships. A Cognitive Science faculty sponsor is required and must be named in the Independent Academic Work form. Please read the relevant independent academic work FAQ. KSAS primary majors, visit https://advising.jhu.edu/research-internships-and-independent-study/. WSE primary majors, visit https://engineering.jhu.edu/advising/advising-questions/.
AS.990.500

AS.050.511. Readings in Cognitive Science/Juniors. 1 - 3 Credits.
Assigned readings on current topics in cognitive science. Instructor approval required. Letter-graded.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.512. Readings Cognitive Science-Juniors. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.513. Research in Cognitive Science/Juniors. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.514. Research Cognitive Science - Juniors. 1 - 3 Credits.
Permission Required,
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.515. Readings in Cognitive Science/Seniors. 1 - 3 Credits.
Assigned readings on current topics in cognitive science. Instructor approval required. Letter-graded.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.516. Readings Cognitive Science - Senior. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.517. Research in Cognitive Science/Seniors. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.518. Research Cognitive Science - Seniors. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.550. Undergraduate Teaching Practicum in Cognitive Science. 1 - 3 Credits.
By invitation, qualified students may serve as undergraduate Teaching Assistants for cognitive science courses and receive credit. This practicum is graded S/U. Each section instructor will determine TA responsibilities based upon departmental policy. Students who accept an invitation, should forward that invitation to the Director of Undergraduate Studies (Dr. Colin Wilson) and make a request in SIS to add the instructor's teaching practicum section. Dr. Wilson will approve requests in SIS. Students may not both receive credit and be paid for the same undergraduate teaching position. This course may not be used toward cognitive science major degree requirements.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.599. Research-Cognitive Science. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.603. Intro to Cognitive Neuroscience.
This course surveys theory and research concerning how mental processes are carried out by the human brain. Currently a wide range of methods of probing the functioning brain are yielding insights into the nature of the relation between mental and neural events. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Methods surveyed include electrophysiological recording techniques such as EEG, ERP, single/multiple unit recording and MEG; functional imaging techniques such as PET and fMRI; and methods that involve lesioning or disrupting neural activity such as cortical stimulation, animal lesion studies, and the study of brain-damaged individuals.

AS.050.606. Intro to Bilingualism.
Do children get confused when they grow up exposed to more than one language? Is it possible to forget one's native language? Are the first and second language processed in different areas of the brain? How does brain damage impact the different languages of a polyglot? Does knowing a second language affect non-linguistic cognitive processing? This course will address questions such as these through an exploration of mental and neural processes underlying bilingual and multilingual language processing. Also listed as AS.050.206.

AS.050.617. Semantics I.
Also offered as AS.050.317. This is an introduction to the study of meaning in natural language. We address the conceptual and empirical issues in semantic theory and introduce some formal machinery that has been developed to deal with such problems. After discussing foundational questions, we turn to formal semantics and pragmatics, as well as their interfaces with syntax and the lexicon. Specific topics include presupposition, type-driven composition, quantification, lexical aspect, argument structure, and lexical representations of meaning.

AS.050.620. Syntax I.
Introduces the basic methods and means of analysis used in contemporary syntax investigations, practicing with data from different languages. Also offered as AS.050.320.

AS.050.625. Phonology I.
An introduction to the basic principles underlying the mental representation and manipulation of language sounds and their relation to human perception and vocal articulation: how units of sound are both decomposable into elementary features and combined to form larger structures like syllables and words. The role of rules and constraints in a formal theory of phonological competence and in accounting for the range of variation among the world's languages. Also offered as AS.050.325.

AS.050.626. Foundations of Cognitive Science.
Also offered as AS.050.326. This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion.
Area: Writing Intensive

AS.050.632. Developmental Cognitive Neuroscience.
In-depth examination of the current literature on cognitive development in the context of developmental cognitive neuroscience. Meets with AS.050.332.

AS.050.633. Psycholinguistics.
Also offered as AS.050.333. This course provides a broad survey of current research on language processing in adult native speakers and language learners. Topics include speech perception, word recognition, and sentence production and comprehension. We will discuss the nature of representations that are being constructed in real-time language use, as well as how the mental procedures for constructing linguistic representations could be studied by various behavioral and physiological measures.

AS.050.636. Intro to Neurolinguistics.
This course provides an introductory survey of the cognitive neuroscience of language – a multidisciplinary field in the intersection of Linguistics, Psycholinguistics, and Neuroscience. We will explore current research on the neural bases of the perception, production, and acquisition or human language in neuro-typical and impaired individuals. Also listed as AS.050.236.

AS.050.639. Cognitive Development.
Also offered as AS.050.339. This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.648. First Language Acquisition.
This course provides an introduction to the fields of first and second language acquisition by looking at questions such as the following: Can the grammar of a native language be learned solely on the basis of noticing statistical correlations among words? How does native language acquisition explain — or is explained by — the universal properties, shared by all languages, of words and grammars? How does being exposed to multiple languages from birth affect language acquisition and what happens when a child is not exposed to any language early in life? Does the same cognitive mechanism guide language learning in children and adults? What factors account for individual differences in ease and ultimate attainment when a second language is learned later in life? Is it possible to become indistinguishable from a native speaker in a foreign language? What changes take place in the brain when a new language is learned? Recommended background: An introductory course in a linguistic course such as world of language, phonology, or syntax as well as a linguistics course such as language and mind or bilingualism. Also offered as AS.050.348.

AS.050.649. Second Language Acquisition.
First language acquisition is natural and seemingly effortless. The situation is reversed when one tries to learn another language. This course discusses in what ways first and second language acquisition (SLA) differ and how individual differences of the learners as well as external factors contribute to the variability observed in rates and ultimate proficiency of second language learning in children and adults. We will discuss such topics as Universal Grammar access in early and late SLA, first language influence, critical periods, possibility of native-like attainment, and language attrition. Recommended background in AS.050.102 Language and Mind, AS.050.348 Language Acquisition, AS.050.206 Bilingualism or equivalent. Also offered as AS.050.349.

AS.050.652. Applying Cognitive Neuroscience to Artificial Intelligence Part I.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidly improving for well-defined tasks and narrow intelligence. Moreover, it has entered all industries in a myriad of ways. But will AI ever have human-like general intelligence? What does humanlike general intelligence even mean? Why should we even care? This course is designed to answer these complex questions by giving students working knowledge of the underlying principles and mechanisms of human behavior and cognition, and how they may be applied to solving current and rising industry challenges. Key topics to be addressed will include vision, audition, language, learning, emotion and social cognition, creativity, and consciousness. Each topic addressed will cover latest advancements within cognitive neuroscience, with relevant applied case studies. Students will apply learned topics to a final group research project on the topic of their choice.

AS.050.653. Applying Cognitive Neuroscience to Artificial Intelligence Part II.
As a myriad of artificial intelligence enabled autonomous systems enter into our lives and change how we live, we must ask: can we trust these systems? In this course we will take a human-centered perspective on assured autonomy and identify why and how insights from human perception and cognition can guide solutions for reliable, resilient, and robust autonomous systems. We will address bias, ethics, explanability, and safety by focusing on specific case studies from autonomous vehicles, cybersecurity, healthcare, fashion, law enforcement, and military systems. Students will apply learned material to a semester-long group research project on a topic of their choice.

AS.050.658. Language & Thought.
Have you ever wondered about the relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too and this course will survey the current thinking on this matter. Classical papers such as those by Whorf and Sapir, more recent philosophical papers by people such as Fodor and Dennett, and recent empirical work by linguists and psycholingists on the relationship between language and thinking in development and in adults will be covered. Discussions will focus on the theoretically possible relationships between language and thought and the empirical data that speak to these.

AS.050.660. Computational Psycholinguistics.
How do we understand and produce sentences in a language we speak? How do we acquire the knowledge that underlies this ability? Computational psycholinguistics seeks to address these questions using a combination of two approaches: computational models, which aim to replicate the processes that take place in the human mind; and human experiments, which are designed to test those models. The perspective we will take in this class is that the models and experimental paradigms do not only advance our understanding of the cognitive science, but can also help us advance artificial intelligence and language technologies. While computational psycholinguistics spans all levels of linguistic structure, from speech to discourse, our focus in this class will be at the level of the sentence (syntax and semantics). The course will assume familiarity with programming and computational modeling frameworks in cognitive science, as covered by Introduction to Computational Cognitive Science or equivalent. Also offered as AS.050.360.An optional, hands-on lab (AS.050.361) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.

AS.050.665. Cracking the code: Theory and modeling of information coding in neural activity.
One of the most foundational concepts in neuroscience is the idea that neural activity encodes information about an animal's sensory environment and internal mental states. This idea is closely connected to the concept of mental representation in cognitive science and philosophy, whereby the mind is proposed to contain internal symbols that represent things in the external world. There have been many fascinating discoveries about how neural signals encode information, but we are still far from a comprehensive theory of neural representation. Recent major developments in neuroscience and machine learning have opened up a new world of possibilities for investigating the underlying principles of information coding in the brains of humans and other animals.
In this course, we will discuss primary research articles on neural representation and information processing, and students will implement computational analyses that address issues in these domains. We will mostly focus on vision as a system that illustrates broader principles of information processing in the human brain. The reading material will include work from philosophy, neuroimaging, electrophysiology, and computational modeling. The topics covered include mental and neural representation, neural tuning, population coding, information theory, encoding and decoding models, dimensionality reduction, computational models, deep learning, and other applications of machine learning in neuroscience. Enrollment is limited to Juniors and Seniors. While this class does not have formal prerequisites, programming experience (e.g., AS.250.205 Introduction to Computing) and mathematical preparation (e.g., AS.110.107 Calculus II) are essential. It is also highly recommended that students have previously taken introductory courses in cognitive or systems neuroscience (e.g., AS.050.203 Neuroscience: Cognitive) and machine learning or neural network modeling (e.g., AS.050.372 Foundations of Neural Network Theory).

AS.050.670. Mathematical Models of Language.
This course will be devoted to the study of formal systems that have proven useful in the cognitive science of language. We will discuss a wide range of mathematical structures and techniques and demonstrate their applications in theories of grammatical competence and performance. A major goal of this course is bringing students to a point where they can evaluate the strengths and weaknesses of existing formal theories of cognitive capacities, as well as profitably engage in such formalization, constructing precise and coherent definitions and rigorous proofs. Recommended background in language and mind or computational cognitive science. Also offered as AS.050.370

AS.050.671. Bayesian Inference.
Also offered as AS.050.371. This course introduces techniques for computational modeling of aspects of human cognition, including perception, categorization, and induction. Possible topics include maximum likelihood and Bayesian inference, structured statistical models (including hierarchical and graphical models), nonparametric models. The course emphasizes the close connections among data analysis, theory development, and modeling, with examples drawn from language and vision.

AS.050.672. Foundations of Neural Network Theory.
Introduction to continuous mathematics for cognitive science, with applications to biological and cognitive network models: real and complex numbers, differential and integral multi-variable calculus, linear algebra, dynamical systems, numerical optimization. Recommended course background in Calculus I. This is a basic-level course not appropriate for students with significant math background. Students who have completed both Calc III and Linear Algebra or an equivalent combination may not register. Also offered as AS.050.372.

AS.050.675. Probabilistic Models of the Visual Cortex.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modelling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Also offered as AS.050.375.

AS.050.683. Computational Social Cognition.
Humans are a fundamentally social species with amazing capabilities beyond that of any other biological or artificial system. Yet the cognitive and neural computations underlying our vast social abilities are largely unknown. Advances in naturalistic neuroscience paradigms and machine learning are revolutionizing the way cognitive scientists study social cognition. This course will explore new research in computational social cognition, drawing from topics in cognitive neuroscience, development, and artificial intelligence. Our goal is to understand the motivation, methodology and implications of recent research. The class will be heavily focused on social vision, but will also explore other aspects of social cognition including theory of mind and moral reasoning. Also offered as AS.050.383.

AS.050.800. Directed Readings in Cognitive Science.
Directed readings on current topics in cognitive science. Instructor approval required.

AS.050.801. Research Seminar in Cognitive Neuropsychology.
Participants in this graduate seminar will read and discuss current research articles in cognitive neuropsychology of vision or language, and present their own research.

AS.050.802. Research Seminar in Cognitive Processes.
Permission required. Current issues and ongoing research on human cognition are discussed.

AS.050.806. Research Seminar in Cognitive Neuroscience and Machine Learning.
Participants in this seminar will read and discuss current research articles in the fields of cognitive neuroscience, computational neuroscience, machine learning, and artificial intelligence. The seminar will focus on research that provides insights into the representations and algorithms of the human brain, with an emphasis on vision and natural semantic understanding.

AS.050.809. Research Seminar in Computational Cognitive Science.
This seminar is on computational models for vision and its interaction with language. For Cognitive Science, computational models, like Deep Nets, offer the possibility of developing computational theories which can be tested on natural, or realistically synthetic images. But Deep Nets by themselves are unable to capture the richness and flexibility of human perception, so we will discuss other classes of model with more compositional structure and ability to represent the physical properties of the 3D world. These will be related to, and motivated by, behavioral and electrophysiological experiments.

AS.050.811. Research Seminar in Language & Cognition.
A specialized research seminar for individuals researching language acquisition, cognitive development and the interface between language and cognition. Students must actively carry out empirical or theoretical research in these areas. Permission required.

AS.050.812. Research Seminar in Computational Cognitive Neuroscience.
This seminar will discuss papers and ongoing research in the areas of computational cognitive neuroscience, with a focus on different areas of visual and social perception.

AS.050.814. Research Seminar in Computer Vision.
This seminar is based on topics in computational vision with the option of attending additional subgroup meetings on specific topics.

AS.050.817. Research Seminar in Semantics.
A critical analysis of current issues and debates in natural language semantics. Discussion of on-going research. Permission required.

AS.050.818. Research Seminar: AcqLab Meeting.
Participants in this graduate seminar will read and discuss current research articles in language development and present their own research. Permission required.

AS.050.819. Research Seminar in Psycholinguistics.
Discussion of current computational and experimental research on human language processing.

AS.050.822. Research Seminar Syntax.
A critical analysis of current issues and debates in theoretical syntax. Discussion of on-going research.

AS.050.826. Research Seminar in Formal Approaches to Cognitive Science.
Readings and research presentations on varying topics in mathematics, computation, and formal linguistics with bearing on cognitive science.

AS.050.827. Research Seminar in Language Acquisition.
Focus is on current research in acquisition of syntax.

AS.050.829. Research Seminar on Formal Theory in Cognitive Science.
Topics range from mathematical analysis of neural networks to computational studies of linguistic structure. Focus is ongoing research and current literature.

AS.050.830. Seminar on Special Topics.
This seminar will focus on Special Topics of current interest in Cognitive Science and reflect the breath of expertise in the department.

AS.050.839. Research in Cognitive Science.
Current topics in any area of cognitive science, including language and vision, with discussion of recent developments in theory, experimental study, and computational modeling.

AS.050.849. Teaching Practicum.
Permission required. Essential for Teaching Assistants.

AS.050.860. Professional Seminar in Cognitive Science.
Instructor permission required.Addresses professional issues such as research ethics, success on the job market and in an academic career, teaching and mentoring and differing professional standards in the sub-disciplines of cognitive science.

Cross Listed Courses

Computer Science

EN.601.769. Events Semantics in Theory and Practice. 3 Credits.
This course explores selected topics in the nature of event representations from the perspective of cognitive science, computer science, linguistics, and philosophy. These fields have developed a rich array of scientific theories about the representation of events, and how humans make inferences about them -- we investigate how (and if) such theories could be applied to current research topics and tasks in computational semantics such as inference from text, automated summarization, veridicality assessment, and so on. In addition to classic articles dealing with formal semantic theories, the course considers available machine-readable corpora, ontologies, and related resources that bear on event structure, such as WordNet, PropBank, FrameNet, etc.. The course is aimed to marry theory with practice: students with either a computational or linguistic background are encouraged to participate. [Applications]

EN.601.783. Vision as Bayesian Inference. 3 Credits.
This is an advanced course on computer vision from a probabilistic and machine learning perspective. It covers techniques such as linear and non-linear filtering, geometry, energy function methods, markov random fields, conditional random fields, graphical models, probabilistic grammars, and deep neural networks. These are illustrated on a set of vision problems ranging from image segmentation, semantic segmentation, depth estimation, object recognition, object parsing, scene parsing, action recognition, and text captioning. [Analysis orApplications] Required course background: calculus, linear algebra (AS.110.201 or equiv.), probability and statistics (AS.553.311 or equiv.), and the ability to program in Python and C++. Background in computer vision (EN.601.461/661) and machine learning (EN.601.475) suggested but not required.

First Year Seminars

AS.001.146. FYS: Nature, Nurture, Cognition. 3 Credits.
Using both seminal and contemporary readings as a foundation, we will explore the foundations of cognition and how they support human cognitive development, focusing on how ‘nature’ and ‘nurture’ collaborate to shape development of the human mind. This semester, we will read at least three, and possibly four books, along with supplementary readings, as appropriate. Our focus will be on understanding the roles of nature and nurture in the context of typical and atypical development, including an understanding of how knowledge about objects, language, number, and other minds all emerge during human development, from infancy to adulthood, in typically and atypically developing individuals.

AS.001.189. FYS: Language, Advertising, and Propaganda. 3 Credits.
Advertising pervades our culture; interactions with advertising are an unavoidable fact of modern life. This class uses tools from linguistics and cognitive science to analyze these interactions, and understand the impact of advertising on its viewers. A central theme is to treat ads as communicative acts, and explore the consequences -- what can theories of communication (from linguistics, psychology, and philosophy) tell us about ads? How do ads use central features of human cognition to accomplish their aims? Do ads manipulate, and if so, how successfully? The theories of communication we explore include Gricean pragmatics, theories of speech acts, linguistic theories of presuppositions, and more. Students will collect, analyze, and discuss advertisements in all mediums.

Music

AS.376.371. Introduction to Music Cognition. 3 Credits.
What underlies our aesthetic response to music? How and why are we able to identify certain sounds as music? To what extent are music and natural language similar? What is it about music that evokes such powerful emotions such as happiness and sadness? What is unique to musical creativity? Examining such questions from cognitive science, neuroscience, psychology, and philosophical perspectives, this course explores relevant research and theory in the emerging domain of music perception and cognition. Students will complete a final research paper on the topic of their choice that integrates the course material.

AS.376.372. Topics in Music Cognition. 3 Credits.
This course explores the similarities and differences between music and language, the effects of musical training on cognitive development, and the expressive power of music, with an introduction to music and its role in film. We will read relevant research and theory on these topics from cognitive science, neuroscience, psychology, musicology, and philosophical perspectives.

Psychological & Brain Sciences

AS.200.313. Models of Mind and Brain. 3 Credits.
This is a seminar surveying computational approaches to understanding mental and neural processes, including sensory and conceptual representation, categorization, learning and memory. The course will also develop familiarity with computational tools such as numerical simulation, linear transformation and data visualization. Recommended Course Background: AS.110.106 / Calculus I OR AS.110.108 Calculus I, AS.050.101 / Cognition OR AS.200.211 / Sensation & Perception OR AS.080.105 / Introduction to Neuroscience OR other introductory coursework in cognitive & neural sciences. Experience with at least one programming language is strongly recommended.

For current faculty and contact information go to http://cogsci.jhu.edu/people (http://cogsci.jhu.edu/people/)

Cognitive Science, Bachelor of Arts

https://cogsci.jhu.edu/undergraduate/

Cognitive science is the study of the human mind and brain, focusing on how the mind represents and manipulates knowledge and how mental representations and processes are realized in the brain. Conceiving of the mind as an abstract computing device instantiated in the brain, cognitive scientists seek to understand the mental computations underlying cognitive functioning, and how these computations are implemented by neural tissue. Also of central interest in cognitive science are questions about how cognitive functions develop, and how they break down when the brain is damaged.

Cognitive science is a relatively new field, having emerged at the interface of cognitive psychology, linguistics, neuroscience, philosophy, and computer science. As a consequence of this diverse ancestry, cognitive science incorporates a variety of perspectives and methodologies, including linguistic analysis, empirical studies of normal cognitive functioning in adults, developmental studies of children, cognitive neuropsychological research on cognitive deficits, functional neuroimaging studies, and computational modeling.

Our cognitive science undergraduate program reflects the interdisciplinary nature of the field, allowing students to approach the study of the mind and brain from multiple perspectives. Students gain broad knowledge of the field as a whole, plus a greater depth of the understanding in two of the sub-disciplines within the field. Training emphasizes not only learning about the principal theories and evidence, but also development of the conceptual and practical skills needed for understanding and conducting theoretical and empirical work in the field. Undergraduate students in the department also have many opportunities to get involved in research.

Cognitive Science Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The required courses for cognitive science majors are divided into five general areas, as described below. The program is structured so as to ensure some exposure to each of the five areas. In addition, it provides in-depth training in two of the areas, deemed *focal areas***,** chosen by the student. Majors in cognitive science thus acquire a broad perspective which will enable them to situate particular research disciplines within the overall study of the mind/brain.

Focal Areas: Students must take courses in all five focal areas; however, two focal areas must be chosen in which a greater selection of courses is required. The three focal areas not chosen may be referred to as 'non focal' areas for advising purposes. Courses offered by our department and other affiliated departments (e.g., Departments of Psychological and Brain Sciences, Philosophy, Computer Science, Neuroscience, etc.) may be used to satisfy the requirements for these areas. Examples of courses that satisfy the requirements for each area can be found on our website. (http://cogsci.jhu.edu/undergraduate/cognitive-science-major/) However, please note that courses change over time, and some courses are not offered every year. The Director of Undergraduate Studies (http://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/) can answer questions about which courses qualify for each focal area.

- Cognitive Psychology/Neuropsychology
- Linguistics
- Computational Approaches to Cognition
- Neuroscience
- Philosophy of Mind

General Information

- Departmental requirements may not be taken Satisfactory/Unsatisfactory, with the exception of research and practica.
- A grade of C- or better must be earned in all major requirements.

Code	Title	Credits
Two Focal Areas		
Four courses in each of the two chosen focal areas. Research, readings, and practica courses do not qualify. At least two courses in each focal area must be at the 300-600 level. [1]		12-16
Three 'Non-Focal' Areas		
One course at any level from each of the three non-focal areas. Research, readings, and practica courses do not qualify.		9-12
Additional Upper-Level Elective Courses		
Nine credits at the 300-600 level chosen from any of the five areas or other cognitive science courses. Up to three credits of cognitive science research, readings, or practica may apply. [1]		9
Math		
Select Math Option A or B:		6-8
Math Option A [2]		
Select two of the following:		
AS.110.106	Calculus I (Biology and Social Sciences)	
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	
or AS.110.10	Calculus II (For Physical Sciences and Engineering)	
or AS.110.11	Honors Single Variable Calculus	
AS.110.201/212	Linear Algebra	
or EN.553.291	Linear Algebra and Differential Equations	
AS.150.118	Introduction to Formal Logic	
AS.150.420	Mathematical Logic I	
AS.050.370	Mathematical Models of Language	
AS.050.371	Bayesian Inference	
AS.050.372	Foundations of Neural Network Theory	
EN.553.171	Discrete Mathematics	
Math Option B: Statistics Sequence [3]		
AS.200.200 & AS.200.201	Research Methods in Psychology and Design & Statistical Analysis for Psychology	
Total Credits		**36-45**

1. For students with **Linguistics as one of their focal areas**, one intermediate or advanced foreign language course may be used to partially satisfy the upper-level course requirement for that area and one other intermediate or advanced foreign language course may be used to partially satisfy the Additional Upper-Level Elective Courses requirement.
2. For students with **Cognitive Psychology/Neuropsychology as one of their focal areas**, Math Option B is required and should be completed, if possible, by the end of the sophomore year.
3. Students who would like to substitute a different statistics course for one of the two Math Option B courses should consult with their Cognitive Science faculty advisor, then seek approval from the Director of Undergraduate Studies.

Sample Program

The below sample program demonstrates how a student with the focal areas of **Cognitive Psychology/Neuropsychology** and **Linguistics** might complete the Cognitive Science major requirements in four years. In this scenario, the student has not placed out of any foreign language requirements. Each student's path through the program will have variation depending on the two focal areas they choose to pursue within the major.

Course	Title	Credits
First Year		
First Semester		
Course in Linguistics area (any level)		3-4
	Credits	**3-4**
Second Semester		
Course in Neuroscience area (any level)		3
	Credits	**3**
Second Year		
First Semester		
Course in Computational Approaches to Cognitive Science area (any level)		3-4
Course in Cognitive (Neuro)Psychology area (any level)		3
AS.200.200	Research Methods in Psychology	4
	Credits	**10-11**
Second Semester		
Course in Cognitive (Neuro)Psychology area (any level)		3
Course in Linguistics area (300-level or above)		
AS.200.201	Design & Statistical Analysis for Psychology	4
	Credits	**7**
Third Year		
First Semester		
Course in Philosophy of Mind area (any level)		3
Course in Linguistics area (any level)		3-4
	Credits	**6-7**
Second Semester		
Cognitive Science elective (300-level or above) *		1-4
Course in Cognitive (Neuro)Psychology area (300-level or above)		3-4
	Credits	**4-8**
Fourth Year		
First Semester		
Course in Linguistics area (300-level or above)		3-4
Cognitive Science elective (300-level or above) *		1-4
	Credits	**4-8**
Second Semester		
Cognitive Science elective (300-level or above) *		1-4
Course in Cognitive (Neuro)Psychology area (300-level or above)		3-4
	Credits	**4-8**
	Total Credits	**41-56**

* No more than 3 credits of cognitive science research, readings, or practica may apply toward the major requirements.

Honors and Awards

Departmental Honors

To receive Honors in Cognitive Science, graduating seniors must have a major GPA of 3.5 or higher. Graduating students will receive a major GPA calculation worksheet from the department in their final semester. The worksheet must be completed and submitted to the department's Director of Undergraduate Studies (http://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/) in a timely manner for review and approval. Only courses directly applied to a student's cognitive science major, including Math A or B, factor into the major GPA calculation. All other elective courses should be excluded from the major GPA calculation. If the GPA requirement is met, departmental honors will appear on the student's transcript and will be indicated in that year's Commencement program.

Glushko Outstanding Undergraduate Cognitive Scientist Prize

This prize is awarded annually to the senior cognitive science major who has demonstrated the strongest combination of:

- academic excellence
- sustained and outstanding involvement in research (typically involving two or more semesters devoted to a single project)
- significant contribution of the undergraduate environment of the JHU Cognitive Science Department (e.g., service to Omega Psi), including contributing to diversity and inclusiveness of the program in any respect
- involvement in increasing awareness of cognitive science at JHU and beyond
- intent to pursue a career building on their expertise in cognitive science

The recipient receives a monetary prize of $500, is acknowledged in the Commencement program, and is invited to present research in which they have participated in the Department's Brown Bag Talk series.

Expected Learning Outcomes

Undergraduate cognitive science majors are expected to achieve the following learning outcomes:

- Acquire a firm grasp of the basic conception of the mind and brain that defines the discipline of cognitive science.
- Develop the fundamental skills required for understanding theories, evidence, and methods in cognitive science, and for pursuing advanced training in cognitive science or one of its sub-disciplines.
- Develop a basic understanding of the major sub-disciplines of cognitive science (i.e., linguistics, cognitive psychology and neuropsychology, neuroscience, computational approaches, philosophy of mind), and the relationships among sub-disciplines.
- Develop an understanding of theories, evidence, and research methods in the principal content domains within cognitive science (e.g., language, vision).
- Gain a deeper understanding of two sub-disciplines of cognitive science, and the principal content domains within these sub-disciplines.
- Acquire the skills required for clear and cogent written and oral communication in cognitive science.

Cognitive Science, Master of Arts

Department of Cognitive Science (https://cogsci.jhu.edu/graduate/ma-program/)

The Department of Cognitive Science's one-year Master of Arts program is designed to flexibly provide graduate-level training to a wide range of students with diverse backgrounds and interests. This program is intended to appeal to students who have undergraduate degrees in linguistics, psychology, computer science, neuroscience, and other subdisciplines of cognitive science. It may be of particular interest to students who wish to strengthen their qualifications for a PhD program or a career in which an MA in cognitive science would make them more competitive.

A student in the MA program chooses to pursue either the research track or the course track. For both tracks, the student works closely with a faculty mentor throughout the program.

The MA in cognitive science allows students to develop research-oriented expertise needed to pursue a PhD at another institution or research-centered employment, and provides interdisciplinary education beyond the undergraduate level that will be useful for careers related to cognitive science.

There are many career opportunities open to those with advanced degrees in cognitive science and related fields. Outside of academia, these include positions in lab management, grant and technical writing, market research and consulting, computational linguistics, and human-computer interaction (e.g., work on automatic language production and recognition systems).

Please note that the MA program is not a pathway into the department's PhD program. They are separate and distinct programs. Students in most cognitive science PhD programs generally earn an MA/MS degree on the way to a PhD, but most of the cognitive science departments in the U.S. do not offer stand-alone MA degrees. Few programs can provide pre-PhD training beyond the undergraduate level. The cognitive science MA program is a preparation for those wishing to pursue doctoral studies in a related field or to gain a competitive edge in the job market.

Financial Support

No regular funding is provided to students in the MA program, though a one-year (Spring and Fall only) 50% reduction in tuition is offered to students with JHU bachelors degrees. Students may seek funding from other sources.

Program Requirements

General Information

- Courses may not be double-counted. Each course may only be used to satisfy a single degree requirement, even if it may qualify for more than one requirement.
- All courses must be completed with a grade of B- or better, with the exception of the following courses for which a P (passing) grade will be accepted (where P = C- or better):
  - AS.360.625 Responsible Conduct of Research
  - Graduate courses in other departments only offered as Pass/Fail with the written approval from the mentor and Director of Graduate Studies.
  - One Cognitive Science course may be converted to Pass/Fail with written approval from the instructor, mentor, and Director of Graduate Studies.
- The majority of requirements must be completed in the spring and fall semesters. Only research ethics, research, and readings courses are offered year-round, including the summer and intersession terms.

Course Track Requirements

Code	Title	Credits
Coursework		
Seven courses, 600-800-level [1,2]		
Lab or Research Seminars		
Two courses, 800-level [2]		
Directed Readings and/or Research		
Three research and/or readings courses, including one during Intersession. The mentor determines the distribution of 9 credit-hours across each term.		
AS.050.800	Directed Readings in Cognitive Science	
AS.050.839	Research in Cognitive Science	
Research Ethics		
AS.360.625	Responsible Conduct of Research (in-person)	
Capstone: Portfolio and Oral Exam		
The portfolio should include accomplishments from the program (e.g. course assignments, seminar papers, etc.) overseen by the faculty mentor, a reading list, and a set of discussion questions. Student will present what has been learned while in the program at an oral presentation supervised by two faculty members.		

1 Up to four courses may be substituted with written permission of both the mentor and Director of Graduate Studies.

2 May not include independent research or readings courses (e.g. AS.050.800 and AS.050.839).

Research Track Requirements

Code	Title	Credits
Formal Methods or Statistics Course		
One of the following or equivalent with mentor's written permission:		
AS.200.657	Advanced Statistical Methods	
AS.050.670	Mathematical Models of Language	
AS.050.671	Bayesian Inference	
AS.050.672	Foundations of Neural Network Theory	
Lab or Research Seminar		
Two courses, 800-level [1]		
Additional Courses		
Three courses, 600-800-level [1]		
Research		
Student must work on full-time research overseen by their faculty mentor. Student registers in this course once each term: fall, intersession, spring and summer. The mentor determines the distribution of 18 credit-hours across each term.		
AS.050.839	Research in Cognitive Science (4x)	
Research Ethics		
AS.360.625	Responsible Conduct of Research (in-person)	
Capstone: Research Paper and Oral Defense		
Student must produce and defend a mentor-approved research paper before two faculty members.		

1 May not include independent research or readings courses (e.g. AS.050.800 or AS.050.839).

Expected Learning Outcomes

The MA program aims to develop and extend the knowledge and research skills of individuals interested in pursuing a PhD in a field of cognitive science or gaining research-centered employment.

Students in the MA program will:

- Acquire a strong background in the empirical findings and theoretical frameworks of one or more areas of cognitive science
- Acquire and apply analytic and technical skills needed to critically evaluate research findings, and to communicate research findings orally and in writing
- Develop the ability to conduct original problem-centered and theory-driven research in the chosen areas of study
- Gain experience with and fully participate in a collaborative lab-based community of researchers from a wide range of backgrounds and fields.

Cognitive Science, PhD

https://cogsci.jhu.edu/graduate/phd-program/

The Department of Cognitive Science's five-year PhD program has a primary goal to train a new generation of cognitive scientists who can meld multiple existing disciplines into a new, genuinely integrated science of the mind/brain. A secondary goal is to train graduates who are competitive for positions in traditional disciplinary departments at research universities. Because many of the most exciting research developments recognized within the related traditional disciplines arise through interdisciplinary research, the training in cognitive science offered by our department can promote a graduate's attractiveness as a candidate for positions in a variety of departments.

The training we offer in cognitive science is highly interdisciplinary, strongly theoretically oriented, and integrated to an extent only possible within a department of cognitive science. In addition, PhD students are provided extensive experience integrating the theory and methods of diverse cognitive sub-disciplines through specially designed integrative courses and regular seminars involving the entire department.

Our program can offer such a breadth and depth of training because, unlike departments in the allied disciplines, in a department of cognitive science, 100% of graduate training can be focused on cognition. Integrated training across the spectrum of cognitive methods allows students to emerge from graduate school as professional cognitive scientists.

Financial Support

The department provides competitive levels of funding for PhD students. This funding includes full tuition, student health insurance, and a 12-month stipend. PhD students are also given access to an annual travel/research allowance for eligible expenses. Assuming satisfactory progress toward the PhD degree and continued funding levels, PhD students may expect this support to continue for five years (10 semesters).

In return, graduate students are expected to dedicate their full time and attention to coursework, teaching, research, etc. within the Department of Cognitive Science. Additionally, they are expected to apply for any outside funding (e.g. NSF fellowship, etc.) for which they are eligible as early as their first semester. Students who receive fellowships or grants are to report this information to the Chair and administrative staff of the department to work out an overall package.

Program Requirements

The Department of Cognitive Science's PhD requirements are designed to meet the goals below.

- **Depth**: Students become expert in their primary area of research interest and are prepared so that they will be competitive for academic positions in one of the traditional disciplines. Students take several advanced courses or participate in seminars/lab meetings that the student, in conjunction with their advisory committee, determines to be important for achieving expertise in a chosen research area and marketplace competitiveness.
  - In the specialized *Computational Cognitive Science Track* the students become expert in the area of CCS and are prepared so that they will be competitive in the job market. Students take several advanced courses or participate in seminars/lab meetings that the student, in conjunction with their advisory committee, determines to be important for achieving expertise in CCS research and marketplace competitiveness.
- **Breadth**: Students develop the ability to understand and critically evaluate work in the various sub-disciplines of cognitive science by completing courses in the areas of cognitive psychology/neuropsychology, computation, linguistics, philosophy, and cognitive neuroscience. Students may place out of breadth courses based on prior equivalent coursework or based on examination.
  - In the specialized *Computational Cognitive Science Track* students develop an understanding of theoretical and experimental approaches to cognitive science that complement and inform computational approaches. Students may place out of breadth courses based on prior equivalent coursework or examination.
- **Integration**: Students learn to integrate theory and method across sub-disciplines through a specially designed integrative course.
- **Research Ethics:** Students complete a research ethics course, which they are encouraged to take in their first year.
- **Professional Development:** Students attend a spring seminar devoted to professional development.
- **Training in Teaching:** Students TA three to five semesters (depending upon external funding). Students are not typically expected to TA in their first semester or in the last two semesters of residency (5th year).
- **Research Papers and Dissertation:** Students produce two research papers prior to completing a dissertation. These papers, which are due November 1st of the second year and May 1st of the third year, draw on two different research methodologies. These two research papers are typically presented at conferences and often lead to separate journal publications.

General PhD Track Requirements

Courses may not be double-counted to fulfill more than one degree requirement. Students are expected to attend the Cognitive Science Colloquium Series and Brown Bag Series in addition to completing course requirements.

The Computational Cognitive Science (CCS) Track (p. 1742) within the PhD program in Cognitive Science has requirements that differ somewhat from the program outlined immediately below.

Code	Title	Credits
Breadth		
One breadth course may be audited in consultation with your advisor.		
Cognitive Neuroscience		
One course		
Philosophy		
One course in philosophy of mind, language, or science		
Cognitive Psychology/Neuropsychology		
AS.200.657	Advanced Statistical Methods (to be completed early in the program, preferably the first semester)	
Select one of the following or an approved course/seminar on a topic outside the area of language:		
AS.050.639	Cognitive Development	
AS.050.315	Cognitive Neuropsychology of Visual Perception: The Malfunctioning Visual Brain	
Computation		
AS.050.672	Foundations of Neural Network Theory	
Select one of the following or an approved course on Programming (C++, Java, etc.), or equivalent (e.g. computational linguistics):		
AS.050.671	Bayesian Inference	
AS.050.660	Computational Psycholinguistics	
Linguistics		
AS.050.670	Mathematical Models of Language	
Select one of the following:		
AS.050.617	Semantics I	
AS.050.620	Syntax I	
AS.050.625	Phonology I	
Integration		
AS.050.626	Foundations of Cognitive Science	
Depth: Area of Focus		
Number and scope of courses selected in conjunction with adviser(s) to achieve depth in a chosen research area. Lab meetings may be used to fulfill this requirement.		
Research Ethics		
AS.360.625	Responsible Conduct of Research (encouraged to complete in the first year. In-person RCR required.)	
Professional Development		
AS.050.860	Professional Seminar in Cognitive Science (two mini sessions or one semester-long course)	
Teaching Assistantships		
AS.050.849	Teaching Practicum (x3-5 semesters, depending upon external funding.)	
Two Research Papers		
Dissertation Proposal		
Graduate Board Oral Exam (Dissertation Defense)		

Computational Cognitive Science Track Requirements

Students in this track will obtain a depth of focus in computational coursework, not achieved in the PhD in Cognitive Science general requirements. Accordingly, some of the breadth coursework has been replaced with computational courses, while aiming to retain the spirit of the breadth requirement.

Courses may not be double-counted to fulfill more than one degree requirement. Students are expected to attend the Cognitive Science Colloquium Series and Brown Bag Series in addition to completing course requirements.

Code	Title	Credits
Breadth		
3-4 courses in the Department of Cognitive Science that collectively develop sophistication in theoretical and (human) experimental approaches to cognitive science.		
At least one course must be in each language and vision.		
Basic Computation		
Three courses. Following are examples of courses that apply:		
AS.050.670	Mathematical Models of Language	
AS.050.671	Bayesian Inference	
AS.050.672	Foundations of Neural Network Theory	
EN.601.675	Machine Learning	
Integration		
AS.050.626	Foundations of Cognitive Science	
Research Ethics		
AS.360.625	Responsible Conduct of Research (encouraged to complete in first year)	
Depth: Area of Focus in Computation CogSci		
6-8 courses selected in conjunction with advisor(s) to achieve depth and expertise in CCS. Lab meetings may be used to fulfill this requirement. Following are examples of courses that apply:		
AS.050.660	Computational Psycholinguistics	
AS.050.675	Probabilistic Models of the Visual Cortex	
EN.601.665	Natural Language Processing	
EN.601.769	Events Semantics in Theory and Practice	
EN.601.783	Vision as Bayesian Inference	
Professional Development		
AS.050.860	Professional Seminar in Cognitive Science (two mini sessions or one semester-long course)	
Teaching Assignments		
AS.050.849	Teaching Practicum (x3-5 semesters depending on external funding.)	
Two Research Papers		
Dissertation Proposal		
Graduate Board Oral Exam (Dissertation Defense)		

Linguistics, Minor

Linguistics Minor Requirements

https://cogsci.jhu.edu/undergraduate/linguistics-minor/

A minor in linguistics is available to undergraduates majoring in any department, except for cognitive science majors who choose linguistics as a focal area. Students intending to minor in linguistics should declare their intention, preferably by the beginning of junior year.

The minor requires successful completion of the following with a grade of C- or better.

Code	Title	Credits
Foreign Language		
One foreign language through the intermediate level OR two foreign languages at the elementary level.		12-16
Linguistics Courses		
Six courses in linguistics from the Linguistics focal area. *		18
At least four courses must be at the 300-level or above, excluding research, readings, and practica.		
Total Credits		**30-34**

* Qualifying Linguistics courses are found on our departmental website. (https://cogsci.jhu.edu/undergraduate/cognitive-science-major/) However, please note that courses change over time, and some courses are not offered every year. Offered linguistics courses are identifiable in SIS (https://sis.jhu.edu/sswf/) by the POS-Tag "COGS-LING". Questions about which courses qualify may be directed to the Cognitive Science Director of Undergraduate Studies. (https://advising.jhu.edu/completing-your-degree/directors-of-undergraduate-studies/)

Comparative Thought and Literature

http://compthoughtlit.jhu.edu/

The faculty of the Department of Comparative Thought and Literature shares an ongoing commitment to questions at the intersection of literature, philosophy and aesthetics. Central to these concerns is the analysis of literary and philosophical texts, ranging across a set of diverse traditions, genres, and languages, in juxtaposition to ethics, religion, history, art history, anthropology, media studies, political theory, and the natural sciences. Questions of literary theory, the history and value of literature, and the constitution and development of philosophical and literary forms in a global context are similarly at the forefront of the department's research and teaching.

The department's interdisciplinary nature is one of its main strengths and provides crucial common ground for scholars from humanities departments across the university. Faculty members work in a variety of fields but are unified by a common investment in intellectual curiosity, flexibility, open-mindedness, and careful reading and criticism. Graduate students are encouraged to undertake projects addressing authentic philosophical or theoretical problems without the restriction of disciplinary conventions. Students may also cultivate strong ties with faculty in other departments working in their areas of interest.

Every year, the department hosts at least two associates, who are faculty members from other institutions that stay for an extended period to present lectures, give seminars, and interact with faculty and students. Previous and current associates include many distinguished scholars, such as Anita LaFrance Allen, Susan James, Barbara Cassin, David Wellbery, Robert Pippin, Jean-Luc Marion, Eli Friedlander, Sari Nusseibeh, and Toril Moi.

History

In the mid-20th century, the department, which was then known as the Humanities Center, was established as a meeting ground for the various humanities departments. With Charles Singleton as its first director, the center aimed to strengthen the humanities at Johns Hopkins and provide a place where scholars could engage in theoretical reflections on the human sciences, including recent European movements such as structuralist thought and literary hermeneutics.

The department's first full academic year was 1966–67, and from the outset, its founders sought to establish a focal site for structuralism in the U.S., based on the model of the "sixième section" of the École Pratique des Hautes Études in Paris or the Institut für Sozialforschung at the University of Frankfurt. The conference held in the fall of its inaugural year, "The Languages of Criticism and the Sciences of Man: The Structural Controversy" brought many of the leading figures of European thought together in the U.S. and continues to be cited as both the substantial introduction of structuralist thought into the American academy and an important moment of transition between structuralism and post-structuralism. This model of exchange and innovation continued into the 21st century with a robust program of visiting scholars, professors, and lecturers.

As of January 1, 2018, the name of the Humanities Center has been changed to Department of Comparative Thought and Literature. The new name recognizes the department's ongoing commitment to serious interdisciplinary study, with a focus on questions at the intersection of literature, philosophy, and aesthetics. It also represents the various literatures, philosophies, religions, political systems, cultures, and methodologies that its faculty studies and applies.

The department offers several courses taught by its faculty. These courses provide a broad introduction to the documents and thought of Western culture for all students, from those interested in a general liberal arts preparation to those in one of the university's pre-professional programs.

For qualified juniors and seniors preparing for graduate school, the department also offers the opportunity to pursue an independent and often interdisciplinary research project through the Honors Program (p. 1751).

The Department of Comparative Thought and Literature does not offer a departmental major or minor. Students who wish to concentrate on the courses that it offers should consider a major in another humanities department.

Programs

- Honors Program in the Humanities (p. 1751)
- Humanistic Studies, PhD (p. 1751)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.300.102. Great Minds. 3 Credits.
Introductory survey of foundational texts of modern philosophy, social and political thought, and literature. This semester will include works by Plato, René Descartes, Immanuel Kant, Karl Marx, Virginia Woolf, Ludwig Wittgenstein, Iris Murdoch, Cora Diamond, Judith Butler, Kwame A. Appiah, Jacques Derrida, and others. The course is taught in lectures and in seminar discussions.

AS.300.145. Humanities Collaboratory. 3 Credits.
The Humanities Collaboratory is designed for new researchers from across the humanities as they gain the applied skills and experience to conduct their own independent research projects in the humanities. The Humanities Collaboratory model uses a high-tech classroom to allow students and instructors to work, learn, and research together. Three sections of this course will share a core list of materials focused on humanities research techniques, but your primary course materials will be individually selected. Students will have the unique opportunity to participate in a humanities lab section where all three course sections merge for discussion. You will choose your own topic to research with no limits of time period, subject, or genre, and through constant collaborative and independent research, each student will develop the expertise in that topic to both write a research paper and create a final oral presentation.
Area: Writing Intensive

AS.300.207. The American Literature of the Movies. 3 Credits.
This course brings the question of film's status as art into historical focus by approaching it through the various forms of writing that cinema inspired. Following a brief historical and philosophical preamble, each of the three sections will present a literary vantage point on the movies: "inside," "outside," and "alongside." The "alongside" section centers on poets who incorporated film into an adjacent art form, the "inside" section centers on those within the moviemaking industry who wrote about it in their fiction, and "outside" on those who criticized and theorized it. Films that exemplify the issues at hand will accompany each section. Relevant scholarly and theoretical texts elucidate the topics, texts, and films of concern. Students will have the opportunity to read works by H.D., Hart Crane, F. Scott Fitzgerald, James Agee, and other notable writers from the first half of the 20th century.
Area: Writing Intensive

AS.300.227. Business Fictions. 3 Credits.
When you are working for a company, how do you distinguish your ideas, actions, and responsibilities from the firms'—if that is even possible? What is corporate culture or a corporate person, and how is it similar or different from any other kind of culture or person? These and related questions inspired and fascinated writers from the nineteenth century through the present. By reading and thinking about short stories, novels, film, a television series, and a play, we will explore these issues and potential resolutions to them. The course especially considers how problems of action, agency, and responsibility become an intriguing challenge for writers of a variety of modern and contemporary fictions of the business world. Texts will include short stories by Herman Melville, Alice Munro, Ann Petry, and John Cheever; novels by Willa Cather, F. Scott Fitzgerald, and Lydia Millet; films, plays, and television by Charlie Chaplin, David Mamet, and Dan Harmon (Community).

AS.300.300. Honors Seminar. 3 Credits.
The Honors Seminar is a mandatory component of the Honors Program in Humanities, which offers qualified undergraduates the possibility of pursuing an independent research project in their Junior and Senior years in any humanistic discipline or combination of disciplines: intellectual history, comparative literature, philosophy, critical theory, psychoanalysis, religion, film, etc., as well as points of intersection between the arts and the sciences. Sophomores who plan to study abroad in their Junior year should also consider applying to the Program. In the 2021-2022 academic year, the Seminar will focus on a close reading of Tolstoy's The Death of Ivan Ilych and associated texts by Plato, Montaigne, Heidegger, Beauvoir, Levi, Gawande, and others on death and dying.

AS.300.301. Women and Work in the US. 3 Credits.
This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women's labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women's work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

AS.300.311. Introduction to Intellectual History. 3 Credits.
This course offers a conceptual and historical introduction to Intellectual History. What makes the "history of ideas" different from the history of other objects? What, if anything, distinguishes the history of ideas from the history of philosophy? What is it exactly that we call "ideas"? In what sense do they have a history? These are examples of the kind of questions addressed in the course.

AS.300.312. Imagining Revolution and Utopia. 3 Credits.
What form should revolution take, and what should society look like after the revolution? What would happen to the state, family, home, status of women, human interrelations, and everyday life? These questions consumed radicals in 19th century Russia and Europe, and their answers helped to shape the political culture of the 20th century. This course examines theories of revolution and utopia and responses to them in literature, art and film. Primary case study is Russia and the Soviet Union, with a comparative look at influential European works.
Area: Writing Intensive

AS.300.317. The Russian Novel. 3 Credits.
This course introduces students to the nineteenth century Russian novel and considers its lasting impact on world culture. We will read classic masterpieces of the psychological and philosophical novel, and their experimental forerunners. Short lectures on historical and cultural context and on methods of literary analysis will be combined with intensive group discussion. Novels include Anna Karenina, Crime and Punishment, Eugene Onegin, Dead Souls, and Hero of our Time.
Area: Writing Intensive

AS.300.319. The Modernist Novel: Mann, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Thomas Mann, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the "luminous halo" of life.
Area: Writing Intensive

AS.300.322. Lu Xun And His Times: China's Long 20th Century And Beyond. 3 Credits.
The "founding father of modern Chinese literature," Lu Xun (1881-1936) saw himself as a contemporary of writers like Gogol, Ibsen, and Nietzsche in creating his seminal short stories and essays, and likewise, he has been seen by numerous Chinese, Sinophone, and East Asian writers as their contemporary since his lifetime until today. In this course, we will survey Lu Xun's canonical works and their legacies through a comparative approach. What echoes do Lu Xun's works have with the European and Russian texts he engaged with? Why did his works manage to mark a "new origin" of Chinese literature? How were his works repeated, adapted, and appropriated by Chinese writers from the Republican period through the Maoist era to the post-socialist present, even during the Covid-19 pandemic? How do we assess his cross-cultural reception? Are his times obsolete now that China is on the rise? Or, have his times come yet? Through our comparative survey, Lu Xun's works and their afterlives will offer us a window onto China's long twentieth century and beyond in a transnational context. All materials are provided in English translation.

AS.300.323. Shakespeare and Ibsen. 3 Credits.
William Shakespeare and Henrik Ibsen are the two most frequently performed playwrights in history, and both have been credited with reinventing drama: Shakespeare for the Elizabethan stage and Ibsen for the modern. In this course we will pair together plays by each author – those that stand in an explicit relation of influence as well as those that share a significant set of concerns – in order to investigate how each takes up and transform key problems in the literary, political, and philosophical tradition for their own historical moment. Plays to be studied: by Shakespeare, A Midsummer Night's Dream, Hamlet, Othello, King Lear, The Tempest, A Winter's Tale; by Ibsen, St. John's Night, Hedda Gabler, Rosmersholm, The Wild Duck, The Master Builder, When We Dead Awaken.

AS.300.324. Cinema of the 1930s: Communist and Capitalist Fantasies. 3 Credits.
Comedy and musical comedy film flourished in the USA during the Great Depression as well as in the USSR during the Stalinist Great Terror. This course will compare films of the era in a variety of genres (musical, epic, Western, drama), examining the intersections between politics and aesthetics as well as the lasting implications of the films themselves in light of theoretical works on film as a medium, ethics and gender.

AS.300.328. Contemporary Sinophone Literature and Film. 3 Credits.
A survey of contemporary literature and film from the peripheries of the Chinese-speaking world, with a special focus on Hong Kong, Taiwan, and overseas Chinese communities in Southeast Asia, the Americas, and Europe. We will not only examine literary and filmic works in the contexts of the layered histories and contested politics of these locations, but will also reexamine, in light of those works, critical concepts in literary and cultural studies including, but not limited to, form, ideology, hegemony, identity, history, agency, translation, and (post)colonialism. All readings are in English; all films subtitled in English.

AS.300.330. Modern East Asian Literatures Across Boundaries. 3 Credits.
Modern literature in East Asia is as much defined by creation of national boundaries as by their transgressions, negotiations, and reimaginations. This course examines literature originally written in Chinese, Japanese, and Korean in light of contemporary understandings of political, social, and cultural boundary demarcation and crossings. How do experiences of border-crossing create and/or alter literary forms? How, in turn, does literature inscribe, displace, and/or dismantle boundaries? Our readings will include, but not limited to, writings by intra- and trans-regional travelers, exiles, migrants, and settlers; stories from and on contested borderlands and islands (e.g. Manchuria, Okinawa, Jeju); and works and translations by bilingual authors. All readings are provided in English translation.

AS.300.331. The Authoritarian Image: Russian Cinema from Stalin to Putin. 3 Credits.
Vladimir Putin's charismatic authority has a deep history in Russian culture. We'll investigate that history through cinema, which Lenin called "the most important of the arts." While Soviet cinema often served as immersive propaganda, directors also found ways to question authority and power. Films to be screened range from Sergei Eisenstein's Ivan the Terrible (1944) to the 2013 documentary Pussy Riot: A Punk Prayer. This course will combine study of Russian and Soviet culture from the end of World War II to the present with study of film history, style, and technique.
Area: Writing Intensive

AS.300.332. From Chekhov to Chernobyl: Russian Literature of Environmental Catastrophe. 3 Credits.
Environmental degradation and disaster offer a steady backdrop to the 20th century in Russia and the Soviet Union. While the Soviet regime promised mastery over the environment and Russian culture valorized the harmonization of humans with the natural world, environmental catastrophe proved the folly of those dreams. We will read works by authors who havegrappled with this ongoing catastrophe and its implications for relations between human beings and the world. Texts range from short stories and novellas to modernist experimental fiction and documentary prose. We will also engage with materials in special collections and screen selected films. Authors include: Chekhov, Bulgakov, Platonov, Solzhenitsyn, Rasputin,Petrushevskaya, and the Nobel laureate Svetlana Alexievich.
Area: Writing Intensive

AS.300.334. Love and its maladies. 3 Credits.
Much of what we know about love and desire we owe to fiction's ability to evoke these experiences. Consider for example that the publication, in Germany, of The Sorrows of Young Werther inspired young men across Europe to dress and behave just like this lover. Just as nowadays film and television represent, as well as mold our conceptions of love, love-stories from the eighteenth-century onwards have given shape to gendered subjectivities in ways that still matter now. As, intriguingly, illness is a recurrent theme in many modern love stories, we will be prompted to decipher signs and symptoms in the bodies of mind of our protagonists. Why is it that in Western cultures, passion is tightly interwoven with a landscape of pain, suffering, and disease? In studying texts that represent major aspects of a romantic sensibility, we are indeed invited to trace the steps of a history of the body increasingly defined by gender and by medical knowledge. The readings for this class (all available in English) include: Austen, Persuasion; Balzac, The Unknown Masterpiece; Barthes, Lover's Discourse; Goethe; The Sorrows of Young Werther; Mann, Death in Venice; Winterson, Written on the Body.

AS.300.336. Forms of Moral Community: The Contemporary World Novel. 3 Credits.
Literary and philosophical imaginations of moral community in the post-WWII period. Texts include: Coetzee, Disgrace; McEwan, Atonement; Achebe,Things Fall Apart; Ishiguro, An Artist of the Floating World; Roy, The God of Small Things; Lessing, The Grass is Singing; Mistry, A Fine Balance; Morrison, Beloved; and essays by Levi, Strawson, Adorno, Murdoch, and Beauvoir on the deep uncertainty over moral community after the crisis of World War II. Close attention to novelistic style and narrative will inform our study of the philosophical questions that animate these works. What does it mean to acknowledge another person's humanity? Who are the members of a moral community? Why do we hold one another responsible for our actions? How do fundamental moral emotions such as contempt, humiliation, compassion, gratitude, forgiveness, and regret reveal the limits of a moral community?

AS.300.337. The Tragic Tradition. 3 Credits.
This course offers a broad survey of tragic drama in the Western tradition, from its origins in ancient Greece to the twentieth century. In weekly lectures and discussion sections, we will study the specific literary features and historical contexts of a range of different works, and trace the continuities and transformations that shape them into a unified tradition. Key questions and themes throughout the semester will include what counts as tragic, the tragedy of social and political conflict, the bearing of tragedy on the meaning and value of life, the antagonistic relation between world and humans, the promises and dangers of tragedy for contemporary culture. Authors to be studied: Sophocles, Euripides, Seneca, Shakespeare, Racine, Goethe, Ibsen, Strindberg, Chekov, Brecht, Pirandello, and Beckett.

AS.300.339. Introduction to Comparative Literature. 3 Credits.
This course offers an introduction to the history, theory, and praxis of comparative literature. We will read texts from some of the founding figures of the discipline and look at the most recent debates in the field, including translation studies, literary theory, and world literature, among others. Particular attention will be given to the methodologies and problems of studying literatures in different linguistic traditions and the relation between literature and other areas of thought and culture, such as philosophy, art history, and psychoanalysis. Case studies in comparative approaches to literature will provide concrete examples to our discussions.

AS.300.340. Literature and Film of Unintended Consequences. 3 Credits.
Sometimes brilliant ideas and plans don't work as anticipated, or go very badly—for example, empowering the "invisible hand" of the market, building a huge hydroelectric dam, or plotting a double murder by two strangers. This course explores these and other fascinating literary instances of unintended consequences—the unanticipated results of actions that people planned ending up a very different way. Reading or watching mainly twentieth-century American literature and movies, as well as some essays and poetry, we will follow a range of different creators as they think about unplanned effects and why they matter. What can these works tell us about how we intend, act, or make meaning at the limits of our control? Texts will include films by Charlie Chaplin, Billy Wilder, and Alfred Hitchcock, poetry or fiction by Wallace Stevens, Patricia Highsmith, and Zadie Smith.
Area: Writing Intensive

AS.300.341. Transwar Japanese and Japanophone Literatures. 3 Credits.
A survey of Japanese and Japanese- language literatures produced in Japan and its (former)colonies during the "transwar" period, or the several years before and after the end of WWII. This periodization enables us to take into account the shifting boundaries, sovereignties, and identities amid the intensification of Japanese imperialism and in the aftermath of its eventual demise. We aim to pay particular attention to voices marginalized in this political watershed, such as those of Japanese-language writers from colonial Korea and Taiwan, intra-imperial migrants, and radical critics of Japan's "postwar" regime. Underlying our investigation is the question of whether literature can be an agent of justice when politics fails to deliver it. We will introduce secondary readings by Adorno, Arendt, Levinas, Derrida, and Scarry, among others, to help us interrogate this question. All readings are in English.

AS.300.343. The Cinema of Revolution. 3 Credits.
This course examines global political revolutions through cinema and the ways in which cinema helped to make political revolutions. Early cinema was intimately intertwined with the Russian revolution, and Russian revolutionary cinema had a profound impact on the ways in which media was used for revolutionary purposes through the 20th century and around the world. Students will be introduced to films from a number of different countries, and the history and context of their production and reception. They will also learn methods of film analysis and produce their own video essay.

AS.300.344. Literature and the World. 3 Credits.
This course interrogates how modern literature not simply reflects the world but functions as world-making power. What is a world? How do we conceive of, live in, and change it? What if there are multiple worlds? How are literature and other aesthetic forms crucial to tackling these questions? We will survey literary and philosophical texts in a comparative setting, engaging examples from both Europe and East Asia. All readings are in English. Open to graduate students.
Area: Writing Intensive

AS.300.345. Narrative Imagination in Philosophy and Literature. 3 Credits.
We are constantly immersed in narratives or, as Roland Barthes said, narrative "is simply there like life itself. . . international, transhistorical, transcultural." As a bridge between experience and language, narrative informs the way we understand history, gender, politics, emotion, cognition and much more. Through reading a series of philosophical and literary texts, this course will provide a systematic understanding of how narratives are composed, how they are experienced, and eventually, how they evolve. The first part of this course will focus on building a foundation in the formal study of narrative, focusing on elements such as genre, plot, character, narrator and reader. We will start with a brief consideration of ancient approaches to literary narrative in Aristotle's Poetics and Plato's Republic. From there, we will engage with a wide range of readings in narrative theory. The second part of the course will focus on critical approaches to narrative, such as gender and narrative, social and political critique of narrative, narratives in the age of artificial intelligence, and conclude with the evolving concept of narrative in the Anthropocene.

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.348. Modern Drama. 3 Credits.
This course offers a survey of modern drama, from the mid nineteenth century to the present. We will sample a broad range of dramatic styles and movements in order to uncover the variety of ways theatre has made sense of the human experience over the past two hundred years.

AS.300.349. Capitalism and Tragedy: from the 18th Century to Climate Change. 3 Credits.
In contemporary discussions of climate change, it is an increasingly prevalent view that capitalism will lead to the destruction of civilization as we know it. The notion that capitalism is hostile to what makes human life worth living, however, is one that stretches back at least to the early eighteenth century. In this class, we will examine key moments in the history of this idea in works of literature, philosophy, and politics, from the birth of bourgeois tragedy in the 1720s, through topics such as imperialism and economic exploitation, to the prospects of our ecological future today. Authors to be studied: George Lillo, Balzac, Dickens, Marx and Engels, Ibsen, Weber, Brecht, Arthur Miller, Steinbeck, Pope Francis, and contemporary fiction, politics and philosophy on climate change.

AS.300.366. Russian Avant-Garde Cinema. 3 Credits.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.367. Seeing Like a Woman. 3 Credits.
What does it mean to “see,” think, desire, feel, speak, act, or write “like a woman”? Gendered notions of seeing have had an impact on politics and society long before the #metoo movement and far beyond debates about women’s rights in isolation. This seminar examines the issues of female desire, subjectivity, spectatorship and performance in fiction, poetry, memoir and film from a variety of cultures and theoretical perspectives. This is not a course on “the image of the woman” in literature, film or politics, but a course in which we examine the ways in which both male and female theorists, novelists, poets, and filmmakers have imagined how women “see,” feel, think and behave.
Area: Writing Intensive

AS.300.399. Cinema and Philosophy. 3 Credits.
What do films and philosophy have in common? Do films express, with their own means, philosophical problems that are relevant to our experience of ourselves and the world we live in? This term we will study such issues with a particular focus on questions of justice, truth, revenge, forgiveness, hope, hate, and fear.

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.410. China in Imagination. 3 Credits.
What is China? This question has gained new relevance amid the nation’s recent rise as a global power. We survey how China was imagined, represented, and conceptualized in literature, film, and philosophical writings from mainland China, overseas Chinese communities, East Asia, and the West from the late nineteenth century to the present. Through exploring this complex history, we aim to understand China and the contemporary world in a diversified, historically self-reflective way. Topics of discussion include, but not limited to, representation, identity, form, allegory, exile, diaspora, modernism, translation, world history, and universality. All readings are in English; all films subtitled in English.

AS.300.418. The Modernist Novel: James, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Henry James, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the “luminous halo” of life.
Area: Writing Intensive

AS.300.421. Introduction to Concepts and Problems of Modern Philosophy, Aesthtics, and Critical Theory. 3 Credits.
This seminar is addressed to first and second year graduate students as well as to advanced undergraduates. It aims at providing a survey of some fundamental concepts and problems that shape modern and contemporary debates in philosophy, literary studies, and the humanities at large. This term we will study in particular notions of existence, language, truth, power, otherness, race, gender, and reality.
Area: Writing Intensive

AS.300.425. Modernities and Comparison. 3 Credits.
Comparative survey of literary modernities in Europe and East Asia (China, Japan, and Korea). We will study works of modern literature as well as critical and philosophical texts from these civilizations in each other’s light. We will, as a working hypothesis, begin our examination by bracketing off the conventional center-periphery (Europe-Asia) scheme and considering literary modernities to be singular and contested, yet mutually resonating attempts at reconstruction, restoration, and revolution vis-à-vis the deconstructive forces of capitalist modernity. Ultimately, we will interrogate how we should understand literary modernities in the plural, as they emerged in distant civilizations. Topics of discussion include decadence, repetition, the trope of the human, ideology, the sublime, ritual, and translation. Readings in Hegel, Nietzsche, Mann, Benjamin, Baudelaire, Proust, Breton, Soseki, Kobayashi, Wang Guowei, Lu Xun, and Yi Kwangsu. All readings are in English.

AS.300.437. Literature and Philosophy of the Everyday. 3 Credits.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

AS.300.439. Stories of hysteria. 3 Credits.
Many are the stories that recount episodes of hysteria, and we owe them not only to medicine. To the modern observer, they are a puzzle, involving strange beliefs about wandering wombs, demonic possession, and female virtue (or lack thereof). Closer to our time, contemporary media, as well as accounts in the social and clinical sciences have evoked cases of "mass hysteria" in America and across the globe. Marriage, it was thought for a long time, might be the best cure, which might be the reason case-studies of this illness can be as intriguing and troubling as novels. Against a backdrop of medical and historical materials, we will examine a selection of stories, from the 17th century onward, that evoke aspects of hysteria. They serve as our case-studies and as prompts to study an illness born at the convergence of histories and myths, of medical science, and of cultural and gender assumptions. Among the notions we will explore: The birth of psychoanalysis, trauma and PTSD, the concept of repression, the visual aspects of an illness and its spread in the arts, including cinema.

AS.300.501. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.300.508. Honors Seminar. 3 Credits.
The Honors Seminar is a mandatory component of the Honors Program in Humanities, which offers qualified undergraduates the possibility of pursuing an independent research project in their Junior and Senior years in any humanistic discipline or combination of disciplines: intellectual history, comparative literature, philosophy, critical theory, psychoanalysis, religion, film, etc., as well as points of intersection between the arts and the sciences. Sophomores who plan to study abroad in their Junior year should also consider applying to the Program. In the 2021-2022 academic year, the Seminar will focus on a close reading of Tolstoy's The Death of Ivan Ilych and associated texts by Plato, Montaigne, Heidegger, Beauvoir, Levi, Gawande, and others on death and dying.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.300.601. How to Read Proust?.
Given the difficulty of his prose, closely and patiently would seem the best way to read Proust, but who has time – time to read a book that, ironically, begins with "Longtemps" and ends with "le temps"? This course will offer for critical examination surgically selected passages of A la Recherche du Temps Perdu as a training ground for the (lost?) art of close reading and as entry points into wide-ranging aspects of literary criticism and theory.Open to advanced undergraduates with permission of the instructor.Taught in English. Knowledge of French is desirable, but not required.

AS.300.608. The Physics and Metaphysics of Handwriting.
When word processing machines that can be held in the palm of a hand, why use pen and paper? Handwriting -- and its juxtaposition against digital forms of communication -- offers a unique approach to studying human interactions and the ways in which meaning, truth, intimacy, and agency are shaped by our changing technologies. At a time of exponential growth in machine writing, a study of this older form of communication enables a comparative approach that, perhaps surprisingly, opens up what are contemporary political questions. Centered on a few case-studies involving works by Sand, Chopin, Manet, Giacometti, Mallarmé, and Proust, this course takes a backward glance at a culture of written expression at a great remove from our word processing world and yet explicitly vested in an aesthetics of free expression. This modern graphological culture saw in the tracings of the hand, the uniquely personal marks of an intertwining of mind, body, and of subjectivity. Merleau-Ponty and recent word on embodiment will provide us with critical tools for our investigations into the "physics" of this activity, as will the methods of textual criticism and the new domain of creativity studies. The "metaphysics" of handwriting call, meanwhile, for a return to Heidegger, to Derrida and other major contemporary theorists of writing. They will help us see how hand and digital writing emerge as fundamentally different modes of human expression – philosophically and politically. Knowledge of French is not required for this course. Undergraduates accepted with the permission of the professor.

AS.300.613. Modern Drama.
This course offers a survey of modern drama, from the mid nineteenth century to the present. We will sample a broad range of dramatic styles and movements in order to uncover the variety of ways theatre has made sense of the human experience over the past two hundred years.

AS.300.614. The End of Art.
In this course we will examine Hegel's seminal claim that art has come to an end in the modern world. In addition to Hegel's original argument, readings will include important elaborations of the idea by Kierkegaard, Heidegger, and Adorno. In a final section of the course, we will relate these texts to reflections on the function and prospects of art under the unprecedented condition of the Anthropocene.

AS.300.617. Philosophy and Literature in Either/Or.
Celebrated and reviled alike, Kierkegaard's 1843 Either/Or has been viewed as both the culmination of the Enlightenment project and the birth of existentialism, a playful work of romantic literature and a piece of late-Hegelian philosophy, a vindication of the secular everyday and the articulation of a modern faith in a transcendent God. In this course we read the work closely and in its entirety and pay particular attention to the relation between its philosophical arguments and literary forms of presentation.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

AS.300.620. Cosmopolitanism: Conflicted Legacies, Potential Futures.
In its modern version cosmopolitanism is a defining aspect of Enlightenment that bespeaks its emancipatory aspirations as well as the shortcomings of its Eurocentric and gendered presuppositions. In our time of resurgence of violent nationalisms and mass refugees crises, this seminar aims at reassessing the conflicted legacies of cosmopolitanism and its critical value for the present. Authors studied include: Montaigne, Kant, Marx, Derrida, Lévinas, Kwame A. Appiah, Seyla Benhabib, and others.

AS.300.621. Immersive Poetics and Permeable Screens.
Victor Shklovsky claimed that the art exists "to return sensation to life, to make us feel objects, to make a stone feel stony." This seminar examines various ways of understanding Shklovsky's concept of ostranenie ("enstrangement") across media (literature, art, cinema, and beyond) and in comparative perspective, considering the problematics of politics, philosophy, and aesthetic form. Students will be encouraged to present on texts in their own area of expertise over the course of the term.

AS.300.622. The Concept of World: From Descartes to the Apocalypse.
In this course we will examine the idea of the world as it operates in a range of different literary, philosophical, and theoretical contexts. Beginning with the birth of the modern world in texts like Camões's "The Lusíads," Descartes's "Le Monde," and More's "Utopia," we will pursue its evolution through Baumgarten's invention of aesthetics, Kant's critique of dialectical reason, Husserl's phenomenology, and Heidegger's fundamental ontology, to the rise of world literature and the study of indigenous cosmologies in contemporary anthropology. We conclude with reflections on the end of our world in the Anthropocene and its implication for the humanistic disciplines. This course serves as the proseminar in methods and theory for graduate students in Comparative Thought and Literature but is open to students in all departments.

AS.300.624. Logics of Recognition.
Since the publication of Hegel's Phenomenology of Spirit, the struggle of consciousness for recognition has played an important role in moral and political philosophy. This seminar aims at studying Hegel's account of subjectivity and its antagonistic encounter with the other as well as the responses and critiques it has elicited in contemporary philosophy. Readings include Foucault, Butler, Derrida, Lévinas, Cavell, Honneth and others.

AS.300.625. Russian Literary and Critical Theory.
Close reading of major authors from the Russian literary theoretical and critical tradition including Bakhtin, Eikhenbaum, Jakobson, Lotman, Shklovsky and Tynianov. Student will present primary sources or case studies from their own fields and research.

AS.300.628. Introduction to Concepts and Problems of Modern Philosophy, Aesthtics, and Critical Theory.
This seminar is addressed to first and second year graduate students as well as to advanced undergraduates. It aims at providing a survey of some fundamental concepts and problems that shape modern and contemporary debates in philosophy, literary studies, and the humanities at large. This term we will study in particular notions of existence, language, truth, power, otherness, race, gender, and reality.

AS.300.629. Theory, Now and Then: Autonomy, Form, Critique.
This course explores recent developments and disputes in critical theory in relation to their longer philosophical genealogies. The three topics—form, autonomy, and critique—have been the subject of much recent debate, contention, and new analysis, yet each was also a source of critical and philosophical interest in years past. Our aim will be to make sense of today's interventions in conversation with earlier theory. "Historical" theory writing will include Adorno, Lukács, Cavell, and Jameson; contemporary theory will include Nicholas Brown, Rita Felski, Caroline Levine, Mark McGurl, and Toril Moi.

AS.300.631. On Literature and Ethics.
Arguments for the immorality of literature, the morality of literature, and the amorality of literature. Can a literary text be evaluated on ethical grounds, and how? How do literary texts make ethical arguments? What does it mean to read literary texts or do literary criticism in an ethical mode? We will be concerned throughout with the philosophical uses, and abuses, of literary forms.
Area: Writing Intensive

AS.300.635. Foucault's Late Seminars: the Courage of Truth and the Care of the Self.
In his latest seminars Foucault shifts his attention from power relations and historical scientific paradigms to the study of the history and philosophical, ethical, and political implications of the knowledge and care of the self as well as its relation to truth. In our current context, where speaking of a supposed "post-truth" epoch is commonplace, the analysis of the later works of Foucault provides precious insights in the nature of subjectivity, social and power relations, and the enduring significance of the search for truth regardless of any particular epistemological attempt to define what 'truth really is.'

AS.300.638. Happy and Unhappy Words: Austin, Wittgenstein, and Cavell.
This seminar studies how words help shaping the world we inhabit and how the power and limits of language affect the possibility of living in a shared world in the works of Austin, Wittgenstein, Cavell and others.
Area: Writing Intensive

AS.300.639. Literature and Philosophy of the Everyday.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

AS.300.647. Comparative Methods and Theory: Formalism and Materialism (Graduate Pro-Seminar).
This pro-seminar provides a brief overview and map of the theoretical and philosophical positions in the major debate, still ongoing, between formalism and materialism. Its aim is both theoretical and historical: to help graduate students understand the range and depth of these positions as well as their development over time, continuing to this day. We will study fundamental philosophical works (Kant, Hegel, Marx, de Beauvoir), classic theoretical texts (Propp, Lévi-Strauss, Foucault, Derrida, Bourdieu), and contemporary variations on these debates (Fish, McGurl, Moi, Pippin), to name a few. The course fulfills the pro-seminar requirements in comparative methods and theory for CTL but is open to all graduate students.

AS.300.666. Russian Avant-Garde Cinema.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.802. Independent Study Field Exam.

AS.300.803. Dissertation Research.

AS.300.804. Dissertation Research.

AS.300.805. Literary Pedagogy.

AS.300.810. Thesis Seminar.
Thesis Seminar.

AS.300.811. Independent Study.
New course

AS.300.891. Summer Research.
Summer Research

Cross Listed Courses

Computer Science

EN.601.769. Events Semantics in Theory and Practice. 3 Credits.
This course explores selected topics in the nature of event representations from the perspective of cognitive science, computer science, linguistics, and philosophy. These fields have developed a rich array of scientific theories about the representation of events, and how humans make inferences about them -- we investigate how (and if) such theories could be applied to current research topics and tasks in computational semantics such as inference from text, automated summarization, veridicality assessment, and so on. In addition to classic articles dealing with formal semantic theories, the course considers available machine-readable corpora, ontologies, and related resources that bear on event structure, such as WordNet, PropBank, FrameNet, etc.. The course is aimed to marry theory with practice: students with either a computational or linguistic background are encouraged to participate. [Applications]

EN.601.783. Vision as Bayesian Inference. 3 Credits.
This is an advanced course on computer vision from a probabilistic and machine learning perspective. It covers techniques such as linear and non-linear filtering, geometry, energy function methods, markov random fields, conditional random fields, graphical models, probabilistic grammars, and deep neural networks. These are illustrated on a set of vision problems ranging from image segmentation, semantic segmentation, depth estimation, object recognition, object parsing, scene parsing, action recognition, and text captioning. [Analysis orApplications] Required course background: calculus, linear algebra (AS.110.201 or equiv.), probability and statistics (AS.553.311 or equiv.), and the ability to program in Python and C++. Background in computer vision (EN.601.461/661) and machine learning (EN.601.475) suggested but not required.

First Year Seminars

AS.001.146. FYS: Nature, Nurture, Cognition. 3 Credits.
Using both seminal and contemporary readings as a foundation, we will explore the foundations of cognition and how they support human cognitive development, focusing on how ‘nature’ and ‘nurture’ collaborate to shape development of the human mind. This semester, we will read at least three, and possibly four books, along with supplementary readings, as appropriate. Our focus will be on understanding the roles of nature and nurture in the context of typical and atypical development, including an understanding of how knowledge about objects, language, number, and other minds all emerge during human development, from infancy to adulthood, in typically and atypically developing individuals.

AS.001.189. FYS: Language, Advertising, and Propaganda. 3 Credits.
Advertising pervades our culture; interactions with advertising are an unavoidable fact of modern life. This class uses tools from linguistics and cognitive science to analyze these interactions, and understand the impact of advertising on its viewers. A central theme is to treat ads as communicative acts, and explore the consequences -- what can theories of communication (from linguistics, psychology, and philosophy) tell us about ads? How do ads use central features of human cognition to accomplish their aims? Do ads manipulate, and if so, how successfully? The theories of communication we explore include Gricean pragmatics, theories of speech acts, linguistic theories of presuppositions, and more. Students will collect, analyze, and discuss advertisements in all mediums.

Music

AS.376.371. Introduction to Music Cognition. 3 Credits.
What underlies our aesthetic response to music? How and why are we able to identify certain sounds as music? To what extent are music and natural language similar? What is it about music that evokes such powerful emotions such as happiness and sadness? What is unique to musical creativity? Examining such questions from cognitive science, neuroscience, psychology, and philosophical perspectives, this course explores relevant research and theory in the emerging domain of music perception and cognition. Students will complete a final research paper on the topic of their choice that integrates the course material.

AS.376.372. Topics in Music Cognition. 3 Credits.
This course explores the similarities and differences between music and language, the effects of musical training on cognitive development, and the expressive power of music, with an introduction to music and its role in film. We will read relevant research and theory on these topics from cognitive science, neuroscience, psychology, musicology, and philosophical perspectives.

Psychological & Brain Sciences

AS.200.313. Models of Mind and Brain. 3 Credits.
This is a seminar surveying computational approaches to understanding mental and neural processes, including sensory and conceptual representation, categorization, learning and memory. The course will also develop familiarity with computational tools such as numerical simulation, linear transformation and data visualization. Recommended Course Background: AS.110.106 / Calculus I OR AS.110.108 Calculus I, AS.050.101 / Cognition OR AS.200.211 / Sensation & Perception OR AS.080.105 / Introduction to Neuroscience OR other introductory coursework in cognitive & neural sciences. Experience with at least one programming language is strongly recommended.

Honors Program in the Humanities

Honors Program in the Humanities Requirements

Initiated in 1976, the Honors Program in the Humanities offers all qualified undergraduates the possibility to pursue an independent and often interdisciplinary research project, normally in their junior and senior years. Students can propose a topic in any humanistic discipline, including intellectual or cultural history, English and comparative literatures, women and gender studies, minority literatures and culture, film studies, anthropology, philosophy, etc. Past topics have also examined points of intersection between the arts and sciences, giving majors outside the humanities a chance to broaden and combine their studies through the program.

Application Process

Applications are accepted in the spring of the applicant's sophomore year. Second-semester freshmen who plan to study abroad in their junior year or who already possess the necessary qualifications are also encouraged to apply.

Applications may be submitted by email or in hardcopy to Prof. Yi-Ping Ong. All applications must include:

- A completed application form which can be found on the Comparative Thought and Literature website (https://compthoughtlit.jhu.edu/undergraduate/honors-program/), including the name of at least one faculty advisor
- Brief statement of purpose outlining the proposed thesis topic, with initial bibliography
- Unofficial transcript of undergraduate course work

Program Requirements

- Students must have above average performance in humanities courses.
- The proposed project should show coherence, focus, and seriousness of purpose.
- Each project must be sponsored by two faculty members, one of whom will be the primary advis0r. One advisor may be external to the university.
- Students must complete the research thesis and participate in the honors seminar for two years, the second of which must be the student's senior year.

Sample Program of Study

Sophomore Year (Optional)

Sophomores who plan to study abroad in their junior year and those who are ready to begin their honors research should consider participating in the honors seminar during their sophomore year.

Junior Year

1. Two courses chosen from relevant offerings in the Department of Comparative Thought and Literature curriculum.
2. A semester-long honors seminar for all students in the program, in which the general progress of the students' writing and research will be discussed, and senior students will present work-in-progress reports.
3. Optional independent study course on thesis project with one or both advisors.

Junior Agenda

- September-October: Students should identify and meet with prospective faculty advisors. Two faculty advisors are required for the final thesis; at least one of these advisors must be a Department of Comparative Thought and Literature faculty member or affiliate. Once students have received a commitment from two advisors to supervise the thesis, they should begin to compose a comprehensive reading list in consultation with their advisors.
- November-January: Using the reading list as a guide, students will conduct exploratory research in the field of their proposed project.
- February-March: Students will present a three- to five-page prospectus, which formulates the central questions of the thesis, in the honors seminar.

Senior Year

1. Independent study course in the spring semester dedicated to completing the thesis.
2. Two courses taught by department faculty members or affiliates.
3. Continued participation in the two-semester honors seminar with periodic "work-in-progress" reports and an oral presentation of the thesis research in the spring semester.

Senior Agenda

- All year: Students will complete their theses in consultation with their advisors and continue to attend the honors seminar.
- April-May: Students will present their final theses in the honors seminar.

Humanistic Studies, PhD

The department offers a PhD in humanistic studies, which includes a program in comparative thought and literature. Priority is given to highly-qualified candidates whose proposed course of study is congruent with faculty interests and strengths.

Financial Aid

Tuition grants, stipends, and teaching fellowships are available to doctoral candidates.

Program Requirements

Each PhD student works with a committee of faculty members who helps to design a coherent, individual program of study. During the first two years, the candidate works closely with each of their advisers. The course of study, seminars, and tutorials lead to three area examinations administered by the department and committee. During the second year, qualified students are invited to teach under faculty supervision, and occasionally students may offer undergraduate seminars of their own design.

PhD students choosing a focus in comparative literature should be competent in three national literatures and have a general familiarity with critical theory. Students are encouraged to spend at least one year studying abroad, usually working in Paris, Florence, Hamburg, Geneva, or Madrid in programs sponsored by the department or the Department of German and Romance Languages and Literatures.

Students can become supervised teaching assistants in the German Program in the Department of German and Romance Languages and Literatures, and they can earn a master's degree in German upon completion of the field examinations, before their doctoral degree is completed. Similar arrangements can generally be made with the

Department of Classics and the programs in the romance languages and literatures.

Advisors

New PhD students will work with the department chair to select a faculty member to serve as a primary academic advisor. As a student's interests become defined, they may change advisors or work with a faculty member in another department. Students who choose to work with a faculty member outside of the department should meet regularly with the Department of Comparative Thought and Literature's director of graduate studies.

Third-Year Review

During their third year of residence, after completing all outstanding seminar papers, students will have their work reviewed by a faculty committee. The committee will comprise three faculty members from the department and the faculty members from the other departments with whom the student plans to conduct field exams. The review allows the faculty to assess the student's progress, clarify their status in regards to remaining course work, and define future fields. Prior to the meeting, the student should circulate materials that they judge to be work that will best serve the purpose of the review.

Field Examinations

In their third and fourth years, students are expected to complete three field exams. The exams may serve to help students refine their dissertation topics, or they may be a means of extending and deepening students' knowledge of an area in which they propose to teach and conduct research.

The examinations may take a variety of forms, and the form should be discussed at the student's third-year review. Examples include:

- Work further on a project begun in a seminar and produce a longer paper that would become part of a dissertation
- Read into and across a particular field, writing a series of short papers on the reading or sitting for a written or oral examination on the material studied
- Design and teach an undergraduate course in an area of interest
- Complete the requirements for an MA degree in another department, as a way of strengthening claim to teach in that field

Undergraduate Teaching

Graduate students have many opportunities to develop their skills and confidence as a teacher. Beginning in the second year, students often serve as teaching assistants for courses taught by the department's faculty or, if appropriate, for courses in other departments. In the past, PhD students have taught courses in French and German language programs, English composition and literature, history, philosophy, and political science. More experienced students are encouraged to teach courses of their own invention as a way of completing a field exam, in competition for one of the Dean's Teaching Fellowships, or to add to the department's array of offerings.

Dissertation Review

A second formal review of a student's work will take place after the completion of field exams, either in the student's fourth year or in the fall semester of the fifth year. This review will connect the student with the faculty member with whom they will write a dissertation.

The review will take place when the student has composed a substantial piece of work associated with the dissertation, e.g., the draft of a chapter. This work will be circulated before the review, along with a prospectus of 10-40 pages, to the faculty members the student wishes to have as dissertation advisers. (If all of these advisers are from outside the Department of Comparative Thought and Literature, one of the department's faculty members, selected by the student, will also sit in on the review.)

This discussion is not intended to replace the graduate board oral, which will take place after the dissertation has been completed. However, it will mark the transition from work on the field exams to the preparation and writing of a dissertation.

Departmental Presentations

In their fifth year or beginning of their sixth year, students will give a talk on material from their dissertation to the students and faculty of the department and invited guests. This presentation gives students experience formally presenting their work. It also allows for a wider range of response to that work than a dissertation committee can provide and allows all students in the department to become better acquainted with each other's projects.

To apply, please submit the following to https://grad.jhu.edu/ (http://grad.jhu.edu/apply/apply-now/):

Official Application

Statement of purpose
Three letters of recommendation
Transcripts
Sample of work
Supplementary Application Form (Language Form)
GRE scores and subject (optional)
TOEFL/IELTS scores (if applicable)

Morton K. Blaustein Department of Earth and Planetary Sciences

http://eps.jhu.edu/

The Department of Earth and Planetary Sciences offers programs of study and research in a wide range of disciplines including atmospheric science, ecology, environmental science and studies, geology, geochemistry, geophysics, oceanography, and planetary science. The undergraduate major in Earth and Planetary Sciences is flexible and allows the student, in consultation with a faculty advisor, to devise a program of study that is both rigorous and individualized. The department also supports an interdisciplinary undergraduate program in Environmental Science and Studies (ENVS), which involves faculty from a range of departments across the university. The two ENVS majors and minor introduce students to the many ways in which humans interact with and affect the Earth. The Energy minor is a multi-school program jointly administered with the Department of Electrical and Computer Engineering in the Whiting School of Engineering and affiliated with the Ralph O'Connor Sustainable Energy Institute (ROSEI, https://energyinstitute.jhu.edu/).

The department's graduate program develops skills in research through independent investigation under the general guidance of one or more members of the faculty, backed up by relevant course work. Faculty expertise provides particular emphasis on the integration of experimental investigation, theoretical calculation, and quantitative field observations.

Undergraduate Programs

Earth and Planetary Sciences (EPS)

The Earth and Planetary Sciences major focuses on the study of the physical, chemical, and biological processes that shape the Earth and other planets. It is designed primarily for science students who wish to have a career involving research and study of the Earth and planets, although it is also suitable for students planning careers in the health professions.

Environmental Science and Studies (ENVS)

Program website: http://krieger.jhu.edu/envs (http://krieger.jhu.edu/envs/)

Undergraduate degrees are typically specialized within traditional disciplines, but a primary goal of the ENVS program is to develop the ability of students to think outside of those boxes. The program is solution-focused and trains students to help solve the environmental and sustainability problems facing society today using the powerful tools of science and policy. Students learn theory, research, and practical applications of the natural and social sciences in their coursework, while also examining the relationship between humans and the environment through the lens of the humanities.

The interdisciplinary Environmental Science and Environmental Studies majors and Environmental Studies minor introduce students to human-Earth interactions and processes, our complex relationship with the changing environment, and methods for solving environmental and sustainability problems. The Environmental Science major emphasizes the perspective of the natural sciences, while the Environmental Studies major emphasizes the social science perspective, but there is a set of common core courses shared by both these majors that create a strong interdisciplinary foundation. These majors prepare students for a variety of potential career paths, including both graduate study and entry-level jobs in an environmentally related field.

In addition to major requirements, students are required to complete the university requirements for the bachelor's degree. See Requirements for a Bachelor's Degree (p. 1587).

Energy Minor

The Energy minor is designed to allow students majoring in a diverse set of disciplines to develop additional expertise in energy, with a focus on the development of both technical skills and the science and policy context of modern energy issues. The goal is to position students to become leaders in the energy field, either directly as entering professionals in industry, government laboratories, and other organizations, or as students in the best graduate programs. For more information, see https://energyinstitute.jhu.edu/energy-minor/ (https://energyinstitute.jhu.edu/?page_id=5385&preview=true).

Facilities

The Department of Earth and Planetary Sciences is housed in Olin Hall, a modern building dedicated to the Earth sciences, nestled on a wooded knoll on the western edge of campus. Its facilities include state-of-the-art instrumentation, a departmental library, and modern computer equipment. There are laboratories for crystallography, evolutionary biology/ecology, stable isotope geochemistry, materials science, and fluid and solid mechanics. Olin Hall also contains equipment for modern petrographic work (including a computer-controlled image analysis system), darkroom facilities, and a laboratory for sectioning rocks. There is also a substantial collection of rocks, minerals, and fossils.

A JEOL 8600 electron microprobe in Olin Hall is available to all members of the department. Crystallographic facilities include a modern specimen preparation laboratory for transmission electron microscopy and single-crystal X-ray diffraction studies. The transmission electron microscopy laboratory houses state-of-the-art instruments capable of both high-resolution imaging at the atomic scale and microanalysis at the nanometer scale.

The department contains several computer laboratories containing clusters of workstations and personal computers, together with printers and scanners. These computers are used for numerical simulations, graphics applications, data manipulation, and word processing.

Field studies and excursions form an integral part of the program of instruction and research in geology and are closely integrated with the laboratory and course work. Situated at the fall line between the Coastal Plain and the Piedmont and only an hour's ride from the Blue Ridge and Appalachians, Baltimore is an excellent location for a department with a field-oriented program in geology. The department has a permanent field station for geological research, Camp Singewald, in the Bear Pond Mountains of Washington County, Maryland, and a vehicle for field use.

Supporting facilities on campus include the Milton S. Eisenhower Library, the Space Telescope Science Institute, and the Homewood High-Performance Computing Center. In addition, the JHU Applied Physics Laboratory, the facilities of the Smithsonian Institution and the Geophysical Laboratory and the Department of Terrestrial Magnetism of the Carnegie Institution of Washington are available by special arrangement for students qualified to use them. For students whose research requires substantial computation, special arrangements can be made to use the supercomputers at the NASA Goddard Space Flight Center and the National Center for Atmospheric Research.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.270.103. Introduction to Global Environmental Change. 3 Credits.
A broad survey of the Earth as a planet, with emphasis on the processes that control global changes. Topics include: the structure, formation, and evolution of the Earth, the atmosphere, oceans, continents, and biosphere. Special attention is given to present-day issues, such as global climate change, natural hazards, air pollution, resource depletion, human population growth, habitat destruction, and loss of biodiversity. Open to all undergraduates.

AS.270.111. The Story of Earth. 1 Credit.
The four and a half billion year story of Earth's global changes focusing on the co-evolution of Earth and Life.

AS.270.114. Guided Tour: The Planets. 3 Credits.
An introduction to planetary science and planetary exploration primarily for non-science majors. A survey of concepts from astronomy, chemistry, geology, and physics applied to the study of the solar system.

AS.270.129. The Grandeur of You & The Universe. 3 Credits.
A common question that the scientific community is confronted with is "Why do I care?" or "How does this relate to and affect me?". We will address these questions by inquiring and exploring where each one of us fit in the grand scheme of the cosmos and its exploration, centered around themes and concepts fundamental in Earth, planetary, and space sciences (EPSS). Using various creative mediums, you will learn to understand and narrate how you, all parts of your identity relate to the story of the universe. This class will allow you to master the fundamentals in EPSS, appreciate and relate to scientific discoveries, understand how to be responsible future scientists and citizens cognizant of broad scientific impacts, and develop and enhance various skills to be able to understand and communicate science.
Area: Writing Intensive

AS.270.202. Introduction to Ecology. 3 Credits.
Ecology is the study of organisms and their environment. This course focuses on the patterns of distribution and abundance of organisms. Topics include population dynamics and regulation, competition, predation, host-parasite interactions, patterns of species diversity, community succession, the flow of energy and matter through ecosystems. We will also discuss the role of natural and human disturbances in shaping communities.
AS.270.103 OR AS.020.151

AS.270.205. Introduction to Geographic Information Systems and Geospatial Analysis. 3 Credits.
The course provides a broad introduction to the principles and practice of Geographic Information Systems (GIS) and related tools of Geospatial Analysis. Topics will include history of GIS, GIS data structures, data acquisition and merging, database management, spatial analysis, and GIS applications. In addition, students will get hands-on experience working with GIS software.

AS.270.220. The Dynamic Earth: An Introduction to Geology. 3 Credits.
Basic concepts in geology, including plate tectonics; Earth's internal structure; geologic time; minerals; formation of igneous, sedimentary, and metamorphic rocks; development of faults, folds and earthquakes; geomagnetism. Corequisite (for EPS Majors): AS.270.221; optional for others. The course is introductory and open to undergraduates at all levels; freshmen are encouraged to enroll.

AS.270.221. The Dynamic Earth Laboratory. 2 Credits.
This course is a hands-on learning experience for introductory geological concepts and techniques using geological tools, such as mineral/rock samples, microscopes, and maps. Field trips are its essential part. The course is open to undergraduates at all levels; freshmen who wish to get their hands (and boots) dirty are encouraged to enroll.
AS.270.220, credit earned or concurrent enrollment

AS.270.222. Mineralogy. 4 Credits.
Introduction to the classification, crystallography, and physical properties of minerals. Weekly lab topics include field identification, crystal morphology and symmetry, optical microscopy and Raman spectroscopy. One field trip to the Smithsonian National Museum of History and Research Archives is planned.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.224. Oceans & Atmospheres. 3 Credits.
A broad survey of the Earth's oceans and atmospheres, and their role in the environment and climate. Topics covered include waves, tides, ocean and atmosphere circulation, weather systems, tornadoes and hurricanes, El Niño, and climate change. For science and engineering majors

AS.270.302. Aqueous Geochemistry. 3 Credits.
Modeling the chemistry of water-rock interactions from weathering and riverine development at Earth's surface to hot springs at depth, fluids in subduction zones in Earth's interior, and the ancient fluids preserved in fluid inclusions. Thermodynamic basis for the calculation of equilibria and irreversible chemical mass transfer involving minerals and aqueous species at low and high temperatures and pressures. The course culminates with practical examples of research interest to individual participants.
(AS.030.101 AND AS.030.102) AND (AS.270.220 AND AS.270.221) or equivalents.

AS.270.303. Earth History. 3 Credits.
This course will explore the evolution of life in the context of environmental, ecological, and geological changes to the Earth surface system. The goal of the class is to provide students with an understanding of how geological and paleontological records provide insight into the origin(s) of life, oxygenation of the atmosphere, the evolution of multicellularity, evolutionary radiations and extinctions, and modern global change.
AS.270.103 OR AS.270.220 OR AS.270.224; or permission of the instructor.

AS.270.305. Energy Resources in the Modern World. 3 Credits.
This in-depth survey will inform students on the non-renewable and renewable energy resources of the world and the future prospects. Topics include petroleum, natural gas, coal, nuclear, hydroelectric, geothermal, solar, wind, biomass, and ocean energy. Global production, distribution, usage, and impacts of these resources will be discussed.

AS.270.306. Urban Ecology. 3 Credits.
Urban ecology has been called the ecology in, of, and for cities. In this course, we will explore how ecological concepts are applied to urban ecosystems and the different approaches to urban ecological research. Topics will include: Biodiversity, water dynamics, energy and heat island effects, and nutrient cycling, urban metabolism, design of greenspace, and sustainability of cities. We will use Baltimore as a case study for studying cities.
AS.270.308 OR EN.570.205 OR EN.570.403

AS.270.307. Geoscience Modeling. 4 Credits.
An introduction to modern ways to interpret observations in the context of a conceptual model. Topics include model building, hypothesis testing, and inverse methods. Practical examples from geophysics, engineering, and medical physics will be featured.

AS.270.310. Evolution and Development of the Vertebrates. 3 Credits.
Modern vertebrates (animals with backbones) are the products of a more than 500-million-year evolutionary history. This course surveys that history and uses it to explore such core evolutionary concepts as adaptive radiation, convergence, extinction, homology, phylogenetic taxonomy, and tree thinking. Emphasis will be placed on the origins of the modern vertebrate fauna and how fossils are being integrated with developmental biology to better understand major transitions in the vertebrate body plan.

AS.270.312. Mammalian Evolution. 3 Credits.
An introduction to the evolutionary history and diversity of mammals, with emphasis on the first half of the Cenozoic - the beginning of the Age of Mammals. The course will focus primarily on the adaptive radiation of mammals (including our own order primates) that followed the extinction of the dinosaurs, exploring the origins and relationships of the major groups of mammals as well as the anatomical and ecological reasons for their success. Lectures will be supplemented with relevant fossils and recent specimens.

AS.270.316. Agroecology: A Global Perspective. 3 Credits.
How can we balance the increasing global food demand with sustainable ecological practices?How are the agricultural, ecological, and socio-economic aspects of food productionintertwined? This course addresses these questions and enables students to critically evaluateexisting agroecosystems around the world, with special attention paid to the challenges of globalenvironmental change. Students will be introduced to the principles of agroecology, and theywill examine interactions between biodiversity, soil, and people through case studies, peerreviewed scientific papers, and a field trip to a local agroecosystem

AS.270.317. Conservation Biology. 3 Credits.
In this course, students examine the meaning and implications of biodiversity with a focus on disciplines associated with conservation biology, wildlife conservation and wildlife management, including taxonomy, genetics, small population biology, chemical and restoration ecology, and marine biology. This includes exploring how conservation biology differs from other natural sciences in theory and in application. Students learn the major threats to biodiversity and what natural and social science methods and alternatives are used to mitigate, stop, or reverse these threats. The course also includes the economic and cultural tradeoffs associated with each conservation measure at the global, national, regional, and local levels. One required field trip.

AS.270.318. Remote Sensing of the Environment. 3 Credits.
This course is an introduction to the use of remote sensing technology to study Earth's physical and biochemical processes. Topics covered include remote sensing of the atmosphere, land and oceans, as well as remote sensing as a tool for policy makers.Also offered as 270.618

AS.270.319. Geochronology. 3 Credits.
Introduction to radioisotope geo/thermochronology and mantle stable and radioisotope geochemistry. Course covers: (1) methods for dating of rocks and geologic processes using long-half-life radioisotope systems, including the various isotope systems available and their applicability; (2) radioisotope techniques for investigation of the geochemical evolution of the crust and mantle; (3) isotope fractionation and utility of traditional and novel stable isotope geochemistry for interrogating high-temperature processes, and (4) thermochronology and methods for interrogating upper-crustal processes. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.323. Ocean Biogeochemical Cycles. 3 Credits.
This course will examine the cycling of trace chemicals in the ocean, consider what we can learn from the distributions of these chemicals about the ocean circulation, and ocean ecosystems. Topics covered will include oceanic biological productivity, open water cycling of nutrients and oxygen, ocean acidification and sediment cycling.

AS.270.325. Introductory Oceanography. 3 Credits.
This class is an introduction to a wide range of physical, chemical, and biological phenomena in the world's oceans. Underlying basic principles are exposed wherever possible. Topics covered include: seawater, waves, tides, ocean circulation, chemical oceanography, biogeochemical ocean processes, and remote sensing of the oceans. Recommended Course Background: freshman Physics, Chemistry, Calculus through ordinary differential equations.

AS.270.326. Cosmochemistry. 4 Credits.
Students in this course will gain an understanding of the origin of various forms of matter in our Solar System and beyond, along with its evolution through geologic processes. Beginning with the concepts of nucleosynthesis and stellar evolution, this course will then cover the condensation of matter, meteoritics, and petrogenetic evolution of differentiated, rocky bodies (i.e. asteroids, the Moon, Mars). Evolution of matter in extra-Solar planetary systems (i.e. exoplanets) will also be broached. In lab we will examine thin sections of meteorites, lunar material, and terrestrial analogs - a field trip to the Smithsonian Meteorite Collection is planned. Graduate and advanced undergraduate-level students are encouraged, as are interdisciplinary students with an interest in planetary science.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.331. Isotope Geochemistry. 4 Credits.
Introduction to stable isotope and radioisotope geochemistry. Isotope measurements are used to probe fundamental questions in the Earth and environmental sciences because they can be used to extract information about the timing of and/or chemical, physical, and biological processes associated with the formation of geomaterials. The first half of the course focuses on light isotope systems (O, C, S, etc.) and low-temperature applications, including: (1) tracing sources and sinks of fluids, sediments, biological materials, and contaminants, (2) studying rates and mechanisms of biochemical reactions, and (3) paleoenvironmental reconstructions. The second half of the course focuses on heavier isotope systems and high-temperature applications, including: (1) methods for dating of rocks and geologic processes using long-half-life radioisotopes, including the various isotope systems available and their applicability, and (2) isotope fractionation at high temperatures and the utility of radioisotope and novel stable isotope geochemistry for interrogating processes influencing the crust and mantle. Biweekly lab classes (scheduled in first week) will allow students to become familiar with principles of isotope measurements and interpretations. Mid-term and final exams. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.
AS.270.220 AND AS.270.221

AS.270.332. Soil Ecology. 3 Credits.
The course introduces basic aspects of cycles and flows in the soil ecosystem, and provides students with an overview of the higher groups of soil organisms. Laboratory and field surveying methods are also covered.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.333. Mineral Physics Recitation. 2 Credits.
This course is designed for undergraduate students interested in pursuing geophysics research in the topics of solid state physics or inorganic chemistry. It will consist of a weekly seminar paired with a separate paper reading+discussion group, covering a range of topics on the frontiers of mineral physics. Themes rotate each semester, and Fall 2018 will be paired with the Mineralogy Lecture Series on Modeling and Experimental challenges in Cosmochemistry. Recommended Course Background: Relevant coursework such as Mineralogy or equivalent in other department, and instructor permission.

AS.270.336. Freshwater Systems. 3 Credits.
A study of streams, lakes, and groundwater with a focus on aspects of water quality, hydrology, geomorphology, and aquatic ecology that are relevant to human impacts on freshwater systems. US environmental policies and water resource management agencies will also be examined in the context of issues such as dams, cattle grazing, climate change, and water allocation.
AS.270.103 OR AS.271.107 or permission of the instructor.

AS.270.337. Freshwater Systems Lab. 1 Credit.
A hands-on investigation of the water quality, hydrology, geomorphology, and aquatic ecology of streams and other freshwater bodies. Includes field trips to water-related facilities such as drinking water and wastewater treatment plants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.338. Field Methods in Ecology. 3 Credits.
This course will introduce student to methods used in field-based ecological research addressing population, community and ecosystem-level questions. Outdoor fieldwork is an essential part of the course. Field activities will center around the riparian ecosystem adjacent to the Homewood campus and on the urban ecology of the greater Baltimore region. Students will build skills in data collection, analysis, synthesis, and presentation. Basic statistical instruction in R will be taught to aid data analysis.
AS.270.202;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.339. Topics in Mineralogy. 3 Credits.
This semester, join HEMI's Designer in residence, and MICA professor Jenna Frye, in a modified version of her popular experimental fabrication course, EPIC FAIL. Discover how thinking with your hands, embracing risk and failure and playful exploration with educational toys, can invigorate your research in mineralogy and deepen your understanding of crystallography visualization. This course is designed as a hands-on, deeply collaborative workshop, where we will investigate the role of creative fabrication technology and invention as it relates to communicating scientific research to outside audiences. Together we will make, tinker and fail our way to improved visualization and presentation strategies so that others may more fully access the complexities in our work.Topics in Mineralogy is a special topics course that rotates in subject and may be taken multiple times for credit. This course is designed for those interested in mineralogy, and we recommend concurrent enrollment in Planetary Interiors, Space Weathering, and/or Advanced Mineralogy seminar.

AS.270.345. Metamorphic Petrology. 3 Credits.
Introduction to metamorphic geology and the concepts on which it is built. Ideas and techniques that underpin metamorphic petrology are introduced. Focus is on utility of metamorphic geology in understanding petrogenesis crustal processes and plate tectonics. Local field trip(s) to explore the metamorphic geology of the Baltimore region. Recommended course background: AS.270.220 and AS.270.221, or instructor permission
AS.270.220 AND AS.270.221

AS.270.346. Structural Geology Seminar. 1 Credit.
Seminar class on fundamentals of structural geology. Involves weekly readings/practical exercises on: (1) rock mechanics and deformation processes; (2) commonly-encountered deformation products/structures; (3) deformation style and associated fabrics/textures/structure; (4) metamorphism and deformation; (5) techniques for describing and measuring structures; (6) interpretation of structural data on maps and cross-sections; (7) approaches for inferring large-scale structure from limited data, and (8) methods for visualizing and analyzing structure. Recommended course background: AS.270.220, or instructor permission.
AS.270.220

AS.270.347. Foundations of Ecology. 3 Credits.
In this seminar students will read seminal pieces in ecology. Assigned readings will span early 1900s to present. Students will pair a foundational paper with a more current paper on a similar topic to explore the evolution of ecological concepts and approaches over time. This course is aimed at upper level undergraduates and graduate students.
AS.270.202

AS.270.350. Sedimentary Geology. 4 Credits.
Sedimentary rocks are the historical records of the Earth, documenting climate change, mass extinctions, and the evolution of life. This course will provide an introduction to sedimentary processes and sedimentary rocks. Focus is placed on linking physical observations to the ancient environments in which sedimentary rocks once formed. Fundamental tools for interpreting the sedimentary rock record, such as depositional models, geochronology, and chemostratigraphy will be reviewed. Two 1-day weekend field trips will occur over the course of the semester. There will also be weekly 1-hour labs. Lab and field trip times will be determined in the first week of class. Graduate and advanced undergraduate level. Recommended Course Background: AS.270.220 or instructor permission.

AS.270.354. Stable Isotope Geochemistry. 3 Credits.
Stable isotope measurements are used to probe fundamental questions in the Earth and environmental sciences because they can be used to extract information about chemical, physical, and biological processes associated with the formation of geomaterials. Stable isotope patterns have been used for applications ranging from tracking the rise of oxygen on the early Earth to studying human diet. The majority of the course will focus on light isotope systems (O, C, S, etc.) and low-temperature applications, including: (1) tracing sources and sinks of fluids, sediments, biological materials, and contaminants, (2) studying rates and mechanisms of biochemical reactions, and (3) paleoenvironmental reconstructions. We will also review novel stable isotope applications including heavy isotope systems and mass independent fractionations. At the end of the course, students will be able to make interpretations about how stable isotope patterns inform our knowledge of how geomaterials are formed and provide information about the Earth system.
AS.270.220 OR AS.270.224

AS.270.361. Geodynamics Seminar. 1 Credit.
Seminar class on the dynamics of subduction and accretionary orogenesis. Weekly readings discussed in class. Focus will be broad and process-based. Topics in subduction may include: (1) modes of global subduction through Earth history; (2) models of forced/triggered v. spontaneous subduction initiation; (3) arc development and implications for growth of continents; (4) subduction zone rollback and arc migration, and (5) subducted slab breakoff and tearing. Topics in accretionary orogenesis may include: (1) stress state of the overriding plate; (2) tectonic mode switches (shortening to extension and vice versa), and (3) length and time scales of the thermal manifestations of accretionary orogenesis.
AS.270.220 AND AS.270.221 or instructor permission.

AS.270.362. Lunar Exploration and Analog Geology. 3 Credits.
This course involves readings, discussion, and lectures about astronaut-enabled geological exploration of the Moon and analogous terrains on Earth. Topics include: volcanism, impact geology (cratering, ejecta, ballistic sedimentation), faulting, field methods (video and voice descriptions, sampling protocol), and field equipment (spacesuits, rovers, landers, cores, etc.), Apollo history and Artemis plans/current events. Assessment will involve participation, ~5 assignments related to the course objectives, and a presentation or short paper (student's discretion) synthesizing a small range of covered topics of interest to the student at the conclusion.

AS.270.378. Present and Future Climate. 3 Credits.
Intended for majors who are interested in the science that underlies the current debate on global warming, the focus is on recent observations one can glean from model simulations. Meets with AS.270.641.
Recommended Course Background: AS.110.108-AS.110.109 and AS.171.101-AS.171.102
Student may not receive credit for both AS.270.378 and AS.270.641.

AS.270.379. Atmospheric Science. 3 Credits.
A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

AS.270.380. Seminar in Regional Field Geology. 3 Credits.
Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field.
Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.381. Seminar in Field Geology. 3 Credits.
Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential.Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).
(AS.270.220 AND AS.270.221) OR AS.270.350 OR AS.270.303

AS.270.396. Special Topics in Planetary Exploration. 3 Credits.
Geology in the Outer Solar System: This course will focus on the solid bodies of the outer solar system, addressing their formation, surfaces, interiors, evolution, and how we study them via remote sensing and spacecraft investigation. We will use data from the various missions that have investigated the outer system and cover aspects of instrumentation and remote sensing of outer system bodies from the Voyager missions, Galileo, Cassini, and New Horizons. The course includes lecture, discussion, and hands-on lab work. Recommended pre-requisites: Dynamic Earth and/or Introductory planetary science and/or remote sensing, or instructor approval.

AS.270.400. The Carbon Cycle: Past, Present and Future. 3 Credits.
This course will explore how the carbon cycle shapes environmental conditions and influences other biogeochemical cycles through an investigation of the modern carbon cycle, major carbon cycle perturabtions in the geological record, and projections of future global change. The majority of the class will be structured as a reading seminar, but students will also develop an understanding of how to use quantitative models to evaluate patterns of change associated with both modern and ancient carbon cycle perturbations with implications for predicting future environmental changes.Recommended Prerequisites: AS.270.103 or AS.270.220 or AS.270.224

AS.270.404. Planetary Interiors. 3 Credits.
This course investigates the physical processes occurring in planetary interiors. Topics include formation and differentiation of planetary bodies, planetary structure, thermal evolution, convection, and dynamo generation of magnetic fields. Standard remote sensing methods used to investigate planetary interiors and results from recent planetary satellite missions will also be discussed.Recommended: Knowledge of vector calculus, PDEs and introductory physics.

AS.270.406. Space Weathering. 1 Credit.
This course will introduce and explore multiple topics of Space Weathering - the interaction of solar system bodies with the space environment. Through a combination of lecture, reading, research, and discussion the course will explore physical and chemical processes of solar and cosmic radiation and particles, micrometeorites, etc., on the surfaces of planets. We will also explore interaction of the space environment with planetary magnetic fields and atmospheres, and with non-planetary materials (such as spacecraft, and astronauts).
AS.270.222

AS.270.408. Petrology Seminar. 1 Credit.
Seminar class on recent developments in igneous and metamorphic petrology. Involves weekly readings on modern methods/understanding in petrogenesis and processes leading to mineral (re)crystallization; rock deformation; fluid transport in rocks; pressure and temperature estimates of rock formation, and rates/durations of thermotectonic processes in the lithosphere. Topics covered will cater to interests and learning goals of those who register in the class.
AS.270.220

AS.270.410. Planetary Surface Processes. 3 Credits.
This course explores processes that influence the evolution of planetary surfaces, including impact cratering, tectonics, volcanism, weathering, and sediment transport. These processes manifest themselves as structural deformation of planetary crusts due to loading by volcanoes, formation of craters by asteroid impacts, modification of surfaces by flowing landslides, rivers and glaciers, and the accumulation and transport of sand in dune fields on various planets. Emphasis is on the relationship to similar Earth processes, and the integrated geologic histories of the terrestrial planets, satellites, and asteroids. The focus will be on developing a physical understanding of these processes to interpret the surface characteristics and evolution of planets, satellites, asteroids, and comets from both qualitative assessments and quantitative measurements obtained from spacecraft data. A key component of the class will be the interpretation of these observations from recent and current planetary missions to the Moon, Mars, and other terrestrial bodies.Recommended Course Background: A sound knowledge of Calculus and Introductory Physics, and some prior knowledge of Earth and/or Planetary Science.

AS.270.412. Spring seminar: Geological Field Studies in California. 2 Credits.
Field experience is an integral part of a geology student's education. During this course, students will learn to digitize, synthesize, and interpret the observations they made during the January field-based class to interpret the geologic history and structure of southern California. Study USA: Geological Field Studies in California is a co-requisite for this course.For Spring 2020, the focus of the field work and course will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), Earth History (AS.270.303), Planets, Life and the Universe (AS.020.334), and Isotope Geochemistry (AS.270.331). Sedimentary rocks are spectacularly exposed in this region and record over a billion years of key events in Earth history. Students will learn how these rocks have shaped our understanding of major evolutionary and environmental shifts in Earth's past, while also learning how to map these units' regional geographic distribution. Finally, students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and E&PS graduate students.

AS.270.423. Planetary Atmospheres. 3 Credits.
Fundamental concepts and basic principles of chemistry and physics applied to the study of planetary atmospheres. Vertical structure of planetary atmospheres. Atmospheric radiation, thermodynamics, and transport. Principles of photochemistry. Planetary spectroscopy and remote sensing. Upper atmospheres and ionospheres. Evolution and stability of planetary atmospheres. Recommended Course Background: basic physics, chemistry and calculus

AS.270.425. Earth and Planetary Fluids. 3 Credits.
An introductory course on the properties, flow, and transport characteristics of fluids throughout the Earth and planets. Topics covered include: constitutive relationships, fluid rheology, hydrostatics, dimensional analysis, low Reynolds number flow, porous media, waves, stratified and rotating fluids, plus heat, mass, and tracer transport. Illustrative examples and problems are drawn from the atmosphere, ocean, crust, mantle, and core of the Earth and other Planets. Open to graduate and advanced undergraduate students. Recommended Course Background: Basic Physics, Calculus, and familiarity with ordinary differential equations.

AS.270.426. Mineral Physics. 3 Credits.
Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. Investigations of the thermodynamic and transport properties of minerals at the atomic scale are used to interpret observational data from seismology, geodynamics, geochemistry, and planetary science, an important step toward solving many geologic and geophysical problems. Students in this course will also be introduced to the high pressure and high temperature experiments that measure the physical and mechanical properties of minerals, which is crucial to understanding planetary interiors. Recommended prerequisites: introductory chemistry, physics, mineralogy, or structure of materials.

AS.270.501. Independent Study. 1 - 3 Credits.
Exploration of topic(s) in earth, planetary, and/or environmental science under the direction of an instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.504. Independent Research. 1 - 3 Credits.
Research in earth, planetary, and/or environmental science conducted under the direction of a faculty advisor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.510. Senior Thesis. 1 - 3 Credits.
Senior thesis research in earth sciences conducted under the direction of a faculty advisor.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.603. Geochemistry Seminar.
A variety of topics of current interest involving mineral-fluid interactions will be reviewed.

AS.270.605. EPS Colloquium.
A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.606. EPS Colloquium.
A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.612. Tropical Meteorology.
The tropics are a region where climate variability has large impacts yet many aspects of the structure are poorly understood. This course will cover the dynamics of tropical circulation and variability. Topics covered will include equatorial planetary waves, Matsuno-Gill models of tropical circulation, tropical air-sea interaction, the Madden-Julian Oscillation, tropical cyclones, dynamics of the El Nino-Southern Oscillation and monsoonal circulation and flow.

AS.270.614. Atmosphere and Oceanic Vortices.
Vortices are observed in the Earth's atmosphere and oceans and in the atmospheres of other planets. Examples are polar vortices in Earth, Mars and Titan's atmospheres, Spots on Jupiter, Saturn, and Neptune, Gulf Stream rings, and eddies throughout the oceans. These vortices are often the most dominant feature of the regional circulation, and understanding their structure and evolution dynamics is necessary to understand the dynamics and transport of atmospheres and oceans. In this course we focus on the structure and dynamics of long-lived vortices, i.e., vortices that exist for longer than typical wave periods. The first section of the course will consist of lectures examining the fundamental dynamics of vortices in rapidly rotating, stratified fluids, while the second section will be seminars discussing more detailed aspects of specific vortices occurring in nature. It is suggested that you have taken 270.425 Earth and Planetary Fluids or another similar introductory fluids class.

AS.270.615. Inversion Modeling & Data Assimilation.
This graduate class will introduce modern inverse modeling and data assimilation techniques. These powerful methods are used in atmospheric science, oceanography, and geophysics and are growing more widespread. Topics will include: singular value decomposition, Green's function inversions, Kalman filtering, and variational data assimilation. The class will include lectures on concepts and theory, and practical experience in the computer laboratory.Permission of Instructor Required

AS.270.618. Remote Sensing of the Environment.
Also offered as 270.318

AS.270.626. Ocean General Circulation.
The aim of this course is to achieve conceptual understanding of the large scale low frequency ocean general circulation. The role of the ocean circulation in earth's climate is emphasized throughout.

AS.270.628. Seminar in regional field geology.
Weekend field trip to explore regional geology. Students are required to prepare short presentations on field trip topics in advance of weekend trip. Attendance at two organizational meetings (to be scheduled) is required. Open to E&PS graduate students and upper level E&PS undergraduate majors and minors. Trip date is 11/9/2019. Consult instructors for details.

AS.270.630. Physics and Chemistry of Aerosols.
This course will cover fundamentals of aerosol physics and chemistry. Topics covered will include aerodynamics and diffusion of aerosol particles, condensation and evaporation, particle size distributions, optics of small particles, characterization of particle composition, and the diversity of aerosols found in planetary atmospheres.Recommended Course Background: Basic Physics and Chemistry. Calculus.

AS.270.633. Seminar on the IPCC Sixth Assessment.
This course will discuss the contents of the Working Group I contribution to the sixth assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC).

AS.270.641. Present and Future Climate.
Meets with AS.270.378.
Student may not receive credit for both AS.270.378 and AS.270.641.

AS.270.653. Earth and Planetary Fluids II.
A sequel to AS.270.425 concentrating on planetary-scale atmospheric and oceanic circulation. Physical understanding of the underlying fluid dynamics will be emphasized.

AS.270.656. Geochemical modeling of water-rock interactions in the deep Earth.
Thermodynamic basis for the modeling of irreversible chemical mass transfer involving minerals and aqueous species at elevated temperatures and pressures. Reading will start with classic papers by Helgeson and co-workers and proceed to applications in the literature involving hydrothermal ore deposits, subduction zones, and diamond formation in the upper mantle. The course focusses on developing specific projects of research interest to individual participants.Recommended Course Background: AS.030.101 and AS.030.102 or equivalent, AND AS.270.220 AND AS.270.221 or equivalent, AND AS.270.302 or equivalent.

AS.270.662. Seminar in Planetary Science.

AS.270.667. Seminar in Soil Ecology.

AS.270.668. Geobiology Seminar.
Geobiology is the study of interactions between life and rocks. In this class we will explore how organisms impact sedimentary records both directly, by leaving behind biosignatures, or indirectly, by affecting their surroundings in a way that promotes formation of certain types of minerals. This will serve as a guide for interpreting geological records during the early evolution of life on Earth, the rise of animals, and major mass extinctions.

AS.270.675. Communication for Scientists.
Communication for Scientists" and the description is "This course will cover the various ways in which scientists are expected to communicate throughout the life of a project. Topics will include writing proposals, preparing impactful figures, writing press releases, interacting with the press (press conferences, radio/TV, interviews, etc.), writing for and speaking to the public, social media, and interacting with policy makers."

AS.270.679. Atmospheric Science.
A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

AS.270.680. Seminar in Regional Field Geology.
Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.681. Seminar in Field Geology.
Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential.Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).

AS.270.683. Topics in Mineral Physics.
Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. In this course, students will learn about the foundational and developing research capabilities in Mineral Physics, with an emphasis this year on shock compression and experiments at High Energy Density. Topics will include experimental investigation of equation of states, phase transitions, changes in optical and transport properties and other strain-rate dependent phenomena. Topics in Mineral Physics is a special topics course that rotates in subject and may be taken multiple times for credit . (EN.510.311 OR EN.510.601) OR AS.270.222 or instructor permission.

AS.270.684. Mathematical Methods in Earth and Planetary Sciences.
A range of standard mathematical methods used in earth and planetary science applications will be studied. A core set of topics will include back-of-the-envelope estimates, differential equations, linear algebra, special functions, and transforms. In addition, students will tailor the course to their needs by choosing from a range of extended topics to explore further. Potential topics include perturbation theory, tensors, probability theory and complex analysis. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of single and multivariable calculus and linear algebra.

AS.270.685. Seminar in Virtual Field Experiences: Accessibility, Exploration, and Development.
The Earth Sciences traditionally rely heavily on outdoor field education – the purposeful use of an outdoor environment to achieve educational objectives – in higher education. Observations made at the surface of the Earth are fundamental to understanding the processes that have shaped it, and outdoor field education is often considered an essential way to connect classroom theory with actual data and observations. However, despite the demonstrated benefits of outdoor field education, there are persistent, deep-rooted problems with it in higher education, two of which include accessibility issues and financial barriers. There is overwhelming and demonstrated need to make outdoor field education and research more accepting of all who want to participate. This course aims to explore some of these accessibility issues by: 1) reading and discussing peer-reviewed literature on this topic, 2) participating in and learning about already established virtual field trips and tools, and 3) developing our own virtual educational tools and experiences.

AS.270.686. Cordilleran Controversies.
The origins of the American Cordillera – the mountain ranges forming the backbone of North America, Central America, and South America – remain contentious. It is one of the few global orogens in which there was an active margin whose formation mechanisms remain unresolved. This seminar class will begin by reading seminal papers on the application of "new global tectonics" to the Cordillera shortly following the plate tectonic revolution in the late 1960s. Progressing forward in time, the class will continue to read and discuss papers that develop the classic, broadly accepted model that western North America was gradually assembled from the late Paleozoic into the Miocene through east-dipping subduction. The class will then turn to a drastically different model that was first published in a divisive paper in 2009 that turned the classic tectonic interpretation of the Cordillera on its head by proposing that much of western North America was a separate ribbon continent. The final part of the course will focus on papers published during the last 10 years that try to reconcile differences between the two models. Throughout the course, we will evaluate the range of observations and datasets – both geological and geophysical – that are used to support aspects of the two competing models.

AS.270.688. Exoplanets and their Atmospheres.
This course covers the basic theory of planetary atmospheres as applied to extrasolar planets. The fundamental physical processes related to the structure, composition, radiative transfer, chemistry and dynamics of planetary atmospheres are covered, with an emphasis on those related to observable exoplanet properties. We also provide an overview of the observational techniques of exoplanetary atmospheres and discuss the habitability of exoplanets.

AS.270.693. Special Topics in Dynamo Theory.
Current research literature in planetary magnetic fields and dynamo theory will be studied. Topics will vary year-to-year. Students will be responsible for leading discussions on relevant papers from the literature. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of fluid dynamics, electromagnetism and planetary science.

AS.270.695. Graduate Skills in Earth and Planetary Sciences.
This seminar-style course will enable graduate students in Earth and Planetary Sciences to discuss issues and develop skills relevant to working in earth and planetary science fields. Topics will vary each iteration and may include graduate school expectations, research and communication methods, grant and funding procedures, stress management, organization and management methods, critical conversations, work-life balance, career paths, and JEDI issues and resources in the geosciences. Course open to EPS Graduate Students or by Instructor Permission

AS.270.807. Research.

AS.270.808. Research.

AS.271.107. Introduction to Sustainability. 3 Credits.
Humans are having such a massive impact on Earth systems that some call this the Anthropocene epoch. Should we consider this state of affairs progress or catastrophe? How to we find a sustainable path to the future? This course provides an interdisciplinary introduction to the principles and practice of sustainability, exploring such issues as population, pollution, energy and natural resources, biodiversity, food, justice, and climate change through the lens of systems thinking. Course open to freshmen, sophomores, and juniors. Seniors by instructor permission only.

AS.271.302. Exploring Nature. 3 Credits.
This course integrates the analysis and production of environmental media with weekly outdoor excursions. Students will survey a range of authors, adventurers, journalists, scientists, photographers, acoustic ecologists and filmmakers that have explored the natural world and chronicled the history of human-environmental relations and environmental problems. Field trips to regional parks and green spaces will encourage students to discover their own sense of place, foster a deeper level of ecological awareness and construct personal environmental narratives through careful exploration, observation, documentation and reflection.
Area: Writing Intensive

AS.271.304. Sustainable Food Systems. 3 Credits.
Where does your food come from? What impact does food production have on the environment and human societies? How can food systems become more sustainable as the human population increases? This seminar-style course examines the past, present, and future of agriculture, including topics such as the foodways of indigenous people, modern "factory farming" versus organic agriculture, genetically modified foods, and the interplay among science, economics, policy, and agriculture. Involves hands-on experiences.

AS.271.305. Special Topics in Environmental Studies. 3 Credits.
Environmental Policy in the Age of Trump. This course will analyze the effects of the current administration's actions on environmental issues by assessing the policies in question and estimating the potential impacts on climate change, human health, and ecology. Policies that have been overturned or are under review represent a number of environmental issues, including climate change and greenhouse gas emissions, offshore drilling, national monuments, mining pollution, toxic discharge into public waterways, the development of oil pipelines, public land use planning, coal leases, a harmful insecticide, hunting in wildlife refuges, airborne mercury emissions, protection of tributaries and wetlands under the Clean Water Act, energy and fuel-efficiency standards, and resource extraction from federal lands. Students will examine the historical roles environmental organizations and government agencies have played in advocating for, creating and enforcing U.S. environmental policy and will discuss the future roles of these actors and other stakeholders in implementing effective environmental policy

AS.271.311. Climate and Health. 3 Credits.
This course will examine the impact of climate variability and change on human health and disease, including the adverse health effects related to extreme heat, air quality, nutrition, waterborne infections, insect-borne diseases, and exposure to storms and floods. Adaptation and mitigation strategies, including the health "co-benefits", will also be examined
AS.270.103 OR AS.271.107

AS.271.315. Environmental Films and Literature. 1 Credit.
This "book club" style seminar focuses on the exploration, discussion and critical analysis of a range of contemporary environmental films and literature.

AS.271.320. Environmental Photojournalism. 3 Credits.
Environmental cognition, consciousness and communication are produced, reproduced, interpreted and remembered with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will review critical literature focusing on visual representation theory, the relationship between images and social change, the practice of journalism and the history and typology of environmental photography. An understanding of environmental issues is required. Students will engage with the local community, identify and investigate environmental issues facing Baltimore, participate in photographic critiques, and develop a documentary project. This studio/seminar course is designed with an emphasis on independent research and practice.
Area: Writing Intensive

AS.271.345. Society and Nature Conflicts: Interdisciplinary Approaches to Studying Environmental Problems Over Time. 3 Credits.
In this seminar students will read seminal pieces in the field of socio-environmental research. Socio-environmental research recognizes that society and nature inherently interact in such a way that they affect and change one-another - it is not only that society affects the nature or that nature only affects society. Solving environmental problems necessitates understanding this duality and thus an interdisciplinary background. Assigned readings will span early from thinkers on environmental problems (Before 1900) to current approaches to studying and solving environmental problems.It is aimed at upper level undergraduates and graduate students.

AS.271.360. Climate Change: Science & Policy. 3 Credits.
Prereq: 270.103 or permission of instructor.This course will investigate the policy and scientific debate over global warming. It will review the current state of scientific knowledge about climate change, examine the potential impacts and implications of climate change, explore our options for responding to climate change, and discuss the present political debate over global warming.

AS.271.399. Research Design. 1 Credit.
This course supports students in the design of their senior capstone project, including crafting a suitable research question, identifying appropriate methodologies, and writing a formal project proposal.

AS.271.401. Environmental Ethics. 3 Credits.
Environmental Ethics is a philosophical discipline that examines the moral relationship between humans and the natural environment. For individuals and societies, it can help structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Beginning with a comprehensive analysis of their own values, students will explore complex ethical questions, philosophical paradigms and real-life case studies through readings, films and seminar discussions. Traditional ethical theories, including consequentialism, deontology, and virtue ethics will be examined and applied. Environmental moral worldviews, ranging from anthropocentric to ecocentric perspectives, will be critically evaluated. Organized debates will help students strengthen their ability to deconstruct and assess ethical arguments and to communicate viewpoints rooted in ethical principles. Students will apply ethical reasoning skills to an examination of contemporary environmental issues including, among others, biodiversity conservation, environmental justice, climate change, and overpopulation. Students will also develop, defend and apply their own personal environmental ethical framework. A basic understanding of modern environmental history and contemporary environmental issues is required. Prior experience with philosophy and ethics is not required.
Area: Writing Intensive

AS.271.402. Water, Energy, and Food. 3 Credits.
The water, energy and food (WEF) nexus is a topic of growing interest in the research and policy communities. This course will survey WEF concepts and principles, introduce tools of analysis, and engage students in case studies of critical WEF issues in the United States and internationally.

AS.271.403. Environmental Policymaking and Policy Analysis. 3 Credits.
This course provides students with a broad introduction to US environmental policymaking and policy analysis. Included are a historical perspective as well as an analysis of future policymaking strategies. Students examine the political and legal framework, become familiar with precedent-setting statutes such as NEPA, RCRA, and the Clean Air and Clean Water Acts, and study models for environmental policy analysis. Cost benefit studies, the limits of science in policymaking, and the impact of environmental policies on society are important aspects of this course. A comparison of national and international policymaking is designed to provide students with the proper perspective. This course is taught in conjunction with an identical graduate course. All students will be expected to perform at a graduate level.

AS.271.496. Senior Capstone. 3 Credits.
This seminar will provide the academic space, time, and mentoring for students to integrate, synthesize and apply the knowledge and skills obtained through the ENVS curriculum. The course focuses on the development of critical thinking and oral communication skills through intellectual engagement with complex and challenging environmental problems.

AS.271.499. Senior Seminar. 1 Credit.
This seminar explores topics related to career development and current events to support senior environmental majors as they transition to post-graduate life and work.

AS.271.502. Independent Study. 1 - 3 Credits.
Exploration of topic(s) in environmental studies under the direction of an instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.506. Independent Research. 1 - 3 Credits.
Research in environmental studies conducted under the direction of a faculty advisor.

AS.271.507. Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.509. Applied Experience. 1 Credit.
This course is designed to accompany a supervised, hands-on experience working on an environmental or sustainability-related internship. In addition to completing 80 hours of applied work, students will prepare a reflective journal, paper, and poster presentation about their experience.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.511. Senior Thesis. 1 - 3 Credits.
Senior thesis research project in environmental science or environmental studies conducted under the direction of a faculty advisor.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

First Year Seminars

AS.001.129. FYS: Environmental Poisons. 1 Credit.
An exploration of the occurrence and potential effects of poisons in the environment, from naturally occurring ones such as arsenic to those that may be introduced by mankind such as nuclear waste.

AS.001.167. FYS: The Natural History of the Homewood Campus. 3 Credits.
Johns Hopkins University Homewood campus and its surroundings is a wonderful green space in the middle of Baltimore City. This First-Year Seminar will introduce students to both the visible and cryptic organisms living above- and belowground. A combination of observational and sampling techniques will be used to demonstrate how ecologists collect data about plants, insects, and other organisms. In the classroom, these field observations, combined with reading material will be used to discuss environmental issues including global biodiversity decline, invasive species, and the effects of human activities on local and global biodiversity patterns. By the end of the course students will be able to generate research questions based upon field observations and appreciate the diverse life forms on Earth and in our own backyard.

Interdepartmental

AS.360.339. Planets, Life and the Universe. 3 Credits.
This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.616 OR AS.171.333 OR AS.171.699 OR AS 270.335 OR AS.360.671

AS.360.671. Planets, Life and the Universe.
Replace description with the following--"This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.616 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.

Modern Languages and Literatures

AS.211.231. Planet Amazonia: Culture, History, and the Environment. 3 Credits.
Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We'll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a "virgin paradise" or a "green hell"; scientific studies and artists' depictions of the region's flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world's largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine?

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.
Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an eco-critical approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni's Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone's Gomorrah (2008), Alice Rohrwacher's Happy as Lazzaro (2018), and many others.

AS.211.424. Climate Change Narratives: Human and Non-Human Transformative Storytelling. 3 Credits.
In The Great Derangement Indian novelist Amitav Ghosh writes that "the climate crisis is also a crisis of culture, and thus of imagination." Worldwide, climate and environmental change is stirring the imaginary of novelists, filmmakers, and artists who are finding ways to frame, emplot, or even perform, an unmanageable phenomenon like climate change. How is climate change shaping new modes of storytelling and aesthetics? How do film, literature, and environmentally conscious art transform our perception of the world we inhabit and its unpredictable changes? Can climate change narratives help us to imagine futures of possibilities, maybe dystopian, uncertain, or even happy, but futures nonetheless? This multimedia course explores, through a transnational perspective, a variety of contemporary novels, films, and other media that attempt answer these questions.

AS.217.425. Latin American Ecocriticism. 3 Credits.
Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

Near Eastern Studies

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.131.678. Geoarchaeology: Applications of Earth Science to Archaeology.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

For current faculty and contact information go to http://eps.jhu.edu/people/

Earth and Planetary Sciences, PhD

Fields of Graduate Study and Research

The department offers a range of fields of study covering Earth, Space and Environmental Sciences. In the past decade we have hired seven new assistant professors and two full professors spanning Planetary Sciences, Geosciences and Environmental Science. What links all of our fields of research together is a focus on treating individual processes-ranging from the formation of rocks to the distribution of organisms-as part of a system, with implications for and feedbacks from other parts of the system. The description below provides a rough grouping of the research areas involved and the faculty associated with each one. Interested applicants are urged to consult individual group web sites for more detail as well as to view presentations made as part of the department's 50th Anniversary celebration (http://eps.jhu.edu/events/50th-anniversary-symposium/). Prospective students should contact individual faculty members with whom they are interested in working. Students with interests that cross disciplinary boundaries or who use techniques found in different groups are strongly encouraged to apply as we believe that the most exciting questions to pursue in science today involve interdisciplinary research.

All Ph.D. students are expected to have a background of general biology, physics, chemistry and calculus. Deficiencies can be made up in the first semesters at Hopkins. Students take a core program of statistics, Earth history, stable isotope geochemistry, and ecology. In conjunction with the Department of Environmental Health and Engineering, Earth and Planetary Sciences offers course work opportunities in aquatic chemistry, microbial ecology, geospatial analysis, and analytical environmental chemistry.

PLANETARY SCIENCES

In the last decade the department has hired four new faculty members in the Planetary Sciences who study bodies ranging from Mercury to Pluto to exoplanets. Key questions include: What role do planetary atmospheres play in the habitability of planets and the origin and/or evolution of life? (Hörst) What can we learn from the sedimentary record on Mars about what processes have shaped the evolution of that planet? (Lewis) How do planetary dynamos work? (Stanley) How can we use the wealth of spectra coming to us from new sensors to learn about planetary atmospheres? (Sing) A common thread across all of this work is the question of habitability- what sort of things need to happen in order for a planet to be able to support life, and for us to detect it? These questions are addressed using a combination of observation (ground-based telescopes and robotic spacecraft), laboratory experimentation, theoretical modeling, and Earth-analog field studies. The program requires an interdisciplinary focus, drawing from a wide variety of fields including astronomy, geosciences, physics and chemistry. Research often includes data from active planetary exploration missions. EPS faculty include members of the Cassini mission to the Saturn system, New Horizons mission to the Pluto system, and Mars Science Laboratory Rover teams, along with a number of proposed future missions to Venus, and Titan, and other worlds.

Students are encouraged to take courses in astrophysics, chemistry, physics, applied mathematics, computer science, and engineering to gain the comprehensive background necessary for interdisciplinary research. The best undergraduate preparation is a broad background in physics, applied mathematics, chemistry, or earth science. Advanced undergraduate courses in these fields (including differential equations, linear algebra, classical mechanics, electricity and magnetism, thermodynamics, organic, and physical chemistry) are strongly recommended. The EPS Planetary Science research program has close ties with the Space Department of the JHU Applied Physics Laboratory (APL), and students may be co-advised by APL researchers. Students in the department additionally benefit from the local availability of outside institutions including the Space Telescope Science Institute (co-located on the JHU campus), NASA Goddard Space Flight Center, the Carnegie Institution for Science, and the Smithsonian Institution.

DEEP EARTH GEOSCIENCES

This area focuses on understanding chemical and physical processes deep within the Earth and other planetary bodies. Key questions include: How do materials behave at very high temperatures and pressures, and what are the implications of this behavior for the whole planet system? (Wicks, Sverjensky) By what processes and at what rates do petrologic and tectonic systems evolve, and what are the feedbacks with the biosphere? (Viete). How is the Earth's geodynamo changing with time - and why? (Stanley) The interdisciplinary techniques used to study these questions include X-ray scattering and laser studies of planet-building minerals at extreme conditions (Wicks), geological field work and observation, and spatially-resolved geochemical and geochronological analysis of crystalline rocks (Viete) and theoretical and laboratory studies of mineral-fluid interactions (Sverjensky).

Aqueous geochemical studies centered in the Sverjensky group focus on the role of water in the evolution of Earth through deep time, particularly the linkages between water in the deep Earth and the near-surface environment. It involves quantitative geochemical modeling of the chemistry of water-rock interactions from Earth's surface into the upper mantle. Students participate in research involving the interpretation of experimental studies of water-rock interactions in terms of fundamental properties of aqueous inorganic and organic species over extreme ranges of pressure and temperature. Developing a thermodynamic characterization of the behavior of fluids at elevated pressures and temperatures enables exciting research into topics such as the origins of diamonds, the development and evolution of the continents and the potential roles of abiogenic hydrocarbons in Earth's deep carbon cycle. Collaborations with experimental laboratories enable a wide range of training in combined theoretical and experimental studies of the role of fluids in the history of Earth and other planets

Students applying in this area will come from a wide variety of backgrounds, including class and research experience in chemistry, mechanical engineering, material science and condensed matter physics. Recommended classes, depending on the research track, include crystallography, mineralogy, petrology, and field geology, thermodynamics, quantum mechanics, continuum mechanics, and mineral physics.

Research within the fields of petrology and tectonics centered in the Viete group focus on questions of length scales, time scales and drivers. It seeks to understand the tectonic processes that operate at plate margins, the nature and utility of the rock record, and interactions between the solid Earth and biosphere. Current foci include crustal heating and the tectonic significance of metamorphic rocks, scales of tectonic organization and episodicity, and petrologic records of seismicity. Student projects begin in the field, first involving mapping, measurement, observation and sampling. With field context established, geological questions are further interrogated through micro-scale structural, geochemical and geochronological analysis of sampled materials. Simple analytical and numerical modeling of processes of deformation and heat and material transfer are used to reproduce observed features and constrain processes recorded in landscapes and rocks.

Students applying in this area should enjoy field work and the outdoors and will preferably have some background and interest in chemistry, physics and/or mathematics. Recommended classes, depending on research track, may include field geology, petrology and petrography, structural geology, sedimentology, transport phenomena, thermodynamics, and rock mechanics.

GEOSCIENCE IN THE SURFACE ENVIRONMENT

This area focuses on what the geological record can tell us about the evolution of life on Earth and its interaction with climate. A particular focus of this group is the use of isotope geochemistry to examine the carbon, nitrogen, oxygen and sulfur cycles, and to link changes in the rock record to the actual organisms present at the time. Key questions include: What was the physical and chemical context in which the earliest complex life formed? (Smith) How do environmental conditions and/or biological communities influence geochemical signatures found in the rock record? (Gomes)

Students working in this area will learn a range of skills- including the field geology methods necessary to put samples in context, how to make isotopic measurements necessary to characterize the large-scale chemical environment, and how to use this information in conjunction with quantitative and modeling tools to investigate the coevolution of life and the Earth surface. Additionally, the Smith group has expertise in the paleontology of Ediacaran organisms and the Gomes group uses the tools of microbial ecology. Using multi-disciplinary tools, researchers in this area seek to use insight about the coevolution of life and the Earth surface to provide context to understand modern climate change and investigate the tools that can be used to search for life on other planets.

OCEANS, ATMOSPHERES AND CLIMATE

The Oceans, Atmospheres and Climate area focuses on understanding planetary-scale and regional dynamics with implications for planetary climates, including anthropogenic climate change. The philosophy underlying the department's program is a rigorous and thorough process-based understanding of the climate system, with a grounding in fluid dynamics, energy exchange, and relevant chemical and biological interactions. Researchers in the department address these processes with theory, laboratory and numerical experiments, and study both remotely sensed and *in situ* field observations. Johns Hopkins is a member of the University Corporation for Atmospheric Research.

The best preparation for graduate study in this program is an undergraduate degree in physics, applied mathematics, mechanical engineering, or another parent science such as chemistry, oceanography, meteorology, or geology/geophysics. Prior course work in fluid dynamics, while highly desirable, is not mandatory to pursue graduate study in this area. It is strongly recommended to have a broad background in the parent sciences, specialization in one of them, and at least three years of undergraduate mathematics. Research experience is also desirable.

Research in physical oceanography (involving Profs. Haine, Gnanadesikan and Waugh) focuses on the processes that maintain the global ocean circulation and the ocean's role in climate and global biogeochemical cycling. In particular, attention is on the role of waves, eddies, and small-scale mixing in controlling the ocean's part in Earth's heat and freshwater balances. We also study advection, stirring, and mixing processes in the interior ocean and their roles in dispersing atmospheric trace gases and nutrients. The research program also includes computational oceanography, with links to other Hopkins departments and centers.

Research in atmospheric dynamics, (involving Prof. Waugh) focuses on large-scale dynamics, the transport of trace constituents, and understanding the composition of the global atmosphere (e.g., distributions of stratospheric ozone and tropospheric water vapor). Current interests include stratospheric vortex dynamics, troposphere-stratosphere couplings, transport and mixing processes, and global modeling of chemical constituents.

Research in hydroclimate, including atmospheric processes that drive precipitation and terrestrial hydrology, is a focus of Prof. Zaitchik's group. This research employs satellite image analysis, numerical modeling, and field observation to build a process-based understanding of the ways in which climate shapes landscape and vice versa. Current interests include drivers of rainfall variability in the tropics, coupled natural-human systems, seasonal forecast, and the application of hydroclimate analysis to studies of water resources, agriculture, and human health.

Research on climate and radiation is found across all of the research groups in this area and includes study of the global climate system and its response to radiative forcing due to changes in greenhouse gases and solar luminosity, the feedback effects of water vapor and clouds, and the radiative and hydrological effects of aerosols. These studies involve global and regional scale modeling, and the analysis and interpretation of satellite observations.

Additionally Prof. Gnanadesikan's group conducts research in biogeochemical cycling, focussing on applying and developing three-dimensional computational models that can be combined with observations and remotely sensed data to characterize cycling of key elements (including carbon, nitrogen, and oxygen) in the earth system. Opportunities exist to link this work to the observational and theoretical geochemistry work done in the department as well as to simulate key periods and transitions in Earth History.

ECOLOGY: ORGANISMS, ECOSYSTEMS AND ENVIRONMENTAL CHANGE

This area of research involves understanding how organisms interact with each other and with the physical world, and how humans affect ecological processes and ecosystems. Questions include: How does past and present land use change affect species distribution, community assembly and biogeochemical cycles? (Avolio, Szlavecz) How does biodiversity, especially invasive species, affect the rates of soil biogeochemical cycling the production of greenhouse gasses (Szlavecz)? How do urban environments shape the ecology and evolution of plants and soil organisms within these systems (Avolio, Szlavecz)? What are the linkages between plant community composition and ecosystem function and/or services in grasslands and cities (Avolio)? How resistant or resilient are grasslands to global change drivers and what is their capacity to adapt to new environmental conditions (Avolio)? Students are invited to participate in ongoing collaborations at two Long Term Ecological Research Sites (Baltimore Ecosystem Study and Konza Prairie Biological Station), the Smithsonian Environmental Research Center, the Beltsville Agricultural Research Center, or to design an original research project under the advisement of our faculty.

Graduate Programs

Requirements for Admission

The department expects applicants for advanced degrees to have completed undergraduate training in the basic sciences and mathematics. Normally this includes mathematics through at least integral calculus and coursework at least one year of coursework in physics, chemistry, and/or biology (with the exact combination depending on specialization). Further undergraduate study in one or more of these subjects or in mathematics is highly desirable for all programs in the Earth sciences; additional mathematics is essential for geophysics, atmospheric sciences, and dynamical oceanography. Extensive undergraduate work in Earth sciences is not a requirement for admission. If students lack formal training in this area or have deficiencies in the other related sciences, they may be admitted but will have to allow additional time in the graduate program to make up for deficiencies in their preparation. Students who have not attended undergraduate universities where the language of instruction is English will either be required to provide evidence of their reading, writing and speaking ability in English at level sufficient to conduct high-level scholarship. This may either take the form of a standardized test, evidence of work experience in a comparable environment, or an interview with the proposed advisor.

Requirements for Advanced Degrees

Candidates for the Ph.D. must meet requirements specified by their advisory committee. This begins with at least one year of coursework or supervised research, following by passing a comprehensive examination before a departmental committee and an oral examination administered by the Graduate Board of the university. Finally, students must submit an acceptable dissertation involving significant original research, as determined by two faculty readers, and present this research to the department. A minimum of two consecutive terms registered as a full-time student (engaged in some combination of classwork and research) is required.

The department rarely accepts candidates for the M.A. degree alone, but Ph.D. students can, with the consent of their advisors, complete a program that will qualify them for the M.A. degree at some point after their first year. Candidates for this degree must pass a comprehensive examination before a departmental committee, and must satisfy the residency requirement specified above for the Ph.D. degree. A student's advisor may require an essay demonstrating research capability.

For further information about graduate study in the Earth and planetary sciences contact the Chair, Department of Earth and Planetary Sciences.

Financial Aid

The university makes available to the department a number of Gilman Fellowships, which provide for complete payment of tuition, together with Johns Hopkins' fellowships and graduate assistantships that carry a nine-month stipend. Graduate assistantships cannot require more than 10 hours a week of service to the department, and all recipients of financial aid carry a full program of study and/or research. In addition, a number of special and endowed fellowships pay as much or more. The departmental expectation is that advisors will cover students' summer stipend on grants. In cases where this is not possible the department will backstop this support subject to availability of funds.

Applications for admission to graduate study and financial aid (including all supporting documents and, if necessary, evidence of proficiency in English) should be submitted to the department before January 1.

Earth and Planetary Sciences, Bachelor of Arts

Earth and Planetary Sciences Major Requirements (B.A.)

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Bachelor of Arts in Earth and Planetary Sciences is for undergraduates interested in the study of the physical, chemical, and biological processes that shape the Earth and the other planets, drawing on the disciplines of geology, geochemistry, geophysics, hydrology, ecology, geobiology, oceanography, and atmospheric science.

Students should design a specific plan of appropriate courses in consultation with their advisor and the EPS Director of Undergraduate Studies (DUS). Those who wish to be majors may proceed directly to the introductory courses at the 200-level, but depending on the student's background, it may be appropriate initially to take a freshman seminar or 100-level course designed for the non-major. Our courses provide a broad educational base in the Earth, planetary, and environmental sciences and enable exploration of a set of electives at the 300- and 400-level, depending on the area of interest. Students who plan to attend graduate school are strongly encouraged to engage in undergraduate research and complete a senior thesis under the supervision of a department faculty member.

The department requires a total of 9-11 credits at the 100-level or above and 12 credits at the 300-level or above in Earth, planetary, and environmental sciences (numbered AS.270.xxx), as well as science and math foundation courses from other departments. No more than one environmental studies course numbered AS.271.xxx can be counted as an EPS elective for the major. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the major.

Major Requirements

Code	Title	Credits
EPS Core Courses		
AS.270.224	Oceans & Atmospheres	3
AS.270.220	The Dynamic Earth: An Introduction to Geology	3
AS.270.221	The Dynamic Earth Laboratory	2
EPS Elective Courses [1]		
One course at the 100-level or above (1-3 credits)		1-3
Four courses at the 300-level or above (at least 3 credits each)		12
Other Science & Math Courses		
AS.030.101	Introductory Chemistry I	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.110.113	Honors Single Variable Calculus	
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
Total Credits		**40-42**

1 Only one environmental studies course numbered AS.271.xxx may apply towards the EPS major. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards these EPS elective course requirements without permission of the Director of Undergraduate Studies.

Other courses recommended to enrich the educational background of the major:

Code	Title	Credits
AS.030.102	Introductory Chemistry II	3
AS.020.151	General Biology I	3
AS.020.152	General Biology II	3
Laboratory courses in the natural sciences		
EN.553.291	Linear Algebra and Differential Equations	4

Courses in Environmental Studies (AS.271.xxx) and/or Environmental Engineering (EN.570.xxx)	

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.270.220	The Dynamic Earth: An Introduction to Geology	3
AS.270.221	The Dynamic Earth Laboratory	2
	Credits	**9**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
AS.270.224	Oceans & Atmospheres	3
	Credits	**7**
Second Year		
First Semester		
AS.171.101	General Physics: Physical Science Major I	4
AS.030.101	Introductory Chemistry I	3
	Credits	**7**
Second Semester		
AS.171.102	General Physics: Physical Science Major II	4
AS.270.1xx-4xx		3
	Credits	**7**
Third Year		
First Semester		
AS.270.3xx-4xx		3
	Credits	**3**
Second Semester		
AS.270.3xx-4xx		3
	Credits	**3**
Fourth Year		
First Semester		
AS.270.3xx-4xx		3
	Credits	**3**
Second Semester		
AS.270.3xx-4xx		3
	Credits	**3**
	Total Credits	**42**

Honors in the Major

To earn honors in the major, students must meet the following criteria:

- Earn a GPA of 3.50 or higher in the major requirements by the end of the senior year.
- Complete a total of 6 credits of AS.270.510 Senior Thesis taken over two or more semesters. A grade of B or better must be earned for the first 3 credits to register for additional thesis credits. A grade of B+ or better must be earned in the final semester in order to qualify for honors.
- Complete a senior thesis research project rated very good or excellent by the student's thesis committee.
- Present the results of the thesis orally in the Department of Earth and Planetary Sciences.

Earth and Planetary Sciences, Minor

Earth and Planetary Sciences Minor Requirements

The Earth and Planetary Sciences minor is primarily for science undergraduates interested in learning about Earth and other planets through the study of geology, geochemistry, geophysics, hydrology, ecology, geobiology, oceanography, and atmospheric science. Students take 12 credits of EPS courses (numbered AS.270.xxx), at least six of which are at the 300-level, and at least 16 credits of other natural sciences, quantitative studies, or engineering. No environmental studies courses (numbered AS.271.xxx) may count toward the minor. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course towards the minor.

Code	Title	Credits
AS.270.220	The Dynamic Earth: An Introduction to Geology	3
or AS.270.224	Oceans & Atmospheres	
Three credits of EPS courses at any level [1]		3
Six credits of EPS courses at the 300-level or above [1]		6
Sixteen credits of natural science, quantitative, or engineering courses not from the EPS Department, preferably biology, chemistry, physics, or mathematics.		16
Total Credits		**28**

1 Courses taken at another institution without a direct equivalency to a JHU course may not apply towards this requirement without permission of the Director of Undergraduate Studies.

Energy, Minor

Energy Minor

Energy touches all aspects of the human experience and is central to nearly every global challenge the world faces today, from raising the standards of living around the world to the existential threat of climate change. The scientific basis of energy is inherently multidisciplinary, and social and behavioral sciences are also crucial to understanding the economics and policy driving technology adoption. The Energy minor program addresses the growing need for trained engineers and scientists in the many sectors that develop, manage, and propagate these technologies.

The Energy minor is jointly administered by the Department of Earth and Planetary Sciences in the Krieger School of Arts and Sciences and the Department of Electrical and Computer Engineering in the Whiting School of Engineering and is affiliated with the Ralph O'Connor Sustainable Energy Institute (ROSEI, https://energyinstitute.jhu.edu/) which provides additional support and co-curricular opportunities to students in the program. If you have questions regarding the minor, please direct them to Professor Susanna Thon at susanna.thon@jhu.edu.

Energy Minor Requirements

The Energy minor is designed to allow students majoring in a diverse set of disciplines to develop additional expertise in energy and to position them to become leaders in the energy field, either directly as entering professionals in industry, government laboratories, and other organizations, or as students in the best graduate programs. It consists of 26-29 credits of energy-related courses in four areas: (a) pre-requisite courses, (b) fundamentals, (c) science and policy context, and (d) technical energy electives. There are two options for completing the fundamentals. Option I is recommended for students completing a major that does not require a thermodynamics course. Option II is recommended for students completing a major that requires a thermodynamics course. Students are encouraged to select electives to fit their particular interests and career goals.

Elective courses that can count toward the minor are those focused on science and policy issues related to energy and relevant technical skills and knowledge areas. The joint KSAS and WSE Directors of Undergraduate Studies (DUS) distribute a list of approved courses for the minor each semester, and these courses are denoted with the POS tags ENGY-SCIPOL and ENGY-TECH in the Schedule of Classes. Approval for other appropriate courses can be sought by emailing one of the DUS's. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the minor. Consult the Energy minor's website for additional information: https://energyinstitute.jhu.edu/energy-minor/ (https://energyinstitute.jhu.edu/?page_id=5385&preview=true).

Minor Requirements

Code	Title	Credits
Pre-Requisites		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.105	Classical Mechanics I	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
or AS.173.115	Classical Mechanics Laboratory	
Fundamentals: Option I *		
EN.520.370	Introduction to Renewable Energy Engineering	3
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.106	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
or EN.560.112	Electromagnetism & Sensors Lab	
Fundamentals: Option II *		
EN.520.370	Introduction to Renewable Energy Engineering	3
AS.030.301	Physical Chemistry I	2-4
or AS.171.312	Statistical Physics/Thermodynamics	
or AS.250.372	Biophysical Chemistry	
or EN.510.312	Thermodynamics/Materials	
or EN.530.231	Mechanical Engineering Thermodynamics	
or EN.540.203	Engineering Thermodynamics	
or EN.580.241	Statistical Physics	
Science and Policy Context Electives		
Complete a minimum of 6 credits of approved electives with the ENGY-SCIPOL POS-Tag		6
Technical Energy Electives		
Complete a minimum of 6 credits of approved electives with the ENGY-TECH POS-Tag		6
Total Credits		**27-29**

* Students complete either (1) Fundamentals: Option I or (2) Fundamentals: Option II.

Sample Programs of Study

Students majoring in a natural science discipline who do Option I of the fundamentals may follow a curriculum similar to the following:

Course	Title	Credits
First Year		
Fall		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Spring		
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
	Credits	**5**
Second Year		
Fall		
EN.520.370	Introduction to Renewable Energy Engineering	3
	Credits	**3**
Third Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Fourth Year		
Fall		
Technical elective (ENGY-TECH)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
	Total Credits	**29**

Students majoring in an engineering field who do Option II of the fundamentals may follow a curriculum similar to the following:

Course	Title	Credits
First Year		
Fall		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Second Year		
Fall		
EN.520.370	Introduction to Renewable Energy Engineering	3
	Credits	**3**
Spring		
EN.510.312	Thermodynamics/Materials	3
	Credits	**3**
Third Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
Fourth Year		
Fall		
Policy elective (ENGY-SCIPOL)		3
	Credits	**3**
Spring		
Technical elective (ENGY-TECH)		3
	Credits	**3**
	Total Credits	**27**

Environmental Science, Bachelor of Science

Environmental Science Major Requirements (B.S.)

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Bachelor of Science in Environmental Science is an interdisciplinary major that introduces students to the ways in which human activities impact Earth systems and vice versa. It equips students to use a variety of tools, such as science, policy, communication, and individual and societal behavior change, to solve environmental and sustainability problems, with an emphasis on the perspectives and tools of the natural sciences. Environmental Science majors must complete a set of core courses common to both ENVS majors, including a senior capstone and an applied experience, plus several additional natural science core courses and a suite of electives in the student's area of interest.

All ENVS majors are encouraged to consider studying abroad at some point during their undergraduate years to develop a more global, culturally sensitive perspective on environmental and sustainability issues. They are also encouraged to take advantage of the opportunities at JHU and elsewhere to engage in research and scholarship, either through a work or internship experience, an independent research course, or a senior thesis project.

The Environmental Science major requires a total of 71-76 credits to complete. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the major. Students are not permitted to double-major in both Environmental Science and Environmental Studies.

Electives

Each student should work with their advisor to choose a coherent and meaningful suite of elective courses that are relevant to the student's individual interests and career plans and that total at least 15 credits, 12 of which are at the 300-level or above. Some students may choose to center their electives around one or more environmental/sustainability issues or disciplines, such as Earth science or ecology; others may choose to explore more broadly. Approved elective courses are those that concentrate directly on environmental or sustainability issues. ENVS independent study, independent research, and senior thesis courses can also count as electives. The ENVS Director of Undergraduate Studies (DUS) distributes a list of approved elective courses each semester, and these courses are denoted with the POS tag ENVS-MAJOR in the Schedule of Classes. Approval for other courses can be sought by emailing the DUS.

Applied Experience

The applied experience can be completed during any semester including summers and involves at least 80 hours of supervised, hands-on work while enrolled in AS.271.509 Applied Experience. The experience can involve doing research or working with an organization on environmental or sustainability issues through an internship or similar work or volunteer experience. Journal entries and synthesizing assignments reflecting on the experience are required for the course. The goal of this requirement is to ensure that students have practical experience in a workplace or community setting that will help prepare them for the next step in their education and career.

Senior Capstone & Seminar

The ENVS AS.271.496 Senior Capstone course focuses on developing critical thinking and communication skills through engagement with complex, real world, environmental and sustainability problems. Concurrently, seniors take the 1-credit AS.271.499 Senior Seminar course that focuses on life design and career planning in order to support seniors as they transition to post-graduate life and work. All ENVS majors must enroll in the capstone and senior seminar courses in the fall semester of their senior year.

Major Requirements

Code	Title	Credits
Common ENVS Core		
AS.270.103	Introduction to Global Environmental Change	3
AS.271.107	Introduction to Sustainability	3
AS.270.202	Introduction to Ecology	3
AS.270.205	Introduction to Geographic Information Systems and Geospatial Analysis	3
AS.270.336	Freshwater Systems	3
AS.271.403	Environmental Policymaking and Policy Analysis	3
AS.271.496	Senior Capstone	3
AS.271.499	Senior Seminar	1
AS.271.509	Applied Experience	1

AS.030.101	Introductory Chemistry I	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.180.102	Elements of Microeconomics	3
AS.190.101	Introduction to American Politics	3
or AS.190.102	Introduction To Comparative Politics	
or AS.190.111	Introduction to Global Studies	
or AS.190.108	Contemporary International Politics	
or AS.190.226	Global Governance	
AS.230.205	Introduction to Social Statistics	4
or AS.200.201	Design & Statistical Analysis for Psychology	
or AS.280.345	Public Health Biostatistics	
or EN.553.111	Statistical Analysis I	
or EN.553.211	Probability and Statistics for the Life Sciences	
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Natural Sciences Core		
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
AS.030.102	Introductory Chemistry II	3
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
Select two of the following science courses:		6-8
AS.020.151	General Biology I	
AS.020.152	General Biology II	
AS.171.101	General Physics: Physical Science Major I	
or AS.171.10	General Physics I for Biological Science Majors	
or AS.171.10	Classical Mechanics I	
or AS.171.10	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	
or AS.171.104	General Physics/Biology Majors II	
or AS.171.105	Electricity and Magnetism I	
or AS.171.108	General Physics for Physical Science Majors (AL)	
Lab Experiences		
3 approved science lab courses are required. Lab courses waived due to Advanced Placement Exam credit cannot count toward this requirement. Approved labs include but are not limited to:		3-6
AS.020.153	General Biology Laboratory I	
AS.020.154	General Biology Lab II	
AS.030.105	Introductory Chemistry Laboratory I	
AS.030.106	Introductory Chemistry Laboratory II	
AS.173.111	General Physics Laboratory I	
AS.173.112	General Physics Laboratory II	
AS.173.115	Classical Mechanics Laboratory	
AS.173.116	Electricity and Magnetism Laboratory	
AS.270.221	The Dynamic Earth Laboratory	
AS.270.337	Freshwater Systems Lab	
AS.270.338	Field Methods in Ecology (If used to satisfy the lab requirement, this course cannot count as an elective.)	
Electives		
Choose 15 credits of approved courses, at least 12 credits of which are at the 300-level or above. ENVS independent study, independent research, and senior thesis courses can count as electives.		15
Total Credits		**71-76**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.270.103	Introduction to Global Environmental Change	3
AS.030.101	Introductory Chemistry I	3
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.190.108	Contemporary International Politics	3
	Credits	**13**
Second Semester		
AS.271.107	Introduction to Sustainability	3
AS.030.102	Introductory Chemistry II	3
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
	Credits	**10**
Second Year		
First Semester		
AS.270.205	Introduction to Geographic Information Systems and Geospatial Analysis	3
AS.020.151	General Biology I	3
AS.020.153	General Biology Laboratory I	1
EN.553.111	Statistical Analysis I	4
	Credits	**11**
Second Semester		
AS.270.202	Introduction to Ecology	3
AS.020.152	General Biology II	3
AS.020.154	General Biology Lab II	1
AS.180.102	Elements of Microeconomics	3
	Credits	**10**
Third Year		
First Semester		
AS.270.336	Freshwater Systems	3
AS.270.337	Freshwater Systems Lab	1
Elective course		3
	Credits	**7**
Second Semester		
AS.271.509	Applied Experience	1
Elective course		3
Elective course		3
	Credits	**7**
Fourth Year		
First Semester		
AS.271.496	Senior Capstone	3
AS.271.499	Senior Seminar	1
Elective course		3
	Credits	**7**

Second Semester		
AS.271.403	Environmental Policymaking and Policy Analysis	3
Elective course		3
	Credits	**6**
	Total Credits	**71**

Honors in the Major

To earn honors in the major, a student must meet the following criteria:

- Earn a cumulative GPA of 3.50 in the courses taken to fulfill the major requirements.
- Complete AS.271.399 Research Design during the junior year to develop a senior thesis project proposal. If a student is prevented from taking the course for some reason, such as studying abroad, they must petition the DUS for a waiver.
- Submit a senior thesis project proposal on an environmental or sustainability-related research project or other comparable scholarly endeavor before the start of the senior year. It will be evaluated by the ENVS Director, Associate Director, and the proposed faculty research advisor and must meet their approval.
- Complete 6 credits of AS.271.511 Senior Thesis under the guidance of a JHU faculty member or research affiliate.
- Earn a rating of good or excellent on the final product of the thesis, as determined by the ENVS thesis committee including the student's research advisor.
- Present the results of the thesis orally in an appropriate JHU department.

Additional details on the procedures and criteria for earning honors are available on the ENVS website. A thesis project completed to earn honors in an ENVS major cannot be double-counted with an honors thesis done in another department or program for a second major.

B.S./M.S. Option

Undergraduates majoring in Environmental Science may apply for accelerated status toward an M.S. in Environmental Sciences and Policy (ESP) or an M.S. in Geographic Information Systems (GIS) through the JHU Krieger School of Arts & Sciences' Advanced Academic Programs. Interested students should speak with their advisor and the Director of the ESP or GIS Program in their senior year. Students may apply up to three courses taken as undergraduates toward the M.S. in Environmental Science and Policy and up to two courses toward the M.S. in GIS, thereby leaving only seven to eight more courses to complete the M.S. following receipt of their bachelor's degree. Students will receive two separate degrees, so the requirements of both degrees must be fulfilled. Students cannot earn the M.S. degree without completion of the B.A. or B.S., however, students who do not complete the M.S. retain their B.A. or B.S.

Environmental Studies, Bachelor of Arts

Environmental Studies Major Requirements (B.A.)

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Bachelor of Arts in Environmental Studies is an interdisciplinary major that introduces students to the ways in which human activities impact Earth systems and vice versa. It equips students to use a variety of tools, such as policy, science, communication, and individual and societal behavior change, to solve environmental and sustainability problems, with an emphasis on the perspectives and tools of the social sciences. Environmental Studies majors must complete a set of core courses common to both ENVS majors, including a senior capstone and an applied experience, plus additional social science core courses and a suite of electives in the student's area of interest.

All ENVS majors are encouraged to consider studying abroad at some point during their undergraduate years to develop a more global, culturally sensitive perspective on environmental and sustainability issues. They are also encouraged to take advantage of the opportunities at JHU and elsewhere to engage in research and scholarship, either through a work or internship experience, an independent research course, or a senior thesis project.

The Environmental Studies major requires a total of 58 credits to complete. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the major. Students are not permitted to double-major in both Environmental Studies and Environmental Science.

Electives

Each student should work with their advisor to choose a coherent and meaningful suite of elective courses that are relevant to the student's individual interests and career plans and that total at least 12 credits, 9 of which are at the 300-level or above. Some students may choose to center their electives around one or more environmental/sustainability issues or disciplines, such as anthropology or economics; others may choose to explore more broadly. Approved elective courses are those that concentrate directly on environmental or sustainability issues. ENVS independent study, independent research, and senior thesis courses can also count as electives. The ENVS Director of Undergraduate Studies (DUS) distributes a list of approved elective courses each semester, and these courses are denoted with the POS tag ENVS-MAJOR in the Schedule of Classes. Approval for other courses can be sought by emailing the DUS.

Applied Experience

The applied experience can be completed during any semester including summers and involves at least 80 hours of supervised, hands-on work while enrolled in AS.271.509 Applied Experience. The experience can involve doing research or working with an organization on environmental or sustainability issues through an internship or similar work or volunteer experience. Journal entries and synthesizing assignments reflecting on the experience are required for the course. The goal of this requirement is to ensure that students have practical experience in a workplace or community setting that will help prepare them for the next step in their education and career.

Senior Capstone & Seminar

The ENVS AS.271.496 Senior Capstone course focuses on developing critical thinking and communication skills through engagement with complex, real world, environmental and sustainability problems. Concurrently, seniors take the 1-credit AS.271.499 Senior Seminar course that focuses on life design and career planning in order to support seniors as they transition to post-graduate life and work. All ENVS majors must enroll in the capstone and senior seminar courses in the fall semester of their senior year.

Major Requirements

Code	Title	Credits
Common ENVS Core		
AS.270.103	Introduction to Global Environmental Change	3
AS.271.107	Introduction to Sustainability	3
AS.270.202	Introduction to Ecology	3
AS.270.205	Introduction to Geographic Information Systems and Geospatial Analysis	3
AS.270.336	Freshwater Systems	3
AS.271.403	Environmental Policymaking and Policy Analysis	3
AS.271.496	Senior Capstone	3
AS.271.499	Senior Seminar	1
AS.271.509	Applied Experience	1
AS.030.101	Introductory Chemistry I	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.180.102	Elements of Microeconomics	3
AS.190.101	Introduction to American Politics	3
or AS.190.102	Introduction To Comparative Politics	
or AS.190.111	Introduction to Global Studies	
or AS.190.108	Contemporary International Politics	
or AS.190.226	Global Governance	
AS.230.205	Introduction to Social Statistics	4
or AS.200.201	Design & Statistical Analysis for Psychology	
or AS.280.345	Public Health Biostatistics	
or EN.553.111	Statistical Analysis I	
or EN.553.211	Probability and Statistics for the Life Sciences	
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
Social Sciences Core		
AS.180.101	Elements of Macroeconomics	3
AS.230.202	Research Methods for the Social Sciences	3
or AS.070.317	Methods	
or AS.190.365	Research and Inquiry in the Social Sciences	
or AS.200.200	Research Methods in Psychology	
or AS.230.323	Qualitative Research Practicum	
or AS.280.240	Research Methods in Public Health	
Electives		
Choose 12 credits of approved courses, at least 9 credits of which are at the 300-level or above. ENVS independent study, independent research, and senior thesis courses can count as electives.		12
Total Credits		**58**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.270.103	Introduction to Global Environmental Change	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
AS.180.101	Elements of Macroeconomics	3
AS.190.108	Contemporary International Politics	3
	Credits	**13**
Second Semester		
AS.271.107	Introduction to Sustainability	3
AS.180.102	Elements of Microeconomics	3
AS.230.205	Introduction to Social Statistics	4
	Credits	**10**
Second Year		
First Semester		
AS.270.205	Introduction to Geographic Information Systems and Geospatial Analysis	3
AS.030.101	Introductory Chemistry I	3
	Credits	**6**
Second Semester		
AS.270.202	Introduction to Ecology	3
AS.230.202	Research Methods for the Social Sciences	3
	Credits	**6**
Third Year		
First Semester		
AS.270.336	Freshwater Systems	3
Elective course		3
	Credits	**6**
Second Semester		
AS.271.509	Applied Experience	1
Elective course		3
Elective course		3
	Credits	**7**
Fourth Year		
First Semester		
AS.271.496	Senior Capstone	3
AS.271.499	Senior Seminar	1
Elective course		3
	Credits	**7**
Second Semester		
AS.271.403	Environmental Policymaking and Policy Analysis	3
	Credits	**3**
	Total Credits	**58**

Honors in the Major

To earn honors in the major, a student must meet the following criteria:

- Earn a cumulative GPA of 3.50 in the courses taken to fulfill the major requirements.
- Complete AS.271.399 Research Design during the junior year to develop a senior thesis project proposal. If a student is prevented from taking the course for some reason, such as studying abroad, they must petition the DUS for a waiver.
- Submit a senior thesis project proposal on an environmental or sustainability-related research project or other comparable scholarly endeavor before the start of the senior year. It will be evaluated by the ENVS Director, Associate Director, and the proposed faculty research advisor and must meet their approval.

- Complete 6 credits of AS.271.511 Senior Thesis under the guidance of a JHU faculty member or research affiliate.
- Earn a rating of good or excellent on the final product of the thesis, as determined by the ENVS thesis committee including the student's research advisor.
- Present the results of the thesis orally in an appropriate JHU department.

Additional details on the procedures and criteria for earning honors are available on the ENVS website. A thesis project completed to earn honors in an ENVS major cannot be double-counted with an honors thesis done in another department or program for a second major.

B.A./M.S. Option

Undergraduates majoring in Environmental Studies may apply for accelerated status toward an M.S. in Environmental Sciences and Policy (ESP) or an M.S. in Geographic Information Systems (GIS) through the JHU Krieger School of Arts & Sciences' Advanced Academic Programs. Interested students should speak with their advisor and the Director of the ESP or GIS Program in their senior year. Students may apply up to three courses taken as undergraduates toward the M.S. in Environmental Science and Policy and up to two courses toward the M.S. in GIS, thereby leaving only seven to eight more courses to complete the M.S. following receipt of their bachelor's degree. Students will receive two separate degrees, so the requirements of both degrees must be fulfilled. Students cannot earn the M.S. degree without completion of the B.A. or B.S., however, students who do not complete the M.S. retain their B.A. or B.S.

Environmental Studies, Minor

Environmental Studies Minor Requirements

The Environmental Studies minor is designed to allow students majoring in other disciplines to develop additional expertise in environmental issues and sustainability. It consists of 18 credits of environmental or sustainability-related courses, including two introductory core courses. At least 6 credits must be at the 300-level or above. Students are encouraged to select electives from relevant courses in both the social and natural sciences but can tailor their coursework to fit their particular interests and career goals.

Appropriate elective courses are those focused directly on environmental or sustainability issues. The ENVS Director of Undergraduate Studies (DUS) distributes a list of approved courses for the minor each semester, and these courses are denoted with the POS tag ENVS-MINOR in the Schedule of Classes. Approval for other courses can be sought by emailing the DUS. All courses must be taken for a letter grade, and students must earn a grade of C- or better to apply the course to the minor.

Code	Title	Credits
AS.270.103	Introduction to Global Environmental Change	3
AS.271.107	Introduction to Sustainability	3
Take 12 credits of approved elective courses, at least 6 credits of which are at the 300-level or above.		12
Total Credits		**18**

East Asian Studies

http://krieger.jhu.edu/east-asian/

East Asian Studies Major and Minor

The East Asian Studies program is interdisciplinary and interdepartmental. It includes both a major and a minor. The primary purpose of the program is to introduce undergraduates to the knowledge, language skills, and research methods they will need to enter various academic and professional paths relating to China, Japan, and Korea. Majors in East Asian Studies engage in intensive Chinese, Japanese and/or Korean language study through the Center for Language Education and work with faculty on such topics as China in the global economy, nationalism in East Asia, Korean politics, modern Japanese history and politics, Chinese urban history, and women in modern China. Students are encouraged to pursue original research projects in East Asia with the support of intersession and summer travel grants, stipends for conference presentations, a senior thesis honors option, and seminars that bring together research scholars, faculty, graduate students and undergraduates in a manner that is distinctly Hopkins. Many students choose to combine the major in East Asian Studies with another major. Alumni of the program are making their mark around the world in business and finance, academia, law, international development, medicine and public health, engineering, media, public service, and the arts.

BA/MA Program with SAIS

For students wishing to both develop their language skills and to pursue a master's degree after graduation from Johns Hopkins, the university offers an accelerated and competitive International Studies B.A./M.A. Program drawing upon its resources at the School of Advanced International Studies (SAIS), located in Washington, D.C, and the Hopkins-Nanjing Center in Nanjing, China. Combining a liberal arts curriculum with a strong specialization in international studies, the program allows those enrolled to receive the B.A. and M.A. degrees in five years instead of the usual six. Students spend three years in Baltimore, one year in Nanjing, and their final year in Washington, D.C.

Approximately eight sophomores are selected for the accelerated BA/MA program each year. Admission is limited to those majoring in East Asian Studies (the combined program via the Nanjing, China campus only), International Studies, and Political Science and who are highly motivated toward careers for which a background in international studies is essential: research, teaching, or practice in international affairs. Financial assistance is available to those admitted based on need and on academic achievement. For more information go to http://krieger.jhu.edu/internationalstudies/bama-programs/bama-program-with-sais/.

Johns Hopkins in Tokyo

In fall 2012, we inaugurated a full-year undergraduate exchange program with the University of Tokyo. This study abroad program was designed with JHU East Asian Studies majors and Japanese language students in mind. As with other departmental study abroad programs at JHU, students' credits and grades will be transferred between the two universities.

This is a direct exchange program between the two universities, rather than a program run by JHU. For each JHU student who attends the University of Tokyo, one University of Tokyo student will attend JHU. Each

JHU student has a Japanese student as their personal tutor. The tutors assist students in both academic matters and in daily life.

Limited to 1-3 students per year, admission to the University of Tokyo program is competitive. Students must have completed 4 semesters of college-level Japanese or the equivalent, have a term GPA of 3.0 or above, and submit two faculty references, one of which should be from a Japanese language instructor. For more information and application instructions, visit http://krieger.jhu.edu/east-asian/study-abroad/hopkins-in-tokyo/

Programs

- East Asian Studies, Bachelor of Arts (p. 1785)
- East Asian Studies, Minor (p. 1787)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.310.106. Introduction to Korean History and Culture. 3 Credits.
This course offers a comprehensive overview of Korean history and culture from ancient times to the modern era. Through primary, secondary, and audio-visual sources, students will become familiar not only with the overall contours of the entirety of Korean history, but also with its cultural and religious legacy. The course combines lectures and class discussions.

AS.310.107. Introduction to Korean Studies. 3 Credits.
This course offers a comprehensive overview of Korean history, politics, and culture encompassing premodern, modern, and contemporary times. Through primary and secondary materials, students will learn about the formation of Korea as a complex interplay of dynastic changes, wars, colonialism, rapid modernization, migrations, and minority and diasporic politics. We will approach the study of Korea through a cultural studies perspective, paying close attention to systems of power, ideology, gender, race, and class.

AS.310.110. Literatures and Films of Korea and the Korean Diaspora. 3 Credits.
This survey course introduces students to major events and themes addressed in Korean literature and film such as: Japanese colonialism, modernity, capitalism, the Korean War, rapid industrialization, postmodernity, immigration, transnational adoption, and more. Students will examine the role of literature and film in the development of the nation and the depiction of the Korean and Korean-diasporic subject as a complex set of intersecting social identities that contend with race, class, and gender.
Area: Writing Intensive

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

AS.310.230. Chinese Politics and Society. 3 Credits.
This introductory course will familiarize students with the major dynamics of political and social change in contemporary China since 1949. The course will be divided chronologically into four main topics: 1. The contested processes of nation-state making in modern China before 1949; 2. The making of the socialist system during the Mao Years and its dismantling since 1978; 3. The Reform Era transformation to a market economy with Chinese characteristics; 4. The dynamic relationships among the state, market and society since the new millennium. Students will explore how scholars have explained major political and social changes with reference to individual and collective rationalities, specific organizational and institutional arrangements, and specific strategic and cultural mechanisms of Chinese political and social habits.

AS.310.285. Chinese Leaders: Institutions and Agency. 3 Credits.
This course is a broad survey of what leadership looks like in China. The main through-line of the course is the how China's leaders navigate the often challenging terrain between constraints and incentives, on the one hand, and opportunities to apply their own individual agency. We will explore the state as the arena in which all this takes place over time (to explore continuity and change) and across space (to explore adaptation and innovation). The course does not presume prior knowledge of China or Chinese language, but students new to the study of China are encouraged to pay special attention to the cumulative nature of the course and invest in the readings, particularly in the first four weeks. Although some of the themes of this course may minimally overlap with/reinforce other Chinese politics courses offered at JHU, the approach to this class will be significantly different.

AS.310.302. China, Human Rights, and U.S. Policy Responses. 3 Credits.
This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will "adopt" one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights. This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will "adopt" one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights.

AS.310.305. China, Southeast Asia, and U.S. National Security. 3 Credits.
The global political and security landscape of the 21st century will be shaped by the rivalry between two superpowers -- China and the U.S. For the foreseeable future, the geographic focus of that contest will be Southeast Asia and the surrounding maritime space, particularly the South China Sea. Southeast Asia is a complex, highly differentiated region of ten-plus nations, each with its own unique history and relationship with China. This course will introduce Southeast Asia as a key region -- geographically, economically, and strategically -- often overlooked by policymakers and scholars. It will also focus on the craft of national security strategy as the best tool for understanding the multi-sided competition, already well underway involving China, the U.S., and the Southeast Asian states.

AS.310.316. First Year Classical Chinese: Philosophers, Poets and Fantasists: An Introduction to Chinese Literature in the Original Classical Texts. 3 Credits.
We will read arguments, anecdotes and stories, beginning with the philosophers of the ancient period, including the imaginative paradigms of the Daoist writer Zhuangzi, and continue with the strange writings allied with shamanism and goddess-worship. We will continue with the fantastical writers of the medieval world and finish with anecdotes of the strange from the Ming and Qing. Because this is a language as well as a literature class, in addition to literary content and social history as background, we will emphasize grammar and vocabulary. Class preparation will require language exercises, translations, readings in English and there will be a final translation/research paper.
(AS.373.115 AND AS.373.116) OR (AS.373.111 AND AS.373.112) OR (AS.378.115 OR AS.378.116) or Instructor permission.

AS.310.318. Eurasia's Transformation and the Global Implications. 3 Credits.
Eurasia, stretching from the Western Europe across Russia, Central Asia, and China to the Pacific, is by far the largest continent on earth, with a massive share of global population, economic output, and key natural resources. It has been traditionally Balkanized. Yet since the late 1970s, due to China's modernizations, the collapse of the Soviet Union, and a series of global geo-economic shocks, the nations of this Super Continent have become increasingly interactive, creating fluid new trans-regional political-economic patterns that remain remarkably unexplored. This course explores the critical junctures that made Eurasia the dynamic, growing colossus that it is becoming today, as well as the global implications, from a unique problem-oriented perspective. It looks first at the developmental and political challenges confronting China, Russia, and key European states as the Cold War waned, how the key nations coped, and how they might have evolved differently. It then considers the new challenges of the post-Cold War world, and how national and local leaders are responding today. Particular attention is given, in this problem—centric approach, to the challenges that growing Eurasian continental connectivity, epitomized in China's Belt and Road Initiative, are creating for US foreign policy and for the grand strategy of American allies in NATO, Japan, and Korea. Note: Some familiarity with Eurasian history and/or politics is recommended
Area: Writing Intensive

AS.310.319. Gender & Sexuality in Korea and Asia. 3 Credits.
Utilizing an interdisciplinary approach, this course examines the role that gender and sexuality play within primarily the South Korean polity and in Asia. Drawing on queer studies, feminist studies, and critical Asian studies, the class will offer a foundational framework from which to analyze how social constructs around gender and sexuality play a major part in the marginalization of communities and their access to rights and representation. We will explore questions of kinship, family, love, and intimacy as they pertain to the larger thematics of the course.
Area: Writing Intensive

AS.310.320. Sociology of Urban China. 3 Credits.
Urban China has gone through two major social transformations since 1949: the embrace of a central planning socialist system between early 1950s and late 70s, and the embrace of neo-liberal market economy in the so-call "socialism with Chinese characteristics" since 1980. While the political regime remains the same over time, many profound changes have occurred in economic life, social life, cultural life, spiritual life and civil life. What really happened in the social transformation of urban China? What would explain those changes? How did people in different walk of life deal with those huge and deep social transformation? To address these concerns, we will exam a list of issues. Topics includes changes in population and demographic characteristics, employment structure and job market, workplace and residential communities, income and wealth distributions, segregation impacts of urban household registration systems, urban consumption patterns, courting cultures and dressing codes, spiritual practices, and social mobility and social stratifications. In the realm of public policies, we will pay special attentions to the issues of transportation, housing, medical service, public education, social insurance, and environmental protection. We will also study the characteristics of contentious politics and how social conflicts of power, interest, justice, cultural and belief were processed in urban China.

AS.310.322. Korean History Through Film and Literature. 3 Credits.
In this course, students will engage with select topics in Korean history from premodern and modern times and examine how the past has been represented through various forms of film and literature. This will be combined with readings of academic articles to allow students to gauge the distance between scholarship and cultural expressions of history. Through this, students will be introduced to the highly contested and often polarizing nature of Korean history and the competition surrounding historical memory. Prior coursework in East Asian Studies strongly recommended.
Area: Writing Intensive

AS.310.324. Belonging and Difference in Modern Korea. 3 Credits.
Drawing on critical race theory, and gender and sexuality studies, this course provides the analytical framework necessary to grapple with how belonging and difference are produced, manifested, and challenged within Korea's citizenry. Students will gain knowledge on modern Korea and its diasporas and examine its construction as one rooted in a history of empire, nationalism, militarism, and neoliberalism.
Area: Writing Intensive

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

AS.310.328. COVID-19 and Human Rights in Asia. 3 Credits.
This seminar explores the impact of the Covid-19 pandemic and government responses on a range of human rights in Asia, with a focus on the cases of China, Japan, Taiwan, India, South Korea, and Myanmar. In the first part of the course, we will investigate the fundamentals of the international human rights system, the foundational Universal Declaration of Human Rights and core human rights treaties, and the role of civil society in protecting, defending , and advancing human rights. We will then explore the United Nations' human rights-based guidance for Covid-19 response and prevention, the right to health, and approaches to the balancing of rights and duties, including freedom of movement, freedoms of association and assembly, individuals' right to health and duties to others, the right to education, rights to privacy, freedom of expression, right to information (and the problem of disinformation) and governments' emergency powers (and their limits) to protect public health. Inequities and discrimination exacerbated by the Covid-19 pandemic will also be discussed, as will the necessity for international cooperation to effectively battle Covid-19 and vaccine inequity.

AS.310.335. Theorizing Race and Mixed-Race in Asia and its Diasporas. 3 Credits.
This class will explore the construction of race and its applications in Asia and its diasporas. Using the notion of "mixed-race" as an analytic, we will examine how the colonial origins of race and the ensuing Cold War have influenced concepts of national identity and belonging. Employing an inter-sectional approach towards race, gender, and sexuality, the course will draw on a variety of media including memoirs, archives, and videos, to contemplate the locus of race and mixed-race and their importance within the larger nexus of identity formation in Asia and its diasporas.
Area: Writing Intensive

AS.310.340. Development and Social Change in Rural China. 3 Credits.
This course will survey the major issues of development and social change in rural China since 1950s. These issues will be addressed in chronological order. They include land ownership and land grabbing, organization of rural economic, political, and social life, rural elections and village governance, development strategies, urban-rural relationship in resource allocation, rural modernization strategies in regard to irrigation, clean drinking water, electricity supply, hard paved road, education and rural medical service, women's rights and family life, rural consumption, and etc. This course will prepare students, both empirically and analytically, to understand what happened in rural China from 1949 to the present, and how we can engage in policy and theoretical discussions based on what we learn.

AS.310.431. Senior Thesis Seminar: East Asian Studies. 3 Credits.
The East Asian Studies Senior Honors Thesis Seminar is a workshop for EAS majors writing an honors thesis. It is a year-long course with meetings scheduled in both the fall and spring semesters. Please note that in order to qualify for honors in the major, the thesis must receive a final grade of A- or better. Students will receive credit for the seminar regardless of whether their thesis qualifies for honors.
Area: Writing Intensive

AS.310.432. Senior Thesis Seminar: East Asian Studies. 3 Credits.
This course is the continuation of Senior Thesis Course AS.360.431 for students completing their thesis in the East Asian Studies program.
Area: Writing Intensive
AS.310.431

AS.310.501. Independent Study - East Asia. 1 - 3 Credits.
Students carry out an independent research project involving East Asia. You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.332. Reverberations Of The Korean War. 3 Credits.
This course will takes the reverberations of the Korean War to examine the ways in which catastrophic violence is absorbed into and corrodes social life. Particular attention is paid to the transnational nature of conflict, how boundaries around peace and war are established, and how recent scholarly and artistic work on the Korean War has critically engaged dominant frameworks of memory and trauma. Readings will draw from fiction, ethnography, historiography and will also include film. This course also draws from the public syllabus on Ending the Korean War.
Area: Writing Intensive

AS.070.359. Korean War. 3 Credits.
This course takes the Korean War as a site to both explore: 1) contemporary historical and political transformations in East Asia and globally and 2) the ways in which violence, catastrophic loss, and separation are woven into everyday life. It will explore the Korean War through film, fiction, historiography, and draw on comparative materials in anthropology
Area: Writing Intensive

AS.070.389. Precarity in South Korea through TV and Film:Aesthetics and everyday life. 3 Credits.
This seminar explores how precarity in South Korea gains expression in the medium of TV and film. In particular, this seminar will focus on how the moving image brings the viewer into the texture of everyday life. We will focus on the TV show Misaeng and include films such as Parasite and Burning. TV and film will be paired with readings on the transformations of intimate life in contemporary South Korea and comparative work on precarity.
Area: Writing Intensive

Center for Language Education

AS.373.111. First Year Heritage Chinese. 3 Credits.
This course is designed for students who were raised in an environment in which Chinese is spoken by parents or guardians at home and for those who are familiar with the language and possess native-like abilities in comprehension and speaking. The course therefore focuses on reading and writing (including the correct use of grammar). Cross-listed with East Asian Studies

AS.373.112. First Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Lab required. Continuation of AS.373.111. Recommended Course Background: AS.373.111 or permission required.
AS.373.111 or or instructor permission

AS.373.115. First Year Chinese. 5 Credits.
This course is designed primarily for students who have no prior exposure to Chinese. The objective of the course is to help students build a solid foundation of the four basic skills---listening, speaking, reading, and writing in an interactive and communicative learning environment. The emphasis is on correct pronunciation, accurate tones and mastery of basic grammatical structures. Note: Students with existing demonstrable skills in spoken Chinese should take AS.373.111-112. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.373.116. First Year Chinese II. 5 Credits.
Introductory course in Modern Standard Chinese. Goals: mastery of elements of pronunciation and control of basic vocabulary of 800-900 words and most basic grammatical patterns. Students work first with Pin-Yin system, then with simplified version of written Chinese characters. Continuation of AS.373.115. Note: Student with existing demonstrable skills in spoken Chinese should take AS.373.111-112. Recommended Course Background: AS.373.115 or permission required.
AS.373.115 or instructor permission]

AS.373.211. Second Year Heritage Chinese. 3 Credits.
This course is designed for students who finished AS.373.112 with C+ and above (or equivalent). Students in this course possess native-like abilities in comprehension and speaking. The course focuses on reading and writing. Cross-listed with East Asian Studies
AS.373.112 or equivalent.

AS.373.212. Second Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Continuation of AS.373.211. Recommended Course Background: AS.373.211 or permission required.
AS.373.211 or instructor permission

AS.373.215. Second Year Chinese. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Cross-listed with East Asian Studies
AS.373.116 or equivalent

AS.373.216. Second Year Chinese II. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Recommended Course Background: AS.373.215 or Permission Required.Cross-listed with East Asian Studies
AS.373.215 or instructor permission.

AS.373.313. Third Year Heritage Chinese. 3 Credits.
This course is designed for those who have already taken AS.373.212 or equivalent. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be introduced on a regular basis.Cross-listed with East Asian Studies
AS.373.211 AND AS.373.212 or instructor's permission

AS.373.314. Third Year Heritage Chinese II. 3 Credits.
This course is a continuation of AS.373.313. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be included on a regular basis. Recommended Course Background: AS.373.313 or Permission Required. Lab required.
AS.373.313 or equivalent

AS.373.315. Third Year Chinese. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible and written assignments will be given. Cross-listed with East Asian Studies
AS.373.216 or instructor permission

AS.373.316. Third Year Chinese II. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible, and written assignments will be given. Continuation of AS.373.315. Recommended Course Background: AS.373.315 or permission required.
AS.373.315 or instructor permission

AS.373.415. Fourth Year Chinese. 3 Credits.
This course is designed for students who finished AS.373.316 with a C + or above (or equivalent). Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students are supposed to be able to understand most of the readings with the aid of a dictionary, so that class discussion is not focused primarily on detailed explanation of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content.Cross-listed with East Asian Studies
AS.373.316 or instructor permission

AS.373.416. Fourth Year Chinese II. 3 Credits.
Continuation of AS.373.415. Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students should understand most of the readings with the aid of a dictionary, so that class discussion need not focus primarily on detailed explanations of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content. Recommended Course Background: AS.373.415 or Permission Required. Cross-listed with East Asian Studies
AS.373.415 or instructor permission

AS.373.491. 5th Year Chinese. 3 Credits.
Fifth Year Chinese is designed for students who finished fourth year regular or third year heritage Chinese course at JHU or its equivalent and wish to achieve a higher advanced proficiency level in Chinese. The goal of the course is to help students further develop their listening, speaking, reading and writing skills cohesively and to enhance students' understanding of Chinese culture and society through language learning.
AS.373.416 OR AS.373.314 or equivalent

AS.378.115. First Year Japanese. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the year, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 150 kanji in context. Knowledge of grammar will be expanded significantly in AS.373.215. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.378.116. First Year Japanese II. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the fall term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 60 kanji in context. Knowledge of grammar will be expanded significantly in 2nd year Japanese. May not be taken Satisfactory/Unsatisfactory. Recommended Course Background: AS.378.115
Prereq: AS.378.115 or instructor permission

AS.378.215. Second Year Japanese. 5 Credits.
Training in spoken and written language, increasing their knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.115 and AS.378.116 or equivalent.
AS.378.116 or equivalent

AS.378.216. Second Year Japanese II. 5 Credits.
Continuation of Beginning Japanese and Intermediate Japanese I. Training in spoken and written language, increasing students' knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.215 or equivalent.
AS.378.215 or instructor permission

AS.378.315. Third Year Japanese. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Cross-listed with East Asian Studies
AS.378.215 AND AS.378.216 or instructor permission

AS.378.316. Third Year Japanese II. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Lab required. Continuation of AS.378.315. Recommended Course Background: AS.378.315 or equivalent.
AS.378.315 or equivalent.

AS.378.396. Fundamentals of Japanese Grammar. 2 Credits.
This course is designed for students who have already studied 1st Year Japanese grammar and wish to develop a thorough knowledge of Japanese grammar in order to advance all aspects of language skills to a higher level. It is also appropriate for graduate students who need to be able to read materials written in Japanese. The goal of the course is to provide students with a thorough knowledge of Japanese grammar; therefore, knowledge of vocabulary (including kanji) in depth is not requisite. In addition, since this is not a language course that places equal focus on all four skills (speaking, listening, writing, and reading), there will be no conversation practice – this is a lecture course on grammar. 2 credits. Pass-fail grade option only
AS.378.115 AND AS.378.116 or Instructor Permission

AS.378.415. Fourth Year Japanese. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Recommended Course Background: AS.378.315 and AS.378.316 or equivalent.
AS.378.316 or equivalent

AS.378.416. Fourth Year Japanese II. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Lab required. Recommended Course Background: AS.378.415
AS.378.415 or equivalent.

AS.378.493. Grammar and Readings in Japanese Studies. 2 Credits.
This course is designed for graduate students (in East Asian Studies, Public Health, History of Medicine, History,etc.) and undergraduate students with a strong interest in developing a thorough knowledge of Japanese grammar from both linguistic and cultural perspectives in depth well beyond regular language courses in order to advance reading and comprehension of materials written in Japanese without use of a dictionary. We first review the primary components of Japanese grammar, such as tense, aspect, particles, conditionals, passive and causative, etc., followed by readings of articles demonstrating particular grammatical items. Specific strategies and techniques are also introduced, followed by practice. Class materials include a broad spectrum of native materials, including novels, newspapers, scholarly articles, essays, and historical papers. A diverse range of articles and essays are selected by students to introduce and enforce various ways of reading Japanese effectively. 2 credits. Pass-fail grade option only.

AS.380.101. First Year Korean. 5 Credits.
Introduces the Korean alphabet, hangeul. Covers basic elements of the Korean language, high-frequency words and phrases, including cultural aspects. Focuses on oral fluency reaching Limited Proficiency where one can handle simple daily conversations. No Satisfactory/ Unsatisfactory. Cross-listed with East Asian Studies

AS.380.102. First Year Korean II. 5 Credits.
Focuses on improving speaking fluency to Limited Proficiency so that one can handle simple daily conversations with confidence. It provides basic high-frequency structures and covers Korean holidays. Continuation of AS.380.101. Recommended Course Background: AS.380.101 or permission required.
AS.380.101 or instructor permission

AS.380.201. Second Year Korean. 4 Credits.
Aims for improving oral proficiency and confident control of grammar with vocabulary building and correct spelling intended. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness. Project due on Korean cities. Existing demonstrable skills in spoken Korean preferred.
AS.380.101 AND AS.380.102 or instructor permission

AS.380.202. Second Year Korean II. 4 Credits.
Aims for improving writing skills with correct spelling. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness, including discussion on family tree. Continuation of AS.380.201. Recommended Course Background: AS.380.201 or equivalent.
AS.380.201 or equivalent

AS.380.301. Third Year Korean. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose, from easy essays to difficult short stories. Vocabulary refinement and native-like grasp of grammar explored. Project due on Korean culture. Cross-listed with East Asian Studies
AS.380.202 or equivalent

AS.380.302. Third Year Korean II. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose. By reading Korean newspapers and professional articles in one's major, it enables one to be well-versed and truly literate. Continuation of AS.380.301. Cross-listed with East Asian StudiesPrerequisite: AS.380.301 or equivalent.
AS.380.301 or instructor permission

AS.380.401. Fourth Year Korean. 2 Credits.
This course is designed for those who have finished AS 380.302 or beyond advanced mid level of competency in Korean in four skills. By dealing with various topics on authentic materials including news, articles on websites, short stories, this course aims to help students enhance not only linguistics knowledge and skills, but also current issues in Korea. It is expected that, by the end of the term, students will be able to discuss a variety of topics and express opinions fluently in both spoken and written language.
AS.380.302 or instructor permission

Comparative Thought and Literature

AS.300.322. Lu Xun And His Times: China's Long 20th Century And Beyond. 3 Credits.
The "founding father of modern Chinese literature," Lu Xun (1881-1936) saw himself as a contemporary of writers like Gogol, Ibsen, and Nietzsche in creating his seminal short stories and essays, and likewise, he has been seen by numerous Chinese, Sinophone, and East Asian writers as their contemporary since his lifetime until today. In this course, we will survey Lu Xun's canonical works and their legacies through a comparative approach. What echoes do Lu Xun's works have with the European and Russian texts he engaged with? Why did his works manage to mark a "new origin" of Chinese literature? How were his works repeated, adapted, and appropriated by Chinese writers from the Republican period through the Maoist era to the post-socialist present, even during the Covid-19 pandemic? How do we assess his cross-cultural reception? Are his times obsolete now that China is on the rise? Or, have his times come yet? Through our comparative survey, Lu Xun's works and their afterlives will offer us a window onto China's long twentieth century and beyond in a transnational context. All materials are provided in English translation.

AS.300.328. Contemporary Sinophone Literature and Film. 3 Credits.
A survey of contemporary literature and film from the peripheries of the Chinese-speaking world, with a special focus on Hong Kong, Taiwan, and overseas Chinese communities in Southeast Asia, the Americas, and Europe. We will not only examine literary and filmic works in the contexts of the layered histories and contested politics of these locations, but will also reexamine, in light of those works, critical concepts in literary and cultural studies including, but not limited to, form, ideology, hegemony, identity, history, agency, translation, and (post)colonialism. All readings are in English; all films subtitled in English.

AS.300.330. Modern East Asian Literatures Across Boundaries. 3 Credits.
Modern literature in East Asia is as much defined by creation of national boundaries as by their transgressions, negotiations, and reimaginations. This course examines literature originally written in Chinese, Japanese, and Korean in light of contemporary understandings of political, social, and cultural boundary demarcation and crossings. How do experiences of border-crossing create and/or alter literary forms? How, in turn, does literature inscribe, displace, and/or dismantle boundaries? Our readings will include, but not limited to, writings by intra- and trans-regional travelers, exiles, migrants, and settlers; stories from and on contested borderlands and islands (e.g. Manchuria, Okinawa, Jeju); and works and translations by bilingual authors. All readings are provided in English translation.

AS.300.341. Transwar Japanese and Japanophone Literatures. 3 Credits.
A survey of Japanese and Japanese- language literatures produced in Japan and its (former)colonies during the “transwar” period, or the several years before and after the end of WWII. This periodization enables us to take into account the shifting boundaries, sovereignties, and identities amid the intensification of Japanese imperialism and in the aftermath of its eventual demise. We aim to pay particular attention to voices marginalized in this political watershed, such as those of Japanese-language writers from colonial Korea and Taiwan, intra-imperial migrants, and radical critics of Japan’s “postwar” regime. Underlying our investigation is the question of whether literature can be an agent of justice when politics fails to deliver it. We will introduce secondary readings by Adorno, Arendt, Levinas, Derrida, and Scarry, among others, to help us interrogate this question. All readings are in English.

AS.300.344. Literature and the World. 3 Credits.
This course interrogates how modern literature not simply reflects the world but functions as world-making power. What is a world? How do we conceive of, live in, and change it? What if there are multiple worlds? How are literature and other aesthetic forms crucial to tackling these questions? We will survey literary and philosophical texts in a comparative setting, engaging examples from both Europe and East Asia. All readings are in English. Open to graduate students.
Area: Writing Intensive

AS.300.410. China in Imagination. 3 Credits.
What is China? This question has gained new relevance amid the nation’s recent rise as a global power. We survey how China was imagined, represented, and conceptualized in literature, film, and philosophical writings from mainland China, overseas Chinese communities, East Asia, and the West from the late nineteenth century to the present. Through exploring this complex history, we aim to understand China and the contemporary world in a diversified, historically self-reflective way. Topics of discussion include, but not limited to, representation, identity, form, allegory, exile, diaspora, modernism, translation, world history, and universality. All readings are in English; all films subtitled in English.

AS.300.425. Modernities and Comparison. 3 Credits.
Comparative survey of literary modernities in Europe and East Asia (China, Japan, and Korea). We will study works of modern literature as well as critical and philosophical texts from these civilizations in each other’s light. We will, as a working hypothesis, begin our examination by bracketing off the conventional center-periphery (Europe-Asia) scheme and considering literary modernities to be singular and contested, yet mutually resonating attempts at reconstruction, restoration, and revolution vis-à-vis the deconstructive forces of capitalist modernity. Ultimately, we will interrogate how we should understand literary modernities in the plural, as they emerged in distant civilizations. Topics of discussion include decadence, repetition, the trope of the human, ideology, the sublime, ritual, and translation. Readings in Hegel, Nietzsche, Mann, Benjamin, Baudelaire, Proust, Breton, Soseki, Kobayashi, Wang Guowei, Lu Xun, and Yi Kwangsu. All readings are in English.

Economics

AS.180.210. Migrating to Opportunity? Economic Evidence from East Asia, the U.S. and the EU. 3 Credits.
Increased mobility of people across national borders, whether by choice or by force, has become an integral part of the modern world. Using a comparative perspective and an applied economics approach, the course explores the economic and political determinants, and (likely) consequences of migration flows for East Asia, the US and the EU. Lectures, assignments and in class discussions, will be built around the following topics: i) migrants’ self-selection; ii) human capital investment decision-making; iii) remittance decisions and effects; iv) impacts on labor markets of both receiving and sending countries; and v) the economic benefits from immigration. Overall, the course will give students perspective on the why people choose or feel compelled to leave their countries, how receiving countries respond to migrants’ presence, and the key economic policy concerns that are influencing the shaping of immigration policy in East Asia, the US, and the EU.
AS.180.101 AND AS.180.102

AS.180.391. Economics of China. 3 Credits.
Discussion of the economic experience of Post-War China, primarily emphasizing topics rather than historical narrative: agriculture, industry including corporate governance and public enterprises, international trade, population, migration, education, health, public finances among other topics. This course is writing intensive and the only assignment for the course is a 40 page paper on some aspect of the Chinese economy to be done under the close supervision of the instructor. The course is not primarily a lecture course, although there will be some lectures on how to do a paper and on the substance of the Chinese economic experience.
Area: Writing Intensive
AS.180.301 OR AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

First Year Seminars

AS.001.102. FYS: Japanese Robots. 3 Credits.
Japan is a world leader in biomimetic robotics. Japanese society enthusiastically embraces robotic nurses, robotic guides, robotic waiters, robotic pets, and even robotic girlfriends. What are the origins of the Japanese love of robots? What role did robotics engineers play in creating the image of loveable robots? What societal fears do Japanese robots assuage and what hopes do they foster? In the course of the semester, students will learn about the evolution of Japanese robotics, and explore the implications of this evolution to humans’ relationship with robots. While learning about Japanese robots, students will acquire skills necessary for college-level education, including how to write an email to a professor, how to organize and manage digital tools, how to navigate the information resources, and how to develop, complete, and present research projects. This course will equip students with skills essential to their success in college and beyond.

AS.001.107. FYS: Thinking and Writing Across Cultures - East Asia and the West. 3 Credits.
In this First-Year Seminar, we will explore what it means to think and write across multiple cultures in the contemporary world. What do we gain and/or lose when we think and write crossing cultural boundaries? How do knowledge and experience of two or more cultures help us think and act critically, creatively, and ethically? What does plurality of cultures mean to universal discourses such as science and technology? How can cultural differences help or hamper our efforts to tackle global problems like climate change? These are some of the guiding questions that we will investigate together in this course by examining novels, essays, autobiographies, travelogues, philosophical writings, and films that engage with multiplicity of cultures between East Asia -- especially China, Japan, and Korea – and the West as well as within East Asia.

History

AS.100.165. Japan in the World. 3 Credits.
This course is an introduction to Japan's history from 1800 to the present with emphasis on the influences of an increasing global circulation of ideas and people. Topics include the emperor system, family and gender, imperialism, World War II, the postwar economy, and global J-pop.

AS.100.170. Chinese Cultural Revolution. 3 Credits.
The Cultural Revolution was Mao Zedong's last attempt to transform Chinese society spiritually and structurally. The events of this period were marked by social upheaval, personal vendettas, violence, massive youth movements, and extreme ideological pressure. This course will explore the Cultural Revolution from a variety of perspectives, focusing on the relationship between events in China from 1966-1976, and their interpretation in China and the West during the Cultural Revolution decade and since. (Previously offered as AS.100.219 and AS.100.236.)

AS.100.243. China: Neolithic to Song. 3 Credits.
This class offers a broad overview of changes in China from Neolithic times through the Song Dynasty (roughly from 5000 BCE through the 13th century CE) and will include discussion of art, material culture, and literature as well as politics and society. Close readings of primary sources in discussion sections and extensive use of visual material in lectures will help students gain firsthand perspective on the materials covered.

AS.100.248. Japan in the World. 3 Credits.
An introduction to Japan's history from 1700 to the present, with emphasis on the influences of an increasing global circulation of ideas, goods, and people in early modern and modern times. Topics include samurai, nation-building, gender, imperialism, World War II, the postwar economy, and contemporary popular culture.

AS.100.301. America after the Civil Rights Movement. 3 Credits.
This course explores the history of late twentieth-century America by examining the social, economic, and political legacies of 1960s civil rights protest for the 1970s, 1980s, and 1990s.
Area: Writing Intensive

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.347. Early Modern China. 3 Credits.
The history of China from the 16th to the late 19th centuries.
Area: Writing Intensive

AS.100.348. 20th-Century China. 3 Credits.
Survey of the history of China from ca. 1895 to ca. 1976.
Area: Writing Intensive

AS.100.422. Society & Social Change in 18th Century China. 3 Credits.
What did Chinese local society look like under the Qing Empire, and how did it change over the early modern era?

AS.100.423. Multiethnic Japan. 3 Credits.
An advanced undergraduate seminar on the intertwined histories of race, ethnicity, and empire in Japan and its former colonies from the early twentieth century to the present.

AS.100.424. Women & Modern Chinese History. 3 Credits.
This course examines the experience of Chinese women, and also how writers, scholars, and politicians (often male, sometimes foreign) have represented women's experiences for their own political and social agendas.
Area: Writing Intensive

AS.100.478. Japan from its Peripheries. 3 Credits.
An advanced undergraduate seminar on the history of modern Japan from the perspective of regions and people often considered as belonging to its geographical, cultural, social, and political peripheries.
Area: Writing Intensive

AS.100.482. Historiography of Modern China. 3 Credits.
Study of Western, Chinese, and Japanese understandings of the history of China, emphasizing their implications for cultural understanding and for policy.

AS.100.613. Modern Japanese and Korean Histories.
A reading seminar on the interconnected histories and historiographies of Japan and Korea in the nineteenth and twentieth centuries.

AS.100.614. Seminar in Modern Chinese History.
A seminar covering major milestones in research on late imperial and modern Chinese history, primarily in English.Open to undergraduates with the permission of the instructor.

AS.100.623. Telling Japanese Histories.
A graduate-level seminar on the political, social, and intellectual concerns that have both shaped and undermined dominant ways of telling Japanese history, especially in Japan and the U.S. since 1945.

AS.100.733. Reading Qing Documents.
Open also to advanced undergraduates with at least one semester of Classical Chinese. This course has several objectives. First and foremost, it is a hands-on document reading class designed to familiarize students with the skills, sources, and reference materials necessary to conduct research in Qing history. To that end, we will spend much of our time reading documents. At the same time, we will engage in problem solving exercises designed to develop and enhance basic research skills. Finally, we will consider important archive-based secondary works which demonstrate the ways in which historians have made use of Qing documents in their scholarship.

AS.100.756. Reading Seminar in Chinese History.
A seminar covering recent work on late imperial and modern Chinese history, primarily in English.

History of Art

AS.010.103. Introduction to the Art of Asia. 3 Credits.
A survey of the art and architecture of Asia, from the ancient world to the present and including the Indian subcontinent, China, Japan, Korea, and Southeast Asia.

AS.010.233. Asian Art Since 1945. 3 Credits.
This course examines the art and architecture of East, South, and Southeast Asia produced since the mid-twentieth century. We will engage with theoretical, visual, and political developments in the recent art of this region, reading statements by artists and architects, discussing the rising commercial and international profile of contemporary Asian art, and exploring established and emerging art histories of this period.Cross-list with East Asian Studies

AS.010.327. Asia America: Art and Architecture. 3 Credits.
This course examines a set of case studies spanning the last century that will enable us to explore the shifting landscape of Asian transnational art and architecture. Each week will focus on a different artist, group, exhibition, architect, urban space, or site to unpack artists' and architects' engagements with the changing landscape of immigration policies, movements to build solidarity with other artists of color, and campaigns for gender and sexual equality. The course will situate these artists within American art, and build an expansive idea of Asia America to include the discussion of artists whose work directly addresses the fluidity of location and the transnational studio practice.
Area: Writing Intensive

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.451. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art. 3 Credits.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.662. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

History of Science, Medicine, and Technology

AS.140.198. Technology and Environment in Japanese Films and Anime. 1 Credit.
In the course of the semester we will watch Japanese films and animation that touch upon topics of technology and environment. The list of screenings includes several blockbusters, classics in film studies, and documentaries. The course is a companion course to 140.398 "Godzilla and Fukushima," but is also open to anyone interested. Students who do not take 140.398 will be required to write a short review paper by the end of the semester.

AS.140.245. Biology and Society in Asia. 3 Credits.
What major knowledge traditions about life's generation and function have taken shape in Asia that continue to shape our contemporary world? How have they fared in encounters with Western knowledge traditions? How have modern biology, biotechnology and biomedicine developed in Asia in recent years within distinct geopolitical contexts? This course addresses these questions with selected historical cases from China, India, Japan, Koreas and selected Southeast Asian countries. It first introduces concepts and frameworks of major non-Western knowledge systems about life such as yin-yang and five phases and examine how religions, politics, and cross-cultural encounters impacted these systems, their evolutions or replacements. Then the class will examine the political, material, cultural and institutional contexts of more recent development in the life sciences in Asia. Class activities include lectures, discussions, research seminars, a final research project, and possible conversations with visiting professors and field trips.

AS.140.341. Humanoid Robots in Global History. 3 Credits.
Humanoid machines reflect their creators' ideals of humanity. Comparing examples from societies across the globe we will investigate what factors shaped these ideals, and how they manifested in technological design.
Area: Writing Intensive

AS.140.398. Godzilla and Fukushima: Japanese Environment in History and Films. 3 Credits.
Japan is often described as "nature-loving," and is considered to be one of world leaders in environmental protection policies. Yet current environmental successes come on the heels of numerous environmental disasters that plagued Japan in the past centuries. Juxtaposing Japanese environmental history and its reflection in popular media, the course will explore the intersection between technology, environment, and culture.
Area: Writing Intensive

AS.140.423. Science and Science Fiction in Global Perspective. 3 Credits.
What can we learn from science fiction about the history of science and technology? What ideas about science do Sci-Fi novels manifest? Is the relationship between science and science fiction always the same, across different time periods and geographical areas? This course will explore these questions by taking a comparative perspective. Each meeting we will read a Sci-Fi novel from Europe, America, South and East Asia, and discuss it in conjunction with historical writing about relevant scientific developments. Reading Sci-Fi novels from 17th-century Germany, 19th-century England and India, and 20th-century Japan, China, Korea and the US, the students will explore how actual scientific developments were reflected in fiction, and what fictional depictions say about the aspirations and anxieties provoked by new technologies.
Area: Writing Intensive

International Studies

AS.192.225. Economic Growth and Development in East Asia. 3 Credits.
The course offers an overview of the complexities of East Asia's development experience from a variety of perspectives. It is divided into three parts to allow students to develop expertise in one or more countries and/or policy arenas, while cultivating a broad grasp of the challenges of "East Asia's fast-paced economic growth." Part I considers the origins of East Asian economic development, analyses the common economic variables behind the region's success, looks at the 1997-1998 East Asian financial crisis, its lessons and the economic renaissance that followed. Part II focuses on the development experiences of individual countries, with an emphasis on the ASEAN economies, NIEs, Japan and China. Part III considers topics of special interest to East Asia, including trends toward greater regional economic cooperation, trade integration, and issues related to poverty, migration, and inclusiveness.

AS.192.404. Democracy, Autocracy and Economic Development: Korea, Indonesia, and Myanmar. 3 Credits.
East Asia's "miracle growth" has not gone hand in hand with a decisive move toward democracy. The course explores the reasons why democratization proceeds slowly in East Asia, and seems to be essentially decoupled from the region's fast-paced economic growth. The course is divided into three parts. Part I introduces the specifics of East Asia's economic development strategies as well as key concepts of democracy, authoritarianism and military rule and the tensions between these theories and the East Asian experience. Part II will focus on the economic and political development experiences of Korea, Indonesia and Myanmar in light of what discussed in Part I. Finally, Part III presents lessons emerging from the comparison of Korea's, Indonesia's and Myanmar's economic and political developmental trajectories.

Political Science

AS.190.109. Politics of East Asia. 3 Credits.
This course examines some of the central ideas and institutions that have transformed politics in the contemporary world through the lens of East Asia, focusing on Japan, South Korea, Taiwan, and China. We analyze two enduring themes of classic and contemporary scholarship in comparative politics: development and democracy. The purpose is to introduce students to the various schools of thought within comparative politics as well as to the central debates concerning East Asian politics.

AS.190.264. What You Need to Know About Chinese Politics (Part 1). 3 Credits.
What you need to know about Chinese politics covers the major scandals, political events, and policy debates that every China watcher needs to know. This first module of a two-semester experience brings together two professors, Prof. Andrew Mertha (SAIS) and Prof. John Yasuda (KSAS), with very different perspectives on China's past achievements, its political and economic futures, and the global implications of China's rise. The course seeks to give ample coverage to every major political question about China that is often missed in a semester long class. In addition to lively debates between the instructors, students can also expect guest speakers from the policy world, business, and the academy for a fresh take on what's going on in China today.

AS.190.269. What you need to know about Chinese Politics, Part 2. 3 Credits.
This serves as a two-semester survey of Chinese politics from 1911-Present. This second module explores the politics of the reform and post-reform eras.

AS.190.315. Asian American Politics. 3 Credits.
This course examines issues of political identity, political incorporation, and political participation of Asian Americans. Themes include Asian American panethnicity, the struggle for immigration and citizenship, Asian American electoral politics, political activism and resistance since the 1960s, and the impact of Asian Americans on the politics of race and ethnicity in the United States.

AS.190.341. Korean Politics. 3 Credits.
This course introduces students to the historical and institutional foundations of modern South Korean politics. Topics include nationalism, political economic development, civil society, globalization, and ROK-DPRK relations.Recommended students should take Intro to Comparative Politics or a course related to East Asia first.(CP)
Area: Writing Intensive

AS.190.347. A New Cold War? Sino-American Relations in the 21st Century. 3 Credits.
"Can the United States and China avoid a new Cold War? One might think not given disputes over the South China Sea, Taiwan, Hong Kong, human rights, trade, ideology and so much more. Moreover, competition for influence in the developing world and American concerns as to whether China will replace it as the preeminent world power suggest a new Cold War is in the offing. Nevertheless, their extensive economic ties and need to work together to solve common problems such as climate change, nuclear proliferation, and pandemics argues against a continuing confrontation. This course will examine whether cooperation or conflict will define Sino-American relations, and whether a new Cold War—or even a shooting war—lies in the future."

AS.190.348. Business, Finance, and Government in E. Asia. 3 Credits.
Business, Finance, and Government in East Asia explores the dynamics of East Asia's economic growth (and crises) over the last fifty years. We will examine Japan's post-war development strategy, the Asian tiger economies, and China's dramatic rise. Centered on case studies of major corporations, this course examines the interplay between politics and economics in East Asia, and considers the following questions: How have businesses navigated East Asia's complex market environment? In what ways can the state foster economic development? How has the financial system been organized to facilitate investment? What are the long-term prospects for growth in the region?

AS.190.370. Chinese Politics. 3 Credits.
This course is designed to help students better understand the politics of China. Lectures will focus on the tools of governance that China has employed to navigate its transition from plan to market, provide public goods and services to its citizens, and to maintain social control over a rapidly changing society. The course will draw heavily from texts covering a range of subjects including China's political economy, social and cultural developments, regime dynamics, and historical legacies. Students interested in authoritarian resilience, governance, post-communist transition, and domestic will find this course particularly instructive.

AS.190.389. China's Political Economy. 3 Credits.
This course examines the most important debates about China's political economic development. After exploring Mao Zedong's disastrous economic policies, we will consider the politics of reform and opening under Deng Xiaoping, and finally conclude with China's state capitalist policies across a variety of issue areas. The course will cover literatures on financial reform, public goods provision, foreign trade and investment, agriculture, corruption, business groups, and regulatory development. Where possible we will draw comparisons with the economic experiences of other East Asian nations as well as other post-communist states.

AS.190.427. Political Economy of Japan and Korea. 3 Credits.
This upper-level seminar examines some of the major debates and issues of postwar Japanese and South Korean political economy. Topics include nationalism, gender politics, civil society, immigration, and US-Japan-South Korea trilateral relations.
Area: Writing Intensive

AS.190.442. Civil Society. 3 Credits.
This course explores classic and contemporary debates on the concept of civil society and critically examines its analytical value in light of recent developments. Topics include the relationship between civil society, the state, and markets, the role of civil society in development and democratization, social capital, and global civil society. This course is open to graduate students from any discipline. Advanced undergraduate students must obtain permission from the instructor and are expected to keep up with graduate students during class discussions.
Area: Writing Intensive

AS.190.612. Comparative Citizenship and Immigration Politics.
Graduate students only. Examines the contemporary political dynamics of migration, citizenship, and race concentrating on North America, Europe and East Asia. We will focus on how citizenship and immigration policies shape immigrant political identities, claims, and strategies as well as how immigrants impact public debates and policies in receiving societies.

Sociology

AS.230.175. Chinese Revolutions. 3 Credits.
This course introduces the origins, operation and impacts of five major revolutions in modern China between 1850 and 1950. These include the Taiping Rebellion, the republican revolutions, federalist and southern automatic movements, labor strikes as well as peasant rebellions. It draws on the existing historiography that examines China's transition from an empire to a republic, impacts of western and Japanese influences to China, as well as the continuity and change of Chinese social organizations. Cross list with International Studies and East Asian Studies. Fulfills IS History requirement.
Area: Writing Intensive

AS.230.228. Colonialism in Asia and Its Contested Legacies. 3 Credits.
This course surveys the impacts of colonialism in East and Southeast Asia. Special attention will be paid to the social and economic development in British Singapore and Hong Kong as well as Japanese Korea and Taiwan. Topics include free-trade imperialism, colonial modernity, anticolonial movements, pan-Asianism, and post-war U.S. hegemony.

AS.230.233. Inequality and Social Change in Contemporary China. 3 Credits.
This course examines the trajectory of economic development in China since the beginning of market reforms in the late 1970s, with a special focus on social inequality and forms of resistance that have emerged in response to the expansion of the market economy. The first part of the course focuses on understanding the academic debates around China's economic miracle and introduces students to theories about the relationship between market expansion and social resistance. The second part focuses on key thematic topics including the rural/urban divide, rural protest, urban inequality and labor unrest, gender and sexuality in social movements, environmental protests, and the politics of ethnic relations.

AS.230.239. Coffee, Tea and Empires. 3 Credits.
The course introduces the transformation of the coffee and tea industries in the long nineteenth century against the backdrop of European and Japanese colonial expansion. It surveys the social changes in the colonial world under the development of the cash crop economy. It also analyzes how the consumption of such caffeinated beverages became sources of heritage makings both in the metropoles and colonies and the latter's postcolonial reconstructions.

AS.230.352. Chinese Diaspora: Networks and Identity. 3 Credits.
This course combines lecture and class discussion. It examines the history and historiography of Chinese overseas migration. Major issues include overseas Chinese as "merchants without empire," Chinese exclusion acts in the age of mass migration, the "Chinese question" in postcolonial Southeast Asia, as well as the making and unmaking of Chinese identity in the current wave of globalization.
Students may not have completed AS.230.217 previously.

AS.230.415. Social Problems in Contemporary China. 3 Credits.
In this course we will examine contemporary Chinese society, looking at economic development, rural transformation, urbanization and migration, labor relations, changes in class structure and family organization, health care, environmental problems, governance, and popular protest. The course is designed for both graduate and undergraduate students. Undergraduates must have already completed a course about China at Hopkins. Cross-listed with East Asian Studies.
Area: Writing Intensive

Study of Women, Gender, & Sexuality

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.

Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women's thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

Writing Seminars

AS.220.220. Reading Korean Literature in Translation: A Survey. 3 Credits.

An introduction for students unfamiliar with the Korean language but interested in Korean culture / literature. Students will read a variety of translated texts, especially of works written in the 20th and early 21st centuries by authors including Kim Tong-in, Hwang Sun-won, Pak Wanso, Hwang Sok-yong and Han Kang; there will also be classes on traditional sijo poetry. Students will become familiar with Korean literary genres and formal features, and develop a broad understanding of the historical and sociocultural context of Korean literature.
Area: Writing Intensive

AS.220.230. Reading Contemporary Korean Fiction in Translation. 3 Credits.

This course examines a range of contemporary Korean fiction produced since political liberalization of Korea in the 1990s. Students will see the many different ways in which individual selves relate to the world, question the value systems of a globalized society, and celebrate the instinct to survive and thrive. While exploring these things, students will develop their analytical skills and identify the central components of new Korean narratives.

For current faculty and contact information go to http://krieger.jhu.edu/east-asian/directory/

East Asian Studies, Bachelor of Arts

East Asian Studies Major Requirements

(See also Requirements of a Bachelor's Degree (p. 1587).)

The curriculum of the East Asian Studies major consists of a balanced mixture of language and area studies. All majors must study an East Asian language during their time at Hopkins. They also have the opportunity to choose from a rich menu of content courses dealing with East Asia.

In addition to solid language training and content courses about the region, EAS majors receive training in the methods and theory of the particular academic discipline they select as a focus area. Students select from among four discipline-based focus areas - history, political science, history of science and technology, or sociology - or create an individualized focus area. Possible individualized focus areas include art history, archaeology, or business. The individualized focus area requires consultation and approval of the program director.

If they choose, East Asian Studies majors may double major in International Studies, as the requirements of each of the four focus areas overlap with those of International Studies. Students may also find it convenient to double major in history, political science, sociology, or history of science, medicine and technology.

No major requirements may be taken satisfactory/unsatisfactory. All courses required for the major must be passed with a grade of C- or higher. The University encourages students enrolled in this program to take advantage of foreign study options. Courses and programs must be pre-approved by the program director. Seven of the 14 courses required for the major are required to be taken at JHU.

Code	Title	Credits
East Asian Survey Course [1]		
AS.100.243	China: Neolithic to Song	3
or AS.100.165	Japan in the World	
or AS.100.347	Early Modern China	
or AS.100.348	20th-Century China	
or AS.310.106	Introduction to Korean History and Culture	
or AS.310.107	Introduction to Korean Studies	
Additional East Asian Studies Courses		
Two East Asian Studies courses at any level		6
One East Asian Studies course at the 300- or 400-level		3
East Asian Foreign Language		
Six courses in an East Asian Language [2]		24-26
Focus Area - History, Political Science, Sociology, or History of Science and Technology		
Select one of the following focus areas:		12-13
History focus area		
Three East Asian history courses at any level [3]		
One East Asian history course at the 300- or 400-level [3]		
Political Science focus area		
Two core courses at the 100- or 200-level in two of the following subfields - American Politics, Comparative Politics, International Relations, or Political Theory.		
One East Asian political science or sociology courses at any level [3]		

One East Asian political science or sociology course at the 300- or 400-level [3]		
Sociology focus area		
Select two of the following:		
AS.230.101	Introduction to Sociology	
AS.230.202	Research Methods for the Social Sciences	
AS.230.205	Introduction to Social Statistics	
AS.230.213	Social Theory	
One East Asian sociology or political science course at any level [3]		
One East Asian sociology or political science course at the 300- or 400-level [3]		
History of Science and Technology focus area [4]		
Select two survey courses of the following list:		
AS.140.105	History of Medicine	
AS.140.106	History of Modern Medicine	
AS.140.301	History of Science: Antiquity To Renaissance	
AS.140.302	Rise Of Modern Science	
One East Asian history of science and technology course at any level [3]		
One East Asian history of science and technology course at the 300- or 400-level [3]		
Individualized focus		
Requires approval of the EAS director. Focus requirements to be determined in consultation with the director.		
Total Credits		**48-51**

1. Or students may take another East Asian survey course as approved by the program director.
2. Students must complete 6 courses in East Asian languages (Korean, Japanese, and/or Chinese) after high school graduation and while the student is in college working towards their degree. Students can use at most two different languages towards the 6 course requirement (they can count courses in a third language as electives). If using one East Asian language, students must demonstrate proficiency through the advanced level (as indicated by proficiency through the Third Year, semester two). If using two East Asian Languages, the minimum proficiency demonstrated must be through the intermediate level (as indicated by proficiency through the Second Year, semester two). In those instances where a student is proficient through the advanced level in one language and proficient through the intermediate level in a second language, they may waive two semesters of this requirement. These classes must be replaced by two other East Asian Studies courses at any level. In all other circumstances, language waivers are not allowed.
3. AS.310.xxx courses cross-listed with History, Sociology, Political Science, or History of Science and Technology can be used to fulfill focus area requirements in the discipline for which they are cross-listed. For example, an AS.310.xxx course cross-listed in Sociology is equivalent to a course in the Sociology Department for purposes of fulfilling focus area requirements in the Sociology or Political Science tracks. Courses cross-listed with History or History of Science and Technology can be counted toward the History or History of Science and Technology tracks respectively.
4. Courses taught by professors Yulia Frumer, Lijing Jiang, and Hayang Yumi Kim may be applicable even if not coded AS.140.xxx, pending permission.

Sample Program of Study

The plan below assumes the student begins language study in Chinese at JHU.

Course	Title	Credits
First Year		
First Semester		
AS.373.115	First Year Chinese	5
East Asian Studies course at any level		3
	Credits	**8**
Second Semester		
AS.373.116	First Year Chinese II	5
	Credits	**5**
Second Year		
First Semester		
AS.373.215	Second Year Chinese	5
Focus area requirement		3
	Credits	**8**
Second Semester		
AS.373.216	Second Year Chinese II	5
Required survey course		3
Focus area requirement		3
	Credits	**11**
Third Year		
First Semester		
AS.373.315	Third Year Chinese	3
Focus area requirement		3
	Credits	**6**
Second Semester		
AS.373.316	Third Year Chinese II	3
East Asian Studies course at 300-400 level		3
	Credits	**6**
Fourth Year		
First Semester		
East Asian Studies course at any level		3
Additional language study (optional)		
	Credits	**3**
Second Semester		
Focus area requirement		3
Additional language study (optional)		
	Credits	**3**
	Total Credits	**50**

Honors in East Asian Studies

- Honors in the major may be earned by maintaining a GPA of 3.7 in the major and writing a senior honors thesis by taking a two-semester seminar, AS.310.431 Senior Thesis Seminar: East Asian Studies and AS.310.432 Senior Thesis Seminar: East Asian Studies. The thesis seminar is a total of six credits and may count toward two of the required EAS courses.

East Asian Studies, Minor

East Asian Studies Minor Requirements

The East Asian Studies minor consists of six courses. Up to two of these can be advanced East Asian language courses at the 300 level or above; language courses at the 100 or 200 level do not count towards the minor. At least four and up to six of these will be content courses listed or cross-listed with East Asian Studies, two of which must be at the 300 or 400 level. Students must demonstrate language proficiency through the advanced level (third -year level) in either Chinese, Japanese, or Korean by taking a placement examination through the Center for Language Education or by taking language courses at the 300 level or above.

No minor requirements may be taken satisfactory/unsatisfactory. All courses required for the minor must be passed with a grade of C- or higher.

Requirements

Code	Title	Credits
Two courses offered by East Asian Studies or cross-listed by East Asian Studies at any level (not language courses)		6
Two 300 or 400-level courses offered by East Asian Studies or cross-listed in East Asian Studies (not language courses)		6
Two courses in third-year (or higher) EAS language courses or, if minimum language proficiency is met, two courses offered by East Asian Studies or cross-listed with East Asian Studies. *		6
Total Credits		**18**

* These may not be waived courses. Students must complete 6 courses for the minor.

Economics

http://www.econ.jhu.edu/

The Department of Economics offers programs designed to improve the understanding of important economic problems and to provide the tools needed for the critical analysis of these problems and for dealing with them in practice.

On the undergraduate level, the department provides both for those who want to become professional economists and for those interested in a specialty related to economics, such as business, law, government, history, health care management, or environmental engineering. Still other students are simply interested in improving their understanding of society or making informed assessments of economic policies as citizens or making wise decisions about personal finances.

On the graduate level, the department provides advanced training for students preparing for careers as professional economists. The program encompasses such fields as macroeconomics, microeconomic theory, econometrics, labor economics, international economics, industrial organization, economic development, and finance, with an emphasis on the application of economic theory and quantitative methods. Because of the small number of graduate students admitted, they can work closely with faculty in graduate courses and seminars, and have easy and informal access to faculty members. Aside from traditional coursework, research, and special lectures, the department holds three weekly seminars to encourage collaboration and communication in different areas of economics. The seminars attract top scholars from throughout the world to discuss their work and also provide a forum for faculty and graduate students to present their recent research. The department also hosts two annual lecture series, the Johns Hopkins Distinguished Lectures in Economics and the Newcomb Lectures that invite reputed economists or scholars in related fields as guest speakers.

Financial Aid

The department offers a Departmental Fellowship to all enrolled students. This fellowship covers full tuition costs plus an annual stipend of $33,000 and full student health insurance coverage. The department guarantees financial support for five years of graduate study, conditional on satisfactory performance. Beginning in the third year of study, students are required to be teaching assistants or research assistants.

For further information about graduate study in economics, contact the director of graduate admissions, Department of Economics at econadmissions@jhu.edu.

Carl Christ Fellowship

In the academic year 1989–90, the department established the Carl Christ Fellowship fund to honor one of its faculty members for his distinguished service and achievements. The proceeds of the fund are used to support outstanding graduate students at the dissertation stage of their research.

For further information about graduate study in economics, contact the director of graduate admissions, Department of Economics at econadmissions@jhu.edu.

Center for Financial Economics (CFE)

Founded in 2008 and housed in the Economics Department in the Krieger School of Arts and Sciences at Johns Hopkins, the Center for Financial Economics blends the study of finance and economics, providing in-depth training and cutting-edge research in both. The dual research and teaching missions of the Center are premised on the belief that a deep understanding of modern economies requires an integrated treatment of finance and the broader economic forces driving economic progress.

The CFE offers an undergraduate minor, producing expertise in finance within the context of a top-notch liberal arts education. The minor will equip students with a thorough foundation in the workings of financial markets and their role in the broader economy, providing a foundation for careers in finance, business, academics, and government.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.180.101. Elements of Macroeconomics. 3 Credits.
An introduction to the economic system and economic analysis, with emphasis on total national income and output, employment, the price level and inflation, money, the government budget, the national debt, and interest rates. The role of public policy. Applications of economic analysis to government and personal decisions. Prerequisite: basic facility with graphs and algebra.

AS.180.102. Elements of Microeconomics. 3 Credits.
An introduction to the economic system and economic analysis with emphasis on demand and supply, relative prices, the allocation of resources, and the distribution of goods and services, theory of consumer behavior, theory of the firm, and competition and monopoly, including the application of microeconomic analysis to contemporary problems.

AS.180.203. Faculty Research in Economics. 1 Credit.
This course will consist of a series of informal lectures by various professors in the Department of Economics. Each lecture will consist of a description of a professional research project which he/she has undertaken over the course of his/her professional career.
AS.180.101 and AS.180.102, both may be taken concurrently.

AS.180.210. Migrating to Opportunity? Economic Evidence from East Asia, the U.S. and the EU. 3 Credits.
Increased mobility of people across national borders, whether by choice or by force, has become an integral part of the modern world. Using a comparative perspective and an applied economics approach, the course explores the economic and political determinants, and (likely) consequences of migration flows for East Asia, the US and the EU. Lectures, assignments and in class discussions, will be built around the following topics: i) migrants' self-selection; ii) human capital investment decision-making; iii) remittance decisions and effects; iv) impacts on labor markets of both receiving and sending countries; and v) the economic benefits from immigration. Overall, the course will give students perspective on the why people choose or feel compelled to leave their countries, how receiving countries respond to migrants' presence, and the key economic policy concerns that are influencing the shaping of immigration policy in East Asia, the US, and the EU.
AS.180.101 AND AS.180.102

AS.180.214. The Economic Experience of the BRIC Countries. 3 Credits.
In 2001, Jim O'Neill, the Chief Economist at Goldman Sachs, coined the acronym BRIC to identify the four large emerging economies, Brazil, Russia, India and China. These economies have since had an amazing run, and have emerged as the biggest and fastest growing emerging markets. In this course, we look at the economic experiences of the BRIC countries for the past 50 years. We discuss the reasons that have contributed to their exceptional growth rates, with particular emphasis on their transformation into market economies. We also analyze the challenges that these countries continue to face in their development process.
AS.180.101 AND AS.180.102

AS.180.217. Game Theory in Social Sciences. 3 Credits.
Game Theory is the study of multiple person decision problems in which the well-being of a decision maker depends not only on his own actions but also on those of others. Such problems arise frequently in economics, political science, business, military science and many other areas. In this course, we will learn how to model different social situations as games and how to use solution concepts to understand players' behavior. We will consider various examples from different fields and will play several games in class. The emphasis of the class is on the conceptual analysis and applications and we will keep the level of mathematical technicalities at the minimum -- high school algebra and one term of calculus will be sufficient. Students who took AS.180.117 are not eligible to take AS.180.217.
AS.180.102 or instructor permission;Students may not have previously taken AS.180.117.

AS.180.221. The Informal Economy: Who Wins, Who Loses, and Why We Care About It.. 3 Credits.
The informal economy is one of the most complex economic and political phenomena of our time. It exists in rich and poor countries alike, currently employs almost half of the world's workers, about 1.8 billion people, and totals to economic activity of around $10 trillion. If the informal economy were an independent nation, it would be the second-largest economy in the world, after the United States and before China. In today's globalizing environment, are informal economies a poverty trap or an engine of growth? Do they stimulate entrepreneurship and popular empowerment, or promote exploitation? How does an improved understanding of the size and organization of informal economies affect service provision, social policy or taxation? What are the implications of the informal economy for social cohesion and popular politics? The proposed course will address these (as well as other) questions related to the informal economy to offer students an understanding of such complex phenomenon from a variety of perspectives. The course will comprise three parts. Part 1 will explore the complexities of the informal economy, and the effects of informality on policies of inclusive growth. Part 2 will draw on empirical evidence and comparative case studies to examine informal economies in various regions, including Africa, East Asia, North and South America, and Europe, highlighting variations in activities, relations with the state, global integration and economic outcomes. Finally, Part 3 will discuss the ongoing economic policy shift from punitive measures to accepting informality as a virtual space through which citizens flow from job-seeker to compliant entrepreneurs.
AS.180.101 AND AS.180.102

AS.180.223. Economic Development in Sub-Saharan Africa. 3 Credits.
Many sub-Saharan African countries are among the least developed countries in the world. In this course, we explore the economic development experiences of African countries, with more focus on sub-Saharan Africa. The course starts with a historical perspective, delves into development strategies, and examines evidence on successes and failures of some case study countries. We conclude by analyzing the many challenges that these countries continue to face in their development process. Elements of Microeconomics and Macroeconomics are required prerequisites. There would be group presentations on assigned readings.
AS.180.101 AND AS.180.102

AS.180.228. Economic Development. 3 Credits.
A comprehensive survey of economic behavior by households, farms and firms in poor countries and the role of and for governments. Discussions include measurement of income levels, economy-wide equilibrium, sources of growth, agriculture and industry, international trade and investment, savings, population, fertility, education, health, income distribution and public finances. Applies economic theory rigorously to interpret and evaluate the economic experience of poor countries. Diagnostic test on Elements of Economics is required in the second week. Grading based on 3 exams and one paper.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.229. Economics of Health and Education in South Asia. 3 Credits.
Human capital is an important factor of economic growth in South Asian economies, along with physical capital and technology. Addressing health and education challenges has implications for improving a country's human capital formation and income growth. In this course, we look at past and present health and educational outcomes in South Asian Countries. We discuss the gaps in access to education and health care services, the quality of education and health care services as well as the impacts on the productivity of the labor force. We also empirically analyze the link between economic growth and human capital development. Furthermore, we focus on some challenges and future policy options for economies in South Asia.
AS.180.101 AND AS.180.102

AS.180.231. Debates in Macroeconomics. 3 Credits.
This course covers some of the more contentious current debates in macroeconomics. Topics include: recent and proposed tax changes (are workers affected by the corporate tax?); unconventional monetary policies (have they helped?); modern monetary theory (sound doctrine or hokum?); why are interest rates so low? backlash against globalization (warranted? unprecedented?); immigration (economic bane or boon?); rising income inequality (causes? consequences? pervasiveness?); has competition waned in US markets? Students will use the tools of economics to analyze these and other pressing issues. Though definitive answers may prove elusive, sound economic analysis can shed considerable light, not least by unmasking the political biases that often drive protagonists on both sides of these debates.
AS.180.101 AND AS.180.102

AS.180.233. Economics of Transition and Institutional Change. 3 Credits.
This course will introduce students to the comparative analysis of institutions of existing capitalist systems and to the historical evolution of those institutions. By comparing the economic systems of different nations, we will try to reveal the institutional setups that either contribute or hinder economic performance. We will also examine the process of countries transforming their economies and investigate the factors that determine the differences in reforms' outcomes between countries.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.238. Rethinking Economics After the Great Recession. 3 Credits.
The financial crisis that began in the United States in 2007 threw virtually the entire world into recession. This class will look at the causes of the crisis and at how it unfolded. It will look into the conventional wisdom of economists, circa 2006, and why that wisdom proved to be so wrong. It will examine the financial innovations that contributed to the crisis, at the reasons financial regulators were blindsided, and at the reforms enacted after the crisis.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.239. Urban Economics. 3 Credits.
This course introduces students to the major ideas of modern urban economics focused on the causes and consequences of urban economic growth, urban poverty and a city's quality of life. We will analyze basic questions such as; Why is Silicon Valley in Silicon Valley? Why did Beijing become so polluted? Why is crime high in Baltimore? Why does rich San Francisco face a homelessness challenge? The role of federal, state, and local government in urban life will be explored.
AS.180.101 AND AS.180.102

AS.180.241. International Trade. 3 Credits.
Theory of comparative advantage and the international division of labor: the determinants and pattern of trade, factor price equalization, factor mobility, gains from trade and distribution of income, and theory and practice or tariffs and other trade restrictions. Recommended Course Background: AS.180.101.
AS.180.101 AND AS.180.102

AS.180.242. International Monetary Economics. 3 Credits.
This course presents International Monetary Economics theory and applies it towards gaining an understanding of recent events and current policy issues. The theory presented in this course covers a broad range of topics including exchange rate determination, monetary and fiscal policy in an open economy, balance of payments crisis, the choice of exchange rate, and international debt. The insights provided by these theoretical frameworks will enable us to discuss topics such as the global financial crisis, global financial imbalances, the Chinese exchange rate regime, and proposed changes in the international financial architecture.
AS.180.101 AND AS.180.102

AS.180.244. Market Design. 3 Credits.
We will study how the rules of a market impact behavior, and in turn whether this behavior leads to (un)desirable outcomes. We will cover how the lessons learned from both successful and failing markets have been used by economists to design new markets.It will help us address questions such as:(i) Can economics help with the shortage of donated kidneys? (ii) How should a ride share service assign cars to clients?(iii) Can changing the way school seats are assigned change the welfare of students in a city?The material is intended to be as accessible as possible, keeping the mathematical technicalities to a minimum (i.e. one-term of calculus would be sufficient).
AS.180.102

AS.180.246. Environmental Economics. 3 Credits.
This course presents a broad overview of the key issues in modern environmental economics with a focus on understanding and solving urban pollution challenges in developed and developing nations. This course explores how cities and nations can achieve the "win-win" of economic growth and reduced urban pollution. Special attention is paid to the incentives of households, firms and governments in reducing the production of pollution. The course examines a number of pollution challenges including; air, water, noise, garbage and the global challenge of climate change.

AS.180.248. Financial Writing and Analysis. 3 Credits.
There is an immense chasm between economic and financial commentary in academic discussions and that provided by private sector analysts and the press. Some of the difference is merely semantic, but much of the difference has real substance. Academic and nonacademic commentators tend to simply write off the other as being clueless in some way. Sorting out which bits of each style of analysis are most valuable and synthesizing them into a coherent commentary is a rare and valuable skill. This is a hands-on course with a goal of building skills reading and writing commentary in financial economics. The course begins critically studying commentary regarding prominent topics in the news over the recent months and then moves to writing "explainer" pieces for publication on the Center for Financial Economics blog. Students will work in teams both analyzing commentary, and writing and critiquing the work of fellow students.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.249. Gender Economics. 3 Credits.
"We've begun to raise daughters more like sons... but few have the courage to raise our sons more like our daughters." ? Gloria Steinem This course aims to explore the differences in economic outcomes observed among women and men. We will study those differences in earnings, income, asset ownership, hours of work, unpaid work, poverty, and the allocation of resources within the household. The course explores the gender dimensions of paid labor and how gender roles in unpaid work and in caring labor impact how men and women participate in the formal and informal economy. It will evaluate women's perspectives and experiences in the United States and around the world.
AS.180.101 AND AS.180.102

AS.180.252. Economics of Discrimination. 3 Credits.
This course examines labor market discrimination by gender, race and ethnicity in the United States. What does the empirical evidence show, and how can we explain it? How much of the difference in observed outcomes is driven by differences in productivity characteristics and how much is due to discrimination? How have economists theorized about discrimination and what methodologies can be employed to test those theories? What has been the impact of public policy in this area; how do large corporations and educational institutions respond; and what can we learn from landmark lawsuits? The course will reinforce skills relevant to all fields of applied economics, including critical evaluation of the theoretical and empirical literature, the reasoned application of statistical techniques, and analysis of current policy issues.
Area: Writing Intensive
AS.180.102

AS.180.259. Demystifying Hedge Funds: A Firsthand Look at the Alternative Investment Industry. 3 Credits.
An introduction to hedge funds taught by two industry professionals and JHU alumnae. This course will examine the interplay between hedge funds, their investors, and investment banks. Students will explore types of hedge fund strategies, delve into market trends, and discuss key investment themes in the alternatives industry.
AS.180.101 AND AS.180.102

AS.180.260. Real Estate Economics and Finance. 3 Credits.
An introduction to the economic analysis of real estate markets. Various perspectives will be considered, including individual homeowners and renters, investors and financiers, and policymakers. Topics include the determinants of property valuations, financing considerations, real estate development, and analysis of real estate as an investment class. The course qualifies as an elective for the Financial Economics Minor.
AS.180.101 AND AS.180.102

AS.180.261. Monetary Analysis. 3 Credits.
This course analyzes the financial and monetary system of the U.S. economy and the design and implementation of U.S. monetary policy. Among other topics, we will examine the role of banks in the economy, the term structure of interest rates, the stock market, the supply of money, the role of the Federal Reserve in the economy, the objectives of monetary policy in the United States and current monetary policy practice.
AS.180.101 AND AS.180.102

AS.180.263. Corporate Finance. 3 Credits.
This course is an introduction to the financial management of a corporation. Students study the following broad questions. How should a firm decide whether to invest in a new project? How much debt and equity should a firm use to finance its activities? How should a firm pay its investors? How do taxes affect a firm's investment and financing decisions? What determines the value of a firm? The emphasis throughout the course is on the economic principles that underlie answers to these questions.
AS.180.101 AND AS.180.102

AS.180.266. Financial Markets and Institutions. 3 Credits.
Understanding design and functioning of financial markets and institutions, connecting theoretical foundations and real-world applications and cases. Basic principles of asymmetric information problems, management of risk. Money, bond, and equity markets; investment banking, security brokers, and venture capital firms; structure, competition, and regulation of commercial banks. Importance of electronic technology on financial systems.
AS.180.101 AND AS.180.102

AS.180.277. Economic Activity in the Black Community. 3 Credits.
This course uses the study of economic concepts and dynamics to increase our understanding of the activity and issues that arise in the urban Black Community. If you take this course, you will learn about the correlation of education, employment opportunities, and health to the economics of an area. While doing this, you will expand your understanding of economic theory to learn how the theoretical concepts and models can be applied to Black Communities. We will begin with African Americans in slavery in the United States and examine their economic contributions. We will move through history to present day to address issues and problems like: Why are many low-income level communities populated with large numbers of African Americans? What are the particular characteristics of those neighborhoods? Where do we generally find these types of neighborhoods? Learning and using the tools of GIS, students will map issues of importance by the neighborhood to show the relationship of economic activity in the Black Community to other communities.
AS.180.101 AND AS.180.102

AS.180.280. The History and Future of the Hedge Fund Industry. 3 Credits.
The precursors to modern hedge funds began more than 50 years ago, but in the 1990s the hedge fund, or alternative investments, industry began a period of rapid growth and evolution. With growth came controversy. Some argue that hedge funds, by allowing immense amounts of capital to be rapidly and freely deployed, play a vital role in pushing prices toward the efficient markets ideal. Others claim that hedge funds may accentuate speculative price dynamics, threatening the stability of the financial sector. While many hedge funds claim to offer outstanding returns to investors, data suggest that many clients end up paying high fees for unspectacular results. This course examines these and other controversies, while tracing the history of the alternative investments industry over the last 25 years.
AS.180.101 AND AS.180.102 AND (AS.180.266 OR AS.180.263 OR AS.180.367)

AS.180.285. Information and Investing Seminar. 3 Credits.
The course will seek to discuss and illuminate the information (news reports, industry reports, government statistics, and proprietary indicators) that investors use to make investment decisions.The course will be conducted in the framework of a weekly investment committee format wherein information is processed to maximize an investment portfolio's return to risk.Each class will be conducted in two parts. The first part will require students to share with the class information gathered from their assigned specialty (e.g.: fixed income, equities, emerging markets, commodities) and the second part will require group interaction as to what decisions need to be made to a hypothetical portfolio in order to maximize objectives.The course will require regular reading of financial and economic news as well as numerous assigned industry and academic research related to global finance.Other: this course will require quite a bit of reading and regular interaction in group discussion and with the instructor.
AS.180.280 or permission of instructor Kevin Heerdt or Robert Barbera

AS.180.289. Economics Of Health. 3 Credits.
Application of economic concepts and analysis to the health services system. Review of empirical studies of demand for health services, behavior of providers, and relationship of health services to population health levels. Discussion of current policy issues relating to financing and resource allocation.
AS.180.102

AS.180.301. Microeconomic Theory. 4 Credits.
An introduction to the modern theory of allocation of resources, starting with the theories of the individual consumer and producer, and proceeding to analysis of systems of interacting individuals, first in the theory of exchange, then to systems which include production as well.
AS.180.102 AND (AS.110.106 OR AS.110.107 OR AS.110.108 OR AS.110.109) OR equivalent.;AS.180.101 may be taken concurrently.

AS.180.302. Macroeconomic Theory. 4 Credits.
The course provides a treatment of macroeconomic theory including a static analysis of the determination of output, employment, the price level, the rate of interest, and a dynamic analysis of growth, inflation, and business cycles. In addition, the use and effectiveness of monetary and fiscal policy to bring about full employment, price stability, and steady economic growth will be discussed.
AS.180.101 and (AS.110.106 or AS.110.107 or AS.110.108 or AS.110.109);AS.180.102 can be taken at the same time as AS.180.302.

AS.180.303. Topics in International Macroeconomics and Finance. 3 Credits.
The course will review selected topics in international macroeconomics and finance. The topics for the Fall of 2019 include: financial globalization; international portfolio diversification; capital account liberalization and the choice of the exchange rate regime in emerging markets; the global financial safety net; macroeconomic adjustment in the euro area.
AS.180.101 AND AS.180.102 AND AS.180.302

AS.180.309. Economics of Uncertainty and Information. 3 Credits.
In this course we'll discuss the theory of decision making in the face of risk, the theory of risk aversion and its applications to financial and insurance markets. Building on the theory of individual decision making under risk, we will study the economic implications of asymmetric information, the type of market failures produced by adverse selection and moral hazard problems, and the models that were advanced to analyze these problems, including incentive contracts, screening and signaling equilibria.
AS.180.301 OR AS.180.401

AS.180.310. Economics Of Antitrust. 3 Credits.
This course explores the economic rationale for, and consequence of, antitrust laws. In addition to economic analysis we will study landmark antitrust cases.
Area: Writing Intensive
AS.180.301 OR AS.180.401

AS.180.314. Mathematical Economics. 3 Credits.
This course traces the extent to which modern economic theory, particularly as it pertains to pure competition in market and non-market games under the rationality postulate.
AS.180.301

AS.180.315. Housing Problems and Policy: An Economics Perspective. 3 Credits.
This course uses economic theory and econometric research approaches as a lens on housing issues and policy. Housing is at the center of the effects of segregation and the Great Recession, and bears a significant connection to the labor market as well. This course briefly explores microeconomic theory specifically relevant to the housing market, then uses readings from academic social science literatures to dive deeper into these issues and others. Finally, students will examine public housing policies, using the literature and proposing statistical techniques to assess their effectiveness. The course will improve the understanding and use of basic econometric techniques with respect to policy questions as well as the ability to critically read academic literature.
(AS.180.301 OR AS.180.401)AND (EN.550.420 OR EN.550.310 OR EN.550.112 OR EN.550.113 OR EN.550.211 OR EN.550.311 OR EN.550.430 OR EN.550.435 OR EN.550.111 OR AS.280.345)

AS.180.327. Economics of Matching Markets. 3 Credits.
Matching markets are those markets where the identities or characteristics of the agents engaged in a transaction matter, not only the price. In fact, no monetary transactions may happen at all. Examples include donated organ allocation, school choice, refugee resettlement, among others. Although the mathematical pre-requisites are low, emphasis is given to proofs; thus, some degree of mathematical/logical maturity is assumed. Evaluation consists of problem sets, presenting a summary of an academic paper in-class, and a final paper (either original research or critical literature review).
AS.180.102;AS.180.244 AND (AS.180.301 OR AS.180.401), may be taken at the same time as AS.180.327.

AS.180.334. Econometrics. 3 Credits.
Introduction to the methods of estimation in economic research. The course begins with a review of basic statistics. This is followed by developing the primary method employed in economic research, the method of least squares, and an investigation of the performance of this method in a variety of important situations. The course considers a way to handle many of the situations in which ordinary least squares is not useful, the method of instrumental variables. The modeling of economic time series, binary dependent variables, panel data and differences in differences are all also considered. Applications are intended to showcase how the tools of econometrics can be brought to bear on important policy questions.
AS.180.301 OR AS.180.401, may be taken concurrently.;One semester of calculus, AS.280.345 OR EN.540.305 OR EN.553.211 OR EN.553.111 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.560.435 OR EN.560.348 OR EN.553.112 OR EN.540.382

AS.180.336. Macroeconomic Strategies. 3 Credits.
Will sketch out a strategy for anticipating economic turning points. Business cycle basics,monetary policy/financial market/real economy interactions will be reviewed. Long-term growth issues will be explored.
AS.180.101 AND AS.180.102 AND AS.180.302 or instructor permission.

AS.180.338. Political Economy and Development. 3 Credits.
Good governance is associated with desirable outcomes across countries and societies: higher life satisfaction, greater income per capita, lower child mortality, longer life expectancy, less disease, etc. But these statistical associations in the data are not sufficient to establish either that good governance truly causes such societal outcomes, or what types of policies produce them. This course asks: What are the determinants of good governance? Is good governance "good" beyond its intrinsic desirability? If so, how? We use a data-driven approach, focusing on quantitative empirical methods and their applications to policy. The goal is to develop skills to be savvy consumers, as well as producers, of policy-relevant evidence related to issues of governance, in rich and poor countries alike. Topics will include: democracy, corruption, conflict, culture, mass media, quotas, and foreign aid.
(AS.180.301 OR AS.180.401) AND AS.180.334

AS.180.345. Rationality: Meaning and Measurement. 3 Credits.
Economists generally work with a number of classic models of how people behave in different contexts. These models (such as utility maximization and expected utility maximization) are widely used because they are tractable and elegant, but are they also accurate models of human behavior? In this course, we examine the axiomatic foundations of these models, explore their implications for choice behavior, and discuss the empirical and experimental strategies economists have developed to test these models. The course would require you to solve mathematical problems; knowledge of mathematics up to the level of multi-variate calculus would be very helpful.
AS.180.301

AS.180.347. Macroeconomic Thinking 1936-2020: Evolution or Devolution?. 3 Credits.
This course charts a narrative for the evolution of macroeconomics from its very initiation to its present formulation in a way that is sensitive to issues of principle and of policy, and without becoming totally subservient to the disciplinary boundaries within which the problems are formulated and studied. Rather than macroeconomics as a subject that takes its shape in current conventional texts, the focus of the course shall be how it got there. As such, it touches on the development of ideas and intellectual history. The course will be mathematically self-contained but will pre-suppose conceptual sophistication that one expects after completion of courses in micro and macroeconomics at the intermediate level. The course is open to students in the sister-disciplines in anthropology, political science, and sociology, but it would be advisable for interested students in these departments to talk to the instructors.
AS.180.302

AS.180.349. Economics of Race, Gender and Culture. 3 Credits.
This course will review popular causal analysis tools used in economics research and cover papers on race, gender, and culture that used the causal analysis tools.This course will ask you to use STATA to solve problem sets and exams. Exams will take place in a computer lab.Students must be familiar with undergraduate-level econometrics.
AS.180.101 AND AS.180.102 AND AS.180.301 AND AS.180.334

AS.180.351. Labor Economics. 3 Credits.
The course discusses various issues in labor markets from the perspective of economic theory. We first study the major forces at work that shape labor market behavior; firms' labor demand and workers' labor supply. Then we discuss the equilibrium behavior of employment and wages. Using these tools, we also cover various applied topics in labor economics, such as minimum wage regulations, male-female wage differentials, human capital investment, worker mobility, and unemployment.
AS.180.301 OR AS.180.401

AS.180.352. Public Economics. 3 Credits.
This course explores issues related to expenditure and tax policies of governments, as well as views regarding the purpose of government and criteria for evaluating government actions. The course also includes a discussion of how group or collective choices are made within society, how environmental policies affect the level of pollution, and the importance of public debt.
AS.180.301 OR AS.180.401

AS.180.355. Economics of Poverty/Inequality. 3 Credits.
This course focuses on the economics of poverty and inequality. It covers the measurement of poverty and inequality, facts and trends over time, the causes of poverty and inequality with a focus on those related to earnings and the labor market, and public policy toward poverty and inequality, covering both taxation and government expenditure and programs. By the nature of the material, the course is fairly statistical and quantitative. Students should have an intermediate understanding of microeconomic concepts. Basic knowledge of regression analysis is also helpful.
Area: Writing Intensive
AS.180.301

AS.180.361. Rich Countries, Poor Countries. 3 Credits.
Why are some countries rich while some other countries poor? Why does a country’s income per person generally grow over time? We try to analyze these questions using the theoretical and empirical growth literature. We will study seminal growth models, and also try to explain cross-country income differences in terms of factors like geography, institutions and global integration. Knowledge of regression analysis (including instrumental variables estimation) is required.
AS.180.302 AND (AS.180.334 OR AS.180.434)

AS.180.363. Sex, Drugs and Dynamic Optimization: The Economics of Risky Behavior. 3 Credits.
We apply the tools of economic analysis to understand behaviors that are enjoyable today, but may have negative consequences in the future.
(AS.180.301 OR AS.180.401) AND AS.180.302;AS.180.334 can be taken concurrently.

AS.180.365. Topics in Macroeconomics. 3 Credits.
This course builds on AS.180.302 (Macroeconomic Theory) to consider the leading macroeconomic controversies of today (such as the appropriate monetary and fiscal policies of the Federal Reserve and U.S. Government). The classes will include frequent student presentations.
AS.180.302

AS.180.367. Investment-Portfolio Management. 3 Credits.
Investment securities and their markets, especially the stock market. The relations between expected return and risk. The determination of security prices. Financial portfolio selection. The assessment of the performance of managed portfolios.
(AS.180.301 OR AS.180.334 OR AS.180.401) AND (EN.553.111 OR EN.553.112 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430)

AS.180.368. Managerial Economics and Business Strategy. 3 Credits.
Seminar on quantitative concepts, decision-making, and strategy in business organizations. Overall context is ‘value’ – how it is measured and maximized long term. Microeconomic theory of the firm, competitive analysis, corporate finance.
(AS.180.301 OR AS.180.401) AND (EN.550.111 OR AS.180.367 OR AS.180.263) or permission of the instructor.

AS.180.371. Industrial Organization. 3 Credits.
Investigation of firm behavior in markets characterized by imperfect competition. Imperfect competition lies in between monopoly and perfect competition and characterizes most major industries in modern capitalist economies. Central issues to be covered in the course include what determines the intensity of competition? What determines the extent of entry and exit? How is it that some firms consistently dominate their industries?
AS.180.301 OR AS.180.401

AS.180.389. Social Policy Implications of Behavioral Economics. 3 Credits.
Economists increasingly incorporate insights from psychology into models of rational decision-making. Known as "behavioral economics", this line of research considers how, for example, emotions, rules-of-thumb, biased beliefs and time-inconsistent preferences influence how we make choices. Behavioral economics increasingly pervades policy discussions on topics as diverse as: obesity, the role of media, subprime mortgages and voting patterns. Behavioral models are certainly novel, but do they help us to design superior social policies? With the goal of preparing students to address this question, this course (1) provides a thorough overview of the main contributions of behavioral economics, highlighting departures from more traditional economic models and (2) emphasizes how behavioral economic models might (or might not) improve how we think about social policy.
AS.180.301 OR AS.180.401;AS.180.334 OR AS.180.434 can be taken concurrently.

AS.180.390. Health Economics & Developing Countries. 3 Credits.
Benefits of good health and its costs. Health demand and supply in poor countries. Welfare economics of Public Health. This is a writing seminar. There are some lectures on how to write a paper and on the substance of the economics of international health but the focus and only assignment is a 40-page paper by each student under the supervision of the instructor.
Area: Writing Intensive
AS.180.301 or AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

AS.180.391. Economics of China. 3 Credits.
Discussion of the economic experience of Post-War China, primarily emphasizing topics rather than historical narrative: agriculture, industry including corporate governance and public enterprises, international trade, population, migration, education, health, public finances among other topics. This course is writing intensive and the only assignment for the course is a 40 page paper on some aspect of the Chinese economy to be done under the close supervision of the instructor. The course is not primarily a lecture course, although there will be some lectures on how to do a paper and on the substance of the Chinese economic experience.
Area: Writing Intensive
AS.180.301 OR AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

AS.180.434. Advanced Econometrics. 3 Credits.
This is a faster-paced and more intensive version of Econometrics 180.334. You can use either 180.334 or 180.434 to satisfy the requirement for the economics major. This course is suitable for those students who prefer a more technical treatment of econometric methodologies.NOTE: Students may not take both 180.334 and 180.434.
AS.180.301 or AS.180.401, one semester of linear algebra, one semester of calculus, AS.280.345 or EN.580.305 or EN.550.211 or EN.550.111 or EN.550.310 or EN.550.311 or EN.550.420 or EN.560.435 OR EN.560.348.;Students may only receive credit for either AS.180.334 or AS.180.434.

AS.180.501. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.521. Research in Economics. 2 Credits.
The assignment in this course is to complete the initial stages of research for the Senior Honors Thesis in Economics. Students will work independently under the supervision of a thesis advisor from the department. Students must discuss with their departmental academic advisor about possible thesis advisors. They should get the approval from their thesis advisor, and register for the section of the course assigned to the thesis advisor, who will also be responsible for grade reporting. Open to Senior and Junior Economics majors. Note: This course cannot be counted as one of the five elective economics courses required for the Economics major.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.522. Senior Thesis. 3 Credits.
Students enrolled in this course will complete the Senior Honors Thesis under the supervision of a thesis advisor (who will have been chosen by the student prior to registration for AS.180.521). Students should register for the section of the course assigned to their thesis advisor. The thesis advisor will be responsible for submitting grades for their section. Note: This course cannot be counted as one of the five elective economics courses required for the Economics Major.
Area: Writing Intensive
AS.180.521;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.600. General Equilibrium Theory.
The mathematical theory of general static equilibrium. The course will emphasize the formal mathematical expression of economic ideas and the ability to give a loose economic intuition a coherent logical meaning. Different mathematical structures in general equilibrium theory will be isolated and discussed. The text will be Debreu's book "Theory of Value". Recommended Course Background: AS.110.106, AS.180.301, and AS.180.302 or permission of the instructor.

AS.180.601. Microeconomic Theory I.
This course covers the basics of Walrasian general equilibrium theory as set out in Debreu's Theory of Value, and thereby covers the standard (neoclassical) partial equilibrium theories of production and consumption. In addition, it covers Kuhn-Tucker optimization theory and its specializations of concave and linear programming. Finally, it touches on order structures and monotone comparative statics, as well as decision making under risk. A subtext of the course will be an exploration of how loose economic ideas and intuitions can be given formal mathematical expression. Prerequisites: Economics PhD students or permission of the instructor

AS.180.603. Macroeconomic Theory I.
A comprehensive treatment of macroeconomic theory, including static analysis of aggregate output employment, the rate of interest, and the price level; aggregative theory of investment, consumption, demand and supply of money; empirical work on aggregative relationships.

AS.180.604. Macroeconomic Theory II.
First term: a comprehensive treatment of macroeconomic theory, including static analysis of aggregate output employment, the rate of interest, and the price level; aggregative theory of investment, consumption, demand and supply of money; empirical work on aggregative relationships. Second term: the macrodynamic theory of growth, cycles, unemployment and inflation, and selected subjects.

AS.180.605. Advanced Macroeconomics I.
Topics of recent research in macro-economics. Content will vary from year to year. Likely topics include implicit contract theory, search theory and unemployment, disequilibrium macroeconomic models, monetary policy and the control of inflation, contract-based rational expectations models, imperfect competition in macrodynamic models, business cycle models, empirical tests of rational expectations models, theories of investment behavior, and debt neutrality.Open to 2nd year Grad Students and up.

AS.180.606. Advanced Macroeconomics II.
Topics of recent research in macroeconomics. Prof. Ball's course covers nominal rigidities, dynamic-consistency theories of inflation, inflation inertia and the costs of disinflation, monetary policy, costs and benefits of price stability, benefits of output stabilization, alternative policy rules, measuring inflation, unemployment, efficiency-wage theories, the behavior of the NAIRU, macro in middle-income countries, high inflation and stabilization, currency crises. Prof. Carroll's course analyzes implications of the buffer-stock and habit formation theories of consumption for comovement of aggregate variables and asset pricing. The models are applied to study the phenomena of declining U.S. saving rate, the dynamic relationship between saving rates and growth, and the equity premium puzzle.
AS.180.603

AS.180.607. Macroeconometrics I.
The course is an attempt to provide a framework for discussing the techniques that are used in macroeconometric analysis. Generally the bias that it has is one of looking at these from the perspective of someone analyzing macroeconomic data for policy analysis. Consequently, many of the applications considered are drawn from the type of research conducted in central banks and finance ministries. Its emphasis is therefore upon the issues raised by the analysis of time series of macro-economic data. Today there is an emerging literature that looks at micro-economic data as well as conducting cross-country studies. We will tend to ignore that material as the methods used in such research are essentially those of micro-econometrics, although sometimes with adjustments made to reflect the nature of macro-economic time series.
AS.180.633

AS.180.609. Core Mathematics for Economics.
This course will develop the necessary mathematical language and tools that are to be regarded as a pre-requisite for graduate study in economics at Johns Hopkins. Specifically, the course will focus on set theory, linear algebra and real analysis.

AS.180.611. Economics of Uncertainty.
This course offers a review of subjective expected utility theory of decision making under uncertainty and choice based subjective probabilities. It also explores the motivation for the recent developments of non-expected utility theories under risk and under uncertainty. It examines the role of completeness and awareness in these theories as well as the theories of menu choice and random choice behavior.

AS.180.622. Game Theory.
The topics covered include solutions concepts such as dominance, rationalizability, Nash equilibrium, correlated equilibrium, subgame perfect equilibrium and Perfect Bayesian equilibrium. We will discuss both static and dynamic games and games of complete and incomplete information.
Prerequisite(s): AS.180.623
AS.180.623

AS.180.623. Economics of Information.
The course introduces the economic issues associated asymmetric information and analyses the institutions and mechanisms designed to mitigate the resulting inefficiencies. Topics include: Adverse selection; moral hazard; incentive contracts; and mechanism design.
Prerequisite(s): AS.180.622
Area: Writing Intensive
AS.180.600 AND AS.180.601

AS.180.626. Computational Methods.
This class will introduce students to the computational tools that are used to get things done in scientific research. Such tools include, but are not limited to, unix bash shell scripting, LaTeX/Beamer, virtual machines, git and github, tools for parallel computation, cloud services, and others. Brief treatments of special-purpose tools (like Mathematica for symbolic math) will conclude this part of the class. After this introduction, the course will involve an intensive introduction to the use of the Python language for scientific computation purposes, including a discussion of why Python dominates other choices like Matlab and Julia. The final third of the course will apply the tools in a practical application to a specific problem identified jointly between the instructor and the student. There is no required text; readings will be assigned in class. (The characteristic that distinguishes this class from alternatives is that this class will not teach specific algorithms nor frontier computational techniques; rather, it aims to expose students to a broad set of tools that they will use regularly thereafter).

AS.180.632. Topics in Applied Microeconometrics.
This course teaches methods for using micro-data to recover structural parameters of microeconomic models. We cover static models, but focus largely on single-agent dynamic programming, including "full solution" methods along with innovations that permit circumvention of daunting computational tasks. Additional topics will be partially based on students' interests, but will likely include: general equilibrium models, static and dynamic games, matching models, unobserved heterogeneity, structural methods with experimental data and biased expectations. The goal is to teach students to use structural methods in their own research, and so we will delve into the nuts and bolts of structural work, examining how researchers actually get from raw data to results. This includes: how the sub-sample for analysis is chosen, how the model is specified, how the programming problem is solved, which moments are generated, how these are matched to the analogous moments in the data and, importantly, how identification is established.

AS.180.633. Econometrics.
Mathematical models of economic behavior and the use of statistical methods for testing economic theories and estimating economic parameters. Subject matter will vary from year to year; statistical methods, such as linear regression, multivariate analysis, and identification, estimation and testing in simultaneous equation models, will be stressed.
AS.180.636

AS.180.634. Panel Data Models & Applications.
This course is a reading course for the panel data models in the economics department. We will focus on econometric theories that are commonly used in panel data analysis, although many of these techniques can be applied to other areas as well. In addition, we will discuss applications of these theories. The course material will start form chapter 10 & 11 in Wooldridge's book which covers linear panel data models. And then we discuss the discrete choice models from chapter 7 of Hsiao's book. After these, we will try to read papers relatedto panel data models.

AS.180.636. Statistical Inference.
Theory and applications of statistical inference. Topics include probability and sampling, distribution theory, estimation, hypothesis testing, and simple regression analysis. Statistical applications will be drawn from economics. Limited to graduate students in Economics except by permission of the chair. Recommended Course Background: AS.110.201, AS.110.302

AS.180.637. Microeconometrics I.
This is an advanced graduate course on major econometric techniques and models that are used in empirical microeconomics. We will cover topics like extremum estimators, empirical process, quantile regression, plugin estimator, Bootstrap, weak Instrumental variables, MCMC, and partial identification in this course.
AS.180.601 AND AS.180.622 AND AS.180.633 AND AS.180.636

AS.180.638. Microeconometrics II.
This course is the second in the microeconometrics sequence in the Economics Department. It will introduce a selection of models and techniques that are useful when a researcher wants to estimate a structural model, i.e. a model derived from economic theory. Structural models that try to incorporate restrictions derived from economic theory are used in empirical IO, but also in quantitative marketing research, labor economics and other fields that consider individual decision making. No attempt will be made to be comprehensive. Instead we will focus on a few areas that have been well-researched in recent years: dynamic discrete choice, microeconomic models with latent variables, program evaluation, the empirical analysis of auctions and nonseparable models. Some topics will be included only if time permits. The models and methods developed for these areas are relevant for other cases. The emphasis is on the interaction between economic theory and econometrics. Basic issues are specification and (nonparametric) identification, computational problems and the use of simulation, semiparametric estimation to avoid functional form and distributional assumptions that cannot be derived from economic theory.
AS.180.601 AND AS.180.622

AS.180.641. International Trade.
This is a graduate course in international trade. It will develop basic analytical tools and frameworks used in the general equilibrium analysis of international trade. Recent research topics will be discussed in the second half of the course.
AS.180.601 AND AS.180.603

AS.180.642. International Monetary Economics.
A link between the balance of payments and asset accumulation/decumulation, microeconomics of international finance and open-economy macroeconomics. The section on open-economy macroeconomics covers approaches to balance-of-payments adjustments, theories of exchange rate determination and monetary, fiscal, and exchange-market policies under fixed and flexible rate regimes.

AS.180.643. Topics of Game Theory.
This course covers topics such as repeated games, dynamic games, bargaining and strategic communication.
AS.180.622

AS.180.645. Topics in Economic Theory.
The course will cover matching markets, which typically deal with assignment problems with and without the use of transfers. Examples of these include school choice, course allocation, and organ exchange. We will cover the theoretical underpinnings, field applications, and empirical evaluations of these markets.

AS.180.646. Revealed Preference and Comparative Statics.
The overall theme of this course is the observable implications of optimizing choice. We will cover the theory of monotone comparative statics and supermodular games. We also discuss results in the revealed preference literature, such as Afriat's Theorem, that deal with the consistency of data with different canonical models. The course is useful to students doing research in pure or applied theory, where comparative statics tools/insights are often needed for model building. It could also be interesting to those with an empirical focus who would like to know more about revealed preference approaches to testing models and drawing inferences from them.

AS.180.647. Topics in Economic Theory and Finance.
This course studies the theory of asset trading in which agents hold different information and/or beliefs. Foundational papers as well as recent ones will be covered, with applications both within and outside of Finance. Topics include: information aggregation via prices; rational expectations equilibrium; market micro-structure; large auctions; herding/information cascades/price bubbles; dynamic models and learning.

AS.180.648. Topics in Applied Microeconomics.
This course will cover popular research designs in applied microeconomics, from reduced-form approach to structural estimation. The first half of this course will be devoted to studying methodologies in reduced-form approach and the second half will be about structural estimation. Students must be familiar with at least one programming language of own choice (python, matlab, R, Julia, Fortran, C/C++) and statistical package (STATA, R) to solve problem sets in this course. The course will introduce various papers related to unobserved heterogeneity in applied microeconomics literature.Basic programming skills are needed for dynamic programming in this course.
AS.180.600 AND AS.180.601

AS.180.649. Structural Approach in Family and Cultural Economics.
This course will introduce structual approach in applied microeconomics, with emphasis on models including endogenous unobservable heterogeneity. The first half of this course will cover popular estimators, such as simulated method of moments, indirect inference, conditional choice probability estimator. The course will cover both single agent problem and multi- agents problem, potentially including endogenious unobservable heterogeneity. The second half of this course will discuss multiple decision maker problem, so- called collective model, and family formation and dissolution model, and cultural economics.

AS.180.651. Labor Economics I.
Theories of the allocation of time and supply of labor, human capital, demand for labor, market equilibrium, and income distribution. As time allows, other topics, such as unemployment, unions, and compensating differences are discussed. Corequisite: AS.180.601

AS.180.661. Bayesian Methods and Machine Learning in Macro and Finance.
This course is composed of two parts. In the first half, we will cover an introduction to Bayesian methods and standard methods as Metropolis, Metropolis-Hasting, Gibbs sampling, etc. We will then review the relation between Bayesian methods and machine learning. In the second part, we will study how Bayesian methods and machine learning have been used in the macro and macro-finance literatures to handle DSGE's, VAR's, Markov-switching-VAR's, Time-Varying VAR's, textual analysis, forecasting, etc.

AS.180.662. Asset Pricing.
This course is an introduction and guide to the most important issues in asset pricing. It begins with classic concepts such as the Capital Asset Pricing Model and the Arbitrage Pricing Theory and continues through continuous-time dynamic no-arbitrage models. It covers both basic theory and classic empirical research. Recommended Course Background: AS.180.604, AS.180.633, AS.180.636 or instructor's permission.

AS.180.672. Industrial Organization.
First term: This course covers methods in applied empirical Industrial Organization. The focus will be on the use of econometric analysis and data both for descriptive and measurement purposes, and to test the predictions of economic theories. The course will cover demand estimation, cost and production function estimation, and estimation of auction models.Second term: The emphasis in this course is on empirical analysis of firm behavior. The first part of the course focuses on models of the internal organization of the firm. The second part considers empirical analysis of firm behavior in markets, with an emphasis on the "new industrial economics."
AS.180.601

AS.180.673. Advanced Economics of Labor.
This course is for graduate students at the 3rd year and above who wish to participate in a semester in-depth readings and discussion topics in labor economics and in econometric methods typically used in labor economics and in many other applied microeconomics fields. Students will have to participate in discussions of materials in each class. The topics covered in each semester are partly a function of student interest and their dissertation topics.

AS.180.690. Advanced Econometrics.
Advanced econometric techniques are often essential to innovative empirical work, but finding and implementing the right methods for a particular problem poses formidable challenges. This course/seminar aims to address these challenges by combining lectures and discussions of foundational econometric methods in areas of student interest (whether those interests be specific for thesis work or more speculative) with examples of implementation, including software development, in more of a 'workshop' environment. The emphasis will be on drawing on the resources of econometric theory to address specific empirical issues while at the same time developing implementation skills.

AS.180.694. Applied Microeconomics Workshop.
This is a weekly seminar series that brings in speakers from other universities to present their research in the field of applied microeconomics. Graduate Students only.
Area: Writing Intensive

AS.180.695. Microeconomic Theory Workshop.
This is a seminar series devoted to the presentation of research in microeconomic theory, typically by speakers from outside the department. Graduate students only.

AS.180.696. Macroeconomics Workshop.
This course features lectures by economists from other universities. They present research findings at the frontier of the field. Graduate students only.

AS.180.697. Research Seminar.
The purpose of this seminar is to train students to do research in economics. This course is for second year graduate students in the PhD program in Economics. For Graduate Students Only.

AS.180.891. Dissertation Research.
This course is for students working on the dissertation for the Ph.D. in Economics. It is graded pass-fail
Area: Writing Intensive

AS.180.899. Independent Study.

Cross Listed Courses

Asia

SA.552.100. Asia in International Finance. 4 Credits.
Examines the evolution of the financial systems of Japan and China from 1980 to the present, including structure, regulation, and functioning of these markets in domestic, regional and international contexts. National context includes an in depth review of the structure and operation of the financial markets of Japan and China, including: the key participants, the governmental and regulatory institutions that supervise them, various financial crises in each country with a focus on causes and solutions, reforms over time with a particular focus on liberalization of the financial system and related issues such as corporate governance and legal and accounting issues, the fiscal/monetary processes and policies in each country that affect the financial system, and the historical, political and social factors that affect institutions and policy. Regional context includes the Asian Financial Crisis, the structural causes, the roles of Japan and China, the IMF response and the various proposals to create regional solutions to future crises; roles of regional financial institutions (ADB, AIIB); China's Belt and Road Initiative and the degree/desirability of financial integration in Asia. The international perspective focuses on the geopolitical/geo-economic implications of the structure and regulation of financial markets. Current events/topics in finance relevant to the course are covered and students are encouraged to propose such topics for discussion. Taught by a SAIS alumnus with 30 years of investment banking and private equity experience in Asia and the US. Students wishing to take the class but lacking the prerequisites should email Professor Talarico at gtalari1@jhu.edu for permission to enroll.
Students may not register for this class if they have already received credit for SA.755.720[C];SA.100.304[C] AND ((SA.380.760[C] OR SA.510.102[C] OR SA.380.722[C] OR SA.510.108[C]) OR (SA.380.722[C] OR SA.510.108[C]))

Development, Climate, and Sustainability

SA.500.131. Venture Capital and Impact Investing in Emerging Markets. 2 Credits.
This class will thus focus on the intersection of venture capital and impact investing, on this newer asset class for emerging markets, and its specific application in the service of consciously creating impact. Given the roots of the early success stories in impact investing in the financial services sector, this class will focus primarily (although not exclusively) on financial inclusion, as it helps to demonstrate the progression of one impact investment sector that has had both early stage VC support and multiple exits. Financial inclusion also offers an ideal laboratory because it offers a service typically provided by private sector entities (albeit to fewer people than it should) and has been the source of entrepreneurs pursuing pro-poor innovations for decades, led and supported by Grameen, Accion, Women's World Banking, Opportunity International, and many others who pioneered microcredit. But the course will go well beyond the field's microcredit roots and explore what is happening on the frontier in the fintech revolution, as significant portions of the financial services sector begin to digitize and financial services increasingly are delivered via mobile phones. As such, this focus on financial inclusion will, in turn, highlight the power of investing and value creation in many of the newest pro-poor sectors.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.400.795[C];SA.380.760[C] OR SA.510.102[C]

First Year Seminars

AS.001.132. FYS: Exploring Economic Inequality through the Lens of Literature. 3 Credits.
In this First-Year Seminar we examine inequalities in income, wealth and working conditions in the United States today; explore some causes of inequality; ask whether or not economists consider inequality to be a significant problem, and, if so, why; and consider appropriate policies to address it. Readings from literature, both past and present, will be paired with economics texts for our weekly discussions. The aim is not to show that inequality is always with us, but, on the contrary, to shed light on the distinctive nature of inequality in the 21st century. Students will have the opportunity to show how their own selections from literature, poetry, music, or film illuminate some dimension of current inequality. The inspiration for this course offering is that reading fiction at an early age motivated the instructor herself to study economics.

AS.001.149. FYS: What Is Poverty? A View from Economics and the Social Sciences. 3 Credits.
Social science is the scholarly study of society and social behavior. This First-Year Seminar will introduce students to the social sciences by studying poverty in America through the lens of economics and other social sciences, including sociology and anthropology. The quantitative approach taken by economics will be compared and contrasted with qualitative approaches. Illustrations of how the lives of the poor are led as depicted in ethnographic studies, movies, and literature will be studied to learn how integrated perspectives can be formed. Students will learn how to read scholarly articles with a critical eye, to speak about their interpretations of the material, and to write short critical essays. Students will also be introduced to quantitative analysis using graphs and tables. Group projects will be required. Guest lecturers bringing non-economics perspectives will visit the class.

History

AS.100.442. The Intellectual History of Capitalism, 1900 to present. 3 Credits.

This course examines shifting understandings of the philosophical foundations, political implications, and social effects of the market economy since the early twentieth century.
Area: Writing Intensive

Interdepartmental

AS.360.247. Introduction to Social Policy and Inequality: Baltimore and Beyond. 3 Credits.

This course will introduce students to basic concepts in economics, political science and sociology relevant to the study of social problems and the programs designed to remedy them. It will address the many inequalities in access to education and health care, unequal treatment in the criminal justice system, disparities in income and wealth, and differential access to political power. The focus will be on designing effective policies at the national and local level to address these pressing issues. This course is open to all students, but will be required for the new Social Policy Minor. The course is also recommended for students who are interested in law school, medical school, programs in public health, and graduate school in related social science fields. This course does not count as one of the required courses for the Economics major or minor, but it is required for the Social Policy Minor. Cross list with Sociology, Economics and Political Science. Freshman, Sophomore and Juniors only.
Area: Writing Intensive

AS.360.528. Problems in Applied Economics. 2 Credits.

This course focuses on a monetary approach to national income determination and the balance of payments. Money and banking, as well as commodity and financial markets, are dealt with under both central banking, as well as alternative monetary regimes. Particular emphasis is placed on currency board systems. Students learn how to properly conduct substantive economic research, utilizing primary data sources, statistical techniques and lessons from economic history. Findings are presented in the form of either memoranda or working papers of publishable quality. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a requisite.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

International Economics

SA.340.709. Statistics for Data Analysis. 4 Credits.

Covers basic statistical tools for data analysis. Emphasizes facility in problem-solving in statistical inference and two-variable regression and correlation analysis. Presents descriptive statistics, probability and probability distributions and their use in hypothesis testing. Uses computer to solve problems and to reinforce statistical concepts.

SA.340.710. Econometrics. 4 Credits.

Provides comprehensive introduction to econometrics. Develops tools for estimating functional relationships and critically reading empirical studies that use different econometric techniques; presents assumptions of multivariate regression and discusses the most common econometric problems and the potential consequences and remedies; and discusses omitted variables, sample selection, heteroscedasticity, autocorrelation, multicollinearity and use of discrete variables. Introduces instrumental variable technique. Uses statistical software in applied exercises.
SA.340.709[C] ORSA.999.702[C] OR SA.630.724[C]

States, Markets, and Institutions

SA.503.108. Watching Wall Street from Washington: Financial Market Analysis for the Public Sector. 4 Credits.

This course investigates the strategies for, as well as the relevance of, financial market analysis directed toward policy audiences. Students will develop a deeper understanding of global financial markets and learn how to leverage that understanding shape and achieve policy goals. The course will cover five major topics: 1) Basic techniques for financial market analysis across a variety of major asset classes; 2) The characteristics of financial market analysis – its forms, theoretical underpinnings, advantages, and deficiencies; 3) The hierarchy of policy relevance of financial market analysis; 4) Costs, risks, and difficulties of financial market analysis for the public sector; and 5) Future challenges and formulations of public sector market analysis given the technological developments in finance, money management, and trading.
Students may not register for this class if they have already received credit for SA.610.703[C];SA.100.304[C] OR SA.300.701[C] OR SA.300.706[C] OR SA.999.701[C]

The Americas

SA.551.100. Economics of Immigration. 4 Credits.

Examines the economic causes and consequences of international migration. The central focus is an economic analysis of the general patterns of population flows, their determinants and their impact. Analyzes these primarily within a comparative context of the North American experience, although also considers other case studies. Current US migration policy is examined so as to understand how the US system is 'broken' and what is meant by ' true immigration reform'. Includes consideration of the Canadian experience, in that Canadian immigration policy seems to get many things 'right'.
Students may not register for this class if they have already received credit for SA.840.715[C]

SA.551.102. Financial Crises and Policy Dilemmas in Emerging Markets and Latin America. 4 Credits.

The course will focus on key macroeconomic and financial policy issues with a focus on Emerging Markets. The course is divided into two parts. The first part explores the causes, dynamics and consequences of selected crises episodes affecting emerging markets, especially in Latin America; from the debt crises of the 1980's to the COVID-19 pandemic. The second part of the course addresses selected issues regarding crisis resolution, including the political economy of crises, their long run impacts on the economy, and the future of the international financial architecture. By the end of the course, it is expected that students will be able to identify the major factors leading to crises in emerging markets, assess the difficult policy trade-offs that policymakers face when dealing with crises, and evaluate alternative policy options.
Students may not register for this class if they have already received credit for SA.810.727[C]

For current faculty and contact information go to http://econ.jhu.edu/directoryindex/faculty/

Economics, Bachelor of Arts

Economics Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The introductory courses AS.180.101 Elements of Macroeconomics and AS.180.102 Elements of Microeconomics are open to all students. Each 200-level course has at least one of AS.180.101 and AS.180.102) as a prerequisite. Some have both.

AS.180.301 Microeconomic Theory and AS.180.302 Macroeconomic Theory courses have AS.180.101 Elements of Macroeconomics and AS.180.102 Elements of Microeconomics as well as Calculus I (AS.110.106 or equivalent) as prerequisites. (AS.180.301 Microeconomic Theory can be taken concurrently with AS.180.101 Elements of Macroeconomics but only if the student has completed AS.180.102 Elements of Microeconomics. AS.180.302 Macroeconomic Theory can be taken concurrently with AS.180.102 Elements of Microeconomics but only if the student has completed AS.180.101 Elements of Macroeconomics). All 300-level courses above 301 and 302 have Microeconomic and/or Macroeconomic Theory (AS.180.301, AS.180.302) as prerequisites (or, with permission of the instructor, corequisites), as well as Elements of Economics and Calculus. Some 300-level courses have additional prerequisites; see individual course listings. Independent study is available, subject to the consent of the department and of the faculty member with whom the student wants to work.

Subject to the consent of the instructor and the DUS, graduate courses at the 600-level are open to qualified undergraduates in the spring of their junior year or later.

For the economics major, a minimum grade of C- or better is required for all courses meeting the requirements and courses may not be taken satisfactory/unsatisfactory. Courses directly equivalent to JHU courses from study abroad or taken at other universities may count towards requirements; however non-direct equivalent courses must be approved by the department's director of undergraduate studies. In all cases, at least 5 of the 10 required economics courses of the major must be taken at JHU. Internships, independent studies, and intersession courses do not apply towards major requirements.

Major Requirements

Code	Title	Credits
Economics Core		
AS.180.101	Elements of Macroeconomics [1]	3
AS.180.102	Elements of Microeconomics [1]	3
AS.180.301	Microeconomic Theory	4
AS.180.302	Macroeconomic Theory	4
AS.180.334	Econometrics	3
Economics Electives		
Three 200- or 300-level economics courses [2]		9
Two 300-level economics courses		6
Mathematics		
AS.110.106	Calculus I (Biology and Social Sciences) [3]	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
Statistics		
EN.553.111	Statistical Analysis I	4
or EN.553.112	Statistical Analysis II	
or EN.553.211	Probability and Statistics for the Life Sciences	
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
or EN.553.420	Introduction to Probability	
or EN.553.430	Introduction to Statistics	
or AS.280.345	Public Health Biostatistics	
Total Credits		**40**

1. Students who use exam credits to satisfy the AS.180.101 Elements of Macroeconomics and/or AS.180.102 Elements of Microeconomics requirements must take additional courses in the department to reach a total of 10 courses in the department.
2. Please note: AS.180.203 Faculty Research in Economics, a S/U one-credit course, does not count as one of these three 200-level electives.
3. Or other equivalent courses approved by the DUS.

Additional Notes for Students

- EN.553.111 Statistical Analysis I or equivalent (any of the Statistics courses listed above) is a prerequisite for Econometrics.
- Except for AS.180.301 Microeconomic Theory, AS.180.302 Macroeconomic Theory, AS.180.334 Econometrics, AS.180.521 Research in Economics, and AS.180.522 Senior Thesis the department does not necessarily offer all 200- to 500-level courses every year. Students should plan their programs accordingly, in consultation with faculty.
- The Senior Honors Thesis sequence (AS.180.521 Research in Economics and AS.180.522 Senior Thesis) cannot be used to satisfy any of the requirements for the major. Anybody interested in pursuing the senior honors thesis should discuss this with the student's academic advisor not later than the end of the spring semester junior year.

Sample Program of Study

A typical program might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
AS.180.101	Elements of Macroeconomics	3
AS.110.106	Calculus I (Biology and Social Sciences)	4
	Credits	**7**
Second Semester		
AS.180.102	Elements of Microeconomics	3
EN.553.111	Statistical Analysis I	4
	Credits	**7**
Second Year		
First Semester		
AS.180.301	Microeconomic Theory	4
200 level elective		3
	Credits	**7**
Second Semester		
AS.180.302	Macroeconomic Theory	4
200 or 300 level elective		3
	Credits	**7**

Third Year		
First Semester		
AS.180.334	Econometrics	3
200 or 300 level elective		3
	Credits	**6**
Second Semester		
300 level elective		3
	Credits	**3**
Fourth Year		
First Semester		
300 level elective		3
	Credits	**3**
Second Semester		
200 or 300 level elective (optional)		
	Credits	**0**
	Total Credits	**40**

- The total credit count for the major includes AS.110.106 and EN.553.111. Students trying to take these courses after freshman or sophomore year are likely to run into serious schedule conflicts in the junior and senior years because of the need to fulfill the prerequisites for advanced courses. Consult with faculty at an early stage.

Honors in Economics

Departmental honors are awarded to those students who satisfy the following requirements:

- All economics courses applied to the major have been taken in the department.
- AS.180.521 Research in Economics and AS.180.522 Senior Thesis. The thesis may not be counted as one of the five economics electives.
- A grade point average of at least 3.5 for all economics courses.
- A grade point average of at least 3.5 for AS.180.301 Microeconomic Theory, AS.180.302 Macroeconomic Theory, AS.180.521 Research in Economics and AS.180.522 Senior Thesis.

Economics, Minor

Economics Minor Requirements

For the economics minor, a minimum grade of C- or better is required for all courses meeting the requirements and courses may not be taken satisfactory/unsatisfactory. Courses directly equivalent to JHU courses from study abroad or taken at other universities may count towards requirements; however non-direct equivalent courses must be approved by the department's director of undergraduate studies. In all cases, at least 50% of the 6 required economics courses of the minor must be taken at JHU. Internships and independent studies courses do not apply towards minor requirements.

Code	Title	Credits
AS.180.101	Elements of Macroeconomics	3
AS.180.102	Elements of Microeconomics	3
Four economics courses at the 200- or 300-level *		12
Total Credits		**18**

* Please note: 180.203 "Faculty Research in Economics", a S/U one-credit course, does not count as one of these courses.

No substitution of courses in other departments for economics electives may be made. Students who use exam credits to satisfy the AS.180.101 Elements of Macroeconomics and/or AS.180.102 Elements of Microeconomics requirements must take additional courses in the department to reach a total of 6 courses.

Economics, PhD

Admission Requirements

The admission of each applicant is decided by the Department as a whole and rests upon their academic record (especially economics and mathematics courses), GRE test scores, recommendations of scholars and instructors, and other pertinent information including a match between the research interests of the applicant and the faculty. To apply for admission, applicants are required to upload unofficial transcripts of all previous college and university study to their online application. Failure to upload unofficial transcripts will result in an inability to complete and submit the online application. In addition, we require at least two letters of recommendation. These recommendation letters should come from individuals who can comment on your scholarly skills. All applicants must submit scores from the Graduate Record Examination. Admitted students nearly always have very high quantitative GRE scores. Foreign applicants, who have not earned a degree in a university where English is the sole language of instruction, must take the TOEFL to satisfy the department that they are fluent in English. The department requires the TOEFL with a minimum score of 100 (internet based), 600 (paper based) or 250 (computer based), or IELTS with a bandscore of 7 in place of the TOEFL.

Students should have a knowledge of economic theory and statistics and a strong background in mathematics including differential and integral calculus and linear algebra. Almost all of our students enter with at least two semesters of calculus and linear algebra. In admissions decisions, we like applicants to have taken other mathematics courses as well, including more advanced calculus, differential equations, probability, and real analysis. We especially welcome applications from under-represented populations, as diversity is important in our graduate program.

Program Requirements

Preparation for the Dissertation. The program's first year is comprised of two semesters each of courses in microeconomic theory, macroeconomic theory, and mathematical methods, and one-semester courses in statistics and econometrics. Second-year students take courses in specific fields within economics. If necessary, students may take relevant courses in other departments such as Mathematics, Applied Mathematics and Statistics, Political Science, Public Health, Sociology, and Anthropology. Second-year students also begin their exposure to original research through research mentorships with faculty. A research paper is submitted near the end of the second year. Third-year students complete any remaining course work and prepare a dissertation proposal

Comprehensive Exam. This exam is administered by the department and consists of two written examinations designed to test the candidate's knowledge of both microeconomics and macroeconomics. The written examinations are taken prior to the start of the second year.

Dissertation. The dissertation is an original investigation worthy of publication, prepared under the supervision of three members of the faculty. A dissertation proposal is due near the end of the third year. Though it is feasible to finish the program in four years, students typically complete the Ph.D. in five or six years. The final requirement is a Graduate Board Oral Examination on the dissertation. The committee that administers the examination includes faculty from outside the department.

Requirements for the M.A. Degree

The department does not admit students from outside Johns Hopkins University who intend to work only for an M.A. However, it does offer this degree as an intermediate step toward the Ph.D. or as a final degree to some of those who do not complete their doctoral work.

Beyond the general university requirements, the department requires for the master's degree either two years of satisfactory graduate course work or one year of satisfactory graduate course work and an acceptable master's essay.

Financial Economics, Minor

Financial Economics Minor Requirements

The main objective of the minor is to provide students with training in the conceptual framework, guiding concepts, and technical tools of modern finance. The broader goal is to provide insights into the large and the small—the macro and micro—of how this framework helps us understand the workings of the economy.

The minor in financial economics includes five required courses and two elective courses with the POS-Tag ECON-FINMIN.

Code	Title	Credits
Required Courses		
AS.180.101	Elements of Macroeconomics	3
AS.180.102	Elements of Microeconomics	3
AS.180.263	Corporate Finance	3
AS.180.301	Microeconomic Theory	4
AS.180.367	Investment-Portfolio Management	3
Elective Courses		
Two additional financial economics elective courses with the POS-Tag ECON-FINMIN.		6
Total Credits		**22**

The minor is open to all majors. A minimum grade of C- or better is required for all courses and they may not be taken satisfactory/unsatisfactory. One cannot take both the economics and financial economics minor. For economics majors, there is a restriction on double-counting: the two elective courses counting toward the minor cannot also count toward the economics major.

English

http://english.jhu.edu/

The Department of English offers separate undergraduate and graduate programs, each designed to suit the needs of its particular student body. The undergraduate program, in the context of university requirements and elective courses, provides the basis for a liberal education and prepares students for graduate work or professional schools, such as medicine and law, as well as professional teaching and literary scholarship. The graduate program prepares advanced students for professional teaching careers in English literature.

Facilities

In addition to the the Sheridan Libraries, Johns Hopkins students have easy access to the 12 million volumes and innumerable historical manuscripts of the Library of Congress, as well as the library at Dumbarton Oaks, the Folger Library, the Freer Library, the library of the National Gallery, and many other specialized public collections. Students learn about advances in research and criticism and confer with leading American and European scholars and critics through participation in the activities of the Tudor and Stuart Club, the ELH Colloquium, and the department's other programming.

Programs

- English, Bachelor of Arts (p. 1820)
- English, Minor (p. 1821)
- English, PhD (p. 1821)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.060.107. Introduction to Literary Study. 3 Credits.
This course serves as an introduction to the basic methods of and critical approaches to the study of literature. Some sections may have further individual topic descriptions; please check in SIS when searching for courses.
Area: Writing Intensive

AS.060.108. Time Travel. 3 Credits.
Why is time travel such a consistent and perplexing theme in literature and film over the last 150 years? Why is modernity so concerned with peeking backwards or forwards? This course will examine the history of time-travel fiction, from its beginning in utopian fiction through its box-office dominance in the 1980s, and into today. Writers will likely include Mark Twain, Edward Bellamy, Harold Steele Mackay, Ray Bradbury, Robert Heinlein, and Philip K. Dick. Movies will include *The Terminator*, *Back to the Future*, and *Primer*.
Area: Writing Intensive

AS.060.109. Robots, Androids, Slaves. 3 Credits.
Since the rise of Silicon Valley, tech enthusiasts and futurists have been debating the possibility of what has been called "the singularity" — the moment when artificial intelligence (AI) decisively and irreversibly surpasses human abilities. If this does happen, observers worry, it's not just that robots will take our jobs; will we become subservient to our new robot masters? Will we become extinct, and not because of climate change? This course explores such questions through the lens of literature and popular media. We will watch several films from the last 15 years or so that depict the rise of AI. We will ask about the roles tat gender, race and class have in our imagination of the work robots do. And we will read a range of short essays that approach the question of labor and technology from different angles than mass media usually do.

AS.060.129. Writing Africa Now. 3 Credits.
This course surveys post-2000 literary and cultural production from sub-Saharan Africa. Topics will include debates over genre and fiction's relevance to African experience, legacies of canonical writing about independence, urban Africa as violent or "tragic" landscape, and problems of scale and geographical context. Readings by authors such as Adichie, Wainaina, Duiker, and Vladislavic, and students will be introduced to the main print and online arteries of African intellectual discussion. This class is for non-majors and does not count towards the English major or minor.
Area: Writing Intensive

AS.060.135. American Nightmares: Burroughs, Highsmith, Dick. 3 Credits.
These three authors share a common starting point: Patricia Highsmith, William S. Burroughs and Philip K. Dick all began their careers writing mass market genre fiction in pre-Stonewall, pre-civil rights, Cold War 1950s America. Absorbing the stylistic codes of their respective marketplaces of suspense writing and lesbian romance, "drug fiend" confessional, and science fiction, each writer's conformist apprenticeship in pulp resurfaces in increasingly nightmarish forms in the violent and paranoid scenarios that dominate their mature work. Reading broadly in each author's short fiction, novels, and prose, we will sequentially examine Burroughs' "cut-up" techniques and "routines", Highsmith's free indirect discourse gone wrong, and Dick's disorienting temporal experiments as inflamed allergic reactions to generic codes. We will also examine the cinematic afterlives of these authors by looking at key scenes from three adaptations of their work: Alfred Hitchcock's Strangers on a Train (1951), David Cronenberg's Naked Lunch (1991), and Richard Linklater's A Scanner Darkly (2006).

AS.060.137. Doctors Without Borders: Literature, Medicine, and the Human Condition. 3 Credits.
Doctors play a significant role in shaping literary history as both writers and fictional subjects. From Chekhov to Sherlock Holmes, W. Somerset Maugham to Middlemarch, medical practice is imagined to bestow a privileged understanding of humanity in confrontation with questions of life and death. This course explores how writing about medicine connects long-established themes of mortality, authority, and ways of knowing to timely questions of global migration, cultural contact, and social justice. We will read literary writing by physicians as well as writing that depicts their work in detail, by authors including Nawal El Saadawi, Atul Gawande, Abraham Verghese, Damon Galgut, and Taiye Selasi.

AS.060.140. Diaries, Journals, Some Notes. 3 Credits.
A study of genres of private writings, focusing on the diary form. Readings will likely include diaries by Pepys, Boswell, Frank, Woolf, as well as critical and theoretical texts on the form.
Area: Writing Intensive

AS.060.142. Indigenous Science Fiction: (Re)making Worlds. 3 Credits.
This discussion-based seminar will survey science fiction written by indigenous authors in what are now the United States, Canada, and Australia. We will investigate by what means and to what ends this particular genre has been taken up by indigenous peoples both to reflect on their settler-colonial pasts and presents and to imagine decolonial futures. Texts may include: Leslie Marmon Silko, Almanac of the Dead; William Sanders, "The Undiscovered"; Daniel Heath Justice, The Way of Thorn and Thunder; Blake Hausman, Riding the Trail of Tears; Waubgeshig Rice, Moon of the Crusted Snow; Claire Coleman, Terra Nullius; Tanya Tagaq, Split Tooth. Fulfills the Global and Minority Literatures requirement.
Area: Writing Intensive

AS.060.148. Asian and Latinx American Literatures: Rethinking Empire. 3 Credits.
This course explores the transnational convergence of Asians/Asian Americans and Latinxs/ Latinx Americans from a history of multiple imperialisms to the neoliberal, globalized present. We will situate the racialization of Asian and Latinx peoples within a larger, global framework and think critically about areas of solidarity and tension between these two multi-ethnic groups through readings in literature, history, and sociology.
Area: Writing Intensive

AS.060.151. Doubles, Demons, and Dummies: The Literature of the Fantastic. 3 Credits.
Talking reflections. Dolls with knives. Dancing automatons. They are all part of the strange and dangerous world of the fantastic. This course examines the literature of the fantastic, or what we can refer to as creepy double, demon, and dummy stories. We'll look at everything from Poe to American Psycho in an attempt to figure out what just happened, why, and how it relates to literary meaning.

AS.060.163. William Faulkner, Race, and Southern Fiction. 3 Credits.
This course will introduce students to debates in American literary studies around questions of race, politics, and the history of the American South. The course will center around a reading of William Faulkner's Absalom, Absalom! alongside literary history, critical theory, and other pieces of fiction from the American South. We will use these texts to explore the transformations of ra-cial discourses in 19th and 20th century America, with close attention to how they influence the present.
Area: Writing Intensive

AS.060.164. Cyberpunk: High-Tech, Low Life. 3 Credits.
This course will examine the science fiction movement of cyberpunk as an aesthetic, narrative, and political reaction to late neoliberalism. We will read and discuss literature, film, and interactive media from this genre to develop an understanding of how cyberpunk texts register, refract, and attempt to reconcile antagonisms central to contemporary life.
Area: Writing Intensive

AS.060.165. Science Fiction and Climate Change. 3 Credits.
This course will examine representations of, and confrontations with, climate change in science fiction. Special focus will be given to indigenous futurisms as uniquely valuable perspectives on the climate crisis. We will examine these narratives alongside climate change discourse, literary theory, and literary criticism.
Area: Writing Intensive

AS.060.169. Literature and Visual Art. 3 Credits.
We'll glance at the history of the relations between painting and literature, before turning to the art of the past 200 years. What has drawn writers to place their powers against those of painters (in particular)? How have they managed the comparisons? How might we understand the distinctive powers and limitations of these two modes of responding to human experience? While we may have an exam, writing assignments will constitute most of your grade.
Area: Writing Intensive

AS.060.207. William Shakespeare. 3 Credits.
Who was William Shakespeare, and what can his poems, histories, comedies and tragedies tell us about our overlap with, and divergences from, the early modern world?

AS.060.208. English Literature from Chaucer to Behn. 3 Credits.
This course is a survey of English writing from the fourteenth to the seventeenth centuries. Tracing the evolution of vernacular literature in English from the late medieval period to the early modern period and onwards to the threshold of modernity, we will focus intensively upon four key works: Geoffrey Chaucer's "The Canterbury Tales," Book I of Edmund Spenser's "The Faerie Queene", John Milton's "Paradise Lost" and Aphra Behn's "Oroonoko." These works will be examined in their formal and generic dimensions as key examples of broader aesthetic changes in the constitution of "literature" as a category. They will also be placed in their political, religious, and social contexts. Through lectures, class discussion, written responses, and longer essay assignments, students will master the fundamentals of English literary history as well as the techniques of critical reading and writing.

AS.060.209. The Literary History of the Devil to 1800. 3 Credits.
This course reads major works in European literature before 1800 (give or take) depicting the devil. It examines the history of the various social, cultural and political guises under which the devil appears, and the function that representing radical evil performs, in literature and society. Among our readings will be Dante's Inferno; Milton's Paradise Lost; Goethe's Faust, Part One, and many other major Satanic works.

AS.060.210. British Literature II. 3 Credits.
This course provides a framework for grasping the dazzling variety and explosive innovation of literature in English during the last quarter-millennium. Attending both to textual details and to historical contexts, we will see how Wordsworth, Austen, Keats, Tennyson, Dickens, Wilde, Woolf, Rushdie, and other writers extend and undo tradition, illuminate their times and places as well as our own, and conspire to bring to us the intense experience distinctive to great literary art.

AS.060.211. How Not to be Afraid of Poetry. 3 Credits.
What is poetry? And why don't we like it? This course will explore what makes poetry turn ordinary language into something extraordinary. Opening up a range of poetry in English, the course will involve reading poetry aloud, thinking about poetry and its forms, and gaining experience in understanding poetry. Assignments will include attending to details small and large in poems, becoming an expert about a single poet, debating aesthetic issues, and composing short analytical papers about poems. There are two required written assignments, a midterm and a final examination.

AS.060.212. British Literature: 18th Century to the Prese. 3 Credits.
A survey of major authors such as Wordsworth, Keats, Austen, Tennyson, Dickens, Wilde, Woolf, Joyce, and Rushdie. Substantial attention to formal conventions as well as stylistic innovation, to aesthetic value as well as social meaning.

AS.060.216. Zombies. 3 Credits.
This lecture survey will attempt to answer why the zombie has become such a fixture in contemporary literature and cinema. We will track this figure across its many incarnations--from its late-eighteenth-century appearance in ethnographic fictions growing out of the modern cultures of racialized slavery in the Americas right up to twenty-first-century Hollywood blockbusters in which the origins of the figure in the cultures of racialized slavery are perhaps not overt yet continue to manifest. What are the implications of the zombie's arc from a particular human being targeted for domination by a sorcerer to a living-dead horde created by radiation or epidemic? "Texts" may include: Mary Shelley, Frankenstein; Edgar Allan Poe, "The Man Who Was Used Up"; H.P. Lovecraft, "Herbert West--Re-Animator"; Zora Neale Hurston, Tell My Horse; Victor Halperin, dir., White Zombie; George Romero, dir., Dead series; Edgar Wright, dir., Shaun of the Dead; Alejandro Brugués, dir., Juan de los Muertos; Colm McCarthy, dir., The Girl with All the Gifts; Colson Whitehead, Zone One; Jordan Peele, dir., Get Out. Fulfills the Global and Minority Literatures requirement.
Area: Writing Intensive

AS.060.217. Time Travel. 3 Credits.
Why is time travel such a consistent and perplexing theme in literature and film over the last 150 years? Why is modernity so concerned with peeking backwards or forwards? This course will examine the history of time-travel fiction, from its beginning in utopian fiction through its box-office dominance in the 1980s, and into today.
Area: Writing Intensive

AS.060.219. American Literature to 1865. 3 Credits.
A survey course of American literature from contact to the Civil War.

AS.060.220. Clint Eastwood, Race and the American Western. 3 Credits.
Drawing from the body of work engaging and recording the Hollywood gunfighter and outlaw folk-hero Clint Eastwood, the course will investigate American cinematic representations of slavery and its absence, the Civil War, and racial formation along the United States' southwestern frontier in films produced from the 1950s through the contemporary period. A focus on the cultural icon Clint Eastwood enables a close examination of American cinematic fantasies of the frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, particularly the creation of American masculine ideals. The course will also take decided note of the national shift from liberal "Great Society Programs" of the 1960s to the conservative "neoliberal" social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between civilization and savagery, belonging and alienation, and metropolitan and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion.

AS.060.221. The Modernist Novel: Consciousness and Crisis. 3 Credits.
A course on key novels written in Britain or its former colonies between 1900 and 1960. Major attention to the meanings of modernism across the arts as well as innovations in prose fiction.
Area: Writing Intensive

AS.060.222. American Literature, 1865 to today. 3 Credits.
A survey of American literature from 1865 to today.

AS.060.232. Detective Fiction. 3 Credits.
This lecture will trace the the history of English-language detective fiction through the nineteenth and twentieth centuries. Why does the figure of the detective appear when it does? How does it change over time, and what can we learn from that? We will pay special attention to the way clues and suspense operate, the role of the reader in figuring out the mystery, and the complicated relationship of the detective with official authority. Authors will likely include some selection of Wilkie Collins, Edgar Allen Poe, Arthur Conan Doyle, Agatha Christie, Dashiell Hammet, and Raymond Chandler.

AS.060.265. Nineteenth Century British Novel. 3 Credits.
Reading major novelists from the nineteenth century including Austen, C. Brontë, Dickens, Eliot, Hardy, and Conrad. We will pay attention to formal conventions, and relation to social and historical context.

AS.060.304. Large Novels. 3 Credits.
This course will look at novels that are not only large in size, but which also think about the meaning and methods of trying to capture huge segments of the world into a piece of art. How much can be fit into a novel? What is gained and what is lost? How large is too large? We will read Charles Dickens's Bleak House, Lev Tolstoy's War and Peace, and Herman Melville's Moby Dick.
Area: Writing Intensive

AS.060.308. The Essay Form and Creative Non-Fiction. 3 Credits.
We'll focus on the essay form, with special attention to recent creative non-fiction that responds to art and literature itself. Theoretical, stylistic, and formal issues will all be considered.
Area: Writing Intensive

AS.060.309. Slavery in Renaissance Literature. 3 Credits.
Against the backdrop of the rise of the European slave trade, how were slaves represented in early modern English literature? How was the condition of enslavement inflected by emergent nationalism, colonialism and theological constructions of difference? This course puts Renaissance literature into conversation with comparative histories of slavery and critical race theory. Authors include Aristotle, Terence, Epictetus, Christopher Marlowe, William Shakespeare, John Milton, Aphra Behn, Orlando Patterson, Kim Hall, Stephen Greenblatt, Mary Nyquist, Moses Finley and others.
Area: Writing Intensive

AS.060.313. Literature of the Settler Revolution. 3 Credits.
The nineteenth century saw the creation of an "Angloworld" as a result of what one historian has called "the settler revolution." In perhaps the largest mass migration in human history, millions of English-speakers (and others) invaded Indigenous worlds in what have consequently come to be known as the United States, Canada, and Australia. This seminar offers an introduction to nineteenth-century Indigenous and settler Anglophone writing in the US, Canada, and Australia with a view to understanding the role of literature in inciting, interrogating, and resisting this settler revolution.
Area: Writing Intensive

AS.060.314. Social Media Fictions. 3 Credits.
Writers around the world are now searching for ways to incorporate new modes of social interaction - e.g. Facebook, Twitter, text messaging, and Skype - into their print work. This course explores the various techniques they have adopted for this purpose, with an eye to critically evaluating their implications for narrative structure and its "reality effect." From Teju Cole's very public experiments with the Twitter novel to a Zimbabwean writer's attempt to capture plot turns through SMS, we will discuss the ways in which narrative is helped or hindered by the ubiquity of social media. Writers studied will include Tendai Huchu, Zadie Smith, Jonathan Franzen, and Eben Venter.
Area: Writing Intensive

AS.060.315. Literature of Incarceration. 3 Credits.
We will take up a history of writing from and about various carceral sites (prison, detention camps, etc-- as well as Circe' island and Jonah's whale) to see what they can teach us about larger questions of the movement (or not) of certain populations, the ideology and economies of imprisonment, and campaigns for the abolition of prisons.
Area: Writing Intensive

AS.060.316. Mapping the Global Metropolis. 3 Credits.
Cities have long taken on a central role in literature, but much of our reading about urban space is confined to a few Western hubs. And while the city has traditionally been a space for fictional characters to develop into national subjects, much of the most innovative contemporary writing sees the city as a character of its own. This course will address the representational challenges of globalization through fiction and genre-bending memoir about contemporary metropolises that act as its microcosm: Johannesburg, Lagos, Delhi, London, and New York. We will read primary works by Ivan Vladislavic, Chris Abani, Aravind Adiga, Zadie Smith, and Teju Cole, as well as supplementary excerpts from books including Capital, by Rana Dasgupta, Mike Davis' Planet of Slums, Ato Quayson's Oxford Street, Accra, and Loren Kruger's Imagining the Edgy City. Finally, the course will include theoretical readings about globality and representation, such as Fredric Jameson's essay on "Cognitive Mapping" and Arjun Appadurai's seminal book Modernity at Large.
Area: Writing Intensive

AS.060.317. Jane Austen Beyond England. 3 Credits.
This will be an in-depth study of Austen's novels with an emphasis on how they have traveled outside of the country of her birth – e.g. to the United States, India, and East Asia—through the work of individuals and the flows of global capitalism. Students will gain perhaps a disorienting sense of what Austen means in different cultures at different historical moments, and conduct individual research to learn more. Knowledge of another language is not necessary but could prove useful. The course will include a field-trip to the Alberta Burke Austen collection at Goucher College.
Area: Writing Intensive
AS.060.107

AS.060.320. Icons of Feminism. 3 Credits.
This course looks at four crucial figures who have haunted feminist thought and responses to feminism over the centuries. Sappho, known as the first female poet, remains an enigmatic icon of feminine desire and creativity; Antigone, the daughter of Oedipus and the heroine of Sophocles's play Antigone, still inspires feminist analyses of women's relationship to law, the state and civil society; and Joan of Arc, the militant maid of Orleans, troubles thinking about women and violence as well as women, religion and spirituality. The last figure is Mary Wollstonecraft, often cited as the first modern feminist. The course will examine literary works written about these iconic figures, as well as contemporary feminist writing about their influence and viability as models for the future of feminism.
Area: Writing Intensive

AS.060.326. Shakespeare: The Novel. 3 Credits.
What if King Lear had been a mother? What if the we thought about Othello through the lens of the holocaust? What if the indigene Caliban was the hero, not the villain? What if Miranda chose Caliban over her European suitor? (The Tempest) Could a modern-day Kate be tricked into marriage and "tamed" (The Taming of the Shrew)? When contemporary novelists rewrite Shakespeare, they pose questions left hanging in the play and bring the plays into our own world. In this course, we will read Shakespeare plays (King Lear, The Tempest, The Taming of the Shrew, Merchant of Venice) along with contemporary novelists that rewrite – and confront -- those plays (Jane Smiley, Caryl Phillips, J. M. Coetzee, Anne Tyler). Students will take up important literary questions about kinds of literature (plays vs novels), the canon, imitation, adaptation, and also address the themes of power, gender and sexuality, family dynamics, authority, colonization and the environment.
Area: Writing Intensive

AS.060.327. "All Art is Propaganda". 3 Credits.
This course will explore black literature written as protest. We will examine how, in the face of threats to black life, Frances E.W. Harper, Richard Wright, Amiri Baraka, and others have realized versions of W.E.B. Du Bois's objective: "all art is propaganda and ever must be, despite the wailing of the purists."
Area: Writing Intensive

AS.060.328. Malcolm and Martin: An Introduction to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their recorded speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.331. The Literature of the Atlantic Slavery. 3 Credits.
This seminar will trace the historical development of the slavery debate in the Atlantic world through examination of key texts from a host of genres and locations—Quaker religious tracts, political documents like the Haitian Declaration of Independence, Cuban antislavery novels, slave narratives, and "classics" of American literature like Melville's Benito Cereno. We will consider how the institution of Atlantic slavery was variously represented, justified, and criticized, discovering in the process the deep structures of modern slavery discourse.
Area: Writing Intensive

AS.060.337. James Joyce's Ulysses. 3 Credits.
A careful semester-long reading of James Joyce's masterpeice Ulysses, one of the greatest and most intimidating novels in world literature.
Area: Writing Intensive

AS.060.341. Milton. 3 Credits.
This class will study Milton's poetry and prose across the whole of his writing career, with special attention to Paradise Lost, the great epic poem retelling the story of the fall of humankind. We will consider Milton's literary background, his contemporary political and social milieu, as well as critical debates that surrounding the poet, who was accused of being 'of the devil's party.' Pre-1800 course.
Area: Writing Intensive

AS.060.342. Contemporary Novel of Ideas. 3 Credits.
The novel of ideas is often traced to 18th century French or 19th century Russian writing, but it has come broadly to signify works of robust philosophical contemplation. The inherently slippery term seems to indicate a work in which "form" is subsidiary to "content," or at least, in which narrative structures adapt to prioritize thought rather than style, image, or even character. But how, exactly, and about what, do novels "think?" In large part, the novel of ideas is now conflated with a rote and recognizable brand of social realism. This course asks what might qualify as a novel of ideas today, both in terms of the novel's changing relation to geographical space (and thereby the formal spaces in which philosophy might lurk), and of the particular "ideas" it critiques or puts forth. We will read novelists including J.M. Coetzee, Marlene van Niekerk, Jonathan Franzen, Teju Cole, and Ronan Bennett within a longer literary-philosophical tradition, with reference to works such as Candide, War and Peace, Thus Spoke Zarathustra, and Kierkegaard's Diary of a Seducer.
Area: Writing Intensive

AS.060.343. Marxism and Literature. 3 Credits.
This course will provide a survey of some of the concepts in Marx's work, especially those to be found in volume 1 of Capital, that might help us get a clearer sense of 21st-century politics and culture. We will move outward from reading Marx to reading recent and classic texts in the Marxist critical tradition. We will discuss explicitly economic ideas about commodities, surplus value, and concrete and abstract labor, as well as historical and political ideas like "primitive accumulation" and the "uneven and combined development" of nations. We will think about what reading Marx and the Marxist tradition can help us see about colonialism, gender, race, technology, and the environment, as well as how it can clarify the character of economic crises. Toward the end of the term we will turn to literary texts, not necessarily "Marxist" themselves, to help us understand important questions that Marxism cannot tackle by itself, like: who are people, anyway? What do they hope for, when they write? Is there a Marxist idea of beauty, and is it different than everybody else's? Along with Marx, and anti-colonial, anti-racist and feminist writers in the Marxist tradition, we'll read work by the novelist NK Jemisin, and the poet Stephanie Young.
Area: Writing Intensive

AS.060.348. Virginia Woolf and Bloomsbury. 3 Credits.
An exploration of the achievements and investments of one of the most influential coteries in the history of Britain. In addition to delving into key fictions by Virginia Woolf, we will examine novels by Leonard Woolf and E. M. Forster, art criticism by Roger Fry and Clive Bell, biographical essays by Lytton Strachey, economic writings by John Maynard Keynes, and poetry by T. S. Eliot.
Area: Writing Intensive

AS.060.350. Reason and Romance: Literature of the British Eighteenth Century. 3 Credits.
Any era can be characterized by its oppositions and polarities, but perhaps few were more defined by their contradictions than the eighteenth century in Britain. Reason and passion, honor and ribaldry, skepticism and fantasy, tradition and revolution: in capturing the tensions between these dyads, the wildly energetic literature of the period furnishes a singular lens through which to examine questions of consciousness, gender, celebrity, race, political theater, and even life during a pandemic that continue to shape our lives today. Authors studied may include Frances Burney, Ottobah Cugoano, Daniel Defoe, Olaudah Equiano, John Gay, Samuel Johnson, Charlotte Lennox, Alexander Pope, Jonathan Swift, and Mary Wollstonecraft.
Area: Writing Intensive

AS.060.353. Margaret Atwood: Imagining Catastrophe. 3 Credits.
This is the moment for a course on the Canadian climate activist, poet, and novelist Margaret Atwood. Best known for her dystopian The Handmaid's Tale (1985), Atwood's monitory visions in poetry, short stories, non-fiction and novels attend to themes of malevolence, metamorphosis, memory, genetic mutation, totalitarianism, corporate control, feminism, and climate disaster, while rooted in traditions of folktale, myth, and ironic detachment. Among other works, including poetry and non-fiction, we will read novels The Handmaid's Tale, The Testaments, The Blind Assassin, Oryx and Crake, The Year of the Flood, and MaddAddam, exploring Atwood's "writing with intent." Seminar discussion; midterm; class presentations; two short papers and one final project.
Area: Writing Intensive

AS.060.354. Literature of the Sea. 3 Credits.
In this course, we will read 19th- and 20th-century American and British literature about the sea, using an approach informed by recent scholarship in what has been called Blue Humanities or Oceanic Studies.
Area: Writing Intensive

AS.060.355. Poetry and Politics Today. 3 Credits.
The history of poetry is full of political poems of every kind — odes, epics, dramatic persona poems. And the history of literary criticism is full of denunciations of poetry that gets "too political," and loses sight of its job to give pleasure. In this course, we will look at a range of contemporary poetry that tackles political issues — things like the causes of climate change; immigration crises; white supremacy; patriarchal gender systems; the legacies of colonialism — and study the ways it accomplishes its goals while still giving us the kinds of surprise in language that poetry has always promised. Reading will include (but not be limited to) work by Tongo Eisen-Martin, Cathy Park Hong, Sandra Simonds, Stephanie Young, and Wendy Trevino.
Area: Writing Intensive

AS.060.358. Virginia Woolf. 3 Credits.
Beautiful, acute, and consequential, Woolf's writing opens onto an extraordinary range of aesthetic, psychological, and political issues. In this seminar, we will read from her novels, essays, and diaries as well as the varied works of art and philosophy that influenced her.
Area: Writing Intensive

AS.060.359. Slavery in Early Modern Literature. 3 Credits.
Against the backdrop of the rise of the European slave trade, how were enslaved people represented in early modern English literature? How was the condition of enslavement inflected by emergent nationalism, colonialism and theological constructions of difference? This course puts Renaissance literature into conversation with comparative histories of slavery and critical race theory. Authors include Aristotle, Plautus, Thomas More, Bartolomé de las Casas, Christopher Marlowe, William Shakespeare, Philip Massinger, John Milton, Aphra Behn, Osman of Timisoara, Stephanie Smallwood, Michael Guasco, Saidiya Hartman, Herman Bennett, Orlando Patterson, Jared Sexton, and Mary Nyquist.
Area: Writing Intensive

AS.060.360. Politics, History and Autobiography. 3 Credits.
This is an intensive seminar exploring the political and historical dimensions of personal experience. The class is designed to introduce students to writing critically about their own lives and to understanding the function of autobiographical writing in the lives of black Americans. We function partly as a writers' workshop and partly as a critical review. The final goal of the seminar is a polished 15-20 page autobiographical essay and a 5-7 page critical review of an autobiography, such as would be found in the New York Review of Books.
Area: Writing Intensive

AS.060.361. The Politics of Memoir. 3 Credits.
This course explores the interlocking political and historical dimensions of personal experience, an account of ourselves and our relations ("the quest for competitive advantage between groups, individuals, or societies") that points us in the direction of what "is 'common' to the whole community." What does it mean for people who are not the chief actors or theoreticians of political movements to construe the record of their experience as an act of political intervention, an aid in our total understanding of the structure of popular belief and behavior? Furthermore, what happens when attempt to historicize and critique these recorded experiences? The class asks its members to focus closely on an episode of autobiographical experience as both an historical fossil and tangible politicized moment, particularly the places where race, gender and economic power are visible. By producing a "critical discourse of everyday life—by turning residual, untheorized everyday experience into communicable experience... one can reframe ostensibly private and individual experiences in terms of a collective struggle." To help our investigation we will read and analyze closely memoirs, many of them from the African American experience. We function partly as a writers' workshop and partly as a critical review. The final goal of the seminar is a polished 20-25 page autobiographical essay.
Area: Writing Intensive

AS.060.362. Medicine in Renaissance Literature. 3 Credits.
From quacks to plague, from humoralism to hypochondria, this course explores how early modern literature represents and occasionally satirizes medicine. Authors include Shakespeare, Jonson, Donne, Nashe, Browne and Moliere.
Area: Writing Intensive

AS.060.363. Henry James. 3 Credits.
This seminar will focus on the novels and short fiction of one of the most brilliant crafters of prose and plot ever to write in English. Extensive attention will be devoted to the intricacies of James's language; to his transatlantic situation; to his relationship to other authors; and to his place in the histories of literature, criticism, and theory. In a few instances, we will read his work in relation to writing by his brother, the pioneering philosopher and psychologist William James.
Area: Writing Intensive

AS.060.365. Malcolm and Martin: An Intro to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.369. Speculative Slavery and Liberatory Fiction. 3 Credits.
This course will introduce students to the study and genre of Black speculative fiction and Afrofuturism, through the lens of narratives focused on liberation/freedom. Liberatory fiction pushes the genre of Afrofuturism further to create space for the imagination to envision alternate futures and pasts, that rewrite history to aid in the process of liberation for black lives. The intended outcome of these texts is the liberation of its subjects and, in some cases, its readers to reflect on the contemporary. The liberation of subjects comes in the form of attaining collective or personal freedoms. This course will cover themes such as, gender and the speculative, the haunting of the post-slavery subject, and black apocalypses. All of these themes will be analyzed through reading both theory and narratives including: The Graphic Novel Adaptation of Octavia Butler's Kindred, Toni Morrison's Beloved, Saidiya Hartman's "Venus in Two Acts", and N.K. Jemisin's "The City Born Great".
Area: Writing Intensive

AS.060.374. Irish Literature. 3 Credits.
This course will introduce students to the long history of Irish literature, often relegated to a footnote or subsumed under the study of British literature broadly, from the medieval period until the contemporary era. Starting with the medieval Irish epic Táin Bó Cúailnge [The Cattle Raid of Cooley] and ending with Anna Burns' 2018 masterpiece Milkman, this course will introduce students to the ways in which a colonial literature changes over time as Ireland, England's first colony, is conquered and reconquered, rebels and revolts, and continues to confront the legacy of colonization as the nation remains divided between the North and the Republic today. Throughout the course, students will read texts written Jonathan Swift, Brian Ferriman, Peig Sayers, J.M. Synge, James Connolly, Elizabeth Bowen, Samuel Beckett, Edna O'Brien and others. This course will serve as a case study for students interested in literature of conflict, colonial and neo-colonial politics, and the fight for justice globally.
Area: Writing Intensive

AS.060.377. Edmund Spenser's Fairie Queene. 3 Credits.
After a diagnostic introduction to his early poetry, this reading intensive seminar will concentrate upon Edmund Spenser's masterpiece, The Faerie Queene (1590/1596), which we will read in its entirety.
Area: Writing Intensive

AS.060.381. The Asian American Novel. 3 Credits.
This course provides a foundation for reading Asian American novels. We will be discussing the origins of "Asian American" as a political coalition in the 1960s amidst a longer historical narrative of U.S. imperial and military projects and immigration policies that have influenced the racialization of those who identify with this multi-ethnic group. At the same time, we will be examining the limitations of this U.S.-centric perspective by rethinking the geopolitical spaces of both "Asia" and "the Americas" through transpacific and hemispheric lenses. Discussions will center around how the novel form could provide insight into linked social struggles and the new narratives of political community they imagine.
Area: Writing Intensive

AS.060.384. The Contemporary Novel. 3 Credits.
In the first two decades of the twenty-first century, writers of narrative fiction have been working furiously to keep up with the turbulence that global capitalism has visited on the world — war, political chaos, environmental catastrophe, massive forced migration and displacement — while trying to maintain ties to the techniques of narrative that gave the 19th century reality novel its successes and its prestige. In this course we will read a range of texts, mostly in translation, that stretch and deform those conventions in order to represent the lives and struggles of characters who are caught up in immense historical change. More and more often, novelists are choosing to depict characters drawn from what Marx would have called "surplus populations" — people for whom economic stability and personal safety are out of reach, partly because they are seen as not worth employing (or exploiting). Under these conditions, we will ask, is it only possible to tell tragic stories? What do happy endings look like? What do changes do character development and point of view have to undergo, for instance, to keep up with 21st-century history? Is realism still the best vehicle for telling these stories? Readings will include novels by Sally Rooney, Eduard Louis, Fernanda Melchor, Elena Ferrante, Marlon James, and Manoranjan Byapari, as well as secondary material by Sarah Chihaya, Merve Emre, Katherine Hill, Jill Richards, and the Endnotes collective.
Area: Writing Intensive

AS.060.388. Old World/New World Women. 3 Credits.
The course considers the transatlantic writing of three women in the early modern period, Anne Bradstreet, Aphra Behn, and Phillis Wheatley. We will consider issues of identity, spatiality, religion, commerce, enforced labor, sexuality, race, and gender, along with literary tradition, formal analysis and poetics. We will read a good deal of these early women writers. Foremost in our mind will be the question of how perceptions of space and time are mediated through the global experiences of early modernity.
Area: Writing Intensive

AS.060.389. Emily Dickinson. 3 Credits.
Dickinson's poetry, more than most, has seemed to prompt creativity in others. In the past two decades, especially, poets, writers, critics, and filmmakers have found their own voices in response to hers. We will focus on the formal, aesthetic, historical and gendered aspects of her poetry as we try to understand, and benefit from, this power to elicit response. Exams are unlikely. Instead, expect close attention to your own writing, as we pay close attention to hers.
Area: Writing Intensive

AS.060.391. Early American Literature. 3 Credits.
This course is an introduction to literatures drawn from across the Americas, although primarily the British North American colonies that would eventually become the United States, from first contact in 1492 up through the American wars of independence. Our readings are roughly organized according to chronology and genre. We will think about the adapted and emergent generic forms through which "the New World" was ongoingly invented, including genres like the Indian captivity narrative and the slave narrative that arguably make their debut in world literary history in the Americas during this time frame. We will conclude by attending to the rather late emergence of the novel in American literary history, reading four novels that appeared in the early US national period. The objective of the course is simply to contextualize and analyze a wide array of texts, each of which richly rewards the engaged reader, in order to trace the origins of American literatures. Course texts may include contact narratives (Columbus, Caminha, Smith, Hennepin); conquest narratives (Mather, Las Casas, Poma de Ayala); Indian captivity narratives (Cabeza de Vaca, Rowlandson, Staden); slave narratives (Gronniosaw, Jea, Cugoano); revolutionary polemics (Paine, Bolívar); and the earliest American novels: William Hill Brown, The Power of Sympathy; Hannah Webster Foster, The Coquette; Leonora Sansay, Secret History or, the Horrors of Santo Domingo; Charles Brockden Brown, Arthur Mervyn. Fulfills the pre-1800 requirement.
Area: Writing Intensive

AS.060.394. Class Fictions. 3 Credits.
This seminar investigates one of the central concerns of nineteenth-century fiction: social and economic class. Why did raising oneself from humble beginnings, and falling into poverty, become such familiar stories? And why are they still so familiar today? We will look at how a number of writers approached the topic of class mobility, each with a unique blend of excitement and anxiety. Authors will likely include Jane Austen, Honoré de Balzac (in translation), Charles Dickens, and William Dean Howells. In order to understand our topic better, we will also look at a selection of theoretical work on the nature of class.
Area: Writing Intensive

AS.060.397. Thomas Pynchon. 3 Credits.
Intensive reading of two major Pynchon novels, along with theories of modernity, postmodernity, etc.
Area: Writing Intensive

AS.060.400. Billie Holiday's Baltimore 1870-1960: A Reverse Classroom Journey in the Archives. 3 Credits.
This course will use the tools of the historical archive to etch a social history of Baltimore during the long Billie Holiday (1915-1959) era from the Reconstruction through post-World War II. Holiday's remarkable and unique art has earned her the title of the premier jazz singer of all-time, but unknown to most, her voice and experience were strongly shaped by her early life in Baltimore City, the city's black habitation and migration, its musical culture, its black middle and lower class, its urban density, as well as its cabaret and underworld life. Our task is to examine the city as an unfolding, racializing process, and to glean the evidence from multiple local archival sources to reconstruct some of the rough margins of possibility for the lived experience of Holiday's grandparents and parents, all born in Baltimore, as well as her own experience as truant, orphan, and sex assault victim in the 1920s. Two questions will occupy our interests intensely. How did the two black communities she lived in extensively evolve from the late 19th through the early 20th centuries? Second, what information can be unearthed about black musical culture--ragtime, marching bands, banjo and fiddle ditties, riverboat music--as it evolved in the post-World War I "jazz" age of sound recording and broadcasting? What was the artist's relationship to her urban geography? How did it change over space and time? What dimension of shared fate did she have with the community of black Baltimore domestic workers, laborers, artisans, and small business people from the first half of the twentieth century? In what manner did Baltimore's racial segregation and racism define her life and art? How was her consciousness as a vocal opponent to segregation shaped by her grooming in the city?
Area: Writing Intensive

AS.060.402. The Computer in Modern Literature. 3 Credits.
How have computers, and human interactions with computers, been represented in twentieth- and twenty-first-century literature? How have attitudes toward computers changed over that time? Now most books are written on computers, and many are read on them as well: what traces of these forms of production and consumption can we find in literary texts?
Area: Writing Intensive

AS.060.405. Psychoanalysis and Literature. 3 Credits.
In this course we will read some foundational texts by Sigmund Freud, and pair them with a select group of literary works--Sophocles' "Oedipus the King" and "Oedipus at Colonus", William Shakespeare's "Hamlet", Edgar Allan Poe's "The Purloined Letter", Wilhelm Jensen's "Gradiva"—which have inspired psychoanalytic ideas and generations of psychoanalytic literary interpretation.
Area: Writing Intensive

AS.060.406. Transfiguring the Renaissance. 3 Credits.
Tracing the poetics of bodily transformation then and now, this course puts early modern literature into dialogue with medical epistemologies of the sexed body and contemporary critical reflections upon transgender experience, embodiment and transition. Early modern texts might include Arthur Golding's translation of Ovid's "Metamorphosis", John Lyly's "Gallathea", Francis Beaumont's "Salmacis and Hermaphroditus", Ben Jonson's "Epicoene, or The Silent Woman", Middleton & Dekker's "The Roaring Girl" and John Milton's "Paradise Lost."
Area: Writing Intensive

AS.060.501. Independent Study. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.509. Senior Essay. 3 Credits.
The English Department offers qualified majors the option of writing a senior essay. This is to be a one-semester project undertaken in the fall of the senior year, resulting in an essay of 30-35 pages. The senior essay counts as a three-credit course which can be applied toward the requirements for the major. Each project will be assigned both an advisor and a second reader. In addition, students writing essays will meet as a group with the Director of Undergraduate Study once or twice in the course of the project. The senior essay option is open to all students with a cumulative GPA of 3.6 or higher in English Department courses at the end of the fall term of their junior year. Project descriptions (generally of one to two pages) and a preliminary bibliography should be submitted to a prospective advisor selected by the student from the core faculty. All proposals must be received at least two weeks prior to the beginning of registration period during the spring term of the junior year. Students should meet with the prospective advisor to discuss the project in general terms before submitting a formal proposal. The advisor will determine whether the proposed project is feasible and worthwhile. Individual faculty need not direct more than one approved senior essay per academic year. Acceptance of a proposal will therefore depend on faculty availability as well as on the strength of the proposal itself. When completed, the senior essay will be judged and graded by the advisor in consultation with the second reader. The senior essay will not be part of the Department's honors program, which will continue to be based solely on a cumulative GPA of 3.6 in English Department courses.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.602. Proseminar.
This course is intended to train students in skills required by the discipline, help prepare them for a range of futures, and integrate them into the university community.

AS.060.603. Secularism & Theory.
This graduate seminar will construct a history of critical theory through the lens of contemporary narratives about secularization and methodological critiques of secularism.
Area: Writing Intensive

AS.060.604. Philology.
An examination of the many ways (both as old and then 'New', but also as the subject of a key 'return') that 'philology' has been claimed as the master category of literary study. The nuts and bolts of older philological procedures as well as the broadest theoretical claims for the term will be attended to.
Area: Writing Intensive

AS.060.607. Fiction and Doubt After 1888.
Examines the interrelation between fiction and doubt since the late nineteenth century. Authors may include Ward, Conrad, Joyce, Eliot, Stevens, Woolf, Baldwin, Flannery O'Connor, Ishmael Reed, Sefi Atta, R. O. Kwon.
Area: Writing Intensive

AS.060.613. American Movement.
This seminar examines representations of people in motion in U.S. writing from 1900 to the present. Migration, international and intranational, will be central to our study, but we'll also consider other forms of travel, transits of authorial and readerly attention, experiences of vagrancy and acceleration, and predicaments of stasis in primary texts as well as theoretical work around mobility. Authors and directors studied may include Simone de Beauvoir, Henry James, Gayl Jones, Jack Kerouac, Chang-Rae Lee, Claude McKay, Bernadette Mayer, Muriel Rukeyser, and Gertrude Stein.
Area: Writing Intensive

AS.060.614. Postcolonial/Global/World.
The field now known as "global Anglophone literature" has emerged from a complicated and rapidly advancing disciplinary lineage. A host of past and present recordings – including postcolonial, Commonwealth, Third World, global, transnational, world, and the Global South – provide a record of the wider profession's anxieties in relation to non-Western literary traditions. This course prepares graduate students to be able to articulate some of the subtle differences in approach that this nexus of closely related terms may obscure, from the heyday of postcolonial theory in the 1980s and 90s to contemporary subfields like Indian Ocean studies. In addition to key critical texts by theorists including Edward Said, Gayatri Spivak, Franco Moretti, Peter Hallward, and Emily Apter, students will be introduced to some outstanding recent methodologies and critiques from the adjacent body of work on comparative literature.
Area: Writing Intensive

AS.060.615. Human Rights Before Human Rights.
This course asks in what ways did literature mitigate population category distinctions within a pre-history of human rights from the period 1500-1700. We will take the situations of sponsored violence, and in particular, war captivity, in order to explore how premodern concepts of duties, rights, atrocity, inhumanity (and prohibitions against abuse) arise and become a locus of mimetic complexity within the literature of the period. Prospecting a historical transformation between ancient, early modern, and modern conceptions of rights, duties, and the human, readings may include: Euripides, Suppliant Women; Seneca, Trojan Women; Shakespeare, Troilus and Cressida; Cicero, Grotius, Gentili, Vitoria, Las Casas, Spenser, Bradstreet, Milton, Dryden, and Behn, as well as literature depicting violence resulting from Britain's East India Company's global intrusions. Splicing apart the "human" from "rights" we consider theoretical material from the liberal tradition and its critique; the problem of 'failed universals'; the historical connection between natural law and human rights; the distinctions drawn around legal and gendered categories of person; and critical race theory, with readings from Asad, Foucault, Moten, Wynter, Cavarero, Brown, Butler, Rawls, Dworkin, Drucilla Cornell, depending on the class's interests.
Area: Writing Intensive

AS.060.616. Milton.
A seminar covering the career of John Milton, including all his major poetry and much of his prose. There will be attention to the history of printing, publication and concepts of reading and writing, as well as to current issues and topics within early modern studies that bear on Milton (e.g. materialism, secularization, 'surface' reading, political theology, quantitative vs hermeneutic methods, actor-network theory). As such, the course will also be an introduction to various methods in early modern studies.
Area: Writing Intensive

AS.060.617. Black Print Culture.
Students interested in black print culture will engage in intensive archival research, both collaborative and individual, using the Sheridan Library's Rare Book and Manuscript collections. Texts include poems, printed lectures, pamphlets, novels, periodicals, ephemera, correspondence, etc., alongside relevant critical and theoretical reading.
Area: Writing Intensive

AS.060.618. Milton: Black and White.
In Milton: Black and White we will consider Milton and the discourses of racialized categories (poetical, political, and embodied), specifically attending to his role in the historical developments of white identity; concepts of justice; the genre of epic; and universal notions of personhood through the liberal tradition. We will also consider how Black writers have responded to Milton (including Phillis Wheatley, Frederick Douglass, Malcolm X, the gospel tradition, Toni Morrison, Chris Ofili) through readings of Paradise Lost and selected prose, as well as readings in contemporary critical theory.

AS.060.619. Sentimental Reasons.
Recent work in cognitive approaches to literature have led critics to return to the sentimental novel of the eighteenth-century as a "laboratory," in Daniel Goss's words, for the investigation of human emotion. There is no easy "fit" between these literary narratives and the narratives of cognitive science, nor between them and the regnant moral philosophy of the age (built upon the mechanism of human sympathy or upon "nervous" association). There is rather a discomfort that reveals social inequities as well as alternative possibilities for both thinking and feeling. The sentimental mode took hold in the circuits of the Atlantic world. This course will study several sentimental narratives that traveled promiscuously through those circuits: Bernardin de St. Pierre's Paul and Virginia, Sterne's Sentimental Journey, Mackenzie's Man of Feeling; Equiano's Interesting Narrative; Williams' Peru; and Brown's The Power of Sympathy. Alongside these works we will read studies by critics working the seams between affect and cognition, philosophy and literature, rhetoric and science. The course will provide a broad history of the sentimental mode, stretching to reflections on the links between the sentimental and the melodramatic. It will simultaneously attend to the experience of reading for sentiment, to forms of feeling and what those feelings know.
Area: Writing Intensive

AS.060.620. Thinking with Scale: Frameworks in Early Modernity.
Concepts include expansion, crowding, data collection, the miniscule, temporality, the planetary and the cosmic in the first age of European mercantile activity and colonial expansion. With readings from world-systems theory and theories of the anthropocene, our case studies will comprise pre-modern English literary texts, including Milton, Paradise Lost, Anne Bradstreet, The Four Monarchies, early modern science (Hooke, Newton), Defoe, The Storm, and early British and colonial American holdings in the Garrett Library. The class will be hands-on, working with material from Special Collections, and will include working towards a digital project (no digital project background necessary).
Area: Writing Intensive

AS.060.625. Theory of the Novel.
This course will look at the development of novel theory from the eighteenth century until the present. Authors will include Scott, Barbauld, Dallas, Lewes, Eliot, James, Shklovsky, Tomashevsky, Jakobson, Bakhtin, Lukács, Auerbach, Barthes, Jameson, Girard, Sedgwick, Moretti, Armstrong, Miller, Hale, Lynch, and Woloch. Novelists will likely include Madame de Lafayette, Austen, Goethe, and Wolfe.
Area: Writing Intensive

AS.060.627. Poetry and Performance.
This course will be devoted to the histories and theories of 19th-, 20th-, and 21st-century poetry and performance, beginning with William Wordsworth's and Samuel Taylor Coleridge's Lyrical Ballads. Upon hearing the poets read, William Hazlitt remarked that "[t]here is a chaunt in the recitation both of Coleridge and Wordsworth, which acts as a spell upon the hearer, and disarms the judgment." This early instance of reception history will provide the backdrop for our discussion throughout the semester. Besides Wordsworth and Coleridge, our reading list will include verse, theory, and criticism by Robert Browning, Walt Whitman, T.S. Eliot, James Weldon Johnson, Langston Hughes, William Carlos Williams, Charles Olson, Allen Ginsberg, Norman Pritchard, Amiri Baraka, Tracie Morris, Christian Bök, Lisa Gitelman, Frederich Kittler, Peter Middleton, John M. Picker, Susan Stewart, and others.
Area: Writing Intensive

AS.060.628. Literature and Human Rights: 1500-1720.
Today human rights and capabilities are two intertwined concepts. In the early modern period, these were much debated and literature was a key site for the development of these imperfect, variable and contested discourses. Reading literary works from the European tradition, in particular in Europeans' engagement with dissident groups both within and outside Europe, we will explore themes of embodiment, power, risk, vulnerability and the languages and practices of equivalence and domination in the variable discourses of humanitarianism, natural law, and rights in authors including Shakespeare, Grotius, Montaigne, Hobbes, Milton, Behn, Locke, Swift, Montagu and Defoe.
Area: Writing Intensive

AS.060.629. The History of the Book.
The course will account for the major transformations in the media used for writing from the scroll to the web as well as the rich account of this history and its theorizations.
Area: Writing Intensive

AS.060.636. Settler Colonialism: Theory, History, Literature.
This seminar offers an introduction to a key concept in contemporary critical theory and literary and cultural studies: settler colonialism, understood as a specific form of colonialism focused on the appropriation of land rather than the exploitation of labor and thereby involving the attempted elimination and replacement of indigenous polities and societies by an invading force. The course will have a dual focus: 1) tracing the theoretical distinction of settler colonialism from other forms of colonialism and tracking the critique implicit in this distinction of dominant forms of leftism that arguably presuppose a settler-colonial frame of reference; 2) tracking the history of what James Belich has called the “Anglo settler revolution” of the nineteenth century and engaging in a comparative analysis of the literatures produced in the course of that revolution in what are now Ireland, the United States, Canada, Australia, and elsewhere in the Pacific. We will especially attend to narrative fictions—often (self-) identified as “romances”—that chronicle settlement and register the temporal disruption of indigenous persistence and resistance. Secondary texts may include: Belich, Replenishing the Earth; Glen Coulthard, Red Skin, White Masks; Aileen Moreton-Robinson, The White Possessive; Eve Tuck and K. Wayne Yang, “Decolonization is Not a Metaphor”; Patrick Wolfe, Settler Colonialism and the Transformation of Anthropology. Primary texts may include: Charles Brockden Brown, Edgar Huntly; S. Alice Callahan, A Child of the Forest; Marcus Clarke, His Natural Life; Susanna Moodie, Roughing It in the Bush; Herman Melville, Typee; Sydney Owenson, The Wild Irish Girl; Simon Pokagon, Ogimawkwe Mitigwaki (Queen of the Woods); John Richardson, Wacousta or, The Prophecy; Catharine Maria Sedgwick, Hope Leslie; and the FX television series, Taboo.
Area: Writing Intensive

AS.060.637. Counterfactual Literature.
This course will focus on the formal, affective, ethical, and conceptual issues associated with forking-path texts—poems, fictions and films that openly offer alternative paths to the experience of individuals.
Area: Writing Intensive

AS.060.638. Whitman and the Whitmanian.
This course will take the occasion of the bicentennial of the birth of Walt Whitman as an occasion to think about the legacies of his poetry in American literary history, especially in contemporary poetry. We will read key texts of Whitman’s then move to more recent writing, paying attention to the key scholarship on Whitman from the last few decades, as well as to recent scholarship on poetry that is in dialog with the questions of democracy, capitalism, on the one hand, and form and address, on the other, that have shaped our reading of Whitman and of poetry in the Whitmanian mode.
Area: Writing Intensive

AS.060.639. The American Renaissance: History of a Field.
This seminar will provide an intensive introduction to antebellum nineteenth-century U.S. literature by way of tracking a critical formulation foundational to the field of American studies as whole: "the American Renaissance." Coined by F.O. Matthiessen in 1941, "the American Renaissance" initially referred to a canon of five white male writers (Ralph Waldo Emerson, Nathaniel Hawthorne, Herman Melville, Henry David Thoreau, and Walt Whitman) alleged to have produced work of distinction in two interrelated senses--the first specifically "American" literature deserving of academic study. We will follow the fortunes of this critical formulation, tracing how some of the authors in Matthiessen’s canon have subsequently been reinterpreted and repositioned as well as how "the American Renaissance" canon has been expanded and its very conceptualization contested. Primary authors whose work may be examined include William Apess, William Wells Brown, Lydia Maria Child, Frederick Douglass, Emerson, Margaret Fuller, Hawthorne, Harriet Jacobs, Melville, Harriet Beecher Stowe, and the anonymous author of Xicotencatl. Secondary works may include: Matthiessen, The American Renaissance (1941); Reynolds, Beneath the American Renaissance (1988); Michaels and Pease, The American Renaissance Reconsidered (1989); Crews, "Whose American Renaissance?" (1988); Colacurcio, "The American-Renaissance Renaissance" (1991); Avallone, "What American Renaissance?" (1997); Grossman, Reconstituting the American Renaissance (2003); Brickhouse, Transamerican Literary Relations (2004); Fluck, Romance with America (2009); Hager and Marrs, "Against 1865" (2013).
Area: Writing Intensive

AS.060.641. Close Reading, Exhaustive Reading, and the Novel.
How much can you say about a novel? How much of a novel can a critic interpret? The large scale of the novel form seems to resist the interpretive techniques of literary criticism, which look closely at a small number of textual examples. But what if we tried to read every word of a novel, and see it in all its forms: genre, structure, history, politics, biography, and so on? This seminar will look closely at a small number of Victorian novels (probably Dickens’ *David Copperfield* and Eliot’s *Daniel Deronda*, subject to change). We will approach these novels through a variety of theroetical lenses. There will be a special emphasis placed on the relations between form, history, and politics. This seminar will also offer students a chance to apply theories of literature and the novel often considered in abstract.
Area: Writing Intensive

AS.060.642. Reading Capital Now.
Since the 2008 financial crash, there’s been rising popular consciousness of capitalism’s crisis-bound character and, therefore, its vulnerability. But finance isn’t the only thing that capitalism has brought to a boiling point: for attentive readers of Marx, the mounting climate disaster, the COVID pandemic, and the struggle for Black Lives have only further highlighted the complex interconnections among our energy and food infrastructures, histories of racist and settler-colonial violence, the patriarchal organization of sexuality, and the maintenance of capitalist profitability no matter the social cost. The aim of this seminar is, first, to show how a thorough reading of the first volume of Marx’s Capital goes a long way toward helping us see all these histories and crises as part of a single, many-faceted dynamic, and second, to highlight 20th- and 21st-century Marxist work that takes Marx in new directions, from critiques of racial capitalism, colonialism, and the patriarchy of the wage, to studies of climate crisis and the global recomposition of the labor pool. Along with Marx, we’ll read work by WEB DuBois, James Boggs, Silvia Federici, Thiti Bhattacharya, Jairus Banaji, Nikhil Singh, Andreas Malm, the Endnotes collective, James Parisot, and others.
Area: Writing Intensive

AS.060.644. Oceanic Studies & the Black Diaspora.
In this course, we take up Hester Blum's blunt observation that "the sea is not a metaphor" in order to consider the visions and hopes black writers have associated with the sea, as well as the despair and trauma transatlantic slavery has left "in the wake," to quote Christina Sharpe.
Area: Writing Intensive

AS.060.645. What was Literary Character?.
What role did literary character play along the passage from ancient theories of dramatic action to contemporary theories of subjectivity and personhood? What role, specifically, did Shakespearean personhood play in the theorization of literature's capacity to stage and represent a portable, exemplary "self"? How do group categories of race, gender and class qualify and inflect the ostensive individuation of character outcomes? As test cases, in this course we will consider an array of early modern literary persons from before and after Shakespeare as depicted in poetry, drama and prose : Heywood's Lucrece, Marlowe's Tamburlaine, Shakespeare's Hamlet and Cleopatra, Middleton's Timon, Moliere's Alceste, Milton's Christ and Behn's Oroonoko. This course will range widely across theorists of literary character and the reader/character relationship, considering Aristotle, Theophrastus, Sir Thomas Overbury, Sigmund Freud, Aaron Kunin, Blakey Vermeule, Toril Moi, Rita Felski, Amanda Anderson, and Thomas Metzinger, among others.
Area: Writing Intensive

AS.060.649. The Essay Form & Academic Prose.
While we will spend some time with the history and theory of the essay, much of our time will be spent considering the contemporary essay and its form. Across the past decade, academics have increasingly published essays designed for non-specialists. We'll study many of them, both as objects of critical attention and of practical value. Writing assignments will include the option to write essays.
Area: Writing Intensive

AS.060.650. Character Studies.
What are literary characters? Can we imagine literature without them? And how do they relate to questions of form and society? Starting with Aristotle, and moving through 20th- and 21st-century critics such as Lukacs, Barthes, and Woloch. We will pay special attention to the historical relationship between theories of character and approaches to the novel.

AS.060.651. The Sensorium of Reading c. 1800.
This seminar aims to think hard about the embodied reader and the material realm of reading. Our work will position reading less as a strict function of cognition and more as a matter of phenomenology, sensation, and material structures. Though we will attend to question of vision (and loss of vision) we will also highlight other senses: hearing, touch, smell, taste and bodily proprioception. Course materials will include recent studies that link reading and the senses, as well as texts from the late eighteenth and early nineteenth-century, a moment when the idea of Literature emerged alongside a theorizing of media and mediation, and investigations linking aesthetics and phenomenology. Samuel Taylor Coleridge will be one guide for the seminar, but so will the ballad revival and the literature of abolition. Seminar participants are invited to target other periods and places in their own research projects for the seminar.
Area: Writing Intensive

AS.060.652. The Time and Space of Capital.
This course will look at the relationship between the logical and historical aspects of Marx's analysis of capitalism, which special emphasis on key arguments in volumes 2 and 3 of Capitalism. We will ask questions about capital's use of time and space in the service of accumulation, and read more recent secondary material all term from anti-colonial, feminist, queer, Indigenous, and Black radical traditions, in order to develop a fresh picture of the complex interrelation or different types of oppression and exploitation across capitalist history. Some familiarity with the concepts and argument of Capital, volume 1 will be helpful, but are not required.

AS.060.653. Dark Conceits: Allegory, Interpretation, and Psychoanalysis.
Bringing theological commentary and psychoanalytic diagnosis into conversation with historicism, formalism, sexuality studies and premodern critical race studies, this course uses Edmund Spenser's "Fairie Queene" to re-open the question of hermeneutics.
Area: Writing Intensive

AS.060.654. The Romance.
This graduate seminar takes a long view of the romance—the genre of literary imagination, par excellence—as originating and recurring in the Anglo world as a crucial technology of settler indigenization on stolen land and also of Indigenous resistance to settler fantasies of realization, from twelfth-century Norman England and Ireland to nineteenth-century North America and Australasia. Texts may include: Geoffrey of Monmouth, History of the Kings of Britain; Wace, Roman de Brut; Catharine Maria Sedgwick, Hope Leslie; Joseph Smith, The Book of Mormon; Mark Twain, A Connecticut Yankee in King Arthur's Court; Simon Pokagon, Queen of the Woods; Eleanor Catton, The Luminaries.
Area: Writing Intensive

AS.060.658. 1922 and Its Neighbors.
A course focusing on works published in the _annus mirabilis_ of modernism, 1922, and the years nearby. In addition to reading these texts in detail, we'll consider what it means to periodize at a granular level and how our primary texts and theoretical readings take up the problem of the neighbor as well as questions of of hospitality, community, social obligation, and domesticity.
Area: Writing Intensive

AS.060.668. The Slavery Debate in the Atlantic World.
This graduate seminar will trace the historical development of the slavery debate in the Atlantic world through examination of key texts from a host of genres and locations—Quaker religious tracts, political documents like the Haitian Declaration of Independence, Cuban antislavery novels, slave narratives, and "classics" of "American" literature like Melville's Benito Cereno. Our historical investigations into the rhetorical field of anti- and proslavery will be framed by a theoretical interest in political theology. How might critical reflection on sovereignty, recent and not so recent—from Derrida back to Bodin (widely acknowledged as having provided one of the first philosophical defenses of antislavery)—help us recast the intellectual history of the slavery debate and Atlantic radicalism, more generally?
Area: Writing Intensive

AS.060.800. Independent Study.
This course is a semester-long independent research course for graduate students. Students will have one-on-one assignments and check-in's with designated faculty throughout the semester.

AS.060.893. Individual Work.

AS.060.894. Independent Reading.

AS.060.895. Journal Club.

SA.903.728. English for Academic Purposes I.

SA.903.729. English for Academic Purposes II.

SA.903.994. English Language Placement Test.

SA.903.995. English Listening Proficiency.
SA.903.741[C] OR SA.903.743[C] OR SA.903.745[C] OR SA.903.740[C] OR SA.903.742[C] OR SA.903.744[C] OR SA.903.994[C]

SA.903.996. English Speaking Proficiency.
SA.903.741[C] OR SA.903.743[C] OR SA.903.745[C] OR SA.903.740[C] OR SA.903.742[C] OR SA.903.744[C] OR SA.903.994[C] OR SA.903.994[C]

SA.903.997. English Reading Proficiency.
SA.903.740[C] OR SA.903.742[C] OR SA.903.744[C] OR SA.903.741[C] OR SA.903.743[C] OR SA.903.745[C] OR SA.903.994[C]

SA.903.998. English Writing Proficiency.
SA.903.740[C] OR SA.903.742[C] OR SA.903.744[C] OR SA.903.741[C] OR SA.903.743[C] OR SA.903.745[C] OR SA.903.994[C]

Cross Listed Courses

Agora Institute

AS.196.364. This is Not Propaganda. 3 Credits.
We live in an era of disinformation' mass persuasion and media manipulation run amok. More information was meant to improve democracy and undermine authoritarian regimes- instead the opposite seems to be happening. This course will take you from Russia to South Asia, Europe to the US, to analyze how our information environment has been transformed, why our old formulae for resisting manipulation are failing, and what needs to be done to create a model where deliberative democracy can flourish.
Area: Writing Intensive

Center for Africana Studies

AS.362.111. Introduction to African American Studies. 3 Credits.
This course introduces students to the interdisciplinary field of African American Studies, with attention to the literature, film, culture, history, and politics of black life in the United States. Our reading list will likely include texts by David Walker, Frederick Douglass, Frances E.W. Harper, Sutton Griggs, W.E.B. Du Bois, James Baldwin, Amiri Baraka, Toni Morrison, and others.

AS.362.201. African American Poetry and Poetics. 3 Credits.
In this course, we will follow the development of black poetry primarily as it has evolved in the United States. Beginning with the first published African American writers of the eighteenth century and ending with several important poets writing and performing today, we will consider the shape of the African American poetic tradition as commonly anthologized and as defined by our own theoretically-informed readings of the assigned literature. Attention will be given to both canonical and neglected literary movements and groups. Readings will include poetry and essays by Frances E.W. Harper, James Weldon Johnson, Langston Hughes, Gwendolyn Brooks, Amiri Baraka, Harryette Mullen, Tracie Morris, and others.

AS.362.305. Black Periodical Studies. 3 Credits.
This course explores the ways in which nineteenth- and twentieth-century black periodical culture fostered (and, at times, hampered) the literary and cultural production of the African diaspora. Authors will likely include Frederick Douglass, "Ethiop (William J. Wilson)," Frances E.W. Harper, Pauline Hopkins, W.E.B. Du Bois, Marcus Garvey, Jean Toomer, Langston Hughes, Richard Bruce Nugent, and others.
Area: Writing Intensive

AS.362.311. Black Utopias. 3 Credits.
In this course, we will read literary and historical texts that present visions of black utopia. Authors include "Ethiop" (William J. Wilson), Marcus Garvey, Octavia Butler, Toni Morrison, and others.
Area: Writing Intensive

Classics

AS.040.145. Story and Argument from Homer to Petrarch. 3 Credits.
Stories entertain us, but we also tell them to make a point. This course will explore the ways that stories were used to make points by Greek and Latin authors from Homer to Petrarch, while also looking at, and comparing them to, the techniques of argument contemporaneous thinkers were developing. This is a course about narrative and rhetoric but also about how and in what way stories matter.

AS.040.626. Plato and Poetry.
This graduate seminar will explore Plato's contributions to the "old quarrel" between poetry and philosophy, encompassing such topics as the relationship between poetic inspiration and human reason, the role of literature in pedagogy, and the metaphysical implications of poetic fiction. We will focus on several Greek texts from the Platonic corpus related to these themes, as well as some later sources that engage with Platonic ideas.

Comparative Thought and Literature

AS.300.319. The Modernist Novel: Mann, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Thomas Mann, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the "luminous halo" of life.
Area: Writing Intensive

AS.300.323. Shakespeare and Ibsen. 3 Credits.
William Shakespeare and Henrik Ibsen are the two most frequently performed playwrights in history, and both have been credited with reinventing drama: Shakespeare for the Elizabethan stage and Ibsen for the modern. In this course we will pair together plays by each author – those that stand in an explicit relation of influence as well as those that share a significant set of concerns – in order to investigate how each takes up and transform key problems in the literary, political, and philosophical tradition for their own historical moment. Plays to be studied: by Shakespeare, A Midsummer Night's Dream, Hamlet, Othello, King Lear, The Tempest, A Winter's Tale; by Ibsen, St. John's Night, Hedda Gabler, Rosmersholm, The Wild Duck, The Master Builder, When We Dead Awaken.

AS.300.336. Forms of Moral Community: The Contemporary World Novel. 3 Credits.
Literary and philosophical imaginations of moral community in the post-WWII period. Texts include: Coetzee, Disgrace; McEwan, Atonement; Achebe,Things Fall Apart; Ishiguro, An Artist of the Floating World; Roy, The God of Small Things; Lessing, The Grass is Singing; Mistry, A Fine Balance; Morrison, Beloved; and essays by Levi, Strawson, Adorno, Murdoch, and Beauvoir on the deep uncertainty over moral community after the crisis of World War II. Close attention to novelistic style and narrative will inform our study of the philosophical questions that animate these works. What does it mean to acknowledge another person's humanity? Who are the members of a moral community? Why do we hold one another responsible for our actions? How do fundamental moral emotions such as contempt, humiliation, compassion, gratitude, forgiveness, and regret reveal the limits of a moral community?

AS.300.337. The Tragic Tradition. 3 Credits.
This course offers a broad survey of tragic drama in the Western tradition, from its origins in ancient Greece to the twentieth century. In weekly lectures and discussion sections, we will study the specific literary features and historical contexts of a range of different works, and trace the continuities and transformations that shape them into a unified tradition. Key questions and themes throughout the semester will include what counts as tragic, the tragedy of social and political conflict, the bearing of tragedy on the meaning and value of life, the antagonistic relation between world and humans, the promises and dangers of tragedy for contemporary culture. Authors to be studied: Sophocles, Euripides, Seneca, Shakespeare, Racine, Goethe, Ibsen, Strindberg, Chekov, Brecht, Pirandello, and Beckett.

AS.300.339. Introduction to Comparative Literature. 3 Credits.
This course offers an introduction to the history, theory, and praxis of comparative literature. We will read texts from some of the founding figures of the discipline and look at the most recent debates in the field, including translation studies, literary theory, and world literature, among others. Particular attention will be given to the methodologies and problems of studying literatures in different linguistic traditions and the relation between literature and other areas of thought and culture, such as philosophy, art history, and psychoanalysis. Case studies in comparative approaches to literature will provide concrete examples to our discussions.

AS.300.340. Literature and Film of Unintended Consequences. 3 Credits.
Sometimes brilliant ideas and plans don't work as anticipated, or go very badly—for example, empowering the "invisible hand" of the market, building a huge hydroelectric dam, or plotting a double murder by two strangers. This course explores these and other fascinating literary instances of unintended consequences—the unanticipated results of actions that people planned ending up a very different way. Reading or watching mainly twentieth-century American literature and movies, as well as some essays and poetry, we will follow a range of different creators as they think about unplanned effects and why they matter. What can these works tell us about how we intend, act, or make meaning at the limits of our control? Texts will include films by Charlie Chaplin, Billy Wilder, and Alfred Hitchcock, poetry or fiction by Wallace Stevens, Patricia Highsmith, and Zadie Smith.
Area: Writing Intensive

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.348. Modern Drama. 3 Credits.
This course offers a survey of modern drama, from the mid nineteenth century to the present. We will sample a broad range of dramatic styles and movements in order to uncover the variety of ways theatre has made sense of the human experience over the past two hundred years.

AS.300.349. Capitalism and Tragedy: from the 18th Century to Climate Change. 3 Credits.
In contemporary discussions of climate change, it is an increasingly prevalent view that capitalism will lead to the destruction of civilization as we know it. The notion that capitalism is hostile to what makes human life worth living, however, is one that stretches back at least to the early eighteenth century. In this class, we will examine key moments in the history of this idea in works of literature, philosophy, and politics, from the birth of bourgeois tragedy in the 1720s, through topics such as imperialism and economic exploitation, to the prospects of our ecological future today. Authors to be studied: George Lillo, Balzac, Dickens, Marx and Engels, Ibsen, Weber, Brecht, Arthur Miller, Steinbeck, Pope Francis, and contemporary fiction, politics and philosophy on climate change.

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.418. The Modernist Novel: James, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Henry James, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the "luminous halo" of life.
Area: Writing Intensive

AS.300.437. Literature and Philosophy of the Everyday. 3 Credits.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

AS.300.629. Theory, Now and Then: Autonomy, Form, Critique.
This course explores recent developments and disputes in critical theory in relation to their longer philosophical genealogies. The three topics—form, autonomy, and critique—have been the subject of much recent debate, contention, and new analysis, yet each was also a source of critical and philosophical interest in years past. Our aim will be to make sense of today's interventions in conversation with earlier theory. “Historical” theory writing will include Adorno, Lukács, Cavell, and Jameson; contemporary theory will include Nicholas Brown, Rita Felski, Caroline Levine, Mark McGurl, and Toril Moi.

AS.300.639. Literature and Philosophy of the Everyday.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

First Year Seminars

AS.001.100. FYS: What is the Common Good?. 3 Credits.
What is “the common good”? How do individuals consider this idea, this question, and how are societies led, or misled, by its pursuit? Together, we will explore sources from a range of perspectives: What can the story of Noah, for example, teach us about the question of the common good? Or the engineering of Baltimore public transportation, the notion of meritocracy in higher education, access to vaccines, the perniciousness of pandemics, prohibition of nuclear weapons, or data sharing among scientists? Drawing from movies, interviews, and readings (authors include Rachel Carson, James Baldwin, Bong Joon-ho, Spike Lee, Michael Sandel, and more), this course is as much about how we ask and interrogate hard questions as it is about the answers themselves. Engaging deeply with the sources and each other, students will discuss the texts in class, write short responses, and give occasional oral presentations. The course will culminate in a final, collaborative research project that seeks to map the common good and move the conversation forward.

AS.001.134. FYS: Great Books at Hopkins - a closer reading. 3 Credits.
Modeled after Johns Hopkin's longstanding Great Books course, this Freshman seminar offers a more focused selection of texts to allow in-depth reading and discussion, with greater attention to historical context. Texts will include: The Odyssey, Paradise Lost, Frankenstein, and Narrative of the Life of Frederick Douglass, written by himself, with excerpts from additional slave narratives. In-class lectures and discussions will be supplemented by occasional guest lectures and exhibits from the archives of Eisenhower Libraries. Prior attendance in Great Books at Hopkins is not required; upper class students who have previously taken Great Books may be admitted with permission of instructor.
Area: Writing Intensive

AS.001.163. FYS: Black Baltimore Archives - From Frederick Douglass to Billie Holiday. 3 Credits.
Black Baltimore Archives is an intense exploration (and excavation) of local African American history and narrative. Using the lives of Baltimore's most prominent artists-Frederick Douglass and Billie Holiday-this First-Year Seminar will explore questions connected to creating the historical record, assembling visual and sonic representations of black life, and the challenges that access and preservation pose to sustaining black community. We will visit the Afro-American Newspaper archives, the Maryland Center for History and Culture, the Maryland State Archives, and Morgan State University special collections, among other key archival repositories. Students will participate in a national conference and a local jazz event.

AS.001.172. FYS: Privacy and Surveillance. 3 Credits.
Few topics are more pressing to contemporary society as the right to privacy, in the face of both state and corporate and state surveillance. But the idea of a "right to privacy" has not always been with us. As E. L. Godkin put it in 1890, "Privacy is a distinctly modern product." Indeed, even 300 years ago, many of our own expectations of privacy would have been unheard of. This First-Year Seminar looks at the relation of privacy to modernity, through the lenses of literature, law, and social practices. How can works of art and thought from the past help us understand our own present?

History

AS.100.240. American Cultural Criticism. 3 Credits.
This course explores 20th century U.S. history through the works of writers and artists. We will ask how essays, novels, performance, and art can function as cultural and social criticism.
Area: Writing Intensive

AS.100.275. Passing in American Culture. 3 Credits.
This course explores passing narratives – stories that feature people who cross race, class, ethnic, or gender boundaries. We will consider what passing narratives can teach us about power and identity, especially as power is presumed to reside in the self and race is presumed to no longer matter.

AS.100.326. From Blood Feud to Black Death: European Society in the High Middle Ages, 1000-1400. 3 Credits.
Explores the development of society and institutions in the medieval west including kingship and law, religion and difference, gender and ideology. Looks closely at social responses to change and adversity.

AS.100.354. Playing in the White: Black Writers, the Literary Colorline and Writing Whiteness. 3 Credits.
This course will turn to known and not-so-known black writers during the early to mid-twentieth century who defied literary expectation and wrote stories that featured or focused on whiteness. We will consider what whiteness offered black writers and the political work that their literary experimentations did for a white American publishing industry.

AS.100.373. Crime, Punishment, Felony and Freedom: Law and Society in Pre-Modern England. 3 Credits.
Using legal texts as a window into English society, we will address the changing nature of royal power, trial by jury, treason, felony, and the freedoms enshrined in the Magna Carta.

AS.100.672. Medieval Materialities: Objects, Ontologies, Texts and Contexts.
We will use the meanings and methodologies of “materiality” to examine the medieval world, by analyzing objects, texts, networks, patterns of circulation and appropriation, aesthetics and enshrinement, production and knowledge communities.

AS.100.682. Introductory Topics in Computation for Scholarship in the Humanities.
The first half of this seminar course consists of non-mathematical introductions to, and discussions of, the fundamental motivations, vocabulary, and methods behind computational techniques of particular use for humanistic research. The second half combines selected readings chosen to address specific questions raised by these discussions with hands-on application to students' research goals. Each participant will lead discussion for one of the selected readings relevant to their interests.

AS.100.725. Sex and Slavery II.
Research and methods in the field of sexuality and slavery studies. Part 2: Caribbean & African Continent.

Interdepartmental

AS.360.133. Freshman Seminar: Great Books at Hopkins. 3 Credits.
Students attend lectures by an interdepartmental group of Hopkins faculty and meet for discussion in smaller seminar groups; each of these seminars is led by one of the course faculty. In lectures, panels, multimedia presentations, and curatorial sessions among the University's rare book holdings, we will explore some of the greatest works of the literary and philosophical traditions in Europe and the Americas. Close reading and intensive writing instruction are hallmarks of this course; authors for Fall 2020 include Homer, Plato, Dante, John Donne, George Herbert, Christina Rosetti, Mary Shelley, Friederick Nietzsche, Isaac Bashevis Singer, Frederick Douglass.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.203. Propaganda: From Blut und Boden to Post-Fact. 3 Credits.
This course taught by Writing Seminars professor Wayne Biddle and Media Studies professor Bernadette Wegenstein covers the 20th-century history of propaganda with special focus on its visual techniques, on censorship, and how media serve as sites of both control and resistance to power. We will pay particular attention to the influence of misinformation abetted by the new media revolution, and both the rise of the political rhetoric of "fake news" and the massive dissemination of actual fake news since the 2016 election. Students will write papers pegged to current issues and events using the critical framework developed in class. Cap 30 students. Reader: Jason Stanley: How Propaganda Works, Princeton University Press, 2015.
Area: Writing Intensive

AS.211.301. Nietzsche and Literature. 3 Credits.
Nietzsche and Literature is devoted to exploring the philosophy and literary works of the German philosopher Friedrich Nietzsche, and studying his impact on literature and literary modernism. Readings will include works by Nietzsche and by the literary writers he influenced, including Rainer Maria Rilke, Stefan George, Thomas Mann, Stefan Zweig, Hugo von Hofmannsthal, Franz Kafka, Jorge Luis Borges, Hermann Hesse, James Joyce, Wallace Stevens, and William Butler Yeats, and Else Lasker-Schüler.

AS.211.325. Representing Otherness in Literature and Film. 3 Credits.
The term 'Otherness' is known to be rooted in the Self-Other opposition as it emerged in German Idealism, adopted by psychoanalysis and transformed to Post-Colonial and Feminist theories. This theoretical framework will allow us to explore the role of the Other in literature and cinema. Students will become familiar with the historical development of the notion of the "stranger" through reading and analyzing various contemporary works of prose, poetry and cinema from various countries. We will analyze the ways in which these works depict Otherness and will investigate questions regarding their social, political and philosophical framework as well as the literary and cinematographic devices they employ. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.333. Representing the Holocaust. 3 Credits.
How has the Holocaust been represented in literature and film? Are there special challenges posed by genocide to the traditions of visual and literary representation? Where does the Holocaust fit in to the array of concerns that the visual arts and literature express? And where do art and literature fit in to the commemoration of communal tragedy and the working through of individual trauma entailed by thinking about and representing the Holocaust? These questions will guide our consideration of a range of texts — nonfiction, novels, poetry — in Yiddish, German, English, French and other languages (including works by Primo Levi and Isaac Bashevis Singer), as well as films from French documentaries to Hollywood blockbusters (including films by Alain Resnais, Claude Lanzmann, and Steven Spielberg). All readings in English.
Cannot be taken by anyone who previously took AS.213.361

AS.211.361. Narratives of Dissent in Israeli Society and Culture. 3 Credits.
In this course we will study and analyze the notion of dissent in Israeli society and culture on its various literary and artistic forms. We will examine the emergence and the formation of various political and social protest movements, such as the Israeli Black Panthers, Israeli feminism and the 2011 Social Justice protest. We will discuss at length the history and the nature of dissent in the military and in relation to Israeli wars and will track changes in these relation. Significant portion of the course will be dedicated to the literary, cinematic and artistic aspects of Israeli protest and their influence on Israeli discourse. We will explore the nature and role of specific genres and media such as the Israeli satire, Israeli television, newspaper op-ed and the recent emergence of social media. Students wishing to work in English exclusively for 3 credits should enroll in section one. Students who are fluent in Hebrew and are wishing to attend an additional hour-long Hebrew discussion session per week with Professor Cohen (time TBD in consultation with enrolled students) for 4 credits should enroll in section 2.

AS.211.477. Renaissance Witches and Demonology. 3 Credits.
Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did "The Witch" go from being "monstrous" to being "admirable" and even "sexy"? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.211.479. Dante's Journey through the Afterlife. 3 Credits.
Dante's Divine Comedy presents a complete picture of the medieval world-view in all its aspects: physical (the structure of the cosmos), historical (the major actors from Adam to Dante himself) and moral (a complete system of right and wrong). Dante shows how the Christian religion portrayed itself, other religions, the nature of God, humans, angels and devils, and human society. We will explore these topics both from the viewpoint of Dante's own time, and in terms of its relevance to our own societal and cultural concerns.
Area: Writing Intensive
AS.214.479

AS.211.480. Religious Themes in Film and Literature. 3 Credits.
This course would be of interest to anyone who would like to learn about the intersection of religion and modern culture. At the center of the course will stand a close study of the representation of religious themes and their role in modern literature and cinema. The works which we will deal with are not considered religious and yet they include religious themes as part of their narrative, images, language or symbolic meaning. We will trace in various works from various countries and genre, themes such as: divine justice, providence, creation, revelation, the apocalypse, prophecy, sacrifice and religious devotion. We will also study the ways in which Biblical and New Testament stories and figures are represented in these works. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.754. Modernist Primitivism.
This course will explore the aesthetics and politics of primitivism in European modernity, focusing on the visual arts and literature in German and Yiddish, but looking at the wider European context, including France and Russia. We will begin with the backgrounds of primitivism in Romanticism, looking especially at its ethnographic and colonial sources. We will then focus on the presence of anthropological and ethnographic discourses within various registers of modernist thought, literature, and visual culture, with special attention to visual and literary primitivism. Our central concerns will include: the attempt to create a modernist aesthetics grounded in ethnography; the primitivist critique of modernity; the place of primitivism in the historical avant-garde; the development of the notion of "culture" in modernity; and the aesthetics of modern ethnic and national identity. Key thinkers, artists, and writers to be considered include Herder; Gauguin; Picasso; Wilhelm Worringer; Carl Einstein; Hannah Höch; and Emil Nolde.

AS.211.777. The Critical Unconscious.
Criticism in the 21st century has tended to relegate psychoanalysis to a dustbin of fads that proliferated at the end of the prior century but that today are of interest only to balkanized cliques of devotees. Bucking this trend, this seminar will examine the intellectual history and abiding influence of psychoanalysis's key critical concept: the unconscious. Basing our discussions on in-depth readings from key thinkers in the analytic tradition such as Freud, Lacan, and Klein, as well as the post-analytic philosophical tradition, including Zizek, Butler, Laclau and Mouffe, Deleuze and Guattari, and Jameson, we will work to distill an understanding of the unconscious as essential to the practice of criticism tout court, and as inhering even in those discourses that have sought most stridently to distance themselves from it. Seminar discussions will take place in English; readings will be available in the original as well as in translation.
Area: Writing Intensive

AS.213.321. Bodies and Pleasures. 3 Credits.
This course traces a literary history of sexuality from the Middle Ages to contemporary women's writing. We will analyze how sexual pleasure changed over time. In particular, we will discuss what role literature plays in the reproduction and transformation of bodily pleasures. The course explores how the pleasures of bodies are imagined in and through literature, but also whether words are bodies that give pleasure and perhaps even have their own pleasures.

AS.213.328. German Literary Modernism. 3 Credits.
Taught in English. German Literary Modernism focuses on modernist works of literature between 1900-1930, considering central modernist authors against the backdrop of dramatic changes and events in European culture and society, including urbanization, technological change, the First World War, and social and artistic movements. Students will engage literary works--by such authors as Kafka, Rilke, Hofmannsthal and Thomas Mann--that express a sense of crisis about modern life, or provoke questions about the nature of reality, the human self, the reliability of perception, and the possibilities of language and art. ? Students have the option of an additional hour of German discussion and doing all the assignments in German for German-language credit (3+1) towards the major or minor. Students interested in that option should register for section 2.

AS.213.374. Existentialism in Literature and Philosophy. 3 Credits.
What does it mean to exist, and to be able to reflect on this fact? What is it mean to be a self? This course explores the themes of existentialism in literature and philosophy, including the meaning of existence, the nature of the self, authenticity and inauthenticity, the inescapability of death, the experience of time, anxiety, absurdity, freedom and responsibility to others. It will be examined why these philosophical ideas often seem to demand literary expression or bear a close relation to literary works. Readings may include writings by Kierkegaard, Nietzsche, Dostoevsky, Heidegger, Rilke, Kafka, Simmel, Jaspers, Buber, Sartre, de Beauvoir, Camus, and Daoud.
Area: Writing Intensive

AS.213.407. German Media Theory. 3 Credits.
German Media Theory is an advanced course for upper-level undergraduates and graduate students, giving an introduction and overview of the specifically German version of Media Studies that first gained traction in the 1980s. The term media refers not just to mass media but more broadly to devices that process, transfer and store information, reaching from the alphabet that changed the culture of writing, or the printing press made famous as the foundation of the 'Gutenberg galaxy' to computers and smart phones dominating our current lives. In this course we will cut across disciplinary boundaries to explore the multifaceted roots and formations of German media theory which combine literary poststructuralism, histories of science and technology, psychoanalysis, cybernetics, art history, and philosophy among other fields. Readings include works by Friedrich Kittler, Bernhard Siegert, Cornelia Vismann, Wolfgang Ernst, Walter Benjamin, Niklas Luhmann, Michel Foucault, Marshall McLuhan and many others. The course will be taught in English and all readings will be available in English.

AS.213.446. Nature and Ecology in German Literature and Thought. 3 Credits.
Nature and Ecology in German Literature and Thought considers the understanding and representation of the natural world in literary works and aesthetic theory from the 18th to the 20th centuries. We will consider such topics as poetic reverence for nature, anthropocentric representations of nature in literature, the thematization of landscape, the representation of animal life, the distinction between the human and animal as explored by literary writers, and ecologically-oriented critique of human consciousness. Readings may include works by such writers and thinkers as Goethe, Kant, Hölderlin, Nietzsche, Heidegger, Rilke, and Kafka, and more recent works of literary ecocriticism.

AS.213.623. Poetry and Philosophy.
This course will trace the tensions, antagonisms, and collaborations between poetry and philosophy as distinctive but fundamental expressions of human thought and experience. We will engage poetry as a form of artistic expression that compliments, completes, or challenges other forms of knowledge, and consider the range of philosophy's responses to poetry and poetics. Readings will include works by philosophical poets and poetic philosophers including Hölderlin, Schlegel, Rilke, Bachmann, Celan, Stevens, Heidegger, Gadamer, Adorno, Benjamin, Merleau-Ponty, Valéry, Wittgenstein, and Agamben.

AS.213.639. On the Difficulty of Saying I.
This course takes as its point of departure the position that language carries within it the traces of something that exceeds the cognitive grasp of the subject and to this extent undoes any claim to knowledge the subject might make. This position has been central to twentieth and twenty-first century thought from psychoanalysis and poststructuralism to media theory and new materialism. This course will not take issue with this position. It will examine instead how this position evolved from the Idealism of Fichte to the eerily inhuman, if not mechanical, talking figures in texts by Novalis ("Monolog"), Poe ("Maelzel's Chess Player"), Hoffmann ("Die Automate"), Büchner (Leonce und Lena), and Kafka ("Ein Bericht für eine Akademie"). We will explore the literature of the personal and impersonal in romantic and modernist texts in order to ask what moves and motivates works in which the first-person narrator would seem to be nothing more than a fiction—a staged phenomenon or a mechanical device.

AS.213.643. Franz Kafka in Philosophical and Literary Perspective.
This course is devoted to close study of the writings of Franz Kafka from both philosophical and literary perspectives. Writings will include Kafka's short prose works and novels along with philosophical and literary critical interpretations thereof. Readings may include commentaries by Walter Benjamin, Theodor Adorno, Hannah Arendt, Albert Camus, Giles Deleuze, and Giorgio Agamben. Primary texts for students from the German section will be in original; any other students may read Kafka in translation.

AS.213.687. Imagination in Philosophy and Literary Theory.
Imagination in Philosophy and Literary Theory is devoted to studying theories of imagination in the history of philosophy and literary theory, from the ancient Greeks to the present day. We will study philosophical conceptions of the role of imagination in memory, cognition, perception, and creativity, and assess traditional philosophical oppositions between imagination and reason, the imaginary and the real. Readings may include selections from Aristotle, Kant, Coleridge, Nietzsche, Husserl, Heidegger, Merleau-Ponty, Sartre, Dufrenne, Stevens, Iser, Ricoeur, Ryle, Wittgenstein, and Nussbaum.

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the "virtual" space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.215.290. Latin American Critical Perspectives on Colonialism: From the 'World Upside Down' to the 'Coloniality of Power'. 3 Credits.
This course, taught in English, examines how indigenous and local (postcolonial) intellectuals in Latin America responded to the ideology and practices of Spanish Colonialism in the earliest post-conquest years (1532), continued to battle colonialism during the period of the wars of independence, and finally arrived at the production of an analysis that shows how modernity is but the other face of colonialism. Among key works to be discussed are Guaman Poma's illustrated sixteenth-century chronicles, D.F. Sarramiento's _Civilization and Barbarism_ (1845), and Anibal Quijano's "Coloniality of Power" (2000).
Area: Writing Intensive

AS.215.406. Novelist Intellectuals. 3 Credits.
What does a novelist's op-ed about economics have to do with her literary writing? In what ways does a fiction writer's essays on the environment inform how we read her novels? What happens when we find the political opinions of a writer objectionable? This undergraduate seminar will consider what the Spanish writer Francisco Ayala termed "novelist intellectuals," that is, literary writers who actively participate in a society's public sphere. Considering writers from Madrid to New York, from London to Buenos Aires, we will ask how one should hold a novelist's fictional and non-fictional writings in the balance and explore ways of reading that allow us to consider the public intellectual side and the aesthetic side of a novelist together.

AS.215.417. Literature of the Great Recession. 3 Credits.
The Great Recession—sometimes called the financial crisis or the economic crisis of 2008—brought financial markets to a halt and created significant political turmoil across the North Atlantic. But its impact on culture, and literature especially, has often been ignored. This seminar will travel across Europe, from Dublin to Madrid, from London to Reykjavík in order to examine how literature has registered this most recent economic crisis. We will focus on how crisis is narrated and the ways in which literary works have managed to provide a voice for marginalized social, economic, and political demands.

AS.215.718. Contemporaneity and Crisis.
How should one study contemporary literature and culture? Is "the contemporary" a period in and of itself? Does it require a distinct conceptual approach? This graduate seminar will examine various approaches that have emerged since Michel Foucault called his genealogies a "history of the present." We will pay special attention to contemporary literature and culture's most distinguishing feature today: crisis. Considering theories of crisis and "the contemporary" together, the course will explore how living in a time of overlapping crises—economic, political, social, cultural, environmental, and others—affects the way we interpret the world.

AS.215.747. Borges in Theory.
The course engages close readings of Borges critical essays and some of his fiction in order to establish the points of interpellation that Post-modern theory takes from or shares with Borges's meditation on the problem of writing.

Political Science

AS.191.310. Sex(uality) and Race as the Politics of the Beat Generation. 3 Credits.
This course focuses on the literature of the Beat Generation writers (Ginsberg, Kerouac, Burroughs, Snyder, Kaufman) of the late 1940s through the 1950s and 1960s. The Beats were a group of nomadic writers traveling the North American continent between San Francisco and New York with memorable stops in Denver and St. Louis, Missouri. Beat literature revolted against the constraining normalizing values of post war USA and celebrated freedom of expression, wanderlust, and the search for euphoria of body and mind in stream-of-consciousness narration. The course examines the relationship between society's dominant mores and beliefs (both contemporary and those of the 50's and 60's) and the counterculture, non-conformist philosophy as espoused by The Beats. The course focuses on Beat depictions of sexuality, gender and race in order to understand if these identity markers are but symptoms of social structures of oppression (racism, patriarchy, heterosexism) or if, alternatively, they can also signal, express and enact a new and different understanding of politics. Can the Beats help us envision new forms of (non-toxic) masculinity? Can they help us think of race in non-racist ways?
Area: Writing Intensive

Program in Museums and Society

AS.389.329. Author/Canon/Archive. 3 Credits.
Why are some literary works from the past reprinted, anthologized, and considered worthy of study, but not others? Why are some works "lost" and some "rediscovered," while others simply fall out of favor? Focusing on nineteenth- and early twentieth-century American literary culture, we will use rare books and archival materials from JHU collections to examine Edgar Allan Poe, Walt Whitman, Emily Dickinson, Stephen Crane, Charles Chesnutt, and Zora Neale Hurston, along with a few authors you've never heard of, in terms of the relationship between authorship, stewardship, and status.

AS.389.346. Scribbling Women in the Literary Archive. 3 Credits.
Students examine select texts and archival materials related to Emily Dickinson, Frances Ellen Watkins Harper, Edith Wharton, Ida B. Wells, Charlotte Perkins Gilman, Sui Sin Far, Alice Duer Miller, and Zora Neale Hurston. Students interrogate how these writers navigated the constraints of gender, as informed by race and class, in the decades before and after the 19th Amendment and consider literary collecting in relation to gendered cultural politics.

Study of Women, Gender, & Sexuality

AS.363.226. Women writers and the sonnet from the European Renaissance to the Harlem Renaissance. 3 Credits.
Shakespeare's description of his lover's eyes as 'nothing like the sun' is both an homage and a sendup of the 300-year-old Petrarchan tradition in which the male poetic persona remains forever enraptured by an unattainable female beloved, who never speaks. Beginning with a review of Shakespeare's sonnet sequence and selections from Petrarch's sonnets to an elusive Laura, we will read a series of fifteenth-and sixteenth-century women writers who inserted their own voices into this evolving tradition by allowing "Laura" to talk back. These include Vittoria Colonna (and her interactive sonnets with Michelangelo), Veronica Gambara, and Gaspara Stampa; dueling personas in sonnets by French poets Pernette du Guillet and Maurice Scéve, and sonnets by more familiar Shakespearean contemporaries Lady Mary Wroth and Sir Philip Sidney (both of whom reflect back on Petrarch but from quite different viewpoints). In the final section of the course we will apply our newly acquired historical perspective to selections from a more recently available corpus of female-authored sonnets from the Harlem Renaissance. All continental works will be read in translation; no previous familiarity with the topic is required.
Area: Writing Intensive

AS.363.338. The Poetics and Politics of Sex: Feminist Utopia in Theory and Fiction. 3 Credits.
This course examines the historical development of feminist utopia in theory and fiction. Readings will center Indigenous, Black, postcolonial, diasporic, and transnational perspectives that engage the topic of feminist utopia.
Area: Writing Intensive

AS.363.445. Reading Judith Shakespeare: Women and Gender in Elizabethan England. 3 Credits.
If Shakespeare had a sister who went to London to be a writer, what would she write? Virginia Woolf's account of the thwarted career of Shakespeare's hypothetical sister, Judith, in A Room of One's Own frames our reading of plays and poetry by Shakespeare and contemporary women writers, including Isabella Whitney, Elizabeth Cary, Mary Sidney, Aemelia Lanyer, and Mary Wroth. Working within a selected historical context, students will create fictional biographies of "Judith Shakespeare," including her perspective on our identified authors and a sample or description of Judith's own literary accomplishments. Secondary course readings will reflect contemporary economic, political, and religious contexts.
Area: Writing Intensive

Theatre Arts & Studies

AS.225.318. 21st Century Female Playwrights. 3 Credits.
This is a writing intensive class exploring the current wealth of women playwrights, including Pulitzer Prize winners: Wendy Wasserstein, Paula Vogel, Lynn Nottage, and Jackie Sibblies Drury (2019 Prize for FAIRVIEW). We will discuss Script Analysis and read (and see) plays by numerous writers including Claire Barron, Kia Corthron, Theresa Rebeck, Sarah Ruhl, Danai Gurira, Caleen Sinnette Jennings, and Hansol Jung. This class will include a mid-term and a Final Paper.
Area: Writing Intensive

For current faculty and contact information go to http://english.jhu.edu/people/

English, Bachelor of Arts

English Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

In addition to demonstrating foreign language proficiency in at least one classical or modern foreign language, the English major requires students complete general courses in the humanities and social science, a required course in literary study (AS.060.107 Introduction to Literary Study), and nine additional English courses, of which at least three must be literature before 1800. Within the nine additional English courses, at least two and no more than four courses must be designated as lecture courses. Students may identify lecture courses by the presence of the POS-Tag ENGL-LEC in a course description in the schedule of classes. Pre-1800 literature courses are identified by the POS-Tag ENGL-PR1800, and Global and Minority Literature courses are identified by the POS-Tag ENGL-GLOBAL. Additional details include:

- Only two courses towards the nine required English courses for the major may be taken outside of the department and those must be cross-listed with the English department.
- Only two independent studies or senior essay courses may apply towards the major.
- Students must earn a grade of C- or better in all major requirements and courses may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
Two courses in the humanities or social sciences		6
Foreign language proficiency through the intermediate level		0-17
AS.060.107	Introduction to Literary Study *	3
Nine Additional English Courses (divided as follows): **		
One course in Global and Minority Literatures (POS-Tag ENGL-GLOBAL) ***		3
Two course in Pre-1800 Literature (POS-Tag ENGL-PR1800)		6
Six 200 to 400-level English courses		18
Total Credits		**36-53**

* Should be taken no later than sophomore year.

** Students are required to take at least two lecture courses and up to four lecture courses may apply towards this requirement. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the English course requirements of the major without permission of the Director of Undergraduate Studies. Typically, up to two courses taken through approved study abroad programs may be applied towards the major with approval of the director of undergraduate studies.

*** One of these three courses must be a non-lecture course.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
Intro Course in Humanities or Social Sciences		3
Intro Course in Humanities or Social Sciences		3
	Credits	**6**
Second Semester		
AS.060.107	Introduction to Literary Study	3
English Elective at 200-level (ENGL-LEC)		3
	Credits	**6**
Second Year		
First Semester		
Foreign language		4
Global and Minority Literature Course at 200-level		3
	Credits	**7**
Second Semester		
Foreign language		4
English Elective at 300-level		3
	Credits	**7**
Third Year		
First Semester		
Foreign language		3
Pre-1800 Course at 300-level		3
English Elective at 200-level (ENGL-LEC)		3
	Credits	**9**
Second Semester		
Foreign Language		3
English Elective at 300-level		3
	Credits	**6**
Fourth Year		
First Semester		
English Elective at 300-level		3
English Elective at 300-level		3
	Credits	**6**
Second Semester		
Pre-1800 Course at 200- or 300-level		3
	Credits	**3**
	Total Credits	**50**

Advising for Students

All students, whether their goals are professional or not, should choose courses in consultation with their major advisor to suit their individual needs and satisfy departmental requirements. Students planning to enter graduate school in English should study a second foreign language. Students who have not yet been assigned to a major advisor may discuss departmental requirements and curriculum planning with the Director of Undergraduate Studies.

Honors in English

Departmental honors are awarded to undergraduate English majors who achieve a cumulative average of 3.6 or higher for all English courses taken to satisfy the major requirements. For more information about Honors in English, contact the Director of Undergraduate Studies in English.

Senior Essay Option

Majors with a cumulative G.P.A. of 3.6 in English courses by the end of the fall semester of their junior year may apply to write a senior essay in the fall of their senior year. For further information and deadlines, contact the Director of Undergraduate Studies in English.

English, Minor

English Minor Requirements

Students who wish to graduate with a minor in English must take AS.060.107 Introduction to Literary Study, generally within one year of declaring the minor. Six additional English courses are required, of which at least two and no more than three must be lecture courses (identified by the POS-Tag ENGL-LEC). At least one of the six courses must be a pre-1800 course and at least one course must be a Global and Minority Literatures course. A maximum of one course offered by another department but is cross-listed in English may apply towards the minor. No 100-level courses may apply. Students must earn a grade of C- or better in all minor requirements and courses may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
AS.060.107	Introduction to Literary Study	3
One course in Pre-1800 Literature		3
One course in Global and Minority Literatures		3
Four additional 200-400 level English courses		12
Total Credits		**21**

English, PhD

The Department of English offers advanced programs and guided research leading to the Ph.D. degree in English and American literature in the following major literary fields: the Renaissance, the 18th century, the Romantic period, the Victorian period, American literature, and 20th-century literature.

The department accepts only full-time students working toward the Ph.D.; there is no autonomous M.A. program. Because of its small size and the close association between faculty and students, the department is able to offer an intensive program leading to the Ph.D. in five years.

Program Requirements

Students are required to enroll in three graduate courses in each of the semesters of their first year of study and two in each of the semesters of their second year. By the end of the third year, students will have completed 10 graduate seminars, an oral examination in two fields, and examinations in one or two foreign languages. Fourth-year students will receive dissertation fellowships.

Teaching experience is regarded as an important part of the graduate program, and graduate students are required to teach in the department's literature and expository writing courses during their second, third, and fifth years at Hopkins.

For further information about graduate study, contact the graduate coordinator at the Department of English or go to http://english.jhu.edu/graduate/.

Film and Media Studies

https://krieger.jhu.edu/film-media/

The Film and Media Studies Program offers a comprehensive education in all aspects of the art, theory, and history of the moving image. We offer courses in critical studies, screenwriting and filmmaking—narrative, documentary, experimental film, animation —within a rigorous curriculum designed to foster critical understanding and historical knowledge. Student filmmakers and scholars explore the relationship of film and media to modern cultures, literatures, art, history, and philosophy in a new 20,000 square foot facility that offers an enhanced learning environment as well as all the tools available to professional filmmakers: a large sound stage, a recording studio, computer labs, editing suites, a screening room, classrooms, and state-of-the-art equipment.

Our faculty, comprised of renowned scholars and filmmakers, is known for its dedication to teaching and promoting a highly collaborative and nurturing environment. Our small size allows us to offer undergraduates an unusual amount of hands-on experience, intensive mentoring, individual attention, and access to special opportunities.

Many of our students go on to attend graduate film school or to work in the film and media industries after graduation. Among our graduates are directors, screenwriters, producers, editors, actors, cinematographers, financial and marketing executives, film scholars and curators, entertainment lawyers, agents, digital technicians, and web designers. Our rapidly growing network of alumni provides graduates with essential support and mentoring, opening doors to a wide range of opportunities in the film and media industry. In addition, our undergraduates avail themselves of generous filmmaking grants and funding opportunities from a range of resources available only to FMS majors and minors.

Programs

- Film and Media Studies, Bachelor of Arts (p. 1833)
- Film and Media Studies, Minor (p. 1836)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.061.102. The Cannes Film Festival: Introduction and History. 1 Credit.
In recent decades, film festivals have become important venues for generating international audiences by simultaneously fostering aesthetic communities and creating marketing opportunities. This course considers the purpose and function of the film festival by examining the singularly influential festivals of Cannes. We will read about the culture, politics, and commerce of the festival, and compare Official Selection films with more the more unorthodox choices of the parallel sections: A Certain Regard and Directors' Fortnight. Meets 5x during the semester.Required for students participating in the Cannes Study Abroad. Open to all.

AS.061.103. Navigating the Entertainment Industry: A Preparation for Intersession. 1 Credit.
This course prepares students for FMS's Intersession field trip to Los Angeles, and also serves as an introduction to the professional skills necessary to navigate a career in film, television, and other fields of entertainment. Through discussion, hands-on practice, and guest lectures with FMS alumni, students will learn how to find their way in a complex industry, how to present themselves and their work, how to choose the right path, and how to cultivate the connections and opportunities they'll need to succeed. We will also discuss what to expect and how to make the most of the week-long intersession course, which introduces students to alumni in a range of professions in film, television, and entertainment. Meets 6 times during the semester. Required for students planning to enroll in The Entertainment Industry in Contemporary Hollywood. Open to all FMS majors and minors.

AS.061.120. The Art of the Screenplay. 3 Credits.
Screenwriting workshop. This course will look at the screenplay as both a literary text and blue-print for production. Several classic screenplays will be analyzed. We will intensively focus on character development, creating "believable" cinematic dialogue, plot development, conflict, pacing, dramatic foreshadowing, the element of surprise, text and subtext, and visual story-telling. Several classic and contemporary films will be analyzed and discussed with film clips screened in class (PSYCHO, CHINATOWN, WITNESS, THE DEVIL WEARS PRADA, NO COUNTRY FOR OLD MEN, THE SOCIAL NETWORK, WINTER'S BONE, BOOKSMART, GET OUT). The art of the outline, proper script formatting and character development will be explored as students embark on writing their own 8-12 page screenplays that will be read in class and closely critiqued. Current marketplace and business requirements for screenplays will also be covered.
Area: Writing Intensive

AS.061.137. Virtual and Augmented Reality Technologies. 1 Credit.
This program will provide an overview of the cutting-edge tools and creators shaping the future's narrative journeys. As technologies, such as virtual and augmented reality, along with artificial intelligence and machine learning, continue to evolve, how will we create, share, and experience the most fundamental unit of human culture - the story?

AS.061.138. Acting for Filmmakers. 1 Credit.
This is a series of 3 workshops.1. ACTORS' HOMEWORK & CAMERA AS OBSERVER~Students will discuss and experiment with different methods of preparing for a role. Trying different methods, feel what works for them. We will work on short scenes and have an open discussion about goals, believability, emotional fatigue, distractions of the filming process. ~On the Sound Stage working in front of the camera: ~show how the camera watches performers' thoughts. ~differences between working in front of a camera and playing to a live audience. ~Shooting: coverage continuity eye lines & marks blocking & restricted movement 2. AUDITIONS AND CASTING: ~Students will be given a variety of scripts to audition for. ~Discussion of casting; from actors', directors' and casting directors' perspectives. ~How others perceive you- an exercise in diplomacy and self awareness. ~Preparing for an audition. both cold and rehearsed. ~Improv during auditions. ~Memorization (quick!) for auditions. ~We will rehearse and film auditions. ~Review and analyze audition videos.3. ACTORS DIRECTING DIRECTORS. Working in groups and/or pairs, students will explore what kinds of direction works for them and for others. Students will have an open discussion as to what they need to hear from their director. This will be a class where it is safe to learn what does and doesn't work when communicating with actors- from the actors' perspective. The goal is not to deliver a professional performance in the class, but to explore how it feels to be directed.

AS.061.140. Introduction to Cinema, 1892-1960. 3 Credits.
This course explores the fundamentals of film analysis and encourages students to embark on an exploration of the first half of our first century of movies. It teaches the basic elements of film form, as well as their use in films across the globe from the turn of the twentieth century through the start of World War II. Movements discussed include the silent comedy of Charles Chaplin, Buster Keaton, and Harold Lloyd, moody German Expressionism, the playful anarchy of Surrealism, the fundamentals of editing with Soviet Montage, the beauty of French poetic realism, the rule-breaking of Pre-Production Code cinema, the work of the young Alfred Hitchcock, and, of course, highlights of classical Hollywood filmmaking.
Area: Writing Intensive

AS.061.141. Introduction to Cinema, 1941-present. 3 Credits.
Introduction to Cinema provides an overview of American and international cinema from thepost World War II era to the present. Through lectures and discussion, weekly screenings, andintensive visual analysis of individual films, we will explore the aesthetic, cultural, political, andeconomic forces that have shaped the art and industry of film over the past 70 years. Regularquizzes, writing assignments, class participation required. Mandatory film screenings. Lab Fee $50.
Area: Writing Intensive

AS.061.145. Introduction to Digital Video Production: Visual Language. 3 Credits.
This course is a study of the visual language used to create a moving picture. Through screenings and discussion of films, videos, and related readings, students will develop a visual critical facility and will demonstrate this facility in a few response papers to screenings and video projects. The course will focus on image construction, including composition, framing, movement inside the frame and use of light as well as use of sound. Students will learn to be attentive to rhythm and tempo in picture editing and sound. In-class video assignments included, in which students will work in small groups of three.

AS.061.147. Visual Storytelling. 3 Credits.
This primer to screenwriting will emphasize the power of the image to deliver character, situation, and theme, and to advance even complex plots. Students will analyze narrative films, compose their own still and moving images with cellphone cameras, and write several short dramatic pieces to be read and workshopped by the group. They'll learn the basics of scene design and of screenplay format. For FMS majors in the screenwriting track, this course fulfills the Media and Narrative requirement . $50 lab fee.
Area: Writing Intensive

AS.061.148. Storytelling for Film and Fiction. 3 Credits.
Through the analysis of narrative films, short fiction, myths, fairy tales, and ghost stories, and through the workshopping of their own creative writing, students will explore the art and science of "a good story well told." The course will offer an introduction to dramatic and visual storytelling, and is an essential primer for upper-level screenwriting. Lab fee $50.
Area: Writing Intensive

AS.061.150. Introduction to Film Production. 3 Credits.
This course introduces students to basic considerations of shooting 16mm film. Through lectures and practice, the course approaches the basics of light meter readings, basic camera operations and shot composition. The course also highlights specific readings from classical film theory to augment weekly shooting exercises. Each week students, working in groups, shoot film exercises, providing a general overview of film production. For the final project, each group shoots and edits (physical edits) a short (3-5 minutes) film on 16mm black and white reversal film stock.

AS.061.152. Introduction to Digital Video Production. 3 Credits.
This course introduces students to the world of digital filmmaking. Through screenings, production assignments, and in-class labs, students will develop proficiency in digital cameras, sound recording devices, and software. Students will work individually to produce several video projects. For their final projects students will pitch an idea and develop a more complex film.

AS.061.154. Lights, Camera, Action: Bogart. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of films starring the legendary Humphrey Bogart. Short weekly written responses. No prior experience in film studies required; non-majors welcome. This one-credit course will meet September 3, 10, 17, 24, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.155. Lights, Camera, Action: Coming of Age Films. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of coming of age films. Short weekly written responses, in-class screenings, and emphasis on discussion over lecture. No prior experience in film studies required. This one-credit course will meet September 5, 12, 19, 26, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.156. Lights, Camera, Action: On Location. 1 Credit.
This mini-course will explore the role of place in film; location not merely as setting, but as character, condition, mode of thought. Real and imagined, found and constructed worlds will be considered. Are all cinematic worlds virtual? In-class screenings and an emphasis on discussion over lecture. This 1-credit course will be graded Pass/Fail. Perfect attendance required. Class meets September 19, 26, October 3, 10.

AS.061.159. Lights, Camera, Action: In the City. 1 Credit.
This mini-course will provide a survey of American and international films to which city as setting is integral. In-class screenings and emphasis on discussion over lecture. Four short written responses. No prior experience in film studies required. Due to the limited number of meetings, perfect attendance is required.

AS.061.166. Lights, Camera, Action: The Female Gaze. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of films directed by women. In-class screenings and emphasis on discussion over lecture. Short weekly written responses. No prior experience in film studies required; non-majors welcome. This one-credit course will meet September 2, 9, 16, 23, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.202. Intermediate Film Production: Personal Essay Film. 3 Credits.
In this course students will consider variations of the personal essay film, wherein filmmakers explore their own experiences, both real and imagined. These films constitute dialogues between filmmaker and world using subjective approaches, including but not limited to first person narration. Students will make a short (4-6 minutes) 16mm film from original and possibly archival footage; their own filmic essays based upon personal experiences. We will look at the works of several essay filmmakers including Ross McElwee, Jean Luc Godard, Chris Marker, and Su Friedrich.

AS.061.205. Introduction to Screenwriting. 3 Credits.
In this course we will explore the basic principles of visual storytelling in narrative film as they apply to the design, creation, and revision of the screenplay. Specifically, we will focus on learning the craft of screenwriting — strategies, processes, and philosophies that writers can develop, practice, and rely upon as they progress through a series of screenwriting exercises and write a 12-page screenplay, which will be critiqued in-class during weekly table reads and with the Instructor (one-on-one) during office hours. Select professional screenplays will be read and analyzed — and clips from select films viewed — to further explore what works well on the page, and how it translates to working well onscreen. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Final Draft screenwriting software is required; a FREE 18-week trial will be made available for all students who don't already have Final Draft.
Area: Writing Intensive

AS.061.211. Intermediate Film Production: First Person/Third Person Essay Film. 3 Credits.
Each student shoots an essay film (16mm color and/or black and white) written either in first person or third person, or perhaps, both. The third person essay incorporates the ideas of various authors while the first person film is written chiefly from personal experience. Each film should run between 4-8 minutes. Lab Fee: $200. This course satisfies the Intermediate Film Production requirement.
AS.061.150

AS.061.213. Screening Difference: Race in American Film. 3 Credits.
This course will explore how race and ethnicity have been represented in popular American film from the early 20th century to the present. Weekly screenings, regular quizzes, and open discussion will emphasize close observation and critical thinking. Requirements include an oral presentation and a written analysis. No prior experience in film studies required; majors and non-majors welcome.

AS.061.214. Demystifying the Entertainment Business. 1 Credit.
For many, the entertainment business is alluring. For all, it's pretty confusing. Demystifying the Entertainment Business is a two-week online course that offers students insight into: behind-the-camera careers in the field (specifically writing, directing, producing, and developing); how to best prepare for those careers; and how to break into the industry once graduation finally comes. Students should be prepared to write and read scripts, offer feedback to their fellow students, shoot and edit videos, and create career goal maps and resumes. (Note: some level of basic shooting and video editing acumen will be necessary, as a short film deliverable will be required for successful course completion.) By the end of the course students will understated the basic mechanics of the entertainment industry and where they might like to fall within it, and they will walk away with a complete short film they've written and directed.

AS.061.218. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between literary modernism and modernist cinema: how Virginia Woolf's writings on the cinema connect with her use of shifting points-of-view as literary devices, how James Joyce influenced the Soviet filmmaker Sergei Eisenstein and how Eisenstein in turn influenced the American novelist John Dos Passos, how Franz Kafka's frequent trips to the movies reflect in his fiction, and how artists ventured broadly to develop experimental languages for expressing the new speeds and scales of modern life. Additional texts will be drawn from novels, essays, poems, and films from Ezra Pound, T. S. Eliot, Charlie Chaplin, Claude McKay, Zora Neale Hurston, Anita Loos, Andrei Bely, Dziga Vertov, Gertrude Stein, Louis Aragon, and René Clair. The course fulfills the writing intensive requirement and involves a series of essays on literature and cinema from a critical perspective.
Area: Writing Intensive

AS.061.219. Special Topics: Animation Workshop. 3 Credits.
Students will produce several animations using hand-made techniques, including drawinganimation, paper puppets and stop-motion. Screenings and readings will provide a historical and conceptual context to the exploration of animation as an experimental technique within both narrative and non-narrative works.

AS.061.221. Special Topics: Producing the Independent Film. 3 Credits.
This class will guide students through the process of producing an independent film in the United States. The chronology of lectures and coursework will follow the lifeline of a project, from conception through financing and development, production, postproduction, marketing, and exhibition. Students will learn how to package and pitch projects, budget and schedule a screenplay, develop a financing plan, supervise production and post-production, and mount a viable festival and distribution strategy.Lab Fee: $40

AS.061.226. Special Topics: Writing About Film. 3 Credits.
This workshop promotes more effective writing, hones interpretive skills, and encourages the development of a distinctive voice through a series of progressively more complex assignments. By sharing draft essays with the class, commenting on one another's work, and revising, students will learn to edit their own work and to thoughtfully critique others'. Fulfills the Film and Media Studies expository writing requirement. Lab Fee: $50
Area: Writing Intensive

AS.061.229. French New Wave. 3 Credits.
An exploration of the major films and directors of the French New Wave that is also designed to help students consolidate their skills in the analysis of film. The course will examine the origins of the French New Wave, looking at the directors as critics and as passionate film fans, along with the institutional and historical context of the films. It will also ask how the French New Wave changed the process of filmmaking, and transformed the way we think about the work of the director--inspiring more vocations in filmmaking than any other movement in cinema history. Film screenings T 7:30-10:00PM. $40 lab fee.

AS.061.232. Intermediate Video: Dreams, Psychosis, and Altered States in Cinema. 3 Credits.
In this production course, students will create multiple video projects that reflect the representation of dreams, psychosis, and altered states in cinema. We will screen and deconstruct a variety of feature films, video artworks, and music videos to understand the mechanics and language of subjective realism as a narrative form. We will trace this stylistic lineage from its roots in art house cinema to its rise as an accepted Hollywood modality. We will also explore editing and software techniques that will further students' ability to create stunning works of strange beauty.Basic proficiency with digital cameras and editing is required. This class fulfills the intermediate film production requirement.
AS.061.145 OR AS.061.152

AS.061.233. Intermediate Digital Video Production: Adobe After Effects. 3 Credits.
This course will serve as an introduction to Adobe After Effects. Students will learn a variety of motion graphics techniques such as digital character animation, rotoscoping, motion tracking, chroma key compositing and automating 3D cameras. Through screenings and discussions students will gain insight into the myriad of ways After Effects is used in Film and Television. Throughout the semester students will complete several short video art projects.
AS.061.152OR AS.061.145

AS.061.234. Intermediate Digital Video Production: Experimental Forms. 3 Credits.
This Production course focuses on key movements in both Experimental Film and Video Art. Production assignments will arise from: Structural Film, Performance Art, Lyrical Film, Psychedelic Video, and Experimental Ethnography. Students will explore how these movements developed outside (and at times in opposition to) the mainstream, and became integral to the aesthetics of contemporary art, film, and television. Students will think critically about the personal and societal function that video artwork serves, and gain insight into the history of Experimental Film. At the end of this course, students will have a more nuanced understanding of contemporary media art, and they will be more proficient in video editing and cinematography, which they can apply to future work on: commercials, music videos, webcasts, and feature films.
AS.061.152 OR AS.061.145

AS.061.235. Intermediate Digital Video Production: Advanced Camera. 3 Credits.
In this production course students will gain proficiency on a variety of Digital Cinema Cameras. Students will work with the Canon C300, C500, and FS7. We will discuss picture profiles, different lense options, external capture devices, and shotgun microphones. We will thoroughly explore the various unique functionality of each camera. Throughout the semester students will complete several cinematography focused video projects.
AS.061.145 OR AS.061.152

AS.061.237. Portrait Films. 3 Credits.
Portraiture has a long history in the arts, in painting, sculpture and photography. The film portrait is closer to these plastic arts, rather than traditional documentary, in that it approaches it's subject mostly though looking and finding new forms. Screenings will include the work of Andy Warhol, Philippe Garrel, Shirley Clarke, varied screen tests, some animation and more. Coursework will include a presentation, short papers and a film portrait.
AS.061.145 OR AS.061.152

AS.061.238. Reading the Moving Image. 3 Credits.
This course will emphasize close observation and critical thinking. Through weekly screenings and class discussion, students will practice noticing; seeing and hearing with fresh eyes and ears, and taking nothing on screen for granted. And they'll learn to reflect on and contextualize what they find, drawing evolved conclusions about how film texts communicate ideas and what those ideas may be. They'll consider all elements of cinematic form; an array of analytical frameworks including genre, historical era, authorship, and modes of production; and representations of gender, race, and class. Regular quizzes, a short oral presentation, and a short written analysis. No prior experience in film studies required; majors and non-majors welcome.
Area: Writing Intensive

AS.061.240. Hybrid Cinema: Spaces Where Documentary and Fiction Meet. 3 Credits.
From the films of Robert Flaherty, Jean-Luc Godard, Agnes Varda and Andy Warhol, through the work of Peter Watkins, Ulrich Seidl, Jia Zhangke, Lizzie Borden, Pedro Costa, Abbas Kiarostami, Kevin Jerome Everson, Sacha Baron Cohen and Chloé Zhao, this course explores the dominant techniques, the aberrations, and the virtues and limitations of hybrid filmmaking. Topics discussed include the ethics of representation, the significance of craft, questions of selection, narrative hegemony, the nature of performance, and the porous boundaries between documentary and fiction film. Students will be guided in their own hybrid filmmaking experiments throughout the semester.

AS.061.244. Film Genres. 3 Credits.
$40 lab feeA survey of American genres: the Western, the Gangster Film, Science Fiction, Horror, Comedy, Melodrama, and others. Twice-weekly screenings. Short film responses and a final paper, 10pp.
Area: Writing Intensive

AS.061.245. Introduction to Film Theory. 3 Credits.
This course offers an introduction to the major paradigms of film theory, covering how significant thinkers have conceived of the medium from its inception to the present day. Frequent film screenings help to illustrate key concepts. Topics include the classical opposition between formalist and realist film theories as well as critical approaches to narrative, spectatorship, and representation. Students are expected to enter the course ready to engage in discussion. Weekly film screenings. $50 lab fee.
Area: Writing Intensive
AS.061.140 OR AS.061.141

AS.061.248. Women Making Films About Women. 3 Credits.
This course will examine films (features and shorts) throughout the history of cinema beginning with Alice Guy-Blaché . We will look at how form reveals content, thematic issues and how films relate to the culture and politics of the filmmaker. Filmmakers include Germaine Dulac, Nelly Kaplan, Marguerite Duras, Chantal Ackerman, Barbara Hammer and Nina Menkes. Readings include critical essays, texts by the filmmakers and fiction. Assignments consist of weekly papers on the films.

AS.061.263. Poetry and the Moving Image. 3 Credits.
Using P. Adams Sitney's text: The Cinema of Poetry, this course will explore the relationship between poetry and the moving image. When experimental film began to define itself in the 1950s and 60s the terms cine-poem and film-poem were ubiquitous as identifying avant-garde cinema. Poetic structures in the moving image will be studied in relation to language, images and formation of meaning. Students will independently research a poet who greatly inspired and influenced a filmmaker/moving image artist and write on that filmmaker's work. One moving image project will be undertaken and completed during the semester as well. Weekly assignments will include screenings, reading, writing, and or video work.
Area: Writing Intensive

AS.061.266. Introduction to Writing for Television. 3 Credits.
This course will take novice television writing students from show concept to show bible and into the early stages of pilot writing. It teaches the basics of how to develop a television concept, and dramatic structure for television writing. Students will read analytical work on what makes a successful television series, dramatic structure, and effective characterization, and will engage in both critical readings and writing workshop. The result will be the creation of their own show bible and the beginnings of an original thirty-minute television pilot.
Area: Writing Intensive
AS.061.205

AS.061.267. Cultural History of the Internet. 3 Credits.
This course offers an introduction to internet studies through the many ways digital culture has touched our everyday lives: memes, blogs, gaming, social networking, instant messaging, and more. From its origins in connecting scientific researchers to its present form as a multi-device, multi-platform web connecting us to everything from each other to our smart homes, the internet has proven that nearly our entire social world can be processed as data and linked up. While this has meant greater connection, it has also raised questions about how we learn, communicate, behave, and organize. The internet has long promised new avenues of personal expression, but it has also brought with it the quandaries of echo chambers, information silos, and disinformation campaigns. In response to these complicating effects, the course offers an opportunity for students to develop the critical mapping tools necessary to orient oneself within this vast cultural network and its rapid historical unfolding.

AS.061.268. History of Computer Animation. 3 Credits.
This course offers a journey through the history of computer animation. We'll start with an archaeology of the digital image, look at experimental animations by early computer artists, and sketch out the work of engineers in developing techniques of wire-frame modeling, texture mapping, shadowing, and facial animation. Beginning with short films and digital sequences in otherwise live-action movies, we'll cover a wide variety of animation styles in an international context. Screenings will be drawn from a selection of fully computer-animated features, such as those from Studio Ghibli and Pixar; live-action movies with digital special effects in the mode of Tron (Lisberger, USA, 1982) and Terminator 2: Judgment Day (Cameron, USA, 1992); films that use computer software to aid traditional methods of animating, such as The Illusionist (Chomet, France, 2010) and Boy and the World (Abreu, Brazil, 2014); and animated documentaries, such as Waltz with Bashir (Folman, Israel, 2008) and Tower (Maitland, USA, 2016).

AS.061.269. Feminist Filmmaking: A Theory and Practice Workshop. 3 Credits.
In this workshop for 10 students (no gender preference) documentary filmmaker and media theorist Bernadette Wegenstein and filmmaker and director of the Saul Zaentz Film Innovation Fund co-teach the fundamental principles of gender theory and feminism as applied to practical filmmaking. We will cover the history of women filmmakers, as well as embark on a concrete mini-production where students will be placed in the roles of writers, directors, producers, cinematographers, and editors to make a feminist film. The anthology Feminist Film Studies(Hollinger) and Feminism and Documentary(Waldman/Walker) will be among the readings that our workshop is based on.
AS.061.145 OR AS.061.152

AS.061.270. The Body and Cinema. 3 Credits.
Before film even emerged as a popular entertainment form, motion pictures were used to study the human body for purposes of scientific inquiry and medical practice. The present-day crossovers between imaging science and cinema—the inclusion of medical imaging in movies and television shows, the deployment of informational videos and animations in telehealth, and the myriad ways that digital imaging itself is spurred on by the needs of scientific investigation and the demand for cultural works—suggest that what we know about the human body is caught up in a complex web of technical representations and cultural meanings. This course explores the construction of the human body within this array of cinematic practice. Our approach will be twofold: First, we will consider scientific and medical images not merely as powerful means of seeing what would otherwise be unseeable but also as technically enabled and culturally influenced ways of knowing, that is, images, as in cinema, that are historical and could be otherwise. Second, we will examine representations of the human body in the history of film, focusing on how bodies are represented, what bodies are privileged, and how bodies are figured using medical imaging.

AS.061.271. Intermediality: Between Word, Image, and Sound. 3 Credits.
This course explores film adaptation by considering how words, images, and sounds offer different affordances and constraints for creative expression. A central goal is to conceive of adaptation outside of typical discussions of fidelity to a source work and instead consider how different artistic media open up unique opportunities for storytelling. To this end, we will draw on a number of different intermedial translations, which may include from novel to film (The Night of the Hunter, from Davis Grubb's book to James Agee's screenplay to Charles Laughton's film), from short story to film (The Turin Horse), from graphic novel to film (Ghost World) or television series (HBO's Watchmen), from personal essay to documentary film (James Baldwin's The Devil Finds Work and I Am Not Your Negro), from poetry to film (O Brother, Where Art Thou), from play to film (A Raisin in the Sun and My Own Private Idaho), from radio drama to film (Sorry, Wrong Number), and film-to-film homage (Far From Heaven and All That Heaven Allows). We will also delve into the vagaries of film-to-book novelizations and the curious case of concurrently writing film and book, as in Stanley Kubrick and Arthur C. Clark's collaboration on the film and novel 2001: A Space Odyssey (both adapted from a short story).
Area: Writing Intensive

AS.061.301. Advanced Film Production: The mongrel film. 3 Credits.
In this course, each student is responsible for the design and production of a short 16mm film. The film may be shot on color and/or black and white negative stock. The format is Super 16mm. The film may include sync and/or non-sync sound. The idea behind the "mongrel" film is for the student to incorporate a variety of genres within this project. These may include stylistic elements typically associated with documentaries, experimental, narrative, animation, and lost and found films. Students are expected to have previously completed AS.061.150 and an intermediate level film production class.
AS.061.150

AS.061.302. Strategic Approaches to Filmmaking in 2021. 3 Credits.
The year 2020 challenged the film industry by imposing restrictions on our mobility, collaboration and access. Unable to gather in large groups or travel to the ideal location, much less rent equipment or leave the confines of our homes, moving-image makers found creative ways to embrace these limitations and continue making exceptional things. This intro-level production course will go back to basics in an attempt to define and explore the essential elements of visual storytelling. In this present, and in the future, how do we embrace the aesthetic challenges that come with limited resources and means? Can we make a compelling film or video without human subjects? Can we tell a dynamic story using only one location? Is there a possibility for drama when only one character appears on screen? Can sound be used to evoke the world outside the frame? And how do we make meaningful, relevant, transcendent work amidst a social, political and public health crisis? Over the course of the semester, students will be exposed to films and filmmakers who use these questions to stimulate their practice, and in turn, will be asked to address these challenging questions for themselves through the work they create for class. This course will fulfill the Advanced Filmmaking requirement for the major and minor. Students should have already completed an introductory and intermediate production course before enrolling.

AS.061.303. Podcasting: Critical and Creative Practice. 3 Credits.
In this critical studies course with a creative component, students will learn about the history and cultural significance of podcasting, develop tools for critically listening to and analyzing podcasts, and learn how to research, write for, and produce podcasts. Examples will come from a broad sample of narrative, documentary, interview, and discussion-based podcasts. While no formal training in audio production is necessary to take the course, students will be expected to learn the necessary skills to create their own podcasts. In-class demonstrations of microphones, editing software, and approaches to sound design will be offered, and students are encouraged to take advantage of office hours for further help with audio production.

AS.061.304. After Effects: Intermediate and Advanced Technique. 3 Credits.
This hybrid After Effects course will offer two simultaneous tracks of study. One for students using After Effects for the first time, the other for intermediate After Effects users who are looking to master the program. The class will meet to learn new techniques and to discuss each other's work and the instructor will regularly introduce exciting new material applicable for all skill levels. Students will have the option to create a motion graphics reel for their final project, a valuable asset when applying for any post-production job. The coursework will be supported with robust video tutorials, weekly group instruction, and critique as well as periodic individual meetings with the instructor. Additionally, the entire class will gather for several Zoom sessions with professionals working in the industry.

AS.061.305. Advanced Video Production: Comedy Films!. 3 Credits.
This course will be a hands-on, immersive, deep dive into executing comedic moments through cinematic tools and language. Through screenings and critique, we will analyze a diverse spectrum of films and television until we distill and synthesize that ineffable substance of what makes something funny. Subjects like “Spoof,” “Slapstick” and “Not Funny” will be covered. Students should expect multiple artist visits, time to edit in class and plenty of group discussion. Each student will create two short comedy films throughout the semester, and work collaboratively on a third. We will also have technical days devoted to operating advanced cameras such as the Canon C300 MK2. $100 lab fee.
AS.061.145 OR AS.061.152

AS.061.309. Advanced Video Production: Influence and Anxiety. 3 Credits.
This is an advanced production course focusing on artistic influence. Each student will be working with and around a filmmaker who greatly inspires and influences their work. The evolution of style will be considered. The work will include screenings, readings, and short projects all feeding into a final movie. This course fulfills the advanced production requirement. Students should have completed a Introductory and Intermediate Digital Video Production course prior to enrollment. $100 Lab fee.

AS.061.312. The Fallen World: Morally Complex Storytelling. 3 Credits.
A workshop devoted to creating complex characters in challenging moral landscapes. Students will view and discuss a wide range of films; and creative assignments may include profiles, short fiction, monologues, and dramatic scenes for the screen. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 OR Instructor Permission

AS.061.313. Personal Storytelling for the Screen. 3 Credits.
A workshop devoted to creating compelling short scripts based on personal experience. Analysis of screened films and collaborative development of student work will emphasize how unique worlds and world views can reflect a larger shared humanity. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 or Instructor permission.

AS.061.315. Screenwriting By Genre. 3 Credits.
Story design for the screenplay with special attention to the genres of comedy, horror, melodrama, and adventure. Regular workshops, short written exercises, and a longer final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.270 OR permission of the instructor.

AS.061.316. Characters for the Screenplay. 3 Credits.
A workshop devoted to creating complex characters for the screen. Students will examine memorable film characters from the silent era to the present, with attention to how these characters are revealed through both the drama and the mise en scene. Weekly screenings. Short critical and creative written exercises and a longer, creative final project.Recommended Course Background: AS.061.148 OR AS.061.205 OR AS.061.265
Area: Writing Intensive

AS.061.317. Media and Narrative. 3 Credits.
Using narrative theory, this hybrid course teaches students the ins and outs of narrative forms that interact with cinema, engaging with both screenwriting and narrative studies. Using the adaptation of author Neil Gaiman’s Coraline to teach students the differences in narrative structure that align with fiction, the graphic novel, and the film, it also enables them to engage in their own adaptation. Taking an original concept from short fiction to a graphic novel treatment to a film treatment, culminating in a short film script and storyboard, the course teaches the fundamentals of narrative theory and encourages students to engage with them creatively.
Area: Writing Intensive
AS.061.205

AS.061.320. 21st Century Television Auteurs and American Culture. 3 Credits.
Since the rise of HBO in the late 1990s, cable, network, and streaming television has become home to a diverse range of "quality" shows that showcase strong perspectives by unique creators. These series creators work within an intensive commercial medium and a cultural context they speak to but cannot themselves determine. This course examines the relationship between the cultural milieu in which they create work and the show creator themselves. Featuring such examples as Donald Glover’s Atlanta, Michael Shur’s The Good Place, Phoebe Waller-Bridge’s Fleabag, Rebecca Sugar’s Steven Universe, Mindy Kaling’s The Mindy Project, and Terence Nance’s Random Acts of Flyness, among others, it encourages students to engage in aesthetic critique as well as cultural analysis, with the ultimate end of making students better understand the relationship between television and auteur, and be better able to engage with the culture in which they swim via its media.
AS.061.140 OR AS.061.141

AS.061.321. Environmental Cinema. 3 Credits.
An exploration of cinema’s unique capacity to reveal the world, this course presents an international and richly historical survey of environmental films. Examples come from narrative, documentary, and experimental filmmaking, including blockbusters, exposés of waste and pollution, guerrilla media projects, and poetic contemplations of landscapes and oceans. Filmmakers and artists include Andrei Tarkovsky, Angès Varda, Jia Zhangke, Lucy Walker, Ai Weiwei, Edward Burtynsky, and Werner Herzog.

AS.061.322. Women in Popular Film and Television. 3 Credits.
A survey of female beauty, villainy, comedy, and humanity in film and television from the silent era to the present. $50 lab fee.
AS.061.140 OR AS.061.141 or permission of instructor.

AS.061.323. Masculinities. 3 Credits.
From tap dancer to gangster, assassin to anguished teen, versions of the male in film from the silent era to the present. Cross-listed with Studies of Women, Gender, and Sexuality. One core course in Film and Media Studies is preferred but not required.

AS.061.326. Contested Ground: The American West on Film. 3 Credits.
Fantasized, mythologized, and revised: the cinematic west as landscape and idea through the lens of classical Hollywood and of contemporary independent women and indigenous filmmakers.

AS.061.328. Gangster Films. 3 Credits.
The bad guy as hero from Little Caesar to Goodfellas. Film screenings Th 7:30-10:00 PM, Sun 7:00-9:30 PM. Lab fee: $40.

AS.061.329. Left-Handed Endeavors: Crime Film. 3 Credits.
A survey of primarily American, 20th century, popular crime film: hits, heists, cons, organized crime, crimes of passion, and other "left-handed form[s] of human endeavor." Oral presentation, short critical response (5 pp.), essay (12 pp.).
AS.061.140 AND AS.061.141 AND AS.061.238 AND AS.061.144 or Instructor Permission.

AS.061.335. Monster Films. 3 Credits.
Monstrous others and monstrous selves in classic 20th century horror. One core course or permission required.
AS.061.140 OR AS.061.141 OR AS.061.238 or permission of instructor is required.

AS.061.336. American Landscapes on Film. 3 Credits.
American setting and identity: the frontier, the city, the highway, the sea, the small town, the suburb, and outer space as represented in popular film from the silent era to the present.
AS.061.140 OR AS.061.141 OR AS.061.238 OR AS.061.244 or instructor permission.

AS.061.339. A Cinema Of Anxiety: Film Noir. 3 Credits.
Shadows, dead ends, and dangerous women in the postwar films of Sam Fuller, John Huston, Fritz Lang, Anthony Mann, Jacques Tourneur, and others.

AS.061.340. The Body in French Cinema; Sexuality, Physicality, Vulnerability. 3 Credits.
This course explores how French films have interrogated the body. We will ask how they have attempted to come to terms with human physicality, desire, and fragility--and with the ability of cinema itself to move spectators emotionally and even physically. Themes explored will include sexuality, gender identity and disability. AS.061.140 or AS.061.141 or permission of instructor. $50 lab fee.
AS.061.140 OR AS.061.141 or instructor permission.

AS.061.346. Persistence of Vision: Time, Memory and the Past in Recent Global Cinema. 3 Credits.
This course will examine the ways film represents, remakes, and re-visions cultural and personal memory in a range of recent national and international films, including those by Chantal Akerman, Pedro Almdódovar, Lee Chang-dong, Claire Denis, Joanna Hogg, Hirokazu Kore-eda, Terrence Malick, Joshua Oppenheimer, Christian Petzold, Sarah Polley, Hong Sang Soo, and Jia Zhangke.

AS.061.347. Teens On Screen. 3 Credits.
This course will explore changing representations of adolescence in films from the 1950s to today across a range of mainstream Hollywood, independent, and international films. We'll examine how this dynamic and misunderstood genre shapes and reshapes perceptions of youth, and we'll discuss the frank and sometimes explosive ways teen films address difficult questions of race, class and sexual identity, often in the guise of "pure" entertainment. Recommended Course Background: Introduction to Cinema I or Introduction to Cinema II, or permission of instructor.

AS.061.348. Acting and Screenwriting for Narrative Productions. 3 Credits.
This pre-production course brings together student filmmakers from Maryland Institute College of Art (MICA) and from Johns Hopkins University (JHU), providing intensive training in the crucial aspects of preparing to shoot a successful narrative film. Students work with a professional screenwriter, allowing students to hone and improve their existing screenplays, practice the elements of writing for film, and learn how to do a script breakdown. Workshops on working with actors, taught by a professional actor, will teach students the ins and outs of casting and directing. Supplemental workshops will cover elements of pre-production such as budgets, production schedules, call sheets, and legal issues. Film screenings will train students to see films as festival curators do, with an eye toward what constitutes exciting, innovative filmmaking. This course is the prelude and prerequisite to Narrative Filmmaking II, a production course during which students will collaborate to shoot a short narrative film based on student screenplays.

AS.061.354. Invisible Cities. 3 Credits.
In Italo Calvino's book, Invisible Cities, Marco Polo depicts an eclectic array of imaginary, and fantastic, cities to Kublai Khan. Using this book as a guide, each student will create an imaginary city composed entirely from online archival footage. Following Calvino's advice, these projects will "take delight not in a city's seven or seventy wonders but in the answer it gives to a question of yours". Additional readings will include works by Louis Aragon, Walter Benjamin, Michel de Certeau, Rainer Maria Rilke, and W.G. Sebald. This course satisfies the Advanced Film Production requirement for FMS majors and minors.

AS.061.356. Narrative Productions. 6 Credits.
Narrative Productions is a joint production course for JHU and MICA undergraduates who have completed Acting and Screenwriting for Narrative Productions (AS.061.348). Students work in teams to produce a narrative short from a script written in AS.061.348. Students are assigned a primary and a secondary role on the production or post-production of their chosen film. Students fill all roles from casting, producing, direction, design, cinematography, sound recording and editing. Throughout the course, instructors will facilitate contact with relevant films and film professionals to illuminate the key creative roles necessary in the making of a successful narrative film. Instructors serve in an advisory role in the production of student projects, offering technical information and guidance throughout the filmmaking process. Students should be prepared to spend a significant amount of time outside of class working on their films.
AS.061.348

AS.061.361. Documentary Film Theory. 3 Credits.
Documentary Theory: The Work of Documentary in the Age of Reality Reproduction This course explores contemporary documentary film and video with an emphasis on selected directors and the theoretical implications suggested by their work. In particular, we look at the notion of the 'real' as it is constructed and maintained through and by documentaries. This inquiry necessarily involves a reflection that is philosophically as well as politically motivated. Directors include Errol Morris, Trinh Minh-ha, Ross McElwee, and Werner Herzog. Readings are eclectic, ranging from Annie Dillard to Martin Heidegger. Counts toward 300 or 400-level critical studies requirement.

AS.061.364. The Films of Alfred Hitchcock. 3 Credits.
Close examinations of Hitchcock's films from the Lodger to Frenzy. $40 lab fee.
Area: Writing Intensive

AS.061.365. The New Hollywood:American Films of the Seventies. 3 Credits.
This course will explore the extraordinary renaissance in American film that arose from the death of the studio system and ended with the advent of the blockbuster. We'll discuss how the political and cultural struggles over the Vietnam war, civil rights, and the feminist movement affected American filmmaking between roughly 1967 and 1980, heralded by a new generation of filmmakers working both within and outside of the system. Emphasis will be on both close formal analysis and historical contexts. Filmmakers to be discussed will include Robert Altman, Hal Ashby, Charles Burnett, Ivan Dixon, Francis Ford Coppola, Barbara Loden, Elaine May, Mike Nichols, Alan Pakula, Arthur Penn, Bob Rafelson, Martin Scorsese, Melvin Van Peebles, and Claudia Weill. This is a discussion-based class, and regular participation is required.
Area: Writing Intensive

AS.061.366. Labyrinths of Passion: The Films of Pedro Almodóvar. 3 Credits.
This course will explore a range of Almodóvar's work, from the early films emerging out of La Movida Madrileña up to and including The Human Voice and Parallel Mothers, with particular emphasis on All About My Mother, Talk to Her, Bad Education, Volver, and Pain and Glory. We will examine the director's influences and antecedents—Bunuel, Hitchcock, Sirk, Cassavetes, among others—against the backdrop of Spain's dramatic political and cultural transformation after the death of Franco. And we will closely analyze the characteristics that define Almodóvar's status as an auteur: his groundbreaking approach to sexuality, queer politics and gender transformation; his innovative use of melodrama; and his dazzlingly eclectic visual style.

AS.061.373. Intermediate Screenwriting. 3 Credits.
This course will explore strategy and process for developing a short screenplay from pre-existing literary or journalistic source material (short story, news/feature article, etc.). By exploring several "case studies" — feature films and the source material that inspired them — students will identify the practical strategies employed by professional screenwriters with the goal of employing such strategies with their own screenplay adaptations. Bulk of class will focus on designing, writing, and rewriting a 20-30 page screenplay, and sharing multiple drafts with the class (and with the professor one-on-one) for critique over the course of the semester. Each student should have 2-3 pieces of material under consideration for possible adaptation by the start of class. Discussions from time to time will also touch on the business of screenwriting. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Students will be required to purchase a license for Final Draft screenwriting software for $99. Students are expected to have previously completed AS.061.205 or another lower level screenwriting class.
Area: Writing Intensive

AS.061.374. Terrence Malick: The Poetics of Space. 3 Credits.
This course will closely examine Malick's films, with particular emphasis on his visionary manipulation of the epic vastness and lyrical intimacies of screen space. With this primary concern in mind, we will consider his films' engagement with philosophies of history and time; their increasingly experimental approach to narrative and stylistic conventions; and their enduring fascination with the interaction among the human, natural, and spiritual worlds. We will also look at recent films influenced by his work, including Carlos Reygadas's Silent Light and Shane Carruth's Upstream Color, addressing the question of what constitutes a "Malickian" cinema.
Area: Writing Intensive
AS.061.140 OR AS.061.141

AS.061.375. Surrealism and Film. 3 Credits.
We will define Surrealism through primary texts, including those of Andre Breton, Antonin Artaudand Rene Daumal and other works that defined and influenced the movement in the early part ofthe 20th century. Using an understanding of the practice of surrealism found in the readings, aswell as in surrealist games and automatic writing, we'll study a diverse group of filmmakersinfluenced by the practice, including Luis Buñuel, Joseph Cornell, Raul Ruiz and contemporary artists such as David Lynch. Assignments include weekly papers and one final creative project. Weekly film screenings Thursday 7:30-10:00 PM. $50 lab fee.Media, Online
Area: Writing Intensive

AS.061.378. Automatic Animation. 3 Credits.
A hand-made, 2-D animation course based on ideas of automatism. Students will create their own animated movie during the semester with in-class animation exercises. Readings will included Dada and Surrealist texts, poetry and theory of poetics. Sounds ideas will be discussed and pursued related to the ideas explored throughout the semester. $125 lab fee.
AS.061.145 OR AS.061.152

AS.061.380. French Cinema of Immigration, Cultural Identity, and Difference. 3 Credits.
An exploration of a series of contemporary French films that bear witness to the contemporary reality of France as a multi-ethnic society and ask essential questions about cultural identity. Is cultural and ethnic identity something that you are born into or it is a role that you elect or perform? How should individuals living today understand their relation to historical injustices? Are there things that we can learn only through relationships with people from other cultures? Screenings include works of Abdellatif Kechiche, Jacques Audiard, Claire Denis, Céline Sciamma, Michael Haneke, Mathieu Kassovitz, the Dardennes. $50 LAB FEE

AS.061.382. Explorations in Film Sound. 3 Credits.
This course traces the history of the soundtrack from Vitaphone at the coming of sound to Dolby Stereo in the New Hollywood era to the fully immersive, atmospheric sound systems of today's cinemas and home theaters. We consider major theories on the relationship between sound and image, the production of sound space, the role of the voice in cinema, and the effects of film music. Assignments will engage with the materials through both analytical reflection and short creative sound production. Screenings and examples are likely to include early sound classics, such as Sunrise (1927) and 42nd Street (1933); notable international innovators, such as The Testament of Dr. Mabuse (1933) and A Man Escaped (1956); pathbreaking stereo entries, such as Fantasia (1940) and Apocalypse Now (1979); recent exemplars of film music, such as In the Mood for Love (2000) and Morvern Callar (2002); and films that reflect on the very nature of sound recording, such as The Conversation (1974) and The Lives of Others (2006).
AS.061.140 OR AS.061.141

AS.061.384. Fabric of the Real. 3 Credits.
Maurice Merleau-Ponty writes, "the real is a closely woven fabric". In this course we will consider how several artistic disciplines weave their own version of that fabric. These disciplines include documentary film, prose poetry, landscape painting, literature, and music. The course will be predicated upon Martin Heidegger's essay, "The Age of the World Picture" and follow the lead of Roland Barthe's essay on the "effect of the real". We will also highlight various hybrid forms within these disciplines, with particular attention to the work of W.G.Sebald and StevenReich.

AS.061.391. Love and Film. 3 Credits.
In this course, we explore different understandings of "love" and the way that film has dealt with the concept as a medium. We explore a variety of approaches to the question of "love" - from the agapic to the familial to the romantic - through a series of interdisciplinary readings ranging from philosophy to anthropology. We will also equally explore the question of how film has engaged with the question of love as a concept, and what depictions of human affection - from the general to the personal - it has offered us. Screenings are required for this course. Lab fee: $50
Area: Writing Intensive
AS.061.140 OR AS.061.141 OR AS.061.226

AS.061.396. Modern Paris on Film. 3 Credits.
This course uses French film to examine the history of twentieth-century Paris. We will consider how filmmakers interpreted the social, political, and technological transformations that shaped Paris in the modern era, treating movies as expressions of change and means by which filmmakers comment on it. Taught in English. $50 lab fee.

AS.061.397. French Masculinities. 3 Credits.
Examines changing ideals of masculinity in France after 1960 as they found expression on film, rooting the work of iconic stars and directors in their cultural, political and historical contexts.

AS.061.399. Stop-Motion Puppet Animation. 3 Credits.
Students will create their own stop-motion models (puppets) based on a wire armature model. In small groups, students will design and create a simple set and make a short stop-motion movie using a DSLR camera. The question of "why animate" will be explored in student projects and responses to screenings. We will study the history of stop-motion puppet animation from Starewicz to Svankmajer to Nick Park.

AS.061.403. Advanced Screenwriting: Concocting the Thriller. 3 Credits.
If you love watching thrillers — and believe you are possessed with the right blend of obsession, stamina and blind faith required to write one — then please join us for 13 weeks of screenwriting exploration as we tangle with this most beguiling and and satisfying of film genres. By semester's end, you'll have written a "killer" first act of a feature script, developed a detailed step outline for acts 2 and 3, designed a look-book to inspire yourself and future collaborators, and hatched a plan to see you project through to completion (on your own, or in a future class.)
Area: Writing Intensive
AS.061.205 AND AS.061.373

AS.061.404. Advanced Screenwriting. 3 Credits.
Intensive workshop course where students will write a first draft of a feature-length screenplay. Classes will focus on the specific challenges of the students' works-in-progress, with an emphasis on developing a story idea that is suitable for a feature, and the craft to see it through to completion. Particular emphasis will be placed on the feature screenwriter's central challenge: creating enough of a structure in the early writing stages to keep the screenplay on track, while remaining open to new ideas for scenes and sequences that inevitably arise as the characters come to life. Select professional screenplays will be read and analyzed — and clips from select films viewed—to explore what works well on the page, and how it translates to working well onscreen. Students will aim to have a solid and workable first draft at the end of the semester, at which point avenues for further revision may be discussed. Throughout the course, Instructor will also devote a portion of class time to discuss the business of screenwriting. Students will be required to purchase a license for Final Draft screenwriting software for $99.
Area: Writing Intensive

AS.061.406. Animating Cartoons. 3 Credits.
Animating Cartoons: This class will focus on character animation. Through weekly screenings of cartoons and animations and reading comics, the form will be analyzed in class discussions and short papers. Students will create their own hand drawn character and create an extensive story board for an animation involving their character. A scene will be chosen and a short hand-drawn animation from the storyboard will be created.

AS.061.407. Advanced Screenwriting II. 3 Credits.
You've just finished the first draft of your feature screenplay or long-format teleplay. If you're like most mortals, including the teacher of this course, it's likely to be terrifically average. Here's the chance to make it good — and possibly great — with a semester's worth of systematic, high-octane rewriting. Hard labor, creative breakthroughs and a glimpse at what it takes to get Hollywood's attention included.
Area: Writing Intensive
AS.061.404

AS.061.409. The Films of P. T. Anderson: Innovation and Influences. 3 Credits.
This course will investigate Paul Thomas Anderson's stylistic and narrative innovations, as well as cinematic influences such as Altman, Kubrick, Scorsese, and Welles.

AS.061.413. Lost & Found Film. 3 Credits.
This course explores various elements of film production and filmic expression through a somewhat nebulous field typically described as lost films. Lost films (or as they are sometimes called, "orphan" films) can be generally described as films that have, for a variety of reasons, fallen out of the public view. They frequently come from educational, scientific, medical, or industrial films from the 1950s and 1960s. Using these films as source materials, lost film filmmakers explore and expose cultural conventions, visual icons, and historical value materials. Each week, students are responsible for re-editing sources found on an internet archive site. The assignments follow thematic concerns related to film editing. Students complete a final project (4-8 minutes). All editing for the course is accomplished with non-linear software, generally Adobe Premiere or Final Cut.

AS.061.440. Senior Capstone Project: Production. 3 Credits.
Permission required. Production track students complete an independent project. Should must have completed one advanced level FMS production course (POS tag FILM-PROD).

AS.061.441. Senior Capstone Project: Critical Studies. 3 Credits.
Critical studies track students complete an independent research project.

AS.061.501. Independent Study - Film. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.502. Independent Study:Film & Media. 1 - 3 Credits.
For students who wish to explore an aspect of film studies not covered by existing courses. The course may be used for research or directed readings/viewings and should include one lengthy essay or several short ones as well as regular meetings with the adviser.Permanently required: Lab Fee: $100 (if production related)
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.505. Internship-Film/Media. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.506. Internship-Film & Media. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.542. Senior Capstone Project: Screenwriting. 3 Credits.
Permission required. Screenwriting Track students complete an independent project.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.596. Ind Study - Film & Media. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.599. Internship-Film & Media. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Art

AS.371.303. Documentary Photography. 3 Credits.
In this course, we will explore different genres and approaches to documentary photography and the questions inherent to this mode of image-making like representation, storytelling, records and archives, journalism, community engagement, research and personal perspective. Baltimore neighborhoods and contemporary issues will provide inspiration for student work. Students will learn camera operation, photo editing and produce a final documentary project on a subject of their choice as the culmination of their semester's work. Digital SLRs are available on loan for the semester. Attendance at first class is mandatory.

Comparative Thought and Literature

AS.300.312. Imagining Revolution and Utopia. 3 Credits.
What form should revolution take, and what should society look like after the revolution? What would happen to the state, family, home, status of women, human interrelations, and everyday life? These questions consumed radicals in 19th century Russia and Europe, and their answers helped to shape the political culture of the 20th century. This course examines theories of revolution and utopia and responses to them in literature, art and film. Primary case study is Russia and the Soviet Union, with a comparative look at influential European works.
Area: Writing Intensive

AS.300.324. Cinema of the 1930s: Communist and Capitalist Fantasies. 3 Credits.
Comedy and musical comedy film flourished in the USA during the Great Depression as well as in the USSR during the Stalinist Great Terror. This course will compare films of the era in a variety of genres (musical, epic, Western, drama), examining the intersections between politics and aesthetics as well as the lasting implications of the films themselves in light of theoretical works on film as a medium, ethics and gender.

AS.300.340. Literature and Film of Unintended Consequences. 3 Credits.
Sometimes brilliant ideas and plans don't work as anticipated, or go very badly—for example, empowering the "invisible hand" of the market, building a huge hydroelectric dam, or plotting a double murder by two strangers. This course explores these and other fascinating literary instances of unintended consequences—the unanticipated results of actions that people planned ending up a very different way. Reading or watching mainly twentieth-century American literature and movies, as well as some essays and poetry, we will follow a range of different creators as they think about unplanned effects and why they matter. What can these works tell us about how we intend, act, or make meaning at the limits of our control? Texts will include films by Charlie Chaplin, Billy Wilder, and Alfred Hitchcock, poetry or fiction by Wallace Stevens, Patricia Highsmith, and Zadie Smith.
Area: Writing Intensive

AS.300.343. The Cinema of Revolution. 3 Credits.
This course examines global political revolutions through cinema and the ways in which cinema helped to make political revolutions. Early cinema was intimately intertwined with the Russian revolution, and Russian revolutionary cinema had a profound impact on the ways in which media was used for revolutionary purposes through the 20th century and around the world. Students will be introduced to films from a number of different countries, and the history and context of their production and reception. They will also learn methods of film analysis and produce their own video essay.

AS.300.366. Russian Avant-Garde Cinema. 3 Credits.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.367. Seeing Like a Woman. 3 Credits.
What does it mean to "see," think, desire, feel, speak, act, or write "like a woman"? Gendered notions of seeing have had an impact on politics and society long before the #metoo movement and far beyond debates about women's rights in isolation. This seminar examines the issues of female desire, subjectivity, spectatorship and performance in fiction, poetry, memoir and film from a variety of cultures and theoretical perspectives. This is not a course on "the image of the woman" in literature, film or politics, but a course in which we examine the ways in which both male and female theorists, novelists, poets, and filmmakers have imagined how women "see," feel, think and behave.
Area: Writing Intensive

AS.300.399. Cinema and Philosophy. 3 Credits.
What do films and philosophy have in common? Do films express, with their own means, philosophical problems that are relevant to our experience of ourselves and the world we live in? This term we will study such issues with a particular focus on questions of justice, truth, revenge, forgiveness, hope, hate, and fear.

East Asian Studies

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

First Year Seminars

AS.001.122. FYS: Global Cinema in the 21st Century. 3 Credits.
This First-Year Seminar introduces students to the intellectual life of the university by considering some of the riches of contemporary global cinema. After a brief introduction each week, you will watch the assigned film and read some texts to deepen your sense of how to analyze it and think about broader matters the director has taken on. During in-class discussion, we will consider what makes a particular film noteworthy, what the director seems to think about his/her national context, and how local issues intersect with broader questions about the human condition. How does the past shape us? What is justice? What is political action? Who are we responsible to? We will also consider aesthetics. What is a good director? How do we know we are watching good acting (especially when reading subtitles?) What impact do cinematography and editing have on our perception of a film? How do film makers speak to and quote one another?

AS.001.128. FYS: Deep Listening and Multimedia Sound Art. 3 Credits.
Sound plays a rich and complex role in our everyday lives and in our various forms of media art. In the past thirty years, sound studies has become a new addition to the study of the human senses, as well as the relationship of these senses to history, aesthetics, epistemology, culture, and art. How do we listen to the world around us? To different media? In this First-Year Seminar, we explore listening to the lived environment, to music, and to multimedia sound art ranging from performance art to cinema. The nexus of questions surrounding listening opens us up to a host of new texts and approaches: those of acoustic ecology, or how we experience sound via the lived and natural environment; those of the relationship between the senses and our emotions; those of the nature of musical listening; and those of the art world as it engages with sound. This seminar is a mixture of sound theory and practice. We will read, debate, and bring in examples. Students will create their own projects, both written and sonic. No prior experience in sound theory or sound practice are required.

Interdepartmental

AS.360.409. Humanities Research Lab: Documentary Pre-Production. 3 Credits.
This class will be a hands-on experience for students to be involved in the early stages of a documentary's making. Students will be working with the professor on researching, planning, and writing the treatment for a documentary about a forgotten feminist play (1927) from pre-Holocaust Vienna, where diversity and progressive thought were still possible. This romantic comedy centers around a self-determined matriarch, Therese, helping her three daughters navigate the expectations of rigid, societal beliefs – often leading by example – as they find their way into adulthood. Moving back and forth between the archive of its time both through the re-appropriation of Nazi newsreels and propaganda films, as well as ephemeral films of the time and the the new staging of the play, the film will take the audience inside a theater space where a vibrant environment of escapism smashes against the harsh reality of its time, which is as vivid as it was 80 years ago.

Modern Languages and Literatures

AS.211.222. Italian Cinema: The classics, the Forgotten and the Emergent.. 3 Credits.
This course traces the history of Italian cinema from the silent era to the new millennium, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall examine iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, that received international recognition and influenced other national, cinematic productions. We shall also look at the work of less famous, or independent filmmakers who received less critical attention. While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to the mise-en-scène, frame composition, camera movements, editing, and sound. This class is taught in English.

AS.211.316. Brazilian Cinema and Topics in Contemporary Brazilian Society. 3 Credits.
Course is taught in ENGLISH - This course is an introduction to the academic study of cinema as a communicative art and to Brazilian film. The films selected focuses on films from the late 1950s to the present and highlight import episodes and challenges in the advancement of the Brazilian society as well as its cinematic production with a special view to the film aesthetics through analysis from a number of critical perspectives, including class, race, gender as well as ethnicity, nationalism or national identity, colonialism, social changes, and the politics of representation. In this sense, the films and documentaries that we will be watching and studying encompass the period from the rise of New Cinema (Cinema Novo) up to films exploring the most recent trends, including movies launched up to 2016. Students wishing to do the course work in English, for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory / Unsatisfactory basis.
Area: Writing Intensive

AS.211.333. Representing the Holocaust. 3 Credits.
How has the Holocaust been represented in literature and film? Are there special challenges posed by genocide to the traditions of visual and literary representation? Where does the Holocaust fit in to the array of concerns that the visual arts and literature express? And where do art and literature fit in to the commemoration of communal tragedy and the working through of individual trauma entailed by thinking about and representing the Holocaust? These questions will guide our consideration of a range of texts — nonfiction, novels, poetry — in Yiddish, German, English, French and other languages (including works by Primo Levi and Isaac Bashevis Singer), as well as films from French documentaries to Hollywood blockbusters (including films by Alain Resnais, Claude Lanzmann, and Steven Spielberg). All readings in English.
Cannot be taken by anyone who previously took AS.213.361

AS.211.369. We Conduct: Editing a Documentary. 3 Credits.
This course will provide a hands-on opportunity to work with film director and professor of media studies Bernadette Wegenstein in the editing process of We Conduct, a documentary about the magic of orchestral conducting and the changing face of those who are called to this vocation. The film follows famed conductor Marin Alsop as she breaks new ground in her already distinguished career. The film was shot predominantly in Baltimore, but also in New York, São Paulo, Vienna, Lucerne, and London, with Shana Hagan (Los Angeles) as Director of Photography, additional cinematography by Judith Benedikt (Vienna), and John Benam (Baltimore). During the semester we will be looking at the various narratives in their rough format, and see the film take shape from treatment to full-fledged documentary narrative. Editor Victor Livingston based in Los Angeles will come to work with the class twice during the semester.

AS.211.386. Italian Cinema. 3 Credits.
Italian Cinema: The Classics, The Forgotten, The Emergent. This course traces the history of Italian cinema from the silent era to the contemporary period, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall discuss iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, (the classics) that received international recognition and had a global impact on film history, and also rare archival films by pioneer women filmmakers from the silent era (the forgotten). Finally, we'll discuss films released in the last decade (the emergent) that address issues such as migration and the ecological crisis. (Zoom Q&As with filmmakers will be part of curriculum). While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to frame composition, camera movements, editing, and sound. This is an intensive writing class taught in English.
Area: Writing Intensive

AS.211.444. The Apocalypse in Literature and Film. 3 Credits.
"Everything which we loved is lost! We are in a desert" – this emotional assertion was the reaction to Kazimir Malevich's 1915 painting The Black Square, as the artist himself recalled it. This sentiment of fearing, warning and even witnessing the end of the world as we know it, will stand at the center of the course. We will study the literary and cinematic representations of this apocalyptic notion and investigate its theoretical, theological, physiological and aesthetic aspects. We will seek to trace the narrative dynamics as well as literary and cinematic means of apocalyptic representations in works from various periods, languages, cultures and religions. Among the issues to be discussed: what is the apocalypse, biblical apocalypse, dystopia and nostalgia, trauma and post trauma, war and the apocalypse, the Holocaust as the end of civilization, the atomic bomb, realism and anti-realism, political changes and the apocalypse in popular culture.
Area: Writing Intensive

AS.211.480. Religious Themes in Film and Literature. 3 Credits.
This course would be of interest to anyone who would like to learn about the intersection of religion and modern culture. At the center of the course will stand a close study of the representation of religious themes and their role in modern literature and cinema. The works which we will deal with are not considered religious and yet they include religious themes as part of their narrative, images, language or symbolic meaning. We will trace in various works from various countries and genre, themes such as: divine justice, providence, creation, revelation, the apocalypse, prophecy, sacrifice and religious devotion. We will also study the ways in which Biblical and New Testament stories and figures are represented in these works. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

Writing Seminars

AS.220.218. Writers on Film. 3 Credits.
An interdisciplinary course focusing on the film writings of poets, novelists, critics, and essayists such as Virginia Woolf, H.D., James Agee, James Baldwin, and Pauline Kael; and films showing the intertitle and screenplay work of writers such as Anita Loos, F. Scott Fitzgerald, William Faulkner, and Jean Cocteau. Participants will write weekly assignments on film from a critical perspective.
Area: Writing Intensive

AS.220.221. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between modernist literature and cinema in response to the social and technological changes of the twentieth century. Prominent figures include Charlie Chaplin, Ezra Pound, T. S. Eliot, Virginia Woolf, Franz Kafka, Sergei Eisenstein, Jean Epstein, John Dos Passos, Zora Neale Hurston, Paul Strand, and Gertrude Stein. Participants will write weekly assignments on films and readings from a critical perspective.
Area: Writing Intensive

For current faculty and contact information go to http://krieger.jhu.edu/film-media/directory/

Film and Media Studies, Bachelor of Arts

Film and Media Studies Major Requirements

(See also Requirements for a Bachelor's Degree (p. 1587).)

Because the program emphasizes the historical, cultural, and social context of cinema, Film and Media Studies is an excellent program for undergraduates interested in a broadly humanistic education as well as for those preparing for a career in the field. A departmental faculty advisor assigned to each undergraduate major helps plan individual courses of study. Undergraduates are encouraged to participate fully in all departmental activities.

In addition to core required courses, each student must complete a critical studies, screenwriting or production track for the major. All courses applied toward the major must be taken for a letter grade and a grade of C- or better must be earned. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the major without permission of the Director of Undergraduate Studies.

Code	Title	Credits
Core Required Courses		
AS.061.140	Introduction to Cinema, 1892-1960	3
AS.061.141	Introduction to Cinema, 1941-present	3
AS.061.226	Special Topics: Writing About Film	3
Foreign language (two semesters at elements level or demonstrated proficiency equivalent to one year of elements)		**6-9**
Completion of One Track in Critical Studies, Screenwriting, or Production		**33-36**
Total Credits		**48-54**

Tracks

Code	Title	Credits
CRITICAL STUDIES TRACK		
AS.061.150	Introduction to Film Production	3
or AS.061.145	Introduction to Digital Video Production: Visual Language	
or AS.061.152	Introduction to Digital Video Production	
Two (2) 200-level critical studies film courses (POS tag FILM-CRITST). Screenwriting courses cannot be applied for this requirement.		6
Seven (7) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of 2 classes outside of Film and Media studies can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. Screenwriting courses cannot be applied to this requirement. MI.061 classes cannot count toward this requirement.		21
AS.061.441	Senior Capstone Project: Critical Studies	3
Total Credits		**33**

Code	Title	Credits
SCREENWRITING TRACK		
AS.061.150	Introduction to Film Production	3
or AS.061.145	Introduction to Digital Video Production: Visual Language	
or AS.061.152	Introduction to Digital Video Production	
One (1) Intermediate Film Production or Intermediate Digital Production Course (note: the prerequisite for Intermediate Film Production is AS.061.150; the prerequisite for intermediate Digital Production is AS.061.145 or AS.061.152). The course chosen to fulfill this requirement must have POS tag FILM-PROD.		3
One (1) 200-level critical studies film course (POS tag FILM-CRITST). Screenwriting courses cannot be applied to this requirement.		3
Select one (1) of the following hybrid courses:		3
AS.061.147	Visual Storytelling	
or AS.061.31	Media and Narrative	
AS.061.205	Introduction to Screenwriting	3
AS.061.373	Intermediate Screenwriting	3
AS.061.404	Advanced Screenwriting	3
or AS.061.403	Advanced Screenwriting: Concocting the Thriller	
One (1) 200-300 level screenwriting course (POS tag FILM-SCRWRT).		3
Three (3) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of one class outside of Film and Media Studies can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. Screenwriting courses cannot be applied to this requirement. MI.061 classes cannot count toward this requirement.		9
AS.061.542	Senior Capstone Project: Screenwriting	3
Total Credits		**36**

Code	Title	Credits
PRODUCTION TRACK		
AS.061.150	Introduction to Film Production	3
AS.061.145	Introduction to Digital Video Production: Visual Language	3
or AS.061.152	Introduction to Digital Video Production	
One (1) 200-level critical studies film course (POS tag FILM-CRITST). Screenwriting courses cannot be applied to this requirement.		3
Four (4) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of one class outside of Film and Media studies can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. Screenwriting courses cannot be applied to this requirement. MI.061 classes cannot count toward this requirement.		12
One (1) 200-300 level screenwriting course (POS tag FILM-SCRWRT).		3
One (1) Intermediate Film Production or Intermediate Digital Video Production Course (note: the prerequisite for Intermediate Film Production is AS.061.150; the prerequisite for intermediate digital production is AS.061.145 or AS.061.152). The course chosen to fulfill this requirement should have POS tag FILM-PROD.		3
One (1) Advanced Film Production Course. This will be a 300- to 400-level course with POS tag FILM-PROD.		3-6
AS.061.440	Senior Capstone Project: Production	3
Total Credits		**33-36**

Sample Program of Study

Critical Studies Track

Course	Title	Credits
First Year		
First Semester		
AS.061.140	Introduction to Cinema, 1892-1960	3
One of the listed writing courses		3
One Foreign Language		3
	Credits	**9**
Second Semester		
AS.061.141	Introduction to Cinema, 1941-present	3
One Foreign Language		3

One intro production course		3
	Credits	**9**
Second Year		
First Semester		
Two 200-level Critical Studies Film Courses		6
	Credits	**6**
Second Semester		
Two 300- or 400-level Critical Studies Film Courses		6
	Credits	**6**
Third Year		
First Semester		
Two 300- or 400-level Critical Studies Film Courses		6
	Credits	**6**
Second Semester		
Two 300- or 400-level Critical Studies Film Courses		6
	Credits	**6**
Fourth Year		
First Semester		
One 300- or 400-level Critical Studies Film Courses		3
	Credits	**3**
Second Semester		
AS.061.441	Senior Capstone Project: Critical Studies	3
	Credits	**3**
	Total Credits	**48**

Screenwriting Track

Course	Title	Credits
First Year		
First Semester		
AS.061.140	Introduction to Cinema, 1892-1960	3
One of listed writing courses		3
One foreign language		3
	Credits	**9**
Second Semester		
AS.061.141	Introduction to Cinema, 1941-present	3
AS.061.205	Introduction to Screenwriting	3
One foreign language		3
	Credits	**9**
Second Year		
First Semester		
One 200-level critical studies film course (POS tag FILM-CRITST)		3
One introductory film production course		3
	Credits	**6**
Second Semester		
Intermediate Film Production (200-level film or digital film production course with POS tag FILM-PROD)		3
AS.061.373	Intermediate Screenwriting	3
	Credits	**6**
Third Year		
First Semester		
One 300 or 400-level critical studies film course (POS tag FILM-CRITST)		3
AS.061.404	Advanced Screenwriting	3
AS.061.147 or AS.061.317	Visual Storytelling or Media and Narrative	3
	Credits	**9**
Second Semester		
One 300 or 400-level critical studies film course (POS tag FILM-CRITST)		3
One screenwriting elective (FILM-SCRWRT)		3
	Credits	**6**
Fourth Year		
First Semester		
One 300 or 400-level critical studies course (POS tag FILM-CRITST)		3
	Credits	**3**
Second Semester		
AS.061.542	Senior Capstone Project: Screenwriting	3
	Credits	**3**
	Total Credits	**51**

Production Track

Course	Title	Credits
First Year		
First Semester		
AS.061.140	Introduction to Cinema, 1892-1960	3
AS.061.150 or AS.061.145 or AS.061.152	Introduction to Film Production or Introduction to Digital Video Production: Visual Language or Introduction to Digital Video Production	3
One listed writing course		3
One Foreign Language		3
	Credits	**12**
Second Semester		
AS.061.141	Introduction to Cinema, 1941-present	3
AS.061.150 or AS.061.145 or AS.061.152	Introduction to Film Production or Introduction to Digital Video Production: Visual Language or Introduction to Digital Video Production	3
One Foreign Language		3
	Credits	**9**
Second Year		
First Semester		
One 200-level Critical Studies Film Course		3
One 200- or 300-level Screenwriting Course		3
	Credits	**6**
Second Semester		
One 300- or 400-level Critical Studies Film Course		3
One Intermediate Film Production or Intermediate Digital Video Production Course		3
	Credits	**6**

Third Year		
First Semester		
One 300- or 400-level Critical Studies Film Course		3
	Credits	**3**
Second Semester		
One 300- or 400-level Critical Studies Film Course		3
One Advanced Film Production Course (300-400 level course with POS-Tag FILM-PROD)		3
	Credits	**6**
Fourth Year		
First Semester		
One 300- or 400-level Critical Studies Film Course		3
	Credits	**3**
Second Semester		
AS.061.440	Senior Capstone Project: Production	3
	Credits	**3**
	Total Credits	**48**

Film and Media Studies, Minor

Film and Media Studies Minor Requirements

Students pursuing the minor select the critical studies, screenwriting, or production track. All courses applied toward the minor must be taken for a letter grade and a grade of C- or better must be earned. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. The minor requirements are as follows:

Critical Studies Track

Code	Title	Credits
AS.061.140	Introduction to Cinema, 1892-1960	3
or AS.061.141	Introduction to Cinema, 1941-present	
AS.061.145	Introduction to Digital Video Production: Visual Language	3
or AS.061.150	Introduction to Film Production	
or AS.061.152	Introduction to Digital Video Production	
One (1) 200-level critical studies film course (POS tag FILM-CRITST). Screenwriting courses cannot be applied for this requirement.		3
Four (4) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of one class taken outside of Film and Media Studies Department can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. Screenwriting courses cannot be applied for this requirement. MI.061 classes cannot count toward this requirement.		12
Total Credits		**21**

Screenwriting Track

Code	Title	Credits
AS.061.140	Introduction to Cinema, 1892-1960	3
or AS.061.141	Introduction to Cinema, 1941-present	
AS.061.145	Introduction to Digital Video Production: Visual Language	3
or AS.061.150	Introduction to Film Production	
or AS.061.152	Introduction to Digital Video Production	
One (1) 200-level critical studies film course (POS tag FILM-CRITST). Screenwriting courses cannot be applied for this requirement.		3
Select one (1) of the following hybrid courses:		3
AS.061.147	Visual Storytelling	3
or AS.061.317	Media and Narrative	
Two (2) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of one class taken outside of Film and Media Studies Department can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. Screenwriting courses cannot be applied for this requirement. MI.061 classes cannot count toward this requirement.		6
AS.061.205	Introduction to Screenwriting	3
AS.061.373	Intermediate Screenwriting	3
AS.061.404	Advanced Screenwriting	3
Total Credits		**30**

Production Track

Code	Title	Credits
AS.061.140	Introduction to Cinema, 1892-1960	3
or AS.061.141	Introduction to Cinema, 1941-present	
One (1) 200-level critical studies film course (POS tag FILM-CRITST). Screenwriting courses cannot be applied for this requirement.		3
Three (3) 300- or 400-level critical studies film courses (POS tag FILM-CRITST). A maximum of one class taken outside of Film and Media Studies Department can count toward this requirement. Students are strongly encouraged to take at least one course focusing on cinema outside the United States. One screenwriting course (POS tag FILM-SCRWRT) can be applied to this requirement. MI.061 classes cannot count toward this requirement.		9
AS.061.145	Introduction to Digital Video Production: Visual Language	3.0
or AS.061.150	Introduction to Film Production	
or AS.061.152	Introduction to Digital Video Production	
One (1) intermediate film production course (061.2xx with POS tag FILM-PROD)		3
One (1) Advanced Film Production Course. This will be a 300- to 400-level course with POS tag FILM-PROD.		3
Total Credits		**24**

History

http://history.jhu.edu/

The Department of History offers students the opportunity to work intensively in the classroom and with individual faculty to discover the richness and complexity of history. Undergraduates begin with general courses, but progress quickly to courses that explore topics in depth and provide experience in researching, analyzing, and writing about the past. Graduate students work independently and with faculty advisors on reading and research in their fields of interest, while departmental seminars bring them together to discuss their research, forging a collegial intellectual culture. The department emphasizes European history, United States history, and the histories of Africa, Latin America, and China. Faculty and students participate in a variety of interdisciplinary programs, including Africana Studies, East Asian Studies, Latin American Studies, Judaic Studies, Museums and Society, the Program for the Study of Women, Gender & Sexuality, and International Studies.

Facilities

In addition to the Milton S. Eisenhower Library at the university, students in the Department of History can use the collections of the Peabody Institute Library, the Enoch Pratt Free Library, and the Maryland Historical Society in Baltimore, and of the Library of Congress, the National Archives, the Folger Shakespeare Library, and other specialized libraries in nearby Washington, D.C. There is provision for regular transportation to and from the Library of Congress. Also within easy distance are the holdings of specialized historical libraries and archives in Annapolis, Richmond, Williamsburg, Charlottesville, Wilmington, Harrisburg, Philadelphia, Trenton, Princeton, Newark, and New York.

Graduate Programs

The graduate program prepares professionally motivated students for careers as research scholars and college and university teachers. Hence it is designed for candidates who want to proceed directly to the Ph.D. degree, who have developed historical interests, and who are prepared to work independently. Within the areas of European history, American history, and the histories of Africa, Latin America, and China, the department emphasizes social/economic and intellectual/cultural history. Although diplomatic and political history are not emphasized, attention is given to the social, economic, and cultural bases of politics.

The program is organized around seminars rather than courses, credits, or grades. AS.100.781 The Seminar-AS.100.782 The Seminar and satellite seminars in European, American, and Comparative World History bring together students, faculty, and invited scholars from outside the university to discuss their research work. These departmental seminars create a lively intellectual community in which graduate students quickly become contributing members. The combination of flexibility, independence, and scholarly collegiality offered by the Hopkins program gives it a distinctive character.

Students select four fields (one major and three minor) and make their own arrangements with professors for a study program leading to comprehensive examinations at the end of the second year. Those arrangements may include taking a seminar in the field. One, and exceptionally two, minor field may be taken outside the Department of History. Students have maximum flexibility in the construction of individual plans of study, as well as the opportunity to work closely with several professors.

Admission and Financial Aid

In judging applications, the department puts particularly heavy emphasis on the quality of the student's historical interests and prior research experience. Each applicant must submit a sample of written work. Ordinarily no candidate for admission is accepted whose record does not indicate an ability to read at least one foreign language.

The department accepts only those students who plan to work in the specific fields of the faculty, and each student is admitted only with the approval of a particular professor. Applicants should indicate the proposed field of specialization at the time of application. With the concurrence of a new faculty advisor, students may, of course, later change their major professor.

The department normally provides full fellowship support for all admitted students including both tuition and a stipend. Students are encouraged to apply for external support if eligible.

Programs

- History, Bachelor of Arts (p. 1862)
- History, Bachelor of Arts/Master of Arts Four-Year Program (p. 1864)
- History, Minor (p. 1864)
- History, PhD (p. 1864)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.100.102. The Medieval World. 3 Credits.
This course explores selected topics in the political, economic, social, and intellectual history of Western Europe in the wider world in the period between the fall of the Roman Empire and the fourteenth century. Special emphasis will be given to understanding the ways in which medieval society functioned as it reorganized itself after the almost total collapse of the ancient world. Topics include: religious plurality, sovereignty and subjecthood, flourishing of learning, chivalric culture, crusading, and the plague and its effects. We will follow the interplay between material and cultural forces in the processes of social organization.
Area: Writing Intensive

AS.100.103. Early Modern Europe & the Wider World. 3 Credits.
This course surveys the history of Europe and its interactions with Africa, the Americas, and Asia during the early modern period (c. 1400-1800). Topics include: the Renaissance, the Reformation, International Relations and Warfare, Colonialism, the Enlightenment, and the Age of Revolutions.

AS.100.104. Modern Europe and the Wider World. 3 Credits.
The Modern European World familiarizes students with key moments, ideas, communities, individuals, and movements which have formed European History since the Revolutionary era.

AS.100.108. Making America: Black Freedom Struggles to 1896. 3 Credits.
From slave revolts on the West African coast to national conventions and civil war, people of African descent have defined freedom and struggle in terms of kinship, diasporic connection, and fighting antiblack violence. This course explores the arc of that history and its role in the making of America.

AS.100.113. Making America: Race, Radicalism, and Reform. 3 Credits.
This course examines race and social movements in America from the Revolution to 1921.

AS.100.115. Modern Latin America. 3 Credits.
A class combining Latin American history since independence and digital humanities (revised with 2021 student feedback). Students will build guided research projects while thinking about questions of republicanism, freedom and unfreedom, migration, and development.

AS.100.122. Introduction to History of Africa (since 1880). 3 Credits.
An introduction to the African past since 1880.
Area: Writing Intensive

AS.100.123. Introduction to African History: Diversity, Mobility, Innovation. 3 Credits.
Introduction to three major themes in African history, from the precolonial era to the present.
Area: Writing Intensive

AS.100.128. Approaches to Jewish History. 3 Credits.
The course will provide an introduction to the study of Jewish History.

AS.100.129. Introduction to Modern Jewish History. 3 Credits.
Jewish history 1750-present in Europe, the Near East, the US, Israel; the challenges of modernity and new forms of Jewish life and conflict from Enlightenment and emancipation, Hasidism, Reform and Orthodox Judaism to capitalism and socialism; empire, nationalism and Zionism; the Holocaust. Extensive attention to US Jewry and State of Israel.

AS.100.154. Modern Mexico from the Alamo to El Chapo. 3 Credits.
In this course we will use popular depictions of Mexico's heroes and villains, tragedies and triumphs to delve into both the nation's history and the importance of thinking historically.

AS.100.165. Japan in the World. 3 Credits.
This course is an introduction to Japan's history from 1800 to the present with emphasis on the influences of an increasing global circulation of ideas and people. Topics include the emperor system, family and gender, imperialism, World War II, the postwar economy, and global J-pop.

AS.100.170. Chinese Cultural Revolution. 3 Credits.
The Cultural Revolution was Mao Zedong's last attempt to transform Chinese society spiritually and structurally. The events of this period were marked by social upheaval, personal vendettas, violence, massive youth movements, and extreme ideological pressure. This course will explore the Cultural Revolution from a variety of perspectives, focusing on the relationship between events in China from 1966-1976, and their interpretation in China and the West during the Cultural Revolution decade and since. (Previously offered as AS.100.219 and AS.100.236.)

AS.100.180. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography.

AS.100.190. Modern African American History, 1896 – present. 3 Credits.
This course introduces students to the defining social, political, and cultural moments that reflect the experience of African Americans in the United States, 1896 – present. Topics include the Great Migration, the Harlem Renaissance, the Black Freedom Struggle, African American politics, urban rebellion, mass incarceration, Hip Hop culture, the current movement for Black Lives, and more.

AS.100.193. Undergraduate Seminar In History. 3 Credits.
The first semester of the two-semester sequence required for majors, this course introduces students to the theory and practice of history. Following a survey of approaches to the study of the past and an introduction to research methods, students undertake original research and write an extended essay. Intended for history majors and prospective majors.
Area: Writing Intensive

AS.100.194. Undergraduate Seminar in History. 3 Credits.
The second semester of the two-semester sequence required for majors, this course further introduces students to the theory and practice of history. Students write an essay based on original research.
Area: Writing Intensive
AS.100.193

AS.100.216. Reformation and Counter Reformation Europe. 3 Credits.
This course explores the series of religious and political conflicts that make up what are known now as the Reformation and Counter-Reformation in Europe.

AS.100.230. Bones, Blood, and Ecstasy: Religious Culture in Western Christendom, 1100-1700. 3 Credits.
Explores religious culture in medieval and early modern Europe, with an emphasis on spiritual beliefs and practices, relics, miracles, pilgrimage, and saint-making. Emphasis on reading and discussing written sources and visual culture.
Area: Writing Intensive

AS.100.231. Worlds of Hip Hop. 3 Credits.
Worlds of Hip-Hop explores hip-hop as an arts movement whose forms, conventions, and standards responded to the specific political and social conditions to address questions of freedom and community.

AS.100.233. History of Modern Germany. 3 Credits.
There is more to Germany than beer, BMWs, and Bayern Munich. We explore politics, culture, economics and society to understand Germany and its role within Europe and the world from the 18th century to the 'Refugee Crisis', climate change and EU politics today.

AS.100.238. Expansion and the Early U.S. Republic. 3 Credits.
This course will introduce students to some major issues and problems in the history of the Early U.S. Republic, c. 1750 to 1815, by focusing on the theme of "expansion."

AS.100.240. American Cultural Criticism. 3 Credits.
This course explores 20th century U.S. history through the works of writers and artists. We will ask how essays, novels, performance, and art can function as cultural and social criticism.
Area: Writing Intensive

AS.100.241. American Revolution. 3 Credits.
This course provides an intensive introduction to the causes, character, and consequences of the American Revolution, the colonial rebellion that produced the first republic in the Americas, and set in motion an age of democratic revolutions in the Atlantic world. A remarkable epoch in world history, the revolutionary era was of momentous significance.
Area: Writing Intensive

AS.100.243. China: Neolithic to Song. 3 Credits.
This class offers a broad overview of changes in China from Neolithic times through the Song Dynasty (roughly from 5000 BCE through the 13th century CE) and will include discussion of art, material culture, and literature as well as politics and society. Close readings of primary sources in discussion sections and extensive use of visual material in lectures will help students gain firsthand perspective on the materials covered.

AS.100.248. Japan in the World. 3 Credits.
An introduction to Japan's history from 1700 to the present, with emphasis on the influences of an increasing global circulation of ideas, goods, and people in early modern and modern times. Topics include samurai, nation-building, gender, imperialism, World War II, the postwar economy, and contemporary popular culture.

AS.100.250. The American Revolution in Unexpected Places. 3 Credits.
This course considers the American Revolution from the perspective of locations beyond the thirteen rebelling colonies. Covering a range of global hotspots, the focus is on events from 1763 to 1788.

AS.100.251. West African History. 3 Credits.
This course explores the rich history of West Africa and its place in the broader world. Topics include the environmental history of the Sahara desert, West African empires, and the rise of Nollywood and contemporary culture.
Area: Writing Intensive

AS.100.268. Jewish and Christian mysticism in the Middle Ages and the Early Modern Period. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 12th and the 17th centuries.

AS.100.270. Europe since 1945. 3 Credits.
This class focuses on Europe from the end of World War II until today. We will discuss such topics as the Cold War, social democracy, the welfare state, the relationship to the US and the Soviet Union, decolonization, migration, 1989, European integration, neoliberalism, and the EU. We will discuss and analyze academic literature, movies, documentary films, textual and visual primary sources.

AS.100.273. A Comparative History of Jewish and Christian Mysticism. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 11th and the 19th centuries.

AS.100.275. Passing in American Culture. 3 Credits.
This course explores passing narratives – stories that feature people who cross race, class, ethnic, or gender boundaries. We will consider what passing narratives can teach us about power and identity, especially as power is presumed to reside in the self and race is presumed to no longer matter.

AS.100.282. Race & Power in Modern South Africa. 3 Credits.
Overview of modern South African history, with a focus on the origins of the racial state and the development of black liberation movements.

AS.100.283. Making and Unmaking Queer Histories, 1800-Present. 3 Credits.
Making and Unmaking Queer Histories introduces students to the major themes and historical developments which shape contemporary understandings of LGBTQ+-identified subjects and communities in the US and Western Europe.
Area: Writing Intensive

AS.100.291. Medicine in an Age of Empires, 1500-1800. 3 Credits.
How did medicine emerge as a distinctive body of knowledge and a profession in the early modern period? The answers lie in the histories of disease, empire, and global commerce.

AS.100.293. Historical Methods, Archives and Interpretations. 3 Credits.
Surveys methods, approaches, and practices of historical writing. It asks students to think about the questions historians ask, the archives they use, and the arguments they make. Students will be introduced to subversive and emancipatory potential of contemporary scholarship that importantly incorporates subaltern, marginalized, or formerly forgotten voices.
Area: Writing Intensive

AS.100.294. Undergraduate Seminar in History. 3 Credits.
The second semester of the two-semester sequence required for majors, this course further introduces students to the theory and practice of history. Students write an essay based on original research.
Area: Writing Intensive

AS.100.295. American Intellectual History since the Civil War. 3 Credits.
Readings in American social thought since 1865, ranging across developments in philosophy, literature, law, economics, and political theory.
Area: Writing Intensive

AS.100.301. America after the Civil Rights Movement. 3 Credits.
This course explores the history of late twentieth-century America by examining the social, economic, and political legacies of 1960s civil rights protest for the 1970s, 1980s, and 1990s.
Area: Writing Intensive

AS.100.303. Old Regime and Revolutionary France. 3 Credits.
Examines the history of France from the reign of Louis XIV to the French Revolution, focusing on early modern society, popular culture, absolutism, the Enlightenment, overseas empire, and the French and Haitian Revolutions.
Area: Writing Intensive

AS.100.304. Ecstasy: Mystical, Visionary, and Holy Women and their Writings in Medieval Europe, ca. 1000-1400. 3 Credits.
This course uses the writings of medieval women to explore their social and religious worlds and orients visionary writing within the broader narrative of religious movements from the 12th-14th centuries.
Area: Writing Intensive

AS.100.305. Peter to Putin: Survey. 3 Credits.
Seminar on modern Russia. No midterm and no final. 6 short weekly journals, two short papers, and two small quizzes.
Area: Writing Intensive

AS.100.310. The French Revolution. 3 Credits.
Political, social and cultural history of a turning-point in European history that witnessed the birth and death of democracy.

AS.100.314. The Enlightenment. 3 Credits.
Examines the Enlightenment, an intellectual movement that swept Europe in the eighteenth century to shape the modern world. Topics include science and religion; print culture; gender and sociability; political economy; and race, slavery, and colonialism.
Area: Writing Intensive

AS.100.319. History of American Reproductive Politics. 3 Credits.
This course examines reproductive politics in the United States from the colonial era to the present. Topics include contraception, abortion, and sterilization, emphasizing the impact of gender, class, and race.
Area: Writing Intensive

AS.100.321. Political Thought and Social Transformation in the Haitian Revolution and Early Independent Mexico, c. 1789-1850. 3 Credits.
This course will examine both the Haitian Revolution and the early period of Mexican independence by engaging with the ideas of actors within these events in international contexts.
Area: Writing Intensive

AS.100.323. America in the 1960s. 3 Credits.
The years between 1959, when the course begins, and 1971, when it ends, were tumultuous and divisive. This course explores the political, racial, and cultural struggles of a half century ago.
Area: Writing Intensive

AS.100.324. American Origins, ca. 1619-ca. 1776. 3 Credits.
This discussion-based seminar focuses on Colonial American history, using maps, objects, and other primary sources to examine such topics as colonialism, slavery, war, disease, trade, empire, and cultural encounters.

AS.100.326. From Blood Feud to Black Death: European Society in the High Middle Ages, 1000-1400. 3 Credits.
Explores the development of society and institutions in the medieval west including kingship and law, religion and difference, gender and ideology. Looks closely at social responses to change and adversity.

AS.100.327. The Islamic Age of Empires. 3 Credits.
In this course we will survey the political, social, intellectual, and cultural history of the three Islamic early modern gunpowder empires that ranged from “the Balkans to Bengal”: The Ottomans (1300-1922), the Safavids (1501-1736), and the Mughals (1526-1858).
Area: Writing Intensive

AS.100.329. Russian Imagination in Three Revolutions. 3 Credits.
Russian Literature and the arts in Revolutions of 1905, 1917, and Stalin era to 1941. Req: 6 journals of 350 words, 2 papers 1250, 2 quizzes. No midterm or final.
Area: Writing Intensive

AS.100.333. Making Money in the Atlantic World. 3 Credits.
The history of money is a history of power exercised by states, institutions, and individuals. It is also a history of the structural possibilities and constraints faced by people in the past. We will address making, using, and conceptualizing money in the early modern Atlantic World, a time and a place of expanding empires, extractive enterprises, and changing categories of difference like race, gender, and class.

AS.100.335. The American West. 3 Credits.
This course explores the expansion and creation of an American West—and its inhabitants—from the Constitution to the end of the nineteenth century.
Area: Writing Intensive

AS.100.336. The United Kingdom? A Cultural History of Four Nations, 1707-Present. 3 Credits.
This course delves into the variegated, often divergent national politics, social landscapes, and cultural shifts in England, Scotland, Wales, and Ireland since Britain’s Acts of Union in 1707.
Area: Writing Intensive
AS.100.101 OR AS.100.102 OR AS.100.103[OR AS.100.104

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.343. The Annales School. 3 Credits.
This is not a typical history course but one on historical theory and modern historiographical thought. How did historians in the past generations attempt to analyze the past? To what extent is history connected to other disciplines? What was the French contribution to contemporary historiography? What is "new history"? In this seminar, we are going to examine the scholarship of the French Annales, arguably the most influential and revolutionary “school” of historiography in the twentieth century. Students will read selected works of the Annales historians and discuss concepts such as economic history, serial history, longue durée, conjuncture, total history, mentalité, historical psychology, and historical anthropology.
Area: Writing Intensive

AS.100.346. Soviet-American Cold War. 3 Credits.
The focus will be on Soviet-American interactions, Cold-War Cultures, and the impact on both societies.
Area: Writing Intensive

AS.100.347. Early Modern China. 3 Credits.
The history of China from the 16th to the late 19th centuries.
Area: Writing Intensive

AS.100.348. 20th-Century China. 3 Credits.
Survey of the history of China from ca. 1895 to ca. 1976.
Area: Writing Intensive

AS.100.349. Entertaining America: Popular Culture from Blackface to Broadcast. 3 Credits.
"Entertaining America” will trace the history of popular culture in the United States, starting inthe 1830s, when blackface minstrelsy initiated a new wave of commercial performance, andending in the 1920s, when records, films, and radio ushered in the era of mass culture.
Area: Writing Intensive

AS.100.354. Playing in the White: Black Writers, the Literary Colorline and Writing Whiteness. 3 Credits.
This course will turn to known and not-so-known black writers during the early to mid-twentieth century who defied literary expectation and wrote stories that featured or focused on whiteness. We will consider what whiteness offered black writers and the political work that their literary experimentations did for a white American publishing industry.

AS.100.355. Sex and Society in Early Modern Europe. 3 Credits.
This course will examine how early modern views on the body, gender, and sexuality shaped beliefs about the abilities and rights of women and men.
Area: Writing Intensive

AS.100.360. The Modern British World: Imperial Encounters, Regimes, and Resistance, from the American Revolution to the present. 3 Credits.
The Modern British World introduces some of the major events, themes, and controversies that led to Britain’s global dominance and ultimate decline as an imperial power. This course focuses on varying forms of imperial governance, the interrelationships between metropole and colony, and the formation of British and colonial national identities.
Area: Writing Intensive

AS.100.361. Age of Tolstoy. 3 Credits.
Tolstoy and his era, 1820s to 1910s. Topics include state and politics, empire, the Russian identity, and forms of cultural expression. Students consider "War and Peace" and other masterworks.
Area: Writing Intensive

AS.100.365. Culture & Society in the High Middle Ages. 3 Credits.
This course will cover the period commonly known as the High Middle Ages, that is, the civilization of Western Europe in the period roughly from 1050 to 1350. . It is a period of exceptional creativity in the history of Western Europe and in medieval history specifically, a time when many of the most characteristic institutions of Europe came into being.
Area: Writing Intensive

AS.100.369. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography from the 19th century to the present.

AS.100.371. Modernity, Catastrophe, and Power in Jewish History: 1881 to the Present. 3 Credits.
Jewish history, politics, and culture across a century of enormous transformations and transformative enormities in Europe, the US, and the Middle East. Topics include: impacts on Jewish life of World War I, the Russian Revolution, and the post-imperial reordering of the Eastern Europe and the Middle East; Zionism and other modes of Jewish contestatory politics; the consolidation of American Jewry; Nazism and the Holocaust in Europe; formation and development of the State of Israel; the global reordering of Jewish life amid cross-currents of the Cold War, conflict in the Middle East, and success in the US. Substantial attention to recent and contemporary history including the dramatic changes in Israeli society and polity over the past forty years and the ongoing Israeli-Palestinian conflict.
Area: Writing Intensive

AS.100.373. Crime, Punishment, Felony and Freedom: Law and Society in Pre-Modern England. 3 Credits.
Using legal texts as a window into English society, we will address the changing nature of royal power, trial by jury, treason, felony, and the freedoms enshrined in the Magna Carta.

AS.100.374. Conquest, Conversion, and Language Change in the Middle Ages. 3 Credits.
Examines case-studies of imperial conquests (Islamic, Mongol, reconquista, early colonialism) and attendant changes in religion (Christianization; Islamization) and in language (Arabization; transition from Latin to European vernaculars) across medieval Eurasia.

AS.100.375. Histories of Women and the Vote. 3 Credits.
The year 2020 will mark 100 years since the 19th Amendment guaranteed American women the right to vote. Or did it? This course will examine the long history of women's voting rights in the United States, including the story that extends from a convention at Seneca Falls, NY to a constitutional amendment. It will also examine alternative stories, especially those of women of color whose campaigns for the vote did not end in 1920 – and continue until today.

AS.100.377. The Age of Reason on the Silver Screen: Cinematic Representations of the Enlightenment. 3 Credits.
This course will discuss the problem of historical representation on the basis of an analysis of movies depicting the Age of the Enlightenment.

AS.100.379. Brazil History and Cultures: A Glance from Baltimore. 3 Credits.
Using textual and visual documents (including books from Peabody Library), we will examine the contrasts of Brazilian history and culture, and its connections with 19th and 20th century Baltimore.

AS.100.383. Conversion and Apostasy in the Middle Ages. 3 Credits.
Compares religious transformation in medieval Europe and the Middle East (ca. 600-1500), including conquest and conversion; conversion narratives; apostasy, martyrdom and other encounters between medieval Jews, Christians, and Muslims. Pre-requisite for enrollment: Students must have taken one history course.

AS.100.384. Intoxicated: Commodities & Globalization in the Early Modern World. 3 Credits.
Each week we examine a commodity that defined a new era of global connectivity in the centuries after 1492, including money, medicines, slaves, and fashion.

AS.100.386. The Cold War as Sports History. 3 Credits.
Sport is key to understanding the Cold War. We will investigate how the Cold War has shaped sports, the Olympic movement, the role of athletes at home and abroad, how sports were used in domestic and foreign policy, and how Cold War sports reinforce or challenge notions of race, gender, and class.
Area: Writing Intensive

AS.100.387. Everyday Life in the Medieval Middle East. 3 Credits.
Explores the daily lives of non-elites in the medieval Middle East—food; housing; clothes; marriage and divorce; urban festivals—through primary documents (e.g. letters, court records) and artifacts (e.g. clothing).Pre-requisite for enrollment: Students must have taken one history course.

AS.100.389. History of Law and Social Justice. 3 Credits.
Cause lawyering aims to change the status quo. This course examines histories of this approach to social justice, from battles against the slave trade to contemporary campaigns for marriage equality.

AS.100.390. The Medieval Crusades: Cultural Convergence and Religious Conflict, 1000-1400. 3 Credits.
This course explores the origins of the idea of crusading, examines the experiences of those who traveled east, and analyzes the cultures of contact that developed ca. 1095 and 1291.

AS.100.392. The Art of Lying: Lie, Dissimulation, and the "Fake News" in Pre-modern Europe. 3 Credits.
The course will examine the early modern attitudes to lie and dissimulation.

AS.100.393. Think Globally, Research Locally: Early Maryland and the World. 3 Credits.
A research-intensive seminar, this course uses the rich history of Maryland to approach broader themes in early modern American and global history including colonialism, slavery, revolution, race, gender, and sex.

AS.100.394. Brazilian Paradoxes: Slavery, Race, and Inequality in Brazil (from a Portuguese Colony to the World's 8th Largest Economy). 3 Credits.
Place of contrasts, Brazil has a multi-ethnic cultural heritage challenged by social and racial inequalities. Its political life remains chaotic. We will examine these problems through Brazilian history and culture.

AS.100.395. History of Global Development. 3 Credits.
This course explores development as an ideology and a practice. From colonialism to the Cold War to contemporary NGOs, we will interrogate the history of our attempts to improve the world.
Area: Writing Intensive

AS.100.396. The Gender Binary and American Empire. 3 Credits.
This discussion-based seminar will explore some of the ways that the sex and gender binary was produced out of American statecraft in the late nineteenth and twentieth centuries. Particular attention will be paid to US imperialism, both domestically in its settler form, as well as in Hawaii, the Caribbean, and the Pacific. What happens to the study of the modern gender binary if it is treated as a transnational artefact of US imperialism's encounter with a multitude of cultures and nations?
Area: Writing Intensive

AS.100.397. The Trouble with "Diversity". 3 Credits.
Through archival, literary, and other cultural texts, this course considers the history of “diversity” as both a practice and concept, beginning with the arrival of “colorblindness” in the 1890s and moving through recent approaches to institutionalized multiculturalism.
Area: Writing Intensive

AS.100.404. John Locke. 3 Credits.
Seminar style course in which John Locke's major works will be read intensively, together with some of his contemporaries' works, and select scholarly interpretations.
Area: Writing Intensive

AS.100.408. Theorizing the Age of Enormity: Social Theory and the History of the 20th Century. 3 Credits.
We will read and analyze key works of social and critical theory produced in relation to 20th and 21st century problems of state and society, nationalism, empire, totalitarianism, genocide, capitalism, political order, gender, race, sexuality, secularism, religion, environmental catastrophe. Possible readings include Weber, Du Bois, Adorno, Arendt, Foucault, Balibar, Beckamong others.
Area: Writing Intensive

AS.100.409. Israel and Palestine from 1967 to the Present: a Current and Entangled History. 3 Credits.
Through intensive and extensive reading, we will explore contemporary Israeli society, politics, and culture, contemporary Palestinian society, politics, and culture under occupation, and the historical processes that have shaped both societies and their ongoing entanglement.

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.413. London 1580-1830: The History of Britain's capital city. 3 Credits.
Seminar-style class analyzing the social, cultural, gender, religious, economic, and political history of London from Shakespeare's time through revolutions, plague, fire, and commercial, colonial, and industrial expansion.
Area: Writing Intensive

AS.100.415. The Holocaust in Jewish History and in Global Culture. 3 Credits.
Key works on the history of Nazi Germany's murder of European Jewry during the Second World War; Jewish responses; the recasting of Jewish and global thought in relation to this signal event; genocide and 'ethnic cleansing' since the Holocaust.
Area: Writing Intensive

AS.100.416. History through Things: Objects, Circulation, and Encounters in the Medieval World. 3 Credits.
Objects from the past offer a powerful window into a set of experiences not recorded in texts. We will follow objects and things as they appear in lists, letters, and descriptions, as they travel surprising routes, and bring to life the medieval world before 1400.
Area: Writing Intensive

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, "virgins" in paradise, the sexual slavery of Yazidi women…. This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

AS.100.422. Society & Social Change in 18th Century China. 3 Credits.
What did Chinese local society look like under the Qing Empire, and how did it change over the early modern era?

AS.100.423. Multiethnic Japan. 3 Credits.
An advanced undergraduate seminar on the intertwined histories of race, ethnicity, and empire in Japan and its former colonies from the early twentieth century to the present.

AS.100.424. Women & Modern Chinese History. 3 Credits.
This course examines the experience of Chinese women, and also how writers, scholars, and politicians (often male, sometimes foreign) have represented women's experiences for their own political and social agendas.
Area: Writing Intensive

AS.100.426. Popular Culture in Early Modern Europe. 3 Credits.
Witchcraft, magic, carnivals, riots, folk tales, gender roles; fertility cults and violence especially in Britain, Germany, France, and Italy.
Area: Writing Intensive

AS.100.430. Gender and Sexuality in African History. 3 Credits.
An upper-level history reading seminar with a focus on histories of gender and sexuality in colonial and postcolonial Africa.

AS.100.433. Free Speech and Censorship in the United States. 3 Credits.
This undergraduate research seminar examines censorship laws, practices, and debates over the past century; topics include political radicalism, indecency, pornography, and racist hate speech. In addition to discussing common readings, each student will choose a censorship case or issue to research and present to the class.

AS.100.438. The City Victorious: Medieval Cairo. 3 Credits.
What was medieval Cairo like? Students explore urban life in this imperial capital (969-1517), including food and market habits; relations between Jews, Christians, and Muslims; patronage; plague, drought, and famine.Pre-requisite for enrollment: Students must have taken two history courses.

AS.100.442. The Intellectual History of Capitalism, 1900 to present. 3 Credits.
This course examines shifting understandings of the philosophical foundations, political implications, and social effects of the market economy since the early twentieth century.
Area: Writing Intensive

AS.100.444. Migrants and Refugees in Africa. 3 Credits.
A history of forced and voluntary migration and displacement in Africa, its causes and consequences, with a focus on refugees and labor migrants since 1960.

AS.100.445. Revolution, Anti-Slavery, and Empire 1773-1792: British and American Political Thought from Paine, Smith, and the Declaration of Independence to Cugoano, Wollstonecraft, and the Bill of Rights. 3 Credits.
This seminar-style course will focus on discussing British and American political thought from the "Age of Revolutions", a period also of many critiques of Empire and of many works of Antislavery. Readings include Paine's Common Sense and Rights of Man, the Declaration of Rights, the Constitution and Bill of Rights, the Federalist Papers; works by Smith, Burke, and Wollstonecraft; and antislavery works by Cugoano, Equiano, Rush, Wesley, and Wilberforce.
Area: Writing Intensive

AS.100.450. History Research Lab. 3 Credits.
In this course, students participate in a research "laboratory," engaging in direct research on an area of faculty's research, leading to the development of a collective, digital humanities project.
Area: Writing Intensive

AS.100.478. Japan from its Peripheries. 3 Credits.
An advanced undergraduate seminar on the history of modern Japan from the perspective of regions and people often considered as belonging to its geographical, cultural, social, and political peripheries.
Area: Writing Intensive

AS.100.482. Historiography of Modern China. 3 Credits.
Study of Western, Chinese, and Japanese understandings of the history of China, emphasizing their implications for cultural understanding and for policy.

AS.100.486. Jim Crow in America. 3 Credits.
This course explores the history, politics, and culture of legalized racial segregation in the United State between the mid-nineteenth and twentieth centuries – a regime commonly known as "Jim Crow."
Area: Writing Intensive

AS.100.490. Writing Power, or Dueling in Print with Light Sabers: An RIC Seminar on Scholarly Composition. 3 Credits.
A first-of-its kind seminar hosted by the Program in Racism, Immigration, and Citizenship, this course explores the practice of composition for professional writers. It considers the "light" and "dark" sides of clear, direct scholarly writing and intentional, academic obfuscation, respectively. Attendees will also learn strategies and potential hazards that accompany the written description of power in the Humanities and Social Sciences.
Area: Writing Intensive

AS.100.494. Senior Honors Seminar. 1 Credit.
A two-semester coordinating seminar for history majors writing senior honors theses. Admission is granted by instructor only after the student has selected a faculty thesis advisor. AS.100.494 is to be taken concurrently with AS.100.507 Senior Thesis.
Area: Writing Intensive
AS.100.494 is to be taken concurrently with AS.100.507 Senior Thesis.

AS.100.495. Senior Honors Seminar. 1 Credit.
The Senior Honors Seminar is a coordinating seminar for senior history majors who are writing senior honors theses and wish to graduate with departmental honors. To be taken concurrently with AS.100.508, Senior Thesis.
Prerequisite(s): AS.100.508
Area: Writing Intensive

AS.100.497. 1968: Rebels, Revolutions & the Right-Wing Backlash. 3 Credits.
The sixties were a polarizing decade of unrest, revolutions, and fundamental change across Europe and the US. We will discuss 1968 through the lens of national case studies, the Cold War, and the history of Baltimore. This is a community-engaged class!
Area: Writing Intensive

AS.100.507. Senior Thesis. 3 Credits.
Two semesters. Senior thesis writers will undertake research in primary materials that will explore a significant historical issue or problem. The DUS will confirm admission as soon as the student has selected a faculty thesis advisor: the outside deadline for confirmation is May 1. AS.100.507 is to be taken concurrently with AS.100.494 Senior Honors Seminar.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.508. Senior Thesis. 3 Credits.
This seminar is required for senior history majors who are writing senior honors theses and wish to graduate with departmental honors.
Area: Writing Intensive
AS.100.507;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.535. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.536. Independent Study. 1 - 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.601. Decolonizing The Museum: Case Studies.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.602. The French Revolution.
Introduces graduate students to the rich historiography of the French Revolution. Topics include: revolutionary origins, political culture and radicalization, citizenship, violence, family & gender, the search for stability after the Terror, global revolution, Napoleon's Brumaire coup.

AS.100.603. Readings in the Early U.S. Republic.
Small intensive group reading: the course is primarily intended for students working on their graduate field lists. Other formats are possible with permission of the instructor.

AS.100.605. Modern Britain & the British Empire.
Modern Britain and the British World is a graduate seminar which familiarizes students with major themes and historiographic debates in Modern British and Modern British Imperial History.

AS.100.607. Consumer Revolution in Global Perspective.
First semester of year-long seminar examining transformations in European consumption from 1650 to 1800. Topics include cultural theory; fashion, gender, and social identity; capitalism, retail, and credit; Enlightenment and the public sphere; political economy; overseas empire; globalization; and the Atlantic revolutions.

AS.100.608. The Consumer Revolution in Global Perspective.
Second semester of year-long seminar examining transformations in European consumption from 1650 to 1800. Topics include capitalism and consumption; political economy; fashion, gender, and identity; Enlightenment and the public sphere; globalization; empire and colonization; and the Atlantic revolutions.

AS.100.609. "Baroque" as a Historical Category.
This seminar will discuss the use of the concept of the "Baroque", as developed in the history of art, architecture, and music, as a category of historical periodization.

AS.100.610. Readings in Medieval Islamic Cultural History.
The seminar examines scholarship on central questions in medieval Islamic cultural history including historical writing; the history of education and scholarly cultures; cultural patronage and urban development.

AS.100.613. Modern Japanese and Korean Histories.
A reading seminar on the interconnected histories and historiographies of Japan and Korea in the nineteenth and twentieth centuries.

AS.100.614. Seminar in Modern Chinese History.
A seminar covering major milestones in research on late imperial and modern Chinese history, primarily in English.Open to undergraduates with the permission of the instructor.

AS.100.615. States, Scribes, and Archives: Medieval Arabic Documentary Cultures.
Historical survey of scribal and archiving practices of medieval Islamic states (in comparative perspective); includes close readings of primary documents, including legal deeds, petitions, edicts, fiscal receipts, and administrative reports.

AS.100.616. Post-WWII French and Francophone Writing On History.
This seminar will focus on texts by post-1945 authors who wrote in French and engaged with what it means to write about the past and how to do so. Among those we will focus on are: Aimé Césaire, Frantz Fanon, Assia Djebbar, Simone de Beauvoir, Michel Foucault, Félix Guattari and Gilles Deleuze, Paul Ricoeur, Alain Corbin, Arlette Farge, François Hartog, Paul Ricoeur, Etienne Balibar, Jacques Rancière, Paul B. Preciado, Fernand Braudel.

AS.100.617. Black Political History and Activism in Modern America.
This course focuses on the emergence and development of various strains of Black political thought and action within the modern US. Our course will explore themes of equality, citizenship, democracy, and freedom throughout the 20th Century, specifically as it pertains to the Black experience in America.

AS.100.618. Historiography of Law and Empire.
Introduction to recent work on the history of law and empire, with a focus on critical legal history perspectives.

AS.100.619. Early Modern France.
The second part of a two-semester sequence, this seminar examines the history of France and its empire from the seventeenth century to the French Revolution.

AS.100.620. Early Modern France and the French Empire.
Part of a two-semester sequence, this seminar examines the history of France and its empire from the seventeenth century to the early nineteenth century. Topics include: state formation; political culture; political economy; commercial capitalism; the Enlightenment; popular culture; empire, race, and slavery; and the French and Haitian Revolutions.

AS.100.621. Historiography of the Western European 1970s and 1980s.
How have historians grappled with the quite recent past? We will explore histories of the 1970s and 1980s, with a focus on France, Germany, and the UK, as well as transnational and post-decolonization approaches.

AS.100.622. Religion in Modernity: Theories and Histories.
Drawing on key works in classic and contemporary social theory of religion and secularity as well as historical, ethnographic, and sociological monographs, this course investigates some scholars' answers to the question of why we might want to take "religion in modernity" as an object of study (or not), what kinds of roles and importance religion (or various institutions, impulses, practices, and ideas connected to major faith traditions) has/have arguably enjoyed in an arguably global modernity often imagined as intrinsically secular, whether and how it matters that the category of religion itself may be a modern invention intertwined with specifically Christian-European and European imperial and colonial projects, whether and how we should take “secularism” or “secularity” as our object of study no less than or more than religion, what special kinds of research agendas and assumptions the empirical study of 'religion' and its workings and significance in modern political and cultural life might demand, what sorts of scholarly value it might add, and how the answers to those questions change when we look to a global present which is sometimes framed as post-secular. A more theoretically and comparatively oriented first part of the course will give way to focused attention on historical, sociological, and ethnographic monographs, with much attention to European, North American, and Near Eastern histories and societies, but ample room for students interested in East Asian, South Asian, African, and Latin American religious formations to investigate those literatures and bring to bear in class discussion. Readings likely include Weber, Bergson, Asad, Charles Taylor, de Vries, Lambek, Das, Roger Friedland, Wuthnow, Margaret Jacobs, Blackbourn, Mahmood, Susan Harding, William Connolly, Chidester, Bryan Turner.

AS.100.623. Telling Japanese Histories.
A graduate-level seminar on the political, social, and intellectual concerns that have both shaped and undermined dominant ways of telling Japanese history, especially in Japan and the U.S. since 1945.

AS.100.627. Histories of Development.
Reading seminar on the history of development as both ideology and practice in the nineteenth and twentieth centuries.

AS.100.632. Capetian France: Documents, Devotions and Sovereign Authority.
Through a careful study of texts and objects produced for and by the Capetian rulers during the thirteenth century we will interrogate the creation of the French state, the cultivation of royal ideology, and its practice of sovereign power.
Area: Writing Intensive

AS.100.634. The Haitian Revolution.
This seminar examines the origins, course, and legacies of the Haitian Revolution (1791-1804), the most radical movement of the Age of Revolutions. It explores the colonial background, the overthrow of slavery, the founding of an independent nation, and the aftermath of revolution in the nineteenth century.

AS.100.638. Reading Seminar in Early Modern History.
This is a graduate seminar devoted to close reading of crucial works in early modern history and historiography.

AS.100.640. 20th-Century European Imperial and Transnational Histories.
This course will look at recent historiography on extranational approaches to 20th-century European histories, with a focus on France, the United Kingdom, USSR/Russia, and Germany.

AS.100.641. Global Catholicism in the Early Modern Period.
Explores religious culture in medieval and early modern Europe, with an emphasis on spiritual beliefs and practices, relics, miracles, pilgrimage, and saint-making. Emphasis on reading and discussing written sources and visual culture. Graduate students only.

AS.100.643. Jewish Paths Through Modernity.
Intensive introduction to the key trends and trajectories in modern Jewish history and the major themes in Jewish historiography. Intended to serve both graduate students outside the Jewish history field and graduate students pursuing a field in modern Jewish history.
Area: Writing Intensive

AS.100.645. Race, Law, History.
This seminar examines the relationship of law to the construction of race and inequality in US history, investigating the legal archive through the perspectives of critical race theory and critical legal history. Course can be taken a maximum of two times.

AS.100.648. Crown, Court, and Charter: Political Culture in the High Middle Ages.
Explores mechanisms of political power and the rise of the state in Europe during the High Middle Ages by analyzing royal ideology, administrative growth, legal change, and cultural production.

AS.100.652. European Socialist Thought.
A survey of European socialist theories, including Marxism, anarchism, Social Democracy, feminism, and anti-imperialism. Authors include Proudhon, Marx, Engels, Bakunin, Bernstein, Lenin, Luxemburg, Sorel, Kollontai, Gramsci, and Fanon.

AS.100.653. Africa in the Twentieth Century.
Reading seminar in modern African history. Focus for 2022 will be on gender and sexuality.

AS.100.661. Racial Literacy in the Archives.
This course explores how to use race as a historical category of analysis, and teaches attendees how to locate how historical actors deploy race and racism to make claims, organize labor and identities, and imagine political possibility.

AS.100.664. Heresy and the Holy: Religion and Society in Medieval Europe.
The course explores the rise of heresy and holiness as categories during the Middle Ages.It traces the advent of religious movements, the effects of religious reform, the centralization of ecclesiastical authority, the rise of vernacular spirituality and dissent, and analyzes the historiographical and methodological approaches to the study of medieval religion.

AS.100.666. Topics in Modern Jewish History.
Continuation of AS.100.668 Colloquium in Modern Jewish History.

AS.100.671. Play and Violence in Medieval France.
Since the work of Geertz, Huizinga, Bakhtin and Caillois, among others, the intersection of play and violence has been a focal point for historians, anthropologists, literary scholars, even psychologists. This seminar traces the twin themes of violence and play as instantiated by the fighting classes in the High Middle Ages, beginning with the emergence of the tournament and the crusading movement in the eleventh century. By examining sources in Old French and Latin, we will contextualize music, dances, comedies, and contests that accompanied the violent rituals around which French aristocratic life revolved. Course may not meet weekly.
Area: Writing Intensive

AS.100.672. Medieval Materialities: Objects, Ontologies, Texts and Contexts.
We will use the meanings and methodologies of “materiality” to examine the medieval world, by analyzing objects, texts, networks, patterns of circulation and appropriation, aesthetics and enshrinement, production and knowledge communities.

AS.100.680. Reading Seminar in Early American History, c. 1500-1800.
Colonization and settlement in the Americas brought people from all kinds of places together. This course will explore those contacts, and how they shaped the American experience. The focus is on new books in early American history.

AS.100.681. Research Seminar in Atlantic History, 1600-1800.
Writing workshop for graduate students at all stages presenting work in progress. Discussion of theories, methods, and challenges of graduate student writing.

AS.100.682. Introductory Topics in Computation for Scholarship in the Humanities.
The first half of this seminar course consists of non-mathematical introductions to, and discussions of, the fundamental motivations, vocabulary, and methods behind computational techniques of particular use for humanistic research. The second half combines selected readings chosen to address specific questions raised by these discussions with hands-on application to students’ research goals. Each participant will lead discussion for one of the selected readings relevant to their interests.

AS.100.695. Problems in U.S. Social & Cultural History.
A graduate level seminar in social and cultural history in the 19th and 20th centuries.

AS.100.696. Problems in American Society and Culture.
An intensive graduate seminar exploring various topics in US social and cultural history, focusing on the period from the late 19th century to the late 20th century.

AS.100.700. American Intellectual History.
Readings on late nineteenth- and twentieth-century American and transatlantic social theory.

AS.100.707. The Black World.
This course explores the practice of writing and reading the history of African Americans and the wider African Diaspora. Participants will share written work and do close readings of primary and secondary texts exploring the black experience in Europe, Asia, Africa, and the Americas.

AS.100.708. The Black World II.
The Black World Seminar considers the making and meaning of blackness between the 14th and 20th centuries and Africans and people of African descent's impact on the making of the modern world, from the slave trade to the present. We explore, too, the historical forces which created blackness as a marker on the body and as a political and cultural identity.

AS.100.710. Reformation Europe.
A course discussing major recent works of historiography on Reformation Europe, examining Lutheranism, Calvinism and Anabaptism; iconoclasm, visual, and print culture; urban, social, and gender history; demonology and witchcraft; and martyrology, tolerance and intolerance.

AS.100.713. Black Womanhood.
What does a usable history of black womanhood (black queer and trans womanhood inclusive) look like? How do we imagine, create, and narrate black women's stories? Black women's history across time and space.

AS.100.716. Cultural Theory For Historians.
An examination of modern cultural theories, with emphasis on mass culture and consumerism. Authors include Simmel, Kracauer, Benjamin, Horkheimer, Adorno, Barthes, Debord, Bourdieu, and de Certeau.

AS.100.722. The History of Trans Femininity.
This seminar will offer training in feminist, queer, transgender and postcolonial approaches to the history of sexuality by exploring what methods are adequate to writing the history of trans femininity as a specifically nineteenth and twentieth century phenomenon. Areas of emphasis will include histories of sexology, sex work, social movements, and trans feminism and its opponents. The primary geographic focus will be the US, but through a transnational lens that connects to Western Europe, South Asia, and Latin America.

AS.100.724. Sex and Slavery.
Research and methods in the field of sexuality and slavery studies. Graduate students may take this course up to two times.

AS.100.725. Sex and Slavery II.
Research and methods in the field of sexuality and slavery studies. Part 2: Caribbean & African Continent.

AS.100.728. Historical Writing in the Middle Ages.
This course investigates the basic techniques of writing history and the matters traditionally covered in medieval historical texts by reading a series of exemplary medieval historiographical works. This is preceded by a section on theoretical orientations to the study of history and historiography in order to provide the analytic tools for analyzing medieval texts.

AS.100.729. Reading Seminar: British America and the Early United States in Atlantic Perspective.
Introduction to the history and historiography on British North America and the United States.

AS.100.730. Reading Seminar: British and French North America and the Early United States in Atlantic Perspective.
Continuation of AS.100.729 for students conducting field exams.

AS.100.731. Colonial Africa: French African Empire.
A reading seminar in colonial African history; the focus may be on French African empire.

AS.100.733. Reading Qing Documents.
Open also to advanced undergraduates with at least one semester of Classical Chinese. This course has several objectives. First and foremost, it is a hands-on document reading class designed to familiarize students with the skills, sources, and reference materials necessary to conduct research in Qing history. To that end, we will spend much of our time reading documents. At the same time, we will engage in problem solving exercises designed to develop and enhance basic research skills. Finally, we will consider important archive-based secondary works which demonstrate the ways in which historians have made use of Qing documents in their scholarship.

AS.100.735. Early Modern Britain and the Early Modern British Empire.

AS.100.736. Early Modern Britain and the Early Modern British Empire.

AS.100.738. Women, Genders and Sexualities.
In May 2020, Johns Hopkins will host the meeting of the Berkshire Conference on Women, Gender and Sexualities, a gathering of 1200 scholars from across the world. Our seminar will use the Berkshire Conference program to organize a set of readings that will anticipate the panels, roundtables, performances, and plenaries that will be on campus between May 28 and 31, 2020. Attendance at the conference is not required, but it is recommended.

AS.100.744. Twentieth Century France and the French Empire.
We will read and discuss recent monographs and historiographical essays that emerge from and inform French history, with particular attention transnational, imperial, Mediterranean, international, and colonial frames and questions.

AS.100.749. Social Theory for Historians: Marx, Durkheim, Weber.
An examination of the works of Marx, Durkheim, and Weber, as examples of the Hegelian, positivist, and hermeneutic traditions of social theory.

AS.100.751. Early Modern European Intellectual History.
Early Modern European Intellectual History

AS.100.753. Modern American Seminar.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in 20th century history. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly

AS.100.755. Modern American Seminar.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in 20th century history. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.756. Reading Seminar in Chinese History.
A seminar covering recent work on late imperial and modern Chinese history, primarily in English.

AS.100.757. Cultural Histories of Late Imperial China.
This reading seminar will introduce graduate students and advanced undergraduates (by permission) to recent studies of Late Imperial and Republican China that can (by various standards) be classified as works of cultural history.

AS.100.759. Arabic Historical Writing in the Middle Ages.
The course examines various genres of Arabic historical writing during the high and late Middle Ages (10th-15th c.). All primary readings are in English/French translation (no Arabic required).

AS.100.761. History of Capitalism.
Readings on the history of capitalism since the mid-nineteenth century, with an emphasis on the American context.

AS.100.762. History and Historiography of 19th France in Europe and the World.
This course will look at recent historiography on France and the French empire, notably in North Africa. We will pay particular attention to transnational and imperial questions.

AS.100.765. Problems in Women and Gender Studies.
An exploration of recent work in women's and gender history, focusing on some of the following: sexuality, cultural production, politics, family formation, work, religion, difference, and civic orders.

AS.100.769. Gender History Workshop.
Workshop for presentation of works-in-progress on the history of women, gender, and/or sexuality, including drafts of dissertation chapters, research papers, talks, and proposals. Students in disciplines other than history are welcome.

AS.100.770. Gender History Workshop.
Workshop for presentation of works-in-progress on the history of women, gender, and/or sexuality, including drafts of dissertation chapters, research papers, talks, and proposals. Students in disciplines other than history are welcome. Graduate students only.

AS.100.781. The Seminar.
This course features presentations from invited speakers. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.782. The Seminar.
This course features presentations from invited speakers. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.783. Seminar: Medieval Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Medieval European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.784. Seminar: Medieval Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Medieval European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.785. Seminar: Early Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Early Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.786. Seminar: Early Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Early Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.787. Seminar: Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.788. General Seminar: Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.789. Seminar: American.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.790. General Seminar: America.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.791. Seminar: Latin American.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in Latin American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly

AS.100.792. General Seminar: Latin America.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in Latin American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.793. Seminar: African.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in African History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.794. General Seminar: Africa.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in African History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.797. First Year Graduate Workshop.
First-year graduate workshop for History PhD candidates only.

AS.100.798. First Year Graduate Workshop.
First-year graduate workshop for History PhD candidates only.

AS.100.801. Dissertation Research.
TBA

AS.100.802. Dissertation Research.

AS.100.803. Independent Study.
TBA

AS.100.804. Independent Study.

AS.100.890. Independent Study.

Cross Listed Courses

Agora Institute

AS.196.311. Democracy. 3 Credits.
Democracies around the world are under threat. This course introduces students to the philosophical foundations of democracy as well as the history of democratic revolutions, institutions, and principles. How can we defeat the most important contemporary challenges to democracy, including populism, authoritarianism and disinformation? And how can we revive the "democratic spirit" - in America and around the world?

AS.196.364. This is Not Propaganda. 3 Credits.
We live in an era of disinformation' mass persuasion and media manipulation run amok. More information was meant to improve democracy and undermine authoritarian regimes- instead the opposite seems to be happening. This course will take you from Russia to South Asia, Europe to the US, to analyze how our information environment has been transformed, why our old formulae for resisting manipulation are failing, and what needs to be done to create a model where deliberative democracy can flourish.
Area: Writing Intensive

Center for Africana Studies

AS.362.102. Anti-Racism 101. 3 Credits.
What is Anti-Racism? How do we identify racism's presence and effects, and how do we direct social and civic resources to end it? In this Freshman Seminar, students will learn from a series of faculty experts and invited guests about the history, workings, and legacies of racism. They'll also study present-day and past approaches – attempted and theorized – to abolish racism in the modern world.

AS.362.111. Introduction to African American Studies. 3 Credits.
This course introduces students to the interdisciplinary field of African American Studies, with attention to the literature, film, culture, history, and politics of black life in the United States. Our reading list will likely include texts by David Walker, Frederick Douglass, Frances E.W. Harper, Sutton Griggs, W.E.B. Du Bois, James Baldwin, Amiri Baraka, Toni Morrison, and others.

AS.362.112. Introduction to Africana Studies. 3 Credits.
This course introduces students to the field of Africana Studies. It focuses on the historical experience, intellectual ideas, theories, and cultural production of African-descended people. We will consider how people of the black diaspora remember and encounter Africa. We will explore, too, how such people have lived, spoken, written, and produced art about colonialism and enslavement, gender and mobility, violence and pleasure. This course will be thematically organized and invite you to center your own stories about black people within your understanding of the modern world and its making.

AS.362.204. Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture. 3 Credits.
In Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture, students will learn about key historical, intellectual, and political aspects of white supremacy as a system or racial domination, and anti-black racism as a central feature of that global system. This class will explore the historical forms that white supremacy has taken—from colonialism and plantation slavery to Jim Crow, gentrification, and mass incarceration—racial ideologies, and how modern political systems have hinged on racial oppression. Most important, we will explore how black people have responded to the structures and ideologies of white supremacy, their thinking about freedom, being, and rights, and their efforts to fit into the worlds in which they found themselves, to improve those societies, and those projects that sought radical alternatives to the an anti-black world.
Area: Writing Intensive

AS.362.309. Performing the Archive 2022: 200 Years of US-Liberia Migration. 3 Credits.
This seminar will explore some of the pivotal historical and contemporary connections between the US and Liberia since the first Black American settlers arrived in West Africa with the American Colonization Society in 1822. This course asks: What are implications of these stories of migration and reception for how we make sense of global anti-Blackness in the contemporary moment? How does performance provoke new questions about shared histories of those impacted by colonialism and the transatlantic slave trade? Why is a more in-depth understanding of 19th century Black political thought and the precolonial West African indigenous category necessary for developing theory on the political economy of race today? Through the lens of performance studies, students will analyze the documents in the American Colonization Society archive, to reimagine these early encounters as informed by historical documentation including folklore and pan-Africanist theory. Through exploring a range of historical and contemporary materials that center the problematic "indigenous/settler" binary, students will engage in a dramaturgical process which presents powerful possibilities for unlearning historical misrepresentations. In particular, students will develop theater-based projects that interrogate the spatio-temporal connections between the stories of both, free Blacks and those who were enslaved in Maryland and manumitted to go to Liberia, and the contemporary politics of Liberia-US migration.

Classics

AS.040.216. Exploring the Ancient Astronomical Imagination. 3 Credits.
This course takes us on an exploratory journey through the ancient astronomical imaginary. We will focus on ancient Greek and Roman ideas about the structure of the cosmos, the substance and nature of the stars, the Earth's place and role in the universe, ancient attempts to map the stars, and ancient beliefs about the significance of cosmic phenomena for events in the human world. The course will culminate in the extraordinary ancient tradition of lunar fictions, which are our earliest imaginative accounts of life on other worlds. Come join us for a voyage to the stars!

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

Comparative Thought and Literature

AS.300.301. Women and Work in the US. 3 Credits.
This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women's labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women's work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

AS.300.311. Introduction to Intellectual History. 3 Credits.
This course offers a conceptual and historical introduction to Intellectual History. What makes the "history of ideas" different from the history of other objects? What, if anything, distinguishes the history of ideas from the history of philosophy? What is it exactly that we call "ideas"? In what sense do they have a history? These are examples of the kind of questions addressed in the course.

Development, Climate, and Sustainability

SA.500.109. Facing the Oil Problem: The United States, Canada, OPEC and the World. 4 Credits.
Every aspect of foreign and domestic policy feels the effect of the oil problem. Solutions will be difficult. The course assesses direct and indirect costs of oil addiction, including global warming. Considers scenarios of supply disruption. Examines who controls oil and how. Explains "peak oil" and the loss of "spare capacity" to cushion price shocks. Looks at heavy oil production from Canada, America's largest oil supplier. Weighs energy initiatives, alternative energy development and future energy RD&D. Unravels complexities of the oil problem and explores what is to be done about it. (This is a cross-listed course offered by the Energy, Resources and Environment Program that also can fulfill a requirement for the Canadian Studies Program and the Latin American Studies Program.)
Students may not register for this class if they have already received credit for SA.680.759[C]

East Asian Studies

AS.310.106. Introduction to Korean History and Culture. 3 Credits.
This course offers a comprehensive overview of Korean history and culture from ancient times to the modern era. Through primary, secondary, and audio-visual sources, students will become familiar not only with the overall contours of the entirety of Korean history, but also with its cultural and religious legacy. The course combines lectures and class discussions.

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

AS.310.322. Korean History Through Film and Literature. 3 Credits.
In this course, students will engage with select topics in Korean history from premodern and modern times and examine how the past has been represented through various forms of film and literature. This will be combined with readings of academic articles to allow students to gauge the distance between scholarship and cultural expressions of history. Through this, students will be introduced to the highly contested and often polarizing nature of Korean history and the competition surrounding historical memory. Prior coursework in East Asian Studies strongly recommended.
Area: Writing Intensive

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

English

AS.060.328. Malcolm and Martin: An Introduction to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their recorded speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.361. The Politics of Memoir. 3 Credits.
This course explores the interlocking political and historical dimensions of personal experience, an account of ourselves and our relations ("the quest for competitive advantage between groups, individuals, or societies") that points us in the direction of what "is 'common' to the whole community." What does it mean for people who are not the chief actors or theoreticians of political movements to construe the record of their experience as an act of political intervention, an aid in our total understanding of the structure of popular belief and behavior? Furthermore, what happens when attempt to historicize and critique these recorded experiences? The class asks its members to focus closely on an episode of autobiographical experience as both an historical fossil and tangible politicized moment, particularly the places where race, gender and economic power are visible. By producing a "critical discourse of everyday life—by turning residual, untheorized everyday experience into communicable experience… one can reframe ostensibly private and individual experiences in terms of a collective struggle." To help our investigation we will read and analyze closely memoirs, many of them from the African American experience. We function partly as a writers' workshop and partly as a critical review. The final goal of the seminar is a polished 20-25 page autobiographical essay.
Area: Writing Intensive

AS.060.644. Oceanic Studies & the Black Diaspora.
In this course, we take up Hester Blum's blunt observation that "the sea is not a metaphor" in order to consider the visions and hopes black writers have associated with the sea, as well as the despair and trauma transatlantic slavery has left "in the wake," to quote Christina Sharpe.
Area: Writing Intensive

Europe and Eurasia

SA.554.102. Politics of Protest in Europe and Eurasia. 4 Credits.
This class provides students with an in-depth exploration of the motivations behind, strategies of, and societal changes produced by various instances of collective mobilization across Europe. Some of the main questions we seek to answer throughout this course are: Along what lines of grievance do social movements form? Why do people choose to protest collectively given threats of reprisal? What explains the rise in support for populist outreaches by far-right parties in Europe's most democratic countries? By examining a wide variety of movements, from labor mobilizations such as Poland's Solidarity to ethnic nationalist campaigns by groups such as the Basques and the Kurds, we use comparative analysis to identify points of convergence and divergence across cases. We explore how mobilization strategies spill across borders in "waves" of protest, such as those prefacing the collapse of the Soviet Union. We also investigate how developments in media and technology affect protest outcomes – and when they don't, such as the "Twitter Revolution" that failed in Moldova. Students will gain both empirical insights into particular cases across Europe as well as the conceptual tools used by scholars of comparative politics to analyze the puzzling but highly topical questions above.
Students may not register for this class if they have already received credit for SA.710.707[C]

European and Eurasian Studies

SA.710.737. Writing for Policy: A workshop on the journal, 'Survival: Global Politics and Strategy'. 4 Credits.
This seminar/workshop might also be titled "Writing and Editing for Policy Debate." Following short lectures and class discussion of fiction and non- fiction models for good writing, students will participate, in real time, in a 'shadow editorial process' putting together two issues of the bi-monthly journal, Survival: Global Politics and Strategy. Students will also meet with the instructor in individual tutorial sessions to assess and edit drafts of their own writing.

SA.710.763. Movement Towards European Unity. 4 Credits.
This course represents an introduction to the historical development of the European Community and the European Union. That said, the perspective I adopt is grounded more solidly in political science rather than history. My argument is that European integration can be explained as a function of three types of variables: Ideas, events, and ?unintended consequences?. The analytic claim is that European integration started and is perpetuated to shore up the weaknesses of individual nation-states and of the national state system. In other words, the course is grounded on a set of very specific (and very controversial) arguments and interpretations. These must be examined carefully, critically, comprehensively. They must be challenged. And, if necessary, they must be refuted. The material surveyed in the course should help you do all those things and more.

SA.710.783. EU Foreign Policy. 4 Credits.
The course offers both a general introduction and a more in-depth approach to the way in which the European Union (EU) acts in international relations. It is meant to provide a balanced analysis of all the main issues involved inside as well as outside Europe proper, and to stimulate the students to address specific themes while giving them a flavor of how policy is actually made in Brussels.

Film and Media Studies

AS.061.396. Modern Paris on Film. 3 Credits.
This course uses French film to examine the history of twentieth-century Paris. We will consider how filmmakers interpreted the social, political, and technological transformations that shaped Paris in the modern era, treating movies as expressions of change and means by which filmmakers comment on it. Taught in English. $50 lab fee.

AS.061.397. French Masculinities. 3 Credits.
Examines changing ideals of masculinity in France after 1960 as they found expression on film, rooting the work of iconic stars and directors in their cultural, political and historical contexts.

First Year Seminars

AS.001.101. FYS: The Hospital. 3 Credits.
Johns Hopkins invented the modern hospital along with modern medical education. This seminar will explore the history of the hospital from its monastic origins to its current form, with particular attention to how hospital design has reflected and reinforced ways of thinking about health, disease and medical treatment. We will also consider specialized hospitals and clinics, for the mentally ill, for particular diseases, for women and children, among other topics.

AS.001.102. FYS: Japanese Robots. 3 Credits.
Japan is a world leader in biomimetic robotics. Japanese society enthusiastically embraces robotic nurses, robotic guides, robotic waiters, robotic pets, and even robotic girlfriends. What are the origins of the Japanese love of robots? What role did robotics engineers play in creating the image of loveable robots? What societal fears do Japanese robots assuage and what hopes do they foster? In the course of the semester, students will learn about the evolution of Japanese robotics, and explore the implications of this evolution to humans' relationship with robots. While learning about Japanese robots, students will acquire skills necessary for college-level education, including how to write an email to a professor, how to organize and manage digital tools, how to navigate the information resources, and how to develop, complete, and present research projects. This course will equip students with skills essential to their success in college and beyond.

AS.001.103. FYS: When Worlds Collide - Science Goes Global. 3 Credits.
In this First-Year Seminar, we will explore instances of contact between different world cultures and pre-modern and modern science (16th-20th c.). The premise of the course is the understanding that in addition to the cultural, religious and political negotiations that took place during cross-cultural encounters, science also underwent a similar process. We understand science expansively, as the study of nature and the production of knowledge about it embedded in a particular cultural context. The historical episodes we will discuss are selections of instances where agents of the West—missionaries, explorers, businessmen, colonists, scientists—established prolonged contact with non-western cultures and engaged in conversations about their worldviews. Some cases considered include Jesuits in the Chinese imperial court, Spanish missionaries among the Maya, and English explorers in the Pacific islands.

AS.001.120. FYS: U.S. History of the Present. 3 Credits.
Which ideas, movements, problems, and conflicts define the contemporary United States—and where did they come from? In this First Year Seminar we'll study the history of this country over the last three decades to try to answer those questions. Using a range of written and visual materials, we'll investigate the history behind concepts like "globalization," "the free market," "identity politics," "culture wars," and the "War on Terror," and discuss the causes and consequences of the debates they provoked in this period. We'll also assess what's appealing and challenging about studying the very recent past and using it to interpret our present.

AS.001.145. FYS: The Haitian Revolution. 3 Credits.
Long overshadowed by the American and French Revolutions, the Haitian Revolution (1791-1804) is now widely recognized as one of the most important events in modern history. The most radical of the Atlantic Revolutions, it began with a massive uprising of the enslaved against the institution of slavery and culminated in the independence of the nation of Haiti. This First-Year Seminar will examine the origins, course, and legacy of the Revolution, addressing such issues as colonialism, racism, slavery, emancipation, human rights, and national sovereignty – issues that continue to shape the contemporary world.

AS.001.157. FYS: Leonardo da Vinci - Art, Science, and Medicine. 3 Credits.
How does a notary's son trained as a painter gain expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? How did an artist/engineer who brought few projects to completion come to have such a huge impact on later generations? This First-Year Seminar will focus critically on the myth of Leonardo's singularity while showing his achievements to be characteristic of the artisanal culture of his time.

AS.001.159. FYS: Apartheid as Analogy - Structures of Racial Hierarchy in South Africa, Baltimore, and Beyond. 3 Credits.
Sites of racial conflict, from Palestine to Baltimore, have been compared to South African Apartheid. This First-Year Seminar examines the creation of a totalizing system of racial segregation and exploitation in twentieth century South Africa, and how it can help us understand histories of race elsewhere in the world, including our own city.

AS.001.161. FYS: Books, Authenticity, and Truth. 3 Credits.
We are living through a crisis in how we take in information. Bombarded by information of all sorts coming at us on phones, tablets, and computer screens, it can be difficult to make sense of it all and harder still to determine whether something is true or false, authentic or inauthentic. The scale and speed of the change in media that we are undergoing is unprecedented in human history. Nevertheless, people in the past have faced moments of crisis – moments when writing seemed unreliable, when the format of written information changed, and when new publication formats forced reevaluations of the nature of truth. This First-Year Seminar will take us from Greco-Roman antiquity to the modern age, with stops along the way in the European Middle Ages, Renaissance, and Enlightenment. We will read selected texts that illuminate the place of writing, books, and the search for truth, think about the structure of libraries in the western Middle Ages and Renaissance, do extensive hands-on work with rare books, and visit other repositories of information, all toward the end of evaluating how the history of books and information can help us in our current quest to make sense of our world.

AS.001.163. FYS: Black Baltimore Archives - From Frederick Douglass to Billie Holiday. 3 Credits.
Black Baltimore Archives is an intense exploration (and excavation) of local African American history and narrative. Using the lives of Baltimore's most prominent artists-Frederick Douglass and Billie Holiday- this First-Year Seminar will explore questions connected to creating the historical record, assembling visual and sonic representations of black life, and the challenges that access and preservation pose to sustaining black community. We will visit the Afro-American Newspaper archives, the Maryland Center for History and Culture, the Maryland State Archives, and Morgan State University special collections, among other key archival repositories. Students will participate in a national conference and a local jazz event.

AS.001.166. FYS: The Pleasures of the Imagination - British culture in the eighteenth century. 3 Credits.
Music, Art, plays, novels, satires, and material culture all expanded dramatically in Britain in the long eighteenth century (c. 1714-1830). Contemporaries spoke of the rise of 'beauty', of the appreciation of the 'pleasures of the imagination', and of the rise of a culture of 'happiness'. This First-Year Seminar will introduce students to these exciting developments in British (and British American) culture.

Global Risk

SA.630.740. Risk in International Politics and Economics. 4 Credits.
This is a course on social science research methods as they apply to decision-making under conditions of uncertainty. In other words, it looks at how the skills of a social scientist can be put to use in the 'real world'. The course begins by looking at how decision makers anticipate future events, it explores what evidence they consider and what they ignore, and it looks at the standard models they apply in projecting the future based on the present. The case studies applied in this early part of the course focus on seemingly straightforward economic and financial questions. The problem is that most of the predictions that were made in these areas ended in disaster. Hence the course turns to explore the bias that is built into estimates of the future to understand whether the problem lies in the way the world works or in how we try to understand it. It introduces students to a conceptual vocabulary based on systems theory to make it easier to build more complex relationships into the analysis. And it explores the unintended consequences of policy decisions. Here the case studies move from economics to politics and from crisis to stagnation. This does not offer much of an improvement. Therefore the course makes a third analytic turn to bring the dynamics of human interaction more firmly into focus. It looks at negotiation, communication, and culture as possible sources of error or misunderstanding. The case studies focus on conflict, terrorism, and popular protest. By the end of the course students have a better grasp of where their predictions are likely to falter. They will also understand why such predictions must nevertheless be made. Risk in the international political economy derives from decision-making under conditions of uncertainty. The problem is that uncertainty is inevitable, but decisions must be made regardless of this.

History

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.601. Decolonizing The Museum: Case Studies.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

History of Art

AS.010.208. Leonardo da Vinci: The Renaissance Workshop in the Formation of Scientific Knowledge. 3 Credits.
How does a notary's son trained as a painter come to claim expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? The course will focus critically on the myth of Leonardo's singularity and explore his achievements with regard to the artisanal culture of his time, as well as the problems of authority in the recognition of artisanal knowledge as scientific discovery.

AS.010.212. Mirror Mirror: Reflections in Art from Van Eyck to Velázquez. 3 Credits.
Explores the different ways Early Modern painters and printmakers incorporated mirrors and optical reflections into their works for the sake of illusion and metaphor, deception and desire, reflexivity and truth-telling. Connecting sense perception and ethical knowledge, embedded mirror images often made claims about the nature of the self, the powers of art, and the superiority of painting in particular.

AS.010.235. Art, Medicine, and the Body: Middle Ages to Modernity. 3 Credits.
This course explores seven centuries of fruitful collaboration between physicians and artists, uncovering the shared discourses, diagnostic techniques and therapeutic agendas that united the art of picture-making with the art of healing. Topics include the origin and development of medical illustration; the long, cross-cultural history of the therapeutic artefact; the anatomical investigations of Renaissance artists such as Leonardo and Michelangelo; depictions of bodily pain and disease in the art of Matthias Grünewald and psychosomatic syndromes like melancholy in the work of Albrecht Dürer; the spectacularization of the body in Enlightenment science and the ethics of medical specimen display today -- all in order to bring the complex intersections of the history of medicine and the history of art into view.

AS.010.252. Sculpture and Ideology in the Middle Ages. 3 Credits.
This lecture course will offer a selective, thematic exploration of the art of sculpture as practiced in the Middle Ages, from the fall of the Roman empire in the 4th century CE to height of the Gothic era. The primary concern will be to analyze sculpture in all of its forms – monumental free-standing, architectural, liturgical, and commemorative – as the primary medium utilized by patrons, both private and corporate, to display political messages to an ever growing public.

AS.010.305. The Ethiopia at the Crossroads. 3 Credits.
Ethiopia played a foundational role in modern-day civilization and culture: as the find site of Lucy, the earliest bipedal hominid, the seat of the Queen of Sheba's kingdom, the second country in the world to adopt Christianity in the early 4th century CE, and the nexus of exchange between Africa, Europe, and Asia. In fall 2023, The Walters Art Museum will mount the exhibition tentatively titled, Ethiopia at the Crossroads, which addresses Ethiopia's relationship and artistic exchange with its surrounding cultures, including South Arabia, Nubia, Egypt, Byzantium, Armenia, Italy, and India. It also discusses the impact of Ethiopian art beyond its borders, bringing works of Ethiopian contemporary art into dialogue with the historical Ethiopian art that these artists draw upon in their work. The exhibition covers approximately 1,750 years of Ethiopian history with a special focus on the art of the medieval period, broadly conceived. The course will also offer insights into how a museum exhibition is developed from the initial concept to the physical presentation in the galleries.

AS.010.325. Blood, Gold, and Souls: The Arts of the Spanish Empire. 3 Credits.
From the sixteenth through the eighteenth centuries, visual forms and practices linked such far-flung places as Mexico City and Naples, Manila and Lima, Cuzco and Antwerp, Quito and Madrid: all cities in the Spanish Empire. This course is conceived as a voyage, moving city by city to explore objects that connected Spain's vast holdings. We will investigate how the Spanish Crown and the Catholic Church used visual strategies to consolidate political power and instill religious faith across the world; and, alternatively, we will consider how local conditions, concerns, and resistance reshaped those efforts. This course surveys a diverse range of artistic production: religious paintings and sculptures; maps used for imperial surveillance; luxury goods crafted from shimmering feathers, ceramics, ivory, and precious metals; urban design and architecture from the ports of Europe to the highland outposts of the Andes; ephemeral cityscapes for civic performances. In examining such materials, students will be introduced to the art historical methods and theoretical concerns used to study a wide diversity of objects within an imperial frame.

AS.010.329. Building an Empire: Architecture of the Ottoman Capitals, c. 1300–1600. 3 Credits.
Centered on modern-day Turkey and encompassing vast territories in Asia, Africa, and Europe, the Ottoman Empire (1299 – 1923) was the longest lived and among the most powerful Islamic states in history, with an artistic tradition to match. This course explores the functional and symbolic role that architecture played during the empire's formative centuries, when three successive capital — Bursa, Edirne, and Istanbul — served to visualize the sultans' growing claims to universal authority. With reference to mosques, palaces, tombs, and other categories of architecture, the course will examine the buildings in their artistic, social, and political contexts. Themes to be addressed include patronage and audience, architectural practice and the building trade, ceremonial and ritual, topography and urban planning, and the relationship of Ottoman architecture to other traditions.

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.339. Sex, Death, and Gender: The Body in Premodern Art, Medicine, and Culture, c. 1300-1600. 3 Credits.
To what extent was the body and its depiction a site of contestation, identification, or desire in the Middle Ages and Renaissance? If the body in the West since the 1800s is seen to have been shaped by the rise of photography and film, the institutionalization of biomedicine, and the establishment of techniques of surveyance and mechanization, then how was the body represented, disciplined, and experienced in the preceding centuries? In an age of unprecedented encounter with non-European bodies, what did it mean to describe and categorize bodies by race, region, or religion? These are some of the major questions this class seeks to answer, which is fundamentally interdisciplinary as it draws upon insights and methods from anthropology and the history of medicine and history of science to investigate how the body has been represented and imagined in the visual arts. The bodies of the suffering Christ, the female mystic, the dissected cadaver, the punished criminal, and the non-European 'Other' will loom large as we work to problematize notions of a normative body, whether in the premodern world or in the contemporary one. While most readings and lectures will concern the body and its representation in the Christian West during the later Middle Ages and Renaissance, students are encouraged to work on a topic of their choosing from any geographical area 1000-1800 CE for their research papers.
Area: Writing Intensive

AS.010.432. Therapies of Art and Literature from Antiquity to Early Modern Europe. 3 Credits.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.
Area: Writing Intensive

AS.010.459. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents. 3 Credits.
This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

AS.010.604. Contested Patterns: Islamic Art History and Its Challenges.
Formed against the backdrop of nineteenth- and twentieth-century Orientalism and colonialism, the field of Islamic art history continues to grapple with the overwhelmingly Eurocentric assumptions, narratives, and approaches that shaped its emergence and development. These inherited perspectives and the debates they have sparked are the focus of this seminar, which critically examines the foundational characterizations of Islamic art—as ornamental, iconophobic, and timelessly other—together with the exhibitory, commercial, and scholarly contexts in which such ideas took root. Adopting a simultaneously thematic and chronological approach, the seminar will trace the ways in which diverse constellations of actors—including those from within the Islamic world itself—have variously established, consolidated, or challenged the field's underlying concepts. We will explore how this discursive process has intensified in our own time, in which a spate of scholarly and popular treatments have laid bare the tension between calls to reevaluate the field and an enduring impulse to reinscribe its established contours. Alois Riegl, Oleg Grabar, Gülru Necipoglu, Yasser Tabbaa, and Wendy Shaw are among the authors whose writings will be assessed and compared. Throughout the seminar, we will ground our historiographical inquiry in discussions of specific works and categories of Islamic art—particularly those like carpets that traditional frameworks have fetishized as decorative—and consider more fruitful avenues for addressing such material, making use of local collections to the extent that we can.

AS.010.615. Therapies of Art and Literature from Antiquity to Early Modern Europe.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.

AS.010.671. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents.
This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

History of Science, Medicine, and Technology

AS.140.105. History of Medicine. 3 Credits.
Course provides an introduction to health and healing in the ancient world, the Middle Ages, and the Renaissance. Topics include religion and medicine; medicine in the Islamicate world; women and healing; patients and practitioners.

AS.140.231. Health & Society in Latin America & the Caribbean. 3 Credits.
Medical practice is complex in Latin America and the Caribbean. Most countries in the region have universal healthcare; yet, the quality of clinical services varies widely, and is influenced by degrees of incorporation into—or marginalization from—social power structures. Many people take their health into their own hands by supplementing biomedicine with plant based remedies as well as religious and spiritual services. This course will interrogate the history and contemporary relevance of healthcare in Latin America and the Caribbean, with particular interest in how medicine intersects with colonialism, slavery, capitalism, neo-colonialism, grassroots revolutionary movements, the Cold War, and neoliberalism. Drawing on films, visual and performance art, and music, students will consider the ways in which race, gender, indigeneity, ability, class, and nation have affected people's experiences with medical practice. Informed by postcolonial and decolonial scholarship, we will also examine why Latin America and the Caribbean have become "laboratories" for the production of medical knowledge, and importantly, how that knowledge was created by indigenous, enslaved, and migrant people as well as professionals. Finally, we seek to understand individual health problems in relation to the social and political determinants of health. As such, the course prompts students to reflect on why healthcare professionals—in the United States and abroad—would benefit from historically-informed communication with patients and their communities. This is a discussion-based seminar that requires active participation. There are no exams. The course does not assume any previous knowledge of the history of medicine or Latin American history.
Area: Writing Intensive

AS.140.322. Follow the money: Science, technology, and the 'knowledge economy,' c.1800-present. 3 Credits.
This course examines the historical emergence of knowledge-driven economies, paying special attention to the funding, development, and use of science and technology for commercial purposes.
Area: Writing Intensive

AS.140.356. Man vs. Machine: Resistance to New Technology since the Industrial Revolution. 3 Credits.
This course analyzes different episodes of "luddism" in the history of science and technology, from the destruction of textile machinery in the early 1800s up to recent controversies about biotechnology and ICT.

AS.140.393. Technology and the Making of the Modern World. 3 Credits.
This course critically examines the role of technology in some of the main developments that have shaped the modern world, ranging from industrialization and globalization processes to the rise of new political ideologies and gender patterns. This course is co-taught by an instructor from the Smithsonian Institution and will include a public history research project.

AS.140.685. Histories of Reproduction.
While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

Interdepartmental

AS.360.408. Experiential Research Lab: "Holy" Conquest: Religion and Colonization in Sixteenth-Century Mexico. 3 Credits.
"When the Spanish unleashed their regime of colonization of what is present-day Mexico, their primary justification was the religious salvation of Indigenous people. Spaniards, along with other Europeans, arrived by the boatload to impose colonial order, taking up bureaucratic and ecclesiastical positions. The result was far from smooth—the sixteenth-century saw widespread disease, missionary violence on behalf of salvation, crop destruction and the recultivation of land, urban plans that radically altered the environment, the resettlement of entire populations, among other dramatic social and environmental events. This course investigates the complex and dynamic elements of colonial New Spain (as Mexico was called) from an interdisciplinary perspective. It tries to make sense of the chaotic landscape of the first century of Spanish colonial rule in New Spain. It is a research and writing intensive course that serves as an introduction to both the history and art history of this place and moment. Our meetings will act as a springboard for a group trip to Mexico during the January intersession to study objects and spaces in situ. Final projects will relate to materials viewed in person in Mexico. The costs for this trip are included for all students, no fees required. Knowledge of Spanish preferred but not required.
Area: Writing Intensive

AS.360.420. Humanities Research Lab: Making Maps of Mexico. 3 Credits.
Learn the basics of ArcGIS and data management as you help Prof. Lurtz publish an agricultural dataset and maps from 10 years before Mexico erupted in revolution. No experience necessary.

AS.360.612. Media Theory and Modernity.
This course will engage with 20th century critical theory and social inquiry that wrestles with the idea that new mediations have profoundly altered the character of human experience and subjectivity, and it will consider the questions that these theorists pose for our disciplines. How have modern subjectivity, gender, affect, reason, and politics been shaped by the technologies and structures of representation that mediate them? Among figures of interest: Marx, Freud, Eisenstein, Benjamin, Bakhtin, Adorno, Deleuze, Guy Debord, Haraway, Stuart Hall, Teresa de Lauretis, Kitterer, Sobchack, Berlant, Latour, Linda Williams, Ranciere, Orit Halpern.

AS.360.623. Latin America in a Globalizing World.
An interdisciplinary seminar on Latin America's role in global economic processes, from both historical and contemporary perspectives. Participants will engage with scholarly and primary texts as well as share written work. The Fall 2022 seminar will examine the topic of Latin American political thought.

AS.360.626. Latin America in a Globalizing World II.
The second in a two-semester graduate sequence, this course will be for graduate students and faculty to collaboratively workshop their own research and writing on topics related to Latin American studies.

Islamic Studies

AS.194.201. Jews, Muslims, and Christians in the Medieval World. 3 Credits.
The three most widespread monotheisms have much more in common than is generally portrayed: a common founding figure, a partly shared succession of prophets, closely comparable ethical concerns and religious practices, a history of coexistence and of cultural, religious, social and economic interaction. This course will focus on a number of key texts and historical events that have shaped the relationships between Jews, Muslims, and Christians during the Middle Ages and contributed to their reciprocal construction of the image of the "other." The geographical center of the course will be the Mediterranean and the Near and Middle East, a true cradle of civilizations, religions, and exchange.

AS.194.202. Never Forget: Muslims, Islamophobia, and Dissent after 9/11. 3 Credits.
In partnership with the social justice organization Justice for Muslims Collective, this community-engaged course and oral history project will explore how diverse Muslim communities navigated and contested belonging and political and cultural agency amidst state-sponsored violence and national debates on race, gender, citizenship and national security after 9/11 and during the ongoing War on Terror. Through history, ethnography, first-person narratives, film, fiction, and online resources, students will learn about the impact of 9/11 on American Muslim communities. This includes cultural and political resistance to imperialism, racism, and Islamophobia as well as to intersectional inequities within Muslim communities that were intensified in the context of Islamophobia. Students will learn about community activism and organizing from JMC, and complete a participatory action research project with the organization. This project is an oral history archive that will address gaps in the documentation of movement histories when it comes to early organizing against War on Terror policies by Muslim communities and communities racialized or perceived as Muslim. Students will be trained to record stories of resistance among leaders who organized and responded at the local and national-level in the Greater Washington region, to support the building of an archive that will shape a wide variety of future organizing and advocacy efforts.

AS.194.230. African-Americans and the Development of Islam in America. 3 Credits.
Muslims have been a part of the American fabric since its inception. A key thread in that fabric has been the experiences of enslaved Africans and their descendants, some of whom were Muslims, and who not only added to the dynamism of the American environment, but eventually helped shape American culture, religion, and politics. The history of Islam in America is intertwined with the creation and evolution of African American identity. Contemporary Islam in America cannot be understood without this framing. This course will provide a historical lens for understanding Islam, not as an external faith to the country, but as an internal development of American religion. This course will explicate the history of early Islamic movements in the United States and the subsequent experiences of African-Americans who converted to Islam during the first half of the twentieth century. We will cover the spiritual growth of African American Muslims, their institutional presence, and their enduring impact on American culture writ large and African-American religion and culture more specifically.

Medicine, Science and the Humanities

AS.145.106. Health, Science, Environment. 3 Credits.
Environment has an inexorable effect on human health, and certain human activities have had outsized impacts on the natural world and the ability of forms of life to thrive. This course brings medical humanities, history of science, and science & technology studies into conversation with environmental humanities to ask: how have our conceptions of the natural world emerged, and how have these shaped our understandings of bodies, ecologies, and health outcomes? How do we know and measure the environment and health, and to what effects? How have human and ecological health affected environmental politics? How have writers and artists understood and depicted their environments and environmental questions? Can works of fiction shape ecological transformations? What can we learn from case studies of health and environment in Baltimore and the Chesapeake Bay as well as in global contexts? Course topics will include ecology, epigenetics, toxicity, agriculture and food, radiation, air quality, and more-than-human entanglements.

Modern Languages and Literatures

AS.211.265. Panorama of German Thought. 3 Credits.
This course introduces students to major figures and trends in German literature and thought from the sixteenth to the twentieth century. We will pay particular attention to the evolution of German political thought from the Protestant Reformation to the foundation of the German Federal Republic after WWII. How did the Protestant Reformation affect the understanding of the state, rights, civic institutions, and temporal authority in Germany? How did German Enlightenment thinkers conceive of ethics and politics or morality and rights? How do German writers define the nation, community, and the people or das Volk? What is the link between romanticism and nationalism? To what degree is political economy, as developed by Marx, a critical response to romanticism? How did German thinkers conceive of power and force in the wake of World Wars I and II? What are the ties that bind as well as divide a community in this tradition? We will consider these and related questions in this course through careful readings of selected works.
Area: Writing Intensive

AS.211.328. Berlin Between the Wars: Literature, Art, Music, Film. 3 Credits.
Explore the diverse culture of Berlin during the heyday of modernism. During the Weimar Republic, Berlin became a center for theater, visual arts, film, music, and literature that would have an outsize impact on culture throughout the world and the twentieth century. The thinkers, artists, and writers drawn to interwar Berlin produced a body of work that encapsulates many of the issues of the period: the effect of the modern city on society; “the New Woman”; socialist revolutionary politics; the rise of the Nazis; and economic turmoil. While learning about interwar Berlin’s cultural diversity, we will take a special look at works by Jewish writers and artists that engage with the question of ethnic, religious, and national identity in the modern world, specifically in the context of Berlin’s rich Jewish history and the rise of anti-Semitism in the interwar period. All readings will be in translation.

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

AS.211.394. Brazilian Culture & Civilization. 3 Credits.
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor’s permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

AS.211.477. Renaissance Witches and Demonology. 3 Credits.
Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did “The Witch” go from being “monstrous” to being “admirable” and even “sexy”? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.211.479. Dante's Journey through the Afterlife. 3 Credits.
Dante’s Divine Comedy presents a complete picture of the medieval world-view in all its aspects: physical (the structure of the cosmos), historical (the major actors from Adam to Dante himself) and moral (a complete system of right and wrong). Dante shows how the Christian religion portrayed itself, other religions, the nature of God, humans, angels and devils, and human society. We will explore these topics both from the viewpoint of Dante’s own time, and in terms of its relevance to our own societal and cultural concerns.
Area: Writing Intensive
AS.214.479

AS.211.606. Literature and Truth: Forgery and Fakes.
Forgery is an eternal problem. It is a literary tradition in its own right, with connections to politics, Classics, religion, philosophy, and literary theory. Spurious writings impinge on social and political realities to a degree rarely confronted by criticism. This course offers a reading of the sort traditionally reserved for canonical works of poetry and prose fiction, spotlighting forgery’s imaginative vitality and its sinister impact on scholarship. Students will study manuscripts and incunabula drawn from JHU’s Bibliotheca Fictiva, the world’s premier collection of literary forgeries.
Area: Writing Intensive
Students cannot have taken AS.214.606.

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the “virtual” space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.215.290. Latin American Critical Perspectives on Colonialism: From the 'World Upside Down' to the 'Coloniality of Power'. 3 Credits.
This course, taught in English, examines how indigenous and local (postcolonial) intellectuals in Latin America responded to the ideology and practices of Spanish Colonialism in the earliest post-conquest years (1532), continued to battle colonialism during the period of the wars of independence, and finally arrived at the production of an analysis that shows how modernity is but the other face of colonialism. Among key works to be discussed are Guaman Poma’s illustrated sixteenth-century chronicles, D.F. Sarramiento's _Civilization and Barbarism_ (1845), and Anibal Quijano's "Coloniality of Power" (2000).
Area: Writing Intensive

AS.215.309. An Interdisciplinary Introduction to the Study of Latin America. 3 Credits.
The course is an interdisciplinary introduction to the study of Latin America. It brings together archeology, ethno-history, art history, literature and environmental studies.
Area: Writing Intensive

AS.215.406. Novelist Intellectuals. 3 Credits.
What does a novelist's op-ed about economics have to do with her literary writing? In what ways does a fiction writer's essays on the environment inform how we read her novels? What happens when we find the political opinions of a writer objectionable? This undergraduate seminar will consider what the Spanish writer Francisco Ayala termed "novelist intellectuals," that is, literary writers who actively participate in a society's public sphere. Considering writers from Madrid to New York, from London to Buenos Aires, we will ask how one should hold a novelist's fictional and non-fictional writings in the balance and explore ways of reading that allow us to consider the public intellectual side and the aesthetic side of a novelist together.

AS.215.413. Cuba y España. 3 Credits.
La frase "más se perdió en Cuba" alude al singular rango de la antigua Provincia de Ultramar en el mapa geopolítico del colonialismo hispánico. Hemos de estudiar la prolongada relación entre España y Cuba, desde 1492 al presente, a través de materiales literarios, crónicas, artes plásticas, música y medios sociales al corriente. Enseñado íntegramente en español.
AS.210.311

AS.215.641. Guaman Poma, his 12 theses for an new understanding of the World Upside Down.
As of today, due to the work of Walter Mignolo, Ossio, Lamana and other scholars in Colonial Studies, the 1000 page letter of Guaman Poma to the King of Spain has become the pre-eminent text written on the question of coloniality of power as theorized by Anibal Quijano. Given that the concept is now central to colonial and modern studies, familiarity with the work of Guaman Poma is essential in the formation of all Latin Americanists and scholars interested in coloniality and imperial studies.
Area: Writing Intensive

AS.215.651. The idea of "Latin America": current debates on the fundamentals of the field.
The course will explore the history of the Idea of Latin America as a discursive and political entity. Students will read the work of Walter Mignolo, Maurico Tenorio Trillo and Fernando Digiovanni among other theorist and cultural historians.
Area: Writing Intensive

Near Eastern Studies

AS.130.119. Medicine in Ancient Egypt. 3 Credits.
A survey of medicine and medical practice in Egypt and, to a lesser extent, the ancient Near East in general. The abundant sources range from magical spells to surprisingly "scientific" treatises and handbooks. Readings are selected from translations of primary sources in the writings of ancient Egypt, Mesopotamia, and Israel. Topics will include the sources of our knowledge; the nature of medical practitioners, medical treatment, and surgery; beliefs about disease and the etiology of illness; concepts of contagion and ritual purity.

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.
A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.136. History of Hasidism. 3 Credits.
Although it appears to be a relic of pre-modern Judaism, Hasidism is a phenomenon of the modern era of Jewish history. This course surveys the political and social history of the Hasidic movement over the course of the last three centuries. Students will also explore basic features of Hasidic culture and thought in their historical development. Cross-listed with Jewish Studies.

AS.130.153. A (Virtual) Visit to the Louvre Museum: Introduction to the Material Culture of Ancient Egypt. 3 Credits.
This course will present the Egyptological collections of the musée du Louvre in Paris, room by room, as in a real visit. The experience will be enhanced by the study of objects that are not shown to the public but are kept in the reserves of the museum. From the 4th millennium BC to Roman time, the iconic "masterpieces" of this world-renowned art museum, as well as its little-known artifacts, will allow us to explore the history and material culture of ancient Egypt. We will also learn to observe, describe and analyze archaeological objects, in a global manner and without establishing a hierarchy between them, while questioning their place in the museum and its particular language. The objective will be to go beyond the objects themselves and answer, in fine, the following questions: What do these objects tell us about the men and women who produced them, exchanged them, used them, and lived among them in antiquity? What do they also reveal about those who discovered them in Egypt, several millennia later, about those who collected them and sometimes traded them, and what does this say about the relations between Egypt and the Western countries over time? The courses will be complemented by visits to the rich Egyptian collections in Baltimore.

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.248. Up the Nile: New Approaches to the History of Egyptology and Nubiology. 3 Credits.
King Tut, Napoleon, Champollion, Ozymandias, Nefertiti: the history of Egyptology is filled with big characters, huge monuments, and glimmering objects. But it is also made up of colonialist practices, looted sites, and forgotten scholarly contributions. "Up the Nile" examines the antiquarian, colonialist, racist, Western-centric, and patriarchal roots of modern Egyptology and Nubiology, and addresses how scholars and enthusiasts alike are continuing to grapple with these lasting legacies and biases. This class investigates how the Egyptians and Nubians thought of their own histories, as well as how other ancient cultures viewed the cultures of the Nile. It moves roughly chronologically, tracing understudied and marginalized voices from the Islamic, Medieval, and Ottoman periods into the 20th and 21st centuries. It examines the origins of scholarship, modern collecting, Egyptomania, and museums, delving into the problems and repercussions that still haunt us today. "Up the Nile" will engage with important and difficult aspects regarding Egyptology's and Nubiology's colonialist, racist, and sexist past and present. It asks: who decides who writes history, then and now?

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

AS.132.609. Seminar in Research Methods in Near Eastern Studies.
Area: Writing Intensive

Political Science

AS.190.471. The University and Society. 3 Credits.

In the 20th century, American universities became the envy of the world, leading in most categories of scholarly productivity and attracting students from every nation. In recent years, though, American higher education has come to face a number of challenges including rapidly rising costs, administrative bloat, corporatization and moocification. We will examine the problems and promises of American higher education, the political struggles within the university and the place of the university in the larger society. Upper classes and Grad Students only.

Program in Museums and Society

AS.389.155. The History of Fake News from The Flood to The Apocalypse. 3 Credits.

“Fake News” is everywhere in both past and present. Explore that history first-hand throughJHU’s rare book collection of literary and historical forgeries spanning millennia of human history.Students learn how to examine and investigate rare books.
Area: Writing Intensive

AS.389.165. Hands on History: Material Cultures of Knowledge from Antiquity to the Digital Age. 3 Credits.

This hands-on course deals entirely with JHU’s collections of rare books and manuscripts as a springboard to build skills in the close visual and physical examination of rare books and manuscripts. You will investigate the technological and aesthetic transformation of textual artifacts from ancient papyri to Gutenberg imprints to digital surrogates, and contribute to the accumulation of historical clues about their meaning and significance as material cultural objects. You will learn what goes into curating and conserving book and manuscript collections today, and how to evaluate the quality and significance of collections. Materials/topics will include ancient Babylonian cuneiform and Egyptian papyri; medieval illuminated manuscripts; incunabula; Renaissance illustrated books of the Scientific Revolution and Spanish Golden Age; cheap print and unique ephemera; early books by and about women; forgeries; and “digital humanities” initiatives at JHU. Students will make regular visits to the Special Collections Reading Room in the BLC throughout the semester.
Area: Writing Intensive

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.

This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.220. Queer Sixties. 3 Credits.

Introduction to queer & trans politics and culture in the period immediately preceding the gay liberation movement, from the early to late 1960s, focusing on intersections of race, sexuality, and gender. Course examines how we have come to narrate queer & trans history and investigates the ways archival practices shape conceptions of queer & trans life. Students learn research methods as they draw on and contribute to the university’s digitized archival collections.

AS.389.230. Queer & Trans Public History. 3 Credits.

This course introduces students to a blend of public history, queer studies and transgender studies. Students learn oral history and archival research methods as they draw on and contribute to the university’s archival, museum, and library collections.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.

We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.275. Interpreting Hopkins as Historic Site. 3 Credits.

This hands-on course explores interpretive strategies for historic sites and culminates in the production of original, research-based, outdoor interpretive exhibits on the Homewood Campus.

AS.389.303. World of Things. 3 Credits.

The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.

What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.

Course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation’s museums, galleries, and libraries and used objects to shape taste and status in the U.S.

AS.389.325. Women of the Book: Female Miracle Workers, Mystics, and Material Culture, 1450-1800. 3 Credits.

From psycho-spiritual autobiographers to mystical bi-locating nuns, convent crèche-keepers to choristers of sacred music, from rock-star-status mystics to the hidden careers of women printers, engravers, and miracle-makers, this course will explore the remarkable intellectual, cultural, and imaginative contributions of women who found refuge, agency, and power within alternative lives.
Area: Writing Intensive

AS.389.340. Critical Issues in Art Conservation. 3 Credits.

The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.348. Queer Oral History. 3 Credits.

Students learn to conduct, analyze, and interpret their own oral histories as they contribute to a wide-ranging project documenting queer worldmaking in the Baltimore-Washington D.C. region. We engage with scholarship from performance studies, queer of color critique, LGBTQ history, and public humanities to consider the politics of storytelling and the promises of public-facing oral history projects. Students have the option of developing podcasts, multimedia projects, and public humanities proposals as their final assignment.

AS.389.357. Heaven on Earth: Art, Power, and Wonder in the Vatican from Antiquity to the Enlightenment. 3 Credits.

A material cultural exploration of the Vatican from the founding of St. Peter’s basilica in antiquity to the establishment of the Vatican Library and Museums in the Renaissance and Enlightenment.
Area: Writing Intensive

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art's American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum's commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, revisualise and offer alternative stories. Class meets at the museum every other week.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.410. Sharing Knowledge: Participatory Archives, Collaborative Storytelling, and Social Justice. 3 Credits.
This course introduces students to collaborative humanities projects that encourage democraticparticipation among publics more broadly conceived than the academy. We investigate indigenous research methods; collaborative oral history and ethnography; interactive theater;and community archives. Final projects draw on the university's archival, museum, and librarycollections.

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

Research Methods

SA.100.408. Research Design and Casual Inference. 4 Credits.
This course introduces students to research methods that are commonly employed today in the field of international relations. The focus of the course is on research designs aimed at establishing causal inferences. There are four main sections to the class, each of which covers one major type of research design. The first section focuses on qualitative research methods. The second section turns to quantitative methods, particularly methods used for analyzing observational data (i.e. non-experimental data). In section III, we study experimental methods. The final section provides an overview of various quasi-experimental methods. Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.600.767[C];SA.100.401[C] OR SA.340.710[C]

SA.100.410. Theories & Methods of Qualitative Political Research. 4 Credits.
Research in the social sciences calls upon different methods for gathering information, interpreting data, drawing inferences, and advancing arguments. Qualitative methods rely on direct observation, narrative forms, and tools such as interviews, archival sources, media, participant observation, ethnographic analysis and historical documentation. Qualitative approaches may draw upon inductive techniques (assessing evidence directly) and deductive reasoning (drawing on stylized or logical relationships) when identifying patterns and crafting propositions. The purposes of qualitative methods are broadly similar to those of quantitative methods: drawing inferences (resilient generalizations) from evidence, developing causal arguments about the sources and mechanisms of events, and testing propositions about political behavior. Qualitative methods are also frequently partnered with quantitative methods in "mixed-method" research designs. However, the assumptions and procedures of qualitative methodology are distinct.
Students may not register for this class if they have already received credit for SA.600.774[C]

Security, Strategy, and Statecraft

SA.502.118. Kissinger Seminar: Contemporary Issues in American Foreign Policy and Grand Strategy. 4 Credits.
What is America's purpose in international affairs? What are the major challenges in U.S. foreign policy? What is the future of American power in a changing global system? This course examines these and other critical issues in U.S. foreign policy and global strategy. We will study the opportunities and dilemmas the United States confronts in dealing with terrorism and the Islamic State, great-power competition vis-a-vis Russia and China, the threat of nuclear proliferation and "rogue states," and other issues from international economics to transnational threats. We will consider whether America can maintain its international primacy, and what alternative strategies it might pursue in the future.
Students may not register for this class if they have already received credit for SA.200.734[C]

SA.502.122. Psychology and Decision-Making in Foreign Policy. 4 Credits.
Why do leaders, institutions, and states make the decisions they do? International Relations scholars are increasingly recognizing the importance of psychological and other decision-making approaches to understanding world affairs, particularly the crafting and implementation of foreign policy. In this course, we examine individual cognitive biases and heuristics, organizational culture, groupthink, and other dynamics that produce often surprising, suboptimal outcomes in international politics. A major purpose of the course is to think broadly about ways in which these approaches can help inform theoretical work done by political scientists and policy analysts to provide more nuanced understandings of otherwise confounding cases of foreign policy decision-making. We will also draw from numerous empirical examples of crisis decision-making, major foreign policy shifts, and intelligence failure across time and space to evaluate the relative efficacy of various approaches in explaining specific cases.
Students may not register for this class if they have already received credit for SA.600.738[C]

SA.502.134. World Order in the 21st Century. 4 Credits.
As we look forward several decades, what problems of statecraft are likely to confront us? Will the fragmentation of world politics into three distinct conflict regions, contrasting modes of alliance behavior, and the advent of cyberwarfare threaten national security, thus undermining the capacity to maintain world order in the 21st century? In the face of nuclear proliferation, is deterrence subject to a lowering of the nuclear threshold? By mid-century world population will be in decline in most of the Great Powers. Will globalization suffer? How will oil politics shape future options? Will the advent of aging, urbanization, and increased wealth assist the search for stability and peace? Or will abrupt structural changes on the cycles of relative power of the big states unleash a return of the conditions that led to world war in the first half of the 20th century? What strategies of leadership and balance are available to the United States and to the other Great Powers? How can diplomacy help guide statecraft to surmount these problems in the effort to sustain world order?
Students may not register for this class if they have already received credit for SA.600.788[C]

Sociology

AS.230.306. Plagues, Power, and Social Control. 3 Credits.
While developments in biomedicine and health care have led to the eradication, cure and management of many human health problems, disease, illness and health have also been the focus for aggressive social controls and population management. The technologies and practices of disease control and health management have been foundational to some of the most aggressive structures of oppression in recent history such as the Jewish Ghetto, the Concentration Camp, the South African Township and techniques of segregation. This course seeks to explore how epidemics and disease control are linked to larger questions of power, state craft and international dynamics. This course asks how have outbreaks of infectious disease shaped social and political action? How do societies respond to outbreaks and why? What do epidemic moments tell us about global structures of power and the dynamics of control? Drawing on historical cases including plague during the European Renaissance and before, the HIV/AIDS Pandemic and the West African Ebola Outbreak of 2013-2016, this course will introduce students to the history and practices of disease control as well as important theoretical perspectives by which to understand the sociological and historical effects of disease and the responses to them. Students will engage sociological concepts such as biopolitics, social construction of disease and illness and biosecurity and produce a final research paper examining the outcomes and responses to an epidemic event to show mastery of the topics covered in the course.
Area: Writing Intensive

States, Markets, and Institutions

SA.503.100. Comparative Political Economy. 4 Credits.
This course is intended to bridge the gap between economics and politics as taught at SAIS. First examines some of the main “currents” in the literature and familiarizes the student with different variants of political economy. Presents an overview of the classical liberal, Marxian/Polanyian and Keynesian understandings of the economy, each of which serves as both a primer to political economy and as an introduction to the main contemporary approaches. Then engages with what many scholars argue is the major approach in comparative political economy: rational choice theory. By contrast, the next section looks beyond the rationalist tradition to the nowadays somewhat neglected historical tradition. Building on the historical tradition, next examines institutionalist approaches, explaining institutional change and stability over time through path dependence and earlier arrangements. Concludes with more social constructivist understandings of political economy, emphasizing the powerful role of economic ideas in the evolution of economic policymaking over time.
Students may not register for this class if they have already received credit for SA.610.770[C]

SA.503.101. Contemporary Theory in International Relations. 4 Credits.
Examines the leading contemporary theories of international relations, showing how each contributes uniquely to the larger literature. How are alliances formed? What is the relationship between absolute and relative gains? How do wars begin? Emphasizes interrelationships, divergences and cumulative developments, from the balance of power to the latest in structural, rational choice and regime theory.
Students may not register for this class if they have already received credit for SA.600.702[C]

SA.503.104. International Political Economy of Emerging Markets. 4 Credits.
This course examines the relationship between politics and international economics in developing countries, with a focus on the emerging market economies. Throughout the course, we critically evaluate different political science theories of foreign economic policymaking in emerging markets. The course begins with an overview of theories of international political economy. The second section of the course focuses on developing countries’ embrace of economic globalization over the past thirty years. We examine different political reasons for why emerging market and developing countries have liberalized foreign trade, removed barriers to foreign investment, and reduced the state’s role in the domestic economy since the 1980s. The final section of the course of the course explores how globalization has impacted emerging market economies, and considers how governments in these countries have dealt with the new challenges that have emerged in this era of economic globalization
Students may not register for this class if they have already received credit for SA.610.700[C]

SA.503.105. Politics of International Economy. 4 Credits.
How does globalization affect state power? The course examines how market outcomes shape both politics and economics. Develops a dynamic understanding of international political economy and assesses its impact in rich/poor gap models, inequality questions, the convergences of productivity, and problems of trade liberalization and neomercantilism. Applications include state breakup, the oil dilemma and currency crises. Uses this dynamic approach to identify key regional problems in North America, Europe and Asia and to offer policy solutions.
Students may not register for this class if they have already received credit for SA.610.717[C]

SA.503.106. Public Opinion as a Driver for Policymakers: Analytical Tools and Illustrative Case Studies. 4 Credits.
A key driver in any democracy, public opinion determines who will govern and which policies will be likely to succeed. Contrary to general beliefs that public opinion is highly ephemeral, both practice and scientific evidence show that public opinion is a stable, measurable, and ultimately predictable phenomenon. To explore the issue both conceptually and in practice, the course will first offer a review and discussion of relevant literature on the subject and then analyze concrete case studies exploring the uses and misuses of public opinion and polling by political and policy stakeholders. Likely case studies will include primarily Latin American examples, such as the 2002 Lula election, but also extra-regional cases, such as the 2008 Obama election and the Arab Spring, among others. The final objective is to develop a critical eye when analyzing public policy and political problems.
Students may not register for this class if they have already received credit for SA.810.705[C]

SA.503.107. Research Seminar: Political Economy in the Shadow of Conflict. 4 Credits.
This is a research seminar organized around key ongoing debates in international relations, such as the role of institutions, audience costs, leaders, bargaining, reputation, interdependence, and ideas. The course will emphasize critical engagement of the empirical evidence presented in favor of theoretical arguments, encouraging students to devise rigorous new ways to test their observable implications. Can bargaining theory help us understand the outbreak, as well as the termination of, international conflict? Has growing economic integration among states changed the nature of military conflict? Are certain economic interest groups more prone to support military expansion than others? Do democratic institutions enable states to better signal their resolve to adversaries? By the end of the course, students will be able to recognize, engage, and develop their own taste for theoretical arguments, as well as present the most compelling empirical evidence for or against them.
Students may not register for this class if they have already received credit for SA.610.702[C]

Study of Women, Gender, & Sexuality

AS.363.201. Introduction to the Study of Women, Gender, and Sexuality. 3 Credits.
This course will serve as an intensive introduction to contemporary approaches to theories of gender and sexuality, and their relationship to cultural production and politics. Students will develop a historically situated knowledge of the development of feminist and queer scholarship in the 20th and 21st centuries, and consider the multiply intersecting forces which shape understandings of sexual and gender identity. We will consider both foundational questions (What is gender? Who is the subject of feminism? What defines queerness?) and questions of aesthetic and political strategy, and spend substantial time engaging with feminist and queer scholarship in comparative contexts. Students will be introduced to debates in Black feminism, intersectionality theory, third world feminism, socialist feminism, queer of colour critique, and trans* theory. We will read both canonical texts and recent works of scholarship, and the final weeks of the course will be devoted to thinking with our theoretical and historical readings against a selection of feminist and queer literature and cinema. No prior familiarity with the study of gender and sexuality is necessary.

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.
Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women's thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

AS.363.345. Zora Neale Hurston: Ethnography as Method. 3 Credits.
While many recognize Zora Neale Hurston's creative literary work, her methodological innovations are often overshadowed. This course will examine Hurston's contributions to theorizing the African diaspora and creative use of ethnography.Dr. Amarilys Estrella, the 2020-2021 ACLS Emerging Voices Postdoc, will teach this course. For more info on Dr. Estrella, see https://history.jhu.edu/directory/amarilys-estrella/

Technology and Culture

SA.501.100. News Media & International Affairs. 4 Credits.
The purpose of this course is to provide deeper understanding of the interaction between the operations of the news media and the conduct of international relations. This will include an emphasis on how rapidly the major medium of exchange has passed in barely 50 years from newspapers to broadcast to the internet. The instruction will be through a combination of lectures, guest lectures, student discussion and papers. There will be an emphasis on clear and good writing. Student evaluation will be based on participation in discussion and papers.
Students may not register for this class if they have already received credit for SA.600.755[C]

SA.501.101. SAIS Women Lead Practicum. 4 Credits.
The SAIS Women Lead Practicum partners SAIS students with public, private, and non-governmental organizations and provides professional experiences through projects that advance women and contribute solutions to issues of global importance. Student teams work with clients to produce reports, policies or programs. Students will also be expected to participate in a research assignment during Winter Break (travel may be required). Upon their return, teams proceed to analyze, interpret and present results of findings to the SAIS community and clients. Students audit the course in the fall semester (in additional to their full load) and take the Practicum as a 4-credit course in the spring semester as part of their load. The application deadline is July 20. Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.600.729[C]

The Americas

SA.551.100. Economics of Immigration. 4 Credits.
Examines the economic causes and consequences of international migration. The central focus is an economic analysis of the general patterns of population flows, their determinants and their impact. Analyzes these primarily within a comparative context of the North American experience, although also considers other case studies. Current US migration policy is examined so as to understand how the US system is 'broken' and what is meant by ' true immigration reform'. Includes consideration of the Canadian experience, in that Canadian immigration policy seems to get many things 'right'.
Students may not register for this class if they have already received credit for SA.840.715[C]

SA.551.104. Middle Power Diplomacy. 4 Credits.
International relations scholarship pays close attention to the Great Powers, and concern over failed states. With the formation of the G20, there is a multilateral forum where Great Powers and the Rising Powers of Brazil, Russia, India, and China can shape the global agenda. Yet in every era and every stable international order there is an important role for Middle Powers – countries whose capacity to foster or disrupt order leads them to “punch above their weight” in international relations. Canada self-identifies as a Middle Power, but today the status of Middle Power is claimed by states in every region and on every continent.This course considers the dilemmas and strategies of Middle Power diplomacy, and how the United States, Great Powers and Small States interact with them. Over the course of the semester, we will consider what role Middle Powers play in the contemporary international system, and what to do about it.
Students may not register for this class if they have already received credit for SA.840.706[C]

For current faculty and contact information go to http://history.jhu.edu/people/

History, Bachelor of Arts

History Major Requirements

(Also see Requirements for a Bachelor’s Degree. (p. 1587))

The Krieger School classifies history as both a social scientific and humanistic discipline. This accords very well with the wide range of explanatory and interpretive approaches to the past that now prevail in the discipline of history. One of the history program’s goals is to introduce students to these varied approaches. Although the department offers strong preparation for students who seek to specialize in a particular cultural or geographic region, history at Johns Hopkins is primarily issue and topic oriented. It also puts a premium on developing the capacity to reason comparatively and on deepening the student’s understanding of global connections among cultures in the past and in contemporary life.

The department offers undergraduate courses that range from large introductory classes to small, focused seminars that encourage intensive interaction with individual professors and with other students. Beyond the introductory level, most of our courses are writing intensive and promote in all students critical reading skills and the ability to formulate effective written arguments. Through its core curriculum, the major also cultivates skills specific to the historian, especially research and writing based upon the systematic analysis of primary documents.

The program’s overall aim is to deepen the critical habits of mind that arise from the study of time and change. These capacities are the hallmarks of liberal learning, but they are also the foundation for success in post-graduate studies and careers of many kinds, including business, law, and public affairs.

Major in History

- Students must earn a "C-" or higher grade in all courses used to satisfy major requirements, and may not count courses that are graded as satisfactory/unsatisfactory. If a student opts to take First-Year Seminar (AS.001.xxx) cross-listed with the History and earns an S grade, this course may apply towards major requirements even though it is graded satisfactory/unsatisfactory.
- For students who choose to focus on one geographical area (Europe, United States, Latin America/Caribbean, Atlantic, Africa, Asia, North Africa/Middle East), two courses must be taken outside the student's area of focus.
- At least 4 of the 8 history electives/upper level courses must be completed with courses taken directly from the JHU History department (AS.100.xxx).

Major Requirements

Code	Title	Credits
Introductory Courses		
Select one of the following options:		6
A) Two 100- or 200-level introductory courses offered by the History Department (AS.100.1xx or AS.100.2xx)		
B) One (1) 100- or 200-level introductory course offered by the History Department (AS.100.1xx or AS.100.2xx) plus one (1) First Year Seminar cross-listed with the History Department (AS.001.1xx)		
Method Requirement		
AS.100.293	Historical Methods, Archives and Interpretations (year 2 fall)	3
AS.100.388	Practicing Historical Research (year 2 spring or year 3 fall)	3
Elective Courses		
Two history courses at any level		6
Four 300-level or higher history courses		12
Additional Upper-Level Courses		
Select one of the following options:		6
A) Two 300-level or higher history courses		
B) AS.100.507 & AS.100.508 Senior Thesis [1]		
Second Language Requirement		

Language proficiency in a second language is required through the completion of the intermediate level. [2]	0-18
Total Credits	**36-54**

[1] Students must have a cumulative GPA of 3.25 and a cumulative GPA in history of 3.5 or higher by December of their junior year to be eligible for the senior thesis option to graduate with honors in history.

[2] Foreign language proficiency may be demonstrated by coursework or by special examination with permission of the History Director of Undergraduate Studies (DUS).

Cognate Courses The History Department encourages interdisciplinary work in cognate fields of learning. History minors are therefore strongly advised to take additional courses in any department, including the History Department, that relate to the student's major discipline in a historical way.

Sample Program

A sample path toward degree completion might include the following sequence of courses. Many alternative paths will also work. Please consult with your department advisor regarding alternative paths.

Course	Title	Credits
First Year		
First Semester		
(A) AS.100.1xx or AS.100.2xx Introductory Course, or (B) AS.001.1xx First Year Seminar cross-listed with History [1]		3
Introductory Language Course		3
	Credits	**6**
Second Semester		
(A) AS.100.1xx or AS.100.2xx Introductory Course, or (B) AS.001.1xx First Year Seminar cross-listed with History [1]		3
Introductory Language Course		3
	Credits	**6**
Second Year		
First Semester		
AS.100.293 Historical Methods, Archives and Interpretations		3
AS.100.xxx History Elective		3
Intermediate Language Course		3
	Credits	**9**
Second Semester		
AS.100.388 Practicing Historical Methods		3
AS.100.xxx History Elective		3
Intermediate Language Course		3
	Credits	**9**
Third Year		
First Semester		
AS.100.3xx - AS.100.4xx History Elective		3
AS.100.3xx - AS.100.4xx History Elective		3
	Credits	**6**
Second Semester		
AS.100.3xx - AS.100.4xx History Elective (perhaps, study abroad)		3
	Credits	**3**
Fourth Year		
First Semester		
AS.100.3xx - AS.100.4xx History Elective		3
AS.100.3xx - AS.100.4xx History Elective		3
	Credits	**6**
Second Semester		
AS.100.3xx - AS.100.4xx History Elective		3
	Credits	**3**
	Total Credits	**48**

[1] Students can progress through the major easily even if they take only one history course during their freshman year. There are two paths for the Introductory Course requirement: (A) two (2) introductory courses at the 100- or 200-level offered by the History Department, or (B) one (1) introductory course at the 100- or 200-level offered by the History Department *plus* one (1) First Year Seminar (AS.001.1xx) that is cross-listed with the History Department.

Senior Honors Option

Course	Title	Credits
Fourth Year		
First Semester		
AS.100.507	Senior Thesis	3
AS.100.494	Senior Honors Seminar	1
AS.100.3xx - AS.100.4xx: History Elective		3
	Credits	**7**
Second Semester		
AS.100.508	Senior Thesis	3
AS.100.495	Senior Honors Seminar	1
	Credits	**4**
	Total Credits	**11**

Honors Program in History (BA)

The history department strongly encourages all eligible history majors to pursue the honors track in history. The track culminates in the senior thesis, a yearlong, "capstone" research project completed under the direct supervision of an individual faculty advisor. Like all capstone projects, the senior thesis is intellectually challenging and its completion almost always brings with it a tremendous sense of accomplishment. It also hones the talented young historian's capacity to sustain a cogent argument based on primary evidence in the long form essay. These skills and the completion of a sustained independent project are also important practical assets when seeking a job or a post-graduate education.

A general cumulative GPA of 3.25 and a cumulative GPA in history of 3.5 are prerequisites for undertaking the senior thesis, and to obtain honors students will normally be expected to complete the thesis with a grade of A- or better. All thesis writers must also enroll in both the AS.100.507 Senior Thesis (fall, 3 credits) and AS.100.508 Senior Thesis (spring, 3 credits) and AS.100.494 Senior Honors Seminar (fall, 1 credit) and AS.100.495 Senior Honors Seminar (spring, 1 credit) - enrollment is by instructor's permission and will be granted only to students who have obtained a commitment from a faculty thesis advisor. This commitment should normally be obtained no later than April 30th of the junior year.

For questions about the honors track in history or finding a thesis advisor, consult your departmental advisor or the current Director of Undergraduate Studies.

History, Bachelor of Arts/Master of Arts Four-Year Program

The B.A.– M.A Program is an accelerated program that allows the undergraduate to complete a BA and an MA in history in four years. It is designed for students who demonstrate exceptional scholarly ability and assumes that the student will complete most other requirements for graduation by the end of the junior year. Minimum prerequisites for admission include a GPA of 3.8 or higher, completion of language requirements through the intermediate level by the end of the junior year, and the securing of a faculty sponsor in the department of history in advance of application. Students seeking admission into the BA-MA program shall submit a formal application to the regular graduate program in history: the application deadline is December 15 of the junior year.

The program of study during the senior year includes 6-7 credits of graduate reading and research seminars or independent study each semester, mastery of the scholarship in the student's area of research concentration as demonstrated by the successful completion of a graduate field examination in that area of concentration; and, in lieu of the senior thesis, the completion of a major scholarly research essay equivalent in quality to those completed by first year graduate students in the regular doctoral program.

For questions and further details about the program, contact Megan Zeller, mzeller4@jhu.edu, Graduate Coordinator, Department of History, who can also provide details about application procedures.

History, Minor

History Minor Requirements

The minor in history offers to students majoring in other programs of study an opportunity to pursue a serious interest in history.

- Students must earn a "C-" or higher grade in all courses used to satisfy minor requirements and may not be taken satisfactory/unsatisfactory. If a student opts to take First-Year Seminar (AS.001.xxx) cross-listed with the History and earns an S grade, this course may apply towards minor requirements even though it is graded satisfactory/unsatisfactory.
- At least 2 of the 4 electives must be taken directly from the History Department.

Code	Title	Credits
Introductory Courses		
Select one of the following options:		6
A) Two 100- or 200-level introductory courses offered by the History Department (AS.100.1xx or AS.100.2xx)		
B) One (1) 100- or 200-level introductory course offered by the History Department (AS.100.1xx or AS.100.2xx) plus one (1) First Year Seminar cross-listed with the History Department (AS.001.1xx)		
Method Requirement		
AS.100.293	Historical Methods, Archives and Interpretations	3
Elective Courses		
One 200-level or higher history course		3
Three 300-level or higher history courses		9
Total Credits		**21**

Cognate Courses The History Department encourages interdisciplinary work in cognate fields of learning. History minors are therefore strongly advised to take additional courses in any department, including the History Department, that relate to the student's major discipline in a historical way.

History, PhD

Program Requirements

Students are required to have a reading knowledge of those foreign languages that are necessary for the satisfactory completion of their program of graduate study. Students in European history must have a reading knowledge of at least two languages, and students in medieval history must also have a reading knowledge of Latin. Students of Chinese history are expected to have reading knowledge of modern and classical Chinese and in most cases should also have reading knowledge of Japanese and/or a European language. Students in the Latin American area must have a reading knowledge of two of the following, depending upon their particular specialties: French, Spanish, Portuguese, or Dutch. In African history, students must have a reading knowledge of three languages including English and French. Depending upon their fields of specialization, students in African history may have other language needs. Students are expected to pass a written examination in one language within a month after entering the department, and they are required to do so before the end of the first year.

Each student is required to take a seminar under their major professor and to participate in at least one departmental seminar each semester.

The student's knowledge of four fields will be tested by written and oral examinations before the end of the second year of graduate study.

The student must write and defend a dissertation that is a major piece of historical research and interpretation based on primary sources and representing a contribution to historical knowledge. Its content, form, and style must be adequate to make it suitable for publication.

Normally, each student is required to perform some supervised teaching or research duties at some point during the graduate program, most often as a teaching fellow during the second and fourth years.

History of Art

http://arthist.jhu.edu/

Supporting a proud tradition of excellence in humanities scholarship and teaching, Johns Hopkins University offers students a diverse range of resources and opportunities for the study of art history. Courses are taught by an international faculty of respected research scholars, covering a broad temporal scope of the art and architecture of Europe, the Islamic world, Asia, the Americas, and the trans-Atlantic world. Participating in small classes with opportunities for close study of art in local and regional collections, students integrate their direct experience of works of art with the knowledge and critical perspective gained through historical research, discussion, and debate.

Programs leading to the BA, BA/MA, and PhD degrees emphasize the value of investigating works of art in their historical, intellectual, and social contexts, and enable students to deepen their understanding of cultural history in conjunction with courses in other departments and programs.

Art Collections and Resources

Located in a metropolitan region of unsurpassed museum collections and research institutions, Johns Hopkins is well situated for the study of art history. The Baltimore Museum of Art, with its rich holdings in modern and contemporary art, African Art, and the history of prints (to name just a few of its strengths), is directly adjacent to the Homewood campus. Downtown, and only a short shuttle ride away, is the renowned Walters Art Museum, which houses art from Asia, the Americas, Europe, and the Islamic world from the pre-historic era to the nineteenth century.

Easily accessible from Baltimore are the museums and galleries of Washington D.C., a short train ride to the south. The National Gallery of Art houses a world-class collection of European and American painting, sculpture, photography, and graphic arts from the Renaissance to the present day. Important collections of Byzantine art and the art of the ancient Americas are maintained at Dumbarton Oaks Research Library, and collections of Islamic, Asian, Ancient Near Eastern, and African art are housed in the Smithsonian's National Museum of Asian Art and National Museum of African Art. Works of modern and contemporary art are presented in the permanent collections and exhibitions of the Hirshhorn Museum, Smithsonian American Art Museum (SAAM), and the Phillips Collection. The collections at the National Museum for Women in the Arts, the Library of Congress, and the Textile Museum (at George Washington University) add to the richness of materials available for study.

Meanwhile, the Sheridan Libraries of Johns Hopkins maintains its own extensive art library on the Homewood Campus, alongside a Special Collections department which includes a strong collection of illustrated books, facsimiles, and artists' publications, and illustrated manuscripts, photography, and object collections housed at the Homewood Museums. The Johns Hopkins Archaeological Museum, which neighbors our department in Gilman Hall, houses objects from the ancient Mediterranean, Near East, and Americas, as well as some medieval Islamic works.

Programs

- History of Art, Bachelor of Arts (p. 1879)
- History of Art, Minor (p. 1880)
- History of Art, PhD (p. 1880)
- History of Art, Bachelor of Arts/Master of Arts (p. 1881)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.010.101. Introduction to Art History I. 4 Credits.
This introductory course explores and compares major developments in world art and architecture from the dawn of history, through several ancient and medieval civilizations, down to the era of the Black Death in Europe (mid-14th century). We will focus primarily on Egypt and the ancient Levant, the Mediterranean world of Greece and Rome, medieval Europe, the Islamic Middle East and Spain, and selected aspects of the arts of India, China, and Japan.
Area: Writing Intensive

AS.010.102. Introduction to Art History II. 4 Credits.
This introductory course explores and compares major developments in the arts primarily in Asia, Europe, North Africa, and North America from the fourteenth century to the present day, looking in particular at architecture, painting, sculpture, the arts of the object (ceramics, metalwork, etc.), printmaking, photography, and, starting in the twentieth century, new media. Throughout the semester, we will explore how the artistic practices and theories under consideration relate to their specific historical, intellectual, social, political, and geographical contexts, and we will also consider the roles that works of art and artists played in shaping many of those very same contexts

AS.010.103. Introduction to the Art of Asia. 3 Credits.
A survey of the art and architecture of Asia, from the ancient world to the present and including the Indian subcontinent, China, Japan, Korea, and Southeast Asia.

AS.010.110. Art of the Islamic World. 4 Credits.
This course is an introduction to the art of the Islamic world, covering a geography that stretches from Spain to India and a chronology that extends from the seventh century into our own time. Within this rich and varied continuum, we will look at a range of art forms—including architecture, painting, sculpture, ceramics, and calligraphy—in relation to such themes as patronage, production, function, and audience. A number of the artworks will be viewed firsthand in local collections. We will also explore the intersection of Islamic art with today's political realities.

AS.010.204. Italian Art in the Middle Ages. 3 Credits.
This course explores key monuments of medieval art and architecture in Italy from c. 400 until 1350. We will concentrate on historical, functional, and aesthetical aspects that lead to the creation of single monuments and art works. Emphasis is given to the analysis of "sacred space" by means of architecture, painted, and sculptural decoration, as well as ritual performances. Another focus is laid on the emergence on the political dimension of art for the creation of civic identity as well as in the context of the late medieval courts. We raise questions about the importance of materiality and science for the creation of medieval art works.
Area: Writing Intensive

AS.010.205. Art of Mesoamerica. 3 Credits.
This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.208. Leonardo da Vinci: The Renaissance Workshop in the Formation of Scientific Knowledge. 3 Credits.
How does a notary's son trained as a painter come to claim expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? The course will focus critically on the myth of Leonardo's singularity and explore his achievements with regard to the artisanal culture of his time, as well as the problems of authority in the recognition of artisanal knowledge as scientific discovery.

AS.010.210. The Art of Colonial Latin America. 3 Credits.
This course offers a broad introduction to the arts of colonial Latin America: students will become familiar with the artistic production in the areas of Latin America invaded and controlled by the Spanish Crown from the time of the conquests in the sixteenth century to independence movements in the early nineteenth century. We will explore a wide range of materials from maps to featherwork, paintings to urban grids, cathedrals to mummy bundles. The course is thematically organized, such that students will not only become familiar with the art of Latin America, but will come to understand critical topics related to the study of early modern colonialism: conquest, race, missionary control, literacy, extraction, and indigenous and imperial systems of governance.

AS.010.212. Mirror Mirror: Reflections in Art from Van Eyck to Velázquez. 3 Credits.
Explores the different ways Early Modern painters and printmakers incorporated mirrors and optical reflections into their works for the sake of illusion and metaphor, deception and desire, reflexivity and truth-telling. Connecting sense perception and ethical knowledge, embedded mirror images often made claims about the nature of the self, the powers of art, and the superiority of painting in particular.

AS.010.214. Ancient Americas in Motion. 3 Credits.
This course critically examines the visual arts through the medium of documentary, historical, and Hollywood film. Coverage is mostly North America and Mesoamerica.

AS.010.232. Art and Architecture of the Global Medieval Mediterranean World. 3 Credits.
This course serves as an introduction to the art and architecture of the Mediterranean region between the early Christian period and the Second Crusade (c. 250-1150). We will analyze the interactions between WesternEuropean, Byzantine, and Islamic cultures through the development of religious art and architecture, asking specifically how these interactions were mediated by culturally distinct representational practices. The course will cover the broad Mediterranean region by focusing on specific sites of interaction around the Sea (i.e. Islamic Spain, Norman Sicily, Byzantine North Africa, Venice and the Adriatic Coast, and Crusader Palestine). Select topics will include: the rise of religious image theory and its effect on the visual cultures of the Mediterranean region; the trans-regional movement of artists, crafted objects, and artistic technologies; the history of urbanism and the production of artistic objects in port cities and centers of trade; and the concept of the Mediterranean as "Premodern Globalism." Readings will include both primary and secondary sources, and we will investigate a variety of methods and approaches to the interpretation of art objects.

AS.010.233. Asian Art Since 1945. 3 Credits.
This course examines the art and architecture of East, South, and Southeast Asia produced since the mid-twentieth century. We will engage with theoretical, visual, and political developments in the recent art of this region, reading statements by artists and architects, discussing the rising commercial and international profile of contemporary Asian art, and exploring established and emerging art histories of this period.Cross-list with East Asian Studies

AS.010.235. Art, Medicine, and the Body: Middle Ages to Modernity. 3 Credits.
This course explores seven centuries of fruitful collaboration between physicians and artists, uncovering the shared discourses, diagnostic techniques and therapeutic agendas that united the art of picture-making with the art of healing. Topics include the origin and development of medical illustration; the long, cross-cultural history of the therapeutic artefact; the anatomical investigations of Renaissance artists such as Leonardo and Michelangelo; depictions of bodily pain and disease in the art of Matthias Grünewald and psychosomatic syndromes like melancholy in the work of Albrecht Dürer; the spectacularization of the body in Enlightenment science and the ethics of medical specimen display today -- all in order to bring the complex intersections of the history of medicine and the history of art into view.

AS.010.240. Art and the Environment in the Ancient Eastern Mediterranean. 3 Credits.
What is the relationship between art and the environment? What are "geoaesthetics?" This course explores the interrelationships between ecosystem and creative responses and practices in the ancient Eastern Mediterranean. Specifically, the class will examine the intersections between artistic and architectural practices and the natural environment during the New Kingdom in ancient Egypt, the Neo-Assyrian period in ancient Mesopotamia, and the Minoan Bronze Age in the ancient Aegean.

AS.010.252. Sculpture and Ideology in the Middle Ages. 3 Credits.
This lecture course will offer a selective, thematic exploration of the art of sculpture as practiced in the Middle Ages, from the fall of the Roman empire in the 4th century CE to height of the Gothic era. The primary concern will be to analyze sculpture in all of its forms – monumental free-standing, architectural, liturgical, and commemorative – as the primary medium utilized by patrons, both private and corporate, to display political messages to an ever growing public.

AS.010.255. Contemporary Performance Art. 3 Credits.
Performance art is provocative and often controversial because it troubles, without dissolving, the distinction between art and life. Not just a matter of activating bodies, engaging viewers, or spurring participation, performance art asks what it means to perform, and what kinds of actions count, in contemporary culture. As such, performance art allows us to rethink established art historical concerns with form, perspective, and materiality, while offering critical insight into everyday life. We will explore how performance art addresses ingrained assumptions about action and passivity, success and failure, embodiment and mediation, "good" and "bad" feelings, emancipation and dependency.The study of performance art invites transdisciplinary approaches. Students from across the university are welcome. Our attention to a diverse array of artists and practices will be supplemented by readings in art history and criticism, as well as in feminist and queer theory, critical race theory, and political thought.

AS.010.265. Early Modern Dutch and Flemish Painting. 3 Credits.
Explores the major painters and printmakers working in the Netherlands during the sixteenth and early seventeenth centuries, the period that saw the outbreak of the Reformation, the revolt against Spanish rule, iconoclasm, the birth of the Dutch Republic, and the establishment of a Dutch colonial empire. Featured artists include Jan Gossaert, Pieter Aertsen, Pieter Bruegel the Elder, Jan Brueghel, Rembrandt van Rijn, Peter Paul Rubens, Jan Steen, Jan Vermeer, and others.

AS.010.301. Michelangelo: Religion, Sexuality, and the Crisis of Renaissance Art. 3 Credits.
The course will focus on the controversies surrounding the representation of the body in the writings and figurative art of Michelangelo and his contemporaries, the historical circumstances under which the most admired artist in Europe was attacked as a blasphemer and an idolator, and the effect of widespread calls for censorship on his later production. The writings of Michelangelo, Pietro Aretino, Benvenuto Cellini and own writings will be considered with a focus on their staging of an ambivalent and transgressive eroticism.

AS.010.303. Transformations of an Empire: Power, Religion, and the Arts in Medieval Rome. 3 Credits.
This course investigates the impact of political, religious, and social change for the making of art and architecture in the city of Rome from Constantine the Great (ca. 274-337 CE) until 1308, when the papal court moved to Avignon. From being a thriving metropolis and the political center of an empire in a pagan, multi-ethnical society, Rome became a small town of a few thousand inhabitants dwelling in the ancient ruins under the spiritual leadership of a powerless Christian bishop and unprotected from the invasions of the migrating peoples from Eastern Europe and Central Asia. Later transformations concern the rise to political power of the popes, achieved by the military alliance with the Frankish dynasty of Charlemagne around 800, and the controversy over the superiority of power between the German emperors and the Roman popes. How did the transformation from worldly to religious power affect the architecture of public buildings in the city? What strategies were developed to visually promote the new religious leaders of the city, the popes, and the new Christian God? How did the new status of Rome as one of the most important Christian pilgrim sites with its countless bodies of Early Christian martyrs in the catacombs outside the city influence urban development? And finally, what impact did the economical ups and downs in these periods of transition have for the arts? As we try to reconstruct the 'image' and the appearance of medieval Rome, this course discusses ideas and concepts behind different forms of leadership, both political and religious, as they intersect with the power of the arts and the self-referential character of a city that is obsessed with its own past.
Area: Writing Intensive

AS.010.305. The Ethiopia at the Crossroads. 3 Credits.
Ethiopia played a foundational role in modern-day civilization and culture: as the find site of Lucy, the earliest bipedal hominid, the seat of the Queen of Sheba's kingdom, the second country in the world to adopt Christianity in the early 4th century CE, and the nexus of exchange between Africa, Europe, and Asia. In fall 2023, The Walters Art Museum will mount the exhibition tentatively titled, Ethiopia at the Crossroads, which addresses Ethiopia's relationship and artistic exchange with its surrounding cultures, including South Arabia, Nubia, Egypt, Byzantium, Armenia, Italy, and India. It also discusses the impact of Ethiopian art beyond its borders, bringing works of Ethiopian contemporary art into dialogue with the historical Ethiopian art that these artists draw upon in their work. The exhibition covers approximately 1,750 years of Ethiopian history with a special focus on the art of the medieval period, broadly conceived. The course will also offer insights into how a museum exhibition is developed from the initial concept to the physical presentation in the galleries.

AS.010.307. Diplomats, Dealers, and Diggers: The Birth of Archaeology and the Rise of Collecting from the 19th c. to Today. 3 Credits.
The development of archaeology in the Middle East – its history of explorers, diplomats, missionaries and gentlemen-scholars – profoundly shaped the modern world, from the creation of new museums and the antiquities market to international relations and terrorism.

AS.010.309. The Idea of Athens. 3 Credits.
This thematic course will explore the art, architecture, material culture, and textual evidence from the ancient city of Athens, the many cultures and social positions that made up the ancient city, and the idea of the city as something far beyond its reality. We will take a number of field trips to museums in the area and some of your assignments will be based in local museums.

AS.010.315. Art of the Assyrian Empire, 1000-600 BCE. 3 Credits.
From 900 to 609 BCE, the Assyrian Empire dominated the ancient Near Eastern world, stretching from western Iran to the Mediterranean and Egypt. In concert with imperial expansion came an explosion of artistic production ranging from palace wall reliefs to small-scale luxury objects. This course provides an integrated picture of the imperial arts of this first world empire, situating it within the broader social and political contexts of the first millennium BCE. In its conquest of foreign lands, this powerful state came in contact with and appropriated a diversity of cultures, such as Phoenicia, Egypt, and Greece, which we will also study.

AS.010.316. Venice: Art, Architecture and Ecology from the Late Middle Ages to the Present. 3 Credits.
This course is an investigation into the fashioning of Venetian identity in architecture and the visual arts, with a particular address to the encounter with Byzantine and Islamic traditions and exchanges with other centers of the Italian peninsula.

AS.010.319. Medieval Art and Architecture of the Holy Land. 3 Credits.
The course focuses on art and architecture in the political and religious contexts of the Middle East, from the 4th to the 14th c. The three monotheistic religions all claimed specific territories -- in particular the city of Jerusalem -- for cult practices. This situation resulted in military conflicts that had an impact of Jewish, Medieval, Byzantine, and Islamic art in the Holy Land. The political conflicts, which still plague the region today, are rooted in the complex situation of the medieval period. The Roman, Arab, Byzantine, and crusader invasions resulted however in exciting eclectic styles that characterize the art and architecture of the region. We will discuss concepts behind political and religious leadership, as they intersect with the power of the arts.
Area: Writing Intensive

AS.010.320. Art of Colonial Peru. 3 Credits.
Viewed within the dynamic historical context of colonial society, we consider the pictorial, sculptural, and architectural programs that ensued in viceregal Peru (1532-1825). We examine the role of religious orders, art schools, artisan guilds and cofradía, and consider the social and political implications of art patronage.

AS.010.322. Knowledge, Holiness, and Pleasure: The Illustrated Book in the Medieval World. 3 Credits.
The book was the primary source for the collection of knowledge in the Middle Ages. It was also the medium for the preservation and proliferation of the texts that underlay the three monotheistic religions (Judaism, Christianity, Islam). Finally, the book served as a source for elite entertainment, perhaps most importantly in Late Antiquity and the later Middle Ages. This course investigates the role of the illustrated book within the political, religious, and artistic developments that took place after the rise of Christianity from the end of the Roman Empire until the early modern period in the medieval West and in Byzantium, permeating Jewish and Islamic traditions. We will examine how the different types of books, such as horizontal and vertical scrolls, large and miniature size codices influenced the placement, conception, and style of the illustrations. The course also addresses processes of manufacture, issues of materiality (i.e. precious multi-media book covers, papyrus, parchment, paper), and the relationship between text and image. A major aspect of the seminar focuses on the performative aspect of the book in its wide range of functions: secular and liturgical, public and private. Students will be able to work first hand with manuscripts and facsimiles from the rare book collection of Eisenhower Library and the Walters Art Museum.

AS.010.325. Blood, Gold, and Souls: The Arts of the Spanish Empire. 3 Credits.
From the sixteenth through the eighteenth centuries, visual forms and practices linked such far-flung places as Mexico City and Naples, Manila and Lima, Cuzco and Antwerp, Quito and Madrid: all cities in the Spanish Empire. This course is conceived as a voyage, moving city by city to explore objects that connected Spain's vast holdings. We will investigate how the Spanish Crown and the Catholic Church used visual strategies to consolidate political power and instill religious faith across the world; and, alternatively, we will consider how local conditions, concerns, and resistance reshaped those efforts. This course surveys a diverse range of artistic production: religious paintings and sculptures; maps used for imperial surveillance; luxury goods crafted from shimmering feathers, ceramics, ivory, and precious metals; urban design and architecture from the ports of Europe to the highland outposts of the Andes; ephemeral cityscapes for civic performances. In examining such materials, students will be introduced to the art historical methods and theoretical concerns used to study a wide diversity of objects within an imperial frame.

AS.010.327. Asia America: Art and Architecture. 3 Credits.
This course examines a set of case studies spanning the last century that will enable us to explore the shifting landscape of Asian transnational art and architecture. Each week will focus on a different artist, group, exhibition, architect, urban space, or site to unpack artists' and architects' engagements with the changing landscape of immigration policies, movements to build solidarity with other artists of color, and campaigns for gender and sexual equality. The course will situate these artists within American art, and build an expansive idea of Asia America to include the discussion of artists whose work directly addresses the fluidity of location and the transnational studio practice.
Area: Writing Intensive

AS.010.329. Building an Empire: Architecture of the Ottoman Capitals, c. 1300–1600. 3 Credits.
Centered on modern-day Turkey and encompassing vast territories in Asia, Africa, and Europe, the Ottoman Empire (1299 – 1923) was the longest lived and among the most powerful Islamic states in history, with an artistic tradition to match. This course explores the functional and symbolic role that architecture played during the empire's formative centuries, when three successive capital — Bursa, Edirne, and Istanbul — served to visualize the sultans' growing claims to universal authority. With reference to mosques, palaces, tombs, and other categories of architecture, the course will examine the buildings in their artistic, social, and political contexts. Themes to be addressed include patronage and audience, architectural practice and the building trade, ceremonial and ritual, topography and urban planning, and the relationship of Ottoman architecture to other traditions.

AS.010.337. Global Amsterdam: The Golden Age of a Small but Mighty Metropolis. 3 Credits.
This course examines the visual and material culture of the Dutch Golden Age as the product of global forces. The young Dutch Republic quickly achieved a global reach in the seventeenth century. And Amsterdam served as its commercial capital, which by 1630 could be counted as one of the most important port cities in the world and home to the Dutch East India Company (VOC), the world's first multinational corporation. Moving an incredible quantity of goods (spices, silks, porcelain, coffee, precious stones, "exotic" arts, and slaves) generated not only the economic riches, but also the cultural touchpoints that would give rise to art produced by the likes of Rembrandt, Vermeer, Hals, and the many exceptional craftsmen that have left us some of the most enduring masterpieces of the seventeenth century. This course situates that art, and the city of Amsterdam itself, within networks that connected it to such far flung places as Japan, Jakarta, Surinam, Curacao, Brazil, and the Indian Subcontinent.
Area: Writing Intensive

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.339. Sex, Death, and Gender: The Body in Premodern Art, Medicine, and Culture, c. 1300-1600. 3 Credits.
To what extent was the body and its depiction a site of contestation, identification, or desire in the Middle Ages and Renaissance? If the body in the West since the 1800s is seen to have been shaped by the rise of photography and film, the institutionalization of biomedicine, and the establishment of techniques of surveyance and mechanization, then how was the body represented, disciplined, and experienced in the preceding centuries? In an age of unprecedented encounter with non-European bodies, what did it mean to describe and categorize bodies by race, region, or religion? These are some of the major questions this class seeks to answer, which is fundamentally interdisciplinary as it draws upon insights and methods from anthropology and the history of medicine and history of science to investigate how the body has been represented and imagined in the visual arts. The bodies of the suffering Christ, the female mystic, the dissected cadaver, the punished criminal, and the non-European 'Other' will loom large as we work to problematize notions of a normative body, whether in the premodern world or in the contemporary one. While most readings and lectures will concern the body and its representation in the Christian West during the later Middle Ages and Renaissance, students are encouraged to work on a topic of their choosing from any geographical area 1000-1800 CE for their research papers.
Area: Writing Intensive

AS.010.346. Art of the Cold War Era. 3 Credits.
The Cold War years bore witness to some of the most radical developments in modern art. An abiding question for artists, writers, and political figures too during this period was what role—if any—could art perform in social and political life, and in the struggle between capitalism and communism in particular. This course examines the political viability of art as this concern was taken up by groups and individuals throughout the world in response to rapidly shifting geopolitical circumstances. Beginning with the visual cultures of the United States and Soviet Union, the course will also examine artistic responses to the conditions of Cold War existence in and beyond countries of NATO and the Warsaw Pact. Proceeding roughly chronologically, the course is divided into twelve units following the art of the US, USSR, Western and Eastern Europe, China, and Japan, among others. It treats a wide variety of media as painting and sculpture, canonically privileged in the history of Western art, ceded ground to new forms of practice such as performance, film, and a deep, critical engagement with mass culture. In so doing, this course provides at once a global history of modern art and visual culture and a critical interrogation of their relationships to social change and political life during the 20th century and beyond.
Area: Writing Intensive

AS.010.349. Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE. 3 Credits.
The arts of Egypt, Greece and the Near East are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. From 2000 to 500 BCE (the Middle/Late Bronze and Iron Ages), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Egyptians, Near Easterners, Greeks and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war, imperialism, and colonization.
AS.010.301 - Titled "Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE" - Students who have taken that course in 2014 or prior are not permitted to take this course.

AS.010.350. Body and Soul: Medicine in the Ancient Americas. 3 Credits.
This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.364. Babylon: Myth and Reality. 3 Credits.
Babylon – the name resonates even today, from the biblical whore of Revelation to sci-fi. It evokes exotic places and time long past. But what do we really know about the ancient city and the civilization that flourished there thousands of years ago? The first part of this course examines the archaeological city of Babylon, located in the modern state of Iraq, and considers its artistic and architectural achievements in the context of Mesopotamian history. The second part of the class explores the ongoing impact of Babylon in the cultural imagination of later periods, from the Classical and biblical authors, to European artists, Hollywood movies, science fiction, and contemporary political movements.

AS.010.365. Art of the Ancient Andes. 3 Credits.
The ancient visual arts of Andean South America and their respective cultural contexts form the basis of this course. In conjunction with the Baltimore Museum of Art and the Johns Hopkins Archaeological Museum students will have access to collections for study.

AS.010.366. Native American Art. 3 Credits.
The works of Native American artists are examined and discussed in their respective social and historical contexts. Such works include Hopewell stone sculpture, Mimbres pictorial painting, and Tlingit guardian figures. We examine the concept of sacred landscape through analysis of monumental earthworks and effigy mounds, Anasazi architecture, and rock art. In conjunction with the Baltimore Museum of Art (BMA), and Johns Hopkins Special Collections, students will have access to collections for study.

AS.010.367. Photography, the Archive, and Memory. 3 Credits.
This seminar will culminate in an exhibition in the library, focused on the photographic works of Dayanita Singh (b. India, 1961) in Hopkins' collections. Singh's work delves deeply into her subjects, exploring issues of identity, the body, and sexuality as well as questions related to memory and the archive. She has long presented her photography in the form of the book, and as such we will pursue readings in photography, book arts, and the archive, and bring nineteenth-century illustrated books in our collection into dialogue with Singh's work. This will be a hands-on seminar: students will develop the framework for the exhibition, write the textual materials (labels, wall text), and decide on the arrangements of objects in the show.

AS.010.382. The Politics of Display in South Asia. 3 Credits.
Through an examination of colonial exhibitions, the rise of national, regional, and archaeological museums, and current practices of display and representation in institutions, we will explore how the image of South Asia has been constructed in the colonial, modern, and contemporary eras. We will engage with the politics of representation, spectacle, and the economies of desire as related to colonialism and the rise of modernity. Readings from postcolonial theory, museum studies, anthropology, history, and art history.
Area: Writing Intensive

AS.010.389. The Stone and the Thread. 3 Credits.
Advanced inquiry into imperial Inka architecture and fiber arts.
Area: Writing Intensive

AS.010.390. Ancient Americas Object Workshop. 3 Credits.
Analysis of ancient Americas collection held in the Johns Hopkins Archaeological Museum.
Area: Writing Intensive
AS.010.105 OR AS.010.407 OR AS.010.398 OR AS.010.365 OR AS.010.389 OR AS.010.366 OR AS.010.214 or in consultation with professor prior to registration.

AS.010.398. Tombs for the Living. 3 Credits.
Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.400. Research Lab: The Dutch Americas. 3 Credits.
The Dutch East India Company, or VOC, is historically and art historically well documented and firmly understood. But the Dutch also had significant holdings to the west via the Dutch West India Company, or WIC. They operated and held outposts in the present-day United States (New York/New Amsterdam), Caribbean (Surinam, Curaçao, Bonaire), Latin America (Brazil), and West Africa. Despite the abundance of materials associated with the WIC from this wide geography, these have been scarcely assessed by art historians, and a defined and comprehensive corpus has never been assembled. This class will act as a research lab in which to do so. In research teams, students will map artworks and objects created from that broad, transnational cultural ambit—categories that might include maps, landscape paintings, still life paintings featuring American flora and fauna, botanical illustrations, plantation architecture, luxury objects made from precious raw materials gathered in the Americas, the urban environment of slavery—and develop individual research questions around them.The class will run with a partner lab in the form of a course led by Professor Stephanie Porras at Tulane University. The course will feature speakers; and there is potential for funded travel to conduct research. We will start at the ground level; no previous knowledge about the field is required. Students from all disciplines are welcome.
Area: Writing Intensive

AS.010.405. The Medieval Image and Concepts of Authenticity. 3 Credits.
The course examines the notion of the authentic in conjunction with medieval images, relic veneration, and the practice of law. It investigates the construction, reception, and theoretical grounding of authenticity of reliquaries, icons, and imprints on cloth or seals, and legal documents. These objects elucidate artistic strategies such as cross media references, abstraction, mimesis and bricolage to convey an aura of authenticity. We address other authenticating factors, such as complex ritualized forms of communication. This is a new course for the undergraduate section, existing course is AS.010.644. Will be taught as a hybrid this Fall 2020.
Area: Writing Intensive

AS.010.407. Ancient Americas Metallurgy. 3 Credits.
This course addresses the technology, iconography and social significance of metals and draws on case studies from the Americas. Collections study in museums.

AS.010.409. Theories and Works of “The Baroque”. 3 Credits.
There is perhaps no more confounding, though also no more persistent, art historical concept than that of “the Baroque.” This course introduces students to foundational histories and critiques of “the Baroque” while exploring works of art that have proved central to these formulations. That is, this course will balance careful reading of historiography with close examination of works of art (both digitally presented and visited in local collections). Students will come away with a layered understanding of the Baroque objects—from relatively small-scale museum works to major architectural and sculptural monuments—and their place within the broader evolution of the history of art. Particular attention will be given to newer global and (post-)colonial approaches to notions of the Baroque, ultra-Baroque, and neo-Baroque.
Area: Writing Intensive

AS.010.410. The Epistemology of Photography. 3 Credits.
This seminar will ask how photography produces ways of knowing: how does photography’s reality-effect shape its dissemination and absorption? Is photography’s emergence during the colonial era coincidental or catalytic? How is memory (re)constituted in a photography-saturated world? What kinds of histories does photography encourage and discourage? Is a photograph an object? We will read across disciplines (literature, anthropology, history, history of art, political science, theory) to investigate the epistemology of photography and the photograph.
Area: Writing Intensive

AS.010.413. Historical and Conceptual Bases of Art History. 3 Credits.
This course introduces students to the principal methods and theories of art history. Students will work through readings foundational for the discipline, texts that define key methodological consolidations in the twentieth century, and more recent (e.g. feminist, visual studies, global, post-colonial, and/or ecological) critiques and rethinking. Specific texts will vary by instructor, but the course seeks—in any instantiation—to include a plurality of perspectives.

AS.010.414. The Cartographic Imaginary: Maps, Charts, and the Navigation of the Early Modern Globe. 3 Credits.
In the early modern world, people traveled further and more routinely than ever before. This course looks at the tools used to facilitate such endeavors—from maps to navigational charts, from atlases to astrolabes. However, beyond mere logistical instruments for imperial expansion, colonial settlement, and commercial trade, these objects and pictures structured new ways of thinking about and imagining the world and its spaces. An armchair traveler in Amsterdam could envision a journey to and travel within a place like modern-day Indonesia; a Spaniard living in the highlands of present-day Bolivia could imagine, in period terms, "all the cities of the universe and more." This course attends to excavating the representational economies forged from the mass-production and wide circulation of navigational objects and pictorialized territories. Though the focus will be on the early modern period, we will read broadly and engage a wide range of theories; and students are encouraged to use the tools we develop in class to research representation from any time and place.
Area: Writing Intensive

AS.010.419. Passion Image, Passion Cult, Passion Drama: Narrative and Metaphor in the Middle Ages, Renaissance, and Beyond. 3 Credits.
A set of interdisciplinary explorations of the Passion of Christ narrative in Scripture, theology, visionary literature, cultic devotion, the visual and dramatic arts in Europe from the Central Middle Ages to the Reformation, with a special fast-forward to modern cinematic retellings of the Passion story.
Area: Writing Intensive

AS.010.423. Modern and Contemporary Art in South Asia. 3 Credits.
How does modernism operate in the colonial context, work with and against the nationalisms of new countries (India, Pakistan, Sri Lanka, Nepal, and Bangladesh), challenge existing norms of the art world and the art market, engage with the difficult and violent upheavals of Partition and sectarian conflict, and allow for experimentations and new forms all the while? This course will explore the history of the art of the subcontinent from c. 1880 to the present by critical engagement with the art, artists, and theories at play in the South Asian region.
Area: Writing Intensive

AS.010.424. Art and Colonialism: Nineteenth-century India. 3 Credits.
This seminar explores the technologies of colonial power, from small ephemeral watercolor images of religious processions to massive multi-volume photographic projects documenting the "people of India," and extending to the establishment of new urban and architectural spaces, archaeological museums, and art schools, the circulation of diplomatic art collections, and the commissioning of survey data. We will engage with the anti-colonial movements of resistance and uprising that took place across this century, examining the central participation of modern artists with these political movements, and explore the way this period fundamentally shaped the foundations for the study of South Asian art and archaeology. Readings will include colonial and postcolonial theory, Orientalism, historiography; we will be actively working with materials in the library's Special Collections.
Area: Writing Intensive

AS.010.431. Obsessed with the Past: the Art and Architecture of Medieval Rome. 3 Credits.
In antiquity, Rome became the capital of an empire, its growing status reflected in its sophisticated urban planning, its architecture, and the arts. While an abundance of studies explores the revival of this glorious past in the Renaissance, this seminar discusses various ways of the reception of antiquity during the medieval period. We address the practice of using "spolia" in medieval architecture, the appropriation of ancient pagan buildings for the performance of Christian cult practices, the continuation of making (cult)images and their veneration, the meaning and specific visuality of Latin script (paleography and epigraphy) in later medieval art. We discuss the revival and systematic study of ancient knowledge (f. ex. medicine, astronomy, and the liberal arts), in complex allegorical murals. As we aim to reconstruct the art and architecture of medieval Rome, this course discusses ideas and concepts behind different forms of re-building and picturing the past, as they intersect with the self-referential character of a city that is obsessed with its own history.
Area: Writing Intensive

AS.010.432. Therapies of Art and Literature from Antiquity to Early Modern Europe. 3 Credits.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.
Area: Writing Intensive

AS.010.433. Hands-On Approaches to European Books and Prints before 1800. 3 Credits.
Baltimore's rich museum and library collections create a dynamic laboratory for students to gain an understanding of early modern European traditions of prints and books. Engraving, etching, woodcut, mezzotint, à la poupée; Rembrandt, Dürer, Aldus Manutius, Plantin-Moretus. This course will introduce students to the basic techniques, concepts, terms, and artists that shaped the production of reproductive works on paper in early modern Europe and their subsequent art historical study. All sessions will be taught out of local collections (BMA, Walters, NGA, Hopkins Special Collections); that is, this is a hands-on class that—while requiring no previous experience—will attend to the nitty-gritty details and methods of studying works in person, giving students the tools, expertise, and confidence to pursue their own research with historical printed materials.
Area: Writing Intensive

AS.010.440. Power Dressing: The Politics of Costume between the Ottoman Empire and the West. 3 Credits.
In the Ottoman Empire—a vast multiethnic state straddling Africa, Asia, and Europe—how one dressed was a deeply political affair. Ottoman rulers and subjects alike used clothing to express (and sometimes transgress) the hierarchical, religious, and communal distinctions defining their society, much to the fascination of foreigners who visited the empire or sought knowledge of its sartorial traditions in texts and images. This seminar will explore Ottoman dress and dress codes in the context of the empire's long and complicated relationship with Western powers, focusing on the role that costume played as a charged site of cross-cultural interaction, posturing, and self-assertion from the sixteenth to the nineteenth century. Our case studies will include costume albums—books showing people high and low in their characteristic garb—painted by Ottoman artists for Western buyers; diplomatic robes of honor and their attendant ceremonies; and cultural cross-dressing as manifested in European turquerie portraiture and masquerades. Moving into the modern period, we will consider how nineteenth-century dress reforms bridged the gap between Ottoman and Western costume while engendering new modes of Ottoman sartorial self-representation that challenged hardening Orientalist discourses in such venues as mannequin museums and world's fairs. The seminar will make considerable use of artworks in local collections, including rare books and prints at Hopkins itself.
Area: Writing Intensive

AS.010.444. Classics Research Lab: Antioch Recovery Project (ARP). 3 Credits.
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term "narcissism". Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard's Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

AS.010.451. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art. 3 Credits.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.459. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents. 3 Credits.
This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

AS.010.501. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.521. Honors Thesis. 1 - 3 Credits.
Open to students by arrangement with a faculty advisor in the History of Art Department. Interested students should review the program description available in the department office.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.522. Honors Thesis. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.603. Beyond Word & Image.
The relationship of "word" and "image" has been a central concern of both the history of art and other humanistic disciplines; and semiotics, (post-)structuralism, narrative studies, media studies, and theories of ekphrasis and representation have been marshalled to probe how visual and verbal systems work in conjunction, overlap, and conflict. Much less art historical attention has been paid to the visuality of writing itself. Against the backdrop of robust work on the relationship between text and image, this course focuses on text as image: the visuality of text, the imagistic dimensions of writing, Schriftbildlichkeit. The seminar takes as guiding premise that art historical method might be robustly brought to bear on the visual and material features of texts, both those that appear as part of traditional art historical media (paintings, sculptures, and architectural monuments) and those that have primarily remained within the purview of other humanistic subfields: books, archival documents, writers' manuscripts, epistolary communication, and inscriptions (both analog and digital). In this course, we will survey a broad range of textual objects, from ancient inscriptions to moveable type to digital texts to "writing" in twenty-first century artists' books; and we will work together towards assembling an art historical toolkit for excavating the full valences of texts, accounting for the ways they make meaning in linguistic, semiotic, formal, material, visual, and media-specific registers. Though art historical in focus, this course will be essentially interdisciplinary, and students from other subfields are warmly welcomed. There will be ample opportunity for discussing and studying objects in local collections.

AS.010.604. Contested Patterns: Islamic Art History and Its Challenges.
Formed against the backdrop of nineteenth- and twentieth-century Orientalism and colonialism, the field of Islamic art history continues to grapple with the overwhelmingly Eurocentric assumptions, narratives, and approaches that shaped its emergence and development. These inherited perspectives and the debates they have sparked are the focus of this seminar, which critically examines the foundational characterizations of Islamic art—as ornamental, iconophobic, and timelessly other—together with the exhibitory, commercial, and scholarly contexts in which such ideas took root. Adopting a simultaneously thematic and chronological approach, the seminar will trace the ways in which diverse constellations of actors—including those from within the Islamic world itself—have variously established, consolidated, or challenged the field's underlying concepts. We will explore how this discursive process has intensified in our own time, in which a spate of scholarly and popular treatments have laid bare the tension between calls to reevaluate the field and an enduring impulse to reinscribe its established contours. Alois Riegl, Oleg Grabar, Gülru Necipoglu, Yasser Tabbaa, and Wendy Shaw are among the authors whose writings will be assessed and compared. Throughout the seminar, we will ground our historiographical inquiry in discussions of specific works and categories of Islamic art—particularly those like carpets that traditional frameworks have fetishized as decorative—and consider more fruitful avenues for addressing such material, making use of local collections to the extent that we can.

AS.010.606. Approaches to Ancient Art.
The discipline of art history has passed through a number of major methodological and theoretical shifts since its inception (and in particular, over the last thirty years). Foundational disciplinary methods derive principally from the arts of Classical Greece, the Renaissance and contemporary periods. As the discipline embraces an enlarged field of inquiry, particularly drawing upon developments in anthropology, material culture studies, feminism, queer theory, and political theory, additional avenues for understanding the arts of the ancient world are emerging. The seminar focuses on how art historical method and theory – both foundational and emergent – might be profitably applied to the subfields of the ancient Near East and eastern Mediterranean (understood in the broadest sense).
Area: Writing Intensive

AS.010.607. The Epistemology of Photography.
This seminar will ask how photography produces ways of knowing: how does photography's reality-effect shape its dissemination and absorption? Is photography's emergence during the colonial era coincidental or catalytic? How is memory (re)constituted in a photography-saturated world? What kinds of histories does photography encourage and discourage? Is a photograph an object? We will read across disciplines (literature, anthropology, history, history of art, political science, theory) to investigate the epistemology of photography and the photograph.

AS.010.608. The Picture as Object.
The seminar will explore cases of European pre-modern picture-making in various media that solicit tactile as well as sensory engagement, and that call into question the "Albertian" metaphor of pictura as window. Case studies will include mosaics, reliefs, pastiglia, medals, portable paintings, et al."

AS.010.611. Seminar in Near Eastern Art.

AS.010.613. Geographies of Art: Theories and Cases Studies from the Renaissance to the Present.
The role of place in the art historiography of the Renaissance, with readings in geographical theory. The seminar will also consider the role in the art of Lorenzo Lotto, Gaudenzio Ferrari, Cesare da Sesto, Romanino, Moretto, Pordenone, Titian, and other artists active before the canon-formation enterprise of Giorgio Vasari definitively altered the map of Italian art after 1550.

AS.010.614. Research Lab: The Dutch Americas.
The Dutch East India Company, or VOC, is historically and art historically well documented and firmly understood. But the Dutch also had significant holdings to the west via the Dutch West India Company, or WIC. They operated and held outposts in the present-day United States (New York/New Amsterdam), Caribbean (Surinam, Curaçao, Bonaire), Latin America (Brazil), and West Africa. Despite the abundance of materials associated with the WIC from this wide geography, these have been scarcely assessed by art historians, and a defined and comprehensive corpus has never been assembled. This class will act as a research lab in which to do so. In research teams, students will map artworks and objects created from that broad, transnational cultural ambit—categories that might include maps, landscape paintings, still life paintings featuring American flora and fauna, botanical illustrations, plantation architecture, luxury objects made from precious raw materials gathered in the Americas, the urban environment of slavery—and develop individual research questions around them.The class will run with a partner lab in the form of a course led by Professor Stephanie Porras at Tulane University. The course will feature speakers; and there is potential for funded travel to conduct research. We will start at the ground level; no previous knowledge about the field is required. Students from all disciplines are welcome.
Area: Writing Intensive

AS.010.615. Therapies of Art and Literature from Antiquity to Early Modern Europe.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.

AS.010.620. Theories and Geographies of the Baroque: 1600 to the Present.
Topics in artistic theory and multimedia practice from seventeenth century Italy and Spain to other early modern and modern global baroques.

AS.010.624. Art and Colonialism: Nineteenth-century India.
This seminar explores the technologies of colonial power, from small ephemeral watercolor images of religious processions to massive multi-volume photographic projects documenting the "people of India," and extending to the establishment of new urban and architectural spaces, archaeological museums, and art schools, the circulation of diplomatic art collections, and the commissioning of survey data. We will engage with the anti-colonial movements of resistance and uprising that took place across this century, examining the central participation of modern artists with these political movements, and explore the way this period fundamentally shaped the foundations for the study of South Asian art and archaeology. Readings will include colonial and postcolonial theory, Orientalism, historiography; we will be actively working with materials in the library's special collections.
Area: Writing Intensive

AS.010.625. Art and Interaction in the Bronze Age Eastern Mediterranean.
The arts of the Near East, Aegean and Egypt are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. During the Bronze Age (3000 to 1200 BCE), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Near Easterners, Greeks, Egyptians and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war and imperialism.Students are not expected to have extensive knowledge of all the areas, although some experience in at least one of them will be helpful. The course will interweave establishing a knowledge base necessary to tackle this topic with broader conceptual concerns and interdisciplinary approaches (art historical, archaeological, anthropological, and historical).There will be a final paper.

AS.010.631. Performing Power: Ceremonial, Diplomacy, and Gift-Giving in and beyond the Ottoman Empire.
As a major global power straddling three continents, the Ottoman Empire developed a rich and diversified ceremonial culture aimed at impressing local and international audiences alike. This seminar will explore the ways in which works of art and architecture provided settings and apparatus for, and were themselves shaped and enlivened by, the ceremonial acts in which they featured. Covering the period between the sixteenth and nineteenth centuries, we will address a range of case studies—including mosque inaugurations, royal processions, the reception of foreign ambassadors, and the exchange of diplomatic gifts—with regard to their sociopolitical, visual, material, and spatial contexts. A major concern of the seminar will be the question of how Ottoman ceremonies, together with their staging and attendant art forms, were adapted in response to changing conditions and audiences, particularly with the shift from the early modern to the modern period. While our focus will be on the Ottoman Empire, the course will also consider the ceremonial cultures of the various Asian and European polities with which the Ottomans interacted, investigating the points of comparison and contrast that defined these multifarious but connected interregional approaches.

AS.010.633. Theories and Works of "The Baroque".
There is perhaps no more confounding, though also no more persistent, art historical concept than that of "the Baroque." This course introduces students to foundational histories and critiques of "the Baroque" while exploring works of art that have proved central to these formulations. That is, this course will balance careful reading of historiography with close examination of works of art (both digitally presented and visited in local collections). Students will come away with a layered understanding of the Baroque objects—from relatively small-scale museum works to major architectural and sculptural monuments—and their place within the broader evolution of the history of art. Particular attention will be given to newer global and (post-)colonial approaches to notions of the Baroque, ultra-Baroque, and neo-Baroque.
Area: Writing Intensive

AS.010.634. Rethinking the Renaissance: Alternatives to "Early Modernity".
"The Renaissance" as a periodization under attack, and its persistance; the hermeneutics of the Pre-Modern Image since Panofsky; the critique of Eurocentrism; challenges to and recuperations of iconology, assessing the contributions of semiotics, psycholanalysis and queer theory.

AS.010.638. Interrogating the Material Turn.
This course considers the turn to centering materials and materiality in the history of art. Since the publication of Michael Baxandall's Painting and Experience in Fifteenth Century Italy (1972) and in particular since the turn of the millennium, critical engagement with the materiality of art has proliferated. This seminar will tackle renewed investment in materiality within the discipline of art history and draw on perspectives from archaeology, philosophy, anthropology, conservation science, feminist and queer theory, and postcolonial studies, among others. Particular emphasis will be placed on the polycentrism of materiality as a theoretical lens that cuts across seemingly disjunct cultural, social, and political frames and subject positions. While this course focuses on the art of the ancient Mediterranean, students will be encouraged to bring their own subfields to bear on the material turn and to pursue research topics related their individual research goals. Open to interested students from all disciplines.

AS.010.639. Obsessed with the Past: the Art and Architecture of Medieval Rome.
In antiquity, Rome became the capital of an empire, its growing status reflected in its sophisticated urban planning, its architecture, and the arts. While an abundance of studies explores the revival of this glorious past in the Renaissance, this seminar discusses various ways of the reception of antiquity during the medieval period. We address the practice of using spolia in medieval architecture, the appropriation of ancient pagan buildings for the performance of Christian cult practices, the continuation of making (cult)images and their veneration, the meaning and specific visuality of Latin script (paleography and epigraphy) in later medieval art. We discuss the revival and systematic study of ancient knowledge (f. ex. medicine, astronomy, and the liberal arts), in complex allegorical murals. As we aim to reconstruct the art and architecture of medieval Rome, this course discusses ideas and concepts behind different forms of re-building and picturing the past, as they intersect with the self-referential character of a city that is obsessed with its own history.
Area: Writing Intensive

AS.010.641. Hands-On Approaches to European Books and Prints before 1800.
Baltimore's rich museum and library collections create a dynamic laboratory for students to gain an understanding of early modern European traditions of prints and books. Engraving, etching, woodcut, mezzotint, à la poupée; Rembrandt, Dürer, Aldus Manutius, Plantin-Moretus. This course will introduce students to the basic techniques, concepts, terms, and artists that shaped the production of reproductive works on paper in early modern Europe and their subsequent art historical study. All sessions will be taught out of local collections (BMA, Walters, NGA, Hopkins Special Collections); that is, this is a hands-on class that—while requiring no previous experience—will attend to the nitty-gritty details and methods of studying works in person, giving students the tools, expertise, and confidence to pursue their own research with historical printed materials.
Area: Writing Intensive

AS.010.644. The Medieval Image and Concepts of Authenticity.
The course examines the notion of the authentic in conjunction with medieval images, relic veneration, and the practice of law. It investigates the construction, reception, and theoretical grounding of authenticity of reliquaries, icons, and imprints on cloth or seals, and legal documents. These objects elucidate artistic strategies such as cross media references, abstraction, mimesis and bricolage to convey an aura of authenticity. We address other authenticating factors, such as complex ritualized forms of communication.

AS.010.646. Art and Architecture at the Eastern Frontier: Medieval Georgia.
This seminar investigates the fascinating landscape of medieval art and architecture of Georgia. Its specific geographic position in the South Caucasus, at the cross roads between the East and West, the Christian and Islamic Worlds, had a profound impact on the art and architecture in the region. Ancient sites show close connections with the Graeco-Roman World on the western border and with the Sassanid Empire in the East. The Christianization of the Kingdom of Kartli in the early fourth century resulted in close ties with the development of early Christian art in Syria, the Holy Land, and Byzantium. While the Christian religion remained an identifying factor during several hundred years of Muslim rule (736 to 1122) during which the city of Tbilisi was the capital of an emirate, Islamic motifs and style became an important factor for art works in medieval Georgia. Art and architecture with a specific Byzantine profile flourished in particular after the reunification of Georgia during the reign of King David the Builder (1073- 1125) and Queen Tamar (1184 to 1213). The cathedral and monastery of Gelati and Mzcheta, the murals in the royal monasteries of Vardzia and Khintsvisi, and the countless icons are a testimony to this relationship. We will discuss the specific diverse aesthetics and materiality (stone, enamel and metal works) of Georgian art with the goal to reassess the map of medieval art and architecture that currently does not include the Eastern Frontier. A mandatory c. 10 days field trip to Georgia is planned after classes end in May 2020.
Area: Writing Intensive

AS.010.649. Power Dressing: The Politics of Costume between the Ottoman Empire and the West.
In the Ottoman Empire—a vast multiethnic state straddling Africa, Asia, and Europe—how one dressed was a deeply political affair. Ottoman rulers and subjects alike used clothing to express (and sometimes transgress) the hierarchical, religious, and communal distinctions defining their society, much to the fascination of foreigners who visited the empire or sought knowledge of its sartorial traditions in texts and images. This seminar will explore Ottoman dress and dress codes in the context of the empire's long and complicated relationship with Western powers, focusing on the role that costume played as a charged site of cross-cultural interaction, posturing, and self-assertion from the sixteenth to the nineteenth century. Our case studies will include costume albums—books showing people high and low in their characteristic garb—painted by Ottoman artists for Western buyers; diplomatic robes of honor and their attendant ceremonies; and cultural cross-dressing as manifested in European turquerie portraiture and masquerades. Moving into the modern period, we will consider how nineteenth-century dress reforms bridged the gap between Ottoman and Western costume while engendering new modes of Ottoman sartorial self-representation that challenged hardening Orientalist discourses in such venues as mannequin museums and world's fairs. The seminar will make considerable use of artworks in local collections, including rare books and prints at Hopkins itself.
Area: Writing Intensive

AS.010.650. Before and After Trent: the Image and Sacred Space in Rome and Spanish Italy.
The seminar will investigate the question of art and reform in three major centers of the Italian peninsula (Rome, Naples, Milan), with attention to parallel phenomena in other centers of Catholic Europe (Spain and the Spanish Netherlands). We will examine transformations in the practice of pilgrimage and the organization of sacred shrines, tensions between centralization and the persistence of the local, and the initiative of artists and architects in responding to the call for a "reform" of sacred art."

AS.010.652. Classics Research Lab: Antioch Recovery Project (ARP).
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term "narcissism". Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard's Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

AS.010.656. The Cut.
This seminar focuses on "the cut"—both as material practice and conceptual trope. Looking specifically at the early modern period, we will attempt to stitch together arts of cutting that have all too often been thought of separately or entirely in isolation—decoupage and inlaid stone, silhouette and turned ivory, repurposed drawing and perfectly hewn precious gem, pared-down panel and paper cut-out. To do so, we will look to expansive modern treatments and theorizations of "the cut" as literal gesture and figurative process, material technique and metaphoric mode. At stake is a reappraisal of creative paradigms that rest upon myths of wholeness, finitude, completion, generation, etc., and that thus undergird the early modern emergence of the very notion of "Art." This seminar thus asks whether recentering the cut has the potential to position the art object within more expansive fields of material culture and to resituate artistic production within less hegemonic frameworks of creation and creativity. Though focused on the early modern period, students are encouraged to pursue research in their own fields/periods of study.
Area: Writing Intensive

AS.010.659. Passion Image, Passion Cult, Passion Drama: Narrative and Metaphor in the Middle Ages, Renaissance, and Beyond.
A set of interdisciplinary explorations of the Passion of Christ narrative in Scripture, theology, visionary literature, cultic devotion, the visual and dramatic arts in Europe from the Central Middle Ages to the Reformation, with a special fast-forward to modern cinematic retellings of the Passion story.

AS.010.660. The Hegemony of Bodies.
Bodies—material, artistic, political, cartographic—and their breakdown, form the focus of this seminar. Situating this inquiry in the ancient Mediterranean, we will analyze the human body as an organizing term, giving rise to a robust set of practices and performances. We will consider the conception of atoms as bodies in motion, the role of direct democracy and assembly as they intersect with artistic practices of both figuration and other non-figural corpora, and the emerging body of medical knowledge that would eventually be gathered under the Hippocratic corpus. The Mediterranean sea itself as it connects with other bodies of water and forged connections between different land bodies will also be among the topics we explore. While organized around the ancient Mediterranean and its afterlives, students from all formations are very welcome.

AS.010.662. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.671. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents.
This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

AS.010.672. Inventions of Antiquity. Constructing the Ancient Past in Early Modern Europe.
TBA

AS.010.702. 1525: Prints and Politics in the German Reformation.
Examines the involvement of prints, print culture, and the professional activity of the German painter-printmaker with the patterns of social and religious dissent, propagandizing, and political confrontation that marked the first decade of the Protestant Reformation, with a special focus on the revolutionary year 1525. Seminar includes planned visits to the print collections of the Baltimore Museum of Art and the National Gallery in Washington.

AS.010.703. Patterns of Attention in the Visual Arts.
This seminar aims to excavate six distinct modalities of attention and attentiveness in the visual arts from Middle Ages to Modernity (cultic, narrational, speculative, ethical, sexual, and artistic). While emphasizing European developments, close consideration will be given to the role of visual attention in Hindu and Islamic visual cultures, providing the opportunity for cross-cultural comparison. Each case study will consider the historically shifting roles given to vision, cognition, imagination, affect, desire and power-knowledge in the culturally prevalent patterns of attention we study, and explore how specific kinds of pictorial schema or spatial environments served to structure and guide, or deflect and disrupt, the attention of their beholders. Finally, we will ask whether the historical study of attention can suggest analytical models or ethical lessons for the (re)mobilization of attentiveness in our own art-historical methods.

AS.010.704. Pieter Bruegel the Elder: New Directions in Scholarship.
Examines major interpretations of the art and career of the great Flemish painter Pieter Bruegel the Elder (1525?-1569), with an emphasis on new approaches and research agendas. In the aftermath of the 450-year Bruegel Anniversary of 2019, with its major exhibitions and comprehensive catalogues, what comes next?

AS.010.708. Topics in Late Medieval Art.
A critical interrogation of past and current interpretative approaches to the devotional arts of western Europe, c. 1300-1500.
Area: Writing Intensive

AS.010.801. Special Rsrch & Problems.

AS.010.802. Spec Research/Problems.

AS.010.803. Individual Work.

AS.010.804. Individual Work.

AS.010.807. Summer Research.
Summer research for doctoral students

Cross Listed Courses

Classics

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

First Year Seminars

AS.001.157. FYS: Leonardo da Vinci - Art, Science, and Medicine. 3 Credits.
How does a notary's son trained as a painter gain expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? How did an artist/engineer who brought few projects to completion come to have such a huge impact on later generations? This First-Year Seminar will focus critically on the myth of Leonardo's singularity while showing his achievements to be characteristic of the artisanal culture of his time.

History

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.601. Decolonizing The Museum: Case Studies.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

Interdepartmental

AS.360.408. Experiential Research Lab: "Holy" Conquest: Religion and Colonization in Sixteenth-Century Mexico. 3 Credits.
"When the Spanish unleashed their regime of colonization of what is present-day Mexico, their primary justification was the religious salvation of Indigenous people. Spaniards, along with other Europeans, arrived by the boatload to impose colonial order, taking up bureaucratic and ecclesiastical positions. The result was far from smooth—the sixteenth-century saw widespread disease, missionary violence on behalf of salvation, crop destruction and the recultivation of land, urban plans that radically altered the environment, the resettlement of entire populations, among other dramatic social and environmental events. This course investigates the complex and dynamic elements of colonial New Spain (as Mexico was called) from an interdisciplinary perspective. It tries to make sense of the chaotic landscape of the first century of Spanish colonial rule in New Spain. It is a research and writing intensive course that serves as an introduction to both the history and art history of this place and moment. Our meetings will act as a springboard for a group trip to Mexico during the January intersession to study objects and spaces in situ. Final projects will relate to materials viewed in person in Mexico. The costs for this trip are included for all students, no fees required. Knowledge of Spanish preferred but not required.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

Near Eastern Studies

AS.130.153. A (Virtual) Visit to the Louvre Museum: Introduction to the Material Culture of Ancient Egypt. 3 Credits.
This course will present the Egyptological collections of the musée du Louvre in Paris, room by room, as in a real visit. The experience will be enhanced by the study of objects that are not shown to the public but are kept in the reserves of the museum. From the 4th millennium BC to Roman time, the iconic “masterpieces” of this world-renowned art museum, as well as its little-known artifacts, will allow us to explore the history and material culture of ancient Egypt. We will also learn to observe, describe and analyze archaeological objects, in a global manner and without establishing a hierarchy between them, while questioning their place in the museum and its particular language. The objective will be to go beyond the objects themselves and answer, in fine, the following questions: What do these objects tell us about the men and women who produced them, exchanged them, used them, and lived among them in antiquity? What do they also reveal about those who discovered them in Egypt, several millennia later, about those who collected them and sometimes traded them, and what does this say about the relations between Egypt and the Western countries over time? The courses will be complemented by visits to the rich Egyptian collections in Baltimore.

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

AS.132.609. Seminar in Research Methods in Near Eastern Studies.
Area: Writing Intensive

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.
Course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation's museums, galleries, and libraries and used objects to shape taste and status in the U.S.

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art's American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum's commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, revisualise and offer alternative stories. Class meets at the museum every other week.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

For current faculty and contact information go to http://arthist.jhu.edu/people/

History of Art, Bachelor of Arts

History of Art Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

History of art majors choose from a variety of courses on the world's artistic and architectural traditions and are encouraged to pursue a curriculum that is both geographically and chronologically broad. They are also required to take an advanced course on the historical and conceptual bases of art history, and to demonstrate intermediate knowledge of a foreign language, which is an invaluable skill for art-historical research. All courses taken towards a History of Art major requirement must be taken for a letter grade and a grade of C- or higher must be achieved. If a student opts to take First-Year Seminar (AS.001.xxx) cross-listed with the History of Art and earns an S grade, this course may apply towards major requirements even though it is graded satisfactory/unsatisfactory. Full requirements are outlined below.

Code	Title	Credits
Core Courses		
AS.010.101	Introduction to Art History I	4
AS.010.102	Introduction to Art History II	4
AS.010.413	Historical and Conceptual Bases of Art History [1]	3
Five Advanced-Level Courses (010.2xx-4xx) [2]		
One course in ancient art history		3
One course in medieval art history		3
One course in Renaissance/early modern art history		3
One course in modern art history		3
One course in any period		3
Three Additional Courses		
Three elective courses. Only one of these elective courses may be at the 100-level and all electives must in the department or cross-listed with History of Art. [3]		9
Intermediate Knowledge of a Modern Foreign Language [4]		
Proficiency is verified by completion of courses through the second semester of the intermediate level or higher.		0-14
Total Credits		**35-49**

1. Course should be taken within one year of declaring, ideally before senior year.
2. **At least one must be at the 400 level**. Students should consult with their faculty advisor and/or the Director of Undergraduate Studies in choosing their courses, which should relate to at least two geographical and/or cultural contexts.
3. Exceptions to these rules may be reviewed with the director of undergraduate studies.
4. Those planning to continue to graduate school in the History of Art should discuss which language(s) to pursue with their advisor and/or the director of undergraduate studies.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.010.101	Introduction to Art History I	4
Foreign Language		4
	Credits	**8**
Second Semester		
AS.010.102	Introduction to Art History II	4
Foreign Language		4
	Credits	**8**
Second Year		
First Semester		
Ancient Art Course		3
Foreign Language		3
	Credits	**6**
Second Semester		
Medieval Art Course		3
Foreign Language		3
	Credits	**6**
Third Year		
First Semester		
Rennaisance/Early Modern Art Course		3
Art History Elective [3]		
	Credits	**3**
Second Semester		
AS.010.413	Historical and Conceptual Bases of Art History	3
Modern Art Course		3
	Credits	**6**
Fourth Year		
First Semester		
Any Period Course		3
Art History Elective		3
	Credits	**6**
Second Semester		
Art History Elective		3
	Credits	**3**
	Total Credits	**46**

Honors Program in History of Art

For graduation with honors, students must have a cumulative GPA of 3.7 or higher in History of Art and successfully complete an honors thesis.

HONORS THESIS

- The honors thesis comprises a significant expansion and deepening of a paper in a 400-level seminar into a 20-25 page paper, with figures, bibliography, and any appendices constituting additional pages.

- Students pursuing honors must make a formal request to do so in conjunction with a proposed mentor via the Honors Thesis Form.
- While writing the thesis, students enroll in Honors Thesis credits (AS.010.521 or AS.010.522 Honors Thesis, 3 credits). These credits are in addition to the normal major requirements and do not count as an elective or advanced course.

History of Art, Minor

History of Art Minor Requirements

Students majoring in another department may minor in Art History. All courses taken towards a History of Art minor requirement must be taken for a letter grade and a grade of C- or higher must be achieved. If a student opts to take First-Year Seminar (AS.001.xxx) cross-listed with the History of Art and earns an S grade, this course may apply towards minor requirements even though it is graded satisfactory/unsatisfactory.

Code	Title	Credits
Introduction to Art History courses		
AS.010.101	Introduction to Art History I	4
AS.010.102	Introduction to Art History II	4
Four History of Art Electives (AS.010.1xx-4xx) *		12
Total Credits		**20**

* Each course must be at least 3 credits. One FYS course (AS.001.xxx) cross-listed with History of Art may also apply towards this requirement.

History of Art, PhD

The graduate program is designed to give students working toward the PhD degree an encompassing knowledge of the history of art and a deep understanding of the theories and approaches pertaining to art historical research. The program emphasizes collaborative working relationships among students and faculty in seminars. Each PhD student benefits from supervision by a primary advisor in their field of study, while continuing to work closely with other department faculty. Students will routinely avail themselves of faculty expertise in other departments, dependent on their area of study.

The program also fosters a close familiarity with the outstanding art in the Baltimore–Washington area relevant to the student's area of study. In addition to the rich holdings of the Sheridan Libraries of Johns Hopkins University (which include collections of rare books at the Garrett Library, Special Collections at the Milton S. Eisenhower Library, and the George Peabody Library) graduate students have access to world-renowned collections and research facilities in Washington D.C.

Our recent PhD students have gone on to academic, administrative, and museum positions at institutions around the world including Aarhus University, American University of Paris, Arcadia University, Baylor University, Columbia University, DePaul University, Florida State University, Howard University, King's College London, Marshall University, National Museum of Denmark, Notre Dame University of Maryland, Oberlin College, Portland State University, University of Chicago, University of Pittsburgh, University of San Francisco, University of Texas Rio Grande Valley, Virginia Commonwealth University, and Wellesley College.

Admission Requirements

Admission and Financial Aid

Applicants to the Ph.D. program in History of Art should upload and submit all required application materials and supporting documents through the online application. For information about applying to the Ph.D. program in History of Art, please see the department's website (http://arthist.jhu.edu/graduate/admissions/). Applications must be completed by December 15.

To foster close student-faculty relationships and provide for the greatest flexibility in developing each graduate student's individual curriculum, the department strictly limits the number of students it admits each year.

All graduate students entering the program are guaranteed five years of support, contingent upon satisfactory progress year by year. This support covers the individual's full tuition costs and health insurance, and includes a stipend annually. Student stipends are guaranteed at the level stated in the letter of offer (for incoming students) and in the renewal letter (for continuing students) for the duration of the applicable period.

Outstanding graduate applicants from underrepresented communities are regularly nominated for the Kelly Miller Fellowship, named for the first African-American to attend Johns Hopkins, as a graduate student in the Department of Mathematics in 1887. The fellowship provides additional funding to support student research, travel, and study during the student's graduate career. In addition to the financial award, Kelly Miller Fellows benefit from quarterly programming designed to enhance the graduate experience and ensure professional success.

All ABD students (those who have completed all requirements but the dissertation, something that usually happens in year three) are strongly encouraged to apply for external grants and fellowships to support their dissertation research and writing. The department also has internal fellowships to support students beyond their fifth year. Funds to support summer and conference travel are also available through the department, the Dean's office, and cross-disciplinary programs. The Dean's Teaching Fellowship enables advanced students to propose, design, and teach an undergraduate seminar course and provides one semester of support. Further details available via our website.

PhD Requirements

In discussion with major and minor field advisors, History of Art Ph.D. students develop areas of concentration and courses of study to suit their intellectual interests and commitments. The art history faculty also encourages students to take full advantage of offerings in other departments, and students may, if they choose, develop a minor field in another discipline.

All students entering the Ph.D. program, regardless of the degree they hold, must complete four full semesters of coursework and pass the required language exams before being approved to take their qualifying exams (also known as the Ph.D. exams). In the first year, students normally take three courses at the graduate level per semester; in the second year, when students generally assume Teaching Assistant assignments (https://arthist.jhu.edu/graduate/graduate-teaching-and-museum-opportunities/), the student will normally take two courses at the graduate level per semester. As part of the coursework requirement, students must satisfactorily complete and submit all assigned papers and projects associated with the courses they have taken before being approved to take their qualifying exams.

All qualifying exams, regardless of the fields in which they are taken, are comprised of two written exams (one major field and one minor field), followed by an oral defense before the advisors and other department faculty. Exams should take place during the student's third year; in some instances (e.g. the need for additional specialized language training beyond the modern language requirement or additional coursework) the exams may be taken later.

After the successful completion of qualifying exams, it is expected that students will be ready to begin work towards the dissertation by formulating a proposal. The dissertation proposal should be approximately 6–8 pages in length (10 pages will be the maximum), with a list of works cited and a very selective sample of figures appended. Simple parenthetical references to the works cited list are preferable to footnotes. Each proposal must contain a relatively straightforward description of the principal object of study and the defining questions the work seeks to answer, as well as a working title that captures the subject and the theme. The body of the proposal often also includes discussion of the current state of research, the intended contribution of the work to the field, and a preview of the research agenda and its challenges.

Students, having ideally secured outside research funding, then proceed to pursue dissertation research and writing. When the dissertation is complete, the student must successfully defend the dissertation before a Graduate Board Orals committee consisting of three internal (departmental) readers and two external readers. Successful defense of the dissertation and electronic submission of the work, complete in all its components, marks the fulfillment of the program's degree requirements.

Art History Fields

Ancient

The department affords students of ancient art the opportunity to work with a faculty that includes experts in Greek, Roman, Mediterranean, and Ancient Near Eastern art and architecture. Students also benefit from close and long-standing relationships with the Departments of Classics (https://classics.jhu.edu/) and Near Eastern Studies, which provide training in the languages, literatures, and histories of the ancient world. Facilities of special relevance to students of ancient art include the Johns Hopkins Archaeological Museum (http://archaeologicalmuseum.jhu.edu/), located on campus inside Gilman Hall, and the extraordinary holdings of the Walters Art Museum (https://thewalters.org/) and the Baltimore Museum of Art (https://artbma.org/).

Medieval

Since its founding in 1947, the department has given special emphasis to the study of medieval art, and that tradition continues with a new generation of faculty bringing expertise in Early Medieval, Gothic, Islamic, Italian, and Mediterranean art and architecture to the program. Students also avail themselves of local expertise through the departments of History (http://history.jhu.edu/), English (http://english.jhu.edu/), and Modern Languages and Literatures (http://krieger.jhu.edu/modern-languages-literatures/), and frequently consult with curators at the Walters Art Museum, several of whom participate as adjunct faculty. The extraordinary collections at the Walters Art Museum and at Dumbarton Oaks are especially valuable for students interested in manuscript illumination and the portable object.

Early Modern and Renaissance

Another signature strength of the Department of the History of Art is its expertise in the Early Modern period, encompassing the art, architecture, and culture of Italy, the Spanish Empire, the Islamic world, and Northern Europe from the fourteenth to the eighteenth century. Graduate students in these areas participate in the programs of the Charles Singleton Center for the Study of Pre-Modern Europe (http://krieger.jhu.edu/singleton/), which sponsors collaborative research abroad and brings a steady stream of world-class lecturers to Baltimore. Students also benefit from the excellent collections of Islamic art, Italian and Northern Renaissance art, and the art of the Spanish Empire at the Walters Art Museum, the National Museum of Asian Art, the National Gallery, and the Philadelphia Museum of Art.

Modern

At Hopkins a diverse and challenging curriculum in modern art and criticism is offered by a research faculty of international prominence, supplemented by occasional visiting scholars and museum curators. Students oriented toward the study of criticism and aesthetic theory can also broaden their perspective and develop their critical skills by taking courses offered through the Comparative Thought and Literature, Philosophy, History, English, Modern Languages and Literatures, Political Science, and Anthropology, and with faculty affiliated with the programs in Women, Gender and Sexuality Studies, Africana Studies, Latin American Studies, and Islamic Studies. Distinctive collections at the Baltimore Museum of Art and at multiple institutions in Washington, D.C., (the Hirshhorn Museum, the Smithsonian American Art Museum, the National Museum of Asian Art, the Phillips Collection, and others) provide unparalleled resources for students of modern art at all levels.

History of Art, Bachelor of Arts/ Master of Arts

History Of Art Bachelor Of Art / Master of Art Program

BA/MA Degree Requirements in History of Art

Admission to the BA/MA program is restricted to current Johns Hopkins University undergraduate history of art majors who are pursuing the honors track in the department, including writing a senior honors thesis. Admission is based on outstanding performance in previous History of Art courses.

Students considering a five-year program are expected to declare their interest during the spring semester of their junior year. Prior to application, students must consult with the director of undergraduate studies, their faculty advisor, and the department administrator. A formal graduate application must be submitted via the graduate school admissions site (http://krieger.jhu.edu/graduate-admissions/) by the departmental deadline for graduate admissions (December 15th) in the fall semester of the senior year for admission to the program in the spring of the senior year, meeting the requirement for concurrent status. In the senior (fourth) year, students are to devise a program of study that would best prepare them to do advanced work in their final (fifth) year. All requirements for the BA must be completed by the end of the fourth year.

In the MA (fifth) year, students must:

- Take six graduate seminars in the History of Art Department
- Demonstrate reading proficiency in one modern language according to the department's modern language requirements

The BA and MA degrees are conferred consecutively: at the end of the senior year for the BA and the end of the fifth year for the MA. The department does not award degrees during the summer; students are expected to complete the degree requirements in conformance with the university Graduate Board spring deadlines. Specific departmental and Graduate Board deadlines are communicated to the student in due course.

Applicants interested in the BA/MA program must submit the following documentation:

- Application (https://applygrad.jhu.edu/apply/?sr=32d103dd-97ab-431e-9e3f-5943d554f69c)
- Statement of Purpose
  - Statements of purpose should be no more than three (3) pages long.
- Transcript(s)
- Sample of Work
  - The sample of work should be no more than 30 pages, including images and works cited. Most samples are between fifteen and twenty-five (15-25) pages.

Note that the GRE is **not** a requirement for admission into the BA/MA program and there is no application fee. The program is 50% of the yearly tuition cost.

History of Science and Technology

http://host.jhu.edu/

The Department of the History of Science and Technology offers an undergraduate program leading to the degree of Bachelor of Arts with a major in science, medicine, and technology, and a graduate program leading to the degree of Doctor of Philosophy.

Undergraduate Programs

The department offers a variety of courses that deal with the history of the conceptual and technical development of the sciences, as well as the cultural and social impact of science and technology on civilization. These courses are open to all undergraduates in the Schools of Arts and Sciences and Engineering. A few of the courses require some background in an appropriate science, but most are accessible to those with no specialized knowledge who want to understand the part science has played in shaping modern culture. Students who have concerns about their technical competence for a given course should consult the professor involved.

Programs

Courses

AS.140.105. History of Medicine. 3 Credits.
Course provides an introduction to health and healing in the ancient world, the Middle Ages, and the Renaissance. Topics include religion and medicine; medicine in the Islamicate world; women and healing; patients and practitioners.

AS.140.106. History of Modern Medicine. 3 Credits.
The history of medicine and public health from the Enlightenment to the present, with emphasis on ideas, science, practices, practitioners, and institutions, and the relationship of these to the broad social context.

AS.140.178. History of Biology. 3 Credits.
The course surveys the emergence and development of life sciences since the 1700s. It examines major ideas, approaches, and debates regarding life, along with their material and cultural underpinnings as well as social impacts. One crucial question throughout the course is how social and cultural contexts have shaped views of life at particular times and places. Topics include natural history, classification, morphology, cell theory, physiology, evolution, genetics and eugenics, molecular biology, biomedicine, and biotechnology. Lectures are supplemented with discussions about primary historical texts and scholarly articles. Students will learn about the course content, methods in historical inquiries of scientific fields, and will develop an original research essay as a final project.

AS.140.198. Technology and Environment in Japanese Films and Anime. 1 Credit.
In the course of the semester we will watch Japanese films and animation that touch upon topics of technology and environment. The list of screenings includes several blockbusters, classics in film studies, and documentaries. The course is a companion course to 140.398 “Godzilla and Fukushima,” but is also open to anyone interested. Students who do not take 140.398 will be required to write a short review paper by the end of the semester.

AS.140.227. Race, Racism and Medicine. 3 Credits.
How can we think about the interconnections between racism, theories of race and the practice of medicine? Living at a moment when racial disparities in health outcomes in the United States are still very stark, this course will provide a historically grounded approach to thinking about the roles that race and racism have played in healthcare, the production of health disparities as well as the role of medicine in the development of racist thought. While much of this course will focus geographically within the United States, this class will also explore global histories of medicine, encountering questions of race and medicine in Africa, the South Pacific and Asia. In addition to the analysis of primary source documents and historical texts, students will also be introduced to theoretical approaches to the study of race and racism from W.E.B. Dubois, Sylvia Wynter, Frantz Fanon and others.
Area: Writing Intensive

AS.140.228. Epidemic!: Diseases that Shaped our World. 3 Credits.
In this course, we will look at a number of key epidemic diseases in the pre-modern and modern world, from Black Death to COVID-19, and investigate how it affected medical thought and practice, as well as political, social and economic lives. We will pay special attention to how these diseases spread and how they affected and were influenced by questions of race, gender, sexuality and colonialism.

AS.140.231. Health & Society in Latin America & the Caribbean. 3 Credits.
Medical practice is complex in Latin America and the Caribbean. Most countries in the region have universal healthcare; yet, the quality of clinical services varies widely, and is influenced by degrees of incorporation into—or marginalization from—social power structures. Many people take their health into their own hands by supplementing biomedicine with plant based remedies as well as religious and spiritual services. This course will interrogate the history and contemporary relevance of healthcare in Latin America and the Caribbean, with particular interest in how medicine intersects with colonialism, slavery, capitalism, neo-colonialism, grassroots revolutionary movements, the Cold War, and neoliberalism. Drawing on films, visual and performance art, and music, students will consider the ways in which race, gender, indigeneity, ability, class, and nation have affected people's experiences with medical practice. Informed by postcolonial and decolonial scholarship, we will also examine why Latin America and the Caribbean have become "laboratories" for the production of medical knowledge, and importantly, how that knowledge was created by indigenous, enslaved, and migrant people as well as professionals. Finally, we seek to understand individual health problems in relation to the social and political determinants of health. As such, the course prompts students to reflect on why healthcare professionals—in the United States and abroad—would benefit from historically-informed communication with patients and their communities. This is a discussion-based seminar that requires active participation. There are no exams. The course does not assume any previous knowledge of the history of medicine or Latin American history.
Area: Writing Intensive

AS.140.232. Food, Environment, and Society. 3 Credits.
A seminar discussing crucial events and processes in global history which have shaped how food production and consumption impacted the environment and human societies. Students will learn how food practices, originally bounded within certain places and cultures, became transformed in modern societies with the rise of modern agricultural, transportation and food processing technologies, as well as the public health and environmental consequences of these transformations. Sessions will include lectures, seminar discussions, field visits or guest speaker events, and some hands-on activities. For the final project, students will conduct original research on topics of interest and produce a multi-media, public-facing intellectual product.
Area: Writing Intensive

AS.140.245. Biology and Society in Asia. 3 Credits.
What major knowledge traditions about life's generation and function have taken shape in Asia that continue to shape our contemporary world? How have they fared in encounters with Western knowledge traditions? How have modern biology, biotechnology and biomedicine developed in Asia in recent years within distinct geopolitical contexts? This course addresses these questions with selected historical cases from China, India, Japan, Koreas and selected Southeast Asian countries. It first introduces concepts and frameworks of major non-Western knowledge systems about life such as yin-yang and five phases and examine how religions, politics, and cross-cultural encounters impacted these systems, their evolutions or replacements. Then the class will examine the political, material, cultural and institutional contexts of more recent development in the life sciences in Asia. Class activities include lectures, discussions, research seminars, a final research project, and possible conversations with visiting professors and field trips.

AS.140.301. History of Science: Antiquity To Renaissance. 3 Credits.
The first part of a three-part survey of the history of science. This course deals with the origins, practice, ideas, and cultural role of scientific thought in Graeco-Roman, Arabic/Islamic, and Medieval Latin/Christian societies. Interactions across cultures and among science, art, technology, and theology are highlighted.
Area: Writing Intensive

AS.140.302. Rise Of Modern Science. 3 Credits.
Survey of major scientific developments from the mid-18th century to the present.

AS.140.306. Science And Religion. 3 Credits.
Science and religion are crucial influences on Western culture. This course examines their interrelations during the past 2000 years, including the Athens-Jerusalem debate, medieval theology, the Galileo affair, evolution, and current issues.

AS.140.312. The Politics of Science in America. 3 Credits.
This course examines the relations of the scientific and technical enterprise and government in the United States in the 20th and 21st centuries. Topics will include the funding of research and development, public health, national defense, etc. Case studies will include the 1918 Spanish influenza epidemic, the Depression-era Science Advisory Board, the founding of the National Science Foundation and the National Institutes of Health, the institution of the President's Science Advisor, the failure of the Superconducting Supercollider, the Hubble Space Telescope, the covid pandemic, etc.

AS.140.316. Minds and Machines. 3 Credits.
Is the mind identical to the brain? Is the mind (or brain) a computer? Could a computer reason, have emotions, or be ethically culpable? How have computers changed our minds? This course examines such questions philosophically and historically. Topics include early AI research, computationalism, connectionism, 4EA cognitive science, simulation theory, and the Singularity.

AS.140.317. The Hydrologic Sphere: Histories of Water in the Colonial and Postcolonial World. 3 Credits.
Water supplies are becoming scarcer globally due to climate change. We use clean water—fresh and salt—in a variety of ways that provide comfort, stability, and health, making it one of the most valuable commodities on Earth. While countries in the Global North are beginning to see more frequent and lengthier droughts, those in the Latin America, Africa, and South Asia have long struggled over how to distribute and use their clean water supplies. This class will examine how colonialism and its far-reaching effects have created an environment of scarce water supplies in many areas of the world. Water access is difficult to achieve, but for much of the Global South, the colonial period helped craft the problems we see today. This class will ask what colonial and postcolonial technologies' construction and use teach us about equitable clean water distribution, how social and cultural identities influence water supplies and use, and why water has been such an important element—and commodity—in our world, especially where Europeans settled and oppressed local populations.
Area: Writing Intensive

AS.140.321. Scientific Revolution. 3 Credits.
How did the Western understanding of nature change between 1500 and 1720? We'll study the period through the works of astronomers and astrologers, naturalists and magi, natural philosophers and experimentalists, doctors and alchemists & many others.

AS.140.322. Follow the money: Science, technology, and the 'knowledge economy,' c.1800-present. 3 Credits.
This course examines the historical emergence of knowledge-driven economies, paying special attention to the funding, development, and use of science and technology for commercial purposes.
Area: Writing Intensive

AS.140.324. Commercializing Science: Academic Entrepreneurs from Kelvin to Venter. 3 Credits.
From the 19th century physicist William Thomson (Lord Kelvin) to contemporary geneticists such as Walter Gilbert and Craig Venter, academic scientists and engineers across a broad range of disciplines have commercialized academic knowledge and inventions as patentees, consultants, and entrepreneurs. This course examines the motives and strategies behind such commercialization activities, ethical issues associated with them, and the factors influencing their success. We will also explore the history of currently dominant policies and institutions designed to foster the commercialization of academic science and evaluate their impact from a longer-term perspective.
Area: Writing Intensive

AS.140.327. Science and Utopia. 3 Credits.
This seminar will explore the complex interaction between science, technology and utopian/dystopian thought from the late nineteenth century. Major utopians will include Bellamy, H.G. Wells, Mark Twain, Frank Lloyd Wright, Aldous Huxley, George Orwell, Sinclair Lewis, B.F. Skinner, Margaret Atwood, and Walt Disney.

AS.140.329. Women, Health, and Medicine in Colonial and Antebellum America. 3 Credits.
This class will examine the history of women's health and medicine in America from the 17th century to the mid-19th century, a period in which settler colonialism and the trans-Atlantic slave trade mixed European, Indigenous American, and African people and belief systems, resulting in diverse healing practices and understandings of the body and gender. Major themes addressed in the course include reproductive health, domestic and "alternative" medicine, as well as enslavement, racialized medicine, poverty, disability, and sexuality.
Area: Writing Intensive

AS.140.335. Photography in Science and Medicine (19th Century-Present). 3 Credits.
How did photography change science and medicine, and vice versa? This course explores how and why photography and related imaging techniques became central to a broad variety of fields of science and medicine, ranging from anthropology and astronomy to embryology, nuclear physics, and radiology. It also considers how these techniques were created in the first place and to what extent they affected the standing of photography as an "art-science." Central themes will include (among others) the status and objectivity of photographic evidence; the historical relationships between technical, scientific, and artistic change; the role of photography in disseminating scientific and medical knowledge and (mis)information; the racial and gender biases of scientific and medical photography; and photography's use as a tool of scientific exploration, measurement, and surveillance. Students will be developing their own research projects in consultation with the instructor.

AS.140.336. History of Mental Healthcare in the United States. 3 Credits.
In recent decades, much has been done in the United States to destigmatize mental illness and incorporate psychiatric services into broader systems of healthcare and welfare. As clinicians, policy makers, social scientists, activists, and other stakeholders have collaborated to promote mental health and reintegrate people with behavioral disorders into society, they have often contrasted their efforts with those made in the past, portraying community-based approaches as more efficacious and humane. Narratives like these, however, deemphasize many important continuities in the history of American psychiatry. In this discussion-based course, students will explore how concerns about citizenship and social control have shaped the organization and provision of mental healthcare in the United States from the early nineteenth century to the present day. They will also complete various assignments designed to hone their ability to evaluate historical arguments, conduct independent and collaborative research on primary sources, and communicate the results of their scholarship to professional and lay audiences.

AS.140.338. Unsafe America: Accidents, Disasters, and Society, 1800–2020. 3 Credits.
According to the latest data from the National Safety Council, accidents cause over 173,000 deaths and 48,300,000 injuries per year across the United States. Since the nineteenth century, accidents ranging from burns to car crashes to the Three Mile Island nuclear disaster have become increasingly central to American life. This course examines the history of accidents and why Americans have chosen to control some hazards but not others. We will investigate how accidents have changed over time alongside the introduction and spread of new technologies; cultural beliefs about safety; the economic and political interests of different stakeholders; and the efforts of safety experts, nonprofits, corporations, families, and the government to protect Americans from harm. On one level, this course traces the unexpected consequences of remaking the United States with modern industry, transportation, infrastructure, and consumer products. At the same time, it captures how the principles of free enterprise and personal responsibility continue to influence the American safety movement.
Area: Writing Intensive

AS.140.341. Humanoid Robots in Global History. 3 Credits.
Humanoid machines reflect their creators' ideals of humanity. Comparing examples from societies across the globe we will investigate what factors shaped these ideals, and how they manifested in technological design.
Area: Writing Intensive

AS.140.347. History Of Genetics. 3 Credits.
Intellectual and social history of the gene concept, including Mendelism, eugenics, medical genetics, DNA, genomics, and personalized medicine.
Area: Writing Intensive

AS.140.356. Man vs. Machine: Resistance to New Technology since the Industrial Revolution. 3 Credits.
This course analyzes different episodes of "luddism" in the history of science and technology, from the destruction of textile machinery in the early 1800s up to recent controversies about biotechnology and ICT.

AS.140.364. The City Course: Disciplinary Perspectives on Urban Life and Form. 3 Credits.
This course aims, first, at enlarging our understanding of cities by looking at them from a variety of disciplinary perspectives and, secondly, at examining the distinctive ways of thinking associated with disciplines from engineering, the sciences and medicine to anthropology, sociology, economics, archaeology, history and literature. Baltimore and cities from around the world will provide resource material. Lectures, discussions, term projects.

AS.140.374. Force and Matter from Galileo to Maxwell's Field Theory. 3 Credits.
This seminar will trace the concept of force and its interaction with matter from Galileo in the late sixteenth century to rise of field theory in the work of James Clerk Maxwell in the late nineteenth century. Major figures to be studied through primary source readings are Galileo, Kepler, Descartes, Hobbes, Newton, Boscovich, Schelling, Laplace, Fourier, Faraday, William Thomson (Lord Kelvin) and Maxwell.

AS.140.391. Individualized Medicine from Antiquity to the Genome Age. 3 Credits.
A seminar for advanced undergraduates. We explore the notion of the individual in medicine over twenty-five centuries, from the Hippocratics to the invention of the case study during the Renaissance to the current JHU medical curriculum. The history of medicine survey, AS.140.105 or AS.140.106, is recommended though not required. Graduate students are welcomed but should expect to do additional work and readings.
Area: Writing Intensive

AS.140.393. Technology and the Making of the Modern World. 3 Credits.
This course critically examines the role of technology in some of the main developments that have shaped the modern world, ranging from industrialization and globalization processes to the rise of new political ideologies and gender patterns. This course is co-taught by an instructor from the Smithsonian Institution and will include a public history research project.

AS.140.394. Heredity, Eugenics, and Society. 3 Credits.
In this course, we will examine the ways in which concepts of the gene, heredity, and innateness have both shaped and been shaped by society over the last two-plus centuries. Topics under discussion may include: eugenics, biological determinism, scientific racism, human breeding programs, genetics and gender, genetics and intelligence, genetic engineering including CRISPR, assisted reproductive technologies, sociogenomics, and polygenic risk scores. Term paper. AS.140.106 recommended.
Area: Writing Intensive

AS.140.395. Prosthetics and Technologies of Disability. 3 Credits.
The purpose of prosthetics seems to be fairly straightforward—to restore function that was lost due to the loss of a body part. According to this logic, the quality of prosthetics is measured in its ability to replicate lost human function and restore individuals with disabilities to normalcy. And indeed, numerous disability technologies enrich the experience of individuals in need of them. At the same time, these very technologies are often perceived as a marker of something abnormal, or, by the nature of their design prove to be an obstacle for mobility and access. Therefore, as much as prosthetics and other technologies of disabilities improve the quality of life, they also led to stigmatization, marginalization, and exclusion. By looking at prosthetics and disability in a variety of historical contexts, we will learn what kind of ideas of 'normalcy' they reflect, and how they shape the experience of individuals who use them.
Area: Writing Intensive

AS.140.396. Encoding Bias: Algorithms, Artificial Intelligence, and the History of Computing. 3 Credits.
How can an inanimate object be biased? How is it possible for a machine or software to discriminate on the basis of race, gender, or economic status? After all, machines are supposed be free from the lapses of judgement that can cloud human minds. And yet, the more we rely on digital technologies, the more we realize that algorithms are not as neutral and objective as we hoped they would be. This course traces the origins of computer bias to the aspirations, ideals, metaphors, hopes, fears, and, of course, biases of the people who developed computer technologies. During the semester, we will learn about the humble origins of computing technologies, the original, human "computers" in astronomical labs, Alan Turing's invention of a "digital" mechanical computer to decipher Nazi codes, the Cybernetics movement, the models of rationality and intelligence that guided the development of AI, the gendering of the computing profession, the advent of personal computers, and more. While exploring these episodes in the history of computing we will discuss and analyze the social and structural origins of computer and algorithm bias.
Area: Writing Intensive

AS.140.398. Godzilla and Fukushima: Japanese Environment in History and Films. 3 Credits.
Japan is often described as "nature-loving," and is considered to be one of world leaders in environmental protection policies. Yet current environmental successes come on the heels of numerous environmental disasters that plagued Japan in the past centuries. Juxtaposing Japanese environmental history and its reflection in popular media, the course will explore the intersection between technology, environment, and culture.
Area: Writing Intensive

AS.140.401. The Knowledge City: from Silicon Valley to Bloomberg's New York. 3 Credits.
This seminar will explore the increasingly productive relationship between research universities and urban and regional development in the period after World War II to the present. Working with the faculty, participants will be expected to develop a research paper. Discussion, presentations, lectures.

AS.140.411. Senior Research Seminar. 3 Credits.

AS.140.412. Research Seminar. 2 Credits.
Departmental Majors Writing a Senior Thesis Only
Area: Writing Intensive

AS.140.423. Science and Science Fiction in Global Perspective. 3 Credits.
What can we learn from science fiction about the history of science and technology? What ideas about science do Sci-Fi novels manifest? Is the relationship between science and science fiction always the same, across different time periods and geographical areas? This course will explore these questions by taking a comparative perspective. Each meeting we will read a Sci-Fi novel from Europe, America, South and East Asia, and discuss it in conjunction with historical writing about relevant scientific developments. Reading Sci-Fi novels from 17th-century Germany, 19th-century England and India, and 20th-century Japan, China, Korea and the US, the students will explore how actual scientific developments were reflected in fiction, and what fictional depictions say about the aspirations and anxieties provoked by new technologies.
Area: Writing Intensive

AS.140.435. Ways of Knowing: New Histories of Science, Medicine, and Technology. 3 Credits.
What does it mean for science to have a history? Comparing newer approaches with classic works, we will explore different strategies for placing science, medicine, and technology in social context.
Area: Writing Intensive

AS.140.501. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.598. HoST Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.601. Research Methods/Hist Sci.
This graduate seminar introduces students to a variety of methods, sources, and approaches used in the historical study of science, medicine, and technology. The emphasis will be on the development of skills crucial to the successful completion of research projects.

AS.140.609. Technology and Labor.
In recent years historians, anthropologists, and sociologists of technology show increasing interest in questions of human labor. Adding to the literature that explores emergence, production, and use of technology, the new direction seeks to uncover and to analyze human labor that is necessitated by emerging technologies, and that is often concealed by them. The course will cover several classic works but will mainly focus on recent exciting scholarship that explores the relationship between technology and labor.

AS.140.614. Media of Science, Medicine, and Technology.
This research seminar starts from the premise that the production and circulation of scientific knowledge has always been mediated: through parchment and paper, books and journals, laboratory notebooks and electronic datasets. Likewise the body in health and illness has mediated through material objects, from the uroscopy flask to the stethoscope to MRIs and PET scans. Students will explore the theory and method of media history in developing their own research projects in the history of science, medicine, and technology.

AS.140.641. Departmental Colloquium.
Reports by staff members, students, and invited speakers.

AS.140.642. Colloquium.
Reports by faculty, students, and invited speakers.

AS.140.660. Working with Manuscripts: Paleography, Codicology, and Editing.
This is a practical course on using manuscript materials (especially premodern documents). It covers how to read both Latin and early modern vernacular scripts in various formats (paleography), how to describe, date, and document manuscript materials (codicology), and how to edit texts and make critical (and not-so-critical) editions. Other related topics of interest to enrolled students are possible. The specific topics that will be stressed will respond to the interests and needs of those students who enroll. Students are encouraged to bring examples or problems from their own research for study, practice, and analysis.

AS.140.678. Catching Up: Responses to Technical Change in the 19th and 20th Centuries.
This research seminar focuses on varieties of paths to modernity by nations in the 19th and 20th centuries as driven by technological change. The approach will be comparative and its reach global. The emphasis will be on preparing a research paper by semester's end.

AS.140.679. Humanoid Robots in Global History.
Graduate section of AS.140.341.

AS.140.681. Graduate Readings in History of Science and Technology.
The course explores advanced topics in History of Technology, as well as in History of Science, Medicine, and Technology in East Asia.

AS.140.683. Non-human Agency in Science, Medicine, and Technology Studies.
Studies of non-humans repeatedly challenge the assumption that agency is an exclusively human prerogative. We not only witness animals scheme and carry out their plans, be also experience interaction with non-animate objects as if they had will and capacity to manipulate us. What is the relationship between anthropomorphization and agency? What does our attribution of agency to objects say about our understanding of agency as an analytical category? How do we integrate non-humans into our investigation of human activity? In this course we will explore studies of non-human agency in history, sociology, and anthropology of science, medicine, and technology. Learning from authors such as Donna Haraway, Anna Tsing, Bruno Latour, Sherry Turkle, Lucy Suchman, Cynthia Breazeal and others, we will examine human relationship with companion species, vermin, mycelium, humanoids, digital technologies, and others.

AS.140.684. Science and the Marketplace.
This seminar explores the global economic history of science and technology and the historical entanglements between science and capitalism by investigating various practices that were simultaneously scientific and economic or had both scientific and economic dimensions. Through this lens, which reflects recent trends in the historiography of science-economy relationships, this course seeks to develop new perspectives on topics ranging from the modern histories of scientific publishing and popularization to the acquisition and standardization of research tools and materials and the conduct of various forms of knowledge work. Specific interests of the seminar participants will be taken into account.

AS.140.685. Histories of Reproduction.
While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

AS.140.705. History of Science: Antiquity To Renaissance.
Graduate-level version of 140.301 with additional readings, discussions and assignments in seminar format.

AS.140.708. Rise of Modern Science.
Survey of history of science, 18th-20th c. Students are encouraged to attend lectures for 140.302, but seminar may be taken without attending those lectures.

AS.140.710. Scientific Revolution.
Reading intensive seminar that studies the events and ideas that transformed western science from Medieval natural philosophy to the experimental sciences (1500-1720s). Lecture meets with AS.140.321.

AS.140.801. Directed Readings & Dissertation.

AS.140.808. Graduate Independent Research.
Independent research for graduate students in the History of Science and Technology Department only.

AS.140.888. Dissertation Research.
For graduate students in the History of Science and Technology Department Only.

For current faculty and contact information go to http://host.jhu.edu/people/

History of Science and Technology, PhD

The graduate program in the history of science and technology leads to the Ph.D. degree. The object of the Ph.D. program is to provide the rigorous training necessary for a scholarly career in teaching and research; consequently, the focus of the student's activity will be the research seminars of the department. Faculty from the Institute of the History of Medicine in the School of Medicine also participate in the program.

Facilities

The Eisenhower Library and the Welch Medical Library contain about two million volumes, including the special collections of the Institute of the History of Medicine in Baltimore. These research facilities are supplemented by the rare book holdings at Evergreen House, the Pratt Library, and the Peabody Library.

Other important research collections are available to students. In Philadelphia, collections include the Science History Institute, the American Philosophical Society, and the Academy of Natural Sciences. The Hagley Museum and Library's collections in the history of American science and technology are within easy distance of campus, as are the incomparable holdings of the Smithsonian Institution, the Library of Congress, the National Library of Medicine, and other governmental agencies in Washington, D.C.

Financial Aid

The department has several graduate fellowships and teaching assistantships. Students may also be eligible for federal financial support through the National Science Foundation. Information on these and other fellowships can be obtained through the fellowship advisor at the student's college, or from the Fellowship Office of the National Academy of Sciences, National Research Council, Washington, D.C. 20025. In the recent past, doctoral candidates have also won support for their research in the United States and abroad through such sources as the Smithsonian Fellowships, the Fulbright-Hays grants, the Spencer Foundation, Consortium for History of Science, Technology and Medicine, Max Planck Institute for the History of Science, and the Deutscher Akademischer Austauschdienst (DAAD) Fellowship.

Admission Requirements

Application deadline is January 15. Applicants to the Ph.D. program in the History of Science and Technology should upload and submit all required application materials and supporting documents through the online application system. For additional information on admission requirements, please visit our admissions website (https://host.jhu.edu/graduate/admissions/).

For further information on our faculty and programs, please visit our website at: http://host.jhu.edu.

Program Requirements

Before candidates begin full-time research on their dissertations, they must prepare themselves adequately in the appropriate fields of knowledge, become skilled in the techniques of historical research, and be able to carry out a sustained piece of historical analysis and writing.

In the first year of the program students are introduced to the methods and techniques of research and complete a year-long survey course in the history of science or the history of medicine. Students in their second year of study present a research paper to the department. In the second and third years of study, students complete three "fields" or concentrations. One field should be within the Program, one in a historical discipline outside the Program, and the third is negotiable depending on student interests and needs. Our students have also done historical fields with curators or research historians at the Smithsonian Institution. The third field can extend beyond historical subjects and may involve a scientific subject, for example. A field is intended to demonstrate a student's mastery of a specific body of knowledge, both for the student's own scholarly work and as a preparation for teaching. The fields are individually arranged and satisfied. Before being admitted for formal candidacy for the degree, the student must also demonstrate a reading knowledge of two foreign languages. If a student's native language, excluding English, is research related, the native language may fulfil a language requirement. Students are expected to submit a dissertation prospectus by the end of the summer after their third year. The final requirement for the Ph.D. degree is the completion of a dissertation that is an original contribution to historical knowledge and of a standard suitable for publication.

The History of Science and Technology is by its nature interdisciplinary, and students are encouraged to undertake study in related areas such as history, philosophy, and the natural and medical sciences.

History of Science, Medicine and Technology, Minor

History of Science, Medicine, and Technology Minor Requirements

The department offers a minor which may be combined with other science, social science, or humanities majors. To complete the requirements for the minor, students must have a total of 18 credits in the history of science, medicine, or technology, including at least one survey course. A minimum grade of C- is necessary in all courses applied toward the requirements of the minor and requirements may not be taken satisfactory/unsatisfactory. Each course must be at least 3 credits.

Code	Title	Credits
Survey Course [1]		
Select one of the following:		3
AS.140.105	History of Medicine	
AS.140.106	History of Modern Medicine	

AS.140.301	History of Science: Antiquity To Renaissance	
AS.140.302	Rise Of Modern Science	
AS.140.321	Scientific Revolution	
Additional History of Science, Medicine & Technology Courses		
Two history of science, medicine & technology courses at any level (6 credits) and three 200-400 level history of science, medicine & technology courses (9 credits)		15
Total Credits		**18**

[1] Another course might serve to fulfill the survey course requirement with permission of the director of undergraduate studies.

History of Science, Medicine, and Technology, Bachelor of Arts

History of Science, Medicine, and Technology Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Offered in cooperation with the Institute of the History of Medicine, this major allows students to combine substantive work in science with study of the social and historical context of modern science, medicine, and technology. The aim of the program is to produce graduates who are scientifically literate and technically competent, and who at the same time understand science and medicine not as static, autonomous enterprises but rather as modes of thought that have developed in specific social contexts.

The major is appropriate for any student planning a career in medicine or other areas of the health care industry. It is also flexible enough to serve as a basis for a variety of careers where an informed knowledge of science and technology and their impact on society is important. Such careers include broad areas of business and industry, journalism, teaching, museum work, and specialized areas of law and public policy.

- Sciences: Students are required to have a total of 30 credits in science, engineering, and mathematics courses coded (E, N, or Q), of which at least nine credits must be above the 100-level. Laboratory courses in science count toward this requirement. Calculus I is strongly recommended.
- History of Science, Medicine and Technology: A total of 24 credits of course work in the history of science, medicine and technology are required. These must include at least two survey courses and four additional courses above the 100-level.
- Students in their senior year may take graduate courses with permission.
- A minimum grade of C- is necessary in all courses applied toward the requirements of the major and requirements may not be taken satisfactory/unsatisfactory. Each course must be at least 3 credits.

Code	Title	Credits
Survey Courses [1]		
Select two of the following:		6
AS.140.105	History of Medicine	
AS.140.106	History of Modern Medicine	
AS.140.301	History of Science: Antiquity To Renaissance	
AS.140.302	Rise Of Modern Science	
AS.140.321	Scientific Revolution	
Additional History of Science, Medicine & Technology Courses [2]		
Two history of science, medicine & technology courses at any level		6
Four 200-400 level history of science, medicine & technology courses		12
Science, Math, or Engineering Courses (N, Q, or E)		
Nine credits of 200-level or higher N, Q, or E courses		9
Twenty-one credits of N, Q, or E courses at any level		21
Total Credits		**54**

[1] Other courses might serve to fulfill the survey course requirement with permission of the director of undergraduate studies.

[2] The courses AS.140.411 Senior Research Seminar and AS.140.412 Research Seminar may not be used towards this requirement

Sample Program of Study

A typical program might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
AS.140.1xx Freshman Seminar or other AS.140.xxx elective		3
Any level N,Q,E course		3
	Credits	**6**
Second Semester		
AS.140.1xx Freshman Seminar or other AS.140.xxx elective		3
Any level N,Q,E course		3
Any level N,Q,E course		3
	Credits	**9**
Second Year		
First Semester		
Survey course like AS.140.105 or AS.140.321		3
200 level or above N,Q,E course		3
	Credits	**6**
Second Semester		
Survey course like AS.140.106 or AS.140.302		3
200 level or above N,Q,E course		3
200 level or above N,Q,E course		3
	Credits	**9**
Third Year		
First Semester		
AS.140.xxx HSMT elective above 100 level		3
AS.140.xxx HSMT elective above 100 level		3
Any level N,Q,E course		3
	Credits	**9**
Second Semester		
AS.140.xxx HSMT elective above 100 level		3
Any level N,Q,E course		3
Any level N,Q,E course		3
	Credits	**9**
Fourth Year		
First Semester		
AS.140.411	Senior Research Seminar (Optional)	3

AS.140.xxx HSMT elective above 100 level		3
	Credits	**6**
Second Semester		
AS.140.412	Research Seminar (Optional)	2
Any level N,Q,E course		3
	Credits	**5**
	Total Credits	**59**

Honors in the Major

Students who demonstrate excellence in course work are eligible to write an honors thesis (AS.140.411 (http://e-catalog.jhu.edu/search/?P=AS.140.411) Senior Research Seminar and AS.140.412 (http://e-catalog.jhu.edu/search/?P=AS.140.412) Research Seminar) in their final year for additional credits. Students must have outstanding recommendations from two department members to be eligible for the thesis. Departmental honors are conferred if a student has a GPA of 3.5 or better in major requirements and receives a grade of A- or better on the thesis.

Interdisciplinary Studies

The undergraduate major in interdisciplinary studies allows students to combine disciplines in Krieger School of Arts and Sciences to develop a major focused on a particular topic or intellectual theme. Therefore, courses proposed for this interdisciplinary major must have coherence and build toward a rich exploration of a clear set of principles or questions.

Programs

- Interdisciplinary Studies, Bachelor of Arts (p. 1889)

Interdisciplinary Studies, Bachelor of Arts

Interdisciplinary Studies Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

Students in the humanities and social sciences who wish to design their own major, or who wish to divide their studies between departments, may create their own program in Interdisciplinary Studies. This interdisciplinary major may straddle several traditional disciplines but must maintain a substantive theme or focus. For example, a student interested in the American Revolutionary period may construct a curriculum including courses from History, English, History of Art, and Sociology. Another may wish to focus on children in poverty, drawing from Anthropology and Economics. Proposals for the interdisciplinary major should be submitted at the end of the sophomore year.

This major requires the support of a faculty advisor and the approval of the Arts and Sciences Curriculum Committee. A student wishing to complete this major must work with a full-time faculty member from the Homewood campus to construct a curricular plan that includes courses representing 45 to 60 credits. These courses can include all related prerequisites and related courses, such as language study. Independent study, research, and internships may be included. Twenty-one credits must be earned at the 300-level or higher. Courses from the School of Engineering are not permitted, except by petition.

The proposal should explain how each of these courses provides insight on the given topic, concept, issue, time period, etc. There is no need to defend the principle of interdisciplinary study, as that is a given, but the student must explain how the courses from two or more departments represent a conceptual whole.

After receiving approval from a sponsoring faculty advisor, the student then works with the Office of Academic Advising to finalize the proposal and to present it to the Curriculum Committee, consisting of faculty and undergraduates, who must approve the proposal by majority vote. After approval, the student continues to work with the faculty advisor and Academic Advising to oversee completion of requirements.

Rules:

- Students pursuing this major must still meet all other requirements for a bachelor's degree (p. 1587) in the Krieger School of Arts and Sciences.
- All courses for the major must be taken for a letter grade and students must earn a C- or better in courses completing major requirements.
- Students must earn 45-60 credits in the completion of the major.
- At least 21 credits must be completed at the 300-level or higher and may not be counted toward another major or minor.
- Courses offered by the School of Engineering may not be included in major requirements. (Some minor exceptions may be permissible.)

International Studies

http://krieger.jhu.edu/internationalstudies (http://krieger.jhu.edu/internationalstudies/)

The International Studies major is an interdisciplinary program drawn from the departments of political science, history, economics, languages, sociology, and anthropology. There are three programs in International Studies: a regular undergraduate major leading to the B.A. degree in four years, and two accelerated programs leading to a B.A. and M.A. degree in five years. One of the accelerated programs is in partnership with the Johns Hopkins School of Advanced International Studies in Washington, D.C. and the other is with political science institute Sciences Po in Paris. The three programs, and all other aspects of the International Studies Program, are described on the International Studies website.

Programs

- International Studies, Bachelor of Arts (p. 1934)
- International Studies Five-Year Accelerated B.A./M.A. Program with Sciences Po (p. 1936)
- International Studies Five-Year Accelerated B.A./M.A. Program with the Paul H. Nitze School of Advanced International Studies (SAIS) (p. 1936)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.192.150. States, Regimes & Contentious Politics. 3 Credits.
This course, which satisfies the gateway requirement for the major in International Studies, introduces students to the study of politics and political life in the world, with a particular focus on the Middle East, Latin America, and Africa. Throughout the course, we will analyze the sources of order and disorder in modern states, addressing a series of questions, such as: why did nation-states form? What makes a state a nation? Why are some states democracies while others are not? How do people organize to fight oppression? Why does conflict sometimes turn violent? What are the causes of ethnic war? Drawing on a mix of classic works and contemporary scholarship, we will discuss the answers that scholars have formulated to address these and other questions, paying special attention to research design and the quality of argumentation. This course also counts as a 100-level course in comparative politics required for political science majors.

AS.192.210. Library Research Seminar for International Studies and Social Sciences. 1 Credit.
Are you planning to do a research project for your independent study class, or preparing for a grant application, or working on a big research project for a research intensive class or graduation thesis, or just wishing to improve your research skills? If so, this course is for you! Through weekly two hour sessions over ten weeks, you will receive systematic training on major research tools, resources and techniques useful for any research project in international studies, political science, and other social science subjects. By the end of the course, you will be able to come up with a viable research topic, and complete a research statement that includes an abstract, problem statement and literature review based on in-depth research utilizing tools and techniques covered in the course. The skills you learn through the course will prepare you for any future research projects and advanced studies.

AS.192.225. Economic Growth and Development in East Asia. 3 Credits.
The course offers an overview of the complexities of East Asia's development experience from a variety of perspectives. It is divided into three parts to allow students to develop expertise in one or more countries and/or policy arenas, while cultivating a broad grasp of the challenges of "East Asia's fast-paced economic growth." Part I considers the origins of East Asian economic development, analyses the common economic variables behind the region's success, looks at the 1997-1998 East Asian financial crisis, its lessons and the economic renaissance that followed. Part II focuses on the development experiences of individual countries, with an emphasis on the ASEAN economies, NIEs, Japan and China. Part III considers topics of special interest to East Asia, including trends toward greater regional economic cooperation, trade integration, and issues related to poverty, migration, and inclusiveness.

AS.192.265. Introduction to Contemporary African Politics. 3 Credits.
This class provides an introduction to contemporary African politics. Africa is diverse, and its political landscape is rapidly changing. Dramatic events that have occurred in just over half a century in Africa, including but not limited to decolonization, the end of the Cold War, rapid democratization, urbanization, the youth bulge, conflicts, and most recently, the COVID-19 pandemic, etc. has significantly shaped the nature of state and society with implications for political outcomes in present-day Africa. This course unfolds in four parts. In part one, we examine Africa's recent political history focusing on how pre-colonial politics, slave trade, colonialism, and decolonization politics impact modern African states. Part two then examines the social forces that shape contemporary politics across the continent. These include ethnic groups, religion, gender, and civil society. With an understanding of these social forces, we then move on to part three, which will explore dynamics and structures that mediates these social forces, including democracy, development, social movements, and international relations. The final part examines Africa's critical issues and opportunities, including conflict, the youth bulge, regionalism/AfCFTA, climate change, gender (in)equality and women's empowerment, and the COVID-19 pandemic.

AS.192.270. International Migration, Diasporas and Development. 3 Credits.
International migration has emerged as one of most politically salient and contentious issues in the politics of advanced democracies. However, while the economic, political, and social impact of large immigrant inflows has prompted much debate and analysis in developed countries, the effects of emigration and diasporas on the source country are poorly understood. This seminar examines the economic and political challenges and opportunities of international migration and diasporas on countries of origin and policy options to address them.The seminar will examine a range of issues. Is the phenomenon of greater import in the current (and future) context than it has historically been and if so, why? How do selection characteristics of international migrants and reasons for leaving affect the country of origin? Why do diasporas differ in the forms of engagement with the country of origin? What explains the massive increases in financial remittances sent by immigrants to their countries of origin and what are their effects? The seminar will also examine non-pecuniary or "social" remittances, which reshape individual preferences and social norms and thereby influence economic, political, and social change. What are the human capital effects of international migration, ranging from the "brain-drain" of limited human capital to "brain-gain" effects arising from diasporic networks? How does the "long-distance" nationalism of diasporas that support more polarizing political parties and groups engaged in conflict affect international security? Finally, we will examine policies in both receiving and sending countries and how they affect outcomes in their countries as well as of migrants themselves. Are international agreements on migration feasible or will rising nationalism ensure that unilateral policies and bilateral arrangements prevail?
Area: Writing Intensive

AS.192.290. Informational World Orders. 3 Credits.
We are on the cusp of a new era of contention in global politics. For decades, politicians and experts assumed that global information networks like the Internet had an inherently liberal bias, and would weaken autocratic regimes like China and Russia. Now, we are discovering that authoritarian countries can use technology too. The result is increased clashes over information technology between democratic countries and non-democratic countries, and among democratic countries too. All of them find themselves sharing the same global networks, and fighting over how these networks ought to work. In this course, we'll debate the conflict between different informational world orders promoted by the US, Europe and China. We will examine when information technology helps strengthen democracy, and when it benefits autocracies instead. We'll explore how information markets work, and work through the logic of political fights over artificial intelligence and surveillance.

AS.192.305. Global Energy and Environment: A Political Economy Approach. 3 Credits.
Global environmental deterioration is a major threat to human wellbeing. How do governments cooperate to address international environmental problems? Why is the global environmental regime structured as it is? Can international agreements and organizations solve global environmental problems? These are the primary questions addressed in this seminar. Among other topics, we cover research on global climate cooperation, the relationship between trade liberalization and the environment, North South negotiations on environmental agreements, environmental activism, and the problem of energy poverty in non-OECD countries.The seminar also provides students with an opportunity to conduct original research. In addition to weekly readings and discussion, the students write a final paper for the class based on empirical research on global environmental governance. Students also participate in a simulation of global climate negotiations under the 2015 Paris Agreement on Climate Change.
Area: Writing Intensive

AS.192.315. Politics of India. 3 Credits.
India is the world's largest democracy and its second most populous country. This course introduces core issues in the study of modern Indian politics. The class is organized around the following topics: we trace India's journey to Independence; the consolidation of democracy in the early decades; the relationship between the state and the economy; the state's institutional architecture; how political parties and electoral campaigns operate; the threats posed by corruption, criminality and dynastic politics; the role of caste and religion in shaping politics; the political and economic consequences of economic liberalization; elections; and the recent rise of right-wing hindutva in the country. The focus is on building knowledge and understanding of the Indian case. But we will also consider to what extent India's experience is reflective of more general theories of politics, and how they might change because of what India can teach us. Class sessions will be interactive, with plenty of opportunity for group discussion. The reading list is diverse and draws from political science, sociology, history, and anthropology.
Area: Writing Intensive

AS.192.325. International Political Economy of Emerging Markets. 3 Credits.
This course examines the relationship between politics and international economics in emerging market and developing economies. Throughout the course, we critically evaluate different political science theories of foreign economic policymaking in emerging markets. The course begins with an overview of theories of international political economy. The second section of the course focuses on developing countries' embrace of economic globalization over the past thirty years. We examine different political explanations for why emerging market and developing countries have removed barriers to foreign trade and foreign investment since the 1980s. The final section of the course explores how globalization has impacted emerging market economies, focusing on the challenge of maintaining economic and financial stability in this era of economic globalization.

AS.192.360. Modern Warfare. 3 Credits.
This course examines modern warfare from the Second World War to the present. It takes a broad historical perspective. Strategic decision-making, technological change, experiences of the soldier, different concepts of warfare, and the effect of war on societies and the effect of societies upon war will be examined. Students will be introduced to critical texts and key primary source documents. The course will start with the Second World War. It will then go on to the nuclear revolution, the Korean War, and the early Cold War. From there, the subject matter will turn to examine people's war, focusing on Mao and the Chinese Civil War and then Vietnam. Next, the Arab-Israeli conflicts will be discussed before moving on to the strategic environment of the post-Cold War world and the long war against "terrorism" in Afghanistan, Iraq, Syria, and elsewhere. Finally, the course will look at recent technological change, clashes, and new players. Throughout, special attention will be paid to non-Western views and experience of war. The five main questions of the class will be: • How has the nature of warfare changed between 1939 and today? What is the nature of war today? What kind of war is possible today?• How has technology changed warfare?• What are the experiences of people, both soldiers and civilians, in war?• How has warfare affected societies and culture? How have societies and culture affected war?• How has warfare affected domestic and international political change?

AS.192.404. Democracy, Autocracy and Economic Development: Korea, Indonesia, and Myanmar. 3 Credits.
East Asia's "miracle growth" has not gone hand in hand with a decisive move toward democracy. The course explores the reasons why democratization proceeds slowly in East Asia, and seems to be essentially decoupled from the region's fast-paced economic growth. The course is divided into three parts. Part I introduces the specifics of East Asia's economic development strategies as well as key concepts of democracy, authoritarianism and military rule and the tensions between these theories and the East Asian experience. Part II will focus on the economic and political development experiences of Korea, Indonesia and Myanmar in light of what discussed in Part I. Finally, Part III presents lessons emerging from the comparison of Korea's, Indonesia's and Myanmar's economic and political developmental trajectories.

AS.192.410. Kissinger Seminar on American Grand Strategy. 3 Credits.
Enrollment is at the discretion of the instructor and space in the course is limited. To apply, email a one-page resume, one-page personal statement on why you want to take the class including how it contributes to your professional interests, and a writing sample of less than ten pages to KissingerCenter@jhu.edu by the end of the day on Sunday, October 24, 2021. This course is an initiative of the Henry A. Kissinger Center for Global Affairs at Johns Hopkins SAIS. It will expose exceptional undergraduate students to the study of grand strategy and the history of U.S. foreign policy. The course will explore critical moments, themes, and people in the history of American grand strategy, from Washington's Farewell Address to the statecraft of Donald Trump. The seminar will also consider key issues in U.S. grand strategy today, from climate change to the challenge of an assertive China. Students will also have the opportunity to meet with current and former policymakers who have worked on these issues in real time. The course will meet 9 times at Homewood and 4 times at the SAIS campus in Washington, D.C.; transportation between Homewood campus and SAIS will be provided.

AS.192.412. Politics of Inequality. 3 Credits.
At the heart of the study of politics is a question about who gets what and when. Consequently, inequality features as a central theme in the discipline. Scholars have studied how inequality shapes democratization, redistribution, voting behavior, and how the institutions of welfare and taxation in turn shape inequality. More recently, scholars have started to pay attention to how inequality across and within ethnicities, races, and gender may matter to political outcomes. The centrality of inequality is reflected in the significant increase in quantity and quality of research on this subject over the past two decades. This seminar is designed to provide you with a critical overview of the field, both theoretically and empirically. We will briefly review the normative foundations and conceptual complexities involved in the study of inequality. Measures of inequality vary in their analytical properties, and it is important to choose the right one. We will review the main issues when measuring inequality. We will then proceed thematically. We will examine the political, and institutional foundations of income inequality and also its effects on institutional development, political participation and voting choice. Next, we examine the individual-level determinants of economic and political preferences, and how inequality intersects with race and gender. We end with a discussion of the social effects of inequality and what constraints exist to addressing inequality.
Area: Writing Intensive

AS.192.415. The Battle of Ideas for the World Economy. 3 Credits.
This seminar is intended as a capstone intellectual experience for seniors and advanced juniors majoring in international studies. The course presumes some background in economics, comparative politics, and international relations. This course will hone your analytical and writing skills by exposing you to theoretically advanced forms of political economy argument in a "proposition-opposition" format. The seminar is organized around a series of thematic pairings, covering such political economy themes like free trade vs. protectionism, free market capitalism vs. socialism, democratic erosion vs. autocratic strength, hegemonic stability vs. US abdication of power, or whether the current populist wave has mainly economic or mostly cultural roots. Each segment will deal with a specific topic area. Our discussions will involve in-depth interrogations of the arguments of these 'pro-con' authors.
Area: Writing Intensive

AS.192.420. Global Health Policy. 3 Credits.
The world's countries—low, middle and high-income alike—face numerous health challenges, many shaped by processes connected to globalization. We are presently amidst one of the greatest global health challenges of the past century—the COVID-19 pandemic. But there are others that persist, including combating the HIV/AIDS pandemic, addressing non-communicable diseases, expanding health coverage and ensuring effective global governance for health. This course will examine these and other issues with an emphasis on facilitating your understanding and critical analysis of central issues in global health policy, and examining the role you can play to address health conditions—particularly those that affect disadvantaged populations.
Area: Writing Intensive

AS.192.425. The Politics and International Relations of Iran. 3 Credits.
This course provides a basis for understanding the political, economic and security dimensions of Iran's politics and the country's role in World politics. It will discuss the Islamic Republic of Iran's complicated political system and its international politics. A significant and geostrategically situated country, Iran is where Islamic ideology first attained power in form a major social revolution. The unfolding of that revolution has shaped the Middle East, and has posed one of the most important challenges to American foreign policy. As a revolutionary Islamic State Iran experienced a unique path to development and state-building. This course will introduce the students to the main ideological currents and political trends in Iranian politics. It will discuss the structure of its theocracy, and the working of its politics and economy. The course will also examine Iran's foreign policy posture, with focus on U.S.-Iran relations, quest for nuclear power, and Iran's regional policy.

AS.192.501. Internship- International Studies. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.591. Research- International Studies. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.598. Independent Study. 3 Credits.
Approval Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.599. Independent Study. 3 Credits.
Approval Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Agora Institute

AS.196.300. Getting to Truth: How to Navigate Today's Media Jungle. 3 Credits.

Our democratic system depends on an informed public, but media today are polarized along ideological lines, undercut by economic and technological change and sometimes polluted with bogus stories written for profit or spin. In this course, taught by a veteran journalist, we will discuss the evolution of news, examine the current challenges and assess what citizens can do to get a fair understanding of what's going on. We'll use many concrete examples and students will have multiple writing assignments.
Area: Writing Intensive

AS.196.304. Democratic Challenges. 3 Credits.

Modern democracies like the U.S. are undergoing severe challenges from within and elsewhere. Internally, many of their citizens are newly skeptical of democracy, believing for example that elections are rigged. Outside, they face new competition from authoritarian systems such as China's government, which show no signs of converging towards democracy, and offer a possible alternative system of rule. Finally, democracies also have to engage with new policy challenges, such as racial justice and climate change. In this course, we will draw upon the collective wisdom of faculty at Johns Hopkins' new SNF Agora Institute, to understand better the political challenges that democracy faces, and the policy challenges that it has to respond to. We will put modern democratic challenges in their appropriate historical context. Has America really been a democracy in the past? We will ask about the social and political conditions under which democracy does well, and under which it fails. Finally, we will look at the new agenda of questions that democracy faces, and the means that it can draw on to confront them.
Area: Writing Intensive

AS.196.306. Democracy by the Numbers. 3 Credits.

How is democracy doing around the world? This course will help students to answer this question and ask their own questions about political systems by examining a variety of quantitative measures of facets of democracy in the U.S. and internationally. We consider general indices as well as those that focus on specific normatively-appealing aspects —the absence of fraud in and broader integrity of the electoral process itself, the guarantees of fundamental human rights to all, governments' effectiveness and accountability to the public, the equity of both representation and policy outcomes for minority groups and those historically disadvantaged or excluded, and the possibility and extent of civic engagement in non-government institutions. Wherever possible, the course will present evidence about the kinds of institutions and policies that seem to bolster democracy. Students can expect to gain hands-on experience with publicly-available subnational and national indicators of electoral and democratic quality.

AS.196.311. Democracy. 3 Credits.

Democracies around the world are under threat. This course introduces students to the philosophical foundations of democracy as well as the history of democratic revolutions, institutions, and principles. How can we defeat the most important contemporary challenges to democracy, including populism, authoritarianism and disinformation? And how can we revive the “democratic spirit” - in America and around the world?

AS.196.364. This is Not Propaganda. 3 Credits.

We live in an era of disinformation' mass persuasion and media manipulation run amok. More information was meant to improve democracy and undermine authoritarian regimes- instead the opposite seems to be happening. This course will take you from Russia to South Asia, Europe to the US, to analyze how our information environment has been transformed, why our old formulae for resisting manipulation are failing, and what needs to be done to create a model where deliberative democracy can flourish.
Area: Writing Intensive

Anthropology

AS.070.212. Minorites in South Asia. 3 Credits.

This course will introduce first-year students to the anthropology of modern South Asia from the lens of its varied minorities. We will interrogate ideas of nation, community, tradition, and belonging across the region to understand contemporary dilemmas of diversity, heterogeneity, and cultural citizenship.
Area: Writing Intensive

AS.070.241. African Cities. 3 Credits.

Over the past two decades, African cities have absorbed rapid population increase without accompanying economic growth. Students will review the major challenges of this mode of urbanization and explore the vibrant ways residents have sought to meet them. Following anthropology's commitment to lived experience, we will track these issues through the twists and turns of everyday life, and consider what they may say about urbanity more broadly in the 21st century. Topics include livelihood, the built environment, conflict and membership, and popular culture.
Area: Writing Intensive

AS.070.267. Culture, Religion and Politics in Iran. 3 Credits.

This is an introductory course for those interseted in gaining basic knowledge about contemporary Iran. The focus will be on culture and religion and the ways they in which they become interwoven into different kinds of political stakes.
Area: Writing Intensive

AS.070.295. Conflict and Security in a Global World. 3 Credits.

Students will be introduced to problems of global governance in the context of transnational conflicts, changing nature of war, new epidemics and pandemics, and the threats of planetary extinction. What are the ways security is imagined and what kinds of political passions are mobilized for security of people versus security of states.
Area: Writing Intensive

AS.070.324. Latin America in a Fracturing World. 3 Credits.

This course examines the multiple and overlapping crises afflicting Latin America today through an ethnographic lens. Featuring conversations with authors of recent work on the region's most pressing issues, we will explore the contours of knowledge production itself under conditions of precarity and violence. Discussions will include the retrenchment of borders, migration crises, the state management of life and death, the resurgence of authoritarianism, food insecurity, and resource conflicts.
Area: Writing Intensive

AS.070.332. Reverberations Of The Korean War. 3 Credits.
This course will takes the reverberations of the Korean War to examine the ways in which catastrophic violence is absorbed into and corrodes social life. Particular attention is paid to the transnational nature of conflict, how boundaries around peace and war are established, and how recent scholarly and artistic work on the Korean War has critically engaged dominant frameworks of memory and trauma. Readings will draw from fiction, ethnography, historiography and will also include film. This course also draws from the public syllabus on Ending the Korean War.
Area: Writing Intensive

AS.070.336. Ethnographic Perspectives on Brazil. 3 Credits.
This seminar offers an examination of Brazilian culture and politics through close readings of classic and contemporary ethnography. The course will track how anthropologists have approached the complexities and contradictions of Brazilian society. And, conversely, we investigate how studies in Brazil have prompted challenges to and generated innovations in anthropological thought.
Area: Writing Intensive

AS.070.342. Common Ground: Shared Resources, Social Economies. 3 Credits.
This course explores the idea and practice of the commons through various sites and objects (money, work, natural resources, urban land, knowledge and culture, etc.). We will examine the promise and limitations of local, grassroots social and economic forms of organization that propose alternatives to the market economy. Focusing on workers, consumers and housing cooperatives; community currencies; urban gardens; self-help associations; fair trade organizations and knowledge networks; we will enquire how these social economies propose autonomous forms of living together, and sharing resources, property and labor.
Area: Writing Intensive

AS.070.359. Korean War. 3 Credits.
This course takes the Korean War as a site to both explore: 1) contemporary historical and political transformations in East Asia and globally and 2) the ways in which violence, catastrophic loss, and separation are woven into everyday life. It will explore the Korean War through film, fiction, historiography, and draw on comparative materials in anthropology
Area: Writing Intensive

AS.070.367. Science and Technology in Africa. 3 Credits.
This course explores the role of science and technology in the making of African histories and politics. We will examine precolonial iron-working, healing, and weaving; the ways guns and railroads functioned as tools of empire; the role of hydroelectric dams in postcolonial nation building; and the rise of digital communication and payment systems in the present. Throughout, we will challenge commonsense distinctions between the material and the spiritual, designers and users, wealth and people.
Area: Writing Intensive

AS.070.380. Slumworld: Life in informal Settlements. 3 Credits.
One quarter of the planet's urban population lives today in slums, shantytowns, favelas, chawls, colonias and other forms of rudimentary settlements (according to UN Habitat). Despite their prevalence throughout the world, these places are still depicted as spaces of informality and abjection, rather than as sites of emergence ofinnovative - even if disadvantaged-, makeshift ways of producing the city. This course will combine ethnographic and geographical literature, as well as works of fiction and film to explore the lives of squatters and slum-dwellers in many regions of the world and examine in what way their practices, forms of dwelling, sociality, conflict and cooperation are constitutive of the urban experience.
Area: Writing Intensive

AS.070.389. Precarity in South Korea through TV and Film:Aesthetics and everyday life. 3 Credits.
This seminar explores how precarity in South Korea gains expression in the medium of TV and film. In particular, this seminar will focus on how the moving image brings the viewer into the texture of everyday life. We will focus on the TV show Misaeng and include films such as Parasite and Burning. TV and film will be paired with readings on the transformations of intimate life in contemporary South Korea and comparative work on precarity.
Area: Writing Intensive

AS.070.413. Reading Marx. 3 Credits.
This seminar offers a close reading of selected works of Karl Marx, along with supplemental secondary literature. We will explore how the central pillars of Marx's thought--including dialectical materialism, critical political economy, and utopian socialist thought—shape his critical method in interrogating the logic of capital.
Area: Writing Intensive

AS.070.425. Anthropology of Epidemics. 3 Credits.
In this course we will examine how forms of governance, politics, expert knowledge, and citizen actions are implicated in the emergence and management of epidemics.
Area: Writing Intensive

AS.070.465. Concepts: How to Read Hindu and Islamic Texts. 3 Credits.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

Center for Africana Studies

AS.362.115. Introduction to Police and Prisons. 3 Credits.
This introductory course will examine policing and prisons in the United States and beyond, with a focus on racial inequality. It will consist of three parts. First, we will define key concepts in police and prison studies. Then, we will explore the contemporary state of prisons and policing in the United States and look at debates around the rise of “mass incarceration” and aggressive forms of policing in the final third of the 20th century. Third, we will explore policing and prison in other parts of the globe in the contemporary moment, highlighting similarities and differences from the U.S. case. What can studying the instruments of social control in other societies reveal about our own? Students will develop an understanding of major trends, keywords, and debates in the literature on policing and prisons, with particular reference to race and racism.

AS.362.160. Land, Labour and Environmental Rights and Struggles in Contemporary Africa. 3 Credits.
‘Africa rising’ has become an influential, albeit contested, narrative used by institutions like the International Monetary Fund and World Economic Forum to describe the rapid economic growth in 21st century Africa. This rapid ‘economic growth has been accompanied by another type of ‘Africa Rising’ – a mushrooming of social protest and popular uprisings across the continent. The course will introduce important theoretical perspectives, debates, and examples to equip students to critically examine contemporary social dynamics through the interconnected themes of land, labor and environmental rights and struggles that have gripped the African continent. What has given rise to these awakenings? Who are the actors involved in these actions? What are their demands and strategies? What lessons does it hold for social movement theory and development more broadly? The first section focuses on land reclamation movements, the new wave of ‘land grabs’ and responses from below. The second section presents the role of labour movements and its intersection with popular uprisings. The third section considers responses from communities and movements to the ecological destruction and climate change.

AS.362.315. Black Against Empire. 3 Credits.
This course will examine the confrontation of Black social movements with imperialism in the twentieth century. How, we will ask, have key Black internationalist thinkers conceptualized and defined diaspora, capitalism, imperialism, war, and the global? What have been the effects of war and repression, as well as economic growth and globalization, on Black internationalism? Readings may include texts by W.E.B. Du Bois, Angela Y. Davis, Frantz Fanon, Ashley Farmer, Claudia Jones, Robin D.G. Kelley, Claude McKay, Huey P. Newton, Walter Rodney, Malcolm X, etc. Students will complete a research paper on a topic of their own choosing related to Black internationalism in the twentieth century.
Area: Writing Intensive

AS.362.413. African American Representations in the Western. 3 Credits.
The course will investigate American cinematic representations of African Americans, slavery (and more specifically its absence), the Civil War, and racial formation along the United States’ southwestern frontier in films produced from the 1950s through the contemporary period. The course closely examines American cinematic fantasies of the western frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, strongly shaping the production of American masculine ideals. The course will also take decided note of the national shift from liberal “Great Society Programs” of the 1960s to the conservative “neoliberal” social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between blackness and whiteness, civilization and savagery, belonging and alienation, and metropolis and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion. Films include “Buck and the Preacher,” “The Battle of Algiers,” “Sgt. Rutledge,” and “Django Unchained.”
Area: Writing Intensive

Comparative Thought and Literature

AS.300.102. Great Minds. 3 Credits.
Introductory survey of foundational texts of modern philosophy, social and political thought, and literature. This semester will include works by Plato, René Descartes, Immanuel Kant, Karl Marx, Virginia Woolf, Ludwig Wittgenstein, Iris Murdoch, Cora Diamond, Judith Butler, Kwame A. Appiah, Jacques Derrida, and others. The course is taught in lectures and in seminar discussions.

AS.300.301. Women and Work in the US. 3 Credits.
This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women’s labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women’s work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

AS.300.311. Introduction to Intellectual History. 3 Credits.
This course offers a conceptual and historical introduction to Intellectual History. What makes the “history of ideas” different from the history of other objects? What, if anything, distinguishes the history of ideas from the history of philosophy? What is it exactly that we call “ideas”? In what sense do they have a history? These are examples of the kind of questions addressed in the course.

AS.300.317. The Russian Novel. 3 Credits.
This course introduces students to the nineteenth century Russian novel and considers its lasting impact on world culture. We will read classic masterpieces of the psychological and philosophical novel, and their experimental forerunners. Short lectures on historical and cultural context and on methods of literary analysis will be combined with intensive group discussion. Novels include Anna Karenina, Crime and Punishment, Eugene Onegin, Dead Souls, and Hero of our Time.
Area: Writing Intensive

AS.300.322. Lu Xun And His Times: China's Long 20th Century And Beyond. 3 Credits.
The "founding father of modern Chinese literature," Lu Xun (1881-1936) saw himself as a contemporary of writers like Gogol, Ibsen, and Nietzsche in creating his seminal short stories and essays, and likewise, he has been seen by numerous Chinese, Sinophone, and East Asian writers as their contemporary since his lifetime until today. In this course, we will survey Lu Xun's canonical works and their legacies through a comparative approach. What echoes do Lu Xun's works have with the European and Russian texts he engaged with? Why did his works manage to mark a "new origin" of Chinese literature? How were his works repeated, adapted, and appropriated by Chinese writers from the Republican period through the Maoist era to the post-socialist present, even during the Covid-19 pandemic? How do we assess his cross-cultural reception? Are his times obsolete now that China is on the rise? Or, have his times come yet? Through our comparative survey, Lu Xun's works and their afterlives will offer us a window onto China's long twentieth century and beyond in a transnational context. All materials are provided in English translation.

AS.300.324. Cinema of the 1930s: Communist and Capitalist Fantasies. 3 Credits.
Comedy and musical comedy film flourished in the USA during the Great Depression as well as in the USSR during the Stalinist Great Terror. This course will compare films of the era in a variety of genres (musical, epic, Western, drama), examining the intersections between politics and aesthetics as well as the lasting implications of the films themselves in light of theoretical works on film as a medium, ethics and gender.

AS.300.328. Contemporary Sinophone Literature and Film. 3 Credits.
A survey of contemporary literature and film from the peripheries of the Chinese-speaking world, with a special focus on Hong Kong, Taiwan, and overseas Chinese communities in Southeast Asia, the Americas, and Europe. We will not only examine literary and filmic works in the contexts of the layered histories and contested politics of these locations, but will also reexamine, in light of those works, critical concepts in literary and cultural studies including, but not limited to, form, ideology, hegemony, identity, history, agency, translation, and (post)colonialism. All readings are in English; all films subtitled in English.

AS.300.330. Modern East Asian Literatures Across Boundaries. 3 Credits.
Modern literature in East Asia is as much defined by creation of national boundaries as by their transgressions, negotiations, and reimaginations. This course examines literature originally written in Chinese, Japanese, and Korean in light of contemporary understandings of political, social, and cultural boundary demarcation and crossings. How do experiences of border-crossing create and/or alter literary forms? How, in turn, does literature inscribe, displace, and/or dismantle boundaries? Our readings will include, but not limited to, writings by intra- and trans-regional travelers, exiles, migrants, and settlers; stories from and on contested borderlands and islands (e.g. Manchuria, Okinawa, Jeju); and works and translations by bilingual authors. All readings are provided in English translation.

AS.300.331. The Authoritarian Image: Russian Cinema from Stalin to Putin. 3 Credits.
Vladimir Putin's charismatic authority has a deep history in Russian culture. We'll investigate that history through cinema, which Lenin called "the most important of the arts." While Soviet cinema often served as immersive propaganda, directors also found ways to question authority and power. Films to be screened range from Sergei Eisenstein's Ivan the Terrible (1944) to the 2013 documentary Pussy Riot: A Punk Prayer. This course will combine study of Russian and Soviet culture from the end of World War II to the present with study of film history, style, and technique.
Area: Writing Intensive

AS.300.332. From Chekhov to Chernobyl: Russian Literature of Environmental Catastrophe. 3 Credits.
Environmental degradation and disaster offer a steady backdrop to the 20th century in Russia and the Soviet Union. While the Soviet regime promised mastery over the environment and Russian culture valorized the harmonization of humans with the natural world, environmental catastrophe proved the folly of those dreams. We will read works by authors who havegrappled with this ongoing catastrophe and its implications for relations between human beings and the world. Texts range from short stories and novellas to modernist experimental fiction and documentary prose. We will also engage with materials in special collections and screen selected films. Authors include: Chekhov, Bulgakov, Platonov, Solzhenitsyn, Rasputin,Petrushevskaya, and the Nobel laureate Svetlana Alexievich.
Area: Writing Intensive

AS.300.341. Transwar Japanese and Japanophone Literatures. 3 Credits.
A survey of Japanese and Japanese- language literatures produced in Japan and its (former)colonies during the "transwar" period, or the several years before and after the end of WWII. This periodization enables us to take into account the shifting boundaries, sovereignties, and identities amid the intensification of Japanese imperialism and in the aftermath of its eventual demise. We aim to pay particular attention to voices marginalized in this political watershed, such as those of Japanese-language writers from colonial Korea and Taiwan, intra-imperial migrants, and radical critics of Japan's "postwar" regime. Underlying our investigation is the question of whether literature can be an agent of justice when politics fails to deliver it. We will introduce secondary readings by Adorno, Arendt, Levinas, Derrida, and Scarry, among others, to help us interrogate this question. All readings are in English.

AS.300.343. The Cinema of Revolution. 3 Credits.
This course examines global political revolutions through cinema and the ways in which cinema helped to make political revolutions. Early cinema was intimately intertwined with the Russian revolution, and Russian revolutionary cinema had a profound impact on the ways in which media was used for revolutionary purposes through the 20th century and around the world. Students will be introduced to films from a number of different countries, and the history and context of their production and reception. They will also learn methods of film analysis and produce their own video essay.

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.366. Russian Avant-Garde Cinema. 3 Credits.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.410. China in Imagination. 3 Credits.
What is China? This question has gained new relevance amid the nation's recent rise as a global power. We survey how China was imagined, represented, and conceptualized in literature, film, and philosophical writings from mainland China, overseas Chinese communities, East Asia, and the West from the late nineteenth century to the present. Through exploring this complex history, we aim to understand China and the contemporary world in a diversified, historically self-reflective way. Topics of discussion include, but not limited to, representation, identity, form, allegory, exile, diaspora, modernism, translation, world history, and universality. All readings are in English; all films subtitled in English.

Earth & Planetary Sciences

AS.271.360. Climate Change: Science & Policy. 3 Credits.
Prereq: 270.103 or permission of instructor.This course will investigate the policy and scientific debate over global warming. It will review the current state of scientific knowledge about climate change, examine the potential impacts and implications of climate change, explore our options for responding to climate change, and discuss the present political debate over global warming.

AS.271.401. Environmental Ethics. 3 Credits.
Environmental Ethics is a philosophical discipline that examines the moral relationship between humans and the natural environment. For individuals and societies, it can help structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Beginning with a comprehensive analysis of their own values, students will explore complex ethical questions, philosophical paradigms and real-life case studies through readings, films and seminar discussions. Traditional ethical theories, including consequentialism, deontology, and virtue ethics will be examined and applied. Environmental moral worldviews, ranging from anthropocentric to ecocentric perspectives, will be critically evaluated. Organized debates will help students strengthen their ability to deconstruct and assess ethical arguments and to communicate viewpoints rooted in ethical principles. Students will apply ethical reasoning skills to an examination of contemporary environmental issues including, among others, biodiversity conservation, environmental justice, climate change, and overpopulation. Students will also develop, defend and apply their own personal environmental ethical framework. A basic understanding of modern environmental history and contemporary environmental issues is required. Prior experience with philosophy and ethics is not required.
Area: Writing Intensive

AS.271.402. Water, Energy, and Food. 3 Credits.
The water, energy and food (WEF) nexus is a topic of growing interest in the research and policy communities. This course will survey WEF concepts and principles, introduce tools of analysis, and engage students in case studies of critical WEF issues in the United States and internationally.

AS.271.403. Environmental Policymaking and Policy Analysis. 3 Credits.
This course provides students with a broad introduction to US environmental policymaking and policy analysis. Included are a historical perspective as well as an analysis of future policymaking strategies. Students examine the political and legal framework, become familiar with precedent-setting statutes such as NEPA, RCRA, and the Clean Air and Clean Water Acts, and study models for environmental policy analysis. Cost benefit studies, the limits of science in policymaking, and the impact of environmental policies on society are important aspects of this course. A comparison of national and international policymaking is designed to provide students with the proper perspective. This course is taught in conjunction with an identical graduate course. All students will be expected to perform at a graduate level.

East Asian Studies

AS.310.106. Introduction to Korean History and Culture. 3 Credits.
This course offers a comprehensive overview of Korean history and culture from ancient times to the modern era. Through primary, secondary, and audio-visual sources, students will become familiar not only with the overall contours of the entirety of Korean history, but also with its cultural and religious legacy. The course combines lectures and class discussions.

AS.310.107. Introduction to Korean Studies. 3 Credits.
This course offers a comprehensive overview of Korean history, politics, and culture encompassing premodern, modern, and contemporary times. Through primary and secondary materials, students will learn about the formation of Korea as a complex interplay of dynastic changes, wars, colonialism, rapid modernization, migrations, and minority and diasporic politics. We will approach the study of Korea through a cultural studies perspective, paying close attention to systems of power, ideology, gender, race, and class.

AS.310.110. Literatures and Films of Korea and the Korean Diaspora. 3 Credits.
This survey course introduces students to major events and themes addressed in Korean literature and film such as: Japanese colonialism, modernity, capitalism, the Korean War, rapid industrialization, postmodernity, immigration, transnational adoption, and more. Students will examine the role of literature and film in the development of the nation and the depiction of the Korean and Korean-diasporic subject as a complex set of intersecting social identities that contend with race, class, and gender.
Area: Writing Intensive

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

AS.310.230. Chinese Politics and Society. 3 Credits.
This introductory course will familiarize students with the major dynamics of political and social change in contemporary China since 1949. The course will be divided chronologically into four main topics: 1. The contested processes of nation-state making in modern China before 1949; 2. The making of the socialist system during the Mao Years and its dismantling since 1978; 3. The Reform Era transformation to a market economy with Chinese characteristics; 4. The dynamic relationships among the state, market and society since the new millennium. Students will explore how scholars have explained major political and social changes with reference to individual and collective rationalities, specific organizational and institutional arrangements, and specific strategic and cultural mechanisms of Chinese political and social habits.

AS.310.285. Chinese Leaders: Institutions and Agency. 3 Credits.
This course is a broad survey of what leadership looks like in China. The main through-line of the course is the how China's leaders navigate the often challenging terrain between constraints and incentives, on the one hand, and opportunities to apply their own individual agency. We will explore the state as the arena in which all this takes place over time (to explore continuity and change) and across space (to explore adaptation and innovation). The course does not presume prior knowledge of China or Chinese language, but students new to the study of China are encouraged to pay special attention to the cumulative nature of the course and invest in the readings, particularly in the first four weeks. Although some of the themes of this course may minimally overlap with/ reinforce other Chinese politics courses offered at JHU, the approach to this class will be significantly different.

AS.310.302. China, Human Rights, and U.S. Policy Responses. 3 Credits.
This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will “adopt” one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights. This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/ forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will “adopt” one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights.

AS.310.305. China, Southeast Asia, and U.S. National Security. 3 Credits.
The global political and security landscape of the 21st century will be shaped by the rivalry between two superpowers -- China and the U.S. For the foreseeable future, the geographic focus of that contest will be Southeast Asia and the surrounding maritime space, particularly the South China Sea. Southeast Asia is a complex, highly differentiated region of ten-plus nations, each with its own unique history and relationship with China. This course will introduce Southeast Asia as a key region -- geographically, economically, and strategically -- often overlooked by policymakers and scholars. It will also focus on the craft of national security strategy as the best tool for understanding the multi-sided competition, already well underway involving China, the U.S., and the Southeast Asian states.

AS.310.318. Eurasia's Transformation and the Global Implications. 3 Credits.
Eurasia, stretching from the Western Europe across Russia, Central Asia, and China to the Pacific, is by far the largest continent on earth, with a massive share of global population, economic output, and key natural resources. It has been traditionally Balkanized. Yet since the late 1970s, due to China's modernizations, the collapse of the Soviet Union, and a series of global geo-economic shocks, the nations of this Super Continent have become increasingly interactive, creating fluid new trans-regional political-economic patterns that remain remarkably unexplored. This course explores the critical junctures that made Eurasia the dynamic, growing colossus that it is becoming today, as well as the global implications, from a unique problem-oriented perspective. It looks first at the developmental and political challenges confronting China, Russia, and key European states as the Cold War waned, how the key nations coped, and how they might have evolved differently. It then considers the new challenges of the post-Cold War world, and how national and local leaders are responding today. Particular attention is given, in this problem—centric approach, to the challenges that growing Eurasian continental connectivity, epitomized in China's Belt and Road Initiative, are creating for US foreign policy and for the grand strategy of American allies in NATO, Japan, and Korea. Note: Some familiarity with Eurasian history and/or politics is recommended
Area: Writing Intensive

AS.310.320. Sociology of Urban China. 3 Credits.
Urban China has gone through two major social transformations since 1949: the embrace of a central planning socialist system between early 1950s and late 70s, and the embrace of neo-liberal market economy in the so-call "socialism with Chinese characteristics" since 1980. While the political regime remains the same over time, many profound changes have occurred in economic life, social life, cultural life, spiritual life and civil life. What really happened in the social transformation of urban China? What would explain those changes? How did people in different walk of life deal with those huge and deep social transformation? To address these concerns, we will exam a list of issues. Topics includes changes in population and demographic characteristics, employment structure and job market, workplace and residential communities, income and wealth distributions, segregation impacts of urban household registration systems, urban consumption patterns, courting cultures and dressing codes, spiritual practices, and social mobility and social stratifications. In the realm of public policies, we will pay special attentions to the issues of transportation, housing, medical service, public education, social insurance, and environmental protection. We will also study the characteristics of contentious politics and how social conflicts of power, interest, justice, cultural and belief were processed in urban China.

AS.310.322. Korean History Through Film and Literature. 3 Credits.
In this course, students will engage with select topics in Korean history from premodern and modern times and examine how the past has been represented through various forms of film and literature. This will be combined with readings of academic articles to allow students to gauge the distance between scholarship and cultural expressions of history. Through this, students will be introduced to the highly contested and often polarizing nature of Korean history and the competition surrounding historical memory. Prior coursework in East Asian Studies strongly recommended.
Area: Writing Intensive

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

AS.310.328. COVID-19 and Human Rights in Asia. 3 Credits.
This seminar explores the impact of the Covid-19 pandemic and government responses on a range of human rights in Asia, with a focus on the cases of China, Japan, Taiwan, India, South Korea, and Myanmar. In the first part of the course, we will investigate the fundamentals of the international human rights system, the foundational Universal Declaration of Human Rights and core human rights treaties, and the role of civil society in protecting, defending , and advancing human rights. We will then explore the United Nations' human rights-based guidance for Covid-19 response and prevention, the right to health, and approaches to the balancing of rights and duties, including freedom of movement, freedoms of association and assembly, individuals' right to health and duties to others, the right to education, rights to privacy, freedom of expression, right to information (and the problem of disinformation) and governments' emergency powers (and their limits) to protect public health. Inequities and discrimination exacerbated by the Covid-19 pandemic will also be discussed, as will the necessity for international cooperation to effectively battle Covid-19 and vaccine inequity.

AS.310.335. Theorizing Race and Mixed-Race in Asia and its Diasporas. 3 Credits.
This class will explore the construction of race and its applications in Asia and its diasporas. Using the notion of "mixed-race" as an analytic, we will examine how the colonial origins of race and the ensuing Cold War have influenced concepts of national identity and belonging. Employing an inter-sectional approach towards race, gender, and sexuality, the course will draw on a variety of media including memoirs, archives, and videos, to contemplate the locus of race and mixed-race and their importance within the larger nexus of identity formation in Asia and its diasporas.
Area: Writing Intensive

AS.310.340. Development and Social Change in Rural China. 3 Credits.
This course will survey the major issues of development and social change in rural China since 1950s. These issues will be addressed in chronological order. They include land ownership and land grabbing, organization of rural economic, political, and social life, rural elections and village governance, development strategies, urban-rural relationship in resource allocation, rural modernization strategies in regard to irrigation, clean drinking water, electricity supply, hard paved road, education and rural medical service, women's rights and family life, rural consumption, and etc. This course will prepare students, both empirically and analytically, to understand what happened in rural China from 1949 to the present, and how we can engage in policy and theoretical discussions based on what we learn.

Economics

AS.180.101. Elements of Macroeconomics. 3 Credits.
An introduction to the economic system and economic analysis, with emphasis on total national income and output, employment, the price level and inflation, money, the government budget, the national debt, and interest rates. The role of public policy. Applications of economic analysis to government and personal decisions. Prerequisite: basic facility with graphs and algebra.

AS.180.102. Elements of Microeconomics. 3 Credits.
An introduction to the economic system and economic analysis with emphasis on demand and supply, relative prices, the allocation of resources, and the distribution of goods and services, theory of consumer behavior, theory of the firm, and competition and monopoly, including the application of microeconomic analysis to contemporary problems.

AS.180.210. Migrating to Opportunity? Economic Evidence from East Asia, the U.S. and the EU. 3 Credits.
Increased mobility of people across national borders, whether by choice or by force, has become an integral part of the modern world. Using a comparative perspective and an applied economics approach, the course explores the economic and political determinants, and (likely) consequences of migration flows for East Asia, the US and the EU. Lectures, assignments and in class discussions, will be built around the following topics: i) migrants' self-selection; ii) human capital investment decision-making; iii) remittance decisions and effects; iv) impacts on labor markets of both receiving and sending countries; and v) the economic benefits from immigration. Overall, the course will give students perspective on the why people choose or feel compelled to leave their countries, how receiving countries respond to migrants' presence, and the key economic policy concerns that are influencing the shaping of immigration policy in East Asia, the US, and the EU.
AS.180.101 AND AS.180.102

AS.180.214. The Economic Experience of the BRIC Countries. 3 Credits.
In 2001, Jim O'Neill, the Chief Economist at Goldman Sachs, coined the acronym BRIC to identify the four large emerging economies, Brazil, Russia, India and China. These economies have since had an amazing run, and have emerged as the biggest and fastest growing emerging markets. In this course, we look at the economic experiences of the BRIC countries for the past 50 years. We discuss the reasons that have contributed to their exceptional growth rates, with particular emphasis on their transformation into market economies. We also analyze the challenges that these countries continue to face in their development process.
AS.180.101 AND AS.180.102

AS.180.217. Game Theory in Social Sciences. 3 Credits.
Game Theory is the study of multiple person decision problems in which the well-being of a decision maker depends not only on his own actions but also on those of others. Such problems arise frequently in economics, political science, business, military science and many other areas. In this course, we will learn how to model different social situations as games and how to use solution concepts to understand players' behavior. We will consider various examples from different fields and will play several games in class. The emphasis of the class is on the conceptual analysis and applications and we will keep the level of mathematical technicalities at the minimum -- high school algebra and one term of calculus will be sufficient. Students who took AS.180.117 are not eligible to take AS.180.217.
AS.180.102 or instructor permission;Students may not have previously taken AS.180.117.

AS.180.221. The Informal Economy: Who Wins, Who Loses, and Why We Care About It.. 3 Credits.
The informal economy is one of the most complex economic and political phenomena of our time. It exists in rich and poor countries alike, currently employs almost half of the world's workers, about 1.8 billion people, and totals to economic activity of around $10 trillion. If the informal economy were an independent nation, it would be the second-largest economy in the world, after the United States and before China. In today's globalizing environment, are informal economies a poverty trap or an engine of growth? Do they stimulate entrepreneurship and popular empowerment, or promote exploitation? How does an improved understanding of the size and organization of informal economies affect service provision, social policy or taxation? What are the implications of the informal economy for social cohesion and popular politics? The proposed course will address these (as well as other) questions related to the informal economy to offer students an understanding of such complex phenomenon from a variety of perspectives. The course will comprise three parts. Part 1 will explore the complexities of the informal economy, and the effects of informality on policies of inclusive growth. Part 2 will draw on empirical evidence and comparative case studies to examine informal economies in various regions, including Africa, East Asia, North and South America, and Europe, highlighting variations in activities, relations with the state, global integration and economic outcomes. Finally, Part 3 will discuss the ongoing economic policy shift from punitive measures to accepting informality as a virtual space through which citizens flow from job-seeker to compliant entrepreneurs.
AS.180.101 AND AS.180.102

AS.180.223. Economic Development in Sub-Saharan Africa. 3 Credits.
Many sub-Saharan African countries are among the least developed countries in the world. In this course, we explore the economic development experiences of African countries, with more focus on sub-Saharan Africa. The course starts with a historical perspective, delves into development strategies, and examines evidence on successes and failures of some case study countries. We conclude by analyzing the many challenges that these countries continue to face in their development process. Elements of Microeconomics and Macroeconomics are required prerequisites. There would be group presentations on assigned readings.
AS.180.101 AND AS.180.102

AS.180.228. Economic Development. 3 Credits.
A comprehensive survey of economic behavior by households, farms and firms in poor countries and the role of and for governments. Discussions include measurement of income levels, economy-wide equilibrium, sources of growth, agriculture and industry, international trade and investment, savings, population, fertility, education, health, income distribution and public finances. Applies economic theory rigorously to interpret and evaluate the economic experience of poor countries. Diagnostic test on Elements of Economics is required in the second week. Grading based on 3 exams and one paper.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.229. Economics of Health and Education in South Asia. 3 Credits.
Human capital is an important factor of economic growth in South Asian economies, along with physical capital and technology. Addressing health and education challenges has implications for improving a country's human capital formation and income growth. In this course, we look at past and present health and educational outcomes in South Asian Countries. We discuss the gaps in access to education and health care services, the quality of education and health care services as well as the impacts on the productivity of the labor force. We also empirically analyze the link between economic growth and human capital development. Furthermore, we focus on some challenges and future policy options for economies in South Asia.
AS.180.101 AND AS.180.102

AS.180.233. Economics of Transition and Institutional Change. 3 Credits.
This course will introduce students to the comparative analysis of institutions of existing capitalist systems and to the historical evolution of those institutions. By comparing the economic systems of different nations, we will try to reveal the institutional setups that either contribute or hinder economic performance. We will also examine the process of countries transforming their economies and investigate the factors that determine the differences in reforms' outcomes between countries.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.238. Rethinking Economics After the Great Recession. 3 Credits.
The financial crisis that began in the United States in 2007 threw virtually the entire world into recession. This class will look at the causes of the crisis and at how it unfolded. It will look into the conventional wisdom of economists, circa 2006, and why that wisdom proved to be so wrong. It will examine the financial innovations that contributed to the crisis, at the reasons financial regulators were blindsided, and at the reforms enacted after the crisis.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.241. International Trade. 3 Credits.
Theory of comparative advantage and the international division of labor: the determinants and pattern of trade, factor price equalization, factor mobility, gains from trade and distribution of income, and theory and practice or tariffs and other trade restrictions. Recommended Course Background: AS.180.101.
AS.180.101 AND AS.180.102

AS.180.242. International Monetary Economics. 3 Credits.
This course presents International Monetary Economics theory and applies it towards gaining an understanding of recent events and current policy issues. The theory presented in this course covers a broad range of topics including exchange rate determination, monetary and fiscal policy in an open economy, balance of payments crisis, the choice of exchange rate, and international debt. The insights provided by these theoretical frameworks will enable us to discuss topics such as the global financial crisis, global financial imbalances, the Chinese exchange rate regime, and proposed changes in the international financial architecture.
AS.180.101 AND AS.180.102

AS.180.246. Environmental Economics. 3 Credits.
This course presents a broad overview of the key issues in modern environmental economics with a focus on understanding and solving urban pollution challenges in developed and developing nations. This course explores how cities and nations can achieve the "win-win" of economic growth and reduced urban pollution. Special attention is paid to the incentives of households, firms and governments in reducing the production of pollution. The course examines a number of pollution challenges including; air, water, noise, garbage and the global challenge of climate change.

AS.180.261. Monetary Analysis. 3 Credits.
This course analyzes the financial and monetary system of the U.S. economy and the design and implementation of U.S. monetary policy. Among other topics, we will examine the role of banks in the economy, the term structure of interest rates, the stock market, the supply of money, the role of the Federal Reserve in the economy, the objectives of monetary policy in the United States and current monetary policy practice.
AS.180.101 AND AS.180.102

AS.180.266. Financial Markets and Institutions. 3 Credits.
Understanding design and functioning of financial markets and institutions, connecting theoretical foundations and real-world applications and cases. Basic principles of asymmetric information problems, management of risk. Money, bond, and equity markets; investment banking, security brokers, and venture capital firms; structure, competition, and regulation of commercial banks. Importance of electronic technology on financial systems.
AS.180.101 AND AS.180.102

AS.180.289. Economics Of Health. 3 Credits.
Application of economic concepts and analysis to the health services system. Review of empirical studies of demand for health services, behavior of providers, and relationship of health services to population health levels. Discussion of current policy issues relating to financing and resource allocation.
AS.180.102

AS.180.303. Topics in International Macroeconomics and Finance. 3 Credits.
The course will review selected topics in international macroeconomics and finance. The topics for the Fall of 2019 include: financial globalization; international portfolio diversification; capital account liberalization and the choice of the exchange rate regime in emerging markets; the global financial safety net; macroeconomic adjustment in the euro area.
AS.180.101 AND AS.180.102 AND AS.180.302

AS.180.338. Political Economy and Development. 3 Credits.
Good governance is associated with desirable outcomes across countries and societies: higher life satisfaction, greater income per capita, lower child mortality, longer life expectancy, less disease, etc. But these statistical associations in the data are not sufficient to establish either that good governance truly causes such societal outcomes, or what types of policies produce them. This course asks: What are the determinants of good governance? Is good governance "good" beyond its intrinsic desirability? If so, how? We use a data-driven approach, focusing on quantitative empirical methods and their applications to policy. The goal is to develop skills to be savvy consumers, as well as producers, of policy-relevant evidence related to issues of governance, in rich and poor countries alike. Topics will include: democracy, corruption, conflict, culture, mass media, quotas, and foreign aid.
(AS.180.301 OR AS.180.401) AND AS.180.334

AS.180.349. Economics of Race, Gender and Culture. 3 Credits.
This course will review popular causal analysis tools used in economics research and cover papers on race, gender, and culture that used the causal analysis tools.This course will ask you to use STATA to solve problem sets and exams. Exams will take place in a computer lab.Students must be familiar with undergraduate-level econometrics.
AS.180.101 AND AS.180.102 AND AS.180.301 AND AS.180.334

AS.180.351. Labor Economics. 3 Credits.
The course discusses various issues in labor markets from the perspective of economic theory. We first study the major forces at work that shape labor market behavior; firms' labor demand and workers' labor supply. Then we discuss the equilibrium behavior of employment and wages. Using these tools, we also cover various applied topics in labor economics, such as minimum wage regulations, male-female wage differentials, human capital investment, worker mobility, and unemployment.
AS.180.301 OR AS.180.401

AS.180.355. Economics of Poverty/Inequality. 3 Credits.
This course focuses on the economics of poverty and inequality. It covers the measurement of poverty and inequality, facts and trends over time, the causes of poverty and inequality with a focus on those related to earnings and the labor market, and public policy toward poverty and inequality, covering both taxation and government expenditure and programs. By the nature of the material, the course is fairly statistical and quantitative. Students should have an intermediate understanding of microeconomic concepts. Basic knowledge of regression analysis is also helpful.
Area: Writing Intensive
AS.180.301

AS.180.361. Rich Countries, Poor Countries. 3 Credits.
Why are some countries rich while some other countries poor? Why does a country's income per person generally grow over time? We try to analyze these questions using the theoretical and empirical growth literature. We will study seminal growth models, and also try to explain cross-country income differences in terms of factors like geography, institutions and global integration. Knowledge of regression analysis (including instrumental variables estimation) is required.
AS.180.302 AND (AS.180.334 OR AS.180.434)

AS.180.389. Social Policy Implications of Behavioral Economics. 3 Credits.
Economists increasingly incorporate insights from psychology into models of rational decision-making. Known as "behavioral economics", this line of research considers how, for example, emotions, rules-of-thumb, biased beliefs and time-inconsistent preferences influence how we make choices. Behavioral economics increasingly pervades policy discussions on topics as diverse as: obesity, the role of media, subprime mortgages and voting patterns. Behavioral models are certainly novel, but do they help us to design superior social policies? With the goal of preparing students to address this question, this course (1) provides a thorough overview of the main contributions of behavioral economics, highlighting departures from more traditional economic models and (2) emphasizes how behavioral economic models might (or might not) improve how we think about social policy.
AS.180.301 OR AS.180.401;AS.180.334 OR AS.180.434 can be taken concurrently.

AS.180.390. Health Economics & Developing Countries. 3 Credits.
Benefits of good health and its costs. Health demand and supply in poor countries. Welfare economics of Public Health. This is a writing seminar. There are some lectures on how to write a paper and on the substance of the economics of international health but the focus and only assignment is a 40-page paper by each student under the supervision of the instructor.
Area: Writing Intensive
AS.180.301 or AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

AS.180.391. Economics of China. 3 Credits.
Discussion of the economic experience of Post-War China, primarily emphasizing topics rather than historical narrative: agriculture, industry including corporate governance and public enterprises, international trade, population, migration, education, health, public finances among other topics. This course is writing intensive and the only assignment for the course is a 40 page paper on some aspect of the Chinese economy to be done under the close supervision of the instructor. The course is not primarily a lecture course, although there will be some lectures on how to do a paper and on the substance of the Chinese economic experience.
Area: Writing Intensive
AS.180.301 OR AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

First Year Seminars

AS.001.107. FYS: Thinking and Writing Across Cultures - East Asia and the West. 3 Credits.
In this First-Year Seminar, we will explore what it means to think and write across multiple cultures in the contemporary world. What do we gain and/or lose when we think and write crossing cultural boundaries? How do knowledge and experience of two or more cultures help us think and act critically, creatively, and ethically? What does plurality of cultures mean to universal discourses such as science and technology? How can cultural differences help or hamper our efforts to tackle global problems like climate change? These are some of the guiding questions that we will investigate together in this course by examining novels, essays, autobiographies, travelogues, philosophical writings, and films that engage with multiplicity of cultures between East Asia -- especially China, Japan, and Korea – and the West as well as within East Asia.

AS.001.127. FYS: Public Opinion and Democracy. 3 Credits.
How does public opinion shape electoral behavior and the contours of democracy in the United States, and how have these relationships changed as techniques for measuring public opinion have evolved since the early twentieth century? To consider this question, the course introduces alternative perspectives on the features of a healthy democracy, including both historical perspectives and current arguments. Interweaved with this material, the course examines how public opinion is measured and interpreted by private pollsters, survey researchers, and data journalists. Emphasis is placed on the alternative claims that opposing analysts adopt, as well as how the technologies of data collection and analysis shape the permissibility of conclusions. Students will learn to interpret public opinion patterns, which requires a brief presentation of basic concepts from survey sampling, including what to make of the polling industry's most boring concept: margin of error.

History

AS.100.102. The Medieval World. 3 Credits.
This course explores selected topics in the political, economic, social, and intellectual history of Western Europe in the wider world in the period between the fall of the Roman Empire and the fourteenth century. Special emphasis will be given to understanding the ways in which medieval society functioned as it reorganized itself after the almost total collapse of the ancient world. Topics include: religious plurality, sovereignty and subjecthood, flourishing of learning, chivalric culture, crusading, and the plague and its effects. We will follow the interplay between material and cultural forces in the processes of social organization.
Area: Writing Intensive

AS.100.103. Early Modern Europe & the Wider World. 3 Credits.
This course surveys the history of Europe and its interactions with Africa, the Americas, and Asia during the early modern period (c. 1400-1800). Topics include: the Renaissance, the Reformation, International Relations and Warfare, Colonialism, the Enlightenment, and the Age of Revolutions.

AS.100.104. Modern Europe and the Wider World. 3 Credits.
The Modern European World familiarizes students with key moments, ideas, communities, individuals, and movements which have formed European History since the Revolutionary era.

AS.100.108. Making America: Black Freedom Struggles to 1896. 3 Credits.
From slave revolts on the West African coast to national conventions and civil war, people of African descent have defined freedom and struggle in terms of kinship, diasporic connection, and fighting antiblack violence. This course explores the arc of that history and its role in the making of America.

AS.100.113. Making America: Race, Radicalism, and Reform. 3 Credits.
This course examines race and social movements in America from the Revolution to 1921.

AS.100.115. Modern Latin America. 3 Credits.
A class combining Latin American history since independence and digital humanities (revised with 2021 student feedback). Students will build guided research projects while thinking about questions of republicanism, freedom and unfreedom, migration, and development.

AS.100.122. Introduction to History of Africa (since 1880). 3 Credits.
An introduction to the African past since 1880.
Area: Writing Intensive

AS.100.123. Introduction to African History: Diversity, Mobility, Innovation. 3 Credits.
Introduction to three major themes in African history, from the precolonial era to the present.
Area: Writing Intensive

AS.100.128. Approaches to Jewish History. 3 Credits.
The course will provide an introduction to the study of Jewish History.

AS.100.129. Introduction to Modern Jewish History. 3 Credits.
Jewish history 1750-present in Europe, the Near East, the US, Israel; the challenges of modernity and new forms of Jewish life and conflict from Enlightenment and emancipation, Hasidism, Reform and Orthodox Judaism to capitalism and socialism; empire, nationalism and Zionism; the Holocaust. Extensive attention to US Jewry and State of Israel.

AS.100.154. Modern Mexico from the Alamo to El Chapo. 3 Credits.
In this course we will use popular depictions of Mexico's heroes and villains, tragedies and triumphs to delve into both the nation's history and the importance of thinking historically.

AS.100.165. Japan in the World. 3 Credits.
This course is an introduction to Japan's history from 1800 to the present with emphasis on the influences of an increasing global circulation of ideas and people. Topics include the emperor system, family and gender, imperialism, World War II, the postwar economy, and global J-pop.

AS.100.170. Chinese Cultural Revolution. 3 Credits.
The Cultural Revolution was Mao Zedong's last attempt to transform Chinese society spiritually and structurally. The events of this period were marked by social upheaval, personal vendettas, violence, massive youth movements, and extreme ideological pressure. This course will explore the Cultural Revolution from a variety of perspectives, focusing on the relationship between events in China from 1966-1976, and their interpretation in China and the West during the Cultural Revolution decade and since. (Previously offered as AS.100.219 and AS.100.236.)

AS.100.180. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography.

AS.100.216. Reformation and Counter Reformation Europe. 3 Credits.
This course explores the series of religious and political conflicts that make up what are known now as the Reformation and Counter-Reformation in Europe.

AS.100.233. History of Modern Germany. 3 Credits.
There is more to Germany than beer, BMWs, and Bayern Munich. We explore politics, culture, economics and society to understand Germany and its role within Europe and the world from the 18th century to the 'Refugee Crisis', climate change and EU politics today.

AS.100.241. American Revolution. 3 Credits.
This course provides an intensive introduction to the causes, character, and consequences of the American Revolution, the colonial rebellion that produced the first republic in the Americas, and set in motion an age of democratic revolutions in the Atlantic world. A remarkable epoch in world history, the revolutionary era was of momentous significance.
Area: Writing Intensive

AS.100.243. China: Neolithic to Song. 3 Credits.
This class offers a broad overview of changes in China from Neolithic times through the Song Dynasty (roughly from 5000 BCE through the 13th century CE) and will include discussion of art, material culture, and literature as well as politics and society. Close readings of primary sources in discussion sections and extensive use of visual material in lectures will help students gain firsthand perspective on the materials covered.

AS.100.248. Japan in the World. 3 Credits.
An introduction to Japan's history from 1700 to the present, with emphasis on the influences of an increasing global circulation of ideas, goods, and people in early modern and modern times. Topics include samurai, nation-building, gender, imperialism, World War II, the postwar economy, and contemporary popular culture.

AS.100.250. The American Revolution in Unexpected Places. 3 Credits.
This course considers the American Revolution from the perspective of locations beyond the thirteen rebelling colonies. Covering a range of global hotspots, the focus is on events from 1763 to 1788.

AS.100.251. West African History. 3 Credits.
This course explores the rich history of West Africa and its place in the broader world. Topics include the environmental history of the Sahara desert, West African empires, and the rise of Nollywood and contemporary culture.
Area: Writing Intensive

AS.100.268. Jewish and Christian mysticism in the Middle Ages and the Early Modern Period. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 12th and the 17th centuries.

AS.100.270. Europe since 1945. 3 Credits.
This class focuses on Europe from the end of World War II until today. We will discuss such topics as the Cold War, social democracy, the welfare state, the relationship to the US and the Soviet Union, decolonization, migration, 1989, European integration, neoliberalism, and the EU. We will discuss and analyze academic literature, movies, documentary films, textual and visual primary sources.

AS.100.273. A Comparative History of Jewish and Christian Mysticism. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 11th and the 19th centuries.

AS.100.282. Race & Power in Modern South Africa. 3 Credits.
Overview of modern South African history, with a focus on the origins of the racial state and the development of black liberation movements.

AS.100.283. Making and Unmaking Queer Histories, 1800-Present. 3 Credits.
Making and Unmaking Queer Histories introduces students to the major themes and historical developments which shape contemporary understandings of LGBTQ+-identified subjects and communities in the US and Western Europe.
Area: Writing Intensive

AS.100.303. Old Regime and Revolutionary France. 3 Credits.
Examines the history of France from the reign of Louis XIV to the French Revolution, focusing on early modern society, popular culture, absolutism, the Enlightenment, overseas empire, and the French and Haitian Revolutions.
Area: Writing Intensive

AS.100.305. Peter to Putin: Survey. 3 Credits.
Seminar on modern Russia. No midterm and no final. 6 short weekly journals, two short papers, and two small quizzes.
Area: Writing Intensive

AS.100.310. The French Revolution. 3 Credits.
Political, social and cultural history of a turning-point in European history that witnessed the birth and death of democracy.

AS.100.314. The Enlightenment. 3 Credits.
Examines the Enlightenment, an intellectual movement that swept Europe in the eighteenth century to shape the modern world. Topics include science and religion; print culture; gender and sociability; political economy; and race, slavery, and colonialism.
Area: Writing Intensive

AS.100.321. Political Thought and Social Transformation in the Haitian Revolution and Early Independent Mexico, c. 1789-1850. 3 Credits.
This course will examine both the Haitian Revolution and the early period of Mexican independence by engaging with the ideas of actors within these events in international contexts.
Area: Writing Intensive

AS.100.329. Russian Imagination in Three Revolutions. 3 Credits.
Russian Literature and the arts in Revolutions of 1905, 1917, and Stalin era to 1941. Req: 6 journals of 350 words, 2 papers 1250, 2 quizzes. No midterm or final.
Area: Writing Intensive

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.343. The Annales School. 3 Credits.
This is not a typical history course but one on historical theory and modern historiographical thought. How did historians in the past generations attempt to analyze the past? To what extent is history connected to other disciplines? What was the French contribution to contemporary historiography? What is "new history"? In this seminar, we are going to examine the scholarship of the French Annales, arguably the most influential and revolutionary “school” of historiography in the twentieth century. Students will read selected works of the Annales historians and discuss concepts such as economic history, serial history, longue durée, conjuncture, total history, mentalité, historical psychology, and historical anthropology.
Area: Writing Intensive

AS.100.346. Soviet-American Cold War. 3 Credits.
The focus will be on Soviet-American interactions, Cold-War Cultures, and the impact on both societies.
Area: Writing Intensive

AS.100.347. Early Modern China. 3 Credits.
The history of China from the 16th to the late 19th centuries.
Area: Writing Intensive

AS.100.348. 20th-Century China. 3 Credits.
Survey of the history of China from ca. 1895 to ca. 1976.
Area: Writing Intensive

AS.100.360. The Modern British World: Imperial Encounters, Regimes, and Resistance, from the American Revolution to the present. 3 Credits.
The Modern British World introduces some of the major events, themes, and controversies that led to Britain’s global dominance and ultimate decline as an imperial power. This course focuses on varying forms of imperial governance, the interrelationships between metropole and colony, and the formation of British and colonial national identities.
Area: Writing Intensive

AS.100.361. Age of Tolstoy. 3 Credits.
Tolstoy and his era, 1820s to 1910s. Topics include state and politics, empire, the Russian identity, and forms of cultural expression. Students consider "War and Peace" and other masterworks.
Area: Writing Intensive

AS.100.365. Culture & Society in the High Middle Ages. 3 Credits.
This course will cover the period commonly known as the High Middle Ages, that is, the civilization of Western Europe in the period roughly from 1050 to 1350. . It is a period of exceptional creativity in the history of Western Europe and in medieval history specifically, a time when many of the most characteristic institutions of Europe came into being.
Area: Writing Intensive

AS.100.369. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography from the 19th century to the present.

AS.100.371. Modernity, Catastrophe, and Power in Jewish History: 1881 to the Present. 3 Credits.
Jewish history, politics, and culture across a century of enormous transformations and transformative enormities in Europe, the US, and the Middle East. Topics include: impacts on Jewish life of World War I, the Russian Revolution, and the post-imperial reordering of the Eastern Europe and the Middle East; Zionism and other modes of Jewish contestatory politics; the consolidation of American Jewry; Nazism and the Holocaust in Europe; formation and development of the State of Israel; the global reordering of Jewish life amid cross-currents of the Cold War, conflict in the Middle East, and success in the US. Substantial attention to recent and contemporary history including the dramatic changes in Israeli society and polity over the past forty years and the ongoing Israeli-Palestinian conflict.
Area: Writing Intensive

AS.100.373. Crime, Punishment, Felony and Freedom: Law and Society in Pre-Modern England. 3 Credits.
Using legal texts as a window into English society, we will address the changing nature of royal power, trial by jury, treason, felony, and the freedoms enshrined in the Magna Carta.

AS.100.374. Conquest, Conversion, and Language Change in the Middle Ages. 3 Credits.
Examines case-studies of imperial conquests (Islamic, Mongol, reconquista, early colonialism) and attendant changes in religion (Christianization; Islamization) and in language (Arabization; transition from Latin to European vernaculars) across medieval Eurasia.

AS.100.379. Brazil History and Cultures: A Glance from Baltimore. 3 Credits.
Using textual and visual documents (including books from Peabody Library), we will examine the contrasts of Brazilian history and culture, and its connections with 19th and 20th century Baltimore.

AS.100.384. Intoxicated: Commodities & Globalization in the Early Modern World. 3 Credits.
Each week we examine a commodity that defined a new era of global connectivity in the centuries after 1492, including money, medicines, slaves, and fashion.

AS.100.386. The Cold War as Sports History. 3 Credits.
Sport is key to understanding the Cold War. We will investigate how the Cold War has shaped sports, the Olympic movement, the role of athletes at home and abroad, how sports were used in domestic and foreign policy, and how Cold War sports reinforce or challenge notions of race, gender, and class.
Area: Writing Intensive

AS.100.387. Everyday Life in the Medieval Middle East. 3 Credits.
Explores the daily lives of non-elites in the medieval Middle East—food; housing; clothes; marriage and divorce; urban festivals—through primary documents (e.g. letters, court records) and artifacts (e.g. clothing).Pre-requisite for enrollment: Students must have taken one history course.

AS.100.389. History of Law and Social Justice. 3 Credits.
Cause lawyering aims to change the status quo. This course examines histories of this approach to social justice, from battles against the slave trade to contemporary campaigns for marriage equality.

AS.100.394. Brazilian Paradoxes: Slavery, Race, and Inequality in Brazil (from a Portuguese Colony to the World's 8th Largest Economy). 3 Credits.
Place of contrasts, Brazil has a multi-ethnic cultural heritage challenged by social and racial inequalities. Its political life remains chaotic. We will examine these problems through Brazilian history and culture.

AS.100.395. History of Global Development. 3 Credits.
This course explores development as an ideology and a practice. From colonialism to the Cold War to contemporary NGOs, we will interrogate the history of our attempts to improve the world.
Area: Writing Intensive

AS.100.396. The Gender Binary and American Empire. 3 Credits.
This discussion-based seminar will explore some of the ways that the sex and gender binary was produced out of American statecraft in the late nineteenth and twentieth centuries. Particular attention will be paid to US imperialism, both domestically in its settler form, as well as in Hawaii, the Caribbean, and the Pacific. What happens to the study of the modern gender binary if it is treated as a transnational artefact of US imperialism's encounter with a multitude of cultures and nations?
Area: Writing Intensive

AS.100.404. John Locke. 3 Credits.
Seminar style course in which John Locke's major works will be read intensively, together with some of his contemporaries' works, and select scholarly interpretations.
Area: Writing Intensive

AS.100.408. Theorizing the Age of Enormity: Social Theory and the History of the 20th Century. 3 Credits.
We will read and analyze key works of social and critical theory produced in relation to 20th and 21st century problems of state and society, nationalism, empire, totalitarianism, genocide, capitalism, political order, gender, race, sexuality, secularism, religion, environmental catastrophe. Possible readings include Weber, Du Bois, Adorno, Arendt, Foucault, Balibar, Beckamong others.
Area: Writing Intensive

AS.100.409. Israel and Palestine from 1967 to the Present: a Current and Entangled History. 3 Credits.
Through intensive and extensive reading, we will explore contemporary Israeli society, politics, and culture, contemporary Palestinian society, politics, and culture under occupation, and the historical processes that have shaped both societies and their ongoing entanglement.

AS.100.413. London 1580-1830: The History of Britain's capital city. 3 Credits.
Seminar-style class analyzing the social, cultural, gender, religious, economic, and political history of London from Shakespeare's time through revolutions, plague, fire, and commercial, colonial, and industrial expansion.
Area: Writing Intensive

AS.100.415. The Holocaust in Jewish History and in Global Culture. 3 Credits.
Key works on the history of Nazi Germany's murder of European Jewry during the Second World War; Jewish responses; the recasting of Jewish and global thought in relation to this signal event; genocide and 'ethnic cleansing' since the Holocaust.
Area: Writing Intensive

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, "virgins" in paradise, the sexual slavery of Yazidi women…. This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

AS.100.422. Society & Social Change in 18th Century China. 3 Credits.
What did Chinese local society look like under the Qing Empire, and how did it change over the early modern era?

AS.100.423. Multiethnic Japan. 3 Credits.
An advanced undergraduate seminar on the intertwined histories of race, ethnicity, and empire in Japan and its former colonies from the early twentieth century to the present.

AS.100.424. Women & Modern Chinese History. 3 Credits.
This course examines the experience of Chinese women, and also how writers, scholars, and politicians (often male, sometimes foreign) have represented women's experiences for their own political and social agendas.
Area: Writing Intensive

AS.100.426. Popular Culture in Early Modern Europe. 3 Credits.
Witchcraft, magic, carnivals, riots, folk tales, gender roles; fertility cults and violence especially in Britain, Germany, France, and Italy.
Area: Writing Intensive

AS.100.430. Gender and Sexuality in African History. 3 Credits.
An upper-level history reading seminar with a focus on histories of gender and sexuality in colonial and postcolonial Africa.

AS.100.438. The City Victorious: Medieval Cairo. 3 Credits.
What was medieval Cairo like? Students explore urban life in this imperial capital (969-1517), including food and market habits; relations between Jews, Christians, and Muslims; patronage; plague, drought, and famine.Pre-requisite for enrollment: Students must have taken two history courses.

AS.100.442. The Intellectual History of Capitalism, 1900 to present. 3 Credits.
This course examines shifting understandings of the philosophical foundations, political implications, and social effects of the market economy since the early twentieth century.
Area: Writing Intensive

AS.100.444. Migrants and Refugees in Africa. 3 Credits.
A history of forced and voluntary migration and displacement in Africa, its causes and consequences, with a focus on refugees and labor migrants since 1960.

AS.100.445. Revolution, Anti-Slavery, and Empire 1773-1792: British and American Political Thought from Paine, Smith, and the Declaration of Independence to Cugoano, Wollstonecraft, and the Bill of Rights. 3 Credits.
This seminar-style course will focus on discussing British and American political thought from the "Age of Revolutions", a period also of many critiques of Empire and of many works of Antislavery. Readings include Paine's Common Sense and Rights of Man, the Declaration of Rights, the Constitution and Bill of Rights, the Federalist Papers; works by Smith, Burke, and Wollstonecraft; and antislavery works by Cugoano, Equiano, Rush, Wesley, and Wilberforce.
Area: Writing Intensive

AS.100.478. Japan from its Peripheries. 3 Credits.
An advanced undergraduate seminar on the history of modern Japan from the perspective of regions and people often considered as belonging to its geographical, cultural, social, and political peripheries.
Area: Writing Intensive

AS.100.482. Historiography of Modern China. 3 Credits.
Study of Western, Chinese, and Japanese understandings of the history of China, emphasizing their implications for cultural understanding and for policy.

AS.100.497. 1968: Rebels, Revolutions & the Right-Wing Backlash. 3 Credits.
The sixties were a polarizing decade of unrest, revolutions, and fundamental change across Europe and the US. We will discuss 1968 through the lens of national case studies, the Cold War, and the history of Baltimore. This is a community-engaged class!
Area: Writing Intensive

History of Art

AS.010.212. Mirror Mirror: Reflections in Art from Van Eyck to Velázquez. 3 Credits.
Explores the different ways Early Modern painters and printmakers incorporated mirrors and optical reflections into their works for the sake of illusion and metaphor, deception and desire, reflexivity and truth-telling. Connecting sense perception and ethical knowledge, embedded mirror images often made claims about the nature of the self, the powers of art, and the superiority of painting in particular.

AS.010.320. Art of Colonial Peru. 3 Credits.
Viewed within the dynamic historical context of colonial society, we consider the pictorial, sculptural, and architectural programs that ensued in viceregal Peru (1532-1825). We examine the role of religious orders, art schools, artisan guilds and cofradía, and consider the social and political implications of art patronage.

AS.010.329. Building an Empire: Architecture of the Ottoman Capitals, c. 1300–1600. 3 Credits.
Centered on modern-day Turkey and encompassing vast territories in Asia, Africa, and Europe, the Ottoman Empire (1299 – 1923) was the longest lived and among the most powerful Islamic states in history, with an artistic tradition to match. This course explores the functional and symbolic role that architecture played during the empire's formative centuries, when three successive capital — Bursa, Edirne, and Istanbul — served to visualize the sultans' growing claims to universal authority. With reference to mosques, palaces, tombs, and other categories of architecture, the course will examine the buildings in their artistic, social, and political contexts. Themes to be addressed include patronage and audience, architectural practice and the building trade, ceremonial and ritual, topography and urban planning, and the relationship of Ottoman architecture to other traditions.

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.400. Research Lab: The Dutch Americas. 3 Credits.
The Dutch East India Company, or VOC, is historically and art historically well documented and firmly understood. But the Dutch also had significant holdings to the west via the Dutch West India Company, or WIC. They operated and held outposts in the present-day United States (New York/New Amsterdam), Caribbean (Surinam, Curaçao, Bonaire), Latin America (Brazil), and West Africa. Despite the abundance of materials associated with the WIC from this wide geography, these have been scarcely assessed by art historians, and a defined and comprehensive corpus has never been assembled. This class will act as a research lab in which to do so. In research teams, students will map artworks and objects created from that broad, transnational cultural ambit—categories that might include maps, landscape paintings, still life paintings featuring American flora and fauna, botanical illustrations, plantation architecture, luxury objects made from precious raw materials gathered in the Americas, the urban environment of slavery—and develop individual research questions around them.The class will run with a partner lab in the form of a course led by Professor Stephanie Porras at Tulane University. The course will feature speakers; and there is potential for funded travel to conduct research. We will start at the ground level; no previous knowledge about the field is required. Students from all disciplines are welcome.
Area: Writing Intensive

AS.010.410. The Epistemology of Photography. 3 Credits.
This seminar will ask how photography produces ways of knowing: how does photography's reality-effect shape its dissemination and absorption? Is photography's emergence during the colonial era coincidental or catalytic? How is memory (re)constituted in a photography-saturated world? What kinds of histories does photography encourage and discourage? Is a photograph an object? We will read across disciplines (literature, anthropology, history, history of art, political science, theory) to investigate the epistemology of photography and the photograph.
Area: Writing Intensive

History of Science, Medicine, and Technology

AS.140.227. Race, Racism and Medicine. 3 Credits.
How can we think about the interconnections between racism, theories of race and the practice of medicine? Living at a moment when racial disparities in health outcomes in the United States are still very stark, this course will provide a historically grounded approach to thinking about the roles that race and racism have played in healthcare, the production of health disparities as well as the role of medicine in the development of racist thought. While much of this course will focus geographically within the United States, this class will also explore global histories of medicine, encountering questions of race and medicine in Africa, the South Pacific and Asia. In addition to the analysis of primary source documents and historical texts, students will also be introduced to theoretical approaches to the study of race and racism from W.E.B. Dubois, Sylvia Wynter, Frantz Fanon and others.
Area: Writing Intensive

AS.140.228. Epidemic!: Diseases that Shaped our World. 3 Credits.
In this course, we will look at a number of key epidemic diseases in the pre-modern and modern world, from Black Death to COVID-19, and investigate how it affected medical thought and practice, as well as political, social and economic lives. We will pay special attention to how these diseases spread and how they affected and were influenced by questions of race, gender, sexuality and colonialism.

AS.140.231. Health & Society in Latin America & the Caribbean. 3 Credits.
Medical practice is complex in Latin America and the Caribbean. Most countries in the region have universal healthcare; yet, the quality of clinical services varies widely, and is influenced by degrees of incorporation into—or marginalization from—social power structures. Many people take their health into their own hands by supplementing biomedicine with plant based remedies as well as religious and spiritual services. This course will interrogate the history and contemporary relevance of healthcare in Latin America and the Caribbean, with particular interest in how medicine intersects with colonialism, slavery, capitalism, neo-colonialism, grassroots revolutionary movements, the Cold War, and neoliberalism. Drawing on films, visual and performance art, and music, students will consider the ways in which race, gender, indigeneity, ability, class, and nation have affected people's experiences with medical practice. Informed by postcolonial and decolonial scholarship, we will also examine why Latin America and the Caribbean have become "laboratories" for the production of medical knowledge, and importantly, how that knowledge was created by indigenous, enslaved, and migrant people as well as professionals. Finally, we seek to understand individual health problems in relation to the social and political determinants of health. As such, the course prompts students to reflect on why healthcare professionals—in the United States and abroad—would benefit from historically-informed communication with patients and their communities. This is a discussion-based seminar that requires active participation. There are no exams. The course does not assume any previous knowledge of the history of medicine or Latin American history.
Area: Writing Intensive

AS.140.245. Biology and Society in Asia. 3 Credits.
What major knowledge traditions about life's generation and function have taken shape in Asia that continue to shape our contemporary world? How have they fared in encounters with Western knowledge traditions? How have modern biology, biotechnology and biomedicine developed in Asia in recent years within distinct geopolitical contexts? This course addresses these questions with selected historical cases from China, India, Japan, Koreas and selected Southeast Asian countries. It first introduces concepts and frameworks of major non-Western knowledge systems about life such as yin-yang and five phases and examine how religions, politics, and cross-cultural encounters impacted these systems, their evolutions or replacements. Then the class will examine the political, material, cultural and institutional contexts of more recent development in the life sciences in Asia. Class activities include lectures, discussions, research seminars, a final research project, and possible conversations with visiting professors and field trips.

AS.140.312. The Politics of Science in America. 3 Credits.
This course examines the relations of the scientific and technical enterprise and government in the United States in the 20th and 21st centuries. Topics will include the funding of research and development, public health, national defense, etc. Case studies will include the 1918 Spanish influenza epidemic, the Depression-era Science Advisory Board, the founding of the National Science Foundation and the National Institutes of Health, the institution of the President's Science Advisor, the failure of the Superconducting Supercollider, the Hubble Space Telescope, the covid pandemic, etc.

AS.140.317. The Hydrologic Sphere: Histories of Water in the Colonial and Postcolonial World. 3 Credits.
Water supplies are becoming scarcer globally due to climate change. We use clean water—fresh and salt—in a variety of ways that provide comfort, stability, and health, making it one of the most valuable commodities on Earth. While countries in the Global North are beginning to see more frequent and lengthier droughts, those in the Latin America, Africa, and South Asia have long struggled over how to distribute and use their clean water supplies. This class will examine how colonialism and its far-reaching effects have created an environment of scarce water supplies in many areas of the world. Water access is difficult to achieve, but for much of the Global South, the colonial period helped craft the problems we see today. This class will ask what colonial and postcolonial technologies' construction and use teach us about equitable clean water distribution, how social and cultural identities influence water supplies and use, and why water has been such an important element—and commodity—in our world, especially where Europeans settled and oppressed local populations.
Area: Writing Intensive

AS.140.398. Godzilla and Fukushima: Japanese Environment in History and Films. 3 Credits.
Japan is often described as "nature-loving," and is considered to be one of world leaders in environmental protection policies. Yet current environmental successes come on the heels of numerous environmental disasters that plagued Japan in the past centuries. Juxtaposing Japanese environmental history and its reflection in popular media, the course will explore the intersection between technology, environment, and culture.
Area: Writing Intensive

AS.140.423. Science and Science Fiction in Global Perspective. 3 Credits.
What can we learn from science fiction about the history of science and technology? What ideas about science do Sci-Fi novels manifest? Is the relationship between science and science fiction always the same, across different time periods and geographical areas? This course will explore these questions by taking a comparative perspective. Each meeting we will read a Sci-Fi novel from Europe, America, South and East Asia, and discuss it in conjunction with historical writing about relevant scientific developments. Reading Sci-Fi novels from 17th-century Germany, 19th-century England and India, and 20th-century Japan, China, Korea and the US, the students will explore how actual scientific developments were reflected in fiction, and what fictional depictions say about the aspirations and anxieties provoked by new technologies.
Area: Writing Intensive

Interdepartmental

AS.360.247. Introduction to Social Policy and Inequality: Baltimore and Beyond. 3 Credits.
This course will introduce students to basic concepts in economics, political science and sociology relevant to the study of social problems and the programs designed to remedy them. It will address the many inequalities in access to education and health care, unequal treatment in the criminal justice system, disparities in income and wealth, and differential access to political power. The focus will be on designing effective policies at the national and local level to address these pressing issues. This course is open to all students, but will be required for the new Social Policy Minor. The course is also recommended for students who are interested in law school, medical school, programs in public health, and graduate school in related social science fields. This course does not count as one of the required courses for the Economics major or minor, but it is required for the Social Policy Minor. Cross list with Sociology, Economics and Political Science. Freshman, Sophomore and Juniors only.
Area: Writing Intensive

AS.360.420. Humanities Research Lab: Making Maps of Mexico. 3 Credits.
Learn the basics of ArcGIS and data management as you help Prof. Lurtz publish an agricultural dataset and maps from 10 years before Mexico erupted in revolution. No experience necessary.

Islamic Studies

AS.194.102. Islamic Pasts in the Contemporary World. 3 Credits.
This course will focus on the intellectual and cultural legacies of "Islamic pasts." It has been argued by scholars that Islam is not only a religion but a "civilization" with identifiable sensibilities, overlapping histories, and temporalities. This civilization once spread from the Atlantic coast of Africa to the Indian subcontinent and beyond, but regimes and dynasties have changed hands in many of these places, while remaining in place in others. What remains of Islamic pasts in places where Islam once reigned supreme but has either vanished, been reduced to minority status, or repressed in ongoing political projects? This course examines lost Islamic pasts in the contemporary world, using readings from anthropology, history, literature, and poetry. As the basis of this course, we will read four texts in their entirety focusing on four different geographic points of interest—Spain, India, the Balkans, and Palestine.

AS.194.105. Islam and its Cultural and Religious Diversity, 600-1600. 3 Credits.
While media often present Islam as a fairly univocal and compact cultural and religious system, news reports about tensions, hostility and at times open conflict within the Islamic world itself are frequent. Unity and internal diversity characterize Islam nowadays and have historical roots that have deeply shaped Islam since its very inception.This course will explore the historical origins of the dynamics of unity and diversity in Islam from the predication of Muhammad and the expansion of the first caliphate, to the formation of the Ottoman, Safavid and Mughal empires. By focusing on the historical events and the cultural production of the first millennium of Islam, this course will offer a thorough historical introduction to its cultural and religious complexity.

AS.194.201. Jews, Muslims, and Christians in the Medieval World. 3 Credits.
The three most widespread monotheisms have much more in common than is generally portrayed: a common founding figure, a partly shared succession of prophets, closely comparable ethical concerns and religious practices, a history of coexistence and of cultural, religious, social and economic interaction. This course will focus on a number of key texts and historical events that have shaped the relationships between Jews, Muslims, and Christians during the Middle Ages and contributed to their reciprocal construction of the image of the “other.” The geographical center of the course will be the Mediterranean and the Near and Middle East, a true cradle of civilizations, religions, and exchange.

AS.194.202. Never Forget: Muslims, Islamophobia, and Dissent after 9/11. 3 Credits.
In partnership with the social justice organization Justice for Muslims Collective, this community-engaged course and oral history project will explore how diverse Muslim communities navigated and contested belonging and political and cultural agency amidst state-sponsored violence and national debates on race, gender, citizenship and national security after 9/11 and during the ongoing War on Terror. Through history, ethnography, first-person narratives, film, fiction, and online resources, students will learn about the impact of 9/11 on American Muslim communities. This includes cultural and political resistance to imperialism, racism, and Islamophobia as well as to intersectional inequities within Muslim communities that were intensified in the context of Islamophobia. Students will learn about community activism and organizing from JMC, and complete a participatory action research project with the organization. This project is an oral history archive that will address gaps in the documentation of movement histories when it comes to early organizing against War on Terror policies by Muslim communities and communities racialized or perceived as Muslim. Students will be trained to record stories of resistance among leaders who organized and responded at the local and national-level in the Greater Washington region, to support the building of an archive that will shape a wide variety of future organizing and advocacy efforts.

AS.194.205. Islamic Mysticism: Traditions, Legacies, Politics. 3 Credits.
For over a thousand years, the Sufi tradition has been a dynamic force in Islamic social, political and spiritual life. The tradition offers a treasure trove of devotional literature and music, philosophical treatises, contemplative practices, and institutions of social and political organization. After unpacking the politics of the term “Sufi,” we will trace the historical development of the tradition from the early ascetics in Iraq and Syria to the age of trans-national Sufi orders, with case studies from South Asia, Turkey, and the United States. We will then move into some of the key constructs of the tradition of spiritual growth and character formation: the divine-human relationship, the stages of the spiritual path, contemplative and practical disciplines, ideas of sainthood, discipleship and ethical perfection, and the psychology of love. Throughout the class, we will explore the nature of experiential language and interrogate the tradition through the lens of gender. We will also experience Sufism through ritual and music.

AS.194.210. Race, Gender, Citizenship: Being Muslim in America. 3 Credits.
This course explores how American Muslims navigate and contest complex notions of belonging in the context of national conversations on race, gender, citizenship, and national security. With a focus on specific case studies that range from Black Muslim movements of the early twentieth century to the ongoing War on Terror, the course adds complexity to the public conversation on what it means to be Muslim - and what it means to be American. We will draw on history, ethnography, first-person narratives, films, blogs, documentaries and fiction. As a Community Engaged course, the class will include site visits and learning with and from Muslim communities in Baltimore.

AS.194.220. The Qur’an: Text and Context. 3 Credits.
For 1400 years, the Qur’an has played a central role in Muslim intellectual, spiritual, artistic and ritual life. This course will explore the sacred scripture of Islam through its foundational ideas, history of the text and thematic development, literary style, history and methods of interpretation, and role in Muslim spiritual and ritual life. We will also explore how the Qur’an weaves through literature, music and the visual arts.

AS.194.230. African-Americans and the Development of Islam in America. 3 Credits.
Muslims have been a part of the American fabric since its inception. A key thread in that fabric has been the experiences of enslaved Africans and their descendants, some of whom were Muslims, and who not only added to the dynamism of the American environment, but eventually helped shape American culture, religion, and politics. The history of Islam in America is intertwined with the creation and evolution of African American identity. Contemporary Islam in America cannot be understood without this framing. This course will provide a historical lens for understanding Islam, not as an external faith to the country, but as an internal development of American religion. This course will explicate the history of early Islamic movements in the United States and the subsequent experiences of African-Americans who converted to Islam during the first half of the twentieth century. We will cover the spiritual growth of African American Muslims, their institutional presence, and their enduring impact on American culture writ large and African-American religion and culture more specifically.

AS.194.305. Cultures of Pilgrimage in Islam. 3 Credits.
The hajj pilgrimage to Mecca is one of the pillars of Islam. But Muslims around the world also take part in many other pilgrimages, from the massive annual Shi'a pilgrimage to Karbala to the smaller ziyarat "visits" to Sufi saint shrines, to travel to centers of Islamic learning, to pilgrimage to isolated natural features like mountains, trees, valleys. What are the theologies that propel the act of travel in Islam? How are cities, architectures, economies shaped by these cultures? And how are these traditions affected by the wars and colonial projects that plague many Muslim-majority countries in the contemporary world? Readings in this course will draw from anthropology, philosophy, Islamic interpretive texts (tafsir), and travelogues.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.222. Italian Cinema: The classics, the Forgotten and the Emergent.. 3 Credits.
This course traces the history of Italian cinema from the silent era to the new millennium, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall examine iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, that received international recognition and influenced other national, cinematic productions. We shall also look at the work of less famous, or independent filmmakers who received less critical attention. While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to the mise-en-scène, frame composition, camera movements, editing, and sound. This class is taught in English.

AS.211.224. Made in Italy: Italian style in context. 3 Credits.
Italy and the "Italian style" have become synonym of exquisite taste, class, and elegance thanks to the quality of Italian craftsmanship. This course will explore some of the major factors that contributed to the rise of Italian fashion and Italian industrial design as iconic all around the world. The classes will focus on the main protagonists and art movements that influenced the development of Italian style. We will analyze trends, clothing, and style not only in a historical context, but also through a critical apparatus that will include themes related to gender, culture, power, and politics.The course is taught in English. No knowledge of Italian is required, but those who can read in Italian will have an opportunity to do so. Everyone will learn some Italian words and expressions.

AS.211.231. Planet Amazonia: Culture, History, and the Environment. 3 Credits.
Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We'll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a "virgin paradise" or a "green hell"; scientific studies and artists' depictions of the region's flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world's largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine?

AS.211.265. Panorama of German Thought. 3 Credits.
This course introduces students to major figures and trends in German literature and thought from the sixteenth to the twentieth century. We will pay particular attention to the evolution of German political thought from the Protestant Reformation to the foundation of the German Federal Republic after WWII. How did the Protestant Reformation affect the understanding of the state, rights, civic institutions, and temporal authority in Germany? How did German Enlightenment thinkers conceive of ethics and politics or morality and rights? How do German writers define the nation, community, and the people or das Volk? What is the link between romanticism and nationalism? To what degree is political economy, as developed by Marx, a critical response to romanticism? How did German thinkers conceive of power and force in the wake of World Wars I and II? What are the ties that bind as well as divide a community in this tradition? We will consider these and related questions in this course through careful readings of selected works.
Area: Writing Intensive

AS.211.300. Niccolò Machiavelli's "The Prince": Understanding the Meaning and Legacy of a Masterpiece. 3 Credits.
Who was Niccolò Machiavelli? We often hear the term "Machiavellian" in reference to actors in business or politics, but what does it really mean? What does Machiavelli teach us about the nature and the dynamics of political power? Can Machiavelli's thought offer insights into today's politics and fast-changing world? The course aims to answer these questions by addressing three topics. First, we will study Machiavelli's life and times, particularly the events connected to his production and the context in which he wrote his main writings. We will see how the fifteenth-century Florentine humanism and the massive political changes affecting early modern Europe shaped Machiavelli's mindset. Second, we will familiarize ourselves with Machiavelli's thought by reading The Prince and excerpts from Discourses on Livy. Third, we will get acquainted with some of the main trends in the reception of Machiavelli in the 20th and 21st centuries. Special attention will be paid to interpretations of Machiavelli by Antonio Gramsci, Leo Strauss, Isaiah Berlin, John Greville Agard Pocock, Quentin Skinner, and John P. McCormick. We will also pay attention to modern television programs and films that show the width and depth of Machiavelli's legacy.

AS.211.316. Brazilian Cinema and Topics in Contemporary Brazilian Society. 3 Credits.
Course is taught in ENGLISH - This course is an introduction to the academic study of cinema as a communicative art and to Brazilian film. The films selected focuses on films from the late 1950s to the present and highlight import episodes and challenges in the advancement of the Brazilian society as well as its cinematic production with a special view to the film aesthetics through analysis from a number of critical perspectives, including class, race, gender as well as ethnicity, nationalism or national identity, colonialism, social changes, and the politics of representation. In this sense, the films and documentaries that we will be watching and studying encompass the period from the rise of New Cinema (Cinema Novo) up to films exploring the most recent trends, including movies launched up to 2016. Students wishing to do the course work in English, for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory / Unsatisfactory basis.
Area: Writing Intensive

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.
Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an eco-critical approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni's Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone's Gomorrah (2008), Alice Rohrwacher's Happy as Lazzaro (2018), and many others.

AS.211.328. Berlin Between the Wars: Literature, Art, Music, Film. 3 Credits.
Explore the diverse culture of Berlin during the heyday of modernism. During the Weimar Republic, Berlin became a center for theater, visual arts, film, music, and literature that would have an outsize impact on culture throughout the world and the twentieth century. The thinkers, artists, and writers drawn to interwar Berlin produced a body of work that encapsulates many of the issues of the period: the effect of the modern city on society; "the New Woman"; socialist revolutionary politics; the rise of the Nazis; and economic turmoil. While learning about interwar Berlin's cultural diversity, we will take a special look at works by Jewish writers and artists that engage with the question of ethnic, religious, and national identity in the modern world, specifically in the context of Berlin's rich Jewish history and the rise of anti-Semitism in the interwar period. All readings will be in translation.

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

AS.211.333. Representing the Holocaust. 3 Credits.
How has the Holocaust been represented in literature and film? Are there special challenges posed by genocide to the traditions of visual and literary representation? Where does the Holocaust fit in to the array of concerns that the visual arts and literature express? And where do art and literature fit in to the commemoration of communal tragedy and the working through of individual trauma entailed by thinking about and representing the Holocaust? These questions will guide our consideration of a range of texts — nonfiction, novels, poetry — in Yiddish, German, English, French and other languages (including works by Primo Levi and Isaac Bashevis Singer), as well as films from French documentaries to Hollywood blockbusters (including films by Alain Resnais, Claude Lanzmann, and Steven Spielberg). All readings in English.
Cannot be taken by anyone who previously took AS.213.361

AS.211.349. JHU Bologna Program: Food for Thought: Gastronomy, Politics & Identity. 3 Credits.
Italian Culture course offered on the JHU Summer Program in Bologna. Permission required. Must be taken for a letter grade. Open to students admitted to the JHU Summer Program in Bologna only.

AS.211.361. Narratives of Dissent in Israeli Society and Culture. 3 Credits.
In this course we will study and analyze the notion of dissent in Israeli society and culture on its various literary and artistic forms. We will examine the emergence and the formation of various political and social protest movements, such as the Israeli Black Panthers, Israeli feminism and the 2011 Social Justice protest. We will discuss at length the history and the nature of dissent in the military and in relation to Israeli wars and will track changes in these relation. Significant portion of the course will be dedicated to the literary, cinematic and artistic aspects of Israeli protest and their influence on Israeli discourse. We will explore the nature and role of specific genres and media such as the Israeli satire, Israeli television, newspaper op-ed and the recent emergence of social media. Students wishing to work in English exclusively for 3 credits should enroll in section one. Students who are fluent in Hebrew and are wishing to attend an additional hour-long Hebrew discussion session per week with Professor Cohen (time TBD in consultation with enrolled students) for 4 credits should enroll in section 2.

AS.211.386. Italian Cinema. 3 Credits.
Italian Cinema: The Classics, The Forgotten, The Emergent. This course traces the history of Italian cinema from the silent era to the contemporary period, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall discuss iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, (the classics) that received international recognition and had a global impact on film history, and also rare archival films by pioneer women filmmakers from the silent era (the forgotten). Finally, we'll discuss films released in the last decade (the emergent) that address issues such as migration and the ecological crisis. (Zoom Q&As with filmmakers will be part of curriculum). While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to frame composition, camera movements, editing, and sound. This is an intensive writing class taught in English.
Area: Writing Intensive

AS.211.394. Brazilian Culture & Civilization. 3 Credits.
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor's permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

AS.211.423. Black Italy. 3 Credits.
Over the last three decades Italy, historically a country of emigrants—many of whom suffered from discrimination in the societies they joined—became a destination for hundreds of thousands of migrants and refugees from various countries, and particularly from Africa. Significant numbers of these immigrants came to Italy as a result of the country's limited, though violent colonial history; others arrive because Italy is the closest entry-point to Europe. How have these migratory flows challenged Italian society's sense of itself? How have they transformed the notion of Italian national identity? In recent years, growing numbers of Afro- and Afro-descendant writers, filmmakers, artists and Black activists are responding through their work to pervasive xenophobia and racism while challenging Italy's self-representation as a 'White' country. How are they forcing it to broaden the idea of 'Italianess'? How do their counternarratives compel Italy to confront its ignored colonial past? And, in what way have Black youth in Italy embraced the #Blacklivesmatter movement? This multimedia course examines representation of blackness and racialized otherness, whiteness, and national identity through literary, film, and visual archival material in an intersectional framework. Examining Italy's internal, 'Southern question,' retracing Italy's colonial history, and recognizing the experiences of Italians of immigrant origins and those of immigrants themselves, we'll explore compelling works by writers and filmmakers such as Igiaba Scego, Gagriella Ghermandi, Maza Megniste, Dagmawi Yimer, and others.

AS.211.424. Climate Change Narratives: Human and Non-Human Transformative Storytelling. 3 Credits.
In The Great Derangement Indian novelist Amitav Ghosh writes that "the climate crisis is also a crisis of culture, and thus of imagination." Worldwide, climate and environmental change is stirring the imaginary of novelists, filmmakers, and artists who are finding ways to frame, emplot, or even perform, an unmanageable phenomenon like climate change. How is climate change shaping new modes of storytelling and aesthetics? How do film, literature, and environmentally conscious art transform our perception of the world we inhabit and its unpredictable changes? Can climate change narratives help us to imagine futures of possibilities, maybe dystopian, uncertain, or even happy, but futures nonetheless? This multimedia course explores, through a transnational perspective, a variety of contemporary novels, films, and other media that attempt answer these questions.

AS.211.478. Power and Resistance in French Political Thought. 3 Credits.
Today France is a multicultural, multi-ethnic society fractured by the memories of colonialism. Throughout the country's history, French thinkers – classical and contemporary – have questioned the foundations of power and focused critically not only on the claims of authority issuing from the top, but also on the compliance of the governed. What it is, they ask, that makes people stick together and recognize each other as citizens of one country? Is there such a thing as a shared history, and is Fraternité something more than a slogan? Works by La Boétie, Montaigne, Diderot, Robespierre, Tocqueville, Gobineau, Camus, Sartre, Memmi, Foucault and others.
Students may not have previously completed AS.212.341.

AS.212.353. La France Contemporaine. 3 Credits.
Students will explore contemporary French society and culture through a wide variety of media: fiction and non-fiction readings (graphic novels, news periodicals, popular magazines), films, music, art, websites, and podcasts. A diverse range of hands-on activities in addition to guided readings will help students develop cultural awareness as we discuss topics such as education, politics, humor, sports, cuisine, immigration, slang, and national identity, as well as the historical factors that have influenced these facets of French and francophone culture. Recommended Course Background: AS.210.301 or AS.210.302 or permission of instructor.
Students may not have taken AS.211.401.

AS.212.413. For the Record: Jazz Cultures of Modern France. 3 Credits.
Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in music criticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.

AS.212.431. Style, Gender and Politics from Marie-Antoinette to the Burqini. 3 Credits.
From effeminate kings, to slutty queens, to post-revolutionary dandies, to the manifest invisibility adopted by some French citizens today, debates on the gendering and styling of political bodies have always been central to power struggles in France. Students will read from sociology, history and literature in order to understand the complex interplay among fashion, gender and political identity.Taught in English, but French minor/major credit possible by completing written work in French and by attending a weekly discussion section conducted in French. Students interested in the 4-credit French option should enroll in section 2. All others should enroll in section 1.Special Notes: This course is meant to be a small class experience. Enrollment limits will be strictly enforced.

AS.213.407. German Media Theory. 3 Credits.
German Media Theory is an advanced course for upper-level undergraduates and graduate students, giving an introduction and overview of the specifically German version of Media Studies that first gained traction in the 1980s. The term media refers not just to mass media but more broadly to devices that process, transfer and store information, reaching from the alphabet that changed the culture of writing, or the printing press made famous as the foundation of the 'Gutenberg galaxy' to computers and smart phones dominating our current lives. In this course we will cut across disciplinary boundaries to explore the multifaceted roots and formations of German media theory which combine literary poststructuralism, histories of science and technology, psychoanalysis, cybernetics, art history, and philosophy among other fields. Readings include works by Friedrich Kittler, Bernhard Siegert, Cornelia Vismann, Wolfgang Ernst, Walter Benjamin, Niklas Luhmann, Michel Foucault, Marshall McLuhan and many others. The course will be taught in English and all readings will be available in English.

AS.213.423. Reflections on Modernity. 3 Credits.
Taught in English. Reflections on Modernity takes up the problems conflicts, and possibilities of modernity in aesthetic, literary, and philosophical texts. Questions about the modern self, our relationship to nature, to urban experience, to history and language, and the role of the artist and writer in reflecting on modern life. Texts include works by such authors as Kant, Nietzsche, Baudelaire, Weber, Rilke, Hofmannsthal, Simmel, Heidegger, Habermas, Foucault.

AS.214.362. Italian Journeys: Medieval and Early Modern. 3 Credits.
The Truth behind the Courtly Façade: «Of ladies, knights, of passions and of cutthroat competition»: the truth behind the romantic façade. What did life actually look like at Italian courts of the 1400 's and 1500's? We will reconstruct life at a Renaissance court through Italian history, literature, music and art of this period. Who were the stars of these scenes? We will explore the complex and intricate world of the Italian courts, including Florence and Ferrara, through the works of art they produced. The course will concentrate on historical, literary and visual representations including modern media such as film and television.
Area: Writing Intensive

AS.214.466. Utopias and Dystopias in Renaissance Culture. 3 Credits.
We will trace the dream of designing an ideal society and the danger of creating its opposite in the sixteenth and seventeenth century Italian and European thought.

AS.215.290. Latin American Critical Perspectives on Colonialism: From the 'World Upside Down' to the 'Coloniality of Power'. 3 Credits.
This course, taught in English, examines how indigenous and local (postcolonial) intellectuals in Latin America responded to the ideology and practices of Spanish Colonialism in the earliest post-conquest years (1532), continued to battle colonialism during the period of the wars of independence, and finally arrived at the production of an analysis that shows how modernity is but the other face of colonialism. Among key works to be discussed are Guaman Poma's illustrated sixteenth-century chronicles, D.F. Sarramiento's _Civilization and Barbarism_ (1845), and Anibal Quijano's "Coloniality of Power" (2000).
Area: Writing Intensive

AS.215.309. An Interdisciplinary Introduction to the Study of Latin America. 3 Credits.
The course is an interdisciplinary introduction to the study of Latin America. It brings together archeology, ethno-history, art history, literature and environmental studies.
Area: Writing Intensive

AS.215.380. Modern Latin American Culture. 3 Credits.
Taught in Spanish. This course will explore the fundamental aspects of Latin- America culture from the formation of independent states through the present—in light of the social, political, and economic histories of the region. The course will offer a general survey of history of Latin-America, and will discuss texts, movies, songs, pictures, and paintings, in relation to their social, political, and cultural contexts. May not be taken satisfactory/unsatisfactory.
AS.210.312;Students may earn credit for AS.211.380 or AS.215.380, but not both.

AS.215.390. Modern Spanish Culture. 3 Credits.
This course will explore the fundamental aspects of Spanish culture from the nineteenth to the twenty-first centuries. The course will offer a general survey of the history of Spain and will discuss texts, movies, songs, pictures, and paintings in relation to their social, political, and cultural contexts. This course will be of particular interest for students planning on spending a semester abroad in Spain—specially for those students going to the JHU Fall Semester in Madrid, at Carlos III University. Taught in Spanish. Recommended Course Background: AS.210.311 or appropriate Webcape score.AS.215.390 was formerly numbered AS.211.390
Students may not have previously completed AS.211.390.

AS.215.409. Catalonia and Independence. 3 Credits.
What is the Catalan independence movement? Where did it come from? What, exactly, does it advocate? This seminar will examine the history, politics, and culture of Catalonia in an attempt to understand why the push for independence has grown over the past decade. We will focus especially on the impact of nationalism, ideology, social history, economics, law, and language on the construction of Catalan identity. But we will also compare Catalonia to other regions in the Iberian Peninsula (the Basque Country, Galicia) as well as across Europe (Scotland, Northern Italy) and North America (Québec) in order to better understand how movements for regional autonomy and independence emerge today. Taught in English.

AS.215.412. Populism. 3 Credits.
What do Hugo Chávez, Marine Le Pen, and Donald Trump have in common? According to many from across the political spectrum, they are all populists. But what is populism, exactly, and how can it describe such disparate phenomena as left-wing social movements, xenophobic anti-immigrant policies, and economic redistribution? This advanced seminar will examine the history, culture, and political theory of populism. We will pay special attention to the resurgence of populism after the Great Recession and examine a number of cases from Latin America, Europe, and the United States.

AS.215.416. Mexican Empire: the Problem of Territory from Aztec Philosophy to Trump's Wall. 3 Credits.
This course with seminar option is devoted to Mexico, its past and present paths into a remote inside-out pre-imperial epoch inalienable from North-against-South histories across the American Narcoland from Honduras to Alaska. Our nonfictional materials combine detailed summaries and readings of Stuart Elden's The Birth of Territory and James Maffie's Aztec Philosophy: Understanding a World in Motion. The fictional matter concerns Roberto Bolaño's 1998 novel, Los detectives salvajes (The Savage Detectives), Corman McCarthy's apocalypse Western, 1985 Blood Meridian, and Carlos Reygadas' films, Post Tenebras lux (2012) and Nuestro tiempo (2018).

AS.215.417. Literature of the Great Recession. 3 Credits.
The Great Recession—sometimes called the financial crisis or the economic crisis of 2008—brought financial markets to a halt and created significant political turmoil across the North Atlantic. But its impact on culture, and literature especially, has often been ignored. This seminar will travel across Europe, from Dublin to Madrid, from London to Reykjavík in order to examine how literature has registered this most recent economic crisis. We will focus on how crisis is narrated and the ways in which literary works have managed to provide a voice for marginalized social, economic, and political demands.

AS.215.419. Colombia: Territory Against Nation. 3 Credits.
The nation of Colombia amounts to a large country partly made immense and hard to govern and corruptible by its territorial nexus and porous frontier with Venezuela. Starting from such polemic claim, leaning on misgovernance vs. excessive governmentality, we will study two novels, Laura Restrepo's Delirio/Delirium (2004) and Juan Gabriel Vásquez's The Noise of Things Falling (2011); both winners of the prestigious Planeta Prize. To what extent can literary fictions of such scope and ambitions, invested in deeply rooted family politics, help or harm the reader's political trust in nations as novels and fictions as nations?

AS.215.442. Whose Caribbean and the Epic of Race. 3 Credits.
We will study literary claims of epic colonial possession and aesthetic dispossession through close readings of five works in reverse chronological order: V.S. Naipaul's late historical novel, A Way in the World (1994); Derek Walcott's transoceanic poem, Omeros (1990); Alejo Carpentier's short anti-Enlightenment moral tale, El reino de este mundo (1949) and his short tale in celebration of Afro Cuban wizardry, Viaje a la semilla (1944); Aimé Césaire's prose poetry, mixed chronicle, Cahier d'un retour au pays natal, or Notebook of a Return to the Native Land (1939-1947). We will address questions of temporality and historicity (Heidegger) and a base-materialist political blocking of wild dreams as attainable through translation (Bataille). Such formal and epistemic problems will draw us into issues of race across the colonial spectrum of Caribbean histories.

AS.215.469. Mapping Identity in Modern Spain. 3 Credits.
What social, political, and economic forces make groups of people appear out of place in a given society? How have literary works contributed to counteracting the marginalization of certain groups? This course will look at how modern Spanish artists, writers, and intellectuals wrestled with questions of identity and marginalization. We will critically examine how the modern Spanish state was forged from restrictions on cultural difference and consider the various marginalized groups that were left in its wake. These groups include various peoples (e.g. the Romani), ideologies (e.g. anarchism, socialism, communism), social and economic classes (e.g. peasants, the working class), and regional identities (e.g. Catalonia, the Basque Country). Key texts in modern Spanish literature will prompt our investigation into how writers and artists reflected on, contested, and expressed the marginality of the country's various internal others. Taught in Spanish.

AS.216.305. Representations of the Other(s) in Israeli Culture. 3 Credits.
This course will use the concept of the Other to study the ways in which various marginal groups in Israel are represented in contemporary Israeli films, TV drama, prose-fiction, poetry and visual art. As a nation-state which was founded on the premise of a utopian vision of a just and fair society and as a promise for a safe haven for Jews escaping their status as Others, contemporary Israeli culture offers a unique case study. The course will run as a research seminar in which students will be encouraged to actively engage in analyzing the ways in which cultural productions depict the Other/s and Otherness as well as the social, political and psychological motivations and implications of these depictions. We will ask questions such as: who is considered as Other and by whom? What roles do the cultural representations play in shaping national collective identity, stereotypes and the perception of the self as Other? And how collective memory shapes Otherness?
Area: Writing Intensive

AS.216.342. The Holocaust in Israeli Society and Culture. 3 Credits.
This course examines the role of the Holocaust in Israeli society and culture. We will study the emergence of the discourse on the Holocaust in Israel and its development throughout the years. Through focusing on scholarly, literary, artistic, and cinematic responses to the Holocaust, we will analyze the impact of its memory on the nation, its society, politics, and collective self. The course is divided to three general categories: Historical and Sociological Perspective, Literary Perspective, and Cinematic Perspective. However, we will study the crossroad between these three categories, and will explore them in relation to one another.

AS.216.373. War in Israeli Arts and Culture. 3 Credits.
In this course we will study the various representations of what functions as one of Israel's most unifying and yet dividing forces: war. By analyzing literary and cinematic works as well as visual art and popular culture we will attempt to understand the role of war in shaping Israeli society, culture and politics. Topics such as commemoration and mourning, heroism, dissent and protest, trauma and memory and the changing image of the soldier will stand at the center of the course.

AS.217.307. Cultura e Ditadura [Culture and Dictatorship]. 3 Credits.
In the 20th century, the Lusophone world saw the rise and fall of such authoritarian governments as the Estado Novo in Portugal (1933–74) and the military dictatorship in Brazil (1964–85). During this period, a series of revolutionary political movements sprung up, as well as innovative cultural production. How does culture respond to censorship? How do art and politics comment on and ultimately transform each other? In this course we will discuss novels, poetry, film, songs, and artworks from Brazil, Portugal, and Lusophone Africa that engage critically with dictatorships and their aftermaths. Topics include violence, trauma and memory, colonialism, post-colonialism, and decoloniality, race and the legacies of slavery, counterculture, and popular cultures. Readings and discussion in Portuguese. Interested students who have not completed course prerequisites should contact the instructor for permission to enroll.

AS.217.425. Latin American Ecocriticism. 3 Credits.
Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

AS.217.427. Radical Women: Brazilian Literature, Art, and Culture. 3 Credits.
The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry. The course is taught in English, but those interested in doing the coursework in Portuguese (4 credits) should register for section 02.

Near Eastern Studies

AS.130.170. Diplomacy and Conflict in the Ancient Middle East. 3 Credits.
The Middle East is home to the invention of agriculture, cities, and writing. It is also in the Middle East that we find evidence of humanity's earliest diplomatic activity in, for instance, the actual letters sent by ancient kings to one another, the treaties drawn up after their conflicts, and the inscriptions that commemorate their conquests. In this course, we examine texts such as these to explore questions such as: How do we characterize the international system of the ancient Middle East? Does this system change over the approximately two millennia for which we have documentation? Is it better to approach ancient diplomacy through present-day eyes or in the context of ancient world-views? Is an understanding of diplomacy in the ancient Middle East relevant to our understanding of modern international relations? All texts read in translation.

AS.130.216. History of the Jews in Pre-Modern Times, from the Middle Ages to 1789. 3 Credits.
A broad survey of the significant political and cultural dynamics of Jewish history in the Medieval, Early-Modern, and Modern Eras.

Philosophy

AS.150.205. Introduction to the History of Modern Philosophy. 3 Credits.
An overview of philosophical thought in the seventeenth and eighteenth centuries. We shall focus on fundamental questions in epistemology (knowledge, how we acquire it, its scope and limits), metaphysics (the ultimate nature of reality, the relation of mind and body, free will), and theology (the existence and nature of God, God's relation to the world, whether knowledge of such things is possible): all questions that arose in dramatic ways as a result of the rise of modern science. The principal philosophers to be discussed are Descartes, Locke, Hume and Kant, though we shall also make the acquaintance of Spinoza, Leibniz and Berkeley.

AS.150.237. Foundations of Modern Political Philosophy. 3 Credits.
This course is an introduction to modern political philosophy through an intensive study of the classic texts. The focus will be on the nature and limits of political authority under modern social conditions. Authors included are Machiavelli, Hobbes, Locke, Rousseau and Mill.

AS.150.240. Intro-Political Philosop. 3 Credits.
This course begins by reviewing canonical texts in modern political philosophy beginning with Thomas Hobbes and John Locke and ends by exploring classic questions in contemporary debates in race, gender, and identity.
Area: Writing Intensive

AS.150.355. Philosophy of Law. 3 Credits.
In this course we will examine major issues in the philosophy of law, including the nature of law, the role of the Constitution in legal decisions, and the justification of punishment. No previous knowledge of law or philosophy is required.

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

AS.150.425. Enlightenment Moral and Political Theory. 3 Credits.
An examination of some of the central texts of the Enlightenment, including works by Locke, Montesquieu, Rousseau, and Kant.
Area: Writing Intensive

AS.150.428. Spinoza's Theological Political Treatise. 3 Credits.
The course is an in-depth study of Spinoza's Theological-Political Treatise. Among the topics to be discussed are: Spinoza's Bible criticism, the nature of religion, philosophy and faith, the nature of the ancient Hebrew State, Spinoza's theory of the State, the role of religion in Spinoza's political theory, the freedom to philosophize, the metaphysics of Spinoza's Theological-Political Treatise, and finally, the reception of the TTP.

AS.150.492. Plato's Republic. 3 Credits.
This course will be a close reading of Plato's Republic, with special attention to the parallel of city and soul, the relevance of metaphysics to politics, and the relation of aristocracy, democracy and tyranny.

Political Science

AS.190.101. Introduction to American Politics. 3 Credits.
This course examines the ideals and operation of the American political system. It seeks to understand how our institutions and politics work, why they work as they do, and what the consequences are for representative government in the United States. Emphasis is placed on the federal government and its electoral, legislative, and executive structures and processes. As useful and appropriate, attention is also given to the federal courts and to the role of the states. The purpose of the course is to understand and confront the character and problems of modern government in the United States in a highly polarized and plebiscitary era.

AS.190.102. Introduction To Comparative Politics. 3 Credits.
To understand politics, the sound bites of the modern media take us only so far. In this course, we will take a step back and implement an intellectually rigorous method. Scholars of comparative politics use the method of comparison in order to illuminate important political phenomena of our times. Following this method, we will embark on a scholarly tour of the world and compare the politics of various countries. We will also trace these politics back to their historical sources. We will work from the assumption that there is something to be gained from such comparisons across space and time.

AS.190.108. Contemporary International Politics. 3 Credits.
An introduction to international politics. Emphasis will be on continuity and change in international politics and the causes of war and peace. The first half of the course will focus on events prior to the end of the Cold War, including the Peloponnesian War, the European balance of power, imperialism, the origins and consequences of WWI and WWII, and the Cold War. The second half will focus on international politics since 1990, including globalization, whether democracies produce peace, the impact of weapons of mass destruction, terrorism, and the prospects for peace in the 21st century. Theories of realism and liberalism will also be considered. This course was previously AS.190.209.

AS.190.109. Politics of East Asia. 3 Credits.
This course examines some of the central ideas and institutions that have transformed politics in the contemporary world through the lens of East Asia, focusing on Japan, South Korea, Taiwan, and China. We analyze two enduring themes of classic and contemporary scholarship in comparative politics: development and democracy. The purpose is to introduce students to the various schools of thought within comparative politics as well as to the central debates concerning East Asian politics.

AS.190.111. Introduction to Global Studies. 3 Credits.
This course surveys scholarly approaches to processes, relations, institutions, and social structures that cross, subvert, or transcend national borders. The course will also introduce students to research tools for global studies. Students who have taken Contemporary International Politics 190.209 or International Politics 190.104 may not register.

AS.190.180. Introduction to Political Theory. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, adn the relationship between freedom, responsibility, and political judgement. Spanning texts ancient, modern, and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past impossible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.204. Ancient Political Thought. 3 Credits.
The premise of this course is that a political perspective is tied up with a (meta)physical one, that is to say, with ideas about the nature of Nature and of the status of the human and nonhuman elements within it. How is the universe ordered? Who or what is responsible for it? What place do or should humans occupy within it? How ought we to relate to nonhuman beings and forces? We will read three different responses to such questions and show how they are linked to a particular vision of political life. In the first, the world into which human are born is ordered by gods whose actions often appear inexplicable: Prometheus Bound by Aeschylus, Oedipus the King by Sophocles, and Hippolytus by Euripedes will represent this tragic vision of the cosmos. In the second, Plato , in Republic and in Phaedrus, the forces of reason and eros play central and powerful roles. In the third, Augustine of Hippo presents a world designed by a benevolent, omnipotent God who nevertheless has allowed humans a share in their own fate. We end the course with Nietzsche's Birth of Tragedy , which offers a perspective on these three visions of the world -- the tragic, the rational, and the faithful -- which will help us evaluate them in the light of contemporary political and ecological concerns.
Area: Writing Intensive

AS.190.207. The Power of Rhetoric. 3 Credits.
In a time when people claim language "has no preference to facts, truths, or realities," the power of rhetoric is both vilified and lauded in the strongest possible terms. According to some, rhetoric is responsible for the dismissal of everything from political dissent to science as a species of "fake news". By contrast, others argue public life cannot be repaired without a "restoration" of rhetoric. What are these people talking about? This course will help us figure this out. Students will be introduced to the art of persuasive speech, writing, and visual media so as to be prepared to critically examine and evaluate the claims made for and about the role of language in contemporary politics. Topics will include informal logic, appeals, fallacies, figures and tropes. Among others, we will read texts by Aristotle, Austin, Barthes, Foucault, Freud, Kierkegaard, Nietzsche, and Zizek. In addition to a number of short exercises and writing assignments throughout the semester, there will be a mid-term and a final paper.

AS.190.220. Global Security Politics. 3 Credits.
Contemporary and emerging technologies of nuclear (weapons, terrorism, energy) outer space (missiles, missile defense, asteroids), biosecurity (bioweapons, pandemics, terrorism) and cyber (war, spying, surveillance) and implications for security, international politics, arms control, and political freedom.

AS.190.226. Global Governance. 3 Credits.
Global problems like poverty, financial instability, human rights abuses, and climate change threaten both international order and human well-being. In the absence of a world state, these problems must be addressed by an increasingly complex, transnational network of organizations and social groups. First, we will aim to understand and explain how global problems are governed through detailed case studies of International Organizations and Non-Governmental Organizations such as the United Nations, World Bank, Intergovernmental Panel on Climate Change, Amnesty International and more. Second, we will critically evaluate the successes and failures of these organizations and explore the possibilities for improving democratic governance at the global level.

AS.190.227. U.S. Foreign Policy. 3 Credits.
This course provides an analysis of US foreign policy with a focus on the interests, institutions, and ideas underpinning its development. It offers a broad historical survey that starts with US involvement in the First World War, covers major developments of the twentieth century, and concludes with contemporary issues. Important themes include the developments underpinning the emergence of the liberal world order, strategies of containment during the Cold War, nuclear deterrence and antiproliferation efforts, the politics of international trade, alliance politics, technological and security policy, and the re-emergence of great power competition.

AS.190.228. The American Presidency. 3 Credits.
Over the past several decades, the power and importance of America's presidency have greatly expanded . Of course, presidential history includes both ups and downs, some coinciding with the rise and fall of national party systems and others linked to specific problems, issues, and personalities. We should train our analytic eyes, however, to see beneath the surface of day-to-day and even decade-to-decade political turbulence. We should focus, instead, on the pronounced secular trend of more than two and a quarter centuries of American history. Two hundred years ago, presidents were weak and often bullied by Congress. Today, presidents are powerful and often thumb their noses at Congress and the courts. For better or worse, we have entered a presidentialist era.

AS.190.244. Weapons of Mass Destruction. 3 Credits.
This course examines the impact of weapons of mass destruction on global politics and American interests. The first half of the course focuses on nuclear weapons, examining their development and targeting throughout the Cold War. The second half of the course examines contemporary issues involving nuclear weapons (including arms control, nuclear zero, terrorism, proliferation and defense). It also considers other weapons of mass destruction (or disruption) including chemical, biological, radiological and cyber weapons. The growing concerns about Artificial Intelligence will also be addressed. Requirements include a midterm and a final exam.

AS.190.245. The Politics of Global Development. 3 Credits.
Development is often assumed to be an economic issue. In this course we examine the politics of development on a global scale. We begin by looking at the colonial and Cold War histories of development. We then use these histories to contextualise contemporary development issues that directly affect international relations such as aid and debt, humanitarianism, food security, land "grabs", migration and indigenous rights. The course also seeks to understand the ways in which the issues underlying global development have always connected and continue to connect the peoples and polities of the Global North and Global South.

AS.190.249. Fictional World Politics: International Relations Through Fiction. 3 Credits.
The plots and settings of fictitious works provide "cases" for the exploration of international relations theories. Incorporates literature, film, and works of IR scholarship.
Area: Writing Intensive

AS.190.255. Race and Racism in International Relations. 3 Credits.
This course introduces students to the foundational importance of race and racism to the construction of our contemporary global order. Topics include the Crusades, European imperialism, eugenics, Apartheid, freedom struggles, decolonization, and global development.

AS.190.264. What You Need to Know About Chinese Politics (Part 1). 3 Credits.
What you need to know about Chinese politics covers the major scandals, political events, and policy debates that every China watcher needs to know. This first module of a two-semester experience brings together two professors, Prof. Andrew Mertha (SAIS) and Prof. John Yasuda (KSAS), with very different perspectives on China's past achievements, its political and economic futures, and the global implications of China's rise. The course seeks to give ample coverage to every major political question about China that is often missed in a semester long class. In addition to lively debates between the instructors, students can also expect guest speakers from the policy world, business, and the academy for a fresh take on what's going on in China today.

AS.190.267. Introduction to Political Economy. 3 Credits.
An introduction to the fundamental questions and concepts of political economy: money, commodities, profit, and capital. The course will study the nature of economic forces and relations as elements larger social and political orders.

AS.190.269. What you need to know about Chinese Politics, Part 2. 3 Credits.
This serves as a two-semester survey of Chinese politics from 1911-Present. This second module explores the politics of the reform and post-reform eras.

AS.190.283. Human Security. 3 Credits.
While traditional studies on security have focused largely on border protection, sovereign authority of the state, and interstate alliances, the threats posed to everyday people were not a central focus of security analyses until the end of the Cold War. The human security approach has evolved as a challenge to conventional thinking on security. This course will introduce the notion of human security, trace its emergence and evolution in the global political discourse, explore the theoretical scholarship from which it developed, and evaluate its effectiveness as a framework for addressing the most egregious threats human beings face today. From refugee flows, gender inequality, ethnic conflict, mass atrocities, poverty, to climate change, human security scholarship and policy has sought to examine the various threats to the lives of people that transcend national borders and allow us to break out of narrow thinking to develop innovative and globally-minded solutions.
Area: Writing Intensive

AS.190.284. Classics of Political Theory: Political Freedom. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, and the relationship between freedom, responsibility and political judgment. Spanning texts ancient, modern and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past possible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.300. Racial Inequality, Policy and Politics in the US. 3 Credits.
While policies were passed to ensure equal opportunity for racially subjugated Americans, the United States witnessed increasing stratification of wealth and income and deepening concentration of poverty, stagnation in closing racial gaps, and new forms of inequality posed by the striking upsurge in contact with the criminal justice system at the bottom of the skills ladder and concentration of wealth at the top. At the same time, the welfare state came under attack and faced challenges posed by an aging population, women entering the labor force, deindustrialization, and international pressures of globalization. Social spending withered in some areas while spending on citizens was increasingly likely to happen through tax expenditures and private means. This course investigates the politics around these developments and competing perspectives in debates over redistributive policies in the United States and their impact on inequality, particularly race and gender inequality. We will examine the contours of inequality and explanations for why it has expanded over the past several decades. We explore why the US is exceptional in both the level of inequality it tolerates and the generosity and types of remedies to alleviate poverty in comparison to its European counterparts and debate the role of race, unions, electoral politics and institutions. We investigate several specific cases of persistent racial inequality – concentrated poverty, segregation, and incarceration. We investigate both how policies have reinforced racial and gender divisions from a top-down perspective as well as examining under what conditions the disadvantaged contest inequality, exploring how political struggle shapes policy from the bottom-up. The last part of the course examines the consequences of inequality and social policy for representation and citizenship and how economic inequality affects political representation and responsiveness of elites to masses.

AS.190.306. Latin American Politics and Society in Comparative and Historical Prespective. 3 Credits.
The seminar will introduce students to the political and economic trajectories of Latin America as a whole and of individual countries, including Mexico, Brazil, Argentina, and Chile. Special attention will be paid to the long-term trajectory of the political regime (democracy versus dictatorship) and of economic development (variations in GDP per capita). Competing theories, from economic dependence to historical institutionalism, will be examined for their contribution to our understanding of Latin America's relative economic backwardness and low quality democracies.
Area: Writing Intensive

AS.190.307. Race, Politics and Literature. 3 Credits.
Area: Writing Intensive

AS.190.308. Democracy and Dictatorship: Theory and Cases. 3 Credits.
The course will cover three topics: 1) The conceptualization of political regime, democracy and authoritarianism. We will also consider neighboring concepts of other macro-political structures—government, state, and administration—in order to be able to demarcate what is distinctive about the study of political regimes.2) The characterization of political regimes in most Western and some non-Western countries, in history and today. We will centrally focus on the so called "Waves of Democratization," but we will also consider stories with less happy outcomes, that is, processes that led to the breakdown of democracies and the installation of repressive dictatorships.3) The explanation(s) of the stability and change of political regimes around the world. Theoretical accounts of regime change come in many flavors—emphasis on economic versus political causes, focus on agents and choices versus structures and constraints, international versus domestic factors, among others. We will consider most of them.

AS.190.311. Disposable People: Race, Immigration and Biopolitics. 3 Credits.
This course will explore theories and practices of race and immigration in order to illuminate the proliferation of populations regarded as disposable in contemporary politics. We will pay special attention to the contestable criteria used to determine eligibility for membership in the human race. We shall also examine how political power influences the relays between citizenship status and those whose lives are worthy of protection, and those who should be allowed to die.

AS.190.315. Asian American Politics. 3 Credits.
This course examines issues of political identity, political incorporation, and political participation of Asian Americans. Themes include Asian American panethnicity, the struggle for immigration and citizenship, Asian American electoral politics, political activism and resistance since the 1960s, and the impact of Asian Americans on the politics of race and ethnicity in the United States.

AS.190.322. Future of American Democracy. 3 Credits.
For the most part, observers of American politics have not considered the possibility that the American democratic regime might be at risk. But the unexpected election of Donald Trump in 2016 and the subsequent course of his presidency have occasioned a great deal of uncertainty and anxiety about whether democracy in the United States is at risk and whether American political institutions can withstand the stresses of contemporary politics. This course will use the Trump era to explore the conditions that seem to threaten the stability of the American regime. We will begin by exploring the political circumstances that led to Trump's rise. We will then examine what we can learn from the experience of other countries about the conditions that make democracy either robust or fragile. Finally, we will consider how a set of contemporary political conditions in the United States — extreme partisan polarization, intense racial antagonism, growing economic inequality, and expanded executive power — contribute to the challenges facing American democracy today and in the future.
Area: Writing Intensive

AS.190.324. The Law of Democracy: The United States and Canada in Comparative Perspective. 3 Credits.
The Law of Democracy refers to the statutes, court decisions, and other practices that govern the electoral processes. Although the United States and Canada have a great deal in common, they have approached many of the problems involved in institutionalizing democracy quite differently. Recognizing these differences should contribute to understanding both the strengths, and the problems, of the two approaches. Specific topic will include the right to vote, political finance, delineation of district boundaries, electoral dispute resolution, and the role of electoral management bodies and elections administrators.

AS.190.325. Finding Equality in Law and Society. 3 Credits.
In this class, we will ask questions about the relationship between equality, law, and society. We will investigate how people have used law in their movements for greater equality, and ask whether law has served these movements well and how it has worked. We will pay particular attention to movements based on race, gender, and economic class.

AS.190.326. Democracy And Elections. 3 Credits.
An examination of most aspects of democratic elections with the exception of th e behavior of voters. Topics include the impact of various electoral systems and administrative reforms on the outcome of elections, standards for evaluations of electoral systems, and the impact of the Arrow problem on normative theories of democratic elections.

AS.190.327. Politics of Information. 3 Credits.
Considers global and comparative politics of information, information technologies, and the Internet. Examines governance of information (ownership of information, rights to information, privacy) and governance of information technologies (domain names, social media websites, etc.).

AS.190.328. Political Thought in the Americas. 3 Credits.
Reflection on political ideas and institutions in the United States is often oriented by the notion that the US is in some sense exceptional. For some commentators, the US is exceptionally democratic, exceptionally stable, exceptionally productive, and exceptionally innovative. For others, the US is exceptionally racist, exceptionally unequal, exceptionally violent, and exceptionally unhealthy. What both sides share is a common point of comparative reference in Europe. For all these commentators, Europe is the norm against which all of the exceptional qualities of the US stand out. In this course, we will ask how well notions of US exceptionalism stand up against the different comparative references found in the Americas, focusing in particular on the history of political thought in the Americas. We'll begin by studying texts from the pre-colonial and colonial periods, noting similarities and differences between the political institutions, economies, and social and racial hierarchies of in the regions that comprised British, Spanish, Portuguese, and French America. Next, we'll consider the US, Latin American, and Caribbean independence movements, early constitutionalism, and debates on women's role in society, slavery, and the rights of Indigenous Americans, asking what, if anything, distinguished the US from its neighbors in its early years. Finally, we'll examine theories of imperialism, racism, patriarchy, exploitation, and environmental destruction that have emerged from the Americas in the course of the 20th century, to see how both shared and divergent historical experiences have shaped perspectives relevant to contemporary political issues.

AS.190.329. National Security-Nuclear Age. 3 Credits.
This course examines the impact of weapons of mass destruction on international politics with an emphasis on security issues. The first half of the course focuses on the history of nuclear weapons development during the Cold War and theories of deterrence. The second half of the class considers contemporary issues including terrorism, chemical and biological weapons, ballistic missile defense and proliferation. Requirements include a midterm, final and a ten page paper.

AS.190.331. America and the World. 3 Credits.
This course is a survey of the unique position of the United States in world politics. We will cover the broader international relations literature on the dynamics of hegemony and empire, from work in the realist tradition to more critical approaches. The course will encompass security politics as well as the economic and monetary dimensions of American influence. Interested students must have at least completed one 100 or 200 level introductory course in international relations.

AS.190.332. The University in Democracy. 3 Credits.
From the founding of the United States to the COVID-19 pandemic, modern universities have evolved into expansive, complex institutions that play a variety of indispensable roles in the support of democratic societies. They educate citizens as well as specialists; produce new knowledge that shapes discourse and public policy; foster reasoned debate; and act as engines of social mobility. They also incite a great deal of controversy, criticism, and distrust, including for how they have performed these roles. In this course, we will study the centuries-long relationship between universities and democracy, and assess how successfully these institutions (including Johns Hopkins) are fulfilling their most profound functions today.
Area: Writing Intensive

AS.190.333. American Constitutional Law. 3 Credits.
This course covers enduring debates about the way the Constitution has structured the U.S. government and about which powers the Constitution assigns to the federal government and to the states. We will examine these debates in the context of American political history and thought by studying the writings of prominent participants, and landmark Supreme Court cases.

AS.190.334. Constitutional Law. 3 Credits.
Topics include executive and emergency power, racial and gender equality, and selected free speech and religious freedom issues.

AS.190.335. Imagining Borders. 3 Credits.
What is a border and why do borders matter in global politics. What do borders mean under conditions of globalization? An examination of the politics of borders, transborder flows, and networks within and across borders. The readings which come from political science and other disciplines, will include theoretical and case-specific works.

AS.190.338. Comparative Political Behavior. 3 Credits.
An introduction to the study of political behavior, emphasizing electoral behavior in democratic countries.

AS.190.339. American Racial Politics. 3 Credits.
Recommended Course Background: AS.190.214

AS.190.340. Black Politics I. 3 Credits.
This course is a survey of the bases and substance of politics among black Americans and the relation of black politics to the American political system up to the end of Jim Crow. The intention is both to provide a general sense of pertinent issues and relations over this period as a way of helping to make sense of the present and to develop criteria for evaluating political scientists' and others' claims regarding the status and characteristics of black American political activity.

AS.190.341. Korean Politics. 3 Credits.
This course introduces students to the historical and institutional foundations of modern South Korean politics. Topics include nationalism, political economic development, civil society, globalization, and ROK-DPRK relations.Recommended students should take Intro to Comparative Politics or a course related to East Asia first.(CP)
Area: Writing Intensive

AS.190.342. Black Politics II. 3 Credits.
Recommended Course Background: AS.190.340.

AS.190.344. Seminar In Anti-Semitism. 3 Credits.
Jews exercise a good deal of power in contemporary America.. They are prominent in a number of key industries, play important roles in the political process, and hold many major national offices. For example, though Jews constitute barely two percent of America's citizens, about one-third of the nation's wealthiest 400 individuals are Jewish and more than ten percent of the seats in the U.S. Congress are held by Jews. One recent book declared that, "From the Vatican to the Kremlin, from the White House to Capitol Hill, the world's movers and shakers view American Jewry as a force to be reckoned with." Of course, Jews have risen to power in many times and places ranging from the medieval Muslim world and early modern Spain through Germany and the Soviet Union in the 20th century. In nearly every prior instance, though, Jewish power proved to be evanescent. No sooner had the Jews become "a force to be reckoned with" than they found themselves banished to the political ma rgins, forced into exile or worse. Though it may rise to a great height, the power of the Jews seems ultimately to rest on a rather insecure foundation. Cross-listed with Jewish Studies. Course is open to juniors and seniors.
Area: Writing Intensive

AS.190.346. Foundations of International Relations Theory. 3 Credits.
This course is a broad conceptual introduction to international relations theory in a format that stresses close reading and critical discussion. We will explore mainstream theoretical perspectives and critiques of those perspectives, as well as more recent developments in the field. By the end of the course, students will have a firm grasp of the core issues and debates in the field. The course is conceptually demanding; interested students should have at least completed an introductory course in political science.

AS.190.347. A New Cold War? Sino-American Relations in the 21st Century. 3 Credits.
"Can the United States and China avoid a new Cold War? One might think not given disputes over the South China Sea, Taiwan, Hong Kong, human rights, trade, ideology and so much more. Moreover, competition for influence in the developing world and American concerns as to whether China will replace it as the preeminent world power suggest a new Cold War is in the offing. Nevertheless, their extensive economic ties and need to work together to solve common problems such as climate change, nuclear proliferation, and pandemics argues against a continuing confrontation. This course will examine whether cooperation or conflict will define Sino-American relations, and whether a new Cold War—or even a shooting war—lies in the future."

AS.190.348. Business, Finance, and Government in E. Asia. 3 Credits.
Business, Finance, and Government in East Asia explores the dynamics of East Asia's economic growth (and crises) over the last fifty years. We will examine Japan's post-war development strategy, the Asian tiger economies, and China's dramatic rise. Centered on case studies of major corporations, this course examines the interplay between politics and economics in East Asia, and considers the following questions: How have businesses navigated East Asia's complex market environment? In what ways can the state foster economic development? How has the financial system been organized to facilitate investment? What are the long-term prospects for growth in the region?

AS.190.350. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include civil wars, targeted killings, terrorism, ethnic conflict and war itself. Students examine what makes types of political violence unique and what unites them.

AS.190.355. Comparative Racial Politics. 3 Credits.
This course surveys the major trends and approaches to the comparative study of race in political science and critically examines the link between race and politics. Topics include race and state formation, citizenship and national membership, immigration, racial regimes, and the political economy of race.

AS.190.356. The Social Contract and its Discontents. 3 Credits.
This course focuses on one of the most powerful stories told in the tradition of western political theory: the story of the social contract. This story is about the constitution of legitimate political authority. It is told in many ways and each version makes different assumptions, in particular about human nature, the power of reason, the value of order, and the character of justice. We examine this often-conflicting assumptions and explore how they continue to inform the way we think about the possibilities and problems of politics. Readings include texts by Arendt, Hobbes, Locke, Rousseau, Freud, Pateman, the Federalists, Derrida, and Douglass. Final grades are based on class participation, two exams and two papers.
Area: Writing Intensive

AS.190.357. The State of Nature. 3 Credits.
Though it is possible to imagine ways of addressing the multiple crises the world will face as the atmosphere warms, seas rise, and pollutants seep into the surface of the planet, any serious proposal will require a degree of coordination amongst nation-states that has proven impossible to achieve in the past. In this course, we will consider this difficult situation by treating it as an instance of an old problem in political theory: how to escape the infamous "state of nature," where individuals struggle to obtain the resources they need to survive at others' expense, rather than cooperating to satisfy their needs and address the threats they face in common. First, we will study some influential reflections on the state of nature by Hobbes, Locke, Rousseau, Freud, and Pateman, as well as efforts to apply the logic of the state of nature to problems in international politics by Kant, Wendt, Waltz, Enloe, and others. Then we will read contemporary work on the international politics of climate change and ask what it would take to start building the better world that is possible today.

AS.190.366. Free Speech and the Law in Comparative Perspective. 3 Credits.
This class explores the ideas and legal doctrines that define the freedom of speech. We will examine the free speech jurisprudence of the U.S. in comparison to that of other systems, particularly the jurisprudence of the European Court of Human Rights and the Supreme Court of Canada.

AS.190.368. Political Arts: Dada, Surrealism, and Societal Transformation. 3 Credits.
An exploration of the political aims, tactics, and strengths and liabilities, of Dada and Surrealism, as it operated in Europe and the Americas in the years between the World Wars, with a comparison to political conditions today.
Area: Writing Intensive

AS.190.370. Chinese Politics. 3 Credits.
This course is designed to help students better understand the politics of China. Lectures will focus on the tools of governance that China has employed to navigate its transition from plan to market, provide public goods and services to its citizens, and to maintain social control over a rapidly changing society. The course will draw heavily from texts covering a range of subjects including China's political economy, social and cultural developments, regime dynamics, and historical legacies. Students interested in authoritarian resilience, governance, post-communist transition, and domestic will find this course particularly instructive.

AS.190.372. Decolonizing Politics. 3 Credits.
This course introduces students to the colonial logics that underpin key categories and concepts in Political Science. Working through four sub-fields – political theory, political behavior, comparative politics and international relations, the course also introduces students to alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to explain the stuff of Political Science via anti-colonial logics.

AS.190.374. Political Violence. 3 Credits.
This undergraduate seminar is designed to introduce students to the comparative study of political violence and intra-state conflict. We will examine social science theories and empirical studies on a wide range of forms of political violence, including civil war, coups, state repression, communal violence, riots, terrorism, genocide, and criminal-political violence. We will study these phenomena at the micro, meso and macro levels, and focus on understanding their causes, dynamics, outcomes, and aftermath. The class will also equip students with an ability to analyze political violence by using social scientific tools.

AS.190.379. Nationalism and the Politics of Identity. 3 Credits.
Nationalism ties powerful organizations to political mobilization, territory, and individual loyalty. Yet nationalism is typically studied in isolation from other social formations that depend upon organizational – individual linkages. Alternative types of identity category sometimes depend similarly upon organizations that collect and deploy resources, mobilize individuals, erect boundaries, and promote strong emotional connections among individuals as well as between individuals and institutions. In this class, we study classic and contemporary works on nationalism, drawn from multiple disciplinary and analytic traditions, in the comparative context of alternative forms of identity. The focus of the class will be primarily theoretical, with no regional or temporal limitations.

AS.190.380. The American Welfare State. 3 Credits.
This course analyzes the distinctive US welfare state in historical and comparative perspective. We begin with a survey of the policy context, an historical overview from the poorhouses through the Great Society, and a tour of welfare states across the rich democracies. We then survey developments – and explain the actual workings of policy – across jobs, education, welfare, pensions, and health care. We explore the institutional and political factors behind their divergent trajectories through conservative revival and the age of Trump. Students will write a seminar paper exploring policy development over time in a program or area of their choosing. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students may take AS.190.380 or AS.360.380, but not both.

AS.190.381. Global Environmental Politics. 3 Credits.
Area: Writing Intensive

AS.190.382. Democracy and Development: Theory and Cases. 3 Credits.
Most wealthy countries are democracies. But not all democracies are wealthy—India, Costa Rica, and Mongolia are prominent examples of poor countries with democratic regimes. The course will examine the relation between economic development and political democratization under three big questions. (a) Under what conditions, and through which mechanisms, does economic development promote democracy? (b) If economic development is not possible in the foreseeable future, how do countries achieve stable democratization? (c) Under what conditions, and through which mechanisms, does democracy foster economic development?
Area: Writing Intensive

AS.190.384. Urban Politics & Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations.
Cross-listed with Africana Studies

AS.190.385. Urban Politics and Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations. Cross listed with Africana Studies.

AS.190.387. Parties and Elections in America. 3 Credits.
Considers how parties and elections structure political conflict, and facilitate (or not) democratic control of government. Topics include campaigns, voting behavior, election administration, money in politics, presidential nomination, and party coalitions.
Area: Writing Intensive

AS.190.388. Race and the Politics of Memory. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar. The course will examine the politics of memory: how power shapes what is available to be remembered, the timing and occasions of memory, who is allowed to remember, and the spaces inside of which remembrance takes place. Specifically, the seminar will explore how segregated memory enables racial segregation and racial inequality. Toward that end, we shall investigate political and theoretical interventions potentially equipped to contest contemporary forms of racial amnesia haunting what some have labeled a "post-truth" world.
Area: Writing Intensive

AS.190.389. China's Political Economy. 3 Credits.
This course examines the most important debates about China's political economic development. After exploring Mao Zedong's disastrous economic policies, we will consider the politics of reform and opening under Deng Xiaoping, and finally conclude with China's state capitalist policies across a variety of issue areas. The course will cover literatures on financial reform, public goods provision, foreign trade and investment, agriculture, corruption, business groups, and regulatory development. Where possible we will draw comparisons with the economic experiences of other East Asian nations as well as other post-communist states.

AS.190.390. Race and American Democracy. 3 Credits.
While the United States has long been a democracy for white men, it has mostly been anything but democratic when seen through the eyes of Black Americans. But progress toward the expansion of democracy has occurred at a few times in American history. What made American democratization possible, and how might the United States again move toward more complete and inclusive democracy?

AS.190.391. Imperialism and Anti-Imperialism. 3 Credits.
Since antiquity, global politics have been defined by the struggle between imperialism and anti-imperialism. This course examines the arguments that have accompanied this struggle, considering influential texts written to defend or to denounce empires, as well as contemporary scholarship on imperial and anti-imperial ideologies. We will focus in particular on how imperial conflicts shaped natural law, international law, liberalism, and cosmopolitanism, as well as the connections between imperialism and contemporary capitalism, development assistance, and humanitarian intervention. The fundamental questions for the course are: What is an empire? and What would it mean to decolonize our world, our international institutions, and our minds?

AS.190.393. Nonviolent Resistance in World Politics. 3 Credits.
In this seminar we examine the origins, dynamics, and consequences of nonviolent struggles around the world. How do ordinary people organize for social change? What are the differences in people power campaigns in authoritarian and democratic contexts? When does nonviolent resistance succeed or fail, and what are the political consequences of these outcomes? In answering these questions, we will study the central ideas behind nonviolent action, learn about the most important scholarly discoveries in this field and analyze paradigmatic cases. Students will choose a historical or contemporary nonviolent movement to interrogate throughout the semester, as we learn new concepts, theories, and empirical patterns to make sense of them.
Area: Writing Intensive

AS.190.394. Comparative Politics of the Middle East and North Africa. 3 Credits.
This course examines the domestic, regional, and transnational politics of the Middle East and North Africa. The class is organized into three units. The first examines major armed conflicts—anti-colonial, intra-state, and inter-state—from 1948 through the 1990s. It uses these historical moments as windows onto key issues in Middle Eastern and North African political issues such as external intervention/occupation, human rights, sectarianism, social movements, and memory politics. Unit Two focuses on policy relevant issues such as democratization, minority populations, religion and politics, and gender. In Unit Three, students will explore the politics of the Arab Uprisings through critical reading and discussion of new (post-2011) scholarship on MENA states, organizations, and populations. Enrollment limited to Political Science and International Studies majors.

AS.190.396. Capitalism and Ecology. 3 Credits.
Capitalism and Ecology focuses on the relations between capitalism and climate during the era of the Anthropocene. How do capitalist processes of fossil extraction, consumption, production and governance contribute to the pace of climate warming, glacier flows, the ocean conveyor system, species loss and other phenomena? What are the effects and the possible modes of political response? How do the nonhuman, self-organizing processes such as glaciers, oceans and climate change on their own as they also amplify the effects of capitalist emissions? The course combines texts on capitalism and activism with those by geoscientists on how the nonhuman systems work. Books by authors in the fields of political theory, geology, anthropology, economics, philosophy and ethology will be drawn upon. Authors such as Michael Benton, Brian Fagan, Hayek, Naomi Klein, Fred Hirsch, Fred Pearce, van Dooren and Connolly are apt to be read to engage these issues. A previous course in political theory is recommended. The class is organized around student presentations on assigned readings. Two papers, 10-12 pages in length. Extensive class discussion.
Area: Writing Intensive

AS.190.398. Politics Of Good & Evil. 3 Credits.
The Politics of Good and Evil examines comparatively a series of classical myths and modern philosophies concerning the sources of evil, the nature of goodness and nobility, the relations of culture to politics, nature and the gods, the degree to which any metaphysic or theological faith is certain, and so on. It is a course in "elemental theory" in the sense that each text pursued challenges and disrupts others we read. Often the reader is disrupted existentially too, in ways that may spur new thought. A previous course in political theory or a theoretical course in the humanities is advised. A high tolerance for theory is essential. Texts on or by Sophocles, Job, Genesis ("J" version), Augustine, Voltaire, Nietzsche, James Baldwin, W. Connolly and Elizabeth Kolbert form the core of the class. Assignments: 1) One 12 page paper and a second 5-7 page paper, both anchored in the readings; 2) a class presentation on one text; 3) regular attendance and quality participation in class discussions.
Area: Writing Intensive

AS.190.402. Environmental Racism. 3 Credits.
This is an undergraduate political theory seminar that addresses the disproportionate impact of environmental destruction on racially stigmatized populations. We shall examine the logics of power whereby the natural world is subjected to exploitation and domination, in tandem with the subordination of racial subjects historically identified as closer to nature. Likewise, we will explore political and theoretical challenges to environmental racism, such as those posed by indigenous communities, decolonial theory, and political movements contesting the intersection of racial inequalities and ecological crises.
Area: Writing Intensive

AS.190.403. Arendt/Foucault. 3 Credits.
This upper-level undergraduate writing intensive course brings together the work of Hannah Arendt and Michel Foucault to focus on their critiques of modernity and their discussions of political change/revolution. Although Arendt and Foucault are often understood as coming from and supporting different political theoretical traditions, the course will also explore ways in which their shared debt to the work of Friedrich Nietzsche illuminates sometimes surprising commonalities and complementary positions. There is no final exam in this course but in addition to reading assignments, students will be required to write three papers.
Area: Writing Intensive

AS.190.404. Race and Debt: Living on Borrowed Time. 3 Credits.
This is an advanced undergraduate seminar that explores how racial stigma functions as a marker of being always already in debt. In view of the legacies of settler-colonialism, imperialism and chattel slavery, how is it that those from whom so much has been taken are nevertheless regarded as perpetually in debt? We shall examine the moral, economic and racialized logics of power through which a range of political subjects come to be regarded as ungrateful "takers" as opposed to "makers," and owing a debt to society. In so doing, we will investigate how temporality functions as a tool of power by considering how the indebted are made vulnerable to precarity, discipline, and disposability—in effect, forced to live life on borrowed time.
Area: Writing Intensive

AS.190.406. The Executive Branch. 3 Credits.
In the 19th Century America was noted for its courts, political parties and representative institutions. Today, America's political parties and representative institutions have declined in importance while the institutions of the executive branch have increased in importance. This seminar will examine the nation's key executive institutions and aspects of executive governance in the U.S. Students will alternate primary responsibility for week's readings. Every student will prepare a 10-15 page review and critique of the books for which they are responsible in class.

AS.190.408. Sovereignty: Historical Perspectives and Contemporary Issues. 3 Credits.
This seminar provides an in-depth exploration of the concept of sovereignty by examining its historical development, current controversies, and its salience in international relations scholarship. Works in political theory and the international law literature will also inform our discussion. The course is open to advanced undergraduate students with previous coursework in political science. .
Area: Writing Intensive

AS.190.410. Beyond Bob Marley: Exploring the Rastafari Movement in the Greater Baltimore Area. 3 Credits.
This course uses a community based learning approach to inquire into the presence of the Rastafari community in the Baltimore area. Most people will have heard of Rastafari through the music of Bob Marley. People might not know, however, that Rastafari emerges out of and has been part of a global history of liberation struggles. This course is co-taught with a local Rastafari organization. You will be intellectually and practically equipped to take part in a project of original research on the Rastafari presence in the Baltimore region, starting with the demonization of the movement in the 1980s "war on drugs" and including the movement's response.

AS.190.412. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include terrorism, assassination, genocide, coups, rebellions and war itself. Students examine what makes types of political violence unique and what unites them. (Formerly AS.190.372)

AS.190.418. The End of Whiteness. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar on racial formation. Specifically, the course explores the end of whiteness in multiple senses of the phrase. First, to what extent do the ends served by whiteness change, or remain continuous, over time? What power hierarchies and political goals has white identity been engineered to advance historically? We shall then examine the contemporary phenomenon whereby the end of white supremacy is conceived by some as the end of the world. This, in turn, will lead us to investigate how we should best understand white disavowal of threats of climate change and pandemics/health-care crises currently coursing through white identity politics. The last part of the course will be dedicated to exploring the end of whiteness in terms of the theories and practices potentially required to dismantle whiteness as white supremacy. Readings include Du Bois, Fanon, Painter, Baldwin, Moreton-Robinson, Hartmann, Olson
Area: Writing Intensive

AS.190.419. Race and Segregated Time. 3 Credits.
This course explores how time, and not just space, is segregated along racial lines. We shall examine how racial injustices are experienced as impositions on human time, how resistance to racial inequality has often been figured in temporal terms, and what it means to think in untimely ways that challenge how the extended lifespans of racially dominant groups is contingent upon the foreshortened lifetimes of racial others. Readings will bring political theory into contact with contemporary experiences of race, such as: criminal (in)justice, environmental racism and the proliferation of human disposability. Recommended Course Background: One Political Theory course.
Area: Writing Intensive

AS.190.421. Violence: State and Society. 3 Credits.
This course will examine violence that occurs mainly within the territory of nominally sovereign states. We will focus on violence as an object of study in its own right. For the most part, we will look at violence as a dependent variable, though in some instances it will function as an independent variable, a mechanism, or an equilibrium. We will ask why violence starts, how it "works" or fails to work, why it takes place in some locations and not others, why violence take specific forms (e.g., insurgency, terrorism, civilian victimization, etc.), what explains its magnitude (the number of victims), and what explains targeting (the type or identity of victims).

AS.190.423. Planetary Geopolitics. 3 Credits.
With the tools of geopolitics, course explores political debates over globalization of machine civilization and changes in scope and pace, space and place, and role of nature in human affairs.
Area: Writing Intensive

AS.190.424. Policy Disasters. 3 Credits.
Investigates the causes of large-scale policy disasters, examining the role of ideology, psychology, organization design and political incentives. Examples may be drawn from the Iraq War, Bay of Pigs, Hurricane Katrina, the U.S. Financial crisis, Shuttle Challenger disaster. economic development policy, privatization, and the Great Society. Limited to seniors or with permission of instructor. (CP / AP)

AS.190.425. The New Deal and American Politics. 3 Credits.
This seminar explores how the New Deal, the fundamental moment in the post-Civil War United States, has structured politics and government across a variety of domains ever since. Topics include presidential leadership, executive power, political parties, labor, race, and the welfare state.
Area: Writing Intensive

AS.190.426. Qualitative Research. 3 Credits.
This class is designed to introduce students to qualitative methodology. Practically, students will gain first-hand experience with qualitative research methods via research design, ethics review, in-depth interviewing, participant observation, and archival/primary source research. They will learn to deploy analytical techniques such as discourse analysis and process tracing. Students will also be asked to consider the merits of qualitative approaches more generally, and discuss the relative advantages of qualitative, experimental, and quantitative approaches. Questions that we will discuss include: What place should qualitative research have in a research design? Can qualitative research test hypotheses, or only generate them? Can qualitative research explain social phenomena, or only interpret them? What are the disadvantages and advantages of qualitative approaches compared to quantitative approaches? For what kinds of research questions are ethnographic techniques best suited? Is replicability possible for ethnographic field research? What criteria of evidence and analytical rigor apply on this terrain?

AS.190.427. Political Economy of Japan and Korea. 3 Credits.
This upper-level seminar examines some of the major debates and issues of postwar Japanese and South Korean political economy. Topics include nationalism, gender politics, civil society, immigration, and US-Japan-South Korea trilateral relations.
Area: Writing Intensive

AS.190.428. The Politics of Disaster in the Middle East and Beyond. 3 Credits.
This course examines the politics of natural and man-made disasters, including war, forced migration, drought, famine, earthquakes, tsunamis, storms, and epidemics. Focusing on the Middle East, it also presents comparative cases from Africa, South and Southeast Asia, and North America. In doing so, the class will examine the unique ways that different types of disasters interact with governance structures; social and economic inequalities; medical infrastructure; gender; race and ethnicity; and political cleavages. Throughout the course, students will learn basic elements of research design and methods in addition to welcoming experienced disaster response and analysis practitioners to class. Finally, the Politics of Disaster in the Middle East and Beyond addresses some of the philosophical aspects of working in and studying disaster-affected contexts, bringing an ethical sensibility to policy-relevant analysis.

AS.190.429. The Political Bases of the Market Economy. 3 Credits.
Although “the market” is conventionally understood as separate from “politics”, the modern market economy did not arise in a political vacuum. In fact, the very separation between the economy and politics is itself the product of a politically potent set of ideas. This course is an upper-division reading seminar on the origins and evolution of the modern market economy. Readings will include Smith, Marx, Weber, Polanyi, Keynes, Hayek, Friedman, Becker, and Foucault. Recommended course background: Introduction to comparative politics OR any college-level course in social or political theory.

AS.190.431. Global Climate Governance. 3 Credits.
This course will offer an in-depth study of the history and politics of global climate governance. It will examine the central actors, agreements, and policy proposals that shape climate governance.

AS.190.433. Race and the Politics of Punishment in the US. 3 Credits.
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold for citizenship. In this advanced undergraduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields - history, sociology, law and criminology - and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad’s Condemnation of Blackness: race, Crime, and the Making of Modern Urban America, Elizabeth Hinton’s From the War on Poverty to the War on Crime, David Oshinsky’s Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western’s Punishment and Inequality in America, and Michael Fortner’s Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.
Area: Writing Intensive

AS.190.434. Does Israel Have a Future?. 3 Credits.
Israel is one of the only countries whose existence is openly challenged. This class will examine the future of Israel focusing on international and domestic threats to its continued existence as a Jewish democracy. Outside threats to be considered include nuclear attack and the growing international movement to delegitimize Israel. domestic challenges include demographic changes, the role of religion in governance, and doubts as to whether one can be a Jewish state and still be a democracy. Lessons from the destruction of the ancient Israelite kingdoms and from contemporary state deaths will be included. The course will conclude by considering efforts that Israel can undertake to meet the threats it faces.

AS.190.437. Race and Ethnic Politics in the United States. 3 Credits.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the “struggle with difference” within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.190.438. Violence and Politics. 3 Credits.
This seminar will address the role of violence–both domestic and international–in political life. Though most claim to abhor violence, since the advent of recorded history, violence and politics have been intimately related. States practice violence against internal and external foes. Political dissidents engage in violence against states. Competing political forces inflict violence upon one another. Writing in 1924, Winston Churchill declared–and not without reason–that, "The story of the human race is war." Indeed, violence and the threat of violence are the most potent forces in political life. It is, to be sure, often averred that problems can never truly be solved by the use of force. Violence, the saying goes, is not the answer. This adage certainly appeals to our moral sensibilities. But whether or not violence is the answer presumably depends upon the question being asked. For better or worse, it is violence that usually provides the most definitive answers to three of the major questions of political life--statehood, territoriality and power. Violent struggle, in the form of war, revolution, civil war, terrorism and the like, more than any other immediate factor, determines what states will exist and their relative power, what territories they will occupy, and which groups will and will not exercise power within them. Course is open to juniors and seniors.

AS.190.440. European Politics in Comparative Perspective. 3 Credits.
Europe has been in a sense the first testing ground for theories of comparative politics, but many outsiders now see Europe as a pacified and somewhat boring place. This course will question conventional wisdom through an examination of European politics in historical and cross-national perspective. We will apply the comparative method to the study of European politics today, and conversely we will ask what Europe tells us more generally about politics. We will see that Europe is still a locus of intense conflict as well as remarkably diverse experimentation. Topics will include: political, legal, and economic governance; the evolution of democracy and fundamental rights, the welfare state, class stratification, immigration and race, the role of religion; European integration and globalization. Recommended background: Introduction to Comparative Politics.

AS.190.442. Civil Society. 3 Credits.
This course explores classic and contemporary debates on the concept of civil society and critically examines its analytical value in light of recent developments. Topics include the relationship between civil society, the state, and markets, the role of civil society in development and democratization, social capital, and global civil society. This course is open to graduate students from any discipline. Advanced undergraduate students must obtain permission from the instructor and are expected to keep up with graduate students during class discussions.
Area: Writing Intensive

AS.190.443. Politics of Outer Space. 3 Credits.
Intensive examination of the political aspects of human activities in outer space, past, present and future, with focus on militarization, earth-remote sensing, surveillance, navigation, resource exploitation, the Outer Space Treaty, and colonization.
Area: Writing Intensive

AS.190.450. Power. 3 Credits.
Power is a -- if not the -- key concept of international relations, yet there is no single definition of power that is accepted by all scholars in the field. In this course we will critically examine definitions of power from classic and contemporary works of international relations, political science, and related areas of study.

AS.190.451. Geopolitics. 3 Credits.
Intensive exploration of theories of how geography, ecology, and technology shape political orders. Case studies of ancient, early modern, global, and contemporary topics, including European ascent, industrial revolution, tropics and North South divide, climate change, geo-engineering and global commons (oceans, atmosphere and orbital space
Area: Writing Intensive

AS.190.452. Party Politics from the Founding to the Progressives. 3 Credits.
Though the torchlight parade has long since passed, American parties still stand in the shadow of the nineteenth-century Party Period. This course seeks to untangle the ideologies and practices of party politics from the Founding to the Progressive Era. Topics include the rise of mass parties, political violence, the coming of the Republican Party, the party politics of Reconstruction and westward expansion, corruption and the political machine, Populism, and movements for reform. We pay particular attention to comparisons between past and present, and to opportunities taken and foregone.
Area: Writing Intensive

AS.190.454. Nuclear Weapons and World Politics. 3 Credits.
An intensive examination of competing theories of the role of nuclear weapons in world politics and alternative global security orders. Focus on nuclear weapons and the interstate system, deterrence, war fighting, arms control, proliferation and terrorism, with select historical and contemporary case studies.
Area: Writing Intensive

AS.190.471. The University and Society. 3 Credits.
In the 20th century, American universities became the envy of the world, leading in most categories of scholarly productivity and attracting students from every nation. In recent years, though, American higher education has come to face a number of challenges including rapidly rising costs, administrative bloat, corporatization and moocification. We will examine the problems and promises of American higher education, the political struggles within the university and the place of the university in the larger society. Upper classes and Grad Students only.

AS.190.473. Political Polarization. 3 Credits.
The American constitutional order, which was designed to operate without political parties, now has parties as divided as any in the democratic world. This course will examine explanations of how this happened, the consequences of party polarization for public policy and governance, and what if anything should be done about it.
Area: Writing Intensive

AS.190.474. Philosophy of Law. 3 Credits.
The philosophy of law or jurisprudence investigates the nature of law and what makes law, as it were, law. Thus, this course will examine various ways in which law has been defined and understood. It will also consider how law is distinguished from other systems of norms and values, such as morality, and how law is distinguished from other aspects of government, such as politics. In addition, the course will introduce students to discussions of legal reasoning and interpretation. Students will be required to participate in class discussion, take three exams, and write one paper.

AS.191.303. Critical Race Theory, Law, and Criminal Justice. 3 Credits.
In this course, students will gain a foundational understanding of critical race theory, including its genesis in legal theory. The course will examine its relationship and importance to social movements, including through key concepts like intersectionality. The course will also use critical race theory to grapple with law, racial segregation, and the criminal justice system in the United States.
Area: Writing Intensive

AS.191.335. Arab-Israeli Conflict. 3 Credits.
The course will focus on the origin and development of the Arab-Israeli conflict from its beginnings when Palestine was controlled by the Ottoman Empire, through World War I, The British Mandate over Palestine, and the first Arab-Israeli war (1947-1949). It will then examine the period of the Arab-Israeli wars of 1956, 1967, 1973, and 1982, the Palestinian Intifadas (1987-1993 and 2000-2005); and the development of the Arab-Israeli peace process from its beginnings with the Egyptian-Israeli treaty of 1979, the Oslo I and Oslo II agreements of 1993 and 1995, Israel's peace treaty with Jordan of 1994, the Road Map of 2003; and the periodic peace talks between Israel and Syria. The conflict will be analyzed against the background of great power intervention in the Middle East, the rise of political Islam and the dynamics of Intra-Arab politics, and will consider the impact of the Arab Spring.

AS.191.345. Russian Foreign Policy. 3 Credits.
This course will explore the evolution of Russian Foreign Policy from Czarist times to the present. The main theme will be the question of continuity and change, as the course will seek to determine to what degree current Russian Foreign Policy is rooted in the Czarist(1613-1917) and Soviet(1917-1991) periods, and to what degree it has operated since 1991 on a new basis. The main emphasis of the course will be on Russia's relations with the United States and Europe, China, the Middle East and the countries of the former Soviet Union--especially Ukraine, the Baltic States, Transcaucasia and Central Asia. The course will conclude with an analysis of the Russian reaction to the Arab Spring and its impact both on Russian domestic politics and on Russian foreign policy.

AS.191.352. Race, Class, and America. 3 Credits.
Through an intensive and in-depth reading of theorists, thinkers, historians, and political scientists, this course will take students through the deeply interconnected story of American race relations and labor politics. We will examine primary source material, such as the essays of Richard Wright and Ralph Ellison, the speeches of A. Philip Randolph, Bayard Rustin, and Martin Luther King, Jr., the memoirs of Charles Denby and Angelo Herndon, and the pamphlets of Claudia Jones; we will read historical accounts which situate these figures in their context; and we will engage critically with the fundamental topic: in the United States, what is the relationship between race and class; racism and exploitation; civil rights and labor activism? Toward the end of the course, we will examine recent scholarship that has returned to these themes to show how deeply imbricated America—its people, its institutions, its political economy—remains to this history.
Area: Writing Intensive

AS.191.354. Congress and Foreign Policy. 3 Credits.
This course is an introduction to the Congressional role in foreign policy. The Constitution grants the President the authority to conduct foreign policy. Yet it also gives Congress a substantial role in the shaping of foreign policy. The roles are not always clear, creating an inherent tension between these two branches of government and efforts on each side to increase their power. This class will address the "rules of the road" in conducting American foreign policy and how they change. The class will go beyond theory to include case studies that show the tension between Congress and the Administration – including the Iran Agreement, Climate Change, the use of sanctions and American policy towards Cuba. The course will include guest lecturers who work in Congress on the various aspects of foreign policy – including appropriations, intelligence, oversight and investigations. We will address the Congressional role in ratification of treaties and in declaring war. The class will consider the different ways that each branch of government approaches human rights and sanctions. The class will also address the domestic political aspects of foreign policy – including the role of advocacy groups and special interests and the political use of Congressional investigations. One class might be held in Washington D.C. at the U.S. Senate, so would require additional time for travel.

AS.191.358. Use of Force and the American State. 3 Credits.
This course examines the growth and development of the American state's coercive institutions, namely, the military and police. We will explore the ways in which the American state makes war, fights crime, and polices the boundaries of citizenship. While we tend to approach these topics from the perspective of international relations, law, or political philosophy, this course focuses on American politics and institutions. How did the United States secure control over a transcontinental territory in the absence of a large standing army? Why did the federal government try to criminalize vices, and how were these statutes enforced? How did violence influence the development of the American state, and to what extent do these historical processes explain warfare and law enforcement today?
Area: Writing Intensive

AS.191.406. Capitalism: Politics and Political Thought in a Market Economy. 3 Credits.
The United States is a capitalist economy and we live in a capitalist world. This a fact we take for granted and therefore spend little time examining. Capitalism' proponents attribute our society's unprecedented wealth and technological advances to this economic system. Some go so far as to claim that modern democracy and social progress are impossible without a capitalist economy. Critics point to growing social inequality and a slew of environmental ills as proof of capitalism's unsustainability. Some suggest that capitalism is antithetical to true democracy and human flourishing. But what exactly is capitalism? How did it evolve in the USA and how does the form capitalism takes in the United States differ from the forms it takes elsewhere? And, crucially, how is capitalism shaped by – and how does it shape – contemporary politics? And how exactly is this all related to liberalism, conservatism, neoliberalism, libertarianism, socialism, and democratic socialism? This seminar is designed to help students critically approach these questions.Rather than taking simplistic pro-contra approach, this seminar will examine capitalism along four axes: as a political-economic system, a corollary set of structures and institutions, the force behind a specific form of state organization, and the determinant of how society and individuals act and see themselves. To explore these issues, we will focus on a number of contemporary political issues, with a primary geographic focus on the United States, including the following: the debates over the welfare state and socialized healthcare; unions, lobbies, and special interests; the connection between capitalism, culture, and ideology; the effects of a capitalist organization of labor of questions of race, gender, and citizenship; the commodification of the environment and other species; and the process of critique, resistance, and social change in a capitalist system. Throughout, we will discuss the theoretical and empirical arguments put forward by a historically and disciplinarily broad range of thinkers including Karl Marx, Simone Weil, John Locke, Adam Smith, Robert Nozick, Thomas Sewell, Nancy Fraser, David Graeber, Melinda Cooper, Andreas Malm, and Guy Debord, through to Alexandria Ocasio-Cortez and Elon Musk.
Area: Writing Intensive

AS.191.415. Fear and Loathing: Writing About Contemporary American Politics. 3 Credits.
This course is focused on reading, analyzing, and, most importantly, producing writing about the American political experience and contemporary events in American politics. We will use scholarly, print, and new media sources from different sides of the political spectrum, drawing on political and literary theory to inform our discussions. We will then try to do better: Students will write and workshop a variety of pieces of different lengths and styles, spending in-class time on peer critique, presentations, and writing exercises, which they will compile into a writing portfolio. We will discuss and write op-eds, memoirs, long-form book reviews, commentary essays, and satire. Throughout, we will devote considerable class time to critique and discussion of students' writing. Readings will include works by James Baldwin, William F. Buckley, Claudia Rankine, Hunter S. Thompson, Ta-Nehisi Coates, Alexander Chee, Angela Nagle, and Omar el Akkad. We will draw on political commentary from sources ranging from The Washington Post to Jacobin to The Onion, through to Facebook and Twitter. Throughout, we will consider a wide range of topics pertinent to writing about politics, including questions of the make-up of the public sphere and diverse audiences, the use of voice and language, the deployment of facts and rhetoric, the place of fiction and humor in political critique, and the rise of fake news and trolling.
Area: Writing Intensive

Program in Latin American Studies

AS.361.335. Colombia at War. 3 Credits.
The history of Colombia comes down to a tale of armed conflicts, protracted and renewed civil wars, coups, ethnic cleansing riots, narco wars, besides the struggles for independence from Spanish colonial rule and extractive capitalist exploitation. We will study the literary, journalistic, and historical record about warring and uncivil Colombia through fiction from Gabriel García Márquez (The General in his Labyrinth and News of a Kidnapping), Fernando Vallejo (The Virgin of the Assassins), and Juan Gabriel Vázquez (The Sound of Things Falling and The Secret History of Costaguana). We will also delve into the current peace process and disarming of the FARCS and the perils and promises that the absorption of the former combatants and recalcitrant holdovers pose to the skeptical and hopeful citizens and various political factions.

AS.361.336. Hugo Chávez, Fidel Castro, and Bolivar's Venezuela. 3 Credits.
Are the current extreme hard times in Venezuela's Bolivarian Republic irreversible? Is there a ballpark somewhere for Thomas Jefferson and Simón Bolívar to hold a debate match about democracy, achieved emancipations, republican values and the lure of dictatorship? The course welcomes serious and sharply political dialogue about ideals of democratic republicanism in clash from the rise and apparent fall of Fidelismo and Chavismo in the Caribbean region to the agitations and alliances dictated by Trump's seizure of American politics.

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered.
Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

Sociology

AS.230.150. Issues in International Development. 3 Credits.
Why do billions of people continue to live in poverty? What obstacles stand in the way of secure and dignified lives for all? Who is most likely to bring about change, what strategies should they follow, and what kinds of institutions should they put in place? This course will introduce the main theoretical perspectives, debates, and themes in the field of international development since the mid-20th century. It has three sections. The first section focuses on debates over the optimal conditions and strategies for generating economic growth and on the relationship between growth, human welfare, and inequality. The second section presents critical assessments of development interventions from various perspectives. The third section considers the role of social movements in shaping development and social change in the 21st century.

AS.230.175. Chinese Revolutions. 3 Credits.
This course introduces the origins, operation and impacts of five major revolutions in modern China between 1850 and 1950. These include the Taiping Rebellion, the republican revolutions, federalist and southern automatic movements, labor strikes as well as peasant rebellions. It draws on the existing historiography that examines China's transition from an empire to a republic, impacts of western and Japanese influences to China, as well as the continuity and change of Chinese social organizations. Cross list with International Studies and East Asian Studies. Fulfills IS History requirement.
Area: Writing Intensive

AS.230.213. Social Theory. 3 Credits.
This course will focus on four classical social theorists whose ideas have greatly influenced how we study and understand society: Karl Marx, Emile Durkheim, Max Weber and W.E.B. DuBois. Students will gain an in-depth understanding of how each theorist answered three major questions: 1) what is the origin, structure and historical dynamic of modern society?; 2) how do we gain an accurate knowledge of society?; 3) what are the conditions of possibility for freedom in modern society? In comparing, applying and critiquing their respective theories, students will advance their own theory of society.
Area: Writing Intensive

AS.230.219. Land, Labor and Environmental Movements in Contemporary Africa. 3 Credits.
The course examines the new wave of social protest and popular uprisings in contemporary Africa through the interconnected themes of land, labor, and environmental movements.Attention will be placed on the early 21st century.

AS.230.221. Global Social Change. 3 Credits.
This course introduces students to issues of global social change, with a particular focus on the challenges of international development and the contemporary globalization process. Specific themes include world income inequality and global poverty, the rise of supranational organizations (e.g. WTO and EU) and their relations with sovereign states, anti-globalization activism, the rise of China and India in the global economy, and the origins as well as consequences of the current global economic crisis and global pandemics, among others. Lectures will be aided by documentary films and other multi-media materials. Special Note: Fulfills Economics requirement for IS GSCD track students only. Formerly offered as AS 230.353. Students who took AS.230.353 cannot take AS.230.221.
Area: Writing Intensive

AS.230.228. Colonialism in Asia and Its Contested Legacies. 3 Credits.
This course surveys the impacts of colonialism in East and Southeast Asia. Special attention will be paid to the social and economic development in British Singapore and Hong Kong as well as Japanese Korea and Taiwan. Topics include free-trade imperialism, colonial modernity, anticolonial movements, pan-Asianism, and post-war U.S. hegemony.

AS.230.233. Inequality and Social Change in Contemporary China. 3 Credits.
This course examines the trajectory of economic development in China since the beginning of market reforms in the late 1970s, with a special focus on social inequality and forms of resistance that have emerged in response to the expansion of the market economy. The first part of the course focuses on understanding the academic debates around China's economic miracle and introduces students to theories about the relationship between market expansion and social resistance. The second part focuses on key thematic topics including the rural/urban divide, rural protest, urban inequality and labor unrest, gender and sexuality in social movements, environmental protests, and the politics of ethnic relations.

AS.230.238. Beyond the Wall: The Political Economy of the US and Mexico. 3 Credits.
Examining the exchange of culture, people, and commodities between the United States and Mexico since the 19th century, this course asks not just how US practices and policies have shaped Mexican society, but how, in turn, Mexico has shaped the United States. We will examine the social, political, and economic forces that have long pulled these two societies together – and pushed them apart.

AS.230.239. Coffee, Tea and Empires. 3 Credits.
The course introduces the transformation of the coffee and tea industries in the long nineteenth century against the backdrop of European and Japanese colonial expansion. It surveys the social changes in the colonial world under the development of the cash crop economy. It also analyzes how the consumption of such caffeinated beverages became sources of heritage makings both in the metropoles and colonies and the latter's postcolonial reconstructions.

AS.230.242. Race and Racism. 3 Credits.
Race has been important in social classifications and producing inequalities. This course is designed to provide you with a global understanding of how racial categories are created and maintained, how they change over time, and how they vary from place to place. It is organized in four parts. The first part introduces the concepts and analytical tools used by social scientists to study race. Of particular concern is power and the social construction rather than "natural" categories of race, as well as the general social processes involved in the maintenance and reproduction of these boundaries. In the second part, we will study the theories and dynamics racial category formation in the United States with attention to forms and processes of racial exclusion and oppression, and evidence of socio-economic inequalities based on race. In the third part of the course, we will compare these processes in the U.S. to those occurring in other countries. The fourth and final part of the course examines how race and racism shape political struggles and resistance movements.

AS.230.244. Race and Ethnicity in American Society. 3 Credits.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.250. Knowledge, Evidence, and Democracy. 3 Credits.
Fake news. Alternative facts. Follow the science. Misinformation. Disinformation. How can we understand the role of information, evidence, and scientific inquiry in politics? Where does information come from? How is it used? How can evidence, argument, and listening improve public conversations? This seminar will examine the connections between information, knowledge, evidence, and democracy, focusing mostly on the United States but with global examples as well.
Area: Writing Intensive

AS.230.265. Research Tools for Global Sociology and Development. 3 Credits.
This course will introduce students to a range of software programs that are critical for conducting social scientific research in the 21st century. Students will develop competency in the use of computer programs for statistical analysis, database management, the creation of maps and timelines, and the presentation of research reports. The course uses examples from ongoing social science faculty research projects at Johns Hopkins on global inequality and international development. Required for GSCD track students.Course previously titled "Research Tools and Technologies for the Social Sciences"

AS.230.304. (Making Space For) Black Thought. 3 Credits.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, Sadiya Hartman, Walter Rodney, Derek Walcott, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.306. Plagues, Power, and Social Control. 3 Credits.
While developments in biomedicine and health care have led to the eradication, cure and management of many human health problems, disease, illness and health have also been the focus for aggressive social controls and population management. The technologies and practices of disease control and health management have been foundational to some of the most aggressive structures of oppression in recent history such as the Jewish Ghetto, the Concentration Camp, the South African Township and techniques of segregation. This course seeks to explore how epidemics and disease control are linked to larger questions of power, state craft and international dynamics. This course asks how have outbreaks of infectious disease shaped social and political action? How do societies respond to outbreaks and why? What do epidemic moments tell us about global structures of power and the dynamics of control? Drawing on historical cases including plague during the European Renaissance and before, the HIV/AIDS Pandemic and the West African Ebola Outbreak of 2013-2016, this course will introduce students to the history and practices of disease control as well as important theoretical perspectives by which to understand the sociological and historical effects of disease and the responses to them. Students will engage sociological concepts such as biopolitics, social construction of disease and illness and biosecurity and produce a final research paper examining the outcomes and responses to an epidemic event to show mastery of the topics covered in the course.
Area: Writing Intensive

AS.230.315. Advanced Topics in International Development. 3 Credits.
This class offers an advanced engagement of various topics in international development. The course begins with an historical examination of the actors and global events, as well as the intellectual debates, that birthed the field of international development as a discrete area of study and practice. We will then analyze the evolving theories that dominated the first five decades of the international development effort. The final part of the course will examine more recent perspectives that have attempted to fill the intellectual void left by the demise of the traditional development paradigm. Here we will cover topics that span the global North and South, including issues of race/caste/ethnicity, migration, gender, and right-wing nationalism. Some prior knowledge of international development is recommended
Area: Writing Intensive

AS.230.316. African American Family. 3 Credits.
This course is an examination of sociological theories and studies of African-American families and an overview of the major issues confronting African-American family life. The contemporary conditions of black families are explored, as well as the historical events that have influenced the family patterns we currently observe. Special attention will be given to social policies that have evolved as a result of the prominence of any one perspective at a given point in time.

AS.230.317. Sociology of Immigration. 3 Credits.
This course surveys sociological theories and research on immigration to the U.S. Theoretical approaches include theories of international migration, economic sociology, immigration, and assimilation. Research topics include the impact of U.S. immigration laws and policies on immigrant inflows and stocks, self-selection of immigrants, the impact of immigration on the native-born population and the U.S. labor market and economy, and the adaptation of the first and second generations.
Area: Writing Intensive

AS.230.318. The Political Economy of Modern India. 3 Credits.
This course examines the complex, at times conflicting, relationship that has emerged between Indian seats of power from above and Indian expressions of society from below. Attention will be placed on the period between 1947 to the present.
Area: Writing Intensive

AS.230.324. Gender and International Development. 3 Credits.
This course employs a comparative perspective to examine the gendered impact of international development experiences and policies. Students will discuss the historical evolution of how the concept of gender has been constructed, conceptualized, and integrated into international development theory and practice. The course will also examine how greater international development. In particular, we will examine structural theories of poverty reduction, individual theories of power and processes of stratification at the household and family level. Specific issue areas will include the globalization, class and work political participation and social movements. Cross-listed with International Studies (CP, IR). Fulfills Economics requirement for IS GSCD track students only.
Area: Writing Intensive

AS.230.325. Global Social Change and Development Practicum. 3 Credits.
This course provides "hands on" research experience in the field of global social change and development. The course fulfills the "research practicum" requirement for Sociology majors and is required for the GSCD track.

AS.230.327. Sociology of Revolution and Counterrevolution. 3 Credits.
In this course, students will learn about analyzing revolutionary and counterrevolutionary movements, with a focus on their strategic dimensions. Contributions from the military, counterinsurgency, sociology of revolution, historical materialist, world-system, and critical realist literature will provide different visions of strategy and tactics. The cases of Guatemala and Chile in the early 1980s and 1970s, respectively, will provide historical and empirical roots to class discussions about these different approaches and the possibilities of synthesizing them.
Area: Writing Intensive

AS.230.335. Medical Humanitarianism. 3 Credits.
Humanitarian organizations play life-preserving roles in global conflicts, and have front-row views of disasters ranging from the 2010 Haiti earthquake to the 2011 Fukushima tsunami in Japan. Yet even while they provide vital assistance to millions of people in crisis, such organizations are beset by important paradoxes that hinder their capacity to create sustainable interventions. They work to fill long-lasting needs, but are prone to moving quickly from one site to the next in search of the latest emergency. They strive to be apolitical, yet are invariably influenced by the geopolitical agendas of global powers. How do such contradictions arise, and what is their impact upon millions of aid recipients around the world? Drawing on case studies from South Sudan to Haiti, this course addresses these contradictions by exploring how and why medical aid organizations attempt, and sometimes fail, to reconcile short-term goals, such as immediate life-saving, with long-term missions, such as public health programs and conflict resolution initiatives.

AS.230.337. Global Crises: Past and Present. 3 Credits.
This course will compare the current global crisis with previous major crises of historical capitalism through a combination of theoretical and historical readings. Throughout, we will ask: What can a study of past crises tell us about the nature and future trajectory of the current global crisis? Special emphasis will be placed on (1) “the late-nineteenth century great depression”, (2) the Great Depression of the 1930s, and (3) the period of crisis and stagflation in the 1970s. We will be particularly concerned to understand the differential social and geopolitical impact of the crises. Which social classes bore the brunt of the disruptions in economic activity in each crisis? Which geographical areas or geopolitical groupings lost out (or benefited) from the crisis? How have environmental and ecological challenges resurfaced in each crisis including today?

AS.230.342. Resistance, Rebellion, and Revolution in Latin America. 3 Credits.
This course will examine the dynamics of transformative social change in Latin America and the Caribbean through analyses of resistance, rebellion, and revolution. Because revolutionary change is at once the most transformative and the most rare, this course will cover the exemplary cases of the Haitian, Mexican, and Cuban revolutions, but then also ask how theorists have understood the dynamics of both open rebellion and of everyday resistance in societies deeply structured by racial, gender, and class power, situated within an unequal world system. Attending to both local and global dynamics, this course will ask how Latin American dynamics have both conformed to and challenged universalist theories of social change.

AS.230.348. Climate Change and Society. 3 Credits.
This course will focus on the social dimensions of climate change. Drawing on global and multi-disciplinary scholarship, we will address such issues as: the history of fossil capitalism; the relationship between social inequality and “vulnerability” to climate change (including heat waves, drought, rising seas, and extreme weather); climate migration and the political economy of “adaptation”; the merits of various mitigation strategies, including the Green New Deal, conservation offsets, and geo-engineering; the roots of climate denialism; and climate justice movements. Students will write a final research paper on a sociological aspect of climate change.
Area: Writing Intensive

AS.230.349. Class, Race, and Political Struggle in Capitalist Societies. 3 Credits.
Does capitalism promote democracy and stability, or repression, racial conflict, and social unrest? Following the 2008 financial crisis, countries around the world have experienced severe economic and political crises, giving rise to explosive movements that have challenged the viability of capitalism and democracy as durable systems. By considering these developments, this course examines the core political dimensions of capitalist societies. We will define and discuss key terms, like capitalism, racial capitalism, the capitalist state, democracy, social movements, and more. We will pay special attention to the ways in which the economic, political, and ideological structures of capitalist societies shape and are shaped by social movements and political parties. The course is global in perspective, drawing on developments in many countries, with a special focus on the United States.
Area: Writing Intensive

AS.230.350. Capitalism, Dependency, and Development in Latin America. 3 Credits.
This course examines Latin American insertion into the global capitalist economy from the colonial period to the present. Examining various historical, sociological, and political-economic theories, this course will ask not only how Latin American economies and societies have developed their particular characteristics, but also how theorists within and outside the region have understood Latin American development over time.development over time.

AS.230.352. Chinese Diaspora: Networks and Identity. 3 Credits.
This course combines lecture and class discussion. It examines the history and historiography of Chinese overseas migration. Major issues include overseas Chinese as "merchants without empire," Chinese exclusion acts in the age of mass migration, the "Chinese question" in postcolonial Southeast Asia, as well as the making and unmaking of Chinese identity in the current wave of globalization.
Students may not have completed AS.230.217 previously.

AS.230.356. Power, Privilege, and Inequality. 3 Credits.
Race, class and gender are among key factors in systematic patterns of inequality in the United States (and globally). In this course, we examine the manner in which social inequality comes about and is maintained through a range of social institutions and daily social interactions. This class will examine how social institutions and daily social interactions structure the decisions individuals make and, in turn, how the decisions that individuals make serve to perpetuate or challenge existing social institutions and interactions. We will explore how the intersection of different forms of inequality, for example race and class or class and gender challenge traditional conceptions of inequality and provide insight into the processes that perpetuate inequality. We will use these sociological tools to develop what sociologist C. Wright Mills calls the "sociological imagination" and apply this imagination to contemporary debates in American society. We will discuss how the sociological imagination differs from the approach other disciplines in social science might take to study inequality.

AS.230.363. Sociology of Dispossession. 3 Credits.
The "grabbing" of land and natural resources has, in recent years, generated widespread political conflict across the world and put dispossession on the agenda of academics and policy-makers. Nevertheless, compared to other social relations of power, land dispossession has not been central to scholarly or public understandings of capitalism, the state, development, or politics. In this class, we will collectively explore the nascent field that we might call the sociology of dispossession. We will examine existing theories of dispossession, and proceed to challenge, reconstruct or supplant those theories as we consider a wide range of historical examples of dispossession from the English Enclosures and colonial plunder to contemporary urban redevelopment and rural land grabs. This is a reading- and writing-intensive seminar.
Area: Writing Intensive

AS.230.366. Black Social Thought and Social Movements. 3 Credits.
This course will examine the reciprocal relationship between Black social thought and social movements. How have social movements informed thinkers who grapple with questions of freedom and liberation in racially and economically stratified societies, and how have their ideas affected movement tactics? This course will look at 20th century movements and investigate connections between theory and practice through concepts like civil disobedience, internal colonialism, Black feminism, Black internationalism, and others.
Area: Writing Intensive

AS.230.367. Islamic Finance. 3 Credits.
Today, Islamic finance is a global industry comprising nearly $3 trillion in assets, with hubs from Kuala Lumpur to Dubai to London. But half a century ago, nothing called "Islamic finance" existed. So where did Islamic finance come from? Why is it growing so fast? And what does it mean for finance to be Islamic? We discuss the ban on usury in Islam and other religious and philosophical traditions, finance in early and medieval Islamic societies, petrodollars and the birth of Islamic banking in the 1970s, the rise of Islamic capital markets since 2000, contemporary shariah-compliant financial structures, and the constitution of piety through financial practice.

AS.230.369. Sociology in Economic Life. 3 Credits.
This course discusses how geopolitics, technology as well as social differentiation (such as race, class and gender) shape the structure of economic actions. Special attention will be paid to patterns of state-business relationship, labor processes, migrant economy, globalization and international division of labor.

AS.230.370. Housing and Homelessness in the United States. 3 Credits.
This course will examine the role of housing, or the absence thereof, in shaping quality of life. It will explore the consequences of the places in which we live and how we are housed. Consideration will be given to overcrowding, affordability, accessibility, and past and existing housing policies and their influence on society. Special attention will be given to the problem of homelessness.
Students may not have previously taken AS.230.223.

AS.230.378. Refugees, Human Rights, and Sovereignty. 3 Credits.
What is a refugee? Since World War II, states that have pledged to offer protection to refugees have frequently been drawn instead to the dictates of nationalism and communitarianism, which prioritize concern for their own citizens, rather than to the needs of forced migrants. As a result, even those migrants that have been formally recognized as refugees according to the 1951 UN Refugee Convention have not been assured of protection, and other migrants have been even less assured. In this course, we will locate the reasons for this reality in the legal, political, and historical underpinnings of political asylum. What is the difference between an asylum seeker and a refugee? How has the refugee category been redefined and contested by international bodies since 1951? How are the ambiguities of real-life violence and persecution simplified in asylum adjudication interviews that require clear, factual narratives? What kinds of protections are offered to asylum seekers, whether by UN bodies, NGOs, or host governments, and how have such protections varied geographically and historically? Finally, what protections, if any, are afforded to those migrants who are fleeing not persecution but rather "merely" endemic poverty or climate-induced displacement? The course draws on literature from sociology, history, anthropology, and international refugee law in order to understand the capacity (or lack thereof) of human rights discourses and declarations to contravene state sovereignty in the name of protecting the rightless.

AS.230.385. Schooling, Racial Inequality and Public Policy in America. 3 Credits.
After examining alternative explanations for why individuals obtain different amounts and types of educational training, the course focuses on how an individual's family background and race affect his or her trajectory through the educational system. The course covers the specific challenges that have confronted urban schooling in America since the 1960s, including the classic literature on the effects of school and community resources on student achievement as well as the development and later evaluation of school desegregation policies. The course also considers case studies of current policy debates in the US, such as housing segregation and school resegregation, voucher programs for school choice, and the motivation for and consequences of the establishment of state-mandated testing requirements. Throughout the course, emphasis is placed upon the alternative modes of inquiry and writing which opposing scholars, policymakers, and journalists use to address these contentious topics.
Area: Writing Intensive

AS.230.386. The Making of the Asian Races Across the Pacific in the Long 20th Century. 3 Credits.
Focusing on the race-makings of the Asians across the Pacific in the long twentieth century, the course employs the reading materials that elucidate the constructions about the demographic categories of the Asian "races." We use prewar Japanese materials and Chinese nationalist thoughts to elaborate on the following themes: the internal distinction among the peoples grouped under the racial category of the Asians; the overall presentation about the generic category of the "Asian" peoplehood, as well as their alleged shared civilization and interests. The theoretical framework include concepts of capitalist reconfiguration of social boundaries through racism and the question of power behind the reproduction of racial hierarchy.

AS.230.389. The Value of Life: Racism, Capitalism and Health. 3 Credits.
We are generally told that you can't put a price on life or a price on our health but lives are quantified, valued and priced every day. In this class we will explore the ways in which life is valued in the modern world, its effects and the outcomes from it. We will also examine how forms of quantification and valuation have been employed to dehumanize and subjugate peoples, especially those racialized as different. Beginning with an exploration of human pricing during the trans-Atlantic Slave trade and continuing through to contemporary health care and health insurance practices, this course will examine how we value (monetarily) human existence in modernity. This course will introduce students to ideas emerging out of the Black Marxist Tradition, postcolonial thought, and critical feminist approaches to historical research. From the examination of insurance under slavery to the use of race corrections in medical algorithms, this class will confront students with the question- "how can we put a price on life?" and most importantly "Should we?".
Area: Writing Intensive

AS.230.393. Global Health and Human Rights. 3 Credits.
Is access to healthcare a fundamental human right? If so, then which global actors are obligated to provide healthcare to whom, and for how long? How do meanings of health and illness vary across time and place? And finally, how are human rights principles translated into frontline practice in order to promote well-being? This course takes a critical interdisciplinary approach to these questions through a series of global case studies ranging from humanitarian aid in post-tsunami Sri Lanka to anti-FGM (female genital mutilation) campaigns in Ghana. How do international NGOs, UN bodies, and governments collaborate (or compete) to distribute healthcare in places beset by dire resource shortages? Do human rights principles carry legal weight across borders, and if so, could access to healthcare services and essential medicines be litigated in order to compel governments to provide it? And finally, what cultural assumptions do human rights discourses carry with them, and what happens if rights-based approaches are poorly received by recipient populations? Moving beyond the basic principle of healthcare as a human right, this course aims to bring this idea's history and politics into focus by offering an in-depth exploration of its ethics and implementation.
Area: Writing Intensive

AS.230.395. Contemporary Social Theory. 3 Credits.
What is the structure of society, how does it change, and how is it reproduced? What is the relation between social structures and our ideas about them? What are the conditions of possibility for human freedom? This course will examine how major social theorists of the 20th century advanced novel answers to these questions as they grappled with the historical events and social concerns of the 20thcentury—the Russian revolution and its degeneration into Stalinism, the failure of communist movements in the West, the rise and fall of fascism and Nazism, the consolidation of capitalist democracies and welfare states, the emergence of anti-colonial movements in the "Third World," and the persistence of race, gender and sexuality as forms of domination. In addition to understanding and comparing theories, we will assess their usefulness for understanding the present. This is a reading and writing-intensive seminar.
Area: Writing Intensive

AS.230.396. Politics and Society. 3 Credits.
This seminar surveys key problems of political sociology including the rise of the modern state, the origins and nature of liberal democracy, sources of authority, the relationship between political and economic power, the nation-state and nationalism, states and war, ideology and political contention, collective identity, social movements, and social revolutions. Fulfills Comparative Politics for International Studies.
Area: Writing Intensive

AS.230.397. The Political Economy of Drugs and Drug Wars. 3 Credits.
In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

AS.230.405. Neoliberalism. 3 Credits.
Neoliberalism, a political project that seeks to subject all aspects of social life to free market force, has ascended to orthodoxy in developed and developing countries alike over the last four decades. This course is a reading seminar focused on some of the key classic and cutting-edge original texts that critically examine and debate the origins, socio-political impacts, and crisis of the neoliberal project. It will cover such topics as the genealogy of the neoliberal idea, neoliberal state, informalization of works, neoliberal cities, rise of the one percent, and global governance. Class will be a mix of lecture and seminar-style discussions. Requirements include reading memo, class presentation, and a term paper.
Area: Writing Intensive

AS.230.415. Social Problems in Contemporary China. 3 Credits.
In this course we will examine contemporary Chinese society, looking at economic development, rural transformation, urbanization and migration, labor relations, changes in class structure and family organization, health care, environmental problems, governance, and popular protest. The course is designed for both graduate and undergraduate students. Undergraduates must have already completed a course about China at Hopkins. Cross-listed with East Asian Studies.
Area: Writing Intensive

AS.230.418. Racial Capitalism: A Sociological Perspective. 3 Credits.
This course provides theoretical and historical approaches to examining the centrality of racism, imperialism, and colonialism to the origins and ongoing functioning of capitalism and the global political economy. We begin with the dominant theoretical frameworks used to study capitalism and carefully juxtapose these with theory and empirical analyses foregrounding capitalism’s connections to racial slavery/racialized labor exploitation, imperialism, colonialism, and gendered exploitation. Following this, we examine the unfolding of capitalism in the post-emancipation, post-independence, and neoliberal periods, paying close attention to inequalities produced within and between nations. We end by examining resistance to racial capitalism, as well as imagining alternative futures.
Area: Writing Intensive

AS.230.440. Port Cities and Historical Capitalism in Maritime Asia. 3 Credits.
The goal of the seminar is to examine the prospects and limits of understanding the incorporation of Asia in the capitalist world-system from the prism of oceanic connections. The theoretical thrust of this course is to develop but also to adapt Janet Abu-Lughod emphasis on the connections across port cities and littoral in the Afro-Eurasian continents before the long sixteenth century in her Before European Hegemony. But instead of looking at a port city as its adjacent hinterland polity’s gateway to global trade in the premodern era, the course examines the multifarious coast-hinterland relationships. The readings are organized by a chronological order, which begins with the historical maritime silk road between the third and thirteenth centuries, and will be followed by Asian port cities in the European age of empire and postwar American-led Cold War Structure, as well as the present-day Chinese New Silk Road Diplomacy. Students are expected to select an issue of regional tensions and to analyze its historical root.

AS.230.445. Sociology of Religion. 3 Credits.
This seminar tackles major issues in the classical and contemporary sociology of religion. We begin with Ibn Khaldun, Friedrich Nietzsche, Karl Marx, Max Weber, Émile Durkheim, and Mary Douglas, asking basic questions: What are religion and the sacred? Why do they exist? What is the relationship between religion and social structure? And what role does religion play in morality, solidarity, boundaries, exploitation, patriarchy, and macrohistorical transformations such as the rise of capitalism? Keeping this theoretical grounding (and its flaws and biases) in mind, we continue to probe the problem of religion in modernity through more-recent writings. Topics include the secularization debate (Are modernity and religion antithetical?); “religious markets” and rational-choice theories of religion; religious revivalism, evangelicalism, fundamentalism, and proselytizing movements; feminist and queer sociologies of religion; civil religion (Is standing for the national anthem a religious act?); embodiment and prayer; Orientalism and postcolonial interrogations of the secular; religious violence and nationalism; the intersectionality of religion with race, class, and caste; and religion and neoliberalism. Although dominant sociologies of religion have focused on Christianity in Western Europe and North America, this course applies a global lens, training significant focus on non-Western and non-Christian contexts.
Area: Writing Intensive

AS.230.465. Labor in the World System. 3 Credits.
This is an intensive reading seminar on working class formation from a comparative, historical and global perspective, including theoretical and empirical (case study) readings on changes over time in labor process, labor markets, and labor movements. We will build on a range of local case studies to establish spatial and temporal patterns, and discuss the connections between these global patterns and the dynamics of historical capitalism.
Area: Writing Intensive

Study of Women, Gender, & Sexuality

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.
Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women's thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

AS.363.330. Ecofeminist Debates: Gender and Sexuality Beyond the Global West. 3 Credits.
This course develops an interdisciplinary and comparative approach to introduce students to ecofeminism through a special focus on its inflections in non-western contexts. Through class discussions and sustained writing engagement, we will develop an understanding of the history of ecofeminism, including theoretical debates linking gender perspectives with political mobilization, as well as ecofeminism's enduring influence on new intellectual and political movements.

For current faculty and contact information go to http://krieger.jhu.edu/internationalstudies/directory/

International Studies, Bachelor of Arts

International Studies Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Students considering a major in International Studies should begin introductory courses required of the major early in their college careers. Choices may include AS.180.101 Elements of Macroeconomics, AS.180.102 Elements of Microeconomics, the appropriate level of a foreign language, and one of the designated Gateway courses.

The international studies major is comprised of three main components:

- Foreign language study
- Courses in history, political science, and economics
- A focus area of the student's choosing

In addition, students must earn a grade of C- or better in all courses applied towards major requirements and courses may not be taken satisfactory/unsatisfactory. Students must also complete at least 5 courses at the 300 level or higher within the history, political science, and/or economics components of the major. This excludes courses used to fulfill the language requirement and focus area.

Foreign Language

Language proficiency through the second semester of the advanced/third-year level is required. If students have proficiency above the advanced/third-year level, they must take either: Option (A), two semesters of upper level literature or culture courses offered by the language departments and taught in the language of proficiency, or Option (B), take two semesters of another language. Waivers indicating advanced level/third-year language proficiency must be documented in the student's official academic record in order for a student to be eligible to complete Option A or B. To receive these waivers, students should contact the Center for Language Education or the Department of Modern Languages & Literatures to complete a proficiency exam on campus.

Core Courses

Courses fulfilling the specific requirements below are listed on the International Studies website (http://krieger.jhu.edu/internationalstudies/courses/).

- One Gateway course: AS.190.108 Contemporary International Politics, AS.190.111 Introduction to Global Studies , or AS.192.150 States, Regimes & Contentious Politics.
- One course in international relations (POS-Tag INST-IR)
- One course in American politics (POS-Tag INST-AP)
- Two courses in comparative politics (POS-Tag INST-CP)
- One course in political theory (POS-Tag INST-PT)
- Five courses in global history (identified by the POS-Tag INST-GLOBAL on the course description in the schedule of classes).
- Four courses in economics. Two courses must be AS.180.101 Elements of Macroeconomics and AS.180.102 Elements of Microeconomics. One must be an internationally-oriented course identified by the POS-Tag INST-ECON on the course description in the schedule of classes. The final course may be of the students' choosing from courses offered in the Economics Department at Johns Hopkins University. Both the Elements courses should be completed by the end of the sophomore year.

Focus Area Specialization

Every major in International Studies selects a specialization area, which consists of four courses within a coherent field of interest. Specialization fields may be organized in terms of area (e.g., Latin America, East Asia), theme (e.g., security studies, international economics), or language (e.g., Chinese, Spanish). These courses may not overlap with other requirements of the major.

Major Requirements

Code	Title	Credits
Foreign Language Study		
Two courses beyond the intermediate level or, if proficient based on exam, two additional language courses		6-10

Gateway Course		
AS.190.108	Contemporary International Politics	3
or AS.190.111	Introduction to Global Studies	
or AS.192.150	States, Regimes & Contentious Politics	
Political Science Courses		
One international relations course		3
One American politics course		3
Two comparative politics courses		6
One political theory course		3
Economics Courses		
AS.180.101	Elements of Macroeconomics	3
AS.180.102	Elements of Microeconomics	3
One AS.180.xxx course		3
One approved internationally-focused economics course [1]		3
History Courses		
Five global history courses with the POS-Tag INST-GLOBAL		15
Focus Area		
Four courses within a coherent field of interest		12
Total Credits		**63-67**

1. Approved internationally-focused economics courses are listed each semester on the International Studies website and can be identified by the POS-Tag INST-ECON on the course description in the schedule of classes.

Sample Plan of Study

Note: The plan below assumes the student begins language study at the Elements/First-Year level. Not displayed on the plan below is the requirement that at least 5 courses be taken at the 300 level or higher within the history, political science, and/or economics components of the major. This excludes courses used to fulfill the language requirement and focus area.

Course	Title	Credits
First Year		
First Semester		
AS.180.101	Elements of Macroeconomics	3
AS.190.108	Contemporary International Politics (or other gateway course)	3
History course (INST-GLOBAL)		3
Foreign language		4
	Credits	**13**
Second Semester		
AS.180.102	Elements of Microeconomics	3
Foreign language		4
Comparative politics (INST-CP) course		3
	Credits	**10**
Second Year		
First Semester		
Foreign language		3
International relations (INST-IR) course		3
AS.180.xxx Economics course		3
History course (INST-GLOBAL)		3
	Credits	**12**
Second Semester		
Foreign language		3
Political theory (INST-PT) course		3
Focus area course		3
	Credits	**9**
Third Year		
First Semester		
Foreign language		3
American politics (INST-AP) course		3
History course (INST-GLOBAL)		3
	Credits	**9**
Second Semester		
Foreign language		3
Comparative politics (INST-CP) course		3
Internationally-focused economics course (INST-ECON)		3
	Credits	**9**
Fourth Year		
First Semester		
Focus area course		3
Focus area course		3
History course (INST-GLOBAL)		3
	Credits	**9**
Second Semester		
Focus area course		3
History course (INST-GLOBAL)		3
	Credits	**6**
	Total Credits	**77**

Double-Major and Major-Minor Programs

Students may pursue one of International Studies' unique double-major or major-minor programs. These are offered in conjunction with affiliated departments and allow students to concentrate their course of study within a specific department or program while simultaneously benefiting from the interdisciplinary training offered by the International Studies major.

Students pursuing a double-major program will receive a major in International Studies as well as a major in the affiliated department or program. For example, students pursuing the Global Social Change and Development track will receive a double major in International Studies and Sociology. The student will have a faculty advisor from the affiliated department or program as well as an advisor in International Studies.

Students pursuing a major-minor program will receive a major in International Studies and a minor in the affiliated department or program (e.g., students pursuing the Global Italy track will receive a minor in Italian Studies) and benefit from a faculty advisor in the affiliated department or program.

Successful completion of an approved double-major or major-minor program will satisfy the International Studies major's focus area requirement.

Senior Thesis and Honors in the Major

International Studies majors also have the opportunity to write a senior thesis. A senior thesis is an extended original research project written under the supervision of a faculty advisor during the student's senior year. Thesis projects are best suited for students who have an interest in exploring a specific question and/or a field of knowledge beyond their previous course work. Students may complete a senior thesis regardless of GPA; however, those students with a 3.7 GPA (or above) in their International Studies major coursework, and who complete a senior thesis that is internationally-focused, will be eligible for honors in International Studies. Theses completed for any of the major's affiliated departments may be used to earn honors both in that departmental major and in International Studies.

Study Abroad

Studying abroad is especially valuable for International Studies majors. JHU encourages all IS majors to spend one or both semesters of their junior year abroad. International Studies sponsors a number of study abroad programs designed for IS majors and administers them in collaboration with the Office of Study Abroad.

The Junior Year or Semester Abroad at SAIS Europe, offered through the Bologna, Italy campus of the Paul H. Nitze School of Advanced International Studies (SAIS), allows motivated International Studies majors to spend all or part of their junior year taking graduate level classes. Students who spend their junior year or a semester in Bologna and subsequently apply for graduate studies at SAIS will receive advanced credit at SAIS for part of their work.

A similar exchange program with the French political science institute Sciences Po allows students to spend a semester or a year studying at one of Sciences Po's seven regional campuses: Paris, Menton, Reims, Poitiers, Le Havre, Nancy, or Dijon. Courses are offered in English as well as French and thus are open to students regardless of their knowledge of French. One of Europe's most prestigious universities, Sciences Po has a strong international focus and allows students to develop a cross-cultural and transatlantic perspective, while simultaneously offering unique access to the field of international affairs.

Additionally, the Office of Study Abroad offers a wide range of study abroad opportunities across the globe tailored to students' specific interests.

BA/MA Programs for International Studies Majors

The International Studies Program offers two BA/MA options for its undergraduates, one with the Johns Hopkins Paul H. Nitze School of Advanced International Studies (SAIS) (p. 846) in Washington, DC and the other at the renowned French political science institute Sciences Po (https://krieger.jhu.edu/internationalstudies/bama-programs/bama-program-with-sciences-po-paris/) in Paris. Admission to both programs is restricted to current Johns Hopkins University undergraduate International Studies and Political Science majors (Note: East Asian Studies majors may apply to the Nanjing, China campus for the BA/MA program with SAIS) and is based on strong academic performance, a high level of maturity, and a demonstrated interest in international affairs. See the program page for more information.

International Studies Five-Year Accelerated B.A./M.A. Program with Sciences Po

Five-Year Accelerated B.A./M.A. Program with Sciences Po

Students may apply to participate in a five-year accelerated B.A./M.A. program with Sciences Po, one of Europe's finest schools of political science. The B.A./M.A. Program is aimed principally at students who are interested in international affairs and who would like to develop their intellectual and professional capabilities from an international and multidisciplinary perspective. After the junior year, students spend two years at Sciences Po's Paris campus completing graduate-level coursework at the Paris School of International Affairs (PSIA), which houses the majority of Sciences Po's internationally-oriented master's programs. PSIA is a bilingual institution, thus students may choose to pursue either an English or French track. Students may also elect to pursue a master's degree at the School of Journalism, School of Communication, or School of Law. Students interested in an academic career may also choose to pursue a research master's with the Doctoral Program at Sciences Po. Students who are not proficient in French will also pursue French language training during their course of study.

Applicants follow an application and review process similar to the one for the SAIS BA/MA program in spring of the sophomore year. Students pay tuition to Johns Hopkins for the first year in Paris and to Sciences Po for the second. Financial aid from Johns Hopkins continues only through the end of a student's fourth year.

Progress toward the B.A./M.A. Degree

Students in the Sciences Po BA/MA program spend their first three years at the Homewood campus and the last two at Sciences Po. Students receive the B.A. degree at the end of their first year at Sciences Po and the M.A. at the end of their second year.

Students selected for the accelerated program may study abroad during their Homewood years on a case by case basis and should discuss their plans with the International Studies Program Director before submitting an application to the Office of Study Abroad.

International Studies Five-Year Accelerated B.A./M.A. Program with the Paul H. Nitze School of Advanced International Studies (SAIS)

Five-Year Accelerated B.A./M.A. Program with the Paul H. Nitze School of Advanced International Studies (SAIS)

For students wishing to pursue a master's degree after graduation from Hopkins, the university offers an accelerated and competitive International Studies B.A./M.A. Program drawing upon its resources at SAIS, located in Washington, D.C. Combining a liberal arts curriculum with a strong specialization in international studies, the program allows those enrolled to receive the B.A. and M.A. degrees in five years instead of the usual six.

Admission is limited to those students majoring in International Studies, Political Science or East Asian Studies (Nanjing, China campus only) and who are highly motivated toward careers for which a background in international studies is essential: research, teaching, or practice in international affairs. Financial assistance is available to those admitted based on need and on academic achievement. For more information go to http://krieger.jhu.edu/internationalstudies/bama-programs/bama-program-with-sais/.

Students admitted to SAIS through the Direct Matriculation Program (DMP) may be subject to additional requirements. https://apply.jhu.edu/apply/direct-matriculation-programs/

Progress toward the B.A./M.A. Degree

Students in the SAIS BA/MA program spend their first three years at the Homewood campus and the last two at SAIS. Students receive the B.A. degree at the end of their first year at SAIS and the M.A. at the end of their second year.

Students selected for the accelerated program may study abroad during their Homewood years on a case by case basis and should discuss their plans with the International Studies Program Director before submitting an application to the Office of Study Abroad.

Islamic Studies

https://krieger.jhu.edu/islamic/

The Islamic Studies Program meets the need for accurate and rigorous knowledge of a religious tradition that has shaped countless aspects of human history and culture, stands at the center of political and cultural debates in the United States, and yet continues to be examined reductively in the public square. The multidisciplinary minor in Islamic Studies provides the intellectual training to approach Islam - and the world - in a historically and culturally informed manner, challenging stereotypes while exploring the diversity, complexity, and creativity of Islam and Muslim communities world-wide. Special community-engaged courses also offer experiential opportunities in and around Baltimore that introduce students to lived religion and encourage self-awareness, critical consciousness, and sustained connections with organizations and communities in the city.

Programs

- Islamic Studies, Minor (p. 1942)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.194.102. Islamic Pasts in the Contemporary World. 3 Credits.
This course will focus on the intellectual and cultural legacies of "Islamic pasts." It has been argued by scholars that Islam is not only a religion but a "civilization" with identifiable sensibilities, overlapping histories, and temporalities. This civilization once spread from the Atlantic coast of Africa to the Indian subcontinent and beyond, but regimes and dynasties have changed hands in many of these places, while remaining in place in others. What remains of Islamic pasts in places where Islam once reigned supreme but has either vanished, been reduced to minority status, or repressed in ongoing political projects? This course examines lost Islamic pasts in the contemporary world, using readings from anthropology, history, literature, and poetry. As the basis of this course, we will read four texts in their entirety focusing on four different geographic points of interest—Spain, India, the Balkans, and Palestine.

AS.194.105. Islam and its Cultural and Religious Diversity, 600-1600. 3 Credits.
While media often present Islam as a fairly univocal and compact cultural and religious system, news reports about tensions, hostility and at times open conflict within the Islamic world itself are frequent. Unity and internal diversity characterize Islam nowadays and have historical roots that have deeply shaped Islam since its very inception.This course will explore the historical origins of the dynamics of unity and diversity in Islam from the predication of Muhammad and the expansion of the first caliphate, to the formation of the Ottoman, Safavid and Mughal empires. By focusing on the historical events and the cultural production of the first millennium of Islam, this course will offer a thorough historical introduction to its cultural and religious complexity.

AS.194.201. Jews, Muslims, and Christians in the Medieval World. 3 Credits.
The three most widespread monotheisms have much more in common than is generally portrayed: a common founding figure, a partly shared succession of prophets, closely comparable ethical concerns and religious practices, a history of coexistence and of cultural, religious, social and economic interaction. This course will focus on a number of key texts and historical events that have shaped the relationships between Jews, Muslims, and Christians during the Middle Ages and contributed to their reciprocal construction of the image of the "other." The geographical center of the course will be the Mediterranean and the Near and Middle East, a true cradle of civilizations, religions, and exchange.

AS.194.202. Never Forget: Muslims, Islamophobia, and Dissent after 9/11. 3 Credits.
In partnership with the social justice organization Justice for Muslims Collective, this community-engaged course and oral history project will explore how diverse Muslim communities navigated and contested belonging and political and cultural agency amidst state-sponsored violence and national debates on race, gender, citizenship and national security after 9/11 and during the ongoing War on Terror. Through history, ethnography, first-person narratives, film, fiction, and online resources, students will learn about the impact of 9/11 on American Muslim communities. This includes cultural and political resistance to imperialism, racism, and Islamophobia as well as to intersectional inequities within Muslim communities that were intensified in the context of Islamophobia. Students will learn about community activism and organizing from JMC, and complete a participatory action research project with the organization. This project is an oral history archive that will address gaps in the documentation of movement histories when it comes to early organizing against War on Terror policies by Muslim communities and communities racialized or perceived as Muslim. Students will be trained to record stories of resistance among leaders who organized and responded at the local and national-level in the Greater Washington region, to support the building of an archive that will shape a wide variety of future organizing and advocacy efforts.

AS.194.205. Islamic Mysticism: Traditions, Legacies, Politics. 3 Credits.
For over a thousand years, the Sufi tradition has been a dynamic force in Islamic social, political and spiritual life. The tradition offers a treasure trove of devotional literature and music, philosophical treatises, contemplative practices, and institutions of social and political organization. After unpacking the politics of the term “Sufi,” we will trace the historical development of the tradition from the early ascetics in Iraq and Syria to the age of trans-national Sufi orders, with case studies from South Asia, Turkey, and the United States. We will then move into some of the key constructs of the tradition of spiritual growth and character formation: the divine-human relationship, the stages of the spiritual path, contemplative and practical disciplines, ideas of sainthood, discipleship and ethical perfection, and the psychology of love. Throughout the class, we will explore the nature of experiential language and interrogate the tradition through the lens of gender. We will also experience Sufism through ritual and music.

AS.194.210. Race, Gender, Citizenship: Being Muslim in America. 3 Credits.
This course explores how American Muslims navigate and contest complex notions of belonging in the context of national conversations on race, gender, citizenship, and national security. With a focus on specific case studies that range from Black Muslim movements of the early twentieth century to the ongoing War on Terror, the course adds complexity to the public conversation on what it means to be Muslim - and what it means to be American. We will draw on history, ethnography, first-person narratives, films, blogs, documentaries and fiction. As a Community Engaged course, the class will include site visits and learning with and from Muslim communities in Baltimore.

AS.194.220. The Qur’an: Text and Context. 3 Credits.
For 1400 years, the Qur’an has played a central role in Muslim intellectual, spiritual, artistic and ritual life. This course will explore the sacred scripture of Islam through its foundational ideas, history of the text and thematic development, literary style, history and methods of interpretation, and role in Muslim spiritual and ritual life. We will also explore how the Qur’an weaves through literature, music and the visual arts.

AS.194.230. African-Americans and the Development of Islam in America. 3 Credits.
Muslims have been a part of the American fabric since its inception. A key thread in that fabric has been the experiences of enslaved Africans and their descendants, some of whom were Muslims, and who not only added to the dynamism of the American environment, but eventually helped shape American culture, religion, and politics. The history of Islam in America is intertwined with the creation and evolution of African American identity. Contemporary Islam in America cannot be understood without this framing. This course will provide a historical lens for understanding Islam, not as an external faith to the country, but as an internal development of American religion. This course will explicate the history of early Islamic movements in the United States and the subsequent experiences of African-Americans who converted to Islam during the first half of the twentieth century. We will cover the spiritual growth of African American Muslims, their institutional presence, and their enduring impact on American culture writ large and African-American religion and culture more specifically.

AS.194.305. Cultures of Pilgrimage in Islam. 3 Credits.
The hajj pilgrimage to Mecca is one of the pillars of Islam. But Muslims around the world also take part in many other pilgrimages, from the massive annual Shi’a pilgrimage to Karbala to the smaller ziyarat “visits” to Sufi saint shrines, to travel to centers of Islamic learning, to pilgrimage to isolated natural features like mountains, trees, valleys. What are the theologies that propel the act of travel in Islam? How are cities, architectures, economies shaped by these cultures? And how are these traditions affected by the wars and colonial projects that plague many Muslim-majority countries in the contemporary world? Readings in this course will draw from anthropology, philosophy, Islamic interpretive texts (tafsir), and travelogues.
Area: Writing Intensive

AS.194.401. Themes in Medieval Islamic Thought. 3 Credits.
This seminar examines medieval Muslim thinkers who addressed themes at the intersection of theology, philosophy, science, and ethics: the definition of the nature of God’s attributes, His uniqueness, transcendence and omnipotence; human freewill and the limits of human knowledge; the nature of the world; and the relationship among reason, religion, and science. The course will look at how these and other crucial themes were addressed by major medieval philosophers and philosophical schools not only in Islam, but also in Judaism and Christianity, and highlight similarities and differences among the three major monotheistic faiths.

AS.194.502. Independent Study. 3 Credits.
Approval Required
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.267. Culture, Religion and Politics in Iran. 3 Credits.
This is an introductory course for those interseted in gaining basic knowledge about contemporary Iran. The focus will be on culture and religion and the ways they in which they become interwoven into different kinds of political stakes.
Area: Writing Intensive

AS.070.465. Concepts: How to Read Hindu and Islamic Texts. 3 Credits.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

Center for Language Education

AS.375.115. First Year Arabic. 5 Credits.
Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of studyNo Satisfactory/ Unsatisfactory

AS.375.116. First Year Arabic II. 4 Credits.
Continuation of AS.375.115. Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of study. May not be taken Satisfactory/ Unsatisfactory
AS.375.115 or instructor permission

AS.375.215. Second Year Arabic. 4 Credits.
Designed to bring students up to competency level required for third/ fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.115-116 or equivalent.
AS.375.116 or equivalent

AS.375.216. Second Year Arabic II. 4 Credits.
Continuation of AS.375.215. Designed to bring students up to competency level required for third/fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.215 or permission required.
AS.375.215 or instructor permission

AS.375.301. Third Year Arabic. 3 Credits.
Designed to enhance students' ability to read, discuss, and write about various topics covered in traditional and contemporary Arabic texts. Recommended Course Background: AS.375.216 or equivalent.
AS.375.116 or instructor permission

AS.375.401. Fourth Year Arabic. 2 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course.
AS.375.302 or equivalent

AS.375.402. Fourth Year Arabic II. 3 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course. Continuation of AS.375.401. Recommended Course Background: AS.375.302 or equivalent.
AS.375.401 or equivalent.

First Year Seminars

AS.001.183. FYS: What Does It Mean to Be Religious? Creativity, Experience, and the Individual. 3 Credits.
What do we mean when we say that something or someone is "religious?" Our First-Year Seminar unpacks this question through a comparative approach, and pays special attention to the ways in which this term has been applied to the study of Islamic cultures and Muslim experience. Through an exploration of the categories of experience, creativity and the individual, we offer a less presumptuous and more open-ended way of imagining the many things it may mean to be religious.

History

AS.100.327. The Islamic Age of Empires. 3 Credits.
In this course we will survey the political, social, intellectual, and cultural history of the three Islamic early modern gunpowder empires that ranged from "the Balkans to Bengal": The Ottomans (1300-1922), the Safavids (1501-1736), and the Mughals (1526-1858).
Area: Writing Intensive

AS.100.374. Conquest, Conversion, and Language Change in the Middle Ages. 3 Credits.
Examines case-studies of imperial conquests (Islamic, Mongol, reconquista, early colonialism) and attendant changes in religion (Christianization; Islamization) and in language (Arabization; transition from Latin to European vernaculars) across medieval Eurasia.

AS.100.383. Conversion and Apostasy in the Middle Ages. 3 Credits.
Compares religious transformation in medieval Europe and the Middle East (ca. 600-1500), including conquest and conversion; conversion narratives; apostasy, martyrdom and other encounters between medieval Jews, Christians, and Muslims. Pre-requisite for enrollment: Students must have taken one history course.

AS.100.387. Everyday Life in the Medieval Middle East. 3 Credits.
Explores the daily lives of non-elites in the medieval Middle East—food; housing; clothes; marriage and divorce; urban festivals—through primary documents (e.g. letters, court records) and artifacts (e.g. clothing).Pre-requisite for enrollment: Students must have taken one history course.

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, "virgins" in paradise, the sexual slavery of Yazidi women…. This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

AS.100.438. The City Victorious: Medieval Cairo. 3 Credits.
What was medieval Cairo like? Students explore urban life in this imperial capital (969-1517), including food and market habits; relations between Jews, Christians, and Muslims; patronage; plague, drought, and famine.Pre-requisite for enrollment: Students must have taken two history courses.

History of Art

AS.010.103. Introduction to the Art of Asia. 3 Credits.
A survey of the art and architecture of Asia, from the ancient world to the present and including the Indian subcontinent, China, Japan, Korea, and Southeast Asia.

AS.010.110. Art of the Islamic World. 4 Credits.
This course is an introduction to the art of the Islamic world, covering a geography that stretches from Spain to India and a chronology that extends from the seventh century into our own time. Within this rich and varied continuum, we will look at a range of art forms—including architecture, painting, sculpture, ceramics, and calligraphy—in relation to such themes as patronage, production, function, and audience. A number of the artworks will be viewed firsthand in local collections. We will also explore the intersection of Islamic art with today's political realities.

AS.010.319. Medieval Art and Architecture of the Holy Land. 3 Credits.
The course focuses on art and architecture in the political and religious contexts of the Middle East, from the 4th to the 14th c. The three monotheistic religions all claimed specific territories -- in particular the city of Jerusalem -- for cult practices. This situation resulted in military conflicts that had an impact of Jewish, Medieval, Byzantine, and Islamic art in the Holy Land. The political conflicts, which still plague the region today, are rooted in the complex situation of the medieval period. The Roman, Arab, Byzantine, and crusader invasions resulted however in exciting eclectic styles that characterize the art and architecture of the region. We will discuss concepts behind political and religious leadership, as they intersect with the power of the arts.
Area: Writing Intensive

AS.010.329. Building an Empire: Architecture of the Ottoman Capitals, c. 1300–1600. 3 Credits.
Centered on modern-day Turkey and encompassing vast territories in Asia, Africa, and Europe, the Ottoman Empire (1299 – 1923) was the longest lived and among the most powerful Islamic states in history, with an artistic tradition to match. This course explores the functional and symbolic role that architecture played during the empire's formative centuries, when three successive capital — Bursa, Edirne, and Istanbul — served to visualize the sultans' growing claims to universal authority. With reference to mosques, palaces, tombs, and other categories of architecture, the course will examine the buildings in their artistic, social, and political contexts. Themes to be addressed include patronage and audience, architectural practice and the building trade, ceremonial and ritual, topography and urban planning, and the relationship of Ottoman architecture to other traditions.

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.423. Modern and Contemporary Art in South Asia. 3 Credits.
How does modernism operate in the colonial context, work with and against the nationalisms of new countries (India, Pakistan, Sri Lanka, Nepal, and Bangladesh), challenge existing norms of the art world and the art market, engage with the difficult and violent upheavals of Partition and sectarian conflict, and allow for experimentations and new forms all the while? This course will explore the history of the art of the subcontinent from c. 1880 to the present by critical engagement with the art, artists, and theories at play in the South Asian region.
Area: Writing Intensive

AS.010.440. Power Dressing: The Politics of Costume between the Ottoman Empire and the West. 3 Credits.
In the Ottoman Empire—a vast multiethnic state straddling Africa, Asia, and Europe—how one dressed was a deeply political affair. Ottoman rulers and subjects alike used clothing to express (and sometimes transgress) the hierarchical, religious, and communal distinctions defining their society, much to the fascination of foreigners who visited the empire or sought knowledge of its sartorial traditions in texts and images. This seminar will explore Ottoman dress and dress codes in the context of the empire's long and complicated relationship with Western powers, focusing on the role that costume played as a charged site of cross-cultural interaction, posturing, and self-assertion from the sixteenth to the nineteenth century. Our case studies will include costume albums —books showing people high and low in their characteristic garb—painted by Ottoman artists for Western buyers; diplomatic robes of honor and their attendant ceremonies; and cultural cross-dressing as manifested in European turquerie portraiture and masquerades. Moving into the modern period, we will consider how nineteenth-century dress reforms bridged the gap between Ottoman and Western costume while engendering new modes of Ottoman sartorial self-representation that challenged hardening Orientalist discourses in such venues as mannequin museums and world's fairs. The seminar will make considerable use of artworks in local collections, including rare books and prints at Hopkins itself.
Area: Writing Intensive

AS.010.451. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art. 3 Credits.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.631. Performing Power: Ceremonial, Diplomacy, and Gift-Giving in and beyond the Ottoman Empire.
As a major global power straddling three continents, the Ottoman Empire developed a rich and diversified ceremonial culture aimed at impressing local and international audiences alike. This seminar will explore the ways in which works of art and architecture provided settings and apparatus for, and were themselves shaped and enlivened by, the ceremonial acts in which they featured. Covering the period between the sixteenth and nineteenth centuries, we will address a range of case studies—including mosque inaugurations, royal processions, the reception of foreign ambassadors, and the exchange of diplomatic gifts—with regard to their sociopolitical, visual, material, and spatial contexts. A major concern of the seminar will be the question of how Ottoman ceremonies, together with their staging and attendant art forms, were adapted in response to changing conditions and audiences, particularly with the shift from the early modern to the modern period. While our focus will be on the Ottoman Empire, the course will also consider the ceremonial cultures of the various Asian and European polities with which the Ottomans interacted, investigating the points of comparison and contrast that defined these multifarious but connected interregional approaches.

AS.010.662. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

History of Science, Medicine, and Technology

AS.140.301. History of Science: Antiquity To Renaissance. 3 Credits.
The first part of a three-part survey of the history of science. This course deals with the origins, practice, ideas, and cultural role of scientific thought in Graeco-Roman, Arabic/Islamic, and Medieval Latin/Christian societies. Interactions across cultures and among science, art, technology, and theology are highlighted.
Area: Writing Intensive

Near Eastern Studies

AS.130.364. Archaeology of Arabia. 3 Credits.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.131.664.

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Political Science

AS.190.394. Comparative Politics of the Middle East and North Africa. 3 Credits.

This course examines the domestic, regional, and transnational politics of the Middle East and North Africa. The class is organized into three units. The first examines major armed conflicts—anti-colonial, intra-state, and inter-state—from 1948 through the 1990s. It uses these historical moments as windows onto key issues in Middle Eastern and North African political issues such as external intervention/occupation, human rights, sectarianism, social movements, and memory politics. Unit Two focuses on policy relevant issues such as democratization, minority populations, religion and politics, and gender. In Unit Three, students will explore the politics of the Arab Uprisings through critical reading and discussion of new (post-2011) scholarship on MENA states, organizations, and populations. Enrollment limited to Political Science and International Studies majors.

Sociology

AS.230.367. Islamic Finance. 3 Credits.

Today, Islamic finance is a global industry comprising nearly $3 trillion in assets, with hubs from Kuala Lumpur to Dubai to London. But half a century ago, nothing called “Islamic finance” existed. So where did Islamic finance come from? Why is it growing so fast? And what does it mean for finance to be Islamic? We discuss the ban on usury in Islam and other religious and philosophical traditions, finance in early and medieval Islamic societies, petrodollars and the birth of Islamic banking in the 1970s, the rise of Islamic capital markets since 2000, contemporary shariah-compliant financial structures, and the constitution of piety through financial practice.

AS.230.445. Sociology of Religion. 3 Credits.

This seminar tackles major issues in the classical and contemporary sociology of religion. We begin with Ibn Khaldun, Friedrich Nietzsche, Karl Marx, Max Weber, Émile Durkheim, and Mary Douglas, asking basic questions: What are religion and the sacred? Why do they exist? What is the relationship between religion and social structure? And what role does religion play in morality, solidarity, boundaries, exploitation, patriarchy, and macrohistorical transformations such as the rise of capitalism? Keeping this theoretical grounding (and its flaws and biases) in mind, we continue to probe the problem of religion in modernity through more-recent writings. Topics include the secularization debate (Are modernity and religion antithetical?); “religious markets” and rational-choice theories of religion; religious revivalism, evangelicalism, fundamentalism, and proselytizing movements; feminist and queer sociologies of religion; civil religion (Is standing for the national anthem a religious act?); embodiment and prayer; Orientalism and postcolonial interrogations of the secular; religious violence and nationalism; the intersectionality of religion with race, class, and caste; and religion and neoliberalism. Although dominant sociologies of religion have focused on Christianity in Western Europe and North America, this course applies a global lens, training significant focus on non-Western and non-Christian contexts.
Area: Writing Intensive

Study of Women, Gender, & Sexuality

AS.363.329. Gender and Sexuality Beyond the Global West: Gender and Sexuality in Contemporary Art in North Africa and the Middle East. 3 Credits.

This course aims to explore how gender and sexuality is situated in contemporary artistic practices in the geographical Middle East, through concepts of religion, war, revolution, resistance, nation-state, post-colonialism, and neoliberalism, especially as written and observed first-hand by artists, curators and scholars from the Middle East and North Africa region and their diasporas. Every week, under an overarching topic, notions of gender and sexuality will be questioned through works of selected artists across the region, as well as texts that provide the historical, theoretical, sociological and political background.
Area: Writing Intensive

Islamic Studies, Minor

Islamic Studies Minor Requirements

The Islamic Studies Program meets the need for accurate and rigorous knowledge of a religious tradition that has shaped countless aspects of human history and culture, stands at the center of political and cultural debates in the United States, and yet continues to be examined reductively in the public square. The multidisciplinary minor in Islamic Studies provides the intellectual training to approach Islam - and the world - in a historically and culturally informed manner, challenging stereotypes while exploring the diversity, complexity, and creativity of Islam and Muslim communities world-wide. Special community-engaged courses also offer experiential opportunities in and around Baltimore that introduce students to lived religion and encourage self-awareness, critical consciousness, and sustained connections with organizations and communities in the city.

The minor in Islamic Studies is open to all undergraduates regardless of major. All courses must be taken for letter grades and receive a grade of C- or higher. To count toward the minor, courses must, as a general rule, be worth three credits or more. Exceptions require the approval of the Director of Undergraduate Studies for the Program in Islamic Studies. Courses directly equivalent to JHU courses taken at other universities may count towards requirements; however non-direct equivalent external courses must be approved by the department's director of undergraduate studies. In all cases, at least four of the six required Islamic Studies courses required of the minor must be taken at JHU.

Code	Title	Credits
Courses [1, 2]		
Four Islamic studies elective courses at any level		12
Two Islamic studies elective courses at the 300 level or above		6
Total Credits		**18**

1. To complete the minor, students must complete both six courses *and* earn at least 18 credits. This is true even though some language courses count for more than three credits per semester (e.g., 4.5 credits).
2. A maximum of two of these courses may be language courses at any level. Languages can include: Arabic (which is offered at Homewood), Persian (which is offered at the School of Advanced International Studies [SAIS] in Washington, DC), Bahasa Indonesia (also offered at SAIS), Bahasa Malaysia, Bengali, Hausa, Punjabi, Turkish, and

Urdu. Additional languages may be approved by the Director of Undergraduate Studies.

Jewish Studies

http://krieger.jhu.edu/jewishstudies/

The Leonard and Helen R. Stulman Jewish Studies Program was founded in 2002 to coordinate the many academic activities at Johns Hopkins dedicated to the study of Jewish history, literature, language, philosophy, politics, and religion. The program gives students the opportunity to explore over three millennia of Jewish culture, ranging from ancient Israel to the present. The Stulman Program sponsors visiting professors and course offerings in a wide variety of disciplines, awards undergraduate travel funds and graduate fellowships, and provides many opportunities for students, faculty, and the general public to participate in a wide range of lectures, conferences, and other special events.

The program offers a minor to students interested in the many dimensions of Jewish life, religion, and culture, from ancient times to the present. It will also interest students who wish to study cultures and civilizations in which thinking about Jews and Judaism played an important role, that is, students interested in Christianity, Islam, or the culture of global modernity. Because of its interdisciplinary nature, the Jewish studies minor offers students access to a broad array of humanities and social sciences disciplines. It therefore serves as a good complement to many majors, as well as providing indispensable intellectual training to anyone interested in Jewish professional life.

Programs

- Jewish Studies, Minor (p. 1943)

For current course information and registration go to https://sis.jhu.edu/classes/

For current faculty and contact information go to http://krieger.jhu.edu/jewishstudies/people/

Jewish Studies, Minor

Jewish Studies Minor Requirements

The Jewish Studies minor requires a minimum of six courses (amounting to at least 18 credits) selected from those approved by the Advisory Committee of the Jewish Studies Program. The courses must be from at least two departments, and at least three must be upper-level courses (300-level or above). All courses applied towards the minor must be taken for a letter grade and a grade of C- or better must be earned. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. In addition, only two courses with any single professor can be counted towards the minor.

The requirements for a minor in Jewish studies are as follows:

Code	Title	Credits
Jewish Studies Courses		
Three courses at any level		9
Three 300-level or higher courses		9
Total Credits		**18**

Students may take up to two courses in Hebrew or Yiddish language study to apply towards the minor requirements.

Mathematics

http://www.mathematics.jhu.edu/

Mathematics is a way of defining and solving problems by combining logic with insight, and by finding patterns and structure. At a most basic level, we use the abstract concept of “number” to understand what we observe, and we develop the method of “counting”; at a higher level, we use the language of “calculus” to understand motion, and we develop the methods of differentiation and integration. But mathematics is more than just computations with numbers and derivatives. Math is a way of thinking—an art that describes the abstract structure of logic, reason, and the scientific method.

The Undergraduate program in the Department of Mathematics is intended both for students interested in preparing for graduate study and research in pure mathematics, and for students interested in using mathematics to pose and solve problems in the sciences, engineering, social sciences, or other areas. Undergraduate mathematics majors and minors will study:

- The foundations of analysis, which begins with the study of functions and their derivatives and integrals
- The fundamentals of advanced algebra, which is based on axiomatic systems involving operations of addition and multiplication in general settings
- Additional subjects such as geometry, probability, and topology
- Applications of mathematics to science and/or engineering.

The graduate program is designed primarily to prepare students for research and teaching in mathematics. It is naturally centered around the research areas of the faculty, which include algebraic geometry, algebraic number theory, data-intensive computation, geometric analysis, harmonic analysis, mathematical physics, partial differential equations, stochastic partial differential equations, and topology. The program can be supplemented in applied directions by courses in theoretical physics, computer science, mechanics, probability, and statistics offered in other departments of the Krieger School of Arts and Sciences and in the Department of Applied Mathematics and Statistics in the Whiting School of Engineering.

Facilities

The Mathematics Department resides in Krieger Hall on the Keyser Quad of the Homewood Campus. Adjacent to Krieger Hall, The University’s Milton S. Eisenhower Library has an unusually extensive collection of mathematics literature, including all the major research journals, almost all of which are also accessible electronically. The stacks are open to students. The department also has a useful reference library, the Philip Hartman Library. Graduate students share departmental offices, and study space can also be reserved in the university library. Graduate students may access the department’s Linux and Windows servers, as well as computers in graduate student offices. The department also hosts numerous research seminars, special lectures, and conferences throughout the academic year.

Programs

The Department of Mathematics offers Bachelor’s, Master’s, and Doctoral degrees across a variety of programs. Undergraduates can elect to pursue a major or minor in Mathematics; the major has an Honors designation available, as well as a four-year BA/MA program. Graduate students can pursue doctoral work in the department. We do not have a terminal Master's program at this time.

- Mathematics, Bachelor of Arts (p. 1953)
- Mathematics, Minor (p. 1955)
- Mathematics, Bachelor of Arts/Master of Arts (p. 1956)
- Mathematics, PhD (p. 1956)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.110.102. College Algebra. 3 Credits.
This introductory course will create a foundational understanding of topics in Algebra. An emphasis will be on applications to prepare students for future courses like Precalculus or Statistics. After a review of elementary algebra concepts, topics covered include: equations and inequalities, linear equations, exponents and polynomials, factoring, rational expressions and equations, relations and functions, radicals, linear and quadratic equations, higher-degree polynomials, exponential, logarithmic, and rational functions.

AS.110.105. Precalculus. 4 Credits.
This course provides students with the background necessary for the study of calculus. It begins with a review of the coordinate plane, linear equations, and inequalities, and moves purposefully into the study of functions. Students will explore the nature of graphs and deepen their understanding of polynomial, rational, trigonometric, exponential, and logarithmic functions, and will be introduced to complex numbers, parametric equations, and the difference quotient.

AS.110.106. Calculus I (Biology and Social Sciences). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, introduction to differential equations, functions of several variables, linear systems, applications for systems of linear differential equations, probability distributions. Many applications to the biological and social sciences will be discussed.

AS.110.107. Calculus II (For Biological and Social Science). 4 Credits.
Differential and integral Calculus. Includes analytic geometry, functions, limits, integrals and derivatives, introduction to differential equations, functions of several variables, linear systems, applications for systems of linear differential equations, probability distributions. Applications to the biological and social sciences will be discussed, and the courses are designed to meet the needs of students in these disciplines.
Recommended Course Background: Grade of C- or Better in AS.110.106 or AS.110.108, or a 5 on the AP AB exam.

AS.110.108. Calculus I (Physical Sciences & Engineering). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the courses are designed to meet the needs of students in these disciplines.

AS.110.109. Calculus II (For Physical Sciences and Engineering). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the courses are designed to meet the needs of students in these disciplines. Recommended Course Background: Grade of C- or Better in AS.110.106 or AS.110.108, or a 5 on the AP AB exam.

AS.110.113. Honors Single Variable Calculus. 4 Credits.
This is an honors alternative to the Calculus sequences AS.110.106-AS.110.107 or AS.110.108-AS.110.109 and meets the general requirement for both Calculus I and Calculus II (although the credit hours count for only one course). It is a more theoretical treatment of one variable differential and integral calculus and is based on our modern understanding of the real number system as explained by Cantor, Dedekind, and Weierstrass. Students who want to know the "why's and how's" of Calculus will find this course rewarding. Previous background in Calculus is not assumed. Students will learn differential Calculus (derivatives, differentiation, chain rule, optimization, related rates, etc), the theory of integration, the fundamental theorem(s) of Calculus, applications of integration, and Taylor series. Students should have a strong ability to learn mathematics quickly and on a higher level than that of the regular Calculus sequences.

AS.110.201. Linear Algebra. 4 Credits.
Vector spaces, matrices, and linear transformations. Solutions of systems of linear equations. Eigenvalues, eigenvectors, and diagonalization of matrices. Applications to differential equations.
Grade of C- or better in AS.110.107 OR AS.110.109 OR AS.110.113 OR AS.110.202 OR AS.110.302, or a 5 on the AP BC exam.

AS.110.202. Calculus III. 4 Credits.
Calculus of functions of more than one variable: partial derivatives, and applications; multiple integrals, line and surface integrals; Green's Theorem, Stokes' Theorem, and Gauss' Divergence Theorem.
Grade of C- or better in AS.110.107 OR AS.110.109 OR AS.110.113 OR AS.110.201 OR AS.110.212 OR AS.110.302, or a 5 or better on the AP BC exam.

AS.110.211. Honors Multivariable Calculus. 4 Credits.
This course includes the material in AS.110.202 with some additional applications and theory. Recommended for mathematically able students majoring in physical science, engineering, or especially mathematics. AS.110.211-AS.110.212 used to be an integrated yearlong course, but now the two are independent courses and can be taken in either order.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.212. Honors Linear Algebra. 4 Credits.
This course includes the material in AS.110.201 with additional applications and theory, and is recommended only for mathematically able students majoring in physical science, engineering, or mathematics who are interested in a proof-based version of linear algebra. This course can serve as an Introduction to Proofs (IP) course. Prerequisites: Grade of B+ or better in 110.107 or 110.109 or 110.113, or a 5 on the AP BC exam.
Area: Quantitative and Mathematical Sciences.
Grade of B+ or better in AS.110.107 or AS.110.109 or AS.110.113 or AS.110.202, or AS.110.302, or a 5 on the AP BC exam.

AS.110.225. Problem Solving Lab. 2 Credits.
This course is an introduction to mathematical reason and formalism in the context of mathematical problem solving, such as induction, invariants, inequalities and generating functions. This course does not satisfy any major requirement, and may be taken more than once for credit It is primarily used as training for the William Lowell Putnam Mathematics Competition. Area: Quantitative and Mathematical Sciences.

AS.110.275. Probability. 4 Credits.
This course follows the actuarial Exam P syllabus and learning objectives to prepare students to pass the SOA/CAS Probability Exam. Topics include axioms of probability, discrete and continuous random variables, conditional probability, Bayes' theorem, Chebyshev's Theorem, Central Limit Theorem, univariate and joint distributions and expectations, loss frequency, loss severity and other risk management concepts. Exam P learning objectives and learning outcomes are emphasized. Recommended Course Background: Calculus II
AS.110.107 OR AS.110.109

AS.110.276. Introduction to Financial Mathematics. 4 Credits.
This course is designed to develop students' understanding of fundamental concepts of financial mathematics. The course will cover mathematical theory and applications including the time value of money, annuities and cash flows, bond pricing, loans, amortization, stock and portfolio pricing, immunization of portfolios, swaps and determinants of interest rates, asset matching and convexity. A basic knowledge of calculus and an introductory knowledge of probability is assumed.

AS.110.301. Introduction to Proofs. 4 Credits.
This course will provide a practical introduction to mathematical proofs with the aim of developing fluency in the language of mathematics, which itself is often described as "the language of the universe." Along with a library of proof techniques, we shall tour propositional logic, set theory, cardinal arithmetic, and metric topology and explore "proof relevant" mathematics by interacting with a computer proof assistant. This course on the construction of mathematical proof will conclude with a deconstruction of mathematical proof, interrogating the extent to which proof serves as a means to discover universal truths and assessing the mechanisms by which the mathematical community achieves consensus regarding whether a claimed result has been proven.

AS.110.302. Differential Equations and Applications. 4 Credits.
This is a course in ordinary differential equations (ODEs), equations involving an unknown function of one independent variable and some of its derivatives, and is primarily a course in the study of the structure of and techniques for solving ODEs as mathematical models. Specific topics include first and second ODEs of various types, systems of linear differential equations, autonomous systems, and the qualitative and quantitative analysis of nonlinear systems of first-order ODEs. Laplace transforms, series solutions and the basics of numerical solutions are included as extra topics.Prerequisites: Grade of C- or better in 110.107 or 110.109 or 110.113, or a 5 on the AP BC exam. Area: Quantitative and Mathematical Sciences.
Grade of C- or better in AS.110.107 or AS.110.109 or AS.110.113 or AS.110.201 or AS.110.202 or AS.110.211 or AS.110.212, or a 5 on the AP BC exam.

AS.110.303. The Mathematics of Politics, Democracy, and Social Choice. 4 Credits.
This course is designed for students of all backgrounds to provide a mathematical introduction tosocial choice theory, weighted voting systems, apportionment methods, and gerrymandering. Inthe search for ideal ways to make certain kinds of political decisions, a lot of wasted effort couldbe averted if mathematics could determine that finding such an ideal were actually possible in thefirst place. The course will analyze data from recent US elections as well as provide historicalcontext to modern discussions in politics, culminating in a mathematical analysis of the USElectoral College. Case studies, future implications, and comparisons to other governing bodiesoutside the US will be used to apply the theory of the course. Students will use Microsoft Excel toanalyze data sets. There are no mathematical prerequisites for this course.
Area: Writing Intensive

AS.110.304. Elementary Number Theory. 4 Credits.
The student is provided with many historical examples of topics, each of which serves as an illustration of and provides a background for many years of current research in number theory. Primes and prime factorization, congruences, Euler's function, quadratic reciprocity, primitive roots, solutions to polynomial congruences (Chevalley's theorem), Diophantine equations including the Pythagorean and Pell equations, Gaussian integers, Dirichlet's theorem on primes.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.311. Methods of Complex Analysis. 4 Credits.
This course is an introduction to the theory of functions of one complex variable. Its emphasis is on techniques and applications, and it serves as a basis for more advanced courses. Functions of a complex variable and their derivatives; power series and Laurent expansions; Cauchy integral theorem and formula; calculus of residues and contour integrals; harmonic functions.
Grade of C- or better in (AS.110.202 or AS.110.211)

AS.110.365. Mathematical Foundations of AI Bias. 4 Credits.
At the end of this course students should be able to understand various sources of algorithmic bias; understand what types of bias can or cannot be addressed in a given data set; be able to reason over when different algorithms can be applied to a data set, and how they can be interpreted; take the outcomes of a given algorithm and reason about the bias of the output. Recommended Course Background: Vector calc, linear algebra, a suffiently advanced stats course, programming ability in R, matlab or python
AS.110.201 OR AS.110.202 OR EN.553.310

AS.110.375. Introduction to Mathematical Cryptography. 4 Credits.
An Introduction to Mathematical Cryptography is an introduction to modern cryptography with an emphasis on the mathematics behind the theory of public key cryptosystems and digital signature schemes. The course develops the mathematical tools needed for the construction and security analysis of diverse cryptosystems. Other topics central to mathematical cryptography covered are: classical cryptographic constructions, such as Diffie-Hellmann key exchange, discrete logarithm-based cryptosystems, the RSA cryptosystem, and digital signatures. Fundamental mathematical tools for cryptography studied include: primality testing, factorization algorithms, probability theory, information theory, and collision algorithms. A survey of important recent cryptographic innovations, such as elliptic curves, elliptic curve and pairing-based cryptography are included as well. This course is an ideal introduction for mathematics and computer science students to the mathematical foundations of modern cryptography.

AS.110.401. Introduction to Abstract Algebra. 4 Credits.
An introduction to the basic notions of modern abstract algebra and can serve as as Introduction to Proofs (IP) course. This course is an introduction to group theory, with an emphasis on concrete examples, and especially on geometric symmetry groups. The course will introduce basic notions (groups, subgroups, homomorphisms, quotients) and prove foundational results (Lagrange's theorem, Cauchy's theorem, orbit-counting techniques, the classification of finite abelian groups). Examples to be discussed include permutation groups, dihedral groups, matrix groups, and finite rotation groups, culminating in the classification of the wallpaper groups.Prerequisites: Grade of C- or better in 110.201 or 110.212 Area: Quantitative and Mathematical Sciences.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.405. Real Analysis I. 4 Credits.
This course is designed to give a firm grounding in the basic tools of analysis. It is recommended as preparation (but may not be a prerequisite) for other advanced analysis courses and may be taken as an Introduction to Proofs (IP) course. Topics include the formal properties of real and complex number systems, topology of metric spaces, limits, continuity, infinite sequences and series, differentiation, Riemann-Stieltjes integration. Prerequisites: Grade of C- or better in 110.201 or 110.212 and 110.202 or 110.211
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.110.406. Real Analysis II. 4 Credits.
This course continues AS.110.405 with an emphasis on the fundamental notions of modern analysis. Sequences and series of functions, Fourier series, equicontinuity and the Arzela-Ascoli theorem, the Stone-Weierstrass theorem, functions of several variables, the inverse and implicit function theorems, introduction to the Lebesgue integral.

AS.110.407. Honors Complex Analysis. 4 Credits.
AS.110.407. Honors Complex Analysis. 4.00 Credits.This course is an introduction to the theory of functions of one complex variable for honors students. Its emphasis is on techniques and applications, and can serve as an Introduction to Proofs (IP) course. Topics will include functions of a complex variable and their derivatives; power series and Laurent expansions; Cauchy integral theorem and formula; calculus of residues and contour integrals; harmonic functions, as well as applications to number theory and harmonic analysis.Area: Quantitative and Mathematical Sciences.This is not an Introduction to Proofs course (IP) and may not be taken as a first proof-based mathematics course except at the discretion of the instructor. This course satisfies a core requirement of the mathematics major as a second analysis course, and is a core requirement for honors in the major.
AS.110.405 OR AS.110.415

AS.110.411. Honors Algebra I. 4 Credits.
An introduction to the basic notions of modern algebra for students with some prior acquaintance with abstract mathematics. Elements of group theory: groups, subgroups, normal subgroups, quotients, homomorphisms. Generators and relations, free groups, products, abelian groups, finite groups. Groups acting on sets, the Sylow theorems. Definition and examples of rings and ideals.
Grade of C- or better in AS.110.212 OR AS.110.304 OR AS.110.113 OR AS.110.405 OR AS.110.415 OR AS.110.407 OR AS.110.413 OR AS.110.421

AS.110.412. Honors Algebra II. 4 Credits.
This is a continuation of 110.411 Honors Algebra I. Topics studies include principal ideal domains, structure of finitely generated modules over them. Introduction to field theory. Linear algebra over a field. Field extensions, constructible polygons, non-trisectability. Splitting field of a polynomial, algebraic closure of a field. Galois theory: correspondence between subgroups and subfields. Solvability of polynomial equations by radicals. Prerequisites: Grade of C- or better in 110.201 or 110.212.Area: Quantitative and Mathematical Sciences.
C- or better in AS.110.411

AS.110.413. Introduction To Topology. 4 Credits.
Topological spaces, connectedness, compactness, quotient spaces, metric spaces, function spaces. An introduction to algebraic topology: covering spaces, the fundamental group, and other topics as time permits.
Grade of C- or better in (AS.110.202 OR AS.110.211)

AS.110.415. Honors Analysis I. 4 Credits.
This highly theoretical sequence in analysis is reserved for the most able students. The sequence covers the real number system, metric spaces, basic functional analysis, the Lebesgue integral, and other topics.

AS.110.416. Honors Analysis II. 4 Credits.
Lebesgue integration and differentiation. Elementary Hilbert and Banach space theory. Baire category theorem. Continuation of AS.110.415, introduction to real analysis.
Grade of C- or better in AS.110.415

AS.110.417. Partial Differential Equations. 4 Credits.
Characteristics. classification of second order equations, well-posed problems. separation ofvariables and expansions of solutions. The wave equation: Cauchy problem, Poisson's solution,energy inequalities, domains of influence and dependence. Laplace's equation: Poisson's formula, maximum principles, Green's functions, potential theory Dirichlet and Neumann problems, eigenvalue problems. The heat equation: fundamental solutions, maximum principles. Recommended Course Background: AS.110.405 or AS.110.415

AS.110.421. Dynamical Systems. 4 Credits.
This is a course in the modern theory of Dynamical Systems. Topic include both discrete (iterated maps) and continuous (differential equations) dynamical systems and focuses on the qualitative structure of the system in developing properties of solutions. Topics include contractions, interval and planar maps, linear and nonlinear ODE systems including bifurcation theory, recurrence, transitivity and mixing, phase volume preservation as well as chaos theory, fractional dimension and topological entropy. May be taken as an Introduction to Proofs (IP) course.Prerequisites: Grade of C- or better in 110.201 or 110.212 OR 110.202 or 110.211 and 110.302 Area: Quantitative and Mathematical Sciences
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 or AS.110.211) AND 110.302

AS.110.422. Representation Theory. 4 Credits.
This course will focus on the basic theory of representations of finite groups in characteristic zero: Schur's Lemma, Mashcke's Theorem and complete reducibility, character tables and orthogonality, direct sums and tensor products. The main examples we will try to understand are the representation theory of the symmetric group and the general linear group over a finite field. If time permits, the theory of Brauer characters and modular representations will be introduced.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.401 OR AS.110.411)

AS.110.433. Introduction to Harmonic Analysis and Its Applications. 4 Credits.
The course is an introduction to methods in harmonic analysis, in particular Fourier series, Fourier integrals, and wavelets. These methods will be introduced rigorously, together with their motivations and applications to the analysis of basic partial differential equations and integral kernels, signal processing, inverse problems, and statistical/machine learning.
(AS.110.201 OR AS.110.212 OR EN.550.291 OR EN.553.291) AND (AS.110.202 OR AS.110.211) AND (AS.110.405 OR AS.110.415)

AS.110.435. Introduction to Algebraic Geometry. 4 Credits.
Algebraic geometry studies zeros of polynomials in several variables and is based on the use of abstract algebraic techniques, mainly from commutative algebra, for solving geometric problems about these sets of zeros. The fundamental objects of study are algebraic varieties which are the geometric manifestations of solutions of systems of polynomial equations. Algebraic geometry occupies a central place in modern mathematics and has multiple conceptual connections with diverse fields such as complex analysis, topology and number theory.This course aims to provide to an undergraduate student majoring in mathematics the fundamental background to approach the study of algebraic geometry by providing the needed abstract knowledge also complemented by several examples and applications.

AS.110.439. Introduction To Differential Geometry. 4 Credits.
Theory of curves and surfaces in Euclidean space: Frenet equations, fundamental forms, curvatures of a surface, theorems of Gauss and Mainardi-Codazzi, curves on a surface; introduction to tensor analysis and Riemannian geometry; theorema egregium; elementary global theorems.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.100.211)

AS.110.441. Calculus on Manifolds. 4 Credits.
This course provides the tools for classical three-dimensional physics and mechanics. This course extends these techniques to the general locally Euclidean spaces (manifolds) needed for an understanding of such things as Maxwell's equations or optimization in higher dimensional contexts, eg. in economics. The course will cover the theory of differential forms and integration. Specific topics include Maxwell's equations in terms of 4D Lorentz geometry, vector (in particular, tangent) bundles, an introduction to de Rham theory, and Sard's theorem on the density of regular values of smooth functions. The course is intended to be useful to mathematics students interested in analysis, differential geometry, and topology, as well as to students in physics and economics.

AS.110.443. Fourier Analysis. 4 Credits.
An introduction to the Fourier transform and the construction of fundamental solutions of linear partial differential equations. Homogeneous distributions on the real line: the Dirac delta function, the Heaviside step function. Operations with distributions: convolution, differentiation, Fourier transform. Construction of fundamental solutions of the wave, heat, Laplace and Schrödinger equations. Singularities of fundamental solutions and their physical interpretations (e.g., wave fronts). Fourier analysis of singularities, oscillatory integrals, method of stationary phase.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.110.445. Mathematical and Computational Foundations of Data Science. 4 Credits.
We will cover several topics in the mathematical and computational foundations of Data Science. The emphasis is on fundamental mathematical ideas (basic functional analysis, reproducing kernel Hilbert spaces, concentration inequalities, uniform central limit theorems), basic statistical modeling techniques (e.g. linear regression, parametric and non-parametric methods), basic machine learning techniques for unsupervised (e.g. clustering, manifold learning), supervised (classification, regression), and semi-supervised learning, and corresponding computational aspects (linear algebra, basic linear and nonlinear optimization to attack the problems above). Applications will include statistical signal processing, imaging, inverse problems, graph processing, and problems at the intersection of statistics/machine learning and physical/dynamical systems (e.g. model reduction for stochastic dynamical systems).

AS.110.503. Undergraduate Research in Mathematics. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.586. Independent Study. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.587. DRP Independent Study. 1 Credit.
Directed Reading Program (DRP) Independent Study.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.599. Independent Study. 1 - 3 Credits.

AS.110.601. Algebra I.
The first of a two semester algebra sequence to provide the student with the foundations for Number Theory, Algebraic Geometry, Representation Theory, and other areas. Topics include refined elements of group theory, commutative algebra, Noetherian rings, local rings, modules, and rudiments of category theory, homological algebra, field theory, Galois theory, and non-commutative algebras.

AS.110.602. Algebra II.
The second of a two semester algebra sequence to provide the student with the foundations for Number Theory, Algebraic Geometry, Representation Theory, and other areas. Topics include refined elements of group theory, commutative algebra, Noetherian rings, local rings, modules, and rudiments of category theory, homological algebra, field theory, Galois theory, and non-commutative algebras.

AS.110.605. Real Analysis.
This course covers the theory of the Lebesgue theory of integration in d-dimensional Euclidean space, and offers a brief introduction to the theory of Hilbert spaces. Topics include the Lebesgue measure on Euclidean space, the Lebesgue integral, classical convergence results for the Lebesgue integral, Fubini's theorem, the spaces of L^1 and L^2 functions.

AS.110.607. Complex Variables.
Analytic functions of one complex variable. Topics include Cauchy integral theorems, residue theory, conformal mapping, harmonic functions, riemann mapping theorem, normal families. Other topics may include Mittag-Leffler theorem, Weierstrass factorization theorem, elliptic functions, Picard theorem, and Nevanlinna theory.

AS.110.608. Riemann Surfaces.
Abstract Riemann surfaces. Examples: algebraic curves, elliptic curves and functions on them. Holomorphic and meromorphic functions and differential forms, divisors and the Mittag-Leffler problem. The analytic genus. Bezout's theorem and applications. Introduction to sheaf theory, with applications to constructing linear series of meromorphic functions. Serre duality, the existence of meromorphic functions on Riemann surfaces, the equality of the topological and analytic genera, the equivalence of algebraic curves and compact Riemann surfaces, the Riemann-Roch theorem. Period matrices and the Abel-Jacobi mapping, Jacobi inversion, the Torelli theorem. Uniformization (time permitting).

AS.110.615. Algebraic Topology I.
Singular homology theory, cohomology and products, category theory and homological algebra, Künneth and universal coefficient theorems, Poincaré and Alexander duality theorems, Lefschetz fixed-point theorem, covering spaces and fundamental groups. Prerequsites: the equivalent of one semester in both Abstract Algebra and Real Analysis (specifically, point set topology).

AS.110.616. Algebraic Topology II.
Higher homotopy groups, CW complexes, cellular homology and cohomology, spectral sequences and comparison theorems, graded homological algebra, fibrations, Serre and Eilenberg-Moore spectral sequence, Eilenberg-MacLane spaces, Steenrod algebra, spectra.

AS.110.617. Number Theory I.
Elements of advanced algebra and number theory. Possible topics for the year-long sequence include local and global fields, Galois cohomology, semisimple algebras, class field theory, elliptic curves, modular and automorphic forms, integral representations of L-functions, adelic geometry and function fields, fundamental notions in arithmetic geometry (including Arakelov and diophantine geometry).

AS.110.618. Number Theory II.
Topics in advanced algebra and number theory. Possible topics for the year-long sequence include local and global fields, Galois cohomology, semisimple algebras, class field theory, elliptic curves, modular and automorphic forms, integral representations of L-functions, adelic geometry and function fields, fundamental notions in arithmetic geometry (including Arakelov and diophantine geometry).

AS.110.619. Lie Groups and Lie Algebras.
Lie groups and Lie algebras, classification of complex semi-simple Lie algebras, compact forms, representations and Weyl formulas, symmetric Riemannian spaces.

AS.110.631. Partial Differential Equations I.
This course is the first in the sequence about the general theory of PDEs. The beginning of the course will describe several important results of functional analysis which are instrumental for the study of PDEs: Hahn-Banach theorem, Uniform boundedness and closed graph theorems, reflexive spaces and weak topologies, elements of semi-group theory. Then we will describe the basic theory of Sobolev spaces and the standard existence theory for (initial) boundary value problems of elliptic/parabolic type. Finally, the rest of the course will be devoted to finer properties of solutions of elliptic equations such as maximum principles, Harnack principles and regularity.

AS.110.632. Partial Differential Equations II.
An introductory graduate course in partial differential equations. Classical topics include first order equations and characteristics, the Cauchy-Kowalevski theorem, Laplace's equation, heat equation, wave equation, fundamental solutions, weak solutions, Sobolev spaces, maximum principles. The second term focuses on special topics such as second order elliptic theory.

AS.110.633. Harmonic Analysis.
Fourier multipliers, oscillatory integrals, restriction theorems, Fourier integral operators, pseudodifferential operators, eigenfunctions. Undergrads need instructor's permission.

AS.110.637. Functional Analysis.
This class will explore basic aspects of functional analysis, focusing mostly on normed vector spaces. This will include the Hahn-Banach and open mapping theorems, a discussion of strong and weak topologies, the theory of compact operators, and spaces of integrable functions and Sobolev spaces, with applications to the study of some partial differential equations. Prerequisite: Real Analysis

AS.110.643. Algebraic Geometry I.
Introduction to affine varieties and projective varieties. Hilbert's theorems about polynomials in several variables with their connections to geometry. Abstract algebraic varieties and projective geometry. Dimension of varieties and smooth varieties. Sheaf theory and?some notions of cohomology. Applications of sheaves to?geometry;?e.g., theory of divisors, rudiments of scheme theory for the understanding of the Riemann-Roch theorem for curves and surfaces. Other topics may include Jacobian varieties, resolution of singularities, birational geometry on surfaces, schemes, connections with complex analytic geometry and topology.?

AS.110.644. Algebraic Geometry II.
Introduction to affine varieties and projective varieties. Hilbert's theorems about polynomials in several variables with their connections to geometry. Abstract algebraic varieties and projective geometry. Dimension of varieties and smooth varieties. Sheaf theory and?some notions of cohomology. Applications of sheaves to?geometry;?e.g., theory of divisors, rudiments of scheme theory for the understanding of the Riemann-Roch theorem for curves and surfaces. Other topics may include Jacobian varieties, resolution of singularities, birational geometry on surfaces, schemes, connections with complex analytic geometry and topology.

AS.110.645. Riemannian Geometry I.
This course is a graduate-level introduction to foundational material in Riemannian Geometry. Riemannian manifolds, a smooth manifold equipped with a Riemannian metric. Topics include connections, geodesics, Jacobi fields, submanifold theory including the second fundamental form and Gauss equations, manifolds of constant curvature, comparison theorems, Morse index theorem, Hadamard theorem and Bonnet-Myers theorem.

AS.110.646. Riemannian Geometry II.
This course covers more advanced topics in Riemannian geometry chosen at the instructors discretion. Possible topics include: minimal surface theory, geometric heat flows, harmonic mappings, Einstein manifolds, etc.

AS.110.653. Stochastic Differential Equations: An Introduction With Applications.
This course is an introduction to stochastic differential equations and applications. Basic topics to be reviewed include Ito and Stratonovich integrals, Ito formula, SDEs and their integration. The course will focus on diffusion processes and diffusion theory, with topics include Markov properties, generator, Kolmogrov's equations (Fokker-Planck equation), Feynman-Kac formula, the martingale problem, Girsanov theorem, stability and ergodicity. The course will briefly introduce applications, with topics include statistical inference of SDEs, filtering and control.

AS.110.707. Functional Analysis.

AS.110.710. What is... Seminar.
This is a professional development course for graduate students, where they will learn, practice, or enhance their skills at giving math talks. The course will run in the format of a "What is... Seminar", where each week one of the participants will present a 1 hour talk on an accessible and relatively self-contained topic, titled What is (insert your math notion of choice). In preparation for their talk, students will meet with the instructor at least once, where they will receive guidance and detailed advice to help them give a great talk. Although the definition of a "great talk" is subjective, participants should be willing to follow the instructors' advice. Graduate students at any stage of their PhD are encouraged to attend, regardless of their experience giving talks.

AS.110.711. Topics in Topos Theory.
Reading course to discuss Topics in Topos Theory

AS.110.712. Topics in Mathematical Physics.

AS.110.721. Topics In Homotopy Type Theory.
Homotopy type theory (HoTT) is a new proposed foundation system for mathematics that extends Martin-Löf's dependent type theory with Voevodsky's univalence axiom. Dependent type theory is a formal system for constructive mathematics, in which a theorem is proven by constructing a term in the type that encodes its statement. In Homotopy type theory, types are thought of as spaces and terms as points in those spaces. A proof that two terms in a common type are equal is now interpreted as a path between two points in a space. In particular, types might have interesting higher homotopical structure, which can be thought of as revealing fundamental differences between two proofs of a common proposition. One advantage of this foundation system is its amenability to computer formalization, which this course will illustrate by introducing the computer proof assistant Agda.

AS.110.722. Topics in Homotopy Theory.
The course will focus on recent developments in homotopy theory, such as Galois theory for E_n (n \geq 2) ring-spectra, and on connections with number theory; in particular, work of Bhatt, Hesselholt, Lurie, Scholze and others on topological Hochschild homology and its applications to geometry over the p-adic complex numbers.

AS.110.726. Topics in Analysis.
The topics covered will involve the theory of calculus of Functors applied to Geometric problems like Embedding theory. Other related areas will be covered depending on the interest of the audience.

AS.110.727. Topics in Algebraic Topology.

AS.110.731. Topics in Geometric Analysis.

AS.110.733. Topics In Alg Num Theory.

AS.110.737. Topics Algebraic Geometry.

AS.110.739. Topics in Analytic Number Theory.
This course will be on functional analysis (applied to number theory) and Connes-Meyer's spectral interpretation of zeroes of Hecke L functions. Topics will include : adeles, ideles, bornologies, spectral theory, condensed/liquid modules à la Scholze-Clausen, Pontryagin duality and almost-periodic functions, Tate's thesis, Connes-Meyer's spectral interpretation. Relations with category theory, quantum mechanics, Bost-Connes systems and non-commutative geometry will be evoked. This course will be designed to be appealing for students from analysis or from algebra.

AS.110.741. Topics in Partial Differential Equations.

AS.110.742. Topics In Partial Differential Equations.
In this course we will be discussing some dispersive evolution equations, primarily the nonlinear Schrodinger equation. Topics will include well -posedness theory, conservation laws, and scattering. The course will be accessible to students who have not taken graduate partial differential equations or functional analysis.

AS.110.745. Introduction to Curvature Flows.

AS.110.749. Topics in Differential Geometry.
In this class, we will study Aaron Naber and Jeff Cheeger's recent result on proving codimension four conjecture. We plan to talk about some early results of the structure on manifolds with lower Ricci bound by Cheeger and Colding. We will prove quantitative splitting theorem, volume convergence theorem, and the result that almost volume cone implies almost metric cone. Then we will discuss regularity of Einstein manifolds and the codimension four conjecture.

AS.110.750. Topics in Representation Theory.

AS.110.756. Topics in Algebra.
This will be a course in commutative algebra. Topics may include: Noetherian rings and modules, the Nullstellensatz, Hilbert basis theorem, localization, integrality, Noether normalization, primary decomposition, DVRs, Dedekind domains, dimension theory, smoothness and regularity, and homological methods.

AS.110.757. Topics in Stochastic Dynamical Systems.
The course will present an introduction to stochastic dynamical systems and some applications in model reduction and data assimilation. The main focus will be on stability and ergodicity of stochastic dynamical systems, including stochastic differential equations driven by white and fractional noise, and their numerical approximations. We will then discuss model reduction, focusing on Mori-Zwanzig formalism and approximation of the generalized Langevin equation, and methods on the parametric inference of related stochastic systems. Data assimilation and stochastic control will also be briefly introduced.

AS.110.771. Mathematics GTA Teaching Seminar.
he goals of this seminar center on the preparedness for graduate students in mathematics to engage in classroom instructions for undergraduates at Johns Hopkins University. This seminar augments the teaching orientation provided to graduate students by the CER and Mathematics Department by addressing (1) teaching-techniques: student-centered inclusive teaching strategies, facilitating small group work, incorporating student ideas and student thinking into active hole class discussions, and choosing appropriate mathematical tasks, (2) opportunities for practice teaching in classrooms before their first assignment to TA for a course in scaffolded micro-teaching experiences and (3) preparing for the practice of and documentation of a reflective teaching practice necessary for success in their careers as mathematicians and educators.

AS.110.791. Seminar in Analysis and Partial Differential Equations.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.793. Seminar in Topology.
For graduate students only. Presentations of current research papers by faculty, graduate students and invited guest speakers.

AS.110.794. Seminar in Category Theory.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.795. Data Science Seminar.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.798. Seminar in Number Theory.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.799. Seminar in Algebraic Geometry.
For graduate students only. Presentations of current research papers by faculty, graduate students and invited guest speakers.

AS.110.800. Independent Study-Graduates.

AS.110.801. Thesis Research.

Cross Listed Courses

Applied Mathematics & Statistics

EN.553.738. High-Dimensional Approximation, Probability, and Statistical Learning. 3 Credits.
The course covers fundamental mathematical ideas for certain approximation and statistical learning problems in high dimensions. We start with basic approximation theory in low-dimensions, in particular linear and nonlinear approximation by Fourier and wavelets in classical smoothness spaces, and discuss applications in imaging, inverse problems and PDE's. We then introduce notions of complexity of function spaces, which will be important in statistical learning. We then move to basic problems in statistical learning, such as regression and density estimation. The interplay between randomness and approximation theory is introduced, as well as fundamental tools such as concentration inequalities, basic random matrix theory, and various estimators are constructed in detail, in particular multi scale estimators. At all times we consider the geometric aspects and interpretations, and will discuss concentration of measure phenomena, embedding of metric spaces, optimal transportation distances, and their applications to problems in machine learning such as manifold learning and dictionary learning for signal processing.

Applied and Computational Mathematics

EN.625.603. Statistical Methods and Data Analysis. 3 Credits.
This course introduces statistical methods that are widely used in modern applications. A balance is struck between the presentation of the mathematical foundations of concepts in probability and statistics and their appropriate use in a variety of practical contexts. Foundational topics of probability, such as probability rules, related inequalities, random variables, probability distributions, moments, and jointly distributed random variables, are followed by foundations of statistical inference, including estimation approaches and properties, hypothesis testing, and model building. Data analysis ranging from descriptive statistics to the implementation of common procedures for estimation, hypothesis testing, and model building is the focus after the foundational methodology has been covered. Software, for example R-Studio, will be leveraged to illustrate concepts through simulation and to serve as a platform for data analysis. Prerequisite(s): Multivariate calculus.

EN.625.616. Optimization in Finance. 3 Credits.
Optimization models play an increasingly important role in financial decisions. This course introduces the student to financial optimization models and methods. We will specifically discuss linear, integer, quadratic, and general nonlinear programming. If time permits, we will also cover dynamic and stochastic programming. The main theoretical features of these optimization methods will be studied as well as a variety of algorithms used in practice. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): Due to overlap in subject matter in EN.625.615 and EN.625.616, students may not receive credit towards the MS or post-master's certificate for both EN.625.615 and EN.625.616.

EN.625.633. Monte Carlo Methods. 3 Credits.
This course is an introduction to fundamental tools in designing, conducting, and interpreting Monte Carlo simulations. Emphasis is on generic principles that are widely applicable in simulation, as opposed to detailed discussion of specific applications and/or software packages. At the completion of this course, it is expected that students will have the insight and understanding to critically evaluate or use many state-of-the-art methods in simulation. Topics covered include random number generation, simulation of Brownian motion and stochastic differential equations, output analysis for Monte Carlo simulations, variance reduction, Markov chain Monte Carlo, simulation-based estimation for dynamical (state-space) models, and, time permitting, sensitivity analysis and simulation-based optimization. Course Note(s): This course serves as a complement to the 700-level course EN.625.744 Modeling, Simulation, and Monte Carlo. EN.625.633 Monte Carlo Methods and EN.625.744 emphasize different topics, and EN.625.744 is taught at a slightly more advanced level. EN.625.633 includes topics not covered in EN.625.744 such as simulation of Brownian motion and stochastic differential equations, general output analysis for Monte Carlo simulations, and general variance reduction. EN.625.744 includes greater emphasis on generic modeling issues (bias-variance tradeoff, etc.), simulation-based optimization of real-world processes, and optimal input selection.
Linear algebra and a graduate-level statistics course such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.641. Mathematics of Finance. 3 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision making. Topics covered in the course include the basic theory of interest and its applications to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, and portfolio evaluation.
Multivariate calculus and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.642. Mathematics of Risk, Options, and Financial Derivatives. 3 Credits.
The concept of options stems from the inherent human desire and need to reduce risks. This course starts with a rigorous mathematical treatment of options pricing, and related areas by developing a powerful mathematical tool known as Ito calculus. We introduce and use the well-known field of stochastic differential equations to develop various techniques as needed, as well as discuss the theory of martingales. The mathematics will be applied to the arbitrage pricing of financial derivatives, which is the main topic of the course. We treat the Black-Scholes theory in detail and use it to understand how to price various options and other quantitative financial instruments. Topics covered in the course include options strategies, binomial pricing, Weiner processes and Ito's lemma, the Black-Scholes-Merton Model, futures options and Black's Model, option Greeks, numerical procedures for pricing options, the volatility smile, the value at risk, exotic options, martingales and risk measures. Course Note(s): This class is distinguished from EN.625.641 Mathematics of Finance: Investment Science (formerly 625.439) and EN.625.714 Introductory Stochastic Differential Equations with Applications, as follows: EN.625.641 Mathematics of Finance: Investment Science gives a broader and more general treatment of financial mathematics, and EN.625.714 Introductory Stochastic Differential Equations with Applications provides a deeper (more advanced) mathematical understanding of stochastic differential equations, with applications in both finance and non-finance areas.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and a graduate-level course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.695. Time Series Analysis. 3 Credits.
This course will be a rigorous and extensive introduction to modern methods of time series analysis and dynamic modeling. Topics to be covered include elementary time series models, trend and seasonality, stationary processes, Hilbert space techniques, the spectral distribution function, autoregressive/ integrated/moving average (ARIMA) processes, fitting ARIMA models, forecasting, spectral analysis, the periodogram, spectral estimation techniques, multivariate time series, linear systems and optimal control, state-space models, and Kalman filtering and prediction. Additional topics may be covered if time permits. Some applications will be provided to illustrate the usefulness of the techniques. Course Note(s): This course is also offered in the Department of Applied Mathematics and Statistics (Homewood campus) as EN.553.639.
Graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis) and familiarity with matrix theory and linear algebra.

EN.625.714. Introductory Stochastic Differential Equations with Applications. 3 Credits.
The goal of this course is to give basic knowledge of stochastic differential equations useful for scientific and engineering modeling, guided by some problems in applications. The course treats basic theory of stochastic differential equations, including weak and strong approximation, efficient numerical methods and error estimates, the relation between stochastic differential equations and partial differential equations, Monte Carlo simulations with applications in financial mathematics, population growth models, parameter estimation, and filtering and optimal control problems. Prerequisite(s): Multivariate calculus and a graduate course in probability and statistics, as well as exposure to ordinary differential equations.

Chemical & Biomolecular Engineering

EN.540.468. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306)) OR EN.553.291;Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (S.110.302 OR AS.110.306) OR EN.553.291[C];Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

Computer Science

EN.601.442. Modern Cryptography. 3 Credits.
Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis]
Students may receive credit for only one of EN.600.442, EN.601.442, EN.601.642.;(EN.601.230 OR EN.601.231) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.421)

EN.601.642. Modern Cryptography. 3 Credits.
Same material as 601.442, for graduate students. Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis] Required course background: Probability & Automata/Computation Theory
Students may receive credit for only one of EN.601.442 OR EN.601.642.

Financial Mathematics

EN.555.642. Investment Science. 3 Credits.
This is the key introductory course for the financial mathematics program and introduces the major topics of investment finance. The investment universe, its context of markets, and the flow of global capital are introduced. Details of equities, interest, bonds, commodities, forwards, futures, and derivatives are introduced to varying degree. The concepts of deterministic cash flow stream, valuation, term structure theories, risk, and single- and multi-period random cash flows are presented. Here the neoclassical theory of finance is introduced including the topics of efficient markets, the risk-return twins leading to the mean variance Capital Asset Pricing Model (CAPM), the efficient frontier, the intertemporal models, and Arbitrage Pricing Theory (APT). Some introductory models of asset dynamics (including the binomial model), basic options theory, and elements of hedging are also included in this course. Course Note(s): This course is the same as EN.553.642 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.644. Introduction to Financial Derivatives. 3 Credits.
This is the first of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. The basic cash, hybrid, and derivative instruments are reviewed and set in a rigorous mathematical context. This includes equities, bonds, options, forwards, futures, and swaps, as well as their dealer, overthe-counter, and exchange environment. Models of the term structure of interest rates, spot rates and, the forward rate curve are treated; derived from cash instruments (e.g., bonds and interest rates like LIBOR) as well as from derivatives (such as Eurodollar futures and swaps). Principles of static, discrete, continuous and dynamic probabilistic models for derivative analysis (including the Weiner process, Ito's Lemma, and an introduction to risk-neutral valuation) are applied to develop the binomial tree approach to option valuation, the Black-ScholesMerton differential equation, and the Black-Scholes formulas for option pricing. Course Note(s): This course is the same as EN.553.644 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.645. Interest Rate and Credit Derivatives. 3 Credits.
This is the second of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. Focus turns to interest rate derivatives and the credit markets. The martingale approach to risk-neutral valuation is covered, followed by interest rate derivatives and models of the short rate process (including Heath, Jarrow & Morton and the Libor Market Model); analysis of bonds with embedded options and other interest rate derivatives (e.g., caps, floors, swaptions). Credit risk and credit derivatives, including copula models of time to default, credit default swaps, and a brief introduction to collateralized debt obligations will be covered. A major component of this course is computational methods. This includes data and time series analysis (e.g., estimation of volatilities), developing binomial and trinomial lattices and derivative analysis schemes, and numerical approaches to solving the partial differential equations of derivatives. Course Note(s): This course is the same as EN.553.645 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.
EN.555.644 Introduction to Financial Derivatives

EN.555.646. Financial Risk Management and Measurement. 3 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings, and compensatory techniques are addressed. Throughout the course, the environment for risk is considered, be it regulatory or social (e.g., Basel capital accords). A major component of the course are the Value at Risk (VaR) and Conditional VaR measures for market risk in trading operations, including approaches for calculating and aggregating VaR, testing VaR, VaR-driven capital for market risk, and limitations of the VaR-based approach. Asset Liability Management (ALM), where liquidity risk as well as market risk can affect the balance sheet, is analyzed. Here, models for interest rate, spread, and volatility risks are applied to quantify this exposure. Another major component of the course is credit risk. Sources of credit risk, how measured risk is used to manage exposure, credit derivatives, techniques for measuring default exposure for a single facility (including discriminant analysis and Mertonbased simulation), portfolio risk aggregation approaches (including covariance, actuarial, Merton-based simulation, macro-economic default model, and the macro-economic cashflow model - for structured and project finance). Finally, there is a brief introduction to concepts and tools that remain valid for large and extreme price moves, including the theory of copulas and their empirical testing and calibration. Course Note(s): This course is the same as EN.553.646 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.647. Quantitative Portfolio Theory & Performance Analysis. 3 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including Sharpe, Treynor, and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement, and attribution; Replicating Benchmark Index (RBI) strategies using cash securities/ derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management (Passive, Quasi-Passive [Indexing] Semi-Active [Immunization & Dedicated] Active [Scenario, Relative Value, Total Return and Optimization]). In addition, risk management and hedging techniques are also addressed. Course Note(s): This course is the same as EN.553.647 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.648. Financial Engineering and Structured Products. 3 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives, and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis). Course Note(s): This course is the same as EN.553.648 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

First Year Seminars

AS.001.141. FYS: The Art of Mathematics. 3 Credits.
Mathematics is so much more that simply the language of science, or a set of techniques for solving quantitative-based problems. In fact, it is not a science at all, but an art, a construct of the imagination that not only provides structure to the reality of the world, but also gives form to anything and everything we can possibly imagine. Many of its fundamental principles and methods of employment are shared by artists of all types, from musicians to painters, sculptors, and poets. In this First-Year Seminar, we will explore these principles and methods shared by mathematicians and artists, like the notions of abstraction, metaphor, and pattern, the aesthetic quality both mathematicians and artists give to their work, the geometry of representation and visualization, the imagination as a tool of discovery and structure, and the use of mathematics in art, as well as the use of art in mathematics. Along the way, we will talk to artists and mathematicians, and hopefully visit the studios and galleries of each.

AS.001.184. FYS: The Mathematics of Politics, Democracy, and Social Choice. 3 Credits.
This First-Year Seminar is designed for students of all backgrounds to provide a mathematical introduction to social choice theory, weighted voting systems, apportionment methods, and gerrymandering. In the search for ideal ways to make certain kinds of political decisions, a lot of wasted effort could be averted if mathematics could determine that finding such an ideal were actually possible in the first place. The seminar will analyze data from recent US elections as well as provide historical context to modern discussions in politics, culminating in a mathematical analysis of the US Electoral College. Case studies, future implications, and comparisons to other governing bodies outside the US will be used to apply the theory of the course. Students will use Microsoft Excel to analyze data sets. There are no mathematical prerequisites for this course.

Mathematics

AS.110.433. Introduction to Harmonic Analysis and Its Applications. 4 Credits.
The course is an introduction to methods in harmonic analysis, in particular Fourier series, Fourier integrals, and wavelets. These methods will be introduced rigorously, together with their motivations and applications to the analysis of basic partial differential equations and integral kernels, signal processing, inverse problems, and statistical/machine learning.
(AS.110.201 OR AS.110.212 OR EN.550.291 OR EN.553.291) AND (AS.110.202 OR AS.110.211) AND (AS.110.405 OR AS.110.415)

AS.110.445. Mathematical and Computational Foundations of Data Science. 4 Credits.
We will cover several topics in the mathematical and computational foundations of Data Science. The emphasis is on fundamental mathematical ideas (basic functional analysis, reproducing kernel Hilbert spaces, concentration inequalities, uniform central limit theorems), basic statistical modeling techniques (e.g. linear regression, parametric and non-parametric methods), basic machine learning techniques for unsupervised (e.g. clustering, manifold learning), supervised (classification, regression), and semi-supervised learning, and corresponding computational aspects (linear algebra, basic linear and nonlinear optimization to attack the problems above). Applications will include statistical signal processing, imaging, inverse problems, graph processing, and problems at the intersection of statistics/machine learning and physical/dynamical systems (e.g. model reduction for stochastic dynamical systems).

AS.110.653. Stochastic Differential Equations: An Introduction With Applications.
This course is an introduction to stochastic differential equations and applications. Basic topics to be reviewed include Ito and Stratonovich integrals, Ito formula, SDEs and their integration. The course will focus on diffusion processes and diffusion theory, with topics include Markov properties, generator, Kolmogrov's equations (Fokker-Planck equation), Feynman-Kac formula, the martingale problem, Girsanov theorem, stability and ergodicity. The course will briefly introduce applications, with topics include statistical inference of SDEs, filtering and control.

AS.110.795. Data Science Seminar.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

For current faculty and contact information go to http://www.mathematics.jhu.edu/people/

Mathematics, Bachelor of Arts

Math Course Placement and Sequencing for All Homewood Students

There are three different versions of single variable calculus offered by the Mathematics Department, including 2 versions of semester courses in Calculus I and II, roughly equivalent to Calculus AB and BC in the College Board's Advanced Placement (AP) system, and a single semester honors version encompassing both Calculus I and II. Students should select their first course in mathematics at JHU based on their intended areas of study, prior experience and training in mathematics, and the results of an advisory Placement Exam offered to incoming freshmen. Students intending to major in mathematics, the natural sciences, or engineering, or who are interested in studying mathematics beyond a year of single variable calculus are strongly encouraged to begin with the AS.110.108 Calculus I (Physical Sciences & Engineering) - AS.110.109 Calculus II (For Physical Sciences and Engineering) sequence or AS.110.113 Honors Single Variable Calculus. Students majoring in other subjects, or who do not intend to continue taking mathematics courses beyond a year of calculus, may wish to take the sequence AS.110.106 Calculus I (Biology and Social Sciences) - AS.110.107 Calculus II (For Biological and Social Science). This latter sequence relates the methods of calculus to the biological and social sciences. A one-semester pre-calculus course (AS.110.105 Precalculus) is a pre-calculus course offered for students who would benefit from additional preparation in the basic tools (algebra, trigonometry and the properties of functions) used in calculus.

Entering students may receive course credit for Calculus I or Calculus I and II on the basis of the performance level on either the (AP) or International Baccalaureate (IB) exams (p. 1604). All students, regardless of completion of advanced placement exams previously, must take a departmental placement exam to determine their appropriate first course in mathematics. Additional placement information can be found here (http://mathematics.jhu.edu/undergraduate/placement-exams/).

After completing a full year of calculus, the courses AS.110.201 Linear Algebra, AS.110.202 Calculus III, or AS.110.302 Differential Equations and Applications may be taken in any order. The department offers honors courses of the former 2; AS.110.212 Honors Linear Algebra and AS.110.211 Honors Multivariable Calculus.

Mathematics Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

The undergraduate program in the Department of Mathematics is intended both for students interested in preparing for graduate study and research in pure mathematics, and for students interested in using mathematics to pose and solve problems in the sciences, engineering, social sciences, or other areas. Undergraduate mathematics majors will study:

- The foundations of analysis, which begins with the study of functions and their derivatives and integrals
- The fundamentals of advanced algebra, which is based on axiomatic systems involving operations of addition and multiplication in general settings
- Additional subjects such as geometry, probability, and topology
- Applications of mathematics to science and/or engineering.

A candidate for the Bachelor of Arts Degree in Mathematics is required to have completed the major requirements listed below. All courses used to meet these requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory (S/U) grading scheme.

Code	Title	Credits
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science) [1]	4
or AS.110.113	Honors Single Variable Calculus	
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
AS.110.202	Calculus III [2]	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.201	Linear Algebra [2]	4
or AS.110.212	Honors Linear Algebra	
AS.110.401	Introduction to Abstract Algebra	4
or AS.110.411	Honors Algebra I	
AS.110.304	Elementary Number Theory [2]	4
or AS.110.412	Honors Algebra II	
or AS.110.413	Introduction To Topology	
or AS.110.422	Representation Theory	
or AS.110.435	Introduction to Algebraic Geometry	
AS.110.405	Real Analysis I [2]	4
or AS.110.415	Honors Analysis I	
AS.110.311	Methods of Complex Analysis	4
or AS.110.406	Real Analysis II	
or AS.110.407	Honors Complex Analysis	
or AS.110.413	Introduction To Topology	
or AS.110.416	Honors Analysis II	
or AS.110.417	Partial Differential Equations	
or AS.110.421	Dynamical Systems	
or AS.110.439	Introduction To Differential Geometry	
or AS.110.441	Calculus on Manifolds	
or AS.110.443	Fourier Analysis	
One 300-level or higher math course		4
Two courses in any one of the approved applications of mathematics or other courses approved by the Director of Undergraduate Studies. [4]		8
Total Credits		**44**

1. Honors Single Variable is a single 4 credit course that will count toward the major or minor in mathematics as both Calculus I and Calculus II.
2. Majors are encouraged but not required to take honors variant.
3. AS.110.413 Introduction To Topology cannot be used for more than one requirement.
4. See table below for some examples of approved application courses. All other choices must be approved by the Director of Undergraduate Studies, and must be upper-level, quantitative in nature, and both from the same department or program.

Approved Courses in Areas of Application

Code	Title	Credits
Physics		
AS.171.204	Classical Mechanics II	4
AS.171.301	Electromagnetic Theory II	4
AS.171.303	Quantum Mechanics I	4
AS.171.304	Quantum Mechanics II	4
AS.171.312	Statistical Physics/Thermodynamics	4
Chemistry		
AS.030.302	Physical Chemistry II	3
AS.030.453	Intermediate Quantum Chemistry	3
Economics		
AS.180.301	Microeconomic Theory	4
AS.180.302	Macroeconomic Theory	4
AS.180.334	Econometrics	3
AS.180.434	Advanced Econometrics	3
Computer Science		
EN.601.231	Automata & Computation Theory	3
EN.601.433	Intro Algorithms	3
EN.601.442	Modern Cryptography	3
EN.601.457	Computer Graphics	3
EN.601.461	Computer Vision	3
EN.601.464	Artificial Intelligence	3
EN.601.475	Machine Learning	3
EN.601.476	Machine Learning: Data to Models	3
Applied Mathematics and Statistics		
EN.553.361	Introduction to Optimization	4
EN.553.362	Introduction to Optimization II	4
EN.553.391	Dynamical Systems	4
EN.553.420	Introduction to Probability	4
EN.553.426	Introduction to Stochastic Processes	4
EN.553.430	Introduction to Statistics	4
EN.553.453	Mathematical Game Theory	4
EN.553.465	Introduction to Convexity	4
EN.553.471	Combinatorial Analysis	4
EN.553.472	Graph Theory	4
EN.553.481	Numerical Analysis	4
EN.553.492	Mathematical Biology	3
EN.553.493	Mathematical Image Analysis	4

Philosophy		
AS.150.420	Mathematical Logic I	3
AS.150.421	Mathematical Logic II	3
AS.150.422	Axiomatic Set Theory	3

Sample Program of Study

The following chart is one example of how a student might progress through the mathematics major. As potential math majors enter JHU with a wide range of prior math abilities, students should begin courses at their current level of knowledge.

Course	Title	Credits
First Year		
First Semester		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
	Credits	**4**
Second Semester		
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
	Credits	**4**
Second Year		
First Semester		
AS.110.202 or AS.110.211	Calculus III or Honors Multivariable Calculus	4
	Credits	**4**
Second Semester		
AS.110.201 or AS.110.212	Linear Algebra or Honors Linear Algebra	4
AS.110.302	Differential Equations and Applications (or other 300+ level elective)	4
	Credits	**8**
Third Year		
First Semester		
AS.110.405 or AS.110.415	Real Analysis I or Honors Analysis I	4
Math application course		3-4
	Credits	**7-8**
Second Semester		
AS.110.406 or AS.110.416	Real Analysis II or Honors Analysis II	4
	Credits	**4**
Fourth Year		
First Semester		
AS.110.401	Introduction to Abstract Algebra	4
	Credits	**4**
Second Semester		
AS.110.304	Elementary Number Theory	4
Math application course		3-4
	Credits	**7-8**
	Total Credits	**42-44**

Honors Program in Mathematics

As a general guideline, departmental honors are awarded to recipients of the B.A. degree who have completed the following with a combined GPA of at least 3.6 out of 4.0:

- AS.110.415 Honors Analysis I and AS.110.416 Honors Analysis II,
- AS.110.411 Honors Algebra I, and AS.110.412 Honors Algebra II,
- AS.110.411 Honors Algebra I, or AS.110.412 Honors Algebra II, and AS.110.407 Honors Complex Analysis
- and one more course at the 400-level or above with a combined grade point average of at least 3.6/4.0.

J.J. Sylvester Prize

The J.J. Sylvester Prize in Mathematics, which carries a cash award, is given each year to the one of two top-performing graduating seniors majoring in mathematics for outstanding achievement.

Undergraduate Teaching Assistantships

The department awards many upper-level undergraduates the opportunity to act as recitation instructors to our freshman courses. This award enables a student to practice the art of teaching and communicating mathematics in an environment where they are hired as a formal instructor to aid the professor of a regular curriculum course as a Teaching Assistant (TA). Undergraduate TAs are fully mentored and monitored, and the position provides a valuable credential and experience.

Undergraduate Learning Goals

At the time of graduation, math majors should:

- Have a good working knowledge of the language of mathematics as embodied in the basic constructs of mathematics in the fundamental areas of algebra, analysis, and geometry
- Be able to analyze the logical structure of a scientific or mathematical problem and to develop a meaningful approach to a solution
- Be able to read, understand, and construct a well-formed proof
- Develop the mathematical maturity and skills necessary to extend their knowledge through self-study and independent research
- Be able to apply mathematical methods to solve research problems arising outside of mathematics
- Be able to formulate precise mathematical statements and questions
- Be able to effectively and successfully communicate mathematics in both oral and written form to a broad mathematical and lay audience.

Mathematics, Minor

Mathematics Minor Requirements

Students with a major in another department may be awarded a minor in mathematics upon completion of a set of core required courses and elective courses. All courses used to meet the mathematics minor requirements must be completed with a grade of C- or better and may not be taken using the S/U grading scheme. One course in the Applied Mathematics and Statistics Department (at the 300-level or above) may be substituted for one of the elective courses for the minor. One or two credit math courses may not apply. No other course substitutions are allowed.

Code	Title	Credits
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
Select one of the following:		4
AS.110.107	Calculus II (For Biological and Social Science)	
AS.110.109	Calculus II (For Physical Sciences and Engineering)	
AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
One 200-level or above math course (excluding AS.110.202)		4
Three 300-level or above math courses		12
Total Credits		**28**

Mathematics, Bachelor of Arts/ Master of Arts

By applying some courses simultaneously toward the requirements for the Bachelor of Arts degree and a Master of Arts degree, an advanced student can qualify for both degrees during the four years of undergraduate study. Admission to the BA/MA Program is by the standard graduate application form, completed and submitted no later than April 30 of the undergraduate student's junior year of study. With the application, the applicant must supply an official copy of the current transcript and a statement of purpose. The GRE exams are not required, and the graduate application fee is waived. In addition, the applicant must have one member of the faculty of the Department of Mathematics submit a letter of recommendation.

And while the application process for the BA/MA program is not competitive, it is contingent on the following:

- A current GPA of least a 3.0/4.0 in the 400-level mathematics courses taken while resident at the university, and
- at the time of application, a student must be a candidate for the honors designation in the undergraduate degree.

Note that the BA/MA must be completed within the four years that the student is an undergraduate, and that graduate student financial support is not available for BA/MA candidates.

All interested students must contact the academic program coordinator (course@math.jhu.edu) prior to applying.

Mathematics, PhD

Graduate

The goal of our PhD program is to train graduate students to become research mathematicians. Each year, an average of five students complete their theses and go on to exciting careers (https://mathematics.jhu.edu/graduate/placement/) in mathematics both inside and outside of academia.

Faculty research interests (https://mathematics.jhu.edu/people/) in the Johns Hopkins University Department of Mathematics are concentrated in several areas of pure mathematics, including analysis and geometric analysis, algebraic geometry and number theory, differential geometry, algebraic topology, category theory, and mathematical physics. The department also has an active group in data science, in collaboration with the Applied Math Department (https://engineering.jhu.edu/ams/).

The Department values diversity among its members, is committed to building a diverse intellectual community, and strongly encourages applications from all interested parties.

A brief overview of our graduate program is below. For more detailed information, please see the links at the right.

Program Overview

All students admitted to the PhD program receive full tuition fellowships and teaching assistantships. Teaching assistant salaries for the 2022-2023 academic year are $33,000, and exceptional applicants are also considered for supplementary fellowships. Students making satisfactory progress can expect to be supported for six years.

PhD candidates take two or three courses per semester over the first several years of the program. These are a mix of required and intermediate-level graduate courses, independent studies, and special topics classes offered by our faculty.

By the beginning of their second year, students are asked to demonstrate competency in algebra and in analysis by passing written qualifying exams in these two broad areas. Students are then expected to choose an advisor, who will supervise their dissertation and also administer an oral qualifying exam to be taken in the second or third year. More specifics about all these requirements are described on the requirements page (https://mathematics.jhu.edu/graduate/requirements/).

All graduate students are invited to attend weekly research seminars in a variety of topic areas (https://mathematics.jhu.edu/events/)as well as regular department teas and a weekly wine and cheese gathering attended by many junior and senior members of the department. A graduate student lunch seminar series provides an opportunity for our students to practice their presentation skills to a general audience.

PhD students will gain teaching experience as a teaching assistant for undergraduate courses. Most of our students lead two TA sections per week, under the supervision of both the faculty member teaching the course and the director of undergraduate studies. Students wanting more classroom experience (or extra pay) can teach their own sections of summer courses. First-year students are given a reduced TA workload in the spring semester, in preparation for the qualifying exams.

In addition to their stipend, each student is awarded an annual travel allowance to enable them to attend conferences for which limited funding is available or visit researchers at other institutions.

Financial Aid

Students admitted to the Ph.D. program receive teaching assistantships and full tuition fellowships. Exceptional applicants become candidates for one of the university's George E. Owen Fellowships.

William Kelso Morrill Award

The William Kelso Morrill Award for excellence in the teaching of mathematics is awarded every spring to the graduate student who best exemplifies the traits of Kelso Morrill: a love of mathematics, a love of teaching, and a concern for students.

Excellence in Teaching Awards

Three awards are given each year to a junior faculty member and graduate student teaching assistants who have demonstrated exceptional ability and commitment to undergraduate education.

Admission Requirements

Admission to the PhD program is based on primarily on academic records, letters of recommendation, and a personal statement. *The Department of Mathematics values diversity among its members, is committed to building a diverse intellectual community, and strongly encourages applications from all interested parties.*

Via the online application (http://grad.jhu.edu/apply/), applicants should submit:

- A Statement of Purpose
- An optional Personal Statement
- Transcripts from all institutions attended
- Three letters of recommendation
- Official GRE scores for both the general and the subject test
- Official TOEFL scores (if English is not your first language)

The required Statement of Purpose discusses your academic interests, objectives, and preparation. The optional Personal Statement describes your personal background, and helps us create a more holistic understanding of you as an applicant. If you wish you may also discuss your personal background in the Statement of Purpose (e.g. if you have already written a single essay addressing both topics), instead of submitting separate statements.

Application fee waivers are available based on financial need and/or participation in certain programs (http://grad.jhu.edu/apply/application-process/#1464027869971-8cbbde29-b882).

Many frequently asked questions about the graduate admission process are answered here (https://mathematics.jhu.edu/graduate/admissions/prospective-graduate-student-faq/).

No application materials should be mailed to the department. All application materials are processed by the Graduate Admissions Office (http://grad.jhu.edu/apply/).

Undergraduate Background

The following is an example of what the math department would consider a good background for a student coming out of a four-year undergraduate program at a college or university in the U.S. (assuming a semester system):

- Calculus in one variable (two semesters, or AP credits)
- Multivariable Calculus (one semester)
- Linear Algebra (one semester)
- Complex analysis (one semester)
- Real analysis (two semesters)
- Abstract algebra (two semesters)
- Point-set topology (one semester)

Many admitted students have taken upper-level undergraduate mathematics courses or graduate courses. Nevertheless, the department does admit very promising students whose preparation falls a little short of the above model. In such cases, we strongly recommend that the student start to close the gap over the summer, before arriving for the start of the fall semester.

Financial Support

Students admitted to the PhD program receive full tuition fellowships and teaching assistantships. Teaching assistant salaries for the 2022–2023 academic year are $33,000. Students making satisfactory progress can expect to be supported for six years. Exceptional applicants are considered for supplementary fellowships of $6,000 each year for three years.

Students from underrepresented groups may be eligible for other university-wide supplemental fellowships. Summer teaching is available for students seeking extra income.

Additional Information for International Students

Student Visa Information: The Office of International Services at Homewood (http://ois.jhu.edu/) will assist admitted international students in obtaining a student visa.

English Proficiency: Johns Hopkins University requires students to have adequate English proficiency for their course of study. Students must be able to read, speak, and write English fluently upon their arrival at the university. Applicants whose native language is not English must submit proof of their proficiency in English before they can be offered admission and before a visa certificate can be issued. Proficiency can be demonstrated by submitting results from either the Test of English as a Foreign Language (TOEFL) (http://www.toefl.org/) or the IELTS (https://www.ielts.org/en-us/). Johns Hopkins prefers a minimum score of 100 on the TOEFL or a Band Score of 7 on the IELTS. Results should be sent to Johns Hopkins directly by TOEFL or IELTS. Applicants taking the IELTS must additionally upload a copy of their score through the application system. However, do **not** send the student copy or a photocopy of the TOEFL.

Program Requirements

Course Requirements

Mathematics PhD candidates must show satisfactory work in Algebra (110.601-602), Real Variables (110.605), Complex Variables (110.607), and one additional non-seminar mathematics graduate course in their first year. The first-year algebra and analysis requirement can be satisfied by passing the corresponding written qualifying exam in September of the first year; these students must complete at least two courses each semester. In addition, PhD candidates must take Algebraic Topology (110.615) and Riemannian Geometry (110.645) by their second year. Students having sufficient background can substitute an advanced topology course for 110.615, or an advanced geometry course for 110.645 with the permission of the instructor.

Candidates must show satisfactory work in at least two mathematics graduate courses each semester of their second year, and if they have not passed their oral qualifying exam, in the first semester of their third year.

Qualifying Exams

Candidates must pass written qualifying exams by the beginning of their second year in Analysis (Real & Complex) and in Algebra. Exams are scheduled for September and May of each academic year, and the dates are announced well in advance.

Oral Exam

Candidates must pass an oral qualifying examination in the student's chosen area of research by April 10 of the third year. The topics of the exam are chosen in consultation with the faculty member who has agreed (provisionally) to be the student's thesis adviser, who will also be involved in administering the exam.

PhD Dissertation

Candidates must produce a written dissertation based upon independent and original research. After completion of the thesis research, the student will defend the dissertation by means of the Graduate Board Oral exam (http://krieger.jhu.edu/math/graduate/requirements/graduate-board-oral-exam/). The exam must be held at least three weeks before the **Graduate Board** deadline the candidate wishes to meet.

Our PhD program does not have a foreign language requirement.

Medicine, Science, and the Humanities

http://krieger.jhu.edu/msh (http://krieger.jhu.edu/msh/)

This is an interdisciplinary, humanities-based major using a cultural and historical context to explore scientific inquiry and the roots of medicine. The medicine, science, and the humanities major is ideal for students who plan to pursue careers in the science and health professions as well as those interested in issues of importance to science and medicine, and students who plan to pursue graduate work in a range of humanities, social science, or professional disciplines.

MSH Major Goals and Objectives

Goal

Medicine, science, and humanities majors will develop an interdisciplinary understanding of the cultural and historical roots of scientific inquiry and medicine, with the ability to apply these precepts to contemporary life.

Objectives

MSH majors will:

- Gain an introductory awareness of theory, interpretation, and methods in a specific humanistic topic related to science and/or medicine
- Acquire and develop skills of interpretation and analysis in a specific humanities discipline by focusing on primary and secondary sources such as literature, imagery, film, artifacts, and commentary
- Acquire fundamental skills of writing and oral presentation, emphasizing clear and logical exposition to enhance student readiness for subsequent graduate school, professional school, or the workforce
- Acquire knowledge and experience in the natural sciences
- Understand the advantages of multiculturalism through intermediate mastery of a language beyond English.

Affiliated Humanities Departments

- Anthropology (http://anthropology.jhu.edu/)
- Archaeology (https://krieger.jhu.edu/archaeology/)
- Bioethics (https://bioethics.jhu.edu/education-training/undergraduate-minor/)
- Classics (http://classics.jhu.edu/)
- East Asian Studies (https://krieger.jhu.edu/east-asian/)
- English (http://english.jhu.edu/)
- Film and Media Studies (https://krieger.jhu.edu/film-media/)
- German (Modern Languages and Literatures) (https://krieger.jhu.edu/modern-languages-literatures/german/)
- History (http://history.jhu.edu/)
- History of Art (http://arthist.jhu.edu/)
- History of Science and Technology (http://host.jhu.edu/)
- Italian (Modern Languages and Literatures) (https://krieger.jhu.edu/modern-languages-literatures/italian/)
- Latin American Studies (https://krieger.jhu.edu/plas/)
- Near Eastern Studies (http://neareast.jhu.edu/)
- Philosophy (http://philosophy.jhu.edu/)
- The Writing Seminars (http://writingseminars.jhu.edu/)

Programs

- Medicine, Science, and the Humanities, Bachelor of Arts (p. 1968)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.145.101. Death and Dying in Art, Literature, and Philosophy: Introduction to Medical Humanities. 3 Credits.
In this course, four essential aspects of the theme of death and dying will be examined: Death and Medicine; Emotional Responses to Death; Burying and Commemorating the Dead; and Conceptions of Death. Specific topics relating to each of these aspects that will be covered include illness and causes of death; prevention of death; suicide; death and grief; burial practices; mourning the dead; public commemoration of the dead; life after death; and death and rebirth. Students will explore these topics from a historical-anthropological perspective with Paul Delnero, a specialist in the history and culture of the ancient Near East (Near Eastern Studies); from a literary perspective, by reading and writing poetry relating to these subjects with the acclaimed poet James Arthur (Writing Seminars); and from a musical perspective, through direct encounters with the music and creative process of the award-winning composer, Michael Hersch (Peabody).
Area: Writing Intensive

AS.145.104. Science, Medicine, Media. 3 Credits.
Much of our understanding of science and medicine is filtered through what we casually refer to as "the media": newspapers, magazines, television shows, films, and electronic social media. But the scientific world relies on its own media to produce and circulate knowledge: from scientific journals and conferences, to agar plates and petri dishes, cloud chambers and electrophoresis gels. Medical technologies from the stethoscope to the echocardiogram likewise mediate the perception of the body in health and disease, and increasingly our own understanding and perception of our bodies and our health is mediated via screens, scans, and images — without which we can hardly imagine ourselves anymore. Students will learn theoretical tools to critically assess the technologies that mediate our knowledge of our own bodies and the broader world, as well as practical tools in media production and visual storytelling (video, podcast, website etc.) to bring these analytics to bear on our broader understandings of science and medicine.
Area: Writing Intensive

AS.145.106. Health, Science, Environment. 3 Credits.
Environment has an inexorable effect on human health, and certain human activities have had outsized impacts on the natural world and the ability of forms of life to thrive. This course brings medical humanities, history of science, and science & technology studies into conversation with environmental humanities to ask: how have our conceptions of the natural world emerged, and how have these shaped our understandings of bodies, ecologies, and health outcomes? How do we know and measure the environment and health, and to what effects? How have human and ecological health affected environmental politics? How have writers and artists understood and depicted their environments and environmental questions? Can works of fiction shape ecological transformations? What can we learn from case studies of health and environment in Baltimore and the Chesapeake Bay as well as in global contexts? Course topics will include ecology, epigenetics, toxicity, agriculture and food, radiation, air quality, and more-than-human entanglements.

AS.145.201. Clues: Unreasoning the Medical Mystery. 3 Credits.
Foundational authors of detective fiction, including Edgar Allen Poe, Arthur Conan Doyle, and Pauline Hopkins, often used medical doctors and themes in their mystery plots. It’s no coincidence that medicine and crime fiction share a vocabulary of clues, evidence, and diagnosis. The mystery genre was integrally tied to the rise of scientific medicine as a respected profession. Indeed, classic detective stories are practically propaganda for the scientific method, showing readers how the powerful tools of observation and inference can solve any problem. Over the course of the 20th century, not only doctors, but also psychologists, social scientists and historians adopted the authoritative stance of the detective in constructing or reconstructing facts. However, as we study Sherlock Holmes and his modern proteges, such as TV doctor Gregory House, we will analyze how "medical mystery" narratives can limit our thinking about problems and solutions in medicine. We will consider post-modern detective stories that offer alternatives to the "Holmsian" model for understanding the complex clinical realities of today.
Area: Writing Intensive

AS.145.202. Health Care Activism in Baltimore and Beyond. 3 Credits.
National struggles over the right to health care, and over the health needs of marginalized groups, have taken distinctive forms in Baltimore City during the past century. The renowned Johns Hopkins University came to symbolize, for many residents, the power of medicine both to heal and to harm – and the need for community action. This course delves into the archives of local institutions to understand the work of activists and advocates who connected health, medicine, and social justice. We focus on specific sites, from the segregated wards of Johns Hopkins to the People’s Free Medical Clinic on Greenmount Avenue, where demands for equity changed the city’s health care landscape. Through interdisciplinary readings and conversations with local organizers, we consider how historical memory can serve as a creative resource for the art and politics of the present.
Area: Writing Intensive

AS.145.203. Constructing memories: between art and science. 3 Credits.
What is a personal memory? Is it a story or a scene, as if in a film? Is there such a thing as body memory? How tight is the connection between remembering and story-telling? Scientific articles and book chapters in cognitive psychology and the neurosciences can provide some answers to such questions. Two films, “Memento” and “Inside Out” can also help us grasp the impact of major scientific discoveries of how memory works. But our discussions will depend above all on literary and biographical accounts based on the experiences of “rememberers” such as St Augustine, Proust, Woolf, Freud, as well as on cases on amnesia documented by Oliver Sacks, Antonio Damasio, and David Shenk. The latter will help us understand why our ability to engage in mental time-travel is essential to our personal and social existence. Coming out of this course, you will not only have a better comprehension of how autobiographical memory works, you’ll have learned also how some of the sharpest scientific and philosophical minds of our times have tried to make sense of this mysterious human capacity.

AS.145.204. Graphic! Visualizing Medicine from Textbooks to Comics. 3 Credits.
Visuals play an important role in the history and practice of medicine, from medical textbooks to medical imaging, and from hospital signage and public health posters to comics and graphic novels. This course will examine the visual aspects of the history and practice of medicine by focusing on the rising genre of medical comics and graphic novels, known as “graphic medicine.” The course will embed this examination of “graphic medicine” in a wider examination of the various uses of visuals in medicine, the complicated history of class, race and gender in those uses, and how visuals have served different functions in the history and practice of medicine, from assisting medical diagnosis to enabling new forms of medical consumerism, and from facilitating doctor-patient communication to practicing art therapy, as well as presenting visual pathographies and documenting patients’ and caregivers’ experiences of disease. Through an assortment of primary sources that include medical comics and graphic novels, aided by a variety of secondary sources that embed these narratives in larger issues in the history of medicine, medical anthropology, and the medical humanities, the course will aim to introduce students to some of the most important themes in the field of “graphic medicine.”

AS.145.205. The Costs of Care: Writing about Illness in America. 3 Credits.
Health care can be expensive for those who receive it and those who provide it. In the United States, patients go into debt while doctors suffer from burnout and nurses rush through understaffed wards. The U.S. has the highest healthcare spending of any wealthy nation, yet suffers comparatively worse outcomes. This seminar brings together social science research with patient experiences that show the human face of the American health care debate. We read the work of scholars, poets, and medical practitioners who reflect on core questions: What should be the government’s role in healthcare provision? What alternative models have people in marginalized groups developed when the system fails them? Understanding both failures and successes gives us the tools to build new paths.
Area: Writing Intensive

AS.145.215. Representations of Pain and Suffering in Contemporary Culture. 3 Credits.
What does it mean to experience pain or encounter the suffering of another person in our post-truth era? This course explores the changing representation of pain and suffering in contemporary film, fiction, creative non-fiction, science and technology. Through analysesand close-readings of a variety of primary and secondary sources, we will consider the different ways twentieth- and twenty-first-century historical, cultural, and media representations have mediated pain and suffering. Such investigations allow us to understand the workings of pain in the present.
Area: Writing Intensive

AS.145.217. Neurofictions: History and Literature of the Mind Sciences. 3 Credits.
Neuroscience has a long way to go from mapping neural connections to a precise account of memory, emotion, and consciousness. But the limits of science have never stopped us from imagining its possible futures. Engaging two centuries of debate in the mind sciences and in western culture at large, this course looks at historical attempts to explain and control human consciousness. By placing each period's scientific texts in dialog with contemporaneous science fiction -- from Edgar Allan Poe to Ursula K. Le Guin -- we discover how theories about the brain can shape society while at the same time responding to social contexts.

AS.145.219. Science Studies and Medical Humanities: Theory and Methods. 3 Credits.
The knowledge and practices of science and medicine are not as self-evident as they may appear. When we observe, what do we see? What counts as evidence? How does evidence become fact? How do facts circulate and what are their effects? Who is included in and excluded from our common-sense notions of science, medicine, and technology? This course will introduce students to central theoretical concerns in Science and Technology Studies and the Medical Humanities, focusing on enduring problematics that animate scholars. In conjunction with examinations of theoretical bases, students will learn to evaluate the methodological tools used in different fields in the humanities to study the production and circulation of scientific knowledge and the structures of medical care and public health. This problem-centered approach will help students understand and apply key concepts and approaches in critical studies of science, technology, and medicine.
Area: Writing Intensive

AS.145.220. Health, Medicine, Gender, and Sexuality. 3 Credits.
This course invites students to take the perspective of gender and sexuality on health and medicine. In this course, we do not see gender and sexuality as a separate domain of health. Instead, we will learn how a gender perspective is in fact crucial for critically exposing the ways in which medicine is interpenetrated by social life and by law. For example, what technologies and discourses constitute “the normal”? How is sexuality braided into disease surveillance? How do we understand the lawfare on the terrain of reproductive rights? What aspects of disease are suppressed in dominant forms of knowledge production, due to the undervaluation of gendered forms of experience? We will take cases involving HIV/AIDS; reproductive justice and rights; poverty, marginality and queer kinship; and household patterns of care.

AS.145.303. Research in the Medical Humanities: A Practical Introduction. 3 Credits.
This seminar is designed to prepare students for an extended interdisciplinary writing project, such as an honor's thesis or an undergraduate research proposal. The first part will be devoted to establishing or consolidating skills in research, in methods, and in approaches specific to the medical humanities. Class meeting will involve different formats and types of preparation: studying examples of writing in different domains related to MSH, visits of specialists (e.g. librarians and authors), preparing a proposal to be presented in a workshop, and a well-documented capstone project outlining a proposal. You'll be asked to submit at regular intervals written results of your work in progress and you must be prepared as well to present your results orally at different important points in our unfolding semester.
Area: Writing Intensive

AS.145.305. Lives in Medicine: Exploring the Personal Writing of Patients and Practitioners. 3 Credits.
The personal accounts of patients and practitioners offer a rich exposure to human experience in medicine. What is it like to be a patient, to be sick or to face the threats or limits that illness presents? What is it like to be a doctor or nurse in this world of illness? In this course we will read such accounts as published in book form, discuss them in a seminar setting and write about them. We will select a small number from the thousands of such publications to introduce the student to this unique genre, emphasizing reading, writing and group discussion.
Area: Writing Intensive

AS.145.310. A Noble Profession? Doctors as Social and Political Actors. 3 Credits.
Medicine is a profession known for its ethical code of conduct—a code that is imbued with an ethos of neutrality and impartiality. However, real life shows us that doctors do not occupy a special moral class, but are rather members of social and political communities, citizens with grievances, political affiliations and loyalties, and are often subject to many social and political influences around them. This course will examine how doctors' political choices shape their medical practice, and how their medical practice—especially their temporally and spatially privileged access to bodily suffering and loss of life—shapes in turn their political choices. It investigates the roles of doctors, not simply as technical experts, but as social and political actors informed by technical expertise among other factors. Relying on histories, ethnographies, memoirs and even works of fiction, this course will explore narratives of doctors' social and political engagement in the US and around the globe.
Area: Writing Intensive

AS.145.350. MSH Research Capstone. 3 Credits.
The Research Capstone seminar prepares students to undertake original extended research in the medical humanities and science studies. The course will help students synthesize the interdisciplinary knowledge upon which the Medicine, Science, and the Humanities (MSH) major is built. Students will have the opportunity to form research topics, devise and execute research plans, write a research grant application, and share their work with the class. The course is aimed at MSH juniors seeking to create Honors projects, though the course is open to any student wishing to learn or enhance research skills.

AS.145.360. Incarceration and Health: Critical Perspectives. 3 Credits.
Can care exist in a space of punishment? Institutions of incarceration are inherently spaces of violence and social control and, in the U.S.'s current context of mass incarceration, racial oppression. Yet prisons, jails, and detention centers are required to provide individuals access to health care. How can we understand this convergence of care for the body and psyche with multiple forms of carceral violence? This course will examine modes of health and health care inside institutions of incarceration as they are situated within broader socio-political contexts that shape society's over-reliance on incarceration as a means of social and racialized control. Drawing on history, anthropology, sociology, legal theory, critical race studies, and public health, the course will explore the everyday realities inside institutions of incarceration as they relate to suffering and care and how those are connected to policies and processes of subjugation outside the institutions' walls. Case studies for examining these relationships include pregnancy, COVID-19, addiction, and mental illness behind bars. Students will engage with concepts such as disciplinary power, biopower, carceral and anti-carceral feminism, theories of care, medical abolition, and dual loyalty. While the course will primarily focus on the U.S. context, we will also draw comparisons to non-U.S. settings. Throughout the course we will seek to understand how institutions of incarceration are not, as popularly understood, isolated places "elsewhere," but implicitly porous with so-called free society—and therefore as exemplars for understanding the connections among health, inequality, and state institutions.
Area: Writing Intensive

AS.145.502. Medicine, Science & the Humanities Internship. 3 Credits.
An internship in Medicine, Science & the Humanities approved by the director of the program.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.510. Medicine, Science & the Humanities Independent Research. 1 - 3 Credits.
This course is for students in the Medicine, Science & the Humanities doing independent research. Course can be taken up to 3 credits with approval from the director.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.511. Medicine, Science & the Humanities Independent Research. 1 - 3 Credits.
This class is for the MSH majors completing their research project. Instructor approval required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.516. MSH Honors Thesis. 1 - 3 Credits.
This class is for the MSH majors completing their honors thesis. Instructor approval required. This course can be taken for up to 3 credits with instructor approval.

Cross Listed Courses

Anthropology

AS.070.381. Addiction: An anthropological approach to substance dependence in the U.S.. 3 Credits.
This course offers an advanced examination of the interpersonal, institutional, and societal dimensions of addiction in the United States. The course will be divided into four sections. This first section tracks the evolution of addiction from a moral problem of the will to a formal, biomedical disease category over the course of the 20th century. This section introduces the problem of addiction within the societal context of the United States, exploring questions of political governance, social control, and issues of race, class, and gender inequality. It asks the question: what is the social life of addiction in the United States? The second section of the course will ground these broad inquiries in the urban U.S. by examining how addiction overlaps with mass incarceration, poverty, and homelessness in the U.S. city. Over the course of this section, we will engage and reframe the crack crisis of the late 20th century. The third section of the course will shift our attention to the rural United States and how addiction overlays unemployment, social isolation, and the urbanization of the U.S. Through this social and institutional lens, the third course section will explore the contemporary opioid crisis and draw comparisons with the crack crisis. The course concludes with an examination of the personal dimensions of the addiction experience and explores substance dependence in the realms of kinship, love, and personal understandings of recovery.
Area: Writing Intensive

Classics

AS.040.152. Medical Terminology. 3 Credits.
This course investigates the Greek and Latin roots of modern medical terminology, with additional focus on the history of ancient medicine and its role in the development of that terminology.

Comparative Thought and Literature

AS.300.334. Love and its maladies. 3 Credits.
Much of what we know about love and desire we owe to fiction's ability to evoke these experiences. Consider for example that the publication, in Germany, of The Sorrows of Young Werther inspired young men across Europe to dress and behave just like this lover. Just as nowadays film and television represent, as well as mold our conceptions of love, love-stories from the eighteenth-century onwards have given shape to gendered subjectivities in ways that still matter now. As, intriguingly, illness is a recurrent theme in many modern love stories, we will be prompted to decipher signs and symptoms in the bodies of mind of our protagonists. Why is it that in Western cultures, passion is tightly interwoven with a landscape of pain, suffering, and disease? In studying texts that represent major aspects of a romantic sensibility, we are indeed invited to trace the steps of a history of the body increasingly defined by gender and by medical knowledge. The readings for this class (all available in English) include: Austen, Persuasion; Balzac, The Unknown Masterpiece; Barthes, Lover's Discourse; Goethe; The Sorrows of Young Werther; Mann, Death in Venice; Winterson, Written on the Body.

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.439. Stories of hysteria. 3 Credits.
Many are the stories that recount episodes of hysteria, and we owe them not only to medicine. To the modern observer, they are a puzzle, involving strange beliefs about wandering wombs, demonic possession, and female virtue (or lack thereof). Closer to our time, contemporary media, as well as accounts in the social and clinical sciences have evoked cases of "mass hysteria" in America and across the globe. Marriage, it was thought for a long time, might be the best cure, which might be the reason case-studies of this illness can be as intriguing and troubling as novels. Against a backdrop of medical and historical materials, we will examine a selection of stories, from the 17th century onward, that evoke aspects of hysteria. They serve as our case-studies and as prompts to study an illness born at the convergence of histories and myths, of medical science, and of cultural and gender assumptions. Among the notions we will explore: The birth of psychoanalysis, trauma and PTSD, the concept of repression, the visual aspects of an illness and its spread in the arts, including cinema.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

English

AS.060.108. Time Travel. 3 Credits.
Why is time travel such a consistent and perplexing theme in literature and film over the last 150 years? Why is modernity so concerned with peeking backwards or forwards? This course will examine the history of time-travel fiction, from its beginning in utopian fiction through its box-office dominance in the 1980s, and into today. Writers will likely include Mark Twain, Edward Bellamy, Harold Steele Mackay, Ray Bradbury, Robert Heinlein, and Philip K. Dick. Movies will include *The Terminator*, *Back to the Future*, and *Primer*.
Area: Writing Intensive

First Year Seminars

AS.001.101. FYS: The Hospital. 3 Credits.
Johns Hopkins invented the modern hospital along with modern medical education. This seminar will explore the history of the hospital from its monastic origins to its current form, with particular attention to how hospital design has reflected and reinforced ways of thinking about health, disease and medical treatment. We will also consider specialized hospitals and clinics, for the mentally ill, for particular diseases, for women and children, among other topics.

AS.001.102. FYS: Japanese Robots. 3 Credits.
Japan is a world leader in biomimetic robotics. Japanese society enthusiastically embraces robotic nurses, robotic guides, robotic waiters, robotic pets, and even robotic girlfriends. What are the origins of the Japanese love of robots? What role did robotics engineers play in creating the image of loveable robots? What societal fears do Japanese robots assuage and what hopes do they foster? In the course of the semester, students will learn about the evolution of Japanese robotics, and explore the implications of this evolution to humans' relationship with robots. While learning about Japanese robots, students will acquire skills necessary for college-level education, including how to write an email to a professor, how to organize and manage digital tools, how to navigate the information resources, and how to develop, complete, and present research projects. This course will equip students with skills essential to their success in college and beyond.

AS.001.107. FYS: Thinking and Writing Across Cultures - East Asia and the West. 3 Credits.
In this First-Year Seminar, we will explore what it means to think and write across multiple cultures in the contemporary world. What do we gain and/or lose when we think and write crossing cultural boundaries? How do knowledge and experience of two or more cultures help us think and act critically, creatively, and ethically? What does plurality of cultures mean to universal discourses such as science and technology? How can cultural differences help or hamper our efforts to tackle global problems like climate change? These are some of the guiding questions that we will investigate together in this course by examining novels, essays, autobiographies, travelogues, philosophical writings, and films that engage with multiplicity of cultures between East Asia -- especially China, Japan, and Korea – and the West as well as within East Asia.

AS.001.108. FYS: Heart Matters. 3 Credits.
To the human imagination, the heart is more than a muscle and thumping pump keeping us alive. From the Renaissance to the present, writers have helped us make sense of our bodies, in health and in illness or pain. The history of the heart, meanwhile, starts in Antiquity, where it shapes our beliefs about life. One of our aims will be to trace the historical, cultural, and subjective meanings our minds have given to this "sublime engine." The other will be to discover how our scientifically inquisitive minds, backed up with technical skills and technological devices such as the stethoscope, have found new ways to take care of this volatile organ. Our materials will involve a constellation of texts in medical history, modern fiction in the form of poems and short-stories, and recent scientific prose on such topics as heart transplants, heart-monitoring implants, xenotransplants as well as heartbreaks.

AS.001.123. FYS: Wired to Read: the Science and the Art. 3 Credits.
We all think we know that reading is: of course, that's what you are doing right now, as you are trying to make sense of words I have written. But how do we do we do it? How do mere shapes and lines on the page suddenly begin to mean something? Is our brain wired for reading? Apart from our eyes, are other parts of the body involved? When did humans start to write and read? These are the kinds of questions we'll pursue. This First-Year Seminar will explore two distinctive perspectives: one literary, the other is scientific. We'll divide our attention between the study of chapters and articles that present scientific findings about how we read and a practical exploration of a novel. Literary works tax our brains in multiple ways and our example will show why and how. George Eliot's The Mill of the Floss, will serve as our case-study. We'll learn why fiction can make us cry or make us angry about the world, how word-pictures trigger our imagination, how a writer tricks us (or our brains?) into believing the things that words in print evoke. As a story of growth in adversity filled with memories, drama, and insights about society and gender, The Mill on the Floss is bound to hold your attention.

AS.001.139. FYS: Medicine and Cinema. 3 Credits.
This First-Year Seminar explores the intersection between medicine and film, looking at how medicine, medical providers, and narratives of illness and health are depicted in cinematic works. Some of the questions that the seminar pursues are: What are some of the medical issues that filmmakers focus on? How did the cinematic portrayal of medicine change over time? What role do these films play in shaping public perceptions of medicine, medical providers, and medical institutions? By watching a number of films throughout the semester and reading some accompanying texts, students will develop deeper knowledge both of the history of medicine in cinema and the tools that cinema offers to the telling medical stories.

AS.001.181. FYS: Introduction to Lives in Medicine - Exploring the Experience of Patients and Practitioners. 3 Credits.
Beyond scientific and technological advances in the classification and treatment of disease, beyond complex hospital and health delivery systems, beyond the immensity of the medical world itself there is a human world of experience that tells its stories in various ways. Patients, doctors, nurses and related healthcare providers inhabit this shared environment of intense personal experience, giving rise to various accounts: memoirs, autobiographies, blogs, websites and interviews that provide us with a rich resource for understanding the culture of medicine and the world of the sick. In this First-Year Seminar, we explore some of these accounts by reading from books and personal memoirs of patients and practitioners, looking at films and photographs, listening to interviews and discussing what we learn from such accounts and how they shape our understanding of the many worlds of health and medicine. As a complement to the scientific study of human biology and disease, this seminar offers the incoming student an introduction to a broad literacy in medicine, disease and human biology, focusing on the importance of individuals by exploring the records of their experiences and the ways in which they are made available to us.

AS.001.190. FYS: Poisons! A History. 3 Credits.
Poisons aren't what they seem. Sometimes they look like food. Sometimes they look like drugs. From cinnabar to cinnamon, from dragon blood to goat bezoars, poisons result from careful human construction, collection, and creation. They are objects of early chemistry. Far from killing us, poisons have been central to the history of medicine. Physicians in the past and present monitor dosage, drug combination, and drug preparation to mitigate poison toxicity while still maintaining drugs' therapeutic potencies. Knowledge about poisons, in other words, quietly undergirds most of human civilization. Poisons are what keep us alive. Or not.This First-Year Seminar comes to understand poisons in three ways. First, it takes on individual poisons (mercury, opium, among others) to introduce major themes in the history of science and science studies. Second, it engages with global perspectives in the history of medicine to understand how poisons were deployed, refined, and neutralized around the world. Third, it introduces frameworks in the philosophy of chemistry to analyze the social, conceptual, and practical demands on empiricism. Together, these three perspectives will shift students' perspectives on poisons from objects that kill to critiquing them as objects that are intimately tied to ideas of cure.

History

AS.100.291. Medicine in an Age of Empires, 1500-1800. 3 Credits.
How did medicine emerge as a distinctive body of knowledge and a profession in the early modern period? The answers lie in the histories of disease, empire, and global commerce.

AS.100.319. History of American Reproductive Politics. 3 Credits.
This course examines reproductive politics in the United States from the colonial era to the present. Topics include contraception, abortion, and sterilization, emphasizing the impact of gender, class, and race.
Area: Writing Intensive

AS.100.396. The Gender Binary and American Empire. 3 Credits.
This discussion-based seminar will explore some of the ways that the sex and gender binary was produced out of American statecraft in the late nineteenth and twentieth centuries. Particular attention will be paid to US imperialism, both domestically in its settler form, as well as in Hawaii, the Caribbean, and the Pacific. What happens to the study of the modern gender binary if it is treated as a transnational artefact of US imperialism's encounter with a multitude of cultures and nations?
Area: Writing Intensive

History of Art

AS.010.208. Leonardo da Vinci: The Renaissance Workshop in the Formation of Scientific Knowledge. 3 Credits.
How does a notary's son trained as a painter come to claim expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? The course will focus critically on the myth of Leonardo's singularity and explore his achievements with regard to the artisanal culture of his time, as well as the problems of authority in the recognition of artisanal knowledge as scientific discovery.

AS.010.212. Mirror Mirror: Reflections in Art from Van Eyck to Velázquez. 3 Credits.
Explores the different ways Early Modern painters and printmakers incorporated mirrors and optical reflections into their works for the sake of illusion and metaphor, deception and desire, reflexivity and truth-telling. Connecting sense perception and ethical knowledge, embedded mirror images often made claims about the nature of the self, the powers of art, and the superiority of painting in particular.

AS.010.235. Art, Medicine, and the Body: Middle Ages to Modernity. 3 Credits.

This course explores seven centuries of fruitful collaboration between physicians and artists, uncovering the shared discourses, diagnostic techniques and therapeutic agendas that united the art of picture-making with the art of healing. Topics include the origin and development of medical illustration; the long, cross-cultural history of the therapeutic artefact; the anatomical investigations of Renaissance artists such as Leonardo and Michelangelo; depictions of bodily pain and disease in the art of Matthias Grünewald and psychosomatic syndromes like melancholy in the work of Albrecht Dürer; the spectacularization of the body in Enlightenment science and the ethics of medical specimen display today -- all in order to bring the complex intersections of the history of medicine and the history of art into view.

AS.010.350. Body and Soul: Medicine in the Ancient Americas. 3 Credits.

This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

History of Science, Medicine, and Technology

AS.140.105. History of Medicine. 3 Credits.

Course provides an introduction to health and healing in the ancient world, the Middle Ages, and the Renaissance. Topics include religion and medicine; medicine in the Islamicate world; women and healing; patients and practitioners.

AS.140.228. Epidemic!: Diseases that Shaped our World. 3 Credits.

In this course, we will look at a number of key epidemic diseases in the pre-modern and modern world, from Black Death to COVID-19, and investigate how it affected medical thought and practice, as well as political, social and economic lives. We will pay special attention to how these diseases spread and how they affected and were influenced by questions of race, gender, sexuality and colonialism.

AS.140.231. Health & Society in Latin America & the Caribbean. 3 Credits.

Medical practice is complex in Latin America and the Caribbean. Most countries in the region have universal healthcare; yet, the quality of clinical services varies widely, and is influenced by degrees of incorporation into—or marginalization from—social power structures. Many people take their health into their own hands by supplementing biomedicine with plant based remedies as well as religious and spiritual services. This course will interrogate the history and contemporary relevance of healthcare in Latin America and the Caribbean, with particular interest in how medicine intersects with colonialism, slavery, capitalism, neo-colonialism, grassroots revolutionary movements, the Cold War, and neoliberalism. Drawing on films, visual and performance art, and music, students will consider the ways in which race, gender, indigeneity, ability, class, and nation have affected people's experiences with medical practice. Informed by postcolonial and decolonial scholarship, we will also examine why Latin America and the Caribbean have become "laboratories" for the production of medical knowledge, and importantly, how that knowledge was created by indigenous, enslaved, and migrant people as well as professionals. Finally, we seek to understand individual health problems in relation to the social and political determinants of health. As such, the course prompts students to reflect on why healthcare professionals—in the United States and abroad—would benefit from historically-informed communication with patients and their communities. This is a discussion-based seminar that requires active participation. There are no exams. The course does not assume any previous knowledge of the history of medicine or Latin American history.
Area: Writing Intensive

AS.140.245. Biology and Society in Asia. 3 Credits.

What major knowledge traditions about life's generation and function have taken shape in Asia that continue to shape our contemporary world? How have they fared in encounters with Western knowledge traditions? How have modern biology, biotechnology and biomedicine developed in Asia in recent years within distinct geopolitical contexts? This course addresses these questions with selected historical cases from China, India, Japan, Koreas and selected Southeast Asian countries. It first introduces concepts and frameworks of major non-Western knowledge systems about life such as yin-yang and five phases and examine how religions, politics, and cross-cultural encounters impacted these systems, their evolutions or replacements. Then the class will examine the political, material, cultural and institutional contexts of more recent development in the life sciences in Asia. Class activities include lectures, discussions, research seminars, a final research project, and possible conversations with visiting professors and field trips.

AS.140.301. History of Science: Antiquity To Renaissance. 3 Credits.

The first part of a three-part survey of the history of science. This course deals with the origins, practice, ideas, and cultural role of scientific thought in Graeco-Roman, Arabic/Islamic, and Medieval Latin/Christian societies. Interactions across cultures and among science, art, technology, and theology are highlighted.
Area: Writing Intensive

AS.140.302. Rise Of Modern Science. 3 Credits.

Survey of major scientific developments from the mid-18th century to the present.

AS.140.316. Minds and Machines. 3 Credits.
Is the mind identical to the brain? Is the mind (or brain) a computer? Could a computer reason, have emotions, or be ethically culpable? How have computers changed our minds? This course examines such questions philosophically and historically. Topics include early AI research, computationalism, connectionism, 4EA cognitive science, simulation theory, and the Singularity.

AS.140.317. The Hydrologic Sphere: Histories of Water in the Colonial and Postcolonial World. 3 Credits.
Water supplies are becoming scarcer globally due to climate change. We use clean water—fresh and salt—in a variety of ways that provide comfort, stability, and health, making it one of the most valuable commodities on Earth. While countries in the Global North are beginning to see more frequent and lengthier droughts, those in the Latin America, Africa, and South Asia have long struggled over how to distribute and use their clean water supplies. This class will examine how colonialism and its far-reaching effects have created an environment of scarce water supplies in many areas of the world. Water access is difficult to achieve, but for much of the Global South, the colonial period helped craft the problems we see today. This class will ask what colonial and postcolonial technologies' construction and use teach us about equitable clean water distribution, how social and cultural identities influence water supplies and use, and why water has been such an important element—and commodity—in our world, especially where Europeans settled and oppressed local populations.
Area: Writing Intensive

AS.140.321. Scientific Revolution. 3 Credits.
How did the Western understanding of nature change between 1500 and 1720? We'll study the period through the works of astronomers and astrologers, naturalists and magi, natural philosophers and experimentalists, doctors and alchemists & many others.

AS.140.327. Science and Utopia. 3 Credits.
This seminar will explore the complex interaction between science, technology and utopian/dystopian thought from the late nineteenth century. Major utopians will include Bellamy, H.G. Wells, Mark Twain, Frank Lloyd Wright, Aldous Huxley, George Orwell, Sinclair Lewis, B.F. Skinner, Margaret Atwood, and Walt Disney.

AS.140.329. Women, Health, and Medicine in Colonial and Antebellum America. 3 Credits.
This class will examine the history of women's health and medicine in America from the 17th century to the mid-19th century, a period in which settler colonialism and the trans-Atlantic slave trade mixed European, Indigenous American, and African people and belief systems, resulting in diverse healing practices and understandings of the body and gender. Major themes addressed in the course include reproductive health, domestic and "alternative" medicine, as well as enslavement, racialized medicine, poverty, disability, and sexuality.
Area: Writing Intensive

AS.140.335. Photography in Science and Medicine (19th Century-Present). 3 Credits.
How did photography change science and medicine, and vice versa? This course explores how and why photography and related imaging techniques became central to a broad variety of fields of science and medicine, ranging from anthropology and astronomy to embryology, nuclear physics, and radiology. It also considers how these techniques were created in the first place and to what extent they affected the standing of photography as an "art-science." Central themes will include (among others) the status and objectivity of photographic evidence; the historical relationships between technical, scientific, and artistic change; the role of photography in disseminating scientific and medical knowledge and (mis)information; the racial and gender biases of scientific and medical photography; and photography's use as a tool of scientific exploration, measurement, and surveillance. Students will be developing their own research projects in consultation with the instructor.

AS.140.336. History of Mental Healthcare in the United States. 3 Credits.
In recent decades, much has been done in the United States to destigmatize mental illness and incorporate psychiatric services into broader systems of healthcare and welfare. As clinicians, policy makers, social scientists, activists, and other stakeholders have collaborated to promote mental health and reintegrate people with behavioral disorders into society, they have often contrasted their efforts with those made in the past, portraying community-based approaches as more efficacious and humane. Narratives like these, however, deemphasize many important continuities in the history of American psychiatry. In this discussion-based course, students will explore how concerns about citizenship and social control have shaped the organization and provision of mental healthcare in the United States from the early nineteenth century to the present day. They will also complete various assignments designed to hone their ability to evaluate historical arguments, conduct independent and collaborative research on primary sources, and communicate the results of their scholarship to professional and lay audiences.

AS.140.338. Unsafe America: Accidents, Disasters, and Society, 1800–2020. 3 Credits.
According to the latest data from the National Safety Council, accidents cause over 173,000 deaths and 48,300,000 injuries per year across the United States. Since the nineteenth century, accidents ranging from burns to car crashes to the Three Mile Island nuclear disaster have become increasingly central to American life. This course examines the history of accidents and why Americans have chosen to control some hazards but not others. We will investigate how accidents have changed over time alongside the introduction and spread of new technologies; cultural beliefs about safety; the economic and political interests of different stakeholders; and the efforts of safety experts, nonprofits, corporations, families, and the government to protect Americans from harm. On one level, this course traces the unexpected consequences of remaking the United States with modern industry, transportation, infrastructure, and consumer products. At the same time, it captures how the principles of free enterprise and personal responsibility continue to influence the American safety movement.
Area: Writing Intensive

AS.140.391. Individualized Medicine from Antiquity to the Genome Age. 3 Credits.
A seminar for advanced undergraduates. We explore the notion of the individual in medicine over twenty-five centuries, from the Hippocratics to the invention of the case study during the Renaissance to the current JHU medical curriculum. The history of medicine survey, AS.140.105 or AS.140.106, is recommended though not required. Graduate students are welcomed but should expect to do additional work and readings.
Area: Writing Intensive

AS.140.398. Godzilla and Fukushima: Japanese Environment in History and Films. 3 Credits.
Japan is often described as "nature-loving," and is considered to be one of world leaders in environmental protection policies. Yet current environmental successes come on the heels of numerous environmental disasters that plagued Japan in the past centuries. Juxtaposing Japanese environmental history and its reflection in popular media, the course will explore the intersection between technology, environment, and culture.
Area: Writing Intensive

AS.140.411. Senior Research Seminar. 3 Credits.

AS.140.435. Ways of Knowing: New Histories of Science, Medicine, and Technology. 3 Credits.
What does it mean for science to have a history? Comparing newer approaches with classic works, we will explore different strategies for placing science, medicine, and technology in social context.
Area: Writing Intensive

Modern Languages and Literatures

AS.210.313. Medical Spanish. 3 Credits.
Medical Spanish is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in medicine and health-related fields in Spanish-speaking environments. The student will be able to participate in conversations on topics such as contrasting health systems, body structures, disorders and conditions, consulting your doctor, physical and mental health, first-aid, hospitalization and surgery on completion of this course. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
AS.210.311 OR AS.210.312 or appropriate Spanish placement exam score.

AS.211.259. Introduction to Medical and Mental Health Interpreting. 3 Credits.
This course is a broad introduction to the fields of medical and mental health interpreting. Modules will include: (1) Three-way communication: managing role expectations and interpersonal dynamics; (2) Basic interpreting skills and techniques in a healthcare setting; (3) Ethical principles, dilemmas, and confidentiality; (4) Elements of medical interpreting; (5) Elements of mental health interpreting; (6) Trauma-informed interpreting: serving the refugee population. The course is taught in English, and has no foreign language pre-requisites.

AS.211.307. Labor in Theory, Literature, and Art. 3 Credits.
This seminar examines some of the ways we define, represent, and think about the concept of labor in capitalism. We will analyze and compare a wide variety of texts (literary, visual, and theoretical) that embody different, often contradictory, notions of the work we do, why we do it, and how it affects us. As we investigate different types of work—productive and unproductive, physical & intellectual, factory & office—a few of the questions we will ask are: What methods have writers and artists used to depict labor in the 20th and 21st centuries? How is labor stratified along racial and gender lines? Is it possible to imagine a post-work society? The course curates a range of cultural artifacts (short stories, manifestos, novel excerpts, visual art, and film) that employ aesthetic strategies like irony, humor, absurdity, and duration to represent the dynamics of labor in capitalism. Theoretical texts then provide varied conceptual viewpoints from which to compare, contrast, and synthesize our impressions and interpretations of art and literary works. By the end of the semester, we will have traced a trajectory of labor in capitalism from the early 20th century to our own strange and precarious present.
Area: Writing Intensive

AS.211.423. Black Italy. 3 Credits.
Over the last three decades Italy, historically a country of emigrants—many of whom suffered from discrimination in the societies they joined—became a destination for hundreds of thousands of migrants and refugees from various countries, and particularly from Africa. Significant numbers of these immigrants came to Italy as a result of the country's limited, though violent colonial history; others arrive because Italy is the closest entry-point to Europe. How have these migratory flows challenged Italian society's sense of itself? How have they transformed the notion of Italian national identity? In recent years, growing numbers of Afro- and Afro-descendant writers, filmmakers, artists and Black activists are responding through their work to pervasive xenophobia and racism while challenging Italy's self-representation as a 'White' country. How are they forcing it to broaden the idea of 'Italianess'? How do their counternarratives compel Italy to confront its ignored colonial past? And, in what way have Black youth in Italy embraced the #Blacklivesmatter movement? This multimedia course examines representation of blackness and racialized otherness, whiteness, and national identity through literary, film, and visual archival material in an intersectional framework. Examining Italy's internal, 'Southern question,' retracing Italy's colonial history, and recognizing the experiences of Italians of immigrant origins and those of immigrants themselves, we'll explore compelling works by writers and filmmakers such as Igiaba Scego, Gagriella Ghermandi, Maza Megniste, Dagmawi Yimer, and others.

AS.211.477. Renaissance Witches and Demonology. 3 Credits.
Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did "The Witch" go from being "monstrous" to being "admirable" and even "sexy"? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.212.696. Literature Confronts Science: Zola.
Zola worked with the theories of heredity of his time in the Rougon-Macquart novels. But he also attempted to use his understanding of biology and thermodynamics to reform the theory of the novel in general. This course will examine these two different effects of science on literature and try to see what leads an author to undertake such a project. For a more extended description, please see http://www.wilda.org/Courses/CourseVault/Grad/Zola/Syllabus.html. Advanced undergraduates with sufficient background may register for this course with permission of the instructor.

Near Eastern Studies

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

Philosophy

AS.150.136. Philosophy & Science: An Introduction to Both. 3 Credits.
Philosophers and scientists raise important questions about the nature of the physical world, the mental world, the relationship between them, and the right methods to use in their investigations of these worlds. The answers they present are very different. Scientists are usually empiricists, and want to answer questions by experiment and observation. Philosophers don't want to do this, but defend their views a priori. Why? Can both be right? Readings will present philosophical and scientific views about the world and our knowledge of it. They will include selections from major historical and contemporary figures in philosophy and science. The course has no prerequisites in philosophy or science.

AS.150.219. Introduction to Bioethics. 3 Credits.
Introduction to a wide range of moral issues arising in the biomedical fields, e.g. physician-assisted suicide, human cloning, abortion, surrogacy, and human subjects research. Cross listed with Public Health Studies.
Area: Writing Intensive

AS.150.245. Philosophy of Mind. 3 Credits.
If we know anything, it is natural to think it is our own minds. Despite this, philosophers have long disagreed about the natures of the states which make up our minds. And there is equally little agreement as to what makes such states count as mental in the first place. This course will investigate the nature of different aspects of mind and their interrelations. Time permitting, we will explore debates and puzzles about perception, memory, imagination, dreaming, pain and bodily sensation, emotion, action, volition and those states commonly classed as propositional attitudes: knowledge, belief, desire and intention. This will put us in a position to ask what if anything unifies such phenomena as mental

AS.150.312. Applied Public Health Ethics and Decision-Making. 3 Credits.
In this course, students receive an introduction to core theoretical foundations and case studies in public and global health ethics. this course adopts an applied framework for understanding how public health ethical values are navigated in different decision-making processes. This course is geared toward juniors and seniors.
Area: Writing Intensive

AS.150.405. Evidence: An Introduction. 3 Credits.
What is evidence? Can it ever be disregarded in science, the law, or religion, and if so, when? What are the paradoxes of evidence (grue, ravens) and how can they be solved?

AS.150.450. Topics in Biomedical Ethics. 3 Credits.
Area: Writing Intensive

AS.150.474. Justice and Health. 3 Credits.
Course will consider the bearing of theories of justice on health care. Topics will include national health insurance, rationing and cost containment, and what justice requires of researchers in developing countries.

AS.150.476. Philosophy and Cognitive Science. 3 Credits.
This year's topic is perception. Questions will include: In what ways might perceptual states be like and unlike pictures? Does what we believe affect what we perceive? Is linguistic comprehension a kind of perception? This course is geared toward advanced undergraduates and graduate students in philosophy and in the mind brain sciences and related fields. Others may be successful in the course depending on their prior course of study.

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

Public Health Studies

AS.280.120. Lectures on Public Health and Wellbeing in Baltimore. 1 Credit.
An introduction to Urban Health with Baltimore as a case study: wellbeing, nutrition, education, violence and city-wide geographic variation. Lectures by JH Faculty, local government/service providers and advocates.

Sociology

AS.230.341. Sociology of Health and Illness. 3 Credits.
This course introduces students to core concepts that define the sociological approach to health, illness and health care. Topics include: health disparities, social context of health and illness, and the Sociology of Medicine.

Writing Seminars

AS.220.206. Writing about Science I: Daily News Journalism. 3 Credits.
This course is designed to teach students the skills of daily news reporting, with a focus on covering science news. Students will learn how turn scientific discoveries into lively and engaging prose for the general public, interview sources, and pitch stories to news organizations. The skills taught are applicable to all areas of journalism, not just science journalism.
Area: Writing Intensive

AS.220.317. Writing about Science II: Feature Writing Journalism. 3 Credits.
This course is designed to teach students the skills of long-form narrative journalism, with a focus on covering science news. Skills taught will include how to compose scenes, create three-dimensional characters, create narrative tension, and conduct on-site reporting. Class speakers will include award-winning science journalists from New York to DC, who will share the secrets of their craft. The primary writing assignment will be a 3,000-word feature piece that is pitched, reported, and workshopped throughout the course of the class. "Writing About Science I" is recommended as a prerequisite for this course. If you have not taken this, please contact instructor (dgrimm5@jhu.edu) to enroll.
Area: Writing Intensive

AS.220.424. Science as Narrative. 3 Credits.
Class reads the writings of scientists to explore what their words would have meant to them and their readers. Discussion will focus on the shifting scientific/cultural context throughout history. Authors include Aristotle, Copernicus, Galileo, Descartes, Newton, Darwin, Freud, Einstein, Heisenberg, Bohr, Crick and Watson.
Area: Writing Intensive

Medicine, Science, and the Humanities, Bachelor of Arts

Medicine, Science, and the Humanities Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Program in Medicine, Science, and the Humanities is an interdisciplinary major that focuses on humanistic approaches to understanding the knowledge constituted by the natural sciences and medicine. Students complete two introductory courses, a focus area in a core humanities area, additional courses in both the medical humanities and sciences, and foreign language through the intermediate level.
A minimum grade of C- or better is required for all courses applying towards major requirements and courses may not be taken satisfactory/unsatisfactory. Courses directly equivalent to JHU courses from study abroad or taken at other universities may count towards requirements; however non-direct equivalent courses must be approved by the director of undergraduate studies for the major.

Major Requirements:

Code	Title	Credits
AS.145.10x One introductory medical humanities course		3
AS.145.219	Science Studies and Medical Humanities: Theory and Methods	3
Four courses in one pre-approved humanities focus area [1]		12
Foreign language through the intermediate level		12-18
Six additional courses totaling at least 18 credits in the humanities and sciences		**18**
Two must be in the humanities with POS-Tag MSCH-HUM at the 200-400 level		
One must be in the humanities with POS-Tag MSCH-HUM at the 300 or 400 level		
Three must be in the sciences (courses with an N designator) [2]		
Total Credits		**48-54**

[1] See choices in **Focus Area choices** below.

[2] Two of the science course must be from the same department and one of them must be at the 200-level or higher.

Focus Area Choices:

Africana Studies

Code	Title	Credits
Two core courses in Africana Studies from the following list: *		6
AS.362.111	Introduction to African American Studies	
AS.100.122	Introduction to History of Africa (since 1880)	
AS.100.123	Introduction to African History: Diversity, Mobility, Innovation	
AS.362.112	Introduction to Africana Studies	
Two Africana Studies courses (or cross-listed with Africana Studies) at the 300-400 level.		6
Total Credits		**12**

* If offered, AS.100.121, AS.362.121, and AS.362.104 would also apply.

Anthropology

Code	Title	Credits
Two courses in the Anthropology Department at the 100-400 level (AS.070.1xx-AS.070.4xx)		6
Two courses in the Anthropology Department at the 300-400 level (AS.070.3xx-AS.070.4xx)		6
Total Credits		**12**

Archaeology

Code	Title	Credits
AS.136.101	Introduction To Archaeology	3
or AS.130.177	World Prehistory: An Anthropological Perspective	
One course with POS-Tag ARCH-ARCH at the 100-400 level		3
Two courses with POS-Tag ARCH-ARCH at the 300-400 level		6
Total Credits		**12**

Bioethics

Code	Title	Credits
AS.150.219	Introduction to Bioethics	3
AS.150.220	Introduction to Moral Philosophy	3
Two courses in the Philosophy Department (AS.150.3xx-4xx) with POS-Tag PHIL-BIOETH at the 300-400 level		6
Total Credits		**12**

Classics

Code	Title	Credits
Two Classics courses (or cross-listed with Classics) at the 100-400 level		6
Two Classics courses (or cross-listed with Classics) at the 300-400 level		6
Total Credits		**12**

East Asian Studies

East Asian language courses cannot be used to fulfill the focus area requirement. However, students pursing the East Asian focus area are encouraged to study an East Asian language to fulfill the foreign language requirement of the Medicine, Science, and Humanities major.

Code	Title	Credits
Two East Asian Studies courses (or cross-listed with East Asian Studies) at the 100-400 level		6
Two East Asian Studies courses (or cross-listed with East Asian Studies) at the 300-400 level		6
Total Credits		**12**

English

Code	Title	Credits
AS.060.107	Introduction to Literary Study	3
One period or theme course at any level **		3
Two course in the English department at the 300-400 level (AS.060.3xx-4xx courses)		6
Total Credits		**12**

** To identify these courses, students should select one course with either the POS-Tag of ENGL-PR1800 or ENGL-GLOBAL. If this course is at the 300 or 400 level in the English department, students will need another English courses at the 100-400 level to complete a total of 4 courses for the focus area.

Film and Media Studies

Students are encouraged to take AS.061.226 Special Topics: Writing About Film. This will count as the 200 level course with the POS-Tag FILM-CRITST.

Code	Title	Credits
AS.061.140	Introduction to Cinema, 1892-1960	3
or AS.061.141	Introduction to Cinema, 1941-present	
One course with POS-Tag FILM-CRITST at the 200 level		3
Two courses with POS-Tag FILM-CRITST at the 300-400 level		6
Total Credits		**12**

German

One of the four courses may be taught in English (identified with POS-Tag MLL-ENGL).

Code	Title	Credits
Four courses designated AS.210.3xx (German language only); AS.211.3xx-4xx (with POS-TAG GRLL-GERM) and AS.213.3xx-4xx		12

History

Code	Title	Credits
AS.100.293	Historical Methods, Archives and Interpretations	3
One course in the History Department at the 100-200 level (AS.100.1xx-2xx)		3
Two courses in the History Department at the 300-400 level (AS.100.3xx-4xx)		6
Total Credits		**12**

History of Art

Code	Title	Credits
AS.010.101	Introduction to Art History I	4
or AS.010.102	Introduction to Art History II	
One History of Art course (cross-listed with History of Art) at the 200-400 level		3
Two History of Art courses (or cross-listed with History of Art) at the 300-400 level		6
Total Credits		**13**

History of Science, Medicine, and Technology

Code	Title	Credits
One survey course selected from:		3
AS.140.105	History of Medicine	
AS.140.105	History of Medicine	
AS.140.301	History of Science: Antiquity To Renaissance	
AS.140.302	Rise Of Modern Science	
AS.140.321	Scientific Revolution	
One History of Science, Medicine, & Technology course (or cross-listed) at the 100-400 level		3
Two History of Science, Medicine & Technology courses (or cross-listed) at the 300-400 level		6
Total Credits		**12**

Italian

Code	Title	Credits
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
or AS.214.363	Italian Journeys: An Other Story	
One course AS.211.2xx-4xx with POS-Tag MLL-ITAL or AS.214.2xx-4xx		3
Total Credits		**12**

Latin American Studies

Code	Title	Credits
One survey course selected from: ****		3
AS.100.115	Modern Latin America	
AS.215.231	Introduction to Literature in Spanish	
One course cross-listed with Latin American Studies at the 100-400 level		3
Two courses cross-listed with Latin American Studies at the 300-400 level		6
Total Credits		**12**

**** If offered, AS.100.105 and AS.100.239 would also apply.

Near Eastern Studies

Code	Title	Credits
Two Near Eastern Studies courses (or cross-listed with Near Eastern Studies) at the 100-400 level		6

Two Near Eastern Studies courses (or cross-listed with Near Eastern Studies) at the 300-400 level	6
Total Credits	**12**

Philosophy

Of the four required courses, at least two courses must be at the 300-400 level. Either AS.150.111 or AS.150.112 will count, but not both.

Code	Title	Credits
One course in philosophy of science [1]		3
One course with POS-Tag PHIL-ANCIEN, PHIL-MODERN, PHIL-ETHICS, or PHIL-MIND		3
Two additional philosophy courses		6
Total Credits		**12**

1. Philosophy of science courses will have the POS-Tag PHIL-LOGSCI. However, as some courses with this POS-Tag are focused on logic, students will need to speak to the director of undergraduate studies to confirm if a course will apply.

Writing Seminars

Code	Title	Credits
AS.220.105	Introduction to Fiction & Poetry I	3
or AS.220.108	Introduction to Fiction & Nonfiction	
AS.220.106	Introduction to Fiction & Poetry II	3
AS.220.200	The Craft of Fiction	3
or AS.220.201	The Craft of Poetry	
One course in the Writing Seminars Department at the 300-400 level (AS.220.3xx-4xx)		3
Total Credits		**12**

Sample Program of Study

A typical program might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
Foreign language		4
AS.145.10x course		3
Natural science course at the 100 level		3
	Credits	**10**
Second Semester		
Foreign language		4
Natural science course at the 100 level		3
Course in selected focus area at any level		3
	Credits	**10**
Second Year		
First Semester		
AS.145.219	Science Studies and Medical Humanities: Theory and Methods	3
Foreign language		3
Natural science course at the 200 level		3
	Credits	**9**
Second Semester		
Foreign language		3
Course selected focus area at any level		3
	Credits	**6**
Third Year		
First Semester		
Course in selected focus area at the 300-400 level		3
	Credits	**3**
Second Semester		
Course in selected focus area at the 300-400 level		3
200-400 level Humanities elective with POS-Tag MSCH-HUM		
	Credits	**3**
Fourth Year		
First Semester		
200-400 level Humanities elective with POS-Tag MSCH-HUM		3
	Credits	**3**
Second Semester		
300-400 level Humanities elective with POS-Tag MSCH-HUM		3
	Credits	**3**
	Total Credits	**47**

Honors in the Major

Honors will be offered as an option to juniors with a minimum GPA of 3.50 in major requirements. Honors work will require enrollment in two courses, culminating with an original thesis paper (or equivalent scholarly or creative work) approximately 20-25 pages in length, whose topic is closely related to the student's humanities core area. Thesis projects may be supervised by a faculty member in the student's core area, or by another faculty member with expertise relevant to the topic. In either case the supervisory/mentoring role will be by arrangement between the student, MSH Director of Undergraduate Studies, and the faculty member being solicited. All topics and supervisors are to be approved by the Director of Undergraduate Studies. Juniors interested in the pursing honors option must apply with the Director of Undergraduate Studies before fall of the senior year. The application requires development of an approved research proposal with an accompanying mentorship plan.

For the first course requirement, all students hoping to pursue honors in the major must take the MSH Capstone course in the spring of their junior year. This capstone course may count as a 300 level MSCH-HUM POS-Tagged course. Completion of this course does not require a student to write a thesis in the senior year nor does it guarantee a student will be approved to write an honors thesis.

Typically, students are expected to write their thesis in fall of their senior year by enrolling in an honors-specific Senior Thesis course for 3 credits. These credits do not count as fulfilling a requirement of the major.

Military Science

http://www.krieger.jhu.edu/rotc (http://www.krieger.jhu.edu/rotc/)

The JHU Army Reserve Officers' Training Corps (ROTC) was among the first to be established by Congress in 1916 and is routinely ranked at the top of the Nation's 273 programs. Nearly 3,000 Hopkins students have received Army officer commissions through the program, with over 40 attaining the rank of general officer. Students can enter the program with as little as two years remaining as an undergraduate or may complete the requirements while pursuing a graduate degree. Upon graduation, Hopkins students are commissioned as a second lieutenant in the U.S. Army. Some are selected to attend a funded law school or several medical programs, while others serve in the Active Army, Reserves or National Guard. The Leadership and Management class specializes in leader development and is an excellent course for students aspiring to become leaders on campus and beyond. Additional information on military science or ROTC can be obtained at our building (behind the athletic center), by asking a current cadet, and by calling 1-800-JHU-ROTC or 410-516-7474. You can also visit the JHU ROTC website (https://krieger.jhu.edu/rotc/) to find further contact information.

Scholarship and Financial Assistance

To apply for an ROTC scholarship go to http://www.goarmy.com/rotc/scholarships.html. Scholarship opportunities are regularly improved and incentives are added. Applications for scholarships by qualified students are awarded throughout the semester. A non-scholarship program is also available. For health profession and nursing students, ROTC can offer numerous opportunities to achieve specialized education, additional postgraduate scholarships and accession/graduation bonuses.

Curriculum

The curriculum normally consists of a two-year Basic Course (freshmen / sophomores) and a two-year Advanced Course (juniors / seniors). Some modification to this curriculum is common, as with graduate or transfer students. Completing the 30-day Basic Camp at Fort Knox, KY, is equivalent to the Basic Course. Successful graduates of Basic Camp are normally offered ROTC scholarships and an opportunity to enroll in the Advanced Course. Junior-ROTC experience, prior military service and military academy attendance may also qualify for Basic Course completion.

All Advanced Course students are cadets and have a contractual agreement with the Army. These students attend the Advanced Camp at Fort Knox, KY, between the 300- and 400-level courses. This is a core requirement to commission in the Army and cannot be waived.

Army ROTC strives to develop values-based graduates who offer expert leadership to the campus, the community and the Army. As such, we offer and encourage cadets to participate in: paid leadership and technical internships; cultural and language immersion programs; a number of Army military school opportunities in: Europe, South America, the Republic of Korea, Alaska, Hawaii, and across the continental United States.

Extracurricular activities may also include: community assistance, Red Cross blood drives, tutoring for at-risk children, and volunteering at the Veterans Administration. Cadets may apply for additional military training such as skydiving, helicopter rappelling, mountaineering, and cold weather training. New and challenging opportunities routinely become available.

Air Force ROTC

While not part of the Military Science program at JHU, Hopkins students are able to participate in an Air Force ROTC program with an agreement with the University of Maryland. For more information, visit the their website (https://www.afrotc.com/).

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.374.101. Introduction to the Army. 2 Credits.
The MSL I course produces a Cadet who accepts the Army as a values-based organization and embraces the scholar-athlete-warrior ethos; who is familiar with individual roles and responsibilities in support of team efforts and problem solving processes in military and non-military situations; who demonstrates oral and written communication skills, understands resilience, and demonstrates a commitment to learning. MSL101 introduces Cadets to the Army and the Profession of Arms. Students will examine the Army Profession and what it means to be a professional in the U.S. Army. The overall focus is on developing basic knowledge and comprehension of the Army Leadership Requirements Model while gaining a big picture understanding of the Reserve Officers' Training Corps (ROTC) program, its purpose in the Army, and its advantages for the student. Cadets also learn how resiliency and fitness supports their development as an Army leader. As you become further acquainted with MSL101, you will learn the structure of the ROTC Basic Course program consisting of MSL101, 102, 201, 202, Fall and Spring Leadership Labs, and Basic Camp. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student.Military Science courses require department permission and are restricted to active or inquiring ROTC members

AS.374.102. Foundations of Agile and Adaptive Leadership. 2 Credits.
The MSL I course produces a Cadet who accepts the Army as a values-based organization and embraces the scholar-athlete-warrior ethos; who is familiar with individual roles and responsibilities in support of team efforts and problem solving processes in military and non-military situations; who demonstrates oral and written communication skills, understands resilience, and demonstrates a commitment to learning. MSL102 introduces Cadets to the Army and the Profession of Arms. Students will examine the Army Profession and what it means to be a professional in the U.S. Army. The overall focus is on developing basic knowledge and comprehension of the Army Leadership Requirements Model while gaining a big picture understanding of the Reserve Officers' Training Corps (ROTC) program, its purpose in the Army, and its advantages for the student. Cadets also learn how resiliency and fitness supports their development as an Army leader. As you become further acquainted with MSL102, you will learn the structure of the ROTC Basic Course program consisting of MSL101, 102, 201, 202, Fall and Spring Leadership Labs, and Basic Camp. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student.

AS.374.110. Basic Leadership Laboratory, ROTC 101. 1 Credit.
These introductory courses in a laboratory environment are designed to expose students to practical experiences, challenges and individual learning opportunities in a small group. Students learn the fundamentals of an organization and apply principles of leadership and management at the foundation level. Students develop military courtesy, organizational discipline, communication and basic leadership and management skills. Ultimately, students understand how to facilitate and lead a small group of four to five people as an integral part of a larger organization of 75-100 people through situational training opportunities in a variety of conditions. As a leadership practicum, students have the opportunity to serve in leadership positions and receive tactical and technical training. In addition to learning to lead groups of five to 100 people, students will also be exposed to training on first aid, operating Army equipment, Army activities such as rappelling and drill and ceremony. These laboratories are required for enrolled ROTC participants who desire to be considered for a commission in the Army. Corequisite: AS.374.101-AS.374.102.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.101 OR AS.374.102

AS.374.120. Basic Leadership Laboratory II. 1 Credit.
Students learn and apply team echelon leadership at an entry level. They continue development of military courtesy, discipline, communication and basic Soldier skills. Ultimately, students understand how to operate in and lead 4-5 persons through a program of training opportunities in a variety of conditions. Freshmen only.

AS.374.201. Leadership and Decision Making. 2 Credits.
The MSL II course produces a cadet grounded in foundational leadership doctrine and skills by following and leading small units to achieve assigned missions; who applies critical thinking and problem solving using Troop Leading Procedures (TLP); who comprehends the value of diversity and understands the officer's role in leading change; understands the fundamentals of the Army as a profession. MSL201 adds depth to the Cadets understanding of the Adaptability Army Learning Area. The outcomes are demonstrated through Critical and Creative Thinking and the ability to apply Troop Leading Procedures (TLP) to apply Innovative Solutions to Problems. The Army Profession is also stressed through leadership forums and a leadership self-assessment. Students are then required to apply their knowledge outside the classroom in a hands-on performance-oriented environment during Leadership LABs team building exercises, and Field Training Exercises.Military Science courses require department permission and are restricted to active or inquiring ROTC members.

AS.374.202. Army Doctrine and Team Development. 2 Credits.
MSL 202 focuses on Army doctrine and team development. The course begins the journey to understand and demonstrate competencies as they relate to Army doctrine. Army Values, Teamwork, and Warrior Ethos and their relationship to the Law of Land Warfare and philosophy of military service are also stressed.The ability to lead and follow is also covered through Team Building exercises in small units up to squad level. Students are then required to apply their knowledge outside the classroom in a hands-on performance-oriented environment during Leadership LABs (team building exercises, LTXs, VBS exercises). Includes a 1-Hour lab per week taught by MS III Cadets.The Army Reserve Officer Training Course (ROTC) Basic Course is an academically rigorous 2-year college program comprised of four semester courses of instruction, Leadership Labs (two sets, Fall/Spring), and the Cadet Basic Camp conducted at Fort Knox, KY.

AS.374.210. Basic Team Leadership. 1 Credit.
Students lead and assist in leading 4-5 person teams through a variety of training opportunities. They learn the troop-leading procedures, basic problem solving, and tactical skills aimed at military leadership. Students will mentor and assist members of their team with improving their own skills and leadership as well. Corequisite: AS.374.201.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.201

AS.374.220. Advanced Team Leadership. 1 Credit.
Students perform duties of and develop their leadership, as team leaders during a variety of induced training opportunities. Continued emphasis is placed on troop-leading-procedures and simple problem solving. Students lead physical fitness training and mentor subordinates in military, academic and extra-curricular activities. Successful completion of advanced team leadership allows students to progress into ROTC Advanced Courses. Sophomores only.

AS.374.301. Training Management and the Warfighting Functions. 2 Credits.
MSL301 Training Management and the Warfighting Functions, is an academically challenging course where you will study, practice, and apply the fundamentals of Army Leadership, Officership, Army Values and Ethics, Personal Development, and small unit tactics at the platoon level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a squad and platoon in the execution of a mission during a classroom PE, a Leadership Lab, or during a Field Training Exercise (FTX). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills that can further develop you in to a successful officer. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your instructor, other ROTC cadre, and MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation System (COER). Successful completion of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Area: Writing Intensive

AS.374.302. Applied Leadership in Small Unit Operations. 2 Credits.
MSL302 Applied Leadership in Small Unit Operations, is an academically challenging course were you will study, practice, and apply the fundamentals of Army Leadership, Army Values and Ethics, Personal Development, and small unit tactics at the platoon level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a squad and platoon in the execution of a mission during a classroom PE, a Leadership Lab, or during a Field Training Exercise (FTX). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills that can further develop you in to a successful officer. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your instructor, other ROTC cadre, and MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation Report (COER). Successful completion of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY.
Area: Writing Intensive

AS.374.307. Leadership in Military History. 2 Credits.
This course provides students with a historical perspective to decisions made by American military leaders: battlefield complexity, resource limitations, and teamwork deficiencies. Students cover major military engagements from the colonial period through the current operating environment. Students examine how leaders motivated their men, devised battle strategies, implemented rules of engagement, and managed supplies, transportation, and logistics for their troops. Requires permission of the Director of Military Science. Registration restricted to contracted ROTC cadets only.
Area: Writing Intensive

AS.374.310. Basic Tactical Leadership Laboratory. 1 Credit.
In Leadership Laboratory, students are given the opportunity to apply what they have learned in the classroom, in a tactical or field environment. Students learn and demonstrate the fundamentals of leadership by planning, coordinating, navigating, motivating, and leading squads in the execution of both garrison and tactical missions. Successful completing of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY. Corequisite: AS.374.301.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.301

AS.374.320. Advanced Tactical Leadership. 1 Credit.
Students further develop their leadership skills by directing and coordinating the efforts of 9-60 personnel on offensive, defensive and civil-support tactical-tasks. Develop written plans for garrison and field environments while supervising its execution. Ultimately, prepares students to excel at the four-week National Leadership Development and Assessment Course at Fort Knox, KY. Permission required. Juniors only.

AS.374.401. The Army Officer. 2 Credits.
MSL 401 Focuses on development of the Army Officer. It is an academically challenging course were you will develop knowledge, skills, and abilities to plan, resource, and assess training at the small unit level. You will also learn about Army programs that support counseling subordinates and evaluating performance, values and ethics, career planning, and legal responsibilities. At the conclusion of this course, you will be familiar with how to plan, prepare, execute, and continuously assess the conduct of training at the company or field grade officer level. Includes a lab per week overseeing MSL III lesson facilitation and supervised by ROTC Cadre.Military Science courses require department permission and are restricted to active or inquiring ROTC members.

AS.374.402. Company Grade Leadership. 2 Credits.
This is an academically challenging course were you will study, practice, develop, and apply critical thinking skills pertaining to Army leadership, officer skills, Army Values and ethics, personal development, and small unit tactics at platoon level. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, practical exercises, mid-term exam, and a Capstone Exercise in place of the final exam. For the Capstone Exercise, you will be required to complete an Oral Practicum that you will be evaluated on your knowledge of the 20 Army Warfighting Challenges (AWFC) covered throughout MSL401 and 402 coursework. In addition, you could be assessed on leadership abilities during classroom PE, Leadership Labs, or during a Field Training Exercise (FTX). You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your cadre, PMS and other MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation Report (COER). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills. At the conclusion of this course, you will be able to plan, coordinate, navigate, motivate and lead a platoon in future operational environments. Successful completion of this course will assist in preparing you for your BOLC B course and is a mandatory requirement for commissioning.

AS.374.410. Advanced Planning & Decision Making I. 1 Credit.
Students develop a semester-long progression of programmed training activates that support completion of the unit’s Mission Essential Task List. The laboratory builds from fall to spring semester as students master advanced problem solving, resource synchronization and executive decision making. Students evaluate, mentor and develop subordinate leaders as part of the Leadership Development Program and FM 6-22, Army Leadership. The course serves as the final evaluation and determination on a student’s ability to lead Soldier’s as a Second Lieutenant in the US Army. Co-requisite: AS.374.401-AS.374.402. Recommended Course Background: AS.374.301-AS.374.302, AS.374.310-AS.374.320 and Basic Course.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.401 OR AS.374.402

AS.374.420. Advanced Organizational Planning. 1 Credit.
Students develop a semester-long progression of training activates that support completion of the unit’s Mission Essential Task List. The laboratory builds on the first semester’s achievements through advanced problem solving, resource synchronization and executive decision making. Students evaluate and develop subordinate leaders as part of the Leadership Development Program and FM 6-22, Army Leadership. The course serves as the final evaluation and determination on a student’s ability to lead Soldier’s as a Second Lieutenant in the US Army. Permission required. Seniors only.

AS.374.501. Independent Study. 1 Credit.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.374.512. Internship - Military Science. 1 - 3 Credits.
Students will select a topic relevant to the study of military leadership and will complete a project based on current military doctrine and the contemporary operating environment of current military operations. Permission required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Modern Languages and Literatures

https://krieger.jhu.edu/modern-languages-literatures/

The Department of Modern Languages and Literatures offers graduate and undergraduate courses in the languages, literatures, and cultures of France, Germany, Israel, Italy, Portugal, Latin America, and Spain. The language programs include a wide range of courses from introductory through conversation and composition to civilization. The literature programs treat all periods of literature from both historical and critical-theoretical perspectives. These courses emphasize the close reading of texts and modern theories of literary criticism, particularly those based on contemporary philosophy, psychoanalysis, anthropology, and linguistics. In addition, an active program of visiting professors and lecturers complements the core program offered by the faculty-in-residence.

Facilities

The Milton S. Eisenhower Library has collections that provide an ample basis for advanced research in modern languages and literatures. With the Peabody Library of The Johns Hopkins University in Baltimore and the Library of Congress and other libraries in nearby Washington, a variety of excellent research resources are available to students and faculty.

Undergraduate Programs

A major in the department prepares students for teaching language at the elementary level or for graduate work leading to advanced degrees in French, German, Italian, Latin American, Portuguese, or Spanish studies, or in comparative literature. It also provides excellent background for work in fields such as philosophy, history, international affairs, business, law, or medicine. Opportunities are available to study abroad. Students are encouraged to take advantage of these opportunities.

Requirements for the B.A.

Also see Requirements for a Bachelor's Degree (p. 1587).

Currently, the B.A. degree is offered in French, German, Italian, Romance Languages, or Spanish. A candidate for the B.A.degree in the Department of Modern Languages and Literatures should have a good command of the spoken language of their specialization, and a general familiarity with the literature written in that language. Each major requires *a minimum of 24 hours (or eight courses) beyond the first two years of language instruction; please see specific details for each individual major below.* The department also recommends that majors take courses in other literatures, history, philosophy, and anthropology.

The student who has had four years of German or a Romance language in high school or two years of German or a Romance language in college normally begins the major with Conversation and Composition (provided they have results commensurate with that level on the placement test) and (where offered) the undergraduate survey of literature. It is recommended that any student majoring in German or a Romance language spend at least one semester of junior year taking university courses in the country of study. Study abroad credit transfer is arranged by the student in consultation with the director of undergraduate studies and/or the relevant undergraduate language program director, and the Office of Study Abroad. In the senior year, a major may be permitted to take courses in the department at the graduate level.

A minor in German or one of the Romance languages is available to undergraduate students in any major. Like the various majors, the minors allow students to develop competence in German or a Romance language while receiving grounding in the culture and literature of that language. Five or six courses in the department beyond the first two years of language study are required for each minor option (see below for details).

Graduate Programs

In addition to general university requirements for the Ph.D., the following regulations apply to graduate students in the Department of Modern Languages and Literatures:

To be accepted into the Ph.D. program, students must demonstrate by an exceptionally strong academic record that they are capable of advanced study in literature. They will choose French, German, Italian, Latin American, or Spanish literature as the major field of interest. The student will normally take two to three years of graduate courses and devote the fourth year to study and research in the country on which the student's study concentrates. The well-prepared student can expect to receive the Ph.D. after five years of study. The graduate program in Modern Languages and Literatures emphasizes work in three complementary areas: literary history, close textual analysis (including *explication de texte*), and theory of interpretation. By way of preparing students in a variety of critical schools, the faculty and the visiting professors offer training in the different disciplines pertaining to critical theory, including philosophy, theory of language, psychoanalytic theory, intellectual history, and cultural anthropology.

In addition to the major language, the Ph.D. candidate must demonstrate proficiency in one or two other languages besides English, depending on the specialization. (See below for further information.)

A dissertation proposal, presented to the faculty and students in their section, is required before official admittance to candidacy for the Ph.D. for French, Italian and Spanish graduate students.

Admission Requirements

Application Procedures

Prospective graduate students may visit the departmental website (https://krieger.jhu.edu/modern-languages-literatures/) for further information on programs and faculty. All questions regarding the programs offered by the department should be emailed to mll@jhu.edu (grll@jhu.edu). Prospective students are encouraged to apply online through the secure Graduate Admissions website (https://www.jhu.edu/admissions/graduate-admissions/).

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.210.101. French Elements I. 4 Credits.
Provides a multi-faceted approach to teaching language and culture to the novice French student. The first semester emphasizes listening and speaking, while laying the foundation in grammar structures, reading, and writing. This course is designed for true beginners: Students with any previous background must take the placement test (https://advising.jhu.edu/student-roadmap/freshmen/placement-exams/french/). May not be taken on a Satisfactory/Unsatisfactory basis. Contact: Claude Guillemard (cguille1@jhu.edu)

AS.210.102. French Elements II. 4 Credits.
The second semester of this intensive course for beginners provides students with the linguistic tools to read excerpts from a play (Antigone by Jean Anouilh), to polish a written autobiography, and to perform short oral skits. A variety of cultural materials help students acquire grammatical structures and expand their vocabulary.May not be taken on a Satisfactory/Unsatisfactory basis.
AS.210.101 or AS.210.103 or appropriate score on the placement exam (https://advising.jhu.edu/student-roadmap/freshmen/placement-exams/french/). Contact: Claude Guillemard cguille1@jhu.edu)

AS.210.103. Learner Managed French Elements I. 3 Credits.
This beginner course is specifically designed for students who have had some exposure to French. They must take the mandatory placement test: http://www.advising.jhu.edu/placement_french.php, and receive between 30 and 49. They will cover the first semester of French Elements at a pace suited for "false beginners" with major online components to supplement class instruction. Must complete the year with 210.102 to obtain credit. May not be taken on a Satisfactory/Unsatisfactory basis.

AS.210.105. Fast-Track Beginning French. 4 Credits.
This beginning French course is a fast-paced, intensive introduction to the French language and the culture of France and the French-speaking world, covering the content of French Elements 1 and 2 (AS 210.101-102) but in one semester. As such, it is meant for students who have some previous classroom or independent study of French (as assessed by a placement exam), or who are native or bilingual speakers of another Romance language. Classroom activities will emphasize spoken communication on a variety of topics, using relevant vocabulary and grammar. Extensive use of online resources outside of class will build skills in listening, reading, and writing. Completion of this class will allow students to enroll in Intermediate French 1 (AS 210.201).

AS.210.106. Italian through Food. 3 Credits.
This beginner's course will help you develop foundational linguistic skills in Italian while offering an overview of Italian food cultures, both past and present. By the end of this course, you will be able to navigate everyday situations (e.g. ordering a meal at a restaurant, describing your favorite dishes, talking about likes and dislikes) entirely in Italian, and will develop an appreciation for the history of Italian cuisine. Upon completion of this course, students are encouraged to enroll in AS210.152 (Italian Elements II) in the Spring term. Advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese) are encouraged to enroll in AS.210.175 (Accelerated Italian for Speakers of Other Romance Languages I). Open to first-year students only.
Students who are taking/who took AS.210.151 or higher Italian language course are not allowed to register.

AS.210.111. Spanish Elements I. 4 Credits.
This is an introductory Spanish language course. On completion of this course, the students will have acquired the basic communication and grammatical skills necessary for speaking, writing, listening and reading in Spanish. Students will demonstrate these skills through their performance in class, by completing several online assignments, and by taking part in three group presentations in addition to two comprehensive exams which focus on the following thematic topics: Greetings, University Life, Family and Leisure. Students will also be introduced to the culture, history and geography of various Spanish and Latin American countries. The content covered in Spanish Elements 1 is the foundation for all consecutive Spanish courses. A placement exam is required to ensure the appropriate level. Your enrollment in Spanish Elements I will not be considered for approval until you have emailed the Spanish Language Director.

AS.210.112. Spanish Elements II. 4 Credits.
This introductory Spanish language course is a continuation of the content covered in Spanish Elements I. On completion of this course, the students will have further developed the communication and grammatical skills necessary for speaking, writing, listening and reading in Spanish. Students will demonstrate these skills through their performance in class, by completing several online assignments, and by taking part in three group presentations in addition to two comprehensive exams which focus on the following thematic topics: Food, Sports, Shopping, Travel, and Health. Students will also be introduced to the culture, history and geography of various Spanish and Latin American countries. The content covered in Spanish Elements II prepares the students for Intermediate Spanish.May not be taken satisfactory/unsatisfactory. No new enrollments permitted after 4th class session.Prerequisite: AS.210.111 or appropriate placement exam score.
AS.210.111 or Spanish placement exam score.

AS.210.120. Elementary Modern Hebrew. 3 Credits.
Elementary Modern Hebrew is the first exposure to the language as currently used in Israel in all its functional contexts. All components of the language are discussed: reading, writing, listening, and speaking. Simple idiomatic sentences and short texts in Hebrew are used. Students learn the Hebrew alphabet, words and short sentences. Cultural aspects of Israel will be intertwined throughout the course curriculum.

AS.210.121. Modern Hebrew for Beginners II. 3 Credits.
Hebrew for Beginners 106 is a continuation of Hebrew 105 and as such, students are required to have a foundation in Hebrew. The course will enhance and continue to expose students to Hebrew grammar, vocabulary, and syntax. All components of the Hebrew language will be emphasized in this course; we will highlight verbs, adjectives, and the ability to read longer texts. Speaking in Hebrew will also be highlighted to promote students' engagement and communication. Cultural aspects of the language will be incorporated into lessons as well.
AS.384.115 OR AS.210.120

AS.210.151. Italian Elements I. 4 Credits.
This course sequence (AS.210.151 and AS.210.152) is an introduction to Italian for students with no previous exposure to the language. By the end of the academic year, you will be able to meet basic needs in an Italian-only environment. Examples include introducing yourself, asking for and giving directions, ordering a meal at a restaurant, describing and asking information about places and people, and engaging in a simple phone conversation. Advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese) are encouraged to enroll in AS.210.175 (Accelerated Italian for Speakers of Other Romance Languages I)

AS.210.152. Italian Elements II. 4 Credits.
Course helps students develop basic listening, reading, writing, speaking, and interactional skills in Italian. The content of the course is highly communicative, and students are constantly presented with real-life, task-based activities. Course adopts a continuous assessment system (no mid-term and no final). May not be taken Satisfactory/ Unsatisfactory. No previous knowledge of Italian is required.
AS.210.151 OR AS.210.106 or Placement Exam Part I.

AS.210.161. German Elements I. 4 Credits.
Four-skills introduction to the German language and culture. Develops proficiency in speaking, writing, reading and listening skills through the use of basic texts, multi-media and communicative language activities. Online tools required. May not be taken on a satisfactory/unsatisfactory basis. Tuesday section is a mandatory hour.

AS.210.162. German Elements II. 4 Credits.
Continuation to the introduction to the German language and a development of reading, speaking, writing & listening through the use of basic texts and communicative activities. The culture of the German-language countries is also incorporated into the curriculum. May not be taken on a S/U basis. Prerequisites: AS.210.161 or Placement Exam. Tuesday hour is mandatory.
AS.210.161 or appropriate score on placement exam.

AS.210.163. Elementary Yiddish I. 3 Credits.
Year-long course. Includes the four language skills, reading,writing, listening, and speaking, and introduces students to Yiddish culture through text, song, and film. Emphasis is placed both on the acquisition of Yiddish as a tool for the study of Yiddish literature and Ashkenazic history and culture, and on the active use of the language in oral and written communication. This class will be using In Eynem, the brand new Yiddish language program from the Yiddish Book Center.Cannot be taken Satisfactory/Unsatisfactory.

AS.210.164. Elementary Yiddish II. 3 Credits.
Year-long course that includes the four language skills--reading, writing, listening, and speaking--and introduces students to Yiddish culture through text, song, and film. Emphasis is placed both on the acquisition of Yiddish as a tool for the study of Yiddish literature and Ashkenazic history and culture, and on the active use of the language in oral and written communication. Both semesters must be taken with a passing grade to receive credit. Recommended Course Background: AS.210.163 or instructor permission.

AS.210.171. Accelerated Italian Elements I for Advanced Spanish Speakers. 4 Credits.
This course sequence is designed for advanced speakers of other romance languages (e.g. French, Spanish, Portuguese), and will cover the same material as the regular-track Italian Elements I and II and Intermediate Italian I and II courses. Upon completion of both semesters, students will be allowed to register for AS210.351 (Advanced Italian I).

AS.210.172. Accelerated Italian Elements II for Advanced Spanish Speakers. 4 Credits.
Course draws on the many similarities between Spanish and Italian to help students develop basic listening, reading, writing, speaking, and interactional skills in Italian in an accelerated fashion. The content of the course is highly communicative, and students are constantly presented with real-life, task-based activities. Course is taught in Spanish and Italian. Students successfully completing the course with a grade of A- or higher will be allowed to place into Advanced Italian I (AS210.351)
AS.210.171 with a grade of A- or higher.

AS.210.175. Accelerated Italian for Advanced Speakers of other Romance Languages. 3 Credits.
This course sequence (AS210.175 and AS210.176) is designed for advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese), and will cover the same material as the regular-track Italian Elements I and II (AS.210.151 and AS.210.152) and Intermediate Italian I and II (AS.210.251 and AS.210.252) courses. Upon successful completion of both semesters, students will be allowed to register for AS.210.351 (Advanced Italian I).

AS.210.176. Accelerated Italian for Advanced Speakers of other Romance Languages II. 4 Credits.
This is the second part of an elementary Italian language course sequence designed for advanced speakers of other romance languages (e.g. French, Spanish, Portuguese). This course will cover the same material as the regular-track Intermediate Italian I and II courses. Students completing this course with a grade of B or higher will be allowed to register for AS210.351 (Advanced Italian I) in the Fall term. Pre-requisite: Completion of AS.210.175 with a grade of B or higher, or Italian Language Program Director permission.
AS.210.175 with a B or higher

AS.210.177. Portuguese Elements I. 4 Credits.
This one-year course introduces students to the basic skills in reading, writing, and speaking the language. Emphasis is placed on oral communication with extensive training in written and listening skills. Class participation is encouraged from the very beginning. All classes are conducted in Portuguese. Students must complete both semesters with passing grades to receive credit. May not be taken on a Satisfactory / Unsatisfactory basis. No previous knowledge of Portuguese is required.

AS.210.178. Portuguese Elements II. 4 Credits.
This course expands students knowledge of the basic language skills: reading, writing, listening, speaking. It uses a multifaceted approach to immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa. The focus of the course is on oral communication with, however, extensive training in grammar. The course is conducted entirely in Portuguese. Lab work required. Students must complete both semesters with passing grades to receive credit.
AS.210.177 or equivalent score on placement test or instructor approval.

AS.210.201. Intermediate French I. 3 Credits.
This course develops skills in speaking, listening comprehension, reading, and writing.Systematic review of language structures with strong focus on oral communication and acquisition of vocabulary; extensive practice in writing and speaking; readings and films from French-speaking countries. Recommended Course Background: AS.210.102 or AS.210.104 or appropriate score on Placement test I.

AS.210.202. Intermediate French II. 3 Credits.
This course develops skills in speaking, listening comprehension, reading, and writing. Systematic review of language structures with strong focus on oral communication and acquisition of vocabulary; extensive practice in writing and speaking; readings and films from French-speaking countries. Recommended Course Background: AS.210.201 or permission of instructor (sroos@jhu.edu).

AS.210.211. Intermediate Spanish I. 3 Credits.
Intermediate Spanish I is a comprehensive study of Spanish designed for students who have attained an advanced elementary level in the language. The course is organized around a thematic approach to topics relevant to contemporary Hispanic culture. Students will practice the four language skills in the classroom through guided grammatical and creative conversational activities and through the completion of three comprehensive exams. Outside of class, students will complete extensive online assignments and write three major compositions (as part of the three exams). In addition, students will broaden their knowledge of Hispanic culture by viewing a Spanish-language film and by reading several literary selections. Successful completion of Intermediate Spanish I will prepare students for the next level of Spanish (Intermediate Spanish II).There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.112 or appropriate Spanish placement exam score.

AS.210.212. Intermediate Spanish II. 3 Credits.
Intermediate Spanish II is a comprehensive study of Spanish designed for students who have attained a mid-intermediate level in the language or who have completed Spanish 212. The course is organized around a thematic approach to topics relevant to contemporary Hispanic culture. Students will practice the four language skills in the classroom through guided grammatical and creative conversational activities and through the completion of three comprehensive exams. Outside of class, students will complete extensive online assignments and write three major compositions (as part of the three exams). In addition, students will broaden their knowledge of Hispanic culture by viewing a Spanish-language film and by reading several literary selections. Successful completion of Intermediate Spanish II will prepare students for the next level of Spanish (Advanced Spanish I).There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after September 13th.
AS.210.211 or appropriate Spanish placement exam score.

AS.210.220. Intermediate Modern Hebrew I. 3 Credits.
Intermediate Modern Hebrew enhances and enforces previous knowledge of Hebrew as acquired from previous foundational coursework and/or experience. Grammatical aspects of the language such as past and present tenses as well as combined and complex sentence syntax and construction would be applied. Reading comprehension and writing skills will be emphasized. Modern Israeli cultural links and facets of the Hebrew language will also be introduced to inform the holistic understanding of the modern language.
AS.384.116 OR AS.210.121 or equivalent

AS.210.221. Intermediate Modern Hebrew II. 3 Credits.
Intermediate Hebrew level II is a continuation of the course Hebrew 205 and as such is a requirement for entry. In the course, grammatical aspects of the language will be introduced in the focus of past and future tenses. Combined and complex sentences with proper syntax and reading comprehension and writing skills will be required. Modern Israeli cultural aspects of the Hebrew language will be introduced as well and will be part of the holistic understanding of the modern language.
AS.384.215 OR AS.210.220

AS.210.251. Intermediate Italian I. 3 Credits.
This course sequence (AS.210.251 and AS.210.252) will reinforce your ability to engage in complex daily tasks in Italian, and will introduce you to more formal academic and real-world topics. By the end of the academic year, you will be able to write a strong résumé and cover letter in the European format, sit a job interview in Italian, and participate in debates on simple topics. You will also read five engaging short stories, watch several Italian films, and discuss topics such as emigration and immigration from/to Italy, the protection of the environment, and the history of the Italian South.
AS.210.152 or placement exam.

AS.210.252. Intermediate Italian II. 3 Credits.
Taught in Italian. Course continues building on the four essential skills for communication presented in Intermediate Italian I (listening, speaking, reading, writing) on topics of increasing complexity. Course adopts a continuous assessment system. May not be taken Satisfactory/Unsatisfactory.
AS.210.251 OR appropriate placement exam scores (Parts I II).

AS.210.261. Intermediate German I. 3 Credits.
Taught in German. This course continues the same four-skills approach (speaking, writing, reading and listening) from the first-year sequence, introducing and practicing more advanced topics and structures. Expansion and extension through topical readings and discussion and multi-media materials. Online tools required. Prereq: 210.162 or placement exam. May not be taken on an S/U basis.
AS.210.162 or placement by exam.

AS.210.262. Intermediate German II. 3 Credits.
Taught in German. This course is designed to continue the four skills (reading, writing, speaking and listening) approach to learning German. Readings and discussions are topically based and include fairy tales, poems, art and film, as well as readings on contemporary themes such as Germany's green movement. Students will also review and deepen their understanding of the grammatical concepts of German. Prereq: 210.261 or placement exam May not be taken on an S/U basis.
AS.210.261 or placement by exam.

AS.210.263. Intermediate Yiddish I. 3 Credits.
For students who have completed one year of Yiddish language study or equivalent, this course will provide the opportunity to broaden and deepen their knowledge of Yiddish culture while continuing to improve their skills in reading, writing, listening and speaking Yiddish. Alongside textbook-based language work, students will read, listen to and interact with a variety of texts, for example literature, journalism and oral history.

AS.210.264. Intermediate Yiddish II. 3 Credits.
Continuation of Intermediate Yiddish I: this course will focus on the Yiddish language as a key to understanding the culture of Yiddish-speaking Jews. Topics in Yiddish literature, cultural history and contemporary culture will be explored through written and aural texts, and these primary sources will be used as a springboard for work on all the language skills: reading, writing, listening, and speaking.

AS.210.265. Individualized Yiddish Practicum. 3 Credits.
This course will allow students at any stage of Yiddish language acquisition to hone their skills in reading, writing, listening and speaking. The program will be individualized for each student according to his or her needs while at the same time providing joint activities in which all can participate.

AS.210.266. German Conversation. 1.5 Credits.
Taught in German. This course is designed for intermediate and above students who wish to improve their conversational and oral presentational language skills. The syllabus aims to provide useful, relevant language and necessary discourse structures to hold conversations and presentation on varied topics of an everyday, as well as academic nature. Students will practice German to build confidence, develop fluency and improve pronunciation and accuracy. Short texts, audio and films will provide the basis for discussion. Students fields of study and interests will be incorporated into the syllabus and tasks will be matched to the ability level of the students enrolled. Recommended course background: 210.262 or at least 3 semesters of college instruction or the equivalent. May be taken concurrently with other courses in German. May be taken S/U. Not for major or minor credit.

AS.210.267. German Across the Curriculum. 1 Credit.
Students in courses in History, CTL, Art History, Classics, Near Eastern Studies, WGS, and Philosophy augment their studies in those disciplines by reading short excerpts from the material assigned in the original German. The selected excerpts rotate among the disciplines, exposing students to a variety of texts and giving students the opportunity to collaborate across disciplines and acquaint themselves with the scholarly language in their respective majors and minors.

AS.210.275. Fast Portuguese for Spanish Speakers and speakers of other Romance Languages I. 4 Credits.
NO PREVIOUS KNOWLEDGE OF PORTUGUESE IS REQUIRED. This fast-paced one-semester course covers all content for Portuguese Elementary. This course is designed as an accelerated introductory course for speakers with a sound knowledge of Spanish OR other romance languages (e.g. French and Italian). The course will cover introductory aspects of Portuguese grammar and present relevant points of the cultures of the Portuguese speaking countries. Upon the successful completion of this course with a grade of C or higher, students may enroll in 210.277 Portuguese Intermediate. May not be taken on a Satisfactory / Unsatisfactory basis. No Prereq. THERE IS NO FINAL EXAM.

AS.210.277. Intermediate Portuguese I. 3 Credits.
Intermediate Portuguese I is designed for students who have attained an advanced elementary level in the language. The course offers training in the skills of the language with emphasis on expanding grammatical knowledge and vocabulary, while developing ease and fluency in the language through the use of a multifaceted approach. Course materials immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa, and reflect the mix of cultures at work in the contemporary Lusophone world. Upon the successful completion of Intermediate Portuguese I, students may enroll in the next level, Intermediate Portuguese II – AS.210.278. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.275 or placement test. THERE IS NO FINAL EXAM.
AS.210.178 or AS.210.275 or equivalent score on placement test or instructor approval.

AS.210.278. Intermediate Portuguese II. 3 Credits.
Intermediate Portuguese II is designed for students who have attained a mid-intermediate level in the language or completed Intermediate Portuguese I AS.210.277. The course offers training in the skills of the language with emphasis on advancing grammatical knowledge, expanding vocabulary, and developing fluency in the language through the use of a multifaceted approach. Course materials immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa, and reflect the mix of cultures at work in the contemporary Lusophone world. Successful completion of Intermediate Portuguese II will prepare students for the next level Advanced Portuguese I – AS.210.391. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.277 or placement test. THERE IS NO FINAL EXAM.
AS.210.277 or equivalent score on placement test or instructor approval.

AS.210.288. Portuguese: Conversation through Film & Music. 3 Credits.
Improve your Portuguese conversational and speaking skills through colorful Brazilian media. This course is designed for highly motivated undergraduate and graduate students who want to SPEAK Portuguese. Conversation sessions provide intensive work on communication skills through discussion on issues raised in films, news media & music. Grammar will be reviewed as needed outside of class with tutors or TA, freeing class time for more communicative activities. May not be taken on a Satisfactory / Unsatisfactory basis. Prereq: one semester of Portuguese (AS.210.177), two semesters of Spanish or Placement test.

AS.210.290. Accelerated Portuguese. 4 Credits.
NO PREVIOUS KNOWLEDGE OF PORTUGUESE IS REQUIRED. This accelerated one-semester course covers all content for Elementary Portuguese. Upon the successful completion of this course with a grade of C or higher, students may enroll in 210.277 Intermediate Portuguese. Encourages rapid acquisition by intensive exposure to the language through immersion activities, videos and culture. The course will cover relevant aspects of the Portuguese language grammar. Students will be encouraged to use the language through communicative activities, listening and writing activities. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory/ Unsatisfactory basis.

AS.210.301. Advanced French for Writing. 3 Credits.
Students in AS.210.301 will focus primarily on written expression, learning to 'decipher' classic and contemporary French texts, in order to expand their vocabulary and communicate their ideas in writing with clarity and accuracy. (A primary focus on oral expression is provided in AS.210.302; the two advanced-level courses may be taken in either order or simultaneously.)
Area: Writing Intensive

AS.210.302. Advanced French for Speaking. 3 Credits.
Students in 210.302 will focus primarily on oral expression through individual and group work on contemporary media (music, film, current events) in order to expand their vocabulary and become fluent in conversation across social-cultural contexts. (A primary focus on written expression is provided in 210.301; the two advanced-level courses may be taken in either order or simultaneously.)

AS.210.306. Medical French : Santé et Société. 3 Credits.
In this interactive language course (not exclusively designed for pre-meds), students learn how to communicate in the fields of public health, medicine, and humanitarian aid in a French-speaking environment. While acquiring new lexical and syntactic tools weekly, students examine and debate the current structures and issues of the French health system, through a variety of media (governmental websites, mainstream and specialized newspapers, movies, blogs, first-account books, etc.). A final project is tailored to each student's own area of interest. Please note that this course is taught by a language instructor, not a medical expert. Students may elect to take the exam for the French For Health Diploma: https://www.lefrancaisdesaffaires.fr/testsdiplomes/diplomes-francaisprofessionnel-dfp/sante/
AS.210.301 OR AS.210.302

AS.210.308. Acting French: learning about French language and culture through theater. 3 Credits.
This course proposes to enhance students' verbal (pronunciation, intonation, syntax, vocabulary) and nonverbal skills (body language, vocal projection, spatial awareness) by performing excerpts from French and Francophone plays ranging from the Middle Ages to the 21st century. A closer analysis of these excerpts will lead us to consider how theater uses the physicality and immediacy of human experience to create a more universal form of connectivity with the world.Recommended course background: AS.210.301.

AS.210.309. The Sounds of French. 3 Credits.
This course introduces students to the sound system of French: its development over centuries, its standardized Parisian form versus regional and international dialects and accents, and the popularity of "word games" (abbreviations, acronyms, and verlan). The course will include extensive practice in perceiving, articulating, and transcribing sounds, words, and intonation groups through viewing film clips, listening to songs, and completing in class lab assignments. Recorded speech samples obtained at the beginning, middle, and end of the semester will allow students to track their progress in moving toward more native pronunciation and intonation. Recommended Course Background: AS.210.202 or equivalent

AS.210.311. Advanced Spanish I. 3 Credits.
This course is a comprehensive study of the Spanish language focused on the continuing development of students' communicative abilities and their knowledge of Hispanic cultures. Students will expand their use of basic structures of Spanish with a special emphasis on more difficult grammatical and vocabulary aspects, and further improve both their oral and written skills. Students will sharper their critical thinking skills and listening abilities utilizing movies and written texts. This course combines an extensive use of an online component with class participation and three exams. Upon successful completion of this course, students will have acquired extended complex language tools that facilitate proficiency in Spanish and its use in various professional contexts. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.212 OR AS.210.213 or appropriate Spanish placement exam score.

AS.210.312. Advanced Spanish II. 3 Credits.
This course is thorough review of the Spanish language focused on the development of students' communicative abilities and their knowledge of Hispanic cultures. Students will both expand their knowledge of the basic structures of Spanish, with special emphasis on more difficult grammatical and vocabulary aspects, and further improve on oral and written skills. Students will increase their critical thinking skills and listening abilities utilizing movies and written texts. This course combines an extensive use of an online component, class participation and three exams. Upon successful completion of this course, students will have acquired more complex language tools to become proficient in Spanish and its use in various professional contexts. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.311 or appropriate Spanish placement exam score.

AS.210.313. Medical Spanish. 3 Credits.
Medical Spanish is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in medicine and health-related fields in Spanish-speaking environments. The student will be able to participate in conversations on topics such as contrasting health systems, body structures, disorders and conditions, consulting your doctor, physical and mental health, first-aid, hospitalization and surgery on completion of this course. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
AS.210.311 OR AS.210.312 or appropriate Spanish placement exam score.

AS.210.314. Spanish for International Commerce. 3 Credits.
Spanish for international business is an overview of business topics in an international Spanish-speaking context with an emphasis on deep review of grammar and vocabulary acquisition. On completion of this course the student will have developed the ability to read and critically discuss business and government relations in Latin America and will have examine entrepreneurship, finance, marketing, business ethics, human resources and commerce in the Spanish speaking world. In completing the course's final project students will apply, synthesize, and reflect on what has been covered in the class by creating a professional dossier individualized to their own professional interests. Concepts learned in this course will be directly applicable to careers linked to international relations and will apply to various careers in business. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session. Language Program Director: Loreto Sanchez-Serrano
AS.210.311 or or appropriate Spanish placement exam score.

AS.210.315. Spanish for International Relations. 3 Credits.
Spanish for international relations is an advanced examination of grammar and an analysis of international relations' topics in Spanish. By completion of this course the student will have developed the ability to read, critically discuss and demonstrate mastery of political and socio-economic issues in Spanish-speaking environments. Potential topics include a survey of the professions in international relations, NGOs in Latin America, intellectual property, cultural diplomacy, remesas, regional coalitions and treaties, and the environment. Class presentations and final projects will allow students to apply, synthesize, and reflect on what has been learned in the class by participating in a global simulation that will include a written exercise individualized to their professional interests. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the 4th class session.
AS.210.311 or appropriate webcape score

AS.210.316. Advanced Spanish Conversation. 3 Credits.
Conversational Spanish surveys high-interest themes, discusses short films by contemporary Hispanic filmmakers and offers a thorough review of grammar. The student will be able to participate in conversations on topics such as personality traits, social media, political power, art and lifestyles on completion of this course. Conversational skills mastered during the course apply to all careers interconnected by Spanish. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
AS.210.311 or appropriate Spanish placement exam score.

AS.210.317. Adv Spanish Composition. 3 Credits.
This third-year course is a hands-on and process-oriented introduction to discussion and compositional analysis. On completion of this course, students will have improved their Spanish writing skills in various types of compositions they might be expected to write in academic settings and in real-life formats such as film reviews, letters to the editor, cover letters, etc. The course also focuses on refinement of grammar and vocabulary use.May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after September 13th.
Area: Writing Intensive
AS.210.312 or appropriate Spanish placement exam score.

AS.210.318. Spanish for Engineering. 3 Credits.
Spanish for engineering is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in the engineering field to develop their communicative strategies in the field of engineering. On completion of this course, students will be able to participate in conversations on topics such as applications of biomedical engineering in the diagnosis and treatment of different medical conditions, efficient use of energy and materials, design and construction of public works, development of electrical systems and development of solutions to environmental problems. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests.There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third-class session.
AS.210.311

AS.210.319. Spanish for Public Health. 3 Credits.
Spanish for Public Health is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in the Public Health field such as government agencies, health care organizations, nonprofits, or health insurer companies, in Spanish-speaking environments. On completion of this course, the student will be able to participate in conversations on topics including health systems, reproductive biology, nutrition, epidemiology, mental health, and environmental health. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests.
AS.210.311

AS.210.320. Advanced Modern Hebrew I. 3 Credits.
Advanced Modern Hebrew I will focus on conversational and interactive language skills to expose learners to attributes of different genres and layers of the language. Students will be introduced to various original texts and lingual patterns to better understand and formulate proper syntax. The course will include contemporary readings from Israeli journalism and essays, along with other relevant Hebrew resources to inform class discussions and students' reflective writings. Israeli cultural aspects will be integral to the course curriculum.
AS.384.216 OR AS.210.221 or equivalent

AS.210.321. Modern Hebrew via the Lens of Israeli Cinema. 3 Credits.
This course will expand students' fluencies in Modern Hebrew through Hebrew-dialogic Israeli and Palestinian cinema, examining and comparing several layers of a contemporary Hebrew-speaking society. For this class, students will view, discuss, and write about films with Hebrew as the primary spoken language. Through aural interpretation and subtitles, students will understand, analyze, and reflectively discuss the diversity of Hebrew-speaking cultures within society and the provenance and intentionalities of the dialects exhibited throughout a given film. Linguistic nuance, slang, and interpretive aspects of Hebrew as shown in the chosen films will prompt students to examine this modality of the expression of contemporary Hebrew. The course will be taught primarily in Hebrew and will be open to students who have matriculated to at least 200-level coursework of Modern Hebrew.
AS.384.315 OR AS.210.320 or instructor permission

AS.210.351. Advanced Italian I. 3 Credits.
This highly interactive course focuses on complex historical and contemporary themes, and is ideal, among others, for students who are specializing in international studies, medicine, psychology, and cognitive science. Students will analyze authentic texts and audiovisual materials on topics including the history of the Sicilian mafia, mental health and the deinstitutionalization movement in Italy, Europe and Italy in the 1960s-1980s, the role of curiosity and amazement in scientific discovery and art, and intercultural differences around hilarity. Taught in Italian.
Area: Writing Intensive
AS.210.252 or placement exam

AS.210.352. Advanced Italian II. 3 Credits.
Course presents a systematic introduction to a variety of complex cultural and historical topics related to present-day Italy, emphasizing intercultural comparisons, interdisciplinarity, and encouraging a personal exploration of such topics. Course adopts a continuous assessment system (no mid-term and no final).
Area: Writing Intensive
AS.210.351 OR appropriate placement exam scores (Parts I, II and III).

AS.210.361. Advanced German I: Cultural Topics of the Modern German-speaking World. 3 Credits.
Taught in German. Topically, this course focuses on defining moments in cultural history in German speaking countries in the 2nd half of the 20th century. Films, texts, including a full-length novel, and other media provide a basis for discussing events in post-war Germany from 1945 to 2000. A review and expansion of advanced grammatical concepts and vocabulary underlies the course. Focus on improving expression in writing and speaking. May not be taken on an S/U basis.
Area: Writing Intensive
AS.210.262 or placement exam.

AS.210.362. Advanced German II: Contemporary Issues in the German Speaking World. 3 Credits.
Taught in German. Topically, this course focuses on contemporary issues such as national identity, multiculturalism and the lingering social consequences of major 20th century historical events. Readings include literary and journalistic texts, as well as radio broadcasts, internet sites, music and film. Students read a full-length novel. Emphasis is placed on improving mastery of German grammar, development of self-editing skills and practice in spoken German for academic use. Introduction/Review of advanced grammar.
Area: Writing Intensive
AS.210.361 or equivalent score on placement test.

AS.210.363. Business German. 3 Credits.
Taught in German. Course is designed to familiarize students with the vocabulary and standards for doing business in Germany. Taking a cultural approach, students read texts and engage in discussion that elucidate the works of business, commerce & industry in Germany, the world's third largest economy. Emphasis is placed on vocabulary expansion and writing as it relates to business and business cases. May not be taken S/U. Recommended background: at least 4 semesters of college German (210.262) or equivalent.

AS.210.364. German for Medical & Public Health Professions. 3 Credits.
Taught in German. An introduction to the concepts and linguistic tools necessary for understanding the German health care system and public health fields. Designed for students with B1 or above language skills in German. Readings, role plays, videos and research projects will form the basis for learning. Linguistic focus on expanding vocabulary, increasing reading and listening comprehension while also honing grammatical control to increase accuracy in speaking and writing. Topics include the German health-care system, the body, typical interactions between patients and health care professionals, as well as the history of iconic institutions such as Berlin's Charite. Prerequisite: 4 semesters of college German or equivalent or permission of German LPD.
AS.210.262 OR AS.210.361 OR AS.210.362

AS.210.365. German for Science and Engineering. 3 Credits.
Taught in German. This course is designed to provide language training in German tailored to students of science & engineering. Germany has long been a world leader in engineering, most notably in chemical and mechanical engineering. Over the past decades, Germany also has taken a lead in environmental sciences and information technology. In addition, Germany is now becoming an increasingly attractive place to pursue degrees in the technical fields. This course will provide practice and expansion in all language skill areas: analysis of texts, hands-on-activities, preparation of presentations, and discussion of topics. Specific areas of interest to the course members will be taken into consideration for the selection of materials. [Does not replace 210.362 as prerequisite for upper level courses or as major requirement.]
AS.210.262 OR AS.210.361 OR AS.210.362 or equivalent or placement exam.

AS.210.367. Advanced Yiddish I. 3 Credits.
This course will provide students who have completed at least two years of Yiddish with the opportunity to hone their skills in all four language areas: reading, writing, listening, and speaking. In addition to advanced grammar study and readings in Yiddish literature, the course will take into account the interests of each individual student, allowing time for students to read Yiddish texts pertinent to their own research and writing.

AS.210.368. Advanced Yiddish II. 3 Credits.
Continuation of Advanced Yiddish I (AS.210.367). Students will continue to hone their skills in all four language areas: reading, writing, listening, and speaking. In addition to advanced grammar study and readings in Yiddish literature, the course will take into account the interests of each individual student, allowing time for students to read Yiddish texts pertinent to their own research and writing.

AS.210.391. Advanced Portuguese I: Language and Literature. 3 Credits.
This third-year course focuses on reading, writing, and oral expression. Students will read two complete works by major Brazilian, Portuguese, and/or Afro-Portuguese writers each semester, followed by intense writing and oral discussion on the topics covered. Grammar will be reviewed as necessary. All classes are conducted in Portuguese. Prereq: 210.278, placement test or instructor approval.
Area: Writing Intensive
AS.210.278 or equivalent score on placement test or instructor approval.

AS.210.392. Advanced Portuguese II. 3 Credits.
Advanced Portuguese II offers a systematic review of the Portuguese language focused on the development of students' communicative skills and their knowledge of the Lusophone culture. This course fosters the development of complex language skills that enhance fluency, accuracy and general proficiency in Portuguese and its appropriate use in professional and informal contexts. Students will concentrate on complex grammar concepts and the use of appropriate written and oral registers. Using a variety of cultural items such as current news, short stories, plays, films, videos, newspaper articles, and popular music, students discuss diverse topics followed by intense writing and oral discussion with the aim of developing critical thinking and solid communication skills. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.391 or placement test.
Area: Writing Intensive
AS.210.391 or equivalent score on placement test or instructor approval.

AS.210.409. Le monde francophone. 3 Credits.
This course examines both sociolinguistic and cultural aspects of the French-speaking world and the relationship between la francophonie and France itself. We focus on five regions—Sub-Saharan Africa (Cameroun and Senegal), Northern Africa (Morocco and Algeria), the Caribbean (Martinique and Haiti), North America (Quebec), and Europe (Belgium) —and consider language features unique to those regional varieties, the status of French as opposed to other indigenous languages and creoles, the demographics of their speakers, and the representation of their culture in media (particularly in short stories, poetry, song, and film). A semester-long research project on one of these main areas will allow students to combine their study of the French-speaking world with other disciplines of interest to them.

AS.210.411. Translation for the Professions. 3 Credits.
Spanish Translation for the Professions surveys the field of contemporary translation theory and provides practice of translation from English to Spanish. Translation exercises may include comparing and contrasting texts of literature, medicine, health, law, technology, politics, and journalism. Students will identify and differentiate terminology specific to these various fields and will focus on practicing correct uses of the grammatical structures relevant to the translation of both English and Spanish. In the course's final projects students will apply, synthesize, and reflect on what has been learned in the class by completing a translation exercise individualized to their professional interests. Strategies of communication mastered in this course will help students of Spanish throughout their careers, in that achievement of the course objectives will help students discern, translate, and evaluate the usefulness of translations in different professional settings. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
Area: Writing Intensive
AS.210.313 OR AS.210.314 OR AS.210.315 OR AS.210.318 OR AS.210.319

AS.210.412. Community Based Learning - Spanish Language Practicum. 3 Credits.
This fourth-year course involves a specially designed project related to the student's minor concentration. On completion of this course, the student will be able to use the Spanish language in real world contexts. The student-designed project may be related to each student´s current employment context or developed in agencies or organizations that complement student's research and experimental background while contributing to the improvement of his/her language proficiency. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after first week of class.
Area: Writing Intensive
AS.210.411

AS.210.413. Curso de Perfeccionamiento. 3 Credits.
This forth-year course is an in-depth examination of the Spanish grammar, including a wider range of idiomatic expressions and usages than students might have previously encountered. On completion of this course, students will be able to achieve the ACTFL Advanced-Mid to high level in oral and written expression as well as in reading and listening skills. The course will also help to prepare students for the DELE Intermediate or Superior levels, offered by the Instituto Cervantes. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the 4th class session.
Area: Writing Intensive
(AS.210.312 OR AS.210.317) AND (AS.210.313 OR AS.210.314 OR AS.210.315)

AS.210.417. Eloquent French. 3 Credits.
This highly interactive, writing intensive course intends to 1) provide tools to help students reach linguistic proficiency in French (advanced lexical and idiomatic expressions, rhetorical devices used in complex argumentation; 2) sharpen analytical skills by applying the French method of Explication de textes to a variety of fictional and non-fictional discourses (film, literary excerpts, articles, social media); 3) help students develop their own voice in creative writing.
Area: Writing Intensive

AS.210.426. French for Reading and Translation. 3 Credits.
This course aims to provide proficiency in reading and translating? a variety of French texts from the humanities and social sciences. It is designed for undergraduate and graduate students with little or no background in French who wish to acquire a knowledge of French for research purposes 2) for Ph.D. candidates preparing to fulfill their a Foreign Language Proficiency requirement. Please note that this course does not provide speaking and listening skills, and can therefore not be taken as a substitute for other classes in the French Language curriculum (AS.210.xxx).

AS.210.501. French Independent Study/Language. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.551. Portuguese Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.596. German Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.661. Reading and Translating German for Academic Purposes.
Graduate students only. Seniors may enroll with permission from LPD and instructor.Taught in English. This is the first semester of a year-long course designed for graduate students in other fields who wish to gain a reading knowledge of the German language. Seniors who intend to do graduate study in other disciplines are also welcome. Instruction includes an introduction to German vocabulary and grammatical structures as well as discussion of relevant translation practices. The goal of the course is for students to gain confidence in reading a variety of texts, including those in their own fields of study. No knowledge of German is assumed.

AS.210.662. Reading & Translating German for Academic Purposes II.
Taught in English. Seniors by permission & Graduate students only. This course is designed for graduate students in other departments who wish to gain reading knowledge of the German language and translation practice from German to English. This course is a continuation of the Fall semester. Focus on advanced grammatical structures and vocabulary. For certification or credit.
AS.210.661 or permission of instructor.

AS.211.103. The missing "A". Seminar participant immere on torie and iue affecting Hipanic in the US, pecifically quetioning if ocial media and information created by artificial intelligence perpetuate ubordination and micommunication. By invetigating platform uch a TikTok, Youtube and Twitter thi coure hone foundational critical thinking kill in the art and humanitie. Upon completion of thi eminar, you will innovate and perfect reearch quetion to continue tudie in Hipanic and Latin American culture. The coure focue on reading and analyi of ditinct influencer uch a #latinainmedicine, @lin-manuel, @CDC, @johnhopkinph, @WHO. Critical reading required. Credits.
STEM to STEAM for Hispanics
Area: Humanities

AS.211.203. Propaganda: From Blut und Boden to Post-Fact. 3 Credits.
This course taught by Writing Seminars professor Wayne Biddle and Media Studies professor Bernadette Wegenstein covers the 20th-century history of propaganda with special focus on its visual techniques, on censorship, and how media serve as sites of both control and resistance to power. We will pay particular attention to the influence of misinformation abetted by the new media revolution, and both the rise of the political rhetoric of "fake news" and the massive dissemination of actual fake news since the 2016 election. Students will write papers pegged to current issues and events using the critical framework developed in class. Cap 30 students. Reader: Jason Stanley: How Propaganda Works, Princeton University Press, 2015.
Area: Writing Intensive

AS.211.222. Italian Cinema: The classics, the Forgotten and the Emergent.. 3 Credits.
This course traces the history of Italian cinema from the silent era to the new millennium, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall examine iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, that received international recognition and influenced other national, cinematic productions. We shall also look at the work of less famous, or independent filmmakers who received less critical attention. While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to the mise-en-scène, frame composition, camera movements, editing, and sound. This class is taught in English.

AS.211.224. Made in Italy: Italian style in context. 3 Credits.
Italy and the "Italian style" have become synonym of exquisite taste, class, and elegance thanks to the quality of Italian craftsmanship. This course will explore some of the major factors that contributed to the rise of Italian fashion and Italian industrial design as iconic all around the world. The classes will focus on the main protagonists and art movements that influenced the development of Italian style. We will analyze trends, clothing, and style not only in a historical context, but also through a critical apparatus that will include themes related to gender, culture, power, and politics.The course is taught in English. No knowledge of Italian is required, but those who can read in Italian will have an opportunity to do so. Everyone will learn some Italian words and expressions.

AS.211.231. Planet Amazonia: Culture, History, and the Environment. 3 Credits.
Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We'll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a "virgin paradise" or a "green hell"; scientific studies and artists' depictions of the region's flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world's largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine?

AS.211.240. Italian Culture and Civilization I. 3 Credits.
This class aims to introduce students to some major traits of Italian culture. This analysis explores topics that span from Art History, Fashion, including Film, to Food Culture, Pop Culture, and Politics. This first module will focus mostly on its aesthetic traditions, and their impact outside national boundaries. The course will be taught mostly in English with the opportunity to be introduced to elements of Italian language. No knowledge of Italian is required. This three-credit course counts toward the major and Minor in Italian, and the International Studies Global Italy concentration.

AS.211.251. The New Media Revolution and its Effects on Storytelling and Media Aesthetics. 3 Credits.
This course will highlight the change from a culture of mass media to social media in the recent media history. As examples of how story telling is affected throughout this paradigm shift, we will be taking into account such phenomena as AI storytelling, Video Vines, and News Feeds. In the age of Mass Media, spanning the rise of TV culture in the 1950s to the end of the 20th century, media had a unifying effect on American culture. With the rise of Cable TV in the 1990s to the ubiquity of internet entertainment sources to the invention of the iPhone and the rise of social media, this cultural unanimity had been shattered. In some ways this has caused a positive effect, as the forms of storytelling have proliferated and diversified, and there is more room for different voices and perspectives today than every before. In other ways the effects have been more insidious, with some critics pointing to social media as one of the main factors in the rise of our post-truth age. The age of social media has also certainly increased a sense of insecurity (FOMO) and attention deficit disorder in the millennials.

AS.211.259. Introduction to Medical and Mental Health Interpreting. 3 Credits.
This course is a broad introduction to the fields of medical and mental health interpreting. Modules will include: (1) Three-way communication: managing role expectations and interpersonal dynamics; (2) Basic interpreting skills and techniques in a healthcare setting; (3) Ethical principles, dilemmas, and confidentiality; (4) Elements of medical interpreting; (5) Elements of mental health interpreting; (6) Trauma-informed interpreting: serving the refugee population. The course is taught in English, and has no foreign language pre-requisites.

AS.211.265. Panorama of German Thought. 3 Credits.
This course introduces students to major figures and trends in German literature and thought from the sixteenth to the twentieth century. We will pay particular attention to the evolution of German political thought from the Protestant Reformation to the foundation of the German Federal Republic after WWII. How did the Protestant Reformation affect the understanding of the state, rights, civic institutions, and temporal authority in Germany? How did German Enlightenment thinkers conceive of ethics and politics or morality and rights? How do German writers define the nation, community, and the people or das Volk? What is the link between romanticism and nationalism? To what degree is political economy, as developed by Marx, a critical response to romanticism? How did German thinkers conceive of power and force in the wake of World Wars I and II? What are the ties that bind as well as divide a community in this tradition? We will consider these and related questions in this course through careful readings of selected works.
Area: Writing Intensive

AS.211.278. Eataly: An Exploration of Italian Food Cultures. 3 Credits.
Italian cuisine is often recognized as one of the finest in the world. This Freshman Seminar will offer an exploration of Italian food cultures past and present. Discussion topics will include the Slow Food Movement, the tension between local and global, food and social justice, and the representation of food in literature, film, and other media. The course is taught in English. No knowledge of Italian is required, and everyone will learn some Italian words and expressions.

AS.211.300. Niccolò Machiavelli's "The Prince": Understanding the Meaning and Legacy of a Masterpiece. 3 Credits.
Who was Niccolò Machiavelli? We often hear the term "Machiavellian" in reference to actors in business or politics, but what does it really mean? What does Machiavelli teach us about the nature and the dynamics of political power? Can Machiavelli's thought offer insights into today's politics and fast-changing world? The course aims to answer these questions by addressing three topics. First, we will study Machiavelli's life and times, particularly the events connected to his production and the context in which he wrote his main writings. We will see how the fifteenth-century Florentine humanism and the massive political changes affecting early modern Europe shaped Machiavelli's mindset. Second, we will familiarize ourselves with Machiavelli's thought by reading The Prince and excerpts from Discourses on Livy. Third, we will get acquainted with some of the main trends in the reception of Machiavelli in the 20th and 21st centuries. Special attention will be paid to interpretations of Machiavelli by Antonio Gramsci, Leo Strauss, Isaiah Berlin, John Greville Agard Pocock, Quentin Skinner, and John P. McCormick. We will also pay attention to modern television programs and films that show the width and depth of Machiavelli's legacy.

AS.211.301. Nietzsche and Literature. 3 Credits.
Nietzsche and Literature is devoted to exploring the philosophy and literary works of the German philosopher Friedrich Nietzsche, and studying his impact on literature and literary modernism. Readings will include works by Nietzsche and by the literary writers he influenced, including Rainer Maria Rilke, Stefan George, Thomas Mann, Stefan Zweig, Hugo von Hofmannsthal, Franz Kafka, Jorge Luis Borges, Hermann Hesse, James Joyce, Wallace Stevens, and William Butler Yeats, and Else Lasker-Schüler.

AS.211.307. Labor in Theory, Literature, and Art. 3 Credits.
This seminar examines some of the ways we define, represent, and think about the concept of labor in capitalism. We will analyze and compare a wide variety of texts (literary, visual, and theoretical) that embody different, often contradictory, notions of the work we do, why we do it, and how it affects us. As we investigate different types of work—productive and unproductive, physical & intellectual, factory & office—a few of the questions we will ask are: What methods have writers and artists used to depict labor in the 20th and 21st centuries? How is labor stratified along racial and gender lines? Is it possible to imagine a post-work society? The course curates a range of cultural artifacts (short stories, manifestos, novel excerpts, visual art, and film) that employ aesthetic strategies like irony, humor, absurdity, and duration to represent the dynamics of labor in capitalism. Theoretical texts then provide varied conceptual viewpoints from which to compare, contrast, and synthesize our impressions and interpretations of art and literary works. By the end of the semester, we will have traced a trajectory of labor in capitalism from the early 20th century to our own strange and precarious present.
Area: Writing Intensive

AS.211.311. Introduction to Romance Linguistics. 3 Credits.
If the modern-day Romance languages all evolved from Latin, how and why do they differ in so many important ways? What drives language change in the first place and why should this be the case? We approach these questions not only from a linguistic perspective (analyzing Romance sound systems, vocabulary, morphosyntax, and semantics), but from a cognitive-psychological and a socio-political perspective as well. Recommended Course Background: At least intermediate-level proficiency in a Romance language as assessed by coursework or placement exam; some previous coursework in linguistics is desirable but not necessary.

AS.211.316. Brazilian Cinema and Topics in Contemporary Brazilian Society. 3 Credits.
Course is taught in ENGLISH - This course is an introduction to the academic study of cinema as a communicative art and to Brazilian film. The films selected focuses on films from the late 1950s to the present and highlight import episodes and challenges in the advancement of the Brazilian society as well as its cinematic production with a special view to the film aesthetics through analysis from a number of critical perspectives, including class, race, gender as well as ethnicity, nationalism or national identity, colonialism, social changes, and the politics of representation. In this sense, the films and documentaries that we will be watching and studying encompass the period from the rise of New Cinema (Cinema Novo) up to films exploring the most recent trends, including movies launched up to 2016. Students wishing to do the course work in English, for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory / Unsatisfactory basis.
Area: Writing Intensive

AS.211.325. Representing Otherness in Literature and Film. 3 Credits.
The term 'Otherness' is known to be rooted in the Self-Other opposition as it emerged in German Idealism, adopted by psychoanalysis and transformed to Post-Colonial and Feminist theories. This theoretical framework will allow us to explore the role of the Other in literature and cinema. Students will become familiar with the historical development of the notion of the "stranger" through reading and analyzing various contemporary works of prose, poetry and cinema from various countries. We will analyze the ways in which these works depict Otherness and will investigate questions regarding their social, political and philosophical framework as well as the literary and cinematographic devices they employ. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.
Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an eco-critical approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni's Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone's Gomorrah (2008), Alice Rohrwacher's Happy as Lazzaro (2018), and many others.

AS.211.328. Berlin Between the Wars: Literature, Art, Music, Film. 3 Credits.
Explore the diverse culture of Berlin during the heyday of modernism. During the Weimar Republic, Berlin became a center for theater, visual arts, film, music, and literature that would have an outsize impact on culture throughout the world and the twentieth century. The thinkers, artists, and writers drawn to interwar Berlin produced a body of work that encapsulates many of the issues of the period: the effect of the modern city on society; "the New Woman"; socialist revolutionary politics; the rise of the Nazis; and economic turmoil. While learning about interwar Berlin's cultural diversity, we will take a special look at works by Jewish writers and artists that engage with the question of ethnic, religious, and national identity in the modern world, specifically in the context of Berlin's rich Jewish history and the rise of anti-Semitism in the interwar period. All readings will be in translation.

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

AS.211.332. Heidegger's Being and Time and the Examined Life. 3 Credits.
This course will explore Heidegger's Being and Time with attention to such central concepts as Dasein's unique relation to Being, worldliness, care, authentic and inauthentic existence, attunement, understanding, projection, and being unto death. The first eight weeks will be devoted to a thorough reading of Being and Time and selected critical texts. The last five will consider works of art that expand our understanding of Heidegger's magnum opus.

AS.211.333. Representing the Holocaust. 3 Credits.
How has the Holocaust been represented in literature and film? Are there special challenges posed by genocide to the traditions of visual and literary representation? Where does the Holocaust fit in to the array of concerns that the visual arts and literature express? And where do art and literature fit in to the commemoration of communal tragedy and the working through of individual trauma entailed by thinking about and representing the Holocaust? These questions will guide our consideration of a range of texts — nonfiction, novels, poetry — in Yiddish, German, English, French and other languages (including works by Primo Levi and Isaac Bashevis Singer), as well as films from French documentaries to Hollywood blockbusters (including films by Alain Resnais, Claude Lanzmann, and Steven Spielberg). All readings in English.
Cannot be taken by anyone who previously took AS.213.361

AS.211.342. Emerging Latin American Cinema. 3 Credits.
This survey of emerging cinema in Latin America focuses on thematic clusters such as gender identity, violence against women, the struggle for indigenous rights and recognition of their history, the politics of ecological crises, and the plight of youth who don't see a viable future. We will focus on films from Brazil, Mexico, Argentina, and Colombia, among other cultures.

AS.211.347. Monsters, Ghosts, and Golems. 3 Credits.
Modern Jewish culture is full of monsters, ghosts, golems, dybbuks, and other occult creatures. We will study the rich religious and folkloric traditions that these works draw on in order to better understand why Yiddish, German, Hebrew, and English literature from the 19th century to the present and why film from its beginnings are so full of the occult and the supernatural. We will pay special attention to the ways that monsters, spirits, and the like were deployed in modernist literature and film, in order to ask and answer major questions about modernity: what are the social and aesthetic consequences of technology and automation? what aspects of human nature are revealed by new insights into the psyche? All readings in English.

AS.211.349. JHU Bologna Program: Food for Thought: Gastronomy, Politics & Identity. 3 Credits.
Italian Culture course offered on the JHU Summer Program in Bologna. Permission required. Must be taken for a letter grade. Open to students admitted to the JHU Summer Program in Bologna only.

AS.211.354. The Art, Craft, and Science of Translation. 3 Credits.
This course is an introduction to the growing field of Translation Studies. Broadly speaking, the translation process involves three major phases: (1) 'understanding' what someone else has written; (2) exploring the linguistic/cultural tools available (or not) in another language to convey the original meaning; and (3) taking responsibility for one's translation choices. What does it mean to 'understand' a text? Is it ever possible to find an 'equivalent' in another language? Can the translation process ever be objective, and what role, if any, does the translator's voice play? What practical tools are available to facilitate the translation process? Drawing from interdisciplinary theories and approaches to translation, this course will attempt to reflect on these questions, and provide an opportunity for some hands-on translation practice. Language pre-requisite: Completion of Advanced French I (AS210.301), Advanced Italian I (AS210.351), Advanced Spanish I (AS210.311), or instructor permission.
Area: Writing Intensive
AS.210.301 OR AS.210.351 OR AS.210.311 OR Instructor Permission

AS.211.356. Short Forms in German Literature. 3 Credits.
Taught in English. Before Twitter, there were the diverse short forms that evolved in the accelerating world of modernity to capture fleeting experiences, fragmentary perceptions, and flash-like insights: epigrams, aphorisms, fragments, feuilletons, parables, thought images, and mini-essays. The course offers an alternative history of German modernity by surveying masters of short forms from the 17th century to the present, such as Angelus Silesius, Lichtenberg, Novalis, Fr. Schlegel, Schopenhauer, Nietzsche, Kafka, Roth, Walser, Kracauer, Benjamin, Adorno, Blumenberg, and Kluge. Readings will be made available both in English translation and in the original German.

AS.211.361. Narratives of Dissent in Israeli Society and Culture. 3 Credits.
In this course we will study and analyze the notion of dissent in Israeli society and culture on its various literary and artistic forms. We will examine the emergence and the formation of various political and social protest movements, such as the Israeli Black Panthers, Israeli feminism and the 2011 Social Justice protest. We will discuss at length the history and the nature of dissent in the military and in relation to Israeli wars and will track changes in these relation. Significant portion of the course will be dedicated to the literary, cinematic and artistic aspects of Israeli protest and their influence on Israeli discourse. We will explore the nature and role of specific genres and media such as the Israeli satire, Israeli television, newspaper op-ed and the recent emergence of social media. Students wishing to work in English exclusively for 3 credits should enroll in section one. Students who are fluent in Hebrew and are wishing to attend an additional hour-long Hebrew discussion session per week with Professor Cohen (time TBD in consultation with enrolled students) for 4 credits should enroll in section 2.

AS.211.369. We Conduct: Editing a Documentary. 3 Credits.
This course will provide a hands-on opportunity to work with film director and professor of media studies Bernadette Wegenstein in the editing process of We Conduct, a documentary about the magic of orchestral conducting and the changing face of those who are called to this vocation. The film follows famed conductor Marin Alsop as she breaks new ground in her already distinguished career. The film was shot predominantly in Baltimore, but also in New York, São Paulo, Vienna, Lucerne, and London, with Shana Hagan (Los Angeles) as Director of Photography, additional cinematography by Judith Benedikt (Vienna), and John Benam (Baltimore). During the semester we will be looking at the various narratives in their rough format, and see the film take shape from treatment to full-fledged documentary narrative. Editor Victor Livingston based in Los Angeles will come to work with the class twice during the semester.

AS.211.374. Gendered Voices. 3 Credits.
The course will explore the notion of 'voice' in order to show how poetry, literature, philosophy, and music have been dealing with it throughout the ages. In particular, by focusing on classical figures such as the Sirens, Circe and Echo, as well as by considering the seminal discussions of the 'voice' in Plato and Aristotle, the course will address the gendered nature of the voice as a tool to seduce and manipulate the human mind. More specifically, the course will discuss the ways in which male, female, queer, gendered and un-gendered voices embody different functions. Course materials include classical, medieval and early modern sources as well as later rewritings of myths concerned with the voice by authors such as Jules Verne, Karen Blixen, Giuseppe Tomasi di Lampedusa, and Italo Calvino. A selection of theoretical works (e.g. Cavarero, Silverman, Dollar, Butler) will also be discussed. The course is taught in English and all materials will be available in English translation; Italian majors and minors should enroll in section 2.
Area: Writing Intensive

AS.211.386. Italian Cinema. 3 Credits.
Italian Cinema: The Classics, The Forgotten, The Emergent. This course traces the history of Italian cinema from the silent era to the contemporary period, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall discuss iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, (the classics) that received international recognition and had a global impact on film history, and also rare archival films by pioneer women filmmakers from the silent era (the forgotten). Finally, we'll discuss films released in the last decade (the emergent) that address issues such as migration and the ecological crisis. (Zoom Q&As with filmmakers will be part of curriculum). While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to frame composition, camera movements, editing, and sound. This is an intensive writing class taught in English.
Area: Writing Intensive

AS.211.394. Brazilian Culture & Civilization. 3 Credits.
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor's permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

AS.211.400. Topics in Romance Literatures. 3 Credits.
The Romance Avant-Garde: The course will examine the revolutionary contributions of literary artists from the French, Italian, Spanish, and Latin American traditions to the Avantgarde movements of the 20th century.
Area: Writing Intensive

AS.211.415. Thomas Mann's "The Magic Mountain". 3 Credits.
Taught in English. Stranded for seven years in an Alpine sanatorium, a young engineer is granted a highly unusual education, one that is at turns hilarious and stirring. He gains initiation into the mysteries of life, death, and love, and finds himself caught in the middle of dazzling arguments animated by the ideological conflicts of a continent on the brink of world war. A unique blend of comic portrayal, essayistic reflection, and ironic narration allows Mann to develop an absorbing panorama and an acute diagnosis of cultural crisis, making his novel from 1924 a key work of modernism. We will discuss the novel against the backdrop of the cultural currents and political developments to which it responds.

AS.211.423. Black Italy. 3 Credits.
Over the last three decades Italy, historically a country of emigrants—many of whom suffered from discrimination in the societies they joined—became a destination for hundreds of thousands of migrants and refugees from various countries, and particularly from Africa. Significant numbers of these immigrants came to Italy as a result of the country's limited, though violent colonial history; others arrive because Italy is the closest entry-point to Europe. How have these migratory flows challenged Italian society's sense of itself? How have they transformed the notion of Italian national identity? In recent years, growing numbers of Afro- and Afro-descendant writers, filmmakers, artists and Black activists are responding through their work to pervasive xenophobia and racism while challenging Italy's self-representation as a 'White' country. How are they forcing it to broaden the idea of 'Italianess'? How do their counternarratives compel Italy to confront its ignored colonial past? And, in what way have Black youth in Italy embraced the #Blacklivesmatter movement? This multimedia course examines representation of blackness and racialized otherness, whiteness, and national identity through literary, film, and visual archival material in an intersectional framework. Examining Italy's internal, 'Southern question,' retracing Italy's colonial history, and recognizing the experiences of Italians of immigrant origins and those of immigrants themselves, we'll explore compelling works by writers and filmmakers such as Igiaba Scego, Gagriella Ghermandi, Maza Megniste, Dagmawi Yimer, and others.

AS.211.424. Climate Change Narratives: Human and Non-Human Transformative Storytelling. 3 Credits.
In The Great Derangement Indian novelist Amitav Ghosh writes that "the climate crisis is also a crisis of culture, and thus of imagination." Worldwide, climate and environmental change is stirring the imaginary of novelists, filmmakers, and artists who are finding ways to frame, emplot, or even perform, an unmanageable phenomenon like climate change. How is climate change shaping new modes of storytelling and aesthetics? How do film, literature, and environmentally conscious art transform our perception of the world we inhabit and its unpredictable changes? Can climate change narratives help us to imagine futures of possibilities, maybe dystopian, uncertain, or even happy, but futures nonetheless? This multimedia course explores, through a transnational perspective, a variety of contemporary novels, films, and other media that attempt answer these questions.

AS.211.444. The Apocalypse in Literature and Film. 3 Credits.
"Everything which we loved is lost! We are in a desert" – this emotional assertion was the reaction to Kazimir Malevich's 1915 painting The Black Square, as the artist himself recalled it. This sentiment of fearing, warning and even witnessing the end of the world as we know it, will stand at the center of the course. We will study the literary and cinematic representations of this apocalyptic notion and investigate its theoretical, theological, physiological and aesthetic aspects. We will seek to trace the narrative dynamics as well as literary and cinematic means of apocalyptic representations in works from various periods, languages, cultures and religions. Among the issues to be discussed: what is the apocalypse, biblical apocalypse, dystopia and nostalgia, trauma and post trauma, war and the apocalypse, the Holocaust as the end of civilization, the atomic bomb, realism and anti-realism, political changes and the apocalypse in popular culture.
Area: Writing Intensive

AS.211.477. Renaissance Witches and Demonology. 3 Credits.
Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did "The Witch" go from being "monstrous" to being "admirable" and even "sexy"? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.211.478. Power and Resistance in French Political Thought. 3 Credits.
Today France is a multicultural, multi-ethnic society fractured by the memories of colonialism. Throughout the country's history, French thinkers – classical and contemporary – have questioned the foundations of power and focused critically not only on the claims of authority issuing from the top, but also on the compliance of the governed. What it is, they ask, that makes people stick together and recognize each other as citizens of one country? Is there such a thing as a shared history, and is Fraternité something more than a slogan? Works by La Boétie, Montaigne, Diderot, Robespierre, Tocqueville, Gobineau, Camus, Sartre, Memmi, Foucault and others.
Students may not have previously completed AS.212.341.

AS.211.479. Dante's Journey through the Afterlife. 3 Credits.
Dante's Divine Comedy presents a complete picture of the medieval world-view in all its aspects: physical (the structure of the cosmos), historical (the major actors from Adam to Dante himself) and moral (a complete system of right and wrong). Dante shows how the Christian religion portrayed itself, other religions, the nature of God, humans, angels and devils, and human society. We will explore these topics both from the viewpoint of Dante's own time, and in terms of its relevance to our own societal and cultural concerns.
Area: Writing Intensive
AS.214.479

AS.211.480. Religious Themes in Film and Literature. 3 Credits.
This course would be of interest to anyone who would like to learn about the intersection of religion and modern culture. At the center of the course will stand a close study of the representation of religious themes and their role in modern literature and cinema. The works which we will deal with are not considered religious and yet they include religious themes as part of their narrative, images, language or symbolic meaning. We will trace in various works from various countries and genre, themes such as: divine justice, providence, creation, revelation, the apocalypse, prophecy, sacrifice and religious devotion. We will also study the ways in which Biblical and New Testament stories and figures are represented in these works. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.566. Independent Study - CAMS/undergraduate. 1 - 3 Credits.
requires permission of instructor
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.211.606. Literature and Truth: Forgery and Fakes.
Forgery is an eternal problem. It is a literary tradition in its own right, with connections to politics, Classics, religion, philosophy, and literary theory. Spurious writings impinge on social and political realities to a degree rarely confronted by criticism. This course offers a reading of the sort traditionally reserved for canonical works of poetry and prose fiction, spotlighting forgery's imaginative vitality and its sinister impact on scholarship. Students will study manuscripts and incunabula drawn from JHU's Bibliotheca Fictiva, the world's premier collection of literary forgeries.
Area: Writing Intensive
Students cannot have taken AS.214.606.

AS.211.612. Monuments and Monumentality.
As is clear from current events and debates surrounding monuments to the Confederacy, monuments play an outsize role in the public negotiation of history and identity and the creation of communal forms of memory. But monumentality is not restricted to statues or buildings. In this course we will study alternative forms of monumentality, especially in the 20th and 21st centuries. These alternative monumentalities — primarily literary, but including various material- and object-based expressions, and elaborations on institutional modes of monumentality — have assumed significance especially in minority and diaspora communities, and for other people and peoples outside the economic and political systems that endow and erect traditional public monuments. The primary case studies in this course will be forms of Holocaust commemoration, including the post-Holocaust large-scale Yiddish literary projects meant to serve Jewish communities in search of new forms of memorialization; and counter-monuments like Germany's Stolpersteine (stumbling stones). We will also consider contemporary debates around monuments in America and global manifestations of alternative monumentalities. All readings in English.

AS.211.616. Caribbean Fiction: Race, History, & Exoticism.
The Caribbean is often described as enigmatic, uncommon and supernatural. While foreigners assume that the Caribbean is exotic, this course will explore this assumption from a Caribbean perspective. We will examine the links between Caribbean and Old World imagination, the relationship between exoticism and Caribbean notions of superstition, and the way in which the Caribbean fictional universe derives from a variety of cultural myths. The course will be taught in English and all required texts are in English and English translations from French. A weekly session in French will be held for undergraduates wishing to count the course towards the French major and for interested graduate students. Open to all grad students and to undergraduates with permission of the instructor."
Area: Writing Intensive

AS.211.623. Reading Modern Hebrew Literature.
"And Jesus was a Jew with ear-locks and prayer shawl" claimed Uri Zvi Greenberg, the ultra-nationalist giant of modern Jewish poetry. A flesh-and-blood Jew, a demon, a spoiled student, an idol, a suffering brother, a (failed) Messiah, a nationalist rebel, a Greek god in a Jewish garb – these images of Jesus accompanied Jewish thought and literature for almost two thousand years. This course will study these images through a close reading of major Jewish texts from the Talmud to modern times.

AS.211.640. The Literature of Existence.
This seminar will explore some key expressions of what could loosely be called existentialist writing from the early twentieth century to the present day, to the end of coming to terms with an emerging "new politics of existence." While there will be some emphasis on Spanish language materials, including writings by José Ortega Y Gasset, Miguel de Unamuno, María Zambrano, and Jorge Luis Borges, we will also be reading important works by Martin Heidegger, Jean-Paul Sartre, Simone de Beauvoir, Albert Camus, and Martin Hägglund.
Area: Writing Intensive

AS.211.641. Women Filmmakers from the Margins.
Filmmaking remains an overwhelmingly male-dominated profession, but women are making significant inroads, and in so doing are leaving their distinctive mark on the medium. In this seminar we will examine the films of a group of women auteurs (those who write and direct their own films) who have endeavored to speak from the margins—be they social, geographical, or sexual—and whose work has challenged mainstream cinematic norms. The filmmakers whose work we will analyze may include Jane Campion, Australia; Aurora Guerrero, Mexico-USA; Claudia Llosa, Peru; Mira Nair, India-USA; Marialy Rivas, Chile; So Yong Kim, Korea.
Area: Writing Intensive

AS.211.658. Nomadic Narratives: Italian Women's Literature and Cinema.
This interdisciplinary graduate seminar examines the work of women writers, directors, and photographers in modern and contemporary Italy. We shall explore the question of female authorship and themes such as female subjectivity and mobility, women's participation in, or exclusion from, history. We shall read foundational texts such as Elsa Morante's La storia (1974), Anna Maria Ortese's collection of short stories Il mare non bagna Napoli (1953), and more contemporary novels such as Goliarda Sapienza's L'arte della gioia, and Elena Ferrante's L'amore molesto (1995). In the second part of the semester, we will study the work of female directors from different generations, from pioneer Elvira Notari, to mid-century Cecilia Mangini, and contemporary Alice Rohrwacher, as well as the work of photographers such as Carla Cerati and Letizia Battaglia.

AS.211.666. Graduate practicum: Mapping the Scholarly Landscape I (Research Skills).
From online resources to core printed reference works, this course acquaints students with the range of scholarly apparatus in the field of literary and cultural studies, with attention to issues of access, retrieval, and research. The course, which is required for all first-year graduate students in MLL, will be conducted in six (6) two-hour sessions.

AS.211.667. Graduate practicum: Mapping the Scholarly Landscape II (Tools for Professional development).
Spring Semester (coordinated by GRLL faculty with the participation of advanced grad students)1. Preparing a syllabus, marketing your classes (DTF, Summer, Intersession) [with the participation of successful DTF/Intersession instructors]Options for online teaching2. Writing a conference paper abstract; conference presentations 3. Organizing a conference/symposium [led by advanced grad students]4. How to get published (what, when, where)5. Academic review writing6. Options for fellowships/grants/career development

AS.211.713. The Culture of Algorithms.
This course proposes a study of the culture of algorithms for students of the literate space. True (deep) literacy is the ability to interpret a text or an object in its cultural, historical, conceptual, material or political contexts. With the evolution of digital cultures, literate practices have changed to incorporate the emerging cultural paradigms born out of the encounter of algorithms and computability with social practices embedded in the earlier literate traditions. Indeed, modern computation environments invite a new algorithmic hermeneutics grounded in both literate and scientific traditions. We will consider, among others, texts such as Bernard Chazelle's inaugural lesson at the Collège de France, "L'algorithmique et les sciences"; Leibniz on ordered problem solving; Condorcet on "social arithmetic"; Norbert Wiener, God and Golem, Inc.; Herbert Simon, "Bounded Rationality…"; Alan Turing, "Computing Machinery and Intelligence"; Steven Wolfram: Computation and the Future of the Human Condition; Leslie Valiant, Probably, Approximately Correct; Ed Finn, What Algorithms Want. Imagination in the Age of Computing; Daniel Cardon, À Quoi rêvent les algorithmes?; and of course Donald Knuth's classics, Literate Programming and "Computing Science and its Relation to Mathematics". Various modern novels also attempt to engage with the algorithmic, and these can form a counterpoint to the more technical or philosophical texts. For more information and a provisional syllabus, please go to http://www.wilda.org/Courses/CourseVault/Grad/Algorithms/Syllabus.html.This course will be taught in English. A few (short) texts are in French, so the ability to read French will be useful although not required.

AS.211.714. Ariadne's Threads: Metamorphosing Mythologies.
Abandoned by Theseus, Ariadne lamenting on the shore of Naxos embodies one of the most powerful tropes in literature and the arts. The fate of the heroine who helped Theseus out of the labyrinth became herself a thread (indeed, an inexhaustible series of threads) running across the ages and populating the imagination of poets, painters, composers. After exploring in detail the classical sources that canonized Ariadne's myth (Catullus, Carmina, 64; Ovid, Heroides, 10) as well as references to the myth found in other classical authors (Homer, Hesiod, Pausanias, Plutarch, Propertius), we will turn to the reception of Ariadne in literature and music (Ariosto, Rinuccini-Monteverdi, Haydn, Nietzsche, Strauss-Von Hofmannsthal). The analysis of the various case studies will focus on the rhetorical and poetical devices used by poets and composers to reenact the vocal features of Ariadne's lament.

AS.211.722. Global Feminist Filmmaking: a Theory in Practice Seminar.
This seminar examines recent emerging narrative and documentary global feminist filmmakers, applying feminist theory, intersectional theory, cine´ma ve´rite´, theory of nonviolence, and intersubjectivity to understand their work. Each week, we will examine one filmmaker's approach to their own personal practice of feminist filmmaking, and either interview them during our class or screen a pre-recorded zoom interview. In this seminar students will go beyond a theoretical feminist film criticism to one introduced into a lived and living feminist film practice. The filmmakers in question are Marialy Rivas (Chile), Elisabeth Scharang (Austria), Habiba Djahine (Algeria), Patricia Ortega (Venezuela and Argentina), Wanuri Kahiu (Kenya), Naomi Kawase (Japan), Sandra Kogut (Brazil), Kirsten Johnson (USA), TT the Artist (USA), Patricia Ramos (Cuba), Susana de Sousa Dias (Portugal), Claudia Llosa (Peru), Alina Marazzi (Italy), Rosine Mfetko Mbakam (Cameroun and Belgium).

AS.211.724. Media Artist in Residence Jane Jin Kaisen.
Media Artist in Residence Jane Jin Kaisen is a team-taught class between Bernadette Wegenstein (MLL) and Clara Han (Anthropology). In this class we will prepare the artist residency of Jane Jin Kaisen, a visual artist born in Jeju Island, South Korea and raised in Denmark. In the first part of the semester, we will cover theoretical questions raised in Jane Jin Kaisen's work such as cross-cultural adoption, diaspora, migration, war, gender and sexuality, and translation. In the second part we will involve students practically in questions of media arts curation for the artist's exhibit planned for April 2-9, 2022, at the Parkway Theatre, featuring three of her recent and acclaimed installations and films: The Woman, the Orphan, and the Tiger (2010), Apertures/ Rifts (2016), and Community of Parting (2019. In this class students will be closely involved with JHU's Center for Advanced Media Studies (CAMS), and the Baltimore Stavros Niarchos Parkway Theatre's artistic director Christy LeMaster. They will also meet the artist Jane Jin Kaisen during her residency.

AS.211.727. Humanity in Question.
Although it is often assumed that any inquiry into the human inevitably leads to pernicious forms of anthropocentrism, current debates about the Anthropocene suggest that we avoid such reflection at our own peril. Drawing on philosophy, biology, and sociology, Helmuth Plessner's Levels of Organic Life and the Human: An Introduction to Philosophical Anthropology (1928) offers a powerful account of humans' "excentric positionality," whose key ideas Plessner would further flesh out in his Political Anthropology (1931). Plessner's 1928 book was overshadowed, however, by the near-simultaneous appearance of Being and Time and Heidegger's imperious dismissals of philosophical anthropology. Disturbed by Heidegger's blindspot and its political consequences, during the World War II Hans Jonas, one of Heidegger's most original students, began to outline a conception of organic life as "an experiment with mounting stakes," with the highest stakes reached in human freedom. That conception, fully elaborated in The Phenomenon of Life: Toward a Philosophical Biology (1966), would serve as the basis for Jonas's influential theory of bioethical and ecological responsibility. Now that Plessner's key works are finally available in English translation, a joint examination of his, Heidegger's, and Jonas's conceptions is in order. We will ask what these three thinkers have to tell us about our current situation.

AS.211.732. The Literature of Speculative Genres: Science Fiction, Bandes dessinées, MMOGs, Mangas….
The francophone and anglophone worlds have longstanding distinct if complementary traditions for staging the primordial literary gesture, the imagining of the "What if". This course will confront the two cultures in early works like Cyrano de Bergerac's Histoire comique des états et empires du soleil, C. N. Ledoux's utopian workers' paradise, or Jules Verne's novels. It will then address the modern literate spaces in which the two traditions cross-fertilize each other— for example the French reception of Philip K Dick's oeuvre, Korogodski's Pink Noise-A Posthuman Tale, Catherine Dufour's Le Goût de l'immortalité, cyberpunk, mangas co-authored by francophone artists and writers, the "9e art" of the high graphic novels, especially the Cités obscures of Schuitten and Peeters, or hybrid French/anglophone MMOG communities like Ubisoft's Assassin's Creed. The materials will be in French or English, so the ability to understand French is necessary, with class discussion in English. Undergraduates are welcome with permission of the instructor, and this course may count for the French major or minor.

AS.211.748. Media Theory in the Age of Big Data.
This seminar will explore some key themes in contemporary media theory in an age when five tech giants have succeeded in infiltrating the daily lives of global citizens to an unprecedented degree in history. We will study the impact of this saturation on socioeconomic inequality as well as the implications of an almost total loss of privacy.Among the strategies of resistance to the capacity for surveillance these companies have developed we will focus in particular on current examples of feminist media art and voices from the global and cultural periphery as well as tendencies in these practices to emphasize a return to interpersonal connections and the embodied here and now. As case studies we nay include #metoo, slo-film movements from Southern Bahia in Brazil, and the financing and distribution of art films by mega media companies like Netflix.

AS.211.753. The Renaissance Comic Romance.
In the fifteenth and sixteenth centuries, Italian and French humanists transformed the medieval adventure stories of Charlemagne's and Arthur's knights. The course concentrates on Luigi Pulci's earthy, bourgeois Morgante, Teofilo Folengo's Macaronic (Latin/Italian dialect) Baldus, and Rabelais's encyclopedic Gargantua and Pantagruel, combining close analysis of their linguistic and narrative fabric with examples of their influence on later comic narrative masterpieces.
Area: Writing Intensive

AS.211.754. Modernist Primitivism.
This course will explore the aesthetics and politics of primitivism in European modernity, focusing on the visual arts and literature in German and Yiddish, but looking at the wider European context, including France and Russia. We will begin with the backgrounds of primitivism in Romanticism, looking especially at its ethnographic and colonial sources. We will then focus on the presence of anthropological and ethnographic discourses within various registers of modernist thought, literature, and visual culture, with special attention to visual and literary primitivism. Our central concerns will include: the attempt to create a modernist aesthetics grounded in ethnography; the primitivist critique of modernity; the place of primitivism in the historical avant-garde; the development of the notion of "culture" in modernity; and the aesthetics of modern ethnic and national identity. Key thinkers, artists, and writers to be considered include Herder; Gauguin; Picasso; Wilhelm Worringer; Carl Einstein; Hannah Höch; and Emil Nolde.

AS.211.777. The Critical Unconscious.
Criticism in the 21st century has tended to relegate psychoanalysis to a dustbin of fads that proliferated at the end of the prior century but that today are of interest only to balkanized cliques of devotees. Bucking this trend, this seminar will examine the intellectual history and abiding influence of psychoanalysis's key critical concept: the unconscious. Basing our discussions on in-depth readings from key thinkers in the analytic tradition such as Freud, Lacan, and Klein, as well as the post-analytic philosophical tradition, including Zizek, Butler, Laclau and Mouffe, Deleuze and Guattari, and Jameson, we will work to distill an understanding of the unconscious as essential to the practice of criticism tout court, and as inhering even in those discourses that have sought most stridently to distance themselves from it. Seminar discussions will take place in English; readings will be available in the original as well as in translation.
Area: Writing Intensive

AS.211.866. Independent Study - CAMS/graduate.
requires permission of instructor

AS.212.318. Women in French Literature of the 17th and 18th Centuries. 3 Credits.
This course will examine the changes in the relationship of women to literature in France before the French Revolution from several points of view: (1) What were the social and intellectual contexts of gender distinctions? (2) How did men writing about women differ from women writing about women? (3) How were these questions affected by the changing norms of literary productions? Texts by Mme. de Sévigné, Molière, Mme. de Lafayette, Prévost, Diderot, Rousseau, Laclos, and Beaumarchais.
Area: Writing Intensive

AS.212.333. Introduction à la littérature française I. 3 Credits.
Readings and discussion of texts of various genres from the Middle Ages to the 20th century. The two semesters (212.333 and 212.334) may be taken in either order. Students may co-register with an upper level course during this course. 212.333 covers the time period from the Middle Ages to the Revolution.
Area: Writing Intensive
AS.210.30] AND AS.210.302

AS.212.334. Introduction à la littérature française II. 3 Credits.
Readings and discussion of texts of various genres covering the time period from the Revolution to the 20th century. This sequence is a pre-requisite to all further literature courses. Students may co-register with an upper-level course during their second semester.
Area: Writing Intensive
AS.210.301 OR AS.210.302 or at least one semester of AS.210.301 or AS.210.302 with a grade of A and written permission of the instructor.

AS.212.340. Topics in French Cinema: Immigration, identité, différence culturelle. 3 Credits.
An exploration of immigration, identity, and cultural differences through the lens of recent French and Francophone films. Focus on discussion and analyses of film sequences in class and on oral presentations. Students will have the opportunity to progress in vocabulary, oral expression, and in critical analysis. Films studied include works of Kassowitz, the Dardennes, Kechiche, Sciamma, Haneke, and Audiard. Conducted in French. Recommended course background: completion of AS. 210.301 or equivalent score on Placement test.

AS.212.353. La France Contemporaine. 3 Credits.
Students will explore contemporary French society and culture through a wide variety of media: fiction and non-fiction readings (graphic novels, news periodicals, popular magazines), films, music, art, websites, and podcasts. A diverse range of hands-on activities in addition to guided readings will help students develop cultural awareness as we discuss topics such as education, politics, humor, sports, cuisine, immigration, slang, and national identity, as well as the historical factors that have influenced these facets of French and francophone culture. Recommended Course Background: AS.210.301 or AS.210.302 or permission of instructor.
Students may not have taken AS.211.401.

AS.212.402. The Count of Monte Cristo and its Avatars. 3 Credits.
Alexandre Dumas's Le Comte de Monte Cristo (1844-46) is widely regarded as one of the most popular novels of all time and as one of the best adventure novels ever written. Perhaps no other masterpiece of French literature has been subjected around the world to such countless film adaptations, including animation, television series, and serials. This course aims to study and contextualize the reasons behind this sustained transnational and transcultural interest. Close reading and analysis of Dumas' novel will provide a good point of departure to explore problems that cut across nineteenth-century French society: politics, social class, revolution, family, love and desire, revenge, justice, science, and religion. Course conducted in French; most films in English or with English subtitles.

AS.212.403. Voodoo and Literature. 3 Credits.
This course will examine the various ways voodoo, as the Unknown, has been represented, misrepresented, recuperated, and interpreted in the aftermath of the Haitian Revolution from the early nineteenth century to the present day. While historians have debunked the role of voodoo in the aftermath of the Haitian Revolution, the literary representation of the slaves in captivity is often associated with the will to liberation enacted in the secret practice of voodoo on the plantation. The history of voodoo in Saint-Domingue (Haiti) is intertwined with the history of colonial subversion, ancestral medicine, and the physical resistance of the enslaved people. Yet the most defining event in the armed uprising by the enslaved, the ceremony of Bois Caiman (August 14, 1791) still divides historians, novelists, and anthropologists. Where history and anthropology seem to flounder in trying to capture the mystery of such ceremony, literature soars majestically, maintaining the mystery by using the freedom of the imagination as its sole support. Might the transmission of voodoo during the colonial period, be understood as the historical mode of preservation of an ancestral secret practice that can only be transmitted through oral tradition and rituals, which may have been lost in the attempt to produce written translations ? Readings in French and English may include works by Alejo Carpentier, Aimé Césaire, Patrick Chamoiseau, Marie Chauvet, Edwidge Danticat, René Depestre, Zora Neale Hurston, Frédéric Marcelin, Alfred Métraux, Toni Morisson, Jacques Roumain, Simone Schwarz-Bart, William Seabrook, Derek Walcott, Richard Wright, to be supplemented by films, an art exhibit, music, and cultural demonstrations of voodoo. Course taught in French. Discussion in French and EnglishCross-listed with Humanities Center
Area: Writing Intensive

AS.212.406. The City in French Literature. 3 Credits.
The city is an integral theme, even a privileged character, in the literary and speculative texts of the 17th and 18th century. It is often understood to stand in opposition to the royal court and embodies the spirit of the people in a way related to the modern notion of "solidarity". This course will look at a number of examples of the peculiar status of the French city (especially Paris) from the late Renaissance through the First Empire. Selections from Marguerite de Valois, Mme de Sévigné, Montesquieu, Diderot, Rousseau, Turgot, Ruault, Rétif de la Bretonne, Mercier, Saint-Just, Robespierre, Napoléon Bonaparte, with a coda from Balzac and Michelet. Please note: taught in French
AS.212.333 OR AS.212.334

AS.212.413. For the Record: Jazz Cultures of Modern France. 3 Credits.
Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in music criticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.

AS.212.419. Romans africains d'expression française [French-Language Novels of Sub-Saharan Africa]. 3 Credits.
Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in musiccriticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.
AS.212.334

AS.212.429. Honors Thesis Prep. 1 Credit.
This course will meet three times during the Fall semester to enable all French majors to prepare their thesis subject, thesis bibliography, and abstract prior to the writing of the Senior Thesis (AS.212.430) in the Spring semester of their senior year. This course is required of all French majors and must be taken during the Fall semester of their senior year. Schedule TBA upon consultation with the class list, as there are only three group meetings. The rest of the meetings are in individual appointments with the DUS or another chosen French professor.Prerequisites: AS.212.333-334 and either prior enrollment or concurrent enrollment in AS.210.417 Eloquent French.
AS.210.417;AS.212.333 AND AS.212.334

AS.212.430. French Honors Thesis. 3 Credits.
An in-depth and closely supervised initiation to research and thinking, oral and written expression, which leads to the composition of a senior thesis in French.Recommended Course Background: AS.212.429
Area: Writing Intensive

AS.212.431. Style, Gender and Politics from Marie-Antoinette to the Burqini. 3 Credits.
From effeminate kings, to slutty queens, to post-revolutionary dandies, to the manifest invisibility adopted by some French citizens today, debates on the gendering and styling of political bodies have always been central to power struggles in France. Students will read from sociology, history and literature in order to understand the complex interplay among fashion, gender and political identity.Taught in English, but French minor/major credit possible by completing written work in French and by attending a weekly discussion section conducted in French. Students interested in the 4-credit French option should enroll in section 2. All others should enroll in section 1.Special Notes: This course is meant to be a small class experience. Enrollment limits will be strictly enforced.

AS.212.433. Reason and Revolution. 3 Credits.
The French Revolution in relation to the literature and political thought of the Enlightenment: Montesquieu, Rousseau, Beaumarchais, Condorcet, Robespierre, Mme de Stael and the revolutionary theater. Recommended Course Background: AS.212.333 or AS.212.334. http://www.wilda.org/Courses/CourseVault/Undergrad/ReasonRev/syllabus.html
Area: Writing Intensive

AS.212.436. Cultures of Love. 3 Credits.
From the time of its invention, as a kind of counterfeit religion, in the Hispano-Arabic world, love has been an unsettling, paradoxical, transgressive phenomenon: mystical, adulterous, con game, parlor game, poison, illness. Taking a literary, sociological and anthropological approach, this course will try to grasp some of the challenges posed by love's protean discourse: from the fin'amor born in women-ruled Medieval courts, to the language of 17th-century women mystics, to libertinage, to the cold intimacies of today's emotional capitalism. Taught in French.
Area: Writing Intensive
AS.210.301

AS.212.437. Diderot and the French Enlightenment. 3 Credits.
Denis Diderot's early work was dominated by his work on the natural sciences and the Encyclopédie. In later years, his literature addressed the social applications of knowledge: economic, anthropological, political, and moral issues structured his aesthetic concerns. As an author in continual conversation with his contemporaries and who was instrumental in the creation of an engaged intellectual community, his fiction, philosophical texts and critical works serve as the ideal lens to bring into focus the peculiarities of the French Enlightenment. Among the texts to be considered will be articles from the Encyclopédie, the Supplément au voyage de Bougainville, Le Rêve de d'Alembert, the Salon de 1767, Le Neveu de Rameau, extracts from his Essai sur les règnes de Claude et de Néron… This class will be taught in French.Recommended Course Background - AS.212.333
Area: Writing Intensive

AS.212.439. Aimer Son Prochain? Sympathie, Différence, Hostilité. 3 Credits.
Une exploration des diverses manières de produire et réguler l'amour de l'autre au sein d'une société hiérarchique et compétitive: que cet autre soit un concitoyen ou un étranger, un inférieur ou un supérieur, qu'il nous ressemble ou non. Du roman, à l'anthropologie, à la sociologie, au débats sur le vivre-ensemble à l'Assemblée Nationale, nous examinerons les rêves pacificateurs de la politesse aristocratique, l'institution de la solidarité républicaine, les blessures de la socialité coloniale. Cours et textes à lire en français.
Area: Writing Intensive

AS.212.440. Pandemic and Vaccination as Cultural Watershed in the Ancien Régime. 3 Credits.
What is a plague? What does it mean to protect your society from such diseases? This was a fraught, even violently debated political, social and moral, more than a medical question in the French Enlightenment, and it marked the literate culture of the Age of Enlightenment. Early on, pandemics and vaccination were understood in radically different ways in England (especially by the Princess of Wales) and in France, still dominated by a view of plagues as divine punishment. In Enlightenment literature, both fiction and nonfiction, the disease is secondary to the experience of the conscious sufferer, or to its sociopolitical consequences. We will approach these issues first via a quick overview of explanations of the plague, then discuss the 18th-century smallpox vaccination debates (one of Princess Caroline's letters, Voltaire on vaccination in two of his Lettres anglaises, extracts of Rousseau's novel La Nouvelle Héloïse). We will then consider the hugely influential mid-century debate space within the magisterial Encyclopédie of Diderot and d'Alembert. Finally, we will pass to late-18th-century texts that inflect culturally, politically and socially the consequences and metaphors of pandemics on the cusp of the Revolution. Texts to be read include Laclos' Liaisons dangereuses and a short essay by Guillotin (the inventor of the guillotine) on the citizen's experience of illness and contagion in a post-aristocratic, Revolutionary state. This will be a writing-intensive course, focused on close readings of texts in 2 explications de texte (written close analyses of a selected passage). The second paper may be a more extensive study, still based on textual analysis, but which may address a historical context or set of texts that particularly interest the student. This course will be taught in French.
Area: Writing Intensive
AS.212.333

AS.212.449. France, terre des migrations [French Histories of Migration]. 3 Credits.
Comme le Canada ou les Etats-Unis, la France est une grande terre d'immigration qui depuis le 19e siècle a accueilli sur son sol des populations du monde entier. En examinant témoignages, textes de fiction et films documentaires, nous suivrons les expériences contrastées de diverses vagues de migrants chassés par la faim, le chômage ou les persécutions. Quels mécanismes ont favorisé ou freiné l'intégration économique, sociale et civique de ces migrants qui ont rejoint la République française? Que veut dire "être immigré" aujourd'hui?
Recommended Course Background: AS.212.333 OR AS.212.334
AS.211.401

AS.212.452. The Character Function. 3 Credits.
What do we really mean when we talk about a "character" in a discursive work? What are the structuring, esthetic and heuristic functions of such forms of agency? How has the concept of the character evolved from the early modern period to the present day? A sampling of the cases to be considered: Descartes, Racine, Marivaux, Diderot, Rousseau, Napoleon, Michelet, Zola, avatars and "digital angels". This course will be taught in French.Recommended Course Background - AS.212.333

AS.212.454. French Theater: Reading and Practice. 3 Credits.
Reading modern theater in French can be exciting: a battle waged with words instead of swords, a battle of wit and of style. The literature of the nineteenth century was marked by major literary battles opposing young Romantic writers against an old school of Academicians. This battle was fought largely in and through the theatre. In this course the classroom space itself becomes a stage in which to reenact or rehearse some of these battles, through careful readings of texts and by exploring all possible literary contexts. Participants will read together a number of plays as well as take part in collaborative learning and creative activities. Readings to include texts by Césaire, Dumas, Hugo, Marivaux, Musset, Scribe, Sartre, and Vigny. Readings and discussion in French.
Area: Writing Intensive

AS.212.651. Romantisme et Indigénisme.
Le romantisme littéraire, en tout temps et en tout lieu, est contagieux. Ce qui a fait la force pérenne du romantisme français au XIXe siècle, c'est sa capacité de susciter de nouveaux modèles en France et de miroiter son élan esthétique au-delà des frontières nationales. Ce séminaire abordera principalement la question du romantisme français et la manière dont ses prolégomènes ont été appropriées par une ancienne culture coloniale.
Area: Writing Intensive

AS.212.679. Romantique et Romanesque: Desire, History, and Politics in 19th Century French Novel.
Literary critics from René Girard to Jacques Rancière assert that French literature of the 19th century— itself arguably the century of the novel— is fundamentally romantic. What does that mean? Is the French novel intrinsically romantic? Our discussion could well start with Girard's Vérité romanesque et mensonge romantique, which presents a new conception of the novel in correlation with human philosophy, and concludes that the "roman romanesque" is not "romantique," because romanesque adhered to the truthfulness of its subject while the romantic scenario is linked to its deceit. However, the real theoretical focal point is not the position of contemporary critics on romantic and non-romantic narrative scenarios, but the following characterization from 1903 of the "roman romanesque" by Academician Émile Faguet (1847-1916): "Ce n'est point du tout le roman à aventures extraordinaires et tumultueuses. Celui-là, je l'appellerais plutôt le roman mélodramatique. J'entends par roman romanesque celui qui, très délibérément, s'attache à nous présenter des caractères exceptionnels qui ne cessent pas d'être vrais." The course will introduce the socio-cultural complexity of novelistic forms and techniques of the literary movement familiarly known among the critics as "le romanesque français" from the Restoration to the early Third Republic. Readings by Balzac, Constant, Dumas, Flaubert, Hugo, Sand, Staël, and Stendhal. Taught in French.

AS.212.684. Fabrique de la banlieue parisienne [The Making of the Paris Suburbs].
Parler de "la banlieue parisienne", qu'est-ce à dire? Et si ce singulier induisait en erreur? Selon les époques, la banlieue fut tour à tour verte, grise, rouge ou néon vif. Appréhendée à la croisée des discours sur l'urbain et des productions culturelles, elle est le lieu de conflits idéologiques entre le capital et le salariat, entre "le Français" et "l'étranger", entre progressisme et nostalgie, entre droit et non-droit. La dialectique qui se tisse entre représentations artistiques (romans, photographies, films), pratiques sociales (arts de faire, modes d'habitation et de déplacement) et représentations idéales (urbanisme, architecture) formera l'objet de ce parcours critique embrassant un siècle de banlieue parisienne. Textes de Céline, Simenon, Queneau, Fallet, Rochefort, Daeninckx, Charef, Djaïdani; films de Duvivier, Dhéry, Godard, Rohmer, Cabrera, Ly. *Open to undergraduate French majors with permission of instructor.

AS.212.696. Literature Confronts Science: Zola.
Zola worked with the theories of heredity of his time in the Rougon-Macquart novels. But he also attempted to use his understanding of biology and thermodynamics to reform the theory of the novel in general. This course will examine these two different effects of science on literature and try to see what leads an author to undertake such a project. For a more extended description, please see http://www.wilda.org/Courses/CourseVault/Grad/Zola/Syllabus.html. Advanced undergraduates with sufficient background may register for this course with permission of the instructor.

AS.212.702. Une Littérature révolutionnaire.
The 1st half of the semester will consider some of the theoretical underpinnings (Montesquieu, Rousseau, Condorcet) and a few examples of Revolutionary rhetoric, especially the trial of Louis XVI and the late speeches of Robespierre. The 2nd half of the semester will study memoirs and literary works produced during the Revolution's aftermath and 19th-century attempts to culturally digest the Revolution. Please note: taught in French

AS.212.711. Baudelaire and Flaubert: Literary Life in the Year 1857.
Charles Baudelaire (1821-1867) and Gustave Flaubert (1821-1880): two young men from wealthy families, two opponents of bourgeois education, two aborted social callings, two terminal illnesses, two resounding failures before literary institutions, two adventures in love, two satanic fascinations, two notorious literary trials, two conceptions of the craft of writing, two approaches to realism, two criticisms of romantic art, two models of poetic inspiration, two aesthetics of language, two cults of Beauty, all for one and a unique literature. This seminar will be devoted to the literary life of two writers whose canon for more than a century has occupied a central place of importance in contemporary literary criticism. It will be our task to place their work in perspective within the context of the rise of modernism, which is to say, the new status of literature as of the year 1857. We shall endeavor, thus, to discern the authenticity of the creative relationship of each artist with himself and subsequently with others. The point will be to foreground three fundamental principles that will aid in grasping the evolution of the literary world under the Second Empire and under the Third Republic: literary history, writing and the elevation of the writer (Bénichou). Our work will be based on three or four texts by Baudelaire and Flaubert, it being understood that additional works of criticism will illuminate the discussion of these texts.
Area: Writing Intensive

AS.212.720. Le Livre Antillais: Culture/Écriture.
On s'arrête trop souvent pour souligner l'inexistence d'une véritable sphère du livre lorsqu'on aborde la littérature haïtienne, mais assez rarement pour s'interroger sur la place de cet objet dans la fiction. Il semble que la représentation du Livre et ses avatars sont partout dans les œuvres des écrivains antillais depuis le 19esiècle. Car lire et écrire jouent un rôle non négligeable dans la représentation culturelle, esthétique et politique qu'ils se font de leur société qui subit une quelconque tyrannie. Ce séminaire sera consacré essentiellement à la question du livre dans un contexte antillais. Aussi s'interrogera-t-on sur la personne de l'auteur antillais, sa présence dans l'œuvre fictionnelle, sa conception fétichisée du livre et de l'écriture au travers de l'esthétique, du social et du politique, en prenant pour exemples quelques romans de Marie Chauvet, René Depestre, Frankétienne, Fernand Hibbert, Dany Laferrière, Émile Ollivier, René Philoctète.
Area: Writing Intensive

AS.212.726. Approches géopoétiques: théâtre, poésie, roman.
Chaque genre littéraire développe un rapport particulier à l'espace, tout autant qu'au temps. Au théâtre, l'espace est à la fois abstrait, dans la mesure où le texte théâtral fait subir au monde une réduction à l'extrême, et concret, en ce que la mise-en-scène actualise un ensemble de possibles devant le public. Dans le domaine de la poésie, l'espace fait l'objet d'évocations diverses et changeantes ; il peut être intensément présent ou être renvoyé à l'arrière-plan au profit de la seule voix, siège de la "conscience" poétique. Le récit de fiction, lui, fort de sa visée mimétique, semble engendrer un imaginaire spatial plus marqué, que celui-ci se crée à partir de topoï communément admis ou qu'il intègre des précisions géographiques ou architecturales, comme le veut l'esthétique réaliste. Le but de ce séminaire sera de confronter ces trois imaginaires de l'espace en littérature, afin d'en arriver à une meilleure compréhension des ressources propres aux textes littéraires et de leur possible théorisation. Ouvrages et articles critiques d'Ubersfeld, Collot, Westphal, Moretti, Bouvet et Camus; œuvres d'expression française, à lire in extenso ou sous forme d'extraits, de Corneille à Koltès, de Lamartine à Glissant, de Voltaire à Volodine...
Area: Writing Intensive

AS.212.741. Rousseau: Citizenship and Exile.
Throughout his life Rousseau presented himself by turns as the citizen of a Republic, a stateless outcast, the resident of a vanishing homeland of the heart, and the focal point of an international conspiracy. He invented new foundations for political communities that could never be implemented or were misunderstood during the revolutionary Terror. The families he portrayed were both patriarchal and defiantly anti-normative. He affirmed his desire to belong and insisted on his irreducible difference; he extolled friendship and engineered breakups. Through readings of Rousseau's major political, autobiographical and fictional works we shall examine how and why communities, personal identity and citizenship are alternately built and destroyed. Taught in French. Course open to undergraduates with permission of the instructor.

AS.212.751. Franco-Algerian Screens: Exoticism, Revolution, Independence.
From exoticist features of the 1920s and 1930s and political works of the 1960s, to family sagas and personal essays looking back on a conflicted past from the standpoint of the new century, Algeria has featured prominently in the French cinematographic imaginary. The independent North African nation has likewise produced compelling narratives that address the colonial legacy, the armed struggle for independence and its aftermath. Addressing from both sides of the Mediterranean an entangled political and cultural history, this course places in critical context conflicting screen representations as well as the institutions, individuals, and publics associated with them. The course will be taught in English, however most course materials will be in French. Undergraduates may take with permssion of the instructor and completion of AS.212.333 and AS.212.334. Graduate students need not have completed the prererquisite courses.

AS.212.757. Romans Africains D'expression Française [French-language Novels of Sub-saharan Africa].
Depuis la période coloniale finissante, le roman africain d'expression française a porté les espoirs et les déceptions d'un continent tiraillé entre panafricanisme et nationalisme, patrimoine traditionnel et modernité, courants séculiers et religieux. Que signifie le choix d'écrire des romans en une langue de colonisation qui est aussi, dans les sociétés multiethniques du Mali, du Sénégal ou encore du Congo, une langue fédératrice auréolée de prestige? Quels publics les romanciers visent-ils à atteindre, et à quel point la forme romanesque permet-elle d'exposer des griefs ou de dénoncer des états de fait tout en faisant apparaître des alternatives? Nous éclairerons, en étudiant des auteur.e.s francophones d'Afrique noire, trois temps forts: l'éveil politico-culturel menant aux indépendances d'abord (Kane, Oyono, Ouologuem, Kourouma); la construction de nouvelles identités africaines ensuite (Sembene, M. Bâ, Sony Labou Tansi); et enfin, les violences génocidaires au Rwanda qui laissent, sur les consciences et les corps, des marques indélébiles (Tadjo, B. Diop, Mukasanga).

AS.212.778. Les écritures contemporaines aux confins des genres [Contemporary French Writing Beyond the Genres.
Le système des genres littéraires consacré par la vieille trinité "roman, poésie, théâtre" ne fait plus la loi. Depuis les années 1980 ont émergé en France des formes d'écriture hybrides s'appuyant sur le montage, le recyclage, le catalogue ou encore la traduction intermédiale. Notre objet sera d'interroger le statut de l'objet littéraire et de la figure de l'écrivain dans un paysage artistico-médiatique que caractérisent la surproduction de textes et d'images et une certaine déréalisation du lien social.

AS.212.781. L'entre-deux-guerres en toutes lettres [French Literature Between the Wars].
French literary culture between the wars (1919-1939) promoted the novel as a forum for social comment and formal experimentation alike. Questioning the psychological biases of the 'roman d'analyse' and reacting to the collective tragedy of the Great War, interwar writers updated the French language as well as narrative 'technique' in light of emergent theories (psychoanalysis, Marxism, phenomenology). Readings from Aragon, Breton, Céline, Cocteau, Colette, Dabit, Malraux, Némirovsky, Queneau, and Simenon.

AS.212.785. The Enlightenment and its Critics.
Are imperialism, universalism, soulless rationalism, reckless exploitation of nature, and social engineering the legacy of a so-called "Enlightenment project," as many have argued in the wake of World War II? This course explores some core aspects of that critique, from Rousseau to Foucault, while testing them against examples of the plurality of discursive practices that we call Enlightenment. Readings and discussion in French. Course open to undergraduates with the instructor's permission.
Area: Writing Intensive

AS.212.791. Film Theory and Critical Methods.
Film Theory and Critical Methods surveys critical approaches to the study of film. Each week we examine a different theoretical approach to filmic representation, with emphasis variously placed on a style, genre, region of production, or period. We will be examining global film traditions from East Asia to Latin America, Western Africa, Europe, and North America. Seminar discussions will incorporate examples from films that students both view on their own as well as during the Wednesday evening screenings, which are mandatory for all seminar participants.

AS.212.801. French Independent Study.

AS.212.802. French Dissertation Research.

AS.212.803. French Proposal Preparation.
1st semester: Develop list of already-read works in your chosen field to develop a thesis subject. Identify 2 co-advisors of the ABD project; the expectation is that 1 will direct the thesis following the ABD defense. Register in this advisor's section (01: Desormeaux; 02: Anderson; 03: Russo; 04: Schilling). 1st month: Discuss with co-advisors your understanding of the core research question(s) and prepare a provisional abstract (an ongoing working tool). The abstract includes 1) well-articulated thesis statement; 2) description of proposed methodology; 3) list of proposed primary works to be studied; 4) justification of the project's relevance to the field and its interdisciplinary reach. It should be accompanied by a report on your literature search: situate your project within the existing scholarly corpus. 2nd month: prepare an annotated bibliography of primary and secondary works. Expect it to expand significantly during ABD prep as well as after the ABD defense. 3rd month: review and modify the abstract with the co-advisors; develop a provisional outline of your ABD text. Present a reading list for the period between the 1st and 2nd semesters of proposal prep. 2nd semester: Meet with the co-advisors to report on the interim research and revisit if necessary the proposed outline and abstract. Submit proposal for the sample chapter. 1st month: begin writing the sample chapter. 2nd month: in the light of how the sample chapter is progressing, review the outline with the co-advisors, then begin writing a narrative of potential thesis chapters. 3rd month: once the foregoing are drafted, write up the methodological introduction and finalize the annotated bibliography. Finally, review the abstract for completeness and revise the ABD for language and formatting. The ABD must be approved by the ABD co-advisors before it is distributed for defense. Goal: ~25 pages of supporting material; ~30-page writing sample; an annotated bibliography. ABD is not to exceed 75 pp.

AS.212.804. French Summer Research.

AS.213.205. Outsiders, outlaws, outcasts. 3 Credits.
Introduction to the close reading of German-language literature in the original. We read and discuss literary works in which experiences of crisis give rise to novel forms of selfhood. Authors may include Tieck, Kleist, Büchner, Droste-Hülshoff, Heine, Keller, Storm, Kafka, and others. We will ask how narrative form can represent breakdowns in established ways of sense-making. Attention will be paid to writers' divergent responses to the challenges of modernity. Readings, discussion, and writing assignments in German.

AS.213.311. Wege aus der Krise: politisches Theater heute. 3 Credits.
Course taught in German. Klimakrise, sogenannte Flüchtlingskrise, Gesundheitskrise, Krise der Demokratie: Eine Krise nach der anderen stellt sich ein oder wird zumindest ausgerufen. Das Resultat ist jedes Mal Weltverlust, wenn auch auf sehr unterschiedliche Weise. Es gibt also grundsätzliche Probleme, mit denen sich politisches Theater heute auseinanderzusetzen hat. In Deutschland und Österreich hat das Theater traditionell und aktuell einen hohen gesellschaftlichen Stellenwert. Allerdings ist auch die Welt des Theaters seit Frühjahr 2020 aufgrund des Gebots, soziale Kontakte einzuschränken, weitgehend zusammengebrochen. Dennoch arbeiten Theatermacher*innen weiter daran, den großen Problemen unserer Zeit zu begegnen. Welche Entwürfe bieten zeitgenössische Stücke, um uns als Gesellschaft Wege aus der Krise zu weisen.
AS.210.362

AS.213.313. Utopia: Idyllic Pasts, New Frontiers. 3 Credits.
Taught in German. This course will explore the vision in German romantic and modern literature of ideal communities. We will examine the relation of past and to future in these works as well as the way they conceive humans and nature, earth and heavens, bodies and machines. To what extent is a utopia something crafted? To what degree is it presented as a fashioned setting like a work of art? What does the image of utopia tell us about the act of imagining at the heart of literature? To what extent does envisioning a utopia amount to inhabiting one? Why is a utopia at once every place and no place (u-topos)? Reading to include works by Klopstock, Novalis, Hoffmann, Kleist, Nietzsche, Scheerbart, Walser and Jünger.
AS.210.361 AND AS.210.362

AS.213.314. Texte sehen, Bilder lesen. 3 Credits.
Taught in German. This course examines the intersections of literature and the visual arts. We will read texts by writers influenced by artists and explore art that mobilizes text; and we will examine the relationships between text and image in both illustrated books and artworks. We will also consider the visual dimensions of texts themselves, asking how texts sometimes come to function imagistically or even as images in their own right. We will work across different periods of literary and visual production, and specific topics will include: theories of text and image; manuscript illumination and early printing; typography; concrete poetry; artists' books; text art; and graphic novels. The course will include visits to the Baltimore Museum of Art, the Walters Art Museum, Special Collections at the Sheridan Library, and a letterpress shop.
Area: Writing Intensive
AS.210.362 or Instructor Permission

AS.213.315. Playtime…auf deutsch. 3 Credits.
Taught in German. German discussions of theater have largely focused on Greek tragedy and how this classical genre can be adapted for the modern stage. Yet comedies (or Lustspiele) have played an equally important role in German cultural productions and discourse from the early modern figure of the buffoon (Hanswurst) to reflections on puppet theater and to larger philosophical and anthropological inquiries into play. In this course we will read several theoretical texts on comedy and play by Aristotle, Huizinga, Kant, Schiller, and Kleist before turning to various comedies by Lessing, Kotzebue, Kleist, Brentano, Droste-Hülshoff, Büchner and Brecht. The culmination of the class will be a theatrical production.
AS.210.362 or Instructor approval

AS.213.321. Bodies and Pleasures. 3 Credits.
This course traces a literary history of sexuality from the Middle Ages to contemporary women's writing. We will analyze how sexual pleasure changed over time. In particular, we will discuss what role literature plays in the reproduction and transformation of bodily pleasures. The course explores how the pleasures of bodies are imagined in and through literature, but also whether words are bodies that give pleasure and perhaps even have their own pleasures.

AS.213.328. German Literary Modernism. 3 Credits.
Taught in English. German Literary Modernism focuses on modernist works of literature between 1900-1930, considering central modernist authors against the backdrop of dramatic changes and events in European culture and society, including urbanization, technological change, the First World War, and social and artistic movements. Students will engage literary works--by such authors as Kafka, Rilke, Hofmannsthal and Thomas Mann--that express a sense of crisis about modern life, or provoke questions about the nature of reality, the human self, the reliability of perception, and the possibilities of language and art. ? Students have the option of an additional hour of German discussion and doing all the assignments in German for German-language credit (3+1) towards the major or minor. Students interested in that option should register for section 2.

AS.213.340. Flucht und Migration: Literarische Erkundungen. 3 Credits.
We will study how contemporary German literature reflects the experiences of migrants and refugees. Jenny Erpenbeck's novel Gehen, ging, gegangen (2017) and Sasha Marianna Salzmann's novel Außer sich (2018) will serve as our main examples, complemented with shorter texts and other material on the historical and political contexts.

AS.213.354. Introduction to German Poetry. 3 Credits.
This class will introduce students to German poetry from the eighteenth to the twentieth century. We will read selected poems by Goethe, Eichendorff, Mörike, George, Hofmannsthal, Rilke, Trakl, Celan, and Bachmann. In addition we will read several theoretical reflections on poetry by literary critics and philosophers which examine the lyric form and the curious world that poetry constructs. Readings and discussion in German.

AS.213.360. Animals and Animality in Literature and Philosophy. 3 Credits.
(300-level, taught in English) critically engages the presentation and imagination of animals and other non-human life in modern literature, philosophy, and thought. We will examine the figure of the animal and the means of conceptual differentiation between the animal and the human, considering animals' relation to or perceived exclusion from language, pain, embodiment, sexuality, and the visual gaze. The course is ideal for students interested in fascinating themes in literature and how they reflect philosophical concerns. No prior courses in philosophy are required. Students will read philosophical texts alongside literary works in learning the conceptual history of animals and of humanity as a distinct species. Expect fascinating readings and engaging, lively discussions. Readings may include works by Marx, Nietzsche, Freud, Heidegger Derrida, Agamben, Poe, Kleist, Hofmannsthal, Rilke, Kafka, Mann, Pirandello, and Coetzee.
Area: Writing Intensive

AS.213.373. Sex und Macht. 3 Credits.
We will discuss postwar and contemporary literature and films that grapple with the effect of unequal power structures on sexual relations. Taught in German.

AS.213.374. Existentialism in Literature and Philosophy. 3 Credits.
What does it mean to exist, and to be able to reflect on this fact? What is it mean to be a self? This course explores the themes of existentialism in literature and philosophy, including the meaning of existence, the nature of the self, authenticity and inauthenticity, the inescapability of death, the experience of time, anxiety, absurdity, freedom and responsibility to others. It will be examined why these philosophical ideas often seem to demand literary expression or bear a close relation to literary works. Readings may include writings by Kierkegaard, Nietzsche, Dostoevsky, Heidegger, Rilke, Kafka, Simmel, Jaspers, Buber, Sartre, de Beauvoir, Camus, and Daoud.
Area: Writing Intensive

AS.213.377. Wassermänner Und Meerjungfrauen. 3 Credits.
Schriftsteller*innen haben immer wieder Geschichten von Wassermenschen erzählt. Was für eine Faszination birgt das Leben im Wasser? Was ist an diesen Zwitterwesen— Männer mit Schwimmhäuten, Frauen mit Fischschwänzen—so interessant? Was geht verloren, wenn solche Amphibien sich für immerauf dem Land einrichten? Tatsächlich sind alle Menschen Wasserwesen— zu einem Großteil aus Wasser bestehend. Aber dieses Lebenselement wird zunehmend gefährdet und gefährlich. Was nun? Wir werden literarische Texte aus der Romantik, Moderne und Gegenwart sowie ein paar Filme analysieren, um diesen Fragen nachzugehen

AS.213.378. Seeing the World by Foot. 3 Credits.
TAUGHT IN GERMAN. Few traditions have placed more emphasis than German literature on the importance of walking for finding one's way on earth and in the cosmos. From Schiller and Novalis to Thomas Bernhard and Werner Herzog, walking has been conceived not only as a journey outwards but also inwards into uncharted terrain of memory, the unconscious, and the imagination. In this course we will read short texts on wandering by Schiller, Chamisso, Goethe, Novalis, Tieck, Stifter, Walser, Bernhard, Herzog and Sebald with an eye toward the relationships that walking establishes between past and present, reality and imagination, time and space and inner and outer experience.
AS.210.361 AND AS.210.362

AS.213.380. Ghost Stories, Haunted House and Other Occult Phenomena. 3 Credits.
From the eighteenth century to the modern period, German authors have been obsessed with uncanny phenomena that blur the line between the natural world and the supernatural world of ghosts, spirits, and magic. We will explore the encounter with otherworldly phenomena in this course with a special emphasis on the status of literature as a play of semblance or collection of shadows. Why have ghost stories been so persistent in the modern era when science and reason are said to dominate our understanding of the world? Is the occult the dark side of science? What kind of knowledge does literature yield? What can literature tell us about what is random, obscure, or inexplicable?

AS.213.407. German Media Theory. 3 Credits.
German Media Theory is an advanced course for upper-level undergraduates and graduate students, giving an introduction and overview of the specifically German version of Media Studies that first gained traction in the 1980s. The term media refers not just to mass media but more broadly to devices that process, transfer and store information, reaching from the alphabet that changed the culture of writing, or the printing press made famous as the foundation of the 'Gutenberg galaxy' to computers and smart phones dominating our current lives. In this course we will cut across disciplinary boundaries to explore the multifaceted roots and formations of German media theory which combine literary poststructuralism, histories of science and technology, psychoanalysis, cybernetics, art history, and philosophy among other fields. Readings include works by Friedrich Kittler, Bernhard Siegert, Cornelia Vismann, Wolfgang Ernst, Walter Benjamin, Niklas Luhmann, Michel Foucault, Marshall McLuhan and many others. The course will be taught in English and all readings will be available in English.

AS.213.423. Reflections on Modernity. 3 Credits.
Taught in English. Reflections on Modernity takes up the problems conflicts, and possibilities of modernity in aesthetic, literary, and philosophical texts. Questions about the modern self, our relationship to nature, to urban experience, to history and language, and the role of the artist and writer in reflecting on modern life. Texts include works by such authors as Kant, Nietzsche, Baudelaire, Weber, Rilke, Hofmannsthal, Simmel, Heidegger, Habermas, Foucault.

AS.213.437. Phenomenology and Literature. 3 Credits.
Phenomenology and Literature engages the most fertile interchanges between literature and philosophy in the 20th century, focusing on the roots of phenomenology in German philosophy and its connections with and expansion to literary writing. Themes include: the nature of literary experience, including the experience of reading and writing, literary and phenomenological descriptions of reality, the literary construction of the self, and the understanding of literary imagination from a phenomenological perspective. We will read philosophers and literary theorists such as Nietzsche, Husserl, Heidegger, Sartre, Camus, Merleau-Ponty, Blanchot, Beauvoir, Hamburger, Ingarden and Iser in connection with the works of many modernist writers, including Rainer Maria Rilke, Franz Kafka, Hugo von Hofmannsthal, Thomas Mann, Thomas Bernhard, Virginia Woolf, Marcel Proust, and Wallace Stevens.
Area: Writing Intensive

AS.213.446. Nature and Ecology in German Literature and Thought. 3 Credits.
Nature and Ecology in German Literature and Thought considers the understanding and representation of the natural world in literary works and aesthetic theory from the 18th to the 20th centuries. We will consider such topics as poetic reverence for nature, anthropocentric representations of nature in literature, the thematization of landscape, the representation of animal life, the distinction between the human and animal as explored by literary writers, and ecologically-oriented critique of human consciousness. Readings may include works by such writers and thinkers as Goethe, Kant, Hölderlin, Nietzsche, Heidegger, Rilke, and Kafka, and more recent works of literary ecocriticism.

AS.213.509. German Honors Program. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.213.510. German Honors Program. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.213.607. Critical Ecologies of Literary Modernism.
Critical Ecologies of Literary Modernism will trace the origins of ecocritical literary modernism. Beginning with Hölderlin and Nietzsche, who most radically identified the source of estrangement from nature in human cognition itself, we will explore how innovations in conceiving human cognition and practice play out ecologically in the work of German modernists Hugo von Hofmannsthal, Rainer Maria Rilke, Franz Kafka, Else Lasker-Schu¨ler, Robert Musil, and Bertoldt Brecht, as well as in the modernist works of Virginia Woolf, D.H. Lawrence, William Carlos Williams, T.S. Eliot, Wallace Stevens, Elizabeth Bishop, Françis Ponge and Albert Camus. Grounded in modern German thought and extending across multiple literary modernisms, we will see that what have been taken as the subjective or aestheticized concerns of modernist writing can be recognized as critical ecologies of human cognition and practice, while exposingmodernist anxiety about the technological advances of human habitats, the expanse ofurbanization, the reach of human intervention in nature, and the underlying animality within human thinking and perception. These works may also initiate forms of imagined intimacy with nature and non-human life in modernist works.
Area: Writing Intensive

AS.213.618. Nietzsche.
The first premise of this seminar is that Nietzsche's works are not simply expositions of ideas. Rather, they testify to an effort to overcome nihilism, that is, to make a life of writing worth living by turning it into an enthralling experiment in which basic tenets of Western culture are pitted against themselves. Our second premise is that this project cannot be adequately understood without attention paid to the peculiarly German form of cultural crisis that confronted the young Nietzsche, the characteristically German turn to Greek antiquity that defined his beginnings, and the grand project of national renewal to which he dedicated his energies during his early alliance with Wagner—the encounter with whom Nietzsche continued to view as the most important event of his life even after he repudiated Wagner. The selection of works we discuss will therefore be bookended on one end by The Birth of Tragedy and a few other early writings, and on the other end by Nietzsche's final settling of scores with Wagner. A recurrent theme will be the shifting relation between aesthetic delight and the will to truth in Nietzsche's writings.

AS.213.620. Robert Walser, Literary Miracles and Virgin Births.
One of the most remarkable features of Robert Walser's writing is that the narrator consistently orchestrates or engineers his birth. He crafts a narrative that enables him to pass from the page into life in a form of literary transubstantiation in which the word is made flesh. This is the miracle of Walser's writing. It is also a perversion of the Platonic and mystical ideal of a virgin birth. This seminar will explore Walser's work against this historical and theological backdrop with special emphasis on the nexus of religion and psychosis, as evidenced in Daniel Paul Schreber's memoir and Freud's analysis thereof. We will consider the perversion at the heart of Walser's work that makes literature the sphere of wonders and miracles in an otherwise disenchanted world. Reading knowledge of German is required for this course, as many of Walser's works have not been translated into English. In addition to Walser' work, we will also read Plato, Meister Eckhart, Mechthild of Magdeburg, Schreber, Freud, and Beierwaltes on neo-Platonism.

AS.213.622. Possible Worlds: Fiction and Contingency from Leibniz to Tieck.
In 1689, as Leibniz began to understand that contingent phenomena exist, he declared that they pulled him out of an "abyss." What contributed decisively to this insight was not only infinitesimal calculus but also the novel, whose fictive worlds could be given the status of the possible, even if they had no place in the existing "series of the universe." The result of the convergence of literature and mathematics prompted by Leibniz's epistemic breakthrough included new practices of writing and of inventing possible worlds. We will take up these questions in the seminar beginning with Leibniz's Theodicy and Blanckenburg's Essay on the Novel (1774), followed by readings of selected novels from Wieland's Agathon to Dorothea Schlegel's Florentin as well as (more or less) fantastical shorter narratives from Goethe to Tieck. We will also consider theories of fiction and possible worlds from Doležel to Lamarque. Course taught by the Max Kade Visiting Professor Christiane Frey.

AS.213.623. Poetry and Philosophy.
This course will trace the tensions, antagonisms, and collaborations between poetry and philosophy as distinctive but fundamental expressions of human thought and experience. We will engage poetry as a form of artistic expression that compliments, completes, or challenges other forms of knowledge, and consider the range of philosophy's responses to poetry and poetics. Readings will include works by philosophical poets and poetic philosophers including Hölderlin, Schlegel, Rilke, Bachmann, Celan, Stevens, Heidegger, Gadamer, Adorno, Benjamin, Merleau-Ponty, Valéry, Wittgenstein, and Agamben.

AS.213.624. Reading Sand.
Why is there "a world in a grain of sand"? And why in German literature is it a "sandman" who brings dreams? The specific materiality of sand allows for a broad range of metaphorical uses with strong epistemological implications. With its small discrete grains of the same size, sand is barely limited in its potential to coalesce into formations that can be counted yet remain innumerable and to dissolve. Exploring sand in literary texts means to deal with issues like the history of the microscope, the problem(s) of infinity, "sandy" or "grainy" mediality and loose grounds as well as the subjects of remembrance, dream and the historicity of the human being. In this seminar we will read texts by Barthold Heinrich Brockes, Theodor Kornfeld, Jorge Luis Borges, Italo Calvino, Ingeborg Bachmann, Stefan Heym, Paul Celan, E. T. A. Hoffmann and Bodo Kirchhoff. The discussion will be in English, but reading knowledge of German is required for the course material. This course will be taught by Max Kade Visiting Professor, Annina Klappert

AS.213.626. Husserl's Ideas: An Introduction to Phenomenology.
The first volume of Husserl's Ideas I (1913) provides an overarching picture of the phenomenological method that came to define much twentieth-century German and French thought. This course will consider the foundational concepts introduced in this volume (eidetic analysis, intentionality, bracketing, correlationism, time consciousness, the natural attitude and the phenomenological reduction) as well as responses to them by Merleau-Ponty, Derrida, Heidegger and others. We will also consider Husserl's later efforts to incorporate history, other minds, and even that which is other-than-mind into his idealist system.

AS.213.630. Modern Orpheus: Rilke and Celan.
In the Sonnets to Orpheus Rilke proclaims, “Singing is being” [Gesang ist Dasein], in an affirmation of the life attained through art that Nietzsche spoke of in The Birth of Tragedy. This is not an individual life but the whole of being, in which poet and reader share, provided they surrender to the movement of the song, the rhythm of its words. Celan’s halting rhythm could not be more different than Rilke’s, and yet his poetry also invites the reader to surrender to the work, albeit not to the words but to the wounds it opens within them, to the silence it exposes in speech. This course will consider the Orphic tradition and its aftermath as seen in Rilke’s and Celan’s work. Special attention will be paid to the status of the unsayable (das Unsägliche for Rilke, das Unsagbare for Celan) in both writer’s poetry, prose and translations, especially from the French.

AS.213.636. Hölderlin and His Readers.
Hölderlin’s works develop vast intellectual constructions in a poetic language of striking rhythmical power, while remaining anxiously concerned with the conditions of lyric utterance. Although his work responded to the literary and philosophically currents as well as the revolutionary politics and Philhellenism of his time, it proved untimely. Yet the same severe features that alienated contemporaries would lead such 20th-century poets as George, Rilke, and Celan to celebrate and emulate Hölderlin. We will examine how Hölderlin’s early contributions to post-Kantian idealism paved the way for his poetic project, as well as his odes and elegies, and some of the poetological writings. The late hymns will be discussed in detail against the backdrop of Hölderlin’s engagement with ancient tragedy and his Empedocles project. Since Hölderlin’s works have elicited literary criticism of the highest order as well as influential reflections on the aims and challenges of literary interpretation, our readings of Hölderlin will proceed in dialogue with such critical responses.
Area: Writing Intensive

AS.213.639. On the Difficulty of Saying I.
This course takes as its point of departure the position that language carries within it the traces of something that exceeds the cognitive grasp of the subject and to this extent undoes any claim to knowledge the subject might make. This position has been central to twentieth and twenty-first century thought from psychoanalysis and poststructuralism to media theory and new materialism. This course will not take issue with this position. It will examine instead how this position evolved from the Idealism of Fichte to the eerily inhuman, if not mechanical, talking figures in texts by Novalis (“Monolog”), Poe (“Maelzel’s Chess Player”), Hoffmann (“Die Automate”), Büchner (Leonce und Lena), and Kafka (“Ein Bericht für eine Akademie”). We will explore the literature of the personal and impersonal in romantic and modernist texts in order to ask what moves and motivates works in which the first-person narrator would seem to be nothing more than a fiction—a staged phenomenon or a mechanical device.

AS.213.643. Franz Kafka in Philosophical and Literary Perspective.
This course is devoted to close study of the writings of Franz Kafka from both philosophical and literary perspectives. Writings will include Kafka’s short prose works and novels along with philosophical and literary critical interpretations thereof. Readings may include commentaries by Walter Benjamin, Theodor Adorno, Hannah Arendt, Albert Camus, Giles Deleuze, and Giorgio Agamben. Primary texts for students from the German section will be in original; any other students may read Kafka in translation.

AS.213.668. Kleist im Kontext.
This seminar will explore the narrative, dramatic, and quasi-journalistic work of Heinrich von Kleist in its philosophical and literary environment. We will examine how Kleist comments on and parodies the positions of the enlightenment, German Idealism, Weimar classicism, and the theater establishment. We will pay particular attention to the way he combines the verbal and the visual in his performative, narrative, and syntactic strategies, and analyze how this contributes to a specifically Kleistian sense of humor.Grading: P/F

AS.213.679. Haitian Revolution: German Responses.
We will explore how contemporary German thinkers and writers reacted to the Haitian Revolution, what their interests were, and how later generations of writers responded to earlier reactions, perhaps tried to do better and used the historical material for their own purposes. Possible authors: Hegel, Humboldt, Kleist, Zschokke, Seghers, Müller, Fichte, Buch, Öziri and others.

AS.213.687. Imagination in Philosophy and Literary Theory.
Imagination in Philosophy and Literary Theory is devoted to studying theories of imagination in the history of philosophy and literary theory, from the ancient Greeks to the present day. We will study philosophical conceptions of the role of imagination in memory, cognition, perception, and creativity, and assess traditional philosophical oppositions between imagination and reason, the imaginary and the real. Readings may include selections from Aristotle, Kant, Coleridge, Nietzsche, Husserl, Heidegger, Merleau-Ponty, Sartre, Dufrenne, Stevens, Iser, Ricoeur, Ryle, Wittgenstein, and Nussbaum.

AS.213.742. New Objectivity: Program and Projects.
The course will focus on the aesthetics and discourse of “New Objectivity” in Weimar German literature. The ideals of sobriety and coldness called for a direct and unadorned view of the routines of modern work and love and found proponents not only among writers of the avant-garde but also, and with less fanfare, among authors who worked in popular genres like adventure novels. In this course, we will investigate how the desire for objectivity responded to a cultural crisis in the aftermath of World War I and how it guided the choice of genres (biography, reportage, non-fiction, modernist novel) as well as encouraged factographic styles of writing. Authors to be discussed include Egon Erwin Kisch, Joseph Roth, Siegfried Kracauer, Ilja Ehrenburg, B. Traven, Irmgard Keun, Gabriele Tergit, and Marieluise Fleißer. Class discussion will be in English or German depending students’ preferences. Reading will be in German.

AS.213.761. Literary Aesthetics.
This course explores literature in the context of the aesthetic tradition in philosophy. Themes include literature as mimesis, or the representation of reality, its relation to truth, untruth, and possibility, literature as the revealing of being, literary imagination, the distinctiveness of literary language and expression, the role of the literary author. Readings may include background selections from Plato and Aristotle, but the course will focus on philosophical interest in literature since the late 18th century, and may include Kant, Hölderlin, Nietzsche, Heidegger, Sartre, Blanchot, Bachelard, among other readings. Course will be taught by the Kurrelmeyer Chair in German. Taught in English.

AS.213.763. Contemporary Theater: Gender/Violence.
The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point "experimental" artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the "directors' theater," political theater, "pop-theater," "discourse-theater," "new documentary theater," "post-migratory theater," postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.

AS.213.800. Independent Study-German.

AS.213.804. German Summer Research.

AS.213.812. Directed Dissertation Research.

AS.213.813. German Qualifying Paper Preparation.

AS.214.304. Founding Mothers: Female Genealogies in Medieval and Renaissance Italian Literature. 3 Credits.
In this course we will explore the problem of the relationship of women to dynastic power in the literature and culture of late medieval and Renaissance in Italy. Beginning from Giovanni Boccaccio's famously ambivalent portraits of women in the Decameron and his treatise On Famous Women, we will locate women within an early modern system of inherited power and literary representations. We will then move to study a series of genealogically motivated chivalric poems (such as Orlando innamorato, Orlando furioso, Floridoro, Gerusalemme liberata) which propose a number of roles for women: warriors, queens, saints, monsters, saviors, poets, founders. These texts return again and again to the key role of women in establishing and maintaining dynastic continuity within noble families, but also to the dangers they pose to dynastic stability. We will try to understand how these literary texts work within the social and political context of the Italian city- states of this period. We will also study the involvement of women in the production and circulation of literary texts, focussing on notable patrons of the arts like Isabella d'Este and Lucrezia Borgia, and on important poets like Vittoria Colonna.

AS.214.362. Italian Journeys: Medieval and Early Modern. 3 Credits.
The Truth behind the Courtly Façade: «Of ladies, knights, of passions and of cutthroat competition»: the truth behind the romantic façade. What did life actually look like at Italian courts of the 1400 's and 1500's? We will reconstruct life at a Renaissance court through Italian history, literature, music and art of this period. Who were the stars of these scenes? We will explore the complex and intricate world of the Italian courts, including Florence and Ferrara, through the works of art they produced. The course will concentrate on historical, literary and visual representations including modern media such as film and television.
Area: Writing Intensive

AS.214.363. Italian Journeys: An Other Story. 3 Credits.
What does it mean to be "other," and how can reading about experiences of otherness affect our understanding of historical moments? In this interdisciplinary survey of contemporary Italian literature, students will read through the lens of "the other" in order to highlight both the milieu of lived experiences (often lived by the authors themselves) outside of sociocultural ideals, and the role they play within modern Italian canon. Combining gender studies, animal studies, posthumanism, and other theoretical frameworks, students will examine works from authors such as Sibilla Aleramo, Carlo Levi, Elena Ferrante, Igiaba Scego, and directors Vittorio De Sica, and Alice Rohrwacher. Taught in English—students wishing to do coursework in Italian should register for AS.214.363 (02).

AS.214.422. Ugly Beasts, Talking Monkeys: The Medieval Animal. 3 Credits.
This seminar explores the boundaries between humans and animals in the medieval world and beyond. Reading literary texts such as Giovanni Boccaccio's Decameron, Moderata Fonte's Floridoro, Luigi Pulci's Morgante and medical texts such as Girolamo Fracastoro's On Contagion, we will trace the formation of distinctions between species.The categories we will use to investigate the distinctions between animals and humans include metamorphosis, contagion, education, taxonomy, subjugation, hunting, representation, anthropomorphism and zoomorphism, wilderness, misogyny, and promiscuity. To probe these categories and distinctions, we will make use of a series of critical approaches, from critical animal studies to posthumanism, within the disciplinary specificity of Medieval Studies.

AS.214.434. Elena Ferrante and her Brilliant Friends: Contemporary Italian Women Writers. 3 Credits.
Elena Ferrante is Italy's most acclaimed contemporary novelist, although her true identity remains unconfirmed. Having been translated into and published in 45 languages, with over 15 million copies sold worldwide, her 'Neapolitan Quartet' triggered what has been called 'Ferrante Fever.' Through reading and discussion of Ferrante's works (novels, letters, and a fairytale) and their screen adaptations— the HBO TV series My Brilliant Friend and Maggie Gyllenhaal's The Lost Daughter (2022) —we shall discover the reasons behind this global, literary phenomenon while exploring themes such as gender, memory, trauma, women's participation in, or exclusion from, history, and the internal violence of a rapidly changing society. In addition to Ferrante's works, we shall also read Anna Maria Ortese, Elsa Morante, and Fabrizia Ramondino to understand the influence of women writers from previous generations on Ferrante's work. This class is taught in English. Additional discussion sessions in Italian will be offered.

AS.214.466. Utopias and Dystopias in Renaissance Culture. 3 Credits.
We will trace the dream of designing an ideal society and the danger of creating its opposite in the sixteenth and seventeenth century Italian and European thought.

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the "virtual" space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.214.561. Italian Independent Study. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.214.562. Italian Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.214.607. Teoria e Prassi della Glottodidattica dell'Italiano.
The goal of this course is to familiarize Graduate Student Instructors in Italian with foundational elements of Second Language Acquisition and foreign language teaching. The course will (1) acquaint students with historical and current theories of foreign language pedagogy; (2) demonstrate strategies to integrate theoretical knowledge into everyday practice, both in terms of instructional delivery, and materials development; (3) introduce participants to basic evaluation tools to critically assess teaching practices and tools in terms of quality, relevance, validity, reliability and other theory-based criteria; (4) help participants to articulate their own pedagogical training and philosophy of teaching in preparation for the academic job market. Taught in Italian.

AS.214.608. Vico: Mythology, Philology, and Forgery.
In this course we will examine Giambattista Vico's innovative effect on intellectual history, in light of recent discoveries regarding Vico's publication history. Extensive work in Special Collections will be featured.

AS.214.610. The Nonhumans of Renaissance Humanism.
This course is an exploration of the notions of the human that emerge when interrogating pre-modern Italian literary constructions of nonhuman entities (water, earth, flora, fauna, objects, buildings, cities, automata, demons, angels, gods, and God). We will read work by authors such as Dante, Petrarch, Boccaccio, Pico, Alberti, Leonardo, Sannazaro, Baldi, and Della Porta, as well as parts of the Hypnerotomachia Poliphili, and selections from bestiaries, herbaria, and books of emblems. Accompanying these readings are recent studies in critical theory on posthumanism and transhumanism, animal studies, ecocriticism, and phenomenology.

AS.214.685. Donne e scrittura tra '500 e '600.
While women's contributions to Italian Renaissance literature have long been acknowledged, their creative output continued well into the 17th century. This course focuses on some of the protagonists of this extraordinary season, from Lucrezia Marinella and Arcangela Tarabotti to Elena Lucrezia Cornaro Piscopia, who in 1678 became the first woman in the world to receive a university degree. Taught in Italian

AS.214.747. Umberto Eco: Medievalist, Postmodernist, Narratologist.
Umberto Eco was one of the most prolific and flamboyant authors of the 20th and early 21st centuries. Trained as a medievalist, he became one of the central figures in literary theory as well as a best-selling novelist, essayist, and public intellectual. We will explore his long career as both narratologist and narrator and its foundations in intellectual history. Works will include Il nome della rosa, Il pendolo di Foucault, Opera aperta, and The Limits of Interpretation.
Area: Writing Intensive

AS.214.748. Giambattista Vico and the Old Science.
Giambattista Vico's Principi di scienza nuova (1725, 1730, 1744) was intended to found an "ideal" and "eternal" model of human development. Vico emphasizes the importance of both philology and philosophy to his project, and attempts to break the mold of thinking about the history of humanity by exposing the preconceptions and misconceptions that arose from attempts to square "sacred history" with "profane" or non Judaeo-Christian history, creating a philosophy (or even a science) of mythology.
Area: Writing Intensive

AS.214.757. Tasso, Poet of Doubt.
A reading of Tasso's Gerusalemme liberata along with relevant poetic, literary-theoretical, philosophical, and theological texts.
Area: Writing Intensive

AS.214.766. Italy and Environmental Humanities.
This seminar examines a variety of literary texts and films, produced in Italy from the post-war period to the contemporary era, from material eco-critical perspectives. While maintaining a focus on Italy, this course addresses broad questions within the field of environmental humanities: what is the Anthropocene and how it has been conceptualized? How is has been framed chronologically? How do we interrogate a text from an ecocritical perspective? What is a non-anthropocentric narrative? What is the task of the eco-scholar? What is the goal of environmentally concerned scholarship? What does it mean to teach 'ecocritally'? Literary texts include works by Italo Calvino, Carlo Cassola, Paolo Volponi, Anna Maria Ortese, and films by directors Roberto Rossellini, Pier Paolo Pasolini, Pietro Marcello, and Alice Rohrwacher. Critical and theoretical readings will include Marco Armiero and Marcus Hall's Nature and History in Modern Italy, Timothy Morton's Humankind, Serenella Iovino Ecocriticsm and Italy, and Rosi Braidotti's The Posthuman.

AS.214.804. Italian Summer Research.

AS.214.861. Italian Independent Study.

AS.214.862. Italian Dissertation Research.

AS.214.863. Italian Proposal Preparation.

AS.215.231. Introduction to Literature in Spanish. 3 Credits.
The main objective of this course is to examine and discuss specific authors and topics in literature in Spanish from the Middle Ages to the 20th century. The course is designed to cover a selection of Hispanic texts from Spain and Latin America. Literary genres to be studied will include narratives, poetry, and drama. The bulk of each class session will be dedicated to the discussion of the assigned readings. This course is taught in Spanish. This course is required for the major in Spanish.

AS.215.290. Latin American Critical Perspectives on Colonialism: From the 'World Upside Down' to the 'Coloniality of Power'. 3 Credits.
This course, taught in English, examines how indigenous and local (postcolonial) intellectuals in Latin America responded to the ideology and practices of Spanish Colonialism in the earliest post-conquest years (1532), continued to battle colonialism during the period of the wars of independence, and finally arrived at the production of an analysis that shows how modernity is but the other face of colonialism. Among key works to be discussed are Guaman Poma's illustrated sixteenth-century chronicles, D.F. Sarramiento's _Civilization and Barbarism_ (1845), and Anibal Quijano's "Coloniality of Power" (2000).
Area: Writing Intensive

AS.215.309. An Interdisciplinary Introduction to the Study of Latin America. 3 Credits.
The course is an interdisciplinary introduction to the study of Latin America. It brings together archeology, ethno-history, art history, literature and environmental studies.
Area: Writing Intensive

AS.215.336. Don Quijote. 3 Credits.
A close reading and discussion primarily in Spanish of Cervantes' masterpiece, with concentration on its major themes and contributions to the formation of the modern novel. We will use A. Murillo's edition of the novel, Editorial Castalia.
AS.210.311 AND AS.210.312

AS.215.380. Modern Latin American Culture. 3 Credits.
Taught in Spanish. This course will explore the fundamental aspects of Latin- America culture from the formation of independent states through the present—in light of the social, political, and economic histories of the region. The course will offer a general survey of history of Latin-America, and will discuss texts, movies, songs, pictures, and paintings, in relation to their social, political, and cultural contexts. May not be taken satisfactory/unsatisfactory.
AS.210.312;Students may earn credit for AS.211.380 or AS.215.380, but not both.

AS.215.390. Modern Spanish Culture. 3 Credits.
This course will explore the fundamental aspects of Spanish culture from the nineteenth to the twenty-first centuries. The course will offer a general survey of the history of Spain and will discuss texts, movies, songs, pictures, and paintings in relation to their social, political, and cultural contexts. This course will be of particular interest for students planning on spending a semester abroad in Spain—specially for those students going to the JHU Fall Semester in Madrid, at Carlos III University. Taught in Spanish. Recommended Course Background: AS.210.311 or appropriate Webcape score.AS.215.390 was formerly numbered AS.211.390
Students may not have previously completed AS.211.390.

AS.215.406. Novelist Intellectuals. 3 Credits.
What does a novelist's op-ed about economics have to do with her literary writing? In what ways does a fiction writer's essays on the environment inform how we read her novels? What happens when we find the political opinions of a writer objectionable? This undergraduate seminar will consider what the Spanish writer Francisco Ayala termed "novelist intellectuals," that is, literary writers who actively participate in a society's public sphere. Considering writers from Madrid to New York, from London to Buenos Aires, we will ask how one should hold a novelist's fictional and non-fictional writings in the balance and explore ways of reading that allow us to consider the public intellectual side and the aesthetic side of a novelist together.

AS.215.407. Power And Gender In Hispanic American Novels And Films. 3 Credits.
We will analyze and discuss four novels and three films impacted by gender violence and political idolatry under shattering stress. Oficio de tinieblas or The Book of Lamentations (1962) by Rosario Castellanos (Mexico). Zama (1956) by Antonio di Benedetto (Argentina). Delirio or Delirium (2004) by Laura Restrepo (Colombia). El ruido de las cosas al caer or The Noise of Things Falling (2011) by Juan Gabriel Vásquez (Colombia). In addition, we will examine in depth films by Lucrecia Martel (Argentina): the short Rey muerto (1995), La ciénaga (2001), and her own version of Zama (2017). Course taught in Spanish.
AS.210.312

AS.215.409. Catalonia and Independence. 3 Credits.
What is the Catalan independence movement? Where did it come from? What, exactly, does it advocate? This seminar will examine the history, politics, and culture of Catalonia in an attempt to understand why the push for independence has grown over the past decade. We will focus especially on the impact of nationalism, ideology, social history, economics, law, and language on the construction of Catalan identity. But we will also compare Catalonia to other regions in the Iberian Peninsula (the Basque Country, Galicia) as well as across Europe (Scotland, Northern Italy) and North America (Québec) in order to better understand how movements for regional autonomy and independence emerge today. Taught in English.

AS.215.412. Populism. 3 Credits.
What do Hugo Chávez, Marine Le Pen, and Donald Trump have in common? According to many from across the political spectrum, they are all populists. But what is populism, exactly, and how can it describe such disparate phenomena as left-wing social movements, xenophobic anti-immigrant policies, and economic redistribution? This advanced seminar will examine the history, culture, and political theory of populism. We will pay special attention to the resurgence of populism after the Great Recession and examine a number of cases from Latin America, Europe, and the United States.

AS.215.413. Cuba y España. 3 Credits.
La frase "más se perdió en Cuba" alude al singular rango de la antigua Provincia de Ultramar en el mapa geopolítico del colonialismo hispánico. Hemos de estudiar la prolongada relación entre España y Cuba, desde 1492 al presente, a través de materiales literarios, crónicas, artes plásticas, música y medios sociales al corriente. Enseñado íntegramente en español.
AS.210.311

AS.215.414. Blood Cinema in films by Pedro Almodóvar, Julio Medem, and Alejandro Amenábar. 3 Credits.
Films by three leading Spanish male directors from different generational backgrounds and sexual and political orientations. We will study their respective filming and mythmaking of kinship and regional passions in mixing love with hate, attraction with rejection. Our dialogue will revive and debate the polemical psycho-analytic theses in Marsha Kinder's Blood Cinema: The Reconstruction of National Identity in Spain.
AS.210.311 OR AS.210.312

AS.215.416. Mexican Empire: the Problem of Territory from Aztec Philosophy to Trump's Wall. 3 Credits.
This course with seminar option is devoted to Mexico, its past and present paths into a remote inside-out pre-imperial epoch inalienable from North-against-South histories across the American Narcoland from Honduras to Alaska. Our nonfictional materials combine detailed summaries and readings of Stuart Elden's The Birth of Territory and James Maffie's Aztec Philosophy: Understanding a World in Motion. The fictional matter concerns Roberto Bolaño's 1998 novel, Los detectives salvajes (The Savage Detectives), Corman McCarthy's apocalypse Western, 1985 Blood Meridian, and Carlos Reygadas' films, Post Tenebras lux (2012) and Nuestro tiempo (2018).

AS.215.417. Literature of the Great Recession. 3 Credits.
The Great Recession—sometimes called the financial crisis or the economic crisis of 2008—brought financial markets to a halt and created significant political turmoil across the North Atlantic. But its impact on culture, and literature especially, has often been ignored. This seminar will travel across Europe, from Dublin to Madrid, from London to Reykjavík in order to examine how literature has registered this most recent economic crisis. We will focus on how crisis is narrated and the ways in which literary works have managed to provide a voice for marginalized social, economic, and political demands.

AS.215.419. Colombia: Territory Against Nation. 3 Credits.
The nation of Colombia amounts to a large country partly made immense and hard to govern and corruptible by its territorial nexus and porous frontier with Venezuela. Starting from such polemic claim, leaning on misgovernance vs. excessive governmentality, we will study two novels, Laura Restrepo's Delirio/Delirium (2004) and Juan Gabriel Vásquez's The Noise of Things Falling (2011); both winners of the prestigious Planeta Prize. To what extent can literary fictions of such scope and ambitions, invested in deeply rooted family politics, help or harm the reader's political trust in nations as novels and fictions as nations?

AS.215.421. Blood and Honor in the Spanish Golden Age. 3 Credits.
In this class we will study a selection of the often violent and suspenseful literature that served to entertain both the masses and the nobility during the height and rapid decline of the Spanish Empire. We will delve into how the literary establishment, in particular the theater, disseminated and sometimes questioned social and gender norms, all while wrestling with the at times deadly code of honor that permeated Spanish society. (Course taught in Spanish)

AS.215.442. Whose Caribbean and the Epic of Race. 3 Credits.
We will study literary claims of epic colonial possession and aesthetic dispossession through close readings of five works in reverse chronological order: V.S. Naipaul's late historical novel, A Way in the World (1994); Derek Walcott's transoceanic poem, Omeros (1990); Alejo Carpentier's short anti-Enlightenment moral tale, El reino de este mundo (1949) and his short tale in celebration of Afro Cuban wizardry, Viaje a la semilla (1944); Aimé Césaire's prose poetry, mixed chronicle, Cahier d'un retour au pays natal, or Notebook of a Return to the Native Land (1939-1947). We will address questions of temporality and historicity (Heidegger) and a base-materialist political blocking of wild dreams as attainable through translation (Bataille). Such formal and epistemic problems will draw us into issues of race across the colonial spectrum of Caribbean histories.

AS.215.448. The Politics of Spanish Painting. 3 Credits.
How is painting political? What would it mean for a painting to make a political intervention? Can a painting, through its subject, composition, and style, make political arguments and claims? Understanding painting as a repository for social, economic, and political relations, this course will examine the works of major Spanish painters from El Greco to Picasso. We will pay special attention to the ways in which painters developed a particular "political vision" of Iberia and the world. Paintings will be paired with texts ranging from art history and criticism to literature, history, and political philosophy. Taught in Spanish.

AS.215.460. Modern Mexico and the Culture of Death. 3 Credits.
Drawing from sources in popular culture, literature, folk religion, and the media, we will explore the myths and daily practices of death-related representations of Mexico's survival against enemies, from within the state apparatus, and the insertion into it of drug traffickers, on both sides of the so-called Crystal Frontier with the US.

AS.215.463. Borges: His Fiction and Critical Essays. 3 Credits.
This course will deal with close readings of Borges ficciones and critical essays in order to determine how his thinking on the problem of writing and thinking is fictionalized in his stories.
Area: Writing Intensive

AS.215.465. Wild Surrealism: Lorca, Dalí, Buñuel. 3 Credits.
Spanish surrealism emerged unevenly. Some writers and artists sought out the surrealist label while others rejected or ignored it altogether. Some attempted to adhere to André Breton's "Surrealist Manifesto" while others went decidedly against its principles. Yet surrealism, in one way or another, took over the Spanish artistic scene during the 1920s and '30s. Today, it is associated with Federico García Lorca, Salvador Dalí, and Luis Buñuel. Friends, roommates, and even lovers, Lorca, Dalí, and Buñuel came to define surrealism's acceptance, rejection, and indifference in Spain. This seminar will examine the moment of Spanish surrealism through these three figures. The course will include the study of film, art, drama, poetry, and nonfiction. Taught in Spanish.Recommended Course Background: AS.215.390 or AS.215.231

AS.215.469. Mapping Identity in Modern Spain. 3 Credits.
What social, political, and economic forces make groups of people appear out of place in a given society? How have literary works contributed to counteracting the marginalization of certain groups? This course will look at how modern Spanish artists, writers, and intellectuals wrestled with questions of identity and marginalization. We will critically examine how the modern Spanish state was forged from restrictions on cultural difference and consider the various marginalized groups that were left in its wake. These groups include various peoples (e.g. the Romani), ideologies (e.g. anarchism, socialism, communism), social and economic classes (e.g. peasants, the working class), and regional identities (e.g. Catalonia, the Basque Country). Key texts in modern Spanish literature will prompt our investigation into how writers and artists reflected on, contested, and expressed the marginality of the country's various internal others. Taught in Spanish.

AS.215.477. La Habana Miami: One World and Two Cities. 3 Credits.
Havana and Miami make up the oldest US enclave city linked to a foreign one under US Embargo access. We will study a unique counterpoint Hispanic Exiled culture which considers itself protected by American Exceptionalism

AS.215.525. Spanish Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.215.526. Spanish Independent Study. 1 - 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.215.603. Napoleon's Haitian Cosmos from Boukman to Bolívar.
A seminar on middle-modern to late-modern fictions by Alejo Carpentier (1949-1962 El reino de este mundo and El siglo de las luces), Carlos Fuentes (1980 Una familia Lejana), and Gabriel García Márquez (1989 El general en su laberinto). Reread as defunct belles-lettres. Main critical and theoretical points of in-depth reference: Derek Walcott's rogue Robinson-Crusoe Caribbean poetics and Jared Hickman's exorbitant Black Prometheus. Taught in English.

AS.215.604. To Die in Mexico.
The seminar adopts and translates recent ideological revisions of Mexico's alternate modernities; impacted by postcolonial, subaltern, and decolonial theories of Latin American exceptionality. The plural character of these combined exceptions and exemptions and refusals to reincorporate Mexicanness into modernizing Occidentalism will be foregrounded in two historical moments: modernismo-to-modernism, in convulsed Mexico (1900-1927) and criollista Nueva España "Baroque" hybridized and myth-invested ethics of nationhood (1604/1690): Bernardo de Balbuena's Grandeza Mexicana (1604)/Carlos Sigüenza y Góngora's Infortunios de Alonso Ramírez (1690). These materials will be framed in Europe's modernist, re-mythologized "Waste Land" (T.S. Eliot), as "brought home" to America in Hart Crane's The Bridge (a poem largely conceived and reborn in Cuba's Isla de Pinos.)(Fluent reading knowledge of Spanish)

AS.215.606. Engaging with the Global Hispanophone.
This course is envisioned as an invitation to branch out beyond the traditional archives of Hispanism, as we engage with the cultural production of 'peripheral' territories in the so-called Hispanic world, including regions that have recently been grouped within the category of the "Global Hispanophone." This rubric aspires to incorporate the cultures and historical experiences of territories once bound by the Spanish Empire in North Africa, the Gulf of Guinea, and the Philippines. In this reconfiguration of our intellectual and geographic maps of Hispanic studies, we will place these regions' pasts and presents in dialogue with other areas traditionally more central to our disciplines, while giving particular centrality to Africa. The course is thus informed by a determination to break away from the overarching Iberian/Latin American binary, an even some configurations of Atlantic Studies, and to embrace other communities, histories, experiences, and repertoires. We will ask: what might an engagement with this new archive of the Global Hispanophone entail for the broader fields, and for the scholarly practices, of Latin American, Caribbean, Latinx, Iberian, or Atlantic studies today? How might engaging with one or more of the geographical areas involved –Western Sahara, Ceuta, Melilla, Morocco, Algeria, the Philippines, Equatorial Guinea and perhaps others not fully covered in this course– alter, or transform, our approach to the respective fields?

AS.215.607. Utopia, Text, Torture.
We will examine and stress-test writings that graphically breach and exploit established literary discourses in direct or indirect reference to unbound self-consciousness. This mode of textual introspection struggles against false consciousness as a form of self-absorbed torture (matching routine practices by the dictorships that rule over any sense of actuality in these novels). Textual imprisonment (often hyper-sexualized) escapes and humiliates these otherwise triumphantly gendered writers. Diamela Eltit, Lumpérica (1983); José Donoso, La desesperanza (1986); Néstor Perlongher, O negocio do miché. Prostitução viril em Sao Paulo (1987), La prostitución masculina (1993) or El negocio del deseo (1999); Mario Vargas Llosa, El paraíso en la otra esquina (2003); Laura Restrepo, Delirio (2004). In each case, aspects of dictatorship as specific South American despotism should loudly impact our discussions.

AS.215.613. Ricardo Piglia, Borges, Derrida and Argentina's Eighteenth Century.
A voice in Piglia's Artificial Respiration claims that Argentina did not have an eighteenth century or the Eighteenth Century. Besides Piglia's palimpsest novel, we'll study a handful of texts by Borges. Passages from Leopoldo Marechal's Adan Buenosayres, and Derrida's The Beast and the Sovereign Volume Two, in reference to Heidegger's The Fundamental Concepts of Metaphysics and Defoe's Robinson Crusoe. Taught in English.

AS.215.631. Contemporary Latin American Cinema: History, Theory, and Practice.
This seminar presents a transnational history of Latina American cinema from the 1960s to the present, with a special regard to its global influence. Starting with the Cuban Revolution and the subsequent founding of the ICAIC, we'll examine how politics and aesthetics shape each other. We'll discuss the manifestos and films of the so-called New Latin American Cinema, including Tercer Cine, Cine Imperfecto, and Cinema Novo; the filmography made during the continent's various dictatorships; and post-dictatorship debates on memory. We'll also engage with a recent theoretical and cinematic production on gender, sexuality, the non-human, and new cinematic postcolonial approaches. In December, we will visit the International Festival of New Latin American Cinema of Havana to continue discussions in the setting of Latin America's largest film festival. Some knowledge of Spanish will be necessary to take this class.

AS.215.633. Spectacle, Subjectification, and Reality Literacy in Early Modern Society.
In this seminar we will examine the widespread deployment of cultural production in the early modern period in the service of generating social cohesion around an emerging national project, primarily in the case of Spain. At stake will be how cultural practices can determine a shared sense of reality, often at odds with the interests of marginal groups, as well as the strategies that emerge to counteract and question those practices. While reading knowledge of Spanish is desirable, graduate students from other disciplines who wish to explore these theoretical questions with regard to a different cultural corpus are welcome. Graded Pass/Fail.

AS.215.640. Borges, Derrida, Heidegger and the Paradoxes of Perception.
In this seminar we will the examine the ways in which Jorge Luis Borges's narratives intersect with lines of inquiry pursued by Martin Heidegger and Jacques Derrida around perception, knowledge, language, time, and space.
Area: Writing Intensive

AS.215.641. Guaman Poma, his 12 theses for an new understanding of the World Upside Down.
As of today, due to the work of Walter Mignolo, Ossio, Lamana and other scholars in Colonial Studies, the 1000 page letter of Guaman Poma to the King of Spain has become the pre-eminent text written on the question of coloniality of power as theorized by Anibal Quijano. Given that the concept is now central to colonial and modern studies, familiarity with the work of Guaman Poma is essential in the formation of all Latin Americanists and scholars interested in coloniality and imperial studies.
Area: Writing Intensive

AS.215.651. The idea of "Latin America": current debates on the fundamentals of the field.
The course will explore the history of the Idea of Latin America as a discursive and political entity. Students will read the work of Walter Mignolo, Maurico Tenorio Trillo and Fernando Digiovanni among other theorist and cultural historians.
Area: Writing Intensive

AS.215.718. Contemporaneity and Crisis.
How should one study contemporary literature and culture? Is "the contemporary" a period in and of itself? Does it require a distinct conceptual approach? This graduate seminar will examine various approaches that have emerged since Michel Foucault called his genealogies a "history of the present." We will pay special attention to contemporary literature and culture's most distinguishing feature today: crisis. Considering theories of crisis and "the contemporary" together, the course will explore how living in a time of overlapping crises—economic, political, social, cultural, environmental, and others—affects the way we interpret the world.

AS.215.747. Borges in Theory.
The course engages close readings of Borges critical essays and some of his fiction in order to establish the points of interpellation that Post-modern theory takes from or shares with Borges's meditation on the problem of writing.

AS.215.748. Public Humanities Writing Workshop.
Humanists possess a reservoir of scholarly abilities that prime them for contributing to debates well beyond the academy. This semester-long workshop will introduce graduate students to the basics of writing for such broad audience. Each session will be organized around particular topics in public humanities writing, including the pitching, writing, editing, and publishing processes of newspapers, magazines, and online outlets. We will also consider the forms of writing that most allow scholars to draw from their academic training and research: reviews, personal essays, op-eds, interviews, and profiles. Throughout the course we will see how the interdisciplinarity, comparativism, and multilingualism of fields from across the humanities can be helpful for reaching wide audiences. Beyond the nuts and bolts of getting started in so-called "public" writing, this course aspires to teach graduate students how to combine quality writing with academic knowledge, scholarly analysis with a general intellectual readership—and, ultimately, make academic knowledge a public good. Taught in English.

AS.215.791. Film Theory and Critical Methods.
Placed at the crossroads of aethestics and politics, psychology and economics, the history of technology and popular culture, film has emerged as the interdisciplinary object of study par excellence. Based on intensive weekly viewing and on classic and contemporary statements in film theory, this seminar—required for the Graduate Certificate in Film and Media—opens up questions of film language, authorship, genre, spectatorship, gender, technology, and the status of national and transnational cinemas.

AS.215.804. Spanish Summer Research.

AS.215.826. Spanish Independent Study.

AS.215.827. Spanish Dissertation.

AS.215.828. Spanish Proposal Preparation.

AS.216.300. Contemporary Israeli Poetry. 3 Credits.
This course examines the works of major Israeli poets such as Yehuda Amichai, Nathan Zach, Dalia Rabikovitch, Erez Biton, Roni Somek, Dan Pagis, Yona Wollach, Yair Horwitz, Maya Bejerano, and Yitzhak Laor. Against the background of the poetry of these famous poets we will study recent developments and trends in Israeli poetry, including less known figures such as Mois Benarroch, Shva Salhoov and Almog Behar. Through close reading of the poems, the course will trace the unique style and aesthetic of each poet, and will aim at presenting a wide picture of contemporary Hebrew poetry.

AS.216.305. Representations of the Other(s) in Israeli Culture. 3 Credits.
This course will use the concept of the Other to study the ways in which various marginal groups in Israel are represented in contemporary Israeli films, TV drama, prose-fiction, poetry and visual art. As a nation-state which was founded on the premise of a utopian vision of a just and fair society and as a promise for a safe haven for Jews escaping their status as Others, contemporary Israeli culture offers a unique case study. The course will run as a research seminar in which students will be encouraged to actively engage in analyzing the ways in which cultural productions depict the Other/s and Otherness as well as the social, political and psychological motivations and implications of these depictions. We will ask questions such as: who is considered as Other and by whom? What roles do the cultural representations play in shaping national collective identity, stereotypes and the perception of the self as Other? And how collective memory shapes Otherness?
Area: Writing Intensive

AS.216.342. The Holocaust in Israeli Society and Culture. 3 Credits.
This course examines the role of the Holocaust in Israeli society and culture. We will study the emergence of the discourse on the Holocaust in Israel and its development throughout the years. Through focusing on scholarly, literary, artistic, and cinematic responses to the Holocaust, we will analyze the impact of its memory on the nation, its society, politics, and collective self. The course is divided to three general categories: Historical and Sociological Perspective, Literary Perspective, and Cinematic Perspective. However, we will study the crossroad between these three categories, and will explore them in relation to one another.

AS.216.373. War in Israeli Arts and Culture. 3 Credits.
In this course we will study the various representations of what functions as one of Israel's most unifying and yet dividing forces: war. By analyzing literary and cinematic works as well as visual art and popular culture we will attempt to understand the role of war in shaping Israeli society, culture and politics. Topics such as commemoration and mourning, heroism, dissent and protest, trauma and memory and the changing image of the soldier will stand at the center of the course.

AS.216.500. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.216.601. Eastern European Literature.
Twentieth-century and contemporary Eastern European Literature is the locus of poetry and the essay. In this course we shall examine classic authors, such as Bruno Schulz, Zbigniew Herbert, and Adam Zagajewski, as well as those less known in the English-speaking world: Zuzanna Ginczanka, Ota Pavel, Henryk Grynberg, Oksana Lutsyshyna. We will consider verse, poetic prose and lyrical essays. The issues that will inform our readings will be internal and actual emigration, translingualism, and the persistence of war. Polish, Ukrainian, Hungarian, Czech, Serbo-Croatian, but also French and American English are the languages in which these authors speak to us. Eastern European literature resonates with voices that have, time and again, brushed against catastrophe.

AS.216.611. Modern Hebrew Literature and Its Quest for the Sacred.
Modern Hebrew literature emerged during the nineteenth century as part of the Haskalah movement, which attempted to break from the traditional modes of Jewish intellectual and social life while also offering a new understanding of Judaism. The Hebrew literature that arose in this period embraced the rebellious nature of the Haskalah and is therefore commonly characterized as secular in nature, defying Orthodoxy and rejecting the old Hebrew God. Against this clear-cut distinction between religious and secular literature, this seminar will study the ways in which modern Hebrew literature has maintained a vital dialogue with the divine and the sacred. We will read and analyze prosefiction, poetry and publicist essays in order to track the various theological trends that were part of this self- declared secular national literature. The reading will include texts by Ahad Haam, Bialik, Shlonsky, Brenner, Agnon, Grinberg and Goldberg, as well as more contemporary writers like Amichai, Ravikovitch, Wallach, Behar and Pedaya.This course will be taught in Hebrew.

AS.216.615. Exilic Chronotope.
The concept of exile relies on the existence of differentiated space and of borders. It also presupposes affective attachment: to be exiled is to be forcibly removed from the space of belonging. And yet time cannot be excluded from a consideration of exile. Hence exilic chronotope, the timespace of forcible displacement. Beginning with the canonical banishment from the Garden of Eden, the seminar will trace the implications of exile in its historical and metaphysical sense: social alienation caused by displacement, creative fulfillment of the distance from home, phenomenological aspects of exilic topology. The readings and visual works will include Georg Simmel, Alfred Schuetz, Kurt Zadek Lewin, Charles Baudelaire, Walter Benjamin, Siegfried Kracauer, Aby Warburg, Mascha Kaleko, Zuzanna Ginczanka, Charlotte Salomon, and Daniel Mendelson.

AS.216.620. Jesus in Modern Hebrew Literature.
This seminar will track the changes in the representations of Jesus in modern Hebrew literature. Reading will include prose-fiction, poetry, drama, and intellectual essays from the late 19th century to the beginning of the 21st century. We will study the mutual influences of the scholarship on Jesus, national Zionist ideology, changes in cultural and theological perceptions of Jesus and the literary representations of his figure.

AS.216.643. Realism and Anti-Realism in Modern Hebrew Literature.
This seminar seeks to trace the narrative dynamics and literary means of modern Hebrew Literature through a close examination of the tension between its realistic and anti-realistic trends. It begins with theoretical questions regarding the definition of realism as a literary genre. After this introductory section, the seminar is divided to three different periods in modern Hebrew literature, each is analyzed within the framework of its relation to realism. The first period is the turn of the 20th century and its first decades, reading works by writers such as Yosef Haim Brenner, Shmuel Yosef Agnon and Devora Baron. In the second period we study the post Israeli statehood period through reading works by A.B. Yehoshua, Amos Oz, Amalia Khanana Carmon and Yehoshua Knaz. The third part of the course deals with prose-fiction that is considered post-modernistic and includes writers such as David Grossman, Orly Castel-Bloom Yoel Hofmann, and Ronit Matalon.
Area: Writing Intensive

AS.216.707. Modern Hebrew Women's Prose-Fiction.
In this graduate seminar we will read and discuss modern Hebrew women's prose-fiction and novels in the Hebrew original. We will study the historical background in which they emerged and their various literary means of expressing a feminine voice. We will read works by writers such as Amalia Kahanna- Carmon, Savyon Liebrecht, Ronit Matalon, Orly Castel-Bloom, Michal Govrin, Yehudit Hendel, Nurit Zarchi, Ester Peled and Maya Arad.Required Course Background: Knowledge of Hebrew
Area: Writing Intensive

AS.216.800. Independent Study.

AS.216.802. Yiddish Independent Study.
Yiddish Independent Study

AS.216.804. Hebrew/Yiddish Summer Research.

AS.217.301. Literary Readings in Portuguese. 3 Credits.
This discussion-based course for continuing students of Portuguese focuses on a wide range of Lusophone literary sources from the modern and contemporary periods. We'll read seminal texts from Europe, the Americas, and Africa, paying close attention to language and context. How do forms, ideas, and genres travel across the Atlantic? What shape do they take according to different geographies, cultures, and histories? Topics include the legacies of empire and slavery, theoretical debates about the formation of Brazilian Literature, national identity, (post)colonialism, representations of nature, and indigeneity. Students will read in the original Portuguese innovative prose works by Machado de Assis and Clarice Lispector; the poetry of Fernando Pessoa; concrete poetry, and modernist manifestos, among other things. Recommended Course Background: AS.210.278

AS.217.307. Cultura e Ditadura [Culture and Dictatorship]. 3 Credits.
In the 20th century, the Lusophone world saw the rise and fall of such authoritarian governments as the Estado Novo in Portugal (1933–74) and the military dictatorship in Brazil (1964–85). During this period, a series of revolutionary political movements sprung up, as well as innovative cultural production. How does culture respond to censorship? How do art and politics comment on and ultimately transform each other? In this course we will discuss novels, poetry, film, songs, and artworks from Brazil, Portugal, and Lusophone Africa that engage critically with dictatorships and their aftermaths. Topics include violence, trauma and memory, colonialism, post-colonialism, and decoloniality, race and the legacies of slavery, counterculture, and popular cultures. Readings and discussion in Portuguese. Interested students who have not completed course prerequisites should contact the instructor for permission to enroll.

AS.217.425. Latin American Ecocriticism. 3 Credits.
Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

AS.217.427. Radical Women: Brazilian Literature, Art, and Culture. 3 Credits.
The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry. The course is taught in English, but those interested in doing the coursework in Portuguese (4 credits) should register for section 02.

Cross Listed Courses

Anthropology

AS.070.472. Rumors, Conspiracy Theories And Disinformation. 3 Credits.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

AS.070.607. Schelling and Anthropology.
The 18th century German philosopher Schelling has been hugely influential on 20th century thought (Freud, Heidegger, Nancy, Zizek, Pierce) but remains unknown outside of philosophical circles. This neglect is unfortunate given that he has so much to offer anthropological inquiries into the relations between mind and matter, nature and culture, theology and mythology among other topics. This course places Schelling's writings and commentaries on his work alongside anthropological texts and figures to explore lines of productive conversation. The theme of a romanticism appropriate to our present will be consistently explored throughout the course.
Area: Writing Intensive

AS.070.672. Rumors, Conspiracy Theories And Disinformation.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

Classics

AS.040.626. Plato and Poetry.
This graduate seminar will explore Plato's contributions to the "old quarrel" between poetry and philosophy, encompassing such topics as the relationship between poetic inspiration and human reason, the role of literature in pedagogy, and the metaphysical implications of poetic fiction. We will focus on several Greek texts from the Platonic corpus related to these themes, as well as some later sources that engage with Platonic ideas.

Comparative Thought and Literature

AS.300.337. The Tragic Tradition. 3 Credits.
This course offers a broad survey of tragic drama in the Western tradition, from its origins in ancient Greece to the twentieth century. In weekly lectures and discussion sections, we will study the specific literary features and historical contexts of a range of different works, and trace the continuities and transformations that shape them into a unified tradition. Key questions and themes throughout the semester will include what counts as tragic, the tragedy of social and political conflict, the bearing of tragedy on the meaning and value of life, the antagonistic relation between world and humans, the promises and dangers of tragedy for contemporary culture. Authors to be studied: Sophocles, Euripides, Seneca, Shakespeare, Racine, Goethe, Ibsen, Strindberg, Chekov, Brecht, Pirandello, and Beckett.

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.349. Capitalism and Tragedy: from the 18th Century to Climate Change. 3 Credits.
In contemporary discussions of climate change, it is an increasingly prevalent view that capitalism will lead to the destruction of civilization as we know it. The notion that capitalism is hostile to what makes human life worth living, however, is one that stretches back at least to the early eighteenth century. In this class, we will examine key moments in the history of this idea in works of literature, philosophy, and politics, from the birth of bourgeois tragedy in the 1720s, through topics such as imperialism and economic exploitation, to the prospects of our ecological future today. Authors to be studied: George Lillo, Balzac, Dickens, Marx and Engels, Ibsen, Weber, Brecht, Arthur Miller, Steinbeck, Pope Francis, and contemporary fiction, politics and philosophy on climate change.

AS.300.608. The Physics and Metaphysics of Handwriting.
When word processing machines that can be held in the palm of a hand, why use pen and paper? Handwriting -- and its juxtaposition against digital forms of communication -- offers a unique approach to studying human interactions and the ways in which meaning, truth, intimacy, and agency are shaped by our changing technologies. At a time of exponential growth in machine writing, a study of this older form of communication enables a comparative approach that, perhaps surprisingly, opens up what are contemporary political questions. Centered on a few case-studies involving works by Sand, Chopin, Manet, Giacometti, Mallarmé, and Proust, this course takes a backward glance at a culture of written expression at a great remove from our word processing world and yet explicitly vested in an aesthetics of free expression. This modern graphological culture saw in the tracings of the hand, the uniquely personal marks of an intertwining of mind, body, and of subjectivity. Merleau-Ponty and recent word on embodiment will provide us with critical tools for our investigations into the "physics" of this activity, as will the methods of textual criticism and the new domain of creativity studies. The "metaphysics" of handwriting call, meanwhile, for a return to Heidegger, to Derrida and other major contemporary theorists of writing. They will help us see how hand and digital writing emerge as fundamentally different modes of human expression – philosophically and politically. Knowledge of French is not required for this course. Undergraduates accepted with the permission of the professor.

First Year Seminars

AS.001.110. FYS: How We Read. 3 Credits.
This First-Year Seminar invites you to think about reading as a cognitive process, a cultural obsession, and a history of revolutions. We will consider the act of reading from a range of perspectives (cognitive science, literary, political, and sociological) and examine artefacts of reading culture (manuscripts, books as material objects, the screens that dominate contemporary life). We will activate these perspectives in order to grapple with the range of values associated with reading – moral panics and political virtues, ideas of isolation and community, shifting concepts individual and public. Sources will range from Kant's "What is Enlightenment?" to RadioLab podcasts, to hands-on work with materials in the MSEL's Special Collections.

AS.001.112. FYS: Story, Song, Food, And Film - A Thousand Years Of Jewish Culture. 3 Credits.
Most Jews in America today are descendants of Ashkenazi Jews from Central and Eastern Europe. This First-Year Seminar will introduce students to the thousand-year history and culture of Ashkenazi Jews through their vernacular, Yiddish. How did Ashkenazi Jews maintain a distinct identity, even while borrowing cultural forms from their non-Jewish neighbors? How did Jews in the modern period challenge tradition and create new forms of Jewish identity? How did Eastern European immigrants adapt to life in America? In addition to studying a wide range of texts—including fiction, poetry, memoir, song, and film—students will learn how to read the Yiddish alphabet, and will explore food culture by preparing Ashkenazi Jewish dishes. No prior knowledge of Yiddish is necessary for this course.

AS.001.123. FYS: Wired to Read: the Science and the Art. 3 Credits.
We all think we know that reading is: of course, that's what you are doing right now, as you are trying to make sense of words I have written. But how do we do we do it? How do mere shapes and lines on the page suddenly begin to mean something? Is our brain wired for reading? Apart from our eyes, are other parts of the body involved? When did humans start to write and read? These are the kinds of questions we'll pursue. This First-Year Seminar will explore two distinctive perspectives: one literary, the other is scientific. We'll divide our attention between the study of chapters and articles that present scientific findings about how we read and a practical exploration of a novel. Literary works tax our brains in multiple ways and our example will show why and how. George Eliot's The Mill of the Floss, will serve as our case-study. We'll learn why fiction can make us cry or make us angry about the world, how word-pictures trigger our imagination, how a writer tricks us (or our brains?) into believing the things that words in print evoke. As a story of growth in adversity filled with memories, drama, and insights about society and gender, The Mill on the Floss is bound to hold your attention.

AS.001.125. FYS: Matchmaker, Matchmaker! Love, Marriage, and Modern Jewish Identity. 3 Credits.
Should children accept the match their parents make for them, or at least choose a partner their parents approve of? Is marriage a pillar of traditional society, or a passport to new ways of thinking and being? How do questions of love and marriage help us to understand changes in Jewish life and identity in the modern period? In this First-Year Seminar, we will examine these questions in a broad range of stories, plays, and films spanning Europe and America, including the American movie Fiddler on the Roof and the stories on which it is based by Yiddish writer Sholem Aleichem.

AS.001.138. FYS: Soccer in Brazil: Opium of the Masses. 3 Credits.
Did you know that we can explain various aspects of Brazil and Brazilian society such as race, politics and national identity through studying its national sport? Futebol offers a unique perspective on politics, race and citizenship in Brazil. This First-Year Seminar seeks to understand Brazilian culture through the historic national pastime of futebol. In addition to the main textbooks chosen for the seminar, by reading a variety of texts from newspapers, academic journals, fiction and film, students will be able to find their own approach to understanding the phenomenon of futebol within the social and political traditions of Brazil. Students who have already taken AS.211.294 are not eligible to take AS.001.138.

AS.001.143. FYS: Poets, Physicists, Philosophers, and the Ultimate Nature of Reality. 3 Credits.
In this First-Year Seminar we will explore the long and mostly untold story behind the most revolutionary discoveries of modern physics—quantum mechanics and relativity—a story written, astonishingly, in the languages of poetry, fiction, and philosophy. Shuttling between twentieth-century Germany and Argentina by way of eighteenth-century Prussia, with stopovers in Plato's Greece and Dante's Italy, we will pursue the age-old riddle of how the human mind interacts with the physical world; tangle with theologians as they ponder the nature of free will; interrogate cosmologists as they attempt to grasp the shape the universe; and, finally, explores the implications of these profound problems for our understanding of reality today.

AS.001.144. FYS: Literary Multilingualism. 3 Credits.
What does it mean to live and to write in more than one language? This is a particularly charged question in today's globalized world. In this First-Year Seminar, we will explore texts and films produced by multilingual writers and directors, who reflect on the experiences of the multilingual subject; their concerns range from the turmoil of living between identities and cultures, to the playful experience of daily life and existence opened up through thinking and working in multiple languages. Main questions will include: In what ways do languages influence how writers write? How does the presence of multiple languages in a text structure a reading experience and for whom? How do texts by multilingual writers destabilize conceptions of national literature? While some texts we will read were originally composed in English, the majority were written by multilingual writers in other languages. Finally, therefore, we will address what it means to read translated into English texts that were, in some sense, already produced "in translation."

AS.001.170. FYS: Vive la Différence? The Love-Hate Relationship Between France and the USA. 3 Credits.
What do French views on culture, society, and politics tell us about ourselves? France is frequently misunderstood and criticized in US media, yet books and articles touting various aspects of a "French" lifestyle are bestsellers. French media, for its part, commonly engages in US-bashing, yet the popularity and influence of American culture there are undeniable. Why have many prominent Black American writers sought refuge in France, while many French intellectuals have chosen to bring their academic work to American universities, including The Johns Hopkins University? A cross-cultural examination will allow this First-Year Seminar to bring to light many aspects of the complex relationship between these two countries that are historical allies yet ofttimes rivals. We will explore and discuss food, language, cinema, diplomacy, and health, as well as conceptions of friendship, family, identity, and social justice. Course includes a meal at a French restaurant, a museum visit, film screening, and guest speakers.

History

AS.100.233. History of Modern Germany. 3 Credits.
There is more to Germany than beer, BMWs, and Bayern Munich. We explore politics, culture, economics and society to understand Germany and its role within Europe and the world from the 18th century to the 'Refugee Crisis', climate change and EU politics today.

AS.100.377. The Age of Reason on the Silver Screen: Cinematic Representations of the Enlightenment. 3 Credits.
This course will discuss the problem of historical representation on the basis of an analysis of movies depicting the Age of the Enlightenment.

AS.100.497. 1968: Rebels, Revolutions & the Right-Wing Backlash. 3 Credits.
The sixties were a polarizing decade of unrest, revolutions, and fundamental change across Europe and the US. We will discuss 1968 through the lens of national case studies, the Cold War, and the history of Baltimore. This is a community-engaged class!
Area: Writing Intensive

AS.100.602. The French Revolution.
Introduces graduate students to the rich historiography of the French Revolution. Topics include: revolutionary origins, political culture and radicalization, citizenship, violence, family & gender, the search for stability after the Terror, global revolution, Napoleon's Brumaire coup.

AS.100.682. Introductory Topics in Computation for Scholarship in the Humanities.
The first half of this seminar course consists of non-mathematical introductions to, and discussions of, the fundamental motivations, vocabulary, and methods behind computational techniques of particular use for humanistic research. The second half combines selected readings chosen to address specific questions raised by these discussions with hands-on application to students' research goals. Each participant will lead discussion for one of the selected readings relevant to their interests.

History of Art

AS.010.204. Italian Art in the Middle Ages. 3 Credits.
This course explores key monuments of medieval art and architecture in Italy from c. 400 until 1350. We will concentrate on historical, functional, and aesthetical aspects that lead to the creation of single monuments and art works. Emphasis is given to the analysis of "sacred space" by means of architecture, painted, and sculptural decoration, as well as ritual performances. Another focus is laid on the emergence on the political dimension of art for the creation of civic identity as well as in the context of the late medieval courts. We raise questions about the importance of materiality and science for the creation of medieval art works.
Area: Writing Intensive

AS.010.301. Michelangelo: Religion, Sexuality, and the Crisis of Renaissance Art. 3 Credits.
The course will focus on the controversies surrounding the representation of the body in the writings and figurative art of Michelangelo and his contemporaries, the historical circumstances under which the most admired artist in Europe was attacked as a blasphemer and an idolator, and the effect of widespread calls for censorship on his later production. The writings of Michelangelo, Pietro Aretino, Benvenuto Cellini and own writings will be considered with a focus on their staging of an ambivalent and transgressive eroticism.

AS.010.432. Therapies of Art and Literature from Antiquity to Early Modern Europe. 3 Credits.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.
Area: Writing Intensive

AS.010.615. Therapies of Art and Literature from Antiquity to Early Modern Europe.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.

Interdepartmental

AS.360.133. Freshman Seminar: Great Books at Hopkins. 3 Credits.
Students attend lectures by an interdepartmental group of Hopkins faculty and meet for discussion in smaller seminar groups; each of these seminars is led by one of the course faculty. In lectures, panels, multimedia presentations, and curatorial sessions among the University's rare book holdings, we will explore some of the greatest works of the literary and philosophical traditions in Europe and the Americas. Close reading and intensive writing instruction are hallmarks of this course; authors for Fall 2020 include Homer, Plato, Dante, John Donne, George Herbert, Christina Rosetti, Mary Shelley, Friederick Nietzsche, Isaac Bashevis Singer, Frederick Douglass.
Area: Writing Intensive

AS.360.623. Latin America in a Globalizing World.
An interdisciplinary seminar on Latin America's role in global economic processes, from both historical and contemporary perspectives. Participants will engage with scholarly and primary texts as well as share written work. The Fall 2022 seminar will examine the topic of Latin American political thought.

Medicine, Science and the Humanities

AS.145.101. Death and Dying in Art, Literature, and Philosophy: Introduction to Medical Humanities. 3 Credits.
In this course, four essential aspects of the theme of death and dying will be examined: Death and Medicine; Emotional Responses to Death; Burying and Commemorating the Dead; and Conceptions of Death. Specific topics relating to each of these aspects that will be covered include illness and causes of death; prevention of death; suicide; death and grief; burial practices; mourning the dead; public commemoration of the dead; life after death; and death and rebirth. Students will explore these topics from a historical-anthropological perspective with Paul Delnero, a specialist in the history and culture of the ancient Near East (Near Eastern Studies); from a literary perspective, by reading and writing poetry relating to these subjects with the acclaimed poet James Arthur (Writing Seminars); and from a musical perspective, through direct encounters with the music and creative process of the award-winning composer, Michael Hersch (Peabody).
Area: Writing Intensive

Music

AS.376.428. Mozart Operas. 3 Credits.
Wolfgang Amadeus Mozart wrote his first opera in 1767 at the age of 11. By the time of his death at age 35, he had written 22 full-length operas. Many of these operas are still performed today in opera houses around the world. In this course, we will discuss the enduring popularity of these works. We will discover how these operas were created, delving into the many important collaborations Mozart had with singers, librettists, impresarios, and patrons. We will analyze the words and music of the operas and how they combine to create three-dimensional characters for which his operas are known, such as the melancholy but determined Countess in The Marriage of Figaro, or the cowardly but loyal Papageno in The Magic Flute. Cultural norms have shifted dramatically between Mozart's time and ours, and we will examine how Mozart's operas have been received from their premieres through to today. We will think about how the operas have been translated, adapted, and circulated to different audiences in different eras and locations. Finally, we will reflect on our position as modern audience members, watching recent productions of the operas which reinterpret the works in alternative settings or times and studying the ways in which opera companies promote Mozart's works.
Area: Writing Intensive

Philosophy

AS.150.400. Simone de Beauvoir. 3 Credits.
Seminar on Beauvoir's moral philosophy, covering the major works of the 1940s. Readings will include selections from The Blood of Others, Pyrrhus and Cineas, All Men are Mortal, The Ethics of Ambiguity, and The Second Sex. Open to graduate students and advanced undergraduates. (Beginning undergraduates should contact Professor Kosch.) No prerequisites.
Area: Writing Intensive

Program in Latin American Studies

AS.361.336. Hugo Chávez, Fidel Castro, and Bolivar's Venezuela. 3 Credits.
Are the current extreme hard times in Venezuela's Bolivarian Republic irreversible? Is there a ballpark somewhere for Thomas Jefferson and Simón Bolívar to hold a debate match about democracy, achieved emancipations, republican values and the lure of dictatorship? The course welcomes serious and sharply political dialogue about ideals of democratic republicanism in clash from the rise and apparent fall of Fidelismo and Chavismo in the Caribbean region to the agitations and alliances dictated by Trump's seizure of American politics.

Program in Museums and Society

AS.389.155. The History of Fake News from The Flood to The Apocalypse. 3 Credits.
"Fake News" is everywhere in both past and present. Explore that history first-hand throughJHU's rare book collection of literary and historical forgeries spanning millennia of human history.Students learn how to examine and investigate rare books.
Area: Writing Intensive

AS.389.165. Hands on History: Material Cultures of Knowledge from Antiquity to the Digital Age. 3 Credits.
This hands-on course deals entirely with JHU's collections of rare books and manuscripts as a springboard to build skills in the close visual and physical examination of rare books and manuscripts. You will investigate the technological and aesthetic transformation of textual artifacts from ancient papyri to Gutenberg imprints to digital surrogates, and contribute to the accumulation of historical clues about their meaning and significance as material cultural objects. You will learn what goes into curating and conserving book and manuscript collections today, and how to evaluate the quality and significance of collections. Materials/topics will include ancient Babylonian cuneiform and Egyptian papyri; medieval illuminated manuscripts; incunabula; Renaissance illustrated books of the Scientific Revolution and Spanish Golden Age; cheap print and unique ephemera; early books by and about women; forgeries; and "digital humanities" initiatives at JHU. Students will make regular visits to the Special Collections Reading Room in the BLC throughout the semester.
Area: Writing Intensive

AS.389.325. Women of the Book: Female Miracle Workers, Mystics, and Material Culture, 1450-1800. 3 Credits.
From psycho-spiritual autobiographers to mystical bi-locating nuns, convent crèche-keepers to choristers of sacred music, from rock-star-status mystics to the hidden careers of women printers, engravers, and miracle-makers, this course will explore the remarkable intellectual, cultural, and imaginative contributions of women who found refuge, agency, and power within alternative lives.
Area: Writing Intensive

AS.389.357. Heaven on Earth: Art, Power, and Wonder in the Vatican from Antiquity to the Enlightenment. 3 Credits.
A material cultural exploration of the Vatican from the founding of St. Peter's basilica in antiquity to the establishment of the Vatican Library and Museums in the Renaissance and Enlightenment.
Area: Writing Intensive

For current faculty and contact information go to https://krieger.jhu.edu/modern-languages-literatures/people/

French, Bachelor of Arts

French Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The program stress the importance of students meeting each semester with their appointed faculty advisor to ensure a coherent and adequate course of study and students with previous exposure to French must take a web-based language placement test to determine the appropriate course level in which to enroll when selecting their first French language course. Of the ten courses required for the French major, only one may be a course taught in English (indicated under either the 211 and 212 prefixes with a MLL-ENGL POS-Tag. Six of the ten courses must be completed through the French Program at JHU on the Homewood campus. The program encourages students to study abroad and students should be sure to follow all required procedures for the approval of study abroad coursework. All major requirements must be completed with a grade of C or better and may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
Required Courses		
AS.210.301	Advanced French for Writing	3
AS.210.302	Advanced French for Speaking	3
AS.212.333	Introduction à la littérature française I	3
AS.212.334	Introduction à la littérature française II	3
AS.210.417	Eloquent French (no later than fall of senior year)	3
AS.212.353	La France Contemporaine	3
Elective Courses [1]		**12**
At least one course numbered AS.212.4xx is required for the major		
Up to one course numbered AS.210.3xx-4xx (in French) may be counted towards the major		
Up to one course listed as AS.211.xxx with POS-Tag MLL-FREN may be counted towards the major		
Any remaining electives must be AS.212.3xx-4xx		
Total Credits		**30**

[1] No more than one course may be taught in English.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.210.101	French Elements I	4
	Credits	**4**
Second Semester		
AS.210.102	French Elements II	4
	Credits	**4**
Second Year		
First Semester		
AS.210.201	Intermediate French I	3
	Credits	**3**
Second Semester		
AS.210.202	Intermediate French II	3
	Credits	**3**
Third Year		
First Semester		
AS.210.301	Advanced French for Writing	3
AS.212.353	La France Contemporaine	3
	Credits	**6**
Second Semester		
AS.210.302	Advanced French for Speaking	3
AS.212.334	Introduction à la littérature française II	3
AS.210.3xx-4xx or AS.212.3xx-4xx course		3
	Credits	**9**
Fourth Year		
First Semester		
AS.210.417	Eloquent French	3

AS.212.333	Introduction à la littérature française I	3
AS.211.3xx-4xx or AS.212.3xx-4xx elective		3
	Credits	**9**
Second Semester		
AS.212.3xx-4xx elective		3
AS.212.4xx elective		3
	Credits	**6**
	Total Credits	**44**

Honors in French

Qualified majors may earn Honors in French by meeting the minimal GPA requirement (3.7 in all French classes) and completing four credits capstone thesis. This includes the 1-credit "Thesis Prep" and the 3-credit "Senior Thesis." Note that these courses, usually taken in the Senior year, are in addition to the 10 required three-credit courses.

French, Minor

French Minor Requirements

All minor requirements must be completed with a grade of C or better and may not be taken satisfactory/unsatisfactory. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. All courses for the minor must be taught in French (no courses with POS-Tag MLL-ENGL apply). Students are expected to consult with either the Director of Undergraduate Studies or the appointed French faculty advisor to review all elective course selections.

Code	Title	Credits
Required Courses		
AS.210.301	Advanced French for Writing (or equivalent placement)	3
AS.210.302	Advanced French for Speaking (or equivalent placement)	3
AS.212.333	Introduction à la littérature française I	3
or AS.212.334	Introduction à la littérature française II	
AS.212.353	La France Contemporaine	3
AS.210.417	Eloquent French	3
Elective Courses		
AS.212.3xx-4xx elective		3
Select one of the following:		3
AS.210.3xx-4xx (French courses only)		
AS.212.3xx-4xx elective		
Total Credits		**21**

French, PhD

French

In addition to general university requirements for the Ph.D., the following regulations apply to graduate students in the Department of Modern Languages and Literatures:

To be accepted into the Ph.D. program, students must demonstrate by an exceptionally strong academic record that they are capable of advanced study in literature. The student will normally take two to three years of graduate courses and devote the fourth year to study and research in the country on which the student's study concentrates. The well-prepared student can expect to receive the Ph.D. after five years of study. The graduate program in Modern Languages and Literatures emphasizes work in three complementary areas: literary history, close textual analysis (including *explication de texte*), and theory of interpretation. By way of preparing students in a variety of critical schools, the faculty and the visiting professors offer training in the different disciplines pertaining to critical theory, including philosophy, theory of language, psychoanalytic theory, intellectual history, and cultural anthropology.

In addition to the major language, the Ph.D. candidate must demonstrate proficiency in one or two other languages besides English, depending on the specialization. (See below for further information.)

A dissertation proposal, presented to the faculty and students in their section, is required before official admittance to candidacy for the Ph.D.

For students who choose to specialize in an early modern period (medieval, Renaissance, or 17th century), proficiency in Latin is required by the end of the third semester. Students may also choose a minor field: another Romance literature, modern criticism, comparative literature, medieval studies, or some other field connected with the student's major field.

Graduate Study Abroad

The Department encourages and expects graduates student to do research abroad during their program of study. In the French section, an exchange program with the École Normale Superieure offers the opportunity for graduate students to study in Paris, where they are encouraged to participate to research programs at ENS, EHESS, and other Universities; an exchange program with University Paris-Diderot-Paris 7 offers the opportunity for graduate or post-graduate students in French to study and teach in Paris; and the University of Geneva offers a fellowship each year for a grad student in the French section. Ph.D. students in the French section are also encouraged to apply for the Chateaubriand scholarship offered by the Embassy of France.

After presenting a research proposal to their advisor, with the approval of that advisor and the head of section, students may elect to go abroad for a semester or the entire academic year in order to conduct research essential to their dissertation.

Financial Aid

The department has a number of fellowships for graduate students. Awards include university fellowships, which carry stipends and teaching fellowships for teaching one section of an undergraduate language course each semester, in addition to remission of tuition fees. All graduate students are expected to do four years of apprentice teaching of elementary and intermediate level undergraduate courses as part of their professional preparation. The amount of classroom teaching required is usually three to four hours a week. Students are admitted for five years, fully funded, subject to annual review to assure satisfactory progress. In addition, stipends (equivalent to that year's teaching fellowship) are available for study abroad during the third or fourth year.

Fourth- and fifth-year graduate students may also compete for Dean's Teaching Fellowships, which provide opportunities for the design and teaching of undergraduate courses in literature, cultural studies, or intellectual history.

Admission Requirements

Application Procedures

Prospective graduate students may visit the departmental website at https://krieger.jhu.edu/modern-languages-literatures/ for further information on programs and faculty. All questions regarding the programs offered by the department should be emailed to mll@jhu.edu (grll@jhu.edu). Prospective students are encouraged to apply online through the secure Graduate Admissions website (https://applygrad.jhu.edu/apply/?sr=1bf0a763-446d-4552-b7f6-4b450a7fa62f).

German Bachelor of Arts/Master of Arts

The department offers highly qualified students the option to complete a combined degree in five years. To receive the B.A./M.A. degree, the student must complete advanced courses in German literature and pass the departmental written and oral master's examinations. Students interested in this option should make an appointment with the Director of Undergraduate Studies no later than the spring of their junior year to discuss the options available to them.

German, Bachelor of Arts

German Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Students are encouraged to declare their intent to major in German in their sophomore year and to make an advising appointment with the Director of Undergraduate Studies to discuss their academic plans, including options for a study abroad semester or year.

Majors must complete a minimum of nine courses (at least 3 credits each) in German beyond AS.210.262 Intermediate German II.

Majors are required to complete the Advanced German sequence, (AS.210.361 Advanced German I: Cultural Topics of the Modern German-speaking World and AS.210.362 Advanced German II: Contemporary Issues in the German Speaking World), which counts for 6 credits (2 courses) and is a prerequisite for upper level AS.213.xxx seminars taught in German. Of the remaining seven courses, majors choose courses designated AS.210.3xx (German language), AS.211.xxx (with POS-TAG MLL-GERM), courses in other departments with POS-TAG MLL-GERM, and AS.213.xxx. No more than 6 credit hours of translation courses (courses in English with POS-Tag MLL-ENGL) may be used to fulfill major requirements and five of the nine courses for the major must be taken at Hopkins. All major requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
AS.210.361	Advanced German I: Cultural Topics of the Modern German-speaking World	3
AS.210.362	Advanced German II: Contemporary Issues in the German Speaking World	3
Seven additional German courses [1]		21
Total Credits		**27**

[1] Courses designated AS.210.3xx (German language), AS.211.xxx (with POS-TAG MLL-GERM), AS.213.xxx, or courses in other departments with POS-TAG MLL-GERM apply towards the additional 21 credits.

Sample Program of Study

The following 4-year plan presents a sample guideline for students starting with no prior knowledge in German. Beyond the completion of the Advanced German sequence, the selection of courses suggested below is just a suggestion; students are free to choose other courses and vary the sequence as long as they complete the total number of credit hours and do not exceed the maximum number of credits for courses taught in English. Students with prior knowledge in German must take the departmental placement exam before registering for a German class. It is recommended that they discuss specific arrangements for the completion of their requirements with the DUS.

Course	Title	Credits
First Year		
First Semester		
AS.210.161	German Elements I	4
German elective taught in English		3
	Credits	**7**
Second Semester		
AS.210.162	German Elements II	4
	Credits	**4**
Second Year		
First Semester		
AS.210.261	Intermediate German I	3
German elective taught in English		3
	Credits	**6**
Second Semester		
AS.210.262	Intermediate German II	3
	Credits	**3**
Third Year		
First Semester		
AS.210.361	Advanced German I: Cultural Topics of the Modern German-speaking World	3
	Credits	**3**
Second Semester		
AS.210.362	Advanced German II: Contemporary Issues in the German Speaking World	3
German elective		3
	Credits	**6**
Fourth Year		
First Semester		
German elective		3
German elective		3
	Credits	**6**
Second Semester		
German elective		3
German elective		3
	Credits	**6**
	Total Credits	**41**

Honors in German

The Department of German offers an Honors Program for highly qualified undergraduates. Students must have a minimum GPA of 3.5 to qualify for the program. Students will work on a project in German literature and thought under the guidance of a faculty advisor. The program is completed by a senior essay more comprehensive in scope than a seminar paper. Students interested in the honors program should meet with the Director of Undergraduate Studies no later than the spring semester of their junior year to discuss the requirements and outline the research project to be conducted the following year.

German, Minor

German Minor Requirements

Students are encouraged to declare their intent to minor in German in their sophomore year and to make an advising appointment with the Director of Undergraduate Studies to discuss their academic plans, including options for a study abroad semester or year.

Students must complete a minimum of 6 courses (with each course counting for at least 3 credits) in German beyond Elementary German (AS.210.161 German Elements I-AS.210.162 German Elements II) and Intermediate German (AS.210.261 Intermediate German I-AS.210.262 Intermediate German II).

Minors are required to complete the Advanced German sequence, (AS.210.361 Advanced German I: Cultural Topics of the Modern German-speaking World-AS.210.362 Advanced German II: Contemporary Issues in the German Speaking World), which counts for 6 credits (2 courses) and is a prerequisite for upper-level AS.213.xxx seminars taught in German. Students with previous proficiency exempting them from taking Advanced German I or II are required to take a course(s) from the AS.213.2xx-AS.213.4xx series to reach the required 6 courses.

Of the remaining four courses, minors choose courses designated AS.210.3xx (German language), AS.211.xxx (with POS-TAG MLL-GERM), courses in other departments with the POS-TAG MLL-GERM, and AS.213.xxx. No more than three (3) credits of courses taught in English (courses with POS-Tag MLL-ENGL) may be used to fulfill minor requirements. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. All minor requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
AS.210.361	Advanced German I: Cultural Topics of the Modern German-speaking World	3
AS.210.362	Advanced German II: Contemporary Issues in the German Speaking World	3
Four additional German courses [1]		12
Total Credits		**18**

[1] Courses designated AS.210.3xx (German language), AS.211.xxx (with POS-TAG MLL-GERM), AS.s13.xxx, or courses in other departments with POS-TAG MLL-GERM apply towards the additional 12 credits.

German, PhD

German

In addition to general university requirements for the Ph.D., the following regulations apply to graduate students in the Department of Modern Languages and Literatures:

To be accepted into the Ph.D. program, students must demonstrate by an exceptionally strong academic record that they are capable of advanced study in literature. The student will normally take two to three years of graduate courses and devote the fourth year to study and research in the country on which the student's study concentrates. The well-prepared student can expect to receive the Ph.D. after five years of study. The graduate program in Modern Languages and Literatures emphasizes work in three complementary areas: literary history, close textual analysis, and theory of interpretation. By way of preparing students in a variety of critical schools, the faculty and the visiting professors offer training in the different disciplines pertaining to critical theory, including philosophy, theory of language, psychoanalytic theory, intellectual history, and cultural anthropology.

In addition to the major language, the Ph.D. candidate must demonstrate proficiency in one or two other languages besides English, depending on the specialization.

In addition to fulfilling the general university requirements for advanced degrees, candidates for the M.A. must demonstrate fluency in spoken German, be able to write German reasonably well, have a good knowledge of the history of German language and literature, be familiar with the general cultural background, and have read extensively in German literature, particularly in the periods after 1700. During their first two years at Hopkins, candidates for the M.A. degree must pass two topical examinations. After the M.A., two major qualifying papers are required under the supervision of two advisors, chosen by the candidate, before work on the dissertation can be undertaken.

Graduate Study Abroad

The Department encourages and expects graduates student to do research abroad during their program of study. Exchange programs with the FU Berlin (Friedrich Schlegel Graduate School of Literary Studies), the University of Hamburg, and the Humboldt University, offer the opportunity for graduate students in the German section to study in Germany. In addition, the German section offers Max Kade travel grants for research in a German-speaking country.

After presenting a research proposal to their advisor, with the approval of that advisor and the head of section, students may elect to go abroad for a semester or the entire academic year in order to conduct research essential to their dissertation.

Financial Aid

The department has a number of fellowships for graduate students. Awards include university fellowships, which carry stipends and teaching fellowships for teaching one section of an undergraduate language course each semester, in addition to remission of tuition fees. All graduate students are expected to do four years of apprentice teaching of elementary and intermediate level undergraduate courses as part of their professional preparation. The amount of classroom teaching required is usually three to four hours a week. Students are admitted for five years, fully funded, subject to annual review to assure satisfactory progress.

In addition, stipends (equivalent to that year's teaching fellowship) are available for study abroad during the third or fourth year.

Fourth- and fifth-year graduate students may also compete for Dean's Teaching Fellowships, which provide opportunities for the design and teaching of undergraduate courses in literature, cultural studies, or intellectual history.

Admission Requirements

Application Procedures

Prospective graduate students may visit the departmental website at https://krieger.jhu.edu/modern-languages-literatures/ for further information on programs and faculty. All questions regarding the programs offered by the department should be emailed to mll@jhu.edu (grll@jhu.edu). Prospective students are encouraged to apply online through the secure Graduate Admissions website (https://applygrad.jhu.edu/apply/?sr=1bf0a763-446d-4552-b7f6-4b450a7fa62f).

Italian, Bachelor of Arts

Italian Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The major requires completion of language courses through Advanced Italian I and II (AS.210.351 Advanced Italian I-AS.210.352 Advanced Italian II), two courses (6 credits) from the "Italian Journeys" series, including "Medieval and Early Modern" (AS.214.362 Italian Journeys: Medieval and Early Modern) and "Modern and Contemporary" (AS.214.363 Italian Journeys: An Other Story), and four elective courses (or the equivalent of 12 credits) from the Italian Culture series (AS.211.200-AS.211.499 with the POS-Tag MLL-ITAL) and the Italian Literature series (AS.214.200-214.499). It may also include one course in Italian film/history/art history (if approved by the DUS) and one independent study in the senior year (taken after completing an Italian Literature series course). At least two of the four elective courses (or the equivalent of 6 credits) must be conducted in Italian. At least five of the eight courses for the major must be taken at JHU. All major requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
Required Core Courses		
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
AS.214.363	Italian Journeys: An Other Story	3
Electives		
Two AS.211.2xx-4xx or AS.214.2xx-4xx taught in Italian		6
Two AS.211.2xx-4xx (related to Italian) or AS.214.2xx-4xx taught in English or Italian [1]		6
Total Credits		**24**

[1] Please note that the Italian program offers 1-credit courses in Italian culture (211.xxx) taught in English that can be freely combined as long as the total number of credits taken satisfies the general requirements. Courses taught in English are identified in the Schedule of Classes by the POS-Tag MLL-ENGL.

Sample Program of Study

The plan is conceived as a guideline for students starting with no previous skills in Italian language. The sequence of language courses is strongly recommended in order to complete all the requirements for the major by senior year. It is conceivable, though, to postpone Italian Elements to sophomore year.

Course	Title	Credits
First Year		
First Semester		
AS.210.151	Italian Elements I	4
	Credits	**4**
Second Semester		
AS.210.152	Italian Elements II	4
Italian elective course		3
	Credits	**7**
Second Year		
First Semester		
AS.210.251	Intermediate Italian I	3
AS.214.363	Italian Journeys: An Other Story	3
	Credits	**6**
Second Semester		
AS.210.252	Intermediate Italian II	3
	Credits	**3**
Third Year		
First Semester		
AS.210.351	Advanced Italian I	3
Italian elective		3
	Credits	**6**
Second Semester		
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
	Credits	**6**
Fourth Year		
First Semester		
Italian elective (taught in Italian)		3
	Credits	**3**
Second Semester		
Italian elective (taught in Italian)		3
	Credits	**3**
	Total Credits	**38**

Honors in Italian

Students have the opportunity to earn honors in the major by successfully completing an honors senior essay. Italian majors who select this option may enroll, during either fall or spring semester of their senior year, in a for-credit independent study dedicated to the preparation of the honors senior essay.

Italian, Minor

Italian Minor Requirements

Language courses through Intermediate Italian I and II (AS.210.251 Intermediate Italian I-AS.210.252 Intermediate Italian II) or equivalent placement as well as Advanced Italian I and II (AS.210.351 Advanced Italian I-AS.210.352 Advanced Italian II). One course (3 credits) from the "Italian Journeys" series, including "Medieval and Early Modern" (AS.214.362 Italian Journeys: Medieval and Early Modern) or "Modern and Contemporary" (AS.214.363 Italian Journeys: An Other Story) Three additional courses (or the equivalent of 9 credits) from the Italian Culture series (AS.211.200-499 with POS-Tag MLL-ITAL) and the Italian Literature series (AS.214.200-499). One independent study is acceptable toward the course requirements, provided it is taken after completing a course from the Italian Literature series. At least two of the three courses (or the equivalent of 6 credits) must be conducted in Italian. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. All minor requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
or AS.214.363	Italian Journeys: An Other Story	
Three Additional Italian Courses *		9

* Only one course can be taught in English (courses with POS-Tag MLL-ENGL).

Italian, PhD

Italian

In addition to general university requirements for the Ph.D., the following regulations apply to graduate students in the Department of Modern Languages and Literatures:

To be accepted into the Ph.D. program, students must demonstrate by an exceptionally strong academic record that they are capable of advanced study in literature. The student will normally take two to three years of graduate courses and devote the fourth year to study and research in the country on which the student's study concentrates. The well-prepared student can expect to receive the Ph.D. after five years of study. The graduate program in Modern Languages and Literatures emphasizes work in three complementary areas: literary history, close textual analysis, and theory of interpretation. By way of preparing students in a variety of critical schools, the faculty and the visiting professors offer training in the different disciplines pertaining to critical theory, including philosophy, theory of language, psychoanalytic theory, intellectual history, and cultural anthropology.

In addition to the major language, the Ph.D. candidate must demonstrate proficiency in one or two other languages besides English, depending on the specialization.

In addition to the major language, the student must demonstrate proficiency in two other foreign languages. The student must take a minimum of five semesters of graduate courses. After this period, normally in the third year, the student will take examinations which, if completed successfully, will lead to candidacy for the Ph.D.

Graduate Study Abroad

The Department encourages and expects graduates student to do research abroad during their program of study. Italian graduate students can take advantage of a wealth of formal and informal contacts with Italian scholars, archives, and institutes.

After presenting a research proposal to their advisor, with the approval of that advisor and the head of section, students may elect to go abroad for a semester or the entire academic year in order to conduct research essential to their dissertation.

Financial Aid

The department has a number of fellowships for graduate students. Awards include university fellowships, which carry stipends and teaching fellowships for teaching one section of an undergraduate language course each semester, in addition to remission of tuition fees. All graduate students are expected to do four years of apprentice teaching of elementary and intermediate level undergraduate courses as part of their professional preparation. The amount of classroom teaching required is usually three to four hours a week. Students are admitted for five years, fully funded, subject to annual review to assure satisfactory progress. In addition, stipends (equivalent to that year's teaching fellowship) are available for study abroad during the third or fourth year.

Fourth- and fifth-year graduate students may also compete for Dean's Teaching Fellowships, which provide opportunities for the design and teaching of undergraduate courses in literature, cultural studies, or intellectual history.

Graduate students conducting research in Italian studies compete each year for two Charles S. Singleton Travel Grants for study in Italy. This program is administered by the department and is open to graduate students from other departments.

Admission Requirements

Application Procedures

Prospective graduate students may visit the departmental website at https://krieger.jhu.edu/modern-languages-literatures/ for further information on programs and faculty. All questions regarding the programs offered by the department should be emailed to mll@jhu.edu (grll@jhu.edu). Prospective students are encouraged to apply online through the secure Graduate Admissions website (https://applygrad.jhu.edu/apply/?sr=1bf0a763-446d-4552-b7f6-4b450a7fa62f).

Romance Languages, Bachelor of Arts

Romance Languages Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Department offers a Romance Languages major in two different configurations: a dual-language option, where the student specializes in two Romance languages, and a three-language option, where the student specializes in three Romance languages. Students interested in pursuing a Romance Languages major should get in touch with the Directors of Undergraduate Studies for each language. Students majoring in Romance Languages will be assigned an advisor for each relevant language, including a primary advisor in their main field of specialization. Six of the twelve courses must be taken at JHU.

All major requirements must be completed with a grade of C- or better and may not be taken satisfactory/unsatisfactory.

Required of All Romance Languages Majors

Code	Title	Credits
AS.211.400	Topics in Romance Literatures	3
Completion of a dual language or triple language option		36-42
Total Credits		**39-45**

Dual Language Options

Students must complete the requirements listed below for two languages (French, Italian, or Spanish). They must also take the 3-credit, capstone course AS.211.400 Topics in Romance Literatures

French

Code	Title	Credits
AS.210.301	Advanced French for Writing	3
AS.210.302	Advanced French for Speaking	3
AS.212.333	Introduction à la littérature française I	3
or AS.212.334	Introduction à la littérature française II	
Three French courses from the AS.211.3xx-4xx (POS-Tag MLL-FREN) or AS.212.3xx-4xx series, at least one of which must be at the 400 level		9
Total Credits		**18**

Spanish

Code	Title	Credits
AS.210.311	Advanced Spanish I	3
AS.210.312	Advanced Spanish II	3
AS.215.231	Introduction to Literature in Spanish	3
Three Spanish courses from the AS.211.3xx-4xx (POS-Tag MLL-SPAN) or 215.3xx-4xx series. One course may be an independent study.		9
Total Credits		**18**

Italian

Code	Title	Credits
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
or AS.214.363	Italian Journeys: An Other Story	
Three Italian courses from the AS.211.3xx-4xx (POS-Tag MLL-ITAL) or 214.3xx-4xx series. One course may be an independent study.		9
Total Credits		**18**

Sample Program of Study (Dual Languages - Spanish and Italian)

Course	Title	Credits
First Year		
First Semester		
AS.210.111	Spanish Elements I	4
AS.210.151	Italian Elements I	4
	Credits	**8**
Second Semester		
AS.210.112	Spanish Elements II	4
AS.210.152	Italian Elements II	4
	Credits	**8**
Second Year		
First Semester		
AS.210.211	Intermediate Spanish I	3
AS.210.251	Intermediate Italian I	3
	Credits	**6**
Second Semester		
AS.210.212	Intermediate Spanish II	3
AS.210.252	Intermediate Italian II	3
	Credits	**6**
Third Year		
First Semester		
AS.210.311	Advanced Spanish I	3
AS.210.351	Advanced Italian I	3
AS.215.231	Introduction to Literature in Spanish	3
AS.214.362 or AS.214.363	Italian Journeys: Medieval and Early Modern or Italian Journeys: An Other Story	3
	Credits	**12**
Second Semester		
AS.210.312	Advanced Spanish II	3
AS.210.352	Advanced Italian II	3
One course from the AS.211.3xx-4xx series with MLL-SPAN POS tag or from the 215.3xx=4xx series		3
One course from the AS.211.3xx-4xx series with MLL- ITAL POS tag or from the 214.3xx-4xx series		3
	Credits	**12**
Fourth Year		
First Semester		
Two courses from the AS.211.3xx-4xx series with MLL-SPAN POS tag or from the 215.3xx-4xx series		6
One course from the AS.211.3xx-4xx series with MLL- ITAL POS tag or from the 214.3xx-4xx series		3
	Credits	**9**
Second Semester		
One course from the AS.211.3xx-4xx series with MLL- ITAL POS tag or from the 214.3xx-4xx series		3
AS.211.400	Topics in Romance Literatures	3
	Credits	**6**
	Total Credits	**67**

Three Language Options

Students must complete the requirements of two languages (French, Italian, or Spanish) as described in the Languages 1 and 2 section and also complete the requirements of an additional language (French, Italian, Portuguese, or Spanish) as described in the Language 3 section. Students must also take the capstone course, AS.211.400 Topics in Romance Literatures

Languages 1 and 2

French

Code	Title	Credits
AS.210.301	Advanced French for Writing	3
AS.210.302	Advanced French for Speaking	3
AS.212.333	Introduction à la littérature française I	3
or AS.212.334	Introduction à la littérature française II	
Two French courses from the AS.212.3xx-4xx series, at least one of which must be at the 400 level		6
Total Credits		**15**

Spanish

Code	Title	Credits
AS.210.311	Advanced Spanish I	3
AS.210.312	Advanced Spanish II	3
AS.215.231	Introduction to Literature in Spanish	3
Two Spanish courses from the AS.211.3xx-4xx (POS-Tag MLL) or AS.215.3xx-4xx series		6
Total Credits		**15**

Italian

Code	Title	Credits
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
or AS.214.363	Italian Journeys: An Other Story	
Two Italian courses from the AS.211.3xx-4xx (POS-Tag MLL-ITAL) or AS.214.3xx-4xx series)		6
Total Credits		**15**

Language 3

The student must satisfy their third language requirement as described below:

French

Code	Title	Credits
AS.210.301	Advanced French for Writing	3
AS.210.302	Advanced French for Speaking	3
AS.212.333	Introduction à la littérature française I	3
or AS.212.334	Introduction à la littérature française II	
One French course from the AS.212.3xx-4xx series		3
Total Credits		**12**

Spanish

Code	Title	Credits
AS.210.311	Advanced Spanish I	3
AS.210.312	Advanced Spanish II	3
AS.215.231	Introduction to Literature in Spanish	3
One Spanish course from the AS.215.3xx-4xx series		3
Total Credits		**12**

Italian

Code	Title	Credits
AS.210.351	Advanced Italian I	3
AS.210.352	Advanced Italian II	3
AS.214.362	Italian Journeys: Medieval and Early Modern	3
or AS.214.363	Italian Journeys: An Other Story	
One Italian course from the AS.214.3xx-4xx series		3
Total Credits		**12**

Portuguese

Code	Title	Credits
AS.210.391	Advanced Portuguese I: Language and Literature	3
AS.210.392	Advanced Portuguese II	3
AS.211.394	Brazilian Culture & Civilization	3
One Portuguese course from the AS.210.3xx or AS.211.3xx series		3
Total Credits		**12**

Honors in the Romance Languages Major

Dual-language option:

Verification of a 3.5 or higher cumulative GPA and a 3.7 GPA in your major requirements is required at the time of graduation. Honors are conferred upon successful completion of the 3-credit Senior Thesis in Romance Languages.

Prepared under faculty mentorship during the Fall or Spring of the final year of study, the 3-credit Senior Thesis in Romance Languages (AS.211.4xx) compares literary and cultural materials embedded in two or more Romance traditions. Students wishing to complete the Senior Thesis should notify the advisor(s) the semester prior to registering.

Three-language option:

No Honors track is available. Majors wishing to pursue Honors in Romance Languages should pursue the dual-language option leading to the preparation of the Senior Thesis in Romance Languages.

Spanish, Bachelor of Arts

Spanish Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The Spanish Major consists of 9 courses. All students must take the Spanish language placement exam before registering for a Spanish course. Speakers with prior language proficiency should consult with the Spanish major advisor about the waiver of language courses. Note, however, that a waived language course may not be used to substitute for one of the nine required courses of the major. All major requirements must be completed with a grade of C or better and may not be taken satisfactory/unsatisfactory. Students may include a focus on Spanish for the professions in their Spanish major - see footnotes below. One course taught in English may be counted towards the major requirements. Courses taught in English can be identified by the MLL-ENGL POS-Tag. Of the nine courses for the major, five must the taken on the Homewood JHU campus.

The program strongly recommends that Spanish majors study abroad, either for a semester in the Hopkins in Madrid program or for a summer or winter intersession term in our programs in Salamanca (Spain) and Coronado (Costa Rica). The Hopkins in Madrid Program, which is for advanced language students, allows students to complete a significant number of major requirements while abroad. Hopkins is also affiliated with a number of other study abroad programs. Students wishing to understand how transfer courses taken elsewhere apply towards the major should contact Loreto Sánchez- Serrano.

Code	Title	Credits
AS.210.311	Advanced Spanish I (or an additional AS.215.xxx course)	3
Four courses numbered AS.215.2xx - AS.215.4xx or AS.210.3xx-AS.210.4xx (taught in Spanish) [1]		9
Three courses numbered AS.215.2xx - AS.215.4xx		9
One course numbered AS.215.4xx		6
Total Credits		**27**

[1] Spanish for the professions track: Students may specialize in Spanish for the professions by taking three of the following in order to fulfill part of the requirements of the Spanish major: (1) one course from AS.210.314 Spanish for International Commerce or AS.210.313 Medical Spanish or AS.210.315 Spanish for International Relations or AS.210.318 Spanish for Engineering or AS.210.319 Spanish for Public Health; and (2) both courses AS.210.411 Translation for the Professions and AS.210.412 Community Based Learning - Spanish Language Practicum.

Sample Program of Study

This plan assumes the student is starting at the beginning level of the language.

Course	Title	Credits
First Year		
First Semester		
AS.210.111	Spanish Elements I	4
	Credits	**4**
Second Semester		
AS.210.112	Spanish Elements II	4
	Credits	**4**
Second Year		
First Semester		
AS.210.211	Intermediate Spanish I	3
	Credits	**3**
Second Semester		
AS.210.212	Intermediate Spanish II	3
	Credits	**3**
Third Year		
First Semester		
AS.210.311	Advanced Spanish I	3
	Credits	**3**
Second Semester		
AS.215.2xx-4xx course		3
AS.215.2xx-4xx course		3
	Credits	**6**
Fourth Year		
First Semester		
AS.215.2xx-4xx course		3
AS.215.2xx-4xx course		3
AS.215.2xx-AS.215.4xx		
	Credits	**6**
Second Semester		
AS.215.4xx course		3
AS.215.2xx-4xx course		3
AS.215.2xx-4xx course		3
	Credits	**9**
	Total Credits	**38**

Honors in the Major

Honors in Spanish requires a cumulative GPA of 3.5 or higher, and GPA of 3.7 or higher major required courses.

Spanish for the Professions, Minor

Spanish for the Professions Minor Requirements

The Spanish for the Professions Minor consists of 6 courses. All students must take the Spanish language placement exam before registering for a Spanish course. Speakers with prior language proficiency should consult with the Spanish minor advisor about the waiver of language courses. Note, however, that a waived language course may not be used to substitute for one of the six required courses of the minor. All minor requirements must be completed with a grade of C or better and may not be taken satisfactory/unsatisfactory. One course taught in English may be counted towards the minor requirements. Courses taught in English can be identified by the MLL-ENGL POS-Tag.

Code	Title	Credits
AS.210.311	Advanced Spanish I	3
AS.210.313	Medical Spanish	3
or AS.210.314	Spanish for International Commerce	
or AS.210.315	Spanish for International Relations	
or AS.210.318	Spanish for Engineering	
AS.210.411	Translation for the Professions	3
AS.210.412	Community Based Learning - Spanish Language Practicum	3
One course AS.215.2xx-4xx or AS.210.3xx-4xx		3
One course AS.215.4xx		3
Total Credits		**18**

Spanish Language and Hispanic Cultures, Minor

Spanish Language and Hispanic Cultures Minor Requirements

The Spanish Language and Hispanic Cultures Minor consists of 6 courses. All students must take the Spanish language placement exam before registering for a Spanish course. Speakers with prior language proficiency should consult with the Spanish minor advisor about the waiver of language courses. Note, however, that a waived language course may not be used to substitute for one of the six required courses of the minor. All minor requirements must be completed with a grade of C or better and may not be taken satisfactory/unsatisfactory. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. One course taught in English may be counted towards the minor requirements. Courses taught in English can be identified by the MLL-ENGL POS-Tag.

Code	Title	Credits
AS.210.311	Advanced Spanish I (or an additional 215.xxx course)	3
Two courses from the 215.2xx, 215.3xxx and 215.4xx series or 210.312, 210.316, 210.317 and 210.413		6
Two courses from 215.3xx- 215.4xx series		6
One course from the 215.4xx series		3

Spanish, PhD

Spanish

In addition to general university requirements for the Ph.D., the following regulations apply to graduate students in the Department of Modern Languages and Literatures:

To be accepted into the Ph.D. program, students must demonstrate by an exceptionally strong academic record that they are capable of advanced study in literature. The student will normally take two to three years of graduate courses and devote the fourth year to study and research in the country on which the student's study concentrates. The well-prepared student can expect to receive the Ph.D. after five years of study. The graduate program in Modern Languages and Literatures emphasizes work in three complementary areas: literary history, close textual analysis, and theory of interpretation. By way of preparing students in a variety of critical schools, the faculty and the visiting professors offer training in the different disciplines pertaining to critical theory, including philosophy, theory of language, psychoanalytic theory, intellectual history, and cultural anthropology.

In addition to the major language, the Ph.D. candidate must demonstrate proficiency in one or two other languages besides English, depending on the specialization.

In addition to the major language, the student must demonstrate proficiency in two other foreign languages.

The student must take a minimum of four semesters of graduate courses. After this period, normally in the third year, the student will present a dissertation prospectus that, if completed successfully, will lead to candidacy for the Ph.D.

Graduate Study Abroad

The Department encourages and expects graduates student to do research abroad during their program of study. Spanish students may elect to make their fourth year a non-teaching year.

After presenting a research proposal to their advisor, with the approval of that advisor and the head of section, students may elect to go abroad for a semester or the entire academic year in order to conduct research essential to their dissertation.

Financial Aid

The department has a number of fellowships for graduate students. Awards include university fellowships, which carry stipends and teaching fellowships for teaching one section of an undergraduate language course each semester, in addition to remission of tuition fees. All graduate students are expected to do four years of apprentice teaching of elementary and intermediate level undergraduate courses as part of their professional preparation. The amount of classroom teaching required is usually three to four hours a week. Students are admitted for five years, fully funded, subject to annual review to assure satisfactory progress. In addition, stipends (equivalent to that year's teaching fellowship) are available for study abroad during the third or fourth year.

Fourth- and fifth-year graduate students may also compete for Dean's Teaching Fellowships, which provide opportunities for the design and teaching of undergraduate courses in literature, cultural studies, or intellectual history.

Admission Requirements

Application Procedures

Prospective graduate students may visit the departmental website at https://krieger.jhu.edu/modern-languages-literatures/ for further information on programs and faculty. All questions regarding the programs offered by the department should be emailed to mll@jhu.edu (grll@jhu.edu). Prospective students are encouraged to apply online through the secure Graduate Admissions website (https://applygrad.jhu.edu/apply/?sr=1bf0a763-446d-4552-b7f6-4b450a7fa62f).

Museums and Society

http://krieger.jhu.edu/museums/

The Program in Museums and Society is concerned with the institutions that shape knowledge and understanding through the collection, preservation, interpretation, and/or presentation of art, material culture, heritage, or natural and scientific specimens. It focuses on the role of museums (broadly defined) and their collections in societies past and present, including their historical, cultural, intellectual, and political significance.

A minor in Museums and Society complements study in a range of fields, including but not limited to anthropology, archaeology, history, history of art, and history of science and technology. Many courses include visits to or focused work in local and regional institutions, including on-campus collections (Archaeological Museum, Homewood Museum, Evergreen Museum and Library, and the Sheridan Libraries).

Whether they are researching a historical artifact or debating the obligations of public institutions, students in the program are challenged to approach their discipline from a new angle. While some may choose to pursue a museum career, the program has the larger goal of encouraging critical, careful thinking about some of the most influential cultural institutions of our day.

Programs

- Museums and Society, Minor (p. 2025)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.389.155. The History of Fake News from The Flood to The Apocalypse. 3 Credits.
"Fake News" is everywhere in both past and present. Explore that history first-hand throughJHU's rare book collection of literary and historical forgeries spanning millennia of human history.Students learn how to examine and investigate rare books.
Area: Writing Intensive

AS.389.165. Hands on History: Material Cultures of Knowledge from Antiquity to the Digital Age. 3 Credits.
This hands-on course deals entirely with JHU's collections of rare books and manuscripts as a springboard to build skills in the close visual and physical examination of rare books and manuscripts. You will investigate the technological and aesthetic transformation of textual artifacts from ancient papyri to Gutenberg imprints to digital surrogates, and contribute to the accumulation of historical clues about their meaning and significance as material cultural objects. You will learn what goes into curating and conserving book and manuscript collections today, and how to evaluate the quality and significance of collections. Materials/topics will include ancient Babylonian cuneiform and Egyptian papyri; medieval illuminated manuscripts; incunabula; Renaissance illustrated books of the Scientific Revolution and Spanish Golden Age; cheap print and unique ephemera; early books by and about women; forgeries; and "digital humanities" initiatives at JHU. Students will make regular visits to the Special Collections Reading Room in the BLC throughout the semester.
Area: Writing Intensive

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.202. Introduction to the Museum: Issues and Ideas. 3 Credits.
Museums face practical, political and ethical challenges, including economic difficulties, debates over interpretation of culture and pressure to demonstrate social value. This course considers how museums are answering these challenges.

AS.389.220. Queer Sixties. 3 Credits.
Introduction to queer & trans politics and culture in the period immediately preceding the gay liberation movement, from the early to late 1960s, focusing on intersections of race, sexuality, and gender. Course examines how we have come to narrate queer & trans history and investigates the ways archival practices shape conceptions of queer & trans life. Students learn research methods as they draw on and contribute to the university's digitized archival collections.

AS.389.230. Queer & Trans Public History. 3 Credits.
This course introduces students to a blend of public history, queer studies and transgender studies. Students learn oral history and archival research methods as they draw on and contribute to the university's archival, museum, and library collections.

AS.389.240. Archaeological Museum Practicum: Collections Management. 3 Credits.
Students will learn current procedures for surveying, cataloguing, documenting and rehousing collections using objects from the Archaeological Museum. This is a hands-on practicum course working closely with museum staff.

AS.389.242. Museum Education: From Contested Knowledge to Reflective Narrative. 3 Credits.
This practicum course critically considers current art and history museum education practices and explores social justice discourses through museum visits, visitor studies, and museum learning strategies.

AS.389.250. Conservation of Material Culture: Art, Artifacts and Heritage Sites. 3 Credits.
This course will introduce students to the field of art conservation through the study of paintings, paper, books, objects, contemporary sculpture and historic preservation. Topics covered will include: methods of manufacture, agents of deterioration, preservation initiatives, conservation treatment and ethics, and conservation science. Cross-listed with History of Art.Class usually meets at 1:30 - 3:50 PM, except for days with field trips.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.275. Interpreting Hopkins as Historic Site. 3 Credits.
This hands-on course explores interpretive strategies for historic sites and culminates in the production of original, research-based, outdoor interpretive exhibits on the Homewood Campus.

AS.389.280. Of and For Everyone: Diversity, Equity, Inclusion and Access in the Museum. 3 Credits.
How are museums responding to the pressures to be more equitable, inclusive, and accessible towards public audiences and their staff? Students go behind the scenes of the Smithsonian, Baltimore Museum of Industry and Baltimore Museum of Art to meet with working groups and staff charged with transforming their institutions. Includes site visits, hands-on experiences and research on best practices.

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.311. From Treasure House to Production House: Exploring New Roles for the Museum in the 21st Century. 3 Credits.
Students work with the Director of, the Peale Center for Baltimore History and Architecture as it reinvents itself as a museum for the twenty-first century. Involves working with community story-tellers in residence. Extra time is to allow for field trip travel - most days class runs 1:30-3:50.

AS.389.314. Commemoration, Mourning, and Race: The Stories of Mount Auburn Cemetery. 3 Credits.
In partnership with Mount Auburn Cemetery in Baltimore, owned and operated by the Sharp Street Memorial United Methodist Church, this community-engaged course will address the African American cemetery in general, and the Mount Auburn Cemetery in particular, as a place of multiple meanings: a sacred site of private mourning, a public place of commemoration, a representation of racism, an historic accomplishment. This course will require on-site research that contributes to the cemetery's interests.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.
Course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation's museums, galleries, and libraries and used objects to shape taste and status in the U.S.

AS.389.324. The BMA Seminar: Digital Interpretation. 3 Credits.
When museums shut their galleries in response to the global pandemic they saw a surge in digital audiences and engagement, athough not everyone can access digital content equally. Continued public health risks bring new challenges to digital interpretation, while universal access as well as embedded racial and gender bias remain significant issues. Students research what works and what doesn't in digital interpretation for art museums, centering social equity and accessibility in their assessment, and develop principles and guidelines for the museum's digital interpretation strategy.

AS.389.325. Women of the Book: Female Miracle Workers, Mystics, and Material Culture, 1450-1800. 3 Credits.
From psycho-spiritual autobiographers to mystical bi-locating nuns, convent crèche-keepers to choristers of sacred music, from rock-star-status mystics to the hidden careers of women printers, engravers, and miracle-makers, this course will explore the remarkable intellectual, cultural, and imaginative contributions of women who found refuge, agency, and power within alternative lives.
Area: Writing Intensive

AS.389.329. Author/Canon/Archive. 3 Credits.
Why are some literary works from the past reprinted, anthologized, and considered worthy of study, but not others? Why are some works "lost" and some "rediscovered," while others simply fall out of favor? Focusing on nineteenth- and early twentieth-century American literary culture, we will use rare books and archival materials from JHU collections to examine Edgar Allan Poe, Walt Whitman, Emily Dickinson, Stephen Crane, Charles Chesnutt, and Zora Neale Hurston, along with a few authors you've never heard of, in terms of the relationship between authorship, stewardship, and status.

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.346. Scribbling Women in the Literary Archive. 3 Credits.
Students examine select texts and archival materials related to Emily Dickinson, Frances Ellen Watkins Harper, Edith Wharton, Ida B. Wells, Charlotte Perkins Gilman, Sui Sin Far, Alice Duer Miller, and Zora Neale Hurston. Students interrogate how these writers navigated the constraints of gender, as informed by race and class, in the decades before and after the 19th Amendment and consider literary collecting in relation to gendered cultural politics.

AS.389.347. Landscaping Baltimore: Designing and Interpreting JHU's Neighborhood. 3 Credits.
This course will explore the landscape history and current arrangement of the area around JHU's Homewood campus, including Evergreen Museum, coinciding with the bi-centennial of the birth of Frederick Law Olmsted whose design firm played a central role in developing plans for and around JHU. The course will culminate in a student-produced exhibit for a public audience.

AS.389.348. Queer Oral History. 3 Credits.
Students learn to conduct, analyze, and interpret their own oral histories as they contribute to a wide-ranging project documenting queer worldmaking in the Baltimore-Washington D.C. region. We engage with scholarship from performance studies, queer of color critique, LGBTQ history, and public humanities to consider the politics of storytelling and the promises of public-facing oral history projects. Students have the option of developing podcasts, multimedia projects, and public humanities proposals as their final assignment.

AS.389.357. Heaven on Earth: Art, Power, and Wonder in the Vatican from Antiquity to the Enlightenment. 3 Credits.
A material cultural exploration of the Vatican from the founding of St. Peter's basilica in antiquity to the establishment of the Vatican Library and Museums in the Renaissance and Enlightenment.
Area: Writing Intensive

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art's American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum's commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.

AS.389.379. Interpreting Historic Sites for the 21st Century. 3 Credits.
Students go behind the scenes at JHU's own Evergreen Museum and Library to investigate how historic sites design spaces for learning, community engagement, leisure, as well as for exhibitions and special events. Students consider the history of Evergreen and its inhabitants and create concepts for how to engage communities in that history and story. Multiple class meetings take place at the Evergreen Museum.

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, revisualise and offer alternative stories. Class meets at the museum every other week.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.410. Sharing Knowledge: Participatory Archives, Collaborative Storytelling, and Social Justice. 3 Credits.
This course introduces students to collaborative humanities projects that encourage democraticparticipation among publics more broadly conceived than the academy. We investigate indigenous research methods; collaborative oral history and ethnography; interactive theater;and community archives. Final projects draw on the university's archival, museum, and librarycollections.

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

AS.389.502. Independent Study- Museum and Society. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.389.521. Capstone in Museums and Society. 1 - 3 Credits.
The Capstone allows students to develop and carry out their own, hands-on research project in a museum, collection, archive, or other living resource. Final projects must involve some form of public presentation (exhibition, lecture, poster, web-based, etc.) and a work of self-reflection (journal, brief paper, blog, or other). Projects must be approved and overseen by a supervising faculty member and approved by the Program's Director, in keeping with the University's Independent Work Policy. Instructor permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.389.522. Capstone in Museum and Society. 1 - 3 Credits.
The Capstone allows students to develop and carry out their own, hands-on research project in a museum, collection, archive, or other living resource. Final projects must involve some form of public presentation (exhibition, poster, web-based, etc.) and a work of self-reflection (journal, brief paper, blog, or other). Projects must be approved and overseen by a supervising faculty member and approved by the Program's Director, in keeping with the University's Independent Work Policy.
AS.389.201;AS.389.202;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

English

AS.060.617. Black Print Culture.
Students interested in black print culture will engage in intensive archival research, both collaborative and individual, using the Sheridan Library's Rare Book and Manuscript collections. Texts include poems, printed lectures, pamphlets, novels, periodicals, ephemera, correspondence, etc., alongside relevant critical and theoretical reading.
Area: Writing Intensive

First Year Seminars

AS.001.164. FYS: Curating Women. 3 Credits.
From the women who created the Museum of Modern Art in New York City to the "Because of Her" working group across the Smithsonian's museums, this First-Year Seminar investigates the hidden women of many distinct social positions, racial and ethnic identities whose labor shaped the museums we know today and considers how museums tell the stories of women, including transgender women, in the arts, sciences, and history.

AS.001.169. FYS: Inventing a City - Exploring Baltimore Through Maps and Mapping. 3 Credits.
Using maps from the 17th century to the present, students in this First-Year Seminar will explore the historical and contemporary landscape of their new hometown -- Baltimore. These primary sources will show how Baltimore was invented and developed in popular imagination to become the most vital port on the US Eastern Seaboard, but also a symbol American post-industrial decline. Students will have the chance to map how they see Baltimore, by learning and applying Geographic Information Systems (GIS) and converting geospatial data into visual stories. With the goal of fostering a deeper understanding of this complex city, and a student's place in it, the class will include explorations outside of the classroom. The course will culminate with the creation of a small exhibit whose content and venue will be decided upon mutually by students during the course of the semester.

History

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

History of Art

AS.010.305. The Ethiopia at the Crossroads. 3 Credits.
Ethiopia played a foundational role in modern-day civilization and culture: as the find site of Lucy, the earliest bipedal hominid, the seat of the Queen of Sheba's kingdom, the second country in the world to adopt Christianity in the early 4th century CE, and the nexus of exchange between Africa, Europe, and Asia. In fall 2023, The Walters Art Museum will mount the exhibition tentatively titled, Ethiopia at the Crossroads, which addresses Ethiopia's relationship and artistic exchange with its surrounding cultures, including South Arabia, Nubia, Egypt, Byzantium, Armenia, Italy, and India. It also discusses the impact of Ethiopian art beyond its borders, bringing works of Ethiopian contemporary art into dialogue with the historical Ethiopian art that these artists draw upon in their work. The exhibition covers approximately 1,750 years of Ethiopian history with a special focus on the art of the medieval period, broadly conceived. The course will also offer insights into how a museum exhibition is developed from the initial concept to the physical presentation in the galleries.

AS.010.307. Diplomats, Dealers, and Diggers: The Birth of Archaeology and the Rise of Collecting from the 19th c. to Today. 3 Credits.
The development of archaeology in the Middle East – its history of explorers, diplomats, missionaries and gentlemen-scholars – profoundly shaped the modern world, from the creation of new museums and the antiquities market to international relations and terrorism.

AS.010.382. The Politics of Display in South Asia. 3 Credits.
Through an examination of colonial exhibitions, the rise of national, regional, and archaeological museums, and current practices of display and representation in institutions, we will explore how the image of South Asia has been constructed in the colonial, modern, and contemporary eras. We will engage with the politics of representation, spectacle, and the economies of desire as related to colonialism and the rise of modernity. Readings from postcolonial theory, museum studies, anthropology, history, and art history.
Area: Writing Intensive

AS.010.424. Art and Colonialism: Nineteenth-century India. 3 Credits.
This seminar explores the technologies of colonial power, from small ephemeral watercolor images of religious processions to massive multi-volume photographic projects documenting the "people of India," and extending to the establishment of new urban and architectural spaces, archaeological museums, and art schools, the circulation of diplomatic art collections, and the commissioning of survey data. We will engage with the anti-colonial movements of resistance and uprising that took place across this century, examining the central participation of modern artists with these political movements, and explore the way this period fundamentally shaped the foundations for the study of South Asian art and archaeology. Readings will include colonial and postcolonial theory, Orientalism, historiography; we will be actively working with materials in the library's Special Collections.
Area: Writing Intensive

AS.010.444. Classics Research Lab: Antioch Recovery Project (ARP). 3 Credits.
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term "narcissism". Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard's Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

Modern Languages and Literatures

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

Near Eastern Studies

AS.130.247. Digging for Legitimacy Archaeology, Museums, and Ideology. 3 Credits.
Archaeology was born out of Western Colonial endeavors into Africa, the Middle East, Asia, and the Americas. Large scale excavations conducted by the United Kingdom, France, Germany, Italy, and the United States resulted in the removal and transfer of valuable (culturally and monetarily) material culture from local stewards and stakeholders to the West. To this day the discipline of archaeology is still saddled by its colonial past and the Hollywood interpretation of archaeologists as saviors of ancient treasures. Today, most interaction between people and ancient objects is facilitated via the museum. In this course we will explore 19th- 21st century archaeological and museum practices and the role they play in modern narratives of identity and representation in the America and the Middle East. Students will engage with the historical, legal, economic, and ethical implications of archaeology and analyze how political, religious, cultural, and academic institutions have leveraged archaeology and cultural artifacts to reify and legitimize their pursuits and ideologies.

AS.130.248. Up the Nile: New Approaches to the History of Egyptology and Nubiology. 3 Credits.
King Tut, Napoleon, Champollion, Ozymandias, Nefertiti: the history of Egyptology is filled with big characters, huge monuments, and glimmering objects. But it is also made up of colonialist practices, looted sites, and forgotten scholarly contributions. "Up the Nile" examines the antiquarian, colonialist, racist, Western-centric, and patriarchal roots of modern Egyptology and Nubiology, and addresses how scholars and enthusiasts alike are continuing to grapple with these lasting legacies and biases. This class investigates how the Egyptians and Nubians thought of their own histories, as well as how other ancient cultures viewed the cultures of the Nile. It moves roughly chronologically, tracing understudied and marginalized voices from the Islamic, Medieval, and Ottoman periods into the 20th and 21st centuries. It examines the origins of scholarship, modern collecting, Egyptomania, and museums, delving into the problems and repercussions that still haunt us today. "Up the Nile" will engage with important and difficult aspects regarding Egyptology's and Nubiology's colonialist, racist, and sexist past and present. It asks: who decides who writes history, then and now?

AS.130.334. Egyptian Funerary Arts in the Archaeological Museum. 3 Credits.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.133.706. Egyptian Funerary Arts in the Archaeological Museum.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

For current faculty and contact information go to http://krieger.jhu.edu/museums/directory/

Museums and Society, Minor

Museums and Society Minor Requirements

Course requirements for the minor in Museums and Society are designed to introduce students to a broad set of historical, theoretical, and practical museum issues and to give them the opportunity to explore museums first-hand. Prospective minors should consult with the Director of Undergraduate Studies for guidance in designing a program of study.

- A minimum of six different courses (amounting to at least 18 credits) selected from those approved by the program.
- Required courses: AS.389.201 Introduction to the Museum: Past and Present and one additional introductory course in museum practice or contemporary issues [POS tag: PMUS-INTRO].
- Four additional courses in the program: Of these courses, at least three must be 300-level or higher and at least two different primary disciplines must be represented; these four courses must also include a minimum of three credits of "practicum" work. [POS-Tag: PMUS-PRAC]
- Courses used to satisfy minor requirements must be taken for a letter grade. Students must earn a "C-" or higher grade in all courses used to satisfy minor requirements.

Code	Title	Credits
Introductory Courses		
AS.389.201	Introduction to the Museum: Past and Present	3
Introductory Course (with POS tag: PMUS-INTRO)		3
Upper-Level Electives		
Select four Upper-Level Electives		12
At least three must be 300-level or higher courses		
Three credits of practicum work (POS-Tag PMUS-PRAC)		
Two courses must be from at least two different primary disciplines		
Total Credits		**18**

Sample Program of Study

A sample path toward completion might include the following sequence, but many other paths are possible. Please consult with the Director of Undergraduate Studies for guidance.

Course	Title	Credits
First Year		
First Semester		
AS.389.201	Introduction to the Museum: Past and Present	3
	Credits	**3**
Second Semester		
One PMUS-INTRO course		3
	Credits	**3**
Second Year		
First Semester		
One 300-level seminar		3
	Credits	**3**
Second Semester		
One 300-level seminar		3
	Credits	**3**
Third Year		
First Semester		
A practicum course		3
	Credits	**3**
Fourth Year		
First Semester		
A 300+ level practicum course -or- a 300+ level seminar course		3
	Credits	**3**
	Total Credits	**18**

Additional Details

Introduction to the Museum sequence: Ideally, students should take at least one introductory course before enrolling in more focused courses, but this is not required.

Departmental Distribution: In keeping with the interdisciplinary nature of the program, students are encouraged to explore various fields and must complete courses in at least two different primary disciplines beyond Museums and Society. Primary disciplines are defined either as the home department for the course (identified by the course's three-digit prefix), as the first cross-listing beyond Museums and Society, or as the home discipline of the instructor. Students should seek guidance from the program to ensure they are fulfilling this requirement, and should note that Independent Study and Capstone credits cannot be applied to it.

Practicum Work: Practicum credits can be earned only from courses designated as Museums and Society "practicum" in the course description [POS-Tag: PMUS-PRAC].

Independent Study and Capstone: Students have two options for pursuing independent work for credit in Museums and Society. The Independent Study typically takes a more traditional academic approach to research and presentation; the Capstone encourages research that is engaged with collections and results in an alternative, often public project. Students interested in these options should consult the university's independent work policy and follow the guidelines outlined under Independent Research (http://krieger.jhu.edu/museums-society/academics/independent-research/). Approval for credit will not be given until a project has been officially approved by an appropriate mentor, in full and frequent consultation with the Program in Museums and Society. No more than 3 credits of independent work can be applied to the minor.

Internships: Internships are valuable opportunities to expand horizons, learn in the field, and investigate real-world applications of academic work. The Program in Museums and Society highly encourages students to explore internship options and works with the Career Center to identify opportunities to do so. However, while the program sponsors interns for academic credit when needed by the host institution, such credit cannot be used to satisfy minor requirements. Students interested in receiving credit for independent work should consider the Independent Study and Capstone options instead.

Other Information: No course other than the Independent Study or Capstone may be counted toward the minor more than once (up to a maximum of 3 credits).

Music

http://www.krieger.jhu.edu/music (http://www.krieger.jhu.edu/music/)

The Peabody Institute of The Johns Hopkins University is an internationally acclaimed music conservatory. The Peabody campus, located at historic Mount Vernon Place, is on the university shuttle bus route between Homewood campus and the medical institutions in East Baltimore. Faculty of the Peabody Institute offer classes on the Homewood campus that are open to all undergraduates.

Qualified Hopkins undergraduates may, for no extra charge, register for classes in music history, music theory, music education, recording techniques, and computer music offered on the Peabody campus. There are also limited opportunities to take private lessons and participate in ensembles.

Concerts

Homewood students are welcome to attend Peabody's many concerts and are entitled to one complimentary ticket per concert, excluding opera and dance productions. Multiple performances of the same program do not count as separate concerts. Students can order tickets or e-tickets through University Tickets, accessible through the Peabody website (http://www.peabody.jhu.edu/). To pick up will-call tickets, students need to show their Hopkins ID at the Peabody Box Office, Monday through Friday, 10 a.m. to 4 p.m, or during the hour before the concert. The Box Office is in the lower level of the Grand Arcade in the Conservatory building; call (667) 208-6620.

Private Lessons

Private lessons are available to students at varying levels of accomplishment on a musical instrument or by voice.

- Half-hour or hour lessons are offered for credit in the Peabody Conservatory for the intermediate to advanced musician.
- Non-credit lessons are available in the Peabody Preparatory, space permitting.

The annual registration fee will be waived for all JHU students. School of Arts and Sciences and Engineering students are eligible to receive a cross-registration discount of 25 percent for Preparatory private lessons by obtaining a cross-registration form from their division each semester. There is a lesson fee for KSAS and WSE undergraduate students for lessons at the Conservatory and students may check with the Registrar's Office for the current fee.

Students wishing to take advantage of this opportunity should consult the Peabody Conservatory and/or Preparatory catalogs for more information.

Auditions for lesson assignments at the intermediate or advanced level take place at the beginning of each term. Please see the following website for annual and semesterly updates regarding audition dates, repertoire, and fees: https://krieger.jhu.edu/music/music-lessons/

Students may sign up for Mattin Center instrumental practice facilities by bringing their Jcard to the office of Student Leadership & Involvement, also located in the Mattin Center.

Ensemble Membership

Membership in the Hopkins Symphony Orchestra, the Johns Hopkins University Band, and the Hopkins Glee Club, all of which rehearse and perform on the Homewood campus, is open to all university students. Membership in the Hopkins Symphony Orchestra is by audition on a space-available basis. Seating is limited, especially in the winds. Contact the HSO Office in Shriver Hall at 410-516-6542 for audition information, which can also be found on the Hopkins Symphony Orchestra website (https://studentaffairs.jhu.edu/hso/current-season/auditions/).

Participation in the Peabody-Hopkins Chorus and Peabody Singers is open to all university students upon completion of a satisfactory audition. Please contact Ensemble Coordinator, 667-208-6628 (email TBA), if you wish to schedule an audition or would like additional information.

Advanced instrumentalists who wish to be considered for membership in Peabody's large instrumental ensembles—the Peabody Symphony Orchestra, Peabody Concert Orchestra, Peabody Wind Ensemble, Peabody Camerata (contemporary music), Peabody Improvisation and Multimedia Ensemble, and Peabody Jazz Orchestra—are welcome to take part in the placement audition process which takes place each fall during the week prior to Peabody's registration process. In order to be given an audition slot, instrumentalists must be taking private minor lessons with a Peabody instructor, and that instructor must inform the Peabody Ensemble Office that they've evaluated the player's ability to be on par with that of the student's peers at Peabody. Occasional exceptions to this policy have been made for players of instruments which are uncommon or currently under-represented at Peabody. Due to the fact that each of the instrumental ensembles can accommodate only a certain number of players of each instrument, placement into these ensembles is made on a space-available basis, with priority given to Peabody instrumental majors for whom participation in large ensembles is a degree requirement.

Please direct any questions regarding participation in Peabody's large ensemble program to Ensemble Coordinator, 667-208-6628.

Programs

- Music, Minor (p. 2030)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.376.111. Rudiments of Music Theory and Musicianship. 3 Credits.
This course introduces written and aural music fundamentals including notation, scales, intervals, chords, rhythm, meter and sight-singing. Students will compose melodies and short pieces and complete listening projects. Course does not count towards the completion of the minor.

AS.376.166. Star Trek Music- The Franchise Frontier. 3 Credits.
Music defines the Star Trek experience. Through their continued reuse and repetition, Star Trek's many musical themes go beyond their original audiovisual frameworks to operate as learned musical-cultural texts. As Star Trek has expanded its content into a myriad of installments and media platforms, this musical symbolism has proved vital in articulating both these differences and "sameness."This online, asynchronous course uses Star Trek's music as a tool to investigate musical branding and the creation of meaning in the media we consume every day. Through close viewings—and listenings—of film, television episodes, video games, computer games, commercials, and other media, we will explore the meaning(s) these media construct and acquire as they are re-used and re-purposed in audiovisual contexts. Your work will include studying media clips, television episodes, and some feature-length films; short readings in which we interact with both current and classic scholarly literature; regular discussion posts and responses to our content; a weekly reflection journal of short posts; and a final paper/project on a Star Trek music topic of your choice (1500 words). In so doing, we will hone your analytical skills by learning to critically evaluate filmic media and craft arguments about the roles of music/sound in film.

AS.376.190. Learn Music by Writing It. 3 Credits.
This course uses composition and song-writing projects to introduce music fundamentals to students with little or no musical background. Topics will include rhythm and meter, pitch and intervals, scales, chords, and harmony, and how to read and write music in both traditional and popular presentations. We will cover standard classical music notation (score, Roman numerals, traditional theory terminology) as well as popular (lead-sheet notation and performance conventions). This course has no prerequisite.

AS.376.211. Music Theory I. 3 Credits.
Introduction to basic principles of tonal music through listening, analysis and music making. Students study melody, harmony, voice leading, figured bass and dissonance treatment, and will also undertake short composition projects. Must have taken the qualifying examination or AS.376.111. Recommended to be taken concurrently with AS.376.221.

AS.376.212. Music Theory II. 3 Credits.
This course continues the aural and written work of the previous course, but focuses on chromatic harmony while continuing the study of melody, counterpoint, and figured bass. Prerequisite: Music Theory I.
AS.376.211

AS.376.221. Musicianship I. 2 Credits.
An introduction to basic musicianship skills. The course is divided into performance skills (sight singing, rhythm reading, basic piano, and improvisation) and aural skills (recognition of pitch, chords, rhythms, melodies, and other musical structures). Topics include major and minor keys and simple time signatures. Emphasis is placed on developing effective practice techniques. Pre-requisite: AS.376.111 (Rudiments of Music Theory and Musicianship) or placement exam.

AS.376.222. Musicianship II. 2 Credits.
A continuation of the skills developed Musicianship I. The course is divided into performance skills (sight singing, rhythm reading, basic piano, and improvisation) and aural skills (recognition of pitch, chords, rhythms, melodies, and other musical structures). Topics include minor keys, chromatic melody and harmony, compound time signatures, and syncopation). As in Musicianship I, emphasis is placed on developing effective practice techniques. Pre-requisite: AS.376.221 (Musicianship I) or placement exam.

AS.376.231. Western Classical Music. 3 Credits.
This course offers an introduction to music of the Western "classical" tradition through the study of a select number of works written over the course of the last four hundred years. In examining these musical works, all of which were remarkable for their time and which many still value today, we will consider their identity both as timeless aesthetic objects and as particular moments in cultural history. We will frame our work within the historical, philosophical, and political contexts of the time, and more recent critical assessments will help us evaluate the circumstances that have shaped reception of this repertoire over the past four centuries. In addition to the works and composers treated in our textbook, we will supplement our study throughout the semester with a consideration of the lives and works of individuals whose stories are less well-known. Ultimately, we will work to understand the particular challenges, opportunities, and responsibilities related to continued engagement with so-called "classical" music in the 21st century. Close attention is given to techniques of musical listening, and to details of first performances, with a consideration of the problems involved in assembling such a picture. No previous knowledge of musical notation or terminology is required. 3 credits.

AS.376.242. Introduction to Popular Music. 3 Credits.
A survey of the stylistic features and social contexts of American popular music since the 1950s.

AS.376.244. Electronic Music Production. 3 Credits.
Students will be introduced to electronic music production techniques and software, and how both can be used to produce a wide range of genre specific results. Skills such as beat matching, intricate use of quantization, virtual instrument editing, automation, sampling, mixing, mastering, effect usage and use of plugins will be explored.

AS.376.245. Introduction to Sound, Audio, and Recording Arts. 3 Credits.
In this course we will undertake a comprehensive survey of sound, audio and the related technology. While covering sound recording from an historical perspective, we'll touch on related material in physics, music, psychology and acoustics. In lab exercises and assignments, students will have the opportunity to learn in a hands-on environment as practical applications of the lecture material are explored. Assignments will include critical listening, in addition to basic recording, editing and mixing of audio. The course will culminate in a comprehensive final project.

AS.376.250. Introduction to Computer Music. 3 Credits.
Introduction to Computer Music is an opportunity for people with no specialized training in music to explore electronic art music as a long-standing, if obscure, body of art, then to participate in creative work in the style. Participants will gain a heuristic understanding of forms of musical composition that operate outside the conventions of regular rhythm and harmony as they record and manipulate sound to sculpt it into original musical works. The lecture portion combines an historical overview of electronic music, rudiments of acoustics and musical perception, and instruction in compositional techniques and in using computers as creative musical tools. The laboratory portion, given at the Digital Media Center, serves as a workshop for creative exploration and for the completion of assigned creative projects including original works of digital sound art.

AS.376.252. Jazz History. 3 Credits.
The primary focus of this course is a survey, investigation, and study of jazz music and how it shaped American history from its origins to current times. Upon completion of this course students will be able to: discuss why jazz is important, both musically and culturally; learn the nuances of a new art form; demonstrate that jazz is a huge part of American heritage; explore parallels between jazz and both American and world history; and become a receptive and knowledgeable audience for jazz.

AS.376.258. Jazz Improvisation and Theory. 3 Credits.
The primary focus of this performance/theory course is designed to help students acquire and develop basic language for improvisation in a collaborative environment. Throughout the semester, the course will develop these skills through songs drawn from standard jazz repertoire, examining improvised solos by master musicians, and understanding the application of fundamental theory concepts in performance situations. Enrolled students should be comfortable with theory rudiments such as note reading, scales, and intervals. No textbook is required, but students should have access to an instrument (singers are welcome).

AS.376.259. Theory of 20th Century Popular Song. 3 Credits.
This class will explore the way harmonic concepts codified in the western classical tradition over the last few centuries are represented and expanded upon in 20th and 21st century popular music. We will examine a number of harmonic techniques using a wide array of genres, ranging from jazz to Broadway to rock to pop to R&B/soul to hip-hop. This course will focus on listening, analysis, and composition techniques.

AS.376.303. Musical Theater from Aristophanes to Leonard Bernstein. 3 Credits.
This course examines the birth of musical theatre from Greek tragedy through the liturgical and secular plays of the middle ages and Renaissance, to the classical and romantic singspiels, operettas, and zarzuelas of the modern era, by such figures as Aristophanes, Adam de la Halle, Hildegard of Bingen, Angelo Poliziano, Juan del Encina, Wolfgang Amadeus Mozart, Gilbert and Sullivan, Ernesto Lecuona, Igor Stravinsky, and Kurt Weill. These will serve as a backdrop for a closer examination of the musicals of Jerome Kern, Cole Porter, George Gershwin, Irving Berlin, Richard Rodgers, Harold Arlen, Frank Loesser, Leonard Bernstein and others. In addition to studying and placing the works of these Broadway giants into a social, political, and economic context, we will study and perform from representative musicals and attend a performance at the Lyric Theatre. Student will be expected to write a capstone project.
Area: Writing Intensive

AS.376.330. History of Opera. 3 Credits.
A basic course in the origin and development of opera and its dissemination throughout the Western world.

AS.376.332. A Cappella Arranging. 1 Credit.
Students will learn how to arrange pre-existing melodies or songs for various vocal ensembles. Music theory I as a prerequisite recommended but not required.

AS.376.334. World Music & Cultures. 3 Credits.
The general purpose of this course is to introduce students to the scholarly study of traditional, popular, and classical music from around the world through reading, discussion, close listening of recordings, and observation of ethnographic and commercial films. We will be primarily concerned with using music as a lens through which to better understand cultural concepts including diaspora, religion, colonialism, creolization, and tradition. Area case studies will include India, East Asia, Sub-Saharan Africa, the Caribbean, and the Middle East.

AS.376.336. Beethoven and the Transformation of Musical Style. 3 Credits.
A survey course focusing on the life and music of Ludwig van Beethoven, whose compositions transformed and revolutionized music of the 19th century. Students will become acquainted with Beethoven's major works, including piano sonatas, string quartets, and symphonies. No previous musical background is necessary. NOTE: The year 2020 marks the 250th anniversary of Beethoven's birth.

AS.376.342. Caribbean Music. 3 Credits.
This course will explore the many genres of traditional and popular music that have emerged among the peoples and cultures of the Caribbean region and its Diaspora. We will examine the social, political, and economic issues that have shaped the region's music and how that music may have intersected with migration, colonization, ethnicity, race and tourism. Using a "participantobservation" approach, students will read about, listen to and research a variety of musical experiences within the relevant sociopolitical context. Students should expect to fully participate in discussions about the assigned readings and music, and should be prepared to conduct their own research and share their own or newly acquired knowledge of contemporary and "historical/traditional" musical themes, and local and regional artists. Our collective goal will be to enjoy as well as to think critically about music, culture and performance and within a moreinformed understanding of the complex, multi-varied and multi-vocal context—know as "The Caribbean".

AS.376.344. Powerful Women in Opera. 3 Credits.
Many opera scholars have noted that opera abuses its female characters. Many operatic heroines die, whether from violent acts or chronic diseases. However, women in opera also wield great power through their voices as ambitious queens, cunning servants, magical beings, and femmes fatales. In this course we will examine how these female characters operate through explorations of the operas' historical context, their texts and scores, and modern performance practice. Spanning from the 17th to 21st centuries, the repertoire studied in this class will provide an introduction to opera history. At the same time, we will delve deeply into different ways to do close analyses of opera through the lens of gender, reading the work of such thinkers as Carolyn Abbate, Naomi Andre, Adriana Caverero, Catherine Clément, and Wayne Koestenbaum.

AS.376.348. The Symphonic Century. 3 Credits.
The symphony occupies a prominent place within the history of Western classical music in the "long" nineteenth century. At once a canvas for daring innovations in style and form and a genre strongly allied with notions of "tradition," the nineteenth-century symphony brings together a complex set of issues that illuminate the broader history of music and musical culture of the past 200 years. This course introduces the iconic works of the symphonic tradition, with a focus on music of Haydn, Mozart, Beethoven, Schubert, Berlioz, Schumann, Mendelssohn, Brahms, Bruckner, and Mahler. As we aim to discover what made this music so remarkable in its time and why so many people still care about it today, we will consider each symphony both as a timeless work of art and as a particular moment in cultural history. Close attention will be given to the techniques of musical listening, and our work will be deeply rooted within the historical, philosophical, and political contexts of the time. There are no pre-requisites for the course apart from a willingness to open one's ears and to engage creatively and critically with some of the most extraordinary music ever written.

AS.376.371. Introduction to Music Cognition. 3 Credits.
What underlies our aesthetic response to music? How and why are we able to identify certain sounds as music? To what extent are music and natural language similar? What is it about music that evokes such powerful emotions such as happiness and sadness? What is unique to musical creativity? Examining such questions from cognitive science, neuroscience, psychology, and philosophical perspectives, this course explores relevant research and theory in the emerging domain of music perception and cognition. Students will complete a final research paper on the topic of their choice that integrates the course material.

AS.376.372. Topics in Music Cognition. 3 Credits.
This course explores the similarities and differences between music and language, the effects of musical training on cognitive development, and the expressive power of music, with an introduction to music and its role in film. We will read relevant research and theory on these topics from cognitive science, neuroscience, psychology, musicology, and philosophical perspectives.

AS.376.404. History of Musical Instruments. 3 Credits.
The history, technology, and performance of Western European musical instruments, their precursors, and their non-western counterparts, addressed by experts and explored on visits to historic collections.Recommended prerequisite: AS.376.231 "Western Classical Music".
Area: Writing Intensive

AS.376.407. Music and Evolution. 3 Credits.
This course will examine the bio-cultural evolution of music in light of recent interdisciplinary research on the social bases of human cognitive evolution, and explore its implications for current debates in musicology, ethno- musicology, psychology of music, and human cognitive evolution.
Area: Writing Intensive

AS.376.428. Mozart Operas. 3 Credits.
Wolfgang Amadeus Mozart wrote his first opera in 1767 at the age of 11. By the time of his death at age 35, he had written 22 full-length operas. Many of these operas are still performed today in opera houses around the world. In this course, we will discuss the enduring popularity of these works. We will discover how these operas were created, delving into the many important collaborations Mozart had with singers, librettists, impresarios, and patrons. We will analyze the words and music of the operas and how they combine to create three-dimensional characters for which his operas are known, such as the melancholy but determined Countess in The Marriage of Figaro, or the cowardly but loyal Papageno in The Magic Flute. Cultural norms have shifted dramatically between Mozart's time and ours, and we will examine how Mozart's operas have been received from their premieres through to today. We will think about how the operas have been translated, adapted, and circulated to different audiences in different eras and locations. Finally, we will reflect on our position as modern audience members, watching recent productions of the operas which reinterpret the works in alternative settings or times and studying the ways in which opera companies promote Mozart's works.
Area: Writing Intensive

Cross Listed Courses

First Year Seminars

AS.001.111. FYS: What's Music Do?. 3 Credits.
Why do we listen to music? What use is it? Does it have medical applications? How can it improve our lives? This First-Year Seminar looks at the various ways that music can change the world. WMD is for musician and non-musician alike. It is designed for students with all sorts of musical tastes and academic interests. It also challenges the usual "top down" approach of most courses, where the professor decides all the material that will be studied and leads all the class discussions. While I do assign certain texts and lead certain discussions, the students also determine much of what we study and lead many of our discussions. This means that sometimes you will be in the position of teacher and guide the rest of us to an understanding of your perspective. By honing your research skills, you will introduce us to your interests through many different media: film, essay, podcast, scientific paper, musical composition, etc. If you are a doctor in the making, you may diagnose the health benefits of music on Alzheimer's patients. If you are a dancer, you might ask how music-inspired movement strengthens society. Future scientists can wonder at music's ability to solve problems, and future philosophers can ponder music as a path to the good life. Meanwhile, musicians themselves might ask how music benefits its creators in contrast to its consumers, and whether they can control how their art gets used. Our listening will be similarly broad: from folk to popular, classical to jazz, and any other variety of sound you can convince us is musical. But the ultimate goal of this seminar and its diversity is not just to ask what music does for us as individuals and to pursue those isolated areas of interest. It is also to hone the foundational ability of communication: to read and to write for, to talk and to listen to our colleagues.

AS.001.117. FYS: Composer Biographies in Film. 3 Credits.
This First-Year Seminar focuses on the lives of Mozart, Beethoven, Schumann, and Chopin and the depictions of their lives in film during the 20th century. The seminar provides both an introduction to film analysis and music history biography. In the last module, we will examine the canon of Western art music composers and consider historiographical issues along lines of gender, race, and other American demographics within this inherited tradition--all toward a collaborative final project.

Modern Languages and Literatures

AS.211.374. Gendered Voices. 3 Credits.
The course will explore the notion of 'voice' in order to show how poetry, literature, philosophy, and music have been dealing with it throughout the ages. In particular, by focusing on classical figures such as the Sirens, Circe and Echo, as well as by considering the seminal discussions of the 'voice' in Plato and Aristotle, the course will address the gendered nature of the voice as a tool to seduce and manipulate the human mind. More specifically, the course will discuss the ways in which male, female, queer, gendered and un-gendered voices embody different functions. Course materials include classical, medieval and early modern sources as well as later rewritings of myths concerned with the voice by authors such as Jules Verne, Karen Blixen, Giuseppe Tomasi di Lampedusa, and Italo Calvino. A selection of theoretical works (e.g. Cavarero, Silverman, Dollar, Butler) will also be discussed. The course is taught in English and all materials will be available in English translation; Italian majors and minors should enroll in section 2.
Area: Writing Intensive

Recitals

PY.350.701. Computer Music Recital (UG). 2 Credits.
Undergraduate recital for Computer Music Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

For current faculty and contact information go to http://peabody.jhu.edu/faculty (http://peabody.jhu.edu/faculty/)

Music, Minor

Music Minor Requirements

http://krieger.jhu.edu/music/minor-requirements/

The School of Arts and Sciences offers a music minor to students majoring in other fields. The minor is intended for students who have some training and background in music and wish to pursue their interest in a systematic way without getting their degree in the field. It consists of a selection of music courses, including music history, music theory, ensembles, and/or lessons at Peabody. Students must earn a grade of C- or better in all courses applied towards the minor and courses can not be taken satisfactory/unsatisfactory without a formal appeal in writing and approvals by the program director and vice dean of undergraduate education.

Code	Title	Credits
AS.376.231	Western Classical Music	3
AS.376.211	Music Theory I	3
AS.376.221	Musicianship I	2
AS.376.212	Music Theory II	3
AS.376.222	Musicianship II	2
One music history course at any level		3
One 300- or 400-level music history course		3
Applied music experience (lessons/ensembles) [1]		0-2
Total Credits		**19-21**

[1] Two semesters of lessons or ensembles with the approval of minor advisor.

Applied Music Experience

Since the study of music should always take place in the context of practical music making, students completing the minor in music must participate in an applied music experience for at least two semesters. Students must select an applied music experience in consultation with their advisor, who will approve the applied music experience. These experiences are not required to be for academic credit. Most students will select either private instrument lessons at Peabody or participation in an ensemble at Peabody or on the Homewood campus.

Please consult the Krieger Music Minor pages for updates regarding audition dates and fees for credit lessons via Peabody Conservatory and non-credit lessons via Peabody Preparatory.

https://krieger.jhu.edu/music/music-lessons/

Natural Sciences Area Major

The Natural Sciences Area major allows students to combine appropriate upper-level courses in two different areas of natural science. Students may bridge biology and chemistry, chemistry and physics, or some other combination as long as the curriculum forms a coherent whole. The major prepares students for careers in medicine, dentistry, or veterinary science, if the introductory courses chosen by the student include those prescribed for admission to these professional schools.

Students selecting the Natural Sciences Area major can also go on to graduate study in natural science, though they may have to take some remedial work in graduate school, if their undergraduate program does not include courses usually required by a traditional major in a particular subject.

Programs

- Natural Sciences Area, Bachelor of Arts (p. 2030)

Natural Sciences Area, Bachelor of Arts

Natural Sciences Area Major Requirements

(Also see Requirements of a Bachelor's Degree (p. 1587).)

The Natural Sciences Area major allows students to combine appropriate upper-level courses in two different areas of natural science. Students may bridge biology and chemistry, chemistry and physics, or some other combination as long as the curriculum forms a coherent whole. The major prepares students for careers in medicine, dentistry, or veterinary science, if the introductory courses chosen by the student include those prescribed for admission to these professional schools.

Students selecting the Natural Sciences Area major also go on to graduate study in natural science, though they may have to take some remedial work in graduate school, if their undergraduate program does not include courses usually required by a traditional major in a particular subject.

The requirements of the natural sciences area major are:

Code	Title	Credits
Science and Math Core Courses		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.110.113	Honors Single Variable Calculus	
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.111	General Physics Laboratory I	1

AS.173.112	General Physics Laboratory II	1
Science Electives		
Natural science or quantitative credits at any level [1]		20
At least five courses of upper level natural science electives at the 300- or 400-level in at most 2 departments [2]		15
Humanities and Social Science Electives [3]		
Humanities or social science credits at any level [4]		12
At least four courses of humanities or social science electives at the 300- or 400-level in at most 2 departments		12
Total Credits		**85**

1. While students typically take these credits at the 100- or 200-level, 300- or 400-level N or Q credits not used to fulfill the upper level science elective credits may be used.
2. Laboratory, research, internship, and independent study courses may not be used. Permission to count courses from more than two departments is often granted if the material involved constitutes a coherent program (for example, biochemistry courses from Biology, Biophysics and Chemistry). No more than two (2) courses and no more than six (6) credits may be taken in appropriate areas of engineering, mathematics, applied math and statistics, or (N)-coded psychology.
3. At least 9 credits must be in the humanities and at least 9 credits must be in the social sciences.
4. While students typically take these credits at the 100- or 200-level, 300- or 400-level H or S credits not used to the fulfill the upper level humanities or social science electives may be used.

Minimum GPA Standards

Students must maintain an overall grade point average of 2.0 in their major. Satisfactory/unsatisfactory graded courses may not count towards major requirements.

Double Major Restrictions

Students majoring in another natural sciences major may not double major with the Natural Sciences Area Major.

Near Eastern Studies

http://neareast.jhu.edu/

The Department of Near Eastern Studies offers programs in four main areas: Egyptology, Assyriology, Northwest Semitic languages and literatures (including the Hebrew Bible), and Near Eastern Archaeology and art. The department approaches Near Eastern civilizations primarily through their own records, and language study is therefore an important part of the curriculum. However, many undergraduate courses require no knowledge of foreign languages and any interested student may take them.

Facilities

The university's Milton S. Eisenhower Library contains an outstanding collection of books and journals in the branches of Near Eastern studies pursued by the department. The Johns Hopkins Archaeological Museum has a collection of Near Eastern antiquities, including excellent study collections of Egyptian artifacts and Palestinian pottery. The Baltimore-Washington area is especially rich in library and museum facilities. Of special interest to students of the Near East are the Walters Art Museum, the Smithsonian Institution, and the Library of Congress.

Programs

- Near Eastern Studies, Bachelor of Arts (p. 2041)
- Near Eastern Studies, Minor (p. 2042)
- Near Eastern Studies, PhD (p. 2042)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.130.101. Ancient Near Eastern Civilizations. 3 Credits.
Review of important issues in ancient Near Eastern history and culture from the Neolithic era to the Persian period. Included will be an examination of the Neolithic agricultural revolution, the emergence of cities, states and writing, and formation of empires. Cultures such as Sumer and Akkad, Egypt, the Hittites, Israelites, Assyrians, Babylonians, and Persians will be discussed.

AS.130.119. Medicine in Ancient Egypt. 3 Credits.
A survey of medicine and medical practice in Egypt and, to a lesser extent, the ancient Near East in general. The abundant sources range from magical spells to surprisingly "scientific" treatises and handbooks. Readings are selected from translations of primary sources in the writings of ancient Egypt, Mesopotamia, and Israel. Topics will include the sources of our knowledge; the nature of medical practitioners, medical treatment, and surgery; beliefs about disease and the etiology of illness; concepts of contagion and ritual purity.

AS.130.124. Texts, Tablets, and Tweets: The Sociolinguistics of Writing. 3 Credits.
This course examines the evolution of writing and the relationship between speech and writing in ancient and modern societies. We will examine the ways in which orthography, scripts, and the visual components inherent to written language (e.g., scripts, fonts, emoticons, diacritics etc.) are used to create and/or project certain social identities in these new written spaces. A primary aim of this course is to generate discussion regarding the ways in which writing in all of its forms—at the institutional, group, and individual level, in official documents, in emails, texts, tweets, and graffiti, using standardized and non-standard orthographies, in both regulated and unregulated spaces—can be a social and often political act of identity. The writing assignments for the course will encourage you to consider the ways in which writing can be harnessed to express social identities. You will work as a group to develop your own writing system and present it to the class. This will hone your creative and critical thinking skills and give you practice collaborating on a project. You will also research and conduct an original analysis on a corpus of writing.

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.
A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.136. History of Hasidism. 3 Credits.
Although it appears to be a relic of pre-modern Judaism, Hasidism is a phenomenon of the modern era of Jewish history. This course surveys the political and social history of the Hasidic movement over the course of the last three centuries. Students will also explore basic features of Hasidic culture and thought in their historical development. Cross-listed with Jewish Studies.

AS.130.140. Hebrew Bible / Old Testament. 3 Credits.
The Bible is arguably the most read and yet most misinterpreted book of all time, one of the most influential and yet most misapplied work of literature. The Hebrew Bible (Old Testament) is Scripture to Jews and Christians yet also a rich collection of literature w/ numerous literary genres that has been highly influential on secular Western culture. At its core, it is our most important literary source that (when wed with archaeology) helps us to understand the people and culture of Iron Age Israel and Judah. This is an introductory course surveying of the books of the Hebrew Bible (Old Testament) giving primary attention to the religious ideas they contain and the ancient contexts in which they were composed. Topics include: The Academic Study of Religion, Ancient Creation Accounts, Ancestral Religion, The Exodus and Moses, Covenant, Tribalism and Monarchy, The Ideology of Kingship, Prophecy, Priestly Sources, Psalms, Wisdom Literature, and Apocalyptic Thought.

AS.130.152. After Babylon: Mesopotamia from Athens to Anime. 3 Credits.
This course is an exploration of how ancient Mesopotamian art, literature, history, and culture have been transmitted from the fall of Babylon in 539 BCE to the present day and the ways in which they have been adapted and transformed along the way. While all aspects of ancient Mesopotamia will be under discussion, the course will principally focus on the narratives of Gilgamesh, Semiramis/Shammuramat, and Sardanapalus/Assurbanipal. After briefly introducing ancient Mesopotamia, we will see how the region and its history are portrayed in biblical, Classical, Quranic, and medieval sources. From there we will discuss the “rediscovery” of Mesopotamia and the decipherment of cuneiform. The latter half of the course will then be devoted to Mesopotamia in 20th and 21st century popular culture.

AS.130.153. A (Virtual) Visit to the Louvre Museum: Introduction to the Material Culture of Ancient Egypt. 3 Credits.
This course will present the Egyptological collections of the musée du Louvre in Paris, room by room, as in a real visit. The experience will be enhanced by the study of objects that are not shown to the public but are kept in the reserves of the museum. From the 4th millennium BC to Roman time, the iconic “masterpieces” of this world-renowned art museum, as well as its little-known artifacts, will allow us to explore the history and material culture of ancient Egypt. We will also learn to observe, describe and analyze archaeological objects, in a global manner and without establishing a hierarchy between them, while questioning their place in the museum and its particular language. The objective will be to go beyond the objects themselves and answer, in fine, the following questions: What do these objects tell us about the men and women who produced them, exchanged them, used them, and lived among them in antiquity? What do they also reveal about those who discovered them in Egypt, several millennia later, about those who collected them and sometimes traded them, and what does this say about the relations between Egypt and the Western countries over time? The courses will be complemented by visits to the rich Egyptian collections in Baltimore.

AS.130.170. Diplomacy and Conflict in the Ancient Middle East. 3 Credits.
The Middle East is home to the invention of agriculture, cities, and writing. It is also in the Middle East that we find evidence of humanity’s earliest diplomatic activity in, for instance, the actual letters sent by ancient kings to one another, the treaties drawn up after their conflicts, and the inscriptions that commemorate their conquests. In this course, we examine texts such as these to explore questions such as: How do we characterize the international system of the ancient Middle East? Does this system change over the approximately two millennia for which we have documentation? Is it better to approach ancient diplomacy through present-day eyes or in the context of ancient world-views? Is an understanding of diplomacy in the ancient Middle East relevant to our understanding of modern international relations? All texts read in translation.

AS.130.177. World Prehistory: An Anthropological Perspective. 3 Credits.
How and why did our nomadic hunting and gathering ancestors become farmers? What led agricultural societies to build cities, develop writing, religious institutions, wage war, and trade for exotic goods? This course surveys prehistory and ancient history from the origins of human culture to the emergence civilization. Although prehistory and ancient history yield evidence of tremendous cultural diversity this course emphasizes common elements of past human experience, culture, and culture change. These include the origins of modern humans and their adjustment to a variety of post-ice age environments, shifts from hunting and gathering to agricultural lifeways, and the initial development of the world’s earliest cities and civilizations.

AS.130.202. Ancient Mythology. 3 Credits.
This course explores the mythology of the ancient Near East from the invention of writing in Sumer in 3000 B.C. until the conquest of Alexander the Great near the end of the first millennium B.C. Mythological texts from Mesopotamia, Egypt, Anatolia, the Levant, and the Bible will be read from a comparative perspective. Special attention is paid to the origin and development of the epic, culminating in the great Epic of Gilgamesh, but considerable time is also given to the vast mythological and historical literature, and such diverse genres as love poetry, proverbs, humorous dialogues, Omens, and legal and medical texts. All readings are in English translation.

AS.130.203. Archaeology of Africa: From Human Origins to the Emergence of Civilizations. 3 Credits.
This course examines Africa’s ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.130.214. The Origins of Civilization: A Cross-Cultural Perspective. 3 Credits.
One of the most significant transformations in human history was the “urban revolution” in which cities, writing, and social classes formed for the first time. In this course, we compare five areas where this development occurred: China, Mesopotamia, the Indus Valley, Egypt, and Mesoamerica (Mexico/Guatemala/Honduras/Belize). In each region, we review the physical setting, the archaeological and textual evidence, and the theories advanced to explain the rise (and eventual collapse) of these complex societies.

AS.130.216. History of the Jews in Pre-Modern Times, from the Middle Ages to 1789. 3 Credits.
A broad survey of the significant political and cultural dynamics of Jewish history in the Medieval, Early-Modern, and Modern Eras.

AS.130.223. Ancient Revolutions: The Archaeology of Culture Change. 3 Credits.
The last 250,000 years have seen many moments that could be referred to as “revolutions” in art, technology, or other aspects of human society. The “Human Revolution” of the Upper Paleolithic saw the birth of artistic ability and symbolic thinking in hominids. We call the transition from hunting and gathering to settled agriculture the “Neolithic Revolution,” while the “Urban Revolution” gave us complex societies and urban life. Times of dynamic change gave rise to important aspects of our shared behavioral and societal identity. They have become the subject not only of much archaeological investigation, but also of popular discourse about the human past. This class will explore famous cultural “revolutions” by looking at the causes and consequences of these important changes. We will evaluate the archaeological evidence, and through it interrogate the term “revolution” itself. What do we mean when we speak of “revolutions?” Are there other ways to think of past social and technological change, and when, if ever, do we truly see “revolutions” in the human condition in the ancient past?

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.246. Writing History in the Ancient Mediterranean World. 3 Credits.
Just what does it mean to "write history"? In this course, we will read a selection of historical texts from ancient Egypt, Mesopotamia, Greece, and Rome, in order to examine how these cultures conceived of, and narrated, their own pasts. A major focus will be how these texts were created in order to understand or control the present. We will also examine how these texts have come down to us, and in what ways this might affect how we use them in constructing our own historical narratives. No prior knowledge of the ancient world necessary; all texts read in English translation.
Area: Writing Intensive

AS.130.247. Digging for Legitimacy Archaeology, Museums, and Ideology. 3 Credits.
Archaeology was born out of Western Colonial endeavors into Africa, the Middle East, Asia, and the Americas. Large scale excavations conducted by the United Kingdom, France, Germany, Italy, and the United States resulted in the removal and transfer of valuable (culturally and monetarily) material culture from local stewards and stakeholders to the West. To this day the discipline of archaeology is still saddled by its colonial past and the Hollywood interpretation of archaeologists as saviors of ancient treasures. Today, most interaction between people and ancient objects is facilitated via the museum. In this course we will explore 19th- 21st century archaeological and museum practices and the role they play in modern narratives of identity and representation in the America and the Middle East. Students will engage with the historical, legal, economic, and ethical implications of archaeology and analyze how political, religious, cultural, and academic institutions have leveraged archaeology and cultural artifacts to reify and legitimize their pursuits and ideologies.

AS.130.248. Up the Nile: New Approaches to the History of Egyptology and Nubiology. 3 Credits.
King Tut, Napoleon, Champollion, Ozymandias, Nefertiti: the history of Egyptology is filled with big characters, huge monuments, and glimmering objects. But it is also made up of colonialist practices, looted sites, and forgotten scholarly contributions. “Up the Nile” examines the antiquarian, colonialist, racist, Western-centric, and patriarchal roots of modern Egyptology and Nubiology, and addresses how scholars and enthusiasts alike are continuing to grapple with these lasting legacies and biases. This class investigates how the Egyptians and Nubians thought of their own histories, as well as how other ancient cultures viewed the cultures of the Nile. It moves roughly chronologically, tracing understudied and marginalized voices from the Islamic, Medieval, and Ottoman periods into the 20th and 21st centuries. It examines the origins of scholarship, modern collecting, Egyptomania, and museums, delving into the problems and repercussions that still haunt us today. “Up the Nile” will engage with important and difficult aspects regarding Egyptology’s and Nubiology’s colonialist, racist, and sexist past and present. It asks: who decides who writes history, then and now?

AS.130.249. Everything She Says is Done for Her: Exploring the Spheres of Influence of Women in Ancient Egypt. 3 Credits.
How did women move within their gendered spheres of influence in ancient Egyptian society? How do scholars discuss women in the ancient world and what are the spheres influence often allotted to women? How can we investigate the lives of women through the material record? What methodologies are applied by scholars to study women in antiquity? This course seeks to explore these questions and much more. The course will utilize textual and material evidence to examine and deconstruct the economic, social, religious, and political roles of women in ancient Egypt.

AS.130.300. History of Ancient Mesopotamia. 3 Credits.
A survey of the history of Sumer, Babylonia, and Assyria.

AS.130.301. History of Ancient Syria-Palestine. 3 Credits.
A survey of the history of Ancient Syria and Canaan, including Ancient Israel.

AS.130.302. History: Ancient Syria-Palestine II. 3 Credits.
A survey of the history of Ancient Syria and Cannan, including ancient Israel. Taught with AS.134.661. Cross-listed with Jewish Studies.

AS.130.334. Egyptian Funerary Arts in the Archaeological Museum. 3 Credits.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.130.338. The Talmud as Read in the Middle Ages: The Sugya of Kavod HaBriot (Human Dignity). 3 Credits.
In the early Middle Ages the Talmud emerged as the defining document of official Jewish religion and culture, and remained so until the dawn of the Modern Era. Jewish scholars in many different countries, and in a wide variety of cultural contexts, developed certain ways of reading, interpreting, and applying the Talmud. In the process, they produced an immense corpus of commentary and law. This course will examine how and why the Talmud was studied in these centuries by Jews who mined it, subject by subject, for emotional, philosophical, and legal meaning.

AS.130.346. Introduction to the History of Rabbinic Literature. 3 Credits.
Broadly surveying classic rabbinic literature, including the Talmud and its commentaries, the legal codes and the response, this seminar explores the immanent as well as the external factors that shaped the development of this literature, the seminal role of this literature in Jewish self-definition and self-perception, and the role of this literature in pre-modern and modern Jewish culture.

AS.130.348. Survey Jewish History as Relected in Responsa Literature: How Immutable Judaism Wrestles with Change. 3 Credits.
How does a religious system which defines its ancient laws as God-given and unchangeable apply them to radically different and changing social, political and intellectual situations? This course explores the literature of "Questions and Answers"(She'elot u-Teshuvot), the Jewish legal responsa which have struggled to match Jewish religious law to modern life for fifteen centuries. A sweeping survey of Jewish history as revealed by one of its most impenetrable yet fascinating sources.

AS.130.353. Space Archaeology: An Introduction to Satellite Remote Sensing, GIS and GPS. 3 Credits.
This course introduces technologies archaeologists use to map ancient landscapes. These include Geographic Information Systems (GIS) mapping software, advanced Global Positioning System (GPS) receivers, and various types of satellite imagery. Taught together with AS.131.653.

AS.130.354. Archaeological Method and Theory. 3 Credits.
Climate change, population growth, war - what questions do archaeologists ask about the ancient past, how do they collect relevant evidence, and how do they arrive at satisfying answers to their questions? This course will review major theoretical currents in archaeology including evolutionary, cultural-historical, processual and post-processual approaches and discuss the future of archaeology as a scientific and humanistic discipline. Basic techniques for analyzing major categories of artifacts such as lithics, ceramics, archaeobotanical, and zooarchaeological materials will also be introduced.

AS.130.357. Geographic Information Systems in Archaeology. 3 Credits.
Applications of GIS in archaeology have recently expanded dramatically and GIS has now become an indispensable tool for archaeological research worldwide. This course will introduce the major applications of Geographic Information Systems (GIS) in archaeology. These include the history of GIS in archaeology, air photography and satellite imagery, predictive modeling, hydrological modeling, viewsheds, and least-cost routes. It will grapple with theoretical issues manifest in archaeological GIS including conflicts between environment and social understandings of the ancient past, and will foster discussion of issues that affect outcomes of analyses including spatial scale and boundary delineation choices that can dramatically influence results. Students will learn the basics of ESRI's ArcGIS software. Taught with AS.131.657.

AS.130.364. Archaeology of Arabia. 3 Credits.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.131.664.

AS.130.373. Prophets and Prophecy in the Bible. 3 Credits.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?

AS.130.376. Ancient Magic and Ritual. 3 Credits.
This course will introduce students to the vast body of rituals that were practiced and performed in antiquity, with a particular emphasis on rituals from ancient Mesopotamia, Egypt, and the Hebrew Bible. In addition to examining rituals from a comparative perspective, anthropological and sociological studies of ritual will be read and discussed to shed light on the social, cultural, and political significance of ritual in the ancient world and beyond.
Area: Writing Intensive

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.130.381. Elementary Akkadian. 3 Credits.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language. Co-listed with AS.132.600

AS.130.382. History of Mesopotamia II. 3 Credits.
A survey of the history of Sumer, Babylonia, and Assyria.

AS.130.383. Elementary Akkadian II. 3 Credits.
An introduction to the paleography, grammar, and lexicon of the Akkadian language, and the reading of simpler texts in that language.Continues AS.130.381

AS.130.388. Elementary Sumerian. 3 Credits.
An introduction to the paleography, grammar and lexicon of the Sumerian language, and the reading of simpler texts in that language.

AS.130.389. Elementary Sumerian II. 3 Credits.
An introduction to the paleography,, grammar and lexicon of the Sumerian language and the reading of simpler texts in that language.

AS.130.400. Introduction To Middle Egyptian. 3 Credits.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2055-1650 B.C.). In the second semester, literary texts and royal inscriptions will be read. Course meets with AS.133.600.

AS.130.401. Introduction To Middle Egyptian. 3 Credits.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2011- 1700 B.C.). Co-listed with AS.133.601.
AS.130.400 or equivalent.

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

AS.130.440. Elementary Biblical Hebrew. 3 Credits.
Introduction to the grammar, vocabulary, and writing system of biblical Hebrew.

AS.130.441. Elementary Biblical Hebrew II. 3 Credits.
Survey of grammar and reading of simple texts. May not be taken on a satisfactory/unsatisfactory basis. A continuation of Elementary Biblical Hebrew I.
AS.130.440

AS.130.442. Readings - Hebrew Prose. 3 Credits.
Reading of biblical Hebrew prose, especially from the Pentateuch, Joshua, Judges, Samuel, and Kings. Cross-listed with Jewish Studies.

AS.130.443. Readings - Hebrew Prose and Poetry. 3 Credits.
Reading of Biblical Hebrew Prose, from texts such as the Pentateuch, Joshua, Judges, Samuel, and Kings.

AS.130.501. Readings & Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.504. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.505. Archaeology Fieldwork. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.506. Independent Study-Archaeology Fieldwork. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.510. Archaeology Major Honors Thesis I. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.511. Archaeology Major Honors Thesis II. 3 Credits.
Area: Writing Intensive
AS.130.510;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.590. Independent Study. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.131.600. Seminar Near Eastern History.
Seminar in Near Eastern History.

AS.131.601. Seminar Near Eastern History: Mesopotamia.
A three-year history cycle required of all graduate students and forming the core of our graduate program. One year each will be devoted to Egyptian history, Mesopotamian history, and Syro-Palestinian history.

AS.131.613. Archaeology of Africa: From Human Origins to the Emergence of Civilizations.
This course examines Africa's ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.131.634. Seminar: Near Eastern Archaeology.
Topic varies but can include the archaeology of Mesopotamia, Syria, or Palestine, or thematic discussions (e.g., on ideology, state collapse, etc.).

AS.131.635. Seminar: Near East Archaeology.
Topic varies but can include the archaeology of Mesopotamia, Syria, or Palestine, or thematic discussions (e.g., on ideology, state collapse, etc.).

AS.131.653. Space Archaeology: An Introduction to Satellite Remote Sensing, GIS and GPS.
This course introduces technologies archaeologists use to map ancient landscapes. These include Geographic Information Systems (GIS) mapping software, advanced Global Positioning System (GPS) receivers, and various types of satellite imagery. Taught together with AS.130.353.

AS.131.654. Advanced Archaeological Method and Theory.
Climate change, population growth, war - what questions do archaeologists ask about the ancient past, how do they collect relevant evidence, and how do they arrive at satisfying answers to their questions? This course will review major theoretical currents in archaeology including evolutionary, cultural-historical, processual and post-processual approaches and discuss the future of archaeology as a scientific and humanistic discipline. Basic techniques for analyzing major categories of artifacts such as lithics, ceramics, archaeobotanical, and zooarchaeological materials will also be introduced.

AS.131.657. Geographic Information Systems in Archaeology.
Applications of GIS in archaeology have recently expanded dramatically and GIS has now become an indispensible tool for archaeological research worldwide. This course will introduce the major applications of Geographic Information Systems (GIS) in archaeology. These include the history of GIS in archaeology, air photography and satellite imagery, predictive modeling, hydrological modeling, viewsheds, and least-cost routes. It will grapple with theoretical issues manifest in archaeological GIS including conflicts between environment and social understandings of the ancient past, and will foster discussion of issues that affect outcomes of analyses including spatial scale and boundary delineation choices that can dramatically influence results. Students will learn the basics of ESRI's ArcGIS software.Taught with AS.130.357.

AS.131.664. Archaeology of Arabia.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.130.364.

AS.131.678. Geoarchaeology: Applications of Earth Science to Archaeology.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.131.800. Readings & Research.

AS.131.801. Readings And Research.

AS.131.848. Dissertation Research.

AS.131.849. Dissertation Research.

AS.131.850. Summer Independent Research.
Independent summer research

AS.132.600. Elementary Akkadian.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language.

AS.132.601. Elementary Akkadian II.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language.

AS.132.606. Intermediate Akkadian Texts.
In this course a selection of intermediate level Akkadian texts from different genres and period will be read, analyzed and discussed. To build on skills learned in Introduction to Akkadian, specific emphasis will be placed on understanding more advanced grammatical forms and learning how to critically use research tools like the Chicago Assyrian Dictionary and von Soden's Akkadisches Handwoerterbuch.

AS.132.607. Intermediate Akkadian Texts.
In this course a selection of intermediate level Akkadian texts from different genres and period will be read, analyzed and discussed. To build on skills learned in Introduction to Akkadian, specific emphasis will be placed on understanding more advanced grammatical forms and learning how to critically use research tools like the Chicago Assyrian Dictionary and von Soden's Akkadisches Handwoerterbuch.

AS.132.608. Akkadian Letters.
This course introduces students to letters written in the Akkadian language from a variety of historical periods. Recommended course background: AS.132.600 and AS.132.601.

AS.132.609. Seminar in Research Methods in Near Eastern Studies.
Area: Writing Intensive

AS.132.612. Advanced Akkadian.
Students read texts in the original Akkadian cuneiform with attention to their philological, archaeological, historical, and literary features. The seminar topic varies from semester to semester but usually consists either of texts of various genres from a single period (e.g., Neo-Assyrian) or texts of various period from a single genre (e.g., letters).

AS.132.631. Literature and Religious Texts.

AS.132.643. Ancient Magic and Ritual.
This course will introduce students to the vast body of rituals that were practiced and performed in antiquity, with a particular emphasis on rituals from Ancient Mesopotamia, Egypt, and the Hebrew Bible. In addition to examining rituals from a comparative perspective, anthropological and sociological studies of ritual will be read and discussed to shed light on the social, cultural, and political significance of ritual in the ancient world and beyond.

AS.132.644. Treaties And Diplomacy.
Reading treaties and related materials in Akkadian.

AS.132.701. Elementary Sumerian II.

AS.132.710. Advanced Sumerian.
We will read Letter Collection B and related materials in the original cuneiform.

AS.132.711. Advanced Sumerian.
In this course a selection of Sumerian texts from different periods and genres will be read and discussed from a linguistic, philological, historical, and literary perspective.

AS.132.800. Mesopotamian Seminar.
Research and discussion on topics of current interest.

AS.132.801. Mesopotamian Seminar.
Research and discussion on topics of current interest.

AS.133.304. Let's Play! Games from Ancient Egypt and Beyond. 3 Credits.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.600. Introduction To Middle Egyptian.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2135-2000 B.C.). In the second semester, literary texts and royal inscriptions will be read.

AS.133.601. Introduction To Middle Egyptian (Hieroglyphs).
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2011-1700 B.C.). Co-listed with AS.130.401
AS.133.600 or equivalent.

AS.133.610. Middle Egyptian Texts.
In this course we read a variety of Middle Egyptian hieroglyphic compositions and documents. Knowledge of Middle Egyptian Required.

AS.133.611. Middle Egyptian Texts.
In this course we read a variety of Middle Egyptian hieroglyphic compositions and documents. Knowledge of Middle Egyptian Required.

AS.133.616. Let's Play! Games from Ancient Egypt and Beyond.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.620. Hieratic.

AS.133.630. Old Egyptian.

AS.133.631. Old Egyptian.

AS.133.640. Late Egyptian.

AS.133.641. Late Egyptian Texts.
An introduction to the grammar and texts of Late Egyptian.

AS.133.646. Demotic Texts.

AS.133.647. Demotic Texts.

AS.133.648. Intro To Coptic.

AS.133.649. Advanced Coptic.
In this class we will read Coptic texts of various genres.

AS.133.706. Egyptian Funerary Arts in the Archaeological Museum.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.133.751. Seminar in Egyptian Art and Archaeology: Egyptian Art in Museums.
This course will utilize Egyptian collections in museums as a basis for studying Egyptian art. An aim is to evaluate how the experience of the objects impacts approaches to the discipline.

AS.134.101. GOD 101: The Early History of God - Origin, Character, Practice. 3 Credits.
In a world of big ideas, there is none larger than that of God. Divinity is an ever-present topic for both religious devotees and hard core secularists —for anyone who embraces the humanities or ponders what makes us human. Humans are, for better and worse, homo-religiosus (humans who practice religion) as much as homo-sapiens. But what do we know of God historically? How do we go about reconstructing divinity from ancient texts and archaeology? How do we best walk back in time to understand ancient Middle Eastern cultures that gave birth to notions of the divine that have come down to today's Judaism, Christianity and Islam? This course looks synthetically at the vast topic of God—exploring questions of historical origin, how God was characterized in literature (mythic warrior, king, parent, judge, holy, compassionate) and how God was represented in iconography, both materially and abstractly. Secondly, how did belief intersect with practice? Using the indow of divinity, this course will peer into the varieties of religion experience, exploring the royal use of religion for power, prestige and control balanced against the intimacy of family and household religion. It will probe priestly prerogatives and cultic status, prophetic challenges to injustice, and the pondering of theodicy by poetic sages.

AS.134.301. Introduction to the Pentateuch. 3 Credits.
This course surveys the linguistic and literary structure of the Pentateuch, with a focus on P and non-P in Genesis and Exodus. A second and equally important focus will be the history of scholarship and its broader impact on the study of the history and religion of ancient Israel and Judah. We will examine critical issues in the study of the Pentateuch, focusing on scholarly reconstructions of composition and redaction and key literary themes. Throughout our examination of the biblical text, we will also address parallels to other ancient Near Eastern corpora.

AS.134.400. Northwest Semitic Epigraphy. 3 Credits.
This course will provide an introduction to West Semitic dialects as reflected in inscriptions from the first millennium BCE. We will survey the grammar (phonology, morphology, syntax, and lexicon) of epigraphic Hebrew, Phoenician, and known Transjordanian languages (Moabite, Ammonite, Edomite). We will also discuss the methodological challenges inherent to the study of script evolution, scribalism, and the reconstruction of NWS languages through the study of inscriptions. This course will also introduce students to scholarship outside of the field of NWS and Hebrew Bible on literacy, the study of visual grammar, and the socio-semiotic approach to the study of writing.

AS.134.404. The Book of Job. 3 Credits.
Reading portions of the Book of Job in Hebrew. In addition to increasing proficiency in biblical Hebrew, the course also involves critical exegesis including grammatical analysis and textual criticism. Students will interact with various aspects of interpretation for the Book of Job (e.g., philology, text history, structure, literary history, message, poetics, rhetoric, philosophy, theology and reception history).

AS.134.406. Kings, Prophets, and Scribes: The Creation of "Israel" in the Deuteronomistic History. 3 Credits.
This class will introduce students to "The Deuteronomistic History," which comprises the biblical books of Deuteronomy, Joshua, 1-2 Samuel and 1-2 Kings. The narrative arc of this "history" spans the giving of the law to Moses to the rise and fall of the monarchies of Israel and Judah, respectively in the Neo-Assyrian and Neo-Babylonian periods. During this course we will examine the reasons why biblical scholars have argued in varying ways that this body of text represents the work of a group of ideologically driven scribes, the Deuteronomists; we will also investigate the primary texts themselves for evidence for divergent views about the need for a king in Israel and the role and fate of the royal house of David. We will also explore the relationship between the books of the former prophets (Joshua>2 Kings) and Deuteronomy, which is a book that concludes the Pentateuch. This course requires students to engage with the biblical text in the original Hebrew language at an advanced level. We will also engage with biblical scholarship regarding the scope, purpose, and nature of a cohesive Deuteronomistic History, as well as with dissenting voices that probe the unity of these biblical books.

AS.134.408. The Book of Ezekiel. 3 Credits.
A rapid reading course aimed at increasing proficiency in reading the Hebrew text of the book of Ezekiel. Various aspects of translation and interpretation will be studied (e.g., grammar, textual criticism, Philology) including literary, historical, and theological questions.

AS.134.409. Prophets and Prophecy in the Hebrew Bible. 3 Credits.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?"

AS.134.410. Kings and Chronicles. 3 Credits.
This course surveys scholarship on the histories of Israel and Judah as presented in Kings and Chronicles. The course also addresses changes in the Hebrew language in the first millennium BCE.
AS.130.440 OR AS.130.441

AS.134.450. Seminar in Hebrew: Archaic Biblical Poetry. 3 Credits.
Translation and analysis of selected texts in Biblical Hebrew giving attention to advanced features of grammar and syntax. Topic: "Archaic Biblical Poetry".

AS.134.604. The Book Of Job.
Reading portions of the Book of Job in Hebrew. In addition to increasing proficiency in biblical Hebrew, the course also involves critical exegesis including grammatical analysis and textual criticism. Students will interact with various aspects of interpretation for the Book of Job (e.g., philology, text history, structure, literary history, message, poetics, rhetoric, philosophy, theology and reception history)

AS.134.606. Kings, Prophets, and Scribes: The Creation of "Israel" in the Deuteronomistic History.
This class will introduce students to "The Deuteronomistic History," which comprises the biblical books of Deuteronomy, Joshua, 1-2 Samuel and 1-2 Kings. The narrative arc of this "history" spans the giving of the law to Moses to the rise and fall of the monarchies of Israel and Judah, respectively in the Neo-Assyrian and Neo-Babylonian periods. During this course we will examine the reasons why biblical scholars have argued in varying ways that this body of text represents the work of a group of ideologically driven scribes, the Deuteronomists; we will also investigate the primary texts themselves for evidence for divergent views about the need for a king in Israel and the role and fate of the royal house of David. We will also explore the relationship between the books of the former prophets (Joshua>2 Kings) and Deuteronomy, which is a book that concludes the Pentateuch. This course requires students to engage with the biblical text in the original Hebrew language at an advanced level. We will also engage with biblical scholarship regarding the scope, purpose, and nature of a cohesive Deuteronomistic History, as well as with dissenting voices that probe the unity of these biblical books.

AS.134.607. Texts, Tablets, and Tweets: The Sociolinguistics of Writing.
This course examines the evolution of writing and the relationship between speech and writing in ancient and modern societies. We will examine the ways in which orthography, scripts, and the visual components inherent to written language (e.g., scripts, fonts, emoticons, diacritics etc.) are used to create and/or project certain social identities in these new written spaces.A primary aim of this course is to generate discussion regarding the ways in which writing in all of its forms—at the institutional, group, and individual level, in official documents, in emails, texts, tweets, and graffiti, using standardized and non-standard orthographies, in both regulated and unregulated spaces—can be a social and often political act of identity. The writing assignments for the course will encourage you to consider the ways in which writing can be harnessed to express social identities. You will work as a group to develop your own writing system and present it to the class. This will hone your creative and critical thinking skills and give you practice collaborating on a project. You will also research and conduct an original analysis on a corpus of writing.

AS.134.608. Book Of Ezekiel.
A rapid reading course aimed at increasing proficiency in reading the Hebrew text of the book of Ezekiel. Various aspects of translation and interpretation will be studied (e.g., grammar, textual criticism, Philology) including literary, historical, and theological questions. Cross-listed with Jewish Studies.

AS.134.609. Prophets and Prophecy in the Hebrew Bible.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?"

AS.134.623. Pentateuch.
This course surveys the linguistic and literary structure of the Pentateuch. A second and equally important focus will be the history of scholarship and its broader impact on the study of the history and religion of ancient Israel and Judah.

AS.134.650. Seminar in Hebrew:.

AS.134.651. Seminar: Hebrew.

AS.134.652. Seminar in Ancient Israelite Religion.
Topics include history of scholarship, methodology, representations of deity, the aniconic tradition, solar Yahwism, sacred space, blood rituals, passover, royal cult, family religion, divination, prophecy, incantations, etc.

AS.134.660. History of Ancient Syria/Palestine.
A survey of the history of Ancient Syria and Canaan, including Ancient Israel.

AS.134.661. History: Ancient Syria-Palestine II.
A survey of the history of Ancient Syria and Cannan, including Ancient Israel.

AS.134.700. Northwest Semitic Epigraphy.

AS.134.720. Ugaritic I.
A year-long course studying Ugaritic language and literature. The first semester will focus on grammar and translating a representative selection of mythological texts. The second semester will concentrate on ritual texts. The course will also be epigraphic in nature using both conventional and digital techniques.

AS.134.721. Ugaritic II.
A continuation of AS.134.720 with emphasis on the mythological and ritual texts from Ugarit. A digital epigraphy lab will also form part of the course.

AS.134.744. Survey Of Aramaic Texts.

AS.134.747. Archaic Aramaic.
An advanced course in Aramaic devoted to the study of Old Aramaic inscriptions. We will be translating and analyzing a selection of texts from Northern Syria (e.g. Bar-Rakib; Hadad; Kuttamuwa, Nerab, Panamuwa, Sefire, Zakkur), Southern Syria (e.g. Bar-Hadad/Melqart Stela, Hazael, Tel Dan) and Northern Mesopotamia (e.g. Tell Fakhariyah). Students will be expected to vocalize such texts as a study in historical and comparative linguistics and to clarify their understanding of the morphology and syntax.

Cross Listed Courses

Archaeology

AS.136.101. Introduction To Archaeology. 3 Credits.
An introduction to archaeology and to archaeological method and theory, exploring how archaeologists excavate, analyze, and interpret ancient remains in order to reconstruct how ancient societies functioned. Specific examples from a variety of archaeological projects in different parts of the world will be used to illustrate techniques and principles discussed.

Classics

AS.040.216. Exploring the Ancient Astronomical Imagination. 3 Credits.
This course takes us on an exploratory journey through the ancient astronomical imaginary. We will focus on ancient Greek and Roman ideas about the structure of the cosmos, the substance and nature of the stars, the Earth's place and role in the universe, ancient attempts to map the stars, and ancient beliefs about the significance of cosmic phenomena for events in the human world. The course will culminate in the extraordinary ancient tradition of lunar fictions, which are our earliest imaginative accounts of life on other worlds. Come join us for a voyage to the stars!

Earth & Planetary Sciences

AS.270.205. Introduction to Geographic Information Systems and Geospatial Analysis. 3 Credits.
The course provides a broad introduction to the principles and practice of Geographic Information Systems (GIS) and related tools of Geospatial Analysis. Topics will include history of GIS, GIS data structures, data acquisition and merging, database management, spatial analysis, and GIS applications. In addition, students will get hands-on experience working with GIS software.

First Year Seminars

AS.001.147. FYS: Reading Ancient Middle Eastern Literature. 3 Credits.
The Middle East is home to some of the world's earliest and most important literature. In this First-Year Seminar, students will read in translation a selection of texts from different traditions that flourished in the pre-Islamic Middle East. Sample readings include the Epic of Gilgamesh, the Descent of Ishtar to the Netherworld, and the battle between David and Goliath from the Hebrew Bible. As we read, we will consider why ancient Middle Eastern literature may be more relevant to our own present moment than ever before.

History

AS.100.374. Conquest, Conversion, and Language Change in the Middle Ages. 3 Credits.
Examines case-studies of imperial conquests (Islamic, Mongol, reconquista, early colonialism) and attendant changes in religion (Christianization; Islamization) and in language (Arabization; transition from Latin to European vernaculars) across medieval Eurasia.

AS.100.383. Conversion and Apostasy in the Middle Ages. 3 Credits.
Compares religious transformation in medieval Europe and the Middle East (ca. 600-1500), including conquest and conversion; conversion narratives; apostasy, martyrdom and other encounters between medieval Jews, Christians, and Muslims. Pre-requisite for enrollment: Students must have taken one history course.

AS.100.615. States, Scribes, and Archives: Medieval Arabic Documentary Cultures.
Historical survey of scribal and archiving practices of medieval Islamic states (in comparative perspective); includes close readings of primary documents, including legal deeds, petitions, edicts, fiscal receipts, and administrative reports.

AS.100.682. Introductory Topics in Computation for Scholarship in the Humanities.
The first half of this seminar course consists of non-mathematical introductions to, and discussions of, the fundamental motivations, vocabulary, and methods behind computational techniques of particular use for humanistic research. The second half combines selected readings chosen to address specific questions raised by these discussions with hands-on application to students' research goals. Each participant will lead discussion for one of the selected readings relevant to their interests.

History of Art

AS.010.205. Art of Mesoamerica. 3 Credits.
This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.240. Art and the Environment in the Ancient Eastern Mediterranean. 3 Credits.
What is the relationship between art and the environment? What are “geoaesthetics?” This course explores the interrelationships between ecosystem and creative responses and practices in the ancient Eastern Mediterranean. Specifically, the class will examine the intersections between artistic and architectural practices and the natural environment during the New Kingdom in ancient Egypt, the Neo-Assyrian period in ancient Mesopotamia, and the Minoan Bronze Age in the ancient Aegean.

AS.010.301. Michelangelo: Religion, Sexuality, and the Crisis of Renaissance Art. 3 Credits.
The course will focus on the controversies surrounding the representation of the body in the writings and figurative art of Michelangelo and his contemporaries, the historical circumstances under which the most admired artist in Europe was attacked as a blasphemer and an idolator, and the effect of widespread calls for censorship on his later production. The writings of Michelangelo, Pietro Aretino, Benvenuto Cellini and own writings will be considered with a focus on their staging of an ambivalent and transgressive eroticism.

AS.010.307. Diplomats, Dealers, and Diggers: The Birth of Archaeology and the Rise of Collecting from the 19th c. to Today. 3 Credits.
The development of archaeology in the Middle East – its history of explorers, diplomats, missionaries and gentlemen-scholars – profoundly shaped the modern world, from the creation of new museums and the antiquities market to international relations and terrorism.

AS.010.315. Art of the Assyrian Empire, 1000-600 BCE. 3 Credits.
From 900 to 609 BCE, the Assyrian Empire dominated the ancient Near Eastern world, stretching from western Iran to the Mediterranean and Egypt. In concert with imperial expansion came an explosion of artistic production ranging from palace wall reliefs to small-scale luxury objects. This course provides an integrated picture of the imperial arts of this first world empire, situating it within the broader social and political contexts of the first millennium BCE. In its conquest of foreign lands, this powerful state came in contact with and appropriated a diversity of cultures, such as Phoenicia, Egypt, and Greece, which we will also study.

AS.010.319. Medieval Art and Architecture of the Holy Land. 3 Credits.
The course focuses on art and architecture in the political and religious contexts of the Middle East, from the 4th to the 14th c. The three monotheistic religions all claimed specific territories -- in particular the city of Jerusalem -- for cult practices. This situation resulted in military conflicts that had an impact of Jewish, Medieval, Byzantine, and Islamic art in the Holy Land. The political conflicts, which still plague the region today, are rooted in the complex situation of the medieval period. The Roman, Arab, Byzantine, and crusader invasions resulted however in exciting eclectic styles that characterize the art and architecture of the region. We will discuss concepts behind political and religious leadership, as they intersect with the power of the arts.
Area: Writing Intensive

AS.010.349. Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE. 3 Credits.
The arts of Egypt, Greece and the Near East are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. From 2000 to 500 BCE (the Middle/Late Bronze and Iron Ages), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Egyptians, Near Easterners, Greeks and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war, imperialism, and colonization.
AS.010.301 - Titled "Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE" - Students who have taken that course in 2014 or prior are not permitted to take this course.

AS.010.364. Babylon: Myth and Reality. 3 Credits.
Babylon – the name resonates even today, from the biblical whore of Revelation to sci-fi. It evokes exotic places and time long past. But what do we really know about the ancient city and the civilization that flourished there thousands of years ago? The first part of this course examines the archaeological city of Babylon, located in the modern state of Iraq, and considers its artistic and architectural achievements in the context of Mesopotamian history. The second part of the class explores the ongoing impact of Babylon in the cultural imagination of later periods, from the Classical and biblical authors, to European artists, Hollywood movies, science fiction, and contemporary political movements.

AS.010.389. The Stone and the Thread. 3 Credits.
Advanced inquiry into imperial Inka architecture and fiber arts.
Area: Writing Intensive

AS.010.398. Tombs for the Living. 3 Credits.
Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.444. Classics Research Lab: Antioch Recovery Project (ARP). 3 Credits.
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term “narcissism”. Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard’s Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

AS.010.611. Seminar in Near Eastern Art.

AS.010.625. Art and Interaction in the Bronze Age Eastern Mediterranean.
The arts of the Near East, Aegean and Egypt are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. During the Bronze Age (3000 to 1200 BCE), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Near Easterners, Greeks, Egyptians and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war and imperialism.Students are not expected to have extensive knowledge of all the areas, although some experience in at least one of them will be helpful. The course will interweave establishing a knowledge base necessary to tackle this topic with broader conceptual concerns and interdisciplinary approaches (art historical, archaeological, anthropological, and historical).There will be a final paper.

AS.010.646. Art and Architecture at the Eastern Frontier: Medieval Georgia.
This seminar investigates the fascinating landscape of medieval art and architecture of Georgia. Its specific geographic position in the South Caucasus, at the cross roads between the East and West, the Christian and Islamic Worlds, had a profound impact on the art and architecture in the region. Ancient sites show close connections with the Graeco-Roman World on the western border and with the Sassanid Empire in the East. The Christianization of the Kingdom of Kartli in the early fourth century resulted in close ties with the development of early Christian art in Syria, the Holy Land, and Byzantium. While the Christian religion remained an identifying factor during several hundred years of Muslim rule (736 to 1122) during which the city of Tbilisi was the capital of an emirate, Islamic motifs and style became an important factor for art works in medieval Georgia. Art and architecture with a specific Byzantine profile flourished in particular after the reunification of Georgia during the reign of King David the Builder (1073- 1125) and Queen Tamar (1184 to 1213). The cathedral and monastery of Gelati and Mzcheta, the murals in the royal monasteries of Vardzia and Khintsvisi, and the countless icons are a testimony to this relationship. We will discuss the specific diverse aesthetics and materiality (stone, enamel and metal works) of Georgian art with the goal to reassess the map of medieval art and architecture that currently does not include the Eastern Frontier. A mandatory c. 10 days field trip to Georgia is planned after classes end in May 2020.
Area: Writing Intensive

Medicine, Science and the Humanities

AS.145.101. Death and Dying in Art, Literature, and Philosophy: Introduction to Medical Humanities. 3 Credits.
In this course, four essential aspects of the theme of death and dying will be examined: Death and Medicine; Emotional Responses to Death; Burying and Commemorating the Dead; and Conceptions of Death. Specific topics relating to each of these aspects that will be covered include illness and causes of death; prevention of death; suicide; death and grief; burial practices; mourning the dead; public commemoration of the dead; life after death; and death and rebirth. Students will explore these topics from a historical-anthropological perspective with Paul Delnero, a specialist in the history and culture of the ancient Near East (Near Eastern Studies); from a literary perspective, by reading and writing poetry relating to these subjects with the acclaimed poet James Arthur (Writing Seminars); and from a musical perspective, through direct encounters with the music and creative process of the award-winning composer, Michael Hersch (Peabody).
Area: Writing Intensive

Program in Museums and Society

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

For current faculty and contact information go to http://neareast.jhu.edu/people/

Near Eastern Studies, Bachelor of Arts

Near Eastern Studies Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

The ancient Near East is where history begins. It is where the first crops were sown, the first towns built, and where writing was first invented. The origins of Western culture are to be found in its great civilizations, from the three great monotheistic religions—Christianity, Islam, and Judaism—to everyday aspects of our life that we take for granted, such as the alphabet and marking time by hours and minutes. The Near Eastern studies major can be the focal point of a broad liberal arts education, as well as a basis for graduate study. An undergraduate major can specialize in one of the four main areas of specialization of the department - Egyptology, Assyriology, Northwest Semitic languages and literatures (including the Hebrew Bible), and Near Eastern Archaeology and Art - or in the civilizations of the ancient Near East in general.

Students must earn a "C-" or higher grade in all courses used to satisfy major requirements and courses may not be taken satisfactory/unsatisfactory. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the major without permission of the Director of Undergraduate Studies.

Code	Title	Credits
Introductory Courses		
Select two of the following:		6
AS.130.101	Ancient Near Eastern Civilizations	
AS.130.126	Gods and Monsters in Ancient Egypt	
AS.130.140	Hebrew Bible / Old Testament	
AS.130.170	Diplomacy and Conflict in the Ancient Middle East	
Upper-Level Core Courses		
Select two of the following:		6
AS.130.301	History of Ancient Syria-Palestine	
AS.130.302	History: Ancient Syria-Palestine II	
AS.130.300	History of Ancient Mesopotamia (when offered)	
AS.130.382	History of Mesopotamia II (when offered)	
Four 300-level courses in a focus area of art and archaeology, history and culture, or language [1]		12
Three Near Eastern Studies courses at any level		9
AS.130.420	Seminar in Research Methods in Near Eastern Studies	3
Total Credits		**36**

[1] Students pursuing the language focus area need to select four courses from the following languages: Akkadian, Arabic, Ancient Egyptian, Biblical Hebrew, Modern Hebrew or Sumerian. These may not be 300-level.

Note: AS.130.420 Seminar in Research Methods in Near Eastern Studies - This writing intensive seminar covers different selected topics in order help students develop skills in specific research areas such as critical reading, analysis, interpretation, and writing. Specific topics vary each semester. AS.130.420 Seminar in Research Methods in Near Eastern Studies is required of NES Majors, but is also open to non-majors who have taken at least one 100-level and one 300-level Near Eastern Civilization course, or with the consent of the instructor. It is recommended that NES majors take the class during their sophomore or junior years.

Sample Program of Study

A typical path toward degree completion might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
Near Eastern elective at any level #1		3
	Credits	**3**
Second Semester		
Required intro course #1		3
	Credits	**3**
Second Year		
First Semester		
Required intro course #2		3
	Credits	**3**
Second Semester		
Near Eastern elective at any level #2		3
Course in focus area at 300 level #1		3
	Credits	**6**
Third Year		
First Semester		
Required upper level core course #1		3
AS.130.420	Seminar in Research Methods in Near Eastern Studies	3
	Credits	**6**
Second Semester		
Required upper level core course #2		3
Course in focus area at 300 level #2		3
	Credits	**6**
Fourth Year		
First Semester		
Course in focus area at 300 level #3		3
Near Eastern elective at any level #3		3
	Credits	**6**
Second Semester		
Course in focus area at 300 level #4		3
	Credits	**3**
	Total Credits	**36**

Honors

Those seniors wishing to be considered for departmental honors may choose to write a senior thesis. A student must maintain a 3.5 GPA in the major (through the junior year) to be eligible for departmental honors. It is advisable for such students to contact a faculty member to supervise the thesis during the spring semester of their junior year and to notify the department's Director of Undergraduate Studies. The student should then register for two semesters of independent study in the senior year. The student will need to complete the thesis and submit it for approval to their faculty advisor in the final semester of their coursework.

Near Eastern Studies, Minor

Near Eastern Studies Minor Requirements

To minor in Near Eastern Studies, a student must complete six courses (18 credits) from among the department's offerings. One of these courses must be from among the Department's regularly offered introductory courses to the ancient Near East: AS.130.101 Ancient Near Eastern Civilizations; AS.130.126 Gods and Monsters in Ancient Egypt; and AS.130.170 Diplomacy and Conflict in the Ancient Middle East. The remaining five courses are selected, in consultation with the director of undergraduate studies in Near Eastern Studies, to meet the needs and interests of the student. Minors may wish to survey all of the different fields covered by the department or to focus on a single ancient language, culture, or methodology in more depth.

Students must earn a "C-" or higher grade in all courses used to satisfy minor requirements and courses may not be taken satisfactory/unsatisfactory. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies. All courses must be at least 3 credits.

Code	Title	Credits
Select one of the following:		3
AS.130.101	Ancient Near Eastern Civilizations	
AS.130.126	Gods and Monsters in Ancient Egypt	
AS.130.140	Hebrew Bible / Old Testament	
AS.130.170	Diplomacy and Conflict in the Ancient Middle East	
5 Additional Near Eastern Studies Courses (AS.130.xxx)		15
Total Credits		**18**

Near Eastern Studies, PhD

The graduate program, the oldest of its kind in the nation, is designed to train professional scholars and teachers in four main areas: Egyptology, Assyriology, Northwest Semitic languages and literatures (including Hebrew Bible), and Near Eastern archaeology and art. The courses may be modified in particular years to suit the needs of students currently in residence. Reading and private study under the direction of the faculty are considered as important as work in class. The seminars allow small groups of students and faculty to engage in close study of special problems. As the program is intended to lead to the Ph.D., students are admitted as candidates for the M.A. only in unusual cases.

Financial Aid

The department awards all students admitted to the Ph.D. program an annual fellowship covering full tuition and a full stipend for living expenses for up to five years. During this period, students may be occasionally asked to serve as a teaching or research assistant. In addition, the period of support may be extended by the various competitive awards available to advanced students within the university. When appropriate, the department will award travel stipends for graduate students to participate in archaeological excavations in the Near East or visit collections in this country and abroad.

For further information on graduate study in Near Eastern Studies, visit the departmental website at http://neareast.jhu.edu/.

Program Requirements

Students working full time toward the Ph.D. may expect to do three to four years of course work, after which comprehensive examinations must be written before work on the dissertation begins. The examinations cover a student's major and minor fields of concentration. After passing these examinations, the student, in consultation with the faculty, prepares a dissertation proposal for faculty consideration and then proceeds to write the dissertation.

An ability to read scholarly French and German is necessary, and an examination in one of these must be passed within the first semester of residence at Hopkins. The examination in the other may be delayed not more than one year. Some command of Greek and Latin is necessary to pursue biblical studies.

Neuroscience

http://krieger.jhu.edu/neuroscience (http://krieger.jhu.edu/neuroscience/)

Neuroscience is the study of the nervous system and how it functions. Neuroscientists study the nervous system from all levels, ranging from molecules interacting with cell membranes to brain systems subserving cognitive functions such as language. Dramatic progress has been made at all levels, and the field continues to grow. On the Homewood campus, researchers studying the nervous system are in the departments of Biology, Biomedical Engineering, Biophysics, Cognitive Science, and Psychological and Brain Sciences and in the Krieger Mind/Brain Institute. Their presence provides the opportunity for an innovative, interdepartmental program which offers a broad overview of the neuroscience field, as well as more advanced training in one of four focus areas.

Cellular and Molecular Neuroscience (CM) focuses on the mechanisms by which information flows within and between cells in the nervous system, and the mechanisms through which the cellular structure of the nervous system develops and is maintained. Topics include the molecular basis of membrane permeability, action potentials, sensory transduction, synaptic transmission, neuronal modulation, mechanisms of drug action, and the molecular basis of genetic disorders of the nervous system.

Cognitive Neuroscience (CG) focuses on how cognitive functions, such as vision or language, are implemented by the brain. Drawing upon a variety of techniques for probing the working brain at cognitive and neural levels, including functional neuroimaging, analysis of cognitive impairments in brain-damaged patients, and electrophysiological techniques, research in cognitive neuroscience seeks to relate mental representations and computations to brain mechanisms and processes.

Computational Neuroscience (CP) focuses on applying mathematical tools and theories to investigate brain function. This discipline incorporates a diverse set of approaches from mathematics, physics, engineering, and computer science, to understand how the nervous system processes information. Such principles are used to answer questions across a variety of domains of neuroscience: cellular/molecular, systems and circuits, behavioral and cognitive.

Systems Neuroscience (ST) seeks to relate brain structure and functioning to behaviors and related physiological processes. Research in this area explores the description and analysis of neural circuits. This includes identifying the brain nuclei and interconnections making up a circuit, identifying and investigating the implicated neurotransmitters, and characterizing the intrinsic and extrinsic factors that modulate the development and adult functioning of the circuit. Topics as diverse as learning and memory, communication, sensory systems, and motivated behaviors (e.g., reproduction, feeding, and aggression) are explored from this perspective.

Neuroscience Program Committee

The Neuroscience Program Committee coordinates course offerings, oversees the program's interdepartmental courses, reviews and updates the administration of the program, makes decisions about admission to the B.S./M.S. program, approves proposed research programs and mentors for students in the B.S./M.S. mentored research program, and evaluates the final reports and presentations from the research year.

Programs

- Neuroscience, Bachelor of Science (p. 2053)
- Neuroscience, Bachelor of Science/Master of Science (p. 2055)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.080.140. Neuroscience and Human Behavior. 1 Credit.
Consider how behavioral neuroscience can help you understand these curiosities and more: a native Australian man suffers a stroke, recovers, but can only speak Chinese; altering but one neural receptor in the prairie vole will change it from a monogamous to polygamous animal; neurodegenerative disease can cause fits of uncontrollable laughter, despite nothing being funny. Learn how cells and chemicals result in complex behavior and critically examine whether or not the mind is an organic computer in this behavioral neuroscience program.

AS.080.160. Neurobiology: Cellular & Systems. 1 Credit.
Establish a foundation for advanced study of neuroscience in research and medicine. Your curriculum will cover university-level cellular, network, and behavioral neurobiology using engaging evidence-based educational models that encourage enthusiasm and uninhibited critical thought. Additional emphasis will be placed on familiarizing you with the laboratory and research methods useful in a scientific career. There are no prerequisites, but a background in biology is helpful.

AS.080.250. Neuroscience Laboratory. 3 Credits.
This course will give students the "hands-on" experience of the inter-disciplinary nature of neuroscience. Students will use anatomical and neuro-physiological techniques to understand the basic underlying principles of neuroscience.
(AS.080.305 AND AS.080.306) OR AS.200.141

AS.080.301. Behavioral Assessment of Animal Models of Cognition and Neuropsychiatric Disorders. 3 Credits.
What does a rat exploring it's environment tell us about memory? How can a mouse help us better understand schizophrenia? This course will focus on procedures that are routinely used to study behavior in animal models of cognition and neuropsychiatric disorders. Topics will include motor function, emotional and motivational states, disorders such as dementia and schizophrenia, among others. Throughout the course, we will read and discuss original research articles to illustrate and compare some of the measures and results from the various procedures.
AS.200.141 OR AS.080.105 OR (AS.080.305 and AS.080.306), OR by instructor permission.

AS.080.303. Structure of the Nervous System. 3 Credits.
This course takes a structural biological approach to studying the nervous system. In using a systems approach it provides students of cellular-molecular and computational neuroscience with a thorough introduction to functional, microscopic and submicroscopic organization of the brain, spinal cord and peripheral nervous system.
AS.080.305 AND AS.080.306

AS.080.304. Neuroscience Learning and Memory. 3 Credits.
This course is an advanced survey of the scientific study of learning and memory. Different perspectives will be used to review the science of learning and memory including the cellular-molecular basis of synaptic plasticity, the functional circuitry involved in learning and memory and memory systems in the brain. The course is designed to provide a deep understanding of the issues and current debates in learning and memory research and focuses specifically on animal models of memory and memory impairment. This is an interactive lecture course with a strong emphasis on student participation.
AS.200.141 OR (AS.080.305 AND AS.080.306) OR (AS.020.312 AND AS.020.306) or instructor permission.

AS.080.305. Neuroscience: Cellular and Systems I. 3 Credits.
(Formerly Nervous Systems I) Neuroscience: Cellular and Systems I is a fully integrated, two-semester course that surveys the cellular and molecular biology of neurons as well as the structure and function of the nervous system. Students must register for Neuroscience: Cellular and Systems II offered in the second term. Course open to JHU undergraduates only.
AS.080.203 OR AS.050.203 OR AS.200.141 OR AS.080.105 OR AS.050.105 or instructor permission.

AS.080.306. Neuroscience: Cellular and Systems II. 3 Credits.
(Formerly Nervous Systems II) Neuroscience: Cellular and Systems II uses the functional organization of the somatosensory system as a means to examine mechanisms of neutral development. Generation and maturation of neurons, guidance of axons, formation of synapses and the regressive events that shape the adult nervous system will be examined. At the same time we will explore the structure and function of brain regions that allow us to feel pain and temperature, detect vibration, recognize shape and perceive where we are in space. Finally, the single-neuron events that lead to adaptive changes in function will be explored in the context of central nervous system control of movement and of higher order functions of speech and memory. Students who do not register for Neuroscience: Cellular and Systems I offered during the first term should not register for this class.
AS.080.305

AS.080.308. Neuroeconomics. 3 Credits.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience.
AS.080.306 OR AS.200.141 OR AS.020.312

AS.080.310. Synaptic Function and Plasticity. 3 Credits.
The function of the nervous system is based on synaptic transmission between neurons. Synapses are not static structures, but dynamically change with experience. Experience-dependent synaptic plasticity not only allows proper development of the nervous system in tune with the environment, but also is the basis for learning and memory. This course will cover the structure and function of synapses, and how they are altered by experience to encode information.
(AS.020.305 AND AS.020.306) OR (AS.080.305 AND AS.080.306)

AS.080.314. How to Live a SPECtacular Life. 3 Credits.
Good mental health is key to living a happy and healthy life. This statement is true whether you are an elementary, middle, high school, or college student. It is also true if you are a recent graduate in the work force, middle aged, retired or elderly. According to the literature, to achieve good mental health you need to focus on the role that the brain plays in our Social, Physical, Emotional and Cognitive (SPEC) health. These are four key components needed to achieve and maintain good mental health. The main focus of the course will be mental health. Using the research, we will come up with tools to help educate individuals, at any point in their lifespan, on how to live a SPECtacular life.
Area: Writing Intensive
AS.080.306

AS.080.316. Prefrontal Cortex- Computational Models and Neurophysiology. 3 Credits.
The course will cover the function of the prefrontal cortex. We will discuss various computational models of prefrontal function and neurobiological evidence for these models. The class will consist of lectures, student presentations, and discussions.
AS.080.305 AND AS.080.306 or Instructor Permission.

AS.080.321. Computational Neuroscience. 3 Credits.
This course is designed to give students an overview of computational neuroscience. The topics discussed will cover many exciting domains of the field including neural coding, decision-making, learning, attention and connectomics. Lectures will be complemented with hands on experience working with computational models using Matlab and/or other programming language. The overarching goal of the course is to increase overall literacy in the field of computational neuroscience and to gain an appreciation of the interplay between experimental and theoretical neuroscience.
AS.080.306 OR AS.200.141. Familiarity with programing in Matlab will be helpful but not necessary.

AS.080.326. Neurobiology and Diseases of the Peripheral Nervous System. 3 Credits.
This course will cover neurobiology and disorders of the peripheral nervous system (PNS). A particular emphasis will be on cellular interactions within the PNS and with target tissues. For example, the two principal components of the peripheral nerves- axons and Schwann cells- have intimate and continuous cellular communications that are critical for physiological function of the PNS. The course will teach how these cellular interactions are developed, maintained throughout life, and are impacted by injury and diseases.
AS.080.305 AND AS.080.306

AS.080.328. Behavioral Neuroscience Lab. 3 Credits.
Class designed to give students first-hand knowledge of the behavioral procedures and techniques used to study behavior in the field of neuroscience. Students will gain hands-on experience by carrying out some of the behavioral tasks used to assess animals under specific behavioral domains, discuss why certain aspects (i.e. genotype, environment conditions, group size, etc.) are important factors to consider when designing, planning, and carrying out such experiments, and learn the relevance of behavioral research in translational medicine.
AS.200.141 OR AS.200.302 OR AS.080.301 OR (AS.080.305 AND AS.080.306) or permission by instructor.

AS.080.334. Unraveling Circuits in Systems Neuroscience- Emerging Techniques. 3 Credits.
Rapid technological development in neuroscience provides researchers with new tools and strategies to ask important questions about the neural basis of behavior. In this course, we will examine some of these emerging techniques, along with a sampling of the questions they have allowed scientists to answer. We will consider the conceptual insights that arise from answering these questions, as well as investigate the fundamental science behind the cutting-edge techniques that allow us to understand brain function in health and disease.
AS.080.305 AND AS.080.306 or Instructor Approval

AS.080.336. Brain-Body Interactions in Health and Disease. 3 Credits.
Both classical and recent primary research papers that deal with cross signaling of other major organs with the nervous system, particularly the central nervous system, will be discussed. Students will be exposed to emerging literature on how peptides, signaling molecules, and hormones effect the nervous system function both in health and in diseases.
AS.080.305 AND AS.080.306

AS.080.339. Cognitive Neuroscience of Aging. 3 Credits.
When will I start forgetting things? Do I have Alzheimer's disease? What can I do to minimize the chances I experience cognitive decline with aging? This class will spend a significant amount of time exploring the answers to all of these questions and many more. We will review basic information about cognitive neuroscience techniques such as fMRI, DTI, PET, and EEG and explore how aging changes the brain. The heart of the class will be about cognitive changes with aging with a focus on attention, executive function, memory, and emotion. The class will end with discussions about Alzheimer's disease and Parkinson's disease as well as lifestyle choices that increase/decrease the chances of healthy aging.
Area: Writing Intensive
AS.200.141 OR AS.080.306

AS.080.345. Great Discoveries in Neuroscience. 3 Credits.
This course examines the historical and intellectual context of selected, key advances in neuroscience, how they were made and the impact they had on an understanding of the nervous system. Particular attention will be paid to advances in cellular and molecular neuroscience. Among the topics covered will be the discovery of monoamine neurotransmitters and of endocannabinoids, the role of neurotrophins in neural development, and prion-based diseases of the brain.
AS.080.306

AS.080.355. Computational Principles of Biological Vision. 3 Credits.
Even though we take it for granted, vision is a superpower. It is so central to how most of us interact with the world, and so effortless, that we are unaware of the astronomically complex computations that underlie it. There are no computer vision programs that can match the performance of the human visual system in understanding the real, physical, 3D world. On the biological side, vision is the most thoroughly studied sensory system. As such, vision is a rich target for computational understanding of the brain. Vision is the topic that both of us actively study, and remain passionately excited about. In this course, we present our up-to-the-minute synthesis of what we consider to be the most important insights into how vision, especially object vision, works, at the level of biological information processing. We believe the result is a coherent, mechanistic account of how the brain transforms images into visual understanding. We know of no textbook that provides a comparable viewpoint. In addition to presenting this visual information processing framework, we hope to teach you how to critically evaluate current research papers within that framework. To this end, we will be incorporating discussions of current research papers into our lectures and assignments. The course will feature a series of weekly lectures (delivered as videos) and a weekly assignment. The weekly assignment will be an essay, and will make up the largest portion of your grade. The remainder of your grade will come from one larger final essay. We will offer 2 weekly, voluntary Zoom meetings to discuss any questions about the material that might have come up.

AS.080.360. Diseases & Disorders of the Nervous System. 3 Credits.
(EN.580.421 AND EN.580.422) OR (AS.020.305 AND AS.020.306) OR AS.080.306 or instructor permission.

AS.080.366. Neuroscience of Pain. 3 Credits.
This course is a systems-oriented course focusing on the basic neural processing of pain signals in both the spinal cord and the brain. Class lectures will cover the anatomical and molecular basis for the transmission and perception of pain signals, basic concepts such as allodynia, hyperalgesia, peripheral and central sensitization, remodeling, the pathophysiology of chronic pain disorders and the cognitive and emotional aspects of pain. We will also discuss the regulation of pain signals by descending systems, and current practices and new advances in the treatment of pain.
Area: Writing Intensive
AS.080.305 OR AS.080.306 OR AS.020.312 or permission of instructor.

AS.080.370. The Cerebellum: Is it just for motor control?. 3 Credits.
The cerebellum is traditionally thought to be involved in movement and motor control, and observations of patients with cerebellar damage do in fact show motor deficits. However, since the proliferation of functional MRI, cerebellar activations have been observed in a surprising number of brain activation studies that were designed to investigate the neural correlates of cognitive function. Over the past 2 decades, an increasing number of investigators have tried to characterize the role of the cerebellum in cognitive function. Through lectures and reading discussions this course will survey cerebellar circuitry, neuroimaging and neuromodulatory methods for investigating the cerebellum, and traditional and non-traditional functions of the cerebellum, including cerebellar involvement in cognitive functions such as language, working memory, and executive control.
(AS.080.306 AND AS.080.203) OR AS.050.203

AS.080.411. Advanced Seminar: Neuroscience I. 3 Credits.
For students in the first semester of the BS/MS Program. Instructor permission required.

AS.080.412. Advanced Seminar: Neuroscience II. 3 Credits.
For students in the 2nd semester of the BS/MS Program. Permission Required.

AS.080.413. Advanced Seminar: Neuroscience III. 3 Credits.
For students in the 3rd semester of the BS/MS Program. Permission Required.

AS.080.500. Scientific Communication: Neuroscience. 0.5 Credits.
Scientific communication is crucial to encouraging engagement with the public and advancing science. The Scientific Communication course consists of a two hour research orientation session held at the beginning of the semester and a two hour exit session held at the end of the semester. In addition to the two in-person sessions, students will work with faculty and peers to hone their ability to communicate complex topics to a broad audience. These interactions will take place over the course of the semester via Blackboard and have a more flexible timeline. See special notes section for specific meeting day/time for the two in-person sessions. Students need to complete two semesters of Scientific Communications. Students are strongly encouraged to only take Scientific Communications when they are either actively involved in research or have completed at least three credits of research. See Neuroscience Research website for more details.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.505. Practicum in Language Disorders- Community Based Learning. 2 Credits.
This course provides the opportunity to learn about adult aphasias, language disorders which are one of the most common consequences of stroke. You will receive training in supportive communication techniques and work as a communication partner with an individual with aphasia for two hours per week. Three class meetings for orientation and reading assignments will be held on campus; training and practicum will be conducted at a local aphasia support center. Independent mode of transportation required. Co-listed as AS.050.500 in Cognitive Science. Find out more about the practicum site at https://www.leagueforpeople.org/scale.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.;Students must have earned an A- or Better in AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.311, or obtain instructor's permission.

AS.080.511. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.531. Research Neuroscience-Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.534. Neuroscience Research- Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.541. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.544. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.555. Neuroscience DUS Approved Research. 1 - 3 Credits.
TBA
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.582. Neuroscience: Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.592. Research Neuroscience – Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.594. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.601. Neuroeconomics -Graduate Level.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience. Only graduate students can register for this course. Instructor signature is required.

AS.080.610. Experiential Learning: HopKids – Kennedy Krieger Institute.
This experiential learning experience provides the opportunity to learn and interact with children recovering from brain, spinal, and musculoskeletal injuries. Students will travel to the Kennedy Krieger Institute to volunteer in the Child Life Department where they will participate in a variety of therapeutic activities including playing with the children and helping them achieve goals on Saturdays (days/times TBA). Students will gain valuable clinical experience while learning patient empathy. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times). Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.612. Experiential Learning: KEEN (Kids Enjoying Exercise Now).
In this experiential learning experience, students will work with children who have a variety of neurological disabilities, including autism, cerebral palsy and Down syndrome through exercise and recreational activities. We partner with the KEEN (Kids Enjoy Exercise Now), a nonprofit organization. Student “coaches” will receive a profile for the KEEN athlete that they will pair up with during a session. Students will receive initial training and then select 4 sessions to attend. Sessions are held on the first and third Sunday of each month during the semester at KEEN centers in Maryland. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times). Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Transportation will be via student carpools using Zipcars, personal vehicles or Hop Vans. No credit - S/U Grading Only

AS.080.614. Experiential Learning: Making Neuroscience Fun.
The goal of Making Neuroscience Fun (MNF), a community outreach program, is to educate Baltimore city and county elementary school students, on how to achieve good mental health by focusing on the role the brain plays in our Social, Physical, Emotional and Cognitive (SPEC) health. The MNF- Brain Health: It's SPECtacular program focuses on using scientific research as the foundation for developing information about mental health and relaying the information in an age-appropriate manner. The elementary school students (pre-K through 5th grade) learn about their brain and how to keep it healthy and our students learn valuable communication skills. Hopkins students will receive initial training and certification on content & presenting skills prior to participating and will then be part of the new launch of the program. In order to participate, students must be available either 7am-11am or 11am-3pm at least one day per week, Monday-Friday. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times of the orientation/exit sessions). Transportation to the schools will be via student carpools using Zipcars or personal vehicles. No credit - S/U Grading Only

AS.080.616. Experiential Learning: HopKids- Children's Center.
This experiential learning experience provides students the opportunity to learn, play and interact with children receiving treatment in over 20 different specialties including dermatology, endocrine, GI, immunology, urology, plastics and hematology. Students will volunteer in outpatient clinics at the Johns Hopkins Children's Center where they will encourage, provide developmentally supportive play for children and participate in a variety of activities including art projects, coloring, board games, and reading. Students will gain valuable clinical experience and be exposed to a wide range of children with a variety of diseases/illnesses. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times. Students will sign up for 5 shifts on a first-come, first-serve basis after the mandatory orientation. Shifts are Mondays 1pm-3pm, Tuesdays 10am-12pm, Wednesdays 1pm-3pm, Thursdays 10am-12pm and Fridays 10am-12pm throughout the semester. Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Volunteer shifts will take place at outpatient clinics in the Rubenstein Child Health Building. Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.618. Experiential Learning: Helping an Aging Community: Social and Cognitive Support for Seniors.
This experiential learning opportunity provides a hands-on experience, working side-by-side with elderly individuals at the Keswick Multi-care Center and the Roland Park Place. Students will have a chance to interact with residents that have both short-term and long-term cognitive and physical impairments. The residents typically live on the premises but may also be participating in a daytime care only program. Students will interact with the residents in various enriching ways in order to develop a better understanding of how our mind and body ages with time. Students will gain hands-on experience working with residents with dementia, Alzheimer's and other cognitive impairments that effect the body and the brain. 4 students per semester. Students MUST attend a mandatory orientation and a mandatory exit session to be held onsite (Day/Time TBD). Students are required to provide a written description of their experiences and to discuss their experiences at the exit session. Time Commitment: 2-3 hours a week for the entire semester. Must provide medical immunization records to include- flu shot and PPD (tuberculosis). Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.620. Theoretical and Computational Neuroscience.
The objective of this class is to introduce fundamentals of quantitative neuroscience. The focus is on understanding basic information processing in neurons and networks of neurons, with some more advanced topics added. Knowledge of basic calculus and linear algebra is required.

AS.080.630. Bodian Seminar Series.
The Bodian Seminar is an interdisciplinary colloquium for discussion of current research into the neural basis of mental processes. Leading researchers, generally from outside the University, are invited to give lectures, which will be announced per e-mail. Undergraduate students who register for this course are asked to study a publication by the speaker, as provided with the announcement, and to prepare a question for each speaker together with a brief discussion of the possible answers. Permission required for undergraduate students.

AS.080.631. Bodian Seminar Series.
Graduate students and Seniors with instructor permission. The Bodian Seminar is an interdisciplinary colloquium for discussion of current research into the neural basis of mental processes. Leading researchers, generally from outside the University, are invited to give lectures. About 12 lectures are scheduled per semester (see http://www.mb.jhu.edu/seminars.asp). Speakers, titles of lectures, and dates are announced to participants per e-mail. The announcements also include links to one or two recent publications of the speaker. Undergraduate students who register for this course are asked to study these papers and to prepare a question for each speaker together with a brief discussion of the possible answers. Question and discussion have to be in writing and turned in the day before the lecture. Undergraduates must e-mail the instructor for permission (cfetsch@jhu.edu) prior to registering for the course.

AS.080.660. Commencement Project.
This course is for BA/MS students that have completed their year of research and are now working on their final thesis. In this course, students devote their semester to preparing their final thesis documentation and move forward with their Master's Thesis Defense which is the last piece to the program. This course is for BA/MS student only and students should only register for this course in their last semester in the program.

AS.080.849. Teaching Practicum.
Permission required. Graduate students only.

AS.080.850. Mentored Research: Neuroscience I.
For students in the BS/MS Program first semester. Permission required.

AS.080.851. Mentored Research: Neuroscience.
Permission Required. For students in the BS/MS Program.
Area: Writing Intensive

AS.080.852. Mentored Research: Neuroscience II.
For students in the BS/MS Program second semester. Permission required.

ME.440.300. Research Practicum. 0 Credits.
N/A

ME.440.301. Research in Neuroscience (Undergraduate). 1 Credit.
N/A

ME.440.699. Neuroscience Elective. 0 Credits.
For Medical Students only. Specialized Topics in Neuroscience. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.440.701. Diseases of the Brain. 0 Credits.

ME.440.702. Cellular Substrates of Learning and Memory. 1 Credit.

ME.440.705. Cellular and Molecular Basis of Neural Development II. 1.5 Credits.
This is a seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development.

ME.440.707. Molecular Mechanisms in Synaptic Transmission. 2 Credits.
An advanced seminar and reading course devoted to the molecular and cellular mechanisms underlying synaptic transmission and the regulation of synaptic plasticity. We will discuss fundamental discoveries in th eareas of synapse formation, transmitter release, vesicle recycling, ribbon synapses, dendritic modulation, LTP/LTD, and homeostatic regulation. Students will present two papers and provide written answers to questions about the assigned reading.

ME.440.709. Neuropharmacology. 1.5 Credits.
The course will illustrate the use of diverse approaches (molecular, biochemical, electrophysiological and behavioral) to decipher how psychotropic drugs impact the brain. The course will utilize a lecture format for the first two classes and then switch to a “journal club” format in which students will present classic and recent articles. Topics to be covered include: opiates, benzodiazepines, antipsychotic drugs, and antidepressant drugs.

ME.440.710. Molecular Mechanisms Of Cell Death: Necrosis To Apoptosis. 0 Credits.

ME.440.711. Cellular and Molecular Basis of Neural Development I: Neuronal Differentiation. 1.5 Credits.
A seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development. Topics include cell proliferation and migration, nervous system patterning, differentiation of neurons and glia, morphogen and growth factor signaling mechanisms, neuronal polarity, and neural stem cell biology. Examples from vertebrate and invertebrate model systems will be covered. This course is designed to complement The Cellular and Molecular Basis of Neural Development II: Axon Guidance and Synaptogenesis, offered alternate years.

ME.440.712. Science, Ethics and Society. 0.5 Credits.
This is a required course for first year Neuroscience students. The course format will consist of focused discussions with the course director and rotating faculty on pre-assigned case studies and more informal discussions about various topics.

ME.440.715. Trends in the Neurobiology of Aging. 0.5 Credits.
This course will reveiw recent research progress in the fields of agin and neurodegenerative disorders with coverage of cellular, moleular, and systems neuroscience.

ME.440.718. Neurobiology. 1 Credit.
For Non-Neuroscience Program students only. This course provides a comprehensive introduction to cellular and molecular neurobiology. Areas covered by the basic science faculty include the following: Neural development (cell specificaion, differentiation, axon guidance, synapse formation); Cellular electrophysiology (ionic conductances, resting potential, action potentials); Molecular biology of synaptic transmission (neurotransmitters and receptors); Sensory transduction (phototransduction, other sensory systems); Synaptic plasticity (mechanisms of synapse modification); and Cellular basis of neurological and psychiatric disorders.

ME.440.720. The Retinal Ganglion Cell. 0 Credits.

ME.440.721. Development and Function of the Spinal Cord Circuitry. 0 Credits.

ME.440.722. Visual System. 0 Credits.
From outer segments of photoreceptors to the Fusiform Face Area of the cerebral cortex we hav ecome to understand how the visual system works at each of many fundamental levels. This course examines the basis for perception of visible objects at each of these levels. We will use teh secondary literature (scientific reviews) to accent the hard-won truths about visual system functional organization and to highlight ongoing controversies. Students will be led through carefully chosen reviews in a series of lectures and written summaries prepared by faculty. Three exams and a final exam will test students not on their memorization of minutiae but on their understanding of fundamental principles.

ME.440.723. Writing About the Brain. 3 Credits.
The goal of this course is to train working neuroscientists to effectively and clearly communicate ideas aboout nervous system function of a general audience

ME.440.724. Neuroscience Career Skills. 1 Credit.
This course is intended to help graduate students in the Neuroscience Graduate Program obtain an appreciation of options, challenges, and steps towards careers in the field of neuroscience.

ME.440.725. Neurobiology of Substance Abuse Disorders. 0 Credits.

ME.440.726. The Hypothalamus: The Brain's Master Homeostat. 1.5 Credits.
The hypothalamus is he central regulator of a broad range of homeostatic behaviors essential to survival, and plays a key role in controlling emotional and appetitive behaviors. This course offers an overview of both historical and recent work on this vital brain region. Topics covered will include the evolution and development of the hypothalamus, control of circadian rhythms and sleep, regulation of hunger and body temperature, as well as hypothalamic regulation of sexual, defensive, and affiliative behavior.

ME.440.727. Brain Diseases: Neurodevelopmental Diseases. 2 Credits.
This course will consider the emerging unity of approaches and concepts in understanding a range of brain diseases such as schizophrenia, bipolar disorder, autism and related disorders.

ME.440.728. Brain Diseases: Neurodegenerative Diseases. 2 Credits.
The course will provide an in-depth examination of the biology of the classic neurodegenerative diseases such as Huntington’s disease, Parkinson’s disease, ALS and Alzheimer’s disease, and other diseases may be considered depending on student and faculty interest.

ME.440.729. Emerging Strategies in Understanding Innate Behaviors. 0 Credits.
This course will focus on the neural control of homeostatic, appetitive and emotional behaviors, with an emphasis on the pypothalamus. It offers an overview of bothhistorical and recent work on this vital brain region. Topics covered will include the evolution and development of the hypothalamus, control of circadian rhythms and sleep, regulation of hunger and body temperature, as well as hypothalamic regulation of sexual, defensive, and social behavior. Each class will include 20-30 minutes of introductory lecture, followed by in-class discussion of 2 relevant recent papers. The final grade will be based on class participation and one 6- page review article or mock grant proposal on any related topic. An optional lecture on good grant writing practices will also be offered.

ME.440.730. Submitting Your First Paper. 0.5 Credits.
This course is taught by Neuroscience Training Program faculty and provide "how to" training and guidance to second year Neuroscience students.This course covers: knowing when you are ready to write, getting started, writing transparent methods, generating figures, writing an effective discussion section, citation manager, writing for rigor and reproduciblity, choosing appropriate statistics, how to choose a journal, peer review, and how to respond to reviews.

ME.440.800. Research in Neuroscience. 0 Credits.
Research in Neuroscience.

ME.440.801. Readings in Neuroscience (Journal Club). 1 Credit.
A weekly talk on current literature topics of special interest. Students present either journal articles or their own research depending on their year in the program.

ME.440.802. Current Topics in Neuroscience (Research Seminar). 1 Credit.
Weekly lecture on current research by active researchers. Topics are chosen so that an overall balance of subjects in neuroscience are covered in the course of a year. Students receive a reading list before the seminar and will be given an opportunity to meet with outside speakers.

ME.440.803. Teaching in Neuroscience. 0 Credits.
TBD

ME.440.804. Directed Readings in Neuroscience. 0 Credits.
Independent course work, directed by assigned faculty member.

ME.440.807. Topics in Somatosensory Research. 0 Credits.
TBD

ME.440.808. Physiology of Sensory Transduction. 1.5 Credits.
A reading/presentation course focusing on visual and chemical transductions. The electrophysiological approach will be emphasized. A couple of long or several short papers will be presented and discussed by students each week.

ME.440.810. Readings In Systems Neuroscience. 1 Credit.
A weekly talk on current literature topics of special interest. Students present journal articles for discussion.

ME.440.811. Neuroscience Cognition I. 4.5 Credits.
This is the first half of a 4-quarter course on the cellular and molecular basis of neural function adn the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) development and structure of the nervous system, (2) cellular neurophysiology, (3) neural signaling and coding, and (4) audition, vocalization, and language. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science departments. The course will also include discussion sections based current literature and several neurotechniques sessions designed to familiarize student with current experimental approaches in cellular, systems and molecular neurosciences. This course is required of all students in the Neuroscience Graduate Program.

ME.440.812. Neuroscience Cognition II. 4.5 Credits.
This is the second half of a 4-quarter course on the cellular and molecular basis of neural function and the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) perception of objects, space, and self, (2) movement and balance, (3) learning and memory, (4) neurological and psychiatric disorders, and (5) global function in the nervous system. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science Departments. The course will also have a laboratory component. This course is required of all students in the Neuroscience Graduate Program.

ME.440.813. Current Issues in Systems and Cognitive Neuroscience. 1 Credit.
The mammalian brain is an information processing system without parallel. It excels at recognizing objects and substances, reconstructing space, making decisions, and controllig complex behaviors. The neural mechanisms underlying these abilities are studied by a large community of systems and cognitive neuroscientists. This research has generated a rapidly evolving field of high-profile discoveries and lively debates between competing laboratories. Our course aims to convey a clear sense of this field by focusing on current experimental and conceptual controversies regarding organization and function in the primate nervous system. Each week will focus on a different topic represented by two or more recent papers (selected by an instructor) reflecting timely questions or opposing points of view. Students will present the papers informally and direct a debate over the relative merits of hte conflicting view points.

ME.440.814. Research in Neuroscience (BCMB). 0 Credits.
Thesis Research

ME.440.815. Stem Cells: Unit of Development and Unit of Regeneration. 0 Credits.
This is a seminar and reading course devoted to discussion of different types of stem cells. The course will highlihgt ongoing research at JHU and current advances in the stem cell field.

ME.440.816. Topics in Cortical Plasticity. 0 Credits.
Experience-dependent changes in cortical synapses and circuits are critical for proper development of the nervous system and for memory storage. This course will focus on recent findings on fundamental mechanisms of plasticity from synapses to circuit level through discussions of recent research papers.

ME.440.817. Psychedelics. 0 Credits.
In this course we will explore the history and uses of psychoactive compounds, the neurobiological basis of their activity, and their potential for healing. Along the way we will attempt to debunk some of the most common myths about this especially controversial class of drugs. Each session, one student will take the lead in discussing the assigned primary research articles (except for 2-3 documentary film sessions, which will take up the whole period). Beyond didactic learning, this graduate level course is designed to hone students' skills in oral presentations, critical thinking, as well as composition and editing of manuscripts.

ME.440.818. Bioenergetics, Neuroplasticity and Brain Health. 1 Credit.
Overindulgent sedentary lifestyles are increasingly common with adverse consequences for trajectories of brain health in current and future generations. This course will review findings from studies of humans and animals that are elucidating the cellular and molecular mechanisms by which energy intake and exercise affect structural and functional neuroplasticity. This topic will be considered from a bioenergetic perspective with emphases on brain evolution, developmental neurobiology, adult neuroplasticity and disorders of mood and cognition. The course will consist of a series of introductory lectures, and subsequent class meetings in which hot topics in the field are discussed.

ME.440.819. Rigor, Reproducibility, and Responsibility in Science. 2 Credits.
In this course, students will learn the professional norms and practices central to a successful scientific career. Also, students will learn about what constitutes scientific misconduct and about proper behavior involving issues of authorship and various conflicts of interest. Students will be exposed to rules, regulations, and ethics relating to animal and human experimentation. Further, participants will learn about how to choose a lab, keep proper records, deliver presentations, and seek funding.

ME.440.820. Circuits and Brain Disorders. 2 Credits.
The course is designed to serve as an introduction to neurodegenerative disorders of the nervous system, and is intended to provide a balance of basic neurobiology, clinical presentation, biomarkers, genetics, and therapeutic approaches. One of the goals would be to highlight the distinct circuitry that is most impacted by each disorder. The curriculum includes: (1) one lecture per week and (2) a coordinated journal club once per week.

ME.440.821. Readings in Neuroscience Journal Club. 0 Credits.
Neuroscience training program journal club.

ME.440.822. Computational Principles of Biological Vision. 3 Credits.
This course will present up-to-the-minute synthesis of what are considered the most important insights into how vision, especially object vision, works, at the level of biological information processing. The result will be a coherent, mechanistic account of how the brain transforms images into visual understanding. Also, this course will teach how to critically evaluate current research papers within that framework by incorporating discussions of current papers into the lectures and assignments.

ME.440.823. Grant Writing Skills. 1 Credit.
The course covers topics such as: writing a clear and compelling specifics aims page; writing a concise background section; preliminary data; stating a clear hypothesis; describing how data will be analyzed and how results will be predicted; power analysis and sufficient sample size; problems and alternatives; devising a budget and justification; and using vertebrate and human subjects.

ME.440.824. Cell Physiology of Visual and Olfactory Transductions. 1 Credit.
A reading/student presentation course focusing on visual and olfactory transductions studied by single-cell electrophysiology.

ME.440.825. Quantitative Neurogenomics. 3 Credits.
Modern molecular neuroscience involves an understanding of how the organization and use of the genome contributes to the development, structure, and function of the nervous system. Regulation of the genome and gene expression across different cell types, conditions, and spatial domains can provide insight into the functional organization of the brain and the etiopathology of disease. In this course, students will learn, through a combination of didactic, interactive, and hands-on sessions, the basics of genomic and transcriptional data analysis as applied to current questions in neuroscience. Students will outline and develop workflows and algorithms for both bulk and single-cell analysis of gene expression and genomic data using publicly available datasets. Finally, students will explore methods for spatial analysis of gene expression and how application of newer technologies can enhance understanding of anatomy and connectivity.

Cross Listed Courses

Behavioral Biology

AS.290.400. Comparative Neural Systems and Behavior Research Discussions. 0.5 Credits.
This course is required concurrently with research in the Comparative Neural Systems Research and Behavior lab. During the scheduled meetings we will discuss scientific papers, policies and procedures, research ethics and other information related to activities in the lab. At the end of the semester, students will present their research in groups. This course is only open to students doing research in the Neural Systems and Behavior Lab.

Cognitive Science

AS.050.105. Introduction to Cognitive Neuropsychology. 3 Credits.
When the brain is damaged or fails to develop normally, even the most basic cognitive abilities (such as the ability to understand words, or perceive objects) may be disrupted, often in remarkable ways. This course explores a wide range of cognitive deficits, focusing on what these deficits can tell us about how the normal brain works. Topics include brain anatomy and causes of brain damage, reading and spelling deficits, unilateral spatial neglect, hemispheric disconnection, cortical plasticity, and visual perception of location and orientation. Students read primary sources: journal articles that report deficits and discuss their implications.

AS.050.315. Cognitive Neuropsychology of Visual Perception: The Malfunctioning Visual Brain. 3 Credits.
When we think about our ability to see, we tend to think about our eyes, but in fact vision happens mostly in the brain. This course explores the remarkable perceptual deficits that occur when the visual regions of the brain are damaged or fail to develop normally, focusing on what these perceptual malfunctions tell us about normal visual perception. Topics include visual system anatomy and physiology; functional specialization in the lower visual system as revealed by cerebral achromatopsia (color blindness resulting from brain damage) and akinetopsia (impaired motion perception); cortical plasticity in the visual system; spatial deficits in perception and action; and the implications of high-level visual deficits, including prosopagnosia (impaired face recognition), Charles Bonnet syndrome (complex visual hallucinations in blind areas of the visual field), blindsight (accurate responding to visual stimuli despite apparent inability to see them), and aphantasia (lack of visual imagery).
AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.101 OR AS.200.110 OR AS.200.211 or instructor's permission.

AS.050.326. Foundations of Cognitive Science. 3 Credits.
This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion. Also offered as AS.050.626.
Area: Writing Intensive

AS.050.332. Developmental Cognitive Neuroscience. 3 Credits.
In-depth examination of the current literature on cognitive development in the context of developmental cognitive neuroscience. Please see course prerequisites. Meets with AS.050.632.
AS.050.101 OR AS.050.339 OR AS.200.132 OR AS.050.105 OR Instructor's Permission.

AS.050.339. Cognitive Development. 3 Credits.
This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.626. Foundations of Cognitive Science.
Also offered as AS.050.326. This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion.
Area: Writing Intensive

AS.050.639. Cognitive Development.
Also offered as AS.050.339. This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

First Year Seminars

AS.001.109. FYS: Why'd Your Brain Sign You up for This?. 3 Credits.
This First-Year Seminar will explore the neuroscience of choice. In addition to exploring the neurobiology of choice, we will dabble with philosophical ideas of free will and determinism. We will also touch on questions related to culpability. For example, are people who break the law but suffer from brain damage responsible for their actions? Sound interesting? Well, why stop there? Let's sit back, eat some popcorn and take a look at how popular culture depicts the neuroscience of choice in the movies. Yes, with your help, we can do it all – but will you choose to???

AS.001.115. FYS: Illusions, Delusions, and Other Confusions. 3 Credits.
Most people think the strongest kind of evidence in a criminal case is a confident eyewitness. Most students think re-reading textbook materials or class notes is the best way to prepare for an exam. And all too many people think that measles vaccines cause autism. All three of these ideas are wrong. In this First-Year Seminar, we will explore what modern psychology has uncovered about how our intuitions concerning human nature deceive us, and lead to incorrect ideas such as the ones just mentioned. We will discuss a wide variety of topics including "the attention economy," groupthink, and subliminal perception.

Psychological & Brain Sciences

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.

AS.200.304. Neuroscience of Decision Making. 3 Credits.
This course will survey the neural mechanisms of decision-making. Current experimental research and theory concerning selection, control, and evaluation of actions are examined in humans and animals. Topics will range from simple perceptual judgements to complex social behavior. The course involves a weekly lecture about a specific topic followed by a student presentation of a current research paper. Cross-listed with Neuroscience.
AS.080.305 AND AS.080.306 or instructor permission

AS.200.329. Real World Human Data: Analysis & Visualization. 3 Credits.
Experiments in human cognition typically involve careful manipulation and control of variables in order to answer specific questions about the mind or brain. However, digital devices now provide an ocean of incidental human data: information collected continuously about our behavior and physiological states as we go about our lives. These incidental datasets are often large and noisy, and pose different analysis and visualization challenges from more traditional manipulated experiments. In this course students will learn computational tools and qualitative approaches for exploring, visualizing and interpreting large human data. The course emphasizes computer-based analysis of open-source human behavioral and neuroimaging datasets. Analyses will be conducted in MATLAB. Instructor will grant approval as long as you have previous programming experience (roughly equivalent to material covered in an introductory-level programming course). Self-taught or real-world experience can be applicable in lieu of previous formal classroom instruction.

AS.200.334. Human Memory Psychology. 3 Credits.
This class will survey the behavioral and biological science of human memory. Historical perspectives as well as modern controversies will be discussed. Intersections with other fields such as law, education, medicine, and technology will be highlighted. The course will be a mixture of lectures and group discussions.

AS.200.344. Behavioral Endocrinology. 3 Credits.
This course examines both the evolution and mechanisms of hormonal effects on behavior across animals, including humans. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, stress and social behavior. Additionally, this course emphasizes developing skills in hypothesis testing and critically assessing the scientific literature. Cross-listed with Behvioral Biology and Neuroscience.
(AS.200.141 OR AS.080.306) OR (AS.020.151 AND AS.020.152) or instructor's permission

AS.200.370. Functional Human Neuroanatomy. 3 Credits.
This course examines the general organizing principles of the anatomy of the human central nervous system and how this anatomical organization relates to function, from the level of neural circuits, to systems, to behavior. Students will learn to identify neuroanatomical structures and pathways in dissections and MRI images through computerized exercises. Readings and lectures will emphasize general structure-function relationships and an understanding of the functional roles of particular structures in sensory, motor, and cognitive systems.
Recommended Course Background in addition to pre-requisite AS.080.305: AS.080.306 OR AS.050.203 OR AS.080.250
AS.080.305

AS.200.376. Neuropsychopharmacology. 3 Credits.
Designed to provide information about how drugs affect the brain and behavior. The course focuses on biological concepts underlying structures and functions of the brain that relate to mental disorders. An introduction to neurobiology and brain function is presented as it applies to the interaction of various classes of drugs with the individual neurotransmitter systems in the brain. A brief historic review is followed by a discussion of clinical relevance. Cross-listed with Behavioral Biology and Neuroscience. Enrollment limited to juniors and seniors.
(AS.080.305 AND AS.080.306) OR AS.020.306 AND AS.020.312) OR (AS.200.141 AND AS.020.306)

For current faculty and contact information go to https://krieger.jhu.edu/neuroscience/people/

Neuroscience, Bachelor of Science

Neuroscience Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

Neuroscience is the study of the nervous system and how it functions. Neuroscientists study the nervous system from all levels, ranging from molecules interacting with cell membranes to brain systems subserving cognitive functions such as language. Dramatic progress has been made at all levels, and the field continues to grow. On the Homewood campus, researchers studying the nervous system are in the departments of Biology, Biomedical Engineering, Biophysics, Cognitive Science, and Psychological and Brain Sciences and in the Krieger Mind/Brain Institute. Their presence provides the opportunity for an innovative, interdepartmental program which offers a broad overview of the neuroscience field, as well as more advanced training in one of four focus areas.

General Information

- Students are encouraged to complete an optional introductory course in their freshman year, such as AS.200.141 Foundations of Brain, Behavior and Cognition or AS.050.105 Introduction to Cognitive Neuropsychology . Either of these courses will satisfy the prerequisite for AS.080.305 Neuroscience: Cellular and Systems I. Foundations of Brain, Behavior and Cognition will also satisfy the prerequisite for AS.080.250 Neuroscience Laboratory.
- Students interested in attending medical school will need to take a second semester of organic chemistry and its corresponding laboratory and biochemistry to meet medical school admission requirements; however, these courses are not major requirements.
- Students are required to select their advanced neuroscience elective courses from one of four approved focus areas: cellular and molecular neuroscience, cognitive neuroscience, computational neuroscience, or systems neuroscience. Approved courses fulfilling this requirement are found on the neuroscience website (http://krieger.jhu.edu/neuroscience/bs-program/courses/) or in the schedule of classes.
- Students considering double majoring in Public Health should plan to take only one of the Probability and Statistics course options listed below. AS.280.345 (https://e-catalogue.jhu.edu/search/?P=AS.280.345) Public Health Biostatistics will not fulfill the Neuroscience Major requirements.
- To apply towards the major, all courses must be taken for a letter grade and a grade of C- or better is required.

Code	Title	Credits
Neuroscience Sequence		
AS.050.203	Neuroscience: Cognitive (spring)	3
AS.080.250	Neuroscience Laboratory (fall/spring)	3
AS.080.305	Neuroscience: Cellular and Systems I (fall)	3
AS.080.306	Neuroscience: Cellular and Systems II (spring)	3
Mathematics, Statistics, and Science Courses		
EN.553.211	Probability and Statistics for the Life Sciences	4
or EN.553.310	Probability & Statistics for the Physical Sciences & Engineering	
or EN.553.311	Probability and Statistics for the Biological Sciences and Engineering	
or EN.553.111 & EN.553.112	Statistical Analysis I and Statistical Analysis II	
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
AS.110.107	Calculus II (For Biological and Social Science)	4
or AS.110.109	Calculus II (For Physical Sciences and Engineering)	
or AS.171.113	Subatomic World	
AS.030.101 & AS.030.105	Introductory Chemistry I and Introductory Chemistry Laboratory I	4
AS.030.102 & AS.030.106	Introductory Chemistry II and Introductory Chemistry Laboratory II	4
or AS.030.103	Applied Chemical Equilibrium and Reactivity w/lab	
AS.030.205	Introductory Organic Chemistry I	4
AS.171.101	General Physics: Physical Science Major I	4
or AS.171.103	General Physics I for Biological Science Majors	
or AS.171.107	General Physics for Physical Sciences Majors (AL)	
AS.173.111	General Physics Laboratory I	1
AS.171.102	General Physics: Physical Science Major II	4
or AS.171.104	General Physics/Biology Majors II	
or AS.171.108	General Physics for Physical Science Majors (AL)	
AS.173.112	General Physics Laboratory II	1
Biology Sequence [1 and 2]		
Select one biology course with lab of the following:		6-8
AS.020.151 & AS.020.153	General Biology I and General Biology Laboratory I (see footnote about AP Biology credits) [1]	
AS.020.152 & AS.020.154	General Biology II and General Biology Lab II (see footnote about AP Biology credits) [1]	
AS.020.303 & AS.250.253	Genetics and Protein Engineering and Biochemistry Lab (see footnote) [3]	
or AS.020.31	Biochemistry Project lab	
AS.020.305 & AS.020.315	Biochemistry and Biochemistry Project lab	
or AS.250.25	Protein Engineering and Biochemistry Lab	
or AS.250.25	Protein Biochemistry and Engineering Laboratory	
AS.020.306 & AS.020.316	Cell Biology and Cell Biology Lab	
AS.020.374 & AS.020.377	Comparative Physiology and Comparative Physiology Lab	
Advanced Neuroscience Elective Courses and Focus Area		

Nine credits of 300-level or higher approved courses from one of four focus areas: systems neuroscience, cognitive neuroscience, computational neuroscience, or cellular and molecular neuroscience		9
Three credits of 300-level or higher approved course outside of focus area selected above		3
If pursuing the Computational Neuroscience focus area, EN.553.291 (or the combo of AS.110.201/212 and AS.110.303) and AS.250.205 are required in addition to the 12 credits in advanced courses required for the focus area.		
If pursuing the Cellular and Molecular Neuroscience focus area, AS.020.306 and AS.020.316 must be selected as the required biology course with lab		
Research [4]		
Six credits of neuroscience research		6
AS.080.500	Scientific Communication: Neuroscience	0.5
AS.080.500	Scientific Communication: Neuroscience	0.5
Total Credits		**71-73**

1 For students with Biology credit from an exam (AP, IB, GCE), exam credit may not use credits towards this requirement. Therefore, these student must take at least one biology course and its lab at JHU. Students who elect to take General Biology I or II with its lab will lose the corresponding exam credits.

2 Students planning on taking the MCAT should consider whether or not they have a solid biology background coming into JHU. If they are unsure they should consult Pre-Professional advising and consider taking General Biology I and II along with the associated labs.

3 AS.020.340 Developmental Genetics Lab can be taken during the **fall semester only.** AS.250.253 Protein Engineering and Biochemistry Lab OR AS.020.315 Biochemistry Project Lab can be taken either in the fall or spring semester.

4 Research must be conducted in one of the neuroscience laboratories participating in the program. **Students must register for two semesters** of AS.080.500 (https://e-catalogue.jhu.edu/search/?P=AS.080.500) Scientific Communication: Neuroscience for a **total of 1 credit.** Students are strongly encouraged to only take Scientific Communications when they are either actively involved in research or have completed at least three credits of research.

Sample Program

The following course sequence is only a suggestion and is based on the assumption that there are no AP/IB/TR credits applied. Please consult with your faculty advisor when selecting and registering for classes, as there are multiple ways to complete the major.

Course	Title	Credits
First Year		
First Semester		
AS.030.101	Introductory Chemistry I	3
AS.030.105	Introductory Chemistry Laboratory I	1
AS.110.106	Calculus I (Biology and Social Sciences)	4
Biology Option 1 [1]		3
Biology Lab Option 1		1
	Credits	**12**
Second Semester		
AS.030.102	Introductory Chemistry II	3
AS.030.106	Introductory Chemistry Laboratory II	1
AS.110.107	Calculus II (For Biological and Social Science)	4
Biology Option 2 [1]		3
Biology Lab Option 2		1
	Credits	**12**
Second Year		
First Semester		
AS.080.305	Neuroscience: Cellular and Systems I [2]	3
AS.030.205	Introductory Organic Chemistry I	4
AS.080.500	Scientific Communication: Neuroscience [3]	.50
AS.080.541	Research Neuroscience – Neuroscience Majors [3]	1 - 3
	Credits	**8.5-10.5**
Second Semester		
AS.080.306	Neuroscience: Cellular and Systems II [2]	3
EN.553.211	Probability and Statistics for the Life Sciences	4
AS.080.500	Scientific Communication: Neuroscience [3]	.50
AS.080.541	Research Neuroscience – Neuroscience Majors [3]	1 - 3
	Credits	**8.5-10.5**
Third Year		
First Semester		
AS.171.103	General Physics I for Biological Science Majors	4
AS.173.111	General Physics Laboratory I	1
AS.080.500	Scientific Communication: Neuroscience [3]	.50
AS.080.541	Research Neuroscience – Neuroscience Majors [3]	1 - 3
Upper Level Neuroscience Course #1		3
	Credits	**9.5-11.5**
Second Semester		
AS.171.104	General Physics/Biology Majors II	4
AS.173.112	General Physics Laboratory II	1
AS.050.203	Neuroscience: Cognitive	3
AS.080.500	Scientific Communication: Neuroscience [3]	.50
AS.080.541	Research Neuroscience – Neuroscience Majors [3]	1 - 3
Upper Level Neuroscience Course #2		3
	Credits	**12.5-14.5**
Fourth Year		
First Semester		
AS.080.250	Neuroscience Laboratory [4]	3
Upper Level Neuroscience Course #3		3
	Credits	**6**
Second Semester		
Upper Level Neuroscience Course #4		3
	Credits	**3**
	Total Credits	**72-80**

1 Biology Course Options and Biology Lab Options can be taken in any year. For Students who are obtaining a Cellular and Molecular focus area, one of the biology options must be Cell Biology with lab.

[2] AS.080.305 Neuroscience: Cellular and Systems I & AS.080.306 Neuroscience: Cellular and Systems II can be taken sophomore or junior year.
[3] Research in Neuroscience can be taken at any time.
[4] AS.080.250 Neuroscience Laboratory can be taken any time after completing AS.200.141 Foundations of Brain, Behavior and Cognition or AS.080.305 Neuroscience: Cellular and Systems I & AS.080.306 Neuroscience: Cellular and Systems II.

Honors in the Major

To receive honors in Neuroscience, students must meet the following criteria:

- Earn a GPA of 3.5 or better in major requirements
- Earn 9 credits of required research
- Presentation of research findings at the Day of Research in Engineering, Arts, Medicine and Sciences (DREAMS) during the Fall or Spring semester
- Receive a recommendation from research mentor

Neuroscience, Bachelor of Science/ Master of Science

BS/MS Program

Undergraduate students in the Krieger School of Arts and Sciences may pursue a five-year BS/MS in neuroscience, which involves a year of intense research and seminars in addition to courses for the major.

The principal aim of the BS/MS program is to allow students with a serious interest and commitment to pursuing research in a future MD, MD/PhD, or PhD program to spend a year conducting laboratory research full-time. Students are expected to concentrate fully on their research, attend seminars and journal clubs, and write extensively about their research and related topics.

The BS/MS program is structured to provide students with a genuine, intensive research experience in an area of systems neuroscience, cognitive neuroscience, or cellular and molecular neuroscience.

The typical candidate is a senior who has completed all required courses for the major and has a major GPA of at least 3.5. The application process begins each fall semester (September–October), when the program administrator sends an email with specific due dates and requirements to students. Accepted students begin their research year in the spring semester of their senior year. The program covers 50 percent of the tuition cost for a student's fifth year of study.

Requirements for the B.S./M.S. Degree

Current JHU undergraduate Neuroscience majors who wish to apply for the B.S./M.S. Program in their junior or senior year must meet the following minimum requirements (prior to applying):

- A minimum 3.5 GPA in all required courses for the undergraduate major and cumulative GPA of 3.5.
- Completion of all courses required 6 credits of research for the JHU B.S. degree in Neuroscience.
- Completion of the neuroscience sequence as well as the mathematics and science courses required for the BS.

Students in the BS/MS program must complete all requirements for the BS degree in neuroscience, as well as a total of 43 credits of advanced and specialized courses to complete the MS degree. The additional requirements for the MS degree are as follows:

Advanced Seminars in Neuroscience (6 credits)

The Advanced Seminar in Neuroscience is offered in the fall and spring terms.

Final Spring Courses (12 credits)

Degree requirements include 12 credits of additional advanced course work (300-level or above). At least three credits must be at 400-level or above. Courses must be related to the study of neuroscience and ideally focused on the student's concentration of study and area of research. Students may choose courses from the approved list of undergraduate advanced courses. (In addition, up to six additional credits of the Advanced Seminar in Neuroscience, and/or statistics courses, graduate courses and seminars may be taken with the approval of the program director.)

Mentored Research (24 credits)

During the research year, students will complete a total of 24 credits of mentored research. Students must complete nine credits of research in a spring academic term, six in the summer and an additional nine in the fall.

B.S./M.S. Commencement Project (1 credit)

After completing the research year, students must register for a one-credit independent study course intended to track the progress and defense of the student's final research project.

Writing Requirement

Writing is an integral part of scientific work; accordingly, one aim of the mentored research year is to train students in scientific writing. BS/MS students prepare a research proposal for admission to the program, as well as a final report in scientific journal article format. Students are required to write 4 brief (>10 double-spaced pages) review papers in the spring and summer terms of their research year.

Note: This masters degree is only open to current Johns Hopkins University undergraduate students pursuing a major in neuroscience.

Philosophy

http://philosophy.jhu.edu/

The William H. Miller III Department of Philosophy offers programs and courses at the undergraduate and graduate levels. The courses cover major periods in the history of Western philosophy and many of the main topics of systematic investigation: epistemology, metaphysics, ethics, aesthetics, philosophy of language, mathematical logic, and philosophy of science.

The undergraduate courses are designed to introduce students to the history of philosophy and its place in Western civilization, to teach them how to read philosophical texts, and to help them think about philosophical problems, including those that arise in other disciplines. Students may major in philosophy or use it as a concentration for an area major in Humanistic Studies. They may also study philosophy along with another subject, either by constructing a double major or by taking courses designed to help them develop philosophical perspectives on their own fields of interest.

The graduate program is intended primarily for those planning to teach philosophy and make their own contributions to it. While the acquisition of a broad background in the history and different systematic fields of philosophy is required, students will have ample opportunity to develop their own special interests.

The William H. Miller III Department of Philosophy encourages its students to take advantage of the rich resources of other departments at Johns Hopkins University. As a look at their offerings will show, numerous philosophically important courses are offered by such departments as Political Science (political philosophy), History of Science and Technology (philosophy of science), the Humanities Center (hermeneutic, interpretive, and literary theory), and Cognitive Science.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.150.111. Philosophic Classics. 3 Credits.
The course introduces students to philosophy by critically examining selected texts in the Western philosophical tradition. Philosophers whose ideas will be examined include Plato, Descartes, Rousseau and Nietzsche.
Area: Writing Intensive

AS.150.112. Philosophical Problems. 3 Credits.
An introduction to philosophy through several central problems. This year’s topics are free will, death, time, and race.

AS.150.118. Introduction to Formal Logic. 3 Credits.
An introduction to symbolic logic and probability. In the first two parts of the course we study formal ways of determining whether a conclusion of an argument follows from its premises. Included are truth-functional logic and predicate logic. In the third part we study the basic rules of probability, and learn how to make probability calculations and decisions in life.

AS.150.125. Life and Death. 3 Credits.
This course will address some of the Big Picture questions about human life using the methods of analytic philosophy. These questions include: What am I, and what kinds of things could happen to me before I’d no longer be me? Should I be afraid of death? Is it better to be than to never have been anything at all? When is it permissible to end a life? To what extent do I live my life freely?

AS.150.136. Philosophy & Science: An Introduction to Both. 3 Credits.
Philosophers and scientists raise important questions about the nature of the physical world, the mental world, the relationship between them, and the right methods to use in their investigations of these worlds. The answers they present are very different. Scientists are usually empiricists, and want to answer questions by experiment and observation. Philosophers don’t want to do this, but defend their views a priori. Why? Can both be right? Readings will present philosophical and scientific views about the world and our knowledge of it. They will include selections from major historical and contemporary figures in philosophy and science. The course has no prerequisites in philosophy or science.

AS.150.161. Introduction to Nietzsche. 3 Credits.
This course will provide an introduction to Nietzsche’s thought. We shall read and discuss selections from each period of his philosophical development. Students will receive a grade based on a combination of attendance, participation, and a final essay, drafts of which will be discussed with the instructor prior to the final due date.
Area: Writing Intensive

AS.150.193. Philosophy of Language Seminar: Proper Names and Definite Descriptions. 3 Credits.
In talking with each other, we often use proper names like 'Juliet' and definite descriptions like 'The most beautiful fresco in Italy' to pick out persons and objects in our world. But what do these expressions mean exactly? In this seminar, we’ll slowly and carefully work through some classic philosophical texts that address this issue. These texts will provide an introduction to the philosophy of language, and to analytic philosophy in general.
Area: Writing Intensive

AS.150.201. Introduction To Greek Philosophy. 3 Credits.
A survey of the earlier phase of Greek philosophy. Socrates, Plato, and Aristotle will be discussed, as well as two groups of thinkers who preceded them, usually known as the pre-Socratics and the Sophists.

AS.150.205. Introduction to the History of Modern Philosophy. 3 Credits.
An overview of philosophical thought in the seventeenth and eighteenth centuries. We shall focus on fundamental questions in epistemology (knowledge, how we acquire it, its scope and limits), metaphysics (the ultimate nature of reality, the relation of mind and body, free will), and theology (the existence and nature of God, God’s relation to the world, whether knowledge of such things is possible): all questions that arose in dramatic ways as a result of the rise of modern science. The principal philosophers to be discussed are Descartes, Locke, Hume and Kant, though we shall also make the acquaintance of Spinoza, Leibniz and Berkeley.

AS.150.215. Problems with Knowledge, Evidence, and Action. 3 Credits.
This course covers a selection of recent work in epistemology and serves as an introduction to these topics. Issues to be discussed include new approaches to the nature of knowledge and skepticism, normative aspects of the way we handle information in our decision-making, epistemic injustices, and epistemic requirements for democratic discourse.
Area: Writing Intensive

AS.150.219. Introduction to Bioethics. 3 Credits.
Introduction to a wide range of moral issues arising in the biomedical fields, e.g. physician-assisted suicide, human cloning, abortion, surrogacy, and human subjects research. Cross listed with Public Health Studies.
Area: Writing Intensive

AS.150.220. Introduction to Moral Philosophy. 3 Credits.
An introduction to moral philosophy through in-depth and critical reading of selected texts from the history of philosophy. The philosophers whose texts will be discussed include Aristotle, Kant, Mill, and Hannah Arendt.

AS.150.223. Formal Methods of Philosophy. 3 Credits.
For better or for worse (and we think better), during the last century or so, philosophy has become infused with logic. Logic informs nearly every area of philosophy; it is part of our shared language and knowledge base. Vast segments of literature, especially in contemporary analytic philosophy, presuppose basic competence in logic and a familiarity with associated formal methods, particularly set theoretical. The standard philosophy curriculum should therefore guarantee a minimum level of logic literacy, thus enabling students to read the literature without it seeming like an impenetrable foreign tongue. This course is an introductory survey of the formal methods that a contemporary philosopher should be familiar with. It is not mathematically demanding in the way that more advanced courses in metalogic and specialized topics may be. The emphasis is on basic comprehension, not on mathematical virtuosity.

AS.150.235. Philosophy of Religion. 3 Credits.
Can one prove or disprove the existence of God? What is the relation between reason and faith? Are science and religion at odds with one another? We will consider historically significant discussions of these questions as well as important contemporary writings.

AS.150.237. Foundations of Modern Political Philosophy. 3 Credits.
This course is an introduction to modern political philosophy through an intensive study of the classic texts. The focus will be on the nature and limits of political authority under modern social conditions. Authors included are Machiavelli, Hobbes, Locke, Rousseau and Mill.

AS.150.240. Intro-Political Philosop. 3 Credits.
This course begins by reviewing canonical texts in modern political philosophy beginning with Thomas Hobbes and John Locke and ends by exploring classic questions in contemporary debates in race, gender, and identity.
Area: Writing Intensive

AS.150.245. Philosophy of Mind. 3 Credits.
If we know anything, it is natural to think it is our own minds. Despite this, philosophers have long disagreed about the natures of the states which make up our minds. And there is equally little agreement as to what makes such states count as mental in the first place. This course will investigate the nature of different aspects of mind and their interrelations. Time permitting, we will explore debates and puzzles about perception, memory, imagination, dreaming, pain and bodily sensation, emotion, action, volition and those states commonly classed as propositional attitudes: knowledge, belief, desire and intention. This will put us in a position to ask what if anything unifies such phenomena as mental

AS.150.260. Introduction to Metaphysics. 3 Credits.
Metaphysics addresses fundamental questions about the nature and structure of reality. This course will offer an introduction to metaphysics, and a survey of metaphysical debates about topics including free will, possibility and necessity, and arguments for the existence of God.

AS.150.300. Prometheus Editorial Workshop. 1 Credit.
Prometheus is an international undergraduate philosophy journal published by students at Johns Hopkins University. The purpose of the journal is to promote philosophic discourse of the highest standard by offering students an opportunity to engage in open discussion, participate in the production and publication of an academic journal, and establish a community of aspiring philosophers. Students enrolled in this workshop will act as the staff readers for the journal. For more information, please visithttps://prometheus.students.jh.edu/Prerequisite: MUST have taken one philosophy course

AS.150.301. Majors Seminar:. 3 Credits.
Topics change by semester. Please view class search to see what the topic is for a specific term.
Area: Writing Intensive

AS.150.307. Plato's Phaedrus. 3 Credits.
This is a reading course. Together we will do a close reading of one of Plato's masterpieces, the Phaedrus. We will also use this text to address general questions of interpretation, such as how to approach a philosophical classic, how to discern its underlying idea, etc.

AS.150.312. Applied Public Health Ethics and Decision-Making. 3 Credits.
In this course, students receive an introduction to core theoretical foundations and case studies in public and global health ethics. this course adopts an applied framework for understanding how public health ethical values are navigated in different decision-making processes. This course is geared toward juniors and seniors.
Area: Writing Intensive

AS.150.313. Technology, Democracy, and Social Justice. 3 Credits.
This course will consider healthcare technologies through the lens of political values: democracy and social justice. At a broad level, we will ask of these technologies: Who should decide on their design and use when the experts don't resemble the public and the public lacks expertise? How can we provide broad access to the benefits of these new technologies without exposing vulnerable people to further risk and unfairness? More narrowly, the course will focus on four technologies that affect healthcare: anti-malarial "gene drive" mosquitoes, medical AI, genomic data collection, and social media. Gene drives hold the promise of modifying mosquitoes to prevent the spread of infectious disease, but they also expose people in lower-income countries to unanticipated risks. Artificial intelligence and genomic data can deliver scarce medical resources to those who need it most and tailor it to minorities based on their precise characteristics. But they can also exacerbate existing unfairness while exposing minorities to risks of further discrimination and surveillance. Social media has a similar potential to deliver crucial health data, especially in a pandemic. But it also promotes the spread of misinformation among the populations most in need of help. This course will consider how we can balance the benefits and risks of these novel technologies and who gets to decide that balance.
Area: Writing Intensive

AS.150.330. Decisions, Games & Social Choice. 3 Credits.
We investigate rational decision making at the individual and group level. In the first section of the course on decision theory, we consider how a single rational agent will act in a choice situation given her knowledge, or lack thereof, about the world and her particular risk profile. In the second section on game theory, we explore different kinds of competitive and cooperative strategic interactions between agents, and we define different kinds of solutions, or equilibria, of these games. We also apply game theory to the study of morality, convention, and the social contract. In the final section of the course on social choice theory, we turn to group decision making with a focus on the impossibility results of Arrow and Sen.

AS.150.331. Themes from the Philosophy of Religion. 3 Credits.
Religion has always been a contested and extensively debated topic throughout the history of philosophy, and the topics from the philosophy of religion are still relevant today. In this course, we will look at several of those topics: what is religion? Do we have reason to believe or not believe in God? How does God relate to the world (or are there many Gods)? How can we understand religious practice? And what role (if any) should religion play in our society?

AS.150.355. Philosophy of Law. 3 Credits.
In this course we will examine major issues in the philosophy of law, including the nature of law, the role of the Constitution in legal decisions, and the justification of punishment. No previous knowledge of law or philosophy is required.

AS.150.356. Political Philosophy and Public Health Ethics. 3 Credits.
In 2015, Rand Paul generated controversy by insisting that parents should have complete discretion over whether to vaccinate their children. When pressed to come up with a defense for this policy, Paul replied, "The state doesn't own your children. Parents own the children, and it is an issue of freedom and public health." His rationale for his policy proposal and the responses to it hint at several fundamental questions about the role of the State as it pertains to producing health, as well as more practically oriented questions concerning policy. In this seminar, we will consider both sorts of questions. We will consider the merits of and objections to various policies such as cigarette bans, mandatory seatbelt or helmet laws for motorists, taxes for sugary beverages, and prohibitions of the private sale of organs. We will also ask more philosophical questions: When discussing public health, what constitutes 'the public'? And how should we connect public health and policy measures to salient concepts such as legitimacy, justice, coercion, manipulation, paternalism, autonomy, liberty, privacy, and parental rights? In asking these questions, both at the level of policy and more philosophically, we will engage with a variety of political theories, including various strands of feminism, anarchism, libertarianism, perfectionism, critical race theory, leftist theories, broadly consequentialist theories, and public reason liberalism. Must have some background in philosophy or bioethics.
AS.150.219 OR AS.150.220 OR AS.150.237 OR AS.150.240

AS.150.400. Simone de Beauvoir. 3 Credits.
Seminar on Beauvoir's moral philosophy, covering the major works of the 1940s. Readings will include selections from The Blood of Others, Pyrrhus and Cineas, All Men are Mortal, The Ethics of Ambiguity, and The Second Sex. Open to graduate students and advanced undergraduates. (Beginning undergraduates should contact Professor Kosch.) No prerequisites.
Area: Writing Intensive

AS.150.401. Greek Philosophy: Plato and His Predecessors. 3 Credits.
A study of pre-Socratic philosophers, especially those to whom Plato reacted; also an examination of major dialogues of Plato with emphasis upon his principal theses and characteristic methods. Cross-listed with Classics.
Area: Writing Intensive

AS.150.402. Aristotle. 3 Credits.
A study of major selected texts of Aristotle.
Area: Writing Intensive

AS.150.403. Hellenistic Philosophy. 3 Credits.
A study of later Greek philosophy, stretching roughly from the death of Aristotle to the Roman imperial period. Epicureans, Stoics, and Skeptics will be the main philosophical schools examined.
Area: Writing Intensive

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

AS.150.405. Evidence: An Introduction. 3 Credits.
What is evidence? Can it ever be disregarded in science, the law, or religion, and if so, when? What are the paradoxes of evidence (grue, ravens) and how can they be solved?

AS.150.406. Tragedy and Living Well. 3 Credits.
This course revisits the idea of tragedy as represented in Ancient Greek thought for the purpose of approaching questions of flourishing and ethical living from a different angle.
Area: Writing Intensive

AS.150.409. Wittgenstein On Certainty. 3 Credits.
Wittgenstein's On Certainty consists of four notebooks containing remarks on knowledge, certainty, doubt and truth. In this course, we will undertake a close study of Wittgenstein's notes, critically examining competing interpretations of Wittgenstein's ideas and the different use of those ideas have been taken up in current debates about philosophical skepticism.

AS.150.410. The Philosophy of Afrofuturism I. 3 Credits.
The main goal of speculatibe fiction is to render a familiar world slightly unfamiliar to then ask familiar questions in new ways. Afrofuturism as a genre of sci-fi, fantasy, and horror written by and about black people, applies this ethic to the problems of race, broadly speaking. In this course we survey major texts to philosophically inquire into phenomena like incaceration., Slavery and it's lingering effects, and colonialism among other themes.
Area: Writing Intensive

AS.150.411. Modal Psychology. 3 Credits.
In this seminar, we'll consider recent theoretical and experimental work by philosophers, psychologists, and cognitive scientists on the impact of our modal judgments (i.e., our judgments about whether a state or event is possible or not, statistically probable or not, morally bad or not, and so forth) in various cognitive domains. Among other things, we'll look at recent studies suggesting that our moral judgments can affect our judgments about whether an agent is free to act, our selection of causes, and our simulation of counterfactual possibilities in surprising ways.

AS.150.415. Typefaces and Meaning. 3 Credits.
While linguists and philosophers have developed deep and intricate theories of meaning for natural language, considerably less attention has been paid to how the form of written and printed language can itself communicate content. In this seminar, we'll look at recent theoretical and experimental work across a range of different disciplines that converges on the idea that typeface choice can be a rational means to communicate and construct different personae. To get clearer about this phenomenon, we'll also look at philosophical work on meaning, and related research on sociolinguistic variation and the semantics and pragmatics of expressive language.

AS.150.417. Kant's 'Critique Of Pure Reason'. 3 Credits.
An examination of the philosophy of Immanuel Kant, with emphasis on The Critique of Pure Reason.

AS.150.418. Hermeneutics and Critrical Theory. 3 Credits.
An introduction to two of the most important and influential schools in twentieth-century German philosophy. This course examines the works of four leading representatives of these schools, i.e. Heidegger, Gadamer, Horkheimer, and Habermas.

AS.150.419. Kant's Critique/Judgment. 3 Credits.
This course will examine closely and in detail the aesthetic and teleological parts of Kant's third masterpiece, The Critique of the Power of Judgment.

AS.150.420. Mathematical Logic I. 3 Credits.
Mathematical Logic I (H,Q) is the first semester of a year long course. It introduces the two notions of validity and provability for both sentential logic and first-order predicate logic, showing in each case that there is a system of derivation such that any argument is valid if and only if the conclusion is provable from the premises. The result is non-trivial since validity is a semantic notion involving the preservation of truth, while a proof is a finite syntactic object whose correctness can be effectively decided. The goal of the course, however, is to learn how to formulate mathematical theories in first-order logic and to explore various of their properties (or lack thereof) such as completeness, decidability, axiomatizability, finite axiomatizability, and consistency. The course concludes with a brief introduction to model theory and the interpretability of one theory in another, which is the basis for relative consistency proofs in mathematics.

AS.150.421. Mathematical Logic II. 3 Credits.
Euclid set a precedent for the codification of mathematics by axiomatizing the set of geometric truths. An obvious question that arises is whether all branches of mathematics are axiomatizable, especially fundamental ones, such as arithmetic. In the late nineteenth century, what became known as Peano arithmetic was proposed as an axiomatization. The essential feature of an axiomatization is that, although one might have an infinite number of axioms, as does Peano arithmetic, one must have a decision procedure for determining whether a given proposition is or is not an axiom. In 1931, Gödel proved the astounding result that, not only is Peano arithmetic incomplete in the sense that it does not entail all arithmetic truths, but any attempted axiomatization of arithmetic is incomplete, and thus the set of arithmetic truths must be undecidable. Subsequently, Alfred Tarski showed the set of arithmetic truths is not even definable. Also, by finding a finitely axiomatizable undecidable subtheory of Peano arithmetic, Alonzo Church was able to show that there is not even an effective procedure for determining whether a given sentence is a logical truth.Finally, in his 1931 paper, Gödel argued a second incompleteness theorem, viz., that any theory strong enough to express its own consistency, as he showed Peano arithmetic to be, cannot prove its own consistency unless it is inconsistent. We will cover these and other results that have had a profound effect on the foundations of mathematics. It remains an open question whether so basic a theory as Peano arithmetic is consistent.
AS.150.420

AS.150.422. Axiomatic Set Theory. 3 Credits.
A development of Zermelo-Fraenkel set theory (ZF), including the axiom of choice (ZFC), a system in which all of mathematics can be formulated (i.e., entails all theorems of mathematics). Although, we'll do an exposure to transfinite ordinals and cardinals in general so that you can get a sense for how stupendously “large” these can be, the main thrust concerns certain simple, seemingly well-posed conjectures whose status appears problematic. For example, the Continuum Hypothesis (CH) is the conjecture that the cardinality of the real numbers is the first uncountable cardinality, i.e., the first cardinality greater than that of the set of natural numbers. Equivalently, there is no uncountable subset of real numbers strictly smaller in cardinality than the full set of reals. (You'd think that if there were one, you would be able eventually to find such.) Cantor thought that CH is true, but could not prove it. Gödel showed, at least, that if ZFC is consistent, then so is ZFC+CH. However, Paul Cohen later proved that if ZFC is consistent, then so is ZFC + the negation of CH. In fact, CH could fail in astoundingly many ways. For example, the cardinality of the continuum could be (weakly) inaccessible, i.e., of a cardinality that cannot even be proved to exist in ZFC (although the reals can certainly can be proved to exist in ZFC). So, are there further, intuitively true axioms that can be added to ZFC to resolve the cardinality of the continuum, and CH is definitely true or false? Or, as Cohen thought, does CH simply lack a definite truth value?

AS.150.423. Theory of Knowledge. 3 Credits.
An advanced introduction to the central problems, concepts and theories of contemporary philosophical epistemology (theory of knowledge). Topics to be explored will includes: what is knowledge (and why do we want it)?; theories of justification (foundationalism, the coherence theory, etc.); externalism and internalism in epistemology; skepticism, relativism and how to avoid them. Reading from contemporary sources.

AS.150.425. Enlightenment Moral and Political Theory. 3 Credits.
An examination of some of the central texts of the Enlightenment, including works by Locke, Montesquieu, Rousseau, and Kant.
Area: Writing Intensive

AS.150.426. Philosophy and Disability. 3 Credits.
In this course, we will consider various philosophical issues related to disability. What counts as a disability? What obligations do we have, both as individuals and as a society, to people with disabilities? What counts as respecting people with disabilities, and what counts as unjustifiable discrimination against them?
Area: Writing Intensive
AS.150.219 OR AS.150.220

AS.150.428. Spinoza's Theological Political Treatise. 3 Credits.
The course is an in-depth study of Spinoza's Theological-Political Treatise. Among the topics to be discussed are: Spinoza's Bible criticism, the nature of religion, philosophy and faith, the nature of the ancient Hebrew State, Spinoza's theory of the State, the role of religion in Spinoza's political theory, the freedom to philosophize, the metaphysics of Spinoza's Theological-Political Treatise, and finally, the reception of the TTP.

AS.150.430. Hegel's Phenomenology of Spirit. 3 Credits.
From the opening chapter on "Sense-certainty" to the concluding "Absolute Knowledge," we will follow Hegel's account of the experience of consciousness through the transitions to self-consciousness, reason, spirit, and religion.

AS.150.432. Philosophy of Memory. 3 Credits.
Memory is amongst the most fundamental capacities of the mind. Without memory, we would be limited to our present experience, and many of our other cognitive capacities and social practices would be impossible. In this course we will investigate interconnected questions including: What is the nature of memory and of its different varieties? How should we study memory: what should be the roles of psychology, neuroscience, and introspection? If someone loses many of their memories due to injury or disease, are they still the same person—and should we still respect their past wishes and hold them responsible for their past deeds? What kinds of memory do other animals have and is this morally significant? Is forgetting always bad, or do we have a duty to remember? How do collective memory and public memorials relate to individual memory, and what lessons does the study of individual memory have for the politics of collective memory?
Area: Writing Intensive

AS.150.433. Philosophy of Space & Time. 3 Credits.
Is space an entity that exists independently of matter (substantivalism), or is it only an abstraction from spatial relations between bodies (relationism)? Is there a lapse of time even when nothing changes, or is time only a measure of motion? Are motion and rest contrary properties or states of a body, or are there only changes in the positions of bodies relative to one another? Philosophers and physicists have disputed these questions from antiquity to the present day. We survey the arguments and attempt to find a resolution. But there are further questions. What is the significance of incongruent counterparts (left hands vs. right hands)? Is there a fact of the matter as to the geometry of space (flat, hyperbolic or elliptical), or as to whether space-like separated events occur at the same time? What is the principle of relativity? Does Einstein's theory have consequences for the substantivalist/relationist debate? What is the status of spacetime in current physics and cosmology? Why does time but not space have a "direction"? Are past, present and future objective features of reality, or are they merely "stubborn illusions"? Does time flow? If not, how do we account for our sense of the passage of time?

AS.150.434. Formal Methods of Philosophy. 3 Credits.
For better or for worse (and we think better), during the last century or so, philosophy has become infused with logic. Logic informs nearly every area of philosophy; it is part of our shared language and knowledge base. Vast segments of literature, especially in contemporary analytic philosophy, presuppose basic competence in logic and a familiarity with associated formal methods, particularly set theoretical. The standard philosophy curriculum should therefore guarantee a minimum level of logic literacy, thus enabling students to read the literature without it seeming like an impenetrable foreign tongue. This course is an introductory survey of the formal methods that a contemporary philosopher should be familiar with. It is not mathematically demanding in the way that more advanced courses in metalogic and specialized topics may be. The emphasis is on basic comprehension, not on mathematical virtuosity. Co-taught with AS.150.223 Formal Methods of Philosophy.

AS.150.436. Philosophy of Gender. 3 Credits.
In this class we will examine philosophical questions about gender, and about the intersections between gender and other social categories including race, class and sexuality. We will focus specifically on questions about the metaphysics of gender and other social categories.

AS.150.437. Kierkegaard. 3 Credits.
A survey of the works of Danish philosopher Søren Kierkegaard, considered by many to be the most important figure in the history of what came to be called 'existential philosophy', and one of the great moral psychologists in the history of western philosophy. We will read a broad selection from Kierkegaard's pseudonymous works, including Either/Or, Fear and Trembling, The Concept of Anxiety and The Sickness unto Death.
Area: Writing Intensive

AS.150.441. Paradoxes of Agency and Belief. 3 Credits.
This course will focus on issues arising from the Socratic paradoxes of agency and from Moore's Paradox. Readings will include Platonic dialogues, the ethical writings of Kant, Fichte and Hegel, selections from Moore and Wittgenstein, and writings by contemporary philosophers of agency.

AS.150.442. Wittgenstein. 3 Credits.
An advanced introduction to the philosophical work of Ludwig Wittgenstein. We shall begin by examining the central ideas of Wittgenstein's Tractatus Logico-Philosophicus against the background of the philosophical work of Frege and Russell. We shall then move on to the Philosophical Investigations, paying special attention to his searching self-criticisms and to the "rule-following" and "private language" problems, as highlighted by Saul Kripke's pathbreaking but controversial account of Wittgenstein's argument.
Area: Writing Intensive

AS.150.445. Berkeley's Idealism. 3 Credits.
Idealism is the view that, at bottom, whatever is - is an idea. For the idealist, to be is to be perceived. George Berkeley is probably the most famous idealist among European philosophers, and on this seminar we will read closely two of his major texts: Principles of Human Knowledge and Three Dialogues between Hylas and Philonus. Topics to be discussed include: the nature of bodies, the nature of the mind, the possible sources of our ides, and Berkeley's understanding of God.

AS.150.447. The Logic of Spinoza's Ethics. 3 Credits.
One of the unique aspects of Spinoza's major work, the Ethics, is its formal or "geometric" structure. The book is written following the model of Euclid's Elements, with Definitions, Axioms, Propositions, and Demonstrations. In this seminar, we scrutinize the deductive structure of the Ethics and some of its earlier drafts. We consider the role and epistemic status of the definitions and axioms, attempt to provide rigorous reconstructions of some of its key propositions, and also investigate the possibility of alternative routes between these propositions.

AS.150.448. The Religion of Morality. 3 Credits.
In the wake of the Enlightenment criticism of traditional forms of religion, philosophers attempted to give religion a rational basis by equating it with moral practice. We will examine this religion of morality with the goal of determining whether it can vindicate its claim to be a genuine religion. We will read texts by Rousseau, Kant, Fichte, Hegel and Emerson.

AS.150.449. New Foundations for Mathematics. 3 Credits.
With the appearance of Zermelo-Fraenkel set theory (ZF) in the early 20th century and the subsequent identification of first-order logic, the problem of an adequate foundations for mathematics was thought to have been solved. The emergence of category theory (Cat) in the latter half of the century and more recently of homotopy type theory (HoT) has been seen to undermine ZF's foundational status and to threaten to replace it. In this course we will (1) see how ZF serves as a foundation, (2) learn a bit of Cat and HoT, and (3) discuss what the foundations can and should be (if any).

AS.150.450. Topics in Biomedical Ethics. 3 Credits.
Area: Writing Intensive

AS.150.451. Animal Points of View. 3 Credits.
Are non-human animals conscious? Do they possess a stream of consciousness like our own? This course will explore these questions by asking what it is for an animal to possess a point of view and a temporal point of view in particular.

AS.150.452. Freedom of Will & Moral Responsibility. 3 Credits.
What are freedom of the will and moral responsibility? Are they compatible with determinism or naturalism? This course will examine various philosophers' answers to these questions.
Area: Writing Intensive

AS.150.453. Hegel's Logic. 3 Credits.
This seminar is a close study of Hegel's major work, the Science of Logic. Among the issues to be discussed are the questions: How should philosophy begin and what - if anything - can it take for granted? We will also attempt to scrutinize Hegel's attitude toward the law of non-contradiction.

AS.150.455. Ethics And Animals. 3 Credits.
Area: Writing Intensive

AS.150.458. The Biggest Hits in Philosophy of Science (20th and 21st Centuries). 3 Credits.
Readings from Duhem, Carnap, Hempel, Popper, Quine, Kuhn, Feyerabend, van Fraassen, and others who got us where we are in the field today. Quine said: Philosophy of science is philosophy enough. Is it?

AS.150.459. Counterfactual Reasoning, Normative & Descriptive Aspects. 3 Credits.
Counterfactual reasoning is reasoning about what would be the case if things had been other than they are: If it had been sunny and so I didn't run into that store for cover from the rain, maybe I would never have met my future partner! How ought one to reason counterfactually? How do people in fact do it? Counterfactual reasoning might seem like a narrow topic, but it is of fundamental importance to both scientific and everyday inquiry, where it is intimately connected to the use of imagination, planning for the future, assessment of and learning from the past, providing explanations, understanding fictions, and constructing experiments. This course will explore both normative and empirical aspects of counterfactual reasoning, drawing upon readings in philosophy, psychology, and linguistics. An overarching goal of this course is to arrive at a better understanding of counterfactuality that is informed by research across these different disciplines.

AS.150.461. Theory Of Value. 3 Credits.
What is value? What is the difference between instrumental and final value? What is the relation of ethical and economic value? This course will explore a range of answers to these questions, with special focus on the role of desire and reason in determining value. Readings will include historical and contemporary authors.

AS.150.464. Hegel's Philosophy of Right. 3 Credits.
This course will be a close reading of G.W.F. Hegel's Philosophy of Right. Some of the main topics for discussion will be the relation of law and morality, the dependence of the political philosophy on Hegel's Logic, and the relation of individual and social conceptions of freedom.

AS.150.465. Topics in the Philosophy of Physics. 3 Credits.
This course will consider some philosophical topics in the foundations of physics. Entropy and the arrow of time -- why time has a direction, whether it can be explained in terms of entropy, and what role the arrow of time plays in causation and emergence. Anthropics and indexical uncertainty -- approaches to probability, reference classes, the cosmological multiverse, Boltzmann brains, simulation and doomsday arguments. Foundations of quantum mechanics -- the measurement problem, many-worlds, probability and structure, alternative approaches.

AS.150.473. Classics of Analytic Philosophy. 3 Credits.
A reading of some of the classic philosophical works in 20th Century Analytic Philosophy, beginning with G. Frege and ending with V.O. Quine.

AS.150.474. Justice and Health. 3 Credits.
Course will consider the bearing of theories of justice on health care. Topics will include national health insurance, rationing and cost containment, and what justice requires of researchers in developing countries.

AS.150.475. The Nature and Significance of Animal Minds. 3 Credits.
Humans have a complicated relationship with other animals. We love them, befriend them and save them. We hunt, farm and eat them. We experiment on and observe them to discover more about them and to discover more about ourselves. For many of us, our pets are amongst the most familiar inhabitants of our world. Yet when we try to imagine what is going on in a dog or cat's mind — let alone that of a crow, octopus or bee — many of us are either stumped about how to go about this, or (the science strongly suggests) get things radically wrong. Is our thought about and behaviour towards animals ethically permissible, or even consistent? Can we reshape our habits of thought about animals to allow for a more rational, richer relationship with the other inhabitants of our planet? In this course, students will reflect on two closely intertwined questions: an ethical question, what sort of relationship ought we to have with animals?; and a metaphysical question, what is the nature of animal minds? Readings will primarily be from philosophy and ethics and the cognitive sciences, with additional readings from literature and biology. There are no prerequisites for this class. It will be helpful but certainly not necessary to have taken previous classes in philosophy (especially ethics and philosophy of mind) or in cognitive science
Area: Writing Intensive

AS.150.476. Philosophy and Cognitive Science. 3 Credits.
This year's topic is perception. Questions will include: In what ways might perceptual states be like and unlike pictures? Does what we believe affect what we perceive? Is linguistic comprehension a kind of perception? This course is geared toward advanced undergraduates and graduate students in philosophy and in the mind brain sciences and related fields. Others may be successful in the course depending on their prior course of study.

AS.150.480. Death and Dying. 3 Credits.
What is death? How should we think about death? How should we think about it? How should we treat those who are dying including ourselves? This course will examine these and other philosophical questions.
Area: Writing Intensive

AS.150.481. Hobbes' Leviathan. 3 Credits.
Thomas Hobbes' Leviathan is a masterpiece of modern political philosophy. This class is an in-depth study of that work.

AS.150.482. Food Ethics. 3 Credits.
Eating is an essential human activity: we need to eat to survive. But how should we eat? In this course, we consider such ethical questions as: Is it morally wrong to make animals suffer and to kill them in order to eat them? What is the extent of hunger and food insecurity, in this country and globally, and what should we as individuals do about it? Should the government try to influence our food choices, to make them healthier?

AS.150.483. Evidence, Foundations of Probability, and Speculation. 3 Credits.
The course examines major theories about the meaning of evidence and probability, and in terms of these provides answers to the questions “What is a scientific speculation?” and “When, if at all, is speculating important or even legitimate in science?” No preview study of evidence or probability is required.

AS.150.485. Descartes and Spinoza. 3 Credits.
Descartes and Spinoza are two of the leading philosophers of the modern period. In the class we will study the works of both figures. Special attention will be assigned to Spinoza’s early works.

AS.150.486. Moral Imagination. 3 Credits.
This course explores the relationship between moral principles and how we use imagination to put or fail to put principles to work. We will read widely and eclectically in exploring this relationship.

AS.150.491. American Philosophy: Pragmatism. 3 Credits.
Studies of major figures in the history of American philosophy beginning with the 19th century. The course focuses on the development of pragmatism in the work Peirce, James and Dewey. Other philosophers, such as Royce and Mead, may also be studied.

AS.150.492. Plato's Republic. 3 Credits.
This course will be a close reading of Plato’s Republic, with special attention to the parallel of city and soul, the relevance of metaphysics to politics, and the relation of aristocracy, democracy and tyranny.

AS.150.498. Modal Logic and Its Applications. 3 Credits.
In the first part of the course, we’ll investigate the theory of modal logic, considering its syntax, semantics, and proof theory. We’ll then turn to some its philosophical applications: epistemic logic, counterfactuals, deontic logic, intuitionistic logic, and the metaphysics of time.

AS.150.511. Directed Study. 3 Credits.
Individual study of special topics, under regular supervision of a faculty member. Special permission is required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.512. Directed Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.551. Honors Project. 3 Credits.
See departmental major adviser.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.552. Honors Project. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.603. Seminar in Modern Philosophy.
German-style colloquium for advanced graduate students working in the history of modern philosophy. Course will meet synchronously online every other week for the duration of the academic year. Spring offering will carry a separate course number.

AS.150.604. Graduate Seminar in the Philosophy of Science: The Big Issues.
Readings from Duhem, Carnap, Hempel, Popper, Quine, Kuhn, Feyerabend, van Fraassen, and others who, in the 20th and 21st centuries, got us where we are in the field today. And Quine added: philosophy of science is philosophy enough. Is it?

AS.150.606. Seminar on Skepticism - Ancient & Modern.
Course will focus on ancient skepticism as a way of life, and on the role of epistemological argument in skepticism so conceived. The seminar will end with a brief look at early modern reactions to ancient skepticism.

AS.150.607. Graduate Seminar: Knowledge and Perception.
How does perception reveal the world, if it does? Why have philosophical reflections on perception often led to skepticism? For background, we will start with readings from Ayer and Austin (on the sense-datum theory), and Sellars (on the Myth of the Given). We will then spend time on contemporary "disjunctive" accounts of perceptual consciousness, with readings from McDowell, Travis and (possibly) others.

AS.150.609. Fichte, Schelling and Spinoza.
Spinoza constituted a major philosophical interlocutor for both Fichte and Schelling. In this class will study the critical reception of Spinoza by the two philosophers. Among the topics we intend to discuss are: freedom, God, the concept of substance, the nature of thought, and reason.Recommended Course Background: Previous acquaintance with Spinoza's ethics.

AS.150.612. The Birth of German Idealism.
This course will mainly consist of close readings of the work F.H. Jacobi, J.G. Fichte, and F.W.J. Schelling. We will focus on the issues of freedom and systematicity in the transformation of Kant’s critical philosophy through the influence of Spinoza.

AS.150.613. Graduate Seminar: Topics in the Philosophy of Mind - Perception.
Recent work on the philosophy of perception, including Tyler Burge’s new book Perception: First Form of Mind

AS.150.616. Is Scientific Knowledge Possible?.
Philosophical Views of Descartes, Newton, Duhem, Popper, Carnap, Goodman (grue), Kuhn, and Feyerabend.

AS.150.617. Origins of Analytic Philosophy; Frege to Carnap.
Course description forthcoming. Previous philosophy classes of History of Modern Philosophy and/or Elementary Logic useful. This class is geared toward graduate students in philosophy.

AS.150.619. Topics in Hegel's Philosophy: The Philosophy of Right.
This course will be a close reading of G.W.F. Hegel’s Philosophy of Right. Some of the main topics for discussion will be the relation of law and morality, the dependence of the political philosophy on Hegel’s Logic, and the relation of individual and social conceptions of freedom.

AS.150.620. Political Philosophy.
A high level review of key thinkers in contemporary political thought.
Area: Writing Intensive

AS.150.622. Graduate Seminar: Metametaphysics.
Metametaphysics is the study of the nature and viability of metaphysics. In this seminar we will engage with questions about metametaphysics, including questions about the relationship between metaphysics and science, responses to deflationist challenges, and the nature of social metaphysics.

AS.150.623. Seminar in German Idealism.
This course explores the transformation of Kantian idealism by F.W.J. Schelling and G.W.F. Hegel in their early years in Jena. Readings will include Schelling's System of Transcendental Idealism as well as Hegel's "Difference" essay and Faith and Knowledge.

AS.150.632. Formal Logic.
"An introduction to symbolic logic and probability. In the first two parts of the course we study formal ways of determining whether a conclusion of an argument follows from its premises. Included are truth-functional logic and predicate logic. In the third part we study the basic rules of probability, and learn how to make probability calculations and decisions in life." Co-listed with AS.150.118 (for undergraduate students) (01-F 11:00-11:50am).

AS.150.633. Kant's Opus Postumum.
This research seminar examines the reasons that led Kant to revise his transcendental philosophy late in life. Special attention to problems in the Metaphysics of Nature and the Metaphysics of Morals. Students should be familiar with Kant's theoretical and practical philosophy.

AS.150.635. Graduate Seminar: Truthmaker Semantics & Pragmatics.
An investigation into the theory of truthmaker semantics and pragmatics and its applications to various problems in philosophical logic and linguistics. This course is geared toward graduate students. Some background in mathematical logic will be useful in this class.

AS.150.642. Seminar on Ancient Greek Ethics.
The seminar will focus on the ethical system of the Stoics. Stoic ethics is notorious for a number of apparently extreme assertions, such as "Virtue is the only good", "Virtue is sufficient for happiness", and "The wise man is happy on the rack". Yet the system had a wide following, over several centuries, in both the Greek and Roman worlds; and its devotees (including at least one Roman emperor, and a close adviser to another) were certainly not all fanatics. We will attempt to make sense of this ethical outlook, with particular focus on the relations among virtue, wisdom and happiness.

AS.150.645. Truthmakers.
An investigation into the metaphysics and semantics of truthmakers and their application in various areas of philosophy.

AS.150.651. Animal Points of View.
Are non-human animals conscious? Do they possess a stream of consciousness like our own? This course will explore these questions by asking what it is for an animal to possess a point of view and a temporal point of view in particular.

AS.150.653. Seminar: Philosophy of Physics.
Physicists, natural philosophers and ordinary people have long held that space and time are fundamental entities, the stage as it were for all bodies and their interactions. Although relativity now teaches us that space and time are not fundamental, but aspects of a single entity, spacetime, it is typically thought that the latter is strictly fundamental, especially given its dynamical role in general relativity as the gravitational field. Yet recent attempts to unify general relativity and quantum mechanics reject this view and instead hold that spacetime emerges from something non-spatiotemporal and more fundamental. But what is the nature of this emergence and from what does spacetime emerge? We will examine a variety of proposals and ask (i) what it means for spacetime to emerge from non-spatiotemporal features and (ii) how this compares with philosophical theories of emergence. On one approach in particular, spacetime (gravity) emerges from the entropy of quantum entanglement. Thus, because it appears to come in various forms, we will also be concerned to understand the concept of entropy. But we will consider other approaches as well (e.g., loop quantum gravity and causal set theory) and attendant issues such as the black hole information loss paradox, the holographic principle, and the conjecture that entangled particles are connected by a wormhole.

AS.150.668. Graduate Seminar on Essence.
An exploration of historical and contemporary work on the metaphysics of essence, and related questions about modality, explanation, identity and the Principle of Sufficient Reason. Readings will include work from Aristotle, Spinoza, Kripke and Fine. This course is open to upper level undergraduate students with the permission of the instructor.

AS.150.669. Topics in Practical Philosophy.
An investigation into central topics in practical philosophy.

AS.150.675. Recent Works in Skepticism.
We all take it for granted that perceptual experience yields knowledge of the world around us. But in his Meditations on First Philosophy, Descartes presents new and puzzling thought experiments. He asks whether there is any way to be sure that, when he tales himself to be experiencing things in the world around him, he is not dreaming. From there, he goes on to imagines an Evil Demon with the power to manipulate the total course of his (Descartes's) experience, so that what he naturally takes to be experience of the world around him is really a kind of perpetual dream: a simulation or virtual reality, as we might say today. Descartes's problem, which has made its way into popular culture through films like those in the "Matrix" series, remains a source of philosophical puzzlement. While no one believes that skeptical hypotheses like Demon or computer deception are true, it is not easy to say how we can exclude them. Given that the deception is systematic, it seems that any 'evidence' I cite could itself be part of the simulation. So how do I (or could I) know (for sure) that I'm not the victim of the Deceiver or the Matrix? We shall examine some of the latest attempts to respond to Descartes's challenge. Does the "How could I know?" question admit of a theoretical answer. Is the question itself somehow ill-posed? Can we answer it without making significant concessions to skepticism? What can we learn about knowledge (or the concept of knowledge) by coming to understand how skepticism arises and how it goes wrong (if it does)? Readings from contemporary sources.

AS.150.676. Graduate Seminar: Current Topics in Philosophy.
Rather than having a set topic, the point of this seminar is to stay up-to-date with the current philosophy literature by working through 1-2 recently published papers each week. The papers covered will depend on the research interests of the seminar participants (and my own).

AS.150.677. Moral Imagination.
This course explores the relationship between moral principles and how we use imagination to put or fail to put principles to work. We will read widely and eclectically in exploring this relationship.

AS.150.678. Social Construction.
An exploration of the metaphysics of social construction, examining different theories of social construction and related questions about social ontology, scientific realism and the boundaries of metaphysics.

AS.150.688. Philosophy of Psychology.
An examination of recent philosophical and empirical work on perception and consciousness.

AS.150.810. Independent Study.

AS.150.811. Directed Study.
Please see AS.150.810 for section numbers to use when registering.

AS.150.812. Directed Study.
Please see AS.150.810 for section number to use when registering.

AS.150.813. Seminar in Modern Philosophy.
German-style colloquium for graduate students working in the history of modern philosophy. We will read newly-published work, invite speakers, and have presentations by advanced graduate students. First- and second-year students may register for a grade. Advanced graduate students in history of modern should audit/present

AS.150.821. Research Seminar in Language and Mind.
A workshop for current departmental research in language and mind. Permission required.

AS.150.822. READINGS AND SKILLS IN CONTEMPORARY PHILOSOPHY PART I.
This course provides skills training for a successful career in philosophy, through engagement with contemporary work across a wide range of areas of philosophy. As a class, we will choose accessible articles of general interest recently published in top journals. Each student will be responsible for presenting one of these articles to the class and leading discussion, with guidance from the instructors. All students will be required to carefully and closely read each paper for each class, and come prepared to discuss it in depth. The aim of this part of the course is to learn how to read and analyze articles, present work, and engage in constructive philosophical discussion. After presenting the paper, each presenter will be required to write a short reply. As a class, we will then engage in a mock review process, crafting anonymous referee reports, revising replies in the light of these, and writing letters to the editor explaining the revisions. The aim of this part of the course is to gain knowledge and skills relevant to writing philosophy and successful publication. The course is open to 1st and 2nd year Philosophy PhD students only. It will meet every other week in both the fall and the spring semesters; each semester is worth 2 credits and students are required to enroll in both. Grading will be based predominantly on participation and effort

AS.150.823. READINGS AND SKILLS IN CONTEMPORARY PHILOSOPHY II.
This course provides skills training for a successful career in philosophy, through engagement with cutting-edge contemporary work across a wide-range of areas of philosophy. As a class, we will choose accessible articles of general interest recently published in top journals. Each student will be responsible for presenting one of these articles to the class and leading discussion, with guidance from the instructors. All students will be required to carefully and closely read each paper for each class, and come prepared to discuss it in depth. The aim of this part of the course is to learn how to read and analyze articles, present work, and engage in constructive philosophical discussion. After presenting the paper, each presenter will be required to write a short reply to it, in the style of the relevant journal. As a class, we will then engage in a mock review process, crafting anonymous referee reports, revising replies in the light of these, and discussing these as editors. The aim of this part of the course is to gain knowledge and skills relevant to writing philosophy and successful publication. The course is open to 1st and 2nd year graduate students. It will meet every other week in both the fall and the spring semesters; each semester is worth 2 credits and students are required to enroll in both. Grading will be based predominantly on participation and effort. Upper-year graduate students may audit the course by permission of the instructors, conditional on their commitment to attend and engage as full members of the class; if student numbers are high, priority with respect to presentations will be given to 1st and 2nd year students.
Area: Writing Intensive
AS.150.822

AS.150.824. Research Seminar.
For 3rd and 4th year Philosophy graduate students working on their Qualifying Papers and Dissertation Proposals. Meets every other week.

AS.150.825. Research Seminar.
In this course students will present drafts of Qualifying Papers and first dissertation chapters, receiving feedback from students, the instructor and other relevant faculty.

AS.150.850. Summer Research.
Students research and develop their dissertation topic.

Cross Listed Courses

Classics

AS.040.626. Plato and Poetry.
This graduate seminar will explore Plato’s contributions to the “old quarrel” between poetry and philosophy, encompassing such topics as the relationship between poetic inspiration and human reason, the role of literature in pedagogy, and the metaphysical implications of poetic fiction. We will focus on several Greek texts from the Platonic corpus related to these themes, as well as some later sources that engage with Platonic ideas.

Comparative Thought and Literature

AS.300.399. Cinema and Philosophy. 3 Credits.
What do films and philosophy have in common? Do films express, with their own means, philosophical problems that are relevant to our experience of ourselves and the world we live in? This term we will study such issues with a particular focus on questions of justice, truth, revenge, forgiveness, hope, hate, and fear.

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

East Asian Studies

AS.310.335. Theorizing Race and Mixed-Race in Asia and its Diasporas. 3 Credits.
This class will explore the construction of race and its applications in Asia and its diasporas. Using the notion of "mixed-race" as an analytic, we will examine how the colonial origins of race and the ensuing Cold War have influenced concepts of national identity and belonging. Employing an inter-sectional approach towards race, gender, and sexuality, the course will draw on a variety of media including memoirs, archives, and videos, to contemplate the locus of race and mixed-race and their importance within the larger nexus of identity formation in Asia and its diasporas.
Area: Writing Intensive

First Year Seminars

AS.001.121. FYS: Socrates and his Intellectual Context. 2 Credits.
This First-Year Seminar will focus on the figure of Socrates. Socrates wrote nothing, so we depend on others for our knowledge of him. We will examine the ways he is portrayed by several different authors, including Plato. We will also examine some other ideas around in his time - some of which were pretty radical - and consider how he may have reacted to them. Finally, we will examine his influence on later thought.

AS.001.142. FYS: The Physics of Democracy. 3 Credits.
This First-Year Seminar considers what we can learn about democratic societies by thinking of them as complex physical systems. We will discuss voting and social choice theories and their relationship to renormalization and emergence; organization and segregation in complex systems: power laws, inequality, and polarization; and the dynamics of information and opinions: networks, bubbles, filters, and phase transitions.

AS.001.188. FYS: Skepticism - Ancient, Modern, Contemporary. 3 Credits.
Can we gain knowledge of reality, or is everything a matter of opinion? Does it matter? Why do we want (or need) knowledge anyway? Questions like this have been the stock in trade of philosophical skeptics throughout the entire history of our Western philosophical tradition. This First-Year Seminar will involve close readings of some classic works on the topic of skepticism with a view to understanding some of the main arguments for (and against) skepticism: how they work and how they may have changed over time. Readings include selections from Sextus Empiricus, Descartes, Hume and Wittgenstein.

History

AS.100.295. American Intellectual History since the Civil War. 3 Credits.
Readings in American social thought since 1865, ranging across developments in philosophy, literature, law, economics, and political theory.
Area: Writing Intensive

Islamic Studies

AS.194.401. Themes in Medieval Islamic Thought. 3 Credits.
This seminar examines medieval Muslim thinkers who addressed themes at the intersection of theology, philosophy, science, and ethics: the definition of the nature of God's attributes, His uniqueness, transcendence and omnipotence; human freewill and the limits of human knowledge; the nature of the world; and the relationship among reason, religion, and science. The course will look at how these and other crucial themes were addressed by major medieval philosophers and philosophical schools not only in Islam, but also in Judaism and Christianity, and highlight similarities and differences among the three major monotheistic faiths.

Modern Languages and Literatures

AS.211.265. Panorama of German Thought. 3 Credits.
This course introduces students to major figures and trends in German literature and thought from the sixteenth to the twentieth century. We will pay particular attention to the evolution of German political thought from the Protestant Reformation to the foundation of the German Federal Republic after WWII. How did the Protestant Reformation affect the understanding of the state, rights, civic institutions, and temporal authority in Germany? How did German Enlightenment thinkers conceive of ethics and politics or morality and rights? How do German writers define the nation, community, and the people or das Volk? What is the link between romanticism and nationalism? To what degree is political economy, as developed by Marx, a critical response to romanticism? How did German thinkers conceive of power and force in the wake of World Wars I and II? What are the ties that bind as well as divide a community in this tradition? We will consider these and related questions in this course through careful readings of selected works.
Area: Writing Intensive

AS.211.640. The Literature of Existence.
This seminar will explore some key expressions of what could loosely be called existentialist writing from the early twentieth century to the present day, to the end of coming to terms with an emerging "new politics of existence." While there will be some emphasis on Spanish language materials, including writings by José Ortega Y Gasset, Miguel de Unamuno, María Zambrano, and Jorge Luis Borges, we will also be reading important works by Martin Heidegger, Jean-Paul Sartre, Simone de Beauvoir, Albert Camus, and Martin Hägglund.
Area: Writing Intensive

AS.211.777. The Critical Unconscious.
Criticism in the 21st century has tended to relegate psychoanalysis to a dustbin of fads that proliferated at the end of the prior century but that today are of interest only to balkanized cliques of devotees. Bucking this trend, this seminar will examine the intellectual history and abiding influence of psychoanalysis's key critical concept: the unconscious. Basing our discussions on in-depth readings from key thinkers in the analytic tradition such as Freud, Lacan, and Klein, as well as the post-analytic philosophical tradition, including Zizek, Butler, Laclau and Mouffe, Deleuze and Guattari, and Jameson, we will work to distill an understanding of the unconscious as essential to the practice of criticism tout court, and as inhering even in those discourses that have sought most stridently to distance themselves from it. Seminar discussions will take place in English; readings will be available in the original as well as in translation.
Area: Writing Intensive

AS.213.360. Animals and Animality in Literature and Philosophy. 3 Credits.
(300-level, taught in English) critically engages the presentation and imagination of animals and other non-human life in modern literature, philosophy, and thought. We will examine the figure of the animal and the means of conceptual differentiation between the animal and the human, considering animals' relation to or perceived exclusion from language, pain, embodiment, sexuality, and the visual gaze. The course is ideal for students interested in fascinating themes in literature and how they reflect philosophical concerns. No prior courses in philosophy are required. Students will read philosophical texts alongside literary works in learning the conceptual history of animals and of humanity as a distinct species. Expect fascinating readings and engaging, lively discussions. Readings may include works by Marx, Nietzsche, Freud, Heidegger Derrida, Agamben, Poe, Kleist, Hofmannsthal, Rilke, Kafka, Mann, Pirandello, and Coetzee.
Area: Writing Intensive

AS.213.374. Existentialism in Literature and Philosophy. 3 Credits.
What does it mean to exist, and to be able to reflect on this fact? What is it mean to be a self? This course explores the themes of existentialism in literature and philosophy, including the meaning of existence, the nature of the self, authenticity and inauthenticity, the inescapability of death, the experience of time, anxiety, absurdity, freedom and responsibility to others. It will be examined why these philosophical ideas often seem to demand literary expression or bear a close relation to literary works. Readings may include writings by Kierkegaard, Nietzsche, Dostoevsky, Heidegger, Rilke, Kafka, Simmel, Jaspers, Buber, Sartre, de Beauvoir, Camus, and Daoud.
Area: Writing Intensive

AS.213.423. Reflections on Modernity. 3 Credits.
Taught in English. Reflections on Modernity takes up the problems conflicts, and possibilities of modernity in aesthetic, literary, and philosophical texts. Questions about the modern self, our relationship to nature, to urban experience, to history and language, and the role of the artist and writer in reflecting on modern life. Texts include works by such authors as Kant, Nietzsche, Baudelaire, Weber, Rilke, Hofmannsthal, Simmel, Heidegger, Habermas, Foucault.

AS.213.437. Phenomenology and Literature. 3 Credits.
Phenomenology and Literature engages the most fertile interchanges between literature and philosophy in the 20th century, focusing on the roots of phenomenology in German philosophy and its connections with and expansion to literary writing. Themes include: the nature of literary experience, including the experience of reading and writing, literary and phenomenological descriptions of reality, the literary construction of the self, and the understanding of literary imagination from a phenomenological perspective. We will read philosophers and literary theorists such as Nietzsche, Husserl, Heidegger, Sartre, Camus, Merleau-Ponty, Blanchot, Beauvoir, Hamburger, Ingarden and Iser in connection with the works of many modernist writers, including Rainer Maria Rilke, Franz Kafka, Hugo von Hofmannsthal, Thomas Mann, Thomas Bernhard, Virginia Woolf, Marcel Proust, and Wallace Stevens.
Area: Writing Intensive

AS.213.623. Poetry and Philosophy.
This course will trace the tensions, antagonisms, and collaborations between poetry and philosophy as distinctive but fundamental expressions of human thought and experience. We will engage poetry as a form of artistic expression that compliments, completes, or challenges other forms of knowledge, and consider the range of philosophy's responses to poetry and poetics. Readings will include works by philosophical poets and poetic philosophers including Hölderlin, Schlegel, Rilke, Bachmann, Celan, Stevens, Heidegger, Gadamer, Adorno, Benjamin, Merleau-Ponty, Valéry, Wittgenstein, and Agamben.

AS.213.626. Husserl's Ideas: An Introduction to Phenomenology.
The first volume of Husserl's Ideas I (1913) provides an overarching picture of the phenomenological method that came to define much twentieth-century German and French thought. This course will consider the foundational concepts introduced in this volume (eidetic analysis, intentionality, bracketing, correlationism, time consciousness, the natural attitude and the phenomenological reduction) as well as responses to them by Merleau-Ponty, Derrida, Heidegger and others. We will also consider Husserl's later efforts to incorporate history, other minds, and even that which is other-than-mind into his idealist system.

AS.213.643. Franz Kafka in Philosophical and Literary Perspective.
This course is devoted to close study of the writings of Franz Kafka from both philosophical and literary perspectives. Writings will include Kafka's short prose works and novels along with philosophical and literary critical interpretations thereof. Readings may include commentaries by Walter Benjamin, Theodor Adorno, Hannah Arendt, Albert Camus, Giles Deleuze, and Giorgio Agamben. Primary texts for students from the German section will be in original; any other students may read Kafka in translation.

AS.213.687. Imagination in Philosophy and Literary Theory.
Imagination in Philosophy and Literary Theory is devoted to studying theories of imagination in the history of philosophy and literary theory, from the ancient Greeks to the present day. We will study philosophical conceptions of the role of imagination in memory, cognition, perception, and creativity, and assess traditional philosophical oppositions between imagination and reason, the imaginary and the real. Readings may include selections from Aristotle, Kant, Coleridge, Nietzsche, Husserl, Heidegger, Merleau-Ponty, Sartre, Dufrenne, Stevens, Iser, Ricoeur, Ryle, Wittgenstein, and Nussbaum.

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the “virtual” space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.215.640. Borges, Derrida, Heidegger and the Paradoxes of Perception.
In this seminar we will the examine the ways in which Jorge Luis Borges’s narratives intersect with lines of inquiry pursued by Martin Heidegger and Jacques Derrida around perception, knowledge, language, time, and space.
Area: Writing Intensive

Study of Women, Gender, & Sexuality

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.
Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women’s thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

AS.363.306. Feminist and Queer Theory: Race, Class, Gender, Sexuality-Intersectional Feminist Theory. 3 Credits.
In this course, we will get to know intersectional feminist philosophy through the lens of a Black feminist epistemology. What does this mean? That means that we will focus on how the contributions of Black feminist authors can bring out the specific political and philosophical nature of an intersectional theoretical framework.

Theatre Arts & Studies

AS.225.328. The Existential Drama: Philosophy and Theatre of the Absurd. 3 Credits.
Existentialism, a powerful movement in modern drama and theatre, has had a profound influence on contemporary political thought, ethics, and psychology, and has transformed our very notion of how to stage a play. Selected readings and lectures on the philosophy of Kierkegaard, Nietzsche, Camus and Sartre -- and discussion of works for the stage by Sartre, Ionesco, Genet, Beckett, Albee, Pinter, Athol Fugard (with Nkani & Nshone), Heiner Müller and the late plays of Caryl Churchill. Opportunities for projects on Dürrenmatt, Frisch, Havel, Witkiewicz, and Mrozek.
Area: Writing Intensive

For current faculty and contact information go to http://philosophy.jhu.edu/people/

Philosophy, Bachelor of Arts

Philosophy Major Requirements

(Also see Requirements for a Bachelor’s Degree (p. 1587).)

Philosophy poses such fundamental questions as: What can we know? How should we live? and How do the results of human inquiry, obtained so far, hang together? It is an excellent preparation for professional studies such as law and medicine; it provides perspective on other disciplines such as psychology, mathematics, literature, and political science; and it centers on a set of questions that thinking people cannot avoid. At Hopkins it can be studied in a variety of ways.

A number of our courses are designed to provide broad introductions to the subject. Both AS.150.111 Philosophic Classics and AS.150.112 Philosophical Problems cover a wide range of topics, the former through the study of some of the major texts of Western thought, the latter by more systematic examination of representative issues. Either one will show a student a variety of approaches to philosophical problems. The courses AS.150.201 and AS.150.205 offer historically oriented introductions to the subject, giving the student a basic grasp of the development of philosophy in two of its major periods. Other courses, such as AS.150.118 Introduction to Formal Logic, AS.150.223 Formal Methods of Philosophy, and AS.150.220 Introduction to Moral Philosophy, are designed for students with an interest in the particular areas they cover. All of these courses are readily available without prior study of philosophy.

The 400-level courses are open to graduate students as well as to undergraduates. Some require no previous course work in philosophy. Others presuppose some familiarity with philosophy, such as would be provided by one of the introductory courses. Still others require more specific preparation. A student with questions about whether they have the background for a particular 400-level course should consult either the instructor or the departmental undergraduate studies.

A student who wants to study an area of philosophy not provided for in the regular curriculum or to undertake a special project of writing and research should consult with a faculty member about taking AS.150.511 Directed Study-AS.150.512 Directed Study. An undergraduate who has the proper background may enroll in a graduate seminar if the instructor approves.

Requirements

Philosophy majors must take 11 departmental courses. A minimum of six courses must be at the 300 level or higher. Of the two general introductory courses, AS.150.111 Philosophic Classics and AS.150.112 Philosophical Problems, only one may count toward the major, and two total 100-level courses may count toward the major. Majors are required to take the Undergraduate Seminar, preferably in the junior year. Courses in which a grade of D is received may not count toward the major, nor may courses taken satisfactory/unsatisfactory.

Other courses must be distributed by taking at least one course in each of the five following categories:

- Ancient philosophy
- Modern philosophy
- Logic, philosophy of science, or philosophy of mathematics
- Philosophy of mind, theory of knowledge, philosophy of language, or metaphysics
- Ethics, aesthetics, or political philosophy

The first two categories are normally satisfied by taking AS.150.201 (http://e-catalog.jhu.edu/search/?P=AS.150.201) Introduction To Greek Philosophy and AS.150.205 (http://e-catalog.jhu.edu/search/?P=AS.150.205) Introduction to the History of Modern Philosophy.The student thus has four or five additional electives after satisfying the distribution requirements.

Well-qualified majors may be admitted to a graduate seminar during their senior year. They should consult their major advisor.

If you have any questions or concerns regarding these requirements, please contact the director of undergraduate studies.

Code	Title	Credits
Major Requirements		
One course in ancient philosophy (PHIL-ANCIEN)		3
One course in modern philosophy (PHIL-MODERN)		3
One course in logic, philosophy of science, or philosophy of mathematics (PHIL-LOGSCI)		3
One course in philosophy of mind, theory of knowledge, philosophy of language, or metaphysics (PHIL-MIND)		3
One course in ethics, aesthetics, or political philosophy (PHIL-ETHICS)		3
One undergraduate seminar (300-level; ideally in junior year)		3
Five additional courses		15
Total Credits		**33**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.150.1xx-2xx: elective		3
	Credits	**3**
Second Semester		
AS.150.2xx-4xx: Course in Modern Philosophy		3
	Credits	**3**
Second Year		
First Semester		
AS.150.2xx-4xx: Course in Ancient Philosophy		3
	Credits	**3**
Second Semester		
AS.150.3xx-4xx: elective		3
	Credits	**3**
Third Year		
First Semester		
AS.150.3xx: Undergraduate Seminar		3
AS.150.3xx-4xx: elective		3
	Credits	**6**
Second Semester		
AS.150.2xx-4xx: Course in Ethics		3
AS.150.2xx-4xx: Course in Phil of Mind		3
	Credits	**6**
Fourth Year		
First Semester		
AS.150.2xx-4xx: Course in Logic		3
AS.150.3xx-4xx: elective		3
	Credits	**6**
Second Semester		
AS.150.3xx-4xx: elective		3
AS.150.3xx-4xx: elective (if needed to have six 300 level or higher courses)		
	Credits	**3**
	Total Credits	**33**

Course	Title	Credits
First Year		
Fall		
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.171.101	General Physics: Physical Science Major I	4
AS.173.111	General Physics Laboratory I	1
	Credits	**9**
Spring		
AS.171.102	General Physics: Physical Science Major II	4
AS.173.112	General Physics Laboratory II	1
	Credits	**5**
Second Year		
Fall		
EN.520.370	Introduction to Renewable Energy Engineering	3
	Credits	**3**
Third Year		
Fall		
Policy elective (ENGY-SCIPOL)		
	Credits	**0**
Spring		
Policy elective (ENGY-SCIPOL)		
	Credits	**0**

Fourth Year		
Fall		
Technical elective (ENGY-TECH)		
	Credits	**0**
Spring		
Technical elective (ENGY-TECH)		
	Credits	**0**
	Total Credits	**17**

Examples of Courses in Each Required Area

Code	Title	Credits
Ancient Philosophy		
AS.150.201	Introduction To Greek Philosophy	3
AS.150.401	Greek Philosophy: Plato and His Predecessors	3
AS.150.402	Aristotle	3
AS.150.403	Hellenistic Philosophy	3
Modern Philosophy		
AS.150.205	Introduction to the History of Modern Philosophy	3
AS.150.417	Kant's 'Critique Of Pure Reason'	3
Logic, Philosophy of Science, or Philosophy of Mathematics		
AS.150.419	Kant's Critique/Judgment	3
AS.150.118	Introduction to Formal Logic	3
AS.150.420	Mathematical Logic I	3
AS.150.421	Mathematical Logic II	3
AS.150.422	Axiomatic Set Theory	3
AS.150.433	Philosophy of Space & Time	3
AS.150.434	Formal Methods of Philosophy	3
Philosophy of Mind, Theory of Knowledge, Philosophy of Language, or Metaphysics		
AS.150.245	Philosophy of Mind	3
AS.150.476	Philosophy and Cognitive Science	3
Ethics, Aesthetics, or Political Philosophy		
AS.150.219	Introduction to Bioethics	3
AS.150.220	Introduction to Moral Philosophy	3
AS.150.240	Intro-Political Philosop	3
AS.150.452	Freedom of Will & Moral Responsibility	3

Double Majors

The department encourages linking the study of philosophy with the study of other disciplines. For example, the subject matter and course requirements of the philosophy and psychology departments are such as to make a double major both practical and intriguing. Similarly, knowledge of literature or the history of art is pertinent to the study of aesthetics; a solid understanding of science is valuable for those interested in the philosophy of science; and students of ethics benefit considerably by combining their work with study of political theory and of the political realities in which morality must function. Members of the department are available to assist students in planning double majors tailored to their interests.

Honors Program in Philosophy

Students with an overall GPA of 3.0 and a Philosophy GPA of 3.5 or higher (or outstanding recommendations from three department members) are eligible for the Senior Honors Thesis Program. In addition to the 11 courses required for the major, successful applicants take AS.150.551 Honors Project and AS.150.552 Honors Project, to write a thesis of about 50 pages under the supervision of a faculty member. The thesis must be completed prior to spring vacation of senior year. If the student withdraws prior to completion of a thesis, a satisfactory/unsatisfactory grade will be awarded.

The grade for the thesis will depend on the thesis itself and an oral examination about it, conducted by the thesis adviser and two other faculty members. Graduation Honors will be awarded to those whose work receives an A- or better. For more information about the Honors Program, contact the department's director of undergraduate studies.

Code	Title	Credits
Honors Thesis Program		
AS.150.551	Honors Project	3
AS.150.552	Honors Project	3

BA/MA Program

The department offers an accelerated BA/MA program. See the BA/MA Program page for more information.

Learning Outcomes

A student who graduates with a BA in philosophy will be able to demonstrate:

- A broad understanding of the work of major figures in the history of philosophy, both ancient (especially Plato and Aristotle) and modern (especially the period of Descartes through Kant)
- Familiarity with the most important topics in a range of areas that are typically regarded as lying at the center of contemporary philosophical thought, including metaphysics, theory of knowledge, philosophy of mind, and philosophy of language
- Familiarity with the most important topics in ethics and political philosophy
- Familiarity with formal logic, including the ability to understand the logical symbolism used in many contemporary philosophical texts
- The capacity to think analytically and creatively about philosophical texts and issues
- The capacity to express philosophical ideas and support them effectively in argument, both in writing and orally.

Philosophy, Bachelor of Arts/Master of Arts

The department now offers an accelerated BA/MA program. The requirements for the BA and for the MA remain unchanged, but in the combined BA/MA program, two 400-level courses taken as part of the BA can also be used toward the MA. This means that the MA requires only eight additional courses, rather than the 10 required for a free-standing MA.

Program Requirements

The department now offers an accelerated BA/MA program. The requirements for the BA and for the MA remain unchanged, but in the combined BA/MA program, two 400-level courses taken as part of the BA can also be used toward the MA. This means that the MA requires only eight additional courses, rather than the 10 required for a free-standing MA. For full details of the MA program and the BA/MA program, see the

Requirements handbook (2015 and after) in the Graduate section here and on the department website.

In order to be admitted to the BA/MA program, you must already be a philosophy major; you can apply in the spring term of your junior year or any time in your senior year. If you meet the qualification for the BA honors thesis (overall GPA of 3.0, philosophy GPA of 3.5), you will automatically be admitted; others may be admitted on a case-by-case basis. Interested students should contact the chair of the department, Professor Steven Gross (https://philosophy.jhu.edu/directory/steven-gross/).

Please note that there is no departmental financial aid for BA/MA students. However, BA/MA students whose MA-level studies extend into a fifth year get a 50% discount on their tuition in their fifth year.

All application material and supporting documents should be uploaded through the online application; these include:

- Online application (https://applygrad.jhu.edu/apply/)—be sure to select Combined Graduate Student option
- Transcripts: unofficial transcripts must be uploaded through the online application.

Philosophy, Minor

Philosophy Minor Requirements

Philosophy minors must take seven departmental courses, which should include the following:

- At least one course in the history of philosophy, either ancient or modern.
- At least one course in two of the following areas:
  - Logic, philosophy of science, or philosophy of mathematics
  - Ethics, aesthetics, or political philosophy
  - Philosophy of mind, theory of knowledge, philosophy of language, or metaphysics

Students must earn a C- or better in all minor requirements and courses may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
One course in history of philosophy (ancient or modern)		3
Two courses, each from a different focal area		6
Four additional courses		12
Total Credits		**21**

Minor Restrictions

- Either AS.150.111 Philosophic Classics or AS.150.112 Philosophical Problems, but not both, may count as one of the seven courses. Neither is a required course.

Philosophy, PhD

When the Johns Hopkins University was founded in 1876, it was the first university in the United States designed as a center for research and doctoral education. Among its earliest graduate students were Josiah Royce and John Dewey; C.S. Peirce was an early faculty member. The William H. Miller III Department of Philosophy continues this tradition today, preparing graduate students to make original contributions to the field and to pursue careers in college and university teaching. With the support of an unprecedented gift by alumnus William H. Miller, the Department has increased guaranteed PhD funding to six years and is expanding the size and breadth of the faculty.

Usually there are about 15 graduate students taking courses and seminars, and another 15 at various stages in the writing of their dissertations. Because classes are small, we look for students who wish to take advantage of the individual attention available here. The Department's purpose is to provide opportunities for students to develop special interests within a program that also ensures breadth of knowledge. We offer classes, seminars, and directed study in the history of ancient, modern, and contemporary Western philosophy, and in the systematic areas of epistemology, metaphysics, ethics, philosophy of science, philosophy of physics, philosophy of language, philosophy of mind, philosophy of mathematics, mathematical logic, and aesthetics. Courses with relevance to philosophy are frequently offered in other departments, and in certain circumstances these may be used toward the PhD or MA course requirements in philosophy.

For more information on the requirements for the PhD, financial aid, and other support refer to the Department's website (https://philosophy.jhu.edu/graduate/graduate-requirements/).

Admission Requirements

While an undergraduate major in philosophy is good preparation for graduate study in the department, applications are welcomed from students with other majors whose interests are now turning toward philosophy.

To apply, please read the information below and on the Graduate Admissions website (https://www.jhu.edu/admissions/graduate-admissions/), and complete the application online.

If applying to more than one department, please send complete application materials for each department. All application documents must be provided in English (either the original or translations of the original documents). If you are unable to secure translations to English, we recommend that you contact World Education Services (http://www.wes.org/).

All application materials and supporting documents should be uploaded through the online application; these include:

- Online application (https://applygrad.jhu.edu/apply/?sr=1bf0a763-446d-4552-b7f6-4b450a7fa62f)
- Application fee
- Statement of Purpose (briefly state your area of interest at the beginning of your Statement of Purpose; upload through the online application)
- Letters of recommendation (at least two): Letters of recommendation should be submitted and uploaded electronically following the instructions in the online application.
- Transcripts: Unofficial transcripts must be uploaded through the online application. Applications will be ready for review with unofficial transcripts, but official transcripts will be required if an offer of admission is made
- GRE scores (mandatory)
- TOEFL or IELTS score (for international applicants)
- Sample of work (the sample should reflect the applicant's area of interest, and generally does not have to be more than 20 pages in length).

Application Deadline

The deadline for applications is January 15 or, if January 15 falls on a weekend or a holiday, the next business day. Admissions decisions will be made around March 15.

For questions or inquiries about the online application and supporting documents, contact the Graduate Admissions office using the online contact form (https://applygrad.jhu.edu/register/?id=6ac9a6f3-2129-4bf5-ab36-8ab80fcd2f5e). You may also contact the Department's administrative office at philosophy@jhu.edu or 410-516-7524.

Physics and Astronomy

http://physics-astronomy.jhu.edu/

Johns Hopkins is the nation's first research university. That emphasis on research continues to this day and forms the backbone of the undergraduate and graduate programs in the Department of Physics and Astronomy. The department's research program is focused into four areas of excellence:

- Astrophysics
- Condensed Matter Physics
- Elementary Particle Physics
- Plasma Physics

For graduate students interested in these fields, the department offers world-class research opportunities in a friendly and supportive setting. For undergraduates, JHU offers exposure to cutting-edge research combined with a level of personal attention that is typically found only in liberal arts colleges. Nearly all physics majors at JHU work on research projects and many begin as freshmen or sophomores.

All research builds upon an established body of knowledge. To be effective researchers, teachers, or professionals, both undergraduate and graduate students must acquire a core knowledge of physics. Our undergraduate and graduate courses are designed to cover the core subjects at the appropriate levels, leading to advanced courses on a variety of specialized topics. As a consequence, students having different backgrounds or different ultimate objectives can select those parts that are most appropriate for them. The selections are made under the guidance of a faculty advisor. The advisor aids the student in making the most efficient use of their time and ensures that their program contains a reasonable balance among classroom and laboratory, mathematics, seminars, and introduction to research.

Donald E. Kerr Memorial Prize

In recognition of Dr. Kerr's work in microwave physics, the department awards the Donald E. Kerr Memorial Prize each year to the most outstanding undergraduate major graduating in physics.

Facilities

The Department of Physics and Astronomy's first facility was Rowland's measuring engine for determining the solar spectrum in the 1880s. Ever since that time the Department has maintained a long and continuous history in instrumentation. In recent decades this has extended to instrumentation for space missions. The Department maintains a Class-1000 clean room for microfabrication and nanofabrication, a high bay lab, professional and student machine shops, and supports a world-renowned Instrument Development Group (IDG) with six full-time engineers and three full-time machinists.

Among the diverse techniques used for studying condensed matter physics are magnetometry/susceptometry, specific heat and transport measurements, atomic force and magnetic force microscopy, X-ray and electron diffraction, terahertz spectroscopy, and neutron scattering at the nearby NIST Center for Neutron Research and at the Spallation Neutron Source, ORNL. A variety of cryostats, He3 refrigerators, and He3-He4 dilution refrigerators together with high temperature ovens, electromagnets, and superconducting magnets allow measurements to be made from 0.05 K to 1100 K and in magnetic fields up to 14 Tesla. Apparatus for the preparation of samples includes two image furnaces for floating zone growth, single-crystal growth vacuum furnaces, box and tube furnaces, arc furnaces, several high vacuum and ultra-high vacuum chambers for thin film fabrication using evaporation, MBE, pulsed laser deposition, sputtering, and focused ion beam (FIB) milling. Also available on campus are cutting-edge transmission electron microscopes and scanning electron microscopes.

In astrophysics, research groups have state-of-the-art laboratories for testing cryogenic transition-edge bolometer detectors with SQUID read-out electronics, and closed-cycle helium crogenics. Recent instrumentation advances include the design and manufacture of large free-standing polarization grids and novel high-bandwidth smooth-wall feed horns. Current activities include development of microwave and millimeter-wave instruments for far-infrared and microwave astronomy and cosmology.

The research groups in the department have a wide range of state-of-the-art computer facilities including high performance clusters with over a thousand processors and the largest database at a university—over a petabyte. All undergraduate majors and graduate students have access to high performance workstations.

Financial Aid

Graduate students in good standing are normally supported by a combination of fellowships, research assistantships and teaching assistantships. The financial package covers full tuition, individual health insurance, and an academic year salary commensurate with that of other leading research institutions. Teaching assistantship is a common mode of financial support; experience in teaching is a valuable part of the Ph.D. program. A teaching assistantship supports the student during the academic year and is supplemented by a research assistantship during the summer. The assistant is expected to help in the teaching of the general physics course and other introductory and major courses. The typical teaching duties include leading a problem-solving section or laboratory exercises and homework grading. Research assistantships are based on the availability of funding to the research advisor and are arranged directly with them. Research assistantships provide an opportunity for deep engagement in ongoing experimental or theoretical research. In addition, the department and the University offer several fellowships on a competitive basis, some covering travel, supplies or research expenses and some covering a semester's or a year's worth of the entire financial package. Some students are supported by external fellowships, such as the pre-doctoral fellowship of the National Science Foundation.

All fellows and teaching and research assistants in the Department of Physics and Astronomy register as full-time students and thus fulfill their residence requirements while holding appointments. Loans and work-study arrangements are available from the Office of Financial Aid.

Graduate Programs

Graduate study in physics and astronomy at JHU is intended primarily to prepare Ph.D. graduates for careers in teaching and research in physics and astronomy, or in applications such as biophysics, space physics, and industrial research. Entering students may elect to work toward a Ph.D. in physics or a Ph.D. in astronomy and astrophysics. The two programs are similar in structure but have somewhat different course requirements (see the programs tab). A wide range of research projects —both theoretical and experimental—are available for graduate students in Astrophysics (http://physics-astronomy.jhu.edu/groups/astro/), Condensed Matter Physics (http://physics-astronomy.jhu.edu/research/condensed-matter-physics/), Particle Physics (http://www.pha.jhu.edu/~morris/jhu_hep/jhu_hep.html), and Plasma Spectroscopy (http://physics-astronomy.jhu.edu/research/plasma-spectroscopy/).

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.171.101. General Physics: Physical Science Major I. 4 Credits.
First semester of a two-semester sequence in general physics covers mechanics, heat, sound, electricity and magnetism, optics, and atomic physics. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Corequisite: AS.110.108-AS.110.109, AS.173.111-AS.173.112

AS.171.102. General Physics: Physical Science Major II. 4 Credits.
Second semester of a two-semester sequence in general physics covers mechanics, heat, sound, electricity and magnetism, optics, and atomic physics. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Recommended Course Background: A grade of C- or better in either Physics I or the first semester of Intro to Mechanics I (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR EN.530.123)
Prerequisites: A grade of C- or better in either Physics I or the first semester of Engineering Mechanics (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR (EN.530.103 OR EN.530.123)

AS.171.103. General Physics I for Biological Science Majors. 4 Credits.
First-semester of two-semester sequence in calculus-based general physics, tailored to students majoring in one of the biological sciences. In this term, the topics covered include the basic principles of classical mechanics and fluids as well as an introduction to wave motion. Recommended Corequisites: (AS.173.111) AND (AS.110.106 or AS.110.108 or AS.110.113).Midterm exams are given at 8am Tuesdays, so students must leave their schedules open at this time in order to be able to take these exams

AS.171.104. General Physics/Biology Majors II. 4 Credits.
This two-semester sequence is designed to present a standard calculus-based physics preparation tailored to students majoring in one of the biological sciences. Topics in electricity & magnetism, optics, and modern physics will be covered in this semester. Midterm exams for every section are given during the 8 AM section time!Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Recommended Course Background: C- or better in AS.171.101 or AS.171.103 or AS.171.105 or AS.171.107; Corequisite: AS.110.109, AS173.112 or OR EN.530.123.

AS.171.105. Classical Mechanics I. 4 Credits.
An in-depth introduction to classical mechanics intended for physics majors/minors and other students with a strong interest in physics. This course treats fewer topics than AS.171.101 and AS.171.103 but with greater mathematical sophistication. It is particularly recommended for students who intend to take AS.171.201-AS.171.202 or AS.171.309-AS.171.310. Recommended Corequisites: AS.173.115 and AS.110.108

AS.171.106. Electricity and Magnetism I. 4 Credits.
Classical electricity and magnetism with fewer topics than 171.101-103, but with greater mathematical sophistication. Particularly recommended for students who plan to take AS.171.201-AS.171.202. Recommended Course Background: C- or better in AS.171.105; Corequisite: AS.173.116, AS.110.109

AS.171.107. General Physics for Physical Sciences Majors (AL). 4 Credits.
This two-semester sequence in general physics is identical in subject matter to AS.171.101-AS.171.102, covering mechanics, heat, sound, electricity and magnetism, optics, and modern physics, but differs in instructional format. Rather than being presented via lectures and discussion sections, it is instead taught in an "active learning" style with most class time given to small group problem-solving guided by instructors. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Recommended Corequisites: (AS.173.111) AND (AS.110.106 or AS.110.108 or AS.110.113)

AS.171.108. General Physics for Physical Science Majors (AL). 4 Credits.
This two-semester sequence in general physics is identical in subject matter to AS.171.101-AS.171.102, covering mechanics, heat, sound, electricity and magnetism, optics, and modern physics, but differs in instructional format. Rather than being presented via lectures and discussion sections, it is instead taught in an "active learning" style with most class time given to small group problem-solving guided by instructors. Recommended Course Background: A grade of C- or better in either Physics I or the first semester of Engineering Mechanics (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR EN.530.123)
Can be taken concurrently or as a prerequisite: (AS.110.107 OR AS.110.109 OR AS.110.211 OR AS.110.113)

AS.171.113. Subatomic World. 3 Credits.
Introduction to the concepts of physics of the subatomic world: symmetries, relativity, quanta, neutrinos, particles and fields. The course traces the history of our description of the physical world from the Greeks through Faraday and Maxwell to quantum mechanics in the early 20th century and on through nuclear physics and particle physics. The emphasis is on the ideas of modern physics, not on the mathematics. Intended for non-science majors.

AS.171.114. Powering the world: the science of energy. 3 Credits.
We all know that the energy we use on a daily basis can come from a variety of sources, but a discussion of the merits and drawbacks to those sources more often leads to political argument than fact-based scientific dialogue. This course, meant for science and non-science students alike, explores the principles behind how energy from fossil fuels, solar, wind, nuclear, and other resources is produced, how efficiently the energy can be harnessed, and what effect the process has and will have on our environment and society today and in the future. Students will apply this fundamental understanding to compare and understand how each source could be used in real world scenarios. Ultimately, the course is intended to help students use a scientific perspective to shape their opinions when faced with these controversial topics.

AS.171.118. Stars and the Universe: Cosmic Evolution. 3 Credits.
This course looks at the evolution of the universe from its origin in a cosmic explosion to emergence of life on Earth and possibly other planets throughout the universe. Topics include big-bang cosmology; origin and evolution of galaxies, stars, planets, life, and intelligence; black holes; quasars; and relativity theory. The material is largely descriptive, based on insights from physics, astronomy, geology, chemistry, biology, and anthropology.

AS.171.201. Special Relativity/Waves. 4 Credits.
Course continues introductory physics sequence (begins with AS.171.105-AS.171.106). Special theory of relativity, forced and damped oscillators, Fourier analysis, wave equation, reflection and transmission, diffraction and interference, dispersion. Meets with AS.171.207.

AS.171.202. Modern Physics. 4 Credits.
Course completes four-semester introductory sequence that includes AS.171.105-AS.171.106 and AS.171.201. Planck's hypothesis, de Broglie waves, Bohr atom, Schrodinger equation in one dimension, hydrogen atom, Pauli exclusion principle, conductors and semiconductors, nuclear physics, particle physics.

AS.171.204. Classical Mechanics II. 4 Credits.
Principles of Newtonian and Lagrangian mechanics; application to central-force motion, rigid body motion, and the theory of small oscillations. Recommended Course Background: AS.110.108 and AS.110.109, AS.110.202, AS.171.201, or AS.171.309. AS.110.201 or equivalent is strongly recommended.

AS.171.205. Introduction to Practical Data Science: Beautiful Data. 3 Credits.
The class will provide an overview of data science, with an introduction to basic statistical principles, databases, fundamentals of algorithms and data structures, followed by practical problems in data analytics. Recommend Course Background: Familiarity with principles of computing.

AS.171.207. Special Relativity. 1 Credit.
Three-week introduction to special relativity for students who elect to take AS.171.209 in place of AS.171.201.

AS.171.301. Electromagnetic Theory II. 4 Credits.
Static electric and magnetic fields in free space and matter; boundary value problems; electromagnetic induction; Maxwell's equations; and an introduction to electrodynamics.

AS.171.303. Quantum Mechanics I. 4 Credits.
Fundamental aspects of quantum mechanics. Uncertainty relations, Schrodinger equation in one and three dimensions, tunneling, harmonic oscillator, angular momentum, hydrogen atom, spin, Pauli principle, perturbation theory (time-independent and time-dependent), transition probabilities and selection rules, atomic structure, scattering theory. Recommended Course Background: AS.110.302 or AS.110.306.
(AS.171.204) AND (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.171.304. Quantum Mechanics II. 4 Credits.
Fundamental aspects of quantum mechanics. Uncertainty relations, Schrodinger equation in one and three dimensions, tunneling, harmonic oscillator, angular momentum, hydrogen atom, spin, Pauli principle, perturbation theory, transition probabilities and selection rules, atomic structure, scattering theory. Recommended Course Background: AS.171.303, AS.171.202, AS.171.204, AS.110.202.

AS.171.310. Biological Physics. 4 Credits.
Introduces topics of classical statistical mechanics. Additional topics include low-Reynolds number hydrodynamics and E&M of ionic solutions, via biologically relevant examples.

AS.171.312. Statistical Physics/Thermodynamics. 4 Credits.
Undergraduate course that develops the laws and general theorems of thermodynamics from a statistical framework.
Calculus II (AS.110.107 or AS.110.109 or AS.110.113). Linear Algebra (AS.110.201 or AS.110.212) and Calculus III (AS.110.202 or AS.110.211)

AS.171.313. Introduction to Stellar Physics. 3 Credits.
Survey of stellar astrophysics. Topics include stellar atmospheres, stellar interiors, nucleosynthesis, stellar evolution, supernovae, white dwarfs, neutron stars, pulsars, black holes, binary stars, accretion disks, protostars, and extrasolar planetary systems. Recommended Course Background: AS.110.108-AS.110.109, AS.171.202

AS.171.314. Introduction to Galaxies and Active Galactic Nuclei. 3 Credits.
This course will introduce student to the physics of galaxies and their constituents: stars, gas, dust, dark matter and a supermassive black hole in the central regions.Recommended Course Background: AS.110.108-AS.110.109, AS.171.202

AS.171.321. Introduction to Space, Science, and Technology. 3 Credits.
Topics include space astronomy, remote observing of the earth, space physics, planetary exploration, human space flight, space environment, orbits, propulsion, spacecraft design, attitude control and communication. Crosslisted by Departments of Earth and Planetary Sciences, Materials Science and Engineering and Mechanical Engineering. Recommended Course Background: AS.171.101-AS.171.102 or similar; AS.110.108-AS.110.109.

AS.171.324. Learn to Think Statistically. 3 Credits.
We live in a data-rich world where the flux of information increases exponentially. We will learn how to think statistically and see patterns and structure in many systems around us: news reports, images, cities, social networks, etc. We will learn how to use this knowledge to analyze data, make decisions and predictions. We will explore correlations, patterns, entropy, fractals. This course will allow students to better understand the complex world we live in. The course will occasionally involve some coding. Junior, senior and graduate students only. More at https://bit.ly/3iJ90ps

AS.171.402. Applied Quantum Information. 3 Credits.
This course will provide a basic introduction to quantum computing and quantum algorithms. This course will cover celebrated quantum algorithms that are of interest in the long term in addition to having a particular focus on near-term quantum algorithms for specific applications (e.g., material simulation, approximate optimization and machine learning) that can be readily studied on currently available hardware. Course attendees will also receive hands-on experience in near-term quantum algorithm implementation on the IBM Quantum Experience (IBM QE), a publicly available quantum computing platform.Recommended Background : Calculus, Python (Basic), Linear Algebra, Basic Quantum Mechanics (Preferred/Optional)

AS.171.405. Condensed Matter Physics. 3 Credits.
Undergraduate course covering basic concepts of condensed matter physics: crystal structure, diffraction and reciprocal lattices, electronic and optical properties, band structure, phonons, superconductivity and magnetism. Co-listed with AS.171.621Recommended Course Background: AS.171.304, AS.110.201-AS.110.202.

AS.171.406. Condensed Matter Physics. 3 Credits.

AS.171.408. Nuclear and Particle Physics. 3 Credits.
Basic properties of nuclei, masses, spins, parity. Nuclear scattering, interaction with electromagnetic radiation, radioactivity, Pions, muons, and elementary particles, including resonances. Recommended Course Background: AS.171.303

AS.171.410. Physical Cosmology. 3 Credits.
This course provides an overview of modern physical cosmology. Topics covered include: the contents, shape, and history of the universe; the big bang theory; dark matter; dark energy; the cosmic microwave background; Hubble's law; the Friedmann equation; and inflation. Recommended Course Background: (AS.171.101-AS.171.102), or (AS.171.103-AS.171.104), or (AS.171.105-AS.171.106), or (AS.171.107-AS.171.108), or equivalent.

AS.171.411. Light and Optics. 3 Credits.
What is light? How does it propagate and interact with matter? How do we use it to transmit information? How does technology make use of light? This course is designed for majors in physics as well as other science and engineering departments.

AS.171.416. Numerical Methods for Physicists. 4 Credits.

AS.171.425. Group Theory in Physics. 3 Credits.
Introduction to finite and Lie groups, representations and applications to quantum mechanics, condensed matter physics, and other fields of physics; selected topics from differential geometry and algebraic topology.Recommended Prerequisite: AS.171.304

AS.171.430. Introduction to Quantum Field Theory. 3 Credits.
Quantum Field Theory marries the principles of special relativity with quantum mechanics and provides a remarkably consistent description of a wide variety of phenomena, ranging from the theory of elementary particles to processes in condensed matter physics. It is an essential element in the toolkit of every physicist. In this course, we provide an introduction to this vast topic and aim to provide an intuitive understanding of this field. We will start by learning how to think about quantum mechanics in a manner consistent with special relativity (the Klein Gordon and Dirac equations), learn how to estimate relativistic quantum processes (Feynman diagrams), analyze nonsensical infinities that arise in these theories (Renormalization) and conclude with an overview of the Standard Model of Particle Physics (QCD and Electroweak theory). The course is aimed at introducing the student to how physicists think about these issues and it is a stepping stone to graduate study in this topic.
AS.171.304

AS.171.449. Astrophysical Plasmas. 3 Credits.
This course is for both graduate students and undergraduate students. There is no prerequisite although reading for introductory texts will be supplied where useful. Postdocs are also welcome to attend. Topics that will be discussed include: 1.Gravitational Wave Astronomy (related to cosmic plasmas),2. Ultra-High Energy Cosmic Rays,3. Black Hole Electrodynamics, 4.the Intergalactic, Interstellar and Intra-Cluster Medium, 5.Pulsars, 6.Magnetars, 7.Stellar and Galactic Dynamos,8.Solar Flares and CMEs, 9.Gamma Ray Bursts, 10.Supernovae and their Remnants, 11. Radio Sources and Jets and, 12. the universal cosmic plasma from earliest times13.Finally the detailed dusty plasmas around protostellar and protoplanetary disks including debris components of comets, asteroids planetesimals and interstellar intruders. We will spend roughly one week on each topic. In class, we will combine the lectures with reading interesting new papers from the current literature and it is expected that students will be sufficiently fluent in this field by the end of the semester to critically discuss and analyze such papers as experts.

AS.171.501. Independent Research- Undergraduate. 3 Credits.
Students may register for independent research with a faculty member in the Department of Physics and Astronomy. A research plan should be sent to the Director of Undergraduate Study before the add/drop date that includes project details, the number of hours of effort each week and the number of credits. This course may not be used for one of the two electives required for a BA, but one semester of research may be used as one of four focused electives in a BS program.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.502. Undergraduate Independent Research. 1 - 3 Credits.
Research done in senior year in conjunction with experimental equipment of intermediate laboratory or as special project in research group. Credit for independent study given to junior and senior students who act as tutors.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.597. Independent Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.603. Electromagnetic Theory.
Classical field theory, relativistic dynamics, Maxwell's equations with static and dynamic applications, boundary-value problems, radiation and propagation of electromagnetic waves, advanced topics in electrodynamics in media and plasmas

AS.171.605. Quantum Mechanics.
Review of wave mechanics and the Schrodinger equation, Hilbert space, harmonic oscillator, the WKB approximation, central forces and angular momentum, scattering, electron spin, density matrix, perturbation theory (time-independent and time-dependent), quantized radiation field, absorption and emission of radiation, identical particles, second quantization, Dirac equation.

AS.171.606. Quantum Mechanics.
Review of wave mechanics and the Schrodinger equation, Hilbert space, harmonic oscillator, the WKB approximation, central forces and angular momentum, scattering, electron spin, density matrix, perturbation theory (time -independent and time - dependent), quantized radiation field, absorption and emission of radiation, identical particles, second quantization, Dirac equation. Recommended Course Background: AS.171.303 and AS.171.304

AS.171.610. Numerical Methods for Physicists.
Topics in applied mathematics used by physicists, covering numerical methods: linear problems, numerical integration, pseudo-random numbers, finding roots of nonlinear equations, function minimization, eigenvalue problems, fast Fourier transforms, solution of both ordinary and partial differential equations. Undergraduate students may register online for this course and will be assigned 3 credits during the add/drop period.

AS.171.611. Stellar Structure and Evolution.
Basic physics of stellar structure and evolution will be discussed with emphasis on current research.

AS.171.612. Interstellar Medium and Astrophysical Fluid Dynamics.

AS.171.613. Radiative Astrophysics.
A one-term survey of the processes that generate radiation of astrophysical importance. Topics include radiative transfer, the theory of radiation fields, polarization and Stokes parameters, radiation from accelerating charges, bremsstrahlung, synchrotron radiation, thermal dust emission, Compton scattering, properties of plasmas, atomic and molecular quantum transitions, and applications to astrophysical observations.

AS.171.618. Observational Astronomy.
How do we observe the Universe at each wavelength and what do we see? This course will present the knowledge required for astronomical observations across the entire spectrum. For each wavelength range (gamma rays, X-rays, UV, visible, IR, radio) we will discuss the typeof detector used, the range of possible observations and current open questions. We will also discuss the dominant astronomical and terrestrial sources across the spectrum, and study the differences between ground- and space-based observations.

AS.171.620. Soft Matter Physics.
This course is aimed at both graduate students and upper level undergraduate students. It will cover a range of topics going from the traditional areas of soft matter (polymers, liquid crystals, membranes) to newer areas at the intersection with biological physics and condensed matter. In class, we will combine lectures with reading and discussing papers from the current literature. In the second part of the course, students will at turn lead the paper discussions.

AS.171.621. Condensed Matter Physics.
This sequence is intended for graduate students in physics and related fields. Topics include: metals and insulators, diffraction and crystallography, phonons, electrons in a periodic potential, transport. Co-listed with AS.171.405

AS.171.622. Condensed Matter Physics.
This sequence is intended for graduate students in physics and related fields. Topics include superconductivity, magnetism, metal-insulator transitions, low dimensional materials, quantized hall effect.

AS.171.625. Experimental Particle Physics.
For graduate students interested in experimental particle physics, or theory students, or students from other specialties. Subjects covered: experimental techniques, including particle beams, targets, electronics, and various particle detectors; and a broad description of high energy physics problems. Undergraduate students may register online for this course and will be assigned 3 credits during the add/drop period.

AS.171.627. Astrophysical Dynamics.
This is a graduate course that covers the fundamentals of galaxy formation, galactic structure and stellar dynamics and includes topics in current research.

AS.171.630. First Year Research.

AS.171.639. Group Theory in Physics.
Introduction to finite and Lie groups, representations and applications to quantum mechanics, condensed matter physics, and other fields of physics; selected topics from differential geometry and algebraic topology.

AS.171.642. Second Year Research.

AS.171.644. Exoplanets and Planet Formation.
A graduate-level introduction to the properties of the solar system, the known exoplanet systems, and the astrophysics of planet formation and evolution. Topics also include the fundamentals of star formation, protoplanetary disk structure and evolution, exoplanet detection techniques, and the status of the search for other Earths in the Galaxy. Upper-level undergraduates may enroll with the permission of the instructor.

AS.171.646. General Relativity.
An introduction to the physics of general relativity. Principal topics are: physics in curved spacetimes; the Equivalence Principle; the Einstein Field Equations; the post-Newtonian approximation and Solar System tests; the Schwarzschild and Kerr solutions of the Field Equations and properties of black holes; Friedmann solutions and cosmology; and gravitational wave propagation and generation.

AS.171.648. Physics of Cell Biology: From Mechanics to Information.
Cells are actively-driven soft materials – but also efficient sensors and information processors. This course will cover the physics of those cellular functions, from the mechanics of DNA to the sensing of chemical signals. Questions answered include: How does polymer physics limit how quickly chromosomes move? Why do cells use long, thin flagella to swim? What limits the accuracy of a cell's chemotaxis?Some experience with partial differential equations required. No biology knowledge beyond the high school level necessary. Some problem sets will require minimal programming.

AS.171.649. Astrophysical Plasmas.
This course is for both graduate students and undergraduate students. There is no prerequisite although reading for introductory texts will be supplied where useful. Postdocs are also welcome to attend. Topics that will be discussed include: 1.Gravitational Wave Astronomy (related to cosmic plasmas),2. Ultra-High Energy Cosmic Rays,3. Black Hole Electrodynamics, 4.the Intergalactic, Interstellar and Intra-Cluster Medium, 5.Pulsars, 6.Magnetars, 7.Stellar and Galactic Dynamos,8.Solar Flares and CMEs, 9.Gamma Ray Bursts, 10.Supernovae and their Remnants, 11. Radio Sources and Jets and, 12. the universal cosmic plasma from earliest times13.Finally the detailed dusty plasmas around protostellar and protoplanetary disks including debris components of comets, asteroids planetesimals and interstellar intruders. We will spend roughly one week on each topic. In class, we will combine the lectures with reading interesting new papers from the current literature and it is expected that students will be sufficiently fluent in this field by the end of the semester to critically discuss and analyze such papers as experts.

AS.171.652. Exoplanets and their Atmospheres.
This course covers the basic theory of planetary atmospheres as applied to extrasolar planets. The fundamental physical processes related to the structure, composition, radiative transfer, chemistry and dynamics of planetary atmospheres are covered, with an emphasis on those related to observable exoplanet properties. We also provide an overview of the observational techniques of exoplanetary atmospheres and discuss the habitability of exoplanets.

AS.171.698. Physics Beyond the Standard Model.
The Standard Model of particle physics has withstood every direct experimental test, explaining physics from sub nuclear to cosmological length scales. But, we know that it is not a complete theory. It fails to explain observational facts such as the nature of dark matter and dark energy. The theory is also beset by theoretical problems such as the hierarchy, strong CP, cosmological constant and the black hole information problem. Attempts to explain these puzzles have not been successful. In this course, we will highlight the main obstacles towards solving these problems and discuss new approaches to these problems, both from the experimental and theoretical point of view.

AS.171.701. Quantum Field Theory.
Introduction to relativistic quantum mechanics and quantum field theory. Canonical quantization; scalar, spinor, and vector fields; scattering theory; renormalization; functional integration; spontaneous symmetry breaking; Standard Model of particle physics.

AS.171.702. Quantum Field Theory II.
Introduction to relativistic quantum mechanics and quantum field theory. Recommended Course Background: AS.171.605-AS.171.606 or equivalent.

AS.171.703. Advanced Statistical Mechanics.
Brief review of basic statistical mechanics and thermodynamics. Then hydrodynamic theory is derived from statistical mechanics and classical treatments of phase transitions, including Ginzburg-Landau theory.

AS.171.704. Phase Transitions and Critical Phenomena.
Course covers phase transitions and critical phenomena. Building on the ideas of spontaneous symmetry breaking and scale invariance at a critical point we develop Landau's theory of phase transitions and the apparatus of renormalization group using both analytic and numerical techniques for studying interacting systems.

AS.171.708. Gravitational Waves.
In September 2015, one hundred years after Einstein's prediction of the existence of gravitational waves, the LIGO/Virgo collaboration detected the gravitational radiation produced by the merger of two black holes, marking the beginning of a new era in astronomy. This course will review the theory of gravitational waves, the main astrophysical and cosmological sources of gravitational radiation, and the modeling of these sources through numerical and analytical techniques. We will discuss how present and future gravitational wave detections on Earth and in space can be used to study the astrophysics of compact objects (such as black holes and neutron stars) and to test Einstein's theory of general relativity.

AS.171.732. Elementary Particle Physics.
Description TBA

AS.171.749. Machine Learning for Scientists.
Artificial Intelligence is penetrating the world at many levels. Neural networks have changed the ways we interact with data and think about statistics. For scientists, it is important to understand the fundamental concepts behind these systems, why they work, what are their potential and limitations. This course will provide an introduction to the subject, including aspects of statistics, information theory, optimization, and neural network architectures. We will alternate between theory and applications in python. More at https://bit.ly/3LEAg7D

AS.171.750. Cosmology.
Review of special relativity and an introduction to general relativity, Robertson-Walker metric, and Friedmann equation and solutions. Key transitions in the thermal evolution of the universe, including big bang nucleosynthesis, recombination, and reionization. The early universe (inflation), dark energy, dark matter, and the cosmic microwave background. Development of density perturbations, galaxy formation, and large-scale structure.

AS.171.752. Black Hole Astrophysics.
Black holes are the central engines for a wide variety of astrophysical objects: Galactic X-ray sources, active galactic nuclei, gamma-ray bursts, stellar tidal disruptions, and black hole mergers. Although the mass distribution of astrophysical black holes spans ten orders of magnitude and their circumstances can vary tremendously, the physical processes relevant to them are often closely related. The class will begin with an overview of astrophysical black hole phenomenology and then review the most important physical mechanisms responsible for their observed properties: relativistic orbits for both matter and photons; accretion dynamics and radiation; relativistic jet launching, propagation, and radiation; binary black hole dynamics and gravitational wave emission; and lastly, black hole creation.

AS.171.753. String Theory.

AS.171.755. Fourier Optics and Interferometry in Astronomy.
A course for advanced undergraduate and beginning graduate students covering the principles of optics and image formation using Fourier Transforms, and a discussion of interferometry and other applications both in radio and optical astronomy.

AS.171.762. Advanced Condensed Matter.
This course is designed for graduate students interested in learning the language, techniques, and problematic of modern quantum many-body theory as applied to condensed matter physics.

AS.171.764. Experimental Techniques in Condensed Matter Physics.
This course will be a survey of modern techniques in experimental condensed matter physics and is intended for graduate students interested in this area, but others interested in this topic (especially condensed matter the- ory students) are encouraged to enroll. Topics include low temperature techniques, transport, the SQUID and other magnetic probes, digital and analog signal processing, scattering (neutron, X-ray, and light), EPR, NMR, data analysis, and Monte Carlo. Sample preparation, including crystal and film growth and lithography will also be covered.

AS.171.781. Symmetry and anomalies in quantum systems.
This course with cover various aspects of gauge symmetries and anomaly cancelations, Anomaly matching and EFT, phases of matter, topological states, SPT phases, edge mode, discrete symmetries, aspect of quantum gravity and anomaly cancelations, QCD at low energies and chiral symmetry. A background in quantum mechanics and quantum field theory is recommended for the course.

AS.171.782. Advanced Particle Theory: Quantum Gravity.
Advanced course on the AdS/CFT correspondence and its relationship with contemporary research topics.

AS.171.783. Black Hole Physics.
General Relativity predicts its own demise in the existence of singular black hole solutions. There have been mounting astrophysical evidence that black holes do exist in nature. Thus they are not just pathologies of the theory but fundamental objects in gravity that require understanding. Theoretically, they serve as "laboratories" for studies in quantum gravity; indeed, most of the research in the field aims to resolve various paradoxes and puzzles that emerge when one tries to understand physics inside or outside black holes. The goal of this course is to elucidate these paradoxes and puzzles. First, we will study the classical properties of black holes in general relativity such as horizons, causal history, singularity theorems, area theorems and black hole mining. Next, we will study semi-quantum and quantum properties such as black hole thermodynamics, Hawking radiation, black hole evaporation. We will also explore modern results and perspectives on the fundamental physics of black holes that are necessary for current research. A background in general relativity and quantum field theory is recommended for the course.

AS.171.801. Independent Research- Graduates.

AS.171.802. Independent Research-Graduate.

AS.171.803. Independent Research-Graduate.

AS.172.203. Contemporary Physics Seminar. 1 Credit.
This seminar exposes physics majors to a broad variety of contemporary experimental and theoretical issues in the field. Students read and discuss reviews from the current literature, and are expected to make an oral or written presentation. Recommended Course Background: AS.171.101-AS.171.102, AS.171.103-AS.171.104, or AS.171.105-AS.171.106.

AS.172.601. Department Colloquium.

AS.172.604. Joint JHU/STScI Colloquium.
A joint JHU Department of Physics and Astronomy and Space Telescope Science Institute Colloquium Series.

AS.172.633. Language Of Astrophysics.
Survey of the basic concepts, ideas, and areas of research in astrophysics, discussing general astrophysical topics while highlighting specialized terms often used compared to physics.

AS.172.732. CAS Research Seminar.

AS.172.751. Elementary Particle Physics Seminar.

AS.172.752. Elementary Particle Physics Seminar.

AS.172.753. Advanced Particle Theory Seminar.

AS.172.754. Advanced Particle Theory Seminar.

AS.172.763. Condensed Matter Physics Seminar.

AS.172.764. Condensed Matter.

AS.173.111. General Physics Laboratory I. 1 Credit.
Experiments are chosen from both physical and biological sciences and are designed to give students background in experimental techniques as well as to reinforce physical principles. Corequisite: AS.171.101, AS.171.103, AS.171.105 or AS.171.107, or EN.530.123.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.112. General Physics Laboratory II. 1 Credit.
Experiments are chosen from both physical and biological sciences and are designed to give students background in experimental techniques as well as to reinforce physical principles. Recommended Course Background: AS.173.111; Corequisite: AS.171.102.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.171.101 OR AS.171.102 OR AS.171.104 OR AS.171.106 OR AS.171.108 OR EN.530.123

AS.173.115. Classical Mechanics Laboratory. 1 Credit.
Experiments chosen to complement the lecture course Classical Mechanics I, II AS.171.105-AS.171.106 and introduce students to experimental techniques and statistical analysis. Corequisite: AS.171.105.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.116. Electricity and Magnetism Laboratory. 1 Credit.
Experiments chosen to complement Electricity and Magnetism AS.171.106 and introduce students to experimental techniques and statistical analysis.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.308. Advanced Physics Laboratory. 3 Credits.
A broad exposure to modern laboratory procedures such as holography, chaos, and atomic, molecular, and particle physics.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

Cross Listed Courses

Applied Mathematics & Statistics

EN.553.793. Turbulence Theory. 3 Credits.
An advanced introduction to turbulence theory for graduate students in the physical sciences, engineering and mathematics. Both intuitive understanding and exact analysis of the fluid equations will be stressed. Previous familiarity with fluid mechanics is not required, although it could be helpful.

Chemistry

AS.030.691. Hardware, Software and Materials Chemistry.

The course is designed to provide the essential principles and concepts underlying the modern study of the structure and properties of solids in bulk crystals, thin films, and nanoscale objects. Topics include basic crystallography, structure determination by x-ray, neutron, and electron diffraction, fundamental concepts of bonding in solids, lattice dynamics, electronic band structure, magnetism, and strongly correlated electron behavior. Particular emphasis is placed on the impact of the structure, dimensionality, and electron count on electrical and magnetic properties (electric conduction, superconductivity, thermoelectricity, etc). More course info available at http://occamy.chemistry.jhu.edu.. Cross-listed with Physics and Astronomy

First Year Seminars

AS.001.105. FYS: The Science Behind the Fiction. 3 Credits.

In this First-Year Seminar, we will seek to answer questions including: could you forge Beskar? What would it take to make a light saber? Is "Image, enhance" really possible? What is possible today? What might be possible in the future? And, what may never be possible, as it violates the laws of nature as we know them? We will take an empiricist approach, gathering data on the needed properties via screenings and related research, and then applying physical principles to reveal feasibility.

AS.001.140. FYS: What Everyone Should Know about How Science Works. 3 Credits.

Science and scientists often bear the brunt of public displeasure over current events. Recent debates over CoVID (the safety and effectiveness of vaccines, masks, and isolation), climate change, and many other controversies raise questions about the reliability of scientific results and what it means to conduct research. What is and what is not scientific? How can non-scientists determine whether a scientific result is "right?" In this First-Year Seminar, we will explore what scientists do -- the practices of science -- and how they set standards of knowledge. Discussions will be organized around current pressing topics, including: What does it mean to "follow the science" or "do your own research" in the age of COVID? Will science save us from the ravages of climate change? Who or what has ultimate authority over the direction of scientific advances? When are new scientific announcements important new results and when are they just click bait hype? Who pays for science and should we care? What is meant by replication and is it bad if it doesn't happen? How does scientific publication work and what issues have arisen? Why do scientists often get bad press, and is it fair?

AS.001.142. FYS: The Physics of Democracy. 3 Credits.

This First-Year Seminar considers what we can learn about democratic societies by thinking of them as complex physical systems. We will discuss voting and social choice theories and their relationship to renormalization and emergence; organization and segregation in complex systems: power laws, inequality, and polarization; and the dynamics of information and opinions: networks, bubbles, filters, and phase transitions.

AS.001.185. FYS: Dynamics of Fundamental Science to General Society. 3 Credits.

This First-Year Seminar will explore how important results in physics and astronomy are discovered, their transformative implications to the basic understanding of nature and their impact on the progress of society. Students will explore how simple rules obtained from the lab or in idealized settings imply the complex behaviors and dynamics observed in the natural world, and how they back-reaction on society. An example of topic that will be explored is General Relativity, a subject that emerged purely from theoretical considerations by Einstein which have revolutionized our basic understanding of the physical world and have reshaped the fields of physics and astronomy. On the other hand, General Relativity is necessary for satellite timing which revolutionized communication in human society. Another example is the basic physics experiments and research that lead to the invention of the transistor and the ensuing revolution of the information age. The students will explore the value of scientific thinking and its necessity in building a more robust society that can effectively serve its citizens. The course will aim to help students understand how the various tools used in the lab and idealized settings can be effectively applied to solve important problems beyond academic settings. For example, the course can explore the unique perspectives that physicist and astronomers can bring to bear to the emerging world of data science and artificial intelligence. These are both topics that will reshape society in more ways that we can predict.

Interdepartmental

AS.360.339. Planets, Life and the Universe. 3 Credits.

This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.616 OR AS.171.333 OR AS.171.699 OR AS 270.335 OR AS.360.671

AS.360.671. Planets, Life and the Universe.

Replace description with the following--"This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.616 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.

Philosophy

AS.150.465. Topics in the Philosophy of Physics. 3 Credits.

This course will consider some philosophical topics in the foundations of physics. Entropy and the arrow of time -- why time has a direction, whether it can be explained in terms of entropy, and what role the arrow of time plays in causation and emergence. Anthropics and indexical uncertainty -- approaches to probability, reference classes, the cosmological multiverse, Boltzmann brains, simulation and doomsday arguments. Foundations of quantum mechanics -- the measurement problem, many-worlds, probability and structure, alternative approaches.

For current faculty and contact information go to http://physics-astronomy.jhu.edu/people/

Astronomy and Astrophysics, PhD

Advising

In the beginning of every fall semester, the department organizes a series of events (graduate orientation, various seminars and presentations) to provide an in-depth overview of research activities in the department. During a two-day research jamboree, students discuss possible research projects with multiple faculty members either in individual meetings or in a group setting. These events help familiarize the student with the department, with the faculty and with the expectations of the graduate program.

To help guide students through the first two years of the program, all entering graduate students are assigned an academic advisor who works closely with them during their first year. This first-year advisor meets regularly with the student to determine courses of study, familiarize them with the department, and help them find research opportunities. The first-year advisor works with the student until a thesis advisor has been appointed. During the orientation, the first-year advisor reviews the undergraduate record with the student. If there are any gaps in the physics background, the first-year advisor may recommend additional coursework or independent reading.

Admission Requirements

A complete application will include:

- Statement of purpose. We look for a thoughtful, well-written statement that shows the ability to overcome challenges, dedication to attain chosen goals, a capacity for creativity, an understanding of physics and/or astronomy, and any other indication of potential for research.
- Three letters of recommendation. Recommendation letters should help us evaluate your capacity for research, the most important criterion for admission.
- Transcripts of all previous work. Transcripts submitted with the application may be unofficial transcripts. Successful applicants who accept the offer of admission must supply an official transcript before they can begin the PhD program at JHU. In the case of students in the final year of their bachelors program, the official transcript must show completion of all coursework required for the degree.
- TOEFL or IELTS for international students. A reproduction is acceptable. Johns Hopkins prefers a minimum score of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) on the Test of English as a Foreign Language (TOEFL).
- $75 non-refundable application fee. The application fee may be waived (http://krieger.jhu.edu/graduate-admissions/apply/how-to-apply/#fees).

Note: submission of General GRE and Physics GRE scores is optional.

Successful applicants applying in the last year of their Bachelor's program will need to demonstrate the completion of their Bachelor's degree program before they can begin the Ph. D. program at JHU.

Program Requirements

The Ph.D. program has strong emphasis on early and active involvement in graduate research. Thus, students are required to have a research advisor and file a research summary every semester they are enrolled in the program, starting with the first one. Furthermore, students must complete the required courses with a grade of B- or better; the coursework is typically done over the first two years. In the beginning of the second year, students complete the research examination, and in the beginning of the third year – the University's Graduate Board Oral examination, both of which are based on completed or proposed research. During the first two years, students are typically involved in introductory research projects, which may or may not be related to their thesis work, and sometimes work with several different advisors, but they must identify (and have an agreement with) a thesis advisor no later than the beginning of their third year in the program, after which point students focus on their thesis research. The thesis is to be completed by no later than the end of the 6th year, ending with an oral presentation of the thesis to a faculty committee.

Course Requirements

Ph.D. in Physics

Students must complete the following courses:

Code	Title	Credits
AS.171.603	Electromagnetic Theory	
AS.171.605 & AS.171.606	Quantum Mechanics and Quantum Mechanics	0
AS.171.703	Advanced Statistical Mechanics	

Ph.D. in Astronomy and Astrophysics

Students must complete the following courses:

Code	Title	Credits
AS.171.611	Stellar Structure and Evolution	
AS.171.612	Interstellar Medium and Astrophysical Fluid Dynamics	
AS.171.613	Radiative Astrophysics	
AS.171.627	Astrophysical Dynamics	
AS.172.633	Language Of Astrophysics	

Students in both programs must receive at least a B- in each required course, or they will be required to retake the specific course once more and pass it.

The department offers a wide range of graduate physics, astrophysics, mathematical methods and statistics classes, and while only five are required, the students are encouraged to use the flexibility of the graduate program and the available classes to design programs of study that best prepare them for their chosen area of research. In addition to the required courses listed above, below is the list of the graduate courses that have been taught in recent years:

Code	Title	Credits
AS.171.610	Numerical Methods for Physicists	
AS.171.618	Observational Astronomy	
AS.171.620	Soft Matter Physics	
AS.171.621 & AS.171.622	Condensed Matter Physics and Condensed Matter Physics	
AS.171.622	Condensed Matter Physics	
AS.171.625	Experimental Particle Physics	
AS.171.639	Group Theory in Physics	
AS.171.644	Exoplanets and Planet Formation	
AS.171.646	General Relativity	

AS.171.648	Physics of Cell Biology: From Mechanics to Information
AS.171.649	Astrophysical Plasmas
AS.171.652	Exoplanets and their Atmospheres
AS.171.698	Physics Beyond the Standard Model
AS.171.701 & AS.171.702	Quantum Field Theory and Quantum Field Theory II
AS.171.704	Phase Transitions and Critical Phenomena
AS.171.708	Gravitational Waves
AS.171.732	Elementary Particle Physics
AS.171.749	Machine Learning for Scientists
AS.171.750	Cosmology
AS.171.752	Black Hole Astrophysics
AS.171.753	String Theory
AS.171.755	Fourier Optics and Interferometry in Astronomy
AS.171.762	Advanced Condensed Matter
AS.171.783	Black Hole Physics
AS.171.764	Experimental Techniques in Condensed Matter Physics
AS.171.781	Symmetry and anomalies in quantum systems
AS.171.782	Advanced Particle Theory: Quantum Gravity

Students in both programs must receive at least a B- in each required course, or they will be required to retake the specific course once more and pass it.

First and Second-Year Research Requirement

By the end of September, the student chooses their first research advisor among the professorial faculty and starts working on the first-semester research project. If the proposed research advisor does not hold a primary appointment as a tenure-track or research faculty member in the Department of Physics and Astronomy, the form must be co-signed by a PHA faculty member, who will provide mentorship (relevant department faculty members list) (https://physics-astronomy.jhu.edu/people/#filter=faculty). This requirement holds for all semesters of research. The first-semester project continues through intersession in January. The spring-semester research project continues until the end of the spring semester. The summer semester lasts from June through August. Students may continue with one advisor through the entire first year, or they may choose to cycle through several different research advisers from one semester to the next.

This system of semester projects continues during the first two years of the program, when students also complete required coursework. The nature of these first- and second-year research projects varies from student to student, from advisor to advisor and from one sub-field of physics to another. Some may be self-contained research projects that lead to published scientific papers and may or may not be related to the thesis research in later years. Listing of recent publications by our graduate students (http://sites.krieger.jhu.edu/pags/academics/graduate-research/). Others may comprise reading or independent-study projects to develop background for subsequent research. In other cases, they may be first steps in a longer-term research project.

This system accommodates both the students who have chosen the direction of their thesis work before graduate school and those who would like to try a few different things before committing to a long-term project. As students get more familiar with the department and the research opportunities, they zero in on their thesis topic and find a thesis advisor. This may happen any time during the first two years, and students are required to find a thesis advisor by the beginning of the third year.

Thesis Research and Defense

Securing a mutual agreement with a thesis advisor is one of the most important milestones of our graduate program. Students must find a thesis advisor and submit the thesis advisor form before the first day of their 3rd year. The form represents a long-term commitment and serious efforts in planning and communication between the student and the advisor. If the proposed thesis advisor does not hold a primary appointment as a tenure-track or research faculty member in the Department of Physics and Astronomy, the form must be co-signed by a PHA faculty member, who will serve as the departmental advisor of record (relevant department faculty members list) (https://physics-astronomy.jhu.edu/people/#filter=faculty).

Students should start their thesis planning no later than the beginning of the summer after the second year. By this time in the program, many students have identified projects and advisors of interest during their research rotations in the 1st and 2nd years. In these cases, students should discuss with their prospective advisors their mutual expectations for the scope and the timeline of the thesis and when an agreement is reached, submit the thesis advisor form. If by the summer after their 2nd year, the student does not have a clear idea of who they want to work with for their thesis, they should reach out to different faculty of interest, to 1st / 2nd year academic advisors, and/or to the Chair of the graduate program committee (Director of graduate studies). In these cases the student’s goal for the summer is to identify a thesis advisor and to reach an agreement regarding a thesis topic. In all cases, the thesis advisor form must be submitted before the 1st day of the 3rd year.

Physics, Bachelor of Arts

Physics Major Requirements (B.A.)

(See also Requirements for a Bachelor’s Degree (p. 1587).)

The major program is structured so that nearly all students take the same classes during the first two years and must complete the same list of core upper-level courses during their second two years, but permits a variety of choices in upper-level electives. The total number of credits required for the B.A. degree is 120. By the end of the four years our students share an understanding of classical mechanics, electromagnetism, statistical physics and quantum mechanics, and have acquired physics lab skills that will support them in graduate school or in a host of other pursuits.

A grade of C- or higher is required for a course to be counted towards major requirements. This includes required math courses. An exception for a single course taken in the year before graduation may be granted by the Director of Undergraduate Studies under extenuating circumstances.

Core Courses

Mathematics

The standard mathematics requirements for all physics majors consist of:

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4

or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.302	Differential Equations and Applications	4
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
Total Credits		**20**

PHYSICS
The standard physics requirements for all physics majors consist of:

Code	Title	Credits
AS.171.105	Classical Mechanics I	4
AS.173.115	Classical Mechanics Laboratory	1
AS.171.106	Electricity and Magnetism I	4
AS.173.116	Electricity and Magnetism Laboratory	1
AS.171.201	Special Relativity/Waves	4
AS.172.203	Contemporary Physics Seminar	1
AS.171.204	Classical Mechanics II	4
AS.171.312	Statistical Physics/Thermodynamics	4
AS.171.301	Electromagnetic Theory II	4
AS.171.303	Quantum Mechanics I	4
AS.171.304	Quantum Mechanics II (or Topics in Modern Physics)	4
AS.173.308	Advanced Physics Laboratory	3
Total Credits		**38**

B.A Additional Requirements

Code	Title	Credits
Two Additional Upper Level Physics Courses		6
Total Credits		**6**

* For the B.A. in Physics students must take two additional courses (at least 3 credits each) at the 300-600 level in the Department of Physics and Astronomy or approved physics-related courses in other departments. Students who intend to continue Physics in graduate school are strongly encouraged to take these electives in Physics and Astronomy, and take AS.171.304 Quantum Mechanics II.

Note: AS.171.101 General Physics: Physical Science Major I**-**AS.171.102 General Physics: Physical Science Major II**,** AS.171.103 General Physics I for Biological Science Majors-AS.171.104 General Physics/Biology Majors II **or** AS.171.107 General Physics for Physical Sciences Majors (AL)-AS.171.108 General Physics for Physical Science Majors (AL) **with their labs is acceptable in place of** AS.171.105 Classical Mechanics I-AS.171.106 Electricity and Magnetism I**,** AS.173.115 Classical Mechanics Laboratory-AS.173.116 Electricity and Magnetism Laboratory.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.171.105	Classical Mechanics I	4
AS.173.115	Classical Mechanics Laboratory	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
	Credits	**9**
Second Semester		
AS.171.106	Electricity and Magnetism I	4
AS.173.116	Electricity and Magnetism Laboratory	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
	Credits	**9**
Second Year		
First Semester		
AS.172.203	Contemporary Physics Seminar	1
AS.171.201	Special Relativity/Waves	4
AS.110.202 or AS.110.211	Calculus III or Honors Multivariable Calculus	4
AS.110.302	Differential Equations and Applications	4
	Credits	**13**
Second Semester		
AS.171.204	Classical Mechanics II	4
AS.171.312	Statistical Physics/Thermodynamics	4
AS.110.201 or AS.110.212	Linear Algebra or Honors Linear Algebra	4
	Credits	**12**
Third Year		
First Semester		
AS.171.301	Electromagnetic Theory II	4
AS.171.303	Quantum Mechanics I	4
Department elective #1		3-4
	Credits	**11-12**
Second Semester		
AS.171.304	Quantum Mechanics II (or Topics in Modern Physics)	4
AS.173.308	Advanced Physics Laboratory	3
Department elective #2		3-4
	Credits	**10-11**
Fourth Year		
First Semester		
Department elective #3		3-4
	Credits	**3-4**
Second Semester		
Additional major elective		3-4
Department elective #4		3-4
	Credits	**6-8**
	Total Credits	**73-78**

Honors in the Major

Honors in Physics is granted to graduating students who achieve a GPA of 3.5 or higher in all courses taken to fulfill the major requirements.

Senior Thesis

Any student majoring in the department may write a senior thesis, based on original research conducted under the supervision of a member of the faculty. Arrangements for this research will be made on an individual basis. The department views the writing of a senior thesis as an excellent capstone experience to an undergraduate education in physics, and encourages all students to consider it.

Physics, Bachelor of Science

Physics Major Requirements (B.S.)

(See also Requirements for a Bachelor's Degree (p. 1587).)

The major program is structured so that nearly all students take the same classes during the first two years and must complete the same list of core upper-level courses during their second two years, but permits a variety of choices in upper-level electives. The total number of credits required for the B.S. in Physics degree is 126. By the end of the four years our students share an understanding of classical mechanics, electromagnetism, statistical physics and quantum mechanics, and have acquired physics lab skills that will support them in graduate school or in a host of other pursuits.

A grade of C- or higher is required for a course to be counted towards major requirements. This includes required math courses. An exception for a single course taken in the year before graduation may be granted by the Director of Undergraduate Studies under extenuating circumstances.

Core Courses

Mathematics

The standard mathematics requirements for all physics majors consist of:

Code	Title	Credits
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
or AS.110.113	Honors Single Variable Calculus	
AS.110.202	Calculus III	4
or AS.110.211	Honors Multivariable Calculus	
AS.110.302	Differential Equations and Applications	4
AS.110.201	Linear Algebra	4
or AS.110.212	Honors Linear Algebra	
Total Credits		**20**

Physics

The standard physics requirements for all physics majors matriculating on or after September 2020 consist of:

Code	Title	Credits
AS.171.105	Classical Mechanics I	4
AS.173.115	Classical Mechanics Laboratory	1
AS.171.106	Electricity and Magnetism I	4
AS.173.116	Electricity and Magnetism Laboratory	1
AS.171.201	Special Relativity/Waves	4
AS.171.204	Classical Mechanics II	4
AS.171.312	Statistical Physics/Thermodynamics	4
AS.172.203	Contemporary Physics Seminar	1
AS.171.301	Electromagnetic Theory II	4
AS.171.303	Quantum Mechanics I	4
AS.171.304	Quantum Mechanics II (or Topics in Modern Physics)	4
AS.173.308	Advanced Physics Laboratory	3
Total Credits		**38**

Additional Requirements

Code	Title	Credits
Five Additional Elective Courses		
Four Courses in One Area		12-16
One Additional Course		3-4
Total Credits		**15-20**

* For the B.S. in Physics five (5) additional courses (at least 3 credits each) at the 200-600 level in the following departments: Physics and Astronomy, Biology, Biophysics, Chemistry, Cognitive Science, Earth and Planetary Sciences, Mathematics, Neuroscience and/or the School of Engineering (excluding courses listed as 500.xxx, 660.xxx, 551.xxx and 661.xxx). These courses must constitute a coherent and rigorous program of study approved by the Departmental Advisor and Director of Undergraduate Studies no later than the registration period for the fall semester of the senior year. At least four (4) of these courses must be taken within a single department or program in the Krieger School of Arts and Sciences or the Whiting School of Engineering (note: called "Department elective" in the Sample Program of Study). One (1) semester of research may be used as one elective.

Note: AS.171.101 General Physics: Physical Science Major I-AS.171.102 General Physics: Physical Science Major II**,** AS.171.103 General Physics I for Biological Science Majors-AS.171.104 General Physics/Biology Majors II **or** AS.171.107 General Physics for Physical Sciences Majors (AL)-AS.171.108 General Physics for Physical Science Majors (AL) **with their labs is acceptable in place of** AS.171.105 Classical Mechanics I-AS.171.106 Electricity and Magnetism I**,** AS.173.115 Classical Mechanics Laboratory-AS.173.116 Electricity and Magnetism Laboratory.

Sample Program of Study

A typical B.S. in Physics program might include the following sequence of courses:

***Note: Because students arrive with a wide range of mathematical preparation, each student should consult the Department of Mathematics to determine the best individual plan.**

Course	Title	Credits
First Year		
First Semester		
AS.171.105	Classical Mechanics I	4
AS.173.115	Classical Mechanics Laboratory	1
AS.110.108	Calculus I (Physical Sciences & Engineering)	4
	Credits	**9**
Second Semester		
AS.171.106	Electricity and Magnetism I	4
AS.173.116	Electricity and Magnetism Laboratory	1
AS.110.109	Calculus II (For Physical Sciences and Engineering)	4
	Credits	**9**

Second Year		
First Semester		
AS.172.203	Contemporary Physics Seminar	1
AS.171.201	Special Relativity/Waves	4
AS.110.202 or AS.110.211	Calculus III or Honors Multivariable Calculus	4
AS.110.302	Differential Equations and Applications	4
	Credits	**13**
Second Semester		
AS.171.204	Classical Mechanics II	4
AS.171.312	Statistical Physics/Thermodynamics	4
AS.110.201 or AS.110.212	Linear Algebra or Honors Linear Algebra	4
	Credits	**12**
Third Year		
First Semester		
AS.171.301	Electromagnetic Theory II	4
AS.171.303	Quantum Mechanics I	4
Department elective #1		3-4
	Credits	**11-12**
Second Semester		
AS.171.304	Quantum Mechanics II (or Topics in Modern Physics)	4
AS.173.308	Advanced Physics Laboratory	3
Department elective #2		3-4
	Credits	**10-11**
Fourth Year		
First Semester		
Department elective #3		3-4
	Credits	**3-4**
Second Semester		
Additional major elective		3-4
Department elective #4		3-4
	Credits	**6-8**
	Total Credits	**73-78**

Honors in the Major

Honors in Physics is granted to graduating students who achieve a GPA of 3.5 or higher in all courses taken to fulfill the major requirements."

Senior Thesis

Any student majoring in the department may write a senior thesis, based on original research conducted under the supervision of a member of the faculty. Arrangements for this research will be made on an individual basis. The department views the writing of a senior thesis as an excellent capstone experience to an undergraduate education in physics, and encourages all students to consider it.

Physics, Bachelor of Science/Master of Science

Requirements for Four-year Bachelor/Master's in Physics

Requirements for acceptance into the four-year Bachelor/Master's in Physics.

- The program is open only to current JHU undergraduates.
- Interested students should apply no later than the end of the fall semester of their junior year.
- A minimum GPA of 3.6 in courses taken in the department of Physics & Astronomy (PHA) at the time of the application is required.
- The following courses or their analogs must be completed or in progress by the time of the application: AS.171.105 Classical Mechanics I/AS.171.106 Electricity and Magnetism I, AS.173.115 Classical Mechanics Laboratory/AS.173.116 Electricity and Magnetism Laboratory, AS.171.201 Special Relativity/Waves/AS.171.207 Special Relativity, AS.171.204 Classical Mechanics II, AS.171.301 Electromagnetic Theory II, AS.171.303 Quantum Mechanics I

As part of the application, the student must submit to the Director of Undergraduate Studies:

- A research advisor form signed by a faculty member in the Department of Physics & Astronomy who has agreed to supervise a minimum of two semesters of graduate-level research of a scope appropriate for the M.A. degree and on a subject appropriate for the Department of Physics & Astronomy.
- A research plan approved by the research advisor.
- A plan to satisfy the course requirements both for the B.A. or B.Sci. degree in Physics and for the M.A. degree in Physics or Astronomy & Astrophysics by the end of their fourth year at JHU.

Requirements for completing the four-year Bachelor/Masters in Physics.

- The student must satisfy all JHU requirements for a B.A. in Physics or a B.Sci. in Physics to be eligible for the M.A. degree.
- The student must complete the course requirements for the M.A. degree using courses outside of those used for the B.A. or B.Sci. degree.
- For the M.A. in Physics, the student must complete eight graduate courses. For the M.A. in Astronomy and Astrophysics, the student must complete eight graduate courses plus the AS.172.633 Language Of Astrophysics seminar.
- As part of the eight graduate courses, the student must pass the core graduate courses with a grade of B- or better. For the M.A. in Physics, the core courses are Quantum Mechanics I (AS.171.605 Quantum Mechanics), Quantum Mechanics II (AS.171.606 Quantum Mechanics), Advanced Statistical Mechanics (AS.171.703 Advanced Statistical Mechanics), and Electromagnetic Theory (AS.171.603 Electromagnetic Theory). For the M.A. in Astronomy & Astrophysics, the core courses are Stellar Structure & Evolution (AS.171.611 Stellar Structure and Evolution), Interstellar Medium & Astrophysical Fluid Dynamics (AS.171.612 Interstellar Medium and Astrophysical Fluid Dynamics), Radiative Processes (AS.171.613 Radiative Astrophysics), and Astrophysical Dynamics (AS.171.627 Astrophysical Dynamics). At most one of the core graduate courses may be replaced with

another graduate course with a comparable workload and level, by prior approval of the graduate program committee.

- As part of the eight graduate courses, between two and four of the courses must be research semester courses (AS.171.501 Independent Research- Undergraduate/AS.171.502 Undergraduate Independent Research, at 3 credits per semester).
- For every semester of research, the student must submit written research reports to the graduate program committee of the same format as that required for first- and second year students in the Ph.D. program.
- The student must pass a research examination of the same format as that required for second-year students in the Ph.D. program.
- The student must maintain status as a full time undergraduate while completing the M.A. requirements. The full program (B.A. or B.Sci. plus the M.A. degrees) should be completed in four years or less.

Physics, Minor

Physics Minor Requirements

To earn a minor in Physics, a student must complete four (4) courses (at least 3 credits each) at the 200-level or above, plus AS.172.203 Contemporary Physics Seminar.

Restrictions: A grade of "C-" or better must be earned in required courses, which may not be taken S/U.

Physics, PhD

Admission Requirements

To obtain admission, a student is expected to submit evidence that they have a good chance to succeed.

A complete application will include:

- Statement of purpose. We look for a thoughtful, well-written statement that shows the ability to overcome challenges, dedication to attain chosen goals, a capacity for creativity, an understanding of physics and/or astronomy, and any other indication of potential for research.
- Three letters of recommendation. Recommendation letters should help us evaluate your capacity for research, the most important criterion for admission.
- Transcripts of all previous work. Transcripts submitted with the application may be unofficial transcripts. Successful applicants who accept the offer of admission must supply an official transcript before they can begin the PhD program at JHU. In the case of students in the final year of their bachelors program, the official transcript must show completion of all coursework required for the degree.
- TOEFL or IELTS for international students. A reproduction is acceptable. Johns Hopkins prefers a minimum score of 600 (paper-based) or 250 (computer-based) or 100 (Internet-based) on the Test of English as a Foreign Language (TOEFL).
- $75 non-refundable application fee. The application fee may be waived (http://krieger.jhu.edu/graduate-admissions/apply/how-to-apply/#fees).

Note: submission of General GRE and Physics GRE scores is optional.

Successful applicants applying in the last year of their Bachelor's program will need to demonstrate the completion of their Bachelor's degree program before they can begin the Ph.D. program at JHU.

Advising

All entering students are assigned to a first-year advisor who works closely with the student through the first two years of graduate study, or until a thesis advisor is found. The first-year advisor advises the student on courses of study, helps familiarize them with the department and provides guidance in finding research opportunities. In the beginning of each fall semester, the department holds a "research jamboree" where incoming students are introduced to the research in the department through a series of brief talks, lab tours, and research group open houses. Thus, the students are familiar, immediately upon their arrival, with the scope of research in the department and can identify prospective research advisors they may wish to work with.

Program Requirements

The Ph.D. program has strong emphasis on early and active involvement in graduate research. Thus, students are required to have a research advisor and file a research summary every semester they are enrolled in the program, starting with the first one. Furthermore, students must complete the required courses with a grade of B- or better; the coursework is typically done over the first two years. In the beginning of the second year, students complete the research examination, and in the beginning of the third year – the University's Graduate Board Oral examination, both of which are based on completed or proposed research. During the first two years, students are typically involved in introductory research projects, which may or may not be related to their thesis work, and sometimes work with several different advisors, but they must identify (and have an agreement with) a thesis advisor no later than the beginning of their third year in the program, after which point students focus on their thesis research. The thesis is to be completed by no later than the end of the 6th year, ending with an oral presentation of the thesis to a faculty committee.

Course Requirements

Ph.D. in Physics

Students must complete the following courses:

Code	Title	Credits
AS.171.603	Electromagnetic Theory	
AS.171.605 & AS.171.606	Quantum Mechanics and Quantum Mechanics	
AS.171.703	Advanced Statistical Mechanics	

Ph.D. in Astronomy and Astrophysics

Students must complete the following courses:

Code	Title	Credits
AS.171.611	Stellar Structure and Evolution	
AS.171.612	Interstellar Medium and Astrophysical Fluid Dynamics	
AS.171.613	Radiative Astrophysics	
AS.171.627	Astrophysical Dynamics	
AS.172.633	Language Of Astrophysics	

Students in both programs must receive at least a B- in each required course, or they will be required to retake the specific course once more and pass it.

The department offers a wide range of graduate physics, astrophysics, mathematical methods and statistics classes, and while only five are required, the students are encouraged to use the flexibility of the graduate program and the available classes to design programs of study that best prepare them for their chosen area of research. In addition to the required courses listed above, below is the list of the graduate courses that have been taught in recent years:

Code	Title	Credits
AS.171.610	Numerical Methods for Physicists	
AS.171.618	Observational Astronomy	
AS.171.620	Soft Matter Physics	
AS.171.621	Condensed Matter Physics	
AS.171.625	Experimental Particle Physics	
AS.171.639	Group Theory in Physics	
AS.171.644	Exoplanets and Planet Formation	
AS.171.646	General Relativity	
AS.171.648	Physics of Cell Biology: From Mechanics to Information	
AS.171.649	Astrophysical Plasmas	
AS.171.701	Quantum Field Theory	
AS.171.704	Phase Transitions and Critical Phenomena	
AS.171.708	Gravitational Waves	
AS.171.732	Elementary Particle Physics	
AS.171.750	Cosmology	
AS.171.752	Black Hole Astrophysics	
AS.171.753	String Theory	
AS.171.755	Fourier Optics and Interferometry in Astronomy	
AS.171.762	Advanced Condensed Matter	
AS.171.783	Black Hole Physics	
AS.171.749	Machine Learning for Scientists	
AS.171.764	Experimental Techniques in Condensed Matter Physics	

First and Second-Year Research Requirement

First-year students must find, by the end of the third week of class in the fall semester, and by the end of the first week of class the second semester, as well as before the summer term begins, a member of the professorial faculty to advise them in some type of research project. If the proposed research advisor does not hold a primary appointment as a tenure-track or research faculty member in the Department of Physics and Astronomy, the student must select a co-advisor who is a PHA faculty member. The students are required to submit a short written summary of that research experience at the end of the semester. Students may continue with one advisor through all three semesters, or they may choose to cycle through several different research advisors. In some cases, one of these first-year research advisors may become a thesis advisor, but in others, the thesis advisor may change. This research requirement continues until the end of the second year, or until the student finds a thesis advisor.

The nature of these first-year research projects may vary from student to student, from one advisor to another, and from one sub-field of physics to another. In some cases they lead to published research. In other cases, they may be first steps in a longer-term research project. And in some cases, they may comprise reading or independent-study projects to develop background for subsequent research. It is left to the individual advisor to determine what the written summary should entail. These research projects are not research assistantships and are performed in addition to other graduate student responsibilities (teaching and graduate classwork), although they are typically merged with RA-supported research for those students supported by RAs.

Thesis Research and Defense

Securing a mutual agreement with a thesis advisor is one of the most important milestones of our graduate program. Students must find a thesis advisor and submit the thesis advisor form before the first day of their 3rd year. The form represents a long-term commitment and serious efforts in planning and communication between the student and the advisor. If the proposed thesis advisor does not hold a primary appointment as a tenure-track or research faculty member in the Department of Physics and Astronomy, the form must be co-signed by a PHA faculty member, who will serve as the departmental advisor of record (relevant department faculty members list) (https://physics-astronomy.jhu.edu/people/#filter=faculty).

After the student chooses a thesis advisor, the student forms their Thesis Committee consisting of the advisor and two other faculty members (all Thesis Committees contain at least two full-time faculty from the department). These committees function as extended advisory bodies; students have the opportunity to discuss their progress and problems with several faculty. They also conduct one formal annual review of each student's progress. Research leading to the dissertation can be carried out not only within the Department of Physics and Astronomy, but with appropriate arrangements, either partly or entirely at other locations if necessitated by the project goals. At the conclusion of thesis research, the student presents the written dissertation to the faculty committee and defends the thesis in an oral examination.

Requirements for the M.A. Degree

Although the department does not admit students who intend to pursue the master's degree exclusively, students in the department's Ph.D. program and students in other Ph.D. programs at Johns Hopkins may apply to fulfill the requirements for the M.A. degree in the Department of Physics and Astronomy. Students from other JHU departments must seek approval from their home department and from the Department of Physics and Astronomy.

Before beginning their M.A. studies, students must have mastered the undergraduate physics material covered by the following courses:

Code	Title	Credits
AS.171.204	Classical Mechanics II	4
AS.171.303 & AS.171.304	Quantum Mechanics I and Quantum Mechanics II	8
AS.171.312	Statistical Physics/Thermodynamics	4

Courses taken elsewhere may qualify at the discretion of the Graduate Program Committee (normally this requirement is satisfied by the Ph.D.-track students before they arrive at JHU as they have completed a B.A. or B.Sci. in Physics at another institution).

To qualify for the M.A. degree in Physics, students must complete eight one-semester 3-credit graduate-level courses in the Department of Physics and Astronomy and pass the departmental research exam. For the M.A. degree in Astronomy, students must complete eight one-semester 3-credit graduate-level courses in the Department of Physics and Astronomy, plus the seminar “Language of Astrophysics” and pass the departmental research exam. The student must receive a grade of B- or above in each of the courses; graduate courses can be retaken once in case of failure.

Of the eight one-semester courses, four must be the core courses listed above in the Ph.D. requirements and two must be Independent Graduate Research courses. The remaining two course requirements for the M.A. degree may be fulfilled either by 3-credit graduate electives or by additional Independent Graduate Research. The research courses must include an essay or a research report supervised and approved by a faculty member of the Department of Physics and Astronomy.

Under most circumstances students pursuing their Ph.D. qualify for the M.A. degree by the end of their second year if they have taken all four core courses in their discipline at JHU, the “Language of Astrophysics” seminar (for M.A. in Astronomy), four semesters of Independent Graduate Research, and passed the research exam. Graduate courses taken at another institution or in another department at JHU in most cases do not count toward the M.A. requirements (therefore, students who are interested in the M.A. degree, but are planning to waive any graduate courses because they have passed a comparable graduate course at another institution, should discuss their eligibility for the M.A. degree with the Academic Program Administrator as soon as they arrive at JHU). Students should expect that no M.A. requirements can be waived; that the minimal research requirement is two semesters; and that at most one of the core courses can be substituted by another (non-research) graduate course in exceptional circumstances. Any requests for M.A. course substitutions must be made to the Graduate Program Committee at least a year before the expected M.A. degree so that the committee can recommend an appropriate substitution.

Political Science

http://politicalscience.jhu.edu

The programs of the Political Science Department are designed to help students attain a deeper understanding of politics and civic life in its various dimensions. The department encourages students to become sophisticated theoretically and to study politics in global and comparative perspective. We divide the curriculum into American Politics, Comparative Politics, Political Theory, and International Relations (and Law and Politics at the graduate level). Students are encouraged to develop expertise in several of these areas.

The department has 32 faculty members. The undergraduate program offers a broad range of courses about politics and government at local, state, national, and international levels. In addition to taking courses on the Homewood campus, students can do independent research under the guidance of a faculty mentor, take courses at the Nitze School of Advanced International Studies (SAIS) in Washington, D.C., and participate in the Aitchison Public Service Undergraduate Fellowship Program at the Johns Hopkins Washington Center.

Intellectual Orientation

In addition to our work within the traditional fields of Political Science, faculty research engages four clusters of activity that cut across the various subfields while speaking to core questions of politics: power and inequality, identities and allegiances, agency and structures, and borders and flows.

Power and Inequality

In many ways, political science is the study of power. This includes the wide array of rules, authority structures, and forms of violence at the local, national, transnational and international levels, as well as how the value, distribution, and accumulation of resources create conditions of security and insecurity among nation states, regions, economic classes, or populations.

Identities and Allegiances

A second cluster of research centers on questions of identity and the various allegiances and attachments organized around them. These include how racial, ethnic, gender, and sexual identities inform citizenship and nationalism, the organization of civil society, or the formation of social movements.

Agency and Structure

A third cross-cutting area of activity in the department explores questions of agency and structures. Agency includes entrepreneurship, innovation and creative action, and the agency of material things. Structures include formal and informal institutions, particularly the rules, roles, and regulations that guide human relations in the public, private, and non-profit worlds, among states and within them, at the global level and in local communities.

Borders and Flows

A fourth cluster examines borders and flows. Research in this area examines the movement of people, ideas, material objects, and natural forces across space and over time. A focus on borders and flows informs the study of territorial regimes, sovereignty, religious intensities, immigration and diasporas, globalizing capital, information, and ecological politics.

Undergraduate Programs

Political Science courses can contribute to two different majors:

Political Science, Bachelor of Arts

The major in political science described below is designed for students interested in intensive study of the institutions, theory, and problems of politics, government and modern political culture.

International Studies, Bachelor of Arts

The department contributes to an interdisciplinary program leading to B.A. or B.A./M.A. degrees in International Studies. This program and its requirements are described under International Studies (https://e-catalogue.jhu.edu/arts-sciences/international-studies/).

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.190.101. Introduction to American Politics. 3 Credits.
This course examines the ideals and operation of the American political system. It seeks to understand how our institutions and politics work, why they work as they do, and what the consequences are for representative government in the United States. Emphasis is placed on the federal government and its electoral, legislative, and executive structures and processes. As useful and appropriate, attention is also given to the federal courts and to the role of the states. The purpose of the course is to understand and confront the character and problems of modern government in the United States in a highly polarized and plebiscitary era.

AS.190.102. Introduction To Comparative Politics. 3 Credits.
To understand politics, the sound bites of the modern media take us only so far. In this course, we will take a step back and implement an intellectually rigorous method. Scholars of comparative politics use the method of comparison in order to illuminate important political phenomena of our times. Following this method, we will embark on a scholarly tour of the world and compare the politics of various countries. We will also trace these politics back to their historical sources. We will work from the assumption that there is something to be gained from such comparisons across space and time.

AS.190.108. Contemporary International Politics. 3 Credits.
An introduction to international politics. Emphasis will be on continuity and change in international politics and the causes of war and peace. The first half of the course will focus on events prior to the end of the Cold War, including the Peloponnesian War, the European balance of power, imperialism, the origins and consequences of WWI and WWII, and the Cold War. The second half will focus on international politics since 1990, including globalization, whether democracies produce peace, the impact of weapons of mass destruction, terrorism, and the prospects for peace in the 21st century. Theories of realism and liberalism will also be considered. This course was previously AS.190.209.

AS.190.109. Politics of East Asia. 3 Credits.
This course examines some of the central ideas and institutions that have transformed politics in the contemporary world through the lens of East Asia, focusing on Japan, South Korea, Taiwan, and China. We analyze two enduring themes of classic and contemporary scholarship in comparative politics: development and democracy. The purpose is to introduce students to the various schools of thought within comparative politics as well as to the central debates concerning East Asian politics.

AS.190.111. Introduction to Global Studies. 3 Credits.
This course surveys scholarly approaches to processes, relations, institutions, and social structures that cross, subvert, or transcend national borders. The course will also introduce students to research tools for global studies. Students who have taken Contemporary International Politics 190.209 or International Politics 190.104 may not register.

AS.190.180. Introduction to Political Theory. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, adn the relationship between freedom, responsibility, and political judgement. Spanning texts ancient, modern, and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past impossible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.204. Ancient Political Thought. 3 Credits.
The premise of this course is that a political perspective is tied up with a (meta)physical one, that is to say, with ideas about the nature of Nature and of the status of the human and nonhuman elements within it. How is the universe ordered? Who or what is responsible for it? What place do or should humans occupy within it? How ought we to relate to nonhuman beings and forces? We will read three different responses to such questions and show how they are linked to a particular vision of political life. In the first, the world into which human are born is ordered by gods whose actions often appear inexplicable: Prometheus Bound by Aeschylus, Oedipus the King by Sophocles, and Hippolytus by Euripedes will represent this tragic vision of the cosmos. In the second, Plato , in Republic and in Phaedrus, the forces of reason and eros play central and powerful roles. In the third, Augustine of Hippo presents a world designed by a benevolent, omnipotent God who nevertheless has allowed humans a share in their own fate. We end the course with Nietzsche's Birth of Tragedy , which offers a perspective on these three visions of the world -- the tragic, the rational, and the faithful -- which will help us evaluate them in the light of contemporary political and ecological concerns.
Area: Writing Intensive

AS.190.207. The Power of Rhetoric. 3 Credits.
In a time when people claim language "has no preference to facts, truths, or realities," the power of rhetoric is both vilified and lauded in the strongest possible terms. According to some, rhetoric is responsible for the dismissal of everything from political dissent to science as a species of "fake news". By contrast, others argue public life cannot be repaired without a "restoration" of rhetoric. What are these people talking about? This course will help us figure this out. Students will be introduced to the art of persuasive speech, writing, and visual media so as to be prepared to critically examine and evaluate the claims made for and about the role of language in contemporary politics. Topics will include informal logic, appeals, fallacies, figures and tropes. Among others, we will read texts by Aristotle, Austin, Barthes, Foucault, Freud, Kierkegaard, Nietzsche, and Zizek. In addition to a number of short exercises and writing assignments throughout the semester, there will be a mid-term and a final paper.

AS.190.220. Global Security Politics. 3 Credits.
Contemporary and emerging technologies of nuclear (weapons, terrorism, energy) outer space (missiles, missile defense, asteroids), biosecurity (bioweapons, pandemics, terrorism) and cyber (war, spying, surveillance) and implications for security, international politics, arms control, and political freedom.

AS.190.223. Understanding the Food System. 3 Credits.
This course examines the politics and policies that shape the production and consumption of food. Topics include food security, obesity, crop and animal production, and the impacts of agriculture on climate change. We will also consider the vulnerabilities of our food system to challenges such as the Covid-19 pandemic, as well as efforts to transform food and agriculture through new food technologies and grass-roots movements to create a more democratic food system.
Students who have completed AS.190.405 may not enroll in this class.

AS.190.226. Global Governance. 3 Credits.
Global problems like poverty, financial instability, human rights abuses, and climate change threaten both international order and human well-being. In the absence of a world state, these problems must be addressed by an increasingly complex, transnational network of organizations and social groups. First, we will aim to understand and explain how global problems are governed through detailed case studies of International Organizations and Non-Governmental Organizations such as the United Nations, World Bank, Intergovernmental Panel on Climate Change, Amnesty International and more. Second, we will critically evaluate the successes and failures of these organizations and explore the possibilities for improving democratic governance at the global level.

AS.190.227. U.S. Foreign Policy. 3 Credits.
This course provides an analysis of US foreign policy with a focus on the interests, institutions, and ideas underpinning its development. It offers a broad historical survey that starts with US involvement in the First World War, covers major developments of the twentieth century, and concludes with contemporary issues. Important themes include the developments underpinning the emergence of the liberal world order, strategies of containment during the Cold War, nuclear deterrence and antiproliferation efforts, the politics of international trade, alliance politics, technological and security policy, and the re-emergence of great power competition.

AS.190.228. The American Presidency. 3 Credits.
Over the past several decades, the power and importance of America's presidency have greatly expanded . Of course, presidential history includes both ups and downs, some coinciding with the rise and fall of national party systems and others linked to specific problems, issues, and personalities. We should train our analytic eyes, however, to see beneath the surface of day-to-day and even decade-to-decade political turbulence. We should focus, instead, on the pronounced secular trend of more than two and a quarter centuries of American history. Two hundred years ago, presidents were weak and often bullied by Congress. Today, presidents are powerful and often thumb their noses at Congress and the courts. For better or worse, we have entered a presidentialist era.

AS.190.244. Weapons of Mass Destruction. 3 Credits.
This course examines the impact of weapons of mass destruction on global politics and American interests. The first half of the course focuses on nuclear weapons, examining their development and targeting throughout the Cold War. The second half of the course examines contemporary issues involving nuclear weapons (including arms control, nuclear zero, terrorism, proliferation and defense). It also considers other weapons of mass destruction (or disruption) including chemical, biological, radiological and cyber weapons. The growing concerns about Artificial Intelligence will also be addressed. Requirements include a midterm and a final exam.

AS.190.245. The Politics of Global Development. 3 Credits.
Development is often assumed to be an economic issue. In this course we examine the politics of development on a global scale. We begin by looking at the colonial and Cold War histories of development. We then use these histories to contextualise contemporary development issues that directly affect international relations such as aid and debt, humanitarianism, food security, land "grabs", migration and indigenous rights. The course also seeks to understand the ways in which the issues underlying global development have always connected and continue to connect the peoples and polities of the Global North and Global South.

AS.190.249. Fictional World Politics: International Relations Through Fiction. 3 Credits.
The plots and settings of fictitious works provide "cases" for the exploration of international relations theories. Incorporates literature, film, and works of IR scholarship.
Area: Writing Intensive

AS.190.255. Race and Racism in International Relations. 3 Credits.
This course introduces students to the foundational importance of race and racism to the construction of our contemporary global order. Topics include the Crusades, European imperialism, eugenics, Apartheid, freedom struggles, decolonization, and global development.

AS.190.264. What You Need to Know About Chinese Politics (Part 1). 3 Credits.
What you need to know about Chinese politics covers the major scandals, political events, and policy debates that every China watcher needs to know. This first module of a two-semester experience brings together two professors, Prof. Andrew Mertha (SAIS) and Prof. John Yasuda (KSAS), with very different perspectives on China's past achievements, its political and economic futures, and the global implications of China's rise. The course seeks to give ample coverage to every major political question about China that is often missed in a semester long class. In addition to lively debates between the instructors, students can also expect guest speakers from the policy world, business, and the academy for a fresh take on what's going on in China today.

AS.190.267. Introduction to Political Economy. 3 Credits.
An introduction to the fundamental questions and concepts of political economy: money, commodities, profit, and capital. The course will study the nature of economic forces and relations as elements larger social and political orders.

AS.190.269. What you need to know about Chinese Politics, Part 2. 3 Credits.
This serves as a two-semester survey of Chinese politics from 1911-Present. This second module explores the politics of the reform and post-reform eras.

AS.190.283. Human Security. 3 Credits.
While traditional studies on security have focused largely on border protection, sovereign authority of the state, and interstate alliances, the threats posed to everyday people were not a central focus of security analyses until the end of the Cold War. The human security approach has evolved as a challenge to conventional thinking on security. This course will introduce the notion of human security, trace its emergence and evolution in the global political discourse, explore the theoretical scholarship from which it developed, and evaluate its effectiveness as a framework for addressing the most egregious threats human beings face today. From refugee flows, gender inequality, ethnic conflict, mass atrocities, poverty, to climate change, human security scholarship and policy has sought to examine the various threats to the lives of people that transcend national borders and allow us to break out of narrow thinking to develop innovative and globally-minded solutions.
Area: Writing Intensive

AS.190.284. Classics of Political Theory: Political Freedom. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, and the relationship between freedom, responsibility and political judgment. Spanning texts ancient, modern and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past possible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.300. Racial Inequality, Policy and Politics in the US. 3 Credits.
While policies were passed to ensure equal opportunity for racially subjugated Americans, the United States witnessed increasing stratification of wealth and income and deepening concentration of poverty, stagnation in closing racial gaps, and new forms of inequality posed by the striking upsurge in contact with the criminal justice system at the bottom of the skills ladder and concentration of wealth at the top. At the same time, the welfare state came under attack and faced challenges posed by an aging population, women entering the labor force, deindustrialization, and international pressures of globalization. Social spending withered in some areas while spending on citizens was increasingly likely to happen through tax expenditures and private means. This course investigates the politics around these developments and competing perspectives in debates over redistributive policies in the United States and their impact on inequality, particularly race and gender inequality. We will examine the contours of inequality and explanations for why it has expanded over the past several decades. We explore why the US is exceptional in both the level of inequality it tolerates and the generosity and types of remedies to alleviate poverty in comparison to its European counterparts and debate the role of race, unions, electoral politics and institutions. We investigate several specific cases of persistent racial inequality – concentrated poverty, segregation, and incarceration. We investigate both how policies have reinforced racial and gender divisions from a top-down perspective as well as examining under what conditions the disadvantaged contest inequality, exploring how political struggle shapes policy from the bottom-up. The last part of the course examines the consequences of inequality and social policy for representation and citizenship and how economic inequality affects political representation and responsiveness of elites to masses.

AS.190.306. Latin American Politics and Society in Comparative and Historical Prespective. 3 Credits.
The seminar will introduce students to the political and economic trajectories of Latin America as a whole and of individual countries, including Mexico, Brazil, Argentina, and Chile. Special attention will be paid to the long-term trajectory of the political regime (democracy versus dictatorship) and of economic development (variations in GDP per capita). Competing theories, from economic dependence to historical institutionalism, will be examined for their contribution to our understanding of Latin America's relative economic backwardness and low quality democracies.
Area: Writing Intensive

AS.190.307. Race, Politics and Literature. 3 Credits.
Area: Writing Intensive

AS.190.308. Democracy and Dictatorship: Theory and Cases. 3 Credits.
The course will cover three topics: 1) The conceptualization of political regime, democracy and authoritarianism. We will also consider neighboring concepts of other macro-political structures—government, state, and administration—in order to be able to demarcate what is distinctive about the study of political regimes.2) The characterization of political regimes in most Western and some non-Western countries, in history and today. We will centrally focus on the so called "Waves of Democratization," but we will also consider stories with less happy outcomes, that is, processes that led to the breakdown of democracies and the installation of repressive dictatorships.3) The explanation(s) of the stability and change of political regimes around the world. Theoretical accounts of regime change come in many flavors—emphasis on economic versus political causes, focus on agents and choices versus structures and constraints, international versus domestic factors, among others. We will consider most of them.

AS.190.311. Disposable People: Race, Immigration and Biopolitics. 3 Credits.
This course will explore theories and practices of race and immigration in order to illuminate the proliferation of populations regarded as disposable in contemporary politics. We will pay special attention to the contestable criteria used to determine eligibility for membership in the human race. We shall also examine how political power influences the relays between citizenship status and those whose lives are worthy of protection, and those who should be allowed to die.

AS.190.315. Asian American Politics. 3 Credits.
This course examines issues of political identity, political incorporation, and political participation of Asian Americans. Themes include Asian American panethnicity, the struggle for immigration and citizenship, Asian American electoral politics, political activism and resistance since the 1960s, and the impact of Asian Americans on the politics of race and ethnicity in the United States.

AS.190.319. Policy & Politics Design. 3 Credits.
The study of public policy is the study of power—who has it, how it is acquired, and how policies themselves grant or diminish the power of individuals and groups. It is also the study of choice—how political actors make consequential decisions to deploy their resources in different ways, some of which enhance magnify their power while others diminish it. This class will examine the scholarly literature on how public policy is made and how it can be changed. We will also engage directly with actors seeking to change public policy, in order to integrate our academic knowledge with their practical experience.
Area: Writing Intensive

AS.190.322. Future of American Democracy. 3 Credits.
For the most part, observers of American politics have not considered the possibility that the American democratic regime might be at risk. But the unexpected election of Donald Trump in 2016 and the subsequent course of his presidency have occasioned a great deal of uncertainty and anxiety about whether democracy in the United States is at risk and whether American political institutions can withstand the stresses of contemporary politics. This course will use the Trump era to explore the conditions that seem to threaten the stability of the American regime. We will begin by exploring the political circumstances that led to Trump's rise. We will then examine what we can learn from the experience of other countries about the conditions that make democracy either robust or fragile. Finally, we will consider how a set of contemporary political conditions in the United States — extreme partisan polarization, intense racial antagonism, growing economic inequality, and expanded executive power — contribute to the challenges facing American democracy today and in the future.
Area: Writing Intensive

AS.190.324. The Law of Democracy: The United States and Canada in Comparative Perspective. 3 Credits.
The Law of Democracy refers to the statutes, court decisions, and other practices that govern the electoral processes. Although the United States and Canada have a great deal in common, they have approached many of the problems involved in institutionalizing democracy quite differently. Recognizing these differences should contribute to understanding both the strengths, and the problems, of the two approaches. Specific topic will include the right to vote, political finance, delineation of district boundaries, electoral dispute resolution, and the role of electoral management bodies and elections administrators.

AS.190.325. Finding Equality in Law and Society. 3 Credits.
In this class, we will ask questions about the relationship between equality, law, and society. We will investigate how people have used law in their movements for greater equality, and ask whether law has served these movements well and how it has worked. We will pay particular attention to movements based on race, gender, and economic class.

AS.190.326. Democracy And Elections. 3 Credits.
An examination of most aspects of democratic elections with the exception of th e behavior of voters. Topics include the impact of various electoral systems and administrative reforms on the outcome of elections, standards for evaluations of electoral systems, and the impact of the Arrow problem on normative theories of democratic elections.

AS.190.327. Politics of Information. 3 Credits.
Considers global and comparative politics of information, information technologies, and the Internet. Examines governance of information (ownership of information, rights to information, privacy) and governance of information technologies (domain names, social media websites, etc.).

AS.190.328. Political Thought in the Americas. 3 Credits.
Reflection on political ideas and institutions in the United States is often oriented by the notion that the US is in some sense exceptional. For some commentators, the US is exceptionally democratic, exceptionally stable, exceptionally productive, and exceptionally innovative. For others, the US is exceptionally racist, exceptionally unequal, exceptionally violent, and exceptionally unhealthy. What both sides share is a common point of comparative reference in Europe. For all these commentators, Europe is the norm against which all of the exceptional qualities of the US stand out. In this course, we will ask how well notions of US exceptionalism stand up against the different comparative references found in the Americas, focusing in particular on the history of political thought in the Americas. We'll begin by studying texts from the pre-colonial and colonial periods, noting similarities and differences between the political institutions, economies, and social and racial hierarchies of in the regions that comprised British, Spanish, Portuguese, and French America. Next, we'll consider the US, Latin American, and Caribbean independence movements, early constitutionalism, and debates on women's role in society, slavery, and the rights of Indigenous Americans, asking what, if anything, distinguished the US from its neighbors in its early years. Finally, we'll examine theories of imperialism, racism, patriarchy, exploitation, and environmental destruction that have emerged from the Americas in the course of the 20th century, to see how both shared and divergent historical experiences have shaped perspectives relevant to contemporary political issues.

AS.190.329. National Security-Nuclear Age. 3 Credits.
This course examines the impact of weapons of mass destruction on international politics with an emphasis on security issues. The first half of the course focuses on the history of nuclear weapons development during the Cold War and theories of deterrence. The second half of the class considers contemporary issues including terrorism, chemical and biological weapons, ballistic missile defense and proliferation. Requirements include a midterm, final and a ten page paper.

AS.190.331. America and the World. 3 Credits.
This course is a survey of the unique position of the United States in world politics. We will cover the broader international relations literature on the dynamics of hegemony and empire, from work in the realist tradition to more critical approaches. The course will encompass security politics as well as the economic and monetary dimensions of American influence. Interested students must have at least completed one 100 or 200 level introductory course in international relations.

AS.190.332. The University in Democracy. 3 Credits.
From the founding of the United States to the COVID-19 pandemic, modern universities have evolved into expansive, complex institutions that play a variety of indispensable roles in the support of democratic societies. They educate citizens as well as specialists; produce new knowledge that shapes discourse and public policy; foster reasoned debate; and act as engines of social mobility. They also incite a great deal of controversy, criticism, and distrust, including for how they have performed these roles. In this course, we will study the centuries-long relationship between universities and democracy, and assess how successfully these institutions (including Johns Hopkins) are fulfilling their most profound functions today.
Area: Writing Intensive

AS.190.333. American Constitutional Law. 3 Credits.
This course covers enduring debates about the way the Constitution has structured the U.S. government and about which powers the Constitution assigns to the federal government and to the states. We will examine these debates in the context of American political history and thought by studying the writings of prominent participants, and landmark Supreme Court cases.

AS.190.334. Constitutional Law. 3 Credits.
Topics include executive and emergency power, racial and gender equality, and selected free speech and religious freedom issues.

AS.190.335. Imagining Borders. 3 Credits.
What is a border and why do borders matter in global politics. What do borders mean under conditions of globalization? An examination of the politics of borders, transborder flows, and networks within and across borders. The readings which come from political science and other disciplines, will include theoretical and case-specific works.

AS.190.338. Comparative Political Behavior. 3 Credits.
An introduction to the study of political behavior, emphasizing electoral behavior in democratic countries.

AS.190.339. American Racial Politics. 3 Credits.
Recommended Course Background: AS.190.214

AS.190.340. Black Politics I. 3 Credits.
This course is a survey of the bases and substance of politics among black Americans and the relation of black politics to the American political system up to the end of Jim Crow. The intention is both to provide a general sense of pertinent issues and relations over this period as a way of helping to make sense of the present and to develop criteria for evaluating political scientists' and others' claims regarding the status and characteristics of black American political activity.

AS.190.341. Korean Politics. 3 Credits.
This course introduces students to the historical and institutional foundations of modern South Korean politics. Topics include nationalism, political economic development, civil society, globalization, and ROK-DPRK relations.Recommended students should take Intro to Comparative Politics or a course related to East Asia first.(CP)
Area: Writing Intensive

AS.190.342. Black Politics II. 3 Credits.
Recommended Course Background: AS.190.340.

AS.190.344. Seminar In Anti-Semitism. 3 Credits.
Jews exercise a good deal of power in contemporary America.. They are prominent in a number of key industries, play important roles in the political process, and hold many major national offices. For example, though Jews constitute barely two percent of America's citizens, about one-third of the nation's wealthiest 400 individuals are Jewish and more than ten percent of the seats in the U.S. Congress are held by Jews. One recent book declared that, "From the Vatican to the Kremlin, from the White House to Capitol Hill, the world's movers and shakers view American Jewry as a force to be reckoned with." Of course, Jews have risen to power in many times and places ranging from the medieval Muslim world and early modern Spain through Germany and the Soviet Union in the 20th century. In nearly every prior instance, though, Jewish power proved to be evanescent. No sooner had the Jews become "a force to be reckoned with" than they found themselves banished to the political ma rgins, forced into exile or worse. Though it may rise to a great height, the power of the Jews seems ultimately to rest on a rather insecure foundation. Cross-listed with Jewish Studies. Course is open to juniors and seniors.
Area: Writing Intensive

AS.190.346. Foundations of International Relations Theory. 3 Credits.
This course is a broad conceptual introduction to international relations theory in a format that stresses close reading and critical discussion. We will explore mainstream theoretical perspectives and critiques of those perspectives, as well as more recent developments in the field. By the end of the course, students will have a firm grasp of the core issues and debates in the field. The course is conceptually demanding; interested students should have at least completed an introductory course in political science.

AS.190.347. A New Cold War? Sino-American Relations in the 21st Century. 3 Credits.
"Can the United States and China avoid a new Cold War? One might think not given disputes over the South China Sea, Taiwan, Hong Kong, human rights, trade, ideology and so much more. Moreover, competition for influence in the developing world and American concerns as to whether China will replace it as the preeminent world power suggest a new Cold War is in the offing. Nevertheless, their extensive economic ties and need to work together to solve common problems such as climate change, nuclear proliferation, and pandemics argues against a continuing confrontation. This course will examine whether cooperation or conflict will define Sino-American relations, and whether a new Cold War—or even a shooting war—lies in the future."

AS.190.348. Business, Finance, and Government in E. Asia. 3 Credits.
Business, Finance, and Government in East Asia explores the dynamics of East Asia's economic growth (and crises) over the last fifty years. We will examine Japan's post-war development strategy, the Asian tiger economies, and China's dramatic rise. Centered on case studies of major corporations, this course examines the interplay between politics and economics in East Asia, and considers the following questions: How have businesses navigated East Asia's complex market environment? In what ways can the state foster economic development? How has the financial system been organized to facilitate investment? What are the long-term prospects for growth in the region?

AS.190.350. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include civil wars, targeted killings, terrorism, ethnic conflict and war itself. Students examine what makes types of political violence unique and what unites them.

AS.190.355. Comparative Racial Politics. 3 Credits.
This course surveys the major trends and approaches to the comparative study of race in political science and critically examines the link between race and politics. Topics include race and state formation, citizenship and national membership, immigration, racial regimes, and the political economy of race.

AS.190.356. The Social Contract and its Discontents. 3 Credits.
This course focuses on one of the most powerful stories told in the tradition of western political theory: the story of the social contract. This story is about the constitution of legitimate political authority. It is told in many ways and each version makes different assumptions, in particular about human nature, the power of reason, the value of order, and the character of justice. We examine this often-conflicting assumptions and explore how they continue to inform the way we think about the possibilities and problems of politics. Readings include texts by Arendt, Hobbes, Locke, Rousseau, Freud, Pateman, the Federalists, Derrida, and Douglass. Final grades are based on class participation, two exams and two papers.
Area: Writing Intensive

AS.190.357. The State of Nature. 3 Credits.
Though it is possible to imagine ways of addressing the multiple crises the world will face as the atmosphere warms, seas rise, and pollutants seep into the surface of the planet, any serious proposal will require a degree of coordination amongst nation-states that has proven impossible to achieve in the past. In this course, we will consider this difficult situation by treating it as an instance of an old problem in political theory: how to escape the infamous “state of nature,” where individuals struggle to obtain the resources they need to survive at others’ expense, rather than cooperating to satisfy their needs and address the threats they face in common. First, we will study some influential reflections on the state of nature by Hobbes, Locke, Rousseau, Freud, and Pateman, as well as efforts to apply the logic of the state of nature to problems in international politics by Kant, Wendt, Waltz, Enloe, and others. Then we will read contemporary work on the international politics of climate change and ask what it would take to start building the better world that is possible today.

AS.190.365. Research and Inquiry in the Social Sciences. 3 Credits.
How do we assess research in the social sciences? What makes one study more persuasive than another? What are the advantages and disadvantages of the main methods used in research in the social sciences? What are the elements that go into designing a research project? This course considers these questions, introducing students to the basic principles of research design.

AS.190.366. Free Speech and the Law in Comparative Perspective. 3 Credits.
This class explores the ideas and legal doctrines that define the freedom of speech. We will examine the free speech jurisprudence of the U.S. in comparison to that of other systems, particularly the jurisprudence of the European Court of Human Rights and the Supreme Court of Canada.

AS.190.368. Political Arts: Dada, Surrealism, and Societal Transformation. 3 Credits.
An exploration of the political aims, tactics, and strengths and liabilities, of Dada and Surrealism, as it operated in Europe and the Americas in the years between the World Wars, with a comparison to political conditions today.
Area: Writing Intensive

AS.190.370. Chinese Politics. 3 Credits.
This course is designed to help students better understand the politics of China. Lectures will focus on the tools of governance that China has employed to navigate its transition from plan to market, provide public goods and services to its citizens, and to maintain social control over a rapidly changing society. The course will draw heavily from texts covering a range of subjects including China’s political economy, social and cultural developments, regime dynamics, and historical legacies. Students interested in authoritarian resilience, governance, post-communist transition, and domestic will find this course particularly instructive.

AS.190.372. Decolonizing Politics. 3 Credits.
This course introduces students to the colonial logics that underpin key categories and concepts in Political Science. Working through four sub-fields – political theory, political behavior, comparative politics and international relations, the course also introduces students to alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to explain the stuff of Political Science via anti-colonial logics.

AS.190.374. Political Violence. 3 Credits.
This undergraduate seminar is designed to introduce students to the comparative study of political violence and intra-state conflict. We will examine social science theories and empirical studies on a wide range of forms of political violence, including civil war, coups, state repression, communal violence, riots, terrorism, genocide, and criminal-political violence. We will study these phenomena at the micro, meso and macro levels, and focus on understanding their causes, dynamics, outcomes, and aftermath. The class will also equip students with an ability to analyze political violence by using social scientific tools.

AS.190.379. Nationalism and the Politics of Identity. 3 Credits.
Nationalism ties powerful organizations to political mobilization, territory, and individual loyalty. Yet nationalism is typically studied in isolation from other social formations that depend upon organizational – individual linkages. Alternative types of identity category sometimes depend similarly upon organizations that collect and deploy resources, mobilize individuals, erect boundaries, and promote strong emotional connections among individuals as well as between individuals and institutions. In this class, we study classic and contemporary works on nationalism, drawn from multiple disciplinary and analytic traditions, in the comparative context of alternative forms of identity. The focus of the class will be primarily theoretical, with no regional or temporal limitations.

AS.190.380. The American Welfare State. 3 Credits.
This course analyzes the distinctive US welfare state in historical and comparative perspective. We begin with a survey of the policy context, an historical overview from the poorhouses through the Great Society, and a tour of welfare states across the rich democracies. We then survey developments – and explain the actual workings of policy – across jobs, education, welfare, pensions, and health care. We explore the institutional and political factors behind their divergent trajectories through conservative revival and the age of Trump. Students will write a seminar paper exploring policy development over time in a program or area of their choosing. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students may take AS.190.380 or AS.360.380, but not both.

AS.190.381. Global Environmental Politics. 3 Credits.
Area: Writing Intensive

AS.190.382. Democracy and Development: Theory and Cases. 3 Credits.
Most wealthy countries are democracies. But not all democracies are wealthy—India, Costa Rica, and Mongolia are prominent examples of poor countries with democratic regimes. The course will examine the relation between economic development and political democratization under three big questions. (a) Under what conditions, and through which mechanisms, does economic development promote democracy? (b) If economic development is not possible in the foreseeable future, how do countries achieve stable democratization? (c) Under what conditions, and through which mechanisms, does democracy foster economic development?
Area: Writing Intensive

AS.190.384. Urban Politics & Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations.
Cross-listed with Africana Studies

AS.190.385. Urban Politics and Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations. Cross listed with Africana Studies.

AS.190.386. The Right to the City. 3 Credits.
Over the past several years the city has been the center of almost every significant political struggle we've had over the past several years, from Occupy Wall Street to Black Lives Matter. Theorists, activists, and scholars have argued for a specific "right to the city". What does that right look like? What might it look like? How has it informed political struggle over space and time? This course will seek to answer this question.
Area: Writing Intensive

AS.190.387. Parties and Elections in America. 3 Credits.
Considers how parties and elections structure political conflict, and facilitate (or not) democratic control of government. Topics include campaigns, voting behavior, election administration, money in politics, presidential nomination, and party coalitions.
Area: Writing Intensive

AS.190.388. Race and the Politics of Memory. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar. The course will examine the politics of memory: how power shapes what is available to be remembered, the timing and occasions of memory, who is allowed to remember, and the spaces inside of which remembrance takes place. Specifically, the seminar will explore how segregated memory enables racial segregation and racial inequality. Toward that end, we shall investigate political and theoretical interventions potentially equipped to contest contemporary forms of racial amnesia haunting what some have labeled a “post-truth” world.
Area: Writing Intensive

AS.190.389. China’s Political Economy. 3 Credits.
This course examines the most important debates about China’s political economic development. After exploring Mao Zedong’s disastrous economic policies, we will consider the politics of reform and opening under Deng Xiaoping, and finally conclude with China’s state capitalist policies across a variety of issue areas. The course will cover literatures on financial reform, public goods provision, foreign trade and investment, agriculture, corruption, business groups, and regulatory development. Where possible we will draw comparisons with the economic experiences of other East Asian nations as well as other post-communist states.

AS.190.390. Race and American Democracy. 3 Credits.
While the United States has long been a democracy for white men, it has mostly been anything but democratic when seen through the eyes of Black Americans. But progress toward the expansion of democracy has occurred at a few times in American history. What made American democratization possible, and how might the United States again move toward more complete and inclusive democracy?

AS.190.391. Imperialism and Anti-Imperialism. 3 Credits.
Since antiquity, global politics have been defined by the struggle between imperialism and anti-imperialism. This course examines the arguments that have accompanied this struggle, considering influential texts written to defend or to denounce empires, as well as contemporary scholarship on imperial and anti-imperial ideologies. We will focus in particular on how imperial conflicts shaped natural law, international law, liberalism, and cosmopolitanism, as well as the connections between imperialism and contemporary capitalism, development assistance, and humanitarian intervention. The fundamental questions for the course are: What is an empire? and What would it mean to decolonize our world, our international institutions, and our minds?

AS.190.393. Nonviolent Resistance in World Politics. 3 Credits.
In this seminar we examine the origins, dynamics, and consequences of nonviolent struggles around the world. How do ordinary people organize for social change? What are the differences in people power campaigns in authoritarian and democratic contexts? When does nonviolent resistance succeed or fail, and what are the political consequences of these outcomes? In answering these questions, we will study the central ideas behind nonviolent action, learn about the most important scholarly discoveries in this field and analyze paradigmatic cases. Students will choose a historical or contemporary nonviolent movement to interrogate throughout the semester, as we learn new concepts, theories, and empirical patterns to make sense of them.
Area: Writing Intensive

AS.190.394. Comparative Politics of the Middle East and North Africa. 3 Credits.
This course examines the domestic, regional, and transnational politics of the Middle East and North Africa. The class is organized into three units. The first examines major armed conflicts—anti-colonial, intra-state, and inter-state—from 1948 through the 1990s. It uses these historical moments as windows onto key issues in Middle Eastern and North African political issues such as external intervention/occupation, human rights, sectarianism, social movements, and memory politics. Unit Two focuses on policy relevant issues such as democratization, minority populations, religion and politics, and gender. In Unit Three, students will explore the politics of the Arab Uprisings through critical reading and discussion of new (post-2011) scholarship on MENA states, organizations, and populations. Enrollment limited to Political Science and International Studies majors.

AS.190.396. Capitalism and Ecology. 3 Credits.
Capitalism and Ecology focuses on the relations between capitalism and climate during the era of the Anthropocene. How do capitalist processes of fossil extraction, consumption, production and governance contribute to the pace of climate warming, glacier flows, the ocean conveyor system, species loss and other phenomena? What are the effects and the possible modes of political response? How do the nonhuman, self-organizing processes such as glaciers, oceans and climate change on their own as they also amplify the effects of capitalist emissions? The course combines texts on capitalism and activism with those by geoscientists on how the nonhuman systems work. Books by authors in the fields of political theory, geology, anthropology, economics, philosophy and ethology will be drawn upon. Authors such as Michael Benton, Brian Fagan, Hayek, Naomi Klein, Fred Hirsch, Fred Pearce, van Dooren and Connolly are apt to be read to engage these issues. A previous course in political theory is recommended. The class is organized around student presentations on assigned readings. Two papers, 10-12 pages in length. Extensive class discussion.
Area: Writing Intensive

AS.190.398. Politics Of Good & Evil. 3 Credits.
The Politics of Good and Evil examines comparatively a series of classical myths and modern philosophies concerning the sources of evil, the nature of goodness and nobility, the relations of culture to politics, nature and the gods, the degree to which any metaphysic or theological faith is certain, and so on. It is a course in “elemental theory” in the sense that each text pursued challenges and disrupts others we read. Often the reader is disrupted existentially too, in ways that may spur new thought. A previous course in political theory or a theoretical course in the humanities is advised. A high tolerance for theory is essential. Texts on or by Sophocles, Job, Genesis ("J" version), Augustine, Voltaire, Nietzsche, James Baldwin, W. Connolly and Elizabeth Kolbert form the core of the class. Assignments: 1) One 12 page paper and a second 5-7 page paper, both anchored in the readings; 2) a class presentation on one text; 3) regular attendance and quality participation in class discussions.
Area: Writing Intensive

AS.190.402. Environmental Racism. 3 Credits.
This is an undergraduate political theory seminar that addresses the disproportionate impact of environmental destruction on racially stigmatized populations. We shall examine the logics of power whereby the natural world is subjected to exploitation and domination, in tandem with the subordination of racial subjects historically identified as closer to nature. Likewise, we will explore political and theoretical challenges to environmental racism, such as those posed by indigenous communities, decolonial theory, and political movements contesting the intersection of racial inequalities and ecological crises.
Area: Writing Intensive

AS.190.403. Arendt/Foucault. 3 Credits.
This upper-level undergraduate writing intensive course brings together the work of Hannah Arendt and Michel Foucault to focus on their critiques of modernity and their discussions of political change/revolution. Although Arendt and Foucault are often understood as coming from and supporting different political theoretical traditions, the course will also explore ways in which their shared debt to the work of Friedrich Nietzsche illuminates sometimes surprising commonalities and complementary positions. There is no final exam in this course but in addition to reading assignments, students will be required to write three papers.
Area: Writing Intensive

AS.190.404. Race and Debt: Living on Borrowed Time. 3 Credits.
This is an advanced undergraduate seminar that explores how racial stigma functions as a marker of being always already in debt. In view of the legacies of settler-colonialism, imperialism and chattel slavery, how is it that those from whom so much has been taken are nevertheless regarded as perpetually in debt? We shall examine the moral, economic and racialized logics of power through which a range of political subjects come to be regarded as ungrateful “takers” as opposed to “makers,” and owing a debt to society. In so doing, we will investigate how temporality functions as a tool of power by considering how the indebted are made vulnerable to precarity, discipline, and disposability—in effect, forced to live life on borrowed time.
Area: Writing Intensive

AS.190.405. Food Politics. 3 Credits.
This course examines the politics of food at the local, national, and global level. Topics include the politics of agricultural subsidies, struggles over genetically modified foods, government efforts at improving food safety, and issues surrounding obesity and nutrition policy. Juniors, seniors, and graduate students only. Cross-listed with Public Health Studies. A student who takes AS.190.223 (Understanding the Food System) in Summer 2021 cannot also enroll in this course.
Area: Writing Intensive
A student who takes AS.190.223 (Understanding the Food System) cannot also enroll in this course.

AS.190.406. The Executive Branch. 3 Credits.
In the 19th Century America was noted for its courts, political parties and representative institutions. Today, America’s political parties and representative institutions have declined in importance while the institutions of the executive branch have increased in importance. This seminar will examine the nation’s key executive institutions and aspects of executive governance in the U.S. Students will alternate primary responsibility for week’s readings. Every student will prepare a 10-15 page review and critique of the books for which they are responsible in class.

AS.190.408. Sovereignty: Historical Perspectives and Contemporary Issues. 3 Credits.
This seminar provides an in-depth exploration of the concept of sovereignty by examining its historical development, current controversies, and its salience in international relations scholarship. Works in political theory and the international law literature will also inform our discussion. The course is open to advanced undergraduate students with previous coursework in political science. .
Area: Writing Intensive

AS.190.409. Research Seminar in State Politics. 3 Credits.
The United States Constitution creates a federal system that leaves a great deal of power in the hands of the individual states. Each year, the states collectively adopt nearly 20,000 new laws, an average of 400 per state, while the U.S. Congress in recent years has on average enacted hardly more than 150 new statutes. In terms of spending, state and local governments collectively spent $3 trillion dollars last year–almost as much as the federal government. The states are especially important in the realms of education, health care, environmental policy and transportation. In all these areas, to be sure, the states share power with the federal government but possess considerable discretionary authority. Despite the importance of the states, most Americans know little about them. Hardly anyone knows much about their state’s executive branch or legislature. In a recent survey, most Americans couldn’t say whether their state had a constitution (they all do). In this seminar we will explore some of the mysteries of state politics. Each student will develop a research project designed to discover something about the states that no one else knows.
Area: Writing Intensive

AS.190.410. Beyond Bob Marley: Exploring the Rastafari Movement in the Greater Baltimore Area. 3 Credits.
This course uses a community based learning approach to inquire into the presence of the Rastafari community in the Baltimore area. Most people will have heard of Rastafari through the music of Bob Marley. People might not know, however, that Rastafari emerges out of and has been part of a global history of liberation struggles. This course is co-taught with a local Rastafari organization. You will be intellectually and practically equipped to take part in a project of original research on the Rastafari presence in the Baltimore region, starting with the demonization of the movement in the 1980s “war on drugs” and including the movement’s response.

AS.190.412. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include terrorism, assassination, genocide, coups, rebellions and war itself. Students examine what makes types of political violence unique and what unites them. (Formerly AS.190.372)

AS.190.418. The End of Whiteness. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar on racial formation. Specifically, the course explores the end of whiteness in multiple senses of the phrase. First, to what extent do the ends served by whiteness change, or remain continuous, over time? What power hierarchies and political goals has white identity been engineered to advance historically? We shall then examine the contemporary phenomenon whereby the end of white supremacy is conceived by some as the end of the world. This, in turn, will lead us to investigate how we should best understand white disavowal of threats of climate change and pandemics/health-care crises currently coursing through white identity politics. The last part of the course will be dedicated to exploring the end of whiteness in terms of the theories and practices potentially required to dismantle whiteness as white supremacy. Readings include Du Bois, Fanon, Painter, Baldwin, Moreton-Robinson, Hartmann, Olson
Area: Writing Intensive

AS.190.419. Race and Segregated Time. 3 Credits.
This course explores how time, and not just space, is segregated along racial lines. We shall examine how racial injustices are experienced as impositions on human time, how resistance to racial inequality has often been figured in temporal terms, and what it means to think in untimely ways that challenge how the extended lifespans of racially dominant groups is contingent upon the foreshortened lifetimes of racial others. Readings will bring political theory into contact with contemporary experiences of race, such as: criminal (in)justice, environmental racism and the proliferation of human disposability. Recommended Course Background: One Political Theory course.
Area: Writing Intensive

AS.190.421. Violence: State and Society. 3 Credits.
This course will examine violence that occurs mainly within the territory of nominally sovereign states. We will focus on violence as an object of study in its own right. For the most part, we will look at violence as a dependent variable, though in some instances it will function as an independent variable, a mechanism, or an equilibrium. We will ask why violence starts, how it "works" or fails to work, why it takes place in some locations and not others, why violence take specific forms (e.g., insurgency, terrorism, civilian victimization, etc.), what explains its magnitude (the number of victims), and what explains targeting (the type or identity of victims).

AS.190.423. Planetary Geopolitics. 3 Credits.
With the tools of geopolitics, course explores political debates over globalization of machine civilization and changes in scope and pace, space and place, and role of nature in human affairs.
Area: Writing Intensive

AS.190.424. Policy Disasters. 3 Credits.
Investigates the causes of large-scale policy disasters, examining the role of ideology, psychology, organization design and political incentives. Examples may be drawn from the Iraq War, Bay of Pigs, Hurricane Katrina, the U.S. Financial crisis, Shuttle Challenger disaster. economic development policy, privatization, and the Great Society. Limited to seniors or with permission of instructor. (CP / AP)

AS.190.425. The New Deal and American Politics. 3 Credits.
This seminar explores how the New Deal, the fundamental moment in the post-Civil War United States, has structured politics and government across a variety of domains ever since. Topics include presidential leadership, executive power, political parties, labor, race, and the welfare state.
Area: Writing Intensive

AS.190.426. Qualitative Research. 3 Credits.
This class is designed to introduce students to qualitative methodology. Practically, students will gain first-hand experience with qualitative research methods via research design, ethics review, in-depth interviewing, participant observation, and archival/primary source research. They will learn to deploy analytical techniques such as discourse analysis and process tracing. Students will also be asked to consider the merits of qualitative approaches more generally, and discuss the relative advantages of qualitative, experimental, and quantitative approaches. Questions that we will discuss include: What place should qualitative research have in a research design? Can qualitative research test hypotheses, or only generate them? Can qualitative research explain social phenomena, or only interpret them? What are the disadvantages and advantages of qualitative approaches compared to quantitative approaches? For what kinds of research questions are ethnographic techniques best suited? Is replicability possible for ethnographic field research? What criteria of evidence and analytical rigor apply on this terrain?

AS.190.427. Political Economy of Japan and Korea. 3 Credits.
This upper-level seminar examines some of the major debates and issues of postwar Japanese and South Korean political economy. Topics include nationalism, gender politics, civil society, immigration, and US-Japan-South Korea trilateral relations.
Area: Writing Intensive

AS.190.428. The Politics of Disaster in the Middle East and Beyond. 3 Credits.
This course examines the politics of natural and man-made disasters, including war, forced migration, drought, famine, earthquakes, tsunamis, storms, and epidemics. Focusing on the Middle East, it also presents comparative cases from Africa, South and Southeast Asia, and North America. In doing so, the class will examine the unique ways that different types of disasters interact with governance structures; social and economic inequalities; medical infrastructure; gender; race and ethnicity; and political cleavages. Throughout the course, students will learn basic elements of research design and methods in addition to welcoming experienced disaster response and analysis practitioners to class. Finally, the Politics of Disaster in the Middle East and Beyond addresses some of the philosophical aspects of working in and studying disaster-affected contexts, bringing an ethical sensibility to policy-relevant analysis.

AS.190.429. The Political Bases of the Market Economy. 3 Credits.
Although "the market" is conventionally understood as separate from "politics", the modern market economy did not arise in a political vacuum. In fact, the very separation between the economy and politics is itself the product of a politically potent set of ideas. This course is an upper-division reading seminar on the origins and evolution of the modern market economy. Readings will include Smith, Marx, Weber, Polanyi, Keynes, Hayek, Friedman, Becker, and Foucault. Recommended course background: Introduction to comparative politics OR any college-level course in social or political theory.

AS.190.431. Global Climate Governance. 3 Credits.
This course will offer an in-depth study of the history and politics of global climate governance. It will examine the central actors, agreements, and policy proposals that shape climate governance.

AS.190.433. Race and the Politics of Punishment in the US. 3 Credits.
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold for citizenship. In this advanced undergraduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields - history, sociology, law and criminology - and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad's Condemnation of Blackness: race, Crime, and the Making of Modern Urban America, Elizabeth Hinton's From the War on Poverty to the War on Crime, David Oshinsky's Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western's Punishment and Inequality in America, and Michael Fortner's Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.
Area: Writing Intensive

AS.190.434. Does Israel Have a Future?. 3 Credits.
Israel is one of the only countries whose existence is openly challenged. This class will examine the future of Israel focusing on international and domestic threats to its continued existence as a Jewish democracy. Outside threats to be considered include nuclear attack and the growing international movement to delegitimize Israel. domestic challenges include demographic changes, the role of religion in governance, and doubts as to whether one can be a Jewish state and still be a democracy. Lessons from the destruction of the ancient Israelite kingdoms and from contemporary state deaths will be included. The course will conclude by considering efforts that Israel can undertake to meet the threats it faces.

AS.190.437. Race and Ethnic Politics in the United States. 3 Credits.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the “struggle with difference” within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.190.438. Violence and Politics. 3 Credits.
This seminar will address the role of violence–both domestic and international–in political life. Though most claim to abhor violence, since the advent of recorded history, violence and politics have been intimately related. States practice violence against internal and external foes. Political dissidents engage in violence against states. Competing political forces inflict violence upon one another. Writing in 1924, Winston Churchill declared–and not without reason–that, "The story of the human race is war." Indeed, violence and the threat of violence are the most potent forces in political life. It is, to be sure, often averred that problems can never truly be solved by the use of force. Violence, the saying goes, is not the answer. This adage certainly appeals to our moral sensibilities. But whether or not violence is the answer presumably depends upon the question being asked. For better or worse, it is violence that usually provides the most definitive answers to three of the major questions of political life--statehood, territoriality and power. Violent struggle, in the form of war, revolution, civil war, terrorism and the like, more than any other immediate factor, determines what states will exist and their relative power, what territories they will occupy, and which groups will and will not exercise power within them. Course is open to juniors and seniors.

AS.190.440. European Politics in Comparative Perspective. 3 Credits.
Europe has been in a sense the first testing ground for theories of comparative politics, but many outsiders now see Europe as a pacified and somewhat boring place. This course will question conventional wisdom through an examination of European politics in historical and cross-national perspective. We will apply the comparative method to the study of European politics today, and conversely we will ask what Europe tells us more generally about politics. We will see that Europe is still a locus of intense conflict as well as remarkably diverse experimentation. Topics will include: political, legal, and economic governance; the evolution of democracy and fundamental rights, the welfare state, class stratification, immigration and race, the role of religion; European integration and globalization. Recommended background: Introduction to Comparative Politics.

AS.190.442. Civil Society. 3 Credits.
This course explores classic and contemporary debates on the concept of civil society and critically examines its analytical value in light of recent developments. Topics include the relationship between civil society, the state, and markets, the role of civil society in development and democratization, social capital, and global civil society. This course is open to graduate students from any discipline. Advanced undergraduate students must obtain permission from the instructor and are expected to keep up with graduate students during class discussions.
Area: Writing Intensive

AS.190.443. Politics of Outer Space. 3 Credits.
Intensive examination of the political aspects of human activities in outer space, past, present and future, with focus on militarization, earth-remote sensing, surveillance, navigation, resource exploitation, the Outer Space Treaty, and colonization.
Area: Writing Intensive

AS.190.450. Power. 3 Credits.
Power is a -- if not the -- key concept of international relations, yet there is no single definition of power that is accepted by all scholars in the field. In this course we will critically examine definitions of power from classic and contemporary works of international relations, political science, and related areas of study.

AS.190.451. Geopolitics. 3 Credits.
Intensive exploration of theories of how geography, ecology, and technology shape political orders. Case studies of ancient, early modern, global, and contemporary topics, including European ascent, industrial revolution, tropics and North South divide, climate change, geo-engineering and global commons (oceans, atmosphere and orbital space
Area: Writing Intensive

AS.190.452. Party Politics from the Founding to the Progressives. 3 Credits.
Though the torchlight parade has long since passed, American parties still stand in the shadow of the nineteenth-century Party Period. This course seeks to untangle the ideologies and practices of party politics from the Founding to the Progressive Era. Topics include the rise of mass parties, political violence, the coming of the Republican Party, the party politics of Reconstruction and westward expansion, corruption and the political machine, Populism, and movements for reform. We pay particular attention to comparisons between past and present, and to opportunities taken and foregone.
Area: Writing Intensive

AS.190.454. Nuclear Weapons and World Politics. 3 Credits.
An intensive examination of competing theories of the role of nuclear weapons in world politics and alternative global security orders. Focus on nuclear weapons and the interstate system, deterrence, war fighting, arms control, proliferation and terrorism, with select historical and contemporary case studies.
Area: Writing Intensive

AS.190.471. The University and Society. 3 Credits.
In the 20th century, American universities became the envy of the world, leading in most categories of scholarly productivity and attracting students from every nation. In recent years, though, American higher education has come to face a number of challenges including rapidly rising costs, administrative bloat, corporatization and moocification. We will examine the problems and promises of American higher education, the political struggles within the university and the place of the university in the larger society. Upper classes and Grad Students only.

AS.190.473. Political Polarization. 3 Credits.
The American constitutional order, which was designed to operate without political parties, now has parties as divided as any in the democratic world. This course will examine explanations of how this happened, the consequences of party polarization for public policy and governance, and what if anything should be done about it.
Area: Writing Intensive

AS.190.474. Philosophy of Law. 3 Credits.
The philosophy of law or jurisprudence investigates the nature of law and what makes law, as it were, law. Thus, this course will examine various ways in which law has been defined and understood. It will also consider how law is distinguished from other systems of norms and values, such as morality, and how law is distinguished from other aspects of government, such as politics. In addition, the course will introduce students to discussions of legal reasoning and interpretation. Students will be required to participate in class discussion, take three exams, and write one paper.

AS.190.476. Frantz Fanon's Global Politics: Racism, Madness, and Colonialism. 3 Credits.
“The abnormal is he who demands, appeals, and begs” – Frantz Fanon. This course explores the writings and politics of Frantz Fanon, the radical anti-colonial author, psychiatrist, diplomat, and revolutionary who inspired decolonial and anti-racist struggles across the globe. We will situate Fanon’s writings in the global historical context of decolonization, and ask how they can illuminate contemporary questions of madness, racism, fascism, and empire. In addition to reading Fanon’s work, we will trace his influence on radical social movements, political thought, and global politics, and explore the limits and promises of culture, art, and film for social transformation.

AS.190.498. Thesis Colloquium. 3 Credits.
Open to and required for Political Science majors writing a thesis. International Studies majors writing a senior thesis under the supervision of a Political Science Department faculty member may also enroll. Topics include: research design, literature review, evidence collection and approaches to analysis of evidence, and the writing process. The course lays the groundwork for completing the thesis in the second semester under the direction of the faculty thesis supervisor. Students are expected to have decided on a research topic and arranged for a faculty thesis supervisor prior to the start of the semester. Seniors. Under special circumstances, juniors will be allowed to enroll. Enrollment limit: 15.
Area: Writing Intensive

AS.190.499. Senior Thesis. 3 Credits.
Seniors also have the opportunity to write a senior research thesis. To be eligible to write this thesis, students must identify a faculty sponsor who will supervise the project.
Area: Writing Intensive

AS.190.501. Internship-Political Science. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.502. Political Science Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.504. Internship-International Relations. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.535. Independent Study - Freshmen. 3 Credits.
Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.536. Independent Study-Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.537. Independent Study-Sophomores. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.538. Independent Study-Sophomores. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.539. Independent Study-Juniors. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.540. Independent Study-Juniors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.541. Independent Study-Seniors. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.542. Independent Study-Seniors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.543. Independent Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.544. Independent Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.592. Summer Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.598. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.599. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.601. Qualitative Research.
This class is designed to introduce students to qualitative methodology. Practically, students will gain first hand experience with qualitative research methods via research design, ethics review, in-depth interviewing, participant observation, and archival/primary source research. They will learn to deploy analytical techniques such as discourse analysis and process tracing. Students will also be asked to consider the merits of qualitative approaches more generally, and discuss the relative advantages of qualitative, experimental, and quantitative approaches. Questions that we will discuss include: What place should qualitative research have in a research design? Can qualitative research test hypotheses, or only generate them? Can qualitative research explain social phenomena, or only interpret them? What are the disadvantages and advantages of qualitative approaches compared to quantitative approaches? For what kinds of research questions are ethnographic techniques best suited? Is replicability possible for ethnographic field research? What criteria of evidence and analytical rigor apply on this terrain?

AS.190.602. Introduction to Quantitative Political Science.
An introduction to measurement and data analysis in contemporary American political science. Measurement topics will include the formation of indices and cumulative scales. Analytic topics will topics include sampling variations, statistical association and causation, as manifested in contingency tables and correlation and regression. Emphasis will be on fundamental concepts and assumptions, and on comprehension and evaluation of the scholarly literature. Advanced undergraduates by permission only.

AS.190.604. Foucault and Kant.
This seminar will explore Kant and Foucault comparatively across the registers of ontology, morality, epistemology, time, and politics. How does each move into and across these registers? How do the two thinkers inform and challenge one another? Texts will include: Kant, The Critique of Practical Reason, Conflict of the Faculties, Perpetual Peace and Other Essays, The Anthropology (sections); Foucault, The Order of Things (chapters), Discipline and Punish, “On the Genealogy of Ethics,” “What Was Enlightenment?”, and Subjectivity and Truth.

AS.190.605. Enviromental racism.
Environmental racism has largely been understood in terms of environmental policy-making that discriminates against people of color, particularly with respect to the state-sanctioned siting of toxic waste facilities, the distribution of pollutants, food-deserts, and the exclusion of non-white peoples from leading positions in the environmental movement. This graduate seminar explores environmental racism more broadly, pushing beyond its conventional, place-based understandings and approaching the corresponding logics that produce human disposability and environmental waste from the standpoint of both space and time. Examining colonial legacies of coding racial others in terms natural disasters, epidemics, infestations, non-human animals and dirt, we shall investigate how the natural world is subjected to exploitation and domination in tandem with the subordination of racial subjects historically identified with nature and rendered expendable. In other words, we shall illuminate the logics of power through which race-making coincides with waste-making. Accordingly, we will explore political and theoretical challenges to environmental racism in multiple registers; such as those posed by indigenous studies, decolonial thinkers and Afro-diasporic theories contesting the intersection of racial biopolitics, ecological crises and racial capitalism in an era of proliferating human disposability. Authors considered may include; Mbembe, Du Bois, Hage, Glissant, Césaire, Wynter & Chakrabarty.

AS.190.607. Decolonizing the Episteme: Knowledge, Empire and the Academy.
What complicity does the Western academy have with empire? How might the development of certain intellectual dispositions be implicated in the challenges of imperial rule? And how might such implications have produced influential concepts and theories? In this course we will consider the ways in which - and extent to which - the academy’s claim to epistemic privilege has a colonial provenance. Seniors permitted with instructor permission only.

AS.190.610. Process Philosophies and Political Manifestos.
What do the process philosophies of Bergson, Whitehead and Daoism have to say to political manifestos advanced by writers such as Marx and Engels, Naomi Klein, Hardt and Negri, Dziga Vertov, Haitian and French revolutionaries, Folco Portinari. How, in turn, can the latter illuminate, deform, or inform them? The readings in this seminar bounce back and forth between the cosmic politics of process philosophy and a variety of short manifestos designed to speak to the vicissitudes of today.

AS.190.612. Comparative Citizenship and Immigration Politics.
Graduate students only. Examines the contemporary political dynamics of migration, citizenship, and race concentrating on North America, Europe and East Asia. We will focus on how citizenship and immigration policies shape immigrant political identities, claims, and strategies as well as how immigrants impact public debates and policies in receiving societies.

AS.190.613. Political Arts: Dada, Surrealism, and Societal Transformation.
An exploration of the political aims and tactics, and strengths and liabilities, of Dada and Surrealism, as it operated in Europe and the Americas in the years between and after the World Wars. Readings by Andre Breton, Leonora Carrington, Georges Bataille, Roger Caillois, Meret Oppenheim, College of Sociology, and others. Seniors allowed by permission of instructor only.

AS.190.616. American Political Development.
An examination of state-building and nation-building throughout American political history. (AP)

AS.190.617. The Politics of Finance.
This graduate seminar considers the relationship between finance and state building in both the developing and developed world. Topics will explore the role of central banking, the development of equity and debt markets, bubble economy politics, the effects of financialization, and financial regulatory politics.

AS.190.619. Great Powers in the Middle East and North Africa.
How have Great Powers shaped the history and politics of states in the Middle East and North Africa? For over a century, Great Powers have been extensively involved in the region: they established colonies, protectorates, and mandates during colonial period; afterward, they employed military force to constrain and shape regimes. Focusing primarily on Great Britain, France, and the United States, this course examines the causes and consequences of foreign military intervention from colonial conquest through the post-colonial period. Students will critically assess claims that link Great Power actions to current-day conditions in the region through evaluating contemporary scholarship and analyzing the history of selected cases.

AS.190.620. Stengers, Nietzsche and Whitehead: Three Process Philosophies.
This seminar explores the philosophies of Stengers, Nietzsche and Whitehead comparatively, focusing on their philosophies of agency, multitemporality, affect in ethics and politics, flirtations with panexperientialism, and accounts of planetary/culture imbrications. We will also read contemporary engagements with all three on subjectivity, biology and politics, the Anthropocene, democracy, the shapes of logic, and the visiccitudes of time. Primary texts by Stengers may be Another Science is Possible and Thinking with Whitehead, by Nietzsche Daybreak, Thus Spoke Zarathustra, and the Late Notebooks. For Whitehead, Process and Reality and Modes of Thought. Presentation, class discussions, and a seminar paper.

AS.190.621. Poesis and Politics.
This graduate seminar will investigate how an aesthetic approach to political concepts and practices – in particular the concept of the polity and the practice of judgment – responds to, troubles, and complicates political thought. In the company of Plato, Kant, Heidegger, Arendt, and Auden, we will explore two related sets of questions. First, what are the advantages and disadvantages of figuring the polity as a work of art or as an artistic creation? Second, how might poetry play a role in politics? Students will be required to submit weekly response papers and write a final 20-30 page paper on a topic related to the course, drawing on the work of at least two of the thinker-poets discussed.

AS.190.622. Republicanism, Realism, and Liberalism.
Close reading of major texts in western political thought on violence, security and politics developed by republicans, realists and liberals

AS.190.623. Law's Love: Command, Submission, Obligation, Power.
This course focuses on the affective dimensions of law, a power that both creates and preserves the system of rules which a particular country or community recognizes as regulating the actions of its members and which it may enforce by the imposition of penalties. Two related questions will guide our examination of the affection dimensions of law: What are the grounds of law? Why do we obey law? Students will turn in response papers every week on the reading. In addition, there will be a 20-30 page paper due at the end of the semester.

AS.190.625. Theories of Comparative Politics.
This seminar is intended for graduate students planning to take the comprehensive exam in comparative politics, either as a major or as a minor. In addition to exploring central methodological debates and analytic approaches, the seminar reviews the literature on state-society relations, political and economic development, social movements, nationalism, revolutions, formal and informal political institutions, and regime durability vs. transition. Graduate students only.

AS.190.626. Quantitative Methods for the Study of Politics.
This course is intended as Ph.D.-level introduction to applied statistics, with a focus on the identification of causal effects in the tradition of the Neyman/Rubin potential outcomes framework. Prior coursework in applied statistics or quantitative methods will be useful but is not required. Upon completion of the course, students will be in a position to understand and critically assess scholarship that uses instrumental variables, difference-in-differences, regression discontinuity, and other quasi- and natural-experimental research designs. Formal mathematical proof will be kept to a minimum. Students will be asked to adapt existing code and write some of their own code in R.

AS.190.627. Gilles Deleuze and Classical Theory.
What can Deleuze teach classical Eurocentric theories? And what can representatives of those traditions teach him? We will read Deleuze in relation to theorists he has examined, such as Plato, Lucretius, Spinoza, Kant, Kafka, Nietzsche and Hegel, as we seek to hear the history of political theory in a new key. Concepts and issues such as politics, history, time, culture/nature divisions, capitalism, the source of ethics, the shape of political ideals, and the nature of explanation will come up for review. The course will typically read a text from a classical thinker and then consult Deleuze's engagements with them.

AS.190.628. Hobbes & Spinoza.
A close reading of Leviathan by Thomas Hobbes (1588-1679) and Ethics by Baruch Spinoza (1632-1677), with consideration of important commentaries on these works. What conceptions of the human being, nature, reason, God, and freedom are defended and affirmed by Hobbes and Spinoza? What rhetorical strategies accompany their theories of self, ethics, social life?

AS.190.629. American Racial Politics.
Race is not a biological fact but rather a social construction. However, it is a social construction with very real consequences. Definitions of citizenship, allocation of state resources, attitudes about government and government policy, the creation of government policy, all shape and are shaped by race and racial classifications. Serving as a critical corrective to American politics treatments that ignore race, this class will examine how race functions politically in the United States. While not required, some knowledge of statistics is helpful.

AS.190.630. Interpretation and Critique of Political Ideas.
This is a graduate seminar on the interpretive and critical problems that arise when political theorists read and write about texts from long, long ago or far, far away. The first part of the course will consider approaches to the history of European political thought influenced by Marx, Foucault, Strauss, Skinner, and Arendt, amongst others. Readings will include both major methodological statements and examples of interpretive and critical scholarship undertaken by proponents of these different schools of thought. In the second part of the course, we will ask whether and how methods developed to analyze and learn from the history of political thought can be applied to the study of political thinkers who lived and wrote outside western Europe and North America. Major questions for consideration in both parts of the course include: Can old ideas help us solve problems arising in contemporary politics and political theory? What can we learn from intellectual traditions unconnected to our own? What do we have to do in order to understand the ideas contained within a given text? Do we have to understand a text for it to be useful to us?

AS.190.631. Making Social Policy.
Examines American social policy in comparative perspective. Special attention to issues of poverty and inequality, and their relation to the political system.

AS.190.632. The Development of American Political Institutions.
This course explores institutional development in American national politics, from the Founding until the present. It traces parties, Congress, the presidency, bureaucracy, and courts, and also examines how those institutions have interacted with one another across American history. Throughout the course, we will consider how ideas, interests, procedures, and sequence together shape institutions as they collide and abrade over time. Finally, although it hardly covers the entire corpus across the subfield, the course is also designed to prepare students to sit for comprehensive examinations in American politics.

AS.190.633. Black Political Thought.
This course will introduce you to a survey of Black political thought. Our examination will cover the time period between the latter years of the Transatlantic Slave Trade and the present. In the first two thirds of the course we will deal with primary texts (including but not limited to Incidents in the Life of a Slave Girl, The Souls of Black Folk, and The Wretched of the Earth), and in the last third we will deal with modern day attempts to wrestle with the ideas in these texts (including but not limited to Intimate Justice and Critique of Black Reason).

AS.190.634. Political Corruption.
Political corruption is widely seen to be an impediment to economic and political development and stability. But what is political corruption? The common definition of corruption as abuse of power for private gain is too vague to be of serious scholarly use. Is “abuse” culturally specific or merely a synonym for “illegal” - or even worse, for undesirable according to some unspecified standard? Does “private gain” refer only to under-the-table cash payments to a corrupt official, or does it extend to intangible private benefits, and does it extend to gains for identifiable favored groups (“club goods”) and may or may not include the corrupt official him or herself?This seminar will focus on several questions. How should political corruption be defined, and what is at stake in the choice if definition? Are there identifiable patterns to, or types of, political corruption? What conditions encourage or discourage corruption, and how might corruption be controlled or limited? What are the consequences of corruption - and are they necessarily all negative?

AS.190.635. Theories of Constitutional Governance.
This class is focused on the nature of constitutions and the way that they should and do work within a political system, with particular emphasis on the U.S. context. We will examine both normative and empirical arguments about the relationship between politics and constitutional law. More specifically, we will think about how societies and individual actors should make meaning out of constitutional texts, how they do seem to make meaning out of those texts, and the conditions that give rise to constitutional drafting and change. Graduate students only.

AS.190.636. Information/Knowledge/Power/Politics.
Explores how information and knowledge flow through political/social/economic configurations, forming and reforming the politics of everyday engagements at different scales. Topics such as mis/disinformation, commodification of information, embodied information, surveillance, and cyber-mediated information provide the context for analyzing practices, power, agency, and ethics. Critical security studies scholarship provides an overarching template, and we will also draw theoretical insights from multiple disciplines. The format will combine elements of seminar and workshop, and the emphasis will be on collaborative participation in the research process.

AS.190.637. The Colonial Constitution of the "Human".
This course inquires into the colonial constitution of the "human" across philosophical, legal, political, social and economic dimensions. Special attention is paid to the ways in which sexuality, gender, race, class and faith are complicit in this constitution. The course finishes by critically considering theories of the "post-human" from the perspective of both a colonial genealogy of the "human" and anti-colonial claims upon humanism.

AS.190.638. Racial Capitalism.
This graduate seminar will explore the imbrication of the theory, history, and politics of the logic of race and the logic of capital.

AS.190.641. Race and Ethnic Politics in the United States.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the "struggle with difference" within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.190.642. Institutions, Power, Ideas and Practices.
Comparative politics scholars have long identified institutions as a crucial source of cross-national variation in political life. Yet institutions are not static. We know from everyday experience that institutions change over time, sometimes quite fast. Scholars have attempted to address the problem of institutional change in various ways. Some institutionalist scholars underscore the endogenous logic of institutional evolution, whereas others resort to exogenous factors such as power. Constructivist and pragmatist scholars foreground ideas and practices as sources of institutional change. This course will explore these different strands of scholarship and attempt to reconstruct a fruitful dialogue between them."

AS.190.643. Practice and Process in International Relations Theory.
This course covers a series of special topics in IR theory with an emphasis on how an appreciation of practices and process provides a fresh perspective on old questions and raises new ones. The course will focus on the pertinent sociological literature and how this has been applied in IR.
Area: Writing Intensive

AS.190.644. Colonialism and Foreign Intervention in the Middle East and Africa.
How did colonial rule and post-colonial foreign intervention shape the history and politics of states in the Middle East and Africa? The first part of this course focuses on the colonial period, examining the era of conquest, considering how and whether colonial rule differed from other types of ruling arrangements, and studying how people in colonized territories reacted to conquest and foreign rule. Part Two focuses on post-colonial foreign military interventions. Part Three considers the potential long-term consequences of colonialism and foreign intervention. The course focuses on British, French, and American imperialism.
Area: Writing Intensive

AS.190.645. Black Politics.
Grad Students Only.

AS.190.646. CLR James: Black Marxism, Pan-Africanism and International Relations.
This course uses the life and writings of famous Trinidadian Marxist CLR James to explore a set of analytical issues of importance to understanding Pan-Africanism and international relations, including: political economy and slavery, culture and freedom, and the fraught relationship between black intellectuals and black masses.

AS.190.647. Community and Its Disconcents.
This course is inspired by Hannah Arendt's claim that the calamity of stateless people is "not that they are deprived of life, liberty and the pursuit of happiness" but that "they no longer belong to any community whatsoever." Rather than attempt to verify or disprove this claim, the course will use this claim as a provocation. How do we understand, experience, and imagine "community"? What does it mean to "belong" to a community? Is it possible not to belong to any community? Why is the language of community so ubiquitous? To help us consider these questions, we will read among others, Anderson, Freud, Harney and Moten, Joseph, LeGuin, McMillan, and Rousseau. A final paper of 20-30 pages is required.

AS.190.648. Writing for Research.
This course is designed to help graduate students in political science craft an original piece of high-quality writing. This class is open to students in their first, second, or third years of the graduate program. We will work on developing the skill of academic writing step by step, focusing first on the question of how to identify and articulate a good question, second on the skill of literature review, third on the art of theoretical engagement, and fourth on the presentation of evidence. During the semester, students may choose to turn a set of interests and questions into a prospectus draft. Alternatively, they may decide to use the class to turn a seminar paper into a dissertation chapter, or a revise a dissertation chapter into an article manuscript. Special sessions will bring other faculty to the class to talk about writing a dissertation and the peer-review process.

AS.190.649. The Economic and the Political.
The neoclassical paradigm of economics utterly excludes politics, yet a large swath of the subfield of "political economy" presupposes or is predicated upon that very paradigm. Neither approach can account for the distinct force of "the economic" as it continually interacts with "the political" (and the social, the cultural, etc.) This graduate seminar will be an experimental effort in exploring a whole new terrain of the economic — not another critique of the neoclassical paradigm, but the initial (re)formulation of a new approach to the economic and the political.

AS.190.651. Policy Dynamics.
Policy dynamics is the study of changes of the political system in its entirety, from the point of view of the system's outputs--what government actually does, or fails to do. It is dynamic in that it seeks to explain changes in what matters governments feel can or must be addressed, the tools that are available to deal with problems, and the interactions of government and non-government actors that generate change. Particular emphasis will be placed on studying policy dynamics over long periods of time, including such post-enactment issues as implementation, policy feedback on political identities and group formation, and policy durability.

AS.190.652. The Politics of Money, Debt and Credit.
This course will survey recent scholarship on the politics of monetary and financial flows in the economy. We will reflect on the significance and causes of changes in underlying political economy and institutions since the mid-20th century. We will pay special attention to the rise of a new political economy often characterized as neoliberal, and we will discuss how scholars within and beyond political science make sense of these changes.
Area: Writing Intensive

AS.190.653. Organizations.
Graduate students only. "Organizations are the fundamental building blocks of economic, social and political life. This course will examine how different disciplines (sociology, economics, political science) approach the problem of explaining how organizations operate, as well as exploring the structure and development of a very wide range of organizations (firms, interest groups, charitable foundations, universities, militaries, bureaucracies, international organizations, and professions)."

AS.190.654. The Development of the Conservative Movement.
The last twenty years has seen a flourishing of literature on conservatism across multiple disciplines. This course will survey that literature, placing it in a developmental context. Particular focus will be placed on the relationship between elite and mass conservatism, especially in the light of the rise of populism in the US, UK and elsewhere.

AS.190.655. Decolonizing Time and Memory.
This graduate seminar is a critical encounter with the colonial imprint on the politics of memory, temporality and race. We shall investigate the recent turn to "decolonize" virtually everything and ask what such efforts might entail given that the hallmarks of colonialism include a disavowal of the past, the capacity to set the clock to zero and begin the world anew, a linear conception of time and an abiding desire for temporal sovereignty. While investigating the possibility of decolonizing futurity, we will pay particular attention to the Promethean construction of the human race (and its constitutive others) across history. We shall confront the role of segregated temporality and mnemonic politics in modern race-making projects and their impact on the contemporary political imagination. Authors may include Nietzsche, Wynter, Fanon, Foucault, Deleuze, Anzaldúa, Baldwin, & Du Bois.

AS.190.657. Re-Turn to Language.
A central claim of structuralism is that all systems of meaning are structured along the lines of language. Post-structuralism challenges this claim but does not dismiss it so much as probe the ways in which these systems fail and reveal interesting things about how communication may (not) take place. What is sometimes called "post-post-structuralism" rejects the focus on language, emphasing instead how meaning is generated in and by culture or with the (mostly) unacknowledged collaboration of matter. This course will revisit these claims, challenges, and refusals within the context of contemporary, philosophy, literary theory, and political thought. We will read, among others, texts by Saussure, Liev-Strauss, Lacan, Barthes, Derrida, Foucault, Kristeva, Butler, and Barad. Students will be required to submit weekly response papers and write a final 20-30 page paper on a topic related to the course.

AS.190.659. Postcolonial Political Economy.
There is currently an intermittent and under-examined relationship between postcolonial studies and critical political economy. The aim of this module is to help you to account for this relationship on your own terms. We will examine the entanglements of capitalism and colonialism by building unconventional conversations between classical political economists (as well as their 19th century successors) and thinkers and traditions invested in confronting colonialism and its legacies. We will focus primarily on regions affected by (Anglo) settler colonialism – especially the Americas and the Pacific.

AS.190.660. Democratic Resilience: US Democracy in Comparative and Historical Perspective.
What gives democratic regimes the ability to withstand challenges such as extreme polarization, racial and ethnic conflict, rising economic inequality, and institutional sclerosis and avoid the prospect of backsliding toward authoritarianism? This course will examine the problem of democratic resilience by locating the contemporary crisis of American democracy in comparative and historical perspective, bringing together literatures in comparative democratization and American politics.

AS.190.662. Reading (vols 2 & 3 of) Capital.
TBA

AS.190.664. Decolonizing Political Science: Contexts, Concepts, and Imaginations.
This graduate course explores the colonial contexts out of which key sub-fields of political science arose. The course then examines the colonial logics that underpin the conceptual formation of each sub-field. Finally, the course considers alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to alternatively explain the phenomena engaged with by each sub-field.

AS.190.666. Political Economy Of Development.
Graduate students only.

AS.190.667. Reconstructing International Relations Theory.
In this class, we will study IR theory in a reconstructive mode. We will return to foundational texts in light of more recent theoretical developments both in IR and social thought more broadly. Our goal will be to critically assess the basic epistemological, ontological, and historical assumptions of IR theory while charting paths for its possible futures.

AS.190.668. Rethinking Western Thought.
The history of Euro-American Political Thought has been criticized for its orientations to race, gender, class, Christianity, the subject, capitalism, colonialism, sociocentrism, and humanist exceptionalism. How deeply are those themes ensconced in early Christian traditions, secular orientations to the earth, practices of capitalism, and contemporary images of "the political"? What openings are discernible? The seminar starts with Hesiod's Theogony and a chapter from Tim Whitmarsh on atheism in ancient Greece. It then explores how Augustine consolidates sharp shifts in orientations to faith, divinity, nature, discipline, time and the earth. An agent of the first conquest of paganism. Readings in The City of God: Against the Pagans and The Confessions in relation to Foucault's newly translated book, Confessions of The Flesh. Then we turn to what might be called the second Christian/imperial conquest of paganism, launched during the 15th century Spanish invasion of the Americas. How did that conquest re-enact and differ from the first? Texts by Todorov, The Conquest of America, alongside essays by C.L.R. James and perhaps de Castro. Followed by essays from Kant, Marx, Arendt, or Deleuze/Guattari, to see how each consolidates or turns earlier western theories. The seminar then engages Dipesh Chakrabarty in The climate of history in a planetary age as he criticizes Euro-centered thought ("the political", the earth as background to politics, racism, exceptionalism, etc) and some currents in post-colonial thought. Critiques and augmentations will be explored, too.

AS.190.670. The Dream of the 90s: Political Theory, 1990-1995.
This graduate seminar will explore works from this extraordinary period in contemporary political theory.

AS.190.672. Money.
What is money? And given its absolute centrality to economics and politics, shouldn't political economy and political theory hold answers to this question? Instead, the history of both neoclassical economics and modern political thought is marked by eschewals or refusals of it or its importance. This graduate seminar will explore the theory and politics of money, through critical readings of orthodox theories, engagements with heterodox political economy, and encounters with contemporary political theory.

AS.190.675. Nuclear Weapons and Global Politics: History, Strategy, Race and Gender.
This course provides an analysis of US foreign policy with a focus on the interests, institutions, and ideas underpinning its development. It offers a broad historical survey that starts with US involvement in the First World War, covers major developments of the twentieth century, and concludes with contemporary issues. Important themes include the developments underpinning the emergence of the liberal world order, strategies of containment during the Cold War, nuclear deterrence and antiproliferation efforts, the politics of international trade, alliance politics, technological and security policy, and the re-emergence of great power competition.

AS.190.676. Field Survey of International Relations.
This course provides a scaffold for the study of international relations theory, organized historically and by major approaches. The focus is on close reading and discussion of exemplars of important bodies of theory. Intended for doctoral students with IR as their major or minor field. Graduate students only.

AS.190.678. Law and Politics.
As a field, Law and Politics has evolved from the study of constitutional law and judicial politics to the political behavior of judges and their associates to the study of law and society, the operation of law and courts "on the ground" in the international arena as well as in the United States, historical institutionalism, and the carceral state. In this graduate course, we will review some of the classic texts in the field, with a focus on the tension between legal institutions and democratic politics. In particular, we will examine how that tension is manifest in the foundations of the American political system and in critical reflection on contemporary practices of American democracy. Students will turn in response papers every week on the reading. In addition, there will be two 10-20 page papers due during the semester. Graduate Students Only.

AS.190.679. The Political Poetics of Walt Whitman and Henry Thoreau.
A study of the works of Thoreau and Whitman, with an eye toward how they explore the process of outside influences upon subjectivity-formation. What are the powers and limits of Whitman's and Thoreau's experiments with language and writing (rhetoric, syntax, imagery, myth) as they seek to induce, cultivate, and transform influences? What role is played by physical encounters with the nonhuman agencies (of plants, animals, objects, divinities)?

AS.190.681. Race and Politics of Punishment in the U.S..
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold impacts for citizenship. In this graduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history, and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields – history, sociology, law, and criminology – and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad's Condemnation of Blackness: Race, Crime, and the Making of Modern Urban America, Elizabeth Hinton's From the War on Poverty to the War on Crime, David Oshinsky's Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western's Punishment and Inequality in America, and Michael Fortner's Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.

AS.190.682. Regulatory Politics.
This graduate seminar considers regulatory politics in both the developing and developed world. Topics will explore the role of independent agencies, soft paternalism, co-regulation, regulatory failure, and other topics, across a host of sectors.

AS.190.683. Research Seminar/Political Parties.

AS.190.684. How to Be(Come) an Intellectual.
The university both provides a platform for critical intellectual life and, particularly during its neoliberalization, sets severe barriers to it. The latter involve increasing administrative entanglement with corporate and state forces of authoritarian control, disciplinary drives to narrow professionalism and reductive epistemologies, attacks on tenure and university governance, and cutbacks in university budgets. How can those with intellectual aspirations negotiate such departmental, professional, trustee and state pressures? What preparations and role models are conducive to help carve out such space in the academy? What critical role can intellectuals play today in and beyond the academy? What intellectual personae from the recent past are helpful here? The seminar will be divided into two parts. Part I will explore a group of academics who created intellectual space in the United States during a period resistant to it in the 1960s. Texts by Charles Taylor, Sheldon Wolin, Donna Haraway, Herbert Marcuse, Cornel West, Althusser, and me may be consulted. Part II moves into the contemporary era. Texts by Foucault, Theweleit, Latour, Haraway (again), and Moten may be reviewed, along with new explorations of relations between adjunct faculty and intellectual life. Readings for Part II thus remain in flux. But intersections between new fascist drives, climate change, racism, professional retreatism, and pandemics may be explored. Seminar assignments include a class presentation, two short papers, and regular participation in discussion.

AS.190.685. Critical theory, method, and application in International Relations.
Critical theories are often taught by focusing on their various philosophical and ethical claims. But how do you “apply” critical theories in the study of International Relations? Is “method” only a “mainstream” concern? This course seeks to relate philosophy and ethics to method with a (future) eye to dissertation writing. We will consider e.g. Marxist, feminist, postcolonial, and poststructural lines of inquiry, as well as, at the same time, a range of conceptual areas of inquiry – e.g., the affective, the normative, the poetic, the phenomenological, and the material.

AS.190.686. The Right to the City.
Over the past decade, political, economic, and cultural struggles in and over the city have become more important than ever before. Protests against the growing carceral state, against increasing wealth inequality, as well as revanchist attempts to rollback multicultural societal shifts all have the city as its core. While some Marxist thinkers suggest these struggles represent larger struggles over use- versus exchange-value, Black Radical thinkers connect these struggles to anti-black racism. In the wake of one world challenging movement – Black Lives Matter – and one world altering crisis – the Covid-19 pandemic - this course will reflect critically on these two traditions of thinking about the city and to rethink the Marxist tradition through the Black Radical tradition. We will anchor these conversations in an exploratory dialogue between two exemplars of each tradition - the French geographer Henri Lefebvre, and Detroit movement intellectuals James and Grace Lee Boggs. This class will be a vital component of the 2022-23 Sawyer Seminar.

AS.190.687. Philosophy and the Anthropocene.
How do philosophers such as Heidegger, Whitehead, Deleuze and Braidotti help us to think about the dynamics of the Anthropocene? What do anthropologists and geoscientists such as Anna Tsing, Bruno Latour, Jason Moore, Michael Benton, Jan Zalasiewics and Wally Broecker--teach those philosophies and us about the contemporary condition? Class presentations on assigned readings, seminar paper, and class discussions.

AS.190.688. Political Violence.
This undergraduate seminar is designed to introduce students to the comparative study of political violence and intra-state conflict. We will examine social science theories and empirical studies on a wide range of forms of political violence, including civil war, coups, state repression, communal violence, riots, terrorism, genocide, and criminal-political violence. We will study these phenomena at the micro, meso and macro levels, and focus on understanding their causes, dynamics, outcomes, and aftermath. The class will also equip students with an ability to analyze political violence by using social scientific tools.

AS.190.690. Statelessness.
This course will examine Hannah Arendt’s claim that the most “symptomatic group” of contemporary politics is “the existence of an ever-growing new people comprised of stateless persons.” We will consider what, if anything, this group may be a symptom of and its consequences for theories of law and politics. Among other authors we will read Arendt, Agamben, Brown, Foucault, Moten, Said, and Somers. A final paper of 20-30 pages is required.

AS.190.691. The Hopkins Seminar on Racial Politics.
This class surveys the ways in which racial politics has become an increasingly salient topic for Political Science. We examine how racial politics has been engaged with in various sub-fields, and how the study of racial politics might be pursued through cross-sub-field and inter-disciplinary interventions. The class also situates these investigations in the historical importance of Hopkins as a key site in the emergence of a racist discipline and, alternatively, as a site from which important interventions have been launched towards formulating an anti-racist Political Science.

AS.190.800. Independent Study.

AS.190.801. Summer Research.

AS.190.849. Graduate Research.

AS.191.131. An Introduction to Global Migration. 3 Credits.
We live in a world in motion. There are over 272 million migrants in the world today and these numbers are expected to increase in the next decades. Simultaneously, migration is one of the most contested contemporary issues and dominates politics and the media. This course provides students with a thorough understanding of key themes, policies, dilemmas and debates in migration. The first part will focus on theories of migration where students can learn about the history of migration, how and why migrants move today and what categories of migrants exist. The second part will focus on debates around migration and discursive strategies used to ’other’ migrants. Part three will focus on core issues in migration studies such as racism, integration, border controls and the link between migration and the economy.
Area: Writing Intensive

AS.191.303. Critical Race Theory, Law, and Criminal Justice. 3 Credits.
In this course, students will gain a foundational understanding of critical race theory, including its genesis in legal theory. The course will examine its relationship and importance to social movements, including through key concepts like intersectionality. The course will also use critical race theory to grapple with law, racial segregation, and the criminal justice system in the United States.
Area: Writing Intensive

AS.191.304. Writing Politics in an Age of Crisis. 3 Credits.
We live in an age of crisis. Social, political, and environmental disruptions both in the United States and around the world are the new normal. How do we – as individuals, citizens, and scholars – come to understand these issues? And how should we write about them? This course is designed to help students improve as writers, readers, and editors for a world where powerful young voices are more necessary than ever. The substantive focus of the course will be on the dynamics of interlinked contemporary political crises and on the responses available to individuals to address them. We will read a variety of scholarly, journalistic, and literary sources to inform our discussion and inspire our writing. However, this course is designed not as a standard seminar, but as a writing workshop. Students will write and critique a variety of pieces of different lengths and styles – including a political memoir, an op-ed, a long-form critical essay, and a piece of speculative fiction - spending the majority of in-class time on peer review, presentations, and writing exercises, which they will compile into a writing portfolio. Reading will include works by Alexander Chee, Ta-Nehisi Coates, Mary Annaise Heglar, Hunter S. Thompson, James Baldwin, Dave Zirin, Elizbeth Rush, Charlotte Shane, and Teju Cole, among many others.
Area: Writing Intensive

AS.191.310. Sex(uality) and Race as the Politics of the Beat Generation. 3 Credits.
This course focuses on the literature of the Beat Generation writers (Ginsberg, Kerouac, Burroughs, Snyder, Kaufman) of the late 1940s through the 1950s and 1960s. The Beats were a group of nomadic writers traveling the North American continent between San Francisco and New York with memorable stops in Denver and St. Louis, Missouri. Beat literature revolted against the constraining normalizing values of post war USA and celebrated freedom of expression, wanderlust, and the search for euphoria of body and mind in stream-of-consciousness narration. The course examines the relationship between society's dominant mores and beliefs (both contemporary and those of the 50's and 60's) and the counterculture, non-conformist philosophy as espoused by The Beats. The course focuses on Beat depictions of sexuality, gender and race in order to understand if these identity markers are but symptoms of social structures of oppression (racism, patriarchy, heterosexism) or if, alternatively, they can also signal, express and enact a new and different understanding of politics. Can the Beats help us envision new forms of (non-toxic) masculinity? Can they help us think of race in non-racist ways?
Area: Writing Intensive

AS.191.325. Environmental Social Sciences meet Environmental Fiction. 3 Credits.
The course pairs readings of critical texts addressing environmental crises with literary fiction broadly dealing with the relationship between the human and the environment. We discuss the ways narratives affect our understanding of complex global phenomena, and how the tools of literary analysis can help us unpack the rhetorics and values of both fictional and nonfictional texts.
Area: Writing Intensive

AS.191.335. Arab-Israeli Conflict. 3 Credits.
The course will focus on the origin and development of the Arab-Israeli conflict from its beginnings when Palestine was controlled by the Ottoman Empire, through World War I, The British Mandate over Palestine, and the first Arab-Israeli war (1947-1949). It will then examine the period of the Arab-Israeli wars of 1956, 1967, 1973, and 1982, the Palestinian Intifadas (1987-1993 and 2000-2005); and the development of the Arab-Israeli peace process from its beginnings with the Egyptian-Israeli treaty of 1979, the Oslo I and Oslo II agreements of 1993 and 1995, Israel's peace treaty with Jordan of 1994, the Road Map of 2003; and the periodic peace talks between Israel and Syria. The conflict will be analyzed against the background of great power intervention in the Middle East, the rise of political Islam and the dynamics of Intra-Arab politics, and will consider the impact of the Arab Spring.

AS.191.340. Cities, Space & Power. 3 Credits.
Gentrify! 80% of people live in urban areas. These locations are key for solving political dilemmas, including climate change, class, segregation, gender & immigration. This class explores all of these through the lens of gentrification. What does 20th century urban planning have to do with it? How can I talk to my friends about gentrification in Baltimore? Find out this and more!

AS.191.345. Russian Foreign Policy. 3 Credits.
This course will explore the evolution of Russian Foreign Policy from Czarist times to the present. The main theme will be the question of continuity and change, as the course will seek to determine to what degree current Russian Foreign Policy is rooted in the Czarist(1613-1917) and Soviet(1917-1991) periods, and to what degree it has operated since 1991 on a new basis. The main emphasis of the course will be on Russia's relations with the United States and Europe, China, the Middle East and the countries of the former Soviet Union--especially Ukraine, the Baltic States, Transcaucasia and Central Asia. The course will conclude with an analysis of the Russian reaction to the Arab Spring and its impact both on Russian domestic politics and on Russian foreign policy.

AS.191.352. Race, Class, and America. 3 Credits.
Through an intensive and in-depth reading of theorists, thinkers, historians, and political scientists, this course will take students through the deeply interconnected story of American race relations and labor politics. We will examine primary source material, such as the essays of Richard Wright and Ralph Ellison, the speeches of A. Philip Randolph, Bayard Rustin, and Martin Luther King, Jr., the memoirs of Charles Denby and Angelo Herndon, and the pamphlets of Claudia Jones; we will read historical accounts which situate these figures in their context; and we will engage critically with the fundamental topic: in the United States, what is the relationship between race and class; racism and exploitation; civil rights and labor activism? Toward the end of the course, we will examine recent scholarship that has returned to these themes to show how deeply imbricated America—its people, its institutions, its political economy—remains to this history.
Area: Writing Intensive

AS.191.354. Congress and Foreign Policy. 3 Credits.
This course is an introduction to the Congressional role in foreign policy. The Constitution grants the President the authority to conduct foreign policy. Yet it also gives Congress a substantial role in the shaping of foreign policy. The roles are not always clear, creating an inherent tension between these two branches of government and efforts on each side to increase their power. This class will address the "rules of the road" in conducting American foreign policy and how they change. The class will go beyond theory to include case studies that show the tension between Congress and the Administration – including the Iran Agreement, Climate Change, the use of sanctions and American policy towards Cuba. The course will include guest lecturers who work in Congress on the various aspects of foreign policy – including appropriations, intelligence, oversight and investigations. We will address the Congressional role in ratification of treaties and in declaring war. The class will consider the different ways that each branch of government approaches human rights and sanctions. The class will also address the domestic political aspects of foreign policy – including the role of advocacy groups and special interests and the political use of Congressional investigations. One class might be held in Washington D.C. at the U.S. Senate, so would require additional time for travel.

AS.191.358. Use of Force and the American State. 3 Credits.
This course examines the growth and development of the American state's coercive institutions, namely, the military and police. We will explore the ways in which the American state makes war, fights crime, and polices the boundaries of citizenship. While we tend to approach these topics from the perspective of international relations, law, or political philosophy, this course focuses on American politics and institutions. How did the United States secure control over a transcontinental territory in the absence of a large standing army? Why did the federal government try to criminalize vices, and how were these statutes enforced? How did violence influence the development of the American state, and to what extent do these historical processes explain warfare and law enforcement today?
Area: Writing Intensive

AS.191.372. Making Social Change. 1.5 Credits.
Aitchison Students Only.

AS.191.375. Thinking Organizationally about Politics. 3 Credits.
Aitchison Students Only.

AS.191.376. Public Policy Writing. 3 Credits.
Aitchison Students Only.
Area: Writing Intensive

AS.191.379. Thinking Strategically. 1.5 Credits.
Aitchison Students Only.

AS.191.381. Education Policy. 1.5 Credits.
Aitchison Students only

AS.191.382. Thinking Economically. 3 Credits.
Aitchison Students Only.

AS.191.383. Visualizing Data. 3 Credits.

AS.191.405. Modernity and the Slaughterhouse: Labor, Violence, and Animals in Contemporary Society. 3 Credits.
Steven Pinker opens his influential bestseller The Better Angels of Our Nature with the claim that "If the past is a foreign country, it is a shockingly violent one," going on to argue that the contemporary age is one marked by relatively more peace and less violence than ever before. Drawing on a long tradition of optimist thinkers, he credits this civilizational progress to a combination of the intellectual legacy of Enlightenment humanism, greater faith in scientific rationality and technological progress, a strong system of states and social institutions, and the development of democracy and the liberal market economy. For Pinker, this account holds as much for humans as it does for animals, and he goes so far as to claim the emergence of animal rights as "another rights revolution" akin to civil rights and women's rights. But does this account of modern society hold up under scrutiny? Or, more specifically, where does it fail? And how exactly does contemporary society relate to different forms of violence (against humans and animals) that it has not done away with?The historical processes described by Pinker have not only drastically changed human society, but they have also impacted how we interact with animals. The United States today produces and consumes more meat than ever, but most Americans live at an increasing geographic and perceptual distance from animals and the humans who work with them, relying on a system of industrial production and a complex division of labor. This course approaches the politics of this distribution of labor, violence, and human-animal relations from a site rarely considered in political analysis: the modern slaughterhouse. It engages with this institution as a historical and cultural object, using the story of its emergence and operation to ask broader questions about the politics of social change. We will draw on an interdisciplinary range of academic and non-academic works to explore a range of questions about the relationships between institutions and rationality, visibility and invisibility, hygiene and marginalization, and labor and society, and to examine the narratives ostensibly peaceful, liberal democracies tell themselves about violence, history, and progress
Area: Writing Intensive

AS.191.406. Capitalism: Politics and Political Thought in a Market Economy. 3 Credits.
The United States is a capitalist economy and we live in a capitalist world. This a fact we take for granted and therefore spend little time examining. Capitalism' proponents attribute our society's unprecedented wealth and technological advances to this economic system. Some go so far as to claim that modern democracy and social progress are impossible without a capitalist economy. Critics point to growing social inequality and a slew of environmental ills as proof of capitalism's unsustainability. Some suggest that capitalism is antithetical to true democracy and human flourishing. But what exactly is capitalism? How did it evolve in the USA and how does the form capitalism takes in the United States differ from the forms it takes elsewhere? And, crucially, how is capitalism shaped by – and how does it shape – contemporary politics? And how exactly is this all related to liberalism, conservatism, neoliberalism, libertarianism, socialism, and democratic socialism? This seminar is designed to help students critically approach these questions.Rather than taking simplistic pro-contra approach, this seminar will examine capitalism along four axes: as a political-economic system, a corollary set of structures and institutions, the force behind a specific form of state organization, and the determinant of how society and individuals act and see themselves. To explore these issues, we will focus on a number of contemporary political issues, with a primary geographic focus on the United States, including the following: the debates over the welfare state and socialized healthcare; unions, lobbies, and special interests; the connection between capitalism, culture, and ideology; the effects of a capitalist organization of labor of questions of race, gender, and citizenship; the commodification of the environment and other species; and the process of critique, resistance, and social change in a capitalist system. Throughout, we will discuss the theoretical and empirical arguments put forward by a historically and disciplinarily broad range of thinkers including Karl Marx, Simone Weil, John Locke, Adam Smith, Robert Nozick, Thomas Sewell, Nancy Fraser, David Graeber, Melinda Cooper, Andreas Malm, and Guy Debord, through to Alexandria Ocasio-Cortez and Elon Musk.
Area: Writing Intensive

AS.191.415. Fear and Loathing: Writing About Contemporary American Politics. 3 Credits.
This course is focused on reading, analyzing, and, most importantly, producing writing about the American political experience and contemporary events in American politics. We will use scholarly, print, and new media sources from different sides of the political spectrum, drawing on political and literary theory to inform our discussions. We will then try to do better: Students will write and workshop a variety of pieces of different lengths and styles, spending in-class time on peer critique, presentations, and writing exercises, which they will compile into a writing portfolio. We will discuss and write op-eds, memoirs, long-form book reviews, commentary essays, and satire. Throughout, we will devote considerable class time to critique and discussion of students' writing. Readings will include works by James Baldwin, William F. Buckley, Claudia Rankine, Hunter S. Thompson, Ta-Nehisi Coates, Alexander Chee, Angela Nagle, and Omar el Akkad. We will draw on political commentary from sources ranging from The Washington Post to Jacobin to The Onion, through to Facebook and Twitter. Throughout, we will consider a wide range of topics pertinent to writing about politics, including questions of the make-up of the public sphere and diverse audiences, the use of voice and language, the deployment of facts and rhetoric, the place of fiction and humor in political critique, and the rise of fake news and trolling.
Area: Writing Intensive

Cross Listed Courses

Agora Institute

AS.196.300. Getting to Truth: How to Navigate Today's Media Jungle. 3 Credits.
Our democratic system depends on an informed public, but media today are polarized along ideological lines, undercut by economic and technological change and sometimes polluted with bogus stories written for profit or spin. In this course, taught by a veteran journalist, we will discuss the evolution of news, examine the current challenges and assess what citizens can do to get a fair understanding of what's going on. We'll use many concrete examples and students will have multiple writing assignments.
Area: Writing Intensive

AS.196.301. Social Entrepreneurship, Policy, and Systems Change: The Future of Democracy. 3 Credits.
This course will explore the dynamics and interplay between social entrepreneurship, social change, and policy. Students will explore frameworks for social transformation and systems change, and explore whether stable governance and effective policies are necessary for sustainable change. The course will examine the intersection between social change and policy change, examining how the two concepts intersect while focusing on the end goal of systems change. Students will examine different case studies of social transformation (or proposed social transformation) from across the United States and world. Guest speakers will include diverse practitioners of social entrepreneurship who think about long-term pathways to transformative social change, and dynamic policymakers.While the course will include case studies on broader domestic and international challenges and models of social transformation, a larger focus will be on specific local social problems and solutions. This will manifest through class discussions and a final project based on the surrounding community.
Area: Writing Intensive

AS.196.364. This is Not Propaganda. 3 Credits.
We live in an era of disinformation' mass persuasion and media manipulation run amok. More information was meant to improve democracy and undermine authoritarian regimes- instead the opposite seems to be happening. This course will take you from Russia to South Asia, Europe to the US, to analyze how our information environment has been transformed, why our old formulae for resisting manipulation are failing, and what needs to be done to create a model where deliberative democracy can flourish.
Area: Writing Intensive

AS.196.600. Data-analysis for Social Science & Public Policy I.
We will gain experience with data-analysis geared towards understanding the social world. Our scope ranges from simple descriptions and predictions under strong assumptions to intervention analyses that provide a more trustworthy foundation for quantifying causal effects. The course will be offered in a hybrid modality and will have a heavy focus on computation. We will alternate between discussion sessions devoted to fundamental concepts, and lab sessions devoted to a combination of web- and instructor-led data-analyses. Whenever possible, examples using both R and Stata and using a range of national and cross-national data-sources relevant to the study of democracy will be provided.

AS.196.601. Data-analysis for Social Science & Public Policy II.
We will gain experience with data-analysis geared towards understanding the social world. Our scope ranges from simple descriptions and predictions under strong assumptions to intervention analyses that provide a more trustworthy foundation for quantifying causal effects. The course will be offered in a hybrid modality and will have a heavy focus on computation. We will alternate between discussion sessions devoted to fundamental concepts, and lab sessions devoted to a combination of web- and instructor-led data-analyses. Whenever possible, examples using both R and Stata and using a range of national and cross-national data-sources relevant to the study of democracy will be provided.

Anthropology

AS.070.607. Schelling and Anthropology.
The 18th century German philosopher Schelling has been hugely influential on 20th century thought (Freud, Heidegger, Nancy, Zizek, Pierce) but remains unknown outside of philosophical circles. This neglect is unfortunate given that he has so much to offer anthropological inquiries into the relations between mind and matter, nature and culture, theology and mythology among other topics. This course places Schelling's writings and commentaries on his work alongside anthropological texts and figures to explore lines of productive conversation. The theme of a romanticism appropriate to our present will be consistently explored throughout the course.
Area: Writing Intensive

Comparative Thought and Literature

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

East Asian Studies

AS.310.230. Chinese Politics and Society. 3 Credits.
This introductory course will familiarize students with the major dynamics of political and social change in contemporary China since 1949. The course will be divided chronologically into four main topics: 1. The contested processes of nation-state making in modern China before 1949; 2. The making of the socialist system during the Mao Years and its dismantling since 1978; 3. The Reform Era transformation to a market economy with Chinese characteristics; 4. The dynamic relationships among the state, market and society since the new millennium. Students will explore how scholars have explained major political and social changes with reference to individual and collective rationalities, specific organizational and institutional arrangements, and specific strategic and cultural mechanisms of Chinese political and social habits.

AS.310.305. China, Southeast Asia, and U.S. National Security. 3 Credits.
The global political and security landscape of the 21st century will be shaped by the rivalry between two superpowers -- China and the U.S. For the foreseeable future, the geographic focus of that contest will be Southeast Asia and the surrounding maritime space, particularly the South China Sea. Southeast Asia is a complex, highly differentiated region of ten-plus nations, each with its own unique history and relationship with China. This course will introduce Southeast Asia as a key region -- geographically, economically, and strategically -- often overlooked by policymakers and scholars. It will also focus on the craft of national security strategy as the best tool for understanding the multi-sided competition, already well underway involving China, the U.S., and the Southeast Asian states.

AS.310.318. Eurasia's Transformation and the Global Implications. 3 Credits.
Eurasia, stretching from the Western Europe across Russia, Central Asia, and China to the Pacific, is by far the largest continent on earth, with a massive share of global population, economic output, and key natural resources. It has been traditionally Balkanized. Yet since the late 1970s, due to China's modernizations, the collapse of the Soviet Union, and a series of global geo-economic shocks, the nations of this Super Continent have become increasingly interactive, creating fluid new trans-regional political-economic patterns that remain remarkably unexplored. This course explores the critical junctures that made Eurasia the dynamic, growing colossus that it is becoming today, as well as the global implications, from a unique problem-oriented perspective. It looks first at the developmental and political challenges confronting China, Russia, and key European states as the Cold War waned, how the key nations coped, and how they might have evolved differently. It then considers the new challenges of the post-Cold War world, and how national and local leaders are responding today. Particular attention is given, in this problem—centric approach, to the challenges that growing Eurasian continental connectivity, epitomized in China's Belt and Road Initiative, are creating for US foreign policy and for the grand strategy of American allies in NATO, Japan, and Korea. Note: Some familiarity with Eurasian history and/or politics is recommended
Area: Writing Intensive

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

AS.310.340. Development and Social Change in Rural China. 3 Credits.
This course will survey the major issues of development and social change in rural China since 1950s. These issues will be addressed in chronological order. They include land ownership and land grabbing, organization of rural economic, political, and social life, rural elections and village governance, development strategies, urban-rural relationship in resource allocation, rural modernization strategies in regard to irrigation, clean drinking water, electricity supply, hard paved road, education and rural medical service, women's rights and family life, rural consumption, and etc. This course will prepare students, both empirically and analytically, to understand what happened in rural China from 1949 to the present, and how we can engage in policy and theoretical discussions based on what we learn.

First Year Seminars

AS.001.106. FYS: Legal Fictions - Law and Humanities. 3 Credits.
A legal fiction is a fact assumed or created by courts to help reach a decision. In this First-Year Seminar, we study how legal fictions and fictions about law work in order to examine the possibilities and limits of fiction's (legal) power. Drawing from legal and literary thought, as well as plays, short stories, cases, and legal commentary, we critically explore the capacity of words to reveal (or conjure) some fundamental features of our shared worlds and discuss their impact in contemporary debates about justice. The course is designed with first-year students in mind and requires no prior knowledge of law.

AS.001.114. FYS: The Politics of Reproduction. 3 Credits.
The idea that the "personal" is "political" finds no greater example than in the politics of reproduction. From inheritance laws, the rights of the offspring of enslaved peoples, or policies to reduce (or increase) fertility, the modern nation state has had a great deal to say about the use and produce of human bodies. In this First-Year Seminar, we will examine how formal and informal institutions have governed reproductive practices over the past 200 years. We will look at how family structures and economic development map onto fertility, and at how technological innovations in fertility control (including birth control and IVF) have influenced women's economic and political participation. We will also consider whether reproductive policies have differential impacts for LGBTQ households. Finally, we examine the "dark side" of reproductive policies -- not only sterilization campaigns but also the treatment of sex workers and sex-selective abortion -- to understand how state policies have divided households based on race, class, and occupation.

AS.001.135. FYS: Free Speech and Its Limits. 3 Credits.
Freedom of speech is a core value for democracies -- and for universities, in which the freedom to challenge accepted beliefs is essential to advancing knowledge. The 1st Amendment to the US Constitution guarantees freedom of speech and of the press, as do the Canadian Charter of Rights and Freedoms, and the European Convention on Human Rights. But like other rights, my right to freedom of speech may conflict with yours, or with other important rights or societal objectives. As a result, freedom of speech cannot be (and in practice never is) unlimited. In this First-Year Seminar, we will be asking why freedom of speech has been accorded such importance, and how and why it might legitimately be limited, in politics, in business, in everyday life, and in universities, looking both at the United States and at other liberal democracies. Topics will include asking what should count as speech beyond the mere utterance of words; appropriate protections or limitations for hate speech and other offensive speech and for falsehoods; where the boundary between legitimate protest and unlawful infringement on the rights of others should be drawn; whether free speech includes an affirmative right to be informed, or an affirmative right to be let alone; appropriate regulations for social media; and campus speech codes.

AS.001.137. FYS: The Power of Speech: Law, Politics, and the Humanities. 3 Credits.
What don't we do with words? Even silence makes manifest the power of speech. This First-Year Seminar will introduce you to some of the ways that power has been described and thought about. In addition to studying arguments that connect the power of speech to what it means to be human, we will explore various attempts both to protect and limit speech, taking into consideration not only how we do things with words but how words affect us. Topics that will be covered include freedom of speech, censorship, hate speech, silence, and storytelling. We will read texts in philosophy, politics, law, and literature, and we will watch at least one film.

AS.001.150. FYS: Master of the Senate. 3 Credits.
This First-Year Seminar offers an opportunity to think through the nature of political power, political institutions, and political ambition. We make our way through a single book: Robert Caro, Master of the Senate, an account of Lyndon Baines Johnson's dozen years in the US Senate, from 1949 to 1961. Through lively discussion centered around this completely riveting text, the class will explore central questions in politics (democratic and non-democratic) that reverberate far beyond the bygone world of the midcentury Senate.

AS.001.151. FYS: Citizenship and Society in the United States. 3 Credits.
Popular sovereignty — the idea that the people rule themselves — has been heralded as one of the preeminent innovations of the modern world. And over the course of the last two hundred or so years, a rising tide of nations committed themselves to the principles of popular sovereignty. Yet in recent years, the inevitability, soundness, and very viability of "rule by the people" has come into question. On the one hand, popular uprisings around the globe have rejected the decisions and practices of governing elites on the grounds that they are out of touch with the people's needs. On the other hand, these uprisings have resurrected and strengthened authoritarian practices and have facilitated the erosion of liberal rights long considered instrumental to preserving democracy. The result — turmoil, unrest, and uncertainty about what the future holds — is evident from Venezuela to England, Turkey to the United States. Can popular sovereignty survive? In what form will the people rule, and at what cost?This First-Year Seminar is an investigation into the idea and practice of popular sovereignty in the contemporary United States. We will explore this topic by actively consulting theory and empirical research in the social sciences. We will supplement this with our own research on the 2022 election, media coverage of issues, popular attitudes about democracy, and popular representation in government and by interest/advocacy groups.Additionally, this class is organized as a collaboration between two first-year seminars: one at Johns Hopkins, the other at Williams College. Over the course of the semester, the two seminars will meet frequently via videoconference to share research and discuss readings and ideas. This is intended to broaden the perspectives brought to bear on our investigation generally and, specifically, to allow each group to share real time research on the politics of the region in which their respective institutions are located.

AS.001.168. FYS: The Psychology of Mass Politics in the U.S.. 3 Credits.
Taught during the election season of 2022, this First-Year Seminar looks at the deeper psychological motivations of the American electorate. We begin by discussing the meaning of democracy and establishing a common understanding of American democracy specifically, placing the current moment into historical and international context. We then gradually dismantle the "folk theory" of democracy that assumes all voters are rational and economically-minded. Instead, we apply theories from social psychology to understand some essential questions about voter behavior. Why do people vote? How do they understand politics? How are their feelings and judgments affected by their own identities, biases, information sources, and by the messages they hear from leaders? Why have Americans grown so polarized? What role do racial and gender-based prejudice play? Is American politics headed toward a more violent future? We use evidence-based research from political science, sociology, and psychology to answer these questions.

AS.001.177. FYS: The Right to the City - Race, Class, and Struggle in Baltimore. 3 Credits.
Over the past decade, cities have become more important than ever before. Protests against policing, against increasing inequality, as well as attempts to rollback societal shifts all have the city as its core. While some suggest these struggles represent larger struggles over the relationship between labor and capital, Black Radical thinkers connect these struggles to anti-black racism. In the wake of one world challenging movement – Black Lives Matter – and one world altering crisis – the Covid-19 pandemic - this First-Year Seminar will reflect critically on these two traditions of thinking about the city by using Baltimore as a case study. This class will be taught alongside similar courses at other universities, offering students a deep dive into Baltimore.

History

AS.100.295. American Intellectual History since the Civil War. 3 Credits.
Readings in American social thought since 1865, ranging across developments in philosophy, literature, law, economics, and political theory.
Area: Writing Intensive

AS.100.404. John Locke. 3 Credits.
Seminar style course in which John Locke's major works will be read intensively, together with some of his contemporaries' works, and select scholarly interpretations.
Area: Writing Intensive

AS.100.442. The Intellectual History of Capitalism, 1900 to present. 3 Credits.
This course examines shifting understandings of the philosophical foundations, political implications, and social effects of the market economy since the early twentieth century.
Area: Writing Intensive

AS.100.445. Revolution, Anti-Slavery, and Empire 1773-1792: British and American Political Thought from Paine, Smith, and the Declaration of Independence to Cugoano, Wollstonecraft, and the Bill of Rights. 3 Credits.
This seminar-style course will focus on discussing British and American political thought from the "Age of Revolutions", a period also of many critiques of Empire and of many works of Antislavery. Readings include Paine's Common Sense and Rights of Man, the Declaration of Rights, the Constitution and Bill of Rights, the Federalist Papers; works by Smith, Burke, and Wollstonecraft; and antislavery works by Cugoano, Equiano, Rush, Wesley, and Wilberforce.
Area: Writing Intensive

History of Art

AS.010.327. Asia America: Art and Architecture. 3 Credits.
This course examines a set of case studies spanning the last century that will enable us to explore the shifting landscape of Asian transnational art and architecture. Each week will focus on a different artist, group, exhibition, architect, urban space, or site to unpack artists' and architects' engagements with the changing landscape of immigration policies, movements to build solidarity with other artists of color, and campaigns for gender and sexual equality. The course will situate these artists within American art, and build an expansive idea of Asia America to include the discussion of artists whose work directly addresses the fluidity of location and the transnational studio practice.
Area: Writing Intensive

AS.010.382. The Politics of Display in South Asia. 3 Credits.
Through an examination of colonial exhibitions, the rise of national, regional, and archaeological museums, and current practices of display and representation in institutions, we will explore how the image of South Asia has been constructed in the colonial, modern, and contemporary eras. We will engage with the politics of representation, spectacle, and the economies of desire as related to colonialism and the rise of modernity. Readings from postcolonial theory, museum studies, anthropology, history, and art history.
Area: Writing Intensive

AS.010.634. Rethinking the Renaissance: Alternatives to "Early Modernity".
"The Renaissance" as a periodization under attack, and its persistance; the hermeneutics of the Pre-Modern Image since Panofsky; the critique of Eurocentrism; challenges to and recuperations of iconology, assessing the contributions of semiotics, psycholanalysis and queer theory.

History of Science, Medicine, and Technology

AS.140.364. The City Course: Disciplinary Perspectives on Urban Life and Form. 3 Credits.
This course aims, first, at enlarging our understanding of cities by looking at them from a variety of disciplinary perspectives and, secondly, at examining the distinctive ways of thinking associated with disciplines from engineering, the sciences and medicine to anthropology, sociology, economics, archaeology, history and literature. Baltimore and cities from around the world will provide resource material. Lectures, discussions, term projects.

Interdepartmental

AS.360.247. Introduction to Social Policy and Inequality: Baltimore and Beyond. 3 Credits.
This course will introduce students to basic concepts in economics, political science and sociology relevant to the study of social problems and the programs designed to remedy them. It will address the many inequalities in access to education and health care, unequal treatment in the criminal justice system, disparities in income and wealth, and differential access to political power. The focus will be on designing effective policies at the national and local level to address these pressing issues. This course is open to all students, but will be required for the new Social Policy Minor. The course is also recommended for students who are interested in law school, medical school, programs in public health, and graduate school in related social science fields. This course does not count as one of the required courses for the Economics major or minor, but it is required for the Social Policy Minor. Cross list with Sociology, Economics and Political Science. Freshman, Sophomore and Juniors only.
Area: Writing Intensive

AS.360.331. Methods for Policy Research. 3 Credits.
This course will introduce students to quantitative methods for studying social policy problems. Topics to be covered include descriptive statistics and sampling, correlation and causation, simple and multiple regression, experimental methods, and an introduction to cost-benefit analysis. The emphasis will be on the selection, interpretation and practical application of these methodologies in specific policy settings, rather than with formal proofs. Skills will be reinforced by hands-on exercises using statistical software. Over the course of the semester, students will critically analyze policy reports and empirical research in a range of policy areas and learn how to present this research to a non-specialist audience. Finally, we will discuss the pros and cons of quantitative vs. qualitative methodologies. The course will conclude with group presentations that draw on all these skills. Enrollment restricted to Social Policy minors only.

AS.360.366. Public Policy Writing Workshop. 3 Credits.
This workshop is designed to hone the analytical and communications skills necessary for effective formulation and advocacy of public policy. Topics include how to develop op-ed pieces and other forms of advocacy journalism, memoranda, position papers, and grant proposals. The workshop puts special stress on how to make a clear and persuasive exposition of complex or counter-intuitive policy arguments in the market place of ideas, including the challenges of writing for popular journals and communicating to specific audiences both in and out of government. Students receive intensive individual instruction, including close editing of their work and advice on how to publish or promote it in the public sphere. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive

AS.360.401. Social Policy Seminar. 3 Credits.
This course is designed for students who have completed either the Baltimore intensive semester of the Social Policy Minor. The students will make presentations and pursue joint projects based on what they have learned during the intensive semesters concerning key social policy issues.

International Studies

AS.192.150. States, Regimes & Contentious Politics. 3 Credits.
This course, which satisfies the gateway requirement for the major in International Studies, introduces students to the study of politics and political life in the world, with a particular focus on the Middle East, Latin America, and Africa. Throughout the course, we will analyze the sources of order and disorder in modern states, addressing a series of questions, such as: why did nation-states form? What makes a state a nation? Why are some states democracies while others are not? How do people organize to fight oppression? Why does conflict sometimes turn violent? What are the causes of ethnic war? Drawing on a mix of classic works and contemporary scholarship, we will discuss the answers that scholars have formulated to address these and other questions, paying special attention to research design and the quality of argumentation. This course also counts as a 100-level course in comparative politics required for political science majors.

AS.192.225. Economic Growth and Development in East Asia. 3 Credits.
The course offers an overview of the complexities of East Asia's development experience from a variety of perspectives. It is divided into three parts to allow students to develop expertise in one or more countries and/or policy arenas, while cultivating a broad grasp of the challenges of "East Asia's fast-paced economic growth." Part I considers the origins of East Asian economic development, analyses the common economic variables behind the region's success, looks at the 1997-1998 East Asian financial crisis, its lessons and the economic renaissance that followed. Part II focuses on the development experiences of individual countries, with an emphasis on the ASEAN economies, NIEs, Japan and China. Part III considers topics of special interest to East Asia, including trends toward greater regional economic cooperation, trade integration, and issues related to poverty, migration, and inclusiveness.

AS.192.404. Democracy, Autocracy and Economic Development: Korea, Indonesia, and Myanmar. 3 Credits.
East Asia's "miracle growth" has not gone hand in hand with a decisive move toward democracy. The course explores the reasons why democratization proceeds slowly in East Asia, and seems to be essentially decoupled from the region's fast-paced economic growth. The course is divided into three parts. Part I introduces the specifics of East Asia's economic development strategies as well as key concepts of democracy, authoritarianism and military rule and the tensions between these theories and the East Asian experience. Part II will focus on the economic and political development experiences of Korea, Indonesia and Myanmar in light of what discussed in Part I. Finally, Part III presents lessons emerging from the comparison of Korea's, Indonesia's and Myanmar's economic and political developmental trajectories.

AS.192.410. Kissinger Seminar on American Grand Strategy. 3 Credits.
Enrollment is at the discretion of the instructor and space in the course is limited. To apply, email a one-page resume, one-page personal statement on why you want to take the class including how it contributes to your professional interests, and a writing sample of less than ten pages to KissingerCenter@jhu.edu by the end of the day on Sunday, October 24, 2021. This course is an initiative of the Henry A. Kissinger Center for Global Affairs at Johns Hopkins SAIS. It will expose exceptional undergraduate students to the study of grand strategy and the history of U.S. foreign policy. The course will explore critical moments, themes, and people in the history of American grand strategy, from Washington's Farewell Address to the statecraft of Donald Trump. The seminar will also consider key issues in U.S. grand strategy today, from climate change to the challenge of an assertive China. Students will also have the opportunity to meet with current and former policymakers who have worked on these issues in real time. The course will meet 9 times at Homewood and 4 times at the SAIS campus in Washington, D.C.; transportation between Homewood campus and SAIS will be provided.

AS.192.415. The Battle of Ideas for the World Economy. 3 Credits.
This seminar is intended as a capstone intellectual experience for seniors and advanced juniors majoring in international studies. The course presumes some background in economics, comparative politics, and international relations. This course will hone your analytical and writing skills by exposing you to theoretically advanced forms of political economy argument in a “proposition-opposition” format. The seminar is organized around a series of thematic pairings, covering such political economy themes like free trade vs. protectionism, free market capitalism vs. socialism, democratic erosion vs. autocratic strength, hegemonic stability vs. US abdication of power, or whether the current populist wave has mainly economic or mostly cultural roots. Each segment will deal with a specific topic area. Our discussions will involve in-depth interrogations of the arguments of these ‘pro-con’ authors.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.300. Niccolò Machiavelli's "The Prince": Understanding the Meaning and Legacy of a Masterpiece. 3 Credits.
Who was Niccolò Machiavelli? We often hear the term “Machiavellian” in reference to actors in business or politics, but what does it really mean? What does Machiavelli teach us about the nature and the dynamics of political power? Can Machiavelli’s thought offer insights into today’s politics and fast-changing world? The course aims to answer these questions by addressing three topics. First, we will study Machiavelli’s life and times, particularly the events connected to his production and the context in which he wrote his main writings. We will see how the fifteenth-century Florentine humanism and the massive political changes affecting early modern Europe shaped Machiavelli’s mindset. Second, we will familiarize ourselves with Machiavelli’s thought by reading The Prince and excerpts from Discourses on Livy. Third, we will get acquainted with some of the main trends in the reception of Machiavelli in the 20th and 21st centuries. Special attention will be paid to interpretations of Machiavelli by Antonio Gramsci, Leo Strauss, Isaiah Berlin, John Greville Agard Pocock, Quentin Skinner, and John P. McCormick. We will also pay attention to modern television programs and films that show the width and depth of Machiavelli’s legacy.

AS.211.394. Brazilian Culture & Civilization. 3 Credits.
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor’s permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

Philosophy

AS.150.312. Applied Public Health Ethics and Decision-Making. 3 Credits.
In this course, students receive an introduction to core theoretical foundations and case studies in public and global health ethics. this course adopts an applied framework for understanding how public health ethical values are navigated in different decision-making processes. This course is geared toward juniors and seniors.
Area: Writing Intensive

AS.150.313. Technology, Democracy, and Social Justice. 3 Credits.
This course will consider healthcare technologies through the lens of political values: democracy and social justice. At a broad level, we will ask of these technologies: Who should decide on their design and use when the experts don’t resemble the public and the public lacks expertise? How can we provide broad access to the benefits of these new technologies without exposing vulnerable people to further risk and unfairness? More narrowly, the course will focus on four technologies that affect healthcare: anti-malarial “gene drive” mosquitoes, medical AI, genomic data collection, and social media. Gene drives hold the promise of modifying mosquitoes to prevent the spread of infectious disease, but they also expose people in lower-income countries to unanticipated risks. Artificial intelligence and genomic data can deliver scarce medical resources to those who need it most and tailor it to minorities based on their precise characteristics. But they can also exacerbate existing unfairness while exposing minorities to risks of further discrimination and surveillance. Social media has a similar potential to deliver crucial health data, especially in a pandemic. But it also promotes the spread of misinformation among the populations most in need of help. This course will consider how we can balance the benefits and risks of these novel technologies and who gets to decide that balance.
Area: Writing Intensive

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

Sociology

AS.230.318. The Political Economy of Modern India. 3 Credits.
This course examines the complex, at times conflicting, relationship that has emerged between Indian seats of power from above and Indian expressions of society from below. Attention will be placed on the period between 1947 to the present.
Area: Writing Intensive

AS.230.357. Baltimore and Beyond. 3 Credits.
This course uses the city of Baltimore as a lens through which to explore issues of urban inequality. We will focus on Baltimore's history of racial segregation and concentrated poverty, and its effect on the social and economic well-being of the city and its residents, with attention to education, employment, health and crime. Students will learn how to employ Census data, GIS approaches, and sociological research to inform questions about population change, inequality and the distribution of resources across the city and metropolitan region. Students will also work on one or more policy relevant studies based in Baltimore, including: a project on abandoned and vacant housing, a desegregation intervention, and a longitudinal study of inner city youth. Finally, students will become familiar with Baltimore City's programs and policy approaches to addressing the city's most pressing problems, and will design innovative and effective and innovative solutions as part of their course assignments. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students that took AS.360.357 may not take AS.230.357

Study of Women, Gender, & Sexuality

AS.363.416. WGS Internship/Practicum: Feminist Animals: Sex, Nature, and Nonhumans. 3 Credits.
Introducing feminist approaches to ecology and nonhumans, this course considers the interconnections between heteropatriarchal domination and the domination of nonhuman animals and ecologies. What different sensibilities and ways of seeing sex and gender open up when attention shifts to nonhumans? What tensions within and between feminism, animal liberation, and ecological concern come to the fore when each approach is alongside the others? How does the study of nonhumans extend the promise of feminism, and vice versa? In responding to these questions, we will see the real breadth of issues that the theory and practice of feminism can address.
Area: Writing Intensive

For current faculty and contact information go to http://politicalscience.jhu.edu/people/

Political Science, Bachelor of Arts

Political Science Major Requirements

(See also Requirements for a Bachelor's Degree (p. 1587).)

All courses applied towards the major must be taken for a letter grade and students must receive a grade of C or higher. At least six of the 12 political science courses required of the major must be taken at JHU. Only one letter-graded independent study of 3 credits may apply towards the major (unless honors thesis). The Department of Political Science does not award credit for the Advanced Placement Exam in government.

Code	Title	Credits
Subfield Courses		
One 100- level 3-credit course in American Politics (AP)		3
One 100- level 3-credit course in Comparative Politics (CP)		3
One 100- level 3-credit course in International Relations (IR)		3
One 100- level 3-credit course in Political Theory (PT)		3
100 level courses beginning with 191 do not count toward introductory political science subfield courses		
Writing Intensive Course		
One 3-credit writing intensive course in political science. This course may overlap with one of the 12 required political science courses and KSAS writing requirement. The course may be at any level.		
Political Science Elective Courses		
Three (9 credits) political science courses at any level		9
Five (15 credits) political science courses at the 300 or 400 level		15
At least four courses beyond the introductory classes ("100" level) must be taken with tenure-track or tenured professors in the Department of Political Science. These courses are usually denoted with a "190" designation though occasionally there are exceptions. Check with the DUS or Political Science coordinator if you have any questions as to whether a particular class meets this requirement. (For students entering in the 2021 class and beyond.)		
Cognate Courses		
At any level for a total of 12 credits selected from the following areas: history, history of art, history of science & technology, philosophy, anthropology, geography, economics, sociology, psychology, and courses offered by the SNF Agora Institute		12
Total Credits		**48**

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
100 Level American Politics Course		3
Cognate #1		3
	Credits	**6**
Second Semester		
100 Level Comparative Politics Course		3
Cognate #2		3
	Credits	**6**
Second Year		
First Semester		
100 Level International Relations Course		3
Cognate #3		3
	Credits	**6**
Second Semester		
100 Level Political Theory Course		3
Cognate #4		3
	Credits	**6**
Third Year		
First Semester		
Political Science Course at any level #1		3
Upper Level Political Science Course #1		3
	Credits	**6**
Second Semester		
Political Science Course at any level #2		3
Upper Level Political Science Course #2		3
	Credits	**6**
Fourth Year		
First Semester		
Political Science Course at any level #3		3
Upper Level Political Science Course #3		3

Writing Intensive Political Science Course (if needed, could overlap with other required course)	
Credits	**6**
Second Semester	
Upper Level Political Science Course #4	3
Upper Level Political Science Course #5	3
Credits	**6**
Total Credits	**48**

World Politics and Global Governance Double Major

The World Politics and Global Governance (WPGG) (http://politicalscience.jhu.edu/undergraduate/world-politics-and-global-governance-double-major/) program offers an intellectually rigorous path for students who want to understand world politics from a broad interdisciplinary perspective. Completing this course of study satisfies the requirements for a double major in political science and international studies. Students take courses from one of five different thematic foci: Global governance and law; Political economy; International security; Borders and identities; Environmental politics. The WPGG program enables students to develop their analytical skills and their critical judgment as citizens of the world. The program provides excellent preparation for professional careers as well as for graduate studies in political science, public affairs, law, business, and beyond. http://politicalscience.jhu.edu/undergraduate/world-politics-and-global-governance-double-major/

Honors Thesis Program

Seniors may choose to write a senior research thesis. After the student has obtained approval from a faculty sponsor to supervise the project, the student will enroll in three-credit thesis colloquium course during the fall semester of their senior year. If at the end of the fall semester adequate progress has been made and the project warrants further work, the student must enroll in a three-credit independent study supervised by the faculty sponsor.

Students who complete a distinguished senior thesis and have a final major GPA (including final semester grades) of 3.7 will be awarded departmental honors. All students may choose to write a thesis, regardless of GPA, provided they have a detailed proposal approved by a faculty member at the beginning of the fall semester of their senior year.

All thesis-related courses apply to the total of 12 political science courses required for graduation in the major.

Political Science, PhD

The Johns Hopkins University Department of Political Science is known for its strength in theory and in innovative and trans-disciplinary approaches to uncovering new knowledge, and the program of doctoral study draws on these strengths to provide rigorous training. Our program is designed for highly qualified, intellectually curious, and creative graduate students who can benefit by learning from and contributing to this community of scholars.

Doctoral students develop in-depth knowledge of a major field and a minor field (or two major fields), chosen from American politics, comparative politics, international relations, law and politics, and political theory. In addition, doctoral students may complete a certificate in comparative racial politics.

Students have opportunities to work closely with faculty and to pursue independent research, and faculty and doctoral students benefit from strong connections with colleagues in other social science and humanities disciplines and opportunities to collaborate with them.

The preparation of the next generation of scholars in the field of political science is a key part of the Johns Hopkins political science department faculty's commitment to research and advancing the understanding of politics. The doctoral program reflects the distinctive strengths of the department's cross-cutting intellectual orientations (encompassing the themes of power and inequality, identities and allegiances, agency and structure, and borders and flows), realized in faculty and PhD student research and teaching.

The department and Krieger School of Arts and Sciences provide opportunities for developing teaching and other career-related skills.

Financial Support

The department ordinarily provides financial aid to all students admitted to the graduate program unless they hold fellowships from sources outside the university. Departmental fellowships cover full tuition and an annual stipend. Assuming satisfactory progress toward the PhD, students can normally expect to receive funding for five years. All students receiving financial aid are expected to serve as teaching assistants for one semester of each academic year beginning their second year at the university.

Admission Requirements

The Department of Political Science admits approximately 16 new graduate students each year, selected from approximately 200 applications. Our entering class is typically around 10 students.

The deadline for application for admission to graduate study and the award of financial assistance is December 15 (most years). Decisions are made exclusively in late February or early March and announced by March 15.

A bachelor's degree (or equivalent) and results of the Graduate Record Examination are required for application. Students whose native language is not English must take the TOEFL examinations or provide other evidence of fluency in English (such as a degree from an institution in which the language of instruction is English.) A broad background in the liberal arts and sciences is preferred.

More information on applying can be found at http://grad.jhu.edu/apply/application-process/.

All applications should be submitted online.

Program Requirements

The requirements for the PhD in political science are divided between those that must be satisfied by all candidates for that degree and those particular to the student's major and minor fields.

Department-wide Requirements

All candidates for the PhD must satisfy the following requirements:

Course Requirements

- To fulfill the requirements for the PhD in Political Science students must complete 12 courses at the 600-level with a grade of B or better.

- Of these 12 courses, eight must be graduate-level (600-level) courses taken in the Political Science Department.
- No more than two of these eight courses (600-level) may be Independent Studies.
- If a graduate student is interested in taking an undergraduate-level course, the student must make arrangements to take a graduate-level Independent Study with the professor teaching that course. (NB: As noted above, a student may take no more than two Independent Studies for credit toward fulfilling the requirements of the PhD).
- A graduate student may take no more than one graduate-level course at another division of Johns Hopkins University (i.e. SAIS, Public Health, etc.) for credit toward fulfilling the requirements of the PhD in Political Science.
- Students may make a formal request to the DGS to have up to two graduate-level courses taken at another institution count for credit toward fulfilling the requirements of the PhD in Political Science at JHU.

Foreign Language Requirement

All students must demonstrate proficiency in a foreign language. This requirement can be fulfilled as follows:

1. Demonstrate fluency in a foreign language (granted automatically for students whose first language is not English).
2. Complete four semesters of college-level foreign language instruction.
3. Pass a translation exam.
4. Earn a degree from a University where instruction is not in English.
5. With a degree from an institution in which the language of instruction is a language other than English.
6. Place into a third-year foreign language course through online placement tests (see GRLL website).

Comprehensive Examination Requirement

Students are required, at a minimum, to take comprehensive exams in one major field and one minor field. Students may also elect to take two major exams or a major exam and two minor exams (one of which may be outside the Department of Political Science).

Faculty members in the field write and evaluate the exams and determine the format. Major field comprehensive exams take place over two days (8 hours per day); minor field exams take place over one day. The fields within the department are: American Politics, Law and Politics, Political Theory, Comparative Politics and International Relations.

Students choosing a second minor outside the Political Science Department must devise a coherent program of study in that discipline, in consultation with their Political Science faculty advisor and with faculty from the other department. Students choosing an external minor must complete a minimum of three courses at the 600 level in the external minor's discipline, earning a grade of B or better. They must also pass a comprehensive examination prepared and evaluated in consultation with faculty of the Department of Political Science by the instructors in those courses.

Dissertation

The dissertation is the capstone of doctoral education, and it must be a substantial work of independent scholarship that contributes to knowledge in the student's field of study. Students must identify a tenure-track or tenured member of the Political Science faculty who is willing to supervise the preparation of their dissertation. A dissertation prospectus must be submitted to two professors (one of whom must be the dissertation advisor) and that prospectus must be accepted by them both.

Defense

Students must pass a final examination that takes the form of a defense of the doctoral dissertation that is conducted under the rules of the Graduate Board of Johns Hopkins University.

Note: Exceptions may be made to some of these requirements but only with the approval of the graduate student's advisor and the Political Science Department's Director of Graduate Studies.

Field-specific Requirements

Field-specific basic expectations, procedures, and requirements are stated below. These are implemented, interpreted, and adjusted in the light of the intellectual orientations and objectives of individual students. It is important that students work closely with their advisors and with the faculty in their major and minor fields in constructing and pursuing their programs of study.

American Politics

Students majoring and minoring in American Politics will work with at least two faculty members to develop a plan of study that includes recommended course work and other preparation needed to pass a comprehensive exam. Students completing a major are expected to demonstrate a breadth of knowledge sufficient for framing a dissertation in the relevant disciplinary literature and teaching undergraduate courses in the field; students who pursue a minor may focus more narrowly on an area of study in which they demonstrate fluency. These may include, but are not limited to, the following areas of faculty interest:

- American Political Institutions (Congress, Courts, and the Executive)
- Urban Politics
- American Political Development
- Race and Politics
- Political Behavior and Public Opinion
- Public Policy
- American Political Thought
- Political Parties and Elections

In addition, students majoring in the field are strongly encouraged to take AS.190.602 Introduction to Quantitative Political Science as part of their course of study.

Comparative Politics

All students majoring and minoring in this Comparative Politics will become conversant with major substantive and methodological debates in the field, and be able to comment on the key theoretical literature in several of those debates. They will normally also develop knowledge of at least one world region. Students majoring or minoring in Comparative Politics are required to take AS.190.625 Theories of Comparative Politics and at least one seminar in quantitative or qualitative methods. Students are expected to master the material covered in these courses, as well as others with more specialized topics.

Students will take a comprehensive exam that will test their ability to engage with several areas of theoretical debate in Comparative Politics, and their ability to use comparative examples to support their arguments. Students may focus on (but are not limited to):

- Civil Society
- Institutional Theories
- Transnational Relations, Social Movements, and Contentious Politics
- Political Parties, Interest Groups, Representation, and Political Behavior
- Comparative Political Economy
- Comparative Racial Politics, Nationalism, and Migration and Citizenship
- The Political Economy of Development
- Economic and Political Transitions
- Ideas and Politics

Within the spirit of this division of the overall field, students may propose alternative delineations of thematic subfields.

Students working in specific thematic and substantive subfields within Comparative Politics will be required to demonstrate competence in methodologies and bodies of theory judged by the faculty to be necessary for quality research and teaching in those subfields.

Requirements for the Major Exam

Student taking the major exam are expected to compile a reading list that includes at least six fields, including a general "Theories of Comparative Politics" field. The reading list must be approved by the student's advisor at least six weeks before the exam. We strongly advise students to submit their reading lists to all of the CP faculty for feedback at least a few months before the exam. A minimum of three CP faculty members will read each major exam.

Requirements for the Minor Exam

Students taking the minor exam should seek two readers among the CP faculty for their exams. Students are expected to compile a reading lists that includes at least four fields, including a general "Theories of Comparative Politics" field. The reading list must be approved by the two readers at least six weeks before the exam. We strongly advise students to submit their reading lists to all of the CP faculty for feedback at least a few months before the exam.

International Relations

All students majoring or minoring in International Relations will be required to be conversant with the major theoretical, substantive, and methodological themes and debates of the field. It is strongly recommended that students take AS.190.676 Field Survey of International Relations and a methods course.

Students majoring in International Relations will take an examination covering two subfields. The first subfield must be International Politics. The other subfield is to be determined in consultation with faculty teaching International Relations. Choices include but are not restricted to:

- International Law and Diplomacy
- International Relations Theory
- International Security Studies
- Science, Technology, and Art and International Relations
- Global Political Economy

Students minoring in International Relations will take a comprehensive examination in International Politics.

Political Theory

Students majoring in Political Theory will take a comprehensive examination covering the following two subfields:

- Contemporary Political Theory
- History of Political Thought

Each student preparing for a major comprehensive exam will propose six or seven thinkers in the history of thought, six or seven recent or contemporary thinkers, and three or four issue areas. Examination questions are composed in light of the theorists and issues articulated in the exam prospectus.

The minor comprehensive exam in political theory asks the student to select half the number of thinkers required for the major exam and three issue areas.

Preparation for these examinations will be arranged in consultation with relevant faculty.

Students majoring in political theory will also take at least one minor field from American Politics, Law and Politics, Comparative Politics, or International Relations.

Law and Politics

Law and politics focuses on American constitutional thought, judicial politics, law and society, and philosophy of law. Students learn not only about the history and context of American constitutional developments, but also about the operation of the judicial branch of government in the past and the present. Studying how courts and judges do their work, students also consider how that work has changed over time. Students explore how legislation as well as court decisions reflect and influence a society's policies, politics, and moral commitments. In addition, they examine how social movements, interest groups, and professional networks help to shape law's content and implementation.

Students may major or minor in law and politics. In either case, students work closely with at least two members of the faculty to develop a plan of study regarding coursework and additional reading to prepare them for comprehensive exams. Majors are expected to demonstrate a breadth of knowledge in the field sufficient for framing a dissertation and for teaching undergraduate courses; minors may focus more narrowly on a particular area of study.

Progress Toward the PhD

The time necessary to obtain a PhD in the department varies according to the preparation individual students bring to the program, the scope and complexity of their dissertation topics, and other factors. Students are required to make satisfactory progress, meaning that they must work toward fulfilling the requirements in a timely manner. Students are encouraged to satisfy the department's foreign language requirement by the time of their first comprehensive exam. Most students take their comprehensive examinations in the third year in the program. Students who have completed all requirements except the dissertation must work to complete their dissertations as quickly as is reasonable given the unique circumstances of their course of study, and they must periodically demonstrate progress on the dissertation.

The Master of Arts degree is offered only to students who have been admitted into the PhD program. For the M.A., the student must complete at least seven one-semester courses at the 600-level with a grade of B or better, and demonstrate an effective reading knowledge of one approved foreign language.

Program In Latin American Studies (PLAS)

The Program in Latin American Studies (PLAS) promotes the study of the histories, cultures, societies, and political systems of Latin America and the Caribbean at the Johns Hopkins University. PLAS's curricular offerings and extracurricular activities provide undergraduate and graduate students with opportunities to explore the rich political, aesthetic, intellectual, and scientific traditions of Latin America. Drawing on faculty expertise across the disciplines, PLAS aims to generate new perspectives on Latin America, the Caribbean, and the Latinx experience in the United States. PLAS coordinates an undergraduate minor in Latin American studies.

Information about PLAS may be found on its website: http://krieger.jhu.edu/plas (http://krieger.jhu.edu/plas/)

- Latin American Studies, Minor (p. 2118)

Cross-listed courses applicable to the PLAS minor include:

AS.010.205 (01) Art of Mesoamerica

This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.398 (01) Tombs for the Living

Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.350 (01) Body and Soul: Medicine in the Ancient Americas

This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

AS.100.115 (01) Modern Latin America

A class combining Latin American history since independence and digital humanities (revised with 2021 student feedback). Students will build guided research projects while thinking about questions of republicanism, freedom and unfreedom, migration, and development.

AS.100.379 (01) Brazil History and Cultures: A Glance from Baltimore

Using textual and visual documents (including books from Peabody Library), we will examine the contrasts of Brazilian history and culture, and its connections with 19th and 20th century Baltimore.

AS.140.685 (01) Histories of Reproduction

While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

AS.190.306 (01) Latin American Politics and Society in Comparative and Historical Perspective

The seminar will introduce students to the political and economic trajectories of Latin America as a whole and of individual countries, including Mexico, Brazil, Argentina, and Chile. Special attention will be paid to the long-term trajectory of the political regime (democracy versus dictatorship) and of economic development (variations in GDP per capita). Competing theories, from economic dependence to historical institutionalism, will be examined for their contribution to our understanding of Latin America's relative economic backwardness and low quality democracies.

AS.211.294 (01) Freshman Seminar: Soccer in Brazil: Opium of the Masses

Futebol offers a unique perspective on politics, race and citizenship in Brazil. This course seeks to understand Brazilian culture through the historic national pastime of futebol. In addition to the main textbooks chosen for the class, by reading a variety of texts from newspapers, academic journals, fiction and film, students will be able to find their own approach to understanding the phenomenon of futebol within the social and political traditions of Brazil. No knowledge of Portuguese is required, but those who can read in Portuguese will have an opportunity to do so. Everyone will learn some Portuguese words and expressions. This class may count toward the Minor in Portuguese.

AS.211.394 (01) Brazilian Culture & Civilization
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today.

AS.215.407 (01) Power And Gender In Hispanic American Novels And Films

We will analyze and discuss four novels and three films impacted by gender violence and political idolatry under shattering stress. Oficio de tinieblas or The Book of Lamentations (1962) by Rosario Castellanos (Mexico). Zama (1956) by Antonio di Benedetto (Argentina). Delirio or Delirium (2004) by Laura Restrepo (Colombia). El ruido de las cosas al caer or The Noise of Things Falling (2011) by Juan Gabriel Vásquez

(Colombia). In addition, we will examine in depth films by Lucrecia Martel (Argentina): the short Rey muerto (1995), La ciénaga (2001), and her own version of Zama (2017). Course taught in Spanish.

AS.217.425 (01) Latin American Ecocriticism

Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

AS.217.427 (01) Radical Women: Brazilian Literature, Art, and Culture

The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry.

AS.230.342 (01) Resistance, Rebellion, and Revolution in Latin America

This course will examine the dynamics of transformative social change in Latin America and the Caribbean through analyses of resistance, rebellion, and revolution. Because revolutionary change is at once the most transformative and the most rare, this course will cover the exemplary cases of the Haitian, Mexican, and Cuban revolutions, but then also ask how theorists have understood the dynamics of both open rebellion and of everyday resistance in societies deeply structured by racial, gender, and class power, situated within an unequal world system. Attending to both local and global dynamics, this course will ask how Latin American dynamics have both conformed to and challenged universalist theories of social change.

AS.230.397 (01) The Political Economy of Drugs and Drug Wars

In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

AS.360.420 (01) Humanities Research Lab: Making Maps of Mexico

Learn the basics of ArcGIS and data management as you help Prof. Lurtz publish an agricultural dataset and maps from 10 years before Mexico erupted in revolution. No experience necessary.

AS.376.342 (01) Caribbean Music

This course will explore the many genres of traditional and popular music that have emerged among the peoples and cultures of the Caribbean region and its Diaspora. We will examine the social, political, and economic issues that have shaped the region's music and how that music may have intersected with migration, colonization, ethnicity, race and tourism. Using a "participant observation" approach, students will read about, listen to and research a variety of musical experiences within the relevant sociopolitical context. Students should expect to fully participate in discussions about the assigned readings and music, and should be prepared to conduct their own research and share their own or newly acquired knowledge of contemporary and "historical/ traditional" musical themes, and local and regional artists. Our collective goal will be to enjoy as well as to think critically about music, culture and performance and within a more informed understanding of the complex, multi-varied and multi-vocal context—know as "The Caribbean".

Latin American Studies, Minor

Requirements for the Minor

Students who wish to minor in Latin American Studies must complete a minimum of 18 credits comprising of at least six courses offered by the Program in Latin American Studies (AS.361.xxx) or cross-listed with the Program in Latin American Studies. In addition, students must demonstrate proficiency through the intermediate language in either Spanish or Portuguese by either taking courses or by proficiency documentation through the language program. Language courses taken to meet the minimum proficiency of the minor do not count towards the six required courses. Of the six courses required: (1) no more than two may be in additional language study (AS.210.xxx), (2) two must be taken outside of the Modern Languages and Literatures Department, and (3) four courses must be at the 300-400 level. All courses must be taken for a letter grade and be completed with a grade of C- or better.

Code	Title	Credits
Language Proficiency Requirement:		
Language Proficiency in Spanish or Portuguese through the intermediate level *		0-14
Six Latin American Studies Courses:		
Two Latin American Studies courses at any level (100-400) **		6
Four Latin American Studies courses at the 300 or 400 level		12
Total Credits		**18-32**

* Language requirements can be waived for those who demonstrate suitable proficiency (via placement exam) in either Spanish or

Portuguese, or in an Amerindian language such as Quechua or Guarani.

** 3-credit intersession courses offered by JHU may be used to fulfill this requirement. All courses should be at least three credits and either be AS.361.xxx courses or cross-listed with the Program in Latin American Studies.

Psychological and Brain Sciences

http://pbs.jhu.edu/

The psychological and brain sciences are concerned with understanding the biological and psychological processes underlying animal and human behavior at all stages of development.

The undergraduate program leading to the baccalaureate degree is intended to provide students with a sound background in psychological and brain sciences and, at the same time, to prepare them for advanced study.

The program for doctoral students in psychological and brain sciences has a strong empirical focus and emphasizes research methodology. The broad aim of the graduate program is to train students to become scientists rather than practitioners.

Facilities

Members of the department have access to MARCC (https://www.marcc.jhu.edu/) high-performance computing systems for computational studies, simulations and data analysis.

The cognitive psychology and cognitive neuroscience laboratories contain a wide range of computer equipment and special-purpose research equipment, including image-processing and large-format graphics systems, eye-movement monitors, speech recognition and analysis systems, stereoscopic graphic systems, video equipment, EEG, Transcranial Magnetic Stimulation, and other stimulus-presentation and response-collection devices.

The biopsychology laboratories have a host of facilities necessary to conduct modern behavioral neuroscience research, including equipment for behavioral and operant testing, elctrophysiology, calcium imaging (2p and endoscopic), opto- and chemogenetics, histology, surgery, neurochemistry, and systems for the analysis of behavioral gestures as well as neural data.

Psychological and Brain Science faculty conduct anatomical and functional MRI studies on human physiology and cognition at the F.M. Kirby Research Center for Functional Brain Imaging at Kennedy Krieger Institute (https://www.kennedykrieger.org/kirby-research-center (https://www.kennedykrieger.org/kirby-research-center/)).

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.200.101. Introduction To Psychology. 3 Credits.
Do we all see colors the same way? How did so many 'good' people support the Nazi party? Do crossword puzzles really stave off Alzheimer's Disease? This course tries to answer these questions and many others, providing a comprehensive overview of the scientific study of the mind. We'll explore topics such as perception, language, memory, decision-making, creativity, love, sex, art, politics, religion, dreams, drugs, brain damage and mental illness, grappling with deep and long-standing controversies along the way: differences between the sexes, the relationship between mind and brain, causes and consequences of racism, human uniqueness (or not) within the animal kingdom, nature vs. nurture, good and evil, consciousness. Appropriate for anyone wanting to know who and what we are as human beings (or who noticed that psychology is now on the MCAT).

AS.200.110. Introduction to Cognitive Psychology. 3 Credits.
Introductory survey of current research and theory on topics in cognitive psychology. The course will cover a range of topics in perception, attention, learning, reasoning, and memory, emphasizing relationships among mind, brain, and behavior.

AS.200.132. Introduction to Developmental Psychology. 3 Credits.
An introductory survey of human development from the prenatal period through adolescence. The developing child is examined in terms of cognitive, social, emotional, motor, and language development.

AS.200.133. Introduction to Social Psychology. 3 Credits.
An introductory survey of social psychology. Topics include social perception, social cognition, attitudes, prejudice, attraction, social influence, altruism, aggression, and group behavior.

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.

AS.200.162. Childhood Disorders & Treatments. 3 Credits.
This course examines the psychological disorders that are usually first diagnosed prior to adulthood. Some of the specific disorders that will be discussed are Attention-Deficit and Disruptive Behavior Disorders, Neurodevelopmental Disorders, Learning Disorders and Intellectual Disability.Students will become familiar with various diagnoses, etiologies, and methods of treatment. Note: This course does not count toward the Psychology Major

AS.200.199. Psychopathology and Its Development. 1 Credit.
Examine an overview of abnormal psychology (i.e., psychopathology), including its development, etiological/theoretical perspectives, diagnosis, and treatment. Broadly cover the DSM categories, with a focus on understanding the major features of the common disorders and the evidence-based treatment of these conditions.

AS.200.200. Research Methods in Psychology. 4 Credits.
The goal of this course is to introduce how psychological scientists develop and test research questions about the mind and behavior. We will explore how empirical investigation differs from other ways of making discoveries and learning about the world, and how psychologists employ various methodologies to tackle their phenomena of interest. We will examine the relationships between research questions and research designs, the benefits and drawbacks of differing measurement and sampling approaches, the ethical implications of various research paradigms, and best practices in communicating research findings clearly and engagingly. You will have the opportunity to engage "hands-on" with the research process through interactive labs and demonstrations. Over the course of the semester, you will develop and receive feedback on a research proposal, which will serve as a foundation for the spring course "Design and Analysis for Experimental Psychology".
Area: Writing Intensive

AS.200.201. Design & Statistical Analysis for Psychology. 4 Credits.
The goal of this course is to expose you to the processes of data collection, analysis, and dissemination in psychology. This course is the follow-up to "Research Methods in Experimental Psychology," and therefore will draw on the methodological principles and practices covered in the Fall semester. This course will cover a wide array of analytical techniques (i.e., statistics) that you will apply to data collected as part of a semester-long group research project. The course will also include extensive coverage of the R programming language for use in data management, analysis, and visualization. With your group members, you will collect primary research data, carry out appropriate statistical tests, compose individual research manuscripts, and collectively present a poster at an on-campus research symposium. In combination with the Fall course, this class will serve as strong preparation for those considering honors theses, joining research labs at Homewood and/or JHMI, conducting independent research projects, and ultimately pursuing careers/graduate work in experimental psychology.
Area: Writing Intensive
AS.200.200 (was AS.200.207)

AS.200.202. Forensic Psychology. 3 Credits.
The field of forensic psychology is focused on answering legal questions about the causes of human behavior. This survey course will explore the work that forensic psychologists do; their research, assessment, and clinical methods; and how their work influences lawyers, judges, and other legal practitioners. Specific topics will include mental capacity assessment, psychopathy, claims of mental distress, child custody evaluations, juvenile delinquency, forensic treatment, and forensic neuropsychological assessments.
Students can only receive credit for AS.200.202 or AS.200.325, not both.

AS.200.205. Psychological Profiling. 1 Credit.
"Psychological Profiling" focuses on strengths and limitations of psychological methods employed by forensic professionals who assist police in criminal investigations. Clinical cases of serial offenders, spree killers, disgruntled employees, police profiling, and terrorists will be studied. Legal and ethical issues will be explored, especially racial profiling controversies. We anticipate visits to the FBI Behavioral Sciences Unit at Quantico, Virginia; Baltimore County Forensic Crime Lab (with emphasis on crime scene analysis), and the Baltimore Police Profiling Program.This course does not count towards the psychology major.

AS.200.208. Animal Behavior. 3 Credits.
This course examines how and why animal behaviors are produced across the animal kingdom. Neurobiological, hormonal and developmental mechanisms and adaptive function of behaviors are examined in an evolutionary context. Behaviors include survival, acquiring food, reproduction, communication, parental care, and cooperation. Students will also learn how to develop hypotheses and predictions for scientific questions and interpret graphical results.
AS.200.141 OR Permission of Instructor.

AS.200.209. Personality. 3 Credits.
This is a survey course focused on theory and research on human personality. Topics include personality traits, motivation, unconscious processes, self-regulation, cognitive and behavioral aspects of personality, biological and evolutionary influences on personality, and dysfunctional manifestations of personality.

AS.200.211. Sensation & Perception. 3 Credits.
This course surveys how stimuli from the environment are transformed into neural signals, and how the brain processes those signals to interpret the objects and events in the world. A primary focus will be on the visual system, with additional coverage of hearing, touch, taste, and smell.

AS.200.212. Abnormal Psychology. 3 Credits.
A survey of the major syndromes of psychological disorders. Research and theory about the mechanisms, development, and diagnosis of psychopathology are emphasized.

AS.200.222. Positive Psychology. 3 Credits.
The course will review the growing field of positive psychology and will review the research on positive human attributes such as optimism, happiness, hope, resiliency, self-esteem, altruism, empathy, and forgiveness. This course will explore the research on how such positive attributes are developed and how they relate to psychological and physical well-being.

AS.200.240. Industrial and Organizational Psychology. 3 Credits.
This course provides a survey of the field of Industrial and Organizational Psychology, a scientific discipline that studies human behavior in the workplace. The course focuses on understanding the psychological bases of work behaviors, cognitions, and emotions and practices that can be implemented to create a good fit between employees' characteristics and work demands. A number of topics are addressed in the scientist-practitioner model, including the structure/characteristics of jobs, techniques for assessing and supporting employee performance, selecting and training a workforce, and the various mechanisms that influence employee motivation and attitudes, among other topics. Real-world applications and research are emphasized throughout the course.

AS.200.250. Behavioral Neuroscience. 3 Credits.
Behavioral neuroscience is the study of the neural basis of behavior of animals, including humans. This course will introduce the student to this field using a traditional lecture format. We will cover fundamental properties of brain structure and function, mechanisms of psychoactive drug action, and brain mechanisms of perception, homeostatic drives, learning and memory, and cognition. Along the way, we will touch on the biological bases for social interactions, as well as for behavioral and mental illnesses, such as addiction, depression and schizophrenia. A key focus will be understanding how behavioral neuroscientific research, past and present, leads to knowledge in this area.

AS.200.301. History Of Psychology. 3 Credits.
A survey of leading figures, schools, and systems in the history of psychology. The course will emphasize the development of experimental psychology in late 19th century Germany and its establishment in America at Johns Hopkins, Harvard, Chicago, and Columbia. Special topics will include the development of clinical and applied psychology and psychological testing. Enrollment limited to Juniors and Seniors only. Sophomores with instructor approval. Recommended Course Background: two prior Psychology courses.

AS.200.304. Neuroscience of Decision Making. 3 Credits.
This course will survey the neural mechanisms of decision-making. Current experimental research and theory concerning selection, control, and evaluation of actions are examined in humans and animals. Topics will range from simple perceptual judgements to complex social behavior. The course involves a weekly lecture about a specific topic followed by a student presentation of a current research paper. Cross-listed with Neuroscience.
AS.080.305 AND AS.080.306 or instructor permission

AS.200.305. Advanced Seminar in Forensic Psychology. 3 Credits.
Forensic psychologists determine clinical diagnoses and offer expert opinions to assist court decision makers who must employ legal tests to make case determinations. This course will explore how forensic psychologists communicate with the courts via consultation, report writing, and expert testimony. Students will write forensic analyses on a variety of controversial, cutting edge forensic topics (e.g., for competence to stand trial, child abuse, civil commitment, compensation for mental injuries, sex offender commitment, insanity, fitness for duty, child custody). Prerequisites: AS.200.202 OR AS.200.212
Area: Writing Intensive
AS.200.202 OR AS.200.212

AS.200.307. Medical Psychology. 3 Credits.
Medical Psychology is a specialization within clinical psychology that focuses on the application of psychological theories, research, and techniques to physical health problems and health promotion. Students will learn about the consultation process and interventions used in medical psychology practice to improve the physical and psychological health of medical patients, including those with chronic conditions (e.g., chronic pain, heart disease) and those with acute illnesses and injuries. Enrollment limited to Junior & Senior Psychology Majors & Minors or with instructor approval. Prerequisite: AS.200.212
AS.200.212

AS.200.311. Sensory Representations in the Brain: Maps, Modules, & Distributed Coding. 3 Credits.
In this course we will explore the ways in which information from vision, hearing, touch, smell, and taste is encoded in the brain. We will compare and contrast different representation schemes and their computational advantages in order to uncover some overarching organizing principles of sensory processing in the brain. Class meetings will consist of lectures plus group discussions of classic papers in cognitive neuroscience, computational modeling, and neurophysiology. Enrollment limited to Juniors & Seniors.
AS.200.211 OR AS.080.203 OR AS.050.203 OR AS.200.141 OR AS.020.312

AS.200.312. Substance Use and Mental Health. 3 Credits.
This course focuses on the intersection of substance use and mental health. Topics will include substance use disorders, the co-morbidity of substance use disorders and other mental health diagnoses, and substance use as a form of self-medication for mental health symptoms. We will explore abuse of substances including synthetic drugs, "street" drugs, and commonly abused prescription medications. We will review etiological factors, including psychological, neurobiological, genetic, and trauma-related factors, as well as evidenced-based treatments. We will also explore controversies about the diagnosis and conceptual models of substance use disorders and addiction and controversial treatments, such as methadone and suboxone. Psychology majors & minors or by permission of the instructor. Pre-requisite: AS.200.212 Abnormal Psychology, or by instructor permission.
AS.200.212

AS.200.313. Models of Mind and Brain. 3 Credits.
This is a seminar surveying computational approaches to understanding mental and neural processes, including sensory and conceptual representation, categorization, learning and memory. The course will also develop familiarity with computational tools such as numerical simulation, linear transformation and data visualization. Recommended Course Background: AS.110.106 / Calculus I OR AS.110.108 Calculus I, AS.050.101 / Cognition OR AS.200.211 / Sensation & Perception OR AS.080.105 / Introduction to Neuroscience OR other introductory coursework in cognitive & neural sciences. Experience with at least one programming language is strongly recommended.

AS.200.317. Interpersonal Relations. 3 Credits.
This course will investigate interpersonal processes ranging from attraction and courtship to relationship functioning and distress. Enrollment limited to Psychology majors and Psychology minors.
AS.200.133

AS.200.321. Child and Adolescent Psychopathology. 3 Credits.
This course focuses on mental disorders in children and adolescents. The course begins with an exploration of the general models and theories for why psychopathology occurs in childhood. The second portion of the course provides a systematic review of the symptoms, course, risk factors, theories, and treatments for specific disorders, including mood disorders, anxiety disorders, autism, ADHD, feeding disorders, and behavioral disorders. Restricted to Junior & Senior Psychology Majors & Minors, or permission of the instructor.
AS.200.212

AS.200.322. Clinical Neuropsychology. 3 Credits.
Clinical Neuropsychology is a clinical psychology specialty focused on assessment and treatment of acquired or developmental disorders of the nervous system, including dementia, neurodegenerative disorders, traumatic brain injury, learning disabilities, and neurodevelopment disorders. This course will focus on research findings and techniques used by psychologists in the assessment, treatment, and rehabilitation processes. Recommended Course Background: AS.200.141 / Foundations of Brain Behavior Cognition.
AS.200.141

AS.200.323. Psychology and Social Media. 3 Credits.
This course explores modern-day social media use (e.g., Facebook, Match.com) through multiple theoretical lenses within psychology. Through weekly student-led discussions and readings, it will accomplish 3 aims: 1) applying psychology of identity, motivation, and communication to social media (e.g., self-presentation, intergroup dynamics), 2) investigating clinical/health implications of social media use (e.g., addiction, loneliness), and 3) exploring social media as data-gathering environments (e.g., user experience research from already committed guest-speakers who work in social media industries). Recommended Course Background: at least 1 course in introductory psychology, developmental psychology, social psychology and/or clinical psychology.

AS.200.326. Law, Psychology and Public Policy. 3 Credits.
An introduction to applications of psychological research in policy analysis. Special emphasis is given to the use and misuse of psychology in Supreme Court advocacy and decision making in the areas of children's rights, adult sexuality, and educational and employment opportunity. Recommended Course Background: Statistics & Regression Analysis

AS.200.329. Real World Human Data: Analysis & Visualization. 3 Credits.
Experiments in human cognition typically involve careful manipulation and control of variables in order to answer specific questions about the mind or brain. However, digital devices now provide an ocean of incidental human data: information collected continuously about our behavior and physiological states as we go about our lives. These incidental datasets are often large and noisy, and pose different analysis and visualization challenges from more traditional manipulated experiments. In this course students will learn computational tools and qualitative approaches for exploring, visualizing and interpreting large human data. The course emphasizes computer-based analysis of open-source human behavioral and neuroimaging datasets. Analyses will be conducted in MATLAB. Instructor will grant approval as long as you have previous programming experience (roughly equivalent to material covered in an introductory-level programming course). Self-taught or real-world experience can be applicable in lieu of previous formal classroom instruction.

AS.200.330. Human and Machine Intelligence. 3 Credits.
Description: The class will discuss original papers in a variety of papers and book chapters on the following topics.1. What is intelligence?2. Origin and evolution of intelligence?3. Human brain and intelligence4. Machine intelligence5. Neural networkRecommended course background: neurobiology.

AS.200.332. Seminar in Theoretical Neuroscience. 3 Credits.
This course develops a theoretical understanding of the large-scale anatomical and functional organization of the cerebral cortex. We will discuss, present, and write about primary literature in the area of theoretical neuroscience. The principles to be explored will include: hierarchy; normalization; pattern completion; prediction; gradient-based learning; and conjunctive representation. We will consider the broader motivation for each of these computational principles, and we will ask how successfully they organize the empirical data about our brains. Specific questions include: What are the functional benefits of a hierarchical anatomical organization of the cerebral cortex? Do neocortical circuits generically implement a normalization operation? How and why is pattern completion implemented in the neocortex and the hippocampus? Can gradient-based representational learning occur in the cerebral cortex without supervision or reinforcement signals? How is the flow of information between brain regions regulated? How can distinct cortical representations be "bound" into joint representations? Calculus 1 or equivalent is required. Higher-level mathematics and programming experience are not required, but students should be willing to engage with computational concepts. Recommended Course Background: AS.200.110 OR AS.050.203 OR AS.200.211 OR AS.080.105 OR other introductory coursework in cognitive & neural sciences.
AS.110.106 OR AS.110.108

AS.200.333. Advanced Social Psychology. 3 Credits.
The class is designed as a seminar including discussion of primary readings of social psychology articles ranging in topics from interpersonal relationship to behavior in large groups. Rising junior & senior Psychology majors only.
AS.200.133

AS.200.334. Human Memory Psychology. 3 Credits.
This class will survey the behavioral and biological science of human memory. Historical perspectives as well as modern controversies will be discussed. Intersections with other fields such as law, education, medicine, and technology will be highlighted. The course will be a mixture of lectures and group discussions.

AS.200.337. Origins of the Social Mind. 3 Credits.
Humans possess remarkable capacities for morality, politics, and culture. But where do these capacities come from and what cognitive mechanisms support them? In this seminar, we will take comparative and developmental perspectives to understand the origins of the social mind. We'll explore how nonhuman animals, especially primates, represent and navigate their social worlds, and what makes the human mind unique. We'll also explore the earliest manifestations of social intelligence that are present in human infancy, allowing babies to richly experience the social world long before they develop language. We'll cover a range of topics, such as the abilities to remember other individuals and keep track of their social relationships and social groups, theory of mind, self-awareness, precursors of politics and morality, and the question of whether animals have culture. Enrollment limited to Junior & Senior Psychology, Neuroscience or Behavioral Biology majors/minors. Prerequisite: 200.132 Intro to Dev. Psych OR 200.133 Intro Social Psych OR 200.110 Intro Cog. Psych OR 200.141 Foundations of BBC OR instructor approval
AS.200.132 OR AS.200.133 OR AS.200.110 OR AS.200.141

AS.200.340. Diversity in Psychology. 3 Credits.
This course presents an overview of the nature of human diversity in psychology and fosters the critical examination of major diversity issues in psychology. Conceptual, historical, philosophical, and theoretical issues and empirical research are reviewed. Students develop sensitivity and critical thinking regarding issues in psychology research and professional practice that may be influenced by factors such as age, generational influence, ethnicity, race, religion and spirituality, gender, socioeconomic class, sexual orientation, national origin, disability and other cultural diversity topics. Current issues will be highlighted. Students will also be introduced to public health paradigms regarding the changing roles of psychology researchers and practitioners. This course is limited to Senior Psychology Majors and Minors. Junior Psychology Majors and Minors can request to enroll by instructor permission.

AS.200.344. Behavioral Endocrinology. 3 Credits.
This course examines both the evolution and mechanisms of hormonal effects on behavior across animals, including humans. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, stress and social behavior. Additionally, this course emphasizes developing skills in hypothesis testing and critically assessing the scientific literature. Cross-listed with Behvioral Biology and Neuroscience.
(AS.200.141 OR AS.080.306) OR (AS.020.151 AND AS.020.152) or instructor's permission

AS.200.350. Why is thinking hard?. 3 Credits.
In what ways and why is human cognition limited? This seminar will focus on understanding and explaining the limitations and capabilities of human cognition through deep dives into a number of subtopics. Possible topics include: What is 'intelligence,' does it have quantifiable units and/or a substance-like underpinning. Why does thinking feel hard, why and how do we experience mental effort? What limits visual attention and working memory? Where does insight come from? Why do we forget things? What is creativity? What makes some concepts hard to learn? Why do we misunderstand science? How do we evaluate our own knowledge and understanding?
AS.200.110

AS.200.357. Advanced Statistical Methods. 3 Credits.
Topics in applied probability and statistical inference; analysis of variance; experimental design. Recommended Course Background: one statistics course.

AS.200.358. Advanced Research Design and Analysis. 3 Credits.
Second half of statistics sequence, covering complex research design and analysis. Recommended Course Background: AS.200.357. Enrollment limited to seniors by instructor approval.
AS.200.357

AS.200.361. Tests & Measurements. 3 Credits.
Psychological tests and measures are used in several settings including research, clinical, business, forensic, school and other applied settings. This course will consider the methodological and practical issues involved in test construction, the evaluation of instruments, and the uses of psychological tests across settings and for different purposes. Examples of assessments that may be discussed are aptitude and achievement tests; personality and behavioral inventories; neuropsychological tests, observations and interviews; and tests for employment and forensic use. Enrollment limited to Junior & Senior Cognitive Science & Psychology Majors, or instructor approval.
AS.200.201

AS.200.369. Neuroscience of Motivation & Reward. 3 Credits.
This course will explore the neurobiological bases of motivated behavior, including eating, drinking, and reproduction, tracing the history of our understanding from early neuroscientific studies to the modern day, with a focus on mammalian model systems. We will discuss innate motivated behaviors, and well as how learning can guide the expression of these behaviors. Neural mediation of processes such as reward and aversion will be considered in depth, as will applications of these findings to the understanding of addiction and other behavioral disorders. The course will be a mixed lecture/seminar format; we will read original research articles and scholarly reviews.
Students may not have taken AS.200.366.;AS.080.305;AS.080.306 (students may enroll concurrently)

AS.200.370. Functional Human Neuroanatomy. 3 Credits.
This course examines the general organizing principles of the anatomy of the human central nervous system and how this anatomical organization relates to function, from the level of neural circuits, to systems, to behavior. Students will learn to identify neuroanatomical structures and pathways in dissections and MRI images through computerized exercises. Readings and lectures will emphasize general structure-function relationships and an understanding of the functional roles of particular structures in sensory, motor, and cognitive systems. Recommended Course Background in addition to pre-requisite AS.080.305: AS.080.306 OR AS.050.203 OR AS.080.250
AS.080.305

AS.200.374. Happiness and Psychological Well-Being. 3 Credits.
This course will cover advances in the field of research on positive psychology, happiness, and well-being, including perspectives on motivational and emotional wellness, cognitive processes, social-interpersonal dynamics, and sociocultural variables. We will explore topics including hobbies and leisure, mindfulness and meditation, money/income, ethics and religion, social media, marriage, friendship, economic institutions, school, the workplace, and more. Coursework includes reflection exercises, discussions, research proposals, fact-checking analyses, and presentations. Restricted to Senior & Junior Psychology majors & minors. Prerequisite: (AS.200.133 OR AS.200.101) AND (AS.200.212 OR 200.382) AND 200.222 or by instructor permission.
(AS.200.133 OR AS.200.101) AND (AS.200.212 OR AS.200.382) AND AS.200.222

AS.200.376. Neuropsychopharmacology. 3 Credits.
Designed to provide information about how drugs affect the brain and behavior. The course focuses on biological concepts underlying structures and functions of the brain that relate to mental disorders. An introduction to neurobiology and brain function is presented as it applies to the interaction of various classes of drugs with the individual neurotransmitter systems in the brain. A brief historic review is followed by a discussion of clinical relevance. Cross-listed with Behavioral Biology and Neuroscience. Enrollment limited to juniors and seniors.
(AS.080.305 AND AS.080.306) OR AS.020.306 AND AS.020.312) OR (AS.200.141 AND AS.020.306)

AS.200.377. Neuroethology. 3 Credits.
A comparative and evolutionary approach to understanding the neural underpinnings of biologically relevant behaviors in vertebrate and invertebrate animals. Enrollment limited to Sophomores, Juniors, Seniors or by instructor approval. Recommended Course Background: AS.200.141

AS.200.380. Neurobiology of Human Cognition. 3 Credits.
The complexity of human behavior surpasses even our closest primate relatives. Only humans communicate through language, build complex technology, devise legal system and wage war. What neurobiological capacities set humans apart from other animals? This course will explore the neurobiology of cognition, focusing on cognitive domains that are particularly developed in the human species: language, social cognition, number, executive function and concepts. The course format will consist of lectures and in class workshops.
AS.200.141 OR AS.200.312 OR AS.080.105 OR AS.080.203 OR AS.050.203 OR AS.050.312

AS.200.382. Models of Psychotherapy. 3 Credits.
This course reviews the major models of psychotherapy, including psychodynamic, cognitive, behavioral, interpersonal, and family therapy, with a focus on modern and empirically supported treatments. The application of the models through the analysis of clinical case studies is emphasized. Restricted to Junior & Senior Psychology Majors. Instructor permission required to enroll.
Area: Writing Intensive
AS.200.212

AS.200.385. Mind, Brain & Experience. 3 Credits.
How do nature and nurture shape the human mind? How does experience contribute to the development of visual perception, language and social reasoning? This course explores insights into these age-old questions from neuroscience and psychology. Studies of infant behavior reveal rich knowledge about objects and people in the first months of life. At the same time, experience has profound effects on behavior and neurobiology. For example, temporary absence of vision (i.e. blindness) during development permanently alters visual perception and the visual cortex. Key evidence also comes from studies of naturally occurring variation in human experience (e.g. blindness, deafness, socioeconomic and cultural differences). We will discuss what such studies of cognitive and neural function tell us about the origins of human cognition. This is a writing intensive course with weekly lectures and seminar style discussion of primary sources. Students will be required to write weekly responses to readings and a term paper.
Area: Writing Intensive
AS.200.141 OR AS.050.105 OR AS.080.105 OR AS.050.203 OR (AS.080.305 AND AS.080.306) OR AS.080.203

AS.200.388. Occupational Health Psychology. 3 Credits.
Occupational Health Psychology (OHP) concerns the application of psychology to improving the quality of work life, and to protecting and promoting the safety, satisfaction, health, and well-being of workers. This course will consider a broad range of topics in OHP including the role of work on well-being, job stress and burnout, diversity and work, safety climate, work-family balance, conflict, and counterproductive work behaviors. The emphasis will be on drawing connections between OHP theory and OHP practice and at the relationship between individual and organizational health and well-being. This class should be of interest to students interested in industrial/organizational psychology, social psychology, health psychology, clinical psychology, human factors, public health, preventive medicine, and industrial engineering.
AS.200.240 or instructor permission

AS.200.401. Careers in Psychology - Freshmen. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.402. Careers in Psychology - Sophomore. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.403. Careers in Psychology - Juniors & Seniors. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.404. Careers in Psychology - Seniors. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.431. Neural Systems & Behavior. 1 Credit.
Discussion of research activities in the Neural Systems and Behavior Lab. Discussion of research activities in the Neural Systems and Behavior Lab. This course is only available for undergraduate students currently working on research projects in the Moss Lab.

AS.200.450. Undergraduate Teaching Assistant in Psychology. 1 - 3 Credits.
Qualified students can serve as undergraduate Teaching Assistants for psychology courses they have already taken at Hopkins (by faculty instructor invitation only). Each individual faculty instructor will determine TA responsibilities based upon departmental policy. Upon invitation, potential Teaching Assistants should forward the instructor invitation to the co-Director of Undergraduate Studies (Dr. Drigotas) and make a request in SIS to add the course using the instructor's section number (e.g., 200.450 section 2). Dr. Drigotas will be approving requests in SIS.

AS.200.515. Psychological Research. 1 - 3 Credits.
The student chooses a research problem with the advice and approval of a faculty member. S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.525. Psychology Internship. 1 - 3 Credits.
S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.530. Independent Study in Psychology. 1 - 3 Credits.
S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.545. Psychological Readings. 1 - 3 Credits.
Psychological Readings represents an in-depth analysis of a psychological subject area not typically covered in departmental course offerings. Students must have the support of a full time faculty sponsor and work with them to plan a curated set of readings and activities for the semester.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.613. Fundamentals of Biopsychology.
This is a required course for all first year PhD students in the Department of Psychological and Brain Sciences. The course covers foundational concepts and methods in neurobiology and cognitive neuroscience.

AS.200.617. Fundamentals of Cognitive Psychology.
This is a required course for all first year PhD students in the Department of Psychological and Brain Sciences. The course covers foundational concepts and methods in cognition.

AS.200.650. Why is thinking hard?.
In what ways and why is human cognition limited? This seminar will focus on understanding and explaining the limitations and capabilities of human cognition through deep dives into a number of subtopics. Possible topics include: What is 'intelligence,' does it have quantifiable units and/or a substance-like underpinning. Why does thinking feel hard, why and how do we experience mental effort? What limits visual attention and working memory? Where does insight come from? Why do we forget things? What is creativity? What makes some concepts hard to learn? Why do we misunderstand science? How do we evaluate our own knowledge and understanding?

AS.200.654. Psychological & Brain Sciences Core Topics A.
This course is designed to introduce students to core topics in psychological and brain sciences. Students will read seminal and contemporary papers in topics that cover the breadth of the field. Graduate students in Psychological and Brain Sciences.

AS.200.655. Psychological & Brain Sciences Core Topics B.
This course is designed to introduce students to core topics in psychological and brain sciences. Students will read seminal and contemporary papers in topics that cover the breadth of the field. Graduate Students in Psychological & Brain Sciences.

AS.200.657. Advanced Statistical Methods.
Topics in applied probability and statistical inference; analysis of variance; experimental design. Intended for graduate students. Recommended Course Background: one statistics course.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR AS.280.345 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

AS.200.658. Advanced Research Design and Analysis.
Second half of graduate statistics sequence, covering complex research design and analysis. Recommended Course Background: AS.200.657. Enrollment limited to seniors by instructor approval and graduate students.

AS.200.659. Quantitative Methods for Brain Sciences.
Focuses on frequently used quantitative methods in the study of brain sciences. Course goals include gaining conceptual understanding of analysis techniques, application of techniques to datasets, and learning the use of MATLAB. Topics will include dimensionality reduction, information theory, clustering and classification, optimization and model selection, and frequency domain methods. Enrollment is limited to graduate students and undergraduate seniors; seniors must receive permission from the instructor to enroll. Recommended (but not required) Course Background: Probability & Statistics, Linear Algebra, MATLAB programming.

AS.200.661. Topics in Psychological & Brain Sciences.
An introduction to postdoctoral activities (e.g., grant applications, journal article submission, meeting presentations, the politics of psychology and American science) for Ph.D. candidates in psychology.

AS.200.662. Psychological and Brain Sciences: Career Development.

AS.200.670. Advanced Seminar in Vision.
This seminar will cover advanced topics in vision from the perspectives of several disciplines.Topics include human visual psychophysics, perception and cognition, and computational vision. Graduate students only.

AS.200.680. Psychological & Brain Sciences Seminar.

AS.200.800. Psychology Research - Summer.

AS.200.808. Readings: Current Research in Cognitive Aging.
Guided independent readings. The class is designed as a seminar including discussion of primary research articles of cognitive aging. Specific topics include human imaging and animal models of memory, aging, and neurodegenerative disease.

AS.200.810. Research In Psychology.
Students plan and execute original research under guidance of advisers. Results are usually prepared in a form suitable for publication. Graduate students only.

AS.200.817. Cognitive Seminar.

AS.200.825. Biopsychology Seminar.
Graduate students only.

AS.200.830. Research Seminar in Psychological & Brain Sciences.
TBA

AS.200.848. Current Advances in Psychological and Brain Sciences.
Introduces advanced research topics to graduate students (as well as faculty) through a series of speakers and discussions.

AS.200.849. Teaching Practicum.
All candidates are required to obtain special experience in various aspects of undergraduate teaching. Graduate students only.

AS.200.850. Advanced Teaching Practicum.

AS.200.860. Dissertation Preparation.
TBA

Cross Listed Courses

Behavioral Biology

AS.290.400. Comparative Neural Systems and Behavior Research Discussions. 0.5 Credits.
This course is required concurrently with research in the Comparative Neural Systems Research and Behavior lab. During the scheduled meetings we will discuss scientific papers, policies and procedures, research ethics and other information related to activities in the lab. At the end of the semester, students will present their research in groups. This course is only open to students doing research in the Neural Systems and Behavior Lab.

Cognitive Science

AS.050.339. Cognitive Development. 3 Credits.
This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.358. Language & Thought. 3 Credits.
Have you ever wondered about the relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too and this course will survey the current thinking on this matter. Classical papers such as those by Whorf and Sapir, more recent philosophical papers by people such as Fodor and Dennett, and recent empirical work by linguists and psycholingists on the relationship between language and thinking in development and in adults will be covered. Discussions will focus on the theoretically possible relationships between language and thought and the empirical data that speak to these. Juniors and seniors only. Freshmen and sophomores by permission of instructor only.
AS.050.102 OR AS.050.320 OR AS.050.325 or instructor permission.

AS.050.375. Probabilistic Models of the Visual Cortex. 3 Credits.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modeling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Required Background: Calculus I and experience in a programming language (Python preferred).
AS.110.106 OR AS.110.108

AS.050.675. Probabilistic Models of the Visual Cortex.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modelling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Also offered as AS.050.375.

First Year Seminars

AS.001.109. FYS: Why'd Your Brain Sign You up for This?. 3 Credits.
This First-Year Seminar will explore the neuroscience of choice. In addition to exploring the neurobiology of choice, we will dabble with philosophical ideas of free will and determinism. We will also touch on questions related to culpability. For example, are people who break the law but suffer from brain damage responsible for their actions? Sound interesting? Well, why stop there? Let’s sit back, eat some popcorn and take a look at how popular culture depicts the neuroscience of choice in the movies. Yes, with your help, we can do it all – but will you choose to???

AS.001.115. FYS: Illusions, Delusions, and Other Confusions. 3 Credits.
Most people think the strongest kind of evidence in a criminal case is a confident eyewitness. Most students think re-reading textbook materials or class notes is the best way to prepare for an exam. And all too many people think that measles vaccines cause autism. All three of these ideas are wrong. In this First-Year Seminar, we will explore what modern psychology has uncovered about how our intuitions concerning human nature deceive us, and lead to incorrect ideas such as the ones just mentioned. We will discuss a wide variety of topics including “the attention economy,” groupthink, and subliminal perception.

AS.001.130. FYS: Evolutionary Psychology. 1 Credit.
In this unique, 1-credit First-Year Seminar, we discuss evolutionary psychology—the idea that the mind can be understood as an adaptation to our ancestral environment by means of natural selection. Topics range from nature vs. nurture and freewill vs. determinism to the exploration of how evolutionary principles speak to broad social issues such sexuality, gender, social class, and violence.

AS.001.165. FYS: Biology in Deep Time. 3 Credits.
This First-Year Seminar will explore seminal ideas in macroevolutionary theory through both classic and cutting-edge studies. Topics would include the relationship between evolution and development, how fossils shape our understanding of biological systems, and the logical basis of evolutionary inference. Students will also gain an appreciation for the historical development of these ideas and their application in modern science and beyond.

AS.001.168. FYS: The Psychology of Mass Politics in the U.S.. 3 Credits.
Taught during the election season of 2022, this First-Year Seminar looks at the deeper psychological motivations of the American electorate. We begin by discussing the meaning of democracy and establishing a common understanding of American democracy specifically, placing the current moment into historical and international context. We then gradually dismantle the "folk theory" of democracy that assumes all voters are rational and economically-minded. Instead, we apply theories from social psychology to understand some essential questions about voter behavior. Why do people vote? How do they understand politics? How are their feelings and judgments affected by their own identities, biases, information sources, and by the messages they hear from leaders? Why have Americans grown so polarized? What role do racial and gender-based prejudice play? Is American politics headed toward a more violent future? We use evidence-based research from political science, sociology, and psychology to answer these questions.

History of Science, Medicine, and Technology

AS.140.336. History of Mental Healthcare in the United States. 3 Credits.
In recent decades, much has been done in the United States to destigmatize mental illness and incorporate psychiatric services into broader systems of healthcare and welfare. As clinicians, policy makers, social scientists, activists, and other stakeholders have collaborated to promote mental health and reintegrate people with behavioral disorders into society, they have often contrasted their efforts with those made in the past, portraying community-based approaches as more efficacious and humane. Narratives like these, however, deemphasize many important continuities in the history of American psychiatry. In this discussion-based course, students will explore how concerns about citizenship and social control have shaped the organization and provision of mental healthcare in the United States from the early nineteenth century to the present day. They will also complete various assignments designed to hone their ability to evaluate historical arguments, conduct independent and collaborative research on primary sources, and communicate the results of their scholarship to professional and lay audiences.

Neuroscience

AS.080.304. Neuroscience Learning and Memory. 3 Credits.
This course is an advanced survey of the scientific study of learning and memory. Different perspectives will be used to review the science of learning and memory including the cellular-molecular basis of synaptic plasticity, the functional circuitry involved in learning and memory and memory systems in the brain. The course is designed to provide a deep understanding of the issues and current debates in learning and memory research and focuses specifically on animal models of memory and memory impairment. This is an interactive lecture course with a strong emphasis on student participation.
AS.200.141 OR (AS.080.305 AND AS.080.306) OR (AS.020.312 AND AS.020.306) or instructor permission.

AS.080.308. Neuroeconomics. 3 Credits.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience.
AS.080.306 OR AS.200.141 OR AS.020.312

For current faculty and contact information go to http://krieger.jhu.edu/publichealth/people/

Psychology, Bachelor of Arts

Psychology Major Requirements

(Also see Requirements for a Bachelor's Degree. (p. 1587))

The courses in Psychological and Brain Sciences have four purposes:

1. to acquaint all interested students with a sampling of topics through a variety of introductory and advanced courses;
2. to prepare majors for graduate work in psychology and related disciplines through a program that meets the admission requirements of the outstanding graduate departments in the United States;
3. to offer a distribution of foundational courses in psychology as well as advanced studies representing areas in the social, behavioral, and brain sciences; and
4. to provide an honors track designed for exceptional students who want training beyond that provided by the standard undergraduate curriculum.

General Requirement

All classes taken for the major (including those for NQE credit & Honors) must be taken for a grade and be completed with a C- or better. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the major without permission of the Director of Undergraduate Studies.

Specific Requirements

- **Intro Level Course Requirement:** Three 100-level psychology courses from an approved list. These are typically taken during Year 1 and Year 2.
- **Experimental Methods, Design & Analysis:** AS.200.200 Research Methods in Psychology and AS.200.201 Design & Statistical Analysis for Psychology should be taken as a two-course sequence in Fall and Spring of Year 2.
- **Upper Level Course Requirement:** Five upper level psychology courses (200- or 300-level), three of which must be at the 300-level. These are typically dispersed through Years 2-4. Courses must be at least 3 credits.
- **Small Group Experience:** 3 credits of either research, internship, independent study or an additional 300-level psychology course with an enrollment cap of 19 students or less. Students who are interested in graduate work in psychology are encouraged to get involved in research/internship activity starting in Year 2 and to continue throughout their time at Hopkins.
- **9 NQE Credits:** Students must complete 9 additional NQE credits using courses not taught within the psychology department (AS.200.XXX) and not counting otherwise toward the psychology major.

Please note that not all courses offered by the Department of Psychological & Brain Sciences (AS.200.XXX) will fulfill the requirements of the Psychology major/minor (ex. AS.200.162 Childhood Disorders & Treatments). Consult with Academic Advising and your psychology major advisor to ensure appropriate progress toward degree completion.

Required Courses Outside the Department

Code	Title	Credits
Nine credits of additional N, Q, or E courses [1]		9

[1] Courses instructed within the psychology department (AS.200.XXX) or counting toward the Psychology major may not be used for this requirement.

Required Courses Within the Department

Code	Title	Credits
AS.200.200	Research Methods in Psychology	4
AS.200.201	Design & Statistical Analysis for Psychology	4
Select three of the following:		9
AS.200.101	Introduction To Psychology	
AS.200.110	Introduction to Cognitive Psychology	
AS.200.132	Introduction to Developmental Psychology	
AS.200.133	Introduction to Social Psychology	
AS.200.141	Foundations of Brain, Behavior and Cognition	
Research, internship, independent study, or a designated seminar course [1]		3
Five additional psychology courses distributed as follows: [2]		15
Two additional courses at the 200-400 level		
Three additional courses at the 300-400 level		
Total Credits		**35**

[1] The 300-level seminar course must have a maximum enrollment of 19 students. Courses used to fulfill the five upper-level course requirements may not be used to satisfy this requirement. Students may take 1-3 credits in any given semester to fulfill this requirement. All students are required to discuss their plans with their faculty advisor before Pre-Graduation Check.

[2] One upper level course in Cognitive Science may be used to satisfy these course credits with the approval of the Director of Undergraduate Studies. Research, independent study, and internships may not be used to satisfy these course requirements.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
Required 100-level Psychology course		3
NQE elective required for major		3
	Credits	**6**
Second Semester		
Two Required 100-level Psychology course		6
	Credits	**6**
Second Year		
First Semester		
AS.200.200	Research Methods in Psychology	4
200- through 400-level Psychology course		3
	Credits	**7**
Second Semester		
AS.200.201	Design & Statistical Analysis for Psychology	4
200- through 400-level Psychology course		3
	Credits	**7**
Third Year		
First Semester		
300- through 400-level Psychology course		3
Small Group Experience or Independent Academic Work		3
	Credits	**6**
Second Semester		
300- through 400-level Psychology course		3
NQE elective required for major		3
	Credits	**6**
Fourth Year		
First Semester		
300- or 400-level Psychology course		3
	Credits	**3**
Second Semester		
NQE elective required for major		3
	Credits	**3**
	Total Credits	**44**

Restrictions

No courses through the School of Education and the Carey Business School may be counted toward the requirements for the major in Psychological and Brain Sciences (although a limited number of such courses may be counted toward the 120 credits required for graduation). As most Intersession courses are graded S/U or are less than 3 credits, they do not apply towards major requirements. Some courses offered by Psychological & Brain Sciences taught in the summer at Hopkins do not count toward the Psychology major or minor as they do not fit into the requirements of the major. You may make an appointment with Dr. Stephen Drigotas (drigotas@jhu.edu), Director of Undergraduate Advising for Psychological & Brain Sciences, to ensure that your enrollments will be considered toward your academic progress in the manner you intend.

Preparation for Graduate Work in Psychology

The Department of Psychological and Brain Sciences provides preparation for graduate training in all areas of psychology, including clinical and counseling. Virtually all psychology graduate programs, including those that provide training in clinical or counseling psychology, expect students to have a strong background in scientific psychology, including statistics. The department encourages students to obtain additional practical experiences outside the classroom, including research in a laboratory and/or an internship in a mental health care setting. These additional experiences are particularly salient to graduate school admission committees.

Honors Program in Psychology

The B.A. degree with honors provides recognition for outstanding achievement in formal course work and research. Students considering applying for honors should begin discussing possible research topics with a faculty sponsor (and research mentor, if different from the sponsor) in the fall semester of their junior year. The requirements for a degree with honors include those for the regular B.A. degree, plus the following:

- A minimum grade point average of 3.5 or better in psychology (200.XXX) courses through the semester before the student graduates.
- A public presentation (poster or talk) at a recognized student research or professional conference either on campus (e.g., DREAMS, Woodrow Wilson, ASPIRE, PURA) or off campus (e.g., APA, APS, VSS, SPSP). The presentation must be on the research conducted specifically for honors (e.g., research for 200.200 or 200.201 does not count).
- The support of a sponsor for honors research. The sponsor must have a full-time faculty appointment at Johns Hopkins and either a primary or a joint appointment in the Department of Psychological and Brain Sciences. Sponsors can sponsor research conducted under the direct supervision of another principal investigator (e.g., a faculty member in the School of Medicine).
- Completion of two 300- or 600-level psychology courses, in addition to those required for the Psychology major. These courses cannot be an independent study, research or internship credits, or a readings course. These additional courses can count toward the 120 credits required for graduation.
- Completion of six credits of research beyond research credits counting toward the major.

Please see the Department of Psychological and Brain Sciences (https://pbs.jhu.edu/) website for the application process details.

Undergraduate Academic Awards

The Department of Psychological and Brain Sciences offers two undergraduate academic awards.

- G. Stanley Hall Prize is awarded for outstanding achievement by an undergraduate in psychology.
- Julian C. Stanley Award is given to the psychology major who most closely approximates Dr. Stanley's personal and professional standards of excellence.

Psychology, Minor

Psychology Minor Requirements

A minor in psychology is available to undergraduates majoring in any department. Students electing to minor in psychology should declare their intention directly to the Director of Undergraduate Studies in the Department of Psychological and Brain Sciences by the end of junior year. All classes taken for the minor must be taken for a grade and be completed with a C- or better. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies.

The minor requires successful completion of the following:

Code	Title	Credits
Select three of the following:		9
AS.200.101	Introduction To Psychology	
AS.200.110	Introduction to Cognitive Psychology	
AS.200.132	Introduction to Developmental Psychology	
AS.200.133	Introduction to Social Psychology	
AS.200.141	Foundations of Brain, Behavior and Cognition	
One psychology course at any level		3
Two psychology courses at the 300 or 600 level [1]		6
Total Credits		**18**

[1] No course from the Carey Business School or School of Education may count toward the minor.

Psychology, PhD

Program Requirements

The Department of Psychological and Brain Sciences (https://pbs.jhu.edu/graduate/requirements/) emphasizes training and experience in the research methods essential to the development of new knowledge in the various sub-fields of psychology. Our core program for doctoral students emphasizes scientific methodology and provides rigorous research training. Each doctoral candidate is expected to become familiar with both a relatively narrowly defined area and a broad spectrum of knowledge related to the student's topic of specialization.

In addition to general university requirements, the Department of Psychological and Brain Sciences has the following regulations:

Statistics

A thorough understanding of statistics is useful in virtually all research settings. Two statistics courses are required during the first year of graduate training. The normal sequence is AS.200.657 Advanced Statistical Methods during the first semester and AS.200.658 Advanced Research Design and Analysis during the second semester. Students with exceptional statistical training should take two more advanced courses by arrangement with the Director of Graduate Studies. Students are encouraged to take more statistics, as appropriate.

Fundamentals and Core Topics in PBS

AS.200.613 Fundamentals of Biopsychology, AS.200.617 Fundamentals of Cognitive Psychology, AS.200.654 Psychological & Brain Sciences Core Topics A, and AS.200.655 Psychological & Brain Sciences Core Topics B offer an introduction to the fundamental principles and methods of the psychological & brain sciences. Students will read seminal and contemporary papers in topics that cover the breadth of the field. In addition, students become versed in the careful consideration of data and in formulating written and oral arguments.

First-Year Research Report

During the first year, the student, together with the faculty advisor, identifies a research project that will provide extended research experience. Normally, the student designs a study as part of a larger ongoing project. A project proposal must be submitted by April 15 of the first year; this proposal introduces the nature of the scientific problem, reviews the relevant literature, and describes the proposed study in detail, together with the anticipated data, means of analysis, and interpretations. A final written version of this report must be submitted by December 15 of the student's second year; ideally, this "first year project" report includes all the information that would be appropriate for submission to a scientific journal.

Advanced Examination

The Advanced Examination is designed to assess expertise in the student's area of concentration. This examination, which includes both a written and oral part, is graded by a committee of at least two faculty members. The written and oral portions of the advanced examination offer the student an opportunity to demonstrate both in-depth, focused knowledge in their specialty area of study, and also a breadth of knowledge outside of their area of expertise. The student must pass the advanced examination by the beginning of the third year of study.

Advanced Seminars

Advanced seminars are more specialized in content than a Core Topics course, but are still geared to students with interests both inside and outside the area. Students are required to complete one advanced seminar outside their concentration area. Completion of an additional advanced seminar is strongly recommended.

Topical Seminars

The Department of Psychological and Brain Sciences offers topical seminars in which one or more faculty members leads seminars on topics of special interest, such as cognitive processes, developmental psycholinguistics, neuro-physiological aspects of behavior, mathematical psychology, and information processing. Through participation in these seminars, students are exposed to findings in subfields of psychology. Topics vary from semester to semester and are determined by the interests of both faculty and graduate students. The format of the seminar is optional, and the course may or may not require formal tests of knowledge. Students are urged to complete topical seminars as appropriate.

Research Seminars

Students and faculty engaged or interested in research in particular areas organize these seminars. Participants discuss their own research and other current research in the area.

Teaching Assistantships

Teaching requirements are fulfilled by graduate students serving as teaching assistants to members of the department's faculty, in courses taught in the School of Arts and Sciences. All graduate students are expected to TA a total of four semesters, beginning in the first semester of their second year, continuing consecutively through the second semester of the third year. The Department Chair, Director of Graduate Studies, Department Administrator, and Academic Program Coordinator collaborate to assess the instructional support needs of the department and assign these teaching duties.

Advanced students may apply for a Dean's Teaching Fellowship (https://krieger.jhu.edu/research/deans-teaching-fellowship/). This prestigious fellowship provides graduate students an opportunity to grow both as educators and scholars by allowing them to propose, design, and offer an undergraduate seminar course.

Literature Review

Students complete a written literature review in preparation of the completion of their dissertation. The literature review is modeled on articles appearing in professional journals, and it should be suitable for publication in such a journal. Typically, the review provides a background for the thesis plan, but for some students it may be prepared on a topic other than the one selected for the thesis. The literature review is evaluated by the same committee that will evaluate the thesis plan.

Thesis Plan

At least one calendar year before receiving the Ph.D. degree, each doctoral candidate must develop a plan for the dissertation research and present the plan before a departmental committee. The thesis plan is a detailed document stating the issue the student wishes to address in a dissertation, the experimental design to be used, and the way the student will interpret the various possible results. In essence, it is a proposal for a research project with predictions and preliminary data, rather than results. The outline of the experiments should be sufficiently clear that the readers will fully understand the procedures; the plan should also include a timeline.

This plan should be completed as soon as possible, but no later than the end of the fourth year. Dissertation research cannot proceed until the Thesis Plan has formally been approved. With the committee's approval, the student then prepares a dissertation.

Dissertation

The dissertation represents the student's culminating piece of scholarly work. It establishes the start of a research career and the basis for postgraduate employment. The Graduate Board of the University administers the final oral examination, a defense of the thesis. The doctoral dissertation must be in a form suitable for and worthy of publication.

Financial Support

Support for graduate students comes from many different sources. Domestic and international students in good standing can expect to receive tuition remission and a stipend.

Stipend support is competitive with that at other institutions and provides sufficient funds to live modestly. Stipends may come from research grants held by faculty members, allowing students to collaborate and be paid as research assistants. The university also provides funds for teaching assistants, as well as special fellowships.

All students are encouraged to apply for national awards, fellowships, and scholarships (e.g., NSF Graduate Fellowships). Our students have been remarkably successful at winning these honors.

The Department of Psychological and Brain Sciences is also affiliated with two diverse training programs (http://krieger.jhu.edu/pbs/graduate/training-programs-and-grants/) supported by the National Eye Institute and the National Institute on Aging, including the NIA-supported training grant titled "Research Training in Age-Related Cognitive Disorders." Qualified graduate students are encouraged to discuss relevant and appropriate training grant applications with their advisors. Stipend and tuition remission may be provided to accepted applicants through these and other training programs.

For further information on graduate study in psychology, contact the Academic Program Coordinator *(*ezurbuc1@jhu.edu*) for the* Department of Psychological and Brain Sciences *(*https://pbs.jhu.edu/*).*

Master of Arts in Psychology

A student who has been admitted into the Ph.D. program can earn a Master of Arts degree in partial fulfillment of the requirements for the Ph.D. degree. Normally, candidates for the Ph.D. degree in psychology will qualify for the M.A. degree at the end of their second year, after having completed two area seminars and at least two courses in psychological research design and/or advanced statistics, provided that their performance is of the quality judged satisfactory for the M.A. level. There is no terminal master's program.

Public Health Studies

http://krieger.jhu.edu/publichealth/

Public health combines a prevention orientation with a population perspective in pursuit of better health for all members of society. Public health professionals deal with critical large-scale issues such as access to health care; chronic disease control; mapping, predicting, and containing outbreaks of infectious disease; as well as researching factors such as gender, poverty, and education that contribute to health outcomes. Public health has close ties with medicine through clinical and biomedical research and healthcare policy.

The Public Health Studies Program offers undergraduates a major that links them to the world of public health through core courses taken on the Homewood campus, as well as electives taken at the Johns Hopkins Bloomberg School of Public Health (JHSPH).

Core coursework at Homewood includes Introduction to Public Health, Research Methods in Public Health, Fundamentals of Epidemiology, Environment and Your Health, Fundamentals of Health Policy and Management, Biostatistics, and a course in Social and Behavioral Health. Students also take coursework in Social Sciences, Biology and Calculus. Students will select additional public health coursework from a range of options that include the global health, demography, health economics, medical sociology, history, and politics. The major is flexible and easily adapted to further course work in the natural and social sciences. About two-thirds of Public Health Studies majors complete the premedical core curriculum.

Public Health Studies majors also complete the Public Health Applied Experience as part of their undergraduate degree requirements. This involves a supervised, hands-on experience working with public health professionals. The goal of the applied experience requirement is to ensure that students have practical public health exposure in a research or community setting. Find more information at http://krieger.jhu.edu/publichealth/applied-experience/

The Johns Hopkins Bloomberg School of Public Health is the oldest and largest school of public health in the United States. Although its primary function is as a graduate school, seniors majoring in public health studies take a semester's worth of courses there in fulfilling their B.A. degree requirements. Undergraduates may take classes in any of the 10 departments at JHSPH. Many students also get involved in ongoing research projects at JHSPH.

Available coursework at JHSPH includes the following areas: health education, environmental health sciences, epidemiology, health finance and management, health policy, human genetics, immunology and infectious diseases, international health, maternal and child health, mental health, nutrition, occupational medicine/health protection and practice, population studies, toxicology, and tropical medicine, among others.

An honors option is available to Public Health Studies seniors with a major GPA of at least 3.5. Public Health Honors students complete an independent research project under the supervision of a JHU faculty member and with the guidance of the Honors seminar instructor. Students register for AS.280.495 Honors In Public Health - Seminar in the fall and AS.280.499 Honors in Public Health in the spring. Interested students should discuss their plans with their PHS advisor no later than the spring of their junior year.

Many Public Health Studies students have pursued international public health internships and study abroad opportunities both during the academic year and over the summer. In addition to a wide array of general options available through the JHU Office of Study Abroad, the PHS program runs a public-health specific program during Intersession (3 weeks) in Uganda, which includes both academic and applied components and allows students to earn graded JHU credits which can be used toward the Public Health Studies major. The Uganda program compares health issues in urban and rural settings. For more information, go to krieger.jhu.edu/publichealth/academics/study-abroad/ (http://krieger.jhu.edu/publichealth/academics/study-abroad/).

The Public Health Studies office is located in the 3505 North Charles Building, adjacent to the Homewood campus. Public Health Studies advisors may be consulted about the various courses, careers, and graduate programs in public health on a walk-in basis or by appointment. Student can make an appointment via the PHSCal scheduling system (http://apps.krieger.jhu.edu/phscal). (http://apps.krieger.jhu.edu/phscal/) Information can also be obtained by emailing phstudies@jhu.edu or at https://krieger.jhu.edu/publichealth/.

Bachelor of Arts/Masters Program

The Bachelor of Arts/Master of Health Sciences (BA/MHS) and Bachelor of Arts/Master of Sciences in Public Health (BA/MSPH) programs are a coordinated academic collaboration between the Krieger School of Arts and Sciences and the Johns Hopkins Bloomberg School of Public Health. It enables talented and committed Public Health Studies majors to complete a BA from KSAS and master's degree from the JHSPH in five to six years.

The Department of Environmental Health Sciences, Department of Epidemiology, Department of Mental Health and Department of International Health will consider JHU undergraduates majoring in Public Health Studies for admission to the BA/MHS program. The Department of Environmental Health Sciences also offers a BA/MSPH in Occupational and Environmental Hygiene. The Department of Health Policy and Management offers a BA/MSPH in Health Policy. The Department of Population, Family and Reproductive Health offers two BA/MSPH programs, one in Adolescent Health, and the second in Sexual and Reproductive Health.

Public Health Studies students apply for early admission during their junior year. Admitted students must complete the BA degree before formally enrolling in the graduate school, but up to 16 of the public health credits earned inter-divisionally toward the BA may also apply toward the MHS or MSPH degree. In addition, students in this program will receive co-advising from both schools to optimize their academic experience. Find more information at http://krieger.jhu.edu/publichealth/academics/.

Programs

- Public Health Studies, Bachelor of Arts (p. 2141)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.280.101. Introduction to Public Health. 3 Credits.
This course provides an overview of the field of public health. Topics include the major causes of morbidity and mortality; the socioeconomic, behavioral, and environmental factors that affect health; the analytical methods used in the field; the role of government in protecting the public's health; key features of the U.S. health care system; and current challenges in the field. The course also introduces students to the basic conceptual models and approaches that are central to public health practice. This course is restricted to freshmen. Your enrollment may be withdrawn at the discretion of the instructor if you don't meet one of those criteria.

AS.280.120. Lectures on Public Health and Wellbeing in Baltimore. 1 Credit.
An introduction to Urban Health with Baltimore as a case study: wellbeing, nutrition, education, violence and city-wide geographic variation. Lectures by JH Faculty, local government/service providers and advocates.

AS.280.161. Applications of Biological Concepts in Public Health. 3 Credits.
This course explores the basic biology concepts relevant to public health. Case studies will be used to examine key scientific principles and their application. This course is designed for public health students who are not intending to pursue a career in natural sciences or medicine. This course satisfies the Public Health Studies Biology requirement, but does not satisfy Pre-Med requirement.All freshman must have taken or be currently enrolled in AS.280.101 to register.Department Approval Required.
Area: Writing Intensive
AS.020.151

AS.280.225. Population, Health and Development. 3 Credits.
This course will cover the major world population changes in the past century as well as the contemporary situation and projections for this century. Topics include rapid population growth, the historical and continuing decline of death and birth rates, contraceptive methods as well as family planning and child survival programs, population aging, urbanization, population and the environment and the demographic effects of HIV/AIDS and Covid.

AS.280.240. Research Methods in Public Health. 4 Credits.
This course examines the research process, with an emphasis on formulating research questions, critically evaluating published research, and drawing objective conclusions from a body of scientific literature. Students conduct a systematic review of the scientific literature related to a public health issue. Labs focus on developing and documenting a sound review methodology and communicating the review findings effectively in writing.
Area: Writing Intensive
AS.280.101 AND (AS.280.345 OR AS.200.314 OR EN.553.230 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR EN.553.211 OR AS.200.201) OR (EN.550.111 AND EN.550.112)

AS.280.312. Media, Politics, and Evidence in the History of Public Health. 3 Credits.
This writing intensive course will encourage students to consider what counts as evidence among public health professionals as well as popular audiences. Using case studies from the field of epidemiology, now emblematic of the field, students will learn about historical changes in theories of population health and disease. Through a series of writing assignments, students will interrogate the formal structure of scientific arguments and gain practice in synthesizing and communicating complex ideas to a lay audience. Juniors/Seniors Only
Area: Writing Intensive
AS.280.350

AS.280.320. Seminar on Public Health and Well-being in Baltimore. 3 Credits.
Seminar combines lectures from AS.280.120 with additional readings and discussion to more deeply address urban health issues. The course will revolve around student projects that can impact health and wellbeing in Baltimore. If you are accepted for this course do NOT register for AS.280.120. Course registration is by instructor permission only. You will be asked to provide a brief description of a project in order to determine your potential linkage with this course.This course is utilizing the online active approval process. Permission requests should be submitted via SIS Self-Service upon the opening of your registration period. The instructor will review requests and approve registrations using SIS Self-Service for Faculty. Please note, a request does not guarantee registration into the course. Status inquiries should be address to the instructor or departmental administrator.

AS.280.330. Mind-Body Practices and Public Health. 3 Credits.
This course will focus on mind-body practices and their place in public health. We will learn about different mind-body practices and talk about if/how mind-body practices can help amerliorate the national burden of disease. We will also learn how to identify evidence based practices (EBPs) in public health and learn the core components of designing EBPs. We will then combine what we learned about mind-body practices and designing EBPs to create programs that lessen the burden of disease. The mind-body portion of this course is experiential and will include the practice of meditation, yoga, other mindfulness exercises. You will also be asked to reflect on these practices through journaling.
AS.280.101

AS.280.335. The Environment and Your Health. 3 Credits.
This course surveys the basic concepts underlying environmental health sciences (toxicology, exposure assessment, risk assessment), current public health issues (air, water- and food-borne diseases) and global health threats (climate change, designing healthy communities, and environmental justice).
AS.280.101 OR AS.270.103

AS.280.340. Fundamentals of Health Policy & Management. 3 Credits.
Through lectures and small group discussions, students will develop a framework for analyzing health care policy problems and gain familiarity with current issues including managed care, Medicare and the uninsured.Public Health Studies majors have 1st priority for enrollment. Your enrollment may be withdrawn at the discretion of the PHS program if you are not a PHS major.
AS.280.101

AS.280.345. Public Health Biostatistics. 4 Credits.
Using problem-based learning focusing on public health topics, students learn to describe & summarize data, make inferences regarding population parameters, & test hypotheses. Recommended Course Background: Four years of high school math.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR AS.200.314 OR AS.200.315 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

AS.280.346. Introduction to R Programming for Public Health. 1 Credit.
Formerly known as Advanced Biostatistics Laboratory, a complementary course to 280.345, Public Health Biostatistics, this course teaches R programming skills necessary for conducting independent data analyses, beyond those presented in the main course. No programming experience is necessary, but a willingness to learn independently and work with other students is indispensable.
AS.280.345

AS.280.347. Health Data Analysis Practicum. 3 Credits.
Students will learn to formulate precise scientific and policy questions, design exploratory and confirmatory statistical analyses to address the questions, conduct appropriate analyses using the statistical package R, and communicate their findings through graphical and tabular displays that are presented in writing and in person. The course will be run seminar style in which students conduct data analysis to present to one another in one meeting per week. Evaluation will be through class participation and a final project in which students will analyze their own data set to address a question of their choice. Students need to have taken an introductory statistics course at the level of AS.280.345 (Public Health Biostatistics) and must have some experience using the statistical software R to perform basic analyses.

AS.280.349. Making Work Safer. 3 Credits.
This course explores major health and safety issues that affect workers in the United States, with an emphasis on developing and selecting interventions to prevent occupational injuries. In this course, students will examine the morbidity, mortality, and economic costs associated with work-related injuries; interact with key surveillance systems and other data sources used for tracking such injuries; and apply principles of injury prevention and decision-making through a basic policy analysis process.
AS.280.340

AS.280.350. Fundamentals of Epidemiology. 4 Credits.
A practical introduction to epidemiology focusing on the principles and methods of examining the distribution and determinants of disease morbidity and mortality in human populations. This course is restricted to Public Health Studies only. Any remaining open seats at the start of the semester will open up to all other majors.

AS.280.355. Introduction to Social and Behavioral Determinants of Health. 3 Credits.
Introduces students to a social ecological perspective of population health; Explains key theories and models of health behavior; Describes social and behavioral factors affecting health outcomes; Illustrates the role of factors such as racism, income inequality, social norms, culture, communication and psychological constructs in health outcomes; Demonstrates applications of these theories and models in health behavior research and intervention.
Area: Writing Intensive
AS.280.101

AS.280.360. Clinical & Public Health Behavior Change. 3 Credits.
This course explores the theory and practice of changing the health behaviors of individuals, and the public health and medical impact of doing so. Theoretical concepts are integrated with practical clinical applications, especially in the areas of diet and fitness. Skill building in persuasive, health-related communication will be included in smaller group discussions.

AS.280.365. Public Policy, Politics and Public Health. 3 Credits.
This course is composed of lectures on public policy and political issues that impact the arena of public health. With real-life examples of public health practice in Baltimore and around the country, this course will also expose students to the wide array of opportunities available to those pursuing a career in public health. Throughout the course a major effort will be made to expose students to the wide array of opportunities that are available to those pursuing a career in public health.
AS.280.101

AS.280.380. Global Health Principles and Practices. 3 Credits.
Global health addresses the staggering global disparities in health status, drawing on epidemiology, demography, anthropology, economics, international relations and other disciplines. We review patterns of mortality, morbidity and disability in low and middle income countries, starting with malnutrition, infectious diseases and reproductive health, and continuing to an emerging agenda including mental health, injury prevention, surgical care, chronic diseases, and health impacts of climate change. Gender, health systems and health workforce challenges, and career trajectories in global health are also discussed. Recommended course background: Minimum of one prior course in Public Health.

AS.280.399. Community Based Learning - Practicum Community Health Care. 3 Credits.
This course introduces students to a social structural, justice orientation to public health, with an emphasis on service learning in Baltimore City. Through lectures, class discussions, reflection practices and experiential learning, students will gain an understanding of education, healthcare, housing and other sectors as social determinants of health. The course draws on a social ecological framework and highlights the role of relationships and policies in impacting community resources foundational to health and well-being. Students will choose a community-based organization according to their interests and schedule and, working in teams, complete 45 hours of service-based learning. Grades are based on class participation, completion of a service learning project, group presentation, and papers. Open to Junior Public Health Studies majors and, space permitting, to others upon permission of instructor. This course qualifies as a PHS upper elective; however, it does not satisfy the PHS Applied Experience requirement.

AS.280.438. Reproductive Health in Crisis: Issues in Meeting the Needs of Vulnerable Populations. 3 Credits.
Introduces students to the reproductive health needs of over 65 million people affected by humanitarian, economic, and environmental crises globally. Presents an overview of health care delivery systems in a variety of contexts, and examines the reproductive health consequences of disruptions in service provision during times of crisis. Examines the impact of policies and programs targeting affected groups. Discusses international standards in humanitarian response. Includes discussion of maternal and newborn health, family planning, abortion, and gender based violence. Students develop competency to conduct reproductive health service needs assessments and design an emergency preparedness plan that ensures provision of essential care. For the final project, students apply their skills to plan a response program to meet the reproductive health needs of a specific crisis-affected population. This is a Gordis Teaching Fellowship course.
Area: Writing Intensive

AS.280.439. Ecological Change and Infectious Disease. 3 Credits.
This course will introduce students to key concepts in infectious disease ecology and epidemiology. Students will also learn how key ecological changes are influencing infectious disease dynamics. Ecological changes explored in the course include climate change, water management, deforestation, agriculture, and urbanization. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.335;AS.280.350 can be taken concurrently

AS.280.440. Introduction to Harm Reduction: Principles and Examples in Public Health. 3 Credits.
Harm reduction is an increasingly popular paradigm in public health research and practice. This course introduces students to the principles of and current research in harm reduction. The class will focus on a) history and principles of harm reduction, and appropriate research methods; b) harm reduction & substance abuse and policy; c) harm reduction & sexual health and sex work; d) ethical considerations in harm reduction. This seminar-format course uses journal clubs, small group discussions, and interactive debates. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR EN.553.112 OR EN.550.112 OR EN.553.211 OR EN.550.211

AS.280.441. Social Media and Public Health. 3 Credits.
This upper-level undergraduate research methods design course explores the growing role of social media in public health research. The course first introduces the current social media landscape, tying in different public health and health communication theories of importance to social media research. This is followed by a discussion of qualitative and quantitative research methods that have been used to conduct social media research, as well as the unique ethical considerations presented by this novel field. The course will then delve into each type of social media platform in depth, discussing how public health research has been conducted and how this ever-changing field continues to move forward. By the end of the course, students will have given explicit consideration to the strengths and challenges posed by conducting social media research in public health, and will be able to apply social media research methods to a public health issue of their interest. Some background in research methods is preferred but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.442. Genetics and Public Health. 3 Credits.
DNA is the code of life and variability in this code can be critical in determining human health outcomes. In a post-genomic era with increasingly advanced genetic tools and data it is critical for future public health professionals to understand the role that genetics plays in disease on the individual and population level. More and more, genetics is instructing public health interventions by informing individuals of their risk of acquiring certain diseases, explaining disease etiology, guiding treatment options in the wake of personalized medicine, and may dictate the future of genetic-based disease treatment in the form of gene therapy. The goal of this semester long course is to expand upon basic genetic concepts and apply them to understanding how variation in the human genome can impact health outcomes and inform treatment. We will look at how genetic diseases are inherited, the various ways in which they can manifest as pathology, and how they are discovered and diagnosed. We will also learn how to interpret genome wide association studies and genetic test results and explore the field of genetic counseling. We will finish by looking at the future of genetic medicine by looking at personalized medicine, gene therapy, and gene drive technologies and the potential ethical implications of these interventions. Prior genetics coursework is useful, but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.020.151 AND AS.020.152

AS.280.443. Health-Related Stigma: Concepts, Considerations, and Interventions. 3 Credits.
Health-related stigma plays an important role in health and social outcomes, however its impact on individuals and populations varies according to context. Through readings, discussions, and assignments, students acquire the framework and skills to conceptualize and assess stigma across a range of health domains. To develop their understanding and analytical approach, students examine examples of HIV/AIDS, smoking, obesity, addiction, and mental health stigma. In each case, students consider key questions including: What are the forms and consequences of stigma? What theories apply? What ethical issues exist? How might interventions minimize or leverage stigma for health promotion? Throughout the semester, students also consider broader questions including: When should interventions target stigma? What are the ethical considerations in health-related stigma research? Is stigma always a threat to health? As the course places a strong emphasis on reading, critiquing, and applying health and social scientific literature, knowledge of or experience with psychology, sociology, ethics, and/or statistics is recommended but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted registration as space allows.

AS.280.445. Mental Health and the Gut. 3 Credits.
Explores the strong, bidirectional communication between the gastrointestinal tract and the brain. Reviews the role of the microbiome in shaping brain health, the link between gastrointestinal symptoms and mental health, and new and seminal research on the brain-gut connection in specific psychiatric disorders, including neurodevelopmental disorders, sleep disorders, depression and anxiety, bipolar disorder, schizophrenia and other psychotic disorders, dementia, and Parkinson's/other movement disorders. Develops students' skills in reading and critiquing literature as well as designing and analyzing studies on the microbiome and mental health. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR (EN.553.211 (EN.550.211) OR EN.553.112);Students who have taken AS.280.236 are not permitted to take AS.280.445.

AS.280.446. Quality of Life: Concepts and Challenges in Assessing Wellbeing. 3 Credits.
Quality of life means something different to nearly everyone. While public health and regulatory professionals agree that quality of life matters, developing tools that appropriately conceptualize and evaluate quality of life across varying populations remains a challenge. This course will explore the role of quality of life and other health status and functional outcomes in public health. The course is structured in three segments: 1) Conceptualizing quality of life, 2) Measuring quality of life, 3) Valuing quality of life. The class challenges students to assess the existing landscape in qualityof life research and critically evaluate how diverse literature bases (including psychology, medicine, economics, & regulatory science) have influenced public health research, policy,and practice. Students will also gain experience in analyzing and drawing meaningful research and regulatory conclusions from experience data such as patient reported outcomes and patient preference information. This course will be structured as a seminar featuring lectures, in-class journal clubs, guest speakers, and small-group lab activities. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR (EN.553.211 (EN.550.211) OR EN.553.112)

AS.280.447. Ethical Considerations When Working With Marginalized Populations- A Public Health Perspective. 3 Credits.
Interested in developing best practices to work with marginalized people in public health? This course is for you! We will use a combination of lectures and discussions to critically analyze public health research methodologies at the intersection of ethics, justice, and human rights when working with marginalized populations. The first part of the course is an introduction to theory to equip students with a shared language to understand how marginalization, justice, and ethics are conceptualized in public health. In the second part of the course, students will delve deeper into various public health research methodologies and apply ethical guidelines to a variety of public health cases in the U.S. and internationally. The course will culminate with students designing case studies to present and provide feedback on based on ethical considerations. Gordis Teaching Fellowship course. Priority registration given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.448. Vaccine Development, Epidemiology, and Hesitancy in the Modern World. 3 Credits.
Immunization is one of the most cost-effective and successful public health measures available, but loss of public confidence in vaccines has resulted in the resurgence of vaccine-preventable diseases. This course will review the process of vaccine development and students will understand the use and utility of immunizations for disease prevention. Students will gain an in-depth understanding of the vaccines that have been successfully introduced into routine immunization schedules. This course will discuss post-licensure vaccine surveillance as well as current domestic and international policy issues in vaccine development, supply, delivery and utilization. We will also examine the origins of vaccine hesitancy and discuss the impact of "anti-vaxxers" on immunization coverage and the subsequent return of vaccine-preventable diseases. Students will have the opportunity to work in teams to critically evaluate multi-level interventions to target vaccine hesitancy and improve immunization coverage, and propose a recommendation that will reduce the morbidity and mortality of a specified vaccine-preventable disease. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.449. Corporate Influence on Public Health. 3 Credits.
Corporate practices are an often under-recognized social determinant of health. Corporate-induced disease contributes to morbidity and mortality worldwide, and a better understanding of the mechanisms underlying corporate-induced diseases illuminates pathways by which social and environmental factors influence health. This course will investigate the influence of industry using tobacco, alcohol, sugar-sweetened beverage, food, and pharmaceutical industries as examples, emphasizing ecological models. Students will evaluate the historical and current role of each industry as they effect health outcomes, research, public health policy, and public perceptions and behaviors. Students will use case studies from around the globe that exemplify instances of influence and interference and critically consider the power and activity of multibillion-dollar multinational companies. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.450. The Dreaded R-Word: The Ethics of Rationing and Resource Allocation in Health Care. 3 Credits.
Uwe Reinhardt, the renowned Princeton health economist, once labeled rationing as "the dreaded 'R-word.'" Sarah Palin infamously criticized the Affordable Care Act for, in her view, setting up rationing "death panels." Many others recoil from the idea of rationing, considering it a "heartless, mechanistic withholding of desirable goods or services by faceless bureaucrats." In contrast, "resource allocation" does not typically inspire the same response. Why does the idea of rationing in health care generate such a negative emotional response? Is this response justified? Does rationing differ from resource allocation as a means of setting priorities for health care? Who has the authority to set priorities for health care? On what basis should priorities be set? Why must priorities be set at all? This class addresses questions like these and offers a broad introduction to the ethics of priority-setting in health care. The class will devote significant time to understanding both the conceptual and normative foundations of priority-setting as well as specific proposals for how to set priorities. We will explore priority-setting in health care at both the individual and population level through various case studies including organ transplants and flu pandemic preparation. We will discuss priority-setting in the context of public health and universal health coverage and explore the role of global organizations like the World Health Organization and World Bank in setting priorities for health care. We will also consider whether priority-setting is compatible with the pursuit of social justice. Gordis Teaching Fellowship course.

AS.280.451. Born a Girl: Issues in Women's Health From a Life Course Perspective. 3 Credits.
The discussion surrounding women's health has often remained limited to understanding women's reproductive health needs. This course seeks to move beyond this topic to explore the key issues affecting women's health, utilizing a life course perspective. This undergraduate course will focus on a select number of themes including: a) understanding the history of women's health; b) sexual and reproductive health; c) maternal health; d) violence against women and girls; e) the needs of younger girls and aging women; and f) how mental health and stigma affect women. The course brings both U.S. and global perspectives to enhance the understanding of how the field of women's health has evolved over time. It will also address some of the challenges public health professionals continue to face in addressing the health and wellbeing of women today. This seminar-style course combines class presentations with journal clubs and small group discussions. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.452. Policy, Politics, and Power in Health Equity. 3 Credits.
Health disparities are avoidable, unjust differences in health opportunities and outcomes related to factors such as race and ethnicity, education, class, citizenship, disability, sex and gender identity, and sexual orientation. These disparities reflect the systems that distribute resources, privileges, and power across society and mediate exposure to physical and mental health hazards such as economic deprivation, discrimination, violence, unhealthy environments, uninsurance, and inadequate medical care. Health equity, which is often referred to as social justice in health, is an ethical value that drives efforts to eliminate these disparities. As the National Academy of Medicine asserts in each of its reports, "Knowing is not enough; we must apply. Willing is not enough; we must do." The purpose of this course is to introduce students to essential concepts, literature, and policy issues related to health disparities and to prepare them to use their knowledge to build effective policy strategies in support of health equity. Gordis Teaching Fellowship course. Completion of AS.280.340/ Fundamental of Health Policy Management is recommended, but not required.Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.453. Contemporary Social Movements in Public Health. 3 Credits.
Health social movements attempt to alter power structures in order to achieve greater health equity, promote access to resources, and change perceptions of disease. But what distinguishes a moment from a movement? Under what conditions can health social movements lead to lasting policy and social change? Together we will explore a wide range of contemporary health social movements such as Black Lives Matter, MeToo, gun reform, US healthcare reform, environmental movements, and others. We will analyze the types of goals, resources, and tactics used in these movements and consider their contributions to the shaping of health-related policies and practices. Students will demonstrate their understanding of course themes through quizzes, written assignments, class discussions, and brief presentations. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.454. What is the Link Between Oppression and Mental Health? Combining Theory, Concepts, and Empirical Science to Explain Minority Mental Health. 3 Credits.
In this three-module course, students will first gain knowledge on the theoretical orientations that inform the social determinants of health, in combination with conceptual approaches in the field of trauma and violence research, in order to formulate a theoretical, conceptual, and empirical understanding of minority mental health. In the final module, students will study select mental health concerns (e.g., trauma, depression, anxiety, suicide) that affect specific minority populations, including discussions around the lived experiences of minority mental health. This culminates in a final group presentation on empirical research from an approved minority mental health topic of their choice that will be delivered as a TED-style talk. The course will run with graduate-level expectations. Students should anticipate weekly reading assignments to inform group lab presentations and discussions. There will be three brief individual writing assignments of 5 pages or less that critically analyze current minority mental health research. Upon completion of the course, students will be able to discuss minority mental health research with the necessary contexts of theory, research, and life stories that inform current public mental health approaches. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
Students cannot take this course is they are taking AS.194.301.

AS.280.455. Understanding and Engaging Adolescents in Public Health Context. 3 Credits.
Adolescent health is an increasingly important component of the public health agenda. As adolescence is a unique and pivotal stage of life, a rich understanding of this population is important for successful public health engagement. This seminar-style course seeks to provide a foundation for those interested in adolescent health and support effective engagement with adolescent populations. The first half of the course offers theoretical and contextual insights on adolescents—ranging from discussing public health significance, to developmental and life course perspectives, to influences across socioecological levels. The course then delves into practical and methodological considerations for working with this population including ethical matters, insights on reaching adolescents, and approaches to collecting information. This course culminates with deliberations of successful examples of engaging adolescents in public health as well as the future of the adolescent health field. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.456. Introduction to Vaccinology. 3 Credits.
Over the past century, vaccines have a made a tremendous impact on human health, averting an estimated 2-3 million deaths each year. This course aims to introduce students to the interdisciplinary field of vaccinology by building the vocabulary and skills necessary to critically evaluate existing and future vaccines and vaccine programs. Topics include the parameters used to characterize vaccines, the vaccine development pathway, vaccine policy and emerging topics in vaccinology. Although the primary focus of the course will be on the public health aspects of vaccinology, we will also cover key biological principles. At least one semester of biology is strongly recommended as a pre-requisite for this course. Gordis Teaching Fellowship course. Priority registration will be give to Public Health Studies majors.
AS.280.101 AND AS.280.240

AS.280.457. Cohorts and Trials: Interpreting Evidence in Epidemiology. 3 Credits.
How do we know smoking is a risk factor for heart attacks? Why did the NIH invest millions of dollars into the Atherosclerosis Risk in Communities (ARIC) Study or the Systolic Blood Pressure Intervention Trial (SPRINT)? When does the FDA accept a vaccine or drug as safe for use? Why do studies disagree about whether coffee is good or bad for health? This course delves into how two major study designs—cohorts and clinical trials—are used to build and interpret a body of epidemiologic evidence, including the practical context of how cohorts and trials are devised, proceduralized, and funded within the larger scientific enterprise. This is a discussion-based class; active sessions modeled after research journal clubs and consortium workgroups drives peer-to- peer learning along with literature-based lecture. Gordis Teaching Fellowship course. Priority registration will be give to Public Health Studies majors.
AS.280.350

AS.280.458. Monitoring, Evaluating, and Learning to Improve Public Health Programs. 3 Credits.
This course introduces basic principles and methods for monitoring and evaluating public health programs. The course will familiarize students with different types of program evaluation, including formative and summative evaluations, and with approaches to monitor and improve program performance. Students will apply their knowledge to design a logic model, formulate evaluation questions, and identify appropriate quantitative and qualitative methods to answer those questions.Additionally, students will reflect on the importance of conducting evaluations that meet the needs of stakeholders and strategies for integrating an equity focus into the design of evaluations. The goal of the course is to help students to think critically and provide them with the practical skills to monitor, evaluate, and learn from data to improve program implementation and public health impact. Gordis Teaching Fellowship course. Priority registration will be given to Public Health Studies majors.
AS.280.350

AS.280.459. Statistics for Humans: Failures, Values, and Conflicts in Data Science. 3 Credits.
Data does not speak for itself, and the way we use data is a matter of choice. This course will explore the human element of statistics: how statistics drive decision-making, how people can be deceived by statistics, what problems data science poses for the 21st century, and other topics. Case studies in public health will be emphasized. A previous course is statistics is recommended. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.460. Urban Health: Global Perspectives for Sustainable Development. 3 Credits.
Urban health is a growing area of public health focus around the world. The interdisciplinary nature of this field of study presents a unique challenge for researchers and policy makers, but also a critical opportunity to share and integrate knowledge using a systems thinking framework.The seminar style course will consist of a brief introduction to the goals and frameworks of urban health planning, followed by four urban case studies represented by four cities around the world at varying stages of industrialization. Material will be guided by discussions and debates about pressing urban health topics. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.101 AND AS.280.335

AS.280.461. Exploring Food Insecurity Through a Racial Equity Lens. 3 Credits.
This course will apply a racial equity lens to explore the issue of food insecurity in the US, including the history, measurement, and current strategies to reduce food insecurity at the national, regional, and local levels. Students in the course will explore how they can take individual action to contribute to dismantling racism and fighting against the root causes of food insecurity. This course will require students to critically reflect on readings and discussions that explore the connection between systems of oppression and food insecurity. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.462. Practicing Equity in the American Healthcare System. 3 Credits.
This course provides a broad orientation to key structures within the American healthcare system and their role in promoting health equity. These structures include providers, payers, local health departments, evidence development, health information technology and innovative policy. This course will emphasize practical experience with these structures in the context of health equity through case studies within the class and an integrative project in which students will plan and execute their own project. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.340

AS.280.463. International Nutrition in the Time of the COVID-19 Pandemic. 3 Credits.
Malnutrition remains one of the largest public health issues in low and middle income countries (LMICs); it has been estimated that 1 in 9 individuals globally remain hungry, and malnutrition related factors contribute to 45% of deaths in children under 5 years old. While global progress has reduced the burden of malnutrition in the past two decades, much of the progress could be undone by the impacts of COVID-19. This course will review the causes and the burden of malnutrition in LMICs and will provide students with the understanding of the various types of malnutrition. This course will discuss the multi-sectoral nature of malnutrition and the role each sector has in addressing malnutrition. In light of recent events, many of these sector's normal operations have been disrupted by the COVID-19 pandemic and disease transmission mitigation strategies. We will examine how the COVID-19 pandemic has influenced these sectors and the anticipated effects on malnutrition. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.464. Risk, Resilience, and Public Health Engagement with Marginalized Communities. 3 Credits.
In public health research and practice, marginalized populations are frequently labeled as "at risk" for negative health outcomes and as being more likely to engage in "high risk" behaviors. All too often, risk assessments and behavior change efforts target individuals without adequate consideration of social and environmental factors contributing to risk and vulnerability. The concepts of resilience and protective factors have gained attention in public health for their focus on supporting positive mental and behavioral health in the face of adversity. This seminar-style course will explore the core concepts of risk and resilience from the perspective of multiple disciplines (e.g. anthropology, epidemiology, and more), delving into each construct's underlying conceptual frameworks, methods of assessment, contributing factors on multiple levels, and evidence-based interventions to support resilience and mitigate risk. Students will then use these core concepts to reflect on meaningful engagement with marginalized populations when assessing and addressing risk and resilience, explore the meaning and consequence of categorizing people based on their risk behavior, and become familiar with cross cultural perspectives on these topics. The course will conclude with a deliberation of future directions risk and resilience examined through a public health equity lens. Students are expected to actively engage with assigned readings and in-class discussions, and will have the opportunity to pursue topics of interest through individual assignments. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND AS.280.240

AS.280.465. Beyond the Peer-Reviewed Article: Embodying Public Health Data for Human Consumption. 3 Credits.
As public health researchers and practitioners, one of the most important and in-demand skills is the ability to communicate data to effect population-level change. This course will explore concepts and case studies in data visualization, ethical data dissemination, and evidence-based advocacy. This course will cover strategies for presenting data that are approachable for lay audiences. Students will gain familiarity with key tools, media, and software to support data visualization and dissemination through lectures, case studies and course assignments. The course will culminate with an applied assignment which calls upon students to collaborate with Bloomberg School of Public Health faculty to utilize data from current research to effectively communicate key messages to non-specialist audiences. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350;AS.280.345 OR EN.553.211 OR EN.553.230 OR AS.200.314 OR AS.200.315 OR EN.553.310 OR EN.553.311 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR AS.200.201

AS.280.466. Rethinking Prevention: Emerging and Novel Approaches to Addressing Adolescent Drug Use. 3 Credits.
Students in this upper-level course will be introduced to the unique needs and public health considerations when working with adolescent populations, specifically in preventing substance use and substance use disorders. Students will explore the etiology and epidemiology of substance use and substance use disorders in young people, as well as the history of substance use prevention while tackling topics of racism, stigma and oppression of those who use drugs. Progressing through the course, students will be introduced to novel and emerging ways the field is rethinking drug prevention, including the use of social media platforms, mindfulness in schools and phone apps. New tools for epidemiologic surveillance of populations will also be considered, such as machine learning and ecological momentary assessment. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.101;AS.280.355 OR AS.230.341

AS.280.467. Adverse Childhood Experiences: A Public Health Perspective. 3 Credits.
This seminar explores the scientific evidence underlying the impact of Adverse Childhood Experiences (ACEs) on various health outcomes. It first describes the prevalence of ACEs, which include abuse, neglect, and household challenges such as parental substance abuse, mental illness, separation or divorce, and incarceration. The course will then discuss mechanisms and risk and protective factors of negative health outcomes following ACE exposure across levels of a socioecological model. These discussions will directly inform the next part of the seminar, which presents evidence-based interventions for ACEs. Throughout the seminar, students will be active participants and will have the opportunity to explore their topics of interest. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.240

AS.280.468. Food Security in America. 3 Credits.
As of July 2021, 1 in 6 households reported experiencing food insecurity in the United States, with Black, Indigenous, and People of Color (BIPOC) populations disproportionally affected. Food insecurity has been a public health issue in America for decades, with COVID-19 exacerbating existing hardships and disparities resulting from inequitable policies and distribution of resources in communities. This course seeks to provide a critical understanding of the issue of food insecurity in America through describing and evaluating the existing policies, programs, and practices in the United States that aim to promote food security. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND AS.280.340

AS.280.469. How Inequity Persists in Statistics: Lessons Learned and Future Challenges. 3 Credits.
The course will examine the past, present, and future of statistics' impact on equity. We will discuss how early statistical thinking was used to defend racist narratives and how inequitypersists in statistics to this day. We will explore current and future challenges using examples from artificial intelligence. Students will learn how to implement common artificial intelligencemethods and communicate their results. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND (AS.280.345 OR (EN.553.211 OR AS.200.314 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR AS.200.201))

AS.280.495. Honors In Public Health - Seminar. 3 Credits.
Using lectures, oral presentations, and writing assignments, this seminar is designed to assist Public Health Studies majors in writing a senior thesis. Students will formulate their topics, develop research skills, and address issues of professional ethics. Participating in this seminar is required for students pursuing honors in Public Health Studies. Permission Required. Classes will be held at Bloomberg School of Public Health.
Area: Writing Intensive

AS.280.499. Honors in Public Health. 3 Credits.
A research methods seminar to prepare students doing honors in Public Health Studies. Permission Required.
Area: Writing Intensive

AS.280.500. Applied Experience-Public Health. 1 Credit.
Perm. Req'd, Public Health Majors Only. This is a supervised, hands-on experience working with public health professionals. Students will complete 80 hours of applied work and will submit a synthesizing assignment at the end of the term. Students completing their AE in the current semester will be enrolled in Section 2. Students whose time will roll over to an additional grading period will be enrolled in Section 1. Please contact your PHS Advisor for complete details.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.501. Internship-Public Health. 1 Credit.
Permission Required. Public Health majors only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.502. Internship-Public Health. 1 Credit.
Permission Required. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.505. Research in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.506. Research in Public Health. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.511. Research for Juniors/Seniors in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.512. Research for Juniors/Seniors in Public Health. 0 - 3 Credits.
Restricted to public health studies majors. Consult the public health studies adviser for procedure. Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.590. Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.595. Special Studies in Public Health. 1 Credit.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.597. Research in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Agora Institute

AS.196.302. Science and Democracy. 3 Credits.
What role does scientific expertise play (or not play) in American democracy? What role should scientific expertise play (or not play) in American democracy? These are the key questions we'll address in this class, focusing on a wide range of examples such as government responses to public health crises, environmental crises, and war. We'll tackle these questions from multiple angles, drawing on ideas from across the social sciences, including political science, psychology, sociology, economics, history, and communication. We'll focus largely on the United States, though in some cases compare the US experience with other democracies to understand how unique aspects of our democratic institutions influence the link between science and democracy.

Behavioral Biology

AS.290.420. Human Sexual Orientation. 3 Credits.
This course will examine the historical and current theories of sexual orientation and sexual variation development by examining the biological, psychological and social contributing factors that influence the development of sexual orientations and variations along with treatment and modification of problematic sexual behaviors. Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester. Priority given to Behavioral Biology majors. Note: For credit towards a Psychology major, students should register for AS.200.204 Human Sexuality, rather than this course.
Prerequisite(s): Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester.
Students may receive credit for either AS.200.204 or AS.290.420, but not both.

Earth & Planetary Sciences

AS.271.107. Introduction to Sustainability. 3 Credits.
Humans are having such a massive impact on Earth systems that some call this the Anthropocene epoch. Should we consider this state of affairs progress or catastrophe? How to we find a sustainable path to the future? This course provides an interdisciplinary introduction to the principles and practice of sustainability, exploring such issues as population, pollution, energy and natural resources, biodiversity, food, justice, and climate change through the lens of systems thinking. Course open to freshmen, sophomores, and juniors. Seniors by instructor permission only.

AS.271.360. Climate Change: Science & Policy. 3 Credits.
Prereq: 270.103 or permission of instructor.This course will investigate the policy and scientific debate over global warming. It will review the current state of scientific knowledge about climate change, examine the potential impacts and implications of climate change, explore our options for responding to climate change, and discuss the present political debate over global warming.

Economics

AS.180.289. Economics Of Health. 3 Credits.
Application of economic concepts and analysis to the health services system. Review of empirical studies of demand for health services, behavior of providers, and relationship of health services to population health levels. Discussion of current policy issues relating to financing and resource allocation.
AS.180.102

AS.180.390. Health Economics & Developing Countries. 3 Credits.
Benefits of good health and its costs. Health demand and supply in poor countries. Welfare economics of Public Health. This is a writing seminar. There are some lectures on how to write a paper and on the substance of the economics of international health but the focus and only assignment is a 40-page paper by each student under the supervision of the instructor.
Area: Writing Intensive
AS.180.301 or AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

Environmental Health and Engineering

EN.570.108. Introduction to Environmental Engineering and Design. 3 Credits.
Overview of environmental engineering including water/air quality issues, water supply/ wastewater treatment, hazardous/solid waste management, pollution prevention, global environmental issues, public health considerations/environmental laws, regulations and ethics.Cross-listed with Public Health Studies.

First Year Seminars

AS.001.187. FYS: Gender x Aging x Health in America. 3 Credits.
In this First-Year Seminar students will develop an understanding of the ways in which gender structures health and well being through adulthood and later life. The experience of sexual minorities and the ntersection of gender with class and ethnicity will also be discussed. Students will be expected to participate actively and lead discussions on specific topics.

History of Science, Medicine, and Technology

AS.140.105. History of Medicine. 3 Credits.
Course provides an introduction to health and healing in the ancient world, the Middle Ages, and the Renaissance. Topics include religion and medicine; medicine in the Islamicate world; women and healing; patients and practitioners.

AS.140.106. History of Modern Medicine. 3 Credits.
The history of medicine and public health from the Enlightenment to the present, with emphasis on ideas, science, practices, practitioners, and institutions, and the relationship of these to the broad social context.

AS.140.227. Race, Racism and Medicine. 3 Credits.
How can we think about the interconnections between racism, theories of race and the practice of medicine? Living at a moment when racial disparities in health outcomes in the United States are still very stark, this course will provide a historically grounded approach to thinking about the roles that race and racism have played in healthcare, the production of health disparities as well as the role of medicine in the development of racist thought. While much of this course will focus geographically within the United States, this class will also explore global histories of medicine, encountering questions of race and medicine in Africa, the South Pacific and Asia. In addition to the analysis of primary source documents and historical texts, students will also be introduced to theoretical approaches to the study of race and racism from W.E.B. Dubois, Sylvia Wynter, Frantz Fanon and others.
Area: Writing Intensive

Medicine, Science and the Humanities

AS.145.202. Health Care Activism in Baltimore and Beyond. 3 Credits.
National struggles over the right to health care, and over the health needs of marginalized groups, have taken distinctive forms in Baltimore City during the past century. The renowned Johns Hopkins University came to symbolize, for many residents, the power of medicine both to heal and to harm – and the need for community action. This course delves into the archives of local institutions to understand the work of activists and advocates who connected health, medicine, and social justice. We focus on specific sites, from the segregated wards of Johns Hopkins to the People's Free Medical Clinic on Greenmount Avenue, where demands for equity changed the city's health care landscape. Through interdisciplinary readings and conversations with local organizers, we consider how historical memory can serve as a creative resource for the art and politics of the present.
Area: Writing Intensive

Philosophy

AS.150.219. Introduction to Bioethics. 3 Credits.
Introduction to a wide range of moral issues arising in the biomedical fields, e.g. physician-assisted suicide, human cloning, abortion, surrogacy, and human subjects research. Cross listed with Public Health Studies.
Area: Writing Intensive

Political Science

AS.190.405. Food Politics. 3 Credits.
This course examines the politics of food at the local, national, and global level. Topics include the politics of agricultural subsidies, struggles over genetically modified foods, government efforts at improving food safety, and issues surrounding obesity and nutrition policy. Juniors, seniors, and graduate students only. Cross-listed with Public Health Studies. A student who takes AS.190.223 (Understanding the Food System) in Summer 2021 cannot also enroll in this course.
Area: Writing Intensive
A student who takes AS.190.223 (Understanding the Food System) cannot also enroll in this course.

Sociology

AS.230.150. Issues in International Development. 3 Credits.
Why do billions of people continue to live in poverty? What obstacles stand in the way of secure and dignified lives for all? Who is most likely to bring about change, what strategies should they follow, and what kinds of institutions should they put in place? This course will introduce the main theoretical perspectives, debates, and themes in the field of international development since the mid-20th century. It has three sections. The first section focuses on debates over the optimal conditions and strategies for generating economic growth and on the relationship between growth, human welfare, and inequality. The second section presents critical assessments of development interventions from various perspectives. The third section considers the role of social movements in shaping development and social change in the 21st century.

AS.230.324. Gender and International Development. 3 Credits.
This course employs a comparative perspective to examine the gendered impact of international development experiences and policies. Students will discuss the historical evolution of how the concept of gender has been constructed, conceptualized, and integrated into international development theory and practice. The course will also examine how greater international development. In particular, we will examine structural theories of poverty reduction, individual theories of power and processes of stratification at the household and family level. Specific issue areas will include the globalization, class and work political participation and social movements. Cross-listed with International Studies (CP, IR). Fulfills Economics requirement for IS GSCD track students only.
Area: Writing Intensive

AS.230.335. Medical Humanitarianism. 3 Credits.
Humanitarian organizations play life-preserving roles in global conflicts, and have front-row views of disasters ranging from the 2010 Haiti earthquake to the 2011 Fukushima tsunami in Japan. Yet even while they provide vital assistance to millions of people in crisis, such organizations are beset by important paradoxes that hinder their capacity to create sustainable interventions. They work to fill long-lasting needs, but are prone to moving quickly from one site to the next in search of the latest emergency. They strive to be apolitical, yet are invariably influenced by the geopolitical agendas of global powers. How do such contradictions arise, and what is their impact upon millions of aid recipients around the world? Drawing on case studies from South Sudan to Haiti, this course addresses these contradictions by exploring how and why medical aid organizations attempt, and sometimes fail, to reconcile short-term goals, such as immediate life-saving, with long-term missions, such as public health programs and conflict resolution initiatives.

AS.230.341. Sociology of Health and Illness. 3 Credits.
This course introduces students to core concepts that define the sociological approach to health, illness and health care. Topics include: health disparities, social context of health and illness, and the Sociology of Medicine.

AS.230.358. The Politics of Mental Health. 3 Credits.
This course examines how the psy disciplines – psychology, psychiatry, psychotherapy and related fields – create knowledge about the mind, and how these fields have in turn shaped political and social life since early 20th century. We will explore how the psy disciplines have proven useful to projects of state building by reconstructing the human mind as a calculable, quantifiable entity, one that can be measured and governed across diverse educational, military, and healthcare settings. We will then ask how psychiatric categories such as bipolar disorder and PTSD (post-traumatic stress disorder) were created, and consider their impact on both the legal/medical management of illness and on lay and expert notions of sanity and normality. Finally, we will examine the rising influence of humanitarian mental health interventions, and immerse ourselves in the debates they have engendered concerning the use of psychotherapy to alleviate suffering in war and disaster zones.
Area: Writing Intensive

AS.230.393. Global Health and Human Rights. 3 Credits.
Is access to healthcare a fundamental human right? If so, then which global actors are obligated to provide healthcare to whom, and for how long? How do meanings of health and illness vary across time and place? And finally, how are human rights principles translated into frontline practice in order to promote well-being? This course takes a critical interdisciplinary approach to these questions through a series of global case studies ranging from humanitarian aid in post-tsunami Sri Lanka to anti-FGM (female genital mutilation) campaigns in Ghana. How do international NGOs, UN bodies, and governments collaborate (or compete) to distribute healthcare in places beset by dire resource shortages? Do human rights principles carry legal weight across borders, and if so, could access to healthcare services and essential medicines be litigated in order to compel governments to provide it? And finally, what cultural assumptions do human rights discourses carry with them, and what happens if rights-based approaches are poorly received by recipient populations? Moving beyond the basic principle of healthcare as a human right, this course aims to bring this idea's history and politics into focus by offering an in-depth exploration of its ethics and implementation.
Area: Writing Intensive

For current faculty and contact information go to http://krieger.jhu.edu/publichealth/directory/

Public Health Studies, Bachelor of Arts

Public Health Studies Major Requirements

(Also see General Requirements for a Bachelor's Degree (p. 1587).)

All courses must be taken for a letter grade and not S/U, unless the course is not offered as a graded course. You must earn a C- or higher to count courses toward your Public Health Studies Degree. Hyperlinks are included to view all course descriptions and requirements. Major requirements are as follows:

Code	Title	Credits
Foundation Courses		
Quantitative		
AS.110.106	Calculus I (Biology and Social Sciences)	4
or AS.110.108	Calculus I (Physical Sciences & Engineering)	
Natural Science		
Select two Biology Lecture Courses of the following: [1]		6-8
AS.020.151	General Biology I	
AS.020.152	General Biology II	
AS.020.303	Genetics	
AS.020.305	Biochemistry	
AS.020.306	Cell Biology	
AS.020.374	Comparative Physiology	
AS.280.161	Applications of Biological Concepts in Public Health	
Select one Biology Lab Course of the following:		1-4
AS.020.153	General Biology Laboratory I	
AS.020.154	General Biology Lab II	
AS.020.315	Biochemistry Project lab	
AS.020.316	Cell Biology Lab	
AS.020.340	Developmental Genetics Lab	
AS.020.377	Comparative Physiology Lab	
AS.250.253	Protein Engineering and Biochemistry Lab	
AS.250.254	Protein Biochemistry and Engineering Laboratory	
Social Science		
Select two introductory social science courses from Table 1. Other courses may apply with advisor approval. These courses must be from two different departments.		6
Public Health Studies Core Courses		
AS.280.101	Introduction to Public Health (Fall & Spring)	3
AS.280.240	Research Methods in Public Health (Fall & Spring)	4
AS.280.335	The Environment and Your Health (Fall & Spring)	3
AS.280.340	Fundamentals of Health Policy & Management (Spring)	3
AS.280.345	Public Health Biostatistics (Fall) [2]	4
AS.280.350	Fundamentals of Epidemiology (Fall & Spring)	4
Intermediate Public Health Courses at Homewood		
One course at the 200-400 level focusing on social and behavioral aspects of public health from the list below. Please see your PHS advisor for a list of current courses that will satisfy the requirement.		3
AS.230.341	Sociology of Health and Illness (other options may be approved by your advisor)	3
AS.280.355	Introduction to Social and Behavioral Determinants of Health	3
Three additional Public Health courses at the 200-400 level. [3]		9
Applied Experience		
AS.280.500	Applied Experience-Public Health [4]	1
Courses at Johns Hopkins Bloomberg School of Public Health (JHSPH) [5]		
Bloomberg School of Public Health Courses		10
Total Credits		**67-72**

1. Or Equivalent
2. Other statistics courses may apply with advisor approval.
3. All courses must be at least 3 credits and only 2 Gordis Teaching Fellowship (GTF) courses may apply (AS.280.4xx courses).
4. The Applied Experience (AE) is a required experiential learning component of the Public Health Studies curriculum. The purpose of the AE is to provide students with supervised, hands-on experience in a professional public health setting. The Applied Experience gives students an opportunity to explore an area of interest within the field of public health by actively engaging in and directly contributing to a

public health project or program. The AE must be at least 80 hours and 4 weeks long under the supervision of a public health profession.

5 Courses are taken at the Johns Hopkins Bloomberg School of Public Health in the student's final year. Students take 15 JHSPH credits, which is the equivalent of 10 Homewood credits. Blended courses may count for this requirement, Independent Research and Special Studies will not. Online courses will count toward you total number of credits needed to graduate, but will not count toward the 15 credits needed to fulfill this specific requirement. Within the 15 credits, students must create an 8 credits focus in one particular area, topic, or department.

Sample Program of Study

While there are many paths through the requirements, a typical program might include the following sequence of Public Health Studies requirements. Your personal sequence of courses may look very different. Work with your PHS advisor to ensure you are satisfying all program requirements.

Course	Title	Credits
First Year		
First Semester		
AS.280.101	Introduction to Public Health	3
AS.020.151	General Biology I	3
AS.020.153	General Biology Laboratory I	1
AS.110.106 or AS.110.108	Calculus I (Biology and Social Sciences) or Calculus I (Physical Sciences & Engineering)	4
Introductory Level Social Science from Table 1		3
	Credits	**14**
Second Semester		
AS.020.152	General Biology II	3
Introductory Level Social Science from Table 1		3
	Credits	**6**
Second Year		
First Semester		
AS.280.345	Public Health Biostatistics	4
AS.280.335	The Environment and Your Health	3
	Credits	**7**
Second Semester		
AS.280.240	Research Methods in Public Health	4
AS.280.350	Fundamentals of Epidemiology	4
AS.280.340	Fundamentals of Health Policy & Management	3
	Credits	**11**
Third Year		
First Semester		
Social/Behavioral Aspects of Public Health Course		3
	Credits	**3**
Second Semester		
AS.280.500	Applied Experience-Public Health (if not taken First Semester)	1
Upper Level Public Health Elective (200-400 level)		3
	Credits	**4**
Fourth Year		
First Semester		
Bloomberg School of Public Health Courses		4-6
Upper Level Public Health Elective (200-400 level)		3
	Credits	**7-9**
Second Semester		
Bloomberg School of Public Health Courses		4-6
Upper Level Public Health Elective (200-400 level)		3
	Credits	**7-9**
	Total Credits	**59-63**

Table 1

Approved Introductory Level Social Science Courses. Students matriculating after 2017 or later must take these from two different departments:

Code	Title	Credits
AS.070.132	Invitation to Anthropology	3
AS.140.105	History of Medicine	3
AS.140.106	History of Modern Medicine	3
AS.150.219	Introduction to Bioethics	3
AS.180.101	Elements of Macroeconomics	3
AS.180.102	Elements of Microeconomics	3
AS.190.220	Global Security Politics	3
AS.190.284	Classics of Political Theory: Political Freedom	3
AS.200.101	Introduction To Psychology	3
AS.200.110	Introduction to Cognitive Psychology	3
AS.200.132	Introduction to Developmental Psychology	3
AS.200.133	Introduction to Social Psychology	3
AS.200.209	Personality	3
AS.200.212	Abnormal Psychology	3
AS.200.222	Positive Psychology	3
AS.230.101	Introduction to Sociology	3
AS.230.150	Issues in International Development	3
AS.271.107	Introduction to Sustainability	3
AS.360.247	Introduction to Social Policy and Inequality: Baltimore and Beyond	3
EN.570.108	Introduction to Environmental Engineering and Design	3
EN.570.110	Introduction to Engineering for Sustainable Development	3

Honors in Public Health Studies

An honors option is available to Public Health Studies students in their final year with a major GPA of 3.5. Public Health Honors students complete a year long independent research project under the supervision of a JHU faculty member and the guidance of the Honors seminar instructor. Students must register for both AS.280.495 Honors In Public Health - Seminar in the fall and AS.280.499 Honors in Public Health in the spring. Interested students should discuss their plans with their PHS advisor no later than the spring of their junior year. Students may not count the honors courses towards any other requirement of the major; they are in addition to major requirements.

Social Policy

http://krieger.jhu.edu/fields/social-policy/

Social policy is the study of policy solutions to the problems of education, inequality, poverty, crime, and other issues faced by society's families and children. It is an interdisciplinary field to which the disciplines of economics, sociology, and political science contribute in equal measure. It is a basic-science field with a strong applied-research focus that can prepare students for careers in government, nonprofits, and the private sector. Students who undertake the social policy minor will work with faculty who are experts in the study of poverty, the labor market, social demography, family structure, educational inequality, political participation, organizational dynamics, and health and welfare policy. They will be strongly grounded in social science training and will apply that training to real-world applications and policies. In the minor, students will be motivated to think about how knowledge translates into policy solutions, making this an appropriate specialization for young people who plan to attend law school, programs in public health, or graduate school in the constituent social science field.

Programs

Social Policy, Minor

Social Policy Minor Requirements

Social Policy Minor Program is not offered in the 2022-2023 Academic Year

A Social Policy minor is offered jointly by the Departments of Economics, Political Science, and Sociology. To complete the minor, students must take an introductory course, Introduction to Social Policy and Inequality: Baltimore and Beyond; a 300-level social policy elective in one of the three departments; the Baltimore Policy Fellowship; and a capstone course to be taken after the semester is completed. The preferred sequence is for students to take the introductory course in their freshman or sophomore years, the elective in the fall of their junior year, the Baltimore Policy Fellowship semester in the spring of their junior year, and the capstone course in their senior year. However, modifications in the sequence will be considered. The Fellowship semester will involve course work focusing on urban and national social policy problems coupled with an internship in Baltimore or Washington in a governmental agency or non-governmental organization that is involved with some aspect of social policy, or as a research assistant to a faculty member conducting research on social policy. The capstone course will involve discussion and research among students who have completed the Fellowship semester and is intended to build upon experiences in that semester.

Enrollment in the Fellowship semester will be limited to 15 and requires application and admission. The Social Policy Minor is grounded in the three disciplines and priority will be given to students who are majoring in Economics, Political Science, or Sociology, but students with other majors will be considered.

A list of electives to be used to fulfill the 300-level social policy elective is available on the Social Policy Program website (http://krieger.jhu.edu/socialpolicy/). Students can identify these courses in the schedule of classes as they will have a POS-Tag of SPOL-UL.

Students interested in the minor should contact the Director of the Social Policy Program, by sending a message to socialpolicy@jhu.edu.

All courses must be taken for a letter grade and a grade of C- or better must be earned in all minor requirements.

Program Requirements

Code	Title	Credits
AS.360.247	Introduction to Social Policy and Inequality: Baltimore and Beyond	3
AS.360.401	Social Policy Seminar	3
One 300- or 400-level approved social policy elective course from the Economics, Sociology, or Political Science Department		3
Baltimore Policy Fellowship semester		
AS.190.380	The American Welfare State	3
AS.230.357	Baltimore and Beyond	3
AS.360.308	Policy and Practice in Human Services	3
AS.360.331	Methods for Policy Research	3
AS.360.366	Public Policy Writing Workshop	3
Total Credits		**24**

Sociology

http://soc.jhu.edu/

The Department of Sociology concentrates on two broad areas at the graduate and undergraduate levels: Global social change, which focuses on cross-national, comparative research; and social inequality, which primarily focuses on family, education, work, race, gender, policy, and immigration.

These concentrations trace back to the department's founding in 1959 by renowned American sociologist James Coleman. The department has since earned a reputation as one of most selective, personalized sociology departments in the U.S. Currently home to 19 faculty members including 2 Bloomberg Distinguished Professors, 36 graduate students, and roughly 60 undergraduates, the department offers a uniquely intimate scholarly atmosphere in which faculty and students interact and collaborate frequently.

Scholars in the department share a wide variety of interests and interdisciplinary partnerships. Students are given flexible parameters for their study, and several faculty members have been honored with joint appointments in other Johns Hopkins University schools and divisions. The department shares a unique relationship with the Bloomberg School of Public Health, which offers faculty and students access to first-rate collaborations in fields such as population and demography, mental health and mental hygiene, and healthcare organization. The department is also proudly partnered with the Department of Applied Mathematics and Statistics and is committed to building and maintaining strong foundations in quantitative research methods.

Alpha Kappa Delta (AKD) Honor Society

In spring 2006, the Sociology department was awarded a chapter of the AKD sociology honor society. The chapter welcomed eleven new initiates that year, two faculty members, two new graduate students, and seven undergraduates. We now have over 100 members.

AKD is an open, democratic, international society of scholars dedicated to the ideal of Athropon Katamanthanein Diakonesein or "to investigate humanity for the purpose of service." AKD seeks to acknowledge and promote excellence in scholarship in the study of sociology, the research of social problems, and other social and intellectual activities that will lead to improvement of the human condition. AKD was founded at the University of Southern California in 1920 and affiliated with the Association of College Honor Societies in 1967. There are more than 97,000 lifetime members and over 600 chapters of the Society. These are persons with academic records showing excellence in sociology.

Initiates receive a chapter pin, a certificate of membership, and a membership activation form. Members who submit completed activation forms receive a one-year subscription to Sociological Inquiry, the official journal of the Society, the Alpha Kappa Delta Newsletter, election materials, and other services. In addition, the Society sponsors student paper contests, provides honoraria for initiation speakers, provides funds for student travel to regional sociological meetings, funds research symposia, sponsors a distinguished lecture series at the Annual Meeting of the American Sociological Association, and contributes annually to the ASA Minority Scholarship Fund. AKD members wear AKD honor cords at graduation ceremonies. AKD chapters are important in the academic, professional, and social lives of student and faculty members. They provide opportunities for initiating and sharing activities in keeping with the purposes of the Society.

To be eligible for membership, majors must have at least junior year standing, an overall GPA of at least 3.0, a sociology GPA of at least 3.5, and have taken at least four courses in sociology.

Election to Alpha Kappa Delta is without regard to race, creed, or national origin. For more information, interested students should contact the AKD Faculty Chapter Representatives.

James S. Coleman Award

This award was established by the Department of Sociology in 1994 in honor of Dr. James S. Coleman, first chair of the department. The award is for outstanding academic achievement by a senior majoring in sociology.

Facilities

Each resident graduate student is provided office or desk space to conduct their studies and research. In addition, the department has a computer lab with a network of computers and printers for graduate student use. Close working relationships exist with other JHU Centers & Programs which provide excellent opportunities for research training.

Financial Aid

The department strives to provide five years of financial aid for all students who are in good academic standing. Eligibility for financial aid in the fifth year ordinarily requires successful oral defense of the dissertation proposal by May 31, following their fourth year in the Ph.D. program.

The department has a number of assistantships that are awarded each year to graduate students in the Ph.D. program. Opportunities are also available for graduate students to work as salaried research assistants with members of the Sociology faculty and staff at associated research centers.

Programs

- Sociology, Bachelor of Arts (p. 2157)
- Sociology, PhD (p. 2158)
- Sociology, PhD/Applied Mathematics and Statistics, MSE Joint Program (p. 2160)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.230.101. Introduction to Sociology. 3 Credits.
Introduces students to basic sociological concepts and perspectives, and applies them to a variety of topics including family, work, and the dynamics of class, gender, and racial/ethnic inequalities in the United States and globally.

AS.230.150. Issues in International Development. 3 Credits.
Why do billions of people continue to live in poverty? What obstacles stand in the way of secure and dignified lives for all? Who is most likely to bring about change, what strategies should they follow, and what kinds of institutions should they put in place? This course will introduce the main theoretical perspectives, debates, and themes in the field of international development since the mid-20th century. It has three sections. The first section focuses on debates over the optimal conditions and strategies for generating economic growth and on the relationship between growth, human welfare, and inequality. The second section presents critical assessments of development interventions from various perspectives. The third section considers the role of social movements in shaping development and social change in the 21st century.

AS.230.175. Chinese Revolutions. 3 Credits.
This course introduces the origins, operation and impacts of five major revolutions in modern China between 1850 and 1950. These include the Taiping Rebellion, the republican revolutions, federalist and southern automatic movements, labor strikes as well as peasant rebellions. It draws on the existing historiography that examines China's transition from an empire to a republic, impacts of western and Japanese influences to China, as well as the continuity and change of Chinese social organizations. Cross list with International Studies and East Asian Studies. Fulfills IS History requirement.
Area: Writing Intensive

AS.230.195. Exploring Baltimore: An Introduction to Urban Studies. 3 Credits.
This course will introduce students to the field of urban studies and Baltimore itself. Students will learn data collection and analysis methods used in the social sciences. Students will discuss relevant research published in urban studies by Johns Hopkins faculty and other experts in the field. Students will also gain an introduction to their adopted home, Baltimore, by collecting data and conducting field observations in different neighborhoods.
Area: Writing Intensive

AS.230.202. Research Methods for the Social Sciences. 3 Credits.
The purpose of this course is to provide a sound introduction to the overall process of research and the specific research methods most frequently used by sociologists and other social scientists. Required for Sociology majors and IS GSCD track students.

AS.230.205. Introduction to Social Statistics. 4 Credits.
This course will introduce students to the application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research. Special Note: Required for IS GSCD track students.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR EN.550.310 OR EN.550.311 OR EN.550.413 OR EN.550.420 OR EN.550.420 OR EN.550.420 OR EN.560.435 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.560.348;Statistics Sequence Restriction: Students who have completed EN.550.111 OR EN.550.113 may not enroll.

AS.230.213. Social Theory. 3 Credits.
This course will focus on four classical social theorists whose ideas have greatly influenced how we study and understand society: Karl Marx, Emile Durkheim, Max Weber and W.E.B. DuBois. Students will gain an in-depth understanding of how each theorist answered three major questions: 1) what is the origin, structure and historical dynamic of modern society?; 2) how do we gain an accurate knowledge of society?; 3) what are the conditions of possibility for freedom in modern society? In comparing, applying and critiquing their respective theories, students will advance their own theory of society.
Area: Writing Intensive

AS.230.216. Disability and Society. 3 Credits.
Objectives of this course are to achieve an understanding of the social context of disability from the population level to the individual disability experience. Topics will include social versus medical models of disability; the spectrum of ability; the history of disability; civil rights perspectives; life course and aging aspects of disability; and the role of the environment. Attention will be paid both to theoretical understandings of disability and the role of policies.

AS.230.219. Land, Labor and Environmental Movements in Contemporary Africa. 3 Credits.
The course examines the new wave of social protest and popular uprisings in contemporary Africa through the interconnected themes of land, labor, and environmental movements.Attention will be placed on the early 21st century.

AS.230.221. Global Social Change. 3 Credits.
This course introduces students to issues of global social change, with a particular focus on the challenges of international development and the contemporary globalization process. Specific themes include world income inequality and global poverty, the rise of supranational organizations (e.g. WTO and EU) and their relations with sovereign states, anti-globalization activism, the rise of China and India in the global economy, and the origins as well as consequences of the current global economic crisis and global pandemics, among others. Lectures will be aided by documentary films and other multi-media materials. Special Note: Fulfills Economics requirement for IS GSCD track students only. Formerly offered as AS 230.353. Students who took AS.230.353 cannot take AS.230.221.
Area: Writing Intensive

AS.230.228. Colonialism in Asia and Its Contested Legacies. 3 Credits.
This course surveys the impacts of colonialism in East and Southeast Asia. Special attention will be paid to the social and economic development in British Singapore and Hong Kong as well as Japanese Korea and Taiwan. Topics include free-trade imperialism, colonial modernity, anticolonial movements, pan-Asianism, and post-war U.S. hegemony.

AS.230.233. Inequality and Social Change in Contemporary China. 3 Credits.
This course examines the trajectory of economic development in China since the beginning of market reforms in the late 1970s, with a special focus on social inequality and forms of resistance that have emerged in response to the expansion of the market economy. The first part of the course focuses on understanding the academic debates around China's economic miracle and introduces students to theories about the relationship between market expansion and social resistance. The second part focuses on key thematic topics including the rural/urban divide, rural protest, urban inequality and labor unrest, gender and sexuality in social movements, environmental protests, and the politics of ethnic relations.

AS.230.236. The Sociology of Intimate Partnerships: Dating, Mating, Marriage, and Divorce. 3 Credits.
How do we define an intimate partnership and what role does it play in society? At the turn of the 20th Century socially sanctioned intimate partnerships existed primarily in the context of marriage between a man and a woman. These partnerships formed the center of family units and provided a foundation of social stability for the individuals that entered them. Since then, additional forms of intimate partnerships have become more widely accepted through dating and cohabitation, while marriage has become less stable. In this course, we will explore the evolution of marriage as the dominant type of intimate partnership in society and the concurrent rise of dating, cohabitation, and divorce. Using the context of how these intimate partnerships have changed in recent decades, students will explore and define the role these different types of partnerships serve in society today.
Area: Writing Intensive

AS.230.238. Beyond the Wall: The Political Economy of the US and Mexico. 3 Credits.
Examining the exchange of culture, people, and commodities between the United States and Mexico since the 19th century, this course asks not just how US practices and policies have shaped Mexican society, but how, in turn, Mexico has shaped the United States. We will examine the social, political, and economic forces that have long pulled these two societies together – and pushed them apart.

AS.230.239. Coffee, Tea and Empires. 3 Credits.
The course introduces the transformation of the coffee and tea industries in the long nineteenth century against the backdrop of European and Japanese colonial expansion. It surveys the social changes in the colonial world under the development of the cash crop economy. It also analyzes how the consumption of such caffeinated beverages became sources of heritage makings both in the metropoles and colonies and the latter's postcolonial reconstructions.

AS.230.242. Race and Racism. 3 Credits.
Race has been important in social classifications and producing inequalities. This course is designed to provide you with a global understanding of how racial categories are created and maintained, how they change over time, and how they vary from place to place. It is organized in four parts. The first part introduces the concepts and analytical tools used by social scientists to study race. Of particular concern is power and the social construction rather than "natural" categories of race, as well as the general social processes involved in the maintenance and reproduction of these boundaries. In the second part, we will study the theories and dynamics racial category formation in the United States with attention to forms and processes of racial exclusion and oppression, and evidence of socio-economic inequalities based on race. In the third part of the course, we will compare these processes in the U.S. to those occurring in other countries. The fourth and final part of the course examines how race and racism shape political struggles and resistance movements.

AS.230.244. Race and Ethnicity in American Society. 3 Credits.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.250. Knowledge, Evidence, and Democracy. 3 Credits.
Fake news. Alternative facts. Follow the science. Misinformation. Disinformation. How can we understand the role of information, evidence, and scientific inquiry in politics? Where does information come from? How is it used? How can evidence, argument, and listening improve public conversations? This seminar will examine the connections between information, knowledge, evidence, and democracy, focusing mostly on the United States but with global examples as well.
Area: Writing Intensive

AS.230.265. Research Tools for Global Sociology and Development. 3 Credits.
This course will introduce students to a range of software programs that are critical for conducting social scientific research in the 21st century. Students will develop competency in the use of computer programs for statistical analysis, database management, the creation of maps and timelines, and the presentation of research reports. The course uses examples from ongoing social science faculty research projects at Johns Hopkins on global inequality and international development. Required for GSCD track students.Course previously titled "Research Tools and Technologies for the Social Sciences"

AS.230.304. (Making Space For) Black Thought. 3 Credits.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, Sadiya Hartman, Walter Rodney, Derek Walcott, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.306. Plagues, Power, and Social Control. 3 Credits.
While developments in biomedicine and health care have led to the eradication, cure and management of many human health problems, disease, illness and health have also been the focus for aggressive social controls and population management. The technologies and practices of disease control and health management have been foundational to some of the most aggressive structures of oppression in recent history such as the Jewish Ghetto, the Concentration Camp, the South African Township and techniques of segregation. This course seeks to explore how epidemics and disease control are linked to larger questions of power, state craft and international dynamics. This course asks how have outbreaks of infectious disease shaped social and political action? How do societies respond to outbreaks and why? What do epidemic moments tell us about global structures of power and the dynamics of control? Drawing on historical cases including plague during the European Renaissance and before, the HIV/AIDS Pandemic and the West African Ebola Outbreak of 2013-2016, this course will introduce students to the history and practices of disease control as well as important theoretical perspectives by which to understand the sociological and historical effects of disease and the responses to them. Students will engage sociological concepts such as biopolitics, social construction of disease and illness and biosecurity and produce a final research paper examining the outcomes and responses to an epidemic event to show mastery of the topics covered in the course.
Area: Writing Intensive

AS.230.312. Education & Society. 3 Credits.
This course analyzes educational systems as social institutions and organizations. It gives particular attention to the often taken-for-granted ways that we structure learning in schools and their consequences for social inequality. To these ends, the course will examine classical institutional and organizational theory in sociology and evaluate these theories in their application to historical process of educational formation and the contemporary organization of K-12 schooling in the US.
Area: Writing Intensive

AS.230.313. Space, Place, Poverty & Race: Sociological Perspectives on Neighborhoods & Public Housing. 3 Credits.
Recent national conversations about racial segregation, inequality and the affordable housing crisis raise many important questions—this course focuses on several of these questions, through the lens of urban sociology and housing policy. There are three main areas we will focus on in the course: 1) Understanding the role of racial segregation, neighborhood and housing effects on children and family life; 2) Research methods for studying urban poverty and neighborhoods; and 3) Programs, policies and initiatives designed to house the poor, alleviate concentrated spatial poverty, and increase residential choice. We will primarily focus on issues related to urban poverty in large cities, comparing the patterns of residential mobility and neighborhood characteristics for white and Black Americans. We will utilize archival data, qualitative interviews, census data, and quasi/experimental data to gather evidence about neighborhoods, housing, and policies, as well as their impacts. We will also explore interactive online applications that facilitate the study of neighborhoods (e.g. American Community Survey, GIS with Social Explorer). A statistics/public policy background is helpful, but not required.
Area: Writing Intensive

AS.230.315. Advanced Topics in International Development. 3 Credits.
This class offers an advanced engagement of various topics in international development. The course begins with an historical examination of the actors and global events, as well as the intellectual debates, that birthed the field of international development as a discrete area of study and practice. We will then analyze the evolving theories that dominated the first five decades of the international development effort. The final part of the course will examine more recent perspectives that have attempted to fill the intellectual void left by the demise of the traditional development paradigm. Here we will cover topics that span the global North and South, including issues of race/caste/ethnicity, migration, gender, and right-wing nationalism. Some prior knowledge of international development is recommended
Area: Writing Intensive

AS.230.316. African American Family. 3 Credits.
This course is an examination of sociological theories and studies of African-American families and an overview of the major issues confronting African-American family life. The contemporary conditions of black families are explored, as well as the historical events that have influenced the family patterns we currently observe. Special attention will be given to social policies that have evolved as a result of the prominence of any one perspective at a given point in time.

AS.230.317. Sociology of Immigration. 3 Credits.
This course surveys sociological theories and research on immigration to the U.S. Theoretical approaches include theories of international migration, economic sociology, immigration, and assimilation. Research topics include the impact of U.S. immigration laws and policies on immigrant inflows and stocks, self-selection of immigrants, the impact of immigration on the native-born population and the U.S. labor market and economy, and the adaptation of the first and second generations.
Area: Writing Intensive

AS.230.318. The Political Economy of Modern India. 3 Credits.
This course examines the complex, at times conflicting, relationship that has emerged between Indian seats of power from above and Indian expressions of society from below. Attention will be placed on the period between 1947 to the present.
Area: Writing Intensive

AS.230.320. Education & Inequality: Individual, Contextual, and Policy Perspectives. 3 Credits.
Area: Writing Intensive

AS.230.322. Quantitative Research Practicum. 3 Credits.
This course provides “hands on” research experience applying sociological research tools and a sociological perspective to problems of substance. Quantitative methods will be emphasized, including how to access publicly available survey data, data management, and the presentation of results. Each student will design and carry out a research project and write a research report. Juniors and seniors only. Sophomores require instructor’s permission.
Area: Writing Intensive

AS.230.323. Qualitative Research Practicum. 3 Credits.
This course provides "hands on" research experience applying sociological research tools and a sociological perspective to problems of substance. Qualitative observational and/or interviewing methods will be emphasized. Students will design and carry out a research project and write a research report. This course fulfills the "research practicum" requirement for the Sociology major.
Area: Writing Intensive

AS.230.324. Gender and International Development. 3 Credits.
This course employs a comparative perspective to examine the gendered impact of international development experiences and policies. Students will discuss the historical evolution of how the concept of gender has been constructed, conceptualized, and integrated into international development theory and practice. The course will also examine how greater international development. In particular, we will examine structural theories of poverty reduction, individual theories of power and processes of stratification at the household and family level. Specific issue areas will include the globalization, class and work political participation and social movements. Cross-listed with International Studies (CP, IR). Fulfills Economics requirement for IS GSCD track students only.
Area: Writing Intensive

AS.230.325. Global Social Change and Development Practicum. 3 Credits.
This course provides "hands on" research experience in the field of global social change and development. The course fulfills the "research practicum" requirement for Sociology majors and is required for the GSCD track.

AS.230.327. Sociology of Revolution and Counterrevolution. 3 Credits.
In this course, students will learn about analyzing revolutionary and counterrevolutionary movements, with a focus on their strategic dimensions. Contributions from the military, counterinsurgency, sociology of revolution, historical materialist, world-system, and critical realist literature will provide different visions of strategy and tactics. The cases of Guatemala and Chile in the early 1980s and 1970s, respectively, will provide historical and empirical roots to class discussions about these different approaches and the possibilities of synthesizing them.
Area: Writing Intensive

AS.230.335. Medical Humanitarianism. 3 Credits.
Humanitarian organizations play life-preserving roles in global conflicts, and have front-row views of disasters ranging from the 2010 Haiti earthquake to the 2011 Fukushima tsunami in Japan. Yet even while they provide vital assistance to millions of people in crisis, such organizations are beset by important paradoxes that hinder their capacity to create sustainable interventions. They work to fill long-lasting needs, but are prone to moving quickly from one site to the next in search of the latest emergency. They strive to be apolitical, yet are invariably influenced by the geopolitical agendas of global powers. How do such contradictions arise, and what is their impact upon millions of aid recipients around the world? Drawing on case studies from South Sudan to Haiti, this course addresses these contradictions by exploring how and why medical aid organizations attempt, and sometimes fail, to reconcile short-term goals, such as immediate life-saving, with long-term missions, such as public health programs and conflict resolution initiatives.

AS.230.337. Global Crises: Past and Present. 3 Credits.
This course will compare the current global crisis with previous major crises of historical capitalism through a combination of theoretical and historical readings. Throughout, we will ask: What can a study of past crises tell us about the nature and future trajectory of the current global crisis? Special emphasis will be placed on (1) “the late-nineteenth century great depression”, (2) the Great Depression of the 1930s, and (3) the period of crisis and stagflation in the 1970s. We will be particularly concerned to understand the differential social and geopolitical impact of the crises. Which social classes bore the brunt of the disruptions in economic activity in each crisis? Which geographical areas or geopolitical groupings lost out (or benefited) from the crisis? How have environmental and ecological challenges resurfaced in each crisis including today?

AS.230.339. The Geography of Opportunity. 3 Credits.
The schools that children attend and the neighborhoods in which they live are critically important sites of mental and physical development, socialization, and academic achievement. These contexts in which children live and learn are also highly segregated by race and class, resulting in spatially stratified opportunities for social mobility – what social scientists call “the geography of opportunity.” This course explores social inequality through the lens of space, place, and geography, with a particular focus on how these dynamics shape educational inequality in the United States. Drawing on readings from sociology, demography, psychology, history, economics, urban planning, and public health, this course will teach students to think critically about how individual choices and public policies interact with dynamics of space and place to create and maintain social inequality.
Area: Writing Intensive

AS.230.341. Sociology of Health and Illness. 3 Credits.
This course introduces students to core concepts that define the sociological approach to health, illness and health care. Topics include: health disparities, social context of health and illness, and the Sociology of Medicine.

AS.230.342. Resistance, Rebellion, and Revolution in Latin America. 3 Credits.
This course will examine the dynamics of transformative social change in Latin America and the Caribbean through analyses of resistance, rebellion, and revolution. Because revolutionary change is at once the most transformative and the most rare, this course will cover the exemplary cases of the Haitian, Mexican, and Cuban revolutions, but then also ask how theorists have understood the dynamics of both open rebellion and of everyday resistance in societies deeply structured by racial, gender, and class power, situated within an unequal world system. Attending to both local and global dynamics, this course will ask how Latin American dynamics have both conformed to and challenged universalist theories of social change.

AS.230.348. Climate Change and Society. 3 Credits.
This course will focus on the social dimensions of climate change. Drawing on global and multi-disciplinary scholarship, we will address such issues as: the history of fossil capitalism; the relationship between social inequality and “vulnerability” to climate change (including heat waves, drought, rising seas, and extreme weather); climate migration and the political economy of “adaptation”; the merits of various mitigation strategies, including the Green New Deal, conservation offsets, and geo-engineering; the roots of climate denialism; and climate justice movements. Students will write a final research paper on a sociological aspect of climate change.
Area: Writing Intensive

AS.230.349. Class, Race, and Political Struggle in Capitalist Societies. 3 Credits.
Does capitalism promote democracy and stability, or repression, racial conflict, and social unrest? Following the 2008 financial crisis, countries around the world have experienced severe economic and political crises, giving rise to explosive movements that have challenged the viability of capitalism and democracy as durable systems. By considering these developments, this course examines the core political dimensions of capitalist societies. We will define and discuss key terms, like capitalism, racial capitalism, the capitalist state, democracy, social movements, and more. We will pay special attention to the ways in which the economic, political, and ideological structures of capitalist societies shape and are shaped by social movements and political parties. The course is global in perspective, drawing on developments in many countries, with a special focus on the United States.
Area: Writing Intensive

AS.230.350. Capitalism, Dependency, and Development in Latin America. 3 Credits.
This course examines Latin American insertion into the global capitalist economy from the colonial period to the present. Examining various historical, sociological, and political-economic theories, this course will ask not only how Latin American economies and societies have developed their particular characteristics, but also how theorists within and outside the region have understood Latin American development over time.development over time.

AS.230.352. Chinese Diaspora: Networks and Identity. 3 Credits.
This course combines lecture and class discussion. It examines the history and historiography of Chinese overseas migration. Major issues include overseas Chinese as “merchants without empire,” Chinese exclusion acts in the age of mass migration, the “Chinese question” in postcolonial Southeast Asia, as well as the making and unmaking of Chinese identity in the current wave of globalization.
Students may not have completed AS.230.217 previously.

AS.230.354. The City After Civil Rights. 3 Credits.
This course examines how American cities have evolved since the United States ratified the radically new vision of race promoted by the Civil Rights Movement in the 1960s. We will study the changing geography of race and class in American cities and their surrounding suburbs and what that evolution has meant for inequality. We will also consider how this shifting geography of race and class affects current debates in metropolitan policies like gentrification and tax policy. We will look to the future to examine what issues might come about in the coming decades and how we might avoid similar problems to those in history.

AS.230.356. Power, Privilege, and Inequality. 3 Credits.
Race, class and gender are among key factors in systematic patterns of inequality in the United States (and globally). In this course, we examine the manner in which social inequality comes about and is maintained through a range of social institutions and daily social interactions. This class will examine how social institutions and daily social interactions structure the decisions individuals make and, in turn, how the decisions that individuals make serve to perpetuate or challenge existing social institutions and interactions. We will explore how the intersection of different forms of inequality, for example race and class or class and gender challenge traditional conceptions of inequality and provide insight into the processes that perpetuate inequality. We will use these sociological tools to develop what sociologist C. Wright Mills calls the "sociological imagination" and apply this imagination to contemporary debates in American society. We will discuss how the sociological imagination differs from the approach other disciplines in social science might take to study inequality.

AS.230.357. Baltimore and Beyond. 3 Credits.
This course uses the city of Baltimore as a lens through which to explore issues of urban inequality. We will focus on Baltimore's history of racial segregation and concentrated poverty, and its effect on the social and economic well-being of the city and its residents, with attention to education, employment, health and crime. Students will learn how to employ Census data, GIS approaches, and sociological research to inform questions about population change, inequality and the distribution of resources across the city and metropolitan region. Students will also work on one or more policy relevant studies based in Baltimore, including: a project on abandoned and vacant housing, a desegregation intervention, and a longitudinal study of inner city youth. Finally, students will become familiar with Baltimore City's programs and policy approaches to addressing the city's most pressing problems, and will design innovative and effective and innovative solutions as part of their course assignments. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students that took AS.360.357 may not take AS.230.357

AS.230.358. The Politics of Mental Health. 3 Credits.
This course examines how the psy disciplines – psychology, psychiatry, psychotherapy and related fields – create knowledge about the mind, and how these fields have in turn shaped political and social life since early 20th century. We will explore how the psy disciplines have proven useful to projects of state building by reconstructing the human mind as a calculable, quantifiable entity, one that can be measured and governed across diverse educational, military, and healthcare settings. We will then ask how psychiatric categories such as bipolar disorder and PTSD (post-traumatic stress disorder) were created, and consider their impact on both the legal/medical management of illness and on lay and expert notions of sanity and normality. Finally, we will examine the rising influence of humanitarian mental health interventions, and immerse ourselves in the debates they have engendered concerning the use of psychotherapy to alleviate suffering in war and disaster zones.
Area: Writing Intensive

AS.230.363. Sociology of Dispossession. 3 Credits.
The "grabbing" of land and natural resources has, in recent years, generated widespread political conflict across the world and put dispossession on the agenda of academics and policy-makers. Nevertheless, compared to other social relations of power, land dispossession has not been central to scholarly or public understandings of capitalism, the state, development, or politics. In this class, we will collectively explore the nascent field that we might call the sociology of dispossession. We will examine existing theories of dispossession, and proceed to challenge, reconstruct or supplant those theories as we consider a wide range of historical examples of dispossession from the English Enclosures and colonial plunder to contemporary urban redevelopment and rural land grabs. This is a reading- and writing-intensive seminar.
Area: Writing Intensive

AS.230.366. Black Social Thought and Social Movements. 3 Credits.
This course will examine the reciprocal relationship between Black social thought and social movements. How have social movements informed thinkers who grapple with questions of freedom and liberation in racially and economically stratified societies, and how have their ideas affected movement tactics? This course will look at 20th century movements and investigate connections between theory and practice through concepts like civil disobedience, internal colonialism, Black feminism, Black internationalism, and others.
Area: Writing Intensive

AS.230.367. Islamic Finance. 3 Credits.
Today, Islamic finance is a global industry comprising nearly $3 trillion in assets, with hubs from Kuala Lumpur to Dubai to London. But half a century ago, nothing called "Islamic finance" existed. So where did Islamic finance come from? Why is it growing so fast? And what does it mean for finance to be Islamic? We discuss the ban on usury in Islam and other religious and philosophical traditions, finance in early and medieval Islamic societies, petrodollars and the birth of Islamic banking in the 1970s, the rise of Islamic capital markets since 2000, contemporary shariah-compliant financial structures, and the constitution of piety through financial practice.

AS.230.369. Sociology in Economic Life. 3 Credits.
This course discusses how geopolitics, technology as well as social differentiation (such as race, class and gender) shape the structure of economic actions. Special attention will be paid to patterns of state-business relationship, labor processes, migrant economy, globalization and international division of labor.

AS.230.370. Housing and Homelessness in the United States. 3 Credits.
This course will examine the role of housing, or the absence thereof, in shaping quality of life. It will explore the consequences of the places in which we live and how we are housed. Consideration will be given to overcrowding, affordability, accessibility, and past and existing housing policies and their influence on society. Special attention will be given to the problem of homelessness.
Students may not have previously taken AS.230.223.

AS.230.378. Refugees, Human Rights, and Sovereignty. 3 Credits.
What is a refugee? Since World War II, states that have pledged to offer protection to refugees have frequently been drawn instead to the dictates of nationalism and communitarianism, which prioritize concern for their own citizens, rather than to the needs of forced migrants. As a result, even those migrants that have been formally recognized as refugees according to the 1951 UN Refugee Convention have not been assured of protection, and other migrants have been even less assured. In this course, we will locate the reasons for this reality in the legal, political, and historical underpinnings of political asylum. What is the difference between an asylum seeker and a refugee? How has the refugee category been redefined and contested by international bodies since 1951? How are the ambiguities of real-life violence and persecution simplified in asylum adjudication interviews that require clear, factual narratives? What kinds of protections are offered to asylum seekers, whether by UN bodies, NGOs, or host governments, and how have such protections varied geographically and historically? Finally, what protections, if any, are afforded to those migrants who are fleeing not persecution but rather “merely” endemic poverty or climate-induced displacement? The course draws on literature from sociology, history, anthropology, and international refugee law in order to understand the capacity (or lack thereof) of human rights discourses and declarations to contravene state sovereignty in the name of protecting the rightless.

AS.230.385. Schooling, Racial Inequality and Public Policy in America. 3 Credits.
After examining alternative explanations for why individuals obtain different amounts and types of educational training, the course focuses on how an individual’s family background and race affect his or her trajectory through the educational system. The course covers the specific challenges that have confronted urban schooling in America since the 1960s, including the classic literature on the effects of school and community resources on student achievement as well as the development and later evaluation of school desegregation policies. The course also considers case studies of current policy debates in the US, such as housing segregation and school resegregation, voucher programs for school choice, and the motivation for and consequences of the establishment of state-mandated testing requirements. Throughout the course, emphasis is placed upon the alternative modes of inquiry and writing which opposing scholars, policymakers, and journalists use to address these contentious topics.
Area: Writing Intensive

AS.230.386. The Making of the Asian Races Across the Pacific in the Long 20th Century. 3 Credits.
Focusing on the race-makings of the Asians across the Pacific in the long twentieth century, the course employs the reading materials that elucidate the constructions about the demographic categories of the Asian "races." We use prewar Japanese materials and Chinese nationalist thoughts to elaborate on the following themes: the internal distinction among the peoples grouped under the racial category of the Asians; the overall presentation about the generic category of the "Asian" peoplehood, as well as their alleged shared civilization and interests. The theoretical framework include concepts of capitalist reconfiguration of social boundaries through racism and the question of power behind the reproduction of racial hierarchy.

AS.230.388. Sociology of the Family. 3 Credits.
Sociological perspectives on contemporary family life, including marriage and divorce, cohabitation, single parenthood, same sex partnerships, children’s wellbeing, balancing work and family responsibilities, domestic violence, and government policy toward families.

AS.230.389. The Value of Life: Racism, Capitalism and Health. 3 Credits.
We are generally told that you can’t put a price on life or a price on our health but lives are quantified, valued and priced every day. In this class we will explore the ways in which life is valued in the modern world, its effects and the outcomes from it. We will also examine how forms of quantification and valuation have been employed to dehumanize and subjugate peoples, especially those racialized as different. Beginning with an exploration of human pricing during the trans-Atlantic Slave trade and continuing through to contemporary health care and health insurance practices, this course will examine how we value (monetarily) human existence in modernity. This course will introduce students to ideas emerging out of the Black Marxist Tradition, postcolonial thought, and critical feminist approaches to historical research. From the examination of insurance under slavery to the use of race corrections in medical algorithms, this class will confront students with the question- "how can we put a price on life?" and most importantly "Should we?".
Area: Writing Intensive

AS.230.393. Global Health and Human Rights. 3 Credits.
Is access to healthcare a fundamental human right? If so, then which global actors are obligated to provide healthcare to whom, and for how long? How do meanings of health and illness vary across time and place? And finally, how are human rights principles translated into frontline practice in order to promote well-being? This course takes a critical interdisciplinary approach to these questions through a series of global case studies ranging from humanitarian aid in post-tsunami Sri Lanka to anti-FGM (female genital mutilation) campaigns in Ghana. How do international NGOs, UN bodies, and governments collaborate (or compete) to distribute healthcare in places beset by dire resource shortages? Do human rights principles carry legal weight across borders, and if so, could access to healthcare services and essential medicines be litigated in order to compel governments to provide it? And finally, what cultural assumptions do human rights discourses carry with them, and what happens if rights-based approaches are poorly received by recipient populations? Moving beyond the basic principle of healthcare as a human right, this course aims to bring this idea’s history and politics into focus by offering an in-depth exploration of its ethics and implementation.
Area: Writing Intensive

AS.230.394. Social Statistics. 4 Credits.
The application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research.

AS.230.395. Contemporary Social Theory. 3 Credits.
What is the structure of society, how does it change, and how is it reproduced? What is the relation between social structures and our ideas about them? What are the conditions of possibility for human freedom? This course will examine how major social theorists of the 20th century advanced novel answers to these questions as they grappled with the historical events and social concerns of the 20thcentury—the Russian revolution and its degeneration into Stalinism, the failure of communist movements in the West, the rise and fall of fascism and Nazism, the consolidation of capitalist democracies and welfare states, the emergence of anti-colonial movements in the "Third World," and the persistence of race, gender and sexuality as forms of domination. In addition to understanding and comparing theories, we will assess their usefulness for understanding the present. This is a reading and writing-intensive seminar.
Area: Writing Intensive

AS.230.396. Politics and Society. 3 Credits.
This seminar surveys key problems of political sociology including the rise of the modern state, the origins and nature of liberal democracy, sources of authority, the relationship between political and economic power, the nation-state and nationalism, states and war, ideology and political contention, collective identity, social movements, and social revolutions. Fulfills Comparative Politics for International Studies.
Area: Writing Intensive

AS.230.397. The Political Economy of Drugs and Drug Wars. 3 Credits.
In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

AS.230.405. Neoliberalism. 3 Credits.
Neoliberalism, a political project that seeks to subject all aspects of social life to free market force, has ascended to orthodoxy in developed and developing countries alike over the last four decades. This course is a reading seminar focused on some of the key classic and cutting-edge original texts that critically examine and debate the origins, socio-political impacts, and crisis of the neoliberal project. It will cover such topics as the genealogy of the neoliberal idea, neoliberal state, informalization of works, neoliberal cities, rise of the one percent, and global governance. Class will be a mix of lecture and seminar-style discussions. Requirements include reading memo, class presentation, and a term paper.
Area: Writing Intensive

AS.230.415. Social Problems in Contemporary China. 3 Credits.
In this course we will examine contemporary Chinese society, looking at economic development, rural transformation, urbanization and migration, labor relations, changes in class structure and family organization, health care, environmental problems, governance, and popular protest. The course is designed for both graduate and undergraduate students. Undergraduates must have already completed a course about China at Hopkins. Cross-listed with East Asian Studies.
Area: Writing Intensive

AS.230.418. Racial Capitalism: A Sociological Perspective. 3 Credits.
This course provides theoretical and historical approaches to examining the centrality of racism, imperialism, and colonialism to the origins and ongoing functioning of capitalism and the global political economy. We begin with the dominant theoretical frameworks used to study capitalism and carefully juxtapose these with theory and empirical analyses foregrounding capitalism's connections to racial slavery/racialized labor exploitation, imperialism, colonialism, and gendered exploitation. Following this, we examine the unfolding of capitalism in the post-emancipation, post-independence, and neoliberal periods, paying close attention to inequalities produced within and between nations. We end by examining resistance to racial capitalism, as well as imagining alternative futures.
Area: Writing Intensive

AS.230.420. Class, Capitalism, Colonialism: Evaluating the work of Walter Rodney. 1 Credit.
This course will focus on key writings of Guyanese scholar and intellectual, Walter Rodney (1942-1980) with an emphasis on evaluating his legacy and the relevance of his work for the 21st century, globally and locally. The main course readings are Rodney's three major books—(1) How Europe Underdeveloped Africa; (2) History of the Guyanese Working People; and (3) Groundings with my Brothers. The course will provide students with the background necessary to participate in the January 31, 2020 workshop on the legacy of Walter Rodney organized by the JHU Arrighi Center for Global Studies.

AS.230.430. Sociology of Policing and Resistance in Race-Class Subjugated Communities. 3 Credits.
Policing has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities, and has been a site of resistance and freedom struggles since the first Reconstruction. In this undergraduate seminar, we will survey key debates around policing and social movements, with a particular focus on research that takes institutional development, history, and racial orders seriously. A core preoccupation of this course will be to understand the ways in which policing "makes race" and how debates about crime, surveillance, and safety were often debates about black inclusion and equality. We will explore changes in the racial logics of policing over time, debates over how policing helped construct the racial order, and the consequences of several shifts in policing for communities. From broken windows policing in New York to the emergence of the new vagrancy-style banishment laws in urban Seattle to the men who live under constant surveillance in Philadelphia and to the large share of blacks in Ferguson with outstanding warrants for 'failure to appear", these policies and policing regimes have helped remake the government in the eyes of the urban poor. How does exposure to criminal justice interventions shape political learning, racial lifeworlds, and community social capital? The course will include a range of methods (ethnography, historical analysis, quantitative and qualitative).
Area: Writing Intensive

AS.230.440. Port Cities and Historical Capitalism in Maritime Asia. 3 Credits.
The goal of the seminar is to examine the prospects and limits of understanding the incorporation of Asia in the capitalist world-system from the prism of oceanic connections. The theoretical thrust of this course is to develop but also to adapt Janet Abu-Lughod emphasis on the connections across port cities and littoral in the Afro-Eurasian continents before the long sixteenth century in her Before European Hegemony. But instead of looking at a port city as its adjacent hinterland polity's gateway to global trade in the premodern era, the course examines the multifarious coast-hinterland relationships. The readings are organized by a chronological order, which begins with the historical maritime silk road between the third and thirteenth centuries, and will be followed by Asian port cities in the European age of empire and postwar American-led Cold War Structure, as well as the present-day Chinese New Silk Road Diplomacy. Students are expected to select an issue of regional tensions and to analyze its historical root.

AS.230.445. Sociology of Religion. 3 Credits.
This seminar tackles major issues in the classical and contemporary sociology of religion. We begin with Ibn Khaldun, Friedrich Nietzsche, Karl Marx, Max Weber, Émile Durkheim, and Mary Douglas, asking basic questions: What are religion and the sacred? Why do they exist? What is the relationship between religion and social structure? And what role does religion play in morality, solidarity, boundaries, exploitation, patriarchy, and macrohistorical transformations such as the rise of capitalism? Keeping this theoretical grounding (and its flaws and biases) in mind, we continue to probe the problem of religion in modernity through more-recent writings. Topics include the secularization debate (Are modernity and religion antithetical?); "religious markets" and rational-choice theories of religion; religious revivalism, evangelicalism, fundamentalism, and proselytizing movements; feminist and queer sociologies of religion; civil religion (Is standing for the national anthem a religious act?); embodiment and prayer; Orientalism and postcolonial interrogations of the secular; religious violence and nationalism; the intersectionality of religion with race, class, and caste; and religion and neoliberalism. Although dominant sociologies of religion have focused on Christianity in Western Europe and North America, this course applies a global lens, training significant focus on non-Western and non-Christian contexts.
Area: Writing Intensive

AS.230.465. Labor in the World System. 3 Credits.
This is an intensive reading seminar on working class formation from a comparative, historical and global perspective, including theoretical and empirical (case study) readings on changes over time in labor process, labor markets, and labor movements. We will build on a range of local case studies to establish spatial and temporal patterns, and discuss the connections between these global patterns and the dynamics of historical capitalism.
Area: Writing Intensive

AS.230.500. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.501. Research Assistantship. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.507. Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.511. Honors Research Seminar. 3 Credits.
This seminar is a workshop for Sociology majors writing senior honor theses. It is part of the two-semester Senior Honors Program. Students must complete an application to enroll in the Honors Program [https://soc.jhu.edu/wp-content/uploads/sites/28/2021/04/Sociology-Honors-ThesisApplication.pdf] before registering for this seminar. Typically, students first take the seminar and then enroll for the Honors Independent Study (230.512) with their thesis advisor in the second semester of the Program. The seminar is designed to assist students in the early phase of their honors thesis research and to provide a community of peers who are writing theses.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.512. Honors Independent Study. 3 Credits.
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You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.598. Summer Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.600. Introduction to Social Statistics.
This course will introduce students to the application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research.

AS.230.602. Theories of Society.
This course will examine how important schools of social theory challenged and reconstructed the "classical" theories of Marx, Weber, and Durkheim as they grappled with the historical developments and social concerns of the 20th century.

AS.230.603. Contemporary Social Theory.
This course will examine how important schools of social theory challenged and reconstructed the "classical" theories of Marx, Weber, and Durkheim as they grappled with the historical developments and social concerns of the 20th century.

AS.230.604. Linear Models for the Social Sciences.
This course provides an accessible but in-depth coverage of multiple regression with a focus on sociological problems and software applications. We begin with the basics of linear regression, including estimation, statistical inference, and model assumptions. We then review several tools for diagnosing violations of statistical assumptions and what to do when things go wrong, including dealing with outliers, missing data, omitted variables, and weights. Graduate students should have completed AS.230.600 or equivalent. Undergraduates admitted with instructor's permission and AS.230.205 or equivalent.

AS.230.605. Categorical Data Analysis.
This course provides the students with a set of statistical tools to understand and interpret social science research dealing with categorical dependent variables and to prepare students to apply these models in their own research. The models covered in the course include logit, probit, Poisson, and log-linear models, as well as multi-level models of categorical dependent variables.

AS.230.608. Proseminar In Sociology.
Individual one-hour presentations by faculty members will introduce students to the faculty's substantive interests and research styles.

AS.230.609. Dissertation Seminar.
Advanced seminar for PhD students who are preparing their dissertation proposals or writing their dissertations. Sociology graduate students only.

AS.230.611. Seminar on Comparative & World-Historical Sociology.
In this seminar we will read key texts in comparative sociology. The topics covered are cross-national sociology, comparative national development, comparing world-systems, the modern world-system, globalization, and social movements.

AS.230.612. Seminar on Social Inequality.
This course covers the sources of inequality in contemporary metropolitan areas. It will investigate traditional and contemporary theories that explain the sociological processes that lead to inequality and the methods used to provide empirical evidence.

AS.230.614. Seminar On The Family.
A discussion-oriented seminar focused on major recent writings on the family, in both the developed and developing nations.

AS.230.615. Sem:Panel Data Analysis.

AS.230.617. Seminar on Immigration.
In-depth reading and discussion of theories and research on immigration to the U.S. theoretical issues include international migration, immigration, and assimilation. Research topics include: the impact of U.S. immigration laws on immigrant inflows and stocks, self-selection of immigrants, the impact of immigration on the native-born population, and the adaptation of the first and second generations. The course focuses on immigration since 1965 and its related controversies and debates.

AS.230.618. Introduction to Computational Social Science.
Computational social science is an interdisciplinary field combining social science and data science. Today's digital age presents both opportunities and risks to social scientists with the availability of increasingly big and complex data that depart from traditional data in remarkable ways. This course offers a foundational basis for social science students to embark upon the field. The weekly 2-hour seminar introduces the topics of big data ethics; research designs for the collection and use of digital trace data, automated texts, government administrative data, and large-scale social network data; new forms of surveys and experiments; and mass data collaborations. Research publications are used to illustrate each topic. The weekly 1-hour labs are for group activities on the weekly topic. There are no social science or data science prerequisites.

AS.230.643. Sociological Analysis.
An intensive analysis of a wide range of sociological studies, designed to acquaint the student with how sociologists deal with important theoretical issues, using a variety of methods and sources of data. Particular attention will be paid to the logical coherence of the studies and to the fit between data and interpretation.

AS.230.646. Race and Ethnicity in American Society.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.649. Qualitative Research Methods: Domestic and International Fieldwork.
The emphasis of this course will be on participant observation and interviews in a fieldwork context (that is, research that takes place in the space and time of "subjects" rather than the observer). While the best way to learn a method is by doing, the pandemic is likely to make a practicum impossible this semester. Therefore, the course will be structured around reading classic or illustrative monographs and articles based on qualitative fieldwork, in both a US and global context. This will be supplemented with a smaller number of methodological texts to introduce different conceptions of science used or assumed by qualitative sociologists. We will also address practical skills like taking ethnographic fieldnotes.

AS.230.650. Macro-Comparative Research.
The course examines methods of studying long-term, large-scale social change. Both qualitative and quantitative methods are covered.

AS.230.651. Political Sociology.
This seminar surveys key problems of political sociology including the rise of the modern state, the relationship between political and economic power, the origins and nature of liberal democracy, the nation-state and nationalism, states and war, sources of authority, identity and political contention, social movements, and social revolutions. This is a graduate level class that will meet together with "Politics and Society", an advanced undergraduate class.

AS.230.675. Arrighi General Seminar.

AS.230.680. Confronting Epistemological Silences in Social Theory.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, bell hooks, Walter Rodney, Gayatri Spivak, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.685. TRP Seminar I.
This seminar includes all members of the second year cohort of sociology graduate students. Class meetings will provide feedback and guidance as students develop proposals for their Trial Research Papers. The course will also include a series of professional developments seminars. For Sociology PhD students only.

AS.230.690. TRP Seminar II.
This seminar includes all members of the third year cohort of sociology graduate students. Class meetings will provide feedback and guidance as students revise the final drafts of their Trial Research Papers. For Sociology PhD students only.

AS.230.800. Independent Study.

AS.230.801. Research Assistantship.

AS.230.802. Dissertation Research.

AS.230.804. Research Apprenticeship.

AS.230.810. Dissertation Fellowship Semester.

AS.230.811. Teaching Assistantship.

AS.230.815. Trial Research Paper I.

AS.230.816. Trial Research Paper II.

AS.230.817. Trial Research Paper III.

AS.230.825. Summer Research.

Cross Listed Courses

Center for Africana Studies

AS.362.115. Introduction to Police and Prisons. 3 Credits.
This introductory course will examine policing and prisons in the United States and beyond, with a focus on racial inequality. It will consist of three parts. First, we will define key concepts in police and prison studies. Then, we will explore the contemporary state of prisons and policing in the United States and look at debates around the rise of “mass incarceration” and aggressive forms of policing in the final third of the 20th century. Third, we will explore policing and prison in other parts of the globe in the contemporary moment, highlighting similarities and differences from the U.S. case. What can studying the instruments of social control in other societies reveal about our own? Students will develop an understanding of major trends, keywords, and debates in the literature on policing and prisons, with particular reference to race and racism.

AS.362.118. Cutting Through the Gaze: An Introduction to Social Justice Cinema. 2 Credits.
This course will introduce students to the fundamentals of community-engaged documentary filmmaking with a focus on both theory and practice. It will examine documentary filmmaking as an educational tool for raising social- and racial- justice issues from an African diasporic and global perspective. The course is taught by award-winning professional documentary filmmakers. Students will produce their own 3-5 minute film or audio podcast. Students will select their documentary film topic, conduct their own research, and move from pre-production into production. No prior experience in filmmaking is required for this course.

AS.362.160. Land, Labour and Environmental Rights and Struggles in Contemporary Africa. 3 Credits.
‘Africa rising’ has become an influential, albeit contested, narrative used by institutions like the International Monetary Fund and World Economic Forum to describe the rapid economic growth in 21st century Africa. This rapid ‘economic growth has been accompanied by another type of ‘Africa Rising’ – a mushrooming of social protest and popular uprisings across the continent. The course will introduce important theoretical perspectives, debates, and examples to equip students to critically examine contemporary social dynamics through the interconnected themes of land, labor and environmental rights and struggles that have gripped the African continent. What has given rise to these awakenings? Who are the actors involved in these actions? What are their demands and strategies? What lessons does it hold for social movement theory and development more broadly? The first section focuses on land reclamation movements, the new wave of ‘land grabs’ and responses from below. The second section presents the role of labour movements and its intersection with popular uprisings. The third section considers responses from communities and movements to the ecological destruction and climate change.

AS.362.315. Black Against Empire. 3 Credits.
This course will examine the confrontation of Black social movements with imperialism in the twentieth century. How, we will ask, have key Black internationalist thinkers conceptualized and defined diaspora, capitalism, imperialism, war, and the global? What have been the effects of war and repression, as well as economic growth and globalization, on Black internationalism? Readings may include texts by W.E.B. Du Bois, Angela Y. Davis, Frantz Fanon, Ashley Farmer, Claudia Jones, Robin D.G. Kelley, Claude McKay, Huey P. Newton, Walter Rodney, Malcolm X, etc. Students will complete a research paper on a topic of their own choosing related to Black internationalism in the twentieth century.
Area: Writing Intensive

AS.362.402. Arts and Social Justice Practicum. 3 Credits.
This course provides students with an opportunity to explore art and social justice and its history in Baltimore and the Black Arts Movement through the creation of student-led artistic projects. Students will examine their creative practices and how they can be used to advocate for change. Local artist and scholars will share their expertise providing lived experiences of using art as a call to action. At the end of the semester, students will present their projects in a public showcase of student work through film, poetry, photography, painting and other visual media. (No prior artistic training necessary.)

East Asian Studies

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

AS.310.230. Chinese Politics and Society. 3 Credits.
This introductory course will familiarize students with the major dynamics of political and social change in contemporary China since 1949. The course will be divided chronologically into four main topics: 1. The contested processes of nation-state making in modern China before 1949; 2. The making of the socialist system during the Mao Years and its dismantling since 1978; 3. The Reform Era transformation to a market economy with Chinese characteristics; 4. The dynamic relationships among the state, market and society since the new millennium. Students will explore how scholars have explained major political and social changes with reference to individual and collective rationalities, specific organizational and institutional arrangements, and specific strategic and cultural mechanisms of Chinese political and social habits.

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

AS.310.340. Development and Social Change in Rural China. 3 Credits.
This course will survey the major issues of development and social change in rural China since 1950s. These issues will be addressed in chronological order. They include land ownership and land grabbing, organization of rural economic, political, and social life, rural elections and village governance, development strategies, urban-rural relationship in resource allocation, rural modernization strategies in regard to irrigation, clean drinking water, electricity supply, hard paved road, education and rural medical service, women's rights and family life, rural consumption, and etc. This course will prepare students, both empirically and analytically, to understand what happened in rural China from 1949 to the present, and how we can engage in policy and theoretical discussions based on what we learn.

First Year Seminars

AS.001.127. FYS: Public Opinion and Democracy. 3 Credits.
How does public opinion shape electoral behavior and the contours of democracy in the United States, and how have these relationships changed as techniques for measuring public opinion have evolved since the early twentieth century? To consider this question, the course introduces alternative perspectives on the features of a healthy democracy, including both historical perspectives and current arguments. Interweaved with this material, the course examines how public opinion is measured and interpreted by private pollsters, survey researchers, and data journalists. Emphasis is placed on the alternative claims that opposing analysts adopt, as well as how the technologies of data collection and analysis shape the permissibility of conclusions. Students will learn to interpret public opinion patterns, which requires a brief presentation of basic concepts from survey sampling, including what to make of the polling industry's most boring concept: margin of error.

AS.001.136. FYS: Cults, Communes, and Conspiracies. 3 Credits.
Cults, communes, and conspiracies are unusual social and ideological organizations. How should we understand their origins, structure, and functioning? In our First-Year Seminar, we will assess the value of alternative explanatory concepts from the social sciences, such as charismatic leadership, organizational ecology, network structure, status competition, social influence, and belief propagation. We will then interpret cases in comparative perspective, asking, for example, how cults differ from religious sects, how communes differ from political movements, and how organized crime groups differ from legal businesses.

AS.001.151. FYS: Citizenship and Society in the United States. 3 Credits.
Popular sovereignty — the idea that the people rule themselves — has been heralded as one of the preeminent innovations of the modern world. And over the course of the last two hundred or so years, a rising tide of nations committed themselves to the principles of popular sovereignty. Yet in recent years, the inevitability, soundness, and very viability of "rule by the people" has come into question. On the one hand, popular uprisings around the globe have rejected the decisions and practices of governing elites on the grounds that they are out of touch with the people's needs. On the other hand, these uprisings have resurrected and strengthened authoritarian practices and have facilitated the erosion of liberal rights long considered instrumental to preserving democracy. The result — turmoil, unrest, and uncertainty about what the future holds — is evident from Venezuela to England, Turkey to the United States. Can popular sovereignty survive? In what form will the people rule, and at what cost?This First-Year Seminar is an investigation into the idea and practice of popular sovereignty in the contemporary United States. We will explore this topic by actively consulting theory and empirical research in the social sciences. We will supplement this with our own research on the 2022 election, media coverage of issues, popular attitudes about democracy, and popular representation in government and by interest/advocacy groups.Additionally, this class is organized as a collaboration between two first-year seminars: one at Johns Hopkins, the other at Williams College. Over the course of the semester, the two seminars will meet frequently via videoconference to share research and discuss readings and ideas. This is intended to broaden the perspectives brought to bear on our investigation generally and, specifically, to allow each group to share real time research on the politics of the region in which their respective institutions are located.

AS.001.168. FYS: The Psychology of Mass Politics in the U.S.. 3 Credits.
Taught during the election season of 2022, this First-Year Seminar looks at the deeper psychological motivations of the American electorate. We begin by discussing the meaning of democracy and establishing a common understanding of American democracy specifically, placing the current moment into historical and international context. We then gradually dismantle the "folk theory" of democracy that assumes all voters are rational and economically-minded. Instead, we apply theories from social psychology to understand some essential questions about voter behavior. Why do people vote? How do they understand politics? How are their feelings and judgments affected by their own identities, biases, information sources, and by the messages they hear from leaders? Why have Americans grown so polarized? What role do racial and gender-based prejudice play? Is American politics headed toward a more violent future? We use evidence-based research from political science, sociology, and psychology to answer these questions.

AS.001.187. FYS: Gender x Aging x Health in America. 3 Credits.
In this First-Year Seminar students will develop an understanding of the ways in which gender structures health and well being through adulthood and later life. The experience of sexual minorities and the ntersection of gender with class and ethnicity will also be discussed. Students will be expected to participate actively and lead discussions on specific topics.

Interdepartmental

AS.360.247. Introduction to Social Policy and Inequality: Baltimore and Beyond. 3 Credits.
This course will introduce students to basic concepts in economics, political science and sociology relevant to the study of social problems and the programs designed to remedy them. It will address the many inequalities in access to education and health care, unequal treatment in the criminal justice system, disparities in income and wealth, and differential access to political power. The focus will be on designing effective policies at the national and local level to address these pressing issues. This course is open to all students, but will be required for the new Social Policy Minor. The course is also recommended for students who are interested in law school, medical school, programs in public health, and graduate school in related social science fields. This course does not count as one of the required courses for the Economics major or minor, but it is required for the Social Policy Minor. Cross list with Sociology, Economics and Political Science. Freshman, Sophomore and Juniors only.
Area: Writing Intensive

AS.360.401. Social Policy Seminar. 3 Credits.
This course is designed for students who have completed either the Baltimore intensive semester of the Social Policy Minor. The students will make presentations and pursue joint projects based on what they have learned during the intensive semesters concerning key social policy issues.

AS.360.626. Latin America in a Globalizing World II.
The second in a two-semester graduate sequence, this course will be for graduate students and faculty to collaboratively workshop their own research and writing on topics related to Latin American studies.

Political Science

AS.190.300. Racial Inequality, Policy and Politics in the US. 3 Credits.
While policies were passed to ensure equal opportunity for racially subjugated Americans, the United States witnessed increasing stratification of wealth and income and deepening concentration of poverty, stagnation in closing racial gaps, and new forms of inequality posed by the striking upsurge in contact with the criminal justice system at the bottom of the skills ladder and concentration of wealth at the top. At the same time, the welfare state came under attack and faced challenges posed by an aging population, women entering the labor force, deindustrialization, and international pressures of globalization. Social spending withered in some areas while spending on citizens was increasingly likely to happen through tax expenditures and private means. This course investigates the politics around these developments and competing perspectives in debates over redistributive policies in the United States and their impact on inequality, particularly race and gender inequality. We will examine the contours of inequality and explanations for why it has expanded over the past several decades. We explore why the US is exceptional in both the level of inequality it tolerates and the generosity and types of remedies to alleviate poverty in comparison to its European counterparts and debate the role of race, unions, electoral politics and institutions. We investigate several specific cases of persistent racial inequality – concentrated poverty, segregation, and incarceration. We investigate both how policies have reinforced racial and gender divisions from a top-down perspective as well as examining under what conditions the disadvantaged contest inequality, exploring how political struggle shapes policy from the bottom-up. The last part of the course examines the consequences of inequality and social policy for representation and citizenship and how economic inequality affects political representation and responsiveness of elites to masses.

AS.190.433. Race and the Politics of Punishment in the US. 3 Credits.
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold for citizenship. In this advanced undergraduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields - history, sociology, law and criminology - and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad's Condemnation of Blackness: race, Crime, and the Making of Modern Urban America, Elizabeth Hinton's From the War on Poverty to the War on Crime, David Oshinsky's Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western's Punishment and Inequality in America, and Michael Fortner's Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.
Area: Writing Intensive

AS.190.437. Race and Ethnic Politics in the United States. 3 Credits.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the "struggle with difference" within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.191.303. Critical Race Theory, Law, and Criminal Justice. 3 Credits.
In this course, students will gain a foundational understanding of critical race theory, including its genesis in legal theory. The course will examine its relationship and importance to social movements, including through key concepts like intersectionality. The course will also use critical race theory to grapple with law, racial segregation, and the criminal justice system in the United States.
Area: Writing Intensive

For current faculty and contact information go to http://soc.jhu.edu/directoryindex/faculty/

Sociology, Bachelor of Arts

Sociology Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587).)

A major in sociology offers undergraduates a variety of post-graduation opportunities. Graduates from the department have found positions in financial institutions, education, non-governmental organizations focusing on international development, research departments of major corporations, and local government social service agencies. Others continue to graduate school in sociology, public health, law, urban planning, and education. A major in sociology can also be combined with the pre-medical course sequence, resulting in a medical school candidate who is well versed in the hard science of the human body and the social science of the human experience. For more details, please visit http://soc.jhu.edu/undergraduate/.

The required courses for a major in sociology provide students with a fundamental understanding of sociological theory, methods, and social statistics. Beyond these core requirements, elective courses are offered on a range of important sociological themes, including gender and family, social structure and personality, education, race and ethnicity, immigration, political sociology, international development, and the evolution of a world social system. All courses must be taken for a letter grade and a grade of C or better is required. At least nine of the eleven required Sociology classes must be taken at JHU. Foreign language study is not required, but it is strongly encouraged, especially for students considering graduate or professional study.

Code	Title	Credits
Core Courses		
AS.230.101	Introduction to Sociology	3
AS.230.202	Research Methods for the Social Sciences	3
AS.230.205	Introduction to Social Statistics (or alternate statistics course and additional Sociology course at least 3 credits) [1]	4
AS.230.213	Social Theory	3
AS.230.322	Quantitative Research Practicum	3
or AS.230.323	Qualitative Research Practicum	
or AS.230.325	Global Social Change and Development Practicum	
Sociology Electives [2]		
Six elective courses in sociology, at least four must be non-introductory courses (at the 200-level or above).		18
Additional Social Science Electives		
Three non-sociology courses at any level carrying an "S" area designator in at least two other departments or programs. These may be at any level.		9
Total Credits		**43**

1 Alternative statistics courses typically offered include: EN.553.111 Statistical Analysis I, EN.553.211 Probability and Statistics for the Life Sciences, EN.553.310 Probability & Statistics for the Physical Sciences & Engineering, EN.553.311 Probability and Statistics for the Biological Sciences and Engineering, and AS.280.345 Public Health Biostatistics. If a student completes one of these alternate statistics courses, then an additional Sociology elective course (AS.230.1xx-AS.230.4xx) at least 3 credits is required.

2 Six elective courses within the department and three elective social science courses in other departments enable students to customize their program of study. Depending on a student's interests and objectives, these courses may focus on a single theme, concentrate on a small set of themes, or sample the specific interests of the department's faculty. Whichever approach is taken, the goal is to craft an individualized program of study that will be a fulfilling intellectual experience. Constructing a personally satisfying roadmap through the major is ultimately the student's responsibility, but the student's faculty advisor stands ready to assist as a willing and eager partner in the process. Students wishing to propose an independent study or research experience to fulfill an elective should refer to the department handbook for guidelines to receive an exception.

Sample Program of Study

A typical program might include the following sequence of courses:

Course	Title	Credits
First Year		
First Semester		
AS.230.101	Introduction to Sociology	3
	Credits	**3**
Second Semester		
Lower-level sociology elective		3
Lower-level sociology elective		3
	Credits	**6**
Second Year		
First Semester		
AS.230.205	Introduction to Social Statistics	4
Upper-level sociology elective		3
	Credits	**7**

Second Semester		
AS.230.202	Research Methods for the Social Sciences	3
"S" credit from non-sociology elective		3
	Credits	**6**
Third Year		
First Semester		
AS.230.213	Social Theory	3
Upper-level sociology elective		3
	Credits	**6**
Second Semester		
AS.230.322	Quantitative Research Practicum	3
"S" credit from non-sociology elective		3
	Credits	**6**
Fourth Year		
First Semester		
Upper-level sociology elective		3
"S" credit from non-sociology elective		3
	Credits	**6**
Second Semester		
Upper-level sociology elective		3
Upper-level sociology elective		3
	Credits	**6**
	Total Credits	**46**

Senior Honors Program

Eligibility for the Sociology Honors Program requires completion of at least four of the five sociology core curriculum courses and at least two 300 level elective courses in sociology by the end of the junior year, with a Sociology GPA of 3.5 or higher. Additionally, by the time of graduation, all students must complete all remaining core curriculum and elective course requirements. Students interested in pursuing the Senior Honors Program must spend a total of TWO SEMESTERS registered for the Program. The Honors Program involves securing a faculty thesis advisor from the Sociology Department prior to the start of those two semesters, completing 1 semester of the Honors Research Seminar (230.511) in their first semester of the Honors program, enrolling in 1 semester of the Honors Independent Study (230.512) with their thesis advisor in their second semester of the Honors Program, and submitting a sole-authored Honors thesis. Students will earn a total of 6 credits for the Honors program. The Honors Research Seminar (230.511) is required in the first semester of the Honors program, because it is designed to assist students in the early phase of their Thesis and to provide a community of peers in the Honors Program. Note that the Honors Research Seminar is graded only S/U. The Honor Independent Study is taken for a letter grade. Both honors courses, AS.230.511 Honors Research Seminar or AS.230.512 Honors Independent Study, may not count towards the required Sociology elective courses. The thesis paper submitted for Honors in Sociology may not be used fulfill an honors thesis requirement in another major.

In order to enroll in the Sociology Honors Program, a student must complete an application: [Honors-Thesis-Application (https://e-catalogue.jhu.edu/arts-sciences/full-time-residential-programs/degree-programs/sociology/sociology-bachelor-arts/Sociology-Honors-Thesis-Application_2022.pdf)] BEFORE registration for the two semester program begins. Therefore, those graduating in the spring of their senior year, must submit their application during the spring of their junior year. Those graduating earlier, must submit their application earlier (for example, by the end of the fall semester of their junior year, for those graduating in the fall of senior year). This application includes a provisional thesis title, 3-5-page description of the project, and a calendar of deadlines agreed upon between the thesis advisor and student (these deadlines are also important because they allow the DUS to submit honors candidates to the university for the graduation program in April). Students must email their completed Honors application (signed by their faculty advisor) to sociology@jhu.edu.

For more information on the Senior Honors Program, contact your faculty advisor.

Global Social Change and Development Track

The Global Social Change and Development (GSCD) Track (http://krieger.jhu.edu/arrighi/undergraduate/gscd/) is geared towards students interested in understanding critical issues surrounding contemporary processes of globalization and international development. The track provides students with a sophisticated set of research and critical-thinking skills, prepares students for twenty-first century professions and helps them to become thoughtful global citizens. Ultimately, students pursuing the Global Social Change and Development track will receive a double major in both International Studies and Sociology.

Sociology, PhD

The department's primary educational goal is to train first-class sociology Ph.D. students. The sociology graduate experience at Johns Hopkins University is best characterized as a research apprenticeship – a careful blend of formal instruction, faculty-directed individual study, and supervised as well as self-initiated research. The department's small size and specific focus areas yield a personalized course of study and close relationships with faculty members and fellow graduate students. The social climate is informal, and the mix of students and faculty, drawn from a wide variety of geographic and social backgrounds, constitutes a rewarding intellectual community. For more details, please visit http://soc.jhu.edu/graduate/.

Admission Requirements

Applicants must submit an application fee, personal statement, all college transcripts, at least two (preferably three) letters of recommendation, and a sample of written work. International applicants must also submit a TOEFL score and a financial statement (FS-1G Form: Graduate International Student Notification [F-1/J-1]). GRE scores are optional. Applicants should have a broad background in social science, especially sociology, economics, and psychology. Training in mathematics is encouraged. The department gives greatest weight to an applicant's demonstrated ability and past performance. For more details, please visit http://soc.jhu.edu/graduate/admissions/.

Program Requirements

Code	Title	Credits
Core Curriculum		
AS.230.600	Introduction to Social Statistics	
AS.230.602	Theories of Society	
AS.230.603	Contemporary Social Theory	
AS.230.604	Linear Models for the Social Sciences	
AS.230.608	Proseminar In Sociology [1]	
AS.230.643	Sociological Analysis	

AS.230.649	Qualitative Research Methods: Domestic and International Fieldwork
or AS.230.605	Categorical Data Analysis
or AS.230.615	Sem:Panel Data Analysis
or AS.230.650	Macro-Comparative Research

[1] This fall semester course is taken during the first year. Faculty presentations introduce students to the substantive interests, research and professional background of the sociology faculty. It is graded pass/fail.

To count toward degree requirements, core curriculum courses other than the Trial Paper Research series of courses must be passed with a grade of B- or higher. After the core course requirement is satisfied, additional methods courses from the list above may be used to fulfill the seven-elective course requirement.

Electives

In addition to the core curriculum, graduate students must enroll in seven additional graduate-level courses. At least four of the seven electives must be JHU Sociology department courses. Up to four of the seven electives may be fulfilled by a combination of:

1. credit awarded for previous graduate coursework that predates matriculation at JHU;
2. courses taken outside the department that are permissible under the Handbook rules and with the Departmental advisor's approval;
3. and one directed research and independent study courses within the Department.

All must be passed with a grade of B- or higher. While students are free to select these courses, the department strongly recommends that they be taken from diverse fields of specializations so as to maximize the breadth of exposure to core areas of sociology and other disciplines.

Teaching Assistantships

As part of their preparation for future academic work, graduate students are required to register for AS.230.811 Teaching Assistantship and serve as a teaching assistant for at least one semester.

Foreign Language

The Sociology Department no longer requires certification of fluency in a foreign language as part of the Ph.D. requirements. Students should be proactive in gaining the language skills necessary to conduct their TRP and dissertation research, and should work closely with their advisor to determine whether additional language education is needed.

Residence

A minimum of two consecutive semesters of full-time residence is mandatory for all degrees. However, at least six semesters of full-time residence is recommended by the department for completion of the core curriculum, electives, and completion of a research apprenticeship and a trial research paper. By the end of the fourth year in the program, the student is expected to have written a dissertation proposal and have defended it successfully before the appropriate examining committees.

Research Assistantship/Apprenticeship

AS.230.801 Research Assistantship and AS.230.804 Research Apprenticeship

Students are required to develop practical research expertise through professional-level participation (data analysis, literature searches/reviews, non-routine data processing or coding, preparation and refinement of research instruments, and data/file management). This requirement is fulfilled by satisfactorily completing a Research Apprenticeship, which is required during the student's first year of full-time graduate study in the department. The standard for certification is substantial research accomplishment as judged by the faculty supervisor.

Trial Research Paper

(AS.230.685 TRP Seminar I, AS.230.690 TRP Seminar II, AS.230.815 Trial Research Paper I, AS.230.816 Trial Research Paper II, AS.230.817 Trial Research Paper III)

Students begin working on a Trial Research Paper (TRP) no later than the spring semester of their second year. The TRP affords students the experience of planning and executing a research project that leads to a publishable quality paper. The TRP is expected to be a serious, complete work of scholarship, suitable for conference presentation or journal submission. Whether or not the topic of the TRP is similar to that of the eventual dissertation, we believe all students will benefit from going through this exercise before planning for the dissertation.

By the end of the fall semester of their second year, students should invite a faculty TRP advisor to supervise the design and execution of the TRP project. Regular or adjunct faculty members whose positions entitle them to serve as dissertation advisors are eligible to serve as faculty TRP advisors. Work on the TRP generally will be done over three semesters. In order to facilitate progress on the TRP, students register for courses that are meant to consist of one-on-one meetings with their TRP advisor (TRP I, AS.230.815 Trial Research Paper I in the spring of your second year, TRP II, AS.230.816 Trial Research Paper II in the fall of your third year, and TRP III, AS.230.817 Trial Research Paper III in the spring of your third year.)

In order to facilitate student progress on the TRP, the department has also introduced two required TRP seminars, for which all students register in the spring of their second and third year. These are: AS.230.685 TRP Seminar I (spring of second year) & AS.230.690 TRP Seminar II (spring of third year). These courses will be graded pass/fail and will not count toward the fulfillment of the elective courses required for the Ph.D.

A TRP proposal must be approved by the faculty TRP advisor by the end of the spring semester of the second year. By the end of the fall semester of the third year, the TRP advisor must approve a draft of the paper which will then be reviewed by another department faculty member. The TRP advisor, at their discretion, may extend this deadline to the end of the intersession period following the fall semester. The faculty reviewer will evaluate the paper and, if necessary, recommend revisions that should be made before the paper is certified. The TRP advisor will determine required revisions and must certify a final TRP by the end of the spring semester of the third year.

Dissertation

The student must propose and conduct original research presented in a dissertation suitable for publication. The department administers an oral examination which must be passed before the student is allowed to defend before a university board. The dissertation must then be defended either at a Graduate Board preliminary oral examination, based on the dissertation proposal, or at a Graduate Board final oral examination, based on the completed dissertation.

Special Programs

The department offers two special programs that coordinate activities in its two focus areas. Doctoral students may affiliate with one or both of these programs at their discretion. These programs function as fields of doctoral specialization within the Department of Sociology.

Program on Global Social Change (PGSC)

This focus area of graduate study focuses on cross-national, comparative research and long-term, world-scale social change. The goal of the program is to give students knowledge of the various theoretical perspectives in these areas, experience in data collection and analysis, and expertise in one or more substantive fields.

The program does not focus on a particular geographic area, although faculty members have conducted extensive research on Latin America, Africa, Asia, the Middle East, and Eastern and Southeastern Europe. Instead of a geographical approach, the emphasis is on issues of development and social change that cut across different countries and world regions. Examples are globalization and regionalization, labor and development, city systems and urban primacy, social movements and revolutions, state violence, migration and labor force formation, family structure and change, social structure and personality, and national and international stratification. Students enroll in a sequence of courses and seminars and participate actively in ongoing faculty projects dealing with one or more of the above issues.

In addition, the interdisciplinary character of graduate education at Johns Hopkins University offers students ample opportunity to enroll in courses or collaborate in research of faculty in other departments. Faculty associates of the program include distinguished scholars in anthropology, economics, geography, history, political science, and public health.

A graduate focus area is not required of Ph.D. students.

Program on Social Inequality (PSI)

This focus area of graduate study focuses on the causes and consequences of social inequality, the social processes that sustain it, and how social policies can reduce it. These questions are addressed in terms of class, gender, race, ethnicity, and immigration status/citizenship.

The program is designed to train students in the sociological analysis of social inequality among individuals and groups. This training includes course work in areas such as social stratification, the sociology of the family, the sociology of education, sociology of immigration, social structure and personality, social policy, and research design and methods. Students in the PSI program enroll in a sequence of courses and seminars and participate actively in ongoing faculty projects dealing with one or more of the above issues.

In addition, the interdisciplinary character of graduate education at Johns Hopkins University offers students ample opportunity to enroll in courses or collaborate in research with faculty in other departments. Faculty associates of the program include distinguished scholars in anthropology, economics, geography, history, political science, and public health.

A graduate focus area is not required of Ph.D. students.

Sociology, PhD/Applied Mathematics and Statistics, MSE Joint Program

The Department of Sociology, Krieger School of Arts and Sciences, and the Department of Applied Mathematics and Statistics, Whiting School of Engineering, announce a joint program leading to a Ph.D. in Sociology and an M.A. or M.S.E. in Applied Mathematics and Statistics. The purpose of the joint program is to offer Sociology doctoral students an opportunity to acquire advanced statistical knowledge and applied research skills.

For more information, please visit department of Sociology (https://soc.jhu.edu/graduate/joint-program/).

Program Requirements

The joint program requirements include all the Ph.D. requirements in Sociology and the specially designed requirements for an M.A. or M.S.E. in Applied Mathematics and Statistics. For Sociology Ph.D. requirements, see the Sociology Ph.D. Students Handbook. Applied Mathematics and Statistics courses may substitute for AS.230.600 Introduction to Social Statistics and AS.230.604 Linear Models for the Social Sciences. Two options for fulfilling the requirements are available for an M.A. or M.S.E. in Applied Mathematics and Statistics. For both options, students are required to meet the Applied Mathematics and Statistics department’s computing requirement (fulfilled through EN.553.413 Applied Statistics and Data Analysis), the purpose of which is to ensure that students are able to effectively use computers to solve mathematical problems.

Note: All Joint Program students are required to complete Responsible Conduct of Research (RCR) training, which is in addition to the HIPPA training required for the sociology Ph.D.

Space Science and Engineering

This minor is open to all students in the Whiting School of Engineering and the Krieger School of Arts and Sciences who have the prerequisites for the required courses. The objective of the Minor is to prepare students for a career in Space Science and Space Engineering, either directly as an entering professional in industry, government laboratories and other organizations or as a student in a graduate program. The educational goal of the Minor is to enable students to:

- Apply their understanding and mastery of the fundamental scientific, engineering, and mathematical principles obtained through their major subject of study to space science and space engineering.
- Develop an understanding and capacity for interdisciplinary approaches to technical activities.
- Improve their ability to work in multidisciplinary teams, which are typical in space and other complex technical activities, through interdisciplinary education and internship(s) or equivalent experience(s).

Programs

- Space Science and Engineering, Minor (p. 1401)

Space Science and Engineering, Minor

Space Science and Engineering Minor Requirements

- A Proposal and Course Plan, which must be approved by your advisor for the minor (hereafter referred to as the "Advisor"). The proposal must discuss a theme that unites the individual elements of the program (courses and internship(s)) into an intellectual whole.
- Five courses in Science and Engineering. One course is specified (AS.171.321 Introduction to Space, Science, and Technology) and the remaining four are chosen through your Proposal and Course Plan, which must be approved prior to taking the courses by the Advisor. All courses must be taken for a grade rather than satisfactory/ unsatisfactory. A grade of C- or better is required. Courses that are named as requirements for the student's major may not be used. However, courses that are not named, but satisfy an elective requirement for the major, may be used.
- An internship or equivalent experience in the field of space science and engineering is required. This must have prior approval from the Advisor.
- A brief report on the internship or equivalent experience to the Advisor.

Course Requirements
Specified Course:

The specified course is 171.321 Introduction to Space Science and Technology. The prerequisites are Physics 171.101-102 or a similar engineering course and Calculus 110.108-109. The course carries 3 credits. The course is co-listed by the Departments of Earth and Planetary Sciences, Materials Science, and Engineering and Mechanical Engineering.

Proposal and Course Plan for the Four Courses:

To ensure that the program is a coherent intellectual activity, you are required to submit a Proposal and Course Plan to your Advisor early in their program, prior to taking the courses. The Proposal and Course Plan will identify a theme that describes the educational goal that you will pursue through your course of study and a list of courses, including alternates, to achieve your goal. Examples of such themes could be "Remote observations of the earth and planets from space vehicles" or "Spacecraft design for astronomy missions." Examples of potential course programs are listed in Section 5 below. A list of suggested candidate courses is listed in Section 6 below. If consistent with the Proposal and Course Plan theme, you may use other courses with the permission of your Advisor. The Course Plan should contain alternative courses in recognition that every course may not be taught every year.

The Proposal should also include ideas for completing the internship requirement discussed below.

Additional Requirements on the Four Courses

- One of the four courses may be at the 200 level, but at least three must be at the 300 level or higher.
- The total credits associated with the courses must be 12 or more.
- At least three of the courses must be in departments other than the department or program of your major.
- Courses cannot be "named" requirements of the major; however, elective courses for the major may be used.

Internship or Equivalent Experience
Practical experience in space science and space engineering can be obtained through an academic internship, non-academic internship or an equivalent experience. This practical experience can be acquired by at least six weeks of full-time effort or the equivalent effort spread over a longer period. This can take place during a summer or during the academic year.

Academic Internships

The Undergraduate Student Handbook describes the regulations governing academic internships. You may find the following quoted material from the Handbook helpful:

- "Academic internships are practical work experiences which have an academic component as certified by a member of the faculty."
- "Academic credit for independent academic work must be sponsored by a full-time member of the Homewood faculty. This is the case whether the work is done on campus or not. The work supervisor and the faculty sponsor may be the same individual. If the faculty sponsor is not the work supervisor, the work supervisor must provide the faculty sponsor with a report on the student's achievements while doing the independent project."
- "Only one credit may be earned for an academic internship during one semester or summer."
- "The grading method is Satisfactory/Unsatisfactory only."
- "Independent work done for academic credit must be unpaid."
- "The use of credit for independent academic work to satisfy the requirements of a major or minor is subject to prior written approval by the appropriate department or program."

Non-academic Internships

These internships are offered by non-academic organizations such as the Space Telescope Science Institute, the Applied Physics Laboratory, and a number of NASA laboratories to provide undergraduate students practical work experience in space science and space engineering. These internships often carry a stipend and are not eligible for academic credit.

Opportunities within the university include the Applied Physics Laboratory, the Center for Astrophysical Sciences, the Space Telescope Science Institute, as well as individual professors and research staff. In addition, local laboratories and companies, such as NASA Goddard Space Flight Center, Lockheed Martin, Northrop Grumman, Orbital Sciences, and other private corporations offer excellent opportunities for internships and summer work experiences.

- Applied Physics Laboratory program for JHU students (https://www.jhuapl.edu/Education/JohnsHopkinsConnection/) – Students should indicate their interest in the Space Department of the JHU APL.
- Space Telescope Science Institute intern program (https://www.stsci.edu/institute/smo/students/)
- NASA (https://www.nasa.gov/centers/goddard/education/internships.html)

Equivalent Experiences

Other activities that meet the spirit of the requirement may be accepted. For example, employment opportunities, often in the summer, can provide practical experience in space science and space engineering.

Prior Approval Required

The student is responsible for identifying and arranging the internship or equivalent experience. However, in order to count toward the Minor, it must be approved in advance by the Advisor. In general, the Advisor will require that the mentor or supervisor be either a space scientist or space engineer.

Required Report on the Internship or Work Experience

In order to have it count toward the Minor, the student must provide a brief report (typically one page) describing the internship or equivalent experience to the Advisor at the beginning of the semester immediately following the activity. The report should give the name of the organization or laboratory (e.g., STScI, JHU-APL, NASA-GSFC), the start date and duration, and the name, position, and email address of the mentor/supervisor. It should include a brief summary describing the activity, a description of new knowledge and skills learned, and information about the overall experience.

For a detailed explanation of the minor and its requirements, including sample programs of study, please visit the Student Handbook for the Minor in Space Science and Engineering (http://spacestudies.jhu.edu/space-minor/).

Study of Women, Gender, and Sexuality

https://krieger.jhu.edu/wgs/

The Program for the Study of Women, Gender, and Sexuality works to catalyze intellectual discussions—at Johns Hopkins, in Baltimore, and beyond—in which gender and sexuality concerns play important roles.

We are a forum that brings together undergraduates, graduate students, and faculty from different departments who share an interest and a need to address and interrogate their research fields from a queer, feminist, or otherwise gender- and sexuality-inflected perspective.

The activities of the program integrate teaching and research on all levels. Most importantly, the program encourages and supports initiatives for research projects, events, and curriculum developments emerging from all parts of the JHU campus—undergraduate students, graduate students, and faculty alike.

WGS brings new scholarship into conversation on campus in three main ways. First, the program sponsors a seminar series that brings speakers from academia and the broader community to Johns Hopkins University. Second, we organize workshops each semester around multiyear themes, such as “Affect and Emotion” and “Medical Humanities.” Finally, we bring renowned scholars and public figures to the Homewood campus through our annual Visiting Distinguished Professorship. Recent visiting professors have included Karen Barad (University of California-Santa Cruz), Joan Wallach Scott (Institute for Advanced Studies), Trinh-Minh Ha (University of California-Berkeley), and Michael Warner (Yale University).

WGS offers an undergraduate minor that enables students to devote a portion of their education to the study of women, gender, sexuality, and related issues. WGS also offers research fellowships for undergraduate and graduate students. Graduate students also have the opportunity to design and teach a course.

Through both interdisciplinary and specialized courses, students are encouraged to develop critical and comparative approaches to the study of gender and sexuality—often in interaction with related issues such as race, class, global health, and violence. Courses in the program are taught by prominent faculty members from across the disciplines and are cross-listed through a variety of departments. New courses are added frequently.

WGS also offers an undergraduate Seminar/Practicum, where students combine volunteer work in a local social service agency with a seminar that explores the connections between social justice and academic inquiry.

Programs

- Women, Gender, and Sexuality, Minor (p. 2173)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.363.201. Introduction to the Study of Women, Gender, and Sexuality. 3 Credits.
This course will serve as an intensive introduction to contemporary approaches to theories of gender and sexuality, and their relationship to cultural production and politics. Students will develop a historically situated knowledge of the development of feminist and queer scholarship in the 20th and 21st centuries, and consider the multiply intersecting forces which shape understandings of sexual and gender identity. We will consider both foundational questions (What is gender? Who is the subject of feminism? What defines queerness?) and questions of aesthetic and political strategy, and spend substantial time engaging with feminist and queer scholarship in comparative contexts. Students will be introduced to debates in Black feminism, intersectionality theory, third world feminism, socialist feminism, queer of colour critique, and trans* theory. We will read both canonical texts and recent works of scholarship, and the final weeks of the course will be devoted to thinking with our theoretical and historical readings against a selection of feminist and queer literature and cinema. No prior familiarity with the study of gender and sexuality is necessary.

AS.363.226. Women writers and the sonnet from the European Renaissance to the Harlem Renaissance. 3 Credits.
Shakespeare's description of his lover's eyes as 'nothing like the sun' is both an homage and a sendup of the 300-year-old Petrarchan tradition in which the male poetic persona remains forever enraptured by an unattainable female beloved, who never speaks. Beginning with a review of Shakespeare’s sonnet sequence and selections from Petrarch’s sonnets to an elusive Laura, we will read a series of fifteenth-and sixteenth-century women writers who inserted their own voices into this evolving tradition by allowing “Laura” to talk back. These include Vittoria Colonna (and her interactive sonnets with Michelangelo), Veronica Gambara, and Gaspara Stampa; dueling personas in sonnets by French poets Pernette du Guillet and Maurice Scéve, and sonnets by more familiar Shakespearean contemporaries Lady Mary Wroth and Sir Philip Sidney (both of whom reflect back on Petrarch but from quite different viewpoints). In the final section of the course we will apply our newly acquired historical perspective to selections from a more recently available corpus of female-authored sonnets from the Harlem Renaissance. All continental works will be read in translation; no previous familiarity with the topic is required.
Area: Writing Intensive

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.
Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women's thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

AS.363.306. Feminist and Queer Theory: Race, Class, Gender, Sexuality-Intersectional Feminist Theory. 3 Credits.
In this course, we will get to know intersectional feminist philosophy through the lens of a Black feminist epistemology. What does this mean? That means that we will focus on how the contributions of Black feminist authors can bring out the specific political and philosophical nature of an intersectional theoretical framework.

AS.363.307. Feminist and Queer Theory: Family Matters: Queer and Feminist Responses to Family Life. 3 Credits.
This course examines the historical development of feminist and queer critique, focusing on how the concept of family life has been understood by generations of writers, activists, and theorists. We will read important early works on western forms of kinship and family structure, and investigate how contemporary developments in reproductive technology, queer marriage, and workplace integration have produced new imaginings of familial belonging and its alternatives.

AS.363.329. Gender and Sexuality Beyond the Global West: Gender and Sexuality in Contemporary Art in North Africa and the Middle East. 3 Credits.
This course aims to explore how gender and sexuality is situated in contemporary artistic practices in the geographical Middle East, through concepts of religion, war, revolution, resistance, nation-state, post-colonialism, and neoliberalism, especially as written and observed first-hand by artists, curators and scholars from the Middle East and North Africa region and their diasporas. Every week, under an overarching topic, notions of gender and sexuality will be questioned through works of selected artists across the region, as well as texts that provide the historical, theoretical, sociological and political background.
Area: Writing Intensive

AS.363.330. Ecofeminist Debates: Gender and Sexuality Beyond the Global West. 3 Credits.
This course develops an interdisciplinary and comparative approach to introduce students to ecofeminism through a special focus on its inflections in non-western contexts. Through class discussions and sustained writing engagement, we will develop an understanding of the history of ecofeminism, including theoretical debates linking gender perspectives with political mobilization, as well as ecofeminism's enduring influence on new intellectual and political movements.

AS.363.331. Gender and Sexuality beyond the Global West. 3 Credits.
Gender and Sexuality in the Global West. Topics change each semester. See class search for specific topic being taught each term.

AS.363.333. Poetics and Politics: Eros & Literature. 3 Credits.
What does it mean to love? From Antiquity to now, from Plato to Jeanette Winterson, writers have staged conversations on love and sex. In this way, they provide us with a "science of sex" (to use Foucault's notion) that, though fully attuned to the power differentials that inhabit our most intimate physical experiences, gives free range to the imagination of desires. With Plato, the legend of Tristan and Isolde, and the study a few Renaissance love lyrics as a backdrop, we will delve into stories of desire that chart new configurations and break away from "normative heterosexuality." Readings involve novellas by Balzac, George Sand, Colette; stories by Woolf, by Proust, and selected from Gender Outlaws as well as two films M. Butterfly and Call Me by Your Name. Meshing such stories with fundamental concepts in gender theory will enable us to chart ever changing configurations of desire from the double perspective of queerness and of sexual politics.
Area: Writing Intensive

AS.363.335. Gender Justice: From Conflict to Resolution. 3 Credits.
This course focuses on the potential and limitations of the recent efforts of the international community to introduce a "gendered approach" to conflict resolution, peacebuilding and transitional justice. It examines the fundamental theoretical issues that underlie the "gendered approach" to transitional justice by following the evolution of the gendered approach to peacebuilding in three phases through case studies: The gender-blind phase (Human Rights Trials in Argentina), the gender-neutral phase (Truth and Reconciliation Commission in South Africa) and the gender-sensitive phase (Disarmament, Demobilization and Reintegration of female combatants in Colombia). The limitations of the gendered approach in practice is explored through cases. For example, we examine the identification of gender-based crimes with sexual crimes in ICTY and ICTR. The LGBTI communities' inclusion to transitional justice as well as gender based harms that are not related to sexual violence are examined through the Colombia Peace Process. Ultimately, the course aims to address the prevailing question in the fields of peacebuilding and transitional justice today through the lens of "gender": Should transitional justice simply redress harms or should it aim to be transformative for the post conflict community? Should response mechanisms aim to restore relationships or should they aim to transform gender relations in communities? The final weeks of the class will be dedicated to the discussion of moral and practical implications of these questions for transitional justice.

AS.363.337. The Poetics & Politics of Sex: Struck From the Record: Reclaiming Women's Contribution to the Global March Towards Modernity. 3 Credits.
The course examines claims that present women's historic role as limited to confinement in the home, and bearing children. Students will gain an understanding of the complexity the world's path to modernity and the important, and?until recently, silent?roles that women have played.
Area: Writing Intensive

AS.363.338. The Poetics and Politics of Sex: Feminist Utopia in Theory and Fiction. 3 Credits.
This course examines the historical development of feminist utopia in theory and fiction. Readings will center Indigenous, Black, postcolonial, diasporic, and transnational perspectives that engage the topic of feminist utopia.
Area: Writing Intensive

AS.363.345. Zora Neale Hurston: Ethnography as Method. 3 Credits.
While many recognize Zora Neale Hurston's creative literary work, her methodological innovations are often overshadowed. This course will examine Hurston's contributions to theorizing the African diaspora and creative use of ethnography.Dr. Amarilys Estrella, the 2020-2021 ACLS Emerging Voices Postdoc, will teach this course. For more info on Dr. Estrella, see https://history.jhu.edu/directory/amarilys-estrella/

AS.363.415. WGS Internship Practicum: The Carceral State, Gender, and the Family. 3 Credits.
This class will examine the U.S. government's use of incarceration, parole, and house-arrest as default forms of social management, in lieu of social welfare policy. We will explore the origins of the "carceral state" and its impact on targeted communities. The class will focus on often neglected aspects of the ongoing crisis of mass-incarceration in the U.S., in particular its debilitating effects on single-mother households, children who grow up with incarcerated family members, and the extreme violence and deprivation of basic medical needs faced by incarcerated women and LGBTQI individuals. Topics will include black-feminism and "black matriarchy," the relationship between domestic violence and mass-incarceration in communities of color, women and non-gender conforming prisoners, the "school-to-prison pipeline," the psychological effects of policing on targeted communities, and the fiscal interests served by mass-incarceration. We will engage sociological, historical, and philosophical materials, as well as literature, film, and past and present social movements.
Area: Writing Intensive

AS.363.416. WGS Internship/Practicum: Feminist Animals: Sex, Nature, and Nonhumans. 3 Credits.
Introducing feminist approaches to ecology and nonhumans, this course considers the interconnections between heteropatriarchal domination and the domination of nonhuman animals and ecologies. What different sensibilities and ways of seeing sex and gender open up when attention shifts to nonhumans? What tensions within and between feminism, animal liberation, and ecological concern come to the fore when each approach is alongside the others? How does the study of nonhumans extend the promise of feminism, and vice versa? In responding to these questions, we will see the real breadth of issues that the theory and practice of feminism can address.
Area: Writing Intensive

AS.363.445. Reading Judith Shakespeare: Women and Gender in Elizabethan England. 3 Credits.
If Shakespeare had a sister who went to London to be a writer, what would she write? Virginia Woolf's account of the thwarted career of Shakespeare's hypothetical sister, Judith, in A Room of One's Own frames our reading of plays and poetry by Shakespeare and contemporary women writers, including Isabella Whitney, Elizabeth Cary, Mary Sidney, Aemelia Lanyer, and Mary Wroth. Working within a selected historical context, students will create fictional biographies of "Judith Shakespeare," including her perspective on our identified authors and a sample or description of Judith's own literary accomplishments. Secondary course readings will reflect contemporary economic, political, and religious contexts.
Area: Writing Intensive

AS.363.601. WGS Graduate Colloquium.
Presenting new scholarship and art, the WGS Graduate Colloquium will catalyze intellectual discussions in which gender and sexuality concerns play important roles. The seminar includes lectures by invited speakers and a film series. Graduate students are encouraged to develop critical and comparative approaches to the study of gender and sexuality—often in interaction with related issues such as race, class, violence, law, medicine, art, and emotionality. This seminar can be taken for credit or audit.

Cross Listed Courses

Behavioral Biology

AS.290.420. Human Sexual Orientation. 3 Credits.

This course will examine the historical and current theories of sexual orientation and sexual variation development by examining the biological, psychological and social contributing factors that influence the development of sexual orientations and variations along with treatment and modification of problematic sexual behaviors. Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester. Priority given to Behavioral Biology majors. Note: For credit towards a Psychology major, students should register for AS.200.204 Human Sexuality, rather than this course.

Prerequisite(s): Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester.
Students may receive credit for either AS.200.204 or AS.290.420, but not both.

Biophysics

AS.250.351. Reproductive Physiology. 2 Credits.

Focuses on reproductive physiology and biochemical and molecular regulation of the female and male reproductive tracts. Topics include the hypothalamus and pituitary, peptide and steroid hormone action, epididymis and male accessory sex organs, female reproductive tract, menstrual cycle, ovulation and gamete transport, fertilization and fertility enhancement, sexually transmitted diseases, and male and female contraceptive methods. Introductory lectures on each topic followed by research-oriented lectures and readings from current literature.

Center for Africana Studies

AS.362.301. Black Women Writers. 3 Credits.

This course will introduce students to a variety of works written by black women of the Diaspora with a focus on the U.S. We will consider how women have theorized power, engaged history, and creatively imagined both the past and the present.
Area: Writing Intensive

Classics

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.

Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

Comparative Thought and Literature

AS.300.301. Women and Work in the US. 3 Credits.

This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women's labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women's work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

AS.300.312. Imagining Revolution and Utopia. 3 Credits.

What form should revolution take, and what should society look like after the revolution? What would happen to the state, family, home, status of women, human interrelations, and everyday life? These questions consumed radicals in 19th century Russia and Europe, and their answers helped to shape the political culture of the 20th century. This course examines theories of revolution and utopia and responses to them in literature, art and film. Primary case study is Russia and the Soviet Union, with a comparative look at influential European works.
Area: Writing Intensive

AS.300.317. The Russian Novel. 3 Credits.

This course introduces students to the nineteenth century Russian novel and considers its lasting impact on world culture. We will read classic masterpieces of the psychological and philosophical novel, and their experimental forerunners. Short lectures on historical and cultural context and on methods of literary analysis will be combined with intensive group discussion. Novels include Anna Karenina, Crime and Punishment, Eugene Onegin, Dead Souls, and Hero of our Time.
Area: Writing Intensive

AS.300.324. Cinema of the 1930s: Communist and Capitalist Fantasies. 3 Credits.

Comedy and musical comedy film flourished in the USA during the Great Depression as well as in the USSR during the Stalinist Great Terror. This course will compare films of the era in a variety of genres (musical, epic, Western, drama), examining the intersections between politics and aesthetics as well as the lasting implications of the films themselves in light of theoretical works on film as a medium, ethics and gender.

AS.300.334. Love and its maladies. 3 Credits.

Much of what we know about love and desire we owe to fiction's ability to evoke these experiences. Consider for example that the publication, in Germany, of The Sorrows of Young Werther inspired young men across Europe to dress and behave just like this lover. Just as nowadays film and television represent, as well as mold our conceptions of love, love-stories from the eighteenth-century onwards have given shape to gendered subjectivities in ways that still matter now. As, intriguingly, illness is a recurrent theme in many modern love stories, we will be prompted to decipher signs and symptoms in the bodies of mind of our protagonists. Why is it that in Western cultures, passion is tightly interwoven with a landscape of pain, suffering, and disease? In studying texts that represent major aspects of a romantic sensibility, we are indeed invited to trace the steps of a history of the body increasingly defined by gender and by medical knowledge. The readings for this class (all available in English) include: Austen, Persuasion; Balzac, The Unknown Masterpiece; Barthes, Lover's Discourse; Goethe; The Sorrows of Young Werther; Mann, Death in Venice; Winterson, Written on the Body.

AS.300.367. Seeing Like a Woman. 3 Credits.

What does it mean to "see," think, desire, feel, speak, act, or write "like a woman"? Gendered notions of seeing have had an impact on politics and society long before the #metoo movement and far beyond debates about women's rights in isolation. This seminar examines the issues of female desire, subjectivity, spectatorship and performance in fiction, poetry, memoir and film from a variety of cultures and theoretical perspectives. This is not a course on "the image of the woman" in literature, film or politics, but a course in which we examine the ways in which both male and female theorists, novelists, poets, and filmmakers have imagined how women "see," feel, think and behave.
Area: Writing Intensive

AS.300.439. Stories of hysteria. 3 Credits.
Many are the stories that recount episodes of hysteria, and we owe them not only to medicine. To the modern observer, they are a puzzle, involving strange beliefs about wandering wombs, demonic possession, and female virtue (or lack thereof). Closer to our time, contemporary media, as well as accounts in the social and clinical sciences have evoked cases of “mass hysteria” in America and across the globe. Marriage, it was thought for a long time, might be the best cure, which might be the reason case-studies of this illness can be as intriguing and troubling as novels. Against a backdrop of medical and historical materials, we will examine a selection of stories, from the 17th century onward, that evoke aspects of hysteria. They serve as our case-studies and as prompts to study an illness born at the convergence of histories and myths, of medical science, and of cultural and gender assumptions. Among the notions we will explore: The birth of psychoanalysis, trauma and PTSD, the concept of repression, the visual aspects of an illness and its spread in the arts, including cinema.

East Asian Studies

AS.310.319. Gender & Sexuality in Korea and Asia. 3 Credits.
Utilizing an interdisciplinary approach, this course examines the role that gender and sexuality play within primarily the South Korean polity and in Asia. Drawing on queer studies, feminist studies, and critical Asian studies, the class will offer a foundational framework from which to analyze how social constructs around gender and sexuality play a major part in the marginalization of communities and their access to rights and representation. We will explore questions of kinship, family, love, and intimacy as they pertain to the larger thematics of the course.
Area: Writing Intensive

AS.310.324. Belonging and Difference in Modern Korea. 3 Credits.
Drawing on critical race theory, and gender and sexuality studies, this course provides the analytical framework necessary to grapple with how belonging and difference are produced, manifested, and challenged within Korea’s citizenry. Students will gain knowledge on modern Korea and its diasporas and examine its construction as one rooted in a history of empire, nationalism, militarism, and neoliberalism.
Area: Writing Intensive

Economics

AS.180.252. Economics of Discrimination. 3 Credits.
This course examines labor market discrimination by gender, race and ethnicity in the United States. What does the empirical evidence show, and how can we explain it? How much of the difference in observed outcomes is driven by differences in productivity characteristics and how much is due to discrimination? How have economists theorized about discrimination and what methodologies can be employed to test those theories? What has been the impact of public policy in this area; how do large corporations and educational institutions respond; and what can we learn from landmark lawsuits? The course will reinforce skills relevant to all fields of applied economics, including critical evaluation of the theoretical and empirical literature, the reasoned application of statistical techniques, and analysis of current policy issues.
Area: Writing Intensive
AS.180.102

English

AS.060.320. Icons of Feminism. 3 Credits.
This course looks at four crucial figures who have haunted feminist thought and responses to feminism over the centuries. Sappho, known as the first female poet, remains an enigmatic icon of feminine desire and creativity; Antigone, the daughter of Oedipus and the heroine of Sophocles’s play Antigone, still inspires feminist analyses of women’s relationship to law, the state and civil society; and Joan of Arc, the militant maid of Orleans, troubles thinking about women and violence as well as women, religion and spirituality. The last figure is Mary Wollstonecraft, often cited as the first modern feminist. The course will examine literary works written about these iconic figures, as well as contemporary feminist writing about their influence and viability as models for the future of feminism.
Area: Writing Intensive

AS.060.348. Virginia Woolf and Bloomsbury. 3 Credits.
An exploration of the achievements and investments of one of the most influential coteries in the history of Britain. In addition to delving into key fictions by Virginia Woolf, we will examine novels by Leonard Woolf and E. M. Forster, art criticism by Roger Fry and Clive Bell, biographical essays by Lytton Strachey, economic writings by John Maynard Keynes, and poetry by T. S. Eliot.
Area: Writing Intensive

AS.060.353. Margaret Atwood: Imagining Catastrophe. 3 Credits.
This is the moment for a course on the Canadian climate activist, poet, and novelist Margaret Atwood. Best known for her dystopian The Handmaid’s Tale (1985), Atwood’s monitory visions in poetry, short stories, non-fiction and novels attend to themes of malevolence, metamorphosis, memory, genetic mutation, totalitarianism, corporate control, feminism, and climate disaster, while rooted in traditions of folktale, myth, and ironic detachment. Among other works, including poetry and non-fiction, we will read novels The Handmaid’s Tale, The Testaments, The Blind Assassin, Oryx and Crake, The Year of the Flood, and MaddAddam, exploring Atwood’s "writing with intent." Seminar discussion; midterm; class presentations; two short papers and one final project.
Area: Writing Intensive

AS.060.388. Old World/New World Women. 3 Credits.
The course considers the transatlantic writing of three women in the early modern period, Anne Bradstreet, Aphra Behn, and Phillis Wheatley. We will consider issues of identity, spatiality, religion, commerce, enforced labor, sexuality, race, and gender, along with literary tradition, formal analysis and poetics. We will read a good deal of these early women writers. Foremost in our mind will be the question of how perceptions of space and time are mediated through the global experiences of early modernity.
Area: Writing Intensive

AS.060.389. Emily Dickinson. 3 Credits.
Dickinson’s poetry, more than most, has seemed to prompt creativity in others. In the past two decades, especially, poets, writers, critics, and filmmakers have found their own voices in response to hers. We will focus on the formal, aesthetic, historical and gendered aspects of her poetry as we try to understand, and benefit from, this power to elicit response. Exams are unlikely. Instead, expect close attention to your own writing, as we pay close attention to hers.
Area: Writing Intensive

AS.060.620. Thinking with Scale: Frameworks in Early Modernity.
Concepts include expansion, crowding, data collection, the miniscule, temporality, the planetary and the cosmic in the first age of European mercantile activity and colonial expansion. With readings from world-systems theory and theories of the anthropocene, our case studies will comprise pre-modern English literary texts, including Milton, Paradise Lost, Anne Bradstreet, The Four Monarchies, early modern science (Hooke, Newton), Defoe, The Storm, and early British and colonial American holdings in the Garrett Library. The class will be hands-on, working with material from Special Collections, and will include working towards a digital project (no digital project background necessary).
Area: Writing Intensive

Film and Media Studies

AS.061.248. Women Making Films About Women. 3 Credits.
This course will examine films (features and shorts) throughout the history of cinema beginning with Alice Guy-Blaché . We will look at how form reveals content, thematic issues and how films relate to the culture and politics of the filmmaker. Filmmakers include Germaine Dulac, Nelly Kaplan, Marguerite Duras, Chantal Ackerman, Barbara Hammer and Nina Menkes. Readings include critical essays, texts by the filmmakers and fiction. Assignments consist of weekly papers on the films.

AS.061.323. Masculinities. 3 Credits.
From tap dancer to gangster, assassin to anguished teen, versions of the male in film from the silent era to the present. Cross-listed with Studies of Women, Gender, and Sexuality. One core course in Film and Media Studies is preferred but not required.

AS.061.366. Labyrinths of Passion: The Films of Pedro Almodóvar. 3 Credits.
This course will explore a range of Almodóvar's work, from the early films emerging out of La Movida Madrileña up to and including The Human Voice and Parallel Mothers, with particular emphasis on All About My Mother, Talk to Her, Bad Education, Volver, and Pain and Glory. We will examine the director's influences and antecedents—Bunuel, Hitchcock, Sirk, Cassavetes, among others—against the backdrop of Spain's dramatic political and cultural transformation after the death of Franco. And we will closely analyze the characteristics that define Almodóvar's status as an auteur: his groundbreaking approach to sexuality, queer politics and gender transformation; his innovative use of melodrama; and his dazzlingly eclectic visual style.

AS.061.391. Love and Film. 3 Credits.
In this course, we explore different understandings of "love" and the way that film has dealt with the concept as a medium. We explore a variety of approaches to the question of "love" - from the agapic to the familial to the romantic - through a series of interdisciplinary readings ranging from philosophy to anthropology. We will also equally explore the question of how film has engaged with the question of love as a concept, and what depictions of human affection - from the general to the personal - it has offered us. Screenings are required for this course. Lab fee: $50
Area: Writing Intensive
AS.061.140 OR AS.061.141 OR AS.061.226

AS.061.397. French Masculinities. 3 Credits.
Examines changing ideals of masculinity in France after 1960 as they found expression on film, rooting the work of iconic stars and directors in their cultural, political and historical contexts.

First Year Seminars

AS.001.114. FYS: The Politics of Reproduction. 3 Credits.
The idea that the "personal" is "political" finds no greater example than in the politics of reproduction. From inheritance laws, the rights of the offspring of enslaved peoples, or policies to reduce (or increase) fertility, the modern nation state has had a great deal to say about the use and produce of human bodies. In this First-Year Seminar, we will examine how formal and informal institutions have governed reproductive practices over the past 200 years. We will look at how family structures and economic development map onto fertility, and at how technological innovations in fertility control (including birth control and IVF) have influenced women's economic and political participation. We will also consider whether reproductive policies have differential impacts for LGBTQ households. Finally, we examine the "dark side" of reproductive policies -- not only sterilization campaigns but also the treatment of sex workers and sex-selective abortion -- to understand how state policies have divided households based on race, class, and occupation.

AS.001.187. FYS: Gender x Aging x Health in America. 3 Credits.
In this First-Year Seminar students will develop an understanding of the ways in which gender structures health and well being through adulthood and later life. The experience of sexual minorities and the ntersection of gender with class and ethnicity will also be discussed. Students will be expected to participate actively and lead discussions on specific topics.

History

AS.100.283. Making and Unmaking Queer Histories, 1800-Present. 3 Credits.
Making and Unmaking Queer Histories introduces students to the major themes and historical developments which shape contemporary understandings of LGBTQ+-identified subjects and communities in the US and Western Europe.
Area: Writing Intensive

AS.100.304. Ecstasy: Mystical, Visionary, and Holy Women and their Writings in Medieval Europe, ca. 1000-1400. 3 Credits.
This course uses the writings of medieval women to explore their social and religious worlds and orients visionary writing within the broader narrative of religious movements from the 12th-14th centuries.
Area: Writing Intensive

AS.100.319. History of American Reproductive Politics. 3 Credits.
This course examines reproductive politics in the United States from the colonial era to the present. Topics include contraception, abortion, and sterilization, emphasizing the impact of gender, class, and race.
Area: Writing Intensive

AS.100.323. America in the 1960s. 3 Credits.
The years between 1959, when the course begins, and 1971, when it ends, were tumultuous and divisive. This course explores the political, racial, and cultural struggles of a half century ago.
Area: Writing Intensive

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.355. Sex and Society in Early Modern Europe. 3 Credits.
This course will examine how early modern views on the body, gender, and sexuality shaped beliefs about the abilities and rights of women and men.
Area: Writing Intensive

AS.100.393. Think Globally, Research Locally: Early Maryland and the World. 3 Credits.
A research-intensive seminar, this course uses the rich history of Maryland to approach broader themes in early modern American and global history including colonialism, slavery, revolution, race, gender, and sex.

AS.100.396. The Gender Binary and American Empire. 3 Credits.
This discussion-based seminar will explore some of the ways that the sex and gender binary was produced out of American statecraft in the late nineteenth and twentieth centuries. Particular attention will be paid to US imperialism, both domestically in its settler form, as well as in Hawaii, the Caribbean, and the Pacific. What happens to the study of the modern gender binary if it is treated as a transnational artefact of US imperialism's encounter with a multitude of cultures and nations?
Area: Writing Intensive

AS.100.408. Theorizing the Age of Enormity: Social Theory and the History of the 20th Century. 3 Credits.
We will read and analyze key works of social and critical theory produced in relation to 20th and 21st century problems of state and society, nationalism, empire, totalitarianism, genocide, capitalism, political order, gender, race, sexuality, secularism, religion, environmental catastrophe. Possible readings include Weber, Du Bois, Adorno, Arendt, Foucault, Balibar, Beckamong others.
Area: Writing Intensive

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, "virgins" in paradise, the sexual slavery of Yazidi women.... This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

AS.100.424. Women & Modern Chinese History. 3 Credits.
This course examines the experience of Chinese women, and also how writers, scholars, and politicians (often male, sometimes foreign) have represented women's experiences for their own political and social agendas.
Area: Writing Intensive

AS.100.426. Popular Culture in Early Modern Europe. 3 Credits.
Witchcraft, magic, carnivals, riots, folk tales, gender roles; fertility cults and violence especially in Britain, Germany, France, and Italy.
Area: Writing Intensive

AS.100.430. Gender and Sexuality in African History. 3 Credits.
An upper-level history reading seminar with a focus on histories of gender and sexuality in colonial and postcolonial Africa.

AS.100.713. Black Womanhood.
What does a usable history of black womanhood (black queer and trans womanhood inclusive) look like? How do we imagine, create, and narrate black women's stories? Black women's history across time and space.

AS.100.722. The History of Trans Femininity.
This seminar will offer training in feminist, queer, transgender and postcolonial approaches to the history of sexuality by exploring what methods are adequate to writing the history of trans femininity as a specifically nineteenth and twentieth century phenomenon. Areas of emphasis will include histories of sexology, sex work, social movements, and trans feminism and its opponents. The primary geographic focus will be the US, but through a transnational lens that connects to Western Europe, South Asia, and Latin America.

AS.100.725. Sex and Slavery II.
Research and methods in the field of sexuality and slavery studies. Part 2: Caribbean & African Continent.

AS.100.765. Problems in Women and Gender Studies.
An exploration of recent work in women's and gender history, focusing on some of the following: sexuality, cultural production, politics, family formation, work, religion, difference, and civic orders.

History of Art

AS.010.255. Contemporary Performance Art. 3 Credits.
Performance art is provocative and often controversial because it troubles, without dissolving, the distinction between art and life. Not just a matter of activating bodies, engaging viewers, or spurring participation, performance art asks what it means to perform, and what kinds of actions count, in contemporary culture. As such, performance art allows us to rethink established art historical concerns with form, perspective, and materiality, while offering critical insight into everyday life. We will explore how performance art addresses ingrained assumptions about action and passivity, success and failure, embodiment and mediation, "good" and "bad" feelings, emancipation and dependency.The study of performance art invites transdisciplinary approaches. Students from across the university are welcome. Our attention to a diverse array of artists and practices will be supplemented by readings in art history and criticism, as well as in feminist and queer theory, critical race theory, and political thought.

AS.010.301. Michelangelo: Religion, Sexuality, and the Crisis of Renaissance Art. 3 Credits.
The course will focus on the controversies surrounding the representation of the body in the writings and figurative art of Michelangelo and his contemporaries, the historical circumstances under which the most admired artist in Europe was attacked as a blasphemer and an idolator, and the effect of widespread calls for censorship on his later production. The writings of Michelangelo, Pietro Aretino, Benvenuto Cellini and own writings will be considered with a focus on their staging of an ambivalent and transgressive eroticism.

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.339. Sex, Death, and Gender: The Body in Premodern Art, Medicine, and Culture, c. 1300-1600. 3 Credits.
To what extent was the body and its depiction a site of contestation, identification, or desire in the Middle Ages and Renaissance? If the body in the West since the 1800s is seen to have been shaped by the rise of photography and film, the institutionalization of biomedicine, and the establishment of techniques of surveyance and mechanization, then how was the body represented, disciplined, and experienced in the preceding centuries? In an age of unprecedented encounter with non-European bodies, what did it mean to describe and categorize bodies by race, region, or religion? These are some of the major questions this class seeks to answer, which is fundamentally interdisciplinary as it draws upon insights and methods from anthropology and the history of medicine and history of science to investigate how the body has been represented and imagined in the visual arts. The bodies of the suffering Christ, the female mystic, the dissected cadaver, the punished criminal, and the non-European 'Other' will loom large as we work to problematize notions of a normative body, whether in the premodern world or in the contemporary one. While most readings and lectures will concern the body and its representation in the Christian West during the later Middle Ages and Renaissance, students are encouraged to work on a topic of their choosing from any geographical area 1000-1800 CE for their research papers.
Area: Writing Intensive

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.413. Historical and Conceptual Bases of Art History. 3 Credits.
This course introduces students to the principal methods and theories of art history. Students will work through readings foundational for the discipline, texts that define key methodological consolidations in the twentieth century, and more recent (e.g. feminist, visual studies, global, post-colonial, and/or ecological) critiques and rethinking. Specific texts will vary by instructor, but the course seeks—in any instantiation—to include a plurality of perspectives.

History of Science, Medicine, and Technology

AS.140.329. Women, Health, and Medicine in Colonial and Antebellum America. 3 Credits.
This class will examine the history of women's health and medicine in America from the 17th century to the mid-19th century, a period in which settler colonialism and the trans-Atlantic slave trade mixed European, Indigenous American, and African people and belief systems, resulting in diverse healing practices and understandings of the body and gender. Major themes addressed in the course include reproductive health, domestic and "alternative" medicine, as well as enslavement, racialized medicine, poverty, disability, and sexuality.
Area: Writing Intensive

AS.140.685. Histories of Reproduction.
While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

Medicine, Science and the Humanities

AS.145.220. Health, Medicine, Gender, and Sexuality. 3 Credits.
This course invites students to take the perspective of gender and sexuality on health and medicine. In this course, we do not see gender and sexuality as a separate domain of health. Instead, we will learn how a gender perspective is in fact crucial for critically exposing the ways in which medicine is interpenetrated by social life and by law. For example, what technologies and discourses constitute "the normal"? How is sexuality braided into disease surveillance? How do we understand the lawfare on the terrain of reproductive rights? What aspects of disease are suppressed in dominant forms of knowledge production, due to the undervaluation of gendered forms of experience? We will take cases involving HIV/AIDS; reproductive justice and rights; poverty, marginality and queer kinship; and household patterns of care.

Modern Languages and Literatures

AS.211.374. Gendered Voices. 3 Credits.
The course will explore the notion of 'voice' in order to show how poetry, literature, philosophy, and music have been dealing with it throughout the ages. In particular, by focusing on classical figures such as the Sirens, Circe and Echo, as well as by considering the seminal discussions of the 'voice' in Plato and Aristotle, the course will address the gendered nature of the voice as a tool to seduce and manipulate the human mind. More specifically, the course will discuss the ways in which male, female, queer, gendered and un-gendered voices embody different functions. Course materials include classical, medieval and early modern sources as well as later rewritings of myths concerned with the voice by authors such as Jules Verne, Karen Blixen, Giuseppe Tomasi di Lampedusa, and Italo Calvino. A selection of theoretical works (e.g. Cavarero, Silverman, Dollar, Butler) will also be discussed. The course is taught in English and all materials will be available in English translation; Italian majors and minors should enroll in section 2.
Area: Writing Intensive

AS.211.722. Global Feminist Filmmaking: a Theory in Practice Seminar.
This seminar examines recent emerging narrative and documentary global feminist filmmakers, applying feminist theory, intersectional theory, cine´ma ve´rite´, theory of nonviolence, and intersubjectivity to understand their work. Each week, we will examine one filmmaker's approach to their own personal practice of feminist filmmaking, and either interview them during our class or screen a pre-recorded zoom interview. In this seminar students will go beyond a theoretical feminist film criticism to one introduced into a lived and living feminist film practice. The filmmakers in question are Marialy Rivas (Chile), Elisabeth Scharang (Austria), Habiba Djahine (Algeria), Patricia Ortega (Venezuela and Argentina), Wanuri Kahiu (Kenya), Naomi Kawase (Japan), Sandra Kogut (Brazil), Kirsten Johnson (USA), TT the Artist (USA), Patricia Ramos (Cuba), Susana de Sousa Dias (Portugal), Claudia Llosa (Peru), Alina Marazzi (Italy), Rosine Mfetko Mbakam (Cameroun and Belgium).

AS.212.318. Women in French Literature of the 17th and 18th Centuries. 3 Credits.
This course will examine the changes in the relationship of women to literature in France before the French Revolution from several points of view: (1) What were the social and intellectual contexts of gender distinctions? (2) How did men writing about women differ from women writing about women? (3) How were these questions affected by the changing norms of literary productions? Texts by Mme. de Sévigné, Molière, Mme. de Lafayette, Prévost, Diderot, Rousseau, Laclos, and Beaumarchais.
Area: Writing Intensive

AS.212.436. Cultures of Love. 3 Credits.
From the time of its invention, as a kind of counterfeit religion, in the Hispano-Arabic world, love has been an unsettling, paradoxical, transgressive phenomenon: mystical, adulterous, con game, parlor game, poison, illness. Taking a literary, sociological and anthropological approach, this course will try to grasp some of the challenges posed by love's protean discourse: from the fin'amor born in women-ruled Medieval courts, to the language of 17th-century women mystics, to libertinage, to the cold intimacies of today's emotional capitalism. Taught in French.
Area: Writing Intensive
AS.210.301

AS.213.321. Bodies and Pleasures. 3 Credits.
This course traces a literary history of sexuality from the Middle Ages to contemporary women's writing. We will analyze how sexual pleasure changed over time. In particular, we will discuss what role literature plays in the reproduction and transformation of bodily pleasures. The course explores how the pleasures of bodies are imagined in and through literature, but also whether words are bodies that give pleasure and perhaps even have their own pleasures.

AS.213.373. Sex und Macht. 3 Credits.
We will discuss postwar and contemporary literature and films that grapple with the effect of unequal power structures on sexual relations. Taught in German.

AS.213.668. Kleist im Kontext.
This seminar will explore the narrative, dramatic, and quasi-journalistic work of Heinrich von Kleist in its philosophical and literary environment. We will examine how Kleist comments on and parodies the positions of the enlightenment, German Idealism, Weimar classicism, and the theater establishment. We will pay particular attention to the way he combines the verbal and the visual in his performative, narrative, and syntactic strategies, and analyze how this contributes to a specifically Kleistian sense of humor.Grading: P/F

AS.213.763. Contemporary Theater: Gender/Violence.
The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point "experimental" artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the "directors' theater," political theater, "pop-theater," "discourse-theater," "new documentary theater," "post-migratory theater," postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.

AS.214.304. Founding Mothers: Female Genealogies in Medieval and Renaissance Italian Literature. 3 Credits.
In this course we will explore the problem of the relationship of women to dynastic power in the literature and culture of late medieval and Renaissance in Italy. Beginning from Giovanni Boccaccio's famously ambivalent portraits of women in the Decameron and his treatise On Famous Women, we will locate women within an early modern system of inherited power and literary representations. We will then move to study a series of genealogically motivated chivalric poems (such as Orlando innamorato, Orlando furioso, Floridoro, Gerusalemme liberata) which propose a number of roles for women: warriors, queens, saints, monsters, saviors, poets, founders. These texts return again and again to the key role of women in establishing and maintaining dynastic continuity within noble families, but also to the dangers they pose to dynastic stability. We will try to understand how these literary texts work within the social and political context of the Italian city- states of this period. We will also study the involvement of women in the production and circulation of literary texts, focussing on notable patrons of the arts like Isabella d'Este and Lucrezia Borgia, and on important poets like Vittoria Colonna.

AS.214.363. Italian Journeys: An Other Story. 3 Credits.
What does it mean to be "other," and how can reading about experiences of otherness affect our understanding of historical moments? In this interdisciplinary survey of contemporary Italian literature, students will read through the lens of "the other" in order to highlight both the milieu of lived experiences (often lived by the authors themselves) outside of sociocultural ideals, and the role they play within modern Italian canon. Combining gender studies, animal studies, posthumanism, and other theoretical frameworks, students will examine works from authors such as Sibilla Aleramo, Carlo Levi, Elena Ferrante, Igiaba Scego, and directors Vittorio De Sica, and Alice Rohrwacher. Taught in English—students wishing to do coursework in Italian should register for AS.214.363 (02).

AS.214.434. Elena Ferrante and her Brilliant Friends: Contemporary Italian Women Writers. 3 Credits.
Elena Ferrante is Italy's most acclaimed contemporary novelist, although her true identity remains unconfirmed. Having been translated into and published in 45 languages, with over 15 million copies sold worldwide, her 'Neapolitan Quartet' triggered what has been called 'Ferrante Fever.' Through reading and discussion of Ferrante's works (novels, letters, and a fairytale) and their screen adaptations— the HBO TV series My Brilliant Friend and Maggie Gyllenhaal's The Lost Daughter (2022) —we shall discover the reasons behind this global, literary phenomenon while exploring themes such as gender, memory, trauma, women's participation in, or exclusion from, history, and the internal violence of a rapidly changing society. In addition to Ferrante's works, we shall also read Anna Maria Ortese, Elsa Morante, and Fabrizia Ramondino to understand the influence of women writers from previous generations on Ferrante's work. This class is taught in English. Additional discussion sessions in Italian will be offered.

AS.215.407. Power And Gender In Hispanic American Novels And Films. 3 Credits.
We will analyze and discuss four novels and three films impacted by gender violence and political idolatry under shattering stress. Oficio de tinieblas or The Book of Lamentations (1962) by Rosario Castellanos (Mexico). Zama (1956) by Antonio di Benedetto (Argentina). Delirio or Delirium (2004) by Laura Restrepo (Colombia). El ruido de las cosas al caer or The Noise of Things Falling (2011) by Juan Gabriel Vásquez (Colombia). In addition, we will examine in depth films by Lucrecia Martel (Argentina): the short Rey muerto (1995), La ciénaga (2001), and her own version of Zama (2017). Course taught in Spanish.
AS.210.312

AS.217.427. Radical Women: Brazilian Literature, Art, and Culture. 3 Credits.
The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry. The course is taught in English, but those interested in doing the coursework in Portuguese (4 credits) should register for section 02.

Music

AS.376.344. Powerful Women in Opera. 3 Credits.
Many opera scholars have noted that opera abuses its female characters. Many operatic heroines die, whether from violent acts or chronic diseases. However, women in opera also wield great power through their voices as ambitious queens, cunning servants, magical beings, and femmes fatales. In this course we will examine how these female characters operate through explorations of the operas' historical context, their texts and scores, and modern performance practice. Spanning from the 17th to 21st centuries, the repertoire studied in this class will provide an introduction to opera history. At the same time, we will delve deeply into different ways to do close analyses of opera through the lens of gender, reading the work of such thinkers as Carolyn Abbate, Naomi Andre, Adriana Caverero, Catherine Clément, and Wayne Koestenbaum.

Near Eastern Studies

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.249. Everything She Says is Done for Her: Exploring the Spheres of Influence of Women in Ancient Egypt. 3 Credits.
How did women move within their gendered spheres of influence in ancient Egyptian society? How do scholars discuss women in the ancient world and what are the spheres influence often allotted to women? How can we investigate the lives of women through the material record? What methodologies are applied by scholars to study women in antiquity? This course seeks to explore these questions and much more. The course will utilize textual and material evidence to examine and deconstruct the economic, social, religious, and political roles of women in ancient Egypt.

Philosophy

AS.150.400. Simone de Beauvoir. 3 Credits.
Seminar on Beauvoir's moral philosophy, covering the major works of the 1940s. Readings will include selections from The Blood of Others, Pyrrhus and Cineas, All Men are Mortal, The Ethics of Ambiguity, and The Second Sex. Open to graduate students and advanced undergraduates. (Beginning undergraduates should contact Professor Kosch.) No prerequisites.
Area: Writing Intensive

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

AS.150.436. Philosophy of Gender. 3 Credits.
In this class we will examine philosophical questions about gender, and about the intersections between gender and other social categories including race, class and sexuality. We will focus specifically on questions about the metaphysics of gender and other social categories.

Program in Museums and Society

AS.389.220. Queer Sixties. 3 Credits.
Introduction to queer & trans politics and culture in the period immediately preceding the gay liberation movement, from the early to late 1960s, focusing on intersections of race, sexuality, and gender. Course examines how we have come to narrate queer & trans history and investigates the ways archival practices shape conceptions of queer & trans life. Students learn research methods as they draw on and contribute to the university's digitized archival collections.

AS.389.230. Queer & Trans Public History. 3 Credits.
This course introduces students to a blend of public history, queer studies and transgender studies. Students learn oral history and archival research methods as they draw on and contribute to the university's archival, museum, and library collections.

AS.389.280. Of and For Everyone: Diversity, Equity, Inclusion and Access in the Museum. 3 Credits.
How are museums responding to the pressures to be more equitable, inclusive, and accessible towards public audiences and their staff? Students go behind the scenes of the Smithsonian, Baltimore Museum of Industry and Baltimore Museum of Art to meet with working groups and staff charged with transforming their institutions. Includes site visits, hands-on experiences and research on best practices.

AS.389.325. Women of the Book: Female Miracle Workers, Mystics, and Material Culture, 1450-1800. 3 Credits.
From psycho-spiritual autobiographers to mystical bi-locating nuns, convent crèche-keepers to choristers of sacred music, from rock-star-status mystics to the hidden careers of women printers, engravers, and miracle-makers, this course will explore the remarkable intellectual, cultural, and imaginative contributions of women who found refuge, agency, and power within alternative lives.
Area: Writing Intensive

AS.389.346. Scribbling Women in the Literary Archive. 3 Credits.
Students examine select texts and archival materials related to Emily Dickinson, Frances Ellen Watkins Harper, Edith Wharton, Ida B. Wells, Charlotte Perkins Gilman, Sui Sin Far, Alice Duer Miller, and Zora Neale Hurston. Students interrogate how these writers navigated the constraints of gender, as informed by race and class, in the decades before and after the 19th Amendment and consider literary collecting in relation to gendered cultural politics.

AS.389.348. Queer Oral History. 3 Credits.
Students learn to conduct, analyze, and interpret their own oral histories as they contribute to a wide-ranging project documenting queer worldmaking in the Baltimore-Washington D.C. region. We engage with scholarship from performance studies, queer of color critique, LGBTQ history, and public humanities to consider the politics of storytelling and the promises of public-facing oral history projects. Students have the option of developing podcasts, multimedia projects, and public humanities proposals as their final assignment.

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

Public Health Studies

AS.280.225. Population, Health and Development. 3 Credits.
This course will cover the major world population changes in the past century as well as the contemporary situation and projections for this century. Topics include rapid population growth, the historical and continuing decline of death and birth rates, contraceptive methods as well as family planning and child survival programs, population aging, urbanization, population and the environment and the demographic effects of HIV/AIDS and Covid.

AS.280.451. Born a Girl: Issues in Women's Health From a Life Course Perspective. 3 Credits.
The discussion surrounding women's health has often remained limited to understanding women's reproductive health needs. This course seeks to move beyond this topic to explore the key issues affecting women's health, utilizing a life course perspective. This undergraduate course will focus on a select number of themes including: a) understanding the history of women's health; b) sexual and reproductive health; c) maternal health; d) violence against women and girls; e) the needs of younger girls and aging women; and f) how mental health and stigma affect women. The course brings both U.S. and global perspectives to enhance the understanding of how the field of women's health has evolved over time. It will also address some of the challenges public health professionals continue to face in addressing the health and wellbeing of women today. This seminar-style course combines class presentations with journal clubs and small group discussions. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

Sociology

AS.230.304. (Making Space For) Black Thought. 3 Credits.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, Sadiya Hartman, Walter Rodney, Derek Walcott, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.316. African American Family. 3 Credits.
This course is an examination of sociological theories and studies of African-American families and an overview of the major issues confronting African-American family life. The contemporary conditions of black families are explored, as well as the historical events that have influenced the family patterns we currently observe. Special attention will be given to social policies that have evolved as a result of the prominence of any one perspective at a given point in time.

AS.230.324. Gender and International Development. 3 Credits.
This course employs a comparative perspective to examine the gendered impact of international development experiences and policies. Students will discuss the historical evolution of how the concept of gender has been constructed, conceptualized, and integrated into international development theory and practice. The course will also examine how greater international development. In particular, we will examine structural theories of poverty reduction, individual theories of power and processes of stratification at the household and family level. Specific issue areas will include the globalization, class and work political participation and social movements. Cross-listed with International Studies (CP, IR). Fulfills Economics requirement for IS GSCD track students only.
Area: Writing Intensive

AS.230.370. Housing and Homelessness in the United States. 3 Credits.
This course will examine the role of housing, or the absence thereof, in shaping quality of life. It will explore the consequences of the places in which we live and how we are housed. Consideration will be given to overcrowding, affordability, accessibility, and past and existing housing policies and their influence on society. Special attention will be given to the problem of homelessness.
Students may not have previously taken AS.230.223.

AS.230.388. Sociology of the Family. 3 Credits.
Sociological perspectives on contemporary family life, including marriage and divorce, cohabitation, single parenthood, same sex partnerships, children's wellbeing, balancing work and family responsibilities, domestic violence, and government policy toward families.

Theatre Arts & Studies

AS.225.218. ANGELS IN AMERICA (The Play) The Millennium Shift in American Culture and Politics. 3 Credits.
Tony Kushner's epoch-making play weaves together astonishingly diverse sides of America in a broad tapestry; a modern work that emerged at the end of the 20th Century, now being revived world wide: it provides keys to understanding the American zeitgeist and the coming transformations of the culture. In one pivotal work we find the emergence of LGBT rights, the Mormon Church, the AIDS epidemic, the new "spirituality," the Reagan-era transformation of both government and business, and the looming figure of Roy Cohn whose influence in American politics "behind the scenes" ranged from the Rosenberg trial to his work as counsel for the McCarthy Committee in the 1950s: and even his legacy in the 2016 as primary political and business mentor of the current President of the United States.

AS.225.318. 21st Century Female Playwrights. 3 Credits.
This is a writing intensive class exploring the current wealth of women playwrights, including Pulitzer Prize winners: Wendy Wasserstein, Paula Vogel, Lynn Nottage, and Jackie Sibblies Drury (2019 Prize for FAIRVIEW). We will discuss Script Analysis and read (and see) plays by numerous writers including Claire Barron, Kia Corthron, Theresa Rebeck, Sarah Ruhl, Danai Gurira, Caleen Sinnette Jennings, and Hansol Jung. This class will include a mid-term and a Final Paper.
Area: Writing Intensive

For current faculty and contact information go to http://anthropology.jhu.edu/wgs/directory.html

Women, Gender, and Sexuality, Minor

Women, Gender, and Sexuality Minor Requirements

Students can receive a minor in women, gender, and sexuality by completing six one-semester courses. The following courses are examples of the WGS core curriculum (363 prefix):

- Introduction to the Study of Women, Gender, and Sexuality
- Feminist and Queer Theory
- Gender and Sexuality Beyond the Global West
- Health, Medicine, Gender, and Sexuality
- Internship/Practicum (offered in collaboration with the JHU Center for Social Concern, the internship-practicum combines academic work with volunteer experience)

Students are asked to complete at least two courses from the core WGS curriculum and may choose among the courses cross-listed with other departments for the remaining four. At least four 300- or 400-level courses are required for the minor; no more than two courses can be at the 100- or 200-level. Students must earn a C- or better in all minor requirements and courses may not be taken satisfactory/unsatisfactory.

Please direct inquiries about the undergraduate minor to Katrin Pahl (kpahl@jhu.edu).

Code	Title	Credits
Core Courses		
Select two of the following:		6
AS.363.201	Introduction to the Study of Women, Gender, and Sexuality	
Any course with the number 363.XXX		
Additional Women, Gender and Sexuality courses [1]		
Select four additional Women, Gender and Sexuality courses		12
Total Credits		**18**

1 These are either courses cross-listed with the Study of Women, Gender, and Sexuality or courses AS.363.xxx.

Theatre Arts and Studies

http://krieger.jhu.edu/theatre-arts (http://krieger.jhu.edu/theatre-arts/)

The program offers a comprehensive approach to the arts of acting, directing, playwriting, and theatre history, along with the fundamentals of technical direction, play production, play analysis, and theatre management.

For those students who intend to prepare for a career in the theatre, the courses offered are taught exclusively by established professionals with experience on Broadway, in the best of regional theatres, and in many countries of the world.

For those students not focused on a career in theatre arts, the courses offer a broader perspective, an understanding of societal traditions and culture, and an appreciation for the arts, whether theatrical, literary, musical, or visual. Students pursuing careers in medicine, engineering, law, international relations, science, and others have been challenged and enriched by the school's courses in theatre arts.

For those who seek careers in the arts, the acting and directing workshops, playwriting courses, and independent study opportunities provide rigorous training in acting and other theatre crafts, as well as an appreciation for and an understanding of the history of dramatic arts, its cultural significance, and the industries it has produced.

Located in the program's home, the historic Merrick Barn, The Johns Hopkins University Theatre provides a vehicle for the fulfillment of student lab requirements. The University Theatre produces several plays each year in the John Astin Theatre and occasionally in the Meyerhoff Auditorium at the Baltimore Museum of Art, which adjoins the Homewood campus. Classes are also held in the Barn.

Programs

- Theatre Arts and Studies, Minor (p. 2176)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.225.100. Introduction to Theatre. 3 Credits.
An introduction to the drama: how and why the theatre came into being; its role in human history; and how changing social structures in different regions and epochs have shaped different kinds of theatre, plays and performance. Also: how theatre "works" for us and on us, and the major plays of world drama.

AS.225.101. Acting I. 3 Credits.
An introduction to the fundamentals of acting through exercises and improvisations based on the teachings of Stanislavsky and Sanford Meisner. This course also includes a brief survey of major modern American playwrights. Plays will be read and employed in scene work.

AS.225.201. Acting II. 3 Credits.
As in Workshop I, the principal classroom activities will consist of scene work, exercises, lectures, and discussion. Some rehearsal will also take place during school hours. It is expected that substantial out-of- class time be spent on rehearsals and exercises. Recommended Course Background: AS.225.301

AS.225.212. Voice and Speech for the Actor. 3 Credits.
It has been said that 90% of what an actor does onstage is dependent on being effortlessly heard and understood by their audiences. This course is designed to establish the tools for the actor to begin to create this foundation. Using a combination of both the benchmark texts by Edith Skinner and Kristin Linklater, along with in-class exercises and monologues, we will begin the process of exploring both vocal power through breathing and breath control, and the fundamental tools of clarity in the speaking of a dramatic text onstage.

AS.225.215. Performing Musical Theatre. 3 Credits.
Effective performance in musical theatre demands a committed analysis of the musical and dramatic values of the song and the libretto from which it springs, in order to develop a fresh, organic interpretation. This course will provide you with the training to both analyze and interpret musical theatre scenes and songs and to make the most of them in performance.Instructor Permission Only.

AS.225.218. ANGELS IN AMERICA (The Play) The Millennium Shift in American Culture and Politics. 3 Credits.
Tony Kushner's epoch-making play weaves together astonishingly diverse sides of America in a broad tapestry; a modern work that emerged at the end of the 20th Century, now being revived world wide: it provides keys to understanding the American zeitgeist and the coming transformations of the culture. In one pivotal work we find the emergence of LGBT rights, the Mormon Church, the AIDS epidemic, the new "spirituality," the Reagan-era transformation of both government and business, and the looming figure of Roy Cohn whose influence in American politics "behind the scenes" ranged from the Rosenberg trial to his work as counsel for the McCarthy Committee in the 1950s: and even his legacy in the 2016 as primary political and business mentor of the current President of the United States.

AS.225.300. Contemporary Theatre & Film. 3 Credits.
An introduction to the performing arts, including an overview of theatre history, acting styles and the interaction of art and society. A personal view from inside.

AS.225.303. Acting III. 3 Credits.
Special attention is given to the development of spontaneity and emotional freedom using the principles of Workshops I and II. Hands on work with John Astin's "The Process" and the second Silverberg workbook are employed, along with the Uta Hagen text. Boleslavsky and Michael Chekhov are introduced. The Clurman, Meisner, Stanislavsky and Strasberg approaches are included. Substantial out of class time is required. Recommended Course Background: Two acting courses.

AS.225.305. A History of Black Performance and Drama. 3 Credits.
A survey of the history of the Black Performer and Performance. In exploring the art of storytelling from ancient African civilizations, students will critically engage and discuss the origins, aesthetics, characteristics, and practices of Black performers, and their often-unacknowledged contributions and influence upon mainstream performance throughout the history of the world.

AS.225.308. Shakespeare in Performance. 3 Credits.
Students will work with a selection of Shakespeare's plays --- CYMBELINE, RICHARD III, CORIOLANUS--- in exploring specific ways in which the power of the lines can be translated dynamically and immediately into vocal and physical performance. This course can be repeated for credit, because it covers different topics. (Some background in the acting sequence is encouraged).

AS.225.310. Stagecraft. 3 Credits.
A hands-on approach to the technical and theoretical elements of production. Meets in the Merrick Barn Scene Shop. Permission Required.

AS.225.311. Scene Study. 3 Credits.
An introduction to the principles of analyzing text in a playscript and using the intrinsic demands of language to create character in a scene. Gradually, the student learns to define an ACTION through given circumstances and develop the arc of performance in a particular setting.

AS.225.314. Theatre: Tech Direction. 3 Credits.
An introduction to Technical Direction including pre-production and production with an overview of materials, tools, rigging and safety, together with design and its implementation.

AS.225.315. Scene Study 2. 3 Credits.
Classes and scenes tailored to the needs of the actors. Some rehearsal will take place during school hours. It is expected that substantial out-of-class time be spent on rehearsals and exercises.

AS.225.318. 21st Century Female Playwrights. 3 Credits.
This is a writing intensive class exploring the current wealth of women playwrights, including Pulitzer Prize winners: Wendy Wasserstein, Paula Vogel, Lynn Nottage, and Jackie Sibblies Drury (2019 Prize for FAIRVIEW). We will discuss Script Analysis and read (and see) plays by numerous writers including Claire Barron, Kia Corthron, Theresa Rebeck, Sarah Ruhl, Danai Gurira, Caleen Sinnette Jennings, and Hansol Jung. This class will include a mid-term and a Final Paper.
Area: Writing Intensive

AS.225.320. Performance. 3 Credits.
The student is given specific acting assignments, and develops them as special projects for public performance under the direct supervision of the instructor. A professional level performance is the goal. Audition Required. Out of class rehearsal time required. Permission only, signature required.

AS.225.321. The Lab - The Actor/Director/Playwright Lab. 3 Credits.
Student actors, directors, and playwrights will explore their respective crafts with emphasis on process and individual artistic growth. Participants in the class will also collaborate on the creation of new material for the stage. Recommended Course Background: one course in Acting, Directing, or Playwriting.

AS.225.323. Design for the Stage. 3 Credits.
The fundamentals of stage design, with an emphasis on process, including script analysis, research, conceptualization, and implementation, from the first reading of the play to opening night, along with an overview of theatre architecture from the Greeks to the current day and into our imagined future.

AS.225.324. Adaptation for the Stage. 3 Credits.
For aspiring playwrights, dramaturgs, and literary translators, this course is a workshop opportunity in learning to adapt both dramatic and non-dramatic works into fresh versions for the stage. Students with ability in foreign languages and literatures are encouraged to explore translation of drama as well as adaptation of foreign language fiction in English. Fiction, classical dramas, folk and fairy tales, independent interviews, or versions of plays from foreign languages are covered.
Area: Writing Intensive

AS.225.328. The Existential Drama: Philosophy and Theatre of the Absurd. 3 Credits.
Existentialism, a powerful movement in modern drama and theatre, has had a profound influence on contemporary political thought, ethics, and psychology, and has transformed our very notion of how to stage a play. Selected readings and lectures on the philosophy of Kierkegaard, Nietszche, Camus and Sartre -- and discussion of works for the stage by Sartre, Ionesco, Genet, Beckett, Albee, Pinter, Athol Fugard (with Nkani & Nshone), Heiner Müller and the late plays of Caryl Churchill. Opportunities for projects on Dürrenmatt, Frisch, Havel, Witkiewicz, and Mrozek.
Area: Writing Intensive

AS.225.330. Playwriting Strategies. 3 Credits.
A seminar and workshop in playwriting with Dr. Joe Martin, playwright and dramaturge. Student writers, developing their plays, will learn how to open up to the creative process, "brainstorm," refine their work, and shape it toward an act of artistic communication. Writer's techniques, such as attending to plot or "story," delineation of character, creating effective "dialog," even overcoming "writer's block," will be addressed. This course is designed to be complementary to – not a replacement for – playwriting classes in the Writing Seminars.
Area: Writing Intensive

AS.225.333. Scene Study 3. 3 Credits.
Classes and scenes tailored to the needs of the actors. Some rehearsal will take place during school hours. It is expected that substantial out-of-class time be spent on rehearsals and exercises.

AS.225.345. History of Modern Theatre & Drama. 3 Credits.
Designed to impart a deepened appreciation and understanding of today's theatre by surveying the major playwrights, historical movements, and theatre practices of the 20th century. The course also seeks to help students understand theatre's relationship to the societal and political power structure of each era and to introduce students to great dynamic literature in its intended form, which is performance.
Area: Writing Intensive

AS.225.346. Creative Improvisation: For Theatre and for Life. 3 Credits.
An exploration of the imagination and the senses using basic techniques of improvisation: exercises, conflict resolution, ensemble building, and theatre games. Texts: Spolin, Johnstone, LaBan and Feldencreis. Open to all students.

AS.225.374. Acting IV. 3 Credits.
Work is tailored to individual students, using the principles of Workshops I and II and other previous experience. Students work with John Astin's "The Process", along with the texts of Uta Hagen, Boleslavsky and Michael Chekhov. The Clurman, Meisner, Stanislavsky and Strasberg approaches are further explored. Substantial out of class time is required. Recommended Course Background: Two acting courses. Permission Required.

AS.225.501. Independent Study. 1 - 3 Credits.
Permission only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.225.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Center for Africana Studies

AS.362.309. Performing the Archive 2022: 200 Years of US-Liberia Migration. 3 Credits.
This seminar will explore some of the pivotal historical and contemporary connections between the US and Liberia since the first Black American settlers arrived in West Africa with the American Colonization Society in 1822. This course asks: What are implications of these stories of migration and reception for how we make sense of global anti-Blackness in the contemporary moment? How does performance provoke new questions about shared histories of those impacted by colonialism and the transatlantic slave trade? Why is a more in-depth understanding of 19th century Black political thought and the precolonial West African indigenous category necessary for developing theory on the political economy of race today? Through the lens of performance studies, students will analyze the documents in the American Colonization Society archive, to reimagine these early encounters as informed by historical documentation including folklore and pan-Africanist theory. Through exploring a range of historical and contemporary materials that center the problematic "indigenous/settler" binary, students will engage in a dramaturgical process which presents powerful possibilities for unlearning historical misrepresentations. In particular, students will develop theater-based projects that interrogate the spatio-temporal connections between the stories of both, free Blacks and those who were enslaved in Maryland and manumitted to go to Liberia, and the contemporary politics of Liberia-US migration.

First Year Seminars

AS.001.162. FYS: From Shakespeare to Baltimore. 3 Credits.
This First-Year Seminar is designed around what is on stage in Baltimore this fall. We will attend several plays, both professional productions at theatres in the city and student productions at JHU. We will pay attention to the interpretation of plays on the page, and to the ways that scripts materialize as performances on the stage. We will place these performances in the context of larger theatre histories, studying great plays from the age of Shakespeare to contemporary American theatre. No acting required – just the desire to explore the theatre of today.

Modern Languages and Literatures

AS.210.308. Acting French: learning about French language and culture through theater. 3 Credits.
This course proposes to enhance students' verbal (pronunciation, intonation, syntax, vocabulary) and nonverbal skills (body language, vocal projection, spatial awareness) by performing excerpts from French and Francophone plays ranging from the Middle Ages to the 21st century. A closer analysis of these excerpts will lead us to consider how theater uses the physicality and immediacy of human experience to create a more universal form of connectivity with the world.Recommended course background: AS.210.301.

AS.213.763. Contemporary Theater: Gender/Violence.
The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point “experimental” artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the “directors’ theater,” political theater, “pop-theater,” “discourse-theater,” “new documentary theater,” “post-migratory theater,” postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.

For current faculty and contact information go to http://krieger.jhu.edu/theatre-arts/people/

Theatre Arts and Studies, Minor

Theatre Arts and Studies Minor Requirements

All courses for the minor here must be taken for letter grades and receive a grade of C- or higher. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the minor without permission of the Director of Undergraduate Studies.

Code	Title	Credits
AS.225.100	Introduction to Theatre	3
or AS.225.300	Contemporary Theatre & Film	
AS.225.101	Acting I	3
AS.225.201	Acting II	3
AS.220.105	Introduction to Fiction & Poetry I	3
One theatre history course [3]		3
One drama course in other program [1]		3
One additional theatre course [2]		3
Total Credits		**21**

1. Courses are identified by the POS-Tag THEA-DRAMA. Alternatively, another theatre history course from within the program (not counted towards another requirement) may apply towards this requirement with permission of the director of undergraduate studies.
2. This course may be an acting, theatre production, playwriting, or theatre history course (AS.225-3xx-4xx). Students may speak to the director of undergraduate studies for additional guidance in selecting this course.
3. Current options include: AS.225.328 The Existential Drama: Philosophy and Theatre of the Absurd and AS.225.345 History of Modern Theatre & Drama. Students may speak to the director of undergraduate studies about other options.

Visual Arts

http://krieger.jhu.edu/visualarts/

The Center for Visual Arts engages and challenges students in the study and practice of the visual arts to encourage innovative making and thinking, risk taking and creative problem solving that is applicable to research across disciplines.

Visual arts courses examine contemporary and historical perspectives in art while providing an inclusive environment where ideas are shared and acted upon.

Central to this mission of challenging students and advancing their knowledge and skills in the arts are classes that offer faculty led cross-disciplinary collaboration within diverse academic programs at JHU and the greater Baltimore community. CVA faculty are accomplished artists, photographers, designers, and illustrators.

Students can minor in art or take general elective classes from a diverse curriculum that includes drawing, painting, printmaking, digital photography, visual communication, fiber art and a range of special topics courses. Through Johns Hopkins’ cooperative programs with MICA (Maryland Institute College of Art) and other colleges in the Baltimore area, students can take courses not offered at the Center for Visual Arts.

The CVA hosts an annual fall faculty show to highlight the creative work of current faculty.

Each spring, the Johns Hopkins community is invited to attend an exhibition of the year’s best work by CVA students. Additionally, a variety of temporary exhibits are hosted in the department throughout the year.

The CVA invites award winning artists to campus every semester to work with students and give a public presentation about their art practice. News and events can be found on our social media pages:

https://www.facebook.com/jhuvisualarts/

https://www.instagram.com/explore/tags/jhuvisualarts/

The photography, painting and drawing departments offer a summer study abroad program at Burren College of Art in Ballyvaughan, Ireland. More information can be found on the Study Abroad website (http://jhu-sa.terradotta.com/).

Programs

- Visual Arts, Minor (p. 2190)

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.371.126. Fiber Art and the String Revolution. 3 Credits.
This course presents students with technical, historical and cultural understanding of the fiber medium. Students learn the basics of textile processes, including dyeing, felting, knitting, weaving, sewing, and lacemaking. Technical demonstrations and samples will be covered in class while students are encouraged to expand upon covered material through long-term personal projects. Technical demonstrations will be supported with slide lectures demonstrating the historical context of fiber processes and their contemporary applications. Attendance in 1st class is mandatory.

AS.371.129. Botanical Painting in Watercolor and Gouache. 3 Credits.
This introductory painting class is an exploration of the ways watercolor and designer gouache are used together to paint organic materials representationally. We'll study the difference between botanical painting and illustration and trace how women specifically have shaped this genre of art through history. Students will learn techniques from both observation and invention and artwork will be assessed in weekly group critiques. Course includes demonstrations, short readings and a research paper about a botanical artist.

AS.371.131. Foundation Drawing. 3 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic drawing for students with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills while experimenting with traditional and contemporary practices in drawing. Wet and dry media will be used. Attendance at 1st class is mandatory.

AS.371.133. Oil Painting I. 3 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic painting for the serious student with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills focusing on issues of light, color and composition while experimenting with traditional and contemporary practices in painting. Lectures and a museum trip give students an art historical context in which to place their own discoveries as beginning painters. Oil paint will be used. Attendance at 1st class is mandatory.

AS.371.147. Art of Architecture: Homewood, Baltimore and Beyond. 3 Credits.
In this course, students will learn to design, draw, and see like an architect. A series of progressive design exercises will teach the practical capacities and habits of mind that lead not merely to competence but success and advancement in the field. We will look at what architecture has been, discuss what it is becoming, and explore both formal and narrative methodologies for design. The class will use the built environment of the city - and the Homewood campus - as a classroom and a site for interpretive drawing and creative design work. Essential in the architect's education is the sketchbook, which functions not merely as a place to 'store' what has been witnessed, but a place to interpret and explore implications of design in the world, whether close to home or traveling in exotic locales.

AS.371.151. Photoshop/Digital Darkroom. 3 Credits.
Photoshop is not only the digital darkroom for processing images created with digital cameras;it is also a creative application for making original artwork. In this course, students use Photoshop software as a tool to produce images from a fine art perspective, working on projectsthat demand creative thinking while gaining technical expertise. Students will make archivalprints, have regular critiques, and attend lectures on the history of the manipulated imageand its place in culture. We will look at art movements which inspire digital artists,including 19th-century collage, dada, surrealism, and the zeitgeist of Hollywood films. Studentsmust have a digital SLR camera. Prior knowledge of Photoshop is not required.Attendance at first class is mandatory. Approval for this course will be considered afterenrollment on SIS; no need to email.

AS.371.152. Introduction to Digital Photography. 3 Credits.
In this course students are introduced to the technical and creative study of digital photography. Students will learn the basic operation of the DSLR camera while receiving instruction in Photoshop, Lightroom, Nik software, file handling and color editing processes. Through in class demonstrations and in the field practice, students learn to use the camera's manual settings to make accurate exposures. Lectures and discussions of historical and contemporary photographs will be introduced to give students guidance and inspiration for their own image making. The semester culminates with students creating a final portfolio of prints. Attendance in first class is mandatory.

AS.371.153. Introduction to Visual Communication- Graphic Design. 3 Credits.
The digital design course explores two-dimensional graphics as visual communication. Students will be introduced to basic design principles and elements, learn graphics tools used in the designindustry, and develop and apply creative strategies to solve design problems in their everyday lives. This unique course will address the students' direct needs through real-life design problems they face. Students will be asked to bring design challenges and tackle the issue both independently and collaboratively. Design challenges may include building print and web visual presentations, producing information brochure and posters, developing off and online portfolios, creating a resume to business cards. The course will offer both analog and digital design processes, graphics software tutorials and techniques, and basic introduction to design history, vocabulary and concepts.

AS.371.154. Introduction to Watercolor. 3 Credits.
Watercolor is simultaneously the most accessible of all painting media and the most misunderstood. This course provides experience and instruction in observational and expressive watercolor techniques, materials, concepts, and vocabulary. Topics to be reviewed include line, perspective, value, texture, composition, color, and pictorial space. There will be an introduction to contemporary practices in watercolor, as well as experimental and abstract exercises, collage, and conceptual work.

AS.371.155. Introduction to Sculpture. 2 Credits.
A studio course introducing students to sculptural concepts and methods. Emphasis is on the process of creating. Even the simplest materials can effectively activate space, convey meaning, and elicit emotion when used thoughtfully and imaginatively. Students will learn different methods including additive and reductive techniques, construction, modeling, and mold-making. No prerequisites except a willingness to experiment, make mistakes... and clean up when you are done. Approval in this course will be considered after enrollment in SIS. Attendance in 1st class is mandatory.

AS.371.162. Black and White: Digital Darkroom. 3 Credits.
In this digital photography course, students explore the beauty and drama of the black- and-white aesthetic. Students learn the elements of composition, style and content through discussions of historic and contemporary imagery. They gain proficiency in Photoshop, Lightroom, and NIK software. Projects enhance students' artistic vision and include the Evocative Landscape, Surrealism, and a DADA collage. Students work on a final project of their choice. Digital SLRs are provided. Attendance at 1st class is mandatory. Camera experience is a plus but not a requirement. Approval for this course will be considered after enrollment on SIS.

AS.371.164. Introduction to Printmaking. 2 Credits.
Working with non-toxic/water based inks and both an engraving press and hand tools, students will explore several types of printmaking. Methods will include intaglio, collograph and both simple and multi-plate relief. As they develop their prints, students can then observe and exploit the strengths that each method has to offer. Drawing and Photoshop skills are helpful but not required.

AS.371.165. Location Photography. 3 Credits.
Working in the studio and in various locations, students will learn the fundamentals of lighting interiors and strategies for working in almost any environment. Field trips will include the National Aquarium, Evergreen Museum & Library, a Howard County horse farm, a Tiffany-designed church and a photo studio. Students will also concentrate on the fine art of printing in our digital lab. They will develop a final portfolio of 10 photographs which express a personal vision about a location of their choice. A basic knowledge of digital photography is helpful, but not required. Approval for this course will be considered after enrollment on SIS. First class is mandatory

AS.371.166. Landscape Photography. 3 Credits.
Class begins: Wednesday, July 6th. In this course students will experience the drama and beauty of the urban and rural landscape. On numerous field trips they will hone their camera technique as well as learn elements of composition and develop a personal style. Students will learn the fundamentals of Photoshop and they will also be introduced to the beauty of black and white in Silver Efex software. Digital SLR cameras will be provided.

AS.371.180. Exploring Line. 2 Credits.
This challenging yet creatively playful course presents abstract, perceptual and conceptual concepts in art to understand line, one of the elements of art, from multiple perspectives, materials and practices. Be prepared to collaborate and experiment! Through an intense exploration of line, students will create artworks exploring line as marks on a flat surface (drawing), lines that communicate data (design), lines that build form (sculpture) and lines that embody movement (performance and video). Possible assignments will include projects with drawing, printmaking, fiber, cell phone video, installation, unconventional or recycled materials and collaboration. • This is not a drawing class but a multimedia course on one of the elements of art.Instructor approval and attendance at first class is mandatory.

AS.371.185. Printmaking: Multiples and Variations. 3 Credits.
In this course students learn to create marks, textures and imagery using a variety of printmaking techniques. Students create relief and intaglio printing matrices and practice printing by hand and with a press to reproduce their images. The class culminates with explorations of layered printing, monoprinting, and mixed media approaches to create unique 2-dimensional and 3-dimensional works. Attendance in first class is mandatory. No prior experience is needed.

AS.371.186. Fundamentals of Design Drawing and 3-D Visualization. 2 Credits.
This course introduces the tools, techniques, and technologies of design representation in a project-based setting. Students will build drawing skills, learn the principles of perspective, and explore theories and applications of design media and emerging digital technologies. Designing projects at various scales from the hand-held object to the public realm, we will develop creative problem solving, design thinking, and iterative design methodologies, leaving the course with the ability to apply the foundations of design to any discipline. Special note: This spring our course will be geared toward collaborative and site-based practices. Class meetings will begin with remote instruction and collaboration, and expand to include site visits as the season progresses. This course will satisfy the foundation drawing class for the art minor.

AS.371.187. Intermediate Drawing, A Contemporary Approach. 2 Credits.
This is an intermediate drawing class that builds on the concepts and skills in Studio Drawing 1. Students will explore contemporary and conceptual approaches to drawing while further developing their skills in various graphic mediums. Risk taking and experimentation will be encouraged while learning about comtemporary practices in the medium. The course will conclude with students creating an individual series of drawings of their choice.
AS.371.131 OR AS.371.186

AS.371.210. Drawing: Who's Telling the Story?. 2 Credits.
What makes an image truthful?Students will create drawings utilizing both traditional and unconventional processes through the lens of historical and political illustrations, propaganda graphics and misinformation, and current events. The course is anchored in, but not limited to, the art practices of Kara Walker's slavery narrative, George Grosz's political caricatures of First War Germany, historical war posters, Hugo Crosthwaite's depiction of the US/MX border to Coronavirus "beauty shot." Projects may include revising a historical artwork, manipulating propaganda graphics of the past and the present, redrawing a visual data, and designing a personal narrative drawing project. Field trips, technical demos, discussions, and lectures will provide context and support for students to become image-makers of their own narrative and history. Attendance in first class is mandatory. Recommended but not required: AS.371.131

AS.371.211. Artist Books: Draft, Print, Stitch. 3 Credits.
In this studio art class students will create three artist books taught by three different CVA faculty. The first four weeks will investigate the book as a technological and cultural artifact, exploring historically what the book is and does, and as a cognitive aid and engine for ideation. Students will create a blank book that they use for their creative explorations.The second section will use printmaking techniques such as paper lithography, xerox transfers, and relief printmaking combined with quick and ephemeral folding structures in an effort to understand both printmaking and bookmaking's rich history in dissemination of ideas, democracy, and social change. This section will participate in a class zine exchange. The third section of the course will explore embroidery and weaving to navigate language and mark making. Students will explore the relationship between poetry, storytelling, and fiber processes to create a narrative textile.

AS.371.215. Hybrid Photography; Analog and Digital Experimentation. 3 Credits.
This course will introduce students to the basic use of the digital camera, Adobe photoshop post processing, basic darkroom printing and a variety of techniques for making images using analog and digital techniques. Students will learn a variety of alternative processes such as Photograms in contemporary practices, Chemigrams, and nature printing techniques such as Lumen Prints, Chlorophyll prints and Anthotypes. Through lectures, demos and hands on experimentation, students will learn how to creatively combine two worlds of technology, digital and analog, to make unique images.

AS.371.226. Sculptural Fibers. 3 Credits.
The fabric of the universe, a wrinkle in time and space: our physical universe is frequently described through fiber metaphors. Fiber processes are algorithmic. They grow exponentially, they fold, they tear, they wrinkle. These processes function as a pliable plane that can be bent, stretched, and turned inside out. This course offers students an opportunity to explore fiber processes through this sculptural lens. Topics include knitting, crochet, basketry, and lace as they come together to form sculptural armatures and objects. Together we will explore the physical properties of fiber and textiles, how they take up space and function in our world. Attendance in first class is mandatory. Recommended but not required: AS.371.126 Fiber Art and the String Revolution.

AS.371.228. Investigations in Still Life Photography. 3 Credits.
Students will learn approaches to taking still life photographs and expressing their relationships to the objects surrounding their daily lives. Still life will be defined as the objects we purchase, own, consume, observe and arrange. Investigations into the still life will be focused on table top, food, found objects, and product photography.Technical explorations include the exposure triangle, depth of field, basic lighting control, framing, and visual design. Class will consist of live-demonstrations, independent studio work, discussions, and photography critiques. Students will complete a portfolio of printed images by the end of the class. A digital camera with manual control, tripod, Lightroom, and Adobe Photoshop will be supplied for this course. Students will be approved into the course after enrollment in SIS. Attendance in first class is mandatory.

AS.371.230. Portrait Photography. 3 Credits.
In this course students will gain insight into the art of portraiture with projects such as the self-portrait, collaborative portraiture, portrait of a place, and image and text. In representing people, we'll explore developing an understanding of people in relation to power and representation, the body, environments and society. Lectures on the history of the portrait and its practitioners, new directions in portraiture as well as empathy and the gaze will inspire students to bring greater depth to their image making. Camera experience is a plus but not a requirement. Cameras will be provided for the semester. First class is mandatory.

AS.371.233. Environmental Photography. 3 Credits.
Environmental cognition, consciousness and communication are formed, deciphered and internalized with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will engage with the local community, identify and investigate environmental issues affecting Baltimore, participate in photographic critiques, and develop a final, in-depth environmental photo-documentary project. This studio/seminar course is designed with an emphasis on individual research and practice.Attendance in first class is mandatory.

AS.371.234. Oil Painting II. 3 Credits.
Students who have mastered basic painting skills undertake sustained projects, including portrait and plein air landscape work. Slide lectures and handouts deepen students' appreciation of representational traditions. Advanced techniques, materials, and compositional issues are also investigated. Recommended Course Background: AS.371.133 or equivalent.
AS.371.131 OR AS.371.133 or instructor's permission.

AS.371.240. Intermediate Digital Photography: Photographic Concepts. 3 Credits.
This studio art course will introduce students to conceptual techniques and applications of digital photography. In this course, we will foster creative exploration and uses of technology through advanced digital capture, image construction and manipulation, substrate choices, and methods of digital output. We will have an in-depth look at historic and contemporary photography as it relates to culture, current trends, and classroom assignments. Students will also engage in conversation and classroom critique throughout the semester to aid their dialogue and understanding of contemporary art. Attendance in first class is mandatory. Completion of AS.371.152 is suggested.

AS.371.250. Life Drawing. 3 Credits.
An intermediate drawing course focusing on drawing the human form and studying anatomy for artists. Working from live models, students will draw the clothed and nude figure, portrait drawing, gesture drawing and anatomy tracings of the skeleton and muscles. Students will use drawing skills learned in Drawing I to explore the human form using wet and dry material, collage and color. The class will study the figure drawings and paintings from Renaissance to contemporary artists. Attendance in 1st class is mandatory.
AS.371.131 or AS.371.187 or permission of Instructor.

AS.371.302. Photographic Portfolio. 3 Credits.
In this upper level course, students will work on a semester-long project. They will develop their ideas within a seminar style format that allows for conversation and debate and provides a forum for the evolution their work. Students will learn advanced techniques in Photoshop, Nik software and Lightroom to enhance content and develop a personal style. Through a combination of critique, lecture, and lab, students will complete a portfolio of ten printed images that work together in a series. Approval for this course will be considered after enrollment on SIS. Attendance in 1st class is mandatory.

AS.371.303. Documentary Photography. 3 Credits.
In this course, we will explore different genres and approaches to documentary photography and the questions inherent to this mode of image-making like representation, storytelling, records and archives, journalism, community engagement, research and personal perspective. Baltimore neighborhoods and contemporary issues will provide inspiration for student work. Students will learn camera operation, photo editing and produce a final documentary project on a subject of their choice as the culmination of their semester's work. Digital SLRs are available on loan for the semester. Attendance at first class is mandatory.

AS.371.307. The Photographer's Book. 3 Credits.
Students create a handmade book of photographs that illustrate a favorite piece of text. They may work with poetry, song lyrics, a play, a narrative, a blog, a diary, any writing (including their own). Students may look at historical texts such as medieval manuscripts or even scientific treatises. The possibilities are endless. We will take fieldtrips to book collections at the George Peabody Library, Evergreen Museum and Library and the Betty and Edgar Sweren Collection.This course will be taught by a photographer and an artist book designer. A previous photography class is a plus, but not a requirement. Students who would like to combine their painting and drawing skills with their photographs are welcome to do so. Attendance in first class is mandatory. Students will have an exhibition of their artist books in the Special Collections Rare Books room of the MSE library.Approval for this course will be considered after enrollment in SIS.

AS.371.330. Evergreen as Muse: A Photographic Exploration. 3 Credits.
In this course taught by an historian and a fine art photographer, students are introduced to the delights of the Evergreen Museum and Library of the Johns Hopkins University. The history of Evergreen, its inhabitants including family members and servants, the world-famous library, art collection and grounds, all serve to inspire students to produce a portfolio of photographs. There will be an exhibition showcasing student work at the museum as the culmination of their semester's work.
AS.371.152 OR AS.371.162 OR AS.371.303

AS.371.381. Advanced Projects in Visual Art. 3 Credits.
In this studio course students will create artwork based on their individual research and concerns in art. Through artist presentations, readings, discussions and museum and gallery visits the students will advance their skills and understanding of contemporary art and theory. This class is open to studio and digital photography students who want to engage with other serious art students and advance their art practice and research.
AS.371.131 OR AS.371.133 OR AS.371.152

AS.371.501. Independent Study. 2 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.371.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.371.590. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

Cross Listed Courses

Anthropology

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

Applied and Computational Mathematics

EN.625.638. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as EN.605.647 Neural Networks.

Center for Africana Studies

AS.362.309. Performing the Archive 2022: 200 Years of US-Liberia Migration. 3 Credits.
This seminar will explore some of the pivotal historical and contemporary connections between the US and Liberia since the first Black American settlers arrived in West Africa with the American Colonization Society in 1822. This course asks: What are implications of these stories of migration and reception for how we make sense of global anti-Blackness in the contemporary moment? How does performance provoke new questions about shared histories of those impacted by colonialism and the transatlantic slave trade? Why is a more in-depth understanding of 19th century Black political thought and the precolonial West African indigenous category necessary for developing theory on the political economy of race today? Through the lens of performance studies, students will analyze the documents in the American Colonization Society archive, to reimagine these early encounters as informed by historical documentation including folklore and pan-Africanist theory. Through exploring a range of historical and contemporary materials that center the problematic “indigenous/settler” binary, students will engage in a dramaturgical process which presents powerful possibilities for unlearning historical misrepresentations. In particular, students will develop theater-based projects that interrogate the spatio-temporal connections between the stories of both, free Blacks and those who were enslaved in Maryland and manumitted to go to Liberia, and the contemporary politics of Liberia-US migration.

Classics

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

Computer Science

EN.605.613. Introduction to Robotics. 3 Credits.
This course introduces the fundamentals of robot design and development with an emphasis on autonomy. Robot design, navigation, obstacle avoidance, and artificial intelligence will be discussed. Topics covered in robot design include robot structure, kinematics and dynamics, the mathematics of robot control (multiple coordinate systems and transformations), and designing for autonomy. Navigation topics include path planning, position estimation, sensors (e.g., vision, ultrasonics, and lasers), and sensor fusion. Obstacle avoidance topics include obstacle characterization, object detection, sensors and sensor fusion. Topics to be discussed in artificial intelligence include learning, reasoning, and decision making. Students will deepen their understanding through several assignments and the term-long robot development project.

EN.605.617. Introduction to GPU Programming. 3 Credits.
This course will teach the fundamentals needed to utilize the ever-increasing power of the GPUs housed in the video cards attached to our computers. For years, this capability was limited to the processing of graphics data for presentation to the user. With the CUDA and OpenCL frameworks, programmers can develop applications that harness this power directly to search, modify, and quickly analyze large amounts of various types of data. Students will be introduced to core concurrent programming principles, along with the specific hardware and software considerations of these frameworks. In addition, students will learn canonical algorithms used to perform high-precision mathematics and data transformations. Class time will be split between lectures and hands-on exercises. There will be two individual projects in both CUDA and OpenCL programming, which will allow students to independently choose demonstrable goals, develop software to achieve those goals, and present the results of their efforts.

EN.605.621. Foundations of Algorithms. 3 Credits.
This follow-on course to data structures (e.g., 605.202) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), recursion and mathematical induction, algorithm analysis and computational complexity (recurrence relations, big-O notation, NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristic, dynamic programming, amortized analysis), and graph algorithms (depth-first and breadth-first search, connectivity, minimum spanning trees, network flow). Advanced topics are selected from among the following: randomized algorithms, information retrieval, string and pattern matching, and computational geometry. Prerequisite(s): EN.605.202 Data Structures or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

EN.605.624. Logic: Systems, Semantics, and Models. 3 Credits.
Traditionally, logic is the study of correct reasoning. In the last few decades, logic has become increasingly important to knowledge representation -- a subfield of artificial intelligence concerned with developing representations of the world (often called ontologies) that aid computers in understanding and making sense of data. This course will promote both a theoretical and practical understanding of logic as a stepping stone for working in contemporary knowledge representation. We will begin with a review of categorical, propositional, and predicate logic. We will then survey modal logics, which include systems that represent necessity and probability, as well as other systems that represent time, and moral notions such as obligation and permissibility. The second half of the course will then introduce the semantic web and ontology engineering. Students will explore the top-level ontology Basic Formal Ontology (BFO) and gain familiarity using mereological and temporal relations. In addition, students will create ontologies in the web ontology language (OWL2) and use the language SPARQL to query knowledge graphs. Students will have the option of writing either a research paper or creating an ontology in OWL with slides as part of a final project.

EN.605.635. Cloud Computing. 3 Credits.
Cloud computing helps organizations realize cost savings and efficiencies without spending capital resources up front, while modernizing and expanding their IT capabilities. Cloud-based infrastructure is rapidly scalable, secure, and accessible over the Internet —you pay only for what you use. So, enterprises worldwide, big and small, are moving toward cloud-computing solutions for meeting their computing needs, including the use of Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). We have also seen a fundamental shift from shrinkwrapped software to Software as a Service (SaaS) in data centers across the globe. Moreover, providers such as Amazon, Google, and Microsoft have opened their datacenters to third parties by providing low-level services such as storage, computation, and bandwidth. This trend is creating the need for a new kind of enterprise architect, developer, QA, and operational professional—someone who understands and can effectively use cloud-computing technologies and solutions. In this course, we discuss critical cloud topics such as cloud service models (IaaS, PaaS, SaaS); virtualization and how it relates to cloud; elastic computing; cloud storage; cloud networking; cloud databases; cloud security; and architecting, developing, and deploying apps in the cloud. The format of this course will be a mix of lectures, and hands-on demos. Upon completing this course, students will have a deeper understanding of what cloud computing is and the various technologies that make up cloud computing, along with hands-on experience working with a major cloud provider. Prerequisite(s): 605.202 Data Structures.

EN.605.646. Natural Language Processing. 3 Credits.
This course surveys the principal difficulties of working with written language data, the fundamental techniques that are used in processing natural language, and the core applications of NLP technology. Topics covered in the course include language modeling, text classification, labeling sequential data (tagging), parsing, information extraction, question answering, machine translation, and semantics. The dominant paradigm in contemporary NLP uses supervised machine learning to train models based on either probability theory or deep neural networks. Both formalisms will be covered. A practical approach is emphasized in the course, and students will write programs and use open source toolkits to solve a variety of problems.Course prerequisite(s): There are no formal prerequisite courses, although having taken any of 605.649 Introduction to Machine Learning, 605.744 Information Retrieval, or 605.645 Artificial Intelligence is helpful.Course note(s): A working knowledge of Python is assumed. While some of the assigned exercises can be done in any programming language, we will sometimes provide example code in Python, and many of the labs are best solved in Python.

EN.605.647. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as 625.638 Neural Networks.

EN.605.649. Introduction to Machine Learning. 3 Credits.
EN.605.649 - Introduction to Machine LearningAnalyzing large data sets ("Big Data"), is an increasingly important skill set. One of the disciplines being relied upon for such analysis is machine learning. In this course, we will approach machine learning from a practitioner's perspective. We will examine the issues that impact our ability to learn good models (e.g., inductive bias, the curse of dimensionality, the bias-variance dilemma, and no free lunch). We will then examine a variety of approaches to learning models, covering the spectrum from unsupervised to supervised learning, as well as parametric versus non-parametric methods. Students will explore and implement several learning algorithms, including logistic regression, nearest neighbor, decision trees, and feed-forward neural networks, and will incorporate strategies for addressing the issues impacting performance (e.g., regularization, clustering, and dimensionality reduction). In addition, students will engage in online discussions, focusing on the key questions in developing learning systems. At the end of this course, students will be able to implement and apply a variety of machine learning methods to real-world problems, as well as be able to assess the performance of these algorithms on different types of data sets. Prerequisite(s): EN.605.202 – Data Structures or equivalent.

EN.605.662. Data Visualization. 3 Credits.
This course explores the underlying theory and practical concepts in creating visual representations of large amounts of data. It covers the core topics in data visualization: data representation, visualization toolkits, scientific visualization, medical visualization, information visualization, flow visualization, and volume rendering techniques. The related topics of applied human perception and advanced display devices are also introduced. Prerequisite(s): Experience with data collection/analysis in data-intensive fields or background in computer graphics (e.g., 605.667 Computer Graphics) is recommended.

EN.605.743. Advanced Artificial Intelligence. 3 Credits.
Many advanced artificial intelligence systems are using both Machine Learning and Symbolic AI to solve subproblems. This course builds on the foundations of EN.605.645 Artificial Intelligence by delving more deeply into those AI algorithms and approaches that go under the name of Good Old Fashioned AI or Symbolic AI. In this course, we will cover logic programming, expert systems and business rules, fuzzy logic, case based reasoning, and knowledge graphs. We will also explore more advanced versions of planning and reinforcement learning algorithms. The instructor may add additional topics as warranted. Prerequisite(s): EN.605.645 Artificial Intelligence or permission of instructor.
EN.605.645 Artificial Intelligence

EN.605.745. Reasoning Under Uncertainty. 3 Credits.
This course is concerned with the problems of inference and decision making under uncertainty. It develops the theoretical basis for a number of different approaches and explores sample applications. The course discusses foundational issues in probability and statistics, including the meaning of probability statement, and the necessity of a rational agent acting in accord with probability theory. We will look at possible generalizations of Bayesian probability, including Dempster-Shafer theory. Next, we will develop algorithms for Bayesian networks—graphical probabilistic models—for exact and approximate inference and consider several application areas. Finally, the course will examine the problem of making optimal decisions under uncertainty. We will explore the conceptual foundations of decision theory and then consider influence diagrams, which are graphical models extending Bayesian networks to the domain of decision analysis. As time permits, we will also look at Bayesian games and Markov decision processes. Pertinent background in probability and theoretical computer science is developed as needed in the course.

EN.605.746. Advanced Machine Learning. 3 Credits.
This course focuses on recent advances in machine learning and on developing skills for performing research to advance the state of knowledge in machine learning. The material integrates multiple ideas from basic machine learning and assumes familiarity with concepts such as inductive bias, the bias-variance trade-off, the curse of dimensionality, and no free lunch. Topics range from determining appropriate data representations and models for learning, understanding different algorithms for knowledge and model discovery, and using sound theoretical and experimental techniques in assessing learning performance. Specific approaches discussed cover nonparametric and parametric learning; supervised, unsupervised, and semi-supervised learning; graphical models; ensemble methods; and reinforcement learning. Topics will be discussed in the context of research reported in the literature within the previous two years. Students will participate in seminar discussions and will present the results of a semester-long research project of their own choosing.
EN.605.649 Introduction to Machine Learning; multivariate calculus;Students cannot receive credit for both EN.605.746 and EN.625.742

EN.605.747. Evolutionary and Swarm Intelligence. 3 Credits.
Recently, principles from the biological sciences have motivated the study of alternative computational models and meta-heuristic approaches to problem solving. Proceeding from a machine learning perspective, this course explores how principles from theories of evolution, natural selection, and swarming behavior can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from evolutionary computation and swarm intelligence for developing software agents capable of solving problems as members of a larger population of agents. Specific topics addressed include representation and schemata; selection, reproduction, and recombination; theoretical models of computational intelligence; optimal allocation of trials (i.e., bandit problems); search, optimization, and machine learning; evolution of programs; population and swarm dynamics; and emergent behavior. Students will participate in seminar discussions and will complete and present the results of an individual project.
EN.605.649 Introduction to Machine Learning; multivariate calculus.

Cybersecurity

EN.695.637. Introduction to Assured AI and Autonomy. 3 Credits.

In order to drive a future where artificial intelligence (AI) enabled autonomous systems are trustworthy contributors to society, these capabilities must be designed and verified for safe and reliable operation and they must be secure and resilient to adversarial attacks. Further, these AI enabled autonomous systems must be predictable, explainable and fair while seamlessly integrated into complex ecosystems alongside humans and technology where the dynamics of human-machine teaming are considered in the design of the intelligent system to enable assured decision-making. In this course, students are first introduced to the field of AI, covering fundamental concepts, theory, and solution techniques for intelligent agents to perceive, reason, plan, learn, infer, decide and act over time within an environment often under conditions of uncertainty. Subsequently, students will be introduced to the assurance of AI enabled autonomous systems, including the areas of AI and autonomy security, resilience, robustness, fairness, bias, explainability, safety, reliability and ethics. This course concludes by introducing the concept of human-machine teaming. Students develop a contextual understanding of the fundamental concepts, theory, problem domains, applications, methods, tools, and modeling approaches for assuring AI enabled autonomous systems. Students will implement the latest state-of-the-art algorithms, as well as discuss emerging research findings in AI assurance.

Data Analytics

SA.100.501. Statistics for Data Analysis. 4 Credits.

Covers basic statistical tools for data analysis. Emphasizes facility in problem-solving in statistical inference and two-variable regression and correlation analysis. Presents descriptive statistics, probability and probability distributions and their use in hypothesis testing. Uses computer to solve problems and to reinforce statistical concepts. Students may not register for this class if they have already received credit for SA.340.709[C]

Data Science

EN.685.621. Algorithms for Data Science. 3 Credits.

This course provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving data science. Topics include advanced data structures for data science (tree structures, disjoint set data structures), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to complexity classes (P, NP and NP-completeness)), data transformations (FFTs, principal component analysis), design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, ordered and unordered trees). Advanced topics are selected from among the following: approximation algorithms, computational geometry, data preprocessing methods, data analysis, linear programming, multi-threaded algorithms, matrix operations, and statistical learning methods. The course will draw on applications from Data Science. Course Prerequisite(s): EN.605.201 Introduction to Programming Using Java or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): This required foundation course must be taken before other 605.xxx courses in the degree. This course does not satisfy the foundation course requirement for Bioinformatics, Computer Science, or Cybersecurity. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

Development, Climate, and Sustainability

SA.500.134. Global Energy and Climate Policy. 4 Credits.

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SA.500.135. Economic Development in Latin America. 4 Credits.

This course examines the economics of Latin America in contemporary comparative perspective. Starting with an overview of long term trends in growth and structural transformation, the course moves on to consider the theoretical approaches which economists have adopted to understand development processes in the region. The introductory phase of the course completed, the next three lectures survey the key macroeconomic themes of fiscal policy, monetary policy and the external balance. The difficulties countries in the region have faced in maintaining macroeconomic stability is an important theme of the course and is referred back to again and again in subsequent sessions. An equally important topic, that of poverty and inequality, forms the basis for the next section of the course. The remainder of the course deals with the challenge Latin America now faces as it struggles to compete in the global economy. The course will entail formal lectures and student presentations/group discussions. Each student (in conjunction with one or two colleagues) will be expected to prepare and present one 20 minute presentation at some point during the course. The presentations will be followed by group discussions led by the course lecturer. Broad indications of themes for the talks provided in this outline. More precise details of the talk topics – along with guidance on sources and formats – will be given in week one of the course.

SA.500.136. Agricultural Development, Poverty Reduction and Food Security. 4 Credits.

...forthcoming

Electrical and Computer Engineering

EN.525.661. UAV Systems and Control. 3 Credits.

This hardware-supplemented course covers the guidance, navigation- and control principles common to many small fixed-wing and multirotor unmanned aerial vehicles (UAVs). Building on classical control systems and modeling theory, students will learn how to mathematically model UAV flight characteristics and sensors, develop and tune feedback control autopilot algorithms to enable stable flight control, and fuse sensor measurements using extended Kalman filter techniques to estimate the UAV position and orientation. Students will realize these concepts through both simulation and interaction with actual UAV hardware. Throughout the course, students will build a full 6-degree-of-freedom simulation of controlled UAV flight using MATLAB and Simulink. Furthermore, students will reinforce their UAV flight control knowledge by experimenting with tuning and flying actual open-source quadrotor UAVs. Prerequisite(s): Background in control systems (e.g., EN.525.609 Continuous Control Systems) and matrix theory along with a working knowledge of MATLAB. Experience using Simulink is desired. Existing familiarity with C programming language, electronics, and microcontrollers will be helpful but is not required.

EN.525.670. Machine Learning for Signal Processing. 3 Credits.

This course will focus on the use of machine learning theory and algorithms to model, classify, and retrieve information from different kinds of real world signals such as audio, speech, image, and video. EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers

EN.525.724. Introduction to Pattern Recognition. 3 Credits.
This course focuses on the underlying principles of pattern recognition and on the methods of machine intelligence used to develop and deploy pattern recognition applications in the real world. Emphasis is placed on the pattern recognition application development process, which includes problem identification, concept development, algorithm selection, system integration, and test and validation. Machine intelligence algorithms to be presented include feature extraction and selection, parametric and non-parametric pattern detection and classification, clustering, artificial neural networks, support vector machines, rule-based algorithms, fuzzy logic, genetic algorithms, and others. Case studies drawn from actual machine intelligence applications will be used to illustrate how methods such as pattern detection and classification, signal taxonomy, machine vision, anomaly detection, data mining, and data fusion are applied in realistic problem environments. Students will use the MATLAB programming language and the data from these case studies to build and test their own prototype solutions.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent. A course in digital signal or imageprocessing is recommended, such as EN.525.627 Digital Signal Processing, EN.525.619 Introduction to Digital Image and Video Processing, 525.643 Real-Time Computer Vision, or 525.746 Image Engineering.

EN.525.733. Deep Learning for Computer Vision. 3 Credits.
Recent technological advances coupled with increased data availability have opened the door for a wave of revolutionary research in the field of Deep Learning. In particular, Deep Neural Networks (DNNs) continue to improve on state-of-the-art performance in many standard computer vision tasks including image classification, segmentation, object recognition, object localization, and scene recognition. With an emphasis on computer vision, this course will explore deep learning methods and applications in depth as well as evaluation and testing methods. Topics discussed will include network architectures and design, training methods, and regularization strategies in the context of computer vision applications. Following a seminar format, students will be expected to read, understand, and present recent publications describing the current state-ofthe-art deep learning methods. Additionally, team projects will give students an opportunity to apply deep learning methods to real world problems.Prerequisite(s): Students should have taken courses in computer vision and machine learning/pattern recognition, have basic familiarity with OpenCV, Python and C++, as well as prior class instruction in neural networks.

EN.525.770. Intelligent Algorithms. 3 Credits.
Intelligent algorithms are, in many cases, practical alternative techniques for tackling and solving a variety of challenging engineering problems. For example, fuzzy control techniques can be used to construct nonlinear controllers via the use of heuristic information when information on the physical system is limited. Such heuristic information may come, for instance, from an operator who has acted as a “human-inthe-loop” controller for the process. This course investigates a number of concepts and techniques commonly referred to as intelligent algorithms; discusses the underlying theory of these methodologies when appropriate; and takes an engineering perspective and approach to the design, analysis, evaluation, and implementation of intelligent systems. Fuzzy systems, genetic algorithms, particle swarm and ant colony optimization techniques, and neural networks are the primary concepts discussed in this course, and several engineering applications are presented along the way. Expert (rule-based) systems are also discussed within the context of fuzzy systems. An intelligent algorithms research paper must be selected from the existing literature, implemented by the student, and presented as a final project. Prerequisite(s): Student familiarity of system-theoretic concepts is desirable.

EN.525.786. Human Robotics Interaction. 3 Credits.
This course provides an investigation of human-robot interaction and prosthetic control, with a focus on advanced man-machine interfaces including neural signal processing, electromyography, and motion tracking interfaces for controlling and receiving feedback from robotic devices. The course will also cover human physiology and anatomy, signal processing, intent determination, communications between the human and the device, haptic feedback, and telepresence. It is designed to be a hands-on course with class time spent in the dedicated robotics lab designing interfaces and performing experiments in a Virtual Integration Environment (VIE) and with robotic devices. Additional time in the lab, outside of class time, may be required to complete the course project. Programming for the class will be in MATLAB and Simulink.Prerequisite(s): Linear algebra, ordinary differential equations, and programming experience with Python or MATLAB

Energy, Resources & Environment

SA.680.680. Introduction to Energy, Resources & Environment. 4 Credits.
This course introduces students to the fundamentals of energy, resources and environment. It covers a wide range of topics from the functioning of electricity markets to the challenge of climate policy and the management of air pollution. It also introduces a host of key concepts and analytical frameworks that underpin policy analysis in the field, such as notions of collective action and the role of regulatory agencies in monopolistic markets. The course pays particular attention to the energy-environment nexus, including the challenge of low-carbon development in an era of climate change. The course lays the foundation for other courses in the program.

First Year Seminars

AS.001.129. FYS: Environmental Poisons. 1 Credit.
An exploration of the occurrence and potential effects of poisons in the environment, from naturally occurring ones such as arsenic to those that may be introduced by mankind such as nuclear waste.

AS.001.157. FYS: Leonardo da Vinci - Art, Science, and Medicine. 3 Credits.
How does a notary’s son trained as a painter gain expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? How did an artist/engineer who brought few projects to completion come to have such a huge impact on later generations? This First-Year Seminar will focus critically on the myth of Leonardo’s singularity while showing his achievements to be characteristic of the artisanal culture of his time.

AS.001.162. FYS: From Shakespeare to Baltimore. 3 Credits.
This First-Year Seminar is designed around what is on stage in Baltimore this fall. We will attend several plays, both professional productions at theatres in the city and student productions at JHU. We will pay attention to the interpretation of plays on the page, and to the ways that scripts materialize as performances on the stage. We will place these performances in the context of larger theatre histories, studying great plays from the age of Shakespeare to contemporary American theatre. No acting required – just the desire to explore the theatre of today.

AS.001.167. FYS: The Natural History of the Homewood Campus. 3 Credits.
Johns Hopkins University Homewood campus and its surroundings is a wonderful green space in the middle of Baltimore City. This First-Year Seminar will introduce students to both the visible and cryptic organisms living above- and belowground. A combination of observational and sampling techniques will be used to demonstrate how ecologists collect data about plants, insects, and other organisms. In the classroom, these field observations, combined with reading material will be used to discuss environmental issues including global biodiversity decline, invasive species, and the effects of human activities on local and global biodiversity patterns. By the end of the course students will be able to generate research questions based upon field observations and appreciate the diverse life forms on Earth and in our own backyard.

Health Policy and Management

PH.552.601. Foundational Principles of Public Health. 0.5 Credits.
Provides a broad systematic understanding of the executive practice of public health from its inception to modern day. Uses case studies, as well as ethical and public heath practice frameworks to provide students with a grounding in “what is public health practice,” why it is important, and why it is contested.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

History

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world’s fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.601. Decolonizing The Museum: Case Studies.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world’s fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

Interdepartmental

AS.360.339. Planets, Life and the Universe. 3 Credits.
This multidisciplinary course explores the origins of life, planet formation, Earth’s evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.616 OR AS.171.333 OR AS.171.699 OR AS 270.335 OR AS.360.671

AS.360.408. Experiential Research Lab: “Holy” Conquest: Religion and Colonization in Sixteenth-Century Mexico. 3 Credits.
"When the Spanish unleashed their regime of colonization of what is present-day Mexico, their primary justification was the religious salvation of Indigenous people. Spaniards, along with other Europeans, arrived by the boatload to impose colonial order, taking up bureaucratic and ecclesiastical positions. The result was far from smooth—the sixteenth-century saw widespread disease, missionary violence on behalf of salvation, crop destruction and the recultivation of land, urban plans that radically altered the environment, the resettlement of entire populations, among other dramatic social and environmental events. This course investigates the complex and dynamic elements of colonial New Spain (as Mexico was called) from an interdisciplinary perspective. It tries to make sense of the chaotic landscape of the first century of Spanish colonial rule in New Spain. It is a research and writing intensive course that serves as an introduction to both the history and art history of this place and moment. Our meetings will act as a springboard for a group trip to Mexico during the January intersession to study objects and spaces in situ. Final projects will relate to materials viewed in person in Mexico. The costs for this trip are included for all students, no fees required. Knowledge of Spanish preferred but not required.
Area: Writing Intensive

AS.360.671. Planets, Life and the Universe.
Replace description with the following--"This multidisciplinary course explores the origins of life, planet formation, Earth’s evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.616 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.

International Economics and Finance

SA.510.115. Public Sector Economics. 4 Credits.
The course analyzes both the role of the state in the economy, including its manifestation as a Welfare State, and the role played in the public sphere by civil society organizations. The first part deals with the theory of market failures and government failures, the theory of collective economic action, the economic theory of democracy, the analysis of tax systems. The second part of the course uses the concepts developed in the first part to analyze specific governmentalinstitutions, expenditure programs and taxes in a comparative international perspective. These include health care (special attention will be devoted to the Covid-19 pandemic), social insurance, redistribution programs, education, the politics of institutional choice, government decentralization (federalism), political capitalism, the digital revolution and the labor market.

SA.510.116. Evolution of the World Economy. 4 Credits.
forthcoming...

SA.510.117. Asian Economic Development. 4 Credits.
This course gives a survey of the Asian economic development experience over the past half-century, with a focus on its international dimensions. In addition to evaluating the source of the remarkable growth and development of the region, the course considers the many challenges that the region has and will continue to face, from the Asian Financial Crisis in 1997-98 to the Covid-19 pandemic shock. It also looks at conflict and cooperation in the region in the 21st century.

Modern Languages and Literatures

AS.210.308. Acting French: learning about French language and culture through theater. 3 Credits.

This course proposes to enhance students' verbal (pronunciation, intonation, syntax, vocabulary) and nonverbal skills (body language, vocal projection, spatial awareness) by performing excerpts from French and Francophone plays ranging from the Middle Ages to the 21st century. A closer analysis of these excerpts will lead us to consider how theater uses the physicality and immediacy of human experience to create a more universal form of connectivity with the world.Recommended course background: AS.210.301.

AS.211.231. Planet Amazonia: Culture, History, and the Environment. 3 Credits.

Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We'll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a "virgin paradise" or a "green hell"; scientific studies and artists' depictions of the region's flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world's largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine?

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.

Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an eco-critical approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni's Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone's Gomorrah (2008), Alice Rohrwacher's Happy as Lazzaro (2018), and many others.

AS.211.329. Museums and Identity. 3 Credits.

The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

AS.211.424. Climate Change Narratives: Human and Non-Human Transformative Storytelling. 3 Credits.

In The Great Derangement Indian novelist Amitav Ghosh writes that "the climate crisis is also a crisis of culture, and thus of imagination." Worldwide, climate and environmental change is stirring the imaginary of novelists, filmmakers, and artists who are finding ways to frame, emplot, or even perform, an unmanageable phenomenon like climate change. How is climate change shaping new modes of storytelling and aesthetics? How do film, literature, and environmentally conscious art transform our perception of the world we inhabit and its unpredictable changes? Can climate change narratives help us to imagine futures of possibilities, maybe dystopian, uncertain, or even happy, but futures nonetheless? This multimedia course explores, through a transnational perspective, a variety of contemporary novels, films, and other media that attempt answer these questions.

AS.213.763. Contemporary Theater: Gender/Violence.

The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point "experimental" artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the "directors' theater," political theater, "pop-theater," "discourse-theater," "new documentary theater," "post-migratory theater," postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.

AS.217.425. Latin American Ecocriticism. 3 Credits.

Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

Near Eastern Studies

AS.130.153. A (Virtual) Visit to the Louvre Museum: Introduction to the Material Culture of Ancient Egypt. 3 Credits.
This course will present the Egyptological collections of the musée du Louvre in Paris, room by room, as in a real visit. The experience will be enhanced by the study of objects that are not shown to the public but are kept in the reserves of the museum. From the 4th millennium BC to Roman time, the iconic “masterpieces” of this world-renowned art museum, as well as its little-known artifacts, will allow us to explore the history and material culture of ancient Egypt. We will also learn to observe, describe and analyze archaeological objects, in a global manner and without establishing a hierarchy between them, while questioning their place in the museum and its particular language. The objective will be to go beyond the objects themselves and answer, in fine, the following questions: What do these objects tell us about the men and women who produced them, exchanged them, used them, and lived among them in antiquity? What do they also reveal about those who discovered them in Egypt, several millennia later, about those who collected them and sometimes traded them, and what does this say about the relations between Egypt and the Western countries over time? The courses will be complemented by visits to the rich Egyptian collections in Baltimore.

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

AS.131.678. Geoarchaeology: Applications of Earth Science to Archaeology.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.132.609. Seminar in Research Methods in Near Eastern Studies.
Area: Writing Intensive

Program in Museums and Society

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.
Course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation’s museums, galleries, and libraries and used objects to shape taste and status in the U.S.

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art’s American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum’s commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, revisualise and offer alternative stories. Class meets at the museum every other week.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

Research Methods

SA.100.412. Quantitative Research Methods. 4 Credits.
….forthcoming!

Security, Strategy, and Statecraft

SA.500.502. Genocide and Mass Violence. 2 Credits.
Genocide is often described as the worst of crimes, the nadir of human behavior, and the world's most "odious scourge." The goal of this course is to examine the origins and causes of genocide and to introduce students to the key works and major debates in the growing field of genocide and mass violence research. This course is divided into three parts. First, we will discuss how genocide is conceptualized and defined, explore the theories that try to explain whygenocides occur, and discuss why people may participate in genocidal killing. In the second part we will examine several key case studies of genocide and mass violence. Third, we will complete the course by debating policy approaches to genocide and mass violence including prevention, intervention, post-genocide justice, reconciliation and memory.

SA.502.126. Strategy And Policy. 4 Credits.
Provides an overview of strategic studies, which deals with the preparation and use of military power to serve the ends of politics. Discusses the development of warfare from the mid-19th century through the present and addresses major theoretical concepts, including those found in Carl von Clausewitz's On War.
Students may not register for this class if they have already received credit for SA.660.740[C]

SA.502.145. Genocide and Mass Violence. 4 Credits.
Genocide is often described as the worst of crimes, the nadir of human behavior, and the world's most "odious scourge." The goal of this course is to examine the origins and causes of genocide and to introduce students to the key works and major debates in the growing field of genocide and mass violence research. This course is divided into three parts. First, we will discuss how genocide is conceptualized and defined, explore the theories that try to explain whygenocides occur, and discuss why people may participate in genocidal killing. In the second part we will examine several key case studies of genocide and mass violence. Third, we will complete the course by debating policy approaches to genocide and mass violence including prevention, intervention, post-genocide justice, reconciliation and memory.

SA.502.148. History of European Integration. 4 Credits.
This course is concerned with the historical process by which European nation-states have constructed the institution known as the European Union (EU). It dealsprimarily with political, diplomatic, and economic history, not legal history or the history of European public policy. By the end of the course, students will have aclear picture of principal forces that have driven European integration at the various stages in the 'European Project's' development.

SA.502.149. The Indo-Pacific: cooperation & contestation. 4 Credits.
The Indo-Pacific has developed into a new framework for regional co-operation and contestation between the major powers, replacing the earlier notion of the Asia-Pacific. It reflects the rise of China and its Belt and Road Initiative, which aspires to weld together the Eurasianlandmass and its adjacent areas in a two-pronged, transcontinental and maritime drive. This course explores the material foundations, the perspectives and strategies of the major players in this huge maritime area, the patterns of co-operation and conflict in their interactions andthe arrangements - and their deficiencies - for transregional international order.

SA.502.150. Transatlantic Security. 4 Credits.
… forthcoming!

States, Markets, and Institutions

SA.503.110. Soft Power and Global Politics. 4 Credits.
As the use of military force to resolve disputes between nations becomes less plausible in most regions of the world,the struggle for influence intensies. Among the results has been the rise to global fame of the concept of 'Soft Power', in theory a means to turn a country's attributes and achievements into a lever for gaining advantage in international competitions of all sorts. Google lists 176m references to the term (11/1/13), China has invested in it heavily and consciously. Even nations such as Russia and Iran are using soft power language and tools. During the Syrian crisis, the term was everywhere. But the course will suggest that the land which gave birth to the term – the US – is still the one which enjoys the greatest advantages in this contest, since the most significant form of soft power leverage over time is the one which most successfully proposes models of modernity. No matter how much weaker the appeal of America's military, its banks, its politics compared to their heyday, America's products, icons, technologies, universities,media industries, personalities, etc. can still produce forms of presence and innovation which the rest of the world must reckon with. The course offers an historical perspective on this dynamic. Specifically it focuses on the great variety of models of modernity the US has produced over time and still can, and how the world has come to terms with them (including militant rejection). The course in its early stages is European in focus. Soon it opens out to other regions of the globe, especially Asia. So often the imperative of innovation that the US brings has encountered waves of anxiety about relations between the state and its citizens, between national communities and the market, between generations, genders, ethnic groups and religions. Efforts to understand 'soft power' and the outcomes of the world's encounter with the American version: these are the central issues of the course.

SA.503.111. Political Systems of the Developing World. 4 Credits.
The course is meant to prepare the students to deal with the most important theoretical and substantive issues affecting the nature, functioning and transformation of the political systems of the developing world. It will be focused on the analysis of the most relevant regime-types: authoritarian, military, theocratic, and democratic, and of major political processes such as political development and social modernization, state-building and state failures, politicaltransitions and democratic consolidations. It will draw from a wide range of cross-national and cross-regional cases. Class time will be divided between lectures and discussion. Each topic will be introduced by the instructor. The readings constitute the background for each lecture, but we will build upon them and go well beyond. Occasionally, timely articles on especially significant events will be analyzed in depth. Hopefully, fertile discussions will follow on the assumption thatall students have done their reading. The course will end with a take-home exam.

SA.503.112. After Afghanistan - Any Fuure for Pace Operations, Peacekeeping & Peacebuilding. 4 Credits.
In August 2021 the international media and most politicians reacted with much surprise to the dramatic events at Kabul airport. Thousands of Afghanis, desperate to flee the Taliban rule,were struggling to get on the last planes leaving the country. It did not take long before prominent Western commentators proclaimed that the failure in Afghanistan would be the end oflongstanding, Western inspired conflict management strategies to end violent conflict in failing states by deploying peace operations and getting involved in long term peace- andnation building processes. Indeed, “peace operations”, conducted by a variety of international actors like the UN, EU, NATO, AU, are a strategic pillar of international peace and securitypolicy since the end of the Cold War. In average, more than 150.000 international military, police, and civilians are annually deployed worldwide. No doubt, a number of these missionsare struggling with difficulties similar to those in Afghanistan. But does the failure in Afghanistan really imply that there is no future for peace operations and peacebuilding and thatmissions like those in Mali, Somalia, DR Congo etc. will suffer a fate similar to that in Afghanistan? This is what we want to explore in the class by having a thorough, field based lookat the history, concepts, development and unsolved problems of UN-lead peace operations and peacebuilding.

SA.503.113. Civil Wars and Interventions. 4 Credits.
The course aims to discuss key concepts and analytical framework for analyzing the various phases and facets of intra-state wars, and to show how international interventions can affect the course of these conflict and peace processes. In order to do so, the course first analyzes thecauses of civil wars and other major episodes of collective violence, the dynamics of violence in these conflicts, and early warnings measures that allow to “predict” the onset of conflict. It then examines the different ways in which external/international actors can intervene in domesticconflict, management techniques that may be introduced at various stages of conflict to halt escalation, minimize violence, and to move conflicts toward a sustainable peaceful settlement. This includes an analysis of peacekeeping, peacebuilding and state-building practices, and transitional justice. The course provides students with an advanced understanding of the thriving literature on civil wars and interventions, looking at both qualitative and quantitative scholarship, and offers students the possibility to engage with case studies to explore the real-world conflicts from their origin to their solution. In particular, the course offers detailed treatment of conflicts across continents, such as the wars in Bosnia, Colombia, Sahel region and Syria. Each case study will cover different aspects of the conflict, from their onset to evolution and the role of external actors. The expected outcome is that students will be able to engages with both academic and policy relevant literature in their quest for gaining a better understanding of the conflict cycle.

SA.503.114. Constitutional Development and Democratization. 4 Credits.
The spread of human rights and constitutional, representative government based on the rule of law, as either spurs for development or desirable outcomes of development, seems both possible and urgently necessary and yet we appear to be in a phase where many countries are undergoing a democratic retrogression. This course examines the nature, fate and prospects for constitutional development and democratisation across the globe. Employing both the diachronicand synchronic methods of analysis typical of comparative constitutional law, the course addresses topics such as constitution-making and constitutional amendment; forms of state and forms of government as well as the role and functions of constitutional and supreme courts with the aim of understanding how a given institutional framework may facilitate or obstruct transitions to democracy. The experience of so-called ‘consolidated’ democracies will often be used to examine the transition to democracy of other countries.

SA.503.116. Law and Institutions of the European Union. 4 Credits.
The spread of human rights and constitutional, representative government based on the rule of law, as either spurs for development or desirable outcomes of development, seems both possible and urgently necessary and yet we appear to be in a phase where many countries are undergoing a democratic retrogression. This course examines the nature, fate and prospects for constitutional development and democratisation across the globe. Employing both the diachronic and synchronic methods of analysis typical of comparative constitutional law, the course addresses topics such as constitution-making and constitutional amendment; forms of state and forms of government as well as the role and functions of constitutional and supreme courts with the aim of understanding how a given institutional framework may facilitate or obstruct transitions to democracy. The experience of so-called ‘consolidated’ democracies will often be used to examine the transition to democracy of other countries.

SA.503.117. Great Powers. 4 Credits.
forthcoming

Systems Engineering

EN.645.651. Integrating Humans and Technology. 3 Credits.
This class provides a hands-on introduction to human and cognitive systems engineering. Students will learn and apply user-centered research and innovation methods that are used to discover, document and integrate human capabilities, limitations and needs into the systems engineering process, improving the likelihood that the resulting systems are intuitive, efficient, effective and useful. Topics include needs elicitation, workflow analysis, functional allocation, decision making, prototyping, and performance measurement.
EN.645.662 Introduction to Systems Engineering OR EN.655.662 Introduction to Healthcare Systems Engineering OR EN.675.600 Systems Engineering for Space

Technology and Culture

SA.501.102. Transnational Advocacy. 4 Credits.
The class will examine theories and practices of international advocacy. Students will examine different types of advocacy: from insider lobbying to people powered campaigns, from agenda-setting to rapid response and digital campaigning. They will read academic scholarship on advocacy alongside texts produced by and/or for practitioners. The first half of the course will focus on theoretical dimensions of advocacy – who drives norm change and who resists it? When is advocacy effective? The second half of the class will focus more on advocacy for refugee and migrant rights. Students will evaluate a campaign for refugee and/or migrant rights and develop their own campaign recommendations. Learning Objectives: critically assess theories of international advocacy; identify and compare different types of advocacy organizations, strategies and tactics; develop practical skills in designing and evaluating campaigns.

SA.501.103. Multiculturalism & the Human Rights of Women. 4 Credits.
...forthcoming

The Middle East

SA.555.104. Political Leadership in the Middle East. 4 Credits.
Change in the Middle East has often been attributed to charismatic and powerful leaders, whose influence has been magnified by crisis, wars, and authoritarian traditions. This course combines biography with politics to ask whether, how, and in which circumstances, individual leaders havechanged the course of modern Middle Eastern history. Special attention is paid to the interaction of leaders and mass movements, and leadership dynamics in the unfolding “Arab Spring.”

SA.555.105. History and Politics of the Middle East & North Africa. 4 Credits.
The course aims at introducing students to the history and politics of the Middle East and North Africa (MENA), with a focus on the Mediterranean Middle East/Mashreq and Maghreb. Starting with the exploration of the emergence of the modern state system in the region, the course willexamine the post-colonial politics of MENA countries and the current state of affairs. In this context, a number of key issues will be addressed, such as state-society relations, authoritarianism and reform, the role of the military, regional dynamics, conflicts, the strategic importance of the region, political Islam, and democracy and human rights. The course will conclude with a discussion of the Arab uprisings and their outcome, along with the implications for the politics and international relations of the MENA region.

For current faculty and contact information go to http://www.jhu.edu/artwork/faculty.htm

Visual Arts, Minor

Visual Arts Minor Requirements

Art minors have the option to combine studio art and photography courses to complete the minor requirements or focus on one of the two disciplines:

1. Studio Art
2. Digital Photography

A minimum range of 15 to 18 credits, including:

Code	Title	Credits
Core Course		
AS.371.131	Foundation Drawing	3
or AS.371.152	Introduction to Digital Photography	
Art History Course		
One course at any level in history of art		3-4
Visual Arts Electives		
Four additional visual arts courses		10-12
Total Credits		**16-19**

Additional details:

- All courses must be taken for a letter grade and students must receive a grade of C- or better to apply the course towards the minor.
- One independent study course (at least 2 credits) in the visual arts may be counted toward the minor.
- Advising will be done by the Director (Studio) and the Photography Coordinator (Digital).
- At least three of the required courses for the minor must be taken through the Center for Visual Arts program at Hopkins.

Writing Seminars

http://writingseminars.jhu.edu/

The Writing Seminars exists to help students combine imaginative writing with scholarship in the general context of the humanities.

Programs

For current course information and registration go to https://sis.jhu.edu/classes/

Courses

AS.220.105. Introduction to Fiction & Poetry I. 3 Credits.
An introduction to basic strategies in the writing of poetry and fiction, with readings by Joyce, Woolf, Baldwin, Munro, Garcia Marquez, Donne, Bishop, Yeats, Komunyakaa, Tretheway, and others. Students will learn the elements of the short story and try their hand at a variety of forms: realist, fantastical, experimental. They'll also study the basic poetic forms and meters, from the ballad to the sonnet, iambic pentameter to free verse. Students will compose short stories and poems and workshop them in class. This course is a prerequisite for most upper level courses. This course is part one of the year-long Introduction to Fiction and Poetry, and must be taken before AS.220.106.
Area: Writing Intensive

AS.220.106. Introduction to Fiction & Poetry II. 3 Credits.
The second half of IFP, this course delves deeper into the finer points of fiction writing, including tone, description, and point of view; students will also enrich their knowledge of poetic forms and devices, such as figurative language, verse rhythm, and the poetic line. Readings include work by Paley, Mahfouz, Calvino, Lessing, Richard Wright, Plath, Rich, Auden, Li-Young Lee, and others. Students will write and workshop their own stories and poems, and complete a final portfolio. This course is a prerequisite for most upper level courses.
Area: Writing Intensive
AS.220.105 or AS.220.108

AS.220.108. Introduction to Fiction & Nonfiction. 3 Credits.
A course in realist fiction and nonfiction, with readings by Eudora Welty, Vladimir Nabokov, Henry James; George Orwell, Beryl Markham and Truman Capote. Students compose short stories and essays with attention to literary models. AS.220.108 can be substituted for AS.220.105.
Area: Writing Intensive

AS.220.138. Creative Writing. 1 Credit.
Enjoy the opportunity to develop your creative writing skills. You will work in both fiction and poetry. Through a combination of robust discussion, writing exercises, and substantial feedback, you will learn about imagery, voice, narrative structure, and other aspects of the writer's craft. The reading list will include a diverse range of contemporary authors. There will be a strong emphasis on collaborative workshopping, during which you will discuss one another's works in progress.

AS.220.200. The Craft of Fiction. 3 Credits.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106

AS.220.201. The Craft of Poetry. 3 Credits.
A study of the fundamentals and strategies of poetry writing. This course combines analysis and discussion of traditional models of poetry with workshop critiques of student poems and student conferences with the instructor.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106.

AS.220.206. Writing about Science I: Daily News Journalism. 3 Credits.
This course is designed to teach students the skills of daily news reporting, with a focus on covering science news. Students will learn how turn scientific discoveries into lively and engaging prose for the general public, interview sources, and pitch stories to news organizations. The skills taught are applicable to all areas of journalism, not just science journalism.
Area: Writing Intensive

AS.220.207. Writing the Unreal. 3 Credits.
"We left what we felt at what we saw," the poet Wallace Stevens once wrote, suggesting writing involves a direct response to our experiences of reality. In this class, we'll look exclusively at writing which takes on what hasn't been seen, and hasn't been felt. Through reading works of science fiction, magical realism, gothic literature, and speculative fiction, students will investigate how the unreal can still speak to our experiences and perceptions of the real. Additionally, students will get the chance to craft their own fantastical worlds through regular writing assignments. Tales of time travelers, haunted houses, unreal languages, and reimagined cities will be covered. Readings will include selections from Paul Beatty, Octavia Butler, Italo Calvino, Ursula K. Le Guin, Yoko Ogawa, and Mary Shelley.
Area: Writing Intensive

AS.220.212. Line and Lineage: A Survey of Poetry Writing. 3 Credits.
This course will be a chronological exploration of English-language poetry, beginning in the medieval era and continuing to the present day. We will examine not only the literature of the past, but also the ways in which a diverse range of contemporary writers have extended, challenged, and reimagined literary tradition. Throughout the semester we will pay especially close attention to the question of how a writer's management of the poetic line can shape a poem's structure, context, and meaning. Although this is a lecture-based class, not a workshop, participants will have many opportunities to respond artistically to the course readings.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106

AS.220.213. Fiction Survey: Once Upon a Time. 3 Credits.
A review of the origins and development of the realist short story from fable, fairy tale, saint's life, Bible story, through versions created in the Renaissance and classic (19th and 20th century) periods, to modern narratives. Writing Seminars majors only.
AS.220.105 AND AS.220.106

AS.220.218. Writers on Film. 3 Credits.
An interdisciplinary course focusing on the film writings of poets, novelists, critics, and essayists such as Virginia Woolf, H.D., James Agee, James Baldwin, and Pauline Kael; and films showing the intertitle and screenplay work of writers such as Anita Loos, F. Scott Fitzgerald, William Faulkner, and Jean Cocteau. Participants will write weekly assignments on film from a critical perspective.
Area: Writing Intensive

AS.220.219. Readings in Fiction and Literary Nonfiction. 3 Credits.
This course offers an in-depth exploration of content, style, and crossover literary techniques among authors who write both fiction and nonfiction, including Jamaica Kincaid's memoir My Brother and "Girl." Students will evaluate why each genre was chosen to narrate, for example, such quandaries as ethics in surgery: Abraham Verghese's novel Cutting for Stone and Richard Selzer's essay, "The Knife," as well as the reportage and novels of Ernest Hemingway and others. Also explored: topics of social import and questions of identity in James Baldwin's essays ("Notes of a Native Son") and stories ("Sonny's Blues"), and other works; The course builds on literary writing and reading techniques established in Intro to Fiction & Nonfiction (IFN) and Intro to Fiction & Poetry (IFP). Either course is a prerequisite, with IFN preferred.
Area: Writing Intensive
AS.220.105 OR AS.220.108

AS.220.220. Reading Korean Literature in Translation: A Survey. 3 Credits.
An introduction for students unfamiliar with the Korean language but interested in Korean culture / literature. Students will read a variety of translated texts, especially of works written in the 20th and early 21st centuries by authors including Kim Tong-in, Hwang Sun-won, Pak Wanso, Hwang Sok-yong and Han Kang; there will also be classes on traditional sijo poetry. Students will become familiar with Korean literary genres and formal features, and develop a broad understanding of the historical and sociocultural context of Korean literature.
Area: Writing Intensive

AS.220.221. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between modernist literature and cinema in response to the social and technological changes of the twentieth century. Prominent figures include Charlie Chaplin, Ezra Pound, T. S. Eliot, Virginia Woolf, Franz Kafka, Sergei Eisenstein, Jean Epstein, John Dos Passos, Zora Neale Hurston, Paul Strand, and Gertrude Stein. Participants will write weekly assignments on films and readings from a critical perspective.
Area: Writing Intensive

AS.220.230. Reading Contemporary Korean Fiction in Translation. 3 Credits.
This course examines a range of contemporary Korean fiction produced since political liberalization of Korea in the 1990s. Students will see the many different ways in which individual selves relate to the world, question the value systems of a globalized society, and celebrate the instinct to survive and thrive. While exploring these things, students will develop their analytical skills and identify the central components of new Korean narratives.

AS.220.231. Art of the Personal Essay. 3 Credits.
This course explores the art and craft of the personal essay from Seneca to Soyinka, Montaigne to Adichie. Deriving from the French essai, to attempt, students bring a sense of investigation, as natural philosophers proposed, to the characteristics, presence, or quality of an idea. Through personal narrative exploration, essayists write on universal themes -- family, loss, social justice -- through various nonfiction essay forms, such as the braided essay, lyric essay, science essay, or humor essay. Students will employ research, convey personal experience, and develop their own voice and style. Course builds on material covered in Introduction to Fiction & Poetry courses and/or Introduction to Fiction & Nonfiction, and will prepare students for Advanced study. This readings-based course is also writing-intensive, including exercises, essay drafts, and revisions. Course features additional diverse authors such as Sei Shonagon, Sara Suleri, James Baldwin, Richard Rodriguez, Brian Doyle, and Ta-Nehisi Coates.
Area: Writing Intensive
AS.220.105 OR AS.220.108

AS.220.311. Intermediate Fiction: Point of View. 3 Credits.
This intermediate workshop will focus on rendering point of view. In addition to exploring questions of psychic distance and reliability, we will examine how point of view comes to bear on voice, character, the management of sympathy, and narrative structure. Students will write and workshop stories and discuss published fiction. Diverse and contemporary readings to include work by Yiyun Li, Carmen Maria Machado, Lorrie Moore, and Alice Munro.
Area: Writing Intensive
AS.220.200

AS.220.312. Intermediate Fiction: Detail and Description. 3 Credits.
An intermediate workshop focusing on the question of how to make fictional worlds feel real. We'll read 19th, 20th, and 21st century short fiction by authors such as Anton Chekhov, Jhumpa Lahiri, Junot Diaz, and Alice Munro, focusing particularly on how authors make the lives on the page feel three-dimensional. Students will write stories and exercises, including exercises that involve exploring Baltimore in order to observe and write about the city in which we live. Recommend Course Background: Students need to have completed a 200-level Writing Seminars course.
AS.220.105 AND AS.220.106

AS.220.317. Writing about Science II: Feature Writing Journalism. 3 Credits.
This course is designed to teach students the skills of long-form narrative journalism, with a focus on covering science news. Skills taught will include how to compose scenes, create three-dimensional characters, create narrative tension, and conduct on-site reporting. Class speakers will include award-winning science journalists from New York to DC, who will share the secrets of their craft. The primary writing assignment will be a 3,000-word feature piece that is pitched, reported, and workshopped throughout the course of the class. "Writing About Science I" is recommended as a prerequisite for this course. If you have not taken this, please contact instructor (dgrimm5@jhu.edu) to enroll.
Area: Writing Intensive

AS.220.319. Intermediate Fiction: Crafting Memorable Voices. 3 Credits.
When we recall our favorite works of fiction, it is often their voice that first comes to mind. This course will explore how narrators enchant us with their voice, focusing on such matters as perspective, syntax, word choice and how even deceptively impartial omniscience takes on a unique and memorable voice. Fiction readings to include: Paul Bowles, Toni Cade Bambara and Ismail Kadare. Craft readings to include: Christopher Castellani and John Gardner. Writing assignments will be both expository and creative.
Area: Writing Intensive
AS.220.200

AS.220.321. Intermediate Fiction: Finishing Touches: How Stories End. 3 Credits.
Typically, stories are easy to start and difficult to conclude. This course will look at various ways in which stories end rewardingly. Close attention will be paid to final paragraphs. We will ask questions like: Do satisfying endings fall into categories? Can we generalize about how stories ought to end? Do some writers have a gift for endings? Readings to include: Sylvia Townsend Warner, Muriel Spark, Alice Munro. Assignments will include both expository and creative writing.
Area: Writing Intensive
AS.220.200

AS.220.327. Intermediate Fiction: Characters. 3 Credits.
How do fiction writers create believable people? A study of Characters. Readings to include E. M. Forster's Aspects of the Novel and A Room with a View, James Baldwin's Giovanni's Room, and various short stories.
Area: Writing Intensive
AS.220.200

AS.220.331. Intermediate Fiction: Forms of Fiction. 3 Credits.
A workshop in the formative genres of fiction: romance, confession, anatomy, and novel. Readings include Flaubert, Stevenson, Camus, and Stephen Dixon. Frequent sketches and two stories.
AS.220.200[C]

AS.220.332. Intermediate Fiction and Poetry: Poet-Novelists. 3 Credits.
We will look at writers in English who excelled at both fiction and poetry. We will ask: How does a talent in one genre show itself in another? Novels will include: Thomas Hardy's Return of the Native, Sylvia Townsend Warner's Lolly Willowes, Vladimir Nabokov's Lolita, John Updike's, Rabbit, Run. Other writers who may be included: Rudyard Kipling, D. H. Lawrence, Malcolm Lowry, Richard Wright, Muriel Spark.
AS.220.200 AND AS.220.201

AS.220.333. Intermediate Fiction: Plot and Narrative Structure. 3 Credits.
This class is primarily a workshop. Students will write two 10-20 page short stories to present for discussion and critique. The craft focus of the class is plot and narrative structure. Through the assigned reading and a few short writing exercises, we will think about storytelling and the elements (character, conflict, desire, causality, consequence) that make a question a plot or narrative question, and how stories are shaped and structured by these questions. The course reading will begin with a variety of short stories. Later in the semester, we will discuss braided narratives and read novels by Virginia Woolf, Rebecca Makkai and Valeria Luiselli.
AS.220.200

AS.220.338. Intermediate Fiction: Developing Subtext. 3 Credits.
In this course, students will write and workshop two original stories. Additional generative writing exercises will explore the ways a writer can develop subtext in their work. How can character details work in parallel with elements of setting? How can a setting be instrumental in advancing a plot? How can finely tuned, sentence-level details, parallel images, foreshadowing, and figurative language give a story a cohesive sensibility and rich subtext? We'll read stories by writers including Stephanie Vaughn, Laura van den Berg, Rickey Fayne, Haruki Murakami, and craft essays by Matthew Salesses, Charles Baxter, and more.
Area: Writing Intensive
AS.220.200

AS.220.346. Line and Lineage: Poems in Time. 3 Credits.
A poem exists in time—both in the historical moment in which it is written, and in its movement from line to line. In this seminar, students will build their knowledge of the history of the poetic line in English, up to the present day. Assignments will include both short critical essays and creative exercises.
Area: Writing Intensive

AS.220.348. Creative Nonfiction Workshop: The Personal and the Public. 3 Credits.
In this workshop, students will study a variety of creative nonfiction essays and articles by a diverse group of writers including Ta-Nehisi Coates, Maggie Nelson, Roxane Gay, Alice Wong, D. Watkins, and Esmé Weijun Wang. Using the expository methods and research practices of journalists and the narrative strategies of memoirists, students will write and workshop their own creative nonfiction as we attempt to understand how the subject of an essay can be meaningfully augmented by acknowledging and even centering the author's identity and experience.
Area: Writing Intensive

AS.220.356. Intermediate Fiction: A Story's Beginnings. 3 Credits.
Where does a story best begin? How does it successfully launch itself? We will look closely at a great many opening paragraphs and pages, analyzing the various strategies by which writers grab and hold a reader's interest. Most of the reading will be short fiction, drawn from various countries and languages.
Area: Writing Intensive

AS.220.363. Intermediate Fiction: Writing about Adolescence. 3 Credits.
Only fairly recently has adolescence been recognized as a developmental period distinct from childhood or adulthood. In this course, we'll read a range of classic and contemporary literature that takes on the challenge of writing about this complicated and fraught stage of life. Readings may include work by Shakespeare, Louisa May Alcott, Colson Whitehead, Louise Erdrich, and others. Students will write and workshop their own stories or novel chapters.
Area: Writing Intensive
AS.220.200

AS.220.372. Intermediate Fiction: Style and Voice. 3 Credits.
In this course, we'll focus on the writing and workshopping of student fiction, with special attention to style and voice. What distinguishes a good sentence from a bad one? How does one develop a style that feels both natural and distinctive at the same time? What do we even mean by "voice," and how on earth is a writer supposed to find one? In addition to each other's work, we'll read stories by authors with particularly unique voices, focusing on what makes their sentences sing.

AS.220.377. Intermediate Poetry: Poetic Forms. 3 Credits.
Poetic Forms I fulfills one of the Intermediate requirements for The Writing Seminars Major. It deals with rhyme, meter, traditional forms, and ad hoc forms of students' own making. Whether you are a poet, novelist, song writer, science writer, or dramatist, this course will help you master lines and sentences even better.
Area: Writing Intensive
AS.220.201

AS.220.378. Contemporary Poetic Forms. 3 Credits.
In Contemporary Poetic Forms, we will look at exciting, mostly younger poets writing in a wide array of metrical forms. From Anthony Hecht to Erica Dawson, you will read a book a week and write eleven poems, and the assignments will be keyed but not beholden to those challenging authors.
Area: Writing Intensive
AS.220.201[C]

AS.220.391. Performing Poetry & Fiction: An Acting Workshop for Writers. 3 Credits.
This hands-on performance workshop, combining literary and theatrical practice, will look closely at what makes a performance or reading compelling, clear, and resonant. Through textual analysis, vocal technique, and group discussion, students will create a pliant and powerful reading style to best serve their work. The course includes regular writing assignments in poetry and fiction and weekly performance and group discussion.
Area: Writing Intensive

AS.220.394. Intermediate Fiction: Place, Setting, and Landscape. 3 Credits.
This course is primarily a workshop; students will each write and workshop two short stories. Additional shorter writing assignments will focus on writing about places, both real and imagined. We will think about the work of description at the sentence level, but also about the relationship between place, character and memory. We'll read work by writers who are known for their ability to evoke or capture in detail a particular setting, potentially including work by Edward P. Jones, Zadie Smith, Eudora Welty, Annie Dillard, Grace Paley, Victor Lavalle, Viet Than Nguyen, and Joan Didion.
Area: Writing Intensive

AS.220.395. Intermediate Fiction: Plots and Subplots. 3 Credits.
How can a subplot inform a reader's understanding of a story's protagonist? How can a story with multiple protagonists and plotlines reveal theme? This intermediate fiction writing class will focus on student writing and on published stories that are interestingly or intricately plotted. Parallel texts by Andrea Barrett, Edward P. Jones, Alice Munro, Amy Hempel, Barret Swanson, Dantiel W. Moniz, and others will give students the opportunity to examine concrete examples of intricately plotted stories while also putting some plotting techniques to the test in their own short fiction.
Area: Writing Intensive
AS.220.200

AS.220.398. Intermediate Fiction: Fictional Frames. 3 Credits.
In this course, we'll focus on writing and workshopping student fiction while reading contemporary parallel texts representing a variety of styles, subgenres, and forms. We'll look at exceptionally short works, stories of intermediate lengths, and longer, novella-length works in an effort to understand what kinds of stories lend themselves to particular lengths and styles. How do you know whether your story should be a work of flash fiction or a novel? What kinds of stories can you tell in each form? We'll read work by Lydia Davis, Kirstin Valdez Quade, Jenny Zhang, Bret Anthony Johnston, Paul Yoon, Lauren Groff, Bryan Washington, and more.
AS.220.200

AS.220.400. Advanced Poetry Workshop. 3 Credits.
In this course we'll explore poetic responses to myth and legend, looking at how poets from different cultures and eras have responded imaginatively to established stories about gods, heroes, and the supernatural, whether for the sake of aligning themselves with tradition, or for the sake of challenging it. Our discussions will take place in the context of a rigorous poetry workshop, where students will experiment with figurative language, management of the line, narrative organization, and the control of rhythm in both form and free verse. At the end of the semester students will turn in a final portfolio of revised poems, accompanied by a reflective letter that demonstrates a mature understanding of verse technique.
Area: Writing Intensive
AS.220.201

AS.220.401. Advanced Fiction Workshop. 3 Credits.
Topics in Advanced Fiction
Area: Writing Intensive
AS.220.200

AS.220.403. Readings In Poetry: Dramatic Verse. 3 Credits.
Why and how do playwrights make their characters speak in verse? What can we learn about writing—and speaking—“naturally” but with artifice? Blank verse is the most important model we have in English dramatic poetry, but not the only one. Readings in this course will range from Shakespeare's King Lear to modern verse plays by Caryll Churchill, Derek Walcott, and David Hirson. Students will write their own one-act verse play.
Area: Writing Intensive
AS.220.201

AS.220.406. Readings in Fiction: Italian war-time and post-war fiction: Italo Calvino, Primo Levi, and Natalia Ginzburg. 3 Credits.
We'll read these three masterly fiction writers who found new ways to write about hard times.
Area: Writing Intensive
AS.220.200

AS.220.408. Readings in Poetry: War Poetry From Troy to Afghanistan. 3 Credits.
The course will follow a chronological line from Homer through to American and British poets of the current war in Afghanistan. This means we will be looking at (among other things) Beowulf, poems of the English Civil War, poems of the American Civil War, poems of the First and Second World Wars, and poems about the conflicts in Iraq and Syria as well as Afghanistan. Each class will be divided into two sections of equal length. In the first half we will study poems written by our predecessors - poems by women as well as men, poems written in the front line as well as behind the lines in hospitals and 'at home', and poems written in a variety of forms - ranging from pure lyric to prose-poetry; in the second half we will discuss poems written by members of the class in response to conflict, and/or in response to the poems we are discussing in any given week.
AS.220.201

AS.220.411. Community-Based Learning: Nonfiction and Social Engagement. 3 Credits.
In this Community-Based Learning course, students will read and write memoir and discuss issues of social concern with high-school age writers from Baltimore public schools in partnership with the organization Writers in Baltimore Schools Please note that this class is not a traditional workshop focusing on critique, but will instead explore how writing can build connection and foster conversation. Participation in some events outside of class time may be required.
Area: Writing Intensive

AS.220.415. Community-Based Learning: Teaching Creative Writing in Baltimore Schools. 3 Credits.
In this course, students will work alongside writing teachers from the non-profit organization Writers in Baltimore Schools (WBS) to lead creative writing workshops in local public elementary and middle schools. Students and WBS teachers will also meet as a group once a week to plan classes, discuss pedagogy, and share ideas. Students will write weekly responses to reading assignments, write reflections on the volunteer experience, and help to assemble a final project at their worksite. Upon completion of the class, students will have the opportunity to apply to become instructors with Writers in Baltimore Schools. Please note that the weekly writing group you will co-lead will occur outside of class. Groups meet either during the school day or after school. We will work with you to find a group that fits your schedule.
Area: Writing Intensive

AS.220.420. Readings in Fiction: Optimistic Apocalypse. 3 Credits.
Contemporary literary depictions of apocalypse often offer up a world that's been transformed (rather than annihilated) by climate change, disease, and war. In this course, students will explore comparatively optimistic literary dystopias with an eye toward understanding how writers observe and extrapolate real dangers to inform their novels and stories. We'll read one classic dystopian work alongside newer stories and novels by Kazuo Ishiguro, Lauren Groff, Colson Whitehead, Rumaan Alam, Emily St. John Mandel, Ted Chiang, Ling Ma, Laura van den Berg, and more. Students will write short creative and critical responses to our readings as well as a final comparative paper.
Area: Writing Intensive
AS.220.200

AS.220.422. Readings in Fiction: Race, Passing, and Performance. 3 Credits.
This course will explore the context and craft of racial passing texts in the U.S, asking students to think critically about literal passing narratives and their persistence over time, and more broadly about how we write about cultural passing, codeswitching, and identity as conscious performance. We'll start with texts that ground us in the genre—Chopin, Larsen, Fauset, Ellison, and Morrison—and read our way into contemporary texts, potentially including work by Danzy Senna, Mat Johnson, Brit Bennett, Min Jin Lee, and Marcelo Hernandez Castillo. Students will write a critical paper, a craft paper, and a short story or novella.
Area: Writing Intensive
AS.220.200

AS.220.424. Science as Narrative. 3 Credits.
Class reads the writings of scientists to explore what their words would have meant to them and their readers. Discussion will focus on the shifting scientific/cultural context throughout history. Authors include Aristotle, Copernicus, Galileo, Descartes, Newton, Darwin, Freud, Einstein, Heisenberg, Bohr, Crick and Watson.
Area: Writing Intensive

AS.220.427. Readings in Fiction: The Novella. 3 Credits.
A study of the novella as a literary form. Authors may include Melville, Turgenev, Tolstoy, Chekhov, Kafka, James, Wharton, Baldwin, Porter, Rulfo, Smiley, and others.
Area: Writing Intensive
AS.220.200

AS.220.437. Creating the Poetry Chapbook. 3 Credits.
Students will build on previous work in the major by completing a project of sustained length, depth, and cohesion (15 - 25 pages) in their final semester. Application only; Advanced Poetry prerequisite.
Area: Writing Intensive

AS.220.441. Readings in Poetry: Shakespeare and Company. 3 Credits.
A study of three of Shakespeare's plays, and of some of the most important creative responses to these plays by modern writers, such as Auden and Stoppard. Students will familiarize themselves with Shakespeare's continuing place in contemporary culture, and write short critical responses; they will also write a longer creative work that in some way transforms one of Shakespeare's plays.
AS.220.201[C]

AS.220.443. Readings in Poetry: International Voices. 3 Credits.
International voices will combine the workshopping of poems by students with a study of contemporary poems written by black British writers and British writers in dialect, African-American writers, Caribbean writers, and Indian and South African poets who are writing in English. The study of broad themes and subjects will be combined with a particular appreciation of linguistic and acoustic matters - which means among other things that time will be spent listening to and evaluating recordings of the poets concerned.Writing Seminars Majors Only
Area: Writing Intensive
AS.220.201

AS.220.452. Reading Proust. 3 Credits.
An excursion through the 3,000 page, seven-volume masterpiece, *In Search of Lost Time.* We will closely read *Swann's Way* and *Within a Budding Grove*; we will cover, in a less intensive way, *Guermantes Way*, and *Time Regained*.
AS.220.200

AS.220.453. Border Crossings: Contemporary Writing from Canada. 3 Credits.
A survey of contemporary Canadian poetry and fiction. Course readings will include work by Margaret Atwood, Christian Bök, Anne Carson, Anne Michaels, Alice Munro, Michael Ondaatje, Madeleine Thien, and others. Students will have the opportunity to respond artistically as well as analytically to the course readings.
AS.220.105 AND AS.220.106 AND AS.220.201

AS.220.454. Community-Based Learning. 3 Credits.
In this Community-Based Learning course, students will explore poetry of social and political concern in partnership with high-school age writers from Baltimore public schools. Students will put learning into practice by engaging in community conversation and collaboration. Participation in some events outside of class time will be required.
Area: Writing Intensive

AS.220.455. Readings in Fiction: Low, High, and Back Again: Experiments in Genre. 3 Credits.
In this course, we'll take a look at the increasingly obsolete notion of "genre fiction" and the way that many contemporary writers are borrowing the conventions of once-frowned-upon genres, from sci-fi to horror to crime, and imbuing them with the concerns of the "literary novel" (character, language, social critique, etc.). The course will pair classics of genre fiction with more contemporary works that take the genre in surprising directions. We'll also do a fair bit of writing ourselves, experimenting with various genres. Authors might include Mary Shelley, Colson Whitehead, Philip K. Dick, Kazuo Ishiguro, Edgar Allen Poe, Carmen Machado, Raymond Chandler, Joan Didion, Zane Grey, and Charles Portis.
Area: Writing Intensive

AS.220.456. The Long Work. 3 Credits.
A course in the composition of a novella or short-story collection. Students will write and revise a thesis of 50 to 60 pages of fiction.Open to seniors by invitation.
Area: Writing Intensive

AS.220.457. Readings in Fiction: 21st Century Fiction: The American Short Story in the Last Twenty Years. 3 Credits.
With the 21st century 22 years old, it seems like a good time to ask ourselves what's going on with the American short story. What can it tell us about our various identities, individual and collective? Is it reflecting our current reality, transforming it, or both? Is it undergoing formal changes to better engage with our transformative times, and if not, should it be? Is contemporary fiction as diverse as our nation itself, and if not, what might account for such shortfalls in representation, and what might be the effects? Our reading list is likely to include such authors as Carmen Maria Machado, Yoon Choi, Bennett Sims, Charles Yu, Jamel Brinkley, ZZ Packer, Kali Fajardo-Anstine, Nana Kwame Adjei-Brenyeh, Dantiel W. Moniz, Claire Vaye Watkins, Kimberly King Parsons, Kirsten Valdez Quade, Ted Chiang, Danielle Evans, Karen Russell, George Saunders, and Bryan Washington. Students will write short critical and creative responses throughout the term, as well as a final longer creative piece.
Area: Writing Intensive
AS.220.200

AS.220.458. Readings in Poetry: Divergencies: British Poetry Since 1945. 3 Credits.
The course will workshop the original work of participants, while also looking at the major figures of immediately post-war British Poetry (Philip Larkin, Ted Hughes) and the diversification of writing that has appeared in more recent years. Among the writers to be discussed are : Simon Armitage, Mary Jean Chan, Imtiaz Dharker, Carol Ann Duffy, Sarah Howe, Linton Kwesi Johnson, Jackie Kay, Grace Nichols, Alice Oswald, Hannah Sullivan and Roger Robinson.
Area: Writing Intensive

AS.220.459. Readings in Poetry: Dramatic Poetry, Poetic Drama. 3 Credits.
This course will explore the intersection of poetry and drama, from Euripides, Shakespeare, and Moliere to modern verse plays by Derek Walcott and Caryl Churchill. We'll also look at some modern plays about poets and poetry—such as Tom Stoppard's Arcadia and The Invention of Love and Sarah Ruhl's Euridice. Finally, we'll examine the poetry of prose speech in such playwrights as David Mamet and August Wilson. Students will write their own scenes in poetic drama.
Area: Writing Intensive

AS.220.460. Community-Based Learning: Nonfiction and Social Engagement. 3 Credits.
In this Community-Based Learning course, students will read and write memoir and discuss issues of social concern with high-school age writers from Baltimore public schools in partnership with the organization Writers in Baltimore Schools Please note that this class is not a traditional workshop focusing on critique, but will instead explore how writing can build connection, foster conversation, and bring together writers from diverse communities.
Area: Writing Intensive

AS.220.501. Independent Study. 3 Credits.
Ordinarily no more than one independent study course may be counted among the eight Writing Seminars courses presented for graduation.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.509. Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.510. The Hopkins Review Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.513. Teaching Writing. 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.594. Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.598. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.604. Readings in Fiction: Personal Touchstones.
The course explores the notion of one's own personal anthology--the books that mean the most to one over the decades, the books one keeps returning to. In addition to the assigned reading, each student will be asked to come up with a list of books (not read in this class) of great personal significance and to analyze in class the things one's personal touchstones have in common. Assigned readings will be drawn from two genres: the epic (Derek Walcott's Omeros, Halldor Laxness's Independent People) and the comic or light novel (Jane Austen's Persuasion, E. M. Forster's Room with a View, Laxness's The Fish Can Sing, Evelyn Waugh's A Handful of Dust, Muriel Spark's The Prime of Miss Jean Brodie, Kingsley Amis's Ending Up, Mark O'Donnell's Getting Over Homer).

AS.220.607. Readings in Fiction: The Laws, License, and Liability of First-Person Narration.
Study of classic/modernist novels written by the "I": Christopher Isherwood, Gertrude Stein, Albert Camus, Ford Madox Ford, and other practitioners. Mostly close study of texts, but some writing practice, too.

AS.220.608. Readings in Poetry: Sonnet and Sequence.
This course will use the sonnet form as a through line to consider both aesthetic shifts and the enduring lyric impulse across centuries of poetry in English, with a particular focus on how contemporary poets are working with the form through individual poems, sequences, and book-length works. Coursework will include reading, critical writing and presentation, discussion, and completion of an original lyric sequence.

AS.220.609. Readings in Fiction: The Novelist as Poet.
An examination of some half-dozen English-language novelists who were also significant poets. Readings will include both novels and poems. The course seeks to bridge the gap between the two genres.

AS.220.611. Readings in Fiction: Shape, Story, and Experiments in Structure.
How is our experience of a novel's story affected by its form? We'll discuss some traditional structures, including mystery plots and the three-act structure, before moving on to works whose forms bend or break various storytelling conventions. Authors may include Vladimir Nabokov, Susan Choi, Zadie Smith, Tommy Orange, Lorrie Moore, Edward P. Jones, Carol Shields and others.

AS.220.612. Readings in Poetry: The Long Poem.
This course will be an artistic exploration of the long poem. Throughout the semester we'll read a diverse range of work by both contemporary and non-contemporary writers, paying particular attention to the question of how a poem's dramatic intensity or lyric charge can be maintained when a poet is writing at length. Instead of submitting individual poems to a weekly workshop, students in this class will submit successive drafts of a long poem, which they will continue developing over the course of the entire semester.

AS.220.619. Graduate Poetic Forms I.
We will read and write a variety of traditional and less traditional poetic forms with a keen ear toward meter, rhyme, and other prosodic curiosities.

AS.220.623. Fiction Workshop.
Discussion and critique of fiction manuscripts by students enrolled in the M.F.A. program.

AS.220.624. Fiction Workshop.
Discussion and critique of fiction manuscripts by students enrolled in the MFA program. Some assignments possible.

AS.220.625. Poetry Workshop.
Discussion and critique of poetry manuscripts by students enrolled in the M.F.A. program. Some assignments possible.

AS.220.626. Poetry Workshop.
Discussion and critique of poetry manuscripts by students enrolled in the MFA program. Some assignments possible.

AS.220.633. Readings in Poetry: Walcott, Heaney, and Brodsky.
A study of three major poets--Caribbean, Irish, and Russian--who self-identified with at least two cultures. We'll examine these poets' literary friendship and their shared engagement with subjects such as tyranny, empire, home, exile, and the English language. Exploration of these poets' shared debt to a predecessor, Robert Frost, and the debt owed to them by younger poets, will lead to students' own original projects in poetry and prose.

AS.220.646. Readings in Pedagogy: Teaching Fiction and Poetry.
A graduate course designed to develop both close reading and genre study, and to support the teaching of Introduction to Fiction and Poetry (IFP) I and II. Readings in selected works of American, English, and European poetry and short fiction. Course required by all graduate students in fiction and poetry.

AS.220.653. Readings in Fiction: The Writer's Bookshelf: Unsung Novels That Writers Love.
Which books do writers often foist on other writers, telling them "You have to read this"? In this course, we'll look at books that have yet to find much popular appeal, but which writers often speak about in reverential tones. Authors may include James Salter, Paula Fox, Dezso Kosztolanyi, J.L. Carr, Juan Rulfo, Tom Drury, Christina Stead, Evan S. Connell, Leonard Gardner, Joy Williams, and Penelope Fitzgerald.

AS.220.654. Readings in Fiction: Rediscovered Masters.
Readings from modern novels and collections of short fiction which, however well received at time of publication, fell into subsequent eclipse before undergoing something of a revival. Many of the titles will be drawn from the series of New York Review of Books Classics.

AS.220.655. Readings in Poetry: Line, Sentence, Syntax.
A study of the interplay of the line and the sentence in poetry, with an emphasis on syntax. Some prose works will also be used for context. Poets employing syntax with great verve and precision, whether they obey or disrupt the rules, will be read in order to inform students' own stylistic choices.

AS.220.659. Readings in Fiction: The Short Novel.
Class will read nine short novels and begin to write one.

AS.220.660. Readings in Poetry: Performing Poetry.
This hands-on performance workshop, combining literary and theatrical practice, looks closely at what makes poetry performance compelling, clear, and resonant. Through textual analysis, vocal technique, and group discussion and critique, students will create a pliant and powerful reading style, as an integral part of their work.

AS.220.662. Readings in Poetry: Poetry in Translation: From the Iliad to the Present Day.
The course will begin by looking at theories of translation, and thereafter spend half of each class looking at examples of poems in translation before moving on in the second half to look at poems by members of the group - translated poems where people have been able to write them, otherwise at original pieces. I'll be providing texts for study each week.

AS.220.664. Readings in Fiction: Point of View: Collage, Polyphony, Shapeshifting, and Omniscience.
Some of the most interesting moments in fiction are those when characters experience the same event or situation in profoundly different ways. In this course we will look at writing that explores those moments of intersection and collision and think about how point of view can work to achieve both strong characterization and an illuminating sense of larger context. We'll consider what makes a story where the narrative lens or voice can shift feel cohesive and intentional. The reading list will include work by Colson Whitehead, Theodore Dreiser, Virginia Woolf, Gwendolyn Brooks, E.L Doctorow, Mieko Kawakami, Caitlin Horrocks, Dawnie Walton, Zadie Smith, and Rebecca Makkai.

AS.220.665. Readings in Poetry: Personal Anthologies.
Who are the poets who made us who we are? Over years of practice, poets become increasingly aware of their special debts to predecessors whose music compels them and whose themes seem both urgent and enduring. Readings will include some of the instructor's own touchstones, including Herbert, Milton, Dickinson, Auden, Larkin, Bishop, Walcott. Students will write poems inspired by certain models, and also present orally and in a final written project a personal anthology of poets who mean the most to them.

Cross Listed Courses

Comparative Thought and Literature

AS.300.311. Introduction to Intellectual History. 3 Credits.
This course offers a conceptual and historical introduction to Intellectual History. What makes the "history of ideas" different from the history of other objects? What, if anything, distinguishes the history of ideas from the history of philosophy? What is it exactly that we call "ideas"? In what sense do they have a history? These are examples of the kind of questions addressed in the course.

AS.300.323. Shakespeare and Ibsen. 3 Credits.
William Shakespeare and Henrik Ibsen are the two most frequently performed playwrights in history, and both have been credited with reinventing drama: Shakespeare for the Elizabethan stage and Ibsen for the modern. In this course we will pair together plays by each author – those that stand in an explicit relation of influence as well as those that share a significant set of concerns – in order to investigate how each takes up and transform key problems in the literary, political, and philosophical tradition for their own historical moment. Plays to be studied: by Shakespeare, A Midsummer Night's Dream, Hamlet, Othello, King Lear, The Tempest, A Winter's Tale; by Ibsen, St. John's Night, Hedda Gabler, Rosmersholm, The Wild Duck, The Master Builder, When We Dead Awaken.

AS.300.331. The Authoritarian Image: Russian Cinema from Stalin to Putin. 3 Credits.
Vladimir Putin's charismatic authority has a deep history in Russian culture. We'll investigate that history through cinema, which Lenin called "the most important of the arts." While Soviet cinema often served as immersive propaganda, directors also found ways to question authority and power. Films to be screened range from Sergei Eisenstein's Ivan the Terrible (1944) to the 2013 documentary Pussy Riot: A Punk Prayer. This course will combine study of Russian and Soviet culture from the end of World War II to the present with study of film history, style, and technique.
Area: Writing Intensive

AS.300.337. The Tragic Tradition. 3 Credits.
This course offers a broad survey of tragic drama in the Western tradition, from its origins in ancient Greece to the twentieth century. In weekly lectures and discussion sections, we will study the specific literary features and historical contexts of a range of different works, and trace the continuities and transformations that shape them into a unified tradition. Key questions and themes throughout the semester will include what counts as tragic, the tragedy of social and political conflict, the bearing of tragedy on the meaning and value of life, the antagonistic relation between world and humans, the promises and dangers of tragedy for contemporary culture. Authors to be studied: Sophocles, Euripides, Seneca, Shakespeare, Racine, Goethe, Ibsen, Strindberg, Chekov, Brecht, Pirandello, and Beckett.

AS.300.339. Introduction to Comparative Literature. 3 Credits.
This course offers an introduction to the history, theory, and praxis of comparative literature. We will read texts from some of the founding figures of the discipline and look at the most recent debates in the field, including translation studies, literary theory, and world literature, among others. Particular attention will be given to the methodologies and problems of studying literatures in different linguistic traditions and the relation between literature and other areas of thought and culture, such as philosophy, art history, and psychoanalysis. Case studies in comparative approaches to literature will provide concrete examples to our discussions.

Film and Media Studies

AS.061.147. Visual Storytelling. 3 Credits.
This primer to screenwriting will emphasize the power of the image to deliver character, situation, and theme, and to advance even complex plots. Students will analyze narrative films, compose their own still and moving images with cellphone cameras, and write several short dramatic pieces to be read and workshopped by the group. They'll learn the basics of scene design and of screenplay format. For FMS majors in the screenwriting track, this course fulfills the Media and Narrative requirement . $50 lab fee.
Area: Writing Intensive

AS.061.148. Storytelling for Film and Fiction. 3 Credits.
Through the analysis of narrative films, short fiction, myths, fairy tales, and ghost stories, and through the workshopping of their own creative writing, students will explore the art and science of "a good story well told." The course will offer an introduction to dramatic and visual storytelling, and is an essential primer for upper-level screenwriting. Lab fee $50.
Area: Writing Intensive

AS.061.205. Introduction to Screenwriting. 3 Credits.
In this course we will explore the basic principles of visual storytelling in narrative film as they apply to the design, creation, and revision of the screenplay. Specifically, we will focus on learning the craft of screenwriting — strategies, processes, and philosophies that writers can develop, practice, and rely upon as they progress through a series of screenwriting exercises and write a 12-page screenplay, which will be critiqued in-class during weekly table reads and with the Instructor (one-on-one) during office hours. Select professional screenplays will be read and analyzed — and clips from select films viewed — to further explore what works well on the page, and how it translates to working well onscreen. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Final Draft screenwriting software is required; a FREE 18-week trial will be made available for all students who don't already have Final Draft.
Area: Writing Intensive

AS.061.218. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between literary modernism and modernist cinema: how Virginia Woolf's writings on the cinema connect with her use of shifting points-of-view as literary devices, how James Joyce influenced the Soviet filmmaker Sergei Eisenstein and how Eisenstein in turn influenced the American novelist John Dos Passos, how Franz Kafka's frequent trips to the movies reflect in his fiction, and how artists ventured broadly to develop experimental languages for expressing the new speeds and scales of modern life. Additional texts will be drawn from novels, essays, poems, and films from Ezra Pound, T. S. Eliot, Charlie Chaplin, Claude McKay, Zora Neale Hurston, Anita Loos, Andrei Bely, Dziga Vertov, Gertrude Stein, Louis Aragon, and René Clair. The course fulfills the writing intensive requirement and involves a series of essays on literature and cinema from a critical perspective.
Area: Writing Intensive

AS.061.271. Intermediality: Between Word, Image, and Sound. 3 Credits.
This course explores film adaptation by considering how words, images, and sounds offer different affordances and constraints for creative expression. A central goal is to conceive of adaptation outside of typical discussions of fidelity to a source work and instead consider how different artistic media open up unique opportunities for storytelling. To this end, we will draw on a number of different intermedial translations, which may include from novel to film (The Night of the Hunter, from Davis Grubb's book to James Agee's screenplay to Charles Laughton's film), from short story to film (The Turin Horse), from graphic novel to film (Ghost World) or television series (HBO's Watchmen), from personal essay to documentary film (James Baldwin's The Devil Finds Work and I Am Not Your Negro), from poetry to film (O Brother, Where Art Thou), from play to film (A Raisin in the Sun and My Own Private Idaho), from radio drama to film (Sorry, Wrong Number), and film-to-film homage (Far From Heaven and All That Heaven Allows). We will also delve into the vagaries of film-to-book novelizations and the curious case of concurrently writing film and book, as in Stanley Kubrick and Arthur C. Clark's collaboration on the film and novel 2001: A Space Odyssey (both adapted from a short story).
Area: Writing Intensive

AS.061.312. The Fallen World: Morally Complex Storytelling. 3 Credits.
A workshop devoted to creating complex characters in challenging moral landscapes. Students will view and discuss a wide range of films; and creative assignments may include profiles, short fiction, monologues, and dramatic scenes for the screen. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 OR Instructor Permission

AS.061.313. Personal Storytelling for the Screen. 3 Credits.
A workshop devoted to creating compelling short scripts based on personal experience. Analysis of screened films and collaborative development of student work will emphasize how unique worlds and world views can reflect a larger shared humanity. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 or Instructor permission.

AS.061.316. Characters for the Screenplay. 3 Credits.
A workshop devoted to creating complex characters for the screen. Students will examine memorable film characters from the silent era to the present, with attention to how these characters are revealed through both the drama and the mise en scene. Weekly screenings. Short critical and creative written exercises and a longer, creative final project.Recommended Course Background: AS.061.148 OR AS.061.205 OR AS.061.265
Area: Writing Intensive

AS.061.373. Intermediate Screenwriting. 3 Credits.
This course will explore strategy and process for developing a short screenplay from pre-existing literary or journalistic source material (short story, news/feature article, etc.). By exploring several “case studies” — feature films and the source material that inspired them — students will identify the practical strategies employed by professional screenwriters with the goal of employing such strategies with their own screenplay adaptations. Bulk of class will focus on designing, writing, and rewriting a 20-30 page screenplay, and sharing multiple drafts with the class (and with the professor one-on-one) for critique over the course of the semester. Each student should have 2-3 pieces of material under consideration for possible adaptation by the start of class. Discussions from time to time will also touch on the business of screenwriting. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Students will be required to purchase a license for Final Draft screenwriting software for $99. Students are expected to have previously completed AS.061.205 or another lower level screenwriting class.
Area: Writing Intensive

AS.061.404. Advanced Screenwriting. 3 Credits.
Intensive workshop course where students will write a first draft of a feature-length screenplay. Classes will focus on the specific challenges of the students’ works-in-progress, with an emphasis on developing a story idea that is suitable for a feature, and the craft to see it through to completion. Particular emphasis will be placed on the feature screenwriter’s central challenge: creating enough of a structure in the early writing stages to keep the screenplay on track, while remaining open to new ideas for scenes and sequences that inevitably arise as the characters come to life. Select professional screenplays will be read and analyzed — and clips from select films viewed—to explore what works well on the page, and how it translates to working well onscreen. Students will aim to have a solid and workable first draft at the end of the semester, at which point avenues for further revision may be discussed. Throughout the course, Instructor will also devote a portion of class time to discuss the business of screenwriting. Students will be required to purchase a license for Final Draft screenwriting software for $99.
Area: Writing Intensive

First Year Seminars

AS.001.113. FYS: The Poetry of Music - Lyrics and the Art of Songwriting. 3 Credits.
In this First-Year Seminar we will examine the poetic artistry of American song, from Tin-Pan Alley and Broadway tunes to Folk songs, Billboard’s Top 40, and Hip Hop. Our focus will be on the linguistic art of song – the meaning(s), rhythm, timbre, and pitch found in words alone. Taught in a workshop format, the course will encourage students to read lyrics as poetry and then write their own.

Interdepartmental

AS.360.133. Freshman Seminar: Great Books at Hopkins. 3 Credits.
Students attend lectures by an interdepartmental group of Hopkins faculty and meet for discussion in smaller seminar groups; each of these seminars is led by one of the course faculty. In lectures, panels, multimedia presentations, and curatorial sessions among the University's rare book holdings, we will explore some of the greatest works of the literary and philosophical traditions in Europe and the Americas. Close reading and intensive writing instruction are hallmarks of this course; authors for Fall 2020 include Homer, Plato, Dante, John Donne, George Herbert, Christina Rosetti, Mary Shelley, Friederick Nietzsche, Isaac Bashevis Singer, Frederick Douglass.
Area: Writing Intensive

Modern Languages and Literatures

AS.211.203. Propaganda: From Blut und Boden to Post-Fact. 3 Credits.
This course taught by Writing Seminars professor Wayne Biddle and Media Studies professor Bernadette Wegenstein covers the 20th-century history of propaganda with special focus on its visual techniques, on censorship, and how media serve as sites of both control and resistance to power. We will pay particular attention to the influence of misinformation abetted by the new media revolution, and both the rise of the political rhetoric of “fake news” and the massive dissemination of actual fake news since the 2016 election. Students will write papers pegged to current issues and events using the critical framework developed in class. Cap 30 students. Reader: Jason Stanley: How Propaganda Works, Princeton University Press, 2015.
Area: Writing Intensive

AS.211.444. The Apocalypse in Literature and Film. 3 Credits.
“Everything which we loved is lost! We are in a desert” – this emotional assertion was the reaction to Kazimir Malevich’s 1915 painting The Black Square, as the artist himself recalled it. This sentiment of fearing, warning and even witnessing the end of the world as we know it, will stand at the center of the course. We will study the literary and cinematic representations of this apocalyptic notion and investigate its theoretical, theological, physiological and aesthetic aspects. We will seek to trace the narrative dynamics as well as literary and cinematic means of apocalyptic representations in works from various periods, languages, cultures and religions. Among the issues to be discussed: what is the apocalypse, biblical apocalypse, dystopia and nostalgia, trauma and post trauma, war and the apocalypse, the Holocaust as the end of civilization, the atomic bomb, realism and anti-realism, political changes and the apocalypse in popular culture.
Area: Writing Intensive

AS.211.479. Dante’s Journey through the Afterlife. 3 Credits.
Dante’s Divine Comedy presents a complete picture of the medieval world-view in all its aspects: physical (the structure of the cosmos), historical (the major actors from Adam to Dante himself) and moral (a complete system of right and wrong). Dante shows how the Christian religion portrayed itself, other religions, the nature of God, humans, angels and devils, and human society. We will explore these topics both from the viewpoint of Dante’s own time, and in terms of its relevance to our own societal and cultural concerns.
Area: Writing Intensive
AS.214.479

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the “virtual” space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.215.463. Borges: His Fiction and Critical Essays. 3 Credits.
This course will deal with close readings of Borges ficciones and critical essays in order to determine how his thinking on the problem of writing and thinking is fictionalized in his stories.
Area: Writing Intensive

AS.216.300. Contemporary Israeli Poetry. 3 Credits.
This course examines the works of major Israeli poets such as Yehuda Amichai, Nathan Zach, Dalia Rabikovitch, Erez Biton, Roni Somek, Dan Pagis, Yona Wollach, Yair Horwitz, Maya Bejerano, and Yitzhak Laor. Against the background of the poetry of these famous poets we will study recent developments and trends in Israeli poetry, including less known figures such as Mois Benarroch, Shva Salhoov and Almog Behar. Through close reading of the poems, the course will trace the unique style and aesthetic of each poet, and will aim at presenting a wide picture of contemporary Hebrew poetry.

AS.216.342. The Holocaust in Israeli Society and Culture. 3 Credits.
This course examines the role of the Holocaust in Israeli society and culture. We will study the emergence of the discourse on the Holocaust in Israel and its development throughout the years. Through focusing on scholarly, literary, artistic, and cinematic responses to the Holocaust, we will analyze the impact of its memory on the nation, its society, politics, and collective self. The course is divided to three general categories: Historical and Sociological Perspective, Literary Perspective, and Cinematic Perspective. However, we will study the crossroad between these three categories, and will explore them in relation to one another.

AS.216.373. War in Israeli Arts and Culture. 3 Credits.
In this course we will study the various representations of what functions as one of Israel’s most unifying and yet dividing forces: war. By analyzing literary and cinematic works as well as visual art and popular culture we will attempt to understand the role of war in shaping Israeli society, culture and politics. Topics such as commemoration and mourning, heroism, dissent and protest, trauma and memory and the changing image of the soldier will stand at the center of the course.

Political Science

AS.191.415. Fear and Loathing: Writing About Contemporary American Politics. 3 Credits.
This course is focused on reading, analyzing, and, most importantly, producing writing about the American political experience and contemporary events in American politics. We will use scholarly, print, and new media sources from different sides of the political spectrum, drawing on political and literary theory to inform our discussions. We will then try to do better: Students will write and workshop a variety of pieces of different lengths and styles, spending in-class time on peer critique, presentations, and writing exercises, which they will compile into a writing portfolio. We will discuss and write op-eds, memoirs, long-form book reviews, commentary essays, and satire. Throughout, we will devote considerable class time to critique and discussion of students’ writing. Readings will include works by James Baldwin, William F. Buckley, Claudia Rankine, Hunter S. Thompson, Ta-Nehisi Coates, Alexander Chee, Angela Nagle, and Omar el Akkad. We will draw on political commentary from sources ranging from The Washington Post to Jacobin to The Onion, through to Facebook and Twitter. Throughout, we will consider a wide range of topics pertinent to writing about politics, including questions of the make-up of the public sphere and diverse audiences, the use of voice and language, the deployment of facts and rhetoric, the place of fiction and humor in political critique, and the rise of fake news and trolling.
Area: Writing Intensive

Program in Museums and Society

AS.389.311. From Treasure House to Production House: Exploring New Roles for the Museum in the 21st Century. 3 Credits.
Students work with the Director of, the Peale Center for Baltimore History and Architecture as it reinvents itself as a museum for the twenty-first century. Involves working with community story-tellers in residence. Extra time is to allow for field trip travel - most days class runs 1:30-3:50.

AS.389.329. Author/Canon/Archive. 3 Credits.
Why are some literary works from the past reprinted, anthologized, and considered worthy of study, but not others? Why are some works “lost” and some “rediscovered,” while others simply fall out of favor? Focusing on nineteenth- and early twentieth-century American literary culture, we will use rare books and archival materials from JHU collections to examine Edgar Allan Poe, Walt Whitman, Emily Dickinson, Stephen Crane, Charles Chesnutt, and Zora Neale Hurston, along with a few authors you’ve never heard of, in terms of the relationship between authorship, stewardship, and status.

AS.389.346. Scribbling Women in the Literary Archive. 3 Credits.
Students examine select texts and archival materials related to Emily Dickinson, Frances Ellen Watkins Harper, Edith Wharton, Ida B. Wells, Charlotte Perkins Gilman, Sui Sin Far, Alice Duer Miller, and Zora Neale Hurston. Students interrogate how these writers navigated the constraints of gender, as informed by race and class, in the decades before and after the 19th Amendment and consider literary collecting in relation to gendered cultural politics.

Study of Women, Gender, & Sexuality

AS.363.445. Reading Judith Shakespeare: Women and Gender in Elizabethan England. 3 Credits.
If Shakespeare had a sister who went to London to be a writer, what would she write? Virginia Woolf's account of the thwarted career of Shakespeare's hypothetical sister, Judith, in A Room of One's Own frames our reading of plays and poetry by Shakespeare and contemporary women writers, including Isabella Whitney, Elizabeth Cary, Mary Sidney, Aemelia Lanyer, and Mary Wroth. Working within a selected historical context, students will create fictional biographies of "Judith Shakespeare," including her perspective on our identified authors and a sample or description of Judith's own literary accomplishments. Secondary course readings will reflect contemporary economic, political, and religious contexts.
Area: Writing Intensive

Theatre Arts & Studies

AS.225.318. 21st Century Female Playwrights. 3 Credits.
This is a writing intensive class exploring the current wealth of women playwrights, including Pulitzer Prize winners: Wendy Wasserstein, Paula Vogel, Lynn Nottage, and Jackie Sibblies Drury (2019 Prize for FAIRVIEW). We will discuss Script Analysis and read (and see) plays by numerous writers including Claire Barron, Kia Corthron, Theresa Rebeck, Sarah Ruhl, Danai Gurira, Caleen Sinnette Jennings, and Hansol Jung. This class will include a mid-term and a Final Paper.
Area: Writing Intensive

AS.225.324. Adaptation for the Stage. 3 Credits.
For aspiring playwrights, dramaturgs, and literary translators, this course is a workshop opportunity in learning to adapt both dramatic and non-dramatic works into fresh versions for the stage. Students with ability in foreign languages and literatures are encouraged to explore translation of drama as well as adaptation of foreign language fiction in English. Fiction, classical dramas, folk and fairy tales, independent interviews, or versions of plays from foreign languages are covered.
Area: Writing Intensive

AS.225.330. Playwriting Strategies. 3 Credits.
A seminar and workshop in playwriting with Dr. Joe Martin, playwright and dramaturge. Student writers, developing their plays, will learn how to open up to the creative process, "brainstorm," refine their work, and shape it toward an act of artistic communication. Writer's techniques, such as attending to plot or "story," delineation of character, creating effective "dialog," even overcoming "writer's block," will be addressed. This course is designed to be complementary to – not a replacement for – playwriting classes in the Writing Seminars.
Area: Writing Intensive

For current faculty and contact information go to http://writingseminars.jhu.edu/people/

Writing Seminars, Minor

Writing Seminars Minor Requirements

Students who wish to graduate with a minor in Writing Seminars must take AS.220.105 Introduction to Fiction & Poetry I or AS.220.108 Introduction to Fiction & Nonfiction, and AS.220.106 Introduction to Fiction & Poetry II, Students also need to take AS.220.200 The Craft of Fiction and AS.220.201 The Craft of Poetry, as well as three additional Writing Seminars courses at the 200-400 level. One course outside of the Writing Seminars Department may count towards the minor with approval from the DUS; approval is given for courses with a strong creative writing component (e.g. AS.061.205 Introduction to Screenwriting). Students must earn a grade of C- or better in all minor requirements and courses may not be taken satisfactory/unsatisfactory.

Code	Title	Credits
AS.220.105	Introduction to Fiction & Poetry I	3
or AS.220.108	Introduction to Fiction & Nonfiction	
AS.220.106	Introduction to Fiction & Poetry II	3
AS.220.200	The Craft of Fiction	3
AS.220.201	The Craft of Poetry	3
Three additional 200-400 level Writing Seminars courses (AS.220.2xx-4xx) [1]		9
Total Credits		21

1 Any Writing Seminars course numbered above "The Craft of Fiction" (220.200) or "The Craft of Poetry" (220.201) may be used to fulfill this requirement.

Writing Seminars, Bachelor of Arts

Writing Seminars Major Requirements

(Also see Requirements for a Bachelor's Degree (p. 1587))

AS.220.105 Introduction to Fiction & Poetry I and AS.220.106 Introduction to Fiction & Poetry II are prerequisite courses required for all majors and others who want to take advanced courses in writing. Majors must receive a grade of C- or better in all courses required for the major and no major requirements may be taken satisfactory/unsatisfactory. Courses taken at another institution that are not directly equivalent to a JHU course may not apply towards the ten Writing Seminar Department courses (AS.220.xxx) required of the major without permission of the Director of Undergraduate Studies.

Code	Title	Credits
AS.220.105	Introduction to Fiction & Poetry I	3
AS.220.106	Introduction to Fiction & Poetry II	3
Four courses of English literature [1]		12
Two courses in philosophy (AS.150.xxx or cross-listed with Philosophy)		6
Two courses in history (AS.100.xxx or cross-listed with history), history of art (AS.010.xxx), or history of science and technology (AS.140.xxx)		6
AS.220.200	The Craft of Fiction	3
AS.220.201	The Craft of Poetry	3
One fiction course at the 300-400 level (with POS-Tag WRIT-FICT)		3
One poetry course at the 300-400 level (with WRIT-POET)		3

One advanced writing workshop	3
Three elective courses at the 200-400 level within the department (AS.220.2xx-4xx). [3]	9
Foreign language proficiency through the second semester of the intermediate level is required	14
Total Credits	**68**

[1] Four semesters of literature at the 100-400 level, in the Department of English (060) or cross listed in English (with the exception of Expository Writing). Courses in literature offered in departments other than English, whether in the original language or in translation, also fulfill this requirement when the department is numbered AS.212-216 (German and Romance Languages and Literatures) and AS.300 (Contemporary Thought and Literature).

[2] Courses cross-listed with The Writing Seminars may count toward history, philosophy, or literature requirements in the major as appropriate.

[3] Any Writing Seminars course numbered above "The Craft of Fiction" (220.200) or "The Craft of Poetry" (220.201) may be used to fulfill this requirement.

Sample Program of Study

Course	Title	Credits
First Year		
First Semester		
AS.220.105	Introduction to Fiction & Poetry I	3
History course #1		3
First year foreign language		4
	Credits	**10**
Second Semester		
AS.220.106	Introduction to Fiction & Poetry II	3
English literature course #1		3
First year foreign language		4
	Credits	**10**
Second Year		
First Semester		
AS.220.201 or AS.220.200	The Craft of Poetry or The Craft of Fiction	3
Philosophy course #1		3
Second year foreign language		3
	Credits	**9**
Second Semester		
AS.220.200 or AS.220.201	The Craft of Fiction or The Craft of Poetry	3
Course with POS-Tag WRIT-FICT at the 300 or 400 level		3
English literature #2		3
Second year foreign language		3
	Credits	**12**
Third Year		
First Semester		
Course with POS-Tag WRIT-POET at the 300 or 400 level		3
English literature course #3		3
History course #2		3
	Credits	**9**
Second Semester		
Writing Seminars elective course		3
English literature course #4		3
Philosophy course #2		3
	Credits	**9**
Fourth Year		
First Semester		
Advanced Fiction or Poetry Workshop		3
Writing Seminars elective course		3
	Credits	**6**
Second Semester		
Writing Seminars elective course		3
	Credits	**3**
	Total Credits	**68**

Honors

A GPA of 3.5 or better in all major requirements is required to earn honors in the major.

Writing Seminars, Master of Fine Arts

The Writing Seminars offers a Master of Fine Arts (M.F.A.) in fiction and poetry. Students admitted to the M.F.A. program enroll in two years of course work and produce a substantial manuscript in the form of a novel or collection of fiction or poetry. M.F.A. candidates are chosen on the basis of a manuscript, college transcripts, and appropriate letters of recommendation that testify to the student's ability and willingness to undertake serious study in the literary arts. Since all students receive financial aid in the form of full tuition and a teaching assistantship, applicants must be able to demonstrate aptitude for college teaching.

The program requires two full years of residency in Baltimore. Students enroll each semester in two courses: a writing workshop in poetry or fiction and a second course in craft or literature taught within the department. At the end of the first year, students present a portfolio of revised work for faculty review. Successful completion of this work is a requirement for continuation in the second year.

The M.F.A. degree in The Writing Seminars is designed for students committed to the study and practice of literary writing at the highest level of accomplishment. Approximately four poets and four fiction writers will be admitted annually. Our pedagogy emphasizes genre-informed discussions, faculty conferences, independent readings, and interactions with visiting writers. Culminating in a book-length thesis, this immersion in literary study is designed to inculcate the habits and skills necessary for a productive writer's life.

Students applying to the M.F.A. program should have a bachelor's degree. All must demonstrate competence in a foreign language at the college level.

Multi-School Programs of Study

At Johns Hopkins University, some programs are offered through a partnership between two or more of the University's nine schools.

- Business Minor (p. 681)
- Peabody Double Degree Program (p. 808)

- Space Science and Engineering Minor (p. 1401)
- Energy Minor (p. 1767)

Business, Minor

Please note that after the Spring 2021 semester, all business minor questions and advising will be through the Carey Business School & the Business minor requirements will change. For questions, contact Michael Tyler at Carey_BusinessMinor@jhu.edu

The Carey Business minor offers Johns Hopkins undergraduates a focused, quantitative minor that will prepare them for careers in small companies, major corporations, consultancies, as well as acceptance into graduate business programs.

- The primary objective for the minor is to help students position themselves as leaders among their peers in the private sector, government, the non-profit sector, and the world of social enterprises. At the conclusion of their program, successful students will be able to:
- Enter a variety of careers such as finance, management, real estate, marketing, accounting, and consulting.
- Create, analyze, and implement value propositions about projects and products for the benefit of various audiences, from shareholders to local communities.
- Establish and manage brands and products and also institutions and organizations.
- Build, manage and grow valuable and lasting relationships with clients, customers, shareholders, creditors, and local communities.
- Recognize, understand, capitalize on, and generate changing trends in local and global economies.
- Be responsible business leaders who are engaged citizens of their communities, cities, and countries.

The minor offers an instructional program that combines critical analysis and theoretical grounding in a broad set of required courses and hands-on experience through an experiential capstone course.

The new requirements for the business minor will only apply to students who declare the minor starting in the fall 2021 semester. Students who declared the minor prior to fall 2021, can find the previous minor requirements here: https://engineering.jhu.edu/cle/business-minor/

PROGRAM REQUIREMENTS

- Seven required courses
- One capstone course

COURSE AND CREDIT REQUIREMENT

The Business minor requires a minimum of 24 credits. Business courses are open to all Johns Hopkins Arts & Sciences and Engineering students.

BUSINESS MINOR REQUIRED COURSES

Code	Title	Credits
BU.667.310	Business Analytics and Statistics	3
BU.667.311	Economics for Decision Making	3
BU.667.312	Marketing Management	3
BU.667.313	Principles of Finances	3
BU.667.314	Operations Management	3
BU.667.315	Organizational Management	3
BU.667.400	Business Capstone	3
EN.660.203	Financial Accounting	3
Total Credits		**24**

Peabody-Homewood Double Degree Program

Peabody and the Homewood schools of Johns Hopkins University offer the opportunity for a select group academically and musically advanced students to simultaneously pursue a Bachelor of Music degree and either a Bachelor of Arts degree from the Krieger School of Arts and Sciences or a Bachelor of Science degree from the Whiting School of Engineering. Students must be admitted independently to Peabody and one of the Homewood schools and be invited to participate in the double degree program. Students who have begun their junior year of study are not eligible to enter the double degree program nor may students transfer into the program midyear. The double degree program is designed as a five year program, and students must comply with the credit limit of 25 credits per semester.

Students in the double degree program must maintain full-time enrollment in each semester of study, including lessons at Peabody and at least one class at Homewood. Administrative services such as registration, financial aid, and student accounts are provided to double degree students by the Homewood schools. Consequently, students in the double degree program do not receive Peabody merit scholarships or any other form of financial aid from Peabody. Double degree students must enroll in private lessons, at a minimum, and, for instrumental majors, large ensembles to maintain their status as Peabody degree candidates in the double degree program.

Student Status
Students in the double degree program are responsible for meeting the requirements of both degree curricula within the published guidelines of the relevant programs. Students' principal affiliation is with the Krieger School of Arts and Science or the Whiting School of Engineering. All official procedures of registration and records are managed through the Homewood Office of the Registrar. The official transcript for a double degree student, including all courses at both Peabody and Homewood, is maintained by the Homewood Office of the Registrar.

Enrollment Requirements and Limits
Double Degree students must enroll in private lessons each semester. Instrumental majors are required to enroll each semester for large ensembles and private lessons to maintain their status as Peabody degree candidates in the Double Degree Program. Double Degree students must register for no less than one course at Homewood each semester. Peabody Double Degree students are permitted to enroll in a maximum of 25 credits per semester.

Residency Requirement for Peabody Double Degree Students
Peabody Double Degree students must complete at least 48 credits on the Homewood campus, in the Krieger School of Arts & Sciences and/or the Whiting School of Engineering.

Course Changes and Withdrawals from Peabody Courses
Students must follow the deadlines for adding, dropping, or withdrawing from Peabody courses which are published on the Peabody Academic Affairs website at https://peabody.jhu.edu/academics/academic-calendar-resources/.

Course Changes and Withdrawals from Arts and Sciences and Engineering Courses
Students must follow the deadlines and processes for adding, dropping or withdrawing from Arts & Sciences and/or Engineering courses which are published on the Homewood Registrar's Office website (https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/).

Leave of Absence
Double Degree students may request a Leave of Absence (LOA) from the entire program, however, they cannot be granted leave from only one portion of the program. A LOA for Double Degree students is subject to the guidelines of the student's respective academic advising office on the Homewood campus.

Graduation Policies
Double Degree students must petition to graduate from the Peabody Conservatory in accordance with information located at https://peabody.jhu.edu/academics/academic-calendar-resources/registrar/, and also adhere to the policies and procedures for applying to graduate from their Homewood school, Arts and Sciences or Engineering as indicated at ASEN Undergraduate Graduation Policy (p. 1616). Both degrees are awarded simultaneously, and degree conferral is available in May and December of each academic year.

Graduation Closes the Undergraduate Record
Upon graduation, the undergraduate record is closed. The only permitted changes are the resolution of incomplete grades, missing grades, and grade errors. These changes must be resolved by the first Monday after 30 days have lapsed since the degree conferral date. Students wishing to take additional courses at JHU after graduation should refer to Alumni Enrollment policies.

Space Science and Engineering

This minor is open to all students in the Whiting School of Engineering and the Krieger School of Arts and Sciences who have the prerequisites for the required courses. The objective of the Minor is to prepare students for a career in Space Science and Space Engineering, either directly as an entering professional in industry, government laboratories and other organizations or as a student in a graduate program. The educational goal of the Minor is to enable students to:

- Apply their understanding and mastery of the fundamental scientific, engineering, and mathematical principles obtained through their major subject of study to space science and space engineering.
- Develop an understanding and capacity for interdisciplinary approaches to technical activities.
- Improve their ability to work in multidisciplinary teams, which are typical in space and other complex technical activities, through interdisciplinary education and internship(s) or equivalent experience(s).

Programs

- Space Science and Engineering, Minor (p. 1401)

Space Science and Engineering, Minor

Space Science and Engineering Minor Requirements

- A Proposal and Course Plan, which must be approved by your advisor for the minor (hereafter referred to as the "Advisor"). The proposal must discuss a theme that unites the individual elements of the program (courses and internship(s)) into an intellectual whole.
- Five courses in Science and Engineering. One course is specified (AS.171.321 Introduction to Space, Science, and Technology) and the remaining four are chosen through your Proposal and Course Plan, which must be approved prior to taking the courses by the Advisor. All courses must be taken for a grade rather than satisfactory/unsatisfactory. A grade of C- or better is required. Courses that are named as requirements for the student's major may not be used. However, courses that are not named, but satisfy an elective requirement for the major, may be used.
- An internship or equivalent experience in the field of space science and engineering is required. This must have prior approval from the Advisor.
- A brief report on the internship or equivalent experience to the Advisor.

Course Requirements
Specified Course:

The specified course is 171.321 Introduction to Space Science and Technology. The prerequisites are Physics 171.101-102 or a similar engineering course and Calculus 110.108-109. The course carries 3 credits. The course is co-listed by the Departments of Earth and Planetary Sciences, Materials Science, and Engineering and Mechanical Engineering.

Proposal and Course Plan for the Four Courses:

To ensure that the program is a coherent intellectual activity, you are required to submit a Proposal and Course Plan to your Advisor early in their program, prior to taking the courses. The Proposal and Course Plan will identify a theme that describes the educational goal that you will pursue through your course of study and a list of courses, including alternates, to achieve your goal. Examples of such themes could be "Remote observations of the earth and planets from space vehicles" or "Spacecraft design for astronomy missions." Examples of potential course programs are listed in Section 5 below. A list of suggested candidate courses is listed in Section 6 below. If consistent with the Proposal and Course Plan theme, you may use other courses with the permission of your Advisor. The Course Plan should contain alternative courses in recognition that every course may not be taught every year.

The Proposal should also include ideas for completing the internship requirement discussed below.

Additional Requirements on the Four Courses

- One of the four courses may be at the 200 level, but at least three must be at the 300 level or higher.
- The total credits associated with the courses must be 12 or more.
- At least three of the courses must be in departments other than the department or program of your major.
- Courses cannot be "named" requirements of the major; however, elective courses for the major may be used.

Internship or Equivalent Experience
Practical experience in space science and space engineering can be obtained through an academic internship, non-academic internship or an equivalent experience. This practical experience can be acquired by at least six weeks of full-time effort or the equivalent effort spread

over a longer period. This can take place during a summer or during the academic year.

Academic Internships

The Undergraduate Student Handbook describes the regulations governing academic internships. You may find the following quoted material from the Handbook helpful:

- “Academic internships are practical work experiences which have an academic component as certified by a member of the faculty.”
- “Academic credit for independent academic work must be sponsored by a full-time member of the Homewood faculty. This is the case whether the work is done on campus or not. The work supervisor and the faculty sponsor may be the same individual. If the faculty sponsor is not the work supervisor, the work supervisor must provide the faculty sponsor with a report on the student’s achievements while doing the independent project.”
- “Only one credit may be earned for an academic internship during one semester or summer.”
- “The grading method is Satisfactory/Unsatisfactory only.”
- “Independent work done for academic credit must be unpaid.”
- “The use of credit for independent academic work to satisfy the requirements of a major or minor is subject to prior written approval by the appropriate department or program.”

Non-academic Internships

These internships are offered by non-academic organizations such as the Space Telescope Science Institute, the Applied Physics Laboratory, and a number of NASA laboratories to provide undergraduate students practical work experience in space science and space engineering. These internships often carry a stipend and are not eligible for academic credit.

Opportunities within the university include the Applied Physics Laboratory, the Center for Astrophysical Sciences, the Space Telescope Science Institute, as well as individual professors and research staff. In addition, local laboratories and companies, such as NASA Goddard Space Flight Center, Lockheed Martin, Northrop Grumman, Orbital Sciences, and other private corporations offer excellent opportunities for internships and summer work experiences.

- Applied Physics Laboratory program for JHU students (https://www.jhuapl.edu/Education/JohnsHopkinsConnection/) – Students should indicate their interest in the Space Department of the JHU APL.
- Space Telescope Science Institute intern program (https://www.stsci.edu/institute/smo/students/)
- NASA (https://www.nasa.gov/centers/goddard/education/internships.html)

Equivalent Experiences

Other activities that meet the spirit of the requirement may be accepted. For example, employment opportunities, often in the summer, can provide practical experience in space science and space engineering.

Prior Approval Required

The student is responsible for identifying and arranging the internship or equivalent experience. However, in order to count toward the Minor, it must be approved in advance by the Advisor. In general, the Advisor will require that the mentor or supervisor be either a space scientist or space engineer.

Required Report on the Internship or Work Experience

In order to have it count toward the Minor, the student must provide a brief report (typically one page) describing the internship or equivalent experience to the Advisor at the beginning of the semester immediately following the activity. The report should give the name of the organization or laboratory (e.g., STScI, JHU-APL, NASA-GSFC), the start date and duration, and the name, position, and email address of the mentor/supervisor. It should include a brief summary describing the activity, a description of new knowledge and skills learned, and information about the overall experience.

For a detailed explanation of the minor and its requirements, including sample programs of study, please visit the Student Handbook for the Minor in Space Science and Engineering (http://spacestudies.jhu.edu/space-minor/).

Graduate and Professional Programs (Advanced Academic Programs)

Academic Catalogue 2022-2023

The University reserves the right to change without prior notice any programs, tuition and fees, requirements, or regulations published in this catalogue. This catalogue is not to be regarded as a contract. Multiple means of communication may be used by the University for announcing changes of this nature including, but not exclusive to, email and/or paper notice. Students are provided an email account from Johns Hopkins University (JHU). The JHU email account will be used by the university for general and official notice/business. To establish an email account, visit my.jh.edu (https://my.jh.edu/portal/web/jhupub/).

Published once a year by Johns Hopkins University, Krieger School of Arts and Sciences, Advanced Academic Programs, June 30, 2022.

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Baltimore, MD 21218
410-516-6749

Online Courses

https://canvas.jhu.edu/
advanced.jhu.edu/online (https://advanced.jhu.edu/academics/)

Master's Degrees

Dual Degree

Certificates

Combined

About Krieger School of Arts and Sciences

The Krieger School of Arts and Sciences is at the heart of a leading, diverse, global coeducational university. Privately endowed, the Johns Hopkins University was founded in 1876 as the first true American university on the European model: a graduate institution with an associated preparatory college, a place where knowledge would be created and assembled, as well as taught.

Today, the Krieger School of Arts and Sciences is the core institution of the Johns Hopkins complex of schools, centers, and institutes. Its home is the park-like Homewood campus in the residential Charles Village section of northern Baltimore City.

Advanced Academic Programs

The School of Arts and Sciences recognizes the intellectual strength and educational requirements of working adults. Through Advanced Academic Programs, it offers a Johns Hopkins education to those wishing to attend graduate school. Courses leading to master's degrees are held in the evening and on weekends at the Homewood campus in Baltimore; the Washington, DC Center near Dupont Circle; and online.

Drawing upon over a century of research and teaching expertise, the programs offer advanced instruction in scientific fields of current interest and innovative graduate study in the humanities and social sciences. While based on the latest scientific and scholarly knowledge, course work emphasizes the application of such knowledge to practical problems. Classes are designed to provide individual attention and to encourage student contribution.

Degree-Granting Divisions of the Johns Hopkins University

- Bloomberg School of Public Health
- Carey Business School
- Krieger School of Arts and Sciences
- Paul H. Nitze School of Advanced International Studies
- The Peabody Institute
- School of Education
- School of Medicine
- School of Nursing
- Whiting School of Engineering

The Johns Hopkins University is privately endowed and accredited by the

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3624 Market St.
Philadelphia, PA 19104-2680
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Since the university's first president, Daniel Coit Gilman, assembled the first faculty in 1876, education in the arts and sciences at Johns Hopkins has been carried out in a research environment, with international distinction, under the supervision of active researchers. The belief in the inseparability of education and research still guides the academic programs of today's School of Arts and Sciences. Distinguished scholars and scientists share and exchange ideas and knowledge with undergraduates and graduates, encouraging creative thinking and independent research. Residential students take courses from anthropology to writing seminars, offered by 24 degree-granting departments that confer the Bachelor of Arts, the Bachelor of Science, the Master of Arts, the Master of Fine Arts, the Master of Science, and the Doctor of Philosophy. Information regarding full-time education can be found in the Arts and Sciences/Engineering Undergraduate and Graduate Programs catalogue.

Admission information for the Office of Undergraduate Admissions:

Mason Hall
Homewood Campus
or 410-516-8171

Graduate admissions for full-time students in the Krieger School of Arts and Sciences and the Whiting School of Engineering can be found at:

101 Whitehead Hall
Homewood Campus
or 410-516-8174

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Master of Liberal Arts

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Melissa Joyce
Associate Program Director, Science Writing

Sam Apple
Program Coordinator, Science Writing

Enrollment Services

The Advanced Academic Programs Enrollment Services and Student Success Office, consisting of the Admissions Office, Registration Office, and Office of Student Experience is located at the:

Johns Hopkins Bernstein/Offit Building
1717 Massachusetts Ave. NW, Suite 101
Washington, DC 20036-2001

Academic Regulations for Online Courses

Academic Regulations for Online Courses

Online Orientation for Online Students

All students taking their first fully online AAP course should participate in the Learning Management System orientation course before the term starts. Students will learn how to navigate, collaborate, and communicate in a fully online course. The orientation provides valuable hands-on experience with the course management system. Important information regarding the technical requirements and support resources available will be given in the orientation. Students should expect to devote one to four hours to the orientation, but it may be spread out over several days. Information about where and how to take the orientation course will be provided to students by email.

Returning students are welcome to participate and review techniques and tools. All students are encouraged to revisit the orientation to test for access to online library resources in the Library Module.

Online Library Access

AAP provides online library resources to all students. New online students are required to obtain access as part of the Learning Management System (LMS) orientation and are supported in this process. The JHED ID and password are needed to access most resources. For a list of resources, visit the library homepage at library.jhu.edu (https://www.library.jhu.edu).

Online Class Structure

AAP online courses are asynchronous, though they may have some optional synchronous components. Students access course materials and discussions at individually desired times. Students share learning actively through the Web-based course site with readings, assignments, group activities, and threaded discussions as guided by their instructor. Course format and structure promote active and interactive learning.

Online Bookstore

AAP has partnered with an online bookstore, MBS Direct, to service online students and students enrolled in on-site courses. MBS Direct offers competitive pricing, new and used books, and buybacks from its large distribution center. Students can access the bookstore at mbsdirect.net (https://bncvirtual.com/jhu-aap/) approximately four weeks prior to the start of each semester to purchase their texts. Questions about MBS Direct or its services can be directed to the customer service center at 800-325-3252 or vb@mbsDirect.net.

Residency Requirement

Some programs are offered fully online, and some have on-ground courses. Other programs have an on-ground residency requirement in addition to courses offered online. Each program has specific requirements, and it is the student's responsibility to check with their program advisor to ascertain the requirements pertaining to their program.

AAP Online Course Access Policy

According to AAP policy, students have one full semester after the end of the semester in which they take an online course to retrieve their student-generated work and access course materials. The University's policy on the use of intellectual property applies in all cases where students access online classes after a semester has already ended. Additionally, individual instructors or University administration have the option to make courses available for longer or shorter periods.

Academic Structure

Academic Structure

Advisors / Terms

Each student accepted into a degree program or certificate is assigned an academic advisor, who is available for consultation regarding the student's program of study. A student advisor's name and email address are provided on the admissions decision letter. Advising is available year-round. Consultation takes place by phone, email, Internet, or in person by appointment. Please see the program sections in this catalogue for specific program advisor information.

Courses in all programs are offered in the summer, fall, and spring terms. The summer term formats:

- one full semester (12 weeks) and
- two accelerated six-week formats.

The fall and spring term formats:

- one full semester (15 weeks).

The spring semester includes a three-week intersession. Courses run from the beginning of January to the end of the month. The intensive semester format allows students to complete special-interest courses, such as travel courses, as well as regular courses offered in a compressed format.

Course Numbering System

Advanced Academic Programs courses are numbered in the following form:

420.601.51 (Example)

- 420 indicates the program—in this case, Environmental Sciences and Policy;
- 601 indicates the course number—in this example, Geological Foundations of Environmental Science; and
- 51 indicates the section number and location where the course is offered—i.e.,
  - sections 01 to 09 are offered at the Homewood campus in Baltimore;
  - sections 51 to 59 are offered at the Washington, DC Center;
  - sections 81 to 89 are offered online; and
  - section 91/92 indicates an international or off-site course.

Course Credit

Effective summer 2016, all Advanced Academic Programs graduate-level courses are assigned credits. In addition, graduate-level students may receive letter grades (A, B, etc.) or P (passing). Prior to May 2016, credit hours were not assigned to graduate-level courses unless taken by an undergraduate student. No GPA is calculated. A transcript guide is available upon request that features grade points needed to calculate grade-point averages. The AAP Registration Office will not calculate grade-point averages for students or third parties.

Course Cancellations

The University reserves the right, in its sole discretion, to change instructors or cancel courses with insufficient enrollment.

Enrollment/Degree Verification

Enrollment verification provides proof of enrollment for a student's financial lender, insurance company, sponsor, etc. Enrollment verification can be obtained through SIS. Verification may also be placed through the National Student Clearinghouse.

Transcripts

The transcript is part of the student's permanent record at the University. No grade may be changed except to correct an error or to replace an incomplete with a grade. Active students can request a transcript through SIS.

Second Master's Degree

After receiving a master's degree from Advanced Academic Programs, students may continue in a second program if prerequisites for that program are fulfilled. To receive a second master's degree from Advanced Academic Programs, all course requirements for the second program must be satisfied. The student may count up to three courses taken as part of the first degree toward requirements of the second degree. However, the relevant program committee must approve the course(s) as appropriate to the plan of study, and the course(s) must satisfy the requirements of the second degree. The course(s) also must fall within the five-year limit for the second degree (i.e., the second degree must be completed within five years, counting from the beginning of the first course accepted toward the second degree).

To apply for a second master's degree, the student must submit a new Advanced Academic Programs application form, an application fee (waived if previous master's degree was earned within the past year), and any additional admissions materials required by the second degree program.

Admission

Admissions

Admissions Process

Applicants may apply throughout the year and begin study during any of the three semesters (summer, fall, spring). While applications are accepted year-round for all programs, all applicants are strongly encouraged to apply and complete the application process four to six weeks before the start of the desired semester. International applicants seeking a visa should submit all application materials three months prior to the start of the intended semester of study. However, the Admissions Office requires no deadlines by which an applicant needs to submit an application.

Applications are accepted up to one year in advance of the intended semester of study. An incomplete application (including application fee) is valid for one year from the date submitted. Applicants who fail to submit required supporting materials within this period and who wish to be considered for admission are required to submit a new application, fee, and all required supporting documents.

Review Process

Once the Admissions Office has received all required materials, the completed application is sent to the Admissions Committee. The Admissions Committee for the chosen program assesses the application and its supporting documents. All materials must be received prior to the Admissions Committee review. Academic background; personal, professional, and field-related experience and achievements; and any program-specific criteria are all considered in this review. Review times for completed applications range from approximately three to four weeks. If a decision is not reached by the Admissions Committee in time for the upcoming semester, the program will automatically consider the applicant for the following semester. The **Admissions Committee reserves the right to require that more than the minimum standards** be met for admission to any academic program and may require additional materials of the applicant, if deemed necessary to make an admission decision.

Admissions Requirements for Degree or Certificate Seeking Applicants

- **Bachelor's degree from a U.S. college or university** (or current enrollment in final semester of undergraduate studies). Applicants who receive their bachelor's degree in a country other than the U.S must have the U.S. equivalency of a bachelor's degree. AAP's Post-Master's certificates also require the completion of a master's degree or equivalent (example: Post-Master's Certificate in Sequence Analysis and Genomics).
- **Minimum GPA of 3.0 on a 4.0 scale.** Meeting the minimum GPA requirement does not guarantee admission, and may vary by program when combined with relevant work and industry experience. Admissions are subject to Program Director and Admissions Committee approval.
- AAP **online application**.
- Nonrefundable **application fee of $75**.
- Applicants who have completed their undergraduate degree must ensure that an **official transcript** confirming degree conferral is submitted to AAP Admissions by the application due date and in accordance with the instructions below.
- AAP may admit applicants with an official transcript on a conditional basis pending degree conferral if, at the time of application, the individual is completing the last semester of their undergraduate degree. If a student is currently finishing their degree, they must ensure that an official transcript that includes the current semester is submitted to AAP Admissions by the application due date in accordance with the instructions below for submitting official transcripts. If a student is admitted, that admission is conditional until AAP receives a second official transcript that confirms degree conferral. Students admitted on a conditional basis will have until the course Withdraw/Audit deadline for the first semester in which they are enrolled at AAP to ensure the final, official transcript that confirms degree conferral is submitted to AAP Admissions in accordance with the instructions below.
- All applicants admitted on a conditional basis are responsible for ensuring that their official transcript confirming degree conferral is submitted to AAP Admissions by the course Withdrawal/Audit deadline in accordance with the instructions below. AAP will automatically dismiss, without a refund, a student who does not ensure their final official transcript confirming degree conferral is submitted to AAP Admissions by the course Withdrawal/Audit deadline in accordance with the instructions below.

Instructions for Submitting an Official Transcript

- To send an official transcript and avoid delays, students graduating from a domestic institution are highly encouraged to use one of the providers listed here (https://advanced.jhu.edu/admissions-aid/how-to-apply/).
  Please list aapadmissions@jhu.edu as the recipient address.
- Unless the official transcript is being sent directly from the institution to JHU AAP, students graduating from an institution outside the United States must submit official transcripts to JHU AAP through: World Education Services (WES) (https://www.wes.org/) or one of the credential evaluation services listed here (https://advanced.jhu.edu/admissions-aid/how-to-apply/).
- JHU AAP also accepts official transcripts that are sent directly from the institution:
  If via email: aapadmissions@jhu.edu.
  If via regular mail:
  Johns Hopkins University AAP Admissions Office
  1717 Massachusetts Avenue, NW, Suite 101
  Washington, DC 20036
- Regardless which of the above methods are used to submit official transcripts, applicants are responsible for ensuring their transcripts are received by JHU by the stated deadlines. It takes time for an institution, approved provider, or credential evaluation service to process and send official transcripts – in some cases at least 4 to 6 weeks. Therefore, applicants should allow sufficient time for their transcripts to be processed and transmitted to JHU.
- **Official TOEFL, IELTS, or PTE score** report is required for international applicants who do not meet the criteria. See section titled "English as a Second Language (p. 2213)" for details.

- **Additional materials** required by the chosen program as listed in that program's section of this catalogue.

Note: All application materials submitted to Advanced Academic Programs become the property of Johns Hopkins University and will not be returned to applicants under any circumstance. Any misrepresentation or omission of information included as part of an application will constitute cause for cancellation of the application prior to admission, reversal of acceptance, dismissal, or initiation of disciplinary action. In the event new information is provided/discovered after a final decision has been made, the Admissions Committee has the right to re-evaluate the application.

Graduate Record Examination

Most of AAP's programs do not require GRE scores. Applicants should check program to determine if they must submit a GRE score. Do not send in the GRE score unless it is required by the program or the committee. If required, applicants must send scores to AAP. Our institutional code is listed under the District of Columbia: 8747 (Johns Hopkins Adv.Acad.Programs).

Acceptance of Admission

Newly accepted students are directed to an Enrollment Decision form, available through the electronic version of their official admissions decision letter. Students who accept the offer of admissions but later decide to defer their enrollment to a future term must contact the Admissions Office immediately with their intent to defer. Not contacting the Admissions Office may result in a temporary delay in a student's ability to enroll in a future term. Applicants can pursue only one program at a time, unless they are applying to an approved dual or combined program in AAP.

Degree/Certificate Candidates

Qualified applicants are admitted as degree or certificate candidates by the committee after the Admissions Committee for that program reviews the completed application and determines eligibility.

Provisional Student

Provisional students are admitted to this status because, in the view of the Admissions Committee, they do not fulfill academic requirements for admission as a degree candidate at the time of the application. A provisional student may also be admitted conditionally, if Admissions determines eligibility. (See Conditional Status below.)

Provisional students are required to take specific prerequisite courses and/or program courses, identified in their admissions letter (additional criteria may be listed). Those with provisional status are held to grading criteria stricter than those required of degree candidates. **Provisional students must receive a grade of B or better** in **all courses taken while under provisional status**. Failure to meet the provisional grade requirement will result in dismissal from the program. When the provision is met, the student must submit a "change of student status request" form to change from provisional to degree candidate.

Note: Provisional Students may not qualify for financial aid.

For eligibility for provisional students, contact the Office of Financial Aid (https://finaid.jhu.edu/contact/) for specifics.

Conditional Student

Applicants who have completed their undergraduate degree must ensure that an official transcript confirming degree conferral is submitted to AAP Admissions by the application due date and in accordance with the instructions below.

AAP may admit applicants with an official transcript on a conditional basis pending degree conferral if at the time of application the individual is completing the last semester of their undergraduate degree. If you are currently finishing your degree, you must ensure that an official transcript that includes the current semester is submitted to AAP Admissions by the application due date in accordance with the instructions below for submitting official transcripts. If you are admitted, your admission is conditional until AAP receives a second official transcript that confirms degree conferral. Students admitted on a conditional basis will have until the course Withdraw/Audit deadline for the first semester in which they are enrolled at AAP to ensure the final, official transcript that confirms degree conferral is submitted to AAP Admissions in accordance with the instructions below.

All applicants admitted on a conditional basis are responsible for ensuring that their official transcript confirming degree conferral is submitted to AAP Admissions by the course Withdrawal/Audit deadline in accordance with the instructions below. AAP will automatically dismiss without a refund a student who does not ensure their final official transcript confirming degree conferral is submitted to AAP Admissions by the course Withdrawal/Audit deadline in accordance with the instructions below.

Instructions for Submitting an Official Transcript

To send an official transcript, and to avoid delays, students graduating from a domestic institution are highly encouraged to use one of the providers listed here (https://advanced.jhu.edu/prospective-students/admissions-requirements/electronic-transcript-organizations/). Please use aapadmissions@jhu.edu as the recipient address.

Unless the official transcript is being sent directly from the institution to JHU AAP, students graduating from an institution outside the United States must submit official transcripts to JHU AAP through World Education Services (WES) (https://nam02.safelinks.protection.outlook.com/?url=https%3A%2F%2Fwww.wes.org%2F&data=04%7C01%7Cdbrant%40jhu.edu%7C77892121b8be47cb24f908d887238be2%7C9fa4f438b1e6473b803f86f8aedf0de
%7C0%7C0%7C637407934021323346%7CUnknown%7CTWFpbGZsb3d8eyJWIjoiMC4wLjAwMDAiLCJQIjoiV2luMzIiLCJBTiI6Ik1haWwiLC
%7C1000&sdata=ADHlbmQzaJMsB8fn7K%2B%2BnKt7L2XU1cwsS5%2F9MWoekrc%3D&reserved=0) or one of the credential evaluation services listed here (https://advanced.jhu.edu/wp-content/uploads/2018/12/authorizedTranscriptVerificationOrganizations.pdf).

JHU AAP also accepts official transcripts that are sent directly from the institution:

- If via email to: aapadmissions@jhu.edu.
- If via regular mail, to:

851 Trafalgar Court
Suite 420 West
Maitland, FL 32751

Regardless which of the above methods are used to submit official transcripts, applicants are responsible for ensuring their transcripts are received by JHU by the stated deadlines. It takes time for an institution, approved provider, or credential evaluation service to process and send official transcripts – in some cases at least 4 to 6 weeks. Therefore, applicants should allow sufficient time for their transcripts to be processed and transmitted to JHU.

Deferral of Admission

Admitted students may defer the start of their studies for up to one year from the term of admission (example: a fall admit can defer until next fall; a spring admit can defer until next spring). Applicants need to complete the Enrollment Decision form, which is available through the electronic version of their official admissions decision letter. Students who accept the offer of admissions but later decide to defer their enrollment to a future term must contact the Admissions Office immediately with their intent to defer. Not contacting the Admissions Office may result in a temporary delay in a student's ability to enroll in a future term. If an admitted student wishes to enroll beyond the year of admission, he/she will need to reapply to the program by submitting a new application, application fee, and any additional supporting documents. A student who reapplies must satisfy admission and program requirements in effect at the time of reapplication.

Denial of Admission

All admission decisions are final. The Admissions Office cannot discuss the committee decision. In the case of denied admission, applicants must take at least one year to attempt to improve their qualifications before reapplying to the same degree or certificate program. Improvements can include but are not limited to taking the GRE, submitting a new writing sample, or taking additional courses in a related field at a regionally accredited college or university. Please note that an improvement to the application or reapplication does not guarantee admission into the program. The applicant will need to reapply to the program by submitting a new application, application fee, and any additional supporting documents. All application material is shredded immediately following denial of admission.

International Applicants

Collegiate-Level Course Work Earned Outside of the U.S.

Applicants who have earned their post-secondary degree(s) or course work in a country other than the United States are required to have a "course-by-course" credential evaluation with GPA performed by an outside evaluation service. Evaluations are waived only if the student received their undergraduate degree from a U.S. institution and the undergraduate course work taken internationally was transferred to that institution. However, the official transcript, in English, is still required of the international school. Please see ed.gov/accreditation (https://www.ed.gov/accreditation/).

Evaluations must be completed by a current National Association of Credential Evaluation Services member such as the World Education Services (WES). The most up-to-date list of current members can be found at the following website (https://advanced.jhu.edu/admissions-aid/how-to-apply/international-students/).

English as a Second Language

International applicants must demonstrate English proficiency by meeting at least one of the following requirements:

- The applicant submits official TOEFL, IELTS, or PTE scores.
- The applicant holds a post-secondary degree from an accredited U.S. institution.
- English is both the official language and the only language of instruction in the applicant's native country.

- **TOEFL:** Official TOEFL score reports must be sent to AAP in the mail. Photocopies or electronic TOEFL score reports will not be accepted. AAP requires a minimum score of 600 on the paper test, 250 on the computer-based test, and 100 on the Internet-based test. However, scores requirements may vary by program. Our institutional code is listed under the District of Columbia: 8747 (Johns Hopkins Adv.Acad.Programs).
- **IELTS:** Applicants should contact the test center where they took the test directly and request that test scores be sent electronically using the IELTS system. Please be sure to select "Krieger School of Arts and Sciences Advanced Academic Programs." All IELTS test centers worldwide are able to send scores electronically. AAP requires a band score of 7.0. However, scores requirements may vary by program.
- **PTE:** Official PTE Academic results must be sent to AAP in the mail or electronically. Photocopies of PTE Academic score reports will not be accepted. AAP requires a minimum score of 68. However, scores requirements may vary by program. Our institutional code is: Krieger School of Arts and Sciences –Advanced Academic Programs.

Student Visas

Applicants seeking admission to enroll in on-site courses in the U.S., taking at least three courses per semester, may request certification for an F-1 visa by indicating "yes" for the "Do you plan to initiate the F-1/J-1 visa process through Johns Hopkins University?" question on their admissions application.

AAP international students on F-1 visas usually begin their program in the fall or spring semester. In order to maintain status on an F-1 visa, students in AAP must be enrolled in a minimum of three courses per semester, one of which can be an online course. Students must complete their certification process with the Office of International Services (https://ois.jhu.edu/).

Dual or Combined Program Admissions

A limited grouping of programs is considered dual (two Master's degrees) or combined (Master's degree + Certificate). Programs combined with those from other Johns Hopkins Schools will have separate admissions requirements and will require a different application, fee, etc. Please see each program's admissions requirements for more information.

Special Student/Non-Degree Applicants

A non-degree seeking or special student is one who would be eligible for admission as a degree or certificate candidate to the chosen program, but who is not interested in pursuing the credential. Admitted students with non-degree seeking/special status are:

- Permitted to enroll in courses for which they satisfy the prerequisites;
- Permitted to take up to four courses;
- Not qualified to receive financial aid;
- Not eligible for graduation; and
- Required to reapply to become degree-seeking (Acceptance not guaranteed).

To be considered for **special student or non-degree admission** to any Advanced Academic Programs course, applicants must do the following:

- Submit a completed online application;
- Indicate non-degree seeking under the AAP Program tab in the application;
- Upload unofficial transcripts (preferred) or copy of diploma;

    - Submit official transcript for the highest degree attained
- Submit a Statement of Purpose;
- Submit a resume;
- Submit a writing sample (Writing, Science Writing, and Teaching Writing applicants only); and
- Submit two Recommendation Letters (see program admissions requirements for more information).

Admission to Other Divisions or Programs of the University

An admitted student in Advanced Academic Programs who wishes to transfer to another school in the University or to a full-time program in the School of Arts and Sciences must apply to the appropriate school or the School of Arts and Sciences' full-time programs. Admission to Advanced Academic Programs establishes no claim or priority for admission to other divisions or programs of the University.

Accelerated Status for Recent Hopkins Undergraduate Students

Recent Johns Hopkins graduates may be allowed to accelerate their time to complete an AAP Master's degree. Academically strong and eligible candidates from JHU's undergraduate programs may be considered for the accelerated option at the time of application. Students who start an AAP Master's Degree program within 5 semesters (including summer) following their graduation from their first Bachelor's degree may have up to two upper-level courses applied through advanced standing toward the Master's degree. Coursework will be approved at the sole discretion of the program director. This evaluation is final and not eligible for appeal.

AAP Course Opportunities for Current Hopkins Undergraduate Students

Eligible upper-level JHU students may be allowed to begin taking a limited number of courses in AAP programs on a space-available basis prior to the completion of their undergraduate degrees. Students must contact the appropriate AAP program director/advisor for further details, specific program requirements, and approval.

Advanced Standing

Advanced Standing signifies a student receiving credit for academic coursework that was achieved prior to applying to their current program. This coursework comes from programs outside of any JHU division and must have been completed within seven years from the date of application. Advanced Standing will only be considered when the relevancy and currency of the prior course content clearly contributes meaningfully to the graduate degree.

The following restrictions apply for coursework being considered for Advanced Standing:

- Advanced Standing can only be granted for those courses that have 75% or higher alignment with course objectives within the AAP program.
- Coursework must have received the minimum grade of B- to be considered; however, individual AAP programs may require a higher grade. Please contact the Program Director for guidelines.
- No more than two courses may qualify for Advanced Standing.
- Courses being considered for Advanced Standing must not have been part of a completed degree or certificate program.
- Advanced Standing will only be considered for Master's degree programs. No advanced standing at the Certificate level will be considered.
- Students admitted with provisional status will not be considered for Advanced Standing

To be considered for Advanced Standing applicants must:

- Request Advanced Standing at the time of application. Advanced Standing cannot be granted or requested once a student is admitted to a program.
- Submit course syllabi for those credits they are seeking to transfer into the program. Advanced Standing requests without syllabi will not be reviewed.

Waived and Replaced Courses

In some programs, the Admissions Committee may allow up to two core courses to be waived. All waived courses must be replaced by electives to satisfy the required number of courses to complete the degree. Students should consult with their Program Director to determine if their program waives and replaces courses.

Some programs waive and replace based on previously completed graduate coursework. Supporting documentation, such as copies of syllabi and course descriptions, may be requested by the committee to assist with its decision. Students are granted this type of waiver at the time of admission.

Some programs waive and replace based on an assessment of specialized knowledge: these assessments must be requested and completed no later than the end of their first enrolled semester at AAP.

New Student Orientation

Once admitted to Advanced Academic Programs, all students are encouraged to complete a Web-based new student orientation (https://advanced.jhu.edu/current-students/new-student-checklist/). This orientation provides guidance for all AAP students, regardless of modality, to understand administrative processes at Advanced Academic Programs and to learn about available resources. New student orientation is separate from "Learning Management System (LMS) orientation," which is available to all students enrolled in online courses and required by certain academic programs. The LMS orientation provides specific information regarding the use of LMS and enrollment in online courses.

Alumni Benefits

Alumni Benefits

Johns Hopkins University alumni are welcome to return for courses in AAP. Having alumni in courses boosts academic rigor, knowledge, and experience in the classroom. To promote this interaction and to provide opportunities for alumni to take courses they missed or that will help them remain current in their fields, AAP offers the Alumni Tuition Benefit Program.

Alumni may be eligible for admission as degree or certificate candidates to the chosen program but may not necessarily be interested in pursuing the credential. These alumni are permitted to enroll in any courses for which they satisfy the stated prerequisites. As long as alumni do not interrupt their studies for more than one year and remain in good academic standing, they can take up to four courses in an individual program under the Alumni Benefit. The program director for the selected program must sign off on each course for which alumni want to register through the Alumni Benefit. Alumni may not register in more than one program at the same time and must reapply for the Alumni Benefit to take courses in additional programs. Alumni who do not remain in good academic standing may be dismissed from AAP. If more than one year lapses between registrations, alumni are required to reapply for the Alumni Benefit.

Alumni are welcome to apply to be accepted as new degree candidates at any time during their studies. The program's Admissions Committee will determine if any credit-bearing courses completed at the time of application will count toward the degree. Program requirements and time limitations in effect when applying will guide the admission decision.

To apply for the AAP Alumni Benefit, alumni must complete the standard AAP online application (https://applygrad.jhu.edu/apply/?sr=2816e1e1-979b-49e1-9502-a48cc8b682e6), checking the appropriate box to indicate alumni status. The application fee will be waived for alumni applying for the Alumni Benefit.

Qualification Required: In all cases above, alumni can enroll only in courses for which they qualify. A program may elect to limit the courses open to alumni or may reserve a certain number of slots for current students.

Full-Tuition Option (with credit): Alumni who have applied for the AAP Alumni Benefit through the online application will be able to register for an approved course. Their registration will be processed promptly during regular registration or late registration. In most instances, they will compete for seats along with current students (first come, first served). Students should contact the program director for more detailed information. The course will appear with a grade on the transcript.

Space-Available Tuition Benefit (noncredit, audit): Alumni interested in this option will be eligible for a reduction in tuition, paying 1/3 of the normal tuition in any course for which they qualify, on a space-available system. The reduction does not apply to fees, which must be paid at the standard student rate. The course will appear with an "AU" to indicate the audit status on the transcript. Courses taken as noncredit or audit cannot be applied toward the completion of a degree or graduate certificate.

Grades / Performance / Conduct

Grades / Performance / Conduct

Grading System

The grading scale for students enrolled for credit is A, A-, B+, B, B-, C, and F. Grades F and C are not removed from a student's transcript even if a course is repeated.

Students are graded under the following system:

Grade	Meaning	Equivalent
A		4.00
A-		3.70
B+		3.30
B		3.00
B-		2.70
C		2.00
F	Failure	0.00
P	Pass	
I	Incomplete	
IP	In Progress	
W	Withdrawal	
AU	Audit	
NG	No Grade	

Performance Standards

If a degree candidate receives a grade of C or below in a core course, the student must repeat that course. Even if the course is repeated, the original grade will remain on the student's transcript, and the student may not receive another grade of C or below. For specific guidelines on what courses are considered core, please review the curriculum requirements listed for the corresponding program in this catalogue.

Special students—those who satisfy all requirements for admission to degree candidacy but who choose not to seek a degree—are held to the same performance standards as degree candidates. Provisional students cannot continue in a program if they earn a grade of B-or below in any course taken while they are in provisional admissions status.

Probation and Dismissal

Degree candidates who receive a grade of C or below are on placed on academic probation and will maintain that status. When a course is repeated, both the original grade and repeated grade appear on the transcript. The degree candidate receives credit only once for the course; however, the original grade of C (or below) places the student on probation. If a degree candidate receives a grade of C in an elective course, the course need not be repeated, and the course can be counted toward degree requirements. Degree candidates who receive a second grade of C or below in either a repeated core course or any course taken in the program will be dismissed from the program. Special students are held to the same performance standards as degree candidates. Provisional students who receive a grade of B- or below in any course cannot repeat the course and are dismissed from the program.

Students who are dismissed may apply immediately to another program in Advanced Academic Programs. Admission is not guaranteed. A dismissed student must wait one year from the date of dismissal before reapplying for admission to the program from which they have been dismissed. Readmission is not guaranteed.

Incomplete Grades

Students who experience extenuating circumstances that prevent them from completing coursework within a given term may request an Incomplete (I) grade from their instructor. An approval of an incomplete grade request is neither automatic nor guaranteed.

To receive an "I" in a course, the student must at the minimum have a passing grade in the coursework completed at the time of the request and receive instructor approval.

A student must request an Incomplete grade from the instructor in writing on or before the last day of the semester. An Incomplete grade can't be formally granted until after the Withdraw/Audit deadline. Requests must include an explanation of the extenuating circumstances. The Instructor has the right to ask for documentation. All documentation must be submitted to the Office of Student Affairs for evaluation to safeguard student privacy, not directly to the instructor.

If the instructor, after consultation with the Program Director (or designee), determines that circumstances warrant an Incomplete grade, the Instructor and the student will complete the Request for Incomplete Grade form. This form outlines the reason for the Incomplete, the remaining work to be done, and the deadline. The instructor also indicates the grade the student will earn if they fail to complete the outstanding assignments.

The instructor establishes the conditions for resolving the missing work. It is the student's responsibility to submit all work at the agreed-upon time. If a student does not complete the missing course work within 60 days from the last day of the term, the "I" will automatically convert to the grade indicated by the instructor on the Request for Incomplete Grade form.

Students with incomplete grades in required courses for degree completion at the date of degree conferral will not graduate. Students with incomplete grades in courses that are not required for degree completion may still graduate. However, the deadline for completion is abbreviated; students must resolve incomplete grades within 30 days after the date of degree conferral, which is when the university closes their graduate record.

Withdrawal

The W (withdrawal) grade signifies an official withdrawal from a course that has been approved by the Advanced Academic Programs Registration Office. The student initiates the withdrawal by completing an online add/drop form (https://advanced.jhu.edu/forms/online-add-drop-form/). A 'W' cannot be assigned by the instructor. Students who register for a course but never attend or stop attending, and later drop, are subject to the refund schedule at the time of their drop. All registered students are subject to the refund schedule, regardless of attendance.

Academic Standing and Conduct

The University reserves the right to dismiss at any time a student whose academic standing or general conduct is deemed unsatisfactory.

Academic Integrity

Graduate students at Johns Hopkins are expected to understand the ethical standards of the University, hold the highest standard of integrity for their work, and avoid academic dishonesty in all forms. Ignorance of ethical rules is no excuse for cheating. It is the further responsibility of every student to report to the instructor or their program's director any suspected violations of academic ethics by peers. Enforcement of our code of conduct is a shared responsibility and should not depend on the University alone. We all celebrate the rigor of a Johns Hopkins education, but that rigor loses its meaning if students cheat. Students who violate this code of conduct face a range of penalties, including failure of a course, permanent university transcript notation of an ethics violation, loss of a degree, or expulsion from the University. Please see the Student Code of Conduct (https://studentaffairs.jhu.edu/policies-guidelines/student-code/)for procedures and responsibilities. Ethics violations of any kind are taken seriously and may result in dismissal from AAP's programs.

Grade Appeals

Grade appeals can only occur after a student has been granted a final grade for the course and appeals in a timely manner including all appropriate documentation. The appeal and supporting documentation must be submitted within 30 calendar days after the student's final course grade has been posted.

Grade appeals on the basis of discrimination are not within the purview of this policy. Students should send concerns regarding discrimination directly to the Office of Institutional Equity (OIE) (https://forms.jh.edu/view.php?id=164822).

Grades are awarded for an individual student's academic work during each semester based on that individual's mastery of the course content. Grades are determined by faculty, and AAP will not override an instructor's considered academic judgment when it comes to grade award decisions. Unhappiness with the grade is not sufficient basis for a grade appeal.

Grade Appeal Process

Facts considered during a grade appeal include but are not limited to: (1) verification that there was not an error in recording the grade or (2) whether the grade was a result of a faculty member's failure to follow the syllabus, assignment guidelines, or other instructions provided by the instructor for assigning grades.

Prior to submitting the appeal, the student must first contact the instructor to attempt to resolve the disputed grade. If the instructor and the student are unable to reach an agreement, or if the instructor does not respond to the student's attempt to contact them, the student may submit a formal appeal to the AAP Grade Appeal Committee AAPgradeappeals@jhu.edu. The student should work with their advisor to prepare necessary documentation for submission, which include a student's statement justifying the grade appeal along with all related supporting documentation. [*Note: In the event that the course instructor is also the student's faculty advisor, an alternative mediator will be identified by the Program Director and/or the Faculty and Academic Affairs Officer*.]

Once the formal appeal has been submitted, the AAP Grade Appeal Committee has 10 business days to verify that the appeal meets the above criteria and all documentation has been submitted. Once the appeal is verified as complete, the AAP Grade Appeal Committee will reach out to the instructor for clarification of the grade; the instructor has 7 business days to respond. The AAP Grade Appeal Committee then has 14 business days from the time of the instructor's response to determine whether the disputed grade should be changed or retained and inform the student and the instructor of its decision. If the committee supports the appeal, the instructor has 10 business days to complete any work directed by the committee and update the grade.

The committee's decision is final. Limited appeals to the Associate Dean following a committee decision are possible only if (1) the timeline or process for the grade appeal was not followed, (2) the instructor did not follow the guidelines set forth in the appeal decision, or (3) if new evidence is made available after the AAP Grade Appeal Committee decision. A student submitting a limited appeal of the Committee decision must submit a statement and supporting documentation to the aapgradeappeals@jhu.edu mailbox. This appeal must be made within 10 business days of the receipt of the AAP Grade Appeal Committee's decision to deny the appeal or of the resubmission of the student's grade.

Time Limitation

Students must complete all academic work in a master's degree or certificate program within five years, calculated from the start of the first course that counts toward the degree. This time limit includes any courses taken at another Johns Hopkins school/division that have been approved to count toward the degree or certificate.

If necessary, students may request from their program committee an extension of time to complete their program beyond the five-year limitation.

If an extension is granted, it will be communicated in a letter, and the five-year limit increased by the time included in the extension. An extension may be granted for a semester up to a full year, and in rare circumstances, for two years. In some instances, students may appeal the time limitation policy (https://advanced.jhu.edu/forms/time-limitation-exemption-appeal-application/) regarding previously completed AAP courses.

Graduation Requirements

Application for Graduation

Students planning to complete their degree requirements at the end of the semester for which they are registering must notify the AAP Registration Office of their intentions by completing the online graduation application form found in SIS. This form should be completed when registering for the last course(s) needed to complete the degree; it initiates the graduation review process that students must undergo to be cleared for graduation. The AAP Registration Office will periodically correspond with the student using the JHU email account address provided to all students in order to provide important information about administrative details, events, and deadlines. A paid $100 graduation fee is required at the time of application for graduation. This fee must be paid for every degree earned.

The application for graduation form is valid for only one semester. If students do not complete their degree requirements during the semester expected, they must resubmit the application form while registering for the next semester. Students who paid the $100 graduation fee (a one-time payment) are not required to submit another graduation fee.

Completion of Degree Requirements

The Johns Hopkins University confers degrees three times a year (August, December, and May) to all students who have completed requirements during the summer, fall, or spring semesters. The University-wide commencement ceremony and the master's degree ceremony take place once a year in May. Diplomas are mailed to graduates at the address provided on the graduate application found online in SIS. The conferral date is the date that will appear on a graduating student's transcript.

Registration

Registration

Student Information System (SIS)

The Student Information System (SIS) provides students access to financial aid, billing, and enrollment records in one location with the same interface. Strong authentication security assures confidential access to information by students using any popular Web browser and their JHED login ID and password.

Proof of Immunization Prior to First Registration

The District of Columbia requires all students under the age of 26 to submit an immunization form (https://advanced.jhu.edu/forms/). This requirement may be waived for students if they meet both of the following criteria:

1. The student is in a fully online program that does not have optional or mandated residency requirements, classes, or activities that may be taken in D.C.
2. The student does not currently live in D.C., nor do they plan to move to D.C., or any contiguous state, including Maryland, Virginia, Delaware, Pennsylvania, or West Virginia. If they move to D.C. or one of the states mentioned above, it is the student's responsibility to complete the immunization form (https://advanced.jhu.edu/forms/) and conform to the immunization requirement prior to the move.

Course Enrollment Limits

All AAP courses have enrollment limits. It is not always possible to offer additional sections of oversubscribed courses. A waiting list option is available in SIS during the registration period for most courses with full enrollment. Enrollment is not guaranteed.

Effective Spring 2019, SIS will limit students from registering for more than two waitlists at a time. If a course's waitlist opens, the student will be notified and have 48 hours to add the class. Once a student removes themselves from a waitlist, they will be able to register for an additional waitlist, up to a total of two waitlists at any given time.

Completion of Prerequisites

The prerequisites for each course can be found in the program sections of this catalogue. It is the student's responsibility to check the prerequisites for each course and register appropriately. A student may be administratively dropped from a course if they have not met the stated prerequisite. Students are encouraged to consult with their academic advisors.

Course Load

Full-time course load for a graduate student is nine credit hours per semester.

Students expecting to take three or more courses should consult with their Program Director. Some programs require permission from the academic advisor before enrolling in more than three courses per term.

Ways to Register

- Online at sis.jhu.edu (https://sis.jhu.edu/)
- Online add/drop form
- Hand-deliver paper registration form to AAP at any of the three locations
- Submit via the SEAM online form (https://support.sis.jhu.edu/case/)

Each semester, the course schedule (https://sis.jhu.edu/classes/) is posted. The course schedule is available only online, and students are encouraged to enroll early for best selection.

Registering for Courses in Other JHU Programs

With advisor approval, AAP students may take up to two comparable courses and apply these courses from other JHU programs toward their master's degree or certificate.

Interprogram Courses

AAP students wishing to count a course outside their program toward their degree need to obtain advisor permission, unless the course is cross-listed in the course schedule or otherwise listed as part of shared concentrations. To obtain advisor approval, students must forward to their advisor a written request that includes documentation of course description and any other information that may be helpful in assessing the course's applicability to a student's program. The student's advisor or academic program director then determines if the requested course is appropriate and whether the student is eligible to take it.

Interdivisional Registration for AAP Students

AAP students who wish to take a course at another Johns Hopkins school/division must submit a request to the AAP Registration Office using the online add/drop form or a paper add/drop form. To ensure that there is time for review and approval from other divisions within Johns Hopkins, the request must be received in the AAP Registration Office no later than two weeks before the first day of class. Advisor approval is required to allow non-AAP courses to count toward the AAP degree (excluding curricula that require courses from other JHU divisions). To obtain advisor approval, students must forward to their advisor a written request that includes documentation of the course description, number of credits, and any other information that may be helpful in assessing the course's applicability to a student's program. The student's advisor then determines if the requested course is appropriate and whether the student is eligible to take it.

Interdivisional Registration for Non-AAP Students

Non-AAP students in other divisions of Johns Hopkins may take up to two courses in AAP, if permitted by their home division, and with permission of the AAP program director or Associate Dean. Non-AAP students must complete the necessary paperwork and/or procedures required by their home school/division. Interdivisional requests are processed by the AAP Registration Office during late registration on a space-available basis, to allow AAP students first eligibility into courses. Interdivisional registration is not guaranteed. School of Medicine students should contact the AAP registration manager for assistance with interdivisional registration.

International and Off-Site Courses

Some AAP programs may offer courses at an international location or at a site that is not on the Johns Hopkins University premises. These courses may have different registration deadline requirements and refund schedules, as well as additional registration paperwork and fees. Students should check the website and SIS messaging carefully for these differences.

Late Registration

Registration is open for approximately two months prior to the start of a semester/term. The Late Registration period is defined as the seven days prior to the start of classes and requires a $150 fee. Late registration does not apply for new students who were accepted for that term. Check the Academic and Registration Calendar for late registration deadlines. Students registering late should check the refund schedule.

Add / Drop

Students wishing to add or drop a course can use the online add/drop form (https://advanced.jhu.edu/forms/). Deadlines for completing this process are featured in the academic calendar.

Faculty members cannot initiate, complete, or process add/ drop changes.

Auditing a Course

Auditors receive no credit for the course, and a grade of "AU" is placed on their official transcript. There is no reduction in fees or tuition when auditing a course. Prior to registering as auditors, students must document with the instructor what tasks are required to earn the audit. Note that not all courses are suitable for audit and requests to audit may not be approved. Students may request an audit by consulting with their instructor and advisor and receiving subsequent approval from the instructor. Students can only change from credit to audit in a course prior to the withdrawal deadline, and if they do not uphold the agreed-upon tasks associated with the audit, the course should revert to a withdrawal on the student's transcript.

Auditors cannot change their status to credit-seeking after the start of the semester. Degree-seeking students should note that choosing to audit a course may have ramifications on other aspects of enrollment, including, but not limited to, financial aid, immigration status, and the maximum number of courses toward degree.

Change of Program

Students who wish to change to another degree program within Advanced Academic Programs must fill out a change of program (COP) request form. Documents required by the new program but not submitted previously must be included with the COP form. Students are not automatically admitted to a new program; their request is reviewed by the appropriate Admissions Committee according to the stipulations of the new program. Any courses taken in one AAP program that are the exact courses in another AAP program will be counted toward the new degree when a student changes programs, provided that the new program's requirements for core and elective are met. There is no charge for change of program. Tuition rates in AAP vary with each academic discipline/program; therefore, changing programs may result in different tuition rates. COP applications may be submitted at any time, but if approved, the student's program information will not be updated until the end of the current semester. Please note: Taking courses outside the program to which you are admitted does not guarantee admission to another program. Average processing times for COP range from six to eight weeks from the date received.

Tuition Payment

In order to complete a registration, a verification of payment method of all tuition and fees is required for each semester at the time of registration. Students will not be not dropped from their courses if payments are not made in full. Subsequently, students remain financially responsible for the tuition and fees associated with each course.

AAP students can make payments by check, credit card, employer contract (employer authorization), tuition remission, or financial aid. In all cases, students are not permitted to register if there is a balance due on their account from a previous semester.

Financial Aid

Students who plan to request financial aid (https://finaid.jhu.edu/graduate-aid/)to cover their tuition should submit the appropriate paperwork in ample time before registering. Students must take a minimum of two courses required for their program to be eligible for federal financial aid. Students may also look at alternative loans for single course registration.

The JHU Policy for Satisfactory Academic Progress requires all students to advance in their program with appropriate grades and within the appropriate timeline to continue receiving financial aid. The financial aid code for JHU/AAP is Eoo473. The Financial Aid section in the catalogue provides details regarding satisfactory academic progress required for compliance for financial aid.

Employer Contract

Students whose tuition is paid by employer billing authorization (employer contract) should begin processing requests with their employers well before the start of registration, and send a copy of the employer contract via the SEAM online form (https://support.sis.jhu.edu/case/). Students using an employer contract are financially responsible for any tuition and fees not paid by the employer.

Employer Reimbursement

Students who are requesting employer tuition reimbursement must pay for the course upon receipt of a bill (through SIS) from the Student Accounts Office with their own funds and request reimbursement from the employer at the appropriate time.

JHU Tuition Remission

Students receiving tuition remission benefits from Johns Hopkins University should read the contract carefully. Call the Center for Training and Education at 443-997-6800 to address any questions. Please note that students are financially responsible for dropped courses paid for with tuition remission and any associated fees, if applicable.

Leave of Absence

Students who anticipate that they will not enroll in classes for one semester or more but intend to resume their studies must notify their program of their intention to do so.

Leave of Absence (LOA) is an approved absence from the University during which time students are not charged tuition nor are they required to register for courses. Time spent on LOA is regarded as an approved break in study and is not counted toward the total time-to-degree. Students on LOA will have access to limited advising and career services. Please note, LOA will not be granted to a student who is currently in a required culminating experience (thesis, capstone, independent research project) course or in a culminating course continuation.

If a LOA is granted for a current semester, the current course/s will be automatically withdrawn and will be subject to the refund policy and refund schedule. LOA requests for a current semester must be made prior to the audit / withdrawal deadline.

LOA may impact health benefits, F1 status, and financial supports. F1 students must contact OIS before applying for LOA.

To apply for LOA, students complete a Request for Leave of Absence form if granted LOA, students automatically receive an extension in their time to complete their degree for the same period of time as their leave. All other criteria listed in the Time Limitation Policy remain in place. Students are limited to two years for LOA, taken at one time or in combination during the student's academic career with AAP.

Students who are granted LOA must notify AAP via the SEAM online form before resuming their studies at the end of the allotted leave time. AAP will withdraw students from their programs if they do not resume their studies after a LOA has expired (refer to the Inactive Status Policy for more information).

Inactive Status

Except for those on a leave of absence, students who do not enroll for two semesters will lose their active status. The student is considered to have withdrawn from the program. To resume taking courses in Advanced Academic Programs, students must reapply by submitting a new application form, application fee, and any new application materials required. Reapplying students are subject to the admissions and program requirements in effect at the time of the new application. Acceptance for inactive students is not guaranteed, and courses taken prior to the interruption of studies may not count toward degree requirements. Time limitation still applies; see the Time Limitation policy.

Maximum Number of Courses Beyond Program Degree Requirements

With advisor approval, AAP students may take up to two courses beyond their degree program requirements. To obtain advisor approval, students must forward a written request that includes documentation of the course description and a rationale for taking the course(s). Students are advised that Financial Aid may not cover courses that don't contribute to the completion of a program and should consult with a Financial Aid advisor prior to enrolling in courses beyond program degree requirements. In addition, students should note that the policies on Probation and Dismissal and on Academic Standing and Conduct apply to all courses, including those taken beyond program degree requirements. Students who are interested in taking additional AAP courses after completing their degrees may do so under the Alumni Benefits Policy or may register as a Special Student/Non-Degree Applicant.

Tuition and Fees

Tuition and Fees

Payment

Full course tuition is due upon receipt of a bill (through SIS) from the Student Accounts Office. All fees are nonrefundable. Tuition is refundable only according to the refund schedule. If a student registers for a course but does not attend **or** officially drops/withdraws from a class, the student remains financially responsible for the tuition and fees associated with the course.

Application Fee

The application fee is $75 for all programs. The application fee must be submitted with the application and is not refundable under any circumstances. Johns Hopkins University alumni from any academic program will have their application fee waived. Please contact the Admissions Office to waive your fee.

Tuition

All tuition in the Advanced Academic Programs is determined according to the academic program of study and varies across AAP disciplines. Students will be charged tuition based upon individual courses within the program of study in which they have been admitted. If courses are taken outside of a student's program of study, the student will pay the tuition rate in effect for the program in which the course is taken. Restrictions apply for how many courses may be taken outside of a student's academic program and applied toward the degree (see section regarding registering for courses in other programs in AAP and outside of AAP).

Course Fees

In addition to tuition, some courses require field trip, laboratory, technology, material, or other related fees. These fees, specified in the course schedule (https://sis.jhu.edu/classes/) for each term, are payable at the same time as the regular tuition charges and are nonrefundable.

Technology Fee

All fully online and blended courses in AAP require an additional technology fee. This fee applies to all students registered in online classes, and it is not refundable.

Withdrawal from Academic Program

Students who elect to discontinue their program of study must formally withdraw from the program in writing by submitting the document via the SEAM online form (https://support.sis.jhu.edu/case/). Once students formally withdraw from their program, they are no longer considered students at AAP and can no longer receive services including, but not limited to, library access, health insurance coverage, or career services. Inactive students are considered Withdrawn.

Continuation Courses

Students who are in a required thesis/capstone/graduate project/culminating experience course and do not finish in the semester in which they enrolled for it must pay a continuation fee of $500 for each subsequent term (including summer) until a final grade has been submitted. The continuation course is relevant only for students currently in the process of completing a required thesis/capstone/graduate project/culminating experience and who need more time to finish and are not eligible for an Incomplete. The continuation has a course number in the AAP schedule of classes and must be registered for through SIS. A continuation course is a non-credit extension of an existing course and does not count toward the total number of courses a student may take in their program. A student registered in a continuation course will receive an "in progress" (IP) grade in their original course. Changing an IP grade to a final grade (A through F, Pass) is acceptable at any time before the student's departure from the university, and requires the instructor's approval. Once the IP is resolved for the original course, the continuation course will be listed as "no grade" (NG) on the student's transcript. Students in continuation are subject to the Time Limitation policy. Students may register for continuation for up to two consecutive semesters. Students may submit an appeal for one additional semester of continuation in exceptional circumstances. If the student has not enrolled in the continuation course on or before the add/drop deadline in the subsequent semester, they will be automatically dismissed from the program.

Graduation Fee

The graduation fee is $100, payable upon receipt of a bill (through your JHU email account) from the Student Accounts Office. Student Accounts sends this bill upon submission of the application to graduate. Billing schedule is subject to change without advanced notice. However, any student who graduates must pay the $100 graduation fee.

Refund Policy

Refunds are made in accordance with the refund schedule. The refund schedule is updated on the website for each semester/term. All registered students are subject to the refund schedule, regardless of attendance. Refunds will be based on the date the request to drop the course is received by the Advanced Academic Programs Registration Office. Refunds are not granted to students suspended or dismissed for disciplinary reasons. On-site courses (e.g., international or regional) may be subject to a separate refund policy. Courses offered by other JHU divisions are subject to that division's refund schedule.

Appeal Process

In the case of rare or exceptional personal medical situations or personal military requirements, a student may request to appeal the standard AAP refund schedule/policy. Refund policy appeals must be submitted in writing (and received) by the Advanced Academic Programs Registration Office no later than the last day of classes of the next semester/term. All supporting documentation and/or a thorough written explanation for the appeal must be included. In cases of rare or exceptional medical situations, supporting documentation should be limited to a letter from the appropriate medical professional, detailing the dates of care and the fitness for the student to attend class during that time. The appeal will be reviewed by the associate dean of AAP. Review times may vary depending upon the complexity of the appeal. Average review times for appeals range from four to six weeks from the date received. All decisions are final.

Refund Schedule

Drop Date	Refund
Prior to the first day of class	dropped at 100 percent
First week of class and prior to the second week of class	dropped at 90 percent
Second week of class and prior to the third week of class	dropped at 75 percent
Third week of class and prior to the fourth week of class	dropped at 50 percent
Beginning the fourth week of classes, courses will be withdrawn (W appears on transcript)	no refund

Some AAP programs may offer courses at an international location or at a site that is not on the Johns Hopkins University premises. These courses may have different registration deadline requirements and refund schedules, as well as additional registration paperwork and fees. Students should check the website and SIS messaging carefully for these differences.

Programs

Applied Economics, Master of Science

MS in Applied Economics

applied-economics.jhu.edu (https://advanced.jhu.edu/academics/graduate/ms-applied-economics/)

Economic analysis is no longer relegated to academicians and a small number of PhD-trained specialists. Instead, economics has become an increasingly ubiquitous and rapidly changing line of inquiry that requires people who are skilled in analyzing and interpreting economic data, and then using it to effect decisions about national and global markets and policy involving everything from health care to fiscal policy, from foreign aid to the environment, and from financial risk to real risk.

The Master of Science in Applied Economics develops skills in economic reasoning and in constructing and estimating economic models through the use of econometrics and other quantitative techniques. This is accomplished by a rigorous and demanding curriculum and a talented and dedicated staff of instructors. This is a 10-course degree program, with classes offered in the evenings at the Washington, DC Center of the Johns Hopkins University (near Dupont Circle) and online. The degree can be pursued at a part-time or a full-time pace, on-site or online, or in both modes. All undergraduate majors are welcome.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Science in Applied Economics also requires:

- One semester of introductory microeconomics, passed with at least a B
- One semester of introductory macroeconomics, passed with at least a B
- One semester of undergraduate calculus or equivalent, passed with at least a B
- A grade in a higher level course trumps a grade in a lower level course. A B grade or higher upon repeat is not acceptable.

Prerequisite Math Requirement

Those entering with only a single calculus course must take in their first semester AS.440.304 Math Methods for Economists, a three undergraduate credit, full-length course, at half tuition. The course does not count toward the degree. In order to waive the Math Methods for Economists course, evidence of multivariable calculus is required.

Program Requirements

Ten courses are required to complete the Master of Science in Applied Economics: four core required courses, one core customizable, and five additional elective courses.

Code	Title	Credits
Core Courses - Required:		
All four courses are required		12
AS.440.601	Microeconomic Theory	
AS.440.602	Macroeconomic Theory	
AS.440.605	Statistics	
AS.440.606	Econometrics	
Core Courses - Customizable:		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
Electives		
Select five of the following:		15
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.625	Machine Learning in Statistics	
AS.440.629	Survey Research Methods	
AS.440.630	Monetary Economics	
AS.440.631	Finance and the Macroeconomy	
AS.440.632	Topics in Macroeconomics and Finance	
AS.440.634	Economic Growth	
AS.440.639	International Finance (Open Economy Macro)	
AS.440.640	Financial Economics	
AS.440.641	Financial Intermediation & Financial Markets	
AS.440.643	Economics of Investments and Financial Management	
AS.440.645	Behavioral Economics & Finance	
AS.440.646	Economics of Derivatives	
AS.440.650	Environmental & Resource Economics	
AS.440.653	Economics of the Labor Market	
AS.440.656	Political Economy	
AS.440.658	Industrial Organization	
AS.440.659	Law and Economics	
AS.440.661	Public Economics	
AS.440.663	Development Microeconomics	
AS.440.665	International Trade (Open Economy Micro)	
AS.440.666	Regional Economics	
AS.440.667	Urban Economics	
AS.440.672	Economics of Health Care	
AS.440.684	Game Theory	
Total Credits		**30**

Concentration in Financial Economics

You may choose to declare a formal concentration in Financial Economics as part of your MS in Applied Economics degree program. Successful completion of the requirements outlined below will allow this concentration to be noted on your transcript.

Code	Title	Credits
Core Courses - Required:		
All five courses are required		15
AS.440.601	Microeconomic Theory	
AS.440.602	Macroeconomic Theory	
AS.440.605	Statistics	
AS.440.606	Econometrics	
AS.440.640	Financial Economics	
Core Courses - Customizable:		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
Electives		12
Select four of the following:		
Financial Economics Electives		
Select between two and four courses to fulfill this requirement.		
*If you chose "Financial Econometrics" as your Advanced Time-Series Econometrics Course, you may not double-count "Financial Econometrics" as one of your elective courses, but need only select between one and four courses to fulfill this requirement.		
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.641	Financial Intermediation & Financial Markets	
AS.440.643	Economics of Investments and Financial Management	
AS.440.645	Behavioral Economics & Finance	
AS.440.646	Economics of Derivatives	
Complementary Macro and Quantitative Electives		
Choose no more than two of these courses to satisfy this concentration's requirements. Please note, you may not double-count your selected Advanced Time-Series Econometrics Course as one of your elective courses.		
*If you chose "Financial Econometrics" as your Advanced Time-Series Econometrics Course, you may choose up to three courses to satisfy this concentration's requirements.		
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.625	Machine Learning in Statistics	
AS.440.630	Monetary Economics	
AS.440.631	Finance and the Macroeconomy	
AS.440.632	Topics in Macroeconomics and Finance	
AS.440.634	Economic Growth	
AS.440.639	International Finance (Open Economy Macro)	
AS.440.653	Economics of the Labor Market	
Other Electives		
Choose no more than one of these courses to satisfy this concentration's requirements.		
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.629	Survey Research Methods	
AS.440.650	Environmental & Resource Economics	
AS.440.656	Political Economy	
AS.440.658	Industrial Organization	
AS.440.659	Law and Economics	
AS.440.661	Public Economics	
AS.440.663	Development Microeconomics	
AS.440.665	International Trade (Open Economy Micro)	
AS.440.666	Regional Economics	
AS.440.667	Urban Economics	
AS.440.672	Economics of Health Care	
AS.440.684	Game Theory	
Total Credits		**30**

Optional Thesis (AS.440.692)

Students may undertake their own research project as an 11th program course for three additional credits at full tuition. Prior to proposing a project, interested students must have clearly identified a research topic, and submit a formal proposal for review and approval to the Thesis Research Committee, to be received no later than two months prior to the beginning of the term in which the student plans to enroll in the course. The proposal must follow the Applied Economics Thesis Guidelines, which can be obtained by contacting the Program Director.

The committee will help identify a mentor who is familiar with their prospective inquiry, and is willing to provide guidance and oversee the project. The mentor must be faculty teaching at the Johns Hopkins University, but the availability of a mentor cannot be guaranteed. Students must meet with the mentor periodically for discussion of the project's progress, on-site or on-line, and must complete a research paper, to be approved by the mentor and the Committee.

Enrollment of the student is undertaken by the Program Director.

Prerequisites: All four Core courses and Microeconometrics or Macroeconometrics, and one or more Applied Economics courses in the substantive area of the proposed research, plus a strong academic record (at least B+ average) in at least eight program courses, are absolute minima.

Applied Economics, MS/ Investment Certificate

MS in Applied Economics and Certificate in Investments

To allow students to better exploit the strong complementary nature between finance and economics, Carey Business School and the Applied Economics Program have eliminated the overlap between the MS in Applied Economics and the Graduate Certificate in Investments. This enables students to earn both the MS degree and a graduate certificate for a total of 15 courses, eight at Applied Economics and seven at Carey.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Applied Economics also requires:

- One semester of introductory microeconomics, passed with at least a B
- One semester of introductory macroeconomics, passed with at least a B
- One semester of undergraduate calculus or equivalent, passed with at least a B
- A grade in a higher level course trumps a grade in a lower level course. A B grade or higher upon repeat is not acceptable.

PREREQUISITE MATH REQUIREMENT

Those entering with only a single calculus course must take in their first semester AS.440.304 Math Methods for Economists, a three undergraduate credit, full-length course, at half tuition. The course does not count toward the degree. In order to waive the Math Methods for Economists course, evidence of multivariable calculus is required.

Program Requirements

15 courses are required - 8 Applied Economics courses and 7 courses for the Certificate.

Code	Title	Credits
MS Applied Economics		
Core Courses - Required:		
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
AS.440.640	Financial Economics	3
Core Courses - Customizable		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
Electives		
Select two of the following:		6
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.625	Machine Learning in Statistics	
AS.440.629	Survey Research Methods	
AS.440.630	Monetary Economics	
AS.440.631	Finance and the Macroeconomy	
AS.440.632	Topics in Macroeconomics and Finance	
AS.440.634	Economic Growth	
AS.440.639	International Finance (Open Economy Macro)	
AS.440.641	Financial Intermediation & Financial Markets	
AS.440.643	Economics of Investments and Financial Management	
AS.440.645	Behavioral Economics & Finance	
AS.440.646	Economics of Derivatives	
AS.440.650	Environmental & Resource Economics	
AS.440.653	Economics of the Labor Market	
AS.440.656	Political Economy	
AS.440.658	Industrial Organization	
AS.440.659	Law and Economics	
AS.440.661	Public Economics	
AS.440.663	Development Microeconomics	
AS.440.665	International Trade (Open Economy Micro)	
AS.440.666	Regional Economics	
AS.440.667	Urban Economics	
AS.440.672	Economics of Health Care	
AS.440.684	Game Theory	
Total Credits		**24**

Code	Title	Credits
Certificate in Investments		
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.231.620	Corporate Finance	2
BU.232.710	Derivatives	2
BU.232.720	Fixed Income	2
BU.232.701	Investments	2
Electives		
Select two of the following:		4
BU.210.650	Financial Statement Analysis	
BU.230.620	Financial Modeling and Valuation	
BU.230.730	Managing Financial Risk	
BU.230.750	Financial Crises and Contagion	
BU.231.710	Financial Institutions	
BU.231.720	Corporate Governance	
BU.231.740	Mergers and Acquisitions	
BU.231.790	Advanced Corporate Finance	
BU.232.725	Emerging Markets	
BU.232.730	Wealth Management	
BU.232.750	Advanced Portfolio Management	
BU.232.770	Cryptos and Blockchain	
BU.232.790	Advanced Hedge Fund Strategies	
BU.233.730	Entrepreneurial Finance	
BU.510.650	Data Analytics	
BU.520.710	Big Data Machine Learning	

Applied Economics, MS/Financial Management Certificate

MS in Applied Economics and Certificate in Financial Management

To allow students to better exploit the strong complementary nature between finance and economics, Carey Business School and the Applied Economics Program have eliminated the overlap between the MS in Applied Economics and the Graduate Certificate in Financial Management. This enables students to earn both the MS degree and a graduate certificate for a total of 15 courses, eight at Applied Economics and seven at Carey.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Applied Economics also requires:

- One semester of introductory microeconomics, passed with at least a B
- One semester of introductory macroeconomics, passed with at least a B
- One semester of undergraduate calculus or equivalent, passed with at least a B
- A grade in a higher level course trumps a grade in a lower level course. A B grade or higher upon repeat is not acceptable.

PREREQUISITE MATH REQUIREMENT

Those entering with only a single calculus course must take in their first semester AS.440.304 Math Methods for Economists, a three undergraduate credit, full-length course, at half tuition. The course does not count toward the degree. In order to waive the Math Methods for Economists course, evidence of multivariable calculus is required.

Program Requirements

15 courses are required - 8 Applied Economics courses and 7 courses for the Certificate.

Code	Title	Credits
MS Applied Economics		
Core Courses - Required:		
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
AS.440.640	Financial Economics	3
Core Courses - Customizable		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
Electives		
Select two of the following:		6
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.625	Machine Learning in Statistics	
AS.440.629	Survey Research Methods	
AS.440.630	Monetary Economics	
AS.440.631	Finance and the Macroeconomy	
AS.440.632	Topics in Macroeconomics and Finance	
AS.440.634	Economic Growth	
AS.440.639	International Finance (Open Economy Macro)	
AS.440.641	Financial Intermediation & Financial Markets	
AS.440.643	Economics of Investments and Financial Management	
AS.440.645	Behavioral Economics & Finance	
AS.440.646	Economics of Derivatives	
AS.440.650	Environmental & Resource Economics	
AS.440.653	Economics of the Labor Market	
AS.440.656	Political Economy	
AS.440.658	Industrial Organization	
AS.440.659	Law and Economics	
AS.440.661	Public Economics	
AS.440.663	Development Microeconomics	
AS.440.665	International Trade (Open Economy Micro)	
AS.440.666	Regional Economics	
AS.440.667	Urban Economics	
AS.440.672	Economics of Health Care	
AS.440.684	Game Theory	

Code	Title	Credits
Certificate in Financial Management		
Required Courses		
BU.210.620	Accounting and Financial Reporting	2
BU.230.620	Financial Modeling and Valuation	2
BU.231.620	Corporate Finance	2
BU.231.720	Corporate Governance	2
BU.232.701	Investments	2
Electives		
Select two of the following:		4
BU.210.650	Financial Statement Analysis	
BU.210.680	Cost Measurement and Control	
BU.230.730	Managing Financial Risk	
BU.230.750	Financial Crises and Contagion	
BU.231.710	Financial Institutions	
BU.231.740	Mergers and Acquisitions	
BU.231.790	Advanced Corporate Finance	
BU.232.650	Continuous Time Finance	

BU.232.710	Derivatives
BU.232.720	Fixed Income
BU.232.725	Emerging Markets
BU.232.730	Wealth Management
BU.232.750	Advanced Portfolio Management
BU.232.770	Cryptos and Blockchain
BU.232.790	Advanced Hedge Fund Strategies
BU.233.730	Entrepreneurial Finance
BU.510.650	Data Analytics
BU.520.710	Big Data Machine Learning

Applied Economics, MS/MBA

Applied Economics, MS/MBA

To allow students to better exploit the strong complementary nature between business and economics, Carey Business School and the Applied Economics Program have eliminated the overlap between the MS in Applied Economics and the MBA. This enables students to earn both the MS degree and the MBA in fewer courses than if pursued separately.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Applied Economics also requires:

- One semester of introductory microeconomics, passed with at least a B
- One semester of introductory macroeconomics, passed with at least a B
- One semester of undergraduate calculus or equivalent, passed with at least a B
- A grade in a higher level course trumps a grade in a lower level course. A B grade or higher upon repeat is not acceptable.

PREREQUISITE MATH REQUIREMENT

Those entering with only a single calculus course must take in their first semester AS.440.304 Math Methods for Economists, a three undergraduate credit, full-length course, at half tuition. The course does not count toward the degree. In order to waive the Math Methods for Economists course, evidence of multivariable calculus is required.

Program Requirements

29 courses are required - 8 Applied Economics courses and 21 MBA courses.

Dual degree recipients receive both diplomas upon completion of both programs.

Code	Title	Credits
MS Applied Economics		
Core Courses - Required:		
AS.440.601	Microeconomic Theory	3
AS.440.602	Macroeconomic Theory	3
AS.440.605	Statistics	3
AS.440.606	Econometrics	3
Core Courses - Customizable		
Select one of the following:		3
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
Electives		
Select three of the following:		9
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.625	Machine Learning in Statistics	
AS.440.629	Survey Research Methods	
AS.440.630	Monetary Economics	
AS.440.631	Finance and the Macroeconomy	
AS.440.632	Topics in Macroeconomics and Finance	
AS.440.634	Economic Growth	
AS.440.639	International Finance (Open Economy Macro)	
AS.440.640	Financial Economics	
AS.440.641	Financial Intermediation & Financial Markets	
AS.440.643	Economics of Investments and Financial Management	
AS.440.645	Behavioral Economics & Finance	
AS.440.646	Economics of Derivatives	
AS.440.650	Environmental & Resource Economics	
AS.440.653	Economics of the Labor Market	
AS.440.656	Political Economy	
AS.440.658	Industrial Organization	
AS.440.659	Law and Economics	
AS.440.661	Public Economics	
AS.440.663	Development Microeconomics	
AS.440.665	International Trade (Open Economy Micro)	
AS.440.666	Regional Economics	
AS.440.667	Urban Economics	
AS.440.672	Economics of Health Care	
AS.440.684	Game Theory	
Total Credits		**24**

Code	Title	Credits
MBA		
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2

BU.142.601	Leadership and Organizational Behavior (Ethics & Leadership & Organizations)	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management (Strategic Management)	2
Electives:		
Select eleven two-credit courses. Students may elect one or more focus areas in the following areas: Business Analytics & Risk Management, Digital Marketing, Entrepreneurial Marketing, Entrepreneurship, Innovation & Technology, Financial Management, Health Care Management, Innovation & Technology, Investments, or Public & Private Sector Leadership.		22
Total Credits		**42**

Center for Advanced Governmental Studies

Center for Advanced Governmental Studies

advanced.jhu.edu/govstudies (https://advanced.jhu.edu/academics/centers/center-for-advanced-governmental-studies/)

The Johns Hopkins University Center for Advanced Governmental Studies (CAGS) encompasses a set of graduate programs designed to build knowledge and skills to prepare our students to be leaders in the government, including security and intelligence, and in the nonprofit or private sectors as well. In addition, CAGS is involved in a number of government and private sector partnerships. The overall mission of all the Center's programs and initiatives is to provide a strong foundation of knowledge upon which innovative policy programs and promising leaders can develop.

Based at the Johns Hopkins University Washington, DC center in Dupont Circle, CAGS is a vibrant learning environment both for our onsite and online graduate programs and also as a forum for policy discussions which are usually offered onsite and virtually as well. The Center provides a venue for unbiased, nonpartisan efforts to expand knowledge of the U.S. government and the policymaking process and apply analytical tools to assess the impacts of governmental action. Both training in and assessment of the best management practices in the nonprofit and private sectors as well as in the government are also a focus of CAGS programs.

Graduate Degrees and Certificates

The graduate degree programs of the Center bring together theory and practice in the study of government and its impacts domestically and abroad while preparing individuals for leadership positions in the public and private sectors. At CAGS, students use their graduate education to better inform their professional work and find that their practical work experience often augments their graduate studies. While our degree programs are designed as part-time studies, students have the option of accelerating their course of study by attending at a full-time pace.

The Center is comprised of seven (7) master's degrees and three (3) certificate programs. These are: MS in Data Analytics and Policy, MS in Geospatial Intelligence, MA in Global Security Studies, MA in Government, MS in Intelligence Analysis, MA in Non-Profit Management, and MA in Public Management; and Certificate in Data Analytics and Policy, Certificate in Intelligence, and Certificate in Nonprofit Management.

In addition, students have various options for combining our master's degrees with our certificates in intelligence, nonprofit management, or government analytics, allowing them to graduate with two credentials after pursuing a concentrated and efficient course of study. These dual degrees and combined programs are: MA in Global Security Studies/Certificate in Intelligence, MA in Government/Certificate in Intelligence, MA in Government/MBA, MS in Government Analytics/Certificate in Intelligence, MA in Public Management/Certificate in Data Analytics and Policy, MA in Public Management/Certificate in Intelligence, and MA in Public Management/Certificate in Nonprofit Management.

Partnerships, Events, and Publications

The Hopkins Center for Advanced Governmental Studies is involved in a number of government and private sector partnerships. We welcome opportunities for collaborations and initiatives that fit within the Center's goals of educational exchange and workshop/training efforts that further the understanding of the roles and functions of government.

CAGS has developed and instituted ongoing leadership exchange programs between U.S. federal executives and their counterparts in China, Germany, and other countries. In addition, the Center frequently hosts special events, policy workshops, and summits with embassies, government agencies, Washington think tanks, and other organizations. Periodically, white papers are published by the Center on topics that can help inform current policy debates. CAGS full-time faculty are actively engaged in their academic fields, as are the practitioner-scholars who comprise our adjunct faculty, and each year collectively publish numerous books, articles, and other works.

International Study

The Center offers degree-seeking students frequent opportunities for intensive international study. The basic format is several intensive course meetings and readings with JHU professors before the students leave; spending one week to 10 days abroad with classes about 4.5 hours a day and field trips, site visits, or other exercises, and a research project or major paper due after students return. Past courses have included The Birth of Modern Democracy" (Scotland and France), "China's Place in the 21st Century," "Command and Leadership in Modern War: Operation Overlord," (United Kingdom and France); Politics, Security and Culture in Israel; Politics, Security and Culture in India; Environmental Governance, Climate Change and Energy Security in Europe and America (Belgium and Germany); Policymaking in the U.S. and Latin America: Perceptions and Misconceptions (Mexico); and Sustainable Cities in France and Germany: Lessons for the United States (Germany and France); European Security: Russian Challenge, Western Response (Belgium, Ukraine, and Estonia); and Nature Conservation and Sustainability in Cuba.

Data Analytics and Policy, Master of Science

MS in Data Analytics and Policy

advanced.jhu.edu/dataanalyticsandpolicy (https://advanced.jhu.edu/academics/graduate/ms-data-analytics-policy/)

The Master of Science in Data Analytics and Policy prepares students to use analytics to tackle policy challenges in the public and private sectors. Students graduate with expertise in cutting-edge analytical methods relied upon by government agencies, research institutes, private companies, and non-profit organizations. The program emphasizes the application of analytics to substantive issues to develop students into data-driven leaders.

The schedule for completing this 12-course degree program is flexible. Many students work full-time while attending the program on a part-time basis and complete their degree in two years. Full-time students can complete the degree in one year. The MS in Data Analytics and Policy is offered primarily online, though some electives are offered at the Johns Hopkins Washington, DC Center each term.

Students may choose to earn a concentration within one of the following specialized areas: political behavior and policy analysis, geospatial analysis, statistical analysis, or public management. The electives cover a wide range of analytical methods, including machine learning, predictive analysis, text analysis, database management systems, computational modeling, civic technology, economic analysis, survey methodology, risk analysis, and data privacy.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Data Analytics and Policy requires:

- Statement of purpose (two pages double-spaced): Explain your reasons for seeking admission and how you will use the degree to advance your career. Your statement should also address your ability or potential to perform quantitative analyses.
- Writing sample (5-7 pages double-spaced). The writing sample should demonstrate your ability to make and support an argument. It does not need to be quantitative.

Program Requirements

- Five required core courses
- Seven elective courses

Code	Title	Credits
Core Courses - Required		
AS.470.681	Probability and Statistics	3
AS.470.768	Programming and Data Management	3
AS.470.709	Quantitative Methods	3
AS.470.673	Data Visualization	3
AS.470.862	Capstone for Data Analytics and Policy	3
Electives		**21**
Total Credits		**36**

Concentrations

There are four concentrations offered through the MS in Data Analytics and Policy. Pursuing a concentration is optional. To earn a concentration, four of the student's electives must be in the concentration area.

Concentration in Statistical Analysis

Code	Title	Credits
AS.470.624	Healthcare Analytics and Policy	3
AS.470.643	Text as Data	3
AS.470.667	Machine Learning and Neural Networks	3
AS.470.699	Applied Performance Analytics	3
AS.470.700	Cloud Computing in the Public Sector	3
AS.470.703	Urban Data Analytics	3
AS.470.708	Unleashing Open Data with Python	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.743	Data Mining and Predictive Analytics	3
AS.470.758	Data-Driven Campaigns and Elections	3
AS.470.763	Database Management Systems	3
AS.470.764	Survey Methodology	3
AS.470.769	Data Science for Public Policy	3
AS.470.772	Practical Applications of Artificial Intelligence	3
AS.470.779	Computational Modeling for Policy and Security Analysis	3
AS.470.835	DC Lab: Politics, Policy, and Analytics	3
AS.420.677	Spatial Statistics (Not available as a general elective outside of the concentration)	3

Concentration in Public Management

Code	Title	Credits
AS.470.605	Global Political Economy	3
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.627	Financial Management & Analysis in the Public Sector	3
AS.470.631	Economics for Public Decision-Making	3
AS.470.645	The Budgetary Process	3
AS.470.671	Risk Management Analytics	3
AS.470.694	Big Data Management Systems	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.763	Database Management Systems	3
AS.470.798	Financial Management and Analysis in Nonprofits	3

Concentration in political Behavior and Policy Analysis

Code	Title	Credits
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.620	Race, Politics, and Policy (Not available as a general elective outside of the concentration)	3
AS.470.624	Healthcare Analytics and Policy	3
AS.470.636	Cognitive and Behavioral Foundations for Artificial Intelligence	3
AS.470.688	Political Institutions and the Policy Process (Not available as a general elective outside of the concentration)	3
AS.470.699	Applied Performance Analytics	3
AS.470.703	Urban Data Analytics	3
AS.470.733	Origins and Influence of Public Opinion on American Democracy and Elections	3
AS.470.736	Methods of Policy Analytics	3
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.470.758	Data-Driven Campaigns and Elections	3
AS.470.769	Data Science for Public Policy	3
AS.470.779	Computational Modeling for Policy and Security Analysis	3
AS.470.835	DC Lab: Politics, Policy, and Analytics	3
AS.473.602	Intelligence Analysis	3

Concentration in Geospatial Analysis

Code	Title	Credits
AS.472.611	Analyzing Social Media and Geospatial Information	3
AS.472.612	Geospatial Analysis: Communicating with Multiple Audiences	3
AS.430.600	Web GIS	4
AS.430.601	Geographic Information Systems (GIS)	4
AS.430.603	Geospatial Statistics	4
AS.430.604	Spatial Analytics	4
AS.430.606	Programming in GIS	4
AS.430.602	Remote Sensing: Systems and Applications (Not available as a general elective outside of the concentration)	4
AS.430.605	Development and Management of GIS Projects (Not available as a general elective outside of the concentration)	4
AS.430.607	Spatial Databases and Data Interoperability (Not available as a general elective outside of the concentration)	4
AS.430.608	GIS and Spatial Decision Support Systems (Not available as a general elective outside of the concentration)	4
AS.430.609	Spatial Data Management: Quality and Control (Not available as a general elective outside of the concentration)	4
AS.430.610	GIS for Infrastructure Management (Not available as a general elective outside of the concentration)	4
AS.430.611	Geospatial Ontologies and Semantics (Not available as a general elective outside of the concentration)	4
AS.430.612	Cartographic Design and Visualization (Not available as a general elective outside of the concentration)	4
AS.430.613	Advanced Topics in Remote Sensing (Not available as a general elective outside of the concentration)	4
AS.430.615	Big Data Analytics: Tools and Techniques (Not available as a general elective outside of the concentration)	4
AS.430.617	Census Data Mining: Visualization and Analytics (Not available as a general elective outside of the concentration)	4
AS.430.618	Advanced Python Scripting for GIS (Not available as a general elective outside of the concentration)	4
AS.430.619	Web Application Development (Not available as a general elective outside of the concentration)	4
AS.430.621	GIS for Emergency Management (Not available as a general elective outside of the concentration)	4
AS.430.623	Geo Apps (Not available as a general elective outside of the concentration)	4
AS.430.625	System Architecture for Enterprise GIS (Not available as a general elective outside of the concentration)	4
AS.430.627	Artificial Intelligence and Machine Learning in Geospatial Technology (Not available as a general elective outside of the concentration)	4
AS.430.629	Drones in Geospatial Decision Making (Not available as a general elective outside of the concentration)	4
AS.430.631	Spatial Algorithms and Data Structures (Not available as a general elective outside of the concentration)	4
AS.430.633	Advanced Spatio-Temporal Statistics (Not available as a general elective outside of the concentration)	4
AS.430.635	Urban Analytics (Not available as a general elective outside of the concentration)	4

Data Analytics and Policy, MS/ Intelligence, Certificate

Students pursuing an MS in Data Analytics and Policy may obtain an additional credential by completing courses that lead to the Certificate in Intelligence. This combined credential prepares graduates for careers in the U.S. Intelligence Community and in those parts of the government and private sector that use intelligence or work with the Intelligence Community, as well as other parts of the national security community. Students can complete the program with 15 courses.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the Master of Science in Data Analytics and Policy requires:

- Statement of purpose (two pages double-spaced): Explain your reasons for seeking admission and how you will use the degree to advance your career. Your statement should also address your ability or potential to perform quantitative analyses.
- Writing sample (5-7 pages double-spaced). The writing sample should demonstrate your ability to make and support an argument. It does not need to be quantitative.
- Current resume.

Program Requirements

Students pursuing an MS in Data Analytics and Policy may obtain an additional credential by completing a sequence of courses offered by the Certificate in Intelligence. This combined credential requires students to complete 15 courses (in lieu of 17 to complete both degrees separately). Students are required to take the following courses:

Data Analytics and Policy Courses

Code	Title	Credits
Core Course - Required:		
AS.470.681	Probability and Statistics	3
AS.470.768	Programming and Data Management	3
AS.470.709	Quantitative Methods	3
AS.470.673	Data Visualization	3
AS.470.862	Capstone for Data Analytics and Policy	3

Five Elective Data Analytics and Policy Courses

Students will complete five elective courses for the MS in Data Analytics and Policy.

Concentrations

There are four concentrations offered through the MS in Data Analytics and Policy. Pursuing a concentration is optional. To earn a concentration, four of the student's electives must be in the concentration area.

All concentration electives can qualify as a general elective unless otherwise noted.

Concentration in Statistical Analysis

Code	Title	Credits
AS.470.624	Healthcare Analytics and Policy	3
AS.470.643	Text as Data	3
AS.470.667	Machine Learning and Neural Networks	3
AS.470.699	Applied Performance Analytics	3
AS.470.700	Cloud Computing in the Public Sector	3
AS.470.708	Unleashing Open Data with Python	3
AS.470.703	Urban Data Analytics	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.743	Data Mining and Predictive Analytics	3
AS.470.758	Data-Driven Campaigns and Elections	3
AS.470.763	Database Management Systems	3
AS.470.764	Survey Methodology	3
AS.470.769	Data Science for Public Policy	3
AS.470.772	Practical Applications of Artificial Intelligence	3
AS.470.779	Computational Modeling for Policy and Security Analysis	3
AS.470.835	DC Lab: Politics, Policy, and Analytics	3
AS.420.677	Spatial Statistics (Not available as a general elective outside of the concentration)	3

Concentration in Public Management

Code	Title	Credits
AS.470.605	Global Political Economy	3
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.627	Financial Management & Analysis in the Public Sector	3
AS.470.631	Economics for Public Decision-Making	3
AS.470.645	The Budgetary Process	3
AS.470.671	Risk Management Analytics	3
AS.470.694	Big Data Management Systems	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.763	Database Management Systems	3
AS.470.798	Financial Management and Analysis in Nonprofits	3

ConcentrAtion in political Behavior and Policy Analysis

Code	Title	Credits
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.620	Race, Politics, and Policy	3
AS.470.624	Healthcare Analytics and Policy	3
AS.470.636	Cognitive and Behavioral Foundations for Artificial Intelligence	3
AS.470.688	Political Institutions and the Policy Process (Not available as a general elective outside of the concentration)	3
AS.470.699	Applied Performance Analytics	3
AS.470.703	Urban Data Analytics	3
AS.470.733	Origins and Influence of Public Opinion on American Democracy and Elections	3
AS.470.736	Methods of Policy Analytics	3
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.470.758	Data-Driven Campaigns and Elections	3
AS.470.769	Data Science for Public Policy	3
AS.470.779	Computational Modeling for Policy and Security Analysis	3
AS.470.835	DC Lab: Politics, Policy, and Analytics	3
AS.473.602	Intelligence Analysis	3

Concentration in Geospatial Analysis

Code	Title	Credits
AS.430.600	Web GIS	4
AS.430.601	Geographic Information Systems (GIS)	4
AS.430.603	Geospatial Statistics	4
AS.430.604	Spatial Analytics	4
AS.430.606	Programming in GIS	4
AS.430.602	Remote Sensing: Systems and Applications (Not available as a general elective outside of the concentration)	4
AS.430.605	Development and Management of GIS Projects (Not available as a general elective outside of the concentration)	4
AS.430.607	Spatial Databases and Data Interoperability (Not available as a general elective outside of the concentration)	4
AS.430.608	GIS and Spatial Decision Support Systems (Not available as a general elective outside of the concentration)	4
AS.430.609	Spatial Data Management: Quality and Control (Not available as a general elective outside of the concentration)	4
AS.430.610	GIS for Infrastructure Management (Not available as a general elective outside of the concentration)	4
AS.430.611	Geospatial Ontologies and Semantics (Not available as a general elective outside of the concentration)	4
AS.430.612	Cartographic Design and Visualization (Not available as a general elective outside of the concentration)	4
AS.430.613	Advanced Topics in Remote Sensing (Not available as a general elective outside of the concentration)	4
AS.430.615	Big Data Analytics: Tools and Techniques (Not available as a general elective outside of the concentration)	4
AS.430.617	Census Data Mining: Visualization and Analytics (Not available as a general elective outside of the concentration)	4
AS.430.618	Advanced Python Scripting for GIS (Not available as a general elective outside of the concentration)	4
AS.430.619	Web Application Development (Not available as a general elective outside of the concentration)	4
AS.430.621	GIS for Emergency Management (Not available as a general elective outside of the concentration)	4

AS.430.623	Geo Apps (Not available as a general elective outside of the concentration)	4
AS.430.625	System Architecture for Enterprise GIS (Not available as a general elective outside of the concentration)	4
AS.430.627	Artificial Intelligence and Machine Learning in Geospatial Technology (Not available as a general elective outside of the concentration)	4
AS.430.629	Drones in Geospatial Decision Making (Not available as a general elective outside of the concentration)	4
AS.430.631	Spatial Algorithms and Data Structures (Not available as a general elective outside of the concentration)	4
AS.430.633	Advanced Spatio-Temporal Statistics (Not available as a general elective outside of the concentration)	4
AS.430.635	Urban Analytics (Not available as a general elective outside of the concentration)	4
AS.472.611	Analyzing Social Media and Geospatial Information	3
AS.472.612	Geospatial Analysis: Communicating with Multiple Audiences	3

Certificate in Intelligence Requirements

Code	Title	Credits
Core Courses - Customizable		
Select one of the following:		
AS.473.600	The Art & Practice of Intelligence	3
AS.473.601	Intelligence: From Secrets to Policy	3
Select one of the following:		
AS.473.606	Legal Issues in Intelligence	3
AS.473.607	Intelligence Ethics	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.795	The Constitution and National Security	3
Select one of the following:		
AS.470.792	Social Science in National Security and Intelligence	3
AS.473.609	Introduction to Intelligence in the Five Eyes Community	3
AS.473.605	Strategic Culture Analysis	3
AS.473.626	Comparative Intelligence Systems	3
Select one of the following:		
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	3
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	3
AS.472.600	Introduction to Geospatial Intelligence	3
AS.472.611	Analyzing Social Media and Geospatial Information	3
AS.473.602	Intelligence Analysis	3
AS.473.642	Assessing Foreign Militaries	3
AS.473.644	Technical Collection of Intelligence	3
AS.473.646	Covert Action and National Security	3
Select one of the following:		
AS.473.668	Intelligence to Secure the Homeland and Hometown	3
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.470.797	Intelligence to Secure the Homeland and Hometown	3
AS.473.660	Intelligence and Counterterrorism	3
Total Credits		*15*

Data Analytics and Policy, Certificate

advanced.jhu.edu/dataanalyticsandpolicycert (https://advanced.jhu.edu/academics/certificates/data-analytics-and-policy/)

The Certificate in Data Analytics and Policy provides students with the knowledge and skill set needed to perform a sophisticated data analysis, draw substantive conclusions, and communicate results for the purpose of improving policy-making and governance. Through the use of cutting-edge tools and skills, students will be able to address contemporary policy challenges in both the public and private sector.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the Certificate in Data Analytics and Policy requires:

- Statement of purpose (two pages double-spaced): Explain your reasons for seeking admission and how you will use the certificate to advance your career. Your statement should also address your ability or potential to perform a quantitative analysis.

Program Requirements

Code	Title	Credits
Core Courses - Required:		
AS.470.681	Probability and Statistics	3
AS.470.709	Quantitative Methods	3
Electives		
Select three from the following list:		*9*
AS.430.600	Web GIS	
AS.430.601	Geographic Information Systems (GIS)	
AS.430.603	Geospatial Statistics	
AS.430.604	Spatial Analytics	
AS.430.606	Programming in GIS	
AS.470.605	Global Political Economy	
AS.470.608	Public Policy Evaluation & the Policy Process	
AS.470.624	Healthcare Analytics and Policy	
AS.470.627	Financial Management & Analysis in the Public Sector	
AS.470.631	Economics for Public Decision-Making	
AS.470.636	Cognitive and Behavioral Foundations for Artificial Intelligence	
AS.470.643	Text as Data	
AS.470.645	The Budgetary Process	
AS.470.667	Machine Learning and Neural Networks	
AS.470.671	Risk Management Analytics	
AS.470.673	Data Visualization	
AS.470.694	Big Data Management Systems	
AS.470.699	Applied Performance Analytics	

AS.470.700	Cloud Computing in the Public Sector	
AS.470.703	Urban Data Analytics	
AS.470.708	Unleashing Open Data with Python	
AS.470.731	Privacy in a Data-driven Society	
AS.470.733	Origins and Influence of Public Opinion on American Democracy and Elections	
AS.470.736	Methods of Policy Analytics	
AS.470.743	Data Mining and Predictive Analytics	
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	
AS.470.758	Data-Driven Campaigns and Elections	
AS.470.763	Database Management Systems	
AS.470.764	Survey Methodology	
AS.470.768	Programming and Data Management	
AS.470.769	Data Science for Public Policy	
AS.470.772	Practical Applications of Artificial Intelligence	
AS.470.779	Computational Modeling for Policy and Security Analysis	
AS.470.798	Financial Management and Analysis in Nonprofits	
AS.470.835	DC Lab: Politics, Policy, and Analytics	
AS.473.602	Intelligence Analysis	
AS.472.611	Analyzing Social Media and Geospatial Information	
AS.472.612	Geospatial Analysis: Communicating with Multiple Audiences	
Total Credits		**15**

Geospatial Intelligence, Master of Science

MS in Geospatial Intelligence

advanced.jhu.edu/geospatialintelligence/ (https://advanced.jhu.edu/academics/graduate/ms-geospatial-intelligence/)

Geospatial intelligence informs and influences policy, military, diplomatic, environmental and disaster relief and recovery decisions, and operations by governments at every level. Increasingly, in non-governmental sectors, it is informing and influencing public health, business, infrastructure, energy, regulatory, and advocacy decisions.

The Geospatial Intelligence Program unites three fields of study: the history of geospatial intelligence; the science and mathematics of digital geography and its related databases; and the art of converting geospatial data into written, spoken, and visual intelligence. Students analyze historical intelligence examples to understand the development of the concepts and practices behind collection, analysis, reporting, and technology. They also will focus on current challenges in the profession, among them the analytics and technology needed for the volume of current and future collection, the challenges of new sensors, and the development of new non-governmental geospatial communities.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Geospatial Intelligence requires:

A four-year degree in a related discipline, such as Geography, GIS, Social Sciences (Political Science, International Relations, Area Studies). For those holding degrees in other disciplines, attention will be given to overall GPA and demonstrated writing ability. The program requires proficiency in mathematical statistics and probability.

A sample of geospatial intelligence

Please compare and contrast the 1860 photograph to a modern Google earth image of the same geography.

Both images show the north end of Boston, Massachusetts. A common reference point is the Old South Church, now called Old South Meeting House which is very near the left hand side at the center of the 1860 balloon view of Boston.

Description and analysis:

Examine the map and the Google earth image to identify and analyze what visibly remains on the Google earth image from the 1860 image. From the two images, point out what you think are the most significant changes and why you think they are significant.

Write up your findings in 2 to 3 pages. Please indicate how you decided what was significant about the changes and similarities you have noted. In the last paragraph, please indicate the next steps you would take if you wanted to learn more about these two images.

Record two measurements, either as you are working or after you are done. Submit the two measurements with your analysis.

How long did you spend examining the images (looking and thinking)

How long did you spend writing up the results (writing and thinking)

The measurements will not be used for any individual performance measurement, only to illustrate an enduring challenge for all geospatial analysis that will be covered throughout the introductory course and the entire program.

PROGRAM REQUIREMENTS

Students complete 12 courses to earn their degree:

- Eight required core courses
- One customizable core course
- Three elective courses

Code	Title	Credits
Core Courses - Required:		
AS.472.600	Introduction to Geospatial Intelligence	3
AS.430.601	Geographic Information Systems (GIS)	4
AS.430.603	Geospatial Statistics	4
AS.430.604	Spatial Analytics	4
AS.473.600	The Art & Practice of Intelligence	3
AS.473.604	Applied Critical Thinking and Analysis	3
AS.430.612	Cartographic Design and Visualization	4
AS.472.613	Geospatial Law and Ethics	3
AS.472.800	Capstone in Geospatial Intelligence	3
Core Courses - Customizable:		**3-4**
Select one of the following:		
AS.473.644	Technical Collection of Intelligence	

AS.430.602	Remote Sensing: Systems and Applications	
Electives		**9-12**
Select three of the following:		
AS.430.600	Web GIS	
AS.430.606	Programming in GIS	
AS.430.608	GIS and Spatial Decision Support Systems	
AS.430.609	Spatial Data Management: Quality and Control	
AS.430.611	Geospatial Ontologies and Semantics	
AS.430.613	Advanced Topics in Remote Sensing	
AS.430.615	Big Data Analytics: Tools and Techniques	
AS.430.618	Advanced Python Scripting for GIS	
AS.430.619	Web Application Development	
AS.430.627	Artificial Intelligence and Machine Learning in Geospatial Technology	
AS.430.629	Drones in Geospatial Decision Making	
AS.430.621	GIS for Emergency Management	
AS.470.601	Climate Change and National Security	
AS.470.667	Machine Learning and Neural Networks	
AS.470.657	Energy, Security, and Defense	
AS.470.752	Intelligence Analysis	
AS.470.697	Intelligence and Counterterrorism	
AS.470.792	Social Science in National Security and Intelligence	
AS.472.610	Commercial Imagery and the Impact of Small Satellites	
AS.472.611	Analyzing Social Media and Geospatial Information	
AS.472.612	Geospatial Analysis: Communicating with Multiple Audiences	
AS.473.601	Intelligence: From Secrets to Policy	
AS.473.607	Intelligence Ethics	

Learning Outcomes

The MS in Geospatial Intelligence weaves the history, science, mathematics, and art of geospatial analysis into a program that will enable its graduates to lead and shape this rapidly-growing intelligence discipline. The program combines recognized faculty with extensive geospatial experience and publications, an interactive and online curriculum, and the research resources, tools, and opportunities for its students to:

- Understand the history and evolution of geospatial intelligence and its enduring challenges.
- Develop the habits of mind and the conceptual framework to thrive as analysts, researchers, program leaders, and managers in the geospatial communities.
- Employ the appropriate mathematical models and scientific sensor knowledge necessary to design advanced commercial geospatial collection management for big data and small data problems, and to design geospatial databases for complex issues,
- Develop analytic processes and products as well as demonstrate the ability to communicate geospatial information and analysis accurately and persuasively in writing and briefing.
- Produce original research on the history and methodologies of geospatial intelligence.

Global Security Studies, Master of Arts

MA in Global Security Studies

globalsecurity.jhu.edu (http://globalsecurity.jhu.edu)

The curriculum of the JHU Master of Arts in Global Security Studies is designed for students who are looking to develop or expand their expertise regarding the security challenges of the 21st century. Students confront the complexities of today's security environment with the latest policy and theoretical tools for analysis and action. Particular strengths of the program are energy and environmental security; irregular warfare; intelligence; cyber and space strategy; and the economic aspects of war.

Courses draw from the best in academia and policy making in order to offer students the cutting edge in intellectual preparedness for career advancement. Classes are designed to maximize individual attention, encourage student contribution, build analytical skills, and provide the tools for engaging in original research.

This is a 12-course program, with classes offered in the evenings at the Washington, DC Center of the Johns Hopkins University (near Dupont Circle) and online. The degree can be pursued at a part-time or a full-time pace, on-site or online, or in both modes. All undergraduate majors are welcome.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

A 5-page, double-spaced essay on the following question:

"*America does not go abroad in search of monsters to destroy. She is the well-wisher to Freedom and independence of all.*" — John Quincy Adams

This quote reflects the trends in American national security for much of the nation's history. Are the implications that can be drawn from the statement consistent with the demands of American national security in the 21st century? Discuss this problem with regard to some recent policy issues or political events, citing at least three references.

PROGRAM REQUIREMENTS

- Five required core courses
- Two customizable core courses
- Five elective courses

Code	Title	Credits
Core Courses - Required:		
AS.470.603	Introduction to Global Security Studies [1]	3
AS.470.605	Global Political Economy	3
AS.470.692	Military Strategy & National Policy	3
AS.470.851	Qualitative Methods in Social Science	3
AS.470.855	Research Study Seminar	3
Core Courses - Customizable		
Select one of the following:		3
AS.470.773	Energy and Environmental Security	
AS.470.601	Climate Change and National Security	

AS.470.657	Energy, Security, and Defense	
Total Credits		**18**

[1] This class should be taken in your first semester.

Research Study Courses

This program does not require a thesis. However, it does require the completion of a rigorous research study of journal article length. The research study should make use of the techniques learned in the courses in the methods sequence below.

Code	Title	Credits
Core Courses - Customizable		
Select one the following:		3
AS.470.854	Fundamentals of Quantitative Methods	
AS.470.709	Quantitative Methods	
AS.470.853	Historical Methods	
Total Credits		**3**

Strategic Studies Concentration

Code	Title	Credits
AS.470.606	U.S. Security in a Disordered World	3
AS.470.611	Introduction to Terrorism Studies	3
AS.470.630	Congress and the Making of Foreign Policy	3
AS.470.632	Security Issues in South Asia	3
AS.470.633	Transnational Organized Crime: Gangsters of the Global Underworld	3
AS.470.640	Challenges of Transnational Security	3
AS.470.653	Russian National Security Policy	3
AS.470.654	Deterrence & Crisis Stability in the New Era of Geopolitical Competition	3
AS.470.657	Energy, Security, and Defense	3
AS.470.659	Radicalization and Deradicalization in Terror Networks	3
AS.470.668	The Politics and Process of American Foreign Policy	3
AS.470.676	From al-Qaeda to Islamic State: Understanding the Roots of the Global Jihad Movement	3
AS.470.679	Armed Social Movements: Terrorism Insurgency and Crime	3
AS.470.685	The Challenge of Change: Innovation in Military Affairs	3
AS.470.697	Intelligence and Counterterrorism	3
AS.470.704	Strategies in Insurgent and Asymmetric Warfare	3
AS.470.706	American Military History from the World Wars to Today	3
AS.470.713	Resisting Tyranny: Strategic Nonviolent Conflict	3
AS.470.725	China's Impact on Global Security	3
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	3
AS.470.744	Trade and Security	3
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.470.746	Iran: Security Policy of a Revolutionary State	3
AS.470.748	The Art & Practice of Intelligence	3
AS.470.750	Modern Conflict in the Middle East	3
AS.470.751	Politics and Security in the Middle East	3
AS.470.756	Understanding Modern War	3
AS.470.760	Comparative Intelligence Systems	3
AS.470.767	Defense Policy	3
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	3
AS.470.792	Social Science in National Security and Intelligence	3
AS.470.775	Great Power Competition	3
AS.470.777	Technology and Terrorism	3
AS.470.778	Conflict, Security, and Development	3
AS.470.784	Technology of Weapons of Mass Destruction	3
AS.470.785	Nuclear Proliferation and Non-Proliferation	3
AS.450.781	The Global Cold War	3
AS.480.661	International Public Relations and Public Diplomacy	3
AS.473.600	The Art & Practice of Intelligence	3
AS.473.601	Intelligence: From Secrets to Policy	3
AS.473.605	Strategic Culture Analysis	3
AS.473.609	Introduction to Intelligence in the Five Eyes Community	3
AS.473.646	Covert Action and National Security	3

Energy and Environmental Security Concentration

Code	Title	Credits
AS.470.601	Climate Change and National Security	3
AS.470.657	Energy, Security, and Defense	3
AS.470.663	Human Security	3
AS.420.604	Hydrology & Water Resources	3
AS.470.773	Energy and Environmental Security	3
AS.420.605	Maritime Law and the Environment	3
AS.420.606	Climate Justice	3
AS.420.608	Oceanic & Atmospheric Processes	3
AS.420.612	Sustainability Science: Concepts and Challenges	3
AS.420.614	Environmental Policymaking and Policy Analysis	3
AS.420.624	Ocean Stewardship and Sustainability	3
AS.420.644	Sustainable Cities	3
AS.420.650	International Environmental Policy	3
AS.420.665	Climate Change on the Front Lines: The Study of Adaptation in Developing Countries	3
AS.420.668	Sustainable Food Systems	3
AS.420.676	Global Scarcity in Freshwater Systems: Crisis and Solutions	3
AS.420.679	International Water: Issues and Policies	3
AS.425.602	Science of Climate Change and its Impact	3
AS.425.603	Climate Change Policy Analysis	3
AS.425.637	International Climate Change Policy	3
AS.425.645	Global Energy Policy	3
AS.425.647	Energy and Water Security in South Asia	3
AS.425.652	Nuclear Energy: Technology, Policy, and Regulations	3

Economic security concentration

Code	Title	Credits
AS.470.601	Climate Change and National Security	3
AS.470.633	Transnational Organized Crime: Gangsters of the Global Underworld	3
AS.470.651	Corruption and Democratic Governance	3
AS.470.657	Energy, Security, and Defense	3
AS.470.663	Human Security	3
AS.470.689	NGOs in Development and Global Policy-Making	3
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	3
AS.470.725	China's Impact on Global Security	3
AS.470.744	Trade and Security	3
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.470.766	Economic Growth:The Politics of Development in Asia, Africa and Beyond	3
AS.470.778	Conflict, Security, and Development	3
AS.420.605	Maritime Law and the Environment	3
AS.420.606	Climate Justice	3
AS.420.624	Ocean Stewardship and Sustainability	3

Global Security Studies, MA/ Intelligence, Certificate

MA in Global Security Studies/ Certificate in Intelligence

Students pursuing an MA in Global Security Studies may obtain an additional credential by completing courses that lead to the Certificate in Intelligence. This combined credential will prepare its graduates for careers in the U.S. Intelligence Community and in those parts of the government and private sector that use intelligence or work with the Intelligence Community. Students can complete this program with only 15 courses.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

5-page, double-spaced essay on the following question:

"*America does not go abroad in search of monsters to destroy. She is the well-wisher to Freedom and independence of all.*" — John Quincy Adams

This quote reflects the trends in American national security for much of the nation's history. Are the implications that can be drawn from the statement consistent with the demands of American national security in the 21st century? Discuss this problem in reference to some recent policy issues or political events, citing at least three references.

Program Requirements

Students pursuing a Master of Arts in Global Security Studies may obtain an additional credential by completing a sequence of courses offered by the Certificate in Intelligence. This combined credential will require students to complete 15 courses (in lieu of 17 to complete both degrees separately).

MA in Global Security Studies Requirements

Code	Title	Credits
Core Courses - Required:		
AS.470.603	Introduction to Global Security Studies	3
AS.470.605	Global Political Economy	3
AS.470.692	Military Strategy & National Policy	3
AS.470.851	Qualitative Methods in Social Science	3
AS.470.855	Research Study Seminar	3
Core Courses - Customizable		
Select one of the following:		3
AS.470.773	Energy and Environmental Security	
AS.470.601	Climate Change and National Security	
AS.470.657	Energy, Security, and Defense	
Select one of the following:		3
AS.470.854	Fundamentals of Quantitative Methods	
AS.470.709	Quantitative Methods	
AS.470.853	Historical Methods	
Electives		**9**
Select three electives		
Total Credits		**30**

Certificate in Intelligence Requirements

Students must pass one course from each of the following categories:

Code	Title	Credits
Core Courses - Customizable		
Select one of the following:		
AS.473.600	The Art & Practice of Intelligence	3
Select one of the following:		
AS.470.792	Social Science in National Security and Intelligence	3
AS.473.605	Strategic Culture Analysis	3
AS.473.609	Introduction to Intelligence in the Five Eyes Community	3
AS.473.626	Comparative Intelligence Systems	3
Select one of the following:		
AS.473.606	Legal Issues in Intelligence	3
AS.470.731	Privacy in a Data-driven Society	3
AS.470.795	The Constitution and National Security	3
AS.473.607	Intelligence Ethics	3
Select one of the following:		
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	3
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	3
AS.472.600	Introduction to Geospatial Intelligence	3
AS.472.611	Analyzing Social Media and Geospatial Information	3
AS.473.602	Intelligence Analysis	3
AS.473.642	Assessing Foreign Militaries	3
AS.473.644	Technical Collection of Intelligence	3
Select one of the following:		
AS.470.668	The Politics and Process of American Foreign Policy	3

AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	3
AS.473.660	Intelligence and Counterterrorism	3
AS.473.668	Intelligence to Secure the Homeland and Hometown	3
Total Credits		*15*

Government, MA/MBA

MA in Government/MBA Dual Degree

advanced.jhu.edu/govmba (https://advanced.jhu.edu/academics/graduate/ma-government/ma-government-mba-dual-degree/)

Management education typically addresses the public and private sectors separately. Universities typically offer the MBA degree for business leadership and the MA, MPP, or MPA for public-sector management. The assumption is that managers working in the public and private sectors are involved with completely different sets of issues and problems. The reality is that both face similar challenges, and managers frequently move from the public sector to the private sector and vice versa.

The MA in Government/MBA uniquely prepares individuals for the combination of public-and-private sector responsibilities they are likely to face during their careers. This program enables those working in government to expand their knowledge and skills in business and management, preparing them to take on leadership roles in nonprofit, public sector, or commercial enterprises. Students in these degrees complete both the professional managerial education requirements of the MBA and the advanced disciplinary requirements of a specialized MA in Government. Graduates of the Johns Hopkins University MA in Government/MBA are capable of integrating rigorous scholarship with business acumen in bringing both intellectual and strategic leadership to the complex challenges of management in government and business in today's global economy.

The MA in Government/MBA is designed with class schedules to accommodate working adults and may be taken onsite at the at the JHU Washington, DC Center (near Dupont Circle) or online. Students who pursue the dual degree will take classes in the government program at the School of Arts and Sciences and in the MBA program at the Carey Business School. They are assigned an advisor from each school who will oversee their coursework. To earn the MA in Government/MBA, students must take 10 classes in the government program and 21 classes in the Carey Business School. Dual degree recipients receive both diplomas upon completion of both programs.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

- GRE or GMAT exam
- At least two years of progressive, full-time, professional experience after the completion of undergraduate studies for the MBA.
- A writing sample of five to seven pages that is research-focused. The purpose of the writing sample is to demonstrate your ability to make and support an argument.

If you do not have an existing research paper that you wish to submit, you may write a five-page paper on the following question:

"If men were angels, no government would be necessary. If angels were to govern men, neither external nor internal controls on government would be necessary. In framing a government which is to be administered by men over men, the great difficulty lies in this: you must first enable the government to control the governed; and in the next place oblige it to control itself."

– James Madison, Federalist 51

In this well-known quote, Madison points towards the age-old problem of reconciling democracy and political power. Discuss this problem in reference to some recent policy issues or political events, citing at least three references.

A waiver from these exams may be approved if a candidate has:

- Completed a graduate degree and can demonstrate quantitative ability through coursework of B or better in statistics, corporate finance, or microeconomics.
- Completed an undergraduate degree and has at least five years of professional experience. Applicant has also taken at least one course in statistics, corporate finance, and microeconomics, earned a B or better, and earned an overall GPA of 3.0 or better.
- A professional designation, such as CPA or CFA

Program Requirements

MA in Government Courses

Code	Title	Credits
Core Course - Required:		
AS.470.602	Government & Politics	3
AS.470.695	Proseminar: Essentials of Public and Private Management	3
Electives (Eight courses)		**24**
Total Credits		**30**

Although not required, the following courses are recommended electives for students in the dual degree program:

Code	Title	Credits
Electives		
AS.470.609	Leadership Skills in the 21st Century	
AS.470.616	Political Ideas, Strategy, and Policy Implementation	
AS.470.622	Money and Politics	
AS.470.630	Congress and the Making of Foreign Policy	
AS.470.638	Negotiating as a Leadership Skill	
AS.470.641	Introduction to Advocacy and Lobbying	
AS.470.645	The Budgetary Process	
AS.470.688	Political Institutions and the Policy Process	
AS.470.721	Comparative Federalism: The United States and the European Union	
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	
AS.470.736	Methods of Policy Analytics	
AS.470.744	Trade and Security	

Students wishing to earn a concentration must complete four of their electives in the concentration area. Concentrations are offered in Political

Communication, Security Studies, and Democracy and Governance Studies. For MA/MBA students, the thesis requirement is optional. If you wish to write a thesis, you must take:

Code	Title	Credits
AS.470.850	Research and Thesis I: MA in Government	
AS.470.852	Research and Thesis II: MA in Government	
AS.470.800	Research & Thesis III: Government	

These three classes would count toward the eight government electives you must take to complete the MA/MBA. MA/MBA students who successfully complete and defend their thesis will be awarded honors at graduation.

MBA Courses

All dual-degree students are required to complete the following MBA courses. Dual degree recipients receive both diplomas upon completion of both programs.

Code	Title	Credits
Core Course - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Electives (11 courses)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

Government, Master of Arts

MA in Government

government.jhu.edu (https://advanced.jhu.edu/academics/graduate/ma-government/)

The curriculum of the Master of Arts in Government program is designed for working adult students who have specialized skills in a particular field and desire the broader perspective necessary for leadership in politics and administration. The courses are based on the latest scholarly and scientific knowledge but emphasize the application of such knowledge to practical governmental, political, and policymaking problems of today.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Government requires:

- A writing sample of five to 10 pages that is research-focused. The purpose of the writing sample is to demonstrate the applicant's ability to make and support an argument.

If the applicant does not have an existing research-focused writing sample that they wish to submit, the applicant may write a five-page paper responding to the following:

"If men were angels, no government would be necessary. If angels were to govern men, neither external nor internal controls on government would be necessary. In framing government which is to be administered by men over men, the great difficulty lies in this: You must first enable the government to control the governed; and in the next place oblige it to control itself." — James Madison, Federalist 51

In this well-known quote, Madison points toward the age-old problem of reconciling democracy and political power. Discuss this problem in reference to some recent policy issues or political events, citing at least three references.

PROGRAM REQUIREMENTS

- Four required core courses
- Eight elective courses (p. 2616)

Code	Title	Credits
Core Courses - Required:		
AS.470.602	Government & Politics	3
AS.470.850	Research and Thesis I: MA in Government	3
AS.470.800	Research & Thesis III: Government	3
Core Courses - Customizable		
Select one of the following:		*3*
AS.470.852	Research and Thesis II: MA in Government	
AS.470.681	Probability and Statistics	
AS.470.854	Fundamentals of Quantitative Methods	
Electives (Eight courses)		*24*
Total Credits		**36**

Concentration: Political Communication

Code	Title	Credits
Select four of the following:		12
AS.470.604	Social Media and The American Presidency	
AS.470.609	Leadership Skills in the 21st Century	
AS.470.615	Speechwriting: Theory and Practice	
AS.470.616	Political Ideas, Strategy, and Policy Implementation	
AS.470.622	Money and Politics	
AS.470.638	Negotiating as a Leadership Skill	
AS.470.641	Introduction to Advocacy and Lobbying	
AS.470.732	Communications and Congress	
AS.470.733	Origins and Influence of Public Opinion on American Democracy and Elections	
AS.470.735	Politics and the Media	
AS.470.741	Campaigns and Elections	
AS.470.747	The FBI and Fusion Centers: Information Sharing in the Post 9/11 World	
AS.470.749	Campaigns and Running for Office	
AS.470.758	Data-Driven Campaigns and Elections	

AS.470.770	Communicating Public Policy	
Total Credits		**12**

Concentration: Security Studies

Note: Any course offering in the MA in Global Security Studies counts toward this concentration.

Code	Title	Credits
Select four of the following:		12
AS.470.605	Global Political Economy	
AS.470.606	U.S. Security in a Disordered World	
AS.473.607	Intelligence Ethics	
AS.470.611	Introduction to Terrorism Studies	
AS.470.630	Congress and the Making of Foreign Policy	
AS.470.640	Challenges of Transnational Security	
AS.470.632	Security Issues in South Asia	
AS.470.654	Deterrence & Crisis Stability in the New Era of Geopolitical Competition	
AS.470.644	Democracy and Its Modern Critics	
AS.470.653	Russian National Security Policy	
AS.470.659	Radicalization and Deradicalization in Terror Networks	
AS.470.692	Military Strategy & National Policy	
AS.470.697	Intelligence and Counterterrorism	
AS.470.748	The Art & Practice of Intelligence	
AS.470.762	Democracy and Security in Israel	
Total Credits		**12**

Concentration: Democracy Studies and Governance

Code	Title	Credits
Select four of the following:		12
AS.470.602	Government & Politics	
AS.470.617	The Courts and Public Policy	
AS.470.620	Race, Politics, and Policy	
AS.470.719	Hate Groups and Domestic Terrorism	
AS.470.629	Models of Democratic Leadership in America	
AS.470.644	Democracy and Its Modern Critics	
AS.470.649	Separation of Powers and Democratic Governance	
AS.470.651	Corruption and Democratic Governance	
AS.470.656	Presidential Power and Politics	
AS.470.658	Religion and American Political Culture	
AS.470.661	Political Debates and the US Constitution	
AS.470.684	Legislative Language and Policymaking	
AS.470.688	Political Institutions and the Policy Process	
AS.470.693	Comparative Democracies	
AS.470.698	American Exceptionalism	
AS.470.701	Congress: Why the First Branch Matters	
AS.470.721	Comparative Federalism: The United States and the European Union	
AS.470.723	Western Political and Constitutional Thought	
AS.470.759	American Political Development	
AS.470.776	Nationalism in the Democratic Age	
AS.470.794	Fixing American Politics	
AS.470.799	State Politics: A Year in the Life	
Total Credits		**12**

Government, MA/Intelligence, Certificate

MA in Government/ Certificate in Intelligence

Students pursuing an MA in Government may obtain an additional credential by completing courses that lead to the Certificate in Intelligence. This combined credential prepares graduates for careers in the U.S. Intelligence Community and in those parts of the government and private sector that use intelligence or work with the Intelligence Community, as well as other parts of the national security community. Students can complete the program with 15 courses.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Interested applicants must complete all admission requirements for both the Master of Arts in Government and the Certificate in Intelligence.

In addition to the materials and credentials required for all programs, the Master of Arts in Government also requires:

- A writing sample of five to 10 pages that is research-focused. The purpose of the writing sample is to demonstrate the applicant's ability to make and support an argument.

If the applicant does not have an existing research-focused writing sample that they wish to submit, the applicant may write a five-page paper responding to the following:

"If men were angels, no government would be necessary. If angels were to govern men, neither external nor internal controls on government would be necessary. In framing government which is to be administered by men over men, the great difficulty lies in this: You must first enable the government to control the governed; and in the next place oblige it to control itself." — James Madison, Federalist 51

In this well-known quote, Madison points toward the age-old problem of reconciling democracy and political power. Discuss this problem in reference to some recent policy issues or political events, citing at least three references.

PROGRAM REQUIREMENTS

Students pursuing an MA in Government may obtain an additional credential by completing a sequence of courses offered by the Certificate in Intelligence. This combined credential will require students to complete 15 courses (in lieu of 17 to complete both degrees separately). Students are required to take the following courses:

MA in Government Requirements

Code	Title	Credits
Core Course - Required:		
AS.470.602	Government & Politics	3
AS.470.850	Research and Thesis I: MA in Government	3
AS.470.852	Research and Thesis II: MA in Government	3
AS.470.800	Research & Thesis III: Government	3

Select six electives		**18**
Total Credits		**30**

Certificate in Intelligence Requirements

Completion of five courses, one each from the following areas:

Code	Title	Credits
Core Courses - Customizable		
Select one of the following:		*3*
AS.473.600	The Art & Practice of Intelligence	
Select one of the following:		*3*
AS.470.792	Social Science in National Security and Intelligence	
AS.473.605	Strategic Culture Analysis	
AS.473.609	Introduction to Intelligence in the Five Eyes Community	
AS.473.626	Comparative Intelligence Systems	
Select one of the following:		*3*
AS.470.731	Privacy in a Data-driven Society	
AS.470.795	The Constitution and National Security	
AS.473.606	Legal Issues in Intelligence	
AS.473.607	Intelligence Ethics	
Select one of the following:		*3*
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	
AS.472.600	Introduction to Geospatial Intelligence	
AS.472.611	Analyzing Social Media and Geospatial Information	
AS.473.602	Intelligence Analysis	
AS.473.642	Assessing Foreign Militaries	
AS.473.644	Technical Collection of Intelligence	
Select one of the following:		*3*
AS.470.668	The Politics and Process of American Foreign Policy	
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	
AS.473.660	Intelligence and Counterterrorism	
AS.473.668	Intelligence to Secure the Homeland and Hometown	
Total Credits		**15**

Intelligence Analysis, Master of Science

MS in Intelligence Analysis

advanced.jhu.edu/intelligenceanalysis (https://advanced.jhu.edu/academics/graduate/ms-intelligence-analysis/)

The Master of Science in Intelligence Analysis (MSIA) provides students interested in launching or advancing their career in intelligence analysis with the core competencies needed to succeed in an array of intelligence analysis roles. The program provides a theoretical grounding in the discipline, as well as mastery of the core skills required to succeed as an intelligence analyst in the public and private sectors. JHU's MSIA degree emphasizes the critical thinking and analytical skills necessary to identify actionable insights from diverse and complex intelligence sources, and persuasively communicate those findings to decision-makers. Courses are taught by leading practitioners in the intelligence community with significant opportunities for students to engage with both faculty and their peers. Graduates of the program will be highly qualified for key roles within public and private sector intelligence agencies.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program-Specific Requirements

In addition to the general admissions criteria for all Advanced Academic Programs, applicants should submit:

- **A 1-2 page Statement of Purpose.** The Statement of Purpose explains the applicant's reasons for seeking admission and includes a plan of study addressing the applicant's analytical abilities and interest in studying the theory and practice of intelligence analysis.
- **A writing sample.** Identify an emerging trend that is likely to influence the profession of intelligence analysis. Drawing on at least three sources, detail the implications of the trend for the future of U.S. private and/or public intelligence operations and present your findings in a 1 to 2 page executive brief to a senior decision-maker.

PROGRAM REQUIREMENTS

- Ten required core courses
- Two elective courses

Curriculum

Code	Title	Credits
Core Courses-Required:		**30**
AS.473.600	The Art & Practice of Intelligence (Introductory course)	
AS.473.602	Intelligence Analysis	
AS.473.603	Intelligence Communications	
AS.473.604	Applied Critical Thinking and Analysis	
AS.473.605	Strategic Culture Analysis	
AS.473.606	Legal Issues in Intelligence	
AS.473.607	Intelligence Ethics	
AS.473.608	Leading Intelligence Organizations	
AS.473.800	Research Seminar	
AS.473.801	Capstone: Current Issues in Intelligence	
Elective Courses:		**6**
Select two of the following:		
AS.473.609	Introduction to Intelligence in the Five Eyes Community	
AS.473.626	Comparative Intelligence Systems	
AS.473.642	Assessing Foreign Militaries	
AS.473.644	Technical Collection of Intelligence	
AS.473.660	Intelligence and Counterterrorism	
AS.473.668	Intelligence to Secure the Homeland and Hometown	
Total Credits		**36**

MSIA Learning Outcomes

Graduates of the Master of Science in Intelligence Analysis (MSIA) are expected to master the following key learning outcomes:

- Discern, extract, and synthesize relevant information from diffuse and extensive intelligence sources in response to current policy and security challenges.
- Employ time-sensitive critical analysis in an environment of ambiguity.
- Inform and persuade diverse audiences using oral, written, and visual media to inform decision-making.
- Evaluate ethical and legal principles in the field of intelligence analysis.
- Analyze and apply effective leadership and management skills for resourcing intelligence operations and organizations.
- Create an inclusive approach to decision-making that fosters awareness of regional and global contexts.

Intelligence, Certificate

Certificate in Intelligence

advanced.jhu.edu/academics/certificates/intelligence/ (https://advanced.jhu.edu/academics/certificates/intelligence/)

The Certificate in Intelligence at JHU is designed for students who are interested in pursuing or advancing careers in intelligence, be it in analysis, human or technical collection, or counterintelligence. It is also useful for professionals in the policy and operational world whose careers involve consuming intelligence.

The certificate can stand on its own as a credential, or students can pair it with the MA in Global Security Studies, MA in Government, MS in Data Analytics and Policy, or MA in Public Management for a combined credential. Students availing themselves of one of these options can count two of their intelligence studies courses toward their Master's degree elective requirements.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the Certificate in Intelligence requires:

- 500-word statement of purpose in pursuing intelligence studies. Explain your reasons for seeking admission and how you will use the degree to advance your career.
- Resume or Curriculum Vitae

PROGRAM REQUIREMENTS

Students must pass one course from each of five categories.

Code	Title	Credits
Core Courses - Customizable		**3**
AS.473.600	The Art & Practice of Intelligence	
Select one of the following:		*3*
AS.470.792	Social Science in National Security and Intelligence	
AS.473.605	Strategic Culture Analysis	
AS.473.609	Introduction to Intelligence in the Five Eyes Community	
AS.473.626	Comparative Intelligence Systems	
Select one of the following:		*3*
AS.470.731	Privacy in a Data-driven Society	
AS.470.795	The Constitution and National Security	
AS.473.606	Legal Issues in Intelligence	
AS.473.607	Intelligence Ethics	
Select one of the following:		*3*
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	
AS.472.600	Introduction to Geospatial Intelligence	
AS.472.611	Analyzing Social Media and Geospatial Information	
AS.473.602	Intelligence Analysis	
AS.473.642	Assessing Foreign Militaries	
AS.473.644	Technical Collection of Intelligence	
Select one of the following:		*3*
AS.470.668	The Politics and Process of American Foreign Policy	
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	
AS.473.660	Intelligence and Counterterrorism	
AS.473.668	Intelligence to Secure the Homeland and Hometown	
Total Credits		**15**

Non-Governmental Organization (NGO) Management, Master of Arts

MA in Non-Governmental Organization (NGO) Management

advanced.jhu.edu/ngo (https://advanced.jhu.edu/academics/graduate-degree-programs/non-governmental-organization-management/)

Students are no longer being admitted to the Non-Governmental Organization Management (NGO), Master of Arts. Students interested in this area of study please see the Non-Profit Management, Master of Arts. (p. 2241)

Johns Hopkins' online Master of Arts in Non-Governmental Organization (NGO) Management provides students with the leadership, management, and organizational skills needed to succeed in the nonprofit sector, both domestically or abroad. The MA in NGO Management is made up of ten asynchronous online courses (7 core courses and 3 electives). Courses focus on nonprofit leadership, grant writing, strategic planning, project management, monitoring and evaluation, resource development, social enterprise, and international mission-based work. Students complete their studies with the Capstone Seminar where they may select one of the following options a) research project/deeper dive on a relevant aspect of non-governmental/nonprofit management; b) a project that will contribute to the social sector in some capacity; or c) a remote immersive experience working with a nonprofit/non-governmental organization. With the MA in NGO Management students and alumni may work for nonprofits, non-governmental and international agencies, foundations, think tanks, educational institutions, museums, environmental organizations, human rights and animal rights organizations, or religious institutions, among others.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in NGO Management also requires:

- Statement of Purpose: This 750-word statement should describe how your academic and/or professional experiences have led to your interest in the field of nonprofit or non-governmental management.

Program Requirements

- Seven required core courses
- Three elective courses

Code	Title	Credits
Core Courses - Required:		
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	3
AS.470.798	Financial Management and Analysis in Nonprofits	3
AS.470.625	Resource Development and Marketing in Nonprofits	3
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	3
AS.470.774	Nonprofit Governance & Executive Leadership	3
AS.470.734	Organizational Leadership and Ethics in NGO Management	3
AS.470.864	NGO Management Capstone Seminar	3
Electives		**9**
AS.470.609	Leadership Skills in the 21st Century	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	
AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.754	Project Management for NGOs	
AS.470.766	Economic Growth:The Politics of Development in Asia, Africa and Beyond	
AS.470.788	Monitoring & Evaluation for Nonprofits/NGOs	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
Total Credits		**30**

Nonprofit Management, Master of Arts

MA in Nonprofit Management

advanced.jhu.edu/Nonprofit (https://advanced.jhu.edu/academics/graduate/ma-nonprofit-management/)

Johns Hopkins' online Master of Arts in Nonprofit Management provides students with the leadership, management, and organizational skills needed to succeed in the nonprofit sector, both domestically or abroad. The MA in Nonprofit Management is made up of ten asynchronous online courses (7 core courses and 3 electives). Courses focus on nonprofit leadership, grant writing, strategic planning, project management, monitoring and evaluation, resource development, social enterprise, and international mission-based work. Students complete their studies with the Capstone Seminar where they may select one of the following options a) research project/deeper dive on a relevant aspect of nonprofit management; b) a project that will contribute to the social sector in some capacity; or c) an immersive professional experience working with a nonprofit or non-governmental organization. All capstones require a 30-60 page final paper. With the MA in Nonprofit Management students and alumni may work for nonprofits, non-governmental and international agencies, foundations, think tanks, educational institutions, museums, environmental organizations, human rights and animal rights organizations, or religious institutions, among others. Students are also eligible to work with select federal agencies, international organizations, and financial development institutions.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Nonprofit Management also requires:

- Applicants must hold a baccalaureate degree in study areas relevant to the curriculum. Applicants are accepted to the program on the understanding that they have sufficient background in a relevant field, either through their previous degree, or through relevant professional experience, to be able to complete the program.
- Statement of Purpose: This 750-word statement should describe how your academic and/or professional experiences have led to your interest in the field of nonprofit or non-governmental management and what your ambitions are for the degree. Your statement will be reviewed for content, organization, and writing style.
- Two letters of recommendation that verify professional and/or academic accomplishment. Under "Recommendations," include the contact information for two recommenders. They will be automatically emailed access information to the system. They can then complete and upload their recommendation form.

Program Requirements

- Seven required core courses
- Three elective courses

Code	Title	Credits
Core Courses - Required:		
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	3
AS.470.798	Financial Management and Analysis in Nonprofits	3
AS.470.625	Resource Development and Marketing in Nonprofits	3
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	3
AS.470.774	Nonprofit Governance & Executive Leadership	3
AS.470.734	Organizational Leadership and Ethics in NGO Management	3
AS.470.864	NGO Management Capstone Seminar	3
Electives		**9**
AS.470.609	Leadership Skills in the 21st Century	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	

AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.754	Project Management for NGOs	
AS.470.766	Economic Growth:The Politics of Development in Asia, Africa and Beyond	
AS.470.788	Monitoring & Evaluation for Nonprofits/NGOs	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
Total Credits		**30**

- Apply history, facts, data, trends and lessons learned to interpret situations that arise every day for nonprofit and non-governmental organizations including the various roles that international and national non-governmental organizations (NGOs) and civil society organizations (CSOs) play in local, national and international development, humanitarian action, and policy processes.
- Demonstrate leadership skills that are critical to effective decision-making to lead, manage, and/or oversee mission-driven organizations on issues related to a) strategic planning and theory of change, b) board management, c) strategic partnership, d) program development, e) monitoring and evaluation, f) marketing, g) fundraising and development, and others.
- Use oral and written communication skills that will enhance effective non-profit leadership from both academic and practitioner-based sources.
- Demonstrate ethical management and leadership decision-making skills specific to the needs of nonprofits and non-governmental organizations.
- Evaluate emerging trends and best practices in charitable, philanthropic, and/or advocacy organizations.

Nonprofit Management, Certificate

Certificate in Nonprofit Management

nonprofit.jhu.edu (https://advanced.jhu.edu/academics/certificates/nonprofit-management/)

The online Certificate in Nonprofit Management offers a specialized curriculum for current or aspiring nonprofit practitioners to prepare them with the leadership skills needed to advance their professional careers. Students take six electives, each designed to strengthen the skills needed by those in management or executive leadership roles in a variety of nonprofit fields. Courses help students to problem solve through specific challenges and identify unique opportunities, relevant to the social sector. Electives focus on organizational leadership, fundraising, grant writing, strategic planning, project management, social enterprise, marketing, monitoring and evaluation, among others. The certificate is relevant for students pursuing careers in nonprofits, private or public foundations, thinktanks, government, multilateral institutions, or other agencies that require extensive interaction and/or collaboration with nonprofit/ non-governmental organizations. Students are able to take courses at a full- or part-time pace. The curriculum is designed for working professionals in the social sector who are looking to expand their expertise in nonprofit management with the latest skills and approaches taught by expert faculty. The certificate in Nonprofit Management may also be combined with a Masters in Public Management, Communications, Cultural Heritage Management, or Museum Studies.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

- Applicants must hold a baccalaureate degree, or have earned one prior to enrollment.
- Statement of Purpose: This 750-word statement should describe how your academic and/or professional experiences have led to your decision to pursue an advanced credential in the field of nonprofit management, and what your ambitions are for the degree. Your statement will be reviewed for content, organization, and writing style.
- Two letters of recommendation that verify professional and/or academic accomplishment.

Program Requirements

Code	Title	Credits
Core Courses - Customizable:		
Select six of the following:		*18*
AS.470.625	Resource Development and Marketing in Nonprofits	
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	
AS.470.689	NGOs in Development and Global Policy-Making (formerly Overview of Global Public and Nonprofit Relationship)	
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management (formerly Influence and Impact of Nonprofits)	
AS.470.774	Nonprofit Governance & Executive Leadership	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
AS.470.798	Financial Management and Analysis in Nonprofits	
Total Credits		**18**

Public Management, Master of Arts

MA in Public Management

publicmanagement.jhu.edu (https://advanced.jhu.edu/academics/graduate/ma-public-management/)

At a time when governments are faced with an array of unprecedented challenges, good management is essential. The Johns Hopkins MA in Public Management will empower you to be strategic by teaching students the fundamentals of public management: policy analysis and evaluation, financial management, economics and fiscal policy, and public policy and administration. This innovative degree prepares emerging leaders to tackle complex public policy and management problems at all levels of government.

The schedule for completing this 12-course degree program is flexible. Many students work full-time while attending the program on a part-time basis and complete their degree in two years. The MA in Public Management is offered both online or onsite at our campus in Washington, DC.

Electives are organized into three Focus Areas:

- Public Administration and Leadership
- Public Policy Evaluation
- Public Financial Management and Budgeting

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Public Management requires:

- A writing sample of two to five pages that is policy oriented. If the applicant does not have a policy-oriented paper that they wish to submit, the applicant may write a three page, double-spaced essay on the following question:

  "A memorandum is not written to inform the reader, but to protect the writer." —Former Secretary of State Dean Acheson

  Please discuss whether you think the quote from former Secretary Acheson is accurate or not and why?

PROGRAM REQUIREMENTS

- Six required core courses
- Six elective courses

Code	Title	Credits
Core Courses - Required:		
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.631	Economics for Public Decision-Making	3
AS.470.627	Financial Management & Analysis in the Public Sector	3
AS.470.695	Proseminar: Essentials of Public and Private Management	3
AS.470.854	Fundamentals of Quantitative Methods	3
AS.470.860	Capstone for Public Management	3
Electives		
Select six electives [1]		18
Total Credits		**36**

[1] Electives need to be chosen in consultation with the student's adviser and should accommodate professional and/or personal goals.

Code	Title	Credits
Electives		
AS.470.605	Global Political Economy	3
AS.470.609	Leadership Skills in the 21st Century	3
AS.470.624	Healthcare Analytics and Policy	3
AS.470.629	Models of Democratic Leadership in America	3
AS.470.638	Negotiating as a Leadership Skill	3
AS.470.645	The Budgetary Process	3
AS.470.660	Program Evaluation	3
AS.470.670	The Practice & Politics of U.S. Tax Policy	3
AS.470.684	Legislative Language and Policymaking	3
AS.470.688	Political Institutions and the Policy Process	3
AS.470.692	Military Strategy & National Policy	3
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	3
AS.470.742	Politics of Cybersecurity	3
AS.470.744	Trade and Security	3
AS.470.754	Project Management for NGOs	3
AS.470.773	Energy and Environmental Security	3
AS.470.774	Nonprofit Governance & Executive Leadership	3
AS.470.778	Conflict, Security, and Development	3
AS.470.798	Financial Management and Analysis in Nonprofits	3
AS.470.799	State Politics: A Year in the Life	3

LEARNING OUTCOMES

The MA in Public Management weaves the study of public administration, public policy, economics, quantitative and qualitative analysis, and financial management into a curriculum that enable its graduates to lead and shape this rapidly growing field. Upon completion of the program graduates will be able to:

1. Utilize analytical skills—including quantitative and qualitative tools—to assess policies and program effectiveness.

2. Appraise and compare management and organization systems utilized in public sector for the purpose of maximizing efficiency and effectiveness.

3. Design, evaluate, and experiment with specific policies with regard to their ability to meet public priorities.

4. Formulate and construct budgets and financial systems used in the public sector.

Public Management, MA/Data Analytics and Policy, Certificate

MA in Public Management / Certificate in Data Analytics and Policy

Students pursuing a MA in Public Management may obtain an additional credential by completing a sequence of courses offered by the Certificate in Data Analytics and Policy. This combined credential will require students to complete 15 courses (in lieu of 17 to complete both degrees separately).

At a time when governments are faced with an array of unprecedented challenges, good management and the ability to analyze and apply data is essential. The Johns Hopkins MA in Public Management/Certificate in Data Analytics and Policy trains students in the fundamentals of public management (policy analysis, financial management, economics and public administration) along with the ability to develop actionable insights from diverse sets of data, as well as the communication skills needed to share findings with decision makers and the public.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the MA in Public Management requires:

- A writing sample of two to five pages that is policy oriented. If the applicant does not have a policy-oriented paper that they wish to submit, the applicant may write a three page, double-spaced essay on the following question:

"A memorandum is not written to inform the reader, but to protect the writer." —Former Secretary of State Dean Acheson

Please discuss whether you think the quote from former Secretary Acheson is accurate or not and why?

and the Certificate in Data Analytics and Policy requires:

- Statement of purpose (two pages double-spaced): Explain your reasons for seeking admission and how you will use the certificate to advance your career. Your statement should also address your ability or potential to perform a quantitative analysis.

PROGRAM REQUIREMENTS

Code	Title	Credits
Core Courses - Required:		
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.627	Financial Management & Analysis in the Public Sector	3
AS.470.631	Economics for Public Decision-Making	3
AS.470.854	Fundamentals of Quantitative Methods	3
AS.470.695	Proseminar: Essentials of Public and Private Management	3
AS.470.860	Capstone for Public Management	3
Four Public Management Electives		*12*
Certificate in Data Analytics and Policy Core Courses		
Core Course - Required:		
AS.470.681	Probability and Statistics	3
AS.470.709	Quantitative Methods	3
Three Data Analytics and Policy Electives		*9*
Total Credits		**45**

Public Management, MA/Intelligence, Certificate

MA in Public Management / Certificate in Intelligence

Students pursuing a MA in Public Management may obtain an additional credential by completing a sequence of courses offered by the Certificate in Intelligence. This combined credential will require students to complete 15 courses (in lieu of 17 to complete both degrees separately).

At a time when governments are faced with an array of unprecedented challenges, good management critical thinking, and analytical skills are essential. The Johns Hopkins MA in Public Management/Certificate in Intelligence trains students in the fundamentals of public management (policy analysis, financial management, economics and public administration) and the core skills required to succeed as an intelligence analyst in the public and private sectors.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to meeting the admissions criteria for all Advanced Academic Programs student interested in applying for the combined program need to meet the standards for both the MA in Public Management and the Certificate in Intelligence.

In addition to the materials and credentials required for all programs, the MA in Public Management requires:

- A writing sample of two to five pages that is policy oriented. If the applicant does not have a policy-oriented paper that they wish to submit, the applicant may write a three page, double-spaced essay on the following question:

  "A memorandum is not written to inform the reader, but to protect the writer." —Former Secretary of State Dean Acheson

  Please discuss whether you think the quote from former Secretary Acheson is accurate or not and why?

Program Requirements

MA Public Management Requirements

Code	Title	Credits
Core Courses - Required:		**18**
AS.470.608	Public Policy Evaluation & the Policy Process	
AS.470.627	Financial Management & Analysis in the Public Sector	
AS.470.631	Economics for Public Decision-Making	
AS.470.854	Fundamentals of Quantitative Methods	
AS.470.695	Proseminar: Essentials of Public and Private Management	
AS.470.860	Capstone for Public Management	
Four Public Management Electives		*12*
Total Credits		**30**

Certificate in Intelligence Requirements

Completion of five courses, one each from the following areas:

Code	Title	Credits
Core Courses - Customizable		
Select one of the following:		*3*
AS.473.600	The Art & Practice of Intelligence	
Select one of the following:		*3*
AS.470.792	Social Science in National Security and Intelligence	
AS.473.605	Strategic Culture Analysis	
AS.473.609	Introduction to Intelligence in the Five Eyes Community	
AS.473.626	Comparative Intelligence Systems	
Select one of the following:		*3*
AS.470.731	Privacy in a Data-driven Society	
AS.470.795	The Constitution and National Security	
AS.473.606	Legal Issues in Intelligence	
AS.473.607	Intelligence Ethics	
Select one of the following:		*3*
AS.470.724	Managing Dangerous Futures: Global Political Risk Analysis	
AS.470.740	Cyber Policy, Strategy, Conflict and Deterrence	
AS.472.600	Introduction to Geospatial Intelligence	

AS.472.611	Analyzing Social Media and Geospatial Information	
AS.473.602	Intelligence Analysis	
AS.473.642	Assessing Foreign Militaries	
AS.473.644	Technical Collection of Intelligence	
Select one of the following:		*3*
AS.470.668	The Politics and Process of American Foreign Policy	
AS.470.745	Terrorist Financing Analysis and Counterterrorist Finance Techniques	
AS.473.660	Intelligence and Counterterrorism	
AS.473.668	Intelligence to Secure the Homeland and Hometown	
Total Credits		**15**

Public Management, MA/Nonprofit Management, Certificate

Students pursuing an MA in Public Management may obtain an additional credential by completing a sequence of courses offered by the Certificate in Nonprofit Management. This combined credential recognizes the interdependence of the governmental and nonprofit sectors and their common ground in mission-driven performance. Students who complete the combined degree will be prepared to move among the public, private, and nonprofit sectors or work for agencies that span them. This combined credential requires students to complete 16 courses (in lieu of 18 to complete both degrees separately).

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the Combined MA in Public Management/Certificate in Nonprofit Management also requires:

- Applicants must hold a baccalaureate degree in study areas relevant to the curriculum. Applicants are accepted to the program on the understanding that they have sufficient background in a relevant field, either through their previous degree, or through relevant professional experience, to be able to complete the program.
- Statement of Purpose: This 750-word statement should describe how your academic and/or professional experiences have led to your interest in the field of public management, nonprofit or non-governmental management, and what your ambitions are for the degree. Your statement will be reviewed for content, organization, and writing style.
- Two letters of recommendation that verify professional and/or academic accomplishment. Under “Recommendations,” include the contact information for two recommenders. They will be automatically emailed access information to the system. They can then complete and upload their recommendation form.

Program Requirements

Combined degree students of the MA in Public Management/Certificate in Nonprofit Management must take 16 courses in total before they are eligible to graduate. Students must take 10 Public Management courses (5 cores, 4 electives, 1 capstone) and six electives from the Certificate in Nonprofit Management degree. See below for course descriptions.

Code	Title	Credits
Core Courses - Required:		
AS.470.608	Public Policy Evaluation & the Policy Process	3
AS.470.627	Financial Management & Analysis in the Public Sector	3
AS.470.631	Economics for Public Decision-Making	3
AS.470.854	Fundamentals of Quantitative Methods	3
AS.470.695	Proseminar: Essentials of Public and Private Management	3
AS.470.860	Capstone for Public Management	3
Four Public Management Electives		12
Nonprofit Certificate Requirements		
Core Courses - Customizable		
Select six of the following:		18
AS.470.625	Resource Development and Marketing in Nonprofits	
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	
AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	
AS.470.774	Nonprofit Governance & Executive Leadership	
AS.470.798	Financial Management and Analysis in Nonprofits	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
Total Credits		**48**

Center for Biotechnology Education

Center for Biotechnology Education

biotechnology.jhu.edu (https://advanced.jhu.edu/academics/centers/center-for-biotechnology-education/)

The Center for Biotechnology Education, established in 2010, expands the scope of biotechnology education at home and abroad to build a pipeline of students and professionals ready to succeed in graduate school, K-12 education, and the work environment in the fields of biotechnology, bioinformatics, regulatory science, and bioscience business and leadership. The mission of the Center for Biotechnology Education is to increase public awareness and understanding of biotechnology, inform educators of the resources and programs available locally and nationally, become a resource center for biotechnology information, coordinate training workshops for students and professionals, and secure funds in support of biotechnology training and education locally, nationally, and internationally. The goals of the center are to develop partnerships with industry and government organizations to provide community outreach, professional development educational opportunities, workshops, research symposia, and lecture series for academia, industry, and the general public.

Biotechnology, the application of biological systems to solve problems or make useful products, continues to expand with discoveries and lifesaving products at a breathtaking pace. The biotechnology industry harnesses advances in microbiology, cell biology, molecular biology, immunology, genomics, and proteomics to move discoveries and ideas out of the laboratory and into the product development pipeline. This dynamic field demands a multidisciplinary workforce skilled in basic research, drug discovery technologies, bioinformatics, regulatory affairs, and product commercialization.

Johns Hopkins University offers students the ability to learn, advance, and succeed in this exciting field, with a variety of learning opportunities designed to meet the needs of working adults.

Bioinformatics, Master of Science

MS in Bioinformatics

Joint Offering with the Whiting School of Engineering for Professionals

bioinformatics.jhu.edu (https://bioinformatics.jhu.edu)

Johns Hopkins University offers an innovative graduate program that prepares professionals for success in bioinformatics. Drawing from the strengths of the Krieger School of Arts and Sciences and the Whiting School of Engineering, this program fully integrates the computer science, bioscience, and bioinformatics needed to pursue a career in this dynamic field.

The MS in Bioinformatics is designed for working adults, but can be completed full-time. All classes are offered in the evening, on Saturdays, or online. Please note that not every course is available at all on-site locations. The degree can be completed online.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

Bachelor's degree from an accredited college or university in the biological sciences or in engineering. Programs require a minimum GPA of 3.0 on a 4.0 scale. Meeting the minimum GPA requirement does not guarantee admission.

- All the prerequisites listed below can be taken from the existing Master of Science in Computer Science or the Master of Science in Biotechnology program. Students who have not completed all the prerequisites may be admitted provisionally to complete the admission requirements.
  - Two semesters of organic chemistry (or AS.410.302 Bio-Organic Chemistry)
  - One semester of biochemistry (or AS.410.601 Biochemistry)
  - Introduction to programming using Java, C++, C or Python (or EN.605.201 Introduction to Programming Using Java or EN.605.206 Introduction to Programming Using Python Introduction to Programming Using Python)
  - Data structures (or EN.605.202 Data Structures)
  - One course in probability and statistics (or AS.410.645 Biostatistics)
  - Calculus
- The Admissions Committee reserves the right to request additional information from applicants, such as GRE or letters of recommendation, if needed, to assess their candidacy for admission.

Program Requirements

Students take 11 courses to complete the degree—two core required courses, seven core customizable courses, an elective from bioscience, and an elective from computer science. After completion, students may choose an independent study project (optional).

Code	Title	Credits
Core Courses - Required:		
AS.410.602	Molecular Biology	4
AS.410.610	Epigenetics, Gene Organization & Expression	4
Core Courses - Customizable		
AS.410.633	Introduction to Bioinformatics	4
or EN.605.652	Biological Databases and Database Tools	
AS.410.634	Practical Computer Concepts for Bioinformatics	4
or EN.605.641	Principles of Database Systems	
EN.605.620	Algorithms for Bioinformatics	3
or EN.605.621	Foundations of Algorithms	
Select four of the following:		16
AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.639	Protein Bioinformatics	
AS.410.640	Molecular Phylogenetic Techniques	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.698	Bioperl	
AS.410.712	Advanced Practical Computer Concepts for Bioinformatics	
AS.410.713	Advanced Genomics and Genetics Analyses	
AS.410.734	Practical Introduction to Metagenomics	
AS.410.736	Genomic and Personalized Medicine	
EN.605.643	Linked Data and the Semantic Web	
EN.605.647	Neural Networks	
EN.605.651	Principles of Bioinformatics	
EN.605.653	Computational Genomics	
EN.605.656	Computational Drug Discovery,Dev	
EN.605.657	Statistics for Bioinformatics	
EN.605.716	Modeling and Simulation of Complex Systems	
EN.605.751	Algorithms for Structural Bioinformatics	
EN.605.755	Systems Biology	
EN.705.601	Applied Machine Learning	
Electives		
Computer Science		
Select one of the following:		3
EN.605.601	Foundations of Software Engineering	
EN.605.644	XML Design Paradigms	
EN.605.649	Introduction to Machine Learning	
EN.605.662	Data Visualization	
EN.605.681	Principles of Enterprise Web Development	
EN.605.684	Agile Development with Ruby on Rails	
EN.605.686	Mobile Application Development for the Android Platform	
EN.605.701	Software Systems Engineering	
EN.605.741	Large-Scale Database Systems	
EN.605.746	Advanced Machine Learning	

EN.605.747	Evolutionary and Swarm Intelligence	
EN.605.759	Independent Project in Bioinformatics	
EN.605.788	Big Data Processing Using Hadoop	
Biotechnology		
Select one of the following:		4
AS.410.603	Advanced Cell Biology	
AS.410.604	Cellular Signal Transduction	
AS.410.612	Human Molecular Genetics	
AS.410.613	Principles of Immunology	
AS.410.615	Microbiology	
AS.410.616	Virology	
AS.410.622	Molecular Basis of Pharmacology	
AS.410.629	Genes & Disease	
AS.410.630	Gene Therapy	
AS.410.632	Emerging Infectious Diseases	
AS.410.638	Cancer Biology	
AS.410.641	Clinical & Molecular Diagnostics	
AS.410.648	Clinical Trial Design and Conduct	
AS.410.656	Recombinant DNA Laboratory	
AS.410.752	High Throughput Screening & Automation Lab	
AS.410.800	Independent Research in Biotechnology	

MS in Bioinformatics with Thesis Option

Students interested in pursuing the MS in Bioinformatics with the thesis are required to take 12 courses. The thesis requires a two-semester research project. Students complete AS.410.800 Independent Research in Biotechnology first and AS.410.801 Biotechnology Thesis the following semester. Students interested in this option should consult with the program advisor.

Biotechnology Education, Certificate

advanced.jhu.edu/biotecheducation (https://advanced.jhu.edu/academics/certificates/biotechnology-education/)

The Certificate in Biotechnology Education incorporates the fundamental and emerging ideas in biology and biotechnology, as well as issues related to teaching and learning of bioscience at the middle and high school levels.

Middle and secondary teachers, as well as curriculum and instructional leaders, will strengthen their content knowledge and pedagogic techniques in bioscience, and develop ways to teach bioscience effectively in their classrooms.

This Certificate consists of five graduate-level courses. The Independent Research Project course will emphasize inquiry-oriented approaches and integrating technology in bioscience education.

Moreover, teachers will analyze recent research on bioscience education, reflect on their learning and practice, and develop teaching tools and assessment strategies to engage students in bioscience-related problems and inquiries.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Requirements

Code	Title	Credits
Core Courses - Required:		
AS.410.303	Foundations in Bioscience	4
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4
AS.410.800	Independent Research in Biotechnology	4
Core Courses - Customizable		
Select at least one of the following: [1]		4
AS.410.652	Cell Culture Techniques	
AS.410.656	Recombinant DNA Laboratory	
AS.410.658	Biodefense & Infectious Disease Laboratory Methods	
AS.410.660	Immunological Techniques in Biotechnology	
Total Credits		**20**

[1] Students must enroll in one laboratory courses offered at the Homewood campus. Laboratory courses are not offered online.

See course descriptions in the Center for Biotechnology Education (p. 2550).

Biotechnology Enterprise, Certificate

advanced.jhu.edu/biotechenterprise (https://advanced.jhu.edu/academics/certificates/biotechnology-enterprise/)

The Certificate in Biotechnology Enterprise is designed to complement students' pre-existing scientific knowledge to help them bring scientific discoveries to the wider public. Students will gain a solid understanding of the enterprise and entrepreneurial skills needed in a successful biotechnology enterprise.

This certificate consists of five graduate-level courses and is a flexible option for working professionals looking to enhance their skill set.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

- Bachelor's degree from an accredited US college or university. A bachelor's degree in the life sciences is recommended.
- Minimum GPA of 3.0 on a 4.0 scale. Meeting the minimum GPA requirement does not guarantee admission.

Program Requirements

Code	Title	Credits
Core Courses - Customizable		
Select two of the following:		8
AS.410.643	Managing and Leading Biotechnology Professionals	
AS.410.644	Marketing Aspects of Biotechnology	
AS.410.680	Finance for Biotechnology [1]	
Electives		

Select three of the following:		12
AS.410.607	Proseminar in Biotechnology	
AS.410.627	Translational Biotechnology: From Intellectual Property to Licensing [1]	
AS.410.637	Bioethics	
AS.410.642	Economic Dynamics of Change in Biotechnology	
AS.410.643	Managing and Leading Biotechnology Professionals	
AS.410.644	Marketing Aspects of Biotechnology	
AS.410.645	Biostatistics [1]	
AS.410.646	Creating a Biotechnology Enterprise	
AS.410.647	Research Ethics	
AS.410.649	Introduction to Regulatory Affairs	
AS.410.650	Legal Aspects of Biotechnology	
AS.410.651	Clinical Development of Drugs and Biologics [1]	
AS.410.665	Bioscience Communication	
AS.410.684	Technology Transfer & Commercialization	
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise	
AS.410.688	Project Management in Biotechnology	
AS.410.689	Leading Change in Biotechnology	
AS.410.703	Strategic Planning for the Biotechnology Enterprise	
AS.410.704	Social Entrepreneurship in BioScience	
AS.410.728	Managing Innovation in the Life Sciences	
AS.410.732	Funding a New Venture	
AS.410.756	Grants and Federal Funding for Biotechnology Enterprises	
Total Credits		**20**

[1] Also counts as science elective

See course requirements in the Center for Biotechnology Education (p. 2550).

Biotechnology, Master of Science

MS in Biotechnology

advanced.jhu.edu/msbiotech (http://biotechnology.jhu.edu)

The MS in Biotechnology program offers a comprehensive exploration of basic science, applied science, and lab science, with a biotechnology focus. The program gives students a solid grounding in biochemistry, molecular biology, cell biology, genomics, and proteomics, and the flexibility for students to tailor elective coursework to meet their individual career goals. In addition to the general degree, the program offers six different concentrations:

- Biodefense
- Bioinformatics
- Biotechnology Enterprise
- Molecular Target and Drug Discovery Technologies
- Regulatory Affairs
- Regenerative and Stem Cell Technologies

Thus, students can choose to solely focus on strengthening their science knowledge and research skills, or to also develop the skills to lead lab teams, make development and planning decisions, create and apply research modalities to large projects, and take the reins of management and marketing decisions.

This 10-course degree program is thesis-optional, part-time or full-time, and can be completed fully on-site, online, or through a combination of on-site and online courses.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Science in Biotechnology requires:

An undergraduate degree in the natural sciences or engineering with at least a 3.0 on a 4.0 scale in undergraduate studies (relevant work experiences are also considered); applicants with degrees in other disciplines may be able to enroll if their undergraduate work included the prerequisite courses that follow:

- Two semesters of biology.
- Two semesters of college chemistry, preferably with laboratories.
- Two semesters of organic chemistry, preferably with laboratories. Students without adequate organic chemistry may be admitted provisionally to take AS.410.302 Bio-Organic Chemistry.

The Admissions Committee reserves the right to request additional information, such as a GRE score or letters of recommendation, to assess the applicant's candidacy for admission.

Program Requirements

Code	Title	Credits
Core Courses - Required:		
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4
AS.410.603	Advanced Cell Biology ("Advanced Cell Biology" starting Fall 2022)	4
AS.410.604	Cellular Signal Transduction ("Cellular Signal Transduction" starting Fall 2022)	4
Electives		
Select six elective courses [1]		24
Total Credits		**40**

[1] See course listings page (p. 2550); at least two must be science electives.

Course requirements differ for the certificate and concentration programs.

Please note: Many of the elective courses require prior completion of core courses. The core courses introduce the foundational information required for these courses.

MS in Biotechnology with Thesis Option

Students interested in pursuing the MS in Biotechnology with the thesis are required to take 11 courses. The thesis requires a two-semester research project. Students complete AS.410.800 Independent Research in Biotechnology, and then AS.410.801 Biotechnology Thesis the following semester. Students interested in this option should consult with the program advisor.

MS in Biotechnology Concentrations (Optional)

Students wishing to focus on a specialized discipline within the MS in Biotechnology program may enroll in one of seven concentrations:

- Biodefense
- Bioinformatics
- Biotechnology Enterprise
- Molecular Targets and Drug Discovery
- Regulatory Affairs
- Regenerative and Stem Cell Technologies Concentration

Concentration in Biodefense

The biodefense concentration integrates basic and translational science to train the next generation of professionals for employment in academia, industry, and government. The curriculum provides students with a solid foundation in basic science, and investigates the various applications of medical science and biotechnology for detection, identification, and response to bio threats.

Specific disciplines of study include molecular biology, infectious diseases, bioinformatics, immunology, epidemiology, molecular diagnostics, and policy.

Code	Title	Credits
Core Courses Required:		
Core requirements differ for this concentration.		
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4
AS.410.603	Advanced Cell Biology	4
AS.410.633	Introduction to Bioinformatics	4
AS.410.692	Biological & Chemical Threat Response & Forensics	4
AS.410.693	Science, Medicine & Policy in Biodefense	4
Core Courses - Customizable:		
Select one of the following:		4
Must be completed onsite		
AS.410.652	Cell Culture Techniques	
AS.410.656	Recombinant DNA Laboratory	
AS.410.658	Biodefense & Infectious Disease Laboratory Methods	
AS.410.659	Advanced Recombinant DNA Lab	
AS.410.660	Immunological Techniques in Biotechnology	
AS.410.731	Bioprocessing and Scale-up Laboratory	
AS.410.752	High Throughput Screening & Automation Lab	
AS.410.780	Stem Cell Culture Laboratory Methods	
Electives		
Select three of the following:		12
AS.410.604	Cellular Signal Transduction	
AS.410.611	Vaccinology	
AS.410.613	Principles of Immunology	
AS.410.614	Pathogenic Bacteriology	
AS.410.615	Microbiology	
AS.410.616	Virology	
AS.410.618	Parasitology	
AS.410.621	Agricultural Biotechnology	
AS.410.631	Infectious Diseases	
AS.410.632	Emerging Infectious Diseases	
AS.410.639	Protein Bioinformatics	
AS.410.640	Molecular Phylogenetic Techniques	
AS.410.641	Clinical & Molecular Diagnostics	
AS.410.645	Biostatistics	
AS.410.652	Cell Culture Techniques	
AS.410.655	Radiation Biology	
AS.410.656	Recombinant DNA Laboratory	
AS.410.658	Biodefense & Infectious Disease Laboratory Methods	
AS.410.659	Advanced Recombinant DNA Lab	
AS.410.660	Immunological Techniques in Biotechnology	
AS.410.662	Epidemiology: Diseases in Populations	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.696	Bioassay Development	
AS.410.731	Bioprocessing and Scale-up Laboratory	
AS.410.752	High Throughput Screening & Automation Lab	
AS.410.780	Stem Cell Culture Laboratory Methods	
Total Credits		**40**

Concentration in Bioinformatics

Given the vast amount of information generated from studies on humans and other organisms, and the need for scientists and researchers to access and manipulate these data, the biotechnology program offers courses that can either be sampled individually or taken together to complete a concentration in bioinformatics.

In addition to the four core courses (Biochemistry, Molecular Biology, Advanced Cell Biology I, and Advanced Cell Biology II) and the two science electives, degree candidates must complete any four of these courses to satisfy the bioinformatics concentration requirements:

Code	Title	Credits
Bioinformatics Courses		
AS.410.633	Introduction to Bioinformatics	
AS.410.634	Practical Computer Concepts for Bioinformatics	
AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.639	Protein Bioinformatics	
AS.410.640	Molecular Phylogenetic Techniques	
AS.410.645	Biostatistics	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.698	Bioperl	
AS.410.709	Cancer Genomics	
AS.410.712	Advanced Practical Computer Concepts for Bioinformatics	
AS.410.713	Advanced Genomics and Genetics Analyses	

AS.410.736	Genomic and Personalized Medicine	
AS.410.734	Practical Introduction to Metagenomics	

Concentration in Biotechnology Enterprise

For research discoveries to reach the public, an understanding of the overall enterprise of biotechnology is essential. Success in this industry requires two distinct sets of skills and perspectives: understanding the science and understanding the business. Students in this concentration must complete four core science courses, four core enterprise courses, and two science electives.

Code	Title	Credits
Biotechnology Enterprise Concentration Courses		
Select four of the following:		16
AS.410.607	Proseminar in Biotechnology	
AS.410.627	Translational Biotechnology: From Intellectual Property to Licensing [1]	
AS.410.637	Bioethics	
AS.410.638	Cancer Biology	
AS.410.642	Economic Dynamics of Change in Biotechnology	
AS.410.643	Managing and Leading Biotechnology Professionals	
AS.410.644	Marketing Aspects of Biotechnology	
AS.410.645	Biostatistics [1]	
AS.410.646	Creating a Biotechnology Enterprise	
AS.410.647	Research Ethics	
AS.410.649	Introduction to Regulatory Affairs	
AS.410.650	Legal Aspects of Biotechnology	
AS.410.651	Clinical Development of Drugs and Biologics [1]	
AS.410.665	Bioscience Communication	
AS.410.680	Finance for Biotechnology	
AS.410.684	Technology Transfer & Commercialization	
AS.410.685	Emerging Issues in Biotechnology	
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise	
AS.410.688	Project Management in Biotechnology	
AS.410.689	Leading Change in Biotechnology	
AS.410.703	Strategic Planning for the Biotechnology Enterprise	
AS.410.704	Social Entrepreneurship in BioScience	
AS.410.705	Problem Solving and Innovation ("Problem Solving and Innovation" starting Fall 2022)	
AS.410.728	Managing Innovation in the Life Sciences	
AS.410.732	Funding a New Venture	
AS.410.756	Grants and Federal Funding for Biotechnology Enterprises	
AS.410.806	Independent Studies in Biotechnology Enterprise and Entrepreneurship (Open only to students in the MBEE program)	
Total Credits		**16**

1 These courses count toward science elective requirement.

Concentration in Molecular Targets and Drug Discovery

Code	Title	Credits
Concentration Courses		
AS.410.696	Bioassay Development	4
AS.410.750	Molecular Targets & Cancer	4
AS.410.751	Drug Design and Chemical Libraries	4
AS.410.752	High Throughput Screening & Automation Lab	4
Elective Courses		
Select two of the following: [1]		8
AS.410.613	Principles of Immunology	
AS.410.620	Advanced Topics in Immunology	
AS.410.622	Molecular Basis of Pharmacology	
AS.410.633	Introduction to Bioinformatics	
AS.410.638	Cancer Biology	
AS.410.639	Protein Bioinformatics	
AS.410.645	Biostatistics	
AS.410.652	Cell Culture Techniques	
AS.410.660	Immunological Techniques in Biotechnology	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.731	Bioprocessing and Scale-up Laboratory	
Total Credits		**24**

1 The following is a list of recommended electives for the MTDDT concentration.

Concentration in Regulatory Affairs

Developed in consultation with representatives from the Food and Drug Administration, the Regulatory Affairs Professional Society, and the biotechnology industry, this concentration in the Master of Science in Biotechnology provides students with the knowledge and understanding required for companies and organizations to comply with federal and state regulatory statutes for the development, approval, and commercialization of drugs, biologics, foods, and medical devices.

Students in this concentration must complete four core science courses, four core regulatory affairs courses, and two science electives.

Code	Title	Credits
Regulatory Affairs Concentration Courses		
Select four of the following:		16
AS.410.627	Translational Biotechnology: From Intellectual Property to Licensing	
AS.410.648	Clinical Trial Design and Conduct	
AS.410.649	Introduction to Regulatory Affairs	
AS.410.651	Clinical Development of Drugs and Biologics	
AS.410.673	Biological Processes in Regulatory Affairs	
AS.410.675	International Regulatory Affairs	
AS.410.676	Food And Drug Law	
AS.410.682	Validation in Biotechnology	
AS.410.683	Introduction to cGMP Compliance	
AS.410.686	Regulation of Good Food Production Practices	
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise	
AS.410.690	International Food Regulations	
AS.410.701	Intro to Food Safety Regulation	

AS.410.702	Biomedical Software Regulation	
AS.410.715	Medical Device Regulation	
AS.410.727	Regulatory Strategies in Biopharmaceuticals	
AS.410.802	Independent Studies in Regulatory Science	
AS.410.803	Regulatory Science Thesis	
Total Credits		**16**

Students may choose any two science electives for which they have met the prerequisites.

Concentration in Regenerative and Stem Cell Technologies

Within the biotechnology industry, there is increasingly a need for highly skilled professionals in the area of regenerative technologies, who possess an in-depth understanding of stem cells, gene therapy, regenerative medicine, and the laboratory skills necessary to advance this rapidly expanding field of research and clinical development. Graduates of this concentration will fill key positions in clinical, industry, and research laboratories which are using cell therapies for treatment of diseases.

In addition to the four core courses (Biochemistry, Molecular Biology, Advanced Cell Biology I and Advanced Cell Biology II), students must complete the four concentration courses and any two electives.

Code	Title	Credits
Concentration Courses		
AS.410.630	Gene Therapy	4
AS.410.653	Regenerative Medicine: from Bench to Bedside	4
AS.410.753	Stem Cell Biology	4
AS.410.780	Stem Cell Culture Laboratory Methods	4
Electives		
Select two electives		8
Total Credits		**24**

Biotechnology, Master of Science/ MBA

MS in Biotechnology / MBA

advanced.jhu.edu/biomba (https://advanced.jhu.edu/academics/graduate/ms-biotechnology/ms-biotechnology-mba-dual-degree/)

Johns Hopkins University offers a dual degree graduate program that prepares bioscience professionals for success in both the science and business of biotechnology. Drawing from the strengths of the Krieger School of Arts and Sciences and the Carey Business School, this innovative program allows students to earn two advanced degrees in less time than it takes to earn them separately. Dual degree recipients receive both diplomas upon completion of both programs: one from the Krieger School of Arts and Sciences, and one from the Carey Business School.

Program Features

- Complete simultaneously or sequentially
- Receive two degrees
- Students may count 3 courses from their MS program toward the Carey 54-credit Professional MBA program and, as a result, complete the MBA with 42 credits of Carey courses
- Although not required, choose from eight in-demand specializations including business analytics and risk management; entrepreneurship, innovation, and technology; financial management; health care management, innovation, and technology; investments; digital marketing; entrepreneurial marketing; and public and private sector leadership.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

MS in Biotechnology Admissions Requirements

In addition to the materials and credentials required for all programs, the Master of Science in Biotechnology requires:

An undergraduate degree in the natural sciences or engineering with at least a 3.0 on a 4.0 scale in undergraduate studies (relevant work experiences are also considered); applicants with degrees in other disciplines may be able to enroll if their undergraduate work included the prerequisite courses that follow:

- Two semesters of biology. Students without adequate biology may be admitted provisionally to take AS.410.303 Foundations in Bioscience.
- Two semesters of college chemistry, preferably with laboratories.
- Two semesters of organic chemistry, preferably with laboratories. Students without adequate organic chemistry may be admitted provisionally to take AS.410.302 Bio-Organic Chemistry.

Additional Requirements

For the MS in Biotechnology and MBA Dual Degree, **two letters of recommendation are required**.

The Admissions Committee reserves the right to request additional information, such as a GRE score, to assess the applicant's candidacy for admission.

MBA Admissions Requirements

- GRE or GMAT exam
- At least two years of progressive, full-time, professional experience after the completion of undergraduate studies for the MBA.

A waiver of the GRE or GMAT exam may be approved if a candidate has:

- Completed a graduate degree and can demonstrate quantitative ability through coursework of B or better in statistics, corporate finance, or microeconomics.
- Completed an undergraduate degree and has at least five years of professional experience. Applicant has also taken at least one course in statistics, corporate finance, and microeconomics, earned a B or better, and earned an overall GPA of 3.0 or better.
- A professional designation, such as CPA or CFA

Program Requirements

The program requires 82 credits, 42 credits (20 credits Flex MBA Business Foundation and 22 credits of electives) for the MBA and 40 credits in Biotechnology. The 42 MBA credits must be completed with "BU" courses from the Carey Business School. Dual degree recipients receive both diplomas upon completion of both programs.

Biotechnology Requirements

Code	Title	Credits
Core Courses - Required:		
AS.410.601	Biochemistry	4
AS.410.602	Molecular Biology	4

AS.410.603	Advanced Cell Biology	4
AS.410.604	Cellular Signal Transduction	4
Electives (Six courses)		**24**
AS.410.645	Biostatistics (students who take Biostatistics may take one additional Carey Business School elective in place of BU.510.601 Statistical Analysis)	
Total Credits		**40**

MBA Requirements

Code	Title	Credits
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis (Students who complete AS.410.645 Biostatistics may take an additional Carey Business Elective in place of BU.510.601 Statistical Analysis.)	2
BU.150.620	Strategic Management	2
Electives (22 credits)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

Food Safety Regulation, Master of Science

MS in Food Safety Regulation

advanced.jhu.edu/foodsafety (https://advanced.jhu.edu/academics/graduate/ms-food-safety-regulation/)

The Master of Science in Food Safety Regulation is designed to provide students with an understanding of the legal and regulatory complexities of food production, labeling, and distribution. The program helps prepare students to assist companies and organizations that grow, process, distribute, or sell foods and beverages to maintain compliance with federal and state regulatory statutes for the production, distribution, and commercialization of food products.

This 10-course degree program can be completed part- or full-time either online or through a combination of on-site and online courses. The curriculum offers hands-on, real-life food safety regulatory experience through case studies and other assignments taught by professionals in the field of food safety.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Science in Food Safety Regulation requires:

- One semester of biochemistry at the undergraduate or graduate level
- One semester of organic chemistry at the undergraduate or graduate level, or AS.410.302 Bio-Organic Chemistry (available to students admitted provisionally only)
- An undergraduate degree in the life sciences or engineering from a four-year college with at least a 3.0 on a 4.0 scale. Meeting the minimum GPA requirement does not guarantee admission.
- If a candidate does not have the necessary science prerequisites but meets all the other requirements, this candidate may be admitted provisionally. A provisional student is required to take AS.410.303 Foundations in Bioscience.

The Admissions Committee reserves the right to request additional information from applicants, if needed, to assess their candidacy for admission.

Program Requirements

Code	Title	Credits
Core Courses - Required:		
AS.410.674	Food Microbiology	4
AS.410.686	Regulation of Good Food Production Practices	4
AS.410.700	Food Labeling and Packaging Regulations	4
AS.410.701	Intro to Food Safety Regulation	4
AS.410.716	Food Toxicology	4
AS.410.717	Risk Assessment and Management	4
AS.410.718	Food Safety Audits and Surveillance	4
Electives		
Select three electives. The three electives can be chosen from any of the Center for Biotechnology Education program courses for which a student has met the prerequisites.		12
Total Credits		**40**

- Interpret existing food regulations from the FDA and USDA
- Apply existing food regulations to real-world scenarios
- Assess risk based on known/ anticipated assumptions
- Distinguish the methods to detect, quantify, and control microbial growth
- Analyze the requirements of Good Manufacturing Practices regulations in the United States
- Demonstrate ability to communicate scientifically both orally and in writing.
- Demonstrate the ability to collaborate in a diverse group to achieve an objective

Individualized Genomics and Health, Master of Science

MS in Individualized Genomics and Health

advanced.jhu.edu/igh (https://advanced.jhu.edu/academics/graduate/ms-individualized-genomics-health/)

Individualized genomics and health is a rapidly growing area of research and applied science. The growth is due in large part to the increasing dependence on DNA and RNA sequence analysis of human and microbial genomes for diagnosis and treatment of disease. This emerging field requires a workforce with multi-disciplinary skills in bioinformatics, bioscience, regulatory science, policy, and ethics. The goal of this degree program is to produce a highly skilled workforce with the theoretical knowledge and practical skills to meet the demands of the academic, research, and business communities.

As the field of individualized genomics and health requires practitioners to have multiple competencies, the core of the Master's degree will include foundation courses in epigenetics, human molecular genetics, ethical, legal and regulatory aspects of individualized genomics, bioinformatics, and individual genome analysis. After completion of the core requirements, students may choose to concentrate in Laboratory Diagnostics, Genomics, Regulatory Science or Policy, or choose a general concentration.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Individualized Genomics and Health requires:

- A 4-year bachelor's degree in the life sciences or engineering with a grade-point average of at least 3.0 on a 4.0
- Organic chemistry or AS.410.302 Bio-Organic Chemistry
- Biochemistry or AS.410.601 Biochemistry
- Advanced cell biology I, or AS.410.603 Advanced Cell Biology
- Molecular biology, or AS.410.602 Molecular Biology
- Biostatistics or AS.410.645 Biostatistics

The Admissions Committee reserves the right to request additional information, such as a GRE score or letters of recommendation, from applicants to assess their candidacy for admission.

PROGRAM REQUIREMENTS

- Six required core courses
- Four electives

Code	Title	Credits
Core Courses - Required:		
AS.410.610	Epigenetics, Gene Organization & Expression	4
AS.410.612	Human Molecular Genetics	4
AS.410.629	Genes & Disease	4
AS.410.633	Introduction to Bioinformatics	4
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise	4
AS.410.736	Genomic and Personalized Medicine	4
Electives (Four required)		**16**
Total Credits		**40**

Electives

Choose any graduate level course from the Biotechnology Center. (p. 2550)

Concentrations

LabOratory Diagnostics

Code	Title	Credits
Electives		
Select three of the following:		12
AS.410.641	Clinical & Molecular Diagnostics	
AS.410.656	Recombinant DNA Laboratory	
AS.410.659	Advanced Recombinant DNA Lab	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
Total Credits		**12**

Genomics

Code	Title	Credits
Electives		
Select three of the following:		12
AS.410.634	Practical Computer Concepts for Bioinformatics	
AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.709	Cancer Genomics	
AS.410.734	Practical Introduction to Metagenomics	
Total Credits		**12**

Regulatory

Code	Title	Credits
Electives		
Select three of the following:		
AS.410.676	Food And Drug Law	4
AS.410.702	Biomedical Software Regulation	4
AS.410.721	In Vitro Diagnostic Regulation	4
Total Credits		**12**

Policy

Code	Title	Credits
Electives		
Select three of the following:		12
AS.410.708	Medical Product Reimbursement	
AS.410.721	In Vitro Diagnostic Regulation	
Additional courses being developed		
Total Credits		**12**

MS in Individualized Genomics and Health with Thesis Option

Students interested in pursuing the MS in Individualized Genomics and Health with the thesis are required to take 11 courses. The thesis requires a two-semester research project. Students complete AS.410.800 Independent Research in Biotechnology, and then AS.410.801 Biotechnology Thesis the following semester. Students interested in this option should consult with the program adviser.

LEARNING OUTCOMES

Students will be able to:

- Explain the molecular and genetic basis for human disease including the role of epigenetic.
- Analyze interaction between Inherited, symbiotic, disease, and environmental inputs to health.
- Apply bioinformatics tools to the analysis of human DNA sequences.
- Explain the ethical, legal and regulatory aspects of individualized genomics and health.
- Discuss the laboratory methods required to identifying genes responsible for disease.

Master of Biotechnology Enterprise and Entrepreneurship

Master of Biotechnology Enterprise and Entrepreneurship

advanced.jhu.edu/mbee (https://advanced.jhu.edu/academics/graduate-degree-programs/biotechnology-enterprise-and-entrepreneurship/)

For a biotechnology enterprise to be successful, it requires trained professionals with rigorous training in science as well as being skilled in the complexities of biotechnology commercialization. This program combines both to help build the biotechnology workforce of tomorrow. It is intended for biotechnology professionals who seek a career beyond the lab bench in an existing private enterprise or government organization or for those who seek to start a new biotechnology enterprise.

This program is designed for full-time working adults, primarily delivered in an online format, and taught by faculty that work in the industry (both private enterprise and government). The curriculum is designed to prepare the next generation of interdisciplinary professionals to address current and future challenges in the biotechnology industry.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Science in Biotechnology Enterprise and Entrepreneurship requires:

- One semester of biochemistry and cell biology at the undergraduate or graduate level. Those that do not but have a strong background will be considered but might be asked to take AS.410.303 Foundations in Bioscience
- An undergraduate degree in the life sciences or engineering from a four-year college with at least a 3.0 on a 4.0 scale. Meeting the minimum GPA requirement does not guarantee admission.

The Admissions Committee reserves the right to request additional information from applicants, if needed, to assess their candidacy for admission.

Program Requirements

- Six required core courses
- One customizable core course
- Three electives

Code	Title	Credits
Core Courses - Required:		
AS.410.607	Proseminar in Biotechnology	4
AS.410.627	Translational Biotechnology: From Intellectual Property to Licensing	4
AS.410.644	Marketing Aspects of Biotechnology	4
AS.410.680	Finance for Biotechnology	4
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise	4
AS.410.804	Practicum in Biotechnology Enterprise & Entrepreneurship	4
Core Course - Customizable		**4**
Select one of the following:		
AS.410.643	Managing and Leading Biotechnology Professionals	
AS.410.689	Leading Change in Biotechnology	
Electives (three required)		**12**
Total Credits		**40**

Master of Biotechnology Enterprise and Entrepreneurship Concentration (Optional)

Students wishing to focus on a specialized discipline within the Master of Biotechnology Enterprise and Entrepreneurship program may enroll in a concentration in Biotechnology Legal/Regulatory.

In addition to the seven core courses, degree candidates must complete any three of these courses to satisfy the Biotechnology Legal/Regulatory concentration requirements:

Code	Title	Credits
Electives		
Select three of the following:		12
AS.410.648	Clinical Trial Design and Conduct	
AS.410.650	Legal Aspects of Biotechnology	
AS.410.651	Clinical Development of Drugs and Biologics	
AS.410.673	Biological Processes in Regulatory Affairs	
AS.410.676	Food And Drug Law	
AS.410.683	Introduction to cGMP Compliance	
AS.410.684	Technology Transfer & Commercialization	
Total Credits		**12**

See list of courses in the Center for Biotechnology Education (p. 2550).

- Apply leadership strategies that leverage the interdisciplinary nature of the biotechnology industry in the areas of business, science, and regulation
- Construct business plans incorporating business, science, and regulatory components to assess innovative life science technologies
- Apply specialized financial acumen to create sound financial funding strategies for the life science industry
- Defend a business strategy for a company in the life science industry
- Demonstrate ability to communicate scientifically both orally and in writing.
- Demonstrate the ability to collaborate in a diverse group to achieve an objective

Regulatory Science, Master of Science

MS in Regulatory Science

regulatory.jhu.edu (https://advanced.jhu.edu/academics/graduate/ms-regulatory-science/)

There are thousands of potential medical products (drugs, biologics, devices) currently in the development pipelines of pharmaceutical and biotechnology companies - not to mention those that have already been granted marketing authorization across the globe. All of these require regulatory professionals to ensure compliance with U.S. Food and Drug Administration rules and regulations and/or their equivalents in other countries. This program prepares students to become leaders in the regulatory field by helping them to become fluent in the regulation of medical products both in the U.S and overseas.

The program is designed for full-time working adults, primarily delivered in an online format, and taught by faculty that work in the industry (both private enterprise and government).

The curriculum is designed to prepare the next generation of interdisciplinary professionals to address current and future challenges in the industry.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Science in Regulatory Sciences requires:

- Bachelor's degree from an accredited US college or university in the life sciences or in engineering.
- One semester of biochemistry and one semester of cell biology at the undergraduate or graduate level

The Admissions Committee reserves the right to request additional information from applicants, if needed, to assess their candidacy for admission.

PROGRAM REQUIREMENTS

- Seven core courses
- Three electives

The three electives can be chosen from any of the Center for Biotechnology Education courses (p. 2550) for which a student has met the prerequisites.

Code	Title	Credits
Core Course - Required:		
AS.410.627	Translational Biotechnology: From Intellectual Property to Licensing	4
AS.410.649	Introduction to Regulatory Affairs	4
AS.410.651	Clinical Development of Drugs and Biologics	4
AS.410.673	Biological Processes in Regulatory Affairs	4
AS.410.676	Food And Drug Law	4
AS.410.683	Introduction to cGMP Compliance	4
AS.410.679	Practicum in Regulatory Science	4
Electives:		
Select three electives		12
Total Credits		**40**

- Justify recommendations to pursue a particular regulatory/clinical path from a legal and scientific point of view
- Identify the relationships between clinical trials, the approval process for medical products, and the impact of labeling
- Demonstrate ability to apply guidances and evaluate all aspects of clinical trials.
- Develop a regulatory strategy document for a medical product
- Analyze the requirements of Good Manufacturing Practices regulations for medical products
- Examine the relationships between medical product development and underlying scientific principles
- Identify the legal and regulatory requirements for all stages of medical products
- Demonstrate ability to communicate scientifically both orally and in writing.
- Demonstrate the ability to collaborate in a diverse group to achieve an objective

Sequence Analysis and Genomics, Post-Master's Certificate

advanced.jhu.edu/sequence (https://advanced.jhu.edu/academics/certificates/sequence-analysis-genomics/)

The field of bioinformatics is continually expanding and challenging our ability to bridge the gap between molecular biology and computer technology. Specifically, the revolution in sequencing technology has resulted in vast quantities of data that require storage and analysis. The analysis of nucleic acid and protein data requires specialized bioinformatics tools and an understanding of genomics. The emerging sequencing technologies and accompanying bioinformatics tools will advance personalized medicine, pharmacogenomics, and molecular diagnostics methods. The advancement of these tools will open new avenues of research on many fronts.

This certificate is targeted at scientists who already have grounding in biochemistry, molecular biology, and cell biology, and do not need advanced computer skills; thus, they do not require all the core requirements of the other two master's programs. It introduces students to the foundations of bioinformatics through the core bioinformatics courses, and then the students take upper-level courses that are required for understanding and performing sequence and genomic analysis. The program is offered both online and on-site.

Admission Requirements

- Master's or doctoral degree in the biological sciences or engineering from an accredited institution
- One semester of biochemistry or equivalent, or AS.410.601 Biochemistry
- One semester of molecular biology or equivalent or AS.410.602 Molecular Biology

Code	Title	Credits
Core Courses - Required:		
AS.410.633	Introduction to Bioinformatics	4
AS.410.634	Practical Computer Concepts for Bioinformatics	4
AS.410.635	Bioinformatics: Tools for Genome Analysis	4
or AS.410.666	Next Generation DNA Sequencing and Analysis	
Elective Courses		
Select two of the following:		8
AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.639	Protein Bioinformatics	
AS.410.640	Molecular Phylogenetic Techniques	
AS.410.645	Biostatistics	
AS.410.666	Next Generation DNA Sequencing and Analysis	
AS.410.671	Gene Expression Data Analysis and Visualization	
AS.410.709	Cancer Genomics	

AS.410.712	Advanced Practical Computer Concepts for Bioinformatics	
AS.410.713	Advanced Genomics and Genetics Analyses	
AS.410.734	Practical Introduction to Metagenomics	
AS.410.736	Genomic and Personalized Medicine	
Total Credits		**20**

See course requirements in the Center for Biotechnology Education (p. 2550).

Communication, Master of Arts

MA in Communication

communication.jhu.edu (https://advanced.jhu.edu/academics/graduate/ma-communication/)

The Master of Arts in Communication program helps professionals advance or switch their careers. Although our diverse group of students is already working in the field of communication and looking for additional training to advance, some are transitioning from another field. Regardless, the majority of our graduates testify that the master's degree helps with getting a new position. Our alumni are managers, directors, vice presidents, presidents, and other leaders in various organizations, such as government agencies, associations, nonprofits, and corporations. Students and alumni have access to our exclusive job opportunities network and career services center. This degree provides a great opportunity to hone or perfect your communication skills, learning from leaders in the field. It is not necessarily a path to a PhD program in that it is geared toward providing practical, leading-edge skills that will prepare students to be leaders in the field.

Learning Outcomes

The curriculum of the Master of Arts in Communication program aims for the following learning outcomes for students:

1. Critically interpret social science communication theories and their role in developing effective messaging
2. Evaluate and summarize scientific communication research
3. Assess the effectiveness of communication messaging in diverse settings
4. Develop effective content that mirrors real-world communication needs

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

- Statement of purpose: Explain why you are interested in earning the Master of Arts in Communication and how it will help your career or other goals. Double space your essay and limit it to 500 words or less (place the word count at the end of the document).
- Writing sample: Please go to the online application to download instructions for your writing sample.

Program Requirements

Code	Title	Credits
Core Course - Required:		
AS.480.600	Research & Writing Methods	3
Core Courses - Customizable		
Select three of the following:		9
AS.480.601	Foundations of Digital Media	
AS.480.602	Changing Behavior through Communication	
AS.480.604	Theory of Mass Communication Practices	
AS.480.606	Persuasion	
AS.480.804	Practicum	
Electives (select six electives)		**18**
Total Credits		**30**

Concentrations

Students are not required to specify a concentration. Students who want a concentration may identify one, or occasionally two, of the fields listed below. A single course cannot count toward two concentrations. Students may take electives in any area regardless of concentration. To earn a concentration, students may have to take in-person and online courses. Although it is possible for online students to earn a concentration, there is no guarantee enough courses will be available online for all concentrations. Concentrations appear on transcripts but not diplomas.

Public and Media Relations

The concentration in public relations and media covers everything from pitching and planning, to budgeting and executing a comprehensive communication campaign. Private companies, nonprofit organizations, and federal agencies all employ communication strategies and need employees knowledgeable in theory and practice. Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.603	Communication in Practice	3
AS.480.613	Communication Ethics in Action	3
AS.480.622	Branding by Motion Picture	3
AS.480.629	Public Relations in the Age of Digital Influence	3
AS.480.634	Journalism & Publishing in the Digital Age	3
AS.480.635	Communication.org:Not-for-Profits in the Digital Age	3
AS.480.637	Using Social and Digital Media	3
AS.480.638	Utilizing Images: Media Literacy In Practice	3
AS.480.642	Corporate Social Responsibility Campaigns	3
AS.480.643	Branding and Advertising	3
AS.480.645	Health Literacy, Language and Culture	3
AS.480.653	Communicating for Social Change	3
AS.480.654	Strategic Communication Program Management	3
AS.480.657	Introduction to Public Relations	3
AS.480.658	Public Relations Writing	3
AS.480.659	Risk and Crisis Communication	3
AS.480.660	Media Relations	3
AS.480.661	International Public Relations and Public Diplomacy	3
AS.480.662	Opinion Writing	3
AS.480.663	Integrated Marketing Communication	3
AS.480.665	Speech Writing	3
AS.480.668	Understanding Markets and Audiences	3
AS.480.678	Spokesperson Development & Training	3

AS.480.681	Communication Evaluation	3
AS.480.685	Argument & Public Address	3

Political Communication

The concentration in political communication addresses issues from campaign strategies to running a press office to influencing public policy. Whether people are governing, running for office, or pushing for policy change, communication lies at the heart of politics.

Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.603	Communication in Practice	3
AS.480.613	Communication Ethics in Action	3
AS.480.622	Branding by Motion Picture	3
AS.480.632	Digital Political Strategy	3
AS.480.637	Using Social and Digital Media	3
AS.480.638	Utilizing Images: Media Literacy In Practice	3
AS.480.645	Health Literacy, Language and Culture	3
AS.480.658	Public Relations Writing	3
AS.480.659	Risk and Crisis Communication	3
AS.480.661	International Public Relations and Public Diplomacy	3
AS.480.662	Opinion Writing	3
AS.480.665	Speech Writing	3
AS.480.668	Understanding Markets and Audiences	3
AS.480.675	Public Policy Management & Advocacy	3
AS.480.678	Spokesperson Development & Training	3
AS.480.685	Argument & Public Address	3

Health Communication

The concentration in health communication covers how to develop and evaluate effective public information campaigns, how to manage the demands placed on communication specialists during a crisis, and how to incorporate behavior change messages into a variety of channels and genres, such as entertainment. Health communication professionals must develop, deliver, and evaluate modern health communication programs. This concentration explores what has been done, what works, and why.

Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.603	Communication in Practice	3
AS.480.613	Communication Ethics in Action	3
AS.480.622	Branding by Motion Picture	3
AS.480.638	Utilizing Images: Media Literacy In Practice	3
AS.480.640	Health Communication	3
AS.480.645	Health Literacy, Language and Culture	3
AS.480.653	Communicating for Social Change	3
AS.480.654	Strategic Communication Program Management	3
AS.480.659	Risk and Crisis Communication	3
AS.480.668	Understanding Markets and Audiences	3
AS.480.681	Communication Evaluation	3
AS.480.682	Health Psychology & Behavior Change	3
AS.480.686	Behavior Change and Education through Entertainment	3
AS.480.687	Intercultural Communication	3

Digital Communication

The concentration in digital communication examines the strategic use of digital technologies for communication professionals. This concentration addresses how to use the Web and social media to reach out to diverse public groups and how to incorporate digital with traditional communication campaigns. Digital communication tools are an important part of the modern communication workplace.

Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.603	Communication in Practice	3
AS.480.622	Branding by Motion Picture	3
AS.480.629	Public Relations in the Age of Digital Influence	3
AS.480.632	Digital Political Strategy	3
AS.480.633	Interactive Marketing and Advertising	3
AS.480.634	Journalism & Publishing in the Digital Age	3
AS.480.635	Communication.org:Not-for-Profits in the Digital Age	3
AS.480.636	Web Writing and Content Strategy	3
AS.480.637	Using Social and Digital Media	3
AS.480.638	Utilizing Images: Media Literacy In Practice	3
AS.480.639	Advanced Social Media Management	3
AS.480.645	Health Literacy, Language and Culture	3
AS.480.668	Understanding Markets and Audiences	3

Corporate and Nonprofit Communication

The concentration in corporate and nonprofit communication examines all of the important components of communication in an organizational context. Students study how managers communicate with staff members effectively across the organization, how businesses and nonprofits communicate with the media, and how advertisers and marketers persuade potential consumers and donors. Successful organizations have solid internal and external communication strategies. Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.603	Communication in Practice	3
AS.480.605	Organizational Communication	3
AS.480.613	Communication Ethics in Action	3
AS.480.622	Branding by Motion Picture	3
AS.480.633	Interactive Marketing and Advertising	3
AS.480.635	Communication.org:Not-for-Profits in the Digital Age	3
AS.480.637	Using Social and Digital Media	3
AS.480.638	Utilizing Images: Media Literacy In Practice	3
AS.480.642	Corporate Social Responsibility Campaigns	3
AS.480.643	Branding and Advertising	3
AS.480.645	Health Literacy, Language and Culture	3
AS.480.646	Managerial Communication	3
AS.480.653	Communicating for Social Change	3
AS.480.654	Strategic Communication Program Management	3
AS.480.657	Introduction to Public Relations	3

AS.480.659	Risk and Crisis Communication	3
AS.480.660	Media Relations	3
AS.480.663	Integrated Marketing Communication	3
AS.480.665	Speech Writing	3
AS.480.668	Understanding Markets and Audiences	3
AS.480.675	Public Policy Management & Advocacy	3
AS.480.681	Communication Evaluation	3
AS.480.687	Intercultural Communication	3

Applied Research in COMMUNICATION

Applied Research in Communication The concentration in applied research prepares students to assess the research needs of a communication effort; design theory-based formative, process, and summative evaluation studies; execute quantitative and qualitative methods; analyze data using thematic, descriptive, and inferential approaches; and use results to plan and refine communication efforts. Students must complete at least three of the following electives:

Code	Title	Credits
AS.480.608	Analytic Techniques in Communication Research	
AS.480.609	Applied Qualitative Research	
AS.480.681	Communication Evaluation	
AS.480.804	Practicum	
AS.480.800	Thesis	

Communication, Master of Arts/MBA

MA in Communication / MBA

Dual Degree Program with the Carey Business School

advanced.jhu.edu/commba (https://advanced.jhu.edu/academics/graduate/ma-communication/ma-communication-mba-dual-degree/)

The university allows students to simultaneously pursue a Master of Arts in Communication in the School of Arts and Sciences and a Master of Business Administration at the Carey Business School. To pursue these dual degrees, students must apply and be accepted to both programs. Students who successfully complete the requirements for both degrees will receive two separate degrees. Students may complete one degree first and be awarded the diploma before continuing with the second degree, or strive toward both degrees concurrently. Pending graduates must complete the graduation application for each school. Dual-degree students may participate in both commencement exercises.

Leaders in business and industry recognize the importance of communication, but few MBA programs offer communication courses. At the same time, communication professionals recognize the importance of good business practices, but programs rarely offer courses in business. The Master of Arts in Communication/Master of Business Administration dual degree program was developed to fill that need. It helps advance the careers of managers in public and media relations, advertising, crisis communication, organizational development, and risk communication. Students and alumni have access to our exclusive job opportunities network and career services center.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

Individuals who wish to apply for the dual MA in Communication/MBA program must apply through Advanced Academic Programs. They can apply to both programs concurrently, or they can start with one program and then apply for the dual degree by submitting an application to the second program through the AAP Admissions Office. The MA in Communication program will consider applicants for the MA in Communication portion of the degree, while the MBA program will consider applicants for the MBA portion of the degree. An individual can be accepted by one rather than both programs; in this case, that person can decide whether to enroll in the single program. (The Admissions Committees reserve the right to request additional information from applicants, if needed, to assess their candidacy for admission. All application materials submitted to Advanced Academic Programs become the property of the Johns Hopkins University and will not be returned to applicants under any circumstances.)

- The MA in Communication and MBA programs have different requirements for GRE or GMAT scores:
  The MA in Communication program may require GRE scores. The program waives this requirement for applicants who have (a) a cumulative undergraduate GPA of 3.0 or higher or (b) five or more years of full-time work experience after earning an undergraduate degree. Submit results directly to the Advanced Academic Programs Office of Admissions, using the code 8747. Photocopies will not be accepted.
  The MBA program may require the GMAT or GRE scores. A waiver from these exams may be approved if a candidate has:
  - Completed a graduate degree and can demonstrate quantitative ability through coursework of B or better in statistics, corporate finance, or microeconomics.
  - Completed an undergraduate degree and has at least five years of professional experience. Applicant has also taken at least one course in statistics, corporate finance, and microeconomics, and earned a B or better and earned an overall GPA of 3.0 or better.
  - Holds a professional designation, such as CPA or CFA.
- Statement of purpose: Explain why you are interested in earning the dual MA in Communication/MBA and how it will help your career. Double space your essay and limit it to 500 words or less (place the word count at the end of the document).
- Writing sample: Please go to the online application to download instructions for your writing sample.

Program Requirements

MA in Communication Curriculum

Code	Title	Credits
Core Course - Required:		
AS.480.600	Research & Writing Methods	3
Core Courses - Customizable		
Select three of the following:		9
AS.480.601	Foundations of Digital Media	
AS.480.602	Changing Behavior through Communication	
AS.480.604	Theory of Mass Communication Practices	
AS.480.606	Persuasion	
AS.480.804	Practicum	

Electives (Six courses)	18
Total Credits	**30**

MBA Curriculum

All students pursuing this dual degree must take the following courses. Course scheduling allows for completion of the MBA portion of the program in 32 months. Dual degree recipients receive both diplomas upon completion of both programs.

Code	Title	Credits
Core Courses - Required:		
BU.210.620	Accounting and Financial Reporting	2
BU.520.601	Business Analytics	2
BU.120.601	Business Communication	2
BU.220.620	Business Microeconomics	2
BU.231.620	Corporate Finance	2
BU.142.601	Leadership and Organizational Behavior	2
BU.410.620	Marketing Management	2
BU.680.620	Operations Management	2
BU.510.601	Statistical Analysis	2
BU.150.620	Strategic Management	2
Electives (11 courses)		**22**
Select 11 two-credit courses. Students may fulfill this requirement with any Carey courses for which they meet the pre-requisites and enrollment criteria.		
Total Credits		**42**

Communication, Master of Arts/ Nonprofit Management, Certificate

Combined Master of Arts in Communication/Certificate in Nonprofit Management

The university allows students to simultaneously pursue a Master of Arts in Communication and Certificate in Nonprofit Management in the School of Arts and Sciences. To enroll in both programs, students must apply and be accepted to both programs. Students who successfully complete the requirements in both programs will receive two separate documents —a communication diploma and nonprofit certificate. Students may complete one program first before continuing with the second program or be in both programs concurrently. Pending graduates must complete the graduation application for each school. Students who finish the combined program participate in a single commencement ceremony.

Professionals with sharpened skills in the social science of communication will be able to apply those skills to mission-driven nonprofit organizations. Upon graduating from the combined program, individuals will be well prepared to lead their nonprofit employers in designing and implementing communication campaigns that promote reforms in public policy, mobilize constituencies to lobby their elected officials, advance their goals through public and media relations, or change behaviors in ways that improve the health, well-being, and public safety of all. Even if students pursue careers in the corporate or public sectors, they are highly likely to interact with nonprofit or nongovernmental organizations, or serve on nonprofit boards of directors. All of these roles require an understanding of the impact of nonprofits in the U.S. and other countries, and the principles and challenges of managing them, including what it means to supervise a volunteer workforce and raise money through the generosity of others.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

Individuals who wish to apply for the combined MA in Communication/ Certificate in Nonprofit Management program must apply through Advanced Academic Programs. They can apply to both programs concurrently, or they can start with one program and then apply for the combined program by submitting an application to the second program through the AAP Admissions Office. The MA in Communication program will consider applicants for the MA in Communication portion, while the Certificate in Nonprofit Management program will consider applicants for the Certificate in Nonprofit Management portion. An individual can be accepted by one rather than both programs; in this case, that person can decide whether to enroll in the single program. (The Admissions Committees reserve the right to request additional information from applicants, if needed, to assess their candidacy for admission. All application materials submitted to the Advanced Academic Programs become the property of the Johns Hopkins University and will not be returned to applicants under any circumstances.)

- Statement of Purpose: Explain why you are interested in entering the MA in Communication and Certificate in Nonprofit Management combined program, and how it will help your career or other goals. Double space your essay and limit it to 500 words or fewer (place the word count at the end of the document).
- Writing Sample: Effective for summer 2015 and beyond, applicants to the MA in Communication program must submit a writing sample. Please click here to download the instructions and article for your writing sample. This exercise asks you to write a single, brief paragraph. It should not take the form of a larger document, such as a letter, an email, a report, or a plan. Submit one paragraph with no more than 250 words.
- GRE scores: The MA in Communication and Certificate in Nonprofit Management programs have different requirements for GRE scores:
  - The MA in Communication program may require GRE scores. The program waives this requirement for applicants who have a cumulative undergraduate GPA of 3.0 and higher or at least five years of full-time work experience after completing college. Submit results directly to the Advanced Academic Programs Office of Admissions, using the code 8747. Photocopies will not be accepted.
  - The Certificate in Nonprofit Management program does not require GRE scores.

Program Requirements

Communication Program Curriculum

The combined MA in Communication/Certificate in Nonprofit Management program enables students to reduce their course load. If students were to complete the two programs separately, they would complete a total of 16 courses. Yet students in the combined program take a total of 14 courses. Please note that students must complete all 14 courses before they are eligible to apply for graduation. Students must take the following courses from the MA in Communication program:

Code	Title	Credits
Core Courses - Required:		
AS.480.600	Research & Writing Methods	3

AS.480.602	Changing Behavior through Communication	3
Core Courses - Customizable		
Select two of the following:		*6*
AS.480.601	Foundations of Digital Media	
AS.480.604	Theory of Mass Communication Practices	
AS.480.606	Persuasion	
AS.480.804	Practicum	
Select at least one of the following:		*3*
AS.480.635	Communication.org:Not-for-Profits in the Digital Age	
AS.480.653	Communicating for Social Change	
AS.480.654	Strategic Communication Program Management	
AS.480.675	Public Policy Management & Advocacy	
Select five electives		**15**
Total Credits		**30**

Certificate in Nonprofit Management Curriculum

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Students must complete four courses under the Nonprofit Management
 program.
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Code	Title	Credits
Select four of the following:		12
AS.470.625	Resource Development and Marketing in Nonprofits	
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	
AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	
AS.470.774	Nonprofit Governance & Executive Leadership	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
AS.470.798	Financial Management and Analysis in Nonprofits	
Total Credits		**12**

Cultural Heritage Management, Master of Arts

MA in Cultural Heritage Management

advanced.jhu.edu/heritage (https://advanced.jhu.edu/academics/graduate/ma-cultural-heritage-management/)

The challenges of the 21st century and the expansion of heritage tourism worldwide have increased the need for forward-thinking management and preservation strategies. With a focus on emergent technology and its impact on conservation, preservation, and engagement; together with integrated approaches to management, and community and stakeholder partnerships, Johns Hopkins University offers an innovative, online graduate degree in Cultural Heritage Management. This degree program immerses students in a broad context of cultural heritage issues, including social, environmental, and economic trends, and provides them with the qualifications needed to assume leadership and management roles in the cultural heritage sector.

We train leaders in the field that embrace our shared humanity and heritage in order to advance its interpretation, documentation, preservation, and management for the betterment of a global society.

Our program is built around several guiding principles:

- We incorporate an inclusive definition of heritage beyond sites, monuments, and artifacts, to include full landscapes, environments, and intangible heritage.
- We recognize grassroots efforts and community buy-in as critical to successful management strategies.
- We support an integrated approach to management and a wide understanding of its ties to sustainability, development, and community.
- We take full advantage of our online medium by focusing on emergent technologies related to the field and their impact on preservation, engagement, documentation, and asset management.
- In addition to a sustained focus on digital technologies, the program is framed through a global lens, situating the local, regional, and national within a global context.

We welcome students from around the world interested in cultural heritage management. The interdisciplinary nature and international focus and concern of cultural heritage are supported well in the online format where domestic and international students have the opportunity to learn together.

The MA in Cultural Heritage Management faculty is made up of highly regarded experts in the heritage field and academia from diverse geographic locations. The faculty is primarily heritage practitioners who are active members of the global heritage community. They are passionate about training the next generation of heritage leaders and professionals and enthusiastic about the online course format.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

Applicants must hold a baccalaureate degree in study areas relevant to the curriculum (Anthropology, Archaeology, Architecture, Preservation, Art History, Conservation, Environmental Sciences, Geography, Preservation, Cultural Management or Tourism, Public History, or related field).

Applicants are accepted to the program on the understanding that they have sufficient background in a relevant field, either through their previous degree or through relevant professional experience, to be able to complete the program.

- A statement of purpose (approximately 750 words): This statement should address how your academic and professional experiences have led to your decision to apply to this program. It should demonstrate an understanding of the cultural heritage sector and describe your academic and career goals, highlighting how this program will serve those goals. If you have worked in the heritage sector in any capacity, please incorporate your experience into your statement. Your statement will be reviewed for content, organization, and writing style.

Program Requirements

Students must take a total of 10 courses:

- Three required core courses
- Three customizable core courses
- Four elective courses

Code	Title	Credits
Core Courses - Required:		**9**
AS.465.702	Studies in World Heritage	
AS.465.704	Cultural Heritage Management/Leadership	
AS.465.708	Two-Week Onsite Cultural Heritage Management Seminar [1]	
Core Courses - Customizable:		**9**
Select three of the following:		
AS.465.707	Reading the Landscape: Cultural Heritage at Scale	
AS.465.710	The Protection of Global Cultural Heritage: Laws, Policies, Politics, and Advocacy	
AS.465.730	Heritage Interpretation	
AS.465.732	Engaging Communities in Heritage	
AS.465.740	Cultural Heritage in the Digital Age	
Electives		**12**
Select four of the following:		
AS.465.706	Research/Capstone in Heritage Studies	
AS.465.712	Managing Cultural Heritage Resources	
AS.465.714	Culture as Catalyst for Sustainable Development	
AS.465.716	Cultural Heritage Risk Management and Security	
AS.465.720	Issues in Intangible Cultural Heritage	
AS.465.734	Heritage Tourism	
AS.465.736	NAGPRA: Repatriation as Compliance or Ethical Practice	
AS.465.780	Internship	
Total Credits		**30**

1 **Waiver option:** Students who are unable to travel to an onsite seminar location due to accommodation needs, financial hardship, or family challenges may apply to the program director for an exemption to the seminar (AS.465.608). If a waiver is granted, the student must enroll in the internship option (AS.465.780) to fulfill the on-site component of the degree requirement.

Learning Outcomes

The curriculum of the Master of Arts in Cultural Heritage Management program aims for the following learning outcomes for students:

- Analyze changes in the heritage field through an assessment of their theoretical and practical impacts.
- Build leadership capacities that contribute to the growth, development, and sustainability of the heritage field.
- Examine the role of new methods and techniques (including digital technology) in the field of heritage.
- Articulate the roles of policy and advocacy in the broader heritage field.
- Evaluate the impact of heritage designation at various scales from the local to the global.
- Explore the roles of multiple constituencies in heritage management.
- Create strategies for heritage management.
- Integrate academic knowledge with applied experience unique to the field of heritage.

Cultural Heritage Management, MA/ Digital Curation, Certificate

MA in Cultural Heritage Management / Certificate in Digital Curation

Students who are interested in pursuing an MA in Cultural Heritage Management and are also interested in the preservation and management of cultural heritage digital assets may enroll in this dual program. Cultural Heritage Management students may earn both the MA degree and the Certificate in Digital Curation with a total of 14 courses.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Applicants must hold a baccalaureate degree in study areas relevant to the curriculum (Anthropology, Archaeology, Architecture, Preservation, Art History, Conservation, Environmental Sciences, Geography, Preservation, Cultural Management or Tourism, Public History, or related field).

Applicants are accepted to the program on the understanding that they have sufficient background in a relevant field, either through their previous degree, or through relevant professional experience, to be able to complete the program.

- A 750-word statement of intent, that addresses your preparation and experience leading to your application to this program. It should describe how your academic and professional experiences have led to your decision to pursue a career in the heritage field with an emphasis in digital curation and how this combined degree will help you succeed in your goals. If you have worked in the heritage field in any capacity, please incorporate your experience into your statement. Your statement will be reviewed for content, organization, and writing style.

Program Requirements

Courses From the MA in Cultural Heritage Management

Students in the Cultural Heritage Management (CHM) program who are pursuing a Certificate in Digital Curation must take the following courses. Students should begin the Certificate in Digital Curation with the course AS.465.740 Cultural Heritage in the Digital Age.

Code	Title	Credits
MA in Cultural Heritage Management Courses		
Core Courses - Required:		*15*
AS.465.702	Studies in World Heritage	
AS.465.704	Cultural Heritage Management/Leadership	
AS.465.708	Two-Week Onsite Cultural Heritage Management Seminar	
AS.460.670	Digital Preservation	
AS.465.740	Cultural Heritage in the Digital Age	
Core Courses - Customizable		*6*
Select two of the following:		
AS.465.707	Reading the Landscape: Cultural Heritage at Scale	

AS.465.710	The Protection of Global Cultural Heritage: Laws, Policies, Politics, and Advocacy	
AS.465.730	Heritage Interpretation	
AS.465.732	Engaging Communities in Heritage	
Electives		**9**
Select three of the following:		
AS.465.706	Research/Capstone in Heritage Studies	
AS.465.712	Managing Cultural Heritage Resources	
AS.465.714	Culture as Catalyst for Sustainable Development	
AS.465.716	Cultural Heritage Risk Management and Security	
AS.465.720	Issues in Intangible Cultural Heritage	
AS.465.734	Heritage Tourism	
AS.465.736	NAGPRA: Repatriation as Compliance or Ethical Practice	
AS.465.780	Internship	
Digital Curation Certificate Courses		**12**
Core Courses - Required:		
AS.460.671	Foundations of Digital Curation	
AS.460.672	Managing Digital Information in Museums and Archives	
AS.460.673	Digital Curation Certificate Internship	
AS.460.674	Digital Curation Research Paper	
Total Credits		**42**

Cultural Heritage Management, MA/ Nonprofit Management, Certificate

MA in Cultural Heritage Management / Certificate in Nonprofit Management

Students pursuing an MA in Cultural Heritage Management, who are interested in furthering their nonprofit education, may enroll in the combined degree program offered with the Certificate in Nonprofit Management. Students may earn the combined degree by taking four of the six courses in the Certificate in Nonprofit Management. This enables students to earn both the MA degree and a Graduate Certificate for a total of 14 courses, 10 in Cultural Heritage Management and four in Nonprofit Management. The Combined degree of MA in Cultural Heritage Management/Certificate in Nonprofit Management allows students to acquire the technical skills needed to thrive in the workplace of both nonprofit and cultural heritage institutions.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Applicants must hold a baccalaureate degree in study areas relevant to the curriculum (Anthropology, Archaeology, Architecture, Preservation, Art History, Conservation, Environmental Sciences, Geography, Preservation, Cultural Management or Tourism, Public History, or related field).

Applicants are accepted to the program on the understanding that they have sufficient background in a relevant field, either through their previous degree, or through relevant professional experience, to be able to complete the program.

- A 750-word statement of intent, that addresses your preparation and experience leading to your application to this program. It should describe how your academic and professional experiences have led to your decision to pursue a career in the heritage field with an emphasis in nonprofit management and how this combined degree will help you succeed in your goals. If you have worked in the heritage or nonprofit fields in any capacity, please incorporate your experience into your statement. Your statement will be reviewed for content, organization, and writing style.

Program Requirements

Combined degree students of the MA in Cultural Heritage Management/ Certificate in Nonprofit Management must complete 14 courses in total. Please note that students must complete all 14 courses before they are eligible to apply for graduation.

Code	Title	Credits
MA in Cultural Heritage Management Courses		
Core Courses - Required:		**12**
AS.465.702	Studies in World Heritage	
AS.465.704	Cultural Heritage Management/Leadership	
AS.465.708	Two-Week Onsite Cultural Heritage Management Seminar	
AS.465.710	The Protection of Global Cultural Heritage: Laws, Policies, Politics, and Advocacy	
or AS.465.71	Culture as Catalyst for Sustainable Development	
Core Courses - Customizable		**9**
Select three of the following:		
AS.465.707	Reading the Landscape: Cultural Heritage at Scale	
AS.465.710	The Protection of Global Cultural Heritage: Laws, Policies, Politics, and Advocacy	
AS.465.730	Heritage Interpretation	
AS.465.732	Engaging Communities in Heritage	
AS.465.740	Cultural Heritage in the Digital Age	
Electives		**9**
Select three of the following:		
AS.465.706	Research/Capstone in Heritage Studies	
AS.465.712	Managing Cultural Heritage Resources	
AS.465.714	Culture as Catalyst for Sustainable Development	
AS.465.716	Cultural Heritage Risk Management and Security	
AS.465.720	Issues in Intangible Cultural Heritage	
AS.465.734	Heritage Tourism	
AS.465.736	NAGPRA: Repatriation as Compliance or Ethical Practice	
AS.465.780	Internship	
Certificate in Nonprofit Management Courses		
Core Courses - Customizable		
Select four of the following: [1]		12
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management (recommended) [1]	
AS.470.798	Financial Management and Analysis in Nonprofits (recommended) [1]	
AS.470.625	Resource Development and Marketing in Nonprofits	
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	

AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.774	Nonprofit Governance & Executive Leadership	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
Total Credits		**42**

[1] Recommended for students new to Nonprofit Management.

Digital Curation, Certificate

Certificate in Digital Curation

advanced.jhu.edu/digitalcuration (https://advanced.jhu.edu/academics/certificate-programs/digital-curation-certificate/)

Digital curation is an emerging field that encompasses the planning and management of digital assets over their full lifetime, from conceptualization through active use and presentation to long-term preservation in a repository for future reuse.

Museums and cultural heritage collections worldwide are now routinely digitizing all collection objects as they are acquired and loaned, not only for access but as documentation in the event of loss, damage, or theft, and to support research on collections and objects. They are also digitizing significant portions or even all of their holdings in order to create the robust websites that the public now expects. In addition, they are acquiring and creating born-digital content, such as digital media art, documentation of heritage sites, historical data in digital formats, administrative records, and scientific research data. The creation and acquisition of valuable digital assets continues at a rapid pace, and cultural heritage institutions now have a critical need for professionals in the field to manage and preserve all types of digital assets to ensure their long-term availability for researchers, educators, internal users, and the public, and to participate in the development and promotion of standards and best practices for digital curation in the scientific and cultural heritage sector.

The Johns Hopkins University Certificate in Digital Curation, offered through the graduate program in museum studies, advances the education and training of museum and other cultural heritage professionals worldwide in this emerging field. The certificate program offers a specialized curriculum that prepares current and aspiring professionals to work with digital collections, exhibitions, and research data to ensure the effective stewardship of our global cultural heritage in all types of museums, from art museums to zoos, and related scientific and cultural heritage organizations. Students in this program will also contribute to the critically needed professional literature in the field.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

Applications to the Certificate in Digital Curation will be accepted from:

- Individuals with a bachelor’s degree and at least 3 years of experience working in a museum, library, archive, or related cultural heritage field.
- Individuals with a master’s degree in museum studies or other relevant fields.

In addition to the materials and credentials required for all programs, the Certificate in Digital Curation also requires:

- Statement of Purpose: A 500-word statement describing how your academic and professional experiences have led to your decision to pursue the Certificate in Digital Curation and how this credential will help you succeed in your career goals. Your statement will be reviewed for content, organization, and writing style.
- Recommendations: Two letters of recommendation that verify professional and/or academic accomplishment.

Curriculum

Students must take a total of six courses to complete the Graduate Certificate requirements: five required core courses and one elective. All courses are three credits.

PROGRAM REQUIREMENTS

Code	Title	Credits
Core Courses - Required:		
AS.460.670	Digital Preservation	3
AS.460.671	Foundations of Digital Curation	3
AS.460.672	Managing Digital Information in Museums and Archives	3
AS.460.673	Digital Curation Certificate Internship	3
AS.460.674	Digital Curation Research Paper	3
Elective Course		**3**
Select one elective from the museum studies curriculum; Collection Management is recommended but another course may be substituted with approval.		
Total Credits		**18**

LEARNING OUTCOMES

The program prepares students to become leaders in the museum, cultural heritage, and digital curation communities upon successful completion of the program.

By the end of the program, students will be able to:

- Analyze digital curation practices in museums and cultural heritage environments from theoretical, legal, ethical, and practical perspectives.
- Develop digital preservation plans and strategies for the long-term management of digital assets.
- Apply digital curation principles to the management of digital objects and collections.
- Evaluate tools and technologies for the creation, use, and management of digital assets in museums and cultural heritage environments.
- Apply knowledge and skills through applied research in the field.

Energy Policy and Climate, Master of Science

MS in Energy Policy and Climate

energy.jhu.edu (https://advanced.jhu.edu/academics/graduate/ms-energy-policy-climate/)

The MS in Energy Policy and Climate program will prepare the next generation of interdisciplinary professionals to address the challenges of climate change and a global transition to energy systems.

Graduates will be able to demonstrate an understanding of the science related to a changing climate, the impacts of current and future climate change on natural and human systems, the vulnerabilities of these systems to predicted changes, and a variety of possible legal, policy, and technological strategies for mitigation and adaptation. Graduates will also develop a comprehension of energy production, delivery, and consumption for both traditional systems and sustainable/renewable energy alternatives, and the implications of our energy choices for averting dangerous levels of climate change.

The program was originally designed by members of JHU's Department of Earth and Planetary Sciences in the Krieger School of Arts and Sciences and by industry and policy specialists. Courses are taught by distinguished instructors with valuable experience in the academic, public, corporate, and nonprofit sectors. The program seeks to build in students the technical and management skills needed to become highly competent and ethical professionals capable of leading societal responses to the challenges of a changing climate and the quest for a revolution in energy production. The curriculum is designed to help students develop an understanding of policy strategies employed at all levels, from the local to the international level, in response to these challenges. Graduates of the program will have an understanding of the current state of the U.S. response to climate change, as well as a familiarity with multilateral agreements and non-U.S.-based approaches to both mitigation of and adaptation to climate change. Additionally, students will develop expertise in energy production and policymaking.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

The Master of Science in Energy Policy and Climate program requires:

- One semester of undergraduate calculus
- One semester of undergraduate statistics
- One semester of undergraduate chemistry or equivalent thereof

Program Requirements

- Three required core courses
- Two customizable core courses
- Five electives

Code	Title	Credits
Core Courses - Required:		
AS.425.601	Principles and Applications of Energy Technology	3
AS.425.602	Science of Climate Change and its Impact	3
AS.425.800	Research Design for Capstone Projects in Energy and Environmental Sciences	3
Core Courses - Customizable:		**6**
Select two of the following:		
AS.425.603	Climate Change Policy Analysis	
AS.425.604	Energy & Climate Finance	
AS.425.605	Introduction to Energy Law & Policy	
Electives		**15**
Total Credits		**30**

MS in Energy Policy and Climate Focus Areas

Students wishing to further customize their degree can focus on one of the following areas or combine them. These are suggested elective courses to illustrate how degree customization can take place. Students should consult with their advisor for further recommendations appropriate to their career and academic goals.

- Climate Change Focus Area
- Energy Focus Area
- Policy Focus Area
- Social Perspectives in Climate and Energy Focus Area
- Modeling Focus Area

CLIMATE change Focus Area

Code	Title	Credits
Electives		
AS.425.630	Cities and Climate Change	3
AS.425.634	Climate Change and Health	3
AS.425.637	International Climate Change Policy	3
AS.425.638	Adaptation to Climate Change	3
AS.425.647	Energy and Water Security in South Asia	3

Energy Focus Area

Code	Title	Credits
Electives		
AS.425.624	Wind Energy: Science, Technology and Policy	3
AS.425.625	Solar Energy:Science, Technology & Policy	3
AS.425.628	Renewable Energy Project Development and Finance	3
AS.425.636	Emerging Energy Technologies and Applications	3
AS.425.644	Principles & Applications of Energy Technology II	3
AS.425.646	US Offshore Energy: Policy, Science and Technology	3
AS.425.651	The Electric Grid: Technology and Policy	3
AS.425.652	Nuclear Energy: Technology, Policy, and Regulations	3

Policy Focus Area

Code	Title	Credits
Electives		
AS.425.606	Social Science Research Methods for Energy & Environmental Policy	3
AS.425.615	Understanding Public Attitudes for the Communication of Climate and Energy Policy	3
AS.425.623	Transportation Policy in a Carbon-constrained World	3
AS.425.637	International Climate Change Policy	3
AS.425.639	Energy Markets and Strategy from Europe to Asia	3
AS.425.645	Global Energy Policy	3
AS.425.652	Nuclear Energy: Technology, Policy, and Regulations	3

Social perspectives in climate and energy Focus Area

Code	Title	Credits
Electives		
AS.425.606	Social Science Research Methods for Energy & Environmental Policy	3
AS.425.615	Understanding Public Attitudes for the Communication of Climate and Energy Policy	3

AS.425.617	Energy, Eutrophication, and Inundation in Coastal Louisiana	3
AS.425.620	Climate Risk: Society and The Economy	3
AS.425.626	Climate Anthropology and Changing Communities	3

Modeling Focus Area

Code	Title	Credits
AS.420.619	Climate Dynamics	3
EN.575.720	Air Resources Management and Modeling	3
EN.575.735	Energy Policy and Planning Modeling	3

Code	Title	Credits
Electives		
Choose five of the following:		
AS.425.606	Social Science Research Methods for Energy & Environmental Policy	3
AS.425.615	Understanding Public Attitudes for the Communication of Climate and Energy Policy	3
AS.425.617	Energy, Eutrophication, and Inundation in Coastal Louisiana	3
AS.425.618	Energy, Policy and Environmental Impact in China	3
AS.425.619	Renewable Energy and Climate Change Projects in California	3
AS.425.620	Climate Risk: Society and The Economy	3
AS.425.623	Transportation Policy in a Carbon-constrained World	3
AS.425.624	Wind Energy: Science, Technology and Policy	3
AS.425.625	Solar Energy:Science, Technology & Policy	3
AS.425.626	Climate Anthropology and Changing Communities	3
AS.425.628	Renewable Energy Project Development and Finance	3
AS.425.630	Cities and Climate Change	3
AS.425.634	Climate Change and Health	3
AS.425.636	Emerging Energy Technologies and Applications	3
AS.425.637	International Climate Change Policy	3
AS.425.638	Adaptation to Climate Change	3
AS.425.639	Energy Markets and Strategy from Europe to Asia	3
AS.425.644	Principles & Applications of Energy Technology II	3
AS.425.645	Global Energy Policy	3
AS.425.646	US Offshore Energy: Policy, Science and Technology	3
AS.425.647	Energy and Water Security in South Asia	3
AS.425.651	The Electric Grid: Technology and Policy	3
AS.425.652	Nuclear Energy: Technology, Policy, and Regulations	3
AS.425.689	Energy and Environmental Graduate Seminar	3

Learning Outcomes

Graduates will be able to:

- Analyze Energy Policy and Climate (EPC) concepts and topics such as energy technology (fossil-fuel based or renewables), energy law and policy, climate change and its societal and environmental impacts (adaptation and mitigation), national and international climate change policy, energy and climate finance through technical policy developing assessments.
- Critically evaluate existing and proposed models, strategies, and policies, from a variety of sources, both academic and nonacademic.
- Develop excellent oral and written communication skills that will enhance career objectives in public sector, non-profit and/or private organizations.
- Demonstrate proficiency in use of qualitative or quantitative research methodologies and the communication of findings for relevant academic or public policy areas.

Environmental Sciences and Policy, Master of Science

MS in Environmental Science and Policy

environment.jhu.edu (https://advanced.jhu.edu/academics/graduate/ms-environmental-sciences-policy/)

Climate change, population growth, energy consumption, habitat loss, water depletion and degradation, air pollution, and species extinction have increasingly come to the fore in minds of citizens around the world. To manage the Earth's environment effectively, there is a need to understand the processes that shape the planet's surface, control the chemistry of its air and water, and generate the natural resources on which humans depend. Our unique program is distinct in its focus on the interplay between science and policy. This program is founded on the premise that rational solutions to complex, twenty-first century environmental challenges require an in-depth understanding of applicable scientific principles and an appreciation for relevant political, ethical, economic, legal, and historical contexts. Graduates of the program develop combined expertise in science and policy that empowers them to become change agents and leaders in public and private organizations responsible for safeguarding our environment. Many of the program's students are currently employed in environmental fields but wish to enhance their knowledge or move in new directions. Others seek to transition into the arena of environmental science and policy.

The program offers a flexible curriculum that allows students to customize their academic experience to suit their personal needs and interests. Courses are focused on wide-ranging issues such as imperiled global ecosystems, natural resources economics, and multinational environmental trusts and laws. The program is open to students with limited scientific background as well as those that already have a background in the environmental sciences. Core course work includes geology, hydrology, oceanography, meteorology, ecology, geographic information systems (GIS), and policymaking. Electives range across a spectrum from courses strongly oriented toward policy to ones focused more heavily on science. Electives are selected by students under the guidance of advisors.

The program was originally designed by members of the Department of Earth and Planetary Sciences at Johns Hopkins, in conjunction with experts in applied science at regional and federal institutes and agencies. Students and faculty continue to collaborate in our accelerated BS/MS degree. Courses are taught by distinguished instructors with valuable experience in the academic, public, and corporate sectors. Many of the program's alumni are highly successful professionals. Taking a holistic approach, curricula in the Environmental Sciences and Policy (ESP) program positions students to join and contribute to the global science community.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

- One semester of undergraduate calculus, statistics, and general chemistry

Students who do not have the necessary undergraduate training in calculus, statistics or chemistry may be offered provisional admission if their other credentials are strong.

B.A./M.S. Option for Johns Hopkins E&PS and ENVS Majors

Undergraduates in Earth and Planetary Sciences majoring in Environmental Science or Environmental Studies (ENVS) may apply for accelerated status toward an M.S. in Environmental Science and Policy (ESP) or Geographic Information Systems (GIS) through the JHU Krieger School of Arts & Sciences' Advanced Academic Programs. Interested students should speak with their advisor and the Director of the ESP and GIS Program, in their senior year. ENVS students may apply up to two courses (a third upon Director approval) toward the M.S. thereby leaving only eight more courses to complete the M.S. following receipt of their bachelor's degree. ENVS students will receive two separate degrees, so the requirements of both degrees must be fulfilled. Students cannot earn the M.S. degree without completion of the B.A. or B.S., however, students who do not complete the M.S. retain their B.A. or B.S.

Admission Requirements

ENVS students may apply for the B.A./M.S. anytime during the senior year or after conferral of their undergraduate degree. The application procedure is the same as that for other AAP applicants. Students admitted to the B.A./M.S. program will be assigned a graduate advisor but will also continue to be advised by their ENVS advisor for all matters concerning the bachelor's degree.

Program Requirements

- Five customizable core courses
- Five electives

Code	Title	Credits
Core Courses - Customizable:		
Select five of the following:		
AS.420.601	Geological Foundations of Environmental Science	3
AS.420.603	Environmental Applications of GIS	3
AS.420.604	Hydrology & Water Resources	3
AS.420.608	Oceanic & Atmospheric Processes	3
AS.420.611	Principles & Methods of Ecology	3
AS.420.614	Environmental Policymaking and Policy Analysis	3

Focus Areas

Students in the Master of Science in ESP program could choose to follow a focus area. The focus areas are general recommendations of logical course groupings that could be pursued. Our goal is to maintain flexibility of the ESP program, and allow students to choose courses that best fulfill their interests.

- Conservation Biology
- International Environmental Policy
- Sustainability
- Climate and Energy
- Remediation, Compliance and Assessment
- Science Writing
- Environmental Justice and Equity

The same five out of six core courses would be required, with electives chosen to support the desired focus area.

Conservation Biology Focus Area

Code	Title	Credits
AS.420.613	Forest Ecosystems	3
AS.420.623	Freshwater Ecology & Restoration of Aquatic Ecosystems	3
AS.420.625	Ecology and Ecosystem Management in Coastal and Estuarine Systems	3
AS.420.628	Ecology and Management of Wetlands	3
AS.420.637	Conservation Biology	3
AS.420.639	Landscape Ecology	3
AS.420.640	Urban Wildlife Ecology	3
AS.420.667	Analysis of Environmental & Ecological Data	3
AS.420.671	Global Land Use Change	3
AS.420.673	Ecology and Evolution of the Galapagos	3
AS.420.703	Open Source GIScience for Environmental Research	3

International Environmental Policy Focus Area

Code	Title	Credits
AS.420.605	Maritime Law and the Environment	3
AS.420.638	Coastal Zone Processes and Policy	3
AS.420.641	Natural Resources Law and Policy	3
AS.420.643	U.S. Environmental History	3
AS.420.645	Environmental and Natural Resource Security	3
AS.420.650	International Environmental Policy	3
AS.420.671	Global Land Use Change	3
AS.420.676	Global Scarcity in Freshwater Systems: Crisis and Solutions	3
AS.420.677	Spatial Statistics	3
AS.420.679	International Water: Issues and Policies	3
AS.420.687	Science Communication and Policy Engagement	3

Sustainability Focus Area

Code	Title	Credits
AS.420.609	Agroecology	3
AS.420.610	Sustainable Business	3
AS.420.612	Sustainability Science: Concepts and Challenges	3
AS.420.617	Managing Responsible Organizations for the Ecosystem	3
AS.420.624	Ocean Stewardship and Sustainability	3
AS.420.644	Sustainable Cities	3
AS.420.646	Transportation Policy and Smart Growth	3
AS.420.654	Environmental & Natural Resource Economics	3
AS.420.668	Sustainable Food Systems	3
AS.420.669	Applied Sustainability	3

AS.420.670	Sustainability Leadership	3
EN.575.734	Smart Growth Strategies for Sustainable Cities	3

Climate and Energy Focus Area

Code	Title	Credits
AS.420.603	Environmental Applications of GIS	3
AS.425.603	Climate Change Policy Analysis	3
AS.425.615	Understanding Public Attitudes for the Communication of Climate and Energy Policy	3
AS.420.616	Environmental Consequences of Conventional Energy Generation	3
AS.420.619	Climate Dynamics	3
AS.420.632	Air Quality Management and Policy	3
AS.425.651	The Electric Grid: Technology and Policy	3
AS.420.674	Applied Energy Policy in the 21st Century	3
AS.420.704	Practical Engineering Approaches to Climate Adaptation	3
EN.575.735	Energy Policy and Planning Modeling	3

Remediation, Compliance, and Assessment Focus Area

Code	Title	Credits
AS.420.615	Environmental Restoration	3
AS.420.622	Ecotoxicology	3
AS.420.629	Drinking Water,Sanitation & Health	3
EN.575.629	Modeling Contaminant Migration through Multimedia Systems	3
AS.420.631	Field Methods in Stream & Water Quality Assessment	3
AS.420.634	Bioremediation & Biofuels for Environmental Restoration	3
EN.575.643	Chemistry of Aqueous Systems	3
AS.420.651	Environmental Risk in Decision Making	3
AS.420.656	Environmental Impact Assessment & Decision Methods	3
EN.575.658	Natural Disaster Risk Modeling	3
AS.420.659	Management for Environmental Results with Performance-based Measurement	3
AS.420.660	Strategies in Watershed Management	3
AS.420.677	Spatial Statistics	3

Science Writing Focus Area

Code	Title	Credits
AS.491.658	Techniques of Science and Medical Writing	4
AS.491.750	Contemporary Science and Medical Writing: Creative and Professional Forms	4
AS.491.787	In the Field: Writing about How Science Can Save Our Wild Lands	4
AS.491.696	The Nature of Nature	4
AS.491.701	Communicating Climate Change	4

Environmental Justice and Equity

Code	Title	Credits
AS.420.606	Climate Justice	3
AS.425.626	Climate Anthropology and Changing Communities	3
AS.420.642	Public Lands-Private Interests:The Struggle for Common Ground	3
AS.420.647	Environmental Racism and Inequality	3
AS.420.665	Climate Change on the Front Lines: The Study of Adaptation in Developing Countries	3
AS.420.666	Community Development and Sustainability in developing countries	3
AS.420.672	Environmental Ethics	3
AS.420.690	Environmental Health	3

Electives

Code	Title	Credits
Select five of the following:		15
AS.420.605	Maritime Law and the Environment	3
AS.420.606	Climate Justice	3
AS.420.609	Agroecology	3
AS.420.610	Sustainable Business	3
AS.420.612	Sustainability Science: Concepts and Challenges	3
AS.420.613	Forest Ecosystems	3
AS.420.615	Environmental Restoration	3
AS.420.616	Environmental Consequences of Conventional Energy Generation	3
AS.420.617	Managing Responsible Organizations for the Ecosystem	3
AS.420.618	Terrestrial and Marine Conservation Biology	3
AS.420.619	Climate Dynamics	3
AS.420.621	The Intersections Between Science and Society: Investigating Watershed Ecosystems in the Cascades	3
AS.420.622	Ecotoxicology	3
AS.420.623	Freshwater Ecology & Restoration of Aquatic Ecosystems	3
AS.420.625	Ecology and Ecosystem Management in Coastal and Estuarine Systems	3
AS.420.627	Great Lakes Ecology and Management	3
AS.420.628	Ecology and Management of Wetlands	3
AS.420.629	Drinking Water,Sanitation & Health	3
AS.420.630	Tropical Ecology and Conservation of African Wildlife	4
AS.420.631	Field Methods in Stream & Water Quality Assessment	3
AS.420.632	Air Quality Management and Policy	3
AS.420.637	Conservation Biology	3
AS.420.638	Coastal Zone Processes and Policy	3
AS.420.639	Landscape Ecology	3
AS.420.641	Natural Resources Law and Policy	3
AS.420.642	Public Lands-Private Interests:The Struggle for Common Ground	3
AS.420.643	U.S. Environmental History	3
AS.420.644	Sustainable Cities	3
AS.420.646	Transportation Policy and Smart Growth	3
AS.420.650	International Environmental Policy	3
AS.420.651	Environmental Risk in Decision Making	3
AS.420.654	Environmental & Natural Resource Economics	3

AS.420.656	Environmental Impact Assessment & Decision Methods	3
AS.420.659	Management for Environmental Results with Performance-based Measurement	3
AS.420.660	Strategies in Watershed Management	3
AS.420.665	Climate Change on the Front Lines: The Study of Adaptation in Developing Countries	3
AS.420.666	Community Development and Sustainability in developing countries	3
AS.420.667	Analysis of Environmental & Ecological Data	3
AS.420.668	Sustainable Food Systems	3
AS.420.669	Applied Sustainability	3
AS.420.670	Sustainability Leadership	3
AS.420.671	Global Land Use Change	3
AS.420.672	Environmental Ethics	3
AS.420.673	Ecology and Evolution of the Galapagos	3
AS.420.674	Applied Energy Policy in the 21st Century	3
AS.420.675	Geology and Tropical Ecology of Hawai'i	3
AS.420.676	Global Scarcity in Freshwater Systems: Crisis and Solutions	3
AS.420.677	Spatial Statistics	3
AS.420.678	Nature Conservation and Sustainability in Cuba	3
AS.420.679	International Water: Issues and Policies	3
AS.420.681	Climate Change Adaptation and Development in Nepal	3
AS.420.687	Science Communication and Policy Engagement	3
AS.420.703	Open Source GIScience for Environmental Research	3
AS.420.704	Practical Engineering Approaches to Climate Adaptation	3
AS.420.738	Newfoundland and Labrador: A Journey Through Time	3
AS.420.800	Independent Research Project in Environmental Sciences and Policy	3

Culminating Experience

Code	Title	Credits
AS.420.800	Independent Research Project in Environmental Sciences and Policy	3
AS.420.805	Internship and Capstone Thesis	3
AS.425.800	Research Design for Capstone Projects in Energy and Environmental Sciences	3

Field Study Electives

Several ESP courses are offered as intensive study field courses. These courses meet the residency requirement and occur in a compressed format during the summer, winter, or over spring break. Each intensive study course has an additional field trip fee. Students are responsible for travel to the location of their residency course.

Code	Title	Credits
AS.425.617	Energy, Eutrophication, and Inundation in Coastal Louisiana	3
AS.420.618	Terrestrial and Marine Conservation Biology (Maine)	3
AS.420.623	Freshwater Ecology & Restoration of Aquatic Ecosystems (Maryland)	3
AS.420.627	Great Lakes Ecology and Management	3
AS.430.629	Drones in Geospatial Decision Making	4
AS.420.630	Tropical Ecology and Conservation of African Wildlife	4
AS.420.637	Conservation Biology (Montana)	3
AS.420.669	Applied Sustainability (Maryland)	3
AS.420.670	Sustainability Leadership (Costa Rica)	3
AS.420.673	Ecology and Evolution of the Galapagos	3
AS.420.675	Geology and Tropical Ecology of Hawai'i	3
AS.420.678	Nature Conservation and Sustainability in Cuba	3
AS.420.681	Climate Change Adaptation and Development in Nepal	3
AS.420.673	Ecology and Evolution of the Galapagos	3
AS.420.678	Nature Conservation and Sustainability in Cuba	3
AS.420.705	Natural Resources Sustainability: Field Study in Alaska	3
AS.420.738	Newfoundland and Labrador: A Journey Through Time	3

Residency Requirement

Many courses are offered online, but at least one ESP course must be taken as a full term on-site classroom course or as an in-person field course to fulfill the requirements of the degree. The Capstone course (AS.425.800) does not count towards the residency requirement. Students may choose to come to our campus in Baltimore or Washington DC for a whole semester, during intersession, or opt for an intensive field course. These are offered throughout the year, but the majority are scheduled during the summer or in January. Compressed field courses require an additional fee and often include lodging, course transportation, and some food (this is variable). Students are responsible for travel to the location of their residency course. Note: The University does not have lodging facilities in Washington DC.

Program Educational Objectives

Our overall programmatic goals at ESP have several objectives and we will hit upon all of these as we read, discuss and proceed through course. Among our learning goals, we want to identify root and structural causes and the systemic nature of environmental issue (such as invasive species), critical interpretation of environmental information (e.g. examining forest carbon sequestration trends), synthesizing scientific studies (e.g. the impacts of land use change on forests), integrating basic principles derived from your core courses (e.g. geology and ecology) and finally we want to frame our science discussions around sound policy decisions (e.g. National Park mining exploration and fire policy).

When you successfully complete the program requirements, you would achieve the following goals: (Number Objectives)

1. Interpret environmental policy making processes, institutions, and organizations to be able to identify root and structural causes and the systemic nature of environmental problems.
2. Research and recommend methods for collection, analysis, presentation and critical interpretation of environmental information using appropriate statistical and quantitative tools.
3. Utilize the practical and theoretical components of environmental science and policy to develop local and global environmental strategies, while developing competency in evaluating and

synthesizing scientific studies to guide environmental decision making, policy making, and advocacy.

4. Analyze environmental problems by applying or integrating basic principles derived from natural and social science, legal, and economic frameworks. Additionally, to conceptualize, develop and devise bridges between the realms of policy and science on critical environmental issues.
5. Evaluate effective strategies, technologies, and methods for sustainable management of environmental systems at and for the remediation or restoration of degraded environments in conjunction with evidence-based, science-informed environmental policy analysis.

MS in Environmental Sciences and Policy/Geographic Information Systems, Certificate

MS in Environmental Sciences and Policy / Certificate in Geographic Information Systems

The use of geographic information systems (GIS) has become standard for many professionals and is one of the most powerful and versatile tools for solving today's environmental and sustainability issues. To enable students to exploit the complementary nature of the fields, we have eliminated the overlap between the MS in Environmental Science and Policy and the graduate certificate in GIS. This enables students to earn both the MS degree and the Graduate Certificate by completion of a total of 13 courses rather than the 15 courses that would be required to complete the programs separately. At least one course must satisfy the residency requirement. Interested students, including those already enrolled in either program, should apply to both the MS in ESP and the Graduate Certificate in GIS program concurrently.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

- One semester of undergraduate level calculus, statistics and chemistry.
- For the GIS certificate component quantitative background or technology oriented experience is required.

Program Requirements

Code	Title	Credits
Core Courses - Customizable		
At least one course must be in residence.		
Select five of the following:		
AS.420.601	Geological Foundations of Environmental Science	
AS.420.603	Environmental Applications of GIS	
AS.420.604	Hydrology & Water Resources	
AS.420.608	Oceanic & Atmospheric Processes	
AS.420.611	Principles & Methods of Ecology	
AS.420.614	Environmental Policymaking and Policy Analysis	
Electives		
Select any three ESP electives as listed below:		
AS.420.605	Maritime Law and the Environment	
AS.420.606	Climate Justice	
AS.420.609	Agroecology	
AS.420.610	Sustainable Business	
AS.420.612	Sustainability Science: Concepts and Challenges	
AS.420.613	Forest Ecosystems	
AS.420.615	Environmental Restoration	
AS.420.616	Environmental Consequences of Conventional Energy Generation	
AS.420.617	Managing Responsible Organizations for the Ecosystem	
AS.420.618	Terrestrial and Marine Conservation Biology	
AS.420.619	Climate Dynamics	
AS.420.622	Ecotoxicology	
AS.420.623	Freshwater Ecology & Restoration of Aquatic Ecosystems	
AS.420.624	Ocean Stewardship and Sustainability	
AS.420.625	Ecology and Ecosystem Management in Coastal and Estuarine Systems	
AS.420.627	Great Lakes Ecology and Management	
AS.420.628	Ecology and Management of Wetlands	
AS.420.629	Drinking Water,Sanitation & Health	
AS.420.630	Tropical Ecology and Conservation of African Wildlife	
AS.420.631	Field Methods in Stream & Water Quality Assessment	
AS.420.632	Air Quality Management and Policy	
AS.420.637	Conservation Biology	
AS.420.638	Coastal Zone Processes and Policy	
AS.420.639	Landscape Ecology	
AS.420.641	Natural Resources Law and Policy	
AS.420.642	Public Lands-Private Interests:The Struggle for Common Ground	
AS.420.643	U.S. Environmental History	
AS.420.644	Sustainable Cities	
AS.420.646	Transportation Policy and Smart Growth	
AS.420.650	International Environmental Policy	
AS.420.651	Environmental Risk in Decision Making	
AS.420.654	Environmental & Natural Resource Economics	
AS.420.656	Environmental Impact Assessment & Decision Methods	
AS.420.659	Management for Environmental Results with Performance-based Measurement	
AS.420.660	Strategies in Watershed Management	
AS.420.665	Climate Change on the Front Lines: The Study of Adaptation in Developing Countries	
AS.420.666	Community Development and Sustainability in developing countries	
AS.420.667	Analysis of Environmental & Ecological Data	
AS.420.668	Sustainable Food Systems	
AS.420.669	Applied Sustainability	
AS.420.670	Sustainability Leadership	
AS.420.671	Global Land Use Change	
AS.420.672	Environmental Ethics	

AS.420.673	Ecology and Evolution of the Galapagos
AS.420.674	Applied Energy Policy in the 21st Century
AS.420.675	Geology and Tropical Ecology of Hawai'i
AS.420.676	Global Scarcity in Freshwater Systems: Crisis and Solutions
AS.420.677	Spatial Statistics
AS.420.678	Nature Conservation and Sustainability in Cuba
AS.420.679	International Water: Issues and Policies
AS.420.681	Climate Change Adaptation and Development in Nepal
AS.420.687	Science Communication and Policy Engagement
AS.420.690	Environmental Health
AS.420.703	Open Source GIScience for Environmental Research
AS.420.704	Practical Engineering Approaches to Climate Adaptation
AS.420.705	Natural Resources Sustainability: Field Study in Alaska
AS.420.738	Newfoundland and Labrador: A Journey Through Time
AS.420.800	Independent Research Project in Environmental Sciences and Policy
AS.420.805	Internship and Capstone Thesis
GIS Certificate (any 5 of the following)	
AS.430.600	Web GIS
AS.430.601	Geographic Information Systems (GIS)
AS.430.603	Geospatial Statistics
AS.430.604	Spatial Analytics
AS.430.606	Programming in GIS
AS.430.629	Drones in Geospatial Decision Making

Film and Media, Master of Arts

MA in Film and Media

advanced.jhu.edu/filmandmedia (https://advanced.jhu.edu/academics/graduate/ma-film-media/)

The Master of Arts in Film and Media provides an in-depth curriculum designed to develop skill sets required to succeed in the film, television, and media industries. Students are exposed to the latest technology, taught the most current financial and distribution strategies, and explore a range of storytelling techniques. The program emphasizes experiential learning and focuses on the latest trends and advances in the entertainment industry. All courses balance practice with theory and are taught by successful creators and executives in the film, television, and media world. The program has been specifically designed to keep up with constant advances in technology, ideas, and trends, both practical and aesthetic.

Courses and workshops feature current case studies that help expose students to the latest tools, equipment, and resources in specific fields. The Johns Hopkins MA in Film and Media brings the industry to Baltimore, as our students grow their professional network while creating a two-way bridge between the local burgeoning film scene and the industry hubs in Los Angeles, New York, and abroad. Courses are held at the JHU/MICA Film Center, Baltimore's film studio and recording center in the Station North Arts and Entertainment District.

Students must choose two concentrations from the fields of Business of Film, Sound Design, Writing, and Immersive Storytelling & Emerging Technology. While they specialize in two of these tracks, students acquire hands-on experience in developing, shooting, editing, and marketing original film, television, and digital short-form content in the Graduate Filmmaking Studio.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM REQUIREMENTS

- Three required core courses
- Select two concentrations and complete four courses under each grouping

Code	Title	Credits
Core Courses - Required:		
AS.455.640	Graduate Filmmaking Studio I	3
AS.455.641	Graduate Filmmaking Studio II	3
AS.455.800	Capstone for Film & Media	3
Concentration: Immersive Storytelling and Emerging Technologies		
Core Courses - Customizable		
Select four of the following:		
AS.455.610	Foundations of Immersive Storytelling: Theory & Practice	3
AS.455.643	The Future of Cinematic Gaming	3
AS.455.647	Virtual Production: A New Era of Filmmaking	3
AS.455.645	Production for Creative Technology	3
AS.455.638	Technology and the Future of Humanity	3
Concentration: Writing		
Core Courses - Customizable		
Select four of the following:		
AS.455.615	Episodic Writing Workshop 1 – The Pilot	3
AS.455.616	Episodic Writing Workshop 2 – Comedy	3
AS.455.618	Episodic Writing Workshop II - The Writers' Room	3
AS.455.637	Comedy Writing - TV Spec Script	3
AS.455.624	Social Impact Documentary Filmmaking	3
Concentration: The Business of Film		
Core Courses - Customizable		
Select four of the following:		
AS.455.620	Fundamentals of Business 1	3
AS.455.619	Business of Non Fiction Film & TV	3
AS.455.635	Sales, Acquisitions and Marketing	3
AS.455.625	Creative Producing & Line Producing	3
AS.455.644	Podcasting Fundamentals	3
AS.455.650	Script to Screen	3
AS.455.651	Film Financing	3
AS.455.652	Digital Media: Storytelling & Strategy	3
Concentration: Sound Design		
Core Courses - Customizable		
Select four of the following:		
AS.455.626	Mixing Sound for Picture	3
AS.455.634	Designing Sound for Film and Media	3
AS.455.630	Recording Sound for Film	3

AS.455.632	Sound on Film I	3
PY.550.524	Sound Design/Video Games	3

Geographic Information Systems, Master of Science

MS in Geographic Information Systems

gis.jhu.edu (https://advanced.jhu.edu/academics/graduate/ms-geographic-information-systems/)

Geographic Information Systems (GIS) is a dynamic and versatile technology that enables visualization, analytics, and data management capabilities for an increasingly wide spectrum of industries. It has come to play a key role in empowering decision-makers, helping them understand various processes and make well-informed decisions. It is used in diverse fields, such as environmental planning, law enforcement, defense and intelligence, business, utilities, telecommunications, economic development, transportation, public health, and many others. It is this dynamism that the Johns Hopkins University GIS programs encompass in their offerings, the Master of Science in GIS and the Certificate in GIS.

These two programs are fully online and provide a strong foundational education that delves into the principles and real-world applications of geospatial technology, allowing students to build their credentials and capitalize on a marketplace that continues to grow in its demand for skilled employees. The Master of Science in GIS is designed to prepare the next generation of geospatial professionals and data scientists, skilled in all facets of geospatial technology, including programming and application development, geospatial data science, spatial and predictive analytics, visualization, big data technologies, enterprise GIS administration, and project management.

Both programs are designed for students who have little or no knowledge of the GIS field, as well as students with prior experience. Students entering either program will be introduced to the most widely used commercial software, as well as open-source software, often utilizing cloud computing infrastructure. Hands-on experience is emphasized and students in the program can expect to work on real-world geospatial scenarios.

Students in the Master of Science program could choose to follow one of two focus areas or customize the degree to suit career goals. The focus areas are general recommendations of logical course groupings that could be pursued. The goal is to maintain flexibility for the GIS program and allow students to choose courses that best fulfill their own interests.

- Advanced Geospatial Technology
- GIS Programming and Application Development
- Geospatial Data Science and Predictive Analytics

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, Post-Baccalaureate Certificate in Geographic Information Systems program requires:

- A semester of statistics, quantitative methods, or technology-oriented experience.

Students who do not have the necessary quantitative background may be offered provisional admission if their other credentials are strong.

PROGRAM REQUIREMENTS

1. One required core course
2. Three customizable core courses
3. Six electives

Code	Title	Credits
Core Courses - Required:		
AS.430.800	Capstone for Geographic Information Systems	
Core Courses - Customizable		
Select three of the following:		
AS.430.600	Web GIS	
AS.430.601	Geographic Information Systems (GIS)	
AS.430.603	Geospatial Statistics	
AS.430.604	Spatial Analytics	
AS.430.606	Programming in GIS	
Electives		
Select six of the following:		
AS.430.602	Remote Sensing: Systems and Applications	
AS.430.605	Development and Management of GIS Projects	
AS.430.607	Spatial Databases and Data Interoperability	
AS.430.608	GIS and Spatial Decision Support Systems	
AS.430.609	Spatial Data Management: Quality and Control	
AS.430.611	Geospatial Ontologies and Semantics	
AS.430.612	Cartographic Design and Visualization	
AS.430.613	Advanced Topics in Remote Sensing	
AS.430.615	Big Data Analytics: Tools and Techniques	
AS.430.617	Census Data Mining: Visualization and Analytics	
AS.430.618	Advanced Python Scripting for GIS	
AS.430.619	Web Application Development	
AS.430.621	GIS for Emergency Management	
AS.430.623	Geo Apps	
AS.430.625	System Architecture for Enterprise GIS	
AS.430.627	Artificial Intelligence and Machine Learning in Geospatial Technology	
AS.430.631	Spatial Algorithms and Data Structures	
AS.430.633	Advanced Spatio-Temporal Statistics	
AS.430.635	Urban Analytics	

Geographic Information Systems, Certificate

Certificate in Geographic Information Systems

advanced.jhu.edu/giscert (https://advanced.jhu.edu/academics/certificates/geographic-information-systems/)

The Certificate in Geographic Information Systems equips students with the knowledge they need to pursue new opportunities created by the expanding demand for geospatial professionals and data analytics experts. The five-course certificate program explores the principles and real-world applications of geospatial technology and data science in a convenient, fully online course format.

The Certificate offers you a foundation in the fascinating fields of Web GIS, geospatial data science, spatial and predictive analytics, programming and application development. You will gain invaluable experience in geospatial technology, utilizing web-based platforms and cloud computing environments, to further your understanding of the digital transformation that is revolutionizing business, government, industries, and social organizations.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Certificate in Geographic Information Systems program requires:

- Quantitative Background – a semester of statistics, quantitative methods or technology oriented experience.

Applicants who do not have the necessary quantitative background may be offered provisional admission if their other credentials are strong. Applicants who are admitted provisionally due to lack of quantitative skills have the option to:

- Take appropriate courses at an accredited college/university.
- Take AS.420.301 Quantitative Methods.

PROGRAM REQUIREMENTS

Code	Title	Credits
Core Course - Required:		
AS.430.600	Web GIS	4
AS.430.601	Geographic Information Systems (GIS)	4
AS.430.603	Geospatial Statistics	4
AS.430.604	Spatial Analytics	4
AS.430.606	Programming in GIS	4
Total Credits		**20**

Master of Liberal Arts

Master of Liberal Arts

mla.jhu.edu (https://advanced.jhu.edu/academics/graduate/master-of-liberal-arts/)

For self-motivated learners with inquisitive minds and an interest in thinking across disciplinary boundaries, the Master of Liberal Arts (MLA) Program is a graduate liberal arts program that offers a diverse range of interdisciplinary courses designed and taught by MLA Program faculty that build upon a foundation in the history of ideas while also incorporating contemporary topics, sources, and approaches to research, analysis, and discourse.

Established in 1962, the Johns Hopkins MLA Program has gained national recognition for the quality of its teaching and for its rigorous interdisciplinary liberal arts education. The program is designed to serve independent thinkers from a variety of academic, professional, and personal backgrounds. Our program thrives on the curiosity, passion, and diversity of its students. The MLA is a unique non-traditional graduate degree. Whereas most graduate programs ask you to become more and more specialized, the MLA expects you to both broaden and deepen your educational experience. MLA students interact with professors and one another in a stimulating learning environment, both on the ground at the Homewood campus and online in an asynchronous format compatible with all work schedules and time zones.

In consultation with their academic advisor, candidates for the MLA degree enroll in topic-based interdisciplinary courses that draw from a wide range of subjects, including history, philosophy, religion, literature, music, art history, African-American studies, environmental studies, digital humanities, critical theory, psychology, and sociology. Given the breadth and flexibility of our program, the MLA is able to meet the different goals and expectations of our students. Our students represent the full range of working professions and are at all stages of their careers.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

The Admissions Committee reserves the right to request additional information from applicants to assess their candidacy for admission.

Instructions for the Statement of Purpose

In addition to the standard required application materials, MLA applicants must submit a 2-3 page statement of purpose that allows assessment of the applicant's academic, professional, and personal goals. Here are three ideas for how applicants may frame the essay:

- Rather than having students concentrate their studies in a specific discipline, the MLA program offers courses in which students analyze complex topics from interdisciplinary perspectives. Please explain how that approach to studying the liberal arts coincides with your own academic, professional, and/or personal goals.
- Through their coursework and capstone projects, students in the MLA program are given multiple opportunities to conduct independent research that engages scholarship across several fields of study. Please describe an academic research project you have completed in the past and how that experience will inform your future research efforts.
- Many courses within the MLA program ask students to consider issues of social justice and explore their ethical implications for us individually and collectively. Please share an example of an issue of social justice you have studied in the past, explain why that issue captured your interest, and discuss how that work informs your current academic, professional, and/or personal goals.

PROGRAM REQUIREMENTS

- One customizable core course
- Eight electives
- One core culminating experience course

Code	Title	Credits
Core Courses - Customizable		
Choose at least one of the following:		
AS.450.600	MLA Core: Interdisciplinary Graduate Research Methods	
AS.450.627	MLA Core: Critical Theory	
AS.450.638	MLA Core: What is History?	
AS.450.738	MLA Core: Why Read the Classics?	

AS.450.772	MLA Core: Ways of Knowing: Historical and Epistemological Foundations of the Liberal Arts
Core Course - Culminating Experience	
Choose one of the following:	
AS.450.082	MLA Capstone: Portfolio
AS.450.830	MLA Capstone: Graduate Project
AS.450.850	MLA Capstone: Internship
Electives	
Select eight of the following:	
AS.450.601	Forbidden Knowledge: the "Metaphysical Rebel" in Myth and Literature
AS.450.605	Art Since 1960
AS.450.606	Ethics for a Multicultural World
AS.450.607	Through a Glass, Darkly: American Film Noir
AS.450.608	Renaissance Women: Portraits, Patrons, and Painters
AS.450.609	1900: The Birth of Modernism in Vienna, Paris, and London
AS.450.611	Social History of Medicine
AS.450.612	Tough Neighborhood: A History of U.S.-Central American Relations
AS.450.613	British Victorian Women
AS.450.617	The Constitution and the Criminal Justice System
AS.450.620	Gender and Media
AS.450.621	The Self in Question: Readings in Lit & Psychol
AS.450.622	The Shape of Things: Embodiment and Sexuality in American Culture
AS.450.631	Western Theatre History: The Dynamic Interplay of Social, Economic and Cultural Forces
AS.450.634	Italian Renaissance Art and Thought
AS.450.635	How the War was Remembered: The Film and Literature of the Vietnam War
AS.450.637	Native American Art History
AS.450.639	The American Southwest:Crossroads of Cultures
AS.450.640	Nature and the American Imagination
AS.450.642	Yesterday's Tomorrows: Utopian and Dystopian Futures in Science Fiction Literature
AS.450.643	Leadership and the Classics
AS.450.644	U.S. Environmental History
AS.450.648	Fakes, Lies, and Forgeries: A History of “Fake News” from The Flood to the Apocalypse
AS.450.650	Nazi Germany and the Holocaust
AS.450.651	Western Political Philosophy
AS.450.654	"When the lamps went out”: WWI as history, memory and commemoration
AS.450.667	The Bildungsroman as Literary Form-Chronicling Personal Growth in Countries and Cultures
AS.450.669	Family in Cross-Cultural Perspective
AS.450.673	Monstrosity & Metamorphosis: Imagining Animals in Early Art & Literature
AS.450.675	Literary Analysis of the Hebrew Bible
AS.450.678	Religions of the Emerging World
AS.450.687	The American Revolution
AS.450.689	Introduction to Digital Humanities in the Liberal Arts
AS.450.694	Philosophy of Beauty
AS.450.695	American Political Theory and Practice
AS.450.697	All in the Family: Power, Scandal, and Fall
AS.450.699	Great Books in Great Contexts
AS.450.700	"The Souls of Black Folk": Evolving Conceptions of Leadership in African American Literature and Culture
AS.450.704	Poetry and the Visual Arts
AS.450.710	The Mind of Leonardo Da Vinci
AS.450.717	School and Society: Education Reimagined, Possibilities Disclosed
AS.450.723	WWII in Visual and Literary Art
AS.450.724	Science Fiction Film in the 20th Century
AS.450.728	On the Shoulders of Giants
AS.450.736	Medieval England: From Beowulf to the Battle of Bosworth
AS.450.739	Race and Jazz
AS.450.741	Apocalyptic in the Bible, Religion, and Popular Culture
AS.450.745	Aristotle and Hobbes: Physics, Psychology, Ethics and Politics
AS.450.746	Deep Ecology: Environmental Ethic
AS.450.748	The Black Politics of Michael Jackson
AS.450.758	American Literature and the Archive
AS.450.761	Documenting Baltimore Through the Photographic Image
AS.450.762	Race and Ethnicity in the United States
AS.450.766	Deconstructing Capitalism
AS.450.767	American Civil War and Reconstruction
AS.450.771	Black Queer History
AS.450.774	Existentialism: Philosophy and Social Critique
AS.450.781	The Global Cold War
AS.450.790	Six Degrees of Miles Davis

Learning Outcomes

Graduates who earn the MLA degree should achieve mastery of the following outcomes:

- **Situate** different methods of inquiry within the liberal arts, building upon a foundation in the history of ideas and enduring humanistic questions.
- **Analyze** complex topics from interdisciplinary perspectives.
- **Conduct** original research that is creative, critical, and well-informed.
- **Raise** vital questions in response to social and ethical issues, interrogating dominant narratives and systems of power.
- **Communicate** ideas in ways that are accessible to diverse audiences and contexts.
- **Articulate** how their MLA studies have enhanced, extended, or challenged their knowledge and skills and will inform their future endeavors.

Museum Studies, Master of Arts

MA in Museum Studies

museum-studies.jhu.edu (https://advanced.jhu.edu/academics/graduate/ma-museum-studies/)

To prepare current and future museum professionals to be the visionary leaders of museums in contemporary society, Johns Hopkins University offers an innovative Master of Arts in Museum Studies. The format of the program itself—an almost fully online program—looks to the future. As an online program, we can offer the expertise of highly regarded professors and museum professionals from around the world, innovative virtual field trips, and global resources from a wide array of museums brought together in new and exciting ways. An international student body provides diverse perspectives and experiences in a dynamic online learning environment.

Museums are more relevant today than ever before. They are responsible for cultural stewardship and serve as a gathering place for communities; a space for reflection, interaction, participation, and learning (onsite and online); and act as an agent of social change. New demands and challenges are emerging in every aspect of the museum landscape. Innovations in information and communication technologies are being integrated into the core strategies of the museum. Museums are increasing in number, expanding in size, and attracting more diverse audiences every day. The museums of the 21st century need leaders with the knowledge and skills to face these challenges and who possess a vision for the future.

This program aims to provide a perspective on the theory and practice of museums in a changing technological, social, and political environment for current and future museum professionals. It emphasizes the role of technology as a pervasive aspect in today's museum; examines new models of education, exhibition, and business strategies; and explores the role of the museum in a global society and as an agent of social change.

We welcome students interested in all types of museums, including history, technology, science, art, special topic or themed museums, historic sites, national parks, and zoos, and those interested in collections and exhibitions for corporations, government agencies, and private organizations.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Arts in Museum Studies also requires:

- Statement of Purpose: This 750-word statement should describe how your academic and professional experiences have led to your decision to pursue a career in the museum field and how this museum studies degree will help you succeed in your goals in the museum profession. If you have worked for a museum in any capacity, please incorporate your experience into your statement. Your statement will be reviewed for content, organization, and writing style.
- Recommendations: Two letters of recommendation that verify professional and/or academic accomplishment.

PROGRAM REQUIREMENTS

Students must take a total of 10 courses

- One required core course
- Four customizable core courses
- Five elective courses

Code	Title	Credits
Core Course - Required:		**3**
AS.460.610	Two-Week Onsite Seminar	
Core Courses - Customizable		**12**
Select one of the following:		
AS.460.601	Exploring Museum Professions	
AS.460.602	Museums in the Digital Age	
Select three of the following:		
AS.460.604	Introduction to Museum Education	
AS.460.606	Exhibition Strategies	
AS.460.608	The Business of Museums	
AS.460.611	History & Philosophy of Museums	
AS.460.621	Museum Evaluation and Audience Research	
AS.460.666	Collection Management	
Electives		**15**
Select five of the following:		
AS.460.615	Museums and Community Engagement	
AS.460.616	Museums, Law, and Policy	
AS.460.618	Museum Controversies: Ethical Issues in Museums	
AS.460.619	Museums, Race, and Inclusion	
AS.460.620	Accessibility in the Museum	
AS.460.622	Evaluation Projects and Practice	
AS.460.628	Architecture of Museums	
AS.460.630	Exhibition Design, Construction, and Documentation	
AS.460.632	Practice of Public History	
AS.460.633	Conservation-Restoration: A 21st Century Approach	
AS.460.635	Curatorship: Principles and Practices	
AS.460.636	Living Collections	
AS.460.637	Curating Online Exhibitions and Experiences	
AS.460.638	Preservation of Analog and Digital Photographs	
AS.460.639	Material Culture and the Modern Museum	
AS.460.640	Educational Programming for Museum Audiences	
AS.460.652	The Practice of Museum Publishing	
AS.460.655	Expanding Roles of Museum Marketing and Communications	
AS.460.657	Fundamentals of Museum Fundraising	
AS.460.662	Developing Effective Digital Engagement Projects for Museums	
AS.460.663	Social Media Strategies for Museums	
AS.460.665	Introduction to Archives	
AS.460.667	Collection Management Systems	
AS.460.668	Cataloging Museum Collections: History, Standards, and Applications	

AS.460.670	Digital Preservation	
AS.460.671	Foundations of Digital Curation	
AS.460.672	Managing Digital Information in Museums and Archives	
AS.460.673	Digital Curation Certificate Internship	
AS.460.674	Digital Curation Research Paper	
AS.460.675	Leadership of Museums	
AS.460.683	Project Management in Museums	
AS.460.684	Museums, Finance, and the Economy	
AS.460.685	Private Collectors, Collections, and Museums	
AS.460.686	Culturally Specific Museums	
AS.460.687	Provenance Research: Connecting Histories	
AS.460.690	Science, Society, and the Museum	
AS.460.691	Innovation and the Modern Museum	
AS.460.695	Museums of the Americas: Facing Challenges in the 21st Century	
AS.460.750	Museum Internship	
AS.460.752	Museums in a Changing Time: Virtual Seminar	
AS.460.755	Museum Projects	
Total Credits		**30**

Waiver option: Students who are unable to travel to an on-site seminar location due to accommodation needs, financial hardship, or family challenges may apply to the program director for an exemption to the two-week seminar (AS.460.610). If a waiver is granted, the student must enroll in the virtual seminar option (AS.460.752 Museums in a Changing Time: Virtual Seminar) to fulfill the on-site component of the degree requirement.

Learning Outcomes

The curriculum of the Master of Arts in Museum Studies program aims for the following learning outcomes for students:

- Examine the roles and responsibilities of museum practitioners in changing times.
- Develop practical skills in museum work, including collaboration and strategic planning, through real-world projects and experiences.
- Generate solutions to current challenges facing museums.
- Examine the purpose and function of museums in a global context.
- Analyze museum practices, theories, and methodologies through the lens of diversity, equity, accessibility, and inclusion.
- Evaluate the impact of technology on museum practice.

Museum Studies, MA/Digital Curation, Certificate

MA in Museum Studies / Certificate in Digital Curation

Students who are interested in pursuing an MA in Museum Studies and are also interested in the creation, management, and preservation of digital assets in museums may enroll in this combined program. This enables students to earn both the MA degree and the certificate for a total of 14 courses.

Combined degree students must complete all fourteen courses prior to being eligible to graduate.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the combined program of the Master of Arts in Museum Studies and the Certificate in Digital Curation also requires:

- Statement of Purpose: This 750-word statement should describe how your academic and professional experiences have led to your decision to pursue a career in the museum field with a focus on digital curation and how this combined degree will help you succeed in your future goals. If you have worked for a museum in any capacity and have any experience working with digital assets, please incorporate this into your statement. Your statement will be reviewed for content, organization, and writing style.
- Recommendations: Two letters of recommendation that verify professional and/or academic accomplishment.

Program Requirements

MA in Museum Studies students pursuing the Digital Curation Certificate must take 9 courses from the Museum Studies course list, per the degree requirements, and 5 Digital Curation courses listed below. Two approved courses (i.e., 460.670 - Digital Preservation and 460.666 - Collection Management) may be applied to both the MA and the certificate for a total of 14 courses.

Courses From the MA in Museum Studies

- One required core course
- Four customizable core courses
- Four elective courses

Courses From the Certificate in Digital Curation

- Five required core courses

Code	Title	Credits
Museum Studies Courses		
Core Course - Required:		*3*
AS.460.610	Two-Week Onsite Seminar	
Core Courses - Customizable		*12*
Select one of the following:		
AS.460.601	Exploring Museum Professions	
AS.460.602	Museums in the Digital Age	
Select three of the following:		
AS.460.604	Introduction to Museum Education	
AS.460.606	Exhibition Strategies	
AS.460.608	The Business of Museums	
AS.460.611	History & Philosophy of Museums	
AS.460.621	Museum Evaluation and Audience Research	
AS.460.666	Collection Management	
Electives		*12*
Select four of the following:		
AS.460.615	Museums and Community Engagement	
AS.460.616	Museums, Law, and Policy	
AS.460.618	Museum Controversies: Ethical Issues in Museums	

AS.460.619	Museums, Race, and Inclusion	
AS.460.620	Accessibility in the Museum	
AS.460.622	Evaluation Projects and Practice	
AS.460.628	Architecture of Museums	
AS.460.630	Exhibition Design, Construction, and Documentation	
AS.460.632	Practice of Public History	
AS.460.633	Conservation-Restoration: A 21st Century Approach	
AS.460.635	Curatorship: Principles and Practices	
AS.460.636	Living Collections	
AS.460.637	Curating Online Exhibitions and Experiences	
AS.460.638	Preservation of Analog and Digital Photographs	
AS.460.639	Material Culture and the Modern Museum	
AS.460.640	Educational Programming for Museum Audiences	
AS.460.652	The Practice of Museum Publishing	
AS.460.655	Expanding Roles of Museum Marketing and Communications	
AS.460.657	Fundamentals of Museum Fundraising	
AS.460.662	Developing Effective Digital Engagement Projects for Museums	
AS.460.663	Social Media Strategies for Museums	
AS.460.665	Introduction to Archives	
AS.460.667	Collection Management Systems	
AS.460.668	Cataloging Museum Collections: History, Standards, and Applications	
AS.460.675	Leadership of Museums	
AS.460.683	Project Management in Museums	
AS.460.684	Museums, Finance, and the Economy	
AS.460.685	Private Collectors, Collections, and Museums	
AS.460.686	Culturally Specific Museums	
AS.460.687	Provenance Research: Connecting Histories	
AS.460.690	Science, Society, and the Museum	
AS.460.691	Innovation and the Modern Museum	
AS.460.695	Museums of the Americas: Facing Challenges in the 21st Century	
AS.460.750	Museum Internship	
AS.460.752	Museums in a Changing Time: Virtual Seminar	
AS.460.755	Museum Projects	
Digital Curation Certificate		**15**
Core Courses - Required:		
AS.460.670	Digital Preservation	
AS.460.671	Foundations of Digital Curation	
AS.460.672	Managing Digital Information in Museums and Archives	
AS.460.673	Digital Curation Certificate Internship	
AS.460.674	Digital Curation Research Paper	
Total Credits		**42**

Museum Studies, MA/Nonprofit Management, Certificate

Students pursuing an MA in Museum Studies have the option of strengthening their leadership skills by enrolling in the combined degree program offered with the Certificate in Nonprofit Management. Students are provided an overview of the nonprofit sector, as well as the technical skills needed to thrive in nonprofit museums and arts philanthropy. Students may earn the combined degree by taking 10 Museum Studies courses, per the masters degree requirements, and 4 Nonprofit Management courses for a total of 14 courses. Two specific Museum Studies courses can be applied to both the masters and the certificate and these courses are listed under the Requirements tab.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Specific Requirements

In addition to the materials and credentials required for all programs, the Master of Arts in Museum Studies also requires:

- Statement of Purpose: This 750-word statement should describe how your academic and professional experiences have led to your decision to pursue a career in the museum field with an emphasis in nonprofit management and how this combined degree will help you succeed in your goals in the museum profession. If you have worked for a museum in any capacity, please incorporate your experience into your statement. Your statement will be reviewed for content, organization, and writing style.

PROGRAM REQUIREMENTS

MA in Museum Studies students pursuing the Certificate in Nonprofit Management must take the 10 Museum Studies courses, per the degree requirements, and 4 Nonprofit Management courses for a total of 14 courses. Two specific Museum Studies courses can be applied to both the masters and the certificate and these courses are listed at the bottom of this page. Students must complete all 14 courses prior to being eligible for graduation.

MA in Museum Studies

- One required core courses
- Four customizable core courses
- Five electives

Certificate in Nonprofit Management

- Four customizable core courses (scroll down to view NPM courses)

Note: Students are encouraged to begin the Certificate with AS.470.728 Fundamentals of Nonprofits and Nonprofit Management.

Code	Title	Credits
Museum Studies		
Core Course - Required:		*3*
AS.460.610	Two-Week Onsite Seminar	
Core Courses - Customizable		*12*
Select one of the following:		
AS.460.601	Exploring Museum Professions	
AS.460.602	Museums in the Digital Age	
Select three of the following (See below for courses that may be applied to the MA & the certificate.)		

AS.460.604	Introduction to Museum Education	
AS.460.606	Exhibition Strategies	
AS.460.608	The Business of Museums	
AS.460.611	History & Philosophy of Museums	
AS.460.621	Museum Evaluation and Audience Research	
AS.460.666	Collection Management	
Electives		*15*
Select five of the following (See below for those courses that may be applied to the MA & the certificate.)		
AS.460.615	Museums and Community Engagement	
AS.460.616	Museums, Law, and Policy	
AS.460.618	Museum Controversies: Ethical Issues in Museums	
AS.460.619	Museums, Race, and Inclusion	
AS.460.620	Accessibility in the Museum	
AS.460.622	Evaluation Projects and Practice	
AS.460.628	Architecture of Museums	
AS.460.630	Exhibition Design, Construction, and Documentation	
AS.460.632	Practice of Public History	
AS.460.633	Conservation-Restoration: A 21st Century Approach	
AS.460.635	Curatorship: Principles and Practices	
AS.460.636	Living Collections	
AS.460.637	Curating Online Exhibitions and Experiences	
AS.460.638	Preservation of Analog and Digital Photographs	
AS.460.639	Material Culture and the Modern Museum	
AS.460.640	Educational Programming for Museum Audiences	
AS.460.652	The Practice of Museum Publishing	
AS.460.655	Expanding Roles of Museum Marketing and Communications	
AS.460.657	Fundamentals of Museum Fundraising	
AS.460.662	Developing Effective Digital Engagement Projects for Museums	
AS.460.663	Social Media Strategies for Museums	
AS.460.665	Introduction to Archives	
AS.460.667	Collection Management Systems	
AS.460.668	Cataloging Museum Collections: History, Standards, and Applications	
AS.460.670	Digital Preservation	
AS.460.671	Foundations of Digital Curation	
AS.460.672	Managing Digital Information in Museums and Archives	
AS.460.673	Digital Curation Certificate Internship	
AS.460.674	Digital Curation Research Paper	
AS.460.675	Leadership of Museums	
AS.460.683	Project Management in Museums	
AS.460.684	Museums, Finance, and the Economy	
AS.460.685	Private Collectors, Collections, and Museums	
AS.460.686	Culturally Specific Museums	
AS.460.687	Provenance Research: Connecting Histories	
AS.460.690	Science, Society, and the Museum	
AS.460.691	Innovation and the Modern Museum	
AS.460.695	Museums of the Americas: Facing Challenges in the 21st Century	
AS.460.750	Museum Internship	
AS.460.752	Museums in a Changing Time: Virtual Seminar	
AS.460.755	Museum Projects	
Nonprofit Management Certificate		
Core Courses - Customizable		
Select four of the following:		12
AS.470.625	Resource Development and Marketing in Nonprofits	
AS.470.666	Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations	
AS.470.682	Mission Meets Profit: Building a Social Enterprise	
AS.470.689	NGOs in Development and Global Policy-Making	
AS.470.728	Fundamentals of Nonprofits and Nonprofit Management	
AS.470.774	Nonprofit Governance & Executive Leadership	
AS.470.789	International/Non-Governmental Organizations and Civil Society in Conflict Zones	
AS.470.798	Financial Management and Analysis in Nonprofits	
Total Credits		**42**

Note: *Two specific Museum Studies courses can be applied to both the masters and the certificate. Choose two from the listing below:*

Code	Title	Credits
AS.460.608	The Business of Museums	
AS.460.621	Museum Evaluation and Audience Research	
AS.460.655	Expanding Roles of Museum Marketing and Communications	
AS.460.657	Fundamentals of Museum Fundraising	
AS.460.675	Leadership of Museums	
AS.460.683	Project Management in Museums	
AS.460.684	Museums, Finance, and the Economy	

Organizational Leadership, Master of Science

MS in Organizational Leadership

advanced.jhu.edu/organizationalleadership (https://advanced.jhu.edu/academics/graduate/ms-organizational-leadership/)

Master of Science in Organizational Leadership students develop core competencies in leadership methodologies and frameworks; theories relevant to critical thinking and analytic techniques; application of analytic techniques and theories to problem sets; and visualization techniques for producing reports, briefs, and infographics.

Students demonstrate these core competencies by achieving six learning outcomes: (1) applying research and analytical skills to solve complex problems; (2) incorporating creativity and strategy into implementable leadership practices; (3) developing and applying ethical principles; (4) evaluating professional frameworks; (5) designing, developing, and communicating strategic plans; and (6) comparing and contrasting industry standards and techniques.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

Program Requirements

- ```
  Nine required courses
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- One elective

Code	Title	Credits
Core Courses: Required		
AS.485.605	Ethics, Integrity and the Responsibility of Leaders	3
AS.485.615	Leading and Managing Change	3
AS.485.635	Leadership and Organizational Behavior	3
AS.485.700	Team Building: Individual and Group Dynamics	3
AS.485.712	Project Management: Leading Projects to Successful Outcomes	3
AS.485.717	Organizational Development and Innovation	3
AS.485.718	Strategic Planning for Leaders	3
AS.485.719	Crisis Mitigation	3
AS.485.820	Capstone: Current Issues in Leadership	3
Elective		
Select one of the following:		
AS.485.620	Managerial Economics	3
AS.410.706	Building and Leading Teams in Health Care	4
AS.485.715	Portfolio Management	3
AS.485.720	Leadership: A Developmental Process	3

Quantitative Methods in Applied Economics, Post-Master's Certificate

advanced.jhu.edu/quantmethods (https://advanced.jhu.edu/academics/certificates/quantitative-methods-applied-economics/)

The four-course Post-Master's Certificate in Quantitative Methods in Applied Economics is intended for those who already hold a master's degree in economics or statistics, and who wish to expand or update their knowledge. All courses are offered on-site in the evenings at the Washington, DC Center of the Johns Hopkins University (near Dupont Circle) and online.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

In addition to the materials and credentials required for all programs, the Master of Science in Applied Economics also requires:

- One semester of introductory microeconomics, passed with at least a B
- One semester of introductory macroeconomics, passed with at least a B
- One semester of undergraduate calculus or equivalent, passed with at least a B
- A grade in a higher level course trumps a grade in a lower level course. A B grade or higher upon repeat is not acceptable.

PREREQUISITE MATH REQUIREMENT

Those entering with only a single calculus course must take in their first semester AS.440.304 Math Methods for Economists, a three undergraduate credit, full-length course, at half tuition. The course does not count toward the degree. In order to waive the Math Methods for Economists course, evidence of multivariable calculus is required.

Program Requirements

Code	Title	Credits
Core Courses - Customizable		
Select four of the following:		*12*
AS.440.614	Macroeconometrics [Time-Series Analysis]	
AS.440.615	Macroeconomic Forecasting [Time Series Analysis]	
AS.440.616	Bayesian Econometrics	
AS.440.617	Financial Econometrics [Time-Series Analysis]	
AS.440.618	Microeconometrics [Cross-Section and Panel Analysis]	
AS.440.622	Cost-Benefit Analysis	
AS.440.624	Computable General Equilibrium Modeling	
AS.440.625	Machine Learning in Statistics	
AS.440.629	Survey Research Methods	
Total Credits		**12**

Regenerative and Stem Cell Technologies, Master of Science

MS in Regenerative and Stem Cell Technologies

https://advanced.jhu.edu/academics/graduate/ms-regenerative-stem-cell-technologies/

Regenerative and stem cell technologies have the potential to revolutionize treatments for numerous diseases and health conditions. Students develop the expertise needed to advance in this rapidly growing field with the MS in Regenerative and Stem Cell Technologies program. The program also provides students a chance to collaborate with JHU's research faculty during a brief lab residency that offers hands-on experience.

The program can be tailored for numerous career goals with electives that span an array of specializations:

- Bioinformatics
- Epigenetics
- Human molecular genetics
- Immunology
- Personalized medicine
- Pharmacology
- Recombinant DNA

This 10-course degree program is thesis-optional, part-time or full-time, and can be completed 95% online. With a one-week lab residency, students find the flexibility needed to meet work and life commitments while preparing to advance in this emerging field.
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Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

To begin this program, you will need a bachelor's degree from an accredited college or university. The GPA minimum is 3.0 on a 4.0 scale. You must also complete these prerequisites at JHU or another accredited university, earning at least a B in each course. Students who have not completed all the prerequisites may be admitted provisionally to complete the admission requirements.

- Organic Chemistry or 410.302 Bio-Organic Chemistry
- Biochemistry or 410.601 Biochemistry
- Molecular Biology or 410.602 Molecular Biology
- Cell Biology or 410.603 Advanced Cell Biology

The Admissions Committee reserves the right to request additional information from applicants, such as GRE or letters of recommendation, if needed, to assess their candidacy for admission.

Program Requirements

- Six required core courses
- Four elective courses

Code	Title	Credits
Core Courses - Required:		*24*
AS.410.609	Developmental Biology	
AS.410.630	Gene Therapy	
AS.410.653	Regenerative Medicine: from Bench to Bedside	
AS.410.753	Stem Cell Biology	
AS.410.780	Stem Cell Culture Laboratory Methods	
Electives (Select four of the following:)		*16*
AS.410.604	Cellular Signal Transduction	
AS.410.610	Epigenetics, Gene Organization & Expression	
AS.410.612	Human Molecular Genetics	
AS.410.613	Principles of Immunology	
AS.410.622	Molecular Basis of Pharmacology	
AS.410.633	Introduction to Bioinformatics	
AS.410.635	Bioinformatics: Tools for Genome Analysis	
AS.410.641	Clinical & Molecular Diagnostics	
AS.410.645	Biostatistics	
AS.410.652	Cell Culture Techniques	
AS.410.659	Advanced Recombinant DNA Lab	
AS.410.709	Cancer Genomics	
AS.410.736	Genomic and Personalized Medicine	
Total Credits		**40**

Research Administration, Master of Science

MS in Research Administration

advanced.jhu.edu/researchadmin (http://advanced.jhu.edu/researchadmin/)

The MS in Research Administration is designed to accommodate both career practitioners and those who seek a career in research administration. The program requires that students complete a core curriculum of four courses, and a minimum of two focus areas. As part of the core curriculum, students must either write a thesis or engage in an approved capstone project. In all, the total number of courses taken must be 12 courses or higher, regardless if it is a three-credit or four credit course. Courses within the focus areas are grouped in areas of interest to benefit students who work or want to work in various areas of research administration, or who may have varying levels of experience or special needs.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM REQUIREMENTS

- Three required core courses
- One culminating experience course
- Select two focus areas or a focus area and a concentration
- Electives

Code	Title	Credits
Core Courses - Required:		
AS.475.601	Introduction to Research Administration	3
AS.475.602	Organization and Leadership for Research Administration	3
AS.475.604	Introduction to Legal, Ethical, Regulatory, and Compliance Issues	3
Core Course - Culminating Experience:		
AS.475.800	Capstone Project in Research Administration	3
or AS.475.801	Research and Thesis in Research Administration	
Concentration / Focus Area		
Select two of the following:		18-21
Concentration in International Research Administration Management		
Program Administration and Facilitation (Focus Area)		
Financial Management of Sponsored Programs (Focus Area)		
Compliance, Legal, and Regulatory Issues (Focus Area)		
Electives		
Select electives courses to meet the 12-course requirement		3-6

Program Administration and Facilitation (Focus Area)

Code	Title	Credits
Required Course		
AS.475.606	Project Management of Sponsored Programs	3
Electives		
Select two of the following:		6
AS.475.603	Assistive Technologies for Research Administration [1]	
AS.475.605	Program Development and Evaluation	
AS.475.607	Grantsmanship, Grant Writing and Evaluation of Grant Proposals	
AS.475.623	University-Corporate Relations: Principles and Best Practices	
AS.470.709	Quantitative Methods (Interdisciplinary Course)	

AS.470.728	Fundamentals of Nonprofits and Nonprofit Management (Interdisciplinary Course)	
Total Credits		**9**

[1] Offered as an elective in multiple focus areas but may only be taken once and applied to one focus area.

Financial Management of Sponsored Programs (Focus Area)

Code	Title	Credits
Required Course		
AS.475.609	Financial Management of Sponsored Programs	3
Electives		
Select two of the following:		6
AS.475.603	Assistive Technologies for Research Administration [1]	
AS.475.611	Reporting and Statistical Analysis for Sponsored Programs	
AS.475.617	The Federal Acquisition Regulations and Defense Contracting	
AS.470.798	Financial Management and Analysis in Nonprofits (Interdisciplinary Course)	
Total Credits		**9**

[1] Offered as an elective in multiple focus areas but may only be taken once and applied to one focus area.

Compliance, Legal, and Regulatory Issues (Focus Area)

Code	Title	Credits
Required Course		
AS.475.613	Advanced Topics in Compliance, Legal, and Regulatory Issues	3
Electives		
Select two of the following:		6-8
AS.475.603	Assistive Technologies for Research Administration [1]	
AS.475.614	Managing Compliance, Legal, and Regulatory Issues in Research Hospitals and Health Care	
AS.475.615	Research Contracts & Industrial Agreements: Domestic and International	
AS.475.616	Domestic and International Special Issues in Research, Legal and Regulatory Affairs	
AS.410.649	Introduction to Regulatory Affairs (Interdisciplinary Course) [2]	
AS.410.687	Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise (Interdisciplinary Course) [2]	
Total Credits		**9-11**

[1] Offered as an elective in multiple focus areas but may only be taken once and applied to one focus area.
[2] Prerequisites in biotechnology may apply.

Concentration in International Research Administration Management

Code	Title	Credits
Required Courses		
AS.475.618	International Research Infrastructure and Management for Higher Education	3
Electives		
Select three of the following:		9
AS.475.615	Research Contracts & Industrial Agreements: Domestic and International	
AS.475.616	Domestic and International Special Issues in Research, Legal and Regulatory Affairs	
AS.475.619	International Funding and Grantsmanship: Proposal Development, Submission and Management	
AS.475.621	International Research Regulatory, Ethical and Compliance Issues in Research Management	
AS.475.624	The Role and Importance of Culture and Communication in International Research Collaborations	
Total Credits		**12**

Science Writing, Master of Arts

MA in Science Writing

sciencewriting.jhu.edu (https://advanced.jhu.edu/academics/graduate/ma-science-writing/)

Science writing explores and explains how our world works. The best science writing inspires a deeper understanding, a sense of wonder, or a need to act. The online/low-residency Science Writing program at Johns Hopkins strives to guide the next generation of writers and editors who will help the public comprehend the increasingly complex issues of science, medicine, and technology that affect their lives. Students in the Science Writing program do not focus on creating scientific research reports, journal articles for peer review, or other scholarly/academic works, nor do we teach technical writing for instruction manuals or regulatory documents. Instead, our students develop the craft of translating complicated information about science, medicine, and technology into clear, perceptive prose for a broad audience.

The program recognizes that contemporary science writing involves journalism, communication, multimedia, and the literary arts. Our typical student hones journalistic and creative writing techniques to craft enticing, understandable prose for digital or print venues, from magazines and books to social media and websites, for news outlets, companies, research agencies, and universities. Along the way, students acquire communication skills to promote viewpoints and develop expertise to thrive in the digital universe. Our writers and editors are also challenged to monitor science itself, to disclose how research can falter or be misused.

A brief residency course, required for the degree, provides intensive face-to-face study to complement the group and personal interaction of online courses. During residencies, students have visited a field research site on a Maine island, control rooms at NASA, environmental monitoring projects on the Irish coast, and world-famous genetics and biotech labs in Washington and Baltimore. They have observed surgeons in the operating room, sailed with biologists on the Chesapeake Bay, heard from Nobel and Pulitzer Prize winners, and met with science writers from The Washington Post, The New York Times, National Public Radio, National Geographic, Discover, Science, Nature, and other journalism outlets. From space and the oceans to nanotechnology and climate change, from artificial intelligence and robotics to fitness and genetics, the ever-changing topics chosen by our science writers are essential to an enlightened citizenry of the 21st century.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Science Writing requires:

- Statement of Purpose - The statement should be one to three typewritten pages, single- or double-spaced, and describe the applicant's education, experience, and interest in writing about science, medicine or technology. Statements of Purpose are reviewed for creativity, content, and the level of interest in the field, so we appreciate originality and professional or personal reflection. The statement should also describe the applicant's recent reading (books, periodicals, digital sites, or other works).
- Writing samples - The samples should total 10 to 20 typewritten, double-spaced pages (about 2,500 to 5,000 words), and should include some pieces about science, medicine, or technology. A combination of several shorter pieces rather than a single, lengthy piece is recommended. Any factual form is permitted, including news or feature article, commentary/blog, memoir, travel, essay, review, profile, book chapter, and creative nonfiction. Applicants may submit published or unpublished works. Digital writing samples should be submitted in their entirety, not as links. The majority of an applicant's samples should be no more than five years old. Academic papers, peer-reviewed research reports, technical writing, or government documents are not recommended as writing samples; the samples should be journalism, communication writing, creative writing, blogging, etc.

PROGRAM REQUIREMENTS

- Three required core courses
- Three customizable core courses
- Three elective courses

Code	Title	Credits
Core Courses - Required:		**12**
AS.491.658	Techniques of Science and Medical Writing	
AS.491.750	Contemporary Science and Medical Writing: Creative and Professional Forms	
AS.491.802	Thesis and Careers in Science Writing	
Core Courses - Customizable		
Select two of the following:		*8*
AS.491.673	Science and Medical Writing Workshop	
AS.491.674	Science-Medical Writing Workshop	
AS.491.675	Science-Medical Writing Workshop	
AS.491.680	Writing the Tech Story Workshop	
AS.491.754	Science Narratives Workshop	
AS.491.755	Science Personal Essay and Memoir Workshop	
AS.491.757	Science Profiles Workshop: Writing About People	
Select one of the following:		*4*
AS.491.691	Science Policy, Funding and Politics	
AS.491.708	Medicine in Action	
AS.491.709	Science in Action	
AS.491.710	In the Field: Science Writing in the Woods, Coasts, & Labs of Mt. Desert Island	
AS.491.711	Public Health in Action	
AS.491.751	Marine Science & Science Writing on the Emerald Isle	
AS.491.785	In the Wild: Science Writers Explore Montana's Wilderness and Wildlife Biology	
AS.491.787	In the Field: Writing about How Science Can Save Our Wild Lands	
Electives		
Select two of the following:		*8*
AS.491.696	The Nature of Nature	
AS.491.697	The Literature of Science	
AS.491.700	Subatomic Writing	
AS.491.701	Communicating Climate Change	
AS.491.702	The Funny Side of Science	
AS.491.703	The Online Science Magazine	
AS.491.707	Prizewinners: The Best Writing about Science, Technology, Environment & Health	
AS.491.748	Principles of Editing	
AS.491.752	Advanced Reporting & Writing in Science	
AS.491.807	Independent Study in Science Writing	
AS.491.808	Internship in Science Writing	
Select one additional course from either the customizable core or the electives		*4*

Teaching Writing, Master of Arts

MA in Teaching Writing

advanced.jhu.edu/teachingwriting (https://advanced.jhu.edu/academics/graduate/ma-teaching-writing/)

The Master of Arts in Teaching Writing Program helps teachers at all levels, K-University, in all disciplines, learn to become master teachers of writing, acquiring new and innovative ways to teach writing to their students, studying theories and best practices on the teaching of writing that they can share with their colleagues, and pursuing their own writing in an exciting and supportive online community of teachers and writers. The Teaching Writing Program allows participants to address individual situations, needs, and interests while learning within a diverse community. By offering flexible, interactive, and customized learning, the program provides a model for teaching writing and a forum where all teachers can learn and grow together as teachers of writing, and as writers too.

The Program is built around five core principles:

1. The best teachers of writing also write. Every course devotes some time and attention to having teachers explore their own writing, in whatever form or forms that course is built around.
2. Teachers can learn from studying theories and best practices in the teaching of writing. Some readings and discussions about both accepted practices and the theories behind those practices are included in every course.

3. Teachers can learn from and share with each other. Participants in the program will have experience and expertise in teaching and writing. Every course provides opportunities for participants to share that knowledge with their classmates, and to learn from each other.
4. Teachers must have the freedom and encouragement to apply what they learn to meet their own specific needs and situations. The makeup of every class includes teachers teaching at different grade levels and in different disciplines. Every course encourages teachers to reflect on what they are learning and adapt that material to suit their individual needs.
5. Teachers learn best in an interactive classroom (even a virtual one). Every course seeks to establish a sense of community.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Teaching Writing requires:

- Writing sample. The writing sample may be in any form or genre, on any subject, and should not exceed 10 typed, double-spaced pages.

PROGRAM REQUIREMENTS

Nine courses required:

- Three required core courses
- Two customizable core courses
- Four electives

Code	Title	Credits
Core Courses - Required:		
AS.492.612	Teaching Writing	4
AS.492.690	Residency: Best Practices in the Teaching of Writing	4
AS.492.700	Thesis in Teaching Writing	4
Core Courses - Customizable		
Select one of the following:		
AS.492.630	The Power of Story: Teaching and Writing Narrative	4
AS.492.632	Teaching Creative Writing	4
AS.492.640	Teaching Argument	4
AS.492.635	Teaching and Writing Nonfiction	4
Select one of the following:		
AS.492.651	Special Topics in Reading: Multicultural Texts	4
AS.492.652	Writing in Literature	4
AS.492.650	Reading Like a Writer	4
Electives		
AS.492.660	Writing for Young Readers	4
AS.492.661	Teaching Composition in College and Community College	4
AS.492.662	Teaching Reluctant Writers	4
AS.492.663	Writing Across the Curriculum	4
AS.492.665	Teaching Writing to English Language Learner Students	4
AS.492.667	Peer Response and Writing Centers: Theories and Practice	4
AS.492.668	Teaching Writing Online	4
AS.492.669	Digital Writing and Multimodal Composing	4
AS.492.682	Neuroscience, Creativity, and Writing	4
AS.492.800	Independent Study in Teaching Writing	4

Teaching Writing, Certificate

Certificate in Teaching Writing

advanced.jhu.edu/teachingwritingcert (https://advanced.jhu.edu/academics/certificates/teaching-writing/)

The Graduate Certificate in Teaching Writing Program helps teachers at all levels, K-University, in all disciplines, learn to become master teachers of writing, acquiring new and innovative ways to teach writing to their students, studying theories and best practices on the teaching of writing that they can share with their colleagues, and pursuing their own writing in an exciting and supportive online community of teachers and writers. The Teaching Writing Program allows participants to address individual situations, needs, and interests while learning within a diverse community. By offering flexible, interactive, and customized learning, the program provides a model for teaching writing and a forum where all teachers can learn and grow together as teachers of writing, and as writers too.

The Program is built around five core principles:

1. The best teachers of writing also write. Every course devotes some time and attention to having teachers explore their own writing, in whatever form or forms that course is built around.
2. Teachers can learn from studying theories and best practices in the teaching of writing. Some readings and discussions about both accepted practices and the theories behind those practices are included in every course.
3. Teachers can learn from and share with each other. Participants in the program will have experience and expertise in teaching and writing. Every course provides opportunities for participants to share that knowledge with their classmates, and to learn from each other.
4. Teachers must have the freedom and encouragement to apply what they learn to meet their own specific needs and situations. The makeup of every class includes teachers teaching at different grade levels and in different disciplines. Every course encourages teachers to reflect on what they are learning and adapt that material to suit their individual needs.
5. Teachers learn best in an interactive classroom (even a virtual one). Every course seeks to establish a sense of community.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Graduate Certificate in Teaching Writing requires:

- Writing sample. The writing sample may be in any form or genre, on any subject, and should not exceed 10 typed, double-spaced pages.

PROGRAM REQUIREMENTS

Code	Title	Credits
Core Courses - Required:		
AS.492.612	Teaching Writing	4
Core Courses - Customizable:		

Select at least one of the following:		
AS.492.630	The Power of Story: Teaching and Writing Narrative	4
AS.492.632	Teaching Creative Writing	4
AS.492.635	Teaching and Writing Nonfiction	4
AS.492.640	Teaching Argument	4
Select at least one of the following:		
AS.492.651	Special Topics in Reading: Multicultural Texts	4
AS.492.650	Reading Like a Writer	4
AS.492.652	Writing in Literature	4
Electives		
Select at least one of the following:		
AS.492.660	Writing for Young Readers	4
AS.492.661	Teaching Composition in College and Community College	4
AS.492.662	Teaching Reluctant Writers	4
AS.492.663	Writing Across the Curriculum	4
AS.492.665	Teaching Writing to English Language Learner Students	4
AS.492.682	Neuroscience, Creativity, and Writing	4
AS.492.800	Independent Study in Teaching Writing	4
AS.492.690	Residency: Best Practices in the Teaching of Writing	4

Writing, Master of Arts

MA in Writing

writing.jhu.edu (https://advanced.jhu.edu/academics/graduate-degree-programs/writing/)

The MA in Writing Program offers students the option of a fiction or nonfiction concentration to study the practice of writing in a series of workshops and reading courses. Students on the fiction track work on short stories, novellas, or novels. Students on the nonfiction track pursue long-form, literary journalism or personal essays, and memoir.

Students in the MA in Writing program learn primarily through the practice of writing and the study of reading with a focus on craft. Depending on student goals, the program offers a broad foundation in fine arts/creative writing, in journalism or in both fields. Some students cultivate skills to prepare for a career; others are seasoned writers who want to change focus; still others favor artistic exploration over professional ambition. Within the realm of literary writing, students have the flexibility to develop individual styles and pursue specialized subjects. The program's goal is to create a nurturing yet demanding environment where writers work toward publication at the highest artistic and professional levels.

Admissions Criteria for all Advanced Academic Programs (p. 2210)

PROGRAM SPECIFIC REQUIREMENTS

In addition to the materials and credentials required for all programs, the Master of Arts in Writing requires:

- Familiarity with writing in the applicant's chosen concentration. Applicants to the Fiction concentration should have read in their area of interest and explored their writing voice. Applicants to the Nonfiction concentration should have read in their field. For Nonfiction applicants, some exposure to journalistic fundamentals is helpful but not necessary.
- Writing samples. The samples should be up to 15 typewritten, double-spaced pages, or about 3,500 to 4,500 words, in the concentration of interest. Samples do NOT have to be a single, lengthy piece of writing.
- The program's admissions committees offer the following additional suggestions for writing samples for each concentration:

  Fiction: Short stories or novel chapters in prose fiction, demonstrating literary content or themes. Any style, vision, or approach is permitted--traditional, experimental, hybrid, etc.

  Nonfiction: Up to five separate works of prose nonfiction about any subject. Any nonfiction form or combination of forms, including feature article, commentary/blogs, memoir, travel, essay, profile, biography, book chapters and creative nonfiction, is permitted. Academic assignments, term papers, government reports, or scholarly criticism are not acceptable nonfiction writing samples.

Dual-Concentration Applicants

Applicants may seek formal degree candidacy in both Fiction and Nonfiction by submitting full writing samples in each proposed area. Such applicants should explain their multiple interest and reading in a single statement of purpose. The program makes individual admission decisions for each concentration in a dual-concentration application. Dual-concentration students must complete two to four more courses than the 10 required for a single-concentration degree.

PROGRAM REQUIREMENTS

Ten Courses:

- Two required core courses
- One required concentration core course
- Three customizable core courses from the declared concentration
- Electives to ensure the 10-course requirement is met

COURSES

Code	Title	Credits
Core Courses - Required:		
AS.490.652	Contemporary American Writers	3
AS.490.801	Thesis And Publication	3
Fiction Concentration: Core Course - Required		
AS.490.654	Fiction Techniques	3
Concentration Core Courses - Customizable		
Select three of the following:		
AS.490.660	Fiction Workshop	3
AS.490.661	Fiction Workshop	3
AS.490.662	Fiction Workshop	3
AS.490.765	Children's and YA Writing Workshop	3
AS.490.668	Combined Workshop and Readings in Nonfiction	3
AS.490.731	Film & Screenwriting	3
Nonfiction Concentration: Core Courses - Required		
AS.490.656	Nonfiction Techniques	3
Concentration Core Courses - Customizable		
Select three of the following:		
AS.490.670	Nonfiction Workshop	3
AS.490.671	Nonfiction Workshop	3

AS.490.672	Nonfiction Workshop	3
AS.490.669	Combined Workshop in Nonfiction and Fiction	3
AS.490.690	Travel Writing Workshop	3
AS.490.693	Writing Memoir & Personal Essay Workshop	3
AS.491.673	Science and Medical Writing Workshop	4
AS.491.674	Science-Medical Writing Workshop	4
AS.491.675	Science-Medical Writing Workshop	4
AS.490.765	Children's and YA Writing Workshop	3
AS.490.731	Film & Screenwriting	3
Electives		
Select electives to ensure you meet the 10 course requirement:		
AS.490.676	Sentence Power: From Craft to Art	3
AS.490.666	Combined Workshop and Readings in Fiction and Nonfiction	3
AS.490.684	Heritage of Literature--Examining the 20th Century	3
AS.490.685	Writing the Body	3
AS.490.715	Noticing as a Writer	3
AS.490.734	Digital Storytelling and Multimedia Journalism	3
AS.490.748	Advanced Workshop in the Novel	3
AS.490.782	Books and the City: Literary Dublin	3
AS.490.785	Our American West: The Evolution of a Counter Narrative	3
AS.490.665	Combined Workshop and Readings in Memoir	3
AS.490.681	The Craft of Poetry: An Introduction for Fiction and Nonfiction Writers	3
AS.490.687	The Short Story: Past & Present	3
AS.490.702	Readings in Global Fact and Fiction	3
AS.490.705	Crafting Nonfiction Voice	3
AS.490.711	Masterworks: Examining the Boundaries	3
AS.490.714	Essence of Place: Description, Detail, and Setting	3
AS.490.745	Voice in Fiction and Nonfiction	3
AS.490.746	Readings in Narrative Fiction and Nonfiction	3
AS.490.747	Advanced Revision Techniques in Fiction	3
AS.490.766	Completing the Novel	3
AS.490.767	Writing the Nonfiction Book Proposal	3
AS.490.770	Writing the Other	3
AS.490.784	Reading, Writing, Walking	3
AS.490.805	Writing Internship	3

Office of Summer and Intersession Programs

summer.jhu.edu (https://summer.jhu.edu)

The Office of Summer and Intersession Programs (OSIP), a division of the Advanced Academic Programs in the Krieger School of Arts and Sciences, offers rigorous credit and non-credit courses and programs in the summer and intersession terms various modalities. The programs have a broad audience, reaching 58 countries for the undergraduate program and 78 countries for the pre-college program. Our programs and courses are distinguished by academic excellence, personal attention by top faculty, opportunities to participate in hands-on activities, and a close-knit community. During intersession and summer terms, OSIP works with academic departments to sponsor courses, providing identical academic rigor as found in the university's fall and spring terms.

JHU undergraduates, postbaccalaureate, and visiting undergraduate students can put credit earned in person or online course to work right away in their degrees. Qualified pre-college students can start college early by earning credit in the summer before college for potential transfer later at the university they attend. Adult students looking to advance in their career, test the waters after a period away from the classroom, or just looking for intellectual engagement can also enroll in a summer online course and make the most of their summer.

Pre-College students can accelerate their entry into college life in a fast-paced environment while earning academic credit from a top university. The Summer pre-college program is offered in multiple modalities. Interactive and flexibly designed to meet today's needs, students can select any combination of these programs, each available over three sessions in the summer. While students are welcome to select more than one online program per session, each is designed so that students committing about 15-18 hours per week can complete that program. In addition to earning college credit, students experience academic life at Hopkins while living on campus or participating online and engaging in a wide variety of academic and social activities.

Each January, academic departments representing the Krieger School of Arts and Sciences and the Whiting School of Engineering sponsor a diverse set of 1, 2, or 3-week undergraduate courses that are not typically offered during the academic year. In addition, students may take one or two intersession courses, which are graded Satisfactory/Unsatisfactory.

There is no additional tuition for current degree-seeking JHU undergraduates registered full-time for the preceding Fall semester. Students who do not meet these criteria are charged tuition on a per-credit basis.

COURSE DESCRIPTIONS

A

B

E

M

N

P

S

AS.010 (History of Art)

AS.010.101. Introduction to Art History I. 4 Credits.
This introductory course explores and compares major developments in world art and architecture from the dawn of history, through several ancient and medieval civilizations, down to the era of the Black Death in Europe (mid-14th century). We will focus primarily on Egypt and the ancient Levant, the Mediterranean world of Greece and Rome, medieval Europe, the Islamic Middle East and Spain, and selected aspects of the arts of India, China, and Japan.
Area: Writing Intensive

AS.010.102. Introduction to Art History II. 4 Credits.
This introductory course explores and compares major developments in the arts primarily in Asia, Europe, North Africa, and North America from the fourteenth century to the present day, looking in particular at architecture, painting, sculpture, the arts of the object (ceramics, metalwork, etc.), printmaking, photography, and, starting in the twentieth century, new media. Throughout the semester, we will explore how the artistic practices and theories under consideration relate to their specific historical, intellectual, social, political, and geographical contexts, and we will also consider the roles that works of art and artists played in shaping many of those very same contexts

AS.010.103. Introduction to the Art of Asia. 3 Credits.
A survey of the art and architecture of Asia, from the ancient world to the present and including the Indian subcontinent, China, Japan, Korea, and Southeast Asia.

AS.010.110. Art of the Islamic World. 4 Credits.
This course is an introduction to the art of the Islamic world, covering a geography that stretches from Spain to India and a chronology that extends from the seventh century into our own time. Within this rich and varied continuum, we will look at a range of art forms—including architecture, painting, sculpture, ceramics, and calligraphy—in relation to such themes as patronage, production, function, and audience. A number of the artworks will be viewed firsthand in local collections. We will also explore the intersection of Islamic art with today's political realities.

AS.010.204. Italian Art in the Middle Ages. 3 Credits.
This course explores key monuments of medieval art and architecture in Italy from c. 400 until 1350. We will concentrate on historical, functional, and aesthetical aspects that lead to the creation of single monuments and art works. Emphasis is given to the analysis of "sacred space" by means of architecture, painted, and sculptural decoration, as well as ritual performances. Another focus is laid on the emergence on the political dimension of art for the creation of civic identity as well as in the context of the late medieval courts. We raise questions about the importance of materiality and science for the creation of medieval art works.
Area: Writing Intensive

AS.010.205. Art of Mesoamerica. 3 Credits.
This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.208. Leonardo da Vinci: The Renaissance Workshop in the Formation of Scientific Knowledge. 3 Credits.
How does a notary's son trained as a painter come to claim expertise in the construction of machines and acquire knowledge of the principles of optics, human anatomy, the flight of birds, the dynamics of air and water? The course will focus critically on the myth of Leonardo's singularity and explore his achievements with regard to the artisanal culture of his time, as well as the problems of authority in the recognition of artisanal knowledge as scientific discovery.

AS.010.210. The Art of Colonial Latin America. 3 Credits.
This course offers a broad introduction to the arts of colonial Latin America: students will become familiar with the artistic production in the areas of Latin America invaded and controlled by the Spanish Crown from the time of the conquests in the sixteenth century to independence movements in the early nineteenth century. We will explore a wide range of materials from maps to featherwork, paintings to urban grids, cathedrals to mummy bundles. The course is thematically organized, such that students will not only become familiar with the art of Latin America, but will come to understand critical topics related to the study of early modern colonialism: conquest, race, missionary control, literacy, extraction, and indigenous and imperial systems of governance.

AS.010.212. Mirror Mirror: Reflections in Art from Van Eyck to Velázquez. 3 Credits.
Explores the different ways Early Modern painters and printmakers incorporated mirrors and optical reflections into their works for the sake of illusion and metaphor, deception and desire, reflexivity and truth-telling. Connecting sense perception and ethical knowledge, embedded mirror images often made claims about the nature of the self, the powers of art, and the superiority of painting in particular.

AS.010.214. Ancient Americas in Motion. 3 Credits.
This course critically examines the visual arts through the medium of documentary, historical, and Hollywood film. Coverage is mostly North America and Mesoamerica.

AS.010.232. Art and Architecture of the Global Medieval Mediterranean World. 3 Credits.
This course serves as an introduction to the art and architecture of the Mediterranean region between the early Christian period and the Second Crusade (c. 250-1150). We will analyze the interactions between WesternEuropean, Byzantine, and Islamic cultures through the development of religious art and architecture, asking specifically how these interactions were mediated by culturally distinct representational practices. The course will cover the broad Mediterranean region by focusing on specific sites of interaction around the Sea (i.e. Islamic Spain, Norman Sicily, Byzantine North Africa, Venice and the Adriatic Coast, and Crusader Palestine). Select topics will include: the rise of religious image theory and its effect on the visual cultures of the Mediterranean region; the trans-regional movement of artists, crafted objects, and artistic technologies; the history of urbanism and the production of artistic objects in port cities and centers of trade; and the concept of the Mediterranean as "Premodern Globalism." Readings will include both primary and secondary sources, and we will investigate a variety of methods and approaches to the interpretation of art objects.

AS.010.233. Asian Art Since 1945. 3 Credits.
This course examines the art and architecture of East, South, and Southeast Asia produced since the mid-twentieth century. We will engage with theoretical, visual, and political developments in the recent art of this region, reading statements by artists and architects, discussing the rising commercial and international profile of contemporary Asian art, and exploring established and emerging art histories of this period.Cross-list with East Asian Studies

AS.010.235. Art, Medicine, and the Body: Middle Ages to Modernity. 3 Credits.
This course explores seven centuries of fruitful collaboration between physicians and artists, uncovering the shared discourses, diagnostic techniques and therapeutic agendas that united the art of picture-making with the art of healing. Topics include the origin and development of medical illustration; the long, cross-cultural history of the therapeutic artefact; the anatomical investigations of Renaissance artists such as Leonardo and Michelangelo; depictions of bodily pain and disease in the art of Matthias Grünewald and psychosomatic syndromes like melancholy in the work of Albrecht Dürer; the spectacularization of the body in Enlightenment science and the ethics of medical specimen display today -- all in order to bring the complex intersections of the history of medicine and the history of art into view.

AS.010.240. Art and the Environment in the Ancient Eastern Mediterranean. 3 Credits.
What is the relationship between art and the environment? What are "geoaesthetics?" This course explores the interrelationships between ecosystem and creative responses and practices in the ancient Eastern Mediterranean. Specifically, the class will examine the intersections between artistic and architectural practices and the natural environment during the New Kingdom in ancient Egypt, the Neo-Assyrian period in ancient Mesopotamia, and the Minoan Bronze Age in the ancient Aegean.

AS.010.252. Sculpture and Ideology in the Middle Ages. 3 Credits.
This lecture course will offer a selective, thematic exploration of the art of sculpture as practiced in the Middle Ages, from the fall of the Roman empire in the 4th century CE to height of the Gothic era. The primary concern will be to analyze sculpture in all of its forms – monumental free-standing, architectural, liturgical, and commemorative – as the primary medium utilized by patrons, both private and corporate, to display political messages to an ever growing public.

AS.010.255. Contemporary Performance Art. 3 Credits.
Performance art is provocative and often controversial because it troubles, without dissolving, the distinction between art and life. Not just a matter of activating bodies, engaging viewers, or spurring participation, performance art asks what it means to perform, and what kinds of actions count, in contemporary culture. As such, performance art allows us to rethink established art historical concerns with form, perspective, and materiality, while offering critical insight into everyday life. We will explore how performance art addresses ingrained assumptions about action and passivity, success and failure, embodiment and mediation, "good" and "bad" feelings, emancipation and dependency.The study of performance art invites transdisciplinary approaches. Students from across the university are welcome. Our attention to a diverse array of artists and practices will be supplemented by readings in art history and criticism, as well as in feminist and queer theory, critical race theory, and political thought.

AS.010.265. Early Modern Dutch and Flemish Painting. 3 Credits.
Explores the major painters and printmakers working in the Netherlands during the sixteenth and early seventeenth centuries, the period that saw the outbreak of the Reformation, the revolt against Spanish rule, iconoclasm, the birth of the Dutch Republic, and the establishment of a Dutch colonial empire. Featured artists include Jan Gossaert, Pieter Aertsen, Pieter Bruegel the Elder, Jan Brueghel, Rembrandt van Rijn, Peter Paul Rubens, Jan Steen, Jan Vermeer, and others.

AS.010.301. Michelangelo: Religion, Sexuality, and the Crisis of Renaissance Art. 3 Credits.
The course will focus on the controversies surrounding the representation of the body in the writings and figurative art of Michelangelo and his contemporaries, the historical circumstances under which the most admired artist in Europe was attacked as a blasphemer and an idolator, and the effect of widespread calls for censorship on his later production. The writings of Michelangelo, Pietro Aretino, Benvenuto Cellini and own writings will be considered with a focus on their staging of an ambivalent and transgressive eroticism.

AS.010.303. Transformations of an Empire: Power, Religion, and the Arts in Medieval Rome. 3 Credits.
This course investigates the impact of political, religious, and social change for the making of art and architecture in the city of Rome from Constantine the Great (ca. 274-337 CE) until 1308, when the papal court moved to Avignon. From being a thriving metropolis and the political center of an empire in a pagan, multi-ethnical society, Rome became a small town of a few thousand inhabitants dwelling in the ancient ruins under the spiritual leadership of a powerless Christian bishop and unprotected from the invasions of the migrating peoples from Eastern Europe and Central Asia. Later transformations concern the rise to political power of the popes, achieved by the military alliance with the Frankish dynasty of Charlemagne around 800, and the controversy over the superiority of power between the German emperors and the Roman popes. How did the transformation from worldly to religious power affect the architecture of public buildings in the city? What strategies were developed to visually promote the new religious leaders of the city, the popes, and the new Christian God? How did the new status of Rome as one of the most important Christian pilgrim sites with its countless bodies of Early Christian martyrs in the catacombs outside the city influence urban development? And finally, what impact did the economical ups and downs in these periods of transition have for the arts? As we try to reconstruct the 'image' and the appearance of medieval Rome, this course discusses ideas and concepts behind different forms of leadership, both political and religious, as they intersect with the power of the arts and the self-referential character of a city that is obsessed with its own past.
Area: Writing Intensive

AS.010.305. The Ethiopia at the Crossroads. 3 Credits.
Ethiopia played a foundational role in modern-day civilization and culture: as the find site of Lucy, the earliest bipedal hominid, the seat of the Queen of Sheba's kingdom, the second country in the world to adopt Christianity in the early 4th century CE, and the nexus of exchange between Africa, Europe, and Asia. In fall 2023, The Walters Art Museum will mount the exhibition tentatively titled, Ethiopia at the Crossroads, which addresses Ethiopia's relationship and artistic exchange with its surrounding cultures, including South Arabia, Nubia, Egypt, Byzantium, Armenia, Italy, and India. It also discusses the impact of Ethiopian art beyond its borders, bringing works of Ethiopian contemporary art into dialogue with the historical Ethiopian art that these artists draw upon in their work. The exhibition covers approximately 1,750 years of Ethiopian history with a special focus on the art of the medieval period, broadly conceived. The course will also offer insights into how a museum exhibition is developed from the initial concept to the physical presentation in the galleries.

AS.010.307. Diplomats, Dealers, and Diggers: The Birth of Archaeology and the Rise of Collecting from the 19th c. to Today. 3 Credits.
The development of archaeology in the Middle East – its history of explorers, diplomats, missionaries and gentlemen-scholars – profoundly shaped the modern world, from the creation of new museums and the antiquities market to international relations and terrorism.

AS.010.309. The Idea of Athens. 3 Credits.
This thematic course will explore the art, architecture, material culture, and textual evidence from the ancient city of Athens, the many cultures and social positions that made up the ancient city, and the idea of the city as something far beyond its reality. We will take a number of field trips to museums in the area and some of your assignments will be based in local museums.

AS.010.315. Art of the Assyrian Empire, 1000-600 BCE. 3 Credits.
From 900 to 609 BCE, the Assyrian Empire dominated the ancient Near Eastern world, stretching from western Iran to the Mediterranean and Egypt. In concert with imperial expansion came an explosion of artistic production ranging from palace wall reliefs to small-scale luxury objects. This course provides an integrated picture of the imperial arts of this first world empire, situating it within the broader social and political contexts of the first millennium BCE. In its conquest of foreign lands, this powerful state came in contact with and appropriated a diversity of cultures, such as Phoenicia, Egypt, and Greece, which we will also study.

AS.010.316. Venice: Art, Architecture and Ecology from the Late Middle Ages to the Present. 3 Credits.
This course is an investigation into the fashioning of Venetian identity in architecture and the visual arts, with a particular address to the encounter with Byzantine and Islamic traditions and exchanges with other centers of the Italian peninsula.

AS.010.319. Medieval Art and Architecture of the Holy Land. 3 Credits.
The course focuses on art and architecture in the political and religious contexts of the Middle East, from the 4th to the 14th c. The three monotheistic religions all claimed specific territories -- in particular the city of Jerusalem -- for cult practices. This situation resulted in military conflicts that had an impact of Jewish, Medieval, Byzantine, and Islamic art in the Holy Land. The political conflicts, which still plague the region today, are rooted in the complex situation of the medieval period. The Roman, Arab, Byzantine, and crusader invasions resulted however in exciting eclectic styles that characterize the art and architecture of the region. We will discuss concepts behind political and religious leadership, as they intersect with the power of the arts.
Area: Writing Intensive

AS.010.320. Art of Colonial Peru. 3 Credits.
Viewed within the dynamic historical context of colonial society, we consider the pictorial, sculptural, and architectural programs that ensued in viceregal Peru (1532-1825). We examine the role of religious orders, art schools, artisan guilds and cofradía, and consider the social and political implications of art patronage.

AS.010.322. Knowledge, Holiness, and Pleasure: The Illustrated Book in the Medieval World. 3 Credits.
The book was the primary source for the collection of knowledge in the Middle Ages. It was also the medium for the preservation and proliferation of the texts that underlay the three monotheistic religions (Judaism, Christianity, Islam). Finally, the book served as a source for elite entertainment, perhaps most importantly in Late Antiquity and the later Middle Ages. This course investigates the role of the illustrated book within the political, religious, and artistic developments that took place after the rise of Christianity from the end of the Roman Empire until the early modern period in the medieval West and in Byzantium, permeating Jewish and Islamic traditions. We will examine how the different types of books, such as horizontal and vertical scrolls, large and miniature size codices influenced the placement, conception, and style of the illustrations. The course also addresses processes of manufacture, issues of materiality (i.e. precious multi-media book covers, papyrus, parchment, paper), and the relationship between text and image. A major aspect of the seminar focuses on the performative aspect of the book in its wide range of functions: secular and liturgical, public and private. Students will be able to work first hand with manuscripts and facsimiles from the rare book collection of Eisenhower Library and the Walters Art Museum.

AS.010.325. Blood, Gold, and Souls: The Arts of the Spanish Empire. 3 Credits.
From the sixteenth through the eighteenth centuries, visual forms and practices linked such far-flung places as Mexico City and Naples, Manila and Lima, Cuzco and Antwerp, Quito and Madrid: all cities in the Spanish Empire. This course is conceived as a voyage, moving city by city to explore objects that connected Spain's vast holdings. We will investigate how the Spanish Crown and the Catholic Church used visual strategies to consolidate political power and instill religious faith across the world; and, alternatively, we will consider how local conditions, concerns, and resistance reshaped those efforts. This course surveys a diverse range of artistic production: religious paintings and sculptures; maps used for imperial surveillance; luxury goods crafted from shimmering feathers, ceramics, ivory, and precious metals; urban design and architecture from the ports of Europe to the highland outposts of the Andes; ephemeral cityscapes for civic performances. In examining such materials, students will be introduced to the art historical methods and theoretical concerns used to study a wide diversity of objects within an imperial frame.

AS.010.327. Asia America: Art and Architecture. 3 Credits.
This course examines a set of case studies spanning the last century that will enable us to explore the shifting landscape of Asian transnational art and architecture. Each week will focus on a different artist, group, exhibition, architect, urban space, or site to unpack artists' and architects' engagements with the changing landscape of immigration policies, movements to build solidarity with other artists of color, and campaigns for gender and sexual equality. The course will situate these artists within American art, and build an expansive idea of Asia America to include the discussion of artists whose work directly addresses the fluidity of location and the transnational studio practice.
Area: Writing Intensive

AS.010.329. Building an Empire: Architecture of the Ottoman Capitals, c. 1300–1600. 3 Credits.
Centered on modern-day Turkey and encompassing vast territories in Asia, Africa, and Europe, the Ottoman Empire (1299 – 1923) was the longest lived and among the most powerful Islamic states in history, with an artistic tradition to match. This course explores the functional and symbolic role that architecture played during the empire's formative centuries, when three successive capital — Bursa, Edirne, and Istanbul — served to visualize the sultans' growing claims to universal authority. With reference to mosques, palaces, tombs, and other categories of architecture, the course will examine the buildings in their artistic, social, and political contexts. Themes to be addressed include patronage and audience, architectural practice and the building trade, ceremonial and ritual, topography and urban planning, and the relationship of Ottoman architecture to other traditions.

AS.010.337. Global Amsterdam: The Golden Age of a Small but Mighty Metropolis. 3 Credits.
This course examines the visual and material culture of the Dutch Golden Age as the product of global forces. The young Dutch Republic quickly achieved a global reach in the seventeenth century. And Amsterdam served as its commercial capital, which by 1630 could be counted as one of the most important port cities in the world and home to the Dutch East India Company (VOC), the world's first multinational corporation. Moving an incredible quantity of goods (spices, silks, porcelain, coffee, precious stones, "exotic" arts, and slaves) generated not only the economic riches, but also the cultural touchpoints that would give rise to art produced by the likes of Rembrandt, Vermeer, Hals, and the many exceptional craftsmen that have left us some of the most enduring masterpieces of the seventeenth century. This course situates that art, and the city of Amsterdam itself, within networks that connected it to such far flung places as Japan, Jakarta, Surinam, Curacao, Brazil, and the Indian Subcontinent.
Area: Writing Intensive

AS.010.338. Art and the Harem: Women's Spaces, Patronage, and (Self-)Representation in Islamic Empires. 3 Credits.
Long characterized in the Western imagination as exotic realms of fantasy, harems in Islamic tradition served as private domestic quarters for the women of elite households. This course explores the harem —as an institution, a physical space, and a community of women— from various art-historical perspectives, considering such topics as the harem's architecture, the agency of its inhabitants as patrons and collectors, the mediating role of eunuchs in the harem's visual and material culture, and the ability of harem women to make their mark through public artistic commissions. Our case studies will address a range of Islamic geographical and chronological contexts, though we will focus on the empires of the early modern period and, above all, the famous harem of the Ottoman sultans at the Topkapi Palace in Istanbul. In challenging popular misconceptions, the course will also look at the wealth of exoticizing imagery that the harem inspired in Western art, which we will consider through Orientalist paintings at the Walters Art Museum and illustrated rare books at Hopkins itself.

AS.010.339. Sex, Death, and Gender: The Body in Premodern Art, Medicine, and Culture, c. 1300-1600. 3 Credits.
To what extent was the body and its depiction a site of contestation, identification, or desire in the Middle Ages and Renaissance? If the body in the West since the 1800s is seen to have been shaped by the rise of photography and film, the institutionalization of biomedicine, and the establishment of techniques of surveyance and mechanization, then how was the body represented, disciplined, and experienced in the preceding centuries? In an age of unprecedented encounter with non-European bodies, what did it mean to describe and categorize bodies by race, region, or religion? These are some of the major questions this class seeks to answer, which is fundamentally interdisciplinary as it draws upon insights and methods from anthropology and the history of medicine and history of science to investigate how the body has been represented and imagined in the visual arts. The bodies of the suffering Christ, the female mystic, the dissected cadaver, the punished criminal, and the non-European 'Other' will loom large as we work to problematize notions of a normative body, whether in the premodern world or in the contemporary one. While most readings and lectures will concern the body and its representation in the Christian West during the later Middle Ages and Renaissance, students are encouraged to work on a topic of their choosing from any geographical area 1000-1800 CE for their research papers.
Area: Writing Intensive

AS.010.346. Art of the Cold War Era. 3 Credits.
The Cold War years bore witness to some of the most radical developments in modern art. An abiding question for artists, writers, and political figures too during this period was what role—if any—could art perform in social and political life, and in the struggle between capitalism and communism in particular. This course examines the political viability of art as this concern was taken up by groups and individuals throughout the world in response to rapidly shifting geopolitical circumstances. Beginning with the visual cultures of the United States and Soviet Union, the course will also examine artistic responses to the conditions of Cold War existence in and beyond countries of NATO and the Warsaw Pact. Proceeding roughly chronologically, the course is divided into twelve units following the art of the US, USSR, Western and Eastern Europe, China, and Japan, among others. It treats a wide variety of media as painting and sculpture, canonically privileged in the history of Western art, ceded ground to new forms of practice such as performance, film, and a deep, critical engagement with mass culture. In so doing, this course provides at once a global history of modern art and visual culture and a critical interrogation of their relationships to social change and political life during the 20th century and beyond.
Area: Writing Intensive

AS.010.349. Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE. 3 Credits.
The arts of Egypt, Greece and the Near East are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. From 2000 to 500 BCE (the Middle/Late Bronze and Iron Ages), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Egyptians, Near Easterners, Greeks and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war, imperialism, and colonization.
AS.010.301 - Titled "Art and Interactions in the Eastern Mediterranean from 2000 to 500 BCE" - Students who have taken that course in 2014 or prior are not permitted to take this course.

AS.010.350. Body and Soul: Medicine in the Ancient Americas. 3 Credits.
This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

AS.010.352. Modern and Contemporary Art: Middle East and South Asia. 3 Credits.
This course will explore modern and contemporary art in colonial and postcolonial contexts from Bangladesh to northern Africa. How do artists negotiate demands to support their national and local identities while participating in modernism across borders? What role do secularism and spirituality have in modern art? How do anticolonial, Marxist, and feminist politics shape art in these regions? How do global economic forces and the rise of powerful collectors, private museums, and international art fairs shape art and artists working across this geographic area? We will foreground the role of women as artists, collectors, patrons, and scholars throughout.
Area: Writing Intensive

AS.010.364. Babylon: Myth and Reality. 3 Credits.
Babylon – the name resonates even today, from the biblical whore of Revelation to sci-fi. It evokes exotic places and time long past. But what do we really know about the ancient city and the civilization that flourished there thousands of years ago? The first part of this course examines the archaeological city of Babylon, located in the modern state of Iraq, and considers its artistic and architectural achievements in the context of Mesopotamian history. The second part of the class explores the ongoing impact of Babylon in the cultural imagination of later periods, from the Classical and biblical authors, to European artists, Hollywood movies, science fiction, and contemporary political movements.

AS.010.365. Art of the Ancient Andes. 3 Credits.
The ancient visual arts of Andean South America and their respective cultural contexts form the basis of this course. In conjunction with the Baltimore Museum of Art and the Johns Hopkins Archaeological Museum students will have access to collections for study.

AS.010.366. Native American Art. 3 Credits.
The works of Native American artists are examined and discussed in their respective social and historical contexts. Such works include Hopewell stone sculpture, Mimbres pictorial painting, and Tlingit guardian figures. We examine the concept of sacred landscape through analysis of monumental earthworks and effigy mounds, Anasazi architecture, and rock art. In conjunction with the Baltimore Museum of Art (BMA), and Johns Hopkins Special Collections, students will have access to collections for study.

AS.010.367. Photography, the Archive, and Memory. 3 Credits.
This seminar will culminate in an exhibition in the library, focused on the photographic works of Dayanita Singh (b. India, 1961) in Hopkins' collections. Singh's work delves deeply into her subjects, exploring issues of identity, the body, and sexuality as well as questions related to memory and the archive. She has long presented her photography in the form of the book, and as such we will pursue readings in photography, book arts, and the archive, and bring nineteenth-century illustrated books in our collection into dialogue with Singh's work. This will be a hands-on seminar: students will develop the framework for the exhibition, write the textual materials (labels, wall text), and decide on the arrangements of objects in the show.

AS.010.382. The Politics of Display in South Asia. 3 Credits.
Through an examination of colonial exhibitions, the rise of national, regional, and archaeological museums, and current practices of display and representation in institutions, we will explore how the image of South Asia has been constructed in the colonial, modern, and contemporary eras. We will engage with the politics of representation, spectacle, and the economies of desire as related to colonialism and the rise of modernity. Readings from postcolonial theory, museum studies, anthropology, history, and art history.
Area: Writing Intensive

AS.010.389. The Stone and the Thread. 3 Credits.
Advanced inquiry into imperial Inka architecture and fiber arts.
Area: Writing Intensive

AS.010.390. Ancient Americas Object Workshop. 3 Credits.
Analysis of ancient Americas collection held in the Johns Hopkins Archaeological Museum.
Area: Writing Intensive
AS.010.105 OR AS.010.407 OR AS.010.398 OR AS.010.365 OR AS.010.389 OR AS.010.366 OR AS.010.214 or in consultation with professor prior to registration.

AS.010.398. Tombs for the Living. 3 Credits.
Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.400. Research Lab: The Dutch Americas. 3 Credits.
The Dutch East India Company, or VOC, is historically and art historically well documented and firmly understood. But the Dutch also had significant holdings to the west via the Dutch West India Company, or WIC. They operated and held outposts in the present-day United States (New York/New Amsterdam), Caribbean (Surinam, Curaçao, Bonaire), Latin America (Brazil), and West Africa. Despite the abundance of materials associated with the WIC from this wide geography, these have been scarcely assessed by art historians, and a defined and comprehensive corpus has never been assembled. This class will act as a research lab in which to do so. In research teams, students will map artworks and objects created from that broad, transnational cultural ambit—categories that might include maps, landscape paintings, still life paintings featuring American flora and fauna, botanical illustrations, plantation architecture, luxury objects made from precious raw materials gathered in the Americas, the urban environment of slavery—and develop individual research questions around them.The class will run with a partner lab in the form of a course led by Professor Stephanie Porras at Tulane University. The course will feature speakers; and there is potential for funded travel to conduct research. We will start at the ground level; no previous knowledge about the field is required. Students from all disciplines are welcome.
Area: Writing Intensive

AS.010.405. The Medieval Image and Concepts of Authenticity. 3 Credits.
The course examines the notion of the authentic in conjunction with medieval images, relic veneration, and the practice of law. It investigates the construction, reception, and theoretical grounding of authenticity of reliquaries, icons, and imprints on cloth or seals, and legal documents. These objects elucidate artistic strategies such as cross media references, abstraction, mimesis and bricolage to convey an aura of authenticity. We address other authenticating factors, such as complex ritualized forms of communication. This is a new course for the undergraduate section, existing course is AS.010.644. Will be taught as a hybrid this Fall 2020.
Area: Writing Intensive

AS.010.407. Ancient Americas Metallurgy. 3 Credits.
This course addresses the technology, iconography and social significance of metals and draws on case studies from the Americas. Collections study in museums.

AS.010.409. Theories and Works of “The Baroque”. 3 Credits.
There is perhaps no more confounding, though also no more persistent, art historical concept than that of “the Baroque.” This course introduces students to foundational histories and critiques of “the Baroque” while exploring works of art that have proved central to these formulations. That is, this course will balance careful reading of historiography with close examination of works of art (both digitally presented and visited in local collections). Students will come away with a layered understanding of the Baroque objects—from relatively small-scale museum works to major architectural and sculptural monuments—and their place within the broader evolution of the history of art. Particular attention will be given to newer global and (post-)colonial approaches to notions of the Baroque, ultra-Baroque, and neo-Baroque.
Area: Writing Intensive

AS.010.410. The Epistemology of Photography. 3 Credits.
This seminar will ask how photography produces ways of knowing: how does photography’s reality-effect shape its dissemination and absorption? Is photography’s emergence during the colonial era coincidental or catalytic? How is memory (re)constituted in a photography-saturated world? What kinds of histories does photography encourage and discourage? Is a photograph an object? We will read across disciplines (literature, anthropology, history, history of art, political science, theory) to investigate the epistemology of photography and the photograph.
Area: Writing Intensive

AS.010.413. Historical and Conceptual Bases of Art History. 3 Credits.
This course introduces students to the principal methods and theories of art history. Students will work through readings foundational for the discipline, texts that define key methodological consolidations in the twentieth century, and more recent (e.g. feminist, visual studies, global, post-colonial, and/or ecological) critiques and rethinking. Specific texts will vary by instructor, but the course seeks—in any instantiation—to include a plurality of perspectives.

AS.010.414. The Cartographic Imaginary: Maps, Charts, and the Navigation of the Early Modern Globe. 3 Credits.
In the early modern world, people traveled further and more routinely than ever before. This course looks at the tools used to facilitate such endeavors—from maps to navigational charts, from atlases to astrolabes. However, beyond mere logistical instruments for imperial expansion, colonial settlement, and commercial trade, these objects and pictures structured new ways of thinking about and imagining the world and its spaces. An armchair traveler in Amsterdam could envision a journey to and travel within a place like modern-day Indonesia; a Spaniard living in the highlands of present-day Bolivia could imagine, in period terms, “all the cities of the universe and more.” This course attends to excavating the representational economies forged from the mass-production and wide circulation of navigational objects and pictorialized territories. Though the focus will be on the early modern period, we will read broadly and engage a wide range of theories; and students are encouraged to use the tools we develop in class to research representation from any time and place.
Area: Writing Intensive

AS.010.419. Passion Image, Passion Cult, Passion Drama: Narrative and Metaphor in the Middle Ages, Renaissance, and Beyond. 3 Credits.
A set of interdisciplinary explorations of the Passion of Christ narrative in Scripture, theology, visionary literature, cultic devotion, the visual and dramatic arts in Europe from the Central Middle Ages to the Reformation, with a special fast-forward to modern cinematic retellings of the Passion story.
Area: Writing Intensive

AS.010.423. Modern and Contemporary Art in South Asia. 3 Credits.
How does modernism operate in the colonial context, work with and against the nationalisms of new countries (India, Pakistan, Sri Lanka, Nepal, and Bangladesh), challenge existing norms of the art world and the art market, engage with the difficult and violent upheavals of Partition and sectarian conflict, and allow for experimentations and new forms all the while? This course will explore the history of the art of the subcontinent from c. 1880 to the present by critical engagement with the art, artists, and theories at play in the South Asian region.
Area: Writing Intensive

AS.010.424. Art and Colonialism: Nineteenth-century India. 3 Credits.
This seminar explores the technologies of colonial power, from small ephemeral watercolor images of religious processions to massive multi-volume photographic projects documenting the “people of India,” and extending to the establishment of new urban and architectural spaces, archaeological museums, and art schools, the circulation of diplomatic art collections, and the commissioning of survey data. We will engage with the anti-colonial movements of resistance and uprising that took place across this century, examining the central participation of modern artists with these political movements, and explore the way this period fundamentally shaped the foundations for the study of South Asian art and archaeology. Readings will include colonial and postcolonial theory, Orientalism, historiography; we will be actively working with materials in the library’s Special Collections.
Area: Writing Intensive

AS.010.431. Obsessed with the Past: the Art and Architecture of Medieval Rome. 3 Credits.
In antiquity, Rome became the capital of an empire, its growing status reflected in its sophisticated urban planning, its architecture, and the arts. While an abundance of studies explores the revival of this glorious past in the Renaissance, this seminar discusses various ways of the reception of antiquity during the medieval period. We address the practice of using "spolia" in medieval architecture, the appropriation of ancient pagan buildings for the performance of Christian cult practices, the continuation of making (cult)images and their veneration, the meaning and specific visuality of Latin script (paleography and epigraphy) in later medieval art. We discuss the revival and systematic study of ancient knowledge (f. ex. medicine, astronomy, and the liberal arts), in complex allegorical murals. As we aim to reconstruct the art and architecture of medieval Rome, this course discusses ideas and concepts behind different forms of re-building and picturing the past, as they intersect with the self-referential character of a city that is obsessed with its own history.
Area: Writing Intensive

AS.010.432. Therapies of Art and Literature from Antiquity to Early Modern Europe. 3 Credits.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch’s therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.
Area: Writing Intensive

AS.010.433. Hands-On Approaches to European Books and Prints before 1800. 3 Credits.
Baltimore’s rich museum and library collections create a dynamic laboratory for students to gain an understanding of early modern European traditions of prints and books. Engraving, etching, woodcut, mezzotint, à la poupée; Rembrandt, Dürer, Aldus Manutius, Plantin-Moretus. This course will introduce students to the basic techniques, concepts, terms, and artists that shaped the production of reproductive works on paper in early modern Europe and their subsequent art historical study. All sessions will be taught out of local collections (BMA, Walters, NGA, Hopkins Special Collections); that is, this is a hands-on class that—while requiring no previous experience—will attend to the nitty-gritty details and methods of studying works in person, giving students the tools, expertise, and confidence to pursue their own research with historical printed materials.
Area: Writing Intensive

AS.010.440. Power Dressing: The Politics of Costume between the Ottoman Empire and the West. 3 Credits.
In the Ottoman Empire—a vast multiethnic state straddling Africa, Asia, and Europe—how one dressed was a deeply political affair. Ottoman rulers and subjects alike used clothing to express (and sometimes transgress) the hierarchical, religious, and communal distinctions defining their society, much to the fascination of foreigners who visited the empire or sought knowledge of its sartorial traditions in texts and images. This seminar will explore Ottoman dress and dress codes in the context of the empire’s long and complicated relationship with Western powers, focusing on the role that costume played as a charged site of cross-cultural interaction, posturing, and self-assertion from the sixteenth to the nineteenth century. Our case studies will include costume albums —books showing people high and low in their characteristic garb—painted by Ottoman artists for Western buyers; diplomatic robes of honor and their attendant ceremonies; and cultural cross-dressing as manifested in European turquerie portraiture and masquerades. Moving into the modern period, we will consider how nineteenth-century dress reforms bridged the gap between Ottoman and Western costume while engendering new modes of Ottoman sartorial self-representation that challenged hardening Orientalist discourses in such venues as mannequin museums and world’s fairs. The seminar will make considerable use of artworks in local collections, including rare books and prints at Hopkins itself.
Area: Writing Intensive

AS.010.444. Classics Research Lab: Antioch Recovery Project (ARP). 3 Credits.

Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term “narcissism”. Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard’s Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

AS.010.451. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art. 3 Credits.

Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.459. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents. 3 Credits.

This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

AS.010.501. Independent Study. 1 - 3 Credits.

You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.502. Independent Study. 1 - 3 Credits.

You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.521. Honors Thesis. 1 - 3 Credits.

Open to students by arrangement with a faculty advisor in the History of Art Department. Interested students should review the program description available in the department office.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.522. Honors Thesis. 3 Credits.

You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.010.603. Beyond Word & Image.

The relationship of “word” and “image” has been a central concern of both the history of art and other humanistic disciplines; and semiotics, (post-)structuralism, narrative studies, media studies, and theories of ekphrasis and representation have been marshalled to probe how visual and verbal systems work in conjunction, overlap, and conflict. Much less art historical attention has been paid to the visuality of writing itself. Against the backdrop of robust work on the relationship between text and image, this course focuses on text as image: the visuality of text, the imagistic dimensions of writing, Schriftbildlichkeit. The seminar takes as guiding premise that art historical method might be robustly brought to bear on the visual and material features of texts, both those that appear as part of traditional art historical media (paintings, sculptures, and architectural monuments) and those that have primarily remained within the purview of other humanistic subfields: books, archival documents, writers’ manuscripts, epistolary communication, and inscriptions (both analog and digital). In this course, we will survey a broad range of textual objects, from ancient inscriptions to moveable type to digital texts to “writing” in twenty-first century artists’ books; and we will work together towards assembling an art historical toolkit for excavating the full valences of texts, accounting for the ways they make meaning in linguistic, semiotic, formal, material, visual, and media-specific registers. Though art historical in focus, this course will be essentially interdisciplinary, and students from other subfields are warmly welcomed. There will be ample opportunity for discussing and studying objects in local collections.

AS.010.604. Contested Patterns: Islamic Art History and Its Challenges.
Formed against the backdrop of nineteenth- and twentieth-century Orientalism and colonialism, the field of Islamic art history continues to grapple with the overwhelmingly Eurocentric assumptions, narratives, and approaches that shaped its emergence and development. These inherited perspectives and the debates they have sparked are the focus of this seminar, which critically examines the foundational characterizations of Islamic art—as ornamental, iconophobic, and timelessly other—together with the exhibitory, commercial, and scholarly contexts in which such ideas took root. Adopting a simultaneously thematic and chronological approach, the seminar will trace the ways in which diverse constellations of actors—including those from within the Islamic world itself—have variously established, consolidated, or challenged the field's underlying concepts. We will explore how this discursive process has intensified in our own time, in which a spate of scholarly and popular treatments have laid bare the tension between calls to reevaluate the field and an enduring impulse to reinscribe its established contours. Alois Riegl, Oleg Grabar, Gülru Necipoglu, Yasser Tabbaa, and Wendy Shaw are among the authors whose writings will be assessed and compared. Throughout the seminar, we will ground our historiographical inquiry in discussions of specific works and categories of Islamic art—particularly those like carpets that traditional frameworks have fetishized as decorative—and consider more fruitful avenues for addressing such material, making use of local collections to the extent that we can.

AS.010.606. Approaches to Ancient Art.
The discipline of art history has passed through a number of major methodological and theoretical shifts since its inception (and in particular, over the last thirty years). Foundational disciplinary methods derive principally from the arts of Classical Greece, the Renaissance and contemporary periods. As the discipline embraces an enlarged field of inquiry, particularly drawing upon developments in anthropology, material culture studies, feminism, queer theory, and political theory, additional avenues for understanding the arts of the ancient world are emerging. The seminar focuses on how art historical method and theory – both foundational and emergent – might be profitably applied to the subfields of the ancient Near East and eastern Mediterranean (understood in the broadest sense).
Area: Writing Intensive

AS.010.607. The Epistemology of Photography.
This seminar will ask how photography produces ways of knowing: how does photography's reality-effect shape its dissemination and absorption? Is photography's emergence during the colonial era coincidental or catalytic? How is memory (re)constituted in a photography-saturated world? What kinds of histories does photography encourage and discourage? Is a photograph an object? We will read across disciplines (literature, anthropology, history, history of art, political science, theory) to investigate the epistemology of photography and the photograph.

AS.010.608. The Picture as Object.
The seminar will explore cases of European pre-modern picture-making in various media that solicit tactile as well as sensory engagement, and that call into question the "Albertian" metaphor of pictura as window. Case studies will include mosaics, reliefs, pastiglia, medals, portable paintings, et al."

AS.010.611. Seminar in Near Eastern Art.

AS.010.613. Geographies of Art: Theories and Cases Studies from the Renaissance to the Present.
The role of place in the art historiography of the Renaissance, with readings in geographical theory. The seminar will also consider the role in the art of Lorenzo Lotto, Gaudenzio Ferrari, Cesare da Sesto, Romanino, Moretto, Pordenone, Titian, and other artists active before the canon-formation enterprise of Giorgio Vasari definitively altered the map of Italian art after 1550.

AS.010.614. Research Lab: The Dutch Americas.
The Dutch East India Company, or VOC, is historically and art historically well documented and firmly understood. But the Dutch also had significant holdings to the west via the Dutch West India Company, or WIC. They operated and held outposts in the present-day United States (New York/New Amsterdam), Caribbean (Surinam, Curaçao, Bonaire), Latin America (Brazil), and West Africa. Despite the abundance of materials associated with the WIC from this wide geography, these have been scarcely assessed by art historians, and a defined and comprehensive corpus has never been assembled. This class will act as a research lab in which to do so. In research teams, students will map artworks and objects created from that broad, transnational cultural ambit—categories that might include maps, landscape paintings, still life paintings featuring American flora and fauna, botanical illustrations, plantation architecture, luxury objects made from precious raw materials gathered in the Americas, the urban environment of slavery—and develop individual research questions around them.The class will run with a partner lab in the form of a course led by Professor Stephanie Porras at Tulane University. The course will feature speakers; and there is potential for funded travel to conduct research. We will start at the ground level; no previous knowledge about the field is required. Students from all disciplines are welcome.
Area: Writing Intensive

AS.010.615. Therapies of Art and Literature from Antiquity to Early Modern Europe.
This seminar examines the myriad ways artists and writers geared their work toward the therapeutic healing of mind, body, and soul, and the role images and texts could play in programs of individual and collective transformation. Taking as our point of departure the ancient tradition of spiritual exercises and inner dialogue, Petrarch's therapy of the passions, and the revival of consolatory letters, we will consider how the Christian artist could invest their work with medicinal, magical, sacramental, or spiritual efficacies, and even take on the mantle of a "physician of souls." Intersections with the histories of medicine and religion will lead us to the ways natural medicine and the thaumaturgical practices associated with pilgrimage could be transposed into the arena of spiritual therapy. Featured authors include Cicero, Marcus Aurelius, Augustine of Hippo, Boethius, Petrarch, Michel Foucault, Pierre Hadot, and Allain de Botton; artists include Hieronymus Bosch, Albrecht Dürer, Matthias Grünewald, and many others.

AS.010.620. Theories and Geographies of the Baroque: 1600 to the Present.
Topics in artistic theory and multimedia practice from seventeenth century Italy and Spain to other early modern and modern global baroques.

AS.010.624. Art and Colonialism: Nineteenth-century India.
This seminar explores the technologies of colonial power, from small ephemeral watercolor images of religious processions to massive multi-volume photographic projects documenting the “people of India,” and extending to the establishment of new urban and architectural spaces, archaeological museums, and art schools, the circulation of diplomatic art collections, and the commissioning of survey data. We will engage with the anti-colonial movements of resistance and uprising that took place across this century, examining the central participation of modern artists with these political movements, and explore the way this period fundamentally shaped the foundations for the study of South Asian art and archaeology. Readings will include colonial and postcolonial theory, Orientalism, historiography; we will be actively working with materials in the library’s special collections.
Area: Writing Intensive

AS.010.625. Art and Interaction in the Bronze Age Eastern Mediterranean.
The arts of the Near East, Aegean and Egypt are typically taught separately from one another. However, the Mediterranean Sea has always served as a connector, and the diverse cultures of these areas were in close contact with one another for much of their histories. During the Bronze Age (3000 to 1200 BCE), these interactions were particularly dynamic, resulting in a diversity of arts including wall frescoes, precious jewelry, and elaborate furnishings and weaponry. This course examines the arts of the interactions among Near Easterners, Greeks, Egyptians and others. It focuses special attention on the role of artistic products in intercultural relations, including trade, diplomacy, war and imperialism.Students are not expected to have extensive knowledge of all the areas, although some experience in at least one of them will be helpful. The course will interweave establishing a knowledge base necessary to tackle this topic with broader conceptual concerns and interdisciplinary approaches (art historical, archaeological, anthropological, and historical).There will be a final paper.

AS.010.631. Performing Power: Ceremonial, Diplomacy, and Gift-Giving in and beyond the Ottoman Empire.
As a major global power straddling three continents, the Ottoman Empire developed a rich and diversified ceremonial culture aimed at impressing local and international audiences alike. This seminar will explore the ways in which works of art and architecture provided settings and apparatus for, and were themselves shaped and enlivened by, the ceremonial acts in which they featured. Covering the period between the sixteenth and nineteenth centuries, we will address a range of case studies—including mosque inaugurations, royal processions, the reception of foreign ambassadors, and the exchange of diplomatic gifts—with regard to their sociopolitical, visual, material, and spatial contexts. A major concern of the seminar will be the question of how Ottoman ceremonies, together with their staging and attendant art forms, were adapted in response to changing conditions and audiences, particularly with the shift from the early modern to the modern period. While our focus will be on the Ottoman Empire, the course will also consider the ceremonial cultures of the various Asian and European polities with which the Ottomans interacted, investigating the points of comparison and contrast that defined these multifarious but connected interregional approaches.

AS.010.633. Theories and Works of “The Baroque”.
There is perhaps no more confounding, though also no more persistent, art historical concept than that of “the Baroque.” This course introduces students to foundational histories and critiques of “the Baroque” while exploring works of art that have proved central to these formulations. That is, this course will balance careful reading of historiography with close examination of works of art (both digitally presented and visited in local collections). Students will come away with a layered understanding of the Baroque objects—from relatively small-scale museum works to major architectural and sculptural monuments—and their place within the broader evolution of the history of art. Particular attention will be given to newer global and (post-)colonial approaches to notions of the Baroque, ultra-Baroque, and neo-Baroque.
Area: Writing Intensive

AS.010.634. Rethinking the Renaissance: Alternatives to "Early Modernity".
"The Renaissance" as a periodization under attack, and its persistance; the hermeneutics of the Pre-Modern Image since Panofsky; the critique of Eurocentrism; challenges to and recuperations of iconology, assessing the contributions of semiotics, psycholanalysis and queer theory.

AS.010.638. Interrogating the Material Turn.
This course considers the turn to centering materials and materiality in the history of art. Since the publication of Michael Baxandall’s Painting and Experience in Fifteenth Century Italy (1972) and in particular since the turn of the millennium, critical engagement with the materiality of art has proliferated. This seminar will tackle renewed investment in materiality within the discipline of art history and draw on perspectives from archaeology, philosophy, anthropology, conservation science, feminist and queer theory, and postcolonial studies, among others. Particular emphasis will be placed on the polycentrism of materiality as a theoretical lens that cuts across seemingly disjunct cultural, social, and political frames and subject positions. While this course focuses on the art of the ancient Mediterranean, students will be encouraged to bring their own subfields to bear on the material turn and to pursue research topics related their individual research goals. Open to interested students from all disciplines.

AS.010.639. Obsessed with the Past: the Art and Architecture of Medieval Rome.
In antiquity, Rome became the capital of an empire, its growing status reflected in its sophisticated urban planning, its architecture, and the arts. While an abundance of studies explores the revival of this glorious past in the Renaissance, this seminar discusses various ways of the reception of antiquity during the medieval period. We address the practice of using spolia in medieval architecture, the appropriation of ancient pagan buildings for the performance of Christian cult practices, the continuation of making (cult)images and their veneration, the meaning and specific visuality of Latin script (paleography and epigraphy) in later medieval art. We discuss the revival and systematic study of ancient knowledge (f. ex. medicine, astronomy, and the liberal arts), in complex allegorical murals. As we aim to reconstruct the art and architecture of medieval Rome, this course discusses ideas and concepts behind different forms of re-building and picturing the past, as they intersect with the self-referential character of a city that is obsessed with its own history.
Area: Writing Intensive

AS.010.641. Hands-On Approaches to European Books and Prints before 1800.
Baltimore's rich museum and library collections create a dynamic laboratory for students to gain an understanding of early modern European traditions of prints and books. Engraving, etching, woodcut, mezzotint, à la poupée; Rembrandt, Dürer, Aldus Manutius, Plantin-Moretus. This course will introduce students to the basic techniques, concepts, terms, and artists that shaped the production of reproductive works on paper in early modern Europe and their subsequent art historical study. All sessions will be taught out of local collections (BMA, Walters, NGA, Hopkins Special Collections); that is, this is a hands-on class that—while requiring no previous experience—will attend to the nitty-gritty details and methods of studying works in person, giving students the tools, expertise, and confidence to pursue their own research with historical printed materials.
Area: Writing Intensive

AS.010.644. The Medieval Image and Concepts of Authenticity.
The course examines the notion of the authentic in conjunction with medieval images, relic veneration, and the practice of law. It investigates the construction, reception, and theoretical grounding of authenticity of reliquaries, icons, and imprints on cloth or seals, and legal documents. These objects elucidate artistic strategies such as cross media references, abstraction, mimesis and bricolage to convey an aura of authenticity. We address other authenticating factors, such as complex ritualized forms of communication.

AS.010.646. Art and Architecture at the Eastern Frontier: Medieval Georgia.
This seminar investigates the fascinating landscape of medieval art and architecture of Georgia. Its specific geographic position in the South Caucasus, at the cross roads between the East and West, the Christian and Islamic Worlds, had a profound impact on the art and architecture in the region. Ancient sites show close connections with the Graeco-Roman World on the western border and with the Sassanid Empire in the East. The Christianization of the Kingdom of Kartli in the early fourth century resulted in close ties with the development of early Christian art in Syria, the Holy Land, and Byzantium. While the Christian religion remained an identifying factor during several hundred years of Muslim rule (736 to 1122) during which the city of Tbilisi was the capital of an emirate, Islamic motifs and style became an important factor for art works in medieval Georgia. Art and architecture with a specific Byzantine profile flourished in particular after the reunification of Georgia during the reign of King David the Builder (1073- 1125) and Queen Tamar (1184 to 1213). The cathedral and monastery of Gelati and Mzcheta, the murals in the royal monasteries of Vardzia and Khintsvisi, and the countless icons are a testimony to this relationship. We will discuss the specific diverse aesthetics and materiality (stone, enamel and metal works) of Georgian art with the goal to reassess the map of medieval art and architecture that currently does not include the Eastern Frontier. A mandatory c. 10 days field trip to Georgia is planned after classes end in May 2020.
Area: Writing Intensive

AS.010.649. Power Dressing: The Politics of Costume between the Ottoman Empire and the West.
In the Ottoman Empire—a vast multiethnic state straddling Africa, Asia, and Europe—how one dressed was a deeply political affair. Ottoman rulers and subjects alike used clothing to express (and sometimes transgress) the hierarchical, religious, and communal distinctions defining their society, much to the fascination of foreigners who visited the empire or sought knowledge of its sartorial traditions in texts and images. This seminar will explore Ottoman dress and dress codes in the context of the empire's long and complicated relationship with Western powers, focusing on the role that costume played as a charged site of cross-cultural interaction, posturing, and self-assertion from the sixteenth to the nineteenth century. Our case studies will include costume albums —books showing people high and low in their characteristic garb—painted by Ottoman artists for Western buyers; diplomatic robes of honor and their attendant ceremonies; and cultural cross-dressing as manifested in European turquerie portraiture and masquerades. Moving into the modern period, we will consider how nineteenth-century dress reforms bridged the gap between Ottoman and Western costume while engendering new modes of Ottoman sartorial self-representation that challenged hardening Orientalist discourses in such venues as mannequin museums and world's fairs. The seminar will make considerable use of artworks in local collections, including rare books and prints at Hopkins itself.
Area: Writing Intensive

AS.010.650. Before and After Trent: the Image and Sacred Space in Rome and Spanish Italy.
The seminar will investigate the question of art and reform in three major centers of the Italian peninsula (Rome, Naples, Milan), with attention to parallel phenomena in other centers of Catholic Europe (Spain and the Spanish Netherlands). We will examine transformations in the practice of pilgrimage and the organization of sacred shrines, tensions between centralization and the persistence of the local, and the initiative of artists and architects in responding to the call for a "reform" of sacred art."

AS.010.652. Classics Research Lab: Antioch Recovery Project (ARP).
Antioch Recovery Project investigates mosaics from the ancient city of Antioch (modern Antakya, Turkey, near the border with Syria) now in the collection of the Baltimore Museum of Art. Excavated by an international team of archaeologists in the 1930s, hundreds of ancient mosaics from the cosmopolitan city were subsequently dispersed to museums across the globe, with twenty-four mosaics entering the collection of the BMA. Phase I will focus on the digital documentation and analysis of the mosaic of Narcissus as a prototype for ongoing research bringing together the fragments of ancient Antioch for contemporary beholders. The Greek myth of Narcissus tells the story of a beautiful Theban hunter doomed to love his own reflection and is the origin of the modern psychiatric term "narcissism". Researching the mythology, materials, conservation history, archival material, historiography, and contemporary reception of the Narcissus mosaic and myth offers extensive opportunities to collaborate with scholars across a range of disciplines at JHU, in the Baltimore museum community, and beyond. Investigators will move between the Baltimore Museum of Art, the CRL processing lab in Gilman Hall, and Special Collections. The course will involve some travel to visit other mosaics from Antioch now in collections at Harvard's Dumbarton Oaks in Washington D.C., and the Princeton Art Museum in Princeton, New Jersey.

AS.010.656. The Cut.
This seminar focuses on “the cut”—both as material practice and conceptual trope. Looking specifically at the early modern period, we will attempt to stitch together arts of cutting that have all too often been thought of separately or entirely in isolation—decoupage and inlaid stone, silhouette and turned ivory, repurposed drawing and perfectly hewn precious gem, pared-down panel and paper cut-out. To do so, we will look to expansive modern treatments and theorizations of “the cut” as literal gesture and figurative process, material technique and metaphoric mode. At stake is a reappraisal of creative paradigms that rest upon myths of wholeness, finitude, completion, generation, etc., and that thus undergird the early modern emergence of the very notion of “Art.” This seminar thus asks whether recentering the cut has the potential to position the art object within more expansive fields of material culture and to resituate artistic production within less hegemonic frameworks of creation and creativity. Though focused on the early modern period, students are encouraged to pursue research in their own fields/periods of study.
Area: Writing Intensive

AS.010.659. Passion Image, Passion Cult, Passion Drama: Narrative and Metaphor in the Middle Ages, Renaissance, and Beyond.
A set of interdisciplinary explorations of the Passion of Christ narrative in Scripture, theology, visionary literature, cultic devotion, the visual and dramatic arts in Europe from the Central Middle Ages to the Reformation, with a special fast-forward to modern cinematic retellings of the Passion story.

AS.010.660. The Hegemony of Bodies.
Bodies—material, artistic, political, cartographic—and their breakdown, form the focus of this seminar. Situating this inquiry in the ancient Mediterranean, we will analyze the human body as an organizing term, giving rise to a robust set of practices and performances. We will consider the conception of atoms as bodies in motion, the role of direct democracy and assembly as they intersect with artistic practices of both figuration and other non-figural corpora, and the emerging body of medical knowledge that would eventually be gathered under the Hippocratic corpus. The Mediterranean sea itself as it connects with other bodies of water and forged connections between different land bodies will also be among the topics we explore. While organized around the ancient Mediterranean and its afterlives, students from all formations are very welcome.

AS.010.662. Script, Character, Scribble: Writing and Pseudo-Writing in Modern and Contemporary Art.
Almost readable, but not quite: artists in the twentieth and twenty-first century played with script of all kinds, from ancient glyphs and Persian script to Roman typefaces and Korean Hangul. Artists also scribbled in ways that evoke writing without script or meaning. This course takes on the question of meaning-making in art through the form of script—flirting with that tantalizing feeling that we can almost read the work of art through the marks on its surface. We will engage with artists from around the world whose work grapples with knowledge, meaning, and script, and discuss the limits and possibilities of legibility, knowing, and language. In addition to painting and drawing, we will also discuss conceptual art, installation, video, architecture, tapestry, ceramics, graphic novel forms, book arts, and sculpture. We will have opportunities to situate these works within longer histories of script and pseudo-script and image-text relations. Our discussion-driven seminars will be guided by readings in art history and theory. The course carries no expectation that you are multi-lingual or have experience with multiple scripts. Central to our semester will be group trips to see art in person in DC and Baltimore. Assignments include an option for short, focused writing with feedback and opportunities to experiment with genre and to rewrite, or a longer seminar paper, chosen in consultation with the professor.
Area: Writing Intensive

AS.010.671. The illuminated charter: visual splendor, performance, and authenticity of medieval legal documents.
This course investigates the complexities of medieval legal documents, their specific visuality and materiality, as well as practices of copying and forgery. We will address the aesthetics of legal documents, their graphic signs, seals, and paleography and the authenticating strategies used to corroborate their legitimacy. Another emphasis is set on the performative aspects of the medieval charters in court and church rituals. Comparison with contemporary illuminated sacred books will reveal the tight connections of monastic scriptoria and royal/imperial chanceries. The geographic focus is set wide, ranging from medieval Spain, to Carolingian and Ottonian chanceries in France and Germany, to the papal court in Rome and the imperial and monastic scriptoria in Byzantium.
Area: Writing Intensive

AS.010.672. Inventions of Antiquity. Constructing the Ancient Past in Early Modern Europe.
TBA

AS.010.702. 1525: Prints and Politics in the German Reformation.
Examines the involvement of prints, print culture, and the professional activity of the German painter-printmaker with the patterns of social and religious dissent, propagandizing, and political confrontation that marked the first decade of the Protestant Reformation, with a special focus on the revolutionary year 1525. Seminar includes planned visits to the print collections of the Baltimore Museum of Art and the National Gallery in Washington.

AS.010.703. Patterns of Attention in the Visual Arts.
This seminar aims to excavate six distinct modalities of attention and attentiveness in the visual arts from Middle Ages to Modernity (cultic, narrational, speculative, ethical, sexual, and artistic). While emphasizing European developments, close consideration will be given to the role of visual attention in Hindu and Islamic visual cultures, providing the opportunity for cross-cultural comparison. Each case study will consider the historically shifting roles given to vision, cognition, imagination, affect, desire and power-knowledge in the culturally prevalent patterns of attention we study, and explore how specific kinds of pictorial schema or spatial environments served to structure and guide, or deflect and disrupt, the attention of their beholders. Finally, we will ask whether the historical study of attention can suggest analytical models or ethical lessons for the (re)mobilization of attentiveness in our own art-historical methods.

AS.010.704. Pieter Bruegel the Elder: New Directions in Scholarship.
Examines major interpretations of the art and career of the great Flemish painter Pieter Bruegel the Elder (1525?-1569), with an emphasis on new approaches and research agendas. In the aftermath of the 450-year Bruegel Anniversary of 2019, with its major exhibitions and comprehensive catalogues, what comes next?

AS.010.708. Topics in Late Medieval Art.
A critical interrogation of past and current interpretative approaches to the devotional arts of western Europe, c. 1300-1500.
Area: Writing Intensive

AS.010.801. Special Rsrch & Problems.

AS.010.802. Spec Research/Problems.

AS.010.803. Individual Work.

AS.010.804. Individual Work.

AS.010.807. Summer Research.
Summer research for doctoral students

AS.020 (Biology)

AS.020.115. Bioenergetics. 2 Credits.
This course is a combination of lectures, student presentations and group discussions that address fundamental principles and also contemporary issues examining the way all forms of Life on Earth are ultimately dependent on sunlight to satisfy their food and energy requirements. We examine the steps from the capture of Physical energy (photons), to the development of electrochemical potentials and finally, to their utilization by cellular organelles towards the synthesis of the chemical "currency" that fuels all biological processes (biosynthesis, cell communication, movements, etc.). Special emphasis will be on current developments in biotechnologies that utilize microbial populations to supply us with fuels and also to clean up environmental hazards. The course will also consider ways to extract lessons from Nature's successful designs and harmonious adaptations so that we, in the long run, can utilize them towards a minimization of our negative impact on the environment.Note: Freshmen and Sophomores only, with good foundations in any two of the following: Physics, Chemistry, Biology, Biophysics.

AS.020.120. Introduction to Laboratory Research. 1 Credit.
In this program, you will be introduced to a variety of biochemical and molecular biological laboratory techniques. These will include DNA analysis by restriction enzyme mapping, amplification of DNA segments by PCR, lipid analysis by chromatography. Additionally, you will visit a variety of biological laboratories to observe actual research projects.Recommended Course Background in Chemistry and Biology is strongly recommended.

AS.020.125. Microbe Hunters- Student-sourcing Antibiotic Discovery. 3 Credits.
This is an introductory course open to all students regardless of intended major. No science background is required. This course covers concepts of biology taught through the lens of microbes and antibiotic resistance. Using environmental samples students actively engage in the hunt for novel antimicrobials. Broader concepts include the meaning of disease, how that meaning has changed over time, and the implications of widespread antibiotic resistance for society. This is a research-based project lab course in which students participate as part of an international consortium of undergraduates at other colleges. Students will isolate and characterize antibiotic-producing bacteria from the environment using modern molecular biological techniques. The course includes a lecture and two lab meetings per week.

AS.020.132. Medical School Intensive. 1 Credit.
Learn the basic knowledge and techniques related to surgery, internal medicine, pediatrics, emergency medicine, and biomedical science by participating in interactive lectures and labs. You and your fellow high-school students will explore new aspects of this critical field at one of the nation's leading institutions as you are taught and guided by experts in the field of medicine.

AS.020.134. Introduction to Surgery. 1 Credit.
Students will be introduced to the fundamentals of a surgical practice. Students will also acquire skills used in the assessment and treatment of surgical conditions.

AS.020.135. Project Lab: Phage Hunting. 2 Credits.
This is an introductory course open to all freshman regardless of intended major. No science background is required. This is the first semester of a year-long research-based project lab course in which students will participate in a nation-wide program in collaboration with undergraduates at other colleges. Students will isolate and characterize novel bacteriophages (viruses that infect bacteria) from the environment using modern molecular biological techniques. The course includes two lab meetings per week. Continues in the spring. Each semester provides 2 credit hours of Natural Sciences (N) distribution credits and/or counts 2 hours toward the research requirement for the Molecular and Cellular Biology degree. No textbook is required. Freshmen only.

AS.020.136. Phage Hunting II. 1 Credit.
This is an introductory course open to all freshman regardless of intended major. No science background is required. This is the second semester of a year-long research-based project lab course in which students will participate in a nation-wide program in collaboration with undergraduates at other colleges. In the spring semester, students will annotate the genome of a bacteriophage isolated and characterized by a student in AS.020.135, in preparation for submission to a database and eventual publication. Enrollment by permission of the instructor only. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.020.137 or permission of instructor

AS.020.137. Phage Discovery Lab. 1 Credit.
In this small-section introductory research lab course, students are introduced to basic microbiological techniques as they isolate and characterize a bacteriophage, a virus that infects bacteria, from an environmental sample. One meeting per week. No textbook required. Not open to anyone who has taken AS.020.135;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.151. General Biology I. 3 Credits.
This course is an introduction to biology from an evolutionary, molecular and cellular perspective. Specific topics and themes include evolutionary theory, the structure and function of biological molecules, mechanisms of harvesting energy, cell division, classical genetics and gene expression.

AS.020.152. General Biology II. 3 Credits.
This course builds on the concepts presented and discussed in General Biology I. The primary foci of this course will be on the diversity of life and on the anatomy, physiology, and evolution of plants and animals. There will be a special emphasis on human biology.
AS.020.151

AS.020.153. General Biology Laboratory I. 1 Credit.
This course reinforces the topics covered in AS.020.151. Students participate in a semester-long project, identifying bacteria from Homewood campus soils using molecular biology techniques. Other laboratory exercises cover aspects of evolution, genomics and biochemistry. Cross-listed with Behavioral Biology. Student must have enrolled in AS.020.151 either this term or in past terms. Students who have credit for AP Biology but take General Biology Lab I will lose four credits of AP Biology credit. Cross-listed with Behavioral Biology.
AS.020.151 can be taken prior to or at the same time as AS.020.153.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.154. General Biology Lab II. 1 Credit.
This course reinforces the topics covered in AS.020.152. Laboratory exercises explore subjects ranging from evolution to anatomy and physiology. Students participate in a project using molecular biology techniques to determine whether specific foods are made from genetically engineered plants.Cross-listed with Behavioral Biology
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.161. Current Events in Biology I. 1 Credit.
In this lively and collaborative course, students discuss current events and controversies in biology ranging from bioterrorism to the health of the Chesapeake Bay.

AS.020.162. Current Events in Biology II. 1 Credit.
Students will discuss current events and controversies in biology, ranging from genetic engineering to nanotechnology in medicine.

AS.020.303. Genetics. 3 Credits.
Presentation of the principles of heredity and variation, and their application to evolution and development; physico-chemical nature of the gene; problems of recombination; gene action.

AS.020.304. Molecular Biology. 3 Credits.
This course will focus on the ways that nucleic acids direct the synthesis of nucleic acids and proteins. Emphasis will be on modern techniques to study these fundamental processes and important biological molecules. This course fulfills a core requirement for biology majors and molecular and cellular biology majors. This course does not fulfill the elective requirement for biology or molecular and cellular biology majors.

AS.020.305. Biochemistry. 3 Credits.
The molecules responsible for the life processes of animals, plants, and microbes will be examined. The structures, biosynthesis, degradation, and interconversion of the major cellular constituents including carbohydrates, lipids, proteins, and nucleic acids will illustrate the similarity of the biomolecules and metabolic processes involved in diverse forms of life.Sophomores, Juniors, and Seniors Only.
AS.030.205 OR AS.030.212 OR EN.540.202, may be taken concurrently.

AS.020.306. Cell Biology. 3 Credits.
How the molecules of living systems are organized into organelles, cells, tissues, and organisms will be explored, as well as how the activities of all of these are orchestrated and regulated to produce “life”—a phenomenon greater than the sum of its parts. Considerable emphasis is placed on experimental approaches to answering these questions. Topics covered include biological membranes, cytoskeletal elements, cell locomotion, membrane and protein traffic, the nucleus, signal transduction, the cell cycle, the extracellular matrix, epithelial structure and function. Sophomores, juniors, and seniors only. Recommended Course Background: (AS.020.151 or AS.020.305) or equivalent knowledge of biomolecules or AS.020.303.
Cell Biology restriction: students who have completed EN.540.307 may not enroll..

AS.020.312. Introduction to the Human Brain. 3 Credits.
This course explores the outstanding problem of biology: how knowledge is represented in the brain. Relating insights from cognitive psychology and systems neuroscience with formal theories of learning and memory, topics include (1) anatomical and functional relations of cerebral cortex, basal ganglia, limbic system, thalamus, cerebellum, and spinal cord; (2) cortical anatomy and physiology including laminar/columnar organization, intrinsic cortical circuit, hierarchies of cortical areas; (3) activity-dependent synaptic mechanisms; (4) functional brain imaging; (5) logicist and connectist theories of cognition; and (6) relation of mental representations and natural language.
AS.020.306 OR EN.540.307

AS.020.314. The Biology of Disease. 3 Credits.
Explore the current understanding of the biology of diseases in this upper-level elective! Each week, a new faculty member will present one class in a lecture style, followed by one class in an interactive discussion style. The faculty member will describe a disease and the fundamental biology relating to that disease and discuss the current state of the field, how their research influenced understanding of the disease, and progress towards treatments. The topics will build upon the basic concepts covered in genetics, cell biology, and molecular biology, and introduce topics related to biochemistry and developmental biology. The class will discuss a wide range of diseases including vision disorders, neurodegenerative diseases, and cancer. Class assessment will be based on homework involving asking questions about the seminar, writing brief summaries of seminars and discussions, and a final project related to topics and techniques from the semester. Open to juniors and seniors.
AS.020.303 AND AS.020.306

AS.020.315. Biochemistry Project lab. 1 Credit.
This research project laboratory investigates the flow of energy through biological systems using focused examination of key cellular energy-conversion processes. Students will be introduced to the broad field of biochemistry research through computational structural analysis, directed mutation, recombinant protein production, and enzymatic analysis. Participants will be trained in biochemical laboratory techniques and expected to contribute their findings to the scientific community using formal, academic communications.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.020.305 OR AS.250.307 OR AS.250.315. These may be taken concurrently.

AS.020.316. Cell Biology Lab. 1 Credit.
The Cell Biology Laboratory will use projects with the nematode C. elegans and mouse 3T3 cells in culture to illustrate experimental systems which are used in cell biology. Light microscopy, fluorescence microscopy, RNA interference, fluorescence-activated cell sorting, Western blotting and the culture of nematodes and cells are techniques which will be used. Because we will be using growing organisms, there will be at least one week when students will have to visit the lab the day after their section meets to complete an experiment.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;Students may have previously taken AS.020.306 prior to enrolling in AS.020.316 OR students may concurrently enroll in AS.020.306 ANDAS.020.316 OR students must have previously completed both EN.540.202 and AS EN.540.307 prior to enrolling in as.020.316.

AS.020.319. Human Genome Variation. 2 Credits.
Human Genome Variate (HGV) exposes students to the power of genomics for understanding human evolutionary history, biological traits, and medical conditions. HGV incorporates basic population genetics, direct-to-consumer DNA tests, and emerging research on human populations and their ancestors. Social and ethical issues related to the use of genetic information are also discussed.
AS.020.303

AS.020.320. Cell Division Mechanisms and Regulation. 3 Credits.
This course will focus upon the molecular mechanisms that underpin the reproduction of eukaryotic cells. General topics will include chromosome duplication, mitotic spindle action, cytokinesis, meiosis, cell cycle control, damage repair and checkpoints, and aberrant regulation characteristic of cancer. Most readings will be from recent research manuscripts and review articles. Classes will consist of a mix of lectures and student oral presentations.
AS.020.306

AS.020.321. Human Genome Variation with Computational Lab. 3 Credits.
This option combines the main course and computational lab components of HGV. HGV exposes students to the power of genomic studies for understanding human evolutionary history, biological traits, and genetic conditions. HGV incorporates basic population genetics, direct-to-consumer DNA tests, and emerging research on human populations and their ancestors. What does real human genomic data look like? How are these data analyzed in practice? Supplementing the main course, the computational lab component will explore public datasets and bioinformatic tools used to analyze human genomic data to better understand how patterns in these data can be used to test hypotheses about evolution and human phenotypes.
AS.020.303;Students who have taken AS.020.319 are not eligible to take AS.020.321.

AS.020.323. Computation Lab: Human Genome Variation. 1 Credit.
This is a stand-alone version of the HGV computational lab. This computation lab course is offered only to students who have completed AS.020.319 (Human Genome Variation without lab). What does real human genomic data look like? How are these data analyzed in practice? Supplementing the main course, this computational lab will explore public datasets and bioinformatic tools used to analyze human genomic data to better understand how patterns in these data can be used to test hypotheses about evolution and human phenotypes.
AS.020.319

AS.020.329. Microbiology. 2 Credits.
This course explores the physiology and genetics of microorganisms within an evolutionary and ecological framework. Concepts in microbiology will be supported by molecular studies of microbial evolution and microbial communities including that of the human microbiome. Recommended Course Background: AS.020.305

AS.020.331. Human Genetics. 3 Credits.
Will examine the growing impact of human genetics on the biological sciences, on law and medicine, and on our understanding of human origins. Topics include structure and evolution of human genome, genetic and physical mapping of human chromosomes, molecular genetics of inherited diseases and forensic genetics.
AS.020.303

AS.020.337. Stem Cells & the Biology of Aging & Disease. 2 Credits.
This will be a team-taught lecture course that focuses on the properties of stem cells, their possible role in cancer (breast and prostate), stem cell aging, and the potential utilization of stem cells for therapy. Topics will include: mechanisms of stem cell renewal, stem cell potency, the impact of the stem cell niche, stem cells and the hematopoietic system, stem cells and the neural system, stem cells in the male and female gonads, induced pluripotent stem cells and cellular reprogramming, stem cell changes with aging, and ethical and policy issues in stem cell research and use. Most lectures will be research-oriented. Students will be expected to read and critically analyze current literature, with an emphasis on the experimental bases from which our current understandings derive.
AS.020.305 (Biochemistry) or AS.020.306 (Cell Biology) or EN.580.221 (Molecules and Cells) or EN.540.307 (Cell Biology for Engineers) or permission of instructor.

AS.020.340. Developmental Genetics Lab. 3 Credits.
CRISPR (clustered regularly-interspaced short palindromic repeat) is one of the greatest advances in biology in the past decade, providing researchers with the tools to precisely and affordably edit genomes and physicians a new tool to cure disease. However, the ability to edit plant and animal genomes, including human genomes, comes with significant ethical considerations. This course will utilize a hybrid classroom-laboratory approach to provide students with both a comprehensive knowledge of the CRISPR system and a deeper understanding of how gene function is studied. At the end of the semester, you will not only understand how CRISPR works, but also have a better understanding of the power of genetics to illuminate molecular mechanisms of protein function.
AS.020.303 can be taken prior to or during enrollment in AS.020.340.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.344. Virology. 3 Credits.
This course will cover basic principles of viral replication and pathogenesis, as well as the host response to viral infection. It will then focus on several viruses of interest, including HIV-1, Influenza, Human Papilloma Virus, and SARS-CoV-2.
AS.020.304 OR AS.020.306

AS.020.347. AIDS. 3 Credits.
AIDS is the world's deadliest infectious disease. This course will cover the biology of human immunodeficiency virus (HIV, the infectious agent that causes AIDS), the effects of HIV on the immune system, the pharmacology of the anti-viral agents that are used to suppress HIV infection, and the ongoing quest for an HIV vaccine. Because HIV drugs cannot cure HIV-infected individuals and no HIV vaccine yet exists, we will also study the long-term consequences of HIV infection including opportunistic infections, comorbid conditions, and the HIV-related cancers Kaposi's Sarcoma and AIDS-Related lymphoma. Recommended Course Background: AS.020.306
AS.020.306

AS.020.350. Introduction to Clinical Medicine. 2 Credits.
Perm. Req'd. Post-Bac Students Only

AS.020.351. Cancer Biology. 3 Credits.
While the "war on cancer" has produced modest victories with respect to clinical outcomes, our knowledge of the cellular mechanisms of cancer is now vast and represents one of the most significant scientific achievements of the past 40 years. Key aspects of cancer biology will be covered with a combination of textbook and original literature readings. Topics will include cancer cell characteristics, oncogenes, tumor suppressor genes, apoptosis, metastasis and immuno-surveillance of cancer cells. Application of our knowledge to the rational treatment of cancer will also be discussed.
Cell Biology 020.306 or permission of instructor

AS.020.361. Advanced Research Lab in Cell and Molecular Biology. 2 Credits.
An intensive research laboratory course on single-molecule, live-cell imaging of chromatin and epigenetic factors designed for undergraduate students with interests in biochemistry, molecular, cellular and computational biology. The course introduces the use of advanced fluorescence microscopy to visualize the single-molecule dynamic behaviors and spatial distributions of important nuclear proteins and chromatin factors in living cells of Saccharomyces cerevisiae as a model for conserved epigenetic regulators in humans. Students will learn and apply imaging and computational tools to localize and track single protein molecules in real time and calculate their diffusive parameters. Students are expected to interpret and integrate data to acquire conceptual insights on chromatin functions, e.g. how chromatin proteins, enzymes, and large protein complexes are distributed in nuclear space and time. After course completion, there is a further option for post-course research in the Wu laboratory.Open to advanced sophomores or upper level students with permission of Professor Carl Wu (wuc@jhu.edu)
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.362. Single Molecule Approaches to Biology. 3 Credits.
This course examines how recently developed single-molecule methods have enhanced our understanding of cellular processes. The ability to observe and manipulate individual biological macromolecules has revolutionized our understanding of the machines and processes that enable life. The course will provide an overview of single-molecule approaches and discuss relevant publications that exemplify how these methodologies are applied to biological problems. For each approach, key concepts will be introduced in a lecture/discussion, followed by a student-led presentation of a related publication.Recommended coursework: Physics II
AS.020.305 OR AS.250.316

AS.020.363. Developmental Biology. 3 Credits.
This class will explore the development of animals from a single fertilized egg into a fullyformed organism. We will emphasize experimental methods to understand the molecular mechanisms controlling development.
AS.020.306 AND (AS.020.330 OR AS.020.303)

AS.020.364. Molecular and Cellular Mechanisms of Reproduction. 2 Credits.
This course will address current research in the cellular and molecular biology of fundamental reproductive processes. The topics covered will vary from year to year, based on current issues in the scientific literature. The focus will be on cellular and molecular mechanisms involved in the synthesis and actions of hormones, gametogenesis, fertilization, pathologies of the reproductive tracts, developmental origins of reproductive health and disease, contraception, and infertility. The emphasis will be on defining cellular and molecular mechanisms that regulate reproductive processes, identifying the hypotheses tested in scientific papers and the strengths and limitations of experimental methods used to test the hypotheses, and evaluating and integrating data described in scientific papers. Classes will consist of a mix of lectures and student oral presentations.Recommended coursework: Reproductive Physiology
AS.020.306

AS.020.367. Primate Adaptation and Evolution. 3 Credits.
A close look at our closest relatives, the primates. Topics include: evolutionary theory, primate evolution, primate behavior and ecology, human evolution, and modern human variation.

AS.020.374. Comparative Physiology. 3 Credits.
This class examines animal physiology from an evolutionary and comparative viewpoint. The goal is to examine the commonalities, as well as unique differences, in how various animal organisms address the necessary life functions. Topics will include metabolism, neural systems, respiration, muscle systems, water and salt homeostasis, thermal regulation, and reproduction
AS.020.305

AS.020.377. Comparative Physiology Lab. 1 Credit.
This course examines the physiological principles that guide animal life processes. As a complement to the Comparative Animal Physiology lecture course, this Laboratory examines fundamental physiological principles through hands-on investigations of animal physiology using zebrafish and mussel as model systems and research-grade data acquisition systems.
AS.020.374, students may enroll concurrently.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.379. Evolution. 3 Credits.
This course takes a broad look at the impact of natural selection and other evolutionary forces on evolution. Emphasis is placed on what we can learn from genome sequences about the history of life, as well as current evolutionary pressures.Recommended Course Background: AS.020.306, AS.020.330, or permission required

AS.020.380. Chromatin, Chromosomes and The Cell Nucleus. 3 Credits.
The course will present analysis of the structural basis of the genome organization in a eukaryotic nucleus and the utilization of its genomic content. We start with the analysis of the fluctuations of the structure of the double helix in response to its cellular microenvironment that yield DNA structural and functional polymorphism. Next we will deal with the mechanics of DNA compaction into chromatin and the differentiation of the chromatin structure at the level of the nucleosome via histone variants and posttranslational modifications and chromatin-based epigenetics. We will next move to chromosomal territories, chromosomal imprinting and chromosome inactivation. Finally, a few lectures will focus on selected topics of special interests that bridge current basic discoveries with potential medical applications such as the nature of telomeres and telomerase-related diseases; the role of histone octamer tails in epigenetics; transcription factors and the regulated expression of the genome. Whenever possible. paradigms will be used that correlate chromatin differentiation to certain human diseases.
AS.020.305 OR AS.020.306; AS.020.303 with approval of the instructor only.

AS.020.382. A Biophysical View of Biology. 3 Credits.
The objective of this course is to develop in students a strong, intuitive, and physically based sense of how fundamental biological processes work—that is, the sizes, shapes, motions, interactions, and cellular functions of biological molecules. Topics will include cell and population growth, diffusion, enzyme kinetics, the qualitative and quantitative aspects of the synthesis, structure, and function of proteins and nucleic acids, least squares equation fitting, Bayesian statistics, and the fluctuation test. The biophysical constraints that dictate the form of the immune system and constraints relevant to development will be discussed.

AS.020.384. Fundamentals of Drug Discovery. 3 Credits.
The creation and implementation of new approaches to the drug discovery and development process is a very active area of research. Currently, only one compound out of 5,000 that enter preclinical studies becomes a drug. Moreover, the development process is time consuming, lasting more than ten years on average. The rate of failure is extremely high. It has become evident that this field is in urgent need of revolutionary changes. This course will cover drug discovery issues ranging from the identification of hits to their optimization as drug candidates. Current as well as novel and proposed approaches aimed at accelerating discovery, potency optimization, selectivity, pharmacokinetics and other drug properties will be discussed.
AS.020.305 AND AS.020.306

AS.020.385. Epigenetics. 3 Credits.
Course description: This course emphasizes epigenetic regulatory mechanisms including DNA methylation, histone modifications, histone variants, non-coding RNA regulation, and chromatin remodeling, etc. We will discuss the broad impact of epigenetic regulation in various biological events, ranging from stem cell activity, small RNAs' and long non-coding RNAs' function, to transgenerational epigenetic inheritance and human diseases. We will mainly use recent literatures to discuss various topics. There are both students' presentation and writing components for this course. Students will be assigned a series of papers for their presentation and faculty will meet with student presenters ahead of the time to go through the presentation content.
AS.020.303 OR AS.020.330

AS.020.401. Master's Seminar: Molecular & Cellular Biology I. 3 Credits.
This is a weekly seminar designed for graduate students enrolled in the B.A./M.S. and Ph.D. programs. The seminar involves student presentations of research and discussion of topics of current interest in the field. BA/MS candidates only.

AS.020.402. Master's Seminar: Molecular and Cellular Biology II. 3 Credits.
This is a weekly seminar designed for students enrolled in the BA/MS program. The seminar involves student presentations of research and discussion of topics of current interest in the field. BA/MS students only.

AS.020.410. Teaching and Learning in Biology. 1 Credit.
This course is by instructor permission only and exclusively for students who are invited and accepted to be learning assistants for other Biology courses. The course will focus on discussing education and application of current best teaching practices to Biology classes.

AS.020.441. Mentoring in General Biology. 1 Credit.
To become a mentor, students must have successfully completed AS.020.151/152, must apply using the form on the Biology Dept. website (https://bio.jhu.edu/undergraduate/courses/), and must be accepted by the instructors. The deadline to apply is April 15th. S/U

AS.020.442. Mentoring in General Biology. 1 Credit.
This course provides students who have taken General Biology I & II the opportunity to mentor new students in General Biology I & II. Mentors collaborate with faculty on how to lead effective sessions, create study materials for students, help student teams complete team assignments, and generally help students understand difficult concepts and principles in biology. Mentors must have a firm command of the topics covered in biology and must meet with both faculty and students through the course of the semester. To become a mentor, students must have successfully completed AS.020.151/AS.020.152, must apply using the form on the Biology Department website, and must be accepted by the instructors.

AS.020.502. Introduction Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.503. Independent Research in Biology. 1 - 3 Credits.
Planning and conducting original laboratory investigations on biological problems, collection and analysis of data, reporting of results. Permission of full-time faculty member in Biology dept.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.504. Independent Research in Biology. 1 - 3 Credits.
Perm. Req'd. Freshmen or Sophomores only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.505. Internship - Biology. 0 - 3 Credits.
An independent course of study may be pursued under the direction of an adviser on those topics not specifically listed in the form of regular courses. Consent of adviser required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.506. Internship - Biology. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.508. Literature Research in Biology. 2 Credits.
Graduating students in the Molecular and Cellular Biology major will fulfill their research credit requirement by researching a topic in the modern scientific literature and writing a review of that topic. The topics will be self-chosen by pairs of students, who will then work together with guidance from the instructor. Intended for graduating students, not those who can fulfill this requirement at a later date with in-person research.

AS.020.511. Independent Study. 3 Credits.
An independent course of study may be pursued under the direction of an adviser on those topics not specifically listed in the form of regular courses. Perm. Req'd.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.512. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.513. Research Problems. 3 Credits.
Planning and conducting original laboratory investigations on biological problems, collection and analysis of data, reporting of results. Juniors and Seniors Only. Recommended Course Background: Permission of full-time faculty member in Biology dept.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.514. Research Problems. 1 - 3 Credits.
Perm. Req'd.Juniors and Seniors only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.551. Mentored Research. 9 Credits.
This courses provide BA/MS students with intensive research experience for a full academic year. Students in the program work under the direction of a research mentor on an original research project, produce a written report in the form of a thesis, and make a presentation of the work to the Biology Department. BA/MS or BS/MS candidates only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.553. Mentored Research. 9 Credits.
BA/MS candidates only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.597. Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.020.601. Current Research in Bioscience.
This course involves 30 minute sessions with each member of the training faculty. It is designed to acquaint incoming graduate students with the research topics and research philosophy of each laboratory. This should help students choose future rotations. More generally the course provides a range of perspectives on the future of specific fields and strategies for success in science. First year Biology Graduate students only

AS.020.605. Computational Simulation and Analysis of Protein Stability and Interactions.
This course deals with the development of computer code for the simulation and non-linear least squares analysis of experimental macromolecular data including protein stability (chemical and temperature denaturation, single and multiple domain proteins); different types of binding (single site, multiple sites, independent and cooperative binding); linkage between conformational equilibrium and binding; enzyme kinetics and inhibition; kinetics of protein denaturation/aggregation. The course will use Python as the programing language.Requirements for this course include: 1) Basic Python programing skills; 2) Calculus; 3) Students must have a basic understanding of conformational equilibrium, binding equilibrium and enzyme kinetics. If not sure, please talk to the Instructor.

AS.020.607. Quantitative Biology Bootcamp.
Quantitative and computational methods have become essential to modern biological research. The goal of this course is to provide an introduction to basic skills that will enable students to employ these methods. Students will learn how to work in a command line shell and use software to perform analyses of large biological datasets.Students will learn basic programming using the Python language.Throughout the course students will apply the skills learned to practical analysis problems emphasizing parsing and working with biological data formats, exploratory data analysis and visualization, and numerical and statistical methods. This course is only open to first-year students in the CMDB program.

AS.020.608. Graduate Course in Optical Microscopy.
An introduction to optical microscopy from basic principles to advanced techniques. The course will involve both lectures and practical experience on a number optical microscopes available within the IIC, other core facilities and labs in the university.

AS.020.612. Introduction to the Human Brain.
This course explores the outstanding problem of biology; how knowledge is represented in the brain. Relating insights from cognitive psychology and systems neuroscience with formal theories of learning and memory, topics include (1) anatomical and functional relations of cerebral cortex, basal ganglia, limbic system, thalamus, cerebellum, and spinal cord; (2) cortical anatomy and physiology including laminar/columnar organization, intrinsic cortical circuit, hierarchies of cortical areas; (3) activity-dependent synaptic mechanism; (4) functional brain imaging; (5) logicist and connectist theories of cognition; and (6) relation of mental representations and natural language. Co-listed with AS.020.312.

AS.020.617. Quantitative Biology Lab 1.
This computer lab is designed for first year CMDB graduate students to enhance their quantitative skills for fall core courses.This course will cover quantitative and computational analysis of biological datasets, emphasizing molecular biology. In a hands on lab setting, students will carry learn to perform essential analyses including assembly of genomes, detection of DNA methylation, analysis of transcription factor binding and motifs, detecting genome variation, measuring expression of genes, and understanding genome evolution.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.618. Quantitative Biology Lab II.
This computer lab is a continuation of the fall quantitative biology lab for CMDB graduate students. This semester will cover quantitative and computational modeling of selected topics from biophysics, cellular biology, and developmental biology
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.020.619. Thesis Proposal Preparation.
This is an elective course for 2nd year PhD students in the CMDB program only. The goal of the course is to help students prepare written thesis proposals. Students will also gain practical experience in peer review, with additional lectures on using their proposals to prepare applications for the NIH National Research Service Award (F31). Because of the considerable time commitment required, students may not enroll in the course without explicit approval from their thesis advisors.

AS.020.629. Microbiology.
This course explores the physiology and genetics of microorganisms within an evolutionary and ecological framework. Concepts will be supported by primary literature exploring microbial evolution and microbial communities including that of the human microbiome.

AS.020.630. Human Genetics.
Will examine the growing impact of human genetics on the biological sciences, on law and medicine, and on our understanding of human origins. Topics include structure and evolution of human genome, genetic and physical mapping of human chromosomes, molecular genetics of inherited diseases and forensic genetics.

AS.020.637. Genomes & Development.
This course covers gametogenesis, embryogenesis, post-embryonic development, genetic analysis, developmental genetics, model developmental systems, and cell determination. Biology graduate students only except with written permission from the instructor.

AS.020.643. Graduate Virology.
This course will cover basic principles of viral replication and pathogenesis, as well as the host response to viral infection. It will then focus on several viruses of interest, including HIV-1, Influenza, Human Papilloma Virus, and SARS-CoV-2.

AS.020.644. RNA.
A graduate seminar course that will explore RNA from its beginning in the primordial RNA world to its present-day roles in gene regulation in bacteria, mammals, and viruses. Topics will include: The early RNA world, Riboswitches, Ribozymes, evolution of protein synthesis, splicing, telomerase, RNA interference, microRNAs, long non-coding RNAs, Viral non-coding RNAs, and RNA therapeutics.Biology PHD students only. MCB MS students with instructor's permission during ADD/DROP Period.

AS.020.662. Single Molecule Approaches to Biology.
This course examines how recently developed single-molecule methods have enhanced our understanding of cellular processes. The ability to observe and manipulate individual biological macromolecules has revolutionized our understanding of the machines and processes that enable life. The course will provide an overview of single-molecule approaches and discuss relevant publications that exemplify how these methodologies are applied to biological problems. For each approach, key concepts will be introduced in a lecture/discussion, followed by a student-led presentation of a related publication.

AS.020.668. Advanced Genetics and Molecular Biology.
This course examines modern concepts in genetics and molecular biology. The coursefocuses on the mechanisms controlling replication, recombination, transcriptional, posttranscriptional, translational, and posttranslational regulation. Lectures will have threeparts: a student-led paper presentation, a discussion about the concepts surrounding atopic, and a discussion of modern techniques to experimentally probe the topic.Biology PHD students only.

AS.020.674. Quantitative Biology and Biophysics.
Students will be given instruction in the concepts of physical and quantitative biology. Students will learn to simulate biological processes, identify the relationship between data and models, and will learn to fit biological data. Note: Friday classes will be held in UTL 398.

AS.020.675. Graduate Comparative Physiology.
This course addresses the basic principles that underlie physiological processes in animals. Framed in an evolutionary context, processes ranging from respiration, circulation, neural control, movement, excretion and metabolism will be understood in terms of core principles that also apply to humans. Emphasis is placed on the physical and chemical principles underlying the comparative biology of how different animals solve physiological problems.

AS.020.684. Fundamentals of Drug Discovery and Development.
The creation and implementation of new approaches to the drug discovery and development process is a very active area of research. Currently, only one compound out of 5,000 that enter preclinical studies becomes a drug. Moreover, the development process is time consuming, lasting more than ten years on average. The rate of failure is extremely high. It has become evident that this field is in urgent need of revolutionary changes. This course will cover drug discovery issues ranging from the identification of hits to their optimization as drug candidates. Current as well as novel and proposed approaches aimed at accelerating discovery, potency optimization, selectivity, pharmacokinetics and other drug properties will be discussed. Grad students only.

AS.020.686. Advanced Cell Biology.
All aspects of cell biology are reviewed and updated in this intensive course through critical evaluation and discussion of the current scientific literature. Topics include protein trafficking, membrane dynamics, cytoskeleton, signal transduction, cell cycle control, cell physiology, and the integration of these processes in neurons. Recommended Course Background: AS.020.306

AS.020.688. PhD Excels.
This course provides foundational and multi-tiered training in career strategy and professional development. Through synchronous and asynchronous classes, students will learn to assess and develop the skills needed to transition into a career and align them to their strengths, values and interests. By engaging in small group discussions, experiential learning activities and networking with alumni experts, students will enhance self-knowledge and confidence to explore wider career opportunities. Biology 3rd year and above students only

AS.020.689. PhD Excels II.
This is the second course in a two-part series that provides foundational and multi-tiered training in career strategy and professional development. Through synchronous and asynchronous classes, students will learn to assess and develop the skills needed to transition into a career and align them to their strengths, values and interests. By engaging in small group discussions, experiential learning activities and networking with alumni experts, students will enhance self-knowledge and confidence to explore wider career opportunities. This course provides in-depth understanding of specific career paths based on the career exploration covered in 020.688. Biology 3rd year and above students only.
AS.020.688

AS.020.699. CMDB Responsible Conduct in Research.
This course involves discussions of ethical conduct and the responsible practice of scientific research.Department signature only; restricted to graduate students in Biology PhD students only.

AS.020.753. Logic and Methods in Modern Biology.
The purpose of this course is to gain experience in critical thinking about the logic and methods used in modern biological research. The main approach will be the critical reading, presentation, and discussion of primary research papers, and the preparation and presentation of a research proposal. It is held once a week on the NIH Bethesda campus. Grad students only.
AS.020.637 AND AS.020.668 AND AS.020.674

AS.020.801. Research – Biological Problems.
Independent research for the Ph.D. dissertation. Biology Ph.D. students only

AS.020.802. Research-Biological Problems.
Biology Graduate students only.

AS.020.803. Summer Graduate Research.
Summer independent research for CMDB graduate students only.

AS.020.823. Introduction to Biology Research.
First year Biology Graduate Students only

AS.020.824. Introduction to Biology Research.
First year Biology Graduate Students only

AS.020.825. Introduction to Research.
Open to first year Biology graduate students only.

AS.020.826. Introduction to Biology Research.
Open to first year Biology graduate students only.

AS.030 (Chemistry)

AS.030.101. Introductory Chemistry I. 3 Credits.
The fundamental principles of chemistry, including atomic and molecular structure, bonding, elementary thermodynamics, equilibrium and acids and bases, are introduced in this course. Can be taken with Introductory Chemistry Laboratory – I unless lab has been previously completed. Note: Students taking this course and the laboratory 030.105 may not take any other course in the summer sessions and should devote full time to these subjects. High school physics and calculus are strongly recommended as prerequisites. First and second terms must be taken in sequence. Students not enrolled in college (unless they are rising freshmen) may not take this course.

AS.030.102. Introductory Chemistry II. 3 Credits.
Continuation of AS.030.101 emphasizing chemical kinetics, chemical bonding. Topics: energy levels and wave functions for particle-in-a-box and hydrogen atom and approximate wave functions for molecules including introduction to hybrid orbitals. Note: Appropriate adjusting caps should be used to ensure both sections are approximately the same size
AS.030.101 OR AS.030.107;Students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.102.

AS.030.103. Applied Chemical Equilibrium and Reactivity w/lab. 4 Credits.
This course is designed for students who have scored a 4 or 5 on the AP Chemistry Exam or who have scored a 6 or 7 HL IB Chemistry Exam. This course will review an advanced introductory chemistry sequence in a single semester. Chemical equilibrium, reactivity and bonding will be covered. These topics will be explored through laboratory experiments and problem solving, and discussing these principles in the context of current research. For details on chemistry placement and exam credit policies, please see http://www.advising.jhu.edu/placement_chemistry.phpStudents who have previously enrolled in AS.030.101 or AS.030.105 may not earn credit for AS.030.103 and students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.102/AS.030.106.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.104. Applications of Chemistry in Medicine. 1 Credit.
Chemistry is one of the oldest scientific disciplines through major contributions have been made in various fields such as health care, medicine, pharmaceutical sciences, materials and polymer science and forensic chemistry, to name a few. The development of new drugs involves chemical analysis and synthesis of new compounds. Chemistry also plays a vital role in the development and growth of several consumer-based industries such as pigments and paints, pharmaceuticals, cosmetics and oil and natural gas. In this program, students will be introduced to applications of chemistry in medicine and pharmaceutical sciences. Prerequisite: Background in chemistry and biology. Learning Objectives (LO) In this program, students will: ? Expand the breadth and depth of understanding of specific applications of chemistry in medicine, including acids and bases, buffers, spectroscopy, nuclear chemistry, chemical analysis and drug synthesis and purification? Research problems related to applications of chemistry in medicine? Demonstrate ability to interpret and explain different aspects of chemical and physical properties of drugs ? Provide working knowledge of biochemistry and how it is directly related to understanding disease and drug therapy ? Discuss and describe various instrumental and spectroscopic tools to detect and treat diseases

AS.030.105. Introductory Chemistry Laboratory I. 1 Credit.
Laboratory work includes quantitative analysis and the measurement of physical properties. Open only to those who are registered for or have successfully completed Introductory Chemistry 030.101.
Students must have completed or be enrolled in AS.030.101 OR EN.510.101 to register for AS.030.105.;Students enrolled in AS.030.105 may not enroll in AS.030.115, AS.030.103, or AS.030.107.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.106. Introductory Chemistry Laboratory II. 1 Credit.
Laboratory work includes some quantitative analysis and the measurement of physical properties. Open only to those who are registered for or have completed Introductory Chemistry II (AS.030.102). Permission required for pre-college students.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.107 OR (AS.030.105 AND (AS.030.101 OR EN.510.101));Students enrolled in AS.030.103 may not enroll in or receive credit for AS.030.106.

AS.030.112. Chemistry with Problem Solving I.
This course is for students who have had moderate or limited exposure to the subject. Special emphasis is placed on scientific problem-solving skills. There are two discussion sections per week, including one devoted exclusively to interactive quantitative problem solving. A typical student may have taken a year of descriptive chemistry as a high school sophomore, but has not been exposed to the problem-solving mathematical approach used in university-level science courses. Taken concurrently with AS.030.101 and AS.030.102.Students who have received an AP4 or higher are not considered eligible for this course and should not enroll.
AS.030.101 OR AS.030.102

AS.030.113. Chemistry with Problem Solving II. 2 Credits.
This course is for students who have had moderate or limited exposure to the subject. Special emphasis is placed on scientific problem-solving skills. There are two discussion sections per week, including one devoted exclusively to interactive quantitative problem solving. A typical student may have taken a year of descriptive chemistry as a high school sophomore, but has not been exposed to the problem-solving mathematical approach used in university-level science courses. Taken concurrently with AS.030.101 and AS.030.102.

AS.030.204. Chemical Structure and Bonding w/Lab. 4 Credits.
An introduction to the synthesis, structure, and reactivity of inorganic compounds. Modern approaches to chemical bonding, including molecular orbital, ligand field, and crystal field theories, will be applied to understanding the physical and chemical properties of inorganic materials. Other topics to be discussed include magnetic properties, electronic spectra, magnetic resonance spectra, and reaction kinetics. The integrated laboratory will cover basic synthetic, measurement, and calculation methods of inorganic chemistry.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.102 OR AS.030.103 OR an AP score of 5

AS.030.205. Introductory Organic Chemistry I. 4 Credits.
The fundamental chemistry of the compounds of carbon. Methods of structure determination and synthesis. The mechanisms of typical organic reactions and the relations between physical and chemical properties and structures.
AS.030.102 OR AS.030.103 OR EN.510.101 OR AS.030.204.

AS.030.206. Organic Chemistry II. 4 Credits.
Continuation of AS.030.205 Organic Chemistry I with special emphasis on organic synthesis and related synthetic methods. Students may not simultaneously enroll for AS.030.212 and AS.030.206.
Prerequisite(s): Students may not simultaneously enroll for AS.030.212 and AS.030.206.
AS.030.205

AS.030.212. Honors Organic Chemistry II. 4 Credits.
Second semester undergraduate organic chemistry from a more advanced prospective, emphasizing connections to modern examples from biochemistry (protein and DNA structure, chemical logic of metabolism, enzyme mechanisms), catalysis, materials (polymer synthesis, supramolecular chemistry), medicine (drug structure and function) and more. The standard topics of second semester organic chemistry (e.g. reactivity of aromatic and carbonyl-containing molecules) will all be covered, but amplified and enriched with topics as noted. Students may not simultaneously enroll in AS.030.212 and AS.030.206. Prereq: Must receive a B or better in the first semester (AS.030.205)
Must receive a B or better in the first semester (AS.030.205)

AS.030.225. Introductory Organic Chemistry Laboratory. 3 Credits.
Laboratory work includes fundamental laboratory techniques and preparation of representative organic compounds. Open only to those who are registered for or have completed Introductory Organic Chemistry. Note: This one-semester course is offered each term. Introductory Organic Chemistry I/II requires one semester of the laboratory.
Prerequisite(s): Students may not simultaneously enroll for AS.030.225 and AS.030.227
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.205, earned credit or concurrent enrollment.;((EN.510.101 OR (AS.030.101 AND AS.030.102) OR AS.030.107) AND (AS.030.105 AND AS.030.106)) OR AS.030.103 permission of instructor for freshmen.

AS.030.227. Chemical Chirality: An Introduction in Organic Chem. Lab, Techniques. 3 Credits.
This is a project lab designed for Chemistry Majors who are concurrently enrolled in AS.030.205.Techniques for the organic chemistry laboratory including methods of purification, isolation, synthesis, and analysis will be explored through a project focused on chemical chirality. Students may not simultaneously enroll for AS.030.225 and AS.030.227.
Prerequisite(s): Students may not simultaneously enroll for AS.030.225 and AS.030.227.
AS.030.205 may be taken at the same time or prior to enrolling in AS.030.227.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.228. Intermediate Organic Chemistry Laboratory. 3 Credits.
Lab skills already acquired in AS.030.225 will be further developed for synthesis, isolation, purification, and identification of organic compounds. Spectroscopic techniques, applications will be emphasized. Recommended Course Background: AS.030.225
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.205 AND (AS.030.225 OR AS.030.227);(AS.030.206 OR AS.030.212)

AS.030.245. Quantitative Analytical Laboratory. 3 Credits.
This is a 3 credit lab that will serve as an introduction into analytical techniques and quantitative methods. There will be a 1 hour of pre-lab lecture component to this course to discuss the lab for that day.
((AS.030.101 AS.030.102) OR AS.030.103) AND AS.030.205

AS.030.301. Physical Chemistry I. 3 Credits.
The laws of thermodynamics, their statistical foundation, and their application to chemical phenomena. Students should have knowledge of general physics, general chemistry, and calculus (two semesters recommended). Freshmen by permission only.

AS.030.302. Physical Chemistry II. 3 Credits.
Introduction to quantum mechanics, its application to simple problems for which classical mechanics fails. Topics: Harmonic oscillator, hydrogen atom, very approximate treatments of atoms and molecules, and theoretical basis for spectroscopy. Recommended Course Background: AS.030.301

AS.030.305. Physical Chemistry Instrumentation Laboratory I. 3 Credits.
This course is designed to illustrate the principles of physical chemistry and to introduce the student to techniques and instruments used in modern chemical research. Chemistry majors are expected to take this sequence of courses, rather than AS.030.307. Chemistry majors only.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module..

AS.030.306. Physical Chemistry Instrumentation Laboratory II. 3 Credits.
Designed to illustrate the principles of physical chemistry, introduce the student to spectroscopic techniques and instruments used in modern chemical research. Chemistry majors are expected to take this course rather than 030.307.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.030.301 OR AS.030.302;AS.030.305

AS.030.315. Biochemistry I. 4 Credits.
Foundation for advanced classes in Biophysics and other quantitative biological disciplines. Lecture and computer laboratory. This class is the first semester of a two semester course in biochemistry. Topics in Biochemistry I include chemical and physical properties of biomolecules and energetic principles of catabolic pathways. Computer labs include extensive use of molecular graphics and modelling of reaction kinetics and pathway flux. Co-listed with AS.250.315
AS.030.206 OR AS.030.212;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.030.356. Advanced Inorganic Lab. 3 Credits.
Laboratory designed to illustrate the principles and practice of inorganic chemistry through the synthesis and characterization of transition metal and organometallic compounds. Methods used include vacuum and inert atmosphere techniques. Instrumental approaches and modern spectroscopic techniques are applied to the characterization of compounds generated. It is strongly recommended that students have taken or are taking one of the following courses: AS.030.204, AS.030.442, AS.030.449, or AS.030.472.
AS.030.228

AS.030.371. Chemistry for Connoisseurs. 3 Credits.
This course will survey the structural and physical properties of chemicals often considered as part of the “finer things in life” including topical discussions of the chemistries of food, drink, art, cosmetics and clothing, among others. Despite the pretentious name, the general theme of the course is to put chemical identities onto the things we interact with on a daily basis but most likely take for granted at a molecular level. Current event topics in consumer chemistry will also be covered as they arise. Students will have the chance to research topics of interest. The course material will be enriched by the contributions from special guest lecturers and occasional field trips.
Area: Writing Intensive
AS.030.205 or equivalent

AS.030.403. Optoelectronic Materials and Devices: Synthesis, Spectroscopy, and Applications. 3 Credits.
This course provides an introduction to the vast chemistry and physics of solid-state materials. The course begins with a fundamental description of bonding in crystalline solids and calculation of electronic band structure. We then extend our discussion to methods for the synthesis of low-dimensional materials and hierarchical structures, including quantum dots (0D), nanowires (1D), graphene and graphene analogs (2D), and thin-film superlattices. An in-depth discussion of spectroscopic and characterization techniques for solid-state materials will follow and focus on some of the foundational studies of quantum devices and cooperative phenomena. At this stage we will describerecent advances in electron-microscopy (e.g. aberration-corrected and energy filtered TEM, atom-probe tomography) that are revolutionizing the structural, compositional, and electronic characterization of materials. The course will conclude with a survey of contemporary topics in solid-state and nanomaterials science, including functional devices and circuits, assembly, energy conversion and catalysis, and biological sensing.Recommended Course Background: AS.030.301 and AS.030.402 are preferred, but instructor approval may be granted in lieu of these courses.

AS.030.404. Electrochemical Systems for Energy Conversion and Storage. 3 Credits.
This course will be focused on the fundamentals and applications of electrochemical methods in catalysis, charge transport, and energy conversion and storage. Topics that will be covered are basic electrochemical techniques, homogenous and heterogeneous (photo)electrocatalysis, fuel cells, and charge storage devices. The class will conclude with a group report and presentation on a recent development in the field of energy catalysis, conversion, and storage. Course topics include: 1) Fundamentals of electrochemistry, 2) Potential sweep methods and current-controlled techniques, 3) Impedance analysis, 4) Electrochemistry coupled with other characterization methods, 5) Electrocatalysis and photoelectrochemical catalysis, 6) Basics in fuel cells and current technologies (alkaline, polymer exchange membrane, solid oxide…), 7) Basics in batteries and current technologies (Pb acid, Li-based, other metals…)Recommended Course Background: AS.030.204 or AS.030.449 or AS.030.472, or instructor approval for undergraduate students. No pre-requisites for graduate students

AS.030.405. Introduction to Computational Chemistry. 3 Credits.
This course provides an introduction to the state-of-the-art computational chemistry.The course integrates the basics about molecular electronic structure theories and the corresponding computational aspects and practice in chemical applications. The discussions of theories cover the modern quantum-chemical methods, ranging from mean-field methods (Hartree-Fock method and density-functional theory) to post mean-field methods for treating electron-correlation effects (configuration interaction and coupled cluster). Demonstrative calculations and computer lab practice are designed to deal with the computation of energetic properties (e.g., heat of formation,bond dissociation energy, reaction activation energy, etc) and structural properties (geometry, vibrational frequencies, etc) of representative molecular systems using standard quantum chemistry program package (the Gaussian program, most probably). The class will conclude with a report and presentation on a piece of recent computational work pertinent to the student's research interests.

AS.030.415. Bioinorganic and Organometallic Chemistry. 3 Credits.
This course will cover key concepts of Bioinorganic chemistry (including metalloenzymes, synthetic catalysts, drugs, and molecular sensors) and Organometallic Chemistry (types of ligands, interactions with metals) and their applications in catalysis and bioinorganic chemistry. A background in organic chemistry and physical chemistry I is strongly recommended.
(AS.030.101 AND AS.030.102) AND (AS.030.205 AND AS.030.206)

AS.030.417. Metallo(bio)chemistry of Molecular Oxygen. 1.5 Credits.
This advanced (but descriptive) course focuses on how transition metals of the first row, i.e., iron, manganese and copper), process molecular oxygen (O2) in metalloenzymes and coordination complexes. Chemical behavior discussed will be reversible O2-binding (e.g., blood dioxygen carriers and their synthetic analogs), insertion of one or both atoms of molecular oxygen into organic substrates (i.e., oxygenase activity), or oxidase (bio)chemistry, wherein the metal ion center facilitates O2-reduction to hydrogen peroxide or water. The focus will be on the metal's role and mechanism of action. Practical societal applications will also be discussed.
AS.030.449 or equivalent

AS.030.421. Data Science Tools for the Chemical and Materials Sciences. 3 Credits.
Advances in measurement techniques and simulations have driven an explosion in the variety, quality, and quantity of data collected when investigating chemical and materials processes. Advances in computing have led to the practicality of machine learning (ML) and related analytical methods to explore and extract meaning from this cornucopia of data, and data science has been called the fourth pillar of the scientific method. This course will provide an introduction to modern tools of data science, including the Python programming language, Jupyter notebooks, ML algorithms and their practical implementation, and high performance computing, with specific emphasis on applying these tools to data of chemical relevance, including UV/Vis, IR and NMR spectra, 3-D micro computed tomography, and physical property data including specific heat, magnetization, and resistivity.

AS.030.424. Molecular Synthetic Biology. 3 Credits.
Synthetic Biology is changing the world around us. This course is designed to help you to understand these powerful emerging technologies and the science behind it, and to help prepare you if you want to contribute toward these exciting developments.
Area: Writing Intensive
AS.030.315 OR AS.020.305

AS.030.441. Spectroscopic Methods of Organic Structure Determination. 3 Credits.
The course provides fundamental theoretical background for and emphasizes practical application of ultraviolet/visible and infrared spectroscopy, proton and carbon-13 nuclear magnetic resonance and mass spectrometry to the structure proof of organic compounds.

AS.030.442. Organometallic Chemistry. 3 Credits.
An introduction to organometallic chemistry beginning with structure, bonding, and reactivity and continuing into applications to fine chemical synthesis and catalysis. Required Course Background: Organic chemistry-I and -II. Level: Upper level Undergraduate AND Graduate Students

AS.030.449. Chemistry of Inorganic Compounds. 3 Credits.
Physical and chemical properties of inorganic, coordination and organometallic compounds are discussed in terms of molecular orbital, ligand field and crystal field theories. Emphasis on structure and reactivity of these inorganic compounds. Other topics: magnetic properties, electronic spectra, magnetic resonance spectra, reaction kinetics.

AS.030.451. Spectroscopy. 3 Credits.
Spectroscopy and structure of molecules starting from rotational, vibrational and electronic spectra of diatomic molecules and extending to polyatomic molecules as time permits.Recommended Course Background: AS.030.302 or permission of instructor.

AS.030.452. Materials & Surface. 3 Credits.
The chemistry associated with surfaces and interfaces as well as a molecular level understanding of their essential roles in many technological fields. The first half of this course addresses various analytical techniques used to study surfaces including X-ray, photoelectron spectroscopy, and scanning tunneling microscopy. The second half of this course uses a number of case studies to illustrate the application of surface analytical techniques in contemporary research.

AS.030.453. Intermediate Quantum Chemistry. 3 Credits.
The principles of quantum mechanics are developed and applied to chemical problems.
(AS.030.301 OR AS.030.370 OR AS.250.372) AND AS.030.302

AS.030.454. Electrochemistry for Energy Conversion and Storage. 1.5 Credits.
This half-semester course introduces fundamental concepts in electrochemistry and the application of electrochemical methods for chemical research. The goal of this course is to enable students to practice electrochemistry in laboratory for any field. We will discuss how to use electrochemistry as an analytical technique in your toolbox for understanding chemical reactions as well as the role of electrochemistry in energy conversion and storage.
AS.030.204 OR AS.030.449 OR AS.030.472 OR Instructor Permission.

AS.030.456. Chemical Applications of Group Theory. 3 Credits.
This class will introduce group theory in the chemical/physical context. In addition to the fundamentals of (practical/applied) group theory, this course will explore how the tools of group theory enable powerful, general statements to be made about the behavior of chemical systems from the atomics scale to the macroscale, often without requiring detailed calculations or knowledge of most microscopic details. It is particularly targeted at upper level chemistry and physics undergraduates who have a basic knowledge of quantum mechanics and a brief familiarity with linear algebra.

AS.030.501. Independent Research in Physical Chemistry I. 3 Credits.
Research under the direction of members of the physical chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.502. Independent Research in Physical Chemistry. 1 - 3 Credits.
Research under the direction of members of the physical chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.503. Independent Research in Inorganic Chemistry I. 3 Credits.
Research under the direction of members of the inorganic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.504. Independent Research in Inorganic Chemistry. 1 - 3 Credits.
Research under the direction of members of the inorganic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.505. Independent Research in Organic Chemistry I. 3 Credits.
Research under the direction of members of the organic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.506. Independent Research in Organic Chemistry I. 1 - 3 Credits.
Research under the direction of members of the organic chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.507. Independent Research in Biochemistry. 3 Credits.
Research under the direction of members of the biochemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.509. Independent Research in Biochemistry II. 3 Credits.
Research under the direction of members of the biochemistry faculty.
Recommended Course Background: AS.030.507-AS.030.508 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.510. Independent Research in Biochemistry II. 1 - 3 Credits.
Research under the direction of members of the biochemistry faculty.
Recommended Course Background: AS.030.507-AS.030.508 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.511. Independent Research in Materials Chemistry. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.512. Independent Research in Materials Chemistry. 1 - 3 Credits.
Research under the direction of the materials chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.513. Independent Research in Medical Science. 3 Credits.
Research under the direction of members of the medical faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.514. Independent Research in Medical Science. 3 Credits.
Research under the direction of members of the medical faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.516. Independent Research in Chemical Biology II. 1 - 3 Credits.
Research under the direction of Chemical Biology faculty. Permission of instructor required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.521. Independent Research in Inorganic Chemistry II. 3 Credits.
Research under the direction of the inorganic chemistry faculty.
Recommended Course Background: AS.030.503-AS.030.504 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.522. Independent Research in Inorganic Chemistry II. 1 - 3 Credits.
Research under the direction of the inorganic chemistry faculty.
Recommended Course Background: AS.030.503-AS.030.504 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.523. Independent Research in Physical Chemistry II. 3 Credits.
Research under the direction of the physical chemistry faculty.
Recommended Coures Background: AS.030.501-AS.030.502 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.525. Independent Research in Organic Chemistry II. 3 Credits.
Research under the direction of the organic chemistry faculty.
Recommended Course Background: AS.030.505-AS.030.506 and permission of instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.526. Independent Research in Organic Chemistry II. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.527. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.530. Independent Research in Inorganic and Materials Chemistry. 1 - 3 Credits.
Research under the direction of members of the Inorganic Chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.540. Independent Research in Solid State and Materials Chemistry. 1 - 3 Credits.
Research under the direction of memebers of the Physical Chemistry faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.593. Research-Organic Chemistry I. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.597. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.030.601. Statistical Mechanics.
An introduction to statistical mechanics of cooperative phenomena using lattice gases and polymers as the main models. Covered topics: phase transitions and critical phenomena, scaling laws, and the use of statistical mechanics to describe time dependent phenomena.

AS.030.610. Chemical Kinetics.
The molecular mechanism of elementary physical and chemical rate processes will be studied. Topics such as elastic scattering, collisional vibrational and rotational energy transfer, chemically reactive collisions, and the theory of unimolecular decay will be covered.

AS.030.613. Chemistry-Biology Interface Program Forum I.
Chemistry-Biology Interface (CBI) program students and faculty will meet weekly in a forum that will host presentations from CBI faculty and students as well as invited guest speakers. These meetings will serve as a valuable opportunity for students to develop presentation skills and interact with CBI students and faculty. Enrollment is required for first- and second-year CBI students, and is recommended for advanced-year graduate students.

AS.030.614. Chemical-Biology Program Interface Forum II.
Chemistry-Biology Interface (CBI) program students and faculty will meet weekly in a forum that will host presentations from CBI faculty and students as well as invited guest speakers. These meetings will serve as a valuable opportunity for students to develop presentation skills and interact with CBI students and faculty. Enrollment is required for first and second year CBI students, and is recommended for advanced year graduate students.

AS.030.615. Bioinorganic Chemistry.

AS.030.616. The Chemistry of Transition Metals in Biology.
This course will cover fundamental principles in inorganic chemistry, biochemistry, and spectroscopy that are important to the field of bioinorganic chemistry. Current topics in bioinorganic chemistry will be covered, including metalloenzyme structure and function and related synthetic model systems. An emphasis will be placed on the role of transition metals in these systems, and their chemical mechanisms. The collection and interpretation of data from modern bioinorganic spectroscopic tools (e.g. UV-vis, EPR, raman, Mössbauer, X-ray absorption) will be discussed in the context of these current topics.

AS.030.617. Metallo(bio)chemistry of Molecular Oxygen.
This advanced (but descriptive) course focuses on how transition metals of the first row, i.e., iron, manganese and copper), process molecular oxygen (O2) in metalloenzymes and coordination complexes. Chemical behavior discussed will be reversible O2-binding (e.g., blood dioxygen carriers and their synthetic analogs), insertion of one or both atoms of molecular oxygen into organic substrates (i.e., oxygenase activity), or oxidase (bio)chemistry, wherein the metal ion center facilitates O2-reduction to hydrogen peroxide or water. The focus will be on the metal's role and mechanism of action. Practical societal applications will also be discussed.

AS.030.619. Chemical Biology I.
Parts I and II constitute the core course of the Chemistry-Biology Interface (CBI) Program. An introduction to the structure, synthesis, reactivity, and function of biological macromolecules (proteins, nucleic acids, carbohydrates, and lipids) will be provided using the principles of organic and inorganic chemistry. Discussion will incorporate a broad survey of molecular recognition and mechanistic considerations, and introduce the tools of molecular and cellular biology that are utilized in research at the interface of chemistry with biology and medicine.
Recommended Course Background: AS.030.206 or equivalent.

AS.030.620. Chemical Biology II.
Selected topics of current importance in chemical biology are covered. They include protein engineering and proteomics, cell signaling, protein-nucleic acid interactions (e.g. replication, transcription, DNA repair), catalytic RNA and the ribosome, biosynthesis of natural products, mechanisms of drug action, combinatorial chemistry and chemical genetics, and in vitro selection. Recommended Course Background: AS.030.619 or permission required.

AS.030.621. Literature-Organic Chemistry.

AS.030.622. Seminar: Literature of Chemistry.
Seminars are presented by advanced graduate students on topics from current chemical journals. Most first-year graduate students are expected to attend for credit. Undergraduates may take the course on a satisfactory/unsatisfactory basis.

AS.030.623. Molecular Synthetic Biology.
Principles and methods for the design and optimization of new biological systems, from a molecular perspective. Topics include: introduction to genetic parts and modern methods for their assembly; synthesis and incorporation of nucleic acids at the level of nucleotides, genes, and genomes; design of genetic programs; library generation and screening; directed evolution and its application to create new proteins and metabolic pathways; computational design of protein and RNA?using physical and bioinformatic approaches; non-canonical amino acids and genetic code expansion. This course will also feature critical evaluation of the primary literature in this fast-paced field, and practical experience with relevant software and computational tools.

AS.030.625. Advanced Mechanistic Organic Chemistry I.
The course covers the application of techniques in physical chemistry to the study of organic reaction mechanisms. Topics include chemical bonding and structure, stereochemistry, conformational effects, molecular orbital theory, methods to determine reaction mechanisms, reactive intermediates, and photochemistry. Recommended Course Background: AS.030.205-AS.030.206

AS.030.626. Advanced Mechanistic Organic Chemistry II.
This course covers advanced organic reactions and their mechanisms. Emphasis is given both to methods of postulating mechanisms for rationalizing reaction results and to the use of mechanistic thinking for designing reactions and reagents. This course is intended to be taken in sequence with AS.030.425. Recommended Course Background: AS.030.205-AS.030.206

AS.030.630. Molecular Photophysics and Photochemistry.
This course will introduce fundamental physical, chemical, and analytical concepts underlying light-induced chemical and (molecular-based) material processes. The final weeks of this course will build from these core concepts to survey molecular photoresponses and their consequences or applications in environmental chemistry, chemical biology, and materials science.

AS.030.633. Bioorganic and Natural Product Chemistry.
This is a natural products chemistry course organized according to the major natural product groups and emphasizing their origins, fundamental chemistry and applications in medicine. The organization is part traditional lecture and part case studies, like law school or business school, involving your participation in independent research, short essays and presentations. The last Workshops will be elective on your part as to topic with approval from C.A.T. Mixed in will be examples of organic and chemoenzymatic synthesis and biomimetic synthesis, relevant aspects of cofactor and enzyme function and their engineering, spectroscopic and kinetic tools.

AS.030.635. Principles of Magnetic Resonance.
This course develops the basic theoretical concepts underlying the fields of NMR (Nuclear Magnetic Resonance) and EPR (electron spin/paramagnetic resonance). From this foundation, a broad range of different applications will be surveyed. This includes applications to multidimensional solution state NMR spectroscopy, EPR spectroscopy, as well as hybrid electron/nuclear magnetic resonance applications such as dynamic nuclear polarization (DNP).

AS.030.636. Principles of Multidimensional NMR Spectroscopy.
This course is intended to be of general interest to those wanting to broaden their spectroscopy skills and will cover the theoretical and practical aspects of multidimensional NMR spectroscopy. This includes approaches to optimization of data acquisition and post-acquisition data processing as well as the development of the theoretical background needed to understand and design NMR pulse sequences.

AS.030.648. Biocatalysis: Fundamentals, Recent Advances, and Industrial Applications.
Biocatalysis is a rapidly evolving field that adapts biology's mechanisms for innovation to offer revolutionary solutions for chemical production. This course features an in-depth coverage of various topics in biocatalysis with examples of how biocatalysis has reshaped various aspects of modern industries including food manufacturing, pharmaceuticals, consumer products, and biomaterials. This course also provides an overview of common enzyme classes used in bioindustries with extensive discussions of their catalytic mechanisms and engineering. Integrated within the course will be reviewing of important literatures, assessment of critical industrial biocatalytic processes, and hands-on experience of common bioinformatic and computational tools for new enzyme discovery.

AS.030.652. A Theoretical and Experimental Approach to X-ray Crystallography.
The X-ray course will provide a complete approach to X-ray structure to determination (mostly concerned with snall molecules) and its uses in Chemistry. The first segment of this course will cover all theoretical aspects of X-ray crystallography, i.e. crystals and crystallixation, the nature of X-rays, the diffraction phenomenon of X-rays by crystals, symmetry and space groups, crystal structure analysis. Additionally, the course will provide laboratory experience for the students, involving hands-on instrumentation, experimental methodology to X-ray structure determination, structure solution/refinement, data analyses and publishing data. The course is aimed for graduate students with a strong interest in organic/inorganic chemistry, materials sciences, and physics. Undergraduate students with a major in chemistry are also encouraged to participate.

AS.030.676. Modern Synthetic Methods in Total Synthesis.
An exploration of modern synthetic methods in the context of total synthesis.

AS.030.677. Advanced Organic Synthesis I.
The reactions and principles involved in the synthesis of simple and complex organic compounds. Discussion of famous natural product syntheses and practice in developing rational designs for organic syntheses. Problems in the design of syntheses and in the use of chemical literature.

AS.030.678. Advanced Organic Synthesis II.
Advanced discussion of organic stereochemistry & its application to problems in asymmetric reactions and catalysis will be presented. Emphasis will be placed on the latest reports in the literature, especially with respect to the development of new catalytic, asymmetric processes.

AS.030.681. Nucleic Acids: Fundamental Chemistry and Applications.
The course will begin with an overview of nucleic acid structure, synthesis and reactivity. Subsequent topics will include nucleic acid damage & repair, expanding the genetic code, the role of nucleic acids in epigenetics and applications in biotechnology, such as the development of nucleic acid sensors.

AS.030.691. Hardware, Software and Materials Chemistry.
The course is designed to provide the essential principles and concepts underlying the modern study of the structure and properties of solids in bulk crystals, thin films, and nanoscale objects. Topics include basic crystallography, structure determination by x-ray, neutron, and electron diffraction, fundamental concepts of bonding in solids, lattice dynamics, electronic band structure, magnetism, and strongly correlated electron behavior. Particular emphasis is placed on the impact of the structure, dimensionality, and electron count on electrical and magnetic properties (electric conduction, superconductivity, thermoelectricity, etc). More course info available at http://occamy.chemistry.jhu.edu.. Cross-listed with Physics and Astronomy

AS.030.800. Summer Independent Research.
This course is for active Chemistry PhD students during summer terms

AS.030.802. Independent Research.
Research under the direction of the chemistry faculty.

AS.030.897. Dissertation Research.
Open to AS Chemistry Graduate Students only.

AS.040 (Classics)

AS.040.102. The Art and Archaeology of Early Greece. 3 Credits.
This course explores the origins and rise of Greek civilization from the Early Bronze Age to the Persian Wars (ca. 3100-480 B.C.), focusing on major archaeological sites, sanctuaries, material culture, and artistic production.

AS.040.103. The Roman Empire. 3 Credits.
This introductory course examines the history, society, and culture of the Roman state in the Imperial age (ca. 31 BCE-ca. 500 CE), during which it underwent a traumatic transition from an oligarchic to a monarchic form of government, attained its greatest territorial expanse, produced its most famous art, architecture, and literature, experienced vast cultural and religious changes, and finally was transformed into an entirely different ("late antique") form of society. All readings in English.

AS.040.104. The Roman Republic: History, Culture, and Afterlife. 3 Credits.
This introductory level course examines the history, society, and culture of the Roman state in the Republican period (509-31 BCE), during which it expanded from a small city-state to a Mediterranean empire. We also consider the Republic's importance for American revolutionaries in the 18th century. All readings in English.

AS.040.105. Elementary Ancient Greek. 4 Credits.
This course provides a comprehensive, intensive introduction to the study of ancient Greek. During the first semester, the focus will be on morphology and vocabulary. Cannot be taken Satisfactory/ Unsatisfactory.

AS.040.106. Elementary Ancient Greek. 4 Credits.
Course provides comprehensive, intensive introduction to the study of ancient Greek. The first semester's focus is morphology and vocabulary; the second semester's emphasis is syntax and reading. Course may not be taken Satisfactory/ Unsatisfactory.
AS.040.105

AS.040.107. Elementary Latin. 3 Credits.
This course provides a comprehensive, intensive introduction to the study of Latin for new students, as well as a systematic review for those students with a background in Latin. Emphasis during the first semester will be on morphology and vocabulary. Course may not be taken Satisfactory/Unsatisfactory.

AS.040.108. Elementary Latin. 3 Credits.
Course provides comprehensive, intensive introduction to the study of Latin for new students as well as systematic review for students with background in Latin. The first semester's emphasis is on morphology and vocabulary; the second semester's focus is on syntax and reading. Course may not be taken Satisfactory/Unsatisfactory.
AS.040.107

AS.040.111. Ancient Greek Civilization. 3 Credits.
The course will introduce students to major aspects of the ancient Greek civilization, with special emphasis placed upon culture, society, archaeology, literature, and philosophy.

AS.040.114. Science Fiction Before the Modern Era: Exploring the Ancient Scientific. 3 Credits.
Science Fiction has classically been considered a product – and even a hallmark – of the modern world. But this course opens up the world of ancient scientific fictions. From philosophical myth and utopia to the imaginary worlds of fantastical travelogues and novelistic adventures in outer space, these narratives take us deep into the scientific imagination of the ancient Greeks and Romans. We will examine how these invented worlds reflected critically and creatively on aspects of contemporary society, including political and cosmic structures; conflicts between religion and philosophy; death and the after-life; the body, sexuality and technology. We will also examine the influence these fictions had on lunar narratives of the (early) modern period, including Kepler's Dream and Richard Adams Locke's great lunar hoax of 1835.

AS.040.121. Ancient Greek Mythology: Art, Narratives, and Modern Mythmaking. 3 Credits.
This course focuses on major and often intricate myths and mythical patterns of thought as they are reflected in compelling ancient visual and textual narratives. Being one of the greatest treasure troves of the ancient world, these myths will further be considered in light of their rich reception in the medieval and modern world (including their reception in the modern fields of anthropology and philosophy).

AS.040.126. Religion, Music and Society in Ancient Greece. 3 Credits.
Emphasis on ancient Greek ritual, music, religion, and society; and on cultural institutions such as symposia (drinking parties) and festivals.

AS.040.129. Reading Homer's Odyssey. 3 Credits.
This course aims to provide an in-depth exploration of Homer's Odyssey (in translation). We will study the poem's roots in a tradition of ancient oral poetry, gain a fuller understanding of how it was interpreted within different historical contexts, and examine the poem's fascination with topics such as gender, class, tales of exploration and colonization, truth and lies and identity.

AS.040.145. Story and Argument from Homer to Petrarch. 3 Credits.
Stories entertain us, but we also tell them to make a point. This course will explore the ways that stories were used to make points by Greek and Latin authors from Homer to Petrarch, while also looking at, and comparing them to, the techniques of argument contemporaneous thinkers were developing. This is a course about narrative and rhetoric but also about how and in what way stories matter.

AS.040.152. Medical Terminology. 3 Credits.
This course investigates the Greek and Latin roots of modern medical terminology, with additional focus on the history of ancient medicine and its role in the development of that terminology.

AS.040.204. Greek Myth and Anime: Cross-cultural Concepts of Man and Divinity. 3 Credits.
This course will examine the reception of the Classics in Japanese popular culture anime. We will view how characters, creatures, and beings from Greco-Roman myth are presented in anime, with special attention to concepts such as human beings, humanity, and divinity. Dean's Teaching Fellowship course.
Area: Writing Intensive

AS.040.205. Intermediate Ancient Greek. 3 Credits.
Reading ability in classical Greek is developed through a study of various authors.
AS.040.105 AND AS.040.106 or equivalent

AS.040.206. Intermediate Ancient Greek. 3 Credits.
Reading ability in classical Greek is developed through a study of various authors.
AS.040.205

AS.040.207. Intermediate Latin. 3 Credits.
Although emphasis is still placed on development of rapid comprehension, readings and discussions introduce student to study of Latin literature, principally through texts of various authors.
AS.040.107 AND AS.040.108 or equivalent

AS.040.208. Intermediate Latin. 3 Credits.
Reading ability in Latin is developed through the study of various authors, primarily Cicero (fall) and Vergil (spring).
AS.040.207

AS.040.212. Race Before Race: Ethnic Difference in the Ancient Mediterranean. 3 Credits.
This course explores how ancient Mediterranean cultures on three continents theorized and negotiated ethnic difference, with an eye toward classical Greece and Rome's role in the later invention of race.
Area: Writing Intensive

AS.040.213. The Painted Worlds of Early Greece: Fantasy, Form and Action. 3 Credits.
This course explores the creation and role of early Aegean wall painting. Found primarily in palaces, villas and ritual spaces, these paintings interacted with architecture to create micro-worlds for social activities taking place in their midst. Their subjects range—from mythological to documentary, from ornamental to instructive. They depict dance and battle, fantastical beasts and daily life. We examine their complex relationship to lived reality as well as the activities that surrounded them, from their crafting, to performance of rituals, to their role in "international" relations.
Area: Writing Intensive

AS.040.216. Exploring the Ancient Astronomical Imagination. 3 Credits.
This course takes us on an exploratory journey through the ancient astronomical imaginary. We will focus on ancient Greek and Roman ideas about the structure of the cosmos, the substance and nature of the stars, the Earth's place and role in the universe, ancient attempts to map the stars, and ancient beliefs about the significance of cosmic phenomena for events in the human world. The course will culminate in the extraordinary ancient tradition of lunar fictions, which are our earliest imaginative accounts of life on other worlds. Come join us for a voyage to the stars!

AS.040.217. A Clash of (Ancient) Civilizations? The Jews in the Graeco-Roman World. 3 Credits.
Judaism and Hellenism have been traditionally opposed to one another: the Jewish calendar celebrates the triumph of the Maccabees against the Hellenizers at Hannukah, and mourns the destruction of the Jerusalem Temple by the Romans on Tisha Be-Av. However, the relationship between the Jewish people and the Graeco-Roman world can hardly be reduced to a military confrontation. Did these apparently opposite worlds influence one another? How were the Jews viewed among the Greeks and the Romans and the many other ethnic groups living in the ancient Mediterranean, and how did they view Greek and Latin culture? What did they have to offer on the international, multilingual 'cultural market' of the Graeco-Roman world? Through a selection of ancient texts and modern scholarship, this course analyzes the vicissitudes of the Jewish people and of Judaism from the Hellenistic Age to the Late Antique, throughout the centuries in which Greeks, Romans and Jews found themselves living "under one roof". All readings in English. Dean's Teaching Fellowship course.

AS.040.218. Celebration and Performance in Early Greece. 3 Credits.
Surviving imagery suggests that persons in Minoan and Mycenaean societies engaged in various celebratory performances, including processions, feasts, and ecstatic dance. This course explores archaeological evidence of such celebrations, focusing on sociocultural roles, bodily experience, and interpretive challenges.

AS.040.232. Island Archaeology: The Social Worlds of Crete, Cyprus and the Cyclades. 3 Credits.
Islands present highly distinctive contexts for social life. We examine three island worlds of the third and second millennia BCE through their archaeological remains, each with its particularities. These are places where water had a unique and powerful meaning, where boat travel was part of daily life, where palaces flourished and where contact with other societies implied voyages of great distance across the sea. Class combines close study of material culture and consideration of island-specific interpretive paradigms; students work with artifacts in the JHU Archaeological Museum.

AS.040.245. Heroes: The Ancient Greek Way. 3 Credits.
Students will acquire more in-depth knowledge of Ancient Greek literature by reading and discussing its most important and famous texts, from the Iliad and the Odyssey to tragedy to philosophy. Knowledge of Greek is not required.
AS.040.111 OR AS.040.121

AS.040.300. The Ancient Novel. 3 Credits.
In this course we will follow the fortunes of the ancient Greek and Roman novels.
AS.040.103 OR AS.040.104 OR AS.040.111 OR AS.040.112 OR AS.040.121 OR AS.040.133 OR AS.040.245

AS.040.302. Greek Tragedy: Human Passions and Divine Power. 3 Credits.
This course introduces students to the significance of Greek theater in its original context and to masterpieces of Greek tragedy such as Medea, Oedipus the King, and The Bacchae. Readings will be in English. No Greek is required. Recommended Course Background: AS.040.111 Ancient Greek Civilization, AS.040.121 Ancient Greek Mythology, or some exposure to ancient Greek culture.

AS.040.305. Advanced Ancient Greek. 3 Credits.
This course aims to increase proficiency and improve comprehension of the ancient Greek language. Intensive reading of ancient Greek texts, with attention to grammar, idiom, translation, etc. Reading of prose or verse authors, depending on the needs of students. Specific offerings vary. Co-listed with AS.040.705.
AS.040.205 AND AS.040.206 or equivalent

AS.040.306. Advanced Ancient Greek. 3 Credits.
This course aims to increase proficiency and improve comprehension of the ancient Greek language. Intensive reading of ancient Greek texts, with attention to grammar, idiom, translation, etc. Reading of prose or verse authors, depending on the needs of students. Specific offerings vary. Co-listed with AS.040.702.
AS.040.205 AND AS.040.206 or equivalent

AS.040.307. Advanced Latin Prose. 3 Credits.
This course aims to increase proficiency and improve comprehension of the Latin language. Intensive reading of Latin texts, with attention to grammar, idiom, translation, etc. Specific offerings vary. Co-listed with AS.040.707.
AS.040.207 AND AS.040.208 or equivalent

AS.040.308. Advanced Latin Poetry. 3 Credits.
The aim of this course is to increase proficiency and improve comprehension of the Latin language. Intensive reading of Latin texts, with close attention to matters of grammar, idiom, and translation. Co-listed with AS.040.710.
AS.040.207 AND AS.040.208 or equivalent

AS.040.348. Worlds of Homer. 3 Credits.
Through texts, art, and archaeological remains, this course examines the various worlds of Homer--those recalled in the Iliad and Odyssey, those within which the epics were composed, and those born of the poet's unique creative work. Class will make museum visits. Ancient texts read in translation..

AS.040.400. The Archaeology of Cyprus: Investigating a Mediterranean Island World in the JHU Museum. 3 Credits.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Class involves regular analysis of artifacts based in the Archaeological Museum.

AS.040.407. Survey of Latin Literature I: Beginnings to the Augustan Age. 3 Credits.
This intensive Latin survey is designed for very advanced undergraduate students--normally those who have completed two semesters of Advanced Latin (AS.040.307/308)--and PhD students preparing for their Latin translation exam. In this course, the first half of a year-long sequence, we will read substantial texts of major Republican and some Augustan authors. The weekly pace is designed to inculcate greater speed and accuracy in Latin reading, and provide significant coverage of various kinds of texts.Recommended background: AS.040.307-308 or equivalent
AS.040.307 AND AS.040.308 or permission of instructor.

AS.040.408. Survey of Latin Literature II: Early Empire to the Post-Classical Period. 3 Credits.
This intensive Latin survey is designed for very advanced undergraduate students (normally those who have completed the regular undergraduate sequence through the advanced level) and PhD students preparing for their Latin translation exam. In this course, the second half of a year-long sequence, we will read substantial texts of major Imperial authors, as well as a selection of works from Late Antiquity and the Post-Classical period. The weekly pace is designed to inculcate greater speed and accuracy in Latin reading and to provide significant coverages of various kinds of texts. Prior completion of AS.040.407 preferred but not required.
AS.040.307 AND AS.040.308 or equivalent.

AS.040.417. Survey of Greek Literature I: Homer to the Classical Period. 3 Credits.
We shall read an extensive selection of major texts of Greek literature from Homer to the classical period.

AS.040.418. Survey of Greek Literature II: Hellenistic Period to Imperial Period. 3 Credits.
We shall read, in the original Greek, major authors of Greek Literature from the Hellenistic period to the Imperial period.

AS.040.420. Classics Research Lab. 3 Credits.
This course gives participants a unique opportunity to engage directly in empirical research and its interpretation and dissemination. Topics vary. There are no prerequisites, but potential students should contact the instructor for permission to enroll.

AS.040.501. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.520. Honors Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.040.600. The Archaeology of Cyprus: Investigating a Mediterranean Island World in the JHU Museum.
This course explores the visual and material worlds of ancient Cyprus from the earliest human evidence through the Iron Age. Class involves regular analysis of artifacts based in the Archaeological Museum.

AS.040.601. Cosmopoetics: Aratus, Manilius and the Literature of the Stars.
This seminar will explore two ancient Greek/Roman poems about the stars: Aratus' ancient Greek poem Phaenomena (3rd century BCE) – which was second only to the Homeric epics in terms of popularity among ancient readers - Manilius' Latin poem, Astronomica (1st century CE) - and ancient catasterism-literature (myths about figures who are converted into stars). Key points for discussion will include the politics and poetics of mapping the night sky, intersections with the scientific/ philosophical tradition, the didactic voice, the interpretation of celestial phenomena and the stars' perceived influence on terrestrial events, and the extraordinarily rich visual tradition that accompanies Aratus' poem and the katasterismoi in particular. The seminar will include sessions working on early astronomical materials from our Special Collections. In order to guarantee maximum accessibility, we will approach these texts in translation, and extra provision will be made for Classics students and others who wish to study the texts in the original Greek and Latin language.

AS.040.603. Homer's Odyssey.
This seminar proposes an in-depth exploration of Homer's Odyssey. One of the monumental epics of ancient Greek and a foundational text of world-literature, the Odyssey examines, through one man's quest to make his way home, profound questions concerning the nature of identity, the meaning of suffering, the importance of sharing stories, and the strange allure of poetry itself. We will study Books 1-12 of the poem in the original Greek in order to gain advanced understanding of its language and style. Emphasis will also be placed on the study of commentaries and scholarship in order to enhance our understanding of the poem's themes, the transmission of the text, and the historical, literary and social contexts in which-and in response to which-it grew.

AS.040.605. Orality and Writing in the Literary Culture of the Early Roman Empire.
This graduate seminar focuses on the oral practices that constitute "literary culture" in Rome in the first and second centuries CE: declamation, recitation, disputation emerging from reading, and the relationship of these practices to both literary "publication" and to arenas of traditional oratory such as the courts and the Senate. Weekly assignments will include substantial readings in Latin.

AS.040.608. Neo-Latin.
This seminar will introduce participants to the reading, editing, translation, and interpretation of humanist Latin, with training in the ancillary skills of paleography, codicology, and textual criticism.

AS.040.610. Biography and the Hero.
This graduate seminar will involve a close reading and study Plutarch's Life of Romulus, particularly in relation to the paired Life of Theseus. We will examine Plutarch's frameworks and principles for "life writing" in general, as well as his understanding and application of the traditional concepts of the Greek "hero" and Roman exemplum, to shed light on his poetics in this mythistorical "biography."

AS.040.611. Labor in Latin Literature.
This graduate seminar examines work and labor in Latin literature, beginning with a close reading of Vergil's Georgics in Latin. We will pay particular attention to the female, enslaved, and non-human labor that elite male authors silence or sublimate, as well as the interpretive and methodological challenges that arise. Students will co-design the reading list; lead discussions around texts, topics and theories relevant to their research; and workshop one abstract, one grant proposal, and one conference paper each. Reading ability in Latin is required.

AS.040.613. Things with Lives in the Ancient Mediterranean.
With a focus on material culture from the ancient Mediterranean, this seminar explores the diversity of ways in which objects may be understood to have lives or to be active elements of humans' lived experience. The seminar meets in the Archaeological Museum, where we can pair direct examination of objects with an exploration of multiple theoretical approaches and interests, such as object biography and agency, affordance theory, object-oriented ontologies, material animacies, embodiment, ecological and enactive perception, and the ongoing post-depositional existences of archaeological material. Students will eventually select an object as the focus of an individual research project.

AS.040.614. Ancient Allegorical Interpretations of Greek Literature.
We shall look at several allegorical readings offered in antiquity to interpret myths and literary works, especially, but not only, the epics of Homer.

AS.040.622. Angelo Poliziano: Renaissance Humanism and Classical Antiquity.
This course will survey works in Latin and the vernacular by the fifteenth-century Florentine humanist Angelo Poliziano, with particular attention to his correspondence, and with recourse to a variety of theoretical approaches, from classical reception theory to queer theory. Good reading ability in classical Latin is required; the same in Italian is ideal but not required.

AS.040.626. Plato and Poetry.
This graduate seminar will explore Plato's contributions to the "old quarrel" between poetry and philosophy, encompassing such topics as the relationship between poetic inspiration and human reason, the role of literature in pedagogy, and the metaphysical implications of poetic fiction. We will focus on several Greek texts from the Platonic corpus related to these themes, as well as some later sources that engage with Platonic ideas.

AS.040.637. Competition in the Early Roman Empire.
A well-documented feature of the middle to late Roman republic is the ferocious competitiveness of the aristocracy, and the governing class in particular. These people competed for prestige and glory on the battlefield, for offices and honors in government and administration, for visibility in public building, in forensic oratory in the courts, in deliberative oratory in various assemblies, and sometimes in literary production. Less well-understood is how the competitiveness of this group manifested itself in the early imperial age, as the emergence of the emperor shut down competition in some of these arenas and fundamentally changed the character of the competition in others. This seminar considers how some old arenas changed under the Imperial regime, and examines new forms that aristocratic competition assumed to make up for the arenas that had altogether disappeared.

AS.040.638. Ancient Literary Criticism.
This course covers essential Greek and Latin texts (e.g. Plato, Aristotle, Horace, Plutarch) and the commentary tradition (e.g. scholia to Homer and other important authors). Focus is on poetic texts, with some prose.

AS.040.641. Reception of the Greek Novel.
In this course, we will follow the fortunes of the Greek novels from the Byzantine period onward, focusing especially on Heliodorus' _Aethiopica_. Knowledge of Greek is highly desirable but not required.

AS.040.702. Reading Ancient Greek Poetry.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.306.

AS.040.705. Reading Ancient Greek Prose.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.305. Recommended Course Background: AS.040.205-AS.040.206.

AS.040.707. Reading Latin Prose.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.307.

AS.040.710. Reading Latin Poetry.
This reading seminar is intended to train graduate students in direct and critical work on primary sources. Co-listed with AS.040.308. Recommended Course Background: AS.040.207-AS.040.208.

AS.040.801. Independent Study.

AS.040.802. Independent Study.

AS.040.806. Master's Thesis Research.

AS.040.807. Master's Thesis Research.

AS.040.809. Exam Preparation.
Study in preparation for a comprehensive oral exam, required to become a PhD candidate, and consisting of three fields in classics and related areas.

AS.040.810. Exam Preparation.
Study in preparation for a comprehensive oral exam, required to become a PhD candidate, and consisting of three fields in classics and related areas

AS.040.814. Dissertation Research.
No Audits.

AS.040.815. Dissertation Research.
No Audits.

AS.050 (Cognitive Science)

AS.050.102. Language and Mind. 3 Credits.
Introductory course dealing with theory, methods, and current research topics in the study of language as a component of the mind. What it is to "know" a language: components of linguistic knowledge (phonetics, phonology, morphology, syntax, semantics) and the course of language acquisition. How linguistic knowledge is put to use: language and the brain and linguistic processing in various domains.

AS.050.105. Introduction to Cognitive Neuropsychology. 3 Credits.
When the brain is damaged or fails to develop normally, even the most basic cognitive abilities (such as the ability to understand words, or perceive objects) may be disrupted, often in remarkable ways. This course explores a wide range of cognitive deficits, focusing on what these deficits can tell us about how the normal brain works. Topics include brain anatomy and causes of brain damage, reading and spelling deficits, unilateral spatial neglect, hemispheric disconnection, cortical plasticity, and visual perception of location and orientation. Students read primary sources: journal articles that report deficits and discuss their implications.

AS.050.116. Visual Cognition. 3 Credits.
How do humans make sense of the visual world around them? This course will provide an introductory survey of current research, methods, and theories in visual cognition. We will draw upon topics in cognitive psychology, cognitive neuroscience, cognitive neuropsychology, and artificial intelligence.

AS.050.135. Speech & Voice. 3 Credits.
Course on human speech production and perception, covering topics including anatomy and physiology of the vocal tract, phonetic analysis, language acquisition and impairments, and speech technologies.

AS.050.202. Introduction to Computational Cognitive Science. 3 Credits.
How does the mind work? Cognitive science addresses this question from a multidiscliplinary perspective, drawing upon methods and ideas from psychology, neurophysiology, neuroscience, philosophy, linguistics, and computer science. Within this framework, computational cognitive science has two related goals. The first is to create computational models of human cognition, computer programs that simulate certain aspects of the mind. The second is to understand how to produce intelligent behavior in machines, taking cues from humans. The computational frameworks we will discuss include symbolic structured representations, probabilistic inference and artificial neural networks, as applied to concept learning, language and vision. While this class does not have formal prerequisites, some programming experience (e.g., AS 250.205 Introduction to Computing or equivalent) and mathematical preparation (e.g., AS.110.107 Calculus II or equivalent) are essential.An optional, hands-on lab (AS.050.212) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.

AS.050.203. Neuroscience: Cognitive. 3 Credits.
This course surveys theory and research concerning how mental processes are carried out by the human brain. Currently a wide range of methods of probing the functioning brain are yielding insights into the nature of the relation between mental and neural events. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Methods surveyed include electrophysiological recording techniques such as EEG, ERP, single/multiple unit recording and MEG; functional imaging techniques such as PET and fMRI; and methods that involve lesioning or disrupting neural activity such as cortical stimulation, animal lesion studies, and the study of brain-damaged individuals.It's strongly recommended that students have background in one of the following courses: AS.050.101 OR AS.050.105 OR AS.200.141.

AS.050.206. Bilingualism. 3 Credits.
Do children get confused when they grow up exposed to more than one language? Is it possible to forget one's native language? Are the first and second language processed in different areas of the brain? How does brain damage impact the different languages of a polyglot? Does knowing a second language affect non-linguistic cognitive processing? This course will address questions such as these through an exploration of mental and neural processes underlying bilingual and multilingual language processing. Also offered as AS.050.606.

AS.050.212. Introduction to Computational Cognitive Science Lab. 0.5 Credits.
This course is a hands-on lab supplement for Introduction to Computational Cognitive Science. While this lab is optional, it is highly recommended to students with less extensive computational and mathematical experience.
Prerequisite(s): Must be registered for AS.050.202 in order to register for this optional lab.

AS.050.233. Lost in Space: How Humans Learn, Think, and Talk About the World Around Us. 3 Credits.
The ability to perceive, navigate, and explain space around us is essential in our everyday life: every day humans find their favorite coffee mug, make their way to work, hang their coat, and give directions to dinner guests with relative ease. How is this assorted set of tasks accomplished? How does the human mind structure the space around us and recognize the spatial relations between various objects? What happens when this ability is impaired? This course will attempt to answer these questions by sampling key concepts, theories, and experimental findings from a diverse set of disciplines, including neuroscience, psychology, and linguistics. We will get an overview of spatial cognition from multiple perspectives and draw analogies between different research paradigms.

AS.050.236. Neurolinguistics. 3 Credits.
This course provides an introductory survey of the cognitive neuroscience of language – a multidisciplinary field in the intersection of Linguistics, Psycholinguistics, and Neuroscience. We will explore current research on the neural bases of the perception, production, and acquisition or human language in neuro-typical and impaired individuals.

AS.050.311. Written Language: Normal Processing and Disorders. 3 Credits.
This course surveys both the historical development of written language as well as current cognitive theories that account for the manner in which the written language is represented and processed by readers/writers of a language. Issues regarding the relationship between the written and spoken language, the neural bases of written language, the acquisition of written language skills, as well as acquired and developmental disorders of reading and writing will be examined.
Area: Writing Intensive
AS.050.102 OR AS.050.105 OR AS.050.203 OR AS.080.203

AS.050.315. Cognitive Neuropsychology of Visual Perception: The Malfunctioning Visual Brain. 3 Credits.
When we think about our ability to see, we tend to think about our eyes, but in fact vision happens mostly in the brain. This course explores the remarkable perceptual deficits that occur when the visual regions of the brain are damaged or fail to develop normally, focusing on what these perceptual malfunctions tell us about normal visual perception. Topics include visual system anatomy and physiology; functional specialization in the lower visual system as revealed by cerebral achromatopsia (color blindness resulting from brain damage) and akinetopsia (impaired motion perception); cortical plasticity in the visual system; spatial deficits in perception and action; and the implications of high-level visual deficits, including prosopagnosia (impaired face recognition), Charles Bonnet syndrome (complex visual hallucinations in blind areas of the visual field), blindsight (accurate responding to visual stimuli despite apparent inability to see them), and aphantasia (lack of visual imagery).
AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.101 OR AS.200.110 OR AS.200.211 or instructor's permission.

AS.050.317. Semantics I. 3 Credits.
This is an introduction to the study of meaning in natural language. We address the conceptual and empirical issues in semantic theory and introduce some formal machinery that has been developed to deal with such problems. After discussing foundational questions, we turn to formal semantics and pragmatics, as well as their interfaces with syntax and the lexicon. Specific topics include presupposition, type-driven composition, quantification, lexical aspect, argument structure, and lexical representations of meaning.
AS.050.107 OR AS.050.102 or AS.050.240 or instructor's permission.

AS.050.320. Syntax I. 3 Credits.
Introduces the basic methods and means of analysis used in contemporary syntax investigations, practicing with data from different languages. Also offered as AS.050.620.
AS.050.102 OR AS.050.240 or equivalent/see instructor.

AS.050.325. Phonology I. 3 Credits.
An introduction to the basic principles underlying the mental representation and manipulation of language sounds and their relation to human perception and vocal articulation: how units of sound are both decomposable into elementary features and combined to form larger structures like syllables and words. The role of rules and constraints in a formal theory of phonological competence and in accounting for the range of variation among the world's languages. Also offered as AS.050.625.

AS.050.326. Foundations of Cognitive Science. 3 Credits.
This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion. Also offered as AS.050.626.
Area: Writing Intensive

AS.050.332. Developmental Cognitive Neuroscience. 3 Credits.
In-depth examination of the current literature on cognitive development in the context of developmental cognitive neuroscience. Please see course prerequisites. Meets with AS.050.632.
AS.050.101 OR AS.050.339 OR AS.200.132 OR AS.050.105 OR Instructor's Permission.

AS.050.333. Psycholinguistics. 3 Credits.
This course provides a broad survey of current research on language processing in adult native speakers and language learners. Topics include speech perception, word recognition, and sentence production and comprehension. We will discuss the nature of representations that are being constructed in real-time language use, as well as how the mental procedures for constructing linguistic representations could be studied by various behavioral and physiological measures. Also offered as AS.050.633.
AS.050.102 OR AS.050.240 OR AS.050.317 OR AS.050.320 OR AS.050.325 or instructor's permission.

AS.050.339. Cognitive Development. 3 Credits.
This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.348. First Language Acquisition. 3 Credits.
This course provides an introduction to the fields of first and second language acquisition by looking at questions such as the following: Can the grammar of a native language be learned solely on the basis of noticing statistical correlations among words? How does native language acquisition explain — or is explained by — the universal properties, shared by all languages, of words and grammars? How does being exposed to multiple languages from birth affect language acquisition and what happens when a child is not exposed to any language early in life? Does the same cognitive mechanism guide language learning in children and adults? What factors account for individual differences in ease and ultimate attainment when a second language is learned later in life? Is it possible to become indistinguishable from a native speaker in a foreign language? What changes take place in the brain when a new language is learned? Also offered as AS.050.648.
(AS.050.240 OR AS.050.320 OR AS.050.325) AND (AS.050.102 OR AS.050.206)

AS.050.349. Second Language Acquisition. 3 Credits.
First language acquisition is natural and seemingly effortless. The situation is reversed when one tries to learn another language. This course discusses in what ways first and second language acquisition (SLA) differ and how individual differences of the learners as well as external factors contribute to the variability observed in rates and ultimate proficiency of second language learning in children and adults. We will discuss such topics as Universal Grammar access in early and late SLA, first language influence, critical periods, possibility of native-like attainment, and language attrition.
(AS.050.240 OR AS.050.320 OR AS.050.325) AND (AS.050.348 OR AS.050.102 OR AS.050.206)

AS.050.352. Applying Cognitive Neuroscience to Artificial Intelligence Part I. 3 Credits.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidly improving for well-defined tasks and narrow intelligence. Moreover, it has entered all industries in a myriad of ways. But will AI ever have human-like general intelligence? What does humanlike general intelligence even mean? Why should we even care? This course is designed to answer these complex questions by giving students working knowledge of the underlying principles and mechanisms of human behavior and cognition, and how they may be applied to solving current and rising industry challenges. Key topics to be addressed will include vision, audition, language, learning, emotion and social cognition, creativity, and consciousness. Each topic addressed will cover latest advancements within cognitive neuroscience, with relevant applied case studies. Students will apply learned topics to a final group research project on the topic of their choice.

AS.050.353. Applying Cognitive Neuroscience to Artificial Intelligence Part II. 3 Credits.
As a myriad of artificial intelligence enabled autonomous systems enter into our lives and change how we live, we must ask: can we trust these systems? In this course we will take a human-centered perspective on assured autonomy and identify why and how insights from human perception and cognition can guide solutions for reliable, resilient, and robust autonomous systems. We will address bias, ethics, explanability, and safety by focusing on specific case studies from autonomous vehicles, cybersecurity, healthcare, fashion, law enforcement, and military systems. Students will apply learned material to a semester-long group research project on a topic of their choice.

AS.050.358. Language & Thought. 3 Credits.
Have you ever wondered about the relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too and this course will survey the current thinking on this matter. Classical papers such as those by Whorf and Sapir, more recent philosophical papers by people such as Fodor and Dennett, and recent empirical work by linguists and psycholingists on the relationship between language and thinking in development and in adults will be covered. Discussions will focus on the theoretically possible relationships between language and thought and the empirical data that speak to these. Juniors and seniors only. Freshmen and sophomores by permission of instructor only.
AS.050.102 OR AS.050.320 OR AS.050.325 or instructor permission.

AS.050.360. Computational Psycholinguistics. 3 Credits.
How do we understand and produce sentences in a language we speak? How do we acquire the knowledge that underlies this ability? Computational psycholinguistics seeks to address these questions using a combination of two approaches: computational models, which aim to replicate the processes that take place in the human mind; and human experiments, which are designed to test those models. The perspective we will take in this class is that the models and experimental paradigms do not only advance our understanding of the cognitive science, but can also help us advance artificial intelligence and language technologies. While computational psycholinguistics spans all levels of linguistic structure, from speech to discourse, our focus in this class will be at the level of the sentence (syntax and semantics). The course will assume familiarity with programming and computational modeling frameworks in cognitive science, as covered by Introduction to Computational Cognitive Science or equivalent. Also offered as AS.050.660.An optional, hands-on lab (AS.050.361) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.
(AS.050.102 OR AS.050.240 OR AS.050.317 OR AS.050.320) AND (AS.050.202 OR EN.601.465) or Instructor Permission.

AS.050.361. Computational Psycholinguistics Lab. 0.5 Credits.
This course is an optional hands-on lab supplement for Computational Psycholinguistics. While this lab is optional, it is highly recommended to students with less extensive computational and mathematical experience.
Prerequisite(s): Must be registered for AS.050.360 or AS.050.660 in order to register for this optional lab.

AS.050.365. Cracking the code: Theory and modeling of information coding in neural activity. 3 Credits.
One of the most foundational concepts in neuroscience is the idea that neural activity encodes information about an animal's sensory environment and internal mental states. This idea is closely connected to the concept of mental representation in cognitive science and philosophy, whereby the mind is proposed to contain internal symbols that represent things in the external world. There have been many fascinating discoveries about how neural signals encode information, but we are still far from a comprehensive theory of neural representation. Recent major developments in neuroscience and machine learning have opened up a new world of possibilities for investigating the underlying principles of information coding in the brains of humans and other animals.
In this course, we will discuss primary research articles on neural representation and information processing, and students will implement computational analyses that address issues in these domains. We will mostly focus on vision as a system that illustrates broader principles of information processing in the human brain. The reading material will include work from philosophy, neuroimaging, electrophysiology, and computational modeling. The topics covered include mental and neural representation, neural tuning, population coding, information theory, encoding and decoding models, dimensionality reduction, computational models, deep learning, and other applications of machine learning in neuroscience. Enrollment is limited to Juniors and Seniors. While this class does not have formal prerequisites, programming experience (e.g., AS 250.205 Introduction to Computing) and mathematical preparation (e.g., AS.110.107 Calculus II) are essential. It is also highly recommended that students have previously taken introductory courses in cognitive or systems neuroscience (e.g., AS.050.203 Neuroscience: Cognitive) and machine learning or neural network modeling (e.g., AS.050.372 Foundations of Neural Network Theory).

AS.050.370. Mathematical Models of Language. 3 Credits.
This course will be devoted to the study of formal systems that have proven useful in the cognitive science of language. We will discuss a wide range of mathematical structures and techniques and demonstrate their applications in theories of grammatical competence and performance. A major goal of this course is bringing students to a point where they can evaluate the strengths and weaknesses of existing formal theories of cognitive capacities, as well as profitably engage in such formalization, constructing precise and coherent definitions and rigorous proofs. Also offered as AS.050.670.
AS.050.102 OR AS.050.202

AS.050.371. Bayesian Inference. 3 Credits.
This course introduces techniques for computational modeling of aspects of human cognition, including perception, categorization, and induction. Possible topics include maximum likelihood and Bayesian inference, structured statistical models (including hierarchical and graphical models), nonparametric models. The course emphasizes the close connections among data analysis, theory development, and modeling, with examples drawn from language and vision. Also offered as AS.050.671.

AS.050.372. Foundations of Neural Network Theory. 4 Credits.
Introduction to continuous mathematics for cognitive science, with applications to biological and cognitive network models: real and complex numbers, differential and integral multi-variable calculus, linear algebra, dynamical systems, numerical optimization. Recommended course background in Calculus I. This is a basic-level course not appropriate for students with significant math background. tudents who have completed both Calc III (AS.110.202 or AS.110.211) and Linear Algebra (AS.110.201 or AS.110.212 or EN.553.291) or an equivalent combination may not register. Also offered as AS.050.672.
Students who have completed both (AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.553.291) or an equivalent combination may not register.

AS.050.375. Probabilistic Models of the Visual Cortex. 3 Credits.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modeling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Required Background: Calculus I and experience in a programming language (Python preferred).
AS.110.106 OR AS.110.108

AS.050.383. Computational Social Cognition. 3 Credits.
Humans are a fundamentally social species with amazing capabilities beyond that of any other biological or artificial system. Yet the cognitive and neural computations underlying our vast social abilities are largely unknown. Advances in naturalistic neuroscience paradigms and machine learning are revolutionizing the way cognitive scientists study social cognition. This course will explore new research in computational social cognition, drawing from topics in cognitive neuroscience, development, and artificial intelligence. Our goal is to understand the motivation, methodology and implications of recent research. The class will be heavily focused on social vision, but will also explore other aspects of social cognition including theory of mind and moral reasoning.
AS.050.203 OR AS.080.203 OR AS.050.202 or equivalent.

AS.050.500. Practicum in Language Disorders- Community Based Learning. 2 Credits.
This course provides the opportunity to learn about adult aphasias, language disorders which are one of the most common consequences of stroke. You will receive training in supportive communication techniques and work as a communication partner with an individual with aphasia for two hours per week. Three class meetings for orientation and reading assignments will be held on campus; training and practicum will be conducted at a local aphasia support center. Independent mode of transportation required. Co-listed as AS.080.505 in Neuroscience. Find out more about the practicum site at https://www.leagueforpeople.org/scale.
A- or Better in AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.311 or instructor's permission.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.503. Research in Cognitive Science/Freshmen. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.504. Research Cognitive Science-Freshmen. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.505. Readings in Cognitive Science/Sophomores. 1 - 3 Credits.
Research current topics in cognitive science.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.506. Readings Cognitive Science-Sophomores. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.507. Research in Cognitive Science/Sophomores. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.508. Research Cognitive Science - Sophomores. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.510. Cognitive Science Internship. 1 Credit.
For internships in cognitive science-related fields. Graded S/U only. Student cannot recieve credit for paid internships. A Cognitive Science faculty sponsor is required and must be named in the Independent Academic Work form. Please read the relevant independent academic work FAQ. KSAS primary majors, visit https://advising.jhu.edu/research-internships-and-independent-study/. WSE primary majors, visit https://engineering.jhu.edu/advising/advising-questions/.
AS.990.500

AS.050.511. Readings in Cognitive Science/Juniors. 1 - 3 Credits.
Assigned readings on current topics in cognitive science. Instructor approval required. Letter-graded.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.512. Readings Cognitive Science-Juniors. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.513. Research in Cognitive Science/Juniors. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.514. Research Cognitive Science - Juniors. 1 - 3 Credits.
Permission Required,
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.515. Readings in Cognitive Science/Seniors. 1 - 3 Credits.
Assigned readings on current topics in cognitive science. Instructor approval required. Letter-graded.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.516. Readings Cognitive Science - Senior. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.517. Research in Cognitive Science/Seniors. 1 - 3 Credits.
Research current topics in cognitive science. Instructor approval required. Graded S/U.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.518. Research Cognitive Science - Seniors. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.550. Undergraduate Teaching Practicum in Cognitive Science. 1 - 3 Credits.
By invitation, qualified students may serve as undergraduate Teaching Assistants for cognitive science courses and receive credit. This practicum is graded S/U. Each section instructor will determine TA responsibilities based upon departmental policy. Students who accept an invitation, should forward that invitation to the Director of Undergraduate Studies (Dr. Colin Wilson) and make a request in SIS to add the instructor's teaching practicum section. Dr. Wilson will approve requests in SIS. Students may not both receive credit and be paid for the same undergraduate teaching position. This course may not be used toward cognitive science major degree requirements.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.599. Research-Cognitive Science. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.050.603. Intro to Cognitive Neuroscience.
This course surveys theory and research concerning how mental processes are carried out by the human brain. Currently a wide range of methods of probing the functioning brain are yielding insights into the nature of the relation between mental and neural events. Emphasis will be placed on developing an understanding of both the physiological bases of the techniques and the issues involved in relating measures of brain activity to cognitive functioning. Methods surveyed include electrophysiological recording techniques such as EEG, ERP, single/multiple unit recording and MEG; functional imaging techniques such as PET and fMRI; and methods that involve lesioning or disrupting neural activity such as cortical stimulation, animal lesion studies, and the study of brain-damaged individuals.

AS.050.606. Intro to Bilingualism.
Do children get confused when they grow up exposed to more than one language? Is it possible to forget one's native language? Are the first and second language processed in different areas of the brain? How does brain damage impact the different languages of a polyglot? Does knowing a second language affect non-linguistic cognitive processing? This course will address questions such as these through an exploration of mental and neural processes underlying bilingual and multilingual language processing. Also listed as AS.050.206.

AS.050.617. Semantics I.
Also offered as AS.050.317. This is an introduction to the study of meaning in natural language. We address the conceptual and empirical issues in semantic theory and introduce some formal machinery that has been developed to deal with such problems. After discussing foundational questions, we turn to formal semantics and pragmatics, as well as their interfaces with syntax and the lexicon. Specific topics include presupposition, type-driven composition, quantification, lexical aspect, argument structure, and lexical representations of meaning.

AS.050.620. Syntax I.
Introduces the basic methods and means of analysis used in contemporary syntax investigations, practicing with data from different languages. Also offered as AS.050.320.

AS.050.625. Phonology I.
An introduction to the basic principles underlying the mental representation and manipulation of language sounds and their relation to human perception and vocal articulation: how units of sound are both decomposable into elementary features and combined to form larger structures like syllables and words. The role of rules and constraints in a formal theory of phonological competence and in accounting for the range of variation among the world's languages. Also offered as AS.050.325.

AS.050.626. Foundations of Cognitive Science.
Also offered as AS.050.326. This course explores general issues and methodologies in cognitive science through the reading of classic works (from Plato and Kant through Skinner and Turing) and recent research articles to begin construction of a coherent picture of many seemingly divergent perspectives on the mind/brain. Recent brain-based computational models serve to focus discussion.
Area: Writing Intensive

AS.050.632. Developmental Cognitive Neuroscience.
In-depth examination of the current literature on cognitive development in the context of developmental cognitive neuroscience. Meets with AS.050.332.

AS.050.633. Psycholinguistics.
Also offered as AS.050.333. This course provides a broad survey of current research on language processing in adult native speakers and language learners. Topics include speech perception, word recognition, and sentence production and comprehension. We will discuss the nature of representations that are being constructed in real-time language use, as well as how the mental procedures for constructing linguistic representations could be studied by various behavioral and physiological measures.

AS.050.636. Intro to Neurolinguistics.
This course provides an introductory survey of the cognitive neuroscience of language – a multidisciplinary field in the intersection of Linguistics, Psycholinguistics, and Neuroscience. We will explore current research on the neural bases of the perception, production, and acquisition or human language in neuro-typical and impaired individuals. Also listed as AS.050.236.

AS.050.639. Cognitive Development.
Also offered as AS.050.339. This is a survey course in developmental psychology designed for individuals with some basic background in psychology or cognitive science, but little or none in development. The course is strongly theoretically oriented, with emphasis on issues of nature, and development psychology as well as relevant empirical evidence. The principle focus will be early development, i.e., from conception through middle childhood. The course is organized topically, covering biological and prenatal development, perceptual and cognitive development, the nature and development of intelligence, and language learning.

AS.050.648. First Language Acquisition.
This course provides an introduction to the fields of first and second language acquisition by looking at questions such as the following: Can the grammar of a native language be learned solely on the basis of noticing statistical correlations among words? How does native language acquisition explain — or is explained by — the universal properties, shared by all languages, of words and grammars? How does being exposed to multiple languages from birth affect language acquisition and what happens when a child is not exposed to any language early in life? Does the same cognitive mechanism guide language learning in children and adults? What factors account for individual differences in ease and ultimate attainment when a second language is learned later in life? Is it possible to become indistinguishable from a native speaker in a foreign language? What changes take place in the brain when a new language is learned? Recommended background: An introductory course in a linguistic course such as world of language, phonology, or syntax as well as a linguistics course such as language and mind or bilingualism. Also offered as AS.050.348.

AS.050.649. Second Language Acquisition.
First language acquisition is natural and seemingly effortless. The situation is reversed when one tries to learn another language. This course discusses in what ways first and second language acquisition (SLA) differ and how individual differences of the learners as well as external factors contribute to the variability observed in rates and ultimate proficiency of second language learning in children and adults. We will discuss such topics as Universal Grammar access in early and late SLA, first language influence, critical periods, possibility of native-like attainment, and language attrition. Recommended background in AS.050.102 Language and Mind, AS.050.348 Language Acquisition, AS.050.206 Bilingualism or equivalent. Also offered as AS.050.349.

AS.050.652. Applying Cognitive Neuroscience to Artificial Intelligence Part I.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidly improving for well-defined tasks and narrow intelligence. Moreover, it has entered all industries in a myriad of ways. But will AI ever have human-like general intelligence? What does humanlike general intelligence even mean? Why should we even care? This course is designed to answer these complex questions by giving students working knowledge of the underlying principles and mechanisms of human behavior and cognition, and how they may be applied to solving current and rising industry challenges. Key topics to be addressed will include vision, audition, language, learning, emotion and social cognition, creativity, and consciousness. Each topic addressed will cover latest advancements within cognitive neuroscience, with relevant applied case studies. Students will apply learned topics to a final group research project on the topic of their choice.

AS.050.653. Applying Cognitive Neuroscience to Artificial Intelligence Part II.
As a myriad of artificial intelligence enabled autonomous systems enter into our lives and change how we live, we must ask: can we trust these systems? In this course we will take a human-centered perspective on assured autonomy and identify why and how insights from human perception and cognition can guide solutions for reliable, resilient, and robust autonomous systems. We will address bias, ethics, explanability, and safety by focusing on specific case studies from autonomous vehicles, cybersecurity, healthcare, fashion, law enforcement, and military systems. Students will apply learned material to a semester-long group research project on a topic of their choice.

AS.050.658. Language & Thought.
Have you ever wondered about the relationships between language and thought? Philosophers, linguists, psychologists, evolutionary theorists and cognitive scientists have too and this course will survey the current thinking on this matter. Classical papers such as those by Whorf and Sapir, more recent philosophical papers by people such as Fodor and Dennett, and recent empirical work by linguists and psycholingists on the relationship between language and thinking in development and in adults will be covered. Discussions will focus on the theoretically possible relationships between language and thought and the empirical data that speak to these.

AS.050.660. Computational Psycholinguistics.
How do we understand and produce sentences in a language we speak? How do we acquire the knowledge that underlies this ability? Computational psycholinguistics seeks to address these questions using a combination of two approaches: computational models, which aim to replicate the processes that take place in the human mind; and human experiments, which are designed to test those models. The perspective we will take in this class is that the models and experimental paradigms do not only advance our understanding of the cognitive science, but can also help us advance artificial intelligence and language technologies. While computational psycholinguistics spans all levels of linguistic structure, from speech to discourse, our focus in this class will be at the level of the sentence (syntax and semantics). The course will assume familiarity with programming and computational modeling frameworks in cognitive science, as covered by Introduction to Computational Cognitive Science or equivalent. Also offered as AS.050.360.An optional, hands-on lab (AS.050.361) is offered to supplement this course. It is highly recommended that students with less extensive computational and mathematical experience register for this lab.

AS.050.665. Cracking the code: Theory and modeling of information coding in neural activity.
One of the most foundational concepts in neuroscience is the idea that neural activity encodes information about an animal's sensory environment and internal mental states. This idea is closely connected to the concept of mental representation in cognitive science and philosophy, whereby the mind is proposed to contain internal symbols that represent things in the external world. There have been many fascinating discoveries about how neural signals encode information, but we are still far from a comprehensive theory of neural representation. Recent major developments in neuroscience and machine learning have opened up a new world of possibilities for investigating the underlying principles of information coding in the brains of humans and other animals. In this course, we will discuss primary research articles on neural representation and information processing, and students will implement computational analyses that address issues in these domains. We will mostly focus on vision as a system that illustrates broader principles of information processing in the human brain. The reading material will include work from philosophy, neuroimaging, electrophysiology, and computational modeling. The topics covered include mental and neural representation, neural tuning, population coding, information theory, encoding and decoding models, dimensionality reduction, computational models, deep learning, and other applications of machine learning in neuroscience. Enrollment is limited to Juniors and Seniors. While this class does not have formal prerequisites, programming experience (e.g., AS.250.205 Introduction to Computing) and mathematical preparation (e.g., AS.110.107 Calculus II) are essential. It is also highly recommended that students have previously taken introductory courses in cognitive or systems neuroscience (e.g., AS.050.203 Neuroscience: Cognitive) and machine learning or neural network modeling (e.g., AS.050.372 Foundations of Neural Network Theory).

AS.050.670. Mathematical Models of Language.
This course will be devoted to the study of formal systems that have proven useful in the cognitive science of language. We will discuss a wide range of mathematical structures and techniques and demonstrate their applications in theories of grammatical competence and performance. A major goal of this course is bringing students to a point where they can evaluate the strengths and weaknesses of existing formal theories of cognitive capacities, as well as profitably engage in such formalization, constructing precise and coherent definitions and rigorous proofs. Recommended background in language and mind or computational cognitive science. Also offered as AS.050.370

AS.050.671. Bayesian Inference.
Also offered as AS.050.371. This course introduces techniques for computational modeling of aspects of human cognition, including perception, categorization, and induction. Possible topics include maximum likelihood and Bayesian inference, structured statistical models (including hierarchical and graphical models), nonparametric models. The course emphasizes the close connections among data analysis, theory development, and modeling, with examples drawn from language and vision.

AS.050.672. Foundations of Neural Network Theory.
Introduction to continuous mathematics for cognitive science, with applications to biological and cognitive network models: real and complex numbers, differential and integral multi-variable calculus, linear algebra, dynamical systems, numerical optimization. Recommended course background in Calculus I. This is a basic-level course not appropriate for students with significant math background. Students who have completed both Calc III and Linear Algebra or an equivalent combination may not register. Also offered as AS.050.372.

AS.050.675. Probabilistic Models of the Visual Cortex.
The course gives an introduction to computational models of the mammalian visual cortex. It covers topics in low-, mid-, and high-level vision. It briefly discusses the relevant evidence from anatomy, electrophysiology, imaging (e.g., fMRI), and psychophysics. It concentrates on mathematical modelling of these phenomena taking into account recent progress in probabilistic models of computer vision and developments in machine learning, such as deep networks.Also offered as AS.050.375.

AS.050.683. Computational Social Cognition.
Humans are a fundamentally social species with amazing capabilities beyond that of any other biological or artificial system. Yet the cognitive and neural computations underlying our vast social abilities are largely unknown. Advances in naturalistic neuroscience paradigms and machine learning are revolutionizing the way cognitive scientists study social cognition. This course will explore new research in computational social cognition, drawing from topics in cognitive neuroscience, development, and artificial intelligence. Our goal is to understand the motivation, methodology and implications of recent research. The class will be heavily focused on social vision, but will also explore other aspects of social cognition including theory of mind and moral reasoning. Also offered as AS.050.383.

AS.050.800. Directed Readings in Cognitive Science.
Directed readings on current topics in cognitive science. Instructor approval required.

AS.050.801. Research Seminar in Cognitive Neuropsychology.
Participants in this graduate seminar will read and discuss current research articles in cognitive neuropsychology of vision or language, and present their own research.

AS.050.802. Research Seminar in Cognitive Processes.
Permission required. Current issues and ongoing research on human cognition are discussed.

AS.050.806. Research Seminar in Cognitive Neuroscience and Machine Learning.
Participants in this seminar will read and discuss current research articles in the fields of cognitive neuroscience, computational neuroscience, machine learning, and artificial intelligence. The seminar will focus on research that provides insights into the representations and algorithms of the human brain, with an emphasis on vision and natural semantic understanding.

AS.050.809. Research Seminar in Computational Cognitive Science.
This seminar is on computational models for vision and its interaction with language. For Cognitive Science, computational models, like Deep Nets, offer the possibility of developing computational theories which can be tested on natural, or realistically synthetic images. But Deep Nets by themselves are unable to capture the richness and flexibility of human perception, so we will discuss other classes of model with more compositional structure and ability to represent the physical properties of the 3D world. These will be related to, and motivated by, behavioral and electrophysiological experiments.

AS.050.811. Research Seminar in Language & Cognition.
A specialized research seminar for individuals researching language acquisition, cognitive development and the interface between language and cognition. Students must actively carry out empirical or theoretical research in these areas. Permission required.

AS.050.812. Research Seminar in Computational Cognitive Neuroscience.
This seminar will discuss papers and ongoing research in the areas of computational cognitive neuroscience, with a focus on different areas of visual and social perception.

AS.050.814. Research Seminar in Computer Vision.
This seminar is based on topics in computational vision with the option of attending additional subgroup meetings on specific topics.

AS.050.817. Research Seminar in Semantics.
A critical analysis of current issues and debates in natural language semantics. Discussion of on-going research. Permission required.

AS.050.818. Research Seminar: AcqLab Meeting.
Participants in this graduate seminar will read and discuss current research articles in language development and present their own research. Permission required.

AS.050.819. Research Seminar in Psycholinguistics.
Discussion of current computational and experimental research on human language processing.

AS.050.822. Research Seminar Syntax.
A critical analysis of current issues and debates in theoretical syntax. Discussion of on-going research.

AS.050.826. Research Seminar in Formal Approaches to Cognitive Science.
Readings and research presentations on varying topics in mathematics, computation, and formal linguistics with bearing on cognitive science.

AS.050.827. Research Seminar in Language Acquisition.
Focus is on current research in acquisition of syntax.

AS.050.829. Research Seminar on Formal Theory in Cognitive Science.
Topics range from mathematical analysis of neural networks to computational studies of linguistic structure. Focus is ongoing research and current literature.

AS.050.830. Seminar on Special Topics.
This seminar will focus on Special Topics of current interest in Cognitive Science and reflect the breath of expertise in the department.

AS.050.839. Research in Cognitive Science.
Current topics in any area of cognitive science, including language and vision, with discussion of recent developments in theory, experimental study, and computational modeling.

AS.050.849. Teaching Practicum.
Permission required. Essential for Teaching Assistants.

AS.050.860. Professional Seminar in Cognitive Science.
Instructor permission required.Addresses professional issues such as research ethics, success on the job market and in an academic career, teaching and mentoring and differing professional standards in the sub-disciplines of cognitive science.

AS.060 (English)

AS.060.107. Introduction to Literary Study. 3 Credits.
This course serves as an introduction to the basic methods of and critical approaches to the study of literature. Some sections may have further individual topic descriptions; please check in SIS when searching for courses.
Area: Writing Intensive

AS.060.108. Time Travel. 3 Credits.
Why is time travel such a consistent and perplexing theme in literature and film over the last 150 years? Why is modernity so concerned with peeking backwards or forwards? This course will examine the history of time-travel fiction, from its beginning in utopian fiction through its box-office dominance in the 1980s, and into today. Writers will likely include Mark Twain, Edward Bellamy, Harold Steele Mackay, Ray Bradbury, Robert Heinlein, and Philip K. Dick. Movies will include *The Terminator*, *Back to the Future*, and *Primer*.
Area: Writing Intensive

AS.060.109. Robots, Androids, Slaves. 3 Credits.
Since the rise of Silicon Valley, tech enthusiasts and futurists have been debating the possibility of what has been called “the singularity” — the moment when artificial intelligence (AI) decisively and irreversibly surpasses human abilities. If this does happen, observers worry, it’s not just that robots will take our jobs; will we become subservient to our new robot masters? Will we become extinct, and not because of climate change? This course explores such questions through the lens of literature and popular media. We will watch several films from the last 15 years or so that depict the rise of AI. We will ask about the roles tat gender, race and class have in our imagination of the work robots do. And we will read a range of short essays that approach the question of labor and technology from different angles than mass media usually do.

AS.060.129. Writing Africa Now. 3 Credits.
This course surveys post-2000 literary and cultural production from sub-Saharan Africa. Topics will include debates over genre and fiction’s relevance to African experience, legacies of canonical writing about independence, urban Africa as violent or “tragic” landscape, and problems of scale and geographical context. Readings by authors such as Adichie, Wainaina, Duiker, and Vladislavic, and students will be introduced to the main print and online arteries of African intellectual discussion. This class is for non-majors and does not count towards the English major or minor.
Area: Writing Intensive

AS.060.135. American Nightmares: Burroughs, Highsmith, Dick. 3 Credits.
These three authors share a common starting point: Patricia Highsmith, William S. Burroughs and Philip K. Dick all began their careers writing mass market genre fiction in pre-Stonewall, pre-civil rights, Cold War 1950s America. Absorbing the stylistic codes of their respective marketplaces of suspense writing and lesbian romance, "drug fiend" confessional, and science fiction, each writer’s conformist apprenticeship in pulp resurfaces in increasingly nightmarish forms in the violent and paranoid scenarios that dominate their mature work. Reading broadly in each author’s short fiction, novels, and prose, we will sequentially examine Burroughs’ "cut-up" techniques and "routines", Highsmith’s free indirect discourse gone wrong, and Dick’s disorienting temporal experiments as inflamed allergic reactions to generic codes. We will also examine the cinematic afterlives of these authors by looking at key scenes from three adaptations of their work: Alfred Hitchcock’s Strangers on a Train (1951), David Cronenberg’s Naked Lunch (1991), and Richard Linklater’s A Scanner Darkly (2006).

AS.060.137. Doctors Without Borders: Literature, Medicine, and the Human Condition. 3 Credits.
Doctors play a significant role in shaping literary history as both writers and fictional subjects. From Chekhov to Sherlock Holmes, W. Somerset Maugham to Middlemarch, medical practice is imagined to bestow a privileged understanding of humanity in confrontation with questions of life and death. This course explores how writing about medicine connects long-established themes of mortality, authority, and ways of knowing to timely questions of global migration, cultural contact, and social justice. We will read literary writing by physicians as well as writing that depicts their work in detail, by authors including Nawal El Saadawi, Atul Gawande, Abraham Verghese, Damon Galgut, and Taiye Selasi.

AS.060.140. Diaries, Journals, Some Notes. 3 Credits.
A study of genres of private writings, focusing on the diary form. Readings will likely include diaries by Pepys, Boswell, Frank, Woolf, as well as critical and theoretical texts on the form.
Area: Writing Intensive

AS.060.142. Indigenous Science Fiction: (Re)making Worlds. 3 Credits.
This discussion-based seminar will survey science fiction written by indigenous authors in what are now the United States, Canada, and Australia. We will investigate by what means and to what ends this particular genre has been taken up by indigenous peoples both to reflect on their settler-colonial pasts and presents and to imagine decolonial futures. Texts may include: Leslie Marmon Silko, Almanac of the Dead; William Sanders, "The Undiscovered"; Daniel Heath Justice, The Way of Thorn and Thunder; Blake Hausman, Riding the Trail of Tears; Waubgeshig Rice, Moon of the Crusted Snow; Claire Coleman, Terra Nullius; Tanya Tagaq, Split Tooth. Fulfills the Global and Minority Literatures requirement.
Area: Writing Intensive

AS.060.148. Asian and Latinx American Literatures: Rethinking Empire. 3 Credits.
This course explores the transnational convergence of Asians/Asian Americans and Latinxs/ Latinx Americans from a history of multiple imperialisms to the neoliberal, globalized present. We will situate the racialization of Asian and Latinx peoples within a larger, global framework and think critically about areas of solidarity and tension between these two multi-ethnic groups through readings in literature, history, and sociology.
Area: Writing Intensive

AS.060.151. Doubles, Demons, and Dummies: The Literature of the Fantastic. 3 Credits.
Talking reflections. Dolls with knives. Dancing automatons. They are all part of the strange and dangerous world of the fantastic. This course examines the literature of the fantastic, or what we can refer to as creepy double, demon, and dummy stories. We’ll look at everything from Poe to American Psycho in an attempt to figure out what just happened, why, and how it relates to literary meaning.

AS.060.163. William Faulkner, Race, and Southern Fiction. 3 Credits.
This course will introduce students to debates in American literary studies around questions of race, politics, and the history of the American South. The course will center around a reading of William Faulkner’s Absalom, Absalom! alongside literary history, critical theory, and other pieces of fiction from the American South. We will use these texts to explore the transformations of ra-cial discourses in 19th and 20th century America, with close attention to how they influence the present.
Area: Writing Intensive

AS.060.164. Cyberpunk: High-Tech, Low Life. 3 Credits.
This course will examine the science fiction movement of cyberpunk as an aesthetic, narrative, and political reaction to late neoliberalism. We will read and discuss literature, film, and interactive media from this genre to develop an understanding of how cyberpunk texts register, refract, and attempt to reconcile antagonisms central to contemporary life.
Area: Writing Intensive

AS.060.165. Science Fiction and Climate Change. 3 Credits.
This course will examine representations of, and confrontations with, climate change in science fiction. Special focus will be given to indigenous futurisms as uniquely valuable perspectives on the climate crisis. We will examine these narratives alongside climate change discourse, literary theory, and literary criticism.
Area: Writing Intensive

AS.060.169. Literature and Visual Art. 3 Credits.
We'll glance at the history of the relations between painting and literature, before turning to the art of the past 200 years. What has drawn writers to place their powers against those of painters (in particular)? How have they managed the comparisons? How might we understand the distinctive powers and limitations of these two modes of responding to human experience? While we may have an exam, writing assignments will constitute most of your grade.
Area: Writing Intensive

AS.060.207. William Shakespeare. 3 Credits.
Who was William Shakespeare, and what can his poems, histories, comedies and tragedies tell us about our overlap with, and divergences from, the early modern world?

AS.060.208. English Literature from Chaucer to Behn. 3 Credits.
This course is a survey of English writing from the fourteenth to the seventeenth centuries. Tracing the evolution of vernacular literature in English from the late medieval period to the early modern period and onwards to the threshold of modernity, we will focus intensively upon four key works: Geoffrey Chaucer's "The Canterbury Tales," Book I of Edmund Spenser's "The Faerie Queene", John Milton's "Paradise Lost" and Aphra Behn's "Oroonoko." These works will be examined in their formal and generic dimensions as key examples of broader aesthetic changes in the constitution of "literature" as a category. They will also be placed in their political, religious, and social contexts. Through lectures, class discussion, written responses, and longer essay assignments, students will master the fundamentals of English literary history as well as the techniques of critical reading and writing.

AS.060.209. The Literary History of the Devil to 1800. 3 Credits.
This course reads major works in European literature before 1800 (give or take) depicting the devil. It examines the history of the various social, cultural and political guises under which the devil appears, and the function that representing radical evil performs, in literature and society. Among our readings will be Dante's Inferno; Milton's Paradise Lost; Goethe's Faust, Part One, and many other major Satanic works.

AS.060.210. British Literature II. 3 Credits.
This course provides a framework for grasping the dazzling variety and explosive innovation of literature in English during the last quarter-millennium. Attending both to textual details and to historical contexts, we will see how Wordsworth, Austen, Keats, Tennyson, Dickens, Wilde, Woolf, Rushdie, and other writers extend and undo tradition, illuminate their times and places as well as our own, and conspire to bring to us the intense experience distinctive to great literary art.

AS.060.211. How Not to be Afraid of Poetry. 3 Credits.
What is poetry? And why don't we like it? This course will explore what makes poetry turn ordinary language into something extraordinary. Opening up a range of poetry in English, the course will involve reading poetry aloud, thinking about poetry and its forms, and gaining experience in understanding poetry. Assignments will include attending to details small and large in poems, becoming an expert about a single poet, debating aesthetic issues, and composing short analytical papers about poems. There are two required written assignments, a midterm and a final examination.

AS.060.212. British Literature: 18th Century to the Prese. 3 Credits.
A survey of major authors such as Wordsworth, Keats, Austen, Tennyson, Dickens, Wilde, Woolf, Joyce, and Rushdie. Substantial attention to formal conventions as well as stylistic innovation, to aesthetic value as well as social meaning.

AS.060.216. Zombies. 3 Credits.
This lecture survey will attempt to answer why the zombie has become such a fixture in contemporary literature and cinema. We will track this figure across its many incarnations--from its late-eighteenth-century appearance in ethnographic fictions growing out of the modern cultures of racialized slavery in the Americas right up to twenty-first-century Hollywood blockbusters in which the origins of the figure in the cultures of racialized slavery are perhaps not overt yet continue to manifest. What are the implications of the zombie's arc from a particular human being targeted for domination by a sorcerer to a living-dead horde created by radiation or epidemic? "Texts" may include: Mary Shelley, Frankenstein; Edgar Allan Poe, "The Man Who Was Used Up"; H.P. Lovecraft, "Herbert West--Re-Animator"; Zora Neale Hurston, Tell My Horse; Victor Halperin, dir., White Zombie; George Romero, dir., Dead series; Edgar Wright, dir., Shaun of the Dead; Alejandro Brugués, dir., Juan de los Muertos; Colm McCarthy, dir., The Girl with All the Gifts; Colson Whitehead, Zone One; Jordan Peele, dir., Get Out. Fulfills the Global and Minority Literatures requirement.
Area: Writing Intensive

AS.060.217. Time Travel. 3 Credits.
Why is time travel such a consistent and perplexing theme in literature and film over the last 150 years? Why is modernity so concerned with peeking backwards or forwards? This course will examine the history of time-travel fiction, from its beginning in utopian fiction through its box-office dominance in the 1980s, and into today.
Area: Writing Intensive

AS.060.219. American Literature to 1865. 3 Credits.
A survey course of American literature from contact to the Civil War.

AS.060.220. Clint Eastwood, Race and the American Western. 3 Credits.
Drawing from the body of work engaging and recording the Hollywood gunfighter and outlaw folk-hero Clint Eastwood, the course will investigate American cinematic representations of slavery and its absence, the Civil War, and racial formation along the United States' southwestern frontier in films produced from the 1950s through the contemporary period. A focus on the cultural icon Clint Eastwood enables a close examination of American cinematic fantasies of the frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, particularly the creation of American masculine ideals. The course will also take decided note of the national shift from liberal "Great Society Programs" of the 1960s to the conservative "neoliberal" social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between civilization and savagery, belonging and alienation, and metropolitan and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion.

AS.060.221. The Modernist Novel: Consciousness and Crisis. 3 Credits.
A course on key novels written in Britain or its former colonies between 1900 and 1960. Major attention to the meanings of modernism across the arts as well as innovations in prose fiction.
Area: Writing Intensive

AS.060.222. American Literature, 1865 to today. 3 Credits.
A survey of American literature from 1865 to today.

AS.060.232. Detective Fiction. 3 Credits.
This lecture will trace the the history of English-language detective fiction through the nineteenth and twentieth centuries. Why does the figure of the detective appear when it does? How does it change over time, and what can we learn from that? We will pay special attention to the way clues and suspense operate, the role of the reader in figuring out the mystery, and the complicated relationship of the detective with official authority. Authors will likely include some selection of Wilkie Collins, Edgar Allen Poe, Arthur Conan Doyle, Agatha Christie, Dashiell Hammet, and Raymond Chandler.

AS.060.265. Nineteenth Century British Novel. 3 Credits.
Reading major novelists from the nineteenth century including Austen, C. Brontë, Dickens, Eliot, Hardy, and Conrad. We will pay attention to formal conventions, and relation to social and historical context.

AS.060.304. Large Novels. 3 Credits.
This course will look at novels that are not only large in size, but which also think about the meaning and methods of trying to capture huge segments of the world into a piece of art. How much can be fit into a novel? What is gained and what is lost? How large is too large? We will read Charles Dickens's Bleak House, Lev Tolstoy's War and Peace, and Herman Melville's Moby Dick.
Area: Writing Intensive

AS.060.308. The Essay Form and Creative Non-Fiction. 3 Credits.
We'll focus on the essay form, with special attention to recent creative non-fiction that responds to art and literature itself. Theoretical, stylistic, and formal issues will all be considered.
Area: Writing Intensive

AS.060.309. Slavery in Renaissance Literature. 3 Credits.
Against the backdrop of the rise of the European slave trade, how were slaves represented in early modern English literature? How was the condition of enslavement inflected by emergent nationalism, colonialism and theological constructions of difference? This course puts Renaissance literature into conversation with comparative histories of slavery and critical race theory. Authors include Aristotle, Terence, Epictetus, Christopher Marlowe, William Shakespeare, John Milton, Aphra Behn, Orlando Patterson, Kim Hall, Stephen Greenblatt, Mary Nyquist, Moses Finley and others.
Area: Writing Intensive

AS.060.313. Literature of the Settler Revolution. 3 Credits.
The nineteenth century saw the creation of an "Angloworld" as a result of what one historian has called "the settler revolution." In perhaps the largest mass migration in human history, millions of English-speakers (and others) invaded Indigenous worlds in what have consequently come to be known as the United States, Canada, and Australia. This seminar offers an introduction to nineteenth-century Indigenous and settler Anglophone writing in the US, Canada, and Australia with a view to understanding the role of literature in inciting, interrogating, and resisting this settler revolution.
Area: Writing Intensive

AS.060.314. Social Media Fictions. 3 Credits.
Writers around the world are now searching for ways to incorporate new modes of social interaction - e.g. Facebook, Twitter, text messaging, and Skype - into their print work. This course explores the various techniques they have adopted for this purpose, with an eye to critically evaluating their implications for narrative structure and its "reality effect." From Teju Cole's very public experiments with the Twitter novel to a Zimbabwean writer's attempt to capture plot turns through SMS, we will discuss the ways in which narrative is helped or hindered by the ubiquity of social media. Writers studied will include Tendai Huchu, Zadie Smith, Jonathan Franzen, and Eben Venter.
Area: Writing Intensive

AS.060.315. Literature of Incarceration. 3 Credits.
We will take up a history of writing from and about various carceral sites (prison, detention camps, etc-- as well as Circe' island and Jonah's whale) to see what they can teach us about larger questions of the movement (or not) of certain populations, the ideology and economies of imprisonment, and campaigns for the abolition of prisons.
Area: Writing Intensive

AS.060.316. Mapping the Global Metropolis. 3 Credits.
Cities have long taken on a central role in literature, but much of our reading about urban space is confined to a few Western hubs. And while the city has traditionally been a space for fictional characters to develop into national subjects, much of the most innovative contemporary writing sees the city as a character of its own. This course will address the representational challenges of globalization through fiction and genre-bending memoir about contemporary metropolises that act as its microcosm: Johannesburg, Lagos, Delhi, London, and New York. We will read primary works by Ivan Vladislavic, Chris Abani, Aravind Adiga, Zadie Smith, and Teju Cole, as well as supplementary excerpts from books including Capital, by Rana Dasgupta, Mike Davis' Planet of Slums, Ato Quayson's Oxford Street, Accra, and Loren Kruger's Imagining the Edgy City. Finally, the course will include theoretical readings about globality and representation, such as Fredric Jameson's essay on "Cognitive Mapping" and Arjun Appadurai's seminal book Modernity at Large.
Area: Writing Intensive

AS.060.317. Jane Austen Beyond England. 3 Credits.
This will be an in-depth study of Austen's novels with an emphasis on how they have traveled outside of the country of her birth – e.g. to the United States, India, and East Asia—through the work of individuals and the flows of global capitalism. Students will gain perhaps a disorienting sense of what Austen means in different cultures at different historical moments, and conduct individual research to learn more. Knowledge of another language is not necessary but could prove useful. The course will include a field-trip to the Alberta Burke Austen collection at Goucher College.
Area: Writing Intensive
AS.060.107

AS.060.320. Icons of Feminism. 3 Credits.
This course looks at four crucial figures who have haunted feminist thought and responses to feminism over the centuries. Sappho, known as the first female poet, remains an enigmatic icon of feminine desire and creativity; Antigone, the daughter of Oedipus and the heroine of Sophocles's play Antigone, still inspires feminist analyses of women's relationship to law, the state and civil society; and Joan of Arc, the militant maid of Orleans, troubles thinking about women and violence as well as women, religion and spirituality. The last figure is Mary Wollstonecraft, often cited as the first modern feminist. The course will examine literary works written about these iconic figures, as well as contemporary feminist writing about their influence and viability as models for the future of feminism.
Area: Writing Intensive

AS.060.326. Shakespeare: The Novel. 3 Credits.
What if King Lear had been a mother? What if the we thought about Othello through the lens of the holocaust? What if the indigene Caliban was the hero, not the villain? What if Miranda chose Caliban over her European suitor? (The Tempest) Could a modern-day Kate be tricked into marriage and "tamed" (The Taming of the Shrew)? When contemporary novelists rewrite Shakespeare, they pose questions left hanging in the play and bring the plays into our own world. In this course, we will read Shakespeare plays (King Lear, The Tempest, The Taming of the Shrew, Merchant of Venice) along with contemporary novelists that rewrite – and confront -- those plays (Jane Smiley, Caryl Phillips, J. M. Coetzee, Anne Tyler). Students will take up important literary questions about kinds of literature (plays vs novels), the canon, imitation, adaptation, and also address the themes of power, gender and sexuality, family dynamics, authority, colonization and the environment.
Area: Writing Intensive

AS.060.327. "All Art is Propaganda". 3 Credits.
This course will explore black literature written as protest. We will examine how, in the face of threats to black life, Frances E.W. Harper, Richard Wright, Amiri Baraka, and others have realized versions of W.E.B. Du Bois's objective: "all art is propaganda and ever must be, despite the wailing of the purists."
Area: Writing Intensive

AS.060.328. Malcolm and Martin: An Introduction to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their recorded speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.331. The Literature of the Atlantic Slavery. 3 Credits.
This seminar will trace the historical development of the slavery debate in the Atlantic world through examination of key texts from a host of genres and locations—Quaker religious tracts, political documents like the Haitian Declaration of Independence, Cuban antislavery novels, slave narratives, and "classics" of American literature like Melville's Benito Cereno. We will consider how the institution of Atlantic slavery was variously represented, justified, and criticized, discovering in the process the deep structures of modern slavery discourse.
Area: Writing Intensive

AS.060.337. James Joyce's Ulysses. 3 Credits.
A careful semester-long reading of James Joyce's masterpeice Ulysses, one of the greatest and most intimidating novels in world literature.
Area: Writing Intensive

AS.060.341. Milton. 3 Credits.
This class will study Milton's poetry and prose across the whole of his writing career, with special attention to Paradise Lost, the great epic poem retelling the story of the fall of humankind. We will consider Milton's literary background, his contemporary political and social milieu, as well as critical debates that surrounding the poet, who was accused of being 'of the devil's party.' Pre-1800 course.
Area: Writing Intensive

AS.060.342. Contemporary Novel of Ideas. 3 Credits.
The novel of ideas is often traced to 18th century French or 19th century Russian writing, but it has come broadly to signify works of robust philosophical contemplation. The inherently slippery term seems to indicate a work in which "form" is subsidiary to "content," or at least, in which narrative structures adapt to prioritize thought rather than style, image, or even character. But how, exactly, and about what, do novels "think?" In large part, the novel of ideas is now conflated with a rote and recognizable brand of social realism. This course asks what might qualify as a novel of ideas today, both in terms of the novel's changing relation to geographical space (and thereby the formal spaces in which philosophy might lurk), and of the particular "ideas" it critiques or puts forth. We will read novelists including J.M. Coetzee, Marlene van Niekerk, Jonathan Franzen, Teju Cole, and Ronan Bennett within a longer literary-philosophical tradition, with reference to works such as Candide, War and Peace, Thus Spoke Zarathustra, and Kierkegaard's Diary of a Seducer.
Area: Writing Intensive

AS.060.343. Marxism and Literature. 3 Credits.
This course will provide a survey of some of the concepts in Marx's work, especially those to be found in volume 1 of Capital, that might help us get a clearer sense of 21st-century politics and culture. We will move outward from reading Marx to reading recent and classic texts in the Marxist critical tradition. We will discuss explicitly economic ideas about commodities, surplus value, and concrete and abstract labor, as well as historical and political ideas like "primitive accumulation" and the "uneven and combined development" of nations. We will think about what reading Marx and the Marxist tradition can help us see about colonialism, gender, race, technology, and the environment, as well as how it can clarify the character of economic crises. Toward the end of the term we will turn to literary texts, not necessarily "Marxist" themselves, to help us understand important questions that Marxism cannot tackle by itself, like: who are people, anyway? What do they hope for, when they write? Is there a Marxist idea of beauty, and is it different than everybody else's? Along with Marx, and anti-colonial, anti-racist and feminist writers in the Marxist tradition, we'll read work by the novelist NK Jemisin, and the poet Stephanie Young.
Area: Writing Intensive

AS.060.348. Virginia Woolf and Bloomsbury. 3 Credits.
An exploration of the achievements and investments of one of the most influential coteries in the history of Britain. In addition to delving into key fictions by Virginia Woolf, we will examine novels by Leonard Woolf and E. M. Forster, art criticism by Roger Fry and Clive Bell, biographical essays by Lytton Strachey, economic writings by John Maynard Keynes, and poetry by T. S. Eliot.
Area: Writing Intensive

AS.060.350. Reason and Romance: Literature of the British Eighteenth Century. 3 Credits.
Any era can be characterized by its oppositions and polarities, but perhaps few were more defined by their contradictions than the eighteenth century in Britain. Reason and passion, honor and ribaldry, skepticism and fantasy, tradition and revolution: in capturing the tensions between these dyads, the wildly energetic literature of the period furnishes a singular lens through which to examine questions of consciousness, gender, celebrity, race, political theater, and even life during a pandemic that continue to shape our lives today. Authors studied may include Frances Burney, Ottobah Cugoano, Daniel Defoe, Olaudah Equiano, John Gay, Samuel Johnson, Charlotte Lennox, Alexander Pope, Jonathan Swift, and Mary Wollstonecraft.
Area: Writing Intensive

AS.060.353. Margaret Atwood: Imagining Catastrophe. 3 Credits.
This is the moment for a course on the Canadian climate activist, poet, and novelist Margaret Atwood. Best known for her dystopian The Handmaid's Tale (1985), Atwood's monitory visions in poetry, short stories, non-fiction and novels attend to themes of malevolence, metamorphosis, memory, genetic mutation, totalitarianism, corporate control, feminism, and climate disaster, while rooted in traditions of folktale, myth, and ironic detachment. Among other works, including poetry and non-fiction, we will read novels The Handmaid's Tale, The Testaments, The Blind Assassin, Oryx and Crake, The Year of the Flood, and MaddAddam, exploring Atwood's "writing with intent." Seminar discussion; midterm; class presentations; two short papers and one final project.
Area: Writing Intensive

AS.060.354. Literature of the Sea. 3 Credits.
In this course, we will read 19th- and 20th-century American and British literature about the sea, using an approach informed by recent scholarship in what has been called Blue Humanities or Oceanic Studies.
Area: Writing Intensive

AS.060.355. Poetry and Politics Today. 3 Credits.
The history of poetry is full of political poems of every kind — odes, epics, dramatic persona poems. And the history of literary criticism is full of denunciations of poetry that gets "too political," and loses sight of its job to give pleasure. In this course, we will look at a range of contemporary poetry that tackles political issues — things like the causes of climate change; immigration crises; white supremacy; patriarchal gender systems; the legacies of colonialism — and study the ways it accomplishes its goals while still giving us the kinds of surprise in language that poetry has always promised. Reading will include (but not be limited to) work by Tongo Eisen-Martin, Cathy Park Hong, Sandra Simonds, Stephanie Young, and Wendy Trevino.
Area: Writing Intensive

AS.060.358. Virginia Woolf. 3 Credits.
Beautiful, acute, and consequential, Woolf's writing opens onto an extraordinary range of aesthetic, psychological, and political issues. In this seminar, we will read from her novels, essays, and diaries as well as the varied works of art and philosophy that influenced her.
Area: Writing Intensive

AS.060.359. Slavery in Early Modern Literature. 3 Credits.
Against the backdrop of the rise of the European slave trade, how were enslaved people represented in early modern English literature? How was the condition of enslavement inflected by emergent nationalism, colonialism and theological constructions of difference? This course puts Renaissance literature into conversation with comparative histories of slavery and critical race theory. Authors include Aristotle, Plautus, Thomas More, Bartolomé de las Casas, Christopher Marlowe, William Shakespeare, Philip Massinger, John Milton, Aphra Behn, Osman of Timisoara, Stephanie Smallwood, Michael Guasco, Saidiya Hartman, Herman Bennett, Orlando Patterson, Jared Sexton, and Mary Nyquist.
Area: Writing Intensive

AS.060.360. Politics, History and Autobiography. 3 Credits.
This is an intensive seminar exploring the political and historical dimensions of personal experience. The class is designed to introduce students to writing critically about their own lives and to understanding the function of autobiographical writing in the lives of black Americans. We function partly as a writers' workshop and partly as a critical review. The final goal of the seminar is a polished 15-20 page autobiographical essay and a 5-7 page critical review of an autobiography, such as would be found in the New York Review of Books.
Area: Writing Intensive

AS.060.361. The Politics of Memoir. 3 Credits.
This course explores the interlocking political and historical dimensions of personal experience, an account of ourselves and our relations ("the quest for competitive advantage between groups, individuals, or societies") that points us in the direction of what "is 'common' to the whole community." What does it mean for people who are not the chief actors or theoreticians of political movements to construe the record of their experience as an act of political intervention, an aid in our total understanding of the structure of popular belief and behavior? Furthermore, what happens when attempt to historicize and critique these recorded experiences? The class asks its members to focus closely on an episode of autobiographical experience as both an historical fossil and tangible politicized moment, particularly the places where race, gender and economic power are visible. By producing a "critical discourse of everyday life—by turning residual, untheorized everyday experience into communicable experience… one can reframe ostensibly private and individual experiences in terms of a collective struggle." To help our investigation we will read and analyze closely memoirs, many of them from the African American experience. We function partly as a writers' workshop and partly as a critical review. The final goal of the seminar is a polished 20-25 page autobiographical essay.
Area: Writing Intensive

AS.060.362. Medicine in Renaissance Literature. 3 Credits.
From quacks to plague, from humoralism to hypochondria, this course explores how early modern literature represents and occasionally satirizes medicine. Authors include Shakespeare, Jonson, Donne, Nashe, Browne and Moliere.
Area: Writing Intensive

AS.060.363. Henry James. 3 Credits.
This seminar will focus on the novels and short fiction of one of the most brilliant crafters of prose and plot ever to write in English. Extensive attention will be devoted to the intricacies of James's language; to his transatlantic situation; to his relationship to other authors; and to his place in the histories of literature, criticism, and theory. In a few instances, we will read his work in relation to writing by his brother, the pioneering philosopher and psychologist William James.
Area: Writing Intensive

AS.060.365. Malcolm and Martin: An Intro to the Lives and Thought of Two Icons of the Black Freedom Struggle. 3 Credits.
Using their speeches, written lectures and published writings and drawing from their biographies, this course will explore the important life work of Malcolm X and Martin Luther King Jr. We intend to upend traditional conversations about political radicalism and ethnic politics by analyzing these spokesmen associated most indelibly with black nationalism and racial integration, respectively.
Area: Writing Intensive

AS.060.369. Speculative Slavery and Liberatory Fiction. 3 Credits.
This course will introduce students to the study and genre of Black speculative fiction and Afrofuturism, through the lens of narratives focused on liberation/freedom. Liberatory fiction pushes the genre of Afrofuturism further to create space for the imagination to envision alternate futures and pasts, that rewrite history to aid in the process of liberation for black lives. The intended outcome of these texts is the liberation of its subjects and, in some cases, its readers to reflect on the contemporary. The liberation of subjects comes in the form of attaining collective or personal freedoms. This course will cover themes such as, gender and the speculative, the haunting of the post-slavery subject, and black apocalypses. All of these themes will be analyzed through reading both theory and narratives including: The Graphic Novel Adaptation of Octavia Butler's Kindred, Toni Morrison's Beloved, Saidiya Hartman's "Venus in Two Acts", and N.K. Jemisin's "The City Born Great".
Area: Writing Intensive

AS.060.374. Irish Literature. 3 Credits.
This course will introduce students to the long history of Irish literature, often relegated to a footnote or subsumed under the study of British literature broadly, from the medieval period until the contemporary era. Starting with the medieval Irish epic Táin Bó Cúailnge [The Cattle Raid of Cooley] and ending with Anna Burns' 2018 masterpiece Milkman, this course will introduce students to the ways in which a colonial literature changes over time as Ireland, England's first colony, is conquered and reconquered, rebels and revolts, and continues to confront the legacy of colonization as the nation remains divided between the North and the Republic today. Throughout the course, students will read texts written Jonathan Swift, Brian Ferriman, Peig Sayers, J.M. Synge, James Connolly, Elizabeth Bowen, Samuel Beckett, Edna O'Brien and others. This course will serve as a case study for students interested in literature of conflict, colonial and neo-colonial politics, and the fight for justice globally.
Area: Writing Intensive

AS.060.377. Edmund Spenser's Fairie Queene. 3 Credits.
After a diagnostic introduction to his early poetry, this reading intensive seminar will concentrate upon Edmund Spenser's masterpiece, The Faerie Queene (1590/1596), which we will read in its entirety.
Area: Writing Intensive

AS.060.381. The Asian American Novel. 3 Credits.
This course provides a foundation for reading Asian American novels. We will be discussing the origins of "Asian American" as a political coalition in the 1960s amidst a longer historical narrative of U.S. imperial and military projects and immigration policies that have influenced the racialization of those who identify with this multi-ethnic group. At the same time, we will be examining the limitations of this U.S.-centric perspective by rethinking the geopolitical spaces of both "Asia" and "the Americas" through transpacific and hemispheric lenses. Discussions will center around how the novel form could provide insight into linked social struggles and the new narratives of political community they imagine.
Area: Writing Intensive

AS.060.384. The Contemporary Novel. 3 Credits.
In the first two decades of the twenty-first century, writers of narrative fiction have been working furiously to keep up with the turbulence that global capitalism has visited on the world — war, political chaos, environmental catastrophe, massive forced migration and displacement — while trying to maintain ties to the techniques of narrative that gave the 19th century reality novel its successes and its prestige. In this course we will read a range of texts, mostly in translation, that stretch and deform those conventions in order to represent the lives and struggles of characters who are caught up in immense historical change. More and more often, novelists are choosing to depict characters drawn from what Marx would have called "surplus populations" — people for whom economic stability and personal safety are out of reach, partly because they are seen as not worth employing (or exploiting). Under these conditions, we will ask, is it only possible to tell tragic stories? What do happy endings look like? What do changes do character development and point of view have to undergo, for instance, to keep up with 21st-century history? Is realism still the best vehicle for telling these stories? Readings will include novels by Sally Rooney, Eduard Louis, Fernanda Melchor, Elena Ferrante, Marlon James, and Manoranjan Byapari, as well as secondary material by Sarah Chihaya, Merve Emre, Katherine Hill, Jill Richards, and the Endnotes collective.
Area: Writing Intensive

AS.060.388. Old World/New World Women. 3 Credits.
The course considers the transatlantic writing of three women in the early modern period, Anne Bradstreet, Aphra Behn, and Phillis Wheatley. We will consider issues of identity, spatiality, religion, commerce, enforced labor, sexuality, race, and gender, along with literary tradition, formal analysis and poetics. We will read a good deal of these early women writers. Foremost in our mind will be the question of how perceptions of space and time are mediated through the global experiences of early modernity.
Area: Writing Intensive

AS.060.389. Emily Dickinson. 3 Credits.
Dickinson's poetry, more than most, has seemed to prompt creativity in others. In the past two decades, especially, poets, writers, critics, and filmmakers have found their own voices in response to hers. We will focus on the formal, aesthetic, historical and gendered aspects of her poetry as we try to understand, and benefit from, this power to elicit response. Exams are unlikely. Instead, expect close attention to your own writing, as we pay close attention to hers.
Area: Writing Intensive

AS.060.391. Early American Literature. 3 Credits.
This course is an introduction to literatures drawn from across the Americas, although primarily the British North American colonies that would eventually become the United States, from first contact in 1492 up through the American wars of independence. Our readings are roughly organized according to chronology and genre. We will think about the adapted and emergent generic forms through which "the New World" was ongoingly invented, including genres like the Indian captivity narrative and the slave narrative that arguably make their debut in world literary history in the Americas during this time frame. We will conclude by attending to the rather late emergence of the novel in American literary history, reading four novels that appeared in the early US national period. The objective of the course is simply to contextualize and analyze a wide array of texts, each of which richly rewards the engaged reader, in order to trace the origins of American literatures. Course texts may include contact narratives (Columbus, Caminha, Smith, Hennepin); conquest narratives (Mather, Las Casas, Poma de Ayala); Indian captivity narratives (Cabeza de Vaca, Rowlandson, Staden); slave narratives (Gronniosaw, Jea, Cugoano); revolutionary polemics (Paine, Bolívar); and the earliest American novels: William Hill Brown, The Power of Sympathy; Hannah Webster Foster, The Coquette; Leonora Sansay, Secret History or, the Horrors of Santo Domingo; Charles Brockden Brown, Arthur Mervyn. Fulfills the pre-1800 requirement.
Area: Writing Intensive

AS.060.394. Class Fictions. 3 Credits.
This seminar investigates one of the central concerns of nineteenth-century fiction: social and economic class. Why did raising oneself from humble beginnings, and falling into poverty, become such familiar stories? And why are they still so familiar today? We will look at how a number of writers approached the topic of class mobility, each with a unique blend of excitement and anxiety. Authors will likely include Jane Austen, Honoré de Balzac (in translation), Charles Dickens, and William Dean Howells. In order to understand our topic better, we will also look at a selection of theoretical work on the nature of class.
Area: Writing Intensive

AS.060.397. Thomas Pynchon. 3 Credits.
Intensive reading of two major Pynchon novels, along with theories of modernity, postmodernity, etc.
Area: Writing Intensive

AS.060.400. Billie Holiday's Baltimore 1870-1960: A Reverse Classroom Journey in the Archives. 3 Credits.
This course will use the tools of the historical archive to etch a social history of Baltimore during the long Billie Holiday (1915-1959) era from the Reconstruction through post-World War II. Holiday's remarkable and unique art has earned her the title of the premier jazz singer of all-time, but unknown to most, her voice and experience were strongly shaped by her early life in Baltimore City, the city's black habitation and migration, its musical culture, its black middle and lower class, its urban density, as well as its cabaret and underworld life. Our task is to examine the city as an unfolding, racializing process, and to glean the evidence from multiple local archival sources to reconstruct some of the rough margins of possibility for the lived experience of Holiday's grandparents and parents, all born in Baltimore, as well as her own experience as truant, orphan, and sex assault victim in the 1920s. Two questions will occupy our interests intensely. How did the two black communities she lived in extensively evolve from the late 19th through the early 20th centuries? Second, what information can be unearthed about black musical culture--ragtime, marching bands, banjo and fiddle ditties, riverboat music--as it evolved in the post-World War I "jazz" age of sound recording and broadcasting? What was the artist's relationship to her urban geography? How did it change over space and time? What dimension of shared fate did she have with the community of black Baltimore domestic workers, laborers, artisans, and small business people from the first half of the twentieth century? In what manner did Baltimore's racial segregation and racism define her life and art? How was her consciousness as a vocal opponent to segregation shaped by her grooming in the city?
Area: Writing Intensive

AS.060.402. The Computer in Modern Literature. 3 Credits.
How have computers, and human interactions with computers, been represented in twentieth- and twenty-first-century literature? How have attitudes toward computers changed over that time? Now most books are written on computers, and many are read on them as well: what traces of these forms of production and consumption can we find in literary texts?
Area: Writing Intensive

AS.060.405. Psychoanalysis and Literature. 3 Credits.
In this course we will read some foundational texts by Sigmund Freud, and pair them with a select group of literary works--Sophocles' "Oedipus the King" and "Oedipus at Colonus", William Shakespeare's "Hamlet", Edgar Allan Poe's "The Purloined Letter", Wilhelm Jensen's "Gradiva"—which have inspired psychoanalytic ideas and generations of psychoanalytic literary interpretation.
Area: Writing Intensive

AS.060.406. Transfiguring the Renaissance. 3 Credits.
Tracing the poetics of bodily transformation then and now, this course puts early modern literature into dialogue with medical epistemologies of the sexed body and contemporary critical reflections upon transgender experience, embodiment and transition. Early modern texts might include Arthur Golding's translation of Ovid's "Metamorphosis", John Lyly's "Gallathea", Francis Beaumont's "Salmacis and Hermaphroditus", Ben Jonson's "Epicoene, or The Silent Woman", Middleton & Dekker's "The Roaring Girl" and John Milton's "Paradise Lost."
Area: Writing Intensive

AS.060.501. Independent Study. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.509. Senior Essay. 3 Credits.
The English Department offers qualified majors the option of writing a senior essay. This is to be a one-semester project undertaken in the fall of the senior year, resulting in an essay of 30-35 pages. The senior essay counts as a three-credit course which can be applied toward the requirements for the major. Each project will be assigned both an advisor and a second reader. In addition, students writing essays will meet as a group with the Director of Undergraduate Study once or twice in the course of the project. The senior essay option is open to all students with a cumulative GPA of 3.6 or higher in English Department courses at the end of the fall term of their junior year. Project descriptions (generally of one to two pages) and a preliminary bibliography should be submitted to a prospective advisor selected by the student from the core faculty. All proposals must be received at least two weeks prior to the beginning of registration period during the spring term of the junior year. Students should meet with the prospective advisor to discuss the project in general terms before submitting a formal proposal. The advisor will determine whether the proposed project is feasible and worthwhile. Individual faculty need not direct more than one approved senior essay per academic year. Acceptance of a proposal will therefore depend on faculty availability as well as on the strength of the proposal itself. When completed, the senior essay will be judged and graded by the advisor in consultation with the second reader. The senior essay will not be part of the Department’s honors program, which will continue to be based solely on a cumulative GPA of 3.6 in English Department courses.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.060.602. Proseminar.
This course is intended to train students in skills required by the discipline, help prepare them for a range of futures, and integrate them into the university community.

AS.060.603. Secularism & Theory.
This graduate seminar will construct a history of critical theory through the lens of contemporary narratives about secularization and methodological critiques of secularism.
Area: Writing Intensive

AS.060.604. Philology.
An examination of the many ways (both as old and then 'New', but also as the subject of a key 'return') that 'philology' has been claimed as the master category of literary study. The nuts and bolts of older philological procedures as well as the broadest theoretical claims for the term will be attended to.
Area: Writing Intensive

AS.060.607. Fiction and Doubt After 1888.
Examines the interrelation between fiction and doubt since the late nineteenth century. Authors may include Ward, Conrad, Joyce, Eliot, Stevens, Woolf, Baldwin, Flannery O’Connor, Ishmael Reed, Sefi Atta, R. O. Kwon.
Area: Writing Intensive

AS.060.613. American Movement.
This seminar examines representations of people in motion in U.S. writing from 1900 to the present. Migration, international and intranational, will be central to our study, but we’ll also consider other forms of travel, transits of authorial and readerly attention, experiences of vagrancy and acceleration, and predicaments of stasis in primary texts as well as theoretical work around mobility. Authors and directors studied may include Simone de Beauvoir, Henry James, Gayl Jones, Jack Kerouac, Chang-Rae Lee, Claude McKay, Bernadette Mayer, Muriel Rukeyser, and Gertrude Stein.
Area: Writing Intensive

AS.060.614. Postcolonial/Global/World.
The field now known as “global Anglophone literature” has emerged from a complicated and rapidly advancing disciplinary lineage. A host of past and present recordings – including postcolonial, Commonwealth, Third World, global, transnational, world, and the Global South – provide a record of the wider profession’s anxieties in relation to non-Western literary traditions. This course prepares graduate students to be able to articulate some of the subtle differences in approach that this nexus of closely related terms may obscure, from the heyday of postcolonial theory in the 1980s and 90s to contemporary subfields like Indian Ocean studies. In addition to key critical texts by theorists including Edward Said, Gayatri Spivak, Franco Moretti, Peter Hallward, and Emily Apter, students will be introduced to some outstanding recent methodologies and critiques from the adjacent body of work on comparative literature.
Area: Writing Intensive

AS.060.615. Human Rights Before Human Rights.
This course asks in what ways did literature mitigate population category distinctions within a pre-history of human rights from the period 1500-1700. We will take the situations of sponsored violence, and in particular, war captivity, in order to explore how premodern concepts of duties, rights, atrocity, inhumanity (and prohibitions against abuse) arise and become a locus of mimetic complexity within the literature of the period. Prospecting a historical transformation between ancient, early modern, and modern conceptions of rights, duties, and the human, readings may include: Euripides, Suppliant Women; Seneca, Trojan Women; Shakespeare, Troilus and Cressida; Cicero, Grotius, Gentili, Vitoria, Las Casas, Spenser, Bradstreet, Milton, Dryden, and Behn, as well as literature depicting violence resulting from Britain’s East India Company’s global intrusions. Splicing apart the "human" from "rights" we consider theoretical material from the liberal tradition and its critique; the problem of 'failed universals'; the historical connection between natural law and human rights; the distinctions drawn around legal and gendered categories of person; and critical race theory, with readings from Asad, Foucault, Moten, Wynter, Cavarero, Brown, Butler, Rawls, Dworkin, Drucilla Cornell, depending on the class’s interests.
Area: Writing Intensive

AS.060.616. Milton.
A seminar covering the career of John Milton, including all his major poetry and much of his prose. There will be attention to the history of printing, publication and concepts of reading and writing, as well as to current issues and topics within early modern studies that bear on Milton (e.g. materialism, secularization, 'surface' reading, political theology, quantitative vs hermeneutic methods, actor-network theory). As such, the course will also be an introduction to various methods in early modern studies.
Area: Writing Intensive

AS.060.617. Black Print Culture.
Students interested in black print culture will engage in intensive archival research, both collaborative and individual, using the Sheridan Library's Rare Book and Manuscript collections. Texts include poems, printed lectures, pamphlets, novels, periodicals, ephemera, correspondence, etc., alongside relevant critical and theoretical reading.
Area: Writing Intensive

AS.060.618. Milton: Black and White.
In Milton: Black and White we will consider Milton and the discourses of racialized categories (poetical, political, and embodied), specifically attending to his role in the historical developments of white identity; concepts of justice; the genre of epic; and universal notions of personhood through the liberal tradition. We will also consider how Black writers have responded to Milton (including Phillis Wheatley, Frederick Douglass, Malcolm X, the gospel tradition, Toni Morrison, Chris Ofili) through readings of Paradise Lost and selected prose, as well as readings in contemporary critical theory.

AS.060.619. Sentimental Reasons.
Recent work in cognitive approaches to literature have led critics to return to the sentimental novel of the eighteenth-century as a "laboratory," in Daniel Goss's words, for the investigation of human emotion. There is no easy "fit" between these literary narratives and the narratives of cognitive science, nor between them and the regnant moral philosophy of the age (built upon the mechanism of human sympathy or upon "nervous" association). There is rather a discomfort that reveals social inequities as well as alternative possibilities for both thinking and feeling. The sentimental mode took hold in the circuits of the Atlantic world. This course will study several sentimental narratives that traveled promiscuously through those circuits: Bernardin de St. Pierre's Paul and Virginia, Sterne's Sentimental Journey, Mackenzie's Man of Feeling; Equiano's Interesting Narrative; Williams' Peru; and Brown's The Power of Sympathy. Alongside these works we will read studies by critics working the seams between affect and cognition, philosophy and literature, rhetoric and science. The course will provide a broad history of the sentimental mode, stretching to reflections on the links between the sentimental and the melodramatic. It will simultaneously attend to the experience of reading for sentiment, to forms of feeling and what those feelings know.
Area: Writing Intensive

AS.060.620. Thinking with Scale: Frameworks in Early Modernity.
Concepts include expansion, crowding, data collection, the miniscule, temporality, the planetary and the cosmic in the first age of European mercantile activity and colonial expansion. With readings from world-systems theory and theories of the anthropocene, our case studies will comprise pre-modern English literary texts, including Milton, Paradise Lost, Anne Bradstreet, The Four Monarchies, early modern science (Hooke, Newton), Defoe, The Storm, and early British and colonial American holdings in the Garrett Library. The class will be hands-on, working with material from Special Collections, and will include working towards a digital project (no digital project background necessary).
Area: Writing Intensive

AS.060.625. Theory of the Novel.
This course will look at the development of novel theory from the eighteenth century until the present. Authors will include Scott, Barbauld, Dallas, Lewes, Eliot, James, Shklovsky, Tomashevsky, Jakobson, Bakhtin, Lukács, Auerbach, Barthes, Jameson, Girard, Sedgwick, Moretti, Armstrong, Miller, Hale, Lynch, and Woloch. Novelists will likely include Madame de Lafayette, Austen, Goethe, and Wolfe.
Area: Writing Intensive

AS.060.627. Poetry and Performance.
This course will be devoted to the histories and theories of 19th-, 20th-, and 21st-century poetry and performance, beginning with William Wordsworth's and Samuel Taylor Coleridge's Lyrical Ballads. Upon hearing the poets read, William Hazlitt remarked that "[t]here is a chaunt in the recitation both of Coleridge and Wordsworth, which acts as a spell upon the hearer, and disarms the judgment." This early instance of reception history will provide the backdrop for our discussion throughout the semester. Besides Wordsworth and Coleridge, our reading list will include verse, theory, and criticism by Robert Browning, Walt Whitman, T.S. Eliot, James Weldon Johnson, Langston Hughes, William Carlos Williams, Charles Olson, Allen Ginsberg, Norman Pritchard, Amiri Baraka, Tracie Morris, Christian Bök, Lisa Gitelman, Frederich Kittler, Peter Middleton, John M. Picker, Susan Stewart, and others.
Area: Writing Intensive

AS.060.628. Literature and Human Rights: 1500-1720.
Today human rights and capabilities are two intertwined concepts. In the early modern period, these were much debated and literature was a key site for the development of these imperfect, variable and contested discourses. Reading literary works from the European tradition, in particular in Europeans' engagement with dissident groups both within and outside Europe, we will explore themes of embodiment, power, risk, vulnerability and the languages and practices of equivalence and domination in the variable discourses of humanitarianism, natural law, and rights in authors including Shakespeare, Grotius, Montaigne, Hobbes, Milton, Behn, Locke, Swift, Montagu and Defoe.
Area: Writing Intensive

AS.060.629. The History of the Book.
The course will account for the major transformations in the media used for writing from the scroll to the web as well as the rich account of this history and its theorizations.
Area: Writing Intensive

AS.060.636. Settler Colonialism: Theory, History, Literature.
This seminar offers an introduction to a key concept in contemporary critical theory and literary and cultural studies: settler colonialism, understood as a specific form of colonialism focused on the appropriation of land rather than the exploitation of labor and thereby involving the attempted elimination and replacement of indigenous polities and societies by an invading force. The course will have a dual focus: 1) tracing the theoretical distinction of settler colonialism from other forms of colonialism and tracking the critique implicit in this distinction of dominant forms of leftism that arguably presuppose a settler-colonial frame of reference; 2) tracking the history of what James Belich has called the “Anglo settler revolution” of the nineteenth century and engaging in a comparative analysis of the literatures produced in the course of that revolution in what are now Ireland, the United States, Canada, Australia, and elsewhere in the Pacific. We will especially attend to narrative fictions—often (self-) identified as “romances”—that chronicle settlement and register the temporal disruption of indigenous persistence and resistance. Secondary texts may include: Belich, Replenishing the Earth; Glen Coulthard, Red Skin, White Masks; Aileen Moreton-Robinson, The White Possessive; Eve Tuck and K. Wayne Yang, “Decolonization is Not a Metaphor”; Patrick Wolfe, Settler Colonialism and the Transformation of Anthropology. Primary texts may include: Charles Brockden Brown, Edgar Huntly; S. Alice Callahan, A Child of the Forest; Marcus Clarke, His Natural Life; Susanna Moodie, Roughing It in the Bush; Herman Melville, Typee; Sydney Owenson, The Wild Irish Girl; Simon Pokagon, Ogimawkwe Mitigwaki (Queen of the Woods); John Richardson, Wacousta or, The Prophecy; Catharine Maria Sedgwick, Hope Leslie; and the FX television series, Taboo.
Area: Writing Intensive

AS.060.637. Counterfactual Literature.
This course will focus on the formal, affective, ethical, and conceptual issues associated with forking-path texts—poems, fictions and films that openly offer alternative paths to the experience of individuals.
Area: Writing Intensive

AS.060.638. Whitman and the Whitmanian.
This course will take the occasion of the bicentennial of the birth of Walt Whitman as an occasion to think about the legacies of his poetry in American literary history, especially in contemporary poetry. We will read key texts of Whitman’s then move to more recent writing, paying attention to the key scholarship on Whitman from the last few decades, as well as to recent scholarship on poetry that is in dialog with the questions of democracy, capitalism, on the one hand, and form and address, on the other, that have shaped our reading of Whitman and of poetry in the Whitmanian mode.
Area: Writing Intensive

AS.060.639. The American Renaissance: History of a Field.
This seminar will provide an intensive introduction to antebellum nineteenth-century U.S. literature by way of tracking a critical formulation foundational to the field of American studies as whole: "the American Renaissance." Coined by F.O. Matthiessen in 1941, "the American Renaissance" initially referred to a canon of five white male writers (Ralph Waldo Emerson, Nathaniel Hawthorne, Herman Melville, Henry David Thoreau, and Walt Whitman) alleged to have produced work of distinction in two interrelated senses--the first specifically "American" literature deserving of academic study. We will follow the fortunes of this critical formulation, tracing how some of the authors in Matthiessen’s canon have subsequently been reinterpreted and repositioned as well as how "the American Renaissance" canon has been expanded and its very conceptualization contested. Primary authors whose work may be examined include William Apess, William Wells Brown, Lydia Maria Child, Frederick Douglass, Emerson, Margaret Fuller, Hawthorne, Harriet Jacobs, Melville, Harriet Beecher Stowe, and the anonymous author of Xicotencatl. Secondary works may include: Matthiessen, The American Renaissance (1941); Reynolds, Beneath the American Renaissance (1988); Michaels and Pease, The American Renaissance Reconsidered (1989); Crews, "Whose American Renaissance?" (1988); Colacurcio, "The American-Renaissance Renaissance" (1991); Avallone, "What American Renaissance?" (1997); Grossman, Reconstituting the American Renaissance (2003); Brickhouse, Transamerican Literary Relations (2004); Fluck, Romance with America (2009); Hager and Marrs, "Against 1865" (2013).
Area: Writing Intensive

AS.060.641. Close Reading, Exhaustive Reading, and the Novel.
How much can you say about a novel? How much of a novel can a critic interpret? The large scale of the novel form seems to resist the interpretive techniques of literary criticism, which look closely at a small number of textual examples. But what if we tried to read every word of a novel, and see it in all its forms: genre, structure, history, politics, biography, and so on? This seminar will look closely at a small number of Victorian novels (probably Dickens’ *David Copperfield* and Eliot’s *Daniel Deronda*, subject to change). We will approach these novels through a variety of theroetical lenses. There will be a special emphasis placed on the relations between form, history, and politics. This seminar will also offer students a chance to apply theories of literature and the novel often considered in abstract.
Area: Writing Intensive

AS.060.642. Reading Capital Now.
Since the 2008 financial crash, there’s been rising popular consciousness of capitalism’s crisis-bound character and, therefore, its vulnerability. But finance isn’t the only thing that capitalism has brought to a boiling point: for attentive readers of Marx, the mounting climate disaster, the COVID pandemic, and the struggle for Black Lives have only further highlighted the complex interconnections among our energy and food infrastructures, histories of racist and settler-colonial violence, the patriarchal organization of sexuality, and the maintenance of capitalist profitability no matter the social cost. The aim of this seminar is, first, to show how a thorough reading of the first volume of Marx’s Capital goes a long way toward helping us see all these histories and crises as part of a single, many-faceted dynamic, and second, to highlight 20th- and 21st-century Marxist work that takes Marx in new directions, from critiques of racial capitalism, colonialism, and the patriarchy of the wage, to studies of climate crisis and the global recomposition of the labor pool. Along with Marx, we’ll read work by WEB DuBois, James Boggs, Silvia Federici, Thiti Bhattacharya, Jairus Banaji, Nikhil Singh, Andreas Malm, the Endnotes collective, James Parisot, and others.
Area: Writing Intensive

AS.060.644. Oceanic Studies & the Black Diaspora.
In this course, we take up Hester Blum's blunt observation that "the sea is not a metaphor" in order to consider the visions and hopes black writers have associated with the sea, as well as the despair and trauma transatlantic slavery has left "in the wake," to quote Christina Sharpe.
Area: Writing Intensive

AS.060.645. What was Literary Character?.
What role did literary character play along the passage from ancient theories of dramatic action to contemporary theories of subjectivity and personhood? What role, specifically, did Shakespearean personhood play in the theorization of literature's capacity to stage and represent a portable, exemplary "self"? How do group categories of race, gender and class qualify and inflect the ostensive individuation of character outcomes? As test cases, in this course we will consider an array of early modern literary persons from before and after Shakespeare as depicted in poetry, drama and prose : Heywood's Lucrece, Marlowe's Tamburlaine, Shakespeare's Hamlet and Cleopatra, Middleton's Timon, Moliere's Alceste, Milton's Christ and Behn's Oroonoko. This course will range widely across theorists of literary character and the reader/character relationship, considering Aristotle, Theophrastus, Sir Thomas Overbury, Sigmund Freud, Aaron Kunin, Blakey Vermeule, Toril Moi, Rita Felski, Amanda Anderson, and Thomas Metzinger, among others.
Area: Writing Intensive

AS.060.649. The Essay Form & Academic Prose.
While we will spend some time with the history and theory of the essay, much of our time will be spent considering the contemporary essay and its form. Across the past decade, academics have increasingly published essays designed for non-specialists. We'll study many of them, both as objects of critical attention and of practical value. Writing assignments will include the option to write essays.
Area: Writing Intensive

AS.060.650. Character Studies.
What are literary characters? Can we imagine literature without them? And how do they relate to questions of form and society? Starting with Aristotle, and moving through 20th- and 21st-century critics such as Lukacs, Barthes, and Woloch. We will pay special attention to the historical relationship between theories of character and approaches to the novel.

AS.060.651. The Sensorium of Reading c. 1800.
This seminar aims to think hard about the embodied reader and the material realm of reading. Our work will position reading less as a strict function of cognition and more as a matter of phenomenology, sensation, and material structures. Though we will attend to question of vision (and loss of vision) we will also highlight other senses: hearing, touch, smell, taste and bodily proprioception. Course materials will include recent studies that link reading and the senses, as well as texts from the late eighteenth and early nineteenth-century, a moment when the idea of Literature emerged alongside a theorizing of media and mediation, and investigations linking aesthetics and phenomenology. Samuel Taylor Coleridge will be one guide for the seminar, but so will the ballad revival and the literature of abolition. Seminar participants are invited to target other periods and places in their own research projects for the seminar.
Area: Writing Intensive

AS.060.652. The Time and Space of Capital.
This course will look at the relationship between the logical and historical aspects of Marx's analysis of capitalism, which special emphasis on key arguments in volumes 2 and 3 of Capitalism. We will ask questions about capital's use of time and space in the service of accumulation, and read more recent secondary material all term from anti-colonial, feminist, queer, Indigenous, and Black radical traditions, in order to develop a fresh picture of the complex interrelation or different types of oppression and exploitation across capitalist history. Some familiarity with the concepts and argument of Capital, volume 1 will be helpful, but are not required.

AS.060.653. Dark Conceits: Allegory, Interpretation, and Psychoanalysis.
Bringing theological commentary and psychoanalytic diagnosis into conversation with historicism, formalism, sexuality studies and premodern critical race studies, this course uses Edmund Spenser's "Fairie Queene" to re-open the question of hermeneutics.
Area: Writing Intensive

AS.060.654. The Romance.
This graduate seminar takes a long view of the romance—the genre of literary imagination, par excellence—as originating and recurring in the Anglo world as a crucial technology of settler indigenization on stolen land and also of Indigenous resistance to settler fantasies of realization, from twelfth-century Norman England and Ireland to nineteenth-century North America and Australasia. Texts may include: Geoffrey of Monmouth, History of the Kings of Britain; Wace, Roman de Brut; Catharine Maria Sedgwick, Hope Leslie; Joseph Smith, The Book of Mormon; Mark Twain, A Connecticut Yankee in King Arthur's Court; Simon Pokagon, Queen of the Woods; Eleanor Catton, The Luminaries.
Area: Writing Intensive

AS.060.658. 1922 and Its Neighbors.
A course focusing on works published in the _annus mirabilis_ of modernism, 1922, and the years nearby. In addition to reading these texts in detail, we'll consider what it means to periodize at a granular level and how our primary texts and theoretical readings take up the problem of the neighbor as well as questions of of hospitality, community, social obligation, and domesticity.
Area: Writing Intensive

AS.060.668. The Slavery Debate in the Atlantic World.
This graduate seminar will trace the historical development of the slavery debate in the Atlantic world through examination of key texts from a host of genres and locations—Quaker religious tracts, political documents like the Haitian Declaration of Independence, Cuban antislavery novels, slave narratives, and "classics" of "American" literature like Melville's Benito Cereno. Our historical investigations into the rhetorical field of anti- and proslavery will be framed by a theoretical interest in political theology. How might critical reflection on sovereignty, recent and not so recent—from Derrida back to Bodin (widely acknowledged as having provided one of the first philosophical defenses of antislavery)—help us recast the intellectual history of the slavery debate and Atlantic radicalism, more generally?
Area: Writing Intensive

AS.060.800. Independent Study.
This course is a semester-long independent research course for graduate students. Students will have one-on-one assignments and check-in's with designated faculty throughout the semester.

AS.060.893. Individual Work.

AS.060.894. Independent Reading.

AS.060.895. Journal Club.

AS.061 (Film and Media Studies)

AS.061.102. The Cannes Film Festival: Introduction and History. 1 Credit.
In recent decades, film festivals have become important venues for generating international audiences by simultaneously fostering aesthetic communities and creating marketing opportunities. This course considers the purpose and function of the film festival by examining the singularly influential festivals of Cannes. We will read about the culture, politics, and commerce of the festival, and compare Official Selection films with more the more unorthodox choices of the parallel sections: A Certain Regard and Directors' Fortnight. Meets 5x during the semester.Required for students participating in the Cannes Study Abroad. Open to all.

AS.061.103. Navigating the Entertainment Industry: A Preparation for Intersession. 1 Credit.
This course prepares students for FMS's Intersession field trip to Los Angeles, and also serves as an introduction to the professional skills necessary to navigate a career in film, television, and other fields of entertainment. Through discussion, hands-on practice, and guest lectures with FMS alumni, students will learn how to find their way in a complex industry, how to present themselves and their work, how to choose the right path, and how to cultivate the connections and opportunities they'll need to succeed. We will also discuss what to expect and how to make the most of the week-long intersession course, which introduces students to alumni in a range of professions in film, television, and entertainment. Meets 6 times during the semester. Required for students planning to enroll in The Entertainment Industry in Contemporary Hollywood. Open to all FMS majors and minors.

AS.061.120. The Art of the Screenplay. 3 Credits.
Screenwriting workshop. This course will look at the screenplay as both a literary text and blue-print for production. Several classic screenplays will be analyzed. We will intensively focus on character development, creating "believable" cinematic dialogue, plot development, conflict, pacing, dramatic foreshadowing, the element of surprise, text and subtext, and visual story-telling. Several classic and contemporary films will be analyzed and discussed with film clips screened in class (PSYCHO, CHINATOWN, WITNESS, THE DEVIL WEARS PRADA, NO COUNTRY FOR OLD MEN, THE SOCIAL NETWORK, WINTER'S BONE, BOOKSMART, GET OUT). The art of the outline, proper script formatting and character development will be explored as students embark on writing their own 8-12 page screenplays that will be read in class and closely critiqued. Current marketplace and business requirements for screenplays will also be covered.
Area: Writing Intensive

AS.061.137. Virtual and Augmented Reality Technologies. 1 Credit.
This program will provide an overview of the cutting-edge tools and creators shaping the future's narrative journeys. As technologies, such as virtual and augmented reality, along with artificial intelligence and machine learning, continue to evolve, how will we create, share, and experience the most fundamental unit of human culture - the story?

AS.061.138. Acting for Filmmakers. 1 Credit.
This is a series of 3 workshops.1. ACTORS' HOMEWORK & CAMERA AS OBSERVER~Students will discuss and experiment with different methods of preparing for a role. Trying different methods, feel what works for them. We will work on short scenes and have an open discussion about goals, believability, emotional fatigue, distractions of the filming process. ~On the Sound Stage working in front of the camera: ~show how the camera watches performers' thoughts. ~differences between working in front of a camera and playing to a live audience. ~Shooting: coverage continuity eye lines & marks blocking & restricted movement 2. AUDITIONS AND CASTING: ~Students will be given a variety of scripts to audition for. ~Discussion of casting; from actors', directors' and casting directors' perspectives. ~How others perceive you- an exercise in diplomacy and self awareness. ~Preparing for an audition. both cold and rehearsed. ~Improv during auditions. ~Memorization (quick!) for auditions. ~We will rehearse and film auditions. ~Review and analyze audition videos.3. ACTORS DIRECTING DIRECTORS. Working in groups and/or pairs, students will explore what kinds of direction works for them and for others. Students will have an open discussion as to what they need to hear from their director. This will be a class where it is safe to learn what does and doesn't work when communicating with actors- from the actors' perspective. The goal is not to deliver a professional performance in the class, but to explore how it feels to be directed.

AS.061.140. Introduction to Cinema, 1892-1960. 3 Credits.
This course explores the fundamentals of film analysis and encourages students to embark on an exploration of the first half of our first century of movies. It teaches the basic elements of film form, as well as their use in films across the globe from the turn of the twentieth century through the start of World War II. Movements discussed include the silent comedy of Charles Chaplin, Buster Keaton, and Harold Lloyd, moody German Expressionism, the playful anarchy of Surrealism, the fundamentals of editing with Soviet Montage, the beauty of French poetic realism, the rule-breaking of Pre-Production Code cinema, the work of the young Alfred Hitchcock, and, of course, highlights of classical Hollywood filmmaking.
Area: Writing Intensive

AS.061.141. Introduction to Cinema, 1941-present. 3 Credits.
Introduction to Cinema provides an overview of American and international cinema from thepost World War II era to the present. Through lectures and discussion, weekly screenings, andintensive visual analysis of individual films, we will explore the aesthetic, cultural, political, andeconomic forces that have shaped the art and industry of film over the past 70 years. Regularquizzes, writing assignments, class participation required. Mandatory film screenings. Lab Fee $50.
Area: Writing Intensive

AS.061.145. Introduction to Digital Video Production: Visual Language. 3 Credits.
This course is a study of the visual language used to create a moving picture. Through screenings and discussion of films, videos, and related readings, students will develop a visual critical facility and will demonstrate this facility in a few response papers to screenings and video projects. The course will focus on image construction, including composition, framing, movement inside the frame and use of light as well as use of sound. Students will learn to be attentive to rhythm and tempo in picture editing and sound. In-class video assignments included, in which students will work in small groups of three.

AS.061.147. Visual Storytelling. 3 Credits.
This primer to screenwriting will emphasize the power of the image to deliver character, situation, and theme, and to advance even complex plots. Students will analyze narrative films, compose their own still and moving images with cellphone cameras, and write several short dramatic pieces to be read and workshopped by the group. They'll learn the basics of scene design and of screenplay format. For FMS majors in the screenwriting track, this course fulfills the Media and Narrative requirement . $50 lab fee.
Area: Writing Intensive

AS.061.148. Storytelling for Film and Fiction. 3 Credits.
Through the analysis of narrative films, short fiction, myths, fairy tales, and ghost stories, and through the workshopping of their own creative writing, students will explore the art and science of "a good story well told." The course will offer an introduction to dramatic and visual storytelling, and is an essential primer for upper-level screenwriting. Lab fee $50.
Area: Writing Intensive

AS.061.150. Introduction to Film Production. 3 Credits.
This course introduces students to basic considerations of shooting 16mm film. Through lectures and practice, the course approaches the basics of light meter readings, basic camera operations and shot composition. The course also highlights specific readings from classical film theory to augment weekly shooting exercises. Each week students, working in groups, shoot film exercises, providing a general overview of film production. For the final project, each group shoots and edits (physical edits) a short (3-5 minutes) film on 16mm black and white reversal film stock.

AS.061.152. Introduction to Digital Video Production. 3 Credits.
This course introduces students to the world of digital filmmaking. Through screenings, production assignments, and in-class labs, students will develop proficiency in digital cameras, sound recording devices, and software. Students will work individually to produce several video projects. For their final projects students will pitch an idea and develop a more complex film.

AS.061.154. Lights, Camera, Action: Bogart. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of films starring the legendary Humphrey Bogart. Short weekly written responses. No prior experience in film studies required; non-majors welcome. This one-credit course will meet September 3, 10, 17, 24, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.155. Lights, Camera, Action: Coming of Age Films. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of coming of age films. Short weekly written responses, in-class screenings, and emphasis on discussion over lecture. No prior experience in film studies required. This one-credit course will meet September 5, 12, 19, 26, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.156. Lights, Camera, Action: On Location. 1 Credit.
This mini-course will explore the role of place in film; location not merely as setting, but as character, condition, mode of thought. Real and imagined, found and constructed worlds will be considered. Are all cinematic worlds virtual? In-class screenings and an emphasis on discussion over lecture. This 1-credit course will be graded Pass/Fail. Perfect attendance required. Class meets September 19, 26, October 3, 10.

AS.061.159. Lights, Camera, Action: In the City. 1 Credit.
This mini-course will provide a survey of American and international films to which city as setting is integral. In-class screenings and emphasis on discussion over lecture. Four short written responses. No prior experience in film studies required. Due to the limited number of meetings, perfect attendance is required.

AS.061.166. Lights, Camera, Action: The Female Gaze. 1 Credit.
This mini-course will offer an introduction to the basics of film analysis through a survey of films directed by women. In-class screenings and emphasis on discussion over lecture. Short weekly written responses. No prior experience in film studies required; non-majors welcome. This one-credit course will meet September 2, 9, 16, 23, and will be graded Pass/Fail. Due to the limited number of meetings, perfect attendance is required.

AS.061.202. Intermediate Film Production: Personal Essay Film. 3 Credits.
In this course students will consider variations of the personal essay film, wherein filmmakers explore their own experiences, both real and imagined. These films constitute dialogues between filmmaker and world using subjective approaches, including but not limited to first person narration. Students will make a short (4-6 minutes) 16mm film from original and possibly archival footage; their own filmic essays based upon personal experiences. We will look at the works of several essay filmmakers including Ross McElwee, Jean Luc Godard, Chris Marker, and Su Friedrich.

AS.061.205. Introduction to Screenwriting. 3 Credits.
In this course we will explore the basic principles of visual storytelling in narrative film as they apply to the design, creation, and revision of the screenplay. Specifically, we will focus on learning the craft of screenwriting — strategies, processes, and philosophies that writers can develop, practice, and rely upon as they progress through a series of screenwriting exercises and write a 12-page screenplay, which will be critiqued in-class during weekly table reads and with the Instructor (one-on-one) during office hours. Select professional screenplays will be read and analyzed — and clips from select films viewed — to further explore what works well on the page, and how it translates to working well onscreen. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Final Draft screenwriting software is required; a FREE 18-week trial will be made available for all students who don't already have Final Draft.
Area: Writing Intensive

AS.061.211. Intermediate Film Production: First Person/Third Person Essay Film. 3 Credits.
Each student shoots an essay film (16mm color and/or black and white) written either in first person or third person, or perhaps, both. The third person essay incorporates the ideas of various authors while the first person film is written chiefly from personal experience. Each film should run between 4-8 minutes. Lab Fee: $200. This course satisfies the Intermediate Film Production requirement.
AS.061.150

AS.061.213. Screening Difference: Race in American Film. 3 Credits.
This course will explore how race and ethnicity have been represented in popular American film from the early 20th century to the present. Weekly screenings, regular quizzes, and open discussion will emphasize close observation and critical thinking. Requirements include an oral presentation and a written analysis. No prior experience in film studies required; majors and non-majors welcome.

AS.061.214. Demystifying the Entertainment Business. 1 Credit.
For many, the entertainment business is alluring. For all, it's pretty confusing. Demystifying the Entertainment Business is a two-week online course that offers students insight into: behind-the-camera careers in the field (specifically writing, directing, producing, and developing); how to best prepare for those careers; and how to break into the industry once graduation finally comes. Students should be prepared to write and read scripts, offer feedback to their fellow students, shoot and edit videos, and create career goal maps and resumes. (Note: some level of basic shooting and video editing acumen will be necessary, as a short film deliverable will be required for successful course completion.) By the end of the course students will understated the basic mechanics of the entertainment industry and where they might like to fall within it, and they will walk away with a complete short film they've written and directed.

AS.061.218. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between literary modernism and modernist cinema: how Virginia Woolf's writings on the cinema connect with her use of shifting points-of-view as literary devices, how James Joyce influenced the Soviet filmmaker Sergei Eisenstein and how Eisenstein in turn influenced the American novelist John Dos Passos, how Franz Kafka's frequent trips to the movies reflect in his fiction, and how artists ventured broadly to develop experimental languages for expressing the new speeds and scales of modern life. Additional texts will be drawn from novels, essays, poems, and films from Ezra Pound, T. S. Eliot, Charlie Chaplin, Claude McKay, Zora Neale Hurston, Anita Loos, Andrei Bely, Dziga Vertov, Gertrude Stein, Louis Aragon, and René Clair. The course fulfills the writing intensive requirement and involves a series of essays on literature and cinema from a critical perspective.
Area: Writing Intensive

AS.061.219. Special Topics: Animation Workshop. 3 Credits.
Students will produce several animations using hand-made techniques, including drawinganimation, paper puppets and stop-motion. Screenings and readings will provide a historical and conceptual context to the exploration of animation as an experimental technique within both narrative and non-narrative works.

AS.061.221. Special Topics: Producing the Independent Film. 3 Credits.
This class will guide students through the process of producing an independent film in the United States. The chronology of lectures and coursework will follow the lifeline of a project, from conception through financing and development, production, postproduction, marketing, and exhibition. Students will learn how to package and pitch projects, budget and schedule a screenplay, develop a financing plan, supervise production and post-production, and mount a viable festival and distribution strategy.Lab Fee: $40

AS.061.226. Special Topics: Writing About Film. 3 Credits.
This workshop promotes more effective writing, hones interpretive skills, and encourages the development of a distinctive voice through a series of progressively more complex assignments. By sharing draft essays with the class, commenting on one another's work, and revising, students will learn to edit their own work and to thoughtfully critique others'. Fulfills the Film and Media Studies expository writing requirement. Lab Fee: $50
Area: Writing Intensive

AS.061.229. French New Wave. 3 Credits.
An exploration of the major films and directors of the French New Wave that is also designed to help students consolidate their skills in the analysis of film. The course will examine the origins of the French New Wave, looking at the directors as critics and as passionate film fans, along with the institutional and historical context of the films. It will also ask how the French New Wave changed the process of filmmaking, and transformed the way we think about the work of the director--inspiring more vocations in filmmaking than any other movement in cinema history. Film screenings T 7:30-10:00PM. $40 lab fee.

AS.061.232. Intermediate Video: Dreams, Psychosis, and Altered States in Cinema. 3 Credits.
In this production course, students will create multiple video projects that reflect the representation of dreams, psychosis, and altered states in cinema. We will screen and deconstruct a variety of feature films, video artworks, and music videos to understand the mechanics and language of subjective realism as a narrative form. We will trace this stylistic lineage from its roots in art house cinema to its rise as an accepted Hollywood modality. We will also explore editing and software techniques that will further students' ability to create stunning works of strange beauty.Basic proficiency with digital cameras and editing is required. This class fulfills the intermediate film production requirement.
AS.061.145 OR AS.061.152

AS.061.233. Intermediate Digital Video Production: Adobe After Effects. 3 Credits.
This course will serve as an introduction to Adobe After Effects. Students will learn a variety of motion graphics techniques such as digital character animation, rotoscoping, motion tracking, chroma key compositing and automating 3D cameras. Through screenings and discussions students will gain insight into the myriad of ways After Effects is used in Film and Television. Throughout the semester students will complete several short video art projects.
AS.061.152OR AS.061.145

AS.061.234. Intermediate Digital Video Production: Experimental Forms. 3 Credits.
This Production course focuses on key movements in both Experimental Film and Video Art. Production assignments will arise from: Structural Film, Performance Art, Lyrical Film, Psychedelic Video, and Experimental Ethnography. Students will explore how these movements developed outside (and at times in opposition to) the mainstream, and became integral to the aesthetics of contemporary art, film, and television. Students will think critically about the personal and societal function that video artwork serves, and gain insight into the history of Experimental Film. At the end of this course, students will have a more nuanced understanding of contemporary media art, and they will be more proficient in video editing and cinematography, which they can apply to future work on: commercials, music videos, webcasts, and feature films.
AS.061.152 OR AS.061.145

AS.061.235. Intermediate Digital Video Production: Advanced Camera. 3 Credits.
In this production course students will gain proficiency on a variety of Digital Cinema Cameras. Students will work with the Canon C300, C500, and FS7. We will discuss picture profiles, different lense options, external capture devices, and shotgun microphones. We will thoroughly explore the various unique functionality of each camera. Throughout the semester students will complete several cinematography focused video projects.
AS.061.145 OR AS.061.152

AS.061.237. Portrait Films. 3 Credits.
Portraiture has a long history in the arts, in painting, sculpture and photography. The film portrait is closer to these plastic arts, rather than traditional documentary, in that it approaches it's subject mostly though looking and finding new forms. Screenings will include the work of Andy Warhol, Philippe Garrel, Shirley Clarke, varied screen tests, some animation and more. Coursework will include a presentation, short papers and a film portrait.
AS.061.145 OR AS.061.152

AS.061.238. Reading the Moving Image. 3 Credits.
This course will emphasize close observation and critical thinking. Through weekly screenings and class discussion, students will practice noticing; seeing and hearing with fresh eyes and ears, and taking nothing on screen for granted. And they'll learn to reflect on and contextualize what they find, drawing evolved conclusions about how film texts communicate ideas and what those ideas may be. They'll consider all elements of cinematic form; an array of analytical frameworks including genre, historical era, authorship, and modes of production; and representations of gender, race, and class. Regular quizzes, a short oral presentation, and a short written analysis. No prior experience in film studies required; majors and non-majors welcome.
Area: Writing Intensive

AS.061.240. Hybrid Cinema: Spaces Where Documentary and Fiction Meet. 3 Credits.
From the films of Robert Flaherty, Jean-Luc Godard, Agnes Varda and Andy Warhol, through the work of Peter Watkins, Ulrich Seidl, Jia Zhangke, Lizzie Borden, Pedro Costa, Abbas Kiarostami, Kevin Jerome Everson, Sacha Baron Cohen and Chloé Zhao, this course explores the dominant techniques, the aberrations, and the virtues and limitations of hybrid filmmaking. Topics discussed include the ethics of representation, the significance of craft, questions of selection, narrative hegemony, the nature of performance, and the porous boundaries between documentary and fiction film. Students will be guided in their own hybrid filmmaking experiments throughout the semester.

AS.061.244. Film Genres. 3 Credits.
$40 lab feeA survey of American genres: the Western, the Gangster Film, Science Fiction, Horror, Comedy, Melodrama, and others. Twice-weekly screenings. Short film responses and a final paper, 10pp.
Area: Writing Intensive

AS.061.245. Introduction to Film Theory. 3 Credits.
This course offers an introduction to the major paradigms of film theory, covering how significant thinkers have conceived of the medium from its inception to the present day. Frequent film screenings help to illustrate key concepts. Topics include the classical opposition between formalist and realist film theories as well as critical approaches to narrative, spectatorship, and representation. Students are expected to enter the course ready to engage in discussion. Weekly film screenings. $50 lab fee.
Area: Writing Intensive
AS.061.140 OR AS.061.141

AS.061.248. Women Making Films About Women. 3 Credits.
This course will examine films (features and shorts) throughout the history of cinema beginning with Alice Guy-Blaché . We will look at how form reveals content, thematic issues and how films relate to the culture and politics of the filmmaker. Filmmakers include Germaine Dulac, Nelly Kaplan, Marguerite Duras, Chantal Ackerman, Barbara Hammer and Nina Menkes. Readings include critical essays, texts by the filmmakers and fiction. Assignments consist of weekly papers on the films.

AS.061.263. Poetry and the Moving Image. 3 Credits.
Using P. Adams Sitney's text: The Cinema of Poetry, this course will explore the relationship between poetry and the moving image. When experimental film began to define itself in the 1950s and 60s the terms cine-poem and film-poem were ubiquitous as identifying avant-garde cinema. Poetic structures in the moving image will be studied in relation to language, images and formation of meaning. Students will independently research a poet who greatly inspired and influenced a filmmaker/moving image artist and write on that filmmaker's work. One moving image project will be undertaken and completed during the semester as well. Weekly assignments will include screenings, reading, writing, and or video work.
Area: Writing Intensive

AS.061.266. Introduction to Writing for Television. 3 Credits.
This course will take novice television writing students from show concept to show bible and into the early stages of pilot writing. It teaches the basics of how to develop a television concept, and dramatic structure for television writing. Students will read analytical work on what makes a successful television series, dramatic structure, and effective characterization, and will engage in both critical readings and writing workshop. The result will be the creation of their own show bible and the beginnings of an original thirty-minute television pilot.
Area: Writing Intensive
AS.061.205

AS.061.267. Cultural History of the Internet. 3 Credits.
This course offers an introduction to internet studies through the many ways digital culture has touched our everyday lives: memes, blogs, gaming, social networking, instant messaging, and more. From its origins in connecting scientific researchers to its present form as a multi-device, multi-platform web connecting us to everything from each other to our smart homes, the internet has proven that nearly our entire social world can be processed as data and linked up. While this has meant greater connection, it has also raised questions about how we learn, communicate, behave, and organize. The internet has long promised new avenues of personal expression, but it has also brought with it the quandaries of echo chambers, information silos, and disinformation campaigns. In response to these complicating effects, the course offers an opportunity for students to develop the critical mapping tools necessary to orient oneself within this vast cultural network and its rapid historical unfolding.

AS.061.268. History of Computer Animation. 3 Credits.
This course offers a journey through the history of computer animation. We'll start with an archaeology of the digital image, look at experimental animations by early computer artists, and sketch out the work of engineers in developing techniques of wire-frame modeling, texture mapping, shadowing, and facial animation. Beginning with short films and digital sequences in otherwise live-action movies, we'll cover a wide variety of animation styles in an international context. Screenings will be drawn from a selection of fully computer-animated features, such as those from Studio Ghibli and Pixar; live-action movies with digital special effects in the mode of Tron (Lisberger, USA, 1982) and Terminator 2: Judgment Day (Cameron, USA, 1992); films that use computer software to aid traditional methods of animating, such as The Illusionist (Chomet, France, 2010) and Boy and the World (Abreu, Brazil, 2014); and animated documentaries, such as Waltz with Bashir (Folman, Israel, 2008) and Tower (Maitland, USA, 2016).

AS.061.269. Feminist Filmmaking: A Theory and Practice Workshop. 3 Credits.
In this workshop for 10 students (no gender preference) documentary filmmaker and media theorist Bernadette Wegenstein and filmmaker and director of the Saul Zaentz Film Innovation Fund co-teach the fundamental principles of gender theory and feminism as applied to practical filmmaking. We will cover the history of women filmmakers, as well as embark on a concrete mini-production where students will be placed in the roles of writers, directors, producers, cinematographers, and editors to make a feminist film. The anthology Feminist Film Studies(Hollinger) and Feminism and Documentary(Waldman/Walker) will be among the readings that our workshop is based on.
AS.061.145 OR AS.061.152

AS.061.270. The Body and Cinema. 3 Credits.
Before film even emerged as a popular entertainment form, motion pictures were used to study the human body for purposes of scientific inquiry and medical practice. The present-day crossovers between imaging science and cinema—the inclusion of medical imaging in movies and television shows, the deployment of informational videos and animations in telehealth, and the myriad ways that digital imaging itself is spurred on by the needs of scientific investigation and the demand for cultural works—suggest that what we know about the human body is caught up in a complex web of technical representations and cultural meanings. This course explores the construction of the human body within this array of cinematic practice. Our approach will be twofold: First, we will consider scientific and medical images not merely as powerful means of seeing what would otherwise be unseeable but also as technically enabled and culturally influenced ways of knowing, that is, images, as in cinema, that are historical and could be otherwise. Second, we will examine representations of the human body in the history of film, focusing on how bodies are represented, what bodies are privileged, and how bodies are figured using medical imaging.

AS.061.271. Intermediality: Between Word, Image, and Sound. 3 Credits.
This course explores film adaptation by considering how words, images, and sounds offer different affordances and constraints for creative expression. A central goal is to conceive of adaptation outside of typical discussions of fidelity to a source work and instead consider how different artistic media open up unique opportunities for storytelling. To this end, we will draw on a number of different intermedial translations, which may include from novel to film (The Night of the Hunter, from Davis Grubb's book to James Agee's screenplay to Charles Laughton's film), from short story to film (The Turin Horse), from graphic novel to film (Ghost World) or television series (HBO's Watchmen), from personal essay to documentary film (James Baldwin's The Devil Finds Work and I Am Not Your Negro), from poetry to film (O Brother, Where Art Thou), from play to film (A Raisin in the Sun and My Own Private Idaho), from radio drama to film (Sorry, Wrong Number), and film-to-film homage (Far From Heaven and All That Heaven Allows). We will also delve into the vagaries of film-to-book novelizations and the curious case of concurrently writing film and book, as in Stanley Kubrick and Arthur C. Clark's collaboration on the film and novel 2001: A Space Odyssey (both adapted from a short story).
Area: Writing Intensive

AS.061.301. Advanced Film Production: The mongrel film. 3 Credits.
In this course, each student is responsible for the design and production of a short 16mm film. The film may be shot on color and/or black and white negative stock. The format is Super 16mm. The film may include sync and/or non-sync sound. The idea behind the "mongrel" film is for the student to incorporate a variety of genres within this project. These may include stylistic elements typically associated with documentaries, experimental, narrative, animation, and lost and found films. Students are expected to have previously completed AS.061.150 and an intermediate level film production class.
AS.061.150

AS.061.302. Strategic Approaches to Filmmaking in 2021. 3 Credits.
The year 2020 challenged the film industry by imposing restrictions on our mobility, collaboration and access. Unable to gather in large groups or travel to the ideal location, much less rent equipment or leave the confines of our homes, moving-image makers found creative ways to embrace these limitations and continue making exceptional things. This intro-level production course will go back to basics in an attempt to define and explore the essential elements of visual storytelling. In this present, and in the future, how do we embrace the aesthetic challenges that come with limited resources and means? Can we make a compelling film or video without human subjects? Can we tell a dynamic story using only one location? Is there a possibility for drama when only one character appears on screen? Can sound be used to evoke the world outside the frame? And how do we make meaningful, relevant, transcendent work amidst a social, political and public health crisis? Over the course of the semester, students will be exposed to films and filmmakers who use these questions to stimulate their practice, and in turn, will be asked to address these challenging questions for themselves through the work they create for class. This course will fulfill the Advanced Filmmaking requirement for the major and minor. Students should have already completed an introductory and intermediate production course before enrolling.

AS.061.303. Podcasting: Critical and Creative Practice. 3 Credits.
In this critical studies course with a creative component, students will learn about the history and cultural significance of podcasting, develop tools for critically listening to and analyzing podcasts, and learn how to research, write for, and produce podcasts. Examples will come from a broad sample of narrative, documentary, interview, and discussion-based podcasts. While no formal training in audio production is necessary to take the course, students will be expected to learn the necessary skills to create their own podcasts. In-class demonstrations of microphones, editing software, and approaches to sound design will be offered, and students are encouraged to take advantage of office hours for further help with audio production.

AS.061.304. After Effects: Intermediate and Advanced Technique. 3 Credits.
This hybrid After Effects course will offer two simultaneous tracks of study. One for students using After Effects for the first time, the other for intermediate After Effects users who are looking to master the program. The class will meet to learn new techniques and to discuss each other's work and the instructor will regularly introduce exciting new material applicable for all skill levels. Students will have the option to create a motion graphics reel for their final project, a valuable asset when applying for any post-production job. The coursework will be supported with robust video tutorials, weekly group instruction, and critique as well as periodic individual meetings with the instructor. Additionally, the entire class will gather for several Zoom sessions with professionals working in the industry.

AS.061.305. Advanced Video Production: Comedy Films!. 3 Credits.
This course will be a hands-on, immersive, deep dive into executing comedic moments through cinematic tools and language. Through screenings and critique, we will analyze a diverse spectrum of films and television until we distill and synthesize that ineffable substance of what makes something funny. Subjects like "Spoof," "Slapstick" and "Not Funny" will be covered. Students should expect multiple artist visits, time to edit in class and plenty of group discussion. Each student will create two short comedy films throughout the semester, and work collaboratively on a third. We will also have technical days devoted to operating advanced cameras such as the Canon C300 MK2. $100 lab fee.
AS.061.145 OR AS.061.152

AS.061.309. Advanced Video Production: Influence and Anxiety. 3 Credits.
This is an advanced production course focusing on artistic influence. Each student will be working with and around a filmmaker who greatly inspires and influences their work. The evolution of style will be considered. The work will include screenings, readings, and short projects all feeding into a final movie. This course fulfills the advanced production requirement. Students should have completed a Introductory and Intermediate Digital Video Production course prior to enrollment. $100 Lab fee.

AS.061.312. The Fallen World: Morally Complex Storytelling. 3 Credits.
A workshop devoted to creating complex characters in challenging moral landscapes. Students will view and discuss a wide range of films; and creative assignments may include profiles, short fiction, monologues, and dramatic scenes for the screen. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 OR Instructor Permission

AS.061.313. Personal Storytelling for the Screen. 3 Credits.
A workshop devoted to creating compelling short scripts based on personal experience. Analysis of screened films and collaborative development of student work will emphasize how unique worlds and world views can reflect a larger shared humanity. Short critical and creative written exercises, and a longer, creative final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.315 OR AS.061.316 or Instructor permission.

AS.061.315. Screenwriting By Genre. 3 Credits.
Story design for the screenplay with special attention to the genres of comedy, horror, melodrama, and adventure. Regular workshops, short written exercises, and a longer final project.
Area: Writing Intensive
AS.061.148 OR AS.061.205 OR AS.061.270 OR permission of the instructor.

AS.061.316. Characters for the Screenplay. 3 Credits.
A workshop devoted to creating complex characters for the screen. Students will examine memorable film characters from the silent era to the present, with attention to how these characters are revealed through both the drama and the mise en scene. Weekly screenings. Short critical and creative written exercises and a longer, creative final project.Recommended Course Background: AS.061.148 OR AS.061.205 OR AS.061.265
Area: Writing Intensive

AS.061.317. Media and Narrative. 3 Credits.
Using narrative theory, this hybrid course teaches students the ins and outs of narrative forms that interact with cinema, engaging with both screenwriting and narrative studies. Using the adaptation of author Neil Gaiman's Coraline to teach students the differences in narrative structure that align with fiction, the graphic novel, and the film, it also enables them to engage in their own adaptation. Taking an original concept from short fiction to a graphic novel treatment to a film treatment, culminating in a short film script and storyboard, the course teaches the fundamentals of narrative theory and encourages students to engage with them creatively.
Area: Writing Intensive
AS.061.205

AS.061.320. 21st Century Television Auteurs and American Culture. 3 Credits.
Since the rise of HBO in the late 1990s, cable, network, and streaming television has become home to a diverse range of "quality" shows that showcase strong perspectives by unique creators. These series creators work within an intensive commercial medium and a cultural context they speak to but cannot themselves determine. This course examines the relationship between the cultural milieu in which they create work and the show creator themselves. Featuring such examples as Donald Glover's Atlanta, Michael Shur's The Good Place, Phoebe Waller-Bridge's Fleabag, Rebecca Sugar's Steven Universe, Mindy Kaling's The Mindy Project, and Terence Nance's Random Acts of Flyness, among others, it encourages students to engage in aesthetic critique as well as cultural analysis, with the ultimate end of making students better understand the relationship between television and auteur, and be better able to engage with the culture in which they swim via its media.
AS.061.140 OR AS.061.141

AS.061.321. Environmental Cinema. 3 Credits.
An exploration of cinema's unique capacity to reveal the world, this course presents an international and richly historical survey of environmental films. Examples come from narrative, documentary, and experimental filmmaking, including blockbusters, exposés of waste and pollution, guerrilla media projects, and poetic contemplations of landscapes and oceans. Filmmakers and artists include Andrei Tarkovsky, Angès Varda, Jia Zhangke, Lucy Walker, Ai Weiwei, Edward Burtynsky, and Werner Herzog.

AS.061.322. Women in Popular Film and Television. 3 Credits.
A survey of female beauty, villainy, comedy, and humanity in film and television from the silent era to the present. $50 lab fee.
AS.061.140 OR AS.061.141 or permission of instructor.

AS.061.323. Masculinities. 3 Credits.
From tap dancer to gangster, assassin to anguished teen, versions of the male in film from the silent era to the present. Cross-listed with Studies of Women, Gender, and Sexuality. One core course in Film and Media Studies is preferred but not required.

AS.061.326. Contested Ground: The American West on Film. 3 Credits.
Fantasized, mythologized, and revised: the cinematic west as landscape and idea through the lens of classical Hollywood and of contemporary independent women and indigenous filmmakers.

AS.061.328. Gangster Films. 3 Credits.
The bad guy as hero from Little Caesar to Goodfellas. Film screenings Th 7:30-10:00 PM, Sun 7:00-9:30 PM. Lab fee: $40.

AS.061.329. Left-Handed Endeavors: Crime Film. 3 Credits.
A survey of primarily American, 20th century, popular crime film: hits, heists, cons, organized crime, crimes of passion, and other "left-handed form[s] of human endeavor." Oral presentation, short critical response (5 pp.), essay (12 pp.).
AS.061.140 AND AS.061.141 AND AS.061.238 AND AS.061.144 or Instructor Permission.

AS.061.335. Monster Films. 3 Credits.
Monstrous others and monstrous selves in classic 20th century horror. One core course or permission required.
AS.061.140 OR AS.061.141 OR AS.061.238 or permission of instructor is required.

AS.061.336. American Landscapes on Film. 3 Credits.
American setting and identity: the frontier, the city, the highway, the sea, the small town, the suburb, and outer space as represented in popular film from the silent era to the present.
AS.061.140 OR AS.061.141 OR AS.061.238 OR AS.061.244 or instructor permission.

AS.061.339. A Cinema Of Anxiety: Film Noir. 3 Credits.
Shadows, dead ends, and dangerous women in the postwar films of Sam Fuller, John Huston, Fritz Lang, Anthony Mann, Jacques Tourneur, and others.

AS.061.340. The Body in French Cinema; Sexuality, Physicality, Vulnerability. 3 Credits.
This course explores how French films have interrogated the body. We will ask how they have attempted to come to terms with human physicality, desire, and fragility--and with the ability of cinema itself to move spectators emotionally and even physically. Themes explored will include sexuality, gender identity and disability. AS.061.140 or AS.061.141 or permission of instructor. $50 lab fee.
AS.061.140 OR AS.061.141 or instructor permission.

AS.061.346. Persistence of Vision: Time, Memory and the Past in Recent Global Cinema. 3 Credits.
This course will examine the ways film represents, remakes, and re-visions cultural and personal memory in a range of recent national and international films, including those by Chantal Akerman, Pedro Almdóvar, Lee Chang-dong, Claire Denis, Joanna Hogg, Hirokazu Kore-eda, Terrence Malick, Joshua Oppenheimer, Christian Petzold, Sarah Polley, Hong Sang Soo, and Jia Zhangke.

AS.061.347. Teens On Screen. 3 Credits.
This course will explore changing representations of adolescence in films from the 1950s to today across a range of mainstream Hollywood, independent, and international films. We'll examine how this dynamic and misunderstood genre shapes and reshapes perceptions of youth, and we'll discuss the frank and sometimes explosive ways teen films address difficult questions of race, class and sexual identity, often in the guise of "pure" entertainment. Recommended Course Background: Introduction to Cinema I or Introduction to Cinema II, or permission of instructor.

AS.061.348. Acting and Screenwriting for Narrative Productions. 3 Credits.
This pre-production course brings together student filmmakers from Maryland Institute College of Art (MICA) and from Johns Hopkins University (JHU), providing intensive training in the crucial aspects of preparing to shoot a successful narrative film. Students work with a professional screenwriter, allowing students to hone and improve their existing screenplays, practice the elements of writing for film, and learn how to do a script breakdown. Workshops on working with actors, taught by a professional actor, will teach students the ins and outs of casting and directing. Supplemental workshops will cover elements of pre-production such as budgets, production schedules, call sheets, and legal issues. Film screenings will train students to see films as festival curators do, with an eye toward what constitutes exciting, innovative filmmaking. This course is the prelude and prerequisite to Narrative Filmmaking II, a production course during which students will collaborate to shoot a short narrative film based on student screenplays.

AS.061.354. Invisible Cities. 3 Credits.
In Italo Calvino's book, Invisible Cities, Marco Polo depicts an eclectic array of imaginary, and fantastic, cities to Kublai Khan. Using this book as a guide, each student will create an imaginary city composed entirely from online archival footage. Following Calvino's advice, these projects will "take delight not in a city's seven or seventy wonders but in the answer it gives to a question of yours". Additional readings will include works by Louis Aragon, Walter Benjamin, Michel de Certeau, Rainer Maria Rilke, and W.G. Sebald. This course satisfies the Advanced Film Production requirement for FMS majors and minors.

AS.061.356. Narrative Productions. 6 Credits.
Narrative Productions is a joint production course for JHU and MICA undergraduates who have completed Acting and Screenwriting for Narrative Productions (AS.061.348). Students work in teams to produce a narrative short from a script written in AS.061.348. Students are assigned a primary and a secondary role on the production or post-production of their chosen film. Students fill all roles from casting, producing, direction, design, cinematography, sound recording and editing. Throughout the course, instructors will facilitate contact with relevant films and film professionals to illuminate the key creative roles necessary in the making of a successful narrative film. Instructors serve in an advisory role in the production of student projects, offering technical information and guidance throughout the filmmaking process. Students should be prepared to spend a significant amount of time outside of class working on their films.
AS.061.348

AS.061.361. Documentary Film Theory. 3 Credits.
Documentary Theory: The Work of Documentary in the Age of Reality Reproduction This course explores contemporary documentary film and video with an emphasis on selected directors and the theoretical implications suggested by their work. In particular, we look at the notion of the 'real' as it is constructed and maintained through and by documentaries. This inquiry necessarily involves a reflection that is philosophically as well as politically motivated. Directors include Errol Morris, Trinh Minh-ha, Ross McElwee, and Werner Herzog. Readings are eclectic, ranging from Annie Dillard to Martin Heidegger. Counts toward 300 or 400-level critical studies requirement.

AS.061.364. The Films of Alfred Hitchcock. 3 Credits.
Close examinations of Hitchcock's films from the Lodger to Frenzy. $40 lab fee.
Area: Writing Intensive

AS.061.365. The New Hollywood:American Films of the Seventies. 3 Credits.
This course will explore the extraordinary renaissance in American film that arose from the death of the studio system and ended with the advent of the blockbuster. We'll discuss how the political and cultural struggles over the Vietnam war, civil rights, and the feminist movement affected American filmmaking between roughly 1967 and 1980, heralded by a new generation of filmmakers working both within and outside of the system. Emphasis will be on both close formal analysis and historical contexts. Filmmakers to be discussed will include Robert Altman, Hal Ashby, Charles Burnett, Ivan Dixon, Francis Ford Coppola, Barbara Loden, Elaine May, Mike Nichols, Alan Pakula, Arthur Penn, Bob Rafelson, Martin Scorsese, Melvin Van Peebles, and Claudia Weill. This is a discussion-based class, and regular participation is required.
Area: Writing Intensive

AS.061.366. Labyrinths of Passion: The Films of Pedro Almodóvar. 3 Credits.
This course will explore a range of Almodóvar's work, from the early films emerging out of La Movida Madrileña up to and including The Human Voice and Parallel Mothers, with particular emphasis on All About My Mother, Talk to Her, Bad Education, Volver, and Pain and Glory. We will examine the director's influences and antecedents—Bunuel, Hitchcock, Sirk, Cassavetes, among others—against the backdrop of Spain's dramatic political and cultural transformation after the death of Franco. And we will closely analyze the characteristics that define Almodóvar's status as an auteur: his groundbreaking approach to sexuality, queer politics and gender transformation; his innovative use of melodrama; and his dazzlingly eclectic visual style.

AS.061.373. Intermediate Screenwriting. 3 Credits.
This course will explore strategy and process for developing a short screenplay from pre-existing literary or journalistic source material (short story, news/feature article, etc.). By exploring several "case studies" — feature films and the source material that inspired them — students will identify the practical strategies employed by professional screenwriters with the goal of employing such strategies with their own screenplay adaptations. Bulk of class will focus on designing, writing, and rewriting a 20-30 page screenplay, and sharing multiple drafts with the class (and with the professor one-on-one) for critique over the course of the semester. Each student should have 2-3 pieces of material under consideration for possible adaptation by the start of class. Discussions from time to time will also touch on the business of screenwriting. (Scripts and clips often selected from American films spanning the 60s through the 2000s.) Students will be required to purchase a license for Final Draft screenwriting software for $99. Students are expected to have previously completed AS.061.205 or another lower level screenwriting class.
Area: Writing Intensive

AS.061.374. Terrence Malick: The Poetics of Space. 3 Credits.
This course will closely examine Malick's films, with particular emphasis on his visionary manipulation of the epic vastness and lyrical intimacies of screen space. With this primary concern in mind, we will consider his films' engagement with philosophies of history and time; their increasingly experimental approach to narrative and stylistic conventions; and their enduring fascination with the interaction among the human, natural, and spiritual worlds. We will also look at recent films influenced by his work, including Carlos Reygadas's Silent Light and Shane Carruth's Upstream Color, addressing the question of what constitutes a "Malickian" cinema.
Area: Writing Intensive
AS.061.140 OR AS.061.141

AS.061.375. Surrealism and Film. 3 Credits.
We will define Surrealism through primary texts, including those of Andre Breton, Antonin Artaudand Rene Daumal and other works that defined and influenced the movement in the early part ofthe 20th century. Using an understanding of the practice of surrealism found in the readings, aswell as in surrealist games and automatic writing, we'll study a diverse group of filmmakersinfluenced by the practice, including Luis Buñuel, Joseph Cornell, Raul Ruiz and contemporary artists such as David Lynch. Assignments include weekly papers and one final creative project. Weekly film screenings Thursday 7:30-10:00 PM. $50 lab fee.Media, Online
Area: Writing Intensive

AS.061.378. Automatic Animation. 3 Credits.
A hand-made, 2-D animation course based on ideas of automatism. Students will create their own animated movie during the semester with in-class animation exercises. Readings will included Dada and Surrealist texts, poetry and theory of poetics. Sounds ideas will be discussed and pursued related to the ideas explored throughout the semester. $125 lab fee.
AS.061.145 OR AS.061.152

AS.061.380. French Cinema of Immigration, Cultural Identity, and Difference. 3 Credits.
An exploration of a series of contemporary French films that bear witness to the contemporary reality of France as a multi-ethnic society and ask essential questions about cultural identity. Is cultural and ethnic identity something that you are born into or it is a role that you elect or perform? How should individuals living today understand their relation to historical injustices? Are there things that we can learn only through relationships with people from other cultures? Screenings include works of Abdellatif Kechiche, Jacques Audiard, Claire Denis, Céline Sciamma, Michael Haneke, Mathieu Kassovitz, the Dardennes. $50 LAB FEE

AS.061.382. Explorations in Film Sound. 3 Credits.
This course traces the history of the soundtrack from Vitaphone at the coming of sound to Dolby Stereo in the New Hollywood era to the fully immersive, atmospheric sound systems of today's cinemas and home theaters. We consider major theories on the relationship between sound and image, the production of sound space, the role of the voice in cinema, and the effects of film music. Assignments will engage with the materials through both analytical reflection and short creative sound production. Screenings and examples are likely to include early sound classics, such as Sunrise (1927) and 42nd Street (1933); notable international innovators, such as The Testament of Dr. Mabuse (1933) and A Man Escaped (1956); pathbreaking stereo entries, such as Fantasia (1940) and Apocalypse Now (1979); recent exemplars of film music, such as In the Mood for Love (2000) and Morvern Callar (2002); and films that reflect on the very nature of sound recording, such as The Conversation (1974) and The Lives of Others (2006).
AS.061.140 OR AS.061.141

AS.061.384. Fabric of the Real. 3 Credits.
Maurice Merleau-Ponty writes, "the real is a closely woven fabric". In this course we will consider how several artistic disciplines weave their own version of that fabric. These disciplines include documentary film, prose poetry, landscape painting, literature, and music. The course will be predicated upon Martin Heidegger's essay, "The Age of the World Picture" and follow the lead of Roland Barthe's essay on the "effect of the real". We will also highlight various hybrid forms within these disciplines, with particular attention to the work of W.G.Sebald and StevenReich.

AS.061.391. Love and Film. 3 Credits.
In this course, we explore different understandings of "love" and the way that film has dealt with the concept as a medium. We explore a variety of approaches to the question of "love" - from the agapic to the familial to the romantic - through a series of interdisciplinary readings ranging from philosophy to anthropology. We will also equally explore the question of how film has engaged with the question of love as a concept, and what depictions of human affection - from the general to the personal - it has offered us. Screenings are required for this course. Lab fee: $50
Area: Writing Intensive
AS.061.140 OR AS.061.141 OR AS.061.226

AS.061.396. Modern Paris on Film. 3 Credits.
This course uses French film to examine the history of twentieth-century Paris. We will consider how filmmakers interpreted the social, political, and technological transformations that shaped Paris in the modern era, treating movies as expressions of change and means by which filmmakers comment on it. Taught in English. $50 lab fee.

AS.061.397. French Masculinities. 3 Credits.
Examines changing ideals of masculinity in France after 1960 as they found expression on film, rooting the work of iconic stars and directors in their cultural, political and historical contexts.

AS.061.399. Stop-Motion Puppet Animation. 3 Credits.
Students will create their own stop-motion models (puppets) based on a wire armature model. In small groups, students will design and create a simple set and make a short stop-motion movie using a DSLR camera. The question of "why animate" will be explored in student projects and responses to screenings. We will study the history of stop-motion puppet animation from Starewicz to Svankmajer to Nick Park.

AS.061.403. Advanced Screenwriting: Concocting the Thriller. 3 Credits.
If you love watching thrillers — and believe you are possessed with the right blend of obsession, stamina and blind faith required to write one — then please join us for 13 weeks of screenwriting exploration as we tangle with this most beguiling and and satisfying of film genres. By semester's end, you'll have written a "killer" first act of a feature script, developed a detailed step outline for acts 2 and 3, designed a look-book to inspire yourself and future collaborators, and hatched a plan to see you project through to completion (on your own, or in a future class.)
Area: Writing Intensive
AS.061.205 AND AS.061.373

AS.061.404. Advanced Screenwriting. 3 Credits.
Intensive workshop course where students will write a first draft of a feature-length screenplay. Classes will focus on the specific challenges of the students' works-in-progress, with an emphasis on developing a story idea that is suitable for a feature, and the craft to see it through to completion. Particular emphasis will be placed on the feature screenwriter's central challenge: creating enough of a structure in the early writing stages to keep the screenplay on track, while remaining open to new ideas for scenes and sequences that inevitably arise as the characters come to life. Select professional screenplays will be read and analyzed — and clips from select films viewed—to explore what works well on the page, and how it translates to working well onscreen. Students will aim to have a solid and workable first draft at the end of the semester, at which point avenues for further revision may be discussed. Throughout the course, Instructor will also devote a portion of class time to discuss the business of screenwriting. Students will be required to purchase a license for Final Draft screenwriting software for $99.
Area: Writing Intensive

AS.061.406. Animating Cartoons. 3 Credits.
Animating Cartoons: This class will focus on character animation. Through weekly screenings of cartoons and animations and reading comics, the form will be analyzed in class discussions and short papers. Students will create their own hand drawn character and create an extensive story board for an animation involving their character. A scene will be chosen and a short hand-drawn animation from the storyboard will be created.

AS.061.407. Advanced Screenwriting II. 3 Credits.
You've just finished the first draft of your feature screenplay or long-format teleplay. If you're like most mortals, including the teacher of this course, it's likely to be terrifically average. Here's the chance to make it good — and possibly great — with a semester's worth of systematic, high-octane rewriting. Hard labor, creative breakthroughs and a glimpse at what it takes to get Hollywood's attention included.
Area: Writing Intensive
AS.061.404

AS.061.409. The Films of P. T. Anderson: Innovation and Influences. 3 Credits.
This course will investigate Paul Thomas Anderson's stylistic and narrative innovations, as well as cinematic influences such as Altman, Kubrick, Scorsese, and Welles.

AS.061.413. Lost & Found Film. 3 Credits.
This course explores various elements of film production and filmic expression through a somewhat nebulous field typically described as lost films. Lost films (or as they are sometimes called, "orphan" films) can be generally described as films that have, for a variety of reasons, fallen out of the public view. They frequently come from educational, scientific, medical, or industrial films from the 1950s and 1960s. Using these films as source materials, lost film filmmakers explore and expose cultural conventions, visual icons, and historical value materials. Each week, students are responsible for re-editing sources found on an internet archive site. The assignments follow thematic concerns related to film editing. Students complete a final project (4-8 minutes). All editing for the course is accomplished with non-linear software, generally Adobe Premiere or Final Cut.

AS.061.440. Senior Capstone Project: Production. 3 Credits.
Permission required. Production track students complete an independent project. Should must have completed one advanced level FMS production course (POS tag FILM-PROD).

AS.061.441. Senior Capstone Project: Critical Studies. 3 Credits.
Critical studies track students complete an independent research project.

AS.061.501. Independent Study - Film. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.502. Independent Study:Film & Media. 1 - 3 Credits.
For students who wish to explore an aspect of film studies not covered by existing courses. The course may be used for research or directed readings/viewings and should include one lengthy essay or several short ones as well as regular meetings with the adviser.Permanently required: Lab Fee: $100 (if production related)
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.505. Internship-Film/Media. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.506. Internship-Film & Media. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.542. Senior Capstone Project: Screenwriting. 3 Credits.
Permission required. Screenwriting Track students complete an independent project.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.596. Ind Study - Film & Media. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.061.599. Internship-Film & Media. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070 (Anthropology)

AS.070.125. Technology and Politics in Native North America. 3 Credits.
How have biodiversity protection measures, cultural heritage NGOs, genomic science, and transnational media altered the lives of Indigenous groups in North America in the twenty-first century? What does "recognition" mean for these people, and how does it actually work in practice? This course will explore the emergence of new spaces and technologies of Indigenous politics and their new roles in shaping everyday experiences, from Inuit communities in Arctic Canada to urban centers in the United States.
Area: Writing Intensive

AS.070.132. Invitation to Anthropology. 3 Credits.
This course invites students to explore the intellectual tools anthropology offers for understanding humanity in its multiple manifestations. We will examine anthropological concepts and methods, and engage in critical analysis of a range of topics including language, exchange, class, kinship, race, community, gender and sexuality, magic and religion, and capitalism.
Area: Writing Intensive

AS.070.140. Anthropology of Food. 3 Credits.
This introductory course investigates what we eat and, as a consequence, who we are. By taking a cross-cultural perspective, students will examine the politics of food production, the values associated with food preparation, and the material and social dynamics of food consumption. Through readings, films, field trips, demonstrations, and tastings, the course offers an interdisciplinary and dynamic pedagogical approach to analyzing cooking and eating—activities central to daily life and social forms more broadly. Local- and global-level issues will be addressed as students explore histories, economics, social issues, and identity formation related to food.

AS.070.154. Maps and Mapping. 3 Credits.
This course explores maps as cultural documents and ethnographic sites. Students will learn how cultural understandings of space, time, and the visible world shape cartographic conventions. Through mapping exercises we will explore how ethnographer can use maps to theorize the nature of political, cultural, and economic life.

AS.070.201. Picturizing Climate Change. 3 Credits.
Climate change is represented in many pictures, such as those of tables, graphs, iconic photographs and filmic images. It materializes in many objects and qualities in our everyday lives, such as emissions, heat, solar grids and taxes. Artists attempt to picturize climate through photographs, installations and performance art. In this class we will examine these myriad representations, materializations and artistic efforts to see what ethical, political and aesthetic issues are at stake within them. We will ask to what concerns and desires does climate change give expression?
Area: Writing Intensive

AS.070.212. Minorites in South Asia. 3 Credits.
This course will introduce first-year students to the anthropology of modern South Asia from the lens of its varied minorities. We will interrogate ideas of nation, community, tradition, and belonging across the region to understand contemporary dilemmas of diversity, heterogeneity, and cultural citizenship.
Area: Writing Intensive

AS.070.213. Data and Society. 3 Credits.
This course explores the context, experience, and consequences of data proliferation in the contemporary moment. Both experts and laypeople generate and study data at unprecedented rates to make decisions, communicate with each other, and process their environments. How do data advance or constrain our social, political, and economic relationships at large? How is knowledge transformed when it is mediated by large volumes of data? What are the consequences of trusting sociopolitical decisions to data-processing algorithms? What happens when everyday users generate data about themselves and volunteer their data to for-profit entities? The course consists of different modules zeroing in on topics ranging from the economy, to public health, climate change, media, and the law. Each module consists of lectures and seminar-type discussions, as well as interactions with invited speakers. Students will be expected to actively participate in all discussions and develop one independent project. The course content and activities tie into the 2019-2021 Sawyer Seminar on "Precision and Uncertainty in a World of Data" led by the Departments of Anthropology and the History of Medicine.
Area: Writing Intensive

AS.070.216. Militarization & Mental Health. 3 Credits.
The course explores contemporary approaches to illness and disease in which somatic expressions reflect broader histories of political violence. The readings in the course will challenge students to consider the ways in which the contours of the human body, its interior as well as its dynamic relations with the milieu are touched by structures of violence and histories of militarization. This will enable students to understand the varying expressions in which illness is expressed in the interactions between medical professionals and patients in clinical and non-clinical settings..
Area: Writing Intensive

AS.070.221. Cityness: Anthropology and the Urban Experience. 3 Credits.
This course is an introduction to urban anthropology through the study of diverse "urban experiences," to explore how they are shaped by power relations as well as resistance. We will read about crowds and anonymity, finance and poverty, media and public space to understand how they change through the evolution of technology, shifts in capital investment and flows of migration. We will examine the scope and limitations of classical (Western) notions of foundational studies city life. We will also explore how the notion of "cityness" better captures the variety of affects and dynamics of contemporary urban everyday life.
Area: Writing Intensive

AS.070.223. Engaging Plants: Human-Plant Relations in Anthropology. 3 Credits.
With their biogeochemical power of rearranging elements, plants have sustained and proliferated life on Earth. Accordingly, humans have cultivated different relations with plants, from domestication to sciences, from agriculture to industrialized plantation, across space and time. Planetary ecological crises have radically pushed us to reconsider not simply what it means to be human but also what it means to live as an “earthling” within the complicated, fast-changing webs of life and nonlife, which are fundamentally intertwined with the vegetal forms of life. This course will explore anthropologically-informed diagnoses and prognoses of the various ways of engaging plants. Specifically, we will delve into standard forms through which humans have engaged plants, institutional frameworks that have given rise to these forms, and alternatives to these forms and institutions
Area: Writing Intensive

AS.070.239. Hinduism and Ethics: The Epics. 3 Credits.
We will read sections of the two major epics Ramayana and Mahabharata to see how issues of morality and ethics are posed in these texts and the disputations around these issues.
Area: Writing Intensive

AS.070.241. African Cities. 3 Credits.
Over the past two decades, African cities have absorbed rapid population increase without accompanying economic growth. Students will review the major challenges of this mode of urbanization and explore the vibrant ways residents have sought to meet them. Following anthropology’s commitment to lived experience, we will track these issues through the twists and turns of everyday life, and consider what they may say about urbanity more broadly in the 21st century. Topics include livelihood, the built environment, conflict and membership, and popular culture.
Area: Writing Intensive

AS.070.253. Introduction to Medical Anthropology. 3 Credits.
Is illness bound within an individual body, or is it entangled with our relations? What are the ethics and politics of the doctor/patient relation? How are medical technologies changing the way we experience illness and healing? How have global institutions responded to the problems posed by disease and development? Drawing on ethnography, film, and literature, this course introduces students to how anthropologists have explored and researched problems related to health and illness.
Area: Writing Intensive

AS.070.267. Culture, Religion and Politics in Iran. 3 Credits.
This is an introductory course for those interseted in gaining basic knowledge about contemporary Iran. The focus will be on culture and religion and the ways they in which they become interwoven into different kinds of political stakes.
Area: Writing Intensive

AS.070.273. Ethnographies. 3 Credits.
What does it mean to translate the field onto the page? This course explores the craft of ethnography and its relationship to anthropological knowledge. Reading a series of classic and contemporary works, and engaging in our own writing experiments, we attend to the knotty problem of rendering lived experience, attending to narrative, voice, structure, and the relationship between description and analysis.
Area: Writing Intensive

AS.070.281. Home and Belonging. 3 Credits.
In this course we will examine different conceptions and experiences of "home" through studies of domesticity, kinship and household in diverse cultural settings. Reading anthropological analysis of urban built environment and locality, we will explore the notions of home and homeland, as realms of care, intimacy and belonging yet also as sites of subjection, discrimination and gender/racial inequality.
Area: Writing Intensive

AS.070.295. Conflict and Security in a Global World. 3 Credits.
Students will be introduced to problems of global governance in the context of transnational conflicts, changing nature of war, new epidemics and pandemics, and the threats of planetary extinction. What are the ways security is imagined and what kinds of political passions are mobilized for security of people versus security of states.
Area: Writing Intensive

AS.070.317. Methods. 3 Credits.
This course aims to teach basic fieldwork skills: Choosing and entering a community; establishing contacts; learning to listen and to ask questions and locating archival material that might be relevant. It is a hands-on course that increases student familiarity with various neighborhoods such as the Arts District in Baltimore. Recommended Course Background: two or more prior courses in anthropology (not cross-listed courses). Course is a requirement for anthropology major.
Area: Writing Intensive
AS.070.132 OR AS.070.273

AS.070.324. Latin America in a Fracturing World. 3 Credits.
This course examines the multiple and overlapping crises afflicting Latin America today through an ethnographic lens. Featuring conversations with authors of recent work on the region’s most pressing issues, we will explore the contours of knowledge production itself under conditions of precarity and violence. Discussions will include the retrenchment of borders, migration crises, the state management of life and death, the resurgence of authoritarianism, food insecurity, and resource conflicts.
Area: Writing Intensive

AS.070.329. An Introduction to Reality. 3 Credits.
Reality is a key concept we often think with more than we think about. And yet reality is not a self-evident thing. This seminar explores a central paradox in the concept of reality: as a totality—an ‘everything’—nonetheless produced and maintained from a partial and situated practice of making. The course begins with historical examinations of reality-making and -undoing then proceeds to approaches from anthropological theory and ethnography. It looks critically at the role of scientific knowledge, technological development, and capitalist and socialist ideological regimes in making realities in their own image. The course puts forth the case that anthropology is uniquely situated to understand how systems of knowledge come into being and stabilize a social order while investigating the inherent contestability and fragility of those systems.
Area: Writing Intensive

AS.070.330. Sheltering in Places: Architecture and Anthropology in Conversation. 3 Credits.
What is the relation between social life and shelter? How do the kinds of buildings we move through shape our sense of what is important, beautiful, or possible? Why do some buildings feel good and others bad? And how do buildings evolve as people inhabit, repurpose, repair or degrade them over time? The course begins with philosophical reflections on spheres, shells, and containers in relation to childhood and memory. It then explores the long interdisciplinary conversation between architecture and anthropology, focusing on the social and cultural dimensions of built structures. Finally, it considers how architectural practice is responding to contemporary challenges of migration, pandemics, and climate change.
Area: Writing Intensive

AS.070.332. Reverberations Of The Korean War. 3 Credits.
This course will takes the reverberations of the Korean War to examine the ways in which catastrophic violence is absorbed into and corrodes social life. Particular attention is paid to the transnational nature of conflict, how boundaries around peace and war are established, and how recent scholarly and artistic work on the Korean War has critically engaged dominant frameworks of memory and trauma. Readings will draw from fiction, ethnography, historiography and will also include film. This course also draws from the public syllabus on Ending the Korean War.
Area: Writing Intensive

AS.070.334. Contemporary Anthropology. 1 Credit.
Students are invited to attend, for credit, the departmental research colloquium in anthropology. The colloquium meets most (but not all) Tuesday afternoons during the semester. Students are expected to attend and listen, encouraged to ask questions when they wish, and to write one brief reflection on contemporary trends in the field, based on what they have observed during these sessions. Prerequisite: Students must have completed one Anthropology course previously This course does not apply to Anthropology major or minors towards their minimum department requirement. It counts towards your total credit requirement to degree..

AS.070.336. Ethnographic Perspectives on Brazil. 3 Credits.
This seminar offers an examination of Brazilian culture and politics through close readings of classic and contemporary ethnography. The course will track how anthropologists have approached the complexities and contradictions of Brazilian society. And, conversely, we investigate how studies in Brazil have prompted challenges to and generated innovations in anthropological thought.
Area: Writing Intensive

AS.070.337. Invisible Cities. 3 Credits.
This year marks the 50th anniversary of the publication of Invisible Cities by the Italian writer Italo Calvino. The curious little book, a kind of re-imagining of Marco Polo’s travels as a parable about the tensions between description and abstraction, has enchanted countless readers and directly inspired projects in architecture, performance art, and the social sciences. This course embarks in a close reading of Invisible Cities to enliven engagements with urban anthropology.?We will explore the hidden and uncanny in urban worlds as an inroads into discussions of theory and ethnographic inquiry.
Area: Writing Intensive

AS.070.342. Common Ground: Shared Resources, Social Economies. 3 Credits.
This course explores the idea and practice of the commons through various sites and objects (money, work, natural resources, urban land, knowledge and culture, etc.). We will examine the promise and limitations of local, grassroots social and economic forms of organization that propose alternatives to the market economy. Focusing on workers, consumers and housing cooperatives; community currencies; urban gardens; self-help associations; fair trade organizations and knowledge networks; we will enquire how these social economies propose autonomous forms of living together, and sharing resources, property and labor.
Area: Writing Intensive

AS.070.359. Korean War. 3 Credits.
This course takes the Korean War as a site to both explore: 1) contemporary historical and political transformations in East Asia and globally and 2) the ways in which violence, catastrophic loss, and separation are woven into everyday life. It will explore the Korean War through film, fiction, historiography, and draw on comparative materials in anthropology
Area: Writing Intensive

AS.070.363. Religious Freedom and Prisons in America. 3 Credits.
"Although we often think of religious freedom as a fixed philosophical doctrine of Enlightenment liberalism, it is a concept continually being (re)made from the ground up in increasingly important ways that today affect national politics and the judiciary. Nowadays, religious freedom has cultivated oppositional meanings: it holds together both a freedom from and to supersede government regulation; where actions in the name of religious freedom seek both to separate from government and to radically engage it as a theological force. We begin by taking this tension as a provocation to look locally and draw widely from a variety of ethnographic, historical, philosophical, literary, and other present-day texts and media, which will deepen how we understand the significant scope of what is at play and at stake in contemporary America and its politics. Through our readings and discussions, we will better grasp how religious freedom and its legal interpretations have grown from the bottom up, moving through local policies, social geographies and institutions, such as churches and prisons, as much as through any singular adherence to transcendent philosophical doctrine. While this class is an overarching exploration of how American Christianity has developed, it will pay particular attention to the Alabama and Louisiana prison systems and their distinctive religious histories. And we will focus on how the varied conceptual forms of religious freedom relate to the social geographies, religious discourses, literary texts, and media produced in and through ideas of the American South."
Area: Writing Intensive

AS.070.367. Science and Technology in Africa. 3 Credits.
This course explores the role of science and technology in the making of African histories and politics. We will examine precolonial iron-working, healing, and weaving; the ways guns and railroads functioned as tools of empire; the role of hydroelectric dams in postcolonial nation building; and the rise of digital communication and payment systems in the present. Throughout, we will challenge commonsense distinctions between the material and the spiritual, designers and users, wealth and people.
Area: Writing Intensive

AS.070.368. Law and Infrastructure. 3 Credits.
Students will learn to read legal judgement and decipher how law is used to make and contest claims over infrastructure.
Area: Writing Intensive

AS.070.369. Media Artist in Residence Jane Jin Kaisen. 3 Credits.
Media Artist in Residence Jane Jin Kaisen is a team-taught class between Clara Han (Anthropology) and Bernadette Wegenstein (MLL). In this class we will prepare the artist residency of Jane Jin Kaisen, a visual artist born in Jeju Island, South Korea and raised in Denmark. In the first part of the semester, we will cover theoretical questions raised in Jane Jin Kaisen's work such as cross-cultural adoption, diaspora, migration, war, gender and sexuality, and translation. In the second part we will involve students practically in questions of media arts curation for the artist's exhibit planned for April 2-9, 2022, at the Parkway Theatre, featuring three of her recent and acclaimed installations and films: The Woman, the Orphan, and the Tiger (2010), Apertures/ Rifts (2016), and Community of Parting (2019. In this class students will be closely involved with JHU's Center for Advanced Media Studies (CAMS), and the Baltimore Stavros Niarchos Parkway Theatre's artistic director Christy LeMaster. They will also meet the artist Jane Jin Kaisen during her residency.
Area: Writing Intensive

AS.070.373. Housing Matters. 3 Credits.
This course will collectively craft an anthropological critique of housing, both as a social concern and as an object of public policy and urban planning. As a key component of the structure and functioning of cities, housing is instrumental to urban governance, segregation, and citizenship, as well as to cultures of consumption and class formation, identities, solidarities and the imagination of alternative social orders. We will study several ethnographies to examine how the material and social effects of housing shape the politics of difference, rights, markets and property relations, consumption and activism in the US urban context.
Area: Writing Intensive

AS.070.375. Technology, Trust, and Expertise. 3 Credits.
How does an idea or an observation become a "fact"? How does one study "science" anthropologically? This course will introduce students to the field of science and technology studies (STS) by asking how different societies have defined the relationship between experimentation, knowledge, and power. Through ethnographic portraits of laboratories, clinics, toxic landscapes, and virtual simulations, we will explore how scientists and other experts have understood their relationships with other citizens, the state, and the physical environment.
Area: Writing Intensive

AS.070.376. Social Ecology. 3 Credits.
This course will explore social and cultural dimensions of contemporary ecological problems, thinking between ecological anthropology, environmental philosophy, and activist literature and media. It will be taught as a community-based learning course in partnership with the Center for Social Concern and a Baltimore environmental organization. Coursework will be organized on a collaborative studio basis and a project-based approach.Recommended Course Background: One prior course in either Anthropology or Environmental Studies.

AS.070.379. Social Ecology Studio. 3 Credits.
This course will grapple with the social and cultural dimensions of contemporary ecological problems through a local, project-based approach. Coursework will be organized on a studio basis in partnership with a local environmental organization, Friends of Stony Run. Continuing a collaborative project initiated in the fall of 2019, we will work together to develop interpretive materials for the Stony Run stream and urban watershed adjoining our campus.

AS.070.380. Slumworld: Life in informal Settlements. 3 Credits.
One quarter of the planet's urban population lives today in slums, shantytowns, favelas, chawls, colonias and other forms of rudimentary settlements (according to UN Habitat). Despite their prevalence throughout the world, these places are still depicted as spaces of informality and abjection, rather than as sites of emergence ofinnovative - even if disadvantaged-, makeshift ways of producing the city. This course will combine ethnographic and geographical literature, as well as works of fiction and film to explore the lives of squatters and slum-dwellers in many regions of the world and examine in what way their practices, forms of dwelling, sociality, conflict and cooperation are constitutive of the urban experience.
Area: Writing Intensive

AS.070.381. Addiction: An anthropological approach to substance dependence in the U.S.. 3 Credits.
This course offers an advanced examination of the interpersonal, institutional, and societal dimensions of addiction in the United States. The course will be divided into four sections. This first section tracks the evolution of addiction from a moral problem of the will to a formal, biomedical disease category over the course of the 20th century. This section introduces the problem of addiction within the societal context of the United States, exploring questions of political governance, social control, and issues of race, class, and gender inequality. It asks the question: what is the social life of addiction in the United States? The second section of the course will ground these broad inquiries in the urban U.S. by examining how addiction overlaps with mass incarceration, poverty, and homelessness in the U.S. city. Over the course of this section, we will engage and reframe the crack crisis of the late 20th century. The third section of the course will shift our attention to the rural United States and how addiction overlays unemployment, social isolation, and the urbanization of the U.S. Through this social and institutional lens, the third course section will explore the contemporary opioid crisis and draw comparisons with the crack crisis. The course concludes with an examination of the personal dimensions of the addiction experience and explores substance dependence in the realms of kinship, love, and personal understandings of recovery.
Area: Writing Intensive

AS.070.389. Precarity in South Korea through TV and Film:Aesthetics and everyday life. 3 Credits.
This seminar explores how precarity in South Korea gains expression in the medium of TV and film. In particular, this seminar will focus on how the moving image brings the viewer into the texture of everyday life. We will focus on the TV show Misaeng and include films such as Parasite and Burning. TV and film will be paired with readings on the transformations of intimate life in contemporary South Korea and comparative work on precarity.
Area: Writing Intensive

AS.070.402. Sustainable Design Studio. 4 Credits.
Environmental justice issues require sustainable design solutions founded on social scientific practice, technical expertise, and solidarity with community partners. Building on theoretical and methodological knowledge gained in the Fall 2020 Sustainable Design course (AS.070.433/633), the Sustainable Design Studio will bring together students, members of Baltimore social justice organizations, and practitioners from a variety of disciplines to work in collaboration to research and design solutions to complex social-ecological problems faced by partner organizations. This studio class provides students with practical, project-based design experience through community collaboration. Instructor permission required.

AS.070.403. Public Anthropology. 3 Credits.
Recent years have seen a renewed commitment to public work in anthropology, in terms of writing, presentation, and activist engagement. This course will focus on recent ethnographic work in a public vein, examining questions of medium, voice, and responsibility, as well as contexts of circulation and reception. We will explore what it means to pursue anthropology with a broader public in mind.

AS.070.407. Design Anthropology. 3 Credits.
From casinos to canoes, algorithms to animal traps, our worlds are bursting with intentional objects. The word design has come to evoke the prestige of such objects, and their power to shape our collective habits and sensations. This course explores the anthropology of designed artifacts and their complex social trajectories. Beginning with philosophical investigations into the relationship between materials, form, and craft, we will proceed through ethnographic case studies of design as expert discourse and ordinary practice. Ultimately we will consider the affinities between the ethnography and design as open-ended and not entirely predictable engagements with the world.
Area: Writing Intensive

AS.070.413. Reading Marx. 3 Credits.
This seminar offers a close reading of selected works of Karl Marx, along with supplemental secondary literature. We will explore how the central pillars of Marx's thought--including dialectical materialism, critical political economy, and utopian socialist thought—shape his critical method in interrogating the logic of capital.
Area: Writing Intensive

AS.070.419. Logic of Anthropological Inquiry. 3 Credits.
Anthropology is an endeavor to think with the empirical richness of the world at hand, a field science with both literary and philosophical pretensions. This course grapples with the nature of anthropological inquiry, reading classic works in the discipline as well as contemporary efforts to reimagine its foundations. Required for anthropology majors.
Area: Writing Intensive

AS.070.424. Normal and Pathological. 3 Credits.
This seminar explores the shifting lines of the normal and the pathological and the constitution of disease in the complex of medicine, public health, and the social. Readings include the works of Canguilhem and Foucault, historical monographs and ethnographies. Students will have the opportunity to develop substantial research or review papers throughout the course of the seminar.
Area: Writing Intensive

AS.070.425. Anthropology of Epidemics. 3 Credits.
In this course we will examine how forms of governance, politics, expert knowledge, and citizen actions are implicated in the emergence and management of epidemics.
Area: Writing Intensive

AS.070.426. Kinship: Old and New. 3 Credits.
We wil track the transformations in kinship theory in relation to wider changes in legal theory, biomedicine, and the relation between state and family. In particular we will ask how the concepts of sovereignty, gift, exchange, human and non-human milieus affect notions of relations.Co-listed with AS.070.639
Area: Writing Intensive

AS.070.433. Development without Displacement: Sustainable Design Practicum. 4 Credits.
This year-long course will create a space for students to join in the collective struggle to build equitable and sustainable urban futures in Baltimore. The course is co-taught by community organizer Shashawnda Campbell (South Baltimore Community Land Trust) and anthropologist Anand Pandian (Johns Hopkins University). Students will gain first-hand exposure to environmental conditions, community needs, and organizing efforts in south Baltimore, working closely together with community members in developing collaborative and interdisciplinary projects in sustainable design. Team projects will continue in the spring. Class sessions will take place mainly in south Baltimore, and meeting times include transportation to/from the Homewood campus.Admission by permission of instructor. Apply at this link: https://tinyurl.com/ykjauf84

AS.070.435. New War/ Civil Conflicts/ Policing. 3 Credits.
This is an advanced course in which we will interrogate the boundaries between war, civil conflict and techniques of policing. Students should be prepared to work through texts of an interdisciplinary character.
Area: Writing Intensive

AS.070.465. Concepts: How to Read Hindu and Islamic Texts. 3 Credits.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

AS.070.472. Rumors, Conspiracy Theories And Disinformation. 3 Credits.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

AS.070.495. Householding on a Warming Earth. 3 Credits.
The household appears as commonsensical to us. It is where people, most often those of a family, reside together, sharing its resources, labor and collective fate. However, anthropologists have been arguing against this commonsense since it emerged in the 1950s. Yet the household is back again in climate change policy discussions as being most vulnerable to the problems associated with climate change, such as, temperature extremes, food insecurity, exacerbated disease, enhanced competition and violence. How might anthropological debates and controversies relating to households and householding as an activity within the context of war, famine and migration, provide important insights into today's urgencies?
Area: Writing Intensive

AS.070.503. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.504. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.508. Directed Readings. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.561. Senior Essay-Fall. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.562. Senior Essay - Spring. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.596. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.070.602. Sustainable Design Studio.
Environmental justice issues require sustainable design solutions founded on social scientific practice, technical expertise, and solidarity with community partners. Building on theoretical and methodological knowledge gained in the Fall 2020 Sustainable Design course (AS.070.433/633), the Sustainable Design Studio will bring together students, members of Baltimore social justice organizations, and practitioners from a variety of disciplines to work in collaboration to research and design solutions to complex social-ecological problems faced by partner organizations. This studio class provides students with practical, project-based design experience through community collaboration. Instructor permission required.

AS.070.603. Public Anthropology.
Recent years have seen a renewed commitment to public work in anthropology, in terms of writing, presentation, and activist engagement. This course will focus on recent ethnographic work in a public vein, examining questions of medium, voice, and responsibility, as well as contexts of circulation and reception. We will explore what it means to pursue anthropology with a broader public in mind. Cross-listed with AS.070.403

AS.070.607. Schelling and Anthropology.
The 18th century German philosopher Schelling has been hugely influential on 20th century thought (Freud, Heidegger, Nancy, Zizek, Pierce) but remains unknown outside of philosophical circles. This neglect is unfortunate given that he has so much to offer anthropological inquiries into the relations between mind and matter, nature and culture, theology and mythology among other topics. This course places Schelling's writings and commentaries on his work alongside anthropological texts and figures to explore lines of productive conversation. The theme of a romanticism appropriate to our present will be consistently explored throughout the course.
Area: Writing Intensive

AS.070.613. Reading Marx.
This seminar offers a close reading of selected works of Karl Marx, along with supplemental secondary literature. We will explore how the central pillars of Marx's thought--including dialectical materialism, critical political economy, and utopian socialist thought—shape his critical method in interrogating the logic of capital.
Area: Writing Intensive

AS.070.616. Proseminar.
This course will consist of close reading of anthropological and philosophical texts to tracesome important aspects of the underlying presuppositions of social theory. We will try to see how regions generate both data and theory; and also see how some abiding concerns around the relation between structural formations and formations of subjects are expressed in classical and current anthropological thought.

AS.070.617. Methods.
The seminar will offer a forum for students to reflect on preliminary field research and think further about problems of ethnographic method. We will proceed in the manner of a workshop for ongoing projects. Open to anthropology graduate students only.

AS.070.619. Logic of Anthropological Inquiry.
Anthropology is an endeavor to think with the empirical richness of the world at hand, a field science with both literary and philosophical pretensions. This course grapples with the nature of anthropological inquiry, reading classic works in the discipline as well as contemporary efforts to reimagine its foundations. Required for anthropology majors.

AS.070.624. Normal and Pathological.
This seminar explores the shifting lines of the normal and the pathological and the constitution of disease in the complex of medicine, public health, and the social. Readings include the works of Canguilhem and Foucault, historical monographs and ethnographies. Students will have the opportunity to develop substantial research or review papers throughout the course of the seminar.
Area: Writing Intensive

AS.070.625. Anthropology of Epidemics.
In this course we will examine how forms of governance, politics, expert knowledge, and citizen actions are implicated in the emergence and management of epidemics.

AS.070.629. Play, Performance, And Personhood.
To approach social life as performative marked a pivotal moment in anthropology and related disciplines, and even as an implicit framework it continues to undergird more recent theoretical orientations. Revisiting foundational works in ethnography and critical theory and tracing their resonances in contemporary turns and experiments, this seminar explores play and performance as both subject and method.

AS.070.633. Development without Displacement: Sustainable Design Practicum.
This year-long course will create a space for students to join in the collective struggle to build equitable and sustainable urban futures in Baltimore. The course is co-taught by community organizer Shashawnda Campbell (South Baltimore Community Land Trust) and anthropologist Anand Pandian (Johns Hopkins University). Students will gain first-hand exposure to environmental conditions, community needs, and organizing efforts in south Baltimore, working closely together with community members in developing collaborative and interdisciplinary projects in sustainable design. Team projects will continue in the spring of 2023. Class sessions will take place mainly in south Baltimore, and meeting times include transportation to/from the Homewood campus.

AS.070.635. New War/ Civil Conflicts/ Policing.
This is an advanced course in which we will interrogate the boundaries between war, civil conflict and techniques of policing. Students should be prepared to work through texts of an interdisciplinary character."
Area: Writing Intensive

AS.070.639. Kinship: Old and New.
We will track the transformations in kinship theory in relation to wider changes in legal theory, biomedicine, and the relation between state and family. In particular, we will ask how the concepts of sovereignty, gift, exchange, human and non-human milieus affect notions of relations.Open to undergraduate anthropology majors with instructors approval..Co-listed with AS.070.426

AS.070.640. Invisible Cities.
This year marks the 50th anniversary of the publication of Invisible Cities by the Italian writer Italo Calvino. The curious little book, a kind of re-imagining of Marco Polo's travels as a parable about the tensions between description and abstraction, has enchanted countless readers and directly inspired projects in architecture, performance art, and the social sciences. This course embarks in a close reading of Invisible Cities to enliven engagements with urban anthropology.?We will explore the hidden and uncanny in urban worlds as an inroads into discussions of theory and ethnographic inquiry.
Area: Writing Intensive

AS.070.659. Proposal Writing.
The seminar will offer a forum for students to discuss research projects, prepare grant proposals and think further about issues of ethnographic methodology and writing. Open to Anthropology graduate students only.
Area: Writing Intensive

AS.070.664. n the Shadow of War: Korea, Violence, and Poverty.
This seminar will explore how violence and catastrophe are embedded in everyday life in Korea. It will focus on how to interconnect the catastrophic with the everyday, and focus on the level of the household and on forms of state knowledge of the population and the unit called "the family". This is a research seminar. Students are expected to discuss their research in depth each week and should be prepared to write a significant research paper during the course.
Area: Writing Intensive

AS.070.665. Concepts: How to Read Hindu and Islamic Texts.
What is the nature of anthropological concepts and what relations do they bear to concepts internal to a society? We invite students to think with key ideas from Hindu and Islamic traditions, asking if anthropological concepts are best seen as abstractions from the particular or as intertwined with ongoing lines of inquiry, say into the nature of the real and continual efforts to test it? Topics in ritual theory, grammar, aesthetics, translation, revelation, luminosity, figuration and the mythological among those to be considered.
Area: Writing Intensive

AS.070.672. Rumors, Conspiracy Theories And Disinformation.
Our present is said to be rife with more rumors, conspiracy theories and disinformation than ever before. Is this moment so different from previous, historical moments of crisis? Haven't these modes of expression always been present, albeit at the margins of the political order? What does it say about knowledge to have multiple "regimes of truth" (Foucault)? How does a new media landscape based in algorithmic modularity, and particularly social media, change the set up from an old analogue media economy? This course, co-taught by an, a literary theorist, and a media theorist, aims to provide a diversity of theoretical and methodological perspectives to help us examine the current state of reality.
Area: Writing Intensive

AS.070.673. Readings of Foucault.
We will do a close reading of selected texts of Foucault to track the concepts of power, subjectivity, government, and care of the self.

AS.070.674. Readings in Anthropology.
In this course we will engage classical texts from the anthropological archives and explore debates and contemporary salience.
Area: Writing Intensive

AS.070.676. Semiotics and its Discontents.
The relationship between speakers, communities, and forms of language-in-use (ritual, everyday life, oral literature) can only partly be captured by conceptions of language as a sign system. In this course, we will review structuralist approaches most closely identified with semiotics and move on to explore the concept of "presence" and its explanatory potential for anthropological attempts in understanding language.
Area: Writing Intensive

AS.070.682. Readings in Anthropology.
This course introduces classical texts from the anthropological archives in relation to contemporary debates in the discipline. In this year's iteration, our readings and discussion will explore the idea of a public and engaged anthropology.

AS.070.687. Romanticism and Anthropology.
The word "romantic" has long carried negative connotations within anthropology meaning the tendency to idealize, exoticize, or seek out the irrational. Instead, through a focus on the themes of magic, art, myth, nature and creativity, we suggest that romantic philosophy has offered and continues to offer much of interest for contemporary anthropology. Drawing on select readings in philosophy and anthropology, we will explore the suppressed romantic legacy of anthropology. This is an undergraduate and graduate combined course. Recommended Course Background: Undergraduates have to have taken at least one anthropology course (any level) to register. Or else they need the permission of the instructor.
Area: Writing Intensive

AS.070.691. The Anthropological Tone in Philosophy.
This course will ask: what constitutes an anthropological tone in philosophy? We will take up classical topics such as rule following, everyday life, skepticism, concept formation, realism, and signification in selected texts of anthropology and philosophy for understanding if these crisscross and overlap.
Area: Writing Intensive

AS.070.698. Defining Region.
This course is open to anthropology graduate students only and is to be run on a workshopmodel. It is to help those students writing their regional essay for the comprehensive exams toacquire expertise in regional debates and literature relevant to their field research. Our understanding of regions is one of cross-cutting concepts and questions rather than geographical framings alone. After identifying a concept or question, each student will create an annotated bibliography, trace the shape of arguments as they emerge within the readings, create an outline and work toward a draft of the final essay.

AS.070.801. Dissertation Research.

AS.070.802. Dissertation Research.

AS.070.803. Summer Research.
Summer Research for doctoral students

AS.070.866. Directed Readings and Research.

AS.070.867. Directed Reading and Research.

AS.070.871. Directed Reading and Research.

AS.070.872. Directed Readings and Research.

AS.070.874. Directed Readings and Research.

AS.070.886. Dir Readings & Research.

AS.070.892. Directed Readings and Research.

AS.080 (Neuroscience)

AS.080.140. Neuroscience and Human Behavior. 1 Credit.
Consider how behavioral neuroscience can help you understand these curiosities and more: a native Australian man suffers a stroke, recovers, but can only speak Chinese; altering but one neural receptor in the prairie vole will change it from a monogamous to polygamous animal; neurodegenerative disease can cause fits of uncontrollable laughter, despite nothing being funny. Learn how cells and chemicals result in complex behavior and critically examine whether or not the mind is an organic computer in this behavioral neuroscience program.

AS.080.160. Neurobiology: Cellular & Systems. 1 Credit.
Establish a foundation for advanced study of neuroscience in research and medicine. Your curriculum will cover university-level cellular, network, and behavioral neurobiology using engaging evidence-based educational models that encourage enthusiasm and uninhibited critical thought. Additional emphasis will be placed on familiarizing you with the laboratory and research methods useful in a scientific career. There are no prerequisites, but a background in biology is helpful.

AS.080.250. Neuroscience Laboratory. 3 Credits.
This course will give students the "hands-on" experience of the inter-disciplinary nature of neuroscience. Students will use anatomical and neuro-physiological techniques to understand the basic underlying principles of neuroscience.
(AS.080.305 AND AS.080.306) OR AS.200.141

AS.080.301. Behavioral Assessment of Animal Models of Cognition and Neuropsychiatric Disorders. 3 Credits.
What does a rat exploring it's environment tell us about memory? How can a mouse help us better understand schizophrenia? This course will focus on procedures that are routinely used to study behavior in animal models of cognition and neuropsychiatric disorders. Topics will include motor function, emotional and motivational states, disorders such as dementia and schizophrenia, among others. Throughout the course, we will read and discuss original research articles to illustrate and compare some of the measures and results from the various procedures.
AS.200.141 OR AS.080.105 OR (AS.080.305 and AS.080.306), OR by instructor permission.

AS.080.303. Structure of the Nervous System. 3 Credits.
This course takes a structural biological approach to studying the nervous system. In using a systems approach it provides students of cellular-molecular and computational neuroscience with a thorough introduction to functional, microscopic and submicroscopic organization of the brain, spinal cord and peripheral nervous system.
AS.080.305 AND AS.080.306

AS.080.304. Neuroscience Learning and Memory. 3 Credits.
This course is an advanced survey of the scientific study of learning and memory. Different perspectives will be used to review the science of learning and memory including the cellular-molecular basis of synaptic plasticity, the functional circuitry involved in learning and memory and memory systems in the brain. The course is designed to provide a deep understanding of the issues and current debates in learning and memory research and focuses specifically on animal models of memory and memory impairment. This is an interactive lecture course with a strong emphasis on student participation.
AS.200.141 OR (AS.080.305 AND AS.080.306) OR (AS.020.312 AND AS.020.306) or instructor permission.

AS.080.305. Neuroscience: Cellular and Systems I. 3 Credits.
(Formerly Nervous Systems I) Neuroscience: Cellular and Systems I is a fully integrated, two-semester course that surveys the cellular and molecular biology of neurons as well as the structure and function of the nervous system. Students must register for Neuroscience: Cellular and Systems II offered in the second term. Course open to JHU undergraduates only.
AS.080.203 OR AS.050.203 OR AS.200.141 OR AS.080.105 OR AS.050.105 or instructor permission.

AS.080.306. Neuroscience: Cellular and Systems II. 3 Credits.
(Formerly Nervous Systems II) Neuroscience: Cellular and Systems II uses the functional organization of the somatosensory system as a means to examine mechanisms of neutral development. Generation and maturation of neurons, guidance of axons, formation of synapses and the regressive events that shape the adult nervous system will be examined. At the same time we will explore the structure and function of brain regions that allow us to feel pain and temperature, detect vibration, recognize shape and perceive where we are in space. Finally, the single-neuron events that lead to adaptive changes in function will be explored in the context of central nervous system control of movement and of higher order functions of speech and memory. Students who do not register for Neuroscience: Cellular and Systems I offered during the first term should not register for this class.
AS.080.305

AS.080.308. Neuroeconomics. 3 Credits.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience.
AS.080.306 OR AS.200.141 OR AS.020.312

AS.080.310. Synaptic Function and Plasticity. 3 Credits.
The function of the nervous system is based on synaptic transmission between neurons. Synapses are not static structures, but dynamically change with experience. Experience-dependent synaptic plasticity not only allows proper development of the nervous system in tune with the environment, but also is the basis for learning and memory. This course will cover the structure and function of synapses, and how they are altered by experience to encode information.
(AS.020.305 AND AS.020.306) OR (AS.080.305 AND AS.080.306)

AS.080.314. How to Live a SPECtacular Life. 3 Credits.
Good mental health is key to living a happy and healthy life. This statement is true whether you are an elementary, middle, high school, or college student. It is also true if you are a recent graduate in the work force, middle aged, retired or elderly. According to the literature, to achieve good mental health you need to focus on the role that the brain plays in our Social, Physical, Emotional and Cognitive (SPEC) health. These are four key components needed to achieve and maintain good mental health. The main focus of the course will be mental health. Using the research, we will come up with tools to help educate individuals, at any point in their lifespan, on how to live a SPECtacular life.
Area: Writing Intensive
AS.080.306

AS.080.316. Prefrontal Cortex- Computational Models and Neurophysiology. 3 Credits.
The course will cover the function of the prefrontal cortex. We will discuss various computational models of prefrontal function and neurobiological evidence for these models. The class will consist of lectures, student presentations, and discussions.
AS.080.305 AND AS.080.306 or Instructor Permission.

AS.080.321. Computational Neuroscience. 3 Credits.
This course is designed to give students an overview of computational neuroscience. The topics discussed will cover many exciting domains of the field including neural coding, decision-making, learning, attention and connectomics. Lectures will be complemented with hands on experience working with computational models using Matlab and/or other programming language. The overarching goal of the course is to increase overall literacy in the field of computational neuroscience and to gain an appreciation of the interplay between experimental and theoretical neuroscience.
AS.080.306 OR AS.200.141. Familiarity with programing in Matlab will be helpful but not necessary.

AS.080.326. Neurobiology and Diseases of the Peripheral Nervous System. 3 Credits.
This course will cover neurobiology and disorders of the peripheral nervous system (PNS). A particular emphasis will be on cellular interactions within the PNS and with target tissues. For example, the two principal components of the peripheral nerves- axons and Schwann cells- have intimate and continuous cellular communications that are critical for physiological function of the PNS. The course will teach how these cellular interactions are developed, maintained throughout life, and are impacted by injury and diseases.
AS.080.305 AND AS.080.306

AS.080.328. Behavioral Neuroscience Lab. 3 Credits.
Class designed to give students first-hand knowledge of the behavioral procedures and techniques used to study behavior in the field of neuroscience. Students will gain hands-on experience by carrying out some of the behavioral tasks used to assess animals under specific behavioral domains, discuss why certain aspects (i.e. genotype, environment conditions, group size, etc.) are important factors to consider when designing, planning, and carrying out such experiments, and learn the relevance of behavioral research in translational medicine.
AS.200.141 OR AS.200.302 OR AS.080.301 OR (AS.080.305 AND AS.080.306) or permission by instructor.

AS.080.334. Unraveling Circuits in Systems Neuroscience- Emerging Techniques. 3 Credits.
Rapid technological development in neuroscience provides researchers with new tools and strategies to ask important questions about the neural basis of behavior. In this course, we will examine some of these emerging techniques, along with a sampling of the questions they have allowed scientists to answer. We will consider the conceptual insights that arise from answering these questions, as well as investigate the fundamental science behind the cutting-edge techniques that allow us to understand brain function in health and disease.
AS.080.305 AND AS.080.306 or Instructor Approval

AS.080.336. Brain-Body Interactions in Health and Disease. 3 Credits.
Both classical and recent primary research papers that deal with cross signaling of other major organs with the nervous system, particularly the central nervous system, will be discussed. Students will be exposed to emerging literature on how peptides, signaling molecules, and hormones effect the nervous system function both in health and in diseases.
AS.080.305 AND AS.080.306

AS.080.339. Cognitive Neuroscience of Aging. 3 Credits.
When will I start forgetting things? Do I have Alzheimer's disease? What can I do to minimize the chances I experience cognitive decline with aging? This class will spend a significant amount of time exploring the answers to all of these questions and many more. We will review basic information about cognitive neuroscience techniques such as fMRI, DTI, PET, and EEG and explore how aging changes the brain. The heart of the class will be about cognitive changes with aging with a focus on attention, executive function, memory, and emotion. The class will end with discussions about Alzheimer's disease and Parkinson's disease as well as lifestyle choices that increase/decrease the chances of healthy aging.
Area: Writing Intensive
AS.200.141 OR AS.080.306

AS.080.345. Great Discoveries in Neuroscience. 3 Credits.
This course examines the historical and intellectual context of selected, key advances in neuroscience, how they were made and the impact they had on an understanding of the nervous system. Particular attention will be paid to advances in cellular and molecular neuroscience. Among the topics covered will be the discovery of monoamine neurotransmitters and of endocannabinoids, the role of neurotrophins in neural development, and prion-based diseases of the brain.
AS.080.306

AS.080.355. Computational Principles of Biological Vision. 3 Credits.
Even though we take it for granted, vision is a superpower. It is so central to how most of us interact with the world, and so effortless, that we are unaware of the astronomically complex computations that underlie it. There are no computer vision programs that can match the performance of the human visual system in understanding the real, physical, 3D world. On the biological side, vision is the most thoroughly studied sensory system. As such, vision is a rich target for computational understanding of the brain. Vision is the topic that both of us actively study, and remain passionately excited about. In this course, we present our up-to-the-minute synthesis of what we consider to be the most important insights into how vision, especially object vision, works, at the level of biological information processing. We believe the result is a coherent, mechanistic account of how the brain transforms images into visual understanding. We know of no textbook that provides a comparable viewpoint. In addition to presenting this visual information processing framework, we hope to teach you how to critically evaluate current research papers within that framework. To this end, we will be incorporating discussions of current research papers into our lectures and assignments. The course will feature a series of weekly lectures (delivered as videos) and a weekly assignment. The weekly assignment will be an essay, and will make up the largest portion of your grade. The remainder of your grade will come from one larger final essay. We will offer 2 weekly, voluntary Zoom meetings to discuss any questions about the material that might have come up.

AS.080.360. Diseases & Disorders of the Nervous System. 3 Credits.
(EN.580.421 AND EN.580.422) OR (AS.020.305 AND AS.020.306) OR AS.080.306 or instructor permission.

AS.080.366. Neuroscience of Pain. 3 Credits.
This course is a systems-oriented course focusing on the basic neural processing of pain signals in both the spinal cord and the brain. Class lectures will cover the anatomical and molecular basis for the transmission and perception of pain signals, basic concepts such as allodynia, hyperalgesia, peripheral and central sensitization, remodeling, the pathophysiology of chronic pain disorders and the cognitive and emotional aspects of pain. We will also discuss the regulation of pain signals by descending systems, and current practices and new advances in the treatment of pain.
Area: Writing Intensive
AS.080.305 OR AS.080.306 OR AS.020.312 or permission of instructor.

AS.080.370. The Cerebellum: Is it just for motor control?. 3 Credits.
The cerebellum is traditionally thought to be involved in movement and motor control, and observations of patients with cerebellar damage do in fact show motor deficits. However, since the proliferation of functional MRI, cerebellar activations have been observed in a surprising number of brain activation studies that were designed to investigate the neural correlates of cognitive function. Over the past 2 decades, an increasing number of investigators have tried to characterize the role of the cerebellum in cognitive function. Through lectures and reading discussions this course will survey cerebellar circuitry, neuroimaging and neuromodulatory methods for investigating the cerebellum, and traditional and non-traditional functions of the cerebellum, including cerebellar involvement in cognitive functions such as language, working memory, and executive control.
(AS.080.306 AND AS.080.203) OR AS.050.203

AS.080.411. Advanced Seminar: Neuroscience I. 3 Credits.
For students in the first semester of the BS/MS Program. Instructor permission required.

AS.080.412. Advanced Seminar: Neuroscience II. 3 Credits.
For students in the 2nd semester of the BS/MS Program. Permission Required.

AS.080.413. Advanced Seminar: Neuroscience III. 3 Credits.
For students in the 3rd semester of the BS/MS Program. Permission Required.

AS.080.500. Scientific Communication: Neuroscience. 0.5 Credits.
Scientific communication is crucial to encouraging engagement with the public and advancing science. The Scientific Communication course consists of a two hour research orientation session held at the beginning of the semester and a two hour exit session held at the end of the semester. In addition to the two in-person sessions, students will work with faculty and peers to hone their ability to communicate complex topics to a broad audience. These interactions will take place over the course of the semester via Blackboard and have a more flexible timeline. See special notes section for specific meeting day/time for the two in-person sessions. Students need to complete two semesters of Scientific Communications. Students are strongly encouraged to only take Scientific Communications when they are either actively involved in research or have completed at least three credits of research. See Neuroscience Research website for more details.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.505. Practicum in Language Disorders- Community Based Learning. 2 Credits.
This course provides the opportunity to learn about adult aphasias, language disorders which are one of the most common consequences of stroke. You will receive training in supportive communication techniques and work as a communication partner with an individual with aphasia for two hours per week. Three class meetings for orientation and reading assignments will be held on campus; training and practicum will be conducted at a local aphasia support center. Independent mode of transportation required. Co-listed as AS.050.500 in Cognitive Science. Find out more about the practicum site at https://www.leagueforpeople.org/scale.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.;Students must have earned an A- or Better in AS.050.105 OR AS.050.203 OR AS.080.203 OR AS.050.311, or obtain instructor's permission.

AS.080.511. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.531. Research Neuroscience-Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.534. Neuroscience Research- Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.541. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.544. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.555. Neuroscience DUS Approved Research. 1 - 3 Credits.
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You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.582. Neuroscience: Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.592. Research Neuroscience – Freshmen. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.594. Research Neuroscience – Neuroscience Majors. 1 - 3 Credits.
Students will receive a hands-on experience conducting Neuroscience Research. In addition to participating in laboratory research students are required to submit a research style paper summarizing their work (https://krieger.jhu.edu/neuroscience/research/research-paper-guidelines/). Students are also strongly encouraged to take Scientific Communication when they are either actively involved in research or have completed at least three credits of research. See the Neuroscience Research website for more details (https://krieger.jhu.edu/neuroscience/research/research-credit-requirements/).
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.080.601. Neuroeconomics -Graduate Level.
Every day decisions often require us to weigh the costs and benefits of engaging in a particular course of action in order to obtain some expected outcome. Unfortunately, we often lack the information necessary to obtain our desired goal with complete certainty. Economists have long been interested in understanding human decision-making under these circumstances. In parallel, neuroscientists have made great strides at describing the underlying neural basis of simple decision-making. However, despite much progress in both fields, our understanding of how the brain makes decisions is incomplete. In order to strengthen and further research in both fields, the interdisciplinary field of Neuroeconomics arose. This course will survey the field of Neuroeconomics focusing on theoretical concepts developed by economists and the role these theories are playing in guiding current experimental neuroscience. Only graduate students can register for this course. Instructor signature is required.

AS.080.610. Experiential Learning: HopKids – Kennedy Krieger Institute.
This experiential learning experience provides the opportunity to learn and interact with children recovering from brain, spinal, and musculoskeletal injuries. Students will travel to the Kennedy Krieger Institute to volunteer in the Child Life Department where they will participate in a variety of therapeutic activities including playing with the children and helping them achieve goals on Saturdays (days/times TBA). Students will gain valuable clinical experience while learning patient empathy. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times). Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.612. Experiential Learning: KEEN (Kids Enjoying Exercise Now).
In this experiential learning experience, students will work with children who have a variety of neurological disabilities, including autism, cerebral palsy and Down syndrome through exercise and recreational activities. We partner with the KEEN (Kids Enjoy Exercise Now), a nonprofit organization. Student “coaches” will receive a profile for the KEEN athlete that they will pair up with during a session. Students will receive initial training and then select 4 sessions to attend. Sessions are held on the first and third Sunday of each month during the semester at KEEN centers in Maryland. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times). Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Transportation will be via student carpools using Zipcars, personal vehicles or Hop Vans. No credit - S/U Grading Only

AS.080.614. Experiential Learning: Making Neuroscience Fun.
The goal of Making Neuroscience Fun (MNF), a community outreach program, is to educate Baltimore city and county elementary school students, on how to achieve good mental health by focusing on the role the brain plays in our Social, Physical, Emotional and Cognitive (SPEC) health. The MNF- Brain Health: It’s SPECtacular program focuses on using scientific research as the foundation for developing information about mental health and relaying the information in an age-appropriate manner. The elementary school students (pre-K through 5th grade) learn about their brain and how to keep it healthy and our students learn valuable communication skills. Hopkins students will receive initial training and certification on content & presenting skills prior to participating and will then be part of the new launch of the program. In order to participate, students must be available either 7am-11am or 11am-3pm at least one day per week, Monday-Friday. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times of the orientation/exit sessions). Transportation to the schools will be via student carpools using Zipcars or personal vehicles. No credit - S/U Grading Only

AS.080.616. Experiential Learning: HopKids- Children's Center.
This experiential learning experience provides students the opportunity to learn, play and interact with children receiving treatment in over 20 different specialties including dermatology, endocrine, GI, immunology, urology, plastics and hematology. Students will volunteer in outpatient clinics at the Johns Hopkins Children’s Center where they will encourage, provide developmentally supportive play for children and participate in a variety of activities including art projects, coloring, board games, and reading. Students will gain valuable clinical experience and be exposed to a wide range of children with a variety of diseases/illnesses. Students MUST attend a mandatory orientation and a mandatory exit session held on the Homewood campus (see section web notes for days/times. Students will sign up for 5 shifts on a first-come, first-serve basis after the mandatory orientation. Shifts are Mondays 1pm-3pm, Tuesdays 10am-12pm, Wednesdays 1pm-3pm, Thursdays 10am-12pm and Fridays 10am-12pm throughout the semester. Students are required to present a written description of their experiences and to discuss their experiences at the exit session. Volunteer shifts will take place at outpatient clinics in the Rubenstein Child Health Building. Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.618. Experiential Learning: Helping an Aging Community: Social and Cognitive Support for Seniors.
This experiential learning opportunity provides a hands-on experience, working side-by-side with elderly individuals at the Keswick Multi-care Center and the Roland Park Place. Students will have a chance to interact with residents that have both short-term and long-term cognitive and physical impairments. The residents typically live on the premises but may also be participating in a daytime care only program. Students will interact with the residents in various enriching ways in order to develop a better understanding of how our mind and body ages with time. Students will gain hands-on experience working with residents with dementia, Alzheimer’s and other cognitive impairments that effect the body and the brain. 4 students per semester. Students MUST attend a mandatory orientation and a mandatory exit session to be held onsite (Day/Time TBD). Students are required to provide a written description of their experiences and to discuss their experiences at the exit session. Time Commitment: 2-3 hours a week for the entire semester. Must provide medical immunization records to include- flu shot and PPD (tuberculosis). Transportation will be provided by the JHMI shuttle. No credit - S/U Grading Only

AS.080.620. Theoretical and Computational Neuroscience.
The objective of this class is to introduce fundamentals of quantitative neuroscience. The focus is on understanding basic information processing in neurons and networks of neurons, with some more advanced topics added. Knowledge of basic calculus and linear algebra is required.

AS.080.630. Bodian Seminar Series.
The Bodian Seminar is an interdisciplinary colloquium for discussion of current research into the neural basis of mental processes. Leading researchers, generally from outside the University, are invited to give lectures, which will be announced per e-mail. Undergraduate students who register for this course are asked to study a publication by the speaker, as provided with the announcement, and to prepare a question for each speaker together with a brief discussion of the possible answers. Permission required for undergraduate students.

AS.080.631. Bodian Seminar Series.
Graduate students and Seniors with instructor permission. The Bodian Seminar is an interdisciplinary colloquium for discussion of current research into the neural basis of mental processes. Leading researchers, generally from outside the University, are invited to give lectures. About 12 lectures are scheduled per semester (see http://www.mb.jhu.edu/seminars.asp). Speakers, titles of lectures, and dates are announced to participants per e-mail. The announcements also include links to one or two recent publications of the speaker. Undergraduate students who register for this course are asked to study these papers and to prepare a question for each speaker together with a brief discussion of the possible answers. Question and discussion have to be in writing and turned in the day before the lecture. Undergraduates must e-mail the instructor for permission (cfetsch@jhu.edu) prior to registering for the course.

AS.080.660. Commencement Project.
This course is for BA/MS students that have completed their year of research and are now working on their final thesis. In this course, students devote their semester to preparing their final thesis documentation and move forward with their Master's Thesis Defense which is the last piece to the program. This course is for BA/MS student only and students should only register for this course in their last semester in the program.

AS.080.849. Teaching Practicum.
Permission required. Graduate students only.

AS.080.850. Mentored Research: Neuroscience I.
For students in the BS/MS Program first semester. Permission required.

AS.080.851. Mentored Research: Neuroscience.
Permission Required. For students in the BS/MS Program.
Area: Writing Intensive

AS.080.852. Mentored Research: Neuroscience II.
For students in the BS/MS Program second semester. Permission required.

AS.100 (History)

AS.100.102. The Medieval World. 3 Credits.
This course explores selected topics in the political, economic, social, and intellectual history of Western Europe in the wider world in the period between the fall of the Roman Empire and the fourteenth century. Special emphasis will be given to understanding the ways in which medieval society functioned as it reorganized itself after the almost total collapse of the ancient world. Topics include: religious plurality, sovereignty and subjecthood, flourishing of learning, chivalric culture, crusading, and the plague and its effects. We will follow the interplay between material and cultural forces in the processes of social organization.
Area: Writing Intensive

AS.100.103. Early Modern Europe & the Wider World. 3 Credits.
This course surveys the history of Europe and its interactions with Africa, the Americas, and Asia during the early modern period (c. 1400-1800). Topics include: the Renaissance, the Reformation, International Relations and Warfare, Colonialism, the Enlightenment, and the Age of Revolutions.

AS.100.104. Modern Europe and the Wider World. 3 Credits.
The Modern European World familiarizes students with key moments, ideas, communities, individuals, and movements which have formed European History since the Revolutionary era.

AS.100.108. Making America: Black Freedom Struggles to 1896. 3 Credits.
From slave revolts on the West African coast to national conventions and civil war, people of African descent have defined freedom and struggle in terms of kinship, diasporic connection, and fighting antiblack violence. This course explores the arc of that history and its role in the making of America.

AS.100.113. Making America: Race, Radicalism, and Reform. 3 Credits.
This course examines race and social movements in America from the Revolution to 1921.

AS.100.115. Modern Latin America. 3 Credits.
A class combining Latin American history since independence and digital humanities (revised with 2021 student feedback). Students will build guided research projects while thinking about questions of republicanism, freedom and unfreedom, migration, and development.

AS.100.122. Introduction to History of Africa (since 1880). 3 Credits.
An introduction to the African past since 1880.
Area: Writing Intensive

AS.100.123. Introduction to African History: Diversity, Mobility, Innovation. 3 Credits.
Introduction to three major themes in African history, from the precolonial era to the present.
Area: Writing Intensive

AS.100.128. Approaches to Jewish History. 3 Credits.
The course will provide an introduction to the study of Jewish History.

AS.100.129. Introduction to Modern Jewish History. 3 Credits.
Jewish history 1750-present in Europe, the Near East, the US, Israel; the challenges of modernity and new forms of Jewish life and conflict from Enlightenment and emancipation, Hasidism, Reform and Orthodox Judaism to capitalism and socialism; empire, nationalism and Zionism; the Holocaust. Extensive attention to US Jewry and State of Israel.

AS.100.154. Modern Mexico from the Alamo to El Chapo. 3 Credits.
In this course we will use popular depictions of Mexico's heroes and villains, tragedies and triumphs to delve into both the nation's history and the importance of thinking historically.

AS.100.165. Japan in the World. 3 Credits.
This course is an introduction to Japan's history from 1800 to the present with emphasis on the influences of an increasing global circulation of ideas and people. Topics include the emperor system, family and gender, imperialism, World War II, the postwar economy, and global J-pop.

AS.100.170. Chinese Cultural Revolution. 3 Credits.
The Cultural Revolution was Mao Zedong's last attempt to transform Chinese society spiritually and structurally. The events of this period were marked by social upheaval, personal vendettas, violence, massive youth movements, and extreme ideological pressure. This course will explore the Cultural Revolution from a variety of perspectives, focusing on the relationship between events in China from 1966-1976, and their interpretation in China and the West during the Cultural Revolution decade and since. (Previously offered as AS.100.219 and AS.100.236.)

AS.100.180. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography.

AS.100.190. Modern African American History, 1896 – present. 3 Credits.
This course introduces students to the defining social, political, and cultural moments that reflect the experience of African Americans in the United States, 1896 – present. Topics include the Great Migration, the Harlem Renaissance, the Black Freedom Struggle, African American politics, urban rebellion, mass incarceration, Hip Hop culture, the current movement for Black Lives, and more.

AS.100.193. Undergraduate Seminar In History. 3 Credits.
The first semester of the two-semester sequence required for majors, this course introduces students to the theory and practice of history. Following a survey of approaches to the study of the past and an introduction to research methods, students undertake original research and write an extended essay. Intended for history majors and prospective majors.
Area: Writing Intensive

AS.100.194. Undergraduate Seminar in History. 3 Credits.
The second semester of the two-semester sequence required for majors, this course further introduces students to the theory and practice of history. Students write an essay based on original research.
Area: Writing Intensive
AS.100.193

AS.100.216. Reformation and Counter Reformation Europe. 3 Credits.
This course explores the series of religious and political conflicts that make up what are known now as the Reformation and Counter-Reformation in Europe.

AS.100.230. Bones, Blood, and Ecstasy: Religious Culture in Western Christendom, 1100-1700. 3 Credits.
Explores religious culture in medieval and early modern Europe, with an emphasis on spiritual beliefs and practices, relics, miracles, pilgrimage, and saint-making. Emphasis on reading and discussing written sources and visual culture.
Area: Writing Intensive

AS.100.231. Worlds of Hip Hop. 3 Credits.
Worlds of Hip-Hop explores hip-hop as an arts movement whose forms, conventions, and standards responded to the specific political and social conditions to address questions of freedom and community.

AS.100.233. History of Modern Germany. 3 Credits.
There is more to Germany than beer, BMWs, and Bayern Munich. We explore politics, culture, economics and society to understand Germany and its role within Europe and the world from the 18th century to the ‘Refugee Crisis’, climate change and EU politics today.

AS.100.238. Expansion and the Early U.S. Republic. 3 Credits.
This course will introduce students to some major issues and problems in the history of the Early U.S. Republic, c. 1750 to 1815, by focusing on the theme of “expansion.”

AS.100.240. American Cultural Criticism. 3 Credits.
This course explores 20th century U.S. history through the works of writers and artists. We will ask how essays, novels, performance, and art can function as cultural and social criticism.
Area: Writing Intensive

AS.100.241. American Revolution. 3 Credits.
This course provides an intensive introduction to the causes, character, and consequences of the American Revolution, the colonial rebellion that produced the first republic in the Americas, and set in motion an age of democratic revolutions in the Atlantic world. A remarkable epoch in world history, the revolutionary era was of momentous significance.
Area: Writing Intensive

AS.100.243. China: Neolithic to Song. 3 Credits.
This class offers a broad overview of changes in China from Neolithic times through the Song Dynasty (roughly from 5000 BCE through the 13th century CE) and will include discussion of art, material culture, and literature as well as politics and society. Close readings of primary sources in discussion sections and extensive use of visual material in lectures will help students gain firsthand perspective on the materials covered.

AS.100.248. Japan in the World. 3 Credits.
An introduction to Japan’s history from 1700 to the present, with emphasis on the influences of an increasing global circulation of ideas, goods, and people in early modern and modern times. Topics include samurai, nation-building, gender, imperialism, World War II, the postwar economy, and contemporary popular culture.

AS.100.250. The American Revolution in Unexpected Places. 3 Credits.
This course considers the American Revolution from the perspective of locations beyond the thirteen rebelling colonies. Covering a range of global hotspots, the focus is on events from 1763 to 1788.

AS.100.251. West African History. 3 Credits.
This course explores the rich history of West Africa and its place in the broader world. Topics include the environmental history of the Sahara desert, West African empires, and the rise of Nollywood and contemporary culture.
Area: Writing Intensive

AS.100.268. Jewish and Christian mysticism in the Middle Ages and the Early Modern Period. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 12th and the 17th centuries.

AS.100.270. Europe since 1945. 3 Credits.
This class focuses on Europe from the end of World War II until today. We will discuss such topics as the Cold War, social democracy, the welfare state, the relationship to the US and the Soviet Union, decolonization, migration, 1989, European integration, neoliberalism, and the EU. We will discuss and analyze academic literature, movies, documentary films, textual and visual primary sources.

AS.100.273. A Comparative History of Jewish and Christian Mysticism. 3 Credits.
This course will trace the historical development of Jewish and Christian mysticism between the 11th and the 19th centuries.

AS.100.275. Passing in American Culture. 3 Credits.
This course explores passing narratives – stories that feature people who cross race, class, ethnic, or gender boundaries. We will consider what passing narratives can teach us about power and identity, especially as power is presumed to reside in the self and race is presumed to no longer matter.

AS.100.282. Race & Power in Modern South Africa. 3 Credits.
Overview of modern South African history, with a focus on the origins of the racial state and the development of black liberation movements.

AS.100.283. Making and Unmaking Queer Histories, 1800-Present. 3 Credits.
Making and Unmaking Queer Histories introduces students to the major themes and historical developments which shape contemporary understandings of LGBTQ+-identified subjects and communities in the US and Western Europe.
Area: Writing Intensive

AS.100.291. Medicine in an Age of Empires, 1500-1800. 3 Credits.
How did medicine emerge as a distinctive body of knowledge and a profession in the early modern period? The answers lie in the histories of disease, empire, and global commerce.

AS.100.293. Historical Methods, Archives and Interpretations. 3 Credits.
Surveys methods, approaches, and practices of historical writing. It asks students to think about the questions historians ask, the archives they use, and the arguments they make. Students will be introduced to subversive and emancipatory potential of contemporary scholarship that importantly incorporates subaltern, marginalized, or formerly forgotten voices.
Area: Writing Intensive

AS.100.294. Undergraduate Seminar in History. 3 Credits.
The second semester of the two-semester sequence required for majors, this course further introduces students to the theory and practice of history. Students write an essay based on original research.
Area: Writing Intensive

AS.100.295. American Intellectual History since the Civil War. 3 Credits.
Readings in American social thought since 1865, ranging across developments in philosophy, literature, law, economics, and political theory.
Area: Writing Intensive

AS.100.301. America after the Civil Rights Movement. 3 Credits.
This course explores the history of late twentieth-century America by examining the social, economic, and political legacies of 1960s civil rights protest for the 1970s, 1980s, and 1990s.
Area: Writing Intensive

AS.100.303. Old Regime and Revolutionary France. 3 Credits.
Examines the history of France from the reign of Louis XIV to the French Revolution, focusing on early modern society, popular culture, absolutism, the Enlightenment, overseas empire, and the French and Haitian Revolutions.
Area: Writing Intensive

AS.100.304. Ecstasy: Mystical, Visionary, and Holy Women and their Writings in Medieval Europe, ca. 1000-1400. 3 Credits.
This course uses the writings of medieval women to explore their social and religious worlds and orients visionary writing within the broader narrative of religious movements from the 12th-14th centuries.
Area: Writing Intensive

AS.100.305. Peter to Putin: Survey. 3 Credits.
Seminar on modern Russia. No midterm and no final. 6 short weekly journals, two short papers, and two small quizzes.
Area: Writing Intensive

AS.100.310. The French Revolution. 3 Credits.
Political, social and cultural history of a turning-point in European history that witnessed the birth and death of democracy.

AS.100.314. The Enlightenment. 3 Credits.
Examines the Enlightenment, an intellectual movement that swept Europe in the eighteenth century to shape the modern world. Topics include science and religion; print culture; gender and sociability; political economy; and race, slavery, and colonialism.
Area: Writing Intensive

AS.100.319. History of American Reproductive Politics. 3 Credits.
This course examines reproductive politics in the United States from the colonial era to the present. Topics include contraception, abortion, and sterilization, emphasizing the impact of gender, class, and race.
Area: Writing Intensive

AS.100.321. Political Thought and Social Transformation in the Haitian Revolution and Early Independent Mexico, c. 1789-1850. 3 Credits.
This course will examine both the Haitian Revolution and the early period of Mexican independence by engaging with the ideas of actors within these events in international contexts.
Area: Writing Intensive

AS.100.323. America in the 1960s. 3 Credits.
The years between 1959, when the course begins, and 1971, when it ends, were tumultuous and divisive. This course explores the political, racial, and cultural struggles of a half century ago.
Area: Writing Intensive

AS.100.324. American Origins, ca. 1619-ca. 1776. 3 Credits.
This discussion-based seminar focuses on Colonial American history, using maps, objects, and other primary sources to examine such topics as colonialism, slavery, war, disease, trade, empire, and cultural encounters.

AS.100.326. From Blood Feud to Black Death: European Society in the High Middle Ages, 1000-1400. 3 Credits.
Explores the development of society and institutions in the medieval west including kingship and law, religion and difference, gender and ideology. Looks closely at social responses to change and adversity.

AS.100.327. The Islamic Age of Empires. 3 Credits.
In this course we will survey the political, social, intellectual, and cultural history of the three Islamic early modern gunpowder empires that ranged from “the Balkans to Bengal”: The Ottomans (1300-1922), the Safavids (1501-1736), and the Mughals (1526-1858).
Area: Writing Intensive

AS.100.329. Russian Imagination in Three Revolutions. 3 Credits.
Russian Literature and the arts in Revolutions of 1905, 1917, and Stalin era to 1941. Req: 6 journals of 350 words, 2 papers 1250, 2 quizzes. No midterm or final.
Area: Writing Intensive

AS.100.333. Making Money in the Atlantic World. 3 Credits.
The history of money is a history of power exercised by states, institutions, and individuals. It is also a history of the structural possibilities and constraints faced by people in the past. We will address making, using, and conceptualizing money in the early modern Atlantic World, a time and a place of expanding empires, extractive enterprises, and changing categories of difference like race, gender, and class.

AS.100.335. The American West. 3 Credits.
This course explores the expansion and creation of an American West—and its inhabitants—from the Constitution to the end of the nineteenth century.
Area: Writing Intensive

AS.100.336. The United Kingdom? A Cultural History of Four Nations, 1707-Present. 3 Credits.
This course delves into the variegated, often divergent national politics, social landscapes, and cultural shifts in England, Scotland, Wales, and Ireland since Britain’s Acts of Union in 1707.
Area: Writing Intensive
AS.100.101 OR AS.100.102 OR AS.100.103[OR AS.100.104

AS.100.340. Asian American Art and Activism: Third World, Feminist, and Queer Solidarities. 3 Credits.
This interdisciplinary course surveys critical themes related to Asian American art and activism including perspectives from history, art and visual culture, literature and gender and sexuality studies.
Area: Writing Intensive

AS.100.343. The Annales School. 3 Credits.
This is not a typical history course but one on historical theory and modern historiographical thought. How did historians in the past generations attempt to analyze the past? To what extent is history connected to other disciplines? What was the French contribution to contemporary historiography? What is "new history"? In this seminar, we are going to examine the scholarship of the French Annales, arguably the most influential and revolutionary “school” of historiography in the twentieth century. Students will read selected works of the Annales historians and discuss concepts such as economic history, serial history, longue durée, conjuncture, total history, mentalité, historical psychology, and historical anthropology.
Area: Writing Intensive

AS.100.346. Soviet-American Cold War. 3 Credits.
The focus will be on Soviet-American interactions, Cold-War Cultures, and the impact on both societies.
Area: Writing Intensive

AS.100.347. Early Modern China. 3 Credits.
The history of China from the 16th to the late 19th centuries.
Area: Writing Intensive

AS.100.348. 20th-Century China. 3 Credits.
Survey of the history of China from ca. 1895 to ca. 1976.
Area: Writing Intensive

AS.100.349. Entertaining America: Popular Culture from Blackface to Broadcast. 3 Credits.
"Entertaining America" will trace the history of popular culture in the United States, starting inthe 1830s, when blackface minstrelsy initiated a new wave of commercial performance, andending in the 1920s, when records, films, and radio ushered in the era of mass culture.
Area: Writing Intensive

AS.100.354. Playing in the White: Black Writers, the Literary Colorline and Writing Whiteness. 3 Credits.
This course will turn to known and not-so-known black writers during the early to mid-twentieth century who defied literary expectation and wrote stories that featured or focused on whiteness. We will consider what whiteness offered black writers and the political work that their literary experimentations did for a white American publishing industry.

AS.100.355. Sex and Society in Early Modern Europe. 3 Credits.
This course will examine how early modern views on the body, gender, and sexuality shaped beliefs about the abilities and rights of women and men.
Area: Writing Intensive

AS.100.360. The Modern British World: Imperial Encounters, Regimes, and Resistance, from the American Revolution to the present. 3 Credits.
The Modern British World introduces some of the major events, themes, and controversies that led to Britain’s global dominance and ultimate decline as an imperial power. This course focuses on varying forms of imperial governance, the interrelationships between metropole and colony, and the formation of British and colonial national identities.
Area: Writing Intensive

AS.100.361. Age of Tolstoy. 3 Credits.
Tolstoy and his era, 1820s to 1910s. Topics include state and politics, empire, the Russian identity, and forms of cultural expression. Students consider "War and Peace" and other masterworks.
Area: Writing Intensive

AS.100.365. Culture & Society in the High Middle Ages. 3 Credits.
This course will cover the period commonly known as the High Middle Ages, that is, the civilization of Western Europe in the period roughly from 1050 to 1350. . It is a period of exceptional creativity in the history of Western Europe and in medieval history specifically, a time when many of the most characteristic institutions of Europe came into being.
Area: Writing Intensive

AS.100.369. Themes and Concepts in Jewish History. 3 Credits.
The course will introduce the student to the main themes and debates in Jewish historiography from the 19th century to the present.

AS.100.371. Modernity, Catastrophe, and Power in Jewish History: 1881 to the Present. 3 Credits.
Jewish history, politics, and culture across a century of enormous transformations and transformative enormities in Europe, the US, and the Middle East. Topics include: impacts on Jewish life of World War I, the Russian Revolution, and the post-imperial reordering of the Eastern Europe and the Middle East; Zionism and other modes of Jewish contestatory politics; the consolidation of American Jewry; Nazism and the Holocaust in Europe; formation and development of the State of Israel; the global reordering of Jewish life amid cross-currents of the Cold War, conflict in the Middle East, and success in the US. Substantial attention to recent and contemporary history including the dramatic changes in Israeli society and polity over the past forty years and the ongoing Israeli-Palestinian conflict.
Area: Writing Intensive

AS.100.373. Crime, Punishment, Felony and Freedom: Law and Society in Pre-Modern England. 3 Credits.
Using legal texts as a window into English society, we will address the changing nature of royal power, trial by jury, treason, felony, and the freedoms enshrined in the Magna Carta.

AS.100.374. Conquest, Conversion, and Language Change in the Middle Ages. 3 Credits.
Examines case-studies of imperial conquests (Islamic, Mongol, reconquista, early colonialism) and attendant changes in religion (Christianization; Islamization) and in language (Arabization; transition from Latin to European vernaculars) across medieval Eurasia.

AS.100.375. Histories of Women and the Vote. 3 Credits.
The year 2020 will mark 100 years since the 19th Amendment guaranteed American women the right to vote. Or did it? This course will examine the long history of women’s voting rights in the United States, including the story that extends from a convention at Seneca Falls, NY to a constitutional amendment. It will also examine alternative stories, especially those of women of color whose campaigns for the vote did not end in 1920 – and continue until today.

AS.100.377. The Age of Reason on the Silver Screen: Cinematic Representations of the Enlightenment. 3 Credits.
This course will discuss the problem of historical representation on the basis of an analysis of movies depicting the Age of the Enlightenment.

AS.100.379. Brazil History and Cultures: A Glance from Baltimore. 3 Credits.
Using textual and visual documents (including books from Peabody Library), we will examine the contrasts of Brazilian history and culture, and its connections with 19th and 20th century Baltimore.

AS.100.383. Conversion and Apostasy in the Middle Ages. 3 Credits.
Compares religious transformation in medieval Europe and the Middle East (ca. 600-1500), including conquest and conversion; conversion narratives; apostasy, martyrdom and other encounters between medieval Jews, Christians, and Muslims. Pre-requisite for enrollment: Students must have taken one history course.

AS.100.384. Intoxicated: Commodities & Globalization in the Early Modern World. 3 Credits.
Each week we examine a commodity that defined a new era of global connectivity in the centuries after 1492, including money, medicines, slaves, and fashion.

AS.100.386. The Cold War as Sports History. 3 Credits.
Sport is key to understanding the Cold War. We will investigate how the Cold War has shaped sports, the Olympic movement, the role of athletes at home and abroad, how sports were used in domestic and foreign policy, and how Cold War sports reinforce or challenge notions of race, gender, and class.
Area: Writing Intensive

AS.100.387. Everyday Life in the Medieval Middle East. 3 Credits.
Explores the daily lives of non-elites in the medieval Middle East—food; housing; clothes; marriage and divorce; urban festivals—through primary documents (e.g. letters, court records) and artifacts (e.g. clothing).Pre-requisite for enrollment: Students must have taken one history course.

AS.100.389. History of Law and Social Justice. 3 Credits.
Cause lawyering aims to change the status quo. This course examines histories of this approach to social justice, from battles against the slave trade to contemporary campaigns for marriage equality.

AS.100.390. The Medieval Crusades: Cultural Convergence and Religious Conflict, 1000-1400. 3 Credits.
This course explores the origins of the idea of crusading, examines the experiences of those who traveled east, and analyzes the cultures of contact that developed ca. 1095 and 1291.

AS.100.392. The Art of Lying: Lie, Dissimulation, and the "Fake News" in Pre-modern Europe. 3 Credits.
The course will examine the early modern attitudes to lie and dissimulation.

AS.100.393. Think Globally, Research Locally: Early Maryland and the World. 3 Credits.
A research-intensive seminar, this course uses the rich history of Maryland to approach broader themes in early modern American and global history including colonialism, slavery, revolution, race, gender, and sex.

AS.100.394. Brazilian Paradoxes: Slavery, Race, and Inequality in Brazil (from a Portuguese Colony to the World's 8th Largest Economy). 3 Credits.
Place of contrasts, Brazil has a multi-ethnic cultural heritage challenged by social and racial inequalities. Its political life remains chaotic. We will examine these problems through Brazilian history and culture.

AS.100.395. History of Global Development. 3 Credits.
This course explores development as an ideology and a practice. From colonialism to the Cold War to contemporary NGOs, we will interrogate the history of our attempts to improve the world.
Area: Writing Intensive

AS.100.396. The Gender Binary and American Empire. 3 Credits.
This discussion-based seminar will explore some of the ways that the sex and gender binary was produced out of American statecraft in the late nineteenth and twentieth centuries. Particular attention will be paid to US imperialism, both domestically in its settler form, as well as in Hawaii, the Caribbean, and the Pacific. What happens to the study of the modern gender binary if it is treated as a transnational artefact of US imperialism's encounter with a multitude of cultures and nations?
Area: Writing Intensive

AS.100.397. The Trouble with "Diversity". 3 Credits.
Through archival, literary, and other cultural texts, this course considers the history of "diversity" as both a practice and concept, beginning with the arrival of "colorblindness" in the 1890s and moving through recent approaches to institutionalized multiculturalism.
Area: Writing Intensive

AS.100.404. John Locke. 3 Credits.
Seminar style course in which John Locke's major works will be read intensively, together with some of his contemporaries' works, and select scholarly interpretations.
Area: Writing Intensive

AS.100.408. Theorizing the Age of Enormity: Social Theory and the History of the 20th Century. 3 Credits.
We will read and analyze key works of social and critical theory produced in relation to 20th and 21st century problems of state and society, nationalism, empire, totalitarianism, genocide, capitalism, political order, gender, race, sexuality, secularism, religion, environmental catastrophe. Possible readings include Weber, Du Bois, Adorno, Arendt, Foucault, Balibar, Beckamong others.
Area: Writing Intensive

AS.100.409. Israel and Palestine from 1967 to the Present: a Current and Entangled History. 3 Credits.
Through intensive and extensive reading, we will explore contemporary Israeli society, politics, and culture, contemporary Palestinian society, politics, and culture under occupation, and the historical processes that have shaped both societies and their ongoing entanglement.

AS.100.410. Decolonizing The Museum: Case Studies. 3 Credits.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.413. London 1580-1830: The History of Britain's capital city. 3 Credits.
Seminar-style class analyzing the social, cultural, gender, religious, economic, and political history of London from Shakespeare's time through revolutions, plague, fire, and commercial, colonial, and industrial expansion.
Area: Writing Intensive

AS.100.415. The Holocaust in Jewish History and in Global Culture. 3 Credits.
Key works on the history of Nazi Germany's murder of European Jewry during the Second World War; Jewish responses; the recasting of Jewish and global thought in relation to this signal event; genocide and 'ethnic cleansing' since the Holocaust.
Area: Writing Intensive

AS.100.416. History through Things: Objects, Circulation, and Encounters in the Medieval World. 3 Credits.
Objects from the past offer a powerful window into a set of experiences not recorded in texts. We will follow objects and things as they appear in lists, letters, and descriptions, as they travel surprising routes, and bring to life the medieval world before 1400.
Area: Writing Intensive

AS.100.421. Sex, Law and Islam. 3 Credits.
ISIS, “virgins” in paradise, the sexual slavery of Yazidi women…. This course will use anthropological and historical studies to examine the long history of how rules and understandings about sex, sexuality, and gender have mattered in how people think about Islam.
Area: Writing Intensive

AS.100.422. Society & Social Change in 18th Century China. 3 Credits.
What did Chinese local society look like under the Qing Empire, and how did it change over the early modern era?

AS.100.423. Multiethnic Japan. 3 Credits.
An advanced undergraduate seminar on the intertwined histories of race, ethnicity, and empire in Japan and its former colonies from the early twentieth century to the present.

AS.100.424. Women & Modern Chinese History. 3 Credits.
This course examines the experience of Chinese women, and also how writers, scholars, and politicians (often male, sometimes foreign) have represented women’s experiences for their own political and social agendas.
Area: Writing Intensive

AS.100.426. Popular Culture in Early Modern Europe. 3 Credits.
Witchcraft, magic, carnivals, riots, folk tales, gender roles; fertility cults and violence especially in Britain, Germany, France, and Italy.
Area: Writing Intensive

AS.100.430. Gender and Sexuality in African History. 3 Credits.
An upper-level history reading seminar with a focus on histories of gender and sexuality in colonial and postcolonial Africa.

AS.100.433. Free Speech and Censorship in the United States. 3 Credits.
This undergraduate research seminar examines censorship laws, practices, and debates over the past century; topics include political radicalism, indecency, pornography, and racist hate speech. In addition to discussing common readings, each student will choose a censorship case or issue to research and present to the class.

AS.100.438. The City Victorious: Medieval Cairo. 3 Credits.
What was medieval Cairo like? Students explore urban life in this imperial capital (969-1517), including food and market habits; relations between Jews, Christians, and Muslims; patronage; plague, drought, and famine.Pre-requisite for enrollment: Students must have taken two history courses.

AS.100.442. The Intellectual History of Capitalism, 1900 to present. 3 Credits.
This course examines shifting understandings of the philosophical foundations, political implications, and social effects of the market economy since the early twentieth century.
Area: Writing Intensive

AS.100.444. Migrants and Refugees in Africa. 3 Credits.
A history of forced and voluntary migration and displacement in Africa, its causes and consequences, with a focus on refugees and labor migrants since 1960.

AS.100.445. Revolution, Anti-Slavery, and Empire 1773-1792: British and American Political Thought from Paine, Smith, and the Declaration of Independence to Cugoano, Wollstonecraft, and the Bill of Rights. 3 Credits.
This seminar-style course will focus on discussing British and American political thought from the "Age of Revolutions", a period also of many critiques of Empire and of many works of Antislavery. Readings include Paine's Common Sense and Rights of Man, the Declaration of Rights, the Constitution and Bill of Rights, the Federalist Papers; works by Smith, Burke, and Wollstonecraft; and antislavery works by Cugoano, Equiano, Rush, Wesley, and Wilberforce.
Area: Writing Intensive

AS.100.450. History Research Lab. 3 Credits.
In this course, students participate in a research “laboratory,” engaging in direct research on an area of faculty’s research, leading to the development of a collective, digital humanities project.
Area: Writing Intensive

AS.100.478. Japan from its Peripheries. 3 Credits.
An advanced undergraduate seminar on the history of modern Japan from the perspective of regions and people often considered as belonging to its geographical, cultural, social, and political peripheries.
Area: Writing Intensive

AS.100.482. Historiography of Modern China. 3 Credits.
Study of Western, Chinese, and Japanese understandings of the history of China, emphasizing their implications for cultural understanding and for policy.

AS.100.486. Jim Crow in America. 3 Credits.
This course explores the history, politics, and culture of legalized racial segregation in the United State between the mid-nineteenth and twentieth centuries – a regime commonly known as “Jim Crow.”
Area: Writing Intensive

AS.100.490. Writing Power, or Dueling in Print with Light Sabers: An RIC Seminar on Scholarly Composition. 3 Credits.
A first-of-its kind seminar hosted by the Program in Racism, Immigration, and Citizenship, this course explores the practice of composition for professional writers. It considers the “light” and “dark” sides of clear, direct scholarly writing and intentional, academic obfuscation, respectively. Attendees will also learn strategies and potential hazards that accompany the written description of power in the Humanities and Social Sciences.
Area: Writing Intensive

AS.100.494. Senior Honors Seminar. 1 Credit.
A two-semester coordinating seminar for history majors writing senior honors theses. Admission is granted by instructor only after the student has selected a faculty thesis advisor. AS.100.494 is to be taken concurrently with AS.100.507 Senior Thesis.
Area: Writing Intensive
AS.100.494 is to be taken concurrently with AS.100.507 Senior Thesis.

AS.100.495. Senior Honors Seminar. 1 Credit.
The Senior Honors Seminar is a coordinating seminar for senior history majors who are writing senior honors theses and wish to graduate with departmental honors. To be taken concurrently with AS.100.508, Senior Thesis.
Prerequisite(s): AS.100.508
Area: Writing Intensive

AS.100.497. 1968: Rebels, Revolutions & the Right-Wing Backlash. 3 Credits.
The sixties were a polarizing decade of unrest, revolutions, and fundamental change across Europe and the US. We will discuss 1968 through the lens of national case studies, the Cold War, and the history of Baltimore. This is a community-engaged class!
Area: Writing Intensive

AS.100.507. Senior Thesis. 3 Credits.
Two semesters. Senior thesis writers will undertake research in primary materials that will explore a significant historical issue or problem. The DUS will confirm admission as soon as the student has selected a faculty thesis advisor: the outside deadline for confirmation is May 1. AS.100.507 is to be taken concurrently with AS.100.494 Senior Honors Seminar.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.508. Senior Thesis. 3 Credits.
This seminar is required for senior history majors who are writing senior honors theses and wish to graduate with departmental honors.
Area: Writing Intensive
AS.100.507;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.535. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.536. Independent Study. 1 - 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.100.601. Decolonizing The Museum: Case Studies.
How do museums represent the world? The course will focus on the colonial legacy of museums and complicate discourses of decolonization by looking at a range of case studies. We will study the world's fairs, artworks, artifacts, collections, curatorial practices, exhibition histories, repatriation requests, and exhibitionary modes of display, in order to analyze their relationship to histories of decolonization, temporality, translation, untranslatability, spectatorship, provenance, and the life of objects.

AS.100.602. The French Revolution.
Introduces graduate students to the rich historiography of the French Revolution. Topics include: revolutionary origins, political culture and radicalization, citizenship, violence, family & gender, the search for stability after the Terror, global revolution, Napoleon's Brumaire coup.

AS.100.603. Readings in the Early U.S. Republic.
Small intensive group reading: the course is primarily intended for students working on their graduate field lists. Other formats are possible with permission of the instructor.

AS.100.605. Modern Britain & the British Empire.
Modern Britain and the British World is a graduate seminar which familiarizes students with major themes and historiographic debates in Modern British and Modern British Imperial History.

AS.100.607. Consumer Revolution in Global Perspective.
First semester of year-long seminar examining transformations in European consumption from 1650 to 1800. Topics include cultural theory; fashion, gender, and social identity; capitalism, retail, and credit; Enlightenment and the public sphere; political economy; overseas empire; globalization; and the Atlantic revolutions.

AS.100.608. The Consumer Revolution in Global Perspective.
Second semester of year-long seminar examining transformations in European consumption from 1650 to 1800. Topics include capitalism and consumption; political economy; fashion, gender, and identity; Enlightenment and the public sphere; globalization; empire and colonization; and the Atlantic revolutions.

AS.100.609. "Baroque" as a Historical Category.
This seminar will discuss the use of the concept of the "Baroque", as developed in the history of art, architecture, and music, as a category of historical periodization.

AS.100.610. Readings in Medieval Islamic Cultural History.
The seminar examines scholarship on central questions in medieval Islamic cultural history including historical writing; the history of education and scholarly cultures; cultural patronage and urban development.

AS.100.613. Modern Japanese and Korean Histories.
A reading seminar on the interconnected histories and historiographies of Japan and Korea in the nineteenth and twentieth centuries.

AS.100.614. Seminar in Modern Chinese History.
A seminar covering major milestones in research on late imperial and modern Chinese history, primarily in English.Open to undergraduates with the permission of the instructor.

AS.100.615. States, Scribes, and Archives: Medieval Arabic Documentary Cultures.
Historical survey of scribal and archiving practices of medieval Islamic states (in comparative perspective); includes close readings of primary documents, including legal deeds, petitions, edicts, fiscal receipts, and administrative reports.

AS.100.616. Post-WWII French and Francophone Writing On History.
This seminar will focus on texts by post-1945 authors who wrote in French and engaged with what it means to write about the past and how to do so. Among those we will focus on are: Aimé Césaire, Frantz Fanon, Assia Djebbar, Simone de Beauvoir, Michel Foucault, Félix Guattari and Gilles Deleuze, Paul Ricoeur, Alain Corbin, Arlette Farge, François Hartog, Paul Ricoeur, Etienne Balibar, Jacques Rancière, Paul B. Preciado, Fernand Braudel.

AS.100.617. Black Political History and Activism in Modern America.
This course focuses on the emergence and development of various strains of Black political thought and action within the modern US. Our course will explore themes of equality, citizenship, democracy, and freedom throughout the 20th Century, specifically as it pertains to the Black experience in America.

AS.100.618. Historiography of Law and Empire.
Introduction to recent work on the history of law and empire, with a focus on critical legal history perspectives.

AS.100.619. Early Modern France.
The second part of a two-semester sequence, this seminar examines the history of France and its empire from the seventeenth century to the French Revolution.

AS.100.620. Early Modern France and the French Empire.
Part of a two-semester sequence, this seminar examines the history of France and its empire from the seventeenth century to the early nineteenth century. Topics include: state formation; political culture; political economy; commercial capitalism; the Enlightenment; popular culture; empire, race, and slavery; and the French and Haitian Revolutions.

AS.100.621. Historiography of the Western European 1970s and 1980s.
How have historians grappled with the quite recent past? We will explore histories of the 1970s and 1980s, with a focus on France, Germany, and the UK, as well as transnational and post-decolonization approaches.

AS.100.622. Religion in Modernity: Theories and Histories.
Drawing on key works in classic and contemporary social theory of religion and secularity as well as historical, ethnographic, and sociological monographs, this course investigates some scholars' answers to the question of why we might want to take "religion in modernity" as an object of study (or not), what kinds of roles and importance religion (or various institutions, impulses, practices, and ideas connected to major faith traditions) has/have arguably enjoyed in an arguably global modernity often imagined as intrinsically secular, whether and how it matters that the category of religion itself may be a modern invention intertwined with specifically Christian-European and European imperial and colonial projects, whether and how we should take “secularism” or “secularity” as our object of study no less than or more than religion, what special kinds of research agendas and assumptions the empirical study of 'religion' and its workings and significance in modern political and cultural life might demand, what sorts of scholarly value it might add, and how the answers to those questions change when we look to a global present which is sometimes framed as post-secular. A more theoretically and comparatively oriented first part of the course will give way to focused attention on historical, sociological, and ethnographic monographs, with much attention to European, North American, and Near Eastern histories and societies, but ample room for students interested in East Asian, South Asian, African, and Latin American religious formations to investigate those literatures and bring to bear in class discussion. Readings likely include Weber, Bergson, Asad, Charles Taylor, de Vries, Lambek, Das, Roger Friedland, Wuthnow, Margaret Jacobs, Blackbourn, Mahmood, Susan Harding, William Connolly, Chidester, Bryan Turner.

AS.100.623. Telling Japanese Histories.
A graduate-level seminar on the political, social, and intellectual concerns that have both shaped and undermined dominant ways of telling Japanese history, especially in Japan and the U.S. since 1945.

AS.100.627. Histories of Development.
Reading seminar on the history of development as both ideology and practice in the nineteenth and twentieth centuries.

AS.100.632. Capetian France: Documents, Devotions and Sovereign Authority.
Through a careful study of texts and objects produced for and by the Capetian rulers during the thirteenth century we will interrogate the creation of the French state, the cultivation of royal ideology, and its practice of sovereign power.
Area: Writing Intensive

AS.100.634. The Haitian Revolution.
This seminar examines the origins, course, and legacies of the Haitian Revolution (1791-1804), the most radical movement of the Age of Revolutions. It explores the colonial background, the overthrow of slavery, the founding of an independent nation, and the aftermath of revolution in the nineteenth century.

AS.100.638. Reading Seminar in Early Modern History.
This is a graduate seminar devoted to close reading of crucial works in early modern history and historiography.

AS.100.640. 20th-Century European Imperial and Transnational Histories.
This course will look at recent historiography on extranational approaches to 20th-century European histories, with a focus on France, the United Kingdom, USSR/Russia, and Germany.

AS.100.641. Global Catholicism in the Early Modern Period.
Explores religious culture in medieval and early modern Europe, with an emphasis on spiritual beliefs and practices, relics, miracles, pilgrimage, and saint-making. Emphasis on reading and discussing written sources and visual culture. Graduate students only.

AS.100.643. Jewish Paths Through Modernity.
Intensive introduction to the key trends and trajectories in modern Jewish history and the major themes in Jewish historiography. Intended to serve both graduate students outside the Jewish history field and graduate students pursuing a field in modern Jewish history.
Area: Writing Intensive

AS.100.645. Race, Law, History.
This seminar examines the relationship of law to the construction of race and inequality in US history, investigating the legal archive through the perspectives of critical race theory and critical legal history. Course can be taken a maximum of two times.

AS.100.648. Crown, Court, and Charter: Political Culture in the High Middle Ages.
Explores mechanisms of political power and the rise of the state in Europe during the High Middle Ages by analyzing royal ideology, administrative growth, legal change, and cultural production.

AS.100.652. European Socialist Thought.
A survey of European socialist theories, including Marxism, anarchism, Social Democracy, feminism, and anti-imperialism. Authors include Proudhon, Marx, Engels, Bakunin, Bernstein, Lenin, Luxemburg, Sorel, Kollontai, Gramsci, and Fanon.

AS.100.653. Africa in the Twentieth Century.
Reading seminar in modern African history. Focus for 2022 will be on gender and sexuality.

AS.100.661. Racial Literacy in the Archives.
This course explores how to use race as a historical category of analysis, and teaches attendees how to locate how historical actors deploy race and racism to make claims, organize labor and identities, and imagine political possibility.

AS.100.664. Heresy and the Holy: Religion and Society in Medieval Europe.
The course explores the rise of heresy and holiness as categories during the Middle Ages.It traces the advent of religious movements, the effects of religious reform, the centralization of ecclesiastical authority, the rise of vernacular spirituality and dissent, and analyzes the historiographical and methodological approaches to the study of medieval religion.

AS.100.666. Topics in Modern Jewish History.
Continuation of AS.100.668 Colloquium in Modern Jewish History.

AS.100.671. Play and Violence in Medieval France.
Since the work of Geertz, Huizinga, Bakhtin and Caillois, among others, the intersection of play and violence has been a focal point for historians, anthropologists, literary scholars, even psychologists. This seminar traces the twin themes of violence and play as instantiated by the fighting classes in the High Middle Ages, beginning with the emergence of the tournament and the crusading movement in the eleventh century. By examining sources in Old French and Latin, we will contextualize music, dances, comedies, and contests that accompanied the violent rituals around which French aristocratic life revolved. Course may not meet weekly.
Area: Writing Intensive

AS.100.672. Medieval Materialities: Objects, Ontologies, Texts and Contexts.
We will use the meanings and methodologies of “materiality” to examine the medieval world, by analyzing objects, texts, networks, patterns of circulation and appropriation, aesthetics and enshrinement, production and knowledge communities.

AS.100.680. Reading Seminar in Early American History, c. 1500-1800.
Colonization and settlement in the Americas brought people from all kinds of places together. This course will explore those contacts, and how they shaped the American experience. The focus is on new books in early American history.

AS.100.681. Research Seminar in Atlantic History, 1600-1800.
Writing workshop for graduate students at all stages presenting work in progress. Discussion of theories, methods, and challenges of graduate student writing.

AS.100.682. Introductory Topics in Computation for Scholarship in the Humanities.
The first half of this seminar course consists of non-mathematical introductions to, and discussions of, the fundamental motivations, vocabulary, and methods behind computational techniques of particular use for humanistic research. The second half combines selected readings chosen to address specific questions raised by these discussions with hands-on application to students’ research goals. Each participant will lead discussion for one of the selected readings relevant to their interests.

AS.100.695. Problems in U.S. Social & Cultural History.
A graduate level seminar in social and cultural history in the 19th and 20th centuries.

AS.100.696. Problems in American Society and Culture.
An intensive graduate seminar exploring various topics in US social and cultural history, focusing on the period from the late 19th century to the late 20th century.

AS.100.700. American Intellectual History.
Readings on late nineteenth- and twentieth-century American and transatlantic social theory.

AS.100.707. The Black World.
This course explores the practice of writing and reading the history of African Americans and the wider African Diaspora. Participants will share written work and do close readings of primary and secondary texts exploring the black experience in Europe, Asia, Africa, and the Americas.

AS.100.708. The Black World II.
The Black World Seminar considers the making and meaning of blackness between the 14th and 20th centuries and Africans and people of African descent’s impact on the making of the modern world, from the slave trade to the present. We explore, too, the historical forces which created blackness as a marker on the body and as a political and cultural identity.

AS.100.710. Reformation Europe.
A course discussing major recent works of historiography on Reformation Europe, examining Lutheranism, Calvinism and Anabaptism; iconoclasm, visual, and print culture; urban, social, and gender history; demonology and witchcraft; and martyrology, tolerance and intolerance.

AS.100.713. Black Womanhood.
What does a usable history of black womanhood (black queer and trans womanhood inclusive) look like? How do we imagine, create, and narrate black women’s stories? Black women’s history across time and space.

AS.100.716. Cultural Theory For Historians.
An examination of modern cultural theories, with emphasis on mass culture and consumerism. Authors include Simmel, Kracauer, Benjamin, Horkheimer, Adorno, Barthes, Debord, Bourdieu, and de Certeau.

AS.100.722. The History of Trans Femininity.
This seminar will offer training in feminist, queer, transgender and postcolonial approaches to the history of sexuality by exploring what methods are adequate to writing the history of trans femininity as a specifically nineteenth and twentieth century phenomenon. Areas of emphasis will include histories of sexology, sex work, social movements, and trans feminism and its opponents. The primary geographic focus will be the US, but through a transnational lens that connects to Western Europe, South Asia, and Latin America.

AS.100.724. Sex and Slavery.
Research and methods in the field of sexuality and slavery studies. Graduate students may take this course up to two times.

AS.100.725. Sex and Slavery II.
Research and methods in the field of sexuality and slavery studies. Part 2: Caribbean & African Continent.

AS.100.728. Historical Writing in the Middle Ages.
This course investigates the basic techniques of writing history and the matters traditionally covered in medieval historical texts by reading a series of exemplary medieval historiographical works. This is preceded by a section on theoretical orientations to the study of history and historiography in order to provide the analytic tools for analyzing medieval texts.

AS.100.729. Reading Seminar: British America and the Early United States in Atlantic Perspective.
Introduction to the history and historiography on British North America and the United States.

AS.100.730. Reading Seminar: British and French North America and the Early United States in Atlantic Perspective.
Continuation of AS.100.729 for students conducting field exams.

AS.100.731. Colonial Africa: French African Empire.
A reading seminar in colonial African history; the focus may be on French African empire.

AS.100.733. Reading Qing Documents.
Open also to advanced undergraduates with at least one semester of Classical Chinese. This course has several objectives. First and foremost, it is a hands-on document reading class designed to familiarize students with the skills, sources, and reference materials necessary to conduct research in Qing history. To that end, we will spend much of our time reading documents. At the same time, we will engage in problem solving exercises designed to develop and enhance basic research skills. Finally, we will consider important archive-based secondary works which demonstrate the ways in which historians have made use of Qing documents in their scholarship.

AS.100.735. Early Modern Britain and the Early Modern British Empire.

AS.100.736. Early Modern Britain and the Early Modern British Empire.

AS.100.738. Women, Genders and Sexualities.
In May 2020, Johns Hopkins will host the meeting of the Berkshire Conference on Women, Gender and Sexualities, a gathering of 1200 scholars from across the world. Our seminar will use the Berkshire Conference program to organize a set of readings that will anticipate the panels, roundtables, performances, and plenaries that will be on campus between May 28 and 31, 2020. Attendance at the conference is not required, but it is recommended.

AS.100.744. Twentieth Century France and the French Empire.
We will read and discuss recent monographs and historiographical essays that emerge from and inform French history, with particular attention transnational, imperial, Mediterranean, international, and colonial frames and questions.

AS.100.749. Social Theory for Historians: Marx, Durkheim, Weber.
An examination of the works of Marx, Durkheim, and Weber, as examples of the Hegelian, positivist, and hermeneutic traditions of social theory.

AS.100.751. Early Modern European Intellectual History.
Early Modern European Intellectual History

AS.100.753. Modern American Seminar.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in 20th century history. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly

AS.100.755. Modern American Seminar.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in 20th century history. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.756. Reading Seminar in Chinese History.
A seminar covering recent work on late imperial and modern Chinese history, primarily in English.

AS.100.757. Cultural Histories of Late Imperial China.
This reading seminar will introduce graduate students and advanced undergraduates (by permission) to recent studies of Late Imperial and Republican China that can (by various standards) be classified as works of cultural history.

AS.100.759. Arabic Historical Writing in the Middle Ages.
The course examines various genres of Arabic historical writing during the high and late Middle Ages (10th-15th c.). All primary readings are in English/French translation (no Arabic required).

AS.100.761. History of Capitalism.
Readings on the history of capitalism since the mid-nineteenth century, with an emphasis on the American context.

AS.100.762. History and Historiography of 19th France in Europe and the World.
This course will look at recent historiography on France and the French empire, notably in North Africa. We will pay particular attention to transnational and imperial questions.

AS.100.765. Problems in Women and Gender Studies.
An exploration of recent work in women's and gender history, focusing on some of the following: sexuality, cultural production, politics, family formation, work, religion, difference, and civic orders.

AS.100.769. Gender History Workshop.
Workshop for presentation of works-in-progress on the history of women, gender, and/or sexuality, including drafts of dissertation chapters, research papers, talks, and proposals. Students in disciplines other than history are welcome.

AS.100.770. Gender History Workshop.
Workshop for presentation of works-in-progress on the history of women, gender, and/or sexuality, including drafts of dissertation chapters, research papers, talks, and proposals. Students in disciplines other than history are welcome. Graduate students only.

AS.100.781. The Seminar.
This course features presentations from invited speakers. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.782. The Seminar.
This course features presentations from invited speakers. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.783. Seminar: Medieval Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Medieval European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.784. Seminar: Medieval Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Medieval European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.785. Seminar: Early Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Early Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.786. Seminar: Early Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Early Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.787. Seminar: Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.788. General Seminar: Modern Europe.
A graduate workshop in which graduate students, faculty, and invited speakers present their latest research results in Modern European History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.789. Seminar: American.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.790. General Seminar: America.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.791. Seminar: Latin American.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in Latin American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly

AS.100.792. General Seminar: Latin America.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in Latin American History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.793. Seminar: African.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in African History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.794. General Seminar: Africa.
A seminar series in which graduate students, faculty, and invited speakers present their latest research results in African History. Q&A, with an emphasis on critical thinking, intellectual discussions, and written and oral presentations. Course may not meet weekly.

AS.100.797. First Year Graduate Workshop.
First-year graduate workshop for History PhD candidates only.

AS.100.798. First Year Graduate Workshop.
First-year graduate workshop for History PhD candidates only.

AS.100.801. Dissertation Research.
TBA

AS.100.802. Dissertation Research.

AS.100.803. Independent Study.
TBA

AS.100.804. Independent Study.

AS.100.890. Independent Study.

AS.110 (Mathematics)

AS.110.102. College Algebra. 3 Credits.
This introductory course will create a foundational understanding of topics in Algebra. An emphasis will be on applications to prepare students for future courses like Precalculus or Statistics. After a review of elementary algebra concepts, topics covered include: equations and inequalities, linear equations, exponents and polynomials, factoring, rational expressions and equations, relations and functions, radicals, linear and quadratic equations, higher-degree polynomials, exponential, logarithmic, and rational functions.

AS.110.105. Precalculus. 4 Credits.
This course provides students with the background necessary for the study of calculus. It begins with a review of the coordinate plane, linear equations, and inequalities, and moves purposefully into the study of functions. Students will explore the nature of graphs and deepen their understanding of polynomial, rational, trigonometric, exponential, and logarithmic functions, and will be introduced to complex numbers, parametric equations, and the difference quotient.

AS.110.106. Calculus I (Biology and Social Sciences). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, introduction to differential equations, functions of several variables, linear systems, applications for systems of linear differential equations, probability distributions. Many applications to the biological and social sciences will be discussed.

AS.110.107. Calculus II (For Biological and Social Science). 4 Credits.
Differential and integral Calculus. Includes analytic geometry, functions, limits, integrals and derivatives, introduction to differential equations, functions of several variables, linear systems, applications for systems of linear differential equations, probability distributions. Applications to the biological and social sciences will be discussed, and the courses are designed to meet the needs of students in these disciplines.
Recommended Course Background: Grade of C- or Better in AS.110.106 or AS.110.108, or a 5 on the AP AB exam.

AS.110.108. Calculus I (Physical Sciences & Engineering). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the courses are designed to meet the needs of students in these disciplines.

AS.110.109. Calculus II (For Physical Sciences and Engineering). 4 Credits.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the courses are designed to meet the needs of students in these disciplines. Recommended Course Background: Grade of C- or Better in AS.110.106 or AS.110.108, or a 5 on the AP AB exam.

AS.110.113. Honors Single Variable Calculus. 4 Credits.
This is an honors alternative to the Calculus sequences AS.110.106-AS.110.107 or AS.110.108-AS.110.109 and meets the general requirement for both Calculus I and Calculus II (although the credit hours count for only one course). It is a more theoretical treatment of one variable differential and integral calculus and is based on our modern understanding of the real number system as explained by Cantor, Dedekind, and Weierstrass. Students who want to know the "why's and how's" of Calculus will find this course rewarding. Previous background in Calculus is not assumed. Students will learn differential Calculus (derivatives, differentiation, chain rule, optimization, related rates, etc), the theory of integration, the fundamental theorem(s) of Calculus, applications of integration, and Taylor series. Students should have a strong ability to learn mathematics quickly and on a higher level than that of the regular Calculus sequences.

AS.110.201. Linear Algebra. 4 Credits.
Vector spaces, matrices, and linear transformations. Solutions of systems of linear equations. Eigenvalues, eigenvectors, and diagonalization of matrices. Applications to differential equations.
Grade of C- or better in AS.110.107 OR AS.110.109 OR AS.110.113 OR AS.110.202 OR AS.110.302, or a 5 on the AP BC exam.

AS.110.202. Calculus III. 4 Credits.
Calculus of functions of more than one variable: partial derivatives, and applications; multiple integrals, line and surface integrals; Green's Theorem, Stokes' Theorem, and Gauss' Divergence Theorem.
Grade of C- or better in AS.110.107 OR AS.110.109 OR AS.110.113 OR AS.110.201 OR AS.110.212 OR AS.110.302, or a 5 or better on the AP BC exam.

AS.110.211. Honors Multivariable Calculus. 4 Credits.
This course includes the material in AS.110.202 with some additional applications and theory. Recommended for mathematically able students majoring in physical science, engineering, or especially mathematics. AS.110.211-AS.110.212 used to be an integrated yearlong course, but now the two are independent courses and can be taken in either order.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.212. Honors Linear Algebra. 4 Credits.
This course includes the material in AS.110.201 with additional applications and theory, and is recommended only for mathematically able students majoring in physical science, engineering, or mathematics who are interested in a proof-based version of linear algebra. This course can serve as an Introduction to Proofs (IP) course. Prerequisites: Grade of B+ or better in 110.107 or 110.109 or 110.113, or a 5 on the AP BC exam. Area: Quantitative and Mathematical Sciences.
Grade of B+ or better in AS.110.107 or AS.110.109 or AS.110.113 or AS.110.202, or AS.110.302, or a 5 on the AP BC exam.

AS.110.225. Problem Solving Lab. 2 Credits.
This course is an introduction to mathematical reason and formalism in the context of mathematical problem solving, such as induction, invariants, inequalities and generating functions. This course does not satisfy any major requirement, and may be taken more than once for credit It is primarily used as training for the William Lowell Putnam Mathematics Competition. Area: Quantitative and Mathematical Sciences.

AS.110.275. Probability. 4 Credits.
This course follows the actuarial Exam P syllabus and learning objectives to prepare students to pass the SOA/CAS Probability Exam. Topics include axioms of probability, discrete and continuous random variables, conditional probability, Bayes' theorem, Chebyshev's Theorem, Central Limit Theorem, univariate and joint distributions and expectations, loss frequency, loss severity and other risk management concepts. Exam P learning objectives and learning outcomes are emphasized. Recommended Course Background: Calculus II
AS.110.107 OR AS.110.109

AS.110.276. Introduction to Financial Mathematics. 4 Credits.
This course is designed to develop students' understanding of fundamental concepts of financial mathematics. The course will cover mathematical theory and applications including the time value of money, annuities and cash flows, bond pricing, loans, amortization, stock and portfolio pricing, immunization of portfolios, swaps and determinants of interest rates, asset matching and convexity. A basic knowledge of calculus and an introductory knowledge of probability is assumed.

AS.110.301. Introduction to Proofs. 4 Credits.
This course will provide a practical introduction to mathematical proofs with the aim of developing fluency in the language of mathematics, which itself is often described as “the language of the universe.” Along with a library of proof techniques, we shall tour propositional logic, set theory, cardinal arithmetic, and metric topology and explore “proof relevant” mathematics by interacting with a computer proof assistant. This course on the construction of mathematical proof will conclude with a deconstruction of mathematical proof, interrogating the extent to which proof serves as a means to discover universal truths and assessing the mechanisms by which the mathematical community achieves consensus regarding whether a claimed result has been proven.

AS.110.302. Differential Equations and Applications. 4 Credits.
This is a course in ordinary differential equations (ODEs), equations involving an unknown function of one independent variable and some of its derivatives, and is primarily a course in the study of the structure of and techniques for solving ODEs as mathematical models. Specific topics include first and second ODEs of various types, systems of linear differential equations, autonomous systems, and the qualitative and quantitative analysis of nonlinear systems of first-order ODEs. Laplace transforms, series solutions and the basics of numerical solutions are included as extra topics.Prerequisites: Grade of C- or better in 110.107 or 110.109 or 110.113, or a 5 on the AP BC exam. Area: Quantitative and Mathematical Sciences.
Grade of C- or better in AS.110.107 or AS.110.109 or AS.110.113 or AS.110.201 or AS.110.202 or AS.110.211 or AS.110.212, or a 5 on the AP BC exam.

AS.110.303. The Mathematics of Politics, Democracy, and Social Choice. 4 Credits.
This course is designed for students of all backgrounds to provide a mathematical introduction tosocial choice theory, weighted voting systems, apportionment methods, and gerrymandering. Inthe search for ideal ways to make certain kinds of political decisions, a lot of wasted effort couldbe averted if mathematics could determine that finding such an ideal were actually possible in thefirst place. The course will analyze data from recent US elections as well as provide historicalcontext to modern discussions in politics, culminating in a mathematical analysis of the USElectoral College. Case studies, future implications, and comparisons to other governing bodiesoutside the US will be used to apply the theory of the course. Students will use Microsoft Excel toanalyze data sets. There are no mathematical prerequisites for this course.
Area: Writing Intensive

AS.110.304. Elementary Number Theory. 4 Credits.
The student is provided with many historical examples of topics, each of which serves as an illustration of and provides a background for many years of current research in number theory. Primes and prime factorization, congruences, Euler's function, quadratic reciprocity, primitive roots, solutions to polynomial congruences (Chevalley's theorem), Diophantine equations including the Pythagorean and Pell equations, Gaussian integers, Dirichlet's theorem on primes.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.311. Methods of Complex Analysis. 4 Credits.
This course is an introduction to the theory of functions of one complex variable. Its emphasis is on techniques and applications, and it serves as a basis for more advanced courses. Functions of a complex variable and their derivatives; power series and Laurent expansions; Cauchy integral theorem and formula; calculus of residues and contour integrals; harmonic functions.
Grade of C- or better in (AS.110.202 or AS.110.211)

AS.110.365. Mathematical Foundations of AI Bias. 4 Credits.
At the end of this course students should be able to understand various sources of algorithmic bias; understand what types of bias can or cannot be addressed in a given data set; be able to reason over when different algorithms can be applied to a data set, and how they can be interpreted; take the outcomes of a given algorithm and reason about the bias of the output. Recommended Course Background: Vector calc, linear algebra, a suffiently advanced stats course, programming ability in R, matlab or python
AS.110.201 OR AS.110.202 OR EN.553.310

AS.110.375. Introduction to Mathematical Cryptography. 4 Credits.
An Introduction to Mathematical Cryptography is an introduction to modern cryptography with an emphasis on the mathematics behind the theory of public key cryptosystems and digital signature schemes. The course develops the mathematical tools needed for the construction and security analysis of diverse cryptosystems. Other topics central to mathematical cryptography covered are: classical cryptographic constructions, such as Diffie-Hellmann key exchange, discrete logarithm-based cryptosystems, the RSA cryptosystem, and digital signatures. Fundamental mathematical tools for cryptography studied include: primality testing, factorization algorithms, probability theory, information theory, and collision algorithms. A survey of important recent cryptographic innovations, such as elliptic curves, elliptic curve and pairing-based cryptography are included as well. This course is an ideal introduction for mathematics and computer science students to the mathematical foundations of modern cryptography.

AS.110.401. Introduction to Abstract Algebra. 4 Credits.
An introduction to the basic notions of modern abstract algebra and can serve as as Introduction to Proofs (IP) course. This course is an introduction to group theory, with an emphasis on concrete examples, and especially on geometric symmetry groups. The course will introduce basic notions (groups, subgroups, homomorphisms, quotients) and prove foundational results (Lagrange's theorem, Cauchy's theorem, orbit-counting techniques, the classification of finite abelian groups). Examples to be discussed include permutation groups, dihedral groups, matrix groups, and finite rotation groups, culminating in the classification of the wallpaper groups.Prerequisites: Grade of C- or better in 110.201 or 110.212 Area: Quantitative and Mathematical Sciences.
Grade of C- or better in (AS.110.201 or AS.110.212)

AS.110.405. Real Analysis I. 4 Credits.
This course is designed to give a firm grounding in the basic tools of analysis. It is recommended as preparation (but may not be a prerequisite) for other advanced analysis courses and may be taken as an Introduction to Proofs (IP) course. Topics include the formal properties of real and complex number systems, topology of metric spaces, limits, continuity, infinite sequences and series, differentiation, Riemann-Stieltjes integration. Prerequisites: Grade of C- or better in 110.201 or 110.212 and 110.202 or 110.211
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.110.406. Real Analysis II. 4 Credits.
This course continues AS.110.405 with an emphasis on the fundamental notions of modern analysis. Sequences and series of functions, Fourier series, equicontinuity and the Arzela-Ascoli theorem, the Stone-Weierstrass theorem, functions of several variables, the inverse and implicit function theorems, introduction to the Lebesgue integral.

AS.110.407. Honors Complex Analysis. 4 Credits.
AS.110.407. Honors Complex Analysis. 4.00 Credits.This course is an introduction to the theory of functions of one complex variable for honors students. Its emphasis is on techniques and applications, and can serve as an Introduction to Proofs (IP) course. Topics will include functions of a complex variable and their derivatives; power series and Laurent expansions; Cauchy integral theorem and formula; calculus of residues and contour integrals; harmonic functions, as well as applications to number theory and harmonic analysis.Area: Quantitative and Mathematical Sciences.This is not an Introduction to Proofs course (IP) and may not be taken as a first proof-based mathematics course except at the discretion of the instructor. This course satisfies a core requirement of the mathematics major as a second analysis course, and is a core requirement for honors in the major.
AS.110.405 OR AS.110.415

AS.110.411. Honors Algebra I. 4 Credits.
An introduction to the basic notions of modern algebra for students with some prior acquaintance with abstract mathematics. Elements of group theory: groups, subgroups, normal subgroups, quotients, homomorphisms. Generators and relations, free groups, products, abelian groups, finite groups. Groups acting on sets, the Sylow theorems. Definition and examples of rings and ideals.
Grade of C- or better in AS.110.212 OR AS.110.304 OR AS.110.113 OR AS.110.405 OR AS.110.415 OR AS.110.407 OR AS.110.413 OR AS.110.421

AS.110.412. Honors Algebra II. 4 Credits.
This is a continuation of 110.411 Honors Algebra I. Topics studies include principal ideal domains, structure of finitely generated modules over them. Introduction to field theory. Linear algebra over a field. Field extensions, constructible polygons, non-trisectability. Splitting field of a polynomial, algebraic closure of a field. Galois theory: correspondence between subgroups and subfields. Solvability of polynomial equations by radicals. Prerequisites: Grade of C- or better in 110.201 or 110.212.Area: Quantitative and Mathematical Sciences.
C- or better in AS.110.411

AS.110.413. Introduction To Topology. 4 Credits.
Topological spaces, connectedness, compactness, quotient spaces, metric spaces, function spaces. An introduction to algebraic topology: covering spaces, the fundamental group, and other topics as time permits.
Grade of C- or better in (AS.110.202 OR AS.110.211)

AS.110.415. Honors Analysis I. 4 Credits.
This highly theoretical sequence in analysis is reserved for the most able students. The sequence covers the real number system, metric spaces, basic functional analysis, the Lebesgue integral, and other topics.

AS.110.416. Honors Analysis II. 4 Credits.
Lebesgue integration and differentiation. Elementary Hilbert and Banach space theory. Baire category theorem. Continuation of AS.110.415, introduction to real analysis.
Grade of C- or better in AS.110.415

AS.110.417. Partial Differential Equations. 4 Credits.
Characteristics. classification of second order equations, well-posed problems. separation ofvariables and expansions of solutions. The wave equation: Cauchy problem, Poisson's solution,energy inequalities, domains of influence and dependence. Laplace's equation: Poisson's formula, maximum principles, Green's functions, potential theory Dirichlet and Neumann problems, eigenvalue problems. The heat equation: fundamental solutions, maximum principles. Recommended Course Background: AS.110.405 or AS.110.415

AS.110.421. Dynamical Systems. 4 Credits.
This is a course in the modern theory of Dynamical Systems. Topic include both discrete (iterated maps) and continuous (differential equations) dynamical systems and focuses on the qualitative structure of the system in developing properties of solutions. Topics include contractions, interval and planar maps, linear and nonlinear ODE systems including bifurcation theory, recurrence, transitivity and mixing, phase volume preservation as well as chaos theory, fractional dimension and topological entropy. May be taken as an Introduction to Proofs (IP) course.Prerequisites: Grade of C- or better in 110.201 or 110.212 OR 110.202 or 110.211 and 110.302 Area: Quantitative and Mathematical Sciences
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 or AS.110.211) AND 110.302

AS.110.422. Representation Theory. 4 Credits.
This course will focus on the basic theory of representations of finite groups in characteristic zero: Schur's Lemma, Mashcke's Theorem and complete reducibility, character tables and orthogonality, direct sums and tensor products. The main examples we will try to understand are the representation theory of the symmetric group and the general linear group over a finite field. If time permits, the theory of Brauer characters and modular representations will be introduced.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.401 OR AS.110.411)

AS.110.433. Introduction to Harmonic Analysis and Its Applications. 4 Credits.
The course is an introduction to methods in harmonic analysis, in particular Fourier series, Fourier integrals, and wavelets. These methods will be introduced rigorously, together with their motivations and applications to the analysis of basic partial differential equations and integral kernels, signal processing, inverse problems, and statistical/ machine learning.
(AS.110.201 OR AS.110.212 OR EN.550.291 OR EN.553.291) AND (AS.110.202 OR AS.110.211) AND (AS.110.405 OR AS.110.415)

AS.110.435. Introduction to Algebraic Geometry. 4 Credits.
Algebraic geometry studies zeros of polynomials in several variables and is based on the use of abstract algebraic techniques, mainly from commutative algebra, for solving geometric problems about these sets of zeros. The fundamental objects of study are algebraic varieties which are the geometric manifestations of solutions of systems of polynomial equations. Algebraic geometry occupies a central place in modern mathematics and has multiple conceptual connections with diverse fields such as complex analysis, topology and number theory.This course aims to provide to an undergraduate student majoring in mathematics the fundamental background to approach the study of algebraic geometry by providing the needed abstract knowledge also complemented by several examples and applications.

AS.110.439. Introduction To Differential Geometry. 4 Credits.
Theory of curves and surfaces in Euclidean space: Frenet equations, fundamental forms, curvatures of a surface, theorems of Gauss and Mainardi-Codazzi, curves on a surface; introduction to tensor analysis and Riemannian geometry; theorema egregium; elementary global theorems.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.100.211)

AS.110.441. Calculus on Manifolds. 4 Credits.
This course provides the tools for classical three-dimensional physics and mechanics. This course extends these techniques to the general locally Euclidean spaces (manifolds) needed for an understanding of such things as Maxwell's equations or optimization in higher dimensional contexts, eg. in economics. The course will cover the theory of differential forms and integration. Specific topics include Maxwell's equations in terms of 4D Lorentz geometry, vector (in particular, tangent) bundles, an introduction to de Rham theory, and Sard's theorem on the density of regular values of smooth functions. The course is intended to be useful to mathematics students interested in analysis, differential geometry, and topology, as well as to students in physics and economics.

AS.110.443. Fourier Analysis. 4 Credits.
An introduction to the Fourier transform and the construction of fundamental solutions of linear partial differential equations. Homogeneous distributions on the real line: the Dirac delta function, the Heaviside step function. Operations with distributions: convolution, differentiation, Fourier transform. Construction of fundamental solutions of the wave, heat, Laplace and Schrödinger equations. Singularities of fundamental solutions and their physical interpretations (e.g., wave fronts). Fourier analysis of singularities, oscillatory integrals, method of stationary phase.
Grade of C- or better in (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.110.445. Mathematical and Computational Foundations of Data Science. 4 Credits.
We will cover several topics in the mathematical and computational foundations of Data Science. The emphasis is on fundamental mathematical ideas (basic functional analysis, reproducing kernel Hilbert spaces, concentration inequalities, uniform central limit theorems), basic statistical modeling techniques (e.g. linear regression, parametric and non-parametric methods), basic machine learning techniques for unsupervised (e.g. clustering, manifold learning), supervised (classification, regression), and semi-supervised learning, and corresponding computational aspects (linear algebra, basic linear and nonlinear optimization to attack the problems above). Applications will include statistical signal processing, imaging, inverse problems, graph processing, and problems at the intersection of statistics/machine learning and physical/dynamical systems (e.g. model reduction for stochastic dynamical systems).

AS.110.503. Undergraduate Research in Mathematics. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.586. Independent Study. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.587. DRP Independent Study. 1 Credit.
Directed Reading Program (DRP) Independent Study.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.110.599. Independent Study. 1 - 3 Credits.

AS.110.601. Algebra I.
The first of a two semester algebra sequence to provide the student with the foundations for Number Theory, Algebraic Geometry, Representation Theory, and other areas. Topics include refined elements of group theory, commutative algebra, Noetherian rings, local rings, modules, and rudiments of category theory, homological algebra, field theory, Galois theory, and non-commutative algebras.

AS.110.602. Algebra II.
The second of a two semester algebra sequence to provide the student with the foundations for Number Theory, Algebraic Geometry, Representation Theory, and other areas. Topics include refined elements of group theory, commutative algebra, Noetherian rings, local rings, modules, and rudiments of category theory, homological algebra, field theory, Galois theory, and non-commutative algebras.

AS.110.605. Real Analysis.
This course covers the theory of the Lebesgue theory of integration in d-dimensional Euclidean space, and offers a brief introduction to the theory of Hilbert spaces. Topics include the Lebesgue measure on Euclidean space, the Lebesgue integral, classical convergence results for the Lebesgue integral, Fubini's theorem, the spaces of L^1 and L^2 functions.

AS.110.607. Complex Variables.
Analytic functions of one complex variable. Topics include Cauchy integral theorems, residue theory, conformal mapping, harmonic functions, riemann mapping theorem, normal families. Other topics may include Mittag-Leffler theorem, Weierstrass factorization theorem, elliptic functions, Picard theorem, and Nevanlinna theory.

AS.110.608. Riemann Surfaces.
Abstract Riemann surfaces. Examples: algebraic curves, elliptic curves and functions on them. Holomorphic and meromorphic functions and differential forms, divisors and the Mittag-Leffler problem. The analytic genus. Bezout's theorem and applications. Introduction to sheaf theory, with applications to constructing linear series of meromorphic functions. Serre duality, the existence of meromorphic functions on Riemann surfaces, the equality of the topological and analytic genera, the equivalence of algebraic curves and compact Riemann surfaces, the Riemann-Roch theorem. Period matrices and the Abel-Jacobi mapping, Jacobi inversion, the Torelli theorem. Uniformization (time permitting).

AS.110.615. Algebraic Topology I.
Singular homology theory, cohomology and products, category theory and homological algebra, Künneth and universal coefficient theorems, Poincaré and Alexander duality theorems, Lefschetz fixed-point theorem, covering spaces and fundamental groups. Prerequsites: the equivalent of one semester in both Abstract Algebra and Real Analysis (specifically, point set topology).

AS.110.616. Algebraic Topology II.
Higher homotopy groups, CW complexes, cellular homology and cohomology, spectral sequences and comparison theorems, graded homological algebra, fibrations, Serre and Eilenberg-Moore spectral sequence, Eilenberg-MacLane spaces, Steenrod algebra, spectra.

AS.110.617. Number Theory I.
Elements of advanced algebra and number theory. Possible topics for the year-long sequence include local and global fields, Galois cohomology, semisimple algebras, class field theory, elliptic curves, modular and automorphic forms, integral representations of L-functions, adelic geometry and function fields, fundamental notions in arithmetic geometry (including Arakelov and diophantine geometry).

AS.110.618. Number Theory II.
Topics in advanced algebra and number theory. Possible topics for the year-long sequence include local and global fields, Galois cohomology, semisimple algebras, class field theory, elliptic curves, modular and automorphic forms, integral representations of L-functions, adelic geometry and function fields, fundamental notions in arithmetic geometry (including Arakelov and diophantine geometry).

AS.110.619. Lie Groups and Lie Algebras.
Lie groups and Lie algebras, classification of complex semi-simple Lie algebras, compact forms, representations and Weyl formulas, symmetric Riemannian spaces.

AS.110.631. Partial Differential Equations I.
This course is the first in the sequence about the general theory of PDEs. The beginning of the course will describe several important results of functional analysis which are instrumental for the study of PDEs: Hahn-Banach theorem, Uniform boundedness and closed graph theorems, reflexive spaces and weak topologies, elements of semi-group theory. Then we will describe the basic theory of Sobolev spaces and the standard existence theory for (initial) boundary value problems of elliptic/parabolic type. Finally, the rest of the course will be devoted to finer properties of solutions of elliptic equations such as maximum principles, Harnack principles and regularity.

AS.110.632. Partial Differential Equations II.
An introductory graduate course in partial differential equations. Classical topics include first order equations and characteristics, the Cauchy-Kowalevski theorem, Laplace's equation, heat equation, wave equation, fundamental solutions, weak solutions, Sobolev spaces, maximum principles. The second term focuses on special topics such as second order elliptic theory.

AS.110.633. Harmonic Analysis.
Fourier multipliers, oscillatory integrals, restriction theorems, Fourier integral operators, pseudodifferential operators, eigenfunctions. Undergrads need instructor's permission.

AS.110.637. Functional Analysis.
This class will explore basic aspects of functional analysis, focusing mostly on normed vector spaces. This will include the Hahn-Banach and open mapping theorems, a discussion of strong and weak topologies, the theory of compact operators, and spaces of integrable functions and Sobolev spaces, with applications to the study of some partial differential equations. Prerequisite: Real Analysis

AS.110.643. Algebraic Geometry I.
Introduction to affine varieties and projective varieties. Hilbert's theorems about polynomials in several variables with their connections to geometry. Abstract algebraic varieties and projective geometry. Dimension of varieties and smooth varieties. Sheaf theory and?some notions of cohomology. Applications of sheaves to?geometry;?e.g., theory of divisors, rudiments of scheme theory for the understanding of the Riemann-Roch theorem for curves and surfaces. Other topics may include Jacobian varieties, resolution of singularities, birational geometry on surfaces, schemes, connections with complex analytic geometry and topology.?

AS.110.644. Algebraic Geometry II.
Introduction to affine varieties and projective varieties. Hilbert's theorems about polynomials in several variables with their connections to geometry. Abstract algebraic varieties and projective geometry. Dimension of varieties and smooth varieties. Sheaf theory and?some notions of cohomology. Applications of sheaves to?geometry;?e.g., theory of divisors, rudiments of scheme theory for the understanding of the Riemann-Roch theorem for curves and surfaces. Other topics may include Jacobian varieties, resolution of singularities, birational geometry on surfaces, schemes, connections with complex analytic geometry and topology.

AS.110.645. Riemannian Geometry I.
This course is a graduate-level introduction to foundational material in Riemannian Geometry. Riemannian manifolds, a smooth manifold equipped with a Riemannian metric. Topics include connections, geodesics, Jacobi fields, submanifold theory including the second fundamental form and Gauss equations, manifolds of constant curvature, comparison theorems, Morse index theorem, Hadamard theorem and Bonnet-Myers theorem.

AS.110.646. Riemannian Geometry II.
This course covers more advanced topics in Riemannian geometry chosen at the instructors discretion. Possible topics include: minimal surface theory, geometric heat flows, harmonic mappings, Einstein manifolds, etc.

AS.110.653. Stochastic Differential Equations: An Introduction With Applications.
This course is an introduction to stochastic differential equations and applications. Basic topics to be reviewed include Ito and Stratonovich integrals, Ito formula, SDEs and their integration. The course will focus on diffusion processes and diffusion theory, with topics include Markov properties, generator, Kolmogrov's equations (Fokker-Planck equation), Feynman-Kac formula, the martingale problem, Girsanov theorem, stability and ergodicity. The course will briefly introduce applications, with topics include statistical inference of SDEs, filtering and control.

AS.110.707. Functional Analysis.

AS.110.710. What is... Seminar.
This is a professional development course for graduate students, where they will learn, practice, or enhance their skills at giving math talks. The course will run in the format of a "What is... Seminar", where each week one of the participants will present a 1 hour talk on an accessible and relatively self-contained topic, titled What is (insert your math notion of choice). In preparation for their talk, students will meet with the instructor at least once, where they will receive guidance and detailed advice to help them give a great talk. Although the definition of a "great talk" is subjective, participants should be willing to follow the instructors' advice. Graduate students at any stage of their PhD are encouraged to attend, regardless of their experience giving talks.

AS.110.711. Topics in Topos Theory.
Reading course to discuss Topics in Topos Theory

AS.110.712. Topics in Mathematical Physics.

AS.110.721. Topics In Homotopy Type Theory.
Homotopy type theory (HoTT) is a new proposed foundation system for mathematics that extends Martin-Löf's dependent type theory with Voevodsky's univalence axiom. Dependent type theory is a formal system for constructive mathematics, in which a theorem is proven by constructing a term in the type that encodes its statement. In Homotopy type theory, types are thought of as spaces and terms as points in those spaces. A proof that two terms in a common type are equal is now interpreted as a path between two points in a space. In particular, types might have interesting higher homotopical structure, which can be thought of as revealing fundamental differences between two proofs of a common proposition. One advantage of this foundation system is its amenability to computer formalization, which this course will illustrate by introducing the computer proof assistant Agda.

AS.110.722. Topics in Homotopy Theory.
The course will focus on recent developments in homotopy theory, such as Galois theory for E_n (n \geq 2) ring-spectra, and on connections with number theory; in particular, work of Bhatt, Hesselholt, Lurie, Scholze and others on topological Hochschild homology and its applications to geometry over the p-adic complex numbers.

AS.110.726. Topics in Analysis.
The topics covered will involve the theory of calculus of Functors applied to Geometric problems like Embedding theory. Other related areas will be covered depending on the interest of the audience.

AS.110.727. Topics in Algebraic Topology.

AS.110.731. Topics in Geometric Analysis.

AS.110.733. Topics In Alg Num Theory.

AS.110.737. Topics Algebraic Geometry.

AS.110.739. Topics in Analytic Number Theory.
This course will be on functional analysis (applied to number theory) and Connes-Meyer's spectral interpretation of zeroes of Hecke L functions. Topics will include : adeles, ideles, bornologies, spectral theory, condensed/liquid modules à la Scholze-Clausen, Pontryagin duality and almost-periodic functions, Tate's thesis, Connes-Meyer's spectral interpretation. Relations with category theory, quantum mechanics, Bost-Connes systems and non-commutative geometry will be evoked. This course will be designed to be appealing for students from analysis or from algebra.

AS.110.741. Topics in Partial Differential Equations.

AS.110.742. Topics In Partial Differential Equations.
In this course we will be discussing some dispersive evolution equations, primarily the nonlinear Schrodinger equation. Topics will include well - posedness theory, conservation laws, and scattering. The course will be accessible to students who have not taken graduate partial differential equations or functional analysis.

AS.110.745. Introduction to Curvature Flows.

AS.110.749. Topics in Differential Geometry.
In this class, we will study Aaron Naber and Jeff Cheeger's recent result on proving codimension four conjecture. We plan to talk about some early results of the structure on manifolds with lower Ricci bound by Cheeger and Colding. We will prove quantitative splitting theorem, volume convergence theorem, and the result that almost volume cone implies almost metric cone. Then we will discuss regularity of Einstein manifolds and the codimension four conjecture.

AS.110.750. Topics in Representation Theory.

AS.110.756. Topics in Algebra.
This will be a course in commutative algebra. Topics may include: Noetherian rings and modules, the Nullstellensatz, Hilbert basis theorem, localization, integrality, Noether normalization, primary decomposition, DVRs, Dedekind domains, dimension theory, smoothness and regularity, and homological methods.

AS.110.757. Topics in Stochastic Dynamical Systems.
The course will present an introduction to stochastic dynamical systems and some applications in model reduction and data assimilation. The main focus will be on stability and ergodicity of stochastic dynamical systems, including stochastic differential equations driven by white and fractional noise, and their numerical approximations. We will then discuss model reduction, focusing on Mori-Zwanzig formalism and approximation of the generalized Langevin equation, and methods on the parametric inference of related stochastic systems. Data assimilation and stochastic control will also be briefly introduced.

AS.110.771. Mathematics GTA Teaching Seminar.
he goals of this seminar center on the preparedness for graduate students in mathematics to engage in classroom instructions for undergraduates at Johns Hopkins University. This seminar augments the teaching orientation provided to graduate students by the CER and Mathematics Department by addressing (1) teaching-techniques: student-centered inclusive teaching strategies, facilitating small group work, incorporating student ideas and student thinking into active hole class discussions, and choosing appropriate mathematical tasks, (2) opportunities for practice teaching in classrooms before their first assignment to TA for a course in scaffolded micro-teaching experiences and (3) preparing for the practice of and documentation of a reflective teaching practice necessary for success in their careers as mathematicians and educators.

AS.110.791. Seminar in Analysis and Partial Differential Equations.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.793. Seminar in Topology.
For graduate students only. Presentations of current research papers by faculty, graduate students and invited guest speakers.

AS.110.794. Seminar in Category Theory.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.795. Data Science Seminar.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.798. Seminar in Number Theory.
Presentations of current research papers by faculty, graduate students and invited guest speakers. For graduate students only.

AS.110.799. Seminar in Algebraic Geometry.
For graduate students only. Presentations of current research papers by faculty, graduate students and invited guest speakers.

AS.110.800. Independent Study-Graduates.

AS.110.801. Thesis Research.

AS.130 (Near Eastern Studies)

AS.130.101. Ancient Near Eastern Civilizations. 3 Credits.
Review of important issues in ancient Near Eastern history and culture from the Neolithic era to the Persian period. Included will be an examination of the Neolithic agricultural revolution, the emergence of cities, states and writing, and formation of empires. Cultures such as Sumer and Akkad, Egypt, the Hittites, Israelites, Assyrians, Babylonians, and Persians will be discussed.

AS.130.119. Medicine in Ancient Egypt. 3 Credits.
A survey of medicine and medical practice in Egypt and, to a lesser extent, the ancient Near East in general. The abundant sources range from magical spells to surprisingly "scientific" treatises and handbooks. Readings are selected from translations of primary sources in the writings of ancient Egypt, Mesopotamia, and Israel. Topics will include the sources of our knowledge; the nature of medical practitioners, medical treatment, and surgery; beliefs about disease and the etiology of illness; concepts of contagion and ritual purity.

AS.130.124. Texts, Tablets, and Tweets: The Sociolinguistics of Writing. 3 Credits.
This course examines the evolution of writing and the relationship between speech and writing in ancient and modern societies. We will examine the ways in which orthography, scripts, and the visual components inherent to written language (e.g., scripts, fonts, emoticons, diacritics etc.) are used to create and/or project certain social identities in these new written spaces. A primary aim of this course is to generate discussion regarding the ways in which writing in all of its forms—at the institutional, group, and individual level, in official documents, in emails, texts, tweets, and graffiti, using standardized and non-standard orthographies, in both regulated and unregulated spaces—can be a social and often political act of identity. The writing assignments for the course will encourage you to consider the ways in which writing can be harnessed to express social identities. You will work as a group to develop your own writing system and present it to the class. This will hone your creative and critical thinking skills and give you practice collaborating on a project. You will also research and conduct an original analysis on a corpus of writing.

AS.130.126. Gods and Monsters in Ancient Egypt. 3 Credits.
A basic introduction to Egyptian Religion, with a special focus on the nature of the gods and how humans interact with them. We will devote particular time to the Book of the Dead and to the "magical" aspects of religion designed for protective purposes.

AS.130.136. History of Hasidism. 3 Credits.
Although it appears to be a relic of pre-modern Judaism, Hasidism is a phenomenon of the modern era of Jewish history. This course surveys the political and social history of the Hasidic movement over the course of the last three centuries. Students will also explore basic features of Hasidic culture and thought in their historical development. Cross-listed with Jewish Studies.

AS.130.140. Hebrew Bible / Old Testament. 3 Credits.
The Bible is arguably the most read and yet most misinterpreted book of all time, one of the most influential and yet most misapplied work of literature. The Hebrew Bible (Old Testament) is Scripture to Jews and Christians yet also a rich collection of literature w/ numerous literary genres that has been highly influential on secular Western culture. At its core, it is our most important literary source that (when wed with archaeology) helps us to understand the people and culture of Iron Age Israel and Judah. This is an introductory course surveying of the books of the Hebrew Bible (Old Testament) giving primary attention to the religious ideas they contain and the ancient contexts in which they were composed. Topics include: The Academic Study of Religion, Ancient Creation Accounts, Ancestral Religion, The Exodus and Moses, Covenant, Tribalism and Monarchy, The Ideology of Kingship, Prophecy, Priestly Sources, Psalms, Wisdom Literature, and Apocalyptic Thought.

AS.130.152. After Babylon: Mesopotamia from Athens to Anime. 3 Credits.
This course is an exploration of how ancient Mesopotamian art, literature, history, and culture have been transmitted from the fall of Babylon in 539 BCE to the present day and the ways in which they have been adapted and transformed along the way. While all aspects of ancient Mesopotamia will be under discussion, the course will principally focus on the narratives of Gilgamesh, Semiramis/Shammuramat, and Sardanapalus/Assurbanipal. After briefly introducing ancient Mesopotamia, we will see how the region and its history are portrayed in biblical, Classical, Quranic, and medieval sources. From there we will discuss the “rediscovery” of Mesopotamia and the decipherment of cuneiform. The latter half of the course will then be devoted to Mesopotamia in 20th and 21st century popular culture.

AS.130.153. A (Virtual) Visit to the Louvre Museum: Introduction to the Material Culture of Ancient Egypt. 3 Credits.
This course will present the Egyptological collections of the musée du Louvre in Paris, room by room, as in a real visit. The experience will be enhanced by the study of objects that are not shown to the public but are kept in the reserves of the museum. From the 4th millennium BC to Roman time, the iconic “masterpieces” of this world-renowned art museum, as well as its little-known artifacts, will allow us to explore the history and material culture of ancient Egypt. We will also learn to observe, describe and analyze archaeological objects, in a global manner and without establishing a hierarchy between them, while questioning their place in the museum and its particular language. The objective will be to go beyond the objects themselves and answer, in fine, the following questions: What do these objects tell us about the men and women who produced them, exchanged them, used them, and lived among them in antiquity? What do they also reveal about those who discovered them in Egypt, several millennia later, about those who collected them and sometimes traded them, and what does this say about the relations between Egypt and the Western countries over time? The courses will be complemented by visits to the rich Egyptian collections in Baltimore.

AS.130.170. Diplomacy and Conflict in the Ancient Middle East. 3 Credits.
The Middle East is home to the invention of agriculture, cities, and writing. It is also in the Middle East that we find evidence of humanity’s earliest diplomatic activity in, for instance, the actual letters sent by ancient kings to one another, the treaties drawn up after their conflicts, and the inscriptions that commemorate their conquests. In this course, we examine texts such as these to explore questions such as: How do we characterize the international system of the ancient Middle East? Does this system change over the approximately two millennia for which we have documentation? Is it better to approach ancient diplomacy through present-day eyes or in the context of ancient world-views? Is an understanding of diplomacy in the ancient Middle East relevant to our understanding of modern international relations? All texts read in translation.

AS.130.177. World Prehistory: An Anthropological Perspective. 3 Credits.
How and why did our nomadic hunting and gathering ancestors become farmers? What led agricultural societies to build cities, develop writing, religious institutions, wage war, and trade for exotic goods? This course surveys prehistory and ancient history from the origins of human culture to the emergence civilization. Although prehistory and ancient history yield evidence of tremendous cultural diversity this course emphasizes common elements of past human experience, culture, and culture change. These include the origins of modern humans and their adjustment to a variety of post-ice age environments, shifts from hunting and gathering to agricultural lifeways, and the initial development of the world’s earliest cities and civilizations.

AS.130.202. Ancient Mythology. 3 Credits.
This course explores the mythology of the ancient Near East from the invention of writing in Sumer in 3000 B.C. until the conquest of Alexander the Great near the end of the first millennium B.C. Mythological texts from Mesopotamia, Egypt, Anatolia, the Levant, and the Bible will be read from a comparative perspective. Special attention is paid to the origin and development of the epic, culminating in the great Epic of Gilgamesh, but considerable time is also given to the vast mythological and historical literature, and such diverse genres as love poetry, proverbs, humorous dialogues, Omens, and legal and medical texts. All readings are in English translation.

AS.130.203. Archaeology of Africa: From Human Origins to the Emergence of Civilizations. 3 Credits.
This course examines Africa’s ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.130.214. The Origins of Civilization: A Cross-Cultural Perspective. 3 Credits.
One of the most significant transformations in human history was the “urban revolution” in which cities, writing, and social classes formed for the first time. In this course, we compare five areas where this development occurred: China, Mesopotamia, the Indus Valley, Egypt, and Mesoamerica (Mexico/Guatemala/Honduras/Belize). In each region, we review the physical setting, the archaeological and textual evidence, and the theories advanced to explain the rise (and eventual collapse) of these complex societies.

AS.130.216. History of the Jews in Pre-Modern Times, from the Middle Ages to 1789. 3 Credits.
A broad survey of the significant political and cultural dynamics of Jewish history in the Medieval, Early-Modern, and Modern Eras.

AS.130.223. Ancient Revolutions: The Archaeology of Culture Change. 3 Credits.
The last 250,000 years have seen many moments that could be referred to as “revolutions” in art, technology, or other aspects of human society. The “Human Revolution” of the Upper Paleolithic saw the birth of artistic ability and symbolic thinking in hominids. We call the transition from hunting and gathering to settled agriculture the “Neolithic Revolution,” while the “Urban Revolution” gave us complex societies and urban life. Times of dynamic change gave rise to important aspects of our shared behavioral and societal identity. They have become the subject not only of much archaeological investigation, but also of popular discourse about the human past. This class will explore famous cultural “revolutions” by looking at the causes and consequences of these important changes. We will evaluate the archaeological evidence, and through it interrogate the term “revolution” itself. What do we mean when we speak of “revolutions?” Are there other ways to think of past social and technological change, and when, if ever, do we truly see “revolutions” in the human condition in the ancient past?

AS.130.245. The Archaeology of Gender in the Ancient Eastern Mediterranean. 3 Credits.
How do art historians and archaeologists recover and study genders and sexualities of ancient people? This writing-intensive seminar looks at texts and objects from ancient Egypt, Assyria, and Greece through the lens of gender and sexuality studies. Beyond exploring concepts of gender in the ancient Eastern Mediterranean, students will also consider how modern scholars have approached, recovered, and written about ancient gender identities. There are no prerequisites for this course.
Area: Writing Intensive

AS.130.246. Writing History in the Ancient Mediterranean World. 3 Credits.
Just what does it mean to "write history"? In this course, we will read a selection of historical texts from ancient Egypt, Mesopotamia, Greece, and Rome, in order to examine how these cultures conceived of, and narrated, their own pasts. A major focus will be how these texts were created in order to understand or control the present. We will also examine how these texts have come down to us, and in what ways this might affect how we use them in constructing our own historical narratives. No prior knowledge of the ancient world necessary; all texts read in English translation.
Area: Writing Intensive

AS.130.247. Digging for Legitimacy Archaeology, Museums, and Ideology. 3 Credits.
Archaeology was born out of Western Colonial endeavors into Africa, the Middle East, Asia, and the Americas. Large scale excavations conducted by the United Kingdom, France, Germany, Italy, and the United States resulted in the removal and transfer of valuable (culturally and monetarily) material culture from local stewards and stakeholders to the West. To this day the discipline of archaeology is still saddled by its colonial past and the Hollywood interpretation of archaeologists as saviors of ancient treasures. Today, most interaction between people and ancient objects is facilitated via the museum. In this course we will explore 19th- 21st century archaeological and museum practices and the role they play in modern narratives of identity and representation in the America and the Middle East. Students will engage with the historical, legal, economic, and ethical implications of archaeology and analyze how political, religious, cultural, and academic institutions have leveraged archaeology and cultural artifacts to reify and legitimize their pursuits and ideologies.

AS.130.248. Up the Nile: New Approaches to the History of Egyptology and Nubiology. 3 Credits.
King Tut, Napoleon, Champollion, Ozymandias, Nefertiti: the history of Egyptology is filled with big characters, huge monuments, and glimmering objects. But it is also made up of colonialist practices, looted sites, and forgotten scholarly contributions. “Up the Nile” examines the antiquarian, colonialist, racist, Western-centric, and patriarchal roots of modern Egyptology and Nubiology, and addresses how scholars and enthusiasts alike are continuing to grapple with these lasting legacies and biases. This class investigates how the Egyptians and Nubians thought of their own histories, as well as how other ancient cultures viewed the cultures of the Nile. It moves roughly chronologically, tracing understudied and marginalized voices from the Islamic, Medieval, and Ottoman periods into the 20th and 21st centuries. It examines the origins of scholarship, modern collecting, Egyptomania, and museums, delving into the problems and repercussions that still haunt us today. “Up the Nile” will engage with important and difficult aspects regarding Egyptology’s and Nubiology’s colonialist, racist, and sexist past and present. It asks: who decides who writes history, then and now?

AS.130.249. Everything She Says is Done for Her: Exploring the Spheres of Influence of Women in Ancient Egypt. 3 Credits.
How did women move within their gendered spheres of influence in ancient Egyptian society? How do scholars discuss women in the ancient world and what are the spheres influence often allotted to women? How can we investigate the lives of women through the material record? What methodologies are applied by scholars to study women in antiquity? This course seeks to explore these questions and much more. The course will utilize textual and material evidence to examine and deconstruct the economic, social, religious, and political roles of women in ancient Egypt.

AS.130.300. History of Ancient Mesopotamia. 3 Credits.
A survey of the history of Sumer, Babylonia, and Assyria.

AS.130.301. History of Ancient Syria-Palestine. 3 Credits.
A survey of the history of Ancient Syria and Canaan, including Ancient Israel.

AS.130.302. History: Ancient Syria-Palestine II. 3 Credits.
A survey of the history of Ancient Syria and Cannan, including ancient Israel. Taught with AS.134.661. Cross-listed with Jewish Studies.

AS.130.334. Egyptian Funerary Arts in the Archaeological Museum. 3 Credits.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.130.338. The Talmud as Read in the Middle Ages: The Sugya of Kavod HaBriot (Human Dignity). 3 Credits.
In the early Middle Ages the Talmud emerged as the defining document of official Jewish religion and culture, and remained so until the dawn of the Modern Era. Jewish scholars in many different countries, and in a wide variety of cultural contexts, developed certain ways of reading, interpreting, and applying the Talmud. In the process, they produced an immense corpus of commentary and law. This course will examine how and why the Talmud was studied in these centuries by Jews who mined it, subject by subject, for emotional, philosophical, and legal meaning.

AS.130.346. Introduction to the History of Rabbinic Literature. 3 Credits.
Broadly surveying classic rabbinic literature, including the Talmud and its commentaries, the legal codes and the response, this seminar explores the immanent as well as the external factors that shaped the development of this literature, the seminal role of this literature in Jewish self-definition and self-perception, and the role of this literature in pre-modern and modern Jewish culture.

AS.130.348. Survey Jewish History as Relected in Responsa Literature: How Immutable Judaism Wrestles with Change. 3 Credits.
How does a religious system which defines its ancient laws as God-given and unchangeable apply them to radically different and changing social, political and intellectual situations? This course explores the literature of "Questions and Answers"(She'elot u-Teshuvot), the Jewish legal responsa which have struggled to match Jewish religious law to modern life for fifteen centuries. A sweeping survey of Jewish history as revealed by one of its most impenetrable yet fascinating sources.

AS.130.353. Space Archaeology: An Introduction to Satellite Remote Sensing, GIS and GPS. 3 Credits.
This course introduces technologies archaeologists use to map ancient landscapes. These include Geographic Information Systems (GIS) mapping software, advanced Global Positioning System (GPS) receivers, and various types of satellite imagery. Taught together with AS.131.653.

AS.130.354. Archaeological Method and Theory. 3 Credits.
Climate change, population growth, war - what questions do archaeologists ask about the ancient past, how do they collect relevant evidence, and how do they arrive at satisfying answers to their questions? This course will review major theoretical currents in archaeology including evolutionary, cultural-historical, processual and post-processual approaches and discuss the future of archaeology as a scientific and humanistic discipline. Basic techniques for analyzing major categories of artifacts such as lithics, ceramics, archaeobotanical, and zooarchaeological materials will also be introduced.

AS.130.357. Geographic Information Systems in Archaeology. 3 Credits.
Applications of GIS in archaeology have recently expanded dramatically and GIS has now become an indispensable tool for archaeological research worldwide. This course will introduce the major applications of Geographic Information Systems (GIS) in archaeology. These include the history of GIS in archaeology, air photography and satellite imagery, predictive modeling, hydrological modeling, viewsheds, and least-cost routes. It will grapple with theoretical issues manifest in archaeological GIS including conflicts between environment and social understandings of the ancient past, and will foster discussion of issues that affect outcomes of analyses including spatial scale and boundary delineation choices that can dramatically influence results. Students will learn the basics of ESRI's ArcGIS software. Taught with AS.131.657.

AS.130.364. Archaeology of Arabia. 3 Credits.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.131.664.

AS.130.373. Prophets and Prophecy in the Bible. 3 Credits.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?

AS.130.376. Ancient Magic and Ritual. 3 Credits.
This course will introduce students to the vast body of rituals that were practiced and performed in antiquity, with a particular emphasis on rituals from ancient Mesopotamia, Egypt, and the Hebrew Bible. In addition to examining rituals from a comparative perspective, anthropological and sociological studies of ritual will be read and discussed to shed light on the social, cultural, and political significance of ritual in the ancient world and beyond.
Area: Writing Intensive

AS.130.378. Geoarchaeology: Applications of Earth Science to Archaeology. 3 Credits.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.130.381. Elementary Akkadian. 3 Credits.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language. Co-listed with AS.132.600

AS.130.382. History of Mesopotamia II. 3 Credits.
A survey of the history of Sumer, Babylonia, and Assyria.

AS.130.383. Elementary Akkadian II. 3 Credits.
An introduction to the paleography, grammar, and lexicon of the Akkadian language, and the reading of simpler texts in that language.Continues AS.130.381

AS.130.388. Elementary Sumerian. 3 Credits.
An introduction to the paleography, grammar and lexicon of the Sumerian language, and the reading of simpler texts in that language.

AS.130.389. Elementary Sumerian II. 3 Credits.
An introduction to the paleography,, grammar and lexicon of the Sumerian language and the reading of simpler texts in that language.

AS.130.400. Introduction To Middle Egyptian. 3 Credits.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2055-1650 B.C.). In the second semester, literary texts and royal inscriptions will be read. Course meets with AS.133.600.

AS.130.401. Introduction To Middle Egyptian. 3 Credits.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2011- 1700 B.C.). Co-listed with AS.133.601.
AS.130.400 or equivalent.

AS.130.420. Seminar in Research Methods in Near Eastern Studies. 3 Credits.
This writing intensive seminar examines the relationship between religion and science in ancient Mesopotamia and the rest of the Near East from the 4th millennium to the Hellenistic period. Using a variety of case studies, and through engagement with scholarly literature pertaining to the topic of the course, students will develop skills in specific research skills such as critical reading, analysis, and interpretation.
Area: Writing Intensive

AS.130.440. Elementary Biblical Hebrew. 3 Credits.
Introduction to the grammar, vocabulary, and writing system of biblical Hebrew.

AS.130.441. Elementary Biblical Hebrew II. 3 Credits.
Survey of grammar and reading of simple texts. May not be taken on a satisfactory/unsatisfactory basis. A continuation of Elementary Biblical Hebrew I.
AS.130.440

AS.130.442. Readings - Hebrew Prose. 3 Credits.
Reading of biblical Hebrew prose, especially from the Pentateuch, Joshua, Judges, Samuel, and Kings. Cross-listed with Jewish Studies.

AS.130.443. Readings - Hebrew Prose and Poetry. 3 Credits.
Reading of Biblical Hebrew Prose, from texts such as the Pentateuch, Joshua, Judges, Samuel, and Kings.

AS.130.501. Readings & Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.504. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.505. Archaeology Fieldwork. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.506. Independent Study-Archaeology Fieldwork. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.510. Archaeology Major Honors Thesis I. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.511. Archaeology Major Honors Thesis II. 3 Credits.
Area: Writing Intensive
AS.130.510;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.130.590. Independent Study. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.131.600. Seminar Near Eastern History.
Seminar in Near Eastern History.

AS.131.601. Seminar Near Eastern History: Mesopotamia.
A three-year history cycle required of all graduate students and forming the core of our graduate program. One year each will be devoted to Egyptian history, Mesopotamian history, and Syro-Palestinian history.

AS.131.613. Archaeology of Africa: From Human Origins to the Emergence of Civilizations.
This course examines Africa's ancient past from the emergence of biologically modern humans, ancient hunter-gatherers, the earliest animal herding and farming populations, to cities and civilizations. While Egypt plays an undeniably central role in world history, this course concentrates in particular on ancient geographies other than Egypt.

AS.131.634. Seminar: Near Eastern Archaeology.
Topic varies but can include the archaeology of Mesopotamia, Syria, or Palestine, or thematic discussions (e.g., on ideology, state collapse, etc.).

AS.131.635. Seminar: Near East Archaeology.
Topic varies but can include the archaeology of Mesopotamia, Syria, or Palestine, or thematic discussions (e.g., on ideology, state collapse, etc.).

AS.131.653. Space Archaeology: An Introduction to Satellite Remote Sensing, GIS and GPS.
This course introduces technologies archaeologists use to map ancient landscapes. These include Geographic Information Systems (GIS) mapping software, advanced Global Positioning System (GPS) receivers, and various types of satellite imagery. Taught together with AS.130.353.

AS.131.654. Advanced Archaeological Method and Theory.
Climate change, population growth, war - what questions do archaeologists ask about the ancient past, how do they collect relevant evidence, and how do they arrive at satisfying answers to their questions? This course will review major theoretical currents in archaeology including evolutionary, cultural-historical, processual and post-processual approaches and discuss the future of archaeology as a scientific and humanistic discipline. Basic techniques for analyzing major categories of artifacts such as lithics, ceramics, archaeobotanical, and zooarchaeological materials will also be introduced.

AS.131.657. Geographic Information Systems in Archaeology.
Applications of GIS in archaeology have recently expanded dramatically and GIS has now become an indispensible tool for archaeological research worldwide. This course will introduce the major applications of Geographic Information Systems (GIS) in archaeology. These include the history of GIS in archaeology, air photography and satellite imagery, predictive modeling, hydrological modeling, viewsheds, and least-cost routes. It will grapple with theoretical issues manifest in archaeological GIS including conflicts between environment and social understandings of the ancient past, and will foster discussion of issues that affect outcomes of analyses including spatial scale and boundary delineation choices that can dramatically influence results. Students will learn the basics of ESRI's ArcGIS software.Taught with AS.130.357.

AS.131.664. Archaeology of Arabia.
This course examines the archaeology of the Arabian Peninsula from the earliest Paleolithic in the region (c. 1.5 million years ago) through the first few centuries of the Islamic era (c. 1000 AD). We will review basic geology and environmental conditions, examine the development of animal herding and crop cultivating lifeways, and scrutinize the rise of ancient South Arabian complex societies and civilizations. Co-listed with AS.130.364.

AS.131.678. Geoarchaeology: Applications of Earth Science to Archaeology.
Geoarchaeology is a multidisciplinary subfield that applies the tools and techniques of earth science to understand ancient humans and their interactions with environments. This course examines basic topics and concepts, including archaeological site formation, paleo-environmental reconstruction, raw materials and resources, soil science, deposition and erosion of wind and water-borne sediments in different environments such as along rivers, lakes and coastlines, radiocarbon and other chronometric dating methods, and ground-based remote sensing, including ground penetrating radar.

AS.131.800. Readings & Research.

AS.131.801. Readings And Research.

AS.131.848. Dissertation Research.

AS.131.849. Dissertation Research.

AS.131.850. Summer Independent Research.
Independent summer research

AS.132.600. Elementary Akkadian.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language.

AS.132.601. Elementary Akkadian II.
An introduction to the paleography, grammar and lexicon of the Akkadian language, and the reading of simpler texts in that language.

AS.132.606. Intermediate Akkadian Texts.
In this course a selection of intermediate level Akkadian texts from different genres and period will be read, analyzed and discussed. To build on skills learned in Introduction to Akkadian, specific emphasis will be placed on understanding more advanced grammatical forms and learning how to critically use research tools like the Chicago Assyrian Dictionary and von Soden's Akkadisches Handwoerterbuch.

AS.132.607. Intermediate Akkadian Texts.
In this course a selection of intermediate level Akkadian texts from different genres and period will be read, analyzed and discussed. To build on skills learned in Introduction to Akkadian, specific emphasis will be placed on understanding more advanced grammatical forms and learning how to critically use research tools like the Chicago Assyrian Dictionary and von Soden's Akkadisches Handwoerterbuch.

AS.132.608. Akkadian Letters.
This course introduces students to letters written in the Akkadian language from a variety of historical periods. Recommended course background: AS.132.600 and AS.132.601.

AS.132.609. Seminar in Research Methods in Near Eastern Studies.
Area: Writing Intensive

AS.132.612. Advanced Akkadian.
Students read texts in the original Akkadian cuneiform with attention to their philological, archaeological, historical, and literary features. The seminar topic varies from semester to semester but usually consists either of texts of various genres from a single period (e.g., Neo-Assyrian) or texts of various period from a single genre (e.g., letters).

AS.132.631. Literature and Religious Texts.

AS.132.643. Ancient Magic and Ritual.
This course will introduce students to the vast body of rituals that were practiced and performed in antiquity, with a particular emphasis on rituals from Ancient Mesopotamia, Egypt, and the Hebrew Bible. In addition to examining rituals from a comparative perspective, anthropological and sociological studies of ritual will be read and discussed to shed light on the social, cultural, and political significance of ritual in the ancient world and beyond.

AS.132.644. Treaties And Diplomacy.
Reading treaties and related materials in Akkadian.

AS.132.701. Elementary Sumerian II.

AS.132.710. Advanced Sumerian.
We will read Letter Collection B and related materials in the original cuneiform.

AS.132.711. Advanced Sumerian.
In this course a selection of Sumerian texts from different periods and genres will be read and discussed from a linguistic, philological, historical, and literary perspective.

AS.132.800. Mesopotamian Seminar.
Research and discussion on topics of current interest.

AS.132.801. Mesopotamian Seminar.
Research and discussion on topics of current interest.

AS.133.304. Let's Play! Games from Ancient Egypt and Beyond. 3 Credits.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.600. Introduction To Middle Egyptian.
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2135-2000 B.C.). In the second semester, literary texts and royal inscriptions will be read.

AS.133.601. Introduction To Middle Egyptian (Hieroglyphs).
Introduction to the grammar and writing system of the classical language of the Egyptian Middle Kingdom (ca. 2011-1700 B.C.). Co-listed with AS.130.401
AS.133.600 or equivalent.

AS.133.610. Middle Egyptian Texts.
In this course we read a variety of Middle Egyptian hieroglyphic compositions and documents. Knowledge of Middle Egyptian Required.

AS.133.611. Middle Egyptian Texts.
In this course we read a variety of Middle Egyptian hieroglyphic compositions and documents. Knowledge of Middle Egyptian Required.

AS.133.616. Let's Play! Games from Ancient Egypt and Beyond.
The ancient Egyptians played many games, as we do today. Board games, ball games, games of skill, etc., were not only part of daily life, but also had a role to play in religious practices and beliefs. Although the rules of the games are largely unknown to us, archaeological objects, funerary images, and texts help us to better understand their roles and meanings in ancient Egyptian culture. These various sources also show how games reflect some facets of the organization of the society, and reveal how the ancient Egyptians perceived some aspects of their world - social hierarchy, gender division, representation of death, relationship to chance/fate/divine will, etc. This course will present the evolution of games and play in Ancient Egypt from the 4th millennium B.C., with the first board game discovered in the tomb of a woman, through those deposited in the tomb of Tutankhamun, and up to the Roman period, with the games engraved on the ground by soldiers in the fortresses of the Eastern Desert. Particular attention will be paid to the travels of the games - Egyptian games played outside of Egypt and games of foreign origin played inside Egypt - because they allow for a better understanding of the intercultural connections that were established in between Egypt, Nubia, the Near East in general and the Mediterranean world. By replacing the games in their archaeological, historical and cultural contexts, the course is also intended as an original introduction to the civilization of ancient Egypt.

AS.133.620. Hieratic.

AS.133.630. Old Egyptian.

AS.133.631. Old Egyptian.

AS.133.640. Late Egyptian.

AS.133.641. Late Egyptian Texts.
An introduction to the grammar and texts of Late Egyptian.

AS.133.646. Demotic Texts.

AS.133.647. Demotic Texts.

AS.133.648. Intro To Coptic.

AS.133.649. Advanced Coptic.
In this class we will read Coptic texts of various genres.

AS.133.706. Egyptian Funerary Arts in the Archaeological Museum.
This class will aim to cover the production and choice of funerary objects for Egyptian elite tombs in several eras of antiquity: the Middle and New Kingdoms, the Third Intermediate Period, and the Late Periods. Students will work with specific objects after learning generally about them, and they will carry out analyses of materials, pigments, construction methods, and erosion and degradation effects. They will create a virtual exhibition for the Museum's website and present their results for inclusion in the museum cataloguing project.

AS.133.751. Seminar in Egyptian Art and Archaeology: Egyptian Art in Museums.
This course will utilize Egyptian collections in museums as a basis for studying Egyptian art. An aim is to evaluate how the experience of the objects impacts approaches to the discipline.

AS.134.101. GOD 101: The Early History of God - Origin, Character, Practice. 3 Credits.
In a world of big ideas, there is none larger than that of God. Divinity is an ever-present topic for both religious devotees and hard core secularists —for anyone who embraces the humanities or ponders what makes us human. Humans are, for better and worse, homo-religiosus (humans who practice religion) as much as homo-sapiens. But what do we know of God historically? How do we go about reconstructing divinity from ancient texts and archaeology? How do we best walk back in time to understand ancient Middle Eastern cultures that gave birth to notions of the divine that have come down to today's Judaism, Christianity and Islam? This course looks synthetically at the vast topic of God—exploring questions of historical origin, how God was characterized in literature (mythic warrior, king, parent, judge, holy, compassionate) and how God was represented in iconography, both materially and abstractly. Secondly, how did belief intersect with practice? Using the indow of divinity, this course will peer into the varieties of religion experience, exploring the royal use of religion for power, prestige and control balanced against the intimacy of family and household religion. It will probe priestly prerogatives and cultic status, prophetic challenges to injustice, and the pondering of theodicy by poetic sages.

AS.134.301. Introduction to the Pentateuch. 3 Credits.
This course surveys the linguistic and literary structure of the Pentateuch, with a focus on P and non-P in Genesis and Exodus. A second and equally important focus will be the history of scholarship and its broader impact on the study of the history and religion of ancient Israel and Judah. We will examine critical issues in the study of the Pentateuch, focusing on scholarly reconstructions of composition and redaction and key literary themes. Throughout our examination of the biblical text, we will also address parallels to other ancient Near Eastern corpora.

AS.134.400. Northwest Semitic Epigraphy. 3 Credits.
This course will provide an introduction to West Semitic dialects as reflected in inscriptions from the first millennium BCE. We will survey the grammar (phonology, morphology, syntax, and lexicon) of epigraphic Hebrew, Phoenician, and known Transjordanian languages (Moabite, Ammonite, Edomite). We will also discuss the methodological challenges inherent to the study of script evolution, scribalism, and the reconstruction of NWS languages through the study of inscriptions. This course will also introduce students to scholarship outside of the field of NWS and Hebrew Bible on literacy, the study of visual grammar, and the socio-semiotic approach to the study of writing.

AS.134.404. The Book of Job. 3 Credits.
Reading portions of the Book of Job in Hebrew. In addition to increasing proficiency in biblical Hebrew, the course also involves critical exegesis including grammatical analysis and textual criticism. Students will interact with various aspects of interpretation for the Book of Job (e.g., philology, text history, structure, literary history, message, poetics, rhetoric, philosophy, theology and reception history).

AS.134.406. Kings, Prophets, and Scribes: The Creation of "Israel" in the Deuteronomistic History. 3 Credits.
This class will introduce students to “The Deuteronomistic History,” which comprises the biblical books of Deuteronomy, Joshua, 1-2 Samuel and 1-2 Kings. The narrative arc of this “history” spans the giving of the law to Moses to the rise and fall of the monarchies of Israel and Judah, respectively in the Neo-Assyrian and Neo-Babylonian periods. During this course we will examine the reasons why biblical scholars have argued in varying ways that this body of text represents the work of a group of ideologically driven scribes, the Deuteronomists; we will also investigate the primary texts themselves for evidence for divergent views about the need for a king in Israel and the role and fate of the royal house of David. We will also explore the relationship between the books of the former prophets (Joshua>2 Kings) and Deuteronomy, which is a book that concludes the Pentateuch. This course requires students to engage with the biblical text in the original Hebrew language at an advanced level. We will also engage with biblical scholarship regarding the scope, purpose, and nature of a cohesive Deuteronomistic History, as well as with dissenting voices that probe the unity of these biblical books.

AS.134.408. The Book of Ezekiel. 3 Credits.
A rapid reading course aimed at increasing proficiency in reading the Hebrew text of the book of Ezekiel. Various aspects of translation and interpretation will be studied (e.g., grammar, textual criticism, Philology) including literary, historical, and theological questions.

AS.134.409. Prophets and Prophecy in the Hebrew Bible. 3 Credits.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?"

AS.134.410. Kings and Chronicles. 3 Credits.
This course surveys scholarship on the histories of Israel and Judah as presented in Kings and Chronicles. The course also addresses changes in the Hebrew language in the first millennium BCE.
AS.130.440 OR AS.130.441

AS.134.450. Seminar in Hebrew: Archaic Biblical Poetry. 3 Credits.
Translation and analysis of selected texts in Biblical Hebrew giving attention to advanced features of grammar and syntax. Topic: "Archaic Biblical Poetry".

AS.134.604. The Book Of Job.
Reading portions of the Book of Job in Hebrew. In addition to increasing proficiency in biblical Hebrew, the course also involves critical exegesis including grammatical analysis and textual criticism. Students will interact with various aspects of interpretation for the Book of Job (e.g., philology, text history, structure, literary history, message, poetics, rhetoric, philosophy, theology and reception history)

AS.134.606. Kings, Prophets, and Scribes: The Creation of "Israel" in the Deuteronomistic History.
This class will introduce students to “The Deuteronomistic History,” which comprises the biblical books of Deuteronomy, Joshua, 1-2 Samuel and 1-2 Kings. The narrative arc of this “history” spans the giving of the law to Moses to the rise and fall of the monarchies of Israel and Judah, respectively in the Neo-Assyrian and Neo-Babylonian periods. During this course we will examine the reasons why biblical scholars have argued in varying ways that this body of text represents the work of a group of ideologically driven scribes, the Deuteronomists; we will also investigate the primary texts themselves for evidence for divergent views about the need for a king in Israel and the role and fate of the royal house of David. We will also explore the relationship between the books of the former prophets (Joshua>2 Kings) and Deuteronomy, which is a book that concludes the Pentateuch. This course requires students to engage with the biblical text in the original Hebrew language at an advanced level. We will also engage with biblical scholarship regarding the scope, purpose, and nature of a cohesive Deuteronomistic History, as well as with dissenting voices that probe the unity of these biblical books.

AS.134.607. Texts, Tablets, and Tweets: The Sociolinguistics of Writing.
This course examines the evolution of writing and the relationship between speech and writing in ancient and modern societies. We will examine the ways in which orthography, scripts, and the visual components inherent to written language (e.g., scripts, fonts, emoticons, diacritics etc.) are used to create and/or project certain social identities in these new written spaces.A primary aim of this course is to generate discussion regarding the ways in which writing in all of its forms—at the institutional, group, and individual level, in official documents, in emails, texts, tweets, and graffiti, using standardized and non-standard orthographies, in both regulated and unregulated spaces—can be a social and often political act of identity. The writing assignments for the course will encourage you to consider the ways in which writing can be harnessed to express social identities. You will work as a group to develop your own writing system and present it to the class. This will hone your creative and critical thinking skills and give you practice collaborating on a project. You will also research and conduct an original analysis on a corpus of writing.

AS.134.608. Book Of Ezekiel.
A rapid reading course aimed at increasing proficiency in reading the Hebrew text of the book of Ezekiel. Various aspects of translation and interpretation will be studied (e.g., grammar, textual criticism, Philology) including literary, historical, and theological questions. Cross-listed with Jewish Studies.

AS.134.609. Prophets and Prophecy in the Hebrew Bible.
From thundering voices of social justice to apocalyptic visionaries, biblical prophets have been revered by Jews, Christians and Muslims for thousands of years. They have inspired civic leaders such as Martin Luther King Jr. yet also provided fodder for modern charlatans promising a utopian future. Yet who were these individuals (orators? politicians? diviners? poets?) and what was the full range of their message as set against the Realpolitik world of ancient Israel, Iraq, Egypt, Syria and Jordan?"

AS.134.623. Pentateuch.
This course surveys the linguistic and literary structure of the Pentateuch. A second and equally important focus will be the history of scholarship and its broader impact on the study of the history and religion of ancient Israel and Judah.

AS.134.650. Seminar in Hebrew:.

AS.134.651. Seminar: Hebrew.

AS.134.652. Seminar in Ancient Israelite Religion.
Topics include history of scholarship, methodology, representations of deity, the aniconic tradition, solar Yahwism, sacred space, blood rituals, passover, royal cult, family religion, divination, prophecy, incantations, etc.

AS.134.660. History of Ancient Syria/Palestine.
A survey of the history of Ancient Syria and Canaan, including Ancient Israel.

AS.134.661. History: Ancient Syria-Palestine II.
A survey of the history of Ancient Syria and Cannan, including Ancient Israel.

AS.134.700. Northwest Semitic Epigraphy.

AS.134.720. Ugaritic I.
A year-long course studying Ugaritic language and literature. The first semester will focus on grammar and translating a representative selection of mythological texts. The second semester will concentrate on ritual texts. The course will also be epigraphic in nature using both conventional and digital techniques.

AS.134.721. Ugaritic II.
A continuation of AS.134.720 with emphasis on the mythological and ritual texts from Ugarit. A digital epigraphy lab will also form part of the course.

AS.134.744. Survey Of Aramaic Texts.

AS.134.747. Archaic Aramaic.
An advanced course in Aramaic devoted to the study of Old Aramaic inscriptions. We will be translating and analyzing a selection of texts from Northern Syria (e.g. Bar-Rakib; Hadad; Kuttamuwa, Nerab, Panamuwa, Sefire, Zakkur), Southern Syria (e.g. Bar-Hadad/Melqart Stela, Hazael, Tel Dan) and Northern Mesopotamia (e.g. Tell Fakhariyah). Students will be expected to vocalize such texts as a study in historical and comparative linguistics and to clarify their understanding of the morphology and syntax.

AS.136 (Archaeology)

AS.136.101. Introduction To Archaeology. 3 Credits.
An introduction to archaeology and to archaeological method and theory, exploring how archaeologists excavate, analyze, and interpret ancient remains in order to reconstruct how ancient societies functioned. Specific examples from a variety of archaeological projects in different parts of the world will be used to illustrate techniques and principles discussed.

AS.140 (History of Science, Medicine, and Technology)

AS.140.105. History of Medicine. 3 Credits.
Course provides an introduction to health and healing in the ancient world, the Middle Ages, and the Renaissance. Topics include religion and medicine; medicine in the Islamicate world; women and healing; patients and practitioners.

AS.140.106. History of Modern Medicine. 3 Credits.
The history of medicine and public health from the Enlightenment to the present, with emphasis on ideas, science, practices, practitioners, and institutions, and the relationship of these to the broad social context.

AS.140.178. History of Biology. 3 Credits.
The course surveys the emergence and development of life sciences since the 1700s. It examines major ideas, approaches, and debates regarding life, along with their material and cultural underpinnings as well as social impacts. One crucial question throughout the course is how social and cultural contexts have shaped views of life at particular times and places. Topics include natural history, classification, morphology, cell theory, physiology, evolution, genetics and eugenics, molecular biology, biomedicine, and biotechnology. Lectures are supplemented with discussions about primary historical texts and scholarly articles. Students will learn about the course content, methods in historical inquiries of scientific fields, and will develop an original research essay as a final project.

AS.140.198. Technology and Environment in Japanese Films and Anime. 1 Credit.
In the course of the semester we will watch Japanese films and animation that touch upon topics of technology and environment. The list of screenings includes several blockbusters, classics in film studies, and documentaries. The course is a companion course to 140.398 “Godzilla and Fukushima,” but is also open to anyone interested. Students who do not take 140.398 will be required to write a short review paper by the end of the semester.

AS.140.227. Race, Racism and Medicine. 3 Credits.
How can we think about the interconnections between racism, theories of race and the practice of medicine? Living at a moment when racial disparities in health outcomes in the United States are still very stark, this course will provide a historically grounded approach to thinking about the roles that race and racism have played in healthcare, the production of health disparities as well as the role of medicine in the development of racist thought. While much of this course will focus geographically within the United States, this class will also explore global histories of medicine, encountering questions of race and medicine in Africa, the South Pacific and Asia. In addition to the analysis of primary source documents and historical texts, students will also be introduced to theoretical approaches to the study of race and racism from W.E.B. Dubois, Sylvia Wynter, Frantz Fanon and others.
Area: Writing Intensive

AS.140.228. Epidemic!: Diseases that Shaped our World. 3 Credits.
In this course, we will look at a number of key epidemic diseases in the pre-modern and modern world, from Black Death to COVID-19, and investigate how it affected medical thought and practice, as well as political, social and economic lives. We will pay special attention to how these diseases spread and how they affected and were influenced by questions of race, gender, sexuality and colonialism.

AS.140.231. Health & Society in Latin America & the Caribbean. 3 Credits.

Medical practice is complex in Latin America and the Caribbean. Most countries in the region have universal healthcare; yet, the quality of clinical services varies widely, and is influenced by degrees of incorporation into—or marginalization from—social power structures. Many people take their health into their own hands by supplementing biomedicine with plant based remedies as well as religious and spiritual services. This course will interrogate the history and contemporary relevance of healthcare in Latin America and the Caribbean, with particular interest in how medicine intersects with colonialism, slavery, capitalism, neo-colonialism, grassroots revolutionary movements, the Cold War, and neoliberalism. Drawing on films, visual and performance art, and music, students will consider the ways in which race, gender, indigeneity, ability, class, and nation have affected people's experiences with medical practice. Informed by postcolonial and decolonial scholarship, we will also examine why Latin America and the Caribbean have become "laboratories" for the production of medical knowledge, and importantly, how that knowledge was created by indigenous, enslaved, and migrant people as well as professionals. Finally, we seek to understand individual health problems in relation to the social and political determinants of health. As such, the course prompts students to reflect on why healthcare professionals—in the United States and abroad—would benefit from historically-informed communication with patients and their communities. This is a discussion-based seminar that requires active participation. There are no exams. The course does not assume any previous knowledge of the history of medicine or Latin American history.
Area: Writing Intensive

AS.140.232. Food, Environment, and Society. 3 Credits.

A seminar discussing crucial events and processes in global history which have shaped how food production and consumption impacted the environment and human societies. Students will learn how food practices, originally bounded within certain places and cultures, became transformed in modern societies with the rise of modern agricultural, transportation and food processing technologies, as well as the public health and environmental consequences of these transformations. Sessions will include lectures, seminar discussions, field visits or guest speaker events, and some hands-on activities. For the final project, students will conduct original research on topics of interest and produce a multi-media, public-facing intellectual product.
Area: Writing Intensive

AS.140.245. Biology and Society in Asia. 3 Credits.

What major knowledge traditions about life's generation and function have taken shape in Asia that continue to shape our contemporary world? How have they fared in encounters with Western knowledge traditions? How have modern biology, biotechnology and biomedicine developed in Asia in recent years within distinct geopolitical contexts? This course addresses these questions with selected historical cases from China, India, Japan, Koreas and selected Southeast Asian countries. It first introduces concepts and frameworks of major non-Western knowledge systems about life such as yin-yang and five phases and examine how religions, politics, and cross-cultural encounters impacted these systems, their evolutions or replacements. Then the class will examine the political, material, cultural and institutional contexts of more recent development in the life sciences in Asia. Class activities include lectures, discussions, research seminars, a final research project, and possible conversations with visiting professors and field trips.

AS.140.301. History of Science: Antiquity To Renaissance. 3 Credits.

The first part of a three-part survey of the history of science. This course deals with the origins, practice, ideas, and cultural role of scientific thought in Graeco-Roman, Arabic/Islamic, and Medieval Latin/Christian societies. Interactions across cultures and among science, art, technology, and theology are highlighted.
Area: Writing Intensive

AS.140.302. Rise Of Modern Science. 3 Credits.

Survey of major scientific developments from the mid-18th century to the present.

AS.140.306. Science And Religion. 3 Credits.

Science and religion are crucial influences on Western culture. This course examines their interrelations during the past 2000 years, including the Athens-Jerusalem debate, medieval theology, the Galileo affair, evolution, and current issues.

AS.140.312. The Politics of Science in America. 3 Credits.

This course examines the relations of the scientific and technical enterprise and government in the United States in the 20th and 21st centuries. Topics will include the funding of research and development, public health, national defense, etc. Case studies will include the 1918 Spanish influenza epidemic, the Depression-era Science Advisory Board, the founding of the National Science Foundation and the National Institutes of Health, the institution of the President's Science Advisor, the failure of the Superconducting Supercollider, the Hubble Space Telescope, the covid pandemic, etc.

AS.140.316. Minds and Machines. 3 Credits.

Is the mind identical to the brain? Is the mind (or brain) a computer? Could a computer reason, have emotions, or be ethically culpable? How have computers changed our minds? This course examines such questions philosophically and historically. Topics include early AI research, computationalism, connectionism, 4EA cognitive science, simulation theory, and the Singularity.

AS.140.317. The Hydrologic Sphere: Histories of Water in the Colonial and Postcolonial World. 3 Credits.

Water supplies are becoming scarcer globally due to climate change. We use clean water—fresh and salt—in a variety of ways that provide comfort, stability, and health, making it one of the most valuable commodities on Earth. While countries in the Global North are beginning to see more frequent and lengthier droughts, those in the Latin America, Africa, and South Asia have long struggled over how to distribute and use their clean water supplies. This class will examine how colonialism and its far-reaching effects have created an environment of scarce water supplies in many areas of the world. Water access is difficult to achieve, but for much of the Global South, the colonial period helped craft the problems we see today. This class will ask what colonial and postcolonial technologies' construction and use teach us about equitable clean water distribution, how social and cultural identities influence water supplies and use, and why water has been such an important element—and commodity—in our world, especially where Europeans settled and oppressed local populations.
Area: Writing Intensive

AS.140.321. Scientific Revolution. 3 Credits.

How did the Western understanding of nature change between 1500 and 1720? We'll study the period through the works of astronomers and astrologers, naturalists and magi, natural philosophers and experimentalists, doctors and alchemists & many others.

AS.140.322. Follow the money: Science, technology, and the 'knowledge economy,' c.1800-present. 3 Credits.
This course examines the historical emergence of knowledge-driven economies, paying special attention to the funding, development, and use of science and technology for commercial purposes.
Area: Writing Intensive

AS.140.324. Commercializing Science: Academic Entrepreneurs from Kelvin to Venter. 3 Credits.
From the 19th century physicist William Thomson (Lord Kelvin) to contemporary geneticists such as Walter Gilbert and Craig Venter, academic scientists and engineers across a broad range of disciplines have commercialized academic knowledge and inventions as patentees, consultants, and entrepreneurs. This course examines the motives and strategies behind such commercialization activities, ethical issues associated with them, and the factors influencing their success. We will also explore the history of currently dominant policies and institutions designed to foster the commercialization of academic science and evaluate their impact from a longer-term perspective.
Area: Writing Intensive

AS.140.327. Science and Utopia. 3 Credits.
This seminar will explore the complex interaction between science, technology and utopian/dystopian thought from the late nineteenth century. Major utopians will include Bellamy, H.G. Wells, Mark Twain, Frank Lloyd Wright, Aldous Huxley, George Orwell, Sinclair Lewis, B.F. Skinner, Margaret Atwood, and Walt Disney.

AS.140.329. Women, Health, and Medicine in Colonial and Antebellum America. 3 Credits.
This class will examine the history of women's health and medicine in America from the 17th century to the mid-19th century, a period in which settler colonialism and the trans-Atlantic slave trade mixed European, Indigenous American, and African people and belief systems, resulting in diverse healing practices and understandings of the body and gender. Major themes addressed in the course include reproductive health, domestic and "alternative" medicine, as well as enslavement, racialized medicine, poverty, disability, and sexuality.
Area: Writing Intensive

AS.140.335. Photography in Science and Medicine (19th Century-Present). 3 Credits.
How did photography change science and medicine, and vice versa? This course explores how and why photography and related imaging techniques became central to a broad variety of fields of science and medicine, ranging from anthropology and astronomy to embryology, nuclear physics, and radiology. It also considers how these techniques were created in the first place and to what extent they affected the standing of photography as an "art-science." Central themes will include (among others) the status and objectivity of photographic evidence; the historical relationships between technical, scientific, and artistic change; the role of photography in disseminating scientific and medical knowledge and (mis)information; the racial and gender biases of scientific and medical photography; and photography's use as a tool of scientific exploration, measurement, and surveillance. Students will be developing their own research projects in consultation with the instructor.

AS.140.336. History of Mental Healthcare in the United States. 3 Credits.
In recent decades, much has been done in the United States to destigmatize mental illness and incorporate psychiatric services into broader systems of healthcare and welfare. As clinicians, policy makers, social scientists, activists, and other stakeholders have collaborated to promote mental health and reintegrate people with behavioral disorders into society, they have often contrasted their efforts with those made in the past, portraying community-based approaches as more efficacious and humane. Narratives like these, however, deemphasize many important continuities in the history of American psychiatry. In this discussion-based course, students will explore how concerns about citizenship and social control have shaped the organization and provision of mental healthcare in the United States from the early nineteenth century to the present day. They will also complete various assignments designed to hone their ability to evaluate historical arguments, conduct independent and collaborative research on primary sources, and communicate the results of their scholarship to professional and lay audiences.

AS.140.338. Unsafe America: Accidents, Disasters, and Society, 1800–2020. 3 Credits.
According to the latest data from the National Safety Council, accidents cause over 173,000 deaths and 48,300,000 injuries per year across the United States. Since the nineteenth century, accidents ranging from burns to car crashes to the Three Mile Island nuclear disaster have become increasingly central to American life. This course examines the history of accidents and why Americans have chosen to control some hazards but not others. We will investigate how accidents have changed over time alongside the introduction and spread of new technologies; cultural beliefs about safety; the economic and political interests of different stakeholders; and the efforts of safety experts, nonprofits, corporations, families, and the government to protect Americans from harm. On one level, this course traces the unexpected consequences of remaking the United States with modern industry, transportation, infrastructure, and consumer products. At the same time, it captures how the principles of free enterprise and personal responsibility continue to influence the American safety movement.
Area: Writing Intensive

AS.140.341. Humanoid Robots in Global History. 3 Credits.
Humanoid machines reflect their creators' ideals of humanity. Comparing examples from societies across the globe we will investigate what factors shaped these ideals, and how they manifested in technological design.
Area: Writing Intensive

AS.140.347. History Of Genetics. 3 Credits.
Intellectual and social history of the gene concept, including Mendelism, eugenics, medical genetics, DNA, genomics, and personalized medicine.
Area: Writing Intensive

AS.140.356. Man vs. Machine: Resistance to New Technology since the Industrial Revolution. 3 Credits.
This course analyzes different episodes of "luddism" in the history of science and technology, from the destruction of textile machinery in the early 1800s up to recent controversies about biotechnology and ICT.

AS.140.364. The City Course: Disciplinary Perspectives on Urban Life and Form. 3 Credits.
This course aims, first, at enlarging our understanding of cities by looking at them from a variety of disciplinary perspectives and, secondly, at examining the distinctive ways of thinking associated with disciplines from engineering, the sciences and medicine to anthropology, sociology, economics, archaeology, history and literature. Baltimore and cities from around the world will provide resource material. Lectures, discussions, term projects.

AS.140.374. Force and Matter from Galileo to Maxwell's Field Theory. 3 Credits.
This seminar will trace the concept of force and its interaction with matter from Galileo in the late sixteenth century to rise of field theory in the work of James Clerk Maxwell in the late nineteenth century. Major figures to be studied through primary source readings are Galileo, Kepler, Descartes, Hobbes, Newton, Boscovich, Schelling, Laplace, Fourier, Faraday, William Thomson (Lord Kelvin) and Maxwell.

AS.140.391. Individualized Medicine from Antiquity to the Genome Age. 3 Credits.
A seminar for advanced undergraduates. We explore the notion of the individual in medicine over twenty-five centuries, from the Hippocratics to the invention of the case study during the Renaissance to the current JHU medical curriculum. The history of medicine survey, AS.140.105 or AS.140.106, is recommended though not required. Graduate students are welcomed but should expect to do additional work and readings.
Area: Writing Intensive

AS.140.393. Technology and the Making of the Modern World. 3 Credits.
This course critically examines the role of technology in some of the main developments that have shaped the modern world, ranging from industrialization and globalization processes to the rise of new political ideologies and gender patterns. This course is co-taught by an instructor from the Smithsonian Institution and will include a public history research project.

AS.140.394. Heredity, Eugenics, and Society. 3 Credits.
In this course, we will examine the ways in which concepts of the gene, heredity, and innateness have both shaped and been shaped by society over the last two-plus centuries. Topics under discussion may include: eugenics, biological determinism, scientific racism, human breeding programs, genetics and gender, genetics and intelligence, genetic engineering including CRISPR, assisted reproductive technologies, sociogenomics, and polygenic risk scores. Term paper. AS.140.106 recommended.
Area: Writing Intensive

AS.140.395. Prosthetics and Technologies of Disability. 3 Credits.
The purpose of prosthetics seems to be fairly straightforward—to restore function that was lost due to the loss of a body part. According to this logic, the quality of prosthetics is measured in its ability to replicate lost human function and restore individuals with disabilities to normalcy. And indeed, numerous disability technologies enrich the experience of individuals in need of them. At the same time, these very technologies are often perceived as a marker of something abnormal, or, by the nature of their design prove to be an obstacle for mobility and access. Therefore, as much as prosthetics and other technologies of disabilities improve the quality of life, they also led to stigmatization, marginalization, and exclusion. By looking at prosthetics and disability in a variety of historical contexts, we will learn what kind of ideas of 'normalcy' they reflect, and how they shape the experience of individuals who use them.
Area: Writing Intensive

AS.140.396. Encoding Bias: Algorithms, Artificial Intelligence, and the History of Computing. 3 Credits.
How can an inanimate object be biased? How is it possible for a machine or software to discriminate on the basis of race, gender, or economic status? After all, machines are supposed be free from the lapses of judgement that can cloud human minds. And yet, the more we rely on digital technologies, the more we realize that algorithms are not as neutral and objective as we hoped they would be. This course traces the origins of computer bias to the aspirations, ideals, metaphors, hopes, fears, and, of course, biases of the people who developed computer technologies. During the semester, we will learn about the humble origins of computing technologies, the original, human "computers" in astronomical labs, Alan Turing's invention of a "digital" mechanical computer to decipher Nazi codes, the Cybernetics movement, the models of rationality and intelligence that guided the development of AI, the gendering of the computing profession, the advent of personal computers, and more. While exploring these episodes in the history of computing we will discuss and analyze the social and structural origins of computer and algorithm bias.
Area: Writing Intensive

AS.140.398. Godzilla and Fukushima: Japanese Environment in History and Films. 3 Credits.
Japan is often described as "nature-loving," and is considered to be one of world leaders in environmental protection policies. Yet current environmental successes come on the heels of numerous environmental disasters that plagued Japan in the past centuries. Juxtaposing Japanese environmental history and its reflection in popular media, the course will explore the intersection between technology, environment, and culture.
Area: Writing Intensive

AS.140.401. The Knowledge City: from Silicon Valley to Bloomberg's New York. 3 Credits.
This seminar will explore the increasingly productive relationship between research universities and urban and regional development in the period after World War II to the present. Working with the faculty, participants will be expected to develop a research paper. Discussion, presentations, lectures.

AS.140.411. Senior Research Seminar. 3 Credits.

AS.140.412. Research Seminar. 2 Credits.
Departmental Majors Writing a Senior Thesis Only
Area: Writing Intensive

AS.140.423. Science and Science Fiction in Global Perspective. 3 Credits.
What can we learn from science fiction about the history of science and technology? What ideas about science do Sci-Fi novels manifest? Is the relationship between science and science fiction always the same, across different time periods and geographical areas? This course will explore these questions by taking a comparative perspective. Each meeting we will read a Sci-Fi novel from Europe, America, South and East Asia, and discuss it in conjunction with historical writing about relevant scientific developments. Reading Sci-Fi novels from 17th-century Germany, 19th-century England and India, and 20th-century Japan, China, Korea and the US, the students will explore how actual scientific developments were reflected in fiction, and what fictional depictions say about the aspirations and anxieties provoked by new technologies.
Area: Writing Intensive

AS.140.435. Ways of Knowing: New Histories of Science, Medicine, and Technology. 3 Credits.
What does it mean for science to have a history? Comparing newer approaches with classic works, we will explore different strategies for placing science, medicine, and technology in social context.
Area: Writing Intensive

AS.140.501. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.598. HoST Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.140.601. Research Methods/Hist Sci.
This graduate seminar introduces students to a variety of methods, sources, and approaches used in the historical study of science, medicine, and technology. The emphasis will be on the development of skills crucial to the successful completion of research projects.

AS.140.609. Technology and Labor.
In recent years historians, anthropologists, and sociologists of technology show increasing interest in questions of human labor. Adding to the literature that explores emergence, production, and use of technology, the new direction seeks to uncover and to analyze human labor that is necessitated by emerging technologies, and that is often concealed by them. The course will cover several classic works but will mainly focus on recent exciting scholarship that explores the relationship between technology and labor.

AS.140.614. Media of Science, Medicine, and Technology.
This research seminar starts from the premise that the production and circulation of scientific knowledge has always been mediated: through parchment and paper, books and journals, laboratory notebooks and electronic datasets. Likewise the body in health and illness has mediated through material objects, from the uroscopy flask to the stethoscope to MRIs and PET scans. Students will explore the theory and method of media history in developing their own research projects in the history of science, medicine, and technology.

AS.140.641. Departmental Colloquium.
Reports by staff members, students, and invited speakers.

AS.140.642. Colloquium.
Reports by faculty, students, and invited speakers.

AS.140.660. Working with Manuscripts: Paleography, Codicology, and Editing.
This is a practical course on using manuscript materials (especially premodern documents). It covers how to read both Latin and early modern vernacular scripts in various formats (paleography), how to describe, date, and document manuscript materials (codicology), and how to edit texts and make critical (and not-so-critical) editions. Other related topics of interest to enrolled students are possible. The specific topics that will be stressed will respond to the interests and needs of those students who enroll. Students are encouraged to bring examples or problems from their own research for study, practice, and analysis.

AS.140.678. Catching Up: Responses to Technical Change in the 19th and 20th Centuries.
This research seminar focuses on varieties of paths to modernity by nations in the 19th and 20th centuries as driven by technological change. The approach will be comparative and its reach global. The emphasis will be on preparing a research paper by semester's end.

AS.140.679. Humanoid Robots in Global History.
Graduate section of AS.140.341.

AS.140.681. Graduate Readings in History of Science and Technology.
The course explores advanced topics in History of Technology, as well as in History of Science, Medicine, and Technology in East Asia.

AS.140.683. Non-human Agency in Science, Medicine, and Technology Studies.
Studies of non-humans repeatedly challenge the assumption that agency is an exclusively human prerogative. We not only witness animals scheme and carry out their plans, be also experience interaction with non-animate objects as if they had will and capacity to manipulate us. What is the relationship between anthropomorphization and agency? What does our attribution of agency to objects say about our understanding of agency as an analytical category? How do we integrate non-humans into our investigation of human activity? In this course we will explore studies of non-human agency in history, sociology, and anthropology of science, medicine, and technology. Learning from authors such as Donna Haraway, Anna Tsing, Bruno Latour, Sherry Turkle, Lucy Suchman, Cynthia Breazeal and others, we will examine human relationship with companion species, vermin, mycelium, humanoids, digital technologies, and others.

AS.140.684. Science and the Marketplace.
This seminar explores the global economic history of science and technology and the historical entanglements between science and capitalism by investigating various practices that were simultaneously scientific and economic or had both scientific and economic dimensions. Through this lens, which reflects recent trends in the historiography of science-economy relationships, this course seeks to develop new perspectives on topics ranging from the modern histories of scientific publishing and popularization to the acquisition and standardization of research tools and materials and the conduct of various forms of knowledge work. Specific interests of the seminar participants will be taken into account.

AS.140.685. Histories of Reproduction.
While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

AS.140.705. History of Science: Antiquity To Renaissance.
Graduate-level version of 140.301 with additional readings, discussions and assignments in seminar format.

AS.140.708. Rise of Modern Science.
Survey of history of science, 18th-20th c. Students are encouraged to attend lectures for 140.302, but seminar may be taken without attending those lectures.

AS.140.710. Scientific Revolution.
Reading intensive seminar that studies the events and ideas that transformed western science from Medieval natural philosophy to the experimental sciences (1500-1720s). Lecture meets with AS.140.321.

AS.140.801. Directed Readings & Dissertation.

AS.140.808. Graduate Independent Research.
Independent research for graduate students in the History of Science and Technology Department only.

AS.140.888. Dissertation Research.
For graduate students in the History of Science and Technology Department Only.

AS.145 (Medicine, Science and the Humanities)

AS.145.101. Death and Dying in Art, Literature, and Philosophy: Introduction to Medical Humanities. 3 Credits.
In this course, four essential aspects of the theme of death and dying will be examined: Death and Medicine; Emotional Responses to Death; Burying and Commemorating the Dead; and Conceptions of Death. Specific topics relating to each of these aspects that will be covered include illness and causes of death; prevention of death; suicide; death and grief; burial practices; mourning the dead; public commemoration of the dead; life after death; and death and rebirth. Students will explore these topics from a historical-anthropological perspective with Paul Delnero, a specialist in the history and culture of the ancient Near East (Near Eastern Studies); from a literary perspective, by reading and writing poetry relating to these subjects with the acclaimed poet James Arthur (Writing Seminars); and from a musical perspective, through direct encounters with the music and creative process of the award-winning composer, Michael Hersch (Peabody).
Area: Writing Intensive

AS.145.104. Science, Medicine, Media. 3 Credits.
Much of our understanding of science and medicine is filtered through what we casually refer to as “the media”: newspapers, magazines, television shows, films, and electronic social media. But the scientific world relies on its own media to produce and circulate knowledge: from scientific journals and conferences, to agar plates and petri dishes, cloud chambers and electrophoresis gels. Medical technologies from the stethoscope to the echocardiogram likewise mediate the perception of the body in health and disease, and increasingly our own understanding and perception of our bodies and our health is mediated via screens, scans, and images — without which we can hardly imagine ourselves anymore. Students will learn theoretical tools to critically assess the technologies that mediate our knowledge of our own bodies and the broader world, as well as practical tools in media production and visual storytelling (video, podcast, website etc.) to bring these analytics to bear on our broader understandings of science and medicine.
Area: Writing Intensive

AS.145.106. Health, Science, Environment. 3 Credits.
Environment has an inexorable effect on human health, and certain human activities have had outsized impacts on the natural world and the ability of forms of life to thrive. This course brings medical humanities, history of science, and science & technology studies into conversation with environmental humanities to ask: how have our conceptions of the natural world emerged, and how have these shaped our understandings of bodies, ecologies, and health outcomes? How do we know and measure the environment and health, and to what effects? How have human and ecological health affected environmental politics? How have writers and artists understood and depicted their environments and environmental questions? Can works of fiction shape ecological transformations? What can we learn from case studies of health and environment in Baltimore and the Chesapeake Bay as well as in global contexts? Course topics will include ecology, epigenetics, toxicity, agriculture and food, radiation, air quality, and more-than-human entanglements.

AS.145.201. Clues: Unreasoning the Medical Mystery. 3 Credits.
Foundational authors of detective fiction, including Edgar Allen Poe, Arthur Conan Doyle, and Pauline Hopkins, often used medical doctors and themes in their mystery plots. It’s no coincidence that medicine and crime fiction share a vocabulary of clues, evidence, and diagnosis. The mystery genre was integrally tied to the rise of scientific medicine as a respected profession. Indeed, classic detective stories are practically propaganda for the scientific method, showing readers how the powerful tools of observation and inference can solve any problem. Over the course of the 20th century, not only doctors, but also psychologists, social scientists and historians adopted the authoritative stance of the detective in constructing or reconstructing facts. However, as we study Sherlock Holmes and his modern proteges, such as TV doctor Gregory House, we will analyze how "medical mystery" narratives can limit our thinking about problems and solutions in medicine. We will consider post-modern detective stories that offer alternatives to the "Holmsian" model for understanding the complex clinical realities of today.
Area: Writing Intensive

AS.145.202. Health Care Activism in Baltimore and Beyond. 3 Credits.
National struggles over the right to health care, and over the health needs of marginalized groups, have taken distinctive forms in Baltimore City during the past century. The renowned Johns Hopkins University came to symbolize, for many residents, the power of medicine both to heal and to harm – and the need for community action. This course delves into the archives of local institutions to understand the work of activists and advocates who connected health, medicine, and social justice. We focus on specific sites, from the segregated wards of Johns Hopkins to the People’s Free Medical Clinic on Greenmount Avenue, where demands for equity changed the city’s health care landscape. Through interdisciplinary readings and conversations with local organizers, we consider how historical memory can serve as a creative resource for the art and politics of the present.
Area: Writing Intensive

AS.145.203. Constructing memories: between art and science. 3 Credits.
What is a personal memory? Is it a story or a scene, as if in a film? Is there such a thing as body memory? How tight is the connection between remembering and story-telling? Scientific articles and book chapters in cognitive psychology and the neurosciences can provide some answers to such questions. Two films, “Memento” and “Inside Out” can also help us grasp the impact of major scientific discoveries of how memory works. But our discussions will depend above all on literary and biographical accounts based on the experiences of “rememberers” such as St Augustine, Proust, Woolf, Freud, as well as on cases on amnesia documented by Oliver Sacks, Antonio Damasio, and David Shenk. The latter will help us understand why our ability to engage in mental time-travel is essential to our personal and social existence. Coming out of this course, you will not only have a better comprehension of how autobiographical memory works, you’ll have learned also how some of the sharpest scientific and philosophical minds of our times have tried to make sense of this mysterious human capacity.

AS.145.204. Graphic! Visualizing Medicine from Textbooks to Comics. 3 Credits.
Visuals play an important role in the history and practice of medicine, from medical textbooks to medical imaging, and from hospital signage and public health posters to comics and graphic novels. This course will examine the visual aspects of the history and practice of medicine by focusing on the rising genre of medical comics and graphic novels, known as “graphic medicine.” The course will embed this examination of “graphic medicine” in a wider examination of the various uses of visuals in medicine, the complicated history of class, race and gender in those uses, and how visuals have served different functions in the history and practice of medicine, from assisting medical diagnosis to enabling new forms of medical consumerism, and from facilitating doctor-patient communication to practicing art therapy, as well as presenting visual pathographies and documenting patients’ and caregivers’ experiences of disease. Through an assortment of primary sources that include medical comics and graphic novels, aided by a variety of secondary sources that embed these narratives in larger issues in the history of medicine, medical anthropology, and the medical humanities, the course will aim to introduce students to some of the most important themes in the field of “graphic medicine.”

AS.145.205. The Costs of Care: Writing about Illness in America. 3 Credits.
Health care can be expensive for those who receive it and those who provide it. In the United States, patients go into debt while doctors suffer from burnout and nurses rush through understaffed wards. The U.S. has the highest healthcare spending of any wealthy nation, yet suffers comparatively worse outcomes. This seminar brings together social science research with patient experiences that show the human face of the American health care debate. We read the work of scholars, poets, and medical practitioners who reflect on core questions: What should be the government’s role in healthcare provision? What alternative models have people in marginalized groups developed when the system fails them? Understanding both failures and successes gives us the tools to build new paths.
Area: Writing Intensive

AS.145.215. Representations of Pain and Suffering in Contemporary Culture. 3 Credits.
What does it mean to experience pain or encounter the suffering of another person in our post-truth era? This course explores the changing representation of pain and suffering in contemporary film, fiction, creative non-fiction, science and technology. Through analysesand close-readings of a variety of primary and secondary sources, we will consider the different ways twentieth- and twenty-first-century historical, cultural, and media representations have mediated pain and suffering. Such investigations allow us to understand the workings of pain in the present.
Area: Writing Intensive

AS.145.217. Neurofictions: History and Literature of the Mind Sciences. 3 Credits.
Neuroscience has a long way to go from mapping neural connections to a precise account of memory, emotion, and consciousness. But the limits of science have never stopped us from imagining its possible futures. Engaging two centuries of debate in the mind sciences and in western culture at large, this course looks at historical attempts to explain and control human consciousness. By placing each period’s scientific texts in dialog with contemporaneous science fiction -- from Edgar Allan Poe to Ursula K. Le Guin -- we discover how theories about the brain can shape society while at the same time responding to social contexts.

AS.145.219. Science Studies and Medical Humanities: Theory and Methods. 3 Credits.
The knowledge and practices of science and medicine are not as self-evident as they may appear. When we observe, what do we see? What counts as evidence? How does evidence become fact? How do facts circulate and what are their effects? Who is included in and excluded from our common-sense notions of science, medicine, and technology? This course will introduce students to central theoretical concerns in Science and Technology Studies and the Medical Humanities, focusing on enduring problematics that animate scholars. In conjunction with examinations of theoretical bases, students will learn to evaluate the methodological tools used in different fields in the humanities to study the production and circulation of scientific knowledge and the structures of medical care and public health. This problem-centered approach will help students understand and apply key concepts and approaches in critical studies of science, technology, and medicine.
Area: Writing Intensive

AS.145.220. Health, Medicine, Gender, and Sexuality. 3 Credits.
This course invites students to take the perspective of gender and sexuality on health and medicine. In this course, we do not see gender and sexuality as a separate domain of health. Instead, we will learn how a gender perspective is in fact crucial for critically exposing the ways in which medicine is interpenetrated by social life and by law. For example, what technologies and discourses constitute “the normal”? How is sexuality braided into disease surveillance? How do we understand the lawfare on the terrain of reproductive rights? What aspects of disease are suppressed in dominant forms of knowledge production, due to the undervaluation of gendered forms of experience? We will take cases involving HIV/AIDS; reproductive justice and rights; poverty, marginality and queer kinship; and household patterns of care.

AS.145.303. Research in the Medical Humanities: A Practical Introduction. 3 Credits.
This seminar is designed to prepare students for an extended interdisciplinary writing project, such as an honor's thesis or an undergraduate research proposal. The first part will be devoted to establishing or consolidating skills in research, in methods, and in approaches specific to the medical humanities. Class meeting will involve different formats and types of preparation: studying examples of writing in different domains related to MSH, visits of specialists (e.g. librarians and authors), preparing a proposal to be presented in a workshop, and a well-documented capstone project outlining a proposal. You'll be asked to submit at regular intervals written results of your work in progress and you must be prepared as well to present your results orally at different important points in our unfolding semester.
Area: Writing Intensive

AS.145.305. Lives in Medicine: Exploring the Personal Writing of Patients and Practitioners. 3 Credits.
The personal accounts of patients and practitioners offer a rich exposure to human experience in medicine. What is it like to be a patient, to be sick or to face the threats or limits that illness presents? What is it like to be a doctor or nurse in this world of illness? In this course we will read such accounts as published in book form, discuss them in a seminar setting and write about them. We will select a small number from the thousands of such publications to introduce the student to this unique genre, emphasizing reading, writing and group discussion.
Area: Writing Intensive

AS.145.310. A Noble Profession? Doctors as Social and Political Actors. 3 Credits.
Medicine is a profession known for its ethical code of conduct—a code that is imbued with an ethos of neutrality and impartiality. However, real life shows us that doctors do not occupy a special moral class, but are rather members of social and political communities, citizens with grievances, political affiliations and loyalties, and are often subject to many social and political influences around them. This course will examine how doctors' political choices shape their medical practice, and how their medical practice—especially their temporally and spatially privileged access to bodily suffering and loss of life—shapes in turn their political choices. It investigates the roles of doctors, not simply as technical experts, but as social and political actors informed by technical expertise among other factors. Relying on histories, ethnographies, memoirs and even works of fiction, this course will explore narratives of doctors' social and political engagement in the US and around the globe.
Area: Writing Intensive

AS.145.350. MSH Research Capstone. 3 Credits.
The Research Capstone seminar prepares students to undertake original extended research in the medical humanities and science studies. The course will help students synthesize the interdisciplinary knowledge upon which the Medicine, Science, and the Humanities (MSH) major is built. Students will have the opportunity to form research topics, devise and execute research plans, write a research grant application, and share their work with the class. The course is aimed at MSH juniors seeking to create Honors projects, though the course is open to any student wishing to learn or enhance research skills.

AS.145.360. Incarceration and Health: Critical Perspectives. 3 Credits.
Can care exist in a space of punishment? Institutions of incarceration are inherently spaces of violence and social control and, in the U.S.'s current context of mass incarceration, racial oppression. Yet prisons, jails, and detention centers are required to provide individuals access to health care. How can we understand this convergence of care for the body and psyche with multiple forms of carceral violence? This course will examine modes of health and health care inside institutions of incarceration as they are situated within broader socio-political contexts that shape society's over-reliance on incarceration as a means of social and racialized control. Drawing on history, anthropology, sociology, legal theory, critical race studies, and public health, the course will explore the everyday realities inside institutions of incarceration as they relate to suffering and care and how those are connected to policies and processes of subjugation outside the institutions' walls. Case studies for examining these relationships include pregnancy, COVID-19, addiction, and mental illness behind bars. Students will engage with concepts such as disciplinary power, biopower, carceral and anti-carceral feminism, theories of care, medical abolition, and dual loyalty. While the course will primarily focus on the U.S. context, we will also draw comparisons to non-U.S. settings. Throughout the course we will seek to understand how institutions of incarceration are not, as popularly understood, isolated places "elsewhere," but implicitly porous with so-called free society—and therefore as exemplars for understanding the connections among health, inequality, and state institutions.
Area: Writing Intensive

AS.145.502. Medicine, Science & the Humanities Internship. 3 Credits.
An internship in Medicine, Science & the Humanities approved by the director of the program.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.510. Medicine, Science & the Humanities Independent Research. 1 - 3 Credits.
This course is for students in the Medicine, Science & the Humanities doing independent research. Course can be taken up to 3 credits with approval from the director.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.511. Medicine, Science & the Humanities Independent Research. 1 - 3 Credits.
This class is for the MSH majors completing their research project. Instructor approval required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.145.516. MSH Honors Thesis. 1 - 3 Credits.
This class is for the MSH majors completing their honors thesis. Instructor approval required. This course can be taken for up to 3 credits with instructor approval.

AS.150 (Philosophy)

AS.150.111. Philosophic Classics. 3 Credits.
The course introduces students to philosophy by critically examining selected texts in the Western philosophical tradition. Philosophers whose ideas will be examined include Plato, Descartes, Rousseau and Nietzsche.
Area: Writing Intensive

AS.150.112. Philosophical Problems. 3 Credits.
An introduction to philosophy through several central problems. This year's topics are free will, death, time, and race.

AS.150.118. Introduction to Formal Logic. 3 Credits.
An introduction to symbolic logic and probability. In the first two parts of the course we study formal ways of determining whether a conclusion of an argument follows from its premises. Included are truth-functional logic and predicate logic. In the third part we study the basic rules of probability, and learn how to make probability calculations and decisions in life.

AS.150.125. Life and Death. 3 Credits.
This course will address some of the Big Picture questions about human life using the methods of analytic philosophy. These questions include: What am I, and what kinds of things could happen to me before I'd no longer be me? Should I be afraid of death? Is it better to be than to never have been anything at all? When is it permissible to end a life? To what extent do I live my life freely?

AS.150.136. Philosophy & Science: An Introduction to Both. 3 Credits.
Philosophers and scientists raise important questions about the nature of the physical world, the mental world, the relationship between them, and the right methods to use in their investigations of these worlds. The answers they present are very different. Scientists are usually empiricists, and want to answer questions by experiment and observation. Philosophers don't want to do this, but defend their views a priori. Why? Can both be right? Readings will present philosophical and scientific views about the world and our knowledge of it. They will include selections from major historical and contemporary figures in philosophy and science. The course has no prerequisites in philosophy or science.

AS.150.161. Introduction to Nietzsche. 3 Credits.
This course will provide an introduction to Nietzsche's thought. We shall read and discuss selections from each period of his philosophical development. Students will receive a grade based on a combination of attendance, participation, and a final essay, drafts of which will be discussed with the instructor prior to the final due date.
Area: Writing Intensive

AS.150.193. Philosophy of Language Seminar: Proper Names and Definite Descriptions. 3 Credits.
In talking with each other, we often use proper names like 'Juliet' and definite descriptions like 'The most beautiful fresco in Italy' to pick out persons and objects in our world. But what do these expressions mean exactly? In this seminar, we'll slowly and carefully work through some classic philosophical texts that address this issue. These texts will provide an introduction to the philosophy of language, and to analytic philosophy in general.
Area: Writing Intensive

AS.150.201. Introduction To Greek Philosophy. 3 Credits.
A survey of the earlier phase of Greek philosophy. Socrates, Plato, and Aristotle will be discussed, as well as two groups of thinkers who preceded them, usually known as the pre-Socratics and the Sophists.

AS.150.205. Introduction to the History of Modern Philosophy. 3 Credits.
An overview of philosophical thought in the seventeenth and eighteenth centuries. We shall focus on fundamental questions in epistemology (knowledge, how we acquire it, its scope and limits), metaphysics (the ultimate nature of reality, the relation of mind and body, free will), and theology (the existence and nature of God, God's relation to the world, whether knowledge of such things is possible): all questions that arose in dramatic ways as a result of the rise of modern science. The principal philosophers to be discussed are Descartes, Locke, Hume and Kant, though we shall also make the acquaintance of Spinoza, Leibniz and Berkeley.

AS.150.215. Problems with Knowledge, Evidence, and Action. 3 Credits.
This course covers a selection of recent work in epistemology and serves as an introduction to these topics. Issues to be discussed include new approaches to the nature of knowledge and skepticism, normative aspects of the way we handle information in our decision-making, epistemic injustices, and epistemic requirements for democratic discourse.
Area: Writing Intensive

AS.150.219. Introduction to Bioethics. 3 Credits.
Introduction to a wide range of moral issues arising in the biomedical fields, e.g. physician-assisted suicide, human cloning, abortion, surrogacy, and human subjects research. Cross listed with Public Health Studies.
Area: Writing Intensive

AS.150.220. Introduction to Moral Philosophy. 3 Credits.
An introduction to moral philosophy through in-depth and critical reading of selected texts from the history of philosophy. The philosophers whose texts will be discussed include Aristotle, Kant, Mill, and Hannah Arendt.

AS.150.223. Formal Methods of Philosophy. 3 Credits.
For better or for worse (and we think better), during the last century or so, philosophy has become infused with logic. Logic informs nearly every area of philosophy; it is part of our shared language and knowledge base. Vast segments of literature, especially in contemporary analytic philosophy, presuppose basic competence in logic and a familiarity with associated formal methods, particularly set theoretical. The standard philosophy curriculum should therefore guarantee a minimum level of logic literacy, thus enabling students to read the literature without it seeming like an impenetrable foreign tongue. This course is an introductory survey of the formal methods that a contemporary philosopher should be familiar with. It is not mathematically demanding in the way that more advanced courses in metalogic and specialized topics may be. The emphasis is on basic comprehension, not on mathematical virtuosity.

AS.150.235. Philosophy of Religion. 3 Credits.
Can one prove or disprove the existence of God? What is the relation between reason and faith? Are science and religion at odds with one another? We will consider historically significant discussions of these questions as well as important contemporary writings.

AS.150.237. Foundations of Modern Political Philosophy. 3 Credits.
This course is an introduction to modern political philosophy through an intensive study of the classic texts. The focus will be on the nature and limits of political authority under modern social conditions. Authors included are Machiavelli, Hobbes, Locke, Rousseau and Mill.

AS.150.240. Intro-Political Philosop. 3 Credits.
This course begins by reviewing canonical texts in modern political philosophy beginning with Thomas Hobbes and John Locke and ends by exploring classic questions in contemporary debates in race, gender, and identity.
Area: Writing Intensive

AS.150.245. Philosophy of Mind. 3 Credits.
If we know anything, it is natural to think it is our own minds. Despite this, philosophers have long disagreed about the natures of the states which make up our minds. And there is equally little agreement as to what makes such states count as mental in the first place. This course will investigate the nature of different aspects of mind and their interrelations. Time permitting, we will explore debates and puzzles about perception, memory, imagination, dreaming, pain and bodily sensation, emotion, action, volition and those states commonly classed as propositional attitudes: knowledge, belief, desire and intention. This will put us in a position to ask what if anything unifies such phenomena as mental

AS.150.260. Introduction to Metaphysics. 3 Credits.
Metaphysics addresses fundamental questions about the nature and structure of reality. This course will offer an introduction to metaphysics, and a survey of metaphysical debates about topics including free will, possibility and necessity, and arguments for the existence of God.

AS.150.300. Prometheus Editorial Workshop. 1 Credit.
Prometheus is an international undergraduate philosophy journal published by students at Johns Hopkins University. The purpose of the journal is to promote philosophic discourse of the highest standard by offering students an opportunity to engage in open discussion, participate in the production and publication of an academic journal, and establish a community of aspiring philosophers. Students enrolled in this workshop will act as the staff readers for the journal. For more information, please visithttps://prometheus.students.jh.edu/Prerequisite: MUST have taken one philosophy course

AS.150.301. Majors Seminar:. 3 Credits.
Topics change by semester. Please view class search to see what the topic is for a specific term.
Area: Writing Intensive

AS.150.307. Plato's Phaedrus. 3 Credits.
This is a reading course. Together we will do a close reading of one of Plato's masterpieces, the Phaedrus. We will also use this text to address general questions of interpretation, such as how to approach a philosophical classic, how to discern its underlying idea, etc.

AS.150.312. Applied Public Health Ethics and Decision-Making. 3 Credits.
In this course, students receive an introduction to core theoretical foundations and case studies in public and global health ethics. this course adopts an applied framework for understanding how public health ethical values are navigated in different decision-making processes. This course is geared toward juniors and seniors.
Area: Writing Intensive

AS.150.313. Technology, Democracy, and Social Justice. 3 Credits.
This course will consider healthcare technologies through the lens of political values: democracy and social justice. At a broad level, we will ask of these technologies: Who should decide on their design and use when the experts don't resemble the public and the public lacks expertise? How can we provide broad access to the benefits of these new technologies without exposing vulnerable people to further risk and unfairness? More narrowly, the course will focus on four technologies that affect healthcare: anti-malarial "gene drive" mosquitoes, medical AI, genomic data collection, and social media. Gene drives hold the promise of modifying mosquitoes to prevent the spread of infectious disease, but they also expose people in lower-income countries to unanticipated risks. Artificial intelligence and genomic data can deliver scarce medical resources to those who need it most and tailor it to minorities based on their precise characteristics. But they can also exacerbate existing unfairness while exposing minorities to risks of further discrimination and surveillance. Social media has a similar potential to deliver crucial health data, especially in a pandemic. But it also promotes the spread of misinformation among the populations most in need of help. This course will consider how we can balance the benefits and risks of these novel technologies and who gets to decide that balance.
Area: Writing Intensive

AS.150.330. Decisions, Games & Social Choice. 3 Credits.
We investigate rational decision making at the individual and group level. In the first section of the course on decision theory, we consider how a single rational agent will act in a choice situation given her knowledge, or lack thereof, about the world and her particular risk profile. In the second section on game theory, we explore different kinds of competitive and cooperative strategic interactions between agents, and we define different kinds of solutions, or equilibria, of these games. We also apply game theory to the study of morality, convention, and the social contract. In the final section of the course on social choice theory, we turn to group decision making with a focus on the impossibility results of Arrow and Sen.

AS.150.331. Themes from the Philosophy of Religion. 3 Credits.
Religion has always been a contested and extensively debated topic throughout the history of philosophy, and the topics from the philosophy of religion are still relevant today. In this course, we will look at several of those topics: what is religion? Do we have reason to believe or not believe in God? How does God relate to the world (or are there many Gods)? How can we understand religious practice? And what role (if any) should religion play in our society?

AS.150.355. Philosophy of Law. 3 Credits.
In this course we will examine major issues in the philosophy of law, including the nature of law, the role of the Constitution in legal decisions, and the justification of punishment. No previous knowledge of law or philosophy is required.

AS.150.356. Political Philosophy and Public Health Ethics. 3 Credits.
In 2015, Rand Paul generated controversy by insisting that parents should have complete discretion over whether to vaccinate their children. When pressed to come up with a defense for this policy, Paul replied, "The state doesn't own your children. Parents own the children, and it is an issue of freedom and public health." His rationale for his policy proposal and the responses to it hint at several fundamental questions about the role of the State as it pertains to producing health, as well as more practically oriented questions concerning policy. In this seminar, we will consider both sorts of questions. We will consider the merits of and objections to various policies such as cigarette bans, mandatory seatbelt or helmet laws for motorists, taxes for sugary beverages, and prohibitions of the private sale of organs. We will also ask more philosophical questions: When discussing public health, what constitutes 'the public'? And how should we connect public health and policy measures to salient concepts such as legitimacy, justice, coercion, manipulation, paternalism, autonomy, liberty, privacy, and parental rights? In asking these questions, both at the level of policy and more philosophically, we will engage with a variety of political theories, including various strands of feminism, anarchism, libertarianism, perfectionism, critical race theory, leftist theories, broadly consequentialist theories, and public reason liberalism. Must have some background in philosophy or bioethics.
AS.150.219 OR AS.150.220 OR AS.150.237 OR AS.150.240

AS.150.400. Simone de Beauvoir. 3 Credits.
Seminar on Beauvoir's moral philosophy, covering the major works of the 1940s. Readings will include selections from The Blood of Others, Pyrrhus and Cineas, All Men are Mortal, The Ethics of Ambiguity, and The Second Sex. Open to graduate students and advanced undergraduates. (Beginning undergraduates should contact Professor Kosch.) No prerequisites.
Area: Writing Intensive

AS.150.401. Greek Philosophy: Plato and His Predecessors. 3 Credits.
A study of pre-Socratic philosophers, especially those to whom Plato reacted; also an examination of major dialogues of Plato with emphasis upon his principal theses and characteristic methods. Cross-listed with Classics.
Area: Writing Intensive

AS.150.402. Aristotle. 3 Credits.
A study of major selected texts of Aristotle.
Area: Writing Intensive

AS.150.403. Hellenistic Philosophy. 3 Credits.
A study of later Greek philosophy, stretching roughly from the death of Aristotle to the Roman imperial period. Epicureans, Stoics, and Skeptics will be the main philosophical schools examined.
Area: Writing Intensive

AS.150.404. The Idea of Power. 3 Credits.
The Idea of Power surveys seminal texts in the history of political thought on the nature, promise, and dangers of political and social power; it also critically engages contemporary texts on race and gender power relations

AS.150.405. Evidence: An Introduction. 3 Credits.
What is evidence? Can it ever be disregarded in science, the law, or religion, and if so, when? What are the paradoxes of evidence (grue, ravens) and how can they be solved?

AS.150.406. Tragedy and Living Well. 3 Credits.
This course revisits the idea of tragedy as represented in Ancient Greek thought for the purpose of approaching questions of flourishing and ethical living from a different angle.
Area: Writing Intensive

AS.150.409. Wittgenstein On Certainty. 3 Credits.
Wittgenstein's On Certainty consists of four notebooks containing remarks on knowledge, certainty, doubt and truth. In this course, we will undertake a close study of Wittgenstein's notes, critically examining competing interpretations of Wittgenstein's ideas and the different use of those ideas have been taken up in current debates about philosophical skepticism.

AS.150.410. The Philosophy of Afrofuturism I. 3 Credits.
The main goal of speculatibe fiction is to render a familiar world slightly unfamiliar to then ask familiar questions in new ways. Afrofuturism as a genre of sci-fi, fantasy, and horror written by and about black people, applies this ethic to the problems of race, broadly speaking. In this course we survey major texts to philosophically inquire into phenomena like incaceration., Slavery and it's lingering effects, and colonialism among other themes.
Area: Writing Intensive

AS.150.411. Modal Psychology. 3 Credits.
In this seminar, we'll consider recent theoretical and experimental work by philosophers, psychologists, and cognitive scientists on the impact of our modal judgments (i.e., our judgments about whether a state or event is possible or not, statistically probable or not, morally bad or not, and so forth) in various cognitive domains. Among other things, we'll look at recent studies suggesting that our moral judgments can affect our judgments about whether an agent is free to act, our selection of causes, and our simulation of counterfactual possibilities in surprising ways.

AS.150.415. Typefaces and Meaning. 3 Credits.
While linguists and philosophers have developed deep and intricate theories of meaning for natural language, considerably less attention has been paid to how the form of written and printed language can itself communicate content. In this seminar, we'll look at recent theoretical and experimental work across a range of different disciplines that converges on the idea that typeface choice can be a rational means to communicate and construct different personae. To get clearer about this phenomenon, we'll also look at philosophical work on meaning, and related research on sociolinguistic variation and the semantics and pragmatics of expressive language.

AS.150.417. Kant's 'Critique Of Pure Reason'. 3 Credits.
An examination of the philosophy of Immanuel Kant, with emphasis on The Critique of Pure Reason.

AS.150.418. Hermeneutics and Critrical Theory. 3 Credits.
An introduction to two of the most important and influential schools in twentieth-century German philosophy. This course examines the works of four leading representatives of these schools, i.e. Heidegger, Gadamer, Horkheimer, and Habermas.

AS.150.419. Kant's Critique/Judgment. 3 Credits.
This course will examine closely and in detail the aesthetic and teleological parts of Kant's third masterpiece, The Critique of the Power of Judgment.

AS.150.420. Mathematical Logic I. 3 Credits.
Mathematical Logic I (H,Q) is the first semester of a year long course. It introduces the two notions of validity and provability for both sentential logic and first-order predicate logic, showing in each case that there is a system of derivation such that any argument is valid if and only if the conclusion is provable from the premises. The result is non-trivial since validity is a semantic notion involving the preservation of truth, while a proof is a finite syntactic object whose correctness can be effectively decided. The goal of the course, however, is to learn how to formulate mathematical theories in first-order logic and to explore various of their properties (or lack thereof) such as completeness, decidability, axiomatizability, finite axiomatizability, and consistency. The course concludes with a brief introduction to model theory and the interpretability of one theory in another, which is the basis for relative consistency proofs in mathematics.

AS.150.421. Mathematical Logic II. 3 Credits.
Euclid set a precedent for the codification of mathematics by axiomatizing the set of geometric truths. An obvious question that arises is whether all branches of mathematics are axiomatizable, especially fundamental ones, such as arithmetic. In the late nineteenth century, what became known as Peano arithmetic was proposed as an axiomatization. The essential feature of an axiomatization is that, although one might have an infinite number of axioms, as does Peano arithmetic, one must have a decision procedure for determining whether a given proposition is or is not an axiom. In 1931, Gödel proved the astounding result that, not only is Peano arithmetic incomplete in the sense that it does not entail all arithmetic truths, but any attempted axiomatization of arithmetic is incomplete, and thus the set of arithmetic truths must be undecidable. Subsequently, Alfred Tarski showed the set of arithmetic truths is not even definable. Also, by finding a finitely axiomatizable undecidable subtheory of Peano arithmetic, Alonzo Church was able to show that there is not even an effective procedure for determining whether a given sentence is a logical truth.Finally, in his 1931 paper, Gödel argued a second incompleteness theorem, viz., that any theory strong enough to express its own consistency, as he showed Peano arithmetic to be, cannot prove its own consistency unless it is inconsistent. We will cover these and other results that have had a profound effect on the foundations of mathematics. It remains an open question whether so basic a theory as Peano arithmetic is consistent.
AS.150.420

AS.150.422. Axiomatic Set Theory. 3 Credits.
A development of Zermelo-Fraenkel set theory (ZF), including the axiom of choice (ZFC), a system in which all of mathematics can be formulated (i.e., entails all theorems of mathematics). Although, we'll do an exposure to transfinite ordinals and cardinals in general so that you can get a sense for how stupendously “large” these can be, the main thrust concerns certain simple, seemingly well-posed conjectures whose status appears problematic. For example, the Continuum Hypothesis (CH) is the conjecture that the cardinality of the real numbers is the first uncountable cardinality, i.e., the first cardinality greater than that of the set of natural numbers. Equivalently, there is no uncountable subset of real numbers strictly smaller in cardinality than the full set of reals. (You'd think that if there were one, you would be able eventually to find such.) Cantor thought that CH is true, but could not prove it. Gödel showed, at least, that if ZFC is consistent, then so is ZFC+CH. However, Paul Cohen later proved that if ZFC is consistent, then so is ZFC + the negation of CH. In fact, CH could fail in astoundingly many ways. For example, the cardinality of the continuum could be (weakly) inaccessible, i.e., of a cardinality that cannot even be proved to exist in ZFC (although the reals can certainly can be proved to exist in ZFC). So, are there further, intuitively true axioms that can be added to ZFC to resolve the cardinality of the continuum, and CH is definitely true or false? Or, as Cohen thought, does CH simply lack a definite truth value?

AS.150.423. Theory of Knowledge. 3 Credits.
An advanced introduction to the central problems, concepts and theories of contemporary philosophical epistemology (theory of knowledge). Topics to be explored will includes: what is knowledge (and why do we want it)?; theories of justification (foundationalism, the coherence theory, etc.); externalism and internalism in epistemology; skepticism, relativism and how to avoid them. Reading from contemporary sources.

AS.150.425. Enlightenment Moral and Political Theory. 3 Credits.
An examination of some of the central texts of the Enlightenment, including works by Locke, Montesquieu, Rousseau, and Kant.
Area: Writing Intensive

AS.150.426. Philosophy and Disability. 3 Credits.
In this course, we will consider various philosophical issues related to disability. What counts as a disability? What obligations do we have, both as individuals and as a society, to people with disabilities? What counts as respecting people with disabilities, and what counts as unjustifiable discrimination against them?
Area: Writing Intensive
AS.150.219 OR AS.150.220

AS.150.428. Spinoza's Theological Political Treatise. 3 Credits.
The course is an in-depth study of Spinoza's Theological-Political Treatise. Among the topics to be discussed are: Spinoza's Bible criticism, the nature of religion, philosophy and faith, the nature of the ancient Hebrew State, Spinoza's theory of the State, the role of religion in Spinoza's political theory, the freedom to philosophize, the metaphysics of Spinoza's Theological-Political Treatise, and finally, the reception of the TTP.

AS.150.430. Hegel's Phenomenology of Spirit. 3 Credits.
From the opening chapter on "Sense-certainty" to the concluding "Absolute Knowledge," we will follow Hegel's account of the experience of consciousness through the transitions to self-consciousness, reason, spirit, and religion.

AS.150.432. Philosophy of Memory. 3 Credits.
Memory is amongst the most fundamental capacities of the mind. Without memory, we would be limited to our present experience, and many of our other cognitive capacities and social practices would be impossible. In this course we will investigate interconnected questions including: What is the nature of memory and of its different varieties? How should we study memory: what should be the roles of psychology, neuroscience, and introspection? If someone loses many of their memories due to injury or disease, are they still the same person—and should we still respect their past wishes and hold them responsible for their past deeds? What kinds of memory do other animals have and is this morally significant? Is forgetting always bad, or do we have a duty to remember? How do collective memory and public memorials relate to individual memory, and what lessons does the study of individual memory have for the politics of collective memory?
Area: Writing Intensive

AS.150.433. Philosophy of Space & Time. 3 Credits.
Is space an entity that exists independently of matter (substantivalism), or is it only an abstraction from spatial relations between bodies (relationism)? Is there a lapse of time even when nothing changes, or is time only a measure of motion? Are motion and rest contrary properties or states of a body, or are there only changes in the positions of bodies relative to one another? Philosophers and physicists have disputed these questions from antiquity to the present day. We survey the arguments and attempt to find a resolution. But there are further questions. What is the significance of incongruent counterparts (left hands vs. right hands)? Is there a fact of the matter as to the geometry of space (flat, hyperbolic or elliptical), or as to whether space-like separated events occur at the same time? What is the principle of relativity? Does Einstein's theory have consequences for the substantivalist/relationist debate? What is the status of spacetime in current physics and cosmology? Why does time but not space have a "direction"? Are past, present and future objective features of reality, or are they merely "stubborn illusions"? Does time flow? If not, how do we account for our sense of the passage of time?

AS.150.434. Formal Methods of Philosophy. 3 Credits.
For better or for worse (and we think better), during the last century or so, philosophy has become infused with logic. Logic informs nearly every area of philosophy; it is part of our shared language and knowledge base. Vast segments of literature, especially in contemporary analytic philosophy, presuppose basic competence in logic and a familiarity with associated formal methods, particularly set theoretical. The standard philosophy curriculum should therefore guarantee a minimum level of logic literacy, thus enabling students to read the literature without it seeming like an impenetrable foreign tongue. This course is an introductory survey of the formal methods that a contemporary philosopher should be familiar with. It is not mathematically demanding in the way that more advanced courses in metalogic and specialized topics may be. The emphasis is on basic comprehension, not on mathematical virtuosity. Co-taught with AS.150.223 Formal Methods of Philosophy.

AS.150.436. Philosophy of Gender. 3 Credits.
In this class we will examine philosophical questions about gender, and about the intersections between gender and other social categories including race, class and sexuality. We will focus specifically on questions about the metaphysics of gender and other social categories.

AS.150.437. Kierkegaard. 3 Credits.
A survey of the works of Danish philosopher Søren Kierkegaard, considered by many to be the most important figure in the history of what came to be called 'existential philosophy', and one of the great moral psychologists in the history of western philosophy. We will read a broad selection from Kierkegaard's pseudonymous works, including Either/Or, Fear and Trembling, The Concept of Anxiety and The Sickness unto Death.
Area: Writing Intensive

AS.150.441. Paradoxes of Agency and Belief. 3 Credits.
This course will focus on issues arising from the Socratic paradoxes of agency and from Moore's Paradox. Readings will include Platonic dialogues, the ethical writings of Kant, Fichte and Hegel, selections from Moore and Wittgenstein, and writings by contemporary philosophers of agency.

AS.150.442. Wittgenstein. 3 Credits.
An advanced introduction to the philosophical work of Ludwig Wittgenstein. We shall begin by examining the central ideas of Wittgenstein's Tractatus Logico-Philosophicus against the background of the philosophical work of Frege and Russell. We shall then move on to the Philosophical Investigations, paying special attention to his searching self-criticisms and to the "rule-following" and "private language" problems, as highlighted by Saul Kripke's pathbreaking but controversial account of Wittgenstein's argument.
Area: Writing Intensive

AS.150.445. Berkeley's Idealism. 3 Credits.
Idealism is the view that, at bottom, whatever is - is an idea. For the idealist, to be is to be perceived. George Berkeley is probably the most famous idealist among European philosophers, and on this seminar we will read closely two of his major texts: Principles of Human Knowledge and Three Dialogues between Hylas and Philonus. Topics to be discussed include: the nature of bodies, the nature of the mind, the possible sources of our ides, and Berkeley's understanding of God.

AS.150.447. The Logic of Spinoza's Ethics. 3 Credits.
One of the unique aspects of Spinoza's major work, the Ethics, is its formal or "geometric" structure. The book is written following the model of Euclid's Elements, with Definitions, Axioms, Propositions, and Demonstrations. In this seminar, we scrutinize the deductive structure of the Ethics and some of its earlier drafts. We consider the role and epistemic status of the definitions and axioms, attempt to provide rigorous reconstructions of some of its key propositions, and also investigate the possibility of alternative routes between these propositions.

AS.150.448. The Religion of Morality. 3 Credits.
In the wake of the Enlightenment criticism of traditional forms of religion, philosophers attempted to give religion a rational basis by equating it with moral practice. We will examine this religion of morality with the goal of determining whether it can vindicate its claim to be a genuine religion. We will read texts by Rousseau, Kant, Fichte, Hegel and Emerson.

AS.150.449. New Foundations for Mathematics. 3 Credits.
With the appearance of Zermelo-Fraenkel set theory (ZF) in the early 20th century and the subsequent identification of first-order logic, the problem of an adequate foundations for mathematics was thought to have been solved. The emergence of category theory (Cat) in the latter half of the century and more recently of homotopy type theory (HoT) has been seen to undermine ZF's foundational status and to threaten to replace it. In this course we will (1) see how ZF serves as a foundation, (2) learn a bit of Cat and HoT, and (3) discuss what the foundations can and should be (if any).

AS.150.450. Topics in Biomedical Ethics. 3 Credits.
Area: Writing Intensive

AS.150.451. Animal Points of View. 3 Credits.
Are non-human animals conscious? Do they possess a stream of consciousness like our own? This course will explore these questions by asking what it is for an animal to possess a point of view and a temporal point of view in particular.

AS.150.452. Freedom of Will & Moral Responsibility. 3 Credits.
What are freedom of the will and moral responsibility? Are they compatible with determinism or naturalism? This course will examine various philosophers' answers to these questions.
Area: Writing Intensive

AS.150.453. Hegel's Logic. 3 Credits.
This seminar is a close study of Hegel's major work, the Science of Logic. Among the issues to be discussed are the questions: How should philosophy begin and what - if anything - can it take for granted? We will also attempt to scrutinize Hegel's attitude toward the law of non-contradiction.

AS.150.455. Ethics And Animals. 3 Credits.
Area: Writing Intensive

AS.150.458. The Biggest Hits in Philosophy of Science (20th and 21st Centuries). 3 Credits.
Readings from Duhem, Carnap, Hempel, Popper, Quine, Kuhn, Feyerabend, van Fraassen, and others who got us where we are in the field today. Quine said: Philosophy of science is philosophy enough. Is it?

AS.150.459. Counterfactual Reasoning, Normative & Descriptive Aspects. 3 Credits.
Counterfactual reasoning is reasoning about what would be the case if things had been other than they are: If it had been sunny and so I didn't run into that store for cover from the rain, maybe I would never have met my future partner! How ought one to reason counterfactually? How do people in fact do it? Counterfactual reasoning might seem like a narrow topic, but it is of fundamental importance to both scientific and everyday inquiry, where it is intimately connected to the use of imagination, planning for the future, assessment of and learning from the past, providing explanations, understanding fictions, and constructing experiments. This course will explore both normative and empirical aspects of counterfactual reasoning, drawing upon readings in philosophy, psychology, and linguistics. An overarching goal of this course is to arrive at a better understanding of counterfactuality that is informed by research across these different disciplines.

AS.150.461. Theory Of Value. 3 Credits.
What is value? What is the difference between instrumental and final value? What is the relation of ethical and economic value? This course will explore a range of answers to these questions, with special focus on the role of desire and reason in determining value. Readings will include historical and contemporary authors.

AS.150.464. Hegel's Philosophy of Right. 3 Credits.
This course will be a close reading of G.W.F. Hegel's Philosophy of Right. Some of the main topics for discussion will be the relation of law and morality, the dependence of the political philosophy on Hegel's Logic, and the relation of individual and social conceptions of freedom.

AS.150.465. Topics in the Philosophy of Physics. 3 Credits.
This course will consider some philosophical topics in the foundations of physics. Entropy and the arrow of time -- why time has a direction, whether it can be explained in terms of entropy, and what role the arrow of time plays in causation and emergence. Anthropics and indexical uncertainty -- approaches to probability, reference classes, the cosmological multiverse, Boltzmann brains, simulation and doomsday arguments. Foundations of quantum mechanics -- the measurement problem, many-worlds, probability and structure, alternative approaches.

AS.150.473. Classics of Analytic Philosophy. 3 Credits.
A reading of some of the classic philosophical works in 20th Century Analytic Philosophy, beginning with G. Frege and ending with V.O. Quine.

AS.150.474. Justice and Health. 3 Credits.
Course will consider the bearing of theories of justice on health care. Topics will include national health insurance, rationing and cost containment, and what justice requires of researchers in developing countries.

AS.150.475. The Nature and Significance of Animal Minds. 3 Credits.
Humans have a complicated relationship with other animals. We love them, befriend them and save them. We hunt, farm and eat them. We experiment on and observe them to discover more about them and to discover more about ourselves. For many of us, our pets are amongst the most familiar inhabitants of our world. Yet when we try to imagine what is going on in a dog or cat's mind — let alone that of a crow, octopus or bee — many of us are either stumped about how to go about this, or (the science strongly suggests) get things radically wrong. Is our thought about and behaviour towards animals ethically permissible, or even consistent? Can we reshape our habits of thought about animals to allow for a more rational, richer relationship with the other inhabitants of our planet? In this course, students will reflect on two closely intertwined questions: an ethical question, what sort of relationship ought we to have with animals?; and a metaphysical question, what is the nature of animal minds? Readings will primarily be from philosophy and ethics and the cognitive sciences, with additional readings from literature and biology. There are no prerequisites for this class. It will be helpful but certainly not necessary to have taken previous classes in philosophy (especially ethics and philosophy of mind) or in cognitive science
Area: Writing Intensive

AS.150.476. Philosophy and Cognitive Science. 3 Credits.
This year's topic is perception. Questions will include: In what ways might perceptual states be like and unlike pictures? Does what we believe affect what we perceive? Is linguistic comprehension a kind of perception? This course is geared toward advanced undergraduates and graduate students in philosophy and in the mind brain sciences and related fields. Others may be successful in the course depending on their prior course of study.

AS.150.480. Death and Dying. 3 Credits.
What is death? How should we think about death? How should we think about it? How should we treat those who are dying including ourselves? This course will examine these and other philosophical questions.
Area: Writing Intensive

AS.150.481. Hobbes' Leviathan. 3 Credits.
Thomas Hobbes' Leviathan is a masterpiece of modern political philosophy. This class is an in-depth study of that work.

AS.150.482. Food Ethics. 3 Credits.
Eating is an essential human activity: we need to eat to survive. But how should we eat? In this course, we consider such ethical questions as: Is it morally wrong to make animals suffer and to kill them in order to eat them? What is the extent of hunger and food insecurity, in this country and globally, and what should we as individuals do about it? Should the government try to influence our food choices, to make them healthier?

AS.150.483. Evidence, Foundations of Probability, and Speculation. 3 Credits.
The course examines major theories about the meaning of evidence and probability, and in terms of these provides answers to the questions “What is a scientific speculation?” and “When, if at all, is speculating important or even legitimate in science?” No preview study of evidence or probability is required.

AS.150.485. Descartes and Spinoza. 3 Credits.
Descartes and Spinoza are two of the leading philosophers of the modern period. In the class we will study the works of both figures. Special attention will be assigned to Spinoza’s early works.

AS.150.486. Moral Imagination. 3 Credits.
This course explores the relationship between moral principles and how we use imagination to put or fail to put principles to work. We will read widely and eclectically in exploring this relationship.

AS.150.491. American Philosophy: Pragmatism. 3 Credits.
Studies of major figures in the history of American philosophy beginning with the 19th century. The course focuses on the development of pragmatism in the work Peirce, James and Dewey. Other philosophers, such as Royce and Mead, may also be studied.

AS.150.492. Plato's Republic. 3 Credits.
This course will be a close reading of Plato’s Republic, with special attention to the parallel of city and soul, the relevance of metaphysics to politics, and the relation of aristocracy, democracy and tyranny.

AS.150.498. Modal Logic and Its Applications. 3 Credits.
In the first part of the course, we’ll investigate the theory of modal logic, considering its syntax, semantics, and proof theory. We’ll then turn to some its philosophical applications: epistemic logic, counterfactuals, deontic logic, intuitionistic logic, and the metaphysics of time.

AS.150.511. Directed Study. 3 Credits.
Individual study of special topics, under regular supervision of a faculty member. Special permission is required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.512. Directed Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.551. Honors Project. 3 Credits.
See departmental major adviser.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.552. Honors Project. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.150.603. Seminar in Modern Philosophy.
German-style colloquium for advanced graduate students working in the history of modern philosophy. Course will meet synchronously online every other week for the duration of the academic year. Spring offering will carry a separate course number.

AS.150.604. Graduate Seminar in the Philosophy of Science: The Big Issues.
Readings from Duhem, Carnap, Hempel, Popper, Quine, Kuhn, Feyerabend, van Fraassen, and others who, in the 20th and 21st centuries, got us where we are in the field today. And Quine added: philosophy of science is philosophy enough. Is it?

AS.150.606. Seminar on Skepticism - Ancient & Modern.
Course will focus on ancient skepticism as a way of life, and on the role of epistemological argument in skepticism so conceived. The seminar will end with a brief look at early modern reactions to ancient skepticism.

AS.150.607. Graduate Seminar: Knowledge and Perception.
How does perception reveal the world, if it does? Why have philosophical reflections on perception often led to skepticism? For background, we will start with readings from Ayer and Austin (on the sense-datum theory), and Sellars (on the Myth of the Given). We will then spend time on contemporary "disjunctive" accounts of perceptual consciousness, with readings from McDowell, Travis and (possibly) others.

AS.150.609. Fichte, Schelling and Spinoza.
Spinoza constituted a major philosophical interlocutor for both Fichte and Schelling. In this class will study the critical reception of Spinoza by the two philosophers. Among the topics we intend to discuss are: freedom, God, the concept of substance, the nature of thought, and reason.Recommended Course Background: Previous acquaintance with Spinoza’s ethics.

AS.150.612. The Birth of German Idealism.
This course will mainly consist of close readings of the work F.H. Jacobi, J.G. Fichte, and F.W.J. Schelling. We will focus on the issues of freedom and systematicity in the transformation of Kant’s critical philosophy through the influence of Spinoza.

AS.150.613. Graduate Seminar: Topics in the Philosophy of Mind - Perception.
Recent work on the philosophy of perception, including Tyler Burge’s new book Perception: First Form of Mind

AS.150.616. Is Scientific Knowledge Possible?.
Philosophical Views of Descartes, Newton, Duhem, Popper, Carnap, Goodman (grue), Kuhn, and Feyerabend.

AS.150.617. Origins of Analytic Philosophy; Frege to Carnap.
Course description forthcoming. Previous philosophy classes of History of Modern Philosophy and/or Elementary Logic useful. This class is geared toward graduate students in philosophy.

AS.150.619. Topics in Hegel’s Philosophy: The Philosophy of Right.
This course will be a close reading of G.W.F. Hegel’s Philosophy of Right. Some of the main topics for discussion will be the relation of law and morality, the dependence of the political philosophy on Hegel’s Logic, and the relation of individual and social conceptions of freedom.

AS.150.620. Political Philosophy.
A high level review of key thinkers in contemporary political thought.
Area: Writing Intensive

AS.150.622. Graduate Seminar: Metametaphysics.
Metametaphysics is the study of the nature and viability of metaphysics. In this seminar we will engage with questions about metametaphysics, including questions about the relationship between metaphysics and science, responses to deflationist challenges, and the nature of social metaphysics.

AS.150.623. Seminar in German Idealism.
This course explores the transformation of Kantian idealism by F.W.J. Schelling and G.W.F. Hegel in their early years in Jena. Readings will include Schelling's System of Transcendental Idealism as well as Hegel's "Difference" essay and Faith and Knowledge.

AS.150.632. Formal Logic.
"An introduction to symbolic logic and probability. In the first two parts of the course we study formal ways of determining whether a conclusion of an argument follows from its premises. Included are truth-functional logic and predicate logic. In the third part we study the basic rules of probability, and learn how to make probability calculations and decisions in life." Co-listed with AS.150.118 (for undergraduate students) (01-F 11:00-11:50am).

AS.150.633. Kant's Opus Postumum.
This research seminar examines the reasons that led Kant to revise his transcendental philosophy late in life. Special attention to problems in the Metaphysics of Nature and the Metaphysics of Morals. Students should be familiar with Kant's theoretical and practical philosophy.

AS.150.635. Graduate Seminar: Truthmaker Semantics & Pragmatics.
An investigation into the theory of truthmaker semantics and pragmatics and its applications to various problems in philosophical logic and linguistics. This course is geared toward graduate students. Some background in mathematical logic will be useful in this class.

AS.150.642. Seminar on Ancient Greek Ethics.
The seminar will focus on the ethical system of the Stoics. Stoic ethics is notorious for a number of apparently extreme assertions, such as "Virtue is the only good", "Virtue is sufficient for happiness", and "The wise man is happy on the rack". Yet the system had a wide following, over several centuries, in both the Greek and Roman worlds; and its devotees (including at least one Roman emperor, and a close adviser to another) were certainly not all fanatics. We will attempt to make sense of this ethical outlook, with particular focus on the relations among virtue, wisdom and happiness.

AS.150.645. Truthmakers.
An investigation into the metaphysics and semantics of truthmakers and their application in various areas of philosophy.

AS.150.651. Animal Points of View.
Are non-human animals conscious? Do they possess a stream of consciousness like our own? This course will explore these questions by asking what it is for an animal to possess a point of view and a temporal point of view in particular.

AS.150.653. Seminar: Philosophy of Physics.
Physicists, natural philosophers and ordinary people have long held that space and time are fundamental entities, the stage as it were for all bodies and their interactions. Although relativity now teaches us that space and time are not fundamental, but aspects of a single entity, spacetime, it is typically thought that the latter is strictly fundamental, especially given its dynamical role in general relativity as the gravitational field. Yet recent attempts to unify general relativity and quantum mechanics reject this view and instead hold that spacetime emerges from something non-spatiotemporal and more fundamental. But what is the nature of this emergence and from what does spacetime emerge? We will examine a variety of proposals and ask (i) what it means for spacetime to emerge from non-spatiotemporal features and (ii) how this compares with philosophical theories of emergence. On one approach in particular, spacetime (gravity) emerges from the entropy of quantum entanglement. Thus, because it appears to come in various forms, we will also be concerned to understand the concept of entropy. But we will consider other approaches as well (e.g., loop quantum gravity and causal set theory) and attendant issues such as the black hole information loss paradox, the holographic principle, and the conjecture that entangled particles are connected by a wormhole.

AS.150.668. Graduate Seminar on Essence.
An exploration of historical and contemporary work on the metaphysics of essence, and related questions about modality, explanation, identity and the Principle of Sufficient Reason. Readings will include work from Aristotle, Spinoza, Kripke and Fine. This course is open to upper level undergraduate students with the permission of the instructor.

AS.150.669. Topics in Practical Philosophy.
An investigation into central topics in practical philosophy.

AS.150.675. Recent Works in Skepticism.
We all take it for granted that perceptual experience yields knowledge of the world around us. But in his Meditations on First Philosophy, Descartes presents new and puzzling thought experiments. He asks whether there is any way to be sure that, when he tales himself to be experiencing things in the world around him, he is not dreaming. From there, he goes on to imagines an Evil Demon with the power to manipulate the total course of his (Descartes's) experience, so that what he naturally takes to be experience of the world around him is really a kind of perpetual dream: a simulation or virtual reality, as we might say today. Descartes's problem, which has made its way into popular culture through films like those in the "Matrix" series, remains a source of philosophical puzzlement. While no one believes that skeptical hypotheses like Demon or computer deception are true, it is not easy to say how we can exclude them. Given that the deception is systematic, it seems that any 'evidence' I cite could itself be part of the simulation. So how do I (or could I) know (for sure) that I'm not the victim of the Deceiver or the Matrix? We shall examine some of the latest attempts to respond to Descartes's challenge. Does the "How could I know?" question admit of a theoretical answer. Is the question itself somehow ill-posed? Can we answer it without making significant concessions to skepticism? What can we learn about knowledge (or the concept of knowledge) by coming to understand how skepticism arises and how it goes wrong (if it does)? Readings from contemporary sources.

AS.150.676. Graduate Seminar: Current Topics in Philosophy.
Rather than having a set topic, the point of this seminar is to stay up-to-date with the current philosophy literature by working through 1-2 recently published papers each week. The papers covered will depend on the research interests of the seminar participants (and my own).

AS.150.677. Moral Imagination.
This course explores the relationship between moral principles and how we use imagination to put or fail to put principles to work. We will read widely and eclectically in exploring this relationship.

AS.150.678. Social Construction.
An exploration of the metaphysics of social construction, examining different theories of social construction and related questions about social ontology, scientific realism and the boundaries of metaphysics.

AS.150.688. Philosophy of Psychology.
An examination of recent philosophical and empirical work on perception and consciousness.

AS.150.810. Independent Study.

AS.150.811. Directed Study.
Please see AS.150.810 for section numbers to use when registering.

AS.150.812. Directed Study.
Please see AS.150.810 for section number to use when registering.

AS.150.813. Seminar in Modern Philosophy.
German-style colloquium for graduate students working in the history of modern philosophy. We will read newly-published work, invite speakers, and have presentations by advanced graduate students. First- and second-year students may register for a grade. Advanced graduate students in history of modern should audit/present

AS.150.821. Research Seminar in Language and Mind.
A workshop for current departmental research in language and mind. Permission required.

AS.150.822. READINGS AND SKILLS IN CONTEMPORARY PHILOSOPHY PART I.
This course provides skills training for a successful career in philosophy, through engagement with contemporary work across a wide range of areas of philosophy. As a class, we will choose accessible articles of general interest recently published in top journals. Each student will be responsible for presenting one of these articles to the class and leading discussion, with guidance from the instructors. All students will be required to carefully and closely read each paper for each class, and come prepared to discuss it in depth. The aim of this part of the course is to learn how to read and analyze articles, present work, and engage in constructive philosophical discussion. After presenting the paper, each presenter will be required to write a short reply. As a class, we will then engage in a mock review process, crafting anonymous referee reports, revising replies in the light of these, and writing letters to the editor explaining the revisions. The aim of this part of the course is to gain knowledge and skills relevant to writing philosophy and successful publication. The course is open to 1st and 2nd year Philosophy PhD students only. It will meet every other week in both the fall and the spring semesters; each semester is worth 2 credits and students are required to enroll in both. Grading will be based predominantly on participation and effort

AS.150.823. READINGS AND SKILLS IN CONTEMPORARY PHILOSOPHY II.
This course provides skills training for a successful career in philosophy, through engagement with cutting-edge contemporary work across a wide-range of areas of philosophy. As a class, we will choose accessible articles of general interest recently published in top journals. Each student will be responsible for presenting one of these articles to the class and leading discussion, with guidance from the instructors. All students will be required to carefully and closely read each paper for each class, and come prepared to discuss it in depth. The aim of this part of the course is to learn how to read and analyze articles, present work, and engage in constructive philosophical discussion. After presenting the paper, each presenter will be required to write a short reply to it, in the style of the relevant journal. As a class, we will then engage in a mock review process, crafting anonymous referee reports, revising replies in the light of these, and discussing these as editors. The aim of this part of the course is to gain knowledge and skills relevant to writing philosophy and successful publication. The course is open to 1st and 2nd year graduate students. It will meet every other week in both the fall and the spring semesters; each semester is worth 2 credits and students are required to enroll in both. Grading will be based predominantly on participation and effort. Upper-year graduate students may audit the course by permission of the instructors, conditional on their commitment to attend and engage as full members of the class; if student numbers are high, priority with respect to presentations will be given to 1st and 2nd year students.
Area: Writing Intensive
AS.150.822

AS.150.824. Research Seminar.
For 3rd and 4th year Philosophy graduate students working on their Qualifying Papers and Dissertation Proposals. Meets every other week.

AS.150.825. Research Seminar.
In this course students will present drafts of Qualifying Papers and first dissertation chapters, receiving feedback from students, the instructor and other relevant faculty.

AS.150.850. Summer Research.
Students research and develop their dissertation topic.

AS.171 (Physics & Astronomy)

AS.171.101. General Physics: Physical Science Major I. 4 Credits.
First semester of a two-semester sequence in general physics covers mechanics, heat, sound, electricity and magnetism, optics, and atomic physics. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed.
Corequisite: AS.110.108-AS.110.109, AS.173.111-AS.173.112

AS.171.102. General Physics: Physical Science Major II. 4 Credits.
Second semester of a two-semester sequence in general physics covers mechanics, heat, sound, electricity and magnetism, optics, and atomic physics. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed.
Recommended Course Background: A grade of C- or better in either Physics I or the first semester of Intro to Mechanics I (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR EN.530.123)
Prerequisites: A grade of C- or better in either Physics I or the first semester of Engineering Mechanics (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR (EN.530.103 OR EN.530.123)

AS.171.103. General Physics I for Biological Science Majors. 4 Credits.
First-semester of two-semester sequence in calculus-based general physics, tailored to students majoring in one of the biological sciences. In this term, the topics covered include the basic principles of classical mechanics and fluids as well as an introduction to wave motion. Recommended Corequisites: (AS.173.111) AND (AS.110.106 or AS.110.108 or AS.110.113).Midterm exams are given at 8am Tuesdays, so students must leave their schedules open at this time in order to be able to take these exams

AS.171.104. General Physics/Biology Majors II. 4 Credits.
This two-semester sequence is designed to present a standard calculus-based physics preparation tailored to students majoring in one of the biological sciences. Topics in electricity & magnetism, optics, and modern physics will be covered in this semester. Midterm exams for every section are given during the 8 AM section time!Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Recommended Course Background: C- or better in AS.171.101 or AS.171.103 or AS.171.105 or AS.171.107; Corequisite: AS.110.109, AS173.112 or OR EN.530.123.

AS.171.105. Classical Mechanics I. 4 Credits.
An in-depth introduction to classical mechanics intended for physics majors/minors and other students with a strong interest in physics. This course treats fewer topics than AS.171.101 and AS.171.103 but with greater mathematical sophistication. It is particularly recommended for students who intend to take AS.171.201-AS.171.202 or AS.171.309-AS.171.310. Recommended Corequisites: AS.173.115 and AS.110.108

AS.171.106. Electricity and Magnetism I. 4 Credits.
Classical electricity and magnetism with fewer topics than 171.101-103, but with greater mathematical sophistication. Particularly recommended for students who plan to take AS.171.201-AS.171.202. Recommended Course Background: C- or better in AS.171.105; Corequisite: AS.173.116, AS.110.109

AS.171.107. General Physics for Physical Sciences Majors (AL). 4 Credits.
This two-semester sequence in general physics is identical in subject matter to AS.171.101-AS.171.102, covering mechanics, heat, sound, electricity and magnetism, optics, and modern physics, but differs in instructional format. Rather than being presented via lectures and discussion sections, it is instead taught in an "active learning" style with most class time given to small group problem-solving guided by instructors. Midterm exams for every section are given during the 8 AM section time! Accordingly, students registering for sections at times other than 8 AM must retain availability for 8 AM sections as needed. Recommended Corequisites: (AS.173.111) AND (AS.110.106 or AS.110.108 or AS.110.113)

AS.171.108. General Physics for Physical Science Majors (AL). 4 Credits.
This two-semester sequence in general physics is identical in subject matter to AS.171.101-AS.171.102, covering mechanics, heat, sound, electricity and magnetism, optics, and modern physics, but differs in instructional format. Rather than being presented via lectures and discussion sections, it is instead taught in an "active learning" style with most class time given to small group problem-solving guided by instructors. Recommended Course Background: A grade of C- or better in either Physics I or the first semester of Engineering Mechanics (AS.171.101 OR AS.171.103 OR AS.171.105 OR AS.171.107 OR EN.530.123)
Can be taken concurrently or as a prerequisite: (AS.110.107 OR AS.110.109 OR AS.110.211 OR AS.110.113)

AS.171.113. Subatomic World. 3 Credits.
Introduction to the concepts of physics of the subatomic world: symmetries, relativity, quanta, neutrinos, particles and fields. The course traces the history of our description of the physical world from the Greeks through Faraday and Maxwell to quantum mechanics in the early 20th century and on through nuclear physics and particle physics. The emphasis is on the ideas of modern physics, not on the mathematics. Intended for non-science majors.

AS.171.114. Powering the world: the science of energy. 3 Credits.
We all know that the energy we use on a daily basis can come from a variety of sources, but a discussion of the merits and drawbacks to those sources more often leads to political argument than fact-based scientific dialogue. This course, meant for science and non-science students alike, explores the principles behind how energy from fossil fuels, solar, wind, nuclear, and other resources is produced, how efficiently the energy can be harnessed, and what effect the process has and will have on our environment and society today and in the future. Students will apply this fundamental understanding to compare and understand how each source could be used in real world scenarios. Ultimately, the course is intended to help students use a scientific perspective to shape their opinions when faced with these controversial topics.

AS.171.118. Stars and the Universe: Cosmic Evolution. 3 Credits.
This course looks at the evolution of the universe from its origin in a cosmic explosion to emergence of life on Earth and possibly other planets throughout the universe. Topics include big-bang cosmology; origin and evolution of galaxies, stars, planets, life, and intelligence; black holes; quasars; and relativity theory. The material is largely descriptive, based on insights from physics, astronomy, geology, chemistry, biology, and anthropology.

AS.171.201. Special Relativity/Waves. 4 Credits.
Course continues introductory physics sequence (begins with AS.171.105-AS.171.106). Special theory of relativity, forced and damped oscillators, Fourier analysis, wave equation, reflection and transmission, diffraction and interference, dispersion. Meets with AS.171.207.

AS.171.202. Modern Physics. 4 Credits.
Course completes four-semester introductory sequence that includes AS.171.105-AS.171.106 and AS.171.201. Planck's hypothesis, de Broglie waves, Bohr atom, Schrodinger equation in one dimension, hydrogen atom, Pauli exclusion principle, conductors and semiconductors, nuclear physics, particle physics.

AS.171.204. Classical Mechanics II. 4 Credits.
Principles of Newtonian and Lagrangian mechanics; application to central-force motion, rigid body motion, and the theory of small oscillations. Recommended Course Background: AS.110.108 and AS.110.109, AS.110.202, AS.171.201, or AS.171.309. AS.110.201 or equivalent is strongly recommended.

AS.171.205. Introduction to Practical Data Science: Beautiful Data. 3 Credits.
The class will provide an overview of data science, with an introduction to basic statistical principles, databases, fundamentals of algorithms and data structures, followed by practical problems in data analytics. Recommend Course Background: Familiarity with principles of computing.

AS.171.207. Special Relativity. 1 Credit.
Three-week introduction to special relativity for students who elect to take AS.171.209 in place of AS.171.201.

AS.171.301. Electromagnetic Theory II. 4 Credits.
Static electric and magnetic fields in free space and matter; boundary value problems; electromagnetic induction; Maxwell's equations; and an introduction to electrodynamics.

AS.171.303. Quantum Mechanics I. 4 Credits.
Fundamental aspects of quantum mechanics. Uncertainty relations, Schrodinger equation in one and three dimensions, tunneling, harmonic oscillator, angular momentum, hydrogen atom, spin, Pauli principle, perturbation theory (time-independent and time-dependent), transition probabilities and selection rules, atomic structure, scattering theory. Recommended Course Background: AS.110.302 or AS.110.306.
(AS.171.204) AND (AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

AS.171.304. Quantum Mechanics II. 4 Credits.
Fundamental aspects of quantum mechanics. Uncertainty relations, Schrodinger equation in one and three dimensions, tunneling, harmonic oscillator, angular momentum, hydrogen atom, spin, Pauli principle, perturbation theory, transition probabilities and selection rules, atomic structure, scattering theory. Recommended Course Background: AS.171.303, AS.171.202, AS.171.204, AS.110.202.

AS.171.310. Biological Physics. 4 Credits.
Introduces topics of classical statistical mechanics. Additional topics include low-Reynolds number hydrodynamics and E&M of ionic solutions, via biologically relevant examples.

AS.171.312. Statistical Physics/Thermodynamics. 4 Credits.
Undergraduate course that develops the laws and general theorems of thermodynamics from a statistical framework.
Calculus II (AS.110.107 or AS.110.109 or AS.110.113). Linear Algebra (AS.110.201 or AS.110.212) and Calculus III (AS.110.202 or AS.110.211)

AS.171.313. Introduction to Stellar Physics. 3 Credits.
Survey of stellar astrophysics. Topics include stellar atmospheres, stellar interiors, nucleosynthesis, stellar evolution, supernovae, white dwarfs, neutron stars, pulsars, black holes, binary stars, accretion disks, protostars, and extrasolar planetary systems. Recommended Course Background: AS.110.108-AS.110.109, AS.171.202

AS.171.314. Introduction to Galaxies and Active Galactic Nuclei. 3 Credits.
This course will introduce student to the physics of galaxies and their constituents: stars, gas, dust, dark matter and a supermassive black hole in the central regions.Recommended Course Background: AS.110.108-AS.110.109, AS.171.202

AS.171.321. Introduction to Space, Science, and Technology. 3 Credits.
Topics include space astronomy, remote observing of the earth, space physics, planetary exploration, human space flight, space environment, orbits, propulsion, spacecraft design, attitude control and communication. Crosslisted by Departments of Earth and Planetary Sciences, Materials Science and Engineering and Mechanical Engineering. Recommended Course Background: AS.171.101-AS.171.102 or similar; AS.110.108-AS.110.109.

AS.171.324. Learn to Think Statistically. 3 Credits.
We live in a data-rich world where the flux of information increases exponentially. We will learn how to think statistically and see patterns and structure in many systems around us: news reports, images, cities, social networks, etc. We will learn how to use this knowledge to analyze data, make decisions and predictions. We will explore correlations, patterns, entropy, fractals. This course will allow students to better understand the complex world we live in. The course will occasionally involve some coding. Junior, senior and graduate students only. More at https://bit.ly/3iJ90ps

AS.171.402. Applied Quantum Information. 3 Credits.
This course will provide a basic introduction to quantum computing and quantum algorithms. This course will cover celebrated quantum algorithms that are of interest in the long term in addition to having a particular focus on near-term quantum algorithms for specific applications (e.g., material simulation, approximate optimization and machine learning) that can be readily studied on currently available hardware. Course attendees will also receive hands-on experience in near-term quantum algorithm implementation on the IBM Quantum Experience (IBM QE), a publicly available quantum computing platform.Recommended Background : Calculus, Python (Basic), Linear Algebra, Basic Quantum Mechanics (Preferred/Optional)

AS.171.405. Condensed Matter Physics. 3 Credits.
Undergraduate course covering basic concepts of condensed matter physics: crystal structure, diffraction and reciprocal lattices, electronic and optical properties, band structure, phonons, superconductivity and magnetism. Co-listed with AS.171.621Recommended Course Background: AS.171.304, AS.110.201-AS.110.202.

AS.171.406. Condensed Matter Physics. 3 Credits.

AS.171.408. Nuclear and Particle Physics. 3 Credits.
Basic properties of nuclei, masses, spins, parity. Nuclear scattering, interaction with electromagnetic radiation, radioactivity, Pions, muons, and elementary particles, including resonances. Recommended Course Background: AS.171.303

AS.171.410. Physical Cosmology. 3 Credits.
This course provides an overview of modern physical cosmology. Topics covered include: the contents, shape, and history of the universe; the big bang theory; dark matter; dark energy; the cosmic microwave background; Hubble's law; the Friedmann equation; and inflation. Recommended Course Background: (AS.171.101-AS.171.102), or (AS.171.103-AS.171.104), or (AS.171.105-AS.171.106), or (AS.171.107-AS.171.108), or equivalent.

AS.171.411. Light and Optics. 3 Credits.
What is light? How does it propagate and interact with matter? How do we use it to transmit information? How does technology make use of light? This course is designed for majors in physics as well as other science and engineering departments.

AS.171.416. Numerical Methods for Physicists. 4 Credits.

AS.171.425. Group Theory in Physics. 3 Credits.
Introduction to finite and Lie groups, representations and applications to quantum mechanics, condensed matter physics, and other fields of physics; selected topics from differential geometry and algebraic topology.Recommended Prerequisite: AS.171.304

AS.171.430. Introduction to Quantum Field Theory. 3 Credits.
Quantum Field Theory marries the principles of special relativity with quantum mechanics and provides a remarkably consistent description of a wide variety of phenomena, ranging from the theory of elementary particles to processes in condensed matter physics. It is an essential element in the toolkit of every physicist. In this course, we provide an introduction to this vast topic and aim to provide an intuitive understanding of this field. We will start by learning how to think about quantum mechanics in a manner consistent with special relativity (the Klein Gordon and Dirac equations), learn how to estimate relativistic quantum processes (Feynman diagrams), analyze nonsensical infinities that arise in these theories (Renormalization) and conclude with an overview of the Standard Model of Particle Physics (QCD and Electroweak theory). The course is aimed at introducing the student to how physicists think about these issues and it is a stepping stone to graduate study in this topic.
AS.171.304

AS.171.449. Astrophysical Plasmas. 3 Credits.
This course is for both graduate students and undergraduate students. There is no prerequisite although reading for introductory texts will be supplied where useful. Postdocs are also welcome to attend. Topics that will be discussed include: 1.Gravitational Wave Astronomy (related to cosmic plasmas),2. Ultra-High Energy Cosmic Rays,3. Black Hole Electrodynamics, 4.the Intergalactic, Interstellar and Intra-Cluster Medium, 5.Pulsars, 6.Magnetars, 7.Stellar and Galactic Dynamos,8.Solar Flares and CMEs, 9.Gamma Ray Bursts, 10.Supernovae and their Remnants, 11. Radio Sources and Jets and, 12. the universal cosmic plasma from earliest times13.Finally the detailed dusty plasmas around protostellar and protoplanetary disks including debris components of comets, asteroids planetesimals and interstellar intruders. We will spend roughly one week on each topic. In class, we will combine the lectures with reading interesting new papers from the current literature and it is expected that students will be sufficiently fluent in this field by the end of the semester to critically discuss and analyze such papers as experts.

AS.171.501. Independent Research- Undergraduate. 3 Credits.
Students may register for independent research with a faculty member in the Department of Physics and Astronomy. A research plan should be sent to the Director of Undergraduate Study before the add/drop date that includes project details, the number of hours of effort each week and the number of credits. This course may not be used for one of the two electives required for a BA, but one semester of research may be used as one of four focused electives in a BS program.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.502. Undergraduate Independent Research. 1 - 3 Credits.
Research done in senior year in conjunction with experimental equipment of intermediate laboratory or as special project in research group. Credit for independent study given to junior and senior students who act as tutors.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.597. Independent Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.171.603. Electromagnetic Theory.
Classical field theory, relativistic dynamics, Maxwell's equations with static and dynamic applications, boundary-value problems, radiation and propagation of electromagnetic waves, advanced topics in electrodynamics in media and plasmas

AS.171.605. Quantum Mechanics.
Review of wave mechanics and the Schrodinger equation, Hilbert space, harmonic oscillator, the WKB approximation, central forces and angular momentum, scattering, electron spin, density matrix, perturbation theory (time-independent and time-dependent), quantized radiation field, absorption and emission of radiation, identical particles, second quantization, Dirac equation.

AS.171.606. Quantum Mechanics.
Review of wave mechanics and the Schrodinger equation, Hilbert space, harmonic oscillator, the WKB approximation, central forces and angular momentum, scattering, electron spin, density matrix, perturbation theory (time -independent and time - dependent), quantized radiation field, absorption and emission of radiation, identical particles, second quantization, Dirac equation. Recommended Course Background: AS.171.303 and AS.171.304

AS.171.610. Numerical Methods for Physicists.
Topics in applied mathematics used by physicists, covering numerical methods: linear problems, numerical integration, pseudo-random numbers, finding roots of nonlinear equations, function minimization, eigenvalue problems, fast Fourier transforms, solution of both ordinary and partial differential equations. Undergraduate students may register online for this course and will be assigned 3 credits during the add/drop period.

AS.171.611. Stellar Structure and Evolution.
Basic physics of stellar structure and evolution will be discussed with emphasis on current research.

AS.171.612. Interstellar Medium and Astrophysical Fluid Dynamics.

AS.171.613. Radiative Astrophysics.
A one-term survey of the processes that generate radiation of astrophysical importance. Topics include radiative transfer, the theory of radiation fields, polarization and Stokes parameters, radiation from accelerating charges, bremsstrahlung, synchrotron radiation, thermal dust emission, Compton scattering, properties of plasmas, atomic and molecular quantum transitions, and applications to astrophysical observations.

AS.171.618. Observational Astronomy.
How do we observe the Universe at each wavelength and what do we see? This course will present the knowledge required for astronomical observations across the entire spectrum. For each wavelength range (gamma rays, X-rays, UV, visible, IR, radio) we will discuss the typeof detector used, the range of possible observations and current open questions. We will also discuss the dominant astronomical and terrestrial sources across the spectrum, and study the differences between ground- and space-based observations.

AS.171.620. Soft Matter Physics.
This course is aimed at both graduate students and upper level undergraduate students. It will cover a range of topics going from the traditional areas of soft matter (polymers, liquid crystals, membranes) to newer areas at the intersection with biological physics and condensed matter. In class, we will combine lectures with reading and discussing papers from the current literature. In the second part of the course, students will at turn lead the paper discussions.

AS.171.621. Condensed Matter Physics.
This sequence is intended for graduate students in physics and related fields. Topics include: metals and insulators, diffraction and crystallography, phonons, electrons in a periodic potential, transport. Co-listed with AS.171.405

AS.171.622. Condensed Matter Physics.
This sequence is intended for graduate students in physics and related fields. Topics include superconductivity, magnetism, metal-insulator transitions, low dimensional materials, quantized hall effect.

AS.171.625. Experimental Particle Physics.
For graduate students interested in experimental particle physics, or theory students, or students from other specialties. Subjects covered: experimental techniques, including particle beams, targets, electronics, and various particle detectors; and a broad description of high energy physics problems. Undergraduate students may register online for this course and will be assigned 3 credits during the add/drop period.

AS.171.627. Astrophysical Dynamics.
This is a graduate course that covers the fundamentals of galaxy formation, galactic structure and stellar dynamics and includes topics in current research.

AS.171.630. First Year Research.

AS.171.639. Group Theory in Physics.
Introduction to finite and Lie groups, representations and applications to quantum mechanics, condensed matter physics, and other fields of physics; selected topics from differential geometry and algebraic topology.

AS.171.642. Second Year Research.

AS.171.644. Exoplanets and Planet Formation.
A graduate-level introduction to the properties of the solar system, the known exoplanet systems, and the astrophysics of planet formation and evolution. Topics also include the fundamentals of star formation, protoplanetary disk structure and evolution, exoplanet detection techniques, and the status of the search for other Earths in the Galaxy. Upper-level undergraduates may enroll with the permission of the instructor.

AS.171.646. General Relativity.
An introduction to the physics of general relativity. Principal topics are: physics in curved spacetimes; the Equivalence Principle; the Einstein Field Equations; the post-Newtonian approximation and Solar System tests; the Schwarzschild and Kerr solutions of the Field Equations and properties of black holes; Friedmann solutions and cosmology; and gravitational wave propagation and generation.

AS.171.648. Physics of Cell Biology: From Mechanics to Information.
Cells are actively-driven soft materials – but also efficient sensors and information processors. This course will cover the physics of those cellular functions, from the mechanics of DNA to the sensing of chemical signals. Questions answered include: How does polymer physics limit how quickly chromosomes move? Why do cells use long, thin flagella to swim? What limits the accuracy of a cell’s chemotaxis?Some experience with partial differential equations required. No biology knowledge beyond the high school level necessary. Some problem sets will require minimal programming.

AS.171.649. Astrophysical Plasmas.
This course is for both graduate students and undergraduate students. There is no prerequisite although reading for introductory texts will be supplied where useful. Postdocs are also welcome to attend. Topics that will be discussed include: 1.Gravitational Wave Astronomy (related to cosmic plasmas),2. Ultra-High Energy Cosmic Rays,3. Black Hole Electrodynamics, 4.the Intergalactic, Interstellar and Intra-Cluster Medium, 5.Pulsars, 6.Magnetars, 7.Stellar and Galactic Dynamos,8.Solar Flares and CMEs, 9.Gamma Ray Bursts, 10.Supernovae and their Remnants, 11. Radio Sources and Jets and, 12. the universal cosmic plasma from earliest times13.Finally the detailed dusty plasmas around protostellar and protoplanetary disks including debris components of comets, asteroids planetesimals and interstellar intruders. We will spend roughly one week on each topic. In class, we will combine the lectures with reading interesting new papers from the current literature and it is expected that students will be sufficiently fluent in this field by the end of the semester to critically discuss and analyze such papers as experts.

AS.171.652. Exoplanets and their Atmospheres.
This course covers the basic theory of planetary atmospheres as applied to extrasolar planets. The fundamental physical processes related to the structure, composition, radiative transfer, chemistry and dynamics of planetary atmospheres are covered, with an emphasis on those related to observable exoplanet properties. We also provide an overview of the observational techniques of exoplanetary atmospheres and discuss the habitability of exoplanets.

AS.171.698. Physics Beyond the Standard Model.
The Standard Model of particle physics has withstood every direct experimental test, explaining physics from sub nuclear to cosmological length scales. But, we know that it is not a complete theory. It fails to explain observational facts such as the nature of dark matter and dark energy. The theory is also beset by theoretical problems such as the hierarchy, strong CP, cosmological constant and the black hole information problem. Attempts to explain these puzzles have not been successful. In this course, we will highlight the main obstacles towards solving these problems and discuss new approaches to these problems, both from the experimental and theoretical point of view.

AS.171.701. Quantum Field Theory.
Introduction to relativistic quantum mechanics and quantum field theory. Canonical quantization; scalar, spinor, and vector fields; scattering theory; renormalization; functional integration; spontaneous symmetry breaking; Standard Model of particle physics.

AS.171.702. Quantum Field Theory II.
Introduction to relativistic quantum mechanics and quantum field theory. Recommended Course Background: AS.171.605-AS.171.606 or equivalent.

AS.171.703. Advanced Statistical Mechanics.
Brief review of basic statistical mechanics and thermodynamics. Then hydrodynamic theory is derived from statistical mechanics and classical treatments of phase transitions, including Ginzburg-Landau theory.

AS.171.704. Phase Transitions and Critical Phenomena.
Course covers phase transitions and critical phenomena. Building on the ideas of spontaneous symmetry breaking and scale invariance at a critical point we develop Landau’s theory of phase transitions and the apparatus of renormalization group using both analytic and numerical techniques for studying interacting systems.

AS.171.708. Gravitational Waves.
In September 2015, one hundred years after Einstein's prediction of the existence of gravitational waves, the LIGO/Virgo collaboration detected the gravitational radiation produced by the merger of two black holes, marking the beginning of a new era in astronomy. This course will review the theory of gravitational waves, the main astrophysical and cosmological sources of gravitational radiation, and the modeling of these sources through numerical and analytical techniques. We will discuss how present and future gravitational wave detections on Earth and in space can be used to study the astrophysics of compact objects (such as black holes and neutron stars) and to test Einstein's theory of general relativity.

AS.171.732. Elementary Particle Physics.
Description TBA

AS.171.749. Machine Learning for Scientists.
Artificial Intelligence is penetrating the world at many levels. Neural networks have changed the ways we interact with data and think about statistics. For scientists, it is important to understand the fundamental concepts behind these systems, why they work, what are their potential and limitations. This course will provide an introduction to the subject, including aspects of statistics, information theory, optimization, and neural network architectures. We will alternate between theory and applications in python. More at https://bit.ly/3LEAg7D

AS.171.750. Cosmology.
Review of special relativity and an introduction to general relativity, Robertson-Walker metric, and Friedmann equation and solutions. Key transitions in the thermal evolution of the universe, including big bang nucleosynthesis, recombination, and reionization. The early universe (inflation), dark energy, dark matter, and the cosmic microwave background. Development of density perturbations, galaxy formation, and large-scale structure.

AS.171.752. Black Hole Astrophysics.
Black holes are the central engines for a wide variety of astrophysical objects: Galactic X-ray sources, active galactic nuclei, gamma-ray bursts, stellar tidal disruptions, and black hole mergers. Although the mass distribution of astrophysical black holes spans ten orders of magnitude and their circumstances can vary tremendously, the physical processes relevant to them are often closely related. The class will begin with an overview of astrophysical black hole phenomenology and then review the most important physical mechanisms responsible for their observed properties: relativistic orbits for both matter and photons; accretion dynamics and radiation; relativistic jet launching, propagation, and radiation; binary black hole dynamics and gravitational wave emission; and lastly, black hole creation.

AS.171.753. String Theory.

AS.171.755. Fourier Optics and Interferometry in Astronomy.
A course for advanced undergraduate and beginning graduate students covering the principles of optics and image formation using Fourier Transforms, and a discussion of interferometry and other applications both in radio and optical astronomy.

AS.171.762. Advanced Condensed Matter.
This course is designed for graduate students interested in learning the language, techniques, and problematic of modern quantum many-body theory as applied to condensed matter physics.

AS.171.764. Experimental Techniques in Condensed Matter Physics.
This course will be a survey of modern techniques in experimental condensed matter physics and is intended for graduate students interested in this area, but others interested in this topic (especially condensed matter the- ory students) are encouraged to enroll. Topics include low temperature techniques, transport, the SQUID and other magnetic probes, digital and analog signal processing, scattering (neutron, X-ray, and light), EPR, NMR, data analysis, and Monte Carlo. Sample preparation, including crystal and film growth and lithography will also be covered.

AS.171.781. Symmetry and anomalies in quantum systems.
This course with cover various aspects of gauge symmetries and anomaly cancelations, Anomaly matching and EFT, phases of matter, topological states, SPT phases, edge mode, discrete symmetries, aspect of quantum gravity and anomaly cancelations, QCD at low energies and chiral symmetry. A background in quantum mechanics and quantum field theory is recommended for the course.

AS.171.782. Advanced Particle Theory: Quantum Gravity.
Advanced course on the AdS/CFT correspondence and its relationship with contemporary research topics.

AS.171.783. Black Hole Physics.
General Relativity predicts its own demise in the existence of singular black hole solutions. There have been mounting astrophysical evidence that black holes do exist in nature. Thus they are not just pathologies of the theory but fundamental objects in gravity that require understanding. Theoretically, they serve as "laboratories" for studies in quantum gravity; indeed, most of the research in the field aims to resolve various paradoxes and puzzles that emerge when one tries to understand physics inside or outside black holes. The goal of this course is to elucidate these paradoxes and puzzles. First, we will study the classical properties of black holes in general relativity such as horizons, causal history, singularity theorems, area theorems and black hole mining. Next, we will study semi-quantum and quantum properties such as black hole thermodynamics, Hawking radiation, black hole evaporation. We will also explore modern results and perspectives on the fundamental physics of black holes that are necessary for current research. A background in general relativity and quantum field theory is recommended for the course.

AS.171.801. Independent Research- Graduates.

AS.171.802. Independent Research-Graduate.

AS.171.803. Independent Research-Graduate.

AS.172.203. Contemporary Physics Seminar. 1 Credit.
This seminar exposes physics majors to a broad variety of contemporary experimental and theoretical issues in the field. Students read and discuss reviews from the current literature, and are expected to make an oral or written presentation. Recommended Course Background: AS.171.101-AS.171.102, AS.171.103-AS.171.104, or AS.171.105-AS.171.106.

AS.172.601. Department Colloquium.

AS.172.604. Joint JHU/STScI Colloquium.
A joint JHU Department of Physics and Astronomy and Space Telescope Science Institute Colloquium Series.

AS.172.633. Language Of Astrophysics.
Survey of the basic concepts, ideas, and areas of research in astrophysics, discussing general astrophysical topics while highlighting specialized terms often used compared to physics.

AS.172.732. CAS Research Seminar.

AS.172.751. Elementary Particle Physics Seminar.

AS.172.752. Elementary Particle Physics Seminar.

AS.172.753. Advanced Particle Theory Seminar.

AS.172.754. Advanced Particle Theory Seminar.

AS.172.763. Condensed Matter Physics Seminar.

AS.172.764. Condensed Matter.

AS.173.111. General Physics Laboratory I. 1 Credit.
Experiments are chosen from both physical and biological sciences and are designed to give students background in experimental techniques as well as to reinforce physical principles. Corequisite: AS.171.101, AS.171.103, AS.171.105 or AS.171.107, or EN.530.123.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.112. General Physics Laboratory II. 1 Credit.
Experiments are chosen from both physical and biological sciences and are designed to give students background in experimental techniques as well as to reinforce physical principles. Recommended Course Background: AS.173.111; Corequisite: AS.171.102.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.171.101 OR AS.171.102 OR AS.171.104 OR AS.171.106 OR AS.171.108 OR EN.530.123

AS.173.115. Classical Mechanics Laboratory. 1 Credit.
Experiments chosen to complement the lecture course Classical Mechanics I, II AS.171.105-AS.171.106 and introduce students to experimental techniques and statistical analysis. Corequisite: AS.171.105.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.116. Electricity and Magnetism Laboratory. 1 Credit.
Experiments chosen to complement Electricity and Magnetism AS.171.106 and introduce students to experimental techniques and statistical analysis.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.173.308. Advanced Physics Laboratory. 3 Credits.
A broad exposure to modern laboratory procedures such as holography, chaos, and atomic, molecular, and particle physics.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.180 (Economics)

AS.180.101. Elements of Macroeconomics. 3 Credits.
An introduction to the economic system and economic analysis, with emphasis on total national income and output, employment, the price level and inflation, money, the government budget, the national debt, and interest rates. The role of public policy. Applications of economic analysis to government and personal decisions. Prerequisite: basic facility with graphs and algebra.

AS.180.102. Elements of Microeconomics. 3 Credits.
An introduction to the economic system and economic analysis with emphasis on demand and supply, relative prices, the allocation of resources, and the distribution of goods and services, theory of consumer behavior, theory of the firm, and competition and monopoly, including the application of microeconomic analysis to contemporary problems.

AS.180.203. Faculty Research in Economics. 1 Credit.
This course will consist of a series of informal lectures by various professors in the Department of Economics. Each lecture will consist of a description of a professional research project which he/she has undertaken over the course of his/her professional career.
AS.180.101 and AS.180.102, both may be taken concurrently.

AS.180.210. Migrating to Opportunity? Economic Evidence from East Asia, the U.S. and the EU. 3 Credits.
Increased mobility of people across national borders, whether by choice or by force, has become an integral part of the modern world. Using a comparative perspective and an applied economics approach, the course explores the economic and political determinants, and (likely) consequences of migration flows for East Asia, the US and the EU. Lectures, assignments and in class discussions, will be built around the following topics: i) migrants' self-selection; ii) human capital investment decision-making; iii) remittance decisions and effects; iv) impacts on labor markets of both receiving and sending countries; and v) the economic benefits from immigration. Overall, the course will give students perspective on the why people choose or feel compelled to leave their countries, how receiving countries respond to migrants' presence, and the key economic policy concerns that are influencing the shaping of immigration policy in East Asia, the US, and the EU.
AS.180.101 AND AS.180.102

AS.180.214. The Economic Experience of the BRIC Countries. 3 Credits.
In 2001, Jim O'Neill, the Chief Economist at Goldman Sachs, coined the acronym BRIC to identify the four large emerging economies, Brazil, Russia, India and China. These economies have since had an amazing run, and have emerged as the biggest and fastest growing emerging markets. In this course, we look at the economic experiences of the BRIC countries for the past 50 years. We discuss the reasons that have contributed to their exceptional growth rates, with particular emphasis on their transformation into market economies. We also analyze the challenges that these countries continue to face in their development process.
AS.180.101 AND AS.180.102

AS.180.217. Game Theory in Social Sciences. 3 Credits.
Game Theory is the study of multiple person decision problems in which the well-being of a decision maker depends not only on his own actions but also on those of others. Such problems arise frequently in economics, political science, business, military science and many other areas. In this course, we will learn how to model different social situations as games and how to use solution concepts to understand players' behavior. We will consider various examples from different fields and will play several games in class. The emphasis of the class is on the conceptual analysis and applications and we will keep the level of mathematical technicalities at the minimum -- high school algebra and one term of calculus will be sufficient. Students who took AS.180.117 are not eligible to take AS.180.217.
AS.180.102 or instructor permission;Students may not have previously taken AS.180.117.

AS.180.221. The Informal Economy: Who Wins, Who Loses, and Why We Care About It.. 3 Credits.
The informal economy is one of the most complex economic and political phenomena of our time. It exists in rich and poor countries alike, currently employs almost half of the world's workers, about 1.8 billion people, and totals to economic activity of around $10 trillion. If the informal economy were an independent nation, it would be the second-largest economy in the world, after the United States and before China. In today's globalizing environment, are informal economies a poverty trap or an engine of growth? Do they stimulate entrepreneurship and popular empowerment, or promote exploitation? How does an improved understanding of the size and organization of informal economies affect service provision, social policy or taxation? What are the implications of the informal economy for social cohesion and popular politics? The proposed course will address these (as well as other) questions related to the informal economy to offer students an understanding of such complex phenomenon from a variety of perspectives. The course will comprise three parts. Part 1 will explore the complexities of the informal economy, and the effects of informality on policies of inclusive growth. Part 2 will draw on empirical evidence and comparative case studies to examine informal economies in various regions, including Africa, East Asia, North and South America, and Europe, highlighting variations in activities, relations with the state, global integration and economic outcomes. Finally, Part 3 will discuss the ongoing economic policy shift from punitive measures to accepting informality as a virtual space through which citizens flow from job-seeker to compliant entrepreneurs.
AS.180.101 AND AS.180.102

AS.180.223. Economic Development in Sub-Saharan Africa. 3 Credits.
Many sub-Saharan African countries are among the least developed countries in the world. In this course, we explore the economic development experiences of African countries, with more focus on sub-Saharan Africa. The course starts with a historical perspective, delves into development strategies, and examines evidence on successes and failures of some case study countries. We conclude by analyzing the many challenges that these countries continue to face in their development process. Elements of Microeconomics and Macroeconomics are required prerequisites. There would be group presentations on assigned readings.
AS.180.101 AND AS.180.102

AS.180.228. Economic Development. 3 Credits.
A comprehensive survey of economic behavior by households, farms and firms in poor countries and the role of and for governments. Discussions include measurement of income levels, economy-wide equilibrium, sources of growth, agriculture and industry, international trade and investment, savings, population, fertility, education, health, income distribution and public finances. Applies economic theory rigorously to interpret and evaluate the economic experience of poor countries. Diagnostic test on Elements of Economics is required in the second week. Grading based on 3 exams and one paper.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.229. Economics of Health and Education in South Asia. 3 Credits.
Human capital is an important factor of economic growth in South Asian economies, along with physical capital and technology. Addressing health and education challenges has implications for improving a country's human capital formation and income growth. In this course, we look at past and present health and educational outcomes in South Asian Countries. We discuss the gaps in access to education and health care services, the quality of education and health care services as well as the impacts on the productivity of the labor force. We also empirically analyze the link between economic growth and human capital development. Furthermore, we focus on some challenges and future policy options for economies in South Asia.
AS.180.101 AND AS.180.102

AS.180.231. Debates in Macroeconomics. 3 Credits.
This course covers some of the more contentious current debates in macroeconomics. Topics include: recent and proposed tax changes (are workers affected by the corporate tax?); unconventional monetary policies (have they helped?); modern monetary theory (sound doctrine or hokum?); why are interest rates so low? backlash against globalization (warranted? unprecedented?); immigration (economic bane or boon?); rising income inequality (causes? consequences? pervasiveness?); has competition waned in US markets? Students will use the tools of economics to analyze these and other pressing issues. Though definitive answers may prove elusive, sound economic analysis can shed considerable light, not least by unmasking the political biases that often drive protagonists on both sides of these debates.
AS.180.101 AND AS.180.102

AS.180.233. Economics of Transition and Institutional Change. 3 Credits.
This course will introduce students to the comparative analysis of institutions of existing capitalist systems and to the historical evolution of those institutions. By comparing the economic systems of different nations, we will try to reveal the institutional setups that either contribute or hinder economic performance. We will also examine the process of countries transforming their economies and investigate the factors that determine the differences in reforms' outcomes between countries.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.238. Rethinking Economics After the Great Recession. 3 Credits.
The financial crisis that began in the United States in 2007 threw virtually the entire world into recession. This class will look at the causes of the crisis and at how it unfolded. It will look into the conventional wisdom of economists, circa 2006, and why that wisdom proved to be so wrong. It will examine the financial innovations that contributed to the crisis, at the reasons financial regulators were blindsided, and at the reforms enacted after the crisis.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.239. Urban Economics. 3 Credits.
This course introduces students to the major ideas of modern urban economics focused on the causes and consequences of urban economic growth, urban poverty and a city's quality of life. We will analyze basic questions such as; Why is Silicon Valley in Silicon Valley? Why did Beijing become so polluted? Why is crime high in Baltimore? Why does rich San Francisco face a homelessness challenge? The role of federal, state, and local government in urban life will be explored.
AS.180.101 AND AS.180.102

AS.180.241. International Trade. 3 Credits.
Theory of comparative advantage and the international division of labor: the determinants and pattern of trade, factor price equalization, factor mobility, gains from trade and distribution of income, and theory and practice or tariffs and other trade restrictions. Recommended Course Background: AS.180.101.
AS.180.101 AND AS.180.102

AS.180.242. International Monetary Economics. 3 Credits.
This course presents International Monetary Economics theory and applies it towards gaining an understanding of recent events and current policy issues. The theory presented in this course covers a broad range of topics including exchange rate determination, monetary and fiscal policy in an open economy, balance of payments crisis, the choice of exchange rate, and international debt. The insights provided by these theoretical frameworks will enable us to discuss topics such as the global financial crisis, global financial imbalances, the Chinese exchange rate regime, and proposed changes in the international financial architecture.
AS.180.101 AND AS.180.102

AS.180.244. Market Design. 3 Credits.
We will study how the rules of a market impact behavior, and in turn whether this behavior leads to (un)desirable outcomes. We will cover how the lessons learned from both successful and failing markets have been used by economists to design new markets.It will help us address questions such as:(i) Can economics help with the shortage of donated kidneys? (ii) How should a ride share service assign cars to clients?(iii) Can changing the way school seats are assigned change the welfare of students in a city?The material is intended to be as accessible as possible, keeping the mathematical technicalities to a minimum (i.e. one-term of calculus would be sufficient).
AS.180.102

AS.180.246. Environmental Economics. 3 Credits.
This course presents a broad overview of the key issues in modern environmental economics with a focus on understanding and solving urban pollution challenges in developed and developing nations. This course explores how cities and nations can achieve the "win-win" of economic growth and reduced urban pollution. Special attention is paid to the incentives of households, firms and governments in reducing the production of pollution. The course examines a number of pollution challenges including; air, water, noise, garbage and the global challenge of climate change.

AS.180.248. Financial Writing and Analysis. 3 Credits.
There is an immense chasm between economic and financial commentary in academic discussions and that provided by private sector analysts and the press. Some of the difference is merely semantic, but much of the difference has real substance. Academic and nonacademic commentators tend to simply write off the other as being clueless in some way. Sorting out which bits of each style of analysis are most valuable and synthesizing them into a coherent commentary is a rare and valuable skill. This is a hands-on course with a goal of building skills reading and writing commentary in financial economics. The course begins critically studying commentary regarding prominent topics in the news over the recent months and then moves to writing "explainer" pieces for publication on the Center for Financial Economics blog. Students will work in teams both analyzing commentary, and writing and critiquing the work of fellow students.
Area: Writing Intensive
AS.180.101 AND AS.180.102

AS.180.249. Gender Economics. 3 Credits.
"We've begun to raise daughters more like sons... but few have the courage to raise our sons more like our daughters." ? Gloria Steinem This course aims to explore the differences in economic outcomes observed among women and men. We will study those differences in earnings, income, asset ownership, hours of work, unpaid work, poverty, and the allocation of resources within the household. The course explores the gender dimensions of paid labor and how gender roles in unpaid work and in caring labor impact how men and women participate in the formal and informal economy. It will evaluate women's perspectives and experiences in the United States and around the world.
AS.180.101 AND AS.180.102

AS.180.252. Economics of Discrimination. 3 Credits.
This course examines labor market discrimination by gender, race and ethnicity in the United States. What does the empirical evidence show, and how can we explain it? How much of the difference in observed outcomes is driven by differences in productivity characteristics and how much is due to discrimination? How have economists theorized about discrimination and what methodologies can be employed to test those theories? What has been the impact of public policy in this area; how do large corporations and educational institutions respond; and what can we learn from landmark lawsuits? The course will reinforce skills relevant to all fields of applied economics, including critical evaluation of the theoretical and empirical literature, the reasoned application of statistical techniques, and analysis of current policy issues.
Area: Writing Intensive
AS.180.102

AS.180.259. Demystifying Hedge Funds: A Firsthand Look at the Alternative Investment Industry. 3 Credits.
An introduction to hedge funds taught by two industry professionals and JHU alumnae. This course will examine the interplay between hedge funds, their investors, and investment banks. Students will explore types of hedge fund strategies, delve into market trends, and discuss key investment themes in the alternatives industry.
AS.180.101 AND AS.180.102

AS.180.260. Real Estate Economics and Finance. 3 Credits.
An introduction to the economic analysis of real estate markets. Various perspectives will be considered, including individual homeowners and renters, investors and financiers, and policymakers. Topics include the determinants of property valuations, financing considerations, real estate development, and analysis of real estate as an investment class. The course qualifies as an elective for the Financial Economics Minor.
AS.180.101 AND AS.180.102

AS.180.261. Monetary Analysis. 3 Credits.
This course analyzes the financial and monetary system of the U.S. economy and the design and implementation of U.S. monetary policy. Among other topics, we will examine the role of banks in the economy, the term structure of interest rates, the stock market, the supply of money, the role of the Federal Reserve in the economy, the objectives of monetary policy in the United States and current monetary policy practice.
AS.180.101 AND AS.180.102

AS.180.263. Corporate Finance. 3 Credits.
This course is an introduction to the financial management of a corporation. Students study the following broad questions. How should a firm decide whether to invest in a new project? How much debt and equity should a firm use to finance its activities? How should a firm pay its investors? How do taxes affect a firm's investment and financing decisions? What determines the value of a firm? The emphasis throughout the course is on the economic principles that underlie answers to these questions.
AS.180.101 AND AS.180.102

AS.180.266. Financial Markets and Institutions. 3 Credits.
Understanding design and functioning of financial markets and institutions, connecting theoretical foundations and real-world applications and cases. Basic principles of asymmetric information problems, management of risk. Money, bond, and equity markets; investment banking, security brokers, and venture capital firms; structure, competition, and regulation of commercial banks. Importance of electronic technology on financial systems.
AS.180.101 AND AS.180.102

AS.180.277. Economic Activity in the Black Community. 3 Credits.
This course uses the study of economic concepts and dynamics to increase our understanding of the activity and issues that arise in the urban Black Community. If you take this course, you will learn about the correlation of education, employment opportunities, and health to the economics of an area. While doing this, you will expand your understanding of economic theory to learn how the theoretical concepts and models can be applied to Black Communities. We will begin with African Americans in slavery in the United States and examine their economic contributions. We will move through history to present day to address issues and problems like: Why are many low-income level communities populated with large numbers of African Americans? What are the particular characteristics of those neighborhoods? Where do we generally find these types of neighborhoods? Learning and using the tools of GIS, students will map issues of importance by the neighborhood to show the relationship of economic activity in the Black Community to other communities.
AS.180.101 AND AS.180.102

AS.180.280. The History and Future of the Hedge Fund Industry. 3 Credits.
The precursors to modern hedge funds began more than 50 years ago, but in the 1990s the hedge fund, or alternative investments, industry began a period of rapid growth and evolution. With growth came controversy. Some argue that hedge funds, by allowing immense amounts of capital to be rapidly and freely deployed, play a vital role in pushing prices toward the efficient markets ideal. Others claim that hedge funds may accentuate speculative price dynamics, threatening the stability of the financial sector. While many hedge funds claim to offer outstanding returns to investors, data suggest that many clients end up paying high fees for unspectacular results. This course examines these and other controversies, while tracing the history of the alternative investments industry over the last 25 years.
AS.180.101 AND AS.180.102 AND (AS.180.266 OR AS.180.263 OR AS.180.367)

AS.180.285. Information and Investing Seminar. 3 Credits.
The course will seek to discuss and illuminate the information (news reports, industry reports, government statistics, and proprietary indicators) that investors use to make investment decisions.The course will be conducted in the framework of a weekly investment committee format wherein information is processed to maximize an investment portfolio's return to risk.Each class will be conducted in two parts. The first part will require students to share with the class information gathered from their assigned specialty (e.g.: fixed income, equities, emerging markets, commodities) and the second part will require group interaction as to what decisions need to be made to a hypothetical portfolio in order to maximize objectives.The course will require regular reading of financial and economic news as well as numerous assigned industry and academic research related to global finance.Other: this course will require quite a bit of reading and regular interaction in group discussion and with the instructor.
AS.180.280 or permission of instructor Kevin Heerdt or Robert Barbera

AS.180.289. Economics Of Health. 3 Credits.
Application of economic concepts and analysis to the health services system. Review of empirical studies of demand for health services, behavior of providers, and relationship of health services to population health levels. Discussion of current policy issues relating to financing and resource allocation.
AS.180.102

AS.180.301. Microeconomic Theory. 4 Credits.
An introduction to the modern theory of allocation of resources, starting with the theories of the individual consumer and producer, and proceeding to analysis of systems of interacting individuals, first in the theory of exchange, then to systems which include production as well.
AS.180.102 AND (AS.110.106 OR AS.110.107 OR AS.110.108 OR AS.110.109) OR equivalent.;AS.180.101 may be taken concurrently.

AS.180.302. Macroeconomic Theory. 4 Credits.
The course provides a treatment of macroeconomic theory including a static analysis of the determination of output, employment, the price level, the rate of interest, and a dynamic analysis of growth, inflation, and business cycles. In addition, the use and effectiveness of monetary and fiscal policy to bring about full employment, price stability, and steady economic growth will be discussed.
AS.180.101 and (AS.110.106 or AS.110.107 or AS.110.108 or AS.110.109);AS.180.102 can be taken at the same time as AS.180.302.

AS.180.303. Topics in International Macroeconomics and Finance. 3 Credits.
The course will review selected topics in international macroeconomics and finance. The topics for the Fall of 2019 include: financial globalization; international portfolio diversification; capital account liberalization and the choice of the exchange rate regime in emerging markets; the global financial safety net; macroeconomic adjustment in the euro area.
AS.180.101 AND AS.180.102 AND AS.180.302

AS.180.309. Economics of Uncertainty and Information. 3 Credits.
In this course we'll discuss the theory of decision making in the face of risk, the theory of risk aversion and its applications to financial and insurance markets. Building on the theory of individual decision making under risk, we will study the economic implications of asymmetric information, the type of market failures produced by adverse selection and moral hazard problems, and the models that were advanced to analyze these problems, including incentive contracts, screening and signaling equilibria.
AS.180.301 OR AS.180.401

AS.180.310. Economics Of Antitrust. 3 Credits.
This course explores the economic rationale for, and consequence of, antitrust laws. In addition to economic analysis we will study landmark antitrust cases.
Area: Writing Intensive
AS.180.301 OR AS.180.401

AS.180.314. Mathematical Economics. 3 Credits.
This course traces the extent to which modern economic theory, particularly as it pertains to pure competition in market and non-market games under the rationality postulate.
AS.180.301

AS.180.315. Housing Problems and Policy: An Economics Perspective. 3 Credits.
This course uses economic theory and econometric research approaches as a lens on housing issues and policy. Housing is at the center of the effects of segregation and the Great Recession, and bears a significant connection to the labor market as well. This course briefly explores microeconomic theory specifically relevant to the housing market, then uses readings from academic social science literatures to dive deeper into these issues and others. Finally, students will examine public housing policies, using the literature and proposing statistical techniques to assess their effectiveness. The course will improve the understanding and use of basic econometric techniques with respect to policy questions as well as the ability to critically read academic literature.
(AS.180.301 OR AS.180.401)AND (EN.550.420 OR EN.550.310 OR EN.550.112 OR EN.550.113 OR EN.550.211 OR EN.550.311 OR EN.550.430 OR EN.550.435 OR EN.550.111 OR AS.280.345)

AS.180.327. Economics of Matching Markets. 3 Credits.
Matching markets are those markets where the identities or characteristics of the agents engaged in a transaction matter, not only the price. In fact, no monetary transactions may happen at all. Examples include donated organ allocation, school choice, refugee resettlement, among others. Although the mathematical pre-requisites are low, emphasis is given to proofs; thus, some degree of mathematical/logical maturity is assumed. Evaluation consists of problem sets, presenting a summary of an academic paper in-class, and a final paper (either original research or critical literature review).
AS.180.102;AS.180.244 AND (AS.180.301 OR AS.180.401), may be taken at the same time as AS.180.327.

AS.180.334. Econometrics. 3 Credits.
Introduction to the methods of estimation in economic research. The course begins with a review of basic statistics. This is followed by developing the primary method employed in economic research, the method of least squares, and an investigation of the performance of this method in a variety of important situations. The course considers a way to handle many of the situations in which ordinary least squares is not useful, the method of instrumental variables. The modeling of economic time series, binary dependent variables, panel data and differences in differences are all also considered. Applications are intended to showcase how the tools of econometrics can be brought to bear on important policy questions.
AS.180.301 OR AS.180.401, may be taken concurrently.;One semester of calculus, AS.280.345 OR EN.540.305 OR EN.553.211 OR EN.553.111 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.560.435 OR EN.560.348 OR EN.553.112 OR EN.540.382

AS.180.336. Macroeconomic Strategies. 3 Credits.
Will sketch out a strategy for anticipating economic turning points. Business cycle basics,monetary policy/financial market/real economy interactions will be reviewed. Long-term growth issues will be explored.
AS.180.101 AND AS.180.102 AND AS.180.302 or instructor permission.

AS.180.338. Political Economy and Development. 3 Credits.
Good governance is associated with desirable outcomes across countries and societies: higher life satisfaction, greater income per capita, lower child mortality, longer life expectancy, less disease, etc. But these statistical associations in the data are not sufficient to establish either that good governance truly causes such societal outcomes, or what types of policies produce them. This course asks: What are the determinants of good governance? Is good governance "good" beyond its intrinsic desirability? If so, how? We use a data-driven approach, focusing on quantitative empirical methods and their applications to policy. The goal is to develop skills to be savvy consumers, as well as producers, of policy-relevant evidence related to issues of governance, in rich and poor countries alike. Topics will include: democracy, corruption, conflict, culture, mass media, quotas, and foreign aid.
(AS.180.301 OR AS.180.401) AND AS.180.334

AS.180.345. Rationality: Meaning and Measurement. 3 Credits.
Economists generally work with a number of classic models of how people behave in different contexts. These models (such as utility maximization and expected utility maximization) are widely used because they are tractable and elegant, but are they also accurate models of human behavior? In this course, we examine the axiomatic foundations of these models, explore their implications for choice behavior, and discuss the empirical and experimental strategies economists have developed to test these models. The course would require you to solve mathematical problems; knowledge of mathematics up to the level of multi-variate calculus would be very helpful.
AS.180.301

AS.180.347. Macroeconomic Thinking 1936-2020: Evolution or Devolution?. 3 Credits.
This course charts a narrative for the evolution of macroeconomics from its very initiation to its present formulation in a way that is sensitive to issues of principle and of policy, and without becoming totally subservient to the disciplinary boundaries within which the problems are formulated and studied. Rather than macroeconomics as a subject that takes its shape in current conventional texts, the focus of the course shall be how it got there. As such, it touches on the development of ideas and intellectual history. The course will be mathematically self-contained but will pre-suppose conceptual sophistication that one expects after completion of courses in micro and macroeconomics at the intermediate level. The course is open to students in the sister-disciplines in anthropology, political science, and sociology, but it would be advisable for interested students in these departments to talk to the instructors.
AS.180.302

AS.180.349. Economics of Race, Gender and Culture. 3 Credits.
This course will review popular causal analysis tools used in economics research and cover papers on race, gender, and culture that used the causal analysis tools.This course will ask you to use STATA to solve problem sets and exams. Exams will take place in a computer lab.Students must be familiar with undergraduate-level econometrics.
AS.180.101 AND AS.180.102 AND AS.180.301 AND AS.180.334

AS.180.351. Labor Economics. 3 Credits.
The course discusses various issues in labor markets from the perspective of economic theory. We first study the major forces at work that shape labor market behavior; firms' labor demand and workers' labor supply. Then we discuss the equilibrium behavior of employment and wages. Using these tools, we also cover various applied topics in labor economics, such as minimum wage regulations, male-female wage differentials, human capital investment, worker mobility, and unemployment.
AS.180.301 OR AS.180.401

AS.180.352. Public Economics. 3 Credits.
This course explores issues related to expenditure and tax policies of governments, as well as views regarding the purpose of government and criteria for evaluating government actions. The course also includes a discussion of how group or collective choices are made within society, how environmental policies affect the level of pollution, and the importance of public debt.
AS.180.301 OR AS.180.401

AS.180.355. Economics of Poverty/Inequality. 3 Credits.
This course focuses on the economics of poverty and inequality. It covers the measurement of poverty and inequality, facts and trends over time, the causes of poverty and inequality with a focus on those related to earnings and the labor market, and public policy toward poverty and inequality, covering both taxation and government expenditure and programs. By the nature of the material, the course is fairly statistical and quantitative. Students should have an intermediate understanding of microeconomic concepts. Basic knowledge of regression analysis is also helpful.
Area: Writing Intensive
AS.180.301

AS.180.361. Rich Countries, Poor Countries. 3 Credits.
Why are some countries rich while some other countries poor? Why does a country's income per person generally grow over time? We try to analyze these questions using the theoretical and empirical growth literature. We will study seminal growth models, and also try to explain cross-country income differences in terms of factors like geography, institutions and global integration. Knowledge of regression analysis (including instrumental variables estimation) is required.
AS.180.302 AND (AS.180.334 OR AS.180.434)

AS.180.363. Sex, Drugs and Dynamic Optimization: The Economics of Risky Behavior. 3 Credits.
We apply the tools of economic analysis to understand behaviors that are enjoyable today, but may have negative consequences in the future.
(AS.180.301 OR AS.180.401) AND AS.180.302;AS.180.334 can be taken concurrently.

AS.180.365. Topics in Macroeconomics. 3 Credits.
This course builds on AS.180.302 (Macroeconomic Theory) to consider the leading macroeconomic controversies of today (such as the appropriate monetary and fiscal policies of the Federal Reserve and U.S. Government). The classes will include frequent student presentations.
AS.180.302

AS.180.367. Investment-Portfolio Management. 3 Credits.
Investment securities and their markets, especially the stock market. The relations between expected return and risk. The determination of security prices. Financial portfolio selection. The assessment of the performance of managed portfolios.
(AS.180.301 OR AS.180.334 OR AS.180.401) AND (EN.553.111 OR EN.553.112 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430)

AS.180.368. Managerial Economics and Business Strategy. 3 Credits.
Seminar on quantitative concepts, decision-making, and strategy in business organizations. Overall context is 'value' – how it is measured and maximized long term. Microeconomic theory of the firm, competitive analysis, corporate finance.
(AS.180.301 OR AS.180.401) AND (EN.550.111 OR AS.180.367 OR AS.180.263) or permission of the instructor.

AS.180.371. Industrial Organization. 3 Credits.
Investigation of firm behavior in markets characterized by imperfect competition. Imperfect competition lies in between monopoly and perfect competition and characterizes most major industries in modern capitalist economies. Central issues to be covered in the course include what determines the intensity of competition? What determines the extent of entry and exit? How is it that some firms consistently dominate their industries?
AS.180.301 OR AS.180.401

AS.180.389. Social Policy Implications of Behavioral Economics. 3 Credits.
Economists increasingly incorporate insights from psychology into models of rational decision-making. Known as "behavioral economics", this line of research considers how, for example, emotions, rules-of-thumb, biased beliefs and time-inconsistent preferences influence how we make choices. Behavioral economics increasingly pervades policy discussions on topics as diverse as: obesity, the role of media, subprime mortgages and voting patterns. Behavioral models are certainly novel, but do they help us to design superior social policies? With the goal of preparing students to address this question, this course (1) provides a thorough overview of the main contributions of behavioral economics, highlighting departures from more traditional economic models and (2) emphasizes how behavioral economic models might (or might not) improve how we think about social policy.
AS.180.301 OR AS.180.401;AS.180.334 OR AS.180.434 can be taken concurrently.

AS.180.390. Health Economics & Developing Countries. 3 Credits.
Benefits of good health and its costs. Health demand and supply in poor countries. Welfare economics of Public Health. This is a writing seminar. There are some lectures on how to write a paper and on the substance of the economics of international health but the focus and only assignment is a 40-page paper by each student under the supervision of the instructor.
Area: Writing Intensive
AS.180.301 or AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

AS.180.391. Economics of China. 3 Credits.
Discussion of the economic experience of Post-War China, primarily emphasizing topics rather than historical narrative: agriculture, industry including corporate governance and public enterprises, international trade, population, migration, education, health, public finances among other topics. This course is writing intensive and the only assignment for the course is a 40 page paper on some aspect of the Chinese economy to be done under the close supervision of the instructor. The course is not primarily a lecture course, although there will be some lectures on how to do a paper and on the substance of the Chinese economic experience.
Area: Writing Intensive
AS.180.301 OR AS.180.401;Students may not take AS.180.390 if they took AS.180.391.

AS.180.434. Advanced Econometrics. 3 Credits.
This is a faster-paced and more intensive version of Econometrics 180.334. You can use either 180.334 or 180.434 to satisfy the requirement for the economics major. This course is suitable for those students who prefer a more technical treatment of econometric methodologies.NOTE: Students may not take both 180.334 and 180.434.
AS.180.301 or AS.180.401, one semester of linear algebra, one semester of calculus, AS.280.345 or EN.580.305 or EN.550.211 or EN.550.111 or EN.550.310 or EN.550.311 or EN.550.420 or EN.560.435 OR EN.560.348.;Students may only receive credit for either AS.180.334 or AS.180.434.

AS.180.501. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.521. Research in Economics. 2 Credits.
The assignment in this course is to complete the initial stages of research for the Senior Honors Thesis in Economics. Students will work independently under the supervision of a thesis advisor from the department. Students must discuss with their departmental academic advisor about possible thesis advisors. They should get the approval from their thesis advisor, and register for the section of the course assigned to the thesis advisor, who will also be responsible for grade reporting. Open to Senior and Junior Economics majors. Note: This course cannot be counted as one of the five elective economics courses required for the Economics major.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.522. Senior Thesis. 3 Credits.
Students enrolled in this course will complete the Senior Honors Thesis under the supervision of a thesis advisor (who will have been chosen by the student prior to registration for AS.180.521). Students should register for the section of the course assigned to their thesis advisor. The thesis advisor will be responsible for submitting grades for their section. Note: This course cannot be counted as one of the five elective economics courses required for the Economics Major.
Area: Writing Intensive
AS.180.521;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.180.600. General Equilibrium Theory.
The mathematical theory of general static equilibrium. The course will emphasize the formal mathematical expression of economic ideas and the ability to give a loose economic intuition a coherent logical meaning. Different mathematical structures in general equilibrium theory will be isolated and discussed. The text will be Debreu's book "Theory of Value". Recommended Course Background: AS.110.106, AS.180.301, and AS.180.302 or permission of the instructor.

AS.180.601. Microeconomic Theory I.
This course covers the basics of Walrasian general equilibrium theory as set out in Debreu's Theory of Value, and thereby covers the standard (neoclassical) partial equilibrium theories of production and consumption. In addition, it covers Kuhn-Tucker optimization theory and its specializations of concave and linear programming. Finally, it touches on order structures and monotone comparative statics, as well as decision making under risk. A subtext of the course will be an exploration of how loose economic ideas and intuitions can be given formal mathematical expression. Prerequisites: Economics PhD students or permission of the instructor

AS.180.603. Macroeconomic Theory I.
A comprehensive treatment of macroeconomic theory, including static analysis of aggregate output employment, the rate of interest, and the price level; aggregative theory of investment, consumption, demand and supply of money; empirical work on aggregative relationships.

AS.180.604. Macroeconomic Theory II.
First term: a comprehensive treatment of macroeconomic theory, including static analysis of aggregate output employment, the rate of interest, and the price level; aggregative theory of investment, consumption, demand and supply of money; empirical work on aggregative relationships. Second term: the macrodynamic theory of growth, cycles, unemployment and inflation, and selected subjects.

AS.180.605. Advanced Macroeconomics I.
Topics of recent research in macro-economics. Content will vary from year to year. Likely topics include implicit contract theory, search theory and unemployment, disequilibrium macroeconomic models, monetary policy and the control of inflation, contract-based rational expectations models, imperfect competition in macrodynamic models, business cycle models, empirical tests of rational expectations models, theories of investment behavior, and debt neutrality.Open to 2nd year Grad Students and up.

AS.180.606. Advanced Macroeconomics II.
Topics of recent research in macroeconomics. Prof. Ball's course covers nominal rigidities, dynamic-consistency theories of inflation, inflation inertia and the costs of disinflation, monetary policy, costs and benefits of price stability, benefits of output stabilization, alternative policy rules, measuring inflation, unemployment, efficiency-wage theories, the behavior of the NAIRU, macro in middle-income countries, high inflation and stabilization, currency crises. Prof. Carroll's course analyzes implications of the buffer-stock and habit formation theories of consumption for comovement of aggregate variables and asset pricing. The models are applied to study the phenomena of declining U.S. saving rate, the dynamic relationship between saving rates and growth, and the equity premium puzzle.
AS.180.603

AS.180.607. Macroeconometrics I.
The course is an attempt to provide a framework for discussing the techniques that are used in macroeconometric analysis. Generally the bias that it has is one of looking at these from the perspective of someone analyzing macroeconomic data for policy analysis. Consequently, many of the applications considered are drawn from the type of research conducted in central banks and finance ministries. Its emphasis is therefore upon the issues raised by the analysis of time series of macro-economic data. Today there is an emerging literature that looks at micro-economic data as well as conducting cross-country studies. We will tend to ignore that material as the methods used in such research are essentially those of micro-econometrics, although sometimes with adjustments made to reflect the nature of macro-economic time series.
AS.180.633

AS.180.609. Core Mathematics for Economics.
This course will develop the necessary mathematical language and tools that are to be regarded as a pre-requisite for graduate study in economics at Johns Hopkins. Specifically, the course will focus on set theory, linear algebra and real analysis.

AS.180.611. Economics of Uncertainty.
This course offers a review of subjective expected utility theory of decision making under uncertainty and choice based subjective probabilities. It also explores the motivation for the recent developments of non-expected utility theories under risk and under uncertainty. It examines the role of completeness and awareness in these theories as well as the theories of menu choice and random choice behavior.

AS.180.622. Game Theory.
The topics covered include solutions concepts such as dominance, rationalizability, Nash equilibrium, correlated equilibrium, subgame perfect equilibrium and Perfect Bayesian equilibrium. We will discuss both static and dynamic games and games of complete and incomplete information.
Prerequisite(s): AS.180.623
AS.180.623

AS.180.623. Economics of Information.
The course introduces the economic issues associated asymmetric information and analyses the institutions and mechanisms designed to mitigate the resulting inefficiencies. Topics include: Adverse selection; moral hazard; incentive contracts; and mechanism design.
Prerequisite(s): AS.180.622
Area: Writing Intensive
AS.180.600 AND AS.180.601

AS.180.626. Computational Methods.
This class will introduce students to the computational tools that are used to get things done in scientific research. Such tools include, but are not limited to, unix bash shell scripting, LaTeX/Beamer, virtual machines, git and github, tools for parallel computation, cloud services, and others. Brief treatments of special-purpose tools (like Mathematica for symbolic math) will conclude this part of the class. After this introduction, the course will involve an intensive introduction to the use of the Python language for scientific computation purposes, including a discussion of why Python dominates other choices like Matlab and Julia. The final third of the course will apply the tools in a practical application to a specific problem identified jointly between the instructor and the student. There is no required text; readings will be assigned in class. (The characteristic that distinguishes this class from alternatives is that this class will not teach specific algorithms nor frontier computational techniques; rather, it aims to expose students to a broad set of tools that they will use regularly thereafter).

AS.180.632. Topics in Applied Microeconometrics.
This course teaches methods for using micro-data to recover structural parameters of microeconomic models. We cover static models, but focus largely on single-agent dynamic programming, including “full solution” methods along with innovations that permit circumvention of daunting computational tasks. Additional topics will be partially based on students’ interests, but will likely include: general equilibrium models, static and dynamic games, matching models, unobserved heterogeneity, structural methods with experimental data and biased expectations. The goal is to teach students to use structural methods in their own research, and so we will delve into the nuts and bolts of structural work, examining how researchers actually get from raw data to results. This includes: how the sub-sample for analysis is chosen, how the model is specified, how the programming problem is solved, which moments are generated, how these are matched to the analogous moments in the data and, importantly, how identification is established.

AS.180.633. Econometrics.
Mathematical models of economic behavior and the use of statistical methods for testing economic theories and estimating economic parameters. Subject matter will vary from year to year; statistical methods, such as linear regression, multivariate analysis, and identification, estimation and testing in simultaneous equation models, will be stressed.
AS.180.636

AS.180.634. Panel Data Models & Applications.
This course is a reading course for the panel data models in the economics department. We will focus on econometric theories that are commonly used in panel data analysis, although many of these techniques can be applied to other areas as well. In addition, we will discuss applications of these theories. The course material will start form chapter 10 & 11 in Wooldridge’s book which covers linear panel data models. And then we discuss the discrete choice models from chapter 7 of Hsiao’s book. After these, we will try to read papers relatedto panel data models.

AS.180.636. Statistical Inference.
Theory and applications of statistical inference. Topics include probability and sampling, distribution theory, estimation, hypothesis testing, and simple regression analysis. Statistical applications will be drawn from economics. Limited to graduate students in Economics except by permission of the chair. Recommended Course Background: AS.110.201, AS.110.302

AS.180.637. Microeconometrics I.
This is an advanced graduate course on major econometric techniques and models that are used in empirical microeconomics. We will cover topics like extremum estimators, empirical process, quantile regression, plugin estimator, Bootstrap, weak Instrumental variables, MCMC, and partial identification in this course.
AS.180.601 AND AS.180.622 AND AS.180.633 AND AS.180.636

AS.180.638. Microeconometrics II.
This course is the second in the microeconometrics sequence in the Economics Department. It will introduce a selection of models and techniques that are useful when a researcher wants to estimate a structural model, i.e. a model derived from economic theory. Structural models that try to incorporate restrictions derived from economic theory are used in empirical IO, but also in quantitative marketing research, labor economics and other fields that consider individual decision making. No attempt will be made to be comprehensive. Instead we will focus on a few areas that have been well-researched in recent years: dynamic discrete choice, microeconomic models with latent variables, program evaluation, the empirical analysis of auctions and nonseparable models. Some topics will be included only if time permits. The models and methods developed for these areas are relevant for other cases. The emphasis is on the interaction between economic theory and econometrics. Basic issues are specification and (nonparametric) identification, computational problems and the use of simulation, semiparametric estimation to avoid functional form and distributional assumptions that cannot be derived from economic theory.
AS.180.601 AND AS.180.622

AS.180.641. International Trade.
This is a graduate course in international trade. It will develop basic analytical tools and frameworks used in the general equilibrium analysis of international trade. Recent research topics will be discussed in the second half of the course.
AS.180.601 AND AS.180.603

AS.180.642. International Monetary Economics.
A link between the balance of payments and asset accumulation/ decumulation, microeconomics of international finance and open-economy macroeconomics. The section on open-economy macroeconomics covers approaches to balance-of-payments adjustments, theories of exchange rate determination and monetary, fiscal, and exchange-market policies under fixed and flexible rate regimes.

AS.180.643. Topics of Game Theory.
This course covers topics such as repeated games, dynamic games, bargaining and strategic communication.
AS.180.622

AS.180.645. Topics in Economic Theory.
The course will cover matching markets, which typically deal with assignment problems with and without the use of transfers. Examples of these include school choice, course allocation, and organ exchange. We will cover the theoretical underpinnings, field applications, and empirical evaluations of these markets.

AS.180.646. Revealed Preference and Comparative Statics.
The overall theme of this course is the observable implications of optimizing choice. We will cover the theory of monotone comparative statics and supermodular games. We also discuss results in the revealed preference literature, such as Afriat's Theorem, that deal with the consistency of data with different canonical models. The course is useful to students doing research in pure or applied theory, where comparative statics tools/insights are often needed for model building. It could also be interesting to those with an empirical focus who would like to know more about revealed preference approaches to testing models and drawing inferences from them.

AS.180.647. Topics in Economic Theory and Finance.
This course studies the theory of asset trading in which agents hold different information and/or beliefs. Foundational papers as well as recent ones will be covered, with applications both within and outside of Finance. Topics include: information aggregation via prices; rational expectations equilibrium; market micro-structure; large auctions; herding/information cascades/price bubbles; dynamic models and learning.

AS.180.648. Topics in Applied Microeconomics.
This course will cover popular research designs in applied microeconomics, from reduced-form approach to structural estimation. The first half of this course will be devoted to studying methodologies in reduced-form approach and the second half will be about structural estimation. Students must be familiar with at least one programming language of own choice (python, matlab, R, Julia, Fortran, C/C++) and statistical package (STATA, R) to solve problem sets in this course. The course will introduce various papers related to unobserved heterogeneity in applied microeconomics literature.Basic programming skills are needed for dynamic programming in this course.
AS.180.600 AND AS.180.601

AS.180.649. Structural Approach in Family and Cultural Economics.
This course will introduce structual approach in applied microeconomics, with emphasis on models including endogenous unobservable heterogeneity. The first half of this course will cover popular estimators, such as simulated method of moments, indirect inference, conditional choice probability estimator. The course will cover both single agent problem and multi- agents problem, potentially including endogenious unobservable heterogeneity. The second half of this course will discuss multiple decision maker problem, so- called collective model, and family formation and dissolution model, and cultural economics.

AS.180.651. Labor Economics I.
Theories of the allocation of time and supply of labor, human capital, demand for labor, market equilibrium, and income distribution. As time allows, other topics, such as unemployment, unions, and compensating differences are discussed. Corequisite: AS.180.601

AS.180.661. Bayesian Methods and Machine Learning in Macro and Finance.
This course is composed of two parts. In the first half, we will cover an introduction to Bayesian methods and standard methods as Metropolis, Metropolis-Hasting, Gibbs sampling, etc. We will then review the relation between Bayesian methods and machine learning. In the second part, we will study how Bayesian methods and machine learning have been used in the macro and macro-finance literatures to handle DSGE's, VAR's, Markov-switching-VAR's, Time-Varying VAR's, textual analysis, forecasting, etc.

AS.180.662. Asset Pricing.
This course is an introduction and guide to the most important issues in asset pricing. It begins with classic concepts such as the Capital Asset Pricing Model and the Arbitrage Pricing Theory and continues through continuous-time dynamic no-arbitrage models. It covers both basic theory and classic empirical research. Recommended Course Background: AS.180.604, AS.180.633, AS.180.636 or instructor's permission.

AS.180.672. Industrial Organization.
First term: This course covers methods in applied empirical Industrial Organization. The focus will be on the use of econometric analysis and data both for descriptive and measurement purposes, and to test the predictions of economic theories. The course will cover demand estimation, cost and production function estimation, and estimation of auction models.Second term: The emphasis in this course is on empirical analysis of firm behavior. The first part of the course focuses on models of the internal organization of the firm. The second part considers empirical analysis of firm behavior in markets, with an emphasis on the "new industrial economics."
AS.180.601

AS.180.673. Advanced Economics of Labor.
This course is for graduate students at the 3rd year and above who wish to participate in a semester in-depth readings and discussion topics in labor economics and in econometric methods typically used in labor economics and in many other applied microeconomics fields. Students will have to participate in discussions of materials in each class. The topics covered in each semester are partly a function of student interest and their dissertation topics.

AS.180.690. Advanced Econometrics.
Advanced econometric techniques are often essential to innovative empirical work, but finding and implementing the right methods for a particular problem poses formidable challenges. This course/seminar aims to address these challenges by combining lectures and discussions of foundational econometric methods in areas of student interest (whether those interests be specific for thesis work or more speculative) with examples of implementation, including software development, in more of a 'workshop' environment. The emphasis will be on drawing on the resources of econometric theory to address specific empirical issues while at the same time developing implementation skills.

AS.180.694. Applied Microeconomics Workshop.
This is a weekly seminar series that brings in speakers from other universities to present their research in the field of applied microeconomics. Graduate Students only.
Area: Writing Intensive

AS.180.695. Microeconomic Theory Workshop.
This is a seminar series devoted to the presentation of research in microeconomic theory, typically by speakers from outside the department. Graduate students only.

AS.180.696. Macroeconomics Workshop.
This course features lectures by economists from other universities. They present research findings at the frontier of the field. Graduate students only.

AS.180.697. Research Seminar.
The purpose of this seminar is to train students to do research in economics. This course is for second year graduate students in the PhD program in Economics. For Graduate Students Only.

AS.180.891. Dissertation Research.
This course is for students working on the dissertation for the Ph.D. in Economics. It is graded pass-fail
Area: Writing Intensive

AS.180.899. Independent Study.

AS.190 (Political Science)

AS.190.101. Introduction to American Politics. 3 Credits.
This course examines the ideals and operation of the American political system. It seeks to understand how our institutions and politics work, why they work as they do, and what the consequences are for representative government in the United States. Emphasis is placed on the federal government and its electoral, legislative, and executive structures and processes. As useful and appropriate, attention is also given to the federal courts and to the role of the states. The purpose of the course is to understand and confront the character and problems of modern government in the United States in a highly polarized and plebiscitary era.

AS.190.102. Introduction To Comparative Politics. 3 Credits.
To understand politics, the sound bites of the modern media take us only so far. In this course, we will take a step back and implement an intellectually rigorous method. Scholars of comparative politics use the method of comparison in order to illuminate important political phenomena of our times. Following this method, we will embark on a scholarly tour of the world and compare the politics of various countries. We will also trace these politics back to their historical sources. We will work from the assumption that there is something to be gained from such comparisons across space and time.

AS.190.108. Contemporary International Politics. 3 Credits.
An introduction to international politics. Emphasis will be on continuity and change in international politics and the causes of war and peace. The first half of the course will focus on events prior to the end of the Cold War, including the Peloponnesian War, the European balance of power, imperialism, the origins and consequences of WWI and WWII, and the Cold War. The second half will focus on international politics since 1990, including globalization, whether democracies produce peace, the impact of weapons of mass destruction, terrorism, and the prospects for peace in the 21st century. Theories of realism and liberalism will also be considered. This course was previously AS.190.209.

AS.190.109. Politics of East Asia. 3 Credits.
This course examines some of the central ideas and institutions that have transformed politics in the contemporary world through the lens of East Asia, focusing on Japan, South Korea, Taiwan, and China. We analyze two enduring themes of classic and contemporary scholarship in comparative politics: development and democracy. The purpose is to introduce students to the various schools of thought within comparative politics as well as to the central debates concerning East Asian politics.

AS.190.111. Introduction to Global Studies. 3 Credits.
This course surveys scholarly approaches to processes, relations, institutions, and social structures that cross, subvert, or transcend national borders. The course will also introduce students to research tools for global studies. Students who have taken Contemporary International Politics 190.209 or International Politics 190.104 may not register.

AS.190.180. Introduction to Political Theory. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, adn the relationship between freedom, responsibility, and political judgement. Spanning texts ancient, modern, and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past impossible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.204. Ancient Political Thought. 3 Credits.
The premise of this course is that a political perspective is tied up with a (meta)physical one, that is to say, with ideas about the nature of Nature and of the status of the human and nonhuman elements within it. How is the universe ordered? Who or what is responsible for it? What place do or should humans occupy within it? How ought we to relate to nonhuman beings and forces? We will read three different responses to such questions and show how they are linked to a particular vision of political life. In the first, the world into which human are born is ordered by gods whose actions often appear inexplicable: Prometheus Bound by Aeschylus, Oedipus the King by Sophocles, and Hippolytus by Euripedes will represent this tragic vision of the cosmos. In the second, Plato , in Republic and in Phaedrus, the forces of reason and eros play central and powerful roles. In the third, Augustine of Hippo presents a world designed by a benevolent, omnipotent God who nevertheless has allowed humans a share in their own fate. We end the course with Nietzsche's Birth of Tragedy , which offers a perspective on these three visions of the world -- the tragic, the rational, and the faithful -- which will help us evaluate them in the light of contemporary political and ecological concerns.
Area: Writing Intensive

AS.190.207. The Power of Rhetoric. 3 Credits.
In a time when people claim language "has no preference to facts, truths, or realities," the power of rhetoric is both vilified and lauded in the strongest possible terms. According to some, rhetoric is responsible for the dismissal of everything from political dissent to science as a species of "fake news". By contrast, others argue public life cannot be repaired without a "restoration" of rhetoric. What are these people talking about? This course will help us figure this out. Students will be introduced to the art of persuasive speech, writing, and visual media so as to be prepared to critically examine and evaluate the claims made for and about the role of language in contemporary politics. Topics will include informal logic, appeals, fallacies, figures and tropes. Among others, we will read texts by Aristotle, Austin, Barthes, Foucault, Freud, Kierkegaard, Nietzsche, and Zizek. In addition to a number of short exercises and writing assignments throughout the semester, there will be a mid-term and a final paper.

AS.190.220. Global Security Politics. 3 Credits.
Contemporary and emerging technologies of nuclear (weapons, terrorism, energy) outer space (missiles, missile defense, asteroids), biosecurity (bioweapons, pandemics, terrorism) and cyber (war, spying, surveillance) and implications for security, international politics, arms control, and political freedom.

AS.190.223. Understanding the Food System. 3 Credits.
This course examines the politics and policies that shape the production and consumption of food. Topics include food security, obesity, crop and animal production, and the impacts of agriculture on climate change. We will also consider the vulnerabilities of our food system to challenges such as the Covid-19 pandemic, as well as efforts to transform food and agriculture through new food technologies and grass-roots movements to create a more democratic food system.
Students who have completed AS.190.405 may not enroll in this class.

AS.190.226. Global Governance. 3 Credits.
Global problems like poverty, financial instability, human rights abuses, and climate change threaten both international order and human well-being. In the absence of a world state, these problems must be addressed by an increasingly complex, transnational network of organizations and social groups. First, we will aim to understand and explain how global problems are governed through detailed case studies of International Organizations and Non-Governmental Organizations such as the United Nations, World Bank, Intergovernmental Panel on Climate Change, Amnesty International and more. Second, we will critically evaluate the successes and failures of these organizations and explore the possibilities for improving democratic governance at the global level.

AS.190.227. U.S. Foreign Policy. 3 Credits.
This course provides an analysis of US foreign policy with a focus on the interests, institutions, and ideas underpinning its development. It offers a broad historical survey that starts with US involvement in the First World War, covers major developments of the twentieth century, and concludes with contemporary issues. Important themes include the developments underpinning the emergence of the liberal world order, strategies of containment during the Cold War, nuclear deterrence and antiproliferation efforts, the politics of international trade, alliance politics, technological and security policy, and the re-emergence of great power competition.

AS.190.228. The American Presidency. 3 Credits.
Over the past several decades, the power and importance of America's presidency have greatly expanded . Of course, presidential history includes both ups and downs, some coinciding with the rise and fall of national party systems and others linked to specific problems, issues, and personalities. We should train our analytic eyes, however, to see beneath the surface of day-to-day and even decade-to-decade political turbulence. We should focus, instead, on the pronounced secular trend of more than two and a quarter centuries of American history. Two hundred years ago, presidents were weak and often bullied by Congress. Today, presidents are powerful and often thumb their noses at Congress and the courts. For better or worse, we have entered a presidentialist era.

AS.190.244. Weapons of Mass Destruction. 3 Credits.
This course examines the impact of weapons of mass destruction on global politics and American interests. The first half of the course focuses on nuclear weapons, examining their development and targeting throughout the Cold War. The second half of the course examines contemporary issues involving nuclear weapons (including arms control, nuclear zero, terrorism, proliferation and defense). It also considers other weapons of mass destruction (or disruption) including chemical, biological, radiological and cyber weapons. The growing concerns about Artificial Intelligence will also be addressed. Requirements include a midterm and a final exam.

AS.190.245. The Politics of Global Development. 3 Credits.
Development is often assumed to be an economic issue. In this course we examine the politics of development on a global scale. We begin by looking at the colonial and Cold War histories of development. We then use these histories to contextualise contemporary development issues that directly affect international relations such as aid and debt, humanitarianism, food security, land "grabs", migration and indigenous rights. The course also seeks to understand the ways in which the issues underlying global development have always connected and continue to connect the peoples and polities of the Global North and Global South.

AS.190.249. Fictional World Politics: International Relations Through Fiction. 3 Credits.
The plots and settings of fictitious works provide "cases" for the exploration of international relations theories. Incorporates literature, film, and works of IR scholarship.
Area: Writing Intensive

AS.190.255. Race and Racism in International Relations. 3 Credits.
This course introduces students to the foundational importance of race and racism to the construction of our contemporary global order. Topics include the Crusades, European imperialism, eugenics, Apartheid, freedom struggles, decolonization, and global development.

AS.190.264. What You Need to Know About Chinese Politics (Part 1). 3 Credits.
What you need to know about Chinese politics covers the major scandals, political events, and policy debates that every China watcher needs to know. This first module of a two-semester experience brings together two professors, Prof. Andrew Mertha (SAIS) and Prof. John Yasuda (KSAS), with very different perspectives on China's past achievements, its political and economic futures, and the global implications of China's rise. The course seeks to give ample coverage to every major political question about China that is often missed in a semester long class. In addition to lively debates between the instructors, students can also expect guest speakers from the policy world, business, and the academy for a fresh take on what's going on in China today.

AS.190.267. Introduction to Political Economy. 3 Credits.
An introduction to the fundamental questions and concepts of political economy: money, commodities, profit, and capital. The course will study the nature of economic forces and relations as elements larger social and political orders.

AS.190.269. What you need to know about Chinese Politics, Part 2. 3 Credits.
This serves as a two-semester survey of Chinese politics from 1911-Present. This second module explores the politics of the reform and post-reform eras.

AS.190.283. Human Security. 3 Credits.
While traditional studies on security have focused largely on border protection, sovereign authority of the state, and interstate alliances, the threats posed to everyday people were not a central focus of security analyses until the end of the Cold War. The human security approach has evolved as a challenge to conventional thinking on security. This course will introduce the notion of human security, trace its emergence and evolution in the global political discourse, explore the theoretical scholarship from which it developed, and evaluate its effectiveness as a framework for addressing the most egregious threats human beings face today. From refugee flows, gender inequality, ethnic conflict, mass atrocities, poverty, to climate change, human security scholarship and policy has sought to examine the various threats to the lives of people that transcend national borders and allow us to break out of narrow thinking to develop innovative and globally-minded solutions.
Area: Writing Intensive

AS.190.284. Classics of Political Theory: Political Freedom. 3 Credits.
This course investigates core questions of what constitutes political freedom, what limits on freedom (if any) should be imposed by authority, and the relationship between freedom, responsibility and political judgment. Spanning texts ancient, modern and contemporary, we shall investigate how power inhabits and invigorates practices of freedom and consent. Among the questions we will consider: Can we always tell the difference between consent and coercion? Are morality and freedom incompatible? Is freedom from the past possible? By wrestling with slavery (freedom's opposite) we will confront the terrifying possibility that slavery can be both embodied and psychic. If our minds can be held captive by power, can we ever be certain that we are truly free? The political stakes of these problems will be brought to light through a consideration of issues of religion, gender, sexuality, civil liberties, class and race.

AS.190.300. Racial Inequality, Policy and Politics in the US. 3 Credits.
While policies were passed to ensure equal opportunity for racially subjugated Americans, the United States witnessed increasing stratification of wealth and income and deepening concentration of poverty, stagnation in closing racial gaps, and new forms of inequality posed by the striking upsurge in contact with the criminal justice system at the bottom of the skills ladder and concentration of wealth at the top. At the same time, the welfare state came under attack and faced challenges posed by an aging population, women entering the labor force, deindustrialization, and international pressures of globalization. Social spending withered in some areas while spending on citizens was increasingly likely to happen through tax expenditures and private means. This course investigates the politics around these developments and competing perspectives in debates over redistributive policies in the United States and their impact on inequality, particularly race and gender inequality. We will examine the contours of inequality and explanations for why it has expanded over the past several decades. We explore why the US is exceptional in both the level of inequality it tolerates and the generosity and types of remedies to alleviate poverty in comparison to its European counterparts and debate the role of race, unions, electoral politics and institutions. We investigate several specific cases of persistent racial inequality – concentrated poverty, segregation, and incarceration. We investigate both how policies have reinforced racial and gender divisions from a top-down perspective as well as examining under what conditions the disadvantaged contest inequality, exploring how political struggle shapes policy from the bottom-up. The last part of the course examines the consequences of inequality and social policy for representation and citizenship and how economic inequality affects political representation and responsiveness of elites to masses.

AS.190.306. Latin American Politics and Society in Comparative and Historical Prespective. 3 Credits.
The seminar will introduce students to the political and economic trajectories of Latin America as a whole and of individual countries, including Mexico, Brazil, Argentina, and Chile. Special attention will be paid to the long-term trajectory of the political regime (democracy versus dictatorship) and of economic development (variations in GDP per capita). Competing theories, from economic dependence to historical institutionalism, will be examined for their contribution to our understanding of Latin America's relative economic backwardness and low quality democracies.
Area: Writing Intensive

AS.190.307. Race, Politics and Literature. 3 Credits.
Area: Writing Intensive

AS.190.308. Democracy and Dictatorship: Theory and Cases. 3 Credits.
The course will cover three topics: 1) The conceptualization of political regime, democracy and authoritarianism. We will also consider neighboring concepts of other macro-political structures—government, state, and administration—in order to be able to demarcate what is distinctive about the study of political regimes.2) The characterization of political regimes in most Western and some non-Western countries, in history and today. We will centrally focus on the so called "Waves of Democratization," but we will also consider stories with less happy outcomes, that is, processes that led to the breakdown of democracies and the installation of repressive dictatorships.3) The explanation(s) of the stability and change of political regimes around the world. Theoretical accounts of regime change come in many flavors—emphasis on economic versus political causes, focus on agents and choices versus structures and constraints, international versus domestic factors, among others. We will consider most of them.

AS.190.311. Disposable People: Race, Immigration and Biopolitics. 3 Credits.
This course will explore theories and practices of race and immigration in order to illuminate the proliferation of populations regarded as disposable in contemporary politics. We will pay special attention to the contestable criteria used to determine eligibility for membership in the human race. We shall also examine how political power influences the relays between citizenship status and those whose lives are worthy of protection, and those who should be allowed to die.

AS.190.315. Asian American Politics. 3 Credits.
This course examines issues of political identity, political incorporation, and political participation of Asian Americans. Themes include Asian American panethnicity, the struggle for immigration and citizenship, Asian American electoral politics, political activism and resistance since the 1960s, and the impact of Asian Americans on the politics of race and ethnicity in the United States.

AS.190.319. Policy & Politics Design. 3 Credits.
The study of public policy is the study of power—who has it, how it is acquired, and how policies themselves grant or diminish the power of individuals and groups. It is also the study of choice—how political actors make consequential decisions to deploy their resources in different ways, some of which enhance magnify their power while others diminish it. This class will examine the scholarly literature on how public policy is made and how it can be changed. We will also engage directly with actors seeking to change public policy, in order to integrate our academic knowledge with their practical experience.
Area: Writing Intensive

AS.190.322. Future of American Democracy. 3 Credits.
For the most part, observers of American politics have not considered the possibility that the American democratic regime might be at risk. But the unexpected election of Donald Trump in 2016 and the subsequent course of his presidency have occasioned a great deal of uncertainty and anxiety about whether democracy in the United States is at risk and whether American political institutions can withstand the stresses of contemporary politics. This course will use the Trump era to explore the conditions that seem to threaten the stability of the American regime. We will begin by exploring the political circumstances that led to Trump's rise. We will then examine what we can learn from the experience of other countries about the conditions that make democracy either robust or fragile. Finally, we will consider how a set of contemporary political conditions in the United States — extreme partisan polarization, intense racial antagonism, growing economic inequality, and expanded executive power — contribute to the challenges facing American democracy today and in the future.
Area: Writing Intensive

AS.190.324. The Law of Democracy: The United States and Canada in Comparative Perspective. 3 Credits.
The Law of Democracy refers to the statutes, court decisions, and other practices that govern the electoral processes. Although the United States and Canada have a great deal in common, they have approached many of the problems involved in institutionalizing democracy quite differently. Recognizing these differences should contribute to understanding both the strengths, and the problems, of the two approaches. Specific topic will include the right to vote, political finance, delineation of district boundaries, electoral dispute resolution, and the role of electoral management bodies and elections administrators.

AS.190.325. Finding Equality in Law and Society. 3 Credits.
In this class, we will ask questions about the relationship between equality, law, and society. We will investigate how people have used law in their movements for greater equality, and ask whether law has served these movements well and how it has worked. We will pay particular attention to movements based on race, gender, and economic class.

AS.190.326. Democracy And Elections. 3 Credits.
An examination of most aspects of democratic elections with the exception of th e behavior of voters. Topics include the impact of various electoral systems and administrative reforms on the outcome of elections, standards for evaluations of electoral systems, and the impact of the Arrow problem on normative theories of democratic elections.

AS.190.327. Politics of Information. 3 Credits.
Considers global and comparative politics of information, information technologies, and the Internet. Examines governance of information (ownership of information, rights to information, privacy) and governance of information technologies (domain names, social media websites, etc.).

AS.190.328. Political Thought in the Americas. 3 Credits.
Reflection on political ideas and institutions in the United States is often oriented by the notion that the US is in some sense exceptional. For some commentators, the US is exceptionally democratic, exceptionally stable, exceptionally productive, and exceptionally innovative. For others, the US is exceptionally racist, exceptionally unequal, exceptionally violent, and exceptionally unhealthy. What both sides share is a common point of comparative reference in Europe. For all these commentators, Europe is the norm against which all of the exceptional qualities of the US stand out. In this course, we will ask how well notions of US exceptionalism stand up against the different comparative references found in the Americas, focusing in particular on the history of political thought in the Americas. We'll begin by studying texts from the pre-colonial and colonial periods, noting similarities and differences between the political institutions, economies, and social and racial hierarchies of in the regions that comprised British, Spanish, Portuguese, and French America. Next, we'll consider the US, Latin American, and Caribbean independence movements, early constitutionalism, and debates on women's role in society, slavery, and the rights of Indigenous Americans, asking what, if anything, distinguished the US from its neighbors in its early years. Finally, we'll examine theories of imperialism, racism, patriarchy, exploitation, and environmental destruction that have emerged from the Americas in the course of the 20th century, to see how both shared and divergent historical experiences have shaped perspectives relevant to contemporary political issues.

AS.190.329. National Security-Nuclear Age. 3 Credits.
This course examines the impact of weapons of mass destruction on international politics with an emphasis on security issues. The first half of the course focuses on the history of nuclear weapons development during the Cold War and theories of deterrence. The second half of the class considers contemporary issues including terrorism, chemical and biological weapons, ballistic missile defense and proliferation. Requirements include a midterm, final and a ten page paper.

AS.190.331. America and the World. 3 Credits.
This course is a survey of the unique position of the United States in world politics. We will cover the broader international relations literature on the dynamics of hegemony and empire, from work in the realist tradition to more critical approaches. The course will encompass security politics as well as the economic and monetary dimensions of American influence. Interested students must have at least completed one 100 or 200 level introductory course in international relations.

AS.190.332. The University in Democracy. 3 Credits.
From the founding of the United States to the COVID-19 pandemic, modern universities have evolved into expansive, complex institutions that play a variety of indispensable roles in the support of democratic societies. They educate citizens as well as specialists; produce new knowledge that shapes discourse and public policy; foster reasoned debate; and act as engines of social mobility. They also incite a great deal of controversy, criticism, and distrust, including for how they have performed these roles. In this course, we will study the centuries-long relationship between universities and democracy, and assess how successfully these institutions (including Johns Hopkins) are fulfilling their most profound functions today.
Area: Writing Intensive

AS.190.333. American Constitutional Law. 3 Credits.
This course covers enduring debates about the way the Constitution has structured the U.S. government and about which powers the Constitution assigns to the federal government and to the states. We will examine these debates in the context of American political history and thought by studying the writings of prominent participants, and landmark Supreme Court cases.

AS.190.334. Constitutional Law. 3 Credits.
Topics include executive and emergency power, racial and gender equality, and selected free speech and religious freedom issues.

AS.190.335. Imagining Borders. 3 Credits.
What is a border and why do borders matter in global politics. What do borders mean under conditions of globalization? An examination of the politics of borders, transborder flows, and networks within and across borders. The readings which come from political science and other disciplines, will include theoretical and case-specific works.

AS.190.338. Comparative Political Behavior. 3 Credits.
An introduction to the study of political behavior, emphasizing electoral behavior in democratic countries.

AS.190.339. American Racial Politics. 3 Credits.
Recommended Course Background: AS.190.214

AS.190.340. Black Politics I. 3 Credits.
This course is a survey of the bases and substance of politics among black Americans and the relation of black politics to the American political system up to the end of Jim Crow. The intention is both to provide a general sense of pertinent issues and relations over this period as a way of helping to make sense of the present and to develop criteria for evaluating political scientists' and others' claims regarding the status and characteristics of black American political activity.

AS.190.341. Korean Politics. 3 Credits.
This course introduces students to the historical and institutional foundations of modern South Korean politics. Topics include nationalism, political economic development, civil society, globalization, and ROK-DPRK relations.Recommended students should take Intro to Comparative Politics or a course related to East Asia first.(CP)
Area: Writing Intensive

AS.190.342. Black Politics II. 3 Credits.
Recommended Course Background: AS.190.340.

AS.190.344. Seminar In Anti-Semitism. 3 Credits.
Jews exercise a good deal of power in contemporary America.. They are prominent in a number of key industries, play important roles in the political process, and hold many major national offices. For example, though Jews constitute barely two percent of America's citizens, about one-third of the nation's wealthiest 400 individuals are Jewish and more than ten percent of the seats in the U.S. Congress are held by Jews. One recent book declared that, "From the Vatican to the Kremlin, from the White House to Capitol Hill, the world's movers and shakers view American Jewry as a force to be reckoned with." Of course, Jews have risen to power in many times and places ranging from the medieval Muslim world and early modern Spain through Germany and the Soviet Union in the 20th century. In nearly every prior instance, though, Jewish power proved to be evanescent. No sooner had the Jews become "a force to be reckoned with" than they found themselves banished to the political ma rgins, forced into exile or worse. Though it may rise to a great height, the power of the Jews seems ultimately to rest on a rather insecure foundation. Cross-listed with Jewish Studies. Course is open to juniors and seniors.
Area: Writing Intensive

AS.190.346. Foundations of International Relations Theory. 3 Credits.
This course is a broad conceptual introduction to international relations theory in a format that stresses close reading and critical discussion. We will explore mainstream theoretical perspectives and critiques of those perspectives, as well as more recent developments in the field. By the end of the course, students will have a firm grasp of the core issues and debates in the field. The course is conceptually demanding; interested students should have at least completed an introductory course in political science.

AS.190.347. A New Cold War? Sino-American Relations in the 21st Century. 3 Credits.
"Can the United States and China avoid a new Cold War? One might think not given disputes over the South China Sea, Taiwan, Hong Kong, human rights, trade, ideology and so much more. Moreover, competition for influence in the developing world and American concerns as to whether China will replace it as the preeminent world power suggest a new Cold War is in the offing. Nevertheless, their extensive economic ties and need to work together to solve common problems such as climate change, nuclear proliferation, and pandemics argues against a continuing confrontation. This course will examine whether cooperation or conflict will define Sino-American relations, and whether a new Cold War—or even a shooting war—lies in the future."

AS.190.348. Business, Finance, and Government in E. Asia. 3 Credits.
Business, Finance, and Government in East Asia explores the dynamics of East Asia's economic growth (and crises) over the last fifty years. We will examine Japan's post-war development strategy, the Asian tiger economies, and China's dramatic rise. Centered on case studies of major corporations, this course examines the interplay between politics and economics in East Asia, and considers the following questions: How have businesses navigated East Asia's complex market environment? In what ways can the state foster economic development? How has the financial system been organized to facilitate investment? What are the long-term prospects for growth in the region?

AS.190.350. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include civil wars, targeted killings, terrorism, ethnic conflict and war itself. Students examine what makes types of political violence unique and what unites them.

AS.190.355. Comparative Racial Politics. 3 Credits.
This course surveys the major trends and approaches to the comparative study of race in political science and critically examines the link between race and politics. Topics include race and state formation, citizenship and national membership, immigration, racial regimes, and the political economy of race.

AS.190.356. The Social Contract and its Discontents. 3 Credits.
This course focuses on one of the most powerful stories told in the tradition of western political theory: the story of the social contract. This story is about the constitution of legitimate political authority. It is told in many ways and each version makes different assumptions, in particular about human nature, the power of reason, the value of order, and the character of justice. We examine this often-conflicting assumptions and explore how they continue to inform the way we think about the possibilities and problems of politics. Readings include texts by Arendt, Hobbes, Locke, Rousseau, Freud, Pateman, the Federalists, Derrida, and Douglass. Final grades are based on class participation, two exams and two papers.
Area: Writing Intensive

AS.190.357. The State of Nature. 3 Credits.
Though it is possible to imagine ways of addressing the multiple crises the world will face as the atmosphere warms, seas rise, and pollutants seep into the surface of the planet, any serious proposal will require a degree of coordination amongst nation-states that has proven impossible to achieve in the past. In this course, we will consider this difficult situation by treating it as an instance of an old problem in political theory: how to escape the infamous "state of nature," where individuals struggle to obtain the resources they need to survive at others' expense, rather than cooperating to satisfy their needs and address the threats they face in common. First, we will study some influential reflections on the state of nature by Hobbes, Locke, Rousseau, Freud, and Pateman, as well as efforts to apply the logic of the state of nature to problems in international politics by Kant, Wendt, Waltz, Enloe, and others. Then we will read contemporary work on the international politics of climate change and ask what it would take to start building the better world that is possible today.

AS.190.365. Research and Inquiry in the Social Sciences. 3 Credits.
How do we assess research in the social sciences? What makes one study more persuasive than another? What are the advantages and disadvantages of the main methods used in research in the social sciences? What are the elements that go into designing a research project? This course considers these questions, introducing students to the basic principles of research design.

AS.190.366. Free Speech and the Law in Comparative Perspective. 3 Credits.
This class explores the ideas and legal doctrines that define the freedom of speech. We will examine the free speech jurisprudence of the U.S. in comparison to that of other systems, particularly the jurisprudence of the European Court of Human Rights and the Supreme Court of Canada.

AS.190.368. Political Arts: Dada, Surrealism, and Societal Transformation. 3 Credits.
An exploration of the political aims, tactics, and strengths and liabilities, of Dada and Surrealism, as it operated in Europe and the Americas in the years between the World Wars, with a comparison to political conditions today.
Area: Writing Intensive

AS.190.370. Chinese Politics. 3 Credits.
This course is designed to help students better understand the politics of China. Lectures will focus on the tools of governance that China has employed to navigate its transition from plan to market, provide public goods and services to its citizens, and to maintain social control over a rapidly changing society. The course will draw heavily from texts covering a range of subjects including China's political economy, social and cultural developments, regime dynamics, and historical legacies. Students interested in authoritarian resilience, governance, post-communist transition, and domestic will find this course particularly instructive.

AS.190.372. Decolonizing Politics. 3 Credits.
This course introduces students to the colonial logics that underpin key categories and concepts in Political Science. Working through four sub-fields – political theory, political behavior, comparative politics and international relations, the course also introduces students to alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to explain the stuff of Political Science via anti-colonial logics.

AS.190.374. Political Violence. 3 Credits.
This undergraduate seminar is designed to introduce students to the comparative study of political violence and intra-state conflict. We will examine social science theories and empirical studies on a wide range of forms of political violence, including civil war, coups, state repression, communal violence, riots, terrorism, genocide, and criminal-political violence. We will study these phenomena at the micro, meso and macro levels, and focus on understanding their causes, dynamics, outcomes, and aftermath. The class will also equip students with an ability to analyze political violence by using social scientific tools.

AS.190.379. Nationalism and the Politics of Identity. 3 Credits.
Nationalism ties powerful organizations to political mobilization, territory, and individual loyalty. Yet nationalism is typically studied in isolation from other social formations that depend upon organizational – individual linkages. Alternative types of identity category sometimes depend similarly upon organizations that collect and deploy resources, mobilize individuals, erect boundaries, and promote strong emotional connections among individuals as well as between individuals and institutions. In this class, we study classic and contemporary works on nationalism, drawn from multiple disciplinary and analytic traditions, in the comparative context of alternative forms of identity. The focus of the class will be primarily theoretical, with no regional or temporal limitations.

AS.190.380. The American Welfare State. 3 Credits.
This course analyzes the distinctive US welfare state in historical and comparative perspective. We begin with a survey of the policy context, an historical overview from the poorhouses through the Great Society, and a tour of welfare states across the rich democracies. We then survey developments – and explain the actual workings of policy – across jobs, education, welfare, pensions, and health care. We explore the institutional and political factors behind their divergent trajectories through conservative revival and the age of Trump. Students will write a seminar paper exploring policy development over time in a program or area of their choosing. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students may take AS.190.380 or AS.360.380, but not both.

AS.190.381. Global Environmental Politics. 3 Credits.
Area: Writing Intensive

AS.190.382. Democracy and Development: Theory and Cases. 3 Credits.
Most wealthy countries are democracies. But not all democracies are wealthy—India, Costa Rica, and Mongolia are prominent examples of poor countries with democratic regimes. The course will examine the relation between economic development and political democratization under three big questions. (a) Under what conditions, and through which mechanisms, does economic development promote democracy? (b) If economic development is not possible in the foreseeable future, how do countries achieve stable democratization? (c) Under what conditions, and through which mechanisms, does democracy foster economic development?
Area: Writing Intensive

AS.190.384. Urban Politics & Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations.
Cross-listed with Africana Studies

AS.190.385. Urban Politics and Policy. 3 Credits.
An analysis of public policy and policy-making for American Cities. Special attention will be given to the subject of urban crime and law enforcement, poverty and welfare, and intergovernmental relations. Cross listed with Africana Studies.

AS.190.386. The Right to the City. 3 Credits.
Over the past several years the city has been the center of almost every significant political struggle we've had over the past several years, from Occupy Wall Street to Black Lives Matter. Theorists, activists, and scholars have argued for a specific "right to the city". What does that right look like? What might it look like? How has it informed political struggle over space and time? This course will seek to answer this question.
Area: Writing Intensive

AS.190.387. Parties and Elections in America. 3 Credits.
Considers how parties and elections structure political conflict, and facilitate (or not) democratic control of government. Topics include campaigns, voting behavior, election administration, money in politics, presidential nomination, and party coalitions.
Area: Writing Intensive

AS.190.388. Race and the Politics of Memory. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar. The course will examine the politics of memory: how power shapes what is available to be remembered, the timing and occasions of memory, who is allowed to remember, and the spaces inside of which remembrance takes place. Specifically, the seminar will explore how segregated memory enables racial segregation and racial inequality. Toward that end, we shall investigate political and theoretical interventions potentially equipped to contest contemporary forms of racial amnesia haunting what some have labeled a “post-truth” world.
Area: Writing Intensive

AS.190.389. China's Political Economy. 3 Credits.
This course examines the most important debates about China's political economic development. After exploring Mao Zedong's disastrous economic policies, we will consider the politics of reform and opening under Deng Xiaoping, and finally conclude with China's state capitalist policies across a variety of issue areas. The course will cover literatures on financial reform, public goods provision, foreign trade and investment, agriculture, corruption, business groups, and regulatory development. Where possible we will draw comparisons with the economic experiences of other East Asian nations as well as other post-communist states.

AS.190.390. Race and American Democracy. 3 Credits.
While the United States has long been a democracy for white men, it has mostly been anything but democratic when seen through the eyes of Black Americans. But progress toward the expansion of democracy has occurred at a few times in American history. What made American democratization possible, and how might the United States again move toward more complete and inclusive democracy?

AS.190.391. Imperialism and Anti-Imperialism. 3 Credits.
Since antiquity, global politics have been defined by the struggle between imperialism and anti-imperialism. This course examines the arguments that have accompanied this struggle, considering influential texts written to defend or to denounce empires, as well as contemporary scholarship on imperial and anti-imperial ideologies. We will focus in particular on how imperial conflicts shaped natural law, international law, liberalism, and cosmopolitanism, as well as the connections between imperialism and contemporary capitalism, development assistance, and humanitarian intervention. The fundamental questions for the course are: What is an empire? and What would it mean to decolonize our world, our international institutions, and our minds?

AS.190.393. Nonviolent Resistance in World Politics. 3 Credits.
In this seminar we examine the origins, dynamics, and consequences of nonviolent struggles around the world. How do ordinary people organize for social change? What are the differences in people power campaigns in authoritarian and democratic contexts? When does nonviolent resistance succeed or fail, and what are the political consequences of these outcomes? In answering these questions, we will study the central ideas behind nonviolent action, learn about the most important scholarly discoveries in this field and analyze paradigmatic cases. Students will choose a historical or contemporary nonviolent movement to interrogate throughout the semester, as we learn new concepts, theories, and empirical patterns to make sense of them.
Area: Writing Intensive

AS.190.394. Comparative Politics of the Middle East and North Africa. 3 Credits.
This course examines the domestic, regional, and transnational politics of the Middle East and North Africa. The class is organized into three units. The first examines major armed conflicts—anti-colonial, intra-state, and inter-state—from 1948 through the 1990s. It uses these historical moments as windows onto key issues in Middle Eastern and North African political issues such as external intervention/occupation, human rights, sectarianism, social movements, and memory politics. Unit Two focuses on policy relevant issues such as democratization, minority populations, religion and politics, and gender. In Unit Three, students will explore the politics of the Arab Uprisings through critical reading and discussion of new (post-2011) scholarship on MENA states, organizations, and populations. Enrollment limited to Political Science and International Studies majors.

AS.190.396. Capitalism and Ecology. 3 Credits.
Capitalism and Ecology focuses on the relations between capitalism and climate during the era of the Anthropocene. How do capitalist processes of fossil extraction, consumption, production and governance contribute to the pace of climate warming, glacier flows, the ocean conveyor system, species loss and other phenomena? What are the effects and the possible modes of political response? How do the nonhuman, self-organizing processes such as glaciers, oceans and climate change on their own as they also amplify the effects of capitalist emissions? The course combines texts on capitalism and activism with those by geoscientists on how the nonhuman systems work. Books by authors in the fields of political theory, geology, anthropology, economics, philosophy and ethology will be drawn upon. Authors such as Michael Benton, Brian Fagan, Hayek, Naomi Klein, Fred Hirsch, Fred Pearce, van Dooren and Connolly are apt to be read to engage these issues. A previous course in political theory is recommended. The class is organized around student presentations on assigned readings. Two papers, 10-12 pages in length. Extensive class discussion.
Area: Writing Intensive

AS.190.398. Politics Of Good & Evil. 3 Credits.
The Politics of Good and Evil examines comparatively a series of classical myths and modern philosophies concerning the sources of evil, the nature of goodness and nobility, the relations of culture to politics, nature and the gods, the degree to which any metaphysic or theological faith is certain, and so on. It is a course in “elemental theory” in the sense that each text pursued challenges and disrupts others we read. Often the reader is disrupted existentially too, in ways that may spur new thought. A previous course in political theory or a theoretical course in the humanities is advised. A high tolerance for theory is essential. Texts on or by Sophocles, Job, Genesis ("J" version), Augustine, Voltaire, Nietzsche, James Baldwin, W. Connolly and Elizabeth Kolbert form the core of the class. Assignments: 1) One 12 page paper and a second 5-7 page paper, both anchored in the readings; 2) a class presentation on one text; 3) regular attendance and quality participation in class discussions.
Area: Writing Intensive

AS.190.402. Environmental Racism. 3 Credits.
This is an undergraduate political theory seminar that addresses the disproportionate impact of environmental destruction on racially stigmatized populations. We shall examine the logics of power whereby the natural world is subjected to exploitation and domination, in tandem with the subordination of racial subjects historically identified as closer to nature. Likewise, we will explore political and theoretical challenges to environmental racism, such as those posed by indigenous communities, decolonial theory, and political movements contesting the intersection of racial inequalities and ecological crises.
Area: Writing Intensive

AS.190.403. Arendt/Foucault. 3 Credits.
This upper-level undergraduate writing intensive course brings together the work of Hannah Arendt and Michel Foucault to focus on their critiques of modernity and their discussions of political change/revolution. Although Arendt and Foucault are often understood as coming from and supporting different political theoretical traditions, the course will also explore ways in which their shared debt to the work of Friedrich Nietzsche illuminates sometimes surprising commonalities and complementary positions. There is no final exam in this course but in addition to reading assignments, students will be required to write three papers.
Area: Writing Intensive

AS.190.404. Race and Debt: Living on Borrowed Time. 3 Credits.
This is an advanced undergraduate seminar that explores how racial stigma functions as a marker of being always already in debt. In view of the legacies of settler-colonialism, imperialism and chattel slavery, how is it that those from whom so much has been taken are nevertheless regarded as perpetually in debt? We shall examine the moral, economic and racialized logics of power through which a range of political subjects come to be regarded as ungrateful “takers” as opposed to “makers,” and owing a debt to society. In so doing, we will investigate how temporality functions as a tool of power by considering how the indebted are made vulnerable to precarity, discipline, and disposability—in effect, forced to live life on borrowed time.
Area: Writing Intensive

AS.190.405. Food Politics. 3 Credits.
This course examines the politics of food at the local, national, and global level. Topics include the politics of agricultural subsidies, struggles over genetically modified foods, government efforts at improving food safety, and issues surrounding obesity and nutrition policy. Juniors, seniors, and graduate students only. Cross-listed with Public Health Studies. A student who takes AS.190.223 (Understanding the Food System) in Summer 2021 cannot also enroll in this course.
Area: Writing Intensive
A student who takes AS.190.223 (Understanding the Food System) cannot also enroll in this course.

AS.190.406. The Executive Branch. 3 Credits.
In the 19th Century America was noted for its courts, political parties and representative institutions. Today, America’s political parties and representative institutions have declined in importance while the institutions of the executive branch have increased in importance. This seminar will examine the nation’s key executive institutions and aspects of executive governance in the U.S. Students will alternate primary responsibility for week’s readings. Every student will prepare a 10-15 page review and critique of the books for which they are responsible in class.

AS.190.408. Sovereignty: Historical Perspectives and Contemporary Issues. 3 Credits.
This seminar provides an in-depth exploration of the concept of sovereignty by examining its historical development, current controversies, and its salience in international relations scholarship. Works in political theory and the international law literature will also inform our discussion. The course is open to advanced undergraduate students with previous coursework in political science. .
Area: Writing Intensive

AS.190.409. Research Seminar in State Politics. 3 Credits.
The United States Constitution creates a federal system that leaves a great deal of power in the hands of the individual states. Each year, the states collectively adopt nearly 20,000 new laws, an average of 400 per state, while the U.S. Congress in recent years has on average enacted hardly more than 150 new statutes. In terms of spending, state and local governments collectively spent $3 trillion dollars last year–almost as much as the federal government. The states are especially important in the realms of education, health care, environmental policy and transportation. In all these areas, to be sure, the states share power with the federal government but possess considerable discretionary authority. Despite the importance of the states, most Americans know little about them. Hardly anyone knows much about their state’s executive branch or legislature. In a recent survey, most Americans couldn’t say whether their state had a constitution (they all do). In this seminar we will explore some of the mysteries of state politics. Each student will develop a research project designed to discover something about the states that no one else knows.
Area: Writing Intensive

AS.190.410. Beyond Bob Marley: Exploring the Rastafari Movement in the Greater Baltimore Area. 3 Credits.
This course uses a community based learning approach to inquire into the presence of the Rastafari community in the Baltimore area. Most people will have heard of Rastafari through the music of Bob Marley. People might not know, however, that Rastafari emerges out of and has been part of a global history of liberation struggles. This course is co-taught with a local Rastafari organization. You will be intellectually and practically equipped to take part in a project of original research on the Rastafari presence in the Baltimore region, starting with the demonization of the movement in the 1980s “war on drugs” and including the movement’s response.

AS.190.412. Political Violence. 3 Credits.
An examination of the ways in which violence has been used to secure political ends. Topics include terrorism, assassination, genocide, coups, rebellions and war itself. Students examine what makes types of political violence unique and what unites them. (Formerly AS.190.372)

AS.190.418. The End of Whiteness. 3 Credits.
This is a writing intensive, advanced undergraduate political theory seminar on racial formation. Specifically, the course explores the end of whiteness in multiple senses of the phrase. First, to what extent do the ends served by whiteness change, or remain continuous, over time? What power hierarchies and political goals has white identity been engineered to advance historically? We shall then examine the contemporary phenomenon whereby the end of white supremacy is conceived by some as the end of the world. This, in turn, will lead us to investigate how we should best understand white disavowal of threats of climate change and pandemics/health-care crises currently coursing through white identity politics. The last part of the course will be dedicated to exploring the end of whiteness in terms of the theories and practices potentially required to dismantle whiteness as white supremacy. Readings include Du Bois, Fanon, Painter, Baldwin, Moreton-Robinson, Hartmann, Olson
Area: Writing Intensive

AS.190.419. Race and Segregated Time. 3 Credits.
This course explores how time, and not just space, is segregated along racial lines. We shall examine how racial injustices are experienced as impositions on human time, how resistance to racial inequality has often been figured in temporal terms, and what it means to think in untimely ways that challenge how the extended lifespans of racially dominant groups is contingent upon the foreshortened lifetimes of racial others. Readings will bring political theory into contact with contemporary experiences of race, such as: criminal (in)justice, environmental racism and the proliferation of human disposability. Recommended Course Background: One Political Theory course.
Area: Writing Intensive

AS.190.421. Violence: State and Society. 3 Credits.
This course will examine violence that occurs mainly within the territory of nominally sovereign states. We will focus on violence as an object of study in its own right. For the most part, we will look at violence as a dependent variable, though in some instances it will function as an independent variable, a mechanism, or an equilibrium. We will ask why violence starts, how it “works” or fails to work, why it takes place in some locations and not others, why violence take specific forms (e.g., insurgency, terrorism, civilian victimization, etc.), what explains its magnitude (the number of victims), and what explains targeting (the type or identity of victims).

AS.190.423. Planetary Geopolitics. 3 Credits.
With the tools of geopolitics, course explores political debates over globalization of machine civilization and changes in scope and pace, space and place, and role of nature in human affairs.
Area: Writing Intensive

AS.190.424. Policy Disasters. 3 Credits.
Investigates the causes of large-scale policy disasters, examining the role of ideology, psychology, organization design and political incentives. Examples may be drawn from the Iraq War, Bay of Pigs, Hurricane Katrina, the U.S. Financial crisis, Shuttle Challenger disaster. economic development policy, privatization, and the Great Society. Limited to seniors or with permission of instructor. (CP / AP)

AS.190.425. The New Deal and American Politics. 3 Credits.
This seminar explores how the New Deal, the fundamental moment in the post-Civil War United States, has structured politics and government across a variety of domains ever since. Topics include presidential leadership, executive power, political parties, labor, race, and the welfare state.
Area: Writing Intensive

AS.190.426. Qualitative Research. 3 Credits.
This class is designed to introduce students to qualitative methodology. Practically, students will gain first-hand experience with qualitative research methods via research design, ethics review, in-depth interviewing, participant observation, and archival/primary source research. They will learn to deploy analytical techniques such as discourse analysis and process tracing. Students will also be asked to consider the merits of qualitative approaches more generally, and discuss the relative advantages of qualitative, experimental, and quantitative approaches. Questions that we will discuss include: What place should qualitative research have in a research design? Can qualitative research test hypotheses, or only generate them? Can qualitative research explain social phenomena, or only interpret them? What are the disadvantages and advantages of qualitative approaches compared to quantitative approaches? For what kinds of research questions are ethnographic techniques best suited? Is replicability possible for ethnographic field research? What criteria of evidence and analytical rigor apply on this terrain?

AS.190.427. Political Economy of Japan and Korea. 3 Credits.
This upper-level seminar examines some of the major debates and issues of postwar Japanese and South Korean political economy. Topics include nationalism, gender politics, civil society, immigration, and US-Japan-South Korea trilateral relations.
Area: Writing Intensive

AS.190.428. The Politics of Disaster in the Middle East and Beyond. 3 Credits.
This course examines the politics of natural and man-made disasters, including war, forced migration, drought, famine, earthquakes, tsunamis, storms, and epidemics. Focusing on the Middle East, it also presents comparative cases from Africa, South and Southeast Asia, and North America. In doing so, the class will examine the unique ways that different types of disasters interact with governance structures; social and economic inequalities; medical infrastructure; gender; race and ethnicity; and political cleavages. Throughout the course, students will learn basic elements of research design and methods in addition to welcoming experienced disaster response and analysis practitioners to class. Finally, the Politics of Disaster in the Middle East and Beyond addresses some of the philosophical aspects of working in and studying disaster-affected contexts, bringing an ethical sensibility to policy-relevant analysis.

AS.190.429. The Political Bases of the Market Economy. 3 Credits.
Although “the market” is conventionally understood as separate from “politics”, the modern market economy did not arise in a political vacuum. In fact, the very separation between the economy and politics is itself the product of a politically potent set of ideas. This course is an upper-division reading seminar on the origins and evolution of the modern market economy. Readings will include Smith, Marx, Weber, Polanyi, Keynes, Hayek, Friedman, Becker, and Foucault. Recommended course background: Introduction to comparative politics OR any college-level course in social or political theory.

AS.190.431. Global Climate Governance. 3 Credits.
This course will offer an in-depth study of the history and politics of global climate governance. It will examine the central actors, agreements, and policy proposals that shape climate governance.

AS.190.433. Race and the Politics of Punishment in the US. 3 Credits.
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold for citizenship. In this advanced undergraduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields - history, sociology, law and criminology - and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad's Condemnation of Blackness: race, Crime, and the Making of Modern Urban America, Elizabeth Hinton's From the War on Poverty to the War on Crime, David Oshinsky's Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western's Punishment and Inequality in America, and Michael Fortner's Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.
Area: Writing Intensive

AS.190.434. Does Israel Have a Future?. 3 Credits.
Israel is one of the only countries whose existence is openly challenged. This class will examine the future of Israel focusing on international and domestic threats to its continued existence as a Jewish democracy. Outside threats to be considered include nuclear attack and the growing international movement to delegitimize Israel. domestic challenges include demographic changes, the role of religion in governance, and doubts as to whether one can be a Jewish state and still be a democracy. Lessons from the destruction of the ancient Israelite kingdoms and from contemporary state deaths will be included. The course will conclude by considering efforts that Israel can undertake to meet the threats it faces.

AS.190.437. Race and Ethnic Politics in the United States. 3 Credits.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the “struggle with difference” within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.190.438. Violence and Politics. 3 Credits.
This seminar will address the role of violence–both domestic and international–in political life. Though most claim to abhor violence, since the advent of recorded history, violence and politics have been intimately related. States practice violence against internal and external foes. Political dissidents engage in violence against states. Competing political forces inflict violence upon one another. Writing in 1924, Winston Churchill declared–and not without reason–that, "The story of the human race is war." Indeed, violence and the threat of violence are the most potent forces in political life. It is, to be sure, often averred that problems can never truly be solved by the use of force. Violence, the saying goes, is not the answer. This adage certainly appeals to our moral sensibilities. But whether or not violence is the answer presumably depends upon the question being asked. For better or worse, it is violence that usually provides the most definitive answers to three of the major questions of political life--statehood, territoriality and power. Violent struggle, in the form of war, revolution, civil war, terrorism and the like, more than any other immediate factor, determines what states will exist and their relative power, what territories they will occupy, and which groups will and will not exercise power within them. Course is open to juniors and seniors.

AS.190.440. European Politics in Comparative Perspective. 3 Credits.
Europe has been in a sense the first testing ground for theories of comparative politics, but many outsiders now see Europe as a pacified and somewhat boring place. This course will question conventional wisdom through an examination of European politics in historical and cross-national perspective. We will apply the comparative method to the study of European politics today, and conversely we will ask what Europe tells us more generally about politics. We will see that Europe is still a locus of intense conflict as well as remarkably diverse experimentation. Topics will include: political, legal, and economic governance; the evolution of democracy and fundamental rights, the welfare state, class stratification, immigration and race, the role of religion; European integration and globalization. Recommended background: Introduction to Comparative Politics.

AS.190.442. Civil Society. 3 Credits.
This course explores classic and contemporary debates on the concept of civil society and critically examines its analytical value in light of recent developments. Topics include the relationship between civil society, the state, and markets, the role of civil society in development and democratization, social capital, and global civil society. This course is open to graduate students from any discipline. Advanced undergraduate students must obtain permission from the instructor and are expected to keep up with graduate students during class discussions.
Area: Writing Intensive

AS.190.443. Politics of Outer Space. 3 Credits.
Intensive examination of the political aspects of human activities in outer space, past, present and future, with focus on militarization, earth-remote sensing, surveillance, navigation, resource exploitation, the Outer Space Treaty, and colonization.
Area: Writing Intensive

AS.190.450. Power. 3 Credits.
Power is a -- if not the -- key concept of international relations, yet there is no single definition of power that is accepted by all scholars in the field. In this course we will critically examine definitions of power from classic and contemporary works of international relations, political science, and related areas of study.

AS.190.451. Geopolitics. 3 Credits.
Intensive exploration of theories of how geography, ecology, and technology shape political orders. Case studies of ancient, early modern, global, and contemporary topics, including European ascent, industrial revolution, tropics and North South divide, climate change, geo-engineering and global commons (oceans, atmosphere and orbital space
Area: Writing Intensive

AS.190.452. Party Politics from the Founding to the Progressives. 3 Credits.
Though the torchlight parade has long since passed, American parties still stand in the shadow of the nineteenth-century Party Period. This course seeks to untangle the ideologies and practices of party politics from the Founding to the Progressive Era. Topics include the rise of mass parties, political violence, the coming of the Republican Party, the party politics of Reconstruction and westward expansion, corruption and the political machine, Populism, and movements for reform. We pay particular attention to comparisons between past and present, and to opportunities taken and foregone.
Area: Writing Intensive

AS.190.454. Nuclear Weapons and World Politics. 3 Credits.
An intensive examination of competing theories of the role of nuclear weapons in world politics and alternative global security orders. Focus on nuclear weapons and the interstate system, deterrence, war fighting, arms control, proliferation and terrorism, with select historical and contemporary case studies.
Area: Writing Intensive

AS.190.471. The University and Society. 3 Credits.
In the 20th century, American universities became the envy of the world, leading in most categories of scholarly productivity and attracting students from every nation. In recent years, though, American higher education has come to face a number of challenges including rapidly rising costs, administrative bloat, corporatization and moocification. We will examine the problems and promises of American higher education, the political struggles within the university and the place of the university in the larger society. Upper classes and Grad Students only.

AS.190.473. Political Polarization. 3 Credits.
The American constitutional order, which was designed to operate without political parties, now has parties as divided as any in the democratic world. This course will examine explanations of how this happened, the consequences of party polarization for public policy and governance, and what if anything should be done about it.
Area: Writing Intensive

AS.190.474. Philosophy of Law. 3 Credits.
The philosophy of law or jurisprudence investigates the nature of law and what makes law, as it were, law. Thus, this course will examine various ways in which law has been defined and understood. It will also consider how law is distinguished from other systems of norms and values, such as morality, and how law is distinguished from other aspects of government, such as politics. In addition, the course will introduce students to discussions of legal reasoning and interpretation. Students will be required to participate in class discussion, take three exams, and write one paper.

AS.190.476. Frantz Fanon's Global Politics: Racism, Madness, and Colonialism. 3 Credits.
“The abnormal is he who demands, appeals, and begs” – Frantz Fanon. This course explores the writings and politics of Frantz Fanon, the radical anti-colonial author, psychiatrist, diplomat, and revolutionary who inspired decolonial and anti-racist struggles across the globe. We will situate Fanon’s writings in the global historical context of decolonization, and ask how they can illuminate contemporary questions of madness, racism, fascism, and empire. In addition to reading Fanon’s work, we will trace his influence on radical social movements, political thought, and global politics, and explore the limits and promises of culture, art, and film for social transformation.

AS.190.498. Thesis Colloquium. 3 Credits.
Open to and required for Political Science majors writing a thesis. International Studies majors writing a senior thesis under the supervision of a Political Science Department faculty member may also enroll. Topics include: research design, literature review, evidence collection and approaches to analysis of evidence, and the writing process. The course lays the groundwork for completing the thesis in the second semester under the direction of the faculty thesis supervisor. Students are expected to have decided on a research topic and arranged for a faculty thesis supervisor prior to the start of the semester. Seniors. Under special circumstances, juniors will be allowed to enroll. Enrollment limit: 15.
Area: Writing Intensive

AS.190.499. Senior Thesis. 3 Credits.
Seniors also have the opportunity to write a senior research thesis. To be eligible to write this thesis, students must identify a faculty sponsor who will supervise the project.
Area: Writing Intensive

AS.190.501. Internship-Political Science. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.502. Political Science Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.504. Internship-International Relations. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.535. Independent Study - Freshmen. 3 Credits.
Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.536. Independent Study-Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.537. Independent Study-Sophomores. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.538. Independent Study-Sophomores. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.539. Independent Study-Juniors. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.540. Independent Study-Juniors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.541. Independent Study-Seniors. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.542. Independent Study-Seniors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.543. Independent Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.544. Independent Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.592. Summer Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.598. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.599. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.190.601. Qualitative Research.
This class is designed to introduce students to qualitative methodology. Practically, students will gain first hand experience with qualitative research methods via research design, ethics review, in-depth interviewing, participant observation, and archival/primary source research. They will learn to deploy analytical techniques such as discourse analysis and process tracing. Students will also be asked to consider the merits of qualitative approaches more generally, and discuss the relative advantages of qualitative, experimental, and quantitative approaches. Questions that we will discuss include: What place should qualitative research have in a research design? Can qualitative research test hypotheses, or only generate them? Can qualitative research explain social phenomena, or only interpret them? What are the disadvantages and advantages of qualitative approaches compared to quantitative approaches? For what kinds of research questions are ethnographic techniques best suited? Is replicability possible for ethnographic field research? What criteria of evidence and analytical rigor apply on this terrain?

AS.190.602. Introduction to Quantitative Political Science.
An introduction to measurement and data analysis in contemporary American political science. Measurement topics will include the formation of indices and cumulative scales. Analytic topics will topics include sampling variations, statistical association and causation, as manifested in contingency tables and correlation and regression. Emphasis will be on fundamental concepts and assumptions, and on comprehension and evaluation of the scholarly literature. Advanced undergraduates by permission only.

AS.190.604. Foucault and Kant.
This seminar will explore Kant and Foucault comparatively across the registers of ontology, morality, epistemology, time, and politics. How does each move into and across these registers? How do the two thinkers inform and challenge one another? Texts will include: Kant, The Critique of Practical Reason, Conflict of the Faculties, Perpetual Peace and Other Essays, The Anthropology (sections); Foucault, The Order of Things (chapters), Discipline and Punish, “On the Genealogy of Ethics,” “What Was Enlightenment?”, and Subjectivity and Truth.

AS.190.605. Enviromental racism.
Environmental racism has largely been understood in terms of environmental policy-making that discriminates against people of color, particularly with respect to the state-sanctioned siting of toxic waste facilities, the distribution of pollutants, food-deserts, and the exclusion of non-white peoples from leading positions in the environmental movement. This graduate seminar explores environmental racism more broadly, pushing beyond its conventional, place-based understandings and approaching the corresponding logics that produce human disposability and environmental waste from the standpoint of both space and time. Examining colonial legacies of coding racial others in terms natural disasters, epidemics, infestations, non-human animals and dirt, we shall investigate how the natural world is subjected to exploitation and domination in tandem with the subordination of racial subjects historically identified with nature and rendered expendable. In other words, we shall illuminate the logics of power through which race-making coincides with waste-making. Accordingly, we will explore political and theoretical challenges to environmental racism in multiple registers; such as those posed by indigenous studies, decolonial thinkers and Afro-diasporic theories contesting the intersection of racial biopolitics, ecological crises and racial capitalism in an era of proliferating human disposability. Authors considered may include; Mbembe, Du Bois, Hage, Glissant, Césaire, Wynter & Chakrabarty.

AS.190.607. Decolonizing the Episteme: Knowledge, Empire and the Academy.
What complicity does the Western academy have with empire? How might the development of certain intellectual dispositions be implicated in the challenges of imperial rule? And how might such implications have produced influential concepts and theories? In this course we will consider the ways in which - and extent to which - the academy’s claim to epistemic privilege has a colonial provenance. Seniors permitted with instructor permission only.

AS.190.610. Process Philosophies and Political Manifestos.
What do the process philosophies of Bergson, Whitehead and Daoism have to say to political manifestos advanced by writers such as Marx and Engels, Naomi Klein, Hardt and Negri, Dziga Vertov, Haitian and French revolutionaries, Folco Portinari. How, in turn, can the latter illuminate, deform, or inform them? The readings in this seminar bounce back and forth between the cosmic politics of process philosophy and a variety of short manifestos designed to speak to the vicissitudes of today.

AS.190.612. Comparative Citizenship and Immigration Politics.
Graduate students only. Examines the contemporary political dynamics of migration, citizenship, and race concentrating on North America, Europe and East Asia. We will focus on how citizenship and immigration policies shape immigrant political identities, claims, and strategies as well as how immigrants impact public debates and policies in receiving societies.

AS.190.613. Political Arts: Dada, Surrealism, and Societal Transformation.
An exploration of the political aims and tactics, and strengths and liabilities, of Dada and Surrealism, as it operated in Europe and the Americas in the years between and after the World Wars. Readings by Andre Breton, Leonora Carrington, Georges Bataille, Roger Caillois, Meret Oppenheim, College of Sociology, and others. Seniors allowed by permission of instructor only.

AS.190.616. American Political Development.
An examination of state-building and nation-building throughout American political history. (AP)

AS.190.617. The Politics of Finance.
This graduate seminar considers the relationship between finance and state building in both the developing and developed world. Topics will explore the role of central banking, the development of equity and debt markets, bubble economy politics, the effects of financialization, and financial regulatory politics.

AS.190.619. Great Powers in the Middle East and North Africa.
How have Great Powers shaped the history and politics of states in the Middle East and North Africa? For over a century, Great Powers have been extensively involved in the region: they established colonies, protectorates, and mandates during colonial period; afterward, they employed military force to constrain and shape regimes. Focusing primarily on Great Britain, France, and the United States, this course examines the causes and consequences of foreign military intervention from colonial conquest through the post-colonial period. Students will critically assess claims that link Great Power actions to current-day conditions in the region through evaluating contemporary scholarship and analyzing the history of selected cases.

AS.190.620. Stengers, Nietzsche and Whitehead: Three Process Philosophies.
This seminar explores the philosophies of Stengers, Nietzsche and Whitehead comparatively, focusing on their philosophies of agency, multitemporality, affect in ethics and politics, flirtations with panexperientialism, and accounts of planetary/culture imbrications. We will also read contemporary engagements with all three on subjectivity, biology and politics, the Anthropocene, democracy, the shapes of logic, and the visiccitudes of time. Primary texts by Stengers may be Another Science is Possible and Thinking with Whitehead, by Nietzsche Daybreak, Thus Spoke Zarathustra, and the Late Notebooks. For Whitehead, Process and Reality and Modes of Thought. Presentation, class discussions, and a seminar paper.

AS.190.621. Poesis and Politics.
This graduate seminar will investigate how an aesthetic approach to political concepts and practices – in particular the concept of the polity and the practice of judgment – responds to, troubles, and complicates political thought. In the company of Plato, Kant, Heidegger, Arendt, and Auden, we will explore two related sets of questions. First, what are the advantages and disadvantages of figuring the polity as a work of art or as an artistic creation? Second, how might poetry play a role in politics? Students will be required to submit weekly response papers and write a final 20-30 page paper on a topic related to the course, drawing on the work of at least two of the thinker-poets discussed.

AS.190.622. Republicanism, Realism, and Liberalism.
Close reading of major texts in western political thought on violence, security and politics developed by republicans, realists and liberals

AS.190.623. Law's Love: Command, Submission, Obligation, Power.
This course focuses on the affective dimensions of law, a power that both creates and preserves the system of rules which a particular country or community recognizes as regulating the actions of its members and which it may enforce by the imposition of penalties. Two related questions will guide our examination of the affection dimensions of law: What are the grounds of law? Why do we obey law? Students will turn in response papers every week on the reading. In addition, there will be a 20-30 page paper due at the end of the semester.

AS.190.625. Theories of Comparative Politics.
This seminar is intended for graduate students planning to take the comprehensive exam in comparative politics, either as a major or as a minor. In addition to exploring central methodological debates and analytic approaches, the seminar reviews the literature on state-society relations, political and economic development, social movements, nationalism, revolutions, formal and informal political institutions, and regime durability vs. transition. Graduate students only.

AS.190.626. Quantitative Methods for the Study of Politics.
This course is intended as Ph.D.-level introduction to applied statistics, with a focus on the identification of causal effects in the tradition of the Neyman/Rubin potential outcomes framework. Prior coursework in applied statistics or quantitative methods will be useful but is not required. Upon completion of the course, students will be in a position to understand and critically assess scholarship that uses instrumental variables, difference-in-differences, regression discontinuity, and other quasi- and natural-experimental research designs. Formal mathematical proof will be kept to a minimum. Students will be asked to adapt existing code and write some of their own code in R.

AS.190.627. Gilles Deleuze and Classical Theory.
What can Deleuze teach classical Eurocentric theories? And what can representatives of those traditions teach him? We will read Deleuze in relation to theorists he has examined, such as Plato, Lucretius, Spinoza, Kant, Kafka, Nietzsche and Hegel, as we seek to hear the history of political theory in a new key. Concepts and issues such as politics, history, time, culture/nature divisions, capitalism, the source of ethics, the shape of political ideals, and the nature of explanation will come up for review. The course will typically read a text from a classical thinker and then consult Deleuze's engagements with them.

AS.190.628. Hobbes & Spinoza.
A close reading of Leviathan by Thomas Hobbes (1588-1679) and Ethics by Baruch Spinoza (1632-1677), with consideration of important commentaries on these works. What conceptions of the human being, nature, reason, God, and freedom are defended and affirmed by Hobbes and Spinoza? What rhetorical strategies accompany their theories of self, ethics, social life?

AS.190.629. American Racial Politics.
Race is not a biological fact but rather a social construction. However, it is a social construction with very real consequences. Definitions of citizenship, allocation of state resources, attitudes about government and government policy, the creation of government policy, all shape and are shaped by race and racial classifications. Serving as a critical corrective to American politics treatments that ignore race, this class will examine how race functions politically in the United States. While not required, some knowledge of statistics is helpful.

AS.190.630. Interpretation and Critique of Political Ideas.
This is a graduate seminar on the interpretive and critical problems that arise when political theorists read and write about texts from long, long ago or far, far away. The first part of the course will consider approaches to the history of European political thought influenced by Marx, Foucault, Strauss, Skinner, and Arendt, amongst others. Readings will include both major methodological statements and examples of interpretive and critical scholarship undertaken by proponents of these different schools of thought. In the second part of the course, we will ask whether and how methods developed to analyze and learn from the history of political thought can be applied to the study of political thinkers who lived and wrote outside western Europe and North America. Major questions for consideration in both parts of the course include: Can old ideas help us solve problems arising in contemporary politics and political theory? What can we learn from intellectual traditions unconnected to our own? What do we have to do in order to understand the ideas contained within a given text? Do we have to understand a text for it to be useful to us?

AS.190.631. Making Social Policy.
Examines American social policy in comparative perspective. Special attention to issues of poverty and inequality, and their relation to the political system.

AS.190.632. The Development of American Political Institutions.
This course explores institutional development in American national politics, from the Founding until the present. It traces parties, Congress, the presidency, bureaucracy, and courts, and also examines how those institutions have interacted with one another across American history. Throughout the course, we will consider how ideas, interests, procedures, and sequence together shape institutions as they collide and abrade over time. Finally, although it hardly covers the entire corpus across the subfield, the course is also designed to prepare students to sit for comprehensive examinations in American politics.

AS.190.633. Black Political Thought.
This course will introduce you to a survey of Black political thought. Our examination will cover the time period between the latter years of the Transatlantic Slave Trade and the present. In the first two thirds of the course we will deal with primary texts (including but not limited to Incidents in the Life of a Slave Girl, The Souls of Black Folk, and The Wretched of the Earth), and in the last third we will deal with modern day attempts to wrestle with the ideas in these texts (including but not limited to Intimate Justice and Critique of Black Reason).

AS.190.634. Political Corruption.
Political corruption is widely seen to be an impediment to economic and political development and stability. But what is political corruption? The common definition of corruption as abuse of power for private gain is too vague to be of serious scholarly use. Is “abuse” culturally specific or merely a synonym for “illegal” - or even worse, for undesirable according to some unspecified standard? Does “private gain” refer only to under-the-table cash payments to a corrupt official, or does it extend to intangible private benefits, and does it extend to gains for identifiable favored groups (“club goods”) and may or may not include the corrupt official him or herself?This seminar will focus on several questions. How should political corruption be defined, and what is at stake in the choice if definition? Are there identifiable patterns to, or types of, political corruption? What conditions encourage or discourage corruption, and how might corruption be controlled or limited? What are the consequences of corruption - and are they necessarily all negative?

AS.190.635. Theories of Constitutional Governance.
This class is focused on the nature of constitutions and the way that they should and do work within a political system, with particular emphasis on the U.S. context. We will examine both normative and empirical arguments about the relationship between politics and constitutional law. More specifically, we will think about how societies and individual actors should make meaning out of constitutional texts, how they do seem to make meaning out of those texts, and the conditions that give rise to constitutional drafting and change. Graduate students only.

AS.190.636. Information/Knowledge/Power/Politics.
Explores how information and knowledge flow through political/social/economic configurations, forming and reforming the politics of everyday engagements at different scales. Topics such as mis/disinformation, commodification of information, embodied information, surveillance, and cyber-mediated information provide the context for analyzing practices, power, agency, and ethics. Critical security studies scholarship provides an overarching template, and we will also draw theoretical insights from multiple disciplines. The format will combine elements of seminar and workshop, and the emphasis will be on collaborative participation in the research process.

AS.190.637. The Colonial Constitution of the "Human".
This course inquires into the colonial constitution of the "human" across philosophical, legal, political, social and economic dimensions. Special attention is paid to the ways in which sexuality, gender, race, class and faith are complicit in this constitution. The course finishes by critically considering theories of the "post-human" from the perspective of both a colonial genealogy of the "human" and anti-colonial claims upon humanism.

AS.190.638. Racial Capitalism.
This graduate seminar will explore the imbrication of the theory, history, and politics of the logic of race and the logic of capital.

AS.190.641. Race and Ethnic Politics in the United States.
Race has been and continues to be centrally important to American political life and development. In this course, we will engage with the major debates around racial politics in the United States, with a substantial focus on how policies and practices of citizenship, immigration law, social provision, and criminal justice policy shaped and continue to shape racial formation, group-based identities, and group position; debates around the content and meaning of political representation and the responsiveness of the political system to American minority groups; debates about how racial prejudice has shifted and its importance in understanding American political behavior; the prospects for contestation or coalitions among groups; the “struggle with difference” within groups as they deal with the interplay of race and class, citizenship status, and issues that disproportionately affect a subset of their members; and debates about how new groups and issues are reshaping the meaning and practice of race in the United States.
Area: Writing Intensive

AS.190.642. Institutions, Power, Ideas and Practices.
Comparative politics scholars have long identified institutions as a crucial source of cross-national variation in political life. Yet institutions are not static. We know from everyday experience that institutions change over time, sometimes quite fast. Scholars have attempted to address the problem of institutional change in various ways. Some institutionalist scholars underscore the endogenous logic of institutional evolution, whereas others resort to exogenous factors such as power. Constructivist and pragmatist scholars foreground ideas and practices as sources of institutional change. This course will explore these different strands of scholarship and attempt to reconstruct a fruitful dialogue between them.”

AS.190.643. Practice and Process in International Relations Theory.
This course covers a series of special topics in IR theory with an emphasis on how an appreciation of practices and process provides a fresh perspective on old questions and raises new ones. The course will focus on the pertinent sociological literature and how this has been applied in IR.
Area: Writing Intensive

AS.190.644. Colonialism and Foreign Intervention in the Middle East and Africa.
How did colonial rule and post-colonial foreign intervention shape the history and politics of states in the Middle East and Africa? The first part of this course focuses on the colonial period, examining the era of conquest, considering how and whether colonial rule differed from other types of ruling arrangements, and studying how people in colonized territories reacted to conquest and foreign rule. Part Two focuses on post-colonial foreign military interventions. Part Three considers the potential long-term consequences of colonialism and foreign intervention. The course focuses on British, French, and American imperialism.
Area: Writing Intensive

AS.190.645. Black Politics.
Grad Students Only.

AS.190.646. CLR James: Black Marxism, Pan-Africanism and International Relations.
This course uses the life and writings of famous Trinidadian Marxist CLR James to explore a set of analytical issues of importance to understanding Pan-Africanism and international relations, including: political economy and slavery, culture and freedom, and the fraught relationship between black intellectuals and black masses.

AS.190.647. Community and Its Disconcents.
This course is inspired by Hannah Arendt’s claim that the calamity of stateless people is “not that they are deprived of life, liberty and the pursuit of happiness” but that “they no longer belong to any community whatsoever.” Rather than attempt to verify or disprove this claim, the course will use this claim as a provocation. How do we understand, experience, and imagine “community”? What does it mean to “belong” to a community? Is it possible not to belong to any community? Why is the language of community so ubiquitous? To help us consider these questions, we will read among others, Anderson, Freud, Harney and Moten, Joseph, LeGuin, McMillan, and Rousseau. A final paper of 20-30 pages is required.

AS.190.648. Writing for Research.
This course is designed to help graduate students in political science craft an original piece of high-quality writing. This class is open to students in their first, second, or third years of the graduate program. We will work on developing the skill of academic writing step by step, focusing first on the question of how to identify and articulate a good question, second on the skill of literature review, third on the art of theoretical engagement, and fourth on the presentation of evidence. During the semester, students may choose to turn a set of interests and questions into a prospectus draft. Alternatively, they may decide to use the class to turn a seminar paper into a dissertation chapter, or a revise a dissertation chapter into an article manuscript. Special sessions will bring other faculty to the class to talk about writing a dissertation and the peer-review process.

AS.190.649. The Economic and the Political.
The neoclassical paradigm of economics utterly excludes politics, yet a large swath of the subfield of “political economy” presupposes or is predicated upon that very paradigm. Neither approach can account for the distinct force of “the economic” as it continually interacts with “the political” (and the social, the cultural, etc.) This graduate seminar will be an experimental effort in exploring a whole new terrain of the economic — not another critique of the neoclassical paradigm, but the initial (re)formulation of a new approach to the economic and the political.

AS.190.651. Policy Dynamics.
Policy dynamics is the study of changes of the political system in its entirety, from the point of view of the system’s outputs--what government actually does, or fails to do. It is dynamic in that it seeks to explain changes in what matters governments feel can or must be addressed, the tools that are available to deal with problems, and the interactions of government and non-government actors that generate change. Particular emphasis will be placed on studying policy dynamics over long periods of time, including such post-enactment issues as implementation, policy feedback on political identities and group formation, and policy durability.

AS.190.652. The Politics of Money, Debt and Credit.
This course will survey recent scholarship on the politics of monetary and financial flows in the economy. We will reflect on the significance and causes of changes in underlying political economy and institutions since the mid-20th century. We will pay special attention to the rise of a new political economy often characterized as neoliberal, and we will discuss how scholars within and beyond political science make sense of these changes.
Area: Writing Intensive

AS.190.653. Organizations.
Graduate students only. "Organizations are the fundamental building blocks of economic, social and political life. This course will examine how different disciplines (sociology, economics, political science) approach the problem of explaining how organizations operate, as well as exploring the structure and development of a very wide range of organizations (firms, interest groups, charitable foundations, universities, militaries, bureaucracies, international organizations, and professions)."

AS.190.654. The Development of the Conservative Movement.
The last twenty years has seen a flourishing of literature on conservatism across multiple disciplines. This course will survey that literature, placing it in a developmental context. Particular focus will be placed on the relationship between elite and mass conservatism, especially in the light of the rise of populism in the US, UK and elsewhere.

AS.190.655. Decolonizing Time and Memory.
This graduate seminar is a critical encounter with the colonial imprint on the politics of memory, temporality and race. We shall investigate the recent turn to "decolonize" virtually everything and ask what such efforts might entail given that the hallmarks of colonialism include a disavowal of the past, the capacity to set the clock to zero and begin the world anew, a linear conception of time and an abiding desire for temporal sovereignty. While investigating the possibility of decolonizing futurity, we will pay particular attention to the Promethean construction of the human race (and its constitutive others) across history. We shall confront the role of segregated temporality and mnemonic politics in modern race-making projects and their impact on the contemporary political imagination. Authors may include Nietzsche, Wynter, Fanon, Foucault, Deleuze, Anzaldúa, Baldwin, & Du Bois.

AS.190.657. Re-Turn to Language.
A central claim of structuralism is that all systems of meaning are structured along the lines of language. Post-structuralism challenges this claim but does not dismiss it so much as probe the ways in which these systems fail and reveal interesting things about how communication may (not) take place. What is sometimes called "post-post-structuralism" rejects the focus on language, emphasing instead how meaning is generated in and by culture or with the (mostly) unacknowledged collaboration of matter. This course will revisit these claims, challenges, and refusals within the context of contemporary, philosophy, literary theory, and political thought. We will read, among others, texts by Saussure, Liev-Strauss, Lacan, Barthes, Derrida, Foucault, Kristeva, Butler, and Barad. Students will be required to submit weekly response papers and write a final 20-30 page paper on a topic related to the course.

AS.190.659. Postcolonial Political Economy.
There is currently an intermittent and under-examined relationship between postcolonial studies and critical political economy. The aim of this module is to help you to account for this relationship on your own terms. We will examine the entanglements of capitalism and colonialism by building unconventional conversations between classical political economists (as well as their 19th century successors) and thinkers and traditions invested in confronting colonialism and its legacies. We will focus primarily on regions affected by (Anglo) settler colonialism – especially the Americas and the Pacific.

AS.190.660. Democratic Resilience: US Democracy in Comparative and Historical Perspective.
What gives democratic regimes the ability to withstand challenges such as extreme polarization, racial and ethnic conflict, rising economic inequality, and institutional sclerosis and avoid the prospect of backsliding toward authoritarianism? This course will examine the problem of democratic resilience by locating the contemporary crisis of American democracy in comparative and historical perspective, bringing together literatures in comparative democratization and American politics.

AS.190.662. Reading (vols 2 & 3 of) Capital.
TBA

AS.190.664. Decolonizing Political Science: Contexts, Concepts, and Imaginations.
This graduate course explores the colonial contexts out of which key sub-fields of political science arose. The course then examines the colonial logics that underpin the conceptual formation of each sub-field. Finally, the course considers alternative knowledge traditions, emanating from minority communities and colonized peoples, which seek to alternatively explain the phenomena engaged with by each sub-field.

AS.190.666. Political Economy Of Development.
Graduate students only.

AS.190.667. Reconstructing International Relations Theory.
In this class, we will study IR theory in a reconstructive mode. We will return to foundational texts in light of more recent theoretical developments both in IR and social thought more broadly. Our goal will be to critically assess the basic epistemological, ontological, and historical assumptions of IR theory while charting paths for its possible futures.

AS.190.668. Rethinking Western Thought.
The history of Euro-American Political Thought has been criticized for its orientations to race, gender, class, Christianity, the subject, capitalism, colonialism, sociocentrism, and humanist exceptionalism. How deeply are those themes ensconced in early Christian traditions, secular orientations to the earth, practices of capitalism, and contemporary images of "the political"? What openings are discernible? The seminar starts with Hesiod's Theogony and a chapter from Tim Whitmarsh on atheism in ancient Greece. It then explores how Augustine consolidates sharp shifts in orientations to faith, divinity, nature, discipline, time and the earth. An agent of the first conquest of paganism. Readings in The City of God: Against the Pagans and The Confessions in relation to Foucault's newly translated book, Confessions of The Flesh. Then we turn to what might be called the second Christian/imperial conquest of paganism, launched during the 15th century Spanish invasion of the Americas. How did that conquest re-enact and differ from the first? Texts by Todorov, The Conquest of America, alongside essays by C.L.R. James and perhaps de Castro. Followed by essays from Kant, Marx, Arendt, or Deleuze/Guattari, to see how each consolidates or turns earlier western theories. The seminar then engages Dipesh Chakrabarty in The climate of history in a planetary age as he criticizes Euro-centered thought ("the political", the earth as background to politics, racism, exceptionalism, etc) and some currents in post-colonial thought. Critiques and augmentations will be explored, too.

AS.190.670. The Dream of the 90s: Political Theory, 1990-1995.
This graduate seminar will explore works from this extraordinary period in contemporary political theory.

AS.190.672. Money.
What is money? And given its absolute centrality to economics and politics, shouldn't political economy and political theory hold answers to this question? Instead, the history of both neoclassical economics and modern political thought is marked by eschewals or refusals of it or its importance. This graduate seminar will explore the theory and politics of money, through critical readings of orthodox theories, engagements with heterodox political economy, and encounters with contemporary political theory.

AS.190.675. Nuclear Weapons and Global Politics: History, Strategy, Race and Gender.
This course provides an analysis of US foreign policy with a focus on the interests, institutions, and ideas underpinning its development. It offers a broad historical survey that starts with US involvement in the First World War, covers major developments of the twentieth century, and concludes with contemporary issues. Important themes include the developments underpinning the emergence of the liberal world order, strategies of containment during the Cold War, nuclear deterrence and antiproliferation efforts, the politics of international trade, alliance politics, technological and security policy, and the re-emergence of great power competition.

AS.190.676. Field Survey of International Relations.
This course provides a scaffold for the study of international relations theory, organized historically and by major approaches. The focus is on close reading and discussion of exemplars of important bodies of theory. Intended for doctoral students with IR as their major or minor field. Graduate students only.

AS.190.678. Law and Politics.
As a field, Law and Politics has evolved from the study of constitutional law and judicial politics to the political behavior of judges and their associates to the study of law and society, the operation of law and courts "on the ground" in the international arena as well as in the United States, historical institutionalism, and the carceral state. In this graduate course, we will review some of the classic texts in the field, with a focus on the tension between legal institutions and democratic politics. In particular, we will examine how that tension is manifest in the foundations of the American political system and in critical reflection on contemporary practices of American democracy. Students will turn in response papers every week on the reading. In addition, there will be two 10-20 page papers due during the semester. Graduate Students Only.

AS.190.679. The Political Poetics of Walt Whitman and Henry Thoreau.
A study of the works of Thoreau and Whitman, with an eye toward how they explore the process of outside influences upon subjectivity-formation. What are the powers and limits of Whitman's and Thoreau's experiments with language and writing (rhetoric, syntax, imagery, myth) as they seek to induce, cultivate, and transform influences? What role is played by physical encounters with the nonhuman agencies (of plants, animals, objects, divinities)?

AS.190.681. Race and Politics of Punishment in the U.S..
Contact with criminal justice has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities. Yet, our field has been slow to appreciate the development of the carceral state or to consider its manifold impacts for citizenship. In this graduate seminar, we will survey key debates around punishment, state violence, and surveillance, with a particular focus on research that takes institutional development, history, and racial orders seriously. Why did the carceral state expand in "fits and starts" and with what consequence for state-building? We explore its (racialized and gendered) relationship to other key systems: foster care, social provision, labor relations and the labor market, and immigration enforcement. A core preoccupation of this course will be to understand the ways in which the criminal justice system "makes race" and how debates about crime and punishment were often debates about black inclusion and equality. How does exposure to criminal justice interventions shape political learning, democratic habits, and racial lifeworlds? In addition to policy, political discourse, and racial politics, we will employ works from a range of fields – history, sociology, law, and criminology – and a range of methods (ethnography, historical analysis, quantitative and qualitative). Required books include: Khalil Muhammad's Condemnation of Blackness: Race, Crime, and the Making of Modern Urban America, Elizabeth Hinton's From the War on Poverty to the War on Crime, David Oshinsky's Worse than Slavery: Parchman Farm and the Ordeal of Jim Crow Justice, Bruce Western's Punishment and Inequality in America, and Michael Fortner's Black Silent Majority: The Rockefeller Drug Laws and the Politics of Punishment.

AS.190.682. Regulatory Politics.
This graduate seminar considers regulatory politics in both the developing and developed world. Topics will explore the role of independent agencies, soft paternalism, co-regulation, regulatory failure, and other topics, across a host of sectors.

AS.190.683. Research Seminar/Political Parties.

AS.190.684. How to Be(Come) an Intellectual.
The university both provides a platform for critical intellectual life and, particularly during its neoliberalization, sets severe barriers to it. The latter involve increasing administrative entanglement with corporate and state forces of authoritarian control, disciplinary drives to narrow professionalism and reductive epistemologies, attacks on tenure and university governance, and cutbacks in university budgets. How can those with intellectual aspirations negotiate such departmental, professional, trustee and state pressures? What preparations and role models are conducive to help carve out such space in the academy? What critical role can intellectuals play today in and beyond the academy? What intellectual personae from the recent past are helpful here? The seminar will be divided into two parts. Part I will explore a group of academics who created intellectual space in the United States during a period resistant to it in the 1960s. Texts by Charles Taylor, Sheldon Wolin, Donna Haraway, Herbert Marcuse, Cornel West, Althusser, and me may be consulted. Part II moves into the contemporary era. Texts by Foucault, Theweleit, Latour, Haraway (again), and Moten may be reviewed, along with new explorations of relations between adjunct faculty and intellectual life. Readings for Part II thus remain in flux. But intersections between new fascist drives, climate change, racism, professional retreatism, and pandemics may be explored. Seminar assignments include a class presentation, two short papers, and regular participation in discussion.

AS.190.685. Critical theory, method, and application in International Relations.
Critical theories are often taught by focusing on their various philosophical and ethical claims. But how do you “apply” critical theories in the study of International Relations? Is “method” only a “mainstream” concern? This course seeks to relate philosophy and ethics to method with a (future) eye to dissertation writing. We will consider e.g. Marxist, feminist, postcolonial, and poststructural lines of inquiry, as well as, at the same time, a range of conceptual areas of inquiry – e.g., the affective, the normative, the poetic, the phenomenological, and the material.

AS.190.686. The Right to the City.
Over the past decade, political, economic, and cultural struggles in and over the city have become more important than ever before. Protests against the growing carceral state, against increasing wealth inequality, as well as revanchist attempts to rollback multicultural societal shifts all have the city as its core. While some Marxist thinkers suggest these struggles represent larger struggles over use- versus exchange-value, Black Radical thinkers connect these struggles to anti-black racism. In the wake of one world challenging movement – Black Lives Matter – and one world altering crisis – the Covid-19 pandemic - this course will reflect critically on these two traditions of thinking about the city and to rethink the Marxist tradition through the Black Radical tradition. We will anchor these conversations in an exploratory dialogue between two exemplars of each tradition - the French geographer Henri Lefebvre, and Detroit movement intellectuals James and Grace Lee Boggs. This class will be a vital component of the 2022-23 Sawyer Seminar.

AS.190.687. Philosophy and the Anthropocene.
How do philosophers such as Heidegger, Whitehead, Deleuze and Braidotti help us to think about the dynamics of the Anthropocene? What do anthropologists and geoscientists such as Anna Tsing, Bruno Latour, Jason Moore, Michael Benton, Jan Zalasiewics and Wally Broecker--teach those philosophies and us about the contemporary condition? Class presentations on assigned readings, seminar paper, and class discussions.

AS.190.688. Political Violence.
This undergraduate seminar is designed to introduce students to the comparative study of political violence and intra-state conflict. We will examine social science theories and empirical studies on a wide range of forms of political violence, including civil war, coups, state repression, communal violence, riots, terrorism, genocide, and criminal-political violence. We will study these phenomena at the micro, meso and macro levels, and focus on understanding their causes, dynamics, outcomes, and aftermath. The class will also equip students with an ability to analyze political violence by using social scientific tools.

AS.190.690. Statelessness.
This course will examine Hannah Arendt’s claim that the most “symptomatic group” of contemporary politics is “the existence of an ever-growing new people comprised of stateless persons.” We will consider what, if anything, this group may be a symptom of and its consequences for theories of law and politics. Among other authors we will read Arendt, Agamben, Brown, Foucault, Moten, Said, and Somers. A final paper of 20-30 pages is required.

AS.190.691. The Hopkins Seminar on Racial Politics.
This class surveys the ways in which racial politics has become an increasingly salient topic for Political Science. We examine how racial politics has been engaged with in various sub-fields, and how the study of racial politics might be pursued through cross-sub-field and inter-disciplinary interventions. The class also situates these investigations in the historical importance of Hopkins as a key site in the emergence of a racist discipline and, alternatively, as a site from which important interventions have been launched towards formulating an anti-racist Political Science.

AS.190.800. Independent Study.

AS.190.801. Summer Research.

AS.190.849. Graduate Research.

AS.191.131. An Introduction to Global Migration. 3 Credits.
We live in a world in motion. There are over 272 million migrants in the world today and these numbers are expected to increase in the next decades. Simultaneously, migration is one of the most contested contemporary issues and dominates politics and the media. This course provides students with a thorough understanding of key themes, policies, dilemmas and debates in migration. The first part will focus on theories of migration where students can learn about the history of migration, how and why migrants move today and what categories of migrants exist. The second part will focus on debates around migration and discursive strategies used to ’other’ migrants. Part three will focus on core issues in migration studies such as racism, integration, border controls and the link between migration and the economy.
Area: Writing Intensive

AS.191.303. Critical Race Theory, Law, and Criminal Justice. 3 Credits.
In this course, students will gain a foundational understanding of critical race theory, including its genesis in legal theory. The course will examine its relationship and importance to social movements, including through key concepts like intersectionality. The course will also use critical race theory to grapple with law, racial segregation, and the criminal justice system in the United States.
Area: Writing Intensive

AS.191.304. Writing Politics in an Age of Crisis. 3 Credits.
We live in an age of crisis. Social, political, and environmental disruptions both in the United States and around the world are the new normal. How do we – as individuals, citizens, and scholars – come to understand these issues? And how should we write about them? This course is designed to help students improve as writers, readers, and editors for a world where powerful young voices are more necessary than ever. The substantive focus of the course will be on the dynamics of interlinked contemporary political crises and on the responses available to individuals to address them. We will read a variety of scholarly, journalistic, and literary sources to inform our discussion and inspire our writing. However, this course is designed not as a standard seminar, but as a writing workshop. Students will write and critique a variety of pieces of different lengths and styles – including a political memoir, an op-ed, a long-form critical essay, and a piece of speculative fiction - spending the majority of in-class time on peer review, presentations, and writing exercises, which they will compile into a writing portfolio. Reading will include works by Alexander Chee, Ta-Nehisi Coates, Mary Annaise Heglar, Hunter S. Thompson, James Baldwin, Dave Zirin, Elizbeth Rush, Charlotte Shane, and Teju Cole, among many others.
Area: Writing Intensive

AS.191.310. Sex(uality) and Race as the Politics of the Beat Generation. 3 Credits.
This course focuses on the literature of the Beat Generation writers (Ginsberg, Kerouac, Burroughs, Snyder, Kaufman) of the late 1940s through the 1950s and 1960s. The Beats were a group of nomadic writers traveling the North American continent between San Francisco and New York with memorable stops in Denver and St. Louis, Missouri. Beat literature revolted against the constraining normalizing values of post war USA and celebrated freedom of expression, wanderlust, and the search for euphoria of body and mind in stream-of-consciousness narration. The course examines the relationship between society's dominant mores and beliefs (both contemporary and those of the 50's and 60's) and the counterculture, non-conformist philosophy as espoused by The Beats. The course focuses on Beat depictions of sexuality, gender and race in order to understand if these identity markers are but symptoms of social structures of oppression (racism, patriarchy, heterosexism) or if, alternatively, they can also signal, express and enact a new and different understanding of politics. Can the Beats help us envision new forms of (non-toxic) masculinity? Can they help us think of race in non-racist ways?
Area: Writing Intensive

AS.191.325. Environmental Social Sciences meet Environmental Fiction. 3 Credits.
The course pairs readings of critical texts addressing environmental crises with literary fiction broadly dealing with the relationship between the human and the environment. We discuss the ways narratives affect our understanding of complex global phenomena, and how the tools of literary analysis can help us unpack the rhetorics and values of both fictional and nonfictional texts.
Area: Writing Intensive

AS.191.335. Arab-Israeli Conflict. 3 Credits.
The course will focus on the origin and development of the Arab-Israeli conflict from its beginnings when Palestine was controlled by the Ottoman Empire, through World War I, The British Mandate over Palestine, and the first Arab-Israeli war (1947-1949). It will then examine the period of the Arab-Israeli wars of 1956, 1967, 1973, and 1982, the Palestinian Intifadas (1987-1993 and 2000-2005); and the development of the Arab-Israeli peace process from its beginnings with the Egyptian-Israeli treaty of 1979, the Oslo I and Oslo II agreements of 1993 and 1995, Israel's peace treaty with Jordan of 1994, the Road Map of 2003; and the periodic peace talks between Israel and Syria. The conflict will be analyzed against the background of great power intervention in the Middle East, the rise of political Islam and the dynamics of Intra-Arab politics, and will consider the impact of the Arab Spring.

AS.191.340. Cities, Space & Power. 3 Credits.
Gentrify! 80% of people live in urban areas. These locations are key for solving political dilemmas, including climate change, class, segregation, gender & immigration. This class explores all of these through the lens of gentrification. What does 20th century urban planning have to do with it? How can I talk to my friends about gentrification in Baltimore? Find out this and more!

AS.191.345. Russian Foreign Policy. 3 Credits.
This course will explore the evolution of Russian Foreign Policy from Czarist times to the present. The main theme will be the question of continuity and change, as the course will seek to determine to what degree current Russian Foreign Policy is rooted in the Czarist(1613-1917) and Soviet(1917-1991) periods, and to what degree it has operated since 1991 on a new basis. The main emphasis of the course will be on Russia's relations with the United States and Europe, China, the Middle East and the countries of the former Soviet Union--especially Ukraine, the Baltic States, Transcaucasia and Central Asia. The course will conclude with an analysis of the Russian reaction to the Arab Spring and its impact both on Russian domestic politics and on Russian foreign policy.

AS.191.352. Race, Class, and America. 3 Credits.
Through an intensive and in-depth reading of theorists, thinkers, historians, and political scientists, this course will take students through the deeply interconnected story of American race relations and labor politics. We will examine primary source material, such as the essays of Richard Wright and Ralph Ellison, the speeches of A. Philip Randolph, Bayard Rustin, and Martin Luther King, Jr., the memoirs of Charles Denby and Angelo Herndon, and the pamphlets of Claudia Jones; we will read historical accounts which situate these figures in their context; and we will engage critically with the fundamental topic: in the United States, what is the relationship between race and class; racism and exploitation; civil rights and labor activism? Toward the end of the course, we will examine recent scholarship that has returned to these themes to show how deeply imbricated America—its people, its institutions, its political economy—remains to this history.
Area: Writing Intensive

AS.191.354. Congress and Foreign Policy. 3 Credits.
This course is an introduction to the Congressional role in foreign policy. The Constitution grants the President the authority to conduct foreign policy. Yet it also gives Congress a substantial role in the shaping of foreign policy. The roles are not always clear, creating an inherent tension between these two branches of government and efforts on each side to increase their power. This class will address the "rules of the road" in conducting American foreign policy and how they change. The class will go beyond theory to include case studies that show the tension between Congress and the Administration – including the Iran Agreement, Climate Change, the use of sanctions and American policy towards Cuba. The course will include guest lecturers who work in Congress on the various aspects of foreign policy – including appropriations, intelligence, oversight and investigations. We will address the Congressional role in ratification of treaties and in declaring war. The class will consider the different ways that each branch of government approaches human rights and sanctions. The class will also address the domestic political aspects of foreign policy – including the role of advocacy groups and special interests and the political use of Congressional investigations. One class might be held in Washington D.C. at the U.S. Senate, so would require additional time for travel.

AS.191.358. Use of Force and the American State. 3 Credits.
This course examines the growth and development of the American state's coercive institutions, namely, the military and police. We will explore the ways in which the American state makes war, fights crime, and polices the boundaries of citizenship. While we tend to approach these topics from the perspective of international relations, law, or political philosophy, this course focuses on American politics and institutions. How did the United States secure control over a transcontinental territory in the absence of a large standing army? Why did the federal government try to criminalize vices, and how were these statutes enforced? How did violence influence the development of the American state, and to what extent do these historical processes explain warfare and law enforcement today?
Area: Writing Intensive

AS.191.372. Making Social Change. 1.5 Credits.
Aitchison Students Only.

AS.191.375. Thinking Organizationally about Politics. 3 Credits.
Aitchison Students Only.

AS.191.376. Public Policy Writing. 3 Credits.
Aitchison Students Only.
Area: Writing Intensive

AS.191.379. Thinking Strategically. 1.5 Credits.
Aitchison Students Only.

AS.191.381. Education Policy. 1.5 Credits.
Aitchison Students only

AS.191.382. Thinking Economically. 3 Credits.
Aitchison Students Only.

AS.191.383. Visualizing Data. 3 Credits.

AS.191.405. Modernity and the Slaughterhouse: Labor, Violence, and Animals in Contemporary Society. 3 Credits.
Steven Pinker opens his influential bestseller The Better Angels of Our Nature with the claim that "If the past is a foreign country, it is a shockingly violent one," going on to argue that the contemporary age is one marked by relatively more peace and less violence than ever before. Drawing on a long tradition of optimist thinkers, he credits this civilizational progress to a combination of the intellectual legacy of Enlightenment humanism, greater faith in scientific rationality and technological progress, a strong system of states and social institutions, and the development of democracy and the liberal market economy. For Pinker, this account holds as much for humans as it does for animals, and he goes so far as to claim the emergence of animal rights as "another rights revolution" akin to civil rights and women's rights. But does this account of modern society hold up under scrutiny? Or, more specifically, where does it fail? And how exactly does contemporary society relate to different forms of violence (against humans and animals) that it has not done away with?The historical processes described by Pinker have not only drastically changed human society, but they have also impacted how we interact with animals. The United States today produces and consumes more meat than ever, but most Americans live at an increasing geographic and perceptual distance from animals and the humans who work with them, relying on a system of industrial production and a complex division of labor. This course approaches the politics of this distribution of labor, violence, and human-animal relations from a site rarely considered in political analysis: the modern slaughterhouse. It engages with this institution as a historical and cultural object, using the story of its emergence and operation to ask broader questions about the politics of social change. We will draw on an interdisciplinary range of academic and non-academic works to explore a range of questions about the relationships between institutions and rationality, visibility and invisibility, hygiene and marginalization, and labor and society, and to examine the narratives ostensibly peaceful, liberal democracies tell themselves about violence, history, and progress
Area: Writing Intensive

AS.191.406. Capitalism: Politics and Political Thought in a Market Economy. 3 Credits.
The United States is a capitalist economy and we live in a capitalist world. This a fact we take for granted and therefore spend little time examining. Capitalism' proponents attribute our society's unprecedented wealth and technological advances to this economic system. Some go so far as to claim that modern democracy and social progress are impossible without a capitalist economy. Critics point to growing social inequality and a slew of environmental ills as proof of capitalism's unsustainability. Some suggest that capitalism is antithetical to true democracy and human flourishing. But what exactly is capitalism? How did it evolve in the USA and how does the form capitalism takes in the United States differ from the forms it takes elsewhere? And, crucially, how is capitalism shaped by – and how does it shape – contemporary politics? And how exactly is this all related to liberalism, conservatism, neoliberalism, libertarianism, socialism, and democratic socialism? This seminar is designed to help students critically approach these questions.Rather than taking simplistic pro-contra approach, this seminar will examine capitalism along four axes: as a political-economic system, a corollary set of structures and institutions, the force behind a specific form of state organization, and the determinant of how society and individuals act and see themselves. To explore these issues, we will focus on a number of contemporary political issues, with a primary geographic focus on the United States, including the following: the debates over the welfare state and socialized healthcare; unions, lobbies, and special interests; the connection between capitalism, culture, and ideology; the effects of a capitalist organization of labor of questions of race, gender, and citizenship; the commodification of the environment and other species; and the process of critique, resistance, and social change in a capitalist system. Throughout, we will discuss the theoretical and empirical arguments put forward by a historically and disciplinarily broad range of thinkers including Karl Marx, Simone Weil, John Locke, Adam Smith, Robert Nozick, Thomas Sewell, Nancy Fraser, David Graeber, Melinda Cooper, Andreas Malm, and Guy Debord, through to Alexandria Ocasio-Cortez and Elon Musk.
Area: Writing Intensive

AS.191.415. Fear and Loathing: Writing About Contemporary American Politics. 3 Credits.
This course is focused on reading, analyzing, and, most importantly, producing writing about the American political experience and contemporary events in American politics. We will use scholarly, print, and new media sources from different sides of the political spectrum, drawing on political and literary theory to inform our discussions. We will then try to do better: Students will write and workshop a variety of pieces of different lengths and styles, spending in-class time on peer critique, presentations, and writing exercises, which they will compile into a writing portfolio. We will discuss and write op-eds, memoirs, long-form book reviews, commentary essays, and satire. Throughout, we will devote considerable class time to critique and discussion of students' writing. Readings will include works by James Baldwin, William F. Buckley, Claudia Rankine, Hunter S. Thompson, Ta-Nehisi Coates, Alexander Chee, Angela Nagle, and Omar el Akkad. We will draw on political commentary from sources ranging from The Washington Post to Jacobin to The Onion, through to Facebook and Twitter. Throughout, we will consider a wide range of topics pertinent to writing about politics, including questions of the make-up of the public sphere and diverse audiences, the use of voice and language, the deployment of facts and rhetoric, the place of fiction and humor in political critique, and the rise of fake news and trolling.
Area: Writing Intensive

AS.192 (International Studies)

AS.192.150. States, Regimes & Contentious Politics. 3 Credits.
This course, which satisfies the gateway requirement for the major in International Studies, introduces students to the study of politics and political life in the world, with a particular focus on the Middle East, Latin America, and Africa. Throughout the course, we will analyze the sources of order and disorder in modern states, addressing a series of questions, such as: why did nation-states form? What makes a state a nation? Why are some states democracies while others are not? How do people organize to fight oppression? Why does conflict sometimes turn violent? What are the causes of ethnic war? Drawing on a mix of classic works and contemporary scholarship, we will discuss the answers that scholars have formulated to address these and other questions, paying special attention to research design and the quality of argumentation. This course also counts as a 100-level course in comparative politics required for political science majors.

AS.192.210. Library Research Seminar for International Studies and Social Sciences. 1 Credit.
Are you planning to do a research project for your independent study class, or preparing for a grant application, or working on a big research project for a research intensive class or graduation thesis, or just wishing to improve your research skills? If so, this course is for you! Through weekly two hour sessions over ten weeks, you will receive systematic training on major research tools, resources and techniques useful for any research project in international studies, political science, and other social science subjects. By the end of the course, you will be able to come up with a viable research topic, and complete a research statement that includes an abstract, problem statement and literature review based on in-depth research utilizing tools and techniques covered in the course. The skills you learn through the course will prepare you for any future research projects and advanced studies.

AS.192.225. Economic Growth and Development in East Asia. 3 Credits.
The course offers an overview of the complexities of East Asia's development experience from a variety of perspectives. It is divided into three parts to allow students to develop expertise in one or more countries and/or policy arenas, while cultivating a broad grasp of the challenges of "East Asia's fast-paced economic growth." Part I considers the origins of East Asian economic development, analyses the common economic variables behind the region's success, looks at the 1997-1998 East Asian financial crisis, its lessons and the economic renaissance that followed. Part II focuses on the development experiences of individual countries, with an emphasis on the ASEAN economies, NIEs, Japan and China. Part III considers topics of special interest to East Asia, including trends toward greater regional economic cooperation, trade integration, and issues related to poverty, migration, and inclusiveness.

AS.192.265. Introduction to Contemporary African Politics. 3 Credits.
This class provides an introduction to contemporary African politics. Africa is diverse, and its political landscape is rapidly changing. Dramatic events that have occurred in just over half a century in Africa, including but not limited to decolonization, the end of the Cold War, rapid democratization, urbanization, the youth bulge, conflicts, and most recently, the COVID-19 pandemic, etc. has significantly shaped the nature of state and society with implications for political outcomes in present-day Africa. This course unfolds in four parts. In part one, we examine Africa's recent political history focusing on how pre-colonial politics, slave trade, colonialism, and decolonization politics impact modern African states. Part two then examines the social forces that shape contemporary politics across the continent. These include ethnic groups, religion, gender, and civil society. With an understanding of these social forces, we then move on to part three, which will explore dynamics and structures that mediates these social forces, including democracy, development, social movements, and international relations. The final part examines Africa's critical issues and opportunities, including conflict, the youth bulge, regionalism/AfCFTA, climate change, gender (in)equality and women's empowerment, and the COVID-19 pandemic.

AS.192.270. International Migration, Diasporas and Development. 3 Credits.
International migration has emerged as one of most politically salient and contentious issues in the politics of advanced democracies. However, while the economic, political, and social impact of large immigrant inflows has prompted much debate and analysis in developed countries, the effects of emigration and diasporas on the source country are poorly understood. This seminar examines the economic and political challenges and opportunities of international migration and diasporas on countries of origin and policy options to address them.The seminar will examine a range of issues. Is the phenomenon of greater import in the current (and future) context than it has historically been and if so, why? How do selection characteristics of international migrants and reasons for leaving affect the country of origin? Why do diasporas differ in the forms of engagement with the country of origin? What explains the massive increases in financial remittances sent by immigrants to their countries of origin and what are their effects? The seminar will also examine non-pecuniary or "social" remittances, which reshape individual preferences and social norms and thereby influence economic, political, and social change. What are the human capital effects of international migration, ranging from the "brain-drain" of limited human capital to "brain-gain" effects arising from diasporic networks? How does the "long-distance" nationalism of diasporas that support more polarizing political parties and groups engaged in conflict affect international security? Finally, we will examine policies in both receiving and sending countries and how they affect outcomes in their countries as well as of migrants themselves. Are international agreements on migration feasible or will rising nationalism ensure that unilateral policies and bilateral arrangements prevail?
Area: Writing Intensive

AS.192.290. Informational World Orders. 3 Credits.
We are on the cusp of a new era of contention in global politics. For decades, politicians and experts assumed that global information networks like the Internet had an inherently liberal bias, and would weaken autocratic regimes like China and Russia. Now, we are discovering that authoritarian countries can use technology too. The result is increased clashes over information technology between democratic countries and non-democratic countries, and among democratic countries too. All of them find themselves sharing the same global networks, and fighting over how these networks ought to work. In this course, we'll debate the conflict between different informational world orders promoted by the US, Europe and China. We will examine when information technology helps strengthen democracy, and when it benefits autocracies instead. We'll explore how information markets work, and work through the logic of political fights over artificial intelligence and surveillance.

AS.192.305. Global Energy and Environment: A Political Economy Approach. 3 Credits.
Global environmental deterioration is a major threat to human wellbeing. How do governments cooperate to address international environmental problems? Why is the global environmental regime structured as it is? Can international agreements and organizations solve global environmental problems? These are the primary questions addressed in this seminar. Among other topics, we cover research on global climate cooperation, the relationship between trade liberalization and the environment, North South negotiations on environmental agreements, environmental activism, and the problem of energy poverty in non-OECD countries.The seminar also provides students with an opportunity to conduct original research. In addition to weekly readings and discussion, the students write a final paper for the class based on empirical research on global environmental governance. Students also participate in a simulation of global climate negotiations under the 2015 Paris Agreement on Climate Change.
Area: Writing Intensive

AS.192.315. Politics of India. 3 Credits.
India is the world's largest democracy and its second most populous country. This course introduces core issues in the study of modern Indian politics. The class is organized around the following topics: we trace India's journey to Independence; the consolidation of democracy in the early decades; the relationship between the state and the economy; the state's institutional architecture; how political parties and electoral campaigns operate; the threats posed by corruption, criminality and dynastic politics; the role of caste and religion in shaping politics; the political and economic consequences of economic liberalization; elections; and the recent rise of right-wing hindutva in the country. The focus is on building knowledge and understanding of the Indian case. But we will also consider to what extent India's experience is reflective of more general theories of politics, and how they might change because of what India can teach us. Class sessions will be interactive, with plenty of opportunity for group discussion. The reading list is diverse and draws from political science, sociology, history, and anthropology.
Area: Writing Intensive

AS.192.325. International Political Economy of Emerging Markets. 3 Credits.
This course examines the relationship between politics and international economics in emerging market and developing economies. Throughout the course, we critically evaluate different political science theories of foreign economic policymaking in emerging markets. The course begins with an overview of theories of international political economy. The second section of the course focuses on developing countries' embrace of economic globalization over the past thirty years. We examine different political explanations for why emerging market and developing countries have removed barriers to foreign trade and foreign investment since the 1980s. The final section of the course explores how globalization has impacted emerging market economies, focusing on the challenge of maintaining economic and financial stability in this era of economic globalization.

AS.192.360. Modern Warfare. 3 Credits.
This course examines modern warfare from the Second World War to the present. It takes a broad historical perspective. Strategic decision-making, technological change, experiences of the soldier, different concepts of warfare, and the effect of war on societies and the effect of societies upon war will be examined. Students will be introduced to critical texts and key primary source documents. The course will start with the Second World War. It will then go on to the nuclear revolution, the Korean War, and the early Cold War. From there, the subject matter will turn to examine people's war, focusing on Mao and the Chinese Civil War and then Vietnam. Next, the Arab-Israeli conflicts will be discussed before moving on to the strategic environment of the post-Cold War world and the long war against "terrorism" in Afghanistan, Iraq, Syria, and elsewhere. Finally, the course will look at recent technological change, clashes, and new players. Throughout, special attention will be paid to non-Western views and experience of war. The five main questions of the class will be: • How has the nature of warfare changed between 1939 and today? What is the nature of war today? What kind of war is possible today?• How has technology changed warfare?• What are the experiences of people, both soldiers and civilians, in war?• How has warfare affected societies and culture? How have societies and culture affected war?• How has warfare affected domestic and international political change?

AS.192.404. Democracy, Autocracy and Economic Development: Korea, Indonesia, and Myanmar. 3 Credits.
East Asia's "miracle growth" has not gone hand in hand with a decisive move toward democracy. The course explores the reasons why democratization proceeds slowly in East Asia, and seems to be essentially decoupled from the region's fast-paced economic growth. The course is divided into three parts. Part I introduces the specifics of East Asia's economic development strategies as well as key concepts of democracy, authoritarianism and military rule and the tensions between these theories and the East Asian experience. Part II will focus on the economic and political development experiences of Korea, Indonesia and Myanmar in light of what discussed in Part I. Finally, Part III presents lessons emerging from the comparison of Korea's, Indonesia's and Myanmar's economic and political developmental trajectories.

AS.192.410. Kissinger Seminar on American Grand Strategy. 3 Credits.
Enrollment is at the discretion of the instructor and space in the course is limited. To apply, email a one-page resume, one-page personal statement on why you want to take the class including how it contributes to your professional interests, and a writing sample of less than ten pages to KissingerCenter@jhu.edu by the end of the day on Sunday, October 24, 2021. This course is an initiative of the Henry A. Kissinger Center for Global Affairs at Johns Hopkins SAIS. It will expose exceptional undergraduate students to the study of grand strategy and the history of U.S. foreign policy. The course will explore critical moments, themes, and people in the history of American grand strategy, from Washington's Farewell Address to the statecraft of Donald Trump. The seminar will also consider key issues in U.S. grand strategy today, from climate change to the challenge of an assertive China. Students will also have the opportunity to meet with current and former policymakers who have worked on these issues in real time. The course will meet 9 times at Homewood and 4 times at the SAIS campus in Washington, D.C.; transportation between Homewood campus and SAIS will be provided.

AS.192.412. Politics of Inequality. 3 Credits.
At the heart of the study of politics is a question about who gets what and when. Consequently, inequality features as a central theme in the discipline. Scholars have studied how inequality shapes democratization, redistribution, voting behavior, and how the institutions of welfare and taxation in turn shape inequality. More recently, scholars have started to pay attention to how inequality across and within ethnicities, races, and gender may matter to political outcomes. The centrality of inequality is reflected in the significant increase in quantity and quality of research on this subject over the past two decades. This seminar is designed to provide you with a critical overview of the field, both theoretically and empirically. We will briefly review the normative foundations and conceptual complexities involved in the study of inequality. Measures of inequality vary in their analytical properties, and it is important to choose the right one. We will review the main issues when measuring inequality. We will then proceed thematically. We will examine the political, and institutional foundations of income inequality and also its effects on institutional development, political participation and voting choice. Next, we examine the individual-level determinants of economic and political preferences, and how inequality intersects with race and gender. We end with a discussion of the social effects of inequality and what constraints exist to addressing inequality.
Area: Writing Intensive

AS.192.415. The Battle of Ideas for the World Economy. 3 Credits.
This seminar is intended as a capstone intellectual experience for seniors and advanced juniors majoring in international studies. The course presumes some background in economics, comparative politics, and international relations. This course will hone your analytical and writing skills by exposing you to theoretically advanced forms of political economy argument in a "proposition-opposition" format. The seminar is organized around a series of thematic pairings, covering such political economy themes like free trade vs. protectionism, free market capitalism vs. socialism, democratic erosion vs. autocratic strength, hegemonic stability vs. US abdication of power, or whether the current populist wave has mainly economic or mostly cultural roots. Each segment will deal with a specific topic area. Our discussions will involve in-depth interrogations of the arguments of these 'pro-con' authors.
Area: Writing Intensive

AS.192.420. Global Health Policy. 3 Credits.
The world's countries—low, middle and high-income alike—face numerous health challenges, many shaped by processes connected to globalization. We are presently amidst one of the greatest global health challenges of the past century—the COVID-19 pandemic. But there are others that persist, including combating the HIV/AIDS pandemic, addressing non-communicable diseases, expanding health coverage and ensuring effective global governance for health. This course will examine these and other issues with an emphasis on facilitating your understanding and critical analysis of central issues in global health policy, and examining the role you can play to address health conditions—particularly those that affect disadvantaged populations.
Area: Writing Intensive

AS.192.425. The Politics and International Relations of Iran. 3 Credits.
This course provides a basis for understanding the political, economic and security dimensions of Iran's politics and the country's role in World politics. It will discuss the Islamic Republic of Iran's complicated political system and its international politics. A significant and geostrategically situated country, Iran is where Islamic ideology first attained power in form a major social revolution. The unfolding of that revolution has shaped the Middle East, and has posed one of the most important challenges to American foreign policy. As a revolutionary Islamic State Iran experienced a unique path to development and state-building. This course will introduce the students to the main ideological currents and political trends in Iranian politics. It will discuss the structure of its theocracy, and the working of its politics and economy. The course will also examine Iran's foreign policy posture, with focus on U.S.-Iran relations, quest for nuclear power, and Iran's regional policy.

AS.192.501. Internship- International Studies. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.591. Research- International Studies. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.598. Independent Study. 3 Credits.
Approval Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.192.599. Independent Study. 3 Credits.
Approval Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.194 (Islamic Studies)

AS.194.102. Islamic Pasts in the Contemporary World. 3 Credits.
This course will focus on the intellectual and cultural legacies of "Islamic pasts." It has been argued by scholars that Islam is not only a religion but a "civilization" with identifiable sensibilities, overlapping histories, and temporalities. This civilization once spread from the Atlantic coast of Africa to the Indian subcontinent and beyond, but regimes and dynasties have changed hands in many of these places, while remaining in place in others. What remains of Islamic pasts in places where Islam once reigned supreme but has either vanished, been reduced to minority status, or repressed in ongoing political projects? This course examines lost Islamic pasts in the contemporary world, using readings from anthropology, history, literature, and poetry. As the basis of this course, we will read four texts in their entirety focusing on four different geographic points of interest—Spain, India, the Balkans, and Palestine.

AS.194.105. Islam and its Cultural and Religious Diversity, 600-1600. 3 Credits.
While media often present Islam as a fairly univocal and compact cultural and religious system, news reports about tensions, hostility and at times open conflict within the Islamic world itself are frequent. Unity and internal diversity characterize Islam nowadays and have historical roots that have deeply shaped Islam since its very inception.This course will explore the historical origins of the dynamics of unity and diversity in Islam from the predication of Muhammad and the expansion of the first caliphate, to the formation of the Ottoman, Safavid and Mughal empires. By focusing on the historical events and the cultural production of the first millennium of Islam, this course will offer a thorough historical introduction to its cultural and religious complexity.

AS.194.201. Jews, Muslims, and Christians in the Medieval World. 3 Credits.
The three most widespread monotheisms have much more in common than is generally portrayed: a common founding figure, a partly shared succession of prophets, closely comparable ethical concerns and religious practices, a history of coexistence and of cultural, religious, social and economic interaction. This course will focus on a number of key texts and historical events that have shaped the relationships between Jews, Muslims, and Christians during the Middle Ages and contributed to their reciprocal construction of the image of the "other." The geographical center of the course will be the Mediterranean and the Near and Middle East, a true cradle of civilizations, religions, and exchange.

AS.194.202. Never Forget: Muslims, Islamophobia, and Dissent after 9/11. 3 Credits.
In partnership with the social justice organization Justice for Muslims Collective, this community-engaged course and oral history project will explore how diverse Muslim communities navigated and contested belonging and political and cultural agency amidst state-sponsored violence and national debates on race, gender, citizenship and national security after 9/11 and during the ongoing War on Terror. Through history, ethnography, first-person narratives, film, fiction, and online resources, students will learn about the impact of 9/11 on American Muslim communities. This includes cultural and political resistance to imperialism, racism, and Islamophobia as well as to intersectional inequities within Muslim communities that were intensified in the context of Islamophobia. Students will learn about community activism and organizing from JMC, and complete a participatory action research project with the organization. This project is an oral history archive that will address gaps in the documentation of movement histories when it comes to early organizing against War on Terror policies by Muslim communities and communities racialized or perceived as Muslim. Students will be trained to record stories of resistance among leaders who organized and responded at the local and national-level in the Greater Washington region, to support the building of an archive that will shape a wide variety of future organizing and advocacy efforts.

AS.194.205. Islamic Mysticism: Traditions, Legacies, Politics. 3 Credits.
For over a thousand years, the Sufi tradition has been a dynamic force in Islamic social, political and spiritual life. The tradition offers a treasure trove of devotional literature and music, philosophical treatises, contemplative practices, and institutions of social and political organization. After unpacking the politics of the term “Sufi,” we will trace the historical development of the tradition from the early ascetics in Iraq and Syria to the age of trans-national Sufi orders, with case studies from South Asia, Turkey, and the United States. We will then move into some of the key constructs of the tradition of spiritual growth and character formation: the divine-human relationship, the stages of the spiritual path, contemplative and practical disciplines, ideas of sainthood, discipleship and ethical perfection, and the psychology of love. Throughout the class, we will explore the nature of experiential language and interrogate the tradition through the lens of gender. We will also experience Sufism through ritual and music.

AS.194.210. Race, Gender, Citizenship: Being Muslim in America. 3 Credits.
This course explores how American Muslims navigate and contest complex notions of belonging in the context of national conversations on race, gender, citizenship, and national security. With a focus on specific case studies that range from Black Muslim movements of the early twentieth century to the ongoing War on Terror, the course adds complexity to the public conversation on what it means to be Muslim - and what it means to be American. We will draw on history, ethnography, first-person narratives, films, blogs, documentaries and fiction. As a Community Engaged course, the class will include site visits and learning with and from Muslim communities in Baltimore.

AS.194.220. The Qur’an: Text and Context. 3 Credits.
For 1400 years, the Qur’an has played a central role in Muslim intellectual, spiritual, artistic and ritual life. This course will explore the sacred scripture of Islam through its foundational ideas, history of the text and thematic development, literary style, history and methods of interpretation, and role in Muslim spiritual and ritual life. We will also explore how the Qur’an weaves through literature, music and the visual arts.

AS.194.230. African-Americans and the Development of Islam in America. 3 Credits.
Muslims have been a part of the American fabric since its inception. A key thread in that fabric has been the experiences of enslaved Africans and their descendants, some of whom were Muslims, and who not only added to the dynamism of the American environment, but eventually helped shape American culture, religion, and politics. The history of Islam in America is intertwined with the creation and evolution of African American identity. Contemporary Islam in America cannot be understood without this framing. This course will provide a historical lens for understanding Islam, not as an external faith to the country, but as an internal development of American religion. This course will explicate the history of early Islamic movements in the United States and the subsequent experiences of African-Americans who converted to Islam during the first half of the twentieth century. We will cover the spiritual growth of African American Muslims, their institutional presence, and their enduring impact on American culture writ large and African-American religion and culture more specifically.

AS.194.305. Cultures of Pilgrimage in Islam. 3 Credits.
The hajj pilgrimage to Mecca is one of the pillars of Islam. But Muslims around the world also take part in many other pilgrimages, from the massive annual Shi’a pilgrimage to Karbala to the smaller ziyarat “visits” to Sufi saint shrines, to travel to centers of Islamic learning, to pilgrimage to isolated natural features like mountains, trees, valleys. What are the theologies that propel the act of travel in Islam? How are cities, architectures, economies shaped by these cultures? And how are these traditions affected by the wars and colonial projects that plague many Muslim-majority countries in the contemporary world? Readings in this course will draw from anthropology, philosophy, Islamic interpretive texts (tafsir), and travelogues.
Area: Writing Intensive

AS.194.401. Themes in Medieval Islamic Thought. 3 Credits.
This seminar examines medieval Muslim thinkers who addressed themes at the intersection of theology, philosophy, science, and ethics: the definition of the nature of God’s attributes, His uniqueness, transcendence and omnipotence; human freewill and the limits of human knowledge; the nature of the world; and the relationship among reason, religion, and science. The course will look at how these and other crucial themes were addressed by major medieval philosophers and philosophical schools not only in Islam, but also in Judaism and Christianity, and highlight similarities and differences among the three major monotheistic faiths.

AS.194.502. Independent Study. 3 Credits.
Approval Required
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.196 (Agora Institute)

AS.196.300. Getting to Truth: How to Navigate Today's Media Jungle. 3 Credits.
Our democratic system depends on an informed public, but media today are polarized along ideological lines, undercut by economic and technological change and sometimes polluted with bogus stories written for profit or spin. In this course, taught by a veteran journalist, we will discuss the evolution of news, examine the current challenges and assess what citizens can do to get a fair understanding of what's going on. We'll use many concrete examples and students will have multiple writing assignments.
Area: Writing Intensive

AS.196.301. Social Entrepreneurship, Policy, and Systems Change: The Future of Democracy. 3 Credits.
This course will explore the dynamics and interplay between social entrepreneurship, social change, and policy. Students will explore frameworks for social transformation and systems change, and explore whether stable governance and effective policies are necessary for sustainable change. The course will examine the intersection between social change and policy change, examining how the two concepts intersect while focusing on the end goal of systems change. Students will examine different case studies of social transformation (or proposed social transformation) from across the United States and world. Guest speakers will include diverse practitioners of social entrepreneurship who think about long-term pathways to transformative social change, and dynamic policymakers.While the course will include case studies on broader domestic and international challenges and models of social transformation, a larger focus will be on specific local social problems and solutions. This will manifest through class discussions and a final project based on the surrounding community.
Area: Writing Intensive

AS.196.302. Science and Democracy. 3 Credits.
What role does scientific expertise play (or not play) in American democracy? What role should scientific expertise play (or not play) in American democracy? These are the key questions we'll address in this class, focusing on a wide range of examples such as government responses to public health crises, environmental crises, and war. We'll tackle these questions from multiple angles, drawing on ideas from across the social sciences, including political science, psychology, sociology, economics, history, and communication. We'll focus largely on the United States, though in some cases compare the US experience with other democracies to understand how unique aspects of our democratic institutions influence the link between science and democracy.

AS.196.304. Democratic Challenges. 3 Credits.
Modern democracies like the U.S. are undergoing severe challenges from within and elsewhere. Internally, many of their citizens are newly skeptical of democracy, believing for example that elections are rigged. Outside, they face new competition from authoritarian systems such as China's government, which show no signs of converging towards democracy, and offer a possible alternative system of rule. Finally, democracies also have to engage with new policy challenges, such as racial justice and climate change. In this course, we will draw upon the collective wisdom of faculty at Johns Hopkins' new SNF Agora Institute, to understand better the political challenges that democracy faces, and the policy challenges that it has to respond to. We will put modern democratic challenges in their appropriate historical context. Has America really been a democracy in the past? We will ask about the social and political conditions under which democracy does well, and under which it fails. Finally, we will look at the new agenda of questions that democracy faces, and the means that it can draw on to confront them.
Area: Writing Intensive

AS.196.305. Democratic Erosion. 3 Credits.
It is often assumed that once a country achieves a certain level of economic andpolitical development, democratic consolidation is permanent. Recent trends in American and European politics have led some commentators to question this assumption. In this course, students will explore the causes and consequences of democratic erosion in comparative and historical perspective, with a focus on better understanding our own unique political moment.This course is not intended as a partisan critique of any particular American politician or political party. Rather, it is designed to provide an opportunity for students to engage, critically and carefully the state of democracy in the US and elsewhere; to evaluate whether those claims are valid; and, if they are, to consider strategies for mitigating the risk of democratic erosion here and abroad. Readings will address both empirical and normative questions and will be gleaned from a combination of academic and media sources.
Area: Writing Intensive

AS.196.306. Democracy by the Numbers. 3 Credits.
How is democracy doing around the world? This course will help students to answer this question and ask their own questions about political systems by examining a variety of quantitative measures of facets of democracy in the U.S. and internationally. We consider general indices as well as those that focus on specific normatively-appealing aspects —the absence of fraud in and broader integrity of the electoral process itself, the guarantees of fundamental human rights to all, governments' effectiveness and accountability to the public, the equity of both representation and policy outcomes for minority groups and those historically disadvantaged or excluded, and the possibility and extent of civic engagement in non-government institutions. Wherever possible, the course will present evidence about the kinds of institutions and policies that seem to bolster democracy. Students can expect to gain hands-on experience with publicly-available subnational and national indicators of electoral and democratic quality.

AS.196.311. Democracy. 3 Credits.
Democracies around the world are under threat. This course introduces students to the philosophical foundations of democracy as well as the history of democratic revolutions, institutions, and principles. How can we defeat the most important contemporary challenges to democracy, including populism, authoritarianism and disinformation? And how can we revive the "democratic spirit" - in America and around the world?

AS.196.364. This is Not Propaganda. 3 Credits.
We live in an era of disinformation' mass persuasion and media manipulation run amok. More information was meant to improve democracy and undermine authoritarian regimes- instead the opposite seems to be happening. This course will take you from Russia to South Asia, Europe to the US, to analyze how our information environment has been transformed, why our old formulae for resisting manipulation are failing, and what needs to be done to create a model where deliberative democracy can flourish.
Area: Writing Intensive

AS.196.500. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.196.505. Internship - Disinformation. 1 Credit.
This course requires instructor approval. There will be administrative work to complete with some hands-on field research.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.196.506. Research - Disinformation. 2 Credits.
This is a research opportunity around disinformation for undergraduate students. This course requires instructor approval.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.]

AS.196.600. Data-analysis for Social Science & Public Policy I.
We will gain experience with data-analysis geared towards understanding the social world. Our scope ranges from simple descriptions and predictions under strong assumptions to intervention analyses that provide a more trustworthy foundation for quantifying causal effects. The course will be offered in a hybrid modality and will have a heavy focus on computation. We will alternate between discussion sessions devoted to fundamental concepts, and lab sessions devoted to a combination of web- and instructor-led data-analyses. Whenever possible, examples using both R and Stata and using a range of national and cross-national data-sources relevant to the study of democracy will be provided.

AS.196.601. Data-analysis for Social Science & Public Policy II.
We will gain experience with data-analysis geared towards understanding the social world. Our scope ranges from simple descriptions and predictions under strong assumptions to intervention analyses that provide a more trustworthy foundation for quantifying causal effects. The course will be offered in a hybrid modality and will have a heavy focus on computation. We will alternate between discussion sessions devoted to fundamental concepts, and lab sessions devoted to a combination of web- and instructor-led data-analyses. Whenever possible, examples using both R and Stata and using a range of national and cross-national data-sources relevant to the study of democracy will be provided.

AS.196.801. Independent Study.

AS.196.802. Field Research on Civic Engagement.
This is a graduate-level course that will focus on the field research of civic engagement.

AS.196.805. Graduate Internship - Disinformation.
This course requires instructor approval. There will be administrative work to complete with some hands-on field research.

AS.200 (Psychological & Brain Sciences)

AS.200.101. Introduction To Psychology. 3 Credits.
Do we all see colors the same way? How did so many 'good' people support the Nazi party? Do crossword puzzles really stave off Alzheimer's Disease? This course tries to answer these questions and many others, providing a comprehensive overview of the scientific study of the mind. We'll explore topics such as perception, language, memory, decision-making, creativity, love, sex, art, politics, religion, dreams, drugs, brain damage and mental illness, grappling with deep and long-standing controversies along the way: differences between the sexes, the relationship between mind and brain, causes and consequences of racism, human uniqueness (or not) within the animal kingdom, nature vs. nurture, good and evil, consciousness. Appropriate for anyone wanting to know who and what we are as human beings (or who noticed that psychology is now on the MCAT).

AS.200.110. Introduction to Cognitive Psychology. 3 Credits.
Introductory survey of current research and theory on topics in cognitive psychology. The course will cover a range of topics in perception, attention, learning, reasoning, and memory, emphasizing relationships among mind, brain, and behavior.

AS.200.132. Introduction to Developmental Psychology. 3 Credits.
An introductory survey of human development from the prenatal period through adolescence. The developing child is examined in terms of cognitive, social, emotional, motor, and language development.

AS.200.133. Introduction to Social Psychology. 3 Credits.
An introductory survey of social psychology. Topics include social perception, social cognition, attitudes, prejudice, attraction, social influence, altruism, aggression, and group behavior.

AS.200.141. Foundations of Brain, Behavior and Cognition. 3 Credits.
A survey of neuropsychology relating the organization of behavior to the integrative action of the nervous system. Cross-listed with Behavioral Biology and Neuroscience.

AS.200.162. Childhood Disorders & Treatments. 3 Credits.
This course examines the psychological disorders that are usually first diagnosed prior to adulthood. Some of the specific disorders that will be discussed are Attention-Deficit and Disruptive Behavior Disorders, Neurodevelopmental Disorders, Learning Disorders and Intellectual Disability.Students will become familiar with various diagnoses, etiologies, and methods of treatment. Note: This course does not count toward the Psychology Major

AS.200.199. Psychopathology and Its Development. 1 Credit.
Examine an overview of abnormal psychology (i.e., psychopathology), including its development, etiological/theoretical perspectives, diagnosis, and treatment. Broadly cover the DSM categories, with a focus on understanding the major features of the common disorders and the evidence-based treatment of these conditions.

AS.200.200. Research Methods in Psychology. 4 Credits.
The goal of this course is to introduce how psychological scientists develop and test research questions about the mind and behavior. We will explore how empirical investigation differs from other ways of making discoveries and learning about the world, and how psychologists employ various methodologies to tackle their phenomena of interest. We will examine the relationships between research questions and research designs, the benefits and drawbacks of differing measurement and sampling approaches, the ethical implications of various research paradigms, and best practices in communicating research findings clearly and engagingly. You will have the opportunity to engage “hands-on” with the research process through interactive labs and demonstrations. Over the course of the semester, you will develop and receive feedback on a research proposal, which will serve as a foundation for the spring course “Design and Analysis for Experimental Psychology”.
Area: Writing Intensive

AS.200.201. Design & Statistical Analysis for Psychology. 4 Credits.
The goal of this course is to expose you to the processes of data collection, analysis, and dissemination in psychology. This course is the follow-up to “Research Methods in Experimental Psychology,” and therefore will draw on the methodological principles and practices covered in the Fall semester. This course will cover a wide array of analytical techniques (i.e., statistics) that you will apply to data collected as part of a semester-long group research project. The course will also include extensive coverage of the R programming language for use in data management, analysis, and visualization. With your group members, you will collect primary research data, carry out appropriate statistical tests, compose individual research manuscripts, and collectively present a poster at an on-campus research symposium. In combination with the Fall course, this class will serve as strong preparation for those considering honors theses, joining research labs at Homewood and/or JHMI, conducting independent research projects, and ultimately pursuing careers/graduate work in experimental psychology.
Area: Writing Intensive
AS.200.200 (was AS.200.207)

AS.200.202. Forensic Psychology. 3 Credits.
The field of forensic psychology is focused on answering legal questions about the causes of human behavior. This survey course will explore the work that forensic psychologists do; their research, assessment, and clinical methods; and how their work influences lawyers, judges, and other legal practitioners. Specific topics will include mental capacity assessment, psychopathy, claims of mental distress, child custody evaluations, juvenile delinquency, forensic treatment, and forensic neuropsychological assessments.
Students can only receive credit for AS.200.202 or AS.200.325, not both.

AS.200.205. Psychological Profiling. 1 Credit.
“Psychological Profiling” focuses on strengths and limitations of psychological methods employed by forensic professionals who assist police in criminal investigations. Clinical cases of serial offenders, spree killers, disgruntled employees, police profiling, and terrorists will be studied. Legal and ethical issues will be explored, especially racial profiling controversies. We anticipate visits to the FBI Behavioral Sciences Unit at Quantico, Virginia; Baltimore County Forensic Crime Lab (with emphasis on crime scene analysis), and the Baltimore Police Profiling Program.This course does not count towards the psychology major.

AS.200.208. Animal Behavior. 3 Credits.
This course examines how and why animal behaviors are produced across the animal kingdom. Neurobiological, hormonal and developmental mechanisms and adaptive function of behaviors are examined in an evolutionary context. Behaviors include survival, acquiring food, reproduction, communication, parental care, and cooperation. Students will also learn how to develop hypotheses and predictions for scientific questions and interpret graphical results.
AS.200.141 OR Permission of Instructor.

AS.200.209. Personality. 3 Credits.
This is a survey course focused on theory and research on human personality. Topics include personality traits, motivation, unconscious processes, self-regulation, cognitive and behavioral aspects of personality, biological and evolutionary influences on personality, and dysfunctional manifestations of personality.

AS.200.211. Sensation & Perception. 3 Credits.
This course surveys how stimuli from the environment are transformed into neural signals, and how the brain processes those signals to interpret the objects and events in the world. A primary focus will be on the visual system, with additional coverage of hearing, touch, taste, and smell.

AS.200.212. Abnormal Psychology. 3 Credits.
A survey of the major syndromes of psychological disorders. Research and theory about the mechanisms, development, and diagnosis of psychopathology are emphasized.

AS.200.222. Positive Psychology. 3 Credits.
The course will review the growing field of positive psychology and will review the research on positive human attributes such as optimism, happiness, hope, resiliency, self-esteem, altruism, empathy, and forgiveness. This course will explore the research on how such positive attributes are developed and how they relate to psychological and physical well-being.

AS.200.240. Industrial and Organizational Psychology. 3 Credits.
This course provides a survey of the field of Industrial and Organizational Psychology, a scientific discipline that studies human behavior in the workplace. The course focuses on understanding the psychological bases of work behaviors, cognitions, and emotions and practices that can be implemented to create a good fit between employees’ characteristics and work demands. A number of topics are addressed in the scientist-practitioner model, including the structure/characteristics of jobs, techniques for assessing and supporting employee performance, selecting and training a workforce, and the various mechanisms that influence employee motivation and attitudes, among other topics. Real-world applications and research are emphasized throughout the course.

AS.200.250. Behavioral Neuroscience. 3 Credits.
Behavioral neuroscience is the study of the neural basis of behavior of animals, including humans. This course will introduce the student to this field using a traditional lecture format. We will cover fundamental properties of brain structure and function, mechanisms of psychoactive drug action, and brain mechanisms of perception, homeostatic drives, learning and memory, and cognition. Along the way, we will touch on the biological bases for social interactions, as well as for behavioral and mental illnesses, such as addiction, depression and schizophrenia. A key focus will be understanding how behavioral neuroscientific research, past and present, leads to knowledge in this area.

AS.200.301. History Of Psychology. 3 Credits.
A survey of leading figures, schools, and systems in the history of psychology. The course will emphasize the development of experimental psychology in late 19th century Germany and its establishment in America at Johns Hopkins, Harvard, Chicago, and Columbia. Special topics will include the development of clinical and applied psychology and psychological testing. Enrollment limited to Juniors and Seniors only. Sophomores with instructor approval. Recommended Course Background: two prior Psychology courses.

AS.200.304. Neuroscience of Decision Making. 3 Credits.
This course will survey the neural mechanisms of decision-making. Current experimental research and theory concerning selection, control, and evaluation of actions are examined in humans and animals. Topics will range from simple perceptual judgements to complex social behavior. The course involves a weekly lecture about a specific topic followed by a student presentation of a current research paper. Cross-listed with Neuroscience.
AS.080.305 AND AS.080.306 or instructor permission

AS.200.305. Advanced Seminar in Forensic Psychology. 3 Credits.
Forensic psychologists determine clinical diagnoses and offer expert opinions to assist court decision makers who must employ legal tests to make case determinations. This course will explore how forensic psychologists communicate with the courts via consultation, report writing, and expert testimony. Students will write forensic analyses on a variety of controversial, cutting edge forensic topics (e.g., for competence to stand trial, child abuse, civil commitment, compensation for mental injuries, sex offender commitment, insanity, fitness for duty, child custody). Prerequisites: AS.200.202 OR AS.200.212
Area: Writing Intensive
AS.200.202 OR AS.200.212

AS.200.307. Medical Psychology. 3 Credits.
Medical Psychology is a specialization within clinical psychology that focuses on the application of psychological theories, research, and techniques to physical health problems and health promotion. Students will learn about the consultation process and interventions used in medical psychology practice to improve the physical and psychological health of medical patients, including those with chronic conditions (e.g., chronic pain, heart disease) and those with acute illnesses and injuries. Enrollment limited to Junior & Senior Psychology Majors & Minors or with instructor approval. Prerequisite: AS.200.212
AS.200.212

AS.200.311. Sensory Representations in the Brain: Maps, Modules, & Distributed Coding. 3 Credits.
In this course we will explore the ways in which information from vision, hearing, touch, smell, and taste is encoded in the brain. We will compare and contrast different representation schemes and their computational advantages in order to uncover some overarching organizing principles of sensory processing in the brain. Class meetings will consist of lectures plus group discussions of classic papers in cognitive neuroscience, computational modeling, and neurophysiology. Enrollment limited to Juniors & Seniors.
AS.200.211 OR AS.080.203 OR AS.050.203 OR AS.200.141 OR AS.020.312

AS.200.312. Substance Use and Mental Health. 3 Credits.
This course focuses on the intersection of substance use and mental health. Topics will include substance use disorders, the co-morbidity of substance use disorders and other mental health diagnoses, and substance use as a form of self-medication for mental health symptoms. We will explore abuse of substances including synthetic drugs, "street" drugs, and commonly abused prescription medications. We will review etiological factors, including psychological, neurobiological, genetic, and trauma-related factors, as well as evidenced-based treatments. We will also explore controversies about the diagnosis and conceptual models of substance use disorders and addiction and controversial treatments, such as methadone and suboxone. Psychology majors & minors or by permission of the instructor. Pre-requisite: AS.200.212 Abnormal Psychology, or by instructor permission.
AS.200.212

AS.200.313. Models of Mind and Brain. 3 Credits.
This is a seminar surveying computational approaches to understanding mental and neural processes, including sensory and conceptual representation, categorization, learning and memory. The course will also develop familiarity with computational tools such as numerical simulation, linear transformation and data visualization. Recommended Course Background: AS.110.106 / Calculus I OR AS.110.108 Calculus I, AS.050.101 / Cognition OR AS.200.211 / Sensation & Perception OR AS.080.105 / Introduction to Neuroscience OR other introductory coursework in cognitive & neural sciences. Experience with at least one programming language is strongly recommended.

AS.200.317. Interpersonal Relations. 3 Credits.
This course will investigate interpersonal processes ranging from attraction and courtship to relationship functioning and distress. Enrollment limited to Psychology majors and Psychology minors.
AS.200.133

AS.200.321. Child and Adolescent Psychopathology. 3 Credits.
This course focuses on mental disorders in children and adolescents. The course begins with an exploration of the general models and theories for why psychopathology occurs in childhood. The second portion of the course provides a systematic review of the symptoms, course, risk factors, theories, and treatments for specific disorders, including mood disorders, anxiety disorders, autism, ADHD, feeding disorders, and behavioral disorders. Restricted to Junior & Senior Psychology Majors & Minors, or permission of the instructor.
AS.200.212

AS.200.322. Clinical Neuropsychology. 3 Credits.
Clinical Neuropsychology is a clinical psychology specialty focused on assessment and treatment of acquired or developmental disorders of the nervous system, including dementia, neurodegenerative disorders, traumatic brain injury, learning disabilities, and neurodevelopment disorders. This course will focus on research findings and techniques used by psychologists in the assessment, treatment, and rehabilitation processes. Recommended Course Background: AS.200.141 / Foundations of Brain Behavior Cognition.
AS.200.141

AS.200.323. Psychology and Social Media. 3 Credits.
This course explores modern-day social media use (e.g., Facebook, Match.com) through multiple theoretical lenses within psychology. Through weekly student-led discussions and readings, it will accomplish 3 aims: 1) applying psychology of identity, motivation, and communication to social media (e.g., self-presentation, intergroup dynamics), 2) investigating clinical/health implications of social media use (e.g., addiction, loneliness), and 3) exploring social media as data-gathering environments (e.g., user experience research from already committed guest-speakers who work in social media industries). Recommended Course Background: at least 1 course in introductory psychology, developmental psychology, social psychology and/or clinical psychology.

AS.200.326. Law, Psychology and Public Policy. 3 Credits.
An introduction to applications of psychological research in policy analysis. Special emphasis is given to the use and misuse of psychology in Supreme Court advocacy and decision making in the areas of children's rights, adult sexuality, and educational and employment opportunity. Recommended Course Background: Statistics & Regression Analysis

AS.200.329. Real World Human Data: Analysis & Visualization. 3 Credits.
Experiments in human cognition typically involve careful manipulation and control of variables in order to answer specific questions about the mind or brain. However, digital devices now provide an ocean of incidental human data: information collected continuously about our behavior and physiological states as we go about our lives. These incidental datasets are often large and noisy, and pose different analysis and visualization challenges from more traditional manipulated experiments. In this course students will learn computational tools and qualitative approaches for exploring, visualizing and interpreting large human data. The course emphasizes computer-based analysis of open-source human behavioral and neuroimaging datasets. Analyses will be conducted in MATLAB. Instructor will grant approval as long as you have previous programming experience (roughly equivalent to material covered in an introductory-level programming course). Self-taught or real-world experience can be applicable in lieu of previous formal classroom instruction.

AS.200.330. Human and Machine Intelligence. 3 Credits.
Description: The class will discuss original papers in a variety of papers and book chapters on the following topics.1. What is intelligence?2. Origin and evolution of intelligence?3. Human brain and intelligence4. Machine intelligence5. Neural networkRecommended course background: neurobiology.

AS.200.332. Seminar in Theoretical Neuroscience. 3 Credits.
This course develops a theoretical understanding of the large-scale anatomical and functional organization of the cerebral cortex. We will discuss, present, and write about primary literature in the area of theoretical neuroscience. The principles to be explored will include: hierarchy; normalization; pattern completion; prediction; gradient-based learning; and conjunctive representation. We will consider the broader motivation for each of these computational principles, and we will ask how successfully they organize the empirical data about our brains. Specific questions include: What are the functional benefits of a hierarchical anatomical organization of the cerebral cortex? Do neocortical circuits generically implement a normalization operation? How and why is pattern completion implemented in the neocortex and the hippocampus? Can gradient-based representational learning occur in the cerebral cortex without supervision or reinforcement signals? How is the flow of information between brain regions regulated? How can distinct cortical representations be "bound" into joint representations? Calculus 1 or equivalent is required. Higher-level mathematics and programming experience are not required, but students should be willing to engage with computational concepts. Recommended Course Background: AS.200.110 OR AS.050.203 OR AS.200.211 OR AS.080.105 OR other introductory coursework in cognitive & neural sciences.
AS.110.106 OR AS.110.108

AS.200.333. Advanced Social Psychology. 3 Credits.
The class is designed as a seminar including discussion of primary readings of social psychology articles ranging in topics from interpersonal relationship to behavior in large groups. Rising junior & senior Psychology majors only.
AS.200.133

AS.200.334. Human Memory Psychology. 3 Credits.
This class will survey the behavioral and biological science of human memory. Historical perspectives as well as modern controversies will be discussed. Intersections with other fields such as law, education, medicine, and technology will be highlighted. The course will be a mixture of lectures and group discussions.

AS.200.337. Origins of the Social Mind. 3 Credits.
Humans possess remarkable capacities for morality, politics, and culture. But where do these capacities come from and what cognitive mechanisms support them? In this seminar, we will take comparative and developmental perspectives to understand the origins of the social mind. We'll explore how nonhuman animals, especially primates, represent and navigate their social worlds, and what makes the human mind unique. We'll also explore the earliest manifestations of social intelligence that are present in human infancy, allowing babies to richly experience the social world long before they develop language. We'll cover a range of topics, such as the abilities to remember other individuals and keep track of their social relationships and social groups, theory of mind, self-awareness, precursors of politics and morality, and the question of whether animals have culture. Enrollment limited to Junior & Senior Psychology, Neuroscience or Behavioral Biology majors/minors. Prerequisite: 200.132 Intro to Dev. Psych OR 200.133 Intro Social Psych OR 200.110 Intro Cog. Psych OR 200.141 Foundations of BBC OR instructor approval
AS.200.132 OR AS.200.133 OR AS.200.110 OR AS.200.141

AS.200.340. Diversity in Psychology. 3 Credits.
This course presents an overview of the nature of human diversity in psychology and fosters the critical examination of major diversity issues in psychology. Conceptual, historical, philosophical, and theoretical issues and empirical research are reviewed. Students develop sensitivity and critical thinking regarding issues in psychology research and professional practice that may be influenced by factors such as age, generational influence, ethnicity, race, religion and spirituality, gender, socioeconomic class, sexual orientation, national origin, disability and other cultural diversity topics. Current issues will be highlighted. Students will also be introduced to public health paradigms regarding the changing roles of psychology researchers and practitioners. This course is limited to Senior Psychology Majors and Minors. Junior Psychology Majors and Minors can request to enroll by instructor permission.

AS.200.344. Behavioral Endocrinology. 3 Credits.
This course examines both the evolution and mechanisms of hormonal effects on behavior across animals, including humans. Topics will include the effects of hormones on sexual differentiation, reproductive behavior, parental behavior, stress and social behavior. Additionally, this course emphasizes developing skills in hypothesis testing and critically assessing the scientific literature. Cross-listed with Behvioral Biology and Neuroscience.
(AS.200.141 OR AS.080.306) OR (AS.020.151 AND AS.020.152) or instructor's permission

AS.200.350. Why is thinking hard?. 3 Credits.
In what ways and why is human cognition limited? This seminar will focus on understanding and explaining the limitations and capabilities of human cognition through deep dives into a number of subtopics. Possible topics include: What is 'intelligence,' does it have quantifiable units and/or a substance-like underpinning. Why does thinking feel hard, why and how do we experience mental effort? What limits visual attention and working memory? Where does insight come from? Why do we forget things? What is creativity? What makes some concepts hard to learn? Why do we misunderstand science? How do we evaluate our own knowledge and understanding?
AS.200.110

AS.200.357. Advanced Statistical Methods. 3 Credits.
Topics in applied probability and statistical inference; analysis of variance; experimental design. Recommended Course Background: one statistics course.

AS.200.358. Advanced Research Design and Analysis. 3 Credits.
Second half of statistics sequence, covering complex research design and analysis. Recommended Course Background: AS.200.357. Enrollment limited to seniors by instructor approval.
AS.200.357

AS.200.361. Tests & Measurements. 3 Credits.
Psychological tests and measures are used in several settings including research, clinical, business, forensic, school and other applied settings. This course will consider the methodological and practical issues involved in test construction, the evaluation of instruments, and the uses of psychological tests across settings and for different purposes. Examples of assessments that may be discussed are aptitude and achievement tests; personality and behavioral inventories; neuropsychological tests, observations and interviews; and tests for employment and forensic use. Enrollment limited to Junior & Senior Cognitive Science & Psychology Majors, or instructor approval.
AS.200.201

AS.200.369. Neuroscience of Motivation & Reward. 3 Credits.
This course will explore the neurobiological bases of motivated behavior, including eating, drinking, and reproduction, tracing the history of our understanding from early neuroscientific studies to the modern day, with a focus on mammalian model systems. We will discuss innate motivated behaviors, and well as how learning can guide the expression of these behaviors. Neural mediation of processes such as reward and aversion will be considered in depth, as will applications of these findings to the understanding of addiction and other behavioral disorders. The course will be a mixed lecture/seminar format; we will read original research articles and scholarly reviews.
Students may not have taken AS.200.366.;AS.080.305;AS.080.306 (students may enroll concurrently)

AS.200.370. Functional Human Neuroanatomy. 3 Credits.
This course examines the general organizing principles of the anatomy of the human central nervous system and how this anatomical organization relates to function, from the level of neural circuits, to systems, to behavior. Students will learn to identify neuroanatomical structures and pathways in dissections and MRI images through computerized exercises. Readings and lectures will emphasize general structure-function relationships and an understanding of the functional roles of particular structures in sensory, motor, and cognitive systems. Recommended Course Background in addition to pre-requisite AS.080.305: AS.080.306 OR AS.050.203 OR AS.080.250
AS.080.305

AS.200.374. Happiness and Psychological Well-Being. 3 Credits.
This course will cover advances in the field of research on positive psychology, happiness, and well-being, including perspectives on motivational and emotional wellness, cognitive processes, social-interpersonal dynamics, and sociocultural variables. We will explore topics including hobbies and leisure, mindfulness and meditation, money/income, ethics and religion, social media, marriage, friendship, economic institutions, school, the workplace, and more. Coursework includes reflection exercises, discussions, research proposals, fact-checking analyses, and presentations. Restricted to Senior & Junior Psychology majors & minors. Prerequisite: (AS.200.133 OR AS.200.101) AND (AS.200.212 OR 200.382) AND 200.222 or by instructor permission.
(AS.200.133 OR AS.200.101) AND (AS.200.212 OR AS.200.382) AND AS.200.222

AS.200.376. Neuropsychopharmacology. 3 Credits.
Designed to provide information about how drugs affect the brain and behavior. The course focuses on biological concepts underlying structures and functions of the brain that relate to mental disorders. An introduction to neurobiology and brain function is presented as it applies to the interaction of various classes of drugs with the individual neurotransmitter systems in the brain. A brief historic review is followed by a discussion of clinical relevance. Cross-listed with Behavioral Biology and Neuroscience. Enrollment limited to juniors and seniors.
(AS.080.305 AND AS.080.306) OR AS.020.306 AND AS.020.312) OR (AS.200.141 AND AS.020.306)

AS.200.377. Neuroethology. 3 Credits.
A comparative and evolutionary approach to understanding the neural underpinnings of biologically relevant behaviors in vertebrate and invertebrate animals. Enrollment limited to Sophomores, Juniors, Seniors or by instructor approval. Recommended Course Background: AS.200.141

AS.200.380. Neurobiology of Human Cognition. 3 Credits.
The complexity of human behavior surpasses even our closest primate relatives. Only humans communicate through language, build complex technology, devise legal system and wage war. What neurobiological capacities set humans apart from other animals? This course will explore the neurobiology of cognition, focusing on cognitive domains that are particularly developed in the human species: language, social cognition, number, executive function and concepts. The course format will consist of lectures and in class workshops.
AS.200.141 OR AS.200.312 OR AS.080.105 OR AS.080.203 OR AS.050.203 OR AS.050.312

AS.200.382. Models of Psychotherapy. 3 Credits.
This course reviews the major models of psychotherapy, including psychodynamic, cognitive, behavioral, interpersonal, and family therapy, with a focus on modern and empirically supported treatments. The application of the models through the analysis of clinical case studies is emphasized. Restricted to Junior & Senior Psychology Majors. Instructor permission required to enroll.
Area: Writing Intensive
AS.200.212

AS.200.385. Mind, Brain & Experience. 3 Credits.
How do nature and nurture shape the human mind? How does experience contribute to the development of visual perception, language and social reasoning? This course explores insights into these age-old questions from neuroscience and psychology. Studies of infant behavior reveal rich knowledge about objects and people in the first months of life. At the same time, experience has profound effects on behavior and neurobiology. For example, temporary absence of vision (i.e. blindness) during development permanently alters visual perception and the visual cortex. Key evidence also comes from studies of naturally occurring variation in human experience (e.g. blindness, deafness, socioeconomic and cultural differences). We will discuss what such studies of cognitive and neural function tell us about the origins of human cognition. This is a writing intensive course with weekly lectures and seminar style discussion of primary sources. Students will be required to write weekly responses to readings and a term paper.
Area: Writing Intensive
AS.200.141 OR AS.050.105 OR AS.080.105 OR AS.050.203 OR (AS.080.305 AND AS.080.306) OR AS.080.203

AS.200.388. Occupational Health Psychology. 3 Credits.
Occupational Health Psychology (OHP) concerns the application of psychology to improving the quality of work life, and to protecting and promoting the safety, satisfaction, health, and well-being of workers. This course will consider a broad range of topics in OHP including the role of work on well-being, job stress and burnout, diversity and work, safety climate, work-family balance, conflict, and counterproductive work behaviors. The emphasis will be on drawing connections between OHP theory and OHP practice and at the relationship between individual and organizational health and well-being. This class should be of interest to students interested in industrial/organizational psychology, social psychology, health psychology, clinical psychology, human factors, public health, preventive medicine, and industrial engineering.
AS.200.240 or instructor permission

AS.200.401. Careers in Psychology - Freshmen. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.402. Careers in Psychology - Sophomore. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.403. Careers in Psychology - Juniors & Seniors. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.404. Careers in Psychology - Seniors. 1 Credit.
An introduction to the varied career paths offered across the field of psychology, hosting a diverse representation of speakers from various Johns Hopkins institutions and the local Baltimore community.

AS.200.431. Neural Systems & Behavior. 1 Credit.
Discussion of research activities in the Neural Systems and Behavior Lab. Discussion of research activities in the Neural Systems and Behavior Lab. This course is only available for undergraduate students currently working on research projects in the Moss Lab.

AS.200.450. Undergraduate Teaching Assistant in Psychology. 1 - 3 Credits.
Qualified students can serve as undergraduate Teaching Assistants for psychology courses they have already taken at Hopkins (by faculty instructor invitation only). Each individual faculty instructor will determine TA responsibilities based upon departmental policy. Upon invitation, potential Teaching Assistants should forward the instructor invitation to the co-Director of Undergraduate Studies (Dr. Drigotas) and make a request in SIS to add the course using the instructor's section number (e.g., 200.450 section 2). Dr. Drigotas will be approving requests in SIS.

AS.200.515. Psychological Research. 1 - 3 Credits.
The student chooses a research problem with the advice and approval of a faculty member. S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.525. Psychology Internship. 1 - 3 Credits.
S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.530. Independent Study in Psychology. 1 - 3 Credits.
S/U grading only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.545. Psychological Readings. 1 - 3 Credits.
Psychological Readings represents an in-depth analysis of a psychological subject area not typically covered in departmental course offerings. Students must have the support of a full time faculty sponsor and work with them to plan a curated set of readings and activities for the semester.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.200.613. Fundamentals of Biopsychology.
This is a required course for all first year PhD students in the Department of Psychological and Brain Sciences. The course covers foundational concepts and methods in neurobiology and cognitive neuroscience.

AS.200.617. Fundamentals of Cognitive Psychology.
This is a required course for all first year PhD students in the Department of Psychological and Brain Sciences. The course covers foundational concepts and methods in cognition.

AS.200.650. Why is thinking hard?.
In what ways and why is human cognition limited? This seminar will focus on understanding and explaining the limitations and capabilities of human cognition through deep dives into a number of subtopics. Possible topics include: What is 'intelligence,' does it have quantifiable units and/or a substance-like underpinning. Why does thinking feel hard, why and how do we experience mental effort? What limits visual attention and working memory? Where does insight come from? Why do we forget things? What is creativity? What makes some concepts hard to learn? Why do we misunderstand science? How do we evaluate our own knowledge and understanding?

AS.200.654. Psychological & Brain Sciences Core Topics A.
This course is designed to introduce students to core topics in psychological and brain sciences. Students will read seminal and contemporary papers in topics that cover the breadth of the field. Graduate students in Psychological and Brain Sciences.

AS.200.655. Psychological & Brain Sciences Core Topics B.
This course is designed to introduce students to core topics in psychological and brain sciences. Students will read seminal and contemporary papers in topics that cover the breadth of the field. Graduate Students in Psychological & Brain Sciences.

AS.200.657. Advanced Statistical Methods.
Topics in applied probability and statistical inference; analysis of variance; experimental design. Intended for graduate students.
Recommended Course Background: one statistics course.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR AS.280.345 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

AS.200.658. Advanced Research Design and Analysis.
Second half of graduate statistics sequence, covering complex research design and analysis. Recommended Course Background: AS.200.657. Enrollment limited to seniors by instructor approval and graduate students.

AS.200.659. Quantitative Methods for Brain Sciences.
Focuses on frequently used quantitative methods in the study of brain sciences. Course goals include gaining conceptual understanding of analysis techniques, application of techniques to datasets, and learning the use of MATLAB. Topics will include dimensionality reduction, information theory, clustering and classification, optimization and model selection, and frequency domain methods. Enrollment is limited to graduate students and undergraduate seniors; seniors must receive permission from the instructor to enroll. Recommended (but not required) Course Background: Probability & Statistics, Linear Algebra, MATLAB programming.

AS.200.661. Topics in Psychological & Brain Sciences.
An introduction to postdoctoral activities (e.g., grant applications, journal article submission, meeting presentations, the politics of psychology and American science) for Ph.D. candidates in psychology.

AS.200.662. Psychological and Brain Sciences: Career Development.

AS.200.670. Advanced Seminar in Vision.
This seminar will cover advanced topics in vision from the perspectives of several disciplines.Topics include human visual psychophysics, perception and cognition, and computational vision. Graduate students only.

AS.200.680. Psychological & Brain Sciences Seminar.

AS.200.800. Psychology Research - Summer.

AS.200.808. Readings: Current Research in Cognitive Aging.
Guided independent readings. The class is designed as a seminar including discussion of primary research articles of cognitive aging. Specific topics include human imaging and animal models of memory, aging, and neurodegenerative disease.

AS.200.810. Research In Psychology.
Students plan and execute original research under guidance of advisers. Results are usually prepared in a form suitable for publication. Graduate students only.

AS.200.817. Cognitive Seminar.

AS.200.825. Biopsychology Seminar.
Graduate students only.

AS.200.830. Research Seminar in Psychological & Brain Sciences.
TBA

AS.200.848. Current Advances in Psychological and Brain Sciences.
Introduces advanced research topics to graduate students (as well as faculty) through a series of speakers and discussions.

AS.200.849. Teaching Practicum.
All candidates are required to obtain special experience in various aspects of undergraduate teaching. Graduate students only.

AS.200.850. Advanced Teaching Practicum.

AS.200.860. Dissertation Preparation.
TBA

AS.210 Modern Languages & Literature

AS.210.101. French Elements I. 4 Credits.
Provides a multi-faceted approach to teaching language and culture to the novice French student. The first semester emphasizes listening and speaking, while laying the foundation in grammar structures, reading, and writing. This course is designed for true beginners: Students with any previous background must take the placement test (https://advising.jhu.edu/student-roadmap/freshmen/placement-exams/french/). May not be taken on a Satisfactory/Unsatisfactory basis. Contact: Claude Guillemard (cguille1@jhu.edu)

AS.210.102. French Elements II. 4 Credits.
The second semester of this intensive course for beginners provides students with the linguistic tools to read excerpts from a play (Antigone by Jean Anouilh), to polish a written autobiography, and to perform short oral skits. A variety of cultural materials help students acquire grammatical structures and expand their vocabulary.May not be taken on a Satisfactory/Unsatisfactory basis.
AS.210.101 or AS.210.103 or appropriate score on the placement exam (https://advising.jhu.edu/student-roadmap/freshmen/placement-exams/french/). Contact: Claude Guillemard cguille1@jhu.edu)

AS.210.103. Learner Managed French Elements I. 3 Credits.
This beginner course is specifically designed for students who have had some exposure to French. They must take the mandatory placement test: http://www.advising.jhu.edu/placement_french.php, and receive between 30 and 49. They will cover the first semester of French Elements at a pace suited for "false beginners" with major online components to supplement class instruction. Must complete the year with 210.102 to obtain credit. May not be taken on a Satisfactory/Unsatisfactory basis.

AS.210.105. Fast-Track Beginning French. 4 Credits.
This beginning French course is a fast-paced, intensive introduction to the French language and the culture of France and the French-speaking world, covering the content of French Elements 1 and 2 (AS 210.101-102) but in one semester. As such, it is meant for students who have some previous classroom or independent study of French (as assessed by a placement exam), or who are native or bilingual speakers of another Romance language. Classroom activities will emphasize spoken communication on a variety of topics, using relevant vocabulary and grammar. Extensive use of online resources outside of class will build skills in listening, reading, and writing. Completion of this class will allow students to enroll in Intermediate French 1 (AS 210.201).

AS.210.106. Italian through Food. 3 Credits.
This beginner's course will help you develop foundational linguistic skills in Italian while offering an overview of Italian food cultures, both past and present. By the end of this course, you will be able to navigate everyday situations (e.g. ordering a meal at a restaurant, describing your favorite dishes, talking about likes and dislikes) entirely in Italian, and will develop an appreciation for the history of Italian cuisine. Upon completion of this course, students are encouraged to enroll in AS210.152 (Italian Elements II) in the Spring term. Advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese) are encouraged to enroll in AS.210.175 (Accelerated Italian for Speakers of Other Romance Languages I). Open to first-year students only.
Students who are taking/who took AS.210.151 or higher Italian language course are not allowed to register.

AS.210.111. Spanish Elements I. 4 Credits.
This is an introductory Spanish language course. On completion of this course, the students will have acquired the basic communication and grammatical skills necessary for speaking, writing, listening and reading in Spanish. Students will demonstrate these skills through their performance in class, by completing several online assignments, and by taking part in three group presentations in addition to two comprehensive exams which focus on the following thematic topics: Greetings, University Life, Family and Leisure. Students will also be introduced to the culture, history and geography of various Spanish and Latin American countries. The content covered in Spanish Elements 1 is the foundation for all consecutive Spanish courses. A placement exam is required to ensure the appropriate level. Your enrollment in Spanish Elements I will not be considered for approval until you have emailed the Spanish Language Director.

AS.210.112. Spanish Elements II. 4 Credits.
This introductory Spanish language course is a continuation of the content covered in Spanish Elements I. On completion of this course, the students will have further developed the communication and grammatical skills necessary for speaking, writing, listening and reading in Spanish. Students will demonstrate these skills through their performance in class, by completing several online assignments, and by taking part in three group presentations in addition to two comprehensive exams which focus on the following thematic topics: Food, Sports, Shopping, Travel, and Health. Students will also be introduced to the culture, history and geography of various Spanish and Latin American countries. The content covered in Spanish Elements II prepares the students for Intermediate Spanish.May not be taken satisfactory/unsatisfactory. No new enrollments permitted after 4th class session.Prerequisite: AS.210.111 or appropriate placement exam score.
AS.210.111 or Spanish placement exam score.

AS.210.120. Elementary Modern Hebrew. 3 Credits.
Elementary Modern Hebrew is the first exposure to the language as currently used in Israel in all its functional contexts. All components of the language are discussed: reading, writing, listening, and speaking. Simple idiomatic sentences and short texts in Hebrew are used. Students learn the Hebrew alphabet, words and short sentences. Cultural aspects of Israel will be intertwined throughout the course curriculum.

AS.210.121. Modern Hebrew for Beginners II. 3 Credits.
Hebrew for Beginners 106 is a continuation of Hebrew 105 and as such, students are required to have a foundation in Hebrew. The course will enhance and continue to expose students to Hebrew grammar, vocabulary, and syntax. All components of the Hebrew language will be emphasized in this course; we will highlight verbs, adjectives, and the ability to read longer texts. Speaking in Hebrew will also be highlighted to promote students' engagement and communication. Cultural aspects of the language will be incorporated into lessons as well.
AS.384.115 OR AS.210.120

AS.210.151. Italian Elements I. 4 Credits.
This course sequence (AS.210.151 and AS.210.152) is an introduction to Italian for students with no previous exposure to the language. By the end of the academic year, you will be able to meet basic needs in an Italian-only environment. Examples include introducing yourself, asking for and giving directions, ordering a meal at a restaurant, describing and asking information about places and people, and engaging in a simple phone conversation. Advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese) are encouraged to enroll in AS.210.175 (Accelerated Italian for Speakers of Other Romance Languages I)

AS.210.152. Italian Elements II. 4 Credits.
Course helps students develop basic listening, reading, writing, speaking, and interactional skills in Italian. The content of the course is highly communicative, and students are constantly presented with real-life, task-based activities. Course adopts a continuous assessment system (no mid-term and no final). May not be taken Satisfactory/ Unsatisfactory. No previous knowledge of Italian is required.
AS.210.151 OR AS.210.106 or Placement Exam Part I.

AS.210.161. German Elements I. 4 Credits.
Four-skills introduction to the German language and culture. Develops proficiency in speaking, writing, reading and listening skills through the use of basic texts, multi-media and communicative language activities. Online tools required. May not be taken on a satisfactory/unsatisfactory basis. Tuesday section is a mandatory hour.

AS.210.162. German Elements II. 4 Credits.
Continuation to the introduction to the German language and a development of reading, speaking, writing & listening through the use of basic texts and communicative activities. The culture of the German-language countries is also incorporated into the curriculum. May not be taken on a S/U basis. Prerequisites: AS.210.161 or Placement Exam. Tuesday hour is mandatory.
AS.210.161 or appropriate score on placement exam.

AS.210.163. Elementary Yiddish I. 3 Credits.
Year-long course. Includes the four language skills, reading,writing, listening, and speaking, and introduces students to Yiddish culture through text, song, and film. Emphasis is placed both on the acquisition of Yiddish as a tool for the study of Yiddish literature and Ashkenazic history and culture, and on the active use of the language in oral and written communication. This class will be using In Eynem, the brand new Yiddish language program from the Yiddish Book Center.Cannot be taken Satisfactory/Unsatisfactory.

AS.210.164. Elementary Yiddish II. 3 Credits.
Year-long course that includes the four language skills--reading, writing, listening, and speaking--and introduces students to Yiddish culture through text, song, and film. Emphasis is placed both on the acquisition of Yiddish as a tool for the study of Yiddish literature and Ashkenazic history and culture, and on the active use of the language in oral and written communication. Both semesters must be taken with a passing grade to receive credit. Recommended Course Background: AS.210.163 or instructor permission.

AS.210.171. Accelerated Italian Elements I for Advanced Spanish Speakers. 4 Credits.
This course sequence is designed for advanced speakers of other romance languages (e.g. French, Spanish, Portuguese), and will cover the same material as the regular-track Italian Elements I and II and Intermediate Italian I and II courses. Upon completion of both semesters, students will be allowed to register for AS210.351 (Advanced Italian I).

AS.210.172. Accelerated Italian Elements II for Advanced Spanish Speakers. 4 Credits.
Course draws on the many similarities between Spanish and Italian to help students develop basic listening, reading, writing, speaking, and interactional skills in Italian in an accelerated fashion. The content of the course is highly communicative, and students are constantly presented with real-life, task-based activities. Course is taught in Spanish and Italian. Students successfully completing the course with a grade of A- or higher will be allowed to place into Advanced Italian I (AS210.351)
AS.210.171 with a grade of A- or higher.

AS.210.175. Accelerated Italian for Advanced Speakers of other Romance Languages. 3 Credits.
This course sequence (AS210.175 and AS210.176) is designed for advanced speakers of other Romance languages (e.g. French, Spanish, Portuguese), and will cover the same material as the regular-track Italian Elements I and II (AS.210.151 and AS.210.152) and Intermediate Italian I and II (AS.210.251 and AS.210.252) courses. Upon successful completion of both semesters, students will be allowed to register for AS.210.351 (Advanced Italian I).

AS.210.176. Accelerated Italian for Advanced Speakers of other Romance Languages II. 4 Credits.
This is the second part of an elementary Italian language course sequence designed for advanced speakers of other romance languages (e.g. French, Spanish, Portuguese). This course will cover the same material as the regular-track Intermediate Italian I and II courses. Students completing this course with a grade of B or higher will be allowed to register for AS210.351 (Advanced Italian I) in the Fall term. Pre-requisite: Completion of AS.210.175 with a grade of B or higher, or Italian Language Program Director permission.
AS.210.175 with a B or higher

AS.210.177. Portuguese Elements I. 4 Credits.
This one-year course introduces students to the basic skills in reading, writing, and speaking the language. Emphasis is placed on oral communication with extensive training in written and listening skills. Class participation is encouraged from the very beginning. All classes are conducted in Portuguese. Students must complete both semesters with passing grades to receive credit. May not be taken on a Satisfactory / Unsatisfactory basis. No previous knowledge of Portuguese is required.

AS.210.178. Portuguese Elements II. 4 Credits.
This course expands students knowledge of the basic language skills: reading, writing, listening, speaking. It uses a multifaceted approach to immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa. The focus of the course is on oral communication with, however, extensive training in grammar. The course is conducted entirely in Portuguese. Lab work required. Students must complete both semesters with passing grades to receive credit.
AS.210.177 or equivalent score on placement test or instructor approval.

AS.210.201. Intermediate French I. 3 Credits.
This course develops skills in speaking, listening comprehension, reading, and writing.Systematic review of language structures with strong focus on oral communication and acquisition of vocabulary; extensive practice in writing and speaking; readings and films from French-speaking countries. Recommended Course Background: AS.210.102 or AS.210.104 or appropriate score on Placement test I.

AS.210.202. Intermediate French II. 3 Credits.
This course develops skills in speaking, listening comprehension, reading, and writing. Systematic review of language structures with strong focus on oral communication and acquisition of vocabulary; extensive practice in writing and speaking; readings and films from French-speaking countries. Recommended Course Background: AS.210.201 or permission of instructor (sroos@jhu.edu).

AS.210.211. Intermediate Spanish I. 3 Credits.
Intermediate Spanish I is a comprehensive study of Spanish designed for students who have attained an advanced elementary level in the language. The course is organized around a thematic approach to topics relevant to contemporary Hispanic culture. Students will practice the four language skills in the classroom through guided grammatical and creative conversational activities and through the completion of three comprehensive exams. Outside of class, students will complete extensive online assignments and write three major compositions (as part of the three exams). In addition, students will broaden their knowledge of Hispanic culture by viewing a Spanish-language film and by reading several literary selections. Successful completion of Intermediate Spanish I will prepare students for the next level of Spanish (Intermediate Spanish II).There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.112 or appropriate Spanish placement exam score.

AS.210.212. Intermediate Spanish II. 3 Credits.
Intermediate Spanish II is a comprehensive study of Spanish designed for students who have attained a mid-intermediate level in the language or who have completed Spanish 212. The course is organized around a thematic approach to topics relevant to contemporary Hispanic culture. Students will practice the four language skills in the classroom through guided grammatical and creative conversational activities and through the completion of three comprehensive exams. Outside of class, students will complete extensive online assignments and write three major compositions (as part of the three exams). In addition, students will broaden their knowledge of Hispanic culture by viewing a Spanish-language film and by reading several literary selections. Successful completion of Intermediate Spanish II will prepare students for the next level of Spanish (Advanced Spanish I).There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after September 13th.
AS.210.211 or appropriate Spanish placement exam score.

AS.210.220. Intermediate Modern Hebrew I. 3 Credits.
Intermediate Modern Hebrew enhances and enforces previous knowledge of Hebrew as acquired from previous foundational coursework and/or experience. Grammatical aspects of the language such as past and present tenses as well as combined and complex sentence syntax and construction would be applied. Reading comprehension and writing skills will be emphasized. Modern Israeli cultural links and facets of the Hebrew language will also be introduced to inform the holistic understanding of the modern language.
AS.384.116 OR AS.210.121 or equivalent

AS.210.221. Intermediate Modern Hebrew II. 3 Credits.
Intermediate Hebrew level II is a continuation of the course Hebrew 205 and as such is a requirement for entry. In the course, grammatical aspects of the language will be introduced in the focus of past and future tenses. Combined and complex sentences with proper syntax and reading comprehension and writing skills will be required. Modern Israeli cultural aspects of the Hebrew language will be introduced as well and will be part of the holistic understanding of the modern language.
AS.384.215 OR AS.210.220

AS.210.251. Intermediate Italian I. 3 Credits.
This course sequence (AS.210.251 and AS.210.252) will reinforce your ability to engage in complex daily tasks in Italian, and will introduce you to more formal academic and real-world topics. By the end of the academic year, you will be able to write a strong résumé and cover letter in the European format, sit a job interview in Italian, and participate in debates on simple topics. You will also read five engaging short stories, watch several Italian films, and discuss topics such as emigration and immigration from/to Italy, the protection of the environment, and the history of the Italian South.
AS.210.152 or placement exam.

AS.210.252. Intermediate Italian II. 3 Credits.
Taught in Italian. Course continues building on the four essential skills for communication presented in Intermediate Italian I (listening, speaking, reading, writing) on topics of increasing complexity. Course adopts a continuous assessment system. May not be taken Satisfactory/Unsatisfactory.
AS.210.251 OR appropriate placement exam scores (Parts I II).

AS.210.261. Intermediate German I. 3 Credits.
Taught in German. This course continues the same four-skills approach (speaking, writing, reading and listening) from the first-year sequence, introducing and practicing more advanced topics and structures. Expansion and extension through topical readings and discussion and multi-media materials. Online tools required. Prereq: 210.162 or placement exam. May not be taken on an S/U basis.
AS.210.162 or placement by exam.

AS.210.262. Intermediate German II. 3 Credits.
Taught in German. This course is designed to continue the four skills (reading, writing, speaking and listening) approach to learning German. Readings and discussions are topically based and include fairy tales, poems, art and film, as well as readings on contemporary themes such as Germany's green movement. Students will also review and deepen their understanding of the grammatical concepts of German. Prereq: 210.261 or placement exam May not be taken on an S/U basis.
AS.210.261 or placement by exam.

AS.210.263. Intermediate Yiddish I. 3 Credits.
For students who have completed one year of Yiddish language study or equivalent, this course will provide the opportunity to broaden and deepen their knowledge of Yiddish culture while continuing to improve their skills in reading, writing, listening and speaking Yiddish. Alongside textbook-based language work, students will read, listen to and interact with a variety of texts, for example literature, journalism and oral history.

AS.210.264. Intermediate Yiddish II. 3 Credits.
Continuation of Intermediate Yiddish I: this course will focus on the Yiddish language as a key to understanding the culture of Yiddish-speaking Jews. Topics in Yiddish literature, cultural history and contemporary culture will be explored through written and aural texts, and these primary sources will be used as a springboard for work on all the language skills: reading, writing, listening, and speaking.

AS.210.265. Individualized Yiddish Practicum. 3 Credits.
This course will allow students at any stage of Yiddish language acquisition to hone their skills in reading, writing, listening and speaking. The program will be individualized for each student according to his or her needs while at the same time providing joint activities in which all can participate.

AS.210.266. German Conversation. 1.5 Credits.
Taught in German. This course is designed for intermediate and above students who wish to improve their conversational and oral presentational language skills. The syllabus aims to provide useful, relevant language and necessary discourse structures to hold conversations and presentation on varied topics of an everyday, as well as academic nature. Students will practice German to build confidence, develop fluency and improve pronunciation and accuracy. Short texts, audio and films will provide the basis for discussion. Students fields of study and interests will be incorporated into the syllabus and tasks will be matched to the ability level of the students enrolled. Recommended course background: 210.262 or at least 3 semesters of college instruction or the equivalent. May be taken concurrently with other courses in German. May be taken S/U. Not for major or minor credit.

AS.210.267. German Across the Curriculum. 1 Credit.
Students in courses in History, CTL, Art History, Classics, Near Eastern Studies, WGS, and Philosophy augment their studies in those disciplines by reading short excerpts from the material assigned in the original German. The selected excerpts rotate among the disciplines, exposing students to a variety of texts and giving students the opportunity to collaborate across disciplines and acquaint themselves with the scholarly language in their respective majors and minors.

AS.210.275. Fast Portuguese for Spanish Speakers and speakers of other Romance Languages I. 4 Credits.
NO PREVIOUS KNOWLEDGE OF PORTUGUESE IS REQUIRED. This fast-paced one-semester course covers all content for Portuguese Elementary. This course is designed as an accelerated introductory course for speakers with a sound knowledge of Spanish OR other romance languages (e.g. French and Italian). The course will cover introductory aspects of Portuguese grammar and present relevant points of the cultures of the Portuguese speaking countries. Upon the successful completion of this course with a grade of C or higher, students may enroll in 210.277 Portuguese Intermediate. May not be taken on a Satisfactory / Unsatisfactory basis. No Prereq. THERE IS NO FINAL EXAM.

AS.210.277. Intermediate Portuguese I. 3 Credits.
Intermediate Portuguese I is designed for students who have attained an advanced elementary level in the language. The course offers training in the skills of the language with emphasis on expanding grammatical knowledge and vocabulary, while developing ease and fluency in the language through the use of a multifaceted approach. Course materials immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa, and reflect the mix of cultures at work in the contemporary Lusophone world. Upon the successful completion of Intermediate Portuguese I, students may enroll in the next level, Intermediate Portuguese II – AS.210.278. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.275 or placement test. THERE IS NO FINAL EXAM.
AS.210.178 or AS.210.275 or equivalent score on placement test or instructor approval.

AS.210.278. Intermediate Portuguese II. 3 Credits.
Intermediate Portuguese II is designed for students who have attained a mid-intermediate level in the language or completed Intermediate Portuguese I AS.210.277. The course offers training in the skills of the language with emphasis on advancing grammatical knowledge, expanding vocabulary, and developing fluency in the language through the use of a multifaceted approach. Course materials immerse students in the cultures of Brazil, Portugal, and Portuguese-speaking Africa, and reflect the mix of cultures at work in the contemporary Lusophone world. Successful completion of Intermediate Portuguese II will prepare students for the next level Advanced Portuguese I – AS.210.391. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.277 or placement test. THERE IS NO FINAL EXAM.
AS.210.277 or equivalent score on placement test or instructor approval.

AS.210.288. Portuguese: Conversation through Film & Music. 3 Credits.
Improve your Portuguese conversational and speaking skills through colorful Brazilian media. This course is designed for highly motivated undergraduate and graduate students who want to SPEAK Portuguese. Conversation sessions provide intensive work on communication skills through discussion on issues raised in films, news media & music. Grammar will be reviewed as needed outside of class with tutors or TA, freeing class time for more communicative activities. May not be taken on a Satisfactory / Unsatisfactory basis. Prereq: one semester of Portuguese (AS.210.177), two semesters of Spanish or Placement test.

AS.210.290. Accelerated Portuguese. 4 Credits.
NO PREVIOUS KNOWLEDGE OF PORTUGUESE IS REQUIRED. This accelerated one-semester course covers all content for Elementary Portuguese. Upon the successful completion of this course with a grade of C or higher, students may enroll in 210.277 Intermediate Portuguese. Encourages rapid acquisition by intensive exposure to the language through immersion activities, videos and culture. The course will cover relevant aspects of the Portuguese language grammar. Students will be encouraged to use the language through communicative activities, listening and writing activities. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory/ Unsatisfactory basis.

AS.210.301. Advanced French for Writing. 3 Credits.
Students in AS.210.301 will focus primarily on written expression, learning to 'decipher' classic and contemporary French texts, in order to expand their vocabulary and communicate their ideas in writing with clarity and accuracy. (A primary focus on oral expression is provided in AS.210.302; the two advanced-level courses may be taken in either order or simultaneously.)
Area: Writing Intensive

AS.210.302. Advanced French for Speaking. 3 Credits.
Students in 210.302 will focus primarily on oral expression through individual and group work on contemporary media (music, film, current events) in order to expand their vocabulary and become fluent in conversation across social-cultural contexts. (A primary focus on written expression is provided in 210.301; the two advanced-level courses may be taken in either order or simultaneously.)

AS.210.306. Medical French : Santé et Société. 3 Credits.
In this interactive language course (not exclusively designed for pre-meds), students learn how to communicate in the fields of public health, medicine, and humanitarian aid in a French-speaking environment. While acquiring new lexical and syntactic tools weekly, students examine and debate the current structures and issues of the French health system, through a variety of media (governmental websites, mainstream and specialized newspapers, movies, blogs, first-account books, etc.). A final project is tailored to each student's own area of interest. Please note that this course is taught by a language instructor, not a medical expert. Students may elect to take the exam for the French For Health Diploma: https://www.lefrancaisdesaffaires.fr/testsdiplomes/diplomes-francaisprofessionnel-dfp/sante/
AS.210.301 OR AS.210.302

AS.210.308. Acting French: learning about French language and culture through theater. 3 Credits.
This course proposes to enhance students' verbal (pronunciation, intonation, syntax, vocabulary) and nonverbal skills (body language, vocal projection, spatial awareness) by performing excerpts from French and Francophone plays ranging from the Middle Ages to the 21st century. A closer analysis of these excerpts will lead us to consider how theater uses the physicality and immediacy of human experience to create a more universal form of connectivity with the world.Recommended course background: AS.210.301.

AS.210.309. The Sounds of French. 3 Credits.
This course introduces students to the sound system of French: its development over centuries, its standardized Parisian form versus regional and international dialects and accents, and the popularity of "word games" (abbreviations, acronyms, and verlan). The course will include extensive practice in perceiving, articulating, and transcribing sounds, words, and intonation groups through viewing film clips, listening to songs, and completing in class lab assignments. Recorded speech samples obtained at the beginning, middle, and end of the semester will allow students to track their progress in moving toward more native pronunciation and intonation. Recommended Course Background: AS.210.202 or equivalent

AS.210.311. Advanced Spanish I. 3 Credits.
This course is a comprehensive study of the Spanish language focused on the continuing development of students' communicative abilities and their knowledge of Hispanic cultures. Students will expand their use of basic structures of Spanish with a special emphasis on more difficult grammatical and vocabulary aspects, and further improve both their oral and written skills. Students will sharper their critical thinking skills and listening abilities utilizing movies and written texts. This course combines an extensive use of an online component with class participation and three exams. Upon successful completion of this course, students will have acquired extended complex language tools that facilitate proficiency in Spanish and its use in various professional contexts. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.212 OR AS.210.213 or appropriate Spanish placement exam score.

AS.210.312. Advanced Spanish II. 3 Credits.
This course is thorough review of the Spanish language focused on the development of students' communicative abilities and their knowledge of Hispanic cultures. Students will both expand their knowledge of the basic structures of Spanish, with special emphasis on more difficult grammatical and vocabulary aspects, and further improve on oral and written skills. Students will increase their critical thinking skills and listening abilities utilizing movies and written texts. This course combines an extensive use of an online component, class participation and three exams. Upon successful completion of this course, students will have acquired more complex language tools to become proficient in Spanish and its use in various professional contexts. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after the third class session.
AS.210.311 or appropriate Spanish placement exam score.

AS.210.313. Medical Spanish. 3 Credits.
Medical Spanish is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in medicine and health-related fields in Spanish-speaking environments. The student will be able to participate in conversations on topics such as contrasting health systems, body structures, disorders and conditions, consulting your doctor, physical and mental health, first-aid, hospitalization and surgery on completion of this course. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
AS.210.311 OR AS.210.312 or appropriate Spanish placement exam score.

AS.210.314. Spanish for International Commerce. 3 Credits.
Spanish for international business is an overview of business topics in an international Spanish-speaking context with an emphasis on deep review of grammar and vocabulary acquisition. On completion of this course the student will have developed the ability to read and critically discuss business and government relations in Latin America and will have examine entrepreneurship, finance, marketing, business ethics, human resources and commerce in the Spanish speaking world. In completing the course's final project students will apply, synthesize, and reflect on what has been covered in the class by creating a professional dossier individualized to their own professional interests. Concepts learned in this course will be directly applicable to careers linked to international relations and will apply to various careers in business. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session. Language Program Director: Loreto Sanchez-Serrano
AS.210.311 or or appropriate Spanish placement exam score.

AS.210.315. Spanish for International Relations. 3 Credits.
Spanish for international relations is an advanced examination of grammar and an analysis of international relations' topics in Spanish. By completion of this course the student will have developed the ability to read, critically discuss and demonstrate mastery of political and socio-economic issues in Spanish-speaking environments. Potential topics include a survey of the professions in international relations, NGOs in Latin America, intellectual property, cultural diplomacy, remesas, regional coalitions and treaties, and the environment. Class presentations and final projects will allow students to apply, synthesize, and reflect on what has been learned in the class by participating in a global simulation that will include a written exercise individualized to their professional interests. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the 4th class session.
AS.210.311 or appropriate webcape score

AS.210.316. Advanced Spanish Conversation. 3 Credits.
Conversational Spanish surveys high-interest themes, discusses short films by contemporary Hispanic filmmakers and offers a thorough review of grammar. The student will be able to participate in conversations on topics such as personality traits, social media, political power, art and lifestyles on completion of this course. Conversational skills mastered during the course apply to all careers interconnected by Spanish. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
AS.210.311 or appropriate Spanish placement exam score.

AS.210.317. Adv Spanish Composition. 3 Credits.
This third-year course is a hands-on and process-oriented introduction to discussion and compositional analysis. On completion of this course, students will have improved their Spanish writing skills in various types of compositions they might be expected to write in academic settings and in real-life formats such as film reviews, letters to the editor, cover letters, etc. The course also focuses on refinement of grammar and vocabulary use.May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after September 13th.
Area: Writing Intensive
AS.210.312 or appropriate Spanish placement exam score.

AS.210.318. Spanish for Engineering. 3 Credits.
Spanish for engineering is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in the engineering field to develop their communicative strategies in the field of engineering. On completion of this course, students will be able to participate in conversations on topics such as applications of biomedical engineering in the diagnosis and treatment of different medical conditions, efficient use of energy and materials, design and construction of public works, development of electrical systems and development of solutions to environmental problems. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests.There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third-class session.
AS.210.311

AS.210.319. Spanish for Public Health. 3 Credits.
Spanish for Public Health is a comprehensive examination of vocabulary and grammar for students who either work or intend to work in the Public Health field such as government agencies, health care organizations, nonprofits, or health insurer companies, in Spanish-speaking environments. On completion of this course, the student will be able to participate in conversations on topics including health systems, reproductive biology, nutrition, epidemiology, mental health, and environmental health. In completing the course's final project students will apply, synthesize, and reflect on what has been learned in the class by creating a professional dossier individualized to their professional interests.
AS.210.311

AS.210.320. Advanced Modern Hebrew I. 3 Credits.
Advanced Modern Hebrew I will focus on conversational and interactive language skills to expose learners to attributes of different genres and layers of the language. Students will be introduced to various original texts and lingual patterns to better understand and formulate proper syntax. The course will include contemporary readings from Israeli journalism and essays, along with other relevant Hebrew resources to inform class discussions and students' reflective writings. Israeli cultural aspects will be integral to the course curriculum.
AS.384.216 OR AS.210.221 or equivalent

AS.210.321. Modern Hebrew via the Lens of Israeli Cinema. 3 Credits.
This course will expand students' fluencies in Modern Hebrew through Hebrew-dialogic Israeli and Palestinian cinema, examining and comparing several layers of a contemporary Hebrew-speaking society. For this class, students will view, discuss, and write about films with Hebrew as the primary spoken language. Through aural interpretation and subtitles, students will understand, analyze, and reflectively discuss the diversity of Hebrew-speaking cultures within society and the provenance and intentionalities of the dialects exhibited throughout a given film. Linguistic nuance, slang, and interpretive aspects of Hebrew as shown in the chosen films will prompt students to examine this modality of the expression of contemporary Hebrew. The course will be taught primarily in Hebrew and will be open to students who have matriculated to at least 200-level coursework of Modern Hebrew.
AS.384.315 OR AS.210.320 or instructor permission

AS.210.351. Advanced Italian I. 3 Credits.
This highly interactive course focuses on complex historical and contemporary themes, and is ideal, among others, for students who are specializing in international studies, medicine, psychology, and cognitive science. Students will analyze authentic texts and audiovisual materials on topics including the history of the Sicilian mafia, mental health and the deinstitutionalization movement in Italy, Europe and Italy in the 1960s-1980s, the role of curiosity and amazement in scientific discovery and art, and intercultural differences around hilarity. Taught in Italian.
Area: Writing Intensive
AS.210.252 or placement exam

AS.210.352. Advanced Italian II. 3 Credits.
Course presents a systematic introduction to a variety of complex cultural and historical topics related to present-day Italy, emphasizing intercultural comparisons, interdisciplinarity, and encouraging a personal exploration of such topics. Course adopts a continuous assessment system (no mid-term and no final).
Area: Writing Intensive
AS.210.351 OR appropriate placement exam scores (Parts I, II and III).

AS.210.361. Advanced German I: Cultural Topics of the Modern German-speaking World. 3 Credits.
Taught in German. Topically, this course focuses on defining moments in cultural history in German speaking countries in the 2nd half of the 20th century. Films, texts, including a full-length novel, and other media provide a basis for discussing events in post-war Germany from 1945 to 2000. A review and expansion of advanced grammatical concepts and vocabulary underlies the course. Focus on improving expression in writing and speaking. May not be taken on an S/U basis.
Area: Writing Intensive
AS.210.262 or placement exam.

AS.210.362. Advanced German II: Contemporary Issues in the German Speaking World. 3 Credits.
Taught in German. Topically, this course focuses on contemporary issues such as national identity, multiculturalism and the lingering social consequences of major 20th century historical events. Readings include literary and journalistic texts, as well as radio broadcasts, internet sites, music and film. Students read a full-length novel. Emphasis is placed on improving mastery of German grammar, development of self-editing skills and practice in spoken German for academic use. Introduction/Review of advanced grammar.
Area: Writing Intensive
AS.210.361 or equivalent score on placement test.

AS.210.363. Business German. 3 Credits.
Taught in German. Course is designed to familiarize students with the vocabulary and standards for doing business in Germany. Taking a cultural approach, students read texts and engage in discussion that elucidate the works of business, commerce & industry in Germany, the world's third largest economy. Emphasis is placed on vocabulary expansion and writing as it relates to business and business cases. May not be taken S/U. Recommended background: at least 4 semesters of college German (210.262) or equivalent.

AS.210.364. German for Medical & Public Health Professions. 3 Credits.
Taught in German. An introduction to the concepts and linguistic tools necessary for understanding the German health care system and public health fields. Designed for students with B1 or above language skills in German. Readings, role plays, videos and research projects will form the basis for learning. Linguistic focus on expanding vocabulary, increasing reading and listening comprehension while also honing grammatical control to increase accuracy in speaking and writing. Topics include the German health-care system, the body, typical interactions between patients and health care professionals, as well as the history of iconic institutions such as Berlin's Charite. Prerequisite: 4 semesters of college German or equivalent or permission of German LPD.
AS.210.262 OR AS.210.361 OR AS.210.362

AS.210.365. German for Science and Engineering. 3 Credits.
Taught in German. This course is designed to provide language training in German tailored to students of science & engineering. Germany has long been a world leader in engineering, most notably in chemical and mechanical engineering. Over the past decades, Germany also has taken a lead in environmental sciences and information technology. In addition, Germany is now becoming an increasingly attractive place to pursue degrees in the technical fields. This course will provide practice and expansion in all language skill areas: analysis of texts, hands-on-activities, preparation of presentations, and discussion of topics. Specific areas of interest to the course members will be taken into consideration for the selection of materials. [Does not replace 210.362 as prerequisite for upper level courses or as major requirement.]
AS.210.262 OR AS.210.361 OR AS.210.362 or equivalent or placement exam.

AS.210.367. Advanced Yiddish I. 3 Credits.
This course will provide students who have completed at least two years of Yiddish with the opportunity to hone their skills in all four language areas: reading, writing, listening, and speaking. In addition to advanced grammar study and readings in Yiddish literature, the course will take into account the interests of each individual student, allowing time for students to read Yiddish texts pertinent to their own research and writing.

AS.210.368. Advanced Yiddish II. 3 Credits.
Continuation of Advanced Yiddish I (AS.210.367). Students will continue to hone their skills in all four language areas: reading, writing, listening, and speaking. In addition to advanced grammar study and readings in Yiddish literature, the course will take into account the interests of each individual student, allowing time for students to read Yiddish texts pertinent to their own research and writing.

AS.210.391. Advanced Portuguese I: Language and Literature. 3 Credits.
This third-year course focuses on reading, writing, and oral expression. Students will read two complete works by major Brazilian, Portuguese, and/or Afro-Portuguese writers each semester, followed by intense writing and oral discussion on the topics covered. Grammar will be reviewed as necessary. All classes are conducted in Portuguese. Prereq: 210.278, placement test or instructor approval.
Area: Writing Intensive
AS.210.278 or equivalent score on placement test or instructor approval.

AS.210.392. Advanced Portuguese II. 3 Credits.
Advanced Portuguese II offers a systematic review of the Portuguese language focused on the development of students' communicative skills and their knowledge of the Lusophone culture. This course fosters the development of complex language skills that enhance fluency, accuracy and general proficiency in Portuguese and its appropriate use in professional and informal contexts. Students will concentrate on complex grammar concepts and the use of appropriate written and oral registers. Using a variety of cultural items such as current news, short stories, plays, films, videos, newspaper articles, and popular music, students discuss diverse topics followed by intense writing and oral discussion with the aim of developing critical thinking and solid communication skills. May not be taken on a satisfactory/unsatisfactory basis. Prereq: AS.210.391 or placement test.
Area: Writing Intensive
AS.210.391 or equivalent score on placement test or instructor approval.

AS.210.409. Le monde francophone. 3 Credits.
This course examines both sociolinguistic and cultural aspects of the French-speaking world and the relationship between la francophonie and France itself. We focus on five regions—Sub-Saharan Africa (Cameroun and Senegal), Northern Africa (Morocco and Algeria), the Caribbean (Martinique and Haiti), North America (Quebec), and Europe (Belgium) —and consider language features unique to those regional varieties, the status of French as opposed to other indigenous languages and creoles, the demographics of their speakers, and the representation of their culture in media (particularly in short stories, poetry, song, and film). A semester-long research project on one of these main areas will allow students to combine their study of the French-speaking world with other disciplines of interest to them.

AS.210.411. Translation for the Professions. 3 Credits.
Spanish Translation for the Professions surveys the field of contemporary translation theory and provides practice of translation from English to Spanish. Translation exercises may include comparing and contrasting texts of literature, medicine, health, law, technology, politics, and journalism. Students will identify and differentiate terminology specific to these various fields and will focus on practicing correct uses of the grammatical structures relevant to the translation of both English and Spanish. In the course's final projects students will apply, synthesize, and reflect on what has been learned in the class by completing a translation exercise individualized to their professional interests. Strategies of communication mastered in this course will help students of Spanish throughout their careers, in that achievement of the course objectives will help students discern, translate, and evaluate the usefulness of translations in different professional settings. There is no final exam. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the third class session.
Area: Writing Intensive
AS.210.313 OR AS.210.314 OR AS.210.315 OR AS.210.318 OR AS.210.319

AS.210.412. Community Based Learning - Spanish Language Practicum. 3 Credits.
This fourth-year course involves a specially designed project related to the student's minor concentration. On completion of this course, the student will be able to use the Spanish language in real world contexts. The student-designed project may be related to each student´s current employment context or developed in agencies or organizations that complement student's research and experimental background while contributing to the improvement of his/her language proficiency. There is no final exam. May not be taken satisfactory/unsatisfactory. No new enrollments permitted after first week of class.
Area: Writing Intensive
AS.210.411

AS.210.413. Curso de Perfeccionamiento. 3 Credits.
This forth-year course is an in-depth examination of the Spanish grammar, including a wider range of idiomatic expressions and usages than students might have previously encountered. On completion of this course, students will be able to achieve the ACTFL Advanced-Mid to high level in oral and written expression as well as in reading and listening skills. The course will also help to prepare students for the DELE Intermediate or Superior levels, offered by the Instituto Cervantes. May not be taken satisfactory/unsatisfactory. Not open to native speakers of Spanish. No new enrollments permitted after the 4th class session.
Area: Writing Intensive
(AS.210.312 OR AS.210.317) AND (AS.210.313 OR AS.210.314 OR AS.210.315)

AS.210.417. Eloquent French. 3 Credits.
This highly interactive, writing intensive course intends to 1) provide tools to help students reach linguistic proficiency in French (advanced lexical and idiomatic expressions, rhetorical devices used in complex argumentation; 2) sharpen analytical skills by applying the French method of Explication de textes to a variety of fictional and non-fictional discourses (film, literary excerpts, articles, social media); 3) help students develop their own voice in creative writing.
Area: Writing Intensive

AS.210.426. French for Reading and Translation. 3 Credits.
This course aims to provide proficiency in reading and translating? a variety of French texts from the humanities and social sciences. It is designed for undergraduate and graduate students with little or no background in French who wish to acquire a knowledge of French for research purposes 2) for Ph.D. candidates preparing to fulfill their a Foreign Language Proficiency requirement. Please note that this course does not provide speaking and listening skills, and can therefore not be taken as a substitute for other classes in the French Language curriculum (AS.210.xxx).

AS.210.501. French Independent Study/Language. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.551. Portuguese Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.596. German Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.210.661. Reading and Translating German for Academic Purposes.
Graduate students only. Seniors may enroll with permission from LPD and instructor.Taught in English. This is the first semester of a year-long course designed for graduate students in other fields who wish to gain a reading knowledge of the German language. Seniors who intend to do graduate study in other disciplines are also welcome. Instruction includes an introduction to German vocabulary and grammatical structures as well as discussion of relevant translation practices. The goal of the course is for students to gain confidence in reading a variety of texts, including those in their own fields of study. No knowledge of German is assumed.

AS.210.662. Reading & Translating German for Academic Purposes II.
Taught in English. Seniors by permission & Graduate students only. This course is designed for graduate students in other departments who wish to gain reading knowledge of the German language and translation practice from German to English. This course is a continuation of the Fall semester. Focus on advanced grammatical structures and vocabulary. For certification or credit.
AS.210.661 or permission of instructor.

AS.211.103. The missing “A”. Seminar participant immere on torie and iue affecting Hipanic in the US, pecifically quetioning if ocial media and information created by artificial intelligence perpetuate ubordination and micommunication. By invetigating platform uch a TikTok, Youtube and Twitter thi coure hone foundational critical thinking kill in the art and humanitie. Upon completion of thi eminar, you will innovate and perfect reearch quetion to continue tudie in Hipanic and Latin American culture. The coure focue on reading and analyi of ditinct influencer uch a #latinainmedicine, @lin-manuel, @CDC, @johnhopkinph, @WHO. Critical reading required. Credits.
STEM to STEAM for Hispanics
Area: Humanities

AS.211.203. Propaganda: From Blut und Boden to Post-Fact. 3 Credits.
This course taught by Writing Seminars professor Wayne Biddle and Media Studies professor Bernadette Wegenstein covers the 20th-century history of propaganda with special focus on its visual techniques, on censorship, and how media serve as sites of both control and resistance to power. We will pay particular attention to the influence of misinformation abetted by the new media revolution, and both the rise of the political rhetoric of “fake news” and the massive dissemination of actual fake news since the 2016 election. Students will write papers pegged to current issues and events using the critical framework developed in class. Cap 30 students. Reader: Jason Stanley: How Propaganda Works, Princeton University Press, 2015.
Area: Writing Intensive

AS.211.222. Italian Cinema: The classics, the Forgotten and the Emergent.. 3 Credits.
This course traces the history of Italian cinema from the silent era to the new millennium, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall examine iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, that received international recognition and influenced other national, cinematic productions. We shall also look at the work of less famous, or independent filmmakers who received less critical attention. While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to the mise-en-scène, frame composition, camera movements, editing, and sound. This class is taught in English.

AS.211.224. Made in Italy: Italian style in context. 3 Credits.
Italy and the “Italian style” have become synonym of exquisite taste, class, and elegance thanks to the quality of Italian craftsmanship. This course will explore some of the major factors that contributed to the rise of Italian fashion and Italian industrial design as iconic all around the world. The classes will focus on the main protagonists and art movements that influenced the development of Italian style. We will analyze trends, clothing, and style not only in a historical context, but also through a critical apparatus that will include themes related to gender, culture, power, and politics.The course is taught in English. No knowledge of Italian is required, but those who can read in Italian will have an opportunity to do so. Everyone will learn some Italian words and expressions.

AS.211.231. Planet Amazonia: Culture, History, and the Environment. 3 Credits.
Without Amazonia, global warming could reach levels that threaten life on the planet. Yet, in an era of deforestation and climate change, Amazonia itself might be on the verge of disappearance, with disastrous consequences for the world. This course proposes interdisciplinary perspectives on Amazonia through a range of works drawn from history, anthropology, archeology, environmental studies, literature, and the arts. We’ll look at texts by European travelers and missionaries who contributed to the paradoxical image of Amazonia as a “virgin paradise” or a “green hell”; scientific studies and artists’ depictions of the region’s flora and fauna; the often-overlooked history of human occupation of the region; and projects to colonize, develop, or conserve the world’s largest tropical forest. What importance does Amazonia hold for Latin American and global geopolitics? How do art and literature, including indigenous writings, create, reinforce, or deconstruct clichés about the region? What alternative futures for our planet can Amazonia help us to imagine?

AS.211.240. Italian Culture and Civilization I. 3 Credits.
This class aims to introduce students to some major traits of Italian culture. This analysis explores topics that span from Art History, Fashion, including Film, to Food Culture, Pop Culture, and Politics. This first module will focus mostly on its aesthetic traditions, and their impact outside national boundaries. The course will be taught mostly in English with the opportunity to be introduced to elements of Italian language. No knowledge of Italian is required. This three-credit course counts toward the major and Minor in Italian, and the International Studies Global Italy concentration.

AS.211.251. The New Media Revolution and its Effects on Storytelling and Media Aesthetics. 3 Credits.
This course will highlight the change from a culture of mass media to social media in the recent media history. As examples of how story telling is affected throughout this paradigm shift, we will be taking into account such phenomena as AI storytelling, Video Vines, and News Feeds. In the age of Mass Media, spanning the rise of TV culture in the 1950s to the end of the 20th century, media had a unifying effect on American culture. With the rise of Cable TV in the 1990s to the ubiquity of internet entertainment sources to the invention of the iPhone and the rise of social media, this cultural unanimity had been shattered. In some ways this has caused a positive effect, as the forms of storytelling have proliferated and diversified, and there is more room for different voices and perspectives today than every before. In other ways the effects have been more insidious, with some critics pointing to social media as one of the main factors in the rise of our post-truth age. The age of social media has also certainly increased a sense of insecurity (FOMO) and attention deficit disorder in the millennials.

AS.211.259. Introduction to Medical and Mental Health Interpreting. 3 Credits.
This course is a broad introduction to the fields of medical and mental health interpreting. Modules will include: (1) Three-way communication: managing role expectations and interpersonal dynamics; (2) Basic interpreting skills and techniques in a healthcare setting; (3) Ethical principles, dilemmas, and confidentiality; (4) Elements of medical interpreting; (5) Elements of mental health interpreting; (6) Trauma-informed interpreting: serving the refugee population. The course is taught in English, and has no foreign language pre-requisites.

AS.211.265. Panorama of German Thought. 3 Credits.
This course introduces students to major figures and trends in German literature and thought from the sixteenth to the twentieth century. We will pay particular attention to the evolution of German political thought from the Protestant Reformation to the foundation of the German Federal Republic after WWII. How did the Protestant Reformation affect the understanding of the state, rights, civic institutions, and temporal authority in Germany? How did German Enlightenment thinkers conceive of ethics and politics or morality and rights? How do German writers define the nation, community, and the people or das Volk? What is the link between romanticism and nationalism? To what degree is political economy, as developed by Marx, a critical response to romanticism? How did German thinkers conceive of power and force in the wake of World Wars I and II? What are the ties that bind as well as divide a community in this tradition? We will consider these and related questions in this course through careful readings of selected works.
Area: Writing Intensive

AS.211.278. Eataly: An Exploration of Italian Food Cultures. 3 Credits.
Italian cuisine is often recognized as one of the finest in the world. This Freshman Seminar will offer an exploration of Italian food cultures past and present. Discussion topics will include the Slow Food Movement, the tension between local and global, food and social justice, and the representation of food in literature, film, and other media. The course is taught in English. No knowledge of Italian is required, and everyone will learn some Italian words and expressions.

AS.211.300. Niccolò Machiavelli's "The Prince": Understanding the Meaning and Legacy of a Masterpiece. 3 Credits.
Who was Niccolò Machiavelli? We often hear the term “Machiavellian” in reference to actors in business or politics, but what does it really mean? What does Machiavelli teach us about the nature and the dynamics of political power? Can Machiavelli’s thought offer insights into today’s politics and fast-changing world? The course aims to answer these questions by addressing three topics. First, we will study Machiavelli’s life and times, particularly the events connected to his production and the context in which he wrote his main writings. We will see how the fifteenth-century Florentine humanism and the massive political changes affecting early modern Europe shaped Machiavelli’s mindset. Second, we will familiarize ourselves with Machiavelli’s thought by reading The Prince and excerpts from Discourses on Livy. Third, we will get acquainted with some of the main trends in the reception of Machiavelli in the 20th and 21st centuries. Special attention will be paid to interpretations of Machiavelli by Antonio Gramsci, Leo Strauss, Isaiah Berlin, John Greville Agard Pocock, Quentin Skinner, and John P. McCormick. We will also pay attention to modern television programs and films that show the width and depth of Machiavelli’s legacy.

AS.211.301. Nietzsche and Literature. 3 Credits.
Nietzsche and Literature is devoted to exploring the philosophy and literary works of the German philosopher Friedrich Nietzsche, and studying his impact on literature and literary modernism. Readings will include works by Nietzsche and by the literary writers he influenced, including Rainer Maria Rilke, Stefan George, Thomas Mann, Stefan Zweig, Hugo von Hofmannsthal, Franz Kafka, Jorge Luis Borges, Hermann Hesse, James Joyce, Wallace Stevens, and William Butler Yeats, and Else Lasker-Schüler.

AS.211.307. Labor in Theory, Literature, and Art. 3 Credits.
This seminar examines some of the ways we define, represent, and think about the concept of labor in capitalism. We will analyze and compare a wide variety of texts (literary, visual, and theoretical) that embody different, often contradictory, notions of the work we do, why we do it, and how it affects us. As we investigate different types of work—productive and unproductive, physical & intellectual, factory & office—a few of the questions we will ask are: What methods have writers and artists used to depict labor in the 20th and 21st centuries? How is labor stratified along racial and gender lines? Is it possible to imagine a post-work society? The course curates a range of cultural artifacts (short stories, manifestos, novel excerpts, visual art, and film) that employ aesthetic strategies like irony, humor, absurdity, and duration to represent the dynamics of labor in capitalism. Theoretical texts then provide varied conceptual viewpoints from which to compare, contrast, and synthesize our impressions and interpretations of art and literary works. By the end of the semester, we will have traced a trajectory of labor in capitalism from the early 20th century to our own strange and precarious present.
Area: Writing Intensive

AS.211.311. Introduction to Romance Linguistics. 3 Credits.
If the modern-day Romance languages all evolved from Latin, how and why do they differ in so many important ways? What drives language change in the first place and why should this be the case? We approach these questions not only from a linguistic perspective (analyzing Romance sound systems, vocabulary, morphosyntax, and semantics), but from a cognitive-psychological and a socio-political perspective as well. Recommended Course Background: At least intermediate-level proficiency in a Romance language as assessed by coursework or placement exam; some previous coursework in linguistics is desirable but not necessary.

AS.211.316. Brazilian Cinema and Topics in Contemporary Brazilian Society. 3 Credits.
Course is taught in ENGLISH - This course is an introduction to the academic study of cinema as a communicative art and to Brazilian film. The films selected focuses on films from the late 1950s to the present and highlight import episodes and challenges in the advancement of the Brazilian society as well as its cinematic production with a special view to the film aesthetics through analysis from a number of critical perspectives, including class, race, gender as well as ethnicity, nationalism or national identity, colonialism, social changes, and the politics of representation. In this sense, the films and documentaries that we will be watching and studying encompass the period from the rise of New Cinema (Cinema Novo) up to films exploring the most recent trends, including movies launched up to 2016. Students wishing to do the course work in English, for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. THERE IS NO FINAL EXAM. May not be taken on a Satisfactory / Unsatisfactory basis.
Area: Writing Intensive

AS.211.325. Representing Otherness in Literature and Film. 3 Credits.
The term 'Otherness' is known to be rooted in the Self-Other opposition as it emerged in German Idealism, adopted by psychoanalysis and transformed to Post-Colonial and Feminist theories. This theoretical framework will allow us to explore the role of the Other in literature and cinema. Students will become familiar with the historical development of the notion of the “stranger” through reading and analyzing various contemporary works of prose, poetry and cinema from various countries. We will analyze the ways in which these works depict Otherness and will investigate questions regarding their social, political and philosophical framework as well as the literary and cinematographic devices they employ. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.327. Ecocinema: Framing Italy's Environmental Crises. 3 Credits.
Over the past decade, growing numbers of filmmakers in Italy have addressed ecological crises in their work. This class takes an eco-critical approach to contemporary Italian cinema, examining a body of compelling place-centered stories that deal with local and global issues. Defining the scope of eco-cinema and the ways we can interrogate films as ecological texts, we shall screen earth-centered films that raise consciousness about the consequences of human manipulation of the natural world; the complicity of industry, government, and organized crime in creating environmental crises; and the effects of economic and social malaise. Screenings include iconic films such as Michelangelo Antonioni’s Red Desert (1963), more recent, critically acclaimed films such as Matteo Garrone’s Gomorrah (2008), Alice Rohrwacher’s Happy as Lazzaro (2018), and many others.

AS.211.328. Berlin Between the Wars: Literature, Art, Music, Film. 3 Credits.
Explore the diverse culture of Berlin during the heyday of modernism. During the Weimar Republic, Berlin became a center for theater, visual arts, film, music, and literature that would have an outsize impact on culture throughout the world and the twentieth century. The thinkers, artists, and writers drawn to interwar Berlin produced a body of work that encapsulates many of the issues of the period: the effect of the modern city on society; “the New Woman”; socialist revolutionary politics; the rise of the Nazis; and economic turmoil. While learning about interwar Berlin’s cultural diversity, we will take a special look at works by Jewish writers and artists that engage with the question of ethnic, religious, and national identity in the modern world, specifically in the context of Berlin’s rich Jewish history and the rise of anti-Semitism in the interwar period. All readings will be in translation.

AS.211.329. Museums and Identity. 3 Credits.
The museum boom of the last half-century has centered largely around museums dedicated to the culture and history of identity groups, including national, ethnic, religious, and minority groups. In this course we will examine such museums and consider their long history through a comparison of the theory and practice of Jewish museums with other identity museums. We will study the various museological traditions that engage identity, including the collection of art and antiquities, ethnographic exhibitions, history museums, heritage museums, art museums, and other museums of culture. Some of the questions we will ask include: what are museums for and who are they for? how do museums shape identity? and how do the various types of museums relate to one another? Our primary work will be to examine a variety of contemporary examples around the world with visits to local museums including the Jewish Museum of Maryland, the National Museum of African American History and Culture and the National Museum of the American Indian.

AS.211.332. Heidegger's Being and Time and the Examined Life. 3 Credits.
This course will explore Heidegger's Being and Time with attention to such central concepts as Dasein's unique relation to Being, worldliness, care, authentic and inauthentic existence, attunement, understanding, projection, and being unto death. The first eight weeks will be devoted to a thorough reading of Being and Time and selected critical texts. The last five will consider works of art that expand our understanding of Heidegger's magnum opus.

AS.211.333. Representing the Holocaust. 3 Credits.
How has the Holocaust been represented in literature and film? Are there special challenges posed by genocide to the traditions of visual and literary representation? Where does the Holocaust fit in to the array of concerns that the visual arts and literature express? And where do art and literature fit in to the commemoration of communal tragedy and the working through of individual trauma entailed by thinking about and representing the Holocaust? These questions will guide our consideration of a range of texts — nonfiction, novels, poetry — in Yiddish, German, English, French and other languages (including works by Primo Levi and Isaac Bashevis Singer), as well as films from French documentaries to Hollywood blockbusters (including films by Alain Resnais, Claude Lanzmann, and Steven Spielberg). All readings in English.
Cannot be taken by anyone who previously took AS.213.361

AS.211.342. Emerging Latin American Cinema. 3 Credits.
This survey of emerging cinema in Latin America focuses on thematic clusters such as gender identity, violence against women, the struggle for indigenous rights and recognition of their history, the politics of ecological crises, and the plight of youth who don't see a viable future. We will focus on films from Brazil, Mexico, Argentina, and Colombia, among other cultures.

AS.211.347. Monsters, Ghosts, and Golems. 3 Credits.
Modern Jewish culture is full of monsters, ghosts, golems, dybbuks, and other occult creatures. We will study the rich religious and folkloric traditions that these works draw on in order to better understand why Yiddish, German, Hebrew, and English literature from the 19th century to the present and why film from its beginnings are so full of the occult and the supernatural. We will pay special attention to the ways that monsters, spirits, and the like were deployed in modernist literature and film, in order to ask and answer major questions about modernity: what are the social and aesthetic consequences of technology and automation? what aspects of human nature are revealed by new insights into the psyche? All readings in English.

AS.211.349. JHU Bologna Program: Food for Thought: Gastronomy, Politics & Identity. 3 Credits.
Italian Culture course offered on the JHU Summer Program in Bologna. Permission required. Must be taken for a letter grade. Open to students admitted to the JHU Summer Program in Bologna only.

AS.211.354. The Art, Craft, and Science of Translation. 3 Credits.
This course is an introduction to the growing field of Translation Studies. Broadly speaking, the translation process involves three major phases: (1) 'understanding' what someone else has written; (2) exploring the linguistic/cultural tools available (or not) in another language to convey the original meaning; and (3) taking responsibility for one's translation choices. What does it mean to 'understand' a text? Is it ever possible to find an 'equivalent' in another language? Can the translation process ever be objective, and what role, if any, does the translator's voice play? What practical tools are available to facilitate the translation process? Drawing from interdisciplinary theories and approaches to translation, this course will attempt to reflect on these questions, and provide an opportunity for some hands-on translation practice. Language pre-requisite: Completion of Advanced French I (AS210.301), Advanced Italian I (AS210.351), Advanced Spanish I (AS210.311), or instructor permission.
Area: Writing Intensive
AS.210.301 OR AS.210.351 OR AS.210.311 OR Instructor Permission

AS.211.356. Short Forms in German Literature. 3 Credits.
Taught in English. Before Twitter, there were the diverse short forms that evolved in the accelerating world of modernity to capture fleeting experiences, fragmentary perceptions, and flash-like insights: epigrams, aphorisms, fragments, feuilletons, parables, thought images, and mini-essays. The course offers an alternative history of German modernity by surveying masters of short forms from the 17th century to the present, such as Angelus Silesius, Lichtenberg, Novalis, Fr. Schlegel, Schopenhauer, Nietzsche, Kafka, Roth, Walser, Kracauer, Benjamin, Adorno, Blumenberg, and Kluge. Readings will be made available both in English translation and in the original German.

AS.211.361. Narratives of Dissent in Israeli Society and Culture. 3 Credits.
In this course we will study and analyze the notion of dissent in Israeli society and culture on its various literary and artistic forms. We will examine the emergence and the formation of various political and social protest movements, such as the Israeli Black Panthers, Israeli feminism and the 2011 Social Justice protest. We will discuss at length the history and the nature of dissent in the military and in relation to Israeli wars and will track changes in these relation. Significant portion of the course will be dedicated to the literary, cinematic and artistic aspects of Israeli protest and their influence on Israeli discourse. We will explore the nature and role of specific genres and media such as the Israeli satire, Israeli television, newspaper op-ed and the recent emergence of social media. Students wishing to work in English exclusively for 3 credits should enroll in section one. Students who are fluent in Hebrew and are wishing to attend an additional hour-long Hebrew discussion session per week with Professor Cohen (time TBD in consultation with enrolled students) for 4 credits should enroll in section 2.

AS.211.369. We Conduct: Editing a Documentary. 3 Credits.
This course will provide a hands-on opportunity to work with film director and professor of media studies Bernadette Wegenstein in the editing process of We Conduct, a documentary about the magic of orchestral conducting and the changing face of those who are called to this vocation. The film follows famed conductor Marin Alsop as she breaks new ground in her already distinguished career. The film was shot predominantly in Baltimore, but also in New York, São Paulo, Vienna, Lucerne, and London, with Shana Hagan (Los Angeles) as Director of Photography, additional cinematography by Judith Benedikt (Vienna), and John Benam (Baltimore). During the semester we will be looking at the various narratives in their rough format, and see the film take shape from treatment to full-fledged documentary narrative. Editor Victor Livingston based in Los Angeles will come to work with the class twice during the semester.

AS.211.374. Gendered Voices. 3 Credits.
The course will explore the notion of 'voice' in order to show how poetry, literature, philosophy, and music have been dealing with it throughout the ages. In particular, by focusing on classical figures such as the Sirens, Circe and Echo, as well as by considering the seminal discussions of the 'voice' in Plato and Aristotle, the course will address the gendered nature of the voice as a tool to seduce and manipulate the human mind. More specifically, the course will discuss the ways in which male, female, queer, gendered and un-gendered voices embody different functions. Course materials include classical, medieval and early modern sources as well as later rewritings of myths concerned with the voice by authors such as Jules Verne, Karen Blixen, Giuseppe Tomasi di Lampedusa, and Italo Calvino. A selection of theoretical works (e.g. Cavarero, Silverman, Dollar, Butler) will also be discussed. The course is taught in English and all materials will be available in English translation; Italian majors and minors should enroll in section 2.
Area: Writing Intensive

AS.211.386. Italian Cinema. 3 Credits.
Italian Cinema: The Classics, The Forgotten, The Emergent. This course traces the history of Italian cinema from the silent era to the contemporary period, highlighting its main trends and genres, and reflecting on the major transformations modern and contemporary Italian society experienced over the twentieth and twentieth-first centuries. We shall discuss iconic films such as Vittorio De Sica's Bicycle Thieves, Federico Fellini's La Dolce Vita, Michelangelo Antonioni's L'Avventura, and Pier Paolo Pasolini's Mamma Roma, (the classics) that received international recognition and had a global impact on film history, and also rare archival films by pioneer women filmmakers from the silent era (the forgotten). Finally, we'll discuss films released in the last decade (the emergent) that address issues such as migration and the ecological crisis. (Zoom Q&As with filmmakers will be part of curriculum). While this class takes an historical approach, it also includes a theoretical component and introduces students to the specificity of the cinematic language, examining films in relation to frame composition, camera movements, editing, and sound. This is an intensive writing class taught in English.
Area: Writing Intensive

AS.211.394. Brazilian Culture & Civilization. 3 Credits.
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today. The course is taught in English, but ONE extra credit will be given to students who wish to do the course work in Portuguese. Those wishing to do the course work in English for 3 credits should register for section 01. Those wishing to earn 4 credits by doing the course work in Portuguese should register for section 02. The sections will be taught simultaneously. Section 01: 3 credits Section 02: 4 credits (instructor's permission required). No Prereq. THERE IS NO FINAL EXAM.
Area: Writing Intensive

AS.211.400. Topics in Romance Literatures. 3 Credits.
The Romance Avant-Garde: The course will examine the revolutionary contributions of literary artists from the French, Italian, Spanish, and Latin American traditions to the Avantgarde movements of the 20th century.
Area: Writing Intensive

AS.211.415. Thomas Mann's "The Magic Mountain". 3 Credits.
Taught in English. Stranded for seven years in an Alpine sanatorium, a young engineer is granted a highly unusual education, one that is at turns hilarious and stirring. He gains initiation into the mysteries of life, death, and love, and finds himself caught in the middle of dazzling arguments animated by the ideological conflicts of a continent on the brink of world war. A unique blend of comic portrayal, essayistic reflection, and ironic narration allows Mann to develop an absorbing panorama and an acute diagnosis of cultural crisis, making his novel from 1924 a key work of modernism. We will discuss the novel against the backdrop of the cultural currents and political developments to which it responds.

AS.211.423. Black Italy. 3 Credits.
Over the last three decades Italy, historically a country of emigrants—many of whom suffered from discrimination in the societies they joined—became a destination for hundreds of thousands of migrants and refugees from various countries, and particularly from Africa. Significant numbers of these immigrants came to Italy as a result of the country's limited, though violent colonial history; others arrive because Italy is the closest entry-point to Europe. How have these migratory flows challenged Italian society's sense of itself? How have they transformed the notion of Italian national identity? In recent years, growing numbers of Afro- and Afro-descendant writers, filmmakers, artists and Black activists are responding through their work to pervasive xenophobia and racism while challenging Italy's self-representation as a 'White' country. How are they forcing it to broaden the idea of 'Italianess'? How do their counternarratives compel Italy to confront its ignored colonial past? And, in what way have Black youth in Italy embraced the #Blacklivesmatter movement? This multimedia course examines representation of blackness and racialized otherness, whiteness, and national identity through literary, film, and visual archival material in an intersectional framework. Examining Italy's internal, 'Southern question,' retracing Italy's colonial history, and recognizing the experiences of Italians of immigrant origins and those of immigrants themselves, we'll explore compelling works by writers and filmmakers such as Igiaba Scego, Gagriella Ghermandi, Maza Megniste, Dagmawi Yimer, and others.

AS.211.424. Climate Change Narratives: Human and Non-Human Transformative Storytelling. 3 Credits.
In The Great Derangement Indian novelist Amitav Ghosh writes that "the climate crisis is also a crisis of culture, and thus of imagination." Worldwide, climate and environmental change is stirring the imaginary of novelists, filmmakers, and artists who are finding ways to frame, emplot, or even perform, an unmanageable phenomenon like climate change. How is climate change shaping new modes of storytelling and aesthetics? How do film, literature, and environmentally conscious art transform our perception of the world we inhabit and its unpredictable changes? Can climate change narratives help us to imagine futures of possibilities, maybe dystopian, uncertain, or even happy, but futures nonetheless? This multimedia course explores, through a transnational perspective, a variety of contemporary novels, films, and other media that attempt answer these questions.

AS.211.444. The Apocalypse in Literature and Film. 3 Credits.
"Everything which we loved is lost! We are in a desert" – this emotional assertion was the reaction to Kazimir Malevich's 1915 painting The Black Square, as the artist himself recalled it. This sentiment of fearing, warning and even witnessing the end of the world as we know it, will stand at the center of the course. We will study the literary and cinematic representations of this apocalyptic notion and investigate its theoretical, theological, physiological and aesthetic aspects. We will seek to trace the narrative dynamics as well as literary and cinematic means of apocalyptic representations in works from various periods, languages, cultures and religions. Among the issues to be discussed: what is the apocalypse, biblical apocalypse, dystopia and nostalgia, trauma and post trauma, war and the apocalypse, the Holocaust as the end of civilization, the atomic bomb, realism and anti-realism, political changes and the apocalypse in popular culture.
Area: Writing Intensive

AS.211.477. Renaissance Witches and Demonology. 3 Credits.
Who were the witches? Why were they persecuted for hundreds of years? Why were women identified as the witches par excellence? How many witches were put to death between 1400 and 1800? What traits did European witch-mythologies share with other societies? After the witch-hunts ended, how did "The Witch" go from being "monstrous" to being "admirable" and even "sexy"? Answers are found in history and anthropology, but also in medicine, theology, literature, folklore, music, and the visual arts, including cinema.
Area: Writing Intensive
Students who have already taken AS.214.171 cannot take AS.211.477.

AS.211.478. Power and Resistance in French Political Thought. 3 Credits.
Today France is a multicultural, multi-ethnic society fractured by the memories of colonialism. Throughout the country's history, French thinkers – classical and contemporary – have questioned the foundations of power and focused critically not only on the claims of authority issuing from the top, but also on the compliance of the governed. What it is, they ask, that makes people stick together and recognize each other as citizens of one country? Is there such a thing as a shared history, and is Fraternité something more than a slogan? Works by La Boétie, Montaigne, Diderot, Robespierre, Tocqueville, Gobineau, Camus, Sartre, Memmi, Foucault and others.
Students may not have previously completed AS.212.341.

AS.211.479. Dante's Journey through the Afterlife. 3 Credits.
Dante's Divine Comedy presents a complete picture of the medieval world-view in all its aspects: physical (the structure of the cosmos), historical (the major actors from Adam to Dante himself) and moral (a complete system of right and wrong). Dante shows how the Christian religion portrayed itself, other religions, the nature of God, humans, angels and devils, and human society. We will explore these topics both from the viewpoint of Dante's own time, and in terms of its relevance to our own societal and cultural concerns.
Area: Writing Intensive
AS.214.479

AS.211.480. Religious Themes in Film and Literature. 3 Credits.
This course would be of interest to anyone who would like to learn about the intersection of religion and modern culture. At the center of the course will stand a close study of the representation of religious themes and their role in modern literature and cinema. The works which we will deal with are not considered religious and yet they include religious themes as part of their narrative, images, language or symbolic meaning. We will trace in various works from various countries and genre, themes such as: divine justice, providence, creation, revelation, the apocalypse, prophecy, sacrifice and religious devotion. We will also study the ways in which Biblical and New Testament stories and figures are represented in these works. The course will have a comparative nature with the aim of learning more about the differences between the literary and cinematic representations.

AS.211.566. Independent Study - CAMS/undergraduate. 1 - 3 Credits.
requires permission of instructor
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.211.606. Literature and Truth: Forgery and Fakes.
Forgery is an eternal problem. It is a literary tradition in its own right, with connections to politics, Classics, religion, philosophy, and literary theory. Spurious writings impinge on social and political realities to a degree rarely confronted by criticism. This course offers a reading of the sort traditionally reserved for canonical works of poetry and prose fiction, spotlighting forgery's imaginative vitality and its sinister impact on scholarship. Students will study manuscripts and incunabula drawn from JHU's Bibliotheca Fictiva, the world's premier collection of literary forgeries.
Area: Writing Intensive
Students cannot have taken AS.214.606.

AS.211.612. Monuments and Monumentality.
As is clear from current events and debates surrounding monuments to the Confederacy, monuments play an outsize role in the public negotiation of history and identity and the creation of communal forms of memory. But monumentality is not restricted to statues or buildings. In this course we will study alternative forms of monumentality, especially in the 20th and 21st centuries. These alternative monumentalities — primarily literary, but including various material- and object-based expressions, and elaborations on institutional modes of monumentality — have assumed significance especially in minority and diaspora communities, and for other people and peoples outside the economic and political systems that endow and erect traditional public monuments. The primary case studies in this course will be forms of Holocaust commemoration, including the post-Holocaust large-scale Yiddish literary projects meant to serve Jewish communities in search of new forms of memorialization; and counter-monuments like Germany's Stolpersteine (stumbling stones). We will also consider contemporary debates around monuments in America and global manifestations of alternative monumentalities. All readings in English.

AS.211.616. Caribbean Fiction: Race, History, & Exoticism.
The Caribbean is often described as enigmatic, uncommon and supernatural. While foreigners assume that the Caribbean is exotic, this course will explore this assumption from a Caribbean perspective. We will examine the links between Caribbean and Old World imagination, the relationship between exoticism and Caribbean notions of superstition, and the way in which the Caribbean fictional universe derives from a variety of cultural myths. The course will be taught in English and all required texts are in English and English translations from French. A weekly session in French will be held for undergraduates wishing to count the course towards the French major and for interested graduate students. Open to all grad students and to undergraduates with permission of the instructor."
Area: Writing Intensive

AS.211.623. Reading Modern Hebrew Literature.
"And Jesus was a Jew with ear-locks and prayer shawl" claimed Uri Zvi Greenberg, the ultra-nationalist giant of modern Jewish poetry. A flesh-and-blood Jew, a demon, a spoiled student, an idol, a suffering brother, a (failed) Messiah, a nationalist rebel, a Greek god in a Jewish garb – these images of Jesus accompanied Jewish thought and literature for almost two thousand years. This course will study these images through a close reading of major Jewish texts from the Talmud to modern times.

AS.211.640. The Literature of Existence.
This seminar will explore some key expressions of what could loosely be called existentialist writing from the early twentieth century to the present day, to the end of coming to terms with an emerging "new politics of existence." While there will be some emphasis on Spanish language materials, including writings by José Ortega Y Gasset, Miguel de Unamuno, María Zambrano, and Jorge Luis Borges, we will also be reading important works by Martin Heidegger, Jean-Paul Sartre, Simone de Beauvoir, Albert Camus, and Martin Hägglund.
Area: Writing Intensive

AS.211.641. Women Filmmakers from the Margins.
Filmmaking remains an overwhelmingly male-dominated profession, but women are making significant inroads, and in so doing are leaving their distinctive mark on the medium. In this seminar we will examine the films of a group of women auteurs (those who write and direct their own films) who have endeavored to speak from the margins—be they social, geographical, or sexual—and whose work has challenged mainstream cinematic norms. The filmmakers whose work we will analyze may include Jane Campion, Australia; Aurora Guerrero, Mexico-USA; Claudia Llosa, Peru; Mira Nair, India-USA; Marialy Rivas, Chile; So Yong Kim, Korea.
Area: Writing Intensive

AS.211.658. Nomadic Narratives: Italian Women's Literature and Cinema.
This interdisciplinary graduate seminar examines the work of women writers, directors, and photographers in modern and contemporary Italy. We shall explore the question of female authorship and themes such as female subjectivity and mobility, women's participation in, or exclusion from, history. We shall read foundational texts such as Elsa Morante's La storia (1974), Anna Maria Ortese's collection of short stories Il mare non bagna Napoli (1953), and more contemporary novels such as Goliarda Sapienza's L'arte della gioia, and Elena Ferrante's L'amore molesto (1995). In the second part of the semester, we will study the work of female directors from different generations, from pioneer Elvira Notari, to mid-century Cecilia Mangini, and contemporary Alice Rohrwacher, as well as the work of photographers such as Carla Cerati and Letizia Battaglia.

AS.211.666. Graduate practicum: Mapping the Scholarly Landscape I (Research Skills).
From online resources to core printed reference works, this course acquaints students with the range of scholarly apparatus in the field of literary and cultural studies, with attention to issues of access, retrieval, and research. The course, which is required for all first-year graduate students in MLL, will be conducted in six (6) two-hour sessions.

AS.211.667. Graduate practicum: Mapping the Scholarly Landscape II (Tools for Professional development).
Spring Semester (coordinated by GRLL faculty with the participation of advanced grad students)1. Preparing a syllabus, marketing your classes (DTF, Summer, Intersession) [with the participation of successful DTF/Intersession instructors]Options for online teaching2. Writing a conference paper abstract; conference presentations 3. Organizing a conference/symposium [led by advanced grad students]4. How to get published (what, when, where)5. Academic review writing6. Options for fellowships/grants/career development

AS.211.713. The Culture of Algorithms.
This course proposes a study of the culture of algorithms for students of the literate space. True (deep) literacy is the ability to interpret a text or an object in its cultural, historical, conceptual, material or political contexts. With the evolution of digital cultures, literate practices have changed to incorporate the emerging cultural paradigms born out of the encounter of algorithms and computability with social practices embedded in the earlier literate traditions. Indeed, modern computation environments invite a new algorithmic hermeneutics grounded in both literate and scientific traditions. We will consider, among others, texts such as Bernard Chazelle's inaugural lesson at the Collège de France, "L'algorithmique et les sciences"; Leibniz on ordered problem solving; Condorcet on "social arithmetic"; Norbert Wiener, God and Golem, Inc.; Herbert Simon, "Bounded Rationality…"; Alan Turing, "Computing Machinery and Intelligence"; Steven Wolfram: Computation and the Future of the Human Condition; Leslie Valiant, Probably, Approximately Correct; Ed Finn, What Algorithms Want. Imagination in the Age of Computing; Daniel Cardon, À Quoi rêvent les algorithmes?; and of course Donald Knuth's classics, Literate Programming and "Computing Science and its Relation to Mathematics". Various modern novels also attempt to engage with the algorithmic, and these can form a counterpoint to the more technical or philosophical texts. For more information and a provisional syllabus, please go to http://www.wilda.org/Courses/CourseVault/Grad/Algorithms/Syllabus.html.This course will be taught in English. A few (short) texts are in French, so the ability to read French will be useful although not required.

AS.211.714. Ariadne's Threads: Metamorphosing Mythologies.
Abandoned by Theseus, Ariadne lamenting on the shore of Naxos embodies one of the most powerful tropes in literature and the arts. The fate of the heroine who helped Theseus out of the labyrinth became herself a thread (indeed, an inexhaustible series of threads) running across the ages and populating the imagination of poets, painters, composers. After exploring in detail the classical sources that canonized Ariadne's myth (Catullus, Carmina, 64; Ovid, Heroides, 10) as well as references to the myth found in other classical authors (Homer, Hesiod, Pausanias, Plutarch, Propertius), we will turn to the reception of Ariadne in literature and music (Ariosto, Rinuccini-Monteverdi, Haydn, Nietzsche, Strauss-Von Hofmannsthal). The analysis of the various case studies will focus on the rhetorical and poetical devices used by poets and composers to reenact the vocal features of Ariadne's lament.

AS.211.722. Global Feminist Filmmaking: a Theory in Practice Seminar.
This seminar examines recent emerging narrative and documentary global feminist filmmakers, applying feminist theory, intersectional theory, cine´ma ve´rite´, theory of nonviolence, and intersubjectivity to understand their work. Each week, we will examine one filmmaker's approach to their own personal practice of feminist filmmaking, and either interview them during our class or screen a pre-recorded zoom interview. In this seminar students will go beyond a theoretical feminist film criticism to one introduced into a lived and living feminist film practice. The filmmakers in question are Marialy Rivas (Chile), Elisabeth Scharang (Austria), Habiba Djahine (Algeria), Patricia Ortega (Venezuela and Argentina), Wanuri Kahiu (Kenya), Naomi Kawase (Japan), Sandra Kogut (Brazil), Kirsten Johnson (USA), TT the Artist (USA), Patricia Ramos (Cuba), Susana de Sousa Dias (Portugal), Claudia Llosa (Peru), Alina Marazzi (Italy), Rosine Mfetko Mbakam (Cameroun and Belgium).

AS.211.724. Media Artist in Residence Jane Jin Kaisen.
Media Artist in Residence Jane Jin Kaisen is a team-taught class between Bernadette Wegenstein (MLL) and Clara Han (Anthropology). In this class we will prepare the artist residency of Jane Jin Kaisen, a visual artist born in Jeju Island, South Korea and raised in Denmark. In the first part of the semester, we will cover theoretical questions raised in Jane Jin Kaisen's work such as cross-cultural adoption, diaspora, migration, war, gender and sexuality, and translation. In the second part we will involve students practically in questions of media arts curation for the artist's exhibit planned for April 2-9, 2022, at the Parkway Theatre, featuring three of her recent and acclaimed installations and films: The Woman, the Orphan, and the Tiger (2010), Apertures/ Rifts (2016), and Community of Parting (2019. In this class students will be closely involved with JHU's Center for Advanced Media Studies (CAMS), and the Baltimore Stavros Niarchos Parkway Theatre's artistic director Christy LeMaster. They will also meet the artist Jane Jin Kaisen during her residency.

AS.211.727. Humanity in Question.
Although it is often assumed that any inquiry into the human inevitably leads to pernicious forms of anthropocentrism, current debates about the Anthropocene suggest that we avoid such reflection at our own peril. Drawing on philosophy, biology, and sociology, Helmuth Plessner's Levels of Organic Life and the Human: An Introduction to Philosophical Anthropology (1928) offers a powerful account of humans' "excentric positionality," whose key ideas Plessner would further flesh out in his Political Anthropology (1931). Plessner's 1928 book was overshadowed, however, by the near-simultaneous appearance of Being and Time and Heidegger's imperious dismissals of philosophical anthropology. Disturbed by Heidegger's blindspot and its political consequences, during the World War II Hans Jonas, one of Heidegger's most original students, began to outline a conception of organic life as "an experiment with mounting stakes," with the highest stakes reached in human freedom. That conception, fully elaborated in The Phenomenon of Life: Toward a Philosophical Biology (1966), would serve as the basis for Jonas's influential theory of bioethical and ecological responsibility. Now that Plessner's key works are finally available in English translation, a joint examination of his, Heidegger's, and Jonas's conceptions is in order. We will ask what these three thinkers have to tell us about our current situation.

AS.211.732. The Literature of Speculative Genres: Science Fiction, Bandes dessinées, MMOGs, Mangas….
The francophone and anglophone worlds have longstanding distinct if complementary traditions for staging the primordial literary gesture, the imagining of the "What if". This course will confront the two cultures in early works like Cyrano de Bergerac's Histoire comique des états et empires du soleil, C. N. Ledoux's utopian workers' paradise, or Jules Verne's novels. It will then address the modern literate spaces in which the two traditions cross-fertilize each other— for example the French reception of Philip K Dick's oeuvre, Korogodski's Pink Noise-A Posthuman Tale, Catherine Dufour's Le Goût de l'immortalité, cyberpunk, mangas co-authored by francophone artists and writers, the "9e art" of the high graphic novels, especially the Cités obscures of Schuitten and Peeters, or hybrid French/anglophone MMOG communities like Ubisoft's Assassin's Creed. The materials will be in French or English, so the ability to understand French is necessary, with class discussion in English. Undergraduates are welcome with permission of the instructor, and this course may count for the French major or minor.

AS.211.748. Media Theory in the Age of Big Data.
This seminar will explore some key themes in contemporary media theory in an age when five tech giants have succeeded in infiltrating the daily lives of global citizens to an unprecedented degree in history. We will study the impact of this saturation on socioeconomic inequality as well as the implications of an almost total loss of privacy.Among the strategies of resistance to the capacity for surveillance these companies have developed we will focus in particular on current examples of feminist media art and voices from the global and cultural periphery as well as tendencies in these practices to emphasize a return to interpersonal connections and the embodied here and now. As case studies we nay include #metoo, slo-film movements from Southern Bahia in Brazil, and the financing and distribution of art films by mega media companies like Netflix.

AS.211.753. The Renaissance Comic Romance.
In the fifteenth and sixteenth centuries, Italian and French humanists transformed the medieval adventure stories of Charlemagne's and Arthur's knights. The course concentrates on Luigi Pulci's earthy, bourgeois Morgante, Teofilo Folengo's Macaronic (Latin/Italian dialect) Baldus, and Rabelais's encyclopedic Gargantua and Pantagruel, combining close analysis of their linguistic and narrative fabric with examples of their influence on later comic narrative masterpieces.
Area: Writing Intensive

AS.211.754. Modernist Primitivism.
This course will explore the aesthetics and politics of primitivism in European modernity, focusing on the visual arts and literature in German and Yiddish, but looking at the wider European context, including France and Russia. We will begin with the backgrounds of primitivism in Romanticism, looking especially at its ethnographic and colonial sources. We will then focus on the presence of anthropological and ethnographic discourses within various registers of modernist thought, literature, and visual culture, with special attention to visual and literary primitivism. Our central concerns will include: the attempt to create a modernist aesthetics grounded in ethnography; the primitivist critique of modernity; the place of primitivism in the historical avant-garde; the development of the notion of "culture" in modernity; and the aesthetics of modern ethnic and national identity. Key thinkers, artists, and writers to be considered include Herder; Gauguin; Picasso; Wilhelm Worringer; Carl Einstein; Hannah Höch; and Emil Nolde.

AS.211.777. The Critical Unconscious.
Criticism in the 21st century has tended to relegate psychoanalysis to a dustbin of fads that proliferated at the end of the prior century but that today are of interest only to balkanized cliques of devotees. Bucking this trend, this seminar will examine the intellectual history and abiding influence of psychoanalysis's key critical concept: the unconscious. Basing our discussions on in-depth readings from key thinkers in the analytic tradition such as Freud, Lacan, and Klein, as well as the post-analytic philosophical tradition, including Zizek, Butler, Laclau and Mouffe, Deleuze and Guattari, and Jameson, we will work to distill an understanding of the unconscious as essential to the practice of criticism tout court, and as inhering even in those discourses that have sought most stridently to distance themselves from it. Seminar discussions will take place in English; readings will be available in the original as well as in translation.
Area: Writing Intensive

AS.211.866. Independent Study - CAMS/graduate.
requires permission of instructor

AS.212.318. Women in French Literature of the 17th and 18th Centuries. 3 Credits.
This course will examine the changes in the relationship of women to literature in France before the French Revolution from several points of view: (1) What were the social and intellectual contexts of gender distinctions? (2) How did men writing about women differ from women writing about women? (3) How were these questions affected by the changing norms of literary productions? Texts by Mme. de Sévigné, Molière, Mme. de Lafayette, Prévost, Diderot, Rousseau, Laclos, and Beaumarchais.
Area: Writing Intensive

AS.212.333. Introduction à la littérature française I. 3 Credits.
Readings and discussion of texts of various genres from the Middle Ages to the 20th century. The two semesters (212.333 and 212.334) may be taken in either order. Students may co-register with an upper level course during this course. 212.333 covers the time period from the Middle Ages to the Revolution.
Area: Writing Intensive
AS.210.30] AND AS.210.302

AS.212.334. Introduction à la littérature française II. 3 Credits.
Readings and discussion of texts of various genres covering the time period from the Revolution to the 20th century. This sequence is a pre-requisite to all further literature courses. Students may co-register with an upper-level course during their second semester.
Area: Writing Intensive
AS.210.301 OR AS.210.302 or at least one semester of AS.210.301 or AS.210.302 with a grade of A and written permission of the instructor.

AS.212.340. Topics in French Cinema: Immigration, identité, différence culturelle. 3 Credits.
An exploration of immigration, identity, and cultural differences through the lens of recent French and Francophone films. Focus on discussion and analyses of film sequences in class and on oral presentations. Students will have the opportunity to progress in vocabulary, oral expression, and in critical analysis. Films studied include works of Kassowitz, the Dardennes, Kechiche, Sciamma, Haneke, and Audiard. Conducted in French. Recommended course background: completion of AS. 210.301 or equivalent score on Placement test.

AS.212.353. La France Contemporaine. 3 Credits.
Students will explore contemporary French society and culture through a wide variety of media: fiction and non-fiction readings (graphic novels, news periodicals, popular magazines), films, music, art, websites, and podcasts. A diverse range of hands-on activities in addition to guided readings will help students develop cultural awareness as we discuss topics such as education, politics, humor, sports, cuisine, immigration, slang, and national identity, as well as the historical factors that have influenced these facets of French and francophone culture.
Recommended Course Background: AS.210.301 or AS.210.302 or permission of instructor.
Students may not have taken AS.211.401.

AS.212.402. The Count of Monte Cristo and its Avatars. 3 Credits.
Alexandre Dumas's Le Comte de Monte Cristo (1844-46) is widely regarded as one of the most popular novels of all time and as one of the best adventure novels ever written. Perhaps no other masterpiece of French literature has been subjected around the world to such countless film adaptations, including animation, television series, and serials. This course aims to study and contextualize the reasons behind this sustained transnational and transcultural interest. Close reading and analysis of Dumas' novel will provide a good point of departure to explore problems that cut across nineteenth-century French society: politics, social class, revolution, family, love and desire, revenge, justice, science, and religion. Course conducted in French; most films in English or with English subtitles.

AS.212.403. Voodoo and Literature. 3 Credits.
This course will examine the various ways voodoo, as the Unknown, has been represented, misrepresented, recuperated, and interpreted in the aftermath of the Haitian Revolution from the early nineteenth century to the present day. While historians have debunked the role of voodoo in the aftermath of the Haitian Revolution, the literary representation of the slaves in captivity is often associated with the will to liberation enacted in the secret practice of voodoo on the plantation. The history of voodoo in Saint-Domingue (Haiti) is intertwined with the history of colonial subversion, ancestral medicine, and the physical resistance of the enslaved people. Yet the most defining event in the armed uprising by the enslaved, the ceremony of Bois Caiman (August 14, 1791) still divides historians, novelists, and anthropologists. Where history and anthropology seem to flounder in trying to capture the mystery of such ceremony, literature soars majestically, maintaining the mystery by using the freedom of the imagination as its sole support. Might the transmission of voodoo during the colonial period, be understood as the historical mode of preservation of an ancestral secret practice that can only be transmitted through oral tradition and rituals, which may have been lost in the attempt to produce written translations ? Readings in French and English may include works by Alejo Carpentier, Aimé Césaire, Patrick Chamoiseau, Marie Chauvet, Edwidge Danticat, René Depestre, Zora Neale Hurston, Frédéric Marcelin, Alfred Métraux, Toni Morisson, Jacques Roumain, Simone Schwarz-Bart, William Seabrook, Derek Walcott, Richard Wright, to be supplemented by films, an art exhibit, music, and cultural demonstrations of voodoo. Course taught in French. Discussion in French and EnglishCross-listed with Humanities Center
Area: Writing Intensive

AS.212.406. The City in French Literature. 3 Credits.
The city is an integral theme, even a privileged character, in the literary and speculative texts of the 17th and 18th century. It is often understood to stand in opposition to the royal court and embodies the spirit of the people in a way related to the modern notion of "solidarity". This course will look at a number of examples of the peculiar status of the French city (especially Paris) from the late Renaissance through the First Empire. Selections from Marguerite de Valois, Mme de Sévigné, Montesquieu, Diderot, Rousseau, Turgot, Ruault, Rétif de la Bretonne, Mercier, Saint-Just, Robespierre, Napoléon Bonaparte, with a coda from Balzac and Michelet. Please note: taught in French
AS.212.333 OR AS.212.334

AS.212.413. For the Record: Jazz Cultures of Modern France. 3 Credits.
Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in music criticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.

AS.212.419. Romans africains d'expression française [French-Language Novels of Sub-Saharan Africa]. 3 Credits.
Across the 20th century, mainstream and avant-garde French culture was deeply impacted by the presence of African American musicians and performing artists hailing from the jazz tradition. From the Josephine Baker craze of the 1920s to the second post-war which welcomed the innovations of bebop and sixties-era free improvisation, metropolitan France proved a space where expatriate and exiled Black Americans could both perpetuate the tradition and innovate by turns. At the same time, French tastemakers, critics, and musicians eager to adopt new forms and styles debated the extent to which American jazz music in its various strains could be "made French." This course in transcultural French studies will feature readings in musiccriticism, history, and literature, as well as frequent close listening. It will culminate in a local concert reflecting France's continued connection to and support of jazz and related improvised musics. Though some background in French language and in musical notation is desirable (students are encouraged to engage in original-source research), all core course readings will be provided in English. Discussion in English.
AS.212.334

AS.212.429. Honors Thesis Prep. 1 Credit.
This course will meet three times during the Fall semester to enable all French majors to prepare their thesis subject, thesis bibliography, and abstract prior to the writing of the Senior Thesis (AS.212.430) in the Spring semester of their senior year. This course is required of all French majors and must be taken during the Fall semester of their senior year. Schedule TBA upon consultation with the class list, as there are only three group meetings. The rest of the meetings are in individual appointments with the DUS or another chosen French professor.Prerequisites: AS.212.333-334 and either prior enrollment or concurrent enrollment in AS.210.417 Eloquent French.
AS.210.417;AS.212.333 AND AS.212.334

AS.212.430. French Honors Thesis. 3 Credits.
An in-depth and closely supervised initiation to research and thinking, oral and written expression, which leads to the composition of a senior thesis in French.Recommended Course Background: AS.212.429
Area: Writing Intensive

AS.212.431. Style, Gender and Politics from Marie-Antoinette to the Burqini. 3 Credits.
From effeminate kings, to slutty queens, to post-revolutionary dandies, to the manifest invisibility adopted by some French citizens today, debates on the gendering and styling of political bodies have always been central to power struggles in France. Students will read from sociology, history and literature in order to understand the complex interplay among fashion, gender and political identity.Taught in English, but French minor/major credit possible by completing written work in French and by attending a weekly discussion section conducted in French. Students interested in the 4-credit French option should enroll in section 2. All others should enroll in section 1.Special Notes: This course is meant to be a small class experience. Enrollment limits will be strictly enforced.

AS.212.433. Reason and Revolution. 3 Credits.
The French Revolution in relation to the literature and political thought of the Enlightenment: Montesquieu, Rousseau, Beaumarchais, Condorcet, Robespierre, Mme de Stael and the revolutionary theater. Recommended Course Background: AS.212.333 or AS.212.334. http://www.wilda.org/Courses/CourseVault/Undergrad/ReasonRev/syllabus.html
Area: Writing Intensive

AS.212.436. Cultures of Love. 3 Credits.
From the time of its invention, as a kind of counterfeit religion, in the Hispano-Arabic world, love has been an unsettling, paradoxical, transgressive phenomenon: mystical, adulterous, con game, parlor game, poison, illness. Taking a literary, sociological and anthropological approach, this course will try to grasp some of the challenges posed by love's protean discourse: from the fin'amor born in women-ruled Medieval courts, to the language of 17th-century women mystics, to libertinage, to the cold intimacies of today's emotional capitalism. Taught in French.
Area: Writing Intensive
AS.210.301

AS.212.437. Diderot and the French Enlightenment. 3 Credits.
Denis Diderot's early work was dominated by his work on the natural sciences and the Encyclopédie. In later years, his literature addressed the social applications of knowledge: economic, anthropological, political, and moral issues structured his aesthetic concerns. As an author in continual conversation with his contemporaries and who was instrumental in the creation of an engaged intellectual community, his fiction, philosophical texts and critical works serve as the ideal lens to bring into focus the peculiarities of the French Enlightenment. Among the texts to be considered will be articles from the Encyclopédie, the Supplément au voyage de Bougainville, Le Rêve de d'Alembert, the Salon de 1767, Le Neveu de Rameau, extracts from his Essai sur les règnes de Claude et de Néron… This class will be taught in French.Recommended Course Background - AS.212.333
Area: Writing Intensive

AS.212.439. Aimer Son Prochain? Sympathie, Différence, Hostilité. 3 Credits.
Une exploration des diverses manières de produire et réguler l'amour de l'autre au sein d'une société hiérarchique et compétitive: que cet autre soit un concitoyen ou un étranger, un inférieur ou un supérieur, qu'il nous ressemble ou non. Du roman, à l'anthropologie, à la sociologie, au débats sur le vivre-ensemble à l'Assemblée Nationale, nous examinerons les rêves pacificateurs de la politesse aristocratique, l'institution de la solidarité républicaine, les blessures de la socialité coloniale. Cours et textes à lire en français.
Area: Writing Intensive

AS.212.440. Pandemic and Vaccination as Cultural Watershed in the Ancien Régime. 3 Credits.
What is a plague? What does it mean to protect your society from such diseases? This was a fraught, even violently debated political, social and moral, more than a medical question in the French Enlightenment, and it marked the literate culture of the Age of Enlightenment. Early on, pandemics and vaccination were understood in radically different ways in England (especially by the Princess of Wales) and in France, still dominated by a view of plagues as divine punishment. In Enlightenment literature, both fiction and nonfiction, the disease is secondary to the experience of the conscious sufferer, or to its sociopolitical consequences. We will approach these issues first via a quick overview of explanations of the plague, then discuss the 18th-century smallpox vaccination debates (one of Princess Caroline's letters, Voltaire on vaccination in two of his Lettres anglaises, extracts of Rousseau's novel La Nouvelle Héloïse). We will then consider the hugely influential mid-century debate space within the magisterial Encyclopédie of Diderot and d'Alembert. Finally, we will pass to late-18th-century texts that inflect culturally, politically and socially the consequences and metaphors of pandemics on the cusp of the Revolution. Texts to be read include Laclos' Liaisons dangereuses and a short essay by Guillotin (the inventor of the guillotine) on the citizen's experience of illness and contagion in a post-aristocratic, Revolutionary state. This will be a writing-intensive course, focused on close readings of texts in 2 explications de texte (written close analyses of a selected passage). The second paper may be a more extensive study, still based on textual analysis, but which may address a historical context or set of texts that particularly interest the student. This course will be taught in French.
Area: Writing Intensive
AS.212.333

AS.212.449. France, terre des migrations [French Histories of Migration]. 3 Credits.
Comme le Canada ou les Etats-Unis, la France est une grande terre d'immigration qui depuis le 19e siècle a accueilli sur son sol des populations du monde entier. En examinant témoignages, textes de fiction et films documentaires, nous suivrons les expériences contrastées de diverses vagues de migrants chassés par la faim, le chômage ou les persécutions. Quels mécanismes ont favorisé ou freiné l'intégration économique, sociale et civique de ces migrants qui ont rejoint la République française? Que veut dire "être immigré" aujourd'hui? Recommended Course Background: AS.212.333 OR AS.212.334
AS.211.401

AS.212.452. The Character Function. 3 Credits.
What do we really mean when we talk about a "character" in a discursive work? What are the structuring, esthetic and heuristic functions of such forms of agency? How has the concept of the character evolved from the early modern period to the present day? A sampling of the cases to be considered: Descartes, Racine, Marivaux, Diderot, Rousseau, Napoleon, Michelet, Zola, avatars and "digital angels". This course will be taught in French.Recommended Course Background - AS.212.333

AS.212.454. French Theater: Reading and Practice. 3 Credits.
Reading modern theater in French can be exciting: a battle waged with words instead of swords, a battle of wit and of style. The literature of the nineteenth century was marked by major literary battles opposing young Romantic writers against an old school of Academicians. This battle was fought largely in and through the theatre. In this course the classroom space itself becomes a stage in which to reenact or rehearse some of these battles, through careful readings of texts and by exploring all possible literary contexts. Participants will read together a number of plays as well as take part in collaborative learning and creative activities. Readings to include texts by Césaire, Dumas, Hugo, Marivaux, Musset, Scribe, Sartre, and Vigny. Readings and discussion in French.
Area: Writing Intensive

AS.212.651. Romantisme et Indigénisme.
Le romantisme littéraire, en tout temps et en tout lieu, est contagieux. Ce qui a fait la force pérenne du romantisme français au XIXe siècle, c'est sa capacité de susciter de nouveaux modèles en France et de miroiter son élan esthétique au-delà des frontières nationales. Ce séminaire abordera principalement la question du romantisme français et la manière dont ses prolégomènes ont été appropriées par une ancienne culture coloniale.
Area: Writing Intensive

AS.212.679. Romantique et Romanesque: Desire, History, and Politics in 19th Century French Novel.
Literary critics from René Girard to Jacques Rancière assert that French literature of the 19th century— itself arguably the century of the novel— is fundamentally romantic. What does that mean? Is the French novel intrinsically romantic? Our discussion could well start with Girard's Vérité romanesque et mensonge romantique, which presents a new conception of the novel in correlation with human philosophy, and concludes that the "roman romanesque" is not "romantique," because romanesque adhered to the truthfulness of its subject while the romantic scenario is linked to its deceit. However, the real theoretical focal point is not the position of contemporary critics on romantic and non-romantic narrative scenarios, but the following characterization from 1903 of the "roman romanesque" by Academician Émile Faguet (1847-1916): "Ce n'est point du tout le roman à aventures extraordinaires et tumultueuses. Celui-là, je l'appellerais plutôt le roman mélodramatique. J'entends par roman romanesque celui qui, très délibérément, s'attache à nous présenter des caractères exceptionnels qui ne cessent pas d'être vrais." The course will introduce the socio-cultural complexity of novelistic forms and techniques of the literary movement familiarly known among the critics as "le romanesque français" from the Restoration to the early Third Republic. Readings by Balzac, Constant, Dumas, Flaubert, Hugo, Sand, Staël, and Stendhal. Taught in French.

AS.212.684. Fabrique de la banlieue parisienne [The Making of the Paris Suburbs].
Parler de "la banlieue parisienne", qu'est-ce à dire? Et si ce singulier induisait en erreur? Selon les époques, la banlieue fut tour à tour verte, grise, rouge ou néon vif. Appréhendée à la croisée des discours sur l'urbain et des productions culturelles, elle est le lieu de conflits idéologiques entre le capital et le salariat, entre "le Français" et "l'étranger", entre progressisme et nostalgie, entre droit et non-droit. La dialectique qui se tisse entre représentations artistiques (romans, photographies, films), pratiques sociales (arts de faire, modes d'habitation et de déplacement) et représentations idéales (urbanisme, architecture) formera l'objet de ce parcours critique embrassant un siècle de banlieue parisienne. Textes de Céline, Simenon, Queneau, Fallet, Rochefort, Daeninckx, Charef, Djaïdani; films de Duvivier, Dhéry, Godard, Rohmer, Cabrera, Ly. *Open to undergraduate French majors with permission of instructor.

AS.212.696. Literature Confronts Science: Zola.
Zola worked with the theories of heredity of his time in the Rougon-Macquart novels. But he also attempted to use his understanding of biology and thermodynamics to reform the theory of the novel in general. This course will examine these two different effects of science on literature and try to see what leads an author to undertake such a project. For a more extended description, please see http://www.wilda.org/Courses/CourseVault/Grad/Zola/Syllabus.html. Advanced undergraduates with sufficient background may register for this course with permission of the instructor.

AS.212.702. Une Littérature révolutionnaire.
The 1st half of the semester will consider some of the theoretical underpinnings (Montesquieu, Rousseau, Condorcet) and a few examples of Revolutionary rhetoric, especially the trial of Louis XVI and the late speeches of Robespierre. The 2nd half of the semester will study memoirs and literary works produced during the Revolution's aftermath and 19th-century attempts to culturally digest the Revolution. Please note: taught in French

AS.212.711. Baudelaire and Flaubert: Literary Life in the Year 1857.
Charles Baudelaire (1821-1867) and Gustave Flaubert (1821-1880): two young men from wealthy families, two opponents of bourgeois education, two aborted social callings, two terminal illnesses, two resounding failures before literary institutions, two adventures in love, two satanic fascinations, two notorious literary trials, two conceptions of the craft of writing, two approaches to realism, two criticisms of romantic art, two models of poetic inspiration, two aesthetics of language, two cults of Beauty, all for one and a unique literature. This seminar will be devoted to the literary life of two writers whose canon for more than a century has occupied a central place of importance in contemporary literary criticism. It will be our task to place their work in perspective within the context of the rise of modernism, which is to say, the new status of literature as of the year 1857. We shall endeavor, thus, to discern the authenticity of the creative relationship of each artist with himself and subsequently with others. The point will be to foreground three fundamental principles that will aid in grasping the evolution of the literary world under the Second Empire and under the Third Republic: literary history, writing and the elevation of the writer (Bénichou). Our work will be based on three or four texts by Baudelaire and Flaubert, it being understood that additional works of criticism will illuminate the discussion of these texts.
Area: Writing Intensive

AS.212.720. Le Livre Antillais: Culture/Écriture.
On s'arrête trop souvent pour souligner l'inexistence d'une véritable sphère du livre lorsqu'on aborde la littérature haïtienne, mais assez rarement pour s'interroger sur la place de cet objet dans la fiction. Il semble que la représentation du Livre et ses avatars sont partout dans les œuvres des écrivains antillais depuis le 19esiècle. Car lire et écrire jouent un rôle non négligeable dans la représentation culturelle, esthétique et politique qu'ils se font de leur société qui subit une quelconque tyrannie. Ce séminaire sera consacré essentiellement à la question du livre dans un contexte antillais. Aussi s'interrogera-t-on sur la personne de l'auteur antillais, sa présence dans l'œuvre fictionnelle, sa conception fétichisée du livre et de l'écriture au travers de l'esthétique, du social et du politique, en prenant pour exemples quelques romans de Marie Chauvet, René Depestre, Frankétienne, Fernand Hibbert, Dany Laferrière, Émile Ollivier, René Philoctète.
Area: Writing Intensive

AS.212.726. Approches géopoétiques: théâtre, poésie, roman.
Chaque genre littéraire développe un rapport particulier à l'espace, tout autant qu'au temps. Au théâtre, l'espace est à la fois abstrait, dans la mesure où le texte théâtral fait subir au monde une réduction à l'extrême, et concret, en ce que la mise-en-scène actualise un ensemble de possibles devant le public. Dans le domaine de la poésie, l'espace fait l'objet d'évocations diverses et changeantes ; il peut être intensément présent ou être renvoyé à l'arrière-plan au profit de la seule voix, siège de la "conscience" poétique. Le récit de fiction, lui, fort de sa visée mimétique, semble engendrer un imaginaire spatial plus marqué, que celui-ci se crée à partir de topoï communément admis ou qu'il intègre des précisions géographiques ou architecturales, comme le veut l'esthétique réaliste. Le but de ce séminaire sera de confronter ces trois imaginaires de l'espace en littérature, afin d'en arriver à une meilleure compréhension des ressources propres aux textes littéraires et de leur possible théorisation. Ouvrages et articles critiques d'Ubersfeld, Collot, Westphal, Moretti, Bouvet et Camus; œuvres d'expression française, à lire in extenso ou sous forme d'extraits, de Corneille à Koltès, de Lamartine à Glissant, de Voltaire à Volodine...
Area: Writing Intensive

AS.212.741. Rousseau: Citizenship and Exile.
Throughout his life Rousseau presented himself by turns as the citizen of a Republic, a stateless outcast, the resident of a vanishing homeland of the heart, and the focal point of an international conspiracy. He invented new foundations for political communities that could never be implemented or were misunderstood during the revolutionary Terror. The families he portrayed were both patriarchal and defiantly anti-normative. He affirmed his desire to belong and insisted on his irreducible difference; he extolled friendship and engineered breakups. Through readings of Rousseau's major political, autobiographical and fictional works we shall examine how and why communities, personal identity and citizenship are alternately built and destroyed. Taught in French. Course open to undergraduates with permission of the instructor.

AS.212.751. Franco-Algerian Screens: Exoticism, Revolution, Independence.
From exoticist features of the 1920s and 1930s and political works of the 1960s, to family sagas and personal essays looking back on a conflicted past from the standpoint of the new century, Algeria has featured prominently in the French cinematographic imaginary. The independent North African nation has likewise produced compelling narratives that address the colonial legacy, the armed struggle for independence and its aftermath. Addressing from both sides of the Mediterranean an entangled political and cultural history, this course places in critical context conflicting screen representations as well as the institutions, individuals, and publics associated with them. The course will be taught in English, however most course materials will be in French. Undergraduates may take with permssion of the instructor and completion of AS.212.333 and AS.212.334. Graduate students need not have completed the prererquisite courses.

AS.212.757. Romans Africains D'expression Française [French-language Novels of Sub-saharan Africa].
Depuis la période coloniale finissante, le roman africain d'expression française a porté les espoirs et les déceptions d'un continent tiraillé entre panafricanisme et nationalisme, patrimoine traditionnel et modernité, courants séculiers et religieux. Que signifie le choix d'écrire des romans en une langue de colonisation qui est aussi, dans les sociétés multiethniques du Mali, du Sénégal ou encore du Congo, une langue fédératrice auréolée de prestige? Quels publics les romanciers visent-ils à atteindre, et à quel point la forme romanesque permet-elle d'exposer des griefs ou de dénoncer des états de fait tout en faisant apparaître des alternatives? Nous éclairerons, en étudiant des auteur.e.s francophones d'Afrique noire, trois temps forts: l'éveil politico-culturel menant aux indépendances d'abord (Kane, Oyono, Ouologuem, Kourouma); la construction de nouvelles identités africaines ensuite (Sembene, M. Bâ, Sony Labou Tansi); et enfin, les violences génocidaires au Rwanda qui laissent, sur les consciences et les corps, des marques indélébiles (Tadjo, B. Diop, Mukasanga).

AS.212.778. Les écritures contemporaines aux confins des genres [Contemporary French Writing Beyond the Genres.
Le système des genres littéraires consacré par la vieille trinité "roman, poésie, théâtre" ne fait plus la loi. Depuis les années 1980 ont émergé en France des formes d'écriture hybrides s'appuyant sur le montage, le recyclage, le catalogue ou encore la traduction intermédiale. Notre objet sera d'interroger le statut de l'objet littéraire et de la figure de l'écrivain dans un paysage artistico-médiatique que caractérisent la surproduction de textes et d'images et une certaine déréalisation du lien social.

AS.212.781. L'entre-deux-guerres en toutes lettres [French Literature Between the Wars].
French literary culture between the wars (1919-1939) promoted the novel as a forum for social comment and formal experimentation alike. Questioning the psychological biases of the 'roman d'analyse' and reacting to the collective tragedy of the Great War, interwar writers updated the French language as well as narrative 'technique' in light of emergent theories (psychoanalysis, Marxism, phenomenology). Readings from Aragon, Breton, Céline, Cocteau, Colette, Dabit, Malraux, Némirovsky, Queneau, and Simenon.

AS.212.785. The Enlightenment and its Critics.
Are imperialism, universalism, soulless rationalism, reckless exploitation of nature, and social engineering the legacy of a so-called "Enlightenment project," as many have argued in the wake of World War II? This course explores some core aspects of that critique, from Rousseau to Foucault, while testing them against examples of the plurality of discursive practices that we call Enlightenment. Readings and discussion in French. Course open to undergraduates with the instructor's permission.
Area: Writing Intensive

AS.212.791. Film Theory and Critical Methods.
Film Theory and Critical Methods surveys critical approaches to the study of film. Each week we examine a different theoretical approach to filmic representation, with emphasis variously placed on a style, genre, region of production, or period. We will be examining global film traditions from East Asia to Latin America, Western Africa, Europe, and North America. Seminar discussions will incorporate examples from films that students both view on their own as well as during the Wednesday evening screenings, which are mandatory for all seminar participants.

AS.212.801. French Independent Study.

AS.212.802. French Dissertation Research.

AS.212.803. French Proposal Preparation.
1st semester: Develop list of already-read works in your chosen field to develop a thesis subject. Identify 2 co-advisors of the ABD project; the expectation is that 1 will direct the thesis following the ABD defense. Register in this advisor's section (01: Desormeaux; 02: Anderson; 03: Russo; 04: Schilling). 1st month: Discuss with co-advisors your understanding of the core research question(s) and prepare a provisional abstract (an ongoing working tool). The abstract includes 1) well-articulated thesis statement; 2) description of proposed methodology; 3) list of proposed primary works to be studied; 4) justification of the project's relevance to the field and its interdisciplinary reach. It should be accompanied by a report on your literature search: situate your project within the existing scholarly corpus. 2nd month: prepare an annotated bibliography of primary and secondary works. Expect it to expand significantly during ABD prep as well as after the ABD defense. 3rd month: review and modify the abstract with the co-advisors; develop a provisional outline of your ABD text. Present a reading list for the period between the 1st and 2nd semesters of proposal prep. 2nd semester: Meet with the co-advisors to report on the interim research and revisit if necessary the proposed outline and abstract. Submit proposal for the sample chapter. 1st month: begin writing the sample chapter. 2nd month: in the light of how the sample chapter is progressing, review the outline with the co-advisors, then begin writing a narrative of potential thesis chapters. 3rd month: once the foregoing are drafted, write up the methodological introduction and finalize the annotated bibliography. Finally, review the abstract for completeness and revise the ABD for language and formatting. The ABD must be approved by the ABD co-advisors before it is distributed for defense. Goal: ~25 pages of supporting material; ~30-page writing sample; an annotated bibliography. ABD is not to exceed 75 pp.

AS.212.804. French Summer Research.

AS.213.205. Outsiders, outlaws, outcasts. 3 Credits.
Introduction to the close reading of German-language literature in the original. We read and discuss literary works in which experiences of crisis give rise to novel forms of selfhood. Authors may include Tieck, Kleist, Büchner, Droste-Hülshoff, Heine, Keller, Storm, Kafka, and others. We will ask how narrative form can represent breakdowns in established ways of sense-making. Attention will be paid to writers' divergent responses to the challenges of modernity. Readings, discussion, and writing assignments in German.

AS.213.311. Wege aus der Krise: politisches Theater heute. 3 Credits.
Course taught in German. Klimakrise, sogenannte Flüchtlingskrise, Gesundheitskrise, Krise der Demokratie: Eine Krise nach der anderen stellt sich ein oder wird zumindest ausgerufen. Das Resultat ist jedes Mal Weltverlust, wenn auch auf sehr unterschiedliche Weise. Es gibt also grundsätzliche Probleme, mit denen sich politisches Theater heute auseinanderzusetzen hat. In Deutschland und Österreich hat das Theater traditionell und aktuell einen hohen gesellschaftlichen Stellenwert. Allerdings ist auch die Welt des Theaters seit Frühjahr 2020 aufgrund des Gebots, soziale Kontakte einzuschränken, weitgehend zusammengebrochen. Dennoch arbeiten Theatermacher*innen weiter daran, den großen Problemen unserer Zeit zu begegnen. Welche Entwürfe bieten zeitgenössische Stücke, um uns als Gesellschaft Wege aus der Krise zu weisen.
AS.210.362

AS.213.313. Utopia: Idyllic Pasts, New Frontiers. 3 Credits.
Taught in German. This course will explore the vision in German romantic and modern literature of ideal communities. We will examine the relation of past and to future in these works as well as the way they conceive humans and nature, earth and heavens, bodies and machines. To what extent is a utopia something crafted? To what degree is it presented as a fashioned setting like a work of art? What does the image of utopia tell us about the act of imagining at the heart of literature? To what extent does envisioning a utopia amount to inhabiting one? Why is a utopia at once every place and no place (u-topos)? Reading to include works by Klopstock, Novalis, Hoffmann, Kleist, Nietzsche, Scheerbart, Walser and Jünger.
AS.210.361 AND AS.210.362

AS.213.314. Texte sehen, Bilder lesen. 3 Credits.
Taught in German. This course examines the intersections of literature and the visual arts. We will read texts by writers influenced by artists and explore art that mobilizes text; and we will examine the relationships between text and image in both illustrated books and artworks. We will also consider the visual dimensions of texts themselves, asking how texts sometimes come to function imagistically or even as images in their own right. We will work across different periods of literary and visual production, and specific topics will include: theories of text and image; manuscript illumination and early printing; typography; concrete poetry; artists' books; text art; and graphic novels. The course will include visits to the Baltimore Museum of Art, the Walters Art Museum, Special Collections at the Sheridan Library, and a letterpress shop.
Area: Writing Intensive
AS.210.362 or Instructor Permission

AS.213.315. Playtime…auf deutsch. 3 Credits.
Taught in German. German discussions of theater have largely focused on Greek tragedy and how this classical genre can be adapted for the modern stage. Yet comedies (or Lustspiele) have played an equally important role in German cultural productions and discourse from the early modern figure of the buffoon (Hanswurst) to reflections on puppet theater and to larger philosophical and anthropological inquiries into play. In this course we will read several theoretical texts on comedy and play by Aristotle, Huizinga, Kant, Schiller, and Kleist before turning to various comedies by Lessing, Kotzebue, Kleist, Brentano, Droste-Hülshoff, Büchner and Brecht. The culmination of the class will be a theatrical production.
AS.210.362 or Instructor approval

AS.213.321. Bodies and Pleasures. 3 Credits.
This course traces a literary history of sexuality from the Middle Ages to contemporary women's writing. We will analyze how sexual pleasure changed over time. In particular, we will discuss what role literature plays in the reproduction and transformation of bodily pleasures. The course explores how the pleasures of bodies are imagined in and through literature, but also whether words are bodies that give pleasure and perhaps even have their own pleasures.

AS.213.328. German Literary Modernism. 3 Credits.
Taught in English. German Literary Modernism focuses on modernist works of literature between 1900-1930, considering central modernist authors against the backdrop of dramatic changes and events in European culture and society, including urbanization, technological change, the First World War, and social and artistic movements. Students will engage literary works--by such authors as Kafka, Rilke, Hofmannsthal and Thomas Mann--that express a sense of crisis about modern life, or provoke questions about the nature of reality, the human self, the reliability of perception, and the possibilities of language and art. ? Students have the option of an additional hour of German discussion and doing all the assignments in German for German-language credit (3+1) towards the major or minor. Students interested in that option should register for section 2.

AS.213.340. Flucht und Migration: Literarische Erkundungen. 3 Credits.
We will study how contemporary German literature reflects the experiences of migrants and refugees. Jenny Erpenbeck's novel Gehen, ging, gegangen (2017) and Sasha Marianna Salzmann's novel Außer sich (2018) will serve as our main examples, complemented with shorter texts and other material on the historical and political contexts.

AS.213.354. Introduction to German Poetry. 3 Credits.
This class will introduce students to German poetry from the eighteenth to the twentieth century. We will read selected poems by Goethe, Eichendorff, Mörike, George, Hofmannsthal, Rilke, Trakl, Celan, and Bachmann. In addition we will read several theoretical reflections on poetry by literary critics and philosophers which examine the lyric form and the curious world that poetry constructs. Readings and discussion in German.

AS.213.360. Animals and Animality in Literature and Philosophy. 3 Credits.
(300-level, taught in English) critically engages the presentation and imagination of animals and other non-human life in modern literature, philosophy, and thought. We will examine the figure of the animal and the means of conceptual differentiation between the animal and the human, considering animals' relation to or perceived exclusion from language, pain, embodiment, sexuality, and the visual gaze. The course is ideal for students interested in fascinating themes in literature and how they reflect philosophical concerns. No prior courses in philosophy are required. Students will read philosophical texts alongside literary works in learning the conceptual history of animals and of humanity as a distinct species. Expect fascinating readings and engaging, lively discussions. Readings may include works by Marx, Nietzsche, Freud, Heidegger Derrida, Agamben, Poe, Kleist, Hofmannsthal, Rilke, Kafka, Mann, Pirandello, and Coetzee.
Area: Writing Intensive

AS.213.373. Sex und Macht. 3 Credits.
We will discuss postwar and contemporary literature and films that grapple with the effect of unequal power structures on sexual relations. Taught in German.

AS.213.374. Existentialism in Literature and Philosophy. 3 Credits.
What does it mean to exist, and to be able to reflect on this fact? What is it mean to be a self? This course explores the themes of existentialism in literature and philosophy, including the meaning of existence, the nature of the self, authenticity and inauthenticity, the inescapability of death, the experience of time, anxiety, absurdity, freedom and responsibility to others. It will be examined why these philosophical ideas often seem to demand literary expression or bear a close relation to literary works. Readings may include writings by Kierkegaard, Nietzsche, Dostoevsky, Heidegger, Rilke, Kafka, Simmel, Jaspers, Buber, Sartre, de Beauvoir, Camus, and Daoud.
Area: Writing Intensive

AS.213.377. Wassermänner Und Meerjungfrauen. 3 Credits.
Schriftsteller*innen haben immer wieder Geschichten von Wassermenschen erzählt. Was für eine Faszination birgt das Leben im Wasser? Was ist an diesen Zwitterwesen— Männer mit Schwimmhäuten, Frauen mit Fischschwänzen—so interessant? Was geht verloren, wenn solche Amphibien sich für immerauf dem Land einrichten? Tatsächlich sind alle Menschen Wasserwesen— zu einem Großteil aus Wasser bestehend. Aber dieses Lebenselement wird zunehmend gefährdet und gefährlich. Was nun? Wir werden literarische Texte aus der Romantik, Moderne und Gegenwart sowie ein paar Filme analysieren, um diesen Fragen nachzugehen

AS.213.378. Seeing the World by Foot. 3 Credits.
TAUGHT IN GERMAN. Few traditions have placed more emphasis than German literature on the importance of walking for finding one's way on earth and in the cosmos. From Schiller and Novalis to Thomas Bernhard and Werner Herzog, walking has been conceived not only as a journey outwards but also inwards into uncharted terrain of memory, the unconscious, and the imagination. In this course we will read short texts on wandering by Schiller, Chamisso, Goethe, Novalis, Tieck, Stifter, Walser, Bernhard, Herzog and Sebald with an eye toward the relationships that walking establishes between past and present, reality and imagination, time and space and inner and outer experience.
AS.210.361 AND AS.210.362

AS.213.380. Ghost Stories, Haunted House and Other Occult Phenomena. 3 Credits.
From the eighteenth century to the modern period, German authors have been obsessed with uncanny phenomena that blur the line between the natural world and the supernatural world of ghosts, spirits, and magic. We will explore the encounter with otherworldly phenomena in this course with a special emphasis on the status of literature as a play of semblance or collection of shadows. Why have ghost stories been so persistent in the modern era when science and reason are said to dominate our understanding of the world? Is the occult the dark side of science? What kind of knowledge does literature yield? What can literature tell us about what is random, obscure, or inexplicable?

AS.213.407. German Media Theory. 3 Credits.
German Media Theory is an advanced course for upper-level undergraduates and graduate students, giving an introduction and overview of the specifically German version of Media Studies that first gained traction in the 1980s. The term media refers not just to mass media but more broadly to devices that process, transfer and store information, reaching from the alphabet that changed the culture of writing, or the printing press made famous as the foundation of the ‘Gutenberg galaxy’ to computers and smart phones dominating our current lives. In this course we will cut across disciplinary boundaries to explore the multifaceted roots and formations of German media theory which combine literary poststructuralism, histories of science and technology, psychoanalysis, cybernetics, art history, and philosophy among other fields. Readings include works by Friedrich Kittler, Bernhard Siegert, Cornelia Vismann, Wolfgang Ernst, Walter Benjamin, Niklas Luhmann, Michel Foucault, Marshall McLuhan and many others. The course will be taught in English and all readings will be available in English.

AS.213.423. Reflections on Modernity. 3 Credits.
Taught in English. Reflections on Modernity takes up the problems conflicts, and possibilities of modernity in aesthetic, literary, and philosophical texts. Questions about the modern self, our relationship to nature, to urban experience, to history and language, and the role of the artist and writer in reflecting on modern life. Texts include works by such authors as Kant, Nietzsche, Baudelaire, Weber, Rilke, Hofmannsthal, Simmel, Heidegger, Habermas, Foucault.

AS.213.437. Phenomenology and Literature. 3 Credits.
Phenomenology and Literature engages the most fertile interchanges between literature and philosophy in the 20th century, focusing on the roots of phenomenology in German philosophy and its connections with and expansion to literary writing. Themes include: the nature of literary experience, including the experience of reading and writing, literary and phenomenological descriptions of reality, the literary construction of the self, and the understanding of literary imagination from a phenomenological perspective. We will read philosophers and literary theorists such as Nietzsche, Husserl, Heidegger, Sartre, Camus, Merleau-Ponty, Blanchot, Beauvoir, Hamburger, Ingarden and Iser in connection with the works of many modernist writers, including Rainer Maria Rilke, Franz Kafka, Hugo von Hofmannsthal, Thomas Mann, Thomas Bernhard, Virginia Woolf, Marcel Proust, and Wallace Stevens.
Area: Writing Intensive

AS.213.446. Nature and Ecology in German Literature and Thought. 3 Credits.
Nature and Ecology in German Literature and Thought considers the understanding and representation of the natural world in literary works and aesthetic theory from the 18th to the 20th centuries. We will consider such topics as poetic reverence for nature, anthropocentric representations of nature in literature, the thematization of landscape, the representation of animal life, the distinction between the human and animal as explored by literary writers, and ecologically-oriented critique of human consciousness. Readings may include works by such writers and thinkers as Goethe, Kant, Hölderlin, Nietzsche, Heidegger, Rilke, and Kafka, and more recent works of literary ecocriticism.

AS.213.509. German Honors Program. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.213.510. German Honors Program. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.213.607. Critical Ecologies of Literary Modernism.
Critical Ecologies of Literary Modernism will trace the origins of ecocritical literary modernism. Beginning with Hölderlin and Nietzsche, who most radically identified the source of estrangement from nature in human cognition itself, we will explore how innovations in conceiving human cognition and practice play out ecologically in the work of German modernists Hugo von Hofmannsthal, Rainer Maria Rilke, Franz Kafka, Else Lasker-Schu¨ler, Robert Musil, and Bertoldt Brecht, as well as in the modernist works of Virginia Woolf, D.H. Lawrence, William Carlos Williams, T.S. Eliot, Wallace Stevens, Elizabeth Bishop, Françis Ponge and Albert Camus. Grounded in modern German thought and extending across multiple literary modernisms, we will see that what have been taken as the subjective or aestheticized concerns of modernist writing can be recognized as critical ecologies of human cognition and practice, while exposingmodernist anxiety about the technological advances of human habitats, the expanse ofurbanization, the reach of human intervention in nature, and the underlying animality within human thinking and perception. These works may also initiate forms of imagined intimacy with nature and non-human life in modernist works.
Area: Writing Intensive

AS.213.618. Nietzsche.
The first premise of this seminar is that Nietzsche’s works are not simply expositions of ideas. Rather, they testify to an effort to overcome nihilism, that is, to make a life of writing worth living by turning it into an enthralling experiment in which basic tenets of Western culture are pitted against themselves. Our second premise is that this project cannot be adequately understood without attention paid to the peculiarly German form of cultural crisis that confronted the young Nietzsche, the characteristically German turn to Greek antiquity that defined his beginnings, and the grand project of national renewal to which he dedicated his energies during his early alliance with Wagner–the encounter with whom Nietzsche continued to view as the most important event of his life even after he repudiated Wagner. The selection of works we discuss will therefore be bookended on one end by The Birth of Tragedy and a few other early writings, and on the other end by Nietzsche’s final settling of scores with Wagner. A recurrent theme will be the shifting relation between aesthetic delight and the will to truth in Nietzsche’s writings.

AS.213.620. Robert Walser, Literary Miracles and Virgin Births.
One of the most remarkable features of Robert Walser’s writing is that the narrator consistently orchestrates or engineers his birth. He crafts a narrative that enables him to pass from the page into life in a form of literary transubstantiation in which the word is made flesh. This is the miracle of Walser’s writing. It is also a perversion of the Platonic and mystical ideal of a virgin birth. This seminar will explore Walser’s work against this historical and theological backdrop with special emphasis on the nexus of religion and psychosis, as evidenced in Daniel Paul Schreber’s memoir and Freud’s analysis thereof. We will consider the perversion at the heart of Walser’s work that makes literature the sphere of wonders and miracles in an otherwise disenchanted world. Reading knowledge of German is required for this course, as many of Walser’s works have not been translated into English. In addition to Walser’ work, we will also read Plato, Meister Eckhart, Mechthild of Magdeburg, Schreber, Freud, and Beierwaltes on neo-Platonism.

AS.213.622. Possible Worlds: Fiction and Contingency from Leibniz to Tieck.
In 1689, as Leibniz began to understand that contingent phenomena exist, he declared that they pulled him out of an "abyss." What contributed decisively to this insight was not only infinitesimal calculus but also the novel, whose fictive worlds could be given the status of the possible, even if they had no place in the existing "series of the universe." The result of the convergence of literature and mathematics prompted by Leibniz's epistemic breakthrough included new practices of writing and of inventing possible worlds. We will take up these questions in the seminar beginning with Leibniz's Theodicy and Blanckenburg's Essay on the Novel (1774), followed by readings of selected novels from Wieland's Agathon to Dorothea Schlegel's Florentin as well as (more or less) fantastical shorter narratives from Goethe to Tieck. We will also consider theories of fiction and possible worlds from Doležel to Lamarque. Course taught by the Max Kade Visiting Professor Christiane Frey.

AS.213.623. Poetry and Philosophy.
This course will trace the tensions, antagonisms, and collaborations between poetry and philosophy as distinctive but fundamental expressions of human thought and experience. We will engage poetry as a form of artistic expression that compliments, completes, or challenges other forms of knowledge, and consider the range of philosophy's responses to poetry and poetics. Readings will include works by philosophical poets and poetic philosophers including Hölderlin, Schlegel, Rilke, Bachmann, Celan, Stevens, Heidegger, Gadamer, Adorno, Benjamin, Merleau-Ponty, Valéry, Wittgenstein, and Agamben.

AS.213.624. Reading Sand.
Why is there "a world in a grain of sand"? And why in German literature is it a "sandman" who brings dreams? The specific materiality of sand allows for a broad range of metaphorical uses with strong epistemological implications. With its small discrete grains of the same size, sand is barely limited in its potential to coalesce into formations that can be counted yet remain innumerable and to dissolve. Exploring sand in literary texts means to deal with issues like the history of the microscope, the problem(s) of infinity, "sandy" or "grainy" mediality and loose grounds as well as the subjects of remembrance, dream and the historicity of the human being. In this seminar we will read texts by Barthold Heinrich Brockes, Theodor Kornfeld, Jorge Luis Borges, Italo Calvino, Ingeborg Bachmann, Stefan Heym, Paul Celan, E. T. A. Hoffmann and Bodo Kirchhoff. The discussion will be in English, but reading knowledge of German is required for the course material. This course will be taught by Max Kade Visiting Professor, Annina Klappert

AS.213.626. Husserl's Ideas: An Introduction to Phenomenology.
The first volume of Husserl's Ideas I (1913) provides an overarching picture of the phenomenological method that came to define much twentieth-century German and French thought. This course will consider the foundational concepts introduced in this volume (eidetic analysis, intentionality, bracketing, correlationism, time consciousness, the natural attitude and the phenomenological reduction) as well as responses to them by Merleau-Ponty, Derrida, Heidegger and others. We will also consider Husserl's later efforts to incorporate history, other minds, and even that which is other-than-mind into his idealist system.

AS.213.630. Modern Orpheus: Rilke and Celan.
In the Sonnets to Orpheus Rilke proclaims, "Singing is being" [Gesang ist Dasein], in an affirmation of the life attained through art that Nietzsche spoke of in The Birth of Tragedy. This is not an individual life but the whole of being, in which poet and reader share, provided they surrender to the movement of the song, the rhythm of its words. Celan's halting rhythm could not be more different than Rilke's, and yet his poetry also invites the reader to surrender to the work, albeit not to the words but to the wounds it opens within them, to the silence it exposes in speech. This course will consider the Orphic tradition and its aftermath as seen in Rilke's and Celan's work. Special attention will be paid to the status of the unsayable (das Unsägliche for Rilke, das Unsagbare for Celan) in both writer's poetry, prose and translations, especially from the French.

AS.213.636. Hölderlin and His Readers.
Hölderlin's works develop vast intellectual constructions in a poetic language of striking rhythmical power, while remaining anxiously concerned with the conditions of lyric utterance. Although his work responded to the literary and philosophically currents as well as the revolutionary politics and Philhellenism of his time, it proved untimely. Yet the same severe features that alienated contemporaries would lead such 20th-century poets as George, Rilke, and Celan to celebrate and emulate Hölderlin. We will examine how Hölderlin's early contributions to post-Kantian idealism paved the way for his poetic project, as well as his odes and elegies, and some of the poetological writings. The late hymns will be discussed in detail against the backdrop of Hölderlin's engagement with ancient tragedy and his Empedocles project. Since Hölderlin's works have elicited literary criticism of the highest order as well as influential reflections on the aims and challenges of literary interpretation, our readings of Hölderlin will proceed in dialogue with such critical responses.
Area: Writing Intensive

AS.213.639. On the Difficulty of Saying I.
This course takes as its point of departure the position that language carries within it the traces of something that exceeds the cognitive grasp of the subject and to this extent undoes any claim to knowledge the subject might make. This position has been central to twentieth and twenty-first century thought from psychoanalysis and poststructuralism to media theory and new materialism. This course will not take issue with this position. It will examine instead how this position evolved from the Idealism of Fichte to the eerily inhuman, if not mechanical, talking figures in texts by Novalis ("Monolog"), Poe ("Maelzel's Chess Player"), Hoffmann ("Die Automate"), Büchner (Leonce und Lena), and Kafka ("Ein Bericht für eine Akademie"). We will explore the literature of the personal and impersonal in romantic and modernist texts in order to ask what moves and motivates works in which the first-person narrator would seem to be nothing more than a fiction—a staged phenomenon or a mechanical device.

AS.213.643. Franz Kafka in Philosophical and Literary Perspective.
This course is devoted to close study of the writings of Franz Kafka from both philosophical and literary perspectives. Writings will include Kafka's short prose works and novels along with philosophical and literary critical interpretations thereof. Readings may include commentaries by Walter Benjamin, Theodor Adorno, Hannah Arendt, Albert Camus, Giles Deleuze, and Giorgio Agamben. Primary texts for students from the German section will be in original; any other students may read Kafka in translation.

AS.213.668. Kleist im Kontext.
This seminar will explore the narrative, dramatic, and quasi-journalistic work of Heinrich von Kleist in its philosophical and literary environment. We will examine how Kleist comments on and parodies the positions of the enlightenment, German Idealism, Weimar classicism, and the theater establishment. We will pay particular attention to the way he combines the verbal and the visual in his performative, narrative, and syntactic strategies, and analyze how this contributes to a specifically Kleistian sense of humor.Grading: P/F

AS.213.679. Haitian Revolution: German Responses.
We will explore how contemporary German thinkers and writers reacted to the Haitian Revolution, what their interests were, and how later generations of writers responded to earlier reactions, perhaps tried to do better and used the historical material for their own purposes. Possible authors: Hegel, Humboldt, Kleist, Zschokke, Seghers, Müller, Fichte, Buch, Öziri and others.

AS.213.687. Imagination in Philosophy and Literary Theory.
Imagination in Philosophy and Literary Theory is devoted to studying theories of imagination in the history of philosophy and literary theory, from the ancient Greeks to the present day. We will study philosophical conceptions of the role of imagination in memory, cognition, perception, and creativity, and assess traditional philosophical oppositions between imagination and reason, the imaginary and the real. Readings may include selections from Aristotle, Kant, Coleridge, Nietzsche, Husserl, Heidegger, Merleau-Ponty, Sartre, Dufrenne, Stevens, Iser, Ricoeur, Ryle, Wittgenstein, and Nussbaum.

AS.213.742. New Objectivity: Program and Projects.
The course will focus on the aesthetics and discourse of “New Objectivity” in Weimar German literature. The ideals of sobriety and coldness called for a direct and unadorned view of the routines of modern work and love and found proponents not only among writers of the avant-garde but also, and with less fanfare, among authors who worked in popular genres like adventure novels. In this course, we will investigate how the desire for objectivity responded to a cultural crisis in the aftermath of World War I and how it guided the choice of genres (biography, reportage, non-fiction, modernist novel) as well as encouraged factographic styles of writing. Authors to be discussed include Egon Erwin Kisch, Joseph Roth, Siegfried Kracauer, Ilja Ehrenburg, B. Traven, Irmgard Keun, Gabriele Tergit, and Marieluise Fleißer. Class discussion will be in English or German depending students’ preferences. Reading will be in German.

AS.213.761. Literary Aesthetics.
This course explores literature in the context of the aesthetic tradition in philosophy. Themes include literature as mimesis, or the representation of reality, its relation to truth, untruth, and possibility, literature as the revealing of being, literary imagination, the distinctiveness of literary language and expression, the role of the literary author. Readings may include background selections from Plato and Aristotle, but the course will focus on philosophical interest in literature since the late 18th century, and may include Kant, Hölderlin, Nietzsche, Heidegger, Sartre, Blanchot, Bachelard, among other readings. Course will be taught by the Kurrelmeyer Chair in German. Taught in English.

AS.213.763. Contemporary Theater: Gender/Violence.
The course explores 21st-century German theater in its diverse aesthetic and textual forms. Due to comparatively generous funding, German non-commercial theater has over the last decades been able to develop, adapt, and maintain a great variety of at one point “experimental” artistic styles, including frequently stark depiction of gender and violence. We will focus on the ways in which the productions take up, amplify, displace, disrupt, and/or reinforce cultural codes and images of gender and violence both in their symbolic and physical dimension. Topics include the “directors’ theater,” political theater, “pop-theater,” “discourse-theater,” “new documentary theater,” “post-migratory theater,” postcolonial theater and live art. The readings may include Nobel laureate Elfriede Jelinek, Dea Loher, René Pollesch, Milo Rau, Falk Richter, Sasha Marianna Salzmann and various works of shared authorship such as She She Pop, Rimini Protokoll, Gintersdorfer/Klaßen, and Yael Ronen. The Tuesday sessions will be used for the joint viewing of production recordings. Taught in English. Course material in German. No sessions after March 27th.

AS.213.800. Independent Study-German.

AS.213.804. German Summer Research.

AS.213.812. Directed Dissertation Research.

AS.213.813. German Qualifying Paper Preparation.

AS.214.304. Founding Mothers: Female Genealogies in Medieval and Renaissance Italian Literature. 3 Credits.
In this course we will explore the problem of the relationship of women to dynastic power in the literature and culture of late medieval and Renaissance in Italy. Beginning from Giovanni Boccaccio’s famously ambivalent portraits of women in the Decameron and his treatise On Famous Women, we will locate women within an early modern system of inherited power and literary representations. We will then move to study a series of genealogically motivated chivalric poems (such as Orlando innamorato, Orlando furioso, Floridoro, Gerusalemme liberata) which propose a number of roles for women: warriors, queens, saints, monsters, saviors, poets, founders. These texts return again and again to the key role of women in establishing and maintaining dynastic continuity within noble families, but also to the dangers they pose to dynastic stability. We will try to understand how these literary texts work within the social and political context of the Italian city- states of this period. We will also study the involvement of women in the production and circulation of literary texts, focussing on notable patrons of the arts like Isabella d’Este and Lucrezia Borgia, and on important poets like Vittoria Colonna.

AS.214.362. Italian Journeys: Medieval and Early Modern. 3 Credits.
The Truth behind the Courtly Façade: «Of ladies, knights, of passions and of cutthroat competition»: the truth behind the romantic façade. What did life actually look like at Italian courts of the 1400 ‘s and 1500’s? We will reconstruct life at a Renaissance court through Italian history, literature, music and art of this period. Who were the stars of these scenes? We will explore the complex and intricate world of the Italian courts, including Florence and Ferrara, through the works of art they produced. The course will concentrate on historical, literary and visual representations including modern media such as film and television.
Area: Writing Intensive

AS.214.363. Italian Journeys: An Other Story. 3 Credits.
What does it mean to be "other," and how can reading about experiences of otherness affect our understanding of historical moments? In this interdisciplinary survey of contemporary Italian literature, students will read through the lens of "the other" in order to highlight both the milieu of lived experiences (often lived by the authors themselves) outside of sociocultural ideals, and the role they play within modern Italian canon. Combining gender studies, animal studies, posthumanism, and other theoretical frameworks, students will examine works from authors such as Sibilla Aleramo, Carlo Levi, Elena Ferrante, Igiaba Scego, and directors Vittorio De Sica, and Alice Rohrwacher. Taught in English—students wishing to do coursework in Italian should register for AS.214.363 (02).

AS.214.422. Ugly Beasts, Talking Monkeys: The Medieval Animal. 3 Credits.
This seminar explores the boundaries between humans and animals in the medieval world and beyond. Reading literary texts such as Giovanni Boccaccio's Decameron, Moderata Fonte's Floridoro, Luigi Pulci's Morgante and medical texts such as Girolamo Fracastoro's On Contagion, we will trace the formation of distinctions between species.The categories we will use to investigate the distinctions between animals and humans include metamorphosis, contagion, education, taxonomy, subjugation, hunting, representation, anthropomorphism and zoomorphism, wilderness, misogyny, and promiscuity. To probe these categories and distinctions, we will make use of a series of critical approaches, from critical animal studies to posthumanism, within the disciplinary specificity of Medieval Studies.

AS.214.434. Elena Ferrante and her Brilliant Friends: Contemporary Italian Women Writers. 3 Credits.
Elena Ferrante is Italy's most acclaimed contemporary novelist, although her true identity remains unconfirmed. Having been translated into and published in 45 languages, with over 15 million copies sold worldwide, her 'Neapolitan Quartet' triggered what has been called 'Ferrante Fever.' Through reading and discussion of Ferrante's works (novels, letters, and a fairytale) and their screen adaptations— the HBO TV series My Brilliant Friend and Maggie Gyllenhaal's The Lost Daughter (2022) —we shall discover the reasons behind this global, literary phenomenon while exploring themes such as gender, memory, trauma, women's participation in, or exclusion from, history, and the internal violence of a rapidly changing society. In addition to Ferrante's works, we shall also read Anna Maria Ortese, Elsa Morante, and Fabrizia Ramondino to understand the influence of women writers from previous generations on Ferrante's work. This class is taught in English. Additional discussion sessions in Italian will be offered.

AS.214.466. Utopias and Dystopias in Renaissance Culture. 3 Credits.
We will trace the dream of designing an ideal society and the danger of creating its opposite in the sixteenth and seventeenth century Italian and European thought.

AS.214.479. Dante Visits the Afterlife. 3 Credits.
One of the greatest works of literature of all times, the Divine Comedy leads us down into the torture-pits of Hell, up the steep mountain terrain of Purgatory, through the "virtual" space of Paradise, and then back to where we began: our own earthly lives. We accompany Dante on his journey, building along the way knowledge of medieval Italian history, literature, philosophy, politics, and religion. The course also focuses on the arts of reading deeply, asking questions of a text, and interpreting literary and scholarly works through discussion and critical writing. Conducted in English.
Area: Writing Intensive

AS.214.561. Italian Independent Study. 0 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.214.562. Italian Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.214.607. Teoria e Prassi della Glottodidattica dell'Italiano.
The goal of this course is to familiarize Graduate Student Instructors in Italian with foundational elements of Second Language Acquisition and foreign language teaching. The course will (1) acquaint students with historical and current theories of foreign language pedagogy; (2) demonstrate strategies to integrate theoretical knowledge into everyday practice, both in terms of instructional delivery, and materials development; (3) introduce participants to basic evaluation tools to critically assess teaching practices and tools in terms of quality, relevance, validity, reliability and other theory-based criteria; (4) help participants to articulate their own pedagogical training and philosophy of teaching in preparation for the academic job market. Taught in Italian.

AS.214.608. Vico: Mythology, Philology, and Forgery.
In this course we will examine Giambattista Vico's innovative effect on intellectual history, in light of recent discoveries regarding Vico's publication history. Extensive work in Special Collections will be featured.

AS.214.610. The Nonhumans of Renaissance Humanism.
This course is an exploration of the notions of the human that emerge when interrogating pre-modern Italian literary constructions of nonhuman entities (water, earth, flora, fauna, objects, buildings, cities, automata, demons, angels, gods, and God). We will read work by authors such as Dante, Petrarch, Boccaccio, Pico, Alberti, Leonardo, Sannazaro, Baldi, and Della Porta, as well as parts of the Hypnerotomachia Poliphili, and selections from bestiaries, herbaria, and books of emblems. Accompanying these readings are recent studies in critical theory on posthumanism and transhumanism, animal studies, ecocriticism, and phenomenology.

AS.214.685. Donne e scrittura tra '500 e '600.
While women's contributions to Italian Renaissance literature have long been acknowledged, their creative output continued well into the 17th century. This course focuses on some of the protagonists of this extraordinary season, from Lucrezia Marinella and Arcangela Tarabotti to Elena Lucrezia Cornaro Piscopia, who in 1678 became the first woman in the world to receive a university degree. Taught in Italian

AS.214.747. Umberto Eco: Medievalist, Postmodernist, Narratologist.
Umberto Eco was one of the most prolific and flamboyant authors of the 20th and early 21st centuries. Trained as a medievalist, he became one of the central figures in literary theory as well as a best-selling novelist, essayist, and public intellectual. We will explore his long career as both narratologist and narrator and its foundations in intellectual history. Works will include Il nome della rosa, Il pendolo di Foucault, Opera aperta, and The Limits of Interpretation.
Area: Writing Intensive

AS.214.748. Giambattista Vico and the Old Science.
Giambattista Vico's Principi di scienza nuova (1725, 1730, 1744) was intended to found an "ideal" and "eternal" model of human development. Vico emphasizes the importance of both philology and philosophy to his project, and attempts to break the mold of thinking about the history of humanity by exposing the preconceptions and misconceptions that arose from attempts to square "sacred history" with "profane" or non Judaeo-Christian history, creating a philosophy (or even a science) of mythology.
Area: Writing Intensive

AS.214.757. Tasso, Poet of Doubt.
A reading of Tasso's Gerusalemme liberata along with relevant poetic, literary-theoretical, philosophical, and theological texts.
Area: Writing Intensive

AS.214.766. Italy and Environmental Humanities.
This seminar examines a variety of literary texts and films, produced in Italy from the post-war period to the contemporary era, from material eco-critical perspectives. While maintaining a focus on Italy, this course addresses broad questions within the field of environmental humanities: what is the Anthropocene and how it has been conceptualized? How is has been framed chronologically? How do we interrogate a text from an ecocritical perspective? What is a non-anthropocentric narrative? What is the task of the eco-scholar? What is the goal of environmentally concerned scholarship? What does it mean to teach 'ecocritally'? Literary texts include works by Italo Calvino, Carlo Cassola, Paolo Volponi, Anna Maria Ortese, and films by directors Roberto Rossellini, Pier Paolo Pasolini, Pietro Marcello, and Alice Rohrwacher. Critical and theoretical readings will include Marco Armiero and Marcus Hall's Nature and History in Modern Italy, Timothy Morton's Humankind, Serenella Iovino Ecocriticsm and Italy, and Rosi Braidotti's The Posthuman.

AS.214.804. Italian Summer Research.

AS.214.861. Italian Independent Study.

AS.214.862. Italian Dissertation Research.

AS.214.863. Italian Proposal Preparation.

AS.215.231. Introduction to Literature in Spanish. 3 Credits.
The main objective of this course is to examine and discuss specific authors and topics in literature in Spanish from the Middle Ages to the 20th century. The course is designed to cover a selection of Hispanic texts from Spain and Latin America. Literary genres to be studied will include narratives, poetry, and drama. The bulk of each class session will be dedicated to the discussion of the assigned readings. This course is taught in Spanish. This course is required for the major in Spanish.

AS.215.290. Latin American Critical Perspectives on Colonialism: From the 'World Upside Down' to the 'Coloniality of Power'. 3 Credits.
This course, taught in English, examines how indigenous and local (postcolonial) intellectuals in Latin America responded to the ideology and practices of Spanish Colonialism in the earliest post-conquest years (1532), continued to battle colonialism during the period of the wars of independence, and finally arrived at the production of an analysis that shows how modernity is but the other face of colonialism. Among key works to be discussed are Guaman Poma's illustrated sixteenth-century chronicles, D.F. Sarramiento's _Civilization and Barbarism_ (1845), and Anibal Quijano's "Coloniality of Power" (2000).
Area: Writing Intensive

AS.215.309. An Interdisciplinary Introduction to the Study of Latin America. 3 Credits.
The course is an interdisciplinary introduction to the study of Latin America. It brings together archeology, ethno-history, art history, literature and environmental studies.
Area: Writing Intensive

AS.215.336. Don Quijote. 3 Credits.
A close reading and discussion primarily in Spanish of Cervantes' masterpiece, with concentration on its major themes and contributions to the formation of the modern novel. We will use A. Murillo's edition of the novel, Editorial Castalia.
AS.210.311 AND AS.210.312

AS.215.380. Modern Latin American Culture. 3 Credits.
Taught in Spanish. This course will explore the fundamental aspects of Latin- America culture from the formation of independent states through the present—in light of the social, political, and economic histories of the region. The course will offer a general survey of history of Latin-America, and will discuss texts, movies, songs, pictures, and paintings, in relation to their social, political, and cultural contexts. May not be taken satisfactory/unsatisfactory.
AS.210.312;Students may earn credit for AS.211.380 or AS.215.380, but not both.

AS.215.390. Modern Spanish Culture. 3 Credits.
This course will explore the fundamental aspects of Spanish culture from the nineteenth to the twenty-first centuries. The course will offer a general survey of the history of Spain and will discuss texts, movies, songs, pictures, and paintings in relation to their social, political, and cultural contexts. This course will be of particular interest for students planning on spending a semester abroad in Spain—specially for those students going to the JHU Fall Semester in Madrid, at Carlos III University. Taught in Spanish. Recommended Course Background: AS.210.311 or appropriate Webcape score.AS.215.390 was formerly numbered AS.211.390
Students may not have previously completed AS.211.390.

AS.215.406. Novelist Intellectuals. 3 Credits.
What does a novelist's op-ed about economics have to do with her literary writing? In what ways does a fiction writer's essays on the environment inform how we read her novels? What happens when we find the political opinions of a writer objectionable? This undergraduate seminar will consider what the Spanish writer Francisco Ayala termed "novelist intellectuals," that is, literary writers who actively participate in a society's public sphere. Considering writers from Madrid to New York, from London to Buenos Aires, we will ask how one should hold a novelist's fictional and non-fictional writings in the balance and explore ways of reading that allow us to consider the public intellectual side and the aesthetic side of a novelist together.

AS.215.407. Power And Gender In Hispanic American Novels And Films. 3 Credits.
We will analyze and discuss four novels and three films impacted by gender violence and political idolatry under shattering stress. Oficio de tinieblas or The Book of Lamentations (1962) by Rosario Castellanos (Mexico). Zama (1956) by Antonio di Benedetto (Argentina). Delirio or Delirium (2004) by Laura Restrepo (Colombia). El ruido de las cosas al caer or The Noise of Things Falling (2011) by Juan Gabriel Vásquez (Colombia). In addition, we will examine in depth films by Lucrecia Martel (Argentina): the short Rey muerto (1995), La ciénaga (2001), and her own version of Zama (2017). Course taught in Spanish.
AS.210.312

AS.215.409. Catalonia and Independence. 3 Credits.
What is the Catalan independence movement? Where did it come from? What, exactly, does it advocate? This seminar will examine the history, politics, and culture of Catalonia in an attempt to understand why the push for independence has grown over the past decade. We will focus especially on the impact of nationalism, ideology, social history, economics, law, and language on the construction of Catalan identity. But we will also compare Catalonia to other regions in the Iberian Peninsula (the Basque Country, Galicia) as well as across Europe (Scotland, Northern Italy) and North America (Québec) in order to better understand how movements for regional autonomy and independence emerge today. Taught in English.

AS.215.412. Populism. 3 Credits.
What do Hugo Chávez, Marine Le Pen, and Donald Trump have in common? According to many from across the political spectrum, they are all populists. But what is populism, exactly, and how can it describe such disparate phenomena as left-wing social movements, xenophobic anti-immigrant policies, and economic redistribution? This advanced seminar will examine the history, culture, and political theory of populism. We will pay special attention to the resurgence of populism after the Great Recession and examine a number of cases from Latin America, Europe, and the United States.

AS.215.413. Cuba y España. 3 Credits.
La frase “más se perdió en Cuba” alude al singular rango de la antigua Provincia de Ultramar en el mapa geopolítico del colonialismo hispánico. Hemos de estudiar la prolongada relación entre España y Cuba, desde 1492 al presente, a través de materiales literarios, crónicas, artes plásticas, música y medios sociales al corriente. Enseñado íntegramente en español.
AS.210.311

AS.215.414. Blood Cinema in films by Pedro Almodóvar, Julio Medem, and Alejandro Amenábar. 3 Credits.
Films by three leading Spanish male directors from different generational backgrounds and sexual and political orientations. We will study their respective filming and mythmaking of kinship and regional passions in mixing love with hate, attraction with rejection. Our dialogue will revive and debate the polemical psycho-analytic theses in Marsha Kinder's Blood Cinema: The Reconstruction of National Identity in Spain.
AS.210.311 OR AS.210.312

AS.215.416. Mexican Empire: the Problem of Territory from Aztec Philosophy to Trump's Wall. 3 Credits.
This course with seminar option is devoted to Mexico, its past and present paths into a remote inside-out pre-imperial epoch inalienable from North-against-South histories across the American Narcoland from Honduras to Alaska. Our nonfictional materials combine detailed summaries and readings of Stuart Elden's The Birth of Territory and James Maffie's Aztec Philosophy: Understanding a World in Motion. The fictional matter concerns Roberto Bolaño's 1998 novel, Los detectives salvajes (The Savage Detectives), Corman McCarthy's apocalypse Western, 1985 Blood Meridian, and Carlos Reygadas' films, Post Tenebras lux (2012) and Nuestro tiempo (2018).

AS.215.417. Literature of the Great Recession. 3 Credits.
The Great Recession—sometimes called the financial crisis or the economic crisis of 2008—brought financial markets to a halt and created significant political turmoil across the North Atlantic. But its impact on culture, and literature especially, has often been ignored. This seminar will travel across Europe, from Dublin to Madrid, from London to Reykjavík in order to examine how literature has registered this most recent economic crisis. We will focus on how crisis is narrated and the ways in which literary works have managed to provide a voice for marginalized social, economic, and political demands.

AS.215.419. Colombia: Territory Against Nation. 3 Credits.
The nation of Colombia amounts to a large country partly made immense and hard to govern and corruptible by its territorial nexus and porous frontier with Venezuela. Starting from such polemic claim, leaning on misgovernance vs. excessive governmentality, we will study two novels, Laura Restrepo's Delirio/Delirium (2004) and Juan Gabriel Vásquez's The Noise of Things Falling (2011); both winners of the prestigious Planeta Prize. To what extent can literary fictions of such scope and ambitions, invested in deeply rooted family politics, help or harm the reader's political trust in nations as novels and fictions as nations?

AS.215.421. Blood and Honor in the Spanish Golden Age. 3 Credits.
In this class we will study a selection of the often violent and suspenseful literature that served to entertain both the masses and the nobility during the height and rapid decline of the Spanish Empire. We will delve into how the literary establishment, in particular the theater, disseminated and sometimes questioned social and gender norms, all while wrestling with the at times deadly code of honor that permeated Spanish society. (Course taught in Spanish)

AS.215.442. Whose Caribbean and the Epic of Race. 3 Credits.
We will study literary claims of epic colonial possession and aesthetic dispossession through close readings of five works in reverse chronological order: V.S. Naipaul's late historical novel, A Way in the World (1994); Derek Walcott's transoceanic poem, Omeros (1990); Alejo Carpentier's short anti-Enlightenment moral tale, El reino de este mundo (1949) and his short tale in celebration of Afro Cuban wizardry, Viaje a la semilla (1944); Aimé Césaire's prose poetry, mixed chronicle, Cahier d'un retour au pays natal, or Notebook of a Return to the Native Land (1939-1947). We will address questions of temporality and historicity (Heidegger) and a base-materialist political blocking of wild dreams as attainable through translation (Bataille). Such formal and epistemic problems will draw us into issues of race across the colonial spectrum of Caribbean histories.

AS.215.448. The Politics of Spanish Painting. 3 Credits.
How is painting political? What would it mean for a painting to make a political intervention? Can a painting, through its subject, composition, and style, make political arguments and claims? Understanding painting as a repository for social, economic, and political relations, this course will examine the works of major Spanish painters from El Greco to Picasso. We will pay special attention to the ways in which painters developed a particular “political vision” of Iberia and the world. Paintings will be paired with texts ranging from art history and criticism to literature, history, and political philosophy. Taught in Spanish.

AS.215.460. Modern Mexico and the Culture of Death. 3 Credits.
Drawing from sources in popular culture, literature, folk religion, and the media, we will explore the myths and daily practices of death-related representations of Mexico's survival against enemies, from within the state apparatus, and the insertion into it of drug traffickers, on both sides of the so-called Crystal Frontier with the US.

AS.215.463. Borges: His Fiction and Critical Essays. 3 Credits.
This course will deal with close readings of Borges ficciones and critical essays in order to determine how his thinking on the problem of writing and thinking is fictionalized in his stories.
Area: Writing Intensive

AS.215.465. Wild Surrealism: Lorca, Dalí, Buñuel. 3 Credits.
Spanish surrealism emerged unevenly. Some writers and artists sought out the surrealist label while others rejected or ignored it altogether. Some attempted to adhere to André Breton's "Surrealist Manifesto" while others went decidedly against its principles. Yet surrealism, in one way or another, took over the Spanish artistic scene during the 1920s and '30s. Today, it is associated with Federico García Lorca, Salvador Dalí, and Luis Buñuel. Friends, roommates, and even lovers, Lorca, Dalí, and Buñuel came to define surrealism's acceptance, rejection, and indifference in Spain. This seminar will examine the moment of Spanish surrealism through these three figures. The course will include the study of film, art, drama, poetry, and nonfiction. Taught in Spanish.Recommended Course Background: AS.215.390 or AS.215.231

AS.215.469. Mapping Identity in Modern Spain. 3 Credits.
What social, political, and economic forces make groups of people appear out of place in a given society? How have literary works contributed to counteracting the marginalization of certain groups? This course will look at how modern Spanish artists, writers, and intellectuals wrestled with questions of identity and marginalization. We will critically examine how the modern Spanish state was forged from restrictions on cultural difference and consider the various marginalized groups that were left in its wake. These groups include various peoples (e.g. the Romani), ideologies (e.g. anarchism, socialism, communism), social and economic classes (e.g. peasants, the working class), and regional identities (e.g. Catalonia, the Basque Country). Key texts in modern Spanish literature will prompt our investigation into how writers and artists reflected on, contested, and expressed the marginality of the country's various internal others. Taught in Spanish.

AS.215.477. La Habana Miami: One World and Two Cities. 3 Credits.
Havana and Miami make up the oldest US enclave city linked to a foreign one under US Embargo access. We will study a unique counterpoint Hispanic Exiled culture which considers itself protected by American Exceptionalism

AS.215.525. Spanish Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.215.526. Spanish Independent Study. 1 - 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.215.603. Napoleon's Haitian Cosmos from Boukman to Bolívar.
A seminar on middle-modern to late-modern fictions by Alejo Carpentier (1949-1962 El reino de este mundo and El siglo de las luces), Carlos Fuentes (1980 Una familia Lejana), and Gabriel García Márquez (1989 El general en su laberinto). Reread as defunct belles-lettres. Main critical and theoretical points of in-depth reference: Derek Walcott's rogue Robinson-Crusoe Caribbean poetics and Jared Hickman's exorbitant Black Prometheus. Taught in English.

AS.215.604. To Die in Mexico.
The seminar adopts and translates recent ideological revisions of Mexico's alternate modernities; impacted by postcolonial, subaltern, and decolonial theories of Latin American exceptionality. The plural character of these combined exceptions and exemptions and refusals to reincorporate Mexicanness into modernizing Occidentalism will be foregrounded in two historical moments: modernismo-to-modernism, in convulsed Mexico (1900-1927) and criollista Nueva España "Baroque" hybridized and myth-invested ethics of nationhood (1604/1690): Bernardo de Balbuena's Grandeza Mexicana (1604)/Carlos Sigüenza y Góngora's Infortunios de Alonso Ramírez (1690). These materials will be framed in Europe's modernist, re-mythologized "Waste Land" (T.S. Eliot), as "brought home" to America in Hart Crane's The Bridge (a poem largely conceived and reborn in Cuba's Isla de Pinos.)(Fluent reading knowledge of Spanish)

AS.215.606. Engaging with the Global Hispanophone.
This course is envisioned as an invitation to branch out beyond the traditional archives of Hispanism, as we engage with the cultural production of 'peripheral' territories in the so-called Hispanic world, including regions that have recently been grouped within the category of the "Global Hispanophone." This rubric aspires to incorporate the cultures and historical experiences of territories once bound by the Spanish Empire in North Africa, the Gulf of Guinea, and the Philippines. In this reconfiguration of our intellectual and geographic maps of Hispanic studies, we will place these regions' pasts and presents in dialogue with other areas traditionally more central to our disciplines, while giving particular centrality to Africa. The course is thus informed by a determination to break away from the overarching Iberian/Latin American binary, an even some configurations of Atlantic Studies, and to embrace other communities, histories, experiences, and repertoires. We will ask: what might an engagement with this new archive of the Global Hispanophone entail for the broader fields, and for the scholarly practices, of Latin American, Caribbean, Latinx, Iberian, or Atlantic studies today? How might engaging with one or more of the geographical areas involved –Western Sahara, Ceuta, Melilla, Morocco, Algeria, the Philippines, Equatorial Guinea and perhaps others not fully covered in this course– alter, or transform, our approach to the respective fields?

AS.215.607. Utopia, Text, Torture.
We will examine and stress-test writings that graphically breach and exploit established literary discourses in direct or indirect reference to unbound self-consciousness. This mode of textual introspection struggles against false consciousness as a form of self-absorbed torture (matching routine practices by the dictorships that rule over any sense of actuality in these novels). Textual imprisonment (often hyper-sexualized) escapes and humiliates these otherwise triumphantly gendered writers. Diamela Eltit, Lumpérica (1983); José Donoso, La desesperanza (1986); Néstor Perlongher, O negocio do miché. Prostitução viril em Sao Paulo (1987), La prostitución masculina (1993) or El negocio del deseo (1999); Mario Vargas Llosa, El paraíso en la otra esquina (2003); Laura Restrepo, Delirio (2004). In each case, aspects of dictatorship as specific South American despotism should loudly impact our discussions.

AS.215.613. Ricardo Piglia, Borges, Derrida and Argentina's Eighteenth Century.
A voice in Piglia's Artificial Respiration claims that Argentina did not have an eighteenth century or the Eighteenth Century. Besides Piglia's palimpsest novel, we'll study a handful of texts by Borges. Passages from Leopoldo Marechal's Adan Buenosayres, and Derrida's The Beast and the Sovereign Volume Two, in reference to Heidegger's The Fundamental Concepts of Metaphysics and Defoe's Robinson Crusoe. Taught in English.

AS.215.631. Contemporary Latin American Cinema: History, Theory, and Practice.
This seminar presents a transnational history of Latina American cinema from the 1960s to the present, with a special regard to its global influence. Starting with the Cuban Revolution and the subsequent founding of the ICAIC, we'll examine how politics and aesthetics shape each other. We'll discuss the manifestos and films of the so-called New Latin American Cinema, including Tercer Cine, Cine Imperfecto, and Cinema Novo; the filmography made during the continent's various dictatorships; and post-dictatorship debates on memory. We'll also engage with a recent theoretical and cinematic production on gender, sexuality, the non-human, and new cinematic postcolonial approaches. In December, we will visit the International Festival of New Latin American Cinema of Havana to continue discussions in the setting of Latin America's largest film festival. Some knowledge of Spanish will be necessary to take this class.

AS.215.633. Spectacle, Subjectification, and Reality Literacy in Early Modern Society.
In this seminar we will examine the widespread deployment of cultural production in the early modern period in the service of generating social cohesion around an emerging national project, primarily in the case of Spain. At stake will be how cultural practices can determine a shared sense of reality, often at odds with the interests of marginal groups, as well as the strategies that emerge to counteract and question those practices. While reading knowledge of Spanish is desirable, graduate students from other disciplines who wish to explore these theoretical questions with regard to a different cultural corpus are welcome. Graded Pass/Fail.

AS.215.640. Borges, Derrida, Heidegger and the Paradoxes of Perception.
In this seminar we will the examine the ways in which Jorge Luis Borges's narratives intersect with lines of inquiry pursued by Martin Heidegger and Jacques Derrida around perception, knowledge, language, time, and space.
Area: Writing Intensive

AS.215.641. Guaman Poma, his 12 theses for an new understanding of the World Upside Down.
As of today, due to the work of Walter Mignolo, Ossio, Lamana and other scholars in Colonial Studies, the 1000 page letter of Guaman Poma to the King of Spain has become the pre-eminent text written on the question of coloniality of power as theorized by Anibal Quijano. Given that the concept is now central to colonial and modern studies, familiarity with the work of Guaman Poma is essential in the formation of all Latin Americanists and scholars interested in coloniality and imperial studies.
Area: Writing Intensive

AS.215.651. The idea of "Latin America": current debates on the fundamentals of the field.
The course will explore the history of the Idea of Latin America as a discursive and political entity. Students will read the work of Walter Mignolo, Maurico Tenorio Trillo and Fernando Digiovanni among other theorist and cultural historians.
Area: Writing Intensive

AS.215.718. Contemporaneity and Crisis.
How should one study contemporary literature and culture? Is "the contemporary" a period in and of itself? Does it require a distinct conceptual approach? This graduate seminar will examine various approaches that have emerged since Michel Foucault called his genealogies a "history of the present." We will pay special attention to contemporary literature and culture's most distinguishing feature today: crisis. Considering theories of crisis and "the contemporary" together, the course will explore how living in a time of overlapping crises—economic, political, social, cultural, environmental, and others—affects the way we interpret the world.

AS.215.747. Borges in Theory.
The course engages close readings of Borges critical essays and some of his fiction in order to establish the points of interpellation that Post-modern theory takes from or shares with Borges's meditation on the problem of writing.

AS.215.748. Public Humanities Writing Workshop.
Humanists possess a reservoir of scholarly abilities that prime them for contributing to debates well beyond the academy. This semester-long workshop will introduce graduate students to the basics of writing for such broad audience. Each session will be organized around particular topics in public humanities writing, including the pitching, writing, editing, and publishing processes of newspapers, magazines, and online outlets. We will also consider the forms of writing that most allow scholars to draw from their academic training and research: reviews, personal essays, op-eds, interviews, and profiles. Throughout the course we will see how the interdisciplinarity, comparativism, and multilingualism of fields from across the humanities can be helpful for reaching wide audiences. Beyond the nuts and bolts of getting started in so-called "public" writing, this course aspires to teach graduate students how to combine quality writing with academic knowledge, scholarly analysis with a general intellectual readership—and, ultimately, make academic knowledge a public good. Taught in English.

AS.215.791. Film Theory and Critical Methods.
Placed at the crossroads of aethestics and politics, psychology and economics, the history of technology and popular culture, film has emerged as the interdisciplinary object of study par excellence. Based on intensive weekly viewing and on classic and contemporary statements in film theory, this seminar—required for the Graduate Certificate in Film and Media—opens up questions of film language, authorship, genre, spectatorship, gender, technology, and the status of national and transnational cinemas.

AS.215.804. Spanish Summer Research.

AS.215.826. Spanish Independent Study.

AS.215.827. Spanish Dissertation.

AS.215.828. Spanish Proposal Preparation.

AS.216.300. Contemporary Israeli Poetry. 3 Credits.
This course examines the works of major Israeli poets such as Yehuda Amichai, Nathan Zach, Dalia Rabikovitch, Erez Biton, Roni Somek, Dan Pagis, Yona Wollach, Yair Horwitz, Maya Bejerano, and Yitzhak Laor. Against the background of the poetry of these famous poets we will study recent developments and trends in Israeli poetry, including less known figures such as Mois Benarroch, Shva Salhoov and Almog Behar. Through close reading of the poems, the course will trace the unique style and aesthetic of each poet, and will aim at presenting a wide picture of contemporary Hebrew poetry.

AS.216.305. Representations of the Other(s) in Israeli Culture. 3 Credits.
This course will use the concept of the Other to study the ways in which various marginal groups in Israel are represented in contemporary Israeli films, TV drama, prose-fiction, poetry and visual art. As a nation-state which was founded on the premise of a utopian vision of a just and fair society and as a promise for a safe haven for Jews escaping their status as Others, contemporary Israeli culture offers a unique case study. The course will run as a research seminar in which students will be encouraged to actively engage in analyzing the ways in which cultural productions depict the Other/s and Otherness as well as the social, political and psychological motivations and implications of these depictions. We will ask questions such as: who is considered as Other and by whom? What roles do the cultural representations play in shaping national collective identity, stereotypes and the perception of the self as Other? And how collective memory shapes Otherness?
Area: Writing Intensive

AS.216.342. The Holocaust in Israeli Society and Culture. 3 Credits.
This course examines the role of the Holocaust in Israeli society and culture. We will study the emergence of the discourse on the Holocaust in Israel and its development throughout the years. Through focusing on scholarly, literary, artistic, and cinematic responses to the Holocaust, we will analyze the impact of its memory on the nation, its society, politics, and collective self. The course is divided to three general categories: Historical and Sociological Perspective, Literary Perspective, and Cinematic Perspective. However, we will study the crossroad between these three categories, and will explore them in relation to one another.

AS.216.373. War in Israeli Arts and Culture. 3 Credits.
In this course we will study the various representations of what functions as one of Israel's most unifying and yet dividing forces: war. By analyzing literary and cinematic works as well as visual art and popular culture we will attempt to understand the role of war in shaping Israeli society, culture and politics. Topics such as commemoration and mourning, heroism, dissent and protest, trauma and memory and the changing image of the soldier will stand at the center of the course.

AS.216.500. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.216.601. Eastern European Literature.
Twentieth-century and contemporary Eastern European Literature is the locus of poetry and the essay. In this course we shall examine classic authors, such as Bruno Schulz, Zbigniew Herbert, and Adam Zagajewski, as well as those less known in the English-speaking world: Zuzanna Ginczanka, Ota Pavel, Henryk Grynberg, Oksana Lutsyshyna. We will consider verse, poetic prose and lyrical essays. The issues that will inform our readings will be internal and actual emigration, translingualism, and the persistence of war. Polish, Ukrainian, Hungarian, Czech, Serbo-Croatian, but also French and American English are the languages in which these authors speak to us. Eastern European literature resonates with voices that have, time and again, brushed against catastrophe.

AS.216.611. Modern Hebrew Literature and Its Quest for the Sacred.
Modern Hebrew literature emerged during the nineteenth century as part of the Haskalah movement, which attempted to break from the traditional modes of Jewish intellectual and social life while also offering a new understanding of Judaism. The Hebrew literature that arose in this period embraced the rebellious nature of the Haskalah and is therefore commonly characterized as secular in nature, defying Orthodoxy and rejecting the old Hebrew God. Against this clear-cut distinction between religious and secular literature, this seminar will study the ways in which modern Hebrew literature has maintained a vital dialogue with the divine and the sacred. We will read and analyze prosefiction, poetry and publicist essays in order to track the various theological trends that were part of this self- declared secular national literature. The reading will include texts by Ahad Haam, Bialik, Shlonsky, Brenner, Agnon, Grinberg and Goldberg, as well as more contemporary writers like Amichai, Ravikovitch, Wallach, Behar and Pedaya.This course will be taught in Hebrew.

AS.216.615. Exilic Chronotope.
The concept of exile relies on the existence of differentiated space and of borders. It also presupposes affective attachment: to be exiled is to be forcibly removed from the space of belonging. And yet time cannot be excluded from a consideration of exile. Hence exilic chronotope, the timespace of forcible displacement. Beginning with the canonical banishment from the Garden of Eden, the seminar will trace the implications of exile in its historical and metaphysical sense: social alienation caused by displacement, creative fulfillment of the distance from home, phenomenological aspects of exilic topology. The readings and visual works will include Georg Simmel, Alfred Schuetz, Kurt Zadek Lewin, Charles Baudelaire, Walter Benjamin, Siegfried Kracauer, Aby Warburg, Mascha Kaleko, Zuzanna Ginczanka, Charlotte Salomon, and Daniel Mendelson.

AS.216.620. Jesus in Modern Hebrew Literature.
This seminar will track the changes in the representations of Jesus in modern Hebrew literature. Reading will include prose-fiction, poetry, drama, and intellectual essays from the late 19th century to the beginning of the 21st century. We will study the mutual influences of the scholarship on Jesus, national Zionist ideology, changes in cultural and theological perceptions of Jesus and the literary representations of his figure.

AS.216.643. Realism and Anti-Realism in Modern Hebrew Literature.
This seminar seeks to trace the narrative dynamics and literary means of modern Hebrew Literature through a close examination of the tension between its realistic and anti-realistic trends. It begins with theoretical questions regarding the definition of realism as a literary genre. After this introductory section, the seminar is divided to three different periods in modern Hebrew literature, each is analyzed within the framework of its relation to realism. The first period is the turn of the 20th century and its first decades, reading works by writers such as Yosef Haim Brenner, Shmuel Yosef Agnon and Devora Baron. In the second period we study the post Israeli statehood period through reading works by A.B. Yehoshua, Amos Oz, Amalia Khanana Carmon and Yehoshua Knaz. The third part of the course deals with prose-fiction that is considered post-modernistic and includes writers such as David Grossman, Orly Castel-Bloom Yoel Hofmann, and Ronit Matalon.
Area: Writing Intensive

AS.216.707. Modern Hebrew Women's Prose-Fiction.
In this graduate seminar we will read and discuss modern Hebrew women's prose-fiction and novels in the Hebrew original. We will study the historical background in which they emerged and their various literary means of expressing a feminine voice. We will read works by writers such as Amalia Kahanna- Carmon, Savyon Liebrecht, Ronit Matalon, Orly Castel-Bloom, Michal Govrin, Yehudit Hendel, Nurit Zarchi, Ester Peled and Maya Arad.Required Course Background: Knowledge of Hebrew
Area: Writing Intensive

AS.216.800. Independent Study.

AS.216.802. Yiddish Independent Study.
Yiddish Independent Study

AS.216.804. Hebrew/Yiddish Summer Research.

AS.217.301. Literary Readings in Portuguese. 3 Credits.
This discussion-based course for continuing students of Portuguese focuses on a wide range of Lusophone literary sources from the modern and contemporary periods. We'll read seminal texts from Europe, the Americas, and Africa, paying close attention to language and context. How do forms, ideas, and genres travel across the Atlantic? What shape do they take according to different geographies, cultures, and histories? Topics include the legacies of empire and slavery, theoretical debates about the formation of Brazilian Literature, national identity, (post)colonialism, representations of nature, and indigeneity. Students will read in the original Portuguese innovative prose works by Machado de Assis and Clarice Lispector; the poetry of Fernando Pessoa; concrete poetry, and modernist manifestos, among other things. Recommended Course Background: AS.210.278

AS.217.307. Cultura e Ditadura [Culture and Dictatorship]. 3 Credits.
In the 20th century, the Lusophone world saw the rise and fall of such authoritarian governments as the Estado Novo in Portugal (1933–74) and the military dictatorship in Brazil (1964–85). During this period, a series of revolutionary political movements sprung up, as well as innovative cultural production. How does culture respond to censorship? How do art and politics comment on and ultimately transform each other? In this course we will discuss novels, poetry, film, songs, and artworks from Brazil, Portugal, and Lusophone Africa that engage critically with dictatorships and their aftermaths. Topics include violence, trauma and memory, colonialism, post-colonialism, and decoloniality, race and the legacies of slavery, counterculture, and popular cultures. Readings and discussion in Portuguese. Interested students who have not completed course prerequisites should contact the instructor for permission to enroll.

AS.217.425. Latin American Ecocriticism. 3 Credits.
Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

AS.217.427. Radical Women: Brazilian Literature, Art, and Culture. 3 Credits.
The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry. The course is taught in English, but those interested in doing the coursework in Portuguese (4 credits) should register for section 02.

AS.220 (Writing Seminars)

AS.220.105. Introduction to Fiction & Poetry I. 3 Credits.
An introduction to basic strategies in the writing of poetry and fiction, with readings by Joyce, Woolf, Baldwin, Munro, Garcia Marquez, Donne, Bishop, Yeats, Komunyakaa, Tretheway, and others. Students will learn the elements of the short story and try their hand at a variety of forms: realist, fantastical, experimental. They'll also study the basic poetic forms and meters, from the ballad to the sonnet, iambic pentameter to free verse. Students will compose short stories and poems and workshop them in class. This course is a prerequisite for most upper level courses. This course is part one of the year-long Introduction to Fiction and Poetry, and must be taken before AS.220.106.
Area: Writing Intensive

AS.220.106. Introduction to Fiction & Poetry II. 3 Credits.
The second half of IFP, this course delves deeper into the finer points of fiction writing, including tone, description, and point of view; students will also enrich their knowledge of poetic forms and devices, such as figurative language, verse rhythm, and the poetic line. Readings include work by Paley, Mahfouz, Calvino, Lessing, Richard Wright, Plath, Rich, Auden, Li-Young Lee, and others. Students will write and workshop their own stories and poems, and complete a final portfolio. This course is a prerequisite for most upper level courses.
Area: Writing Intensive
AS.220.105 or AS.220.108

AS.220.108. Introduction to Fiction & Nonfiction. 3 Credits.
A course in realist fiction and nonfiction, with readings by Eudora Welty, Vladimir Nabokov, Henry James; George Orwell, Beryl Markham and Truman Capote. Students compose short stories and essays with attention to literary models. AS.220.108 can be substituted for AS.220.105.
Area: Writing Intensive

AS.220.138. Creative Writing. 1 Credit.
Enjoy the opportunity to develop your creative writing skills. You will work in both fiction and poetry. Through a combination of robust discussion, writing exercises, and substantial feedback, you will learn about imagery, voice, narrative structure, and other aspects of the writer's craft. The reading list will include a diverse range of contemporary authors. There will be a strong emphasis on collaborative workshopping, during which you will discuss one another's works in progress.

AS.220.200. The Craft of Fiction. 3 Credits.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106

AS.220.201. The Craft of Poetry. 3 Credits.
A study of the fundamentals and strategies of poetry writing. This course combines analysis and discussion of traditional models of poetry with workshop critiques of student poems and student conferences with the instructor.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106.

AS.220.206. Writing about Science I: Daily News Journalism. 3 Credits.
This course is designed to teach students the skills of daily news reporting, with a focus on covering science news. Students will learn how turn scientific discoveries into lively and engaging prose for the general public, interview sources, and pitch stories to news organizations. The skills taught are applicable to all areas of journalism, not just science journalism.
Area: Writing Intensive

AS.220.207. Writing the Unreal. 3 Credits.
"We left what we felt at what we saw," the poet Wallace Stevens once wrote, suggesting writing involves a direct response to our experiences of reality. In this class, we'll look exclusively at writing which takes on what hasn't been seen, and hasn't been felt. Through reading works of science fiction, magical realism, gothic literature, and speculative fiction, students will investigate how the unreal can still speak to our experiences and perceptions of the real. Additionally, students will get the chance to craft their own fantastical worlds through regular writing assignments. Tales of time travelers, haunted houses, unreal languages, and reimagined cities will be covered. Readings will include selections from Paul Beatty, Octavia Butler, Italo Calvino, Ursula K. Le Guin, Yoko Ogawa, and Mary Shelley.
Area: Writing Intensive

AS.220.212. Line and Lineage: A Survey of Poetry Writing. 3 Credits.
This course will be a chronological exploration of English-language poetry, beginning in the medieval era and continuing to the present day. We will examine not only the literature of the past, but also the ways in which a diverse range of contemporary writers have extended, challenged, and reimagined literary tradition. Throughout the semester we will pay especially close attention to the question of how a writer's management of the poetic line can shape a poem's structure, context, and meaning. Although this is a lecture-based class, not a workshop, participants will have many opportunities to respond artistically to the course readings.
Area: Writing Intensive
(AS.220.105 OR AS.220.108) AND AS.220.106

AS.220.213. Fiction Survey: Once Upon a Time. 3 Credits.
A review of the origins and development of the realist short story from fable, fairy tale, saint's life, Bible story, through versions created in the Renaissance and classic (19th and 20th century) periods, to modern narratives. Writing Seminars majors only.
AS.220.105 AND AS.220.106

AS.220.218. Writers on Film. 3 Credits.
An interdisciplinary course focusing on the film writings of poets, novelists, critics, and essayists such as Virginia Woolf, H.D., James Agee, James Baldwin, and Pauline Kael; and films showing the intertitle and screenplay work of writers such as Anita Loos, F. Scott Fitzgerald, William Faulkner, and Jean Cocteau. Participants will write weekly assignments on film from a critical perspective.
Area: Writing Intensive

AS.220.219. Readings in Fiction and Literary Nonfiction. 3 Credits.
This course offers an in-depth exploration of content, style, and crossover literary techniques among authors who write both fiction and nonfiction, including Jamaica Kincaid's memoir My Brother and "Girl." Students will evaluate why each genre was chosen to narrate, for example, such quandaries as ethics in surgery: Abraham Verghese's novel Cutting for Stone and Richard Selzer's essay, "The Knife," as well as the reportage and novels of Ernest Hemingway and others. Also explored: topics of social import and questions of identity in James Baldwin's essays ("Notes of a Native Son") and stories ("Sonny's Blues"), and other works; The course builds on literary writing and reading techniques established in Intro to Fiction & Nonfiction (IFN) and Intro to Fiction & Poetry (IFP). Either course is a prerequisite, with IFN preferred.
Area: Writing Intensive
AS.220.105 OR AS.220.108

AS.220.220. Reading Korean Literature in Translation: A Survey. 3 Credits.
An introduction for students unfamiliar with the Korean language but interested in Korean culture / literature. Students will read a variety of translated texts, especially of works written in the 20th and early 21st centuries by authors including Kim Tong-in, Hwang Sun-won, Pak Wanso, Hwang Sok-yong and Han Kang; there will also be classes on traditional sijo poetry. Students will become familiar with Korean literary genres and formal features, and develop a broad understanding of the historical and sociocultural context of Korean literature.
Area: Writing Intensive

AS.220.221. Modernist Literature and Film. 3 Credits.
This course explores the exchange of ideas and techniques between modernist literature and cinema in response to the social and technological changes of the twentieth century. Prominent figures include Charlie Chaplin, Ezra Pound, T. S. Eliot, Virginia Woolf, Franz Kafka, Sergei Eisenstein, Jean Epstein, John Dos Passos, Zora Neale Hurston, Paul Strand, and Gertrude Stein. Participants will write weekly assignments on films and readings from a critical perspective.
Area: Writing Intensive

AS.220.230. Reading Contemporary Korean Fiction in Translation. 3 Credits.
This course examines a range of contemporary Korean fiction produced since political liberalization of Korea in the 1990s. Students will see the many different ways in which individual selves relate to the world, question the value systems of a globalized society, and celebrate the instinct to survive and thrive. While exploring these things, students will develop their analytical skills and identify the central components of new Korean narratives.

AS.220.231. Art of the Personal Essay. 3 Credits.
This course explores the art and craft of the personal essay from Seneca to Soyinka, Montaigne to Adichie. Deriving from the French essai, to attempt, students bring a sense of investigation, as natural philosophers proposed, to the characteristics, presence, or quality of an idea. Through personal narrative exploration, essayists write on universal themes -- family, loss, social justice -- through various nonfiction essay forms, such as the braided essay, lyric essay, science essay, or humor essay. Students will employ research, convey personal experience, and develop their own voice and style. Course builds on material covered in Introduction to Fiction & Poetry courses and/or Introduction to Fiction & Nonfiction, and will prepare students for Advanced study. This readings-based course is also writing-intensive, including exercises, essay drafts, and revisions. Course features additional diverse authors such as Sei Shonagon, Sara Suleri, James Baldwin, Richard Rodriguez, Brian Doyle, and Ta-Nehisi Coates.
Area: Writing Intensive
AS.220.105 OR AS.220.108

AS.220.311. Intermediate Fiction: Point of View. 3 Credits.
This intermediate workshop will focus on rendering point of view. In addition to exploring questions of psychic distance and reliability, we will examine how point of view comes to bear on voice, character, the management of sympathy, and narrative structure. Students will write and workshop stories and discuss published fiction. Diverse and contemporary readings to include work by Yiyun Li, Carmen Maria Machado, Lorrie Moore, and Alice Munro.
Area: Writing Intensive
AS.220.200

AS.220.312. Intermediate Fiction: Detail and Description. 3 Credits.
An intermediate workshop focusing on the question of how to make fictional worlds feel real. We'll read 19th, 20th, and 21st century short fiction by authors such as Anton Chekhov, Jhumpa Lahiri, Junot Diaz, and Alice Munro, focusing particularly on how authors make the lives on the page feel three-dimensional. Students will write stories and exercises, including exercises that involve exploring Baltimore in order to observe and write about the city in which we live. Recommend Course Background: Students need to have completed a 200-level Writing Seminars course.
AS.220.105 AND AS.220.106

AS.220.317. Writing about Science II: Feature Writing Journalism. 3 Credits.
This course is designed to teach students the skills of long-form narrative journalism, with a focus on covering science news. Skills taught will include how to compose scenes, create three-dimensional characters, create narrative tension, and conduct on-site reporting. Class speakers will include award-winning science journalists from New York to DC, who will share the secrets of their craft. The primary writing assignment will be a 3,000-word feature piece that is pitched, reported, and workshopped throughout the course of the class. "Writing About Science I" is recommended as a prerequisite for this course. If you have not taken this, please contact instructor (dgrimm5@jhu.edu) to enroll.
Area: Writing Intensive

AS.220.319. Intermediate Fiction: Crafting Memorable Voices. 3 Credits.
When we recall our favorite works of fiction, it is often their voice that first comes to mind. This course will explore how narrators enchant us with their voice, focusing on such matters as perspective, syntax, word choice and how even deceptively impartial omniscience takes on a unique and memorable voice. Fiction readings to include: Paul Bowles, Toni Cade Bambara and Ismail Kadare. Craft readings to include: Christopher Castellani and John Gardner. Writing assignments will be both expository and creative.
Area: Writing Intensive
AS.220.200

AS.220.321. Intermediate Fiction: Finishing Touches: How Stories End. 3 Credits.
Typically, stories are easy to start and difficult to conclude. This course will look at various ways in which stories end rewardingly. Close attention will be paid to final paragraphs. We will ask questions like: Do satisfying endings fall into categories? Can we generalize about how stories ought to end? Do some writers have a gift for endings? Readings to include: Sylvia Townsend Warner, Muriel Spark, Alice Munro. Assignments will include both expository and creative writing.
Area: Writing Intensive
AS.220.200

AS.220.327. Intermediate Fiction: Characters. 3 Credits.
How do fiction writers create believable people? A study of Characters. Readings to include E. M. Forster's Aspects of the Novel and A Room with a View, James Baldwin's Giovanni's Room, and various short stories.
Area: Writing Intensive
AS.220.200

AS.220.331. Intermediate Fiction: Forms of Fiction. 3 Credits.
A workshop in the formative genres of fiction: romance, confession, anatomy, and novel. Readings include Flaubert, Stevenson, Camus, and Stephen Dixon. Frequent sketches and two stories.
AS.220.200[C]

AS.220.332. Intermediate Fiction and Poetry: Poet-Novelists. 3 Credits.
We will look at writers in English who excelled at both fiction and poetry. We will ask: How does a talent in one genre show itself in another? Novels will include: Thomas Hardy's Return of the Native, Sylvia Townsend Warner's Lolly Willowes, Vladimir Nabokov's Lolita, John Updike's, Rabbit, Run. Other writers who may be included: Rudyard Kipling, D. H. Lawrence, Malcolm Lowry, Richard Wright, Muriel Spark.
AS.220.200 AND AS.220.201

AS.220.333. Intermediate Fiction: Plot and Narrative Structure. 3 Credits.
This class is primarily a workshop. Students will write two 10-20 page short stories to present for discussion and critique. The craft focus of the class is plot and narrative structure. Through the assigned reading and a few short writing exercises, we will think about storytelling and the elements (character, conflict, desire, causality, consequence) that make a question a plot or narrative question, and how stories are shaped and structured by these questions. The course reading will begin with a variety of short stories. Later in the semester, we will discuss braided narratives and read novels by Virginia Woolf, Rebecca Makkai and Valeria Luiselli.
AS.220.200

AS.220.338. Intermediate Fiction: Developing Subtext. 3 Credits.
In this course, students will write and workshop two original stories. Additional generative writing exercises will explore the ways a writer can develop subtext in their work. How can character details work in parallel with elements of setting? How can a setting be instrumental in advancing a plot? How can finely tuned, sentence-level details, parallel images, foreshadowing, and figurative language give a story a cohesive sensibility and rich subtext? We'll read stories by writers including Stephanie Vaughn, Laura van den Berg, Rickey Fayne, Haruki Murakami, and craft essays by Matthew Salesses, Charles Baxter, and more.
Area: Writing Intensive
AS.220.200

AS.220.346. Line and Lineage: Poems in Time. 3 Credits.
A poem exists in time—both in the historical moment in which it is written, and in its movement from line to line. In this seminar, students will build their knowledge of the history of the poetic line in English, up to the present day. Assignments will include both short critical essays and creative exercises.
Area: Writing Intensive

AS.220.348. Creative Nonfiction Workshop: The Personal and the Public. 3 Credits.
In this workshop, students will study a variety of creative nonfiction essays and articles by a diverse group of writers including Ta-Nehisi Coates, Maggie Nelson, Roxane Gay, Alice Wong, D. Watkins, and Esmé Weijun Wang. Using the expository methods and research practices of journalists and the narrative strategies of memoirists, students will write and workshop their own creative nonfiction as we attempt to understand how the subject of an essay can be meaningfully augmented by acknowledging and even centering the author's identity and experience.
Area: Writing Intensive

AS.220.356. Intermediate Fiction: A Story's Beginnings. 3 Credits.
Where does a story best begin? How does it successfully launch itself? We will look closely at a great many opening paragraphs and pages, analyzing the various strategies by which writers grab and hold a reader's interest. Most of the reading will be short fiction, drawn from various countries and languages.
Area: Writing Intensive

AS.220.363. Intermediate Fiction: Writing about Adolescence. 3 Credits.
Only fairly recently has adolescence been recognized as a developmental period distinct from childhood or adulthood. In this course, we'll read a range of classic and contemporary literature that takes on the challenge of writing about this complicated and fraught stage of life. Readings may include work by Shakespeare, Louisa May Alcott, Colson Whitehead, Louise Erdrich, and others. Students will write and workshop their own stories or novel chapters.
Area: Writing Intensive
AS.220.200

AS.220.372. Intermediate Fiction: Style and Voice. 3 Credits.
In this course, we'll focus on the writing and workshopping of student fiction, with special attention to style and voice. What distinguishes a good sentence from a bad one? How does one develop a style that feels both natural and distinctive at the same time? What do we even mean by "voice," and how on earth is a writer supposed to find one? In addition to each other's work, we'll read stories by authors with particularly unique voices, focusing on what makes their sentences sing.

AS.220.377. Intermediate Poetry: Poetic Forms. 3 Credits.
Poetic Forms I fulfills one of the Intermediate requirements for The Writing Seminars Major. It deals with rhyme, meter, traditional forms, and ad hoc forms of students' own making. Whether you are a poet, novelist, song writer, science writer, or dramatist, this course will help you master lines and sentences even better.
Area: Writing Intensive
AS.220.201

AS.220.378. Contemporary Poetic Forms. 3 Credits.
In Contemporary Poetic Forms, we will look at exciting, mostly younger poets writing in a wide array of metrical forms. From Anthony Hecht to Erica Dawson, you will read a book a week and write eleven poems, and the assignments will be keyed but not beholden to those challenging authors.
Area: Writing Intensive
AS.220.201[C]

AS.220.391. Performing Poetry & Fiction: An Acting Workshop for Writers. 3 Credits.
This hands-on performance workshop, combining literary and theatrical practice, will look closely at what makes a performance or reading compelling, clear, and resonant. Through textual analysis, vocal technique, and group discussion, students will create a pliant and powerful reading style to best serve their work. The course includes regular writing assignments in poetry and fiction and weekly performance and group discussion.
Area: Writing Intensive

AS.220.394. Intermediate Fiction: Place, Setting, and Landscape. 3 Credits.
This course is primarily a workshop; students will each write and workshop two short stories. Additional shorter writing assignments will focus on writing about places, both real and imagined. We will think about the work of description at the sentence level, but also about the relationship between place, character and memory. We'll read work by writers who are known for their ability to evoke or capture in detail a particular setting, potentially including work by Edward P. Jones, Zadie Smith, Eudora Welty, Annie Dillard, Grace Paley, Victor Lavalle, Viet Than Nguyen, and Joan Didion.
Area: Writing Intensive

AS.220.395. Intermediate Fiction: Plots and Subplots. 3 Credits.
How can a subplot inform a reader's understanding of a story's protagonist? How can a story with multiple protagonists and plotlines reveal theme? This intermediate fiction writing class will focus on student writing and on published stories that are interestingly or intricately plotted. Parallel texts by Andrea Barrett, Edward P. Jones, Alice Munro, Amy Hempel, Barret Swanson, Dantiel W. Moniz, and others will give students the opportunity to examine concrete examples of intricately plotted stories while also putting some plotting techniques to the test in their own short fiction.
Area: Writing Intensive
AS.220.200

AS.220.398. Intermediate Fiction: Fictional Frames. 3 Credits.
In this course, we'll focus on writing and workshopping student fiction while reading contemporary parallel texts representing a variety of styles, subgenres, and forms. We'll look at exceptionally short works, stories of intermediate lengths, and longer, novella-length works in an effort to understand what kinds of stories lend themselves to particular lengths and styles. How do you know whether your story should be a work of flash fiction or a novel? What kinds of stories can you tell in each form? We'll read work by Lydia Davis, Kirstin Valdez Quade, Jenny Zhang, Bret Anthony Johnston, Paul Yoon, Lauren Groff, Bryan Washington, and more.
AS.220.200

AS.220.400. Advanced Poetry Workshop. 3 Credits.
In this course we'll explore poetic responses to myth and legend, looking at how poets from different cultures and eras have responded imaginatively to established stories about gods, heroes, and the supernatural, whether for the sake of aligning themselves with tradition, or for the sake of challenging it. Our discussions will take place in the context of a rigorous poetry workshop, where students will experiment with figurative language, management of the line, narrative organization, and the control of rhythm in both form and free verse. At the end of the semester students will turn in a final portfolio of revised poems, accompanied by a reflective letter that demonstrates a mature understanding of verse technique.
Area: Writing Intensive
AS.220.201

AS.220.401. Advanced Fiction Workshop. 3 Credits.
Topics in Advanced Fiction
Area: Writing Intensive
AS.220.200

AS.220.403. Readings In Poetry: Dramatic Verse. 3 Credits.
Why and how do playwrights make their characters speak in verse? What can we learn about writing—and speaking—"naturally" but with artifice? Blank verse is the most important model we have in English dramatic poetry, but not the only one. Readings in this course will range from Shakespeare's King Lear to modern verse plays by Caryll Churchill, Derek Walcott, and David Hirson. Students will write their own one-act verse play.
Area: Writing Intensive
AS.220.201

AS.220.406. Readings in Fiction: Italian war-time and post-war fiction: Italo Calvino, Primo Levi, and Natalia Ginzburg. 3 Credits.
We'll read these three masterly fiction writers who found new ways to write about hard times.
Area: Writing Intensive
AS.220.200

AS.220.408. Readings in Poetry: War Poetry From Troy to Afghanistan. 3 Credits.
The course will follow a chronological line from Homer through to American and British poets of the current war in Afghanistan. This means we will be looking at (among other things) Beowulf, poems of the English Civil War, poems of the American Civil War, poems of the First and Second World Wars, and poems about the conflicts in Iraq and Syria as well as Afghanistan. Each class will be divided into two sections of equal length. In the first half we will study poems written by our predecessors - poems by women as well as men, poems written in the front line as well as behind the lines in hospitals and 'at home', and poems written in a variety of forms - ranging from pure lyric to prose-poetry; in the second half we will discuss poems written by members of the class in response to conflict, and/or in response to the poems we are discussing in any given week.
AS.220.201

AS.220.411. Community-Based Learning: Nonfiction and Social Engagement. 3 Credits.
In this Community-Based Learning course, students will read and write memoir and discuss issues of social concern with high-school age writers from Baltimore public schools in partnership with the organization Writers in Baltimore Schools Please note that this class is not a traditional workshop focusing on critique, but will instead explore how writing can build connection and foster conversation. Participation in some events outside of class time may be required.
Area: Writing Intensive

AS.220.415. Community-Based Learning: Teaching Creative Writing in Baltimore Schools. 3 Credits.
In this course, students will work alongside writing teachers from the non-profit organization Writers in Baltimore Schools (WBS) to lead creative writing workshops in local public elementary and middle schools. Students and WBS teachers will also meet as a group once a week to plan classes, discuss pedagogy, and share ideas. Students will write weekly responses to reading assignments, write reflections on the volunteer experience, and help to assemble a final project at their worksite. Upon completion of the class, students will have the opportunity to apply to become instructors with Writers in Baltimore Schools. Please note that the weekly writing group you will co-lead will occur outside of class. Groups meet either during the school day or after school. We will work with you to find a group that fits your schedule.
Area: Writing Intensive

AS.220.420. Readings in Fiction: Optimistic Apocalypse. 3 Credits.
Contemporary literary depictions of apocalypse often offer up a world that's been transformed (rather than annihilated) by climate change, disease, and war. In this course, students will explore comparatively optimistic literary dystopias with an eye toward understanding how writers observe and extrapolate real dangers to inform their novels and stories. We'll read one classic dystopian work alongside newer stories and novels by Kazuo Ishiguro, Lauren Groff, Colson Whitehead, Rumaan Alam, Emily St. John Mandel, Ted Chiang, Ling Ma, Laura van den Berg, and more. Students will write short creative and critical responses to our readings as well as a final comparative paper.
Area: Writing Intensive
AS.220.200

AS.220.422. Readings in Fiction: Race, Passing, and Performance. 3 Credits.
This course will explore the context and craft of racial passing texts in the U.S, asking students to think critically about literal passing narratives and their persistence over time, and more broadly about how we write about cultural passing, codeswitching, and identity as conscious performance. We'll start with texts that ground us in the genre—Chopin, Larsen, Fauset, Ellison, and Morrison—and read our way into contemporary texts, potentially including work by Danzy Senna, Mat Johnson, Brit Bennett, Min Jin Lee, and Marcelo Hernandez Castillo. Students will write a critical paper, a craft paper, and a short story or novella.
Area: Writing Intensive
AS.220.200

AS.220.424. Science as Narrative. 3 Credits.
Class reads the writings of scientists to explore what their words would have meant to them and their readers. Discussion will focus on the shifting scientific/cultural context throughout history. Authors include Aristotle, Copernicus, Galileo, Descartes, Newton, Darwin, Freud, Einstein, Heisenberg, Bohr, Crick and Watson.
Area: Writing Intensive

AS.220.427. Readings in Fiction: The Novella. 3 Credits.
A study of the novella as a literary form. Authors may include Melville, Turgenev, Tolstoy, Chekhov, Kafka, James, Wharton, Baldwin, Porter, Rulfo, Smiley, and others.
Area: Writing Intensive
AS.220.200

AS.220.437. Creating the Poetry Chapbook. 3 Credits.
Students will build on previous work in the major by completing a project of sustained length, depth, and cohesion (15 - 25 pages) in their final semester. Application only; Advanced Poetry prerequisite.
Area: Writing Intensive

AS.220.441. Readings in Poetry: Shakespeare and Company. 3 Credits.
A study of three of Shakespeare's plays, and of some of the most important creative responses to these plays by modern writers, such as Auden and Stoppard. Students will familiarize themselves with Shakespeare's continuing place in contemporary culture, and write short critical responses; they will also write a longer creative work that in some way transforms one of Shakespeare's plays.
AS.220.201[C]

AS.220.443. Readings in Poetry: International Voices. 3 Credits.
International voices will combine the workshopping of poems by students with a study of contemporary poems written by black British writers and British writers in dialect, African-American writers, Caribbean writers, and Indian and South African poets who are writing in English. The study of broad themes and subjects will be combined with a particular appreciation of linguistic and acoustic matters - which means among other things that time will be spent listening to and evaluating recordings of the poets concerned.Writing Seminars Majors Only
Area: Writing Intensive
AS.220.201

AS.220.452. Reading Proust. 3 Credits.
An excursion through the 3,000 page, seven-volume masterpiece, *In Search of Lost Time.* We will closely read *Swann's Way* and *Within a Budding Grove*; we will cover, in a less intensive way, *Guermantes Way*, and *Time Regained*.
AS.220.200

AS.220.453. Border Crossings: Contemporary Writing from Canada. 3 Credits.
A survey of contemporary Canadian poetry and fiction. Course readings will include work by Margaret Atwood, Christian Bök, Anne Carson, Anne Michaels, Alice Munro, Michael Ondaatje, Madeleine Thien, and others. Students will have the opportunity to respond artistically as well as analytically to the course readings.
AS.220.105 AND AS.220.106 AND AS.220.201

AS.220.454. Community-Based Learning. 3 Credits.
In this Community-Based Learning course, students will explore poetry of social and political concern in partnership with high-school age writers from Baltimore public schools. Students will put learning into practice by engaging in community conversation and collaboration. Participation in some events outside of class time will be required.
Area: Writing Intensive

AS.220.455. Readings in Fiction: Low, High, and Back Again: Experiments in Genre. 3 Credits.
In this course, we'll take a look at the increasingly obsolete notion of "genre fiction" and the way that many contemporary writers are borrowing the conventions of once-frowned-upon genres, from sci-fi to horror to crime, and imbuing them with the concerns of the "literary novel" (character, language, social critique, etc.). The course will pair classics of genre fiction with more contemporary works that take the genre in surprising directions. We'll also do a fair bit of writing ourselves, experimenting with various genres. Authors might include Mary Shelley, Colson Whitehead, Philip K. Dick, Kazuo Ishiguro, Edgar Allen Poe, Carmen Machado, Raymond Chandler, Joan Didion, Zane Grey, and Charles Portis.
Area: Writing Intensive

AS.220.456. The Long Work. 3 Credits.
A course in the composition of a novella or short-story collection. Students will write and revise a thesis of 50 to 60 pages of fiction.Open to seniors by invitation.
Area: Writing Intensive

AS.220.457. Readings in Fiction: 21st Century Fiction: The American Short Story in the Last Twenty Years. 3 Credits.
With the 21st century 22 years old, it seems like a good time to ask ourselves what's going on with the American short story. What can it tell us about our various identities, individual and collective? Is it reflecting our current reality, transforming it, or both? Is it undergoing formal changes to better engage with our transformative times, and if not, should it be? Is contemporary fiction as diverse as our nation itself, and if not, what might account for such shortfalls in representation, and what might be the effects? Our reading list is likely to include such authors as Carmen Maria Machado, Yoon Choi, Bennett Sims, Charles Yu, Jamel Brinkley, ZZ Packer, Kali Fajardo-Anstine, Nana Kwame Adjei-Brenyeh, Dantiel W. Moniz, Claire Vaye Watkins, Kimberly King Parsons, Kirsten Valdez Quade, Ted Chiang, Danielle Evans, Karen Russell, George Saunders, and Bryan Washington. Students will write short critical and creative responses throughout the term, as well as a final longer creative piece.
Area: Writing Intensive
AS.220.200

AS.220.458. Readings in Poetry: Divergencies: British Poetry Since 1945. 3 Credits.
The course will workshop the original work of participants, while also looking at the major figures of immediately post-war British Poetry (Philip Larkin, Ted Hughes) and the diversification of writing that has appeared in more recent years. Among the writers to be discussed are : Simon Armitage, Mary Jean Chan, Imtiaz Dharker, Carol Ann Duffy, Sarah Howe, Linton Kwesi Johnson, Jackie Kay, Grace Nichols, Alice Oswald, Hannah Sullivan and Roger Robinson.
Area: Writing Intensive

AS.220.459. Readings in Poetry: Dramatic Poetry, Poetic Drama. 3 Credits.
This course will explore the intersection of poetry and drama, from Euripides, Shakespeare, and Moliere to modern verse plays by Derek Walcott and Caryl Churchill. We'll also look at some modern plays about poets and poetry—such as Tom Stoppard's Arcadia and The Invention of Love and Sarah Ruhl's Euridice. Finally, we'll examine the poetry of prose speech in such playwrights as David Mamet and August Wilson. Students will write their own scenes in poetic drama.
Area: Writing Intensive

AS.220.460. Community-Based Learning: Nonfiction and Social Engagement. 3 Credits.
In this Community-Based Learning course, students will read and write memoir and discuss issues of social concern with high-school age writers from Baltimore public schools in partnership with the organization Writers in Baltimore Schools Please note that this class is not a traditional workshop focusing on critique, but will instead explore how writing can build connection, foster conversation, and bring together writers from diverse communities.
Area: Writing Intensive

AS.220.501. Independent Study. 3 Credits.
Ordinarily no more than one independent study course may be counted among the eight Writing Seminars courses presented for graduation.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.509. Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.510. The Hopkins Review Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.513. Teaching Writing. 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.594. Professional Internship. 1 Credit.
The Professional Internship is a one-credit independent course created to document internships in journalism, publishing, the arts, or other writing-related fields. Internships require a minimum of 120 work hours and a short final paper. Permission required. Satisfactory/ Unsatisfactory only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.598. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.220.604. Readings in Fiction: Personal Touchstones.
The course explores the notion of one's own personal anthology--the books that mean the most to one over the decades, the books one keeps returning to. In addition to the assigned reading, each student will be asked to come up with a list of books (not read in this class) of great personal significance and to analyze in class the things one's personal touchstones have in common. Assigned readings will be drawn from two genres: the epic (Derek Walcott's Omeros, Halldor Laxness's Independent People) and the comic or light novel (Jane Austen's Persuasion, E. M. Forster's Room with a View, Laxness's The Fish Can Sing, Evelyn Waugh's A Handful of Dust, Muriel Spark's The Prime of Miss Jean Brodie, Kingsley Amis's Ending Up, Mark O'Donnell's Getting Over Homer).

AS.220.607. Readings in Fiction: The Laws, License, and Liability of First-Person Narration.
Study of classic/modernist novels written by the "I": Christopher Isherwood, Gertrude Stein, Albert Camus, Ford Madox Ford, and other practitioners. Mostly close study of texts, but some writing practice, too.

AS.220.608. Readings in Poetry: Sonnet and Sequence.
This course will use the sonnet form as a through line to consider both aesthetic shifts and the enduring lyric impulse across centuries of poetry in English, with a particular focus on how contemporary poets are working with the form through individual poems, sequences, and book-length works. Coursework will include reading, critical writing and presentation, discussion, and completion of an original lyric sequence.

AS.220.609. Readings in Fiction: The Novelist as Poet.
An examination of some half-dozen English-language novelists who were also significant poets. Readings will include both novels and poems. The course seeks to bridge the gap between the two genres.

AS.220.611. Readings in Fiction: Shape, Story, and Experiments in Structure.
How is our experience of a novel's story affected by its form? We'll discuss some traditional structures, including mystery plots and the three-act structure, before moving on to works whose forms bend or break various storytelling conventions. Authors may include Vladimir Nabokov, Susan Choi, Zadie Smith, Tommy Orange, Lorrie Moore, Edward P. Jones, Carol Shields and others.

AS.220.612. Readings in Poetry: The Long Poem.
This course will be an artistic exploration of the long poem. Throughout the semester we'll read a diverse range of work by both contemporary and non-contemporary writers, paying particular attention to the question of how a poem's dramatic intensity or lyric charge can be maintained when a poet is writing at length. Instead of submitting individual poems to a weekly workshop, students in this class will submit successive drafts of a long poem, which they will continue developing over the course of the entire semester.

AS.220.619. Graduate Poetic Forms I.
We will read and write a variety of traditional and less traditional poetic forms with a keen ear toward meter, rhyme, and other prosodic curiosities.

AS.220.623. Fiction Workshop.
Discussion and critique of fiction manuscripts by students enrolled in the M.F.A. program.

AS.220.624. Fiction Workshop.
Discussion and critique of fiction manuscripts by students enrolled in the MFA program. Some assignments possible.

AS.220.625. Poetry Workshop.
Discussion and critique of poetry manuscripts by students enrolled in the M.F.A. program. Some assignments possible.

AS.220.626. Poetry Workshop.
Discussion and critique of poetry manuscripts by students enrolled in the MFA program. Some assignments possible.

AS.220.633. Readings in Poetry: Walcott, Heaney, and Brodsky.
A study of three major poets--Caribbean, Irish, and Russian--who self-identified with at least two cultures. We'll examine these poets' literary friendship and their shared engagement with subjects such as tyranny, empire, home, exile, and the English language. Exploration of these poets' shared debt to a predecessor, Robert Frost, and the debt owed to them by younger poets, will lead to students' own original projects in poetry and prose.

AS.220.646. Readings in Pedagogy: Teaching Fiction and Poetry.
A graduate course designed to develop both close reading and genre study, and to support the teaching of Introduction to Fiction and Poetry (IFP) I and II. Readings in selected works of American, English, and European poetry and short fiction. Course required by all graduate students in fiction and poetry.

AS.220.653. Readings in Fiction: The Writer's Bookshelf: Unsung Novels That Writers Love.
Which books do writers often foist on other writers, telling them "You have to read this"? In this course, we'll look at books that have yet to find much popular appeal, but which writers often speak about in reverential tones. Authors may include James Salter, Paula Fox, Dezso Kosztolanyi, J.L. Carr, Juan Rulfo, Tom Drury, Christina Stead, Evan S. Connell, Leonard Gardner, Joy Williams, and Penelope Fitzgerald.

AS.220.654. Readings in Fiction: Rediscovered Masters.
Readings from modern novels and collections of short fiction which, however well received at time of publication, fell into subsequent eclipse before undergoing something of a revival. Many of the titles will be drawn from the series of New York Review of Books Classics.

AS.220.655. Readings in Poetry: Line, Sentence, Syntax.
A study of the interplay of the line and the sentence in poetry, with an emphasis on syntax. Some prose works will also be used for context. Poets employing syntax with great verve and precision, whether they obey or disrupt the rules, will be read in order to inform students' own stylistic choices.

AS.220.659. Readings in Fiction: The Short Novel.
Class will read nine short novels and begin to write one.

AS.220.660. Readings in Poetry: Performing Poetry.
This hands-on performance workshop, combining literary and theatrical practice, looks closely at what makes poetry performance compelling, clear, and resonant. Through textual analysis, vocal technique, and group discussion and critique, students will create a pliant and powerful reading style, as an integral part of their work.

AS.220.662. Readings in Poetry: Poetry in Translation: From the Iliad to the Present Day.
The course will begin by looking at theories of translation, and thereafter spend half of each class looking at examples of poems in translation before moving on in the second half to look at poems by members of the group - translated poems where people have been able to write them, otherwise at original pieces. I'll be providing texts for study each week.

AS.220.664. Readings in Fiction: Point of View: Collage, Polyphony, Shapeshifting, and Omniscience.
Some of the most interesting moments in fiction are those when characters experience the same event or situation in profoundly different ways. In this course we will look at writing that explores those moments of intersection and collision and think about how point of view can work to achieve both strong characterization and an illuminating sense of larger context. We'll consider what makes a story where the narrative lens or voice can shift feel cohesive and intentional. The reading list will include work by Colson Whitehead, Theodore Dreiser, Virginia Woolf, Gwendolyn Brooks, E.L Doctorow, Mieko Kawakami, Caitlin Horrocks, Dawnie Walton, Zadie Smith, and Rebecca Makkai.

AS.220.665. Readings in Poetry: Personal Anthologies.
Who are the poets who made us who we are? Over years of practice, poets become increasingly aware of their special debts to predecessors whose music compels them and whose themes seem both urgent and enduring. Readings will include some of the instructor's own touchstones, including Herbert, Milton, Dickinson, Auden, Larkin, Bishop, Walcott. Students will write poems inspired by certain models, and also present orally and in a final written project a personal anthology of poets who mean the most to them.

AS.225 (Theatre Arts & Studies)

AS.225.100. Introduction to Theatre. 3 Credits.
An introduction to the drama: how and why the theatre came into being; its role in human history; and how changing social structures in different regions and epochs have shaped different kinds of theatre, plays and performance. Also: how theatre “works” for us and on us, and the major plays of world drama.

AS.225.101. Acting I. 3 Credits.
An introduction to the fundamentals of acting through exercises and improvisations based on the teachings of Stanislavsky and Sanford Meisner. This course also includes a brief survey of major modern American playwrights. Plays will be read and employed in scene work.

AS.225.201. Acting II. 3 Credits.
As in Workshop I, the principal classroom activities will consist of scene work, exercises, lectures, and discussion. Some rehearsal will also take place during school hours. It is expected that substantial out-of- class time be spent on rehearsals and exercises. Recommended Course Background: AS.225.301

AS.225.212. Voice and Speech for the Actor. 3 Credits.
It has been said that 90% of what an actor does onstage is dependent on being effortlessly heard and understood by their audiences. This course is designed to establish the tools for the actor to begin to create this foundation. Using a combination of both the benchmark texts by Edith Skinner and Kristin Linklater, along with in-class exercises and monologues, we will begin the process of exploring both vocal power through breathing and breath control, and the fundamental tools of clarity in the speaking of a dramatic text onstage.

AS.225.215. Performing Musical Theatre. 3 Credits.
Effective performance in musical theatre demands a committed analysis of the musical and dramatic values of the song and the libretto from which it springs, in order to develop a fresh, organic interpretation. This course will provide you with the training to both analyze and interpret musical theatre scenes and songs and to make the most of them in performance.Instructor Permission Only.

AS.225.218. ANGELS IN AMERICA (The Play) The Millennium Shift in American Culture and Politics. 3 Credits.
Tony Kushner's epoch-making play weaves together astonishingly diverse sides of America in a broad tapestry; a modern work that emerged at the end of the 20th Century, now being revived world wide: it provides keys to understanding the American zeitgeist and the coming transformations of the culture. In one pivotal work we find the emergence of LGBT rights, the Mormon Church, the AIDS epidemic, the new "spirituality," the Reagan-era transformation of both government and business, and the looming figure of Roy Cohn whose influence in American politics "behind the scenes" ranged from the Rosenberg trial to his work as counsel for the McCarthy Committee in the 1950s: and even his legacy in the 2016 as primary political and business mentor of the current President of the United States.

AS.225.300. Contemporary Theatre & Film. 3 Credits.
An introduction to the performing arts, including an overview of theatre history, acting styles and the interaction of art and society. A personal view from inside.

AS.225.303. Acting III. 3 Credits.
Special attention is given to the development of spontaneity and emotional freedom using the principles of Workshops I and II. Hands on work with John Astin's "The Process" and the second Silverberg workbook are employed, along with the Uta Hagen text. Boleslavsky and Michael Chekhov are introduced. The Clurman, Meisner, Stanislavsky and Strasberg approaches are included. Substantial out of class time is required. Recommended Course Background: Two acting courses.

AS.225.305. A History of Black Performance and Drama. 3 Credits.
A survey of the history of the Black Performer and Performance. In exploring the art of storytelling from ancient African civilizations, students will critically engage and discuss the origins, aesthetics, characteristics, and practices of Black performers, and their often-unacknowledged contributions and influence upon mainstream performance throughout the history of the world.

AS.225.308. Shakespeare in Performance. 3 Credits.
Students will work with a selection of Shakespeare's plays --- CYMBELINE, RICHARD III, CORIOLANUS--- in exploring specific ways in which the power of the lines can be translated dynamically and immediately into vocal and physical performance. This course can be repeated for credit, because it covers different topics. (Some background in the acting sequence is encouraged).

AS.225.310. Stagecraft. 3 Credits.
A hands-on approach to the technical and theoretical elements of production. Meets in the Merrick Barn Scene Shop. Permission Required.

AS.225.311. Scene Study. 3 Credits.
An introduction to the principles of analyzing text in a playscript and using the intrinsic demands of language to create character in a scene. Gradually, the student learns to define an ACTION through given circumstances and develop the arc of performance in a particular setting.

AS.225.314. Theatre: Tech Direction. 3 Credits.
An introduction to Technical Direction including pre-production and production with an overview of materials, tools, rigging and safety, together with design and its implementation.

AS.225.315. Scene Study 2. 3 Credits.
Classes and scenes tailored to the needs of the actors. Some rehearsal will take place during school hours. It is expected that substantial out-of-class time be spent on rehearsals and exercises.

AS.225.318. 21st Century Female Playwrights. 3 Credits.
This is a writing intensive class exploring the current wealth of women playwrights, including Pulitzer Prize winners: Wendy Wasserstein, Paula Vogel, Lynn Nottage, and Jackie Sibblies Drury (2019 Prize for FAIRVIEW). We will discuss Script Analysis and read (and see) plays by numerous writers including Claire Barron, Kia Corthron, Theresa Rebeck, Sarah Ruhl, Danai Gurira, Caleen Sinnette Jennings, and Hansol Jung. This class will include a mid-term and a Final Paper.
Area: Writing Intensive

AS.225.320. Performance. 3 Credits.
The student is given specific acting assignments, and develops them as special projects for public performance under the direct supervision of the instructor. A professional level performance is the goal. Audition Required. Out of class rehearsal time required. Permission only, signature required.

AS.225.321. The Lab - The Actor/Director/Playwright Lab. 3 Credits.
Student actors, directors, and playwrights will explore their respective crafts with emphasis on process and individual artistic growth. Participants in the class will also collaborate on the creation of new material for the stage. Recommended Course Background: one course in Acting, Directing, or Playwriting.

AS.225.323. Design for the Stage. 3 Credits.
The fundamentals of stage design, with an emphasis on process, including script analysis, research, conceptualization, and implementation, from the first reading of the play to opening night, along with an overview of theatre architecture from the Greeks to the current day and into our imagined future.

AS.225.324. Adaptation for the Stage. 3 Credits.
For aspiring playwrights, dramaturgs, and literary translators, this course is a workshop opportunity in learning to adapt both dramatic and non-dramatic works into fresh versions for the stage. Students with ability in foreign languages and literatures are encouraged to explore translation of drama as well as adaptation of foreign language fiction in English. Fiction, classical dramas, folk and fairy tales, independent interviews, or versions of plays from foreign languages are covered.
Area: Writing Intensive

AS.225.328. The Existential Drama: Philosophy and Theatre of the Absurd. 3 Credits.
Existentialism, a powerful movement in modern drama and theatre, has had a profound influence on contemporary political thought, ethics, and psychology, and has transformed our very notion of how to stage a play. Selected readings and lectures on the philosophy of Kierkegaard, Nietszche, Camus and Sartre -- and discussion of works for the stage by Sartre, Ionesco, Genet, Beckett, Albee, Pinter, Athol Fugard (with Nkani & Nshone), Heiner Müller and the late plays of Caryl Churchill. Opportunities for projects on Dürrenmatt, Frisch, Havel, Witkiewicz, and Mrozek.
Area: Writing Intensive

AS.225.330. Playwriting Strategies. 3 Credits.
A seminar and workshop in playwriting with Dr. Joe Martin, playwright and dramaturge. Student writers, developing their plays, will learn how to open up to the creative process, "brainstorm," refine their work, and shape it toward an act of artistic communication. Writer's techniques, such as attending to plot or "story," delineation of character, creating effective "dialog," even overcoming "writer's block," will be addressed. This course is designed to be complementary to – not a replacement for – playwriting classes in the Writing Seminars.
Area: Writing Intensive

AS.225.333. Scene Study 3. 3 Credits.
Classes and scenes tailored to the needs of the actors. Some rehearsal will take place during school hours. It is expected that substantial out-of-class time be spent on rehearsals and exercises.

AS.225.345. History of Modern Theatre & Drama. 3 Credits.
Designed to impart a deepened appreciation and understanding of today's theatre by surveying the major playwrights, historical movements, and theatre practices of the 20th century. The course also seeks to help students understand theatre's relationship to the societal and political power structure of each era and to introduce students to great dynamic literature in its intended form, which is performance.
Area: Writing Intensive

AS.225.346. Creative Improvisation: For Theatre and for Life. 3 Credits.
An exploration of the imagination and the senses using basic techniques of improvisation: exercises, conflict resolution, ensemble building, and theatre games. Texts: Spolin, Johnstone, LaBan and Feldencreis. Open to all students.

AS.225.374. Acting IV. 3 Credits.
Work is tailored to individual students, using the principles of Workshops I and II and other previous experience. Students work with John Astin's "The Process", along with the texts of Uta Hagen, Boleslavsky and Michael Chekhov. The Clurman, Meisner, Stanislavsky and Strasberg approaches are further explored. Substantial out of class time is required.
Recommended Course Background: Two acting courses. Permission Required.

AS.225.501. Independent Study. 1 - 3 Credits.
Permission only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.225.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230 (Sociology)

AS.230.101. Introduction to Sociology. 3 Credits.
Introduces students to basic sociological concepts and perspectives, and applies them to a variety of topics including family, work, and the dynamics of class, gender, and racial/ethnic inequalities in the United States and globally.

AS.230.150. Issues in International Development. 3 Credits.
Why do billions of people continue to live in poverty? What obstacles stand in the way of secure and dignified lives for all? Who is most likely to bring about change, what strategies should they follow, and what kinds of institutions should they put in place? This course will introduce the main theoretical perspectives, debates, and themes in the field of international development since the mid-20th century. It has three sections. The first section focuses on debates over the optimal conditions and strategies for generating economic growth and on the relationship between growth, human welfare, and inequality. The second section presents critical assessments of development interventions from various perspectives. The third section considers the role of social movements in shaping development and social change in the 21st century.

AS.230.175. Chinese Revolutions. 3 Credits.
This course introduces the origins, operation and impacts of five major revolutions in modern China between 1850 and 1950. These include the Taiping Rebellion, the republican revolutions, federalist and southern automatic movements, labor strikes as well as peasant rebellions. It draws on the existing historiography that examines China's transition from an empire to a republic, impacts of western and Japanese influences to China, as well as the continuity and change of Chinese social organizations. Cross list with International Studies and East Asian Studies. Fulfills IS History requirement.
Area: Writing Intensive

AS.230.195. Exploring Baltimore: An Introduction to Urban Studies. 3 Credits.
This course will introduce students to the field of urban studies and Baltimore itself. Students will learn data collection and analysis methods used in the social sciences. Students will discuss relevant research published in urban studies by Johns Hopkins faculty and other experts in the field. Students will also gain an introduction to their adopted home, Baltimore, by collecting data and conducting field observations in different neighborhoods.
Area: Writing Intensive

AS.230.202. Research Methods for the Social Sciences. 3 Credits.
The purpose of this course is to provide a sound introduction to the overall process of research and the specific research methods most frequently used by sociologists and other social scientists. Required for Sociology majors and IS GSCD track students.

AS.230.205. Introduction to Social Statistics. 4 Credits.
This course will introduce students to the application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research. Special Note: Required for IS GSCD track students.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR EN.550.310 OR EN.550.311 OR EN.550.413 OR EN.550.420 OR EN.550.420 OR EN.550.420 OR EN.560.435 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.560.348;Statistics Sequence Restriction: Students who have completed EN.550.111 OR EN.550.113 may not enroll.

AS.230.213. Social Theory. 3 Credits.
This course will focus on four classical social theorists whose ideas have greatly influenced how we study and understand society: Karl Marx, Emile Durkheim, Max Weber and W.E.B. DuBois. Students will gain an in-depth understanding of how each theorist answered three major questions: 1) what is the origin, structure and historical dynamic of modern society?; 2) how do we gain an accurate knowledge of society?; 3) what are the conditions of possibility for freedom in modern society? In comparing, applying and critiquing their respective theories, students will advance their own theory of society.
Area: Writing Intensive

AS.230.216. Disability and Society. 3 Credits.
Objectives of this course are to achieve an understanding of the social context of disability from the population level to the individual disability experience. Topics will include social versus medical models of disability; the spectrum of ability; the history of disability; civil rights perspectives; life course and aging aspects of disability; and the role of the environment. Attention will be paid both to theoretical understandings of disability and the role of policies.

AS.230.219. Land, Labor and Environmental Movements in Contemporary Africa. 3 Credits.
The course examines the new wave of social protest and popular uprisings in contemporary Africa through the interconnected themes of land, labor, and environmental movements.Attention will be placed on the early 21st century.

AS.230.221. Global Social Change. 3 Credits.
This course introduces students to issues of global social change, with a particular focus on the challenges of international development and the contemporary globalization process. Specific themes include world income inequality and global poverty, the rise of supranational organizations (e.g. WTO and EU) and their relations with sovereign states, anti-globalization activism, the rise of China and India in the global economy, and the origins as well as consequences of the current global economic crisis and global pandemics, among others. Lectures will be aided by documentary films and other multi-media materials. Special Note: Fulfills Economics requirement for IS GSCD track students only. Formerly offered as AS 230.353. Students who took AS.230.353 cannot take AS.230.221.
Area: Writing Intensive

AS.230.228. Colonialism in Asia and Its Contested Legacies. 3 Credits.
This course surveys the impacts of colonialism in East and Southeast Asia. Special attention will be paid to the social and economic development in British Singapore and Hong Kong as well as Japanese Korea and Taiwan. Topics include free-trade imperialism, colonial modernity, anticolonial movements, pan-Asianism, and post-war U.S. hegemony.

AS.230.233. Inequality and Social Change in Contemporary China. 3 Credits.
This course examines the trajectory of economic development in China since the beginning of market reforms in the late 1970s, with a special focus on social inequality and forms of resistance that have emerged in response to the expansion of the market economy. The first part of the course focuses on understanding the academic debates around China's economic miracle and introduces students to theories about the relationship between market expansion and social resistance. The second part focuses on key thematic topics including the rural/urban divide, rural protest, urban inequality and labor unrest, gender and sexuality in social movements, environmental protests, and the politics of ethnic relations.

AS.230.236. The Sociology of Intimate Partnerships: Dating, Mating, Marriage, and Divorce. 3 Credits.
How do we define an intimate partnership and what role does it play in society? At the turn of the 20th Century socially sanctioned intimate partnerships existed primarily in the context of marriage between a man and a woman. These partnerships formed the center of family units and provided a foundation of social stability for the individuals that entered them. Since then, additional forms of intimate partnerships have become more widely accepted through dating and cohabitation, while marriage has become less stable. In this course, we will explore the evolution of marriage as the dominant type of intimate partnership in society and the concurrent rise of dating, cohabitation, and divorce. Using the context of how these intimate partnerships have changed in recent decades, students will explore and define the role these different types of partnerships serve in society today.
Area: Writing Intensive

AS.230.238. Beyond the Wall: The Political Economy of the US and Mexico. 3 Credits.
Examining the exchange of culture, people, and commodities between the United States and Mexico since the 19th century, this course asks not just how US practices and policies have shaped Mexican society, but how, in turn, Mexico has shaped the United States. We will examine the social, political, and economic forces that have long pulled these two societies together – and pushed them apart.

AS.230.239. Coffee, Tea and Empires. 3 Credits.
The course introduces the transformation of the coffee and tea industries in the long nineteenth century against the backdrop of European and Japanese colonial expansion. It surveys the social changes in the colonial world under the development of the cash crop economy. It also analyzes how the consumption of such caffeinated beverages became sources of heritage makings both in the metropoles and colonies and the latter's postcolonial reconstructions.

AS.230.242. Race and Racism. 3 Credits.
Race has been important in social classifications and producing inequalities. This course is designed to provide you with a global understanding of how racial categories are created and maintained, how they change over time, and how they vary from place to place. It is organized in four parts. The first part introduces the concepts and analytical tools used by social scientists to study race. Of particular concern is power and the social construction rather than “natural” categories of race, as well as the general social processes involved in the maintenance and reproduction of these boundaries. In the second part, we will study the theories and dynamics racial category formation in the United States with attention to forms and processes of racial exclusion and oppression, and evidence of socio-economic inequalities based on race. In the third part of the course, we will compare these processes in the U.S. to those occurring in other countries. The fourth and final part of the course examines how race and racism shape political struggles and resistance movements.

AS.230.244. Race and Ethnicity in American Society. 3 Credits.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.250. Knowledge, Evidence, and Democracy. 3 Credits.
Fake news. Alternative facts. Follow the science. Misinformation. Disinformation. How can we understand the role of information, evidence, and scientific inquiry in politics? Where does information come from? How is it used? How can evidence, argument, and listening improve public conversations? This seminar will examine the connections between information, knowledge, evidence, and democracy, focusing mostly on the United States but with global examples as well.
Area: Writing Intensive

AS.230.265. Research Tools for Global Sociology and Development. 3 Credits.
This course will introduce students to a range of software programs that are critical for conducting social scientific research in the 21st century. Students will develop competency in the use of computer programs for statistical analysis, database management, the creation of maps and timelines, and the presentation of research reports. The course uses examples from ongoing social science faculty research projects at Johns Hopkins on global inequality and international development. Required for GSCD track students.Course previously titled "Research Tools and Technologies for the Social Sciences"

AS.230.304. (Making Space For) Black Thought. 3 Credits.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, Sadiya Hartman, Walter Rodney, Derek Walcott, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.306. Plagues, Power, and Social Control. 3 Credits.
While developments in biomedicine and health care have led to the eradication, cure and management of many human health problems, disease, illness and health have also been the focus for aggressive social controls and population management. The technologies and practices of disease control and health management have been foundational to some of the most aggressive structures of oppression in recent history such as the Jewish Ghetto, the Concentration Camp, the South African Township and techniques of segregation. This course seeks to explore how epidemics and disease control are linked to larger questions of power, state craft and international dynamics. This course asks how have outbreaks of infectious disease shaped social and political action? How do societies respond to outbreaks and why? What do epidemic moments tell us about global structures of power and the dynamics of control? Drawing on historical cases including plague during the European Renaissance and before, the HIV/AIDS Pandemic and the West African Ebola Outbreak of 2013-2016, this course will introduce students to the history and practices of disease control as well as important theoretical perspectives by which to understand the sociological and historical effects of disease and the responses to them. Students will engage sociological concepts such as biopolitics, social construction of disease and illness and biosecurity and produce a final research paper examining the outcomes and responses to an epidemic event to show mastery of the topics covered in the course.
Area: Writing Intensive

AS.230.312. Education & Society. 3 Credits.
This course analyzes educational systems as social institutions and organizations. It gives particular attention to the often taken-for-granted ways that we structure learning in schools and their consequences for social inequality. To these ends, the course will examine classical institutional and organizational theory in sociology and evaluate these theories in their application to historical process of educational formation and the contemporary organization of K-12 schooling in the US.
Area: Writing Intensive

AS.230.313. Space, Place, Poverty & Race: Sociological Perspectives on Neighborhoods & Public Housing. 3 Credits.
Recent national conversations about racial segregation, inequality and the affordable housing crisis raise many important questions—this course focuses on several of these questions, through the lens of urban sociology and housing policy. There are three main areas we will focus on in the course: 1) Understanding the role of racial segregation, neighborhood and housing effects on children and family life; 2) Research methods for studying urban poverty and neighborhoods; and 3) Programs, policies and initiatives designed to house the poor, alleviate concentrated spatial poverty, and increase residential choice. We will primarily focus on issues related to urban poverty in large cities, comparing the patterns of residential mobility and neighborhood characteristics for white and Black Americans. We will utilize archival data, qualitative interviews, census data, and quasi/experimental data to gather evidence about neighborhoods, housing, and policies, as well as their impacts. We will also explore interactive online applications that facilitate the study of neighborhoods (e.g. American Community Survey, GIS with Social Explorer). A statistics/public policy background is helpful, but not required.
Area: Writing Intensive

AS.230.315. Advanced Topics in International Development. 3 Credits.
This class offers an advanced engagement of various topics in international development. The course begins with an historical examination of the actors and global events, as well as the intellectual debates, that birthed the field of international development as a discrete area of study and practice. We will then analyze the evolving theories that dominated the first five decades of the international development effort. The final part of the course will examine more recent perspectives that have attempted to fill the intellectual void left by the demise of the traditional development paradigm. Here we will cover topics that span the global North and South, including issues of race/caste/ethnicity, migration, gender, and right-wing nationalism. Some prior knowledge of international development is recommended
Area: Writing Intensive

AS.230.316. African American Family. 3 Credits.
This course is an examination of sociological theories and studies of African-American families and an overview of the major issues confronting African-American family life. The contemporary conditions of black families are explored, as well as the historical events that have influenced the family patterns we currently observe. Special attention will be given to social policies that have evolved as a result of the prominence of any one perspective at a given point in time.

AS.230.317. Sociology of Immigration. 3 Credits.
This course surveys sociological theories and research on immigration to the U.S. Theoretical approaches include theories of international migration, economic sociology, immigration, and assimilation. Research topics include the impact of U.S. immigration laws and policies on immigrant inflows and stocks, self-selection of immigrants, the impact of immigration on the native-born population and the U.S. labor market and economy, and the adaptation of the first and second generations.
Area: Writing Intensive

AS.230.318. The Political Economy of Modern India. 3 Credits.
This course examines the complex, at times conflicting, relationship that has emerged between Indian seats of power from above and Indian expressions of society from below. Attention will be placed on the period between 1947 to the present.
Area: Writing Intensive

AS.230.320. Education & Inequality: Individual, Contextual, and Policy Perspectives. 3 Credits.
Area: Writing Intensive

AS.230.322. Quantitative Research Practicum. 3 Credits.
This course provides “hands on” research experience applying sociological research tools and a sociological perspective to problems of substance. Quantitative methods will be emphasized, including how to access publicly available survey data, data management, and the presentation of results. Each student will design and carry out a research project and write a research report. Juniors and seniors only. Sophomores require instructor’s permission.
Area: Writing Intensive

AS.230.323. Qualitative Research Practicum. 3 Credits.
This course provides "hands on" research experience applying sociological research tools and a sociological perspective to problems of substance. Qualitative observational and/or interviewing methods will be emphasized. Students will design and carry out a research project and write a research report. This course fulfills the "research practicum" requirement for the Sociology major.
Area: Writing Intensive

AS.230.324. Gender and International Development. 3 Credits.
This course employs a comparative perspective to examine the gendered impact of international development experiences and policies. Students will discuss the historical evolution of how the concept of gender has been constructed, conceptualized, and integrated into international development theory and practice. The course will also examine how greater international development. In particular, we will examine structural theories of poverty reduction, individual theories of power and processes of stratification at the household and family level. Specific issue areas will include the globalization, class and work political participation and social movements. Cross-listed with International Studies (CP, IR). Fulfills Economics requirement for IS GSCD track students only.
Area: Writing Intensive

AS.230.325. Global Social Change and Development Practicum. 3 Credits.
This course provides "hands on" research experience in the field of global social change and development. The course fulfills the "research practicum" requirement for Sociology majors and is required for the GSCD track.

AS.230.327. Sociology of Revolution and Counterrevolution. 3 Credits.
In this course, students will learn about analyzing revolutionary and counterrevolutionary movements, with a focus on their strategic dimensions. Contributions from the military, counterinsurgency, sociology of revolution, historical materialist, world-system, and critical realist literature will provide different visions of strategy and tactics. The cases of Guatemala and Chile in the early 1980s and 1970s, respectively, will provide historical and empirical roots to class discussions about these different approaches and the possibilities of synthesizing them.
Area: Writing Intensive

AS.230.335. Medical Humanitarianism. 3 Credits.
Humanitarian organizations play life-preserving roles in global conflicts, and have front-row views of disasters ranging from the 2010 Haiti earthquake to the 2011 Fukushima tsunami in Japan. Yet even while they provide vital assistance to millions of people in crisis, such organizations are beset by important paradoxes that hinder their capacity to create sustainable interventions. They work to fill long-lasting needs, but are prone to moving quickly from one site to the next in search of the latest emergency. They strive to be apolitical, yet are invariably influenced by the geopolitical agendas of global powers. How do such contradictions arise, and what is their impact upon millions of aid recipients around the world? Drawing on case studies from South Sudan to Haiti, this course addresses these contradictions by exploring how and why medical aid organizations attempt, and sometimes fail, to reconcile short-term goals, such as immediate life-saving, with long-term missions, such as public health programs and conflict resolution initiatives.

AS.230.337. Global Crises: Past and Present. 3 Credits.
This course will compare the current global crisis with previous major crises of historical capitalism through a combination of theoretical and historical readings. Throughout, we will ask: What can a study of past crises tell us about the nature and future trajectory of the current global crisis? Special emphasis will be placed on (1) “the late-nineteenth century great depression”, (2) the Great Depression of the 1930s, and (3) the period of crisis and stagflation in the 1970s. We will be particularly concerned to understand the differential social and geopolitical impact of the crises. Which social classes bore the brunt of the disruptions in economic activity in each crisis? Which geographical areas or geopolitical groupings lost out (or benefited) from the crisis? How have environmental and ecological challenges resurfaced in each crisis including today?

AS.230.339. The Geography of Opportunity. 3 Credits.
The schools that children attend and the neighborhoods in which they live are critically important sites of mental and physical development, socialization, and academic achievement. These contexts in which children live and learn are also highly segregated by race and class, resulting in spatially stratified opportunities for social mobility – what social scientists call “the geography of opportunity.” This course explores social inequality through the lens of space, place, and geography, with a particular focus on how these dynamics shape educational inequality in the United States. Drawing on readings from sociology, demography, psychology, history, economics, urban planning, and public health, this course will teach students to think critically about how individual choices and public policies interact with dynamics of space and place to create and maintain social inequality.
Area: Writing Intensive

AS.230.341. Sociology of Health and Illness. 3 Credits.
This course introduces students to core concepts that define the sociological approach to health, illness and health care. Topics include: health disparities, social context of health and illness, and the Sociology of Medicine.

AS.230.342. Resistance, Rebellion, and Revolution in Latin America. 3 Credits.
This course will examine the dynamics of transformative social change in Latin America and the Caribbean through analyses of resistance, rebellion, and revolution. Because revolutionary change is at once the most transformative and the most rare, this course will cover the exemplary cases of the Haitian, Mexican, and Cuban revolutions, but then also ask how theorists have understood the dynamics of both open rebellion and of everyday resistance in societies deeply structured by racial, gender, and class power, situated within an unequal world system. Attending to both local and global dynamics, this course will ask how Latin American dynamics have both conformed to and challenged universalist theories of social change.

AS.230.348. Climate Change and Society. 3 Credits.
This course will focus on the social dimensions of climate change. Drawing on global and multi-disciplinary scholarship, we will address such issues as: the history of fossil capitalism; the relationship between social inequality and “vulnerability” to climate change (including heat waves, drought, rising seas, and extreme weather); climate migration and the political economy of “adaptation”; the merits of various mitigation strategies, including the Green New Deal, conservation offsets, and geo-engineering; the roots of climate denialism; and climate justice movements. Students will write a final research paper on a sociological aspect of climate change.
Area: Writing Intensive

AS.230.349. Class, Race, and Political Struggle in Capitalist Societies. 3 Credits.
Does capitalism promote democracy and stability, or repression, racial conflict, and social unrest? Following the 2008 financial crisis, countries around the world have experienced severe economic and political crises, giving rise to explosive movements that have challenged the viability of capitalism and democracy as durable systems. By considering these developments, this course examines the core political dimensions of capitalist societies. We will define and discuss key terms, like capitalism, racial capitalism, the capitalist state, democracy, social movements, and more. We will pay special attention to the ways in which the economic, political, and ideological structures of capitalist societies shape and are shaped by social movements and political parties. The course is global in perspective, drawing on developments in many countries, with a special focus on the United States.
Area: Writing Intensive

AS.230.350. Capitalism, Dependency, and Development in Latin America. 3 Credits.
This course examines Latin American insertion into the global capitalist economy from the colonial period to the present. Examining various historical, sociological, and political-economic theories, this course will ask not only how Latin American economies and societies have developed their particular characteristics, but also how theorists within and outside the region have understood Latin American development over time.development over time.

AS.230.352. Chinese Diaspora: Networks and Identity. 3 Credits.
This course combines lecture and class discussion. It examines the history and historiography of Chinese overseas migration. Major issues include overseas Chinese as “merchants without empire,” Chinese exclusion acts in the age of mass migration, the “Chinese question” in postcolonial Southeast Asia, as well as the making and unmaking of Chinese identity in the current wave of globalization.
Students may not have completed AS.230.217 previously.

AS.230.354. The City After Civil Rights. 3 Credits.
This course examines how American cities have evolved since the United States ratified the radically new vision of race promoted by the Civil Rights Movement in the 1960s. We will study the changing geography of race and class in American cities and their surrounding suburbs and what that evolution has meant for inequality. We will also consider how this shifting geography of race and class affects current debates in metropolitan policies like gentrification and tax policy. We will look to the future to examine what issues might come about in the coming decades and how we might avoid similar problems to those in history.

AS.230.356. Power, Privilege, and Inequality. 3 Credits.
Race, class and gender are among key factors in systematic patterns of inequality in the United States (and globally). In this course, we examine the manner in which social inequality comes about and is maintained through a range of social institutions and daily social interactions. This class will examine how social institutions and daily social interactions structure the decisions individuals make and, in turn, how the decisions that individuals make serve to perpetuate or challenge existing social institutions and interactions. We will explore how the intersection of different forms of inequality, for example race and class or class and gender challenge traditional conceptions of inequality and provide insight into the processes that perpetuate inequality. We will use these sociological tools to develop what sociologist C. Wright Mills calls the "sociological imagination" and apply this imagination to contemporary debates in American society. We will discuss how the sociological imagination differs from the approach other disciplines in social science might take to study inequality.

AS.230.357. Baltimore and Beyond. 3 Credits.
This course uses the city of Baltimore as a lens through which to explore issues of urban inequality. We will focus on Baltimore's history of racial segregation and concentrated poverty, and its effect on the social and economic well-being of the city and its residents, with attention to education, employment, health and crime. Students will learn how to employ Census data, GIS approaches, and sociological research to inform questions about population change, inequality and the distribution of resources across the city and metropolitan region. Students will also work on one or more policy relevant studies based in Baltimore, including: a project on abandoned and vacant housing, a desegregation intervention, and a longitudinal study of inner city youth. Finally, students will become familiar with Baltimore City's programs and policy approaches to addressing the city's most pressing problems, and will design innovative and effective and innovative solutions as part of their course assignments. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive
Students that took AS.360.357 may not take AS.230.357

AS.230.358. The Politics of Mental Health. 3 Credits.
This course examines how the psy disciplines – psychology, psychiatry, psychotherapy and related fields – create knowledge about the mind, and how these fields have in turn shaped political and social life since early 20th century. We will explore how the psy disciplines have proven useful to projects of state building by reconstructing the human mind as a calculable, quantifiable entity, one that can be measured and governed across diverse educational, military, and healthcare settings. We will then ask how psychiatric categories such as bipolar disorder and PTSD (post-traumatic stress disorder) were created, and consider their impact on both the legal/medical management of illness and on lay and expert notions of sanity and normality. Finally, we will examine the rising influence of humanitarian mental health interventions, and immerse ourselves in the debates they have engendered concerning the use of psychotherapy to alleviate suffering in war and disaster zones.
Area: Writing Intensive

AS.230.363. Sociology of Dispossession. 3 Credits.
The "grabbing" of land and natural resources has, in recent years, generated widespread political conflict across the world and put dispossession on the agenda of academics and policy-makers. Nevertheless, compared to other social relations of power, land dispossession has not been central to scholarly or public understandings of capitalism, the state, development, or politics. In this class, we will collectively explore the nascent field that we might call the sociology of dispossession. We will examine existing theories of dispossession, and proceed to challenge, reconstruct or supplant those theories as we consider a wide range of historical examples of dispossession from the English Enclosures and colonial plunder to contemporary urban redevelopment and rural land grabs. This is a reading- and writing-intensive seminar.
Area: Writing Intensive

AS.230.366. Black Social Thought and Social Movements. 3 Credits.
This course will examine the reciprocal relationship between Black social thought and social movements. How have social movements informed thinkers who grapple with questions of freedom and liberation in racially and economically stratified societies, and how have their ideas affected movement tactics? This course will look at 20th century movements and investigate connections between theory and practice through concepts like civil disobedience, internal colonialism, Black feminism, Black internationalism, and others.
Area: Writing Intensive

AS.230.367. Islamic Finance. 3 Credits.
Today, Islamic finance is a global industry comprising nearly $3 trillion in assets, with hubs from Kuala Lumpur to Dubai to London. But half a century ago, nothing called "Islamic finance" existed. So where did Islamic finance come from? Why is it growing so fast? And what does it mean for finance to be Islamic? We discuss the ban on usury in Islam and other religious and philosophical traditions, finance in early and medieval Islamic societies, petrodollars and the birth of Islamic banking in the 1970s, the rise of Islamic capital markets since 2000, contemporary shariah-compliant financial structures, and the constitution of piety through financial practice.

AS.230.369. Sociology in Economic Life. 3 Credits.
This course discusses how geopolitics, technology as well as social differentiation (such as race, class and gender) shape the structure of economic actions. Special attention will be paid to patterns of state-business relationship, labor processes, migrant economy, globalization and international division of labor.

AS.230.370. Housing and Homelessness in the United States. 3 Credits.
This course will examine the role of housing, or the absence thereof, in shaping quality of life. It will explore the consequences of the places in which we live and how we are housed. Consideration will be given to overcrowding, affordability, accessibility, and past and existing housing policies and their influence on society. Special attention will be given to the problem of homelessness.
Students may not have previously taken AS.230.223.

AS.230.378. Refugees, Human Rights, and Sovereignty. 3 Credits.
What is a refugee? Since World War II, states that have pledged to offer protection to refugees have frequently been drawn instead to the dictates of nationalism and communitarianism, which prioritize concern for their own citizens, rather than to the needs of forced migrants. As a result, even those migrants that have been formally recognized as refugees according to the 1951 UN Refugee Convention have not been assured of protection, and other migrants have been even less assured. In this course, we will locate the reasons for this reality in the legal, political, and historical underpinnings of political asylum. What is the difference between an asylum seeker and a refugee? How has the refugee category been redefined and contested by international bodies since 1951? How are the ambiguities of real-life violence and persecution simplified in asylum adjudication interviews that require clear, factual narratives? What kinds of protections are offered to asylum seekers, whether by UN bodies, NGOs, or host governments, and how have such protections varied geographically and historically? Finally, what protections, if any, are afforded to those migrants who are fleeing not persecution but rather “merely” endemic poverty or climate-induced displacement? The course draws on literature from sociology, history, anthropology, and international refugee law in order to understand the capacity (or lack thereof) of human rights discourses and declarations to contravene state sovereignty in the name of protecting the rightless.

AS.230.385. Schooling, Racial Inequality and Public Policy in America. 3 Credits.
After examining alternative explanations for why individuals obtain different amounts and types of educational training, the course focuses on how an individual’s family background and race affect his or her trajectory through the educational system. The course covers the specific challenges that have confronted urban schooling in America since the 1960s, including the classic literature on the effects of school and community resources on student achievement as well as the development and later evaluation of school desegregation policies.
The course also considers case studies of current policy debates in the US, such as housing segregation and school resegregation, voucher programs for school choice, and the motivation for and consequences of the establishment of state-mandated testing requirements. Throughout the course, emphasis is placed upon the alternative modes of inquiry and writing which opposing scholars, policymakers, and journalists use to address these contentious topics.
Area: Writing Intensive

AS.230.386. The Making of the Asian Races Across the Pacific in the Long 20th Century. 3 Credits.
Focusing on the race-makings of the Asians across the Pacific in the long twentieth century, the course employs the reading materials that elucidate the constructions about the demographic categories of the Asian "races." We use prewar Japanese materials and Chinese nationalist thoughts to elaborate on the following themes: the internal distinction among the peoples grouped under the racial category of the Asians; the overall presentation about the generic category of the "Asian" peoplehood, as well as their alleged shared civilization and interests. The theoretical framework include concepts of capitalist reconfiguration of social boundaries through racism and the question of power behind the reproduction of racial hierarchy.

AS.230.388. Sociology of the Family. 3 Credits.
Sociological perspectives on contemporary family life, including marriage and divorce, cohabitation, single parenthood, same sex partnerships, children’s wellbeing, balancing work and family responsibilities, domestic violence, and government policy toward families.

AS.230.389. The Value of Life: Racism, Capitalism and Health. 3 Credits.
We are generally told that you can’t put a price on life or a price on our health but lives are quantified, valued and priced every day. In this class we will explore the ways in which life is valued in the modern world, its effects and the outcomes from it. We will also examine how forms of quantification and valuation have been employed to dehumanize and subjugate peoples, especially those racialized as different. Beginning with an exploration of human pricing during the trans-Atlantic Slave trade and continuing through to contemporary health care and health insurance practices, this course will examine how we value (monetarily) human existence in modernity. This course will introduce students to ideas emerging out of the Black Marxist Tradition, postcolonial thought, and critical feminist approaches to historical research. From the examination of insurance under slavery to the use of race corrections in medical algorithms, this class will confront students with the question- "how can we put a price on life?" and most importantly "Should we?".
Area: Writing Intensive

AS.230.393. Global Health and Human Rights. 3 Credits.
Is access to healthcare a fundamental human right? If so, then which global actors are obligated to provide healthcare to whom, and for how long? How do meanings of health and illness vary across time and place? And finally, how are human rights principles translated into frontline practice in order to promote well-being? This course takes a critical interdisciplinary approach to these questions through a series of global case studies ranging from humanitarian aid in post-tsunami Sri Lanka to anti-FGM (female genital mutilation) campaigns in Ghana. How do international NGOs, UN bodies, and governments collaborate (or compete) to distribute healthcare in places beset by dire resource shortages? Do human rights principles carry legal weight across borders, and if so, could access to healthcare services and essential medicines be litigated in order to compel governments to provide it? And finally, what cultural assumptions do human rights discourses carry with them, and what happens if rights-based approaches are poorly received by recipient populations? Moving beyond the basic principle of healthcare as a human right, this course aims to bring this idea’s history and politics into focus by offering an in-depth exploration of its ethics and implementation.
Area: Writing Intensive

AS.230.394. Social Statistics. 4 Credits.
The application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research.

AS.230.395. Contemporary Social Theory. 3 Credits.
What is the structure of society, how does it change, and how is it reproduced? What is the relation between social structures and our ideas about them? What are the conditions of possibility for human freedom? This course will examine how major social theorists of the 20th century advanced novel answers to these questions as they grappled with the historical events and social concerns of the 20thcentury—the Russian revolution and its degeneration into Stalinism, the failure of communist movements in the West, the rise and fall of fascism and Nazism, the consolidation of capitalist democracies and welfare states, the emergence of anti-colonial movements in the "Third World," and the persistence of race, gender and sexuality as forms of domination. In addition to understanding and comparing theories, we will assess their usefulness for understanding the present. This is a reading and writing-intensive seminar.
Area: Writing Intensive

AS.230.396. Politics and Society. 3 Credits.
This seminar surveys key problems of political sociology including the rise of the modern state, the origins and nature of liberal democracy, sources of authority, the relationship between political and economic power, the nation-state and nationalism, states and war, ideology and political contention, collective identity, social movements, and social revolutions. Fulfills Comparative Politics for International Studies.
Area: Writing Intensive

AS.230.397. The Political Economy of Drugs and Drug Wars. 3 Credits.
In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

AS.230.405. Neoliberalism. 3 Credits.
Neoliberalism, a political project that seeks to subject all aspects of social life to free market force, has ascended to orthodoxy in developed and developing countries alike over the last four decades. This course is a reading seminar focused on some of the key classic and cutting-edge original texts that critically examine and debate the origins, socio-political impacts, and crisis of the neoliberal project. It will cover such topics as the genealogy of the neoliberal idea, neoliberal state, informalization of works, neoliberal cities, rise of the one percent, and global governance. Class will be a mix of lecture and seminar-style discussions. Requirements include reading memo, class presentation, and a term paper.
Area: Writing Intensive

AS.230.415. Social Problems in Contemporary China. 3 Credits.
In this course we will examine contemporary Chinese society, looking at economic development, rural transformation, urbanization and migration, labor relations, changes in class structure and family organization, health care, environmental problems, governance, and popular protest. The course is designed for both graduate and undergraduate students. Undergraduates must have already completed a course about China at Hopkins. Cross-listed with East Asian Studies.
Area: Writing Intensive

AS.230.418. Racial Capitalism: A Sociological Perspective. 3 Credits.
This course provides theoretical and historical approaches to examining the centrality of racism, imperialism, and colonialism to the origins and ongoing functioning of capitalism and the global political economy. We begin with the dominant theoretical frameworks used to study capitalism and carefully juxtapose these with theory and empirical analyses foregrounding capitalism's connections to racial slavery/racialized labor exploitation, imperialism, colonialism, and gendered exploitation. Following this, we examine the unfolding of capitalism in the post-emancipation, post-independence, and neoliberal periods, paying close attention to inequalities produced within and between nations. We end by examining resistance to racial capitalism, as well as imagining alternative futures.
Area: Writing Intensive

AS.230.420. Class, Capitalism, Colonialism: Evaluating the work of Walter Rodney. 1 Credit.
This course will focus on key writings of Guyanese scholar and intellectual, Walter Rodney (1942-1980) with an emphasis on evaluating his legacy and the relevance of his work for the 21st century, globally and locally. The main course readings are Rodney's three major books—(1) How Europe Underdeveloped Africa; (2) History of the Guyanese Working People; and (3) Groundings with my Brothers. The course will provide students with the background necessary to participate in the January 31, 2020 workshop on the legacy of Walter Rodney organized by the JHU Arrighi Center for Global Studies.

AS.230.430. Sociology of Policing and Resistance in Race-Class Subjugated Communities. 3 Credits.
Policing has become a primary way that many Americans see and experience government, particularly those from race-class subjugated communities, and has been a site of resistance and freedom struggles since the first Reconstruction. In this undergraduate seminar, we will survey key debates around policing and social movements, with a particular focus on research that takes institutional development, history, and racial orders seriously. A core preoccupation of this course will be to understand the ways in which policing "makes race" and how debates about crime, surveillance, and safety were often debates about black inclusion and equality. We will explore changes in the racial logics of policing over time, debates over how policing helped construct the racial order, and the consequences of several shifts in policing for communities. From broken windows policing in New York to the emergence of the new vagrancy-style banishment laws in urban Seattle to the men who live under constant surveillance in Philadelphia and to the large share of blacks in Ferguson with outstanding warrants for 'failure to appear", these policies and policing regimes have helped remake the government in the eyes of the urban poor. How does exposure to criminal justice interventions shape political learning, racial lifeworlds, and community social capital? The course will include a range of methods (ethnography, historical analysis, quantitative and qualitative).
Area: Writing Intensive

AS.230.440. Port Cities and Historical Capitalism in Maritime Asia. 3 Credits.
The goal of the seminar is to examine the prospects and limits of understanding the incorporation of Asia in the capitalist world-system from the prism of oceanic connections. The theoretical thrust of this course is to develop but also to adapt Janet Abu-Lughod emphasis on the connections across port cities and littoral in the Afro-Eurasian continents before the long sixteenth century in her Before European Hegemony. But instead of looking at a port city as its adjacent hinterland polity's gateway to global trade in the premodern era, the course examines the multifarious coast-hinterland relationships. The readings are organized by a chronological order, which begins with the historical maritime silk road between the third and thirteenth centuries, and will be followed by Asian port cities in the European age of empire and postwar American-led Cold War Structure, as well as the present-day Chinese New Silk Road Diplomacy. Students are expected to select an issue of regional tensions and to analyze its historical root.

AS.230.445. Sociology of Religion. 3 Credits.
This seminar tackles major issues in the classical and contemporary sociology of religion. We begin with Ibn Khaldun, Friedrich Nietzsche, Karl Marx, Max Weber, Émile Durkheim, and Mary Douglas, asking basic questions: What are religion and the sacred? Why do they exist? What is the relationship between religion and social structure? And what role does religion play in morality, solidarity, boundaries, exploitation, patriarchy, and macrohistorical transformations such as the rise of capitalism? Keeping this theoretical grounding (and its flaws and biases) in mind, we continue to probe the problem of religion in modernity through more-recent writings. Topics include the secularization debate (Are modernity and religion antithetical?); "religious markets" and rational-choice theories of religion; religious revivalism, evangelicalism, fundamentalism, and proselytizing movements; feminist and queer sociologies of religion; civil religion (Is standing for the national anthem a religious act?); embodiment and prayer; Orientalism and postcolonial interrogations of the secular; religious violence and nationalism; the intersectionality of religion with race, class, and caste; and religion and neoliberalism. Although dominant sociologies of religion have focused on Christianity in Western Europe and North America, this course applies a global lens, training significant focus on non-Western and non-Christian contexts.
Area: Writing Intensive

AS.230.465. Labor in the World System. 3 Credits.
This is an intensive reading seminar on working class formation from a comparative, historical and global perspective, including theoretical and empirical (case study) readings on changes over time in labor process, labor markets, and labor movements. We will build on a range of local case studies to establish spatial and temporal patterns, and discuss the connections between these global patterns and the dynamics of historical capitalism.
Area: Writing Intensive

AS.230.500. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.501. Research Assistantship. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.507. Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.511. Honors Research Seminar. 3 Credits.
This seminar is a workshop for Sociology majors writing senior honor theses. It is part of the two-semester Senior Honors Program. Students must complete an application to enroll in the Honors Program [https://soc.jhu.edu/wp-content/uploads/sites/28/2021/04/Sociology-Honors-ThesisApplication.pdf] before registering for this seminar. Typically, students first take the seminar and then enroll for the Honors Independent Study (230.512) with their thesis advisor in the second semester of the Program. The seminar is designed to assist students in the early phase of their honors thesis research and to provide a community of peers who are writing theses.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.512. Honors Independent Study. 3 Credits.
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You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.598. Summer Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.230.600. Introduction to Social Statistics.
This course will introduce students to the application of statistical techniques commonly used in sociological analysis. Topics include measures of central tendency and dispersion, probability theory, confidence intervals, chi-square, anova, and regression analysis. Hands-on computer experience with statistical software and analysis of data from various fields of social research.

AS.230.602. Theories of Society.
This course will examine how important schools of social theory challenged and reconstructed the "classical" theories of Marx, Weber, and Durkheim as they grappled with the historical developments and social concerns of the 20th century.

AS.230.603. Contemporary Social Theory.
This course will examine how important schools of social theory challenged and reconstructed the "classical" theories of Marx, Weber, and Durkheim as they grappled with the historical developments and social concerns of the 20th century.

AS.230.604. Linear Models for the Social Sciences.
This course provides an accessible but in-depth coverage of multiple regression with a focus on sociological problems and software applications. We begin with the basics of linear regression, including estimation, statistical inference, and model assumptions. We then review several tools for diagnosing violations of statistical assumptions and what to do when things go wrong, including dealing with outliers, missing data, omitted variables, and weights. Graduate students should have completed AS.230.600 or equivalent. Undergraduates admitted with instructor's permission and AS.230.205 or equivalent.

AS.230.605. Categorical Data Analysis.
This course provides the students with a set of statistical tools to understand and interpret social science research dealing with categorical dependent variables and to prepare students to apply these models in their own research. The models covered in the course include logit, probit, Poisson, and log-linear models, as well as multi-level models of categorical dependent variables.

AS.230.608. Proseminar In Sociology.
Individual one-hour presentations by faculty members will introduce students to the faculty's substantive interests and research styles.

AS.230.609. Dissertation Seminar.
Advanced seminar for PhD students who are preparing their dissertation proposals or writing their dissertations. Sociology graduate students only.

AS.230.611. Seminar on Comparative & World-Historical Sociology.
In this seminar we will read key texts in comparative sociology. The topics covered are cross-national sociology, comparative national development, comparing world-systems, the modern world-system, globalization, and social movements.

AS.230.612. Seminar on Social Inequality.
This course covers the sources of inequality in contemporary metropolitan areas. It will investigate traditional and contemporary theories that explain the sociological processes that lead to inequality and the methods used to provide empirical evidence.

AS.230.614. Seminar On The Family.
A discussion-oriented seminar focused on major recent writings on the family, in both the developed and developing nations.

AS.230.615. Sem:Panel Data Analysis.

AS.230.617. Seminar on Immigration.
In-depth reading and discussion of theories and research on immigration to the U.S. theoretical issues include international migration, immigration, and assimilation. Research topics include: the impact of U.S. immigration laws on immigrant inflows and stocks, self-selection of immigrants, the impact of immigration on the native-born population, and the adaptation of the first and second generations. The course focuses on immigration since 1965 and its related controversies and debates.

AS.230.618. Introduction to Computational Social Science.
Computational social science is an interdisciplinary field combining social science and data science. Today's digital age presents both opportunities and risks to social scientists with the availability of increasingly big and complex data that depart from traditional data in remarkable ways. This course offers a foundational basis for social science students to embark upon the field. The weekly 2-hour seminar introduces the topics of big data ethics; research designs for the collection and use of digital trace data, automated texts, government administrative data, and large-scale social network data; new forms of surveys and experiments; and mass data collaborations. Research publications are used to illustrate each topic. The weekly 1-hour labs are for group activities on the weekly topic. There are no social science or data science prerequisites.

AS.230.643. Sociological Analysis.
An intensive analysis of a wide range of sociological studies, designed to acquaint the student with how sociologists deal with important theoretical issues, using a variety of methods and sources of data. Particular attention will be paid to the logical coherence of the studies and to the fit between data and interpretation.

AS.230.646. Race and Ethnicity in American Society.
Race and ethnicity have played a prominent role in American society and continue to do so, as demonstrated by interracial and interethnic gaps in economic and educational achievement, residence, political power, family structure, crime, and health. Using a sociological framework, we will explore the historical significance of race and its development as a social construction, assess the causes and consequences of intergroup inequalities and explore potential solutions.

AS.230.649. Qualitative Research Methods: Domestic and International Fieldwork.
The emphasis of this course will be on participant observation and interviews in a fieldwork context (that is, research that takes place in the space and time of "subjects" rather than the observer). While the best way to learn a method is by doing, the pandemic is likely to make a practicum impossible this semester. Therefore, the course will be structured around reading classic or illustrative monographs and articles based on qualitative fieldwork, in both a US and global context. This will be supplemented with a smaller number of methodological texts to introduce different conceptions of science used or assumed by qualitative sociologists. We will also address practical skills like taking ethnographic fieldnotes.

AS.230.650. Macro-Comparative Research.
The course examines methods of studying long-term, large-scale social change. Both qualitative and quantitative methods are covered.

AS.230.651. Political Sociology.
This seminar surveys key problems of political sociology including the rise of the modern state, the relationship between political and economic power, the origins and nature of liberal democracy, the nation-state and nationalism, states and war, sources of authority, identity and political contention, social movements, and social revolutions. This is a graduate level class that will meet together with "Politics and Society", an advanced undergraduate class.

AS.230.675. Arrighi General Seminar.

AS.230.680. Confronting Epistemological Silences in Social Theory.
How do we think about the power relations at work in the scholarship we read and in the important texts we consider essential to our educational experience? This course will critically investigate the role that concepts of race and racism have played in formulating dominant perceptions of who can be the producers of knowledge and what constitutes authoritative knowledge itself. We will consider how and why thinkers and scholarship produced outside of Europe and North America are too often ignored for their scholarly contributions and the dynamics that lead to this situation. We will also explore how and why new and important perspectives emerge from engaging and centering voices from beyond traditional canonical works. With a particular focus on the forms of knowledge arising from European Enlightenment approaches to concepts of thought reason and objective knowledge, this course will critically engage students with a wide range of thinkers such asGWF Hegel, W.E.B. Du Bois, Angela Davis, Ralph Trouillot, bell hooks, Walter Rodney, Gayatri Spivak, Sylvia Wynter and Frantz Fanon. This course will focus largely on thinkers engaging within the Black Atlantic and black diaspora traditions to question how we might consider voices and thought from beyond Eurocentric positions in our own scholarly practice.

AS.230.685. TRP Seminar I.
This seminar includes all members of the second year cohort of sociology graduate students. Class meetings will provide feedback and guidance as students develop proposals for their Trial Research Papers. The course will also include a series of professional developments seminars. For Sociology PhD students only.

AS.230.690. TRP Seminar II.
This seminar includes all members of the third year cohort of sociology graduate students. Class meetings will provide feedback and guidance as students revise the final drafts of their Trial Research Papers. For Sociology PhD students only.

AS.230.800. Independent Study.

AS.230.801. Research Assistantship.

AS.230.802. Dissertation Research.

AS.230.804. Research Apprenticeship.

AS.230.810. Dissertation Fellowship Semester.

AS.230.811. Teaching Assistantship.

AS.230.815. Trial Research Paper I.

AS.230.816. Trial Research Paper II.

AS.230.817. Trial Research Paper III.

AS.230.825. Summer Research.

AS.250 (Biophysics)

AS.250.105. Science and Film. 2 Credits.
From the origins of cinema to the present, science and technology have remained the most reliably popular subjects for filmmakers and audiences alike. This course will address that enduring fascination, exploring the meanings and uses of science and technology in film through guest lectures and discussion of cinematic examples both recent and historic. Lectures and discussion will focus on a range of questions: How does film both reflect and shape our understanding of scientific concepts and technologies, from artificial intelligence to genetic engineering? How does science fiction reveal contemporary cultural anxieties and address ethical questions? How “fictional” is the science in science fiction film, and how have science fiction films inspired science and technology? What can we learn about “real” science from the movies? In addition to exploring science through film, students will learn the tools of film analysis through lecture, close viewing, and completion of a series of short written responses. In lieu of a short written response, student may choose to work in a team to create a short (1-3 minute) video response. Possible scientific topics: Genetics and Bioethics, Psychological and Brain Sciences, Artificial Intelligence and Robotics, Climate Change and Public Health and Astrophysical and Planetary Sciences. Possible films to be discussed: 2001: A Space Odyssey, Eternal Sunshine of the Spotless Mind, Blade Runner, GATTACA, The Martian, Interstellar, WALL-E, Children of Men and more. Attendance at weekly screenings at the Parkway Theater is required.

AS.250.205. Introduction to Computing. 3 Credits.
This course is useful for many disciplines not only the life sciences. It will introduce students to basic computing concepts and tools useful in many applications. Students will learn to work in the Unix environment, and write bash shells scripts. They will learn to program using the Python programming language, including Python libraries for graphing, fitting and for numerical and statistical computing, such as NumPy, SciPy, and Matplotlib. At the end of the semester, students will complete a project coupling all components of the semester together. Brief lectures followed by extensive hands-on computer laboratories with examples from many disciplines. No prerequisites. Course offered every semester.
You cannot take AS.250.205 if you have already taken AS.250.206.

AS.250.253. Protein Engineering and Biochemistry Lab. 3 Credits.
This laboratory examines the relationship between genes and proteins in the context of disease and evolution. It is a research project lab in which the structural and functional consequences of mutations are determined for a model protein. Students will learn basic protein science and standard biochemical techniques and methods in protein engineering. They will perform experiments in site-directed mutagenesis, protein purification, and structural, functional and physical characterization of proteins. No prerequisites. Courses offered in Fall and Spring semesters.
Area: Writing Intensive
You cannot take AS.250.253 if you have already taken AS.250.254.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.254. Protein Biochemistry and Engineering Laboratory. 4 Credits.
A project laboratory where students will use the techniques of protein engineering to attempt to modify existing proteins to endow them with new structural or physical properties. This course will provide an introduction to standard biochemistry laboratory practice and to protein science, including experiments in site-directed mutagenesis, protein purification and characterization of proteins in regard to structure, function and stability.
You cannot take AS.250.254 if you have already taken AS.250.253.

AS.250.302. Modeling the Living Cell. 4 Credits.
Previously titled "Models and Algorithms in Biophysics." Introduction to physical and mathematical models used to represent biophysical systems and phenomena. Students will learnalgorithms for implementing models computationally and perform basic implementations. We will discuss the types of approximations made to develop useful models of complex biological systems, and the comparison of model predictions with experiment.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.310. Exploring Protein Biophysics using Nuclear Magnetic Resonance (NMR) Spectroscopy. 3 Credits.
NMR is a spectroscopic technique which provides unique, atomic level insights into the inner workings of biomolecules in aqueous solution and solid state. A wide variety of biophysical properties can be studied by solution state NMR, such as the three dimensional structures of biological macromolecules, their dynamical properties in solution, interactions with other molecules and their physical and chemical properties which modulate structure-function relationships (such electrostatics and redox chemistry). NMR exploits the exquisite sensitivity of magnetic properties of atomic nuclei to their local electronic (and therefore, chemical) environment. As a result, biophysical properties can be studied at atomic resolution, and the global properties of a molecule can be deconstructed in terms of detailed, atomic level information. In addition, interactions between nuclei can be exploited to enhance the information content of NMR spectra via multidimensional (2D and 3D) spectroscopy. Since these properties can be studied in solution, NMR methods serve as an effective complement to X-Ray crystallography and electron microscopy. In this course, we will learn about the basics of NMR spectroscopy, acquire 1D and 2D NMR spectra and use various NMR experiments to characterize and probe biophysical properties of proteins at an atomic level.
((AS.030.101 AND AS.030.105) OR (AS.030.103 OR AS.030.204)) AND (AS.030.370 OR AS.250.372) AND (AS.020.305 OR AS.030.315 OR AS.250.315) AND AS.030.205 or permission of the instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.315. Biochemistry I. 3 Credits.
Foundation for advanced classes in Biophysics and other quantitative biological disciplines. This class is the first semester of a two semester course in biochemistry. Topics in Biochemistry I include chemical and physical properties of biomolecules and energetic principles of catabolic pathways. Co-listed with AS.030.315
If you have completed AS.250.307 you may not register for AS.250.315.;(AS.030.206 OR AS.030.212) AND (AS.250.372 OR AS.030.301)

AS.250.316. Biochemistry II. 3 Credits.
Biochemical anabolism, nucleic acid structure, molecular basis of transcription, translation and regulation, signal transduction with an emphasis on physical concepts and chemical mechanisms. Format will include lectures and class discussion of readings from the literature.
(AS.250.315 OR AS.030.315 OR AS.020.305) AND (AS.030.206 OR AS.030.212) or permission of the instructor.

AS.250.320. Macromolecular Binding. 3 Credits.
All biological processes require the interactions of macromolecules with each other or with ligands that activate or inhibit their activities in a controlled manner. This course will discuss theoretical principles, logic, approaches and practical considerations used to study these binding processes from a quantitative perspective. Topics will include thermodynamics, single and multiple binding equilibria, linkage relationships, cooperativity, allostery, and macromolecular assembly. Some biophysical methods used in the study of binding reactions will be discussed. Computer simulation and analysis of binding curves will be used to analyze binding data, and binding schemes and examples from the scientific literature will be reviewed and discussed.Recommended Course Background: AS.250.372 Biophysical Chemistry
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.335. Single Molecule & Cell Biophysics. 3 Credits.
This (elective) course offers an introduction to the field of single molecule and single cell biophysics to second and third year undergraduate students in biophysics. We will examine technologies such as single molecule fluorescence, force measurements and single cell fluorescence detections that enable high precision molecular visualizations in vitro and in cells. In addition, we will cover topics of genome engineering, cell mechanics and optogenetics toward the end of the semester. Each student is expected to read two articles assigned for each week and submit a written summary. All students will take turns presenting the assigned articles to class.

AS.250.351. Reproductive Physiology. 2 Credits.
Focuses on reproductive physiology and biochemical and molecular regulation of the female and male reproductive tracts. Topics include the hypothalamus and pituitary, peptide and steroid hormone action, epididymis and male accessory sex organs, female reproductive tract, menstrual cycle, ovulation and gamete transport, fertilization and fertility enhancement, sexually transmitted diseases, and male and female contraceptive methods. Introductory lectures on each topic followed by research-oriented lectures and readings from current literature.

AS.250.372. Biophysical Chemistry. 4 Credits.
Course covers classical and statistical thermodynamics, spanning from simple to complex systems. Major topics include the first and second law, gases, liquids, chemical mixtures and reactions, partition functions, conformational transitions in peptides and proteins, ligand binding, and allostery. Methods for thermodynamic analysis will be discussed, including calorimetry and spectroscopy. Students will develop and apply different thermodynamic potentials, learn about different types of ensembles and partition functions. Students will learn to use Pythonand will use it for data fitting and for statistical and mathematical analysis. Background: Calculus, Introductory Organic Chemistry, and Introductory Physics.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.381. Spectroscopy and Its Application in Biophysical Reactions. 3 Credits.
Continues Biophysical Chemistry (AS.250.372). Fundamentals of quantum mechanics underlying various spectroscopies (absorbance, circular dichroism, fluorescence, NMR); application to characterization of enzymes and nucleic acids.
AS.250.372

AS.250.383. Molecular Biophysics Laboratory. 3 Credits.
An advanced inquiry based laboratory course covering experimental biophysical techniques to introduce fundamental physical principles governing the structure/function relationship of biological macromolecules. Students will investigate a “model protein”, staphylococcal nuclease, the “hydrogen atom” of biophysics. Using a vast library of variants, the effect of small changes in protein sequence will be explored. A variety of techniques will be used to probe the equilibrium thermodynamics and kinetic properties of this system; chromatography, spectroscopy (UV-Vis, fluorescence, circular dichroism, nuclear magnetic resonance), calorimetry, analytical centrifugation, X-ray crystallography, mass spectroscopy, and computational methods as needed for analysis. These methods coupled with perturbations to the molecular environment (ligands, co-solvents, and temperature) will help to elucidate protein function. Prerequisite: Introduction to Scientific Computing (250.205) or equivalent. Biophysical Chemistry (250.372 or 020.370) or equivalent. Course taught in Fall and Spring.
Area: Writing Intensive
(AS.250.372 OR AS.030.370) AND AS.250.205;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.403. Advanced Seminar in Bioenergetics. 3 Credits.
The trait shared by all living systems is the capacity to perform energy transduction. This biophysics/biochemistry course examines the physico-chemical and structural basis of biological energy transduction. Emphasis is on understanding the molecular and cellular logic of the flow of energy in living systems. The course explores the connection between fundamental physical requirements for energy transduction and the organization, evolution and possibly even the origins of biological molecules, cells, and organisms. Implications for planet earth¹s energy balance and for the design of synthetic organisms and of artificial energy transducing machines will be discussed, time permitting. Recommended Course Background: One semester of Biochemistry. Recommended Course Background: One semester of Biochemistry
Area: Writing Intensive

AS.250.410. Genome Maintenance and Genome Engineering. 3 Credits.
Advanced seminar for biophysics undergraduates. We focus on topics of genome maintenance via telomere regulation and genome engineering by CRISPR-Cas systems. The course will have lecture, scientific article reading, small and large group discussion.

AS.250.411. Advanced Seminar in Structural Biology of Chromatin. 3 Credits.
Focus is on structural and physical aspects of DNA processes in cells, such as nucleosomal packaging, DNA helicases, RNA polymerase, and RNA inhibition machinery. Topics are meant to illustrate how the structural and chemical aspects of how proteins and nucleic acids are studied to understand current biological questions. Recommended Course Background: Biochemistry I (AS.250.315) and Biochemistry II (AS.250.316) or Biochemistry (AS.020.305) and Intro to Biophys Chem (AS.250.372)
Area: Writing Intensive

AS.250.420. Advanced Seminar in Macromolecular Binding. 3 Credits.
All biological processes require the interactions of macromolecules with each other or with ligands that activate or inhibit their activities in a controlled manner. This is a literature and skills-based course that will discuss theoretical principles, logic, approaches and practical considerations used to study these binding processes from a quantitative perspective. Topics will include thermodynamics, single and multiple binding equilibria, linkage relationships, cooperativity, allostery, and macromolecular assembly. Some biophysical methods used in the study of binding reactions will be discussed. Simulation and analysis of binding scenarios will be used to analyze illustrate binding schemes, and examples from the scientific literature will be reviewed and discussed. Basic working knowledge of Python is helpful. The writing component will be in one of the common formats employed in the professional biophysics field.Recommended Course Background: AS.250.372 Biophysical Chemistry
Area: Writing Intensive

AS.250.421. Advanced Seminar in Membrane Protein Structure, Function & Pharmacology. 3 Credits.
Topics are meant to illustrate the physical basis of membranes and membrane proteins towards understanding their functions and pharmacological importance including aspects of drug design as it relates to membranes. Contemporary issues in the field will be covered using primary literature articles, structural manipulations in pymol, and computational binding simulations.Recommended Course Background: AS.030.205, AS.250.307, and AS.250.372
Area: Writing Intensive

AS.250.514. Research in Protein Design and Evolution. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.250.520. Introduction to Biophysics Research. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.250.521. Research in Biophysics. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.;AS.250.520

AS.250.601. Biophysics Seminar.
Graduate students only. Students and invited speakers present current topics in the field.

AS.250.602. Biophysics Seminar.
Graduate students only. Students and invited speakers present current topics in the field.

AS.250.610. Savvy Science Seminars.
Oral presentations are one of the main forms by which scientists communicate their results. Whether in the context of the classroom, the relatively informal lab meeting or as an invited speaker at an international colloquium, the ability to effectively present scientific results is an important skill to master. This course will cover the planning and execution steps necessary to produce an engaging oral presentation. Students will learn to articulate the big biological questions, tell a story that stimulates interest in their chosen subject, and effectively convey their experimental findings. Key methodological steps in planning will guide students on how to create slides with compelling visuals, and how to use technology to their advantage. Students will each prepare, present, and receive feedback on a 15-minute talk on their thesis project in the style of the Biophysical Society short talks. In addition, each student will receive and evaluate a video of their presentation so they can see themselves through the eyes of others.

AS.250.615. Biophysics Writing Workshop.
A series of writing workshops designed to help Biophysics Graduate Students develop a proposal of thesis work. Each student will write a specific aims page and a full (6 page) proposal.

AS.250.620. Optical Spectroscopy.
Basics of absorbance, CD, and fluorescence spectroscopy; calorimetric methods.

AS.250.621. X-ray Diffraction.
Basics of X-ray diffraction methods

AS.250.622. Statistics and Data Analysis.
Basics of statistics and data analysis

AS.250.623. Macromolecular Simulation.
Basics of molecular dynamics

AS.250.624. NMR Spectroscopy.
Basics of NMR spectroscopy

AS.250.625. Single Molecule Measurements.
Basic Principles of Single Molecule Measurements
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.648. Physics of Cell Biology: From Mechanics to Information.
Cells are actively-driven soft materials but also efficient sensors and information processors. This course will cover the physics of those cellular functions, from the mechanics of DNA to the sensing of chemical signals. Questions answered include: How does polymer physics limit how quickly chromosomes move? Why do cells use long, thin flagella to swim? What limits the accuracy of a cell's chemotaxis?Some experience with partial differential equations required. No biology knowledge beyond the high school level necessary. Some problem sets will require minimal programming.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.250.649. Introduction to Computing in Biology.
In this four week, intensive introductory course, students will gain a practical working knowledge of UNIX and Python programming languages and packages for analyzing data from biochemical and biophysical experiments. Brief daily lectures are followed by extensive hands-on experience in the computer laboratory.

AS.250.685. Proteins & Nucleic Acids.
The structure of proteins, DNA and RNA, and their functions in living systems. Students are required to participate in class discussions based on readings from the primary scientific literature. Co-requisite: AS 250.649 Introduction to Computing in Biology. Instructor permission for undergraduates.
Prerequisite: AS.250.649,may be taken concurrently.

AS.250.689. Physical Chemistry of Biological Macromolecules.
Introduction to the principles of thermodynamics and kinetics as applied to the study of the relationship between structure, energy dynamics, and biological function of proteins and nucleic acids. Topics include of classical, chemical, and statistical thermodynamics, kinetics, theory of ligand binding, and conformational equilibria.

AS.250.801. Dissertation Research.

AS.250.802. Dissertation Research.

AS.250.803. Summer Dissertation Research.
Graduate Independent Academic Work

AS.270 (Earth & Planetary Sciences)

AS.270.103. Introduction to Global Environmental Change. 3 Credits.
A broad survey of the Earth as a planet, with emphasis on the processes that control global changes. Topics include: the structure, formation, and evolution of the Earth, the atmosphere, oceans, continents, and biosphere. Special attention is given to present-day issues, such as global climate change, natural hazards, air pollution, resource depletion, human population growth, habitat destruction, and loss of biodiversity. Open to all undergraduates.

AS.270.111. The Story of Earth. 1 Credit.
The four and a half billion year story of Earth's global changes focusing on the co-evolution of Earth and Life.

AS.270.114. Guided Tour: The Planets. 3 Credits.
An introduction to planetary science and planetary exploration primarily for non-science majors. A survey of concepts from astronomy, chemistry, geology, and physics applied to the study of the solar system.

AS.270.129. The Grandeur of You & The Universe. 3 Credits.
A common question that the scientific community is confronted with is “Why do I care?” or “How does this relate to and affect me?”. We will address these questions by inquiring and exploring where each one of us fit in the grand scheme of the cosmos and its exploration, centered around themes and concepts fundamental in Earth, planetary, and space sciences (EPSS). Using various creative mediums, you will learn to understand and narrate how you, all parts of your identity relate to the story of the universe. This class will allow you to master the fundamentals in EPSS, appreciate and relate to scientific discoveries, understand how to be responsible future scientists and citizens cognizant of broad scientific impacts, and develop and enhance various skills to be able to understand and communicate science.
Area: Writing Intensive

AS.270.202. Introduction to Ecology. 3 Credits.
Ecology is the study of organisms and their environment. This course focuses on the patterns of distribution and abundance of organisms. Topics include population dynamics and regulation, competition, predation, host-parasite interactions, patterns of species diversity, community succession, the flow of energy and matter through ecosystems. We will also discuss the role of natural and human disturbances in shaping communities.
AS.270.103 OR AS.020.151

AS.270.205. Introduction to Geographic Information Systems and Geospatial Analysis. 3 Credits.
The course provides a broad introduction to the principles and practice of Geographic Information Systems (GIS) and related tools of Geospatial Analysis. Topics will include history of GIS, GIS data structures, data acquisition and merging, database management, spatial analysis, and GIS applications. In addition, students will get hands-on experience working with GIS software.

AS.270.220. The Dynamic Earth: An Introduction to Geology. 3 Credits.
Basic concepts in geology, including plate tectonics; Earth's internal structure; geologic time; minerals; formation of igneous, sedimentary, and metamorphic rocks; development of faults, folds and earthquakes; geomagnetism. Corequisite (for EPS Majors): AS.270.221; optional for others. The course is introductory and open to undergraduates at all levels; freshmen are encouraged to enroll.

AS.270.221. The Dynamic Earth Laboratory. 2 Credits.
This course is a hands-on learning experience for introductory geological concepts and techniques using geological tools, such as mineral/rock samples, microscopes, and maps. Field trips are its essential part. The course is open to undergraduates at all levels; freshmen who wish to get their hands (and boots) dirty are encouraged to enroll.
AS.270.220, credit earned or concurrent enrollment

AS.270.222. Mineralogy. 4 Credits.
Introduction to the classification, crystallography, and physical properties of minerals. Weekly lab topics include field identification, crystal morphology and symmetry, optical microscopy and Raman spectroscopy. One field trip to the Smithsonian National Museum of History and Research Archives is planned.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.224. Oceans & Atmospheres. 3 Credits.
A broad survey of the Earth's oceans and atmospheres, and their role in the environment and climate. Topics covered include waves, tides, ocean and atmosphere circulation, weather systems, tornadoes and hurricanes, El Niño, and climate change. For science and engineering majors

AS.270.302. Aqueous Geochemistry. 3 Credits.
Modeling the chemistry of water-rock interactions from weathering and riverine development at Earth's surface to hot springs at depth, fluids in subduction zones in Earth's interior, and the ancient fluids preserved in fluid inclusions. Thermodynamic basis for the calculation of equilibria and irreversible chemical mass transfer involving minerals and aqueous species at low and high temperatures and pressures. The course culminates with practical examples of research interest to individual participants.
(AS.030.101 AND AS.030.102) AND (AS.270.220 AND AS.270.221) or equivalents.

AS.270.303. Earth History. 3 Credits.
This course will explore the evolution of life in the context of environmental, ecological, and geological changes to the Earth surface system. The goal of the class is to provide students with an understanding of how geological and paleontological records provide insight into the origin(s) of life, oxygenation of the atmosphere, the evolution of multicellularity, evolutionary radiations and extinctions, and modern global change.
AS.270.103 OR AS.270.220 OR AS.270.224; or permission of the instructor.

AS.270.305. Energy Resources in the Modern World. 3 Credits.
This in-depth survey will inform students on the non-renewable and renewable energy resources of the world and the future prospects. Topics include petroleum, natural gas, coal, nuclear, hydroelectric, geothermal, solar, wind, biomass, and ocean energy. Global production, distribution, usage, and impacts of these resources will be discussed.

AS.270.306. Urban Ecology. 3 Credits.
Urban ecology has been called the ecology in, of, and for cities. In this course, we will explore how ecological concepts are applied to urban ecosystems and the different approaches to urban ecological research. Topics will include: Biodiversity, water dynamics, energy and heat island effects, and nutrient cycling, urban metabolism, design of greenspace, and sustainability of cities. We will use Baltimore as a case study for studying cities.
AS.270.308 OR EN.570.205 OR EN.570.403

AS.270.307. Geoscience Modeling. 4 Credits.
An introduction to modern ways to interpret observations in the context of a conceptual model. Topics include model building, hypothesis testing, and inverse methods. Practical examples from geophysics, engineering, and medical physics will be featured.

AS.270.310. Evolution and Development of the Vertebrates. 3 Credits.
Modern vertebrates (animals with backbones) are the products of a more than 500-million-year evolutionary history. This course surveys that history and uses it to explore such core evolutionary concepts as adaptive radiation, convergence, extinction, homology, phylogenetic taxonomy, and tree thinking. Emphasis will be placed on the origins of the modern vertebrate fauna and how fossils are being integrated with developmental biology to better understand major transitions in the vertebrate body plan.

AS.270.312. Mammalian Evolution. 3 Credits.
An introduction to the evolutionary history and diversity of mammals, with emphasis on the first half of the Cenozoic - the beginning of the Age of Mammals. The course will focus primarily on the adaptive radiation of mammals (including our own order primates) that followed the extinction of the dinosaurs, exploring the origins and relationships of the major groups of mammals as well as the anatomical and ecological reasons for their success. Lectures will be supplemented with relevant fossils and recent specimens.

AS.270.316. Agroecology: A Global Perspective. 3 Credits.
How can we balance the increasing global food demand with sustainable ecological practices?How are the agricultural, ecological, and socio-economic aspects of food productionintertwined? This course addresses these questions and enables students to critically evaluateexisting agroecosystems around the world, with special attention paid to the challenges of globalenvironmental change. Students will be introduced to the principles of agroecology, and theywill examine interactions between biodiversity, soil, and people through case studies, peerreviewed scientific papers, and a field trip to a local agroecosystem

AS.270.317. Conservation Biology. 3 Credits.
In this course, students examine the meaning and implications of biodiversity with a focus on disciplines associated with conservation biology, wildlife conservation and wildlife management, including taxonomy, genetics, small population biology, chemical and restoration ecology, and marine biology. This includes exploring how conservation biology differs from other natural sciences in theory and in application. Students learn the major threats to biodiversity and what natural and social science methods and alternatives are used to mitigate, stop, or reverse these threats. The course also includes the economic and cultural tradeoffs associated with each conservation measure at the global, national, regional, and local levels. One required field trip.

AS.270.318. Remote Sensing of the Environment. 3 Credits.
This course is an introduction to the use of remote sensing technology to study Earth's physical and biochemical processes. Topics covered include remote sensing of the atmosphere, land and oceans, as well as remote sensing as a tool for policy makers.Also offered as 270.618

AS.270.319. Geochronology. 3 Credits.
Introduction to radioisotope geo/thermochronology and mantle stable and radioisotope geochemistry. Course covers: (1) methods for dating of rocks and geologic processes using long-half-life radioisotope systems, including the various isotope systems available and their applicability; (2) radioisotope techniques for investigation of the geochemical evolution of the crust and mantle; (3) isotope fractionation and utility of traditional and novel stable isotope geochemistry for interrogating high-temperature processes, and (4) thermochronology and methods for interrogating upper-crustal processes. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.323. Ocean Biogeochemical Cycles. 3 Credits.
This course will examine the cycling of trace chemicals in the ocean, consider what we can learn from the distributions of these chemicals about the ocean circulation, and ocean ecosystems. Topics covered will include oceanic biological productivity, open water cycling of nutrients and oxygen, ocean acidification and sediment cycling.

AS.270.325. Introductory Oceanography. 3 Credits.
This class is an introduction to a wide range of physical, chemical, and biological phenomena in the world's oceans. Underlying basic principles are exposed wherever possible. Topics covered include: seawater, waves, tides, ocean circulation, chemical oceanography, biogeochemical ocean processes, and remote sensing of the oceans. Recommended Course Background: freshman Physics, Chemistry, Calculus through ordinary differential equations.

AS.270.326. Cosmochemistry. 4 Credits.
Students in this course will gain an understanding of the origin of various forms of matter in our Solar System and beyond, along with its evolution through geologic processes. Beginning with the concepts of nucleosynthesis and stellar evolution, this course will then cover the condensation of matter, meteoritics, and petrogenetic evolution of differentiated, rocky bodies (i.e. asteroids, the Moon, Mars). Evolution of matter in extra-Solar planetary systems (i.e. exoplanets) will also be broached. In lab we will examine thin sections of meteorites, lunar material, and terrestrial analogs - a field trip to the Smithsonian Meteorite Collection is planned. Graduate and advanced undergraduate-level students are encouraged, as are interdisciplinary students with an interest in planetary science.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.331. Isotope Geochemistry. 4 Credits.
Introduction to stable isotope and radioisotope geochemistry. Isotope measurements are used to probe fundamental questions in the Earth and environmental sciences because they can be used to extract information about the timing of and/or chemical, physical, and biological processes associated with the formation of geomaterials. The first half of the course focuses on light isotope systems (O, C, S, etc.) and low-temperature applications, including: (1) tracing sources and sinks of fluids, sediments, biological materials, and contaminants, (2) studying rates and mechanisms of biochemical reactions, and (3) paleoenvironmental reconstructions. The second half of the course focuses on heavier isotope systems and high-temperature applications, including: (1) methods for dating of rocks and geologic processes using long-half-life radioisotopes, including the various isotope systems available and their applicability, and (2) isotope fractionation at high temperatures and the utility of radioisotope and novel stable isotope geochemistry for interrogating processes influencing the crust and mantle. Biweekly lab classes (scheduled in first week) will allow students to become familiar with principles of isotope measurements and interpretations. Mid-term and final exams. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.
AS.270.220 AND AS.270.221

AS.270.332. Soil Ecology. 3 Credits.
The course introduces basic aspects of cycles and flows in the soil ecosystem, and provides students with an overview of the higher groups of soil organisms. Laboratory and field surveying methods are also covered.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.333. Mineral Physics Recitation. 2 Credits.
This course is designed for undergraduate students interested in pursuing geophysics research in the topics of solid state physics or inorganic chemistry. It will consist of a weekly seminar paired with a separate paper reading+discussion group, covering a range of topics on the frontiers of mineral physics. Themes rotate each semester, and Fall 2018 will be paired with the Mineralogy Lecture Series on Modeling and Experimental challenges in Cosmochemistry. Recommended Course Background: Relevant coursework such as Mineralogy or equivalent in other department, and instructor permission.

AS.270.336. Freshwater Systems. 3 Credits.
A study of streams, lakes, and groundwater with a focus on aspects of water quality, hydrology, geomorphology, and aquatic ecology that are relevant to human impacts on freshwater systems. US environmental policies and water resource management agencies will also be examined in the context of issues such as dams, cattle grazing, climate change, and water allocation.
AS.270.103 OR AS.271.107 or permission of the instructor.

AS.270.337. Freshwater Systems Lab. 1 Credit.
A hands-on investigation of the water quality, hydrology, geomorphology, and aquatic ecology of streams and other freshwater bodies. Includes field trips to water-related facilities such as drinking water and wastewater treatment plants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.338. Field Methods in Ecology. 3 Credits.
This course will introduce student to methods used in field-based ecological research addressing population, community and ecosystem-level questions. Outdoor fieldwork is an essential part of the course. Field activities will center around the riparian ecosystem adjacent to the Homewood campus and on the urban ecology of the greater Baltimore region. Students will build skills in data collection, analysis, synthesis, and presentation. Basic statistical instruction in R will be taught to aid data analysis.
AS.270.202;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

AS.270.339. Topics in Mineralogy. 3 Credits.
This semester, join HEMI's Designer in residence, and MICA professor Jenna Frye, in a modified version of her popular experimental fabrication course, EPIC FAIL. Discover how thinking with your hands, embracing risk and failure and playful exploration with educational toys, can invigorate your research in mineralogy and deepen your understanding of crystallography visualization. This course is designed as a hands-on, deeply collaborative workshop, where we will investigate the role of creative fabrication technology and invention as it relates to communicating scientific research to outside audiences. Together we will make, tinker and fail our way to improved visualization and presentation strategies so that others may more fully access the complexities in our work.Topics in Mineralogy is a special topics course that rotates in subject and may be taken multiple times for credit. This course is designed for those interested in mineralogy, and we recommend concurrent enrollment in Planetary Interiors, Space Weathering, and/or Advanced Mineralogy seminar.

AS.270.345. Metamorphic Petrology. 3 Credits.
Introduction to metamorphic geology and the concepts on which it is built. Ideas and techniques that underpin metamorphic petrology are introduced. Focus is on utility of metamorphic geology in understanding petrogenesis crustal processes and plate tectonics. Local field trip(s) to explore the metamorphic geology of the Baltimore region. Recommended course background: AS.270.220 and AS.270.221, or instructor permission
AS.270.220 AND AS.270.221

AS.270.346. Structural Geology Seminar. 1 Credit.
Seminar class on fundamentals of structural geology. Involves weekly readings/practical exercises on: (1) rock mechanics and deformation processes; (2) commonly-encountered deformation products/structures; (3) deformation style and associated fabrics/textures/structure; (4) metamorphism and deformation; (5) techniques for describing and measuring structures; (6) interpretation of structural data on maps and cross-sections; (7) approaches for inferring large-scale structure from limited data, and (8) methods for visualizing and analyzing structure. Recommended course background: AS.270.220, or instructor permission.
AS.270.220

AS.270.347. Foundations of Ecology. 3 Credits.
In this seminar students will read seminal pieces in ecology. Assigned readings will span early 1900s to present. Students will pair a foundational paper with a more current paper on a similar topic to explore the evolution of ecological concepts and approaches over time. This course is aimed at upper level undergraduates and graduate students.
AS.270.202

AS.270.350. Sedimentary Geology. 4 Credits.
Sedimentary rocks are the historical records of the Earth, documenting climate change, mass extinctions, and the evolution of life. This course will provide an introduction to sedimentary processes and sedimentary rocks. Focus is placed on linking physical observations to the ancient environments in which sedimentary rocks once formed. Fundamental tools for interpreting the sedimentary rock record, such as depositional models, geochronology, and chemostratigraphy will be reviewed. Two 1-day weekend field trips will occur over the course of the semester. There will also be weekly 1-hour labs. Lab and field trip times will be determined in the first week of class. Graduate and advanced undergraduate level. Recommended Course Background: AS.270.220 or instructor permission.

AS.270.354. Stable Isotope Geochemistry. 3 Credits.
Stable isotope measurements are used to probe fundamental questions in the Earth and environmental sciences because they can be used to extract information about chemical, physical, and biological processes associated with the formation of geomaterials. Stable isotope patterns have been used for applications ranging from tracking the rise of oxygen on the early Earth to studying human diet. The majority of the course will focus on light isotope systems (O, C, S, etc.) and low-temperature applications, including: (1) tracing sources and sinks of fluids, sediments, biological materials, and contaminants, (2) studying rates and mechanisms of biochemical reactions, and (3) paleoenvironmental reconstructions. We will also review novel stable isotope applications including heavy isotope systems and mass independent fractionations. At the end of the course, students will be able to make interpretations about how stable isotope patterns inform our knowledge of how geomaterials are formed and provide information about the Earth system.
AS.270.220 OR AS.270.224

AS.270.361. Geodynamics Seminar. 1 Credit.
Seminar class on the dynamics of subduction and accretionary orogenesis. Weekly readings discussed in class. Focus will be broad and process-based. Topics in subduction may include: (1) modes of global subduction through Earth history; (2) models of forced/triggered v. spontaneous subduction initiation; (3) arc development and implications for growth of continents; (4) subduction zone rollback and arc migration, and (5) subducted slab breakoff and tearing. Topics in accretionary orogenesis may include: (1) stress state of the overriding plate; (2) tectonic mode switches (shortening to extension and vice versa), and (3) length and time scales of the thermal manifestations of accretionary orogenesis.
AS.270.220 AND AS.270.221 or instructor permission.

AS.270.362. Lunar Exploration and Analog Geology. 3 Credits.
This course involves readings, discussion, and lectures about astronaut-enabled geological exploration of the Moon and analogous terrains on Earth. Topics include: volcanism, impact geology (cratering, ejecta, ballistic sedimentation), faulting, field methods (video and voice descriptions, sampling protocol), and field equipment (spacesuits, rovers, landers, cores, etc.), Apollo history and Artemis plans/current events. Assessment will involve participation, ~5 assignments related to the course objectives, and a presentation or short paper (student's discretion) synthesizing a small range of covered topics of interest to the student at the conclusion.

AS.270.378. Present and Future Climate. 3 Credits.
Intended for majors who are interested in the science that underlies the current debate on global warming, the focus is on recent observations one can glean from model simulations. Meets with AS.270.641.
Recommended Course Background: AS.110.108-AS.110.109 and AS.171.101-AS.171.102
Student may not receive credit for both AS.270.378 and AS.270.641.

AS.270.379. Atmospheric Science. 3 Credits.
A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

AS.270.380. Seminar in Regional Field Geology. 3 Credits.
Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.381. Seminar in Field Geology. 3 Credits.
Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential.Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).
(AS.270.220 AND AS.270.221) OR AS.270.350 OR AS.270.303

AS.270.396. Special Topics in Planetary Exploration. 3 Credits.
Geology in the Outer Solar System: This course will focus on the solid bodies of the outer solar system, addressing their formation, surfaces, interiors, evolution, and how we study them via remote sensing and spacecraft investigation. We will use data from the various missions that have investigated the outer system and cover aspects of instrumentation and remote sensing of outer system bodies from the Voyager missions, Galileo, Cassini, and New Horizons. The course includes lecture, discussion, and hands-on lab work. Recommended pre-requisites: Dynamic Earth and/or Introductory planetary science and/or remote sensing, or instructor approval.

AS.270.400. The Carbon Cycle: Past, Present and Future. 3 Credits.
This course will explore how the carbon cycle shapes environmental conditions and influences other biogeochemical cycles through an investigation of the modern carbon cycle, major carbon cycle perturabtions in the geological record, and projections of future global change. The majority of the class will be structured as a reading seminar, but students will also develop an understanding of how to use quantitative models to evaluate patterns of change associated with both modern and ancient carbon cycle perturbations with implications for predicting future environmental changes.Recommended Prerequisites: AS.270.103 or AS.270.220 or AS.270.224

AS.270.404. Planetary Interiors. 3 Credits.
This course investigates the physical processes occurring in planetary interiors. Topics include formation and differentiation of planetary bodies, planetary structure, thermal evolution, convection, and dynamo generation of magnetic fields. Standard remote sensing methods used to investigate planetary interiors and results from recent planetary satellite missions will also be discussed.Recommended: Knowledge of vector calculus, PDEs and introductory physics.

AS.270.406. Space Weathering. 1 Credit.
This course will introduce and explore multiple topics of Space Weathering - the interaction of solar system bodies with the space environment. Through a combination of lecture, reading, research, and discussion the course will explore physical and chemical processes of solar and cosmic radiation and particles, micrometeorites, etc., on the surfaces of planets. We will also explore interaction of the space environment with planetary magnetic fields and atmospheres, and with non-planetary materials (such as spacecraft, and astronauts).
AS.270.222

AS.270.408. Petrology Seminar. 1 Credit.
Seminar class on recent developments in igneous and metamorphic petrology. Involves weekly readings on modern methods/understanding in petrogenesis and processes leading to mineral (re)crystallization; rock deformation; fluid transport in rocks; pressure and temperature estimates of rock formation, and rates/durations of thermotectonic processes in the lithosphere. Topics covered will cater to interests and learning goals of those who register in the class.
AS.270.220

AS.270.410. Planetary Surface Processes. 3 Credits.
This course explores processes that influence the evolution of planetary surfaces, including impact cratering, tectonics, volcanism, weathering, and sediment transport. These processes manifest themselves as structural deformation of planetary crusts due to loading by volcanoes, formation of craters by asteroid impacts, modification of surfaces by flowing landslides, rivers and glaciers, and the accumulation and transport of sand in dune fields on various planets. Emphasis is on the relationship to similar Earth processes, and the integrated geologic histories of the terrestrial planets, satellites, and asteroids. The focus will be on developing a physical understanding of these processes to interpret the surface characteristics and evolution of planets, satellites, asteroids, and comets from both qualitative assessments and quantitative measurements obtained from spacecraft data. A key component of the class will be the interpretation of these observations from recent and current planetary missions to the Moon, Mars, and other terrestrial bodies.Recommended Course Background: A sound knowledge of Calculus and Introductory Physics, and some prior knowledge of Earth and/or Planetary Science.

AS.270.412. Spring seminar: Geological Field Studies in California. 2 Credits.
Field experience is an integral part of a geology student's education. During this course, students will learn to digitize, synthesize, and interpret the observations they made during the January field-based class to interpret the geologic history and structure of southern California.
Study USA: Geological Field Studies in California is a co-requisite for this course.For Spring 2020, the focus of the field work and course will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), Earth History (AS.270.303), Planets, Life and the Universe (AS.020.334), and Isotope Geochemistry (AS.270.331). Sedimentary rocks are spectacularly exposed in this region and record over a billion years of key events in Earth history. Students will learn how these rocks have shaped our understanding of major evolutionary and environmental shifts in Earth's past, while also learning how to map these units' regional geographic distribution. Finally, students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and E&PS graduate students.

AS.270.423. Planetary Atmospheres. 3 Credits.
Fundamental concepts and basic principles of chemistry and physics applied to the study of planetary atmospheres. Vertical structure of planetary atmospheres. Atmospheric radiation, thermodynamics, and transport. Principles of photochemistry. Planetary spectroscopy and remote sensing. Upper atmospheres and ionospheres. Evolution and stability of planetary atmospheres. Recommended Course Background: basic physics, chemistry and calculus

AS.270.425. Earth and Planetary Fluids. 3 Credits.
An introductory course on the properties, flow, and transport characteristics of fluids throughout the Earth and planets. Topics covered include: constitutive relationships, fluid rheology, hydrostatics, dimensional analysis, low Reynolds number flow, porous media, waves, stratified and rotating fluids, plus heat, mass, and tracer transport. Illustrative examples and problems are drawn from the atmosphere, ocean, crust, mantle, and core of the Earth and other Planets. Open to graduate and advanced undergraduate students. Recommended Course Background: Basic Physics, Calculus, and familiarity with ordinary differential equations.

AS.270.426. Mineral Physics. 3 Credits.
Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. Investigations of the thermodynamic and transport properties of minerals at the atomic scale are used to interpret observational data from seismology, geodynamics, geochemistry, and planetary science, an important step toward solving many geologic and geophysical problems. Students in this course will also be introduced to the high pressure and high temperature experiments that measure the physical and mechanical properties of minerals, which is crucial to understanding planetary interiors. Recommended prerequisites: introductory chemistry, physics, mineralogy, or structure of materials.

AS.270.501. Independent Study. 1 - 3 Credits.
Exploration of topic(s) in earth, planetary, and/or environmental science under the direction of an instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.504. Independent Research. 1 - 3 Credits.
Research in earth, planetary, and/or environmental science conducted under the direction of a faculty advisor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.510. Senior Thesis. 1 - 3 Credits.
Senior thesis research in earth sciences conducted under the direction of a faculty advisor.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.270.603. Geochemistry Seminar.
A variety of topics of current interest involving mineral-fluid interactions will be reviewed.

AS.270.605. EPS Colloquium.
A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.606. EPS Colloquium.
A weekly seminar series in which graduate students present their latest research results and attend Departmental seminars. This course is required for all graduate students in the Department of Earth and Planetary Sciences.

AS.270.612. Tropical Meteorology.
The tropics are a region where climate variability has large impacts yet many aspects of the structure are poorly understood. This course will cover the dynamics of tropical circulation and variability. Topics covered will include equatorial planetary waves, Matsuno-Gill models of tropical circulation, tropical air-sea interaction, the Madden-Julian Oscillation, tropical cyclones, dynamics of the El Nino-Southern Oscillation and monsoonal circulation and flow.

AS.270.614. Atmosphere and Oceanic Vortices.
Vortices are observed in the Earth's atmosphere and oceans and in the atmospheres of other planets. Examples are polar vortices in Earth, Mars and Titan's atmospheres, Spots on Jupiter, Saturn, and Neptune, Gulf Stream rings, and eddies throughout the oceans. These vortices are often the most dominant feature of the regional circulation, and understanding their structure and evolution dynamics is necessary to understand the dynamics and transport of atmospheres and oceans. In this course we focus on the structure and dynamics of long-lived vortices, i.e., vortices that exist for longer than typical wave periods. The first section of the course will consist of lectures examining the fundamental dynamics of vortices in rapidly rotating, stratified fluids, while the second section will be seminars discussing more detailed aspects of specific vortices occurring in nature. It is suggested that you have taken 270.425 Earth and Planetary Fluids or another similar introductory fluids class.

AS.270.615. Inversion Modeling & Data Assimilation.
This graduate class will introduce modern inverse modeling and data assimilation techniques. These powerful methods are used in atmospheric science, oceanography, and geophysics and are growing more widespread. Topics will include: singular value decomposition, Green's function inversions, Kalman filtering, and variational data assimilation. The class will include lectures on concepts and theory, and practical experience in the computer laboratory.Permission of Instructor Required

AS.270.618. Remote Sensing of the Environment.
Also offered as 270.318

AS.270.626. Ocean General Circulation.
The aim of this course is to achieve conceptual understanding of the large scale low frequency ocean general circulation. The role of the ocean circulation in earth's climate is emphasized throughout.

AS.270.628. Seminar in regional field geology.
Weekend field trip to explore regional geology. Students are required to prepare short presentations on field trip topics in advance of weekend trip. Attendance at two organizational meetings (to be scheduled) is required. Open to E&PS graduate students and upper level E&PS undergraduate majors and minors. Trip date is 11/9/2019. Consult instructors for details.

AS.270.630. Physics and Chemistry of Aerosols.
This course will cover fundamentals of aerosol physics and chemistry. Topics covered will include aerodynamics and diffusion of aerosol particles, condensation and evaporation, particle size distributions, optics of small particles, characterization of particle composition, and the diversity of aerosols found in planetary atmospheres.Recommended Course Background: Basic Physics and Chemistry. Calculus.

AS.270.633. Seminar on the IPCC Sixth Assessment.
This course will discuss the contents of the Working Group I contribution to the sixth assessment report (AR6) of the Intergovernmental Panel on Climate Change (IPCC).

AS.270.641. Present and Future Climate.
Meets with AS.270.378.
Student may not receive credit for both AS.270.378 and AS.270.641.

AS.270.653. Earth and Planetary Fluids II.
A sequel to AS.270.425 concentrating on planetary-scale atmospheric and oceanic circulation. Physical understanding of the underlying fluid dynamics will be emphasized.

AS.270.656. Geochemical modeling of water-rock interactions in the deep Earth.
Thermodynamic basis for the modeling of irreversible chemical mass transfer involving minerals and aqueous species at elevated temperatures and pressures. Reading will start with classic papers by Helgeson and co-workers and proceed to applications in the literature involving hydrothermal ore deposits, subduction zones, and diamond formation in the upper mantle. The course focusses on developing specific projects of research interest to individual participants.Recommended Course Background: AS.030.101 and AS.030.102 or equivalent, AND AS.270.220 AND AS.270.221 or equivalent, AND AS.270.302 or equivalent.

AS.270.662. Seminar in Planetary Science.

AS.270.667. Seminar in Soil Ecology.

AS.270.668. Geobiology Seminar.
Geobiology is the study of interactions between life and rocks. In this class we will explore how organisms impact sedimentary records both directly, by leaving behind biosignatures, or indirectly, by affecting their surroundings in a way that promotes formation of certain types of minerals. This will serve as a guide for interpreting geological records during the early evolution of life on Earth, the rise of animals, and major mass extinctions.

AS.270.675. Communication for Scientists.
Communication for Scientists" and the description is "This course will cover the various ways in which scientists are expected to communicate throughout the life of a project. Topics will include writing proposals, preparing impactful figures, writing press releases, interacting with the press (press conferences, radio/TV, interviews, etc.), writing for and speaking to the public, social media, and interacting with policy makers."

AS.270.679. Atmospheric Science.
A survey of core topics in atmospheric science, including dynamics, thermodynamics, radiative transfer, and chemistry. The course addresses both basic principles and applications to weather and climate. Recommended pre-requisites: General Calculus and Physics I and/or Oceans and Atmospheres.

AS.270.680. Seminar in Regional Field Geology.
Introduction to the regional geology and geological history of the Appalachian system (from Alabama to Newfoundland). Key papers on regional bedrock geology and Mesoproterozoic through Phanerozoic tectonics are reviewed in weekly seminar classes. Two three-day field trips are made on weekends negotiated at the beginning of the semester. Fieldwork will be designed with student input to test ideas and models from the literature. Techniques in sedimentary, metamorphic, igneous and structural field geology are introduced and developed in the field. Recommended course background: AS.270.220 and AS.270.221, or instructor permission.

AS.270.681. Seminar in Field Geology.
Field experience is an integral part of a geology student's education. During this course, students will spend over a week outdoors, learning to make observations that can be used to interpret the geologic history and structure of natural environments. This course is a spring break field course that will focus on different topics each year. For Spring 2019, the focus of the trip will be on applying concepts and techniques covered in Dynamic Earth (AS.270.220/1), Sedimentary Geology (AS.270.350), and Earth History (AS.270.303). Students will also learn about the different tectonic events that have shaped the landscape that we see today in the western United States. The class is designed for upper level E&PS majors and first or second year E&PS graduate students. For logistical reasons, this class is capped at 10 students. Preference will be given to E&PS majors. Students will be camping during the field course and should be prepared to be hiking outside all day. In the case that obtaining personal field supplies (e.g., hiking boots, sleeping bags) is not possible through Homewood student affairs gear rentals and/or is a financial hardship, please contact the instructor. Any communication about this will be kept confidential.Mandatory class field trip: 9-day field trip to Esmeralda County, NV over spring break (3/16/18-3/24/18).

AS.270.683. Topics in Mineral Physics.
Mineral Physics is the study of mineralogical problems through the application of condensed matter physics and solid-state chemistry. In this course, students will learn about the foundational and developing research capabilities in Mineral Physics, with an emphasis this year on shock compression and experiments at High Energy Density. Topics will include experimental investigation of equation of states, phase transitions, changes in optical and transport properties and other strain-rate dependent phenomena. Topics in Mineral Physics is a special topics course that rotates in subject and may be taken multiple times for credit . (EN.510.311 OR EN.510.601) OR AS.270.222 or instructor permission.

AS.270.684. Mathematical Methods in Earth and Planetary Sciences.
A range of standard mathematical methods used in earth and planetary science applications will be studied. A core set of topics will include back-of-the-envelope estimates, differential equations, linear algebra, special functions, and transforms. In addition, students will tailor the course to their needs by choosing from a range of extended topics to explore further. Potential topics include perturbation theory, tensors, probability theory and complex analysis. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of single and multivariable calculus and linear algebra.

AS.270.685. Seminar in Virtual Field Experiences: Accessibility, Exploration, and Development.
The Earth Sciences traditionally rely heavily on outdoor field education – the purposeful use of an outdoor environment to achieve educational objectives – in higher education. Observations made at the surface of the Earth are fundamental to understanding the processes that have shaped it, and outdoor field education is often considered an essential way to connect classroom theory with actual data and observations. However, despite the demonstrated benefits of outdoor field education, there are persistent, deep-rooted problems with it in higher education, two of which include accessibility issues and financial barriers. There is overwhelming and demonstrated need to make outdoor field education and research more accepting of all who want to participate. This course aims to explore some of these accessibility issues by: 1) reading and discussing peer-reviewed literature on this topic, 2) participating in and learning about already established virtual field trips and tools, and 3) developing our own virtual educational tools and experiences.

AS.270.686. Cordilleran Controversies.
The origins of the American Cordillera – the mountain ranges forming the backbone of North America, Central America, and South America – remain contentious. It is one of the few global orogens in which there was an active margin whose formation mechanisms remain unresolved. This seminar class will begin by reading seminal papers on the application of “new global tectonics” to the Cordillera shortly following the plate tectonic revolution in the late 1960s. Progressing forward in time, the class will continue to read and discuss papers that develop the classic, broadly accepted model that western North America was gradually assembled from the late Paleozoic into the Miocene through east-dipping subduction. The class will then turn to a drastically different model that was first published in a divisive paper in 2009 that turned the classic tectonic interpretation of the Cordillera on its head by proposing that much of western North America was a separate ribbon continent. The final part of the course will focus on papers published during the last 10 years that try to reconcile differences between the two models. Throughout the course, we will evaluate the range of observations and datasets – both geological and geophysical – that are used to support aspects of the two competing models.

AS.270.688. Exoplanets and their Atmospheres.
This course covers the basic theory of planetary atmospheres as applied to extrasolar planets. The fundamental physical processes related to the structure, composition, radiative transfer, chemistry and dynamics of planetary atmospheres are covered, with an emphasis on those related to observable exoplanet properties. We also provide an overview of the observational techniques of exoplanetary atmospheres and discuss the habitability of exoplanets.

AS.270.693. Special Topics in Dynamo Theory.
Current research literature in planetary magnetic fields and dynamo theory will be studied. Topics will vary year-to-year. Students will be responsible for leading discussions on relevant papers from the literature. Open to graduate students and senior undergraduate EPS majors with permission of instructor. Recommended preparation includes knowledge of fluid dynamics, electromagnetism and planetary science.

AS.270.695. Graduate Skills in Earth and Planetary Sciences.
This seminar-style course will enable graduate students in Earth and Planetary Sciences to discuss issues and develop skills relevant to working in earth and planetary science fields. Topics will vary each iteration and may include graduate school expectations, research and communication methods, grant and funding procedures, stress management, organization and management methods, critical conversations, work-life balance, career paths, and JEDI issues and resources in the geosciences. Course open to EPS Graduate Students or by Instructor Permission

AS.270.807. Research.

AS.270.808. Research.

AS.271.107. Introduction to Sustainability. 3 Credits.
Humans are having such a massive impact on Earth systems that some call this the Anthropocene epoch. Should we consider this state of affairs progress or catastrophe? How to we find a sustainable path to the future? This course provides an interdisciplinary introduction to the principles and practice of sustainability, exploring such issues as population, pollution, energy and natural resources, biodiversity, food, justice, and climate change through the lens of systems thinking. Course open to freshmen, sophomores, and juniors. Seniors by instructor permission only.

AS.271.302. Exploring Nature. 3 Credits.
This course integrates the analysis and production of environmental media with weekly outdoor excursions. Students will survey a range of authors, adventurers, journalists, scientists, photographers, acoustic ecologists and filmmakers that have explored the natural world and chronicled the history of human-environmental relations and environmental problems. Field trips to regional parks and green spaces will encourage students to discover their own sense of place, foster a deeper level of ecological awareness and construct personal environmental narratives through careful exploration, observation, documentation and reflection.
Area: Writing Intensive

AS.271.304. Sustainable Food Systems. 3 Credits.
Where does your food come from? What impact does food production have on the environment and human societies? How can food systems become more sustainable as the human population increases? This seminar-style course examines the past, present, and future of agriculture, including topics such as the foodways of indigenous people, modern "factory farming" versus organic agriculture, genetically modified foods, and the interplay among science, economics, policy, and agriculture. Involves hands-on experiences.

AS.271.305. Special Topics in Environmental Studies. 3 Credits.
Environmental Policy in the Age of Trump. This course will analyze the effects of the current administration's actions on environmental issues by assessing the policies in question and estimating the potential impacts on climate change, human health, and ecology. Policies that have been overturned or are under review represent a number of environmental issues, including climate change and greenhouse gas emissions, offshore drilling, national monuments, mining pollution, toxic discharge into public waterways, the development of oil pipelines, public land use planning, coal leases, a harmful insecticide, hunting in wildlife refuges, airborne mercury emissions, protection of tributaries and wetlands under the Clean Water Act, energy and fuel-efficiency standards, and resource extraction from federal lands. Students will examine the historical roles environmental organizations and government agencies have played in advocating for, creating and enforcing U.S. environmental policy and will discuss the future roles of these actors and other stakeholders in implementing effective environmental policy

AS.271.311. Climate and Health. 3 Credits.
This course will examine the impact of climate variability and change on human health and disease, including the adverse health effects related to extreme heat, air quality, nutrition, waterborne infections, insect-borne diseases, and exposure to storms and floods. Adaptation and mitigation strategies, including the health "co-benefits", will also be examined
AS.270.103 OR AS.271.107

AS.271.315. Environmental Films and Literature. 1 Credit.
This "book club" style seminar focuses on the exploration, discussion and critical analysis of a range of contemporary environmental films and literature.

AS.271.320. Environmental Photojournalism. 3 Credits.
Environmental cognition, consciousness and communication are produced, reproduced, interpreted and remembered with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will review critical literature focusing on visual representation theory, the relationship between images and social change, the practice of journalism and the history and typology of environmental photography. An understanding of environmental issues is required. Students will engage with the local community, identify and investigate environmental issues facing Baltimore, participate in photographic critiques, and develop a documentary project. This studio/seminar course is designed with an emphasis on independent research and practice.
Area: Writing Intensive

AS.271.345. Society and Nature Conflicts: Interdisciplinary Approaches to Studying Environmental Problems Over Time. 3 Credits.
In this seminar students will read seminal pieces in the field of socio-environmental research. Socio-environmental research recognizes that society and nature inherently interact in such a way that they affect and change one-another - it is not only that society affects the nature or that nature only affects society. Solving environmental problems necessitates understanding this duality and thus an interdisciplinary background. Assigned readings will span early from thinkers on environmental problems (Before 1900) to current approaches to studying and solving environmental problems.It is aimed at upper level undergraduates and graduate students.

AS.271.360. Climate Change: Science & Policy. 3 Credits.
Prereq: 270.103 or permission of instructor.This course will investigate the policy and scientific debate over global warming. It will review the current state of scientific knowledge about climate change, examine the potential impacts and implications of climate change, explore our options for responding to climate change, and discuss the present political debate over global warming.

AS.271.399. Research Design. 1 Credit.
This course supports students in the design of their senior capstone project, including crafting a suitable research question, identifying appropriate methodologies, and writing a formal project proposal.

AS.271.401. Environmental Ethics. 3 Credits.
Environmental Ethics is a philosophical discipline that examines the moral relationship between humans and the natural environment. For individuals and societies, it can help structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Beginning with a comprehensive analysis of their own values, students will explore complex ethical questions, philosophical paradigms and real-life case studies through readings, films and seminar discussions. Traditional ethical theories, including consequentialism, deontology, and virtue ethics will be examined and applied. Environmental moral worldviews, ranging from anthropocentric to ecocentric perspectives, will be critically evaluated. Organized debates will help students strengthen their ability to deconstruct and assess ethical arguments and to communicate viewpoints rooted in ethical principles. Students will apply ethical reasoning skills to an examination of contemporary environmental issues including, among others, biodiversity conservation, environmental justice, climate change, and overpopulation. Students will also develop, defend and apply their own personal environmental ethical framework. A basic understanding of modern environmental history and contemporary environmental issues is required. Prior experience with philosophy and ethics is not required.
Area: Writing Intensive

AS.271.402. Water, Energy, and Food. 3 Credits.
The water, energy and food (WEF) nexus is a topic of growing interest in the research and policy communities. This course will survey WEF concepts and principles, introduce tools of analysis, and engage students in case studies of critical WEF issues in the United States and internationally.

AS.271.403. Environmental Policymaking and Policy Analysis. 3 Credits.
This course provides students with a broad introduction to US environmental policymaking and policy analysis. Included are a historical perspective as well as an analysis of future policymaking strategies. Students examine the political and legal framework, become familiar with precedent-setting statutes such as NEPA, RCRA, and the Clean Air and Clean Water Acts, and study models for environmental policy analysis. Cost benefit studies, the limits of science in policymaking, and the impact of environmental policies on society are important aspects of this course. A comparison of national and international policymaking is designed to provide students with the proper perspective. This course is taught in conjunction with an identical graduate course. All students will be expected to perform at a graduate level.

AS.271.496. Senior Capstone. 3 Credits.
This seminar will provide the academic space, time, and mentoring for students to integrate, synthesize and apply the knowledge and skills obtained through the ENVS curriculum. The course focuses on the development of critical thinking and oral communication skills through intellectual engagement with complex and challenging environmental problems.

AS.271.499. Senior Seminar. 1 Credit.
This seminar explores topics related to career development and current events to support senior environmental majors as they transition to post-graduate life and work.

AS.271.502. Independent Study. 1 - 3 Credits.
Exploration of topic(s) in environmental studies under the direction of an instructor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.506. Independent Research. 1 - 3 Credits.
Research in environmental studies conducted under the direction of a faculty advisor.

AS.271.507. Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.509. Applied Experience. 1 Credit.
This course is designed to accompany a supervised, hands-on experience working on an environmental or sustainability-related internship. In addition to completing 80 hours of applied work, students will prepare a reflective journal, paper, and poster presentation about their experience.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.271.511. Senior Thesis. 1 - 3 Credits.
Senior thesis research project in environmental science or environmental studies conducted under the direction of a faculty advisor.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280 (Public Health Studies)

AS.280.101. Introduction to Public Health. 3 Credits.
This course provides an overview of the field of public health. Topics include the major causes of morbidity and mortality; the socioeconomic, behavioral, and environmental factors that affect health; the analytical methods used in the field; the role of government in protecting the public's health; key features of the U.S. health care system; and current challenges in the field. The course also introduces students to the basic conceptual models and approaches that are central to public health practice. This course is restricted to freshmen. Your enrollment may be withdrawn at the discretion of the instructor if you don't meet one of those criteria.

AS.280.120. Lectures on Public Health and Wellbeing in Baltimore. 1 Credit.
An introduction to Urban Health with Baltimore as a case study: wellbeing, nutrition, education, violence and city-wide geographic variation. Lectures by JH Faculty, local government/service providers and advocates.

AS.280.161. Applications of Biological Concepts in Public Health. 3 Credits.
This course explores the basic biology concepts relevant to public health. Case studies will be used to examine key scientific principles and their application. This course is designed for public health students who are not intending to pursue a career in natural sciences or medicine. This course satisfies the Public Health Studies Biology requirement, but does not satisfy Pre-Med requirement.All freshman must have taken or be currently enrolled in AS.280.101 to register.Department Approval Required.
Area: Writing Intensive
AS.020.151

AS.280.225. Population, Health and Development. 3 Credits.
This course will cover the major world population changes in the past century as well as the contemporary situation and projections for this century. Topics include rapid population growth, the historical and continuing decline of death and birth rates, contraceptive methods as well as family planning and child survival programs, population aging, urbanization, population and the environment and the demographic effects of HIV/AIDS and Covid.

AS.280.240. Research Methods in Public Health. 4 Credits.
This course examines the research process, with an emphasis on formulating research questions, critically evaluating published research, and drawing objective conclusions from a body of scientific literature. Students conduct a systematic review of the scientific literature related to a public health issue. Labs focus on developing and documenting a sound review methodology and communicating the review findings effectively in writing.
Area: Writing Intensive
AS.280.101 AND (AS.280.345 OR AS.200.314 OR EN.553.230 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR EN.553.211 OR AS.200.201) OR (EN.550.111 AND EN.550.112)

AS.280.312. Media, Politics, and Evidence in the History of Public Health. 3 Credits.
This writing intensive course will encourage students to consider what counts as evidence among public health professionals as well as popular audiences. Using case studies from the field of epidemiology, now emblematic of the field, students will learn about historical changes in theories of population health and disease. Through a series of writing assignments, students will interrogate the formal structure of scientific arguments and gain practice in synthesizing and communicating complex ideas to a lay audience. Juniors/Seniors Only
Area: Writing Intensive
AS.280.350

AS.280.320. Seminar on Public Health and Well-being in Baltimore. 3 Credits.
Seminar combines lectures from AS.280.120 with additional readings and discussion to more deeply address urban health issues. The course will revolve around student projects that can impact health and wellbeing in Baltimore. If you are accepted for this course do NOT register for AS.280.120. Course registration is by instructor permission only. You will be asked to provide a brief description of a project in order to determine your potential linkage with this course.This course is utilizing the online active approval process. Permission requests should be submitted via SIS Self-Service upon the opening of your registration period. The instructor will review requests and approve registrations using SIS Self-Service for Faculty. Please note, a request does not guarantee registration into the course. Status inquiries should be address to the instructor or departmental administrator.

AS.280.330. Mind-Body Practices and Public Health. 3 Credits.
This course will focus on mind-body practices and their place in public health. We will learn about different mind-body practices and talk about if/how mind-body practices can help amerliorate the national burden of disease. We will also learn how to identify evidence based practices (EBPs) in public health and learn the core components of designing EBPs. We will then combine what we learned about mind-body practices and designing EBPs to create programs that lessen the burden of disease. The mind-body portion of this course is experiential and will include the practice of meditation, yoga, other mindfulness exercises. You will also be asked to reflect on these practices through journaling.
AS.280.101

AS.280.335. The Environment and Your Health. 3 Credits.
This course surveys the basic concepts underlying environmental health sciences (toxicology, exposure assessment, risk assessment), current public health issues (air, water- and food-borne diseases) and global health threats (climate change, designing healthy communities, and environmental justice).
AS.280.101 OR AS.270.103

AS.280.340. Fundamentals of Health Policy & Management. 3 Credits.
Through lectures and small group discussions, students will develop a framework for analyzing health care policy problems and gain familiarity with current issues including managed care, Medicare and the uninsured.Public Health Studies majors have 1st priority for enrollment. Your enrollment may be withdrawn at the discretion of the PHS program if you are not a PHS major.
AS.280.101

AS.280.345. Public Health Biostatistics. 4 Credits.
Using problem-based learning focusing on public health topics, students learn to describe & summarize data, make inferences regarding population parameters, & test hypotheses. Recommended Course Background: Four years of high school math.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.550.211 OR EN.550.230 OR AS.200.314 OR AS.200.315 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

AS.280.346. Introduction to R Programming for Public Health. 1 Credit.
Formerly known as Advanced Biostatistics Laboratory, a complementary course to 280.345, Public Health Biostatistics, this course teaches R programming skills necessary for conducting independent data analyses, beyond those presented in the main course. No programming experience is necessary, but a willingness to learn independently and work with other students is indispensable.
AS.280.345

AS.280.347. Health Data Analysis Practicum. 3 Credits.
Students will learn to formulate precise scientific and policy questions, design exploratory and confirmatory statistical analyses to address the questions, conduct appropriate analyses using the statistical package R, and communicate their findings through graphical and tabular displays that are presented in writing and in person. The course will be run seminar style in which students conduct data analysis to present to one another in one meeting per week. Evaluation will be through class participation and a final project in which students will analyze their own data set to address a question of their choice. Students need to have taken an introductory statistics course at the level of AS.280.345 (Public Health Biostatistics) and must have some experience using the statistical software R to perform basic analyses.

AS.280.349. Making Work Safer. 3 Credits.
This course explores major health and safety issues that affect workers in the United States, with an emphasis on developing and selecting interventions to prevent occupational injuries. In this course, students will examine the morbidity, mortality, and economic costs associated with work-related injuries; interact with key surveillance systems and other data sources used for tracking such injuries; and apply principles of injury prevention and decision-making through a basic policy analysis process.
AS.280.340

AS.280.350. Fundamentals of Epidemiology. 4 Credits.
A practical introduction to epidemiology focusing on the principles and methods of examining the distribution and determinants of disease morbidity and mortality in human populations. This course is restricted to Public Health Studies only. Any remaining open seats at the start of the semester will open up to all other majors.

AS.280.355. Introduction to Social and Behavioral Determinants of Health. 3 Credits.
Introduces students to a social ecological perspective of population health; Explains key theories and models of health behavior; Describes social and behavioral factors affecting health outcomes; Illustrates the role of factors such as racism, income inequality, social norms, culture, communication and psychological constructs in health outcomes; Demonstrates applications of these theories and models in health behavior research and intervention.
Area: Writing Intensive
AS.280.101

AS.280.360. Clinical & Public Health Behavior Change. 3 Credits.
This course explores the theory and practice of changing the health behaviors of individuals, and the public health and medical impact of doing so. Theoretical concepts are integrated with practical clinical applications, especially in the areas of diet and fitness. Skill building in persuasive, health-related communication will be included in smaller group discussions.

AS.280.365. Public Policy, Politics and Public Health. 3 Credits.
This course is composed of lectures on public policy and political issues that impact the arena of public health. With real-life examples of public health practice in Baltimore and around the country, this course will also expose students to the wide array of opportunities available to those pursuing a career in public health. Throughout the course a major effort will be made to expose students to the wide array of opportunities that are available to those pursuing a career in public health.
AS.280.101

AS.280.380. Global Health Principles and Practices. 3 Credits.
Global health addresses the staggering global disparities in health status, drawing on epidemiology, demography, anthropology, economics, international relations and other disciplines. We review patterns of mortality, morbidity and disability in low and middle income countries, starting with malnutrition, infectious diseases and reproductive health, and continuing to an emerging agenda including mental health, injury prevention, surgical care, chronic diseases, and health impacts of climate change. Gender, health systems and health workforce challenges, and career trajectories in global health are also discussed. Recommended course background: Minimum of one prior course in Public Health.

AS.280.399. Community Based Learning - Practicum Community Health Care. 3 Credits.
This course introduces students to a social structural, justice orientation to public health, with an emphasis on service learning in Baltimore City. Through lectures, class discussions, reflection practices and experiential learning, students will gain an understanding of education, healthcare, housing and other sectors as social determinants of health. The course draws on a social ecological framework and highlights the role of relationships and policies in impacting community resources foundational to health and well-being. Students will choose a community-based organization according to their interests and schedule and, working in teams, complete 45 hours of service-based learning. Grades are based on class participation, completion of a service learning project, group presentation, and papers. Open to Junior Public Health Studies majors and, space permitting, to others upon permission of instructor. This course qualifies as a PHS upper elective; however, it does not satisfy the PHS Applied Experience requirement.

AS.280.438. Reproductive Health in Crisis: Issues in Meeting the Needs of Vulnerable Populations. 3 Credits.
Introduces students to the reproductive health needs of over 65 million people affected by humanitarian, economic, and environmental crises globally. Presents an overview of health care delivery systems in a variety of contexts, and examines the reproductive health consequences of disruptions in service provision during times of crisis. Examines the impact of policies and programs targeting affected groups. Discusses international standards in humanitarian response. Includes discussion of maternal and newborn health, family planning, abortion, and gender based violence. Students develop competency to conduct reproductive health service needs assessments and design an emergency preparedness plan that ensures provision of essential care. For the final project, students apply their skills to plan a response program to meet the reproductive health needs of a specific crisis-affected population. This is a Gordis Teaching Fellowship course.
Area: Writing Intensive

AS.280.439. Ecological Change and Infectious Disease. 3 Credits.
This course will introduce students to key concepts in infectious disease ecology and epidemiology. Students will also learn how key ecological changes are influencing infectious disease dynamics. Ecological changes explored in the course include climate change, water management, deforestation, agriculture, and urbanization. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.335;AS.280.350 can be taken concurrently

AS.280.440. Introduction to Harm Reduction: Principles and Examples in Public Health. 3 Credits.
Harm reduction is an increasingly popular paradigm in public health research and practice. This course introduces students to the principles of and current research in harm reduction. The class will focus on a) history and principles of harm reduction, and appropriate research methods; b) harm reduction & substance abuse and policy; c) harm reduction & sexual health and sex work; d) ethical considerations in harm reduction. This seminar-format course uses journal clubs, small group discussions, and interactive debates. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR EN.553.112 OR EN.550.112 OR EN.553.211 OR EN.550.211

AS.280.441. Social Media and Public Health. 3 Credits.
This upper-level undergraduate research methods design course explores the growing role of social media in public health research. The course first introduces the current social media landscape, tying in different public health and health communication theories of importance to social media research. This is followed by a discussion of qualitative and quantitative research methods that have been used to conduct social media research, as well as the unique ethical considerations presented by this novel field. The course will then delve into each type of social media platform in depth, discussing how public health research has been conducted and how this ever-changing field continues to move forward. By the end of the course, students will have given explicit consideration to the strengths and challenges posed by conducting social media research in public health, and will be able to apply social media research methods to a public health issue of their interest. Some background in research methods is preferred but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.442. Genetics and Public Health. 3 Credits.
DNA is the code of life and variability in this code can be critical in determining human health outcomes. In a post-genomic era with increasingly advanced genetic tools and data it is critical for future public health professionals to understand the role that genetics plays in disease on the individual and population level. More and more, genetics is instructing public health interventions by informing individuals of their risk of acquiring certain diseases, explaining disease etiology, guiding treatment options in the wake of personalized medicine, and may dictate the future of genetic-based disease treatment in the form of gene therapy. The goal of this semester long course is to expand upon basic genetic concepts and apply them to understanding how variation in the human genome can impact health outcomes and inform treatment. We will look at how genetic diseases are inherited, the various ways in which they can manifest as pathology, and how they are discovered and diagnosed. We will also learn how to interpret genome wide association studies and genetic test results and explore the field of genetic counseling. We will finish by looking at the future of genetic medicine by looking at personalized medicine, gene therapy, and gene drive technologies and the potential ethical implications of these interventions. Prior genetics coursework is useful, but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.020.151 AND AS.020.152

AS.280.443. Health-Related Stigma: Concepts, Considerations, and Interventions. 3 Credits.
Health-related stigma plays an important role in health and social outcomes, however its impact on individuals and populations varies according to context. Through readings, discussions, and assignments, students acquire the framework and skills to conceptualize and assess stigma across a range of health domains. To develop their understanding and analytical approach, students examine examples of HIV/AIDS, smoking, obesity, addiction, and mental health stigma. In each case, students consider key questions including: What are the forms and consequences of stigma? What theories apply? What ethical issues exist? How might interventions minimize or leverage stigma for health promotion? Throughout the semester, students also consider broader questions including: When should interventions target stigma? What are the ethical considerations in health-related stigma research? Is stigma always a threat to health? As the course places a strong emphasis on reading, critiquing, and applying health and social scientific literature, knowledge of or experience with psychology, sociology, ethics, and/or statistics is recommended but not required. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted registration as space allows.

AS.280.445. Mental Health and the Gut. 3 Credits.
Explores the strong, bidirectional communication between the gastrointestinal tract and the brain. Reviews the role of the microbiome in shaping brain health, the link between gastrointestinal symptoms and mental health, and new and seminal research on the brain-gut connection in specific psychiatric disorders, including neurodevelopmental disorders, sleep disorders, depression and anxiety, bipolar disorder, schizophrenia and other psychotic disorders, dementia, and Parkinson's/other movement disorders. Develops students' skills in reading and critiquing literature as well as designing and analyzing studies on the microbiome and mental health. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR (EN.553.211 (EN.550.211) OR EN.553.112);Students who have taken AS.280.236 are not permitted to take AS.280.445.

AS.280.446. Quality of Life: Concepts and Challenges in Assessing Wellbeing. 3 Credits.
Quality of life means something different to nearly everyone. While public health and regulatory professionals agree that quality of life matters, developing tools that appropriately conceptualize and evaluate quality of life across varying populations remains a challenge. This course will explore the role of quality of life and other health status and functional outcomes in public health. The course is structured in three segments: 1) Conceptualizing quality of life, 2) Measuring quality of life, 3) Valuing quality of life. The class challenges students to assess the existing landscape in qualityof life research and critically evaluate how diverse literature bases (including psychology, medicine, economics, & regulatory science) have influenced public health research, policy,and practice. Students will also gain experience in analyzing and drawing meaningful research and regulatory conclusions from experience data such as patient reported outcomes and patient preference information. This course will be structured as a seminar featuring lectures, in-class journal clubs, guest speakers, and small-group lab activities. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.345 OR (EN.553.211 (EN.550.211) OR EN.553.112)

AS.280.447. Ethical Considerations When Working With Marginalized Populations- A Public Health Perspective. 3 Credits.
Interested in developing best practices to work with marginalized people in public health? This course is for you! We will use a combination of lectures and discussions to critically analyze public health research methodologies at the intersection of ethics, justice, and human rights when working with marginalized populations. The first part of the course is an introduction to theory to equip students with a shared language to understand how marginalization, justice, and ethics are conceptualized in public health. In the second part of the course, students will delve deeper into various public health research methodologies and apply ethical guidelines to a variety of public health cases in the U.S. and internationally. The course will culminate with students designing case studies to present and provide feedback on based on ethical considerations. Gordis Teaching Fellowship course. Priority registration given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.448. Vaccine Development, Epidemiology, and Hesitancy in the Modern World. 3 Credits.
Immunization is one of the most cost-effective and successful public health measures available, but loss of public confidence in vaccines has resulted in the resurgence of vaccine-preventable diseases. This course will review the process of vaccine development and students will understand the use and utility of immunizations for disease prevention. Students will gain an in-depth understanding of the vaccines that have been successfully introduced into routine immunization schedules. This course will discuss post-licensure vaccine surveillance as well as current domestic and international policy issues in vaccine development, supply, delivery and utilization. We will also examine the origins of vaccine hesitancy and discuss the impact of "anti-vaxxers" on immunization coverage and the subsequent return of vaccine-preventable diseases. Students will have the opportunity to work in teams to critically evaluate multi-level interventions to target vaccine hesitancy and improve immunization coverage, and propose a recommendation that will reduce the morbidity and mortality of a specified vaccine-preventable disease. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.449. Corporate Influence on Public Health. 3 Credits.
Corporate practices are an often under-recognized social determinant of health. Corporate-induced disease contributes to morbidity and mortality worldwide, and a better understanding of the mechanisms underlying corporate-induced diseases illuminates pathways by which social and environmental factors influence health. This course will investigate the influence of industry using tobacco, alcohol, sugar-sweetened beverage, food, and pharmaceutical industries as examples, emphasizing ecological models. Students will evaluate the historical and current role of each industry as they effect health outcomes, research, public health policy, and public perceptions and behaviors. Students will use case studies from around the globe that exemplify instances of influence and interference and critically consider the power and activity of multibillion-dollar multinational companies. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.450. The Dreaded R-Word: The Ethics of Rationing and Resource Allocation in Health Care. 3 Credits.
Uwe Reinhardt, the renowned Princeton health economist, once labeled rationing as “the dreaded ‘R-word.’” Sarah Palin infamously criticized the Affordable Care Act for, in her view, setting up rationing “death panels.” Many others recoil from the idea of rationing, considering it a “heartless, mechanistic withholding of desirable goods or services by faceless bureaucrats.” In contrast, “resource allocation” does not typically inspire the same response. Why does the idea of rationing in health care generate such a negative emotional response? Is this response justified? Does rationing differ from resource allocation as a means of setting priorities for health care? Who has the authority to set priorities for health care? On what basis should priorities be set? Why must priorities be set at all? This class addresses questions like these and offers a broad introduction to the ethics of priority-setting in health care. The class will devote significant time to understanding both the conceptual and normative foundations of priority-setting as well as specific proposals for how to set priorities. We will explore priority-setting in health care at both the individual and population level through various case studies including organ transplants and flu pandemic preparation. We will discuss priority-setting in the context of public health and universal health coverage and explore the role of global organizations like the World Health Organization and World Bank in setting priorities for health care. We will also consider whether priority-setting is compatible with the pursuit of social justice. Gordis Teaching Fellowship course.

AS.280.451. Born a Girl: Issues in Women's Health From a Life Course Perspective. 3 Credits.
The discussion surrounding women’s health has often remained limited to understanding women’s reproductive health needs. This course seeks to move beyond this topic to explore the key issues affecting women’s health, utilizing a life course perspective. This undergraduate course will focus on a select number of themes including: a) understanding the history of women’s health; b) sexual and reproductive health; c) maternal health; d) violence against women and girls; e) the needs of younger girls and aging women; and f) how mental health and stigma affect women. The course brings both U.S. and global perspectives to enhance the understanding of how the field of women’s health has evolved over time. It will also address some of the challenges public health professionals continue to face in addressing the health and wellbeing of women today. This seminar-style course combines class presentations with journal clubs and small group discussions. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.452. Policy, Politics, and Power in Health Equity. 3 Credits.
Health disparities are avoidable, unjust differences in health opportunities and outcomes related to factors such as race and ethnicity, education, class, citizenship, disability, sex and gender identity, and sexual orientation. These disparities reflect the systems that distribute resources, privileges, and power across society and mediate exposure to physical and mental health hazards such as economic deprivation, discrimination, violence, unhealthy environments, uninsurance, and inadequate medical care. Health equity, which is often referred to as social justice in health, is an ethical value that drives efforts to eliminate these disparities. As the National Academy of Medicine asserts in each of its reports, “Knowing is not enough; we must apply. Willing is not enough; we must do.” The purpose of this course is to introduce students to essential concepts, literature, and policy issues related to health disparities and to prepare them to use their knowledge to build effective policy strategies in support of health equity. Gordis Teaching Fellowship course. Completion of AS.280.340/ Fundamental of Health Policy Management is recommended, but not required.Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.453. Contemporary Social Movements in Public Health. 3 Credits.
Health social movements attempt to alter power structures in order to achieve greater health equity, promote access to resources, and change perceptions of disease. But what distinguishes a moment from a movement? Under what conditions can health social movements lead to lasting policy and social change? Together we will explore a wide range of contemporary health social movements such as Black Lives Matter, MeToo, gun reform, US healthcare reform, environmental movements, and others. We will analyze the types of goals, resources, and tactics used in these movements and consider their contributions to the shaping of health-related policies and practices. Students will demonstrate their understanding of course themes through quizzes, written assignments, class discussions, and brief presentations. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.454. What is the Link Between Oppression and Mental Health? Combining Theory, Concepts, and Empirical Science to Explain Minority Mental Health. 3 Credits.
In this three-module course, students will first gain knowledge on the theoretical orientations that inform the social determinants of health, in combination with conceptual approaches in the field of trauma and violence research, in order to formulate a theoretical, conceptual, and empirical understanding of minority mental health. In the final module, students will study select mental health concerns (e.g., trauma, depression, anxiety, suicide) that affect specific minority populations, including discussions around the lived experiences of minority mental health. This culminates in a final group presentation on empirical research from an approved minority mental health topic of their choice that will be delivered as a TED-style talk. The course will run with graduate-level expectations. Students should anticipate weekly reading assignments to inform group lab presentations and discussions. There will be three brief individual writing assignments of 5 pages or less that critically analyze current minority mental health research. Upon completion of the course, students will be able to discuss minority mental health research with the necessary contexts of theory, research, and life stories that inform current public mental health approaches. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
Students cannot take this course is they are taking AS.194.301.

AS.280.455. Understanding and Engaging Adolescents in Public Health Context. 3 Credits.

Adolescent health is an increasingly important component of the public health agenda. As adolescence is a unique and pivotal stage of life, a rich understanding of this population is important for successful public health engagement. This seminar-style course seeks to provide a foundation for those interested in adolescent health and support effective engagement with adolescent populations. The first half of the course offers theoretical and contextual insights on adolescents—ranging from discussing public health significance, to developmental and life course perspectives, to influences across socioecological levels. The course then delves into practical and methodological considerations for working with this population including ethical matters, insights on reaching adolescents, and approaches to collecting information. This course culminates with deliberations of successful examples of engaging adolescents in public health as well as the future of the adolescent health field. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.456. Introduction to Vaccinology. 3 Credits.

Over the past century, vaccines have a made a tremendous impact on human health, averting an estimated 2-3 million deaths each year. This course aims to introduce students to the interdisciplinary field of vaccinology by building the vocabulary and skills necessary to critically evaluate existing and future vaccines and vaccine programs. Topics include the parameters used to characterize vaccines, the vaccine development pathway, vaccine policy and emerging topics in vaccinology. Although the primary focus of the course will be on the public health aspects of vaccinology, we will also cover key biological principles. At least one semester of biology is strongly recommended as a pre-requisite for this course. Gordis Teaching Fellowship course. Priority registration will be give to Public Health Studies majors.
AS.280.101 AND AS.280.240

AS.280.457. Cohorts and Trials: Interpreting Evidence in Epidemiology. 3 Credits.

How do we know smoking is a risk factor for heart attacks? Why did the NIH invest millions of dollars into the Atherosclerosis Risk in Communities (ARIC) Study or the Systolic Blood Pressure Intervention Trial (SPRINT)? When does the FDA accept a vaccine or drug as safe for use? Why do studies disagree about whether coffee is good or bad for health? This course delves into how two major study designs—cohorts and clinical trials—are used to build and interpret a body of epidemiologic evidence, including the practical context of how cohorts and trials are devised, proceduralized, and funded within the larger scientific enterprise. This is a discussion-based class; active sessions modeled after research journal clubs and consortium workgroups drives peer-to- peer learning along with literature-based lecture. Gordis Teaching Fellowship course. Priority registration will be give to Public Health Studies majors.
AS.280.350

AS.280.458. Monitoring, Evaluating, and Learning to Improve Public Health Programs. 3 Credits.

This course introduces basic principles and methods for monitoring and evaluating public health programs. The course will familiarize students with different types of program evaluation, including formative and summative evaluations, and with approaches to monitor and improve program performance. Students will apply their knowledge to design a logic model, formulate evaluation questions, and identify appropriate quantitative and qualitative methods to answer those questions.Additionally, students will reflect on the importance of conducting evaluations that meet the needs of stakeholders and strategies for integrating an equity focus into the design of evaluations. The goal of the course is to help students to think critically and provide them with the practical skills to monitor, evaluate, and learn from data to improve program implementation and public health impact. Gordis Teaching Fellowship course. Priority registration will be given to Public Health Studies majors.
AS.280.350

AS.280.459. Statistics for Humans: Failures, Values, and Conflicts in Data Science. 3 Credits.

Data does not speak for itself, and the way we use data is a matter of choice. This course will explore the human element of statistics: how statistics drive decision-making, how people can be deceived by statistics, what problems data science poses for the 21st century, and other topics. Case studies in public health will be emphasized. A previous course is statistics is recommended. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.

AS.280.460. Urban Health: Global Perspectives for Sustainable Development. 3 Credits.

Urban health is a growing area of public health focus around the world. The interdisciplinary nature of this field of study presents a unique challenge for researchers and policy makers, but also a critical opportunity to share and integrate knowledge using a systems thinking framework.The seminar style course will consist of a brief introduction to the goals and frameworks of urban health planning, followed by four urban case studies represented by four cities around the world at varying stages of industrialization. Material will be guided by discussions and debates about pressing urban health topics. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.101 AND AS.280.335

AS.280.461. Exploring Food Insecurity Through a Racial Equity Lens. 3 Credits.

This course will apply a racial equity lens to explore the issue of food insecurity in the US, including the history, measurement, and current strategies to reduce food insecurity at the national, regional, and local levels. Students in the course will explore how they can take individual action to contribute to dismantling racism and fighting against the root causes of food insecurity. This course will require students to critically reflect on readings and discussions that explore the connection between systems of oppression and food insecurity. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.462. Practicing Equity in the American Healthcare System. 3 Credits.
This course provides a broad orientation to key structures within the American healthcare system and their role in promoting health equity. These structures include providers, payers, local health departments, evidence development, health information technology and innovative policy. This course will emphasize practical experience with these structures in the context of health equity through case studies within the class and an integrative project in which students will plan and execute their own project. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.340

AS.280.463. International Nutrition in the Time of the COVID-19 Pandemic. 3 Credits.
Malnutrition remains one of the largest public health issues in low and middle income countries (LMICs); it has been estimated that 1 in 9 individuals globally remain hungry, and malnutrition related factors contribute to 45% of deaths in children under 5 years old. While global progress has reduced the burden of malnutrition in the past two decades, much of the progress could be undone by the impacts of COVID-19. This course will review the causes and the burden of malnutrition in LMICs and will provide students with the understanding of the various types of malnutrition. This course will discuss the multi-sectoral nature of malnutrition and the role each sector has in addressing malnutrition. In light of recent events, many of these sector's normal operations have been disrupted by the COVID-19 pandemic and disease transmission mitigation strategies. We will examine how the COVID-19 pandemic has influenced these sectors and the anticipated effects on malnutrition. This is a Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350

AS.280.464. Risk, Resilience, and Public Health Engagement with Marginalized Communities. 3 Credits.
In public health research and practice, marginalized populations are frequently labeled as “at risk” for negative health outcomes and as being more likely to engage in “high risk” behaviors. All too often, risk assessments and behavior change efforts target individuals without adequate consideration of social and environmental factors contributing to risk and vulnerability. The concepts of resilience and protective factors have gained attention in public health for their focus on supporting positive mental and behavioral health in the face of adversity. This seminar-style course will explore the core concepts of risk and resilience from the perspective of multiple disciplines (e.g. anthropology, epidemiology, and more), delving into each construct's underlying conceptual frameworks, methods of assessment, contributing factors on multiple levels, and evidence-based interventions to support resilience and mitigate risk. Students will then use these core concepts to reflect on meaningful engagement with marginalized populations when assessing and addressing risk and resilience, explore the meaning and consequence of categorizing people based on their risk behavior, and become familiar with cross cultural perspectives on these topics. The course will conclude with a deliberation of future directions risk and resilience examined through a public health equity lens. Students are expected to actively engage with assigned readings and in-class discussions, and will have the opportunity to pursue topics of interest through individual assignments. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND AS.280.240

AS.280.465. Beyond the Peer-Reviewed Article: Embodying Public Health Data for Human Consumption. 3 Credits.
As public health researchers and practitioners, one of the most important and in-demand skills is the ability to communicate data to effect population-level change. This course will explore concepts and case studies in data visualization, ethical data dissemination, and evidence-based advocacy. This course will cover strategies for presenting data that are approachable for lay audiences. Students will gain familiarity with key tools, media, and software to support data visualization and dissemination through lectures, case studies and course assignments. The course will culminate with an applied assignment which calls upon students to collaborate with Bloomberg School of Public Health faculty to utilize data from current research to effectively communicate key messages to non-specialist audiences. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.350;AS.280.345 OR EN.553.211 OR EN.553.230 OR AS.200.314 OR AS.200.315 OR EN.553.310 OR EN.553.311 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR AS.200.201

AS.280.466. Rethinking Prevention: Emerging and Novel Approaches to Addressing Adolescent Drug Use. 3 Credits.
Students in this upper-level course will be introduced to the unique needs and public health considerations when working with adolescent populations, specifically in preventing substance use and substance use disorders. Students will explore the etiology and epidemiology of substance use and substance use disorders in young people, as well as the history of substance use prevention while tackling topics of racism, stigma and oppression of those who use drugs. Progressing through the course, students will be introduced to novel and emerging ways the field is rethinking drug prevention, including the use of social media platforms, mindfulness in schools and phone apps. New tools for epidemiologic surveillance of populations will also be considered, such as machine learning and ecological momentary assessment. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.101;AS.280.355 OR AS.230.341

AS.280.467. Adverse Childhood Experiences: A Public Health Perspective. 3 Credits.
This seminar explores the scientific evidence underlying the impact of Adverse Childhood Experiences (ACEs) on various health outcomes. It first describes the prevalence of ACEs, which include abuse, neglect, and household challenges such as parental substance abuse, mental illness, separation or divorce, and incarceration. The course will then discuss mechanisms and risk and protective factors of negative health outcomes following ACE exposure across levels of a socioecological model. These discussions will directly inform the next part of the seminar, which presents evidence-based interventions for ACEs. Throughout the seminar, students will be active participants and will have the opportunity to explore their topics of interest. Gordis Teaching Fellowship course. Priority registration is given to Public Health Studies majors. Other students will be permitted to register as space allows.
AS.280.240

AS.280.468. Food Security in America. 3 Credits.
As of July 2021, 1 in 6 households reported experiencing food insecurity in the United States, with Black, Indigenous, and People of Color (BIPOC) populations disproportionally affected. Food insecurity has been a public health issue in America for decades, with COVID-19 exacerbating existing hardships and disparities resulting from inequitable policies and distribution of resources in communities. This course seeks to provide a critical understanding of the issue of food insecurity in America through describing and evaluating the existing policies, programs, and practices in the United States that aim to promote food security. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND AS.280.340

AS.280.469. How Inequity Persists in Statistics: Lessons Learned and Future Challenges. 3 Credits.
The course will examine the past, present, and future of statistics’ impact on equity. We will discuss how early statistical thinking was used to defend racist narratives and how inequitypersists in statistics to this day. We will explore current and future challenges using examples from artificial intelligence. Students will learn how to implement common artificial intelligencemethods and communicate their results. This is a Gordis Teaching Fellowship course open to juniors and seniors. Priority registration will be given to Public Health Studies majors; other students will be permitted as space allows.
AS.280.101 AND (AS.280.345 OR (EN.553.211 OR AS.200.314 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348 OR AS.200.201))

AS.280.495. Honors In Public Health - Seminar. 3 Credits.
Using lectures, oral presentations, and writing assignments, this seminar is designed to assist Public Health Studies majors in writing a senior thesis. Students will formulate their topics, develop research skills, and address issues of professional ethics. Participating in this seminar is required for students pursuing honors in Public Health Studies. Permission Required. Classes will be held at Bloomberg School of Public Health.
Area: Writing Intensive

AS.280.499. Honors in Public Health. 3 Credits.
A research methods seminar to prepare students doing honors in Public Health Studies. Permission Required.
Area: Writing Intensive

AS.280.500. Applied Experience-Public Health. 1 Credit.
Perm. Req’d, Public Health Majors Only. This is a supervised, hands-on experience working with public health professionals. Students will complete 80 hours of applied work and will submit a synthesizing assignment at the end of the term. Students completing their AE in the current semester will be enrolled in Section 2. Students whose time will roll over to an additional grading period will be enrolled in Section 1. Please contact your PHS Advisor for complete details.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.501. Internship-Public Health. 1 Credit.
Permission Required. Public Health majors only
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.502. Internship-Public Health. 1 Credit.
Permission Required. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.505. Research in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.506. Research in Public Health. 1 - 3 Credits.
Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.511. Research for Juniors/Seniors in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.512. Research for Juniors/Seniors in Public Health. 0 - 3 Credits.
Restricted to public health studies majors. Consult the public health studies adviser for procedure. Permission Required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.590. Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.595. Special Studies in Public Health. 1 Credit.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.280.597. Research in Public Health. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290 (Behavioral Biology)

AS.290.101. Human Origins. 3 Credits.
This course examines the origins of human structure, function and behavior from an evolutionary perspective. It includes study of the evolution, behavior and behavioral ecology of nonhuman primates, hominid evolution (including the paleontological and archaeological records), and the origins of human cognition, social behavior and culture.

AS.290.303. Animal Communication Lab. 3 Credits.
This course examines animal communication in all modalities (especially sound, sight, and scent) across taxa. Students will learn how to design experiments, analyze results and write scientific papers in publication form. The course is held in a computer laboratory and on some occasions at “field” locations on or adjacent to campus.
AS.200.208 OR AS.200.344

AS.290.304. Comparative Neuroanatomy. 3 Credits.
This course examines the phylogenetic and developmental history of the central nervous system across the vertebrate tree of life, with emphasis on the deep history of those features that characterize the human brain. We will study how our understanding of non-human vertebrates (both model and non-model organisms) can provide important insights into the structure and function of the modern human brain.
(AS.080.305 AND AS.080.306) OR AS.200.141

AS.290.400. Comparative Neural Systems and Behavior Research Discussions. 0.5 Credits.
This course is required concurrently with research in the Comparative Neural Systems Research and Behavior lab. During the scheduled meetings we will discuss scientific papers, policies and procedures, research ethics and other information related to activities in the lab. At the end of the semester, students will present their research in groups. This course is only open to students doing research in the Neural Systems and Behavior Lab.

AS.290.420. Human Sexual Orientation. 3 Credits.
This course will examine the historical and current theories of sexual orientation and sexual variation development by examining the biological, psychological and social contributing factors that influence the development of sexual orientations and variations along with treatment and modification of problematic sexual behaviors. Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester. Priority given to Behavioral Biology majors. Note: For credit towards a Psychology major, students should register for AS.200.204 Human Sexuality, rather than this course.
Prerequisite(s): Students may enroll in both AS.200.204 and AS.290.420, but cannot do so in the same semester.
Students may receive credit for either AS.200.204 or AS.290.420, but not both.

AS.290.490. Senior Seminar: Behavioral Biology. 1 Credit.
Great ideas in Behavioral Biology. Discussion of classic and cutting edge articles in the original literature. Student presentations and reaction papers. Capstone course for senior Behavioral Biology majors.
AS.290.101 AND AS.200.208 AND AS.200.208 AND AS.200.208, or Instructor permission.;(AS.290.101 AND AS.200.208 AND AS.200.141) or Instructor permission.

AS.290.500. Connections in Behavioral Biology. 0.5 Credits.
In this seminar, students discuss the intellectual merit of current or potential future research, internship and outreach activities in Behavioral Biology. This course is designed to 1) expose Behavioral Biology majors to new knowledge in the field, 2) provide the opportunity to develop oral and written communication skills, and 3) build community among students in the major. Students will make oral presentations and write a short paper/news piece or prepare a webpage.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.501. Behavioral Biology Research - Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.502. Research-Freshmen. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.503. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.504. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.505. Behavioral Biology DUS Approved Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.519. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.520. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.590. Behavioral Biology Internship. 1 - 3 Credits.
TBA
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.594. Behavioral Biology Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.595. Behavioral Biology Research - Freshmen. 1 - 3 Credits.
TBA
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.596. Behavioral Biology Internship. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.290.597. Behavioral Biology Research-Behavioral Biology Majors. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.300 (Comparative Thought and Literature)

AS.300.102. Great Minds. 3 Credits.
Introductory survey of foundational texts of modern philosophy, social and political thought, and literature. This semester will include works by Plato, René Descartes, Immanuel Kant, Karl Marx, Virginia Woolf, Ludwig Wittgenstein, Iris Murdoch, Cora Diamond, Judith Butler, Kwame A. Appiah, Jacques Derrida, and others. The course is taught in lectures and in seminar discussions.

AS.300.145. Humanities Collaboratory. 3 Credits.
The Humanities Collaboratory is designed for new researchers from across the humanities as they gain the applied skills and experience to conduct their own independent research projects in the humanities. The Humanities Collaboratory model uses a high-tech classroom to allow students and instructors to work, learn, and research together. Three sections of this course will share a core list of materials focused on humanities research techniques, but your primary course materials will be individually selected. Students will have the unique opportunity to participate in a humanities lab section where all three course sections merge for discussion. You will choose your own topic to research with no limits of time period, subject, or genre, and through constant collaborative and independent research, each student will develop the expertise in that topic to both write a research paper and create a final oral presentation.
Area: Writing Intensive

AS.300.207. The American Literature of the Movies. 3 Credits.
This course brings the question of film's status as art into historical focus by approaching it through the various forms of writing that cinema inspired. Following a brief historical and philosophical preamble, each of the three sections will present a literary vantage point on the movies: "inside," "outside," and "alongside." The "alongside" section centers on poets who incorporated film into an adjacent art form, the "inside" section centers on those within the moviemaking industry who wrote about it in their fiction, and "outside" on those who criticized and theorized it. Films that exemplify the issues at hand will accompany each section. Relevant scholarly and theoretical texts elucidate the topics, texts, and films of concern. Students will have the opportunity to read works by H.D., Hart Crane, F. Scott Fitzgerald, James Agee, and other notable writers from the first half of the 20th century.
Area: Writing Intensive

AS.300.227. Business Fictions. 3 Credits.
When you are working for a company, how do you distinguish your ideas, actions, and responsibilities from the firms'—if that is even possible? What is corporate culture or a corporate person, and how is it similar or different from any other kind of culture or person? These and related questions inspired and fascinated writers from the nineteenth century through the present. By reading and thinking about short stories, novels, film, a television series, and a play, we will explore these issues and potential resolutions to them. The course especially considers how problems of action, agency, and responsibility become an intriguing challenge for writers of a variety of modern and contemporary fictions of the business world. Texts will include short stories by Herman Melville, Alice Munro, Ann Petry, and John Cheever; novels by Willa Cather, F. Scott Fitzgerald, and Lydia Millet; films, plays, and television by Charlie Chaplin, David Mamet, and Dan Harmon (Community).

AS.300.300. Honors Seminar. 3 Credits.
The Honors Seminar is a mandatory component of the Honors Program in Humanities, which offers qualified undergraduates the possibility of pursuing an independent research project in their Junior and Senior years in any humanistic discipline or combination of disciplines: intellectual history, comparative literature, philosophy, critical theory, psychoanalysis, religion, film, etc., as well as points of intersection between the arts and the sciences. Sophomores who plan to study abroad in their Junior year should also consider applying to the Program. In the 2021-2022 academic year, the Seminar will focus on a close reading of Tolstoy's The Death of Ivan Ilych and associated texts by Plato, Montaigne, Heidegger, Beauvoir, Levi, Gawande, and others on death and dying.

AS.300.301. Women and Work in the US. 3 Credits.
This course offers an introduction to the political forces, cultural values, and social factors which have shaped the history of women's labor in the US. This course will ask question such as: Why do we place a higher value on work which takes place in the public sphere than work in the home? How do representations of work in literature and popular movies reinforce or subvert gender roles? How have women negotiated gendered and racial boundaries through political action or writing? Focusing on racialized labor, domestic labor, sex work, and factory work, the course will provide an interdisciplinary cultural study of women's work relevant to our current historical moment. Authors discussed include Saidiya Hartman, Harriet Beecher Stowe, Emma Goldman, and Kathi Weeks.
Area: Writing Intensive

AS.300.311. Introduction to Intellectual History. 3 Credits.
This course offers a conceptual and historical introduction to Intellectual History. What makes the “history of ideas” different from the history of other objects? What, if anything, distinguishes the history of ideas from the history of philosophy? What is it exactly that we call “ideas”? In what sense do they have a history? These are examples of the kind of questions addressed in the course.

AS.300.312. Imagining Revolution and Utopia. 3 Credits.
What form should revolution take, and what should society look like after the revolution? What would happen to the state, family, home, status of women, human interrelations, and everyday life? These questions consumed radicals in 19th century Russia and Europe, and their answers helped to shape the political culture of the 20th century. This course examines theories of revolution and utopia and responses to them in literature, art and film. Primary case study is Russia and the Soviet Union, with a comparative look at influential European works.
Area: Writing Intensive

AS.300.317. The Russian Novel. 3 Credits.
This course introduces students to the nineteenth century Russian novel and considers its lasting impact on world culture. We will read classic masterpieces of the psychological and philosophical novel, and their experimental forerunners. Short lectures on historical and cultural context and on methods of literary analysis will be combined with intensive group discussion. Novels include Anna Karenina, Crime and Punishment, Eugene Onegin, Dead Souls, and Hero of our Time.
Area: Writing Intensive

AS.300.319. The Modernist Novel: Mann, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Thomas Mann, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the “luminous halo” of life.
Area: Writing Intensive

AS.300.322. Lu Xun And His Times: China’s Long 20th Century And Beyond. 3 Credits.
The “founding father of modern Chinese literature,” Lu Xun (1881-1936) saw himself as a contemporary of writers like Gogol, Ibsen, and Nietzsche in creating his seminal short stories and essays, and likewise, he has been seen by numerous Chinese, Sinophone, and East Asian writers as their contemporary since his lifetime until today. In this course, we will survey Lu Xun’s canonical works and their legacies through a comparative approach. What echoes do Lu Xun’s works have with the European and Russian texts he engaged with? Why did his works manage to mark a “new origin” of Chinese literature? How were his works repeated, adapted, and appropriated by Chinese writers from the Republican period through the Maoist era to the post-socialist present, even during the Covid-19 pandemic? How do we assess his cross-cultural reception? Are his times obsolete now that China is on the rise? Or, have his times come yet? Through our comparative survey, Lu Xun’s works and their afterlives will offer us a window onto China’s long twentieth century and beyond in a transnational context. All materials are provided in English translation.

AS.300.323. Shakespeare and Ibsen. 3 Credits.
William Shakespeare and Henrik Ibsen are the two most frequently performed playwrights in history, and both have been credited with reinventing drama: Shakespeare for the Elizabethan stage and Ibsen for the modern. In this course we will pair together plays by each author – those that stand in an explicit relation of influence as well as those that share a significant set of concerns – in order to investigate how each takes up and transform key problems in the literary, political, and philosophical tradition for their own historical moment. Plays to be studied: by Shakespeare, A Midsummer Night’s Dream, Hamlet, Othello, King Lear, The Tempest, A Winter’s Tale; by Ibsen, St. John’s Night, Hedda Gabler, Rosmersholm, The Wild Duck, The Master Builder, When We Dead Awaken.

AS.300.324. Cinema of the 1930s: Communist and Capitalist Fantasies. 3 Credits.
Comedy and musical comedy film flourished in the USA during the Great Depression as well as in the USSR during the Stalinist Great Terror. This course will compare films of the era in a variety of genres (musical, epic, Western, drama), examining the intersections between politics and aesthetics as well as the lasting implications of the films themselves in light of theoretical works on film as a medium, ethics and gender.

AS.300.328. Contemporary Sinophone Literature and Film. 3 Credits.
A survey of contemporary literature and film from the peripheries of the Chinese-speaking world, with a special focus on Hong Kong, Taiwan, and overseas Chinese communities in Southeast Asia, the Americas, and Europe. We will not only examine literary and filmic works in the contexts of the layered histories and contested politics of these locations, but will also reexamine, in light of those works, critical concepts in literary and cultural studies including, but not limited to, form, ideology, hegemony, identity, history, agency, translation, and (post)colonialism. All readings are in English; all films subtitled in English.

AS.300.330. Modern East Asian Literatures Across Boundaries. 3 Credits.
Modern literature in East Asia is as much defined by creation of national boundaries as by their transgressions, negotiations, and reimaginations. This course examines literature originally written in Chinese, Japanese, and Korean in light of contemporary understandings of political, social, and cultural boundary demarcation and crossings. How do experiences of border-crossing create and/or alter literary forms? How, in turn, does literature inscribe, displace, and/or dismantle boundaries? Our readings will include, but not limited to, writings by intra- and trans-regional travelers, exiles, migrants, and settlers; stories from and on contested borderlands and islands (e.g. Manchuria, Okinawa, Jeju); and works and translations by bilingual authors. All readings are provided in English translation.

AS.300.331. The Authoritarian Image: Russian Cinema from Stalin to Putin. 3 Credits.
Vladimir Putin’s charismatic authority has a deep history in Russian culture. We’ll investigate that history through cinema, which Lenin called “the most important of the arts.” While Soviet cinema often served as immersive propaganda, directors also found ways to question authority and power. Films to be screened range from Sergei Eisenstein’s Ivan the Terrible (1944) to the 2013 documentary Pussy Riot: A Punk Prayer. This course will combine study of Russian and Soviet culture from the end of World War II to the present with study of film history, style, and technique.
Area: Writing Intensive

AS.300.332. From Chekhov to Chernobyl: Russian Literature of Environmental Catastrophe. 3 Credits.
Environmental degradation and disaster offer a steady backdrop to the 20th century in Russia and the Soviet Union. While the Soviet regime promised mastery over the environment and Russian culture valorized the harmonization of humans with the natural world, environmental catastrophe proved the folly of those dreams. We will read works by authors who havegrappled with this ongoing catastrophe and its implications for relations between human beings and the world. Texts range from short stories and novellas to modernist experimental fiction and documentary prose. We will also engage with materials in special collections and screen selected films. Authors include: Chekhov, Bulgakov, Platonov, Solzhenitsyn, Rasputin,Petrushevskaya, and the Nobel laureate Svetlana Alexievich.
Area: Writing Intensive

AS.300.334. Love and its maladies. 3 Credits.
Much of what we know about love and desire we owe to fiction's ability to evoke these experiences. Consider for example that the publication, in Germany, of The Sorrows of Young Werther inspired young men across Europe to dress and behave just like this lover. Just as nowadays film and television represent, as well as mold our conceptions of love, love-stories from the eighteenth-century onwards have given shape to gendered subjectivities in ways that still matter now. As, intriguingly, illness is a recurrent theme in many modern love stories, we will be prompted to decipher signs and symptoms in the bodies of mind of our protagonists. Why is it that in Western cultures, passion is tightly interwoven with a landscape of pain, suffering, and disease? In studying texts that represent major aspects of a romantic sensibility, we are indeed invited to trace the steps of a history of the body increasingly defined by gender and by medical knowledge. The readings for this class (all available in English) include: Austen, Persuasion; Balzac, The Unknown Masterpiece; Barthes, Lover's Discourse; Goethe; The Sorrows of Young Werther; Mann, Death in Venice; Winterson, Written on the Body.

AS.300.336. Forms of Moral Community: The Contemporary World Novel. 3 Credits.
Literary and philosophical imaginations of moral community in the post-WWII period. Texts include: Coetzee, Disgrace; McEwan, Atonement; Achebe,Things Fall Apart; Ishiguro, An Artist of the Floating World; Roy, The God of Small Things; Lessing, The Grass is Singing; Mistry, A Fine Balance; Morrison, Beloved; and essays by Levi, Strawson, Adorno, Murdoch, and Beauvoir on the deep uncertainty over moral community after the crisis of World War II. Close attention to novelistic style and narrative will inform our study of the philosophical questions that animate these works. What does it mean to acknowledge another person's humanity? Who are the members of a moral community? Why do we hold one another responsible for our actions? How do fundamental moral emotions such as contempt, humiliation, compassion, gratitude, forgiveness, and regret reveal the limits of a moral community?

AS.300.337. The Tragic Tradition. 3 Credits.
This course offers a broad survey of tragic drama in the Western tradition, from its origins in ancient Greece to the twentieth century. In weekly lectures and discussion sections, we will study the specific literary features and historical contexts of a range of different works, and trace the continuities and transformations that shape them into a unified tradition. Key questions and themes throughout the semester will include what counts as tragic, the tragedy of social and political conflict, the bearing of tragedy on the meaning and value of life, the antagonistic relation between world and humans, the promises and dangers of tragedy for contemporary culture. Authors to be studied: Sophocles, Euripides, Seneca, Shakespeare, Racine, Goethe, Ibsen, Strindberg, Chekov, Brecht, Pirandello, and Beckett.

AS.300.339. Introduction to Comparative Literature. 3 Credits.
This course offers an introduction to the history, theory, and praxis of comparative literature. We will read texts from some of the founding figures of the discipline and look at the most recent debates in the field, including translation studies, literary theory, and world literature, among others. Particular attention will be given to the methodologies and problems of studying literatures in different linguistic traditions and the relation between literature and other areas of thought and culture, such as philosophy, art history, and psychoanalysis. Case studies in comparative approaches to literature will provide concrete examples to our discussions.

AS.300.340. Literature and Film of Unintended Consequences. 3 Credits.
Sometimes brilliant ideas and plans don't work as anticipated, or go very badly—for example, empowering the "invisible hand" of the market, building a huge hydroelectric dam, or plotting a double murder by two strangers. This course explores these and other fascinating literary instances of unintended consequences—the unanticipated results of actions that people planned ending up a very different way. Reading or watching mainly twentieth-century American literature and movies, as well as some essays and poetry, we will follow a range of different creators as they think about unplanned effects and why they matter. What can these works tell us about how we intend, act, or make meaning at the limits of our control? Texts will include films by Charlie Chaplin, Billy Wilder, and Alfred Hitchcock, poetry or fiction by Wallace Stevens, Patricia Highsmith, and Zadie Smith.
Area: Writing Intensive

AS.300.341. Transwar Japanese and Japanophone Literatures. 3 Credits.
A survey of Japanese and Japanese- language literatures produced in Japan and its (former)colonies during the "transwar" period, or the several years before and after the end of WWII. This periodization enables us to take into account the shifting boundaries, sovereignties, and identities amid the intensification of Japanese imperialism and in the aftermath of its eventual demise. We aim to pay particular attention to voices marginalized in this political watershed, such as those of Japanese-language writers from colonial Korea and Taiwan, intra-imperial migrants, and radical critics of Japan's "postwar" regime. Underlying our investigation is the question of whether literature can be an agent of justice when politics fails to deliver it. We will introduce secondary readings by Adorno, Arendt, Levinas, Derrida, and Scarry, among others, to help us interrogate this question. All readings are in English.

AS.300.343. The Cinema of Revolution. 3 Credits.
This course examines global political revolutions through cinema and the ways in which cinema helped to make political revolutions. Early cinema was intimately intertwined with the Russian revolution, and Russian revolutionary cinema had a profound impact on the ways in which media was used for revolutionary purposes through the 20th century and around the world. Students will be introduced to films from a number of different countries, and the history and context of their production and reception. They will also learn methods of film analysis and produce their own video essay.

AS.300.344. Literature and the World. 3 Credits.
This course interrogates how modern literature not simply reflects the world but functions as world-making power. What is a world? How do we conceive of, live in, and change it? What if there are multiple worlds? How are literature and other aesthetic forms crucial to tackling these questions? We will survey literary and philosophical texts in a comparative setting, engaging examples from both Europe and East Asia. All readings are in English. Open to graduate students.
Area: Writing Intensive

AS.300.345. Narrative Imagination in Philosophy and Literature. 3 Credits.
We are constantly immersed in narratives or, as Roland Barthes said, narrative "is simply there like life itself. . . international, transhistorical, transcultural." As a bridge between experience and language, narrative informs the way we understand history, gender, politics, emotion, cognition and much more. Through reading a series of philosophical and literary texts, this course will provide a systematic understanding of how narratives are composed, how they are experienced, and eventually, how they evolve. The first part of this course will focus on building a foundation in the formal study of narrative, focusing on elements such as genre, plot, character, narrator and reader. We will start with a brief consideration of ancient approaches to literary narrative in Aristotle's Poetics and Plato's Republic. From there, we will engage with a wide range of readings in narrative theory. The second part of the course will focus on critical approaches to narrative, such as gender and narrative, social and political critique of narrative, narratives in the age of artificial intelligence, and conclude with the evolving concept of narrative in the Anthropocene.

AS.300.347. Imagining Climate Change. 3 Credits.
Climate change poses an existential threat to human civilization. Yet the attention and concern it receives in ordinary life and culture is nowhere near what science tells us is required. What are the causes of this mismatch between crisis and response? What accounts for our collective inability to imagine and grasp this new reality, and how can it be overcome? In pursuit of these questions, we will pair literary works and films with texts from politics, philosophy, literary theory, and religion, that frame climate change as a fundamental challenge to our ways of making sense of the human condition.

AS.300.348. Modern Drama. 3 Credits.
This course offers a survey of modern drama, from the mid nineteenth century to the present. We will sample a broad range of dramatic styles and movements in order to uncover the variety of ways theatre has made sense of the human experience over the past two hundred years.

AS.300.349. Capitalism and Tragedy: from the 18th Century to Climate Change. 3 Credits.
In contemporary discussions of climate change, it is an increasingly prevalent view that capitalism will lead to the destruction of civilization as we know it. The notion that capitalism is hostile to what makes human life worth living, however, is one that stretches back at least to the early eighteenth century. In this class, we will examine key moments in the history of this idea in works of literature, philosophy, and politics, from the birth of bourgeois tragedy in the 1720s, through topics such as imperialism and economic exploitation, to the prospects of our ecological future today. Authors to be studied: George Lillo, Balzac, Dickens, Marx and Engels, Ibsen, Weber, Brecht, Arthur Miller, Steinbeck, Pope Francis, and contemporary fiction, politics and philosophy on climate change.

AS.300.366. Russian Avant-Garde Cinema. 3 Credits.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.367. Seeing Like a Woman. 3 Credits.
What does it mean to "see," think, desire, feel, speak, act, or write "like a woman"? Gendered notions of seeing have had an impact on politics and society long before the #metoo movement and far beyond debates about women's rights in isolation. This seminar examines the issues of female desire, subjectivity, spectatorship and performance in fiction, poetry, memoir and film from a variety of cultures and theoretical perspectives. This is not a course on "the image of the woman" in literature, film or politics, but a course in which we examine the ways in which both male and female theorists, novelists, poets, and filmmakers have imagined how women "see," feel, think and behave.
Area: Writing Intensive

AS.300.399. Cinema and Philosophy. 3 Credits.
What do films and philosophy have in common? Do films express, with their own means, philosophical problems that are relevant to our experience of ourselves and the world we live in? This term we will study such issues with a particular focus on questions of justice, truth, revenge, forgiveness, hope, hate, and fear.

AS.300.402. What is a Person? Humans, Corporations, Robots, Trees. 3 Credits.
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.

AS.300.410. China in Imagination. 3 Credits.
What is China? This question has gained new relevance amid the nation's recent rise as a global power. We survey how China was imagined, represented, and conceptualized in literature, film, and philosophical writings from mainland China, overseas Chinese communities, East Asia, and the West from the late nineteenth century to the present. Through exploring this complex history, we aim to understand China and the contemporary world in a diversified, historically self-reflective way. Topics of discussion include, but not limited to, representation, identity, form, allegory, exile, diaspora, modernism, translation, world history, and universality. All readings are in English; all films subtitled in English.

AS.300.418. The Modernist Novel: James, Woolf, and Joyce. 3 Credits.
In this course, we will survey the major works of three of the greatest, most relentless innovators of the twentieth century – Henry James, Virginia Woolf, and James Joyce – who explored and exploded narrative techniques for depicting what Woolf called the "luminous halo" of life.
Area: Writing Intensive

AS.300.421. Introduction to Concepts and Problems of Modern Philosophy, Aesthtics, and Critical Theory. 3 Credits.
This seminar is addressed to first and second year graduate students as well as to advanced undergraduates. It aims at providing a survey of some fundamental concepts and problems that shape modern and contemporary debates in philosophy, literary studies, and the humanities at large. This term we will study in particular notions of existence, language, truth, power, otherness, race, gender, and reality.
Area: Writing Intensive

AS.300.425. Modernities and Comparison. 3 Credits.
Comparative survey of literary modernities in Europe and East Asia (China, Japan, and Korea). We will study works of modern literature as well as critical and philosophical texts from these civilizations in each other's light. We will, as a working hypothesis, begin our examination by bracketing off the conventional center-periphery (Europe-Asia) scheme and considering literary modernities to be singular and contested, yet mutually resonating attempts at reconstruction, restoration, and revolution vis-à-vis the deconstructive forces of capitalist modernity. Ultimately, we will interrogate how we should understand literary modernities in the plural, as they emerged in distant civilizations. Topics of discussion include decadence, repetition, the trope of the human, ideology, the sublime, ritual, and translation. Readings in Hegel, Nietzsche, Mann, Benjamin, Baudelaire, Proust, Breton, Soseki, Kobayashi, Wang Guowei, Lu Xun, and Yi Kwangsu. All readings are in English.

AS.300.437. Literature and Philosophy of the Everyday. 3 Credits.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

AS.300.439. Stories of hysteria. 3 Credits.
Many are the stories that recount episodes of hysteria, and we owe them not only to medicine. To the modern observer, they are a puzzle, involving strange beliefs about wandering wombs, demonic possession, and female virtue (or lack thereof). Closer to our time, contemporary media, as well as accounts in the social and clinical sciences have evoked cases of "mass hysteria" in America and across the globe. Marriage, it was thought for a long time, might be the best cure, which might be the reason case-studies of this illness can be as intriguing and troubling as novels. Against a backdrop of medical and historical materials, we will examine a selection of stories, from the 17th century onward, that evoke aspects of hysteria. They serve as our case-studies and as prompts to study an illness born at the convergence of histories and myths, of medical science, and of cultural and gender assumptions. Among the notions we will explore: The birth of psychoanalysis, trauma and PTSD, the concept of repression, the visual aspects of an illness and its spread in the arts, including cinema.

AS.300.501. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.300.508. Honors Seminar. 3 Credits.
The Honors Seminar is a mandatory component of the Honors Program in Humanities, which offers qualified undergraduates the possibility of pursuing an independent research project in their Junior and Senior years in any humanistic discipline or combination of disciplines: intellectual history, comparative literature, philosophy, critical theory, psychoanalysis, religion, film, etc., as well as points of intersection between the arts and the sciences. Sophomores who plan to study abroad in their Junior year should also consider applying to the Program. In the 2021-2022 academic year, the Seminar will focus on a close reading of Tolstoy's The Death of Ivan Ilych and associated texts by Plato, Montaigne, Heidegger, Beauvoir, Levi, Gawande, and others on death and dying.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.300.601. How to Read Proust?.
Given the difficulty of his prose, closely and patiently would seem the best way to read Proust, but who has time – time to read a book that, ironically, begins with "Longtemps" and ends with "le temps"? This course will offer for critical examination surgically selected passages of A la Recherche du Temps Perdu as a training ground for the (lost?) art of close reading and as entry points into wide-ranging aspects of literary criticism and theory.Open to advanced undergraduates with permission of the instructor.Taught in English. Knowledge of French is desirable, but not required.

AS.300.608. The Physics and Metaphysics of Handwriting.
When word processing machines that can be held in the palm of a hand, why use pen and paper? Handwriting -- and its juxtaposition against digital forms of communication -- offers a unique approach to studying human interactions and the ways in which meaning, truth, intimacy, and agency are shaped by our changing technologies. At a time of exponential growth in machine writing, a study of this older form of communication enables a comparative approach that, perhaps surprisingly, opens up what are contemporary political questions. Centered on a few case-studies involving works by Sand, Chopin, Manet, Giacometti, Mallarmé, and Proust, this course takes a backward glance at a culture of written expression at a great remove from our word processing world and yet explicitly vested in an aesthetics of free expression. This modern graphological culture saw in the tracings of the hand, the uniquely personal marks of an intertwining of mind, body, and of subjectivity. Merleau-Ponty and recent word on embodiment will provide us with critical tools for our investigations into the “physics” of this activity, as will the methods of textual criticism and the new domain of creativity studies. The “metaphysics” of handwriting call, meanwhile, for a return to Heidegger, to Derrida and other major contemporary theorists of writing. They will help us see how hand and digital writing emerge as fundamentally different modes of human expression – philosophically and politically. Knowledge of French is not required for this course. Undergraduates accepted with the permission of the professor.

AS.300.613. Modern Drama.
This course offers a survey of modern drama, from the mid nineteenth century to the present. We will sample a broad range of dramatic styles and movements in order to uncover the variety of ways theatre has made sense of the human experience over the past two hundred years.

AS.300.614. The End of Art.
In this course we will examine Hegel’s seminal claim that art has come to an end in the modern world. In addition to Hegel’s original argument, readings will include important elaborations of the idea by Kierkegaard, Heidegger, and Adorno. In a final section of the course, we will relate these texts to reflections on the function and prospects of art under the unprecedented condition of the Anthropocene.

AS.300.617. Philosophy and Literature in Either/Or.
Celebrated and reviled alike, Kierkegaard’s 1843 Either/Or has been viewed as both the culmination of the Enlightenment project and the birth of existentialism, a playful work of romantic literature and a piece of late-Hegelian philosophy, a vindication of the secular everyday and the articulation of a modern faith in a transcendent God. In this course we read the work closely and in its entirety and pay particular attention to the relation between its philosophical arguments and literary forms of presentation.

AS.300.618. What is a Person? Humans, Corporations, Robots, Trees..
Knowing who or what counts as a person seems straightforward, until we consider the many kinds of creatures, objects, and artificial beings that have been granted—or demanded or denied—that status. This course explores recent debates on being a person in culture, law, and philosophy. Questions examined will include: Should trees have standing? Can corporations have religious beliefs? Could a robot sign a contract? Materials examined will be wide-ranging, including essays, philosophy, novels, science fiction, television, film. No special background is required.
Area: Writing Intensive

AS.300.620. Cosmopolitanism: Conflicted Legacies, Potential Futures.
In its modern version cosmopolitanism is a defining aspect of Enlightenment that bespeaks its emancipatory aspirations as well as the shortcomings of its Eurocentric and gendered presuppositions. In our time of resurgence of violent nationalisms and mass refugees crises, this seminar aims at reassessing the conflicted legacies of cosmopolitanism and its critical value for the present. Authors studied include: Montaigne, Kant, Marx, Derrida, Lévinas, Kwame A. Appiah, Seyla Benhabib, and others.

AS.300.621. Immersive Poetics and Permeable Screens.
Victor Shklovsky claimed that the art exists “to return sensation to life, to make us feel objects, to make a stone feel stony.” This seminar examines various ways of understanding Shklovsky’s concept of ostranenie (“enstrangement”) across media (literature, art, cinema, and beyond) and in comparative perspective, considering the problematics of politics, philosophy, and aesthetic form. Students will be encouraged to present on texts in their own area of expertise over the course of the term.

AS.300.622. The Concept of World: From Descartes to the Apocalypse.
In this course we will examine the idea of the world as it operates in a range of different literary, philosophical, and theoretical contexts. Beginning with the birth of the modern world in texts like Camões’s “The Lusíads,” Descartes’s “Le Monde,” and More’s “Utopia,” we will pursue its evolution through Baumgarten’s invention of aesthetics, Kant’s critique of dialectical reason, Husserl’s phenomenology, and Heidegger’s fundamental ontology, to the rise of world literature and the study of indigenous cosmologies in contemporary anthropology. We conclude with reflections on the end of our world in the Anthropocene and its implication for the humanistic disciplines. This course serves as the proseminar in methods and theory for graduate students in Comparative Thought and Literature but is open to students in all departments.

AS.300.624. Logics of Recognition.
Since the publication of Hegel’s Phenomenology of Spirit, the struggle of consciousness for recognition has played an important role in moral and political philosophy. This seminar aims at studying Hegel’s account of subjectivity and its antagonistic encounter with the other as well as the responses and critiques it has elicited in contemporary philosophy. Readings include Foucault, Butler, Derrida, Lévinas, Cavell, Honneth and others.

AS.300.625. Russian Literary and Critical Theory.
Close reading of major authors from the Russian literary theoretical and critical tradition including Bakhtin, Eikhenbaum, Jakobson, Lotman, Shklovsky and Tynianov. Student will present primary sources or case studies from their own fields and research.

AS.300.628. Introduction to Concepts and Problems of Modern Philosophy, Aesthtics, and Critical Theory.
This seminar is addressed to first and second year graduate students as well as to advanced undergraduates. It aims at providing a survey of some fundamental concepts and problems that shape modern and contemporary debates in philosophy, literary studies, and the humanities at large. This term we will study in particular notions of existence, language, truth, power, otherness, race, gender, and reality.

AS.300.629. Theory, Now and Then: Autonomy, Form, Critique.
This course explores recent developments and disputes in critical theory in relation to their longer philosophical genealogies. The three topics—form, autonomy, and critique—have been the subject of much recent debate, contention, and new analysis, yet each was also a source of critical and philosophical interest in years past. Our aim will be to make sense of today's interventions in conversation with earlier theory. "Historical" theory writing will include Adorno, Lukács, Cavell, and Jameson; contemporary theory will include Nicholas Brown, Rita Felski, Caroline Levine, Mark McGurl, and Toril Moi.

AS.300.631. On Literature and Ethics.
Arguments for the immorality of literature, the morality of literature, and the amorality of literature. Can a literary text be evaluated on ethical grounds, and how? How do literary texts make ethical arguments? What does it mean to read literary texts or do literary criticism in an ethical mode? We will be concerned throughout with the philosophical uses, and abuses, of literary forms.
Area: Writing Intensive

AS.300.635. Foucault's Late Seminars: the Courage of Truth and the Care of the Self.
In his latest seminars Foucault shifts his attention from power relations and historical scientific paradigms to the study of the history and philosophical, ethical, and political implications of the knowledge and care of the self as well as its relation to truth. In our current context, where speaking of a supposed "post-truth" epoch is commonplace, the analysis of the later works of Foucault provides precious insights in the nature of subjectivity, social and power relations, and the enduring significance of the search for truth regardless of any particular epistemological attempt to define what 'truth really is.'

AS.300.638. Happy and Unhappy Words: Austin, Wittgenstein, and Cavell.
This seminar studies how words help shaping the world we inhabit and how the power and limits of language affect the possibility of living in a shared world in the works of Austin, Wittgenstein, Cavell and others.
Area: Writing Intensive

AS.300.639. Literature and Philosophy of the Everyday.
The ordinary, the common, the everyday: why does literary realism consider the experiences of the average individual to be worthy of serious contemplation? In this course, we will read closely a set of novels by Flaubert, Mann, Dickens, Eliot, Zola,Tolstoy, and Woolf from the period between 1850 and 1950 in which the development of realism reaches it climax. These novels transform the conventions for the representation of lives of lower and middle class subjects, revealing such lives as capable of prompting reflection upon deep and serious questions of human existence. Theoretical and philosophical texts on the everyday by Auerbach, Kierkegaard, Heidegger, Sartre, Beauvoir, Lefebvre, Certeau, and Wittgenstein will accompany our discussions.

AS.300.647. Comparative Methods and Theory: Formalism and Materialism (Graduate Pro-Seminar).
This pro-seminar provides a brief overview and map of the theoretical and philosophical positions in the major debate, still ongoing, between formalism and materialism. Its aim is both theoretical and historical: to help graduate students understand the range and depth of these positions as well as their development over time, continuing to this day. We will study fundamental philosophical works (Kant, Hegel, Marx, de Beauvoir), classic theoretical texts (Propp, Lévi-Strauss, Foucault, Derrida, Bourdieu), and contemporary variations on these debates (Fish, McGurl, Moi, Pippin), to name a few. The course fulfills the pro-seminar requirements in comparative methods and theory for CTL but is open to all graduate students.

AS.300.666. Russian Avant-Garde Cinema.
Russian cinema was born out of the intense artistic experimentation of the fin-de-siècle avant-garde and developed in a climate of dramatic political and cultural change in the twenties and thirties. While subject to draconian censorship in the Soviet period, it nonetheless engaged in active dialogue with the film industries of Western Europe and America and had a lasting impact on world cinema. This course examines the extraordinary flourishing of avant-garde cinema in the Soviet Union in the 1920s and 30s including films by Eisenstein, Vertov, Pudovkin, and Dovzhenko, their theoretical writings, and their far-reaching influence on film and film theory. All readings in English, films subtitled in English.
Area: Writing Intensive

AS.300.802. Independent Study Field Exam.

AS.300.803. Dissertation Research.

AS.300.804. Dissertation Research.

AS.300.805. Literary Pedagogy.

AS.300.810. Thesis Seminar.
Thesis Seminar.

AS.300.811. Independent Study.
New course

AS.300.891. Summer Research.
Summer Research

AS.310 (East Asian Studies)

AS.310.106. Introduction to Korean History and Culture. 3 Credits.
This course offers a comprehensive overview of Korean history and culture from ancient times to the modern era. Through primary, secondary, and audio-visual sources, students will become familiar not only with the overall contours of the entirety of Korean history, but also with its cultural and religious legacy. The course combines lectures and class discussions.

AS.310.107. Introduction to Korean Studies. 3 Credits.
This course offers a comprehensive overview of Korean history, politics, and culture encompassing premodern, modern, and contemporary times. Through primary and secondary materials, students will learn about the formation of Korea as a complex interplay of dynastic changes, wars, colonialism, rapid modernization, migrations, and minority and diasporic politics. We will approach the study of Korea through a cultural studies perspective, paying close attention to systems of power, ideology, gender, race, and class.

AS.310.110. Literatures and Films of Korea and the Korean Diaspora. 3 Credits.
This survey course introduces students to major events and themes addressed in Korean literature and film such as: Japanese colonialism, modernity, capitalism, the Korean War, rapid industrialization, postmodernity, immigration, transnational adoption, and more. Students will examine the role of literature and film in the development of the nation and the depiction of the Korean and Korean-diasporic subject as a complex set of intersecting social identities that contend with race, class, and gender.
Area: Writing Intensive

AS.310.210. Documentary Photography in a Changing China. 3 Credits.
This course aims to inspire students to explore the impacts, meanings, and explanations of social transformation in contemporary China, via the lens of documentary photography. The photographic images of selective topics will include the products of photojournalism and documentary photography, and several documentary films, by both Chinese and non-Chinese photographers. While one picture is worth thousand words, one picture may also provoke countless interpretations. Students are strongly encouraged to read broadly about different aspects of social transformations in contemporary China, and to select and curate their own subjects of photo images. The spirit of comparative study of documentary photography of China and other parts of world will be strongly encouraged. Active class participation is imperative. A small exhibition on the campus will be organized by the Spring semester. The course is designed for upper division undergraduates. Cross-listed with Sociology and International Studies (CP).

AS.310.230. Chinese Politics and Society. 3 Credits.
This introductory course will familiarize students with the major dynamics of political and social change in contemporary China since 1949. The course will be divided chronologically into four main topics: 1. The contested processes of nation-state making in modern China before 1949; 2. The making of the socialist system during the Mao Years and its dismantling since 1978; 3. The Reform Era transformation to a market economy with Chinese characteristics; 4. The dynamic relationships among the state, market and society since the new millennium. Students will explore how scholars have explained major political and social changes with reference to individual and collective rationalities, specific organizational and institutional arrangements, and specific strategic and cultural mechanisms of Chinese political and social habits.

AS.310.285. Chinese Leaders: Institutions and Agency. 3 Credits.
This course is a broad survey of what leadership looks like in China. The main through-line of the course is the how China's leaders navigate the often challenging terrain between constraints and incentives, on the one hand, and opportunities to apply their own individual agency. We will explore the state as the arena in which all this takes place over time (to explore continuity and change) and across space (to explore adaptation and innovation). The course does not presume prior knowledge of China or Chinese language, but students new to the study of China are encouraged to pay special attention to the cumulative nature of the course and invest in the readings, particularly in the first four weeks. Although some of the themes of this course may minimally overlap with/reinforce other Chinese politics courses offered at JHU, the approach to this class will be significantly different.

AS.310.302. China, Human Rights, and U.S. Policy Responses. 3 Credits.
This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will "adopt" one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights. This seminar explores select human rights issues in China (e.g., human rights impacts of the management of COVID-19, the Hong Kong protests, mass detentions/forced labor in Xinjiang province) and the extraterritorial reach of China's human rights challenges. As a practice and policy-oriented course, we will also investigate different responses and actions taken by the U.S. government and Congress, including hearings, legislation, reports, statements, etc. Class assignments include advocacy for Chinese prisoners of conscience (each student will "adopt" one currently detained PoC), and written work that mirrors real-world writing. We'll also have several human rights advocates and experts visit the class to share their experiences and insights.

AS.310.305. China, Southeast Asia, and U.S. National Security. 3 Credits.
The global political and security landscape of the 21st century will be shaped by the rivalry between two superpowers -- China and the U.S. For the foreseeable future, the geographic focus of that contest will be Southeast Asia and the surrounding maritime space, particularly the South China Sea. Southeast Asia is a complex, highly differentiated region of ten-plus nations, each with its own unique history and relationship with China. This course will introduce Southeast Asia as a key region -- geographically, economically, and strategically -- often overlooked by policymakers and scholars. It will also focus on the craft of national security strategy as the best tool for understanding the multi-sided competition, already well underway involving China, the U.S., and the Southeast Asian states.

AS.310.316. First Year Classical Chinese: Philosophers, Poets and Fantasists: An Introduction to Chinese Literature in the Original Classical Texts. 3 Credits.
We will read arguments, anecdotes and stories, beginning with the philosophers of the ancient period, including the imaginative paradigms of the Daoist writer Zhuangzi, and continue with the strange writings allied with shamanism and goddess-worship. We will continue with the fantastical writers of the medieval world and finish with anecdotes of the strange from the Ming and Qing. Because this is a language as well as a literature class, in addition to literary content and social history as background, we will emphasize grammar and vocabulary. Class preparation will require language exercises, translations, readings in English and there will be a final translation/research paper.
(AS.373.115 AND AS.373.116) OR (AS.373.111 AND AS.373.112) OR (AS.378.115 OR AS.378.116) or Instructor permission.

AS.310.318. Eurasia's Transformation and the Global Implications. 3 Credits.
Eurasia, stretching from the Western Europe across Russia, Central Asia, and China to the Pacific, is by far the largest continent on earth, with a massive share of global population, economic output, and key natural resources. It has been traditionally Balkanized. Yet since the late 1970s, due to China's modernizations, the collapse of the Soviet Union, and a series of global geo-economic shocks, the nations of this Super Continent have become increasingly interactive, creating fluid new trans-regional political-economic patterns that remain remarkably unexplored. This course explores the critical junctures that made Eurasia the dynamic, growing colossus that it is becoming today, as well as the global implications, from a unique problem-oriented perspective. It looks first at the developmental and political challenges confronting China, Russia, and key European states as the Cold War waned, how the key nations coped, and how they might have evolved differently. It then considers the new challenges of the post-Cold War world, and how national and local leaders are responding today. Particular attention is given, in this problem—centric approach, to the challenges that growing Eurasian continental connectivity, epitomized in China's Belt and Road Initiative, are creating for US foreign policy and for the grand strategy of American allies in NATO, Japan, and Korea. Note: Some familiarity with Eurasian history and/or politics is recommended
Area: Writing Intensive

AS.310.319. Gender & Sexuality in Korea and Asia. 3 Credits.
Utilizing an interdisciplinary approach, this course examines the role that gender and sexuality play within primarily the South Korean polity and in Asia. Drawing on queer studies, feminist studies, and critical Asian studies, the class will offer a foundational framework from which to analyze how social constructs around gender and sexuality play a major part in the marginalization of communities and their access to rights and representation. We will explore questions of kinship, family, love, and intimacy as they pertain to the larger thematics of the course.
Area: Writing Intensive

AS.310.320. Sociology of Urban China. 3 Credits.
Urban China has gone through two major social transformations since 1949: the embrace of a central planning socialist system between early 1950s and late 70s, and the embrace of neo-liberal market economy in the so-call "socialism with Chinese characteristics" since 1980. While the political regime remains the same over time, many profound changes have occurred in economic life, social life, cultural life, spiritual life and civil life. What really happened in the social transformation of urban China? What would explain those changes? How did people in different walk of life deal with those huge and deep social transformation? To address these concerns, we will exam a list of issues. Topics includes changes in population and demographic characteristics, employment structure and job market, workplace and residential communities, income and wealth distributions, segregation impacts of urban household registration systems, urban consumption patterns, courting cultures and dressing codes, spiritual practices, and social mobility and social stratifications. In the realm of public policies, we will pay special attentions to the issues of transportation, housing, medical service, public education, social insurance, and environmental protection. We will also study the characteristics of contentious politics and how social conflicts of power, interest, justice, cultural and belief were processed in urban China.

AS.310.322. Korean History Through Film and Literature. 3 Credits.
In this course, students will engage with select topics in Korean history from premodern and modern times and examine how the past has been represented through various forms of film and literature. This will be combined with readings of academic articles to allow students to gauge the distance between scholarship and cultural expressions of history. Through this, students will be introduced to the highly contested and often polarizing nature of Korean history and the competition surrounding historical memory. Prior coursework in East Asian Studies strongly recommended.
Area: Writing Intensive

AS.310.324. Belonging and Difference in Modern Korea. 3 Credits.
Drawing on critical race theory, and gender and sexuality studies, this course provides the analytical framework necessary to grapple with how belonging and difference are produced, manifested, and challenged within Korea's citizenry. Students will gain knowledge on modern Korea and its diasporas and examine its construction as one rooted in a history of empire, nationalism, militarism, and neoliberalism.
Area: Writing Intensive

AS.310.326. Labor Politics in China. 3 Credits.
This course explores the transformation of labor relations in China over the past century. It will cover the origins of the labor movement, the changes brought about by the 1949 Revolution, the industrial battles of the Cultural Revolution, the traumatic restructuring of state-owned enterprises over the past two decades, the rise of private enterprise and export-oriented industry, the conditions faced by migrant workers today, and recent developments in industrial relations and labor conflict. The course is designed for upper division undergraduates and graduate students. Cross-listed with Sociology and International Studies (CP).
Area: Writing Intensive

AS.310.328. COVID-19 and Human Rights in Asia. 3 Credits.
This seminar explores the impact of the Covid-19 pandemic and government responses on a range of human rights in Asia, with a focus on the cases of China, Japan, Taiwan, India, South Korea, and Myanmar. In the first part of the course, we will investigate the fundamentals of the international human rights system, the foundational Universal Declaration of Human Rights and core human rights treaties, and the role of civil society in protecting, defending , and advancing human rights. We will then explore the United Nations' human rights-based guidance for Covid-19 response and prevention, the right to health, and approaches to the balancing of rights and duties, including freedom of movement, freedoms of association and assembly, individuals' right to health and duties to others, the right to education, rights to privacy, freedom of expression, right to information (and the problem of disinformation) and governments' emergency powers (and their limits) to protect public health. Inequities and discrimination exacerbated by the Covid-19 pandemic will also be discussed, as will the necessity for international cooperation to effectively battle Covid-19 and vaccine inequity.

AS.310.335. Theorizing Race and Mixed-Race in Asia and its Diasporas. 3 Credits.
This class will explore the construction of race and its applications in Asia and its diasporas. Using the notion of "mixed-race" as an analytic, we will examine how the colonial origins of race and the ensuing Cold War have influenced concepts of national identity and belonging. Employing an inter-sectional approach towards race, gender, and sexuality, the course will draw on a variety of media including memoirs, archives, and videos, to contemplate the locus of race and mixed-race and their importance within the larger nexus of identity formation in Asia and its diasporas.
Area: Writing Intensive

AS.310.340. Development and Social Change in Rural China. 3 Credits.
This course will survey the major issues of development and social change in rural China since 1950s. These issues will be addressed in chronological order. They include land ownership and land grabbing, organization of rural economic, political, and social life, rural elections and village governance, development strategies, urban-rural relationship in resource allocation, rural modernization strategies in regard to irrigation, clean drinking water, electricity supply, hard paved road, education and rural medical service, women's rights and family life, rural consumption, and etc. This course will prepare students, both empirically and analytically, to understand what happened in rural China from 1949 to the present, and how we can engage in policy and theoretical discussions based on what we learn.

AS.310.431. Senior Thesis Seminar: East Asian Studies. 3 Credits.
The East Asian Studies Senior Honors Thesis Seminar is a workshop for EAS majors writing an honors thesis. It is a year-long course with meetings scheduled in both the fall and spring semesters. Please note that in order to qualify for honors in the major, the thesis must receive a final grade of A- or better. Students will receive credit for the seminar regardless of whether their thesis qualifies for honors.
Area: Writing Intensive

AS.310.432. Senior Thesis Seminar: East Asian Studies. 3 Credits.
This course is the continuation of Senior Thesis Course AS.360.431 for students completing their thesis in the East Asian Studies program.
Area: Writing Intensive
AS.310.431

AS.310.501. Independent Study - East Asia. 1 - 3 Credits.
Students carry out an independent research project involving East Asia. You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.360 (Interdepartmental)

AS.360.105. Intro to Hopkins: Arrive & Thrive. 1 Credit.
Explore the University. Engage with people. Empower yourself. Chart your expedition at Hopkins. In this freshman-only course, students will explore Hopkins' academic resources and opportunities to integrate their academic, career, and personal goals for college and beyond. Students will be exposed to topics including learning strategies, academic planning, and campus culture. Students will develop a personalized plan for success and make some new friends.

AS.360.111. Special Opportunities in Undergraduate Learning Tutorials. 1 Credit.

AS.360.133. Freshman Seminar: Great Books at Hopkins. 3 Credits.
Students attend lectures by an interdepartmental group of Hopkins faculty and meet for discussion in smaller seminar groups; each of these seminars is led by one of the course faculty. In lectures, panels, multimedia presentations, and curatorial sessions among the University's rare book holdings, we will explore some of the greatest works of the literary and philosophical traditions in Europe and the Americas. Close reading and intensive writing instruction are hallmarks of this course; authors for Fall 2020 include Homer, Plato, Dante, John Donne, George Herbert, Christina Rosetti, Mary Shelley, Friederick Nietzsche, Isaac Bashevis Singer, Frederick Douglass.
Area: Writing Intensive

AS.360.146. Epidemics, Pandemics, & Outbreaks. 1 Credit.
In the midst of a global pandemic that has shifted the ways in which we move, work, and interact with others around the world, it is more important than ever to have a deeper understanding of how outbreaks, epidemics, and pandemics have evolved. You'll review select communicable (COVID-19, Ebola, Zika, and HIV) and non-communicable (diabetes, cancer, cardiovascular disease, injury, and mental health) diseases in public health around the world. Examine the global burden of these diseases and the various forms of prevention efforts undertaken by global and national organizations. This program will use a combination of lecture, discussion, and student presentation format to encourage broad participation.

AS.360.201. The Memoir: Personal Experience in Health Disparity. 3 Credits.
Memoir is an adept genre for expressing the sociological through the personal; this course will use memoirs to examine health care disparities. The course materials will be interwoven with visits from guest speakers who are either practicing clinicians or research scientists grappling with these same inequities. For example, when we address gender and concepts of masculinity and sexuality, we will have a discussion with a gender-reassignment surgeon. Every text will have a corresponding professional speaker. There will be a particular emphasis on medical memories, contemporary debates, and experiences that critically examine how factors such as race, gender identity, and ability impact our humanity and our health outcomes.
Area: Writing Intensive

AS.360.247. Introduction to Social Policy and Inequality: Baltimore and Beyond. 3 Credits.
This course will introduce students to basic concepts in economics, political science and sociology relevant to the study of social problems and the programs designed to remedy them. It will address the many inequalities in access to education and health care, unequal treatment in the criminal justice system, disparities in income and wealth, and differential access to political power. The focus will be on designing effective policies at the national and local level to address these pressing issues. This course is open to all students, but will be required for the new Social Policy Minor. The course is also recommended for students who are interested in law school, medical school, programs in public health, and graduate school in related social science fields. This course does not count as one of the required courses for the Economics major or minor, but it is required for the Social Policy Minor. Cross list with Sociology, Economics and Political Science. Freshman, Sophomore and Juniors only.
Area: Writing Intensive

AS.360.308. Policy and Practice in Human Services. 3 Credits.
This course will focus on the policies that frame human service programs and the methods that are used to deliver them. Course content focuses specifically on child welfare and provides an opportunity for students to study why it is so hard to get good work done by government for vulnerable populations. Students will be given the opportunity to review the challenges of implementing programs and reforms in government and to consider the impact human services have on the population served. This unique course is taught by Professor Tierney, who spent 25 years in the public sector in Chicago, DC and most recently at the helm of the social services agency in Baltimore.

AS.360.331. Methods for Policy Research. 3 Credits.
This course will introduce students to quantitative methods for studying social policy problems. Topics to be covered include descriptive statistics and sampling, correlation and causation, simple and multiple regression, experimental methods, and an introduction to cost-benefit analysis. The emphasis will be on the selection, interpretation and practical application of these methodologies in specific policy settings, rather than with formal proofs. Skills will be reinforced by hands-on exercises using statistical software. Over the course of the semester, students will critically analyze policy reports and empirical research in a range of policy areas and learn how to present this research to a non-specialist audience. Finally, we will discuss the pros and cons of quantitative vs. qualitative methodologies. The course will conclude with group presentations that draw on all these skills. Enrollment restricted to Social Policy minors only.

AS.360.339. Planets, Life and the Universe. 3 Credits.
This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.334 OR AS.020.616 OR AS.171.333 OR AS.171.699 OR AS 270.335 OR AS.360.671

AS.360.366. Public Policy Writing Workshop. 3 Credits.
This workshop is designed to hone the analytical and communications skills necessary for effective formulation and advocacy of public policy. Topics include how to develop op-ed pieces and other forms of advocacy journalism, memoranda, position papers, and grant proposals. The workshop puts special stress on how to make a clear and persuasive exposition of complex or counter-intuitive policy arguments in the market place of ideas, including the challenges of writing for popular journals and communicating to specific audiences both in and out of government. Students receive intensive individual instruction, including close editing of their work and advice on how to publish or promote it in the public sphere. Enrollment restricted to Social Policy minors only.
Area: Writing Intensive

AS.360.401. Social Policy Seminar. 3 Credits.
This course is designed for students who have completed either the Baltimore intensive semester of the Social Policy Minor. The students will make presentations and pursue joint projects based on what they have learned during the intensive semesters concerning key social policy issues.

AS.360.408. Experiential Research Lab: "Holy" Conquest: Religion and Colonization in Sixteenth-Century Mexico. 3 Credits.
"When the Spanish unleashed their regime of colonization of what is present-day Mexico, their primary justification was the religious salvation of Indigenous people. Spaniards, along with other Europeans, arrived by the boatload to impose colonial order, taking up bureaucratic and ecclesiastical positions. The result was far from smooth—the sixteenth-century saw widespread disease, missionary violence on behalf of salvation, crop destruction and the recultivation of land, urban plans that radically altered the environment, the resettlement of entire populations, among other dramatic social and environmental events. This course investigates the complex and dynamic elements of colonial New Spain (as Mexico was called) from an interdisciplinary perspective. It tries to make sense of the chaotic landscape of the first century of Spanish colonial rule in New Spain. It is a research and writing intensive course that serves as an introduction to both the history and art history of this place and moment. Our meetings will act as a springboard for a group trip to Mexico during the January intersession to study objects and spaces in situ. Final projects will relate to materials viewed in person in Mexico. The costs for this trip are included for all students, no fees required. Knowledge of Spanish preferred but not required.
Area: Writing Intensive

AS.360.409. Humanities Research Lab: Documentary Pre-Production. 3 Credits.
This class will be a hands-on experience for students to be involved in the early stages of a documentary's making. Students will be working with the professor on researching, planning, and writing the treatment for a documentary about a forgotten feminist play (1927) from pre-Holocaust Vienna, where diversity and progressive thought were still possible. This romantic comedy centers around a self-determined matriarch, Therese, helping her three daughters navigate the expectations of rigid, societal beliefs – often leading by example – as they find their way into adulthood. Moving back and forth between the archive of its time both through the re-appropriation of Nazi newsreels and propaganda films, as well as ephemeral films of the time and the the new staging of the play, the film will take the audience inside a theater space where a vibrant environment of escapism smashes against the harsh reality of its time, which is as vivid as it was 80 years ago.

AS.360.420. Humanities Research Lab: Making Maps of Mexico. 3 Credits.
Learn the basics of ArcGIS and data management as you help Prof. Lurtz publish an agricultural dataset and maps from 10 years before Mexico erupted in revolution. No experience necessary.

AS.360.528. Problems in Applied Economics. 2 Credits.
This course focuses on a monetary approach to national income determination and the balance of payments. Money and banking, as well as commodity and financial markets, are dealt with under both central banking, as well as alternative monetary regimes. Particular emphasis is placed on currency board systems. Students learn how to properly conduct substantive economic research, utilizing primary data sources, statistical techniques and lessons from economic history. Findings are presented in the form of either memoranda or working papers of publishable quality. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a requisite.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.360.551. Arts and Sciences Research Practicum.

AS.360.603. Graduate Orientation and Academic Ethics.

AS.360.612. Media Theory and Modernity.
This course will engage with 20th century critical theory and social inquiry that wrestles with the idea that new mediations have profoundly altered the character of human experience and subjectivity, and it will consider the questions that these theorists pose for our disciplines. How have modern subjectivity, gender, affect, reason, and politics been shaped by the technologies and structures of representation that mediate them? Among figures of interest: Marx, Freud, Eisenstein, Benjamin, Bakhtin, Adorno, Deleuze, Guy Debord, Haraway, Stuart Hall, Teresa de Lauretis, Kitterer, Sobchack, Berlant, Latour, Linda Williams, Ranciere, Orit Halpern.

AS.360.623. Latin America in a Globalizing World.
An interdisciplinary seminar on Latin America's role in global economic processes, from both historical and contemporary perspectives. Participants will engage with scholarly and primary texts as well as share written work. The Fall 2022 seminar will examine the topic of Latin American political thought.

AS.360.624. Responsible Conduct of Research (Online).
You do not need to register for any course in SIS. Within six weeks after course completion, the following entry will appear on your JHU transcript: "AS.360.624 – Responsible Conduct of Research (Online)"

AS.360.625. Responsible Conduct of Research.
Through a discussion-based curriculum, the Responsible Conduct of Research course introduces students to key research issues: academic ethics, animal subjects, conflict of interest, data management and authorship, and human subjects.Attendance to all meetings is required to receive credit for the course.

AS.360.626. Latin America in a Globalizing World II.
The second in a two-semester graduate sequence, this course will be for graduate students and faculty to collaboratively workshop their own research and writing on topics related to Latin American studies.

AS.360.671. Planets, Life and the Universe.
Replace description with the following--"This multidisciplinary course explores the origins of life, planet formation, Earth's evolution, extrasolar planets, habitable zones, life in extreme environments, the search for life in the Universe, space missions, and planetary protection. Recommended Course Background: Three upper level (300+) courses in sciences (Biophysics, Biology, Chemistry, Physics, Astronomy, Math, or Computer Science)
Students may not register for this class if they have already received credit for AS.020.616 OR AS.020.334 OR AS.171.333 OR AS.171.699 OR AS.270.335 OR AS.360.339.

AS.360.781. Preparation for University Teaching.
Full-time A&S Graduate Students only. This course will prepare graduate students to teach at the university level. Topics covered include large and small class teaching, characteristics of student learning, syllabus construction, grading students, and developing a teaching portfolio. Co-listed with EN.500.781

AS.360.800. Dean's Teaching Practicum.

AS.360.851. Arts and Sciences Research Practicum.

AS.361 (Program in Latin American Studies)

Cross-listed courses applicable to the PLAS minor include:

AS.010.205 (01) Art of Mesoamerica

This course provides a basis for the study of Mesoamerican visual cultures and urban settings. We will explore the artistic production of the Olmec, Maya, and Aztec as well as works created by the artists of Teotihuacan, Monte Albán, and West Mexico. With a focus on aesthetics and cultural function, case studies range from stone sculpture, painted ceramics, and screenfold codices, to architectural complexes from Mexico and Central America. Themes to be discussed include: representations of humans and deities, monumentality and rulership, mutilation and destruction of monuments, and ritual and political significance of materials.

AS.010.398 (01) Tombs for the Living

Centering on the tomb as the unit of analysis, this course examines the cultural and material aspects of death and funerary ritual. Case studies are drawn from North America, Mesoamerica, and the Andes. Collections study in museums.

AS.010.350 (01) Body and Soul: Medicine in the Ancient Americas

This course examines curative medicine in the Americas through its visual culture and oral histories. Philosophies about the body, health, and causes of illness are considered, as are representations of practitioners and their pharmacology. Case studies are drawn from cross the Americas (Aztec, Moche, Aymara, Paracas, American SW). Collections study in museums, Special Collections.

AS.100.115 (01) Modern Latin America

A class combining Latin American history since independence and digital humanities (revised with 2021 student feedback). Students will build guided research projects while thinking about questions of republicanism, freedom and unfreedom, migration, and development.

AS.100.379 (01) Brazil History and Cultures: A Glance from Baltimore

Using textual and visual documents (including books from Peabody Library), we will examine the contrasts of Brazilian history and culture, and its connections with 19th and 20th century Baltimore.

AS.140.685 (01) Histories of Reproduction

While there is a vast literature on reproduction in a global context, this course will focus on the arc of what we might call decolonial histories of reproduction—those that center issues of justice, freedom, intimacy, and agency, as well as cultural negotiation, conflict, and change. Students will write critical histories of reproduction, with attention to the ways in which reproductive politics interface with institutions that exert hegemonic, racialized, gendered, and ableist forms of state power and colonial power. We will also appreciate the ways in which reproduction interacts with other—non geographically-bound, non-institutionalized, and non-state mediated—forms of biopolitical power. We will analyze how the historiography has evolved over time and discuss future directions in the field.

AS.190.306 (01) Latin American Politics and Society in Comparative and Historical Perspective

The seminar will introduce students to the political and economic trajectories of Latin America as a whole and of individual countries, including Mexico, Brazil, Argentina, and Chile. Special attention will be paid to the long-term trajectory of the political regime (democracy versus dictatorship) and of economic development (variations in GDP per capita). Competing theories, from economic dependence to historical institutionalism, will be examined for their contribution to our understanding of Latin America's relative economic backwardness and low quality democracies.

AS.211.294 (01) Freshman Seminar: Soccer in Brazil: Opium of the Masses

Futebol offers a unique perspective on politics, race and citizenship in Brazil. This course seeks to understand Brazilian culture through the historic national pastime of futebol. In addition to the main textbooks chosen for the class, by reading a variety of texts from newspapers, academic journals, fiction and film, students will be able to find their own approach to understanding the phenomenon of futebol within the social and political traditions of Brazil. No knowledge of Portuguese is required, but those who can read in Portuguese will have an opportunity to do so. Everyone will learn some Portuguese words and expressions. This class may count toward the Minor in Portuguese.

AS.211.394 (01) Brazilian Culture & Civilization
Did you know that Brazil is very similar to the United States? This course is intended as an introduction to the culture and civilization of Brazil. It is designed to provide students with basic information about Brazilian history, politics, economy, art, literature, popular culture, theater, cinema, and music. The course will focus on how Indigenous, Asian, African, and European cultural influences have interacted to create the new and unique civilization that is Brazil today.

AS.215.407 (01) Power And Gender In Hispanic American Novels And Films

We will analyze and discuss four novels and three films impacted by gender violence and political idolatry under shattering stress. Oficio de tinieblas or The Book of Lamentations (1962) by Rosario Castellanos (Mexico). Zama (1956) by Antonio di Benedetto (Argentina). Delirio or Delirium (2004) by Laura Restrepo (Colombia). El ruido de las cosas al caer or The Noise of Things Falling (2011) by Juan Gabriel Vásquez (Colombia). In addition, we will examine in depth films by Lucrecia Martel (Argentina): the short Rey muerto (1995), La ciénaga (2001), and her own version of Zama (2017). Course taught in Spanish.

AS.217.425 (01) Latin American Ecocriticism

Increased awareness of climate change has led to a shift in the way we address and intervene in environmental issues in the new millennium. Yet the interest in making sense of the environment has a long history in literature and the arts. How have Latin American writers and artists understood and depicted their environments and environmental questions? How do the form and content of texts and cultural artifacts influence our understanding of the non-human world? Can works of fiction shape ecological transformations? In this course we will discuss texts from the early colonial period to the present, including the literary works of Graciliano Ramos, Horacio Quiroga, and Clarice Lispector; political ecology; film; Ana Mendieta's earth-body art; contemporary experiments in bio-art; postcolonial theory; and the intersection of environmental justice with such topics as nationalism and human rights. Going beyond ecocriticism's original focus on the Anglo-American world, we will engage recent scholarship on Latin America that sheds light on the region's cultural and geopolitical importance to the global climate, with particular attention to Brazil. This course aims to introduce students to current debates in Latin American Ecocriticism and the Anthropocene and thus contribute to an incipient but expanding field.

AS.217.427 (01) Radical Women: Brazilian Literature, Art, and Culture

The vast body of work produced women artists and writers in Brazil has been marginalized by canonical cultural narratives, which are now being contested by a spate of scholarly and artistic projects. This course spotlights the production of women from the early twentieth century to the present, including renowned and lesser-known works. We'll discuss art, literature, and film alongside feminist theory, exploring radicality as it relates to aesthetics and politics. How do women's art, literature, and thought engage with and transform Brazilian cultural production? What are their contributions to global discussions about gender and sexuality? How do these works respond to historical events? Among the topics addressed are the body, feminism, race, indigeneity, and politics. We'll study Clarice Lispector's acclaimed stories, the first Brazilian proletarian novel written by modernist icon Patricia Galvão, known as Pagu, the diaries of Carolina Maria de Jesus, the emblematic paintings of Tarsila do Amaral, and Lygia Clark's artwork, as well as the booming scene of contemporary cinema and poetry.

AS.230.342 (01) Resistance, Rebellion, and Revolution in Latin America

This course will examine the dynamics of transformative social change in Latin America and the Caribbean through analyses of resistance, rebellion, and revolution. Because revolutionary change is at once the most transformative and the most rare, this course will cover the exemplary cases of the Haitian, Mexican, and Cuban revolutions, but then also ask how theorists have understood the dynamics of both open rebellion and of everyday resistance in societies deeply structured by racial, gender, and class power, situated within an unequal world system. Attending to both local and global dynamics, this course will ask how Latin American dynamics have both conformed to and challenged universalist theories of social change.

AS.230.397 (01) The Political Economy of Drugs and Drug Wars

In the United States, we spend more than $100 billion annually on illegal drugs—and the government spends more than $50 billion a year to combat their sale and use. These statistics raise important and complicated social questions. This course will examine the production, sale, use, and control of illegal drugs from a historical and sociological perspective. We will have three objectives: to understand the social construction of drug use and illegality in the United States and other rich countries; to uncover the political and economic consequences of drug trafficking in those countries that produce drugs, particularly in Latin America; and to examine the political economy of drug control through the so-called War on Drugs, both domestically and internationally.

AS.360.420 (01) Humanities Research Lab: Making Maps of Mexico

Learn the basics of ArcGIS and data management as you help Prof. Lurtz publish an agricultural dataset and maps from 10 years before Mexico erupted in revolution. No experience necessary.

AS.376.342 (01) Caribbean Music

This course will explore the many genres of traditional and popular music that have emerged among the peoples and cultures of the Caribbean region and its Diaspora. We will examine the social, political, and economic issues that have shaped the region's music and how that music may have intersected with migration, colonization, ethnicity, race and tourism. Using a "participant observation" approach, students will read about, listen to and research a variety of musical experiences within the relevant sociopolitical context. Students should expect to fully participate in discussions about the assigned readings and music, and should be prepared to conduct their own research and share their own or newly acquired knowledge of contemporary and "historical/traditional" musical themes, and local and regional artists. Our collective goal will be to enjoy as well as to think critically about music, culture and performance and within a more informed understanding of the complex, multi-varied and multi-vocal context—know as "The Caribbean".

AS.362 (Center for Africana Studies)

AS.362.102. Anti-Racism 101. 3 Credits.
What is Anti-Racism? How do we identify racism's presence and effects, and how do we direct social and civic resources to end it? In this Freshman Seminar, students will learn from a series of faculty experts and invited guests about the history, workings, and legacies of racism. They'll also study present-day and past approaches – attempted and theorized – to abolish racism in the modern world.

AS.362.109. Introduction to African American Literature- Part II. 3 Credits.
This course will offer students an introduction to the central novels, plays, short stories, essays and poetry that have constituted African American Literature from 1930-1980. By focusing on representative works that span each of the major periods from the Harlem Renaissance to the Black Arts Movement, we will continue to consider the question of race and representation. How does one represent the race? And, for whom should black authors write – a white audience in order to change their minds about black people, or to black people for their pleasure and edification? Over the course of the semester, we will trace the various ways early- to late- 20th century black writers sometimes borrowed from earlier literary traditions and, at other times, developed new ones. In addition, we will hone in on the major debates and central texts that have come to define African American Literature and explore how it has long served as a creative, political, and intellectual enterprise.

AS.362.111. Introduction to African American Studies. 3 Credits.
This course introduces students to the interdisciplinary field of African American Studies, with attention to the literature, film, culture, history, and politics of black life in the United States. Our reading list will likely include texts by David Walker, Frederick Douglass, Frances E.W. Harper, Sutton Griggs, W.E.B. Du Bois, James Baldwin, Amiri Baraka, Toni Morrison, and others.

AS.362.112. Introduction to Africana Studies. 3 Credits.
This course introduces students to the field of Africana Studies. It focuses on the historical experience, intellectual ideas, theories, and cultural production of African-descended people. We will consider how people of the black diaspora remember and encounter Africa. We will explore, too, how such people have lived, spoken, written, and produced art about colonialism and enslavement, gender and mobility, violence and pleasure. This course will be thematically organized and invite you to center your own stories about black people within your understanding of the modern world and its making.

AS.362.115. Introduction to Police and Prisons. 3 Credits.
This introductory course will examine policing and prisons in the United States and beyond, with a focus on racial inequality. It will consist of three parts. First, we will define key concepts in police and prison studies. Then, we will explore the contemporary state of prisons and policing in the United States and look at debates around the rise of "mass incarceration" and aggressive forms of policing in the final third of the 20th century. Third, we will explore policing and prison in other parts of the globe in the contemporary moment, highlighting similarities and differences from the U.S. case. What can studying the instruments of social control in other societies reveal about our own? Students will develop an understanding of major trends, keywords, and debates in the literature on policing and prisons, with particular reference to race and racism.

AS.362.118. Cutting Through the Gaze: An Introduction to Social Justice Cinema. 2 Credits.
This course will introduce students to the fundamentals of community-engaged documentary filmmaking with a focus on both theory and practice. It will examine documentary filmmaking as an educational tool for raising social- and racial- justice issues from an African diasporic and global perspective. The course is taught by award-winning professional documentary filmmakers. Students will produce their own 3-5 minute film or audio podcast. Students will select their documentary film topic, conduct their own research, and move from pre-production into production. No prior experience in filmmaking is required for this course.

AS.362.123. Introduction to African American Literature (Part 1). 3 Credits.
This course will survey African American Literature from the 19th century to the late 20th century. We will turn to prose, poetry, and drama to explore the various ways black writes have engaged U.S. culture, history, and politics.
Area: Writing Intensive

AS.362.160. Land, Labour and Environmental Rights and Struggles in Contemporary Africa. 3 Credits.
‘Africa rising’ has become an influential, albeit contested, narrative used by institutions like the International Monetary Fund and World Economic Forum to describe the rapid economic growth in 21st century Africa. This rapid ‘economic growth has been accompanied by another type of ‘Africa Rising’ – a mushrooming of social protest and popular uprisings across the continent. The course will introduce important theoretical perspectives, debates, and examples to equip students to critically examine contemporary social dynamics through the interconnected themes of land, labor and environmental rights and struggles that have gripped the African continent. What has given rise to these awakenings? Who are the actors involved in these actions? What are their demands and strategies? What lessons does it hold for social movement theory and development more broadly? The first section focuses on land reclamation movements, the new wave of ‘land grabs’ and responses from below. The second section presents the role of labour movements and its intersection with popular uprisings. The third section considers responses from communities and movements to the ecological destruction and climate change.

AS.362.201. African American Poetry and Poetics. 3 Credits.
In this course, we will follow the development of black poetry primarily as it has evolved in the United States. Beginning with the first published African American writers of the eighteenth century and ending with several important poets writing and performing today, we will consider the shape of the African American poetic tradition as commonly anthologized and as defined by our own theoretically-informed readings of the assigned literature. Attention will be given to both canonical and neglected literary movements and groups. Readings will include poetry and essays by Frances E.W. Harper, James Weldon Johnson, Langston Hughes, Gwendolyn Brooks, Amiri Baraka, Harryette Mullen, Tracie Morris, and others.

AS.362.203. Passing in American Culture. 3 Credits.
This course will examine film and literary narratives of “passing” in 20th century America. We will study texts that feature people who cross social boundaries of race, class, sexuality, and gender, and consider what “passing” reveals about American social mobility.
Area: Writing Intensive

AS.362.204. Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture. 3 Credits.
In Anti-Black Racism and Black Freedom Struggles: History, Theory, and Culture, students will learn about key historical, intellectual, and political aspects of white supremacy as a system or racial domination, and anti-black racism as a central feature of that global system. This class will explore the historical forms that white supremacy has taken—from colonialism and plantation slavery to Jim Crow, gentrification, and mass incarceration—racial ideologies, and how modern political systems have hinged on racial oppression. Most important, we will explore how black people have responded to the structures and ideologies of white supremacy, their thinking about freedom, being, and rights, and their efforts to fit into the worlds in which they found themselves, to improve those societies, and those projects that sought radical alternatives to the an anti-black world.
Area: Writing Intensive

AS.362.216. The politics of contemporary black film. 3 Credits.
Over the past few years films such as Black Panther, Get Out, and Black KKKlansman have been both critical and economic successes, significantly changing how we think of “black films” as a genre. What do these films tell us about what it means to be black at this specific moment in time? How is what these films tell us shaped by how they are produced? How do the circulation of concepts like “Wakanda Forever!” shape political imaginations? When we watch these films how are our own ideas change? As a particularly powerful form of popular culture, film not only entertains, but it educates, and in some instances propagandizes. This is no less true of black films than it is of non-black ones. In this class we will examine a range of recent popular black films with an eye to examining the politics of their production, circulation, and consumption.

AS.362.271. Hip Hop Culture: From the Boogie Down to Black Lives Matter. 3 Credits.
Hip hop has become one of the most influential youth cultural movements of the past 40 years. It has moved from being a geographically-isolated African American and Puerto Rican musical scene to influencing every aspect of American and international youth culture, including music, visual culture, language, and politics. How did hip hop develop? Where did it come from, who made it, and why? What do the images and messages of hip hop culture mean, how has it changed our world, and who cares? We will approach these questions by delving into the historical, aesthetic, socioeconomic, and political dimensions of hip hop culture. Classes will historically explore specific themes, either examining issues that hip hop has dealt with (e.g., police brutality) or employing theoretical frameworks that we can use to help us think more critically about hip hop (e.g., subcultural theory).

AS.362.301. Black Women Writers. 3 Credits.
This course will introduce students to a variety of works written by black women of the Diaspora with a focus on the U.S. We will consider how women have theorized power, engaged history, and creatively imagined both the past and the present.
Area: Writing Intensive

AS.362.305. Black Periodical Studies. 3 Credits.
This course explores the ways in which nineteenth- and twentieth-century black periodical culture fostered (and, at times, hampered) the literary and cultural production of the African diaspora. Authors will likely include Frederick Douglass, “Ethiop (William J. Wilson),” Frances E.W. Harper, Pauline Hopkins, W.E.B. Du Bois, Marcus Garvey, Jean Toomer, Langston Hughes, Richard Bruce Nugent, and others.
Area: Writing Intensive

AS.362.309. Performing the Archive 2022: 200 Years of US-Liberia Migration. 3 Credits.
This seminar will explore some of the pivotal historical and contemporary connections between the US and Liberia since the first Black American settlers arrived in West Africa with the American Colonization Society in 1822. This course asks: What are implications of these stories of migration and reception for how we make sense of global anti-Blackness in the contemporary moment? How does performance provoke new questions about shared histories of those impacted by colonialism and the transatlantic slave trade? Why is a more in-depth understanding of 19th century Black political thought and the precolonial West African indigenous category necessary for developing theory on the political economy of race today? Through the lens of performance studies, students will analyze the documents in the American Colonization Society archive, to reimagine these early encounters as informed by historical documentation including folklore and pan-Africanist theory. Through exploring a range of historical and contemporary materials that center the problematic “indigenous/settler” binary, students will engage in a dramaturgical process which presents powerful possibilities for unlearning historical misrepresentations. In particular, students will develop theater-based projects that interrogate the spatio-temporal connections between the stories of both, free Blacks and those who were enslaved in Maryland and manumitted to go to Liberia, and the contemporary politics of Liberia-US migration.

AS.362.311. Black Utopias. 3 Credits.
In this course, we will read literary and historical texts that present visions of black utopia. Authors include “Ethiop” (William J. Wilson), Marcus Garvey, Octavia Butler, Toni Morrison, and others.
Area: Writing Intensive

AS.362.315. Black Against Empire. 3 Credits.
This course will examine the confrontation of Black social movements with imperialism in the twentieth century. How, we will ask, have key Black internationalist thinkers conceptualized and defined diaspora, capitalism, imperialism, war, and the global? What have been the effects of war and repression, as well as economic growth and globalization, on Black internationalism? Readings may include texts by W.E.B. Du Bois, Angela Y. Davis, Frantz Fanon, Ashley Farmer, Claudia Jones, Robin D.G. Kelley, Claude McKay, Huey P. Newton, Walter Rodney, Malcolm X, etc. Students will complete a research paper on a topic of their own choosing related to Black internationalism in the twentieth century.
Area: Writing Intensive

AS.362.402. Arts and Social Justice Practicum. 3 Credits.
This course provides students with an opportunity to explore art and social justice and its history in Baltimore and the Black Arts Movement through the creation of student-led artistic projects. Students will examine their creative practices and how they can be used to advocate for change. Local artist and scholars will share their expertise providing lived experiences of using art as a call to action. At the end of the semester, students will present their projects in a public showcase of student work through film, poetry, photography, painting and other visual media. (No prior artistic training necessary.)

AS.362.413. African American Representations in the Western. 3 Credits.
The course will investigate American cinematic representations of African Americans, slavery (and more specifically its absence), the Civil War, and racial formation along the United States’ southwestern frontier in films produced from the 1950s through the contemporary period. The course closely examines American cinematic fantasies of the western frontier, frontier violence and the desire to escape or erase the tensions of race and slavery that have deeply permeated the American cultural consciousness, strongly shaping the production of American masculine ideals. The course will also take decided note of the national shift from liberal “Great Society Programs” of the 1960s to the conservative “neoliberal” social and cultural ideals in the 1980s and 1990s. Our purpose is to consider the organization and reformation of hegemonic power by way of the complex morality play the western film evokes, typically considering the interstitial geographies between blackness and whiteness, civilization and savagery, belonging and alienation, and metropolis and colonial outpost. We will privilege in our discussions the contested frontiers of racial dominion. Films include “Buck and the Preacher,” “The Battle of Algiers,” “Sgt. Rutledge,” and “Django Unchained.”
Area: Writing Intensive

AS.362.510. Senior Honors in Africana Studies I. 3 Credits.
The first semester of Senior Honors in Africana Studies, conducted as an Independent Study. Interested students should submit an application to the CAS Director of Undergraduate Studies.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.362.511. Senior Honors in Africana Studies II. 3 Credits.
The second semester of Senior Honors in Africana Studies, conducted as an Independent Study. Only students who have successfully completed AS.362.510 Senior Honors In Africana Studies I will be allowed to register.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.362.590. Independent Study for Africana Studies. 3 Credits.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.363 (Study of Women, Gender, & Sexuality)

AS.363.201. Introduction to the Study of Women, Gender, and Sexuality. 3 Credits.
This course will serve as an intensive introduction to contemporary approaches to theories of gender and sexuality, and their relationship to cultural production and politics. Students will develop a historically situated knowledge of the development of feminist and queer scholarship in the 20th and 21st centuries, and consider the multiply intersecting forces which shape understandings of sexual and gender identity. We will consider both foundational questions (What is gender? Who is the subject of feminism? What defines queerness?) and questions of aesthetic and political strategy, and spend substantial time engaging with feminist and queer scholarship in comparative contexts. Students will be introduced to debates in Black feminism, intersectionality theory, third world feminism, socialist feminism, queer of colour critique, and trans* theory. We will read both canonical texts and recent works of scholarship, and the final weeks of the course will be devoted to thinking with our theoretical and historical readings against a selection of feminist and queer literature and cinema. No prior familiarity with the study of gender and sexuality is necessary.

AS.363.226. Women writers and the sonnet from the European Renaissance to the Harlem Renaissance. 3 Credits.
Shakespeare's description of his lover's eyes as 'nothing like the sun' is both an homage and a sendup of the 300-year-old Petrarchan tradition in which the male poetic persona remains forever enraptured by an unattainable female beloved, who never speaks. Beginning with a review of Shakespeare's sonnet sequence and selections from Petrarch's sonnets to an elusive Laura, we will read a series of fifteenth-and sixteenth-century women writers who inserted their own voices into this evolving tradition by allowing "Laura" to talk back. These include Vittoria Colonna (and her interactive sonnets with Michelangelo), Veronica Gambara, and Gaspara Stampa; dueling personas in sonnets by French poets Pernette du Guillet and Maurice Scéve, and sonnets by more familiar Shakespearean contemporaries Lady Mary Wroth and Sir Philip Sidney (both of whom reflect back on Petrarch but from quite different viewpoints). In the final section of the course we will apply our newly acquired historical perspective to selections from a more recently available corpus of female-authored sonnets from the Harlem Renaissance. All continental works will be read in translation; no previous familiarity with the topic is required.
Area: Writing Intensive

AS.363.301. Feminist and Queer Theory. 3 Credits.
This course will encourage encounters with a number of concepts from a critical gendered perspective, including: sameness/difference, identity politics, race/gender, loyalty, security, queer ethics, and queerness in media.
Area: Writing Intensive

AS.363.302. Feminist and Queer Theory: Women in Western Thought an Introduction. 3 Credits.
Women in Western Thought is an introduction to (the history of) Western thought from the margins of the canon. The class introduces you to some key philosophical question, focusing on some highlights of women's thought in Western thought, most of which are commonly and unjustly neglected. The seminar will be organized around a number of paradigmatic cases, such as the mind/body question in Early Modern Europe, the declaration of the rights of (wo)men during the French revolution, the impact of slavery on philosophical thought, the MeToo debate and others. By doing so, the course will cover a range of issues, such as the nature of God, contract theory, slavery, standpoint epistemology, and queer feminist politics. Students will engage with questions about what a canon is, and who has a say in that. In this sense, Women in Western Thought introduces you to some crucial philosophical and political problems and makes you acquainted with some women in the field. The long term objective of a class on women in Western thought must be to empower, to inspire independence, and to resist the sanctioned ignorance often times masked as universal knowledge and universal history. People of all genders tend to suffer from misinformation regarding the role of women and the gender of thought more generally. By introducing you to women who took it upon themselves to resist the obstacles of their time, I am hoping to provide role models for your individual intellectual and political development. By introducing you to the historical conditions of the exclusion and oppression of women (including trans and queer women as well as black women and women of color), I hope to enable you to generate the sensitivities that are required to navigate the particular social relations of the diverse world you currently inhabit. By introducing philosophical topics in this way, I hope to enable you to have a positive, diversifying influence on you future endeavours.
Area: Writing Intensive

AS.363.306. Feminist and Queer Theory: Race, Class, Gender, Sexuality-Intersectional Feminist Theory. 3 Credits.
In this course, we will get to know intersectional feminist philosophy through the lens of a Black feminist epistemology. What does this mean? That means that we will focus on how the contributions of Black feminist authors can bring out the specific political and philosophical nature of an intersectional theoretical framework.

AS.363.307. Feminist and Queer Theory: Family Matters: Queer and Feminist Responses to Family Life. 3 Credits.
This course examines the historical development of feminist and queer critique, focusing on how the concept of family life has been understood by generations of writers, activists, and theorists. We will read important early works on western forms of kinship and family structure, and investigate how contemporary developments in reproductive technology, queer marriage, and workplace integration have produced new imaginings of familial belonging and its alternatives.

AS.363.329. Gender and Sexuality Beyond the Global West: Gender and Sexuality in Contemporary Art in North Africa and the Middle East. 3 Credits.
This course aims to explore how gender and sexuality is situated in contemporary artistic practices in the geographical Middle East, through concepts of religion, war, revolution, resistance, nation-state, post-colonialism, and neoliberalism, especially as written and observed first-hand by artists, curators and scholars from the Middle East and North Africa region and their diasporas. Every week, under an overarching topic, notions of gender and sexuality will be questioned through works of selected artists across the region, as well as texts that provide the historical, theoretical, sociological and political background.
Area: Writing Intensive

AS.363.330. Ecofeminist Debates: Gender and Sexuality Beyond the Global West. 3 Credits.
This course develops an interdisciplinary and comparative approach to introduce students to ecofeminism through a special focus on its inflections in non-western contexts. Through class discussions and sustained writing engagement, we will develop an understanding of the history of ecofeminism, including theoretical debates linking gender perspectives with political mobilization, as well as ecofeminism's enduring influence on new intellectual and political movements.

AS.363.331. Gender and Sexuality beyond the Global West. 3 Credits.
Gender and Sexuality in the Global West. Topics change each semester. See class search for specific topic being taught each term.

AS.363.333. Poetics and Politics: Eros & Literature. 3 Credits.
What does it mean to love? From Antiquity to now, from Plato to Jeanette Winterson, writers have staged conversations on love and sex. In this way, they provide us with a "science of sex" (to use Foucault's notion) that, though fully attuned to the power differentials that inhabit our most intimate physical experiences, gives free range to the imagination of desires. With Plato, the legend of Tristan and Isolde, and the study a few Renaissance love lyrics as a backdrop, we will delve into stories of desire that chart new configurations and break away from "normative heterosexuality." Readings involve novellas by Balzac, George Sand, Colette; stories by Woolf, by Proust, and selected from Gender Outlaws as well as two films M. Butterfly and Call Me by Your Name. Meshing such stories with fundamental concepts in gender theory will enable us to chart ever changing configurations of desire from the double perspective of queerness and of sexual politics.
Area: Writing Intensive

AS.363.335. Gender Justice: From Conflict to Resolution. 3 Credits.
This course focuses on the potential and limitations of the recent efforts of the international community to introduce a "gendered approach" to conflict resolution, peacebuilding and transitional justice. It examines the fundamental theoretical issues that underlie the "gendered approach" to transitional justice by following the evolution of the gendered approach to peacebuilding in three phases through case studies: The gender-blind phase (Human Rights Trials in Argentina), the gender-neutral phase (Truth and Reconciliation Commission in South Africa) and the gender-sensitive phase (Disarmament, Demobilization and Reintegration of female combatants in Colombia). The limitations of the gendered approach in practice is explored through cases. For example, we examine the identification of gender-based crimes with sexual crimes in ICTY and ICTR. The LGBTI communities' inclusion to transitional justice as well as gender based harms that are not related to sexual violence are examined through the Colombia Peace Process. Ultimately, the course aims to address the prevailing question in the fields of peacebuilding and transitional justice today through the lens of "gender": Should transitional justice simply redress harms or should it aim to be transformative for the post conflict community? Should response mechanisms aim to restore relationships or should they aim to transform gender relations in communities? The final weeks of the class will be dedicated to the discussion of moral and practical implications of these questions for transitional justice.

AS.363.337. The Poetics & Politics of Sex: Struck From the Record: Reclaiming Women's Contribution to the Global March Towards Modernity. 3 Credits.
The course examines claims that present women's historic role as limited to confinement in the home, and bearing children. Students will gain an understanding of the complexity the world's path to modernity and the important, and?until recently, silent?roles that women have played.
Area: Writing Intensive

AS.363.338. The Poetics and Politics of Sex: Feminist Utopia in Theory and Fiction. 3 Credits.
This course examines the historical development of feminist utopia in theory and fiction. Readings will center Indigenous, Black, postcolonial, diasporic, and transnational perspectives that engage the topic of feminist utopia.
Area: Writing Intensive

AS.363.345. Zora Neale Hurston: Ethnography as Method. 3 Credits.
While many recognize Zora Neale Hurston's creative literary work, her methodological innovations are often overshadowed. This course will examine Hurston's contributions to theorizing the African diaspora and creative use of ethnography.Dr. Amarilys Estrella, the 2020-2021 ACLS Emerging Voices Postdoc, will teach this course. For more info on Dr. Estrella, see https://history.jhu.edu/directory/amarilys-estrella/

AS.363.415. WGS Internship Practicum: The Carceral State, Gender, and the Family. 3 Credits.
This class will examine the U.S. government's use of incarceration, parole, and house-arrest as default forms of social management, in lieu of social welfare policy. We will explore the origins of the "carceral state" and its impact on targeted communities. The class will focus on often neglected aspects of the ongoing crisis of mass-incarceration in the U.S., in particular its debilitating effects on single-mother households, children who grow up with incarcerated family members, and the extreme violence and deprivation of basic medical needs faced by incarcerated women and LGBTQI individuals. Topics will include black-feminism and "black matriarchy," the relationship between domestic violence and mass-incarceration in communities of color, women and non-gender conforming prisoners, the "school-to-prison pipeline," the psychological effects of policing on targeted communities, and the fiscal interests served by mass-incarceration. We will engage sociological, historical, and philosophical materials, as well as literature, film, and past and present social movements.
Area: Writing Intensive

AS.363.416. WGS Internship/Practicum: Feminist Animals: Sex, Nature, and Nonhumans. 3 Credits.
Introducing feminist approaches to ecology and nonhumans, this course considers the interconnections between heteropatriarchal domination and the domination of nonhuman animals and ecologies. What different sensibilities and ways of seeing sex and gender open up when attention shifts to nonhumans? What tensions within and between feminism, animal liberation, and ecological concern come to the fore when each approach is alongside the others? How does the study of nonhumans extend the promise of feminism, and vice versa? In responding to these questions, we will see the real breadth of issues that the theory and practice of feminism can address.
Area: Writing Intensive

AS.363.445. Reading Judith Shakespeare: Women and Gender in Elizabethan England. 3 Credits.
If Shakespeare had a sister who went to London to be a writer, what would she write? Virginia Woolf's account of the thwarted career of Shakespeare's hypothetical sister, Judith, in A Room of One's Own frames our reading of plays and poetry by Shakespeare and contemporary women writers, including Isabella Whitney, Elizabeth Cary, Mary Sidney, Aemelia Lanyer, and Mary Wroth. Working within a selected historical context, students will create fictional biographies of "Judith Shakespeare," including her perspective on our identified authors and a sample or description of Judith's own literary accomplishments. Secondary course readings will reflect contemporary economic, political, and religious contexts.
Area: Writing Intensive

AS.363.601. WGS Graduate Colloquium.
Presenting new scholarship and art, the WGS Graduate Colloquium will catalyze intellectual discussions in which gender and sexuality concerns play important roles. The seminar includes lectures by invited speakers and a film series. Graduate students are encouraged to develop critical and comparative approaches to the study of gender and sexuality—often in interaction with related issues such as race, class, violence, law, medicine, art, and emotionality. This seminar can be taken for credit or audit.

AS.370 (Center for Language Education)

AS.370.115. First Year American Sign Language. 3 Credits.
Designed for students who have no previous knowledge of ASL. Students will learn fingerspelling, words, facial expressions, and classifiers to be able to communicate at a basic level with other signers. The curriculum will cover sentence structures such as questions, commands, and other conversational phrases. Mastery will include knowledge of Deaf community and Deaf cultural practices.

AS.370.602. American English Pronunciation.
This course focuses on improving students' perception and pronunciation of American English through learning articulation, phonetics, and phonology. Students learn the basics of anatomy of speech production in order to understand how difficult sounds and sound contrasts are made. Students also learn the International Phonetic Alphabet (IPA) to help them distinguish sound contrasts that are difficult depending on the individual students' native languages. Moving beyond individual sounds, students learn how sounds change depending on what word or phrase they appear in and when they appear in fast or colloquial speech. Finally, students learn and practice intonation appropriate for various types of statements and questions.

AS.370.603. Public Speaking in Academia.
This course is intended for international Teaching Assistants (ITAs) with advanced English skills and satisfactory pronunciation who wish to further improve their communication and public speaking skills, as well as better understand the cultural norms of the American academia. Students refine their pronunciation and intonation, practice designing and giving presentations, learn the basics of conversation and e-mail etiquette in America, as well as the norms of interacting with college students, professors, and colleagues in various academic situations such as classes, office hours, lab meetings, and scientific meetings. This course is appropriate as a follow-up to American English Pronunciation (AS 370.602) or as a stand-alone course for students with satisfactory pronunciation. This course can also be repeated for additional practice or taken concurrently with American English Pronunciation.

AS.370.604. Advanced Grammar and Academic Writing.
In this course, students will read and analyze the content, structure, and style of a wide range of academic and professional writing in order to improve their own essays, articles, reports, theses, critiques, and proposals using those features. They will learn to explain, support, compare and argue their ideas effectively through attention to organization, vocabulary, and style. Grammar will be infused into the course as it applies to revision and editing of written work and consistency within various types of writing. Students will use a variety of strategies to improve skills in idea development, organization, word choice, sentence fluency, voice, grammar and mechanics. Writing tasks will be integrated with content, vocabulary, and grammar from various texts.

AS.373.111. First Year Heritage Chinese. 3 Credits.
This course is designed for students who were raised in an environment in which Chinese is spoken by parents or guardians at home and for those who are familiar with the language and possess native-like abilities in comprehension and speaking. The course therefore focuses on reading and writing (including the correct use of grammar). Cross-listed with East Asian Studies

AS.373.112. First Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Lab required. Continuation of AS.373.111. Recommended Course Background: AS.373.111 or permission required.
AS.373.111 or or instructor permission

AS.373.115. First Year Chinese. 5 Credits.
This course is designed primarily for students who have no prior exposure to Chinese. The objective of the course is to help students build a solid foundation of the four basic skills---listening, speaking, reading, and writing in an interactive and communicative learning environment. The emphasis is on correct pronunciation, accurate tones and mastery of basic grammatical structures. Note: Students with existing demonstrable skills in spoken Chinese should take AS.373.111-112. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.373.116. First Year Chinese II. 5 Credits.
Introductory course in Modern Standard Chinese. Goals: mastery of elements of pronunciation and control of basic vocabulary of 800-900 words and most basic grammatical patterns. Students work first with Pin-Yin system, then with simplified version of written Chinese characters. Continuation of AS.373.115. Note: Student with existing demonstrable skills in spoken Chinese should take AS.373.111-112. Recommended Course Background: AS.373.115 or permission required.
AS.373.115 or instructor permission]

AS.373.211. Second Year Heritage Chinese. 3 Credits.
This course is designed for students who finished AS.373.112 with C+ and above (or equivalent). Students in this course possess native-like abilities in comprehension and speaking. The course focuses on reading and writing. Cross-listed with East Asian Studies
AS.373.112 or equivalent.

AS.373.212. Second Year Heritage Chinese II. 3 Credits.
For students who have significant previously-acquired ability to understand and speak Modern Standard Chinese. Course focuses on reading and writing. Teaching materials are the same as used in AS.373.115-116; however, both traditional and simplified versions of written Chinese characters are used. Continuation of AS.373.211. Recommended Course Background: AS.373.211 or permission required.
AS.373.211 or instructor permission

AS.373.215. Second Year Chinese. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Cross-listed with East Asian Studies
AS.373.116 or equivalent

AS.373.216. Second Year Chinese II. 5 Credits.
Consolidation of the foundation that students have laid in their first year of study and continued drill and practice in the spoken language, with continued expansion of reading and writing vocabulary and sentence patterns. Students will work with both simplified and traditional characters. Note: Students who have native-like abilities in comprehension and speaking should take AS.373.211-212. Recommended Course Background: AS.373.215 or Permission Required.Cross-listed with East Asian Studies
AS.373.215 or instructor permission.

AS.373.313. Third Year Heritage Chinese. 3 Credits.
This course is designed for those who have already taken AS.373.212 or equivalent. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be introduced on a regular basis.Cross-listed with East Asian Studies
AS.373.211 AND AS.373.212 or instructor's permission

AS.373.314. Third Year Heritage Chinese II. 3 Credits.
This course is a continuation of AS.373.313. Students need to have native-level fluency in speaking and understanding Chinese. The course focuses on reading and writing. In addition to the textbooks, downloaded articles on current affairs may also be included on a regular basis. Recommended Course Background: AS.373.313 or Permission Required. Lab required.
AS.373.313 or equivalent

AS.373.315. Third Year Chinese. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible and written assignments will be given. Cross-listed with East Asian Studies
AS.373.216 or instructor permission

AS.373.316. Third Year Chinese II. 3 Credits.
This two-semester course consolidates and further expands students' knowledge of grammar and vocabulary and further develops reading ability through work with textbook material and selected modern essays and short stories. Class discussions will be in Chinese insofar as feasible, and written assignments will be given. Continuation of AS.373.315. Recommended Course Background: AS.373.315 or permission required.
AS.373.315 or instructor permission

AS.373.415. Fourth Year Chinese. 3 Credits.
This course is designed for students who finished AS.373.316 with a C + or above (or equivalent). Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students are supposed to be able to understand most of the readings with the aid of a dictionary, so that class discussion is not focused primarily on detailed explanation of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content.Cross-listed with East Asian Studies
AS.373.316 or instructor permission

AS.373.416. Fourth Year Chinese II. 3 Credits.
Continuation of AS.373.415. Readings in modern Chinese prose, including outstanding examples of literature, newspaper articles, etc. Students should understand most of the readings with the aid of a dictionary, so that class discussion need not focus primarily on detailed explanations of grammar. Discussion, to be conducted in Chinese, will concentrate on the cultural significance of the readings' content. Recommended Course Background: AS.373.415 or Permission Required. Cross-listed with East Asian Studies
AS.373.415 or instructor permission

AS.373.491. 5th Year Chinese. 3 Credits.
Fifth Year Chinese is designed for students who finished fourth year regular or third year heritage Chinese course at JHU or its equivalent and wish to achieve a higher advanced proficiency level in Chinese. The goal of the course is to help students further develop their listening, speaking, reading and writing skills cohesively and to enhance students' understanding of Chinese culture and society through language learning.
AS.373.416 OR AS.373.314 or equivalent

AS.373.492. Fifth Year Chinese II. 3 Credits.
Fifth Year Chinese is designed for students who finished fourth year regular or third year heritage Chinese course at JHU or its equivalent and wish to achieve a higher advanced proficiency level in Chinese. The goal of the course is to help students further develop their listening, speaking, reading and writing skills cohesively and to enhance students' understanding of Chinese culture and society through language learning.
AS.373.491 or equivalent

AS.373.493. Fundamentals of Chinese Grammar. 2 Credits.
This course is designed for students who have already studied 1st Year Chinese grammar and wish to develop a thorough knowledge of Chinese grammar in order to advance all aspects of language skills to a higher level. It is also appropriate for graduate students who need to be able to read materials written in Chinese. The goal of the course is to provide students with a thorough knowledge of Chinese grammar; therefore, knowledge of vocabulary in depth is not requisite. In addition, since this is not a language course that places equal focus on all four skills (speaking, listening, writing, and reading), there will be no conversation practice – this is a lecture course on grammar. Pass-fail grade option only. Must have at least 5 students enrolled to run.
AS.373.115

AS.373.501. Independent Study - Chinese. 0 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.373.503. Chinese Independent Study. 1 Credit.
Chinese independent course work.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.375.115. First Year Arabic. 5 Credits.
Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of studyNo Satisfactory/ Unsatisfactory

AS.375.116. First Year Arabic II. 4 Credits.
Continuation of AS.375.115. Introductory course in speaking, listening, reading, and writing Modern Standard Arabic. Presents basic grammatical structures and a basic vocabulary. Through oral-aural drill in classroom, tapes in Language Laboratory, and reading/writing exercises, students attain a basic level of competence on which they can build in subsequent years of study. May not be taken Satisfactory/ Unsatisfactory
AS.375.115 or instructor permission

AS.375.215. Second Year Arabic. 4 Credits.
Designed to bring students up to competency level required for third/ fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.115-116 or equivalent.
AS.375.116 or equivalent

AS.375.216. Second Year Arabic II. 4 Credits.
Continuation of AS.375.215. Designed to bring students up to competency level required for third/fourth year Arabic. Students will consolidate and expand their mastery of the four basic skills acquired in AS.375.115-116. More authentic material--written, audio, and visual--will be used, and culture will be further expanded on as a fifth skill. Recommended Course Background: AS.375.215 or permission required.
AS.375.215 or instructor permission

AS.375.301. Third Year Arabic. 3 Credits.
Designed to enhance students' ability to read, discuss, and write about various topics covered in traditional and contemporary Arabic texts. Recommended Course Background: AS.375.216 or equivalent.
AS.375.116 or instructor permission

AS.375.302. Third Year Arabic II. 3 Credits.
Designed to enhance students' ability to read, discuss, and write about various topics covered in traditional and contemporary Arabic texts. Continuation of AS.375.301. Recommended Course Background: AS.375.301or permission required.
AS.375.301 or instructor permission

AS.375.401. Fourth Year Arabic. 2 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course.
AS.375.302 or equivalent

AS.375.402. Fourth Year Arabic II. 3 Credits.
This is an introductory course to different periods of the Arabic literature. Selections of famous Arabic poetry and short prose works are the substance of the course. Continuation of AS.375.401. Recommended Course Background: AS.375.302 or equivalent.
AS.375.401 or equivalent.

AS.375.501. Independent Study-Arabic. 0 - 3 Credits.

AS.375.502. Independent Study-Arabic. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.375.802. Independent Study -- Arabic.

AS.377.115. First Year Russian. 4 Credits.
This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Russian. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory. Students may not have completed AS.377.131 AND AS.377.132 under the previous JHU/Goucher program.

AS.377.116. First Year Russian II. 4 Credits.
A continuation of AS.377.115. This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Russian. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory.
AS.377.115

AS.377.215. Second Year Russian. 3 Credits.
This course is designed for students who have finished AS.377.116 with C+ or above, or by a placement exam. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency higher than that learned in First Year Russian.

AS.377.216. Second Year Russian II. 3 Credits.
Continuation of AS.377.215. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Russian linguistics and culture that are necessary for language competency higher than that learned in First Year Russian.
AS.377.215

AS.377.315. Third Year Russian. 3 Credits.
This course offers advanced training in spoken as well as written Russian. It is designed for students who have basic Russian language proficiency acquired through AS.377.216 or equivalent. Advanced level of grammatical structures will be learned and practiced through communicative tasks.

AS.377.316. Third Year Russian II. 3 Credits.
Continuation of AS.377.315. This course offers advanced training in spoken as well as written Russian. Advanced level of grammatical structures will be learned and practiced through communicative tasks.
AS.377.315

AS.377.395. Readings in Russian Studies. 2 Credits.
The course examines aspects of Russian culture through Russian literature. Readings include a wide range of texts. In this particular course, we will read a play by a Soviet writer and watch a video recording of a contemporary stage show by the Moscow Art Theater. Participation in the course would require reading authentic Russian texts, extensive classroom discussions, and frequent writing assignments. (All texts and videos are in Russian.) Pre-req: 377.315-316 or by permission

AS.377.397. Readings in Russian Studies II. 2 Credits.
The course examines aspects of Russian culture through Russian literature. Readings include a wide range of texts. Participation in the course would require reading authentic Russian texts, extensive classroom discussions, and frequent writing assignments. (All texts and videos are in Russian.) Pre-req: 377.315-316 or by permission
AS.377.315 OR AS.377.316 OR AS.377.395 or permission of instructor

AS.378.115. First Year Japanese. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the year, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 150 kanji in context. Knowledge of grammar will be expanded significantly in AS.373.215. No Satisfactory/Unsatisfactory. Cross-listed with East Asian Studies

AS.378.116. First Year Japanese II. 5 Credits.
This course is designed for students who have no background or previous knowledge in Japanese. The course consists of lectures on Tuesday/Thursday and conversation classes on Monday/Wednesdays/Fridays. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of Japanese culture. By the end of the fall term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar items, reading and writing skills, and a recognition and production of approximately 60 kanji in context. Knowledge of grammar will be expanded significantly in 2nd year Japanese. May not be taken Satisfactory/Unsatisfactory. Recommended Course Background: AS.378.115
Prereq: AS.378.115 or instructor permission

AS.378.215. Second Year Japanese. 5 Credits.
Training in spoken and written language, increasing their knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.115 and AS.378.116 or equivalent.
AS.378.116 or equivalent

AS.378.216. Second Year Japanese II. 5 Credits.
Continuation of Beginning Japanese and Intermediate Japanese I. Training in spoken and written language, increasing students' knowledge of more complex patterns. At completion, students will have a working knowledge of about 250 Kanji. Recommended Course Background: AS.378.215 or equivalent.
AS.378.215 or instructor permission

AS.378.315. Third Year Japanese. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Cross-listed with East Asian Studies
AS.378.215 AND AS.378.216 or instructor permission

AS.378.316. Third Year Japanese II. 3 Credits.
Emphasis shifts toward reading, while development of oral-aural skills also continues apace. The course presents graded readings in expository prose and requires students to expand their knowledge of Kanji, grammar, and both spoken and written vocabulary. Lab required. Continuation of AS.378.315. Recommended Course Background: AS.378.315 or equivalent.
AS.378.315 or equivalent.

AS.378.396. Fundamentals of Japanese Grammar. 2 Credits.
This course is designed for students who have already studied 1st Year Japanese grammar and wish to develop a thorough knowledge of Japanese grammar in order to advance all aspects of language skills to a higher level. It is also appropriate for graduate students who need to be able to read materials written in Japanese. The goal of the course is to provide students with a thorough knowledge of Japanese grammar; therefore, knowledge of vocabulary (including kanji) in depth is not requisite. In addition, since this is not a language course that places equal focus on all four skills (speaking, listening, writing, and reading), there will be no conversation practice – this is a lecture course on grammar. 2 credits. Pass-fail grade option only
AS.378.115 AND AS.378.116 or Instructor Permission

AS.378.415. Fourth Year Japanese. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Recommended Course Background: AS.378.315 and AS.378.316 or equivalent.
AS.378.316 or equivalent

AS.378.416. Fourth Year Japanese II. 2 - 3 Credits.
By using four skills in participatory activities (reading, writing, presentation, and discussion), students will develop reading skills in modern Japanese and deepen and enhance their knowledge on Kanji and Japanese culture. Lab required. Recommended Course Background: AS.378.415
AS.378.415 or equivalent.

AS.378.493. Grammar and Readings in Japanese Studies. 2 Credits.
This course is designed for graduate students (in East Asian Studies, Public Health, History of Medicine, History,etc.) and undergraduate students with a strong interest in developing a thorough knowledge of Japanese grammar from both linguistic and cultural perspectives in depth well beyond regular language courses in order to advance reading and comprehension of materials written in Japanese without use of a dictionary. We first review the primary components of Japanese grammar, such as tense, aspect, particles, conditionals, passive and causative, etc., followed by readings of articles demonstrating particular grammatical items. Specific strategies and techniques are also introduced, followed by practice. Class materials include a broad spectrum of native materials, including novels, newspapers, scholarly articles, essays, and historical papers. A diverse range of articles and essays are selected by students to introduce and enforce various ways of reading Japanese effectively. 2 credits. Pass-fail grade option only.

AS.379.115. First Year Haitian-Creole. 3 Credits.
This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Haitian-Creole. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills. No Satisfactory/Unsatisfactory.

AS.379.116. First Year Haitian Creole II. 3 Credits.
A continuation of AS.379.115. This course is designed for students who have no background in the language and wish to learn the language at an academic level, obtaining knowledge of the linguistic aspects of the language as well as skills needed to communicate in Haitian-Creole. The goal of the course is the simultaneous progression of four skills (speaking, listening, writing, and reading) as well as familiarity with aspects of linguistics and culture that are necessary for language competency in survival level. It is expected that, by the end of the spring term, students will have basic speaking and listening comprehension skills, a solid grasp of basic grammar, reading and writing skills.
AS.379.115

AS.380.101. First Year Korean. 5 Credits.
Introduces the Korean alphabet, hangeul. Covers basic elements of the Korean language, high-frequency words and phrases, including cultural aspects. Focuses on oral fluency reaching Limited Proficiency where one can handle simple daily conversations. No Satisfactory/ Unsatisfactory.
Cross-listed with East Asian Studies

AS.380.102. First Year Korean II. 5 Credits.
Focuses on improving speaking fluency to Limited Proficiency so that one can handle simple daily conversations with confidence. It provides basic high-frequency structures and covers Korean holidays. Continuation of AS.380.101. Recommended Course Background: AS.380.101 or permission required.
AS.380.101 or instructor permission

AS.380.201. Second Year Korean. 4 Credits.
Aims for improving oral proficiency and confident control of grammar with vocabulary building and correct spelling intended. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness. Project due on Korean cities. Existing demonstrable skills in spoken Korean preferred.
AS.380.101 AND AS.380.102 or instructor permission

AS.380.202. Second Year Korean II. 4 Credits.
Aims for improving writing skills with correct spelling. Reading materials of Korean people, places, and societies will enhance cultural understanding and awareness, including discussion on family tree. Continuation of AS.380.201. Recommended Course Background: AS.380.201 or equivalent.
AS.380.201 or equivalent

AS.380.301. Third Year Korean. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose, from easy essays to difficult short stories. Vocabulary refinement and native-like grasp of grammar explored. Project due on Korean culture. Cross-listed with East Asian Studies
AS.380.202 or equivalent

AS.380.302. Third Year Korean II. 3 Credits.
Emphasizes reading literacy in classic and modern Korean prose. By reading Korean newspapers and professional articles in one's major, it enables one to be well-versed and truly literate. Continuation of AS.380.301. Cross-listed with East Asian StudiesPrerequisite: AS.380.301 or equivalent.
AS.380.301 or instructor permission

AS.380.401. Fourth Year Korean. 2 Credits.
This course is designed for those who have finished AS 380.302 or beyond advanced mid level of competency in Korean in four skills. By dealing with various topics on authentic materials including news, articles on websites, short stories, this course aims to help students enhance not only linguistics knowledge and skills, but also current issues in Korea. It is expected that, by the end of the term, students will be able to discuss a variety of topics and express opinions fluently in both spoken and written language.
AS.380.302 or instructor permission

AS.380.402. Fourth Year Korean II. 2 Credits.
This course is designed for those who have finished AS 380.302 or beyond advanced mid level of competency in Korean in four skills. By dealing with various topics on authentic materials including news, articles on websites, short stories, this course aims to help students enhance not only linguistics knowledge and skills, but also current issues in Korea. It is expected that, by the end of the term, students will be able to discuss a variety of topics and express opinions fluently in both spoken and written language.
AS.380.401 or equivalent

AS.381.101. First Year Hindi I. 3 Credits.
Course focuses on acquisition of additional vocabulary and grammatical structures in culturally authentic contexts, listening, speaking, reading, and writing comprehension. No Satisfactory/ Unsatisfactory

AS.381.102. First Year Hindi II. 3 Credits.
This course prepares students to function in everyday situations in the Hindi speaking world. Focuses on the acquisition of basic vocabulary and grammatical structures in culturally authentic contexts through listening, speaking, reading, and writing comprehension. Hindi reading and writing is taught in its original Dayva-nagari script. Oral-aural drills in class and work in the Language Lab is required.
AS.381.101 or instructor permission

AS.381.201. Second Year Hindi I. 3 Credits.
Course provides refinement of basic language skills in cultural context. Emphasis will be on expansion of vocabulary and grammatical structures and further development of communicative skills. Recommended Course Background: AS.381.101, AS.382.102
AS.381.102 or equivalent

AS.381.202. Second Year Hindi II. 3 Credits.
Course provides refinement of basic language skills in cultural context. Emphasis will be on expansion of vocabulary and grammatical structures and further development of communicative skills. Continuation of AS.381.201. Recommended Course Background: AS.381.201 or permission required.
AS.381.201 or instructor permission

AS.381.301. Third Year Hindi I. 3 Credits.
Learn to converse in Hindi through Hindi songs, films, and media. Promotes the active use of Hindi in culturally authentic contexts. Development of fluency in oral and written communication is emphasized. Not offered every semester.
Area: Writing Intensive
AS.381.201 AND AS.381.202 or instructor permission

AS.371 (Art)

AS.371.126. Fiber Art and the String Revolution. 3 Credits.
This course presents students with technical, historical and cultural understanding of the fiber medium. Students learn the basics of textile processes, including dyeing, felting, knitting, weaving, sewing, and lacemaking. Technical demonstrations and samples will be covered in class while students are encouraged to expand upon covered material through long-term personal projects. Technical demonstrations will be supported with slide lectures demonstrating the historical context of fiber processes and their contemporary applications. Attendance in 1st class is mandatory.

AS.371.129. Botanical Painting in Watercolor and Gouache. 3 Credits.
This introductory painting class is an exploration of the ways watercolor and designer gouache are used together to paint organic materials representationally. We'll study the difference between botanical painting and illustration and trace how women specifically have shaped this genre of art through history. Students will learn techniques from both observation and invention and artwork will be assessed in weekly group critiques. Course includes demonstrations, short readings and a research paper about a botanical artist.

AS.371.131. Foundation Drawing. 3 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic drawing for students with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills while experimenting with traditional and contemporary practices in drawing. Wet and dry media will be used. Attendance at 1st class is mandatory.

AS.371.133. Oil Painting I. 3 Credits.
This course is designed as an introduction to the tools, techniques and concepts of basic painting for the serious student with little or no previous experience. Studio assignments focus on developing strong observation and rendering skills focusing on issues of light, color and composition while experimenting with traditional and contemporary practices in painting. Lectures and a museum trip give students an art historical context in which to place their own discoveries as beginning painters. Oil paint will be used. Attendance at 1st class is mandatory.

AS.371.147. Art of Architecture: Homewood, Baltimore and Beyond. 3 Credits.
In this course, students will learn to design, draw, and see like an architect. A series of progressive design exercises will teach the practical capacities and habits of mind that lead not merely to competence but success and advancement in the field. We will look at what architecture has been, discuss what it is becoming, and explore both formal and narrative methodologies for design. The class will use the built environment of the city - and the Homewood campus - as a classroom and a site for interpretive drawing and creative design work. Essential in the architect's education is the sketchbook, which functions not merely as a place to 'store' what has been witnessed, but a place to interpret and explore implications of design in the world, whether close to home or traveling in exotic locales.

AS.371.151. Photoshop/Digital Darkroom. 3 Credits.
Photoshop is not only the digital darkroom for processing images created with digital cameras;it is also a creative application for making original artwork. In this course, students use Photoshop software as a tool to produce images from a fine art perspective, working on projectsthat demand creative thinking while gaining technical expertise. Students will make archivalprints, have regular critiques, and attend lectures on the history of the manipulated imageand its place in culture. We will look at art movements which inspire digital artists,including 19th-century collage, dada, surrealism, and the zeitgeist of Hollywood films. Studentsmust have a digital SLR camera. Prior knowledge of Photoshop is not required.Attendance at first class is mandatory. Approval for this course will be considered afterenrollment on SIS; no need to email.

AS.371.152. Introduction to Digital Photography. 3 Credits.
In this course students are introduced to the technical and creative study of digital photography. Students will learn the basic operation of the DSLR camera while receiving instruction in Photoshop, Lightroom, Nik software, file handling and color editing processes. Through in class demonstrations and in the field practice, students learn to use the camera's manual settings to make accurate exposures. Lectures and discussions of historical and contemporary photographs will be introduced to give students guidance and inspiration for their own image making. The semester culminates with students creating a final portfolio of prints. Attendance in first class is mandatory.

AS.371.153. Introduction to Visual Communication- Graphic Design. 3 Credits.
The digital design course explores two-dimensional graphics as visual communication. Students will be introduced to basic design principles and elements, learn graphics tools used in the designindustry, and develop and apply creative strategies to solve design problems in their everyday lives. This unique course will address the students' direct needs through real-life design problems they face. Students will be asked to bring design challenges and tackle the issue both independently and collaboratively. Design challenges may include building print and web visual presentations, producing information brochure and posters, developing off and online portfolios, creating a resume to business cards. The course will offer both analog and digital design processes, graphics software tutorials and techniques, and basic introduction to design history, vocabulary and concepts.

AS.371.154. Introduction to Watercolor. 3 Credits.
Watercolor is simultaneously the most accessible of all painting media and the most misunderstood. This course provides experience and instruction in observational and expressive watercolor techniques, materials, concepts, and vocabulary. Topics to be reviewed include line, perspective, value, texture, composition, color, and pictorial space. There will be an introduction to contemporary practices in watercolor, as well as experimental and abstract exercises, collage, and conceptual work.

AS.371.155. Introduction to Sculpture. 2 Credits.
A studio course introducing students to sculptural concepts and methods. Emphasis is on the process of creating. Even the simplest materials can effectively activate space, convey meaning, and elicit emotion when used thoughtfully and imaginatively. Students will learn different methods including additive and reductive techniques, construction, modeling, and mold-making. No prerequisites except a willingness to experiment, make mistakes... and clean up when you are done. Approval in this course will be considered after enrollment in SIS. Attendance in 1st class is mandatory.

AS.371.162. Black and White: Digital Darkroom. 3 Credits.
In this digital photography course, students explore the beauty and drama of the black- and-white aesthetic. Students learn the elements of composition, style and content through discussions of historic and contemporary imagery. They gain proficiency in Photoshop, Lightroom, and NIK software. Projects enhance students' artistic vision and include the Evocative Landscape, Surrealism, and a DADA collage. Students work on a final project of their choice. Digital SLRs are provided. Attendance at 1st class is mandatory. Camera experience is a plus but not a requirement. Approval for this course will be considered after enrollment on SIS.

AS.371.164. Introduction to Printmaking. 2 Credits.
Working with non-toxic/water based inks and both an engraving press and hand tools, students will explore several types of printmaking. Methods will include intaglio, collograph and both simple and multi-plate relief. As they develop their prints, students can then observe and exploit the strengths that each method has to offer. Drawing and Photoshop skills are helpful but not required.

AS.371.165. Location Photography. 3 Credits.
Working in the studio and in various locations, students will learn the fundamentals of lighting interiors and strategies for working in almost any environment. Field trips will include the National Aquarium, Evergreen Museum & Library, a Howard County horse farm, a Tiffany-designed church and a photo studio. Students will also concentrate on the fine art of printing in our digital lab. They will develop a final portfolio of 10 photographs which express a personal vision about a location of their choice. A basic knowledge of digital photography is helpful, but not required. Approval for this course will be considered after enrollment on SIS. First class is mandatory

AS.371.166. Landscape Photography. 3 Credits.
Class begins: Wednesday, July 6th. In this course students will experience the drama and beauty of the urban and rural landscape. On numerous field trips they will hone their camera technique as well as learn elements of composition and develop a personal style. Students will learn the fundamentals of Photoshop and they will also be introduced to the beauty of black and white in Silver Efex software. Digital SLR cameras will be provided.

AS.371.180. Exploring Line. 2 Credits.
This challenging yet creatively playful course presents abstract, perceptual and conceptual concepts in art to understand line, one of the elements of art, from multiple perspectives, materials and practices. Be prepared to collaborate and experiment! Through an intense exploration of line, students will create artworks exploring line as marks on a flat surface (drawing), lines that communicate data (design), lines that build form (sculpture) and lines that embody movement (performance and video). Possible assignments will include projects with drawing, printmaking, fiber, cell phone video, installation, unconventional or recycled materials and collaboration. • This is not a drawing class but a multimedia course on one of the elements of art.Instructor approval and attendance at first class is mandatory.

AS.371.185. Printmaking: Multiples and Variations. 3 Credits.
In this course students learn to create marks, textures and imagery using a variety of printmaking techniques. Students create relief and intaglio printing matrices and practice printing by hand and with a press to reproduce their images. The class culminates with explorations of layered printing, monoprinting, and mixed media approaches to create unique 2-dimensional and 3-dimensional works. Attendance in first class is mandatory. No prior experience is needed.

AS.371.186. Fundamentals of Design Drawing and 3-D Visualization. 2 Credits.
This course introduces the tools, techniques, and technologies of design representation in a project-based setting. Students will build drawing skills, learn the principles of perspective, and explore theories and applications of design media and emerging digital technologies. Designing projects at various scales from the hand-held object to the public realm, we will develop creative problem solving, design thinking, and iterative design methodologies, leaving the course with the ability to apply the foundations of design to any discipline. Special note: This spring our course will be geared toward collaborative and site-based practices. Class meetings will begin with remote instruction and collaboration, and expand to include site visits as the season progresses. This course will satisfy the foundation drawing class for the art minor.

AS.371.187. Intermediate Drawing, A Contemporary Approach. 2 Credits.
This is an intermediate drawing class that builds on the concepts and skills in Studio Drawing 1. Students will explore contemporary and conceptual approaches to drawing while further developing their skills in various graphic mediums. Risk taking and experimentation will be encouraged while learning about comtemporary practices in the medium. The course will conclude with students creating an individual series of drawings of their choice.
AS.371.131 OR AS.371.186

AS.371.210. Drawing: Who's Telling the Story?. 2 Credits.
What makes an image truthful?Students will create drawings utilizing both traditional and unconventional processes through the lens of historical and political illustrations, propaganda graphics and misinformation, and current events. The course is anchored in, but not limited to, the art practices of Kara Walker's slavery narrative, George Grosz's political caricatures of First War Germany, historical war posters, Hugo Crosthwaite's depiction of the US/MX border to Coronavirus "beauty shot." Projects may include revising a historical artwork, manipulating propaganda graphics of the past and the present, redrawing a visual data, and designing a personal narrative drawing project. Field trips, technical demos, discussions, and lectures will provide context and support for students to become image-makers of their own narrative and history. Attendance in first class is mandatory. Recommended but not required: AS.371.131

AS.371.211. Artist Books: Draft, Print, Stitch. 3 Credits.
In this studio art class students will create three artist books taught by three different CVA faculty. The first four weeks will investigate the book as a technological and cultural artifact, exploring historically what the book is and does, and as a cognitive aid and engine for ideation. Students will create a blank book that they use for their creative explorations.The second section will use printmaking techniques such as paper lithography, xerox transfers, and relief printmaking combined with quick and ephemeral folding structures in an effort to understand both printmaking and bookmaking's rich history in dissemination of ideas, democracy, and social change. This section will participate in a class zine exchange. The third section of the course will explore embroidery and weaving to navigate language and mark making. Students will explore the relationship between poetry, storytelling, and fiber processes to create a narrative textile.

AS.371.215. Hybrid Photography; Analog and Digital Experimentation. 3 Credits.
This course will introduce students to the basic use of the digital camera, Adobe photoshop post processing, basic darkroom printing and a variety of techniques for making images using analog and digital techniques. Students will learn a variety of alternative processes such as Photograms in contemporary practices, Chemigrams, and nature printing techniques such as Lumen Prints, Chlorophyll prints and Anthotypes. Through lectures, demos and hands on experimentation, students will learn how to creatively combine two worlds of technology, digital and analog, to make unique images.

AS.371.226. Sculptural Fibers. 3 Credits.
The fabric of the universe, a wrinkle in time and space: our physical universe is frequently described through fiber metaphors. Fiber processes are algorithmic. They grow exponentially, they fold, they tear, they wrinkle. These processes function as a pliable plane that can be bent, stretched, and turned inside out. This course offers students an opportunity to explore fiber processes through this sculptural lens. Topics include knitting, crochet, basketry, and lace as they come together to form sculptural armatures and objects. Together we will explore the physical properties of fiber and textiles, how they take up space and function in our world. Attendance in first class is mandatory. Recommended but not required: AS.371.126 Fiber Art and the String Revolution.

AS.371.228. Investigations in Still Life Photography. 3 Credits.
Students will learn approaches to taking still life photographs and expressing their relationships to the objects surrounding their daily lives. Still life will be defined as the objects we purchase, own, consume, observe and arrange. Investigations into the still life will be focused on table top, food, found objects, and product photography.Technical explorations include the exposure triangle, depth of field, basic lighting control, framing, and visual design. Class will consist of live-demonstrations, independent studio work, discussions, and photography critiques. Students will complete a portfolio of printed images by the end of the class. A digital camera with manual control, tripod, Lightroom, and Adobe Photoshop will be supplied for this course. Students will be approved into the course after enrollment in SIS. Attendance in first class is mandatory.

AS.371.230. Portrait Photography. 3 Credits.
In this course students will gain insight into the art of portraiture with projects such as the self-portrait, collaborative portraiture, portrait of a place, and image and text. In representing people, we'll explore developing an understanding of people in relation to power and representation, the body, environments and society. Lectures on the history of the portrait and its practitioners, new directions in portraiture as well as empathy and the gaze will inspire students to bring greater depth to their image making. Camera experience is a plus but not a requirement. Cameras will be provided for the semester. First class is mandatory.

AS.371.233. Environmental Photography. 3 Credits.
Environmental cognition, consciousness and communication are formed, deciphered and internalized with the support of visual representations and, in particular, photography. Images increasingly structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Students will engage with the local community, identify and investigate environmental issues affecting Baltimore, participate in photographic critiques, and develop a final, in-depth environmental photo-documentary project. This studio/seminar course is designed with an emphasis on individual research and practice.Attendance in first class is mandatory.

AS.371.234. Oil Painting II. 3 Credits.
Students who have mastered basic painting skills undertake sustained projects, including portrait and plein air landscape work. Slide lectures and handouts deepen students' appreciation of representational traditions. Advanced techniques, materials, and compositional issues are also investigated. Recommended Course Background: AS.371.133 or equivalent.
AS.371.131 OR AS.371.133 or instructor's permission.

AS.371.240. Intermediate Digital Photography: Photographic Concepts. 3 Credits.
This studio art course will introduce students to conceptual techniques and applications of digital photography. In this course, we will foster creative exploration and uses of technology through advanced digital capture, image construction and manipulation, substrate choices, and methods of digital output. We will have an in-depth look at historic and contemporary photography as it relates to culture, current trends, and classroom assignments. Students will also engage in conversation and classroom critique throughout the semester to aid their dialogue and understanding of contemporary art. Attendance in first class is mandatory. Completion of AS.371.152 is suggested.

AS.371.250. Life Drawing. 3 Credits.
An intermediate drawing course focusing on drawing the human form and studying anatomy for artists. Working from live models, students will draw the clothed and nude figure, portrait drawing, gesture drawing and anatomy tracings of the skeleton and muscles. Students will use drawing skills learned in Drawing I to explore the human form using wet and dry material, collage and color. The class will study the figure drawings and paintings from Renaissance to contemporary artists. Attendance in 1st class is mandatory.
AS.371.131 or AS.371.187 or permission of Instructor.

AS.371.302. Photographic Portfolio. 3 Credits.
In this upper level course, students will work on a semester-long project. They will develop their ideas within a seminar style format that allows for conversation and debate and provides a forum for the evolution their work. Students will learn advanced techniques in Photoshop, Nik software and Lightroom to enhance content and develop a personal style. Through a combination of critique, lecture, and lab, students will complete a portfolio of ten printed images that work together in a series. Approval for this course will be considered after enrollment on SIS. Attendance in 1st class is mandatory.

AS.371.303. Documentary Photography. 3 Credits.
In this course, we will explore different genres and approaches to documentary photography and the questions inherent to this mode of image-making like representation, storytelling, records and archives, journalism, community engagement, research and personal perspective. Baltimore neighborhoods and contemporary issues will provide inspiration for student work. Students will learn camera operation, photo editing and produce a final documentary project on a subject of their choice as the culmination of their semester's work. Digital SLRs are available on loan for the semester. Attendance at first class is mandatory.

AS.371.307. The Photographer's Book. 3 Credits.
Students create a handmade book of photographs that illustrate a favorite piece of text. They may work with poetry, song lyrics, a play, a narrative, a blog, a diary, any writing (including their own). Students may look at historical texts such as medieval manuscripts or even scientific treatises. The possibilities are endless. We will take fieldtrips to book collections at the George Peabody Library, Evergreen Museum and Library and the Betty and Edgar Sweren Collection.This course will be taught by a photographer and an artist book designer. A previous photography class is a plus, but not a requirement. Students who would like to combine their painting and drawing skills with their photographs are welcome to do so. Attendance in first class is mandatory. Students will have an exhibition of their artist books in the Special Collections Rare Books room of the MSE library.Approval for this course will be considered after enrollment in SIS.

AS.371.330. Evergreen as Muse: A Photographic Exploration. 3 Credits.
In this course taught by an historian and a fine art photographer, students are introduced to the delights of the Evergreen Museum and Library of the Johns Hopkins University. The history of Evergreen, its inhabitants including family members and servants, the world-famous library, art collection and grounds, all serve to inspire students to produce a portfolio of photographs. There will be an exhibition showcasing student work at the museum as the culmination of their semester's work.
AS.371.152 OR AS.371.162 OR AS.371.303

AS.371.381. Advanced Projects in Visual Art. 3 Credits.
In this studio course students will create artwork based on their individual research and concerns in art. Through artist presentations, readings, discussions and museum and gallery visits the students will advance their skills and understanding of contemporary art and theory. This class is open to studio and digital photography students who want to engage with other serious art students and advance their art practice and research.
AS.371.131 OR AS.371.133 OR AS.371.152

AS.371.501. Independent Study. 2 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.371.502. Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.371.590. Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.374 (Military Science)

AS.374.101. Introduction to the Army. 2 Credits.
The MSL I course produces a Cadet who accepts the Army as a values-based organization and embraces the scholar-athlete-warrior ethos; who is familiar with individual roles and responsibilities in support of team efforts and problem solving processes in military and non-military situations; who demonstrates oral and written communication skills, understands resilience, and demonstrates a commitment to learning. MSL101 introduces Cadets to the Army and the Profession of Arms. Students will examine the Army Profession and what it means to be a professional in the U.S. Army. The overall focus is on developing basic knowledge and comprehension of the Army Leadership Requirements Model while gaining a big picture understanding of the Reserve Officers' Training Corps (ROTC) program, its purpose in the Army, and its advantages for the student. Cadets also learn how resiliency and fitness supports their development as an Army leader. As you become further acquainted with MSL101, you will learn the structure of the ROTC Basic Course program consisting of MSL101, 102, 201, 202, Fall and Spring Leadership Labs, and Basic Camp. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student.Military Science courses require department permission and are restricted to active or inquiring ROTC members

AS.374.102. Foundations of Agile and Adaptive Leadership. 2 Credits.
The MSL I course produces a Cadet who accepts the Army as a values-based organization and embraces the scholar-athlete-warrior ethos; who is familiar with individual roles and responsibilities in support of team efforts and problem solving processes in military and non-military situations; who demonstrates oral and written communication skills, understands resilience, and demonstrates a commitment to learning. MSL102 introduces Cadets to the Army and the Profession of Arms. Students will examine the Army Profession and what it means to be a professional in the U.S. Army. The overall focus is on developing basic knowledge and comprehension of the Army Leadership Requirements Model while gaining a big picture understanding of the Reserve Officers' Training Corps (ROTC) program, its purpose in the Army, and its advantages for the student. Cadets also learn how resiliency and fitness supports their development as an Army leader. As you become further acquainted with MSL102, you will learn the structure of the ROTC Basic Course program consisting of MSL101, 102, 201, 202, Fall and Spring Leadership Labs, and Basic Camp. The focus is on developing basic knowledge and comprehension of Army leadership dimensions, attributes and core leader competencies while gaining an understanding of the ROTC program, its purpose in the Army, and its advantages for the student.

AS.374.110. Basic Leadership Laboratory, ROTC 101. 1 Credit.
These introductory courses in a laboratory environment are designed to expose students to practical experiences, challenges and individual learning opportunities in a small group. Students learn the fundamentals of an organization and apply principles of leadership and management at the foundation level. Students develop military courtesy, organizational discipline, communication and basic leadership and management skills. Ultimately, students understand how to facilitate and lead a small group of four to five people as an integral part of a larger organization of 75-100 people through situational training opportunities in a variety of conditions. As a leadership practicum, students have the opportunity to serve in leadership positions and receive tactical and technical training. In addition to learning to lead groups of five to 100 people, students will also be exposed to training on first aid, operating Army equipment, Army activities such as rappelling and drill and ceremony. These laboratories are required for enrolled ROTC participants who desire to be considered for a commission in the Army. Corequisite: AS.374.101-AS.374.102.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.101 OR AS.374.102

AS.374.120. Basic Leadership Laboratory II. 1 Credit.
Students learn and apply team echelon leadership at an entry level. They continue development of military courtesy, discipline, communication and basic Soldier skills. Ultimately, students understand how to operate in and lead 4-5 persons through a program of training opportunities in a variety of conditions. Freshmen only.

AS.374.201. Leadership and Decision Making. 2 Credits.
The MSL II course produces a cadet grounded in foundational leadership doctrine and skills by following and leading small units to achieve assigned missions; who applies critical thinking and problem solving using Troop Leading Procedures (TLP); who comprehends the value of diversity and understands the officer's role in leading change; understands the fundamentals of the Army as a profession. MSL201 adds depth to the Cadets understanding of the Adaptability Army Learning Area. The outcomes are demonstrated through Critical and Creative Thinking and the ability to apply Troop Leading Procedures (TLP) to apply Innovative Solutions to Problems. The Army Profession is also stressed through leadership forums and a leadership self-assessment. Students are then required to apply their knowledge outside the classroom in a hands-on performance-oriented environment during Leadership LABs team building exercises, and Field Training Exercises.Military Science courses require department permission and are restricted to active or inquiring ROTC members.

AS.374.202. Army Doctrine and Team Development. 2 Credits.
MSL 202 focuses on Army doctrine and team development. The course begins the journey to understand and demonstrate competencies as they relate to Army doctrine. Army Values, Teamwork, and Warrior Ethos and their relationship to the Law of Land Warfare and philosophy of military service are also stressed.The ability to lead and follow is also covered through Team Building exercises in small units up to squad level. Students are then required to apply their knowledge outside the classroom in a hands-on performance-oriented environment during Leadership LABs (team building exercises, LTXs, VBS exercises). Includes a 1-Hour lab per week taught by MS III Cadets.The Army Reserve Officer Training Course (ROTC) Basic Course is an academically rigorous 2-year college program comprised of four semester courses of instruction, Leadership Labs (two sets, Fall/Spring), and the Cadet Basic Camp conducted at Fort Knox, KY.

AS.374.210. Basic Team Leadership. 1 Credit.
Students lead and assist in leading 4-5 person teams through a variety of training opportunities. They learn the troop-leading procedures, basic problem solving, and tactical skills aimed at military leadership. Students will mentor and assist members of their team with improving their own skills and leadership as well. Corequisite: AS.374.201.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.201

AS.374.220. Advanced Team Leadership. 1 Credit.
Students perform duties of and develop their leadership, as team leaders during a variety of induced training opportunities. Continued emphasis is placed on troop-leading-procedures and simple problem solving. Students lead physical fitness training and mentor subordinates in military, academic and extra-curricular activities. Successful completion of advanced team leadership allows students to progress into ROTC Advanced Courses. Sophomores only.

AS.374.301. Training Management and the Warfighting Functions. 2 Credits.
MSL301 Training Management and the Warfighting Functions, is an academically challenging course where you will study, practice, and apply the fundamentals of Army Leadership, Officership, Army Values and Ethics, Personal Development, and small unit tactics at the platoon level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a squad and platoon in the execution of a mission during a classroom PE, a Leadership Lab, or during a Field Training Exercise (FTX). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills that can further develop you in to a successful officer. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your instructor, other ROTC cadre, and MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation System (COER). Successful completion of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Area: Writing Intensive

AS.374.302. Applied Leadership in Small Unit Operations. 2 Credits.
MSL302 Applied Leadership in Small Unit Operations, is an academically challenging course were you will study, practice, and apply the fundamentals of Army Leadership, Army Values and Ethics, Personal Development, and small unit tactics at the platoon level. At the conclusion of this course, you will be capable of planning, coordinating, navigating, motivating and leading a squad and platoon in the execution of a mission during a classroom PE, a Leadership Lab, or during a Field Training Exercise (FTX). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills that can further develop you in to a successful officer. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, and practical exercises, a mid-term exam, and a final exam. You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your instructor, other ROTC cadre, and MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation Report (COER). Successful completion of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY.
Area: Writing Intensive

AS.374.307. Leadership in Military History. 2 Credits.
This course provides students with a historical perspective to decisions made by American military leaders: battlefield complexity, resource limitations, and teamwork deficiencies. Students cover major military engagements from the colonial period through the current operating environment. Students examine how leaders motivated their men, devised battle strategies, implemented rules of engagement, and managed supplies, transportation, and logistics for their troops. Requires permission of the Director of Military Science. Registration restricted to contracted ROTC cadets only.
Area: Writing Intensive

AS.374.310. Basic Tactical Leadership Laboratory. 1 Credit.
In Leadership Laboratory, students are given the opportunity to apply what they have learned in the classroom, in a tactical or field environment. Students learn and demonstrate the fundamentals of leadership by planning, coordinating, navigating, motivating, and leading squads in the execution of both garrison and tactical missions. Successful completing of this course will help prepare you for the SROTC Advanced Camp, which you will attend in the summer at Fort Knox, KY. Corequisite: AS.374.301.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.301

AS.374.320. Advanced Tactical Leadership. 1 Credit.
Students further develop their leadership skills by directing and coordinating the efforts of 9-60 personnel on offensive, defensive and civil-support tactical-tasks. Develop written plans for garrison and field environments while supervising its execution. Ultimately, prepares students to excel at the four-week National Leadership Development and Assessment Course at Fort Knox, KY. Permission required. Juniors only.

AS.374.401. The Army Officer. 2 Credits.
MSL 401 Focuses on development of the Army Officer. It is an academically challenging course were you will develop knowledge, skills, and abilities to plan, resource, and assess training at the small unit level. You will also learn about Army programs that support counseling subordinates and evaluating performance, values and ethics, career planning, and legal responsibilities. At the conclusion of this course, you will be familiar with how to plan, prepare, execute, and continuously assess the conduct of training at the company or field grade officer level. Includes a lab per week overseeing MSL III lesson facilitation and supervised by ROTC Cadre.Military Science courses require department permission and are restricted to active or inquiring ROTC members.

AS.374.402. Company Grade Leadership. 2 Credits.
This is an academically challenging course were you will study, practice, develop, and apply critical thinking skills pertaining to Army leadership, officer skills, Army Values and ethics, personal development, and small unit tactics at platoon level. This course includes reading assignments, homework assignments, small group assignments, briefings, case studies, practical exercises, mid-term exam, and a Capstone Exercise in place of the final exam. For the Capstone Exercise, you will be required to complete an Oral Practicum that you will be evaluated on your knowledge of the 20 Army Warfighting Challenges (AWFC) covered throughout MSL401 and 402 coursework. In addition, you could be assessed on leadership abilities during classroom PE, Leadership Labs, or during a Field Training Exercise (FTX). You will receive systematic and specific feedback on your leader attributes, values, and core leader competencies from your cadre, PMS and other MSL IV Cadets who will evaluate you using the Cadet Officer Evaluation Report (COER). You will be required to write peer evaluations and receive feedback on your abilities as a leader and how to improve those leader skills. At the conclusion of this course, you will be able to plan, coordinate, navigate, motivate and lead a platoon in future operational environments. Successful completion of this course will assist in preparing you for your BOLC B course and is a mandatory requirement for commissioning.

AS.374.410. Advanced Planning & Decision Making I. 1 Credit.
Students develop a semester-long progression of programmed training activates that support completion of the unit's Mission Essential Task List. The laboratory builds from fall to spring semester as students master advanced problem solving, resource synchronization and executive decision making. Students evaluate, mentor and develop subordinate leaders as part of the Leadership Development Program and FM 6-22, Army Leadership. The course serves as the final evaluation and determination on a student's ability to lead Soldier's as a Second Lieutenant in the US Army. Co-requisite: AS.374.401-AS.374.402. Recommended Course Background: AS.374.301-AS.374.302, AS.374.310-AS.374.320 and Basic Course.Military Science courses require department permission and are restricted to active or inquiring ROTC members.
Prerequisite(s): AS.374.401 OR AS.374.402

AS.374.420. Advanced Organizational Planning. 1 Credit.
Students develop a semester-long progression of training activates that support completion of the unit's Mission Essential Task List. The laboratory builds on the first semester's achievements through advanced problem solving, resource synchronization and executive decision making. Students evaluate and develop subordinate leaders as part of the Leadership Development Program and FM 6-22, Army Leadership. The course serves as the final evaluation and determination on a student's ability to lead Soldier's as a Second Lieutenant in the US Army. Permission required. Seniors only.

AS.374.501. Independent Study. 1 Credit.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.374.512. Internship - Military Science. 1 - 3 Credits.
Students will select a topic relevant to the study of military leadership and will complete a project based on current military doctrine and the contemporary operating environment of current military operations. Permission required.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.376 (Music)

AS.376.111. Rudiments of Music Theory and Musicianship. 3 Credits.
This course introduces written and aural music fundamentals including notation, scales, intervals, chords, rhythm, meter and sight-singing. Students will compose melodies and short pieces and complete listening projects. Course does not count towards the completion of the minor.

AS.376.166. Star Trek Music- The Franchise Frontier. 3 Credits.
Music defines the Star Trek experience. Through their continued reuse and repetition, Star Trek's many musical themes go beyond their original audiovisual frameworks to operate as learned musical-cultural texts. As Star Trek has expanded its content into a myriad of installments and media platforms, this musical symbolism has proved vital in articulating both these differences and “sameness.”This online, asynchronous course uses Star Trek's music as a tool to investigate musical branding and the creation of meaning in the media we consume every day. Through close viewings—and listenings—of film, television episodes, video games, computer games, commercials, and other media, we will explore the meaning(s) these media construct and acquire as they are re-used and re-purposed in audiovisual contexts. Your work will include studying media clips, television episodes, and some feature-length films; short readings in which we interact with both current and classic scholarly literature; regular discussion posts and responses to our content; a weekly reflection journal of short posts; and a final paper/project on a Star Trek music topic of your choice (1500 words). In so doing, we will hone your analytical skills by learning to critically evaluate filmic media and craft arguments about the roles of music/sound in film.

AS.376.190. Learn Music by Writing It. 3 Credits.
This course uses composition and song-writing projects to introduce music fundamentals to students with little or no musical background. Topics will include rhythm and meter, pitch and intervals, scales, chords, and harmony, and how to read and write music in both traditional and popular presentations. We will cover standard classical music notation (score, Roman numerals, traditional theory terminology) as well as popular (lead-sheet notation and performance conventions). This course has no prerequisite.

AS.376.211. Music Theory I. 3 Credits.
Introduction to basic principles of tonal music through listening, analysis and music making. Students study melody, harmony, voice leading, figured bass and dissonance treatment, and will also undertake short composition projects. Must have taken the qualifying examination or AS.376.111. Recommended to be taken concurrently with AS.376.221.

AS.376.212. Music Theory II. 3 Credits.
This course continues the aural and written work of the previous course, but focuses on chromatic harmony while continuing the study of melody, counterpoint, and figured bass. Prerequisite: Music Theory I. AS.376.211

AS.376.221. Musicianship I. 2 Credits.
An introduction to basic musicianship skills. The course is divided into performance skills (sight singing, rhythm reading, basic piano, and improvisation) and aural skills (recognition of pitch, chords, rhythms, melodies, and other musical structures). Topics include major and minor keys and simple time signatures. Emphasis is placed on developing effective practice techniques. Pre-requisite: AS.376.111 (Rudiments of Music Theory and Musicianship) or placement exam.

AS.376.222. Musicianship II. 2 Credits.
A continuation of the skills developed Musicianship I. The course is divided into performance skills (sight singing, rhythm reading, basic piano, and improvisation) and aural skills (recognition of pitch, chords, rhythms, melodies, and other musical structures). Topics include minor keys, chromatic melody and harmony, compound time signatures, and syncopation). As in Musicianship I, emphasis is placed on developing effective practice techniques. Pre-requisite: AS.376.221 (Musicianship I) or placement exam.

AS.376.231. Western Classical Music. 3 Credits.
This course offers an introduction to music of the Western “classical” tradition through the study of a select number of works written over the course of the last four hundred years. In examining these musical works, all of which were remarkable for their time and which many still value today, we will consider their identity both as timeless aesthetic objects and as particular moments in cultural history. We will frame our work within the historical, philosophical, and political contexts of the time, and more recent critical assessments will help us evaluate the circumstances that have shaped reception of this repertoire over the past four centuries. In addition to the works and composers treated in our textbook, we will supplement our study throughout the semester with a consideration of the lives and works of individuals whose stories are less well-known. Ultimately, we will work to understand the particular challenges, opportunities, and responsibilities related to continued engagement with so-called “classical” music in the 21st century. Close attention is given to techniques of musical listening, and to details of first performances, with a consideration of the problems involved in assembling such a picture. No previous knowledge of musical notation or terminology is required. 3 credits.

AS.376.242. Introduction to Popular Music. 3 Credits.
A survey of the stylistic features and social contexts of American popular music since the 1950s.

AS.376.244. Electronic Music Production. 3 Credits.
Students will be introduced to electronic music production techniques and software, and how both can be used to produce a wide range of genre specific results. Skills such as beat matching, intricate use of quantization, virtual instrument editing, automation, sampling, mixing, mastering, effect usage and use of plugins will be explored.

AS.376.245. Introduction to Sound, Audio, and Recording Arts. 3 Credits.
In this course we will undertake a comprehensive survey of sound, audio and the related technology. While covering sound recording from an historical perspective, we'll touch on related material in physics, music, psychology and acoustics. In lab exercises and assignments, students will have the opportunity to learn in a hands-on environment as practical applications of the lecture material are explored. Assignments will include critical listening, in addition to basic recording, editing and mixing of audio. The course will culminate in a comprehensive final project.

AS.376.250. Introduction to Computer Music. 3 Credits.
Introduction to Computer Music is an opportunity for people with no specialized training in music to explore electronic art music as a long-standing, if obscure, body of art, then to participate in creative work in the style. Participants will gain a heuristic understanding of forms of musical composition that operate outside the conventions of regular rhythm and harmony as they record and manipulate sound to sculpt it into original musical works. The lecture portion combines an historical overview of electronic music, rudiments of acoustics and musical perception, and instruction in compositional techniques and in using computers as creative musical tools. The laboratory portion, given at the Digital Media Center, serves as a workshop for creative exploration and for the completion of assigned creative projects including original works of digital sound art.

AS.376.252. Jazz History. 3 Credits.
The primary focus of this course is a survey, investigation, and study of jazz music and how it shaped American history from its origins to current times. Upon completion of this course students will be able to: discuss why jazz is important, both musically and culturally; learn the nuances of a new art form; demonstrate that jazz is a huge part of American heritage; explore parallels between jazz and both American and world history; and become a receptive and knowledgeable audience for jazz.

AS.376.258. Jazz Improvisation and Theory. 3 Credits.
The primary focus of this performance/theory course is designed to help students acquire and develop basic language for improvisation in a collaborative environment. Throughout the semester, the course will develop these skills through songs drawn from standard jazz repertoire, examining improvised solos by master musicians, and understanding the application of fundamental theory concepts in performance situations. Enrolled students should be comfortable with theory rudiments such as note reading, scales, and intervals. No textbook is required, but students should have access to an instrument (singers are welcome).

AS.376.259. Theory of 20th Century Popular Song. 3 Credits.
This class will explore the way harmonic concepts codified in the western classical tradition over the last few centuries are represented and expanded upon in 20th and 21st century popular music. We will examine a number of harmonic techniques using a wide array of genres, ranging from jazz to Broadway to rock to pop to R&B/soul to hip-hop. This course will focus on listening, analysis, and composition techniques.

AS.376.303. Musical Theater from Aristophanes to Leonard Bernstein. 3 Credits.
This course examines the birth of musical theatre from Greek tragedy through the liturgical and secular plays of the middle ages and Renaissance, to the classical and romantic singspiels, operettas, and zarzuelas of the modern era, by such figures as Aristophanes, Adam de la Halle, Hildegard of Bingen, Angelo Poliziano, Juan del Encina, Wolfgang Amadeus Mozart, Gilbert and Sullivan, Ernesto Lecuona, Igor Stravinsky, and Kurt Weill. These will serve as a backdrop for a closer examination of the musicals of Jerome Kern, Cole Porter, George Gershwin, Irving Berlin, Richard Rodgers, Harold Arlen, Frank Loesser, Leonard Bernstein and others. In addition to studying and placing the works of these Broadway giants into a social, political, and economic context, we will study and perform from representative musicals and attend a performance at the Lyric Theatre. Student will be expected to write a capstone project.
Area: Writing Intensive

AS.376.330. History of Opera. 3 Credits.
A basic course in the origin and development of opera and its dissemination throughout the Western world.

AS.376.332. A Cappella Arranging. 1 Credit.
Students will learn how to arrange pre-existing melodies or songs for various vocal ensembles. Music theory I as a prerequisite recommended but not required.

AS.376.334. World Music & Cultures. 3 Credits.
The general purpose of this course is to introduce students to the scholarly study of traditional, popular, and classical music from around the world through reading, discussion, close listening of recordings, and observation of ethnographic and commercial films. We will be primarily concerned with using music as a lens through which to better understand cultural concepts including diaspora, religion, colonialism, creolization, and tradition. Area case studies will include India, East Asia, Sub-Saharan Africa, the Caribbean, and the Middle East.

AS.376.336. Beethoven and the Transformation of Musical Style. 3 Credits.
A survey course focusing on the life and music of Ludwig van Beethoven, whose compositions transformed and revolutionized music of the 19th century. Students will become acquainted with Beethoven's major works, including piano sonatas, string quartets, and symphonies. No previous musical background is necessary. NOTE: The year 2020 marks the 250th anniversary of Beethoven's birth.

AS.376.342. Caribbean Music. 3 Credits.
This course will explore the many genres of traditional and popular music that have emerged among the peoples and cultures of the Caribbean region and its Diaspora. We will examine the social, political, and economic issues that have shaped the region's music and how that music may have intersected with migration, colonization, ethnicity, race and tourism. Using a "participantobservation" approach, students will read about, listen to and research a variety of musical experiences within the relevant sociopolitical context. Students should expect to fully participate in discussions about the assigned readings and music, and should be prepared to conduct their own research and share their own or newly acquired knowledge of contemporary and "historical/traditional" musical themes, and local and regional artists. Our collective goal will be to enjoy as well as to think critically about music, culture and performance and within a moreinformed understanding of the complex, multi-varied and multi-vocal context—know as "The Caribbean".

AS.376.344. Powerful Women in Opera. 3 Credits.
Many opera scholars have noted that opera abuses its female characters. Many operatic heroines die, whether from violent acts or chronic diseases. However, women in opera also wield great power through their voices as ambitious queens, cunning servants, magical beings, and femmes fatales. In this course we will examine how these female characters operate through explorations of the operas' historical context, their texts and scores, and modern performance practice. Spanning from the 17th to 21st centuries, the repertoire studied in this class will provide an introduction to opera history. At the same time, we will delve deeply into different ways to do close analyses of opera through the lens of gender, reading the work of such thinkers as Carolyn Abbate, Naomi Andre, Adriana Caverero, Catherine Clément, and Wayne Koestenbaum.

AS.376.348. The Symphonic Century. 3 Credits.
The symphony occupies a prominent place within the history of Western classical music in the "long" nineteenth century. At once a canvas for daring innovations in style and form and a genre strongly allied with notions of "tradition," the nineteenth-century symphony brings together a complex set of issues that illuminate the broader history of music and musical culture of the past 200 years. This course introduces the iconic works of the symphonic tradition, with a focus on music of Haydn, Mozart, Beethoven, Schubert, Berlioz, Schumann, Mendelssohn, Brahms, Bruckner, and Mahler. As we aim to discover what made this music so remarkable in its time and why so many people still care about it today, we will consider each symphony both as a timeless work of art and as a particular moment in cultural history. Close attention will be given to the techniques of musical listening, and our work will be deeply rooted within the historical, philosophical, and political contexts of the time. There are no pre-requisites for the course apart from a willingness to open one's ears and to engage creatively and critically with some of the most extraordinary music ever written.

AS.376.371. Introduction to Music Cognition. 3 Credits.
What underlies our aesthetic response to music? How and why are we able to identify certain sounds as music? To what extent are music and natural language similar? What is it about music that evokes such powerful emotions such as happiness and sadness? What is unique to musical creativity? Examining such questions from cognitive science, neuroscience, psychology, and philosophical perspectives, this course explores relevant research and theory in the emerging domain of music perception and cognition. Students will complete a final research paper on the topic of their choice that integrates the course material.

AS.376.372. Topics in Music Cognition. 3 Credits.
This course explores the similarities and differences between music and language, the effects of musical training on cognitive development, and the expressive power of music, with an introduction to music and its role in film. We will read relevant research and theory on these topics from cognitive science, neuroscience, psychology, musicology, and philosophical perspectives.

AS.376.404. History of Musical Instruments. 3 Credits.
The history, technology, and performance of Western European musical instruments, their precursors, and their non-western counterparts, addressed by experts and explored on visits to historic collections.Recommended prerequisite: AS.376.231 "Western Classical Music".
Area: Writing Intensive

AS.376.407. Music and Evolution. 3 Credits.
This course will examine the bio-cultural evolution of music in light of recent interdisciplinary research on the social bases of human cognitive evolution, and explore its implications for current debates in musicology, ethno- musicology, psychology of music, and human cognitive evolution.
Area: Writing Intensive

AS.376.428. Mozart Operas. 3 Credits.
Wolfgang Amadeus Mozart wrote his first opera in 1767 at the age of 11. By the time of his death at age 35, he had written 22 full-length operas. Many of these operas are still performed today in opera houses around the world. In this course, we will discuss the enduring popularity of these works. We will discover how these operas were created, delving into the many important collaborations Mozart had with singers, librettists, impresarios, and patrons. We will analyze the words and music of the operas and how they combine to create three-dimensional characters for which his operas are known, such as the melancholy but determined Countess in The Marriage of Figaro, or the cowardly but loyal Papageno in The Magic Flute. Cultural norms have shifted dramatically between Mozart's time and ours, and we will examine how Mozart's operas have been received from their premieres through to today. We will think about how the operas have been translated, adapted, and circulated to different audiences in different eras and locations. Finally, we will reflect on our position as modern audience members, watching recent productions of the operas which reinterpret the works in alternative settings or times and studying the ways in which opera companies promote Mozart's works.
Area: Writing Intensive

AS.389 (Program in Museums and Society)

AS.389.155. The History of Fake News from The Flood to The Apocalypse. 3 Credits.
"Fake News" is everywhere in both past and present. Explore that history first-hand throughJHU's rare book collection of literary and historical forgeries spanning millennia of human history.Students learn how to examine and investigate rare books.
Area: Writing Intensive

AS.389.165. Hands on History: Material Cultures of Knowledge from Antiquity to the Digital Age. 3 Credits.
This hands-on course deals entirely with JHU's collections of rare books and manuscripts as a springboard to build skills in the close visual and physical examination of rare books and manuscripts. You will investigate the technological and aesthetic transformation of textual artifacts from ancient papyri to Gutenberg imprints to digital surrogates, and contribute to the accumulation of historical clues about their meaning and significance as material cultural objects. You will learn what goes into curating and conserving book and manuscript collections today, and how to evaluate the quality and significance of collections. Materials/topics will include ancient Babylonian cuneiform and Egyptian papyri; medieval illuminated manuscripts; incunabula; Renaissance illustrated books of the Scientific Revolution and Spanish Golden Age; cheap print and unique ephemera; early books by and about women; forgeries; and "digital humanities" initiatives at JHU. Students will make regular visits to the Special Collections Reading Room in the BLC throughout the semester.
Area: Writing Intensive

AS.389.201. Introduction to the Museum: Past and Present. 3 Credits.
This course surveys museums, from their origins to their most contemporary forms, in the context of broader historical, intellectual, and cultural trends including the social movements of the 20th century. Anthropology, art, history, and science museums are considered. Crosslisted with Archaeology, History, History of Art, International Studies and Medicine, Science & Humanities.

AS.389.202. Introduction to the Museum: Issues and Ideas. 3 Credits.
Museums face practical, political and ethical challenges, including economic difficulties, debates over interpretation of culture and pressure to demonstrate social value. This course considers how museums are answering these challenges.

AS.389.220. Queer Sixties. 3 Credits.
Introduction to queer & trans politics and culture in the period immediately preceding the gay liberation movement, from the early to late 1960s, focusing on intersections of race, sexuality, and gender. Course examines how we have come to narrate queer & trans history and investigates the ways archival practices shape conceptions of queer & trans life. Students learn research methods as they draw on and contribute to the university's digitized archival collections.

AS.389.230. Queer & Trans Public History. 3 Credits.
This course introduces students to a blend of public history, queer studies and transgender studies. Students learn oral history and archival research methods as they draw on and contribute to the university's archival, museum, and library collections.

AS.389.240. Archaeological Museum Practicum: Collections Management. 3 Credits.
Students will learn current procedures for surveying, cataloguing, documenting and rehousing collections using objects from the Archaeological Museum. This is a hands-on practicum course working closely with museum staff.

AS.389.242. Museum Education: From Contested Knowledge to Reflective Narrative. 3 Credits.
This practicum course critically considers current art and history museum education practices and explores social justice discourses through museum visits, visitor studies, and museum learning strategies.

AS.389.250. Conservation of Material Culture: Art, Artifacts and Heritage Sites. 3 Credits.
This course will introduce students to the field of art conservation through the study of paintings, paper, books, objects, contemporary sculpture and historic preservation. Topics covered will include: methods of manufacture, agents of deterioration, preservation initiatives, conservation treatment and ethics, and conservation science. Cross-listed with History of Art.Class usually meets at 1:30 - 3:50 PM, except for days with field trips.

AS.389.260. Cultural Heritage in Crisis. 3 Credits.
We explore the possible futures of cultural heritage and museums in times of accelerating climate change, pandemics, armed conflict and political and social turmoil by examining past and contemporary events.

AS.389.275. Interpreting Hopkins as Historic Site. 3 Credits.
This hands-on course explores interpretive strategies for historic sites and culminates in the production of original, research-based, outdoor interpretive exhibits on the Homewood Campus.

AS.389.280. Of and For Everyone: Diversity, Equity, Inclusion and Access in the Museum. 3 Credits.
How are museums responding to the pressures to be more equitable, inclusive, and accessible towards public audiences and their staff? Students go behind the scenes of the Smithsonian, Baltimore Museum of Industry and Baltimore Museum of Art to meet with working groups and staff charged with transforming their institutions. Includes site visits, hands-on experiences and research on best practices.

AS.389.303. World of Things. 3 Credits.
The course introduces and applies new concepts about materials, and materiality to museum objects. It treats the museum as a site for investigating the relationship between people and things.

AS.389.311. From Treasure House to Production House: Exploring New Roles for the Museum in the 21st Century. 3 Credits.
Students work with the Director of, the Peale Center for Baltimore History and Architecture as it reinvents itself as a museum for the twenty-first century. Involves working with community story-tellers in residence. Extra time is to allow for field trip travel - most days class runs 1:30-3:50.

AS.389.314. Commemoration, Mourning, and Race: The Stories of Mount Auburn Cemetery. 3 Credits.
In partnership with Mount Auburn Cemetery in Baltimore, owned and operated by the Sharp Street Memorial United Methodist Church, this community-engaged course will address the African American cemetery in general, and the Mount Auburn Cemetery in particular, as a place of multiple meanings: a sacred site of private mourning, a public place of commemoration, a representation of racism, an historic accomplishment. This course will require on-site research that contributes to the cemetery's interests.

AS.389.315. Ancient Color: The Technologies and Meanings of Color in Antiquity. 3 Credits.
What role did the colorful surfaces of sculptures, vessels and textiles play in the ancient world? We examine historical texts and recent scholarly and scientific publications on the technologies and meanings of color in antiquity, and use imaging and analytical techniques to study polychromed objects from the Johns Hopkins Archaeological Museum

AS.389.322. Tigers to Teapots: Collecting, Cataloging, and Hoarding in America. 3 Credits.
Course will examine the collecting behavior of Americans. Students will explore how collectors have defined the holdings of the nation's museums, galleries, and libraries and used objects to shape taste and status in the U.S.

AS.389.324. The BMA Seminar: Digital Interpretation. 3 Credits.
When museums shut their galleries in response to the global pandemic they saw a surge in digital audiences and engagement, athough not everyone can access digital content equally. Continued public health risks bring new challenges to digital interpretation, while universal access as well as embedded racial and gender bias remain significant issues. Students research what works and what doesn't in digital interpretation for art museums, centering social equity and accessibility in their assessment, and develop principles and guidelines for the museum's digital interpretation strategy.

AS.389.325. Women of the Book: Female Miracle Workers, Mystics, and Material Culture, 1450-1800. 3 Credits.
From psycho-spiritual autobiographers to mystical bi-locating nuns, convent crèche-keepers to choristers of sacred music, from rock-star-status mystics to the hidden careers of women printers, engravers, and miracle-makers, this course will explore the remarkable intellectual, cultural, and imaginative contributions of women who found refuge, agency, and power within alternative lives.
Area: Writing Intensive

AS.389.329. Author/Canon/Archive. 3 Credits.
Why are some literary works from the past reprinted, anthologized, and considered worthy of study, but not others? Why are some works "lost" and some "rediscovered," while others simply fall out of favor? Focusing on nineteenth- and early twentieth-century American literary culture, we will use rare books and archival materials from JHU collections to examine Edgar Allan Poe, Walt Whitman, Emily Dickinson, Stephen Crane, Charles Chesnutt, and Zora Neale Hurston, along with a few authors you've never heard of, in terms of the relationship between authorship, stewardship, and status.

AS.389.340. Critical Issues in Art Conservation. 3 Credits.
The course examines recent controversies in the conservation of major global art works and sites, raising questions concerning the basic theoretical assumptions, practical methods and ethical implications of art conservation. Cross-Listed with History of Art and Anthropology

AS.389.346. Scribbling Women in the Literary Archive. 3 Credits.
Students examine select texts and archival materials related to Emily Dickinson, Frances Ellen Watkins Harper, Edith Wharton, Ida B. Wells, Charlotte Perkins Gilman, Sui Sin Far, Alice Duer Miller, and Zora Neale Hurston. Students interrogate how these writers navigated the constraints of gender, as informed by race and class, in the decades before and after the 19th Amendment and consider literary collecting in relation to gendered cultural politics.

AS.389.347. Landscaping Baltimore: Designing and Interpreting JHU's Neighborhood. 3 Credits.
This course will explore the landscape history and current arrangement of the area around JHU's Homewood campus, including Evergreen Museum, coinciding with the bi-centennial of the birth of Frederick Law Olmsted whose design firm played a central role in developing plans for and around JHU. The course will culminate in a student-produced exhibit for a public audience.

AS.389.348. Queer Oral History. 3 Credits.
Students learn to conduct, analyze, and interpret their own oral histories as they contribute to a wide-ranging project documenting queer worldmaking in the Baltimore-Washington D.C. region. We engage with scholarship from performance studies, queer of color critique, LGBTQ history, and public humanities to consider the politics of storytelling and the promises of public-facing oral history projects. Students have the option of developing podcasts, multimedia projects, and public humanities proposals as their final assignment.

AS.389.357. Heaven on Earth: Art, Power, and Wonder in the Vatican from Antiquity to the Enlightenment. 3 Credits.
A material cultural exploration of the Vatican from the founding of St. Peter's basilica in antiquity to the establishment of the Vatican Library and Museums in the Renaissance and Enlightenment.
Area: Writing Intensive

AS.389.373. Encountering American Art. 4 Credits.
Students investigate the Baltimore Museum of Art's American art collection and its presentation to the public alongside current scholarship on American art to develop strategies for a new permanent collection display that aligns with the museum's commitment to artistic excellence and social equity. M&S Practicum. Co-taught with BMA curator Virginia Anderson.

AS.389.379. Interpreting Historic Sites for the 21st Century. 3 Credits.
Students go behind the scenes at JHU's own Evergreen Museum and Library to investigate how historic sites design spaces for learning, community engagement, leisure, as well as for exhibitions and special events. Students consider the history of Evergreen and its inhabitants and create concepts for how to engage communities in that history and story. Multiple class meetings take place at the Evergreen Museum.

AS.389.384. Object Encounters at the Baltimore Museum of Art. 3 Credits.
Using the Baltimore Museum of Art as a laboratory, students examine canonical narratives in art museums and iterate new approaches to objects in museums that build equity, interrogate privilege, decolonise, revisualise and offer alternative stories. Class meets at the museum every other week.

AS.389.405. Visualizing Africa. 3 Credits.
Examines the history of African art in the Euro-American world, focusing on the ways that Western institutions have used African artworks to construct narratives about Africa and its billion residents.
Area: Writing Intensive

AS.389.410. Sharing Knowledge: Participatory Archives, Collaborative Storytelling, and Social Justice. 3 Credits.
This course introduces students to collaborative humanities projects that encourage democraticparticipation among publics more broadly conceived than the academy. We investigate indigenous research methods; collaborative oral history and ethnography; interactive theater;and community archives. Final projects draw on the university's archival, museum, and librarycollections.

AS.389.420. Curatorial Seminar. 4 Credits.
In collaboration with a local museum, conceptualize and develop an exhibition, potentially including but not limited to: checklists, exhibition texts, interpretive strategies, and programming. Exhibition theme varies year to year. Concepts, ethics and practicalities of curation are key concerns. Research visits to regional museums and private collections as relevant.
Area: Writing Intensive

AS.389.502. Independent Study- Museum and Society. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.389.521. Capstone in Museums and Society. 1 - 3 Credits.
The Capstone allows students to develop and carry out their own, hands-on research project in a museum, collection, archive, or other living resource. Final projects must involve some form of public presentation (exhibition, lecture, poster, web-based, etc.) and a work of self-reflection (journal, brief paper, blog, or other). Projects must be approved and overseen by a supervising faculty member and approved by the Program's Director, in keeping with the University's Independent Work Policy. Instructor permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.389.522. Capstone in Museum and Society. 1 - 3 Credits.
The Capstone allows students to develop and carry out their own, hands-on research project in a museum, collection, archive, or other living resource. Final projects must involve some form of public presentation (exhibition, poster, web-based, etc.) and a work of self-reflection (journal, brief paper, blog, or other). Projects must be approved and overseen by a supervising faculty member and approved by the Program's Director, in keeping with the University's Independent Work Policy.
AS.389.201;AS.389.202;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

AS.410 (Biotechnology)

AS.410.302. Bio-Organic Chemistry. 4 Credits.
This course provides a foundation in structural organic chemistry, acid-base chemistry, chemical thermodynamics, and reaction mechanisms. Subjects include Lewis structures, atomic and hybridized orbitals, stereochemistry, inter- and intramolecular forces of attraction, nucleophilic reaction mechanisms, functional groups, and the organic chemistry of biological molecules. Please note that this course does not count toward requirements for the master's degree in biotechnology. Prerequisite: two semesters of college chemistry.

AS.410.303. Foundations in Bioscience. 4 Credits.
This course examines the fundamental underlying scientific concepts utilized in the creation and development of biomedical products. Topics to be covered include the structure and function of biomolecules, such as proteins, enzymes, carbohydrates, lipids, and DNA, as well as the structure and function of cellular components, such as membranes, vesicles, organelles, and the cytoskeleton. In addition, students will examine the complexities of metabolism, DNA replication, transcription, translation, signal transduction mechanisms, apoptosis, the cell cycle, and cancer. Please note that this course does not count toward requirements for the master's degree in either biotechnology or regulatory science and is required as a prerequisite course for some students entering the Master of Science in Regulatory Science. Pre-requisites: one year of college chemistry and one year of college biology or permission of program director. S

AS.410.601. Biochemistry. 4 Credits.
This course explores the essential roles of key biological molecules: proteins, lipids, and carbohydrates. It provides a systematic and methodical application of general and organic chemistry principles, particularly as applied to protein biochemistry. Students examine the structure, function, and regulation of a wide variety of proteins, and also the techniques and laboratory methods used to purify and characterize proteins. Enzyme mechanisms, kinetics and inhibition are covered in detail. Major pathways for carbohydrate metabolism are examined from thermodynamic and regulatory perspectives. This course illuminates the links between the disciplines of chemistry and biology.

AS.410.602. Molecular Biology. 4 Credits.
This course provides a comprehensive overview of the key concepts in molecular biology. Topics to be covered include nucleic acid structure and function, DNA replication, transcription, translation, chromosome structure, and the remodeling and regulation of gene expression in prokaryotes and eukaryotes. Extended topics to be covered include methods in recombinant DNA technology, microarrays, and microRNA.

AS.410.603. Advanced Cell Biology. 4 Credits.
This course covers cell organization and subcellular structure. Students examine the evolution of the cell, chromosome, and plasma membrane structures and behaviors, as well as the mechanics of cell division, sites of macromolecular synthesis and processing, transport across cell membranes, cell dynamics, organelle biogenesis, and cell specialization. Students are also introduced to the experimental techniques used in cell biology to study cell growth, manipulation, and evaluation.

AS.410.604. Cellular Signal Transduction. 4 Credits.
This course is a continuation of 410.603 Advanced Cell Biology and further explores cell organization and subcellular structure. Students examine cell-to-cell signaling that involves hormones and receptors, signal transduction pathways, second messenger molecules, cell adhesion, extracellular matrix, cell cycle, programmed cell death, methylation of DNA, modification of chromatin structure, and mechanisms of the cell. The roles that defects in signal transduction pathways play in the development of cancer and other disease states will be stressed. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I.

AS.410.607. Proseminar in Biotechnology. 4 Credits.
The Biotechnology Proseminar introduces students to issues and challenges facing leaders of public and private-sector organizations as well as t0 communities seeking to achieve shared goals within the biotechnology industry. The course brings together diverse academic, science, and business disciplines (science, regulatory affairs, marketing, finance, legal, ethics, communications, etc.). It explores how these disciplines can be used as powerful tools to create effective leadership and productive collaborations within the industry while improving managerial decision-making.

AS.410.608. Neurological Disease. 4 Credits.
Knowledge about neuronal structure, function, and circuitry will be applied in order to understand the genetic and molecular bases of a wide variety of diseases that affect the central and/or peripheral nervous systems. This course will incorporate explorations of the recent primary literature, as it relates to specific disease pathologies and treatments, and innovative research tools used in their study. The particular pathologies covered will vary by semester, but will include some of the following: brain/spinal cord injury, epilepsy, stroke, multiple sclerosis, Parkinson's disease, Alzheimer's disease, schizophrenia, depression/bipolar disorder, amyotrophic lateral sclerosis, Huntington's disease, infectious disease, prion-based disease, addiction, autism spectrum disorder, and disorders of neural development. This course is a natural continuation of, and builds upon the foundations provided in, the Neurobiology course. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, 410.604 Advanced Cell Biology II, 410.628 Neurobiology. SCI

AS.410.609. Developmental Biology. 4 Credits.
This course will explore the cellular and molecular mechanisms involved in the growth and development of complex organisms. In particular, students will be introduced to the mechanisms of fertilization, formation of the early body plan, cell type determination, organogenesis, morphogenesis, and stem cell niches. The course will examine the cellular and morphological changes during development, as well as the molecular signals responsible for development of organisms. SCI

AS.410.610. Epigenetics, Gene Organization & Expression. 4 Credits.
Students use genetic analysis and molecular biology techniques to investigate chromosome organization, chromatin structure, functional genomics, and mechanisms of differential gene expression. Other topics include DNA methylation, silencers, enhancers, genomic imprinting, and microarray analysis. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology. SCI

AS.410.611. Vaccinology. 4 Credits.
This course will cover the biological development of vaccines a well as the immunologic concepts and methods for vaccine delivery. Specific topics include new technologies for vaccine development, such as DNA vaccines, recombinant mucosal vaccines, dendritic cells for antigen delivery, novel adjuvants, and methods to increase vaccine stability. Both time-tested and new vaccine delivery systems, such as lipid-based systems, needle-free injection systems, and the use of genetically modified foods, will be discussed. The underlying biological role of the innate and adaptive immune systems will be explored in light of new types of vaccines and delivery systems. Finally, the process of bringing vaccines to market will be covered, including government oversight and licensure. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, 410.613 Principles of Immunology, or undergraduate immunology course. SCI

AS.410.612. Human Molecular Genetics. 4 Credits.
In this course, students learn to use the tools of modern genomics to elucidate phenotypic variation within populations. The course uses human disease (from simple Mendelian disorders to common, complex disorders) to exemplify the types of studies and tools that can be used to characterize cellular pathophysiology as well as to provide genetic diagnostics and therapies. Students become facile with linkage analysis, cancer genetics, microarray analysis (oligo and DNA arrays), gene therapy, SNP studies, imprinting, disequilibrium mapping, and ethical dilemmas associated with the Human Genome Project. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology. SCI

AS.410.613. Principles of Immunology. 4 Credits.
This course covers molecular and cellular immunology. Topics include innate immunity, adaptive immunity, the development and function of B cell and T cell antigen receptors, the major histocompatibility complexes, innate effector mechanisms, humoral and cellular immune responses, and regulation of immune responses. Special topics include immunomodulation, immunodeficiency diseases, autoimmunity, evasion and subversion of the immune system by pathogens, immunotherapies, and vaccines. Students are also introduced to the applied aspects of immunology, which include protein and cellular-based immunoassays. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.614. Pathogenic Bacteriology. 4 Credits.
Lecture and discussion are augmented by guided readings on pathogenic bacteria, with special attention being given to the microorganisms that cause human disease. The course is designed to impart to the student an appreciation and knowledge of the history, epidemiology, cultivation, morphology, serology, biochemistry, and clinical description of the major disease-producing bacteria. Discussion of therapeutic considerations and vaccination will also be included in this course. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, undergraduate microbiology course, or permission of program committee. SCI

AS.410.615. Microbiology. 4 Credits.
This course is an overview of microorganisms important to clinical diseases and biotechnology. Students are introduced to the general concepts concerning the morphology, genetics, and reproduction of these microbial agents. Lectures focus on individual organisms, with emphasis on infectious diseases, biotechnology applications, molecular and biochemical characteristics, and molecular and serological identification methods. Students will also discuss the impact that biotechnology, particularly genomics, will have on the development of antibiotics and vaccines as treatments and preventive measures. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.616. Virology. 4 Credits.
This course covers the advanced study of viruses with regard to the basic, biochemical, molecular, epidemiological, clinical, and biotechnological aspects of animal viruses primarily, and bacteriophage, plant viruses, viroid's, prions, and unconventional agents secondarily. Specific areas of virology, including viral structure and assembly, viral replication, viral recombination and evolution, virus-host interactions, viral transformation, gene therapy, antiviral drugs, and vaccines, are presented. The major animal virus families are discussed individually with respect to classification, genomic structure, viroid structure, virus cycle, pathogenesis, clinical features, epidemiology, immunity, and control. The viral vectors and their application in biotechnology are discussed. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI
You must enroll in AS.410.601, AS.410.602, and AS.410.603 prior to taking AS.410.616

AS.410.618. Parasitology. 4 Credits.
The field of parasitology is immense. It covers a plethora of organisms and a multitude of disciplines. This course focuses on the parasites of medical importance that causehuman morbidity and mortality throughout the world. It also introduces the student to the general aspects of parasitology. The developmental biology, natural history, and cell and molecular biology of the major eukaryotic parasites will be discussed. Also, the fundamental mechanisms of host-parasite relationships, diagnosis, pathogenesis, epidemiology, and control strategies will be emphasized. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.620. Advanced Topics in Immunology. 4 Credits.
This course integrates and expands concepts learned in an introductory immunology course. Students will be presented with advanced topics in immunology through literature reviews, clinical case studies, and basic science and clinical research papers. Students will also receive support from leading-edge webinars. Topic areas may include, but are not limited to: acellular and cellular innate immunity, adaptive immunity, immune regulation, autoimmunity, immunosuppression, inflammation, neuroimmunology, immunobiology of pregnancy, immunogenomics, tumor immunology, standard and developing therapies for immunopathologies, and immunotherapies. Students will also be introduced to immunological tests used for disease screening and diagnoses. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cellular Biology I, and 410.613 Principles of Immunology or an undergraduate immunology course. SCI

AS.410.621. Agricultural Biotechnology. 4 Credits.
This course is designed to provide an introduction to the application of recombinant DNA technology in agriculture. We will study methods for the introduction of foreign DNA into plant and animal cells and the generation of stably transformed plants and animals. We will discuss specific examples of the use of transgenic plants and animals in biotechnology, which can provide protection against insects, diseases, and tolerance to specific herbicides. We will also investigate how recombinant growth hormones can result in leaner meat, greater milk yield, and better feed utilization, as well as how transgenic plants and animals can serve as bioreactors for the production of medicinals or protein pharmaceuticals. Because recombinant agricultural products are released into the environment or consumed as foods, we will also discuss environmental safety issues. Prerequisites: 410.601 Biochemistry 410.602 Molecular Biology, 410.603 Advanced Cell Biology I.

AS.410.622. Molecular Basis of Pharmacology. 4 Credits.
This course begins by reviewing receptor binding and enzyme kinetics. Various cellular receptors and their physiology are discussed, as are the pharmacological agents used to define and affect the receptor's function. Students study the pharmacology of cell surface receptors and intracellular receptors. Also considered are the drugs that affect enzymes. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, 410.604 Advanced Cell Biology II. SCI

AS.410.627. Translational Biotechnology: From Intellectual Property to Licensing. 4 Credits.
This course provides an extensive overview of a process for the development of a pharmaceutical by a biotechnology company or pharmaceutical company. The course emphasizes the importance of intellectual property, the basic sciences underpinning the development of a product, and the importance of the interaction between a company and the Food and Drug Administration. Students learn to appreciate the importance of quality control and assurance, good manufacturing practices, preclinical and clinical testing, and the lengthy regulatory processes that govern the development, manufacturing, and eventual sale of biotechnological products. Hands-on solving of practical problems and guest lecturers who are experts in the field familiarize students with the intricacies of the process. Prerequisites: 410.303 Bioscience for Regulatory Affairs, OR 410.601 Biochemistry and 410.603 Advanced Cell Biology I or admission to the MS in Regulatory Science OR Master of Biotechnology Enterprise and Entrepreneurship programs. SCI

AS.410.628. Neurobiology. 4 Credits.
This course provides a framework for understanding the molecular physiology of neuronal structure, signaling, and circuitry, and how this cellular design is ultimately integrated to achieve higher cognitive functions, such as perception, control of movement, learning, and memory. The course introduces the students to various current neuroscience topics, including but not limited to membrane physiology and electrical excitability of neurons, neurotransmitters and synaptic transmission, signaling at the neuromuscular junction, cellular and higher-order aspects of perception and motor control, molecular mechanisms of neural development, and the molecular basis of learning and memory. This course places particular emphasis on the genetic and molecular bases of a wide variety of neurological and neurodegenerative diseases, such as multiple sclerosis, amyotrophic lateral sclerosis, Parkinson's, and Alzheimer's. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, 410.604 Advanced Cell Biology II. SCI

AS.410.629. Genes & Disease. 4 Credits.
Because of recent advances, powerful diagnostic tests now detect genetic diseases, and there is promise of gene replacement therapy. In this course, students cover general genetic principles, DNA tools for genetic analysis, cytogenetics, gene mapping, the molecular basis of genetic diseases, animal models, immunogenetics, genetics of development, genetics of cancer, and treatment of genetic diseases. Molecular methods of analysis are emphasized. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.630. Gene Therapy. 4 Credits.
In this course, students learn about how gene therapy can be used to treat or prevent genetic disease in the human population. This course is centered around how disease-causing variations in the human genome, including inherited diseases, mutations, epigenetic modifications, and viral infections, can be targeted using molecular technologies. Students will learn about the benefits and limitations of gene therapy as well as about the bioethical concerns involved with this field of research and medicine. Pre-requisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Cell Biology I. SCI

AS.410.631. Infectious Diseases. 4 Credits.
This course focuses on infectious diseases of mankind and is presented in a system-by-system format. Basic principles of host defense and microbial virulence will be discussed. Practical, up-to-date information on the clinical presentation, symptoms, physical findings, laboratory diagnosis, treatment, and prevention of the general array of diseases caused by bacteria and viruses will be presented. The use of antibiotics, prophylactic agents, and vaccines, along with selected aspects pathogenesis and epidemiology, will be covered. More cursory coverage will be given to the fungal and parasitic agents of human disease. The student will develop a broad understanding of the many different kinds of infectious processes to which our bodies are subjected to on an ongoing basis. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.632. Emerging Infectious Diseases. 4 Credits.
This course focuses on emerging infectious diseases from many different perspectives. The maladies addressed range from diseases that have reappeared in altered genetic forms, such as the influenza virus and West Nile virus, to the lethal hemorrhagic fever caused by the Ebola virus. Also discussed is the threat of recombinant and ancient infectious agents, such as Bacillus anthracis, the causative agent of anthrax, which can be used in biological warfare weapons. Opinions from noted scientists and leaders concerning emerging diseases and the prospects for battling them successfully provide scientific and social perspectives. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.633. Introduction to Bioinformatics. 4 Credits.
This course explores the theory and practice of biological database searching and analysis. In particular, students are introduced to integrated systems where a variety of data sources are connected through internet access. Information retrieval and interpretation are discussed, and many practical examples in a computer laboratory setting enable students to improve their data mining skills. Methods included in the course are searching the biomedical literature, sequence homology searching and multiple alignment, phylogeny, gene prediction, protein sequence motif analysis and secondary structure prediction, and several genome browsing methods. Introductory analysis using the R programming language is introduced. Computer access is required. Prerequisites: 410.601 Biochemistry. Corequisite: 410.602 Molecular Biology. SCI

AS.410.634. Practical Computer Concepts for Bioinformatics. 4 Credits.
This course introduces students with a background in the life sciences to the basic computing concepts of the UNIX operating system, relational databases, structured programming, object-oriented programming, and the Internet. Included is an introduction to SQL and the Python scripting language. The course emphasizes relevance to molecular biology and bioinformatics. It is intended for students with no computer programming background but with a solid knowledge of molecular biology. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology. SCI

AS.410.635. Bioinformatics: Tools for Genome Analysis. 4 Credits.
Large-scale DNA sequencing efforts have resulted in increasingly large numbers of DNA sequences being deposited in public databases. Assigning annotations, such as exon boundaries, repeat regions, and other biologically relevant information accurately in the feature tables of these sequences requires a significant amount of human intervention. This course instructs students on computer analytical methods for gene identification, promoter analysis, and introductory gene expression analysis using software methods. Additionally, students are introduced to comparative genomics and proteomic analysis methods. Students will become proficient in annotating large genomic DNA sequences. This course covers customizing genome browsers with novel data. Next-generation sequence analysis is covered through sequence quality control and assembly and analysis of ChIP-seq and RNA-seq data. Students complete two large sequence analysis projects during the course. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.633 Introduction to Bioinformatics or equivalent. SCI

AS.410.637. Bioethics. 4 Credits.
Students in this course analyze and discuss traditional philosophical theories regarding the nature of the moral good. They then apply these theories to critical issues and selected cases involving experiments with human subjects, organ transplantation, in vitro fertilization, the use of animals in research, the collection and publication of research data, peer review, conflicts of interest, and other topics of current concern.

AS.410.638. Cancer Biology. 4 Credits.
This course provides students with knowledge of the fundamental principles of the molecular and cellular biology of cancer cells. The course explores the role of growth factors and signal transduction mechanisms, oncogenes, tumor suppressor genes, tumor viruses, and angiogenesis in tumorigenesis and metastasis. Special topics include cancer prevention and the array of cancer therapies, which include surgery, chemotherapy, radiation therapy, hormonal therapy, stem cell transplant, and immunotherapies. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cellular Biology I , 410.604 Advanced Cell Biology II. SCI

AS.410.639. Protein Bioinformatics. 4 Credits.
Because the gap between the number of protein sequences and the number of protein crystal structures continues to expand, protein structural predictions are increasingly important. This course provides a working knowledge of various computer-based tools available for predicting the structure and function of proteins. Topics include protein database searching, protein physicochemical properties, secondary structure prediction, and statistical verification. Also covered are graphic visualization of the different types of three-dimensional folds and predicting 3-D structures by homology. Computer laboratories complement material presented in lectures. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.633 Introduction to Bioinformatics. SCI

AS.410.640. Molecular Phylogenetic Techniques. 4 Credits.
This course will provide a practical, hands-on introduction to the study of phylogenetics and comparative genomics. Theoretical background on molecular evolution will be provided only as needed to inform the comparative analysis of genomic data. The emphasis of the course will be placed squarely on the understanding and use of a variety of computational tools designed to extract meaningful biological information from molecular sequences. Lectures will provide information on the conceptual essence of the algorithms that underlie various sequence analysis tools and the rationale behind their use. Only programs that are freely available as either downloadable executables or as Web servers will be used in this course. Students will be encouraged to use the programs and approaches introduced in the course to address questions relevant to their own work. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.633 Introduction to Bioinformatics. SCI

AS.410.641. Clinical & Molecular Diagnostics. 4 Credits.
This course covers basic concepts and practical applications of modern laboratory diagnostic techniques. Topics include the principles of testing methodology, quality assurance, and the application of molecular methods to the clinical and research laboratory. The test methods to be covered include nucleic acid-based methods, such as hybridization, amplification, and sequencing, non-nucleic acid methods, such as HPLC, GLC, and protein analysis, and technologies such as PFGE, ribotyping, RFLP, and serological testing methodologies. In addition to the test procedures, students are exposed to aspects of statistics, quality control, and regulatory issues, as well as applications of these methods to the diagnosis and prognosis of human disease. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology. SCI

AS.410.642. Economic Dynamics of Change in Biotechnology. 4 Credits.
Governments around the world are beginning a long-term process that reviews and redesigns their health care systems, addressing concerns of innovation, cost, equitable access, and sustained quality of health care. As a result, health care is undergoing significant changes globally in R&D, marketing, pricing, sales, and distribution. This course helps students to understand these processes and the new business opportunities and new business models they will create. It provides some of the basics of macro and microeconomics to clarify how economic and social forces drive changes in the pharmaceutical, biotech, and genetic industry. Emphasis will be placed on the application of economics.

AS.410.643. Managing and Leading Biotechnology Professionals. 4 Credits.
The roles of managers and leaders within biotechnology companies undergo constant change. Biotechnology managers and leaders must engage in new and innovative problem-solving strategies, lead a diverse and global workforce, develop partnerships with other businesses, customers, and competitors, manage horizontally and across teams, and utilize technology to a competitive advantage. The student is able to address and cure challenges in his/her own organization and learn methods of implementing change, such as negotiation techniques and motivation. The course includes in-depth discussions of leadership skills, communication, conflict resolution, and goal integration. Students research a biotechnology organization, analyze what is working and not working within its management systems, and suggest alternatives.

AS.410.644. Marketing Aspects of Biotechnology. 4 Credits.
This course introduces students to the strategic and tactical approaches used in the marketing of biotechnological produce and services. Students gain a thorough understanding of the research and planning necessary to develop a marketing plan, the relationship between the marketing and sales functions, the difference between marketing a scientific product and a scientific service, pricing strategies, distribution alternatives, communications, promotion, and the importance of perception. Knowledge of marketing terminology and techniques proves helpful to anyone in the industry.

AS.410.645. Biostatistics. 4 Credits.
This course introduces statistical concepts and analytical methods as applied to data encountered in biotechnology and biomedical sciences. It emphasizes the basic concepts of experimental design, quantitative analysis of data, and statistical inferences. Topics include probability theory and distributions; population parameters and their sample estimates; descriptive statistics for central tendency and dispersion; hypothesis testing and confidence intervals for means, variances, and proportions; categorical data analysis; linear correlation and regression model; logistic regression; analysis of variance; and nonparametric methods. The course provides students a foundation with which to evaluate information critically to support research objectives and product claims and a better understanding of statistical design of experimental trials for biological products/devices. Prerequisites: Basic mathematics (algebra). SCI

AS.410.646. Creating a Biotechnology Enterprise. 4 Credits.
This course provides a foundation to start or help guide a young biotechnology company from inception through early growth. Topics include market assessment of innovative technology, patents and licensing, corporate law, preparing a business plan, raising money from angels and venture capitalists, government grants, strategic alliances, sales and marketing, real estate, human resources, and regulatory affairs. The course provides a survey and overview of the key tasks and challenges typically faced by biotech entrepreneurs, their management team, and directors. Students will prepare a business plan for a biotech startup and present the plan to a panel of industry experts and financiers. Leaders from our local bioscience community will be guest lecturers for many of the classes.

AS.410.647. Research Ethics. 4 Credits.
This course covers the basic ethical issues associated with the responsible conduct of biomedical research using animals and human subjects. Students explore ethical dilemmas and decisions central to these issues, such as the appropriate use of animals in research, misconduct in science, informed consent for human subjects, the role of institutional review boards (IRBs), authorship, data integrity, peer review, intellectual property, and biosecurity.

AS.410.648. Clinical Trial Design and Conduct. 4 Credits.
Through a case study approach, this course will cover the basic design issues of clinical trials, specifically targeting protocol, case report forms, analysis plans, and informed consent. The design of a specific trial will be studied to illustrate the major issues in the design of a study, such as endpoint definition, control group selection, and eligibility criteria. The course will also cover the analysis plan for a study, including approaches that are central to clinical trials, such as stratified analysis, adjustment factors, and “intention-to-treat” analysis. The planned analytical techniques will include the analysis of correlated data (i.e., clustered data and longitudinal data), survival analysis using the proportional hazards (Cox) Regression model, and linear models. A semester-long project will include the creation of a protocol, case report forms, and informed consent. Prerequisites: 410.645 Biostatistics or equivalent (recommended), 410.651 Clinical Development of Drugs and Biologics (recommended). SCI

AS.410.649. Introduction to Regulatory Affairs. 4 Credits.
Regulatory affairs are comprised of the rules and regulations that govern product development and post-approval marketing. In the U.S., the FDA establishes and oversees the applicable regulations under several statutes, many regulations, and partnerships with legislators, patients, and customers. Biotechnology products may be classified as drugs, biologics, or medical devices. Each type is regulated by a different center within the FDA. This course provides an overview of RA and its effect on product development. Topics include RA history, regulatory agencies, how to access regulatory information, drug submissions, biologics submissions, medical device submissions, GLP, GCP, GMP, and FDA inspections.

AS.410.650. Legal Aspects of Biotechnology. 4 Credits.
This course is a survey of legal topics relevant to a biotech enterprise as it is established, conducts research, and brings innovative products to market. These include property, contracts, regulatory compliance, and patents. Students will be able to analyze common business situations and understand how associated legal risks are managed. Students who have taken 410.687 Ethical, Legal and Regulatory Aspects of the Biotechnology Enterprise will also benefit from this course, as they will analyze contracts, patents, and various statutes and court decisions that impact the biotechnology sector.

AS.410.651. Clinical Development of Drugs and Biologics. 4 Credits.
This course introduces students to the planning and work required to develop potential new drugs and biologics efficiently. Students gain a thorough appreciation of FDA and International Council for Harmonisation regulations and guidelines. Because the course emphasizes the importance of planning before the execution of any of the necessary steps, lectures use a “backward” approach, discussing the final analysis and report before developing protocols. Topics also include an overview of preclinical investigations, NDA/BLA format and content, clinical development plans, product and assay development, the IND, and trial design, implementation, and management. Prerequisites: 410.303 Foundations of Bioscience OR 410.601 Biochemistry and 410.603 Advanced Cell Biology OR admission to the MS in Regulatory Science Program OR Master of Biotechnology Enterprise and Entrepreneurship programs. SCI

AS.410.652. Cell Culture Techniques. 4 Credits.
This laboratory course illustrates the use of basic cell culture techniques for bioscience research and commercial applications. Students are introduced to cell cultivation methods, including proper use of a biological safety cabinet, sterile technique, cell enumeration and media preparation, cultivation of cell lines, detection of contamination, cryopreservation, transfection, cell culture scale-up, and bioassays. This course is designed for students with no prior knowledge or with limited knowledge of cell culture methods. Prerequisites: 410.601 Biochemistry, 410.603 Advanced Cell Biology I. SCI

AS.410.653. Regenerative Medicine: from Bench to Bedside. 4 Credits.
Regenerative Medicine is a multidisciplinary field developing next-generation therapies that aim to augment, repair, replace or regenerate tissues and organs. This field can be broadly defined by three overlapping technology domains: cell therapy, gene therapy, and tissue engineering. In this course, we will explore these regenerative medicines from bench to bedside. We will discuss relevant biological, engineering, clinical, legal, regulatory, and ethical principles and perspectives to understand the emerging field of regenerative medicine. Specific topics will include induced pluripotent stem cells, bioartificial organs, cell-based immunotherapy, and gene editing techniques such as a CRISPR/Cas-9. In addition to gaining a scientific foundation, students will become familiar with the current state of the industry and the process of bringing these regenerative medicine products to market, including market trends and opportunities, process development and manufacturing, and commercialization challenges and successes. Readings will be drawn primarily from scientific journals. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.603 Advanced Cell Biology I. SCI

AS.410.655. Radiation Biology. 4 Credits.
This course will review types of ionizing radiation and their differences, physical and chemical interactions of radiation with key biological molecules, and effects on living matter beginning with molecular and cellular interactions and proceeding to tissue, organ, and organism levels, emphasizing the human system. Radiation’s beneficial effects in cancer therapy and medicine, as well as its detrimental and carcinogenic effects, will be discussed. Specific units will consider food irradiation, nuclear power plant accidents, radiation terrorism, everyday sources exposure to the U.S. population, and other practical situations involving radiation. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.656. Recombinant DNA Laboratory. 4 Credits.
This laboratory course introduces students to methods for manipulating and analyzing nucleic acids. Students gain extensive hands-on experience with plasmid purification, restriction mapping, ligations, bacterial transformations, gel electrophoresis, and applications of the polymerase chain reaction. This course is not recommended for students with substantial experience in these methodologies. Prerequisites: 410.602 Molecular Biology. SCI

AS.410.658. Biodefense & Infectious Disease Laboratory Methods. 4 Credits.
This laboratory course introduces students to the methods and techniques used for biothreat detection, surveillance, and identification. Using bio simulants and demonstrations, various bio detection platforms will be discussed and presented, such as point-of-detection devices and methods, laboratory-based screening and identification technologies (culture, quantitative PCR, immunoassays, biosensors), and high-throughput environmental surveillance methods. Statistical methods for determining diagnostic sensitivity and specificity and assay validity will be discussed. Laboratory practices and procedures for working in simulated Biosafety Level 2 and 3 environments will be practiced. Students will be introduced to the current bioinformatics genomic and proteomic databases used for select agent (category A, B, and C) identification and characterization. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, undergraduate microbiology or 410.615 Microbiology, or approval of program committee. SCI

AS.410.659. Advanced Recombinant DNA Lab. 4 Credits.
This course is a continuation of Recombinant DNA Laboratory (410.656), intended for those who have completed the introductory course or who have extensive molecular biology laboratory experience. This second course consists of a series of integrated laboratory exercises designed to give students hands-on experience with a variety of molecular techniques. Exercises include molecular cloning, PCR optimization, quantitative real-time PCR, control of gene expression by RNA interference (RNAi), CRISPR, and DNA sequencing. Students will be introduced to microarray analysis and utilization of bioinformatics pipelines. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.656 Recombinant DNA Laboratory; or consent of program committee. SCI

AS.410.660. Immunological Techniques in Biotechnology. 4 Credits.
This laboratory course introduces students to methods for analyzing the immune system. Participants gain experience with various immunologic techniques used in research and biotechnology laboratories, such as immunoassays, immunofluorescence, western blot analysis, SDS-PAGE, antibody purification (protein A), and cytokine assays. Additional topics for discussion include hybridism technology phage antibody libraries, therapeutic monoclonal antibodies, and flow cytometry. Prerequisites: 410.601 Biochemistry, 410.6 Molecular Biology, 410.603 Advanced Cell Biology I, 410.613 Principles of Immunology or undergraduate immunology course highly recommended, or consent of program committee. SCI

AS.410.662. Epidemiology: Diseases in Populations. 4 Credits.
Epidemiology is the study of the patterns and determinants of disease in populations. It constitutes a basic science for public health and biomedical sciences, and its influence can be felt daily through the presentation of data by government, academic, and industry sources. The goal of this course is to present an introduction to epidemiological methods and inferences to biotechnology professionals with little prior experience in public health. Issues in epidemiological inference and the assessment of causal relationships from epidemiological studies will be discussed, introducing the issues of bias and confounding. Throughout the course, emphasis will be placed on the practical use of epidemiology, and lectures will be complemented by case studies and published literature. Examples will be drawn from contemporaneous issues in chronic and infectious diseases. At the conclusion of the course, students should have a greater appreciation for the role of the epidemiologic method and be able to evaluate a basic epidemiologic study, including how the study goals and research questions relate to the design, measures, and inferences. Recommended prerequisites: undergraduate statistics course or 410.645 Biostatistics. SCI

AS.410.664. Ethics in Emerging Bioscience Technologies. 4 Credits.

AS.410.665. Bioscience Communication. 4 Credits.
Researchers must communicate effectively so their discoveries can be shared with others. In this course, students learn how to communicate their ideas to other researchers, their scientific peers, and investment communities. Students master both written and verbal communication skills, hone their expertise at making both formal and informal oral presentations, prepare poster presentations, and develop their own public speaking strategies. The course also presents personal strategies for improving daily communications, cross-cultural communications, and nonverbal skills. Students improve their written communication, editing, and informal writing skills.Participants also learn effective email strategies for getting their message across and learn how effective writing can improve their chances of getting grant applications approved. Class assignments include preparation of scientific papers, general science writing, oral presentations, PowerPoint presentations, and scientific posters.

AS.410.666. Next Generation DNA Sequencing and Analysis. 4 Credits.
The recent revolution in DNA sequencing technologies has transformed biology within a few short years, decreasing the cost and difficulty of sequencing dramatically to the point where the “$1,000 human genome” is in sight. Armed with complete genome sequences, biologists need to identify the genes encoded within and the variation in these genes between individuals, assign functions to the genes, and put these into functional and metabolic pathways. This course will provide an overview of next-generation sequencing technologies in the historical context of DNA sequencing, the pros and cons of each technology, and the bioinformatics techniques used with this sequence information, beginning with quality control assessment, genome assembly, and annotation. Prerequisites: 410.602 Molecular Biology, 410.633 Introduction to Bioinformatics, 410.634 Practical Computer Concepts for Bioinformatics. SCI

AS.410.671. Gene Expression Data Analysis and Visualization. 4 Credits.
This course will introduce students to various methods for analyzing and interpreting transcriptomics data generated from technologies such as oligonucleotides or two-channel microarrays, qRT-PCR, and RNA sequencing. Topics will include scaling/normalization, outlier analysis, and missing value imputation. Students will learn how to identify differentially expressed genes and correlate their expression with clinical outcomes such as disease activity or survival with relevant statistical tests; methods to control for multiple testing will also be presented. An introduction to linear and nonlinear dimensionality reduction methods and both supervised and unsupervised clustering and classification approaches will be provided. Open source tools and databases for biological interpretation of results will be introduced. Assignments and concepts will make use of publicly available datasets, and students will compute and visualize results using the statistical software R. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.645 Biostatistics, 410.634 Practical Computer Concepts for Bioinformatics, or an undergraduate computer programming course. SCI

AS.410.673. Biological Processes in Regulatory Affairs. 4 Credits.
This course provides an overview of the biological processes and laboratory techniques utilized for the discovery, development, and evaluation of therapeutic drugs. Students investigate drug development processes, such as gene cloning, culture scale-up, downstream processing, and product purification. Emphasis is placed on the theory and application of laboratory methods used in drug development, such as recombinant DNA techniques, antibody technology, protein purification, immunoassays, high- throughput drug screening, chromatography, electrophoresis cell receptor characterization, pharmacokinetics, drug toxicity testing and evaluation of therapeutic drugs, diagnostics, and vaccines. Prerequisites: 410.303 Bioscience for Regulatory Affairs, OR 410.601 Biochemistry and 410.603 Advanced Cell Biology OR admissions to the MS in Regulatory Science OR Master of Biotechnology Enterprise and Entrepreneurship programs. SCI

AS.410.674. Food Microbiology. 4 Credits.
Food microbiology encompasses the study of microorganisms that have both beneficial and deleterious effects on the quality and safety of raw and processed meat, poultry, and egg products. Food microbiology focuses on the general biology of the microorganisms that are found in foods, including their growth characteristics, identification, and pathogenesis. Specifically, areas of interest that concern food microbiology are food poisoning, food spoilage, food preservation, and food legislation. Pathogens in products, or harmful microorganisms, result in major public health problems in the United States and worldwide, and are the leading causes of illnesses and death. SCI

AS.410.675. International Regulatory Affairs. 4 Credits.
Pharmaceutical/biotechnology product approval and marketing requires a good understanding of international regulatory affairs in order to successfully compete in today's global marketplace. It is important for tomorrow's leaders to understand and follow the regulatory differences to ensure optimum product development strategies, regulatory approvals, and designs for exports conforming to the foreign regulatory bodies. There are various product development strategies that industry is using to shorten the product development time by conducting preclinical programs outside the U.S., but the strategies require careful planning and interaction with the U.S. and foreign regulatory agencies. With the increased globalization of economy and exports, international regulations will have a bigger impact on the biotechnology business in the future. The course provides a review and analysis of the pharmaceutical/ biotechnology product approval processes within the world's major markets. The key strategies required in phases from preclinical product development to marketing approval of the products in Europe, Japan, and the U.S. will be compared and discussed. Students will explore the European Union regulations and their overall importance to international markets. The course will cover the salient features of common technical and regulatory documents required for submission and approval to the leading regulatory bodies in the world, general guidance documents, international harmonization, and the General Agreement on Tariffs and Trade.

AS.410.676. Food And Drug Law. 4 Credits.
The Food, Drug, and Cosmetic Act governs the regulatory approval process for bringing a drug, biologic, medical device, food, or cosmetic to market. The class will discuss administrative procedures followed by the FDA. The course includes an overview of the drug, biologic, and medical device approval processes and the regulation of food and dietary supplements. Students then will be exposed to the enforcement activities of the FDA, including searches, seizure actions, injunctions, criminal prosecutions, and civil penalties authorized under the FD&C Act as well as other statutes, like the Public Health Service Act, which regulates the development and approval of biologics.

AS.410.679. Practicum in Regulatory Science. 4 Credits.
This integrative, case-based course will focus on applying knowledge gained from previous courses in the Master of Science in Regulatory Science program to actual cases from the FDA. For each case, students will assume the role of a regulatory specialist, an FDA reviewer or senior-level policy-maker, or other involved stakeholders, such as a consumer group or an advocacy group. Students will be expected to research, evaluate, and present scientifically and legally justifiable positions on case studies from the perspective of their assigned roles. Students will present their perspectives to the class and be asked to debate the issues with the other students from the perspective of their assigned roles. The major responsibility of the students in this course will be to make scientifically and legally defensible recommendations and to justify them through oral and written communication.

AS.410.680. Finance for Biotechnology. 4 Credits.
Students will build an understanding of the basics of contemporary global monetary systems and the essentials of financial management. This course will include the means to develop a working knowledge of the critical financial factors for decision-makers from the perspectives of key stakeholders. The syllabus is designed to provide students with limited or no background in finance an opportunity to establish an understanding of financial basics and communicate clearly in financial terms when conducting business. This course is uniquely designed to meet the current needs of those leading the global life science industry. SCI

AS.410.682. Validation in Biotechnology. 4 Credits.
Understanding validation and applying a comprehensive validation philosophy are essential in today's biotechnology industry. First and foremost, validation allows a company to operate in compliance with the regulations and guidance set forth by the FDA. Perhaps more importantly, it results in equipment assays and processes that are well-understood and robust, less prone to failure, and more cost-effective. This course will introduce the fundamentals of validation, validation master planning, resource management, types of validation and the associated documentation, departmental roles and interactions, and the differences between commissioning and validation. Students will have the opportunity to solve real-world problems, generate actual validation documents, and develop validation program elements that balance regulatory requirements, operational needs, and business expectations.

AS.410.683. Introduction to cGMP Compliance. 4 Credits.
Current Good Manufacturing Practice regulations are the minimum standards for the design, production, and distribution of drugs, biologics, and medical devices in the U.S. and internationally. In the U.S., they are codified at the federal level in the FD&C Act and the Code of Federal Regulations and are actively enforced by the FDA. These regulations, however, only begin to describe the practices used in the pharmaceutic and biotech industries. Additional sources of insight and guidance include the FDA's guidance documents and training manuals, industry trade publications, international compendia, and standards-setting organizations. Students will learn the scope and history of the regulations, industry-standard implementation strategies and "best-practices" approaches, and the FDA's current expectations. Students will also learn to apply practical solutions to the regulatory issues faced in the pharmaceutical and biotech industries today.

AS.410.684. Technology Transfer & Commercialization. 4 Credits.
This course is an introduction to the multidisciplinary aspect involved in the process of translating innovations in technology into commercial use, particularly research discoveries emanating from universities and other nonprofit organizations.

AS.410.685. Emerging Issues in Biotechnology. 4 Credits.
Biotechnology impacts the world and our social, political, and physical environment in ways that many both inside and outside the industry may not fully understand or appreciate. It is critical to ensure that advances in biotechnology be accompanied by important public, political, and social considerations and discussions. This course will cover issues including domestic and global public perception of biotechnology, its benefits and risks, advances in bio-agriculture and genetically modified food, the impact of recombinant therapeutics on the pharmaceutic and health care industry, ways in which advances in biotechnology have and will continue to change our views of what life is, and how the political climate impacts advances in biotechnology discoveries. This highly interactive course will include thought-provoking debate and discussion with industry leaders, both proponents and opponents of biotechnology.

AS.410.686. Regulation of Good Food Production Practices. 4 Credits.
Good Food Production Practices are production and farm level approaches to ensure the safety of food for human consumption. Good food production and post-harvest guidelines are designed to reduce the risk of foodborne disease contamination. These good food production procedures can be tailored to any production system and are directed toward the primary sources of contamination: soil, water, hands, and surfaces. Good food production protocols were developed in response to the increase in the number of outbreaks of foodborne diseases resulting from contaminated food. Students will learn to develop good food production regulatory protocols using case studies.

AS.410.687. Ethical,Legal & Regulatory Aspects of the Biotechnology Enterprise. 4 Credits.
This course provides an overview of the important ethical, legal, and regulatory issues that are critical to the biotechnology industry. The course shares current trends and essential elements of ethics, legal issues, and regulations in a way that allows for an appreciation of how each influences the others. Students will examine core ethical values that guide the practice of science in the biotechnology industry. The course will provide an overview of legal issues, such as protecting inventions, intellectual property, licensing, and the range of regulatory oversight mechanisms with which the biotech industry must comply. This course will review the implications of strategic ethical, legal, and regulatory choices that add value to the biotechnology firm, customers, and society.

AS.410.688. Project Management in Biotechnology. 4 Credits.
Today, many organizations use the approach called project management to handle activities that have a limited life span as opposed to routine, ongoing operations. This course will answer the question, "What do I do to be successful?" The units will provide guidance for project management success by considering each phase in the life of a typical project, from concept to closeout. We will discuss the nature of project management, the structure of projects, working with teams of technical experts, and all the other activities that make project management different from any other discipline. The course will rely heavily on group discussions. Topics will include deciding making decisions, developing a project plan, risk management, team leadership, monitoring and controlling during the project, scope change control, and traditional and modern approaches to project closeout. Concepts presented will be consistent with the Project Management Institute's "Guide to the Project Management Body of Knowledge," the U.S. standard for project management.

AS.410.689. Leading Change in Biotechnology. 4 Credits.
As bioscience companies grow and mature, leadership needs to evolve. Students will learn how to identify their company's position in the "Leadership Life Cycle" and learn how to select the right leadership capabilities based on their current organizational needs. Research shows that the right leaders at the right time dramatically improve organizational success. Discussions will address the leadership needs of organizations from early-stage, research-based companies through fully integrated biopharmaceuticals. General leadership practices and strategies, moving ideas from the research bench to the consumer, and strategies to prevent failure will all be discussed.

AS.410.690. International Food Regulations. 4 Credits.
As the U.S. food industry expands into international markets, the same companies hoping to sell their products abroad find themselves forced to source ingredients and finished products from foreign suppliers to reduce costs and remain competitive, and to do so, they must comply with a myriad of rules and regulations in both the United States and elsewhere. The most visible enforcement agency at any U.S. border is Customs and Border Protection. However, food importers must also comply with regulations enacted by a host of other government agencies, most notably the FDA, USDA Food Safety and Inspection Service, USDA Animal and Plant Health Inspection Service, and U.S. Fish & Wildlife Service. Food exporters have an even tougher burden, as they need to comply with Customs and food safety, quality, and labeling regulations and certification requirements in both the U.S. and the country that is receiving the goods; this is to mention nothing of the international regulatory infrastructure to which manufacturers must adhere when shipping food internationally. This course will cover each step of the importing and exporting process in detail and explain where to go for key information and guidance.

AS.410.692. Biological & Chemical Threat Response & Forensics. 4 Credits.
This course introduces the methods and techniques used for biological and chemical threat agent characterization; methods of detection, identification, medical intervention, and forensic attribution are also discussed. Lectures cover a broad variety of topics pertaining to the use of biological and chemical agents, including the historical background of biological and chemical agents in classic and discretionary warfare, the introduction of scientific evidence in criminal proceedings and chain of custody for evidentiary materials in crimes and terrorism, quality assurance in laboratory operations, threat containment, decontamination and remediation, health and safety of responders and analysts, and risk assessments. Laboratory methods employed in the characterization and forensic analysis of biological (bacterial, viral, biological toxins, agricultural threats) and chemical agents (classic military chemical agents, toxic industrial chemicals, and materials) will also be discussed. The course will also provide general overviews of techniques and sample collection for classic biological and chemical agents (PCR, DNA sequencing methods, immunological analyses) and for chemical agents (gas chromatography and mass spectrometry). Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, undergraduate microbiology, or 410.615 Microbiology. SCI

AS.410.693. Science, Medicine & Policy in Biodefense. 4 Credits.
This course provides a comprehensive introduction to the Concentration in Biodefense. Biological warfare is introduced in its historical context, followed by the properties of the most important biological threat agents, their medical consequences and treatment, diagnostics, and forensics. Relevant international and domestic policy issues are explored, along with defense strategies and the nature of existing dangers to national security. Students should leave the class with a deep understanding of biological warfare and terror agents, the consequences of their potential use, and the available means of protection. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I, undergraduate microbiology, or 410.615 Microbiology. SCI

AS.410.694. FDA Premarket Applications. 4 Credits.
This course provides a comprehensive overview of the U.S. Food and Drug Administration's (FDA's) regulation of the research and development, and marketing of new drugs, biologics, and medical devices. The regulatory requirements for investigational (Investigational New Drug (IND) and Investigational Device Exemption (IDE)) and premarket approval (New Drug Application (NDA), Abbreviated New Drug Application (ANDA), Biologics License Application (BLA), premarket notification (510(k)), Premarket Approval (PMA)) applications will be addressed. The content and format requirements for the preparation, submission, and maintenance of these applications will be covered.

AS.410.696. Bioassay Development. 4 Credits.
This course will cover methodological approaches to bioassay development for high-throughput screening. Both cell-based (cytotoxicity, cytoprotection, high content imaging, and reporter systems) and cell-free assay systems (enzyme, FRET, time-resolved fluorescence, quenching assays, and immunological assays) will be included with discussion of the potential promise and pitfalls associated with each assay system. Various assay formats, visualization techniques, and current developments in assay technology will be discussed. Project management techniques will be utilized to aid in the process of assay development. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.698. Bioperl. 4 Credits.
This course builds on the Perl concepts taught in 410.634 Practical Computer Concepts for Bioinformatics. Perl has emerged as the language of choice for the manipulation of bioinformatics data. Bioperl, a set of object-oriented modules that implements common bioinformatics tasks, has been developed to aid biologists in sequence analysis. The course will include an overview of the principal features of Bioperl and give students extensive opportunity to use Perl and the tools of Bioperl to solve problems in molecular biology sequence analysis. Prerequisites: 410.601 Biochemistry, 410.60 Molecular Biology, 410.634 Practical Computer Concepts for Bioinformatics. SCI

AS.410.699. Nanobiotechnology. 4 Credits.
The emerging field of nanobiotechnology utilizes developments in nanotechnology and molecular biology for applications to biomedical science and clinical practice as well as fundamental cell biology research and industrial biotechnology. Nanobiotechnology is an interdisciplinary field that exploits the unique functional properties of natural and synthetic biomolecular-sized (nanometer-scale) constructs, such as quantum dots, carbon nanotubes, nanostructured surfaces, liposomes, artificial membranes, and molecular machines for biotechnology and medicine. This course is designed for biotechnology majors and will survey the research, development, and applications of nanotechnology to medical diagnostics, imaging, and therapeutics (including drug delivery and anti-cancer treatments), cell biology and single-cell analysis, nanofluidics, bioassays, biosensors, and bio-inspired engineering. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.603 Advanced Cell Biology I. SCI

AS.410.700. Food Labeling and Packaging Regulations. 4 Credits.
The Nutrition Labeling and Education Act of 1990, which amended the FD&C Act, requires most foods to bear nutrition labeling and requires food labels that bear nutrient content claims and certain health messages to comply with specific requirements. The NLEA and the final regulations to implement the NLEA provide for a number of fundamental changes in how food is labeled, including requiring that nutrition labeling be placed on most foods, requiring that terms that characterize the level of nutrients in a food be used in accordance with definitions established by the FDA, and providing for the use of claims about the relationship between nutrients and diseases or health-related conditions. These changes apply to virtually all foods in the food supply, including, in large measure, to foods sold in restaurants. Food labeling is required for most prepared foods, such as breads, cereals, canned and frozen foods, snacks, desserts, drinks, etc. Nutrition labeling for raw produce (fruits and vegetables) and fish is voluntary. SCI

AS.410.701. Intro to Food Safety Regulation. 4 Credits.
This course is designed to help students understand the legal and regulatory complexities of the regulation of food products in the United States. The prone issues, including regulatory compliance in food safety and Hazard Analysis and Critical Control points (HACCP), are among major issues to control the food-supply. The FDA and the U.S. Department of Agriculture (USDA) have primary responsibility for the safety of meat and food products. Based on the principles of HACCP, FDA-issued seafood regulations went into effect in December of 1997. However, the regulation of food additives, labeling, dietary supplements, genetic modifications, and the protection of the food supply account for the majority of the in-depth food regulation in the United States. The FDA and USDA regulate the safe practice of primary and secondary food products to the American public. Depending upon the source and nature of food product, the method of shipment, advertisement of nutritional values, etc., are being governed by FDA and USDA jurisdictions. The Food Safety Modernization Act overhauls the FDA in food surveillance, enforcing regulations on specific targets, inspection records examination, and exemptions. In this course, students will learn the existing food regulations and safety net by examining the product tracing, performance standards, and preventive control plans toward food safety, security, genetic modifications, dietary supplements, and food labeling. Students will have the option to design projects to propose an effective food safety net that can assist in the supply chain of the nation’s food safety and security.

AS.410.702. Biomedical Software Regulation. 4 Credits.
Software continually grows more complex and is becoming relied upon by health care professionals in the treatment of patients. This course describes how the U.S. government regulates software used in delivering health care, including the regulations utilized by the FDA and the Centers for Medicare and Medicaid Services. This course covers a wide range of topics, including FDA regulation of software as a medical device and software validation, medical imaging software regulation, electronic record keeping and software used in clinical trials, laboratory information management systems, and HIPAA privacy rules and security standards.

AS.410.703. Strategic Planning for the Biotechnology Enterprise. 4 Credits.
This course is an overview of the strategic planning process of a biotechnology enterprise. It focuses on creating value through strategy formulation and implementation. Topics covered include leadership and technology competencies, performance indicators, intellectual property, corporate governance, regulatory strategy, and appropriating value. The thesis of the course is that effective strategic planning and implementation is critical to success and provides a valuable, structured process for creating enterprise value and managing business risks. Best practices in strategic planning and managing the planning process are also discussed.

AS.410.704. Social Entrepreneurship in BioScience. 4 Credits.
<p>This course will explore how biotechnology innovators are solving social issues, including developing medical diagnostics, discovering effective and safer medicine, producing cleaner energy, remediating environmental contamination, and improving crop yields. Students will think broadly in terms of the roles required to tackle these social, economic, health, and environmental issues and how these roles can add value to society. </p><p>This course will cover social entrepreneurship principles and practices in a range of sectors, including corporate social responsibility and public value missions in emerging markets. Students will have the opportunity to define their role in advancing biotechnology as it relates to the top global challenges. </p>

AS.410.705. Problem Solving and Innovation. 4 Credits.
Whether tackling business challenges in a clinic or creating global initiatives, being a healthcare provider, scientist, engineer, or entrepreneur means being a problem solver. This course focuses on helping students develop the problem-solving strategies and innovation development models necessary to more effectively tackle challenges in medical, industrial, and environmental areas of biotechnology. Students will develop a working knowledge of design thinking principles, lean startup, storytelling, and human-centered techniques, as well as an understanding of how they can be utilized to create positive change in any context. While evaluating real-world problems, students will consider how these techniques can be utilized to turn an innovative idea into an effective solution. Students will work individually and collaboratively on real-world projects, turn their ideas into practical action, and demonstrate their ability to leverage science, health care, technology, and social innovation to bring change through community-based and global initiatives.

AS.410.706. Building and Leading Teams in Health Care. 4 Credits.
In order to provide the best care possible, health care professionals are working together more now than ever before. As a result, strong leadership and teamwork skills are becoming necessities in joining the health care field. This course will provide hands-on activities to help students develop problem-solving skills, learn basic negotiation and mediation strategies, and understand their own tendencies as leaders and team members. Using real-world examples, students will explore how strong leadership and teamwork can drive innovative solutions to public health issues.

AS.410.707. The Psychosocial Determinants of Health, Implications on Diagnostics. 4 Credits.
In this capstone course, students will learn basic diagnostic techniques and use case studies to explore the relationship between physiological illnesses and diagnostic output. Through discussions and guided interviews, students will explore the role of psychology and sociology in patient care choices as well as physician recommendations to patients. Students will practice cultural sensitivity through group activities and discussion of pressing public health issues. Students will undertake final group projects that identify needs in the local community and attempt to create solutions that could feasibly be completed with limited resources.

AS.410.708. Medical Product Reimbursement. 4 Credits.
Medical products brought to market need to have a sound payment, coding, and coverage strategy. Medicare covers over 100 million Americans and leads the way in all United States insurance policies. This course will provide insight into how medical product reimbursement works and allow students to understand how the Centers for Medicare & Medicaid Services (CMS) considers medical products for coverage, coding, and payment. We’ll review the history of Medicare coverage and the regulations. We’ll focus primarily on strategies used to get reimbursement for medical products—both at the national and local levels.

AS.410.709. Cancer Genomics. 4 Credits.
Alterations to the genome are the basis of cancer development, but not all mutations cause cancer. Cancer genomics is the study of cancer cell genomes to elucidate how changes from the normal host genome drive cancer development and how these changes can be targeted for better prevention, diagnosis, and treatment of cancer. In this course, students learn about the multi-step process of tumorigenesis and the confounding development of passenger mutations that challenge the use of genomics to inform therapies. Students will use bioinformatics tools to analyze human cancer genomic data sets to understand the genetic basis of cancer and how to identify genetic signatures in tumors to guide treatment. Topics also include the development of drug resistance, biological sample acquisition, the technologies used to identify and distinguish pathogenic alleles, and how data is stored, referenced, and shared. Discussions about clinical trials and standards of care based on cancer genomics, and about the ethical challenges raised by the use of genomic information to make personal care decisions, are included in the course. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cellular Biology I. 410.638 Cancer Biology is recommended. SCI

AS.410.712. Advanced Practical Computer Concepts for Bioinformatics. 4 Credits.
This intermediate-to-advanced-level course, intended as a follow-on to 410.634 Practical Computer Concepts for Bioinformatics (a prerequisite for this new class), will integrate and expand on the concepts from that introductory class to allow students to create working, Web-based bioinformatics applications in a project-based course format. After a review of the concepts covered in 410.634, students will learn how to create functional Web applications on a UNIX system, using Python and CGI to create forms that can be acted upon, and using the Perl DBI module to interface with MySQL relational databases that they will create and populate to retrieve and present information. This will be demonstrated by building an in-class, instructor-led project. More advanced SQL concepts and database modeling will also be covered, as well as introductions to HTML5, CSS3, and Javascript/JQuery. Class time in the latter weeks of the class will be devoted to individual assistance on student projects and to short lectures on advanced topics. Once again, whenever possible, this course will emphasize relevance to solving problems in molecular biology and bioinformatics. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.634 Practical Computer Concepts. SCI

AS.410.713. Advanced Genomics and Genetics Analyses. 4 Credits.
The next generation of array and sequencing technologies provides the ability to investigate large quantities of genomics information with higher sensitivity, greater throughput, and lower costs. This also introduces new challenges in data management, novel algorithmic approaches, and general interpretation. This course builds on the topics in 410.671 Gene Expression Data Analysis and Visualization to address analysis of both genetic variation and genomics content, including splice variants, single nucleotide polymorphisms (SNPs) with family-based and case/control genome-wide association, copy number variation, somatic and germline single nucleotide variants, tumor clonality and ploidy estimates, and transcription factor binding sites. Data types will include array, RNA sequencing, and DNA sequencing (targeted and whole exome) with sequence assembly methods presented,?such as de novo and reference-based.?Prerequisites: 410.602 Molecular Biology, 410.633 Introduction to Bioinformatics, 410.671 Gene Expression Data Analysis and Visualization. SCI

AS.410.715. Medical Device Regulation. 4 Credits.
This course provides a comprehensive introduction to medical devices and how they are regulated by the FDA. Topics that will be covered include an overview of the laws and regulations that govern medical devices, the FDA's organizational structure and responsibilities for medical device regulation, and administrative and legal requirements for medical devices throughout the full product life cycle. Particular focus will be placed on the premarket review, post-market programs enforcement (e.g., Quality Systems Regulation, and FDA inspectional programs). Included will be discussions on the responsible offices and major program requirements and resources. Students will be given various case studies to examine the application of regulations and participate in a 510(k)/PMA workshop, mock inspectional audit, and mock enforcement action. Upon completion of this course, the student will have a working knowledge of the requirements and policies of FDA regulation of medical devices.

AS.410.716. Food Toxicology. 4 Credits.
Food toxicology is the study of the nature, properties, effects, and detection of toxic substances in food, and their disease manifestation in humans. This course will provide a general understanding of toxicology related to food and the human food chain. Fundamental concepts will be covered, including dose-response relationships, absorption of toxicants, distribution and storage of toxicants, biotransformation and elimination of toxicants, target organ toxicity, teratogenesis, mutagenesis carcinogenesis, food allergy, and risk assessment. The course will examine chemicals of food interest, such as food additive mycotoxins and pesticides, and how they are tested and regulated. SCI

AS.410.717. Risk Assessment and Management. 4 Credits.
Risk analysis is composed of three separate but integrated elements, namely, risk assessment, risk management, and risk communication. Risk communication is an interactive process of exchange of information and opinion on risk among risk assessors, risk managers, and other interested parties. Risk management is the process of weighing policy alternatives in light of the results of risk assessment and, if required, selecting and implementing appropriate control options, including regulatory measures. Students will learn how to integrate risk assessment, risk management, and risk communication using case studies.

AS.410.718. Food Safety Audits and Surveillance. 4 Credits.
Food safety audits provide a credible verification system to the entire food processing industry, including retail environments, meat, fish, and poultry, vegetable, and produce suppliers. Having a HACCP plan in place is often the first step to a successful food safety program, but is not entirely enough to ensure that food safety standards are being adhered to on a consistent basis. In this course, students will learn how to adequately plan for a food crisis situation.

AS.410.719. Postmarket Surveillance. 4 Credits.
While review of devices prior to marketing plays a significant role in ensuring that patients and providers have access to safe and effective medical devices, continued post-market surveillance of devices after they reach the market is crucial to protecting public health. The Office of Surveillance and Biometrics (OSB) within the FDA's Center for Devices and Radiologic Health (CDRH) is responsible for overseeing the continued post-market surveillance of medical devices. This course covers regulatory requirements for industry once a device reaches the market as well as the post-market surveillance requirements and activities performed by the FDA. Students will discover the multifaceted approach to medical device post-market surveillance through topics including Post-market Surveillance Studies, 522 Studies, Registries, Medical Device Reporting (MDR) & Complaint Handling, the MedSun Program, Medical Device Tracking, Unique Device Identification (UDI), MDEpiNet, and Real-World Data/Evidence & the National Evaluation System for health Technology (NEST). SCI

AS.410.720. American Food Policy and Regulation. 4 Credits.
This course examines American food policy and regulation through the lens of USDA, FSIS. Students will (1) examine federal inspection of food from its birth in the 19th Century to the rise of the Food Safety Inspection Service as a single regulatory agency; (2) examine the use of 'adulterated' and 'misbranded' as the foundational standard for all food safety policy, and (3) apply those standards in a 21st Century federal inspection system. Coursework is built around a project in which students work through the policy and regulatory hurdles to obtaining federal inspection services. Course work concludes with an examination of federal enforcement authority and state inspection programs.

AS.410.721. In Vitro Diagnostic Regulation. 4 Credits.
This course provides a comprehensive overview of in vitro diagnostic (IVD) devices and how they are regulated by the U.S. Food and Drug Administration (FDA) and by international organizations such as the European Union (E.U.). Topics that will be covered include: (1) a summary of the U.S. and international laws, regulations, and policies that govern IVD devices, (2) administrative and legal requirements and resources for IVD devices throughout the full product life-cycle, (3) types of IVD devices, (4) coverage and reimbursement of laboratory tests, and (5) current issues and developments. Upon completion of this course, the student will have a working knowledge of the requirements and policies of the regulation of IVD devices.

AS.410.727. Regulatory Strategies in Biopharmaceuticals. 4 Credits.
Given the costly drug development process and the limited resources of emerging biopharmaceutical companies, developing an early regulatory strategy - starting well before clinical trials are initiated - is extremely important for the success of a company. This course will discuss different regulatory strategies that several players of the U.S. biopharmaceutical industry have employed. Students will learn about interacting with regulatory agencies, the orphan drug development, accelerated approval, fast track, priority review, and other regulatory mechanisms, pharmacogenomics and biomarkers, adaptive clinical trials, animal rule, generic drug development, and biosimilars. Using case studies, the impact of these regulatory strategies on drug development, and how these strategies have helped many biopharmaceutical companies will be discussed. At the end of this course, students will better understand federal regulations and the aspects involved in developing efficient regulatory strategies.

AS.410.728. Managing Innovation in the Life Sciences. 4 Credits.
Innovation is the creation of value from new ideas, concepts, methods, materials, and organizational structures. Life sciences organizations that seek to create value for their stakeholders must do so using available capital resources, including financial capital, human capital, intellectual capital, and physical capital. They should manage those resources to gain leverage and maximize value realized. They then seek to defend and control the value created. Why, then, do most organizations treat innovation (and innovators) in ways similar to the body's immune system (i.e., by identifying the innovators, isolating them, "killing" them, and ejecting them from the organization? This course will explore innovation, invention, and value creation as a driving force in the biotechnology or life sciences enterprise as well as the ways in which managers should plan to take full advantage of innovation as the only true competitive weapon for long-term success. A special emphasis will be placed on innovation as applied to life science applications (biotechnology, medical devices, health care delivery, drug discovery, development and packaging, bioinformatics, etc.). Topics include invention, ROI, disruption, creative destruction, types of innovation, technology brokering, organizational structures that foster innovation, planning, and managing for innovation. Students are required to read extensively, participate actively in discussions, do case studies, and develop a convincing pitch for an innovation project.

AS.410.731. Bioprocessing and Scale-up Laboratory. 4 Credits.
This course will provide students with hands-on experience in the process development of biological products from a cell bank through purification. Students will develop products produced in bacteria, mammalian cells, and insect cells. Students will optimize growth conditions on a small scale and then produce the biologic in a larger-scale vessel. Students will then purify the product after optimizing purification conditions. Topics to be covered include microbial fermentation, cell culture production, bioassays, product purification, and the regulatory, engineering, and business principles associated with the scale-up of a biologic product.

AS.410.732. Funding a New Venture. 4 Credits.
In this course, we study the nuts and bolts of putting together a new company and explore financial markets and the economics of life science companies. The course includes weekly discussions based upon textbook and outside reading materials; the latter are often topical and speak to the issues of the day and how they may affect investor's confidence and funding. Video presentations on the part of all students are required. We will examine the roles of corporate officers and the venture community. The students will learn what makes the startup process both attractive and difficult, and will work through that process in a realistic manner.

AS.410.733. Comparative Animal Physiology. 4 Credits.
This class examines animal physiology from an evolutionary and comparative viewpoint. The goal is to examine the commonalities and unique differences in how various animal organisms address the necessary life functions. Topics will include homeostatic mechanisms as an overarching theme, integrating the following systems: nervous, endocrine, muscle, circulatory, defense, respiratory, excretory, fluid and acid-base balance, digestive, energy balance and thermal, and reproductive. SCI

AS.410.734. Practical Introduction to Metagenomics. 4 Credits.
The emerging field of metagenomics allows for the study of entire communities of microorganisms at once, with far-reaching applications in a wide array of fields, such as medicine, agriculture, and bioremediation. Students will learn the principles of metagenomics through the exploration of published project data and guided readings of recent literature. Using data from the Human Microbiome Project, students will explore practical analysis tasks, including sequence assembly, gene prediction and annotation, metabolic reconstruction, taxonomic community profiling, and more. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.633 Introduction to Bioinformatics, 410.634 Practical Computer Concepts for Bioinformatics. SCI

AS.410.736. Genomic and Personalized Medicine. 4 Credits.
With the advent of rapid, low-cost whole-genome sequencing, the field of personalized medicine is growing from a niche field to becoming the new standard of practice in medicine. Already, oncology makes use of genomic sequencing to inform treatment decisions based on tumor types, and patients are seeking knowledge about their genetic and environmental risk factors to make informed health decisions. This class explores the evolving field of personalized medicine, examining genomics as well as proteomics, metabolomics, epigenetics, and the microbiome. Students will read and discuss new developments in pharmacogenomics, rare and complex diseases, genomics for the healthy person, and the ethical, economic, and social implications of these new technologies. These topics will be approached with a view toward application in clinical practice. Prerequisites: 410.602 Molecular Biology; 410.633 Introduction to Bioinformatics. SCI

AS.410.737. Promotion of Biomedical Products: Regulatory Considerations. 4 Credits.
This course will provide students with knowledge of the basic laws and regulations affecting the advertising and promotion of drugs, biologics, and medical devices. This course is specifically designed to illustrate how the law and regulations are applied on an everyday basis using case study examples as well as to provide historical context on regulations and strategies used in the past. SCI

AS.410.750. Molecular Targets & Cancer. 4 Credits.
This course will investigate current and potential molecular targets in cancer, including kinases, DNA repair pathways, epigenetic modifications, immunotherapy approaches, and hormonal, metastasis, and angiogenesis targets. Discussion will also include topics on what defines a molecular target and the methods by which they are evaluated. Prerequisites: 410.601 Biochemistry, 410.602 Molecule Biology, 410.603 Advanced Cell Biology I. Recommended: 410.604. Advanced Cell Biology II. SCI

AS.410.751. Drug Design and Chemical Libraries. 4 Credits.
The course of Drug Design and Chemical Libraries explores pharmacological space with an emphasis on disciplines related to drug discovery, and an understanding of the properties desirable in a drug. Medicinal chemistry, natural product chemistry, focused synthetic libraries, and combinatorial chemistry will be covered. The application of Lipinski's rules for assessing drug-like molecules will be discussed in detail, as well as methods for chemical analysis, in silico drug design, molecular modeling, and compound storage and handling. Also, techniques used for assessing and harnessing chemical diversity for drug discovery will be discussed. The students will gain a fundamental understanding of small molecules at the atomic level as well as insights into the structure-activity relationship. Both are critical to the design and synthesis of chemical libraries that efficiently explore therapeutically useful chemical space and to drug design.SCI

AS.410.752. High Throughput Screening & Automation Lab. 4 Credits.
This course will use hands-on instruction in automated bioassay systems for high-throughput screening as an entry point to covering pertinent aspects of HTS, such as data manipulation, storage, and analysis; liquid handling robotics, microtiter plate washing, manipulation, and barcoding; HTS assay detectors; and automated devices for assay setup, validation, and visualization. Cost considerations, HTS amenable assay systems, and miniaturization and scale-up will also be discussed. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology, and 410.696 Bioassay Development. SCI

AS.410.753. Stem Cell Biology. 4 Credits.
This course will involve discussion and debate on current topics concerning stem cell biology and the use of stem cells in biotechnology and therapeutics. Topics will include review and discussion of developmental and cell biology, stem cell characteristics, stem cell preparation and therapeutic uses, tissue engineering, global regulatory and ethical issues, and commercialization of stem cell therapy. Current peer-reviewed literature and guest experts in the field will provide up-to-date information for discussion. Prerequisites: 410.601 Biochemistry, 410.602 Molecule Biology, 410.603 Advanced Cell Biology I, 410.604 Advanced Cell Biology II. SCI

AS.410.756. Grants and Federal Funding for Biotechnology Enterprises. 4 Credits.
This course is designed to help students working for life sciences companies understand the fundamentals of obtaining government funding for product/technology research and development. While the emphasis will be on grant funding from the National Institutes of Health, other Federal and state funding mechanisms will also be covered. Students will learn how to search for funding opportunities and receive an overview of the NIH funding mechanisms as well as explore the background and history of the Small Business Innovation Research (SBIR) program. The course will provide insights on preparing an SBIR proposal and submission procedure. Fundamentals of government contracting law will also be covered.

AS.410.777. Next Generation Alternative Energies. 4 Credits.
In this course, students are introduced to the current technologies used in the production of alternative energies. These technologies include first and second-generation biomass biofuels, carbon-neutral synthetic fuels, microbial fuel cells, algae fuel, and biological hydrogen production. The study of biomass biofuels will include technologies using agriculture, cellulosic, and waste feedstocks. Carbon-neutral synthetic fuels will include biobutanol, acetone-butanol-ethanol, methane, and biogas. Students will study the methods used to produce these types of fuels, the by-products produced, and the sustainability of energy production. In addition to studying the techniques used to produce alternative energy, students will also discuss the economic and environmental impacts of producing and using alternative energy sources. Prerequisites: 410.601 Biochemistry, 410.602 Molecular Biology, 410.603 Advanced Cell Biology I. SCI

AS.410.780. Stem Cell Culture Laboratory Methods. 4 Credits.
This laboratory course introduces students to the cultivation and differentiation of stem cells. Students are introduced to cell cultivation methods for three types of stem cells and the basics of tissue engineering. Students will scale-up cells into mini-bioreactors for large scale use. The class will include industry-wide practices in cGMP. Prerequisites: 410.601 Biochemistry; 410.602 Molecular Biology; 410.603 Advanced Cell Biology I; 410.652 Cell Culture Techniques or permission of program committee. SCI

AS.410.799. Current Topics in Regulatory Policy. 4 Credits.
The ability to successfully navigate the intersections of law, regulation, guidance, and policy has never been more critical to the success of entities engaged in medical product development and commercial marketing. The entities that make up this industry are very sophisticated in their abilities to innovate at a blazing speed. In contrast, regulators must use a regulatory model that evolves and adapts much slower than their industry counterparts. As a result, regulators are relying more heavily on policy to drive their strategy, actions, and outcomes. Therefore, a clear understanding of regulatory policy is an essential consideration for individuals engaged in the medical product development industry. This course provides an introduction to several key areas of government regulatory policy (both old and new) and regulatory science. The topics covered in this course will serve as a road map for students who want to successfully navigate within this complex and changing regulatory model.

AS.410.800. Independent Research in Biotechnology. 4 Credits.
Students in the Biotechnology, Bioinformatics, and Individualized Genomics and Health programs have the opportunity to enroll in an independent research course. This elective course is an option after a student has completed at least eight graduate-level courses and has compiled a strong academic record. Prior to proposing a project, interested students must have identified a research topic and a mentor who is familiar with their prospective inquiry and is willing to provide guidance and oversee the project. The research project must be independent of current work-related responsibilities as determined by the project mentor. The mentor may be a faculty member teaching in the biotechnology program, a supervisor from the student's place of work, or any expert with appropriate credentials. Students are required to submit a formal proposal for review and approval by the biotechnology program committee. The proposal must be received by the Advanced Academic Programs office no later than one month prior to the beginning of the term in which the student wants to enroll in the course. Students must meet with a member of the program committee periodically for discussion of the project's progress, and a written document must be completed and approved by the program committee and project mentor for the student to receive graduate credit. Additional guidelines can be obtained from the AAP administrative office. Prerequisite: All core courses for your degree program and four additional courses. SCI

AS.410.801. Biotechnology Thesis. 4 Credits.
Students wishing to complete a thesis may do so by embarking on a two-semester thesis project, which includes the 410.800 Independent Research Project and 410.801 Biotechnology Thesis courses. This project must be a hypothesis-based, original research study. The student must complete 410.800 Independent Research Project and fulfill the requirements of that course, including submission of a project proposal, final paper, and poster presentation, before enrolling in the subsequent thesis course. For the thesis course, students are required to submit a revised proposal (an update of the 410.800 proposal) for review and approval by the faculty adviser and biotechnology program committee one month prior to the beginning of the term. Students must meet with the faculty adviser periodically for discussion of the project's progress. Graduation with a thesis is subject to approval by the thesis committee and program committee and requires the student to present his/her project to a faculty committee both orally and in writing. Prerequisites: Successful completion of 410.800 Independent Research Project and 410.645 Biostatistics. SCI

AS.410.802. Independent Studies in Regulatory Science. 4 Credits.
This course is open only to students in the MS in Regulatory Science program or the MS in Biotechnology with a concentration in Regulatory Affairs and may be taken only after the student has completed 5 courses and has compiled a strong academic record. Prior to proposing a project, interested students must have identified a study topic and a mentor who is familiar with their prospective inquiry and who is willing to provide guidance and oversee the project. The study project must be independent of current work-related responsibilities as determined by the project mentor. The mentor may be a faculty member, a supervisor from the student's place of work, or any expert with appropriate credentials. The goal of the study project should be a "publishable" article. Students are required to submit a formal proposal for review and approval by the regulatory science program committee. The proposal must be received by the Advanced Academic Programs office no later than one month prior to the beginning of the term in which the student wants to enroll in the course. Students must interact with a member of the program committee periodically for discussion of the project's progress, and a written document must be completed and approved by the program committee and project mentor for the student to receive graduate credit. Additional guidelines can be obtained from the AAP administrative office.

AS.410.803. Regulatory Science Thesis. 4 Credits.
Students wishing to complete a thesis may do so by embarking on a two-semester thesis project, which includes the 410.802 Independent Studies in Regulatory Science Project and 410.8 Biotechnology Thesis courses. This project must be either a hypothesis-based or research question-based original research study. The student must complete 410.802 Independent Research Project and fulfill the requirements of that course, including submission of a project proposal, final paper, and poster presentation, before enrolling in the subsequent thesis course. For the thesis course, students are required to submit a revised proposal (an update of the 410.802 proposal) for review and approval by the faculty adviser and biotechnology program committee one month prior to the beginning of the term. Students must meet with the faculty adviser periodically for discussion of the project's progress. Graduation with a thesis is subject to approval by the thesis committee and program committee and requires the student to present his/her project to a faculty committee both orally and in writing. Prerequisites: All required regulatory science courses and three elective courses, which must include 410.802 Independent Studies in Regulatory Science and, if hypothesis-driven, 410.645 Biostatistics.

AS.410.804. Practicum in Biotechnology Enterprise & Entrepreneurship. 4 Credits.
This course synthesizes the knowledge and skills acquired in the Masters of Biotechnology Enterprise and Entrepreneurship program while offering a real-world examination of a bioscience organization and the issues it faces. Students will form interdisciplinary teams and work with faculty and industry professionals on an authentic and current project from a local bioscience public or private company, an entrepreneurial startup, or a nonprofit organization. This course is only open to students completing the Master of Biotechnology Enterprise and Entrepreneurship program.

AS.410.806. Independent Studies in Biotechnology Enterprise and Entrepreneurship. 4 Credits.
This course is open only to students in the MBEE or the MS in Biotechnology with a concentration in Enterprise and may be taken only after the student has completed five courses and has compiled a strong academic record. Prior to proposing a project, interested students must have identified a study topic and a mentor who is familiar with their prospective inquiry and who is willing to provide guidance and oversee the project. The study project must be independent of current work-related responsibilities as determined by the project mentor. The mentor may be a faculty member, a supervisor from the student's place of work, or any expert with appropriate credentials. The goal of the study project should be a "publishable" article. Students are required to submit a formal proposal for review and approval by the enterprise/regulatory program committee. The proposal must be received by the Advanced Academic Programs office no later than one month prior to the beginning of the term in which the student wants to enroll in the course. Students must interact with a member of the program committee periodically for discussion of the project's progress, and a written document must be completed and approved by the program committee and project mentor for the student to receive graduate credit. Additional guidelines can be obtained from the AAP administrative office.

AS.420 (Environmental Sciences)

AS.420.301. Quantitative Methods. 3 Credits.
This prerequisite course provides the necessary background in mathematics for students who do not have sufficient undergraduate course work in calculus and statistics. Students who receive a provisional admission because of math deficiency can opt to take the mathematics assessment test. If the student earns a score of 80% or better, then s/he is not required to take the course. In this course, students acquire quantitative skills and an understanding of mathematical principles fundamental to environmental sciences, and necessary for evaluating the implications of policy measures. Topics include probability and statistics, systems of equations, analytical geometry, and basic concepts of calculus. Problem sets, interpretation of data, and applications to everyday problems help students appreciate the usefulness of quantitative methods. Offered online twice a year.

AS.420.302. Chemistry of Natural Processes. 3 Credits.
This course provides students with a basic understanding of the fundamentals of chemistry, of Earth's interrelated chemical systems, and of how to manipulate and interpret chemical data. Topics include molecules and chemical bonding, states of matter, thermodynamics, and kinetics. Through a series of exercises, students apply chemistry principles to solve real-world environmental problems. Prerequisite: Students are urged to take 420.301 Quantitative Methods for Environmental Sciences before enrolling in this course. Offered online only, one to two times annually.

AS.420.601. Geological Foundations of Environmental Science. 3 Credits.
This course provides an overview of Earth's materials, processes, and resources for environmental scientists and policymakers. Topics include minerals, rocks, sediments, stratigraphy, structure, geomorphology, and geologic environments. Emphasis is placed on understanding geologic principles and methods as applied to environmental science, Earth resources, and public policy. Offered online or onsite, twice per year. Onsite version includes a required field trip.

AS.420.603. Environmental Applications of GIS. 3 Credits.
Geographic information systems technology (GIS) is a powerful data visualization and analysis tool.This course is designed to introduce students to advanced concepts of geographic information science related to the fields of reserve planning, environmental science, natural resources, and ecology for the purpose of spatial analysis and geo-visualization of environmental issues. Topics may include conservation needs using remote sensing, digital image processing, data structures, database design, landscape ecology and metrics, wildlife home range and habitat analysis, suitability modelling, terrain and watershed analysis, and spatial data analysis. This course will only be offered online.

AS.420.604. Hydrology & Water Resources. 3 Credits.
This course provides an introduction to the hydrological cycle and examines the influence of climate, geology, and human activity on this cycle. The components comprising this cycle will be examined and include: precipitation; evapotranspiration; surface and groundwater flow; storage in natural reservoirs; water quality; and water resource management and regulation. Discussion of these topics in threaded discussions using the primary literature as well as problem sets will highlight applications and areas of current hydrological research. Offered online and onsite three times per year. Onsite version includes a required field trip.

AS.420.605. Maritime Law and the Environment. 3 Credits.
The course is designed to introduce students to the process by which environmental policy can be implemented as law in the international sphere. "Law of the Sea" formed the foundation of modern public international law. It also represents the world's first efforts to define and regulate a "global commons" and to grapple with the management of resources as the "common heritage of mankind". Topics explored include freedom of navigation on the high seas, the limits on port-state jurisdiction over foreign vessels, and the scope of coastal nations' power to regulate activities in their respective territorial waters, "contiguous zones", and "exclusive economic zones". The course also examines how the UNCLOS regime functions in tandem with other treaties, customary international law, the role of voluntary standards (such as American Society for Testing and Materials (ASTM) International and International Organization for Standardization (ISO)) and domestic law in addressing specific current issues - including management of living and nonliving resources on the Continental Shelf, deep seabed mining, reduction of pollution, protection of highly migratory fish stocks, aquaculture, "marine dead zones", and the future of ocean policy.

AS.420.606. Climate Justice. 3 Credits.
Climate change impacts and policies effect different groups of people in varying ways. More vulnerable populations will disproportionately experience impacts more severely (drought, flooding, food security, storms, heat islands, changes to resources and livelihoods). Also, policies to mitigate and adapt to climate change will have differential impacts. In this course, we will review both climate impacts and proposed policies through the lens of equity and justice. Topics to cover will include: analysis of differential impacts, equity critique of mitigation policies, and the impact of adaptation policies on the poor and people of color. The course will cover both the US and international topics.

AS.420.608. Oceanic & Atmospheric Processes. 3 Credits.
In this course, students study the oceans and the atmosphere as interrelated systems. The basic concepts of air masses, water masses, winds, currents, fronts, eddies, and storms are linked to permit a fundamental understanding of the similar nature of oceanic and atmospheric processes. Among the course's topics are weather forecasting, global climate change, marine pollution, and an introduction to applied oceanography. A field trip is included for in-person sections. Offered on-site or online two to three times each year.

AS.420.609. Agroecology. 3 Credits.
In this course, Agroecology will be taught as a transdisciplinary study of how agricultural production of plants and animals affects and is affected by the local environment. Students will gain a more in-depth understanding of inputs and outputs in agricultural systems and their relation to primary productivity, nutrient cycling, energy flows, and species interactions on farms. The components of farm management will be studied within the context of a complex ecosystem. Time in this course will be spent in lecture, field studies and field trips that will attempt to integrate concepts in agroecology with actual practices in sustainable agriculture.

AS.420.610. Sustainable Business. 3 Credits.
This course provides an introduction to sustainable business strategies practiced by US companies. Students will examine the evolution of CSR and triple bottom line management in the context of competing stakeholder interests. Given that sustainability practices differ by sector, company and country, specific illustrations will be discussed in relation to deforestation, water and waste. Attention will be placed on evolving regulatory regimes including compliance mechanisms such as certification and auditing as well as voluntary partnering with NGO's and government agencies. The discussion of sustainable business strategies will be approached as a policy debate that continues to be shaped at both the national and global levels.

AS.420.611. Principles & Methods of Ecology. 3 Credits.
This course examines the relationship between organisms and their biotic and abiotic environment at three levels of biological hierarchy: individual organism, population, and community. Population characteristics, models of population dynamics, and the effect of ecological interactions on population regulation are discussed in detail. The structure and function of natural and man-made communities and the impact disturbances have on community structure are also examined. Students are led to appreciate the importance of ecology in solving environmental problems. Offered online or onsite, at least twice per year. Onsite version includes required field trips.

AS.420.612. Sustainability Science: Concepts and Challenges. 3 Credits.
Sustainability Science is an interdisciplinary field engaged with understanding the dynamics between natural and social systems and how those interactions challenge the notion of sustainability. This course will start by reviewing the history of the concept of sustainability and will then consider how it has been applied in the environmental sciences. Specifically the goal of the course is to provide a comprehensive, multidisciplinary perspective on this emerging field, understanding its theory, research horizons, and practical applications. Concepts to be reviewed include socio-environmental systems, complex adaptive systems, cross-scalar impacts, tipping points and regime shifts, vulnerability, resilience and adaptive capacity, equity, sustainable development, political ecology, governance, capital assets and livelihoods. In a seminar context this course will consider these and other concepts from a theoretical perspective but will focus on their application in solving real-world problems.

AS.420.613. Forest Ecosystems. 3 Credits.
Forests are critical global ecosystems that provide not only timber and wood products, but an array of services including habitat for wildlife, water filtration, carbon storage, and recreational opportunities. Forests are also dynamic landscapes produced by complex and interacting social and ecological processes. Yet increasingly they are being impacted by deforestation, climate change, biotic homogenization, the spread of invasive species and a range of other natural and anthropogenic stressors. This graduate discussion based seminar class will explore the distribution, ecology and sustainability of forest ecosystems with an eye on development of forests of North America over time. It will cover aspects of biogeography, climate forcing of vegetation dynamics, effects of invasive species, land use change and creation of urban forests. Prerequisites: Principles and Methods of Ecology or equivalent experience.

AS.420.614. Environmental Policymaking and Policy Analysis. 3 Credits.
This course provides students with a broad introduction to U.S. environmental policymaking and policy analysis. Included are a historical perspective as well as an analysis of future policymaking strategies. Students examine the political and legal framework, become familiar with precedent-setting statutes such as NEPA , RCRA , and the Clean Air and Clean Water Acts, and study models for environmental policy analysis. Cost benefit studies, the limits of science in policymaking, and the impact of environmental policies on society are important aspects of the course. A comparison of national and international policymaking is designed to provide students with the global perspective on environmental policy. Offered online or onsite, at least twice per year.

AS.420.615. Environmental Restoration. 3 Credits.
This field-centered course focuses on river, freshwater tidal wetland, serpentine and deforested grassland environments that have been restored or designed in the southern Pennsylvania, Maryland and DC region. Knowledge of prehistoric and paleoecological conditions and post-settlement impact along with modern ecological studies provide important long-term guidelines for restoration, mitigation and conservation measures. Field trips are an integral component of this course with possible locations to include Gettysburg Battlefield, PA; Soldiers Delight Environmental Area, Little Falls and First Mine Run in northern Baltimore County; Big Spring Run Restoration in Lancaster, PA; Severn River Coastal Plain forest, sweet bay magnolia bog and cedar bog in Anne Arundel County; and the restored Kenilworth Marsh in DC. Weekly classroom sessions include plant identification of grasses, sedges and trees, and background data on vegetation, land use history and paleoecological data. The pros and cons of different restoration and conservation approaches regarding effectiveness and sustainability are reviewed. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.616. Environmental Consequences of Conventional Energy Generation. 3 Credits.
Environmental consequences of conventional energy generation will explore the energy resources that have driven and are projected to be the primary energy sources worldwide for the next several decades. Specifically, this course will focus on the historical and future role of conventional energy sources such as those derived from fossil fuels, focusing on their geologic genesis and the consequences of resource extraction which will invite comparisons to more recent trends in energy generation. Students will be exposed to the nexus of social, technical, engineering and environmental challenges of providing energy supplies to an increasingly urban and technologically connected global population. Topics include petroleum, traditional natural gas, coal, nuclear, hydroelectric, and geothermal supplies as well as recent trends in shale hydrologic fracturing methods of obtaining petroleum resources. Environmental impacts will focus on mining, resource extraction, soil and groundwater contamination as well as particulates, smog, acid rain, and global warming. Global production, distribution, usage and impacts of these resources will be considered. Offered online, annually. Prerequisites: none.

AS.420.617. Managing Responsible Organizations for the Ecosystem. 3 Credits.
Corporations are currently in the forefront of the sustainability debate with business viewed as a primary player in determining the future of the ecosystem. Leading businesses focused on sustainable strategies, implies changes across the conventional management processes of planning, organizing, leading and innovating. This course will examine the existing and emerging managerial approaches and individual competencies for sustainable management.

AS.420.618. Terrestrial and Marine Conservation Biology. 3 Credits.
Both the Maine coast and mountainous, interior Maine provide a stunning and ideal venue for learning about the myriad conservation biology issues, challenges and solutions in dealing with both marine and terrestrial conservation. These habitats provide an ideal “living laboratory” for studying, understanding and implementing conservation biology. Acadia National Park, established in 1919, will provide us opportunities to investigate the only fjord in the Atlantic Northeast, Somes Sound; carefully assess the ocean-land interface, e.g., Otter Cliffs, Thunder Hole, Sand Beach, and the Ocean Path Trail; hike Cadillac Mountain — the first place to see the sunrise from October to early March in the continental U.S.; time permitting visit Long Pond and hike the Ship Harbor Nature Trail; and spend a day “at sea” investigating cutting edge marine conservation issues up close. Additionally, day trips will be scheduled for the Schoodic Peninsula (via ferry from COA’s dock to Winter Harbor) and to the new Katahdin Woods and Waters National Monument, just east of Mt. Katahdin, Maine’s highest mountain — designated by President Obama as our newest National Monument in August 2016. Since this is a brand new Monument, we’ll investigate how to help implement its mission including through a day hike assessing Katahdin Lake off the Loop Road. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.619. Climate Dynamics. 3 Credits.
There is a huge interest in understanding the climate at multiple scales. This course will provide an overview of the chemical and physical climate system, feedbacks, and the basic physical balances governing atmospheric circulations and climate with an eye on understanding the basics of climate models. The course will cover energy transfer in the ocean-atmosphere system, mathematical modelling of the ocean and atmosphere, modeling of these systems and the basics on how to construct a climate model and explore the current state of climate models.

AS.420.621. The Intersections Between Science and Society: Investigating Watershed Ecosystems in the Cascades. 3 Credits.
This field course will synthesize concepts from a variety of disciplines including watershed and resource management, climate change, forestry, freshwater ecology, environmental policy and advocacy, tribal culture, and eco-tourism.? It will examine the sensitive and fragile relationship between water usage practices and observe the effects on the landscape within different watershed levels. Participants will be able to synthesize the interconnective relationships between different water use practices and their impacts on the health of the watershed.? The course will culminate with participants designing and executing their own independent research projects, starting with the initial preliminary studies, and ending with statistical analyses including a write up of their research findings, and deliver a community presentation on their projects.

AS.420.622. Ecotoxicology. 3 Credits.
This course covers fundamental of ecotoxicology, including chemical action on plants, wildlife, and ecosystems. Coursework explores toxic effects of pollutants and other stressors at multiple levels of function ranging from cellular and organ systems to populations, communities, and ecosystem functions. Students will learn essential concepts governing fate, exposure, and toxic mechanisms of chemicals as well as basic mathematical models used to investigate biological uptake, bioaccumulation, and dose-response effects. Course includes lessons on application of ecotoxicology, including standard procedures for toxicity testing, risk assessment, and measuring exposures and impacts in the field. Topics are covered in a framework of basic biology and ecology, including cellular/organismal functions, trophic structure, food-web dynamics, population biology and community ecology. Offered online every two years. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.623. Freshwater Ecology & Restoration of Aquatic Ecosystems. 3 Credits.
This course focuses on the ecology, protection, and restoration of non-tidal waters. Students study the biological, chemical, and physical characteristics of the waters and riparian zones. There is also a focus on ecological responses to anthropogenic activity and approaches to protection and damage mitigation in freshwater ecosystems. Ongoing and planned protection and restoration activities in Maryland and elsewhere are presented. Students develop holistic restoration plans based on existing ecological data. Two weekend field trips are required parts of the course. Offered every two years. Prerequisite: 420.611 Principles and Methods of Ecology.
Must satisfy prerequisite course prior to enrolling in 420.623

AS.420.624. Ocean Stewardship and Sustainability. 3 Credits.
<p> Covering over 70% of our planet, the ocean produces half the planet's oxygen, absorbs a quarter of all carbon dioxide emissions, feeds 3 billion people, and contributes $3 trillion per year to the global economy. Yet, we know more about the moon's surface than we do about the bottom of the ocean. What we do know, however, is that overfishing, pollution, land-use change, and ocean warming and acidification, to name a few, are causing marine biodeterioration and threatening the ability of the ocean to sustain global systems critical for life. This course will provide students with a robust scientific approach to the study of oceans with a focus on environmental issues, governance and social-ecological systems.<o:p></o:p></p><p> This is an interdisciplinary course that examines the history of human interactions with ocean environments, current ocean sustainability issues, and real-world examples of how to advance ocean conservation practices and theories in the future. Students will investigate approaches to protect ocean ecosystems, to promote innovation in ocean governance, and to increase scientific knowledge, research and technology that supports ocean health. This course provides a holistic and systems-based view of how human interactions influence ocean functions and of innovative policies and sustainable management solutions to social and environmental problems stemming from those interactions. <o:p></o:p></p>

AS.420.625. Ecology and Ecosystem Management in Coastal and Estuarine Systems. 3 Credits.
This course examines the physical, chemical, and biological processes affecting coastal and estuarine ecosystems with special emphasis on the Chesapeake Bay as a model system. Human influences on such large and critical ecosystems and the policy decisions made to manage and minimize human impact are explored in lecture and seminar formats. Topics include the hydrodynamics of shallow tidal waters; energy and material flows and transformations; diversity and adaptation of plant, animal, and microbial communities; population and pollution ecology; and ecosystem management. Case histories illustrate problems in fisheries management and the eutrophication of the coastal and estuarine systems. Offered annually, on-site. Required weekend field trips are included. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.627. Great Lakes Ecology and Management. 3 Credits.
This intensive course examines the physical, chemical, and biological aspects of the Great Lakes aquatic ecosystem as well as its governance, policy-making and management. State-of-the-science, socio-economic relationships, human impacts and restoration activities are also explored, often by presentations from regional experts. Daily lecture topics are reinforced with numerous field experiences to an array of sites throughout Michigan. Students will also be exposed to hands-on sampling, learn about long-term monitoring programs and participate in developing alternative management strategies.

AS.420.628. Ecology and Management of Wetlands. 3 Credits.
This course explores the biological, physical, chemical, and ecological aspects of tidal and non-tidal wetland ecosystems. Topics include wetland classification, valuation, function and dynamics. Wetland modification and manipulation are analyzed through case studies of restoration, construction, and mitigation. The effects of federal and state laws, of various regulations, and of human perturbations are explored. In-person sections include field trips that provide hands-on experience and demonstrate the significance of wetland mitigation, restoration and construction projects. Offered onsite every two years. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.629. Drinking Water,Sanitation & Health. 3 Credits.
In this course students examine scientific and public policy dilemmas related to the provision of safe drinking water and related protection of global human health. Course work emphasizes basic understanding of the fundamentals of water supply, treatment, regulation, and sanitation as well as providing a focus on unresolved issues confronting scientists, resource managers, and policymakers. Students work to develop recommendations for solutions to critical issues as controlling pathogens from urban and agricultural runoff, managing harmful by-products of the disinfection process, regulating arsenic in ground water, evaluating the risk posed by exposure to mixtures of contaminants, and confronting the threat of terrorist attacks on water supplies. Offered online, annually. Prerequisite: 420.604 Hydrology and Water Resources, equivalent course, or experience.
Must satisfy prerequisite course (AS.420.604) prior to enrolling in AS.420.629

AS.420.630. Tropical Ecology and Conservation of African Wildlife. 4 Credits.
This is an immersive study abroad field course in Cameroon, Africa with a strong focus in tropical ecology field methods for the purpose of conserving African wildlife. The Congo Basin is the second largest tropical rainforest in the world, storing an estimated 25-30 million tons of carbon stocks, and home to nearly 20% of Earth's species. There is a critical need to better understand the Congo Basin's rainforests because we cannot conserve what we do not understand. The field component of this course takes place at the Dja Nature Reserve in southeast Cameroon at a remote research station operated by the Congo Basin Institute. The Dja rainforest is a diverse and understudied ecosystem. This course will cover basic field methods including but not limited to biodiversity assessments, species population estimates, setting up and checking large mammal camera traps, auditory surveys of primate vocalizations, mist netting for tropical birds, and other field techniques. Couse content will focus on problems such as ecological impacts of biodiversity loss, drivers of wildlife poaching, conservation strategies and best practices. Students will be introduced to local leaders in conservation, members of the community from the ecosystems we'll be working in, as well as indigenous residents from the Baka tribal group. This course will also explore the broader social, political, economic, and climate change impacts to wildlife conservation efforts in Africa. Prerequisite: AS.420.611 – Principles and Methods of Ecology.

AS.420.631. Field Methods in Stream & Water Quality Assessment. 3 Credits.
This course provides an overview of field methods used to sample and assess various biological, physical, and chemical components in streams, rivers, and lakes. It allows students to determine the impact human activity has on aquatic environments. Students gain hands-on experience with standard sampling techniques, and with the detection, identification, and quantification of biological specimens and chemical pollutants in the aquatic environment. Students discuss water quality standards and federal regulations such as the Clean Water Act and Safe Drinking Water Act. Also included are study design, gear selection, sample preservation, and safety. Basic approaches to analyze and report findings are covered, with emphasis on methods currently practiced by government resource agencies. Offered onsite every two years. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.

AS.420.632. Air Quality Management and Policy. 3 Credits.
Understanding and mitigating air pollution, both indoor and outdoor, is of extreme importance to global health. In fact, the World Health Organization released a statement in 2014 that in 2012, approximately 7 million people died - one in eight of total global deaths around the world - as a result of air pollution exposure. Air pollution also has an impact on climate change, in terms of its abilities to both exacerbate and reduce global warming. This course provides an overview of the principles, effects, and policies regarding outdoor air pollution with an emphasis on emerging international air pollution issues, public health and environmental impacts of outdoor air pollution, and evolving ways to monitor air pollution, from low-cost sensors to satellite techniques. Course topics include: history of air pollution events and management; major air pollutants and sources; atmospheric chemistry, transport and dispersion; measurement and monitoring; control technology; effects on human health and climate; and regulatory requirements. The effectiveness of the Clean Air Act, approaches toward air quality management in other countries, international treaties, future air quality projections, and regulatory case studies will also be discussed. Offered online, infrequently. Prerequisite: 420.608 Oceanic and Atmospheric Processes, an equivalent course or experience, or approval of the instructor.
Must satisfy prerequiste course (AS.420.608) prior to enrolling in AS.420.632

AS.420.634. Bioremediation & Biofuels for Environmental Restoration. 3 Credits.
This course presents details of environmental technologies for assessment, remediation, and restoration of contaminated sites. The course includes a brief review of environmental policy related to impacts of hazardous chemicals and endocrine blockers, but focuses on remediation technologies available for reclaiming contaminated resources and reducing health risks. It covers the application of multiple physical, chemical, and biological technologies, but emphasizes use of biological systems for the cleanup of hazardous chemicals. Students are introduced to the nature of hazardous waste, behavior of chemicals in the subsurface, biochemistry of microbial degradation and technology applications. Students also explore the use of biotechnology to maintain biodiversity, to remediate contaminated soils, and to isolate and remove substances. In keeping with the emerging “bio” technology exploration, students take a look at biofuels and their role in combating climate change on a global-scale and their role in restoration of degraded land on a local-scale. Students in this class learn to select appropriate technologies, design a monitoring program for assessing the applicability of bioremediation techniques, develop biological conceptual models for natural attenuation, and understand the key principles for design. Prerequisites: 420.601 Geological Foundations of Environmental Science and 420.604 Hydrology and Water Resources, equivalent courses, or experience.Prerequisites for SIS: AS.420.601 and AS.420.604

AS.420.636. Environmental Anthropology. 3 Credits.
Anthropology, the study of humans and their engagement with the environment, depends on the use of methods and theories to provide insight into human adaptation and resilience to environmental changes. In order to understand the present environmental crisis, we must analyze the sociocultural factors that have led us to this point and consider how they are influenced by various contexts. Applying the theories of cultural materialism, symbolic anthropology, and socioecology, students will explore diverse economic practices, including hunting and gathering, horticulture, aquaculture, agriculture, and pastoralism in a range of geographical settings, both in US and globally. Course activities and assignments will investigate how human belief systems relate to specific environments and are integrated into rituals and arts. Considering current socioecological frameworks, such as deep ecology, ecological feminism, and political ecology, students will explore how Western environmental perspectives overlap with or are disconnected from the local ecological knowledge developed by indigenous societies. To provide training in the application of environmental anthropology frameworks and tools, students will conduct a fieldwork project unique to their interests and regions.

AS.420.637. Conservation Biology. 3 Credits.
In this seminar style course students examine the meaning and implications of biodiversity with a focus on disciplines associated with conservation biology. The course will expound on the following topics: patterns and processes creating biological diversity; estimates of extinction rates; consequences of diversity losses; approaches to conserving diversity, including large-scale conservation planning; conservation biology tools, such as population viability analyses and conservation triage; and causes of diversity loss including habitat loss-fragmentation, invasive species, and climate change. This includes exploring how conservation biology differs from other natural sciences in theory and in application. Students learn the major threats to biodiversity and what natural and social science methods and alternatives are used to mitigate, stop, or reverse these threats. The course also includes the economic and cultural tradeoffs associated with each conservation measure at the global, national, regional, and local levels. Prerequisite: Principles and Methods of Ecology or equivalent experience.

AS.420.638. Coastal Zone Processes and Policy. 3 Credits.
The course is designed to provide the student with knowledge to address modern coastal, environmental, geologic, and policy issues. The course will focus on the coasts, barrier-islands, major estuaries, and inner continental shelf areas of the United States. Fundamental coastal engineering principles will be described in order to address methods used for public works projects including hurricane protection, beach nourishment, and tidal inlet maintenance. The policies pertinent to management and use of coastal environments will be studied. Offered online every other year. Prerequisite: 420.601 Geological Foundations for Environmental Sciences, equivalent course, or experience.

AS.420.639. Landscape Ecology. 3 Credits.
Landscape ecology is a rapidly developing area of study that explicitly examines the effects of spatial pattern and scale on ecological processes that unfold over areas of several square kilometers or larger. Thus, landscape ecology provides many concepts, tools, and approaches that will enhance the effectiveness of endeavors such as watershed management, ecosystem management, design of conservation reserves and green infrastructure, and smart growth. The goal of this course is to give students a firm grasp of the concepts of landscape ecology and of how they can be applied to enhance the effectiveness of environmental policy, management, regulation, and assessment. Offered online at least every other year. Prerequisite: 420.611 Principles and Methods of Ecology, equivalent course, or experience.
Must satisfy prerequisite course (AS.420.611) prior to enrolling in AS.420.639

AS.420.640. Urban Wildlife Ecology. 3 Credits.
An increasing human population, urban sprawl, global travel and commerce are hallmarks of modern society. As a result, human-wildlife interactions are increasingly commonplace, particularly in cities and suburbia, prompting the development of a new discipline known as urban wildlife management. This course will explore the occurrence, adaptations, and management of wildlife in urban and suburban landscapes, focusing on human dimensions, animal damage, zoonoses, control of invasive and introduced species, endangered species recovery, and population dynamics. Students will examine historical and sociopolitical perspectives, review ecological theory, and practical applications for managing wildlife and maintaining biodiversity in increasingly urbanizing environments. Students will also review the current directions in urban wildlife research and explore the use of modern sampling and estimation techniques, such as camera trapping and occupancy estimation, as well as the more traditional methods used on wildlife populations.Prerequisites: 420.611 - Principles and Methods of Ecology, equivalent course, or experience.

AS.420.641. Natural Resources Law and Policy. 3 Credits.
This course introduces students to federal and state legislation and policies of critical importance in natural resource management. Students explore such issues as regulation of ocean fishing, coastal zone management, mineral exploitation and associated environmental impact, water allocation and quality, hazardous waste cleanup programs under the Superfund law, urban industrial infrastructure such as water and sewage systems, land use management, and water and air pollution control. Offered onsite of online every two years. Completing 420.614 Environmental Policymaking and Policy Analysis is recommended. An equivalent course or experience may also suffice.

AS.420.642. Public Lands-Private Interests:The Struggle for Common Ground. 3 Credits.
This course prepares students to participate in the great debate over the use and protection of America 's federally owned forests, rangeland, parks, and sanctuaries. Students consider such questions as how much should be paid for grazing on federal lands; how to balance the demand for timber harvest with the need for watershed and wildlife management; who controls mineral and oil extraction on federal lands; and who has the rights to waters flowing through federal lands and stored behind federally funded dams. These and similar issues of today and tomorrow are studied in the context of history, statute and case law, and administrative regulations. Offered infrequently.Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.

AS.420.643. U.S. Environmental History. 3 Credits.
Environmentalism is a multifaceted phenomenon infused with many different schools of thought about the nature of environmental problems as well as the most appropriate solutions for those problems. This course will examine the major historical influences on the varied approaches to environmentalism and environmental practice. Students will explore the influence of environmental ideas and actions in the US from the 19th century to the present. The goal is to deepen our understanding of contemporary environmental practice – by others and ourselves – by tracing the influence of these historical trends in current debates and actions. Topics include conservationism, preservationism, transcendentalism and green romanticism, toxic construct, the wilderness construct, and sustainability.

AS.420.644. Sustainable Cities. 3 Credits.
This course examines urbanization and its impacts on the environment. The goal of the course is to better understand how urbanization contributes to ecological damage as well as how cities can be constructed in ecologically healthy ways. Topics include land use planning transportation, waste, management, water quality, open space/greening, green building technology, urban design, and urban ecology. The course takes an international perspective by using case studies of cities in North America, Europe, Asia, Latin America, and Africa. The case studies also include a wide range of cities with different populations, geographic scale, and growth rates. Final projects are an in-depth study of one particular city of the student's choice and its attempts to implement programs for sustainability. Offered online, annually. Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.

AS.420.645. Environmental and Natural Resource Security. 3 Credits.
<p>Environmental Security concerns the complex relationship between peace, security, and the environment. It addresses the rapidly growing importance of environmental degradation concerns, resource scarcity, food production, unequal distribution of natural resources, and climate events that present ever-increasing challenges for nations and their security and stability. <o:p></o:p></p><p>This course will survey security disruption and conflicts over natural resources from domestic protests to civil wars to major international armed conflicts. From melting sea ice in the Arctic creating vulnerabilities, to mining rare earth minerals necessary in the production of many renewable energy sources, managing the fair use and distribution of natural resources is critical to peace and security across the globe. This course will also address the risks and opportunities that environmental issues present for domestic and global security and stability. <o:p></o:p></p>

AS.420.646. Transportation Policy and Smart Growth. 3 Credits.
This course examines how transportation policy and decisions can alleviate or prevent problems resulting from urban sprawl. How can transportation decisions and planning contribute to more livable urban design and land use patterns that promote smart growth that is environmentally and ecologically sustainable? Students discuss how different environmental media land, water, and air are affected by our transportation systems and resulting development patterns, and how the design of transportation systems the highways, roads, transit systems, and bike and walk paths can more closely harmonize with nature and provide communities with a better quality of life. A wide range of policy options is examined, from altering the structure of road pricing to redesigning neighborhoods and altering urban form. A number of case studies are examined to illuminate the issues and principles raised in the course. Offered online at least every other year. Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.

AS.420.647. Environmental Racism and Inequality. 3 Credits.
This course will examine the deeply rooted social, psychological, and political backgrounds that have resulted in environmental inequities and injustices. Essentially the course will focus on why, and through what social, political and economic processes, some people are denied access to untainted natural resources and are exposed to direct threats to personhood through environmental degradation and political marginalization. It will examine systemic structural biases in environmental policy-making that discriminates against indigenous peoples and people of color, particularly with respect to the state-sanctioned siting of toxic waste facilities, the distribution of pollutants, the location of food-deserts, and the exclusion Indigenous peoples and people of color from leading positions in the environmental movement.

AS.420.648. Fossil Fuels and the Climate Crisis. 3 Credits.
In this course, we will study the inter-relationship of fossil fuels and the climate crisis, including a particular focus on Louisiana and 'Cancer Alley.' The course will look at the role of fossil fuel companies in the climate crisis and will delve into the issues of climate and environmental justice, indigenous rights, social movement organizing, public policy, and the energy transition. With a particular focus on oil, students will learn about the rise to global dominance of a natural resource on which states and nations have come to depend, but which has also brought great political, environmental, social, and climate strife. The course will explore approaches to solving the seemingly contradictory need to both rapidly transition away from fossil fuels and address this continued dependence. Students will learn about the history and future of fossil fuels, the social movements resisting them, and policy approaches to replacing them.

AS.420.650. International Environmental Policy. 3 Credits.
This course explores the methods and strategies for promoting solutions to global environmental problems. Through consideration of issues such as stratospheric ozone depletion, global climate change, tropical deforestation, loss of biodiversity, transnational pollution, and other threats to the international commons, students examine policymaking from the perspective of developed and developing countries, the United Nations system, international financial entities, and nongovernmental interest groups. By investigating important international agreements, students determine how far the international community has come in solving specific problems, what obstacles prevent effective international solutions, and what needs to be done to overcome barriers. Offered onsite or online, infrequently. Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.
Must satisfy the prerequisite course (AS.420.614) prior to enrolling in AS.420.614

AS.420.651. Environmental Risk in Decision Making. 3 Credits.
Analysis of risk is one of the most powerful tools and components of regulatory decision making. Based on the premise that risk assessment has no "right" answers, this course explores what risk perception, risk management, and risk communication mean. Students are introduced to terminology and concepts necessary in risk communication. Case studies help to explain the complexities of risk assessment and management. Students learn how to balance the costs and benefits of risk reduction and how to account for the uncertainties in risk estimates. Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.

AS.420.654. Environmental & Natural Resource Economics. 3 Credits.
This course presents the fundamental concepts and applications of economic theory related to environmental protection and the management of natural resources, including renewable resources (i.e., fisheries) and exhaustible resources (i.e., petroleum). Topics covered include sustainability, the relationship between the environment and the economy as a whole, the role of government in addressing market failures, how economic incentives can be used to protect the environment, concepts and methods for valuing environmental benefits and cost-benefit analysis of environmental regulatory policies. Prerequisite: AS.420.614 - Environmental Policymaking and Policy Analysis, equivalent course, or experience.
Must satisfy prerequisite course (AS.420.614) prior to enrolling in AS.420.654

AS.420.656. Environmental Impact Assessment & Decision Methods. 3 Credits.
This course introduces the process of environmental impact assessment and policy decision making as required under the National Environmental Policy Act (NEPA) and the regulations of the Council of Environmental Quality (CEQ). Topics include identification of purpose and need for any actions affecting the environment, development of objectives and decision criteria, and various techniques for assessing impact and comparing alternatives for a given environmental intervention. The strengths and weaknesses of various approaches are evaluated with techniques that allow analysis of multiple objectives and conflicting uses of environmental resources. The importance of scientific credibility and public acceptance is demonstrated with actual cases. Offered onsite or online annually.Prerequisite: 420.614 Environmental Policymaking and Policy Analysis, equivalent course, or experience.

AS.420.659. Management for Environmental Results with Performance-based Measurement. 3 Credits.
At all levels of government and throughout private industry, performance-based initiatives now place unprecedented demands on environmental managers to achieve measurable environmental results. The goal of the various performance based initiatives is to give environmental managers a systematic understanding of the causes of environmental problems, both natural and anthropogenic, and their human, ecological and economic effects. It is also at the heart of sound environmental impact analysis, risk assessment, and benefit-cost analysis. In this course, students learn the foundations and applications of modern performance-based initiatives. Using case studies taken from a variety of environmental programs, students learn to use available scientific knowledge to uncover the likely keys to program success. Students learn why success has so often eluded environmental managers in the past. The goal of this class is for students to critically assess the design, performance measurement and management of environmental programs on all scales and to recommend effective improvements. Students will develop skills for implementing results oriented environmental management. Offered onsite or online, annually.

AS.420.660. Strategies in Watershed Management. 3 Credits.
Watersheds are often thought of as the basic organizing units for landscapes and the natural resources they support. As water is a fundamental resource that shapes landscapes, nourishes life, provides habitat and recreation, and transports sediments, nutrients, and wastes, prudent management of watersheds is critical for thriving ecosystems and human populations. The course comprises ten on-line modules students, each with topical content, web pages to visit, readings in the required text, and a quiz. Most modules also have discussions, and some have other assignments. The final discussion is a brief essay on a relevant topic of the student's choice. Students are introduced to definitions of 'watershed' and 'watershed management' in the context of natural resources science and policy. There is a brief review of basic hydrology, a look at the history of watershed management, and examination of the institutions and legislation that control activities affect watershed management. We discuss threats to watershed health, sources of information to guide watershed managers, and practices that can ameliorate the threats. Through case histories, the students are exposed to the collaborative process for assessing, protecting, and restoring watersheds. Offered online, annually.

AS.420.665. Climate Change on the Front Lines: The Study of Adaptation in Developing Countries. 3 Credits.
Poor and developing countries are predicted to bear the brunt of climate change. This course will focus on key sectors such as agriculture, forestry, biodiversity, water resources, human health, and tourism and the ways in which poorer and developing counties are impacted by and adapting to climate change. This course may focus on a region or a specific country depending on the instructor. Assessment and evaluation of demographic trends, environmental challenges such as retreating ice, potential flood hazards, ecosystem impacts, as well as health issues will be incorporated. International instruments such as adaptation funds, carbon funds, clean development mechanisms, and reduced deforestation/degradation strategies and policies will be investigated in a comparative analysis of impacts and adaptation responses of countries around the world. Offered online, annually.

AS.420.666. Community Development and Sustainability in developing countries. 3 Credits.
This course introduces community development concepts via discussion of the environmental-social-economic nexus in developing countries. Students will seek answers to key questions such as: (a) How rural communities in developing countries interact with their natural environment (b) What are the drivers, tradeoffs, and feedback loops of such interactions and what lessons can be drawn to seek common ground for sustainability (c) how do interaction between social, environmental, and economic dimensions shape communities to adapt to changes in these dimensions (d) what are some of the successful models of sustainable community development and environmental management (e) what is the fundamental concept of sustainability and factors that influence sustainability and its pathways (f) what are some of the efforts in place through government, nonprofits, and the private sector to assist developing countries in attaining sustainability. Students will discuss topics ranging from energy saving stoves in the Himalayas; to indigenous practices in Africa for mitigating human-wildlife conflict within buffer zones; to community-driven approaches for water management and agriculture; to community forestry and leasehold forestry models. In addition to key problems and challenges, students will be introduced to important tools used to translate ideas into sustainable action, such as project logical frameworks. By the end of the course, students interested in international, community, and sustainable development would be able to engage in related debates and be familiar with approaches and techniques for designing sustainability solutions.

AS.420.667. Analysis of Environmental & Ecological Data. 3 Credits.
This course will teach participants how to develop work flows going from raw data to graphics and statistical analysis, using the programming language and statistical environment R. Topics will focus exclusively on the biological sciences and will cover foundational concepts in statistical modeling (ANOVA, Regression, ANCOVA, PCR, etc); emphasis is on conceptual underpinnings of statistics not methodology, with a focus on defining statistical models and the major inference paradigms in use today.

AS.420.668. Sustainable Food Systems. 3 Credits.
This course considers the environmental and social challenges of providing a sustainable global food system. We will investigate the geographic patterns of agricultural and food production systems, emphasizing contemporary patterns and how these came to be. Attention will be given to agricultural systems from the local to the global scale and we will consider the global distribution of production and consumption of agricultural products. The impacts of global change issues such as climate change, energy crops, population growth, and urbanization on food production will be also be part of the course. Offered online or onsite, annually.

AS.420.669. Applied Sustainability. 3 Credits.
This course examines the history and current trends in the expanding field of sustainability. Students will be exposed to a wide range of case studies, visit many field sites and have discussions with sustainability practitioners in Maryland to determine the current state of the science as well as impediments to progress. Additional work includes practical application through development and implementation of a sustainability-related vision project. Offered only as a compressed field course every other summer. Offered as intensive field course every other summer.

AS.420.670. Sustainability Leadership. 3 Credits.
Using a highly interactive format, this course examines practical, state-of-the-art concepts in leadership, with a focus on the unique challenges of sustainability facing our world. Students will examine the essential components of leadership, including vision, communication, strategy, organization, synergy and strategy. Recognition of barriers and risks and how to work around them will be stressed, and the restricted conditions under which leadership is actually exercised will be revealed. Students will also practice self-reflection/assessment and become familiar with advanced tools to improve their leadership ability. Coursework will include frequent work in small groups, review of leadership case studies and a practical, 'real-world' vision development project. Offered only as a compressed field course every other January intersession.

AS.420.671. Global Land Use Change. 3 Credits.
This course provides a comprehensive examination of global land use change including the current spatial and historical extent of forests and grasslands, methods used to detect forest cover and its current and historical changes. Reviewing these patterns will lead to an understanding of the past and present drivers of land use change. In this course, we will consider the hydrological, and major biogeochemical cycles (i.e., carbon, nitrogen and phosphorus) and the impacts that forests and grasslands (and the loss of these ecosystems) has had on these cycles. The impact of forest loss on biodiversity, long term functioning of ecosystems and climate will also be discussed. After reviewing the effects of a loss of these environmental processes, we will bridge the physical and biological sciences with the social sciences by examining economic impacts and socioeconomic drivers of deforestation. Lastly, current policies and the potential effect of policies that aim to reduce deforestation such as REDD will be discussed.

AS.420.672. Environmental Ethics. 3 Credits.
Environmental Ethics is a philosophical discipline that examines the moral relationship between humans and the natural environment. For individuals and societies, it can help structure our experience of nature, environmental problems, human-environmental relations, and ecological awareness. Beginning with a comprehensive analysis of their own values, students will explore complex ethical questions, philosophical paradigms and real-life case studies through readings, films and seminar discussions. Traditional ethical theories, including consequentialism, deontology, and virtue ethics will be examined and applied. Environmental moral worldviews, ranging from anthropocentric to ecocentric perspectives, will be critically evaluated. Organized debates will help students strengthen their ability to deconstruct and assess ethical arguments and to communicate viewpoints rooted in ethical principles. Students will apply ethical reasoning skills to an examination of contemporary environmental issues including, among others, biodiversity conservation, environmental justice, climate change, and overpopulation. Students will also develop, defend and apply their own personal environmental ethical framework. A basic understanding of modern environmental history and contemporary environmental issues is required. Prior experience with philosophy and ethics is not required.

AS.420.673. Ecology and Evolution of the Galapagos. 3 Credits.
The Galapagos Islands have often been called the laboratory of evolution, where scientists have been able to study in detail many of the processes that have shaped the face of life on our planet. There are few places in the world, where it is possible to find such a variety of species, both animal and plant, which show so many degrees of evolutionary change, in such a restricted area. This course will focus on the tectonic development of the Islands and of the origin, evolution, and ecology of flora and fauna, and the reasons for the concentration of threatened and endangered species in the forests and on the Galapagos Islands. In the marine environment, emphasis will be placed on the ecological processes that maintain biodiversity, community organization, and the impacts of climate change which are threatening such communities.

AS.420.674. Applied Energy Policy in the 21st Century. 3 Credits.
This course provides an overview of clean energy technology and deployment, infrastructure and finance for environmental scientists and policy makers. Topics include civics, climate science, renewable energy, energy efficiency, sustainable transportation, city infrastructure (energy, transportation, water), and public private partnerships. Emphasis is placed on a place-based approach to energy policy, including climate smart resilient cities and how new urban mobility can address social problems.

AS.420.675. Geology and Tropical Ecology of Hawai'i. 3 Credits.
The breathtaking beauty and unfettered access to the soaring Mauna Kea, the highest mountain when measured from the ocean floor, and home to the Big Island's eight major climate zones, from desert to alpine, inspire countless superlatives. The volcanoes of the Big Island of Hawai'i are one of the premier examples of active hotspot volcanism in the world and are by far the most accessible. This location offers an unparalleled opportunity to observe the planetary processes of destruction and creation through Hawai'i's geology and tropical ecology. This field course explores the unique marine, freshwater and terrestrial habitats of the island, interconnections between the geology and the ecology and the integrated management of natural resources from volcanic mountain tops to the biodiversity of the coral reef. The primary goal of this interdisciplinary course will be to provide a solid foundation in field science for both geologic and ecologic methods. Specifically, we will examine the geological development of hot spot generated Hawaiian ocean islands, we will describe the biological development of the ecosystems on the islands, and we will examine the interaction between humans (landscape use and introduction of exotic species) and the island environments (major biomes and anthropomorphic systems). As a field course, natural communities will be a major emphasis. On land, focus will be placed on the tectonic development of the Islands and of the origin, evolution, and ecology of flora and fauna, and the reasons for the concentration of threatened and endangered species in Hawai'i. In the marine environment, emphasis will be placed on the ecological processes that maintain biodiversity, community organization, and the impacts on coral reefs. Prerequisite: AS.420.601 - Geological Foundations of Environmental Science or permission from the instructors.

AS.420.676. Global Scarcity in Freshwater Systems: Crisis and Solutions. 3 Credits.
This graduate-level course explores the dual nature of water scarcity worldwide, including both natural and human causes, and what is being done to help people and ecosystems cope with scarcity. The course covers definitions of water scarcity, the geographic extent of the problem, and trends in factors that contribute to it. It also examines several types of actions that are being taken to deal constructively with water scarcity. These actions fall into the general categories of monitoring, supply enhancement, conservation, re-use, pollution control, lifestyle changes to lower our water footprint, and public policy changes. Many of these actions, especially those related to public policy, are incorporated into seven principles of sustainable water management detailed in the course textbook, “Chasing Water: A guide for moving from scarcity to sustainability”, by Brian Richter of the Nature Conservancy. Examination of the principles helps to end the course on a hopeful note by reminding us that humans collectively use only 5-10 percent of the water that falls as precipitation, and we have the capacity to greatly reduce the human suffering and environmental damage caused by poorly managed use of freshwater resources.

AS.420.677. Spatial Statistics. 3 Credits.
Spatial Statistics is a rapidly developing tool in the discipline of ecology that analyzes both 2-D and 3-D data that contain a spatial component. Many ecologists use continuous data (e.g., vegetation density and height, net aboveground primary production, percent of biomass killed by disturbance, etc…) that violates the assumption of spatial independence; therefore, necessitating the need to analyze the data using spatial statistics. Thus, spatial statistics provides concepts, tools, and approaches that will enhance the analyses of population data, sample data, partitioning of regions (patch and boundary), spatial interpolation, and data that are spatially autocorrelated. The goal of this course is to give students a firm grasp of the concepts of spatial statistics in ecology and of how they can be applied to analyze continuous data for environmental policy, management, and assessment. Uses of case studies, data analysis in the R spatial statistics package, and discussions help to examine and apply the concepts.

AS.420.678. Nature Conservation and Sustainability in Cuba. 3 Credits.
This cultural and scientific emersion program will investigate Cuba's agroecology, tropical marine and terrestrial ecosystems as well as the countries unique geology. As wildlife and habitat have faded from the tropics, Cuba's importance as an ecological bastion has risen. The island has the largest tracts of untouched rain forest, unspoiled reefs and intact wetlands in the Caribbean islands. Cuba also is home to many unique, or endemic, species, including the solenodon, and the bee hummingbird, the world's smallest bird. In this course, students will have the opportunity to learn about the marine ecology through first-hand investigation of the reefs off the shores of Cuba, and learn about rainforest ecology through observations of Cuban forests. The course will also examine the interplay between geology, ecology, evolution and adaptation in areas such as coastal xeromorphic vegetation, swamp ecosystems, and Viñales National Park.

AS.420.679. International Water: Issues and Policies. 3 Credits.
This course is a broad survey of the international water issues facing the 21st century. Topics to be covered include, water security, privatization of water service delivery, conflict and cooperation on trans-boundary rivers, the role of large multi-purpose reservoirs (for hydropower, water supply, irrigation), water as a human right, achieving the Sustainable Development Goals on water supply and sanitation, the role of water in food security, water institutions and policies, and climate change. Any discourse today on sustainable development is not complete without a discussion of the important role of water to society, economic growth, and poverty reduction. Our objective in this course is to gain a broad overview of these issues, primarily from the sustainable development lens, and to critically evaluate these challenges from a multi-disciplinary perspective (e.g. economics, environment, social, engineering, public health). This is important as solutions to water problems will require many different disciplines and expertise working together.

AS.420.681. Climate Change Adaptation and Development in Nepal. 3 Credits.
This is a field course that takes a firsthand look at the reality of climate change adaptation at various scales as it is experienced in in a developing country such as Nepal. Specifically it considers Nepal's vulnerability and resilience to climate change at the national, district and community levels, and will review adaptation instruments and actions at all levels and the political context in which they are executed. Specific topics to be covered include climate change by sector, vulnerability at various scales, institutional and community-based plans for mitigation and adaptation, institutional and legal mechanisms that address climate change, extension efforts, climate change integration into development, and current effort by developing countries such as Nepal in carbon-financing and other topics. The course will also consider how funding to support climate change adaptation intersects and overlaps with development aid and planning. The course will start and end in Kathmandu, the capital city, where students will meet with policy makers, government officials and experts. We will also travel to communities in the three biophysical regions of Nepal, the highlands, the middle hills and the lowlands (Terai). In all locales students will interact with stakeholders all various kinds and be exposed to the great cultural, economic, political, and biophysical diversity of Nepal.Course prerequisite: 420.665.81, Climate Change on the Front Lines: The Study of Adaptation in Developing Countries, or permission of the instructor.

AS.420.687. Science Communication and Policy Engagement. 3 Credits.
This course provides students with an introduction to the theory and practice of communicating science and engaging with different types of audiences including policymakers, the public, and the media. Science is valued by many and sharing our understanding of science and technology is a crucial part of engaging beyond the scientific community. In this course, we will explore current research on the science of science communication, as well as how to create narratives for engagement based on the goals and audience. Students will have the opportunity to discuss engagement strategies and communication methods, design an engagement plan, and practice using their skills for engaging with policymakers, public audiences, the media, and more.

AS.420.690. Environmental Health. 3 Credits.
The environment plays an important role affecting public health. This course will explore major topics in the area of environmental health, examining sources, routes, and health outcomes associated with exposure to microbial, chemical and physical agents in the environment. This course will cover how such agents affect human disease at the individual, community, and population level. Students will also explore how environmental health challenges are addressed through development of policy in a regulatory framework.

AS.420.703. Open Source GIScience for Environmental Research. 3 Credits.

This course on Free and Open Source GIS is targeted at students who already have some experience working with ArcGIS and want to learn about alternative software packages. The course will discuss the advantages and disadvantages? of open source GIS in contrast with more commercial GIS offerings. Geographic Information Science is now embedded in just about everything we do. From Google Maps to geotagging to wearable technology. Depending on your career choice, commercial software may not always be available for use or affordable. However, there are free, Open Source GIS software options available and as these tools become more powerful, more employers are adding knowledge of these software packages as required or desired skills. In this course, students will use free, publicly available environmental geographic data to perform GIS and remote sensing tasks using Open Source Software (e.g. QGIS, Remap, EO Browser). Students will learn how to obtain, create, analyze, assess, generate, and visualize environmental data relevant to environmental science fields like habitat assessment, natural disturbances, conservation, and landscape ecology.

AS.420.704. Practical Engineering Approaches to Climate Adaptation. 3 Credits.

<p> This course will briefly examine what risks recent POLICY actions pose to the environmental, economic and social infrastructure of the US and global community – especially the less developed nations – from the standpoint of climate-related natural disasters [floods, droughts, tsunamis, landslides, hurricanes, typhoons, monsoons, storm surges, forest fires, etc], and what technologies and technical options can be enlisted to mitigate the adverse [and some positive] effects associated with global warming. <o:p></o:p></p> <p> This course will focus on a few technical mitigation [e.g. geo-engineering] options, but will focus mainly on practical adaptation options and strategies related to contemporary [and future innovative] infrastructure solutions and existing ‘best management practices’ for coastal erosion, storm preparedness, flood/drought management and preservation of ecological systems. Real case studies, based on recent disasters, such as Hurricane Katrina [New Orleans] and Superstorm Sandy [New York metropolitan region], as well as international examples from the Great Lakes, Columbia R. basin, Rio Grande basin, Mekong River basin, small island states, and both European and African case studies will be used to highlight each of the major engineering-based adaptation strategies. <o:p></o:p></p>

AS.420.705. Natural Resources Sustainability: Field Study in Alaska. 3 Credits.

This interdisciplinary field-based course examines the natural, cultural history and resource management in the ecosystems of Southeast Alaska. Through class lecture/discussion and field excursions, students obtain an understanding of integrated resource management and sustainability in protected areas while assessing options for addressing impacts and perturbations in habitats where species have and continue to be affected. The course will emphasize a variety of disciplines including: marine science and fisheries, wildlife management, geology, energy resources, forestry, botany, eco-tourism and anthropomorphic impacts to biodiversity, marine and wilderness areas.

AS.420.738. Newfoundland and Labrador: A Journey Through Time. 3 Credits.

The field course will examine the origins of the North American Continent and the Appalachians including the creation and destruction of oceans, human ecology, climate change, tectonics, whaling, and marine fisheries around the Labrador Sea and the Grand Banks. Field locations include four UNESCO World Heritage sites: <o:p></o:p></p><ul style="list-style-type:disc">
Gros Morne National Park, featuring majestic fjords and glacial valleys; L’Anse aux Meadows, North America’s first authenticated Viking settlement; Red Bay, the 16th-century Labrador home to over 1,500 Basque whalers; and
Mistaken Point Ecological Reserve, site representing the oldest multicellular life on Earth.

AS.420.800. Independent Research Project in Environmental Sciences and Policy. 3 Credits.

The independent research project enables students to apply and synthesize the material learned in their courses, develop expertise on a specific environmental topic, work closely with an expert in the field, and improve their professional writing skills. Students who take this elective must identify a project topic and a Mentor who is both familiar with the chosen topic and willing to guide and oversee the project. The Mentor may be a faculty member teaching in the program or elsewhere at JHU, a qualified and appropriate person from the student's place of work, or any expert with appropriate credentials. A preliminary proposal must be approved by the Mentor and the Course Instructor prior to enrollment in the course. In order to enroll in the class, permission of instructor is required. Final proposals for the IRP must be approved by the Mentor and the Course Instructor at least two weeks prior to the start of the semester in which the IRP is to be completed. A Mentor Agreement form must be completed and returned at the beginning of the semester in which the student in take the I.R.P. course. This form is sent to the Mentor by the Course Instructor once the final proposal is approved. For more information please go to the ESP website => The Experience => IRP. Offered every term and scheduled as needed.

AS.420.801. Independent Study. 3 Credits.

AS.420.805. Internship and Capstone Thesis. 3 Credits.

This course is designed to allow students to have a Capstone/Thesis Internship Experience, a Group Research Project as well as the standard Capstone (Independent Research Project) in an internship format. Advanced students in the MS in Environmental Science and Policy program may propose an internship to receive on-the-job experience in science or science policy or a related profession. An approved internship receives one full course credit toward the MS in ESP degree usually an elective. Students may propose to participate in existing internship programs, or they may arrange a unique experience. In most cases, students should have completed four or more courses toward their degree before seeking an internship, and proposals must be submitted in writing to program leadership at least 30 days before the start of the target term. Proposals are evaluated on a competitive basis. Only a limited number will be approved, and priority will be given to students who have completed the most degree-level courses and who submit proposals that demonstrate the best internship experience. Internships may be paid or unpaid. To complete the course, students must write a robust paper designed for peer-review. The adviser for the paper will be the faculty member teaching the course in conjunction with a mentor as part of the internship experience. Because students receive academic course credit for internships, they pay tuition levels equal to one graduate course.

AS.420.888. Capstone or Thesis Continuation.
Noncredit. This course is for students who completed 420.801 Independent Research Project or 420.805 Internship and Thesis but failed to finish an approved paper or thesis. Required for those who have completed all of their coursework and have taken the above course but have not yet completed their paper. Students must register for this course and pay its accompanying fee for every term until a final paper is approved.

AS.425.641. Greenhouse Gas Inventory, Accounting, and Reporting. 3 Credits.

AS.425 (Energy Policy and Climate)

AS.425.601. Principles and Applications of Energy Technology. 3 Credits.
The course examines the major energy technologies underlying energy supply and consumption, their applications, and their integration with the electric grid. Students will gain a solid understanding of science, economics, environmental impacts associated with the design and operation of different energy technologies on a stand-alone and integrated basis. The course coverage includes: an introduction to energy, heat, work, energy conversion and efficiency; solar, wind, hydro and other renewable electric generation technologies, fossil, and nuclear generation; renewable integration issues such as the role of energy storage to balance supply and demand. Energy security and climate change issues are considered throughout the course. Lower carbon transportation will be introduced, with a focus on hybrids and battery energy vehicles. The course will touch on some major policies impacting the development, deployment, and utilization of technologies.

AS.425.602. Science of Climate Change and its Impact. 3 Credits.
The course begins examining the basic processes of the climate system. The course, then, moves to the study of the changing climate. While natural changes will be studied, the emphasis will be on anthropogenic climate change. Various models for predicting future climate change will be presented, including the assumptions and uncertainties embedded in each model. The regional climate impacts and impacts on subsystems will be examined, including changes in rainfall patterns, loss of ice and changes in sea level. The possible ecological effects of these predicted changes will also be examined. Offered online and on twice per year.

AS.425.603. Climate Change Policy Analysis. 3 Credits.
After a study of the historical development of climate change policy, this course analyzes current policy options for mitigating and adapting to long-term climate change. The course will examine various approaches available in the U.S. for national-level policy, including regulatory and market-based approaches, particularly cap and trade and carbon taxation. Various models for designing a cap and trade system will be studied, including the European experience and regional programs in the United States. Special attention will be paid to methods for setting initial prices and accounting for discounting of future benefits. The course will focus primarily on national-level carbon management policies, but international agreements will also be included, as well as equity considerations on a global level.

AS.425.604. Energy & Climate Finance. 3 Credits.
This course introduces students to environmental markets and the policies that create them, focusing mainly on emissions trading systems to mitigate climate change. The course also provides an introduction to attributes of the financial sector through its analysis of markets for environmental commodities Students learn the economic theory behind market-based environmental policy instruments, such as tradable renewable energy credits, carbon offsets, and water rights in a semester of lectures featuring presentations from practitioners, including state and federal government, private companies subject to market-based emissions regulation, commodity brokers, and representatives from international institutions. Offered online on-site twice per year.

AS.425.605. Introduction to Energy Law & Policy. 3 Credits.
This course will provide an overview of the major laws and policies that shape and regulate the complex energy system the United States and, to a lesser degree, the world. The goal is to provide students with a framework for understanding the energy laws and policies of today and those likely to be important in coming years. The course will review laws and policies for all major types of energy, including fossil fuels, nuclear, and renewables, as well as issues related to extraction, conversion, distribution, use, and conservation. Laws and policies ranging from local level to state, federal, and international levels will be included. Laws and policies will be presented again in the context of profound and rate changes occurring in the energy system, climate change and other environmental issues, economics, national security, and population growth. The course will be largely empirical, but attention will be given to major theories. Most aspects of the course will be illustrated by reference to contemporary issues, such as the recently unveiled Clean Power Plan, court decisions, climate change negotiations, and changes in state policies and federal tax policies for renewables. Offered on-site at least once every two years.

AS.425.606. Social Science Research Methods for Energy & Environmental Policy. 3 Credits.
Many energy, climate, and environmental issues are inherently human problems, yet many natural scientists and policymakers attempt to conduct and review social science research without training or experience in the social sciences. This course is designed to teach students the proper protocol of social science methods like case studies, narratives, interviews, focus groups, ethnographies, oral histories, and mixed methods as they apply to energy and environmental issues and policy. Students will also do an in-depth exploration of survey design, validation, deployment, and data collection. Part of the course involves an investigation of examples for each methodology in the energy, climate, and environmental science and policy sphere. The other part of the course is largely hands-on, giving students the opportunity to practice collecting and/or working with qualitative and quantitative social science data within the different methodologies. Weaved throughout the course is a discussion regarding the ethical concerns of human subject research, informed consent, and the Institutional Review Board (IRB) process.
By the end of this course, students planning capstone or independent research in the energy, climate, or environmental sciences will have a working research plan that includes social science methodology or mixed methods to address their problem of practice. Prerequisites: must have taken at least one core course in either the EPC program or the ESP program. Prerequisites: must have taken at least one core course in either the EPC program (425.601, 425.602, 425.603, 425.604, 425.605) or the ESP program (420.601, 420.603, 420.604, 420.608, 420.611, 420.614).
Prerequisites: must have taken at least one core course in either the EPC program (425.601, 425.602, 425.603, 425.604, 425.605) or the ESP program (420.601, 420.603, 420.604, 420.608, 420.611, 420.614).

AS.425.615. Understanding Public Attitudes for the Communication of Climate and Energy Policy. 3 Credits.
Public attitudes influence the political feasibility of passing new legislation on climate change policy, and consumer decisions contribute to as much as 40% of national emissions. As a result, governmental, non-profit, and commercial sectors have become interested in low-cost, non-regulatory “soft policy” approaches based on social science to inform public decision-making and behavior change. Communication—whether in the form of information provision, participatory decision-making, or social marketing—is among the foremost of these strategies. This course aims to expose students to social science research and methodology on human attitudes, behaviors, and decision-making with respect to climate and energy policy so they can directly apply it in their professional organizations. This course will challenge students not only to think about the varied communication factors that influence human decision-making and behavior, but to use that information in designing and evaluating programs. Special attention is given to the application of behavioral economics to climate, energy, and other environmental issues, and students will learn the fundamentals of social science statistical analysis using SPSS software.Prerequisite: AS.420.301 – Quantitative Methods or Statistics

AS.425.617. Energy, Eutrophication, and Inundation in Coastal Louisiana. 3 Credits.
This course will evaluate the many compounding factors of wetlands loss and sea-level rise in coastal Louisiana, will assess the impact of wetlands and habitat loss on wildlife and bird populations in the coastal zone of Louisiana, and will examine the ongoing menace of eutrophication in Gulf of Mexico waters. A portion of the course will be spent analyzing flood control efforts in New Orleans and along the Mississippi River Delta, their advantages and disadvantages, and future risk in the context of global climate change. Vulnerability analysis, environmental impact, and mitigation strategies associated with energy infrastructure, pipelines, and pipeline canals connecting offshore oil and gas to south Louisiana will be considered and assessed. Further contemplation will be given to efforts by oil and gas companies to minimize environmental impact along the Louisiana coast. The impact of the Coastal Wetlands Planning and Restoration Act will be debated and other policy initiatives explored. Students will leave this field experience with a better understanding of the complex cultural, environmental and climate, economic, and political factors at play in southern Louisiana. Prerequisite: any core course in either ESP or EPC programs (AS.420.601, AS.420.603, AS.420.604, AS.420.608, AS.420.611, AS.420.614, AS.425.601, AS.425.602, AS.425.603, AS.425.604, AS.425.605)

AS.425.618. Energy, Policy and Environmental Impact in China. 3 Credits.
Climate change is a direct result of anthropogenic emissions over decades (since the beginnings of the Industrial Revolution). This most populated country (more than 1.3 billion) in the world has experienced considerable economic growth in the past 20 years, and as a result, some of the world’s largest local environmental impacts have been experienced. The impacts are sweeping, and only recently, the country is attempting to address the issues by monitoring, using replacement technologies and implementing nationwide policies (e.g., favoring electric vehicles and limiting car traffic in cities). This field trip will explore some of the impacted sites from environmental pollution and state-of-the-art research to improve energy technologies and policies to improve the situation in China.

AS.425.619. Renewable Energy and Climate Change Projects in California. 3 Credits.
<p>California has abundant natural resources and has long been the center of attention for renewable energy within the USA. The US Department of Energy indicates that California has just over 24% of its energy coming from renewable energy production, one of the highest for a large population state. Traditionally, California has also lead the nation in terms of proactive climate change and sustainability issues.<o:p></o:p></p><p>This field trip will explore very innovative and leading sustainability projects in San Francisco. We will also visit the solar labs in nearby University of California, Berkeley, followed by a visit to nearby energy projects (e.g. Tesla, Google). Part of the trip will include discussing renewable energy projects with city and state officials. <o:p></o:p></p>

AS.425.620. Climate Risk: Society and The Economy. 3 Credits.
This course introduces students to theory and analytics of risk assessment and risk management with respect to climate change, including scenario analysis, stress testing and corporate risk analysis practices. Physical climate risks to be covered include: 1) fire and extreme weather risk and their impact on insurability of assets and infrastructure; 2) heat, drought, food production and their impact on crop yields and population migration; and 3) sea-level rise and its impact on real-estate, corporate and municipal risks. Climate change transition risks to be covered include: 1) the impact of policy risks on individual sectors of the economy; 2) technology transition and the risk associated with stranded assets; and 3) corporate and sovereign liability risk and the role of climate risk disclosure. Students in this course will learn to analyze the impact of climate risk on corporations, cities, and infrastructure and to evaluate the cost and benefits of climate risk mitigation strategies. AS.425.603 is recommended but not required.

AS.425.622. Renewable Energy and Climate Change Projects in Europe. 3 Credits.
The course will highlight current and near-future renewable energy and climate change mitigation and adaptation projects in an on-ground learning experience with national stakeholders in Europe. The intensive field course will be divided roughly into two parts. First, the course will be held in Luxembourg and hosted by the Luxembourg Institute of Science and Technology where students will be presented with an overview of state-of-the-art tools that are used to study energy technologies and their application in urban, industrial, and natural contexts. Several day trips will include visits to nearby bio-plants, wind farms, and solar energy projects. The course will then move to adjacent Rotterdam, Netherlands, and will include additional daily trips to various innovative urban space and energy projects. The second part of the trip will journey to Hamburg, Copenhagen, and Stockholm where the class will stop to talk with subject matter experts in energy and sustainability along the way and to visit foremost wind energy sites. Throughout the trip students will be expected to connect theoretical concepts of renewable energy, climate change, and sustainability with practical applications and policy.

AS.425.623. Transportation Policy in a Carbon-constrained World. 3 Credits.
Transportation systems provide essential services for individuals, business, and every sector of the economy. However, transportation is a major expense, causes significant negative side effects, and is now the largest source of greenhouse gas emissions in the United States. This course examines the complex system-of-systems that is modern transportation as well as the many technologies and policies that can mitigate the negative effects of transportation while maintaining or improving transportation services. These include cleaner vehicles, lower emission fuels, and changes to travel demand. It also explores disruptive innovation in transportation, including the emerging roles of information technology and the potential transition to connected and automated vehicles. Estimates of impacts of these technologies and policies on energy use, infrastructure, emissions, and other metrics are presented and discussed. This course has a U.S. focus with a balance of technology and policy content and a strong interactive component. Course Prerequisite: AS.425.601 – Principles and Applications of Energy Technology.

AS.425.624. Wind Energy: Science, Technology and Policy. 3 Credits.
Topics include the assessment of wind resources, basic principles of wind turbines and power transmission, electric markets and wind power, technological and economic aspect of storage of intermittent wind power, legal issues at state and federal levels, international water issues, and environmental impact assessment processes for wind developments. Offered on-site at least once every two years. Prerequisite: 425.601 Principles and Applications of Energy Technology.

AS.425.625. Solar Energy:Science, Technology & Policy. 3 Credits.
This course focuses on the two primary solar technologies i the contemporary market: photovoltaic cells and concentrate solar power, with a focus on PV. The course will investigate techniques for increasing efficiency, expanding storage, and decreasing price. Solar energy for use as both distributed and grid-independent resources is considered. The course covers science and technologies, as well as the environmental impact on solar technologies. Additionally, the course examines the main structure considerations for solar technology development. Prerequisite: 425.601 Principles and Applications of Energy Technology.

AS.425.626. Climate Anthropology and Changing Communities. 3 Credits.
Coastal, arctic, and arid ecosystems are significantly affected by climate change. This course invites us to think about small rural communities that have been profoundly affected by climate change. By exploring multiple ethnographic case studies and applying multiple theoretical models, the course offers anthropological insights into how the people in these areas interact with their environment over their lives. While examining the inhabitants’ knowledge-based views of climate and local socioecological systems, students in this course will develop more robust, flexible models of anthropological analysis for climate change (in general) and for smaller ecosystems (in particular). By examining the impact of climate devastation on the local scale, the course contributes to a better understanding of how environmental changes impact people, traditions, economies, politics and health on the global scale, and help students develop new ideas for effective climate communication, community engagement, and the development of future climate and energy policy that addresses the needs of communities.

AS.425.628. Renewable Energy Project Development and Finance. 3 Credits.
This course examines the financial, legal and regulatory topics related to the development of renewable energy (RE) projects (wind, solar, geothermal, hydro etc.) in the US. The bulk of the course focuses on utility scale projects, with the latter section on smaller scale renewable distributed energy resources (DER). The course is divided into sections on finance, siting, basic technical features of the electric grid, and regulatory background. The finance section will provide fundamentals of corporate and project finance, then focus on the ownership and financing structures used for developing renewable energy projects. Basic financial terms and conditions such as power purchase agreements, engineering/ construction/ procurement contract, fuel supply arrangements, and operation and maintenance contracts will be reviewed. The project siting and development section will review models for feasibility studies, environmental assessment and permitting at state and Federal levels. The electrical grid section will discuss at a high level how the power system works, including basics of transmission and generation, with a focus on concepts useful for developing projects, including the transmission interconnection process. Multiple case studies will be used throughout the course to highlight successful models and approaches. At the end of the course the students will have critical skills to work on project development and finance components of RE projects in the US. Prerequisite: There are no prerequisites.

AS.425.630. Cities and Climate Change. 3 Credits.
This course examines cities as the primary centers of energy demand; as major sources of greenhouse gases; as places most vulnerable to climate change impacts; and as logical focal points for mitigation and adaptation solutions. Local level government climate policy and financing options are also examined, including alternative energy production, resilient water systems, green buildings, energy efficient transport and sustainable infrastructure generally, local level offsets, and urban-based Clean Development Mechanisms. Analytical methods are introduced to understand current approaches to decision-making. Offered online at least once every two years. Prerequisites: Climate Change Policy Analysis.

AS.425.634. Climate Change and Health. 3 Credits.
This course examines the potential impacts on human health from global climate change and the possible responses to and adaptations for these impacts. Topics include impacts on health of climate extremes, climate change and infectious diseases, health and climate refugees, national assessments of health impacts of climate change, monitoring the health effects of climate change, and public health policies for climate change. Prerequisite: Science of Climate Change and Its Impacts.

AS.425.635. Climate and Earth System Modeling. 3 Credits.
Provides a survey of the history, use, applications, and broader significance of climate and Earth system modeling. Students will gain an understanding of the process of model development; the evolution of model complexity and performance over time; and the usefulness and application of climate, Earth, and other associated models to various problems. In particular, the utility and role of models for mitigation and adaptation policy and planning will be explored. Participants will also engage with model data and code, although experience with coding and advanced statistics are unnecessary, and students from all backgrounds are welcome. The course will result in a deeper understanding of climate models and the crucial policy-relevant information they offer about future Earth system conditions. Prerequisite: 425.602 - Science of Climate Change and its Impacts or permission of instructor.

AS.425.636. Emerging Energy Technologies and Applications. 3 Credits.

This elective course builds on a number of ideas covered in the core Principles and Applications of Energy Technology course (425.601) - and as with the first course uses and integrates a broad range of ideas from science, engineering and economics. The main focus of the course will be to broaden and deepen the coverage of the how some of the emerging energy technologies work, that were either not covered or only lightly covered in the core course. Electricity generation or storage related topics include (1) Fuel cells and batteries, including hydrogen fuel cells, batteries with different lithium-ion chemistries, and flow batteries, including integration with solar and wind (2) ocean wave devices, with an emphasis on the energy in traveling ocean waves, and how some of this wave energy can be absorbed and converted to electricity, through ideas related to natural frequency and forced damped oscillations, (3) new approaches to carbon capture and sequestration (CCS), such as the proposed Allam cycle - which is a type of closed cycle combustion turbine (CT), where the use of super-critical carbon dioxide rather air as the working fluid facilitates CCS (4) nuclear energy, from small modular fission to fusion. The course will also look at some important applications of electricity, including light emitting diodes (LEDs). The 2014 Nobel prize for physics went to inventors of the first blue LEDs using high band-gap semi-conductors, like indium gallium nitride which has made their widespread use for high quality white light applications possible. LEDs - as will be explained - are similar to (the p-n junctions in) PV cells but with higher band gaps, and operated to run backwards using an electrical source, so that electrical power is converted to visible light with much higher efficiency than with traditional incandescent light bulbs. Prerequisite: 425.601 Principles and Applications of Energy Technology, equivalent experience, or permission of instructor. Prerequisite: 425.601 Principles and Applications of Energy Technology, equivalent experience, or permission of instructor.

AS.425.637. International Climate Change Policy. 3 Credits.

This course focuses on the development, analysis, and implementation of international policy frameworks and mechanisms for climate change mitigation and adaptation. It includes a review of the history of international responses to climate change at the multilateral and bilateral levels, including in depth examination of the agreements of the United Nations Framework Convention on Climate Change (UNFCCC) and the Conference of the Parties (COP) as well as important bilateral agreements. The course explores how international climate change policy is affected by the national priorities and capacities of countries, and how these circumstances shape the evolution of both climate change policy and related areas such as trade and energy. It is recommended, but not required, that students take AS.425.602 - Science of Climate Change and its Impacts and/or AS.425.603 - Climate Change Policy Analysis before taking this elective.

AS.425.638. Adaptation to Climate Change. 3 Credits.

Global climate change risks are increasingly complex and may ultimately affect virtually every facet of our economic, energy, community, and environmental systems. At the same time, policy and investment responses to climate resiliency needs are similarly complex, controversial, and high stakes. Perhaps no issue facing leaders of today and tomorrow is more cross- cutting in nature or in greater need of improved understanding and capability than climate change risk. This course will provide a comprehensive framework for understanding, assessing, and applying climate change risk, vulnerability, a hazard assessment for the development of risk reduction an adaptation response. In the process, it will examine the status, limitations, and strengths of current assessment and action planning approaches across varying sectors, scales, and impact areas. The course will also include a review of methods prioritizing actions and addressing feasibility, flexibility, and logistical needs as applied to specific facilities, such as military installations, as well broader communities and multistate regions. Individual and group learning exercises will be involved. Offered on-site at least once every two years.

AS.425.639. Energy Markets and Strategy from Europe to Asia. 3 Credits.

Europe, the Middle East & North Africa (MENA), and Asia are interdependent geoeconomic domains with interlinked energy markets. This course will provide an overview of the main topics that characterize the structure and fundamental dynamics of energy markets in these regions and how energy security and economic development strategies shape the fate of nations. Students will learn the historic, economic, political, structural, and operational aspects of the regions' energy industries, with a particular emphasis on the production and transportation of petroleum and natural gas. The course will also explore how economic development, energy and national security, environmental considerations, and technology evolution shape and disrupt these relationships. Students will learn how the strategies of nations, national and private energy companies, and the role of international and intergovernmental organizations, such as OPEC and the European Commission, interact to shape the future direction of energy markets and the planet. The course will familiarize students with publicly available sources of data on energy in these regions.

AS.425.644. Principles & Applications of Energy Technology II. 3 Credits.

This course builds on a number of ideas covered in the core EPT course, and as the first course uses and integrates a broad range of ideas from science, engineering, and economics. The course has two distinct but overlapping themes that will be often be covered in parallel. First, the course will broaden and deepen the coverage of the how some of the energy technologies discussed in the core course work, with a slight more formal discussion and use of ideas from mechanics and thermodynamics, including the role of entropy; a few newer potential technologies, such as fusion and ocean, will also be covered. Second, the course will extend the coverage of the economics and operation of energy markets to provide a deep understanding of how to value energy generation assets facing an uncertain future on both a stand-alone and integrate basis, and how these considerations play out in real electric markets, including the role of energy, capacity, and ancillary services. The course will include coverage of the potential role of energy storage and/or demand side management in integrating large-scale renewable energy into the grid from both an operational and economic perspective. Offered on-site at least once every two years.

AS.425.645. Global Energy Policy. 3 Credits.
Energy policy is about more than sheer market design. Policy agendas have become increasingly complex, adding sustainability and development to traditional energy security concerns. In response, a patchwork of institutional frameworks has emerged, including clubs (OPEC, IEA), treaties, the Energy Charter Treaty (ECT), agencies, the International Renewable Energy Agency or policy networks, and the Renewable Energy & Energy Efficiency Partnership. The course introduces students to the global dimensions of energy policy, discusses shifting agendas, and assesses the institutional spectrum of global energy governance. Offered online at least once every two years.

AS.425.646. US Offshore Energy: Policy, Science and Technology. 3 Credits.
Offshore energy is progressively becoming a significant part of the U.S. energy mix. Oil from offshore platforms now accounts for roughly one-third of the U.S. domestic production, and significant interest has emerged for developing renewable energy resources in the ocean and the Great Lakes. Large-scale offshore wind projects have been proposed along the East Coast, and there is also interest in developing wave energy off the West Coast and the Pacific islands. Ocean current and tidal energy are the other emerging sources. This course will take a multi-disciplinary approach to offshore energy analysis. We will discuss both renewable resources such as offshore wind, and conventional resources such as offshore oil and gas. Topics covered will include: resource assessment, state and federal regulations, economics of offshore energy, environmental impact and benefits, space-use conflicts, cultural/tribal issues, public perception, offshore energy technology, and energy infrastructure. We will also review case studies on the proposed Cape Wind project and the Deepwater Horizon oil spill. In addition, we will discuss the recently launched National Ocean Policy initiative and how it is influencing offshore energy regulation. Subject-matter experts from federal regulatory agencies will be invited as guest speakers. By the end of the course, students will understand policies and regulations governing offshore energy in the U.S. They will also be conversant with the economics of resource development, technological drivers for harnessing the resources, and the scientific advances in assessing and mitigating environmental impact from energy production in offshore areas. Offered onsite at least once every two years.

AS.425.647. Energy and Water Security in South Asia. 3 Credits.
<p>South Asia (India, Pakistan, Bangladesh, Afghanistan, Nepal, Sri Lanka, Bhutan and Maldives) is home to more than 1.7 billion people (nearly 25% of the global population). It is also a region of rapidly growing economies, rising energy consumption, and increasing environmental stress. Fossil fuels, particularly coal is the major source of electricity in the region, contributing to rising greenhouse gas emissions and worsening air quality. India in particular is promoting the use of indigenous coal to power its economic growth. At the household level, inefficient use of biomass for cooking and heating continues to be a major health and environmental hazard. Moreover, fresh water stress and pollution has reached alarming levels in the region with far reaching impacts on agriculture and human health. <o:p></o:p></p><p> South Asia is uniquely vulnerable to climate change impacts. On the one hand, receding Himalayan glaciers in Nepal, India, Pakistan and Bhutan are exacerbating water stress and threatening food security for more than a 1 billion people. And on the other hand, Bangladesh and Maldives are prone to sea level rise and coastal flooding from powerful tropical storms. <o:p></o:p></p><p> Creating a sustainable energy and freshwater pathway is intrinsically linked to innovative development approaches tailored to local and regional variabilities. In order to curb growing emissions, the region is promoting renewable energy sources such as solar, wind, and micro hydro power. However, the unmet demand for energy, particularly electricity remains so large in South Asia that fossil fuels are expected to be a major part of the future energy mix. Water stress is being managed through a mix of traditional and modern techniques. <o:p></o:p></p><p> Given the demographic size of the region and the pent-up energy demand, it can be argued that the success of global climate change initiatives (such as the 2015 Paris agreement) in large part is contingent on creating a low-carbon energy future in South Asia. The challenges are national and regional, but the implications are clearly global. <o:p></o:p></p><p> The course will provide a broad overview of the energy and freshwater challenges in South Asia. At the end of the course, students will be conversant with the current energy and water issues, future energy mix and water demand projections, and the technical and policy initiatives to balance growing energy demand with a low-carbon energy pathway and freshwater demands through ingenious initiatives. Students will also benefit from a greater understanding of the unique climate change vulnerabilities of the region and the mitigation initiatives to minimize impacts. <o:p></o:p></p>

AS.425.651. The Electric Grid: Technology and Policy. 3 Credits.
This course aims to introduce the students with an overview of electric power industry including the fundamentals of power system generation, transmission, and markets. Various power generation technologies and system network characteristics will be introduced. Key elements of power system operation such as unit commitment, economic dispatch, and optimal power flow will be discussed to provide the background for understanding how the power grid operates and to lay the foundation for understanding the environmental impact from power generation and system operation. An overview of grid planning will be provided. Students will also be exposed to power markets and complex relationship between market and system. Later, students will be exposed to the topics of US energy policy that particularly pertains to power industry. Relevant energy policies of certain countries on global setting for the electricity sector will also be discussed. The latest developments in power industry such as smart grid, microgrid, distributed energy resources and other topics will also be covered.

AS.425.652. Nuclear Energy: Technology, Policy, and Regulations. 3 Credits.
Nuclear energy is a potent energy source that is widely feared and misunderstood, yet continues to play an integral role in the global energy landscape today and in the future. This course will focus on the different forms and use of nuclear energy, the history of nuclear energy and regulation, the fundamentals of fission and fusion nuclear power, the radiological health applications, and the electromagnetic and other radiation in the environment. Students will also learn about federal and international policies and regulations that govern the civilian use of nuclear energy and implications for climate mitigation. Current events related to nuclear power at the international level will also be covered in the course. Prerequisite: AS.425.601 – Principles and Applications of Energy Technology or permission of instructor.
Prerequisite: AS.425.601 – Principles and Applications of Energy Technology or permission of instructor.

AS.425.689. Energy and Environmental Graduate Seminar. 3 Credits.
This graduate seminar course provides exposure to leading topics and vanguard research in environmental science, conservation science, energy and environmental law, and climate change science and adaptation, and offers discussion on practical applications of energy technology and energy/environmental policy. Students will evaluate how each study contributes to the advancement of theory, builds on previous research, and poses questions for future research. Students will also critically analyze professional presentation styles and technical content throughout the semester and will then synthesize best practices for professional communication in their own practice. This course does not meet the Environmental Science and Policy residency requirement.

AS.425.800. Research Design for Capstone Projects in Energy and Environmental Sciences. 3 Credits.
The Capstone Project enables students to apply and synthesize the material learned in other courses, develop expertise on a specific topic related to climate change science or policy, work closely with experts in the field of study, and improve professional writing and presentation skills. In the semester prior to conducting the project, students must identify a proper topic and mentor who is both familiar with the chosen topic and willing to guide and oversee the project. The mentor must be a faculty member teaching in the program, a supervisor from the student's place of work, or any expert with appropriate credentials. Formal proposals must be submitted at least two weeks prior to the start of the semester in which the project be completed. Prior to the enrollment in the course, the proposal must be reviewed and accepted by the course instructor.

AS.425.801. Independent Study. 3 Credits.

AS.425.888. Capstone Continuation Course.
Noncredit

AS.430 (Geographic Information Systems)

AS.430.600. Web GIS. 4 Credits.
Web GIS is an important foundation course in which students will become familiar with the current platforms available for delivering Web GIS and sharing geographic content over the web. Professionals in various industries often have to make information readily available and with current developments this has become easier than ever. The class offers a fundamental understanding of creating and designing web maps and web apps using various approaches and platforms. Capabilities such as editing, geoprocessing, geocoding, image analysis, 3D, mobile and real-time GIS in a web environment will be examined. Cloud-based and on premises infrastructure to deliver Web GIS will be utilized. Offered twice a year.

AS.430.601. Geographic Information Systems (GIS). 4 Credits.
In this introductory course, students become familiar with the concepts and gain the experience necessary to appreciate the utility of Geographic Information Systems in decision-making. Topics covered include the fundamentals of data structures, georeferencing, data classification, querying, cartography, and basic spatial data analysis. The course provides an overview of the capabilities of GIS software and applications of GIS. Class time is divided between lectures and GIS exercises that reinforce critical concepts. Students must complete a term project as part of the course. Offered every semester. Elective option for Govt. Analytics students.

AS.430.602. Remote Sensing: Systems and Applications. 4 Credits.
This course introduces remote sensing as an important technology to further our understanding of Earth's land, atmospheric, and oceanic processes. Students study remote sensing science, techniques, and satellite technologies to become familiar with the types of information that can be obtained and how this information can be applied in the natural and social sciences. Applications include assessment of land cover and land use, mapping and analysis of natural resources, weather and climate studies, pollution detection and monitoring, disaster monitoring, and identification of oceanographic features. Offered once a year in Spring.

AS.430.603. Geospatial Statistics. 4 Credits.
This course introduces theory and practical application of statistical methods in spatial analysis. Statistical fundamentals will be introduced to expose students to descriptive and inferential methods in spatial statistics. Geostatistical fundamentals will also be covered to introduce methods (in particular, kriging) for modelling spatial and spatio-temporal phenomena. This course will provide working knowledge of theory and practice in spatial statistics and Geostatistics, and will serve as a primer to more advanced courses in spatial statistics and machine learning. Theoretical knowledge will be supplemented with real-world use cases through in-class projects and assignments. Throughout the course, students will be exposed to open-source statistics libraries in R, no previous programming knowledge will be assumed. Offered twice a year.

AS.430.604. Spatial Analytics. 4 Credits.
This course introduces students to using various techniques for solving spatial problems. The course teaches a proven process one can utilize to address common inquiries related to understanding spatial relationships and patterns. Traditional analytical methods such as suitability analysis, network analysis, geostatistical analysis, spatial interpolation, etc. are examined, along with recent data science and analytics methodologies that help us extract knowledge and insights from data. Examples and assignments are drawn from many applications, such as business, urban planning, public safety, public health, transportation and natural sciences. Offered twice a year. Elective option for Govt. Analytics students.

AS.430.605. Development and Management of GIS Projects. 4 Credits.
This course introduces students to project, program, and portfolio management standards, which will guide them on how to successfully manage GIS projects. Students will learn how to apply core project management principles and guidelines to real project scenarios. The course will impart knowledge and skills for managing GIS projects throughout their entire lifecycle, while addressing technical, ethical, and institutional problems. Students will explore key issues in organizational management, including earned-value management, resource planning, and communications. During the course, students will learn how to determine the return on investment of a GIS project, create a comprehensive schedule and budget, and determine risk management, quality control, and contract management skills in support of your GIS project. Offered once a year.

AS.430.606. Programming in GIS. 4 Credits.
In this course students will learn how to automate workflows and develop tools using Python as a fundamental language for geospatial technology. The course will first cover introductory python basics, then move into geospatial concepts. It will teach students how to automate simple and complex GIS tasks and functionality, thus simplifying workflows and increasing efficiency. Focus will be placed on following proper coding techniques and patterns. The course will introduce students to Python, ArcPy, Python API, Pandas, Numpy, Jupyter, and Markdown to name a few. Offered twice a year. Prerequisites: 430.600 Web GIS
You must enroll in AS.430.600 prior to enrolling in AS.430.606.

AS.430.607. Spatial Databases and Data Interoperability. 4 Credits.
A well-designed database is necessary to construct relevant spatial data queries. In this course, students learn the different database designs for stand-alone databases and enterprise database systems. This course examines the requirements for a GIS Decision Support System by focusing on the design of the data schema, identifying the necessary data elements and their formats, and exploring data interoperability as a designed constituent of a database. Data management routines for maintaining the spatial integrity will also be introduced. Offered once a year. Prerequisites: 430.600 Web GIS.
You must enroll in AS.430.600 before you enroll in AS.430.607.

AS.430.608. GIS and Spatial Decision Support Systems. 4 Credits.
GIS can be a very effective tool to assist in making decisions for a wide range of applications at the local, regional, and global scale. This course will examine the use of GIS as a spatial decision support system for systematic policy analysis and scenario modeling. Case studies will be used from the areas of agriculture, conservation planning, homeland security, land use planning, natural disasters, transportation, urban planning, and water resources. Offered once. a year. Prerequisites: 430.601 Geographic Information Systems, 430.604 Spatial Analysis with GIS.
You must enroll in AS.430.601 AND AS.430.604 before enrolling in AS.430.608.

AS.430.609. Spatial Data Management: Quality and Control. 4 Credits.
Spatial data quality is a major concern for any GIS. This course examines the nature of errors in spatial data and various aspects of spatial data quality, including positional and thematic accuracy, resolution, precision, completeness and logical consistency. The impacts of errors on the reliability of GIS-based analysis are explored. Various strategies to improve the quality of spatial data are addressed, including the use of standards for spatial data (FGDC, OGC and ISO) and data management tools. Offered once a year. Prerequisite: 430.601 Geographic Information Systems,
You must enroll in AS.430.601 before you can enroll in AS.430.609.

AS.430.610. GIS for Infrastructure Management. 4 Credits.
This course will familiarize students with applications of Geographic Information Systems (GIS) for infrastructure management. Building, utilizing and sharing reliable asset information and integrating enterprise data will be emphasized, in order to help stakeholders make informed decisions and capitalize on efficiencies of using GIS to support various kinds of facilities and infrastructure. Students will have the opportunity to use GIS applications to do project work in support of facility operations, strategic planning, real estate management, architecture design and construction, sustainability, utilities, buildings and interior space management, drones mapping, among others. Samples will be drawn from large university enterprise with multiple campus locations yet applicable to cities and various other settings. Research and spatial analysis will be conducted using recently acquired GIS orthoimagery, LIDAR and planimetric data for the Johns Hopkins' own Homewood campus. Prerequisite: 430.601 Geographic Information Systems.
You must enroll in AS.430.601 before you can enroll in AS.430.610.

AS.430.611. Geospatial Ontologies and Semantics. 4 Credits.
The development of very large databases requires innovative approaches to data handling to efficiently communicate information meaning to users. The Geospatial Semantics and Ontologies course examines the foundations, design, and use of data structured as linked data, geospatial ontology, knowledge graphs, and related technology. Linked data and knowledge graphs are based on the node-edge-node triple data model to form graphs that can represent information networks. Triple graphs formatted as Resource Description Framework (RDF) can address challenges associated with information management such as inconsistencies within GIS applications, data associations within related enterprises, and information exchange over the Internet. The course begins with some general approaches to semantics and ontology, and basics of information interchange on the Internet. Linked Data in the form of Extensible Markup Language (XML), its extension Geography Markup Language (GML), and other standards for formal semantics such as Well Known Text (WKT) for specifying geographic coordinate geometries, SPARQL and GeoSPARQL query language, and Web Ontology Language (OWL) for automated logical reasoning and data inference are discussed. Subsequent lessons examine semantic system architecture, ontology design, and linked data mapping. No programming is required, but some required technical literacies, such as Java Script Object Notation (JSON) and Scalable Vector Graphics (SVG), are reviewed. Students complete a project in the last few weeks of the semester. The introductory skills offered in this course build a foundation for advanced geospatial Linked Data and Knowledge Graph applications in the future. Offered once a year. Prerequisite: 430.600 Web GIS
You must enroll in AS.430.601 before you can enroll in AS.430.611.

AS.430.612. Cartographic Design and Visualization. 4 Credits.
The Cartographic Design and Visualization course focuses on the fundamentals of cartography, spatial statistics, thematic mapping techniques, 3D mapping, and web based mapping. Students will gain an inter-disciplinary understanding of cartographic representation and visualization with hands on applications using cutting edge GIS and graphic design software to create purpose tailored maps. Upon successful completion of this course, students will be able to interpret and appropriately communicate spatial data; will have developed a personalized cartographic style; will have created a professional GIS portfolio for current/potential employers; and most importantly will have developed a keen appreciation for maps and spatial awareness!Offered once a year. Prerequisite: 430.601 Geographic Information Systems.
You must enroll in AS.430.601 before you can enroll in AS.430.612.

AS.430.613. Advanced Topics in Remote Sensing. 4 Credits.
This course explores the various remote sensing platforms, collection systems, processing methods, and classification approaches to remotely sensed data. Course content includes the Electromagnetic Spectrum, Lidar, Interferometric SAR, Sonar, Unmanned Autonomous Vehicles (drone technology), 2D vs. 3D modeling, volumetric analysis, ecological research with remote sensing and applications of technology and datasets in GIS models. Offered once a year. Prerequisite: 430.602 Remote Sensing: Systems and Applications.
You must enroll in AS.430.601 AND AS.430.602 before you can enroll in AS.430.612.

AS.430.615. Big Data Analytics: Tools and Techniques. 4 Credits.
The explosion of data collection methods from a vast array of data sources in volumes previously unimaginable has tested the limits of traditional technology, which are not able to scale to the requirements of massive data. Big Data is the field of data studies where the data is identified by very large volumes, high velocity in data generation, and data format variety. This course explores Big Data technologies while utilizing cloud infrastructures. We will discuss the characteristics and architectural challenges surrounding Big Data, and explore geo-visualization techniques of data processed using Big Data Analytics. Students will work in a cloud computing environment to build Hadoop clusters, NoSQL databases, and work with other open source technologies to process data stores like Census data, and twitter feeds. Offered twice a year. Prerequisites: 430.606 Programming in GIS. Python programming experience is highly recommended.
You must enroll in AS.430.600 and AS.430.606 before you can enroll in AS.430.615.

AS.430.617. Census Data Mining: Visualization and Analytics. 4 Credits.
Census data is the most often used data in geospatial studies. Census data provide information on the demographic composition of households all the way through state and national population trends. Census data also serve the data layers that form the basis of most mapping applications. In this course, students will learn how to work with Census data in GIS by understanding the vast amounts of data collected in support of the decadal Census, how to discover and read the various tables that associate with the raw Census data, and how to create custom data layers for demographic models in economics, housing, and population studies. Offered once a year. Prerequisite: 430.601 Geographic Information Systems, or permission of the instructor.
You must enroll in AS.430.601 before you can enroll in AS.430.617.

AS.430.618. Advanced Python Scripting for GIS. 4 Credits.
This course focuses on advanced uses of Python as a scripting tool to automate workflows in GIS and create customized applications. This includes the development of script tools, utilizing advanced ArcPy modules, working with third-party modules, implementing Python geoprocessing services, customizing GIS applications, and more advanced Python functionality. Offered once a year. Prerequisites: 430.606 Programming in GIS.
You must enroll in AS.430.606 before you can enroll in AS.430.618.

AS.430.619. Web Application Development. 4 Credits.
This course is designed to provide students with experience in web programming and application development. It focuses on uses of Web APIs for developing rich and interactive web mapping applications. HTML, CSS and several popular JavaScript frameworks, such as Dojo, JQuery and AngularJS, will be covered. Interchange languages (JSON, XML) and responsive design will also be explored. Widgets will be examined to quickly develop solutions, and emphasis will be placed on tasks which provide further functionality. Conceptual and technical documentation, and samples, will be greatly utilized. The course will facilitate heavy engagement with the large and growing community of Web API developers. Offered once a year. Prerequisite: 430.600 Web GIS

AS.430.621. GIS for Emergency Management. 4 Credits.
Geographic Information Systems (GIS) have become an integral part of understanding the natural hazards in our world and how emergency management agencies respond to events and mitigate the impact of disasters. Furthermore, the advent of Web GIS has helped agencies overcome many challenges previously associated with GIS in Emergency Management. This course is an opportunity to learn about the use of GIS in studying natural hazards and apply cutting edge GIS technology to help emergency management agencies in the field. In today's device-driven world, maps need to work on mobile devices so there will be an emphasis on enabling GIS in the field. You will use Web GIS to deploy maps that assist agencies with their incident command functions: Planning, Operations, Logistics, Command, and Public Information. While the industry focus will be on Emergency Management, the knowledge, skills and abilities you develop will be widely applicable in both public and private sector industries.Offered once a year. Prerequisite: 430.601 Geographic Information Systems or permission of the instructor.

AS.430.623. Geo Apps. 4 Credits.
The Geo Apps course is designed to reflect current developments in the GIS industry. The course will teach you to extend your reach beyond common desktop GIS workflows, allowing you to present information and tools to a broader audience. You will learn how to create information models for field and crowdsource data collection apps, best practices for publishing geospatial information and configuring a range of web and native applications, and how to create meaningful information products that match specific user needs. You will work with different types of 2D and 3D data in desktop, web, and mobile geo apps to simulate how GIS is being used in modern organizations. Offered once a year. Prerequisite: 430.601 Geographic Information Systems, or permission of the instructor.

AS.430.625. System Architecture for Enterprise GIS. 4 Credits.
This is a project-based course, which allows students to build an Enterprise GIS implementation. Various enterprise architecture components, such as portals, servers, data stores, web adaptors, load balancers, enterprise databases and big data stores, real time servers, geoanalytics servers, etc. will be examined and implemented in a deployment scenario. Students will first design the enterprise architecture, then implement it. Students will have multiple Amazon EC2 instances configuration available to them at least for part of the semester, in order to practice setting up this enterprise implementation. Topics such as high availability and disaster recovery, enterprise authentication, and administration through scripting, will be applied. Offered once a year. Prerequisites: 430.600 Web GIS.

AS.430.627. Artificial Intelligence and Machine Learning in Geospatial Technology. 4 Credits.
The transformational impact of artificial intelligence and machine learning in geospatial data science is profound. This course presents a hands-on approach of applying automated modeling and predictive analytics to solve problems. Smart capabilities are powered by machine learning and GeoAI through the use of correlations of pattern detection to build predictive models and classify outcomes for data never seen before. Use cases from various sectors focusing on prediction and optimization, finding patterns and correlations, advanced object detection and automatic feature extraction, are examined. Offered once a year. Prerequisites: 430.606 Programming in GIS. Python programming experience is required.

AS.430.629. Drones in Geospatial Decision Making. 4 Credits.
This compressed format field course will explore current and future techniques of close-range remote sensing utilizing unmanned aerial vehicles (UAVs or drones) for environmental monitoring, urban cybersensing, and infrastructure assessment related to emergency response, leading to FAA Remote Pilot Certification to operate UAVs for commercial, professional, and research purposes. The course will focus on four basic objectives: (1) demonstrating knowledge and operational skills to successfully execute data acquisition using a variety of UAV remote sensing collection devices; (2) applying different methods of data acquisition and processing to identify, cross-validate and interpret data collected from UAV sensors; (3) discussing existing and emerging trends of UAV applications in various academic and professional situations, and (4) synthesizing and extrapolating data from these novel collection techniques to solve real-world problems. Students will act as flight crewmembers and scientific crew on numerous daily missions during the field portion of the course. Prerequisite: 430.600 Web GIS, or 420.603 Environmental Applications of GIS, or introductory GIS course.

AS.430.630. Special Topics in Land Air Sea Robotics Field Operations. 4 Credits.
This field course will teach participants to design experiments and collect data by employing all modes of Land Air Sea Robotics (LASR) for environmental monitoring and assessment. Students will act as remotely located LASR crewmembers on numerous daily missions during the field portion of the course.Prerequisites: None. Participants who have completed JHU AAP 430.629 Drones in Geospatial Decision Making will be able to act as pilots in command of aircraft. Everyone have the opportunity to fly equipment.

AS.430.631. Spatial Algorithms and Data Structures. 4 Credits.
This course will teach students about the fundamental data structures and algorithms behind GIS and computer science. These data structures and algorithms are what all complex GIS systems are built upon. The topics presented are a mixture of computer science data structures and computational geometry topics. This course will stress code optimization and runtime analysis of code, teaching students how to program efficiently – just because a set of code works, it does not mean it is optimal. The course will use Python to cover such fundamental concepts and help students become better GIS Professionals. Offered once a year.

AS.430.633. Advanced Spatio-Temporal Statistics. 4 Credits.
This course will examine the theory and practical application of statistical methods. Students will examine advanced concepts in descriptive and predictive statistical approaches to spatial, temporal and spatio-temporal data. Students will be exposed to time-series analysis in GIS and its applications. The course will include labs to be completed in Python and R, in addition to theoretical work. Students will work on a comprehensive final project. Offered once a year. Prerequisites: 430.601 Geographic Information Systems

AS.430.635. Urban Analytics. 4 Credits.
This course will leverage geospatial technology to analyze urban spatial problems relevant to contemporary urban planning and design practices. It provides students the opportunity to integrate spatial information and enhance decision making when working with urban environments. Focus is on understanding the business requirements for urban designs, along with use of spatial patterns and big data in smart city planning. Emphasis will also be placed on digital transformation of urban planning to encourage collaboration with community stakeholders and drive efforts towards sustainable cities. Application problems addressed will be within areas of urban planning and design, business decision-making, social, and political and environmental issues, among others. Prerequisites: 430.600 Web GIS
You must enroll in AS.430.600 prior to enrolling in AS.430.635.

AS.430.637. Statistical Computation for Geospatial Sciences. 4 Credits.
This course introduces the fundamentals of computational statistics in spatial sciences, focusing on computational spatial statistics' essentials using the R programming language. The methodological focus of this course is on applications of Bayesian analysis to solve spatial problems. Introductory ideas on working with the R data frame and spatial data representation are covered. The course's thematic focus is on integrating R and GIS for solving problems that pertain to critical zone geoscience. Students will complete projects on computational spatial statistics applications to problems at the intersection of Earth systems and human-driven systems. Offered once a year. Prerequisites: 430.604 Spatial Analytics
You must enroll in AS.430.604 before you can enroll in AS.430.637.

AS.430.800. Capstone for Geographic Information Systems. 4 Credits.
The capstone is the culmination of the instruction and training a student receives in the MS in GIS program. In this course, the student selects a mentor, identifies a topic of interest, acquires the relevant data required for the study, develops a data model and/or analysis method, devises the visualization of the data as part of the data interpretation, and summarizes the study in a final report. Students are encouraged to make their presentations at a GIS conference or publish the results of their study in a peer-reviewed GIS publication. Students are responsible for selecting a mentor who may be a JHU faculty member, a qualified and appropriate person from the student's place of work, or any expert with appropriate credentials. Offered every semester. Prerequisite: core course requirements for MS in GIS, at least eight courses taken in the program.

AS.430.805. Independent Research Project for Geographic Information Systems. 4 Credits.
The independent research project enables students to apply material learned in their courses, extend expertise on a specific GIS topic, work closely with an expert in the field, and improve their professional geospatial technology skills. Students may choose to do this course in lieu of AS.430.800 Capstone for Geographic Information Systems, and must follow same requirements as the Capstone. In this course, the student selects a mentor, identifies a topic of interest, acquires the relevant data required for the study, develops a data model and/or analysis method, devises the visualization of the data as part of the data interpretation, and summarizes the study in a final report.

AS.440 (Applied Economics)

AS.440.011. Forecasting in Organizations.
This course is required to earn the International Institute of Forecasters Certificate in Forecasting Practice, and introduces students to different types of forecasts including those used in government and the private sector. This is a non-credit mini-course, equivalent to a single class meeting, but with more homework. It is offered during Spring Break, as part of the Spring schedule. Prerequisites: 440.614 Macroeconometrics or 440.618 Microeconometrics. Corequisite: 440.615 Macroeconomic Forecasting.
You must enroll in AS.440.615 AND one of the following course: AS.440.614 OR AS.440.618 prior to taking AS.410.011

AS.440.021. Practicum in Applied Economics.
Internships or external projects applicable to the program curriculum qualify for the course. Permission of the student's advisor and of the Program Director is required before adding this non-credit course.

AS.440.304. Math Methods for Economists. 3 Credits.
This is a three undergraduate credit, full-length course at half tuition, required of those students who have had only a single course in Calculus. It covers those parts of Integral Calculus, Multivariable Calculus, Optimization Theory, and Linear Algebra, which are necessary to pursue economics. For those required to take Math Methods, the course is treated academically as part of the Core. Thus, all rules applying to the Core apply to Math Methods. Prerequisite: A course in Calculus.

AS.440.601. Microeconomic Theory. 3 Credits.
Corequisite: AS.440.304, Math Methods for EconomistsThis course offers a systematic presentation of consumer theory, theory of the firm, and market equilibrium. Topics covered include constrained optimization, preferences and utility, exchange, production, pricing, market structures, and welfare economics.

AS.440.602. Macroeconomic Theory. 3 Credits.
Corequisite: AS.440.304, Math Methods for EconomistsThis course provides a systematic overview of the theory of aggregate output and employment, the rate of interest, and price level determination. Coverage includes the theories of consumption and investment, the demand and supply of money, inflation, unemployment, and economic growth. These topics are discussed in the context of contemporary empirical work on aggregative relationships.

AS.440.605. Statistics. 3 Credits.
This course provides a general survey of statistical methodology. Topics include descriptive statistics, probability theory, sampling distributions, interval estimation, hypothesis testing, and Analysis of Variance. It is also designed to provide the requisite background for 440.606 Econometrics. Prerequisite: A course in Calculus.

AS.440.606. Econometrics. 3 Credits.
This course focuses on the application of statistical methods to the testing and estimation of economic relationships. After developing the theoretical constructs of classical least squares, common problems encountered when applying this approach, including serial correlation, heteroscedasticity, and multicollinearity, are discussed. Techniques for dealing with these problems are then examined. Models with lagged variables are considered, as is estimation with instrumental variables and two-stage least squares. Prerequisites: 440.605 Statistics.
You must take AS.440.605 Statistics, prior to enrolling in AS.440.606 unless waived.

AS.440.614. Macroeconometrics [Time-Series Analysis]. 3 Credits.
This course focuses on the practical uses of time-series econometrics in a macroeconomic context. The topics covered include autoregressive-moving average processes, non-stationary time series models, unit root tests, vector autoregression models, and cointegration analysis.Prerequisites: 440.602 Macroeconomic Theory and Policy; 440.606 Econometrics.
You must take AS.440.602 AND AS.440.606 prior to enrolling in AS.440.614.

AS.440.615. Macroeconomic Forecasting [Time Series Analysis]. 3 Credits.
This course examines econometric approaches to forecasting macroeconomic activity. The approaches covered span single equation time series to large, complex, simultaneous equations systems. Different measures to assess the forecasting accuracy of these approaches are addressed. A discussion of these approaches and their relevance for policy recommendations is also covered.Prerequisites: 440.602 Macroeconomic Theory and Policy; 440.606 Econometrics.
You must take AS.440.602 AND AS.440.606 prior to enrolling in AS.440.615

AS.440.616. Bayesian Econometrics. 3 Credits.
The main goal of this course is to provide the students the alternative viewpoint of the Bayesian approach vis-à-vis the classical econometric approach based on the frequentist perspective. The course will present the basic principles of Bayesian inference, Bayesian Analysis of the linear regression model and extensions of the regression model, and the numerical methods used for Bayesian implementation. Modern Bayesian econometrics relies heavily on numerical simulation methods and computational algorithms. With the advancement of computing power and the advent of new simulation methods, simulation based Bayesian methods have become increasingly popular in practice with a large and growing number of applications. A significant part of the course will be devoted to explaining and demonstrating how numerical Bayesian methods, particularly, Markov Chain Monte Carlo (MCMC) methods, such as the Gibbs sampling and the Metropolis-Hastings algorithm, can be applied to estimate various interesting models in economics and finance. Students will develop practical experience with posterior simulation through hands on computer exercises involving computer programming. Prerequisites: 440.601 Microeconomic Theory, 440.606 Econometrics.

AS.440.617. Financial Econometrics [Time-Series Analysis]. 3 Credits.
[formerly 440.647] This course introduces students to the methods most commonly used in empirical finance. Key models and methods are ARCH, GMM, Regime-Switching Models, test of CAPM (Capital Asset Pricing Model), term structure models, and volatility models (implied, stochastic volatility). Students will also learn aspects of time series econometrics for both stationary and non-stationary variables at different time frequencies, with emphasis on financial variables.Prerequisites: 440.601 Microeconomic Theory and Policy; 440.606 Econometrics; 440.614 Macroeconometrics is recommended..
You must take AS.440.601 AND AS.440.606 prior to enrolling in AS.440.617; 440.614 Macroeconometrics is recommended..

AS.440.618. Microeconometrics [Cross-Section and Panel Analysis]. 3 Credits.
[formerly 440.648] This course covers a number of advanced techniques frequently encountered in applied microeconometric analysis. Topics include generalized method of moments estimation, nonlinear regression, estimation with panel data, systems of regression equations and simultaneous equation models, maximum likelihood estimation and likelihood ratio tests, and limited dependent variable analysis (i.e. Logit, Probit, Tobit, etc.).Prerequisites: 440.601 Microeconomic Theory and Policy; 440.606 Econometrics.

AS.440.622. Cost-Benefit Analysis. 3 Credits.
[formerly 440.632] The objective of this course is to develop and apply an analytical framework for evaluating projects with an emphasis on publicly funded projects. Coverage includes the evaluation of benefits and costs over time, including in the presence of uncertainty, in the absence of market prices, and when income distribution objectives need to be incorporated into a project's evaluation.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.622.

AS.440.624. Computable General Equilibrium Modeling. 3 Credits.
This course will provide an understanding of how to independently develop, modify, run and interpret Computable General Equilibrium (CGE) models. CGE models are widely used in the analysis of International Trade, Taxation, Environmental Policy, and other subjects. The specific objectives of this course are as follows: Students will (1) gain an understanding of the underlying economic theory behind CGE modeling; (2) learn how to gather data sources from publicly available information to build CGE models; (3) gain an understanding of the software General Algebraic Modeling Software (GAMS) to run the models; (4) learn how use and modify existing CGE programs for research purposes; (5) be able to write simple CGE programs in GAMS; (6) be able to analyze public policy with CGE models; (7) how to interpret results from CGE models; (8) understand possible extensions of CGE models for potential future research purposes. Analytical skills developed through this class will assist you in building your careers as researchers, public managers, and policy analysts.Prerequisites: 440.601 Microeconomic Theory, 440.602 Macroeconomics Theory. Corequisite: 440.606 Econometrics.
You must take AS.440.601 AND AS.440.602 prior to enrolling in AS.440.624.

AS.440.625. Machine Learning in Statistics. 3 Credits.
This course focuses on the use of machine learning methods for in-sample and out-of-sample prediction. The topics include regression, classification, random trees (forests, boosting, and pruning), regularization, Bayesian estimation, neural networks, support vector machines, model selection and ensemble learning. Prerequisite 440.606 Econometrics.

AS.440.629. Survey Research Methods. 3 Credits.
This course introduces students to the theory and practice of conducting surveys. Survey methods combines both social science—economics, sociology, and psychology—and quantitative methods—mathematics, statistics, and computer science—to develop a theory of how surveys can best be used to measure important aspects of the human condition. Key topics include sample design, weighting, data collection modes, administrative operations, questionnaire design, nonresponse, and estimation in surveys. Prerequisites: 440.601 Microeconomic Theory, 440.605 Statistics. Corequisite: 440.606 Econometrics.
You must take AS.440.601 AND AS.440.605 prior to enrolling in AS.440.629

AS.440.630. Monetary Economics. 3 Credits.
<p> This course is designed as a survey of the basic theories in monetary economics for masters level students. The main objective of the course is to help students understand the core aspects of monetary economics: how monetary phenomena and policies are determined, and how they interact with the rest of the macro economy. Several key theoretical frameworks will be constructed, and various monetary economics phenomena, including monetary policy actions, will be analyzed within such frameworks. <o:p></o:p></p><p>Among the topics to be covered include: neutrality and super-neutrality of money, money demand and money supply, consumption CAPM and equity premium puzzle, inflation and the optimal inflation rate, public finance and inflation, (new Keynesian) Phillips curve, monetary policy transmission mechanisms, the term structure of interest rates, strategy of monetary policy and optimal monetary policy, the time inconsistency problem in monetary policy, monetary policy targets and rules, monetary policy at ZLB, and non-conventional monetary policies. <o:p></o:p></p><p>Prerequisites: 440.602 Macroeconomic Theory and Policy; 440.606 Econometrics.<o:p></o:p></p>
You must take AS.440.601 AND AS.440.602 AND AS.440.606 prior to enrolling in AS.440.630

AS.440.631. Finance and the Macroeconomy. 3 Credits.
[formerly 440.621] This course explores the role of the financial sector in the overall macroeconomy. It begins by reviewing various financial instruments and markets, with a focus on their economic function. The course then examines the challenges to monetary and fiscal policy that arise because of macro-financial linkages. Further, a number of analytical tools for assessing financial stability and vulnerabilities to macro shocks are presented. Several case studies are used to illustrate real-world situations facing policymakers. Prerequisites: 440.601 Microeconomic Theory and Policy; 440.602 Macroeconomic Theory and Policy. Corequisites: 440.606 Econometrics; 440.640 Financial Economics, or equivalent.
You must take AS.440.601 AND AS.440.602 prior to enrolling in AS.440.631

AS.440.632. Topics in Macroeconomics and Finance. 3 Credits.
[This course aims to develop a better understanding of the linkages between the banking system and the broader macroeconomy. Particular attention will be paid to the role of banks and the banking system in propagating and perpetuating the recent financial crisis. Specific topics include the functioning of the banking system in a basic general equilibrium macro model, the Diamond-Dybvig model of bank runs; an empirical look into the economic cost of banking crises, central bank intervention in the face of a banking failure, the link between sovereign debt and the banking system, and the European debt crisis and the response of the ECB. Prerequisites: 440.601 Microeconomic Theory, 440.602 Macroeconomic Theory. Corequisites: 440.606 Econometrics; 440.640 Financial Economics
You must take AS.440.601, AS.440.602 AND AS.440.606 prior to enrolling in AS.440.632

AS.440.634. Economic Growth. 3 Credits.
[formerly 440.624] Examines contemporary theories of economic growth and empirically applies them to panels of present day developing and industrialized countries, and to the historical evolution of individual countries and groups of countries. Topics include neoclassical growth models, population and growth, the economics of ideas, endogenous growth models, aid and growth, and policy and growth. Prerequisites: 440.601 Microeconomic Theory and Policy; 440.602 Macroeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 and AS.440.602 prior to enrolling in AS.440.634

AS.440.639. International Finance (Open Economy Macro). 3 Credits.
[formerly 440.619] This course provides an overview of open economy macroeconomics, and international financial markets and policies. The focus is on exchange rate determination, the importance of the balance of payments for both the domestic economy and the economies of other countries, international capital flows, the impact of internal debt on the balance of trade, and the interaction and potential conflicts between domestic and international economic policy objectives.Prerequisite: 440.601 Microeconomic Theory and 440.602 Macroeconomic Theory. Corequisite: 440.606 Econometrics.
You must take AS.440.601 AND AS.440.602 prior to enrolling in AS.440.639

AS.440.640. Financial Economics. 3 Credits.
[formerly 440.642] Finance treats the transfer of resources across time and the transfer of risk among economic entities. The aim of this course is to develop the microeconomic theory relevant to these types of transactions. A set of underlying economic principles is applied to the determination of the value of basic financial instruments such as stocks and bonds, as well as to more complicated derivative securities, such as futures and options. Valuation concepts, in turn, allow for the analysis of various issues of interest to policy makers as well as portfolio managers and investors, such as the term structure of interest rates, portfolio theory, the capital structure of the firm, and risk management.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.640

AS.440.641. Financial Intermediation & Financial Markets. 3 Credits.
[formerly 440.620] Examines why financial intermediaries exist, how they co-exist with financial markets, and how they have been forced to switch from accepting deposits and making loans to using derivatives to manage risk. Shows how risk management differs between bank-based and market-based economies. Analyzes the economic consequences of financial market imperfections, especially for credit market equilibrium and rationing. theories of bank runs and systemic risk; and how different financial systems and governments can cope with financial crises, financial fragility, and credit market frictions.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 and AS.440.602 prior to enrolling in AS.440.641

AS.440.643. Economics of Investments and Financial Management. 3 Credits.
This course develops a deeper understanding of financial markets in the context of portfolio theory. In addition to understanding how financial markets operate and relate to the broader economy, students will develop skills to analyze investment decisions and manage investment portfolios. Students will learn the efficient market hypothesis (EMH), criticisms and implications of EMH for investment strategies, modern portfolio theory and practice, and tools for evaluating performance. Throughout the course, several financial models will be analyzed especially as they relate to real-world asset allocation decisions. Prerequisite: 440.601 Microeconomic Theory and 440.640 Financial Economic. Corequisites: 440.606 Econometrics.
You must take AS.440.601 and 440.640 Financial Economic prior to enrolling in AS.440.643

AS.440.645. Behavioral Economics & Finance. 3 Credits.
This course treats key topics in behavioral economics and finance theoretically and empirically. We analyze the efficient markets hypothesis and its potential weaknesses, the role of noise trading, consumer choice anomalies and perception biases, and serial correlation in stock prices, as well as other topics in behavioral economics and finance. Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must first complete AS.440.601 prior to enrolling in AS.440.645

AS.440.646. Economics of Derivatives. 3 Credits.
This course provides students a thorough introduction to the theoretical and practical aspects of forwards, futures, options, and swaps. Derivatives are important tools in financial markets, and students will learn how to price, value, and use them from a practical perspective. This course is particularly important for students seeking to work in finance. Topics covered include no arbitrage-based pricing, the pricing of forwards and futures, interest rate products and commodities, valuation based on market prices, and option pricing and strategies. Prerequisite: 440.601 Microeconomic Theory. Corequisites: 440.606 Econometrics and 440.640 Financial Economics.
Prerequisite(s): You must take AS.440.606 and AS.440.640 prior to or simultaneously with AS.440.646.
You must take AS.440.601 prior to enrolling in AS.440.646

AS.440.650. Environmental & Resource Economics. 3 Credits.
[formerly 440.640] Beginning with the concept of sustainability, the course develops a framework for an economic assessment of environmental problems including the notion of market failure, valuation of environmental resources, and policy design issues associated with using alternative economic incentives and instruments. The second part of the course examines principles of the economically efficient management of non-depletable and depletable (e.g., fossil fuels, natural ecosystems) resources. Various applied settings are used to demonstrate the principles developed in the course.Prerequisites: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.650

AS.440.653. Economics of the Labor Market. 3 Credits.
This course develops the theory and empirics of labor markets by focusing on several leading institutional structures of both labor supply and labor demand. This theory is then applied to issues such as wage determination, wage rigidity, training and retraining programs, and the skills and wage distribution, as well as government policies that correct inefficiencies in labor markets. Prerequisites 440.601 Microeconomic Theory and 440.602 Macroeconomic Theory. Corequisite: 440.606 Econometrics.
You must take AS.440.601 and AS.440.602 prior to enrolling in AS.440.653

AS.440.656. Political Economy. 3 Credits.
[formerly 440.616] This course examines how rational choice methodology (including Game Theory and Neoclassical Economics) can be applied to analyze issues related to political economy. Topics include the origin of state, economic origins of political regimes, different models of voting and their outcomes and different aspects of federalism. This course also explores how political economy influences economic development and public debt. Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 Microeconomic Theory prior to enrolling in AS.440.656 Political Economy.

AS.440.658. Industrial Organization. 3 Credits.
[formerly 440.638] In this course, the focus is on the study of markets and the laws and regulations used to ameliorate some of their imperfections, especially the problems caused by market structure and market power. Many economic models used to explain how markets work and what is necessary for market power to exist are investigated. Subsequently, the course explores how regulators and private litigants try to eliminate or control market power, particularly through antitrust law, with respect to price fixing, mergers, and market dominance. Regulatory issues pertaining to such industries as telecommunication, transportation, electrical power, health, safety, and the environment are covered.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.658

AS.440.659. Law and Economics. 3 Credits.
[formerly 440.639] Techniques of microeconomic theory and game theory are applied to analyze the effects of various laws on individual decisions and on the allocation of resources. Subject areas covered include the theory of public choice, the economics of property rights, contract law, and tort law. Topics include the efficient breach of contract, the determination of damages, the economics of patents and copyrights, optimal liability rules for environmental and other torts, economics of family law, bankruptcy law, zoning law, antitrust law, and the legal process.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.659

AS.440.661. Public Economics. 3 Credits.
This course analyzes the determinants and properties of government expenditures and social regulation. The first part of the course is generic: It addresses efficiency and equity in income redistribution; the provision of public goods; coping with externalities, addiction and risk; and voting and bureaucracy, and taxation. The second part of the course is particular: It examines health policy, education policy, statutory pensions, and welfare policy in a comparative international context.Prerequisites: 440.601 Microeconomic Theory; 440.602 Macroeconomic Theory. Corequisite:; 440.606 Econometrics.
You must take AS.440.601 AND AS.440.602 prior to taking AS.440.661

AS.440.663. Development Microeconomics. 3 Credits.
[formerly 440.623] This course analyzes the constraints on households and policy makers in developing countries using econometric tools. Empirical micro-economic studies of behavior and policy outcomes under different types of market failures are drawn upon. Topics include inter alia inequality, fertility, education, health, poverty, nutrition, and failures in land, labor, credit and insurance markets.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.663

AS.440.665. International Trade (Open Economy Micro). 3 Credits.
The first part of the course examines the causes of trade, the sources of the gains from trade, and the domestic and international distribution of those gains. In addition, it introduces the politico-economic causes of trade policy and addresses the theory and empirics of trade and growth. The second part examines in detail the instruments and consequences of trade policy, namely tariffs and quantitative restrictions, and their modern manifestation as anti-dumping and safeguard measures. The causes and consequences of trade policy, too, are linked to contemporary empirical evidence.Prerequisites: 440.601 Microeconomic Theory and Policy; 440.602 Macroeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 and AS.440.602 prior to enrolling in AS.440.665

AS.440.666. Regional Economics. 3 Credits.
Regional economics is a relatively new formal branch of economics which recognizes the crucial importance of geography in the workings of a market economy. By incorporating variables of space and geography into traditional economic models, it has great relevance to real world phenomena and policy questions. We examine the effects of market forces on spatial variables such as the location choices of households and firms; land use policy; labor market agglomeration; urban poverty; the development of transportation infrastructure; and urban and rural housing markets. The roles of natural resources, demographic base, location of industries, and factors determining regional growth and development will also be considered.Prerequisite: 440.601 Microeconomic Theory and Policy. Corequisite: 440.606 Econometrics.
You must take AS.440.601 prior to enrolling in AS.440.666

AS.440.667. Urban Economics. 3 Credits.
This course develops a framework to analyze how cities operate and how to improve them. The first part of the course addresses basic questions about cities: Why do cities exist? What makes some cities more costly than others? What determines housing prices? The second part of the course examines specialized topics including residential segregation, economic development programs, and suburbanization. Prerequisites: 440.601 Microeconomic Theory and 440.606 Econometrics.

AS.440.672. Economics of Health Care. 3 Credits.
[formerly 440.641] This course explores the economics of the health care system in the United States by examining the demand for health care services, the behavior of health care providers, the influence of government policies, and the relationship between health care services and population health levels. Established health care systems and their potential for change in both the United States and other countries are considered in the context of current policy concerns.Prerequisites: 440.601 Microeconomic Theory and Policy; 440.606 Econometrics.
You must take AS.440.601 AND AS.440.606 prior to enrolling in AS.440.672

AS.440.684. Game Theory. 3 Credits.
[formerly 440.644] Game theory is a mathematical tool developed for the purpose of understanding not only the interaction of economic market participants, but overall observed social phenomena as well. This course provides an introduction to game theory with applications to economics. Moreover, the course presents an approach to modeling a social situation as a game and develops techniques for solving the game in order to gain insight into individual behavior. Topics include repeated games, games with incomplete information, and the experimental testing of hypotheses.Prerequisite: 440.601 Microeconomic Theory.
You must take AS.440.601 prior to enrolling in AS.440.684

AS.440.692. Thesis. 3 Credits.
<p> Students may undertake their own research project as an 11th program course for three additional credits at full tuition. Prior to proposing a project, interested students must have clearly identified a research topic, and submit a formal proposal for review and approval to the Thesis Research Committee, to be received no later than two months prior to the beginning of the term in which the student plans to enroll in the course. The proposal must follow the Applied Economics Thesis Guidelines, which can be obtained by contacting the Program Director. <o:p></o:p></p><p>The committee will help identify a mentor who is familiar with their prospective inquiry, and is willing to provide guidance and oversee the project. The mentor must be faculty teaching at the Johns Hopkins University, but the availability of a mentor cannot be guaranteed. Students must meet with the mentor periodically for discussion of the project's progress, on-site or on-line, and must complete a research paper, to be approved by the mentor and the Committee. <o:p></o:p></p><p>Enrollment of the student is undertaken by the Program Director. Candidates must plan on using two semesters to successfully complete Thesis. <o:p></o:p></p><p>Prerequisites: All four Core courses and Microeconometrics or Macroeconometrics, and one or more Applied Economics courses in the substantive area of the proposed research, plus a strong academic record (at least B+ average) in at least eight program courses, are absolute minima.<o:p></o:p></p>

AS.440.801. Independent Study. 3 Credits.
This course focuses on the practical uses of time-series econometrics in a macroeconomic context. The topics covered include autoregressive-moving average processes, non-stationary time series models, unit root tests, vector autoregression models, and cointegration analysis. Prerequisites: 440.602 Macroeconomic Theory and Policy; 440.606 Econometrics.

AS.440.888. Continuation (Applied Economics).
[formerly 440.656] Students not finishing their paper during the term in which they enroll must register for Continuation in every ensuing semester (including Summer) until their papers are accepted, but Continuation does not count as a separate course. Such students must pay a continuation-of-enrollment fee of $500 for each subsequent term until a final grade has been submitted. In Applied Economics, taking Continuation once may be considered the norm.Prerequisite: 440.692 Thesis

AS.450 (Liberal Arts)

AS.450.082. MLA Capstone: Portfolio.
The MLA Portfolio is a zero-credit Capstone option. Students who select the Portfolio option will take 10 courses in the program (one core course and 9 electives), and register for the zero-credit portfolio in their final semester. The portfolio will be completed within the same semester as the 10th course. The portfolio consists of a sampling of the best papers and projects written over the course of the student's graduate career, and it is designed to highlight the intellectual points of convergence in each student's course of study, presenting the student's reflections on knowledge gained and lessons learned.

AS.450.600. MLA Core: Interdisciplinary Graduate Research Methods. 3 Credits.
This seminar will introduce students to current trends in interdisciplinary research in the liberal arts. It is recommended for any students who plan to complete a thesis as their Capstone Graduate Project. This course will lead students through the process of designing original scholarly research for the MLA Program: from developing a research question to identifying primary sources and defining current debates concerning their chosen topic. In each session, in addition to weekly discussions, students will be guided through a writing exercise or a new step in the research process. In this course, students will learn how to critically examine sources, define a theoretical framework, use standards of logical demonstration, and develop a comprehensive thesis project proposal. Starting in Summer 2022, AS.450.600 MLA Core: Interdisciplinary Graduate Research Methods will be a required prerequisite for AS.450.830 MLA Capstone: Graduate Project and for AS.450.850 MLA Capstone: Internship. Once the prerequisite requirement is in place, students must take Interdisciplinary Graduate Research Methods at least one semester prior to enrolling in either of those capstone courses. There will be no prerequisite required for students who enroll in AS.450.820 MLA Capstone: Portfolio.

AS.450.601. Forbidden Knowledge: the "Metaphysical Rebel" in Myth and Literature. 3 Credits.
But from the tree of the knowledge of good and evil you shall not eat" (Gen. 2:17). This interdisciplinary course explores the theme of forbidden knowledge in the various forms it takes in the Bible, the Epic of Gilgamesh, Greek tragedy, folklore and folktale, and in western literary classics ranging from Milton's Paradise Lost through the versions of the Faust story in Marlowe, Goethe, and Thomas Mann, to short stories by Nathaniel Hawthorne, and Mary Shelley's Frankenstein. What do we make of the parallels between the Greek hero Prometheus and the Biblical Satan? How are we to understand the figure of Dr. Frankenstein as "the Modern Prometheus"? Does Faust's pursuit of conventionally forbidden areas of knowledge anticipate 20th and 21st century quests to unveil the secrets of nuclear power, or of artificial intelligence, or of genetic engineering of the human genome? In addition to our literary readings, we will discuss a variety of operas and other relevant musical works; films from Bride of Frankenstein and Dr. Strangelove, to Hannibal; and transgressive visual imagery from Paleolithic cave art to the work of contemporary performance artists ? in a collective quest to find and define the boundaries of "the forbidden."

AS.450.605. Art Since 1960. 3 Credits.
What is contemporary art, and what are the factors that shaped it? This course will attempt to answer those questions through a chronological and thematic investigation of some of the most influential artworks, movements, and theories of the past 60 years. Beginning with a close look at mid-century modernism, we will move into a consideration of Pop, Minimalism, conceptual art, land art, performance art, postmodernism, AIDS activism, and relational aesthetics. Along the way, we will also consider the relevance of feminist and phenomenological theory and of institutional critique and globalization; at the same time, we will explore ways in which art of our own time constitutes both an extension of, and reaction against, some of the historical ideas we encounter. Throughout, students will have a chance to read and discuss both primary and secondary texts, and a range of resources and assignments will offer a variety of analytical angles and interpretive possibilities.

AS.450.606. Ethics for a Multicultural World. 3 Credits.
This is a course in applied philosophy, a practical approach to ethical thinking based principally on the Discourse Ethic of Jurgen Habermas. Using a "Moral GPS," the course works through the basic steps of a discernment and decision process that takes into account the particular ethical challenges of the 21st-century multicultural world. Through the work of this course, Students will: <o:p></o:p></p><ul style="list-style-type:disc">
analyze the principal ethical theories and their relation to each other; evaluate their own ethical assumptions and those of others in relation to those ethical theories; be able to validate ethical claims in ways compatible with cross-cultural dialog; be able to guide ethical dialog toward consensus for effective action

AS.450.607. Through a Glass, Darkly: American Film Noir. 3 Credits.
In Film Noir (French for dark, or black film), the city often provides the backdrop for stories featuring the dark underbelly of society. Morally conflicted, cynical hardboiled investigators, corrupt officials, low- lives, mysterious, double-crossing dames and set in a landscape of trash strewn alleys, dimly lit bars, tenements, and other dark corners. There are no happy endings in Film Noir and the mood is one of paranoia, pessimism, desperation and existential angst. The course will employ an interdisciplinary understanding of the characters, themes, and gritty visual style and mood of the classic Film Noirs of the 1940s and 1950s. Roots of the Film Noir form come through a fusion of German Expressionism and the hard-boiled detective stories and crime novels of the 1920s-1940s upon which some of the greatest noir films were based. The course utilizes a "read and screen" approach beginning with a close textual reading of each story that is followed by a screening of the film through which we will analyze the distinctive visual style (light and shadow, tilted camera angles, mysterious silhouettes) which contributes to the mood and defines the Film Noir formula. Major auteurs of the form such as authors, directors, and actors will also be studied for what they bring to this formula. The course concludes with a look an example of Neo-Noir from the 1970s. Important note: students will need to find the films included in the course to screen on their own.

AS.450.608. Renaissance Women: Portraits, Patrons, and Painters. 3 Credits.
This seminar will explore the artistic experience of women in Renaissance Italy. A large body of recent scholarship has sought to "recover those women...who have been erased from history in modern literature, rendered invisible or obscured by history or scholarship, as well as those who were overshadowed by male relatives, political accident, or spatial location" (Katherine A. McIver, preface to Wives, Widows, Mistresses and Nuns in Early Modern Italy). Drawing upon a consideration of both current research and primary sources, this course will investigate the role women played as the makers, the commissioners, and the subjects of art in Italy during the period from ca. 1250-1600. Among other issues, we will examine the constraints that limited women's contribution to the arts in this period when women's participation in public life were quite circumscribed, as well as the various means they found to overcome them. We will investigate what types of women were able to become artists. We will learn what categories of women were most likely to commission art, and what kinds of art they generally commissioned. Lastly, we will examine portraits of women, to understand what these representations tell us about the view of women in Renaissance society. Students will develop their own critical positions on the issues through a close reading of both texts and works of art, participation in online discussions, and in several substantial writing assignments.

AS.450.609. 1900: The Birth of Modernism in Vienna, Paris, and London. 3 Credits.
<p> The year 1900 was the pivotal fulcrum of the turn of the century, that short but crucial era we call the fin-de-siècle, ranging from 1890 to WW I. This explosively creative period of literary and artistic expression witnessed the dramatic transition from the cultural order of old Europe to the new worlds of modernity: Freud's Vienna, Toulouse Lautrec's Paris, and the London of George Bernard Shaw and Oscar Wilde. It was an exciting new era of steam, speed and electrification, of the exhilarating cultural life of world's fairs, crowded boulevards, cafes, music halls, art galleries, and photographer's studios. <o:p></o:p></p><p> New styles of painting by Viennese Secessionists Gustav Klimt, Egon Schiele, and Oscar Kokoschka, along with Picasso's Cubist experiments, would change people's ideas of what art could do and even of what art was for. Colorful posters featured a new world of travel and consumerism, of daring cabaret performers and uninhibited night-life, and of "new women" shown smoking cigarettes, riding bicycles, and claiming public space. Radical performances by Diaghilev's innovative company, the Ballets Russes, could provoke controversy, and even rioting in the concert halls. The excitement of Belle Époque Paris is legendary, but London may have felt the most vibrant polarizations of all: on the one hand, the sternly patriarchal imperial and colonialist culture celebrated by Rudyard Kipling, with comic relief provided by Gilbert and Sullivan; and on the other, the subterranean currents of aestheticism and gender-bending decadence explored by Oscar Wilde and Aubrey Beardsley, who pushed the boundaries of what Victorian London would tolerate, up to and beyond its limits. <o:p></o:p></p><p> Our interdisciplinary exploration will range from the fine arts and music, through architecture, urban design and city planning, to popular culture and the radical social changes marking this turn of the century epoch. <o:p></o:p></p>

AS.450.611. Social History of Medicine. 3 Credits.
This course focuses on major developments in modern medicine from the scientific revolution and the Enlightenment to the late 20th century and considers those developments within their social, political, cultural, and economic contexts. The focus is on the growth of scientific/bio medicine. However, the parallel growth of lifestyle choices and holistic medicine is also important. Some of the themes of the course are: the development of the medical profession and institutions; changing concepts of insanity; the impact of industrialization and the linking of dirt with disease; drug discoveries and their consequences; the impact of eugenics theories; gender and medicine; war as a catalyst for medical innovation; growing government involvement in health care provision as well as socialized medicine and its relevance today.

AS.450.612. Tough Neighborhood: A History of U.S.-Central American Relations. 3 Credits.
This course examines the tumultuous history of the United States' relationship with Central America, from William Walker's filibustering in the 1850s to the recent wave of migration from the Northern Triangle. We will consider how US policymakers, organizations, and individuals have judged the isthmus in economic and national security terms and intervened accordingly, and we will examine how Central Americans have viewed the United States as a model of modernization, an interloper, and a site of refuge, as well as the ways in which they have shaped the North-South relationship despite the asymmetry of political, economic, and military power. Sources will include works of scholarship such as Confronting the American Dream and The Last Colonial Massacre, as well as texts from Central American authors, including the poetry of Roque Dalton, the personal testimony of Rigoberta Menchu, and the reporting of Óscar Martínez.

AS.450.613. British Victorian Women. 3 Credits.
This course embraces the broad sweep of primarily British Victorian women's experiences. It analyzes the emergence of the Victorian stereotype of middle and upper class women and compares that stereotype to the reality of individual case studies. It also explores the variety of expectations and demands on working class women - focusing on geographical, industrial and rural factors and the resulting lives of women working and living across the British Isles. In addition, there is an emphasis on Victorian women as agents of change in the fields of literature, medicine, teaching and social work both at home and abroad, as well as in local and national politics.

AS.450.617. The Constitution and the Criminal Justice System. 3 Credits.
Examines how the Supreme Court establishes and enforces the constitutional rules that govern law enforcement in the United States, including the 4th Amendment's provisions on searches and arrests, the 5th and 6th Amendment protections for individuals charged with a crime, and the 8th Amendment's requirement for bail and its ban on cruel and unusual punishments. We will also examine what it means to have a fair trial, the process of plea bargaining which resolves most criminal cases, and the continuing controversy over criminal sentencing. And we will continually be exploring the meaning and the reality of "justice."

AS.450.618. Going Underground: Subculture and Social Justice in Self-Publishing. 3 Credits.
This course explores the wide and weird world of self-published zines (pronounced ZEENS). Defined by Stephen Duncombe, zines are "noncommercial, nonprofessional, small-circulation magazines which their creators produce, publish, and distribute by themselves." Zines—along with adjacent formats including alternative comics, fanfiction, and underground newspapers—have been staples of subculture for decades, tracing their history to 1930's science fiction fandom, and encompassing topics from punk rock to critical race studies. By embracing a DIY (do-it-yourself) spirit and subverting traditional publishing, zine creators have amplified voices advocating for social justice by centering topics long considered subversive, forging communities along the fringes, and molding the mainstream. In addition to studying zines through the lens of history, art, critical theory, and cultural studies, students will design and create zines of their own and share them online in a digital format. Whether you're new to the world of zines, an avid reader of them, or a longtime zinester, all are welcome and no prior experience with the format is required.

AS.450.620. Gender and Media. 3 Credits.
This course addresses the intersection of communication, culture, and identity through an examination of gender and the U.S. media system. The course will first introduce students to key approaches to studying gender and media, and will subsequently examine: 1) media representations of gender, sexuality, and intersectionality; 2) diversity in media industries and gendered labor markets; 3) gendered audiences and fan cultures; and 4) gender, power, and identity in a digital era of communication. We will explore these topics through literature from communication and media studies, cultural studies, feminist theory, internet/new media studies, and sociology.

AS.450.621. The Self in Question: Readings in Lit & Psychol. 3 Credits.
What is a “self” and what is its nature? Is the self discovered or invented? Is it synonymous with character, with personality, with soul? Or is the self primarily a storyline? Thinkers throughout the ages have probed the riddle of our human identity and come to distinctly differing conclusions. Buddha considered the self an illusion, while for Plato, the self is a slumbering sage. For Freud, it is an instinctual hunger; for Sartre, a useless passion; for B.F. Skinner, a machine; for Buckminster Fuller, a verb. Modern literature and psychology have further complicated our conceptions of selfhood, challenging traditional notions of the stable ego and expanding our understanding of personal identity to include race, class, gender, and culture. From ‘selves in the making’ to ‘selves under siege,’ from the lonely, existential self to the transpersonal, communal self, in this class we explore questions of selfhood from the perspectives of literature and psychology –two key disciplines devoted to understanding the perplexities of human nature. We consider the approaches of Freudian, Jungian, feminist, Buddhist, Marxist, and existential psychologists, and we read literary selections by Kafka, Thomas Mann, Saul Bellow, Toni Morrison, Milan Kundera, Margaret Atwood, and Z.Z. Packer. Our interdisciplinary focus will enable us to see the ways in which psychology and literature illuminate and enrich each other—and also where they are in conflict, both in their methodologies and in their basic assumptions about the “knowability” of human nature and behavior.

AS.450.622. The Shape of Things: Embodiment and Sexuality in American Culture. 3 Credits.
This course examines theories and experiences of embodiment, sexuality, and bodily difference in contemporary American culture, focusing on understandings, experiences, misconceptions, and marginalizations. <o:p></o:p></p><p> Drawing on feminist-informed gender, fat, disability, and critical race studies, the course introduces phenomenological, poststructuralist, and new materialist perspectives on the body, and interrogates the implications of diverse embodiments for human subjectivity and social life. <o:p></o:p></p><p> Myths and misconceptions of differences that circulate throughout popular and professional cultures, and inform public policies and everyday practices are analyzed. Course readings and audio/visual texts emphasize the problematics of normalcy across the life span and among diverse populations, and reflect on issues of sexual experience, gender, body size, disability and difference, illness and disease, aging and racialized bodies, and sexual variance. <o:p></o:p></p><p> Our bodies and the scrutiny they are under in American culture inform so much of our lived experience. Drawing on a wide range of texts we will examine the scope of sexuality and embodiment in this critical moment. <o:p></o:p></p>

AS.450.627. MLA Core: Critical Theory. 3 Credits.
This course introduces critical theory in the context of struggles for social justice. From Plato to Judith Jack Halberstam, we will trace the history of Critical Theory by analyzing perspectives from psychoanalysis, Marxism, the Frankfurt School, postcolonial theory, poststructuralism, deconstruction, feminism, critical race theory, and queer theory. We will pay particular attention to how critical theory has been intimately and contentiously linked with politics and social justice. Among the authors studied are: Plato, Aristotle, Edmund Burke, Karl Marx, Sigmund Freud, Ferdinand De Saussure, Walter Benjamin, Claude Levi-Strauss, Jacques Lacan, Roland Barthes, Frantz Fanon, Michel Foucault, Monique Wittig, Helene Cixous, Eve Sedgwick, bell hooks, Paul Gilroy, Judith Jack Halberstam.

AS.450.630. Intimacies of East/West: Hegemony, Representation, & Literature. 3 Credits.
This course begins with exploring histories, tensions, and intimacies between East and West through Edward W. Said’s landmark postcolonial text Orientalism, which analyzes dynamics of hegemony, power, knowledge, imagination, and representation in ways that challenge how we think and know about the world. This lens of inquiry will take a political turn by examining issues and conflicts that arise due to imperialism and dominant paradigms of culture, difference, otherness, nationalism, and religion. In the latter portion of the course, close readings of contemporary world literatures will unfold the shared intimate experiences between East and West through the study of transformative novels, memoirs, and short stories that create forms of agency in today’s world. This will bring us beyond the limiting binary of East and West and enable new ways to think intimately and humanistically about religion/secularity, gender, nation, identity, and belonging.

AS.450.631. Western Theatre History: The Dynamic Interplay of Social, Economic and Cultural Forces. 3 Credits.
Theatre offers unique insight into the development of western civilization by depicting people in their relationships to themselves, to each other, and to society. Theatre history provides a distinctive lens through which to explore the social, economic, cultural, geographical and other forces shaping those relationships over the past 2500 years. Beginning with the inception of theatre in religious ritual up to the present postmodern era, Western Theatre History: The Dynamic Interplay of Social, Economic and Cultural Forces will explore the demographics of audiences, the reasons for attending the theatre, who presented theatre, where theatres were located, what theatre space looked like and why they looked that way in order to track the dynamics of western political and social history. Major works of dramatic literature will serve as the entry point into various periods and as reflections of the historical forces at work. The major periods to be studied are: Classical Greek and Rome, Medieval, Renaissance (Italy, England and Spain), 18th and early 19th centuries, the modern era and the postmodern present.

AS.450.634. Italian Renaissance Art and Thought. 3 Credits.
In what sorts of intellectual contexts was Italian Renaissance art produced and received? What, in other words, were the connections among Renaissance art, philosophy, theology, mathematics, rhetoric, and history? This seminar will investigate a number of answers to such questions through a consideration of primary evidence and recent scholarship. Among other things, we will consider Aristotle’s theory of magnificence as it was applied to Renaissance architecture, the development of perspectival systems, the notion of a Renaissance or golden age, and Vasari’s efforts to conceptualize art of the Renaissance in metaphorical terms. Several substantial writing assignments will allow students to develop critical positions of their own, and throughout the term there will be an emphasis upon close reading of both texts and artworks. (Available online)

AS.450.635. How the War was Remembered: The Film and Literature of the Vietnam War. 3 Credits.
The Vietnam War continues to be one of the most controversial and deeply divisive events in U.S. history. The seeds for the war began early in the 20th century, intensified within the Cold War emerging in the years after 1945, and tore the country apart when boots hit the ground in 1965 to fight a war with no clear objectives or enemies. The legacy of Vietnam is difficult to understand but it is clear that the lessons of the war have been most “remembered” through the films and the powerful perspective of the veteran’s voice in the literature of the war. We will ask how writers and film makers presented the experience of those on the battlefield and the home front; how very public and symbolic battles were fought over how the war should be interpreted and remembered; and how these artifacts help to illustrate the construction of a mediated cultural memory of the war. Particular attention will be paid to the "veteran's voice" and the role of autobiography. The course will consider the war from both liberal and conservative perspectives, and we will add an often-missing voice from the story; that of the Vietnamese. Ken Burn’s new documentary series, The Vietnam War will anchor the class. Other films to be considered may include The Quiet American, The Green Berets, Apocalypse Now, Rambo, The Deer Hunter and Platoon, The Little Girl of Hanoi _(_Em bé Hà Noi) as well as other documentaries including Why Vietnam, Peter Davis’ Hearts and Minds, and Four Hours in My Lai. Important literary works by veterans of the war may include those by Michael Herr, Philip Caputo, Bao Ninh, Le Ly Hayslip, Tim O’Brien and Ron Kovic among others. Please note that most of the films are readily available from multiple streaming sources (e.g. Netflix, Amazon Prime, Public Library, etc..). Students will be required to have watched a particular film in advance of class as noted in the syllabus.

AS.450.637. Native American Art History. 3 Credits.
This course examines Native American art as both internal and external communication centered in American Indian households, workshops, studios, and communities. Internal communication has met community and Tribal expectations for thousands of years as art has been engaged in ongoing economic, religious, political, and social activities that have created and maintained ethnic identity. External communication has placed art in the relationship between American Indian communities and non-Indian participants in the process of military conquest and colonization; and in galleries, museums, Powwows, and other public events. From the Colonial period to the present day Native American art has been admired and collected and has, in this way, mediated the relationships between Native communities and dominant American culture. We will use powerpoint slides, readings, and in-person consideration of Native American art at the National Museum of the American Indian to look at stylistic characteristics of various regions and time periods, and the messages and relationships embodied in specific examples of art.

AS.450.638. MLA Core: What is History?. 3 Credits.
What is history? What makes history, as a field of scholarship and a way of knowing, different from any other discipline? This course will introduce students to a vibrant and evolving field of study, and to the tensions, diversity, debates and controversies that shape it. Themes explored will include an examination of the parameters of the field (such as the relationship between popular and academic history; the tension between description and interpretation; the evaluation of sources; the role of the historian as a public intellectual; the craft of historical writing; and digital history as a new field of study) as well as an analysis of the topics and approaches undertaken by contemporary historians (such as the reframing of dominant narratives; the emergence of dominated voices and of new thematic fields such as sexuality, globalism and popular culture; and ongoing critiques of previously established narratives and theoretical frameworks). Students will read historical scholarship in a wide variety of fields, as well as critical theory, popular literature and documentaries.

AS.450.639. The American Southwest:Crossroads of Cultures. 3 Credits.
The course begins at the time when the Southwest was the homeland of the ancient Pueblo people (the “Anasazi”). Our survey moves from the major archaeological sites such as Chaco Canyon and Mesa Verde to the historical communities of the Hopi and Zuni and other Pueblo peoples of New Mexico and Arizona, along with the Navajo and Apache. We then move on to focus on the period of Spanish incursion, when the region became first part of colonial New Spain and then part of independent Mexico. We look at the narratives of the earliest Spanish arrival, and at the long tradition of Spanish colonial art and architecture, culture and religion in the region. We then move on to the incorporation of the region into the U.S. after the Mexican-American war, and with its impact on the Native American and Hispanic populations. The 19th century saw the arrival of the railroads and of an Anglo population of Easterners, and the genesis of the Southwest as a fine art center, sometimes called the Santa Fe-ization of the Southwest. More recently, the area has witnessed the “re-arrival” of a Mexican-American, or Chicano, population along with the retrieval and revival of Mexican cultural traditions such as the Day of the Dead and the cult of Guadalupe. Today the region, for all its cultural conflicts, is the site of an ongoing evolution of a modern ulticultural Southwest.The course includes reading and discussion of literary works by such authors as Willa Cather, Leslie Marmon Silko, Gloria Anzaldúa, Ed Abbey and Tony Hillerman, and an extensive look at the arts of the Pueblo and Navajo peoples, the paintings of the Taos School and the work of Georgia O’Keeffe, and the contemporary revival of Southwest folk art.

AS.450.640. Nature and the American Imagination. 3 Credits.
This course offers an interdisciplinary study of the American landscape and the role it has played in shaping American identity. We anchor our study by looking at the way the idea of land has been constructed throughout our history as a kindred spirit by Native Americans, as a “howling wilderness” by the early colonists, as a school for spirit by the New England Transcendentalists, as a precious inheritance in need of preservation by 19th century conservationists such as John Muir and Teddy Roosevelt, and in keeping with Manifest Destiny, as a rich resource that was "ours for the taking." Philosophically, we explore the influence on early colonists of Biblical and Enlightenment thought, of the European Romantic movement, the moral ambiguities of the slave experience of the American land, the ideas of Romanticism that gave rise to Emersonian Transcendentalism (America’s first homegrown philosophy), the competing theories behind the national park movement, and more recently the revival of Native American holistic values in ecological paradigms. Beginning with Thoreau, who “went to the woods to learn to live deliberately,” we read primary texts of American nature writing, arguably one of America’s finest contributions to world literature, and we experiment with keeping nature journals. Finally, we discuss the bridging of the two cultures, science and art, in the writings of paleontologist Loren Eiseley and conservationists Aldo Leopold, Rachel Carson, and Al Gore.

AS.450.642. Yesterday's Tomorrows: Utopian and Dystopian Futures in Science Fiction Literature. 3 Credits.
Beginning with Thomas More’s seminal work Utopia (1516), this course will engage in an interdisciplinary discussion of the construction of utopian/dystopian-cacotopian worlds in science fiction, or more broadly speculative fiction, and the accompanying philosophical issues and concerns raised in these stories. We’ll draw on novels, history, philosophy, graphic novels, and film to grapple with the meaning and importance of utopian and dystopian thinking and writing across the 20th century. The authors react to and against major historical paradigm shifts caused by, for example, the Industrial Revolution, Modernity, War, the Cyber Revolution, and millennialism, along with the overarching “End of Days” stories. Some of the authors under consideration are H.G. Wells, Edward Bellamy, Yevgeny Zamyatin, Aldous Huxley, Ursula Le Guin, Philip K. Dick, Margaret Atwood, William Gibson, Octavia Butler, Marge Piercy, and Neil Stephenson. Through these stories the authors project both possible futures and offer incisive commentary on contemporary realities.

AS.450.643. Leadership and the Classics. 3 Credits.
This course explores constants and changes in leadership over time through a selection of readings that ranges from ancient philosophy to 20th-century fiction, including works by Confucius, Plato, Sophocles, Shakespeare, Machiavelli, Hannah Arendt, Martin Luther King, Jr., Anne Tyler, and others. Through directed reading and discussion, students gain valuable insights into how leaders can foster creative initiatives and responses to change. A historical perspective enables students to understand and appreciate the challenge of leadership in the 21st-century multicultural world. They can then develop a framework for interpreting and evaluating responses to that challenge. (Available online)

AS.450.644. U.S. Environmental History. 3 Credits.
Environmentalism is a multifaceted phenomenon infused with many different schools of thought about the nature of environmental problems as well as the most appropriate solutions for those problems. This course will examine the major historical influences on the varied approaches to environmentalism and environmental practice. Students will explore the influence of environmental ideas and actions in the US from the 19th century to the present. The goal is to deepen our understanding of contemporary environmental practice – by others and ourselves – by tracing the influence of these historical trends in current debates and actions. Topics include conservationism, preservationism, transcendentalism and green romanticism, toxic construct, the wilderness construct, and sustainability.

AS.450.646. Religion of Politics, Politics of Religion. 3 Credits.
This course examines patterns of authority in religion and politics by exploring the connection between the sacred and the secular. The class will address questions concerning political power and religious influence in order to better understand the complex relationship between the two. Students will consider societies where religion and politics seem inextricable, societies that attempt to separate the two, and societies that attempt to eliminate religion from the equation. The class will recognize the ways in which nations develop their own civil religions. A variety of religious experiences and political ideologies will be considered. Special attention will be given to the role of religion and politics in social change.

AS.450.648. Fakes, Lies, and Forgeries: A History of “Fake News” from The Flood to the Apocalypse. 3 Credits.
In our digital age of hacking, on-line bots, and trolls stealing, faking, and confounding information across the Internet, it is often forgotten that “fake news” has, in fact, always been with us. The history of fakes, lies, and forgeries transcends human history and encompasses nearly every discipline within the liberal Arts, from literature, art, and philosophy, to history, religion, and archaeology. Human civilization has been filling gaps in the historical record and inventing alternative narratives for all sorts of reasons: political, commercial, evangelical, and personal. This course examines this dark undercurrent within human achievement across historical time, exploring specific examples of historical and literary forgeries that date from the biblical Flood to the future Apocalypse. <o:p></o:p></p><p>We will exploring the textual traditions of false archaeological discoveries and fabricated epigraphic fragments from classical antiquity, manufactured time capsules bearing pagan prophecies of the coming of Jesus, fake “illuminations” of Christopher Columbus and Joan of Arc, preposterous accounts of the world’s great “travel liars,” and even look at books from Shakespeare’s own library bearing his personal “annotations.” In the process, we will learn that history’s fakes and forgeries are also, in part, creative and imaginative enterprises that require considerable knowledge, creativity, and even inspiration, to pull them off effectively. At every stage this on-line course will draw upon the riches of JHU’s own Bibliotheca Fictiva, the world’s premier rare book and manuscript research collection dedicated to literary forgeries across the millennia. <o:p></o:p></p>

AS.450.650. Nazi Germany and the Holocaust. 3 Credits.
This course focuses on three major areas: the reasons for the rise to power of Hitler and the Nazi party; the mechanics of the operation of a totalitarian regime as well as various aspects of life in Nazi Germany; and the Holocaust including the fates of Europe's Jewish populations and other groups such as homosexuals targeted by the Nazi regime. These topics will necessitate the study of various sources – histories of this era, documents, memoirs, personal accounts, literature and films. The course looks at perpetrators, bystanders and victims in an attempt to grapple with one of the most written about and mystifying periods of the 20th century. The period still resonates today both in terms of its horror and its revelations about genocide, a new word coined in the late stages of WWII in an attempt to describe such unfathomable acts. By necessity, the study of these topics includes a consideration of political, social, economic and cultural history as well as ethics and the role of memory in shaping and commemorating events and traumas on this scale.

AS.450.651. Western Political Philosophy. 3 Credits.
This is intended as a broad survey of Western political thought, particularly as it developed in the European historical context from the classical era to the 20th century. The thinkers we will discuss can be thought of as engaged in what Robert Hutchins called a "great conversation" across the centuries on the central questions of political philosophy. These questions include: What are the purposes of government? What is the best form of government? How are justice and liberty best realized in a political system? What are rights - and where do they come from? What is sovereignty and in whom does it reside? What principles make political authority legitimate? Is disobedience to political authority ever justified? In many ways these questions are perennial ones, as relevant in our own time as in the distant past. Moreover the divergent systems of thought developed to answer these questions continue to shape much of contemporary political life - e.g. democracy, constitutionalism, liberalism, socialism, and conservatism. Among the political philosophers who will be examined are Plato, Aristotle, Augustine, Thomas Aquinas, Machiavelli, John Locke, Edmund Burke, Thomas Hobbes, Jean Jacques Rousseau, Friedrich Nietzsche, Karl Marx, Hannah Arendt, and Leo Strauss. (Available online)

AS.450.652. Modern Black Political Thought. 3 Credits.
Approaching black politics as a vital source of theoretical innovation and critical analysis, this course introduces students to key themes, trends, and thinkers within the literatures of modern black political thought. Black political thought constitutes not only a practice of theorization and conceptualization undertaken by African-descended peoples in response to experiences of racial domination and exclusion; it can also be understood as a critical practice that produces scholarship and political writings that situate racism and race-making at the core of the projects associated with Western modernity, and thus as formations that have affected many societies and civilizations, not only black people. Focusing primarily on the latter sense of black political thought, this course explores a series of writings that interrogate the intertwined legacies of the emergence of modernity, the elaboration of racial hierarchy, and black emancipatory struggles. Highlighting the central role played by racial domination in the formation of Western modernity, these texts complicate and challenge the underlying epistemic frames and modes of classification through which the Western tradition has made sense of such foundational political experiences and concepts as freedom, justice, liberation, community, and equality. Reading works by W. E. B. Du Bois, Ida B. Wells, James Baldwin, Jamaica Kincaid, Frantz Fanon, Martin Luther King, Jr., Saidiya Hartman, Hortense Spillers, Angela Y. Davis, and others, students will critically engage a diverse range of methods and literary approaches within the literatures of modern black political thought for apprehending the historical and political significance of racial hierarchy in the modern world. They will also learn key conceptual resources provided by these traditions to attain a more sophisticated understanding of contemporary racial politics and its intersections with the politics of class, gender, nationality, and sexuality.

AS.450.654. "When the lamps went out": WWI as history, memory and commemoration. 3 Credits.
The centenary of the conclusion of World War One is a fitting moment to re-examine the cataclysmic impact that war had on world affairs at both a micro and macro level. The war ended the "long nineteenth century" and ushered in an era of questioning and doubt for many who survived. It was the first manifestation of total war, made both necessary and possible because of industrialization and advances in transportation and weaponry. The resulting catastrophic loss of life among the military and civilians led to the assumption of new roles. This course looks at the different theaters of war; the social impact of the war on gender and class; the effect the war had on colonies in Africa and Asia; and the overall global political and economic ramifications of the war. There will be scope for students to pursue research on a specialized topic within this framework and within the following themes: World War One and literature, art, gender, medicine, propaganda, music, independence movements.

AS.450.667. The Bildungsroman as Literary Form-Chronicling Personal Growth in Countries and Cultures. 3 Credits.
The bildungsroman, often referred to as the Novel of Adolescence or Coming of Age novel, is one of the world's most fascinating literary forms because of its manifestations in the literatures of many cultures and countries. The development of the form closely parallels the development of nations, the emergence of philosophical, social, and literary movements which have defined the world from the Eighteenth Century onward. Many major writers of the Romantic, Modern, and Post-modern periods have experimented with the form in compelling works such as Portrait of the Artist as A Young Man, Mrs. Dalloway, Madame Bovary, Great Expectations, Native Son, Catcher in the Rye, and The Famished Road. The illusiveness of the form derives in part from its ubiquitous nature. The classical German bildungsroman differs significantly from its English, French, American, African American, Asian, and African counterparts. This course examines the bildungsroman in several of its manifestations: the rise of the form in Eighteenth Century Germany, its adoption among French and English writers, its adaptation in Joyce's Ireland, its popularity among American and African American writers, and its unique presentation in Asian and African literatures. Students will read several major bildungsromans and discuss the constructs of the form as well as the ways it differs among countries and cultures, races and ethnicities, and between genders. Some attention will be paid to the social and societal contexts associated with the form, as well as the ways in which it has been shaped by prevailing philosophies. Students will be encouraged to participate in The Bildungsroman Project, a Digital Humanities project designed to catalog and explore the form (http://bildungsromanproject.com/). (Available online)

AS.450.669. Family in Cross-Cultural Perspective. 3 Credits.
This course examines the family from various cross-cultural perspectives. Throughout the semester we will examine the family as a social institution through the lenses of race, gender, age, social class, and sexual orientation. First we will explore how the notion of family has changed over time in the United States. Next we will explore the social processes that take place within the context of the family such as dating, courtship, marriage, and parenting. We will also look at other issues that affect families such as immigration policy, work inside and outside the home, poverty, and domestic violence. (Available online)

AS.450.673. Monstrosity & Metamorphosis: Imagining Animals in Early Art & Literature. 3 Credits.
From humankind's earliest artistic expressions on the walls of caves, animals have figured centrally in the human imagination. One can argue, in fact, that much of early art and literature does not differentiate fully between the human and the animal, that human self-awareness evolved, in part, through interactions with animals, and through the imaginative fusion of human and animal forms. This course will study the representation of animals and of human/animal hybrids in the ancient and medieval worlds, weaving together stories presented through visual art and literature. Our journey will take us through East and West, touching on texts including (but not limited to) the Epic of Gilgamesh, the Hebrew Scriptures, the Vedas, and Ovid's Metamorphoses.

AS.450.675. Literary Analysis of the Hebrew Bible. 3 Credits.
This course focuses on narrative criticism of the Hebrew Bible, comparing it to similar methodologies (poetics, rhetorical criticism, etc.) and contrasting it with other forms of exegesis (historical criticism, deconstruction, etc.). Students will study key literary terms and discuss the elements that work together to form a story. The class will consider the narrator's voice in relation to the text and the reader, examining narrative omniscience, key type scenes, and themes in the Hebrew Bible and ancient Near Eastern (ANE) literature. This course attempts to discern narrative criticism's place in the history of Biblical interpretation. Long overshadowed by historical criticism and increasingly seeking to find its place in the midst of a number of reader oriented approaches, narrative criticism can be a valuable partner to both. This class examines narrative criticism's value as a tool for exegesis by studying its roots and the methodologies incorporated by narrative critics of the Hebrew Bible. (Available online)

AS.450.678. Religions of the Emerging World. 3 Credits.
The emerging world of the 21st century is globally interconnected: Al peoples are now neighbors. In this world, competing religious claims to unique truth pose a serious threat. Yet abandoning such claims can reduce religions to quaint cultural relics. How can religious believers maintain the vitality of their spiritual heritage while fully appreciating the faith/wisdom traditions of others? This course explores the insights of one man who has sought that balance of religious consciousness —philosopher Huston Smith—as he reflects on Hinduism, Buddhism, Confucianism, Taoism, Judaism, Christianity, and Islam. Rather than competing, he found, the world's religious traditions can greatly enrich one another. (Available online)

AS.450.687. The American Revolution. 3 Credits.
This course will analyze the roots of the American Revolution, contrasting the perspectives of England with the colonies on the causes, comparing the positions of Loyalists and Patriots within the colonies, evaluating the role of diplomacy during the revolutionary years, assessing the war years, formulating the legacy of the revolutionary experience on the social, religious, economic and political fabric of the new nation, and the creation of the Constitution for the United States. The central question driving this study of the struggle for independence and the creation of a Constitution will be the intense effort to achieve an effective balance of "liberty" and "order,"---an eternal challenge for all governments in all ages.

AS.450.689. Introduction to Digital Humanities in the Liberal Arts. 3 Credits.
This introductory course in the MLA program's digital humanities concentration is designed to familiarize students with digital encoding tools, web platforms, assorted search engines and other methodologies directly relevant to a wide range of research agendas in the liberal arts. In the course of the semester, students will receive a comprehensive introduction to selected tools and methodologies, such as the Text Encoding Initiative (TEI) and text mining software (e.g. Voyant and Collatex). Assigned text encoding projects will guide students in identifying appropriate textual markup strategies, resolving issues generated through digital research, and finally in selecting appropriate tools for edition making. The semester will conclude with group critiques of these assigned projects from the standpoint of both content and user experience. (Available online)

AS.450.694. Philosophy of Beauty. 3 Credits.
Since Plato, "Beauty" has proven to be a crucial topic in Western Philosophy. Philosophers have seen fit to address numerous questions surrounding the topic: what is beauty, what distinguishes and constitutes it, who can create it, who can discern and appreciate it? Is it subjective or objective? We will consider a variety of other critical questions via the prominent thinkers we will read in this class, such as: what is the point in creating art? Who or what is it for? What is its desired or intended impact on the audience? What are the germs of creativity, or what is the critical environment for its emergence? Is creativity and artistic inspiration an individual privilege, or can it be shared broadly in society, or in a community? What is the political role or place of the artist and his/her work? Philosophers read in this class may include Plato, of course, but also Aristotle, Augustin, Aquinas, Hume, Burke, Kant, Hegel, Schopenhauer and Nietzsche, among others. If time permits, we will also look at more recent philosophers writing on the topic--and why beauty might no longer be a concern for art and artists.

AS.450.695. American Political Theory and Practice. 3 Credits.
Our purpose in this course is not to provide an account of the mechanics of American government, but to examine the principles that underlie those mechanics, and the way in which those principles change over time. In other words, we are going to examine the political philosophy that serves as a basis for the American regime (or regimes, if one is so inclined). This means that in addition to questions of justice and right we will examine how the thinkers of the Founding era understood the human being, and the sort of governmental structures that are built on this understanding. We will also consider the revolution in American politics that occurs in the 20th century. The progressive movement of the 20th century builds on a different view of human nature and metaphysics (originating in, but ultimately transcending, Hegelian Idealism), and therefore finds itself in tension with the principles of the Founding. This tension is one of the animating forces of American political partisanship today, so an understanding of the development of American political theory will help us to better understand political disagreements in our own day. (Available online)

AS.450.697. All in the Family: Power, Scandal, and Fall. 3 Credits.
From the Roman Empire through today, ruling families have had a profound effect on the social, political, and cultural lives of their people. It was believed wealth, power, and nobility from birth formed the perfect formula to rule over the lower class. However, the rise of humanistic study, merchants, explorers, revolutions, and colonialism threatened and ultimately destabilized their wealth and power. As a result, the rise of the middle class, emerging political systems, and development of national identities gave way, arguably, to the dissolution of absolute power predominately in the Western world. We will consider the following ruling families: the Julio-Claudian, Ptolemaic, Ming, Hoehnstaufen, Habsburg, Medici, Aragon-Castille, Tutors, Capetian, Romonovs, and current House of Windsor.

AS.450.699. Great Books in Great Contexts. 3 Credits.
What makes a “great book” great? In this course, which emphasizes deep reading and discussion of some of the influential writings that have shaped the intellectual and cultural heritage of our world, we will begin to try to answer that question. Along our journey, we will explore seminal texts including Homer’s Odyssey, The Song of Roland, Shakespeare’s Henry V, Shelley’s Frankenstein, and Conrad’s Heart of Darkness. In studying these great books and their historical contexts, we will employ elements of literary criticism, identify common and enduring narrative themes, and reflect on the inclusion of each of these texts as part of the Western Canon. Students will select one text on which to write an in-depth research paper (in consultation with the instructor).

AS.450.700. "The Souls of Black Folk": Evolving Conceptions of Leadership in African American Literature and Culture. 3 Credits.
Equal parts historical study, sociological investigation, and cultural analysis, W. E. B. Du Bois’ classic work, The Souls of Black Folk, exemplifies the type of interdisciplinary and multidimensional approach employed by political and social theorists in their efforts to make sense of the fundamental conditions, contours, and characteristics of political life in modern societies. Paying particular attention to Du Bois’ account of race, the role political leadership, and the relationship between leaders and the masses, we will put Du Bois’ seminal work in conversation with a number of other prominent Afro-American voices, including Frederick Douglass, Booker T. Washington, Ralph Ellison, Martin Luther King Jr., James Baldwin, Cornel West, Barack Obama, Ta-Nehisi Coates, and Keeanga-Yamahtta Taylor. By attending to Du Bois’ political engagements as well as literary representations of political leadership that have been influenced by him in one way or another, students will have the opportunity to explore the premises and implications of racial politics as well as some of the creative ways in which African Americans have sought to overcome racial domination. What are the appropriate roles and responsibilities of political leaders? What is the nature of their relationship to the community? What are the foundations of legitimate leadership and authority? What form should black politics take in order to overcome white supremacy? How should we understand the relationship between class, gender, race, and sexuality? (Available online)

AS.450.704. Poetry and the Visual Arts. 3 Credits.
This seminar will explore relationships between the languages of poems and those of the visual arts, including painting, drawing, sculpture, and photography. We will begin by discussing theoretical essays contrasting verbal and visual artistic expression, and go on to consider, for example, poems based on paintings (Auden’s Musee des Beaux Arts and Breughel’s Fall of Icarus); poetic images that make use of a pictorial tradition (Chinese ink painting in Li-Young Lee’s Persimmons); reciprocal tensions in the poetry and visual art of a single artist (Derek Wolcott); the use of similar techniques, such as the symbolic coding of color, in poems (Wallace Stevens) and in painting (Marc Chagall); and the individual responses of several poets to the same work. The class will use a blog for the posting of visual images and other class-related materials. Requirements will include short papers/commentaries and one long paper.

AS.450.710. The Mind of Leonardo Da Vinci. 3 Credits.
Leonardo da Vinci (1452–1519) was one of the most fascinating individuals in history. He is the creator of what are arguably the world’s two most famous paintings: the Last Supper and the Mona Lisa. He was also a brilliant scientist and engineer; he made dozens of original anatomical discoveries (for example, he injected hot wax into an ox brain to demonstrate the shape of the ventricles), and he invented hundreds of devices (from ball bearings to a steam cannon). He was well-known as a musician, court entertainer, and even as a practical joker. Who was Leonardo? What do we know of his personal life, including his thoughts on religion, sexuality, or politics? What personal traits shaped his genius? This course explores his thousands of pages of manuscripts; his paintings and other artistic projects; his scientific projects (including anatomy, physiology, botany, and geology); and his civil and military engineering projects. (Available online)

AS.450.717. School and Society: Education Reimagined, Possibilities Disclosed. 3 Credits.
<p>This course will engage in a discussion of the current realities and challenges present within the United States' PK-12 education system. We will examine a range of perspectives on what does (and doesn't) work in our educational policies and practices. While this endeavor will entail a critical examination of the status quo, it also will invite students to recognize what is possible and inspiring in the work many courageous educators accomplish in the midst of challenging times. The course will address the following questions: <o:p></o:p></p><ul style="list-style-type:disc">
What are the aims and purposes of education? What should be the content of the curriculum? What are the implications of structural inequality in schools? What are the roles and responsibilities of teachers and students? What are the issues that impact 21st century schools? <p>Instead of seeking tidy answers to these course questions, you should approach this class as an invitation to enter into an ongoing discussion of: <o:p></o:p></p><ul style="list-style-type:disc">
The factors that characterize the relationship that exists between school and society; The principles that underlie the decisions made by those who have the power or capacity to alter that relationship; and
The challenges faced by those who strive (and usually struggle) to resolve competing demands upon this relationship. <p>Please note: this course does not require a background in the field of education. Although practicing teachers are welcome to join this course, it has been developed for a wider audience. <o:p></o:p></p>

AS.450.723. WWII in Visual and Literary Art. 3 Credits.
The length and massive scope of World War II make it singular in the history of warfare: never before had the entire globe been involved in such a protracted and technologically sophisticated war. Since the end of World War I, the weapons and machinery of war had become increasingly lethal, culminating in the advent of advanced, long-range aircraft and the successful manufacture of the atomic bomb. Fighting took place on land, at sea, and in the air, and casualties were huge: over 60 million people were killed, including c. 50 million civilians. Predictably, the war generated new forms of literature and art and made particular use of photography, which for the first time enabled a detailed and often horrific visual record of events. In this seminar, students will focus on important novels and films that appeared in response to WWII, as well as on the photographic record of the war. An emphasis will be placed on using these sources to understand the major historical and military events of World War II as well as the efforts made by soldiers and civilians to survive it.

AS.450.724. Science Fiction Film in the 20th Century. 3 Credits.
This course provides a survey of Science Fiction Film from the early part of the 20th century, and the very beginnings of film, through 2002. We will look at influential filmmakers and will analyze the basic components of the genre through science fiction origins (A Trip to the Moon, Metropolis), "classics" (The Day the Earth Stood Still, Invasion of the Body Snatchers), cult/fan favorites (Star Wars, Blade Runner) and will conclude with a section focused on the 1990s and the dystopic imagination (The Matrix, Minority Report, 12 Monkeys, Gattaca, and Dark City among others.) The goal is to develop critical analytical skills in understanding the role of science fiction within culture. How is science fiction defined? What is the role of science fiction literature in the creation and development of the formula? What is the "science" that drives the science fiction? What does it mean to be human? What is the view of the future, of technology? How are cultural and social concerns expressed through formula? The films and filmmakers are placed within a larger historical, cultural, and social context as we explore film as an industry, as a technology, as a form of communication, and as an artifact of culture.

AS.450.728. On the Shoulders of Giants. 3 Credits.
<p>Since the year 1865 and the passage of the 13th Amendment, America has struggled with its ability to assure the right of all Americans to achieve full participation in our democracy. There have been short periods of advancement, but they have typically been followed by devastating rollbacks of hard fought gains. The new Jim Crow has a chameleon-like character, disguising its true intent and malevolent designs with code words and strategic policies that erode the rights of all citizens, but are detrimental to African Americans and communities of color more than to others. <o:p></o:p></p><p>This course will focus on a number of social justice giants and critical movements or organizations from the 1940s through the present. Key topics will include an examination of certain critical flashpoints in U.S. history that are strikingly similar to the years immediately leading up to, encompassing and following the Obama presidency, with an eye to identifying the social, economic and cultural forces that are at once the precipitants and undoing of these unique movements in time. We will attempt to understand how these forces shaped and were in turn shaped by powerful women like Anna Julia Cooper, Nancy Cunard, and Audre Lord whose life work inspired and provided the intellectual framework for the activism of later generations, led by Angela Davis, Fannie Lou Hamer, and Kimberle Crenshaw. The poet, novelist, playwright, and columnist Langston Hughes, who, along with WEB Dubois, was one of the most committed artists and intellectuals of the Harlem Renaissance, provides a bridge from that period to a new vanguard of voices like James Baldwin, Ralph Ellison, Lorraine Hansberry, Gwendolyn Brooks, Sonia Sanchez, Nikki Giovanni, Maya Angelou, Toni Morrison, August Wilson and many others. This period of cultural literacy was also responsible for rediscovery of influential writers like Zora Neal Hurston, who shared the stage with Langston Hughes during the Renaissance. Hughes, along with Paul Robeson, a true giant among men, confront head on, the worst of American paranoia and censorship, providing an example of courage and perseverance with enormous relevance to the writers, actors, and filmmakers of today and to the artists of all future generations. <o:p></o:p></p><p>Our hope in this journey is that we might find the paths to elevation of our own spirit and commitment to our fellow man. <o:p></o:p></p>

AS.450.736. Medieval England: From Beowulf to the Battle of Bosworth. 3 Credits.
This course traces this history of England from the Anglo-Saxon invasions of the fifth and sixth centuries to the political unrest and economic crises of the fourteenth and fifteenth centuries. Approaching medieval England through the broad lenses of myth-making, nation-building, and identity-creation, we will focus on some of the larger trends and developments that help explain the distinctive liberalism and individualism of English culture, e.g. the breakdown of feudalism, life in the medieval town and on the manor, the origins and evolution of the common law, and the rise of Parliament. Our exploration will take the shape of a multidisciplinary journey and will include in-depth analysis of art and literature as well as religious and political texts.

AS.450.738. MLA Core: Why Read the Classics?. 3 Credits.
There are three questions that rest at the heart of this course: What is meant by the term “classic” when we refer to works of literature and poetry? Why is it worthwhile to read the classics? and What would you include in your personal library of the classics? We will turn to authors, poets, and philosophers for their wisdom and guidance on the topic, and we will read a number of works to help refine our understanding of what the classics mean to us. In doing so, we will engage in close readings of each text, find ways to bring them into dialogue with one another, contemplate the insights they give into the human experience, and explore their relevance in our everyday lives. Students will be asked to write analytical, creative, and reflective responses to these works and to consider the classics that are meaningful to them.

AS.450.739. Race and Jazz. 3 Credits.
The music known as jazz has been celebrated and performed by peoples throughout the world. This course will examine the music itself as well as the role that race has played in the creation of jazz, the perception of its history, and the perceived authenticity of present-day jazz. We will examine the music from a historical perspective through the study of the music and lives of its creators and practitioners beginning with precursors in ragtime and minstrelsy and continuing into the modern era. Students will learn to make aesthetic judgments, identify various jazz styles, and discuss their relevance to their time and to the present. Classes are planned to include guest artists from the Baltimore jazz scene, examples in various media, and live performances by the instructor. (Available online)

AS.450.741. Apocalyptic in the Bible, Religion, and Popular Culture. 3 Credits.
This course explores primary sources of apocalyptic literature in the Bible, the ancient Near Eastern world, and various religions and cultures. In seeking to define the term “apocalypse,” the class will study the political, social, and economic forces that contribute to the formation of this rich genre of literature. Utilizing this knowledge, students will analyze manifestations of apocalyptic in movies, television shows, comic books, and other media.

AS.450.745. Aristotle and Hobbes: Physics, Psychology, Ethics and Politics. 3 Credits.
<p>This will be a course focused on two goals: clarifying the importance of foundational principles (in this case, the different teachings on physics we find in Aristotle and Hobbes), and clarifying the distinctions between the ancients and the moderns. We will be concerned with questions about nature, matter, motion, the soul, ethics, politics, philosophy, and human life – both as such, and in their complex interrelationships. <o:p></o:p></p><p>To address these questions, we will read the works of two extremely important thinkers – the ancient Greek philosopher Aristotle, and the 17th century English philosopher Thomas Hobbes. Aristotle, writing at the dawn of what becomes the Western tradition of philosophy and science, investigates everything under the sun, writing foundational works in fields as diverse as rhetoric, psychology, biology, logic, physics, and metaphysics. If one understands Aristotle, one can understand much of what comes after. Thomas Hobbes writes after the modern “revolution” – a revolution accomplished in the thought of diverse thinkers, especially Machiavelli, Bacon, and Descartes. One crucial element of this revolution is the rejection of both Aristotle and Scholasticism (Christian Aristotelianism). In this course, we will engage in close readings of Aristotle’s Nicomachean Ethics, as well as parts of his Physics and his On the Soul, and Hobbes’s Leviathan. Reading these two thinkers in dialogue with one another will allow us to see how their fundamental disagreements about physics and causality give rise to subsequent differences in how they conceive humanity, psychology, ethics, and politics. In attending to these differences, we can more clearly identify the debts that we owe to both Aristotle and Hobbes for our understanding of ourselves and our civilization. <o:p></o:p></p>

AS.450.746. Deep Ecology: Environmental Ethic. 3 Credits.
Today, the concerns of Deep Ecology’s movement that started in the so-called Ecological Revolution of the 1960s continue to be debated and addressed as “climate change” with a sense of immediate urgency. Deep Ecology asks deep questions and aims to bring about long-range goals in moving away from anthropocentrism to ecocentrism, calling for a major paradigm shift in perception, values, and lifestyles. Planetary and human survival is at stake due to climate change — this is humanity’s global ultimate concern. Scientists, environmental activists, and representatives of humanities agree that we need a new paradigm shift, that it is unsustainable to treat the living earth organism as an infinite resource of “energy.” Western environmental practices have been based on anthropocentric view of nature where humans occupy the top of the hierarchy in the chain of life. There is an urgent need for a new environmental ethic that will fundamentally reorient humans in their thinking and relating to the natural environment. The course examines cross-cultural perspectives of environmental ethics that are rooted in Western/scientific, Eastern, and Indigenous worldviews and religions. This semester’s readings include current debates concerning climate change, selections from Deep Ecology movement and indigenous perspectives.

AS.450.748. The Black Politics of Michael Jackson. 3 Credits.
Michael Jackson was a global superstar who reached crossover appeal in the late 20th century. More than a mainstream pop performer, Michael Jackson was musician, singer, dancer and visual artist who transformed his artistic heritage, deeply grounded in the African American tradition, to reach a broad audience, in the United States and globally. This course aims at reframing Michael Jackson's cultural and social origins to reveal his anchor in the African American musical, philosophical and political traditions. This course will explore the African American historical context of the 1960s, Black vernacular practices, the Chitlin Circuit, the Great Migration, Black Minstrelsy, the intersection of Blackness, Sexuality and Gender in pop culture, Black Globalism, and 1980s Black Hyper-visibility. In this course, students will closely examine Michael Jackson's music, videos, writing and performances, Jackson's meta-narratives, in addition to theoretical texts on critical race theory, American History, gender studies, performance studies and African American Studies.

AS.450.758. American Literature and the Archive. 3 Credits.
Why are some literary works from the past reprinted, anthologized, and considered worthy of study, but not others? Why are some works "lost" and some "rediscovered," while others simply fall out of favor? What is the relationship between the canon and the archive? Focusing on the relationship between authorship and status in nineteenth- and early twentieth-century American literary history, we will use rare books and archival materials from JHU libraries and digital collections to investigate the writings, publications, archives, and legacies of authors such as Edgar Allan Poe, Walt Whitman, Emily Dickinson, Stephen Crane, Charles Chesnutt, Gertrude Stein, Ezra Pound, Zora Neale Hurston, and Langston Hughes.

AS.450.761. Documenting Baltimore Through the Photographic Image. 3 Credits.
<p> In this course, students will explore and photograph six of Baltimore's historic areas:<o:p></o:p></p><ul style="list-style-type:disc">
Waverly and Greenmount Avenue
The East Side: Milton at Preston
Druid Hill Park
Old Chinatown and Howard Street
The Northern Arts District
Stony Run
<p>In the process they will gain proficiency using digital cameras and learn the fundamentals of image processing in Lightroom and Photoshop. There will be a photography field trip and lab each week as well as lectures that concentrate on the documentary image, its history, theory and practice. As the culmination of the course, students will submit a final paper and portfolio of ten images that work together in a series. <o:p></o:p></p><p>Disclaimer 1: This course requires walking distances of up to two miles. If, for any reason, there may be an issue with this requirement, please contact Student Services Coordinator Manal White at 202-663-5956 or mwhite@jhu.edu. <o:p></o:p></p><p>Disclaimer 2: A limited number of cameras are available to be loaned, and registered students should inform the professor as soon as possible if they would like to request one.<o:p></o:p></p>

AS.450.762. Race and Ethnicity in the United States. 3 Credits.
This course examines the historical, cultural, and structural dimensions of race and ethnicity in the United States. We will examine key theories about the ways race and ethnicity are constructed and influence intergroup dynamics; engage in debates regarding definitions of race and ethnicity and forms of prejudice and discrimination; and review and analyze empirical evidence related to racial and ethnic disparities in economic status, educational attainment, health, employment, and the criminal justice system. The course will examine the racial and ethnic experiences of a range of individuals and communities, including intersections with gender and immigration status. We will begin by reviewing a series of key readings in racial and ethnic studies that establish central concepts, theories, and historical contexts. Using a variety of sources, this course will examine the racial diversity of America and the enduring implications of racial and ethnic pluralism. Throughout the course, students will work to expand their critical thinking and reflection skills, make meaningful connections between ideas and everyday experiences, and better understand how the personal experience of race and ethnicity interacts with larger social and historical forces. We will also discuss the ways people work to mitigate and overcome racial and ethnic disparities. (Available online).

AS.450.766. Deconstructing Capitalism. 3 Credits.
<p>After the fall of the Communist regimes 25 years ago, it was assumed in the West, and throughout much of the world, that the Capitalist economic system is the best possible economic system, indeed, the best by nature, and our destiny as a species. This was of course not always the preponderant view. For most of its history, Capitalism was not supreme, and its supremacy was not self-evident, but rather, it knew significant competition.<o:p></o:p></p><p>In recent years, important criticisms of Capitalism have emerged. It seems the Capitalist system may not be so 'inevitable' after all—there are many unhappy with the way it has been rolled out globally, and how it has progressed (or regressed) in the US and Europe. Some critics argue that we just have not been capitalist enough; the key to more widespread prosperity is to embrace capitalism more fully, and a purer version thereof. Some argue that the economic system is not engineered correctly, at the moment, to share its fruits. As a result, we are mired in ever worse inequality, which may prove to pose major political problems in the near future. And then some critics still argue—in light of the environmental damages due to market expansion, for example—that capitalism is incompatible with our furtherance as a species. In this course, we will visit a number of authors and theorists making such cases.<o:p></o:p></p>

AS.450.767. American Civil War and Reconstruction. 3 Credits.
The American Civil War and Reconstruction will include an analysis of the origins, interpretations and causes of the conflict, a study of the institution of slavery and its legacy, a review of the ante-bellum culture of the Old South, a comparison of the political leadership in the Confederacy and the Union, a study of the war years, a comparison of military leaders and their strategies, an examination of the outcomes of the war, an introduction to the rise of the new south and a review of the legacy of Reconstruction.

AS.450.771. Black Queer History. 3 Credits.
This course explores the history of black queer cultures in America. In continuous dialogues with mainstream black and LGBT cultures, black queer discourses have unceasingly redefined the boundaries of sexuality, class, color and gender through history. Starting from slavery, this course will explore black queer struggles, desires, imaginations and victories to understand present-day discourses on race and sexuality. Topics explored include: cross-gender behaviors in slavery, same-sex sexualities in slave narratives, homoerotic sadism and lynching, sexological categories and scientific racism, intimate friendships, Drag Balls, The Harlem Renaissance, rent parties, black-and-tan clubs, Jazz, black queer religious leaders, black queer DC, black nationalists and sexuality, Disco, House music, HIV/AIDS, trans identities and TV black queer characters.

AS.450.772. MLA Core: Ways of Knowing: Historical and Epistemological Foundations of the Liberal Arts. 3 Credits.
This course addresses the philosophical foundations, historical traditions, and contemporary debates associated with liberal arts education. It will explore the underlying theories and principles of liberal education and it will assist students in understanding the different epistemological principles and assumptions that are present within the disciplines that are associated with the liberal arts. Students will compare the interpretations of knowledge, truth, and validity that exist across quantitative, qualitative, and conceptual ways of knowing and conducting research. By the end of the course, students should have developed a greater understanding of the significance of their MLA degree as well as greater clarity concerning the epistemological foundations of their studies.

AS.450.774. Existentialism: Philosophy and Social Critique. 3 Credits.
Alienation, ambiguity, anxiety, absurdity, authenticity, belief, despair, dread, death, freedom, joy, and responsibility—all of these are concerns associated with existentialism and its pursuit of what it means to exist, to be a self, to be a being. This course is structured around a series of critical engagements with some of the most prominent and profound thinkers who contributed to the formation, development, and extension of existentialism; together we will trace trajectories of existentialist thought from early articulations in the 19th century (Kierkegaard, Nietzsche, Dostoevsky), through prominent European pronouncements in the wake of the First and Second World Wars (Jaspers, Sartre, De Beauvoir), to the works of Afro-diasporic writers (Fanon, Wright, Baldwin) who explore the complex relation between being and being black. Through these engagements we will approach existentialism not just as a series of abstract claims, questions, and concerns, but also as a critical method for interrogating issues related to the embodied, interpersonal, and historical dimensions of human life. What critical resources can we find in existentialism for illuminating questions of identity and difference and for making sense of contemporary struggles regarding race, gender, class, and sexuality?

AS.450.781. The Global Cold War. 3 Credits.
The Cold War was anything but for much of the so-called Third World. Although the United States and Soviet Union did not come to blows, millions of lives were lost throughout Latin America, Africa, and Asia as the superpower struggle fueled local and transnational conflicts over decolonization and modernization. This course will examine the Cold War's effects across the globe and, conversely, the ways in which conflicts and actors in the global South shaped the outcome of the US-Soviet standoff and shaped the contemporary geopolitical landscape. Sources will include works of scholarship such as Conflicting Missions, Hanoi's War, and The Last Colonial Massacre; primary works like Discourse on Colonialism and essays from Jawharlal Nehru, Fidel Castro, and Ché Guevara; and films such as The Battle of Chile and The Act of Killing.

AS.450.790. Six Degrees of Miles Davis. 3 Credits.
Miles Davis is one of the most important and influential figures in modern music. His innovations as a bandleader, composer, and musician have made an enormous impact on our concept of jazz music as well as our perception of a jazz musician. Following his personal life leads to Picasso, Norman Mailer, Jimi Hendrix, Prince, Cecily Tyson, and many more. This course will examine his contributions to jazz in particular and his impact on society in general through his autobiography, biographies, and documentaries with special emphasis on his recorded works. We will also use the popular 'six degrees of separation' theory as a starting point in discussing the nature of innovation. (Available online)

AS.450.801. MLA Independent Study. 3 Credits.

AS.450.820. MLA Capstone: Portfolio. 3 Credits.
The Portfolio should be taken during a student's final semester in the MLA Program. It is a capstone option that is designed to help students reflect on their learning in the MLA program and to identify the connections across their coursework. It consists of a series of newly-composed essays along with a sampling of assignments that serve as evidence of learning and intellectual growth. The goals of this capstone project are for students to articulate what the MLA program has meant to them, exhibit their mastery of the program-level learning outcomes, synthesize lessons learned across a range of different courses and topics, and evaluate how the MLA program has met their goals and expectations. The Portfolio can also have a practical application for students who need to meet professional development requirements, to help them explain how the MLA Program has prepared them for a change in professional direction, and for students who hope to leverage this degree into additional graduate study.

AS.450.830. MLA Capstone: Graduate Project. 3 Credits.
The Graduate Project should be taken during a student's final semester in the MLA Program. This course prepares students for advanced research in the Liberal Arts. Students will engage the resources, methods, and problems of graduate-level research, investigate the scholarly literature of topics in their area of interest, design a research or creative project and develop a plan for sustained research and professional participation in their field of study. Starting in Summer 2022, AS.450.600 MLA Core: Interdisciplinary Graduate Research Methods will be a required prerequisite for AS.450.830 MLA Capstone: Graduate Project and for AS.450.850 MLA Capstone: Internship. Once the prerequisite requirement is in place, students must take Interdisciplinary Graduate Research Methods at least one semester prior to enrolling in either of those capstone courses. There will be no prerequisite required for students who enroll in AS.450.820 MLA Capstone: Portfolio.
You must complete AS.450.600 in order to register for this course.

AS.450.850. MLA Capstone: Internship. 3 Credits.
A third option in the MLA Capstone is the Internship; students who choose this option take one IC course, 8 electives, and register for a particular internship, which will culminate in a detailed research report, as the their tenth course. Please contact the program director for more information on internship options. Starting in Summer 2022, AS.450.600 MLA Core: Interdisciplinary Graduate Research Methods will be a required prerequisite for AS.450.830 MLA Capstone: Graduate Project and for AS.450.850 MLA Capstone: Internship. Once the prerequisite requirement is in place, students must take Interdisciplinary Graduate Research Methods at least one semester prior to enrolling in either of those capstone courses. There will be no prerequisite required for students who enroll in AS.450.820 MLA Capstone: Portfolio.
You must complete AS.450.600 in order to register for this course.

AS.450.888. MLA Capstone Continuation.
This course is open to MLA students who have not completed their capstone projects and who need an additional semester to complete their work. It functions like an independent study.

AS.455 (Film and Media)

AS.455.610. Foundations of Immersive Storytelling: Theory & Practice. 3 Credits.
This introductory course will provide students with the tools and the mind set for making compelling VR/AR experiences. While the industry is nascent, the technological and storytelling innovations move forward at breakneck speed. Students will also, each class, dissect to understand the approaches to the current catalog of immersive experiences, ranging from 360 film, to animation and room scale installation experiences, often with creators who made them to understand challenges and lessons learned. Subsequently, after this overview, students will have the option to build their own prototypes and, also, to support a VR/AR project housed within the program with a leading artist.

AS.455.611. Screenwriting Workshop. 3 Credits.
This will be an intensive writing class that will go from basic film idea through the development of a three act outline to the completion of a full first draft screenplay. Each student is required to come to the first class with one or two ideas for a completely new screenplay. Please do not bring anything for which there is a previous outline, treatment, or draft of a script. The focus of the class will be the structure of the feature screenplay as a function of thematic coherence—the structure of the film is determined by what the story means. We will analyze films by act, sequence, and scene to understand dramatic action as a tension between different possible outcomes. There will be five weekend intensive workshop sessions, divided between Friday evening and Saturday that will include some lecture components, some viewing and discussion of films, and reading and discussion of student work. Between the weekend workshops there will be weekly writing assignments and individual Internet or telephone conferences. Expect a relatively heavy workload. A completed first draft screenplay will be a requirement for completion of the class.

AS.455.613. Stories Matter: How immersive experiences and new technologies create social change. 3 Credits.
This course will explore the ways in which emerging technologies and immersive media—including artificial intelligence, mixed reality, machine learning, spatial computing, and blockchain—can be used to advance the goals of social impact and social justice. Covering the topics of interactivity and storytelling, it will also discuss questions of flow, agency, design thinking and human centered technology. Each session will include case studies, and there will be presentations by leading experts in the field, followed by in-class discussions. Students will be expected to design and prototype original immersive projects, as well as read and write short essays throughout the semester.

AS.455.615. Episodic Writing Workshop 1 – The Pilot. 3 Credits.
This course will expose students to the mechanics and realities of writing an original pilot for a television series, from concept through beat sheet to draft. Each student will finish the semester with a mini-series bible, a detailed outline and the first half the draft of the pilot. Dramatic goals, character arcs, operational themes will be a few of the many subjects covered.

AS.455.616. Episodic Writing Workshop 2 – Comedy. 3 Credits.
This workshop teaches you how to write a television script for your favorite half-hour comedy. In this class students will learn the basics of script writing, from premise lines and beat sheet, to writing pages, punching up dialogue and polishing the draft. The focus here will be on a writing a "spec" script for a current television half-hour comedy, critiquing and workshopping the script as one would in a professional writers' room. Though in this class we will not be developing and writing pilots, we will discuss the process and students will learn the basics of pitching an idea to networks. This course is designed to prepare students for the professional world.

AS.455.618. Episodic Writing Workshop II - The Writers' Room. 3 Credits.
Imagine your one hour dramatic pilot script has just been picked up to series, congratulations. Find out what really happens in the writers room to turn one pilot into many episodes. Learn how to add depth to your original characters, create new ones and develop future storylines. Having already completed or substantially completed a one hour dramatic pilot script is a plus, but not required. Taught by Tammy Ader Green, a writers room veteran and the creator/showrunner of the long-running Sony series “Strong Medicine.”

AS.455.619. Business of Non Fiction Film & TV. 3 Credits.
In an era of record-setting festival acquisitions and a thriving demand for nonfiction content from television, theatrical and streaming platforms, it is evident why our cultural moment has been described as a modern “golden age” of documentary filmmaking. But for an aspiring filmmaker, what is the best way to break through and navigate this terrain from the business perspective? Covering avenues related to storytelling approach (feature-length, series, short form etc.), producing and exhibiting work (pitching, budgeting, fundraising, proposal-writing, festival strategy, distribution, etc), and the organizations and outlets on the forefront of documentary decision-making, this course aims to situate students in the contemporary market of nonfiction filmmaking. Over the course of the semester, students will develop an idea for a nonfiction film or series into a refined pitch and proposal, applying the strategic knowledge gained from a series of lectures, screenings, case studies, and conversations with established industry professionals and filmmakers.

AS.455.620. Fundamentals of Business 1. 3 Credits.
This comprehensive business seminar is centered on presentations and interactive sessions with experts in the field, the study of relevant case studies and the creation of sample plans and strategies by the students. During the first semester we cover such subjects as entertainment law, film finance, production, marketing, public relations and distribution. Emphasis is placed on analyzing and recreating actual and relevant case studies and business situations. Other subjects include sales estimates, comps, tax credits, festivals, release strategies and the art of the pitch.

AS.455.621. A Filmmaker's Guide to Protecting Your Work: Intro to Intellectual Property & Entertainment Law. 3 Credits.
By dynamically using real-life case studies as a basis for discussion and learning, students in this course will explore the legal and business affairs aspect of filmmaking. We will examine the meaning and structure of copyright law, fair use, option & purchase agreements, key crew & talent agreements, distribution agreements, tax credit/rebate statutes, music licensing and product placement deals, among other topics.

AS.455.624. Social Impact Documentary Filmmaking. 3 Credits.
In this hands on course, students will learn the basics of documentary filmmaking from development through post production and social impact. Through a series of screenings, discussions and real-time filmmaking exercises, students will engage in a process of exploration and discovery focused on honing each filmmakers personal voice. There will be a strong focus on telling stories with a clear and provocative point of view. Students will leave the course with a strong bio and personal statement, and having completed 3-5 minute documentary on the subject of their choosing.

AS.455.625. Creative Producing & Line Producing. 3 Credits.
Through in-class projects, interactions with working producers, line producers and AD's and on-going independent productions, students will be exposed to the myriad responsibilities of producers, from the creative and on-the-field perspectives. We will explore the many elements that make up the creation of films and television shows, with a focus on a producer's creative input from development to post production to a producer's understanding of the nuts and bolts fundamentals of how to budget and schedule.

AS.455.626. Mixing Sound for Picture. 3 Credits.
This course is a practical exploration of all aspects of mixing audio for film and tv. The students will prepare to mix during the first half of the semester, topics will include dialog editing, automated dialog replacement (ADR, or "looping"), Foley, music editing and sound effects spotting as well as basic sound design. Recording of ADR and Foley will take place in the studio at the JHU-MICA Film Centre using condenser and dynamic microphones. The class will shift its focus in the second half of the semester to re-recording mixing, exploring both the technical and creative aspects of mixing. Students will learn to mix in the Film Centre's control room using Avid Pro Tools HD software for Apple macOS with proprietary and third-party software plug-ins. Upon completion of the course, students will know how to provide final mix files as well as stems, i.e. mix minus, M&E, dialog, sound effects, and music. Projects will include spotting, prepping, building and mixing a short film or series of scenes.Class will occur during a three-hour weekday evening throughout the semester in the sound studio of The JHU-MICA Film Centre, where students will work as a class to record and edit group projects and, schedule permitting, individual projects.

AS.455.629. Key Business and Legal Considerations for Creators. 3 Credits.
It is an exciting time to be a creator, but with constant and vast changes in the media industry including the ongoing emergence of new technologies and evolution of distribution platforms, threshold business and legal considerations have never been more complicated, or important. This class is structured around a single production project, from conception to exploitation. Students will learn to form a Limited Liability Company, understand and negotiate key agreements, strategically engage cast and crew members, negotiate licensing deals, obtain production insurance, participate in festivals/live events and distribute their project.

AS.455.630. Recording Sound for Film. 3 Credits.
This course serves as an orientation to the recording studio and the craft of capturing sound with microphones. Topics will include sound behavior (i.e., basic acoustics), human perception of sound (i.e., basic psychoacoustics), microphone theory and techniques, signal flow and processing, basic digital audio theory, and the digital audio workstation (Pro Tools and Logic Pro). Projects will include in-studio and location recordings. By the end of the semester students will be able to effectively navigate the studio at the Ten East North facility and capture sound on location for use in subsequent classes. Should be taken prior to or concurrently with AS.445.631 Designing Sound for Film.

AS.455.632. Sound on Film I. 3 Credits.
According to director George Lucas, "sound is half of the picture." Great directors have always known the secret power of sound in filmmaking. While film is certainly a visual art, take out the sound and you have lost "50% of the film," as director David Lynch has said. In this course, we follow the rapid ascent of sound in film, from early talkies to the emergence of sound as an art form of its own. We will trace the technological innovations and study the artists who helped develop the nuanced language of sound in film, surveying a variety of cinematic genres and analyzing different approaches to sound design. By the end of the course, students will have an understanding of the history of sound in film, the tools and techniques used to create soundtracks, and the essential role sound plays in the cinematic experience. The course will include extensive readings as well as viewing films, writing analytical papers and a lively ongoing discussion.

AS.455.634. Designing Sound for Film and Media. 3 Credits.
Explore the use of software and hardware as a means to create, capture, and edit music and sound for picture. Examine the role of music and sound in media and develop the skills to operate software instruments and Digital Audio Workstations. Gain an appreciation for the craft of composing music for picture - including fundamentals of music, 'spotting' a scene, and creating simple music 'cues'. Additionally, learn about editing and recording sound effects and dialogue to create complete soundtracks that incorporate soundscapes and musical compositions.

AS.455.635. Sales, Acquisitions and Marketing. 3 Credits.
This class will explore the ways films reach an audience. We will examine festival strategy and traditional theatrical distribution as well as changing ancillary and online markets. Case studies of successful marketing campaigns across genres and platforms will be used as evidence. Testimonies by guest lecturers who work in the field of distribution will supplement the core syllabus.

AS.455.637. Comedy Writing - TV Spec Script. 3 Credits.
This course will expose students to the mechanics and realities of writing a spec script or pilot script for episodic comedy, from concept through beat sheet to draft. We will study, analyze and break down a specific television show then proceed to sketch out a spec episode based on that show. Each student will finish the semester with a detailed outline and the first pages of the draft. Genre, act structure, dramatic dialogue and cold-opens will be a few of the many subjects covered. In this course, students will be working on a half-hour comedy series.

AS.455.638. Technology and the Future of Humanity. 3 Credits.
Humanity at once refers both to all human beings, in their different forms and manifestations, and to standards of humaneness – including love, benevolence, care, and dignity. This course will examine questions of how are we to be in this world (individually and collectively) with technology; how are we now; and how should we be. It will do so by engaging in a wide-ranging survey – delving into questions of ethics (of information, of privacy, of environment) and complexifying what forms of knowledge we ascribe value to (drawing on indigeneity and indigenous forms of knowledge, for example). The course will then examine specific instances of humane applications of new technology in the fields of peacemaking and peacebuilding, psychiatry and intergroup relations, and storytelling by those on the margins (indigenous communities, victims of climate change, conflict and violence, and the socioeconomically disempowered). From that point, using a speculative design and thinking framework, the course will challenge students to reflect on desirable and undesirable futures, and likely futures. With a backcasting approach, the course will ask students to consider what systems, milestones, decisions, activities, policies and strategies need to be in place to effect desirable futures.

AS.455.640. Graduate Filmmaking Studio I. 3 Credits.
This two-semester course is the centerpiece of the graduate experience. The studio meets for three hours weekly and is co-taught with the MICA MFA Program. This hands-on studio is where good, smart and compelling movies are born. Students will work in groups, particularly during their first semester. While writing and editing are often solitary activities, production is not. Great films are collaborations and students will be expected to work in teams. Group discussions and critiques are balanced with individual meetings with faculty and visits with guest filmmakers. Special emphasis will be placed on ways that filmmakers can build and reach an audience. Students will explore the diverse ways filmmakers are sustaining careers while creating high impact films. Students will have the opportunity to create a wide range of short form work over the course of the 2 semesters.

AS.455.641. Graduate Filmmaking Studio II. 3 Credits.
This two-semester course is the centerpiece of the graduate experience. The studio meets for three hours weekly and is co-taught with the MICA MFA Program. This hands-on studio is where good, smart and compelling movies are born. Students will work in groups, particularly during their first semester. While writing and editing are often solitary activities, production is not. Great films are collaborations and students will be expected to work in teams. Group discussions and critiques are balanced with individual meetings with faculty and visits with guest filmmakers. Special emphasis will be placed on ways that filmmakers can build and reach an audience. Students will explore the diverse ways filmmakers are sustaining careers while creating high impact films. Students will have the opportunity to create a wide range of short form work over the course of the 2 semesters.

AS.455.642. Advanced Cinematography Workshop. 3 Credits.
The Director of Photography has instrumental role in crafting the final look of a film. In the course, the four creative roles of the cinematography department – Camera Operator, Gaffer, Key Grip, and Dolly Grip are examined in-depth. Through a series of screenings, discussions and workshops, the students learn many of the dynamics between these roles. In class, students will mount detailed and intricately lighted shots. Students will work with the Arri Amira, a professional motion picture camera. Camera topics include camera settings & trouble shooting, on-set data management, ALEXA color science, working with LogC, look management, and dailies creation. Prerequisites: AS.455.640 (Graduate Studio I) or a demonstrated basic camera proficiency

AS.455.643. The Future of Cinematic Gaming. 3 Credits.
An introductory course that provides students with an overview of the process to create innovative and meaningful cinematic stories in the evolving field of interactive games. From concept to completion, the class will explore the creative architecture, production process and technical considerations necessary for developing for the new wave of interactive entertainment across platforms. Drawing from theoretical and production frameworks in game design, narrative and documentary filmmaking, art, immersive theatre, and motion capture––critical attention will be given to intuitive and engaging design. The hands on portion of the class will culminate with students developing a prototype for their own original interactive cinematic project.

AS.455.644. Podcasting Fundamentals. 3 Credits.
In this introductory course, students will ultimately create their own short podcasts around stories that are meaningful to them and their intended audiences. Students will enact principles of listener-centered design, they'll work to find stories worth telling, and they'll learn to tell those stories powerfully. This course will build competency in recording and editing techniques, interviewing skills, creating story structure, and understanding the potential social impact of documentary work. Students will also study current monetization strategies in the booming podcast market and learn how to find, keep, and grow an audience.

AS.455.645. Production for Creative Technology. 3 Credits.
This intermediate course takes you through the workflows of producing compelling narratives with emerging technologies like VR, AR and AI. Students will get an opportunity to work collectively on a project with the deadlines, pressures and challenges that come with delivering a quality product for a world class client. Students will also prototype existing ideas and proposals developed in other ISET courses, or new ideas generated from class, to create something that can be showcased in their portfolio, or be utilized long term as a capstone project. Prerequisite: Students must have taken as least one ISET course though some exceptions will be granted on a case by case basis.

AS.455.646. TV Series Development: Pitching, Process, Pilot. 3 Credits.
Do you have an idea for what you believe would make a great TV show? Find out what really happens in the television development process. Over the course of the semester, you will develop and pitch up to three ideas as well as write a series bible and select script scenes for one. Taught by television writer/creator/showrunner and pitching veteran Tammy Ader Green, this course will teach you what it takes to go from dreaming to streaming.

AS.455.647. Virtual Production: A New Era of Filmmaking. 3 Credits.
<p>Lush and realistic virtual worlds that were recently impossible are suddenly commonplace. These synthetic scenes surround us, hidden in sweeping virtual backgrounds on film sets or featured prominently in seemingly endless videogame landscapes. While breakthroughs in computer graphics and game engines make this possible, new tools make it common. The hidden development conjuring up seemingly anything is a new class of reality capture and filmmaking tools that creators to quickly bring the real world into virtual spaces. These are the tools of virtual production and volumetric filmmaking. </p><p>This course starts with personal stories, transforming a vivid memory into a sharable immersive experience with tools and insights from volumetric filmmaking, virtual production and game design. Students learn how to adapt a script for immersion, 3D modeling, photogrammetry scanning, and applying techniques like virtual lighting, virtual cinematography, and the basics of motion capture and volumetric capture to bring their scene to life. The course invites students to create lush and imaginative worlds immediately with common hardware – mobile phones and computers. </p>

AS.455.648. Directing Workshop. 3 Credits.
Students develop and workshop short narrative scripts that they write. The course covers working with actors and understanding the filmmaking process from the actor's point of view. Students visualize their scripts so they are prepared to work with a Producer, Director of Photography and additional crew. The course also explores techniques of blocking and staging action for the camera, with emphasis on the practical problems and aesthetic questions that arise.

AS.455.650. Script to Screen. 3 Credits.
This course de-mystifies the film development process and teaches students the key tools necessary for a successful career as a film executive or producer. This course will chart the key stages of finding and preparing a good project for production. These steps include how to find, evaluate, obtain rights and shape material from the producer's perspective. The course will examine strategies employed by filmmakers who adapt existing IP and literary works to the screen. Detailed comparisons between cinematic adaptations and the novels, plays, and short stories on which they are based. Case studies of literary works that pose a variety of challenges to filmmakers.

AS.455.651. Film Financing. 3 Credits.
Successful producing involves the bridging of the creative with the commercial. Effective producers need the skills to structure and manage fundraising efforts on behalf of their productions and establish a comfort level in defining and promoting their projects as commercial ventures.<o:p></o:p></p><p>At its conclusion, students should have a working command of both the theory and the practice of raising money for film, television and new media productions and the skill-base to embark confidently on their own fundraising efforts. Students will learn of the various mindsets of attorneys, financiers, and other professionals and master the vocabulary of content as investment. Finally, students will understand how to mix- match financing strategies and approaches as is appropriate for each particular project.<o:p></o:p></p>

AS.455.652. Digital Media: Storytelling & Strategy. 3 Credits.
We live in a world where content is queen and more money is being poured into original content than ever before, but what does this deluge of money and distributors mean for creators? In this course we'll take a dual-pronged approach to the digital media landscape—looking at business strategy and creative process in tandem to understand how to take a holistic approach to selling content in a shifting marketplace with an ever-increasing number of buyers. How is digital distribution of video changing the traditional media business models? How does a content developer create a scalable business in this environment?This course will feature a practical element in which all students will pitch, develop and produce digital content, melding business strategy with creativity to create saleable IP with potential for multiple distribution partners and revenue streams. The course will feature industry executives and independent creators as guest lecturers.

AS.455.800. Capstone for Film & Media. 3 Credits.
Guided by meetings with the instructor and other guest speakers from the industry, students research, develop and deliver a final project that demonstrates skill in one or both of their concentrations. Ideally, this project will be completed in collaboration with a student or students from the JHU MA or MICA MFA program who are completing their own capstone projects.

AS.455.801. Independent Study. 3 Credits.

AS.455.803. Capstone Continuation for Film and Media (non-credit).
Capstone Continuation is required for those students who have taken the Capstone Course but not yet finished the required and approved work.

AS.460 (Museum Studies)

AS.460.601. Exploring Museum Professions. 3 Credits.
Managing a 21st-century museum relies upon the coordinated efforts of a wide range of specially skilled staff from directors, curators, and educators to collection managers, conservators, and exhibition designers to event planners, press officers, fundraisers, and administrators to media, IT, membership, security, and facilities management teams. These professionals working behind-the-scenes or out front with the public define the quality of the institution and each visitor's experience. Through readings and interviews with leaders in the field, this course examines the core functions of a museum and explores how the roles and responsibilities of museum professionals assure an organization's daily operation, growth and sustainability. Current issues facing museums, including diversity in the workforce, financial challenges, and the effects of technology will also be addressed. In addition, students will engage in activities to help strategize their own museum career. Note: This course may be taken as an elective, if you have taken 460.602 to meet the requirement.

AS.460.602. Museums in the Digital Age. 3 Credits.
The ever-expanding use of digital technologies in museum practice is more relevant today than ever before. Technology has changed the traditional role and scope of the museum through global communication, interaction with diverse audiences, and promotion of cultural understanding. The use of technology in the museum field is introducing new forms of audience engagement and access, challenging exhibition concepts, and affecting the museum's core operations. This course explores the impact of technology on the museum, including an examination of the current uses and effects of digitization, social media and mobile technologies by these institutions, while considering future possibilities in the digital realm. Students in this course engage in a Twitter project for professional research and networking, as well as apply the basic concepts of strategic planning to a museum technology project.

AS.460.604. Introduction to Museum Education. 3 Credits.
This course introduces students to the critical and fundamental educational function of museums, the core responsibilities of museum educators, and the impact of museum education practices in a pluralistic society. We review theories of how people learn, current teaching practices in museums, and the unique roles that objects play in an informal learning environment. We analyze the wide range of audiences for education programs, approaches to developing museum programs and interpretive projects, and strategies for measuring success. We learn how museum educators advocate for and activate diverse perspectives internally and externally in order to make museums more inclusive, empathetic, and user-centered.

AS.460.606. Exhibition Strategies. 3 Credits.
This course introduces the diverse strategies and approaches used in exhibition planning, development and implementation. It asks students to think critically about exhibitions and the interface between objects, concept and experience. The course focuses on visitor-centered interpretive design and is applicable to a wide range of institutions. Students spend much of the semester working together in small teams, collaboratively producing a comprehensive exhibition project as they walk through the practical steps in exhibition development and design. Note: Because of the high level of online group work, this course is not recommended for first semester students.

AS.460.608. The Business of Museums. 3 Credits.
Museums are stewards of cultural patrimony, disseminators of knowledge, and agents of civic and social awareness. They are community icons, places of respite, economic drivers, and centers of informal education and public engagement. In serving these functions, museums must deal within a hyper-competitive entertainment and commercial environment. While they serve the greater good, they must function as businesses. As nonprofits, they cultivate financial and community support from individuals and donors. They also rely on fees, grants, sponsorships, retail operations and other strategies to survive. This course is a journey through the business side of the museum world. Students will explore the range, fundamentals, and subtleties of the museum world including mission, governance, programming, management, finance, fundraising, public relations, legal and ethical issues, technologies, risk management, audience engagement, leadership, and strategic planning, all in the context of current news stories and events.

AS.460.610. Two-Week Onsite Seminar. 3 Credits.
A two-week or 10-day intensive period of on-ground museum study in a location organized by the MA in Museum Studies program. The seminar includes practicum opportunities in a variety of museum settings, conversations with local museum professionals, and class sessions that integrate the daily experiences. Using the rich diversity of museums in the designated location, this course provides students with the chance to use what they have learned in their prior courses, develop networks with fellow students and museum experts, and explore the latest in museum practice. Seminars may require some assignments prior to arriving onsite. Students work on directed activities during the two-week period, coupled with multiple site visits focused on the academic work being accomplished. Daily journal entries and a post-seminar reflection paper require students to synthesize knowledge gained across courses in the Museum Studies program. Note: As a prerequisite students must have completed a minimum of six courses in the program to register for this course, one of these courses must be 460.601 or 460.602 (students seeking an exception to the pre-requisite requirements can apply to the Program Director). Students are responsible for travel to and from the location, accommodations, and meals, as well as any specified field trip fees. Waiver option: Students who are unable to travel to a seminar location due to accommodation needs, financial hardship, or family challenges may apply to the program director for a waiver to the two-week seminar. If a waiver is granted, the student must enroll in the Virtual Seminar option (460.752) to fulfill related components of the degree requirement. Students may also apply to the Program Director to substitute the Cultural Heritage Management Seminar (465.708) for the Museum Studies Seminar.

AS.460.611. History & Philosophy of Museums. 3 Credits.
From cabinets of curiosities to historical monuments and sites of memory, this course surveys museum history from a global perspective to examine how the museum's function has changed over time. Students create a comprehensive timeline of museum history and philosophy —thinking through and visualizing the way certain concepts and events are related in time and across space. Through case studies and course readings in museum history, theory and methods, students will contextualize the philosophical trends that have impacted organizational structures, outreach, collection strategies, and the museum's role and relationship to its public.

AS.460.615. Museums and Community Engagement. 3 Credits.
This course explores how museums and cultural organizations of all sizes can strengthen their relationships with the communities they serve. No longer are museums measured and judged solely by their internal resources—collections, endowments, facilities, and staff—but rather by the external benefits and value they create for individuals and communities. Growing numbers of museums are learning to make their organizations more meaningful and relevant by involving their communities in ongoing planning and decision-making. They are reframing museum activities to focus on what matters to their communities. By getting involved in community challenges and developing new partnerships, they are identifying underserved audiences and creating memorable visitor experiences. As museums begin this journey towards community engagement, they are initiating and facilitating social change and moving towards social entrepreneurship. This course includes the theory and skills of community engagement, drawing on both research and practice for examples.

AS.460.616. Museums, Law, and Policy. 3 Credits.
Legal issues and concepts are a fundamental part of the day-today management of museums and the policies that shape the nature of museums. This course introduces students to theways in which museums are affected by the law and key legal concepts. Discussions and assignments will address practical concerns as well as policy and conceptual matters, incorporated cases, mock negotiations, and group discussions. Students will be able to identify issues from hypotheticals and relevant legal concerns and resources. The course will help students understand legal matters in museum practice in an applied manner. Legal and policy discussions will include current issues in copyright, freedom of speech and censorship matters, and collections issues including cultural heritage developments.

AS.460.618. Museum Controversies: Ethical Issues in Museums. 3 Credits.
Museum directors, curators, and other staffers have faced an array of political and ethical dilemmas in an increasingly contentious environment. This course explores the historical,political, and cultural backgrounds to controversies surrounding exhibitions such as the Smithsonian's display of the Enola Gay, the Brooklyn Museum of Art's "Sensation," the British Museum's Elgin Marbles, and the showing of illegally acquired antiquities at various art museums. Nationalism, religious beliefs, obscenity, and "edutainment" are among the issues discussed.

AS.460.619. Museums, Race, and Inclusion. 3 Credits.
For over two decades, museums have been grappling with how to increase participation and engagement with community members who are historically under-engaged. By and large, the 2012 Center for the Future of Museum's Report informs us that of the core group of museum visitors, less than 10% represent visitors of color. This course will examine the historical arch of diversity and inclusion initiatives in the field including recent activism as engineered by museum activists and change-makers of the Inclusive Museum Movement. We will explore and define discourses of participation within museum scholarship. This course will use interdisciplinary pedagogies such as Critical Race Theory and Social Inclusion Theory as informative frameworks to help us interrogate our current museum praxis, the museum space, and how invisible social structures such as institutional racism, privilege, and oppression impact our understanding of terms such as diversity, inclusion, equity, and access. In this course, we will explore why race matters in museums and seek to create and identify new discourses on diversity and inclusion for a more vibrant, 21st century museum social ecosystem.

AS.460.620. Accessibility in the Museum. 3 Credits.
Making museums and their information and collections accessible to people with disabilities concerns more than ramps and restrooms. People with disabilities can encounter barriersto every aspect of the museum experience, from finding out about exhibitions and educational offerings before a visit through advertising or the museum's website; to getting to, intoand around the museum galleries and other public spaces; to hearing tours and lectures, reading labels and signs, and using interactive tools; to participating in educational programs. This course will introduce students to the key concepts and issues associated with making museums accessible to and inclusive of people with disabilities.

AS.460.621. Museum Evaluation and Audience Research. 3 Credits.
This course explores audience research and evaluation theory, methodologies, and practical implementation in museums and similar environments. The class explores the three main stages of research and evaluation - front end, formative and summative - and what can be achieved at each stage, with a focus on exhibition and program evaluation. Each semester a museum client presents a real project; in small groups students develop clear research questions, an evaluation plan, an interview tool and an observation tool, all in conjunction with the client. A final presentation ensures the client's evaluation needs are met and workable tools have been created. Students also spend time developing individual projects for their own museums, or museums in their communities. Emphasis is given on evaluating the holistic visitor experience, examining what is working and what is not - educationally, physically, and socially. This course is useful to all museum professionals, in any role within a museum, whether you plan to conduct, oversee, or in any way participate in audience research and evaluation.

AS.460.622. Evaluation Projects and Practice. 3 Credits.
Building on the successful introductory evaluation course, this more advanced course will allow students who have completed the initial course to develop and complete a full evaluation project. It will emphasize hands-on application, including tool development, data collection, data management, and data analysis. Students will begin with a project in their community, they will develop evaluation questions and an overall evaluation plan, collect a rigorous sample size, and then analyze and present their findings in both written and oral final presentations. Prerequisite: Evaluation Theory & Techniques for Museums (460.621)

AS.460.628. Architecture of Museums. 3 Credits.
This course serves as an introduction to museum architecture, including the history of museum buildings, as well as current case studies of renovations, expansions and new facilities. We will discuss the relevant topics in creating a physical museum space, such as developing a museum program, planning the visitor experience, developing wayfinding systems, building a green museum, and incorporating technology in the initial plan. We will analyze museum buildings from multiple perspectives, including visitors, staff and collections. Students will learn how to evaluate an existing museum building and will be guided through a mini-POE (post-occupancy evaluation) of a museum in their community.

AS.460.630. Exhibition Design, Construction, and Documentation. 3 Credits.
Understanding the exhibition design process, from concept to implementation, is valuable not just for exhibition developers, but also for registrars, curators and museum educators. Looking beyond artifacts, storyline and aesthetics, this course examines the rarely explored, but essential, aspects of exhibition design, from drawings and specifications to contracting and installation. Topics will include drawing packages and project documentation, schedules, client and developer responsibilities, project budget, architectural coordination, fabrication techniques, and legal and practical contracting considerations. As with general construction, the exhibition designers and fabricators follow industry standards, and whether a museum is a public or private organization, specific rules must be followed for solicitation and contracting.
Prerequisite: Exhibition Strategies(460.606)
460.606 is a pre-requisite for 460.630

AS.460.632. Practice of Public History. 3 Credits.
Twenty-first-century public history has expanded beyond the simple definition of "history outside the classroom" to include almost any effort to develop and communicate history-related content, from museums and historic houses to movies and social media, to inform, and even influence, audiences. This course provides a comprehensive overview of public history as a modern, engaging field of practice, with a skill-building focus on digital storytelling as the key tool for reaching existing audiences and building new ones. It is now a heavily democratic field in the sense that it can be practiced anywhere, by anyone — and therein lies additional challenges for museum and public history professionals. Consequently, we will cover the fundamental elements of practicing public history — including fundraising, governance, interpretation, and countering false narratives — while also introducing students to the process of digital storytelling, which merges the strength of visual and audio media with the power of narrative storytelling to produce informative and persuasive history-related content. By the end of the course, students will have a working knowledge of the ways that modern public history practitioners understand their roles and leave with a toolkit of new media skills to help them shape their own careers.

AS.460.633. Conservation-Restoration: A 21st Century Approach. 3 Credits.
Conservation-Restoration has existed for hundreds of years, and conservators have been active in museums and the heritage industry since their inception. This course will explore the history of conservation-restoration, how it has changed over time, where it is today and where it might be going tomorrow. Students will become fluent in conservation-restoration research methods and publishing sources, able to identify good sources for information, and to understand the ethical issues in the field. The Getty Art and Archaeological Technical Abstracts (AATA) Online have partnered with this course to provide material for students to review, abstract, and publish on their online bibliographical database. The final project will be the culmination of a semester's worth of research and writing about a conservation-restoration or collections topic and presented as an encyclopedic article in Wikipedia.org. On completion of this course students will be able to call themselves a Wikipedian and a Getty AATA abstractor and they will have a working knowledge of the field of conservation-restoration as it applies to museums and the heritage industry. Prerequisite: Collection Management (460.666).
460.666 is a pre-requisite for 460.633

AS.460.634. Museums, Libraries, and Archives: Issues of Convergence for Collecting Institutions. 3 Credits.
“Convergence” has been a buzzword for archives, museums, and libraries for most of the past decade. This course will look at areas of convergence among the three communities, focusingon issues that relate specifically to collecting institutions. Class work will involve the history of collecting and the development of the three communities (archives, libraries and museums) inthe United States in the late 19th century/ early 20th century, before delving more deeply into ideas and ideals, missions, professional training, conservation, ethics, and services that areshared among these communities. In the final weeks we will focus on how technology can help shape ongoing dialogues.

AS.460.635. Curatorship: Principles and Practices. 3 Credits.
Whether the museum is large or small, public or private, has several curatorial departments or a single director/curator, it must have a way to fulfill its curatorial obligations. Everyone in the museum should understand the institution's curatorial responsibilities, and every museum should have a curatorial strategy suited to its collection and/or its exhibitions. In this course, students will study principles and practices relating to core curatorial functions, learn about the relationship of curatorship to the museum's mission, investigate current challenges facing museums and curatorial staff, and consider how technology is changing the ways museums fulfill their curatorial responsibilities. Students will research, write about, and present objects; draft an acquisition proposal; and work almost exclusively in groups for the second half of the semester to create and present an exhibition proposal.

AS.460.636. Living Collections. 3 Credits.
Zoos, aquaria, botanical gardens, and nature preserves, like many other museums, are collection-based institutions. This course explores the unique character of these institutions in their core functional areas including the special considerations and challenges of caring for, interpreting, and exhibiting living collections. Developed by three museum professionals with specialties in terrestrial, aquatic, and botanic institutions-course topics are explored through the lenses unique to plants, animals, and marine life. In addition to understanding the core functional areas of these museums students will analyze the complex social role of cultural institutions which are devoted to the living world.

AS.460.637. Curating Online Exhibitions and Experiences. 3 Credits.
Today, every museum must have an effective online presence. Increasingly, museum professionals from multiple disciplines – curatorial, collections management, new media, publications, external affairs, etc. – need to collaborate to create online exhibitions and experiences. It is essential that museum professionals have a solid grounding in the theory of online curation, as well as the practical skills to plan, design, and implement online exhibitions and experiences that capture the imagination of online museum visitors. Students will discuss questions such as: What are the unique challenges of curating online? How are the aesthetics of online spaces similar and/or different from traditional bricks and mortar museum galleries and exhibit spaces? What strategies and methodologies can the curator and other museum professionals apply to successfully educate, inform, and engage online exhibition visitors? What are the trends in curating online museum exhibitions, and where does the future lie in this exciting new area of the museum field? Course readings, assignments and discussions will culminate in a research paper on current trends in online curation in museums.

AS.460.638. Preservation of Analog and Digital Photographs. 3 Credits.
This course will explore the main principles in caring for analog and digital photographic collections. It has been designed as a broad approach to the subject, but with enough depth to give the student an approach to the care for photographic collections with both historical and natively born digital photographs. This course will provide this insight from looking at the materials that photographs are composed of, understanding the materials and environment that they are housed in, and the technologies and workflows needed to care for analog and natively born digital photographs for long-term preservation. Students will be required to build and present a case study and a final project discussing a topic related to the course.

AS.460.639. Material Culture and the Modern Museum. 3 Credits.
From the Mona Lisa to Archie Bunker's easy chair, museums play a critical role in the collection, preservation, and interpretation of objects. This course looks closely at the development of material culture studies and its connection to museums in the 21st century. Students will explore collecting as meaningful action, the classification of objects (from academic categorizations to tags and folksonomies) and their access (from collections to archives, to physical and virtual display). Student-developed object biographies will be used throughout the semester to explore the life history of objects, their changing meanings, and their relationship to self, society, and the museum. Note: Students are strongly encouraged to have completed two courses in the program before registering for this course.

AS.460.640. Educational Programming for Museum Audiences. 3 Credits.
Educational programming for today's museums requires more skills than ever before, from defining mission-driven educational goals to conducting summative evaluation, from understanding learning theory and characteristics of a myriad of museum audiences, to designing and implementing technology solutions. Students in this course will learn the steps needed to design sound educational programming in museums, including developmentally appropriate learning theory and strategies for audiences such as children, families, adults, teachers, and students.
Prerequisite: Introduction to Museum Education (460.604)

AS.460.649. Immersive Technologies and the Future of Museums. 3 Credits.
What are immersive technologies and how will they shape the future of museums? This course examines how emerging technologies, such as Augmented Reality (AR), Virtual Reality (VR), 360° technology, spatial computing, and machine learning can be used to support the museum's mission in an ever-evolving landscape of interactive and immersive experiences. Students will learn the fundamentals of a variety of technologies and how they can be used to enhance museum goals such as audience engagement, curatorial and exhibition initiatives, educational programming, and documentation. Students will analyze case studies of how museums are currently using immersive technologies in order to envision future applications.

AS.460.652. The Practice of Museum Publishing. 3 Credits.
As content originators, museum curators, educators, conservators, public relations officers, development staff, and others will hold a stake in the publications process at some point in their careers. This course presents an overview of the range of print and electronic publications typical—and not so typical—of museums and the processes required to make them happen. Students will gain an understanding of schedules and budgets, the editorial process, design concepts, copyright issues and printing, as well as how new technologies have affected both the way museums think about publications and how they get produced.

AS.460.655. Expanding Roles of Museum Marketing and Communications. 3 Credits.
Major changes in technology have dramatically shifted how people consume information. It is critical for museum professionals to understand this and to adapt their marketing and communications strategies in order to compete for attention in an increasingly busy and competitive world. Looking through the lens of audience development, the course explores how museum marketing and communications professionals are empowered to target and engage audiences and the strategies they employ to do this work. From understanding the basics of the marketing mix and the science of public relations to surveying advances in digital advertising and exploring case studies highlighting innovative practices within and beyond the field, this course is a comprehensive primer for museum marketing and communications today.

AS.460.657. Fundamentals of Museum Fundraising. 3 Credits.
Through a combination of current and historical readings, case studies, discussions, and written assignments based on "real-life" scenarios, this course will cover general fundraising strategies and ethics, ePhilanthropy, prospect research, grant writing, annual and capital campaigns, corporate giving and cause marketing, special events and stewardship.

AS.460.662. Developing Effective Digital Engagement Projects for Museums. 3 Credits.
Shifts in audience attention, access, and expectations are forcing museums of all types to grapple with the challenges and opportunities presented by digital transformation. Developing effective digital engagement projects requires museum professionals to be well-versed in the techniques of user-centered design, which enable them to appropriately match technology solutions to the needs and realities of museum audiences. The course will provide an overview of the range of digital engagement opportunities in museums (i.e, web, mobile, social, interactives), with a focus on interpretive uses for education, marketing, fundraising, and scholarship. Students will gain hands-on experience in applying user-centered design techniques to a digital engagement project of their choice. The core project for the course includes conducting user interviews, identifying user problems and motivations, ideating potential solutions based on user needs, building and testing a prototype, crafting a marketing and evaluation plan, and pitching the project idea for approval or funding.

AS.460.663. Social Media Strategies for Museums. 3 Credits.
From #AskACurator to Snapchat selfies, social media has permeated the work of museum staff and the people who visit them. In this course, we will explore social media trends and their relevance for museums, including marketing, fundraising, education, and curatorial functions. Students will explore case studies, talk with leading museum social media practitioners, and develop social media strategies to meet specific museum objectives.

AS.460.665. Introduction to Archives. 3 Credits.
This course provides an introduction to the theory and practice of archives, including an overview relating to the elements of an archival program and the role and work of archivists. Special attention will be paid to the work of archivists in a museum context. The theoretical component of the course will be supplemented with a variety of hands-on exercises, case studies, and informed anecdotes designed to illustrate the relationship between theory and practice. Although American archival tradition will be the focus, international perspectives on archival theory and practice will play an important role in the course of study. Topics include: acquisition; appraisal; arrangement and description; preservation; reference; outreach; archival access systems; legal and ethical issues; and born-digital curation, including digital preservation.

AS.460.666. Collection Management. 3 Credits.
Museums exist to preserve and share their collections with the world. Collection managers, or registrars, are essential to any collecting institution, whether collections are art, history,science, or live specimens. This course focuses on management principles that can be applied broadly to any type of collection. The course covers all aspects of collections care from the acquisition of objects, evaluation, care and storage, through loans and exhibitions. Safe collections care and handling, using the most current methods, are emphasized so objects may be preserved for future generations. Any student who intends to work at a collecting institution will benefit from mastering the practical knowledge and skills underpinning many phases of museum work, which will be taught in this class.

AS.460.667. Collection Management Systems. 3 Credits.
Collections Management Systems, the workhorses of museum information technology, provide staff members and the public alike with access to collections information for a myriad of purposes. In this course, we will look at how these systems have evolved from their traditional role as registration tools to rich repositories of collection information, with the potential to interface with other types of systems, both inside and beyond the museum walls. This course introduces widely used museum Collections Management Systems in a series of developer-led presentations, providing students with the opportunity to evaluate how collections management transactions are performed using various software. Students will learn the basic features of Collections Information Policies and how to apply museum standards to analyze these policies. Data migration planning – from paper to electronic, and electronic to electronic --will be discussed, as well as emerging technologies used in conjunction with traditional Collections Management Systems. This is a must-have course for students with the goal of becoming a registrar, collections manager, or digital curator. Note: Students are strongly encouraged to take Collection Management (460.666) before enrolling in this course.

AS.460.668. Cataloging Museum Collections: History, Standards, and Applications. 3 Credits.
Cultural heritage institutions – including museums, libraries, and archives – have as core responsibilities the safeguarding of the objects in their care and the education of the public about these objects. To support both of these responsibilities, one of the foundational activities of cultural heritage professionals is the cataloging of the objects in their collections. This course will provide both an overview and practicum of cataloging definitions, philosophies, standards, and practices. Recordkeeping methods, numbering systems and data formats will be emphasized, and professionally accepted standards for cataloging various cultural objects will be reviewed. Discussion of the broad application of cataloging data sets, including cross collection aggregation and search, delivery to the public, and Web 2.0 and 3.0 delivery methods will be covered. Note: Students are strongly encouraged to take Collection Management (460.666) before enrolling in this course.

AS.460.669. 2D Digitization of Collections. 3 Credits.
This course will explore the main principles and best practices for planning and implementing two-dimensional digitization projects. The course is designed as a broad approach to this complex subject to give students the capacity to understand the important concepts, from theory to practice, of what is involved in a 2D, primarily textual and image resources, digitization project. This course will prepare students to have the main skills and critical outlook to be able to participate in digitization projects that entail different approaches and budgets.

AS.460.670. Digital Preservation. 3 Credits.
This course introduces students to the current state of digital preservation, preservation challenges, and basic concepts for designing effective digital preservation plans and programs. Topics include the relevance of digital preservation for museums; archival principles that inform preservation practices; standards and policies; considerations in preservation strategies; issues relating to formats, repositories, and processes; and emerging preservation solutions and services. Note: Students are advised to take 460.666 Collection Management before enrolling in this course; consult with the Digital Curation Program Coordinator for approval of exceptions.

AS.460.671. Foundations of Digital Curation. 3 Credits.
This course lays a foundation for managing digital information throughout its life cycle by introducing students to the emerging field of digital curation and by examining the practical issues and tools involved in managing digital collections and repositories over time. Topics include metadata schemas for describing digital assets in different disciplines; sharing digital content beyond the institution to reach wider audiences; requirements for trustworthy repository services; management of research data; policy issues; and user services. Note: Students are advised to take 460.666 Collection Management before enrolling in this course; consult with the Digital Curation Program Coordinator for approval of exceptions.

AS.460.672. Managing Digital Information in Museums and Archives. 3 Credits.
This course addresses technical and practical issues involved in the long-term management and preservation of digital assets, with an emphasis on the unique problems facing museums and archives tasked with preserving digital material of historical or aesthetic value. Subjects will include the fundamental models of digital curation and preservation, practical planning and design of digital curation strategy and associated workflows, a survey of the technologies commonly involved at the institutional level (software, metadata schemas), and a review of best practices for format identification, migration, and potential emulation of digital assets. Practical exercises are included that involve the use of Open Source, and free applications, such as the BitCurator digital forensics suite, and applications for packaging digital objects for submission to repositories. These topics will be presented within the context of analyzing the digital asset management practices (in the broadest sense) of individual institutions investigated by students. Prerequisite: Students must have completed Digital Preservation (460.670) and/or Foundations of Digital Curation (460.671) —preferably both—before enrolling in this course.

AS.460.673. Digital Curation Certificate Internship. 3 Credits.
The internship, including at least 120 hours of field experience, affords students the opportunity to gain hands-on experience working with experts who are leading digital curation activities in museums and related cultural heritage organizations in the U.S. and abroad. The internship is a partnership between the university and the host institution and is customized to meet each student's needs and career goals. The program will assist students in arranging appropriate internships. Student interns will produce evidence of their accomplishments through work products, project reports, or other documentation in an online course component and will participate in online discussion forums with other students enrolled in digital curation internships during the same semester. The internship is usually taken after completing at least two of the following core courses: Digital Preservation (460.670), Foundations of Digital Curation (460.671), or Managing Digital Information in Museums and Archives (460.672). Note: Students should discuss internship plans with the Digital Curation Program Coordinator at least one semester before enrolling in this course.

AS.460.674. Digital Curation Research Paper. 3 Credits.
The supervised research course enables students to investigate a significant problem or issue in digital curation and to develop and demonstrate critical thinking and communication skills. Ideally, the research paper will build on the student's internship experience. The research paper is expected to result in a publishable or presentable paper that makes a contribution to the literature and field of digital curation. As there is currently a significant need for research in digital curation, and relatively little published literature—especially relating to museums —student research in this program can make a major contribution, and graduates will be prepared for careers as leaders in the field. Course work, assignments, and meetings with a faculty member will take place in an online course environment. The research paper is normally completed as the final requirement in the Digital Curation Certificate program.

AS.460.675. Leadership of Museums. 3 Credits.
<p> Every museum career offers opportunities for leadership. Whether you head an internal project, lead a team, department or an entire institution, you draw from the same attributes and skill sets as leaders everywhere. Understanding that skill set and developing individual leadership competence leads to a career hallmarked by intentionality.</p><p>This course introduces students to the nature and practice of leadership through the vocabulary of competencies. It focuses on personal leadership development, beginning with an assessment of a student's leadership strengths and weaknesses while building awareness of challenges, best practices, and practical workplace applications. Through reading, discussion, interviewing current museum leaders, and reflective writing, students deepen their understanding of their personal leadership capacities, grasp the importance of self-awareness to leadership growth, and understand the range of competencies leaders must embrace to be successful in the rapidly evolving world of the 21st-century museum. </p>

AS.460.683. Project Management in Museums. 3 Credits.
Project management is the oversight and process of planning, organizing, and coordinating multiple tasks, resources, and stakeholders. In museum settings it often requires a choreographed juggle of scheduling, budget tracking, content and education considerations, facility and operations issues, and human resources; along with an ability to be flexible and calmly tackle unexpected challenges. This course will present both theoretical and practical concepts for initiating, planning, executing, monitoring, and completing projects in a museum. Using real world scenarios and different types of projects, the course will, provide students with tools and strategies necessary for project scheduling, task supervision, and stakeholder management. Project management is a learned skill, useful not only to those who will ultimately oversee a project, but to everyone who may eventually be part of a project team.

AS.460.684. Museums, Finance, and the Economy. 3 Credits.
This course examines how changes in the economy can affect museum income, expenditures, fundraising, endowments and attendance. It explores how various museum practicescan mitigate the effects of a weak economy and capitalize on a strong economy. Through case studies of large and small museums, students examine information sources thatmanagers use to identify changes in the local, regional, and national economy, which might affect their institutions. Students gain familiarity with economic and museum financialinformation by adopting two museums and tracking how changes in their finances and attendance relate to shifts in the economy. This course is critical for all students interested in the "behind-the-scenes" of museum management, including those with little or no background in finance or economics.

AS.460.685. Private Collectors, Collections, and Museums. 3 Credits.
An increasingly significant amount of our cultural and historical heritage is in private collections and outside the protective sphere of public institutions. Numbering in the tens of thousands in just the U.S., private collections span a great variety of objects reflecting the wide range of enthusiasts who collect them. This course will explore private collectors and trends in their collecting plus the similarities and differences between public and private collections and museums. It will help prepare students for the unique challenges they may face, illustrated by real world examples and interviews with collectors, curators, collections managers, and service providers plus hands-on experience. It will include developing problem solving strategies and project management skills they can use to adapt and implement institutional ethics and best practices, especially as private collections evolve into public museums.
Prerequisite: Collection Management (460.666)

AS.460.686. Culturally Specific Museums. 3 Credits.
Museums have the potential to provide safe spaces for comprehensive cultural inquiry. Culturally specific museums provide strategic platforms for showcasing diverse sets of art, history and culture with the intention of reaching a broad set of visitors. This course examines the significance of culturally specific museums, both individually and in relation to mainstream museums, to better understand how public culture engages issues of art, history, aesthetics, religion, ethnicity, and politics. Through the combination of contemporary reading material, survey of six national culturally specific museums, synchronous and a-synchronous discussion forums and guest speakers, students will discuss some of the ways in which culturally specific museums help make up the fabric of culture represented in museums in the United States of America.

AS.460.687. Provenance Research: Connecting Histories. 3 Credits.
Every object has a story and a history, and the study of objects and their contexts form the basis for provenance research. This course will expose students to the historical context of collecting around the world and will explore the various roles that provenance research plays in museums today, including within the realms of collections management, acquisitions, visitor engagement, publications, legal issues, and more. We will consider not only what provenance research is, but how it can be used as a valuable method for understanding the biography of an object, including its provenience, acquisition, and movement through time and space through a series of events and transactions. By focusing on specific areas of various fields of study, we will examine the overlapping but often distinct ways that provenance research can be utilized and what it can reveal. Through hands-on activities and representative case studies, students will undertake their own provenance research in order to understand the process and methodologies of a discipline that often encompasses many facets of inquiry and avenues of investigation.

AS.460.690. Science, Society, and the Museum. 3 Credits.
Museums have been shaping the public discourse on science for centuries. They serve as a bridge between science and society, a way for general citizens to connect with, engage, and increasingly contribute to scientific understanding. “Science, Society, and the Museum” presents the history of this intimate relationship, detailing the connection and affect that science and society have on one another, and the museum as the documentarian of that relationship. From Darwin and Sputnik to global change and extinction, the course emphasizes the responsibility of museums—past and present—to embrace their role in communicating science and increasing the scientific literacy of an engaged population.

AS.460.691. Innovation and the Modern Museum. 3 Credits.
This course explores how museums of all types (art, archaeology, design, history, natural history, science, etc.) around the world are seeking ways to incorporate innovation in their missions, practices, and displays. The current coronavirus pandemic has made innovative solutions all the more urgent. Topics to be addressed include theory and practice of museum innovation; tension between innovation and tradition; historical roots of museum innovation; nurturing an innovative culture; and the power of play. Guest presenters include experts on exhibit design and museum architecture from both conceptual and practical viewpoints. The course also looks to the future. It explores how “virtual museums” and cutting-edge digital technologies, including 3-D imaging and replication, will transform the presentation of as well as public access to artifact collections. Students will be urged to model innovation in discussion forums and in weekly planning exercises, culminating in a term project in which they develop their own original concept for an innovative museum.

AS.460.695. Museums of the Americas: Facing Challenges in the 21st Century. 3 Credits.
Take a journey inspired by the peoples, ecosystems, and cultures of the Americas and explore how a variety of museums, as well as related natural and cultural heritage sites, are responding to our shared challenges of social and economic disparity, climate change, heritage preservation, and human rights. Through video interviews and live expert sessions, mapping our journey, and sharing what we discover and learn, we will focus on innovation, community and civic engagement, and sustainable practices that we can adapt to museums where we work and live.

AS.460.750. Museum Internship. 3 Credits.
The Museum Studies internship affords students the opportunity to gain experience working withpractitioners in museums, archives, libraries, and related cultural heritage organizations, while also enrolled in an online internship course with other students. The internship is a partnership between the university and the host institution and is customized to meet the student’s needs and career goals. An internship at a museum, approved by the internship coordinator, will be counted as one elective course toward the degree. To fulfill the internship requirement, a student must complete a minimum of 80 hours of work onsite and a project (either a research paper or a practical product) on an approved topic related to their experience, due at the end of the semester. Students are enrolled in an online course, where they participate in discussions with classmates who are also doing internships and submit other associated coursework during the semester. Before registering for the internship option, the student should contact the internship coordinator for approval. At least four to six weeks before the beginning of the semester in which the internship will take place, the student must submit: 1) a description of the internship weekly duties including activities and/or responsibilities; 2) learning objectives and goals; 3) why this experience should be part of the Museum Studies degree; and 4) a signed letter of commitment from the internship supervisor. Note: Students must have completed a minimum of two courses in the program to be eligible to take the internship class.

AS.460.752. Museums in a Changing Time: Virtual Seminar. 3 Credits.
This virtual seminar will investigate, debate, and visualize pathways to successful museum leadership in turbulent times. Not only has the global Covid-19 pandemic upended nearly every museum operation, but the advancement of justice for social, equity, economic, and environmental goals is urgently and rapidly changing institutional missions. Interviews with thought-leaders from the museum sector will assist students as they problem-solve around real-world challenges and create informed action plans that are ready for immediate application. This virtual learning experience will feature topics of inquiry such as: Building resilience; supporting public health; advocating for justice, implementing de-colonization; and understanding digital implications. Each learning module features opportunities for students and instructors (asynchronous and optional synchronous) to discuss and debate issues and document their thinking in individual journals, discussion forums, and team blogs. This seminar includes practicum, collaboration, and networking opportunities and is available as an alternative to the required onsite seminar (with a waiver from the program director) and as an elective. All students complete a post-seminar reflection paper that synthesizes knowledge gained across courses in the Museum Studies program. This course runs for 6 weeks in Summer; 8 weeks in Fall and Spring. Note: As a prerequisite students must have completed a minimum of six courses in the program to register for this course, one of these courses must be 460.601 or 460.602. This course may be taken in lieu of the Two-Week Onsite Seminar (460.610) with a waiver from the Program Director, or it may be taken as an elective course.

AS.460.755. Museum Projects. 3 Credits.
This course expands opportunities for practical experiences beyond the onsite seminar and internship elective. Offered as an online experience, this course will involve students in anactual museum or museum-related project. Students will work in collaborative teams facilitated by a JHU faculty member and engage with museum professionals outside of the program. Thegoal of the course will be to establish a prototype or complete a real-life project of value to the museum field while interacting with current museum professionals. Museum Projects will beoffered on an occasional basis and will vary in topic. Different prerequisites will be set up each time the course is scheduled depending upon the specific project. In addition to weeklyresearch, writing and asynchronous discussions in the course management system, students should expect to participate in five to seven real-time online meetings throughout thesemester, dates of which will be determined by the Museum Project team in tandem with the project requirements and deadlines. Students must submit a Museum Project application form twoweeks before registration begins to be approved for enrollment in the Museum Project course. On this form, students will describe their interest in the specific Museum Project offeredand other applicable topics as requested, as well as confirm their ability to attend five to seven real-time sessions. A selection committee will review the applications and determineenrollment eligibility before the semester's registration begins. Enrollment limits may vary depending upon the project.
You must complete one of the following courses before enrolling in this course: AS.460.604 OR AS.460.606 OR AS.460.602.

AS.460.888. Continuation of Enrollment.
This course is open to any Digital Curation students who have not completed their Research Paper (460.674) and who need an additional semester to complete their work.

AS.465 (Cultural Heritage Management)

AS.465.702. Studies in World Heritage. 3 Credits.
This course offers an in-depth exploration of World Heritage by focusing on the concept of heritage, both tangible and intangible, its historical development, its international conventions, and the role of society and history in its past, present, and future. Students will be asked to engage critically with contemporary heritage concepts such as authenticity, ownership, assessment, value, and preservation that form much of our global understanding of the field of cultural heritage studies. Through case studies, lectures, discussions, and readings, students will explore international heritage policy as structured by the institutional complex, and consider both its local and global impact.

AS.465.704. Cultural Heritage Management/Leadership. 3 Credits.
Cultural heritage management is a complex intersection of theory and practice. This course will explore issues related to cultural sector management and leadership. Through the lens of current practice, we will examine core theoretical concepts and tools, including traditional approaches as well as the incorporation of emergent technology. We will look closely at the roles of the cultural manager and the proficiencies and characteristics needed for effective management and leadership within the cultural sector. We will consider changing definitions of protection and stewardship as they relate to cultural heritage as well as a larger framing of public interest, what publics, which interests.

AS.465.706. Research/Capstone in Heritage Studies. 3 Credits.
<p>The supervised research course enables students to investigate a significant problem or issue in cultural heritage and to develop and demonstrate leadership, critical thinking, and communication skills. The research project is expected to result in a written deliverable that makes a contribution to the field of cultural heritage broadly defined. Coursework, assignments, and meetings with a faculty member will take place in an online course environment. This course is normally completed toward the end of the degree program.<p>Potential students for this course must complete the Turning Your Topic Into A Good Research Question Research Skills Module and submit a Research Proposal/question form prior to registering. On this form, students will describe their topic and research question. Please reach out to your academic advisor in order to complete this step. The course instructor will review the proposals and determine project appropriateness and enrollment eligibility. Students will register for this course through the add/drop form. <p>This course is recommended for students seeking to satisfy 36 CFR 61 federal qualification standards. These are standards used by the National Park Service previously published in the Code of Federal Regulations. <p>The jobs of History, Archaeology and Architectural History include the following minimal professional qualifications (respectively):<ul style="list-style-type:disc"> Substantial contribution through research and publication to the body of scholarly knowledge in the field of history.
Demonstrated ability to carry research to completion.
Substantial contribution through research and publication to the body of scholarly knowledge in the field of American architectural history.

AS.465.707. Reading the Landscape: Cultural Heritage at Scale. 3 Credits.
This course examines the unique challenges faced by academics and practitioners in defining, preserving and managing rural, natural, and urban heritage at a landscape scale. The multiplicity of interests involved add to the complexity and require robust engagement strategies. Students will use a regional, national and international perspective to derive best practices for understanding the breadth of the cultural landscape concept and the opportunities for its sustainable development. Students are strongly encouraged to take this course before enrolling in the Two-Week Onsite Cultural Heritage Management Seminar (465.708).

AS.465.708. Two-Week Onsite Cultural Heritage Management Seminar. 3 Credits.

<p>A two-week intensive period of on-ground heritage management study in a location organized by the MA in Cultural Heritage Management program. The seminar includes practicum opportunities related to site management, heritage tourism, and conservation, alongside classroom sessions that integrate daily experiences. Using the rich diversity of the designated location, the seminar provides students with the chance to use what they have learned in their prior courses, develop networks with fellow students and heritage experts, and explore the latest in cultural heritage practice. </p><p>Seminars may require some assignments prior to arriving onsite. Students work on directed activities during the two-week period, coupled with multiple site visits focused on the academic work being accomplished. Daily journal entries and a post-seminar reflection paper require students to synthesize knowledge gained across courses in the Cultural Heritage Management program. </p><p>Note: As a prerequisite students must have completed a minimum of six courses in the program to register for this course, these must include 465.702 and 465.704 (students seeking an exception to the pre-requisite requirements can apply to the Program Director). Students are responsible for travel to and from the location, accommodations, and meals, as well as any specified field trip fees. </p><p>Waiver option: Students who are unable to travel to a seminar location due to accommodation needs, financial hardship, or family challenges may apply to the program director for an exemption to the two-week seminar. If a waiver is granted, the student must enroll in the internship option (465.780) and complete a synthesis paper to fulfill related components of the degree requirement. </p>

AS.465.710. The Protection of Global Cultural Heritage: Laws, Policies, Politics, and Advocacy. 3 Credits.

This course introduces students to cultural heritage law, as it relates to the interpretation, ownership, management, and protection of both tangible and intangible heritage. Using case studies taken from the court dockets and newspaper headlines, students will develop a solid background in relevant national and international legal concepts, while exploring how the law is implemented through policy and practice. They will also examine the impact of heritage's continuing politicization, including the use (and misuse) of heritage in public commemoration, nation building, armed conflict, and violent extremism. To this end, from a global perspective, and through a legal and policy lens, the course takes an in depth look at key challenges and controversies affecting the field. It considers what can and cannot—and, for that matter, what should and should not—be done to protect heritage, and how these decisions affect politics, economics, and security from the local to the international levels.

AS.465.712. Managing Cultural Heritage Resources. 3 Credits.

This course is a detailed introduction to the recognition, description, evaluation, and management of cultural heritage resources. The focus is on professional practice in the United States (US), but many of the basic activities, policies, and laws have parallels in other countries. Mainly this course is about tangible heritage resources, such as archaeological sites, historic structures, museum collections and archives, traditional cultural properties, and cultural and historical landscapes. However, some attention is given to intangible cultural heritage in assigned readings. Students with a particular interest in intangible heritage may focus on them in the course paper, in consultation with the course instructor. <o:p></o:p></p><p>Students will evaluate the different values that heritage resources have in general and for specific stakeholder communities. Class sessions cover the historical, legal, and regulatory background of heritage management; heritage resource management private and public organizations at local, tribal, state, and federal levels; professional practice in various kinds of heritage resource management organizations; the values that heritage resources may hold; methods for assessing the condition of heritage resources; how conservation, development, stabilization, rehabilitation, restoration, and protection treatments are applied; how modern technology is used in managing heritage resources; the challenges for the long-term, sustainability of heritage resources management; the ways in which heritage resources are interpreted for public audiences; professional ethical guidelines in heritage management; and, likely developments impacting the management of heritage resources in the future. <o:p></o:p></p><p>In the course, students will develop a major individual written project that also can serve as a professional tool for each participant to use in advancing his or her career objectives. <o:p></o:p></p>

AS.465.714. Culture as Catalyst for Sustainable Development. 3 Credits.

The role of cultural heritage in global developmental policy emphasizes a human centered and inclusive approach. The course will introduce students to the current global discourse on sustainable economic development and unpack the role of cultural heritage including the socio-economic impacts of investment. Students will consider the role of cultural heritage in long term development strategies and policy in order to assess impacts and effects. Cultural heritage will be considered as both a means and an end.

AS.465.716. Cultural Heritage Risk Management and Security. 3 Credits.

The 21st century has seen an unprecedented threat to our global heritage — from natural disasters, extreme weather events, and climate change, to military conflicts in some of our most sensitive areas of global heritage alongside the intentional targeting of cultural sites for destruction. In this course students will gain an understanding of the risks facing our global heritage. They will be introduced to a variety of security strategies and technologies implemented to protect and preserve sites from 21st century threats. And they will analyze the pros and cons of various approaches to create their own security and disaster mitigation proposals.

AS.465.720. Issues in Intangible Cultural Heritage. 3 Credits.
Thanks to the efforts of the United Nations Educational, Scientific and Cultural Organization (UNESCO) over several decades, the global heritage enterprise has been expanded to include 'intangible cultural heritage,' the often ephemeral and ever-changing cultural beliefs, practices, and expressions that are embodied and shared by communities, groups, and individuals all over the world. The course, Issues in Intangible Cultural Heritage, explores this relatively new category of heritage, tracing the development of the ICH concept and related policy through pre-cursor concepts, concerns, and activities at the global level, from the 1970s through to today. Grounded in a critical engagement with the heritage and museum studies literature, particularly the thriving international ICH discourse and debates, and through critical analysis of case studies from across the globe, students will explore the challenges that arise with respect to safeguarding and promoting living cultural beliefs, practices, and expressions, as well as engage with key features of conducting community-based ICH work of their own.

AS.465.730. Heritage Interpretation. 3 Credits.
Interpretation is a key component of cultural heritage management and the visible link between heritage and its diverse publics. This course considers current practice and emerging developments in the field as well as a broad range of heritage both tangible and intangible: from museums and sites, to archeological excavations, to urban and rural landscapes, and both the natural and built environment. It asks students to evaluate the role of interpretation in site management and looks critically at interpretation across global landscapes considering both the intended and unintended consequences of chosen narratives. This course looks closely at audience and community, the control of narrative and interpretation, and the short and long-term impact in terms of identity and access. As well as discusses the skills identified across the sector for heritage interpreters and how they are used to create effective experiences.

AS.465.732. Engaging Communities in Heritage. 3 Credits.
Museums and other heritage institutions are increasingly recognizing the value of "bottom-up" heritage programming. This class will explore issues related to community engagement in the heritage sector as well as strategize ways to engage various constituencies in the formulation, collection, and presentation of their heritage. We will use global case studies (as related to memory and memorial, sites of conscience, marginalized histories, indigenous heritage, and eco-museums) to explore the challenges faced by such projects. Examining both the failures and successes will result in a broader understanding of best practices in the field and help us formulate effective strategies for future engagement.

AS.465.734. Heritage Tourism. 3 Credits.
This course explores the practice and theory of heritage tourism and the history of its developments and impacts. Through the lens of sustainable economic development, it will examine the benefits and challenges of tourism and site management in both rural and urban contexts. We will look closely at the relationship between culture, heritage, and tourism by examining a range of topics including the use of natural and cultural heritage resources for tourism development, understanding tourism development and tourist motivations, impacts of heritage tourism, international examples of heritage tourism and the importance of sustainability.

AS.465.736. NAGPRA: Repatriation as Compliance or Ethical Practice. 3 Credits.
In the United States, the Native American Graves Protection and Repatriation Act (NAGPRA) outlines a process by which government agencies (and those who receive government funding) must return human remains and sacred objects to those who claim them. Repatriation is a complicated process because it means something different in almost every case. One of its earliest claims took 20-years to resolve. In 2017, the Ancient One was returned to the tribes of the Columbia River for reburial after DNA tests proved the relationship that tribes had claimed all along. But now reproductions of the Ancient One's skull are being sold by a company that holds the copyright. When those from outside the culture to which he was returned can examine and/or profit from a replica, the distinction between compliance with the law and the ethics of return is clear. Outside of the United States, few repatriation laws exist and many argue that institutions like The British Museum are the best places to protect world heritage. Is providing care of and access to human remains and cultural objects preferable over returning heritage to those from which it was taken? In this course, we examine repatriation claims around the globe in order to critique NAGPRA and establish a compliance toolkit. Where NAGPRA doesn't apply, heritage professionals can use the successes and failures of past repatriations, and a firm grounding in ethics, to make repatriation decisions. Nothing in NAGPRA prohibits practitioners from exceeding its scope and seeking out opportunities to build relationships with descendent communities even when repatriation is not required by law.

AS.465.740. Cultural Heritage in the Digital Age. 3 Credits.
<p>A Neolithic settlement in Scotland, at risk due to coastal erosion, is digitally preserved through precise 3D laser scanning; the construction of the massive towers at Cologne Cathedral is brought to life with digital photogrammetry and augmented reality; multilayered cultural heritage information, images, and damage assessments are catalogued in open source databases. These are just a few examples of how a growing number of scholars, researchers, and practitioners are using the latest technology as a means to document, visualize, interpret, and preserve cultural heritage worldwide. <o:p></o:p></p><p>This course will explore the ways in which cultural heritage professionals are implementing the latest digital technologies to enhance research, conservation, management and preservation of tangible and intangible heritage, as well as methods of education and engagement for visitors. Through lectures, readings, assignments, and social media, students will identify, analyze and debate the use of documentation, visualization and content creation technology currently being used in the cultural heritage engagement, studies and practice, as well as envision its use for the future. <o:p></o:p></p>

AS.465.780. Internship. 3 Credits.
An internship at a cultural heritage organization, approved by the internship coordinator, may be substituted for one elective course. To fulfill the internship requirement, a student must complete a minimum of 80 hours of work on-site and a project, (either a research paper or a practical product) on an approved topic related to his/her experience, due at the end of the semester. Students also participate in online discussion and course work during the semester. Before registering for the internship option, the student should contact the internship coordinator for approval. At least four to six weeks before the beginning of the semester in which the internship will take place, the student must submit: 1) a description of the internship weekly duties including activities and/or responsibilities; 2) learning objectives and goals; 3) why this experience should be part of the Cultural Heritage Management degree; and 4) a signed letter of commitment from the internship supervisor. Students must have completed a minimum of two courses in the program before registering for this internship.

AS.465.800. Independent Study. 3 Credits.

AS.470 (Government)

AS.470.600. Introduction to Graduate Work. 3 Credits.
This course is an introduction to graduate work and will not count toward your degree, but is designed to help students maximize their performance and excel in graduate studies. The course will combine class work with one-on-one advising and tutoring. The course will cover such topics as research, writing, citation, argument, using evidence, study habits, and managing a graduate-level workload. Teacher and student will meet at the beginning of the semester to assess areas of greatest need and tailor the course to meet them.

AS.470.601. Climate Change and National Security. 3 Credits.
This course provides an in-depth examination of how the effects of climate change could impact national security, international relations, and global stability. Students will begin by examining and discussing the current body of academic literature. As the semester progresses, students will learn and practice how to use cross-disciplinary resources and tools to envision potential relationships between climate change effects and security outcomes.

AS.470.602. Government & Politics. 3 Credits.
This course offers an overview of power and politics through the study of the government of the United States. All governments combine coercion and legitimacy. In a stable and legitimate system of government, coercion is hardly noticed. Government comes to be seen as a source of benefits. The purpose of the course is to look behind institutions, practices, and benefits to appreciate how, for what, and for whom we are governed. We shall examine some of the major institutions of American government, some of America's political processes, and some of the key forces competing for power in the U.S. to see how decisions in the areas of economic, social and foreign policy are reached. This is a core course of the Government Program but is open to all students.

AS.470.603. Introduction to Global Security Studies. 3 Credits.
This course introduces students to the basic concepts of global security studies, including theories of international relations, perception and misperception, theories of foreign policy, the varying concepts of security, and the elements of national power. It also includes a brief introduction to social movement theory. It applies these conceptual tools to selected security issues.

AS.470.604. Social Media and The American Presidency. 3 Credits.
This course will investigate the impact that digital technology has had on the institution of the American presidency. The adoption of the internet in the 21st century, both as a tool and as an information distribution mechanism, has had an astonishing impact on the Office of the Presidency. This course is designed to have students operationalize theoretical concepts and apply them to real world situations. Students will engage with scholarly research, analytical arguments, and real-time case studies on the effective use of social media in all aspects of the presidency: campaigning, public debate, electoral processes, and democracy more broadly. In that spirit, we will examine how the first president of the social media age, Taught by a member of the first White House Office of Digital Strategy, the primary objective of this course is to provide students will the tools and skills to be informed consumers of political social media, as well as to equip them to participate in the political digital conversation.

AS.470.605. Global Political Economy. 3 Credits.
In the wake of the financial crisis, bank bailouts, and stimulus plans, the relationship between American economic power and national security is especially salient. In this course, students investigate core topics in international political economy, analyzing the security implications of each. Topics include trade relations, international finance, monetary relations, poverty, and development. (Core course for the MA in Global Security Studies. Recommended elective for MA in Public Management)

AS.470.606. U.S. Security in a Disordered World. 3 Credits.
This course provides an overview of the manifold challenges and opportunities for United States security in the current disordered and changing world. It aims to help students assess why events occur and what policies are developed in response. In that endeavor, the course has three major objectives. First, the course will review the major perspectives on, and debates about, U.S. security and the institutions through which policy is made and executed. Second, the course will review some U.S. security issues through scholarly, policy, political, and historical lenses. Third, the course will help students write for both policy and academic audiences. This course is not open to students who have had 470.606 American National Security.

AS.470.607. Strategy and Leadership for Public Service Innovation. 3 Credits.
The course explores public sector innovation from the perspective of strategic visioning, policy development, and program leadership, employed for successful new venture implementation. Learning modules progress from foundational ideas through the use of practical methods and applied tools. First, students compare and contrast transformational public service governance policy models (e.g. New Public Service) as government leaders who must execute these periodic and/or evolving innovation concepts and agendas. Second, students examine organization program readiness for change adoption with respect to capability, capacity and competencies. Third, students apply their emerging understanding and knowledge of public innovation to their own organizations and scenarios, either inside or outside their workspace, environment or ecosystem. Specific ideation, design and analytic techniques shall be considered critically, in context, enabling course participants to formulate their own professional repertoire for guiding public innovation and transformation. Cases studies are used throughout the course to introduce students to the real-world application of innovation principles, demonstrate best practices, and provide measurable evidence for the innovation value proposition.

AS.470.608. Public Policy Evaluation & the Policy Process. 3 Credits.
This course is designed to introduce students to the public policymaking process, to the basics of policy analysis, and to the substance of some of today's major policy debates. The first half of the course focuses on establishing a framework in which to analyze public policy formulation within the United States. The class also reviews the tools for developing and implementing policy. The second half of the course turns to policy analysis of some critical contemporary issues. Building on earlier readings, we will study current debates in economic/tax policy, education, health care, social security, and national security. (Core requirement for the MA in Public Management. Elective option for Government. Analytics students)

AS.470.609. Leadership Skills in the 21st Century. 3 Credits.
This course will assist leaders in identifying their personal approach to leadership; provide tips on motivating staff by building trusting relationships and shoring up their credibility; suggest influence and persuasion strategies that leaders need to employ when working with bosses, colleagues, direct reports, and critical stakeholders, including funding agencies; develop strategies to build effective work teams; and consider approaches to monitor organizational performance in an ongoing fashion.

AS.470.611. Introduction to Terrorism Studies. 3 Credits.
This course provide an overview of the principal areas important to the study of terrorism. The course offers a variety of academic, policy, and operational models, theories, approaches, and concepts regarding the definitions of terrorism, the nature and functioning of various terrorist groups across the globe, and a variety of domestic and international governmental operational and policy responses. Through this exploration, students will be able to identify patterns of behavior of both terrorist groups and governmental responses, and will also be able to identify gaps, and principal areas of improvements in how we understand, and respond to this important security challenge.

AS.470.612. Bureaucratic Politics. 3 Credits.
This seminar will examine the political support for bureaucracy, how bureaucracy functions in contemporary government and society, and selected current controversies over the purpose and reach of bureaucracy. How does bureaucracy enhance or frustrate liberal democratic ideals? We will take up case studies involving current political issues, such as civil rights enforcement, the war on terror, the role of regulatory agencies, judicial policymaking, relevant student experiences, and the instructor's own experience in various federal and state agencies.

AS.470.615. Speechwriting: Theory and Practice. 3 Credits.
The theory and practice of speechwriting are the focus of our study of the great political speeches of all time and especially those of the American political tradition. We will examine the content, structure, and purpose of high rhetoric ranging from Pericles to Solzhenitsyn, from Abraham Lincoln, Frederick Douglass, and Franklin D. Roosevelt to contemporary politicians. Based on their knowledge of the best models, students will draft and deliver their own speeches.

AS.470.616. Political Ideas, Strategy, and Policy Implementation. 3 Credits.
It is easy, in this age of reactive 24-hour news, to believe that ideas no longer matter in politics. But ideas are the currency of politics, and are central to both campaigning and governing. What candidates stand for matters, and the best policy is the best politics. This class will discuss the critical role ideas play in our American political system. It will examine how ideas define candidates and governments, shape political strategies, and form campaign communications. But, most importantly, it will discuss how campaigning on ideas leads to successful governing. While compromise and negotiation are often derided as weaknesses in today's political system, we will examine how these techniques have been used to implement policy ideas and further political strategy. From the practical perspective of the instructor's own legislative and political experience, the class will take up case studies involving the interplay between politics and ideas in recent history in areas such as budget reform, national security, tax reform, crime prevention, trade, and poverty. Through these case studies, we will look at how and why policy ideas succeeded or failed through the lens of elections, political communications, and their positive impact on the public.

AS.470.617. The Courts and Public Policy. 3 Credits.
Americans traditionally have viewed the courts as—in the words of a constitutional scholar—"the least dangerous branch of government." They are seen as reflectors, not agents, of change. But in an age of government downsizing, the role of the courts bears renewed examination. Students explore the historical and philosophical roots for the notion that American courts, and whether the lawyers who appear before them, can and should make law and policy, and the alternatives to this function. Students consider prominent areas of public policy that have been shaped by the courts, such as civil rights, family and domestic law, environmental and safety regulation, and the regulation of business and commerce.This course counts towards the Legal Studies Concentration.

AS.470.620. Race, Politics, and Policy. 3 Credits.
This course examines the role of race and ethnicity in U.S. national politics focusing on political development, political behavior, and public policy. Treated as both a persistent "dilemma" and as central to U.S. national identity, race and representation questions have been pivotal in American political development from the Founding to the present. Tracing that development over time, this course focuses, too, on how race-based differences manifest in differences in voting, public opinion, and other behavioral aspects of politics as well as the ways that racial attitudes have been embedded in public policies and reinforced by their implementation.

AS.470.622. Money and Politics. 3 Credits.
This course considers the historical and contemporary relationship between money and government. In what ways do moneyed interests have distinctive influences on American politics? Does this threaten the vibrancy of our representative democracy? Are recent controversies over campaign finance reform and lobbying reform signs that American government is in trouble? This course is reading, writing, and discussion intensive, and we consider the large academic literature on this subject, as well as the reflections of journalists and political practitioners. Election law and regulations on money in politics are always changing, and so part of the course is designed to give students tools at tracking these developments. The overall goal of the course is to foster an understanding of the money/politics relationship in ways that facilitate the evaluation of American democracy.

AS.470.624. Healthcare Analytics and Policy. 3 Credits.
This course covers the ways in which analytics are being used in the healthcare industry. Topics include data collection opportunities created by the ACA and other laws, the use of analytics to prevent fraud, the use of predictive modeling based on medical records, the insurance industry's increasing use of data and the ethical issues raised by these practices. Prerequisites: none required (470.681 Probability and Statistics recommended)

AS.470.625. Resource Development and Marketing in Nonprofits. 3 Credits.
The goal of this course is to prepare future nonprofit leaders and board members with the international resource development and marketing fundamentals that help every nonprofit thrive. The course focuses on how to create and nurture an organizational culture where everyone on the staff and board understands, embraces, and acts on his or her role in developing strategic relationships with funders, potential funders, and media professionals. You will gain an understanding of the process, the metrics that drive the process, and the milestone markers that lead to success. You will explore how to develop a board and/or cadre of volunteers who give generously, share expertise freely, connect you to the right government officials and media leaders, and invite others to join them. Data-driven decision-making and all aspects of fund development, marketing, and communications will be woven throughout the course. Led by an internationally recognized practitioner, consultant, and master teacher, the course will use scenarios, discussion, social media, audio, and video clips so that you will walk away with the knowledge you need to secure private and government funding and social capital as a CEO, senior staff member, board chair, or member, and the confidence to do it all well. Elective course for the Certificate in Nonprofit Management.

AS.470.627. Financial Management & Analysis in the Public Sector. 3 Credits.
This course focuses on financial aspects of public sector organizations and institutions. The objectives of this course include helping students (1) learn the basics of public sector accounting and the construction of their financial reports, (2) become more intelligent users of the financial statements of public sector organizations such as sovereign, state, and municipal institutions, and (3) better understand the factors that affect the financial condition and financial performance of such entities. <o:p></o:p></p><p> More specifically, the course focuses on (1) the financial reporting concepts and standards that are applicable to public sector organizations; (2) ratios and other summary indicators used by analysts to evaluate the financial condition and financial performance of public sector and nonprofit organizations; (3) the analysis and interpretation of financial statements of selected public sector organizations; (4) fundamental finance principles; and 5) basic principles of budget formulation. <o:p></o:p></p>

AS.470.629. Models of Democratic Leadership in America. 3 Credits.
The political scientist James McGregor Burns said "one of the most universal cravings of our time is a hunger for compelling and creative leadership." Today, the craving for sound leadership is felt even more keenly than before, but examples of excellence in leadership are scarce. With both populism and authoritarianism on the rise globally and polarization at high levels domestically, it has become especially urgent to understand what true democratic leadership entails – both its power and its limits. This course will expose students to leadership models in America, starting with the founders and the conditions they set for future democratic leaders. In addition to examples of political leadership, students will study leadership in the area of social reform. Students will assess these models through primary readings, biographies, lectures, and film depictions. The course will help students to identify which models of creative leadership may be helpful in addressing current problems of contemporary politics

AS.470.630. Congress and the Making of Foreign Policy. 3 Credits.
This class will examine the role of Congress in the making of American foreign policy. In particular, this class will discuss the role of Congress in war powers, economic sanctions, human rights advocacy, the approval of international agreements including treaties, international affairs budgets and spending, investigations and oversight of the conduct of foreign policy by the executive branch as well as the impact of Congress on the general direction of American foreign policies and priorities. Special attention will be given to the role of Congress in U.S. policy toward Iran over the past few decades, the use of military force in Iraq and Syria, the role of the legislative branch in U.S policy toward China and Taiwan and the promotion of human rights as a component of American foreign policy. The class will seek to examine the specific actions of Congress on these matters, and their causes and consequences. The class will use books, articles and original source material from committee deliberations and floor action. As we examine these topics, we will come back to larger themes – the balance of power between the executive and legislative branches, the impact of partisan and bureaucratic politics, and the changing role of the United States on the world stage. All this will be discussed with a mind to the role of foreign policy practitioners.

AS.470.631. Economics for Public Decision-Making. 3 Credits.
Economic thinking provides an important set of tools for almost every aspect of public policymaking. This course aims to offer students a basic understanding of economics and its importance in public policymaking. The first half of the course will offer students an understanding of microeconomic and macroeconomic theory, including a discussion of when markets can work to achieve policy goals and when "market failures" call for government intervention. The second half of the class will use these economic tools and theories in order to survey several specific policy areas, including health policy, tax policy, and the national debt. (Core course for the MA in Public Management This course counts toward the Economic Security concentration (GSS). Elective option for Government Analytics students.)

AS.470.632. Security Issues in South Asia. 3 Credits.
The South Asian region, with its complex historical context, a large and diverse population, and contested national borders, especially between nuclearized countries, poses some of the toughest security challenges facing the world. This course highlights salient security challenges in South Asia, and draws out their implications for U.S. strategic interests. It examines the sources and implications of the rivalry between nuclearized India and Pakistan, and how it fuels Sino-Indian security competition. Attention is drawn to the sources of militancy in India, and to the threats to international and regional security arising from the conflict in Afghanistan. The Sri Lankan Tamil Tiger insurgency and its eventual defeat in 2009 are also discussed, alongside the rising Islamist militancy threats in Bangladeshi, and the history of Maoist insurgency in Nepal. Finally, some of the climate-based threats to which no South Asian country is immune will also be discussed.

AS.470.633. Transnational Organized Crime: Gangsters of the Global Underworld. 3 Credits.
Transnational organized crime often is not well understood because crime is most often conceptualized as a domestic legal concern. However, transnational organized crime is more than that. It is crime ordered into complex clandestine networks that operates transnationally with little regard for the borders of states. The gravity of the problem lies not only in the increasing complexity of these organizations, but more importantly, with the serious challenge they pose in their ability to penetrate and operate with relative impunity in several states simultaneously. These illegal enterprises not only threaten aspects of state sovereignty and security that traditionally have been taken for granted, but they prove the permeability of national borders and the vulnerability of state institutions. This course will examine a variety of transnational organized criminal groups, their modus operandi, and their illicit activities. It also will focus on some domestic organized crime groups both to provide a depth of understanding of the operations of organized criminal activity in different countries, as well as to show how international groups can make inroads into domestic markets if they cooperate with local groups.

AS.470.636. Cognitive and Behavioral Foundations for Artificial Intelligence. 3 Credits.
Artificial intelligence is rapidly improving for well-defined tasks and narrow intelligence. But will AI ever have human-like general intelligence? This course is designed to answer this complex question by giving students a working knowledge of the underlying principles and mechanisms of human behavior and cognition. Key topics to be addressed include vision, audition, language, emotion, memory, creativity, and consciousness. We will use current and future advancements in big data and AI as a backdrop for critical and creative analysis.

AS.470.638. Negotiating as a Leadership Skill. 3 Credits.
Conflict is part of organizational life. People in public sector agencies and nonprofit and for-profit organizations disagree over the meaning of regulations, the use of financial resources, office space, leave time, and many other issues. Managers must have the ability to diagnose disputes and to negotiate effectively to resolve conflicts. This course provides the theoretical background and conceptual framework needed for successful negotiation and mediation. Through presentations and discussions students become familiar with the tools necessary for conflict resolution in their agencies and organizations. Analysis of a party's interests, identification of the necessary style, awareness of communication skills, and planning and feedback are part of the process of becoming an accomplished negotiator.

AS.470.640. Challenges of Transnational Security. 3 Credits.
This course focuses on transnational security issues and considers how many of these myriad challenges constitute threats to global peace and security. The combined effects of issues such as drug, weapons, and human trafficking, piracy, terrorism, infectious diseases, and deliberate environmental destruction, along with such critical enablers as corruption, and money movements, are not strangers on the world stage. What is new is their global reach and destructive potential. As a result, these issues have made policy makers consider different conceptions of security and, at times, to move beyond sole considerations of state sovereignty into the realm of human security. Not only are transnational security issues varied in nature and scope, but their effects often are obscured by the fact that many are nascent with gradual and long-term consequences. Further, while some transnational issues may not constitute direct threats to global security, they may threaten the world economy, and quality of life of its citizens. Still others compound and reinforce each other, generating mutations of the original threats. This course will examine a small number of these transnational security issues and relevant policy-making efforts.

AS.470.641. Introduction to Advocacy and Lobbying. 3 Credits.
<p> Lobbying is a Constitutional right guaranteed under the First Amendment. It's also big business in Washington, DC, as more than $4 billion was spent on these efforts in 2015. In fact, for many, the term "lobbying" conjures up an image of a shady character passing a cash-filled envelope to an elected official. <o:p></o:p></p><p> The stereotype of lobbyists as greedy predators of the political system detracts from the efforts made by the tens of thousands of people, from lobbyists and concerned citizens alike, who come to Washington every year to exercise their "Right to Petition" the government to make it more responsive and accountable to the people. <o:p></o:p></p><p> This applied course provides students with a practical understanding of how to lobby Congress and the Executive Branch. The course also teaches students about "advocacy" efforts where unregistered public affairs firms employ campaign-styled tactics to persuade decision-makers to support their client's positions. <o:p></o:p></p>

AS.470.643. Text as Data. 3 Credits.
In this course students will develop expertise in using the tools necessary to collect, analyze, and visualize large amounts of text. The course begins with a hands-on introduction to the programming concepts necessary to collect and process textual data. The course then proceeds to cover key statistical concepts in machine learning and statistics that are used to analyze text as data. Throughout the course, students will develop a research project that culminates in the display of results from a large-scale textual analysis. Prerequisite: 470.681 Probability and Statistics.

AS.470.644. Democracy and Its Modern Critics. 3 Credits.
Much of international politics in the last century can be described as a conflict between liberal democracy and its modern critics. During this period the values and political structures of liberal democracy have been extended to more parts of the world than ever before. Yet the same era also saw the emergence of powerful challengers to liberal democracy from both the right and the left. The resulting clash of ideologies defined such conflicts as World War II and the Cold War. In this course we will survey the intellectual roots of Fascism, National Socialism, and Communism. We will also examine the question of Islam and democracy looking at both its proponents and its radical critics in the Islamic world. Among those whose writings we will examine are Karl Marx, V.I. Lenin, Benito Mussolini, Carl Schmitt, Charles Maurras, Syed Qutb, Ali Shariati, Muktedar Khan, and Ruhollah Khomeini.This course counts towards the Security Studies concentration.

AS.470.645. The Budgetary Process. 3 Credits.
The federal budget process is an enormously complex mixture of administrative routines and mechanisms designed to bias decisions, avoid blame, or reduce conflict. This course explores the structures of federal budgeting in terms of its varied goals and in the context of the wider governing process. The course will review the budgetary process in both the executive and congressional branching, as well as the interaction of those two systems. In order to gain understanding of the difficult policy choices and political pressures policymakers face, students will be asked to do a simulation of a budget process within the executive branch. The role of entitlements, scoring issues, and tax policy will be examined in the context of the debate over budget policy. The course will start with a short primer on finance theory. (Recommended elective for MA in Public Management. Elective option for Government Analytics students.)

AS.470.648. Presidential Election 2020: Campaigning and Communicating. 3 Credits.
The 2020 presidential election will be based largely on how well voters think the incumbent Donald Trump has handled his first term in office. Trump will be seeking re-election with a pandemic that has killed over 100,000 Americans and with the largest number of Americans unemployed since our Great Depression. In addition, the question of racial justice has become an issue of paramount importance to this election. Trump is a master of distraction and should never be counted out as he has all the advantages of the presidency, while his opponent, former Vice-President Joe Biden will need a large Democratic and Independent voter turnout to win the White House. In short, 2020 is a truly unique and historic election. The class will discuss both sides' campaign and media strategies-both social media and traditional media- to win the White House. Will Biden be able to put the Obama coalition together again? Will Trump's base come out in large enough numbers to help him win again? Is America ready for a return to normalcy after the chaotic first term of Trump? Our lively, interactive class will explore all these questions and closely follow the campaign to its conclusion and look at the winning candidate after the November election.

AS.470.649. Separation of Powers and Democratic Governance. 3 Credits.
The separation of powers is America's most profound and useful political contribution to the world. Studying its principles, development, and decay is a requirement for understanding American politics and is as well a potential benefit to students of aspiring democracies throughout the world. For the separation of powers enables self-government, putting democratic principles of equality and liberty into practice while moderating the powers of majorities.We will study the principles and practice of the separation of powers by examining how each elected branch of government protects its rights, while checking the rights of others. The separation of powers can be said to have produced a more just and moderate democratic form of government, but it has also occasioned the complaint that it has produced gridlock and incompetence. To investigate the strengths and drawbacks of the separation of powers, we will pay close attention to the classic texts advocating the separation of powers, such as The Federalist Papers; the great changes in American politics effected by the Civil War, the Progressive movement, and the New Deal; and the domestic and foreign policy debates in recent administrations. Special attention will be paid to the seminal opinions of the unelected branch of American government, the Supreme Court. The course will note in particular the contemporary challenges to the separation of powers, evidenced in the rise of the administrative state, the expanding powers of courts, and the growth of party government. We will also note instances of how parliamentary and presidential governments throughout the world might benefit from separation of powers principles.

AS.470.650. Health Policy and Politics. 3 Credits.
Who knew health care was so complicated." These words remind us that despite decades of work, health policy wonks continue to debate what should come next in health care reform. This course introduces students to the policies and issues surrounding health care in the United States. During the semester the course will review the history of the incremental path to health care coverage since President Truman first called for universal health care in 1947. This will include enactment of Medicare, Medicaid, the Children's Health Insurance Program (CHIP), and the Affordable Care Act (Obamacare). In addition, we will discuss in detail the various reform proposals currently under consideration and analyze their strengths and weaknesses. Finally, we will study how the current U.S health care system is organized, financed, and governed.

AS.470.651. Corruption and Democratic Governance. 3 Credits.
Corruption is ubiquitous. It is a universal phenomenon that has always been around and that can be found almost anywhere. Recent years have seen much focus on the relationship between it and democratic governance. Indeed corruption and politics more generally, are inextricably and universally entwined. In this seminar we will take an in-depth look at the relationship between the two. We will ask: What is Corruption? Is it always the same thing everywhere, or does it vary depending on context or place? Do pork barrel politics and political clientelism count as corruption? What are the implications of corruption? Is it necessarily always a bad thing or can it be beneficial? Is the corruption experienced in developed countries qualitatively different from that in developing ones such that democracy suffers more in developing countries? We will seek to answer these and other questions by taking a critical look at the politics of corruption. We will look at the origins, extent, character and significance of corruption from both a developed and developing country perspective. We will cover various theories relating to corruption as well as look at a number of empirical cases.

AS.470.653. Russian National Security Policy. 3 Credits.
Russia plays a key role in most international issues and openly campaigns to realign the international system away from what it sees as American domination. This course considers the substance and process of Russian national security policy. It acquaints students with the main instruments and mechanisms available to Russian leaders to advance the country's national interests and key policy priorities. The course considers how Russia formulates and conducts its national security policy, the history that informs it, the political culture that sustain it, the ideas and interests that drive it, and the people and institutions responsible for it. The course addresses Russia's role in key global and regional issues and its relations with major powers. It places special emphasis on the wars in Ukraine and Syria, Russian concepts of information war, and on Russian military reform.

AS.470.654. Deterrence & Crisis Stability in the New Era of Geopolitical Competition. 3 Credits.
This course will consider the challenges of conventional and nuclear deterrence in the new era of great power competition among the United States, China, and Russia in particular but also with consideration given to challenges posed by new and aspiring nuclear states. Students will also explore Issues and challenges for crisis stability raised by the to develop and field of emerging military capabilities ranging from lethal autonomous weapons systems to hypersonic missiles to counter space weapons. While Informed by current and evolving concepts in deterrence and strategic stability theory, the course will nevertheless provide an empirical and policy-relevant survey and appreciation of key issues confronting senior national security decision makers today and in the decades ahead.

AS.470.656. Presidential Power and Politics. 3 Credits.
This course considers the evolution of the presidency from its creation by the founders who had "their fingers crossed" while contemplating an executive agent for the emerging government, to its contemporary massive presence in our political system. The class also examines the interactions of the president with the other branches of government—Congress and the Courts—as well as the dynamics and management challenges presented within the executive branch itself. The course focuses on the leadership attributes of effective presidents, as well as aspects of personality or "character" that influence presidential performance. Finally the class focuses on the power and influence exerted by the presidency in domestic public policy and in foreign affairs. Students will be encouraged to develop their own ideas of what makes a great president ion the 21st century.

AS.470.657. Energy, Security, and Defense. 3 Credits.
This course is a seminar-based overview of the role of energy in national security. Using a range of U.S. and non-U.S. case studies, students will review the roles of energy in grand strategy, the role of energy in conflict, and, finally, as a logistical enabler of military operations.

AS.470.658. Religion and American Political Culture. 3 Credits.
The relationship between religion and politics in the American context is one of peculiar complexity in the American context. This course has 3 main objectives: 1) to examine in general terms the role of religion in American public and political life as reflected in the debates concerning the use of religious symbolism and discourse in the public sphere; 2) to analyze how religiously informed moral argument has helped to shape public debate on key issues of public policy including the issues of civil rights, abortion, war and peace, and economic policy; and 3) to provide the necessary historical and philosophical context to help understand the present day intersection of religion and politics, and to see how previous generations of Americans approached similar problems.

AS.470.659. Radicalization and Deradicalization in Terror Networks. 3 Credits.
This course will explore some of the most contested and controversial aspects in contemporary security studies. There are a number of contentious and wide-ranging debates around ideas like radicalization not least concerning its definition, causes, and effects. This course will also prompt you to consider broader issues, such as whether there is a causal link between extremism and violent extremism? Why do some radicalized individuals to embrace terrorism, when other don't? And should security officials concern themselves with radicalization, or only with its violent offshoots? This course will unpack many of these debates, exploring academic and theoretical literature surrounding the issues of radicalization, recruitment, and deradicalization in modern terrorist networks. It will focus primarily on cases in Europe and the United States, while also exploring new phenomena such as homegrown, self-starter, and lone wolf terrorism.

AS.470.660. Program Evaluation. 3 Credits.
This course introduces the student to the literature, theories and approaches to evaluating organizational programs, policies and procedures. Students will acquire a broad perspective on types of program evaluation, including formative and summative evaluation, process evaluation, monitoring of outputs and outcomes, impact assessment, and cost analysis. Students gain practical experience through exercises and assignments involving the design of a conceptual framework, development of indicators, analysis of quantitative and qualitative evaluation data, and development of an evaluation plan to measure impact. In addition, topics such as experimental, quasi-experimental, and non-experimental study designs are introduced in the context of a variety of settings, including schools, welfare agencies, mental health organizations, criminal justice settings, environmental programs, nonprofit organizations, and corporations. Prerequisite: 407.709 Quantitative Methods

AS.470.661. Political Debates and the US Constitution. 3 Credits.
This course explores the political struggles that emerge from the U.S. constitutional system. During the course, we will read contemporary and classic cases in U.S. constitutional law in light of constitutional and political theory. Course discussions will focus on the law as well as the related policy, political, and societal implications of constitutional interpretation. Through paying particular attention to recent decisions and issues before the Court, the course will explore the roles and powers of the branches of federal government, separation of powers, federalism, and the commerce clause. It will also cover individual rights, due process, equal protection, and religious freedoms.

AS.470.662. Expertise and Evidence in Policymaking. 3 Credits.
With the passage of the Foundations for Evidence-Based Policymaking Act, all federal agencies are now required to make data accessible to the public and to implement specific plans for developing statistical evidence to inform policymaking. This course will examine the ways in which evidence and expertise are now being used for policy development and assessment. Specific topics will include cost-benefit analysis, cost effectiveness analysis, contingent valuation, forecasting and the communication of statistical evidence. In addition, the course will explore the interplay between political decisionmakers, experts and citizens in the evidence-based policymaking process.

AS.470.663. Human Security. 3 Credits.
The multiple crises plaguing the world today make evident the mutual inter-dependence and vulnerability of people and nations. The idea of human security has gained increasing significance within this increasingly complex and interconnected world. Human security places emphasis on the security needs of individual citizens, rather than being preoccupied by traditional, state-centric conceptions of security. It takes into account the impact of security threats such as economic crises, pandemics, and climate change on the lives of individuals within and across national boundaries. The course thus draws attention to alternative interpretations of what constitute security threats and how to contend with the underlying causes of volatility and human insecurity that prevail around the world.

AS.470.664. Fundamentals and Applications in Cybersecurity. 3 Credits.
This non-technical course introduces the foundational aspects of cybersecurity policy including basic technical principles of networks and their security, principles of strategy and policy, current governance mechanisms for global information infrastructures, and current strategies and policies for cybersecurity for the public and private sectors. It covers current cybersecurity issues, cyber deterrence and conflict, an inventory and description of state and non-state cyber actors, and the nexus between the public and private sectors. The course assumes little to no exposure to technical and policy aspects of cybersecurity.

AS.470.666. Institutional Fundraising: Raising Maximum Dollars from Government Agencies, Corporations and Foundations. 3 Credits.
In this hands-on course, we'll help you understand the fundamentals of securing funds from institutional donors. As a staff or board leader of a non-profit, understanding the ins and outs of raising funds for priority projects and capacity building from government agencies, corporations and foundations will add to your toolkit for moving your organization forward. We'll cover how this aspect of fundraising fits into your overall fundraising strategy and plan. We'll help you identify the right potential funders for important projects, learn how to land capacity-building funds you can use to grow and sustain your organization, cover the basics of relationship-building with institutional decision-makers, help you use data to build credibility with funders, create pitch-perfect corporate presentations and dive into the process of writing winning proposals and applications. Finally, we'll cover fulfillment and stewardship. Elective course for the Certificate in Nonprofit Management.

AS.470.667. Machine Learning and Neural Networks. 3 Credits.
Machine learning and, more broadly, artificial intelligence, can now be used to perform complex tasks such as image recognition, fraud detection, traffic prediction and product recommendations. These successes are driven by developments in machine learning, such as the use of neural networks. This course introduces students to a variety of machine learning techniques using Python. Students will first learn the fundamentals of the Python programming language and will then implement machine learning algorithms and develop an understanding of how they work. Further, students will learn how to select and implement an appropriate algorithm depending on the type of dataset they have, and will be able to use a machine learning algorithm to generate predictions.
Prerequisite: 470.681 Probability and Statistics

AS.470.668. The Politics and Process of American Foreign Policy. 3 Credits.
Overuse is not the only problem with the maxim that American "politics stop at the water's edge." The slogan has simply never been true. American foreign policy has always been a result not just of the crises and opportunities the nation has faced but its unique politics and policy processes. American national interests are determined through the democratic processes established by the Constitution and other legislation and affected by the politics that drive the nation's elections, its conversations and its foreign policies. These politics and processes have been remarkably consistent since the founding even as the nation's interests have grown significantly. A better understanding of both the politics and processes of American foreign policy will help students appreciate how the country's policies are made today and will be made in the future.

AS.470.670. The Practice & Politics of U.S. Tax Policy. 3 Credits.
Benjamin Franklin famously observed that "nothing can be said to be certain, except death and taxes." Since Franklin's day, however, both the form and prevalence of taxation have undergone a dramatic global transformation. This course will review the history of U.S. federal taxation and delve into the practical mechanics of taxation. It will provide students with an understanding of the processes, institutions, and political influences that shape tax policy. Finally, it will examine alternative methods of taxation and consider what the future may hold for federal tax policy. (Recommended elective for MA in Public Management)

AS.470.671. Risk Management Analytics. 3 Credits.
Risk management has always been in the vanguard of data analytics because risk measurement is a critical element in calculating risk/return tradeoffs. This course will examine both qualitative and quantitative analytical methods commonly used in risk management. Qualitative tools include impact/likelihood analysis; event and fault trees; threats, vulnerability, and consequences (TVC); and failure mode and effects analysis (FMEA). However, a key lesson in risk management is that what gets measured gets managed. As a result, a major part of the course will focus on quantitative tools, including modeling and stochastic simulations. We will use the @Risk software to build realistic risk models, including one in assessing project management risks. The objective of the course is to equip students with practical tools they can apply in risk-based decision making.Prerequisites: 470.681 Probability and Statistics; working knowledge of Excel

AS.470.672. Evolution of American Intelligence. 3 Credits.
This course explores the development of US intelligence system and the ways in which it has influenced (and been influenced by) world events. The goal is to understand how an intelligence system evolves as a result of changes in national strategy, technology, and legal & policy factors. By investigating the US intelligence system, students will develop their analytical skills and increase their understanding of the workings of foreign and security policies. The approach will be historical and topical. The history of US intelligence offers a surprising number of illustrative cases and themes—many of which can now be examined in detail using official records and contrarian views, and can even be compared with analogues across nations and time periods. More-recent events are not as well documented in the public, official record, of course, but an understanding of earlier patterns and activities can provide valid insights on contemporary trends.

AS.470.673. Data Visualization. 3 Credits.
This course instructs students in various visualization techniques and software, including R, Tableau, and vector graphics software (e.g., Adobe Illustrator, Inkscape). Students will learn how to ask interesting questions about politics; identify data that can be used to answer those questions; collect, clean and document the data; explore and analyze the data with statistical and graphical techniques; and create compelling, informative and accurate visualizations and present these visualizations to educated audiences. Prerequisite: 470.681 Probability and Statistics

AS.470.676. From al-Qaeda to Islamic State: Understanding the Roots of the Global Jihad Movement. 3 Credits.
No topic has captured the public imagination of late quite so dramatically as the specter of global jihadism. While much has been said about the way jihadists behave, their ideology remains poorly understood. This course aims to help students explore the intellectual development of jihadist ideology, focusing on how conflict has shaped Islamic theology and law. We go from the movement's origins in the mountains of the Hindu Kush to the jihadist insurgencies of the 1990s and the 9/11 wars. What emerges is the story of a pragmatic but resilient warrior doctrine that often struggles, as so many utopian ideologies do, to consolidate the idealism of theory with the reality of practice.

AS.470.677. The Invisible Primaries: Building Successful Strategies to Win 2020. 3 Credits.
Our interesting and interactive course will focus on the ongoing 2020 presidential campaign as it is actively unfolding in early 2019. We will analyze the background and personality of the candidates and see how they sell themselves to the voters in the "invisible primary" stage. Questions we will explore include: how and why a candidate decides to run for the presidency as well as what early media strategies emerge and how views on key issues of the day from health care to immigration to Syria and North Korea will figure into the campaigns. Running for president is similar to building a huge Fortune 500 corporation starting 50 state subsidiary offices with the one and only product being the candidate. And, we will be inviting most of the presidential candidates to speak at Hopkins.

AS.470.679. Armed Social Movements: Terrorism Insurgency and Crime. 3 Credits.
Drawing on the social movement literature, this course examines the emergence of irregular armed groups and their decisions to use violence. It explains how social movements turnviolent, how violence dictates their nature, and what this nature can tell us in terms of group strengths and weaknesses. It provides the students with the analytical tools needed to distinguish between terrorism, insurgency, and crime – by focusing and understanding group strategies, behavior, and capabilities. Students will thus be familiarized with the theory on armed group formation and evolution – but the course goes further, by counterposing such theory to the complexities of practice through the consideration of key case studies. The course ends with an overview of state strategies intended to counter a wide variety of threats. Particular attention is paid to the notion of operational art and lines of effort to underline the potential and meaning of counterterrorism and counterinsurgency.

AS.470.680. Advanced Academic Writing and Research: Social Movements and Civic Engagement in 21st Century America. 3 Credits.
This course will help students develop graduate writing and research skills. Through the rich scholarship of past and present social movements and civic engagement initiatives, students will gain an in-depth overview of the fundamentals of academic writing, style, and composition. They will learn how to compose a strong research-based argument, thesis statement, supporting paragraphs and conclusion using credible resources with the proper use of citations. These skills will help strengthen their ability to write, synthesize and argue at a graduate level. In the third week of the term, students will identify their own independent research topic, and in the latter part of the term, they will shape it into a research question, learn how to engage in critical inquiry using Hopkins' library resources, and through a writing process broken into scaffolded steps, will formulate an original argument in a cumulative paper. Through learning modules that focus on early social movements like the Women's Suffrage Movement, Civil Rights Movement, Environmental Movement, the White Power Movement, and more contemporary movements like "Me Too", "Black Lives Matter", and Climate Justice, students can explore and analyze how well the United States has realized its democratic ideals and obligations while improving upon their research, writing, and critical thinking skills. The course is intended for those enrolled in one of the Center for Advanced Governmental Studies (CAGS) graduate programs and for other Advanced Academic Program (AAP) students with the permission of their advisor.

AS.470.681. Probability and Statistics. 3 Credits.
This course introduces students to the fundamentals of statistical analysis as well as the R programming language and RStudio environment. Students will learn the building blocks of descriptive and causal inference, including summary statistics, survey sampling, measurement, hypothesis testing, linear regression and probability theory. Students will also learn how to create data visualizations in R, including times series plots, scatter plots and bar graphs. In addition, students will focus on interpreting statistical findings and presenting results in a compelling manner. By the end of the course, students will be able to conduct a statistical analysis to answer a meaningful policy question and will be prepared to take more advanced methods courses. Prerequisites: none

AS.470.682. Mission Meets Profit: Building a Social Enterprise. 3 Credits.
The goal of this course is a comprehensive examination of social enterprises- organizations that, broadly speaking, "apply commercial strategies to maximize improvements in human and environmental well-being". Social enterprises are a relatively new, 21st century phenomenon, and are typically referred to as hybrids of nonprofits and for-profits. While they are similar to nonprofits in that their missions and social and/or environmental objectives drive their very existence, social enterprises can have different structures than traditional 501©3s- some much more complex, legally and otherwise. Throughout the course we will learn about the various types of social enterprises that exist, comparing US models to models operating internationally, and analyze their pros and cons, challenges and opportunities. We will also explore how social enterprises challenge traditional business and nonprofit paradigms, what role social enterprises have come to play in international development, and finally, how to go about developing your own social enterprise. Elective course for the Certificate in Nonprofit Management.

AS.470.684. Legislative Language and Policymaking. 3 Credits.
This course examines the process of drafting legislation and the consequences of legislative language in the implementation and adjudication of federal policies. Focusing on the various stages of the legislative process, this course considers the expert and political sources of the legislative language in the U.S. Congress and the importance of language in coalition-building for policy passage. Examining the interactions of Congress with the other branches of government, the course also considers how presidents, the executive branch, and the judiciary interpret statutory language.

AS.470.685. The Challenge of Change: Innovation in Military Affairs. 3 Credits.
Change is perennial in national security and military affairs, but knowing how, why, and when to embrace change is both difficult and vital. Strategies and tactics may be outdated, new ideas may be resisted, and science and technology continue to change our world faster than we can optimize. The paradox deepens with context: innovation in peacetime has one logic while innovation in war has another. This course unravels the nature of change in military affairs through four themes: ideas, materials, human capital and structure, and, appreciation of the enemy. The course explores these themes through a series of case studies from around the world. Topics include civilian development/military application of science and technology; learning from failure and success (including from other nations); institutional reactions to change; procurement and the role of industry; and, the impact and limitations of individual “champions” of change.

AS.470.688. Political Institutions and the Policy Process. 3 Credits.
Bridging the divide between political science theories of policymaking and the actual workings of the policy process in the institutions of national government, this course examines the individual contributions of each of the legislative, executive, and judicial branches of government as well as the interactions and struggles between those branches. How do these various institutions set the policy agenda, develop and deliberate policy alternatives, make authoritative policy decisions, and implement those decisions? In what ways are the interactions between these institutions best considered conflict or cooperation? Also, how do outside actors and institutions -- the media, interest groups, public opinion, parties and campaigns -- affect policymaking in these various institutional settings? Drawing on the Constitutional design and historical development of these institutions as well as contemporary practice, this course examines the purposes, processes, and outcomes of policymaking from an institutional perspective.

AS.470.689. NGOs in Development and Global Policy-Making. 3 Credits.
This course provides an overview of the role of both national and international non-governmental organizations (NGOs) in processes of development, humanitarian response, and the promotion of human rights and active citizenship. The last decade has been one of rapid change in which NGO relationships with government, the private sector, and donors has been in a state of flux, with unprecedented challenges raised about the legitimacy and effectiveness of NGO actors. The course will look at how systemic changes the evolution of transnational advocacy, the aid effectiveness process, the emergence of new development actors from countries (such as India, China and Brazil) to the primacy of the private sector has influenced NGOs. Elective course for the Certificate in Nonprofit Management.

AS.470.692. Military Strategy & National Policy. 3 Credits.
This course examines how states (primarily the United States) and other political entities harness military capabilities to pursue of policy objectives. It exposes students to levels of strategy—grand strategy, strategy, operations, and tactics—in a national security context. The course will then focus on the practical implications and unique characteristics of military strategy. Students will critically examine topics such as civil-military relations, land warfare, naval warfare, theories of airpower, insurgency and counterinsurgency, and nuclear warfare. The goal is to understand the embedded assumptions of the various theories, the characteristics of the military capabilities animated by them, and, through discussion and case studies, the strengths and limitations of each.

AS.470.693. Comparative Democracies. 3 Credits.
This course uses the comparative method to look at the varieties of democracies that exist today. In the course, we will ask what is democracy, how do we measure it, and how does it vary across space and time? We will look at how democracy manifests in different constitutional forms e.g. parliamentary versus presidential. We will examine how different electoral and party systems influence variation in outcome within the set of democracies, and how social cleavages interact with, and are molded by, these systems. Further, we will use the answers to these questions to explore the issue of democratic consolidation and to ask why some countries become and stay democratic, while others do not. Case studies will be drawn from Europe, Latin America and Asia.

AS.470.694. Big Data Management Systems. 3 Credits.
This course introduces students to big data management systems such as the Hadoop system, MongoDB, Amazon AWS, and Microsoft Azure. The course covers the basics of the Apache Hadoop platform and Hadoop ecosystem; the Hadoop distributed file system (HDFS); MapReduce; common big data tools such as Pig (a procedural data processing language for Hadoop parallel computation), Hive (a declarative SQL-like language to handle Hadoop jobs), HBase (the most popular NoSQL database), and YARN. MongoDB is a popular NoSQL database that handles documents in a free schema design, which gives the developer great flexibility to store and use data. We cover aspects of the cloud computing model with respect to virtualization, multitenancy, privacy, security, and cloud data management. <p>Prerequisite: 470.763 Database Management Systems<o:p></o:p></p><p>Technology Requirements:A 64-bit computer with a chip that supports virtualization (set via BIOS)Windows Operating System 7, 8, or 10At least 8 Gb of Physical RAMOracle VirtualBox version 4.2 (free)Please be in touch with the instructor with questions about the technology requirements.<o:p></o:p></p>

AS.470.695. Proseminar: Essentials of Public and Private Management. 3 Credits.
(The purpose of the class is to help equip students to operate effectively in both the public and private sectors. The class will cover three major topics: (1) an overview of managing public and private organizations, with special attention to their differing missions, capabilities, and environments; (2) a survey of important relationships between the public and private sectors; and (3) the need for improved coordination between the public and private sectors to achieve important public purposes. Students will be encouraged to make the course an interactive one and to share their personal knowledge in the context of the issues discussed. Students will be expected to complete a significant paper on a relevant topic approved by the instructor. (Core course for the MA in Public Management and the MA in Government/MBA program)

AS.470.697. Intelligence and Counterterrorism. 3 Credits.
Counterterrorism is essentially an intelligence war. By definition, both sides use small forces and clandestine means, hiding their presence and activities not only from each other, but often from friends and allies as well. This course will explore the many roles of intelligence in every facet of counterterrorism, and ask students to evaluate their practical, legal, and moral effects and implications. It will also look at the terrorists' own intelligence activities, and the "intelligence race" between terrorists and counterterrorists. There are no pre-requisites for this course. However, students would be well served to have a basic familiarity with intelligence and terrorism before the class starts.

AS.470.698. American Exceptionalism. 3 Credits.
This course will seek to give students a deeper understanding of where the idea of American exceptionalism comes from and what its implications are for America, both domestically and abroad. Students will gain this understanding from reading classic works in the area that trace America's political development, starting with its Puritan heritage. Early American works will be studied from this period, along with Alexis de Tocqueville's Democracy in America. Seminal works of modern political science scholarship on this question will also be assigned, including works from Seymour Martin Lipset, Louis Hartz, Daniel Boorstin, and others. The course will then extrapolate from these historic roots to contemporary issues of America's foreign policy and rationale for its foreign interventions. The course will conclude with questions of America's standing in the world, which has in recent years, declined and seek to understand why this is so and what it means for the future understanding of American exceptionalism.

AS.470.699. Applied Performance Analytics. 3 Credits.
Data are everywhere, and many elected officials and government managers understand they need it. But how can they use it to solve problems and shape policy? What is the best way to make decisions based on a data analysis? How can they communicate those decisions, and the rationale behind them, to employees, citizens, and stakeholders? This course will provide students with an experiential learning opportunity based on real-world scenarios. Students will each take on a role (mayor, police commissioner, human capital director, budget director, public works director, public health director) and participate in a simulated public policy scenario. Working in small groups, students will apply a practical performance analytics process to develop solutions to address governmental challenges. Students will begin by studying foundational concepts and techniques of data collection, analytics, and decision support. They will also learn how to navigate multiple interests, asymmetrical information, and competing political agendas as they make difficult decisions about resource allocation and public policy. Along the way, they will learn how to turn insights into action by effectively communicating the results of analysis to busy executives and decision makers at all levels of the organization. Prerequisites: none required (470.681 Probability and Statistics recommended)

AS.470.700. Cloud Computing in the Public Sector. 3 Credits.
This course provides insights into how to utilize shared cloud computing resources through a service provider. These resources can be storage space, software as a service, or compute servers. This is a hands-on course in which students will access a variety of cloud services and work with different cloud providers such as Apple, Microsoft, Google, and Amazon. Students will set up virtual servers, work with cloud file storage, learn about a variety of cloud collaboration options, and much more. This practical course will help students make the transition to working in the cloud from any device, anywhere, anytime. All areas of the public sector, such as education, healthcare and law enforcement, increasingly use cloud computing both to deliver information to clients and share information within and across agencies. No prerequisite

AS.470.701. Congress: Why the First Branch Matters. 3 Credits.
Congress is the First Branch, "the People's Branch," and one of the most powerful legislatures the world has ever known. At this moment in history, however, the people do not assess the institution favorably and political scientists and pundits have declared it the "broken branch." Is Congress "broken" or merely reflective of our political times? In an era of "unorthodox lawmaking" is a return to "regular order" and "textbook lawmaking" realistic or a fantasy? This course will discuss these questions in the context of the evolving nature of Congress as an institution. The class will examine the institutional development of Congress and explore changes in its representative and legislative functions, as well as constitutional responsibility of holding the "power of the purse." Congress remains a dynamic institution and it behooves citizens to understand its complexity and centrality to governance in the U.S.

AS.470.703. Urban Data Analytics. 3 Credits.
This class applies data analytic skills to the urban context, analyzing urban problems and datasets. Students will develop the statistical skills to complete data-driven analytical projects using data from city agencies, federal census data, and other sources, including NGOs that work with cities. We will examine a variety of data sets and research projects both historical and contemporary that examine urban problems from a quantitative perspective. Over the course of the term, each student will work on a real-world urban data problem, developing the project from start to finish, including identifying the issue, developing the research project, gathering data, analyzing the data, and producing a finished research paper. Prerequisite: 470.681 Probability and Statistics

AS.470.704. Strategies in Insurgent and Asymmetric Warfare. 3 Credits.
This class examines the phenomenon of irregular warfare—of insurgencies and counterinsurgencies in particular—through a historical lens. The course will give you students insight into the origins, objectives, strategies, and tactics of irregular wars, as well as the principles of counterinsurgency theory and practice. Through the course, you will analyze current irregular wars, understand what caused them and whether they are likely to be successful or unsuccessful, and see how they can be combated.

AS.470.705. The Midterm Elections and the Media in the Trump Era. 3 Credits.
<p> Historically, the party out of power gains seats in the House and Senate in midterm elections. Historically, when there is a president with low poll ratings like Trump has today, the opposition party wins seats in Congress. However, with the polarization of our politics and the constant tweets of our president the 2018 midterm elections for the House, Senate, Governor's races and state legislatures could be much different than analysts are predicting. <o:p></o:p></p><p> The interactive class will follow the 2018 midterms in real time as the campaigns are taking place all the way through to election day in November. Social media will play a prominent role in the midterms and we will discuss and analyze the social media and traditional media platforms of the candidates. Plus we will discuss how the so-called mainstream media and other media are covering the midterm elections. We will look at the key issues of the campaign: Is Trump the main issue for many voters? Will issues of impeachment and Special Counsel affect voters? Is immigration and health care the key domestic issues? What role will North Korea, Iran, Syria, Mideast peace, Russian meddling in our elections play in the midterms? We will discuss and analyze whether Democrats move too far to the left and Republicans move too far to the right to capture the votes of their base. And, we will look at the winning campaign strategies of the new members of Congress and how they ran victorious campaigns in the Trump era. <o:p></o:p></p>

AS.470.706. American Military History from the World Wars to Today. 3 Credits.
This course familiarizes students with the general contours of US national security strategy and military policy from the First World War through the so-called “Long War” era of Iraq and Afghanistan. The United States has a long, complex, and increasingly dysfunctional relationship with the use of violence in pursuit of policy aims (war). The institutions of the United States with responsibility for war-making have, over the past century, been shaped by powerful forces of change and continuity as the US adapts to the evolving character of war. Students will develop an appreciation for these factors that have shaped US security policy since WWI, be able to frame current policy debates in that context, and be able to forecast potential implications for the decades ahead.

AS.470.708. Unleashing Open Data with Python. 3 Credits.
Learning the basics of Python empowers analysts to retrieve and leverage data in new ways. After covering the fundamentals of syntax, students learn how to read, create and edit data files using Python. Building on that knowledge, students interact with online resources through bulk data APIs and web scraping. Finally, students will use the data they collect to develop an original analysis. Prerequisite: 470.681 Probability and Statistics

AS.470.709. Quantitative Methods. 3 Credits.
Solutions to policy challenges increasingly require an understanding of how to analyze, present,?and interpret data.? Government agencies use data to evaluate programs and proposed policy initiatives.? Private companies use data to inform their strategic decision making.? Advocacy organizations use data to support their positions.? This course will provide you with the knowledge and skills needed to perform a sophisticated data analysis.? You will learn how to design and test regression models using R/RStudio, an incredibly powerful and open-source statistical software package.? Specific topics covered in the course include measures of fit, logistic and?probit?regression, panel data, instruments,?and translating statistical findings for broad audiences.? The focus of the course is on using statistics in an applied manner to address meaningful research questions.Prerequisite: 470.681 Probability and Statistics

AS.470.710. Advanced Quantitative Methods. 3 Credits.
This course builds upon the concepts taught in 470.709 Quantitative Methods. Students will learn how to construct and evaluate advanced regression models. Topics include experimental data, instrumental variables, panel data, matching and multiple imputation. In addition, you will learn how to use Latex, which is a document preparation system that allows you to incorporate mathematical language, tables and figures into a document in a user-friendly manner. Latex is also incredibly useful for managing references and preparing professional slide presentations. As a culminating project, students will critically evaluate a scholarly article that uses methods covered in the course. Prerequisite: 470.709 Quantitative Methods

AS.470.713. Resisting Tyranny: Strategic Nonviolent Conflict. 3 Credits.
War practitioners, policy makers, and security studies scholars study asymmetric warfare to understand why poorly armed insurgents effectively resist and even defeat technologically advanced and materially stronger armies. This course studies a perfect asymmetry in nonviolent warfare where unarmed ordinary people are able to effectively challenge and eventually defeat a fully armed, resource-rich regimes. In fact, historically, nonviolent movements have been twice as effective against violent regimes as armed insurgencies. This course will consider skills of organized populations in inter-state and intra-state conflicts, including anti-dictatorship, anti-occupation, anti-corruption, anti-violence struggles and analyze how disciplined civilians use nonviolent strategies and tactics to galvanize large and diverse participation, place their violent opponents in dilemma, make repression backfire and cause defections among adversaries' pillars of support.

AS.470.714. Contemporary Politics of Latin America. 3 Credits.
This course covers the politics of Latin America from 1945 to the present. It is designed to introduce students to the academic study of contemporary Latin American politics. Students are required to apply comparative methods of analysis to contrast regimes and political phenomena beyond governments. Students are expected to compare the institutions, policies and development models of different governments and regimes, as well as the ideology, program, organizational structure and support base of different social movements and political parties. These comparisons enable students to explore both similarity and difference. Students may identify broad commonalities in the politics of a region that shares many cultural features and important structural constraints. However, they should also be aware of distinctions; including the important differences between Central America, the Andean region and the Southern Cone, as well as significant variations between neighboring states.

AS.470.715. Political Conventions: Communication, Campaigning, and Controversy. 3 Credits.
This class will examine the history of national political conventions from its earliest days to current time, culminating with conventions this summer in Milwaukee and Charlotte. With winner-take-all primaries a thing of the past we could very likely see a brokered convention in Milwaukee for the Democrats this summer. Will Sanders try to change the convention rules if denied the nomination. Will Biden get the support of the superdelegates? Will Mayor Pete and Mayor Bloomberg still be competitive? Will Senators Klobuchar and Warren rally at the convention? In addition, the class will look at the likely "lovefest" convention the Republicans will hold in Charlotte in August. Will there be any disputes on the GOP platform on issues from immigration to health care? We will hold mock GOP and Democratic Conventions in class and discuss the up to the minute political news the first part of each class. We will discuss the role of social media (Trump's tweets) and current events as they arise in real-time in this lively and interactive class!

AS.470.719. Hate Groups and Domestic Terrorism. 3 Credits.
This course examines domestic terrorism in the homeland with an emphasis on white nationalist movements and anarchist-related groups such as Antifa. We will analyze ways these groups advance their political, ideological, and social agendas through violence and criminal activity in violation of both federal and state laws. Students will also be exposed to other domestic terrorism groups such as eco-terrorists, animal rights, black identity extremists, and sovereign citizen groups. The readings and videos will include a variety of diverse and opposing viewpoints; and utilize case studies such as the Charlottesville Unite the Right Rally in 2017 and the plot to kill the Michigan Governor in 2020. We will also analyze First Amendment and Fourth Amendment protected activities in civil protests and social media platforms in conjunction with these groups' activities. Last, we will address lone-wolf terrorism and whether a federal domestic terrorism law should be enacted to counter future terrorist actions.

AS.470.720. Rhetoric v. Reality in Politics: US Campaigns and Elections. 3 Credits.
The art of political persuasion has evolved rapidly in the past few centuries, but the present mimics the past. Conventional political wisdom asserts that the 2020 election – with the bombastic Donald Trump and a slate of unconventional freshmen Democrats on the ballot – is unlike any witnessed in the nation's history, but with the increase in partisanship over the last few decades, can voters really be persuaded or dissuaded from voting straight party line tickets in November 2020? This course will seek to answer that question in real time, as the students and professor slowly unwrap and examine the packaging – verbal, visual and other – candidates have employed over the last few decades to sell themselves and their platforms to voters. After first laying a historical foundation for understanding the evolution, or devolution, of U.S. rhetoric and campaigns, this course will examine every twist and turn of Election 2020 with an eye towards the means of persuasion employed by candidates, surrogates and PACS. Students will also examine the role money is playing in this post-Citizens United world, along with how free – or "earned" – media and new modes of technology are being employed by contemporary campaigns. The course will also devote a substantial amount of time to examining the media's role in how the public views current and former candidates. Guest lecturers include some of the nation's top political reporters.

AS.470.721. Comparative Federalism: The United States and the European Union. 3 Credits.
Federalism the division of power and sovereignty between a central authority and local governments has emerged as one of the most important themes of contemporary Western politics in both the United States and Europe. For the United States the division of power between the Federal and State governments lies at the very heart of the American Constitution. At the same time disputes over the precise balance of Federal and State power has been a major fault line in American politics since Federalists and anti-Federalists at the time of the founding. For Europe the destruction of two World Wars showed the destructive side of nationalism and acted as an impetus to leverage Europe's common history and cultural inheritance to forge a supranational political and economic union dedicated to peace and prosperity. Since the end of the Cold War and the Treaty of Maastricht the process of European integration has speeded up rapidly resulting in a common European currency as well as common legal and political institutions. At the same time concerns about the perceived loss of sovereignty, national identity, and democratic accountability have led in some places to backlashes against Brussels and resurgent nationalism. There is also the broader question of the European Union's goals and identity is it principally an economic union or is it a super-state in the making? In this course we will explore Federalism in its institutional, legal, philosophical, and historical aspects in both America and Europe.

AS.470.722. Elections 2022: Midterms, Media & Message. 3 Credits.
President Biden and former President Trump are not on the ballot this November but they are the two elephants in the room as voters go to the polls this year.Will Biden's fading poll numbers and Trump's Big Lie on the 2020 election and endorsements impact the midterms? This interactive class will be taking place during the middle of the midterm campaign and class will focus on House, Senate and Governor's races. From abortion to gun control to inflation to immigration to Ukraine we will discuss and analyze the key issues of the midterm election. The course will also focus on the role social media and mainstream media play and the effectiveness of candidate's paid advertising in getting their message out to voters. From the issues and the candidates on the campaign trail to use of media and messaging to the vote and beyond the class will be discussing history as it is happening!

AS.470.723. Western Political and Constitutional Thought. 3 Credits.
Many of the ideas which shape today´s world- democracy, liberalism, conservatism, capitalism, socialism, nationalism - have their roots in a "great conversation" (Robert Hutchins) that spans some 25 centuries from ancient Greece until today. The conversation motivating the Western tradition has included a set of perennial questions such as: Who ought to rule - and how do we decide? What is the purpose of politics? What is the best form of constitution? What makes political authority legitimate? What is political justice? What is citizenship? This course is intended as a broad survey of some the most influential political thinkers in the intellectual tradition of Europe and America. Among the many who will be examined are : Thucydides, Plato, Aristotle, Cicero, St. Augustine, St. Thomas Aquinas, Machiavelli, Thomas Hobbes, John Locke, Voltaire, Baron de Montesquieu, Jean-Jacques Rousseau, Immanuel Kant, Adam Smith, Thomas Jefferson, Edmund Burke, Friedrich Nietzsche, G.W.F. Hegel, Karl Marx, John Stuart Mill, Leo Strauss, and Hannah Arendt.

AS.470.724. Managing Dangerous Futures: Global Political Risk Analysis. 3 Credits.
Political risk affects almost every major decision that governments, corporations, nonprofit organizations, and even individuals make, sometimes turning what appears to be a good decision into a bad one, with severe implications. However, few people really understand political risk or how it can be evaluated and mitigated. The goals of this course are to ensure that all students can assess the political risk of a particular country or situation; assess the political risk of a particular business investment; take a much broader perspective on the possible sources of political risk; understand how the way people think and groups function preclude effective decision making (thus making bad decisions more common); evaluate risks using a variety of different risk assessment tools; and leverage a variety of mechanisms to improve risk management.

AS.470.725. China's Impact on Global Security. 3 Credits.
As China's role on the international stage continues to grow, how will its behavior change the world? Beijing has long espoused a principle of non-interference in the internal affairs of other states, but as China's overseas presence and interests grow, how is it adjusting its approach to global challenges and influencing the interests of other states? Students will put themselves into the position of national security leaders in China, in the United States, and in third countries to explore a range of national interests, priorities, objectives, strategies, and policy tools.

AS.470.726. Education Policy and Federalism. 3 Credits.
This course will explore contemporary issues in education policy, with a focus on the evolving relationships between federal, state, and local governments in guiding America's schools. Topics will include the successes and failures of the soon-to-be-reauthorized federal No Child Left Behind Act, debates over the wisdom of national academic standards, the legal environment for public school finance, the growing role of nongovernmental organizations like Teach for America and national charter school networks in public education, collective bargaining in education, and the political dynamics of education reform. The course will include group discussions and papers in which students will be required to select and defend specific policy positions in the areas discussed. (Recommended elective for MA in Public Management)

AS.470.728. Fundamentals of Nonprofits and Nonprofit Management. 3 Credits.
The goal of this course is to convey the history, size and impact of the nonprofit and philanthropic sector while providing the fundamentals of nonprofit management and the founding of a nonprofit organization. Successful nonprofits today must have strong management systems in place in order to assure quality programs for service and impact. These systems include management of finances, strategic planning, human resources, information technology, marketing, performance measures and other aspects of operations. The course will help the student understand the current thinking regarding "best practices" in managing and improving nonprofit organizations and appreciate the interplay of environmental and organizational factors that influence managerial decision-making. Throughout the course, there will be a comparative perspective that looks at the scope and status of nongovernmental organizations in other countries and the influences on those organizations by their own governments, foreign aid and international philanthropy. Elective course for the Certificate in Nonprofit Management.

AS.470.731. Privacy in a Data-driven Society. 3 Credits.
This course addresses the legal, policy and cultural issues that challenge the government and its citizens in the increasingly complex technical environment of privacy. We will examine the challenges in balancing the need for information and data against the evolving landscape of individual privacy rights. The course will examine privacy at all levels: by analyzing the shifting views of individual privacy by citizens as well as the technological challenges in both protecting and analyzing personal information for government use. Using case studies and hypotheticals, we will discuss the issue of transparency in the government use and retention of data. The cases will range from Facebook to healthcare.gov to sunshine laws to national security uses of information. We will trace the development of legal and policy measures relevant to privacy concerns and envision future solutions needed in an era of great technological innovation including the use of big data.Prerequisite: none

AS.470.732. Communications and Congress. 3 Credits.
We're living in a capital city the founders wouldn't even recognize. In recent years the Capitol itself has been outfitted with state of the art green screens, fiber optic cables, minutely pixelated cameras and new, polished studios where politicians of all stripes roll out proposals that are instantly disseminated to their supporters on multiple mediums, including in email blasts begging for campaign contributions. After a brief exploration of the history of political communications, the course will quickly pivot into a real-time examination and training session for surviving - even thriving - in the contemporary world of communications. The course will instill in students the dire need to stay focused on good policy. While students will leave equipped with the tools that will enable them to thrive in this hyper-partisan atmosphere, the hope of the course is to help Hopkins students stand out as policy focused experts in this soundbite-dominated era. The instructor is a veteran congressional reporter who is offering to bring students enrolled in his course with him to attend press conferences and/or hearings, to witness key votes from the press galleries overlooking the House and Senate floors and to study how reporters and politicians interact inside the marble halls of the Capitol. Students will be offered a front row seat to witness the contemporary congressional communications apparatus in person (some students may not be able to take time off work to accompany the professor to the Capitol, which is fine because they can catch up on those events later on C-SPAN, though students are encouraged to shadow him on the Hill for at least one day during the semester, though some may opt for spending more than one day with him). The main focus is on training students to be communications experts in this new, digital world. Students will have one main project during the semester that will require them to develop their own messaging campaign simultaneously on multiple mediums that's focused on one of the hot button issues being debated at the Capitol during the course

AS.470.733. Origins and Influence of Public Opinion on American Democracy and Elections. 3 Credits.
In a democracy, the views of citizens are intended to guide lawmakers as they shape public policy. This makes public opinion a central component in the study of democratic politics. In this course, we will investigate the psychological and sociological origins, structure, measurement, and consequences of public opinion. We will investigate the content of what people think on a variety of salient topics from immigration, income inequality, taxes, to the 2020 elections. However, the main purpose of this class is to move beyond the what and examine the why. Why do Americans think what they do about politics? The course will draw from theories in political science and political psychology to examine the organizing structures of political beliefs including identity, self-interest, socialization, personality, values and morality. In turn, the course will examine how these various sources of public opinion impact voting behavior and policy preferences.

AS.470.734. Organizational Leadership and Ethics in NGO Management. 3 Credits.
This course focuses on organizational leadership strategies and the role of ethics within nonprofit and nongovernmental work specifically. A wide scope of ethical issues relevant to nonprofit and nongovernmental work will be reviewed, analyzed and discussed. NPOs/NGOs operate under specific ethical guidelines in order to ensure accountability to the public and their many stakeholders. This course will focus on ethical behavior within organizations and explore instances of when prominent NGO leaders and organizations have been situated to face ethical dilemmas. The course will cover a wide scope of management models, techniques, and organizational values and goals. It will also review the impact that various leadership styles have had on organizations through the study of case studies and what has amounted to optimal leadership effectiveness. In addition to learning strategies to lead high performance organizations ethically. This course will combine theory, practical applications, and technical skills that will strengthen their ability to be strong leaders. Core course for the MA in NGO Management.

AS.470.735. Politics and the Media. 3 Credits.
Quickly accelerating changes in the ways we get our news are compelling newsmakers and journalists alike to rethink their craft, and their relationships with their audiences, with repercussions for policy, politics and public discourse. This course will examine how innovations – like social networking, mobile platforms, behavioral targeting, etc --are providing journalists and political leaders with new ways to interact with citizens. It will look at how the rapid migration of consumers to the web is leading news organizations of all types to rethink how they organize, pay for and think about themselves. Students in this course will use real time news developments in the nation’s capital as a laboratory for observing the evolving ways news sources and reporters and the public interact. Questions to be considered include whether this digitized and networked environment has implications for the pace and character of changes in public policy. The course will invite practitioners in journalism and politics who are dealing with these developments daily to share their sense of where all this is leading. This course counts towards the Political Communication Concentration.

AS.470.736. Methods of Policy Analytics. 3 Credits.
Data analytics are an essential part of program and policy evaluation. Policymakers increasingly rely upon analytics when making critical policy decisions. In this course, students will conduct a variety of policy focused data analyses using R. Students will utilize a variety of descriptive and inferential data analysis techniques to inform the design and execution of a policy. Students will utilize data-driven analysis to produce policy memoranda in a variety of domains relevant to today’s practitioners. A good understanding of basic economics and statistics, and an understanding of American government institutions and programs, will be necessary for a student to participate effectively in the class discussions and complete the assignments. Please contact the instructor with any questions.<o:p></o:p></p><p>Prerequisite: 470.681 Statistics and Political Analysis<o:p></o:p></p>

AS.470.738. Policy, Technology and Innovation. 3 Credits.
This course explores technological and data-driven solutions for policy challenges. This includes developments within government, such as the new types of leadership provided by Chief Innovation or Chief Data Officers, the trend toward digitalization of services, and the movement toward open data. It also covers innovation by citizens through the civictechnology movement. Civic tech initiatives have been used to extend and improve services, increase efficiency, design applications for citizen engagement, and improve communication across a variety of policy domains. The course also covers the concept of smart cities and how it can be understood as both new applications of technology (such as sensors and smart infrastructure), and the strategic use of data. For the course project, students will evaluate a policy initiative using city open data, policy research, an analysis of political culture within which the initiative would be implemented, and the technology that could be used for the initiative. Some familiarity with R programming language and theRStudio environment is helpful. Prerequisites: one of the following: 470.681 Probability and Statistics or 470.768 Programming and Data Management

AS.470.740. Cyber Policy, Strategy, Conflict and Deterrence. 3 Credits.
This course will provide an overview of current issues in the cyber realm, focusing on policy and conflict from a U.S. and international perspective. We will begin with an understanding of the power inherent in cyberspace and consider the policy issues facing the civilian, military, intelligence and private business sectors in dealing with offensive and defensive cyber activity. Through the use of case studies, we will examine previous and ongoing cyber conflicts to understand their impacts on international relations. We will analyze the roles of several different types of cyber actors including state actors, non-state actors such as criminal and terror groups and private sector/business responses. This course will also examine the issue of cyber deterrence, and the unique aspects of offensive and defensive cyber activities by all cyber actors. A technical background is not required and basic aspects of cyber operations will be discussed and demonstrated as part of the introductory class sessions.

AS.470.741. Campaigns and Elections. 3 Credits.
This course introduces current theories and controversies concerning political campaigns and elections in the United States. We take advantage of the fact that the class meets during the "invisible primary" of the 2016 presidential campaign, and students are expected to follow journalistic accounts closely. The course is split into two major parts. First, we consider the style and structure of American campaigns. For example, we ask how campaigns have changed in the last fifty years, especially concerning the role of parties, the presence of incumbency advantage, and the role of money. In addition, we consider why candidates decide to run, how they position themselves on important issues, and how they design their campaign messages. We also cover the importance of campaign polling, and the tricky task of forecasting election outcomes. Second, we explore the impact of campaigns on voters. For example, we ask whether campaigns ever convince voters to change their opinion, or whether demographic and socioeconomic factors explain most political behavior. The goal of the course is to review the importance of elections in American politics, and to provide the tools to make normative judgments about the health of American democracy.

AS.470.742. Politics of Cybersecurity. 3 Credits.
In recent years, the United States has become dependent on cyber virtual networks as the engine for our society. However, this digital infrastructure remains extremely vulnerable to cyber attacks. Protecting the networks we rely on presents unique challenges, as networks are without borders and bear the stress of attack millions of times each day. This course will explore the challenges and political factors impacting the judicial, legislative, executive branch agencies of Department of Defense, Homeland Security, National Security Agency, and private industry as they all work to secure and create a national cyber security apparatus. The intelligence community is facing an enormous challenge in working to prevent the transfer of the United States' intellectual property and identifying the cyber attackers. We will discuss the political implications of establishing laws addressing how information is to be shared between governments and industry and the authorities needed for the DoD and intelligence community to operate domestically. We will discuss the impact of the creation of the Department of Homeland Security and examine the evolving relationship of Congressional oversight and legislative mandates. Issues such as jurisdiction of congressional committees, the budget, and the authorization and appropriations processes will be covered. Major policy and counter-terrorism issues of special concern to Congress will also be addressed in this course. Guest speakers will be invited from DHS, Capitol Hill and the media, allowing us to examine the issues from a variety or perspectives.

AS.470.743. Data Mining and Predictive Analytics. 3 Credits.
Many government agencies engage in data mining to detect unforeseen patterns and advanced analytics (such as classification techniques) to predict future outcomes. In this course, students will utilize IBM SPSS Modeler to investigate patterns and derive predictions in policy areas such as fraud, healthcare, fundraising, human resource and others. In addition, students will build segmentation models using clustering techniques in an applied manner. Integration with other statistical tools and visualization options will also be discussed.Prerequisite: 470.681 Probability and Statistics; Recommended: 470.709 Quantitative Methods

AS.470.744. Trade and Security. 3 Credits.
Since World War II, American trade policy has been implemented through agreements with a growing array of foreign governments to encourage global economic integration by lowering barriers to international trade. The course will begin with a look at the foundation of this approach to trade policy at the end of World War II and the relationship the Roosevelt and Truman administrations saw between integration and security policy. It will then introduce students to the American trade regime of the early 21st century and the WTO, and examine the ways the U.S. governments has adapted this regime to regional challenges arising from relationships with Japan, China, and the Muslim world, and to policy issues, like resource dependence, sanctions and export controls. The course will have a midterm exam on America's trade regime and the concepts that have shaped it, and a final paper, in which students will examine an issue of their choice in depth. (Recommended elective for MA in Public Management)

AS.470.745. Terrorist Financing Analysis and Counterterrorist Finance Techniques. 3 Credits.
The course examines how terrorist groups finance their operations. It also explores current policy approaches to curb financial support to terrorists through the application of U.S. and international sanctions, in particular how multilateral fora, such as the United Nations and the Financial Action Task Force, disrupt and deter terrorist financing. At the completion of this course, students will have a better understanding of the key tools, including law enforcement, diplomacy, and intelligence, that are used to counter terrorists' financial networks and activities. Through this course, students will develop proficiency in a series of analytic methods used to study terrorist financing and counter financing. Students will use structured analytic tools such as weighted ranking methods, scenario trees, causal flow diagramming, hypothesis testing, and utility analysis, as well as game theory and logic to form analytic judgments. Prior coursework or professional experience in intelligence, (counter) terrorism, or finance recommended.

AS.470.746. Iran: Security Policy of a Revolutionary State. 3 Credits.
This course will provide the analytical and contextual skills required to understand the current political and security situation of Iran. After laying out the context of the Iranian Revolution through a brief examination of the Pahlavi years, the course then weaves together Iran's political, military, diplomatic, social, economic development during the turbulent years between Iran's 1978-1979 revolution and the 2015 nuclear agreement—covering a time period of roughly 1941 to the present day. This course covers three main inter-related topics: the history and development of the modern Iranian state; the interaction between state and society in modern Iran; and Iran's diplomatic history in the 20th and 21st centuries. The course concludes with a discussion of Iran's present-day foreign, security, and defense structures and processes.

AS.470.747. The FBI and Fusion Centers: Information Sharing in the Post 9/11 World. 3 Credits.
This course examines the “fusion” of information gathering and sharing between the Federal Bureau of Investigation (FBI) and the 79 fusion centers in a Post-9/11 World. We will address federal, state, and international law enforcement jurisdictional issues, the balancing of privacy/civil liberties with information collection/dissemination, and overall assistance to state/local authorities during critical incidents. Students will address broad public policy and perception implications inherent in law enforcement activities. Students will also analyze and discuss case studies such as the Las Vegas Concert, the Orlando Night Club, and the San Bernardino shootings to illustrate the need for timely fusion of information between federal and state law enforcement. The readings and videos will include a variety of diverse and opposing viewpoints relative to law enforcement with practicums and simulations to allow debate in “real-world” situations. An important objective is to determine ways to improve upon the current law enforcement landscape and generate possible solutions to ensure seamless and timely information sharing while safeguarding individual rights.

AS.470.748. The Art & Practice of Intelligence. 3 Credits.
This course introduces students to the field of intelligence, particularly as practiced in the United States. After a brief overview of the historical foundations of modern intelligence, it discusses how intelligence was conducted during the 20th century including collection, analysis, counterintelligence, covert action, and oversight. It then discusses the disruptive influences of September 11, the Iraq War, and new technologies. The course concludes with a discussion of the “democratization of intelligence.”

AS.470.749. Campaigns and Running for Office. 3 Credits.
You can see yourself now – taking the oath of office, giving speeches, and making critical decisions impacting thousands or millions of people. But how do you get there? This class provides a practical guide for students who are interested in exploring a run for elected office. Students will learn how to assess if and when they are ready to run, which office to run for, and most importantly, develop the critical skills needed as a candidate to wage and win a contested campaign. These skills include writing a campaign plan and budget, hiring staff and consultants, learning how to fundraise, and working with the media. This class dispels the myth that only those independently wealthy can serve in office by giving students a real understanding of what it takes to run and win.

AS.470.750. Modern Conflict in the Middle East. 3 Credits.
This course examines the evolution of armed conflict in the Middle East over the past three decades and why the United States’ conventional military dominance has not led to lasting strategic victory. Attention will be paid to how both states and non-state actors in the region have adjusted to America (and Israel)'s overwhelming conventional military superiority through deterrent strategies, asymmetric tactics (i.e. insurgency, terrorism, tunnel warfare), and exploitation of advanced commercial technologies (i.e. improvised explosive devices, UAVs, cyberwarfare, information operations) in lethal and/or strategic operations. Students will utilize "rationalist" and cultural frameworks to critically analyze these innovations across multiple conflicts/operations, including: Operations Iraqi Freedom and Inherent Resolve; various iterations of the Israeli-Palestinian conflict; the civil wars in Syria and Yemen; and strategic conflict between Iran and the United States (and Israel) . The course’s objective is to provide a better understanding of the relationship between military technological capability and strategic success in modern conflict, and of the challenges U.S. policymakers may face in future conflicts both in the Middle East and globally against other great powers.

AS.470.751. Politics and Security in the Middle East. 3 Credits.
This course examines U.S. policy responses to the changing political and security landscape of the Middle East. Bringing together historical events, primary sources and secondary literature and contextual analysis, this course provides the analytical skills required to develop a sophisticated understanding of the current political and security situation in the Middle East. Students will engage key topics in modern Middle Eastern politics and security, including the origins of Islam, Arab nationalism and its rise to prominence, the Arab-Israeli and Palestinian-Israeli conflicts, the internal/external struggles against Western imperialism, the competition among Arab states for regional dominance, the Cold War the Middle East, America’s relations with Iran and Iraq, the oil economy of the Gulf, the challenge minorities pose to the region, the rise of Islamic radicalism, the Arab Spring, and the rise and fall of the Islamic State.

AS.470.752. Intelligence Analysis. 3 Credits.
Intelligence analysis is fundamentally about understanding and communicating to decision makers what is known, not known, and surmised, as it can best be determined. Students will read seminal texts on intelligence analysis, discuss the complex cognitive, psychological, organizational, ethical, and legal issues surrounding intelligence analysis now and in the past, and apply analytic methodologies to real-world problems.

AS.470.754. Project Management for NGOs. 3 Credits.
This course will provide an overview on project management as it pertains to nonprofit work. The course will teach students how to manage the five aspects of project management: project initiation, planning, execution, monitoring and evaluation, and closure. Students will learn the full project cycle from start to finish, drawing on actual examples of projects funded by a diverse range of donors, public and private organizations, and foundations. The course will also utilize templates relevant to project management for students to use as a resource in the field. The class will touch on issues relevant to project management such as project scope, objectives, stakeholders, planning, financial tracking, grants compliance, and closing. Elective course towards the Project Management, Evaluation and Leadership track for the Masters in NGO Management.

AS.470.755. Sustainable Cities in Germany: Lessons for the United States. 3 Credits.
This course addresses two important, but overlooked global urban phenomena – the development of world-class urban sustainability plans in Berlin and the Stuttgart region and their suitable transfer and application to cities in the U.S. This class will be designed to expose the student to the evolution and performance of renewable energy, public transit, water infrastructure, workforce training and social inclusion innovations - in these metropolitan regions and the ways that they may (or not) be considered suitable for adoption in the US. By the end of this course the student will have developed an appreciation for the pioneering urban sustainability programs of Berlin and Stuttgart and the phenomena of cross-national policy transfer to the U.S.

AS.470.756. Understanding Modern War. 3 Credits.
This course examines the phenomenon of modern warfare through both a theoretical and historical lens. It will provide insight into the definitions, origins, objectives, strategies, and tactics of modern conflict. Throughout the course you will analyze recent and ongoing conventional, irregular, and hybrid wars and understand what caused them, how they were conducted, and why they ended the way they did. Through a combination of lecture and online discussion, students will analyze these conflicts from a variety of perspectives to include state security and military forces, insurgents, criminals, and terrorists.

AS.470.757. Language and Power: How to Understand and Use Political Speech. 3 Credits.
<p> Political writing is a subspecies of language with several manifestations. There is an art to the op-ed and to the editorial, to the polemical essay and to the review. Within government, there are skills particular to ghosting speeches and essays, preparing Congressional testimony, Federal commission reports, policy memoranda, and press releases. There are even special forms and qualities of expression for hosting award and memorial ceremonies, and for writing thank-you notes, toasts, and letters of condolence. <o:p></o:p></p><p> This course is designed to teach an appreciation for the range and nature of political writing and speech in both its public and governmental forms. It also introduces students to the fundamental skills required to do effective political writing. The course is designed to be a writing-heavy course, because (most) people learn by doing. It will therefore be somewhat time-consuming, but within reason. <o:p></o:p></p>

AS.470.758. Data-Driven Campaigns and Elections. 3 Credits.
Analytics inform the decision-making process, strategizing, and forecasting of modern American campaigns. This course focuses on the role that analytics play in campaigns and elections in America. Campaign strategists, policy analysts, and social scientists leverage data from voter rolls, consumption and public opinion polls to make better choices. This course surveys the theoretical and empirical literature in American electoral politics to examine how campaigns and political organizations are using field experiments, microtargeting, and public opinion polling to tackle the challenges of getting out the vote and increasing registration and voting rates. Other topics covered include voting behavior, public opinion, partisanship, and campaign finance. Students will gain a rich understanding of how analytics has become a key component of the electoral process. Students will also gain experience analyzing data through simulations and data analysis exercises. Prerequisites: none required (470.681 Probability and Statistics recommended)

AS.470.759. American Political Development. 3 Credits.
This course examines the factors that promote stability and change in American politics. Broad in historical scope, this course considers the development of the American state and its institutions as well as the continuities and complexities of American political culture by analyzing key moments of institution-building and policy change from the American Founding to the present. Key questions include: What explains the character of the American state? What are the consequences of the American state and its policies? Is America “exceptional” in these and other regards? What roles and functions do political institutions perform? What roles do culture, ideas, and rhetoric play in social, political, and economic life? How have these various roles and functions changed over time?

AS.470.760. Comparative Intelligence Systems. 3 Credits.
Do all countries conduct their intelligence activities in the same way? If not, what are the reasons for the differences? This class will consider theoretical ways of understanding and assessing national intelligence systems. It will look at political, historical, and cultural factors which may influence the development and functions of nations’ intelligence agencies and systems. The class will include an examination of the "ways of intelligence" of the United States, the United Kingdom, the USSR/Russia, Germany, China, and Iraq, among others.

AS.470.762. Democracy and Security in Israel. 3 Credits.
The influence of the security circumstances of Israel and its point of departure as a nation for democracy in Israel will be the focus of this class. The exigencies of war put tremendous pressure on liberal-democratic ideals and institutions, and very few democracies have endured such long-term conflict as Israel has. How has Israel managed to combine security with liberty without sacrificing one to the other? How might Israel democracy better serve its multi-ethnic constituencies? What is it about the nature of Israel’s institutions, its history, and its culture that enables it to persevere as a liberal democracy? With authoritarianism on the rise in the world – will Israel be able to resist it? We have planned a variety of units to look at these facets of Israeli democracy – its strengths, challenges, and vulnerabilities.

AS.470.763. Database Management Systems. 3 Credits.
This course provides students with a strong foundation in database architecture and database management systems. Students will evaluate the principles and methodologies of database design and techniques for database application development. Students will also examine the current trends in modern database technologies such as Relational Database Management Systems (RDBMS), NoSQL Databases Cloud Databases, and Graph Databases.Prerequisite: none

AS.470.764. Survey Methodology. 3 Credits.
This course is a comprehensive examination of all aspects of designing questionnaires, conducting survey research, and analyzing survey data. The class will cover question construction, measurement, sampling, weighting, response quality, scale and index construction, IRBs, ethics, integrity and quality control, modes of data collection (including telephone, mail, face to face and focus groups), post collection processing and quantitative analysis of data (including chi-square and ANOVA), as well as report writing fundamentals. The class culminates by fielding a survey of student created questions and writing an executive summary of the survey with a paper discussing the research findings.Prerequisite: 470.681 Probability and Statistics

AS.470.765. Government Regulation of Business: Price and Entry Controls. 3 Credits.
There are two main approaches for implementing government domestic policy: fiscal and regulatory. This is a one-semester course in economic regulation. Economic regulation includes use of market entry and price controls to deal with market imperfections, such as natural monopolies in which competitive markets fail. The course would cover:· the nature of markets and market failure,· a political economy/public choice analysis of the genesis of government intervention,· an evaluation of corrective policies, and· an analysis of alternative regulatory strategies.In addition to the regulation of natural monopolies, potentially competitive markets, and the problem of regulatory capture, the course would cover alternative types of environmental regulation for controlling external social costs. The class would prepare the successful student to examine and interpret problems, policies, programs, and events at all levels of government using the powerful tools of economic analysis applied to government regulation.?

AS.470.766. Economic Growth:The Politics of Development in Asia, Africa and Beyond. 3 Credits.
What makes some countries grow while others do not? What accounts for successful economic development versus stagnation? As these questions become ever more relevant in an increasingly globalized world, this course offers an introduction to the topic. The class will provide an overview of the main classic and current theories of economic development. It will then go on to explore specific current issues in development, including: development aid, role of international organizations, sustainable development, corruption, institution building and regime type. Specific case studies will be examined including China and India, the East Asian 'tigers', development failures in Africa and mixed outcomes in Latin America.

AS.470.767. Defense Policy. 3 Credits.
This course describes the principal challenges facing the making of American Defense Policy and explains previous and current policies declared and practiced to meet them. The course is designed to inform students on the most pressing defense issues confronting the United States, and to present them a framework for defense policy analysis. It emphasizes understanding those defense policies, analyzing them, and considering and weighing alternative approaches to achieving national objectives of deterrence and defense. The course fosters an understanding of the array of U.S. military capabilities providing plausible responses to the use of military power in support of U.S. foreign policy objectives. It examines those policies in the areas of nuclear, conventional, and irregular forces, and weighs alternatives in shaping the size and structure of those forces to meet national objectives.

AS.470.768. Programming and Data Management. 3 Credits.
This course introduces students to the R programming language. The R language is one of the most popular tools used today for performing data analytics, statistics, machine learning, data visualization, and much more. By the end of this course, students will understand fundamental programming concepts that apply to all programming languages. These concepts include variables, functions, loops, data structures, and data types. The course will also cover the use of these tools to solve challenging data problems that students may encounter in their academic or professional careers. Note: The course overlaps a small amount with 470.681 Probability and Statistics, but this course focuses much more heavily on the fundamentals of programming. No prerequisite.

AS.470.769. Data Science for Public Policy. 3 Credits.
Data science is a methodology for extracting insights from data. This course is an introduction to the concepts and tools that are used in data science with an emphasis on their application to public policy questions. The course covers some advanced data mining and machine learning processes including classification and decision trees, random forests, cluster analysis, and outlier detection, while also providing you with training in the basics of data management and data exploration. All of the work in the course will be conducted to prepare you to proficiently conduct predictive analytics in a real-world setting. Some familiarity with R programming language and the RStudio environment is necessary. Prerequisite: 470.681 Probability and Statistics

AS.470.770. Communicating Public Policy. 3 Credits.
This course will introduce students to today's most pressing public policy issues, with an emphasis on writing to achieve impact. Public policy professionals must be familiar with a variety of key issues and be able to effectively make a case for a position. This course will examine such topic areas as health care, energy/environment, fiscal policy, international trade, and education and identify core issues and the politics that characterize each of these policy areas. As part of our study, students will learn the art of writing policy memos, issue briefs, op-eds and speeches. When you complete the course successfully, you will be able to demonstrate a basic understanding of five public policy issues through various forms of writing. You will be able to effectively and succinctly write policy memos, issue briefs, op-eds, blogs and speeches, addressing a specified audience, clearly identifying the problem, and making a case for a position or solution.

AS.470.771. Security and Politics in the South Caucasus. 3 Credits.
This course addresses security and political issues in the South Caucasus, as well as selected economic, cultural and ethnic topics. It examines the histories of Georgia, Armenia, and Azerbaijan prior to the Russian conquest and during the imperial and Soviet periods; political continuity and change since the fall of the Soviet Union; and the origins and evolution of ethno-territorial conflicts. It discusses the region as an arena of security competition between Russia and NATO and as a venue for frozen conflicts. It also considers democratization and global energy politics as well as the role played by regional powers such as Iran and Turkey. Finally, it looks at how the European Union's European Partnership initiative is shaping the region. After initial sessions in Washington the course moves to Tbilisi, Georgia for a week for meetings with policy makers and experts, including those on Azerbaijan and Armenia. Side trips include excursions to the area of the Russia-occupied line near South Ossetia and Georgia's ethnic minorities. The course finishes with a concluding session in Washington.

AS.470.772. Practical Applications of Artificial Intelligence. 3 Credits.
<p>This course will address the practical applications of artificial intelligence particularly in the realms of policy and governance. AI and data science are transformational technologies that hold the promise of improving lives and society at large. While excitement about AI and its applications is growing, its adoption is anything but straightforward. The successful application of AI to lower risk, better understand customers and automate decision making requires a deep knowledge of the right use cases where AI can lead to breakthrough innovations. <o:p></o:p></p> <p>This course will provide students with the opportunity to investigate multiple AI use cases and evaluate their merit. In addition, students will select a specific use case, develop reference architecture and determine an appropriate implementation strategy. The course will culminate in the development and delivery of a lab-to-market strategy for their selected use case.No prerequisite. <o:p></o:p></p>

AS.470.773. Energy and Environmental Security. 3 Credits.
This course examines the nexus of energy, natural resources, and the environment with conflict, war, terrorism, crime, development, diplomacy, politics, and technology. Students critically examine the ways that increased competition for environmental and energy resources, strained resources, and changing conditions can threaten national security. The course also examines how such threats may be mitigated.(Core course for the MA in Global Security Studies)

AS.470.774. Nonprofit Governance & Executive Leadership. 3 Credits.
470.774 Nonprofit Governance & Executive Leadership: Students will advance their understanding of self-governing nonprofit organizations by focusing on nonprofit boards' expectations, challenges, and opportunities and their executive leadership. This course covers the primary responsibilities of nonprofit boards according to law, custom, and best practices, and it includes ethical concepts, public attitudes, and contemporary legislative and regulatory issues. The course explores theories of effective governance and executive leadership. It examines how ethical considerations relate to perceptions of excellence and shape how staff and volunteer leaders manage people and money. In the discussions, there will be opportunities to explore the roles of boards in the context of the nonprofit environment. This is a core course for the MA in Non-Governmental Organization (NGO) Management and Certificate in Nonprofit Management.

AS.470.775. Great Power Competition. 3 Credits.
"Warfare" today is often ambiguous, constant, and non-violent: a combination of low intensity conflict and struggles over information via cyberspace, especially over "narratives" that sway public opinion. Warfare has always included these elements, but our adversaries today fight and stay in this early stage of cyberspace operations, information operations, and limited or no kinetic conflict, careful never to escalate to state-on-state violence. This course will examine how "non-kinetic" warfare (information operations, cyberspace operations, non-violent resistance) takes place today. Students will learn how the control and manipulation of information shapes national security and creates new political realities. Focus will be on Russian hybrid warfare and "information confrontation," Chinese weaponization of business and cyberspace and "coercive gradualism," and terrorist's use of the internet.

AS.470.776. Nationalism in the Democratic Age. 3 Credits.
Nationalism and democracy have been two of the most significant forces shaping the contemporary world. The sense of nationality has provided peoples with a strong sense of shared belonging based around the ideas of a common language, land, and heritage. It has sometimes fuelled the demand for collective freedom and democratic self-determination. At the same time it has been a volatile force generating conflicts within and between nations across the globe. In Europe, the effort at forging a common European identity must confront the challenge of resurgent nationalism in traditional countries like Britain, France, and Austria. Meanwhile traditional states like Britain and Spain must themselves confront secessionist nationalism in Scotland, Catalonia, and elsewhere. The modern Middle East has been shaped in part by the conflicting goals of two major nationalist movements - Arab nationalism and Zionism. In Asia, nationalism is emerging as a dominant theme as countries like China and India rise to political and military power. In spite of economic globalization and the development of international laws and institutions, it is pivotal to understand nationalism if we are to understand world politics today.

AS.470.777. Technology and Terrorism. 3 Credits.
This course explores the phenomenon of terrorism and its nexus with technology. Beginning with an emphasis on terrorist group factors most likely to influence terrorists' perceptions and attitudes towards extant and emerging technologies, the course subsequently investigates cases of terrorist use, and noteworthy non-use, of various technologies. Students also receive a broad understanding of the evolution of technology with an emphasis on current and imminent technologies of acute security concern, including weapons of mass destruction, cyber, robotics, and nanotechnologies. The course then addresses counterterrorism technologies and potential terrorist response actions for overcoming such security efforts. Students operationalize all of these elements in the final phases of the course when engaging in Red Team exercises designed to demonstrate which types of terrorists are most likely to pursue certain types of technologies, the role of tacit versus explicit knowledge, likelihood of successful adoption, targeting options, and potential counterterrorism measures. Please note that students do not need to possess a technical background or prior knowledge of terrorism to succeed in this course.

AS.470.778. Conflict, Security, and Development. 3 Credits.
Over the last two decades, the United States and its partners have sought to “securitize” development assistance to solve a range of national security problems, from resolving conflict, countering violent extremism, insurgencies, and great powers, and promoting democracy. This seminar explores to what extent can and should development be used in these ways, what is the impact of doing so on political order, and has this shift away from supporting longer-term economic growth led to new challenges for both governments and international organizations? The course blends theory with practice and offers students an insider view into how U.S. national security policy is made. The first part of the course examines the theory and practice of using development to achieve short-term political and security goals. The second part of the course examines how the United States and other nations have attempted to address conflict and its drivers through civilian-military approaches in a number of countries.

AS.470.779. Computational Modeling for Policy and Security Analysis. 3 Credits.
This course will introduce computational modeling and demonstrate how it is used in the policy and national security realms. Specifically, the course will focus on agent-based modeling, which is a commonly-used approach to build computer models to better understand proposed policies and political behavior. Agent-based models consist of a number of diverse "agents," which can be individuals, groups, firms, states, etc. These agents behave according to behavioral rules determined by the researcher. The interactions with each other and their environment at the micro-level can produce emergent patterns at the macro-level. These models have been used to understand a diverse range of policy issues including voting behavior, international conflict, segregation, health policy, economic markets, ethnic conflict, and a variety of other policy issues. The course will consist of two parts: First, we will examine the theoretical perspective of computational modeling. Second, you will be introduced to a software platform that is commonly used to develop computational, and, in particular agent-based modeling. No prerequisite

AS.470.784. Technology of Weapons of Mass Destruction. 3 Credits.
Students gain the foundational knowledge behind WMD (both weapons of mass destruction and weapons of mass disruption) and about how these weapons threaten U.S. homeland security. Weapons of mass destruction traditionally include nuclear, biological, and chemical weapons, while weapons of mass disruption include radiological weapons, such as "dirty bombs." In addition, the course covers the technology behind three WMD delivery vehicles: ballistic missiles, cruise missiles, and unmanned aerial vehicles. In assessing each WMD threat, the course first examines the science and technology for each type of weapon and then applies this theory to real world threats emanating from state and non-state actors. Students apply this knowledge by engaging in red team exercises to identify options for preventing and reducing vulnerabilities from WMD. Please note that students do not have to have prior technical knowledge about WMD issues to succeed in this course.

AS.470.785. Nuclear Proliferation and Non-Proliferation. 3 Credits.
Since 1945, eight states have tested nuclear weapons, and perhaps two dozen others have started -- and stopped nuclear weapons programs. This course considers why some countries pursue nuclear weapons and why others forgo them, an issue that bedevils both policymakers, who concerned about the spread of weapons of mass destruction, and political scientists, who attempt to explain and predict it. The class will delve into past and present examples, discussing and evaluating theories of why states pursue such weapons, the technologies that make it possible, and the policy tools available to prevent it. We will also draw on the parallel efforts to control chemical weapons, biological weapons, and ballistic missiles.

AS.470.786. Weapons of War: The Technology and Uses of Weapons. 3 Credits.
Modern warfare utilizes advanced weapons systems. This course will examine various weapon systems ranging from artillery, cruise missiles, aircraft, aircraft launched weapons, ships, submarines and unmanned systems. We will also examine strategic and tactical nuclear weapons. In the examination we will look at capabilities, concepts of operation, and issues surrounding their procurement and use. The course will also involve students working through a crisis scenario utilizing various weapon systems. No pre-existing technical knowledge is assumed nor is any required.

AS.470.787. State and Local Government Financial Management and Analysis. 3 Credits.
The course explores issues of financial management in state and local government, mostly in the United States. Students will study the political economics of property, sales, and income taxation. Non-tax revenue sources such as lotteries and user fees will also be explored. Other financial management strategies and techniques will be assessed as well, and they may include intergovernmental grants, project-based finance, capital project finance, municipal debt valuation, and local economic development. The course is designed for students who desire a practical overview of real-world challenges at the state and local level.

AS.470.788. Monitoring & Evaluation for Nonprofits/NGOs. 3 Credits.
This course provides an overview on the tools, resources, and training needed to measure the impact of an organization's programs and projects. M&E plans help nonprofits to determine if they are meeting their intended results, goals and objectives towards their overall mission. Designing a strong M&E system is critical to identifying realistic indicators, tracking an organization's measurable results; providing programmatic progress; providing accountability to donors; and determining opportunities for growth. The intended results of a strong M&E plan are to enable nonprofits to demonstrate that they are achieving their missions—thus increasing their credibility among beneficiaries and strengthening their appeal to donors. This course will teach students how to develop a strong M&E plan that meets donor, organizational, and/or programmatic needs. Based on M&E results, students will learn how to improve program implementation and achieve greater outcomes. Students will learn to design an M&E plan and the ability to effectively communicate programmatic data to their stakeholders.

AS.470.789. International/Non-Governmental Organizations and Civil Society in Conflict Zones. 3 Credits.
Since the end of the Cold War the world has seen a scourge of civil conflicts emerging across the globe, such as in Bosnia, Rwanda, Darfur, DRC, South Sudan, and now Syria, global conflicts have put enormous pressure on intergovernmental bodies and governments. Whether too slow to respond, afflicted by political restraints or hindered by bureaucracy, the restrictions on international agencies and governments have often placed NGOs at the fore of response. Partnering with both national governments, military, and international agencies, NGOs have gained recognition for their role in diplomacy, conflict resolution, and peacebuilding. NGOs have gained a prominent role at helping to defuse, mitigate, and prevent conflicts strengthening their influence and recognition. This course will provide an overview on the role that international organizations and civil society (including community based organizations) can have in conflict or post-conflict torn countries. Students will learn how to build strategic partnerships when working with local organizations and NGOs. Elective course for the Certificate in Nonprofit Management.

AS.470.792. Social Science in National Security and Intelligence. 3 Credits.
This course examines the role of social science in national security decision making and intelligence. The course lectures, readings and classroom discussion are intended to help students understand the ambivalent relationship between social scientists on the one hand and intelligence personnel and national security policy makers on the other. It also considers the opportunities and limitations in the ways social science could contribute to policy making and how social science has contributed to key national issues. The course will help the student become a savvy consumer of social science.

AS.470.794. Fixing American Politics. 3 Credits.
The widespread diagnosis of American politics is that it is "broken." But what is wrong with American politics? And what, if anything, can be done to fix it? This course will examine the current problems in American politics from a historical, theoretical, and comparative perspective, and explore possible reforms that might make American politics function better.

AS.470.795. The Constitution and National Security. 3 Credits.
This course exams the interpretation of constitutional powers and rights under conditions of heightened national security. We will consider the Supreme Court's role in constitutional interpretation, and the balance of power among the three branches. The course will also examine the tension between security and liberty during a time of war. Topics covered during this semester will include military tribunals, unitary theory of the executive, congressional oversight, war-making power, intelligence authorities, and treatment of detainees.

AS.470.796. 2020 Presidential Campaign: Pre-Primary Phase: Campaigning, Communicating & Controversy. 3 Credits.
The fall before the Iowa Caucus and New Hampshire primary is a key time for the candidates to put their presidential campaigns into high gear. The Democrat debate series will continue into the fall and we will look at the communications strategies of the candidates for the debates as well as analyze and discuss President Trump's media and political strategy for re-election, especially how he rallies his base.The class will delve into the threat of impeachment and other congressional investigations and any impact they will have on the road to the White House. We will analyze the social media strategies of all the presidential contenders (and Trump's Tweets as well) and look at how the mainstream media is covering the race. The class will look at fundraising, policy statements, speeches and the role of personality and character in the 2020 presidential campaign and compare to other presidential elections in American history. We hope to have several of the 2020 presidential candidates speak at Hopkins in the fall.

AS.470.797. Intelligence to Secure the Homeland and Hometown. 3 Credits.
This course provides students with an intellectual foundation for understanding the concepts underpinning homeland security intelligence, as well as an overview of the US national homeland security framework including organization and policies. It examines the underlying intellectual constructs used to frame the comprehension of security issues, intelligence based on those issues and the development of policies and strategies that lead to implementing programs that protect the United States infrastructure and its people from attack. Over the term, students will be challenged to examine the various paradigms that shape homeland security intelligence and critically apply them to contemporary homeland security challenges and examine how well or poorly these paradigms are reflected in current responses, organizations and policies.

AS.470.798. Financial Management and Analysis in Nonprofits. 3 Credits.
From the perspective of a nonprofit leader, this course provides a solid foundation in understanding key financial tools such as audits, financial statements, budgets and tax documents. Using these tools, students will analyze and assess the financial transparency, accountability, and health of various national and international organizations, determine the financial strengths and weaknesses within those organizations, learn how to use that information in the decision-making process, and finally, practice making informed recommendations to organizational leadership. This course is not designed to make students financial experts or practitioners. Instead, it is designed to enlighten students on key financial management concepts that improve their ability to be informed leaders, participants, and donors in the nonprofit sector. Students will also explore the responsibilities and consequences of international nonprofits engaging in activities in the US, as well as implications for US nonprofits operating abroad. This is an elective course for the Certificate in Nonprofit Management.

AS.470.799. State Politics: A Year in the Life. 3 Credits.
<p>State politics and policymaking offer a fascinating contrast to the gridlock in Washington that gets all the media attention. <o:p></o:p></p> <p>This is a particularly timely issue to study as most states gear up for the new legislative session. How are Biden's policies affecting current debates in statehouses? What impact are the 2020 elections having on policymaking at the state level? How has the Trump presidency affected states? We will explore these questions and more in this class. <o:p></o:p></p>

AS.470.800. Research & Thesis III: Government. 3 Credits.
Research and Thesis III (RT III) is the final course for the MA in Government program. You can only enroll in RT III if you have successfully completed the following prerequisites: 470.602 Government and Politics, 470.850 Research and Thesis I, and 470.852 Research and Thesis II or 470.854 Fundamentals of Quantitative Methods or 470.681 Probability and Statistics. The goals of the RT III course are for you to finish the research and writing of your thesis and to prepare for your Thesis Defense.
Pre-requisite to RT III (470.800) only after successful completion (B) of Research and Thesis I: MA in Government (470.850) and Research and Thesis II: MA in Government (470.852). Pre-requisites: AS.470.852 AND AS.470.850

AS.470.803. Independent Study. 3 Credits.

AS.470.820. Independent Study. 3 Credits.
Independent study involves a student working one-on-one with a faculty member. The project must follow a plan of study and end with a final paper. It must not duplicate any course being offered in the Center for Advanced Governmental Studies. Students interested in an independent study should first consult a faculty member to discuss the project and make sure they are willing to participate should an independent study be approved. Proposals for an independent study should be directed to the student's program director at least 30 days before the start of the semester. Proposals must provide details of the project, the name of the instructor, and a plan of study. The program director has sole discretion to approve or disapprove the proposal.

AS.470.830. Practicum in Government & Politics. 3 Credits.
One of the great strengths of the Government Program is that it brings theory and practice together, and recognizes that it is often from work experience that students gather useful and practical insights and information that can be applied to academic work. This course is designed for students who have an internship or who work in a field that will allow them to use that work experience to conduct research that may be applied to their theses. Permission of instructor is required.

AS.470.835. DC Lab: Politics, Policy, and Analytics. 3 Credits.
Washington, D.C. is the laboratory for anyone studying American government and politics or analyzing the policy making process here. DC Lab: Politics, Policy, and Analytics will give any graduate student in one of the programs of the JHU Center for Advanced Governmental Studies the opportunity to bring theory and practice together through an intensive week of lectures, seminars, and site visits in the nation's capital. Sessions will include guest speakers from JHU faculty, think tank scholars, and agency officials. The goal is to experience Hopkins in Washington and assess what is observed to better inform each student's studies of the political process. No prerequisite

AS.470.850. Research and Thesis I: MA in Government. 3 Credits.
(Core course for the MA in Government)The purpose of this core course in the Government Program is for students to refine their thesis topic, develop their research design and complete a working outline for their thesis. Students will begin to research and write their thesis during this class in earnest. The course format is working sessions focused on specific research-oriented tasks. Emphasis will be placed on completing the literature review and methodology sections of the thesis. Students will also complete by semester end a preliminary chapter of their thesis papers and work with the professor to develop a plan for the other two papers that will comprise the portfolio thesis.

AS.470.851. Qualitative Methods in Social Science. 3 Credits.
This course is the first in the Research Study sequence for the Global Security Studies program. The goals of this course are: 1) to help students be producers of scholarly knowledge, 2) to prepare students for later parts of the research study process, and 3) to prepare students to understand and critique others' uses of various methods. The first part of the course will address fundamental issues, such as measurement, causation, and inference. The second part of the course will address research design, data collection, and analysis, focusing on specific methodological tools including case study analysis, interviews, content analysis, participant observation, survey research, etc.

AS.470.852. Research and Thesis II: MA in Government. 3 Credits.
Core course for the MA in Government. Please note that 470.854 Fundamentals of Quantitative Methods or 470.681 Probability and Statistics may be substituted for this requirement with permission from the instructor. This directed research course is designed to help students complete the second paper of their thesis portfolio. Students will work closely with the instructor to revise a current paper, turning it into a research paper that 1) is tightly linked to the theme of the student's first paper and overall thesis portfolio; and 2) meets research and writing standards for being included in the thesis portfolio. Class meetings are designed to give guidance on the methods of research and on the clarity and focus of the research question the student is pursuing. Prerequisite: Students must have passed Research and Thesis I.

AS.470.853. Historical Methods. 3 Credits.
Historians reclaim, recover, and revise what we know about the past. They enter a dialog with the dead to make sense of our world for the living, knowing full well that their hard-earned results may be overturned with new data, analysis, or insights. Yet questionable or flawed "history" is routinely to justify a range of experiences, policies, and events. In this course, we instill the key skills and analytical framework in which historians use to uncover and recreate the past, taking the journey from question, to research (onsite and online), to argument and revision (and revisionism). The importance of argument, objectivity, personal and temporal bias, evidence, narrative and cultural context are examined in detail, along with case studies of history being used, misused, and abused by historians and other actors.

AS.470.854. Fundamentals of Quantitative Methods. 3 Credits.
The main purpose of this class is to train students to be informed consumers of quantitative studies, in addition to teaching the tools of basic statistical work. The emphasis in this class is on application and understanding of existing results, rather than on theory or derivations. The course material will cover basic descriptive statistics, inferential statistics, and data collection. The key learning objective is for students to finish the class with a better understanding of the statistical and econometric results they may encounter, both in papers they read in other classes, as well as in the course of their work. The second key objective is for students to have the skills to employ basic quantitative tools in their own work in the fields of public policy and global security studies. As much as possible, assignments and readings used in class will be drawn from the public policy and security fields. There is no mathematical or statistical pre-requisite for the class. (Core course for the MA in Public Management and the MA in Global Security Studies.)

AS.470.855. Research Study Seminar. 3 Credits.
(Core course for the MA in Global Security Studies). This course is designed for students who have already passed 470.851 Introduction to Qualitative Methods in Social Science and either 470.854 Fundamentals of Quantitative Methods or 470.853 Historical Methods (or 470.709 Quantitative Methods with permission from program director). In this class, students will begin and complete a substantial piece of original research explicitly drawing on research methods they learned in the previous two classes. The research study is expected to be methodologically sound and to make a useful contribution to the issue under study. Class meetings are designed to give guidance in the clarification of issues, collection of data, assembly of various parts, and writing. The class will also prepare students for final defense. Graduation is subject to approval of the research study by the committee. Students should come into the class prepared with a detailed research question. Students may enroll in this course only in their last semester of the MA program.

AS.470.856. Research Study Continuation.
This is a non-credit course required for students in the MA in Global Security Studies program who have completed all of their course work and have taken 470.855 Research Study Seminar but who are still working on their research study. There is a fee associated with this course.

AS.470.860. Capstone for Public Management. 3 Credits.
This is the final required course in the MA in Public Management program, and students can only take the capstone course in their final semester and after having completed all the other core requirements (Students graduating in the summer semester must take the course in the preceding spring semester). In the semester prior to taking the capstone course and conducting the project, students identify a project topic. The adviser for the paper will be the faculty member teaching the course. To complete the course, students must write a 30- to 35-page capstone paper.

AS.470.861. Capstone Continuation.
Required for those who have completed all of their coursework and have taken the capstone course for either Public Management or Government Analytics but have not yet completed their capstone paper.

AS.470.862. Capstone for Data Analytics and Policy. 3 Credits.
<p>This course is for students who are completing their M.S. in Data Analytics and Policy (formerly M.S. in Government Analytics). The course guides through the process of developing and executing an original data analysis project aimed at addressing an issue related to public policy, politics or governance. Students will formulate an empirical research question and answer that question using a quantitative analysis that makes an original, scholarly contribution. To complete the project, students will use the skills, tools and knowledge they have acquired throughout the program. Students should take this course in their final term (or penultimate term with permission from their advisor). </p><p>Prerequisites: All other core courses </p>
For M.S. in Data Analytics Students: 470.681 Probability and Statistics, 470.768 Programming and Data Management, 470.709 Quantitative Methods, 470.673 Data Visualization
For M.S. in Government Analytics Students: 470.681 Probability and Statistics, 470.709 Quantitative Methods, 470.710 Advanced Quantitative Methods, advanced methods course from approved list (see program website)

AS.470.864. NGO Management Capstone Seminar. 3 Credits.
The 470.864 NGO Management Capstone Seminar is the final course required of the MA in NGO Management degree. Students may select one of the following capstone options a) research project/deeper dive on some relevant aspect of non-governmental/nonprofit management; b) a project that will contribute to the sector in some capacity; or c) a volunteership or immersive experience working with a nonprofit/ non-governmental organization (remote options as well). Identifying a specific area of interest will require some forethought and preparation in advance of the class. It is critical that the topic or issue is one that is of profound interest to the student, and/or builds on knowledge acquired throughout the degree. The capstone is not only meant to address an empirical question but nest it within the context of a broader conceptual framework or sector-relevant debate. All capstones must be relevant to the sector, build on present-day questions, issues, or challenges, and possess an “experiential” element. This could be in the form of original data collection, interviews, consultancy, or tackling a real-life problem in a nonprofit/non-governmental organization. This is also an opportunity for students to demonstrate the skills obtained throughout the degree, thus far, to professionals in the nonprofit field, and to the academic committee. The capstone must be presentable and culminate in a 30-60-page paper of publishable quality. (Capstone projects are usually 30 pages, while research papers exceed that amount). Students will dedicate the entire semester to the capstone. Students are encouraged to view this as an opportunity to develop substantive and methodological expertise in an area that will propel their careers forward. This is an intensive course and requires discipline by the student. Student success in this course is contingent on their ability to a) narrow down a focus, b) be organized, c) complete readings ahead of the class, d) meet deadlines, and e) write, write, write. While much of the heavy lifting occurs on your own outside of class, your instructor will check in weekly and guide you through written and verbal feedback. You will also have opportunities for peer-to-peer feedback. This is the final required course for the MA in Non-Governmental Organization (NGO) Management. Students must be in the final semester of their studies to take this course.

AS.470.888. Thesis Continuation.
Required for those who have completed all of their course work, including the Research and Thesis class, but are still working on their thesis. Details of this offering will be posted soon.

AS.470.901. Getting Started with Performance Analytics.
This course will enable participants to: 1) launch a sustainable open data program that increases transparency and public engagement; and 2) leverage data to improve performance-based management with an emphasis on budget, operational, and policy decision making. During the course, participants will receive feedback on the strategies they developed.

AS.470.902. Sports and Entertainment Impact Collective.
The Sports Impact Leadership Certificate (SILC) program serves as a hub for sharing ideas and innovations to build a more sophisticated industry, with a greater community impact through sport. SILC, in partnership with Johns Hopkins University Advanced Academic Programs, offers you the opportunity to earn an innovative non-credit certificate with support from a world-class academic institution. SILC provides working professionals access to a network of top tier faculty, peers and organizations working with athletes, teams, leagues, nonprofit organizations, major consultancies, top firms and other sports industry stakeholders. SILC provides professional development including essential tools, perspectives and meaningful relationships that will help you and your organization adapt and capitalize on future trends and opportunities.

AS.470.904. Community Engagement: Tools and Techniques for Making Meaningful Connections.
“Community engagement” is prized as both a key incentive for and desired outcome of open data and digital government services. However, all too often, the skills, strategies, and activities necessary to develop meaningful community engagement are deprioritized at best or go unrecognized at worst, leaving civil servants scrambling to activate constituents with little time, resources, or capacity.This online course, developed by the Center for Government Excellence at Johns Hopkins University, is a bootcamp designed to introduce and level up essential engagement planning, outreach, and organizing skills, and apply them to a real-world initiative of your choosing. Drawing on best practices in multiple sectors, we’ll delve into the art and science of mobilizing diverse communities, crafting lasting partnerships, and telling the story of our work. Although framed around data and digital initiatives, the skills and strategies learned here can be broadly applied to other government programs as well.Experience working for state or local government strongly recommended, but not required for this course.

AS.470.907. Institute for Corporate Social Responsibility.
The Institute for Corporate Social Responsibility was designed by—and for—those in the corporate social responsibility (CSR) field as a practical, interactive, and affordable professional development opportunity for CSR practitioners. Participants learn from some of the field’s most innovative thinkers, authors, and practitioners, expand their professional networks learning alongside CSR peers from across the country, all while earning a Professional Certificate in CSR from Johns Hopkins University. This non-credit, professional certificate program is an executive education course and initiative of the Washington Regional Association of Grantmakers, offered in partnership with Advanced Academic Programs at Johns Hopkins University and the U.S. Chamber of Commerce Foundation’s Corporate Citizenship Center.

AS.472 (Geospatial Intelligence)

AS.472.600. Introduction to Geospatial Intelligence. 3 Credits.
This course provides an overview of the four disciplines that have merged to create the new discipline of geospatial intelligence and an introduction to the content of the program. The history of imagery analysis and digital cartography, the art of turning observation into insight and communicating those insights to non-experts, the science behind the sensors and platforms, and the mathematics behind imagery collection sampling strategies. The course studies the issues, technologies, and changes over the past 60 years that have developed into geospatial intelligence, and it will introduce the students to the opportunities and challenges of geospatial intelligence as it has shaped intelligence collection, analysis, reporting, and policy decisions. The outcomes of success in this profession have created new industries, and the course will also review the effects of commercial imagery, smallsats, non-governmental collection, and remotely piloted sensors. Students will be introduced to the concepts that will be covered through the remainder of the Master's program through the Capstone exercise.

AS.472.610. Commercial Imagery and the Impact of Small Satellites. 3 Credits.
This course will begin with a brief history of commercial imagery. From there students will learn the fundamentals of various imaging sensor modalities (spectral, thermal, radar, motion imagery, etc.). Next, a historical perspective of collection management will be presented followed by changes to collection management due to technology advances within the commercial imaging industry. The strengths and weaknesses of collection models will be described, and students will learn to apply mathematically defined judgements to assess the value and cost of competitive imagery purchases. These judgments will examine the questions that drive the imagery purchase; the respective kinds of sensors and their applicability to certain questions, and the respective kinds of platforms for these sensors--aircraft, remotely piloted vehicles (drones), and different kinds of satellites, including smallsats (small satellites). The intended outcome would be the students understanding of the fundamentals of commercial imaging satellites and their collection criteria, through the comprehension of existing collection plans; the evaluation of existing collection plans; and the creation and budgeting for new collection plans.

AS.472.611. Analyzing Social Media and Geospatial Information. 3 Credits.
Social media is now present globally in everyday life, and in conflicts. With its reach, social media has also become an increasingly meaningful information source for scholars, advocacy groups, intelligence agencies, and others who are interested in shaping public discourse. This course introduces students to social media as part of present day open source information gathering, and how to plan collection and conduct analysis of information from social media. The course covers the operations security considerations, monitoring real time events, verification of online material, basics of social network analysis, and how to work with imagery sourced from social media, including geolocation of imagery. Automation and the limits of it in different phases of the process, and future developments in social media exploitation will also be discussed. During the course, students will conduct a hands-on investigation using social media data.

AS.472.612. Geospatial Analysis: Communicating with Multiple Audiences. 3 Credits.
The course will cover the art of communicating geospatial intelligence in writing, photographs or images, and mapping. It will address the challenges of communicating technical information and intelligence from satellites, aircraft, and drones, into text, combinations of text, graphics, maps, and data base,. The students will perform their own analysis, and convert their intelligence discoveries into data bases, reporting, analysis, briefings, and video-based presentations.

AS.472.613. Geospatial Law and Ethics. 3 Credits.
As geospatial technology and the power of location becomes more mainstream, lawmakers and policymakers are trying to understand the applicability of existing areas of law, including privacy, intellectual property, liability, national security and licensing. This course will provide geospatial practitioners with an understanding of the legal and ethical issues that will become increasingly important in their careers.

AS.472.800. Capstone in Geospatial Intelligence. 3 Credits.
The Capstone is the culmination of the instruction and the learning in the program. It provides the students an opportunity to demonstrate their applied knowledge of the four disciplines of geospatial intelligence—the history of the profession, the science of the sensors and platforms, the art of analysis and geospatial communication, and the mathematics of collection sampling strategies. In this semester-long experience, the student selects a mentor/advisor, identifies a geospatial issue of interest, defines a collection strategy, an analytic methodology, a reporting strategy, and a written summary product and presentation.

AS.472.803. Capstone Continuation for Geospatial Intelligence.
Noncredit, required for those who have completed all of their coursework and have taken the Capstone course, but have not yet completed the Capstone paper.

AS.475 (Research Administration)

AS.475.601. Introduction to Research Administration. 3 Credits.
Provides an overview of research administration including how it has evolved in the United States, the role it plays nationally and at the state level, and how conducting research in the U.S. differs from elsewhere. The course also examines the research continuum and the research enterprise as it exists in higher education, nonprofit organizations, and the federal government. The course allows students the opportunity to become familiar with issues, problems and strategic outcomes as they affect research administration.

AS.475.602. Organization and Leadership for Research Administration. 3 Credits.
The course provides an overview of the organization, structure, and language of the research enterprise; how the enterprise functions in the discovery to commercialization pipeline; who the players and stakeholders are and how they interact; the organizational models used by institutions; the role and effect of national policy in shaping research; the impact of the information age and technology; the qualities and requirements for students to become successful leaders; and, how university, federal, and non-profit research administration organizations are managed and led. The course allows students the opportunity to become familiar with the issues faced by leadership in the ever-changing and fluid world of the research enterprise.

AS.475.603. Assistive Technologies for Research Administration. 3 Credits.
This course explores the role of software applications and systems utilized by research administrators and by those seeking and receiving funding. Students examine and compare software applications such as COEUS, SunGard Public Sector, Grants.Gov, GrantsOnline, Conversis, PeopleSoft, ERA Software, Compliance Software, SAP, and others.

AS.475.604. Introduction to Legal, Ethical, Regulatory, and Compliance Issues. 3 Credits.
During this course students examine the legal, ethical, and regulatory framework underlying most research activities in the U.S. Students discuss the trajectory of legal, ethical, regulatory and compliance issues affecting research administration, including the role of Congress, the role of the Executive Branch of government, and the role of federal and state agencies in the issuance and auditing of compliance regulations. Students will also discuss practical considerations for human subjects and animal research, financial conflict of interest, misconduct in science, export controls, safety and security and risk assessment.

AS.475.605. Program Development and Evaluation. 3 Credits.
From the perspective of funders, this course explores ways in which initiatives become sponsored programs, the role of strategic planning, how proposals are designed and disseminated, how responses are solicited and evaluated. The important role that communication plays is emphasized, and communication strategies and work products are examined. The course also allows students to become familiar with key roles and relationships, such as those played by the program officer, the proposal development specialist, and the principle investigator.

AS.475.606. Project Management of Sponsored Programs. 3 Credits.
The course explores how research projects and sponsored programs are best catalyzed and later managed utilizing project management theory, best practices, case studies, and research. The course examines the emergence of pre-award research development within the realm of research administration and its impact on post-award project management. Issues related to team building, group dynamics, and building collaborative win-win relationships with multiple principle investigators and team leaders will be emphasized in the course.

AS.475.607. Grantsmanship, Grant Writing and Evaluation of Grant Proposals. 3 Credits.
This course describes the process of applying for, writing, and evaluating grants and sponsored program opportunities offered through non-profit, foundation, think-tank, government, and university settings. Emphasis is placed on how to evaluate opportunities, how to use online resources, how to ensure that prerequisites are met, and how to respond to RFPs with fully-vetted, well- written proposals. Students will be required to write and edit portions of proposals as well as evaluate current opportunities.

AS.475.608. Procurement and Award Process. 3 Credits.
This course provides a detailed examination of request for proposal (RFP) as well as RFAs, RFQs, and other proposal submission requests. It examines the procurement processes of the government through grants, contracts, and cooperative agreements. The course also focuses on award processes from the perspective of those planning and offering them. Students compare and contrast these processes in different environments, including federal and foundation grant-making and private sector funding for specific projects. In the final segment of the course, these same processes—solicitation of proposals, and negotiation and acceptance of awards—will be examined from the perspective of the research administrator at the grantee institution.

AS.475.609. Financial Management of Sponsored Programs. 3 Credits.
Provides an introduction to topics related to financial operations of sponsored programs, including how to establish a financial reporting system, budgeting, effort reporting, preparing for and engaging in an audit, procuring resources, and sub-contracting. Students also learn how to translate the financial terms of a proposal into a project budget and how to engage in specialized oversight and reporting, such as required for projects undertaken within the GSA Schedule.

AS.475.610. Financial Accounting and Compliance Auditing. 3 Credits.
Focuses on the specifics of financial and non-financial auditing as related to sponsored programs and grants. Clinical accounting is presented as well as the role of clinical research in a university and non-profit research environment. The audit process is also examined in detail and the roles of the financial research administrator, auditors, PI, and project participants are discussed. Special attention is paid to compliance pitfalls, record keeping, information technology, and accepted accounting standards and practices.

AS.475.611. Reporting and Statistical Analysis for Sponsored Programs. 3 Credits.
Provides hands-on opportunities for students to understand reporting requirements and work with the types of reports required for research projects and sponsored programs. The course examines reporting as a CRM (customer relationship management) and PM (project management) strategy, as well as special requirements affecting research administration. Specific types of reporting requirements are analyzed, including federal government agency-based requirements, Star Metrics, Data Act, and GSA Schedule.

AS.475.612. Intellectual Property and Technology Transfer. 3 Credits.
This course examines the role of research administrators in safeguarding Intellectual Property (IP), identifying patentable material, creating and operating a technology transfer office, facilitating various aspects of technology transfer, and developing and implementing such specialized agreements as non-disclosure agreements, material transfer agreements, licensing agreements and other related intellectual property agreements. Students examine case studies, case law, institutional and agency policies.

AS.475.613. Advanced Topics in Compliance, Legal, and Regulatory Issues. 3 Credits.
This course examines in-depth advanced issues of compliance, legal and regulatory affairs. Students will examine and discuss critical issues and real world applications in research compliance and research ethics. Topics to be examined include an in-depth examination of research, human tissue centers, use of special populations in research, informed consent, use of primates in research, and misconduct in science. This course will also look at the issues affecting high containment research and facilities, infectious diseases research, and the regulatory agencies that govern these special areas.

AS.475.614. Managing Compliance, Legal, and Regulatory Issues in Research Hospitals and Health Care. 3 Credits.
This course looks at what is needed to develop, maintain, and manage compliance, legal and regulatory issues in a research hospital or health care setting. The elements of patient care, clinical trials, and other research administration issues affecting healthcare are discussed. Areas such as the Physicians Self-Referral (Stark) Law, Anti-kickback laws, HIPPA and HITECH regulations as well as the Privacy Rule, and the Security Rule are examined. Elements of a good compliance program are also discussed.

AS.475.615. Research Contracts & Industrial Agreements: Domestic and International. 3 Credits.
This course examines how to prepare and execute research contracts and industrial agreements. It examines issues affecting both domestic and international contracting, including issues such as U.S. regulations that affect the contracting process, good terms and conditions in research contracts, maintain your nonprofit status, safe harbor laws, unrelated business income, and profit v nonprofit legal issues. The course also examines issues related to the human dynamics and cultural aspects of international and industrial contacting.

AS.475.616. Domestic and International Special Issues in Research, Legal and Regulatory Affairs. 3 Credits.
This course discusses special issues both domestic and international that affect research administration. Special issues such as seeking, obtaining, and monitoring an export control license, issues affecting research with pharmaceutical companies, issues affecting small business contracting, and requirements for international conflict of interest, research integrity, and use of research results will be discussed.

AS.475.617. The Federal Acquisition Regulations and Defense Contracting. 3 Credits.
This course covers the Federal Acquisition Regulations or FAR, with an emphasis on contracting with the Defense Department. The purpose of the FAR and its application to different types of contracts is explored. Using a hypothetical program, the development of a large federal contract program is examined from the earliest phases through the delivery of the required product. The different phases and decision points in the program are explored from the positions of multiple participants. Both federal contracts and subcontracts and related contract clauses are examined. By the end of the course, students will have a recognition of how the FAR is applied to federally funded programs.

AS.475.618. International Research Infrastructure and Management for Higher Education. 3 Credits.
This course discusses, analyses, compares and contrasts the higher education and research landscapes and infrastructures of a number of countries around the world. The course focuses on the ever changing research information management landscape, including initiatives such as information systems, unique identifiers, international standards, metrics, league tables, and scholarly communication. This course also looks at processes to engage in policy, health, and public discourse in higher education management. It also examines the successful operation and the associated perils and pitfalls of trans-national research offices.

AS.475.619. International Funding and Grantsmanship: Proposal Development, Submission and Management. 3 Credits.
This course looks at differing international funding mechanisms and how to navigate them. It focusses on collaborative proposals where at least one partner is not in the jurisdiction of the funder, and also joint funding initiatives involving funders from more than one jurisdiction. All aspects of the grant lifecycle are covered from identification, through proposal development, submission, negotiation, management, and close-out.

AS.475.621. International Research Regulatory, Ethical and Compliance Issues in Research Management. 3 Credits.
This course examines the differing regulatory environments in a number of countries and how these differences can be managed within a joint collaborative project or initiative. Similarly differing standards of ethical and compliance requirements and attitudes are examined. Ethical standards for research are discussed and analyzed from a global perspective. International initiatives such as the World Congress on Research Integrity and the Asia Pacific Research Integrity Network are discussed. Best practices in regulatory and compliance issues are also addressed.

AS.475.623. University-Corporate Relations: Principles and Best Practices. 3 Credits.
The course explores university and corporate research and partnerships. It delves into the history of corporate funding of university based research and how corporations differ from other university partners and how corporations view their relationships with universities. It also examines strategies and best practices needed to organize an academic office of corporate relations; develop metrics to track and manage corporate engagement; the role of intellectual property and technology transfer; stages and categories of university-industry engagement; the role of federal government in corporate engagement; the role of the National Academy of Sciences, Engineering, and Medicine, including the Government-University-Industry Research Roundtable and related national commissions; and, state and local government in academic-corporate relationships.

AS.475.624. The Role and Importance of Culture and Communication in International Research Collaborations. 3 Credits.
This course discusses and analyzes a myriad of cultural and social mores that can foster or inhibit effective communication and collaborative work, even for those sharing a common language. The course will provide strategies and best practices to enhance effective communication across institutions and to anticipate, recognize and address misunderstandings before they escalate. Issues include: language, local meanings, socio-political structures, cultural identity, time zones, working weeks, institutional imperatives, faculty-administration dynamics, and the role of a research administrator in differing countries.

AS.475.800. Capstone Project in Research Administration. 3 Credits.
The Capstone Seminar is the culmination of the Master's in Research Administration where students will integrate and build on their previous coursework in the program to apply it to practical settings. Students must have completed ten of the twelve courses required for the M.S. degree in order to enroll in this course. During the semester students will identify and analyze an issue or problem and propose a solution during this semester long course. Those electing the Capstone may explore issues related to a current research administration project in a "real world" setting. This original work can be for the organization or agency for which the student works or for a hypothetical organization, but it should result in the student conducting original research and applying strategies, testing solutions, and using tools to meet the particular needs of chosen work environment. To complete the course students must write a 25-35 page capstone project paper. If the project is not completed by the end of the semester, students will need to enroll in AS.475.855.

AS.475.801. Research and Thesis in Research Administration. 3 Credits.
The Research and Thesis Seminar is the culmination of the Master's in Research Administration where students embark on a designing and conducting research in the field of research administration. Students must have completed ten of the twelve courses required for the M.S. degree in order to enroll in this course. The purpose of this core course is for students to refine their thesis topic, develop their research design and conduct and complete the research. Students will conduct research and write their thesis during this class in earnest. The course format is working sessions focused on specific research-oriented tasks. Emphasis will be placed on completing the literature review and methodology sections of the thesis. Students will also complete by semester end their thesis paper. To complete the course students must write a 25-35 page thesis. If the thesis is incomplete students will then need to enroll in AS.475.855.

AS.475.802. Thesis and Capstone Continuation (non-credit).
This is a non-credit course required for those who have completed all of their course work including the Research and Thesis class or the Capstone Project in Research Administration class, but who are still working on their Research Thesis or Capstone Project. There is a fee associated with this course.

AS.475.803. Independent Study for Research Administration. 3 Credits.
The Research and Thesis Seminar is the culmination of the Master's in Research Administration where students embark on a designing and conducting research in the field of research administration. Students must have completed ten of the twelve courses required for the M.S. degree in order to enroll in this course. The purpose of this core course is for students to refine their thesis topic, develop their research design and conduct and complete the research. Students will conduct research and write their thesis during this class in earnest. The course format is working sessions focused on specific research-oriented tasks. Emphasis will be placed on completing the literature review and methodology sections of the thesis. Students will also complete by semester end their thesis paper. To complete the course students must write a 25-35 page thesis. If the thesis is incomplete students will then need to enroll in AS.475.855.

AS.475.804. Independent Study. 3 Credits.
The Capstone Seminar is the culmination of the Master's in Research Administration where students will integrate and build on their previous coursework in the program to apply it to practical settings. Students must have completed ten of the twelve courses required for the M.S. degree in order to enroll in this course. During the semester students will identify and analyze an issue or problem and propose a solution during this semester long course. Those electing the Capstone may explore issues related to a current research administration project in a "real world" setting. This original work can be for the organization or agency for which the student works or for a hypothetical organization, but it should result in the student conducting original research and applying strategies, testing solutions, and using tools to meet the particular needs of chosen work environment. To complete the course students must write a 25-35 page capstone project paper. If the project is not completed by the end of the semester, students will need to enroll in AS.475.855.

AS.480 (Communication)

AS.480.600. Research & Writing Methods. 3 Credits.
Communication professionals take on diverse and multiple roles within and across organizations, but they share one role in common as strategic problem solvers. This course will teach you how to find, read, interpret, evaluate, and apply scientific research studies to solve practical problems encountered by communication practitioners. Topics covered include how to effectively use library resources to find research that can be of strategic value; how different research methods, including focus groups, case studies, surveys, and experiments are used in communication research; how to evaluate the quality of research reports; how to interpret qualitative and quantitative findings, including statistics; and how to distill the information found in research reports down to what is most relevant and usable. In addition to learning how to become a competent and critical research consumer, you will also be exposed to current research across different areas of the communication discipline.

AS.480.601. Foundations of Digital Media. 3 Credits.
The digital age is changing how communication professionals communicate with public groups and how people access, understand, and process information. As a result, digital tools are an increasingly important part of the modern communicator's tool kit. This course examines empirical research that will help communication professionals in the digital age. Topics include creating usable and credible websites and effective internet advertising. The course also examines blogs, social networking, and digital journalism. The digital age is explored through primary research across a range of subjects including public relations, political communication and health communication. Prerequisite: Research and Writing Methods
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.602. Changing Behavior through Communication. 3 Credits.
The goal of many communication initiatives is to encourage some type of behavior change. Communication professionals who understand how people change their behavior can createmore successful campaigns. This course surveys major theories used to predict when and under what circumstances individuals are most likely to change their behavior. Behavior changeincludes a variety of actions, such as voting for a candidate, purchasing a product, joining a social networking group, or adopting a new health habit. Individual-level, interpersonal level, and community-level models of change are covered. By becoming familiar with specific theories and the empirical support for those theories, students learn how to use social sciencebased models to guide their communication strategies effectively. Prerequisite: Research and Writing Methods
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.603. Communication in Practice. 3 Credits.
(This course is reserved only for those students who are admitted to the program with Provisional status. If you are a degree candidate, or are not a Communication student, you can not take this course.) Communication is a fast-changing field that requires practitioners to keep current with trends in technology, audience segmentation, needs of stakeholders, message techniques, evaluation methods, and much more. Equally important, practitioners must master new ways of branding themselves in a competitive job environment. This course covers up-to-date perspectives in communication practice so that students gain a concrete understanding of the practice environment. The content includes strategic management, presentation styles, ethics, branding, campaigns, evaluation, cultural diversity, client tactics, and professional networking. Experts in practice will lecture and lead class activities. Students will create deliverables throughout the semester that will showcase their personal brand, talents, and skills in communication.

AS.480.604. Theory of Mass Communication Practices. 3 Credits.
This course surveys major theories and perspectives on how mass media can influence individuals, organizations and society, with a focus on content areas that have the moststrategic relevance for public relations practice. The course covers readings on the role media plays in shaping what issues people attend to, how they think about those issues andpotential outcomes; how public relations practitioners attempt to use media strategically to meet their objectives; and the implications that current media systems, technologies, and practices have for their media relations efforts. Prerequisite: Research and Writing Methods
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.605. Organizational Communication. 3 Credits.
This course explores the complexities and strategies of internal and external communications in public, private, and non-profit organizations. As a leadership tool, communications serves a political, informational, symbolic and influential function. Topics covered include a competency-based approach of organizational communication, the interplay between internal and external communications, communicating effectiveness through problem-solving, decision-making, managing conflict and mitigating crises, organizational change management, addressing workforce diversity issues and others. Students gain exposure to various dimensions of organizational communication from different industry leaders and field experts and gain first-hand experience in critiquing, crafting and developing communication strategies, tactics and tools, as communication professionals and leaders in the workplace.

AS.480.606. Persuasion. 3 Credits.
This course addresses two questions of vital importance to communication professionals: what aspects of a message make it persuasive (or not), and what attributes of individual people and audiences make them susceptible or resistant to influence. The course examines all varieties of messaging, from individuals communicating one-on-one, to messages communicated via mass media. We study topics such as how the expertise, trustworthiness, and likeability of a spokesperson can enhance or weaken a message's persuasiveness, and how people's social groups can affect their willingness to believe. The course draws on both theory and empirical evidence to provide students with a well-rounded understanding of influence and persuasive strategies in today's world. Prerequisite: Research and Writing Methods
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.608. Analytic Techniques in Communication Research. 3 Credits.
This course will explore quantitative research methods, but will take the next step into quantitative communication research by investigating quantitative tools used by communication practitioners, in particular to measure the effectiveness of campaigns. In addition to standard quantitative methods, you will gain an insight on digital analytics, how to understand them, and how to make important information out of the data to report on the effectiveness of campaigns and messages. This class will satisfy the requirement for Applied Quantitative Research. Students should take this course prior to the semester in which they begin their research for Thesis . Prerequisite: 480.600 Research and Writing Methods.
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.609. Applied Qualitative Research. 3 Credits.
Communication professionals use qualitative methods to craft messages that resonate with audiences. This hands-on class exposes students to qualitative research methods that can be used on the job to guide communication efforts more strategically. Students learn how to design and conduct studies to gain insight into audience perceptions on a variety of issues. Specific techniques covered include in-depth interviews, focus groups, qualitative content analyses, and case studies. Through applied activities, students learn how to collect, analyze, and present qualitative research data. Students should take this course prior to the semester in which they begin their research for Thesis. Prerequisite: 480.600 Research and Writing Methods.
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.613. Communication Ethics in Action. 3 Credits.
Have you ever doubted whether you are doing the right thing as a communication researcher or practitioner? Regardless of whether you realize it, you base your professional decisions and subsequent actions on morals, referring to them in different ways. For example, you may turn to your inner compass, organization's values, or professional codes of conduct. This course will not give you quick and easy solutions; however, it will help you learn how to use an ethics framework with confidence as you move forward in your career. In particular, you will learn how to consider the one or more moral problems related to a situation, facts, options for moving forward, and values to consider throughout the process. Readings will draw from fictional and non-fictional literature, news and popular media, and industry and academic research. Not only the instructor but also other communication professionals will deliver lectures. Throughout the semester, you will work as an individual and in groups to use your critical thinking to complete various activities, including reflection, discussion, presentation, and writing based on current, real-world case studies. Your experience will culminate with a final project.

AS.480.614. Communication Strategies for the 2020 Democratic Presidential Primary Debates. 3 Credits.
The Democrats are planning a dozen primary debates for the 2020 candidates with the first debate to be held this June televised by NBC/MSNBC. The second debate will be held this July hosted by CNN. With a field of presidential candidates that could surpass more than 20 people the Democrats will hold their debates on two consecutive evenings. With such a large field, the Democratic presidential hopefuls are busy planning a communications strategy for the debates and a media plan for the long campaign for 2019/2020. Our lively, timely and interactive class will focus on all of the presidential candidates, their policies, their debate strategies, their overall media and social media plans. We will look at the history and future of presidential debates in American politics. The class will analyze, observe and discuss how the media in all its many forms cover the upcoming debates and how they are covering the many presidential candidates. We will be watching the first two debates as part of our class assignment discussing how the candidates performed and if their communications strategy is helping or hurting their hoped for goal of becoming the Democratic presidential nominee and America's next president.

AS.480.620. Becoming a Press Officer. 3 Credits.
Becoming a sought-after press officer takes practice, but it also takes a very specific set of learned skills. This class uses current events and interactive discussions to put into practice skills learned through AAP courses and to focus on what is required to be an effective press officer, press secretary, and communications advisor. It examines the roles, duties and responsibilities of press officers in a variety of settings: on Capitol Hill, in federal agencies, the White House, industry associations, non-profit and advocacy organizations, domestic and international political campaigns, and on the global stage. The course includes engaging guest lectures that share insight from journalists, press officers, and communications professionals in the field about effective techniques and lessons learned. Students will engage in real-time exercises that deal with typical situations that a press officer faces in the course of a day, and participate in discussions on the complex environments in which a press officer works. In addition to gaining valuable skills, students will complete this course with a portfolio of writing samples that mimic what would be expected from a press officer.

AS.480.622. Branding by Motion Picture. 3 Credits.
Branding by Motion Picture is a course for those who want to use the motion picture medium to promote brands. It's a writing course, not a production course, on the art of expressing a brand in linear form —as a 30-second commercial for television and the Web or a longer, branding video for the Web. We study commercials and branding videos for what they can tell us about brands, audience desires and watchability. Students also choose and develop brands and write scripts in the commercial and branding video formats. Branding by Motion Picture gives students the understanding and the tools that have traditionally belonged to a small cadre of creatives in advertising agencies.

AS.480.624. Public Affairs Communication. 3 Credits.
This course is designed to give students an opportunity to learn about strategic online approaches and techniques affecting and influencing public affairs. During this course, students will develop the knowledge to: <o:p></o:p></p><ul style="list-style-type:disc">
Distinguish between public affairs and other forms of communication, such as public relations
Describe the different components of digital public affairs communications
Conduct basic outreach and adhere to ethics guidelines
Propose and choose from the most effective public affairs tools and tactics to achieve a client's goals
Describe the role of stakeholders and create a target list of issue stakeholders for an issue-based organization or corporation that practices corporate social responsibility
Create a comprehensive public affairs influence plan

AS.480.629. Public Relations in the Age of Digital Influence. 3 Credits.
Marketing and communication are changing. The levers that we have pulled for years to sell products and services, change behaviors, and advocate for causes, no longer work the way they did. As trust in media and marketing plummets, trust in our peers, friends, family, and colleagues rises. Today we recognize new influencers in the people sitting next to us. Now, sparking a digital conversation is just as important as crafting messages, forming partnerships, and driving media coverage. Call it influencer marketing or brand stewardship in the network age; it's all public relations. This class covers how to design impactful public relations strategies in the age of digital influence and, ultimately, how to support business imperatives more effectively through public relations.

AS.480.632. Digital Political Strategy. 3 Credits.
No president will ever be elected again without an internet strategy. Mobile phones and Facebook are being used to organize mass protests. Thanks to YouTube, two Senators lost elections, and bloggers took down former CBS anchor Dan Rather and former Senate Majority Leader Trent Lott. Clearly, the world of political and issue campaigns has changed in the digital age. In this course students explore new strategies possible in a networked world and learn what it takes to be adigital political strategist.

AS.480.633. Interactive Marketing and Advertising. 3 Credits.
Understanding the ever-changing world of digital marketing is no longer optional - it is critical. This course is based on real world case studies from known brands that demonstrate best practices for owned, earned and paid digital communications strategies. Students will learn how to define target audiences, establish KPI's (key performance indicators), measure results and learn how to optimize user experience. We will also gauge the importance of strong and relevant content and choosing the right digital channels. Students will understand how to apply social media, e-mail marketing, SMS, digital advertising, organic search engine optimization, mobile and native apps and others. We will introduce emerging technologies and trends and how they influence digital marketing and advertising practices.

AS.480.634. Journalism & Publishing in the Digital Age. 3 Credits.
From charges of fake news to viral hoaxes that spread on social media after breaking news events, it's crucial to understand and judge the credibility of the news we consume. In what has become a 24-hour news cycle, news consumers need to have the necessary skills to navigate the digital media landscape, assess the credibility of the news organizations that produce stories, determine authenticity on social media, and gain insight into how reporters produce their work. This course aims to provide these skills through a constantly updated guide to a rapidly shifting media landscape. We'll consider current challenges, including journalism's collapsing business model, the role of platforms such as Facebook and Google, and the loss of local news and the impact of the resulting news deserts. We'll also review the guidance of leading media critics, and attempts by news organizations to engage their audiences using newsletters, events, and other methods. And we'll read and assess a wide range of stories and sites, from niche news gatherers like The Information, to upstarts like BuzzFeed and Vox, to legacy sites like the The Atlantic and the New York Times.

AS.480.635. Communication.org:Not-for-Profits in the Digital Age. 3 Credits.
Students examine the primary reasons non-profit organizations exist, and the unique communication challenges they face in reaching their audiences and motivating their desiredbehaviors. They will examine leading trends in 21st century communication, and assess how non-profit communicators can capitalize on these trends for the benefit of their organizations.Finally, they will devise practical solutions to one or more of a non-profit "client's" challenges, using one or more of a wide variety of communication tools offered in the current medialandscape.

AS.480.636. Web Writing and Content Strategy. 3 Credits.
You have 3.5 seconds to capture a web visitor's attention. How do you make sure your website entices them to stick around and learn more? This course examines how compelling web content is essential to engaging visitors and driving their behavior. We'll explore writing styles appropriate for B2B and B2C websites and blogs, and work with a variety of content formats, such as videos, infographics, contests, polls, and more. Using the website as the hub for content, we'll cover techniques for driving web visitors to your site with inbound and outbound content marketing strategies. We'll discuss the intersection of search engine optimization, social media and content marketing and the importance of an integrated approach to content creation and distribution. Lectures and exercises draw on real-world examples from a variety of industries. By the end of the semester, students will be able to create and execute a comprehensive content marketing program.

AS.480.637. Using Social and Digital Media. 3 Credits.
In this class students learn about multiple social and digital media tools, such as blogging, Twitter, Facebook, and Instagram, along with platforms to manage social media content and understand social media analytics. Students apply what they learn by developing a social media campaign for a company or organization that they choose. Each week, students learn how to use social media tools to effectively tell an organization's story. Students also learn the theories behind why social and digital media shape the ways that customers, advocates, audiences and consumers are interacting with influencers and organizations. By the end of the semester, students will be able to not just answer, but inspire, the inevitable questions: Why should we care about social media? How can we put social and digital media to work for our personal and organizational brands?

AS.480.638. Utilizing Images: Media Literacy In Practice. 3 Credits.
This course will teach you how to critically evaluate media, create effective visual communication by identifying key elements of a visual message, and apply relevant theory as it relates to visual message design. This course provides an overview of the approaches and strategies communication practitioners use to incorporate media literacy in their practices. This course will address the following questions: What is media literacy and how does it relate to visual communication? How can visual media be used effectively to promote strategic messages or positive change? How can we critically evaluate the quality of visual messages and create effective and ethical visual communication?

AS.480.639. Advanced Social Media Management. 3 Credits.
In today's complex digital media environment, companies and organizations expect communication practitioners to possess advanced social media management skills. Students in the Advanced Social Media course will gain in-depth knowledge in social media ecosystems, social business models, and digital media policy and law. In addition, students will have an opportunity to analyze quantitative and qualitative data to extract audience insights; develop and implement strategies; create engaging content and messages; and ultimately become skilled social media practitioners. Prerequisites: Students must have completed either 480.601 Intro to the Digital Age, or 480.637 Using Social and Digital Media prior to taking this course.

AS.480.640. Health Communication. 3 Credits.
This survey course will provide a broad overview of topics relevant to health communication research, theory, practice, and promotion. Students will learn about the history and evolution of health communication, examine multiple levels of communication (including intrapersonal, interpersonal, group, and societal), various channels of communication, and the importance of ethics in communicating about health. Class members will examine links between health, communication, culture, health literacy, and health disparities. Students will also evaluate and develop health communication interventions. The primary focus will be on investigating the role of health communication in improving health care delivery and better patient outcomes.

AS.480.642. Corporate Social Responsibility Campaigns. 3 Credits.
The Corporate Social Responsibility (CSR) movement is a world-wide phenomenon, and corporations, trade associations and nonprofits are being asked to step up and be accountable. Public relations and communication professionals need to develop the skills to prepare strategic communication plans that reflect their organization's commitment to CSR in order to protect and enhance their employer's reputation in the marketplace. This course examines the global CSR movement, explores the communication challenges it presents and offers practical suggestions and tactics to respond to this trend. The class features in-class activities, outside research and guest speakers from NGOs, communication firms, and major corporations with practical advice on meeting this challenge in the global marketplace.

AS.480.643. Branding and Advertising. 3 Credits.
Branding and advertising are major components of any business or non-profit organization. Showcasing products and services in creative ways increases visibility and improves sales. Thiscourse teaches students how to develop brands, create concepts and develop advertising campaigns. Students also learn practical tips including how to organize a creative department,write a creative brief, create budgets and time-lines, research and purchase visual imagery, and how to determine appropriate media for particular branding and advertising campaigns.

AS.480.645. Health Literacy, Language and Culture. 3 Credits.
This course offers a skills-oriented approach to addressing literacy, language and culture within a health care context. Understanding the relationship between literacy, language and culture will benefit those in heath communication, as well as professionals in areas such as public and media relations, digital communication, political communication, and corporate and non-profit communication. Students will explore how low literacy and poor health literacy affect quality and outcomes at the individual and systems level and consider the integration of health literacy, cultural competency and language assistance strategies to reduce disparities in health and well being. Overall, this 13-week course aims to improve the cultural and health literacy competency of professionals and the systems in which they work.

AS.480.646. Managerial Communication. 3 Credits.
Writer and historian James Humes said, "The art of communication is the language of leadership." It is that simple comment that forms the foundation of this course. Here students explore the role of communication with stakeholders including subordinates, superiors, internal and externalcustomers, suppliers and the community. Students examine effective communication in hiring and promoting, in conflict, in community interaction and in the internal communication of an organization. The class is built around three precepts or questions: With whom does one communicate, what does one communicate and how does one communicate effectively?

AS.480.653. Communicating for Social Change. 3 Credits.
How do professionals in the nonprofit/government/issue- oriented world determine what communication strategies will help their cause? Students will be introduced to various critical theoretical frameworks and sets of conditions that describe how social challenges occur. Students in this skills-based course will individually identify a social change challenge, target specific audiences and develop various communication strategies and tactics that will advocate for, and guide their desired social change. Examples are based on global real-world experiences and address some of the challenges involved in working in the nonprofit space.

AS.480.654. Strategic Communication Program Management. 3 Credits.
This course covers strategic leadership and communication program development, management and evaluation. It emphasizes formative communication research, strategic communication objectives and message design, selection of media, development of materials, management of teams and impact evaluation. Crisis and issues management as well as the use of new communication technologies will also be covered. </p><p>The course will focus on a step-by-step design of a communication program using SCOPE (Strategic Communication Planning and Evaluation) worksheets. The course requires you to develop a strategic communication plan. </p><p>This course combines reality-based and conceptual approaches to provide you with the intellectual tools needed to assume senior management or outside counsel roles in developing and implementing fully integrated communications programs. You will prepare for program management by asking - and answering – appropriate questions about goals, activities, management, and measurement. There will be core readings as well as use of research and planning exercises.

AS.480.657. Introduction to Public Relations. 3 Credits.
The Bureau of Labor Statistics lists public relations as one of the fastest growing professions in the United States. This introductory course, designed for career changers and those new to public relations, details the ideas, skills, and principles that underlie the public relations craft. Students in this class study the role and contributions of public relations practitioners in contemporary society, learn about potential legal and ethical aspects of the practice of public relations, study the communication process and how persuasion is usedwith various audiences, and learn how to develop a strategic communication plan to achieve specific goals and objectives. The class will also introduce students to specialized practiceareas within the public relations field such as business and industry, government, nonprofit and associations, and health care.

AS.480.658. Public Relations Writing. 3 Credits.
The primary goal of this course is for students to develop the professional-level persuasive writing skills expected of the best PR practitioners. Students are given weekly writingassignments outside of class and write on deadline during many class periods. The course covers various forms of public relations writing including press releases, op-ed essays, crisiscommunications and internal communications. Written work is judged using 10 tenets of good writing: organization, persuasion, clarity, focus, flow, tone, proper usage, timeliness,accuracy and relevance.

AS.480.659. Risk and Crisis Communication. 3 Credits.
This course provides students with a fundamental understanding of crisis management, risk communication, media relations, and public-opinion research techniques in multiple contexts. It introduces students to crisis management principles, strategies, tactics and communication methods. Course participants work as a team to develop a crisis management plan for analysis and discussion. Successful students are able to transfer to the workplace the knowledgeand skills developed in this course. Students learn to predict, manage, and control real-world controversies that they may confront as they pursue their careers. Moreover, students areable to manage effectively, participate in, and control volatile situations involving the news media.

AS.480.660. Media Relations. 3 Credits.
Media outreach is a critical piece of any strategic communication effort. This course prepares students to build, implement, and measure earned media programs that achieve policy, business and philanthropic objectives. Class lectures, guest speakers, readings and assignments give students an understanding of the priorities and expectations of various types of contemporary media, and how to successfully engage them through research-based strategies and tactics designed to reach key audiences.

AS.480.661. International Public Relations and Public Diplomacy. 3 Credits.
In today's global world, reaching international audiences is a key function of U.S. government-funded public diplomacy programs, corporate public relations, and non-governmental organizations involved in relief and development. Through readings, lectures, discussions and exercises, this course examines the differences between domestic and internationalmedia environments. Students develop communication skills needed to deliver messages and craft outreach strategies and programs for non-American audiences. Special attention ispaid to communicating with audiences in Africa, Latin America and Southeast Asia, including Afghanistan, Pakistan and India. Topics include a historical overview of international public relations and public diplomacy, opportunities and challenges for today's public diplomacy practitioner, using research to understand international audiences, writing effectively for international audiences, health and development communication, and communication in international conflict resolution. Students emerge with skills to work overseas in the fast-growing areas of public diplomacy and international public relations.

AS.480.662. Opinion Writing. 3 Credits.
The world of Washington revolves around opinion, and access to the nation's editorial and op-ed pages is key to making sure your opinions (or those of your employer) are successfully shared with the policy makers and opinion leaders who shape public policy. Opinion pieces carry far more impact than news; consequently, the editorial and op-ed pages are much more difficult markets to crack than the news pages. The editorial and op-ed pages have their own writing style and standards of news judgment; once a writer knows them, though, opinion writing is some of the most rewarding journalism, personally and professionally. Students in this class learn to understand the anatomy of good editorial writing; how to write for opinion sections of newspapers, magazines, and other news outlets; how to pitch op-ed and opinion pieces; and how to sell ideas to editorial boards.

AS.480.663. Integrated Marketing Communication. 3 Credits.
Integrated marketing communication breaks down the traditional advertising, public relations and marketing silos by challenging practitioners to apply the optimum mix of media and message to motivate the target audience to act. The rise of the internet and now Web 2.0 support the need to embrace integrated marketing communication as a comprehensive approach to reach target audiences. In this course students learn to evaluate audience demographics and apply theappropriate communication channels and messages based upon the audiences' needs and the business realities of marketing campaigns. During the semester, students develop a tool kit ofsteps to follow to attain marketing success. Through simulation exercises, case study analysis and self-directed reading, students develop a results-oriented and measurable marketing campaignproposal.

AS.480.665. Speech Writing. 3 Credits.
Speech writing is one of the most important but least instructed skills for communications professionals. Through hands-on practice, students learn to write speeches for diverse audiences and contexts. Throughout the course, students will curate a speaker's narrative and public persona to develop a portfolio of work. The portfolio encompasses speeches for ceremonial occasions, public policy speeches and the keynote address. The course also incorporates practical considerations such as the speech writer's role in analyzing speaking situations and audiences, and collaborative drafting processes typical of large organizations.

AS.480.668. Understanding Markets and Audiences. 3 Credits.
This course demonstrates the important role market research—and the use of existing data to better understand audience and environment —plays in the overall campaign process. Thiscourse will focus on the integral steps that facilitate target audience definition and how to extract a keen understanding of this audience and its interactions within its environment to develop effective campaign strategy. The course's structure and various assignments will often mimic a client/consultant relationship to ensure a real-world experience. To that end, the instructors will play the role of "client" in many instances, asking students to articulate how an assignment or deliverable contributes to the overall goals of the campaign.

AS.480.675. Public Policy Management & Advocacy. 3 Credits.
Washington D.C. is home to thousands of organizations attempting to influence public policy. Associations, foundations, think tanks and private lobbying firms are all competing for the attention of policymakers and the public. These groups invariably need competent communicators who can help them cut through jargon, crystallize their messages and strategically communicate with the key audiences imperative to advancing their policy goals. This course introduces students to thedeliberate process organizations undertake to speak out on issues and exert influence over the policies that have the potential to impact them and the way they do business. The class will cover how organizations conduct advocacy efforts and how communication is used as a tool to advance policy change. Students will gain a practical understanding of how policygroups and communications professionals operate in the field.

AS.480.678. Spokesperson Development & Training. 3 Credits.
This course provides students with the knowledge and skills necessary to perform effectively as spokespersons in news media interviews and other high-stakes situations requiring public testimony. Students learn what motivates news media and how journalists cover stories. They learn to recognize the numerous interview techniques used by reporters, and the major differences between broadcast and print interviews. Course participants also learn successful spokesperson strategies, tactics and techniques designed to enhance their performance and reduce the risks inherent in today's volatile media environment. Students develop effective messages and the other tools needed to prepare for interviews and public testimony. Students use on-camera training throughout the course to sharpen interview skills and to critique studentperformance. Successful students are able to transfer the knowledge and skills acquired in this course to the workplace. They are prepared to serve as spokespersons in a wide array ofsituations ranging from routine news interviews to potentially volatile confrontations.

AS.480.680. Nonfiction Filmmaking. 3 Credits.
Today's communication environment calls for a good understanding of the process and methods of nonfiction filmmaking. This course introduces students to nonfiction storytelling in the motion picture medium, from conceptualization to writing to production. Using smartphones, simple production equipment and editing software, students will produce their own videos and be prepared for real-world production with professional crews.

AS.480.681. Communication Evaluation. 3 Credits.
This course will prepare communication researchers to gather evidence that guides the planning, implementation, and refinement of communication campaigns. Throughout the semester, students will practice using evaluation to inform the various stages of a communication effort based on real world conditions. They will draw from behavior theory; and formative (including pretesting), process, and summative evaluation. They also will learn how to ensure the protection of the rights of human research participants.

AS.480.682. Health Psychology & Behavior Change. 3 Credits.
This course provides an overview of health psychology: the scientific study of behaviors and cognitive processes related to health states. It addresses the mind/body connection, theinfluence of social and physical environments on our health, cognitive processing of health information, health belief models, and the link between personality traits and health. Understanding the interactions between these biological, psychological, and social influences on individuals' health states is a key element in developing effective health communication and intervention programs. Students approach all course topics from both theory-driven and applied perspectives.

AS.480.685. Argument & Public Address. 3 Credits.
Argument construction, engagement, and analysis are critical skill sets for communication professionals. Whether substantiating your own position or refuting claims made by others, it is important to understand how arguments function, interact, and effect action and policy. This course prepares students to understand and construct arguments by exploring how they are developed and communicated to diverse audiences. Students will learn to analyze, critique, and fashion arguments through written and speech-based exercises.

AS.480.686. Behavior Change and Education through Entertainment. 3 Credits.
This course explores the various ways communication professionals can use entertainment to educate people and encourage them to adopt and enjoy improved life styles. Throughout history, stories, drama, poetry, music, dance, and other entertainment formats have been used to enlighten and educate both adults and children. In today's society, the channels of communication are ever increasing. This course investigates ways in which education can be subtly but effectively worked into both new and time-honored genres of entertainment to foster positive behavior change.

AS.480.687. Intercultural Communication. 3 Credits.
This course examines the meaning and importance of intercultural communication as it applies to individuals, groups, organizations and nations. Students examine the meaning of "culture" and how "culture" can affect personal, national and international understanding and communication,beliefs and behaviors. The course examines the difficulties and dangers that can result from cultural misunderstanding. In a modern world with diverse communication methods, there isan ever-increasing need for intercultural understanding and communication. The course investigates the various ways in which cultures differ and the necessity of understanding andrespecting other cultures. The course assists communication professionals to be more effective with external communication campaigns in other countries and internal communication within a diverse workplace. The course emphasizes clear and logical spoken and written expression to enhance individual ability to interact effectively with people of different cultures.

AS.480.800. Thesis. 3 Credits.
This course is designed to guide students though the thesis process. It is the last course students take in finishing their masters' degrees. Students select a topic for original research and conduct and write up their research in the course of the class. Students are encouraged to select a topic that will be useful in the workplace and that can be part of their professional portfolio. Graduation is subject to approval of the thesis by the thesis committee and completion of a successful defense. Students are encouraged to enter the class with a clear idea of what they would like to research. All core courses must be completed before starting Thesis.

AS.480.801. Independent Study. 3 Credits.
This course is designed to guide students though the thesis process. It is the last course students take in finishing their masters' degrees. Students select a topic for original research and conduct and write up their research in the course of the class. Students are encouraged to select a topic that will be useful in the workplace and that can be part of their professional portfolio. Graduation is subject to approval of the thesis by the thesis committee and completion of a successful defense. Students are encouraged to enter the class with a clear idea of what they would like to research. All core courses must be completed before starting Thesis.

AS.480.804. Practicum. 3 Credits.
Strategic-planning students complete the Practicum course during their last semester in the MA in Communication program. This optional core course offers a culminating experience that helps students integrate new or enhanced capabilities into a significant evidence-based project relevant to their profession. Each student can identify an organization or individual in need of support for a communication-related project and how to fulfill that need. In addition, the student must prepare (a) a proposal that outlines objectives, scope of work, any deliverables, timeline, and method for evaluating achievement of objectives; and (b) any final deliverables. The student must complete the Practicum course in one semester.
You must complete AS.480.600 in order to register for this course. You can enroll for this course when registration opens for the next semester.

AS.480.806. Practicum: Independent Study. 3 Credits.
Strategic-planning students complete the Practicum course during their last semester in the MA in Communication program. This optional core course offers a culminating experience that helps students integrate new or enhanced capabilities into a significant evidence-based project relevant to their profession. Each student can identify an organization or individual in need of support for a communication-related project and how to fulfill that need. In addition, the student must prepare (a) a proposal that outlines objectives, scope of work, any deliverables, timeline, and method for evaluating achievement of objectives; and (b) any final deliverables. The student must complete the Practicum course in one semester.

AS.480.888. Thesis Continuation.
Students not finishing the thesis during the term in which they enroll in the Thesis course must enroll in Thesis Continuation in every ensuing semester (including summer) until they complete their degrees. It is not possible to take a semester off or a leave of absence while working on the thesis.

AS.485 (Organizational Leadership)

AS.485.605. Ethics, Integrity and the Responsibility of Leaders. 3 Credits.
The first part of this course introduces students to the classical literature in philosophical ethics, including consequentialist, regularian, deontological, and virtue approaches. The second part of the course explores the ethical responsibilities professionals have toward themselves, corporations, the government, and the public. In the third part of the course, students apply an appropriate decision-making framework and gain experience in decision-making surrounding ethical issues. Course discussions will center on issues involving research, research designs and populations, privacy and confidential or sensitive information. During their final project, students will codify an individual code of ethics in relation to professional codes of conduct.

AS.485.615. Leading and Managing Change. 3 Credits.
Leading and managing organizational change requires knowledge and skills for analysis, development and the reengineering of processes. This course provides an overview of organizational change management theories and aligns specific strategies to organizational processes. Using the case study method, students will examine examples of organizational change across industries and the leadership characteristics that contribute to organizational dynamics and facilitate sustainability.

AS.485.620. Managerial Economics. 3 Credits.
The field of managerial economics integrates the concepts of microeconomics and logical decisionmaking to facilitate the development of organizational policies and strategies. These organizational policies and strategies in turn, provide leaders with an effective cost-benefit analysis for implementing change. In this course, students study the principles governing managerial economics and apply them to guide the allocation of limited resources to competing entities within the organization. The goal is to optimize spending to maximize value and output. This course recognizes the impact of markets and the challenges of managing production and performance costs. Students then have the opportunity to build skills for distinguishing between business decisions that provide an immediate benefit return, and those decisions designed for longer term investment. The course also addresses optimization tools and techniques to strengthen decision-making during times of uncertainty.

AS.485.635. Leadership and Organizational Behavior. 3 Credits.
The study of leadership and organizational behavior increases our understanding of the complex nature of employees and how their individual interactions impact corporations, government agencies, academic institutions and other working environments. Leadership, on the one hand, involves making sound judgments to inspire others to perform well while working toward a common goal. Organizational behaviors, on the other hand, reflect the impact of environmental characteristics and job duties on the health, safety and wellbeing of employees. Therefore, leadership and organizational behavior are inextricably linked. To understand this connection, this course presents the primary theories of leadership which drive interaction and the key elements of organizational behavior. The course helps students build knowledge and skills to develop protocols for leadership and organizational behavior that result in increased efficiency and productivity in the workplace.

AS.485.700. Team Building: Individual and Group Dynamics. 3 Credits.
Individual and group dynamics are at the core of evidence-based practices. Leaders direct individuals and groups and also the interaction that occurs among multiple groups toward accomplishment of a mission or purpose. Additionally, leaders must come to terms with the concept of self-leadership-which involves personal resilience and methods for building cultures of resilience. The knowledge of how groups and followers function is essential to sound decision making, implementing new concepts, changing direction, solving problems, and motivating others. To acquire this knowledge, students will dissect modern theories and research in individual and group dynamics, identify 'fit' and apply accepted principles of dynamics to a work environment. Students will also differentiate between small and large group dynamics, evaluate the role of a group leader, by focusing on issues such as boundaries, group identity, cohesion, conflict, power, group recognition, and intergroup alliances.

AS.485.712. Project Management: Leading Projects to Successful Outcomes. 3 Credits.
Project management, as a strategic organizational competence, focuses on the goals, resources and timeline of workplace endeavors designed to achieve a unique product or service. Leading projects to a successful outcome will require attaining all project goals within given constraints. This course provides students the opportunity to learn the stages critical to successful project management and build skills to lead project teams through establishing scope, calculating cost, and assessing risk. Students in this course distinguish between project management and true leadership of projects, and proactively observe, assess and remedy extenuating circumstances to reach successful outcomes. The course will examine current project management processes associated with project. Students will develop mastery of the fundamental project management concepts through the use of case studies and software tool to lead successful projects through the entire project life cycle. Students will also acquire the leadership skills to monitor project statuses, document lessons learned, and successfully close a project.

AS.485.715. Portfolio Management. 3 Credits.
Portfolio management aligns the selection, prioritization and control of an organization's projects and programs to the organization's strategic objectives and capacity to deliver. This course will examine the process of portfolio management in organizations and its relationship to projects and programs. Students learn to construct optimal portfolio(s) for an organization that manage risk effectively while supporting strategic operations, change management and sustainability. The concepts and principles of project portfolio maturity (PPM) models are evaluated and applied to ensure strengthening organizational capability for successful divestiture and allocation of resources. Through the use of case studies and hands-on assignments, students will master the foundations of portfolio management in order to maximize their leadership skills for successful projects and programs in organizations.

AS.485.717. Organizational Development and Innovation. 3 Credits.
This course explores the historically rich field of organizational development (OD). The goal of organizational development is to increase efficiency and productivity of organizational processes through planned intervention. To do so effectively, organizational development as an approach will encompass the analysis, development and implementation of planned efforts, often organization-wide and managed from the top. Students will examine common OD efforts that may include diagnostic activities, systems realignment, team-building, sensitivity training, or technology innovation. The outcomes of OD are rich with reward: organizations which embrace this approach also foster a learning culture and incorporate related behaviors that are dynamic, flexible, innovative and creative.

AS.485.718. Strategic Planning for Leaders. 3 Credits.
This course explores models and principles of strategic planning and the leadership characteristics that promote effective strategic planning, including setting priorities, allocating resources to support priorities, and focusing energies to strengthen operations and employee engagement. The outputs of strategic planning, which include documentation and communication that guide achievement of an organization's identified goals. Students learn to recognize the degree of alignment between these goals and actual outcomes from execution of the strategic plan, as a measure of the organization's strategic advantage. Students will extract a set of practical principles useful in any future leadership role.

AS.485.719. Crisis Mitigation. 3 Credits.
This course provides the opportunity to study the process of crisis mitigation in organizations. Primary activities include spending time to assess risks, developing and prioritizing response mechanisms, and training staff and stakeholders in threat detection. Students utilize up-to-date strategies to observe and interpret signals of disruption, and build viable, actionable scenarios to defend the organization's people and processes. Crisis mitigation, as part of an organization's crisis management effort, occurs on several levels (i.e., individual, departmental and organization-wide) and across many functions (i.e., IT, HR, finance, and marketing). This course provides students the knowledge and skills to lead crisis management in organizations with authority and engagement, and to decrease vulnerabilities in diverse circumstances.

AS.485.720. Leadership: A Developmental Process. 3 Credits.
The theory of developmental leadership encompasses three basic assumptions: leadership skills can be learned, the individual is the focus, and many leadership roles exist. This course explores the elements of a successful developmental process for leaders in organizations. Students will learn the characteristics of effective leaders and examine the impact of cognition and emotion on individual behaviors and attitudes. Through the case study method, students will examine the following areas of leadership development: information and communication, decision-making, interpersonal relationships, personal resources, and effective use of self.

AS.485.820. Capstone: Current Issues in Leadership. 3 Credits.
The program culminates in this Capstone Seminar, which requires each student to complete an independent, faculty-approved project that will address a substantive or methodological challenge in Organizational Leadership. A successful capstone will include research that provides evidence of the student's mastery of the theoretical knowledge and analytical skills central to the degree's learning outcomes. The capstone provides an opportunity to apply the skills acquired throughout the program to a key challenge facing their organization or community. This course will introduce a variety of research and statistical methods intended to provide a basis for designing the capstone. Students will prepare a literature review, a bibliography, select a research method appropriate to their study, and analyze data in their capstone project.

AS.485.888. Capstone Continuation.
Required for those who have completed all their course work, including AS.485.820 Capstone: Current Issues in Leadership, but are still working on their capstone project.

AS.490 (Writing)

AS.490.652. Contemporary American Writers. 3 Credits.
This foundation course surveys issues and trends in recent fiction and nonfiction, with emphasis on the diverse work and methods of American writers publishing today. Students read and discuss contemporary writing and hear from accomplished writers. This core course focuses on developing skills to read as a writer, and it explores the similarities and differences between factual and nonfactual writing, including the roles of truth, accuracy, and reader expectation. This core course is required for all incoming fiction and nonfiction students and usually must be completed before students in those concentrations enroll in a writing workshop.

AS.490.654. Fiction Techniques. 3 Credits.
In this foundation course, students explore the elements of fiction, including point of view, plot, character, setting and the forms of short stories and the novel. The course also introduces students to the writing process, the techniques of reading as a writer, and the workshop process. Readings usually include short stories, one or more novels, and books or articles on craft. Writing assignments involve exercises, response writings, and one complete piece, either an original short story or novel chapter. Revisions also may be required. This core course is required for all incoming fiction students as a prerequisite to any workshop. Nonfiction students may take it as an elective, although the program may limit the number of registrants from outside the fiction concentration.

AS.490.656. Nonfiction Techniques. 3 Credits.
The intensive reading and writing exercises of this foundation course help students gather information and transform it into clear, creative prose – whether in literary essay and memoir or journalistic forms such as profiles, reviews or opinion. Reporting techniques include interviewing, personal observation, and examining documents. Writing techniques include structure, quotation, detail, word choice, transition and revision. This core course is required for all incoming nonfiction students prior to enrolling in a workshop. Fiction students may consider this course as an elective.

AS.490.657. Speculative Fiction Workshop: Writing New Realities. 3 Credits.
The term Speculative Fiction encompasses a broad array of subgenres: science fiction, fantasy, urban fantasy, supernatural, alternate history, horror, etc. This Zoom-based workshop is designed for students who want to bring speculative elements into their fiction, even if they may not yet have deep knowledge of the genre. In addition to workshopping each other’s stories, students will read and discuss published fiction that demonstrates how contemporary authors are examining human lives and relationships through alternate realities. Prior knowledge of science fiction and fantasy is not required, but a willingness to step outside the bounds of our current reality is essential. This class counts toward Workshop credits. Prerequisites: Fiction Techniques

AS.490.660. Fiction Workshop. 3 Credits.
Fiction Workshops concentrate on intensive writing and revision, with some required reading. As members of a general workshop, students submit short stories or novel chapters to their instructor and peers for critiques. Typically, two or three stories or chapters are submitted during a semester; revisions are usually required. Workshop participants also submit detailed critiques of their fellow students’ writing. We recommend, but do not require, that students take at least one general workshop before progressing to more specialized workshops, and we urge students to take workshops from different instructors, if possible. Students may take Fiction Workshop up to three times, although specialized workshops also can count toward the requirement of three workshops for a master’s degree. The 660-1-2 sequential numbering of workshops relates only to the three annual academic terms and does not indicate cumulative coursework.

AS.490.661. Fiction Workshop. 3 Credits.
Fiction Workshops concentrate on intensive writing and revision, with some required reading. As members of a general workshop, students submit short stories or novel chapters to their instructor and peers for critiques. Typically, two or three stories or chapters are submitted during a semester; revisions are usually required. Workshop participants also submit detailed critiques of their fellow students’ writing. We recommend, but do not require, that students take at least one general workshop before progressing to more specialized workshops, and we urge students to take workshops from different instructors, if possible. Students may take Fiction Workshop up to three times, although specialized workshops also can count toward the requirement of three workshops for a master’s degree. The 660-1-2 sequential numbering of workshops relates only to the three annual academic terms and does not indicate cumulative coursework.

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AS.490.665. Combined Workshop and Readings in Memoir. 3 Credits.
Writers have long enjoyed a major impact on contemporary thought by producing compelling essays about personal experiences, feelings, or ideas. This innovative experience allows students to earn either Nonfiction Workshop credit or a Nonfiction reading elective credit in a single, combined course. The workshop component allows students to experiment with memoir and the personal essay as distinct forms and as explorations of the self, while the reading component focuses on essay and memoir both short and long, with the goal of deeper understanding of these popular writing forms. Students may count this course as either a workshop or an elective, depending on their needs. There is no prerequisite for students in the Nonfiction concentration; students in other concentrations or programs must seek permission from their advisor and the Writing Program director.

AS.490.666. Combined Workshop and Readings in Fiction and Nonfiction. 3 Credits.
This course introduces students to innovative readings in both fiction and nonfiction. It is designed for students who wish to stretch the boundaries of their own writing in fiction and nonfiction. In exploring craft in blurred-genre readings, students are encouraged to find ways to introduce new techniques into their own work. Readings may include such writers as Paula Vogel, Susan Griffin, James McBride, Alexandra Marzeno-Lesnevich, Rick Moody, Margaret Atwood, bell hooks, Te-Nehisi Coates, Sam Shepard, Moshin Hamid, Han Kang, Daniyal Mueenduddin, John Tateishi, Yiyun Li, Kathy Acker, and others. This course will follow traditional-workshop format during the last weeks of the class, and readings and exercises will take precedence during the first weeks. This course counts as an elective for either fiction or nonfiction students or it may count as a workshop for either genre.

AS.490.668. Combined Workshop and Readings in Nonfiction. 3 Credits.
The innovative experience allows students to earn either Nonfiction Workshop credit or a Nonfiction reading elective credit in a single, combined course. Students seeking workshop credit will submit nonfiction in the usual manner; enrollees needing elective credit will complete extensive reading and exercises in factual writing. At times, all students will engage together in workshop discussion or reading analysis. At other times, the two groups might separate for special attention to reading or the workshop. The dual goal is to provide nonfiction elective students with workshop experience, while workshop students enjoy the full writing critique process as they complete helpful reading. Students must complete Nonfiction Techniques before enrolling in this course. Nonfiction students earn either workshop or elective credit from this course.

AS.490.669. Combined Workshop in Nonfiction and Fiction. 3 Credits.
This course allows students in nonfiction and fiction to earn a workshop credit in the same class. Students in both concentrations and from either are urged to enroll. Students from both concentrations will be expected to critique work across genres and learn the intricacies of craft in both fiction and nonfiction.

AS.490.670. Nonfiction Workshop. 3 Credits.
These general workshops give students extensive experience in writing and revising their factual work, regardless of topic or form. Submissions are critiqued by peers as well as by the instructor. Students typically submit two to four essays, articles or book chapters. Revisions, exercises and readings also are required. Students may take this general workshop or any specialized workshop to meet the requirement of three workshops for the MA in Writing. The 670-1-2 sequential numbering of workshops relates only to the three annual academic terms and does not indicate cumulative coursework.

AS.490.671. Nonfiction Workshop. 3 Credits.
These general workshops give students extensive experience in writing and revising their factual work, regardless of topic or form. Submissions are critiqued by peers as well as by the instructor. Students typically submit two to four essays, articles or book chapters. Revisions, exercises and readings also are required. Students may take this general workshop or any specialized workshop to meet the requirement of three workshops for the MA in Writing. The 670-1-2 sequential numbering of workshops relates only to the three annual academic terms and does not indicate cumulative coursework.

AS.490.672. Nonfiction Workshop. 3 Credits.
These general workshops give students extensive experience in writing and revising their factual work, regardless of topic or form. Submissions are critiqued by peers as well as by the instructor. Students typically submit two to four essays, articles or book chapters. Revisions, exercises and readings also are required. Students may take this general workshop or any specialized workshop to meet the requirement of three workshops for the MA in Writing. This is a dual-campus, videoconference course. Baltimore students meeting in a classroom in Baltimore will be connected by video with students in a D.C. classroom. The instructor will alternate campuses each week.

AS.490.676. Sentence Power: From Craft to Art. 3 Credits.
This craft elective focuses on revision at the sentence and paragraph level and is open to fiction or nonfiction students. Through close reading and brief exercises, students learn various techniques to assemble sentences and establish syntactic relationships within paragraphs. Students imitate other writers, as well as revise, exchange and discuss revisions of their own work. Authors to be studied may include Updike, Munro, and Welty in fiction, and Dillard, McPhee, or Didion in nonfiction.

AS.490.681. The Craft of Poetry: An Introduction for Fiction and Nonfiction Writers. 3 Credits.
This popular elective course helps fiction and factual writers apply the techniques, vision and benefits of poetry to their writing. Through reading, discussion and writing, students explore the lessons of free verse and formal poems, especially their careful attention to language, rhythm, theme, and other tenets of poetic craft. This course engages those with experience in poetry, as well as those new to the field. As part of this course, students will write and workshop poems with their classmates. This onsite course also may involve some online interactivity.

AS.490.684. Heritage of Literature--Examining the 20th Century. 3 Credits.
This reading elective examines the historical development of fiction and nonfiction from a craft perspective, emphasizing the interrelationship of social and cultural development with the maturation of writing. Students learn to appreciate how contemporary authors have roots in the past, and how they themselves might be inspired by those who came before them. Readings and discussions will revolve around William Carlos Williams and T.S. Eliot, two giants who locked horns for forty years and whose disagreements have gone a very long way toward shaping literature in their own era and ever since. All of the authors students study in the class purposely challenged narrative art in the name of forging new and more relevant literary models. Reading list may include James Joyce, Ernest Hemingway, Virginia Woolf, James Baldwin, Philip Roth, Toni Morrison. The course requires extensive reading as well as creative and critical writing. Both nonfiction and fiction students are invited to enroll.

AS.490.685. Writing the Body. 3 Credits.
This course will look at how writing about the body documents and manifests the relationship between experience and consciousness. It will examine questions of self, politics, and genre as questions of craft: How can we shape the physical worlds of our writing? How is the self – and the way we write about the self – shaped by its physical vessel? How can paying attention to the body affect the way we write, and what we write about? Using major bodily experiences like eating, movement, illness, intimacy, and ecstasy as a frame, students will read and analyse work by writers such as Eula Biss, Garth Greenwell, Sinead Gleeson, and James Baldwin, as well as complete creative writing exercises. This elective is open to both fiction and nonfiction students.

AS.490.686. Writing Identity: Race and Ethnicity in Fiction and Nonfiction. 3 Credits.
This cross-concentration elective presents intensive readings in fiction and nonfiction from various racial and ethnic communities in the United States. By studying marginalized and diverse voices, students learn how different cultures, experiences, and histories createa rich and vibrant American literary tapestry. Students also learn methods and techniques for expressing their own cultural perspectives in their creative work. Fiction and nonfiction students earn elective credit in this course, which focuses on craft analysis and discussion. Students will choose whether their final project will consist of creative or analytical writing.

AS.490.687. The Short Story: Past & Present. 3 Credits.
This fiction reading elective begins with a brief review of the history and development of short fiction, moving to analysis of contemporary forms, trends and practitioners. Featured authors may include Chekhov, Carver, Paley, Barthelme, Munro and Dixon. The course focuses on intense reading, analysis and discussion more than writing assignments. Students also may be asked to make class presentations and to review a range of literary journals.

AS.490.690. Travel Writing Workshop. 3 Credits.
The best travel writers weave a rich “sense of place”— a trait also crucial to literary fiction, memoir, and creative nonfiction. The telling detail, apt metaphor, historical reference, cultural connection, and vivid character sketch, coupled with reflections that link these observations to broader themes, can elevate travel writing beyond the guidebook. In this specialized nonfiction workshop, students complete exercises, hear guest speakers, and analyze the works of acclaimed writers such as Jan Morris, Barry Lopez, Ian Frazier, and Jonathan Raban. Students may be asked to visit an assigned nearby location to prepare writing. This workshop counts as one of the three required for a nonfiction degree. Enrollees must have completed or waived the nonfiction core courses. Fiction students may enroll only with program permission.

AS.490.693. Writing Memoir & Personal Essay Workshop. 3 Credits.
Writers have long enjoyed a major impact on contemporary thought by producing compelling essays about personal experiences, feelings, or ideas. In this specialized nonfiction workshop, students experiment with memoir and the personal essay as distinct forms and as explorations of the self. Seminal essays are read to clarify students’ thoughts and to help them develop their own voice and style in personal nonfiction. This workshop counts as one of the three required for a nonfiction degree. Enrollees must have completed or waived the nonfiction core courses. Fiction students may enroll only with program permission.

AS.490.702. Readings in Global Fact and Fiction. 3 Credits.
This cross-concentration elective course presents intensive readings in fiction and nonfiction from around the world. By discussing both fact and fiction, students learn how different cultures, values and histories create differing literature. Readings include a sampling from at least three continents, with specific texts announced in advance for each section. Fiction and nonfiction students earn elective credit in this course, which focuses on craft analysis and discussion but also may involve student and team presentations and a final project of creative or analytical writing. This course combines the content of the previous International Nonfiction and 20th Century World Literature courses.

AS.490.705. Crafting Nonfiction Voice. 3 Credits.
This craft elective is for factual writers. Through reading and writing exercises, students learn the techniques of re-creating voices of others and of shaping a writing voice of their own. The skill to represent a person’s character, mind and feelings also is essential to ghostwriters, speechwriters, writing collaborators, feature writers and novelists. This course focuses on the tools such writers use to craft a voice.

AS.490.711. Masterworks: Examining the Boundaries. 3 Credits.
This cross-concentration reading course, designed for fiction or nonfiction students, focuses on a writer’s analysis of masterworks in fiction, nonfiction, nature, travel or poetry – and how those forms may be combined in various hybrids. The course involves extensive reading and discussion of technique and the changing boundaries among the genres. The format includes craft reports, response writing and individual or team presentations, plus a final creative or critical work.

AS.490.714. Essence of Place: Description, Detail, and Setting. 3 Credits.
This craft elective, designed for students from any program concentration, focuses on how detail and setting combine with other techniques to create a sense of place in fiction, nonfiction or other forms. Readings come from travel, short fiction, memoir, science, novels, nature, poetry and creative nonfiction. Through reading, discussion and writing exercises, students learn how to enhance the sense of place in their own writing. This course counts as an elective in nonfiction or fiction.

AS.490.715. Noticing as a Writer. 3 Credits.
In this craft elective, fiction and nonfiction students will take as a premise the words of novelist Alice LaPlante: “[O]ur first job as writers” is “to notice.” We all notice things as we make our way through each day, but “noticing” as a writer is different. Whether working on fiction, nonfiction, poetry, or any other genre, the writer needs to pay attention to the very small, to zoom in on the specific detail or insight that can make even the most mundane moment feel entirely new and surprising. Noticing in this way is a skill that, like most skills, is developed with practice. In this class, students will practice with weekly writing prompts designed to help them describe their physical and emotional worlds in concrete language. Along the way, students will review each their writing as a group and read works by great contemporary noticers, including Karl Ove Knausgaard, Chimamanda Ngozi Adichie, Ben Lerner, and Weike Wang.

AS.490.731. Film & Screenwriting. 3 Credits.
This intensive writing course is designed to provide students with a broad foundation in the fundamentals of screenwriting and visual storytelling, from idea to story to structure, character, dialogue, and beyond. Readings, screenings, and weekly writing assignments will provide students with the basic theory and practice of screenwriting as an art and a craft, contextualize the form within the history of storytelling, and enable students to put that knowledge to practical use in the development of their own feature-length screenplay. This craft elective is open to fiction and nonfiction students, but nonfiction students should be prepared to develop a fictional feature rather than any documentary work.

AS.490.734. Digital Storytelling and Multimedia Journalism. 3 Credits.
As news organizations increasingly require journalists to work on multiple platforms, this digital storytelling class will help you move your narrative journalism off the page and onto the screen or into the earbud. In this hands-on, experiential course students will learn the basics of audio recording and editing as well as video recording and editing. Students will do multiple projects including developing a short podcast series and several short videos. They may wish to invest in some audio-video recording equipment or rent some for the course but can also use cell phones for these basic exercises.

AS.490.745. Voice in Fiction and Nonfiction. 3 Credits.
In this cross-concentration craft elective, students examine aspects of voice in fiction and factual writing, considering how style, point of view, tone, structure and culture all contribute to an author’s or narrator’s individual writing personality. Students use exercises to strengthen their individual styles or the voices of the characters they portray. Readings include novels, short stories, essays, articles and nonfiction books, as well as articles on craft. Class assignments may include response writings and original fiction or nonfiction as well as oral presentations. This course is the dual-concentration version of 490.683 Voice in Modern Fiction, which covers only fictional works, and 490.705 Crafting a Nonfiction Voice, for factual writers.

AS.490.746. Readings in Narrative Fiction and Nonfiction. 3 Credits.
This cross-concentration elective course presents intensive readings in fictional, factual, and poetic narrative. The course covers elements of narrative, including plot, character, setting, tone, pacing, dialogue, and theme, plus the terms writers use to discuss and analyze narrative. Readings in both traditional and contemporary narratives will include novels, short stories, essays, articles and nonfiction narrative books, and may include some poetry and articles on craft. Class assignments may include response writings and original narratives from prompts. This course counts as an elective in nonfiction or fiction.

AS.490.747. Advanced Revision Techniques in Fiction. 3 Credits.
This elective course is designed to hone skills in the elements of fiction through an intensive revision process. The course explores in depth exercises and techniques such as expanding/slowing down, mapping structure, defining and refining character and characterization, and using syntax and word choice to strengthen sentences. Students improve the use of these and other techniques by reviewing and revising their own writing and the writing of their classmates. While some workshop methods will be employed, this course focuses more on specific revision techniques and exercises than a workshop-style evaluation of student writing. Pre-requisite: Fiction Techniques.

AS.490.748. Advanced Workshop in the Novel. 3 Credits.
This course is for students who have made significant progress on a novel and are looking for help in bringing the book closer to completion. “Significant progress” here might mean you’ve written a hundred pages, or it could mean you’ve finished a complete draft. This hybrid course will meet 3-5 times onsite; during the rest of the course, students will work one-on-one with the instructor on issues particularly relevant to the novels they are writing. Class discussions may focus on general concepts of novel structure, plot points and character arcs, along with advice on publishing. There may be some workshop aspects, but the bulk of the course will focus on one-on-one interaction with the instructor giving singular attention to each individual student’s novel. While students who have completed Fiction Techniques and one previous Fiction Workshop will be on firmer ground in this course, there are no prerequisites; any student who has made “significant progress” on a novel may enroll.

AS.490.765. Children's and YA Writing Workshop. 3 Credits.
This elective course focuses on writing fiction and nonfiction for children and young adults. Students will study the markets, trends, genres, and publishing opportunities for this age group and read several novels, memoirs, and other current works. The majority of class time will be spent reviewing craft elements and workshopping original material. The course is designed as an elective for fiction and nonfiction students, who are urged to complete Fiction Techniques and Nonfiction Techniques before enrolling.

AS.490.766. Completing the Novel. 3 Credits.
Many writers begin novels, but far fewer finish them, let alone have the manuscripts fully ready for a publisher’s consideration. In this new fully online class, JHU writer-in-residence Tim Wendel helps students move forward with their works. The class will focus on writing, revising, selling novels in general, as well as some workshop components. The “point of no return,” effective set pieces, quality dialogue and utilizing lessons from film and other art forms are a few of the class topics. Wendel is the author of 13 published books, including a pair of full-length novels, two children’s books and a novella.

AS.490.767. Writing the Nonfiction Book Proposal. 3 Credits.
This fully online course is designed for writers who have a specific nonfiction book project in mind and are looking to secure an agent or publisher based on the well-drafted proposal. Students can be working on a book based on reporting, a memoir, or a collection of essays but they should register for the class only if they already have an idea for a book and have two or three chapters completed. (Ideally those chapters have been workshopped and refined in other classes before enrolling in this course.). Over the course of the semester, students will draft, revise, and refine a 15-page proposal, will develop a chapter outline, and will refine a sample chapter or two. Based on feedback from the instructor and fellow students, each writer will complete the course with a polished proposal based on publishing industry standards.

AS.490.770. Writing the Other. 3 Credits.
The course focuses on practical approaches to writing "the other." We examine dominant paradigms of otherness, drawing from a worldview that is shaped by our own biographies. We explore varied methods, including defamiliarization and empathization exercises, of bridging cultural and other socially constructed differences, for the writing of successful fiction. Though our emphasis is on writing our own stories that are then reviewed and critiqued by our peers in an online "author-centered" workshop, we shall also discuss some texts which will include: Writing the Other: A Practical Approach by Nisi Shawl & Cynthia Ward, The Art of Perspective: Who Tells the Story by Christopher Castellani, The Art of Subtext: Beyond Plot by Charles Baxter (also Baxter’s chapter on "Defamiliarization" from his book, Burning Down the House), "Write What You Don’t Know: An Outsider’s Reflection on Place, Memory and the Creative Process" by Zakes Mda (a chapter from Mda’s book, Justify the Enemy: Becoming Human in South Africa), and "The Uses and Misuses of Other people’s Myths" by Wendy Doniger O’Flaherty.

AS.490.773. New England Residency: Noticing as a Writer. 3 Credits.
This condensed, one-week course will take place at College of the Atlantic in Bar Harbor, Maine, where Writing students will join with students in the Science Writing and Teaching Writing residencies. The course counts as an elective for students in any concentration and students should plan to do extensive work prior to arriving for the residency. In this craft elective, fiction and nonfiction students will take as a premise the words of novelist Alice LaPlante: “[O]ur first job as writers” is “to notice.” We all notice things as we make our way through each day, but “noticing” as a writer is different. Whether working on fiction, nonfiction, poetry, or any other genre, the writer needs to pay attention to the very small, to zoom in on the specific detail or insight that can make even the most mundane moment feel entirely new and surprising. Noticing in this way is a skill that, like most skills, is developed with practice. In this class, students will read texts from the pantheon of great noticers, they will workshop each other’s work with an eye on this theme, they will practice with daily writing prompts that send them out into the field to describe their physical and emotional worlds in concrete language, and they will attend an evening reading series with visiting authors. Students signing up for this section plan to stay on campus at College of the Atlantic; rooms are doubles and triples so students should count on a roommate.

AS.490.782. Books and the City: Literary Dublin. 3 Credits.
Books and the City: Literary Dublin explores some of this UNESCO City of Literature’s deep literary roots— it counts W.B. Yeats, Oscar Wilde, George Bernard Shaw, James Joyce, Samuel Becket, and Seamus Heaney, to name but a few, among its own. In examining the interplay between city and writer, the course also considers how Dublin has shaped the works of some of Ireland’s most vivid and celebrated contemporary writers, possibly including Anne Enright, Colm Toibin, and Roddy Doyle. This residency course is based at the eminent and historic Trinity College, home to the Book of Kells. The college lies in the heart of the historic capital, with its walkable Georgian squares and Royal Canal, in this city that continues to flourish as a creative center. The course week includes craft discussions and work shopping at Trinity, readings and talks with local Irish writers, and field trips. Possible trips include ones to the Dublin Writers Museum and the James Joyce Centre, the National Print Museum, and some of the city’s exquisite libraries to tour their special collections, including Trinity’s Long Room.

AS.490.784. Reading, Writing, Walking. 3 Credits.
This cross-concentration reading and craft course focuses on the flaneur tradition and the curious link between the mind and feet. From Charles Baudelaire to Virginia Woolf, from Max Beerbohm to E.B. White, writers who walk –and write about their walks or their characters' walks—have proliferated in the last two centuries. We will analyze this literature and make forays of our respective neighborhoods to experiment with the form. Drawing on the outward facing gaze of walkers, we'll pay particular attention to creating a strong sense of place and braiding the exterior world with internal rumination. We will also be workshopping writing that is submitted in advance and hearing from an invited author each evening. This condensed course counts as an elective for students in either the fiction or nonfiction concentration.

AS.490.785. Our American West: The Evolution of a Counter Narrative. 3 Credits.
<p> Using classic western films as a springboard for discussion, this class will explore the evolution of a counter-narrative from writers of both fiction and nonfiction. Readings will include novels, histories and literary nonfiction, all with an eye toward understanding our complicated western expansion, and how our shifting literary legacy corrects, amends, or counters prevailing narratives of the American West. This condensed, one-week course will take place at the University of Montana in Missoula, where Writing students will join with students in the Science Writing and Teaching Writing residencies. The course counts as an elective for students in any concentration. <o:p></o:p></p><p> Because the stories we tell ourselves about place shape our identity and sense of self, students will study the craft of scenes and settings in these works with an eye toward deepening our own observations and skills through writing exercises in the landscape of Montana. <o:p></o:p></p>

AS.490.800. Independent Study in Writing. 3 Credits.
An independent study is a special project that an advanced student proposes to complete within a single semester, for either elective or workshop credit. Most independent studies in the Writing Program involve a student working one-on-one with a faculty member or other writer or editor. The project must involve writing, reading or writing-related work equivalent to a full-semester, graduate-level course, and the project should not duplicate any course or other part of the program's curriculum. Students usually are not eligible to propose independent studies until they have completed at least five courses, including at least one workshop. The tuition for an independent study is the regular, single-course rate for the term in question. Proposals for an independent study should be submitted in writing to program leadership no later than 60 days before the start of the target semester. Proposals are evaluated competitively after that date, and only a small number of proposals will be approved. This course number is only for Writing Program students. Science Writers should consider 490.807.

AS.490.801. Thesis And Publication. 6 Credits.
This final course is required for all degree candidates in fiction or nonfiction and is offered only in the fall and spring terms. The two course goals are the completion of a successful thesis and an enriching, challenging capstone experience for the entire program. The creative writing thesis will contain portions of a novel or a nonfiction book, and/or a collection of short stories, essays, or articles. We recommend that students select their best work and the work they most want to work on revising during the thesis semester; not all program writing will become part of a thesis. Students taking this course are required to submit a full thesis draft early in the course; the author spends the term working one-on-one with a thesis advisor to revise this draft. In addition, thesis students meet as a class. During classes, students engage in forward-looking discussions on the writing life, participate in a program-capping roundtable discussion, and rehearse and conduct a public reading. Prerequisite: All other required and elective courses. Students may take a second course during their thesis term with the program director's permission; such a course must be in addition to program requirements.

AS.490.803. Independent Study. 3 Credits.
An independent study is a special project that an advanced student proposes to complete within a single semester, for either elective or workshop credit. Most independent studies in the Writing Program involve a student working one-on-one with a faculty member. The project must involve writing or writing-related work equivalent to a full-semester, graduate-level course, and the project must not duplicate any course or other part of the program's curriculum. Students usually are not eligible to propose independent studies until they have completed at leastfive courses, including at least one workshop. The tuition for an independent study is the regular, single-course rate for the term in question. Proposals for an independent study must be submitted in writing to the program's independent study coordinator no later than 60 days before the start of the target semester. Proposals are evaluated competitively after that date, and only a small number of proposals will be approved.

AS.490.805. Writing Internship. 3 Credits.
Advanced students in the MA in Writing program may propose an internship to receive on-the-job experience in writing or a writing-related profession. An approved internship receives one full course credit toward the MA in Writing degree—usually an elective. Students may propose to participate in existing internship programs or they may arrange a unique experience. In most cases, students should have completed four or more courses toward their degree before seeking an internship, and proposals must be submitted in writing to program leadership at least 60 days before the start of the target term. Proposals are evaluated on a competitive basis. Only a limited number will be approved, and priority will be given to students who have completed the most degree-level courses and who submit proposals that demonstrate the best internship experience. Internships may be paid or unpaid. Because students receive academic course credit for internships, they pay tuition levels equal to one graduate course.

AS.490.806. Thesis And Publication. 3 Credits.
This final course is required for all degree candidates in fiction or nonfiction and is offered only in the fall and spring terms. The two course goals are the completion of a successful thesis and an enriching, challenging capstone experience for the entire program. The creative writing thesis will contain portions of a novel or a nonfiction book, and/or a collection of short stories, essays, or articles. We recommend that students select their best work and the work they most want to work on revising during the thesis semester; not all program writing will become part of a thesis. Students taking this course are required to submit a full thesis draft early in the course; the author spends the term working one-on-one with a thesis advisor to revise this draft. In addition, thesis students meet as a class. During classes, students engage in forward-looking discussions on the writing life, participate in a program-capping roundtable discussion, and rehearse and conduct a public reading. Prerequisite: All other required and elective courses. Students may take a second course during their thesis term with the program director's permission; such a course must be in addition to program requirements.

AS.490.888. Thesis Continuation.
This course is for students who completed 490.801 Thesis & Publication or 490.802 Thesis and Careers in Science Writing but failed to finish an approved thesis and were not approved for an Incomplete. If both conditions are met, students must register for this course and pay its accompanying fee for every term (including Summer) until a final thesis is approved.

AS.491 (Science Writing)

AS.491.658. Techniques of Science and Medical Writing. 4 Credits.
This core course develops and hones the reporting, creative and explanatory skills demonstrated by the best science-medical writers. The course features writing assignments and exercises in journalistic and literary writing, plus interviewing, ethics and the use of scientific journals and databases. In some cases, students may be able to choose from a range of writing topics, including nature, technology, health, space, biology, medicine, or other scientific issues. Science Writing students should complete this course before enrolling in any writing workshop. Departmental approval and a writing sample required for students not enrolled in the Science Writing Program.

AS.491.673. Science and Medical Writing Workshop. 4 Credits.
In a writing workshop, students receive professional guidance in translating complex scientific, medical, or technological knowledge and research into graceful, lucid prose. Students submit individual essays or articles, or parts of a larger work in progress. Writing submissions are critiqued by peers as well as by the instructor, then revised. Students are encouraged but not required to take this course from different instructors. (The three section numbers designate the academic term in which the workshop is offered. Students earn workshop credit by taking any section number multiple times, or by combining any sections.) Prerequisite: 491.658

AS.491.674. Science-Medical Writing Workshop. 4 Credits.
In a writing workshop, students receive professional guidance in translating complex scientific, medical, or technological knowledge and research into graceful, lucid prose. Students submit individual essays or articles, or parts of a larger work in progress. Writing submissions are critiqued by peers as well as by the instructor, then revised. Students are encouraged but not required to take this course from different instructors. (The three section numbers designate the academic term in which the workshop is offered. Students earn workshop credit by taking any section number multiple times, or by combining any sections.) Prerequisite: 491.658

AS.491.675. Science-Medical Writing Workshop. 4 Credits.
In a writing workshop, students receive professional guidance in translating complex scientific, medical, or technological knowledge and research into graceful, lucid prose. Students submit individual essays or articles, or parts of a larger work in progress. Writing submissions are critiqued by peers as well as by the instructor, then revised. Students are encouraged but not required to take this course from different instructors. (The three section numbers designate the academic term in which the workshop is offered. Students earn workshop credit by taking any section number multiple times or by combining any sections.) Prerequisite: 491.658

AS.491.680. Writing the Tech Story Workshop. 4 Credits.
This workshop course explores the reporting and writing techniques used to produce compelling stories about technology, its inventors, and its consumers. Students first analyze outstanding examples of technology writing on a range of subjects, forms, and styles, from hard news to creative nonfiction. They then submit their own writing about technology for standard workshop discussion. Special topics include making technology interesting to the non-geek and avoiding a tendency to sound promotional about consumer goods. Guest speakers who specialize in technology writing will discuss how to attract readers and find work in the field. This course counts as a workshop for degree or certificate requirements. Prerequisite 491.658

AS.491.691. Science Policy, Funding and Politics. 4 Credits.
This Residency course, intended to be onsite in Washington, D.C., explores how science, medicine and technology are affected by politics and practices within government, the private sector and within the fields themselves. Students or program alumni use the evolution of science policy as context for discussion, research, and writing about contemporary issues. Students meet with leaders from Capitol Hill, the White House, and federal agencies, and they visit important sites relevant to science policy.

AS.491.696. The Nature of Nature. 4 Credits.
This reading course focuses on the species and phenomena that make up "nature" (the outdoors, ecosystems) and human interaction with nature. Students analyze books, essays, and articles from writers who tell stories ranging from the gripping outdoor adventure to the reflective yet penetrating personal essay. Students will also engage in immersive nature writing exercises. For this course, you will be taking a step into the wild. Nature writing is considered a subset of science writing. Readings may include authors such as David Quammen, John McPhee, Elizabeth Kolbert, Gretel Ehrlich, Camille T. Dungy, Helen Macdonald, Kathryn Schulz, Latria Graham, Robin Wall Kimmerer, and Bonnie Tsui.

AS.491.697. The Literature of Science. 4 Credits.
In this reading elective, students analyze current and classic books, magazine articles, and newspaper series to discover how the best science, medical, nature, and environmental writers create compelling, entertaining, factual literature. Craft topics include structure, pace, sources, content, explanatory writing, and clear, lyrical language. Assignments may include brief reviews and a team presentation of an assigned book, from such writers as Erik Larson, Atul Gawande, Rachel Carson, John McPhee, James Gleick, Lewis Thomas, Elizabeth Kolbert, or Jonathan Weiner.

AS.491.700. Subatomic Writing. 4 Credits.
This elective examines writing on the particle level: sound, syntax, punctuation, rhythm, and pacing. Together, these elements can generate meaningful, understandable, and nuanced content. How does sound echo sense? How does the spin of syntax affect the flavor of the sentence? How does pacing affect the joke? Writers who know the laws of language can navigate them with flexibility or break them with aplomb and purpose. Momentum and energy at these basic levels keep readers engaged and make editors and agents sit up with interest. This elective with workshop elements asks students to bring their favorite sentences from literature and analyze why they work at the most fundamental levels. Class discussions on VoiceThread or other online tools allow students to interact with sound and old-school sentence diagrams. Students will then create science writing projects crafted at the quantum level without losing sight of global goals and overall quality. Science writers who feel like weak bosons when it comes to voice, style, grammar, and punctuation will particularly benefit from this course.

AS.491.701. Communicating Climate Change. 4 Credits.
This elective course will examine the unique challenge of effectively engaging the public on climate change, the most serious environmental issue of our time. A highly politicized and polarizing topic, climate change is often called a wicked problem. It is scientifically complex and while global in nature, the effects of climate change are felt locally, with the most serious impacts disproportionately affecting those least responsible for the problem. What's more, the worst impacts of climate change will occur sometime in the future, but minimizing those impacts will require large-scale and widespread changes to current society.</p><p>Students taking this course will compare a range of material representing contemporary climate change communication from books and magazine/newspaper articles to literary journal essays to gain an understanding of how science writers engage, inform and inspire the public. Students will also evaluate social science research that attempts to explain and overcome the challenge of engaging a public that can be in denial, disengaged, disheartened and frustrated. Students will practice effective journalistic methods for gathering information and will experiment with pitching ideas and translating those ideas into articles. They will demonstrate their own strategies for assuring accuracy and for gauging the credibility of their sources. </p><p>The course includes a lot of assigned reading as well as writing and writing-prep exercises, and extensive class discussion on Blackboard. This is not a course on the history of climate science, and nor is it a comprehensive survey of the field of climate science. The overall purpose of this course is to produce writers who can generate exceptional articles and essays about climate change. Course activities will help students publish their writing about climate in newspapers, magazines, podcasts, broadcasts, and other venues for the lay public. </p>

AS.491.702. The Funny Side of Science. 4 Credits.
Students learn techniques of humor writing and how to include humor effectively in science writing. Aided by funny weekly readings, hilarious multimedia examples, and completely serious class discussions (on VoiceThread, Blackboard, or other modalities), students analyze their favorite comedic sentences and scenes, discover their own style of humor, and practice applying the 11 Funny Filters of Scott Dikkers—a founding editor of The Onion—to science writing. Students complete two projects: a collection of their best one-liners (a foundational skill in comedy writing) and either a funny made-for-web science video (based on a workshopped script) or a funny science essay/article. Possessing a funny bone is not a prerequisite for this course, but PLEASE NOTE—we will be following the Seinfeld Strategy, where students will be expected to write for 20 minutes every day. This is a highly entertaining course, but be prepared to work! As John Cleese said, those who laugh most, learn best

AS.491.703. The Online Science Magazine. 4 Credits.
Students learn the magazine editorial and production process through the creation of a special issue of The Science Writer, the Science Writing Program's online publication. Working with the instructor and an editorial team comprised of JHU Science Writing alumni, students participate in every aspect of a modern editorial process, including choosing a theme for the issue, pitching articles or multimedia pieces, creating content, revising work based on the editors' feedback, and working with copy editors, fact-checkers, and web designers. Each student in the class is expected to publish at least one article in The Science Writer. Class guests will include editors and publishers of online magazines. No tech or design skills are required.

AS.491.707. Prizewinners: The Best Writing about Science, Technology, Environment & Health. 4 Credits.
Whether they have received a National Magazine Award, a Pulitzer, a Peabody award for electronic media, or other honors, the work in this course offers lessons in reporting and writing for any science writer. Readings may include articles, essays, or books. Included will be guest sessions with prize-winning authors, by video or tape, to discuss how they created their winning work. Readings and guests for each section of this course will be announced, but they might include Pulitzer-winners Diana Sugg, Siddhartha Mukherjee or Natalie Angier, Peabody winner Christopher Joyce, or National Book Award finalist Lauren Redniss. Students join in team or individual presentations, with several options for a final writing assignment.

AS.491.708. Medicine in Action. 4 Credits.
This special Residency course based at world-renowned Johns Hopkins Hospital in Baltimore allows students, program alumni, and others to experience the front lines of medicine. Participants spend time observing doctors and nurses in action and may be assigned to follow a practitioner during a shift at the hospital. The course includes meetings with doctors, nurses, and patients, plus a final writing exercise. Previous sections of this course included meetings with winners of the Nobel Prize and Pulitzer Prize.

AS.491.709. Science in Action. 4 Credits.
This Residency course takes students to the front lines of scientific research, with a focus on reporting skills, story idea development, and the craft of explanatory writing. Science in Action explores fields beyond medicine and health, including space, environment, energy, climate change, and other topics. The course involves field trips and lab visits, plus video and other links with visiting or out-of-town scientists. This Residency course is held in Washington, Baltimore, or other locations, as announced.

AS.491.710. In the Field: Science Writing in the Woods, Coasts, & Labs of Mt. Desert Island. 4 Credits.
Maine's Mount Desert Island, home to Bar Harbor and Acadia National Park, is a place of exquisite natural beauty. With thriving environmental science centers and a world-class genetics laboratory, the island is also a hub of cutting-edge research. This Residency course allows participants to immerse themselves in the region's stimulating natural and intellectual environments while honing their reporting skills, refining their writing artistry, and gathering information for stories. The course will include field excursions, group discussions, and independent writing/reporting time

AS.491.711. Public Health in Action. 4 Credits.
<p>This residency course is a fast-moving journey into the world of public health. Over 7 to 10 days, students will come face-to-face with public health practitioners and researchers working on the world's most pressing health issues, as well as with journalists who cover the critical work they do. Topics will include everything from how to explain confusing concepts such as prevalence vs. incidence and the uncertainty of disease modeling, to how to avoid sensationalizing or downplaying a public health issue, and tell accurate and complete stories that present diverse perspectives. This course will examine a specific timely public health issue as a case study for learning how to report and write about public health. </p><p>In presentations and meetings, public health researchers, practitioners, and advocates will discuss their work; and the instructor and guest journalists will describe the challenges of explaining public health and the tools and techniques they have used in writing articles, essays, or books in this field. Students will develop their own story ideas on public health, receive coaching on publishing their writing, and may have the opportunity to contribute writing to a class-produced news website or other group project. Most of the course's work will take place during a residency or virtual residency, an intensive week to 10 days of real-time activities (delivered through Zoom, Blackboard, or in person when feasible). Some additional coursework will occur through an online learning platform before and after the residency period, and students will complete extensive readings. </p>

AS.491.748. Principles of Editing. 4 Credits.
In this writing- and editing-intensive course, you will learn the art and craft of editing science-focused nonfiction stories. Writing exercises and editing projects are designed to mimic what it's like at a real publication, and you will learn to think like an editor as you work through each step in the process of making concise and compelling nonfiction articles—from idea development and draft review to primary editing, copyediting, and proofreading. You will face the myriad decisions editors must consider at every stage—audience, deadlines, grammar, style, delivery method, publication size, website optimization—as you craft your own nonfiction story while editing the work of your colleagues. The course includes insights from guest editors as well as illustrative case studies. This course will benefit any writer hoping to pursue an editing career or wanting to sharpen self-editing skills.

AS.491.750. Contemporary Science and Medical Writing: Creative and Professional Forms. 4 Credits.
This core course provides a broad foundation in the diverse forms and venues encountered in contemporary science writing careers. Students learn elements of classic forms, such as essay, profile, news article, and op-ed, and they explore magazines, institutional publications, literary journals, blogs, speeches, and even museum exhibit text. The course covers the differing goals of various forms and how they might be used in multimedia, social networks, and other digital communication. Guest speakers present real-world expertise, with students engaged in discussion, exercises, and writing assignments. Science writing students needing a stronger foundation should complete this course before enrolling in any writing workshop.

AS.491.751. Marine Science & Science Writing on the Emerald Isle. 4 Credits.
This Dublin-based residency course, with accompanying Blackboard site, will explore the confluence of sea, science, and writing. During the week-long onsite portion of the course, students will take field trips to labs and sites along Dublin Bay, meet with marine scientists, read and discuss Irish literary works inspired by the sea, and take part in "plein air" creative writing exercises, among other activities. Talks with science journalists and ocean conservation leaders will probe some of the major threats to Ireland's – and the world's – oceans, and the challenges for writers who cover those issues.

AS.491.752. Advanced Reporting & Writing in Science. 4 Credits.
This course builds on foundation skills in reporting and writing about science, medicine, or technology by expanding into advanced techniques of research, documents, computer analysis, extended interviews, and other tools. The course also expands knowledge of longer or more sophisticated forms, such as magazine essays, narrative nonfiction, and investigative reporting. Students engage in reporting and writing exercises, which may be discussed in group workshops. With adviser permission, this course may be counted as a workshop. Prerequisite: 491.658 or adviser permission.

AS.491.754. Science Narratives Workshop. 4 Credits.
Students in this specialized workshop explore and write science narratives, an approach that joins scientific information and storytelling. Students read and discuss examples by authors such as Rebecca Skloot, Ferris Jabr, and Lee Gutkind, as well as write their own narratives. This course provides a workshop credit for science writers. Prerequisite: 491.658

AS.491.755. Science Personal Essay and Memoir Workshop. 4 Credits.
In this specialized workshop, students experiment with memoir and the personal essay as distinct forms and as an exploration of the self. Seminal essays are read to clarify students' thoughts and to help them develop their own voice and style in personal science writing. The topics of health, technology, environment, and other realms of science or medicine will be paramount, whether in reported content or within the personal experience, feelings or ideas of the writer. This course provides a workshop credit for science writers. Prerequisite: 491.658

AS.491.757. Science Profiles Workshop: Writing About People. 4 Credits.
This workshop focuses on writing about people involved in science, medicine, technology, or policy. Students analyze models of the form, then report and write profiles of various lengths and purpose, from mini-profiles to quick features to longer, in-depth works. The course includes guest speakers who specialize in the research, interviews, and writing needed for effective, readable biographical works. This course provides a workshop credit for science writers. Prerequisite: 491.658.

AS.491.785. In the Wild: Science Writers Explore Montana's Wilderness and Wildlife Biology. 4 Credits.

<p> With its snow-capped mountains, icy trout-filled streams, glaciers, bison, and grizzly bears, Montana is a land of rugged natural beauty. It is also home to a unique set of environmental concerns. Those glaciers are melting. Invasive species threaten native habitats. The range and population of the grizzly are hotly debated. Climate change appears to be increasing the size and intensity of wildfires. </p><p> Students in this residency course will meet with scientists -- wildlife biologists, ecologists, and wildfire management experts -- who use Montana's lakes, mountains, forests, and animals as their laboratories to explore such issues. The class will take field trips to sites of active research, with possible excursions to a world-class ecology research station on a 30-mile-long lake; a fire science lab where scientists model fire behavior and develop tools for wildfire management; and the Clark and Blackfoot Rivers, site of a Superfund success story and the inspiration for Norman Maclean's A River Runs Through It. </p><p> During the onsite portion of the course, students will practice reporting skills and gather story ideas, engage in craft discussions and creative writing exercises, and be invited to take part in an open mic. Discussions will explore how writers can explain complex, nuanced environmental issues to broad groups of readers, and how writers can evoke the region's lyricism in their prose. For inspiration, the class will study works by the many literary greats (Maclean, David Quammen, Rick Bass) who have used Big Sky country as their muse. </p><p> The class will be based at the University of Montana in Missoula, noted for its beautiful campus and as the nation's premier institution for the study of wildlife biology. </p>

AS.491.787. In the Field: Writing about How Science Can Save Our Wild Lands. 4 Credits.

This course will examine the issues and inspiration to be found in national lands across the United States. Most of the course's work will take place during a residency or virtual residency, an intensive week to 10 days of real-time activities (delivered through Zoom, Blackboard, or in person when feasible). In presentations and meetings, scientists will discuss their latest field research; park personnel will explain the biggest environmental issues facing national lands; magazine writers and editors will relate how they are covering environmental challenges and successes using different media; and members of underrepresented groups will talk about their role in these vital landscapes. Issues for examination may include the extraction of resources, effects of climate change, and loss of biodiversity on national lands. Instructors will present lectures and discussions on the tools and techniques of writing nature/science/national lands-related articles, essays, and books, and students will have group and individual time to pursue their own writing, culminating in a student reading. Additional coursework will take place on Blackboard before and after the residency period.

AS.491.802. Thesis and Careers in Science Writing. 4 Credits.

This final degree program course involves the creation of a thesis and a final capstone experience that prepares a student for a writing career. Students usually enroll in this course after completing all other cores, workshops, and electives. Thesis: Each student's thesis is created from work in earlier courses. Students revise and refine an individual portfolio that includes creative writing, journalism, multimedia and communication writing. The first draft of a thesis is due in the second week of the thesis term; students spend the term revising that work under the direction of a one-on-one thesis advisor. Capstone: The group experience of the course requires each participant to develop a career plan that includes personal goals such as publication, job applications, or career advancement. Other capstone experiences may include attending science writing events or seminars, publication of a course magazine or journal, and discussions of the changing business of writing. The Science Writing Program also may propose an optional mini-residency for thesis students that includes commencement and other onsite experiences at Johns Hopkins in Baltimore and Washington. Note: All thesis students should submit a Science Writing Thesis Planning Form at least one month before the course begins. See the Science Writing Program website for more information.

AS.491.807. Independent Study in Science Writing. 4 Credits.

An independent study is reserved for science writing students who have special interests not covered in the program's curriculum. Most independent studies involve a student working one-on-one with a faculty member or other writer or editor. Students should submit an Independent Study proposal at least 60 days before the start of any term. The proposal must include work equivalent to a full-semester, graduate-level course; interested students should consult their advisor well in advance. Only students who have completed four courses or more are eligible to propose an independent study, and only a limited number are approved each year. The tuition for an independent study is the regular, single-course rate for the term in question. With advisor approval, this course counts as an elective or workshop. For more information, see the Science Writing Program website.

AS.491.808. Internship in Science Writing. 4 Credits.

Internships are available to select students with advisor approval. Students should submit an internship proposal well in advance. With the advisor's help, students may develop their own internship where they live, or they may apply for existing internships at publications, companies, agencies or elsewhere. Internships usually are reserved for students who have completed four courses or more. In most cases, an internship counts as an elective.

AS.491.888. Thesis Continuation.

This course is for students who completed 491.802 Thesis and Careers in Science Writing but failed to finish an approved thesis and were not approved for an incomplete. If both conditions are met, students must register for this course and pay its accompanying fee for every term (including summer) until a final thesis is approved.

AS.492 (Teaching Writing)

AS.492.601. Fundamentals of Writing for Graduate Students. 4 Credits.
This intensive writing course offers students a foundation in essay composition and provides an in-depth review of sentence structure, grammar, and punctuation. Designed for those students who need to improve their written communication skills, the curriculum in Writing Basics examines the various techniques writers use to compose their sentences, to establish syntactic relationships within paragraphs, to draft thesis and transitional sentences, and to relate syntactic structure to ideas. Students will master a basic format for the expository or argumentative essay that will include strategies for finding and drafting a thesis, for shaping a proof of that thesis, and for drawing conclusions that demonstrate synthetic, independent thinking. Working through multiple drafts of their essays, students will develop strategies for revision that will focus on both syntax and structure. Note: AS.492.601, Fundamentals of Writing for Graduate Students has been designed for students in all AAP Programs who seek additional help to strengthen their writing skills. The course is not intended for students in the Teaching Writing Program, and Teaching Writing students should not sign up for it.

AS.492.612. Teaching Writing. 4 Credits.
This core course is designed for teachers in all disciplines and at all grade levels who use writing in their teaching and who have an interest in exploring their own writing as well. Someone not currently in a classroom can also complete the course successfully. The course has three main goals: 1. To help participants add to their existing knowledge of teaching writing, focusing particularly on writing as process and the various methods and practices that focus on each individual stage of that process (prewriting, drafting, responding, revising, editing and publishing). 2. To encourage participants to reflect upon their current practices in teaching writing, helping them clarify for themselves their goals and methods in teaching writing, and to provide additional ideas and possibilities that might add to their existing “tool box”. 3. To allow participants to engage in their own writing and writing process, in order to experience both roles of writer and writing teacher, and to see how one’s own writing experiences can enhance one’s knowledge as a teacher of writing. In addition, participants will consider the relationship of reading and writing, will become familiar with leading theories and theorists on the teaching of writing, will share their ideas, their knowledge, and their experiences, and will be encouraged to adapt their learning to make it most useful to their individual teaching situations (grade level, discipline, student population, etc.).

AS.492.630. The Power of Story: Teaching and Writing Narrative. 4 Credits.
This course is designed for participants who wish to teach and write fictional, factual, and poetic narrative. The course covers elements of narrative, including plot, character, setting, tone, pacing, dialogue, and theme, plus the terms writers use to discuss and analyze narrative. Program participants learn how to introduce this language in their classrooms and to engage their own students in discussion about assigned reading and writing. Participants in this course write original narratives from prompts and discuss those writings in a workshop environment. Participants may also read narrative poems, short stories, one or more novels or novel excerpts, and one or more nonfiction narratives, with an eye toward how reading can inform and enrich the writing experience, as well as reading articles on teaching process and theory – including recent brain research concerning the value of narrative. This course also helps teachers understand the differences between factual and nonfactual writing, and how they can be separated or combined.

AS.492.632. Teaching Creative Writing. 4 Credits.
This course is designed for participants who wish to write and/or teach fiction, poetry and creative nonfiction. The course covers elements of writing in each genre, as well as the creative process and the similarities and differences between creative and other forms of writing. The course will also include readings in creative writing and lessons on how to use literature in a creative writing class. With the goal of integrating their writing and knowledge into their own classrooms, participants produce their own original creative writing and discuss it in a workshop environment. This course also may cover elements of playwriting and screenwriting.

AS.492.635. Teaching and Writing Nonfiction. 4 Credits.
This course explores various forms of nonfiction via reading and writing, including personal essays, speeches, opinion pieces, essays about art or literature, biographies, memoirs, journalism, and historical, scientific, or technical accounts written for a broad audience. Students will read nonfiction works as writers and teachers, and will practice various strategies for in-depth research (including deeper evaluation of online sources.) A primary course focus includes the selection and exploration of mentor texts for various reading levels, and nonfiction treatments of various topics, including history. Students will hone their own nonfiction writing skills to enhance clarity, precision, and grace in their work, and will learn teaching methods to encourage students' clear and coherent writing, organization and style. Course also emphasizes classroom community, interactivity, and personal engagement with instructor and classmates.

AS.492.640. Teaching Argument. 4 Credits.
This course is designed for teachers in all disciplines and at all grade levels that currently teach or plan to teach argument writing. Its focus will be in four main areas: 1) Understanding Argument. Participants will be asked to read and reflect on current theory and methods of argument and will be asked to define “what does good argument writing look like” as it applies to their specific classroom and context. 2) Structure and Content of Argument. Participants will be asked to explore, reflect, and duplicate various forms of argument typically seen in classroom settings such as extended research, on-demand writing, self-selected topics, etc. Furthermore, participants will be asked to explore unconventional forms of argument and their value and impact on writing. 3) Assessment. Participants will be required to investigate and reflect on current trends in assessment within the classroom setting to include peer review, self-evaluation, reflection, holistic vs. analytic rubrics, etc. Participants will also explore and evaluate the impact that assessment has on the writer and their writing specifically addressing standardized test assessment. 4) Resources. Participants will be asked to investigate, evaluate, create and share resources on the teaching of argument. In addition, participants will be required to participate in group discussions, activities, and reflections.

AS.492.650. Reading Like a Writer. 4 Credits.
Participants in this class will develop the skills needed to engage in the close reading of fiction, non-fiction, non-peer-reviewed science and medical writing, and poetry in order to apply what they glean from close reading to their own writing. They will also consider how they can apply the techniques of close reading to the teaching of writing in their specific subjects and grade levels. Through the exercises and assignments in "Reading Like a Writer," participants will examine the various techniques writers use to compose their sentences, to establish syntactic relationships within paragraphs, to suit writing style to topic and purpose, and to relate syntactic structure and design to thinking and to the ideas specific writing projects intend to communicate. Through learning to "Read Like a Writer," participants will develop strategies for improving their own writing.

AS.492.651. Special Topics in Reading: Multicultural Texts. 4 Credits.
This reading course in the Teaching Writing Program covers fiction, nonfiction, and poetry written from a multicultural perspective. Texts are selected from a variety of genres aimed at various grade levels, and might include books such as Sherman Alexie’s The Absolutely True Diary of a Part-time Indian, James Baldwin’s The Fire Next Time, and Unsettling America: An Anthology of Contemporary Multicultural Poetry. Texts will be examined as models for writing and as works of current or classic literature. Course participants also present multicultural texts appropriate to the grade levels they teach.

AS.492.652. Writing in Literature. 4 Credits.
Writing is a natural tool for responding to, noticing, and noting the conventions of powerful literature. This course is designed to give instructors of literature writing tools to assist students in finding and expressing their own response to literature in lieu of lecturing on a single ‘read’ of a piece. Participants in the course will experience a number of protocols for responding to literature including literature workshops—which mimic the intellectual moves of an alert reader—response logs, questioning logs, Harkness discussions, and routine rehearsal of writerly moves in a low-risk environment. During the course, participants can expect to create and analyze in both poetry and prose and read and respond to literature. The course ends with an analytical paper mimicking an academic community of peers.

AS.492.660. Writing for Young Readers. 4 Credits.
This course focuses on reading and writing stories and books for children and young adults. Readings include poetry, fiction, and nonfiction. Participants read published writing geared toward young readers with an eye toward understanding techniques and approaches to writing for this particular audience. They also write their own works designed for young readers. The course goals are threefold: to focus on teaching students to read children’s and young adult literature; teaching students to write children’s and young adult literature; and teaching the teacher participants to write children’s and young adult literature.

AS.492.661. Teaching Composition in College and Community College. 4 Credits.
This course is for students who currently teach or wish to teach first-year composition in college or community college. Students design a first-year composition course and study many of the major components that might go into a first-year composition course, including major and low-risk writing assignments, assessments, and effective ways to use reading, discussions, revision, peer response and other practices.

AS.492.662. Teaching Reluctant Writers. 4 Credits.
All educators will encounter students who struggle with writing. This course first focuses on the reasons student writers may be reluctant and then provides participants with a variety of methods to increase student participation and success in writing. Participants will learn about low-stakes writing, classroom relationships, the writing workshop methodology, and scaffolding for special education, English Language Learners (ELLs), and those who have developed an aversion to writing. Participants will be required to investigate methods by doing them and will develop a metacognitive stance by reflecting on articles and strategies. All participants will be required to work in writing workshop, including being a writer and responder in a peer revision group. The instructor will help students to differentiate for subject area and grade level and will provide a framework for developing a writing classroom that works for our most reluctant writers.

AS.492.663. Writing Across the Curriculum. 4 Credits.
In careers and classrooms, professionals and students use writing to communicate information, clarify thinking, and learn new concepts. Writing Across the Curriculum generally extends to two categories: Writing to Learn and Writing in the Disciplines. The first half of the course will focus on Writing to Learn, which is comprised of short, low stakes, expressive activities designed to help students think through a process, connect with a text, and personalize information. These lessons include learning logs, interactive notes, group writing, metaphors, found poems, and difficulty papers. The second half of the course will be dedicated to Writing in the Disciplines. These assignments are created to give students practice with the language conventions, patterns of thinking, and formats of specific disciplines. These sort of activities include proposals, presentations, articles, literature review, lab and field reports, and position papers. Participants in this course will experience Writing to Learn and Writing in the Disciplines firsthand. They will be able to experiment with both types of writing in their classroom contexts regardless of grade level or subject matter. This course is collaborative with teacher to participant commentary and peer feedback and review.

AS.492.665. Teaching Writing to English Language Learner Students. 4 Credits.
Teaching writing to English language learning (ELL) students can be daunting when students have significant needs in listening, speaking, and reading. But even students with limited proficiency can write, and the time spent learning writing yields results in the other language skills. In this course (designed to have value for both ESOL teachers and regular classroom teachers with some ELL students), we'll discuss strategies for pre-writing, drafting, and revision. These strategies can be adapted to students' levels of English proficiency, levels of writing ability in students' home languages, and students' ages (young children through adults). We'll discuss how to foster writing confidence through drawing on students' backgrounds and building students' overarching understanding of genre, as well as when and how to address accuracy in vocabulary, grammar, and mechanics. We'll focus on developing a classroom writing community—whether it is a self-contained ELL classroom, a typical classroom with embedded support for ELL students, or another learning setting-that encourages ELL students to take the risks that enable them to grow as writers and users of English.

AS.492.667. Peer Response and Writing Centers: Theories and Practice. 4 Credits.
This course is designed to help teachers develop and implement meaningful peer writing response in their classrooms as well as to introduce them to theories, pedagogies, and practices of peer-led writing centers. Beginning with an overview of the foundational scholarship on peer response and writing center theory, participants will collaborate in ongoing peer writing groups in which they will practice a variety of response strategies on their own and each other's writing. The second half of the course will introduce participants to key principles and various models of writing centers in secondary and postsecondary settings. Drawing on course readings and activities, students will propose, develop, and present a course curriculum centered around peer response methods or a writing center development plan pertinent to their teaching contexts.

AS.492.668. Teaching Writing Online. 4 Credits.
In this course we will explore the ways that writing can be taught online, while discovering what it means to use digital and networked tools to write and to learn. Whether you have been successfully teaching writing in face-to-face workshops and want to bring your curriculum and best practices online and/or you are curious to explore how online forums and tools can be used to support face-to-face teaching and workshop, this course is design to support that work. Participants will be encouraged to play with the ways that they teach and write in and across online networked spaces while learning from the teaching designs and practices of experienced networked educators and teachers of writing. We will explore the intersections of compositional theory, pedagogical practice in writing, and theories of connected learning and teaching while using both public and private writing spaces. All participants will be encouraged to provide peer feedback as learners and teachers throughout, to engage in social forums to explore what's possible in writing and teaching today, and to design a project they can take forward in their teaching and writing beyond this course.

AS.492.669. Digital Writing and Multimodal Composing. 4 Credits.
In this course we will explore the ways that writing shifts and changes over time, influenced by new tools and technologies as well as its purpose, audience and context. We will dive deep into what it means to write today, using digital tools and technologies as well as explore multimodal composition inspired by many mentor texts that we find in the world around us. We will explore the ways that digital writing and multimodal composing can support teaching that is culturally responsive and relevant for a diversity of learners. And we will write and compose together while curating compositions that inspire us and push our writing forward. Whether you are teaching digitally or hybrid, writing in formal school environments or running a community workshop, this course will be designed to support you in considering the ways you might support digital writing and multimodal composition. All participants will be expected to compose and share their compositions, provide peer feedback as co-learners and co-teachers throughout, to engage in social forums to explore what's possible in writing and teaching today, and to design a project they can take forward beyond this course.

AS.492.682. Neuroscience, Creativity, and Writing. 4 Credits.
This course explores the latest research and practice in the effect of writing on the brain, and of the brain on writing. Students will read both theoretical texts and creative works that examine writing "under the influence" of various brain states, including typical variations throughout the writing life, as wells as variations correlated to physical and psychological brain changes. Virtual guest speakers, case studies, and multimedia experiences provide students access to cutting edge expertise in this fast-growing field. Students complete exercises and semester-long writing projects to develop methods to promote creativity and tap into deeper areas of the brain to aid their own writing and that of their students.

AS.492.690. Residency: Best Practices in the Teaching of Writing. 4 Credits.
This 7-10-day residency, held each summer in Baltimore, MD, Washington, DC or other locations, will include readings, roundtables, field trips and other residency events. Teaching Writing students will meet for four to six hours each day in a face-to-face, classroom environment. Students will design and present a mini-lesson involving writing that they have used, or wish to use, in their own classrooms. Students will engage in discussions of theory and best practices in the teaching of writing, and will also participate in a writing workshop focusing on their own writing. One residency is required for M.A. candidates and is optional for those seeking the certificate.

AS.492.700. Thesis in Teaching Writing. 4 Credits.
In this final capstone course, students work on defining and expressing their own theories and best practices in teaching writing, while at the same time developing and refining their own writing. Students create and revise an individual portfolio that includes creative or personal writing along with writing about issues, theories and practices in the teaching of writing. Thesis students also create and research a statement of inquiry related to their specific teaching interests and situation. Students refine all these writings during this course, working with other students and independently with the instructor and/or individual project advisors. All eight prior courses must be completed before a student may enroll in Thesis.

AS.492.800. Independent Study in Teaching Writing. 4 Credits.
An independent study involves a special project a student proposes to complete within a single semester, working one-on-one with a faculty member. The project must involve writing and teaching writing, and it must not duplicate material covered in existing courses. Proposals for an independent study should be submitted in writing to program leadership no later than 60 days before the start of the target semester.

AS.492.888. Thesis Continuation.

AS.492 (Non-Departmental)

AS.990.951. SAB/JHU CASA Brazil Program.
Placeholder for full-time study abroad on the JHU CASA Brazil Program, Rio de Janeiro, Brazil. Permission required.

AS.990.952. SAB/JHU St. Andrews Program.
Placeholder for full-time study abroad on the JHU/St Andrews University Program, Scotland. Permission required.

AS.990 (-JHU Department)

EN.900.895. Graduate Study. 3 - 9 Credits.
Full-time equivalency.

EN.990.977. Research Practicum.

EN.990.978. JHU In Tours Program.

AS.999 (AAP)

AS.999.999. Graduate Internship Project.
Internship projects are available for students needing transcript documentation of an approved Advanced Academic Programs Internship. The Internship Project course is an audit only, no credit course offered during each semester. Advanced Academic Programs students must be enrolled in a degree program at least one semester (9 credits) before seeking an internship. Students should apply and register for the internship project course at least two weeks before the internship begins. (0 credit)

BU.001 (Graduate Business)

BU.001.450. Quantitative Basics.
Now more than ever, being successful in business means having a solid foundation of quantitative skills, leading to better understanding of data and ways of modeling behavior or business interactions. This course covers basic concepts in mathematics that are crucial for students studying business at the graduate level, including algebra, calculus, statistics and matrix algebra. It is not intended to develop a mastery of these subjects, but simply to familiarize students with or refresh these quantitative skills to prepare for success in Carey's business programs.

BU.001.510. Career and Life Design for Experienced Professionals.
Career and Life Design for Experienced Professionals provides you with an opportunity to learn and develop the necessary skills to engage in career and life design. From exploring opportunities to switch or advance within your career and strategically updating your resume, to interviewing and job search strategies, this mixed synchronous/asynchronous eight-week course will help you understand, tell, and live your career story.

BU.001.520. Professional Development for Career Success.
Professional Development for Career Success provides you with an opportunity to learn and develop the necessary skills to engage in career planning. From clarifying your values and interests, exploring opportunities, and learning about professional branding, to interviewing and job search strategies, this hands-on and exploratory eight-week course will help you understand, tell, and live your career story.

BU.001.700. Independent Graduate Project. 1 Credit.
An independent study provides an opportunity for students to study a particular topic of interest in depth. Students who demonstrated competency in a certain area may elect to pursue an independent study project under the supervision of a faculty sponsor with expertise in the selected area.

BU.003.893. Leadership Development Expedition. 2 Credits.
This course is a leadership-intensive seminar and expedition focused on helping students develop their own leadership capacity, while also emphasizing a conceptual understanding of leadership in diverse settings. The course utilizes the unique opportunity for leadership development embedded in outdoor experiential education, providing students the challenge of serving as a leader. The course combines a thorough academic introduction to leadership development and opportunity for self-assessment with repeated reflection and feedback to help students develop their own path as leaders.

This is a physically demanding course. Students should be in moderate physical condition. However, no technical outdoor skill or experience required.

Expedition destination, activities, physical demands, fees, and eligibility requirements vary.

BU.003.903. Global Immersion:Finance in Europe. 2 Credits.
This course is offered to Carey Business School students interested in learning more about European financial markets. The course takes place in Frankfurt, Germany, and London, England. It aims to develop in-depth knowledge of the European financial system through a partnership with the Frankfurt School of Finance and Management (FSFM). Both Carey Business school faculty and FSFM professors will provide classes on the history and current status of the financial system in Europe and compare those systems to the US financial landscape. Corporate and government organization visits will complement lectures and case studies.

BU.141.710. Effective Teaming. 2 Credits.
In today's businesses, teams are a basic organizational building block. Teaming is perennially listed as one of the top skills that recruiters look for in graduating MBAs. This course conveys knowledge and practical tools that help students become more productive team members and leaders. Topics include the characteristics of high performing teams, leadership strategies for creating performing teams, strategies for avoiding dysfunctional team dynamics, and best practices for managing diverse and virtual teams.

BU.142.720. Managing in a Diverse & Global World. 2 Credits.
Business organizations and other critical organizations operate in both a market and nonmarket environment. A major focus of the course is examining contextually global diversity, inclusion, and multicultural issues through the lens of multiple dimensions. Successful, globally minded managers align the firm's capabilities with the demands of both its market and nonmarket environment. This course examines political, regulatory and societal factors of influence. Students learn to analyze the motives for focused intervention to better judge when and how political developments may affect business or organization interest. It explores the rise of "private politics" (activists, civil society networks, and NGOs), which are increasingly complementing conventional "public politics." This new plurality also opens exciting new nonmarket strategic opportunities for profit and socially driven business, providing it with new potential allies. This course stresses collective moral agency and the ethical dimensions of business and management in such a global political economy. Students explore cross-cultural perspectives on economics and business culture, and how to analyze and proactively manage the nonmarket environment through integrated market and nonmarket strategies. Cumulatively through class interaction and team activities students develop strategies for managing aspects of global diversity and inclusion within the context of a real organization opportunity.

BU.150.710. Discovery to Market I. 2 Credits.
This course teaches the process of bringing scientific discoveries to market. Students learn about innovation and invention processes, how to identify opportunities and assess when ideas are inventions, the steps required to bring the product to market, including intellectual property protection and regulatory processes, and strategies to license early stage inventions to third parties for further development. Students work in small teams on early-stage invention projects that are patented or patent pending sourced by the instructor from university and government technology transfer offices. Students will analyze the feasibility of commercializing the invention so that it can be licensed to a third party that can pursue entrepreneurial funding and development.Students must complete at least one semester at Carey Business School prior to enrolling in this course.

BU.150.715. Discovery to Market II. 2 Credits.
This course is the second part of a two part course. This course teaches the process of bringing scientific discoveries to market. Students learn about innovation and invention processes, how to identify opportunities and assess when ideas are inventions, the steps required to bring the product to market, including intellectual property protection and regulatory processes, and strategies to license early stage inventions to third parties for further development. Students work in small teams on early-stage invention projects that are patented or patent pending sourced by the instructor from university and government technology transfer offices. Students will analyze the feasibility of commercializing the invention so that it can be licensed to a third party that can pursue entrepreneurial funding and development.Students must complete at least one semester at Carey Business School prior to enrolling in this course.
BU.150.710

BU.151.720. Corporate Strategy. 2 Credits.
This course is concerned with the formulation and analysis of corporate strategy. Corporate strategy asks the question, 'In what industries should a firm compete?' These are the objectives and policies that collectively determine how a business positions itself to increase its returns and create economic value for its owners and stakeholders. In this course, students learn analytical techniques for diagnosing the industrial landscape of a business, a firm's overall portfolio, and identifying and analyzing specific business options. These concepts and frameworks will help you to learn to put structure on complex and unstructured problems in corporate strategy to provide a solid foundation for managerial decision making.
BU.150.620 OR BU.920.607

BU.151.770. Power and Politics. 2 Credits.
The purpose of this course is to immerse you in issues and dynamics related to power and politics in organizations. We seek to make power and politics discussable, recognizable, and usable. In other words, this course is designed to fuel learning of concepts that are useful for understanding, analyzing, and harnessing power and political processes. But beyond discovering ways to extend your own power, influence, and political skill, we will also uncover lessons about ways in which power and politics can blind and deceive you, and how you might better navigate situations in which you are up against relatively more powerful people or forces. We will use a range of learning methods including theoretical and business articles, cases, exercises, assessments, and simulations. We will cover a variety of topics ranging from political skills, bases of power and influence, dangers of power, power and change, and leading with power.

BU.152.710. Entrepreneurial Ventures. 2 Credits.
This course focuses on the knowledge, skills, and attitudes that enable entrepreneurs to pursue opportunities in business development. Students form teams to experience each step of the entrepreneurial process. The end result is an opportunity assessment of a business idea. Emphasis is placed on a hands-on approach with learning supplemented by cases appropriate to each phase of the course. Students are exposed to real entrepreneurial operations and businesses, via final project and presentations.
Before registering, please note that this course is graded on a team-based term project involving field work. You should be prepared to spend 15 hours per week, in addition to the time for readings, quizzes and case studies. If you anticipate heavy travel, work or family commitments, please consider registering at a future semester.
(BU.210.620 OR BU.910.610 OR BU.920.602) AND (BU.410.620 OR BU.911.610 OR BU.920.605)

BU.152.735. Strategy Consulting Practicum. 2 Credits.
This virtual course pairs student teams with business clients to solve complex problems. Student teams will have the opportunity to choose from a diverse selection of business clients, ranging from large companies and organizations to smaller local start-ups. The course challenges students to ask, "How should this business compete?" and "What strategic, innovative, and inclusive responses make the most sense?" Students identify and navigate resources, adapt products and services to best reach consumers, and create business strategies to help these companies pivot, sustain, and thrive.

BU.152.740. CityLab Catalyst: Business Innovation for Social Impact. 2 Credits.
For the first time in history, humans are an urban species; the livability of cities now determines the future of humanity and the planet. CityLab is an urban innovation platform engaging students in a global experiment of reinventing cities by revitalizing urban neighborhoods from within. The CityLab Toolkit immerses you in the concrete context of people and places dealing with the disruptive uncertainty and frustration of livability challenges that threaten the environment, human health, social cohesion, civic order, and prosperity of cities. It introduces strategies, tools, and practices for tackling these challenges as opportunities to co-create value for the flourishing of humanity and the planet. This course is a hands-on, active learning experience requiring a high degree of individual commitment, initiative, self-discipline, adaptability, and collaboration. PREREQUISITES: This course is open to graduate students throughout the University who have completed at least four courses of their graduate program prior to enrolling.

BU.152.745. CityLab Practicum: Social Impact Project. 2 Credits.
The CityLab Practicum puts the CityLab Toolkit knowledge and skills to work on a social impact project sponsored by a neighborhood entrepreneur, business, or organization. The Practicum is an opportunity to solidify your skills, demonstrate your expertise, deepen your network, and position yourself as an innovative social impact leader. This course is a hands-on, active learning experience requiring a high degree of individual commitment, initiative, self-discipline, adaptability, and collaboration.
BU.152.740

BU.450.630. Designing Experiments. 2 Credits.
Did a new compensation scheme motivate employees to work harder or stay with the organization longer? Do larger subsidies for health insurance lead to improved employee health and productivity? Did a new website format increase user activity on the site? Did a charitable organization's program to train community leaders lead to positive changes in the community? Cause and effect questions like these are crucial to developing evidence-based practice in business, nonprofits and governments. Yet answering these questions is difficult when new ideas are not implemented with the explicit intent of measuring their impacts. In other words, developing evidence requires a scientific approach to business and policy.
</br>This class aims to teach students to develop empirical evidence about the best ways to achieve their aims, whether these aims are to increase profits or to address social problems. The use of randomized controlled trials to test program impacts is becoming increasingly popular in businesses and government. An employee estimated that the average Facebook user is a participant in about 10 randomized controlled trials at any point in time. The U.S. government recently created a "Nudge Squad" that works with federal agencies to test new ideas through randomized controlled field trials. Experiments are an integral part of the 'big data' revolution going on in business, nonprofits and government. Importantly, they do not require advanced statistics or powerful computers to implement and interpret.
</br>The course will blend lectures, group discussions, readings, homework, a group project, and guest speakers from private industry, nonprofits and government agencies. I am a firm believer that the most fundamental principles can be stated in plain English. Thus the course stresses intuition (in English) over math and mechanics. Nevertheless, there will be math and mechanics in the course.
BU.510.601 OR BU.914.610

BU.510.001. Statistical Analysis Waiver Exam.
This exam affords students the opportunity to confirm proficiency in Statistical Analysis. Students who successfully complete the waiver exam will be granted a waiver with replacement for BU.510.601. Please note: Waiver exams may only be taken once per student, in the first or second semester of registration in a new program. The exam will be completed online in Blackboard within the timeframe stipulated listed within this course description. Students will be required to use Remote Proctor for the actual completion of the exam.

BU.520.701. Enterprise Risk Management Frameworks. 2 Credits.
This course provides an introduction to the formal principles and practices of modern COSO- and ISO-style enterprise risk management (ERM). The course provides a framework that integrates the core, foundational, and elective courses in the school's Enterprise Risk Management Curriculum. A combination of didactic lectures, group conversation, and student presentations will be used to impart the material and bring it alive.

BU.520.710. Big Data Machine Learning. 2 Credits.
This course provides students with a firm understanding of the mathematical and statistical theories that underlie the foundations of big data and machine learning. Students will be engaged in solving real-world problems by directly applying their data science skills through the implementation of code and rigorous analysis of financial data sets. In particular, this course will highlighted some of the challenges and limitations of applying such machine learning algorithms. Focus will be on understanding the subtle differences in each technique. This course will be hands-on with weekly homework assignments and a final presentation geared towards fully immersing students in the data science process. Students will program in Python (e.g. Pandas, NumPy, Scikit-Learn, Matplotlib, pattern, NLTK, etc). Topics that will be covered include: Principle Components Analysis, Multinomial Logistic Regression, Naïve Bayes, Perceptron, Support Vector Machines, Random Forest, Neural Networks, model evaluation ROC/AUC, k-fold cross-validation, etc.

BU.001 (MBA)

BU.001.351. Professional Development for Career Success.
This experience-based course is designed to help first-year, full-time MBA students develop the skills needed to accomplish their personal and professional goals and build lifelong career management skills to navigate the changing world of work and global marketplace. Students will engage in online discussions and interactive career labs to practice course content, collaborate and learn best practices from colleagues and instructors. Active participation is essential so that students develop skills in sequence an receive feedback. Students are expected to interact and engage with peers, coaches and employer relations team members, alumni, and industry professionals throughout this course.

BU.001.600. Graduate Internship Project.
Internship projects are available for students needing transcript documentation of an approved Carey Business School Internship. The Internship Project course is an audit only, no credit course offered during each semester. Carey Business School students must be enrolled in a degree program at least one semester (9 credits) before seeking an internship. Students should apply and register for the internship project course at least two weeks before the internship begins. (0 credit)

BU.910.610. Accounting Foundations. 2 Credits.
This course emphasizes the vocabulary, methods, and processes by which for-profit business transactions are communicated. Topics include the accounting cycle; basic business transactions involving assets, liabilities, equity, revenues, and expenses; and preparation and understanding of financial statements, including balance sheets, statements of income, and cash flows. The course also introduces the analysis of financial results and basic managerial accounting concepts and tools. This course prepares students for topics including capital budgeting, valuation and more advanced financial statement analysis courses.

BU.910.611. Corporate Finance. 2 Credits.
This course studies corporate finance and capital markets, emphasizing the financial aspects of managerial decisions. The course touches on the major areas of finance, including the valuation of real and financial assets, risk and return, the Capital Asset Pricing Model (CAPM), optimal portfolio choice, estimating the cost of capital, capital structure, capital budgeting, the effects of leverage, and financial distress.

BU.911.610. Marketing Management. 2 Credits.
This course covers principles of market-driven managerial decision making that determine competitiveness in dynamic consumer and organizational markets. Particular areas of emphasis include industry analyses, dynamics of competition, market segmentation, target marketing, channels of distribution, and product and pricing decisions. In-depth analytical skills are developed through case analyses, class discussions, and applied projects.

BU.912.610. Competitive Strategy. 2 Credits.
This course requires students to assume the role of a general manager. General managers have to cope with tremendous complexity, uncertainty, and inadequate information. An important requirement of a general manager's job is the ability to think in a cross-functional and holistic manner. Creativity and innovation are critical to achieving success, and so is the ability to execute and manage day to day. The concepts and frameworks to be covered in this course include Porter's 5-forces Analysis, PEST Analysis, SWOT, emergent versus deliberate strategy, Resource-Based View of the Firm, Core Competencies and Dynamic Capabilities, Cost Leadership Strategies, Differentiation Strategies, Vertical Integration, Diversification, Cost Accounting, Business Process Management, Inventory Management, Newsvendor Problem, Value Chain Analysis, Activity-Based Accounting, and more.
BU.930.633

BU.912.611. Operations Management. 2 Credits.
Within a manufacturing or service organization, operations management's role is to orchestrate technology and resources in creating products and services to meet the needs of end consumers. Operations management, accordingly, consists of ideas for shaping and innovating an organization's business model. This course provides a conceptual and actionable introduction to operations management and covers a ? wide? range of topics,? including operations strategy, process ?mapping and ?design, queuing theory, inventory management, lean manufacturing, and revenue management?, unified by a thought framework known as "the operations prism"? (flows, variability, and buffers).?? ?By ?taking ? a process view of value-added functions that lead to an understanding of how to make ?operations ?design choices,? ??students will acquire analytical and strategic thinking skills crucial for ?managing? 21st-century ?operations.

BU.913.610. Business Analytics. 2 Credits.
This course lays the analytical foundation for modeling that supports many managerial decisions that entail tradeoffs among competing objectives. Building on concepts from Operations Research, Economics and Probability Theory, this course provides a basic introduction to a variety of resource allocation problems.

BU.913.611. Judgement and Decision Making. 2 Credits.
The purpose of this course is to improve students' leadership capabilities through a critical examination of the organizational and psychological forces that guide human decision-making. Grounded in behavioral science and geared toward an understanding of decision-makers within organizations, topics in this course include heuristics and biases, Bayesian updating (taught with a behavioral lens), prediction accuracy, social and motivational influences on decisions, trust decisions, and expert intuition. The course culminates in a final project geared toward improving managers' judgment and decision-making.

BU.914.610. Business Statistics. 2 Credits.
Students learn statistical techniques for further study in business, economics, and finance. The course covers descriptive statistics, probability, discrete and continuous random variables, estimation, hypothesis testing, regression analysis. The course emphasizes statistics to solve management problems.

BU.920.601. Business Communication. 2 Credits.
Effective leaders are also skillful communicators. To succeed as a leader, you not only must drive individual and team performance, but also inspire diverse stakeholders to trust you and believe in you. Developing and implementing the right strategy is only part of the job; you also must convince colleagues and clients that you are ready to lead.

BU.920.602. Accounting Foundations. 2 Credits.
Business leaders must be conversant in accounting, the language of business. This course equips future business leaders with essential understanding of financial and managerial accounting and the ability to interpret financial status and make effective managerial decisions by using accounting numbers. The covered topics include fundamentals of financial statements, evaluation of financial positions and risks, managerial accounting concepts, and capital budgeting techniques.

BU.920.603. Microeconomics and Market Design. 2 Credits.
This course develops the students' ability to apply fundamental microeconomics concepts and tools to decision making by consumers and firms, and to understand economic exchanges and markets. The first half of the course covers consumer choice and market demand, production costs and firms' profit maximization, market competition and equilibrium, market power and the implications of different market structures for output and pricing decisions. The second half is devoted to understanding the principles and design of practical market mechanisms; topics include game theory, auctions, matching algorithms, and market "platforms".

BU.920.604. Finance. 2 Credits.
This course covers central issues in financial management and corporate finance. Students will learn how financial managers make investment, financing and other decisions and the tools they use to reach such decisions. Topics covered include time value of money, risk, valuation, capital structure, capital budgeting, and mean-variance portfolio selection. The course provides the analytical tools and the financial theories needed to implement sound financial decisions within a corporation (and outside of a corporation). Ideas are presented in a cohesive way within the framework of the no-arbitrage principle, the fundamental principle shaping all aspects of modern finance. Command of the subject is crucially important for anyone considering a career not only in investment banking, investment management or trading, but also in general management, corporate strategy, management consulting, entrepreneurship, and the non-profit world.

BU.920.605. Marketing Management. 2 Credits.
New digital technology has enabled consumers to take more control of their lives. Wearable devices, smartphone apps, etc., provide consumers with new tools to connect with friends, expand their network, obtain information to improve their buying decisions, change bad habits, monitor health indexes, manage mental health, etc. Individual decisions are often influenced by others.In this course, we learn what drives consumers' needs and their choices, with special reference to the new tech environment. Making use of these insights and taking into account a company's constraints and the competitive environment (i.e., competitors' product portfolio, their constraints, etc.), we study how firms can come up with new products/services or modify their existing portfolios to serve unmet needs. The customer insights also allows us to achieve more efficient segmentation, targeting and positioning (STP), and design more powerful tactical tools like pricing, distribution, advertising, and marketing communication (commonly referred to as the 4Ps) to help reach targeted consumers and improve their adoption and loyalty, with the goal of providing superior customer value to the consumers.Marketing is a multidisciplinary area that makes use of economics, psychology, sociology, experiments, field data, statistics, and econometrics to understand how individuals make their decisions. A unique aspect of this course is to study how the internet has empowered peer effects via social networks and two-sided market platforms, and how companies should take advantage of these new tools in managing customers and developing their businesses.

BU.920.606. Operations Management. 2 Credits.
Operations Management seeks to match supply with demand in a marketplace: On the supply side, it generates value by orchestrating technologies, resources, and processes needed for creating products and services; on the demand side, it captures value by fulfilling the promises of revenue models with the right balance of various competing objectives. This course provides an actionable overview of Operations Management, emphasizing both quantitative models and qualitative strategies needed for shaping and innovating service and manufacturing organizations' business models. We will apply a diverse set of marketplace analytics tools (e.g., flow analysis, process redesign, queueing theory, inventory control, lean, and data analytics) to a variety of operational scenarios, from automobile factories to healthcare organizations, from brick-and-mortar stores to e-retailing, and from airlines to online platforms, centering around a coherent framework known as "the operations prism" ? (flows, variability, and buffers). Through this course, students are also expected to gain a perspective on the role of artificial intelligence in managing 21st-century operations.

BU.920.607. Competitive Strategy. 2 Credits.
This module requires students to assume the role of a general manager in the 2020's and beyond. General managers have to cope with tremendous complexity, uncertainty, and inadequate information. An important requirement of a general manager's job is the ability to think in a cross-functional and holistic manner. Since the beginning of the new millennium, technology progress has been accelerated. The internet, mobile devices, and the abundance of personal data available to companies reshaped the competitive landscape and new business models emerged. As technology does not show any sign of slowing down, creativity and innovation are more critical than ever to achieve success, as is the ability to digest and apply tremendous amounts of cutting-edge research quickly. The concepts and frameworks to be covered in this course range from the, now classic, Porter's 5-forces Analysis, through well understood framework of vertical and horizontal integration, and to cutting edge theories of two-sided markets, network effects, and advertisement-driven, transaction-driven, and data-monetization-driven businesses.

BU.920.621. Data Science: Statistics. 2 Credits.
Students learn statistical techniques for further study in business, economics, and finance. The course covers descriptive statistics, probability, discrete and continuous random variables, hypothesis testing, and analysis of variance. The course emphasizes statistics to solve management problems. Case studies, spreadsheets, and computer software are used.

BU.920.622. Data Science: Econometrics for Market Analysis. 2 Credits.
Our course will be centered around the experiment and why experimentation is so important. We will develop the basic linear regression framework, which is a commonly used econometric technique to evaluate real-world questions and quantify experimental results. We will study three cutting-edge techniques for understanding cause and effect: randomized control trials, difference-in-differences, and regression discontinuity. We
BU.920.621

BU.920.623. Data Science: Big Data Consulting Project. 2 Credits.
Big Data Consulting Project is the first in a sequence of experiential courses for full-time MBA students. The course features a partnering organization (client), which provides a large dataset accompanied with inquiries. Students work in teams, to answer the client's inquiries using a combination of descriptive and predictive analytics. To this end, students may use a combination of data visualization tools and programming languages for data analysis (such as Tableau and R). The students will be introduced to these techniques and tools in the lecture component of the course as well as in earlier courses such as the Bootcamp: Immersion in Technology, Data Science: Statistics, and Data Science: Econometrics for Market Analysis. In this first course of the experiential sequence, the students will adopt several planning and feedback tools that will help them work as a team.

BU.920.624. Data Science: Artificial Intelligence. 2 Credits.
Since its inception in 1950s, Artificial Intelligence (AI) has been shaped by the rise and fall of various competing ideas and techniques emerging from a myriad of disciplines, including computer science, economics, ethics, linguistics, mathematics, operations research, philosophy, psychology, and statistics. Since 2012, deep learning has taken center stage in AI and expanded the landscape of AI to include applications spanning virtually all industries and sectors. This course introduces key concepts of AI, including its mathematical, computational, and economic foundations, and how to manage and lead businesses in the age of AI. Students will learn how to develop concrete AI applications that transform structured and unstructured data to tools with potential of generating business and human value. Students will develop a concrete understanding of AI strategy in a variety of scenarios, including health, operations and supply chain management, marketing, and marketplace design. Students will also develop AI leadership skills that synthesize human and non-human intelligence, with limitation of AI in mind, including, for example, how AI can amplify or mitigate human biases.

BU.920.631. Behavioral Science: Leadership and Organizational Behavior. 2 Credits.
The purpose of this course, required for students in the full-time MBA program at the Carey Business School, is to introduce students to fundamental topics related to managing, leading, and working in modern organizations. The course exposes students to a broad array of frameworks for understanding individual, team, and organizational behavior, with particular emphasis on the design of work, interpersonal dynamics, organizational innovation and change, global work environments, and crafting meaningful careers. This breadth of topics, ranging across organizational levels and career stages, distinguishes the course and is meant to complement students' later coursework focused on individual decision-making, solving problems in teams, and avoiding pitfalls of early career managers.

BU.920.632. Behavioral Science: Design Thinking. 1 Credit.
During this course, students will learn about and participate in Design Thinking: a human-centered problem-solving approach utilized by some of the most creative and competitive businesses globally. With emphases on research, ideation, iteration, prototyping, and multidisciplinary teams, Design Thinking helps practitioners leverage their creativity to achieve novel solutions to complex problems. This two-day intensive course will leverage experiential learning, with students working together in teams to solve a complex problem using Design Thinking.

BU.920.633. Behavioral Science: Negotiating Collaboratively I. 1 Credit.
We negotiate every day—many of us, all day. Determining what we will pay, how much we will get paid, and how to convince our colleagues of our data-driven solutions: All of these are negotiations. Despite the ubiquity of negotiation and its centrality as a leadership competency, however, many of us know little about the strategy and psychology underlying it. This course provides students with the foundational knowledge and skills needed to negotiate. Designed around a series of research-based negotiation exercises, the course exposes students to multiple negotiation situations that help them understand the two fundamental approaches to negotiation. By reflecting on these exercises in light of negotiation theory, students develop an awareness of their personal negotiation style and how to hone it. By the end of the course, students will have the basic skills needed to negotiate collaboratively and effectively—skills that they can further refine in Negotiating Collaboratively II.

BU.920.634. Behavioral Science: Leading Change. 2 Credits.
A core leadership challenge is strategically, efficiently and fluidly guiding others through the stages of organizational change. Change is an important aspect of life for people, groups, and especially organizations. Change is ever more important as we, and the organizations in which we work, face multiple and shifting imperatives. In fact, the ability to create change can make or break careers. We often muddle through change satisfactorily. Yet, we can improve our success if we apply frameworks, techniques, and perspectives that elevate our abilities beyond the common sense level of performance. We do this by analyzing the forces that drive organizations to change, examining impediments to change, and surveying approaches for making organizational change more effective.

BU.920.636. Behavioral Science: Negotiating Collaboratively II. 2 Credits.
We negotiate every day—many of us, all day. Determining what we will pay, how much we will get paid, and how to convince our colleagues of our data-driven solutions: All of these are negotiations. Despite the ubiquity of negotiation and its centrality as a leadership competency, however, many of us know little about the strategy and psychology underlying it. Building from Negotiating Collaboratively I, which provides students with the foundational knowledge and skills needed to negotiate, Negotiating Collaboratively II teaches students advanced negotiation skills and prepares them to negotiate in complex but critical situations. Examples of advanced skills include negotiating across cultures and over virtual media like Zoom. Examples of complex but critical negotiation situations include disputes and ethically fraught deals. Finally, and in addition to learning advanced skills and encountering complex negotiations, students in Negotiating Collaboratively II will negotiate additional simulations involving data and healthcare, receive additional personalized feedback, and apply their skills to negotiations occurring in other classes (i.e., Commercializing Discovery) and/or in their careers (i.e., to job offers they are receiving). By the end of the course, students will be able to display and successfully deploy a variety of sophisticated and situation-appropriate negotiation strategies.

BU.920.711. Foundations of Business Analytics. 2 Credits.
Being a leader in a data driven world requires the knowledge of both data-related (statistical) methods and of appropriate models to use that data. The Business Analytics class focuses on the latter: it introduces students to analytical frameworks used for decision making. These include Linear and Integer Optimization, Decision Analysis, Risk modeling, and Monte Carlo Simulation. For each methodology students are first exposed to the basic mechanics, and then apply the methodology to real-world business problems using software. Emphasis will be not on programming, but rather on formulating problems, translating those formulations into useful models, optimizing and/or displaying the models, and interpreting results.The course will not produce experts at modeling and/or programming (although students may be able to pick up a few spreadsheet skills along the way). Rather, the goal is to prepare managers who are comfortable with translating trade-offs into models, understanding the output of the software, and who are appreciative of quantitative approaches to decision making.
BU.920.621

BU.920.713. Ethical Leadership. 2 Credits.
Students in this course will critically examine ethical questions at the heart of contemporary organizational life. What is a leader's ethical obligation to the people they serve? How can ethics and pragmatism in business co-exist? Why do individuals within organizations fall prey to unethical behavior? And how can one maintain an ethical compass in a globalized world with competing value claims? Contemporary program-specific topics, such as the ethics of privacy, big data, and automation will also be scrutinized. With cases and empirical research as a backdrop, this highly interactive seminar will help students develop the skills, dispositions, and frameworks required of an effective leader.
BU.920.711

BU.920.721. Foundations of Business of Health. 2 Credits.
This course provides an overview of the evolution, structure and current issues in the health care system. It examines the unique features of health care as a product, and the changing relationships between patients, physicians, hospitals, insurers, employers, communities, and government. The course examines three broad segments of the health care industry: payors, providers and suppliers. Within the payor segment, the course examines the sources and destinations of spending, managing care, insurance design, payment models, strategy, and efforts to address payer gaps including insufficient access and social determinants of health. Within the provider segment, the course examines the impact of cost containment, payment reform, and competition on the structure, innovation, care quality, and efficiency of hospitals, physicians, and integrated delivery systems. Within the supplier segment, the course will examine developments in the biotechnology, pharmaceutical, medical devices, genomics, connected health and IT industries.

BU.920.722. Business Law, Health Law, and Regulations. 2 Credits.
This course provides students with an overview of the legal and regulatory environment as it affects health care and business. With the increasing intersection between health care delivery and law, this course introduces students to the legal and regulatory issues they are likely to face in managing health care organizations. Using cutting-edge cases, students will explore medical malpractice, negligence, liability (physician, product, and corporate), criminal aspects of health care, patient consent and rights, and health care reform. In today's economy, a thorough working knowledge of the legal and regulatory environment in which businesses operate is essential for well-prepared business executives. This course provides an overview of the legal and regulatory frameworks affecting business in the United States. Topics include forms of business organization, contracts, torts and product liability, intellectual property, constitutional law business transactions, and discrimination and employment issues.
BU.920.721

BU.920.723. Ethics of Business of Health. 2 Credits.
Students in this course will critically examine ethical questions at the heart of the contemporary healthcare industry. What are the unique ethical obligations of healthcare organizations to patients, providers, and society? How can ethics and pragmatism in healthcare co-exist? Contemporary program-specific topics, such as the ethics of privacy, ethical resource allocation and access to care, and paternalism in healthcare, will also be scrutinized. With cases and empirical research as a backdrop, this highly interactive seminar will help students develop the skills, dispositions, and frameworks required of an effective leader in health fields.

BU.920.811. Design Lab. 2 Credits.
This experiential course is the first part of a two-part series that will provide a hands-on, data-driven experience for students to develop a product or service that has the potential to improve healthcare for patients around the world. In this first part, students will learn how to explore unmet needs in the industry by connecting with leading experts in the field, doing background research and conducting interviews. Students will identify problems that have potential to result in significant opportunities and will learn how to translate these problems into need statements. Students will learn how to screen needs with a deep-dive into the problem through primary and secondary research, understanding existing solutions and competitors, a stakeholder analysis and a detailed market analysis through customer segmentation and discovery. Students will apply principles of ideation, design thinking and user-centered design to develop the winning concepts and develop a prototype that can be tested for commercialization in the second part of the course.

BU.920.812. Commercializing Discovery. 2 Credits.
This course teaches the process of bringing discoveries to market. Students learn about innovation and invention processes, how to identify opportunities and assess when ideas are inventions, determine the steps required to bring the product to market, including intellectual property protection and regulatory processes, and craft a strategy to license early stage invention to third parties for further development. Students work in small teams on early-stage invention projects that are patented or patent pending sourced by the instructor from university and government technology transfer offices. Students will analyze the feasibility of commercializing the invention so that it can be licensed to a third party that can pursue entrepreneurial funding and development. Students enhance their business education by developing collaborative consulting engagements with businesses and nonprofit organizations in which students assist their client organizations in addressing existing and emerging challenges in the health care space.
BU.920.811

BU.920.813. Leadership Development Expedition. 2 Credits.
This course is a leadership-intensive seminar and expedition focused on helping students develop their own leadership capacity, while also emphasizing a conceptual understanding of leadership in diverse settings. The course utilizes the unique opportunity for leadership development embedded in outdoor experiential education, providing students the challenge of serving as a leader during an adventure expedition, and helping students reflect on this challenge to develop their own conceptualization and practice of leadership. The course combines a thorough academic introduction to leadership development and opportunity for self-assessment with repeated reflection and feedback to help students develop their own path as leaders.

BU.920.814. Advising Project Teams. 2 Credits.
Organizations commonly rely on teams to get work done. At the same time, the effectiveness of teams can vary greatly depending on the its leadership and processes. After completing the Innovative Field Project, students can elect to participate in this experiential course to further develop their capacity to lead teams. During the quarter students will be exposed to behavioral research to enhance their knowledge of collaborative work, and practice the corresponding skills by advising an Innovative Field Project team.
BU.920.816

BU.920.815. Applied Behavioral Strategy for Organizational and Social Impact. 2 Credits.
Have you wondered why monetary incentives sometimes work to achieve intended outcomes, whereas they spectacularly backfire in others? Were your decisions affected by "choice architecture" in school or your workplace? Can Netflix incentivize its customers to exercise, and do they have a responsibility to do so? These are examples of inquiries you will encounter in this experiential learning course. A business partner will offer a real-world problem for you to solve, learn and apply concepts from neoclassical economics (incentive theory) and behavioral economics (choice architecture, framing, nudges). You will be challenged to apply learnings on how incentives and nudges (or a combination) impact decisions to improve organizational processes, outcomes, or society. Students will learn principal-agent theory and incentive design, and behavioral concepts such as hyperbolic discounting, loss aversion, and the potential of "choice architecture" to affect behavior. Students will apply economic and behavioral concepts and tools working in teams on a real business problem in partnership with an organization. Teams will scope and provide actionable recommendations to solve a problem. Applications may cover a wide range, such as converting first-time customers into repeat customers, or encouraging employees or community members to recycle, exercise or lower their carbon footprint. The course is relevant to students interested in public service, management and leadership.

BU.920.816. Innovation Field Project. 4 Credits.
The Innovation Field Project is the second experiential course in the full-time MBA program. Students work in teams to define, and scope problems posed by partner organizations, and deliver innovative solutions using evidence-based approaches. Students use the concepts and tools studied in their first year – such as research methods, data analytics, creative problem-solving techniques, and discipline-specific knowledge – to analyze the business issue at hand and provide innovative, actionable recommendations to the project partners. The business problem might relate to a wide range of issues, including process or service design, strategy development, financial risk management, or marketing. Projects might also encompass large scale thematic issues facing contemporary organizations, such as the ethical dilemmas that leaders face. Projects can be in any sector including tech, retail, banking, health or manufacturing. HTI focused projects may include physician group practices, hospitals, pharmaceutical firms, public health organizations and biotechnology firms.

BU.930.610. Effective Communication. 1 Credit.
This course prepares Innovation for Humanity (I4H) teams to communicate effectively with internal and external audiences. Students refine their skills by analyzing and practicing research-based strategies adopted by successful business professionals. In particular, students learn how to write compelling memos, develop executive presence, and deliver informative presentations.

BU.930.630. Solving Organizational Problems. 2 Credits.
This course aims to equip GMBA Innovation for Humanity (I4H) teams with the fundamental knowledge and skills needed to thrive in their I4H projects and future organizational problem-solving endeavors. It differs from other management courses in its focus on the specific challenges faced by problem-solving teams (e.g., I4H teams) versus teams or individuals in other organizational settings (e.g., decision-making situations, organizational change efforts). It includes units intended to help students set up a problem-solving team for success, follow the iterative problem-solving process, adapt that process to manage scope and ambiguity, and both collect and evaluate the quality of problem-relevant evidence. Students will leave with foundational abilities needed to solve organizational problems.

BU.930.631. Experiences in Leadership.
The goal of this course is to help students translate research about individuals and groups into capabilities to become effective leaders. The course will provide students with analytical frameworks that will help them understand behavior in organizations, along with the practical experience to put that understanding into action. Key to developing this experience is using the classroom as a forum to apply knowledge and develop skills through immersive exercises, cases and interaction with practitioner experts.

BU.930.632. Management and Organizational Behavior. 2 Credits.
The purpose of this course is to introduce students to fundamental topics related to managing, leading, and working in modern organizations. The course exposes students to a broad array of frameworks for understanding individual, team, and organizational behavior, with particular emphasis on the design of work, interpersonal dynamics, organizational innovation and change, global work environments, and crafting meaningful careers. This breadth of topics, ranging across organizational levels and career stages, distinguishes the course and is meant to complement students' later coursework focused on individual decision-making, solving problems in teams, and avoiding pitfalls of early career managers.

BU.930.633. Business Microeconomics. 2 Credits.
This is a foundational microeconomics course with emphasis on the application of economic principles and methodologies to private and managerial decision problems. Major topics include consumer choice and market demand, costs and profit maximization, market structures (competition, monopoly, and oligopoly), short- and long-run output/price decisions, and strategic interactions (game theory).

BU.930.634. Financial Valuation. 2 Credits.
This course provides comprehensive methods for valuing securities, projects, assets and firms. Notions and methods from corporate finance, corporate strategy, investments and financial statement analysis are employed extensively.

BU.932.610. Ethical Leadership. 2 Credits.
In this course, students will be challenged to think critically about the ethics of organizational life. What is an organization's or leader's ethical obligation to the people they serve? How can ethics and pragmatism in business co-exist? And, why do individuals within organizations fall prey to unethical behavior? With cases and empirical research as a backdrop, this highly interactive seminar will challenge students to examine these and other fundamental questions, in an effort to cultivate the skills and dispositions that are required of an effective leader.

BU.940.611. Innovation for Humanity. 4 Credits.
This experiential learning course is designed to develop agile and creative business leaders who understand how to build sustainable, impactful businesses within developing communities around the world. The course is consistent with the Carey Business School's signature theme of "teaching business with humanity in mind" and it provides an understanding of the needs of developing communities around the world. Students will work domestically and abroad engaging with entrepreneurs, public officials, faculty and NGOs, exploring critical development issues. The students will learn to understand the complex systems that prevail in the emerging economies, the role of appropriate technologies and interventions in solving pressing problems, and to recognize the sustainable business opportunities embedded in these community needs.

BU.120 (Management)

BU.120.601. Business Communication. 2 Credits.
This course refines students' skills in business writing, public speaking, and interpersonal communication. Through analyses and practice of communication strategies adopted by successful business professionals, students learn to write clearly and concisely, deliver compelling presentations, and construct effective arguments.

BU.121.610. Negotiation. 2 Credits.
This course provides students with the foundational knowledge and skills needed to negotiate. Designed around a series of research-based negotiation exercises, the course exposes students to a variety of negotiation situations that help them to understand two fundamental approaches to negotiation. By reflecting on these exercises in light of negotiation theory, students develop an awareness of their personal negotiation style, including its strengths and weaknesses. By the end of the course, students will be able to negotiate in an effective, ethical, and culturally appropriate manner.

BU.131.601. Business Leadership and Human Values. 2 Credits.
This foundational course develops students' capacities for ? understanding themselves as moral agents in a complex environment of competing values and often ambiguous ethical challenges inherent in business. Through a rigorously discursive exploration of human moral capabilities, value systems, ethical frameworks, and contemporary ethical dilemmas, students clarify their personal moral compass and develop a toolkit of knowledge and practices for sound ethical leadership in business and society?.

BU.132.601. Business Law. 2 Credits.
A thorough working knowledge of the legal and regulatory environment in which businesses operate is essential for well-prepared business executives. This course provides an overview of the legal and regulatory environment affecting business in the United States. Topics include forms of business organization, contracts, torts and product liability, intellectual property, constitutional law business transactions, and discrimination and employment issues. Students are expected to utilize electronic library and Internet resources to complete assignments.

BU.142.601. Leadership and Organizational Behavior. 2 Credits.
Leadership requires a deep understanding of human behavior – how we make sense of the world (or fail to do so), how we make decisions, what brings us together and what sends us apart. Good leaders understand the power of motivation, the benefits and challenges of groups and how to create a context in which others will thrive and perform at their best. The goal of Leadership and Organizational Behavior is to help students leverage knowledge of human behavior to enhance their overall effectiveness within organizations and their ability to lead. This course will provide students with analytical frameworks and practical experience designed to help them put learning into action, whether or not they are currently in a formal leadership role.

BU.142.620. Leadership in Organizations. 2 Credits.
The goal of Leadership in Organizations is to help students learn how to leverage organizational behavior to enhance their ability to lead. Specifically, this course seeks to provide students with both the analytical frameworks and the practical experience necessary to better lead individuals and groups in organizations. The analytical frameworks will help students to understand leadership; the practical experience will help students put that understanding into action. The aim is to help students lead, even if they do not currently find themselves in a formal leadership role. The practices that are discussed will promote effectiveness at any level.

BU.142.730. Strategic Human Capital. 2 Credits.
Developing and managing human capital is vital for the success of any organization. In this course, students will examine ways in which human resources management can be used to enhance organizations' competitive capabilities. The goal will be to understand how an organization can select, train, and retain the right employees, and how it can effectively motivate them to make decisions that will allow the organization to successfully implement its overall strategy. Students will explore and master topics such as hiring and layoff decisions; human capital and on-the-job training; turnover; the provision of incentives; the advantages and disadvantages of alternative compensation schemes; objective and subjective performance evaluation; relative performance evaluation; promotions and other career-based incentive schemes; team production and team incentives; stock options and executive compensation; intrinsic and extrinsic motivation; non-monetary compensation; and mandated benefits.

BU.150.620. Strategic Management. 2 Credits.
Generally, strategy is defined as a set of choices that managers make in order to increase their firm's performance relative to competitors. This course provides the theoretical concepts and analytical tools required for formulating and evaluating strategies appropriate for long-term success. Topics include the internal and external environment analysis, competitive interactions, and business strategy. We will also introduce concepts important for corporate strategy, global strategy, and strategy execution. This course emphasizes the application of theory to real world strategic issues facing managers today.

BU.151.620. Global Strategy. 2 Credits.
This course provides students with the conceptual tools necessary to understand and work effectively in today's interconnected world by developing strategic perspectives that link this changing environment, the state of the global industry, and the capabilities and position of the firm. The course provides frameworks for identifying and taking advantage of the opportunities presented in a dynamic global environment at the level of the country and industry. It then focuses on firm-level strategic choices regarding where to engage in which activities. Finally, it covers the challenges of integrating the multiple perspectives, functions, and interests that constitute the multinational firm.
BU.150.620 OR BU.920.607

BU.450.730. Design Leadership. 2 Credits.
This course offers students the opportunity to learn and participate in design thinking: a human-centered process utilized by some of the most creative and competitive business organizations. With emphases on research, ideation, and prototyping, design thinking helps students leverage their creativity and collective expertise to achieve innovative solutions. During this course, students will work in teams to solve complex problems while applying the entire design thinking process. A large component of the course is experiential, but students will examine design thinking through multiple academic lenses (design and design theory, organizational behavior, and social psychology).

BU.132 (Real Estate)

BU.132.615. Real Estate Legal Environment. 2 Credits.
Complex legal issues involved in a real estate development and management transaction are reviewed and analyzed in this course. Students explore legal topics, beginning with the basic principles of property law and extending to zoning and comprehensive planning, environmental issues and safeguards of site acquisitions through construction, including leasing, conflict resolution, operation, and sale of a real estate project. Negotiation, legal aspects of entity structures and resolving disputes are discussed.

BU.152.725. Real Estate Entrepreneurship. 2 Credits.
Real Estate is historically and fundamentally an entrepreneurial industry. This class examines how to become a real estate entrepreneur and compete in today's marketplace. Course topics focus on the skills and knowledge real estate entrepreneurs successfully use to thrive. Students will learn techniques such as: how to create wealth, real estate pro-formas, back-of-the-envelope calculations, leverage, attracting external investors, and creating a winning business plan. Students will work in teams on case studies.
BU.241.610 OR BU.231.620 OR BU.920.604

BU.230.640. Development Modeling and Risk Analysis. 2 Credits.
This course emphasizes the estimation of development and investment budgets, including construction costs, construction loan interest, tenant improvements, lease-up reserves, marketing costs, and other soft costs. Ongoing property operations, including lease-up and refit allowances, are also examined. In this context, various capital structures are analyzed including mortgage loans, various equity investors, and possible refinancing opportunities. In addition, critical risks are examined using sensitivity analysis, Monte Carlo simulation, scenario analysis to calculate the most likely returns, and the probability of loss.
BU.241.610 OR BU.231.620 OR BU.920.604

BU.234.610. Real Estate and Infrastructure Finance. 2 Credits.
This course examines selected techniques and issues in the area of real estate finance. Special emphasis will be placed on the design and valuation of mortgage instruments. This class will be conducted using a lecture format. While lectures will follow the textbook to some extent, supplemental readings will be required. Students are assumed to have some knowledge of finance. Before taking this class, it is important for students to have a clear understanding of the time value of money concept and knowledge of how to use spreadsheets to solve time value of money problems. Knowing how to use a calculator to solve present value problems (but without a clear understanding of the underlying concept) is not sufficient for tackling the course material of this class. Use of calculators or spreadsheets will not be taught in this class.

BU.241.610. Real Estate Investment and Development. 2 Credits.
This course provides an overview of the real estate development and investment processes, as well as introduces students to various disciplines, professionals, and industry sectors, and how they interact and participate in these processes. Students learn to apply direct capitalization models and discounted cash flow models to estimate real estate values by converting future income expectations into present values. These values are compared to current costs and prices to determine the financial feasibility of proposed projects and existing properties. The concept of highest and best use is also introduced and discussed. The use of Excel software is introduced along with the CoStar database. This course was previously titled Development I.

BU.241.620. Design and Construction Feasibility. 2 Credits.
This course examines site planning, building design, and managing the construction project. The class is divided into two sections. The design section focuses on the conceptualization of the project, and the construction section looks at the management of the implementation of the project. Emphasis is placed on how the selection of materials, equipment, and systems can affect both the function and cost of the building. The course also includes a detailed review of the forms of construction contracts and associated documents commonly used in the industry.

BU.241.725. Global Perspectives in Real Estate. 2 Credits.
This course focuses on real estate and infrastructure investment and financing issues around the globe. Using a case approach supplemented by assigned articles and textbook readings, the course examines the global nature of the real estate asset class, the market players and the issues they encounter when identifying opportunities, and executing real estate strategies in various global markets. Topics covered include risks and returns of international real estate investment; challenges in international real estate development; identification of opportunities and execution of real estate strategies around the world; REITs around the globe; and global real estate portfolio considerations.
BU.241.610 OR BU.234.610 OR BU.231.620 OR BU.920.604

BU.241.735. Infrastructure Development for Sustainable Cities. 2 Credits.
This course provides an understanding of the demand and supply of sustainable infrastructure in a context of accelerating urbanization and growing risks related to global warming. The economic principles that make sustainability in cities so challenging are examined. Then, the course presents potential new strategies, new technologies, new business models, and new financing techniques that could make a difference in addressing a full range of infrastructure needs while addressing sustainability objectives. The course includes an understanding of the demand and supply side, cultural factors, politics, and the potential impact of technology and innovation on sustainability of infrastructure, real estate projects and urban policies.

BU.241.740. Project Finance and Public-Private Infrastructure Delivery. 2 Credits.
Project financing, as an alternative to conventional direct financing, is a well-established technique for large capital intensive projects. It grew in importance in the 1990s as a means of financing projects designed to help meet the tremendous infrastructure needs existing in both developed and developing countries. Whether project financing is suitable for such a purpose will depend, ultimately, on if this financing method offers the most cost-effective means of accomplishing the project after all social and private benefits and costs are considered. This course will discuss the basic project financing framework; the rationale for using project financing as opposed to direct conventional financing; the identification and management of risks associated with a large scale project; evaluating a project's viability using analytical tools; sources of project funds; using public-private partnerships as a mode of project financing; and the crafting of contractual arrangements to allocate a project's risk and economic rewards among the parties involved.
BU.234.610 OR BU.231.620 OR BU.910.611 OR BU.920.604

BU.241.750. Advanced Valuation and Investment Analysis. 2 Credits.
This course will integrate advanced valuation principles with the science of econometrics. Trend analysis, in the form of regression analysis, is used to reveal the influences on value for real estate. This integrates the results of regression analysis into the discounted cash flow methodology. This course is intended to prepare the student for real-world challenges in valuing complex real estate through the use of three case studies.
BU.242.715 OR BU.510.601

BU.241.760. Strategic Commercial Leasing. 2 Credits.
Strategic Commercial Leasing teaches students how to understand and negotiate commercial leases to create maximum value for property owners of all sizes, including institutional owners and investors. The course provides in-depth coverage the economic, legal and control issues related to commercial leasing. In-class discussions include the risk-return considerations property owners must evaluate when negotiating individual lease provisions. Leasing considerations include the impact on property valuation, property financing and asset disposition strategies. Students evaluate how a company's leasing strategy impacts their overall real estate portfolio risk, valuation and returns. The course structure will include lectures, group discussion, in-class negotiation. Guest speakers will include institutional owners, lenders and appraisers, enabling students to understand how lease terms are evaluated by a range of professionals. A special focus will be on how institutional owners and REITS view leases, various tenant uses, and overall leasing strategies. This highly interactive course will also cover the differences between apartment leases and commercial leases.

BU.241.770. Smart Growth, Infrastructure and Real Estate Development. 2 Credits.
For the past twenty years smart growth has had an increasingly significant impact on the built environment. Smart growth results in better cost-benefit outcomes for both developers and the public sector, more efficient and appealing land use in prime locations, and new financing tools.This course provides an understanding of historic development patterns of cities and towns, the emergence of the American suburb, and the countervailing smart growth approach. Examined are the principles behind smart growth, the demographic and economic forces furthering the widespread adoptions of these principles —urban revitalization, smaller households, a more transient workforce and racial and ethnic diversity. The growing strength of the Baby Boomers and the Millennials on the market is discussed. Attention is given to the increasingly important impacts of climate change, sustainability, changing tools of economic development competitiveness, health and equity of communities.The main tools of smart growth, such as higher density, mix of land uses, transportation and housing choices, transit-oriented development, walkable neighborhoods, and form-based zoning are examined. Collectively many of these tools are parts of Complete Streets policies. The impacts of public policies and private demand are discussed.

BU.242.601. Real Estate Market Feasibility Study. 2 Credits.
Understanding the urban environment is the key to understanding the marketability of real estate. Likewise, understanding the marketability of real estate is the key to making wise investment decisions. In this course, students will examine the forces that form, shape, and influence the growth of cities with the goal of understanding how real estate benefits and suffers from these dynamics. Students will explore the techniques for forecasting demand and supply in specific markets, as well as evaluating sites based on product criteria. Products include residential, commercial, and retail properties. Final sessions deal with feasibility analysis.

BU.242.701. Real Estate Investment Trusts: Analysis and Structuring. 2 Credits.
This course examines the role that Real Estate Investment Trusts play in commercial real estate capital and investment. Topics include the history, legal structure, and financial basis for establishing REIT portfolios. Students will examine the role of public and private capital markets in facilitating commercial real estate investments through REITs using real world examples. The primary course objective combines public company finance theory with practical real estate capital applications for intelligent business decisions in complex scenarios. Subjects include a history of the REIT industry; how REITs compete for capital and control investment risk; how to value individual REIT stocks and REIT shares generally; the regulatory and capital markets process for the REIT IPO; quarterly and annual filings; follow-on capital raising; and recent developments and strategies in the REIT industry.
BU.234.610 OR BU.231.620 OR BU.241.610 OR BU.920.604

BU.242.710. Real Estate Funds and Portfolio Management. 2 Credits.
A significant amount of commercial real estate investments is held in the form of large real estate funds. These funds typically range in size from $50 million to over $50 billion. Many of the large office buildings, regional malls, apartment buildings, and industrial parks in the country are held in these funds. Some funds invest in senior housing, student housing, parking, healthcare, and even farm and timberland. The managers of these funds are large institutional investment management firms that manage the properties on behalf of wealthy investors, pension funds, endowments, and sovereign wealth funds. The purpose of this course is to understand how these funds are organized, how they arrive at an investment strategy, and how to evaluate how they have actually performed relative to that strategy. Case studies and actual industry data will be used to reinforce the concepts discussed in the course.
BU.231.620 OR BU.234.610 OR BU.920.604

BU.242.715. Real Estate and Infrastructure Valuation. 2 Credits.
This course integrates the real estate curriculum with the valuation process. The three traditional approaches to value (land and site valuation; building cost estimates, depreciation, direct capitalization; and yield capitalization) will all be covered in the course. This course is integral for students pursuing the appraisal/valuation concentration within the MS Real Estate and Infrastructure Program.

BU.242.720. Real Estate Capital Market Analysis. 2 Credits.
This course examines selected topics and issues related to real estate capital markets. Special emphasis will be placed on mortgage backed securities (MBSs) and real estate investment trusts (REITs). This class will be conducted using a lecture format. While lectures will follow the table of contents of the textbook rather closely, quite often supplemental readings are required. Students are assumed to have some knowledge of real estate finance. Before taking this class, it is important that students have a clear understanding of the design of mortgages and knowledge of how to use spreadsheets to solve mortgage related problems. Knowing how to use a calculator to solve present value problems is not sufficient for tackling the course materials of this class.
BU.234.610 OR BU.231.620 OR BU.920.604

BU.245.790. Real Estate and Infrastructure Capstone. 2 Credits.
The Capstone course provides you with a mentored professional real estate industry experience that integrates all aspects of the MS in Real Estate and Infrastructure curriculum. You may choose one of three options:A real estate and/or infrastructure development project proposal. Students selecting this option work in teams to produce a state-of-the-art development proposal for a challenging site selected by Capstone faculty and judged by a project review board of faculty and industry professionals.A real estate and infrastructure research. Students selecting this option work individually or in teams to conduct original research and analysis of a critical issue in real estate and infrastructure development.An internship with a real estate company. Students selecting this option work on a portfolio of defined assignments mentored by an industry professional in a real estate company, agency, professional or industry association, or portfolio management company.Capstone choices will differ based on individual interests and career goals, but you are encouraged to choose experiences that provide an opportunity for growth and showcase your professional knowledge, skills and talent. Examples include a development proposal for a brownfield site; an analysis of weather-related risks in coastal infrastructure security; or a written participation/ observation report based on a supervised internship. The structure of deliverables may vary, but deliverables for all capstone experiences will include a written report, presentation slide deck, and oral presentation.<p>Students must receive approval and permission from their academic adviser before enrolling in this course.

BU.210 (Finance)

BU.210.001. Accounting and Financial Reporting Waiver Exam.
This exam affords students the opportunity to confirm proficiency in Accounting and Financial Reporting. Students who successfully complete the waiver exam will be granted a waiver with replacement for BU.210.620. Please note: Waiver exams may only be taken once per student, in the first or second semester of registration in a new program. The exam will be completed online in Blackboard within the timeframe stipulated listed within this course description. Students will be required to use Remote Proctor for the actual completion of the exam.

BU.210.620. Accounting and Financial Reporting. 2 Credits.
This course emphasizes the vocabulary, methods, and processes by which business transactions are communicated. Topics include the accounting cycle; basic business transactions involving assets, liabilities, equity, revenues, and expenses; as well as preparation and understanding of financial statements, including balance sheets, statements of income, and cash flows.

BU.210.650. Financial Statement Analysis. 2 Credits.
Financial Statement Analysis is designed to prepare you to analyze, interpret, and use financial statements effectively, both from a general manager and from an investor perspective. The course will review and extend the topics introduced in Accounting and Financial Reporting with an emphasis on value creation. Specifically, the course will introduce a thorough framework for financial statement analysis, including advanced financial (ratio and cash flow) analysis, financial statement adjustments, and financial forecasting.
BU.210.620 OR BU.910.611 OR BU.920.602

BU.210.680. Cost Measurement and Control. 2 Credits.
This course emphasizes the vocabulary, methods, and processes by which managerial accounting concepts and cost management practices are applied across organizations to improve operational performance and achieve strategic goals. Topics include cost behavior, profit planning, product costing, overhead allocation, cost estimation, costing systems for short-term and long-term decision-making, capital budgeting, variance analysis, responsibility accounting, and performance measurement.
BU.210.620 OR BU.910.610 OR BU.920.602

BU.220.610. The Firm and the Macroeconomy. 2 Credits.
This course explores the workings of an economy from a macroeconomic perspective. Although the course focuses primarily on the United States economy and its relation with the rest of the world, the concepts and tools apply to market economies around the world. Major topics include: the determinants of an economy's output and price level in the long run; money and banks in the long run and short run; the role of interest rates and exchange rates in the U.S. economy and in small, open economies; the causes and nature of the business cycle and inflation; the role of fiscal and monetary policy in stabilizing the economy and ensuring full employment and price stability.
BU.220.620 OR BU.920.603 OR BU.930.633

BU.220.620. Business Microeconomics. 2 Credits.
This is a microeconomics course with emphasis on the application of economic principles and methodologies to private and managerial decision problems. Major topics include consumer choice and market demand, costs and profit maximization, market structures, output/price decisions, and strategic interactions.
BU.510.601 OR BU.914.610 OR PH.140.611 OR PH.140.621

BU.220.720. Financial Econometrics. 2 Credits.
Financial econometrics is the intersection of statistical techniques and finance. It provides a set of empirical tools to analyze historical financial data, model underlying economic mechanisms, and predict future price trends. This course covers both cross-sectional and time-series data. Multivariate regression analysis is developed to study the cross-sectional differences in stock returns of individual firms and associated portfolio models. Applications of these techniques to evaluate the performance of new trading strategies and hedge fund managers are also discussed. Furthermore, time-series models are introduced to model and forecast both time-varying aggregate stock returns and volatility. The course prepares students to conduct empirical research in an academic or business setting. Stata will be used for the class.
BU.232.701 AND (BU.510.601 OR BU.914.610)

BU.230.620. Financial Modeling and Valuation. 2 Credits.
The objective of this course is to introduce students to the current practices in financial modeling and valuation using Excel. Students will learn how to manipulate financial data and how to perform financial analyses using various analytical tools. Using the skills, students will learn how to forecast financial statements and build interactive valuation models for firms. By the end of the course, students will complete an equity research paper. One important aspect of this course is also to introduce students to portfolio modeling, efficient frontiers, and portfolio choice subject to constraints.
BU.232.701

BU.230.710. Quantitative Financial Analysis. 2 Credits.
This course explores the fundamentals of Monte Carlo simulation techniques and their applications in finance. Using MATLAB as the programming platform, this course intends to train students to become familiar with simulation techniques in financial modeling, such as derivative pricing and market risk assessment. This course is taught mostly using hands-on computer exercises, and students are required to bring their laptops to class.
BU.232.710 AND BU.232.701

BU.230.730. Managing Financial Risk. 2 Credits.
The course offers an introduction to financial risk management. Risk management is a complex process of identifying, measuring, and controlling risk exposure. The course will balance theory and practical application. Topics include market and credit risks, liquidity, and operational and legal risks, including volatility modeling, and derivatives as tools for controlling risk. Using modern econometric models, such as ARCH and GARCH, along with widely used quantitative methods (Monte Carlo simulation and Filtered Historical simulation), the course will describe how to measure and control risk exposure towards various types of risks, especially market and credit risk.
Prerequisite Requirements Differ by Program:MS BARM (Full-Time): Required: BU.510.601; Recommended: BU.232.710MS Finance (Full-Time Part-Time): Required: BU.510.601 AND BU.232.701 AND BU.232.710All other programs: Required: BU.510.601 AND BU.232.701; Recommended: BU.232.710

BU.230.750. Financial Crises and Contagion. 2 Credits.
What and when will the next financial crisis be? No one knows, but the past provides clues. This course takes students through the history of finance in the United States, with a focus on the last 100 years of financial bubbles, manias, and scandals, from the crash of 1929 to the thrift crisis of the 1980s; Enron and other accounting debacles; and the mortgage meltdown known as the Great Recession. Examining the upheavals is key to understanding how the landscape and laws of modern financial markets evolved and where they might be headed.
</br> With the Great Recession of 2007–2012, the United States experienced the biggest economic crisis and ensuing downturn since the crash of 1929 and Great Depression of the 1930s. While every boom-and-bust is unique, all share certain characteristics—most notably, the seemingly inexhaustible ability of humans to forget the lessons of financial history. This forgetfulness comes at great expense to society. This course provides a tour of the country's major boom-and-bust-cycles, with a focus on last century, and particularly the last three decades, when such events became more numerous. After each debacle, laws and rules changed. Executives must know what those changes are and the reasoning behind them, but they also will have a competitive edge in recognizing future crises if they remember and understand the events underpinning those of the past.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.231.620. Corporate Finance. 2 Credits.
This course is designed to introduce students to the basic, yet fundamental, issues of modern finance. The goal of the course is to provide students with the basic tools needed to successfully complete more advanced finance courses. This course deals primarily with a firm's investment and financing decisions, and its interactions with the capital markets. Students are taught the fundamental principles of financial valuation and analysis, which provide a solid foundation for all other finance courses.
BU.210.620 OR BU.234.610

BU.231.710. Financial Institutions. 2 Credits.
The financial service industry plays a significant role in the economy and it continues to undergo dramatic changes. Financial institutions (FIs) perform the essential function of channeling funds from savers to users of funds. Financial intermediation is subject to a significant risk as the recent financial crisis vividly illustrated. The risk management of FIs is crucial not only in maximizing shareholders' value, but also in ensuring the stability of the whole financial system. In this course, students will acquire a working knowledge of (a) the function of financial intermediaries in the economy, and how this role has changed in the United States; (b) the sources of risks banks are exposed to (e.g., interest rate risk, market risk, credit risk, liquidity risk, sovereign risk) and how they manage them, and (c) elements of capital regulation.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.231.720. Corporate Governance. 2 Credits.
The course is mainly about the practical implications of the principal-agent dilemma due to separation of ownership and control. The separation leads to conflicts of interest between the principals (shareholders) and agents (management) that results in increased risk. The value of a firm depends on good corporate governance practices that protects shareholders rights and lowers the cost of capital due to better risk mitigation. The set of good governance practices, rules, and regulations that attract investments and creates jobs, as well as effective environmental and socially responsible considerations promote opportunities for better access to finance and improve firm value. The three main topics in this course are the shareholders; the board; and the management. Topics cover executive compensation practices and policies, boardroom structure and practices, benefits and problems of corporate disclosure and transparency, and the value of the shareholder vote. The course also covers management abuses, takeovers, mergers and acquisitions, and the role of financial institutions and credit rating agencies. We emphasize transparency, accountability, responsibility, and fair and equitable treatment of all shareholders to help implement good corporate governance practices that reduce agency conflicts and reduce risk. Good corporate governance practices is about building the business case rather than simple compliance. A corporate governance scoring project demonstrates how a company's sustainable, socially responsible investing and governance (ESG) standing profile can be rated as an indicator for building investor confidence and ensuring shareholder protection.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.231.740. Mergers and Acquisitions. 2 Credits.
This course explores the incentives for using mergers, acquisitions, divestitures, and alliances as vehicles to achieve corporate strategic objectives. Students address analytical techniques often employed in M&A, negotiation strategies, and valuation, and the evolution of M&A transactions. Also discussed are problems encountered in post-merger integration, and alternative modes of market entry, including joint ventures and internal development.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.231.790. Advanced Corporate Finance. 2 Credits.
By employing a case study approach, students learn how the theoretical concepts and tools learned in Corporate Finance and other finance classes are applied in solving real-world problems. Through such key concepts as financial forecasting, cost of capital, capital budgeting, optimal capital structure, dividend policy, and firm valuation, students learn the analytical techniques necessary to make rational financial decisions.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.232.610. Computational Finance. 2 Credits.
Modern financial markets are characterized by the widespread use of ever more powerful computational technology. The solutions to pricing, hedging, and portfolio allocation problems require familiarity with it, and so does effective trading in an age in which accuracy and speed are essential. This course teaches students the fundamentals of coding. The emphasis is on coding for inferential, modeling and simulation purposes. While class instruction will be based on MATLAB, one of the most popular programming platforms in the industry and the common language of choice for all courses in this program, students will also be exposed to other popular programming languages.

BU.232.620. Linear Econometrics for Finance. 2 Credits.
Linear Econometrics deals with the estimation of linear economic models. This is a quantitative class requiring strong foundations in multivariate calculus, matrix algebra, probability and statistics as pre-requisites. The course covers linear regression models with both finite-sample and large-sample inference. Topics include the univariate linear regression model, the multivariate linear regression model, regression functional form, conditional heteroskedasticity, weighted least squares, generalized least squares, instrumental variables, stationary and nonstationary time series models and linear panel regression models. Particular emphasis is placed on the notion of causality.
BU.510.601 OR BU.920.621

BU.232.630. Non-Linear Econometrics for Finance. 2 Credits.
Nonlinear Econometrics introduces advanced econometric tools needed to analyze financial data and build sophisticated nonlinear financial models. This is an advanced class requiring strong foundations in multivariate calculus, matrix algebra, probability and statistics as prerequisites. Linear Econometrics is also a pre-requisite. The course will cover methods of asymptotic (i.e., large-sample) inference in extremum (nonlinear) modeling. Among them, particular emphasis is placed on the generalized method of moments and maximum likelihood estimation. Simulation-based methods, like the simulated method-of-moments and indirect inference, will also be studied.
BU.232.620

BU.232.640. Empirical Finance. 2 Credits.
This course introduces students to the empirical methods used in financial econometrics. The techniques we study are employed by a wide range of institutions including commercial banks, non-banking financial companies, mutual funds, hedge funds, investment banks, as well as central banks, consulting firms and governments. Applications include the evaluation and backtesting of trading strategies, risk management and hedging, transactional analysis, and applications in regulation and policy making. The course draws on the econometrics sequence taught in the program but the emphasis is on how to use the techniques in actual applications such as event studies, the analysis of short- and long-run stock returns, multi-factor models, and the analysis of credit risk. The course embraces the traditional approaches in financial econometrics as well as predictive modeling from the data sciences and applications in "Big Data" environments. Students will learn about the typical datasets used in financial econometrics and learn how to design, code, and analyze the models used to analyze these datasets.
BU.232.620 AND BU.232.630

BU.232.650. Continuous Time Finance. 2 Credits.
This course provides a conceptual understanding of the basic ideas in mathematical finance and shows how these ideas are applied to practical situations, through the development and use of financial models. Mathematical abstractions are created which deal with issues including option pricing, risk neutrality, incomplete markets, stochastic volatility, and other responses to the realization of a variety of "unknowns". Topics include Ito calculus, options theory, martingale pricing, exotic options, jump-diffusion processes, and variance gamma models.
BU.232.710

BU.232.701. Investments. 2 Credits.
This course offers the financial theory and quantitative tools necessary for understanding how different kinds of financial instruments are priced and used for investment decisions. Rather than delving into the details of current practice, it takes a rigorous and critical view to the process of investing. The aim is to provide the students with a lasting conceptual framework in which to view and analyze investment decisions. Students learn how to value assets given forecasts of future cash flows and the risk characteristics of different asset classes. The focus is mainly on common stocks, but fixed income securities (bonds) and derivative securities (options) are also analyzed. Topics covered include: time value of money, optimal portfolio selection based on mean–variance analysis, economic and statistical models of the relation between risk and return (including the CAPM and multifactor models), term structure of interest rates, no-arbitrage derivative pricing, and market efficiency (including asset pricing anomalies and behavioral finance).
(BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621) AND (BU.231.620 OR BU.910.611 OR BU.920.604)

BU.232.710. Derivatives. 2 Credits.
This course offers a rich overview of forwards, futures, swaps and options. The course will cover both the actual working of derivatives and the analytical tools needed to effectively understand derivatives. Skills are developed in pricing analysis, use of pricing models, trading, and hedging strategies. The strategies are developed to match specific economic goals, such as portfolio risk reduction.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.232.715. Financial Stability. 2 Credits.
Financial stability has become an explicit objective of central banks around the world. The design of bank regulatory requirements increasingly focuses on mitigating systemic risk as a source of financial instability. Stress testing has emerged as a major risk management tool for both supervisors and banks. This course introduces the analytical underpinnings of the current methodologies to monitor and manage systemic risks. Key learning tools are in-class workshops and case studies drawn from central bank financial stability reports, rating agencies reports, and IMF financial stability assessments. Students will acquire a detailed knowledge of (a) the role of financial frictions in determining macro-financial linkages; (b) current methodologies of systemic risk measurement; (c) micro- and macro- prudential bank regulation; and (d) the architecture of banking system-wide stress testing exercises.
BU.510.601

BU.232.720. Fixed Income. 2 Credits.
Fixed Income securities represent the largest market in the world. However, given the complexity and the relative lack of liquidity in this market, we generally do not hear much about Fixed Income. This advanced course focuses on how to navigate the complexity of the global debt market in a practical way. The course covers major markets and instruments including treasuries, fixed income swaps, forwards, futures, term structure theories and risk management techniques. By completing the course, students will learn actionable concepts and tools about some of the major activities on Wall Street in terms of size and opportunities. The course is both theoretical and practical.
BU.232.701 AND (BU.231.620 OR BU.910.611 OR BU.920.604)

BU.232.725. Emerging Markets. 2 Credits.
What makes emerging financial markets different from those in the US, Western Europe, or Japan? What are the benefits of adding these markets to traditional investment portfolios? Why invest in certain countries versus others? Within a country, which asset class should we invest in - debt or equity? How do hedge funds approach these markets vs. traditional investors? From the practical perspective of a U.S. institutional investor, this course tries to help answer these questions. Through videos, readings, and problem sets, students should develop greater abilities to analyze global macro trends and country fundamentals, master portfolio construction concepts, and implement practical investment strategies.
BU.231.620 AND BU.232.701

BU.232.730. Wealth Management. 2 Credits.
This course provides strategies for coordinating financial planning for high-net-worth individuals. Students will become skilled at identifying and dealing appropriately with clients' goals, needs, and problems in the areas of investment and investment planning.
BU.231.620 OR BU.910.611 OR BU.234.610 OR BU.920.604

BU.232.750. Advanced Portfolio Management. 2 Credits.
This is an advanced course designed as a comprehensive study of primarily institutional investment analysis and portfolio management. It will approach investment management as a rational decision-making process based on the theoretical foundation and best practice techniques of investments. The course is presented to help understand how the basic theories of managing a portfolio of financial assets within the risk–return framework will be addressed. Due to the increasing globalization in the capital markets, portfolio management has become an international business. Thus, a good understanding of valuation of equities and fixed income securities, options and futures, and other investment instruments within a global setting is necessary to maintain optimal investment in this dynamic environment. The course emphasizes portfolio management as a dynamic process in which the concepts from security analysis are factored into the dynamics of strategic and tactical investment decision-making criteria. The course covers the formulation of appropriate investment portfolio objectives for a key institutional investor, and alternative techniques for achieving them. Determination and allocation of asset classes—including bonds, equities, and alternative investment instruments into efficient portfolios—will be discussed, along with such topics as portfolio optimization, risk management, asset selection and allocation, investment management, monitoring, and revising and rebalancing a portfolio. Finally, criteria for evaluating portfolio performance will be discussed. Students are encouraged to incorporate corporate social responsibility and sustainable investing concepts into class discussions and deliverables.
BU.230.620 OR BU.930.634

BU.232.770. Cryptos and Blockchain. 2 Credits.
This course introduces students to one of the most exciting financial technological innovation in modern time -- the Blockchain. Students will gain a strong understanding of how blocks are created and linked together by cryptography. Within this decentralized peer-to-peer ledger system, students will examine in detail its construction, immutability, and security with a keen focus on the potential benefits and weaknesses of its fundamental structure as applied to businesses and organizations. Moreover, students will learn how companies are applying blockchain technologies in practice. We will review the first use-case of the blockchain – Bitcoins. Additionally, the course will chart the evolution of Bitcoins to Ethereum and the advantages of Ethereum's smart-contract framework. Additionally, we will dive into the growing alternative crypto-currencies markets. Initial Coin Offerings (ICOs) will be discussed with focus on their potential implications for destabilizing traditional funding sources. The regulatory challenges and current ICO best practices will be reviewed and analyzed. We will be discussing this industry from the perspective of the academic, entrepreneur, investor, and software engineer. The course will be delivered by standard lectures, presentations, case study discussions, assignments, guest speakers, programming exercises in Python, group presentations, and a final comprehensive exam.

BU.232.790. Advanced Hedge Fund Strategies. 2 Credits.
This course surveys a broad range of hedge fund and proprietary trading strategies with an emphasis on understanding their fundamental investment process. Students will gain practical knowledge in regards to creating, back-testing, and implementing these strategies. There will be particular focus on the theoretical justification for the existence of inefficiencies or risk premium, and the successful extraction of them. The course will cover the gambit of popular hedge funds strategies, such as Long/Short, Event-Driven (Distressed, Risk Arbitrage), Equity Market Neutral, Statistical Arbitrage, Dedicated Short-Bias, Convertible Arbitrage, Emerging Markets, Fixed Income Arbitrage, Global Macro, Managed Futures, and Multi-Strategy. Particular attention will be placed on understanding the mechanics of the alpha-extraction methodology. An example of the type of question that will be addressed in this course is: What do hedge fund managers strive to capture, and how do they do it? Hidden risks and limitations associated with the implementation of such strategies will be highlighted throughout this course. Upon successful completion of this course, students should gain a firm understanding of the popular hedge fund trading strategies currently employed in the industry. This course is presented from a practitioner's perspective and will assume that students have knowledge of basic financial theory, portfolio construction, arbitrage concepts, return calculations, statistics, and financial instruments and derivative products. The class projects will be highly quantitative and will require that students be able to analyze and manipulate market data using statistical and mathematical modeling techniques.
(BU.231.620 OR BU.910.611) AND BU.232.701

BU.233.730. Entrepreneurial Finance. 2 Credits.
This course introduces students to identifying, accessing, and evaluating sources of financing for start-ups and expanding technology companies. The approach uses case studies, group interaction, and presentations from experts in the field. Attention will be given to financial theory, risk assessment, valuation options, term sheets, due diligence techniques, and the setting up of financial reports for monitoring progress toward meeting milestones.
BU.231.620 OR BU.910.611 OR BU.920.604

BU.300 (Information Systems)

BU.300.620. Managing Complex Projects. 2 Credits.
This course aims to equip you with effective techniques, methods, and practices for defining, scoping, and planning a project, and then managing it to successful completion. Special areas of emphasis in the course are driven by practical experiences with large and complex projects frequently being late, over budget, and failing to meet specifications. We will pay particular attention to understanding project complexity, risk, and uncertainty so that you are prepared to address these challenges to success. You will gain experience using a leading project management software package.

BU.300.700. Developing Internet Systems and Services. 2 Credits.
The subject of this course is the development of services that are delivered over the Internet: system feature specification, design, user interface, implementation, and the role of development environments. Increasingly the delivery of services and user access to them is driven by considerations of third-party development, user platform specifications, security, privacy, and performance. Much of the focus of contemporary development is on mobile apps, reflecting the changing modes of behavior and expectations of users for instant availability of highly special-purpose and location-aware applications. This course will consider these trends and their implications for design and development.

BU.330.705. Data Networks: Infrastructures & Emerging Technologies. 2 Credits.
This course covers technological advancements in telecommunications and emerging wireless mobile systems, with emphasis on their business application: how the nature of these advances are driving business models and amplifying the strengths of today's firms; how businesses can select, integrate, and apply telecom and emerging mobile systems and cloud services into their business processes to maximize their value creation value capture, and value delivery. Business applications and contents delivered by mobile systems in public and private sectors – such as in healthcare services (mHealth), in financial and banking industries (mCommerce), mobile money and credits in social entrepreneurship will be covered. Analysis and selection of the needed telecom and mobile technologies, necessary to support business applications and processes, are examined. This course enables the students to gain an in-depth understanding of different telecom network systems, their developments and international standards. Finally, managerial, business critical, and technical issues such as technology evaluation, cost vs. performance trade-offs analysis, requirements analysis and vendor selection as they are needed by today's commercial and public organizations are covered.

BU.330.710. Cybersecurity and Data Vulnerabilities. 2 Credits.
Cybersecurity Information vulnerabilities enable cyber attacks against organoization's didital enterprize systems. In this course, we will introduce the notions and of enterprize systems and software weaknesses, vulnerabilities, and attacks; the corresponding real-world repositories; and the NIST Bugs Framework (BF). Then we will discuss the basic principles and the weaknesses related to information exposure, memory management, access control, random number generation, and the use of cryptography to achieve security services. You will learn about the involved processes and flows via the BF models and the related BF classes. Finally, you will learn to identify, analyze, and clearly and precisely describe real-world vulnerabilities.
BU.350.620

BU.330.730. Cybersecurity. 2 Credits.
This course considers the contemporary cybersecurity threat landscape facing organizations. Students apply various risk frameworks to provide structure to the decision-making needed to invest in resources for security controls and countermeasures. Multiple strategies are explored, including policies, procedures, training, strategic alliances, technologies, and methodologies, especially drawing upon risk management and financial decision-making that are used in other sectors of an organization. Topics include qualitative and quantitative risk analysis, audits, metrics, vulnerability assessment, capital budgeting, return on security investment, legal and regulatory compliance, and security best practices. The course will prepare students to be successful in taking on leadership roles in assuring the security of an organization's operations.

BU.330.740. Large Scale Computing with Hadoop. 2 Credits.
Internet of Things (IoT) is connecting almost all the components together in every aspect of business and our daily life. As a result, huge amount of data is being generated. The term "big data" implies the large scale of data that cannot be stored on one single computer. The analyses of such large-scaled data usually require massively parallel software running on tens, hundreds, or even thousands of servers. Enterprise technology managers are often called upon to organize large-scaled data repositories, to manage and schedule resources between technology components, and to support decision making based on information that resides in distributed data sources. This course prepares students with fundamental concepts of distributed data systems and analytics algorithms. It equips students with advanced techniques to extract the value from the large-scaled data generated and collected in everyday business life. The course uses a hands-on, learning-by-doing approach to understand some of the key technologies within the Hadoop ecosystem, which is the current state of art to provide a framework for distributed storage and processing of large-scaled data. Topics include: enterprise Application Programing Interfaces (APIs), API connectivity to distributed networks, MapReduce model, distributed file system (HDFS), distributed system resources scheduling (Yarn) and user interface (Hue), transferring data in and out of Hadoop (Sqoop), distributed data warehousing (Hive), and high-level distributed platforms such as Pig and Spark. The focus is on creating awareness of the technologies, allowing some level of familiarity with them through assignments, and enabling some strategic thinking around the use of these in business.

BU.330.750. AI: Principles and Business Applications. 2 Credits.
This course covers the foundations of Artificial Intelligence (AI) technologies with emphasis on their business application. It will cover models of machine learning and pattern optimizations. This course will enable the student to gain a fundamental understanding of the foundations and applications of different AI technologies, analysis of the required AI algorithms and machine Learning technologies, necessary to support different business applications. It will require basic uses and applications of an AI tool's (IBM Watson, Python, or R,), however, it does include teaching software coding.

BU.330.760. Deep Learning with Unstructured Data. 2 Credits.
With the enterprises' usage of Information and Communication Technology (ICT), a huge amount of data is being generated every second. Much of this big data is unstructured and loosely connected. Enterprise technology managers are often called upon to support decision making based on information that resides in this unstructured data. Managers of technology need to be able to support such decision making by delivering analytical applications via enterprise wide APIs and secure corporate networks. The ability to organize large repositories of unstructured data and run analytical applications on them is key creating an effective information architecture for the modern corporation. This course prepares students to manage enterprise technology needs by acquiring advanced data analytics skills for driving business insights from large amounts of unstructured data using network analysis and deep learning. The technology function in corporation is increasingly called upon to involve both managers and analysts to support and participate in data driven decision making. Therefore, this course uses a hands-on, learning-by-doing approach. Topics include: organization of corporate data warehouses containing unstructured data, unstructured data distribution through enterprise APIs, graph theory, network evolution and block models, API-based visualization methods, graphical models, deep feedforward network, regularization, convolutional neural network, and recurrent neural network. Students will use Python packages such as NetworkX, graph-tool, TensorFlow, Theano and Keras. Students will also use Gephi, an open source software for exploring and manipulating networks. The focus is on creating awareness of the technologies, allowing some level of familiarity with them through assignments, and enabling some strategic thinking around the use of these in business.

BU.330.770. Database Management. 2 Credits.
The emerging trend of organizations and business decision making is based on data-driven decision making. In fact, database systems are central to most organizations' information systems strategies. At any organizational level, users are expected to face frequent contact with and use of database systems. Therefore, skills in using such systems, which include understanding the capabilities and limitations of the systems, identifying whether to access data directly or through technical specialists and knowing how to retrieve and utilize the information effectively became essential in any industry vertical. Also, skills in designing new systems and related applications are distinct advantage and necessity today. The Relational Database Management System (RDBMS) is one type of database systems, which is widely used and is the primary focus of this course. Further, the course will provide students with an opportunity to apply the knowledge they learn from the lectures, homework assignments, SQL assignments, and a database implementation project.

BU.330.780. Data Science and Business Intelligence. 2 Credits.
This course introduces a set of fundamental principles and a framework that guide extracting business insights from data to generate competitive advantage. We will discuss how the ubiquity and massiveness of digital data and the application of business intelligence have changed competitive landscapes. The business intelligence techniques that will be covered in this course include data visualization, online social network and sentiment analysis (for user-generated content), and predictive analytics (e.g. classification and clustering), which are widely used in the real world. The topics and cases discussed in this course cover a wide range of fields, including marketing, finance, healthcare, and more. This course is not a statistics or computer programming course. The emphasis will be on applications and interpretations of the results from business intelligence techniques for making business decisions. Students will apply these techniques in hands-on exercises as we analyze strategic concepts, which will allow students to deepen their understanding of the fundamentals and the applicability of business intelligence.
BU.510.650

BU.330.790. Applied IS Architecture. 2 Credits.
This course provides students with an integration over prior learning and an application of IS principles and practices in a challenging setting of a significant case or real organization. Within this project-based context, students investigate contemporary information systems and technology architectures that constitute operational and productivity platforms for modern enterprises.
BU.330.705

BU.350.620. Information Systems. 2 Credits.
This course addresses how markets, market mechanisms, and channels of product and service delivery are impacted and often transformed by information and communication technologies. Students will learn how technology, brought together with people and processes into systems, contributes to leveraging the creation of business value. The course considers different elements of the information architecture of the corporation and its impact on the nature of the work and the structure of the corporation.

BU.350.710. IT and Global Sourcing Strategy. 2 Credits.
This course covers information technology developments and global-sourcing strategies. Specifically, it includes two interrelated topics. First, it covers strategic planning models in which it examines business and corporate strategies which require students to assume the role of a general manager or chief technology officer (CTO) where they have to cope with tremendous complexity, uncertainty, and inadequate information to make strategic decisions. Second, this course covers how advances in telecommunication technology along with the process of global collaboration and value creation enable the creation and delivery of new products and services. The course also explores various country evaluations and risk analyses techniques, and the opportunities and threats that business organizations face as a result of these business and technological trends. Finally, this course examines various global-sourcing and collaborations strategies, the role of standardization in global supply chains integration, and how technology influences new forms of value creation such as public-private partnerships and hybrid entrepreneurial forms in developing economies and how their businesses can develop capabilities, capacities, and competencies required to participate in global collaboration and value creation networks.
BU.350.620

BU.360.701. Competitive Intelligence. 2 Credits.
Competitive Intelligence (CI), as defined by the Society of Competitive Intelligence Professionals (SCIP), is a systematic and ethical program for gathering, analyzing, and managing external information that can affect an organization's plans, decisions, and operations. Students learn to apply the CI process and CI-related methodologies, techniques, and tools to better analyze an organization's current and future competitive position. Students apply analytical and socio-technical techniques to improve organizational decision making as related to CI, and should understand the issues related to the collection, analysis, and management of external information.

BU.410 (Marketing)

BU.410.601. Marketing Research. 2 Credits.
This course is an introduction to fundamental concepts, processes and techniques in marketing research. The goal is to enable the students to apply these tools to solve real world problems and to differentiate good research from bad research. The topics in this course cover the whole research process from defining research problems, selecting appropriate research designs and research methods, conducting data analysis to making strategic recommendations. The course will also build on the foundations of statistics and introduce more advanced statistical tools relevant for marketing decision making.
(BU.410.620 OR BU.911.610 OR BU.920.605) AND (BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621)

BU.410.620. Marketing Management. 2 Credits.
This course covers principles of market-driven managerial decision making that determine competitiveness in dynamic consumer and organizational markets. Particular areas of emphasis include industry analyses, dynamics of competition, market segmentation, target marketing, channels of distribution, and product and pricing decisions. In-depth analytical skills are developed through case analyses, class discussions, and applied projects.

BU.420.710. Consumer Behavior. 2 Credits.
This course provides students with a solid foundation in consumers' decision making based on theoretical and empirical findings from the fields of psychology, anthropology, and sociology. Topics include consumers' knowledge and involvement, attention, comprehension, learning, attitude, and purchase intention. Emphasis on cognitive learning, social influence and persuasion, and behavioral science provides an overview of the various methods used to drive behavioral change and social impact when marketing products, services and social issues. Also explored is the practical impact of consumer behavior analysis on marketing mix strategies, market segmentation/positioning, brand loyalty, persuasion process, and promotion.
BU.911.610 OR BU.410.620 OR BU.920.605

BU.420.720. Customer Relationship Management. 2 Credits.
Students investigate the critical role and impact that customer relationship management (CRM) plays in marketing and business decision making. Topics include CRM history and evolution, database marketing, big data, customer lifetime value, predictive modeling, analytics, key performance indicators (KPIs), multichannel customer management, and CRM platform systems. Course content begins with the definition and overview of CRM, and then proceeds to detail the evolutionary trend from database management to the current use of big data and analytics in the multichannel environment. Students are expected to understand how data can be leveraged by marketers to quantify marketing results, forecast marketing goals, and realize marketing objectives. The course in divided into three sections: (1) Customer Centricity & Data Evolution; (2) Leveraging & Quantifying Data; and (3) CRM Management.

BU.420.730. Advanced Behavioral Marketing. 2 Credits.
Marketing, in particular, begins and ends with the consumer – from determining consumer needs to ensuring customer satisfaction. In this advanced behavioral marketing course, we will explore classic as well as the most recent scientific research in marketing, psychology, and behavioral economics on judgment and decision-making. Readings will include primary empirical research articles, business journal articles, and research reviews. We will develop your ability to understand and influence what people want, how people decide what and when to buy, and whether people will be satisfied or dissatisfied with their decisions. These psychological insights are not only particularly useful for marketing management decision making such as target marketing, brand positioning and marketing communication, but also shed light on common decision biases beyond marketing. In addition, we will examine the methodology of behavioral research to build the tools you will need to interpret scientific findings and base decisions on them.
BU.410.620 OR BU.911.610 OR BU.920.605

BU.430.710. Branding and Marketing Communications. 2 Credits.
A brand is a name, term, sign, symbol, or design—or a combination of these—intended to identify the goods and services of one seller or group of sellers, and to differentiate those of the competition. The essence of formulating competitive strategy is relating a brand to its environment. Although the relevant environment is very broad, encompassing social as well as economic forces, the key aspect of the brand's environment is the industry(ies) in which it competes. Therefore, the goal of competitive strategy for a brand is to find a position in the industry where the brand can: 1) articulate a compelling value proposition, 2) defend itself against competitive forces, and 3) leverage communication resources to sell the brand message and build brand equity. In this course, students examine how a favorable brand and memorable brand experiences can influence a firm's ability to withstand competitive pressures and thrive in dynamic market conditions. Students will study brand management from the consumer perspective to highlight the importance of customer perceptions in bringing brands to life and the role of brand knowledge in building brand equity. Students will become acquainted with cutting-edge frameworks, concepts, and tools that have been adopted across industries and around the globe to build lucrative brand franchises. Additionally, students will consider the role of marketing communication vehicles and platforms in effective brand management.
BU.410.620 OR BU.911.610 OR BU.920.605

BU.430.720. Pricing Analysis. 2 Credits.
Pricing is one of the most important and least-understood business decisions. This course aims to equip students with proven concepts, techniques, and frameworks for assessing and formulating pricing strategies. The objective is to prepare students for addressing strategic and tactical pricing issues and identifying profit-boosting changes in pricing practices across a range of professional contexts – as product/service managers, business unit managers, management consultants, entrepreneurs and M&A advisors.
(BU.410.620 OR BU.911.610 OR BU.920.605) AND (BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621)

BU.430.740. Sales Force Management. 2 Credits.
Sales is changing rapidly. In 2011, customers were completing 57% of the buying process before engaging a sales professional. Today, this proportion has passed 70%. In the face of well informed and digital-enabled customers, it is critical to engage them and to lead the sales process both during the 70% portion (i.e., digital-world sales process), and the 30% portion (i.e., physical-world sales process). A modern and well-staffed sales function and full knowledge of sales force management thus is vital for business success. This course takes a close examination into sales force management strategies with a hands-on approach through simulation, role playing, case studies, readings, and interaction with marketing professionals who are engaged in the dynamics of modern sales force management.
BU.410.620 OR BU.911.611

BU.450.710. Marketing Strategy. 2 Credits.
This course provides students an in-depth understanding of marketing strategy. It is designed to help students experience the role of senior business executives in formulating, implementing, and evaluating marketing strategies for a variety of complex, real-world business scenarios. Students will analyze and learn the key factors underlying the successful and lackluster marketing strategies of both major corporations and smaller firms across different industries, across different tiers of brands and products (luxury versus mass-market), and across the globe. Topics covered include industry and market analyses, dynamics of competition, value creation, branding, segmentation, targeting, positioning, product development, pricing, distribution, and promotion. Through case analyses, in-class discussions, course assignments, and a research project, students will develop skills in devising, executing, and evaluating marketing strategies, as well as working in teams on complex business projects.
BU.410.620 OR BU.911.610 OR BU.920.605

BU.450.740. Retail Analytics. 2 Credits.
The retail and service sector is the largest of all economic activities and evolving rapidly in the age of big data and Artificial Intelligence. This course will leverage data-driven tools and theoretical models to analyze decisions of retail firms. We will cover a wide range of topics in strategic decisions in retailing: pricing, location, franchising, and omni-channel retailing. Using the real data in retailing, we will demonstrate and implement a wide range of statistical methods in econometrics and machine learning: single and multi-variate linear regressions, logistic regressions, classification trees, random forest, and multi-layer neural network. The focus is on predicting the effects of marketing decisions on profitability, although we will touch on causality as well. The questions this course will explore includes:How is the landscape of retailing changing in the age of Artificial Intelligence and big data?What is the right price and promotion in presence of competitors?How should a retailer choose a store location?How does omni-channel retailing influence the way shoppers move through all channels in their search and buying process?This class is practical and hands-on. All strategic decisions in business require a quantitative assessment of cause and effect. Each week we will introduce a new data set and data-driven tool that is valuable in the context of data scientists in retailing. You will learn how to perform convincing data analyses to answer specific questions. We will use R and ArcGIS for analyzing data. We do not assume that you have used R or ArcGIS, software for statistical and geographical analyses, respectively, in a previous class. For potential overlaps with other courses, we will cover them at a faster pace and emphasize techniques that are not covered in other courses.
(BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621) AND (BU.410.620 OR BU.911.610 OR BU.920.605)

BU.450.750. Strategic Market Intelligence. 2 Credits.
This course is focused on understanding advanced issues in marketing strategy and processes that determine marketing competitiveness in dynamic consumer and organizational markets. An important objective of the course is to teach students the skills of anticipating competitor's next marketing moves and incorporating them when setting own marketing strategies. Students will learn to apply game theoretic tools in various marketing contexts to understand the strategic implications of competitor's as well as own marketing decisions. Students will also learn strategies to help them make effective decisions when lacking important information and facing an uncertain market environment.
(BU.410.620 OR BU.911.610 OR BU.920.605) AND a basic understanding of microeconomics is recommended

BU.450.760. Customer Analytics. 2 Credits.
This course introduces students to the modern practice of customer analytics. Its main goal is to illustrate how marketing practitioners can improve decision-making by leveraging scientific approaches in the analysis of big data. Leading analytical techniques and data structures are illustrated in the context of their most prominent applications. For example, predicting customer responses to marketing campaigns, and managing customer churn. The class has a strong "hands on" component, enabled by several in-class examples and group assignments (implemented on Microsoft Excel and the statistical language "R"). Students are not expected to become expert programmers or statisticians, but to acquire basic skills and knowledge to orchestrate an effective analytics strategy, given the firm's goals.
(BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621) AND (BU.410.620 OR BU.911.610 OR BU.920.605)

BU.450.765. Social Media Analytics. 2 Credits.
The rapid growth of social media has given the mass consumers a powerful tool to create knowledge and propagate opinions. At the same time, social media has created an unprecedented opportunity for companies to engage real-time interactions with consumers. In addition, the size and richness of social media data has provided companies an unusually deep reservoir of consumer insights to transform the business and marketing operations. The social media analytics course will enable students to grasp the analytics tools to leverage social media data. The course will introduce tools such as engagement analytics, sentiment analysis, topic modeling, social network analysis, identification of influencers and evaluation of social media strategy. It will involve lots of hands-on exercises.
(BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621) AND (BU.410.620 OR BU.911.610 OR BU.920.605)

BU.460.700. Integrated Digital Marketing. 2 Credits.
Integrated Digital Marketing is a course designed to give the student an understanding of the digital marketing environment and how it functions. This course is intended to prepare students for the complexities and nuances of the digital world and provide them with foundational skill-sets that will translate into business value. The course will cover a wide spectrum of topics, including the history of the Internet, new and emerging digital trends, website design and development best practices, digital marketing campaign design, digital analytics, channel decision making, e-marketing research, digital positioning and branding, social network management, and digital messaging/creative best practices. Lectures, readings, case discussions and project assignments will offer both a digital agency management and an end-user perspective. Timely case studies, relevant text materials, digital marketing tools and group projects are used to augment the lectures and gain hands-on experience in the digital space.
BU.410.620 OR BU.911.610 OR BU.920.605

BU.460.710. Business-to-Business Marketing & Channel Strategy. 2 Credits.
This course provides a managerial introduction to the strategic and tactical aspects of business marketing decisions and marketing channel strategy. Students examine the strategic concepts and tools that guide market selection, successful differentiation in business markets, and supply chain management. A mixture of lectures, discussions, cases, videos, and readings are used to examine how product and service decisions are designed to deliver the B2B value proposition, how pricing captures customer value, how value is communicated to and among customers, and how marketing channels are used to make this value accessible to target customers. Students will compare and contrast how the strategic and tactical processes of developing and managing value-generating relationships differ between B2B and B2C markets. Students will also gain understanding of how to manage channel power, conflict, and relationships.

BU.460.730. New Product Development. 2 Credits.
While developing new products and services is vital to the growth to any company, it is also one of the most risky business decisions. This course examines the strategies and processes used by leading companies for successful new product development. Identifying consumers' pain points is the starting point. Practical techniques were introduced to navigate the processes of ideation, market analysis, new product development, and commercialization. Real-world examples were presented to showcase the applications of these concepts and techniques.

BU.510 (Quantitative Methods)

BU.510.601. Statistical Analysis. 2 Credits.
Students learn statistical techniques for further study in business, economics, and finance. The course covers sampling distributions, probability, confidence intervals, hypothesis testing, regression and correlation, basic modeling, analysis of variance, and chi-square testing. The course emphasizes statistics to solve management problems. Case studies, spreadsheets, and Excel Add-in Data Analysis ToolPak computer software are used.

BU.510.615. Python for Data Analysis. 2 Credits.
This is an introductory course in using Python for analytical purposes. Python (www.Python.org) is a general-purpose cross-platform programming language that has a strong presence in the diverse areas of analytics. This course will provide a pragmatic and hands-on introduction to the fundamental aspects of Python programming language with a focus on data exploration, analysis, and driving insights from data. Additionally, towards the end of the semester, students will be exposed to using Python for introductory optimization and machine learning. Class time will be used for short overview lectures followed by analysis of worked-out examples and in-class coding exercises. As the course progresses, students will learn to work with libraries such as statistics, random, numpy, scipy, pandas, matplotlib, seaborn, and plotly. By the end of this course, students should be able to start writing useful Python programs on their own or to understand and modify Python code written by others. Additionally, they should have a solid understanding of forecasting using time series.This course is an introductory Python course for students with a working statistical analysis knowledge. It does not assume any prior coding experience. If you have an extensive knowledge of Python, you might experience significant repetition.Starting the 3rd week, students will be exposed to basic time series analysis. Not only does time series analysis have a strong presence in all areas of business; it also provides a rich context for practicing Python's data handling capabilities (from applying a regression model for forecasting to data aggregation, dataset merging, slicing, and grouping). Time series analysis theory will be covered via a pre-recorded video; students are required to watch the videos prior to each class. The instructor will briefly review this theory at the beginning of each lecture; the majority of the lecture will be spent on learning and practicing Python's capabilities.

BU.510.650. Data Analytics. 2 Credits.
This course prepares students to gather, describe, and analyze data, using advanced statistical tools to support operations, risk management, and responses to disruptions. Analysis is done targeting economic and financial decisions in complex systems that involve multiple partners. Topics include probability, statistics, hypothesis testing, regression, clustering, decision trees, and forecasting.
BU.510.601 OR BU.914.610 OR BU.920.621 OR PH.140.611 OR PH.140.621

BU.520.601. Business Analytics. 2 Credits.
Business analytics makes extensive use of data and modeling to drive decision making in organizations. To become a leader in a data driven world, it is therefore critical to acquire hands-on experience of both data-related (statistical) and modelling skills. This class focuses on the latter: it introduces students to analytical frameworks used for decision making to make sense of the data. The methodologies covered include Linear and Integer Linear Programming, Decision Analysis, Foundations of utility and risk, and Monte Carlo Simulation. For each topic/methodology students are first exposed to the basic mechanics of the framework, and then apply the methodology to several business problems using software.
BU.510.601 OR BU.920.621 OR PH.140.611 OR PH.140.621

BU.520.620. Advanced Business Analytics. 2 Credits.
This course trains decision makers to function in the face of multi-dimensional uncertainty, through the development and use of optimization models. Mathematical abstractions are created which deal with issues including resource allocation, scheduling, pricing, and other responses to the realization of a variety of "known unknowns". Topics include linear programming, dynamic programming, multi-criteria optimization, and non-linear optimization.
BU.520.601 OR BU.913.610 OR BU.920.711 OR BU.920.721

BU.520.650. Data Visualization. 2 Credits.
This project-based course prepares students to make informed decisions based on data using descriptive-analytical techniques. Students will view examples from real-world business cases in which data visualization helps the decision makers to visualize, discover, and decode the hidden information from within the data, and to exploit such information for making educated decisions. We will use R to import, clean, transform, analyze, visualize, and present data. It is assumed that students have basic knowledge of programming in R prior to taking this class. As the course progresses, students will learn to work with libraries such as readr, tidyr, ggplot2, leaflet, and shiny in R. During the eight weeks of the course, students will collaborate with each other in small teams to analyze real-world datasets as well as design, build, and deliver web applications containing interactive visualizations and dashboards. Topics include cognition and visual perception, design principles, fundamental charts, interactive visualizations, storytelling in dashboards, and maps and big data visualization.
BU.510.650 OR BU.450.760 OR BU.330.780

BU.610.615. Simulation for Business Applications. 2 Credits.
This course provides a foundation for applying Simulation in managerial decision making in all areas of an organization. These decision areas could be in both predictive and prescriptive analytics area. Students learn to build quantitative models, in the presence/absence of reliable data, for quantifying and understanding impact of uncertain future on performance metrics under consideration. Simulation constructs probabilistic estimates of quantities of interest such as net present value of an investment, rate of a disease spread under a certain policy, or cost and time of a mega-project. This provides a very insightful information for decision makers to evaluate risks involved and make decisions accordingly. Results of Monte Carlo Simulation could be used for short-term and strategic planning of an organization. @Risk software package will be used for this part of the course. Additionally, in real world complex problems, where closed-form solutions, offered by classical mostly deterministic optimization methodologies, are not readily available/ reachable, Simulation enables decision makers to see the distribution of all possible outcomes as a function of underlying uncertainties and using simulation-optimization methodology to make the best decision in the presence of uncertainty. Students will learn RiskOptimizer for this part of the course.
BU.520.601 OR BU.232.620 OR BU.920.711 OR BU.920.721

BU.550 (Business of Health)

BU.550.620. The U.S. Health Care System: Past, Present, and Future. 2 Credits.
This course provides an overview of the health care delivery system in the United States, and explores the drivers of change over time that shape the organization and delivery of healthcare services and opportunities for innovation and improvements in the cost, quality, and access dimensions of health care services. The course considers the paradox of the U.S. health care delivery system, and how large expenditures on health care have not resulted in best outcomes due in part to issues of cost, access, and quality.

BU.555.710. Applied and Behavioral Economics in Health Care. 2 Credits.
This course covers the application of economic theory to health care markets and decision-making. It explores the economic analysis of the health care industry across the continuum of care, including the role of non-profit and for-profit providers, the nature of competition, the effects of regulation and antitrust activity on hospitals, the effects of alternatives to hospital care and shifting of services between inpatient and outpatient settings and its effect on health care costs and quality. The course builds on analytical tools of economics applied to issues in health care to explore the use of economic incentives to influence health behavior, the role of asymmetric information and agency in health care, the role of decision-making biases as they apply to health care, the incentive implications of government as payer and regulator, issues surrounding equity and ethics, the role of health insurance in the economics of pricing, and the theory of the firm as it applies to physicians, hospitals, and systems.
BU.220.620 OR BU.912.610

BU.881.700. Health Care Overview Bootcamp.
This case-based course provides an overview of the strategic and policy challenges of delivering health care around the world, summarizing the philosophy, pedagogical approaches, and courses in the program. Over a two-week introductory period, discussions will focus on the 4 Managerial Skills (Sense Making, Problem Solving, Sense Giving, and Global Mindset) and 4 Strategic Pillars (Quality, Access, Cost, and Innovation) that leaders in the industry require to achieve the triple aim of high quality, efficiency, and optimal health outcomes.

BU.881.701. Fundamentals of Health Care Systems. 2 Credits.
Nationally organized health systems around the world seek to ensure comprehensive access to health services, improve the quality of care, and contain the growth of health care expenditures. This course provides an overview and synthesis of the four major models of national health systems in five different countries, and the challenges and opportunities for developing and strengthening these systems to maximize population health and the market dynamics for health care products and services under these different models.

BU.881.702. Frameworks for Analyzing Health Care Markets. 2 Credits.
This course introduces students to basic economic concepts and the language used to analyze market structure, conduct, and performance, as well as nonmonetary outcomes including health outcomes and distributional issues. Students learn to discuss system changes and challenges faced by health care providers and patients, facility managers, insurers, and product manufacturers. Lectures and cases explore the drivers of costs, prices, access, innovation, and outcomes.

BU.881.703. Health Care Law and Regulation. 2 Credits.
This course provides students with an overview of the legal environment as it affects medicine and business. Cutting-edge cases are utilized as students explore medical malpractice, negligence, liability (physician, product, and corporate), criminal aspects of health care including fraud and abuse, patient consent and rights, and the current state of health care reform. This is the foundational course in the health services management curriculum.

BU.881.704. Providers and Payers. 2 Credits.
This course focuses on strategies and tactics for provider networks and payers to manage resource constraints as well as insurance and reimbursement issues in order to deliver quality, ethical, and efficient care. Interactions between providers and payers are a critical topic, along with how these interactions lead to changes in health care provision and policy change.

BU.881.705. Health Marketing and Access. 2 Credits.
This course focuses on how standard marketing techniques do, and do not, apply within the health sector, which poses several important constraints and challenges. Students explore the implications of these for marketing analysis, tactics, and strategy. We do so by reviewing existing applied work within the topic area of health care marketing and by leveraging students' experiences in this sector. The main topics covered include product, pricing, distribution and communications to patients, providers, and external stakeholders, such as regulators and nongovernmental organizations. Other topics of discussion include the role of marketing to encourage access; pricing as part of decisions on access; and the role of marketing communication to foster community health.

BU.881.706. Health Innovation and Evaluation. 2 Credits.
This course focuses on emerging models of health care provision, including the role of information technology, mobile technologies, point of care diagnostics on a chip, health care at home, telemedicine, and technology-mediated innovations in health care for both consumers and providers. The course discusses various models of evaluation and how health care innovation is valued, funded, and commercialized.

BU.881.707. Accounting for Decision Making in Health Care. 2 Credits.
This course offers an introduction to the most used tools and techniques of health care accounting, and financial management from a decisional perspective. It is intended to expose students to health care accounting theory, and practice, so as to enable enhanced decision-making at the executive level. The primary objective of this course is to impart financial, and managerial accounting knowledge required in managing contemporary health care organizations. The teaching approach will be to provide fundamental concepts of healthcare financial management, including both accounting and financial management principles with emphasis on the current financial environment in which providers operate. The course will be structured in a way accounting information could be interpreted, and applied to better understand operational efficiency, financial soundness, and strategic opportunity. Mobilization of financial statements, cost reports, and budgeting information will be articulated to support optimality of the managerial decision-making process. Case studies, and other real live anecdotes will be used to supplement concepts, and enhance comprehension.

BU.881.711. Research and Policy Seminars in Health. 2 Credits.
These seminars — led by faculty experts from around the Johns Hopkins University such as the School of Medicine, Bloomberg School of Public Health, and School of Nursing — focus on current issues and cutting-edge research related to health care. Deliverables include a research paper on a topic approved by the instructor, and a reflection paper of a personal development plan for how the student will keep abreast of the field.

BU.883.701. Fundamentals of Health Care Operations. 2 Credits.
This course focuses on designing, measuring, and improving processes that deliver care in both inpatient and outpatient settings. The course provides an introduction to process analysis, queuing theory, capacity management, cost measurement, and the metrics of process flow.

BU.883.702. Health Information Technology. 2 Credits.
This course examines health care organizations from the perspective of managing the information systems that exist within the enterprise. Identifying the clinical and health care delivery processes and how they relate to information systems is the main focus. The intent of the course is to identify key issues confronting the management of today's health care information systems and health care organizations, examine their causes, and develop reasonable solutions to these issues. Specific federal regulations, vendor solutions, and financial implications as they relate to health care information systems are also examined.

BU.883.703. Medical Devices and Diagnostics. 2 Credits.
The goal of this course is to provide the latest market trends and industry analysis for products, services, and technologies in the medical device and diagnostics industry, as well as an assessment of market needs in the context of changing global demographics. The course discusses the barriers to and triggers for innovation with reference to the role of culture, regulation, cost effectiveness, and appropriate pricing. Students are introduced to medical device innovations across various geographic markets and industry sectors.

BU.883.704. Pharmaceutical Strategy. 2 Credits.
Based on an overview of scientific, clinical, legal, financial, strategic and ethical perspectives, this course focuses on new strategic developments in the pharmaceutical industry. Topics covered include business strategies in research and development, intellectual property, clinical trials and getting approval from regulatory bodies, pricing, reimbursement and marketing in the pharmaceutical industry. It explores fast evolving market models for innovation in the pharmaceutical industry in the context of changing global demographics. This course assumes students have basic knowledge of the US Healthcare system through previous work or course experience and/or BU.550.620.

BU.883.705. Health Care Financing and Financial Management. 2 Credits.
This course covers the analysis of the major financial decisions of corporations in the health care industry and application of techniques of corporate finance in the health care industry. Financial and operating decisions in the health care industry are discussed, as are the valuation of profitability and cost performance of service and product lines, the impact of cost containment and competition on hospitals and integrated delivery systems and other providers, modeling of cost drivers in health care including cost and production functions, cost accounting systems, and the concept of price and value. This course also covers managed care and risk management in relation to the relative roles of private sector and public sector insurance and providers, and the effect of delivery system design on cost, quality, and efficiency and equity. Topics related to the payment for the elderly, the poor, medically indigent, and the underinsured are also discussed. Finally, innovations such as insurance exchanges and changing models of employer self-insurance are explored.

BU.883.706. Health Care Organization and Management. 2 Credits.
The overall goal of the course is to increase student effectiveness in understanding and managing individuals and teams. These tools are essential to improve operations and consumer outcomes. The specific aims of the course are to enable students to a) learn theories and concepts in organization behavior and health care management, b) integrate theories with real world situations, c) learn to understand perspectives and value of health care management, and d) develop the ability to work productively with diverse teams. Students will develop the knowledge and skills to analyze strategic issues in health care organizations. Topics that will be discussed include management styles, performance improvement, culture, change, and leadership. We will draw on several sources to meet the course objectives, including conceptual and experiential approaches, case studies, role plays, and exercises.

BU.883.707. The Wire: Business Solutions for Community Health Improvement. 2 Credits.
This course provides students with the opportunity to study "business with humanity in mind" using Baltimore as a case study of the effects of the long-time economic decline of a city on the health status and quality of life of the people who live in it. We will study social determinants of health and focus on leadership and management strategies to effect change.The fundamentals of creating and managing non-profit (tax exempt) organizations is incorporated into the course work. Students will develop and assess the feasibility of an innovative solution to a health issue inspired by The Wire. In addition to the use of video as a text, students will read and discuss assigned articles and book chapters.

BU.883.708. Negotiation in Health Care Settings. 2 Credits.
Negotiating successful agreements in today's healthcare environment presents a formidable challenge for healthcare professionals. In a world of managed care, hospital physician integration, and multi-institutional mergers, members of the healthcare profession are faced with creating agreement in which the complex services of healthcare can be delivered in a coordinated and financially viable fashion. To meet this challenge, healthcare professionals must develop negotiating skills that can achieve mutually beneficial, value added agreements. This course will provide you with the basic knowledge and applied skills to negotiate in a wide array of health care settings. The first part of the course focuses on understanding and systematically preparing for, structuring, and executing increasingly complex negotiations involving administrators, insurers, patients and providers. The second part of the course extends these basic principles to variety of health care settings, including group negotiations, agency relationships, and conflict resolution.

BU.883.711. Analysis of Health Care Operations. 2 Credits.
This course expands on elements of Operations Management including process analysis, queuing theory, and process improvement to focus on nuances of the healthcare setting. It also used tools of statistical analysis and linear programming to consider performance metrics in the presence of variability or across multiple sites. Finally, it introduces new tools including Discrete Event Simulation as a way to gain insights into system performance.
BU.520.601 OR BU.913.610 OR BU.920.711 OR BU.920.721

BU.890.711. Health Policy Design and Implementation I. 2 Credits.
The Health Policy Design & Implementation Practicum consists of two courses, the Health Policy Toolkit and the Health Policy Project, that prepare students with an operational understanding of health policy and its role in healthcare delivery and population health. Students will enhance their portfolio of health policy expertise by completing: 1) A policy analysis brief on a compelling health policy issue and 2) A mentored health policy project with a healthcare provider or facility. The Health Policy Toolkit (Practicum I) provides students with a global contextual overview of US health policy goals, challenges, and initiatives as well as the frameworks, processes, and tools used by multi-sector actors through public, private, and market systems at the federal, state, and local jurisdictional levels. Students will prepare weekly policy memos and collaborate in conducting weekly health policy case labs focused on key public health and healthcare issues. Students will also complete individual health policy briefs on specific health policy issues of their own choosing.

BU.890.712. Health Policy Design and Implementation II. 2 Credits.
The Health Policy Project (Practicum II) enables students to expand their portfolio of expertise by completing a project that applies health policy skills to design, develop, test, or evaluate a healthcare project, program, or policy sponsored by a healthcare facility, agency, or provider. The sponsor works closely with faculty and students to define a value-creating project and deliverable that challenges and stretches student capabilities. The experience of working as a collaborative team with a healthcare sponsor also provides the opportunity to observe organizational operations, policy processes, and decision-making.
BU.890.711

BU.890.713. Health Care Strategy Consulting Practicum I. 2 Credits.
This course is the first part of a two-part course. This course examines business strategies for health care industries and services. It prepares the student to assume the role of a consultant or decision maker in a complex organization who has to cope with tremendous complexity, uncertainty, and inadequate information. The focus throughout is on strategic management—the process of choosing and defining purposes and objectives, formulating and implementing a viable strategy, and monitoring strategic performance. Strategic tools such as SWOT, PESTLE, Competitive Analysis are covered and practiced in-class on contemporary healthcare organizations' strategies. The emphasis is on the kinds of problems and issues that affect the success of the entire organization.
Prerequisite(s): BU.890.714

BU.890.714. Health Care Strategy Consulting Practicum II. 2 Credits.
This course is the second part of a two-part course. Students enhance their business education by developing collaborative consulting engagements with businesses and nonprofit organizations in which students assist their client organizations in addressing existing and emerging challenges in the health care space. These clients may be domestic or international.
Prerequisite(s): BU.890.713
BU.890.713

BU.890.715. Health Services Improvement I. 2 Credits.
This course is the first of a two-part sequence. Students work with clients in the Baltimore/Washington, D.C. area to measurably improve the costs and quality aspects of their organization. The typical "real-world lab" for this project is a working facility within the Johns Hopkins medical system. While our efforts will evolve as we gather data and insight into actual operations, our focus will be on three interrelated sets of issues: physical flows, information flows, and cash flows. Physical flows include the movement of human assets such as medical staff and patients. Information flows involve data shared between agents via direct communication or via information systems. Cash flows include the assessment of cost savings and/or revenue enhancement projected to stem from project outcomes.
BU.883.711 OR BU.883.701 OR BU.680.620 OR BU.912.611

BU.890.716. Health Services Improvement II. 2 Credits.
This course is the second part of a two-part sequence. Students work with clinical clients in the Baltimore/Washington, D.C. area to measurably improve the costs and quality aspects of their organization. The typical "real-world lab" for this project is a working facility within the Johns Hopkins medical system. While our efforts will evolve as we gather data and insight into actual operations, our focus will be on three interrelated sets of issues: physical flows, information flows, and cash flows. Physical flows include the movement of human assets such as medical staff and patients. Information flows involve data shared between agents via direct communication or information systems. Cash flows include the assessment of cost savings and/or revenue enhancement projected to stem from project outcomes.
BU.890.715

BU.890.717. Commercializing Biomedical Innovations I. 2 Credits.
This course is the second part of a two part course. This course teaches the process of bringing scientific discoveries to market. Students learn about innovation and invention processes, how to identify opportunities and assess when ideas are inventions, the steps required to bring the product to market, including intellectual property protection and regulatory processes, and strategies to license early stage inventions to third parties for further development. Students work in small teams on early-stage invention projects that are patented or patent pending sourced by the instructor from university and government technology transfer offices. Students will analyze the feasibility of commercializing the invention so that it can be licensed to a third party that can pursue entrepreneurial funding and development.

BU.890.718. Commercializing Biomedical Innovations II. 2 Credits.
This course is the second part of a two part course that teaches the process of bringing discoveries to market. Students are required to register for parts of the course. Students learn about innovation and invention processes, how to identify opportunities and assess when ideas are inventions, the steps required to bring the product to market, including intellectual property protection and regulatory processes, and strategies to license early stage invention to third parties that can pursue entrepreneurial funding and development. As part of the experiential learning process, students work in small teams on early-stage invention projects sourced by the instructor from university and government technology transfer offices.

BU.890.720. Health Care Consulting Practicum I. 2 Credits.
This course will allow students to integrate healthcare knowledge from previous coursework and apply it to the health care sector by working on real case studies and eventually, real health care challenges. The course will enhance students' ability to work effectively in a team, implement effective consulting and communication strategies which address current healthcare challenges and create viable solutions and plans for implementation. Students will also be expected to utilize a variety of skills from pre-requisite classes such as market analysis, accounting, process modeling, organizational leadership, effective verbal and written communication skills, and financial modeling. During part one, these skills will be practiced with case study analysis and creation of verbal and written consulting strategies that address the challenges.

BU.890.725. Health Care Consulting Practicum II. 2 Credits.
This culminating course allows students the opportunity to establish and maintain relationships with leaders of health care organizations, define and scope challenges faced by those organizations, and scope projects that create feasible solutions regarding operations, strategy, and public policy. Students will enhance their business acumen by working with a professional project sponsor to address real world challenges and present their consultative recommendations based on research and by implementation of the strategies learned during part one and throughout their program.Through lectures, case studies, guest speaker seminars, and field work with sponsoring health care organizations, students will significantly improve their ability to apply knowledge and skills to addressing health care organizations' challenges by formulating and implementing viable research-based strategies.

BU.610 (Operations Management)

BU.610.630. Pricing and Insuring Risk. 2 Credits.
This course prepares students to understand risk and insurance, including decision making under uncertainty. The course will balance theory with industry-best practices and applications. Topics include: understanding the actuarial foundations of risk and insurance, including risk transfer pricing and risk pooling; both deterministic and stochastic risk application processes; understanding insurance product valuation using a variety of methods including simulation; construction of short-term analysis for capital at risk and optimal risk sharing along with analysis of claims and liabilities with extended time horizons; understanding the overall risk and insurance process, including structure and framework, empirical observations and business cycles; appreciation of managing uncertainty in the context of risk and insurance markets.

BU.610.705. Crisis Management. 2 Credits.
In this course, we will examine the entire crisis management lifecycle – from prevention and preparedness through response, recovery, and mitigation – and consider the lifecycle's principles and practices. We will identify and use the entire crisis management toolkit to address challenges faced by managers when organizations face any crisis, due to either external factors outside the organization's control or internal control or strategic management failures. We will develop a complete crisis management plan, including tools and methods to identify potential crises, implement response and mitigation strategies to limit exposure, manage crisis response teams, and create communications to address stakeholder and public relation issues.
BU.120.601 OR BU.930.610 OR BU.920.601

BU.610.730. Contracting: Incentive Design and Analytics. 2 Credits.
This course explores fundamental drivers of human and system behavior embedded in business contracting, with a view integrating economical, operational, legal, and political perspectives. These drivers include alignment of incentives for performance and information sharing, provisions for recourse in the face of unsatisfactory performance, and design of options to facilitate the pursuit of opportunities that arise after contract terms are set. Emphasis will be placed on analyzing and designing contracts to create win-win opportunities and share or minimize risks in global networks.
BU.680.620 OR BU.912.611

BU.610.750. Global Supply Chain Management. 2 Credits.
In this course, we show applications of inventory theory to global supply chain management. In addition, we discuss several related issues in supply chain management, including distribution, coordination, global sourcing and mass customization. We will take analytical and detailed approach in model development. The presentation is designed to refine intuitions developed from models and case studies to build managerial insights.
BU.680.620 OR BU.912.611

BU.610.760. Supply Chain Analytics. 2 Credits.
For a firm to execute its competitive strategy successfully, its supply chain must be able to deliver on the firm's promise to its customers. Therefore, it is important for all managers to have an understanding of key supply chain concepts. With this in mind, this course introduces the main trade-offs involved in supply chain management, and provides analytical, data-driven tools that can be used to evaluate supply chain trade-offs. The course emphasizes (i) building spreadsheet-ready models that capture supply chain challenges, (ii) using these models to ask what-if questions by applying simulation and optimization tools (e.g., @Risk, a powerful Excel add-in for simulations), and (iii) distilling managerial insights from what-if questions and communicating recommendations based on those insights.
(BU.520.601 OR BU.913.610 OR BU.920.711 OR BU.920.721) AND (BU.680.620[C] OR BU.912.611 OR BU.920.606)

BU.680.620. Operations Management. 2 Credits.
Within a manufacturing or service organization, operations provide the power necessary for orchestrating technology and resources in creating products and services to meet the needs of end consumers. Operations management, accordingly, consists of ideas for shaping and innovating an organization's business model. This course provides a conceptual and actionable introduction to operations management and covers a ? wide? range of topics,? including operations strategy, process ?mapping and ?design, queuing theory, inventory management, lean manufacturing, and revenue management?, unified by a thought framework known as "the operations prism"? (flows, variability, and buffers).?? ?By ?taking ? a process view of value-added functions that lead to an understanding of how to make ?operations ?design choices,? ??students will acquire analytical and strategic thinking skills crucial for ?managing? 21st-century ?operations.
BU.520.601

ED (Education)

Counseling & Educational Studies

ED.820.600. Introduction to Statistics. 3 Credits.
This course is designed as an introduction to basic descriptive and inferential statistics, with a focus on how they are used in education research. Students will learn to describe variables using graphs and tables, and summarize variable distribution using measures of central tendency and spread. As a basis for inferential statistics, students will explore concepts of basic probability, and apply them to understand probability sampling, sampling distribution, hypothesis testing and confidence intervals. Finally, students will learn to describe the relationship between two variables using correlation and regression.Students will apply this knowledge to a series of problem sets that ask them to think about research problems in education, and conduct their own analysis of an educational or other social science problem in a research paper that asks them to conduct a bivariate analysis and discuss their results.

ED.820.601. Intermediate Statistics. 3 Credits.
This course introduces students to multiple regression as a tool for inferential statistics in the social science, with a focus on applications to education research. Students will begin with a review of basic statistical concepts, then move on the basics of linear regression including model assumptions, estimation, and statistical inference. Emphasis will be placed on interpreting coefficients, assessing model fit, and critiquing empirical studies. We will review methods for specific types of data in the linear model, including categorical variables, interactions, data transformations and limited dependent variables. Finally, students will consider the limitations of regression and diagnostics for challenges including missing data and outliers.This course is designed for students who have had at least a one-semester introduction to statistics. Students should have existing knowledge of probability theory, properties of distribution and random sampling, and basic statistical tests.

ED.820.602. Introduction to Education Policy. 3 Credits.
Introduction to Education Policy is an intensive hybrid course in the first summer, which will be delivered partially in-person in Washington, DC, and partially online. Through the preparatory readings, an online pre-test, and a five full-day study and learning experience, students will grapple with the current challenges that apply to different levels of education policy and their relevance to the structure, content, and funding of education in the United States. The readings, assignments, and seminars with senior policy experts will introduce students to the central dilemmas and debates in education policy. Students will leave the course with a strong foundation from which to engage, in much greater depth, with course material throughout the degree.

ED.820.603. Federal Education Policy. 3 Credits.
This course will explore the federal government's role in K-12 education policy. While the course will address the historic roots of the federal government's role, it will focus largely on the federal government's rapidly evolving policy role in education over the past two decades. During this period, on global measures of education, U.S. performance has stagnated while other countries' results trend up, and educational achievement gaps continue to reflect a system that is riddled with inequity. Technology is playing a greater role in students' learning out of school – and indeed in all facets of Americans' personal and professional lives – but educators are struggling to use technology effectively in schools. Teachers unions are engaged in existential identity crises, while over one million new teachers will enter the profession in the coming decade. And the hyper-partisan conflicts that we see across the country come home to roost in the context of education policy as fights over which level of government is in charge of what. In this course, students will explore many of these issues, including: the historic roots of the federal role in education within the context of the Civil Rights movement; the structure of the U.S. educational system; school accountability and the Elementary and Secondary Education Act (ESEA)'s evolution over time; academic standards and assessments; school turnaround and choice; and educator effectiveness and teacher policy.

ED.820.604. Diversity. 3 Credits.
This course introduces students to the ways in which diverse student bodies are constructed, educated, and multiply challenged in K-12 American education. Students will analyze research on, and craft responses to, the following issues: the social construction of race; racial achievement gaps; the impact of socioeconomics upon educational performance; the ways in which students of diverse religions and sexual orientations, and who are differently-abled, experience the classroom; and the challenges to creating high-quality culturally relevant educational experiences.

ED.820.605. International Education Policy. 3 Credits.
K-12 education outcomes in the United States are often contrasted with those of other countries, especially nations now showing stronger results than America on international assessments such as TIMSS (Third International Math and Science Study) and PISA (Program for International Student Assessment). But what, exactly, are the top-performing countries doing differently from the United States? How do they structure K-12 education, and how do they manage accountability for excellence? Students will research these questions from several vantage points. They will review synoptic treatments that span multiple countries, and do a “deep dive” on one country’s reforms and evaluate the impact of the different ways in which countries abroad structure their public education systems. Finally, students will assess the strengths and weaknesses of applying international models to their own national or state contexts.

ED.820.606. State and Local Education Policy. 3 Credits.
Since the creation of public schools, education in the US has predominantly been a state and local prerogative. Through this course, students will acquire an empirically-grounded and theoretically-informed understanding of state and local education policy and politics, investigating how various actors, institutions, interests, and issue contexts influence the development, implementation, and outcomes of education policies within and across states and school districts. Through engagement with primary data, documents, and in-depth case studies of different jurisdictions and policy issues, students will develop an appreciation of the complexity of state and local education governance, the opportunities this system presents for educational innovation and diversity, the challenges of reforming education through policy, and the role of research in shaping policy. The course will also introduce students to the concept of intergovernmental relations and the implications of this dynamic for education policymaking and outcomes. Ultimately, the course will push students to engage in thoughtful discussions about the contours, purpose, promise, and limitations of state and local education policy.

ED.820.607. Understanding Education Research. 3 Credits.
One of the most familiar refrains in education policy is: “research shows….” But what exactly does this mean? This course will help students better understand education research, with a focus on methodology and its application in education research. For each method studied, students will learn the structure and requirements of the method, common challenges faced by researchers employing the method, and conclusions that can be drawn from the method. Once students understand the method from a theoretical standpoint, this knowledge will be applied by reading and discussing a peer-reviewed journal article that employs the method to answer a question in the field of education. Students will demonstrate their understanding of the methodologies and articles by leading an online discussion of one article; writing a summary of each methodology/article read; participating in online discussions; and writing a summative research proposal.

ED.820.608. Education Finance. 3 Credits.
This course will give students a strong understanding of the history of education finance, how and from what sources public education is financed in the United States, various finance reforms, and the impact of finance structures on student outcomes and other educational policies. Specifically, the course will layout the tri-part structure of funding between federal, state, and local governments, the revenue sources available to each, and policy tensions created between the three levels of government. The course will cover specific federal funding elements such as the Elementary and Secondary Education Act (ESEA), Title I, and the Individuals with Disabilities Education Act (IDEA). On a state level, the course will provide an understanding of the constitutional requirement that each state has to finance public education and the various ways states elect to do this. The course will use case studies from states that have unique funding structures, such as Indiana which abolished local funding of public education. Next, the course will offer an analysis of various finance reforms focusing on court ordered reforms as a result of state finance litigation as well as more recent funding interventions such as education savings accounts and tax credits along with the debates surrounding these issues. Throughout the course, students will wrestle with ideas over what it means to have equitable, sufficient, and adequate education funding and how education finance affects student outcomes.

ED.820.609. Outside the Schoolhouse. 3 Credits.
It is often said that the greatest impact on student learning comes from outside the school, via family background and the educational opportunities associated with income and education levels. Students will be introduced to the macro-data that is used to test these claims. They will review evidence on family structure and its intersection with race and economics, behavior that can challenge economic determinism, and initiatives such as Say Yes and Thread that are intended to support students to achieve outsized success. How successful are these programs – and where they are successful, and are they scalable? The course will also review the research on “community schools” and “wrap-around services” – two related approaches to giving less privileged students some of the supports that are automatic for those of greater means.

ED.820.610. Capstone Course. 3 Credits.
The capstone course will offer students real-world work scenarios in which they will apply knowledge and skills gained during the program. Students will choose from a list of topics provided by the supporting organizations of the program – from the public and non-profit sector. They will research the topic, and then create three items: a policy brief, an Op. Ed., and a blog entry on their findings. Their work will be read by the most appropriate program partner, as well as being read and graded by the course instructor. The strongest of the policy briefs will be published by the Institute for Education Policy.

ED.820.611. Experiential Learning. 3 Credits.
This course is an elective that may be taken by candidates who have not yet worked in an organization that influences, responds to, studies, or implements education policy. Based on initial market analysis, IEP anticipates that the majority of our applicants will come to us with some in-field experience. This may come from legislative or Congressional offices, state education agencies and district offices, mayoral offices, education research centers, or public policy think tanks. To candidates who are undertaking the program for the purpose of gaining skills that enable a transition into this field for the first time, we will offer a field placement designed to support a sustained, on-the-ground experience with education policy.The field placement will be designed in collaboration with the candidate, to reflect his or her professional goals and geographic environment, and the needs of the hosting institution. Candidates must have received, prior to the start of Spring semester, written program approval of their proposed placement, mentor, projects, and deliverables. Mentors will receive a stipend for their role. Candidates' work will be supervised by the mentor and evaluated by IEP faculty.

ED.840.600. Instructional STEM Leadership and Professional Development in the Elementary School. 3 Credits.
This course is designed to provide students with an overview of theoretical perspectives and research influencing STEM instructional leadership in elementary schools. Students will consider curriculum development, supervision and evaluation of teaching, assessment of student learning, and the design and implementation of school improvement programs. Strategies for developing a constructive, collaborative approach to supporting STEM teachers to improve student learning outcomes will be emphasized.

ED.840.601. Mathematical Foundations in the Pre-K-6 Classroom. 3 Credits.
The goal of this course is to support Pre-K-6 content knowledge for teaching related to the following topics: patterns; number and operation; measurement and data. Connections of these topics to an integrated approach to curriculum and instruction will be emphasized.

ED.840.650. Physical Science in an Integrated Pre-K-6 Classroom. 3 Credits.
The goal of this course is to provide Pre-K-6 teachers a rich understanding of foundational physical science concepts and their applications in an integrated science, technology, engineering, and mathematical world. Topics will include; structure, properties, and interactions of matter; physical and chemical properties of materials; mechanicsforce, and motion; gravity, energy transformation, energy sources, electricity, magnetism, light, sound, and wave interactions. Problem-based inquires will be organized to engage the participants in planning investigations, gathering and analyzing data, offering plausible explanations, and developing a deeper knowledge base in the physical sciences. The engineering design process will be integrated throughout the course.

ED.840.651. Earth and Space Science in an Integrated Pre-K-6 Classroom. 3 Credits.
The goal of this course is to provide Pre-K-6 teachers a rich understanding of Earth and space science content and pedagogy. Topics will include: chemical and physical interactions of the environment, Earth, and the universe; weathering and erosion; processes and events causing changes in Earth's surface; Earth history; plate tectonics; and astronomy. Problem-based inquiries will be organized to engage participants in planning investigations; gathering and analyzing data; offering plausible explanations, and developing a deeper knowledge base of Earth and space science. The engineering design process will be integrated throughout the course.

ED.840.652. Life Science in an Integrated Pre-K-6 Classroom. 3 Credits.
The goal of this course is to provide Pre-K-6 teachers a rich understanding of life science content and pedagogy. Topics will include: living organisms and their interactions, diversity of life, genetics, evolution, flow of matter and energy, and ecology. The applications and impact of technology on human life will be an important feature of the course. Problem-based inquiries will be organized to engage the participants in planning investigations, gathering and analyzing data, offering plausible explanations, and developing a deeper knowledge base of life science. The engineering design process will be integrated throughout the course.

ED.840.670. Advanced Methods in the Elementary STEM Classroom. 3 Credits.
This course will engage students in technology-enhanced, problem-based, and student-centered instructional strategies. Participants will learn to create an integrated, inclusive, and equitable STEM approach to support Pre-K-6 student learning and positive affect toward STEM. The course will include skills essential to the STEM learning environment.

ED.840.671. Algebraic and Geometric Thinking in the Pre-K-6 Classroom. 3 Credits.
This course will model the process standards of problem-solving, reasoning and proof, representations, connections and communication within the context of algebraic and geometric thinking (NCTM, 2000).

ED.840.672. Advanced Topics in the Pre-K-6 Mathematics Classroom. 3 Credits.
The purpose of this course is to develop teachers' content knowledge for teaching (knowledge of mathematics content, pedagogy, and student learning) in the context of advanced mathematics. This course builds on the previous courses: Mathematical Foundations in the Pre-K-6 Classroom and Algebraic and Geometric Thinking in the Pre-K-6 Classroom.

ED.840.673. Practicum in STEM and Mathematical Instructional Leadership. 3 Credits.
Candidates participate in a supervised practicum experience in an educational setting under the direction of the faculty where they demonstrate the application of knowledge, dispositions, competencies, skills and solutions to day-to-day activities performed by Mathematical and or STEM Instructional Leaders. Experiences are reflective of real and simulated field-based activities in a variety of educational settings. Candidates must complete a final practicum reflection paper, as well as a comprehensive portfolio that includes artifacts that are illustrative of their best work from the program.

ED.851.630. School, Family, and Community Collaboration for School Improvement I. 3 Credits.
Participants examine the theory, research, and best practices on school, family, and community partnerships. Individuals explore different types of partnerships, challenges to developing school-based partnership programs, and the components of effective partnership programs that enhance student performance and success. Participants design an action plan for partnerships to address school improvement goals.

ED.851.631. School, Family, and Community Collaboration for School Improvement II. 3 Credits.
Building on the knowledge and skills developed in 851.630 (School, Family, and Community Collaboration for School Improvement I), students continue to explore research-based theories and best practices in school, family, and community collaboration. The emphasis of this second course in the sequence is on students revising, implementing, and evaluating a key activity in the action plan for partnerships developed in 851.630.
ED.851.630

ED.851.633. Introduction to the Independent School. 3 Credits.
This course will focus on the unique quality of the independent school. A specific focus will remain on the relationship between the parent and the teacher, reworking curriculum to fit the diverse needs of the student, understanding the importance of pedagogy and history in the independent school, and fostering a love of learning in each child.

ED.851.634. Curriculum, Instruction, and Assessment in Independent School Settings. 3 Credits.
Students consider the philosophical, historical, and psychological foundations for lower and upper school curriculum and explore the linkages between assessment-based curriculum and instructional strategies. After examining the scope and sequence of the lower and upper school curricula, students evaluate options presented in various school reform plans that pertain to independent schools and contemporary research findings on effective schools and effective instruction.

ED.851.635. Educating the Whole Child: Teaching to the Developmental Needs of the Child. 3 Credits.
This course will provide students with a whole picture of the child they will be, or are, teaching. In-depth examination will be on the cognitive, physical, and emotional development of a child from age 4 through 18 years.

ED.855.500. Language Acquisition in TEFL. 3 Credits.
This course focuses on the language acquisition process when learning English as a foreign language, including research on current theories of language learning, using translanguaging as a pedagogical tool, incorporating multilingual learning strategies, and creating linguistically and culturally responsive programs. Students will review the foundational components of English language learning and the knowledge, skills, and attitudes of those who demonstrate intercultural communicative competency.

ED.855.501. Language and Culture in TEFL. 3 Credits.
This course focuses on the development of intercultural knowledge, awareness, skills, and the impact of culture on language learning and communication. Students will take a critical, sociocultural, and functional view of the role for understanding culture when teaching English as a foreign language or as a lingua franca. Students will investigate the cultural, social, and historical underpinnings of communication across cultures.

ED.855.510. Building Productive Learning Relationships for TEFL. 1 Credit.
This course provides an opportunity for individuals to develop competency in teaching English as a foreign language. Students engage in a series of interactive online modules to learn and apply research-based instructional practices designed to provide processes that 1) build a trusting and inclusive partnership, group, or community that maximizes engagement, learning, and achievement and 2) emphasize how to create a motivating and safe environment to learn and communicate with each other using both their heritage language and English. These practical practices are tailored specifically to motivate learners with different heritage languages to actively speak, understand, and communicate in English.

ED.855.530. Foundational Concepts of STEM. 3 Credits.
This course will build upon student understanding of the science of learning related to the integration of STEM disciplines. In the present course, students will be challenged to apply the understanding of integration by deepening their understanding of STEM instructional strategies. Students will examine STEM instructional programs and their opportunities for supporting learning through an opportunity to learn perspective. That is, students will be able to articulate how they would create STEM instructional units and programs with the focus on both the affordances and barriers to developing STEM curriculum. Students will enact this learning by developing technology-enhanced, problem-based, and student-centered instructional programs. Participants will learn to create an integrated, inclusive, and equitable STEM approach to support student learning and positive affect toward STEM.

ED.855.540. Integration of STEM Content through the Science of Learning. 3 Credits.
This course will examine STEM integration from a science of learning perspectives at the theoretical, empirical, and applied level. Students will explore the ways in which STEM integration supports memory, conceptual understanding, active learning, metacognition, conceptual understanding, and transfer of knowledge from multidisciplinary perspectives on learning. Specifically, the course examines the process and environments in which STEM integration can promote learning.

ED.855.550. Leading STEM Instructional Programs & Professional Development. 3 Credits.
This course is designed to provide students with an overview of theoretical perspectives and empirical research pertaining to leadership and effective professional development. Students will critically examine models of professional development, coaching, supervision, and evaluation of STEM instruction. Students will explore data-driven design to integrate STEM content areas and explore school improvement programs. Strategies for developing a constructive, collaborative approach to supporting STEM teachers to improve student learning outcomes will be emphasized.

ED.855.600. Extended Learning I.
Students will participate in a variety of informal educational experiences, from guest lectures and one-on-one mentor conversations, to exploring how the use of museums, cultural institutions, and other real-world scenarios can be leveraged to promote learning. Students will both learn from these experiences as well as gain exemplars to implement in their own educational systems.

ED.855.601. Extended Learning II.
Students will participate in a variety of informal educational experiences, from guest lectures and one-on-one mentor conversations, to exploring how the use of museums, cultural institutions, and other real-world scenarios can be leveraged to promote learning. Students will both learn from these experiences as well as gain exemplars to implement in their own educational systems.

ED.855.603. The Early Childhood Learner. 3 Credits.
This course focuses on the growth and development of the young child, including current theory and practice in child development and neuroscience. Early childhood educators will analyze the diversity of learner characteristics in young children, including growth and development in the cognitive, physical, and social-emotional domains.

ED.855.608. Comparative High Quality Practices in Early Education. 3 Credits.
This course presents research-based content on high quality, developmentally appropriate practices in early childhood education. Early childhood educators will incorporate tenets of learning theory into proposed lesson planning that reflects developmentally appropriate and inclusive practices for young children. Early childhood educators will demonstrate strategies for professional development and coaching of peers and families in developmentally appropriate practices.

ED.855.609. Introduction to Entrepreneurship in Education. 3 Credits.
This course provides students with the foundational skills necessary to think and behave entrepreneurially within educational systems and organizations in order to solve intractable problems. Students will formulate an understanding of themselves as entrepreneurs and intrapreneurs, evaluate entrepreneurial opportunities around them, and develop a method for solving a problem relevant to them. Further, students will learn the role of capital and socially conscious capitalism in creating sustainable ventures.

ED.855.610. Seminar in Teacher Leadership. 2 - 3 Credits.
Students in the final year present and evaluate their projects and plans for implementing change in their work environments. In addition, participants examine selected topics and current issues in educational leadership.

ED.855.614. Planning a New Venture in Education. 3 Credits.
This course provides students with a survey of the skills necessary to plan a new venture in education, either within an organization or a brand-new enterprise. Topics taught in this course include Human Resources, Sales and Marketing, Finance and Budgeting, and Leadership.

ED.855.617. Launching a New Venture in Education. 3 Credits.
This course provides students with a survey of the skills necessary to launch and operate a venture in education, either within an organization or an independent enterprise. Topics taught in this course include Human Resources, Sales and Marketing, Securing Funding and Capital, and Strategic Growth and Transition.

ED.855.618. The Sustainable Venture. 3 Credits.
This course provides students with the tools and resources necessary for ensuring long-term success and impact for an educational venture. The course will review how to build stability with strategic partnerships. Further, it will teach students how educational ventures weather leadership transitions and changing sociopolitical landscapes. Additionally, the course will cover the importance of social capitalism in education and a venture's contribution to social justice to ensure long-term sustainability.

ED.855.619. Global Leadership. 3 Credits.
This course explores the nature of leadership in the current global society. Students will analyze the behaviors, practices, characteristics and qualities of effective global leaders across a variety of sectors. Students will understand global competence and learn how to become a globally competent leader.

ED.855.630. Authentic Assessment and Measuring Child Outcomes and School Readiness. 3 Credits.
This course presents foundational concepts of authentic assessment in early childhood, including the types and purposes of assessments for young children and accompanying requisite skills in their administration. Early childhood educators will learn interpretation of assessment data and apply assessment data results to program planning in the implementation of early childhood programs.

ED.860.501. Crisis Intervention and Assessment. 1 Credit.
This course provides an overview of the various crises that may trigger trauma; theories and models of intervention; assessment techniques in crisis situations, and the issue of client resistance is also examined from a cognitive-behavioral point of view.
ED.861.507

ED.860.639. Cognitive Behavioral Therapy. 3 Credits.
Cognitive behavior therapy is one of the most popular contemporary models across the helping professions because it allows clients to evaluate and alter maladaptive thought patterns that may have an adverse impact on behavior. This course explores foundations of cognitive behavior therapy to include theoretical underpinnings, methods/models, applications, and research findings around efficacy for use with various adult populations. Cross-cultural issues and ethical practices are also examined, and the course reviews models and methods for child and adolescent populations.
ED.861.502 AND ED.863.501 AND ED.861.605 AND ED.861.507 AND ED.863.607 AND ED.861.609 AND ED.863.709

ED.860.822. Entrepreneurship in Mental Health: Introduction to Building a Private Practice. 3 Credits.
Students investigate principles related to business foundation, principles, legal and ethical implications, and the development of private practice. The course will explore legal, ethical, and practical ways to start a private practice while ensuring that students have a comprehensive expectation and exposure to current practice sites. Students will examine methods to combine the counseling profession, with clients, while establishing and leading a business.

ED.861.502. Counseling Theory and Practice. 3 Credits.
(Lab course) This course provides an overview of the major theories of counseling and therapy, such as cognitive, behavioral, existential, Gestalt, and Adlerian. Students explore integrative approaches, as well as multicultural and feminist perspectives. Participants focus on a wide range of specific techniques and practices that are associated with each theory and how they are applied in various situations. <P><I>Notes: </I>Students are required to attend the two-day laboratory sessions. Laboratory courses and internship classes involve an exploration of personal factors as they contribute to counseling skills and techniques.
ED.861.605

ED.861.503. Group Counseling and Group Experience. 3 Credits.
(Lab course) Students investigate practical and theoretical concepts of group dynamics and group counseling to acquire skills in facilitating various kinds of group interaction. Students explore interpersonal dynamics, personal communication styles, fundamental group counseling strategies, and group facilitation through class and laboratory experiences. <P><I>Notes: </I>Students are required to attend the two-day laboratory sessions. Laboratory courses and internship classes involve an exploration of personal factors as they contribute to counseling skills and techniques.
(ED.861.614 OR ED.861.605) AND ED.861.502 AND ED.861.507 AND ED.863.501 AND ED.863.607 AND ED.861.609 AND ED.863.709 AND ED.863.795

ED.861.507. Counseling Techniques. 3 Credits.
(Lab course) This course provides an overview of the history and philosophy of professional counseling, with special attention to the roles, functions, and limitations of school, community, and organizational counselors. Included is an understanding of the essentials of basic counseling skills; attending, listening, and interviewing stages of clinical treatment; and client/counselor relationships. Students learn about professional counseling organizations, professional credentialing, and standards and ethics in counseling and related human services. The course emphasizes self-growth, awareness, and observational skills as related to becoming a facilitator of individual, group, family, and systems change.

ED.861.511. Career/Life Development and Planning. 3 Credits.
Participants review major theories of career development and decision making, occupational sociology, and vocational psychology. The course places career counseling concepts in a life-span perspective and reviews career development materials and cross-cultural strategies. <P><I>Notes: </I>Tuition includes materials fee.
(ED.861.614 OR ED.863.501) AND ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.607

ED.861.513. Integrating Alternative Approaches to Mental Wellness. 3 Credits.
The course seeks to include culturally diverse counseling practices such as mindfulness, yoga meditation, and expressive arts combining them with conventional psychotherapies such as Adlerian, existential, Gestalt, behavioral and cognitive behavioral therapies. It builds on the foundation established in ED.861.502 Counseling Theory and Practice wherein students introspect, analyze and synthesize essential concepts from various psychotherapeutic theories aiming to develop a personalized integrative theory. The emphasis is on a therapist's creation of a repertoire of counseling techniques and interventions, drawn from multiple theories and most importantly from the client's own life practices. Students learn to integrate key concepts from theories such as cognitive, behavioral, existential, Adlerian and Gestalt while concurrently resourcing alternative therapeutic modalities of expressive arts, mindfulness, movement, music, and yoga meditation. Emphasis will be placed on the importance of a therapist's regard for client's competence in overcoming challenges to facilitate relief from emotional distress, reprieve from behavioral dysfunction and restructuring of maladaptive cognitive schema. (3 credits)

ED.861.605. Human Development and Counseling. 3 Credits.
This course reviews significant findings regarding current theory and practice in human growth and development along the life span through a biopsychosocial lens. Learners gain insights into aspects of human development that impact behavior in a variety of realms to include biological, cognitive, socio-emotional, and dispositional influences. Course outcomes focus on theoretical understanding and application of research findings to normal functioning as well as case conceptualization and counseling interventions within school and clinical mental health counseling populations.

ED.861.609. Diagnosis in Counseling. 3 Credits.
Students study the Diagnostic and Statistical Manual of Mental Disorders (DSM V) to learn to assess, diagnose, and treat psychopathology based on current DSM criteria. Theories related to the etiology of major categories of mental disorder such as anxiety, depression, substance abuse, and personality disorders are examined. Students gain an understanding of the impact of abnormal behavior on individuals, families, and society. Instructors provide a developmental framework for understanding diagnosis from multicultural, feminist, and systems perspectives. <P><I>Notes: </I> Must be taken before ED.863.809 or ED.863.870.
ED.861.507 AND ED.861.502 AND ED.861.605 AND ED.863.501

ED.861.612. Appraisal and Testing for Counselors. 3 Credits.
Students explore individual and group approaches to assessment and evaluation through the use of standardized test instruments and rating scales. Emphasis is given to principles of test construction, reliability and validity, psychometric properties, and strategies for the selection, administration and interpretation of behavioral, psychological, and educational tests. Implications of age, gender, ethnicity, culture, heritage, language, disability, and professional/ethical issues are examined. <P><I>Notes: </I> Tuition includes materials fee.

ED.861.614. The Foundations of School Counseling. 3 Credits.
This course is a survey of the knowledge base and practices in contemporary school counseling. It will emphasize the educational, historical, sociological, economic, philosophical, and psychological dynamics of the professional school counselor's role. Students integrate knowledge and learn skills to examine data driven comprehensive school counseling programs that enhance academic, career, and personal/social development for all students.

ED.861.713. Advanced Treatment Approaches. 3 Credits.
This course explores a wide range of effective techniques and strategies in counseling and therapy, in the context of successfully treating various mental and emotional disorders. Approaches and procedures from such diverse models as psychodynamic, cognitive, behavioral, experiential, and systemic are explored, along with theories of change and research findings on effective counseling and therapy.

ED.863.501. Introduction to Clinical Mental Health Counseling. 3 Credits.
This course provides an overview of the role and scope of the clinical mental health counseling profession. Students address a number of topics including the historical, theoretical, philosophical, and empirical foundations of clinical mental health counseling. The course addresses role functions and employment settings of mental health counselors; program development, emergency management, prevention, intervention, consultation, assessment approaches, and education; and the contextual dimensions of diverse clients seeking mental health counseling services.This course is a requirement of our accrediting body, the Council for the Accreditation of Counseling and Related Educational Programs (CACREP). This is a foundational course that prepares students to work in a broad range of mental health counseling programs by acquainting them with the foundations of clinical mental health counseling.

ED.863.524. Individual and Group Dynamics: Behavior in Context. 3 Credits.
Individual and group dynamics are at the core of adaptive or maladaptive human behavior. A solid grounding in basic empirically-derived principles of motivation aids counselors in better formulating and presenting problems and in conceptualizing appropriate interventions. Foundations for this course are derived from classic theories and research findings in personality psychology, social psychology, cross-cultural psychology, and neuroscience. Students explore the influence of the person, the situation, and cultural diversity as forces in shaping behavioral tendencies. A unifying theme within the course is the influence of resilience as a dispositional perspective for both the client and the helping professional.

ED.863.571. Counseling Adolescents. 3 Credits.
This course provides an overview of the various aspects of adolescent counseling, ranging from adolescent depression, suicide, crisis, drug and alcohol abuse, peer pressure, self-esteem issues, culture, family issues, and developmental themes. Part of the course is dedicated to examining current research on adolescents. The emphasis of the course is on clinical training in group, family, and individual contexts. Relevant ethical and legal issues are addressed. <P><I>Notes: </I> This course must be taken prior to ED.863.820. Master's students must have completed a minimum of 15 credits before registering for this course.
ED.861.502[C] OR ED.861.503[C] OR ED.861.507[C] OR ED.861.609[C]

ED.863.603. Couple and Family Therapy. 3 Credits.
(Lab Course) Students study the theory and practice of family therapy with an emphasis on models of family development and major approaches to intervention with families. Systemic models of family intervention are emphasized, as well as the study of other historically important and contemporary approaches to family therapy. The course blends didactic and experiential learning. <P><I>Notes: </I> Students are required to attend the two-day laboratory sessions. Laboratory courses and internship classes involve an exploration of personal factors as they contribute to counseling skills and techniques. Master's students must have completed a minimum of 15 credits before registering for this course .
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.501 AND ED.863.607 AND ED.861.609 AND ED.863.709

ED.863.607. Diversity and Social Justice in Counseling. 3 Credits.
Participants explore aspects of counseling clients from diverse ethnic, racial, and socioeconomic backgrounds. Through didactic and experiential learning techniques, students consider counseling strategies for enhancing cross-cultural interventions. (3 credits)

ED.863.626. Behavioral Medicine and Health Psychology Applications in Clinical Mental Health Counseling. 3 Credits.
This course provides a broad introduction to the field of behavioral medicine as part of the field of health psychology. Through a culturally-sensitive biopsychosocial lens, students examine theory and research as it applies to behavioral and emotional factors that impact the delivery of primary, secondary, and tertiary prevention efforts as part of a multidisciplinary team within medical settings. The content will explore applications of behavioral medicine and health psychology principles to a variety of health care conditions as they occur across the developmental continuum, preparing the clinical mental health counselor for a variety of roles in health care systems.

ED.863.630. Addictions Counseling I: Theory and Approaches. 3 Credits.
Students explore the fundamental principles of addictions counseling from a wide range of perspectives. These include the psychopharmacological aspects of alcohol and abusable drugs, along with theories and assessments of addictive disorders. Many treatment models are considered and examined in the context of individual, group, and family therapy perspectives. The course also addresses the research literature on codependence, COA's, AA and other 12-step programs, dual diagnosis, relapse, prevention, and multicultural and gender issues. (3 credits)
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.501 AND ED.863.607 AND ED.863.709 AND ED.861.609

ED.863.674. Meditation and Mindfulness. 3 Credits.
This course explores various methods of meditation from a counseling perspective to experientially understand multicultural practices that offer relief from emotional disorders such as anxiety and depression. Emphasis is placed on neuroscientific validation of meditation as a process to cultivate mindfulness and healing presence in a counseling setting. Students research natural outcomes such as concentration, awareness and insight both into self and with client. Eastern world concepts of ego, mind, body, mental health, psychopathology, suffering, compassion, and liberation are also addressed. A portion of class will be devoted to the actual practice and application of techniques from reading assignments.
ED.861.502

ED.863.681. Research and Evaluation for Counselors. 3 Credits.
Participants learn the basic concepts for understanding and conducting research and program evaluation related to the counseling and human services fields. Students study experimental and quasi-experimental designs, examine quantitative and qualitative methodologies, and learn basic statistical procedures for data analysis.
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.501 AND ED.863.607 AND ED.861.609 AND ED.863.709

ED.863.709. Psychopathology. 3 Credits.
This course provides a broad overview of the field of psychopathology using lifespan development and biopsychosocial models to understand the etiology, psychological dynamics, trajectory, and symptomatology of disordered behavior. Students examine theoretical, clinical, legal, ethical, multicultural, and empirical perspectives as they influence case conceptualization, diagnosis, and treatment formulations within a social justice framework.
ED.861.502 AND ED.861.507 AND ED.861.605 AND ED.863.501 AND ED.861.609

ED.863.718. Counseling Military Families. 3 Credits.
Students explore aspects and issues affecting military families. Students consider the military as a unique culture within American society; the cultural context of the transmission of values, beliefs, and customs; and the needs of children and spouses of those serving in the military. Considerable time will be spent exploring counseling for issues of PTSD, substance abuse, isolation, frequent relocations, deployment, reintegration into family life, anticipatory loss and grief, anxiety, uncertainty, the effects of war, managing stress and anger, staying healthy, improving sleep and building resiliency. (3 credits)
ED.861.503[C] AND ED.861.507[C] AND ED.861.609[C] AND ED.861.502[C]

ED.863.736. School Counseling Leadership and Consultation. 3 Credits.
This course is designed to prepare students to lead programs and employ consultation strategies in the development and implementation of data driven school counseling programs. Students will learn leadership and school-based consultation principles, theories, skills, and models necessary to enhance the learning environment. Emphasis is placed on the role of the school counselor as a systemic change agent. Ultimately, the course will assist future school counselor leaders build effective stakeholder consultation teams that promote equitable services for all K-12 students.
ED.861.614[C];ED.863.808[C]

ED.863.795. Ethical and Legal Issues of Mental Health Counseling. 3 Credits.
Participants explore professional issues in counseling, with specific regard to ethics and laws that pertain to the profession, such as ethical codes, responsibility, competence, public statements, confidentiality, reporting abuse, and dual relationships. Professional issues in the context of community mental health are also covered in terms of historical, societal, and philosophical aspects, as well as licensing, roles, policies, legislation, reimbursement, and the professional identify of community counselors. Racial and ethnic issues, as well as gender, sexual orientation, socioeconomic status, and mental status in community counseling settings are also addressed. (3 credits)
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.501

ED.863.808. Practicum in School Counseling. 3 Credits.
This supervised practicum experience is offered in two modalities. The first modality is an experiential course including seminar discussions, review of major theories of counseling with an emphasis on the integration of theory and practice, interview analysis, video and/or audiotape observations, and supervised exercises. Emphasis here is given to the development of foundational counseling skills (i.e. trust building, collaborative goal development, interpretation, summarization, paraphrasing, case conceptualization). The second modality is a practicum course involving 100 hours of individual counseling and group counseling, as well as supervisory experience in a school setting or clinical setting where children and/or adolescents are served. Supervision of this experience will be provided by the on-site supervisor and a school counseling program faculty member. Emphasis here is given to the development of cultural competence, social/emotional issues of children and adolescents (e.g., depression, bullying) and school-related issues (e.g., crisis management). The course is taken near the end of a student's program of study just prior to the internship.
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.861.614 AND ED.861.609 AND ED.863.795 AND ED.861.503

ED.863.820. Internship in School Counseling. 3 Credits.
This supervised internship is the first semester of a two-semester supervised internship in school counseling. The course includes both class instruction and a 300-hour internship.
ED.861.503 AND ED.861.609 AND ED.861.612 AND (ED.861.614 AND AND ED.863.809 OR ED.863.808) AND ED.863.681

ED.863.828. Internship in School Counseling II. 3 Credits.
This supervised internship is the second semester of a two-semester supervised internship in school counseling. The course includes both class instruction and a 300 hour internship

ED.863.830. Graduate Project in Counseling. 3 Credits.
Students of demonstrated ability with a special interest in counseling study under the personal direction of a faculty member in the School of Education. Students must meet with their faculty adviser and prepare an outline of the proposed project prior to registration. (1- 6 credits)

ED.863.870. Practicum in Clinical Mental Health Counseling. 3 Credits.
This supervised practicum experience is offered in two modalities. The first modality is an experiential course including seminar discussions, review of major theories of counseling with an emphasis on the integration of theory and practice, interview analysis, video and/or audiotape observations, and supervised exercises. Emphasis here is given to the development of foundational counseling skills (i.e. trust building, collaborative goal development, interpretation, summarization, paraphrasing, case conceptualization). The second modality is a practicum course involving practical training at a community-based agency or institution. Training focuses on integrating counseling theories in social context with individual counseling practice. Emphasis here is given to the development of cultural competence in joining, trust building, developing clinical hypotheses and interventions, and collaborating with clients in the development of goals, relevant legal and ethical issues. The course includes both didactic and experiential learning and is taken near the end of a student's program of study just prior to the internship.
ED.861.605 AND ED.861.502 AND ED.861.507 AND ED.863.501 AND ED.861.609 AND ED.863.709 AND ED.863.795 AND ED.861.503;ED.861.503

ED.863.875. Internship in Clinical Mental Health Counseling I. 3 - 6 Credits.
This supervised internship is the first semester of a two-semester supervised internship in clinical mental health counseling. The course includes both class instruction and either a 300 or 500-hour internship.

ED.863.876. Internship in Clinical Mental Health Counseling II. 3 - 6 Credits.
This supervised internship is the second semester of a two-semester supervised internship in clinical mental health counseling. The course includes both class instruction and either a 300 or 500-hour internship.
ED.863.875

ED.880.603. Educating the Whole Child: Teaching to the Developmental Needs of the Urban Child. 3 Credits.
This course will focus participants' learning on child and adolescent development consistent with developmental pathways: cognitive, linguistic, emotional, social, and physical. Topics include the needs of urban school children relative to health care, nutrition, differentiation, inclusion, special education, gifted education, arts education, higher order thinking and creative problem-solving.

ED.880.611. The Social Context of Urban Education. 3 Credits.
The course examines the role played by culture, race, language, and class in creating the conditions that lead to structured inequality of educational outcomes in urban areas. Through a diverse set of readings, students will consider questions such as: What is the role of a state-sponsored, public education in a multicultural democracy? Should all students receive the same education, both in terms of curriculum and pedagogy? Why might some students resist efforts to educate them? Does education reproduce social divisions or provide a way for the most talented to rise in society? Through an exploration of these and related questions, the class addresses the relationship between the concepts of race, language and culture; the controversy over efforts to take language into account in the teaching of some students; "multicultural" approaches to education; pedagogical interventions meant to (a) reach "culturally diverse" learners, and (b) create culturally diverse learners; and the role of education in a pluralistic, democratic society.

ED.880.613. Teaching, Learning and Leadership for Successful Urban Schools. 3 Credits.
This course will examine the principles, policies, and practices of leadership and instruction that promote effective schools. Students will be exposed to the Effective Schools Correlates, the principles of the Coalition of Essential Schools and numerous efforts on the local and state and federal level designed to improve the quality of education, particularly as those practices and policies affect urban student achievement. Students will weigh the traditional patterns of teaching, learning, and governance with current federal, state, and local standards and new evidence-based, collaborative practices. Emphasis will be placed on examining models and methodologies currently in use in Baltimore City Public Schools and other local metropolitan areas. Students will use this research and knowledge as a basis for selecting effective methods that could be adapted to their particular setting.

ED.880.617. Urban School Reform. 3 Credits.
This course examines systemic school reform movements in the urban school context. School reform occurs at many different levels, from the classroom level with individual teachers, to the national level with federal mandates. We will explore reform at different levels and analyze the theory, policies, practices, and controversies of various mechanisms of reform, including the K-8 movement, small high schools, school choice (charters and vouchers), mayoral control, merit-pay, and alternative routes to teaching. Participants will synthesize information about school reform in urban schools and systems and will reflect on their role in this process. Final evaluation of reform strategies will be grounded in the effect these reforms are having on improving learning for all students in urban schools.

ED.880.623. Instructional Design for Online Learning. 3 Credits.
This course will guide participants through a process of designing online instruction for adult learners, applicable for a variety of content areas and settings. Building upon a research-based instructional design model, participants will plan online learning experiences that combine pedagogy, organization, design, and technology. Participants will be able to design media-enhanced, engaging online activities and assess learning.

ED.880.633. Curriculum Development. 3 Credits.
In this course, participants will propose a curricular project in health professions education, which will be documented in their professional portfolio. They will learn and apply six steps to curriculum development: problem identification and general needs assessment, targeted needs assessment, writing goals and specific measurable objectives, choosing educational strategies, implementation, and evaluation. Educational methods include readings, mini-lectures, interactive web modules, discussion groups, and application exercises. The course also addresses issues related to curriculum maintenance and enhancement and dissemination of curriculum-related work.

ED.880.635. Instructional Strategies I. 1.5 Credits.
In this course, participants will learn about various instructional strategies to enhance interdisciplinary learning experiences in health professions education. Instructional methods will include such collaborative educational models as small and large group teaching, team-based, interactive and experiential case-based learning. Techniques will include the use of simulations as well as teaching at the bedside with a focus on educator behaviors that stimulate achievement of learners. With an appreciation of the diversity of the student body, participants will effectively integrate and apply technology into instruction to develop and deliver health professions curricula, including web-based teaching environments, content management systems, collaborative project development, and interactive media with an emphasis on instructional design advancements which affect the learning environment. Evidence of participants' knowledge and application of course topics will be captured in a professional portfolio.

ED.880.639. Development, Management, and Evaluation of Health Professions Education Programs. 3 Credits.
In this course, participants will demonstrate their ability to implement a systemic approach to program development and evaluation. They will review the literature on program effectiveness and examine the components that contribute to success. They will also approach program development from the perspective of its critical components – population characteristics, needs assessment, content, logistics, instructional formats, implementation, assessment, and evaluation using quantitative and qualitative methods. In addition, participants will incorporate a continuous process of program improvement that includes closing the loop by analyzing information on student performance, stakeholders, trends, and funding to identify changes that will enhance the effectiveness of the program. Course products and reflections will be highlighted in a professional portfolio.

ED.880.642. Leadership Theory in Action for Health Professions Educators. 3 Credits.
Leadership extends beyond management and involves multiple skills. This course addresses: 1) organizational change theory and the leadership of change; 2) leadership of tasks/processes/systems (including principles of task management and the use of strategic planning, quality improvement, policy/procedure and data to achieve organizational goals and promote efficiency); and 3) resource management and creation (including financial management, fund raising, alignment of resource use and development with function and goals).

ED.880.652. Survey Design for Research in Health Professions Education. 1.5 Credits.
This course will examine Survey Design. Surveys wield tremendous impact on decision-making and are becoming increasingly common when evaluating educational processes, conducting research, and in society more broadly. The major topics of the course will include defining constructs; creating items and item wording; response anchors; formatting surveys; and bolstering response rates. The course will also cover some basic design features of Qualtrics, a leading survey software system. Students do not need to have any previous experience with developing surveys to be successful in this course. The course is targeted toward 1) students who are actively adapting or developing survey measures for research projects and 2) students who are interested in professionally designing surveys. The course is more orientated toward collecting quantitative data, but only minimal knowledge of data analysis is needed.

ED.880.673. Leadership Capstone in Health Professions Education II: Implementation and Results. 1.5 Credits.
Participants will engage in a three-course series capstone to culminate the MEHP program. They will employ principles and concepts from their MEHP educational experiences to develop, implement, and disseminate a research or evaluation project focused on an issue of importance to health professions education. Their projects will be performed under the guidance of assigned capstone instructors and the director with support from fellows' institutional sponsors. In the second course fellows will implement the project by following prescribed design, implementation, and evaluation guidelines. They will conduct the process, collect data, and select appropriate statistical tools for data analysis. They will submit as amendments to Hopkins IRB any modifications to the project components that require IRB approval.Fellows continue preparation of scholarly manuscripts of their work for peer-reviewed dissemination or potential publication. Fellows submit deliverables according to the course schedule to their instructors and consult as needed with their institutional sponsors. Fellows continue to add evidence to their Specialization Portfolio.

ED.880.674. Leadership Capstone in Health Professions Education III: Analysis, Discussion, Conclusion, Dissemination. 1.5 Credits.
Participants will engage in a three-course series capstone to culminate the MEHP program. They will employ principles and concepts from their MEHP educational experiences to develop, implement, and disseminate a research or evaluation project focused on an issue of importance to health professions education. Their projects will be performed under the guidance of assigned capstone instructors and the director with support from fellows' institutional sponsors. In this third course fellows will complete data analysis, construct tables and figures, develop the discussion, identify limitations, write the conclusion, close the Hopkins IRB, and prepare the manuscript for submission to a target journal. They will create a Voice Thread presentation of their project. Fellows complete the Specialization Portfolio including the final program reflection.Fellows complete their scholarly manuscript of their work for peer-reviewed dissemination or potential publication. Fellows submit deliverables according to the course schedule to their instructors and consult as needed with their institutional sponsors.

ED.880.676. Research Capstone in Health Professions Education I: Problem, Gap, Hook, and Methods. 1.5 Credits.
Participants will engage in a three-course series capstone to culminate the MEHP program. They will employ principles and concepts from their MEHP educational experiences to develop, implement, and disseminate a research or evaluation project focused on an issue of importance to health professions education. Their projects will be performed under the guidance of assigned capstone instructors and the director with support from fellows' institutional sponsors. In the first course of the series, fellows will focus on the identification of a problem of urgent concern, establish a gap in the current knowledge or thinking about the problem, and articulate a compelling hook to convince readers that this gap requires attention. They will explore the literature to identify the methodology, the method, and instruments for the project. They will prepare and submit the IRB for their home institutions and prepare the Hopkins IRB for their instructor to submit as the project PI. This course will be complete with the receipt of Hopkins IRB approval.Fellows begin preparation of a scholarly manuscripts of their work for peer-reviewed dissemination or potential publication. Fellows submit deliverables according to the course schedule to their instructors and consult as needed with their institutional sponsors. They also submit progress on their overarching Specialization Portfolio. Fellows may build on educational projects begun in previous courses with the approval of their instructors.

ED.880.677. Research Capstone in Health Professions Education II: Implementation and Results. 1.5 Credits.
Participants will engage in a three-course series capstone to culminate the MEHP program. They will employ principles and concepts from their MEHP educational experiences to develop, implement, and disseminate a research or evaluation project focused on an issue of importance to health professions education. Their projects will be performed under the guidance of assigned capstone instructors and the director with support from fellows' institutional sponsors. In the second course fellows will implement the project by following prescribed design, implementation, and evaluation guidelines. They will conduct the process, collect data, and select appropriate statistical tools for data analysis. They will submit as amendments to Hopkins IRB any modifications to the project components that require IRB approval.Fellows continue preparation of scholarly manuscripts of their work for peer-reviewed dissemination or potential publication. Fellows submit deliverables according to the course schedule to their instructors and consult as needed with their institutional sponsors. Fellows continue to add evidence to their Specialization Portfolio.

ED.880.678. Research Capstone in Health Professions Education III: Analysis, Discussion, Conclusion, Dissemination. 1.5 Credits.
Participants will engage in a three-course series capstone to culminate the MEHP program. They will employ principles and concepts from their MEHP educational experiences to develop, implement, and disseminate a research or evaluation project focused on an issue of importance to health professions education. Their projects will be performed under the guidance of assigned capstone instructors and the director with support from fellows' institutional sponsors. In this third course fellows will complete data analysis, construct tables and figures, develop the discussion, identify limitations, write the conclusion, close the Hopkins IRB, and prepare the manuscript for submission to a target journal. They will create a Voice Thread presentation of their project. Fellows complete the Specialization Portfolio including the final program reflection.Fellows complete their scholarly manuscript of their work for peer-reviewed dissemination or potential publication. Fellows submit deliverables according to the course schedule to their instructors and consult as needed with their institutional sponsors.

ED.881.611. Action Research for School Improvement. 3 Credits.
Students explore the role of the educator as an action researcher, with special emphasis on formulating and refining research questions as well as on selecting appropriate methodologies for classroom or school-based research. Students review research as a tool for assessing and improving teaching/learning environments.

ED.885.501. The Gifted Learner. 3 Credits.
Graduate students survey a historical overview of gifted education and examine research literature, intelligence theorists, and current practices used with gifted learners to gain perspective on the academic, social, and affective nature and manifestations of giftedness. Special needs populations are examined for unique characteristics and needs to further support the premise of a diverse gifted audience. Emphasis will be placed on gifted learning characteristics as they inform identification, planning, and support strategies. Participants explore the potential role they play in working with gifted youth, recommending program delivery options, and the identification process.

ED.885.505. Creativity in Education. 3 Credits.
Graduate students will examine the psychological and educational aspects of creative thinking. Participants review studies of the characteristics of creative children and adults, the creative process, and the identification of potentially creative children and adolescents. The course introduces teaching strategies and curriculum materials for fostering creative behavior at both the elementary and secondary school levels.

ED.885.510. Curriculum, Instruction, and Assessment for Advanced Learners. 3 Credits.
Graduate students explore the various approaches to differentiating curriculum, instruction, and assessment for advanced learning. Strategies and techniques that are supported by research and best practice are discussed and analyzed. Candidates design interventions that translate theories about gifted education into practice in their education contexts.

ED.885.512. Twice Exceptional Learners. 3 Credits.
Graduate students review recent research-based findings regarding identification and programming for the gifted child with learning differences. Candidates consider appropriate strategies and teaching techniques that address learning challenges as well as the development of enriched content and accelerated and innovative approaches for maximization of potential in areas of giftedness.

ED.885.515. Leadership of Gifted Education and Talent Development Programs. 3 Credits.
Graduate students will learn how to develop, implement, and supervise interventions for gifted students in both K-12 and out-of-school settings. An emphasis is placed on how talent identification, service delivery, student assessment, and program evaluation are included in the design of talent development systems.

ED.885.519. Seminar I in Gifted Education and Talent Development. 3 Credits.
Graduate students will explore current issues, research, and trends in gifted education and talent development at the local and national levels, including ways to advocate for programs and services, and the roles of a leader in the field.

ED.885.520. Seminar II in Gifted Education and Talent Development. 3 Credits.
Graduate students will expand upon knowledge gained in Seminar I as they continue to explore current issues, research, and trends in gifted education and talent development at the local and national levels, including ways to advocate for programs and services, and the roles of a leader in the field.

ED.885.604. Social and Emotional Needs of the Gifted. 3 Credits.
Graduate students will examine the unique social and emotional needs of gifted and talented learners and their families. Primary emphasis will be on consultation, guidance and counseling strategies for use with diverse gifted learners including those from special populations.

ED.885.720. Research in Gifted Education and Talent Development. 3 Credits.
Graduate students who have competed their general coursework in Gifted Education and Talent Development may register for this capstone course with their adviser's approval. This course provides an opportunity for graduate students who are not pursuing the MSDE state Gifted and Talented Specialist certificate to conduct research and pursue a special project related to their area of interest under the guidance of the instructor. In collaboration with the instructor, a personalized project will be developed and implemented. Graduate students will select a current issue or problem of practice in the field of gifted education or talent development, conduct a review of the literature, design an intervention or research proposal to address the issue, create and share a written product to inform the community on the issue.

ED.885.820. Practicum in Gifted Education and Talent Development. 3 Credits.
Candidates participate in a capstone supervised practicum experience in an educational setting with a focus on advanced learners under the direction of the faculty. Practicum experiences will be individually designed in consultation with the student's advisor to address the student's professional goals. Individual and small group consultation sessions are held. (3 credits)

ED.887.615. Explorations in Mind, Brain, and Teaching. 3 Credits.
During the past decade, the learning sciences have produced a vast frontier of knowledge on how the brain processes, stores, and retrieves information. Educators have increasingly recognized a role as consumers of this emerging knowledge. Participants in the course will review this research, examining how it intersects with the correlates of a model of research-based effective teaching including the teaching of the arts across content areas. Topics of study will include the brain's memory systems, the impact of emotions on learning, the processes involved in higher order thinking and learning, and issues related to child development. Participants will apply course studies to the creation of learning units that emphasize application of knowledge and the integration of the arts. (3 credits)

ED.887.616. Fundamentals of Cognitive Development. 3 Credits.
This introductory course surveys theoretical and empirical work in the study of cognitive development. A variety of methodological approaches are addressed, with a focus on cognitive processes related to learning. The course proceeds from behaviorist, cognitivist, and sociocultural perspectives of the early and mid- 20th century to recent and ongoing research in the neuro- and cognitive sciences. Topics include the development of language, motivation, and intelligence, as well as the acquisition of skills and concepts related to mathematics, reading, writing, and problem-solving. Implications for education are considered.

ED.887.617. Neurobiology of Learning Differences. 3 Credits.
This course is intended to prepare educators with information about how differences and disabilities in brain development impact the abilities of school aged children and adolescents to participate in instructional activities. Particular attention is given to autism spectrum disorder (ASD), specific learning disabilities (SLD), attention deficit disorder and attention deficit disorder with hyperactivity (ADD and ADHD), and psychiatric disorders that are found in the constellation of disabling conditions identified as emotional disturbance (ED). The course will include case studies of students with each disabling condition, with a focus on how the disability affects learning, the current status of imaging technologies, and the current uses of medications for assisting students in school settings. Students taking this course will review research and link information from lecture to the creation of an instructional unit demonstrating knowledge of how a disabling condition can be accommodated in school.

ED.887.618. Cognitive Processes of Literacy & Numeracy. 3 Credits.
This course is designed to offer students an opportunity to study, discuss and explore aspects of brain function that influences learning, remembering, and utilizing textual and numeric concepts. The inter-relationship of developmental factors, prior knowledge, instructional design and implementation, and assessment mandates will be investigated and discussed. Current research, differentiated strategies, technologies and the impact of disabilities will be included.

ED.887.619. Special Topics in Brain Sciences. 3 Credits.
This capstone course addresses specific topics in brain research and encourages the participants to apply research to inform instructional practices.

ED.893.508. Technology and the Science of Learning. 3 Credits.
Technologies are part of the intellectual landscape in which new kinds of knowledge are breaking down the boundaries of previous distinct disciplines. The design and use of new technologies make possible new approaches to learning, new contexts for learning, new tools to support learning, and new understandings of the dynamics of the learning process itself. This course examines the role of technology relative to the key concepts of active learning, metacognition, and transfer of knowledge from multidisciplinary perspectives on learning. Based on their readings of empirical literature from the science of learning, students will develop and implement a technology-related strategy that aligns educational technology to standards-based instruction, promote problem solving and higher-order thinking skills, facilitate cooperative learning, and use reflective teaching and inductive approaches to increase student achievement. Students must take Technology and the Science of Learning as one of their first courses in the program.

ED.893.545. Technology Integration for the 21st Century Learner. 3 Credits.
This course prepares educators in K-12 and adult education settings to implement instruction and assessment that targets four essential digital-age learning objectives: critical thinking, creativity, communication, and collaboration. Students will learn about and apply the TPACK framework, which describes three forms of knowledge educators need to integrate educational technologies into instruction effectively - technical knowledge, pedagogical knowledge, and content knowledge. Alongside the TPACK framework, students will learn about and apply the SAMR Model, which describes four different types of educational technology integration: Substitution, Augmentation, Modification, and Redefinition. Applying their understanding of TPACK, SAMR, and other concepts and practices from course readings and activities, students will design technology-rich learning activities/learning units for use in their own professional settings.

ED.893.546. Technology for Learner Variability. 3 Credits.
This course provides an overview of the historical foundations and the advancements in the learning sciences related to learner variability. Students will learn to apply the Universal Design for Learning framework in understanding and addressing learning variability. Students will develop the knowledge and skills necessary to anticipate and plan for systematic differences in learners, and apply technology to that end. Students will investigate existing and emerging technologies to determine how these may support all learners in becoming purposeful and motivated, resourceful and knowledgeable, and strategic and goal-directed.

ED.893.550. Emerging Issues in Digital Age Learning. 3 Credits.
The new digital landscape is drastically changing how people work, collaborate and learn. New innovations in digital technologies are powerful influences in 21st century classrooms. In this course, participants are exposed to emerging issues for Internet-based culture and digital age learning, including gaming, virtual and augmented reality, digital libraries and databases, big data and data mining, and the use of social media and digital tools for enhancing instructional delivery. Learners will explore the use of emerging technologies and their integration into schools and organizations. (3 credits)

ED.893.600. Maker Education: Cultivating Curiosity, Creativity, and Problem Solving in Thoery and Practice. 3 Credits.
Maker Education is an educational approach and culture that emphasizes collaboration and community-mindedness, and uses hands-on, project-based learning methods to demonstrate student learning. Well-designed and implemented maker activities and curricula promote creativity, problem-solving, experimentation, and collaboration, as well as content learning, and they are often connected to STEM and STEAM initiatives. In this course, students will learn and apply theoretical principles for Maker Education and the culture of making. They will investigate tools and strategies that hold promise for engaging and empowering learners of all ages in maker-related activities. Students will develop authentic learning experiences that support inclusive and equitable access to technology and maker education for diverse learners in a range of learning environments. Students will also become familiar with critiques of maker education, formulate plans to integrate maker activities with "traditional" learning activities, and develop rubrics to assess student learning with maker activities.

ED.893.601. Evaluation and Research in Digital Age Learning. 3 Credits.
In this course students learn and practice the skills necessary to evaluate the use of educational technology in learning environments and educational settings. The course covers a range of alternative and mixed methods for data collection, such as observation, interviewing, the use of surveys, and analysis of data. Students develop an evaluation plan that can be implemented in their own educational settings and demonstrates their ability to select and/or develop appropriate metrics to identify the impact of technology in the teaching-learning process. Students use empirical methods to describe, explore, and/or explain the relationships between technology and program and/or individual outcomes.

ED.893.628. Gaming and Simulations for Learning. 3 Credits.
This course provides an overview of game-based learning theories and best practices for incorporating educational games and simulations into a range of learning environments. Students will learn to apply analytic frameworks to commercial and educational games so as to evaluate a game's potential as a learning tool or environment for K-18, business, and government settings. Students will integrate games with lessons and other learning activities, as well as produce prototypes for their own educational games and plan to use gameplay data for assessment.

ED.893.632. Data-Driven Decision Making. 3 Credits.
The increasing impact of a knowledge economy and globalization has been a catalyst to the fields of knowledge management and organizational decision making. This course is designed to introduce knowledge management concepts into an educational context and to provide an in depth focus on data-driven decision making in educational organizations and institutions. Participants investigate how decisions and strategies are developed and how tacit or explicit knowledge can be identified, captured, structured, valued and shared for effective use. Course topics include leadership and strategic management relative to organizational decision making, managerial and organizational structures, organizational learning, and decision support systems. A related intent is to develop an understanding of data mining metrics that can be used to create predictive models that support systemic change in schools. Opportunities are provided for participants to use online and electronic tools that can assist in facilitating meaningful conversations about instruction and learning among their school's faculty and staff.

ED.893.634. Technology Leadership for School Improvement. 3 Credits.
Education leaders need to understand the use of technology for teaching, learning, and managing their school environment. These skills include schoolwide technology planning and leadership that incorporate instructional design, curriculum integration with standards, logistics of technology implementation, professional development, and evaluation. Students will develop an understanding of how to create and support technological change through a systems approach. Topics include sources of resistance to change, tools for planning, decision making and change, creating and supporting a culture for learning and change, and managing and institutionalizing change systems.

ED.893.645. Explorations in Blended and Hybrid Learning. 3 Credits.
In this course, students will become familiar with different models of blended learning, discuss how blended learning differs from "technology integration," and examine the potential for blended learning instructional models to provide learners with more personalized learning experiences. Students will evaluate and compare different blended learning models to justify their rationale for selecting models appropriate for their teaching and learning contexts. They will describe instructional strategies and technologies that can be used to increase learner engagement in blended learning environments. Through course readings and their own analyses, students will also examine challenges associated with the implementation of blended learning activities and the impact that implementation has on students, teachers, schools, or stakeholders in other workplace contexts. While exploring these topics, students will to choose a path for their learning based on their teaching and learning context. The course will culminate with students designing their own blended learning initiative that is authentic to their teaching and learning context.

ED.893.650. Fundamentals of Design Thinking. 3 Credits.
This foundational course in the DALET program, to be taken during a student's first term of enrollment, operationalizes principles of design thinking, instructional design, and learning theories to equip learners with foundational knowledge and skills for designing learning experiences in a range of contexts. Throughout the course, students will independently and collaboratively engage in the multiple phases of an iterative design cycle (framing, ideation, prototyping, testing and evaluating) to create human-centered design prototypes to address specific learner/user needs. Students will leave the course with a set of practical tools and techniques to design innovative design solutions within their own professional setting.

ED.893.651. Computational Thinking for K-12 Educators. 3 Credits.
In 2006, Jeannette Wing published a seminal paper on computational thinking, arguing that "it represents a universally applicable attitude and skill set everyone, not just computer scientists, would be eager to learn and use." This course will provide an overview of computational thinking (CT), in theory and in practice, with an emphasis on its use in different K–12 disciplines and contexts. Students will investigate CT theories, CT measures, the benefits of building CT competencies, and approaches to developing CT in many different disciplines. Students will work with a variety of tools, including the Scratch block programming environment, to explore how these can be used to develop CT competencies among their learners, and create a long-term plan for nurturing CT in their particular context.

ED.893.701. Advanced Seminar in Digital Age Learning. 3 Credits.
The seminar is the capstone course in the Digital Age Learning and Educational Technology master's program and reflects students' individual mastery for leveraging technology with diverse learning populations. The seminar focuses on examining the constructs of educational technology topics and culminates in the student creation of his/her online portfolio. The portfolio showcases the products and skills developed by learners during the core courses throughout the term of their academic studies. The goals of the seminar are to engage and support participants in understanding the historical, cognitive, technical, political, and sociological issues involved in the effective use of technology in education and particularly in the integration of technology into instruction.
ED.893.601

ED.893.850. Advanced Applications in Digital Age Learning. 3 Credits.
The advanced applications course provides students the opportunity to individualize their program experience, to sharpen existing skills, to gain new skills, and to pursue their educational technology interests related to curriculum and professional development in support of technology-based programs. Students work with their advisor to create a professional, customized learning experience that stretches the student through his/her participation in the development, design, implementation, or evaluation of high-quality technology products, projects, or services. The activities in this course are aligned to individual students' schedules and can include collaborative opportunities with public and private sector organizations and agencies that have local, regional, national, or international interests. This course supports the development of leadership expertise in an area designated by the student as a set of skills needed to advance the individual in their chosen area of study and professional practice.

Counseling & Human Services

ED.860.666. Applied Cognitive Behavioral Therapy. 3 Credits.
This course covers advanced issues in the real-time application of the theories of Cognitive Behavioral Therapy (CBT) to the treatment and treatment planning of the most commonly diagnosed DSM-5 disorders. Building on the theoretical learning objectives in the Cognitive Behavioral Therapy course, the emphasis of this course will be on the development and application of CBT-based techniques and skills to clinical cases presented by the students.
ED.860.639[C] AND ED.861.609[C]

ED.863.526. Introduction to Play Therapy with Children. 3 Credits.
The major goal of this course is to facilitate students' knowledge, dispositions and skills to counsel children through play therapy and other major theoretical applications. Students' learning will be facilitated through didactic presentations, interactive discussions, and supervised counseling practice with elementary school children. This course also emphasizes the counselor's collaborative work with children's legal guardians/family members. (3 credits)
ED.861.507

Innovative Teaching & Leadership

ED.810.602. Curriculum, Instruction, and Assessment in School Settings. 3 Credits.
Students consider the philosophical, historical, and psychological foundations for elementary and secondary school curriculum and explore the linkages between assessment-based curriculum and instructional strategies. After examining the scope and sequence of the K-12 curriculum, students evaluate options presented in various school reform plans and contemporary research findings in effective schools and effective instruction. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)

ED.810.603. Methods of Teaching in the Elementary School: Part I. 3 Credits.
This course is designed for candidates in the elementary education certification program. Students explore strategies for teaching mathematics, language arts, and the aesthetic areas of music, art, and physical education in the elementary school. Activities, materials, and technology address the varying developmental and learning needs of elementary school children and examine ways of integrating aspects of the curriculum. Participants engage in lesson planning and micro-teaching activities for teaching problem solving and higher order thinking skills. This course includes uses of the Internet to obtain curricular resources. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools.

ED.810.604. Methods of Teaching in the Elementary School: Part II. 3 Credits.
This course is designed for candidates in the elementary education certification program. Students explore strategies for teaching social studies with an integration of language arts, and the aesthetics areas of music, art, and physical education in the elementary school. Activities, materials, and technology address the varying developmental and learning needs of elementary school children and examine ways of integrating aspects of the curriculum. Participants engage in lesson planning and microteaching activities for teaching problem solving and higher order thinking skills. This course includes uses of the Internet to obtain curricular resources. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools.

ED.810.606. Human Development and Learning. 3 Credits.
This course integrates key insights into current theory and practice in human growth and development and educational psychology (learning). Participants analyze a variety of learner characteristics that influence student development and academic achievement. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)

ED.810.607. Culturally Responsive Teaching. 3 Credits.
Candidates will explore the social, organizational, and structural factors influencing educational opportunities, experiences, and outcomes of culturally diverse students. Through personal reflection and analysis, candidates will determine the best way for them to positively impact students, regardless of ethnicity, gender, socioeconomic status, sexual orientation, etc. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (2-3 credits)

ED.810.611. Methods of Teaching in Secondary English: Part I. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.612. Methods of Teaching in Secondary Mathematics: Part I. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.613. Methods of Teaching in Secondary Science: Part I. 6 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.614. Methods of Teaching in Secondary Social Studies: Part I. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.621. Special Topics in Secondary English. 3 Credits.
The purpose of this course is to improve prospective teachers' content knowledge in English. Students explore specific topics in English through seminar discussions, research, projects, and classroom application assignments. Topics are content-focused and vary each semester with the needs of the students. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)<P><I>Notes: </I>Open only to students admitted to Master of Arts in Teaching program.

ED.810.622. Special Topics in Mathematics. 3 Credits.
The purpose of this course is to improve prospective teachers' content knowledge in mathematics. Students explore specific topics in math through seminar discussions, research, projects, and classroom application assignments. Topics are content-focused and vary each semester with the needs of the students. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)<P><I>Notes: </I>Open only to students admitted to the Master of Arts in Teaching program.

ED.810.623. Special Topics in Science. 3 Credits.
The purpose of this course is to improve prospective teachers' content knowledge in science. Students explore specific topics in science through seminar discussions, research, projects, and classroom application assignments. Topics are content-focused and vary each semester with the needs of the students. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)<P><I>Notes: </I>Open only to students admitted to the Master of Arts in Teaching program.

ED.810.624. Special Topics in Secondary Social Studies. 3 Credits.
The purpose of this course is to improve prospective teachers' content knowledge in social studies. Students explore specific topics in social studies through seminar discussions, research, projects, and classroom application assignments. Topics are content-focused and vary each semester with the needs of the students. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools. (3 credits)<P><I>Notes: </I>Open only to students admitted to the Master of Arts in Teaching program.

ED.810.631. Methods of Teaching in Secondary English: Part II. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.632. Methods of Teaching in Secondary Math: Part II. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.633. Methods of Teaching in Secondary Science: Part II. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.634. Methods of Teaching in Secondary Social Studies: Part II. 3 Credits.
Students will use their subject area content expertise to design effective lesson and unit plans that apply significant concepts and understandings as defined by local, state, and national curriculum and professional standards. Discipline appropriate pedagogy will be the focus of instructional delivery as course content when taken into the internship classroom. In both Part I and Part II, unit plans will be developed and assessed. Part I will focus on planning and the integration of standards and content and classroom management. Part II will expand upon this focus and will also include an emphasis on instructional technology and differentiation for students with special needs.

ED.810.640. Supervised Internship and Seminar in the Elementary Schools. 6 Credits.
Students spend a minimum of a semester in appropriate elementary school settings under the guidance and direct supervision of a certified teacher and/or a university supervisor, depending upon the program format. A support seminar meets to enable students to discuss and reflect upon their experiences. Emphasis is placed on applying concepts, techniques, and theories learned in courses and other structured learning experiences to classroom settings. Supervisors provide guidance in the application of rigorous content in developmentally appropriate ways. Participants reflect, continue to develop their portfolios, and prepare for portfolio presentations. Course content is aligned with the Maryland Common Core Curriculum employed by partnership schools.

ED.810.641. MAT Clinical Practice for Elementary Candidates: Part I. 2 Credits.
This school based experience is designed to provide MAT candidates with an opportunity to work with public and private school students in diverse settings. Hosting sites (Professional Development Schools and partnership schools) serve as clinical laboratories where students begin a minimum 100-day internship where they can observe how pupils learn, discover appropriate teaching strategies, plan lessons, implement teaching methods, as well as develop classroom management skills. This course is aligned with the expectations of the Maryland Common Core. This course provides an opportunity to practice clinically while being guided by an experienced master teacher and university faculty.

ED.810.642. MAT Clinical Practice for Elementary Candidates: Part II. 3 Credits.
This school-based experience is designed to provide MAT candidates with an opportunity to continue working with public and private school students in diverse settings. Hosting sites (Professional Development Schools and partnership schools) serve as clinical laboratories where students complete their minimum 100-day internship observing how pupils learn, practicing appropriate teaching strategies, planning lessons, implementing teaching methods, as well as refining classroom management skills. Students will complete their professional portfolio with evidence acquired in this course. This course is aligned with the expectations of the Maryland Common Core. This course provides an opportunity to practice clinically while being guided by an experienced master teacher and university faculty.
ED.810.641

ED.810.645. Supervised Internship and Seminar in the Secondary Schools. 6 Credits.
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ED.810.646

ED.810.660. Teacher as Thinker and Writer. 3 Credits.
Novice teachers will reflect upon and write about their teaching experiences as a means of improving their teaching practice. They will employ a variety of writing forms to reflect on their different roles and contexts required of them in their classrooms, schools, and communities. Each class session will serve as a writing workshop with collaborative activities designed to generate pieces of writing (expository, narrative, descriptive, imaginative, and dramatic). (3 credits)

ED.810.665. In the Age of Change: School Reform in the United States. 3 Credits.
This course examines reform movements across the United States. School reform occurs at many different levels, from the classroom level with individual teachers, to the national level with federal mandates. We will explore reform at different levels and analyze the theory, policies, practices, and controversies of various mechanisms of reform, including the K-8 movement, small high schools, school choice (charters and vouchers), mayoral control, community schools and federal reform initiatives. Participants will synthesize information about school reform in the United States schools and systems and will reflect on their role in this process. Final evaluation of reform strategies will be grounded in the effect these reforms are having on improving learning for all students across the United States schools.

ED.810.679. Classroom Management. 2 Credits.
Students consider the practical ways of managing the classroom by examining organizational techniques, procedures and routines, and teaching strategies that help foster appropriate student behavior. Class members investigate management styles and discipline models to develop their own framework for effective classroom management. (2-3 credits)

ED.811.603. Special Education: Promises and Challenges I. 1 Credit.
This course provides: (a) an overview of the characteristics of students with exceptional learning needs and (b) the field's history, laws, procedures and trends. This is a foundational course in special education that will allow participants to explore the state of special education in the United States today and its impact on urban education.

ED.811.604. Special Education: Promises & Challenges II. 1 Credit.
This course examines a framework for understanding key concepts in inclusion as they relate to the academic, social, and emotional development of all learners. This course encourages participants to consider the cultural and linguistic issues that influence students' needs as well as families' understanding of special education services.

ED.811.608. Building Productive and Nurturing Classroom Communities II. 1 Credit.
In this course, participants will continue to explore models of community building practices for their classrooms that will demonstrate inclusivity and respect for all students. The course emphasizes reinforcement techniques to support student needs and behavior while diving deeper into culturally responsive and restorative discipline approaches. Participants are supported in developing their philosophies for building classroom communities that will support student voice and independence while fostering family and community relationships. Participants will practice enacting reinforcement techniques while developing appropriate systems to use in the clinical setting.

ED.811.612. Introduction to Assessment and Tiered Instruction. 2 Credits.
This course examines teaching and learning for students with exceptional learning needs in the general education classroom, with specific attention to the role of informal assessment and subsequent differentiation in response to findings. Foci include: (a) best practices for nondiscriminatory assessment, (b) practice administering group and individual informal assessments, (c) knowing how, when, and why to vary learning environments, learning activities, and content, and (d) implementing Tier 1 accommodations/modifications and Tier 2 interventions to support student learning opportunities.

ED.811.614. Small Group Practicum (Secondary). 2 Credits.
Practicum is designed to provide participants with an opportunity to work intensively with a small group of students from the host classroom by assessing and analyzing data as well as planning and teaching data-driven lessons. Participants will progress monitor students over the course of the 12+ weeks of small group instruction. The primary goal of the practicum experience is to increase student academic performance. A secondary goal is to provide participants with sufficient opportunities to enact the pedagogy of highly effective mathematics teachers. For mathematics practicum, participants will maintain a working group of 3–4 students across the entire semester, five days a week, and for 30–45 minutes per day, utilizing the Do the Math Now! intervention program. Do the Math NOW! focuses on mathematics topics that are typically taught at grades 6–8 and which—if not mastered—can later interfere with success in secondary mathematics at grades 7–12.

ED.811.615. Formal Assessment and Designing Individualized Education Programs. 1 Credit.
This course provides review of measurement statistics and practice with the administration, scoring, and interpretation of commonly used norm-referenced instruments and procedures for determination of eligibility for special education. Comparisons are made with informal assessment results, and ways to communicate results are discussed. Writing a formal report based on multiple data points is explained and detailed. The IEP process, from referral to eligibility determination and placement, is examined.

ED.811.616. Understanding and Managing Behavior. 2 Credits.
An overview of behavior management is presented within the framework of understanding the context and function of behavior, as well as developing systems that promote prosocial behaviors in the classroom. Residents will consider the interactions of people, environments, and responses to behaviors as factors that influence student behavior. Residents will also demonstrate understanding of Functional Behavior Assessments (FBA) and develop a Behavior Intervention Plan (BIP) as a method to address challenging behaviors.

ED.811.617. Specialized Instructional Techniques. 2 Credits.
Participants will investigate Tier 3 interventions in literacy, math, and behavior to establish how they differ from the kind of support that students already receive, the evidence base for them, the factors that would need to be considered to implement them, the ways in which they are implemented, and the ways to monitor their effectiveness.

ED.811.618. Clinical Residency I. 2 Credits.
Fellows are expected to reflect on their many opportunities to develop and refine their instructional practice and classroom management skills in a whole class setting as well as plan and deliver targeted tiered instruction. Fellows are expected to implement the content and skills developed through coursework and the inherent clinical experiences in a comprehensive manner during their first year as a teacher of record. Fellows will examine the evolution in their unit and lesson planning throughout the year and draw conclusions that inform their ongoing ability to plan targeted, rigorous, and engaging lessons.

ED.811.623. Building Productive and Nurturing Classroom Communities I. 1 Credit.
In this course, participants will be introduced to and practice the implementation of techniques for building classroom communities that are inclusive, equitable, and culturally responsive to all students. During the course, the participants will explore and critique multiple models of behavior management and modification, analyze the behavioral theories behind them, and practice techniques that support culturally relevant behavioral and learning outcomes. Participants will practice the fundamentals of building classroom communities, such as building responsive rapport with their students, enacting strong teacher presence, crafting and delivering explicit directions, and engaging in positive narration and restorative discipline. Participants will develop routines and procedures for implementation in the clinical setting.

ED.811.625. Emergent Literacy. 3 Credits.
This course will prepare participants for teaching literacy in early grades classrooms. Participants will be immersed in the instructional methodology that support the social, cultural, cognitive, and linguistic aspects of young children's reading and writing development in the classroom. Emphasis will be placed on utilization of assessment and its data to guide instructional planning aligned to K-2 standards. Additionally, participants will explore ways technology and new literacies practices can be used to support and enhance instruction.

ED.811.628. Intermediate Literacy. 2 Credits.
This course will prepare participants for teaching literacy in intermediate grades classrooms. Participants will be immersed in instructional methodology that supports the development of literacy in grades 3–6. Emphasis will be placed on the teaching of reading and writing as a means of developing comprehension, critical analysis, and discourse of fiction and nonfiction text. Additionally, participants will focus on the selection and utilization of relevant complex digital and print materials.

ED.811.630. Supporting Writer's Development. 2 Credits.
This course prepares participants for the thoughtful examination of students as writers and writing instruction. Throughout the course, participants will be introduced to strategies and skills they can use to enhance their own writing and the writing of their students. Using a process approach, participants will learn how to teach students to communicate ideas effectively in a variety of genres, for different purposes, and for diverse audiences. Data generated from student writing samples will be used to plan lessons, monitor progress, provide on going feedback, and differentiate instruction. Explicit attention will be given to sentence composing and the use of mentor texts and exemplars to support writing achievement.

ED.811.631. Elementary S.T.E.M. Methods. 3 Credits.
This course is an introduction to teaching inquiry-based science, technology, engineering, and mathematics (STEM) topics in grade level K-5. Participants will examine the practice of science by determining what it means to understand science and be scientifically literate, recognizing the importance of teaching scientific inquiry and process skills, and learning to create 5E inquiry lessons to promote meaningful science instruction; identify disciplinary core ideas by learning some science together, engaging in scientific inquiry just as you might do with your students, and considering inaccurate thinking children (and adults) have about specific science concepts; and use crosscutting concepts when designing thematic lessons. Emphasis will be placed on designing and evaluating instruction and curriculum in terms of how they effectively promote inquiry, critical, and design thinking.

ED.811.632. Small Group Literacy Practicum. 2 Credits.
Participants plan for and deliver small group differentiated instruction. The small group instructional experience prepares participants for intervention instruction. The small group instructional experience prepares participants for intervention instruction to students who need additional academic support(s). Participants are expected to implement the appropriate constructs and models for teaching and learning that they have acquired throughout coursework.

ED.811.640. Secondary ELA Immersion and Discourse. 3 Credits.
This course models a productive and nurturing classroom environment. Participants become completely immersed in their own learning about reading and writing, speaking and viewing, and discussing texts of all kinds. For each sequence of instruction, participants debrief the learning and the instructor's onstage/offstage decision making. Participants also develop and present lessons that are closely aligned to the Common Core State Standards.

ED.811.641. Language Acquisition. 2 Credits.
Participants will look deeply at three major topics that are important to supporting linguistically and culturally diverse students in urban, secondary education settings: language variation, academic language, and second language acquisition. Participants will explore these interrelated topics, attending to both socio-cultural and cognitive-linguistic perspectives on learning and learning environments. The purpose of the course is to guide educators to use linguistic awareness to inform their teaching. Participants will examine state standards andthe role of language in assessment and learning.

ED.811.642. Reading Diagnosis and Intervention. 2 Credits.
In this course, participants will deepen their understanding of reading processes, methods of reading assessment, and reading intervention strategies. They will assess students' skills and knowledge in word recognition, fluency, vocabulary, and reading comprehension, and prepare lessons in response to students' needs. To ensure effective management and clear communication with colleagues and caregivers during the first semester as lead instructors, participants will prepare thorough plans for classroom procedures related to reading assessment and instruction, and they will develop careful scripts for conferences. Course sessions will include time for collaborative lesson planning.

ED.811.643. Writing in the Secondary Classroom. 3 Credits.
This course prepares participants for the thoughtful examination of writers and writing instruction. Throughout the course, participants will be introduced to strategies and skills they can use to enhance the writing of their students. Using a process approach, participants will learn how to teach students to communicate ideas effectively in a variety of genres, for different purposes, and for diverse audiences. Explicit attention will be paid to reading and writing connections, and technology will be used to explore new literacy practices. Data will be used to plan lessons, monitor progress, provide on-going feedback, and differentiate instruction.

ED.811.644. Genre Study I: Argument and Informational Texts. 3 Credits.
In this course participants will be immersed in reading and writing informational and argumentative texts. Participants will analyze texts to identify the characteristics, structures, and techniques commonly used in a variety of texts within each genre. Participants will develop comprehension lessons in each genre and will develop a unit that integrates reading and writing of informational and argumentative texts. To support the development of the unit, participants will explore a wide range of texts for their quality, complexity, and the diverse roles they play in secondary English-Language Arts. Participants will examine how the texts being used in conjunction with it, through the process of reading and then designing original multi-modal, multi-genre text sets with a focus on informational and argumentative texts.

ED.811.646. Genre Study II: Poetry, Drama, and the Novel. 3 Credits.
What we reads determines our reading process, and adolescents need opportunities to read, respond to, and write in different genres. By gaining an understanding of the structures and conventions of a variety of genres, students improve their reading comprehension. First as learners and then as teachers, participants will read and analyze texts in four genres: novel, short story, poetry and drama. These readings will include contemporary texts and those traditionally taught at the secondary level. Emphasis will be placed on fostering and developing student stamina and engagement. Participants will (1) study the major components used within these genres; (2) investigate the reading, writing, and critical-thinking skills required of students when reading and responding to complex texts; (3) identify the challenges unique to teaching diverse learners; and (4) conceptualize, design, and implement a thematic unit that incorporates at least three genres.

ED.811.650. Secondary Math Immersion. 3 Credits.
This course is designed to provide participants with an overview of mathematical thinking and reasoning put forth in the Common Core State Standards for grades 6-12. Participants will experience first-hand a mathematics learning environment that places a premium on students' mathematical sense-making. The overarching goal of this course is to immerse participants in the kind of high cognitive demand math learning experiences they will ultimately provide for their own students. Participants will not only leave this course with lasting images of high quality mathematics instruction, they will also be able to connect those images to specific exemplary teacher behaviors articulated in the Urban Teachers' Teacher Practice Rubric.

ED.811.651. Proportional Reasoning. 3 Credits.
Participants will work with their small group teaching assignments to integrate ideas of proportional thinking, such as using a factor-of-change, a ratio table, cross-multiplication, and scaling up and down. This work with their students will provide an opportunity for exploring ways to identify a student's level of understanding for proportional thinking, such as the ability to differentiate between additive and multiplicative relationships, and developing tasks and activities that will correct and deepen that understanding.

ED.811.652. Algebra, Functions, and Modeling in the Real World. 3 Credits.
This course aims to provide participants with a rich understanding of essential conceptsundergirding high school algebra, functions and the modeling process. Participants considercritical components of how students in grades 6-12 develop algebraic thinking and skill, beyondtraditional focus on algebraic manipulations. An in-depth focus on functions in the course allowsparticipants to systematically explore and analyze patterns, change and relationships amongquantities in everyday events and problems in life and society. Participants will further theiralgebra experience by exploring functions as fundamental mathematics objects that allow us tomodel real life situations. Understanding and applying components of the modeling process allows participations to examine authentic real-world situations by building mathematical models and applying solutions using the lens of culturally relevant pedagogy and social justice mathematics.

ED.811.653. Math Methods I. 2 Credits.
This course is designed to provide participants with initial structure and resources to provide a framework for teaching that includes data collection, case analysis, small group instruction, whole group paired and individual instruction. Participants will discuss effective methods for lesson planning, incorporating the needs of students with IEPs and 504 plans, and assessment. Participants will have the opportunity to rehearse lessons prior to implementation and respond to feedback.

ED.811.655. Math Methods II. 2 Credits.
This course will continue the work done in Math Methods I around planning, collaborating, data collection, self-assessment, rehearsal, revision of lessons to suit students' needs, and general support. Participants will continue to receive guidance on addressing the Specially Designed Instruction (SDI) needed for students with IEPs and 504 plans. This course will focus on issues arising in the participants' clinical work providing effective math instruction to a diverse group of learners.

ED.811.656. Practices Concepts, and Core Ideas in Secondary Science (6-12). 3 Credits.
This course integrates space, engineering, technology, and physical, life, and earth science. Participants will experience inquiry as learners and doers of science and demonstrate knowledge of the practices, crosscutting concepts, and disciplinary core ideas articulated in the Next Generation Science Standards at the middle and high school levels. Participants will reflect on their planning and delivery of science, the science teaching of others, themselves as learners of science, and the opinions of science experts.(3 credits)

ED.811.661. Secondary Classroom Management Seminar. 1 Credit.
This course will focus on introductory exposure to classroom management through readings, discussion, practice, and reflection. Participants will develop an understanding of effective classroom management systems by actively implementing strategies in a summer classroom placement. Participants will also be introduced to the concept of the school-to-prison pipeline and its relationship to classroom management and disciplinary practices. Participants will learn about and understand how effective classroom management strategies, procedures, and strong student-teacher relationships can help counteract the school-to-prison pipeline.

ED.811.665. Trauma Informed Teaching Practices. 1 Credit.
This course is designed to help participants develop skills to support students who have experienced trauma. Participants will also examine current research about trauma-sensitive classroom environments that promote student learning and interpersonal skills for coping with trauma.

ED.811.667. Social Studies Inquiry: Content Area Reading and Writing. 2 Credits.
This online course will engage participants in the inquiry process as learners. Participants apply this process as they design and plan a thematic social studies inquiry unit that supports students in becoming agents of change in the communities in which they reside through historical, cultural, political, and geographical exploration. Specific attention is given to developing rigorous and meaningful units of study to support students in developing relevant content knowledge through multimodal texts using content area and disciplinary literacy practices. Participants will utilize their understanding of literacy practices from previous coursework and social studies methodology to support students in achieving the goals of this unit of study.

ED.811.670. Race, Culture, and Equity in Urban Education. 2 Credits.
In this course, residents will be prompted to see themselves as diversity advocates who understand and respect differences among learners in their classrooms, schools, and organizations. They will explore how by first understanding their own beliefs and biases they can then begin to better understand those around them; particularly those they have chosen to serve – students. They will learn that in order to become effective teachers who will build upon the strengths and skills of urban students and their families and communities they will need to build healthy, meaningful relationships and promote academic achievement. Residents will also explore the intersection of beliefs and practices through the examination of various learning theories and frameworks for effective, culturally responsive instruction.

ED.811.671. Reading, Writing, and Language Development. 2 Credits.
This course provides a foundational understanding of the ways children develop in the areas of reading, writing, speaking and listening. Participants will be immersed in the social and cultural perspectives related to literacy development, the developmental stages of literacy, the five components of reading instruction (phonemic awareness, phonics, fluency, vocabulary, and comprehension) and instructional methods and materials for supporting the literacy development of students with diverse language and learning needs.

ED.811.672. Numbers, Operations, and Algebraic Reasoning. 2 Credits.
This course focuses on building the content understandings and pedagogical skills to teach elementary mathematics. Participants investigate the procedures, concepts, models, and representations that are required to understand our base-ten number system and operations with whole numbers, fractions, and decimals. Additionally, participants will experience and plan for Mathematics Workshops as a structure for implementing equitable, high quality mathematics teaching and learning. Participants will rehearse and plan effective teacher moves for facilitating a student-centered Mathematics Workshop lesson. Particular attention is also given to unpacking standards, identifying quality math tasks, and planning instruction which places emphasis on the representation and communication of student mathematical thinking and reasoning. Participants will also rehearse, plan, and implement effective teacher behaviors that foster student engagement in the eliciting and synthesis of mathematical ideas.

ED.811.673. Counting & Cardinality. 1 Credit.
This course focuses on the scope and sequence of mathematics concepts and skills and developmentally appropriate environments for young learners. Participants will learn about the learning trajectories for number sense, counting, and cardinality. Participants will engage young learners in academic discourse to uncover student thinking and to assess student readiness. Participants will also examine, plan, and implement instructional routines that engage young learners—including examining and discussing appropriate models and manipulatives to support the acquisition of automaticity, fluency, and conceptual understanding.

ED.811.674. Small Group Math Practicum. 2 Credits.
Small Group Practicum is designed to provide participants with a rigorous opportunity to work intensively with a small group of elementary students to provide Tier 2 mathematics intervention instruction using the Number Sense Screener, Number Sense Interventions, Do the Math, or a specialized program for pre-k. Participants learn how to assess and analyze the mathematical skills and knowledge of their students using appropriate diagnostics from the intervention program. Participants will practice using pre-test data to plan and implement Tier 2 mathematics lessons. Participants will monitor the progress of students over the course of the 12+ weeks of small-group instruction with the goal of monitoring the student achievement and attendance of 3–4 children. Mathematics intervention instruction, excluding assessments, occurs 4–5 days a week, for 45 minutes per day, for 12+ weeks (i.e., a total of 45 hours).

ED.811.675. Geometry for Elementary Grades. 2 Credits.
In this course, participants will be immersed in the progression of the standards for geometry in grades K–5. Participants will acquire knowledge about the theoretical model of geometric understanding (Van Hiele) and use this to select a math task aligned to standards, develop lesson plans, and analyze and use student performance data to inform future instruction. Emphasis will be placed on identifying community assets and resources and leveraging those assets to plan geometry instruction that is real-world, authentic, and meaningful for elementary learners. Participants will demonstrate their understanding of geometric progression in the standards, levels of geometric understanding, and community assets by developing a week-long unit.

ED.811.676. Measurement and Data. 2 Credits.
This course focuses participants on developing understanding of the strands of mathematical proficiency involved in concepts of measurement and data in grades K–5. Participants are immersed in the progression of the measurement and data standards aligned to the state standards for mathematics at grades K–5. Emphasis is placed on participants examining the crosscutting mathematics concepts that are connected to measurement and data topics (e.g., Algebraic Reasoning or Number & Operations). Participants acquire strategies for helping students monitor their learning, rehearse the planning of lessons that embed choice options (process), and differentiate the demonstration of learning for students (product).

ED.811.677. Motivation and Engagement of Adolescent Readers and Writers. 1 Credit.
In this course, participants will examine the factors that support engagement and motivation of adolescent readers and writers. Adolescents have distinct identities that inform their relationship to reading and writing, identities that have been formed over the course of many years of experiences in schools. Participants will identify ways to positively engage and motivate students as readers and writers. This work is essential for students entering secondary grades with negative academic identities informed by prior academic experiences. Increasingly negative identities are inversely associated with future academic outcomes. By unpacking the factors that impact identity, motivation, and engagement, participants will be equipped to design lessons that positively support positive identity formation by their students.

ED.811.678. Data and Community: Statistics and Probability in Action. 2 Credits.
This course combines an exploration of fundamental principles of data science with essential concepts in K-12 statistics and probability. Participants explore the place and prevalence of real-world data and examine how data is gathered, represented, analyzed and utilized to drive decision-making in today's world. In the course, participants use statistical tools and work with data to uncover patterns that impact our communities and the world at large. Integrating social justice standards as a basis for problem- solving through statistics and probability empowers participants, and subsequently the students they teach, to be able to unveil data patterns in their communities and lived experiences. Integrating the use of the statistical thinking process, data science and probability will help participants and their students to analyze and respond to individual and institutional bias and injustice.

ED.811.679. Adolescent Development and Urban Youth. 1 Credit.
This course is designed to build an understanding of adolescent development and apply that knowledge to practice as teachers of adolescent learners. It is intended to create teachers who are more informed and better prepared to respond to the abilities, behaviors, and needs of adolescent learners. To that end, residents will explore adolescent development through an examination of their physical, cognitive, and socio-emotional development. In addition, as teachers of adolescents in urban communities, they will also examine how issues related to race and gender identity inform and impact the development of nurturing and productive classroom environments that create inclusive learning spaces for all students

ED.813.601. Seminar in Transformational Leadership and Teaching: Part I. 1 Credit.
In the Seminar in Transformational Leadership and Teaching, educators will determine what transformational teaching looks like in the unique context of their field experience: classroom, school, and community. Each session will focus on specific topics that educators will evaluate for alignment with their vision of transformational teaching. Finally, they will develop a plan of action to apply within their own context. Topics may include the attributes of exemplary teachers, services of community organizations, and characteristics of today's learners.

ED.813.602. Seminar in Transformational Leadership and Teaching: Part II. 1 Credit.
In the Seminar in Transformational Leadership and Teaching, educators will determine what transformational teaching looks like in the unique context of their field experience: classroom, school, and community. Each session will focus on specific topics that educators will evaluate for alignment with their vision of transformational teaching. Finally, they will develop a plan of action to apply within their own context. Topics may include the attributes of exemplary teachers, services of community organizations, and characteristics of today's learners.
ED.813.601

ED.813.603. Seminar in Transformational Leadership and Teaching: Part III. 2 Credits.
In the Seminar in Transformational Leadership and Teaching, educators will determine what transformational teaching looks like in the unique context of their field experience classroom, school, and community. Each session will focus on specific topics that educators will evaluate for alignment with their vision of transformational teaching. Finally, they will develop a plan of action to apply within their own context. Topics may include the attributes of exemplary teachers, services of community organizations, and characteristics of today's learners.
ED.813.602

ED.813.604. Seminar in Transformational Leadership and Teaching: Part IV. 2 Credits.
Teach For America corps members are required to attend a Seminar in Transformational Leadership and Teaching course all four semesters while in the corps. This course will develop corps members' competencies in the Teaching as Leadership (TAL) framework, the TAL impact model, and our developing understanding of transformational teaching. While much of a corps members' university development is rooted in instructional methods and teacher execution, the Seminar in Transformational Leadership and Teaching course develops teachers' ability to foster the more enduring qualities of access, advocacy, and habits of mind. Additionally, the students in this class will be observed once per quarter via a video-based online protocol.
ED.813.603

ED.813.611. Classroom Management: Part I. 1 Credit.
In this course, educators will gain a deep understanding of basic classroom management approaches including skills to maintain organized and efficient learning environments through classroom procedures and routines. Further, teachers will study motivation theory and apply the research in their own classrooms. This course focuses on how to drive students to invest in their own academic success and be self-motivated in school and beyond.

ED.813.612. Classroom Management: Part II. 2 Credits.
In this course, educators learn advanced strategies to help students become self-motivated to drive their own academic growth and future life options. By studying motivation theory, educators develop plans to support the individual learning and behavioral needs of all students, even those who may be disruptive in class. Educators use their own unique classroom experiences to further their professional growth and learning in this course.
ED.813.611

ED.813.621. Effective Practices in Teaching and Learning I: General Educators. 3 Credits.
In this course, educators will acquire the knowledge and skills of research-based effective practices in teaching and learning. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. Educators will select online modules that best address their development as a transformational teacher.

ED.813.622. Effective Practices in Teaching and Learning II: General Educators. 3 Credits.
In this course, educators will build upon the knowledge and skills of research-based effective practices acquired in Effective Practices in Teaching and Learning I. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. With guidance from advisors and coaches, educators select online modules that best address their development as a transformational teacher.
ED.813.621

ED.813.631. Effective Practices in Teaching and Learning I: Special Educators. 3 Credits.
In this course, educators will acquire the knowledge and skills of research-based effective practices in teaching and learning. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. Educators will select online modules that best address their development as a transformational teacher. Special educators will also receive differentiated instruction to address the specific needs of their classrooms.

ED.813.632. Effective Practices in Teaching and Learning II: Special Educators. 3 Credits.
In this course, educators will build upon the knowledge and skills of research-based effective practices acquired in Effective Practices in Teaching and Learning I. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. With guidance from advisors and coaches, educators select online modules that best address their development as a transformational teacher.
ED.813.631

ED.813.641. Effective Practices in Teaching and Learning I: ESOL Educators. 3 Credits.
In this course, educators will acquire the knowledge and skills of research-based effective practices in teaching and learning. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. Educators will select online modules that best address their development as a transformational teacher. Further, elements of effective ESOL education will be highlighted.

ED.813.642. Effective Practices in Teaching and Learning II: ESOL Educators. 3 Credits.
In this course, educators will build upon the knowledge and skills of research-based effective practices acquired in Effective Practices in Teaching and Learning I. Through a combination of coaching and online modules, educators will reflect upon their practice and apply instructional skills to motivate their students to achieve at the highest academic level. With guidance from advisors and coaches, educators select online modules that best address their development as a transformational teacher.
ED.813.641

ED.813.651. Introduction to Education Budgeting. 3 Credits.
Educational leaders must be equipped to analyze and create budgets and other financial tools in order to fully realize their vision of high quality instruction in high performing schools. This course will introduce students to the fundamental principles of budgeting for educational institutions and provide them with a set of basic skills to create and analyze budgets in their specific professional context.

ED.813.652. Introduction to Global Education Policy and Analysis. 3 Credits.
The course provides an introduction to international comparisons of education systems as it reviews the history, comparisons and the educational systems in Europe, Asia and the OECD countries. International education systems and policies are examined on the local and national levels. Methodologies for comparison are explored. Education leaders will become knowledgeable of the systems in competitor countries in order to make their schools academically competitive in the global economy.

ED.813.653. Current Issues in Educational Leadership. 3 Credits.
Today's educational leaders are confronted with a myriad of diverse issues on a daily basis. Those issues traditionally include governance, academic affairs and resources. In the current education environment, leaders must also be prepared to act on issues concerning accountability, accessibility, technology, competition and community partnerships as well as quickly changing local, state and federal policies. This course will introduce students planning to pursue careers as education leaders, in both K-12 and higher education, to the issues and pressures they will encounter in real time. After receiving instruction in a broad overview of a number of important current issues, students are asked to examine case studies and develop leadership strategies to manage these high profile education issues.

ED.813.654. Race, Power and Policy in Education. 3 Credits.
This course examines the intersections of race, power and policy and their impact on education. The course is designed to review historical and systematic drivers of racial and social class inequality in American education. Through this course, students will examine various theories, concepts, principles, and dynamics of race, power, and policy and how these ideas apply to and impact education, organizations, and communities with the intent of acting as advocates and change agents to eradicate racial inequalities to a solutions based orientation.

ED.813.661. Assessment for Reading Instruction for Young Children. 3 Credits.
This course presents foundational concepts of assessment in reading as well as the various types and purposes of emergent and beginning reading assessments. Educators will plan and implement research-based reading assessments and use assessment data to make educational decisions and inform early literacy instruction. Educators will use effective techniques for communicating assessment results to peers, students, and parents.
You may not enroll in this course if you have previously enrolled in 813.662 course or have 813.662 course on your enrollments for this semester already.

ED.813.662. Assessment for Reading Instruction. 3 Credits.
This course presents foundational concepts of assessment in reading as well as the various types and purposes of literacy assessment. Educators will plan and implement research-based reading assessments and use assessment data to make educational decisions and inform literacy instruction. Educators will use effective techniques for communicating assessment results to peers, students, and parents.
You may not enroll in this course if you have previously enrolled in 813.661 course or have 813.661 course on your enrollments for this semester already.

ED.813.664. Portfolio Development, Part I: Teacher Growth.
The course is part one of the yearlong process, requiring monthly submissions from the candidates and communication with a portfolio coach to support them as they develop their Master's portfolio. (0 credit)

ED.813.665. Portfolio Development, Part II: Student Growth.
The course is part two of the yearlong process, requiring monthly submissions from the candidates and communication with a portfolio coach to support them as they develop their Master's portfolio. (0 credit)
ED.813.621 OR ED.813.631 OR ED.813.641;ED.813.622 OR ED.813.632 OR ED.813.642;ED.813.681 OR ED.813.682;ED.813.611 AND ED.813.612

ED.813.666. Instruction in Reading for the Young Child. 3 Credits.
This course presents research-based approaches to developing a comprehensive literacy program for children at varying stages of literacy development. Early childhood educators will incorporate into their daily lessons effective practices to promote language and literacy development, including concepts of print, phonological and phonemic awareness, word recognition (e.g., phonics and spelling), fluency, vocabulary, comprehension, and writing. This course focuses on accelerating literacy development through early intervention strategies. Also emphasized are strategies for involving families and the community in support of the literacy program.
You may not enroll in this course if you have previously enrolled in 813.667 course or have 813.667 course on your enrollments for this semester already,

ED.813.667. Instruction in Reading. 3 Credits.
This course presents research-based approaches to developing a comprehensive literacy program for students at varying stages of literacy development. Educators will incorporate into their daily lessons effective practices to promote language and literacy development, including phonological and phonemic awareness, word recognition (e.g., phonics and spelling), fluency, vocabulary, comprehension, and writing. This course focuses on accelerating literacy development in students with low reading achievement through early identification and intervention strategies. Also emphasized are strategies for involving families and the community in support of the literacy program.
You may not enroll in this course if you have previously enrolled in 813.666 course or have 813.666 course on your enrollments for this semester already.

ED.813.668. Materials for Teaching Reading to the Young Child. 3 Credits.
This course focuses on evaluation and selection of reading materials for a comprehensive early literacy program. Early childhood educators will learn and apply effective practices for selecting, evaluating, and organizing texts and materials, including informational and digital texts and resources, for a variety of purposes of reading. Attention will be given to evaluating quality of literature, addressing diverse cultural and linguistic backgrounds, leveling systems, intervention and family support, and children's interests and motivation.
You may not enroll in this course if you have previously enrolled in 813.669 course or have 813.669 course on your enrollments for this semester already.

ED.813.669. Materials for Teaching Reading. 3 Credits.
This course focuses on evaluation and selection of reading materials for a comprehensive literacy program. Educators will learn and apply effective practices for selecting, evaluating, and organizing texts and materials, including informational and digital texts and resources, for a variety of purposes of reading. Attention will be given to evaluating quality of literature, addressing diverse cultural and linguistic backgrounds, leveling systems, intervention and family support, and student interest and motivation.
You may not enroll in this course if you have previously enrolled in 813.668 course or have 813.668 course on your enrollments for this semester already.

ED.813.681. Teaching for Transformation I: Secondary Content. 3 Credits.
In this course, educators in grades 6-12 will take a three-part journey to advancing their knowledge and skills as secondary instructional leaders. They will: 1) learn and apply effective practices for conducting action research in the classroom to inform teaching and learning; 2) engage in a process for providing students access to opportunities otherwise unavailable to them that will inspire students to become lifelong learners and make productive and fulfilling life choices; and 3) build upon their knowledge and skills in content area teaching and learning to become strategic instructional decision makers, increase their self-efficacy in the classroom, and improve student learning and achievement. Emphasis will be on synthesizing learning, reflective practice, and professional growth.

ED.813.682. Teaching for Transformation I: Elementary Content. 3 Credits.
In this course, educators in grades PreK-5 will take a three-part journey to advancing their knowledge and skills as elementary instructional leaders. They will: 1) learn and apply effective practices for conducting action research in the classroom to inform teaching and learning; 2) engage in a process for providing students access to opportunities otherwise unavailable to them that will inspire students to become lifelong learners and make productive and fulfilling life choices; and 3) build upon their knowledge and skills in content area teaching and learning to become strategic instructional decision makers, increase their self-efficacy in the classroom, and improve student learning and achievement. Emphasis will be on synthesizing learning, reflective practice, and professional growth.

ED.813.683. Teaching for Transformation II: Secondary Content. 3 Credits.
In this course, educators in grades 6-12 will take a three-part journey to advancing their knowledge and skills as secondary instructional leaders. They will: 1) learn and apply effective practices for conducting action research in the classroom to inform teaching and learning; 2) engage in a process for providing students access to opportunities otherwise unavailable to them that will inspire students to become lifelong learners and make productive and fulfilling life choices; and 3) build upon their knowledge and skills in content area teaching and learning to become strategic instructional decision makers, increase their self-efficacy in the classroom, and improve student learning and achievement. Emphasis will be on synthesizing learning, reflective practice, and professional growth.
ED.813.681

ED.813.684. Teaching for Transformation II: Elementary Content. 3 Credits.
In this course, educators in grades PreK–5 will take a three-part journey to advancing their knowledge and skills as elementary instructional leaders. They will: 1) learn and apply effective practices for conducting action research in the classroom to inform teaching and learning; 2) engage in a process for providing students access to opportunities otherwise unavailable to them that will inspire students to become lifelong learners and make productive and fulfilling life choices; and 3) build upon their knowledge and skills in content area teaching and learning to become strategic instructional decision makers, increase their self-efficacy in the classroom, and improve student learning and achievement. Emphasis will be on synthesizing learning, reflective practice, and professional growth.
ED.813.682

ED.851.512. Politics of Education. 3 Credits.
Federal involvement in education has grown enormously in recent decades with calls for national standards and increasing reliance on standardized tests. While state legislatures and school boards traditionally provide funding and policy, mayors, parents and advocates of charter schools are seeking to redefine the nature of local control. Education leaders should understand the politics of education; the swiftly changing balance of power; and how education politics is practiced between and within the levels of government and the public. Students will study and analyze current issues and case studies that focus on the politics of education.

ED.851.601. Organization and Administration of Schools. 3 Credits.
Students examine the role of the school administrator, with emphasis on instructional improvement, pupil development and services, school and community relations, administration of facilities and finance, professional development and services for staff, and organizational relationships and responsibilities. Participants will explore best practices for fostering student achievement.

ED.851.603. School Law. 3 Credits.
Participants explore the legal foundations and structure of education and consider contemporary issues based on legislation and court decisions. Students develop techniques of legal research and analyze a topic of interest.

ED.851.609. Administrative and Instructional Uses of Technology. 3 Credits.
Prospective and practicing school administrators examine the issues, ideas, and programs surrounding the use of technology as a tool for administration and instructional management. Through hands-on experience, participants explore practical uses for software that can be applied to their daily work.

ED.851.616. Issues in K-12 Education Policy. 3 Credits.
This course provides an introduction to and an overview of several key and rapidly expanding areas of educational policy research, teacher effectiveness, teacher labor markets and teacher policy. The goals of this course are to familiarize students with some of the most current research in these areas, and to encourage and support students to develop skills as critical consumers of empirical work and policy debates in educational policy.

ED.851.642. Leadership in Curriculum, Instruction, and Assessment for Independent Schools. 3 Credits.
Students examine curriculum theory, design, and content and their relation to instruction and assessment as applied to independent schools. Topics include: curriculum and the independent school mission statement; K-12 curriculum scope and sequence; leadership of curriculum change; curriculum mapping and its implications; methods of assessment; interdisciplinary curriculum development; culturally responsive curriculum, instruction, and assessment; and differentiation of curriculum and instruction. Participants apply course content by developing a plan for curriculum implementation in their own schools.

ED.851.643. Supervision and Professional Development for Personnel in Independent Schools. 3 Credits.
Students examine models of instructional supervision, including clinical supervision and various approaches to personalizing supervisory strategies appropriate for independent schools. Emphasis is on development of an annual, school-based professional development plan; alignment of instructional goals with the supervision and evaluation of teachers; delegation of supervisory roles; recruitment, retention, and support of faculty and staff in independent schools; designing teacher incentives, recognition, and award programs; and using the principles of high-quality professional development to enhance teachers' knowledge and skills. Students apply concepts to practical situations in clinical observations.

ED.851.644. Public Relations, Marketing, and Fund-raising for Independent Schools. 3 Credits.
Students explore the importance of public relations, marketing principles, and fund raising to independent school success. Topics include: maintaining positive community relations; management of admission policies and procedures; operation of public relations and publicity functions; coordination of relations with other independent schools; facilitating relations with educational, governmental, and social service agencies; and fund-raising strategies. Students analyze and critique various strategies through case studies and discussion.

ED.851.645. Governance of Independent Schools. 3 Credits.
Students learn to facilitate positive working relationships within the board of trustees and build effective partnerships between the board and the school's faculty and staff. Topics include: setting, communicating, and evaluating progress toward annual goals; strategic planning with faculty, staff, and board members; establishing structures for boards to accomplish their work; reporting effectively to boards on important issues and concerns; models for evaluating the head of school; models for evaluating board performance and contributions of individual board members; developing trustees as effective school advocates; and managing crises. Students gain an understanding of the pressures exerted from multiple constituencies, finding ways to base decisions on what is good for students, what is good for the institution, and what is consistent with their own values.

ED.851.646. Business Management and Finance for Independent Schools. 3 Credits.
Students learn to apply business principles and financial processes that are the foundation for successful independent school management. Content includes: oversight of independent school budgets; understanding of tuition and other revenue sources; knowledge and effective use of endowments, financial aid, and loans; understanding of major expenses; annual budget planning; grasping the legal and ethical implications of financial management; developing salary scales and policies; using principles of strategic, long-range planning; and facilities planning, maintenance, and management. Applications include case studies for identifying and resolving common problems and challenges.

ED.851.705. Effective Leadership. 3 Credits.
Students review the principles and techniques required of principals, assistant principals, and teacher leaders. The course emphasizes diagnosis of the school climate, principles of inclusive leadership, motivation of faculty teams, and the dynamics of working in and with groups to accomplish school improvement goals. Emphasis is placed on the leader's role in creating a collaborative vision/mission for a school and in establishing meaningful working relationships with the larger community.

ED.851.708. Systemic Change Process for School Improvement. 3 Credits.
Students examine the literature on systemic change in schools, with an emphasis on the roles of the teacher leader. Topics include planning, implementing, and evaluating the change process for school improvement.

ED.851.809. Seminar in Educational Administration and Supervision. 3 Credits.
Students prepare and present a seminar paper on a problem in educational administration or supervision. The paper includes a comprehensive literature review, an assessment of implications for administrative and supervisory behavior, and an implementation plan for addressing the problem in an educational setting. Students engage in case study analyses, role playing, and assessment exercises.
ED.851.601 AND ED.851.603 AND ED.851.705 AND ED.852.602 AND ED.881.611 AND ED.881.622 AND ED.881.610

ED.851.810. Internship in Administration and Supervision. 3 Credits.
Students participate in a supervised practicum experience in an educational setting. Individual and group sessions of the interns are held. (3 credits)

ED.851.814. Internship in Administration and Supervision. 3 Credits.
Students participate in a supervised practicum experience where they demonstrate the application of knowledge, dispositions, competencies, skills and solutions to day-to-day activities performed by practicing administrators or supervisors. Students are required to complete a minimum of 200 observation and performance hours aligned with leadership standards. Experiences are reflective of real and simulated field-based activities in a variety of educational settings. Students must complete a final internship reflection paper, as well as a comprehensive portfolio that includes artifacts that are illustrative of their best work.

ED.852.602. Supervision and Professional Development. 3 Credits.
Students examine models of instructional supervision, including clinical supervision and various approaches to personalizing supervisory strategies. Emphasis is on supervision skills, including the assessment of teacher performance, effective conferring strategies, and working with teachers to construct instructional improvement plans. Students apply concepts developed to practical situations in laboratory sessions.

ED.871.501. Introduction to Children and Youth with Exceptionalities. 3 Credits.
Students investigate the major areas of exceptionality addressing the characteristics and educational needs of students with a broad range of special instructional needs. Students review incidence and etiology, diagnostic and instructional services, educational continuum of programs, and findings of recent research. (3 credits)

ED.871.502. Educational Alternatives for Students with Special Needs. 3 Credits.
Designed especially for general educators, counselors, supervisors, and administrators, this course examines differentiated instruction for students with special needs in general education classrooms. Students review the legal foundations and requirements of special education and the collaborative role of general and special educators in the implementation of individualized educational programs in general education classrooms. (3 credits)

ED.871.510. Legal Aspects, Service Systems, and Current Issues in Special Education. 3 Credits.
This survey course reviews litigated and legislated standards for special education and related services for persons with disabilities. Students explore current issues in the provision of services for persons with disabilities, including inclusion, the response to intervention (RTI), and regulations for eligibility. (3 credits)

ED.871.511. Instructional Planning and Management in Special Education. 3 Credits.
Students focus on the instructional and organizational skills necessary for teaching students who receive special education services. Topics of primary emphasis include developing effective individualized education plans; preparing and delivering exemplary lesson plans; and identifying instructional best practice strategies that promote effective classroom organization and instruction. Students create lesson plans using best practice strategies. (3 credits)

ED.871.512. Collaborative Programming in Special Education. 3 Credits.
This course focuses on collaboration themes common to various educational settings: interpersonal communication, problem solving, cultural diversity, teamwork, and family systems theory. Students examine techniques that promote effective communication between teachers, school administrators and related professionals, and families of students with special needs. Co-teaching models that work effectively are also discussed. (3 credits)

ED.871.513. Applied Behavioral Programming. 3 Credits.
This course will focus on the methodology of applied behavior analysis including how the principles of behavior can be used to make changes and improvements in classroom behavior. Observational methods, single-subject designs, behavior promotion and reduction, and generalization strategies are reviewed in relation to the needs of students with disabilities. Students assess and develop individual behavior projects that demonstrate their ability to design, implement, and evaluate behavioral support programs in an ethically responsive manner. (3 credits)

ED.873.601. Introduction to Applied Behavior Analysis and Special Education. 3 Credits.
This course provides introductory knowledge of Applied Behavior Analysis (ABA). Among the topics explored will be the scientific foundation on which ABA is built, the concepts and principles of behavior analysis, and an overview of the application of ABA in educational settings.

ED.873.602. Research Methods: Evaluation, Measurement and Single Case Design. 3 Credits.
The course will examine the methods of single subject research design, including defining and measuring behavior, data collection and interpretation of graphs, and single case research designs. Students will learn to utilize research methods to evaluate and measure the effectiveness of intervention and instructional procedures within an educational setting.

ED.873.603. Behavioral Assessment and Intervention for Challenging Behaviors. 3 Credits.
This course will investigate the principles and procedures of the field of applied behavior analysis as it relates to challenging behaviors. Observational methods, behavior promotion and reduction, and generalization strategies will be reviewed in relation to the needs of students with disabilities. Students will design, implement, and evaluate a behavior reduction program based on assessment results to decrease inappropriate behaviors for an individual student or a group of students in an educational setting.
ED.873.601[C] OR ED.873.602[C]

ED.873.604. Behavioral Assessment and Instructional Strategies. 3 Credits.
The course will focus on developing effective teaching plans based on Applied Behavior Analysis (ABA), exploring a variety of teaching strategies including discrete trial instruction, applied verbal behavior, shaping, chaining, direct instruction, precision teaching, personalized systems of instruction, incidental teaching, functional communication training, augmentative communication systems, programming for acquisition, generalization, and maintenance, and making data-based decision making to improve instruction. Students will design, implement and evaluate an instructional program based on assessment results to increase a desired behavior/skill for an individual student or a group of students in an educational setting. (3 credits)
ED.873.601[C] OR ED.873.602[C] OR ED.873.603[C]

ED.873.605. Ethics and Professional Conduct for Behavior Analysts. 3 Credits.
This course will provide discussion and examination of ethics and responsible conduct of behavior analysts with an in-depth review of the Guidelines for Responsible Conduct for Behavior Analysts (BACB, 2012). It will also include an overview of the behavior consultation model and examine the influence of Applied Behavior Analysis (ABA) on autism, developmental disabilities, and special education.
ED.873.601[C] OR ED.873.602[C] OR ED.873.603[C]

ED.873.606. Applications of Applied Behavior Analysis in the Classroom. 3 Credits.
This course will provide in-depth discussion and strategies regarding the implementation of applied behavior analysis in the classroom setting. Strategies will focus on documentation of services, training, and monitoring of others in carrying out behavior change procedures, performance monitoring and procedural integrity, supervision, evaluating effectiveness of intervention and teaching, and maintaining behavior change in the natural environment. Students will learn and plan for unwanted effects of reinforcement, punishment, and extinction in a classroom setting. Students will also examine current issues in special education as they relate to the implementation of applied behavior analysis, including inclusion, effective data collection, choosing evidence-based practices, and discussing the benefits of behavior analysis with other professionals. Finally, the course will help candidates prepare for the Board Certified Behavior Analysts (BCBA) exam. (3 credits)
ED.873.601[C] OR ED.873.602[C] OR ED.873.603[C] OR ED.873.604[C] OR

ED.873.607. Supervision and Consultation in ABA. 3 Credits.
This course will focus on supervision and consultation as it applies to working with personnel within an educational setting (pre-k through 12th grade). The importance of behavior analytic supervision will be reviewed with a specific focus on building skills to develop the supervisor/supervisee relationship including establishing performance expectations, goal setting, training others in the implementation of behavioral procedures, performance monitoring, and evaluating supervision outcomes. Among the topics explored will be behavioral consultation professional practice guided by the science of behavior analysis, utilizing treatment integrity measures, data based decisions, and collaboration within a school environment.

ED.873.610. Applied Behavior Analysis Practicum I. 3 Credits.
The practicum is designed to meet the field experience requirements as outlined by the Behavior Analyst Certification Board (BACB). This practicum provides supervised experiences in the application of behavior analytic services in educational setting. The practicum will also include a face-to-face seminar with an instructor. (3 credits)
ED.873.601 AND ED.873.602 AND ED.873.603 AND ED.873.605

ED.873.611. Applied Behavior Analysis Practicum II. 3 Credits.
The practicum is designed to meet the field experience requirements as outlined by the Behavior Analyst Certification Board (BACB). This practicum provides supervised experiences in the application of behavior analytic services in educational setting. The practicum will also include a face-to-face seminar with an instructor. (3 credits)
ED.873.601[AND ED.873.602 AND ED.873.603 AND ED.873.604 AND ED.873.605

ED.874.512. Characteristics of Students with Mild to Moderate Disabilities: Learning Disabilities, Behavioral Disorders, and Intellectual Disabilities. 3 Credits.
Students examine the incidence, etiology, and characteristics of students with learning disabilities, behavioral disorders, and intellectual disabilities, and review major theoretical models and instructional practices associated with each. (3 credits)

ED.874.513. Educational Assessment of Students with Mild to Moderate Disabilities: Elementary/Middle. 3 Credits.
Students explore assessment instruments and procedures for diagnosing elementary and middle school students who are experiencing learning and behavior problems. Participants administer and interpret norm-referenced, criterion-referenced, and curriculum-based instruments that assess academic achievement, social behavior, and emotional functioning. (3 credits)

ED.874.514. Educational Assessment of Students with Mild to Moderate Disabilities: Secondary/Adult. 3 Credits.
Students examine assessment instruments and procedures for diagnosing secondary level students who are experiencing learning and behavior problems in school. Students administer and interpret norm-referenced, criterion-referenced, and curriculum-based instruments that assess academic achievement, social-emotional behavior, and vocational functioning. (3 credits)

ED.874.524. Spoken and Written Language: Methods for Students with Mild to Moderate Disabilities. 3 Credits.
Students learn teaching strategies that can be used by teachers with students who have difficulty with oral and written expressive language. Instructional methods include both curriculum modifications and teacher-devised tasks. (3 credits)

ED.874.525. Mathematics: Methods for Students with Mild to Moderate Disabilities. 3 Credits.
Students examine effective instructional strategies for the remediation of problems frequently found in the mathematics performance of students with mild to moderate disabilities.

ED.874.526. Classroom Management: Methods for Students with Mild to Moderate Disabilities. 3 Credits.
This course reviews the theoretical foundations for developing practical interventions and management strategies to deal with inappropriate classroom behaviors, as well as strategies for individualized education program (IEP) development and implementation. Behavior modification, therapeutic strategies, social skills instruction, and communication principles are applied to the design and implementation of structured classroom management programs.

ED.874.527. Career Assessment and Programming: Education of Students with Mild to Moderate Disabilities. 3 Credits.
This course examines the assessment and instructional methods needed to implement and evaluate career transition and vocational programs that promote successful post-school adjustments for students with mild to moderate disabilities. Participants review the practice of vocational and career assessment, vocational instruction, vocational counseling, and the development of recreation and leisure skills and activities. (3 credits)

ED.874.528. Diversifying the General Education Curriculum: Methods for Secondary Students with Mild to Moderate Disabilities. 3 Credits.
Students discuss the characteristics of adolescents with mild to moderate disabilities. Students review the goals of the secondary school and gain an understanding of the range of curricular demands and graduation requirements, and their impact on students with special needs. The implications of school organization and service delivery models for students with disabilities are explored. Students develop accommodations, modifications, co-teaching plans, and projects across secondary curricular content areas. (3 credits)

ED.874.541. Reading: Methods for Students with Mild to Moderate Disabilities. 3 Credits.
Students learn to apply strategies designed to improve the reading performance of elementary/middle school students with mild to moderate disabilities. Highlighted are strategies related to word identification and paraphrasing and methods such as progress monitoring and self-evaluation. During the course, students apply a strategy with a student who is experiencing reading difficulties. (3 credits)

ED.874.542. Reading, English, and Language Arts: Methods for Secondary Students with Mild to Moderate Disabilities. 3 Credits.
Students learn to apply strategies designed to improve the reading and writing performance of secondary students with disabilities. Highlighted are strategies designed to maximize content area reading comprehension and writing within the content areas. During the course, students apply strategies with a secondary student or students experiencing reading difficulties. This course incorporates goals and objectives that correspond to the MSDE required course, ED.884.508 Methods of Teaching Reading in the Secondary Content Area, Part I. (3 credits)

ED.874.860. Mild to Moderate Disabilities Internship: Induction - Elementary/Middle. 3 Credits.
Designed for students seeking Maryland generic special education certification at the elementary/middle level, this internship, scheduled approximately midpoint in a student's program, provides supervised experiences in the education of children and youth in grades one through eight who require special education services. The internship sites and activities are assigned according to each student's interest and training needs. The participant implements foundational knowledge, skills, and dispositions gained in coursework in the areas of assessment, instruction, classroom management, and individual behavior intervention appropriate for the learning characteristics of elementary and middle school age students with disabilities.

ED.874.861. Mild to Moderate Disabilities Internship: Culmination - Elementary/Middle. 3 Credits.
Designed for students seeking Maryland generic special education certification at the elementary/middle level, this internship, scheduled near the completion of a student's program, provides supervised experiences in the education of children and youth in grades one through eight who require special education services. The internship sites and activities are assigned according to each student's interest and training needs. The participant continues professional development begun during the induction internship by implementing content specific knowledge, skills, and dispositions gained in subsequent coursework, with a focus on evaluating, selecting, and using reading materials and instructional methods appropriate for the learning characteristics of elementary and middle school age students with disabilities. This course incorporates goals and objectives that correspond to the MSDE required course, ED.884.505 Materials for Teaching Reading. (3 credits)

ED.874.870. Mild to Moderate Disabilities Internship: Induction - Secondary/Adult. 3 Credits.
Designed for students seeking Maryland generic special education certification at the secondary/adult level, this internship, scheduled approximately midpoint in a student's program, provides supervised experiences in the education of adolescents and young adults in grades six through 12 who require special education services. The internship sites and activities are assigned according to each student's interest and training needs. The participant implements foundational knowledge, skills, and dispositions gained in coursework in the areas of assessment, instruction, classroom management, and individual behavior intervention appropriate for the learning characteristics of middle and high school age students with disabilities.

ED.874.871. Mild to Moderate Disabilities Internship: Culmination - Secondary/Adult. 3 Credits.
Designed for students seeking Maryland generic special education certification at the secondary/adult level, this internship, scheduled near the completion of a student's program, provides supervised experiences in the education of adolescents and young adults in grades six through 12 who require special education services. The internship sites and activities are assigned according to each student's interest and training needs. The participant continues professional development begun during the induction internship by implementing content specific knowledge. This course incorporates goals and objectives that correspond to the MSDE required course, ED.884.510 Methods of Teaching Reading in the Secondary Content Area, Part II. (3 credits)

ED.877.513. Education of Students with Severe Disabilities: Augmentative Communication Systems. 3 Credits.
Students examine the design of augmentative communication systems that include use of graphic symbols for individuals with severe disabilities. Participants design and construct communication aids and develop strategies for integrating augmentative communication into the curriculum.

ED.877.514. Community and Independent Living Skills. 3 Credits.
This course reviews the philosophical movements that have fostered the improvements to the instruction of children, youth, and adults with disabilities. Participants: (a) apply the principles of ecological assessment in the development of curriculum sequences for children and youth with severe disabilities; and (b) examine current research-based teaching practices designed to promote the adaptive skills that contribute to the social competence and community acceptance of individuals with severe disabilities. (3 credits)

ED.877.550. Inclusive Practices for Autism Spectrum Disorders. 3 Credits.
This course examines the legal mandates for inclusive practices in public schools and barriers to successful inclusion for students with autism. Students will identify the process for determining the most appropriate educational environment and learn the critical steps in preparing students and teachers for inclusion. Models of inclusion and instructional modifications for the general education classroom will be reviewed. Students will learn to define the varying applications of inclusive settings, plan goals and objectives that reflect the inclusion goals, and implement strategies that lead toward inclusion. (3 credits)

ED.877.551. Survey of Autism and Other Pervasive Developmental Disorders. 3 Credits.
Providing a comprehensive review of current information about autism and other pervasive developmental disorders, this course draws on research findings and clinical experience from a number of related disciplines, including psychiatry, psychology, neurobiology, and pediatrics. In addition to exploring theories of causation, developmental aspects, descriptive and diagnostic characteristics, and legal and social issues, students are introduced to the primary therapeutic and intervention strategies employed with students who have autism. The theoretical basis of, and empirical evidence for, the diverse traditional and nontraditional therapies that have been proposed for persons with autism are also explored.

ED.877.553. Classroom Programming for Students with Autism. 3 Credits.
Students examine the design and implementation of effective classroom programs for students with autism who differ in age and level of functioning. The course topics include classroom structure and organization, group instruction strategies, educational assessment and IEP development, data collection, curriculum, instructional activities and materials, parent involvement, and staffing and support services. (3 credits)

ED.877.555. Teaching Communication and Social Skills. 3 Credits.
This course examines the assessment and instructional strategies that have been shown to be effective in promoting the development of cognitive, language, and social skills by students who have severe disabilities, including those diagnosed with autism, Asperger's Syndrome, or other pervasive developmental disorders. Participants examine the instructional adaptations needed to promote the development of cognitive, communicative, and social skills in students with severe disabilities, and review the relevant empirical literature.

ED.877.810. Internship in Severe Disabilities: Induction. 3 Credits.
Designed for severe disabilities program participants on the Maryland State certification and Non-certification track, this internship provides supervised field experiences in the application of instructional strategies and curriculum adaptations needed to teach children with severe disabilities. Students completing the induction internship gradually assume leadership responsibilities in their placement setting and are expected to demonstrate fluency of applied instructional and behavioral skills. (3 credits)

ED.877.811. Internship in Severe Disabilities: Culmination. 3 Credits.
Designed for severe disabilities program participants on the Maryland State certification track, this internship provides supervised field experiences in the application of instructional strategies and curriculum adaptations needed to teach children with severe disabilities. Students completing the culminating internship assume a more complete leadership role in their placement setting and are expected to demonstrate applied instructional and behavioral skills at and advanced mastery level. (3 credits)

ED.881.610. Curriculum Theory, Development, and Implementation. 3 Credits.
Students examine curriculum theory through philosophical, historical, and sociological perspectives and apply course content to contemporary curriculum issues. Topics include aligning instruction with state and school district curricula and modifying curricula to meet individual learner needs. Students also explore effective strategies for implementing curriculum changes.

ED.881.622. Advanced Instructional Strategies. 3 Credits.
Students review recent research on effective instruction and explore advanced classroom strategies and techniques designed to enhance their effectiveness in meeting the needs of diverse populations of learners. Examples include direct instruction, cooperative learning, dimensions of learning, creative problem solving, and applications of technology to thinking and learning. Students develop expert teaching skills and learn to diagnose and deliver instructional strategies that are most appropriate in specific circumstances.

ED.882.524. Education of Culturally Diverse Students. 3 Credits.
Participants analyze recent research related to the education of culturally diverse children and youth and explore case studies of successful minority education programs. The course focuses on understanding the interrelated roles of the school, the family, and the community in addressing the educational needs of culturally diverse children and youth.

ED.884.501. Processes and Acquisition of Literacy. 3 Credits.
This online course is designed to provide a deep understanding of the component processes associated with reading and writing (with mention of speaking and listening) and the ways that students develop into skilled readers and writers. There are five major themes: the component processes of reading and writing; the nature and structure of the English language; the ways that native English speakers and English learners differ in the ways they read and write; the developmental phases associated with learning to read and write for native English speakers and English learners; and the many factors the influence literacy development. Where appropriate, candidates will explore how to assess literacy processes and acquisition.

ED.884.502. Assessment of Literacy. 3 Credits.
Students in this course learn approaches for assessing and addressing the reading abilities and needs of children. Course activities include the examination of learner characteristics and implications for appropriate reading instruction. Students study and analyze a broad selection of formal and informal assessment techniques and instruments, their application to reading instruction and classroom practice, and strategies for effectively communicating relevant information to parents, educators, and other professionals about children's reading performances.

ED.884.507. Instruction for Literacy. 3 Credits.
Students in this course study how reading research is applied to the various methods, strategies, and techniques of elementary classroom reading instruction. Emphasis is placed on developing expert knowledge in teaching phonics, word recognition, vocabulary, reading comprehension strategies, organization, and study skills related with reading and academic achievement. Participants explore strategies for differentiating instruction to address the wide range of reading abilities and cultural experiences found in classrooms.
ED.884.501

ED.884.508. Literacy in the Content Areas Part I. 3 Credits.
This course is intended to present the reading process from initial to proficient adult levels for teachers of content subjects in middle or high school. Organizing principles of learning development, differences, and environments will be introduced, and connected with principles of content knowledge and application. Additionally, the uses of assessment will be explored and joined to evidence-based practices of planning and multimodal instruction. Finally, issues of professional practice and ethics will be discussed.

ED.884.510. Literacy in the Content Areas Part 2. 3 Credits.
This online graduate level course extends the understanding of the adolescent learner as they explore, apply and discuss literacy skills across the disciplines. Application of information acquired in the first part of the course sequence (Literacy in the Content Areas - Part 1) will be referenced and emphasized to demonstrate understanding and the ability to design, implement and assess effective literacy instruction in the content classroom.
ED.884.508

ED.892.562. Access to General Education Curriculum with Technology Accommodations. 3 Credits.
(Lab Class) Class members investigate student characteristics, the collaborative role of educators, and strategies for differentiating instruction for students with learning disabilities within the general education environment. Participants examine universal design for learning strategies and technologies to enhance student participation in educational programs.

Interdisciplinary Studies in Education

ED.811.611. Special Education and Inclusion: Promises and Challenges. 2 Credits.
This course provides: (1) an overview of the characteristics of students with exceptional learning needs; (2) the field's history, laws, procedures and trends; and (3) a framework for understanding key concepts in inclusion as they relate to the academic, social, and emotional development of all learners. Participants will begin to consider the cultural and linguistic issues that influence students' needs and families' understanding of special education services.

ED.811.612. Introduction to Assessment and Tiered Instruction. 2 Credits.
This course examines teaching and learning for students with exceptional learning needs in the general education classroom, with specific attention to the role of informal assessment and subsequent differentiation in response to findings. Foci include: (a) best practices for nondiscriminatory assessment, (b) practice administering group and individual informal assessments, (c) knowing how, when, and why to vary learning environments, learning activities, and content, and (d) implementing Tier 1 accommodations/modifications and Tier 2 interventions to support student learning opportunities.

ED.811.615. Formal Assessment and Designing Individualized Education Programs. 1 Credit.
This course provides review of measurement statistics and practice with the administration, scoring, and interpretation of commonly used norm-referenced instruments and procedures for determination of eligibility for special education. Comparisons are made with informal assessment results, and ways to communicate results are discussed. Writing a formal report based on multiple data points is explained and detailed. The IEP process, from referral to eligibility determination and placement, is examined.

ED.811.619. Clinical Residency II. 3 Credits.
Fellows are expected to reflect on their many opportunities to develop and refine their instructional practice and classroom management skills in a whole class setting as well as plan and deliver targeted tiered instruction. Fellows are expected to implement the content and skills developed through coursework and the inherent clinical experiences in a comprehensive manner during their first year as a teacher of record. Fellows will examine the evolution in their unit and lesson planning throughout the year and draw conclusions that inform their ongoing ability to plan targeted, rigorous, and engaging lessons.

ED.811.620. Foundations in Elementary Education: Introduction to Teaching and Learning. 3 Credits.
In this course, participants will begin to examine the features of high-quality instruction and in what ways are they the same and different across the content areas. Participants will explore the issues central to urban education, including race, culture, and diversity, as well as the importance of building relationships with students and families. Participants will also explore the ways in which colleagues can support each other in improving the teaching practice of all.

ED.811.621. Language Development in Children. 2 Credits.
In this course, participants will begin to learn about language development. Participants will examine various aspects of language development, including second language acquisition and dialect, including the milestones that mark English and second language development at various stages, and the factors that influence first and second language acquisition and development. Participants will also explore how language-rich environments and practices contribute to lasting language development.

ED.811.622. Number, Operations, and Algebraic Thinking I. 2 Credits.
Participants investigate the conceptual and procedural knowledge involved in learning to count, understanding our number system, and adding and subtracting whole numbers. Particular attention is given to the importance of the representation and communication of mathematical ideas, the attributes of worthwhile tasks, and to gaining a deep understanding of the ways in which algebraic thinking underpins arithmetic.

ED.811.635. Children's Literature.
In this course, participants will immerse themselves in the study of a wide variety of children's literature including traditional and nontraditional texts, informational texts, and media texts. Participants will understand the different variables for choosing texts by class and individual child. Participants will use research and literary criticism, along with their deepening content knowledge, to develop a lens for analyzing texts in terms of possible instructional purposes, student access and interests, and issues of equity (both for biased representations and the cultural and linguistic challenges of texts). Participants will examine the use of assessment strategies to select and design instruction to meet specific learning goals and will monitor progress. Data will be used to plan further lessons, systematically mark growth, and differentiate instruction for student success.

ED.811.641. Language Acquisition. 2 Credits.
Participants will look deeply at three major topics that are important to supporting linguistically and culturally diverse students in urban, secondary education settings: language variation, academic language, and second language acquisition. Participants will explore these interrelated topics, attending to both socio-cultural and cognitive-linguistic perspectives on learning and learning environments. The purpose of the course is to guide educators to use linguistic awareness to inform their teaching. Participants will examine state standards andthe role of language in assessment and learning.

ED.811.642. Reading Diagnosis and Intervention. 2 Credits.
In this course, participants will deepen their understanding of reading processes, methods of reading assessment, and reading intervention strategies. They will assess students' skills and knowledge in word recognition, fluency, vocabulary, and reading comprehension, and prepare lessons in response to students' needs. To ensure effective management and clear communication with colleagues and caregivers during the first semester as lead instructors, participants will prepare thorough plans for classroom procedures related to reading assessment and instruction, and they will develop careful scripts for conferences. Course sessions will include time for collaborative lesson planning.

ED.811.652. Algebra, Functions, and Modeling in the Real World. 3 Credits.
This course aims to provide participants with a rich understanding of essential conceptsundergirding high school algebra, functions and the modeling process. Participants considercritical components of how students in grades 6-12 develop algebraic thinking and skill, beyondtraditional focus on algebraic manipulations. An in-depth focus on functions in the course allowsparticipants to systematically explore and analyze patterns, change and relationships amongquantities in everyday events and problems in life and society. Participants will further theiralgebra experience by exploring functions as fundamental mathematics objects that allow us tomodel real life situations. Understanding and applying components of the modeling process allows participations to examine authentic real-world situations by building mathematical models and applying solutions using the lens of culturally relevant pedagogy and social justice mathematics.

ED.811.654. Geometrical Thinking. 2 Credits.
In this course participants learn how students in grades 6-12 develop geometric thinking and skill; learn and practice the skills necessary to plan; and enact and reflect on teaching in terms of its effect on student learning. Through field experiences, observation, reflection and reading, participants will continue to identify and analyze teacher moves and mathematical tasks in terms of how well they support the development of students' geometric thinking.

ED.811.660. Foundations in Secondary Education: Introduction to Teaching and Learning. 3 Credits.
In this course, participants will be pushed to see themselves as diversity advocates that understand and respect differences among adolescent learners in their classrooms, schools, and communities. They will explore how to become diversity advocates by first understanding their own beliefs and biases so as to better understand those around them, particularly those that have chosen to serve: urban youth. They will learn that in order to become highly-effective teachers that will build upon the strengths and skills of urban youth and their families and communities, they will need to build healthy, meaningful relationships and promote academic achievement. Participants will also explore the intersection of beliefs and practices through the examination of various learning theories and frameworks for effective, culturally responsive secondary instruction. Through the examination of social, political, economic and racial readings, case studies and discussion, participants will immerse themselves in the work of urban education and self-examination.

ED.811.662. Reading Processes and Acquisition. 1 Credit.
This course introduces participants to reading processes and acquisition. Specifically, the fundamental principles of reading and reading acquisition are presented and discussed. Participants will learn how young children learn to read, where reading developmental may break down, and about issues common among adolescents who struggle to make meaning of grade-level texts in the classroom. Participants will be introduced to instructional strategies, materials, and classroom-based assessments to support the adolescent reader.

ED.811.663. Secondary Content Area Reading/Literacy. 2 Credits.
This course explores how listening, speaking, reading, writing, and viewing are tools for both accessing and demonstrating content knowledge within an academic discipline at the secondary level. Through the lens of disciplinary literacy, participants will explore the centrality of word knowledge in the academic disciplines, and a range of reading and writing strategies to support comprehension of diverse content area texts.

ED.811.664. Self-Management of Learning. 2 Credits.
This course focuses on the concept of self-management and its critical role in promoting student achievement in secondary classrooms. It is meant to give teachers an understanding of how to cultivate and build upon their students' interests in learning in order to promote self-management skills. The course will discuss learning theory and motivation as it relates to adolescent learning. Participants will have opportunities to practice and implement lessons that support students' self-management skills, and ultimately student success.

ED.855.502. Program Evaluation and Learner Assessment in TEFL. 3 Credits.
Through this course, students will demonstrate mastery of program evaluation development and design as a means for data-driven decision-making for program improvements to language learning programs. Students will also focus on the formative assessment measures for assessing learners' acquisition of English as a foreign language.

ED.855.520. Promoting Active Engagement and Learning for TEFL. 1 Credit.
This course provides an opportunity for students to develop competency in applying current theories of language learning and translanguaging pedagogy within a consistent cycle of instructional delivery. The pairing of an instructional delivery system with theory and pedagogy for language learning enables students to develop coherent and effective English lessons for speakers of other languages. Students use instructional protocols to create effective lesson experiences that promote engagement, advance English competency, and motivate learners with different heritage languages to actively speak, understand, and communicate in English.

ED.855.602. Extended Learning III.
Students will participate in a variety of informal educational experiences, from guest lectures and one-on-one mentor conversations, to exploring how the use of museums, cultural institutions, and other real-world scenarios can be leveraged to promote learning. Students will both learn from these experiences as well as gain exemplars to implement in their own educational systems.

ED.880.619. Foundations of Online Teaching and Learning. 3 Credits.
This course will provide a research, theoretical, and practical foundation to online teaching and learning. Participants will engage in collaborative inquiry regarding the field of distance learning, resulting in the ability to address common assumptions about online learning, cultural competence in online learning, and ethical issues. Participants will be able to distinguish an effective online learning experience for adults and create criterion for selection, implementation, and integration of an online learning tool or application.

ED.880.830. Graduate Project in Interdisciplinary Studies. 3 Credits.
Students of demonstrated ability with special interest in interdisciplinary projects study under the direction of a faculty member in the School of Education. Students must meet with their faculty adviser and prepare an outline of their proposed project prior to registration.

ED.887.611. Understanding Human Behavior and Helping Relationships, Part I. 3 Credits.
This course provides an introduction to the various helping professions that are available to support teachers in their work with students, including school counselors and clinical mental health counselors. The differences between these helping professions and services provided through special education will be discussed. The course addresses various approaches to helping students, as well as means for collaborating with helping professionals, consulting with other school leaders, and counseling students. Finally, students will learn how to use data in making decisions about how best to address socio-emotional issues so as to promote academic achievement.

ED.887.612. Understanding Human Behavior and Helping Relationships, Part II. 3 Credits.
Building on the information presented in Understanding Human Behavior and Helping Relationships, Part I, this course examines ways of assisting with emotional disorders that teachers may face in the classroom. The main focus of the course is on recognizing the signs of these disorders and working with the school counselor to support children with these diagnoses in the classroom setting. General school issues such as bullying and abuse prevention will also be covered.

Research & Doctoral Programs

ED.855.702. Causal Inference When Regression Fails. 3 Credits.
This course introduces strategies for estimating causal effects from a counterfactual perspective when conditioning techniques, such as matching and regression, do not identify the parameter of interest. After a review of scenarios when such conditioning will fail, the course then presents intervention designs, explaining randomization from both a potential outcome and causal graph perspective. The challenges to implementation of these designs are then discussed, with a special focus on large-scale randomized trials in education research. The course then considers the most prominent designs for causal inference in observational research in the presence of troubling unobservables: instrumental variable estimators, pre-post longitudinal designs, regression discontinuity, and estimation via exhaustive mechanisms. The course concludes with a consideration of credible avenues for investigation when point identification cannot be achieved, including an analysis of bounds and the estimation of a provisional estimate followed by a sensitivity analysis.

ED.855.752. Trends, Principles, and Practices of 21st Century Learning. 3 Credits.
This course explores pedagogical shifts in education that have arisen as a result of the integration of advanced digital tools and considers how these shifts and tools impact leadership, organization, instructional delivery, and student learning in today's schools. Participants learn essential principles and practices for building 21st century content and technology-rich learning environments for all students including those with disabilities and other special needs.

ED.855.753. Digital Age Technology and Instruction. 3 Credits.
This course provides opportunities for participants to explore integration of technology within the K-16 classroom environment. First, students will examine barriers to technology integration in the K-16 context with implications for professional development. Students will examine theoretical perspectives and research to investigate the advantages and challenges of effectively integrating technology to support learning. Specifically, students will be engaged in critically examining "evaluation practices" related to effective application of digital technology in the classroom from an informed theoretical, empirical, and pedagogical perspectives. Examples from research that examines evaluation practices can be related to classroom connectivity technology, mobile technologies, one-to-one computing, and video use. Participants will also be engaged in considering measurement to examine the effectiveness of the technology integration in instruction and gauge the capacity of their school organization in implementing digital age technology successfully. Participants draw upon relevant instructional theories, conceptual frameworks, and effective best practices as criteria for selection, implementation, and integration of technology.

ED.855.807. Career Development and Academic Writing. 1 Credit.
What is the next step? Doctoral students face a variety of career development stages as they work toward their professional goals. This course will cover a wide range of topics related to Ph.D. students' career development, including the university and non-university job market, research and teaching portfolios, CV and resume, job interview skills, networking, and negotiating tips. Furthermore, it is critical for graduate students to have writing skills to effectively convey their ideas to different types of audiences and to achieve their goals as a researcher. This course will also offer an introduction to scientific writing and will provide an overview of important features of academic writing. We will primarily focus on academic writing tasks that may be required in the earlier stages of an academic career. This course will help students to feel prepared for their career and to accomplish their professional goals.

ED.900.895. Graduate Research.
Fulltime Equivalency

Special Education

ED.871.514. Medical and Physical Aspects of Disabilities. 3 Credits.
This survey course provides students with information from the medical sciences concerning the etiologies and treatments of disabilities. Topics include human genetics and embryology; the newborn period; the structure, functions, and interrelationships of the major systems of the human body; infectious diseases; and emergency procedures. The relationship between students' medical issues and classroom activities is discussed. (3 credits)

ED.872.500. Seminar: Current Trends and Issues in Early Childhood Special Education. 3 Credits.
Beginning students in the Early Childhood Special Education (ECSE) program will explore research, policy and practice in the field of ECSE. Students will acquire a broader schema for roles and responsibilities, career planning, accepted standards, contemporary practice, and organizational structures related to ECSE. Students will become familiar with features of national, state, and local ECSE systems. Students will also examine issues related to reform-based preschool and primary special education in Maryland. (3 credits)

ED.872.501. Screening, Diagnosis, and Assessment of Young Children with Disabilities. 3 Credits.
The first few years of life establish initial patterns of learning, literacy, and behavior, and set the pace for subsequent development. In this course, the emphasis is on the translation of evaluation and assessment information into meaningful outcomes for young children with disabilities. Students will review instruments and procedures for screening, evaluating, and assessing the status of a young child's cognitive development, physical development (including vision and hearing), communication development, social and emotional development, and adaptive development. (3 credits)

ED.872.502. Instructional Program Planning and Methods: Birth-3 Years. 3 Credits.
Early intervention can have a significant effect on developmental outcomes for young children with disabilities and their families. This course will prepare students to support the facilitation of a family-centered foundation for learning and literacy in infants and toddlers. Students will focus on planning, implementing, and evaluating programs for eligible infants, toddlers, preschoolers, and their families. Topics include: (a) a survey of curricular options for young children and families; (b) selection of family-centered treatment outcomes; (c) design of instructional activities for promoting developmental progress; (d) evaluation of program effectiveness; and (e) evaluation of family satisfaction with services.

ED.872.503. Instructional Program Planning and Methods: Grades Pre-K-3. 3 Credits.
In this course, students will develop competencies in planning, administering, and reporting the results of a variety of screening, evaluation, and assessment instruments or procedures for children in pre-kindergarten through primary level special education programs. Students will interpret test results for purposes of: (a) communicating findings to families; (b) communicating findings to colleagues; (c) individual program planning for learning and literacy; and (d) monitoring of individualized programs. Students will create strategies for effective management of resources and information related to the screening, evaluation, or assessment process at pre-kindergarten through primary levels of special education. (3 credits)

ED.872.504. Materials for Teaching Reading to Young Children with Disabilities: Grades K-3. 3 Credits.
This course examines the variables associated with the selection and use of appropriate materials for teaching reading to kindergarten and primary level students with disabilities. Students will create an organized, comprehensive intervention plan that effectively integrates meaningful and engaging technology and print materials to address the essential components of reading (phonemic awareness, phonics, fluency, vocabulary, comprehension) and written expression. Students will develop a print-rich classroom environment that promotes interests, motivation, and positive attitudes about literacy. (3 credits)

ED.872.509. Assessment of Reading for Young Children with Disabilities: Grades K-3. 3 Credits.
In this course, students will select, administer, and interpret a variety of reading assessments to use as the basis to create individualized prevention and intervention strategies. These assessments will include formal and informal measures with a focus on the diagnosis of reading problems, individualized planning for reading instruction, and implementation of such reading programs as Orton-Gillingham, the Stevenson method, phonemic awareness, the alphabetic principle, and modification of the literacy environment. (3 credits)

ED.872.810. Internship: Early Intervention and Preschool Special Education. 3 Credits.
Designed for students seeking Maryland special education teacher certification at the infant/primary level, this internship provides supervised field experiences in early intervention or preschool special education programs for young children with disabilities in the birth-to-five-years age range. Internship sites and activities are individually selected according to student interest and training needs. (3 credits)

ED.872.811. Internship: Preschool and Primary Level Special Education. 3 Credits.
Designed for students seeking Maryland special education teacher certification at the infant/primary level, this internship provides supervised field experiences in special education for children in the three-to-eight year age range. Field sites and activities are individually selected according to student interest and training needs. (3 credits)

ED.873.612. Applied Behavior Analysis Practicum III. 3 Credits.
The practicum is designed to meet field experience requirements as outlined by the Behavior Analyst Certification Board (BACB; www.bacb.com). This practicum provides supervised experiences in the application of behavior analytic services in educational settings. The practicum will also include a face-to- face seminar with an instructor. ED.873.601, ED.873.602, ED.873.603, ED.873.604, ED.873.605, ED.873.607

ED.873.613. Applied Behavior Analysis IV. 3 Credits.
The practicum is designed to meet field experience requirements as outlined by the Behavior Analyst Certification Board (BACB; www.bacb.com). This practicum provides supervised experiences in the application of behavior analytic services in educational settings. The practicum will also include a face-to- face seminar with an instructor. ED.873.601, ED.873.602, ED.873.603,ED.873.604, ED.873.605 and ED.873.607

ED.877.515. Education of Students with Severe Disabilities: Hearing and Vision Impairments. 3 Credits.
Participants review suitable methods of assessing the visual and auditory capabilities of students with severe and multiple disabilities and the instructional adaptations necessary to increase their function in daily activities. Topics include ocular and auditory pathologies and their educational implications, functional vision evaluation, and behavioral audiometry.

ED.877.518. Education of Students with Severe Disabilities: Management of Motor Skills. 3 Credits.
This course examines atypical variations in the motor development of students with severe disabilities, with an emphasis on the remediation of abnormal patterns in the performance of daily activities. Participants gain information about specific remediation strategies and the appropriate use of assistive equipment to promote functional positioning, movement, and oral motor skills.

ED.878.501. Differentiated Instruction and Inclusion. 3 Credits.
Students examine practical, ethical, and theoretical issues in the context of national, state, and local initiatives for least restrictive placement of students with diverse learning needs, including typical students, ESOL students, students with disabilities, and those who are gifted. Individuals compare and contrast existing service delivery systems and model programs that are successful at integrating students with a range of educational needs into general education settings. (3 credits)

ED.878.502. Curriculum Design and Adaptations for Strategic Interventions I. 3 Credits.
Students analyze and adapt curricula from general education and design lessons to implement goals and objectives from learners' individualized education programs into their general education settings. Topics include frameworks for curriculum design, assistive technology, effective teaching methods for heterogeneous instruction, and instructional planning techniques that address the needs of students. (3 credits)

ED.878.503. Educational Measurement and Curricular-Based Assessment. 3 Credits.
Students review standardized achievement tests, criterion-referenced tests, and curriculum-based measurement, and interpret results as they relate to program planning for learners with diverse learning needs in general education classrooms. The course emphasizes developing curricular-based assessments and progress monitoring of students, determining local and school norms for tests, and evaluating learners' progress and performance in academic and social curricular areas. (3 credits)

ED.878.505. Cooperative Learning for Diverse School Programs. 3 Credits.
Students explore the recent research on cooperative learning and develop methods for using cooperative systems in heterogeneous settings that accommodate individuals with a range of diverse learning needs. Participants discuss cooperative and peer learning programs and explore research findings and practical classroom organization and instructional strategies. (3 credits)

Teacher Development & Leadership

ED.851.648. Team Leadership. 3 Credits.
This course is designed for school leaders, including administrators, supervisors, and teachers, who want to improve their knowledge and ability to facilitate change in the classroom, school, or district. The course is based on the premise that educational leaders devote considerable time working in group situations. The course is based on research and theory in education and other fields related to individual, group, intergroup, and organizational development. Opportunities are provided for participants to explore and practice various strategies with special emphasis on how these relate to change in educational settings.

ED.881.621. Effective Schools and Effective Instruction. 3 Credits.
Participants review recent research on effective schools and effective instructional techniques. Additional topics include strategies for implementing relevant research findings and implications for administrators, supervisors, and teachers.

ED.882.511. Human Growth and Development: A Lifespan Perspective. 3 Credits.
Students consider an overview of the physical, social, and emotional aspects of human development throughout the lifespan. The course considers developmental theory and reviews current areas of research.

ED.884.505. Materials for Teaching Literacy. 3 Credits.
This course focuses on evidence-based evaluation and selection of materials for a comprehensive literacy program. Candidates will explore and evaluate characteristics of effective literacy programming and instruction, and apply that knowledge to selecting, evaluating, and organizing print and multimedia materials that reflect engagement and respect for student diversity. Diverse cultural and linguistic backgrounds, learning differences, leveling systems, intervention and family support, and student interest and motivation will receive specific focus.

ED.884.508. Literacy in the Content Areas Part I. 3 Credits.
This course is intended to present the reading process from initial to proficient adult levels for teachers of content subjects in middle or high school. Organizing principles of learning development, differences, and environments will be introduced, and connected with principles of content knowledge and application. Additionally, the uses of assessment will be explored and joined to evidence-based practices of planning and multimodal instruction. Finally, issues of professional practice and ethics will be discussed.

ED.884.510. Literacy in the Content Areas Part 2. 3 Credits.
This online graduate level course extends the understanding of the adolescent learner as they explore, apply and discuss literacy skills across the disciplines. Application of information acquired in the first part of the course sequence (Literacy in the Content Areas - Part 1) will be referenced and emphasized to demonstrate understanding and the ability to design, implement and assess effective literacy instruction in the content classroom.
ED.884.508

ED.884.604. Emergent Literacy: Research into Practice. 3 Credits.
This course addresses in-depth instructional issues involving emergent literacy processes. Topics include the application of current literacy theory to alphabetics, word identification, and word study strategies for classroom instruction; designing and providing authentic early literacy experiences and literacy-rich environments; and strategies and methods for storytelling and in developing contextual oral reading fluency. (3 credits)

ED.884.610. Advanced Diagnosis for Reading Instruction. 3 Credits.
This course advances and refines the knowledge of students about advanced diagnostic processes in determining reading difficulties and designing appropriate and related interventions. Case study and small group collaboration are used to develop students' abilities to integrate data from multiple sources, generate diagnostic profiles, and make instructional recommendations. Students learn to administer standardized and criterion-referenced assessments and about the principles, philosophies, and strategies of effective remedial approaches. (3 credits)

ED.884.615. Cross-Cultural Studies in Literacy. 3 Credits.
Students in this class investigate how culture, language, school and out-of-school literacy experiences, and education policy influence student attitude, learning, and content area knowledge. Participants evaluate multicultural literacy research, curriculum, literature, and new literacies, and how social and cultural factors contribute to daily classroom literacy instruction and everyday life. The course emphasizes creating democratic and culturally sensitive learning environments.

ED.884.620. Seminar in Reading: Roles of the Reading Specialist. 3 Credits.
Students in the final year present and evaluate their projects and plans for addressing the needs of students at all levels of reading ability in their classrooms, schools, and school districts. In addition, participants examine selected topics and issues in reading instruction.
ED.884.811[C] OR ED.884.810[C]

ED.884.642. Linguistics for Teachers. 3 Credits.
This course acquaints teachers and other reading professionals with aspects of linguistic theory that apply in elementary and secondary classrooms. Emphasis is on a thorough, research-based understanding of phonology, morphology, semantics, syntax, and pragmatics. Students learn ways to use the information to strengthen existing reading and language arts instruction. Issues of cultural diversity, second language learning, and developmental issues of language are covered in this interactive format.

ED.884.701. Reading Comprehension and Critical Literacy. 3 Credits.
Building on the instructional strategies and skills of earlier coursework, this advanced graduate course examines classic and contemporary research and theory in reading comprehension and critical literacy and how these dimensions and processes are applied to literacy education. During the course, students learn to explore and appreciate the diversity of literacy research perspectives, and to learn to think and write critically and analytically about research, literacy education policy, and practices that influence and are used in classroom education. These topics are overlapped by advanced instructional methods and strategies for teaching students reading comprehension and critical literacy skills and dispositions. (3 credits)

ED.884.811. Supervised Clinical Practicum I for Masters in Reading Candidates. 3 Credits.
This first practicum is a midpoint program experience for Reading candidates. Candidates demonstrate abilities to translate literacy education research into practice. The overarching intent of Practicum I is to develop literacy education leaders while refining candidates' knowledge and applications of research. Coursework centers on actual work with children and allows candidates to provide evidence of their mastery of reading education skills and strategies. (3 credits)

ED.884.820. Supervised Clinical Practicum in Reading II. 3 Credits.
This second practicum is a capstone course that builds on all previous program coursework and especially the pre-requisite ED.884.620 Seminar in Reading: Roles of the Reading Specialist course. Work concentrates on developing effective reading specialist and literacy coaching qualities and skills, facilitating change in school communities, and fostering teacher growth and student achievement. A strong emphasis of the course is on job-embedded professional development. Candidates deliver demonstration lessons and lesson planning assistance to teachers and conduct professional development workshops in school settings. The practicum allows candidates to provide evidence of their mastery of particular ILA leadership/reading specialist standards.
ED.884.610 AND ED.884.620 AND ED.884.810

ED.884.850. Clinical Practicum in Writing and Other Media. 3 Credits.
Reading and writing printed texts have been, by tradition, interconnected processes. In the Digital Age, other media, such as still and moving images and audio texts, increasingly coexist alongside printed texts. During this practicum experience, candidates examine current issues involving the communication shifts that are occurring in the 21st century. Using digital literacies, writing, and object-centered multimedia ideas and instructional approaches, candidates work with teachers and students in designing, producing, and using new and traditional literacies to best prepare themselves and others for advancing technologies and practices that are changing the ways that people communicate and network.

ED.893.830. Graduate Project in Technology. 3 Credits.
Students of demonstrated ability with special interest in technology study under the direction of a faculty member in the School of Education. Students must meet with their faculty adviser and prepare an outline of their proposed project before they register for this course.

Teacher Preparation

ED.813.663. Teaching Reading in the Content Areas: Part II. 1 Credit.
This course focuses on research-based approaches to developing content literacy, a critical component for student achievement in the content areas. Students will learn and apply assessment practices, including diagnostic, portfolio, and student self-assessments, which pinpoint students' content literacy strengths and areas for improvement. Educators also will learn and apply instructional strategies to use before, during and after engaging with content area texts and materials. An emphasis will be on assessing the responsiveness to student's learning differences (e.g., language, culture, learning styles, multiple intelligences, learning difficulties/disabilities, and giftedness).

ED.813.690. TNTP Independent Study. 6 Credits.
In this course, educators will demonstrate competency of objectives related to effective instruction. Through a combination of independent personal development and cultivation of classroom evidence, educators will create a portfolio. Topics covered in the portfolio will include: instructional planning, assessment and data review, classroom management and culture, and special education.

EN.500 (General Engineering)

EN.500.101. What Is Engineering?. 3 Credits.
This is a course of lectures, laboratories, and special projects. Its objective is to introduce students not only to different fields of engineering but also to the analytic tools and techniques that the profession uses. Assignments include hands-on and virtual experiments, oral presentations of product design, and design/construction/testing of structures. Freshmen only or Permission Required.

EN.500.103. Hopkins Engineering Sampler Seminar. 1 Credit.
This course provides students with an overview of the undergraduate programs in the Whiting School of Engineering. Faculty from various departments will introduce students to their discipline including aspects of their personal research. Freshmen only.

EN.500.109. What is Engineering?-Summer. 3 Credits.
To introduce engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig. Open only to high school students admitted to the Engineering Innovation Summer Program. Undergraduates should refer to EN.500.101.
Students may enroll in and complete EN.500.109 or EN.500.110, but not both.

EN.500.110. Engineering Innovation. 3 Credits.
To introduce engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Algebra II with Trig. Open only to high school students admitted to the Engineering Innovation Summer Program. Undergraduates should refer to EN.500.101.
Students may enroll in and complete EN.500.109 or EN.500.110, but not both.

EN.500.111. Hopkins Engineering Applications & Research Tutorials. 1 Credit.

EN.500.112. Gateway Computing: JAVA. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in courses: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.113. Gateway Computing: Python. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.114 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 OR EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.114. Gateway Computing: Matlab. 3 Credits.
This course introduces fundamental programming concepts and techniques, and is intended for all who plan to develop computational artifacts or intelligently deploy computational tools in their studies and careers. Topics covered include the design and implementation of algorithms using variables, control structures, arrays, functions, files, testing, debugging, and structured program design. Elements of object-oriented programming. algorithmic efficiency and data visualization are also introduced. Students deploy programming to develop working solutions that address problems in engineering, science and other areas of contemporary interest that vary from section to section. Course homework involves significant programming. Attendance and participation in class sessions are expected.
Students may not have earned credit in: EN.500.112 OR EN.500.113 OR EN.510.202 OR EN.530.112 OR EN.580.200 OR EN.601.107 EN.500.132 OR EN.500.133 OR EN.500.134.

EN.500.115. Gateway Data Science. 3 Credits.
This course introduces fundamental data science concepts and techniques. It is intended for all who plan work on data driven projects, and will serve as a prerequisite for advanced courses in data science and machine learning. Topics covered include linear and nonlinear regression, classification, clustering, and dimensionality reduction. Students deploy Python packages on data sets and apply data science methods on engineering and science problems. Course homework involves significant programming. Attendance and participation in class sessions are expected.
(EN.500.112 AND EN.500.133) OR EN.500.113 OR (EN.500.114 AND EN.500.133)

EN.500.130. Biomedical Engineering Innovation. 3 Credits.
To introduce biomedical engineering ideas, thoughts, and problem-solving to potential engineering students. The course is intended to establish the framework within which engineers typically operate. Registration Requirement: Either Chemistry with Lab or Physics with Lab.

EN.500.132. Bootcamp: Java. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.601.107, EN.600.107, or EN.500.112;Students must have completed: EN.500.113 OR EN.500.114 OR EN.510.202 OR EN.580.200 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.133. Bootcamp: Python. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only
Not open to students who have completed EN.500.113 or EN.580.200;Students must have completed: EN.500.112 OR EN.500.114 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.134. Bootcamp: MATLAB. 1 Credit.
This on-line course provides students who have already achieved a basic understanding of programming and computational thinking in one programming language with an opportunity to apply these skills in another programming language. Students will be expected to complete projects to demonstrate proficiency in the new language. Satisfactory/unsatisfactory only.
Not open to students who have completed EN.500.114 OR EN.580.200.;Students must have completed: EN.500.112 OR EN.500.113 OR EN.601.107 OR EN.510.202 OR EN.530.112 OR EN.520.123 OR EN.601.220

EN.500.501. SAB/JHU General Engineering Research (Abroad). 3 Credits.
General Engineering Research Project Abroad for undergraduate participating on summer projects with NUS, EPFL, SJTU, and DTU. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.500.551. Engineering Research Practicum.

EN.500.601. Research Laboratory Safety. 1 Credit.
This course covers physical, chemical, radiation, and biological hazards typically found in Johns Hopkins University research laboratories. It will use the “RAMP” (Recognize, Assess, Minimize, Prepare) framework originating in (Hill, R.H. Finster, D.C. Laboratory Safety For Chemistry Students, Wiley, 2nd Edition, 2016, 576pp.) and adopted by the American Chemical Society as a core concept for teaching laboratory safety. This framework does not depend on chemistry-specific practices (although it encompasses them as well as other disciplines), so it transfers well to general university-level research. The course also discusses the concepts of Inherently Safer Design of experiments. The course begins with a RAMP analysis of an assigned paper from the literature and concludes with a project analyzing a paper of the student’s choice.

EN.500.602. Seminar: Environmental and Applied Fluid Mechanics. 1 Credit.

EN.500.603. Graduate Orientation and Academic Ethics.

EN.500.851. Engineering Research Practicum. 1 - 9 Credits.

EN.510 (Materials Science & Engineering)

EN.510.106. Foundations of Materials Science & Engineering. 3 Credits.
Basic principles of materials science and engineering and how they apply to the behavior of materials in the solid state. The relationship between electronic structure, chemical bonding, and crystal structure is developed. Attention is given to characterization of atomic and molecular arrangements in crystalline and amorphous solids: metals, ceramics, semiconductors and polymers (including proteins). The processing and synthesis of these different categories of materials. Basics about the phase diagrams of alloys and mass transport in phase transformations. Introduction to materials behavior including their mechanical, chemical, electronic, magnetic, optical and biological properties.

EN.510.107. Modern Alchemy. 3 Credits.
Can you really turn lead into gold? Converting common substances into useful materials that play important roles in today’s technologies is the goal of many modern scientists and engineers. In this course, we will survey selected topics related to modern materials, the processes that are used to make them as well as the inspiration that led to their development. Topics will include the saga of electronic paper, the sticky stuff of gecko feet and the stretchy truth of metal rubber.

EN.510.135. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for freshmen majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.136. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for freshmen majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.235. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for sophomores majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Sophomores Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.236. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for sophomores majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Sophomores Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.

EN.510.311. Structure Of Materials. 3 Credits.
First of the Introduction to Materials Science series, this course seeks to develop an understanding of the structure of materials starting at the atomic scale and building up to macroscopic structures. Topics include bonding, crystal structures, crystalline defects, symmetry and crystallography, microstructure, liquids and amorphous solids, diffraction, molecular solids and polymers, liquid crystals, amphiphilic materials, and colloids. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.500.113 Gateway Computing: Python.
((AS.110.106 AND AS.110.107) OR (AS.110.108 AND AS.110.109) OR (AS.110.107 AND AS.110.108) OR (AS.110.106 OR AS.110.109)) AND (AS.030.103 OR(AS.030.101 AND AS.030.102)) AND ((AS.171.101 OR AS.171.103 OR AS.171.107) AND (AS.171.102 OR AS.171.104 OR AS.171.108))

EN.510.312. Thermodynamics/Materials. 3 Credits.
Second of the Introduction to Materials Science series, this course examines the principles of thermodynamics as they apply to materials. Topics include fundamental principles of thermodynamics, equilibrium in homogeneous and heterogeneous systems, thermodynamics of multicomponent systems, phase diagrams, thermodynamics of defects, and elementary statistical thermodynamics. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.500.113 - Gateway Computing - MatLab.

EN.510.313. Mechanical Properties of Materials. 3 Credits.
Third of the Introduction to Materials Science series, this course is devoted to a study of the mechanical properties of materials. Lecture topics include elasticity, anelasticity, plasticity, and fracture. The concept of dislocations and their interaction with other lattice defects is introduced. This course contains computational modules; some prior knowledge of computer programming is needed.
EN.500.113 AND EN.510.311

EN.510.314. Electronic Properties of Materials. 3 Credits.
Fourth of the Introduction to Materials Science series, this course is devoted to a study of the electronic, optical and magnetic properties of materials. Lecture topics include electrical and thermal conductivity, thermoelectricity, transport phenomena, dielectric effects, piezoelectricity, and magnetic phenomena. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.
EN.510.311

EN.510.315. Physical Chemistry of Materials II. 3 Credits.
Fifth of the Introduction to Materials Science series, this course covers diffusion and phase transformations in materials. Topics include Fick's laws of diffusion, atomic theory of diffusion, diffusion in multi-component systems, solidification, diffusional and diffusionless transformations, and interfacial phenomena. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.
EN.510.311 AND EN.510.312

EN.510.316. Biomaterials I. 3 Credits.
Sixth of the Introduction to Materials Science series, this course offers an overview of principles and properties of biomedical materials. Topics include properties of materials used in medicine, synthesis and properties of polymeric materials, polymeric biomaterials, natural and recombinant biomaterials, biodegradable materials, hydrogels, stimuli-sensitive materials, and characterizations of biomaterials. This course contains computational modules; some prior knowledge of computer programming is needed. Recommended Course Background: EN.510.202 (Computation and Programming for Materials Scientists and Engineers) or equivalent.

EN.510.335. MSE Design Team I. 3 Credits.
This course is the first half of a two-semester course sequence for freshmen, sophomores, and juniors majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE freshmen, sophomores, and juniors, working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. *The team will meet 150 minutes per week at a time to be designated by the instructor.Recommended Course Background: EN.510.101, EN.510.109, or equivalent courses.

EN.510.336. MSE Design Team I. 3 Credits.
This course is the second half of a two-semester course sequence for juniors majoring or double majoring in materials science and engineering (MSE). This course provides a broad exposure to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE juniors working with a team leader and seniors on the team, apply their general knowledge in MSE to develop the solution to open-ended problems. Materials Science & Engineering Freshman Only. Recommended Course Background: EN.510.106, EN.510.109, or equivalent courses. *The team will meet 150 minutes per week at a time to be designated by the instructor.
EN.510.335

EN.510.400. Introduction to Ceramics. 3 Credits.
This course will examine the fundamental structure and property relationships in ceramic materials. Areas to be studied include the chemistry and structure of ceramics and glasses, microstructure and property relationships, ceramic phase relationships, and ceramic properties. Particular emphasis will be placed on the physical chemistry of particulate systems, characterization, and the surface of colloid chemistry of ceramics. Recommended Course Background: EN.510.311, EN.510.312, or permission of instructor.

EN.510.402. Dynamics of Soft Materials. 3 Credits.
The structure and properties of soft materials will be studied with the focus on understanding ways to control and measure the dynamics. Soft materials to be studied include colloids, emulsions, dispersions, drops, polymers and gels. We will use experimental tools to study these materials including optical microscopy, rheometers, and atomic force microscopy. Recommended Course Background: EN.510.311 or permission of instructor.

EN.510.403. Materials Characterization. 3 Credits.
This course will describe a variety of techniques used to characterize the structure and composition of engineering materials, including metals, ceramics, polymers, composites and semiconductors. The emphasis will be on microstructural characterization techniques, including optical and electron microscopy, X-ray diffraction, and thermal analysis and surface analytical techniques, including Auger electron spectroscopy, secondary ion mass spectroscopy, X-ray photoelectron spectroscopy, and atomic force microscopy. Working with the JHU museums, we will use the techniques learned in class to characterize historic artifacts.

EN.510.405. Materials Science of Energy Technologies. 3 Credits.
This course examines the science and engineering of contemporary and cutting-edge energy technologies. Materials Science and Mechanical Engineering fundamentals in thisarea will be complemented by case studies that include fuel cells, solar cells, lighting, thermoelectrics, wind turbines, engines, nuclearpower, biofuels, and catalysis. Students willconsider various alternative energy systems, and also to research and engineering of traditional energy technologies aimed at increased efficiency, conservation, and sustainability. Recommended Course Background: undergraduate course in thermodynamics.

EN.510.407. Biomaterials II: Host response and biomaterials applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include biomaterials fabrication and characterization, host reactions to biomaterials, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, and biomaterials for artificial organs.
EN.510.316 or permission of instructor.

EN.510.414. Transmission electron microscopy: principle and practice. 3 Credits.
Introduction to basic principles of electron diffraction, phase contrast and Z-contrast and applications of these principles in microstructural characterization of materials by electron diffraction, high-resolution electron microscopy and scanning transmission electron microscopy. Also listed as EN.510.665.

EN.510.415. The Chemistry of Materials Synthesis. 3 Credits.
Many of the latest breakthroughs in materials science and engineering have been driven by new approaches to their synthesis, which has allowed the preparation of materials with fanciful structures and fascinating properties. This advanced course will explore synthetic approaches to multifunctional and nanostructured materials, ranging from opals to complex polymers to nanowires and quantum dots . Applications include electronics, energetics, and drug delivery. Participants will gain sufficient familiarity with synthesis options to be able to design research programs that rely on them. Emphasis will be placed on broad strategies that lead to material functionality, rather than detailed step-by-step sequences. Some topics will be selected “on the fly” from the most exciting current literature.

EN.510.416. Physical Behavior of Metamaterials. 3 Credits.
The field of metamaterials is a rapidly evolving area within the physical and engineering sciences that relates to diverse applications such as transformation optics for advanced imaging, acoustic noise reduction for architectural spaces and electromagnetic shielding for electronic devices. The goal of metamaterials design is to guide energy transport through specified regions of a material avoiding others that might contain delicate or otherwise susceptible structures that must be shielded. Energy transport can occur via electromagnetic waves, acoustic waves, electrical currents or thermal fluxes. Through rational design of the material micro/meso/macrostructure, any one of these can be effectively directed in the material. The challenge is to engineer materials that respond in a way that approximates the desired design. In this course, the methods for metamaterials design will be investigated along with those aspects of materials science and engineering that allow for the fabrication of these materials. Also listed as EN.510.616
EN.510.31 AND EN.510.314 or their equivalents

EN.510.420. Stealth Science & Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens. Co-listed with EN.510.640

EN.510.422. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material’s property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss their mechanical, electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechanical (MEMS) devices.

EN.510.425. Advanced Materials for Battery. 3 Credits.
This class provides an overview of the basic principles of electrochemical energy storage and the essential roles of advanced materials in batteries. Materials selection and design for the anodes and cathodes of lithium and sodium batteries are introduced on the basis of crystallography and materials chemistry. State-of-the-art operando characterization techniques of battery materials are also discussed in the course. This course is also listed as EN.510.625.
EN.510.311 AND EN.510.312

EN.510.426. Biomolecular Materials I - Soluble Proteins and Amphiphiles. 3 Credits.
This course will examine the fundamental structure, interactions, and function relationship for biological macromolecules. The course will emphasize experimental methods and experimental design, and the physics behind human disease. Topics will include micellization, protein folding and misfolding, and macromolecular interactions. Required Course Pre-Requisites: EN.580.221 & EN.510.312 - Co-listed with EN.510.621
EN.580.221 AND EN.510.312

EN.510.428. Material Science Laboratory I. 3 Credits.
This course focuses on characterizing the microstructure and mechanical properties of structural materials that are commonly used in modern technology. A group of A1 alloys, Ti alloys, carbon and alloy steels, and composite materials that are found, for example, in actual bicycles will be selected for examination. Their microstructures will be studied using optical metallography, scanning electron microscopy, X-ray diffraction, and transmission electron microscopy. The mechanical properties of these same materials will be characterized using tension, compression, impact, and hardness tests. The critical ability to vary microstructure and therefore properties through mechanical and heat treatments will also be demonstrated and investigated in the above materials. Restricted to Materials Science & Engineering juniors only
Prerequisite(s): Corequisites: EN.510.313
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.510.311

EN.510.429. Materials Science Laboratory II. 3 Credits.
This laboratory concentrates on the experimental investigation of electronic properties of materials using basic measurement techniques. Topics include thermal conductivity of metal alloys, electrical conductivity of metals/metal alloys and semiconductors, electronic behavior at infrared wavelengths, magnetic behavior of materials, carrier mobility in semiconductors and the Hall effect in metals and semiconductors. Lab Assignment is by Professor. Recommended Course Background: EN.510.311 or Permission Required.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.430. Biomaterials Lab. 3 Credits.
This laboratory course concentrates on synthesis, processing and characterization of materials for biomedical applications, and characterization of cell-materials interaction. Topics include synthesis of biodegradable polymers and degradation, electrospinning of polymer nanofibers, preparation of polymeric microspheres and drug release, preparation of plasmid DNA, polymer-mediated gene delivery, recombinant protein synthesis and purification, self-assembly of collagen fibril, surface functionalization of biomaterials, cell culture techniques, polymer substrates for cell culture, and mechanical properties of biological materials. Recommended Course Background: EN.510.407
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.433. Senior Design Research. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring or double majoring in materials science and engineering. It is intended to provide a broad exposure to many aspects of planning and conducting independent research. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of the weekly departmental research seminar.Co-listed with EN.510.438 and EN.510.440
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.434. Senior Design/Research II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring or double majoring in materials science and engineering. It is intended to provide a broad exposure to many aspects of planning and conducting independent research. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433Meets with EN.510.439, EN.510.441, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.435. Mechanical Properties of Biomaterials. 3 Credits.
This course will focus on the mechanical properties of biomaterials and the dependence of these properties on the microstructure of the materials. Organic and inorganic systems will be considered through a combination of lectures and readings and the material systems will range from cells to bones to artificial implants. Same course as 510.635.

EN.510.436. Biomaterials for Cell Engineering. 3 Credits.
This course focuses on the development of biomaterials both as new tools to study fundamental biology and as means to direct cell behavior and function for biomedical applications. Topics include the material properties of cells and tissue, biomaterials for recapitulating cell microenvironment, biomaterials for studying and directing cell mechanotransduction, biomaterials for gene editing, biomaterials for immunotherapy, and biomaterials for neuroengineering. This course will have in-depth discussions on recent findings and publications in these areas. This course is also listed as EN.510.636.
(EN.510.316 OR EN.510.407 OR EN.510.610

EN.510.438. Biomaterials Senior Design I. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring in materials science and engineering with the Biomaterials Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on biomaterials. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on experiences in design and research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of departmental research seminars.Co-listed with EN.510.440 and EN.510.433
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.439. Biomaterials Senior Design II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring in materials science and engineering with the Biomaterials Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on biomatreials. During this semester, verbal reporting of project activities and status is emphasized, culminating in student talks presented to a special session of students and faculty. Students also prepare a poster and a written final report summarizing their design and research results. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433 or 510.438 or 510.440Meets with EN.510.434, EN.510.441, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.440. Nanomaterials Senior Design I. 3 Credits.
This course is the first half of a two-semester sequence required for seniors majoring in materials science and engineering with the Nanotechnology Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on nanotechnology and nanomaterials. During this semester, students join ongoing graduate research projects for a typical 10-12 hours per week of hands-on experiences in design and research. Classroom activities include discussions, followed by writing of research pre-proposals (white papers), proposals, status reports and lecture critiques of departmental research seminars. Co-listed with EN.510.433 and EN.510.438
Area: Writing Intensive
(EN.510.311 AND EN.510.312 AND EN.510.313 AND EN.510.314 AND EN.510.315 EN.510.316) AND (EN.510.428 AND EN.510.429)

EN.510.441. Nanomaterials Senior Design II. 3 Credits.
This course is the second half of a two-semester sequence required for seniors majoring in materials science and engineering with the Nanotechnology Concentration. It is intended to provide a broad exposure to many aspects of planning and conducting independent research with a focus on nanotechnology and nanomatreials. During this semester, verbal reporting of project activities and status is emphasized, culminating in student talks presented to a special session of students and faculty. Students also prepare a poster and a written final report summarizing their design and research results. Recommended Course Background: EN.510.311-EN.510.312, EN.510.428-EN.510.429, and EN.510.433 or 510.438 or 510.440Meets with EN.510.434, EN.510.439, EN.510.446, and EN.510.448
Area: Writing Intensive

EN.510.442. Nanomaterials Lab. 3 Credits.
The objective of the laboratory course will be to give students hands on experience in nanotechnology based device fabrication through synthesis, patterning, and characterization of nanoscale materials. The students will use the knowledge gained from the specific synthesis, characterization and patterning labs to design and fabricate a working nanoscale/nanostructured device. The course will be augmented with comparisons to microscale materials and technologies. These comparisons will be key in understanding the unique phenomena that enable novel applications at the nanoscale. DMSE Seniors or permission of the instructor.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.510.443. Chemistry and Physics of Polymers. 3 Credits.
The course will describe and evaluate the synthetic routes, including condensation and addition polymerization, to macromolecules with varied constituents and properties. Factors that affect the efficiencies of the syntheses will be discussed. Properties of polymers that lead to technological applications will be covered, and the physical basis for these properties will be derived. Connections to mechanical, electronic, photonic, and biological applications will be made. Also listed as EN.510.643. Recommended Course Background: Organic Chemistry I and one semester of thermodynamics.

EN.510.445. MSE Design Team II. 3 Credits.
This course is the first half of a two-semester course sequence for senior students majoring or double majoring in MSE. This course provides a broad experience to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE seniors, working with a team leader and a group of freshmen, sophomores, and seniors, apply their knowledge in their track area to generate the solution to open-ended problems encountered in MSE. Recommended Course Background: EN.510.101, EN.510.311, EN.510.312, EN.510.428, EN 510.429.
Area: Writing Intensive

EN.510.446. MSE Design Team II. 3 Credits.
This course is the second half of a two-semester course sequence for senior students majoring or double majoring in MSE. This course provides a broad experience to various aspects of planning and conducting independent research in a team setting (3 to 6 students on each team). In this course, MSE seniors, working with a team leader and a group of freshmen, sophomores, and seniors, apply their knowledge in their track area to generate the solution to open-ended problems encountered in MSE. Materials Science & Engineering Seniors Only.Recommended Course Background: EN 510.101, EN 510.311, EN 510.312, EN 510.428, EN 510.429.Meets with EN.510.434, EN.510.439, EN.510.441 and EN.510.448.
EN.510.445

EN.510.447. MSE Design Team Leader. 4 Credits.
This course is the first half of a two-semester course sequence for students majoring or double majoring in MSE. This course provides a leadership experience to various aspects of planning and conducting independent research in a team setting. In this course, MSE seniors assemble and lead a student team consisting of 3 to 6 students, apply their knowledge in their track area, and develop leadership skills to generate the solution to open-ended problems encountered in MSE.Recommended Course Background: EN.510.101, EN.510.311, EN.510.312, EN.510.428, EN 510.429.
Area: Writing Intensive

EN.510.448. MSE Design Team Leader. 4 Credits.
This course is the second half of a two-semester course sequence for students majoring or double majoring in MSE. This course provides a leadership experience to various aspects of planning and conducting independent research in a team setting. In this course, MSE seniors assemble and lead a student team consisting of 3 to 6 students, apply their knowledge in their track area, and develop leadership skills to generate the solution to open-ended problems encountered in MSE. Materials Science & Engineering Seniors Only.Recommended Course Background: EN 510.101, EN 510.311, EN 510.312,EN. 510.428, EN 510.429.Meets with EN.510.434, EN.510.439, EN.510.441, and EN.510.446
EN.510.447

EN.510.450. Three Dimensional Microstructural Characterization of Mateirals. 3 Credits.
An undergraduate level introduction to experimental techniques and data analysis for characterizing the microstructure of materials in three dimensions.Topics to be covered include serial sectioning, principles of optical and scanning-electron microscopy and electron back-scatter diffraction (EBSD), high-energy x-ray diffraction microscopy, and techniques for 3D data reduction, representation, and analysis. Pre-Requisites: 510.311 & 510.313. Also listed as EN.510.701.
EN.510.311 AND EN.510.313

EN.510.451. Recycling for Sustainablility. 3 Credits.
“I’m so confused…which bin do I choose?” Recycling everyday materials and re-using objects made from them have been part of our country’s materials-usage landscape for decades. However, as we engineer a sustainable future, recycling will become an ever-increasing component of our strategies for material selection and product design. This course provides an overview of recycling – from the basics of materials recovery, processing and re-use to its economic and environmental impacts. Students will learn about industrial practices associated with recycling and how these relate to our everyday consumer behaviors. Field experiences and laboratory demonstrations will expose students to the realities of recycling. The challenges associated with recycling will be examined to gain a greater understanding of issues related to the use of materials in a sustainable world.

EN.510.457. Materials Science of Thin Films. 3 Credits.
The processing, structure, and properties of thin films are discussed emphasizing current areas of scientific and technological interest. Topics include elements of vacuum science and technology; chemical and physical vapor deposition processes; film growth and microstructure; chemical and microstructural characterization methods; epitaxy; mechanical properties such as internal stresses, adhesion, and strength; and technological applications such as superlattices, diffusion barriers, and protective coatings. Co-listed with EN.510.657

EN.510.467. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.Co-listed with EN.510.667
EN.510.311 AND EN.510.315

EN.510.501. Undergraduate Research/Material Science. 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
Students must have completed Lab Safety training prior to registering for this class.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.502. Research in Materials Science. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.504. Independent Study. 1 - 3 Credits.
Individual programs of study are worked out between students and the professor supervising their independent study project. Topics selected are those not formally listed as regular courses and include a considerable design component.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.597. Research - Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.510.601. Structure Of Materials. 3 Credits.
An introduction to the structure of inorganic and polymeric materials. Topics include the atomic scale structure of metals, alloys, ceramics, and semiconductors; structure of polymers; crystal defects; elementary crystallography; tensor properties of crystals; and an introduction to the uses of diffraction techniques (including X-ray diffraction and electron microscopy) in studying the structure of materials. Recommended Course Background: undergraduate chemistry, physics, and calculus or permission of instructor.

EN.510.602. Thermodynamics Of Materials. 3 Credits.
An introduction to the classical and statistical thermodynamics of materials. Topics include the zeroth law of thermodynamics; the first law (work, internal energy, heat, enthalpy, heat capacity); the second law (heat engines, Carnot cycle, Clausius inequality, entropy, absolute temperature); equilibrium of single component systems (free energy, thermodynamic potentials, virtual variations, chemical potential, phase changes); equilibrium of multicomponent systems and chemical thermodynamics; basics of statistical physics (single and multiple particle partition functions, configurational entropy, third law; statistical thermodynamics of solid solutions); and equilibrium composition-temperature phase diagrams. Recommended Course Background: undergraduate calculus, chemistry, and physics or permission of instructor.

EN.510.603. Phase Transformations of Materials. 3 Credits.
This course presents a unified treatment of the thermodynamics and kinetics of phase transformations from phenomenological and atomistic viewpoints. Phase transformations in condensed metal and nonmetal systems are discussed. Recommended Course Background: EN.510.601 and EN.510.602

EN.510.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.530.604 are not eligible to take EN.510.604.

EN.510.605. Electrical, Optical and Magnetic Properties of Materials. 3 Credits.
An overview of electrical, optical and magnetic properties arising from the fundamental electronic and atomic structure of materials. Continuum materials properties are developed through examination of microscopic processes. Emphasis will be placed on both fundamental principles and applications in contemporary materials technologies. Recommended Course Background: EN.510.601

EN.510.607. Biomaterials II: Host response and biomaterials applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include host reactions to biomaterials and their evaluation, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, biomaterials for cardiovascular applications, biomaterials for orthopedic applications, and biomaterials for artificial organs. Recommended Course Background: Undergraduate chemistry and basic cell biology. Also listed as EN.510.407

EN.510.610. Fundamentals of Biomaterials. 3 Credits.
This course provides an introduction to biomaterials in medicine. Topics include: hard and soft biomaterials, materials science concepts specific to biomaterials, surface thermodynamics, surfactants and surface functionalization, proteins and protein-surface interactions, tissue engineering and regenerative medicine, wound healing and the inflammatory response, and drug delivery systems.Pre-requisites: 510.602 (Thermodynamics of Materials) or permission of instructor.

EN.510.615. Physical Properties of Materials. 3 Credits.
A detailed survey of the relationship between materials properties and underlying microstructure. Structure/property/processing relationships will be examined across a wide spectrum of materials including metals, ceramics, polymers and biomaterials, and properties including electrical, magnetic, optical, thermal, mechanical, chemical and biocompatibility.

EN.510.616. Physical Behavior of Metamaterials. 3 Credits.
The field of metamaterials is a rapidly evolving area within the physical and engineering sciences that relates to diverse applications such as transformation optics for advanced imaging, acoustic noise reduction for architectural spaces and electromagnetic shielding for electronic devices. The goal of metamaterials design is to guide energy transport through specified regions of a material avoiding others that might contain delicate or otherwise susceptible structures that must be shielded. Energy transport can occur via electromagnetic waves, acoustic waves, electrical currents or thermal fluxes. Through rational design of the material micro/meso/macrostructure, any one of these can be effectively directed in the material. The challenge is to engineer materials that respond in a way that approximates the desired design. In this course, the methods for metamaterials design will be investigated along with those aspects of materials science and engineering that allow for the fabrication of these materials. Also listed as EN.510.416

EN.510.621. Biomolecular Materials I - Soluble Proteins and Amphiphiles. 3 Credits.
Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques. Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques. Co-listed with EN.510.426.

EN.510.622. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material's property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss therir mechanical , electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechnanical (MEMS) devices. (Also listed as 510.622/422)

EN.510.624. X-ray Scattering, Diffraction, and Imaging. 3 Credits.
An introduction to the uses of x-rays for structural characterization of materials, including (i) kinematic theory of x-ray scattering and diffraction by single crystals, polycrystals, liquids, and amorphous solids; (ii) principles of Fourier optics with applications to x-ray radiography and phase-contrast x-ray imaging; and (iii) x-ray computed tomography (CT).Prerequisite: 510.601 or equivalent.

EN.510.625. Advanced Materials for Battery. 3 Credits.
This class provides an overview of the basic principles of electrochemical energy storage and the essential roles of advanced materials in batteries. Materials selection and design for the anodes and cathodes of lithium and sodium batteries are introduced on the basis of crystallography and materials chemistry. State-of-the-art operando characterization techniques of battery materials are also discussed in the course. This class is also listed as EN.510.425.
EN.510.601 AND EN.510.602

EN.510.630. Molecular Simulation of Materials. 3 Credits.
Learn the fundamentals necessary to design and implement computer simulations on the molecular level. This course focuses on two widely used techniques: molecular-dynamics and Monte Carlo simulation. Both are introduced in the context of a review of the basic theoretical background. This class will cover the specifics of handling molecular interactions using empirical potentials, applying proper boundary conditions and simulating various equilibrium ensembles and non-equilibrium systems. Lectures will address how to extract transport coefficients, atomic scale correlations and local stresses and strains from simulation data, and computational issues such as algorithmic complexity and efficiency. The final weeks of the course will focus on new and cutting-edge advances in these methods.

EN.510.633. Computational Materials Design. 3 Credits.
This course will cover the use of computational methods to discover and design materials for new technologies. Topics addressed will include structure prediction, materials informatics, and the calculation of material properties from first principles using methods such as density functional theory. Participants will gain hands-on experience with modern computational techniques.

EN.510.636. Biomaterials for Cell Engineering. 3 Credits.
This course focuses on the development of biomaterials both as new tools to study fundamental biology and as means to direct cell behavior and function for biomedical applications. Topics include the material properties of cells and tissue, biomaterials for recapitulating cell microenvironment, biomaterials for studying and directing cell mechanotransduction, biomaterials for gene editing, biomaterials for immunotherapy, and biomaterials for neuroengineering. This course will have in-depth discussions on recent findings and publications in these areas. This course is also listed as EN.510.436.

EN.510.640. Stealth Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens. Co-listed with EN.510.420.

EN.510.643. Chemistry and Physics of Polymers. 3 Credits.
The course will describe and evaluate the synthetic routes, including condensation and addition polymerization, to macromolecules with varied constituents and properties. Factors that affect the efficiencies of the syntheses will be discussed. Properties of polymers that lead to technological applications will be covered, and the physical basis for these properties will be derived. Connections to mechanical, electronic, photonic, and biological applications will be made. Also listed as EN.510.443. Recommended Course Background: Organic Chemistry I and one semester of thermodynamics.

EN.510.657. Materials Science of Thin Films. 3 Credits.
The processing, structure, and properties of thin films are discussed emphasizing current areas of scientific and technological interest. Topics include elements of vacuum science and technology; chemical and physical vapor deposition processes; film growth and microstructure; chemical and microstructural characterization methods; epitaxy; mechanical properties such as internal stresses, adhesion, and strength; and technological applications such as superlattices, diffusion barriers, and protective coatings. Co-listed with EN.510.457

EN.510.658. Electroanalytical Chemistry & Energy Conversion. 3 Credits.
Electrochemical methods are used by researchers in many fields to study topics such as (photo)electrocatalysis, batteries, and chemical sensors. This course will cover the basic theory and applications of electrochemistry to provide students with foundational knowledge of electrified solid-solution interfaces. Fundamental topics including interfacial charge transfer, mass transport, electric double layer structure, electrode kinetics, and analytical methods will be covered. State-of-the-art topics in electrochemistry research will also be discussed.

EN.510.665. Transmission electron microscopy: principle and practice. 3 Credits.
Introduction to basic principles of electron diffraction, phase contrast and Z-contrast and applications of these principles in microstructural characterization of materials by electron diffraction, high-resolution electron microscopy and scanning transmission electron microscopy. Also listed as EN.510.414.

EN.510.667. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.Co-listed with EN.510.467
EN.510.601

EN.510.701. Three-Dimensional Microstructural Characterization of Materials. 3 Credits.
A graduate-level introduction to experimental techniques and data analysis for characterizing the microstructure of materials in three dimensions. Topics to be covered include serial sectioning, principles of optical and scanning-electron microscopy and electron back-scatter diffraction (EBSD), high-energy x-ray diffraction microscopy, and techniques for 3D data reduction, representation, and analysis.
EN.510.601 or Permission of instructor.

EN.510.801. Materials Research Seminar. 1 Credit.
The Graduate Research Seminar in the Department of Materials Science and Engineering provides a forum for students to present their latest research results in a formal seminar setting. The course encourages discussion between students in varying disciplines in order to establish new collaborations and develop the shared vocabulary required for interdisciplinary materials science research. Permission Required.

EN.510.802. Materials Research Seminar. 1 Credit.

EN.510.803. Materials Science Seminar. 1 Credit.
The Materials Science Seminar exposes students to a wide array of internationally recognized speakers who discuss topics of cutting-edge Materials Science research. Speakers are selected both to overlap research interests within the department and to expose students to broader trends in contemporary Materials Science.

EN.510.804. Materials Science Seminar. 1 Credit.
Meets with EN.510.434, EN.510.439, EN.510.441, EN.510.446, and EN.510.448.

EN.510.807. Graduate Research In Materials Science. 3 - 20 Credits.
Individual programs of study are worked out between students and the professor supervising their independent study project. Topics selected are those not formally listed as regular courses and include a considerable design component.

EN.510.808. Graduate Research. 3 - 20 Credits.

EN.510.809. Graduate Summer Research Course. 9 Credits.
Graduate Summer Research Course

EN.515 (Materials Science and Engineering)

EN.515.601. Structure and Properties of Materials. 3 Credits.
Topics include types of materials, bonding in solids, basic crystallography, crystal structures, tensor properties of materials, diffraction methods, crystal defects, and amorphous materials.

EN.515.602. Thermodynamics and Kinetics of Materials. 3 Credits.
Topics include laws of thermodynamics, equilibrium of single and multiphase systems, chemical thermodynamics, statistical thermodynamics of solid solutions, equilibrium phase diagrams, chemical kinetics, diffusion in solids, nucleation and growth processes, coarsening, and glass transition.

EN.515.603. Materials Characterization. 3 Credits.
This course will describe a variety of techniques used to characterize the structure and composition of engineering materials, including metals, ceramics, polymers, composites, and semiconductors. The emphasis will be on microstructural characterization techniques, including optical and electron microscopy, x-ray diffraction, and acoustic microscopy. Surface analytical techniques, including Auger electron spectroscopy, secondary ion mass spectroscopy, x-ray photoelectron spectroscopy, and Rutherford backscattering spectroscopy. Real-world examples of materials characterization will be presented throughout the course, including characterization of thin films, surfaces, interfaces, and single crystals.

EN.515.605. Electrical, Optical and Magnetic Properties. 3 Credits.
An overview of electrical, optical and magnetic properties arising from the fundamental electronic and atomic structure of materials. Continuum materials properties are developed through examination of microscopic processes. Emphasis will be placed on both fundamental principles and applications in contemporary materials technologies.Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.
EN.515.601 or equivalent.

EN.515.606. Chemical and Biological Properties of Materials. 3 Credits.
An introduction to the chemical and biological properties of organic and inorganic materials. Topics include an introduction to polymer science, polymer synthesis, chemical synthesis, and modification of inorganic materials, biomineralization, biosynthesis, and properties of natural materials (proteins, DNA, and polysaccharides), structure-property relationships in polymeric materials (synthetic polymers and structural proteins), and materials for biomedical applications. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course. Recommended Course Background: undergraduate chemistry and biology or permission of instructor.

EN.515.608. Biomaterials II: Host Response and Biomaterials Applications. 3 Credits.
This course focuses on the interaction of biomaterials with the biological system and applications of biomaterials. Topics include host reactions to biomaterials and their evaluation, cell-biomaterials interaction, biomaterials for tissue engineering applications, biomaterials for controlled drug and gene delivery, biomaterials for cardiovascular applications, biomaterials for orthopedic applications, and biomaterials for artificial organs. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.611. Computational Molecular Dynamics. 3 Credits.
This course aims to enable the student to understand and predict properties of microscopic systems in materials science, physics, biology, and chemistry. We will cover the basics of molecular simulation methods, and provide an overview of modeling tools for problems of interest. In particular this course will cover both hard and soft matter materials spaces. The course is geared toward students with an interest in molecular modeling, with or without prior experience in the area. At the end of this course, students should have a general knowledge of current state-of-the-art molecular simulation methods, and be able to design, run, and analyze simulations for systems of interest.

EN.515.615. Physical Properties of Materials. 3 Credits.
A detailed survey of the relationship between materials properties and underlying microstructure. Structure/property/ processing relationships will be examined across a wide spectrum of materials including metals, ceramics, polymers and biomaterials, and properties including electrical, magnetic, optical, thermal, mechanical, chemical and biocompatibility. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.616. Introduction To Nanotechnology. 3 Credits.
Nanoscale science and nanotechnology are broad, interdisciplinary areas, encompassing not just materials science but everything from biochemistry to electrical engineering and more. This will be a survey course introducing some of the fundamental principles behind nanotechnology and nanomaterials, as well as applications of nanotechnology. The role of solid-state physics and chemistry in nanotech will be emphasized. Nanoscale tools such as surface probe and atomic force microscopy, nanolithography, and special topics such as molecular electronics will also be covered.

EN.515.617. Nanomaterials. 3 Credits.
Nanomaterials is a survey course that covers concepts and the associated relevant physics and materials science of what makes nanoscale materials so unique. We'll learn about nanoscale characterization (electron and probe microscopy), fabrication at the nanoscale (self-assembly and top-down fabrication), and many current applications of nanomaterials across broad areas from medicine to defense. This course will take an in-depth look at nanomaterials discussed in Introduction to Nanotechnology; however, it stands alone with no prerequisite.

EN.515.620. Nanoparticles. 3 Credits.
Nanoparticles - one-dimensional materials with diameters of nearly atomic dimension - are one of the most important classes of nanostructured materials because their unusual properties that often differ significantly from bulk materials. This course will explore the synthesis, structure and properties of nanoparticles. Applications of nanoparticles in medicine, optics, sensing, and catalysis will be discussed, with an emphasis will be on metal nanoparticles and semiconductor quantum dots. Course Note(s): Part-time students should register for the 515 course.

EN.515.621. Biomolecular Materials I: Soluble Proteins & Amphiphiles. 3 Credits.
Structure and function of cellular molecules (lipids, nucleic acids, proteins, and carbohydrates). Structure and function of molecular machines (enzymes for biosynthesis, motors, pumps). Protein synthesis using recombinant nucleic acid methods. Advanced materials development. Interactions of biopolymers, lipid membranes, and their complexes. Mean field theories, fluctuation and correlation effects. Self assembly in biomolecular materials. Biomedical applications. Characterization techniques.

EN.515.622. Micro and Nano Structured Materials & Devices. 3 Credits.
Almost every material's property changes with scale. We will examine ways to make micro- and nano-structured materials and discuss their mechanical, electrical, and chemical properties. Topics include the physics and chemistry of physical vapor deposition, thin film patterning, and microstructural characterization. Particular attention will be paid to current technologies including computer chips and memory, thin film sensors, diffusion barriers, protective coatings, and microelectromechanical (MEMS) devices Course Note(s): Part-time students should register for the 515 course.

EN.515.627. Chemistry of Nanomaterials. 3 Credits.
This course introduces the fundamental principles necessary to understand the behavior of materials at length scales larger than atoms or molecules with applications in chemistry and materials science. This course will explore topics such as nanoparticle synthesis and self assembly, ordered porous materials, catalysis, nanostructured thin films, and solar energy conversion. Size dependent properties of nanomaterials will be discussed.

EN.515.628. Introduction to Solid State Chemistry. 3 Credits.
This course focuses on understanding materials properties and their impact on engineering systems. Students in this course will explore the interrelationships among the atomic structure, bonding, and defects, and their influence on the electrical, magnetic, and optical properties of materials. This course will cover topics related to: atomic arrangement; synthesis and processing of materials; characterization using x-ray, thermal and electrochemical methods; specialized topics involving real-world examples drawn from industry including semiconductor processing, energy conversion and storage, and emerging materials-specific technologies.

EN.515.634. Fundamentals of Metamaterials. 3 Credits.
This course introduces the student to the field of metamaterials. The course will begin with a review of basic electromagnetic wave propagation and interaction with matter. The remainder of the course will discuss how metamaterials can be utilized to manipulate electromagnetic fields. Topics will include negative refractive index, perfect lensing, metasurfaces, artificial magnetic conductors, and absorbers.

EN.515.635. Mechanical Properties of Materials. 3 Credits.
This course will consist of a detailed study of the mechanical properties of materials. Topics covered will include stress-strain behavior, elastic and plastic deformation mechanisms, failure mechanisms in quasi-static and dynamic loading conditions, and microstructure-properties relationships. These topics will be discussed as applied to metallic, ceramic, polymeric, and composite materials at bulk and nano scales. The course will also introduce destructive and non-destructive mechanical testing methods. Course Note(s): Please note that this 515 course is also listed as a 510 course in the full-time program. It is the same course. Part-time students should register for the 515 course.

EN.515.636. Chemical Synthesis and Processing of Advanced Materials. 3 Credits.
This is a treatise course on chemical processing of materials. The primary objective of this course is to provide an introduction to various chemical synthesis and formulation techniques for the study of advanced materials including metals, alloys, semiconductors, ceramics, carbons, polymers, coatings, thin films, nanoparticles, and nanostructured materials. The course will discuss both established chemical processing methods and recent advances in materials synthesis and fabrication. Other topics to be covered include thermodynamics and kinetics in chemistry, structure-property relations, and materials characterization techniques.

EN.515.640. Stealth Science and Engineering. 3 Credits.
The goal of stealth engineering is the creation of objects that are not easily detected using remote sensing techniques. To achieve this end, engineered systems of materials are arrayed to alter the signature of objects by reducing energy returned to remote observers. This course will provide an introduction to the general principles behind signature reduction by examining the mathematics and science behind basic electromagnetic and acoustic transport processes. Specific topics will include energy absorbing materials, anti-reflection coatings, wave guiding and scattering, metamaterials and adaptive screens.

EN.515.646. Artificial Intelligence Methods for Materials Science. 3 Credits.
This course will introduce the principles of machine learning and data science, with a focus on applications in materials science. The fundamentals of machine learning will be emphasized along with state-of-the-art techniques. Topics include data visualization, train/test splits, cross-validation, boosting models and convolutional neural networks. Real-world materials science datasets will be used throughout, and different data formats will be considered (e.g., descriptors vs. images). Students will demonstrate their knowledge in a final project that uses data derived from actual applications.

EN.515.654. Introduction to Micro- and Nano-fabrication. 3 Credits.
This course covers the principles of micro- and nano-fabrication processes for creation of electronic/optical/mechanical devices. The course exposes students to clean room etiquette and safety, film deposition, lithography, etching (dry/wet), vacuum systems, oxide growth, etc. and will familiarize students with use of various techniques, systems and equipment commonly encountered in microfabrication facilities. The course includes the necessary background for students so they can specify fabrication processes for particular device designs.

EN.515.655. Metal Additive Manufacturing. 3 Credits.
Additive Manufacturing (AM), also known colloquially as 3D Printing, is a disruptive technology that has received significant attention in recent years in both the popular press and the manufacturing industry. While the current and potential future applications for this technology, especially for mission-critical metal parts, are impressive and imaginative, the full potential for metal AM has not been realized due to current limitations and a lack of full understanding of metal AM processes. In this class we will cover (1) the current state-of-the-art of AM; (2) the production steps necessary to manufacture AM parts; and (3) the closely linked topics of AM materials and AM processes. While non-metal AM materials such as polymers, composites, and ceramics will be included, the primary focus will be on metal materials fabricated with laser powder bed fusion processes. Specific topics covered will include conventional vs. AM materials, meltpool phenomena including solidification, kinetics and solid-state kinetics, post-process thermal treatments, the process-properties relationship, in-situ process sensing, indirect process measurement methods and process modeling. Recent implementations of metal additive manufacturing, such as those in the aerospace and health care industries, will be presented extensively throughout the class as study cases. Popular press articles and technical papers on AM will be reviewed and discussed. Students taking this class will be expected to participate actively and bring to the class real or potential applications of AM in their workplaces.

EN.515.658. Design for Additive Manufacturing. 3 Credits.
This class builds on material covered in the Additive Manufacturing (AM) overview class (515.656) and previous Materials Science and Engineering courses such as Thermodynamics and Kinetics of Materials (515.602). We will learn the design process and design for AM specifically. Students will determine applications and opportunities to apply AM technology and also learn how to evaluate AM designs. Topics will include work flow decisions to determine AM application, design considerations for metal and polymer AM, design for multi-material and functional assembly applications, and AM design evaluation.
EN.515.655 Metal Additive Manufacturing

EN.515.661. Introduction to Polymer Science. 3 Credits.
The goal of this course is to provide students with an introduction to the preparation, properties and manufacturing of polymers. Methods for synthesizing polymers, manufacture of polymers and the techniques used to characterize polymer properties will be presented. The course topics include natural and synthetic giant molecules; inorganic and organic polymers; biomacromolecules; and elastomers, adhesives, coatings, fibers, plastics, blends, caulks, composites, and ceramics. The basic principles that apply to one polymer class can be used to understand all of the other classes and are integrated into the framework of this course.

EN.515.730. Materials Science and Engineering Project. 3 Credits.
This course is an individually tailored, supervised project that offers research experience through work on a special problem related to each student's field of interest. Upon completion of this course, a written essay must be submitted. The faculty advisor will approve the final essay. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Consent of advisor is required.

EN.515.731. Materials Science and Engineering Project. 3 Credits.
This course is an individually tailored, supervised project that offers research experience through work on a special problem related to each student's field of interest. Upon completion of this course, a written essay must be submitted. The faculty advisor will approve the final essay. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Consent of advisor is required.

EN.515.800. Independent Study in Materials Science and Engineering. 3 Credits.
Independent study allows students to take a specialty course on a topic not currently offered within EP but is related to the expertise of a faculty member. Students enrolled in this course are expected to meet with their instructor on a weekly basis and to complete assignments as required including but not restricted to homework, tests and topical essays. Arrangements for this course should be made between the student and the instructor. Final approval is required from the Program Chair. Generally, only one semester of Independent Study will be approved, but a second semester will be granted with justification. All other coursework should be completed before this project begins (or at least completed concurrently with this project). Program Chair approval is required.

EN.515.801. Independent Study in Material Science and Engineering. 3 Credits.
Second semester of independent study. See description for EN.515.800.

EN.520 (Electrical & Computer Engineering)

EN.520.123. Computational Modeling for Electrical and Computer Engineering. 3 Credits.
In this course, the students will acquire the skills of solving complex real world Electrical and Computer Engineering problems using computational modeling tools. This course will covert two aspects ofsolving those ECE problems. The first aspect consists of learning to map ECE tasks to mathematical models. The second aspect consists of introducing the students to the basic of computational algorithms needed to work with the models, and programming such algorithms in MATLAB.

EN.520.137. Introduction To Electrical & Computer Engineering. 3 Credits.
An introductory course covering the principles of electrical engineering including sinusoidal wave forms, electrical measurements, digital circuits, and applications of electrical and computer engineering. Laboratory exercises, the use of computers, and a design project are included in the course.

EN.520.142. Digital Systems Fundamentals. 3 Credits.
Number systems and computer codes, switching functions, minimization of switching functions, Quine - McCluskey method, sequential logic, state tables, memory devices, analysis, and synthesis of synchronous sequential devices.

EN.520.150. Light, Image and Vision. 3 Credits.
This course is designed for beginning undergraduate students and covers the principle of optics and imaging from the human vision perspective. The topics for the course include the basic principles and properties of light, imaging and image formation, optical imaging and display systems, and human vision. The course include bio-weekly labs that allows students to implement and experience the concepts learned during the lectures.

EN.520.151. ECE Ideation and Design Lab (First Year). 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu. Students must take the class as a graded course. S/U is not an option. For additional info, see link below: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.211. ECE Engineering Team Project. 1 Credit.
This course introduces the student to the basics of engineering team projects. The student will become a member of and participate in the different aspects of an ECE team project over several semesters. (Freshmen and Sophomores)

EN.520.212. ECE Engineering Team Project (Freshmen and Sophomores). 1 Credit.
This course introduces the student to the basics of engineering team projects. The student will participate in an ECE engineering team project as a member. The student is expected to participate in the different aspects of the project over several semesters. (Freshmen and Sophomores)Permission of instructor required.

EN.520.214. Signals and Systems. 4 Credits.
An introduction to discrete-time and continuous-time signals and systems covers representation of signals and linear time-invariant systems and Fourier analysis.
(AS.110.107 OR AS.110.109);AS.110.202 can be taken while taking EN.520.214

EN.520.216. Introduction To VLSI. 3 Credits.
This course teaches the basics of switch-level digital CMOS VLSI design. This includes creating digital gates using MOS transistors as switches, laying out a design using CAD tools, and checking the design for conformance to the Scalable CMOS design rules.Recommended: EN.520.213.
(AS.171.101 AND AS.171.102) OR (AS.171.101 AND AS.171.108) OR (AS.171.102 AND AS.171.107) OR (AS.171.107 AND AS.171.108)

EN.520.219. Introduction to Electromagnetics. 3 Credits.
Vector analysis, electrostatic fields in vacuum and material media, stationary currents in conducting media, magnetostatic fields in vacuum and material media. Maxwell's equations and time-dependent electric and magnetic fields, electromagnetic waves and radiation, transmission lines, wave guides, applications.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;AS.110.109 AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND AS.173.112;AS.110.202 may be taken prior to or while enrolled in EN.520.219.

EN.520.220. Electromagnetic Waves. 3 Credits.
Magnetostatic fields in vacuum and material media. Maxwell's equations and time-dependent electric and magnetic fields, electromagnetic waves and radiation, transmission lines, wave guides, applications.

EN.520.225. Advanced Digital Systems. 3 Credits.
Students are introduced to Hardware Description Languages (HDL) through the assembly of virtual versions of the digital parts used in the previous semester's Digital Systems Fundamentals. From this point on, new components called modules are created as needed to implement larger digital circuits. Increasingly complex digital systems are then created through stages such as desktop calculators, and culminating in the design of microcontrollers and microprocessors.The hardware used for the digital systems designed is a custom board containing a Field Programmable Gate Array (FPGA). This board is configured using software on the student's computer, but is designed to standalone. That is, once configured, it no longer needs to be connected to any host computer.The architecture of these complex digital systems starts with Finite State Machines (FSM). Hierarchical FSMs are then covered, followed by traditional two and three bus microprocessor architectures and digital signal processors.
EN.520.142

EN.520.230. Mastering Electronics. 3 Credits.
With this course, students will have a solid understanding of basic and fundamental electronic concepts and rules and will be able to build and design a wide range of electronic devices. Class lectures cover the fundamental concepts of electronics, followed by laboratory exercises that demonstrate the basic concepts. Topics include phase and frequency response, transistors, operational amplifiers, filters, and other analog circuits. The experiments are done using computer controlled digital oscilloscopes, function generators, and power supplies. Additionally, a project will be completed during the final few weeks of classes. Text book: The Bare Essentials of Electrical Engineering Maryam Al-Othman, John Cole, and Dimitri Peroulis.
Prerequisite(s): EN.520.231
(AS.110.108 AND AS.110.109) AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108) AND AS.173.112);Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.231. Mastering Electronics Laboratory. 2 Credits.
With this course, students will have a solid understanding of basic and fundamental electronic concepts and rules including resistive circuits, loop and node analysis, capacitor/inductor circuits, and transient analysis. Students will be able to build, design, and simulate a wide range of electronic devices; the class will focus on building and designing audio devices. Class lectures cover the fundamental concepts of electronics, followed by laboratory exercises that demonstrate the basic concepts. Students will learn to simulate circuits using SPICE. A final project is required.
Prerequisite(s): EN.520.230 Mastering Electronics
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;(AS.110.108 AND AS.110.109) AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108)) AND AS.173.112)

EN.520.232. Mastering Electronics II. 3 Credits.
With this course, students will further develop their understanding of circuit and electronic concepts and rules and will be able to build and design a wide range of electronic devices. Class lectures cover advanced design concepts of analog CMOS integrated circuits, followed by laboratory exercises that reinforce the concepts. Topics include 2nd order circuits, phase and frequency response, transistors, operational amplifiers, noise, feedback, Bode diagrams, and frequency compensation. The experiments are done using computer controlled digital oscilloscopes, function generators, and power supplies. Additionally, a project will be completed during the final few weeks of classes.
(AS.110.107 OR AS.110.109) AND (EN.500.112 OR EN.500.113 OR EN.500.114)

EN.520.233. Mastering Electronics II Lab. 2 Credits.
For much of the semester, students will be performing a new lab experiment each week. During each student's scheduled lab section, they will be expected to attend in person and demonstrate the operation of the functioning circuit. The student will be graded based on their functioning circuit, their experimental results, and their demonstration of its operation during their scheduled laboratory period. Each lab will have a simulation component as well as an experimental component. Additionally, one week after the demonstration, the student is required to submit a lab assignment where students will demonstrate data analysis and answer questions about the lab to further their understanding. Students will work individually on all of these components, but are encouraged to ask questions to their classmates and the instructors in the discussion areas on MS Teams. In fact, your participation in these discussions will contribute to your laboratory course participation grade.
(AS.110.107 OR AS.110.109) AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND EN.520.230 AND EN.520.231

EN.520.250. Leading Innovation Design Team. 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu. Students must take the class as a graded course. S/U is not an option.For additional info, see link below: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class.

EN.520.251. ECE Ideation and Design Lab. 1 Credit.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Prerequisite(s): Student can take EN.520.463, EN.520.663, and EN.520.251, but not in the same semester
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.302. Internet of Things Project Lab. 3 Credits.
In this course the student configures, programs, and tests microprocessor modules with wireless interconnectivity for embedded monitoring and control purposes. Several different platforms are explored and programmed in high level languages (HLL). Upon completion, students can use these devices as elements in other project courses.Recommended Course Background: HLL programming and digital logic familiarity; Advanced Microprocessor Lab is a plus.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.315. Intro. to Bio-Inspired Processing of Audio-Visual Signals. 3 Credits.
An introductory course to basic concepts of information processing of human communication signals (sounds, images) in living organisms and by machine. Recommended Course Background: EN.520.214 (or EN.580.222) or consent of the instructor.

EN.520.340. Introduction to Mechatronics: Sensing, Processing, Learning and Actuation. 3 Credits.
Introduction to Mechatronics is mostly hands-on, interdisciplinary design class consisting of lectures about key topics in mechatronics, and lab activities aimed at building basic professional competence. After completing the labs, the course will be focused on a final mini-project for the remainder of the semester. This course will encourage and emphasize active collaboration with classmates. Each team will plan. design, manufacture and/or build, test, and demonstrate a robotic system that meets the specified objectives.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.520.230 AND EN.520.231

EN.520.344. Introduction to Digital Signal Processing. 3 Credits.
Introduction to digital signal processing, sampling and quantization, discrete time signals and systems, convolution, Z-transforms, transfer functions, fast Fourier transform, analog and digital filter design, A/D and D/A converters, and applications of DSP.
EN.520.214 OR EN.580.242 OR EN.580.246

EN.520.349. Microprocessor Lab I. 3 Credits.
This course introduces the student to the programming of microprocessors at the machine level. 68HC08, 8051, and eZ8 microcontrollers are programmed in assembly language for embedded control purposes. The architecture, instruction set, and simple input/output operations are covered for each family. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.142 or equivalent.The lab is open 24/7 and students can still take the class if they are unable to meet during lab time.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.353. Control Systems. 4 Credits.
Modeling, analysis, and an introduction to design for feedback control systems. Topics include state equation and transfer function representations, stability, performance measures, root locus methods, and frequency response methods (Nyquist, Bode).
EN.520.214 OR EN.530.343 OR EN.580.222

EN.520.363. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.370. Introduction to Renewable Energy Engineering. 3 Credits.
This course provides an introduction to the science and engineering of renewable energy technologies. The class will begin with an overview of today’s energy landscape and proceed with an introduction to thermodynamics and basic heat engines. Specific technologies to be discussed include photovoltaics, fuel cells and hydrogen, biomass, wind power and energy storage. The class should be accessible to those from a variety of science and engineering disciplines.
(AS.171.101 OR AS.171.105 OR AS.171.107 OR EN.530.123) AND (AS.110.109 OR AS.110.107)

EN.520.385. Signals, Systems, & Learning. 3 Credits.
This course builds on the fundamentals of signal processing to explore state space models and random processes. Topics include LTI systems, feedback, probabilistic models, signal estimation, random processes, power spectral density and hypothesis testing.
(EN.580.222 OR EN.520.214) AND EN.550.310 AND AS.110.201

EN.520.390. Music Signal Processing. 3 Credits.
This course covers the principles and algorithms used in the processing and analysis of music. Topics include music representation, Fourier analysis of signals including both continuous and discrete representations, signal filtering, music synchronization, dynamic time warping, music structure analysis, chord recognition, tempo and beat tracking, tempograms, content-based audio retrieval, and music decomposition. Projects and assignments will be carried out in Matlab and/or Python. Students must have familiarity with music notation, structure, and instruments.
(EN.520.214 OR EN.580.246) AND (EN.500.113 OR EN.500.133);AS.110.201 OR EN.553.291 OR EN.553.310 OR EN.553.311 OR EN.553.420 - student can either have already completed this class or must be concurrently registered at the same time as this course.

EN.520.403. Introduction to Optical Instruments. 3 Credits.
This course is intended to serve as an introduction to optics and optical instruments that are used in engineering, physical, and life sciences. The course covers first basics of ray optics with the laws of refraction and reflection and goes on to description of lenses, microscopes, telescopes, and imaging devices. Following that basics of wave optics are covered, including Maxwell equations, diffraction and interference. Operational principles and performance of various spectrometric and interferometric devices are covered including both basics (monochromatic, Fabry-Perot and Michelson interferometers), and advanced techniques of near field imaging, laser spectroscopy, Fourier domain spectroscopy, laser Radars and others.

EN.520.404. Engineering solutions in a global, economic, environmental, and societal context. 1 Credit.
Students will examine ECE based case studies and will apply decision making theory and leadership theory as it relates to information, communication, healthcare, and energy. The course aims to examine technology as it transitions from old to new, from impossible to possible. It will also evaluate the new hazards that these new technologies may have on the world. The students will have to quantify the good and the bad of each solution and weigh their contribution to Environment, Economy, society and Healthcare. The group will present these case studies to their classmates, justifying the solutions and answers to the ethical dilemmas they faced, and explain the impact of their decisions from an economic, environmental, and global perspective.
Prerequisite(s): EN.660.400

EN.520.412. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video.
(AS.110.201 AND EN.553.310 AND EN.520.344) OR (AS.110.201 AND EN.553.311 AND EN.520.344) OR (AS.110.201 AND EN.553.420 AND EN.520.344) OR (AS.110.201 AND EN.553.421 AND EN.520.344);Students can only take EN.520.412 OR EN.520.612, not both.

EN.520.414. Image Processing & Analysis. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course.
EN.520.214 OR EN.580.222 OR EN.580.243

EN.520.415. Image Process & Analysis II. 3 Credits.
This course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by morphological image processing and analysis, image representation and description, image recognition and interpretation.

EN.520.417. Computation for Engineers. 3 Credits.
Designing algorithms in a finite precision environment that are accurate, fast, and memory efficient is a challenge that many engineers must face. This course will provide students with the tools they need to meet this challenge. Topics include floating point arithmetic, rounding and discretization errors, problem conditioning, algorithm stability, solving systems of linear equations and least-squares problems, exploiting matrix structure, interpolation, finding zeros and minima of functions, computing Fourier transforms, derivatives, and integrals. Matlab is the computing platform.Background in linear algebra, matrices, digital signal processing, Matlab.

EN.520.418. Modern Convex Optimization. 3 Credits.
Convex optimization is at the heart of many disciplines such as machine learning, signal processing, control, medical imaging, etc. In this course, we will cover theory and algorithms for convex optimization problems. The theory part includes convex analysis, convex optimization problems (LPs, QPs, SOCPS, SDPs, Conic Programs), and Duality Theory. We will then explore a diverse array of algorithms to solve convex optimization problems, such as gradient methods, sub-gradient methods, accelerated methods, proximal algorithms, ADMM, and Newton's method.Text Book: There is no required textbook for the course. For reference, the audience can consult the following textbooks:- Convex Optimization by Stephen Boyd and Lieven Vanderberghe
(AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.113 OR EN.500.133 OR EN.540.382)

EN.520.424. FPGA Synthesis Lab. 3 Credits.
An advanced laboratory course in the application of FPGA technology to information processing, using VHDL synthesis methods for hardware development. The student will use commercial CAD software for VHDL simulation and synthesis, and implement their systems in programmable XILINX 20,000 gate FPGA devices. The lab will consist of a series of digital projects demonstrating VHDL design and synthesis methodology, building up to final projects at least the size of an 8-bit RISC computer. Projects will encompass such things as system clocking, flip-flop registers, state-machine control, and arithmetic. The students will learn VHDL methods as they proceed through the lab projects, and prior experience with VHDL is not a prerequisite.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.427. Design of Biomedical Instruments and Systems. 3 Credits.
The purpose of this course is to teach the students principles of product design for the biomedical market. From an idea to a product and all the stages in-between.The course material will include identification of the need, market survey, patents. Funding sources and opportunities, Regulatory requirements, Reimbursement codes, Business models). Integration of the system into the clinical field. system connectivity. Medical information systems. Medical standards (DICOM, HL-7, ICD, Medical information bus). How to avoid mistakes in system design and in system marketing. Entrepreneurship.The course participants will be divided to groups of 2-3 students each. Each group will be acting as a start-up company throughout the whole semester. Each group will need to identify a need. This can be done by meeting and interviewing medical personnel, at the Johns Hopkins Medical campus or other hospitals, clinics, HMOs, assisted living communities or other related to the medical world. The proposed medical instrument or system can be a combination of instrument and software.Each week, there will be a lecture devoted to the principal subjects mentioned above. Afterwards the students will present their ideas and progress to all class participants. There will be an open discussion for each of the projects. The feedback from class will help the development of the product. Each presentation, document, survey or paper will be kept in the course cloud which will have a folder for each of the groups. The material gathered in this folder will be built gradually throughout the semester. Eventually it will become the product blueprint.At the last week of the semester, the groups will present their product to a panel of experts involved with the biotech industry, in order to “convince” them to invest in their project.Previous years’ projects are listed in this website: (https://jhuecepdl.bitbucket.io).

EN.520.432. Medical Imaging Systems. 3 Credits.
This course provides students with an introduction to the physics, instrumentation, and signal processing methods used in general radiography, X-ray computed tomography, ultrasound imaging, magnetic resonance imaging, and nuclear medicine. The primary focus is on the methods required to reconstruct images within each modality from a signals and systems perspective, with emphasis on the resolution, contrast, and signal-to-noise ratio of the resulting images. Students will additionally engage in hands-on activities to reconstruct medical images from raw data.
EN.520.214 OR EN.580.222 OR (EN.580.243 AND EN.580.246)

EN.520.433. Medical Image Analysis. 3 Credits.
This course covers the principles and algorithms used in the processing and analysis of medical images. Topics include, interpolation, registration, enhancement, feature extraction, classification, segmentation, quantification, shape analysis, motion estimation, and visualization. Analysis of both anatomical and functional images will be studied and images from the most common medical imaging modalities will be used. Projects and assignments will provide students experience working with actual medical imaging data.
EN.550.310 OR EN.550.311 OR EN.560.348

EN.520.435. Digital Signal Processing. 3 Credits.
Methods for processing discrete-time signals. Topics include signal and system representations, z- transforms, sampling, discrete Fourier transforms, fast Fourier transforms, digital filters.

EN.520.438. Deep Learning. 3 Credits.
Deep Learning is emerging as one of the most successful tools in machine learning for feature learning and classification. This course will introduce students to the basics of Neural Networks and expose them to some cutting-edge research. In particular, this course will provide a survey of various deep learning-based architectures such as autoencoders, recurrent neural networks and convolutional neural networks. We will discuss merits and drawbacks of available approaches and identify promising avenues of research in this rapidly evolving field. Various applications related to computer vision and biometrics will be studied. The course will include a project, which will allow students to explore an area of Deep Learning that interests them in more depth.
(EN.520.635 OR EN.520.344[]) AND EN.601.220 AND (EN.553.420 OR EN.553.310 OR EN.553.311)

EN.520.439. Machine Learning for Medical Applications. 3 Credits.
In this course, students will actively learn the basic principles of artificial intelligence and machine learning techniques applied to medical applications, as well as medical concepts common in healthcare environments. Throughout the course, students will explore different types of bio-signals such as electroencephalograms, electrocardiograms, sound, medical imaging, and their associated processing methodologies. The primary objective is to give students the tools they need to be able to develop new artificial intelligence-related ideas in biomedical environments. At the end of the course, students will apply their newly acquired knowledge to complete a cumulative final project dealing with a real-world situation. Students are expected to be familiar with linear algebra. Python coding skills are recommended, as there will be one coding assignment every week.
EN.520.412

EN.520.440. Machine Intelligence on Embedded Systems. 3 Credits.
The second wave of AI is about statistical learning of low dimensional structures from high dimensional data. Inference is done using multilayer, data transforming networks using fixed point arithmetic with parameters that have limited precision known as Deep Neural Networks. In this course students will learn about Machine Learning and AI on embedded systems that have limited computational, storage and communication resources. Students are expected to be familiar with linear algebra and Python as well some familiarity with typical ML frameworks (TensorFlow, Keras e.t.c). A first course in ML is strongly advised. At the end of the course, students will apply their newly acquired knowledge to complete a final project with real world data for machine perception and cognition.
EN.520.412 OR EN.520.612 OR EN.601.475 OR EN.601.675 OR EN.601.676 OR EN.601.482 OR EN.601.682 OR EN.601.486 OR EN.601.686 OR EN.520.439 OR EN.520.659 OR EN.520.650

EN.520.445. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.It is recommended that students take EN.520.344 Digital Signal Processing prior to taking this class.

EN.520.447. Information Theory. 3 Credits.
This course will address some basic scientific questions about systems that store or communicate information. Mathematical models will be developed for (1) the process of error-free data compression leading to the notion of entropy, (2) data (e.g. image) compression with slightly degraded reproduction leading to rate-distortion theory and (3) error-free communication of information over noisy channels leading to the notion of channel capacity. It will be shown how these quantitative measures of information have fundamental connections with statistical physics (thermodynamics), computer science (string complexity), economics (optimal portfolios), probability theory (large deviations), and statistics (Fisher information, hypothesis testing).
EN.553.310 OR EN.553.420 OR EN.553.311;Students can earn credit for either EN.520.447 or EN.520.647, but not both.

EN.520.448. Electronics Design Lab. 3 Credits.
An advanced laboratory course in which teams of students design, build, test and document application specific information processing microsystems. Semester long projects range from sensors/actuators, mixed signal electronics, embedded microcomputers, algorithms and robotics systems design. Demonstration and documentation of projects are important aspects of the evaluation process.Recommended: EN.600.333, EN.600.334, EN.520.214, EN.520.216, EN.520.349, EN.520.372, EN.520.490 or EN.520.491.
(EN.520.240 OR EN.520.340 OR EN.520.230 OR EN.520.213) AND AS.110.108 AND AS.110.109 AND ((171.101 AND 171.102) OR (171.101 AND 171.108) OR (171.102 AND 171.107) OR (171.107 AND 171.108)) AND EN.520.142.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.450. Advanced Micro-Processor Lab. 3 Credits.
This course covers the usage of common microcontroller peripherals. Interrupt handling, timer operations, serial communication, digital to analog and analog to digital conversions, and flash ROM programming are done on the 68HC08, 8051, and eZ8 microcontrollers. Upon completion, students can use these flash-based chips as elements in other project courses. Recommended Course Background: EN.520.349
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.453. Advanced ECE Engineering Team Project. 3 Credits.
The course introduces the student to running an engineering team project. The student will participate in the ECE engineering team project as a leading member. The student is expected to participate in the different aspects of the project over several semesters and manage both team members and the project.(Juniors and Seniors) Permission of instructor is required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.454. Control Systems Design. 3 Credits.
Classical and modern control systems design methods. Topics include formulation of design specifications, classical design of compensators, state variable and observer based feedback. Computers are used extensively for design, and laboratory experiments are included.

EN.520.457. Quantum Mechanics for Engineering. 3 Credits.
Basic principles of quantum mechanics for engineers. Topics include the quantum theory of simple systems, in particular atoms and engineered quantum wells, the interaction of radiation and atomic systems, and examples of application of the quantum theory to lasers and solid-state devices. Recommended Course Background: AS.171.101-AS.171.102 and EN.520.219-EN.520.220

EN.520.462. Leading Innovation Design Team. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.eduFor additional info, see: https://engineering.jhu.edu/ece/undergraduate-studies/leading-innovation-design-team/
Students must have completed Lab Safety training prior to registering for this class.

EN.520.463. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Prerequisite(s): Students can take 520.251 and 520.663, but not in the same semester as 520.463.
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.465. Machine Perception. 3 Credits.
This course will cover topics such as Marr-Hildreth and Canny edge detectors, local representations (SIFT, LBP), Markov random fields and Gibbs representations, normalized cuts, shallow and deep neural networks for image and video analytics, shape from shading, Make 3D, stereo, and structure from motion.
Students can only receive credit for EN.520.465 or EN.520.665, but not both.;(AS.110.201 OR AS.110.202 OR AS.110.212 OR EN.553.291 OR EN.553.385) AND (EN.553.310 OR EN.553.311 OR EN.553.420) AND (EN.520.385)

EN.520.470. Infra-Red Sensing & Technologies. 3 Credits.
Infrared technologies have evolved over the last sixty, primarily driven by defense applications and needs but have recently perforated into various non-defense markets. It remains critical to many military systems and increasing to autonomous systems in general. This course is intended as an overview of the various technologies that make up an infrared sensor system, it will include some historical perspectives as well as the state of the art and will emphasize the various tradeoffs involved in designing a system for particular applications. In particular, it will cover the following topics that represent the main components: optics, detectors, readout integrated circuits (ROIC) including digital designs, the various wavelength (SWIR, MWIR, LWIR), testing and calibration, image and signal processing, and applications. The course structure will involve lectures, labs, and final project. Lectures will involve guest speakers that are subject matter experts on the various topics.

EN.520.482. Introduction To Lasers. 3 Credits.
This course covers the basic principles of laser oscillation. Specific topics include propagation of rays and Gaussian beams in lens-like media, optical resonators, spontaneous and stimulated emission, interaction of optical radiation and atomic systems, conditions for laser oscillation, homogeneous and inhomogeneous broadening, gas lasers, solid state lasers, Q-switching and mode locking of lasers.
AS.171.102 OR AS.171.108

EN.520.483. Bio-Photonics Laboratory. 3 Credits.
This laboratory course involves designing a set of basic optical experiments to characterize and understand the optical properties of biological materials. The course is designed to introduce students to the basic optical techniques used in medicine, biology, chemistry and material sciences.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.485. Advanced Semiconductor Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the operating principles and performance characteristics of the modern semiconductor devices used in high speed optical communications, optical storage and information display. The emphasis is on device physics andfabrication technology. The devices include heterojunction bipolar transistors, high mobility FET's, semiconductor lasers, laser amplifiers, light-emitting diodes, detectors, solar cells and others.

EN.520.486. Physics of Semiconductor Electronic Devices. 3 Credits.
The course is designed to develop and enhance the understanding of the physical principles of modern semiconductor electronic and opto-electronic devices. The course starts with the basics of band structure of solid with emphasis on group IV and III-V semiconductors as well as two dimensional semiconductors like graphene. It continues with the statistics of carriers in semiconductors and continues to electronic transport properties, followed by optical properties. The course goes on to investigate the properties of two dimensional electronic gas. The second part of the course describes operational principles of bipolar and unipolar transistors, light emitting diodes, photodetectors, and quantum devices.
Students may earn credit for EN.520.486 or EN.520.686, but not both.;AS.171.102 OR AS.171.108

EN.520.491. CAD Design of Digital VLSI Systems I (Juniors/Seniors). 3 Credits.
Juniors and Seniors Only.
Student may take EN.520.491 or EN.520.691, but not both.;AS.110.109 AND (AS.171.102 OR AS.171.104 OR AS.171.108) AND EN.520.142 AND EN.520.142 AND (EN.520.230 OR (EN.520.213 AND EN.520.345 OR EN.520.216))

EN.520.492. Mixed-Mode VLSI Systems. 3 Credits.
Silicon models of information and signal processing functions, with implementation in mixed analog and digital CMOS integrated circuits. Aspects of structured design, scalability, parallelism, low power consumption, and robustness to process variations. Topics include digital-to-analog and analog-to-digital conversion, delta-sigma modulation, bioinstrumentation, and adaptive neural computation. The course includes a VLSI design project. Recommended Course Background: EN.521.491 or equivalent.

EN.520.495. Microfabrication Laboratory. 4 Credits.
This laboratory course is an introduction to the principles of microfabrication for microelectronics, sensors, MEMS, and other synthetic microsystems that have applications in medicine and biology. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Seniors only or Perm. Req'd. Co-listed as EN.580.495 & EN.530.495
AS.171.102 OR AS.171.108

EN.520.498. Senior Design Project. 3 Credits.
Capstone design project, in which a team of students engineers a system and evaluates its performance in meeting design criteria and specifications. Example application areas are micro-electronic information processing, image processing, speech recognition, control, communications, and biomedical instrumentation. The design needs to demonstrate creative thinking and experimental skills, and needs to draw upon knowledge in basic sciences, mathematics, and engineering sciences. Interdisciplinary participation, such as by biomedical engineering, mechanical engineering, and computer science majors, is strongly encouraged. Instructor permission required.

EN.520.504. ECE Undergraduate Independent Study. 1 - 3 Credits.
Individual study, including participation in research, under the guidance of a faculty member in the department. The program of study or research, time required, and credit assigned must be worked out in advance between the student and the faculty member involved. May be taken either term by juniors or seniors.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.506. ECE Undergraduate Research. 1 - 3 Credits.
Independent research under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.516. ECE Group Undergraduate Research. 1 - 3 Credits.
Independent research under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.520. Artificial Intelligence In Medicine Reading Group. 1 Credit.
Course Description: The course will consist of a reading group exploring novel algorithms and papers on artificial intelligence and machine learning in medical applications. In this course, students will analyze the latest techniques and trends in machine learning (ML) for medical applications. They will also actively discuss basic methodologies traditionally employed. Students are expected to be familiar with linear algebra and machine learning. The primary objective is to give students the tools they need to be able to understand new ideas and trends relating to the use of machine learning in biomedical environments and other fields.
EN.520.412 OR EN.520.612 OR EN.520.439;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.571. Speech Technologies Reading Group. 1 Credit.
Reading group that explores novel algorithms and papers on speech technologies
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.520.603. Introduction to Optical Instruments. 3 Credits.
This course is intended to serve as an introduction to optics and optical instruments that are used in engineering, physical, and life sciences. The course covers first basics of ray optics with the laws of refraction and reflection and goes on to description of lenses, microscopes, telescopes, and imaging devices. Following that basics of wave optics are covered, including Maxwell equations, diffraction and interference. Operational principles and performance of various spectrometric and interferometric devices are covered including both basics (monochromatic, Fabry-Perot and Michelson interferometers), and advanced techniques of near field imaging, laser spectroscopy, Fourier domain spectroscopy, laser Radars and others.

EN.520.605. Advanced Optical and Optoelectronic Instruments and Devices. 3 Credits.
This course is essentially as continuation of 520.403 course “Introduction to Optical Instruments” and it picks where that course ends. The course starts with deeper exploration of light propagation in dispersive and anisotropic media and goes on to study of polarization optics. Then electro-optic and acousto-optic effects and devices based on them are studied. A short review of nonlinear optics includes frequency conversion, multiphoton absorption, Raman and Brillouin scattering. Then we study light propagation in waveguides, starting with coupled mode theory. Integrated devices include modulators, filters, multiplexers-demultiplexers, and others. The last section of the course includes advanced concepts, such as plasmonics, metasurfaces, and Fourier Optics.

EN.520.607. Introduction to the Physics of Electronic Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the basic physical processes taking place in the electronic and optical devices and to prepare students for taking classes in semiconductor devices and circuits, optics, lasers, and microwaves devices, as well as graduate courses. Both classical and quantum approaches are used. Specific topics include theory of molecular bonding; basics of solid state theory; mechanical, transport, magnetic, and optical properties of the metals; semiconductors; and dielectrics.
Students may earn credit for EN.520.607 or EN520.407 but not both.

EN.520.612. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify and retrieve information from different kinds of real world complex signals such as audio, speech, image and video. Recommended Course Background: AS.110.201, EN.553.310, and EN.520.435.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;Credit may only be earned for EN.520.412 or EN.520.612.

EN.520.613. Advanced Topics in Optical Medical Imaging. 3 Credits.
The course will review the recent advances in photonics technologies for medical imaging and sensing. The course is designed for graduate students with a back ground in optics and engineering. The main topics for the course are: Light Source and Devices for Biomedical Imaging; Fluorescence, Raman, Rayleigh Scatterings; Optical Endoscopy and Virtual biopsy; Novel imaging contrast dyes, nanoparticles, and optical clearing reagents; Label-free optical technologies in clinical applications; Neurophotonics and Optogenetics.

EN.520.614. Image Processing & Analysis. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course.Recommended Prerequisite: EN.520.214 or EN 580.222 or EN 580.243 or equivalent.

EN.520.615. Image Processing & Analysis II. 3 Credits.
The course covers fundamental methods for the processing and analysis of images and describes standard and modern techniques for the understanding of images by humans and computers. Topics include elements of visual perception, sampling and quantization, image transforms, image enhancement, color image processing, image restoration, image segmentation, and multiresolution image representation. Laboratory exercises demonstrate key aspects of the course. Grad students only.

EN.520.617. Computation for Engineers. 3 Credits.
Designing algorithms in a finite precision environment that are accurate, fast, and memory efficient is a challenge that many engineers must face. This course will provide students with the tools they need to meet this challenge. Topics include floating point arithmetic, rounding and discretization errors, problem conditioning, algorithm stability, solving systems of linear equations and least-squares problems, exploiting matrix structure, interpolation, finding zeros and minima of functions, computing Fourier transforms, derivatives, and integrals. Matlab is the computing platform.

EN.520.618. Modern Convex Optimization. 3 Credits.
Convex optimization is the most general class of optimization problems that are efficiently solvable. These problems arise in a diverse set of applications in machine learning, signal processing, control, medical imaging, etc. In this course, we will cover the modern aspects of convex optimization beyond Linear Programming, such as conic optimization including quadratic programming and semidefinite programming. We will then discuss a diverse array of numerical optimization methods to solve these optimization problems.

EN.520.621. Introduction To Nonlinear Systems. 3 Credits.
Nonlinear systems analysis techniques: phase-plane, limit cycles, harmonic balance, expansion methods, describing function. Liapunov stability. Popov criterion. Recommended Course Background: EN.520.601 or equivalent.

EN.520.622. Principles of Complex Networked Systems. 3 Credits.
By employing fundamental concepts from diverse areas of research, such as statistics, signal processing, biophysics, biochemistry, cell biology, and epidemiology, this course introduces a multidisciplinary and rigorous approach to the modeling and computational analysis of complex interaction networks. Topics to be covered include: overview of complex nonlinear interaction networks and their applications, graph-theoretic representations of network topology and stoichiometry, stochastic modeling of dynamic processes on complex networks and master equations, Langevin, Poisson, Fokker-Plank, and moment closure approximations, exact and approximate Monte Carlo simulation techniques, time-scale separation approaches, deterministic and stochastic sensitivity analysis techniques, network thermodynamics, and reverse engineering approaches for inferring network models from data.

EN.520.623. Medical Image Analysis. 3 Credits.
Graduate version of 520.433. This course covers the principles and algorithms used in the processing and analysis of medical images. Topics include, interpolation, registration, enhancement, feature extraction, classification, segmentation, quantification, shape analysis, motion estimation, and visualization. Analysis of both anatomical and functional images will be studied and images from the most common medical imaging modalities will be used. Projects and assignments will provide students experience working with actual medical imaging data. EN.520.432 OR EN.580.472 AND EN.550.310 OR EN.550.311;Student may earn credit for 520.433 or 520.623, but not both.

EN.520.624. Integrated Photonics. 3 Credits.
This course gives an introduction to integrated photonics. Topics include: material platforms, fabrication approaches, devices and device operation, numerical modeling, nonlinear processes, and applications. Devices discussed include waveguides, resonators, sensors, modulators, detectors, lasers and amplifiers. Recommended Course Background: EN.520.219-EN.520.220, EN.520.495, or equivalent.

EN.520.627. Photovoltaics and Energy Devices. 3 Credits.
This course provides an introduction to the science of photovoltaics and related energy devices. Topics covered include basic concepts in semiconductor device operation and carrier statistics; recombination mechanisms; p-n junctions; silicon, thin film, and third generation photovoltaic technologies; light trapping; and detailed balance limits of efficiency. Additionally, thermophotovoltaics and electrical energy storage technologies are introduced. A background in semiconductor device physics (EN.520.485, or similar) is recommended.

EN.520.628. Satellite Communication System. 3 Credits.
This course presents the fundamentals of satellite communications link design and an in-depth treatment of practical considerations. Existing commercial, civil, and military systems are described and analyzed.Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design. The impact of new technology on future systems in this dynamic field is discussed.Recommended Course Background: Communication Systems Engineering or equivalent or permission of the instructor.

EN.520.629. Networked Dynamical Systems. 3 Credits.
Networks and dynamics are pervasive in our world today. Power systems, the Internet, social networks, and biological systems are only a few of the numerous scenarios in which objects or individuals can affect -and be affected by- other members of a large group. This course examines modeling, analysis and design of networked dynamical systems -i.e., dynamic entities interconnected by a network- as well as various applications of such systems in science and engineering. Topics covered include (algebraic) graph theory, basic models of networked dynamical systems, continuous-time and discrete-time distributed averaging (consensus), coordination algorithms (rendezvous, formation, flocking, and deployment), and distributed algorithm computation and optimization over networks. Some of the motivating applications that will be analyzed are robotic coordination, coupled oscillators, social networks, web PageRank, sensor networks, power grids, and epidemics.Recommended Course Background: Linear Algebra (AS.110.201), Control Systems (EN.520.353), or equivalents, basic Matlab skills, and sufficient mathematical maturity.

EN.520.631. Ultrasound and Photoacoustic Beamforming. 3 Credits.
This course will discuss basic principles of ultrasound and photoacoustic imaging and provide an in-depth analysis of the beamforming process required to convert received electronic signals into a usable image. We will cover basic beamforming theory and apply it to real data. The course will culminate with student projects to design and implement a new beamformer derived from the principles taught in class. Recent projects have focused on the emerging use of deep learning to form a new class of ultrasound and photoacoustic images. Recommended background for students interested in deep learning projects: machine learning (EN.601.475), deep learning (EN.520.438/638 or EN.601.482/682), or equivalent.

EN.520.632. Medical Imaging Systems. 3 Credits.
This course provides students with an introduction to the physics, instrumentation, and signal processing methods used in general radiography, X-ray computed tomography, ultrasound imaging, magnetic resonance imaging, and nuclear medicine. The primary focus is on the methods required to reconstruct images within each modality from a signals and systems perspective, with emphasis on the resolution, contrast, and signal-to-noise ratio of the resulting images. Students will additionally engage in hands-on activities to reconstruct medical images from raw data.

EN.520.633. Intro To Robust Control. 3 Credits.
The subject of this course is robust analysis and control of multivariable systems. Topics include system analysis (small gain arguments, integral quadratic constraints); parametrization of stabilizing controllers; H_{∞} optimization based robust control design; and LTI model order reduction (balanced truncation, Hankel reduction). Recommended Course Background: EN.520.601 or EN.530.616 or EN.580.616

EN.520.635. Digital Signal Processing. 3 Credits.
Methods for processing discrete-time signals. Topics include signal and system representations, z- transforms, sampling, discrete Fourier transforms, fast Fourier transforms, digital filters.

EN.520.636. Feedback Control in Biological Signaling Pathways. 3 Credits.
This course considers examples of the use of feedback control in engineering systems and looks for counterparts in biological signaling networks. To do this will require some knowledge of mathematical modeling techniques in biology, so a part of the course will be devoted to this.

EN.520.637. Foundations of Reinforcement Learning. 3 Credits.
The course will provide a rigorous treatment of reinforcement learning by building on the mathematical foundations laid by optimal control, dynamic programming, and machine learning. Topics include model-based methods such as deterministic and stochastic dynamic programming, LQR and LQG control, as well as model-free methods that are broadly identified as Reinforcement Learning. In particular, we will cover on and off-policy tabular methods such as Monte Carlo, Temporal Differences, n-step bootstrapping, as well as approximate solution methods, including on- and off-policy approximation, policy gradient methods, including Deep Q-Learning. The course has a final project where students are expected to formulate and solve a problem based on the techniques learned in class.

EN.520.638. Deep Learning. 3 Credits.
Deep Learning is emerging as one of the most successful tools in machine learning for feature learning and classification. This course will introduce students to the basics of Neural Networks and expose them to some cutting-edge research. In particular, this course will provide a survey of various deep learning-based architectures such as autoencoders, recurrent neural networks and convolutional neural networks. We will discuss merits and drawbacks of available approaches and identify promising avenues of research in this rapidly evolving field. Various applications related to computer vision and biometrics will be studied. The course will include a project, which will allow students to explore an area of Deep Learning that interests them in more depth.Recommended Course Background: EN.520.435, EN.601.220, and EN.553.420

EN.520.639. Communication Systems Engineering. 3 Credits.
is course provides an overview of analog communications and presents the theory and applications relevant to modern digital communication systems. The course coversconcepts in random signal analysis, lossless ad lossy source coding, quantization, analog and digital modulation schemes, synchronization, channels characterization andcapacity, optimum receivers, and adaptive equalization. We also discuss modern communication techniques related to adaptive antenna array signal processing and systemsincluding SISO, SIMO, MISO and MIMO.

EN.520.640. Machine Intelligence on Embedded Systems. 3 Credits.
The second wave of AI is about statistical learning of low dimensional structures from high dimensional data. Inference is done using multilayer, data transforming networks using fixed point arithmetic with parameters that have limited precision known as Deep Neural Networks. In this course students will learn about Machine Learning and AI on embedded systems that have limited computational, storage and communication resources. Students are expected to be familiar with linear algebra and Python as well some familiarity with typical ML frameworks (TensorFlow, Keras e.t.c). A first course in ML is strongly advised. At the end of the course, students will apply their newly acquired knowledge to complete a final project with real world data for machine perception and cognition.
EN.520.412 OR EN.520.612 OR EN.601.475 OR EN.601.675 OR EN.601.676 OR EN.601.482 OR EN.601.486 OR EN.520.439 OR EN.520.659 OR EN.520.650

EN.520.641. Neuromorphic Circuits and Systems. 3 Credits.
This course covers the analysis, design and simulation of neuromorphic circuits and systems. It will begin with circuits from the advent of the neuromorphic engineering field, span through current designs and considerations, and culminate with a project that involves designing a novel version of such circuits. A good knowledge of VLSI design is required to complete this course.
EN.520.491 OR EN.520.691 OR EN.520.492 OR EN.520.692.

EN.520.644. FPGA Synthesis Lab. 3 Credits.
An advanced laboratory course in the application of FPGA technology to information processing, using VHDL synthesis methods for hardware development. The student will use commercial CAD software for VHDL simulation and synthesis, and implement their systems in programmable XILINX 20,000 gate FPGA devices. The lab will consist of a series of digital projects demonstrating VHDL design and synthesis methodology, building up to final projects at least the size of an 8-bit RISC computer. Projects will encompass such things as system clocking, flip-flop registers, state-machine control, and arithmetic. The students will learn VHDL methods as they proceed through the lab projects, and prior experience with VHDL is not a prerequisite.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.645. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.

EN.520.646. Wavelets & Filter Banks. 3 Credits.
This course serves as an introduction to wavelets, filter banks, multirate signal processing, and time-frequency analysis. Topics include wavelet signal decompositions, bases and frames, QMF filter banks, design methods, fast implementations, and applications. Recommended Course Background: EN.520.435, AS.110.201, C/C++ and Matlab programming experience.

EN.520.647. Information Theory. 3 Credits.
This course will address some basic scientific questions about systems that store or communicate information. Mathematical models will be developed for (1) the process of error-free data compression leading to the notion of entropy, (2) data (e.g. image) compression with slightly degraded reproduction leading to rate-distortion theory and (3) error-free communication of information over noisy channels leading to the notion of channel capacity. It will be shown how these quantitative measures of information have fundamental connections with statistical physics (thermodynamics), computer science (string complexity), economics (optimal portfolios), probability theory (large deviations), and statistics (Fisher information, hypothesis testing).
Students can earn credit for either 520.447 or 520.647, not both.

EN.520.648. Compressed Sensing and Sparse Recovery. 3 Credits.
Sparsity has become a very important concept in recent years in applied mathematics, especially in mathematical signal and image processing, as in inverse problems. The key idea is that many classes of natural signals can be described by only a small number of significant degrees of freedom. This course offers a complete coverage of the recently emerged field of compressed sensing, which asserts that, if the true signal is sparse to begin with, accurate, robust, and even perfect signal recovery can be achieved from just a few randomized measurements. The focus is on describing the novel ideas that have emerged in sparse recovery with emphasis on theoretical foundations, practical numerical algorithms, and various related signal processing applications. Recommended Course Background: Undergraduate linear algebra and probability.

EN.520.649. Introduction to Radar Systems. 3 Credits.
This course introduces the fundamental concepts of the modern radar system architecture and design. Topics include the major subsystems and functions of a typical radar, the radar range equation and its different forms, radar cross section, signal to noise ratio, and radar modes. We will also discuss antennas, propagation, pulse compression, detection, tracking and many other general radar topics.

EN.520.650. Machine Intelligence. 3 Credits.
This course will cover the full range of topics studied in artificial intelligence, with emphasis on the"core competences" of intelligent systems - search, knowledge representation, reasoning under uncertainty, vulnerability, ethics and safety of intelligent systems. Recent applications in engineering and medicine will be highlighted.

EN.520.651. Foundations of Probabilistic Machine Learning. 4 Credits.
The content for EN.520.651 has been revised with greater emphasis on graphical models, parameter estimation and posterior inference. Topics include probability theory, random variables/vectors, hypothesis testing, parameter estimation, directed and undirected graphical models, the EM algorithm, deterministic and stochastic approximations for EM, Markov chains and random sequences. Additional material may be covered as appropriate. The class is theoretical in nature; new concepts are presented via formula derivations and example problems. Homework assignments may require familiarity with Matlab (or an equivalent computational software).

EN.520.652. Filtering and Smoothing. 3 Credits.
This course is intended to give students an opportunity to do directed research in algorithm development that culminates in a MATLAB program. Students will learn about extracting signals from noise using statistical and non-statistical models. Topics include Kalman filtering, smoothing, interpolation (upsampling), spline fitting, and the numerical linear algebra issues that impact these problems. Emphasis is on fast, compact, stable algorithms. The grade is based on the term project and occasional homework. There are no examinations. Class attendance is mandatory.

EN.520.654. Control Systems Design. 3 Credits.
Classical and modern control systems design methods. Topics include formulation of design specifications, classical design of compensators, state variable and observer based feedback. Computers are used extensively for design, and laboratory experiments are included.

EN.520.656. Data Smoothing Using Machine Learning. 3 Credits.
All measurements contain errors (noise). Before the measurements are used, they should be passed through a noise reduction filter. When the noise level is unknown, the filter can be designed using a machine learning method called cross-validation. This course will investigate algorithmic approaches to data smoothing using cross-validation. Students will complete several Matlab projects.

EN.520.657. Design of Biomedical Instruments and Systems. 3 Credits.
The purpose of this course is to teach the students principles of product design for the biomedical market. From an idea to a product and all the stages in-between.The course material will include identification of the need, market survey, patents. Funding sources and opportunities, Regulatory requirements, Reimbursement codes, Business models). Integration of the system into the clinical field. system connectivity. Medical information systems. Medical standards (DICOM, HL-7, ICD, Medical information bus). How to avoid mistakes in system design and in system marketing. Entrepreneurship.The course participants will be divided to groups of 2-3 students each. Each group will be acting as a start-up company throughout the whole semester. Each group will need to identify a need. This can be done by meeting and interviewing medical personnel, at the Johns Hopkins Medical campus or other hospitals, clinics, HMOs, assisted living communities or other related to the medical world. The proposed medical instrument or system can be a combination of instrument and software.Each week, there will be a lecture devoted to the principal subjects mentioned above. Afterwards the students will present their ideas and progress to all class participants. There will be an open discussion for each of the projects. The feedback from class will help the development of the product. Each presentation, document, survey or paper will be kept in the course cloud which will have a folder for each of the groups. The material gathered in this folder will be built gradually throughout the semester. Eventually it will become the product blueprint.At the last week of the semester, the groups will present their product to a panel of experts involved with the biotech industry, in order to “convince” them to invest in their project.Previous years’ projects are listed in this website: (https://jhuecepdl.bitbucket.io).

EN.520.659. Machine learning for medical applications. 3 Credits.
In this course, students will actively learn the basic principles of artificial intelligence and machine learning techniques applied to medical applications, as well as medical concepts common in healthcare environments. Throughout the course, students will explore different types of bio-signals such as electroencephalograms, electrocardiograms, sound, medical imaging, and their associated processing methodologies. The primary objective is to give students the tools they need to be able to develop new artificial intelligence-related ideas in biomedical environments. At the end of the course, students will apply their newly acquired knowledge to complete a cumulative final project dealing with a real-world situation. Students are expected to be familiar with linear algebra. Python coding skills are recommended, as there will be one coding assignment every week. Recommended Course Background: EN.520.412 OR EN.520.612 OR Other machine learning backgrounds.
EN.520.412 OR EN.520.612

EN.520.662. Leading Innovation Design Team. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu

EN.520.663. ECE Ideation and Design Lab. 3 Credits.
Project design course that Complements and/or Builds on Core Knowledge Relevant to Electrical & Computer Engineering with emphasis on multidisciplinary projects. All Projects will be sponsored, have clearly defined objectives, and must yield a Tangible Result at Completion. Project duration can vary between a minimum of 2 semesters and a maximum of 5 years. This course will afford the students the opportunity to use their creativity to innovative and to master critical skills such as: customer/user discovery and product specifications; concept development; trade study; systems engineering and design optimization; root cause; and effective team work. The students will also experience first-hand the joys and challenges of the professional world. The course will be actively managed and supervised to represent the most effective industry practices with the instruction team, including guest speakers, providing customized lectures, technical support, and guidance. In addition, the students will have frequent interactions with the project sponsor and their technical staff. Specific projects will be listed on ece.jhu.edu
Laboratory Safety Introductory Course available in MyLearning prior to registration. The course is accessible from the Education tab through the portal my.jh.edu. Please note that this requirement is not applicable to new students registering for their first semester at Hopkins.

EN.520.665. Machine Perception. 3 Credits.
This course will cover topics such as Marr-Hildreth and Canny edge detectors, local representations (SIFT, LBP), Markov random fields and Gibbs representations, normalized cuts, shallow and deep neural networks for image and video analytics, shape from shading, Make 3D, stereo, and structure from motion.

EN.520.666. Information Extraction. 3 Credits.
Introduction to statistical methods of speech recognition (automatic transcription of speech) and understanding. The course is a natural continuation of EN.601.465 but is independent of it. Topics include elementary probability theory, hidden Markov models, and n-gram models using maximum likelihood, Bayesian and discriminative methods, and deep learning techniques for acoustic and language modeling.Recommended Course Background: EN.550.310 AND EN.600.120 or equivalent, expertise in Matlab or Python programming.

EN.520.667. Dynamic Implicit Surfaces. 3 Credits.
Course will cover dynamic implicit surfaces that arise in a number of modeling situations where the boundary is implicit. We will discuss a number of techniques used to generate these models, including level set methods and the phase field approach.

EN.520.678. Biomedical Photonics. 3 Credits.
This course will cover the basic optics principles including geometric, beam and wave description of light. The course will also cover the basic generation and detection techniques of light and the principles of optical imaging and spectroscopy. After the basis is established, we will focus on some commonly employed optical techniques and tools for biomedical research including various optical microscopy technologies, fiber optics, Raman spectroscopy, Fluorescence (lifetime), FRAT, FRET and FCS. The recent development in tissue optics, biomedical optical imaging/ spectroscopy techniques (such as OCT, multiphoton fluorescence and harmonics microscopy, Structured Illumination, light scattering, diffuse light imaging and spectroscopy, optical molecular imaging, photo-acoustic imaging) will also be discussed. Representative biomedical applications of translational biomedical photonics technologies will be integrated into the corresponding chapters.

EN.520.680. Speech and Auditory Processing by Humans and Machines. 3 Credits.
The course relevant to building advanced systems for information extraction from speech and auditory signals. It introduces some relevant historical efforts for information processing of speech and audio signals and basic concepts of human auditory perception and human production and perception of speech. The main goal of the course is in implementation of relevant knowledge of human speech information processing in engineering systems for information extraction from speech signals, emphasizing power of the modern data-guided machine learning techniques. Basic knowledge of signal processing is assumed and the previous completion of the EN.520.445 or EN.520.645 is beneficial.

EN.520.682. Introduction to Lasers. 3 Credits.
This course covers the basic principles of laser oscillation. Specific topics include propagation of rays and Gaussian beams in lens-like media, optical resonators, spontaneous and stimulated emission, interaction of optical radiation and atomic systems, conditions for laser oscillation, homogeneous and inhomogeneous broadening, gas lasers, solid state lasers, Q-switching and mode locking of lasers.Recommended Course Background: EN.520.219 and EN.520.220

EN.520.683. Bio-Photonics Laboratory. 3 Credits.
This laboratory course involves designing a set of basic optical experiments to characterize and understand the optical properties of biological materials. The course is designed to introduce students to the basic optical techniques used in medicine, biology, chemistry and material sciences. Graduate version of EN.520.483
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.685. Advanced Semiconductor Devices. 3 Credits.
This course is designed to develop and enhance the understanding of the operating principles and performance characteristics of the modern semiconductor devices used in high speed optical communications, optical storage and information display. The emphasis is on device physics andfabrication technology. The devices include heterojunction bipolar transistors, high mobility FET's, semiconductor lasers, laser amplifiers, light-emitting diodes, detectors, solar cells and others. Students can only take EN.520.485 or EN.520.685, not both.

EN.520.686. Physics of Semiconductor Electronic Devices. 3 Credits.
The course is designed to develop and enhance the understanding of the physical principles of modern semiconductor electronic and opto-electronic devices. The course starts with the basics of band structure of solid with emphasis on group IV and III-V semiconductors as well as two dimensional semiconductors like graphene. It continues with the statistics of carriers in semiconductors and continues to electronic transport properties, followed by optical properties. The course goes on to investigate the properties of two dimensional electronic gas. The second part of the course describes operational principles of bipolar and unipolar transistors, light emitting diodes, photodetectors, and quantum devices.
Students may earn credit for EN.520.486 or EN.520.686, but not both.

EN.520.691. CAD Design of Digital VLSI Systems I (Grad). 3 Credits.
Graduate students only.

EN.520.692. Mixed-Mode VLSI Systems. 3 Credits.
Silicon models of information and signal processing functions, with implementation in mixed analog and digital CMOS integrated circuits. Aspects of structured design, scalability, parallelism, low power consumption, and robustness to process variations. Topics include digital-to-analog and analog-to-digital conversion, delta-sigma modulation, bioinstrumentation, and adaptive neural computation. The course includes a VLSI design project. Recommended Course Background: EN.521.491 or equivalent.

EN.520.738. Advanced Electronic Lab Design. 3 Credits.
This course is the graduate expansion of the EN.520.448 Electronic Design Lab, which is an advanced laboratory course in which teams of students design, build, test and document application specific information processing microsystems. Semester long projects range from sensors/actuators, mixed signal electronics, embedded microcomputers, algorithms and robotics systems design. Demonstration and documentation of projects are important aspects of the evaluation process. For this graduate expansion, all projects will be based on recently published research from IEEE Transactions. The students will be required to fully research, analyze, implement and demonstrate their chosen topic. The emphasis will be on VLSI microsystems, although other topics will also be considered. Open to graduate students only.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.744. Advanced Topics in Signal Processing and Applied Machine learning for Next Generation Radar. 3 Credits.

EN.520.762. Emerging Models of Computation. 3 Credits.
Advanced seminar course with topics in emerging models of computation. This year (Spring 2019) the course focuses on neurotrophic machine learning, event-based spike based processing and neural computation . The students will learn and use Brian and PyNN for a project in the class. (Permission of instructor required)

EN.520.773. Advanced Topics In Microsytem Fabrication. 4 Credits.
Graduate-level course on topics that relate to microsystem integration of complex functional units across different physical scales from nano to micro and macro. Course comprises of laboratory work and accompanying lectures that cover silicon oxidation, aluminum evaporation, photoresist deposition, photolithography, plating, etching, packaging, design and analysis CAD tools, and foundry services. Topics will include emerging fabrication technologies, micro-electromechanical systems, nanolithography, nanotechnology, soft lithography, self-assembly, and soft materials. Discussion will also include biological systems as models of microsystem integration and functional complexity. Perm. Required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.774. Advanced Topics in Electrical and Computer Engineering. 3 Credits.
Course content varies by instructor and topic. The major focus of this course is to train graduate students in developing or increasing research ability related to new and advanced concepts in electrical engineering. For example, these concepts may include advanced techniques in signal processing and communications, high performance computing, real-time computing and advanced parallel system architectures.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.520.800. ECE Graduate Independent Study. 1 - 3 Credits.
Individual, guided study under the direction of a faculty member in the department. May be taken either term by graduate students.

EN.520.802. ECE Dissertation Research. 3 - 20 Credits.

EN.520.803. Graduate Summer Research. 9 Credits.

EN.520.806. ECE Master's Research. 3 - 10 Credits.
Independent research for masters students

EN.520.807. Current Topics in Language and Speech Processing. 1 Credit.
This biweekly seminar will cover a broad range of current research topics in human language technology, including automatic speech recognition, natural language processing and machine translation. The Tuesday seminars will feature distinguished invited speakers, while the Friday seminars will be given by participating students. A minimum of 75% attendance and active participation will be required to earn a passing grade. Grading will be S/U.

EN.520.820. Artificial Intelligence In Medicine Reading Group. 1 Credit.
The course will consist of a reading group exploring novel algorithms and papers on artificial intelligence and machine learning in medical applications. In this course, students will analyze the latest techniques and trends in machine learning (ML) for medical applications. They will also actively discuss basic methodologies traditionally employed. Students are expected to be familiar with linear algebra and machine learning. The primary objective is to give students the tools they need to be able to understand new ideas and trends relating to the use of machine learning in biomedical environments and other fields.
EN.520.612 OR EN.520.659 OR EN.520.439

EN.520.871. Speech Technologies Reading Group. 1 Credit.
Reading Group that explores novel algorithms and papers on speech technologies

EN.520.890. Independent Study-Summer. 1 - 3 Credits.

EN.520.895. Electrical & Computer Engineering Seminar. 1 Credit.
Seminar for Electrical & Computer Engineering; required of all doctoral students who have not passed the qualifying exam. Repeatable course.

EN.525 (Electrical and Computer Engineering)

EN.525.201. Circuits, Devices and Fields. 3 Credits.
This course is intended to prepare students lacking an appropriate background for graduate study in electrical and computer engineering. Fundamental mathematical concepts including calculus, differential equations, and linear algebra are reviewed. Circuit theory for linear and nonlinear devices and components is covered. An introduction to electricity and magnetism is presented along with basic wave propagation theory. Finally, Boolean algebra is studied with applications to digital circuit design and analysis. Prerequisite(s): Two or more semesters of calculus, differential equations, and at least two semesters of calculus-based physics. Course Note(s): Not for graduate credit.

EN.525.202. Signals and Systems. 3 Credits.
This course is intended to prepare students lacking an appropriate background for graduate study in electrical and computer engineering. Signal and system representations and analysis tools in both continuous time and discrete time are covered. Linear time-invariant systems are defined and analyzed. The Fourier transform, the Laplace transform, and the z-transform are treated along with the sampling theorem. Finally, fundamental concepts in probability, statistics, and random processes are considered. Prerequisite(s): Two or more semesters of calculus and differential equations. Course Note(s): Not for graduate credit.

EN.525.603. Advanced Topics in Optical Medical Imaging. 3 Credits.
The course will review the recent advances in photonics technologies for medical imaging and sensing. The course is designed for graduate students with a back ground in optics and engineering. The main topics for the course are: Light Source and Devices for Biomedical Imaging; Fluorescence, Raman, Rayleigh Scatterings; Optical Endoscopy and Virtual biopsy; Novel imaging contrast dyes, nanoparticles, and optical clearing reagents; Label-free optical technologies in clinical applications; Neurophotonics and Optogenetics.

EN.525.605. Intermediate Electromagnetics. 3 Credits.
This course provides a background in engineering electromagnetics required for more advanced courses in the field. Topics include vector calculus, Poisson’s and Laplace’s equations, Vector potentials, Green’s functions, magnetostatics, magnetic and dielectric materials, Maxwell’s equations, plane wave propagation and polarization, reflection and refraction at a plane boundary, frequency-dependent susceptibility functions, transmission lines, waveguides, and simple antennas. Practical examples are used throughout the course.

EN.525.606. Electronic Materials. 3 Credits.
Materials and the interfaces between them are the key elements in determining the functioning of electronic devices and systems. This course develops the fundamental parameters of the basic solid material types and their relationships to electrical, thermal, mechanical, and optical properties. The application of these materials to the design and fabrication of electronic components is described, including integrated circuits, passive components, and electronic boards, modules, and systems. Prerequisite(s): An undergraduate degree in engineering, physics, or materials science; familiarity with materials structures and electronic devices.

EN.525.607. Intro to Electronic Packaging. 3 Credits.
Topics include fundamentals of electronic packaging engineering and basic concepts in thermal, mechanical, electrical, and environmental management of modern electronic systems. Emphasis is on high-frequency (and high-speed) package performance and its achievement through the use of advanced analytical tools, proper materials selection, and efficient computer-aided design. Packaging topics include die and lead attachment, substrates, hybrids, surface-mount technology, chip and board environmental protection, connectors, harnesses, and printed and embedded wiring boards. Prerequisite(s): An undergraduate degree in a scientific or engineering area, including familiarity with computer-aided design and engineering analysis methods for electronic circuits and systems.

EN.525.608. Next Generation Telecommunications. 3 Credits.
This course examines voice, data, and video communications through emerging technologies. Considerations include the characteristics and security requirements of the information being encoded, bandwidth requirements and limitations, and transmission standards and equipment. Topics will consider the pragmatics facing the communications system engineer including space, weight, and power. The student will review past and present network architectures and apply trade-off decisions when analyzing new system requirements. Topics include brief histories of telecommunications, speech processing, encoding, digitization, signaling, and transmission; broadband, fiber optics, and wireless network architectures; and encryption, privacy, and security issues. New and disruptive technologies are discussed each offering.
Either an undergraduate degree in electrical engineering or 525.616 Communications Systems Engineering, or consent of the instructor.

EN.525.609. Continuous Control Systems. 3 Credits.
This course examines classical methods of analysis and design of continuous control systems. Topics include system representation by linear time invariant ordinary differential equations, performance measures, sensitivity, stability, root locus, frequency domain techniques, and design methods. Several practical examples are considered. MATLAB is used as a computational tool. Prerequisite(s): Background in linear algebra and linear differential equations.

EN.525.610. Microprocessors for Robotic Systems. 3 Credits.
This course examines microprocessors as an integral part of robotic systems. Techniques required for successful incorporation of embedded microprocessor technology are studied and applied to robotic systems. Students will use hardware in a laboratory setting and will develop software that uses features of the microprocessor at a low level to accomplish the real-time performance necessary in robotic applications. Topics will include microprocessor selection, real-time constraints, sensor interfacing, actuator control, and system design considerations. Prerequisite(s): Experience with C programming and a course in digital systems or computer architecture.

EN.525.612. Computer Architecture. 3 Credits.
This course focuses on digital hardware design for all major components of a modern, reduced-instructionset computer. Topics covered include instruction set architecture; addressing modes; register-transfer notation; control circuitry; pipelining with hazard control; circuits to support interrupts and other exceptions; microprogramming; computer addition and subtraction circuits using unsigned, two's-complement, and excess notation; circuits to support multiplication using Robertson's and Booth's algorithms; circuits for implementing restoring and non-restoring division; squareroot circuits; floating-point arithmetic notation and circuits; memory and cache memory systems; segmentation and paging; input/output interfaces; interrupt processing; direct memory access; and several common peripheral devices, including analog-to-digital and digital-to-analog converters. A mini-project is required.
EN.525.642 FPGA Design using VHDL or prior knowledge of a hardware description language for FPGA design

EN.525.613. Fourier Techniques in Optics. 3 Credits.
In this course, the study of optics is presented from a perspective that uses the electrical engineer's background in Fourier analysis and linear systems theory. Topics include scalar diffraction theory, Fourier transforming and imaging properties of lenses, spatial frequency analysis of optical systems, spatial filtering and information processing, and holography. The class discusses applications of these concepts in non-destructive evaluation of materials and structures, remote sensing, and medical imaging. Prerequisite(s): An undergraduate background in Fourier analysis and linear systems theory.

EN.525.614. Probability & Stochastic Processes for Engineers. 3 Credits.
This course provides a foundation in the theory and applications of probability and stochastic processes and an understanding of the mathematical techniques relating to random processes in the areas of signal processing, detection, estimation, and communication. Topics include the axioms of probability, random variables, and distribution functions; functions and sequences of random variables; stochastic processes; and representations of random processes. Prerequisite(s): A working knowledge of multi-variable calculus, Fourier transforms, and linear systems theory.

EN.525.615. Embedded Microprocessor Systems. 3 Credits.
This course applies microprocessors as an integral element of system design. Techniques required for successful incorporation of microprocessor technology are studied and used. Hardware and software design considerations that affect product reliability, performance, and flexibility are covered. Students use hardware to gain familiarity with machine and assembly language for software generation, interfacing to a microprocessor at the hardware level, and emulation to check out system performance. Topics include security in embedded systems, case studies in system failures, embedded processors in the space environment, communications protocols, hardware/ software system tradeoffs, and SoC/FPGA designs. The course is based on the ARM architecture, and the student will do a series of development and interfacing labs. Prerequisite(s): Some experience in designing and building digital electronic systems, some familiarity with C programming, and a course in digital systems.

EN.525.616. Communication Systems Engineering. 3 Credits.
In this course, students receive an introduction to the principles, performance and applications of communication systems. Students examine analog modulation/demodulation systems (amplitude - AM, DSB & SSB; and angle - PM & FM) and digital modulation/demodulation systems (binary and M-ary) in noise and interference. Sub-topics include filtering, sampling, quantization, encoding and the comparison of coherent & noncoherent detection techniques to improve signal-to-noise ratio (SNR) and bit error rate (BER) performance. Special topics and/or problems will be assigned that provide knowledge of how communication systems work from a system engineering viewpoint in real-world environments. Prerequisite(s): A working knowledge of Fourier transforms, linear systems, and probability theory. Basic working knowledge of MATLAB.

EN.525.618. Antenna Systems. 3 Credits.
This course introduces and explains fundamental antenna concepts for both antennas and antenna arrays. Electromagnetic theory is reviewed and applied to antenna elements such as dipoles, loops, and aperture antennas, as well as antenna arrays. Antenna analysis is presented from a circuit theory point of view to highlight concepts such as reciprocity and the implications for transmit and receive radiation patterns. The importance of two-dimensional Fourier transforms is explained and applied to aperture antennas. Basic array constraints are examined through case studies of uniform, binomial, and general amplitude distributions. The concept of beam squint is explained through examination of constant-phase versus constant-time phase shifters. The Rotman lens is discussed as an example of a common beamformer. The class concludes with an explanation of antenna measurements.
EN.525.605 Intermediate Electromagnetics or EN.615.642 Electromagnetics or permission of the instructor.

EN.525.619. Introduction to Digital Image and Video Processing. 3 Credits.
This course provides an introduction to the basic concepts and techniques used in digital image and video processing. Two-dimensional sampling and quantization are studied, and the human visual system is reviewed. Edge detection and feature extraction algorithms are introduced for dimensionality reduction and feature classification. High-pass and bandpass spatial filters are studied for use in image enhancement. Applications are discussed in frame interpolation, filtering, coding, noise suppression, and video compression. Some attention will be given to object recognition and classification, texture analysis in remote sensing, and stereo machine vision.
EN.525.627 Digital Signal Processing.

EN.525.620. Electromagnetic Transmission Systems. 3 Credits.
This course examines transmission systems used to control the propagation of electromagnetic traveling waves with principal focus emphasizing microwave and millimeter-wave applications. The course reviews standard transmission line systems together with Maxwell's equations and uses them to establish basic system concepts such as reflection coefficient, characteristic impedance, input impedance, impedance matching, and standing wave ratio. Specific structures are analyzed and described in terms of these basic concepts, including coaxial, rectangular, and circular waveguides, surface waveguides, striplines, microstrips, coplanar waveguides, slotlines, and finlines. Actual transmission circuits are characterized using the concepts and analytical tools developed.
Knowledge of intermediate electromagnetics as covered in EN.525.605 Intermediate Electromagnetics.

EN.525.621. Introduction to Electronics and the Solid State. 3 Credits.
Fundamentals of solid state and device physics are presented. Topics in solid-state physics include crystal structure, lattice vibrations, dielectric and magnetic properties, band theory, and transport phenomena. Concepts in quantum and statistical mechanics are also included. Basic semiconductor device operation is described with emphasis on the p-n junction. Prerequisite(s): An undergraduate degree in electrical engineering or the equivalent.

EN.525.623. Principles of RF and Microwave Circuits. 3 Credits.
This course addresses foundational microwave circuit concepts and engineering fundamentals. Topics include electromagnetics leading to wave propagation and generation, the transmission line, and impedance/admittance transformation and matching. Mapping and transformation are presented in the development of the Smith Chart. The Smith Chart is used to perform passive microwave circuit design. Microwave networks and s-matrix are presented; Mason's rules is introduced. Circuits are physically designed using microstrip concepts, taking into consideration materials properties, connectors, and other components.
Students who have completed EN.525.674 are restricted from enrolling in EN.525.623

EN.525.624. Analog Electronic Circuit Design. 3 Credits.
This course examines the use of passive and active components to perform practical electronic functions. Simple circuits are designed and evaluated emphasizing the characteristics and tolerances of actual components. Devices studied include diodes and bipolar and field effect transistors. Circuit designs are studied in relation to the device characteristics, including small signal amplifiers and oscillators, and linear power supply and amplifier circuits. SPICE modeling is available to students. Prerequisite(s): Undergraduate courses in electricity and magnetism, circuit theory, and linear analysis.

EN.525.625. Laser Fundamentals. 3 Credits.
This course reviews electromagnetic theory and introduces the interaction of light and matter with an emphasis on laser theory. A fundamental background is established, necessary for advanced courses in optical engineering. Topics include Maxwell's equations, total power law, introduction to spectroscopy, classical oscillator model, Kramers-Kroenig relations, line broadening mechanisms, rate equations, laser pumping and population inversion, laser amplification, laser resonator design, and Gaussian beam propagation.
EN.525.605 Intermediate Electromagnetics or equivalent.

EN.525.626. Feedback Control in Biological Signaling Pathways. 3 Credits.
This course considers examples of the use of feedback control in engineering systems and looks for counterparts in biological signaling networks. To do this will require some knowledge of mathematical modeling techniques in biology, so a part of the course will be devoted to this.

EN.525.627. Digital Signal Processing. 3 Credits.
This course examines fundamental principles and applications of Digital Signal Processing. Introductory topics include linear, time-invariant systems, discrete-time convolution, and frequency-domain representations of discrete-time signals and systems. Sampling and quantization of continuous-time signals are covered. The Discrete Fourier Transform and efficient algorithms for its computation are studied in detail. The z-transform and its application to linear discrete-time systems analysis is studied. The design of digital filters using the windowing, equiripple, impulse invariance, and bilinear transformation methods is treated, along with the implementation of digital filter difference equations using canonical structures. MATLAB is utilized to demonstrate and implement Digital Signal Processing techniques.Prerequisite(s): A working knowledge of linear systems and Fourier analysis. Familiarity with MATLAB.

EN.525.628. Compressed Sensing and Sparse Recovery. 3 Credits.
In recent years, compressed sensing (CS) has attracted considerable attention in areas of applied mathematics, computer science, and electrical engineering by suggesting that it may be possible to surpass the traditional limits of sampling theory. CS builds upon the fundamental fact that we can represent many signals using only a few non-zero coe?cients in a suitable basis or dictionary. Optimization can then enable recovery of such signals from very few measurements. Beautiful theoretical results show that structured signals, such as sparse vectors and low-rank matrices, can be recovered from relatively small sets of linear observations. These results raise intriguing possibilities for addressing engineering problems in signal and image processing, and beyond. The goal of this course is to provide students with the theoretical understanding, algorithmic tools, and implementation experience needed to use these tools to solve problems in their own area of interest, or even to begin doing novel work in this area.

EN.525.629. Discrete-Time Control Systems. 3 Credits.
This course is the follow-on to Continuous Control Systems (EN.525.609) and presents a comprehensive introduction to the theory and design of discrete-time control systems. Representation, modeling, and analysis of discrete-time / sampled-data systems are first discussed. Then, the design of discrete-time control systems is introduced using both digital design emulation methods (e.g., emulating a continuous-time compensator via zero-pole mapping, hold equivalents, etc.) and direct design (z-transform) methods using root locus and frequency domain synthesis techniques (e.g., Bode, Nyquist). This “classical” approach to discrete-time control representation, analysis and synthesis is followed by a discussion of the “modern” approach which includes discrete-time state-space representation of dynamic systems, controllability, observability, similarity transforms, and pole placement via full state feedback methods. Sample rate selection, relevant hardware and software components, effects of quantization, and control wind-up are also discussed. In this course, each student must review the open literature for relevant (applications-based) discrete-time control publications, and then select, implement (in Matlab, or similar programming platform), and present a discrete-time control systems design project that reflects / emphasizes one or more of the key topics introduced in this course. MATLAB will be used in this course for all design and analysis topics; therefore, it is expected that students taking the course have reasonable familiarity with the Matlab environment.

EN.525.630. Digital Signal Processing Lab. 3 Credits.
This course builds on the theory of digital signal processing. Opportunities are provided to work on specific applications of digital signal processing involving filtering, deconvolution, spectral estimation, and a variety of other techniques. Students may also suggest their own laboratory topics. Laboratory work involves developing signal processing systems on a personal computer and using them with both real and simulated data. Questions related to hardware realizations are also considered.
EN.525.627 Digital Signal Processing.

EN.525.631. Adaptive Signal Processing. 3 Credits.
This course explores the use of adaptive filtering algorithms and structures to learn the optimal filter or estimator and track timevarying system dynamics in order to improve the performance over static, fixed filtering techniques. Adaptive systems are implemented as part of the coursework with application to digital communications, beamforming, control systems, and interference cancellation. The final project involves creating an adaptive equalizer for digital communications over a timevarying channel.
EN.525.627 Digital Signal Processing. Some knowledge of probability is helpful.

EN.525.634. High Speed Digital Design. 3 Credits.
This course will discuss the principles of signal integrity and its applications in the proper design of high-speed digital circuits. As interconnect data rates increase, phenomena that have historically been negligible begin to dominate performance, requiring techniques that were not previously necessary. This course is designed to give the students the theoretical and simulation tools needed to determine where signal integrity issues may arise, how to prevent such problems, and how to resolve problems when they arise in practice. A partial list of topics includes distributed circuits and lossless transmission lines, nonideal transmission line effects, crosstalk mitigation, differential pairs and modal analysis, I/O circuits and logic standards, and signal coding and waveshaping techniques. Prerequisite(s): Thorough knowledge of digital design and circuit theory. Prior coursework in electromagnetics and Laplace transforms will be helpful.

EN.525.636. Optics & Photonics Lab. 3 Credits.
The objective of this course is to develop laboratory skills in optics and photonics by performing detailed experimental measurements and comparing these measurements to theoretical models. Error analysis is used throughout to emphasize measurement accuracy. A partial list of topics include: geometric optics, optical properties of materials, diffraction, interference, polarization, non-linear optics, fiber optics, non-linear fiber optics, optical detectors (pin, APD, PMT), optical sources (lasers, blackbodies, LEDs), phase and amplitude modulators, lidar, fiberoptic communications, and IR radiometry. The specific experiments will depend on hardware availability and student interest.
EN.525.605 Intermediate Electromagnetics or equivalent or permission of the instructor.

EN.525.637. Foundations of Reinforcement Learning. 3 Credits.
The course will provide a rigorous treatment of reinforcement learning by building on the mathematical foundations laid by optimal control, dynamic programming, and machine learning. Topics include model-based methods such as deterministic and stochastic dynamic programming, LQR and LQG control, as well as model-free methods that are broadly identified as Reinforcement Learning. In particular, we will cover on and off-policy tabular methods such as Monte Carlo, Temporal Differences, n-step bootstrapping, as well as approximate solution methods, including on- and off-policy approximation, policy gradient methods, including Deep Q-Learning. The course has a final project where students are expected to formulate and solve a problem based on the techniques learned in class.

EN.525.638. Introduction to Wireless Technology. 3 Credits.
This course introduces students to the modern technology involved with commercial wireless communications systems such as digital cellular 3G, 4G, 5G, wireless local area networks(WLAN) and other communication systems. Various multiple access methods and signal formats are considered and analyzed in detail. Hardware, software and signal processing implementations of system components are presented and analyzed using Matlab in a software based lab environment. Modulation and demodulation architectures are introduced and modeled using computer-based tools. The adaptive signal processing systems at the heart of modern digital wireless systems are a significant and unique part of this course. Prerequisite(s): An undergraduate degree in electrical engineering or the equivalent. Experience with MATLAB will be helpful but is not required.

EN.525.640. Satellite Communications Systems. 3 Credits.
This course presents the fundamentals of satellite communications link design and an in-depth treatment of practical considerations. Existing commercial, civil, and military systems are described and analyzed, including direct broadcast satellites, high throughput satellites, VSAT links, and Earth-orbiting and deep space spacecraft. Topics include satellite orbits, link analysis, antenna and payload design, interference and propagation effects, modulation techniques, coding, multiple access, and Earth station design. The impact of new technology on future systems in this dynamic field is discussed.

EN.525.641. Computer and Data Communication Networks I. 3 Credits.
This course provides a comprehensive overview of computer and data communication networks, with emphasis on analysis and modeling. Basic communications principles are reviewed as they pertain to communication networks. Networking principles covered include layered network architecture, data encoding, static and multiaccess channel allocation methods (for LAN and WAN), ARQ retransmission strategies, framing, routing strategies, transport protocols, and emerging highspeed networks.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.616 Communication Systems Engineering, or equivalents.

EN.525.642. FPGA Design Using VHDL. 3 Credits.
This lab-oriented course covers the design of digital systems using VHSIC Hardware Description Language (VHDL) and its implementation in Field Programmable Gate Arrays (FPGAs). This technology allows cost-effective unique system realizations by enabling design reuse and simplifying custom circuit design. The design tools are first introduced and used to implement basic circuits. More advanced designs follow, focusing on integrating the FPGA with external peripherals, simple signal processing applications, utilizing soft-core processors, and using intellectual property (IP) cores. Prerequisite(s): A solid understanding of digital logic fundamentals.

EN.525.643. Real Time Computer Vision. 3 Credits.
This course introduces students to key computer vision techniques for real-time applications. Students will learn to quickly build applications that enable computers to “see,” and make decisions based on still images or video streams. Through regular assignments and in class laboratory exercises (students are advised to bring their own laptop to class), students will build real-time systems for performing tasks including object recognition and face detection and recognition. Key computer vision topics addressed in the course include human and machine vision: how does the brain recognize objects?, and what can we emulate?, camera models and camera calibration; edge, line and contour detection; optical flow and object tracking; machine learning techniques; image features and object recognition; stereo vision; 3D vision; face detection and face recognition. Students will be exposed to the mathematical tools that are most useful in the implementation of computer vision algorithms. Prerequisite(s): Python programming experience, and prior knowledge of linear algebra, geometry, and probability theory is desired.

EN.525.645. Modern Navigation Systems. 3 Credits.
This course explores the use of satellite, terrestrial, celestial, radio, magnetic, and inertial systems for the real-time determination of position, velocity, acceleration, and attitude. Particular emphasis is on the historical importance of navigation systems; avionics navigation systems for high performance aircraft; the Global Positioning System; the relationships between navigation, cartography, surveying, and astronomy; and emerging trends for integrating various navigation techniques into single, tightly coupled systems.

EN.525.646. DSP Hardware Lab. 3 Credits.
This course develops expertise and insight into the development of DSP processor solutions to practical engineering problems through hands-on experience. Structured exercises using DSP hardware are provided and used by the student to gain practical experience with basic DSP theory and operations. Course focus is on realtime, floating-point applications. This course is intended for engineers having EE or other technical backgrounds who desire to obtain practical experience and insight into the development of solutions to DSP problems requiring specialized DSP architectures.
EN.525.627 Digital Signal Processing and C programming experience.

EN.525.648. Introduction to Radar Systems. 3 Credits.
This class introduces the student to the fundamentals of radar system engineering. The radar range equation in its many forms is developed and applied to different situations. Radar transmitters, antennas, and receivers are covered. The concepts of matched filtering, pulse compression, and the radar ambiguity function are introduced, and the fundamentals of radar target detection in a noise background are discussed. Target radar cross-section models are addressed, as well as the effects of the operating environment, including propagation and clutter. MTI and pulsed Doppler processing and performance are addressed. Range, angle, and Doppler resolution/accuracy, as well as fundamental tracking concepts, will also be discussed.
EN.525.614 Probability and Stochastic Processes for Engineers, EN.525.627 Digital Signal Processing, a working knowledge of electromagnetics, and familiarity with MATLAB.

EN.525.651. Introduction to Electric Power Systems. 3 Credits.
This course introduces and explains fundamentals of electrical power systems design and engineering. Phasors and their application to power systems analysis are reviewed. The concept of the per-unit system is introduced and applied to circuit calculations. Transformers and their application to electrical power transmission and distribution systems will be covered. Transmission line parameters, their calculation, and transmission line modeling are introduced. Steady-state operation of transmission lines is modeled and investigated. Power flow analysis computational techniques are covered. Short-circuit analysis and the method of symmetrical components are introduced. The concept of power system protection and the role of automatic relays will be covered. Primary and secondary distribution systems and substations are introduced. Renewable energy generation and the integration of renewable energy into the modern power grid will be introduced. Prerequisite(s): Course in electrical networks and a course in linear algebra and matrix operations. MATLAB required software. Course Note(s): Matlab is required for this course.

EN.525.654. Communications Circuits Lab. 3 Credits.
This online laboratory-based course focuses on modulation/ demodulation (MODEM) aspects of wireless communications systems. This course is designed to enhance the student’s understanding of fundamental communications waveforms and to present methods commonly used to process them. Students will be exposed to various implementations of MODEM circuits used to process waveforms such as FM, FSK, PSK, and QAM. All work is performed remotely via Internet access to the remote laboratory facility located at the Johns Hopkins University. Following an introduction to this remote laboratory implementation, students will conduct a series of laboratory exercises designed to enhance their understanding of material presented in communications engineering courses. Course modules involve the characterization of waveforms and MODEM circuits through lecture, laboratory exercises, analysis, and online discussion. Materials required for this course include a broadband Internet connection, web browser, word processing software (e.g., MS Word or equivalent), and analysis software (e.g., MATLAB or equivalent) used to process and present data collected.
EN.525.616 Communication Systems Engineering or consent of the instructor.

EN.525.655. Audio Signal Processing. 3 Credits.
This course gives a foundation in current audio and speech technologies, and covers techniques for sound processing by processing and pattern recognition, acoustics, auditory perception, speech production and synthesis, speech estimation. The course will explore applications of speech and audio processing in human computer interfaces such as speech recognition, speaker identification, coding schemes (e.g. MP3), music analysis, noise reduction. Students should have knowledge of Fourier analysis and signal processing.

EN.525.656. Antenna Design for Space Systems. 3 Credits.
This course presents an engineering approach to the design of antennas for space systems. Students will examine antennas for both large and small space based platforms in earth orbit and beyond. Antenna design is presented in the context of the space environment with particular attention to the flight design and testing cycle, thermal and mechanical considerations, space compatible materials, and high power operation. A primary focus of the course will be single, dual and shaped reflector designs including feed network topologies. Several horn antenna designs including corrugated and multimode horns will be covered as well as feed network components. A variety of other antennas including helices, patches, and arrays will be discussed for applications including: Global Navigation Satellite System (GNSS); Tracking, Telemetry and Command (TT&C); isoflux; smallsat and cubesat antennas. Course Note(s): This course is cross-listed with 675.756 Antenna Design for Space Systems. ECE students can only register for 525.656. Prerequisite(s): An undergraduate- or graduate-level introductory antenna systems course, or with approval of the instructor.

EN.525.658. Digital VLSI System Design. 3 Credits.
An introductory course in digital VLSI design in which students design digital CMOS integrated circuits and systems. The class covers transistor, behavioral, and physical level design using a variety of design tools, including circuit simulation with SPICE, logic synthesis with Verilog HDL, physical layout and automated placement and routing. The class culminates in a final project in which each student designs a more complicated digital system from architecture to final layout. Prerequisite(s): A course in digital design.

EN.525.659. Mixed-Mode VLSI Circuit Design. 3 Credits.
This course focuses on transistor-level design of mixed-signal CMOS integrated circuits. After reviewing fundamentals of MOSFET operation, the course will cover design of analog building blocks such as current-mirrors, bias references, amplifiers, and comparators, leading up to the design of digital-to-analog and analog-to-digital converters. Aspects of subthreshold operation, structured design, scalability, parallelism, low power-consumption, and robustness to process variations are discussed in the context of larger systems. The course will include use of Cadence design software to explore transistor operation and to perform functional-block designs, in the process of incrementally designing a data-converter front-end. Prerequisite(s): Familiarity with MOSFET and transistor level circuit design fundamentals.

EN.525.661. UAV Systems and Control. 3 Credits.
This hardware-supplemented course covers the guidance, navigation- and control principles common to many small fixed-wing and multirotor unmanned aerial vehicles (UAVs). Building on classical control systems and modeling theory, students will learn how to mathematically model UAV flight characteristics and sensors, develop and tune feedback control autopilot algorithms to enable stable flight control, and fuse sensor measurements using extended Kalman filter techniques to estimate the UAV position and orientation. Students will realize these concepts through both simulation and interaction with actual UAV hardware. Throughout the course, students will build a full 6-degree-of-freedom simulation of controlled UAV flight using MATLAB and Simulink. Furthermore, students will reinforce their UAV flight control knowledge by experimenting with tuning and flying actual open-source quadrotor UAVs. Prerequisite(s): Background in control systems (e.g., EN.525.609 Continuous Control Systems) and matrix theory along with a working knowledge of MATLAB. Experience using Simulink is desired. Existing familiarity with C programming language, electronics, and microcontrollers will be helpful but is not required.

EN.525.665. Machine Perception. 3 Credits.
This course will cover machine perception with a focus on computer vision (i.e., feature detection, stereovision, structure from motion, deep learning object detection) as the primary use case. Additional sensor modalities will be addressed (i.e., radar, lidar) along with data fusion (i.e., Kalman filtering, target tracking) in order to provide a broad understanding of multi-modality machine perception.

EN.525.666. Linear System Theory. 3 Credits.
This course covers the structure and properties of linear dynamic systems with an emphasis on the single-input, single-output case. Topics include the notion of state-space, state variable equations, review of matrix theory, linear vector spaces, eigenvalues and eigenvectors, the state transition matrix and solution of linear differential equations, internal and external system descriptions, properties of controllability and observability and their applications to minimal realizations, state-feedback controllers, asymptotic observers, and compensator design using state-space and transfer function methods. An introduction to multi-input, multi-output systems is also included, as well as the solution and properties of timevarying systems. Prerequisite(s): Courses in matrix theory and linear differential equations.

EN.525.670. Machine Learning for Signal Processing. 3 Credits.
This course will focus on the use of machine learning theory and algorithms to model, classify, and retrieve information from different kinds of real world signals such as audio, speech, image, and video. EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers

EN.525.678. Next Generation Mobile Networks and Security with 5G. 3 Credits.
The primary focus of this course is to introduce the next generation mobile networks, including both Cellular and WLAN technologies in great detail, to discuss various types of IP-based mobility protocols, namely Mobile-IP, Mobile IPv6, ProxyMIPv6, SIP-mobility, and Cellular IP, and to explore systems optimization techniques to support seamless handover during Inter RAT handover (e.g., 4G, 5G, and WLAN). Additionally, the course will briefly introduce the principles of cellular communications system and will then move on to describe the evolution of different generations of cellular systems including 2G, 3G, 4G, and 5G as being defined in 3GPP. At the same time it will discuss IEEE WLAN standards as developed by IEEE 802 working group including 802.11 (a, b, g, n) and 802.11 (ax, ay, ac). The Media Independent Handover standard IEEE 802.21 (e.g., integrating WLAN and 3G/4G cellular networks to provide session/service continuity) is also introduced. Further, the course will describe the 4G Long Term Evolution (LTE) in detail, covering its various components—namely Evolved UMTS Terrestrial Radio Access Network (E-UTRAN), EPC (Evolved Packet Network), and IMS (IP Multimedia Subsystem)—and all the associated interfaces and protocols, and the current efforts on 5G evolution and will touch upon various 5G pillars, namely SDN (Software Defined Networking), Network Function Virtualization, Cloud RAN, Network Slicing, Mobile Edge Cloud, and Edge Security. Finally, the course will highlight various standards activities within 3GPP, IEEE, IETF, NGMN, and ITU and will introduce some research problems for future study in the mobility area, presenting various deployment use cases and experimental results from the open-source testbeds.

EN.525.684. Microwave Systems & Receiver Design. 3 Credits.
This course deals with the practical aspects of RF and microwave systems and components. An overview of radar systems is followed by an introduction to communication systems. The majority of the course treats the linear and nonlinear characteristics of individual components and their relation to receiver system performance. Amplifiers, mixers, antennas, filters, and frequency sources are studied, as well as their impact on receiver performance. Top-level receiver designs for a radar system, a wide-band surveillance system, or a communication system application may be studied. Assignments reinforce the course material and may require use of design software. Prerequisite(s): An undergraduate degree in electrical engineering or equivalent.

EN.525.691. Fundamentals of Photonics. 3 Credits.
This course provides the essential background in photonics required to understand modern photonic and fiber-optic systems. Fundamental concepts established in this course are necessary for advanced coursework as well. Topics include: electromagnetic optics, polarization and crystal optics, guided-wave optics, fiber optics, photons in semiconductors, semiconductor photon sources and detectors, electro-optics and acousto-optics. Prerequisite(s): An undergraduate course in electromagnetic theory.

EN.525.707. Error Control Coding. 3 Credits.
This course presents error-control coding with a view toward applying it as part of the overall design of a data communication or storage and retrieval system. Block, trellis, and turbo codes and associated decoding techniques are covered. Topics include system models, generator and parity check matrix representation of block codes, general decoding principles, cyclic codes, an introduction to abstract algebra and Galois fields, BCH and Reed-Solomon codes, analytical and graphical representation of convolutional codes, performance bounds, examples of good codes, Viterbi decoding, BCJR algorithm, turbo codes, and turbo code decoding.
Background in linear algebra, such as EN.625.609 Matrix Theory; in probability, such as EN.525.614 Probability and Stochastic Processes for Engineers; and in digital communications, such as EN.525.616 Communication Systems Engineering. Familiarity with MATLAB or similar programming capability.

EN.525.708. Iterative Methods in Communications Systems. 3 Credits.
Generalization of the iterative decoding techniques invented for turbo codes has led to the theory of factor graphs as a general model for receiver processing. This course will develop the general theory of factor graphs and explore several of its important applications. Illustrations of the descriptive power of this theory include the development of high performance decoding algorithms for classical and modern forward error correction codes (trellis codes, parallel concatenated codes, serially concatenated codes, low-density parity check codes). Additional applications include coded modulation systems in which the error correction coding and modulation are deeply intertwined as well as a new understanding of equalization techniques from the factor graph perspective.
Background in linear algebra, such as EN.625.609 Matrix Theory; in probability, such as EN.525.614 Probability and Stochastic Processes for Engineers; and in digital communications, such as EN.525.616 Communication Systems Engineering. Familiarity with MATLAB or similar programming capability.

EN.525.712. Advanced Computer Architecture. 3 Credits.
This course covers topics essential to modern superscalar processor design. A review of pipelined processor design and hierarchical memory design is followed by advanced topics including the identification of parallelism in processes; multiple diversified functional units in a pipelined processor; static, dynamic, and hybrid branch prediction techniques; the Tomasulo algorithm for efficient resolution of true data dependencies; advanced data flow techniques with and without speculative execution; multiprocessor systems; and multithreaded processors.
EN.525.612 Computer Architecture or equivalent.

EN.525.718. Multirate Signal Processing. 3 Credits.
Multirate signal processing techniques find applications in areas such as communication systems, signal compression, and sub-band signal processing. This course provides an in-depth treatment of both the theoretical and practical aspects of multirate signal processing. The course begins with a review of discrete-time systems and the design of digital filters. Sample rate conversion is covered, and efficient implementations using polyphase filters and cascade integrator comb (CIC) filters are considered. The latter part of the course treats filter bank theory and implementation, including quadrature mirror, conjugate quadrature, discrete Fourier transform, and cosine modulated filter banks along with their relationship to transmultiplexers.
EN.525.627 Digital Signal Processing or equivalent and working knowledge of MATLAB.

EN.525.721. Advanced Digital Signal Processing. 3 Credits.
The fundamentals of statistical signal processing are presented in this course. Topics include matrix factorizations and least squares filtering, optimal linear filter theory, classical and modern spectral estimation, adaptive filters, and optimal processing of spatial arrays.
EN.525.614 Probability and Stochastic Processes for Engineers, EN.525.627 Digital Signal Processing, linear algebra, and familiarity with a scientific programming language such as MATLAB.

EN.525.722. Wireless and Mobile Cellular Communications. 3 Credits.
In this course, students examine fundamental concepts of mobile cellular communications and specifics of current and proposed US cellular systems. Topics include frequency reuse; call processing; propagation loss; multipath fading and methods of reducing fades; error correction requirements and techniques; modulation methods; FDMA, TDMA, and CDMA techniques; microcell issues; mobile satellite systems; GSM, cdmaOne, GPRS, EDGE, cdma2000, W-CDMA, LTE and candidate 5G waveforms.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent and EN.525.616 Communication Systems Engineering.

EN.525.724. Introduction to Pattern Recognition. 3 Credits.
This course focuses on the underlying principles of pattern recognition and on the methods of machine intelligence used to develop and deploy pattern recognition applications in the real world. Emphasis is placed on the pattern recognition application development process, which includes problem identification, concept development, algorithm selection, system integration, and test and validation. Machine intelligence algorithms to be presented include feature extraction and selection, parametric and non-parametric pattern detection and classification, clustering, artificial neural networks, support vector machines, rule-based algorithms, fuzzy logic, genetic algorithms, and others. Case studies drawn from actual machine intelligence applications will be used to illustrate how methods such as pattern detection and classification, signal taxonomy, machine vision, anomaly detection, data mining, and data fusion are applied in realistic problem environments. Students will use the MATLAB programming language and the data from these case studies to build and test their own prototype solutions.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent. A course in digital signal or imageprocessing is recommended, such as EN.525.627 Digital Signal Processing, EN.525.619 Introduction to Digital Image and Video Processing, 525.643 Real-Time Computer Vision, or 525.746 Image Engineering.

EN.525.725. Power Electronics. 3 Credits.
This course is designed to provide students a solid foundation on the fundamentals and principles of power electronics. Analytical modeling and control techniques will be introduced in addition to practical design considerations for switching regulators. Topics include steady state analysis, large and small signal modeling, control loop design, input filter and magnetic design, along with switch realization and efficiency evaluation. Advanced topics such as soft switching and active power factor correction will also be introduced. Each topic will include an in-class modeling and simulation component, utilizing MATLAB/ Simulink, to reinforce concepts and provide the student with a practical design tool for evaluating compliance with typical performance requirements.
EN.525.624 Analog Electronic Circuit Design I or equivalent.

EN.525.726. Applications of Power Electronics Design. 3 Credits.
This course presents applications and practical considerations for the design of power electronic circuits, building on the fundamentals and principles covered in 525.725 Power Electronics. We will go through the step-by-step design and modeling of a synchronous buck converter including the power stage, small-signal model, controller, full simulation, component selection, and magnetics design. Additional topics covered include circuit board layout, peak current mode control, and practical methods of addressing common challenges in power supply circuits. Students gain hands-on experience through lab-based assignments and a design project. All required test equipment will be provided. Students are expected to have basic soldering skills and experience with electronic test equipment (DC power supplies, oscilloscopes, multimeters).

EN.525.728. Detection & Estimation Theory. 3 Credits.
Both hypothesis testing and estimation theory are covered. The course starts with a review of probability distributions, multivariate Gaussians, and the central limit theorem. Hypothesis testing areas include simple and composite hypotheses and binary and multiple hypotheses. In estimation theory, maximum likelihood estimates and Bayes estimates are discussed. Practical problems in radar and communications are used as examples throughout the course.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent.

EN.525.732. Advanced Analog Electronic Circuit Design. 3 Credits.
This course extends the fundamental concepts of practical electronic circuit design developed in the course 525.624 Analog Electronic Circuit Design, beginning with a review of the general feedback method. Students then examine a range of devices, including operational amplifiers, A/D and D/A converters, and comparators. Applications include active filters, sensor conditioning, nonlinear transfer functions, and analog computation. Students explore these topics through a series of assignments supplemented with breadboard-level experimentation. All required test equipment will be provided to the student.
EN.525.624 Analog Electronic Circuit Design or permission of the instructor.

EN.525.733. Deep Learning for Computer Vision. 3 Credits.
Recent technological advances coupled with increased data availability have opened the door for a wave of revolutionary research in the field of Deep Learning. In particular, Deep Neural Networks (DNNs) continue to improve on state-of-the-art performance in many standard computer vision tasks including image classification, segmentation, object recognition, object localization, and scene recognition. With an emphasis on computer vision, this course will explore deep learning methods and applications in depth as well as evaluation and testing methods. Topics discussed will include network architectures and design, training methods, and regularization strategies in the context of computer vision applications. Following a seminar format, students will be expected to read, understand, and present recent publications describing the current state-ofthe-art deep learning methods. Additionally, team projects will give students an opportunity to apply deep learning methods to real world problems.Prerequisite(s): Students should have taken courses in computer vision and machine learning/pattern recognition, have basic familiarity with OpenCV, Python and C++, as well as prior class instruction in neural networks.

EN.525.735. MIMO Wireless Communications. 3 Credits.
This course presents the fundamental concepts and techniques of multiple-input multiple-output (MIMO) communications over wireless communication channels. MIMO communications, which involve the use of multiple antennas at the transmitter and receiver, employ the use of signal processing techniques to enhance the reliability and capacity of communication systems without increasing the required spectral bandwidth. MIMO techniques are currently used or planned in many commercial and military communications systems. Topics include the derivation and application of the theoretical MIMO communications capacity formula; channel fading and multipath propagation; the concepts of transmit and receive space diversity; space-time block coding, with a special emphasis on Alamouti coding; space-time trellis coding; spatial multiplexing; and fundamentals of OFDM modulation and its relation to MIMO communications. Examples and applications will be presented as well as related MATLAB homework assignments.
EN.525.616 Communication Systems Engineering; EN.525.614 Probability and Stochastic Processes for Engineers, or the equivalent. In addition, a working knowledge of MATLAB is required.

EN.525.738. Advanced Antenna Systems. 3 Credits.
This course is designed to follow 525.618 Antenna Systems. Advanced techniques needed to analyze antenna systems are studied in detail. Fourier transforms are reviewed and applied to antenna theory and array distributions. The method of moments is studied and used to solve basic integral equations employing different basis functions. Green's functions for patch antennas are formulated in terms of Sommerfeld-like integrals. Techniques such as saddle-point integration are presented. Topics addressed include computational electromagnetics, Leaky and surface waves, mutual coupling, and Floquet modes. Students should be familiar with complex variables (contour integration), Fourier transforms, and electromagnetics from undergraduate studies.
EN.525.618 Antenna Systems.

EN.525.742. System-on-a-Chip FPGA Design Laboratory. 3 Credits.
This lab-oriented course will focus on the design of large-scale system-on-a-chip (SOC) solutions within field-programmable gate arrays (FPGAs). Modern FPGA densities and commercially available cores enable a single developer to design highly complex systems within a single FPGA. This class will provide the student with the ability to design and debug these inherently complex systems. Topics will include high-speed digital signal processing, embedded processor architectures, customization of soft-core processors, interfacing with audio and video sensors, communications interfaces, and networking. The optimum division of algorithms between hardware and software will be discussed, particularly the ability to accelerate software algorithms by building custom hardware. Many labs will center on a common architecture that includes signal processing algorithms in the FPGA fabric, controlled by an embedded processor that provides user interfaces and network communication. The first section of the course will be spent experimenting with different building blocks for constructing SOCs. Students will spend later class sessions working in teams on self-directed SOC design projects. Industry-standard tools will be used.
EN.525.642 FPGA Design Using VHDL and familiarity with C programming.

EN.525.743. Embedded Systems Development Lab. 3 Credits.
This project-based laboratory course involves the development of embedded system prototypes. Typical projects contain combinations of the following component types: transducers, analog front ends, micro-controllers and processors, FPGAs, digital signal processors, electrical interfaces, wired or wireless connectivity, printed circuit boards required for integration and test, and software/firmware modules needed to operate a designed system. The laboratory activity is a backdrop used to teach key aspects of the development process such as documentation, realistic use of requirements, design partition, integration strategy, interface design, risk mitigation, and design strategies to accommodate available resources. Students will select a project concept and then create an implementation plan that will define the semester's activity. Students may work independently or in teams to define, develop, test, and document their projects. Students are encouraged to select topics based on their interests and learning objectives. All projects are subject to instructor approval.
An undergraduate degree in electrical or computer engineering or computer science, EN.525.612 Computer Architecture, and working knowledge of C or C++ or instructor's approval.

EN.525.744. Passive Emitter Geo-Location. 3 Credits.
This course covers the algorithms used to locate a stationary RF signal source, such as a radar, radio, or cell phone. The topics covered include a review of vectors, matrices, and probability; linear estimation and Kalman filters; nonlinear estimation and extended Kalman filters; robust estimation; data association; measurement models for direction of arrival, time difference of arrival, and frequency difference of arrival; geo-location algorithms; and performance analysis. Most of the course material is developed in planar Cartesian coordinates for simplicity; however, the extension to WGS84 coordinates is provided to equip the students for practical applications. Homework consists of both analytical problems and problems that require computer simulation using software such as MATLAB.
EN.525.614 Probability and Stochastic Processes for Engineers, an undergraduate course in linear algebra/matrix theory, and familiarity with MATLAB.

EN.525.745. Applied Kalman Filtering. 3 Credits.
Theory, analysis, and practical design and implementation of Kalman filters are covered, along with example applications to real-world problems. Topics include a review of random processes and linear system theory; Kalman filter derivations; divergence analysis; numerically robust forms; suboptimal filters and error budget analysis; prediction and smoothing; cascaded, decentralized, and federated filters; linearized, extended, second-order, and adaptive filters; and case studies in GPS, inertial navigation, and ballistic missile tracking.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.666 Linear System Theory or equivalents; knowledge of MATLAB (or equivalent software package).

EN.525.746. Image Engineering. 3 Credits.
The overall goal of the course is to provide the student with a unified view of images, concentrating on image creation, and image processing. Optical, photographic, analog, and digital image systems are highlighted. Topics include image input, output, and processing devices; visual perception; video systems; and fundamentals of image enhancement and restoration. Coding, filtering, and transform techniques are covered, with applications to remote sensing and biomedical problems.
EN.525.627 Digital Signal Processing or equivalent and knowledge of linear systems.

EN.525.747. Speech Processing. 3 Credits.
This course emphasizes processing of the human speech waveform, primarily using digital techniques. Theory of speech production and speech perception as related to signals in time and frequency-domains is covered, as well as the measurement of model parameters, short-time Fourier spectrum, and linear predictor coefficients. Speech coding, recognition, speech synthesis, and speaker identification are discussed. Application areas include telecommunications telephony, Internet VOIP, and man-machine interfaces. Considerations for embedded realization of the speech processing system will be covered as time permits. Several application-oriented software projects will be required.
EN.525.627 Digital Signal Processing and EN.525.614 Probability and Stochastic Processes for Engineers. Background in linear algebra and MATLAB is helpful.

EN.525.748. Synthetic Aperture Radar. 3 Credits.
This course covers the basics of synthetic aperture radar (SAR) from a signal processing perspective. In particular, the course will examine why there are limiting design considerations for real aperture radar and how a synthetic aperture can overcome these limitations to create high-resolution radar imaging. Various SAR geometries will be considered. Image formation algorithms, such as range Doppler, chirp scaling, omega-K, polar formatting, and backprojection, will be reviewed and, in some cases, coded by the student. Other post-processing techniques, such as motion compensation, aperture weighting (or apodization), autofocus, and multilook, will be reviewed. Advanced topics will include interferometric SAR, polarimetry, continuous wave linear FM (CWLFM) SAR, and moving objects in SAR imagery. Students will work through problems involving radar and SAR processing. Students will also develop SAR simulations, in either MATLAB or Python, based on simple point scatterers in a benign background.
EN.525.648 Introduction to Radar Systems, along with either basic MATLAB or Python skills.

EN.525.751. Software Radio for Wireless Communications. 3 Credits.
Software-defined radio (SDR) has become a common approach to rapid prototyping and deployment of communications equipment. It allows engineers to quickly move from algorithm development to functional prototype, using small form-factor commercial hardware. This course will explore modern SDR technology and implementation techniques. Students will design and implement common radio functions using field-programmable gate arrays (FPGAs) and software frameworks. During the semester, we progress from hardware considerations and basic signal processing techniques to synchronization, digital modulation, and cognitive radio. We finish with a final semester project combining multiple cognitive radio concepts.
EN.525.638 Introduction to Wireless Technology or EN.525.616 Communication Systems Engineering; EN.525.627 Digital Signal Processing; and working knowledge of MATLAB and Simulink.

EN.525.752. Digital Receiver Synchronization Techniques. 3 Credits.
This course explores synchronization techniques in modern digital receivers. Synchronization techniques, from initial detection of a signal to symbol timing recovery, is studied in this course. Students will learn practical synchronization techniques through experimentation and hands-on development. Students develop software to solve synchronization problems relevant to modern wireless communication standards. A semester project involving demodulation and synchronization is required.
EN.525.627 Digital Signal Processing

EN.525.753. Laser Systems and Applications. 3 Credits.
This course provides a comprehensive treatment of the generation of laser light, and its properties and applications. Topics include specific laser systems and pumping mechanisms, nonlinear optics, temporal and spatial coherence, guided beams, interferometric and holographic measurements, and remote sensing.
EN.525.625 Laser Fundamentals.

EN.525.754. Wireless Communication Circuits. 3 Credits.
In this course, students examine modulator and demodulator circuits used in communication and radar systems. A combination of two lectures, three laboratory experiments, and a student design project address the analysis, design, fabrication, and test of common circuits. Signal formats considered include phase and frequency shift keying, as well as the linear modulations used in analog systems. The students will select a project topic of their choosing. The nature and extent of the project will be negotiated with the instructors. The project will consume about two-thirds of the semester and weighs in a similar proportion for the final grade. There are no exams in this course, it is a laboratory and project-based learning experience.
EN.525.616 Communication Systems Engineering or EN.525.624 Analog Electronic Circuit Design or EN.525.654 Communications Circuits Laboratory or permission of the instructor.

EN.525.756. Optical Propagation, Sensing, and Backgrounds. 3 Credits.
This course presents a unified perspective on optical propagation in linear media. A basic background is established using electromagnetic theory, spectroscopy, and quantum theory. Properties of the optical field and propagation media (gases, liquids, and solids) are developed, leading to basic expressions describing their interaction. The absorption line strength and shape and Rayleigh scattering are derived and applied to atmospheric transmission, optical window materials, and propagation in water-based liquids. A survey of experimental techniques and apparatus is also part of the course. Applications are presented for each type of medium, emphasizing remote sensing techniques and background noise. Computer codes such as LOWTRAN, FASCODE, and OPTIMATR are discussed. Prerequisite(s): Undergraduate courses on electromagnetic theory and elementary quantum mechanics. A course on Fourier optics is helpful.

EN.525.759. Image Compression, Packet Video, and Video Processing. 3 Credits.
This course provides an introduction to the basic concepts and techniques used for the compression of digital images and video. Video compression requirements, algorithm components, and ISO Standard video processing algorithms are studied. Image compression components that are used in video compression methods are also identified. Since image and video compression is now integrated in many commercial and experimental video processing methods, knowledge of the compression methods' effects on image and video quality are factors driving the usability of that data in many data exploitation activities. Topics to be covered include introduction to video systems, Fourier analysis of video signals, properties of the human visual system, motion estimation, basic video compression techniques, videocommunication standards, and error control in video communications. Video processing applications that rely on compression algorithms are also studied. A mini-project is required.
EN.525.627 Digital Signal Processing.

EN.525.761. Wireless and Wireline Network Integration. 3 Credits.
This course investigates the integration of wireless and wireline networks into seamless networks. The current telecommunications environment in the United States is first discussed, including the state of technology and regulations as they apply to the wireless and wireline hybrid environment. Then each type of these hybrid networks is discussed, including its components, network services, architecture, and possible evolution, as well as important concepts that support the evolution of networks. The integration of wired network advance intelligence, wireless network mobility, and long distance capabilities are shown to provide many new combinations of wired and wireless services to users.
EN.525.608 Next-Generation Telecommunications or EN.525.616 Communication Systems Engineering, or permission of instructor.

EN.525.762. Introduction to Wavelets. 3 Credits.
This is an introductory course on wavelet analysis, with an emphasis on the fundamental mathematical principles and basic algorithms. We cover the mathematics of signal (function) spaces, orthonormal bases, frames, time-frequency localization, the windowed Fourier transform, the continuous wavelet transform, discrete wavelets, orthogonal and biorthogonal wavelets of compact support, wavelet regularity, and wavelet packets. It is designed as a broad introduction to wavelets for engineers, mathematicians, and physicists.Prerequisite: Competence with multivariable calculus, linear algebra, and a scientific programming language is required, as well as familiarity with Fourier transforms and signal processing fundamentals such as the discrete Fourier transform, convolutions, and correlations.

EN.525.768. Wireless Networks. 3 Credits.
This is a hands-on course that integrates teaching of concepts in wireless LANs as well as offering students, in an integrated lab environment, the ability to conduct laboratory experiments and design projects that cover a broad spectrum of issues in wireless LANs. The course will describe the characteristics and operation of contemporary wireless network technologies such as the IEEE 802.11 and 802.11s wireless LANs and Bluetooth wireless PANs. Laboratory experiments and design projects include MANET routing protocols, infrastructure and MANET security, deploying hotspots, and intelligent wireless LANs. The course will also introduce tools and techniques to monitor, measure, and characterize the performance of wireless LANs as well as the use of network simulation tools to model and evaluate the performance of MANETs.
EN.525.641 Computer and Data Communication Networks or EN.605.671 Principles of Data Communications Networks.

EN.525.770. Intelligent Algorithms. 3 Credits.
Intelligent algorithms are, in many cases, practical alternative techniques for tackling and solving a variety of challenging engineering problems. For example, fuzzy control techniques can be used to construct nonlinear controllers via the use of heuristic information when information on the physical system is limited. Such heuristic information may come, for instance, from an operator who has acted as a “human-inthe-loop” controller for the process. This course investigates a number of concepts and techniques commonly referred to as intelligent algorithms; discusses the underlying theory of these methodologies when appropriate; and takes an engineering perspective and approach to the design, analysis, evaluation, and implementation of intelligent systems. Fuzzy systems, genetic algorithms, particle swarm and ant colony optimization techniques, and neural networks are the primary concepts discussed in this course, and several engineering applications are presented along the way. Expert (rule-based) systems are also discussed within the context of fuzzy systems. An intelligent algorithms research paper must be selected from the existing literature, implemented by the student, and presented as a final project. Prerequisite(s): Student familiarity of system-theoretic concepts is desirable.

EN.525.771. Propagation of Radio Waves in the Atmosphere. 3 Credits.
This course examines various propagation phenomena that influence transmission of radio frequency signals between two locations on earth and between satellite-earth terminals, with a focus on applications. Frequencies above 30 MHz are considered with emphasis on microwave and millimeter propagation. Topics include free space transmission, propagation, and reception; effects on waves traversing the ionosphere; and attenuation due to atmospheric gases, rain, and clouds. Brightness temperature concepts are discussed, and thermal noise introduced into the receiver system from receiver hardware and from atmospheric contributions are examined. Also described are reflection and diffraction effects by land terrain and ocean, multipath propagation, tropospheric refraction, propagation via surface and elevated ducts, scatter from fluctuations of the refractive index, and scattering due to rain. Atmospheric dynamics that contribute to the various types of propagation conditions in the troposphere are described. Prerequisite(s): An undergraduate degree in electrical engineering or equivalent.

EN.525.772. Fiber-Optic Communication Systems. 3 Credits.
This course investigates the basic aspects of fiber-optic communication systems. Topics include sources and receivers, optical fibers and their propagation characteristics, and optical fiber systems. The principles of operation and properties of optoelectronic components, as well as the signal guiding characteristics of glass fibers, are discussed. System design issues include terrestrial and submerged point-to-point optical links and fiber-optic networks.
EN.525.691 Fundamentals of Photonics.

EN.525.774. RF & Microwave Circuits I. 3 Credits.
In this course, students examine RF and microwave circuits appropriate for wireless communications and radar sensing. The course emphasizes the theoretical and experimental aspects of micro-strip design of highly integrated systems. Computer-aided design techniques are introduced and used for the analysis and design of circuits. Circuits are designed, fabricated, and tested, providing a technically stimulating environment in which to understand the foundational principles of circuit development. Couplers, modulators, mixers, and calibrated measurements techniques are also covered.
EN.525.623 Principles of Microwave Circuits or EN.525.620 Electromagnetic Transmission Systems.

EN.525.775. RF & Microwave Circuits II. 3 Credits.
This course builds upon the knowledge gained in 525.774 RF and Microwave Circuits I. Here there is a greater emphasis on designs involving active components. Linear and power amplifiers and oscillators are considered, as well as stability, gain, and their associated design circles. The course uses computer-aided design techniques and students fabricate and test circuits of their own design.
EN.525.774 RF and Microwave Circuits I.

EN.525.776. Information Theory. 3 Credits.
Information theory concerns the fundamental limits for data compressibility and the rate at which data may be reliably communicated over a noisy channel. Course topics include measures of information, entropy, mutual information, Markov chains, source coding theorem, data compression, noisy channel coding theorem, error-correcting codes, and bounds on the performance of communication systems. Classroom discussion and homework assignments will emphasize fundamental concepts, and advanced topics and practical applications (e.g., industry standards, gambling/finance, machine learning) will be explored in group and individual research projects.
EN.525.614 Probability and Stochastic Processes for Engineers or equivalent.

EN.525.777. Control System Design Methods. 3 Credits.
This course examines recent multivariable control system design methodologies and how the available techniques are synthesized to produce practical system designs. Both the underlying theories and the use of computational tools are covered. Topics include review of classical control system design and linear system theory, eigenstructure assignment, the linear quadratic regulator, the multivariable Nyquist criterion, singular value analysis, stability and performance robustness measures, loop transfer recovery, H-infinity design, and mu-synthesis. An introduction to nonlinear techniques includes sliding mode control and feedback linearization. Recent papers from the literature are discussed. Each student will be assigned a design project using PC-based design and analysis software.
EN.525.666 Linear System Theory and EN.525.609 Continuous Control Systems or the equivalent.

EN.525.778. Design for Reliability, Testability, and Quality Assurance. 3 Credits.
The design of reliable and testable systems, both analog and digital, is considered at the component, circuit, system, and network levels. Using numerous real-world examples, the trade-offs between redundancy, testability, complexity, and fault tolerance are explored. Although the emphasis is predominantly on electronics, related examples from the aerospace and software industries are included. The concepts of fault lists, collapsed fault lists, and other techniques for reducing the complexity of fault simulation are addressed. A quantitative relationship between information theory, error correction codes, and reliability is developed. Finally, the elements of a practical quality assurance system are presented. In addition to homework assignments, students will conduct an in-depth, quantitative case study of a practical system of personal interest.
EN.525.614 Probability and Stochastic Processes or equivalent.

EN.525.779. RF Integrated Circuits. 3 Credits.
This course covers the RFIC design process focusing on the RF/microwave portion of RFIC. An overview of digital circuits and digital signal processing will be given along with semi-conductor fabrication, device models, and RF/microwave design techniques using a typical SiGe process. Part of the course will involve student design projects using a CAD software to design amplifiers, mixers, etc.
EN.525.774 RF and Microwave Circuits I or equivalent.

EN.525.780. Multidimensional Digital Signal Processing. 3 Credits.
The fundamental concepts of multidimensional digital signal processing theory as well as several associated application areas are covered in this course. The course begins with an investigation of continuous-space signals and sampling theory in two or more dimensions. The multidimensional discrete Fourier transform is defined, and methods for its efficient calculation are discussed. The design and implementation of two-dimensional non-recursive linear filters are treated. The final part of the course examines the processing of signals carried by propagating waves. This section contains descriptions of computed tomography and related techniques and array signal processing. Several application oriented software projects are required.
EN.525.614 Probability and Stochastic Processes for Engineers and EN.525.627 Digital Signal Processing or equivalents. Knowledge of linear algebra and MATLAB is helpful.

EN.525.783. Spread Spectrum Communications. 3 Credits.
This course presents an analysis of the performance and design of spread-spectrum communication systems. Both direct-sequence and frequency-hopping systems are studied. Topics include pseudonoise sequences, code synchronization, interference suppression, and the application of error-correcting codes. The use of code-division multiple access in digital cellular systems is examined. The relationships between spread spectrum, cryptographic, and error correction systems are explored. The mathematics of pseudo-random sequences used as spreading codes is compared with the mathematics of complex numbers with which students are already familiar.
EN.525.616 Communication Systems Engineering. Students should have knowledge of material covered in EN.525.201 Circuits, Devices, and Fields and EN.525.202 Signals and Systems.

EN.525.786. Human Robotics Interaction. 3 Credits.
This course provides an investigation of human-robot interaction and prosthetic control, with a focus on advanced man-machine interfaces including neural signal processing, electromyography, and motion tracking interfaces for controlling and receiving feedback from robotic devices. The course will also cover human physiology and anatomy, signal processing, intent determination, communications between the human and the device, haptic feedback, and telepresence. It is designed to be a hands-on course with class time spent in the dedicated robotics lab designing interfaces and performing experiments in a Virtual Integration Environment (VIE) and with robotic devices. Additional time in the lab, outside of class time, may be required to complete the course project. Programming for the class will be in MATLAB and Simulink.Prerequisite(s): Linear algebra, ordinary differential equations, and programming experience with Python or MATLAB

EN.525.787. Microwave Monolithic Integrated Circuit (MMIC) Design. 3 Credits.
This course is for advanced students who have a background in microwave circuit analysis and design techniques and are familiar with modern microwave computer-aided engineering tools. The course covers the monolithic implementation of microwave circuits on GaAs, or other III/V, substrates, including instruction on processing, masks, simulation, layout, design rule checking, packaging, and testing. The first part of the course includes information and assignments on the analysis and design of MMIC chips. The second part consists of projects in which a chip is designed, reviewed, and evaluated in an engineering environment, resulting in a design that would be ready for submission to a foundry for fabrication.
EN.525.775 RF and Microwave Circuits II.

EN.525.788. Power Microwave Monolithic Integrated Circuit (MMIC) Design. 3 Credits.
This course covers additional circuit design techniques applicable to MMICs (and microwave circuits in general). It is an extension of EN.525.774/775 RF and Microwave Circuits I and II and EN.525.787 Microwave Monolithic Integrated Circuit (MMIC) Design, although for students with a microwave background, these particular courses are not prerequisites. The topics covered include broadband matching, optimum loads for efficiency and low intermodulation products, odd mode oscillations, details of nonlinear modeling, time domain simulation of nonlinear circuits, and thermal effects. Students do need to have a background in microwave measurements and microwave CAD tools. No project is required, but there is structured homework involving power MMIC design completed by the student using a foundry library.
EN.525.744 RF Microwave Circuits I

EN.525.789. Advanced Satellite Communications. 3 Credits.
This course covers advanced topics in satellite communications systems, including investigations of electromagnetics, quantum physics, relativity, orbital mechanics, information theory, and hardware design relevant to practical system design and analysis. Satellite and ground station antennae, including wire, helical, and loop antennae, parabolic dishes, and multiple spot beam phased arrays, are considered from first principles. Electromagnetic wave propagation models that include reflection, polarization, diffraction, refraction, and ionospheric effects are studied as functions of frequency, including at millimeter and x-ray wavelengths. Modulation, coding, multiplexing, channel capacity, filtering, noise, and error correction, for both analog and digital systems, are treated, enabling accurate analyses at higher frequencies for which convention models may fail. The effects of special and general relativity on Doppler shifts and on-orbit clock errors are introduced. Kepler's laws are derived from first principles and used to build a simple, spreadsheet-based orbital mechanics propagator to model link budget and mission designs from low earth orbit to interplanetary space. Using GPS as a case study, it is shown how each of the above topics plays a critical role in the overall design of a complete satellite system. Course materials are augmented by in-class demonstrations, including component level designs to real-time observation of GPS and geostationary satellites using a portable satcom antenna.
EN.525.616 Communication Systems Engineering and EN.525.640 Satellite Communications Systems. Students should have knowledge of material covered in EN.525.201 Circuits, Devices, and Fields and EN.525.202 Signals and Systems.

EN.525.790. RF Power Amplifier Design Techniques. 3 Credits.
This course addresses foundational power amplifier circuit concepts and engineering fundamentals. The design of high power/high efficiency amplifiers that satisfy specific system requirements (bandwidth, linearity, spectral mask, etc.) are covered. Various device technologies (GaAs, GaN, LDMOS, SiGe), device scaling and modeling, optimum load calculations, amplifier classes (A, B, AB, C, E, F, etc.), waveform engineering, modulation techniques, efficiency enhancement, odd/even mode stability analysis, linearization techniques, power combining, reliability, lifetime calculation, and packaging are studied. The concepts are explored theoretically, and practically using numerous design exercises. This course stresses hands-on design techniques and practical considerations for real-world situations and applications.
EN.525.623 Principles of Microwave Circuits or EN.525.620 Electromagnetic Transmission Systems.

EN.525.791. Microwave Communications Lab. 3 Credits.
Concepts involving the design and fabrication of microwave subsystems are introduced in this laboratory course, including image rejection mixers, local oscillators, phase locked loops, and microstrip filters. A communication project is required, such as design and fabrication of an L-band WEFAX (weather facsimile) receiver or a C-band AMSAT (amateur communications satellite) converter. Modern microwave analyzing instruments are used by the students to evaluate the performance of the project subsystems.
EN.525.774 RF and Microwave Circuits l.

EN.525.793. Advanced Communication Systems. 3 Credits.
This course provides a basic introduction to the various building blocks of a modern digital communications system, focusing on the physical layer (PHY). We will first review basic concepts in digital communications, including Shannon theory, Nyquist sampling theory, optimal detection under Gaussian white noise, and basic modulations. We will then treat several building blocks of a digital receiver, including time and frequency synchronization, adaptive equalization and precoding, and error-correction coding/decoding. We will also introduce some advanced communication technologies such as Orthogonal Frequency-Division Multiplexing (OFDM) and Multiple-Input Multiple-Output (MIMO). Finally we will apply the knowledge to some practical wireless and wired systems.
EN.525.614 Probability and Stochastic Processes for Engineers; EN.525.616 Communication Systems Engineering.

EN.525.796. Introduction to High-Speed Optoelectronics. 3 Credits.
This course provides the student with the fundamental concepts needed to address issues in both the design and test of high-speed optoelectronic systems. This is an emerging field where photonics is combined with high-speed electronics to generate, transmit, and process signals from microwave to terahertz frequencies. The purpose of this course is to introduce fundamental principles and state-of-the-art system applications. Topics include photonic and high-speed electronic principles, analog fiber optic link, principles of low-phase noise microwave sources, photonic methods for generating low-phase noise microwave signals, photonicbased RF signal processing techniques, and ultra-short optical pulse generation techniques. State-of-the-art applications include the low-phase noise opto-electronic oscillator, carrier envelope phase locked laser for time and frequency standards, photonic-based complex radar signal generators, phased-array antenna architectures including true time-delay beam forming and the ALMA radio-telescope array, photonic analog-to-digital converter techniques, electro-optic sampling, and Terahertz signal generation. Prerequisite(s): Bachelor's degree in electrical engineering or physics. An undergraduate course in electromagnetics is required. A course in microwave theory is preferred.

EN.525.797. Advanced Fiber Optic Laboratory. 3 Credits.
The purpose of this laboratory course is to expose students to state-of-the-art applications of fiber optic technologies that include continuous-wave (cw) and pulsed fiber lasers, high-speed digital fiber optic communication systems, microwave photonic links, and non-linear fiber optic signal processing and sensors. The first part of the course will focus on a thorough characterization of fiber laser systems starting with the erbium-doped fiber amplifier and implementing different laser configurations that include multi-mode cw operation, Q-switching and relaxation oscillations, non-linear based mode-locking and single longitudinal mode operation. All of the measurements will be compared to theoretical models. This will provide students with hands-on experience with concepts that are applicable to all laser systems. In the latter part of the course, students will select a few topics that demonstrate both modern fiber optic systems based on cw lasers, external electro-optic modulators and high-speed photodetectors and applications of nonlinear fiber optics using self-phase modulation, stimulated Brillouin scattering, stimulated Raman scattering, and four wave mixing. These topics highlight the breadth of applications of modern fiber optic systems. Again, all of the experiments will be compared to theoretical models.
EN.525.691 Fundamentals of Photonics or EN.615.751 Modern Optics or equivalent.

EN.525.801. Special Project I. 3 Credits.
In individual cases, special arrangements can be made to carry out a project of significant scope in lieu of a formal course. Students should be in the second half of their graduate studies. Further information is available from the program chair. Such arrangements are made relatively infrequently. This course number should be used for the first registration of a student in any special project. Course Note(s): To ensure consideration for any term, project proposals should reach the program chair by the end of the registration period.

EN.525.802. Special Project II. 3 Credits.
This course number should be used for the second registration of a student in any special project. (See course EN.525.801 Special Project I for a further description.) Course Note(s): To ensure consideration for any term, project proposals should reach the program chair by the end of the registration period.

EN.525.803. Electrical and Computer Engineering Thesis. 3 Credits.
First of two-course sequence designed for students in the electrical and computer engineering graduate program who wish to undertake a thesis project after completing all other requirements for their degree. Students work with an advisor to conduct independent research and development in Electrical and Computer Engineering (ECE) leading to a written thesis and oral presentation to a thesis committee. The intent of the research may be to advance the body of knowledge in one of the technology areas in the ECE program. Prerequisite(s): Completion of all other courses applicable to the ECE graduate degree and approval of the ECE program chair and vice chair. The thesis option is appropriate for highly motivated students with strong academic records.

EN.525.804. Electrical and Computer Engineering Thesis. 3 Credits.
Second of two-course sequence designed for students in the electrical and computer engineering graduate program who wish to undertake a thesis project after completing all other requirements for their degree. Students work with an advisor to conduct independent research and development in Electrical and Computer Engineering (ECE) leading to a written thesis and oral presentation to a thesis committee. The intent of the research may be to advance the body of knowledge in one of the technology areas in the ECE program. Prerequisite(s): Completion of all other courses applicable to the ECE graduate degree and approval of the ECE program chair and vice chair. The thesis option is appropriate for highly motivated students with strong academic records.

EN.530 (Mechanical Engineering)

EN.530.107. MechE Undergraduate Seminar I. 0.5 Credits.
A series of weekly seminars to inform students about careers in mechanical engineering and to discuss technological, social, ethical, legal, and economic issues relevant to the profession. Part 1 of a year-long sequence.

EN.530.108. MechE Undergraduate Seminar II. 0.5 Credits.
A series of weekly seminars to inform students about careers in mechanical engineering and to discuss technological, social, ethical, legal, and economic issues relevant to the profession. Part 2 of a year-long sequence.

EN.530.111. Intro to MechE Design and CAD. 2 Credits.
This course introduces students to the basic engineering design process and to fundamental concepts and knowledge used in the design of mechanical devices and systems. Students will explore the range of tools utilized in design practice, beginning with the skills of hand-drawing, exploring ways to articulate visual ideas, and concluding with the standards of presentation and CAD tools typical in professional practice.
Prerequisite(s): EN.530.115

EN.530.115. MechE Freshman Lab I. 1 Credit.
Hands-on laboratory complementing EN.530.111, including experiments, mechanical dissections, sketching and CAD, and a cornerstone design project. Experiments and mechanical dissections connect physical principles to practical engineering applications. Sketching and CAD work build the students' design and communication skills. The design project allows students to synthesize a working system by combining knowledge of mechanics and design with practical engineering skills.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.116. MechE Freshman Lab II. 1 Credit.
Hands-on laboratory in which students continue to develop their engineering design skills. Laboratory topics include engines and motors, microcontrollers, and sensors. A design project allows students to synthesize a working system by combining knowledge of mechanics and design with practical engineering skills.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.123. Introduction to Mechanics I. 3 Credits.
This course offers an in-depth study of the fundamental elements of classical mechanics, including particle and rigid body kinematics and kinetics, and work-energy and momentum principles. Part 1 of a year-long sequence.

EN.530.124. Intro to Mechanics II. 2 Credits.
This course offers an in-depth study of the fundamental elements of classical mechanics, statics, mechanics of materials, fluid mechanics, and thermodynamics. Part 2 of a year-long sequence. Restricted to Mechanical Engineering, Engineering Mechanics, Civil Engineering, Undecided Engineering Majors, or permission of instructor.

EN.530.202. Mechanical Engineering Dynamics. 3 Credits.
Basic principles of classical mechanics applied to the motion of particles, system of particles and rigid bodies. Kinematics, analytical description of motion; rectilinear and curvilinear motions of particles; rigid body motion. Kinetics: force, mass, and acceleration; energy and momentum principles. Introduction to vibration.
(EN.530.201 OR EN.560.201) AND (AS.171.101 OR AS.171.107 OR AS.171.105 OR ((EN.530.103 OR EN.530.123) AND EN.530.104)) AND AS.110.109; grade of C- or higher required for EN.530.201 OR EN.560.201;Students must have completed Lab Safety training prior to registering for this class.

EN.530.204. Manufacturing Engineering Theory. 2 Credits.
An introduction to the grand spectrum of the manufacturing processes and technologies used to produce metal and nonmetal components. Topics include casting, forming and shaping, and the various processes for material removal including computer-controlled machining. Simple joining processes and surface preparation are discussed. Economic and production aspects are considered throughout. Students should have knowledge of engineering drawing software like SolidWorks, AutoCAD, or Pro-E.

EN.530.205. Manufacturing Engineering Laboratory. 1 Credit.
This course is the laboratory that supports EN.530.204 Manufacturing Engineering Theory. While concurrent enrollment with EN.530.204 is suggested, it is not required.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.204

EN.530.212. MechE Dynamics Laboratory. 1 Credit.
This is the laboratory component to EN.530.202 MechE Dynamics.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.202

EN.530.215. Mechanics-Based Design. 3 Credits.
Stresses and strains in three dimensions, transformations. Combined loading of components, failure theories. Buckling of columns. Stress concentrations. Introduction to the finite element method. Design of fasteners, springs, gears, bearings, and other components.
EN.530.201 OR EN.560.201

EN.530.216. Mechanics Based Design Laboratory. 1 Credit.
This is the laboratory that supports EN.530.215 Mechanics Based Design.
Prerequisite(s): EN.530.215
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.231. Mechanical Engineering Thermodynamics. 3 Credits.
Properties of pure substances, phase equilibrium, equations of state. First law, control volumes, conservation of energy. Second law, entropy, efficiency, reversibility. Carnot and Rankine cycles. Internal combustion engines, gas turbines. Ideal gas mixtures, air-vapor mixtures. Introduction to combustion.
Prerequisite(s): EN.530.232 AND (AS.171.102 OR AS.171.106 OR AS.171.108)
AS.110.109

EN.530.232. Mechanical Engineering Thermodynamics Laboratory. 1 Credit.
This course is the complementary laboratory course and a required corequisite for EN.530.231. Corequisite: EN.530.231There will be four lab sessions, days and times TBA.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.241. Electronics & Instrumentation. 3 Credits.
Introduction to basic analog electronics and instrumentation with emphasis on basic electronic devices and techniques relevant to mechanical engineering. Topics include basic circuit analysis, laboratory instruments, discrete components, transistors, filters, op-amps, amplifiers, differential amplifiers, power amplification, power regulators, AC and DC power conversion, system design considerations (noise, precision, accuracy, power, efficiency), and applications to engineering instrumentation.
AS.171.102 OR AS.171.108 OR AS.171.106;(EN.550.291/EN.553.291) OR (AS.110.201 AND AS.110.302) OR (AS.110.212 AND AS.110.302); students may take the required courses concurrently with EN.530.241.

EN.530.243. Electronics and Instrumentation Laboratory. 1 Credit.
This is the laboratory that supports EN.530.241 Electronics and Instrumentation.
Prerequisite(s): EN.530.241 Electronics and Instrumentation or instructor approval
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.254. Manufacturing Engineering. 3 Credits.
An introduction to the grand spectrum of the manufacturing processes and technologies used to produce metal and nonmetal components. Topics include casting, forming and shaping, and the various processes for material removal including computer-controlled machining. Simple joining processes and surface preparation are discussed. Economic and production aspects are considered throughout. Students must have completed the WSE Manufacturing Basic Shop training prior to registering for this class. Students should have knowledge of engineering drawing software like SolidWorks, AutoCAD, or Pro-E.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.111 OR EN.530.414 or permission of instructor.

EN.530.310. Reverse Engineering and Diagnostics. 3 Credits.
We will disassemble, inspect, diagnose, reverse engineer, repair (if needed) and test the subsystems of the first modern tractor, the iconic Ford N series (9N, 2N or 8N). The systems include power, cooling, electrical, ignition, hydraulic, transmission, steering, fuel, control (governor) and braking. The course is not about tractor repair, but upon successful completion, you will know the tractor's design and function, inside and out and you will be empowered with the confidence to understand and diagnose mechanical systems. Lessons learned will be applicable to other areas of mechanical engineering and will be particularly helpful for Senior Design. We will analyze (reverse engineer) the tractor. For example, given the engine delivers 28 HP at the PTO, how big does the PTO shaft need to be? How big is it? Over/under designed? How was it manufactured? How else could it have been manufactured. What size engine delivers 28 Hp? What fuel consumption is needed? What cooling capacity is needed? Answering such questions will prepare students to ask appropriate questions in senior design. How big/strong do we need to make it? We will also have a functioning N-series tractor that will be 'sabotaged' each week for students to test their logic skills at diagnosing the cause of the malfunction. Course goals include developing diagnostic skills, learning to read electrical and hydraulic schematics and assembly drawings, developing engineering intuition and applying theoretical knowledge to practical problems. No mechanical experience is needed. Students with the least 'hands on' background will have the most to benefit, but even BAJA members have much to gain.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.327. Introduction to Fluid Mechanics. 3 Credits.
This course introduces the fundamental mathematical tools and physical insight necessary to approach realistic fluid flow problems in engineering systems. The topics covered include: fluid properties, fluid statics, control volumes and surfaces, kinematics of fluids, conservation of mass, linear momentum, Bernoulli's equation and applications, dimensional analysis, the Navier-Stokes equations, laminar and turbulent viscous flows, internal and external flows, and lift and drag. The emphasis is on mathematical formulation, engineering applications and problem solving.
EN.530.329;(EN.530.202 OR EN.560.202) AND (AS.110.302 OR EN.553.291 OR AS.110.306)

EN.530.329. Introduction to Fluid Mechanics Laboratory. 1 Credit.
This course is the complementary laboratory course and a required co-requisite for EN.530.327. Corequisite: EN.530.327There will be four lab sessions, days and times TBA.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.334. Heat Transfer. 3 Credits.
Steady and unsteady conduction in one, two, and three dimensions. Elementary computational modeling of conduction heat transfer. External and internal forced convection. Performance and design of heat exchangers. Boiling and condensation. Black-body and gray-body radiation, Stefan-Boltzmann law view factors and some applications.
EN.530.231 AND EN.530.327

EN.530.335. Heat Transfer Laboratory. 1 Credit.
This is the laboratory that supports EN.530.334 Heat Transfer.
Prerequisite(s): EN.530.334
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.343. Design and Analysis of Dynamical Systems. 3 Credits.
Modeling and analysis of damped and undamped, forced and free vibrations in single and multiple degree-of-freedom linear dynamical systems. Introduction to stability and control of linear dynamical systems.
AS.110.108[AND AS.110.109 AND (AS.110.202 OR AS.110.211) AND (EN.550.291 OR (AS.110.302[AND AS.110.201) OR (AS.110.306 AND AS.110.201)) and C- or better or concurrent enrollment in 530.202 or 560.202. MechE Majors must also have taken 530.241;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.344. Design and Analysis of Dynamical Systems Laboratory. 1 Credit.
Prerequisite(s): EN.530.343
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.352. Materials Selection. 4 Credits.
An introduction to the properties and applications of a wide variety of materials: metals, polymers, ceramics, and composites. Considerations include availability and cost, formability, rigidity, strength, and toughness. This course is designed to facilitate sensible materials choices so as to avoid catastrophic failures leading to the loss of life and property.
EN.530.215

EN.530.381. Engineering Design Process. 3 Credits.
This course is to get you into the world of Senior Design, which means into our spaces, into the machine shop and into the mind set of doing design-build-test work. You will be assigned to be an assistant to one of our Senior Design teams. In industrial design practice this is absolutely typical and project teams grow or shrink as the need demands. It is also a good way for younger engineers to learn the ropes. You will have your own portfolio of design work to do, but it will be in the context of a large project where there has already been a lot of progress. You will have to fit in with that larger context – as usual for engineers – while also making your own contributions. There will be a lecture series which will introduce some key ideas and tools of the engineering designer. Rapid sketching of design ideas; more careful hand drawings that are like fast technical drawings; how to generate ideas and then develop the ideas into workable, feasible, affordable, desirable solutions; how to identify prototypes that will show the way forward, and then actually make them; how to work with a team and negotiate about time, deliverables and design detail; how to find parts from commercial suppliers, size them, order them and get them delivered; how to document design work in a fast and effective way. Some of the lectures will be in the form of case studies of excellent design work, and will be student-driven i.e. you will prepare a case study to present to the class which we then discuss.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.403. MechE Senior Design Project I. 4 Credits.
This senior year "capstone design" course is intended to give some practice and experience in the art of engineering design. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed. Recommended Course Background: ME Majors: EN.530.215, EN.530.327; EM & BME Majors: EN.530.215 or EN.530.405, and EN.530.327.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.404. MechE Senior Design Project II. 4 Credits.
The Senior Design Project, a unique two-semester course, is the capstone of Johns Hopkins's Mechanical Engineering Program. In the class, students working in small teams tackle specific design challenges presented by industry, government, and nonprofit organizations. The sponsors provide each team with a budget, access to world-class resources, and technical contacts. Ultimately, each team conceptualizes a novel solution to the sponsor's problem and then designs, constructs, and tests a real-world prototype before presenting the finished product and specifications to the sponsor. The course requires students to draw upon the four years of knowledge and experience they've gained in their engineering studies and put it to practical use. Throughout the year, they produce progress reports as they design, build, and test the device they are developing. Combining engineering theory, budget and time management, and interactions with real clients, the senior design project is critical to students' preparation for the transition from school to the workplace.
Area: Writing Intensive
EN.530.403

EN.530.405. Mechanics of Advanced Engineering Structures. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and structures. We will begin with the mathematical preliminaries used in continuum mechanics: vector and tensor calculus, then introduce kinematics and strain measures, descriptions of stress in a body, frame indifference, conservation laws: mass, momentum, energy balance, and entropy. These concepts will be applied to develop the constitutive equations for solids and fluids, methods for solving boundary values problems that occur in engineering structures, energy methods and foundations of the finite element method.

EN.530.410. Biomechanics of the Cell. 3 Credits.
Mechanical aspects of the cell are introduced using the concepts in continuum mechanics. Discussion of the role of proteins, membranes and cytoskeleton in cellular function and how to describe them using simple mathematical models.

EN.530.414. Computer-Aided Design. 3 Credits.
The course outlines a modern design platform for 3D modeling, analysis, simulation, and manufacturing of mechanical systems using the "Pro/E" package by PTC. The package includes the following components: • Pro/ENGINEER: is the kernel of the design process, spanning the entire product development, from creative concept through detailed product definition to serviceability.• Pro/MECHANICA: is the main analysis and simulation component for kinematic, dynamic, structural, thermal and durability performance.• Pro/NC: is a numeric-control manufacturing package. This component provides NC programming capabilities and tool libraries. It creates programs for a large variety of CNC machine tools.

EN.530.417. Fabricatology - Advanced Materials Processing. 3 Credits.
The "Fabricatology" is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

EN.530.418. Aerospace Structures. 3 Credits.
An introduction to the design of aircraft and spacecraft structures and components. This course will build on skills learned in EN.530.215 and EN.530.352. Recommended Course Background: EN.530.352 or instructor permission.

EN.530.420. Robot Sensors/Actuators. 4 Credits.
Introduction to modeling and use of actuators and sensors in mechatronic design. Topics include electric motors, solenoids, micro-actuators, position sensors, and proximity sensors.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;((AS.171.101 AND AS.171.102) OR (AS.171.107 AND AS.171.108) OR (AS.171.101 AND AS.171.108) OR (AS.171.107 AND AS.171.102) OR (EN.530.103 AND EN.530.104) OR (EN.530.123 AND EN.530.124)) AND ((AS.110.106 OR AS.110.108) AND AS.110.109 AND (AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.302) AND (EN.530.241 OR (EN.520.230 AND EN.520.231)))

EN.530.421. Mechatronics. 3 Credits.
Students from various engineering disciplines are divided into groups of two to three students. These groups each develop a microprocessor-controlled electromechanical device, such as a mobile robot. The devices compete against each other in a final design competition. Topics for competition vary from year to year. Class instruction includes fundamentals of mechanism kinematics, creativity in the design process, an overview of motors and sensors, and interfacing and programming microprocessors.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.530.420 OR EN.520.240 OR EN.520.340 or permission of the instructor.

EN.530.424. Dynamics of Robots and Spacecraft. 3 Credits.
An introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion, stability theory, and Hamilton's principle.

EN.530.425. Mechanics of Flight. 3 Credits.
Elements of flight dynamics: aerodynamics forces, gliding, cruising, turning, ascending, descending, stability, etc. Review of the pertinent fluid mechanic principles. Application to two-dimensional airfoils and theory of lift. Three-dimensional airfoils. Boundary layers. Effects of compressibility. Subsonic and supersonic flight.

EN.530.426. Biofluid Mechanics. 3 Credits.
Objective: To introduce fundamental concepts associated with the fluid mechanics of biological systems, including physiological flows and organisms living in fluids.

EN.530.427. Intermediate Fluid Mechanics. 3 Credits.
Linear and angular momentum in integral form, applications to turbomachines. The Navier-Stokes equations. Inviscid flow. Laminar viscous flow. Boundary layers. Turbulence. Compressible flows. Projects using computational tools, design of pipe network.

EN.530.430. Applied Finite Element Analysis. 3 Credits.
This course will introduce finite element methods for analysis of solid, structure and biomechanics problems. Following topics will be covered. • Computational solution vs. other solution approaches• Definition of a mechanics problem: governing equations, constitutive equations, boundary and initial conditions. • Procedure to converting a mechanical problem into a computational solution problem.• Understanding and making choices of finite element types to suit problem type.• Finite element solution choices and their application. • Finite element analysis using commercial software ABAQUS. • FE model verification and validation, solution understanding uncertainty. The course will include homework assignments, 2 exams, and a term project. The term project will involve applying FEA to an engineering problem or a research problem, interpretation of results and documenting them in a short report.
EN.550.291 OR AS.110.302

EN.530.432. Jet & Rocket Propulsion. 3 Credits.
The course covers associated aircraft and spacecraft and power generation. The first part reviews the relevant thermodynamics and fluid mechanics, including isentropic compressible flow, Rayleigh and Fanno lines, shock and expansion waves. Subsequently, the performance of various forms of aviation gas turbines, including turbo-jet, turbo-fan, turbo-prop and ram-jet engines are discussed, followed by component analyses, including inlet nozzles, compressors, combustion chambers, turbines and afterburners. Axial and centrifugal turbomachines are discussed on detail, including applications in aviation, power generation and liquid transport. The section on foundations of combustion covers fuels, thermodynamics of combustion, and energy balance. The last part focuses on rockets, including classification, required power for space flight, chemical rocket components, and combustion involving liquid and solid fuels.

EN.530.436. Bioinspired Science and Technology. 3 Credits.
Nature has been a source of inspiration for scientists and engineers and it receives particular attention recently to address many challenges the human society encounter. The course will study novel natural materials/structures with unique properties, the underlying principles, and the recent development of the bio-inspired materials and systems. From this course, students can learn about ingenious and sustainable strategies of organisms, open eyes about various phenomena in nature, and get inspiration for opening new directions of science and technology.

EN.530.438. Aerospace Materials. 3 Credits.
Aircraft materials have a come a long way from the early days of bamboo, muslin and bailing wire, and this course will accentuate processing-structure-property-performance relations is a variety of metallic alloys, ceramics and composites. Materials with applications in aeronautics, space and hypersonics will be emphasized, and topics will include: Al and Ti alloys, Co and Ni- based superalloys, refractory alloys; ceramic, metal and polymer-based composites; thermal protections systems; and dielectric windows and radomes.
EN.530.352

EN.530.441. Introduction to Biophotonics. 3 Credits.
The primary aim for this course is to explore the unique and diverse properties of light that makes it suited for diagnosis, imaging, manipulation and control of biological structure and function from the nanoscale to the tissue level. The course will focus on different optical spectroscopic and microscopic modalities that provide biochemical and morphological information, while introducing new ideas on analysis and interpretation of the acquired data. We will also discuss manipulation methods, including optical tweezers and laser scissors, and low-level light therapy. In all of these areas, the idea is to develop a basic understanding of the subject and to use it for finding solutions to real-world problems in healthcare. Discussions and open exchanges of ideas will be strongly emphasized.

EN.530.443. Fundamentals, Design Principles and Applications of Microfluidic Systems. 3 Credits.
This course will introduce fundamental physical and chemical principles involved in unique microscale phenomena. Topics to be covered include issues associated with being in micrometers in science and engineering, fluid mechanics in micro systems, diffusion, surface tension, surfactants, and interfacial forces, Interfacial hydrodynamics, Mechanical properties of materials in microscale. Students will learn about applications, enabled by the discussed principles.Recommended Pre-Requisites: EN.530.334 Suggested Pre-Requisites: EN.530.328, EN.580.451
EN.530.327 AND EN.530.231

EN.530.445. Introduction to Biomechanics. 3 Credits.
An introduction to the mechanics of biological materials and systems. Both soft tissue such as muscle and hard tissue such as bone will be studied as will the way they interact in physiological functions. Special emphasis will be given to orthopedic biomechanics. Recommended Course Background: EN.530.215/EN.530.216 and Lab or equivalent. If you have not taken this course or an equivalent, please contact the instructor before registering to ensure you have the appropriate background knowledge to succeed in this course.

EN.530.446. Experimental Methods in Biomechanics. 3 Credits.
An introduction to experimental methods used in biomedical research. Standard experimental techniques will be applied to biological tissues, where applicable and novel techniques will be introduced. Topics include strain gauges, extensometers, load transducers, optical kinematic tracking, digital image correlation, proper experimental design, calibration and error analysis. Of particular emphasis will be maintaining native tissue temperature and hydration. Laboratory will include "hands- on" testing.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.448. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties, Recommended Course Background: AS.110.201 and AS.110.302, as well as a class in statics and mechanics.

EN.530.455. Additive Manufacturing. 3 Credits.
The emergence of additive manufacturing (AM) as a viable technology for depositing materials with intricate shapes and architectures enables personal fabrication and threatens to transform global supply chains. This course will give a comprehensive introduction to AM of polymers, metals and ceramics, including: processing fundamentals, processing-structure-property relations and applications. Implications for the design, qualification and introduction of AM products will be addressed, and a variety of applications will be reviewed and used as case studies.Recommended knowledge of Materials Science equivalent to 530.352 Materials Selection. Concurrent enrollment in 530.352 Materials Selection is welcome.

EN.530.464. Energy Systems Analysis. 3 Credits.
This course discusses the grid integration of renewable energy systems. The main emphasis is on grid level effects of renewable energy, particularly wind power systems. It begins with an introduction to basic power system concepts along with power flow analysis (and optimization). Then, important concepts for wind power systems are discussed. Following that, integration issues for wind power at the transmission level and solar cell integration at the distribution level are introduced. The last part of the course will focus on current research in these areas. Students will choose a system to research and present a project or literature review at the end of the term. Prior knowledge of optimization is helpful, but not required. Co-listed with EN530.664

EN.530.468. Locomotion Mechanics: Fundamentals. 3 Credits.
This upper level undergraduate and graduate class will discuss fundamental mechanics of locomotion of both animals and machines, particularly bio-inspired robots. Locomotion emerges from effective physical interaction with an environment; therefore, the ability to generate appropriate forces (besides sensing, control, and planning) is essential to successful locomotion. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How can kangaroos hop faster and fleas jump higher than their muscles allow? Why do race walkers use a peculiar hip movement? How do animals inspire prosthetic feet that helped Blade Runner compete with abled athletes? Why do Boston Dynamics' robots move so well in most modest environments, and why does it still fail in complex terrain? Why do horses walk at low speeds but run at higher speeds? Can T-Rex run or must they walk? Why do larger animals become more erect in their leg posture? Why can a mouse falling from a skyscraper walk away with little injury, but a horse will smash? How can our muscles serve as energy-saving springs, force transmitting struts, and even energy-damping brakes? Why do migrating birds fly in a V-formation? Do Speedo's sharkskin swimsuits really reduce drag? Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics. Nearly all these fundamental studies of interesting biological locomotion phenomena have led to engineering devices that use the same physics principles to move in complex environments, with performance approaching that of animals. Recommended background: Earned B or higher in EN.530.202 (or EN.560.202) Dynamics or equivalent.

EN.530.469. Locomotion Mechanics: Recent Advances. 3 Credits.
This upper level undergraduate and graduate class will discuss recent advances in the mechanics of animal and bio-inspired robot locomotion in complex environments. All of the topics covered are from cutting edge research over the last 20 years, with many still being active research areas. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How do geckos adhere to and climb over almost any surfaces? How do all kinds of animals use tails in novel ways to quickly maneuver in the air and on the ground? How do sandfish lizards burrow into and swim under sand? How do sidewinder snakes crawl up steep sand dunes without triggering an avalanche? How do large ants colonies dig and live in narrow tunnels without trapping themselves in traffic jams? Why do legged and snake robots struggle on sand and rubble, whereas insects, lizards, and snakes traverse similar terrain at ease? Why do insects rotate their wings while flapping to fly? How do soft-bodied worms move and how can we make better soft robots? How do cockroaches survive after squeezing through gaps with pressure several hundreds of their body weight? How do water striders walk on water and why can't we do it?All these fundamental studies of interesting biological locomotion phenomena have led to bio-inspired robots that use the same physics principles to move in complex environments, with performance approaching that of animals.Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics.Recommended background: B or higher in EN.530.202 Dynamics or EN.560.202 Dynamics.Closely-related courses:EN.530.468/668 Locomotion Mechanics: FundamentalsEN.530.676 Locomotion Dynamics and ControlVisit https://li.me.jhu.edu/teaching for more information.

EN.530.470. Space Vehicle Dynamics & Control. 3 Credits.
In this course we study applied spacecraft orbital and attitude dynamics and their impact on other subsystems. In the orbital dynamics part of the course, we discuss some the issues associated with orbital insertion, control and station keeping. Focus is on the two-body problem regime where conic solutions are valid. Orbit perturbations are also considered. For attitude dynamics, different attitude representations such as of direction cosines, quaternions, and angles are introduced. Then we look at the forces and moments acting on space vehicles. Attitude stability and control considerations are introduced.

EN.530.473. Molecular Spectroscopy and Imaging. 3 Credits.
The overarching objective of this course is to understand, employ and innovate molecular spectroscopy and optical imaging tools. The emphasis will be to bridge the domain between molecular spectroscopy, which provides exquisite chemical information, and the imaging capabilities of microscopy to seamlessly traverse between structural and biochemical spaces. The course will build on the foundational principles of light-matter interactions and an understanding of light sources, geometrical and wave optics, and detectors. Using vibrational and fluorescence spectroscopy as the tools of choice, we will discuss the design and fabrication of molecular reporters that offer unprecedented sensitivity, specificity and multiplexing capabilities in imaging of live biological specimen. Finally, we will learn about spectral and image-processing algorithms that have fundamentally changed the nature and quantity of useful information and have directly lead to breakthroughs in super-resolution imaging and multi-modal image fusion. All through the course, the focus will be on the underlying concepts and physical insights as we navigate through a diverse array of biophotonics applications.

EN.530.474. Effective and Economic Design for Biomedical Instrumentation. 4 Credits.
This course is to introduce students to the design, practice, and devices used in biomedical research. The class will be divided into two parts: lecture and lab. In the lectures, students will learn the physics behind the device, the specific requirements of biomedical instruments, and the engineering principles to construct the devices. Lab sessions will focus on designing and building a prototype device. This course aims to forge collaboration between biomedical researchers and mechanical engineers. The goal is to make the devices accessible to the biomedical research community as well as the general public. Economical availability will be one of the critical elements in the device design. Students will be encouraged to build the devices within a healthy budget.PREREQUISITES: Introductory Physics, Programming, and CAD
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.479. Modern Tools and Applications in Experimental Solid Mechanics. 3 Credits.
This course provides students with an introduction to experimental solid mechanics, equipping them with the fundamental knowledge required to design, set up, and interpret laboratory tests to determine the strength, stiffness, fracture toughness, and strains and stresses in solids under quasi-static and dynamic loads. The course is divided into a series of modules, with each module containing a lecture and accompanying laboratory exercises in which students set up and execute experiments and analysis. Module topics include: the basics of experimental measurements, noise, and errors; strain gages; photoelasticity; digital image correlation; impact testing and high-speed imaging; fracture toughness measurements. By the end of the course, students will be able to formulate, design, and execute experiments to characterize the elastic, plastic, and dynamic response of a variety of materials, and compare their measurements with theoretical predictions.
EN.560.201 AND EN.530.215

EN.530.480. Image Processing and Data Visualization. 3 Credits.
The course will be divided into two parts. In the first part, students will learn the basics of image processing, including handling noisy background, creating 2D/3D filters, Fourier domain operations, and building processing pipelines . In the second part, students will learn the importance of data visualization, as well as the skills to use the aids such as virtual reality goggles and haptic devices to help scientists gain insights for data interpretation. Recommended experience programming in Matlab.

EN.530.483. Applied Computational Modeling in Aerodynamics and Heat Transfer. 3 Credits.
Introduction to fundamental principles and applications of the computational modeling in fluid dynamics and heat transfer. Emphasis is on basics of finite-difference methods and hands-on experience in code development as well as the use of a commercial software package (ANSYS CFX) for modeling and simulation. Students will also learn about meshing strategies, post-processing, and critical analysis of simulation results. The concept of numerical errors and the validation and verification will also be emphasized.Recommended Background: (1) Undergraduate or introductory level course in fluid dynamics or heat transfer or transport phenomena or classical mechanics.(2) Basic expertise in writing computer codes (MATLAB or C++ or Fortran or Python).

EN.530.501. Undergraduate Research. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible. All students taking three or more credits of undergraduate research are strongly encouraged to present a research poster at the Johns Hopkins University’s DREAMS Undergraduate Research Day.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.511. Group Undergraduate Research. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible. The professor and students will meet weekly in required meetings. All students taking three or more credits of undergraduate research are strongly encouraged to present a research poster at the Johns Hopkins University's DREAMS Undergraduate Research Day.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.526. Undergrad Independent Study. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.527. Independent Study. 1 - 3 Credits.
Students pursue research problems individually or in pairs. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.597. Research - Summer. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.599. Independent Study. 1 - 4 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.530.603. Applied Optimal Control. 3 Credits.
The course focuses on the optimal control of dynamical systems subject to constraints and uncertainty by studying analytical and computational methods leading to practical algorithms. Topics include calculus of variations, nonlinear local optimization, global stochastic search, dynamic programming, linear quadratic (gaussian) control, numerical trajectory optimization, model-predictive control. Advanced topics include approximate dynamic programming and optimal control on manifolds. The methods and algorithms will be illustrated through implementation of various simulated examples. Recommended Course Background: Linear Algebra and Differential Equations; experience with control systems; programming in MATLAB and/or Python.

EN.530.604. Mechanical Properties of Materials. 3 Credits.
An introduction to the properties and mechanisms that control the mechanical performance of materials. Topics include mechanical testing, tensor description of stress and strain, isotropic and anisotropic elasticity, plastic behavior of crystals, dislocation theory, mechanisms of microscopic plasticity, creep, fracture, and deformation and fracture of polymers. Recommended Course Background: EN.510.601
Students who have taken EN.510.604 are not eligible to take EN.530.604.

EN.530.605. Mechanics of Solids and Materials. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and materials. We will begin with the mathematical preliminaries of continuum mechanics: vectors and tensors calculus, then introduce the kinematics of deformation and descriptions of stress in a continuum: Eulerian and Lagrangian descriptions, followed by conservation laws: mass, momentum, and energy balance, and entropy. These concepts will be applied to develop the concepts of constitutive relations: frame invariance, material symmetry, and dissipation. The second half of the class will be devoted to elasticity, both classical and finite elasticity, and solution methods for boundary value problems.

EN.530.606. Mechanics of Solids and Materials II. 3 Credits.
An overview of the area of the mechanics of solids and materials, with the intent of providing the foundation for graduate students interested in research that involves these disciplines. The course is based on the principles of continuum mechanics, and covers the fundamental concepts of elasticity, plasticity, and fracture as applied to materials. One objective is to get graduate students to the point that they can understand significant fractions of research seminars and papers in this area. This mathematically rigorous course emphasizes the setup and solution of boundary value problems in mechanics, and attempts to integrate the primary behaviors with deformation and failure mechanisms in materials. Special topics covered may include (depending on the interests of the student body) wave propagation, viscoelasticity, geomechanics or biomechanics.

EN.530.607. Introduction to Wind Energy. 3 Credits.
This project-based course will provide an introduction to wind energy engineering.

EN.530.608. Experimental Fluid Dynamics. 3 Credits.
This course will serve as a virtual tour to many experimental facilities and techniques following the history of fluid dynamics research. Stories of several interesting debates will be told to show that iterations of experimental facilities based on the physics of fluid can lead to major new discoveries that brought a long-lasting impact on the entire field. The course will also focus on the unique opportunities and challenges in this decade thanks to the rapid advance of digital cameras, lasers, computed tomography, fluorescence imaging, as well as diagnostic tools based on X-ray, MRI, and gamma radiation. The course is designed for graduate students at all levels that are interested in fluid dynamics.

EN.530.610. Quantitative Cell Mechanics. 3 Credits.
Application of equilibrium and nonequilibrium concepts in statistical mechanics to biology is presented in some detail. Topics include many-body dynamics and equilibrium ensembles, thermodynamics and phase transitions, free energy functionals, computer simulations of biological systems, nonequilibrium model such as the Langevin equation and the Fokker-Planck equation, kinetic models of biochemical networks, Markov models of stochastic systems and pattern formation in nonequilibrium systems. Emphasis will be on quantitative understanding of biological problems.

EN.530.613. MechE Master's Design Project I. 3 Credits.
This course is intended to give graduate students some practice and experience in the art of engineering design in conjunction with undergraduate students taking MechE Senior Design Project I. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed.Recommended Course Background: C- or higher in both 530.403 and 530.404 MechE Senior Design Project I/II. Students from other universities may ask to be considered if they have taken a course like MechE Senior Design Project i.e. two semesters, design-build-test, ideally with industry connection.

EN.530.614. Master's Design Project II. 3 Credits.
This course is intended to give graduate students some practice and experience in the art of engineering design in conjunction with undergraduate students taking MechE Senior Design Project II. Students working in teams of two to four will select a small-scale, industry-suggested design problem in the area of small production equipment, light machinery products, or manufacturing systems and methods. A solution to the problem is devised and constructed by the student group within limited time and cost boundaries. Preliminary oral reports of the proposed solution are presented at the end of the first semester. A final device, product, system, or method is presented orally and in writing at the end of the second semester. Facilities of the Engineering Design Laboratory (including machine shop time) and a specified amount of money are allocated to each student design team for purchases of parts, supplies, and machine shop time where needed.Recommended Course Background: C- or higher in both 530.403 and 530.404 MechE Senior Design Project I/II. Students from other universities may ask to be considered if they have taken a course like MechE Senior Design Project i.e. two semesters, design-build-test, ideally with industry connection.

EN.530.616. Introduction to Linear Systems Theory. 3 Credits.
A beginning graduate course in multi-input multi-output, linear, time-invariant systems. Topics include state-space and input-output representations; solutions and their properties; multivariable poles and zeros; reachability, observability and minimal realizations; stability; system norms and their computation; linearization techniques. Students cannot take EN.530.616 if they have already taken the equivalent courses EN.520.601 OR EN.580.616. No audit option, but contact the instructor if you want to informally sit in on the course. For more information see: 616-introduction-to-linear-systems-theory-fall-2021" target="_blank">https://dscl.lcsr.jhu.edu/530-616-introduction-to-linear-systems-theory-fall-2021
Recommended course background are undergraduate courses in linear algebra, differential equations, and an undergraduate level course in control systems. Students cannot take EN.530.616 if they have already taken EN.520.601 OR EN.580.616.

EN.530.618. Fabricatology - Advanced Materials Processing. 3 Credits.
The “Fabricatology” is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent development in the field so that they can have a comprehensive knowledge about the subject. Recommended Course Background: coursework in introduction to materials chemistry or engineering materials.

EN.530.619. Aerospace Structures. 3 Credits.
A graduate-level introduction to the design of aircraft and spacecraft structures and components. This course will build on skills learned in EN.530.215 Mechanics Based Design and EN.530.352 Materials Selection.Recommended Course Background: EN.530.352 (or knowledge of materials selection) or instructor permission.

EN.530.621. Fluid Dynamics I. 3 Credits.
Kinematics. Stress. Conservation of mass, momentum, and energy. Newtonian fluids. The Navier-Stokes equations. Inviscid flows. Laminar viscous flows. Vorticity. Instability. Turbulence. Boundary layers. External flows. Compressible flows. Introduction to non-Newtonian fluids.

EN.530.622. Fluid Dynamics II. 3 Credits.
Kinematics. Stress. Conservation of mass, momentum, and energy. Newtonian fluids. The Navier- Stokes equations. Inviscid flows. Laminar viscous flows. Vorticity. Instability. Turbulence. Boundary layers. External flows. Compressible flows. Introduction to non-Newtonian fluids.

EN.530.624. Dynamics of Robots and Spacecraft (Graduate). 3 Credits.
An introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion, stability theory, and Hamilton’s principle.

EN.530.625. Turbulence. 3 Credits.
Fundamental equations of fluid mechanics, Reynolds averaging, and the closure problem. Scaling and self-preservation in boundary-free and wall-bounded shear flows. Isotropic turbulence and spectral theories. Vorticity dynamics, intermittency, and cascade models. Turbulence modeling: one- and two-equation models, Reynolds stress modeling, and large-eddy simulations.

EN.530.627. Intermediate Fluid Mechanics (graduate). 3 Credits.
Linear and angular momentum in integral form, applications to turbomachines. The Navier-Stokes equations. Inviscid flow. Laminar viscous flow. Boundary layers. Turbulence. Compressible flows. Projects using computational tools, design of pipe network.

EN.530.629. Simulation and Analysis of Ocean Wave Energy Systems. 3 Credits.
Aspects of the simulation of a dynamic system are covered in this project-based course. Open-source software packages are used to simulate the hydrodynamics and rigid-body dynamics of an ocean wave-energy conversion project. Topics include: wave-energy converter types (buoyancy, hydrostatic pressure, potential energy, etc.), multi-body coupled dynamics, hydrodynamics, and energy conversion. Prerequisites: dynamics, fluid mechanics, computer programming (any language).

EN.530.632. Convection. 3 Credits.
This course begins with a review of the phenomenological basis of the constitutive models for energy and mass flux. Then, using the transport theorem, general conservation and balance laws are developed for mass, species, energy, and entropy. Scaling analysis is used to determine when simplifications are justified, and simplified cases are solved analytically. Experimental results and correlations are given for more complex situations. Free, mixed, and forced internal and external convection are studied, and convection with a phase change is also explored.

EN.530.636. Bioinspired Science and Technology. 3 Credits.
Nature has been a source of inspiration for scientists and engineers and it receives particular attention recently to address many challenges the human society encounter. The course will study novel natural materials/ structures with unique properties, the underlying principles, and the recent development of the bio-inspired materials and systems. From this course, students can learn about ingenious and sustainable strategies of organisms, open eyes about various phenomena in nature, and get inspiration for opening new directions of science and technology.

EN.530.638. Aerospace Materials. 3 Credits.
Aircraft materials have a come a long way from the early days of bamboo, muslin and bailing wire, and this course will accentuate processing-structure-property-performance relations is a variety of metallic alloys, ceramics and composites. Materials with applications in aeronautics, space and hypersonics will be emphasized, and topics will include: Al and Ti alloys, Co and Ni- based superalloys, refractory alloys; ceramic, metal and polymer-based composites; thermal protections systems; and dielectric windows and radomes.

EN.530.641. Statistical Learning For Engineers. 3 Credits.
Graduate level introductory course on machine learning and reinforcement learning. Artificial intelligence (AI) is rapidly growing in virtually all science and engineering fields. Technologies related to machine learning are at the center of this trend. This course provides a fundamental and core knowledge on machine learning and reinforcement learning, which in turn prepares students so as to self-advance into the state-of-the-art AI technologies in a variety of fields. This course will discuss general aspects of machine and reinforcement learning, which is suitable for students in different fields of interest, though the primary applications include robotics engineering. Topics that will be covered include: core mathematics necessary, core principles for supervised and unsupervised learning (e.g., linear regression, logistic regression, Bayes nets, EM, and so on), and for reinforcement learning (e.g., Markov decision process, dynamic programming, etc.). Homework assignments include both theoretical and computational components.Recommended Course Background:o Course background: Linear Algebra, Multivariate Calculus, Probability, Differential Equations;o Programming: Knowledge of Python (and Matlab)

EN.530.642. Plasticity. 3 Credits.
The theory of the inelastic behavior of metallic materials. Experimental background and fundamental postulates for the plastic stress-strain relations. Mechanisms of plastic flow; single-crystal and polycrystalline plasticity. Boundary value problems. Variational principles, uniqueness and the upper and lower bound theorems of limit analysis. Slip line theory. Dynamic plasticity and wave phenomena. Finite strain plasticity and instability.

EN.530.643. Fundamentals, Design Principles and Applications of Microfluidic Systems. 3 Credits.
This course will introduce fundamental physical and chemical principles involved in unique microscale phenomena. Topics to be covered include issues associated with being in micrometers in science and engineering, fluid mechanics in micro systems, diffusion, surface tension, surfactants, and interfacial forces, Interfacial hydrodynamics, Mechanical properties of materials in microscale. Students will learn about applications, enabled by the discussed principles.Required Pre-Requisites: Knowledge of fluid mechanics and thermodynamics. Recommended Pre-Requisites: heat transfer. Suggested: advanced knowledge of fluid mechanics plus knowledge of cell and tissue engineering.

EN.530.645. Kinematics. 3 Credits.
A theoretical treatment of the kinematics of mechanisms, machines, and robotic manipulators intended for (though not restricted to) graduate students. Topics include parameterizations of spherical motion - Euler angles, Rodrigues parameters, unit quaternions, the matrix exponential; analysis of planar and spatial linkages; robot kinematics - forward and inverse kinematics, singularities, elementary topological issues; theory of wrenches and twists; research issues in robot kinematics - redundancy resolution, grasping and rolling contact, steering of nonholonomic systems. Other advanced topics will be covered as time permits. Recommend Course Background: Undergraduate linear algebra and multivariable calculus.

EN.530.646. Robot Devices, Kinematics, Dynamics, and Control. 4 Credits.
Graduate-level introduction to the mechanics of robotic systems with emphasis on the mathematical tools for kinematics and dynamics of robotic systems. Topics include the geometry and mathematical representation of rigid body motion, manipulator kinematics including forward and inverse kinematics of articulated robot arms, differential kinematics, manipulator dynamics and control. Additional special topics such as trajectory generation, actuation, and design issues will be considered as time permits.

EN.530.647. Adaptive Systems and Control. 4 Credits.
Graduate-level introduction to adaptive identification and control. Emphasis on applications to mechanical systems possessing unknown parameters (e.g., mass, inertia, friction). Topics include stability of linear and nonlinear dynamical systems, Lyapunov stability, input-output stability, adaptive identification, and direct and indirect adaptive control. Required Prerequisites: Calculus I, II, and III; Physics I and II; Linear Algebra; Differential Equations; Graduate linear systems theory such as EN.520.601 Introduction to Linear Systems Theory is required prerequisite. Please see the course home page here for additional information: 647-adaptive-systems-fall-2017" target="_blank">https:// dscl.lcsr.jhu.edu/courses/530-647-adaptive-systems-fall-2017. Audit registration not permitted.

EN.530.648. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties, Recommended Course Background: AS.110.201 and AS.110.302, as well as a class in statics and mechanics.

EN.530.649. System Identification. 3 Credits.
This course will cover several fundamental approaches system identification, including spectral, prediction error, subspace, and "online" (adaptive) identification methods. The emphasis will be on LTI systems, but some time will be devoted to system identification for classes of nonlinear dynamical systems, such as those that are linear in parameters.

EN.530.654. Advanced Systems Modeling II. 3 Credits.
A continuation of EN.530.653, this course covers the following topics at an advanced level:Newton's laws of kinematics of systems of particles and rigid bodies; Lagrange's equations forsingle- and multi-degree-of-freedom systems composed of point masses; normal mode analysis and forced linear systems with damping, the matrix exponential and stability theory for linear systems; nonlinear equations of motion; structure, passivity, PD control, noise models and stochastic equations of motion; manipulator dynamics: Newton-Euler formulation, Lagrange, Kane's formulation of dynamics, computing torques with O(n) recursive manipulator dynamics:Luh-Walker-Paul, Hollerbach, O(n) dynamics simulation: Rodriques-Jain-Kreutz, Saha, Fixman. There is also an individual course project that each student must do which relates the topics of this course to his or her research.

EN.530.655. Additive Manufacturing (Graduate). 3 Credits.
The emergence of additive manufacturing (AM) as a viable technology for depositing materials with intricate shapes and architectures enables personal fabrication and threatens to transform global supply chains. This course will give a comprehensive introduction to AM of polymers, metals and ceramics, including: processing fundamentals, processing-structure-property relations and applications. Implications for the design, qualification and introduction of AM products will be addressed, and a variety of applications will be reviewed and used as case studies.Recommended knowledge in Materials Science equivalent to 530.352 Materials Selection.

EN.530.656. Deformation Mechanisms. 3 Credits.
An advanced course on the microscopic mechanisms that control the mechanical behavior of materials. Methods and techniques for measuring, understanding, and modeling: plasticity, creep, shear banding, and fracture will be addressed. Subjects to be covered include dislocation theory and strengthening mechanisms, high temperature diffusion and grain boundary sliding, shear localization, void formation, ductile rupture, and brittle fracture.

EN.530.663. Robot Motion Planning. 3 Credits.
This course provides a graduate-level introduction to robot motion planning. Topics include geometric representation of rigid bodies, configuration space of robots, graph search algorithms, shortest-path motion, and various approaches to motion planning problems (e.g., combinatorial and sampling-based motion planning algorithms, and potential field method). The emphasis is both on mathematical aspects of motion planning (which provides fundamentals in understanding the state-of-the-art planning techniques) and computational implementation of algorithms.

EN.530.664. Energy Systems Analysis (graduate). 3 Credits.
This course discusses the grid integration of renewable energy systems. The main emphasis is on grid level effects of renewable energy, particularly wind power systems. It begins with an introduction to basic power system concepts along with power flow analysis (and optimization). Then, important concepts for wind power systems are discussed. Following that, integration issues for wind power at the transmission level and solar cell integration at the distribution level are introduced. The last part of the course will focus on current research in these areas. Students will choose a system to research and present a project or literature review at the end of the term. Prior knowledge of optimization is helpful, but not required. Co-listed with EN.530.464.

EN.530.668. Locomotion Mechanics: Fundamentals. 3 Credits.
This upper level undergraduate and graduate class will discuss fundamental mechanics of locomotion of both animals and machines, particularly bio-inspired robots. Locomotion emerges from effective physical interaction with an environment; therefore, the ability to generate appropriate forces (besides sensing, control, and planning) is essential to successful locomotion. General principles and integration of knowledge from engineering, biology, and physics will be emphasized. Sample topics include: How can kangaroos hop faster and fleas jump higher than their muscles allow? Why do race walkers use a peculiar hip movement? How do animals inspire prosthetic feet that helped Blade Runner compete with abled athletes? Why do Boston Dynamics' robots move so well in most modest environments, and why does it still fail in complex terrain? Why do horses walk at low speeds but run at higher speeds? Can T-Rex run or must they walk? Why do larger animals become more erect in their leg posture? Why can a mouse falling from a skyscraper walk away with little injury, but a horse will smash? How can our muscles serve as energy-saving springs, force transmitting struts, and even energy-damping brakes? Why do migrating birds fly in a V-formation? Do Speedo's sharkskin swimsuits really reduce drag? Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics. Nearly all these fundamental studies of interesting biological locomotion phenomena have led to engineering devices that use the same physics principles to move in complex environments, with performance approaching that of animals. Recommended background: Earned B or higher in EN.530.202 (or EN.560.202) Dynamics or equivalent.

EN.530.669. Locomotion Mechanics: Recent Advances. 3 Credits.
This upper level undergraduate and graduate class will discuss recent advances in the mechanics of animal and bio-inspired robot locomotion in complex environments. All of the topics covered are from cutting edge research over the last 20 years, with many still being active research areas. General principles and integration of knowledge from engineering, biology, and physics will be emphasized.Sample topics include: How do geckos adhere to and climb over almost any surfaces? How do all kinds of animals use tails in novel ways to quickly maneuver in the air and on the ground? How do sandfish lizards burrow into and swim under sand? How do sidewinder snakes crawl up steep sand dunes without triggering an avalanche? How do large ants colonies dig and live in narrow tunnels without trapping themselves in traffic jams? Why do legged and snake robots struggle on sand and rubble, whereas insects, lizards, and snakes traverse similar terrain at ease? Why do insects rotate their wings while flapping to fly? How do soft-bodied worms move and how can we make better soft robots? How do cockroaches survive after squeezing through gaps with pressure several hundreds of their body weight? How do water striders walk on water and why can't we do it?All these fundamental studies of interesting biological locomotion phenomena have led to bio-inspired robots that use the same physics principles to move in complex environments, with performance approaching that of animals.Students from ME, Robotics, and other programs are all welcome. Freshmen and sophomores with sufficient physics background may take with instructor approval. Students should have a strong understanding of Newtonian mechanics.Recommended background: B or higher in EN.530.202 Dynamics or EN.560.202 Dynamics.Closely-related courses:EN.530.468/668 Locomotion Mechanics: FundamentalsEN.530.676 Locomotion Dynamics and ControlVisit https://li.me.jhu.edu/teaching for more information.

EN.530.672. Biosensing & BioMEMS. 3 Credits.
The course discusses the principles of biosensing and introduces micro- and nano-scale devices for fluidic control and molecular/cellular manipulation, measurements of biological phenomena, and clinical applications.

EN.530.673. Introduction to Molecular and Atomistic Modeling and Simulation. 3 Credits.
The course provides an introduction of how material behaves at the molecular and atomistic levels, when they are subjected to changes in pressure and temperature. The behavior of materials at the molecular/atomistic level defines the global/continuum behavioral response of the material subjected to some loading conditions. The course relates concepts of physics to engineering concepts of deformation in materials/structures. At the end of this course, a successful student will be able to:• Perform simple molecular dynamics simulations on materials.• Appreciate suitability and limitation of molecular/atomistic simulations.• Comprehend how molecular and atomistic modeling and simulation are related to define the global/continuum description of materials/structures. • Comprehend concepts of interatomic potentials used to represent different types of bonds in materials.• Understand concepts of wave/particle duality and the role of electrons in the description of properties of a material.• Develop the ability to understand literature in the area of molecular/atomistic modeling and simulation.For molecular simulations, Lammps code (Sandia Labs) will be used by the students and Matlab/Python for post processing. It's a opensource software, so students can install it in their laptops. However, for purpose of running simulations, ARCH will be used. For electronic contributions, Quantum Espresso code will be utilized, which is also opensource. ARCH already has both the software installed in it, so the students will be given temporary access to it to run their codes.

EN.530.674. Effective and Economic Design for Biomedical Instrumentation. 4 Credits.
This course is to introduce students to the design, practice, and devices used in biomedical research. The class will be divided into two parts: lecture and lab. In the lectures, students will learn the physics behind the device, the specific requirements of biomedical instruments, and the engineering principles to construct the devices. Lab sessions will focus on designing and building a prototype device. This course aims to forge collaboration between biomedical researchers and mechanical engineers. The goal is to make the devices accessible to the biomedical research community as well as the general public. Economical availability will be one of the critical elements in the device design. Students will be encouraged to build the devices within a healthy budget.PREREQUISITES: Introductory Physics, Programming, and CAD
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.530.676. Locomotion Dynamics & Control. 3 Credits.
Graduate course on mechanics and control in locomotion. Topics include modeling (e.g. Lagrangian mechanics), dynamical systems theory (nonholonomic systems, limit-cycle behavior, Poincaré analysis, and Floquet theory), design (control synthesis, mechanical design), and data-driven modeling from animal locomotor control experiments. Prerequisites: A graduate course in linear systems theory (e.g. EN.520.601). Suggested background (not required): 530.475/675.
A graduate course in linear systems theory (e.g. EN.520.601, EN.530.616) or mathematical methods of engineering (e.g. EN.530.761), or permission from the instructor.

EN.530.678. Nonlinear Control and Planning in Robotics. 3 Credits.
The course starts with a brief introduction to nonlinear systems and covers selected topics related to model-based trajectory planning and feedback control. Focus is on applications to autonomous robotic vehicles modeled as underactuated mechanical systems subject to constraints such as obstacles in the environment. Topics include: nonlinear stability, stabilization and tracking, systems with symmetries, differential flatness, backstepping, probabilistic roadmaps, stochastic optimization. Recommended Course Background: multi-variable/differential calculus, AS.110.302, AS.110.201, undergraduate linear control, basic probability theory.

EN.530.679. Modern Tools and Applications in Experimental Solid Mechanics. 3 Credits.
This course provides students with an introduction to experimental solid mechanics, equipping them with the fundamental knowledge required to design, set up, and interpret laboratory tests to determine the strength, stiffness, fracture toughness, and strains and stresses in solids under quasi-static and dynamic loads. The course is divided into a series of modules, with each module containing a lecture and accompanying laboratory exercises in which students set up and execute experiments and analysis. Module topics include: the basics of experimental measurements, noise, and errors; strain gages; photoelasticity; digital image correlation; impact testing and high-speed imaging; fracture toughness measurements. By the end of the course, students will be able to formulate, design, and execute experiments to characterize the elastic, plastic, and dynamic response of a variety of materials, and compare their measurements with theoretical predictions. Recommended Course Background: knowledge of statics, mechanics and materials, and mechanics based design

EN.530.683. Applied Computational Modeling in Aerodynamics and Heat Transfer. 3 Credits.
Introduction to fundamental principles and applications of the computational modeling in fluid dynamics and heat transfer. Emphasis is on basics of finite-difference methods and hands-on experience in code development as well as the use of a commercial software package (ANSYS CFX) for modeling and simulation. Students will also learn about meshing strategies, post-processing, and critical analysis of simulation results. The concept of numerical errors and the validation and verification will also be emphasized.Recommended Background: (1) Undergraduate or introductory level course in fluid dynamics or heat transfer or transport phenomena or classical mechanics.(2) Basic expertise in writing computer codes (MATLAB or C++ or Fortran or Python).

EN.530.684. Orientation Mapping of Crystalline Materials. 3 Credits.
Recent advances in instrumental capabilities are fast making it routine to acquire large 2D and 3D datasets and maps of crystalline materials. SEM-based orientation imaging microscopy (OIM) and transmission Kikuchi diffraction (TKD) and TEM-based precession-assisted crystal orientation mapping (PACOM) provide the means to characterize intra- and inter-grantular details such as grain: orientation, size, shape, neighborhoods and GND distributions. This course will cover the science that underpins these technologies and provide practical experience in gathering, filtering, quantifying and displaying such information. It is motivated by the fact that emergent advances based on the practice of Integrated Materials Science and Engineering (ICMSE) and the Materials Genome Initiative (MGI) are predicated on the availability of physics-based, multi-scale models that are based on such detailed quantitative experimental observations of polycrystalline materials.

EN.530.691. Haptic Interface Design for Human-Robot Interaction. 3 Credits.
This course provides an introduction to haptic interface design and analysis for human-robot interaction involving virtual environments, augmented reality, and teleoperation. Topics include human touch perception, haptic-focused mechatronic design, system modeling and analysis (kinematic and dynamic), human-in-the-loop feedback control, and haptic feedback evaluation. Recommended: coursework or knowledge of Dynamics and knowledge of feedback control, mechatronics, and Matlab.

EN.530.694. Scanning Electron Microscopy 101: Fundamentals of Nanocharacterization and Nanofabrication. 3 Credits.
Over half a century after its formal birth, scanning electron microscope (SEM) has now become a routine instrument that is employed in physical and biological sciences, manufacturing engineering, archeology, forensic science, and more broader fields. SEM typically work as a superb magnifier but actually far beyond that. When a focused electron beam scans over a sample, a variety of signals arise and bring forth information about surface topography, element composition, crystallographic orientation, electronic bands, and so on, all of which can be imaged with micron to sub-nanometer resolution. Recent integration with in situ measurement tools and Focused Ion Beam system further transform SEM into a powerful platform of materials characterization and fabrication. This course is intended as a guidebook for junior scientists and engineers in all fields who have been or will be a SEM user. The basic science and practical experience covered in this course will help them understand what can be achieved from and how to make the best use of the versatile instrument.

EN.530.707. Robot System Programming. 4 Credits.
This course seeks to introduce students to open-source software tools that are available today for building complex experimental and fieldable robotic systems. The course is grouped into sections, each of which building on the previous in increasing complexity and specificity: tools and frameworks supporting robotics research, robotics-specific software frameworks, integrating complete robotic systems, and culminates with an independent project of the student's own design using small mobile robots or other robots in the lab. Students will need to provide a computer (with at least a few GB of memory and a several tens of GB of disc space) running Ubuntu (https://www.ubuntu.com or one of its variants such as Xubuntu) and ROS (http://ros.org/). Students should have an understanding of intermediate programming in C/C++ (including data structures and object-oriented programming). Familiarity with Linux programming. Familiarity with software version control systems such as Git, and linear algebra. Students should see the course homepage https://dscl.lcsr.jhu.edu/home/courses/me530707-2019 for more information and to get started with the course. Required Course Prerequisite/Corequisite: EN.530.646 and EN.601.436/663. No audit option.

EN.530.710. Optical Measurement Techniques. 3 Credits.
Optic-based techniques are being utilized as measurement and data transmission tools in a growing number of applications. The objective of this course is to introduce graduate students with limited background in optics (but with background in graduate-level mathematics) to the fundamentals of optics and their implementation. Topics covered include reflection, refraction, fluorescence, phosphorescence and diffraction of light; review of geometric optics, lenses, lens systems (microscope, telescope), mirrors, prisms; aberrations, astigmatism, coma, and methods to correct them; light as an electromagnetic wave; Fourier optics; spectral analysis of optical systems; coherent and incoherent imaging, holography, interferometry, diffraction grating; lasers, polarization, light detectors; elements of non-liner optics, birefringence; optical fibers, data transmission, and networking.

EN.530.712. Computational Solid Mechanics. 3 Credits.
This course teaches in-depth and hands-on understanding of numerical methods for solid mechanics problems. The course begins with a review of the fundamental concepts of the finite element method for linear boundary value problems (BVP) and initial boundary value problems (IBVP) in solid mechanics. Then more advance methods for nonlinear BVPs are presented and applied to problems of material inelasticity and finite elasticity. Topics covered include the strong and weak statements of the BVP, weighted residual methods, time integration, Newton-type methods for nonlinear problems, and error estimation and convergence. EN.530.606 Mechanics of Solids and Materials II or equivalent AND EN.530.761 Mathematical Methods for Engineers or equivalent or permission of instructor.

EN.530.715. Mesoscale Simulations of Defects in Metals. 3 Credits.
This course focuses on coarse grained simulations of defects and plasticity in crystalline materials. Topics of interest include modeling dislocation plasticity, diffusion of point defects, grain and twin boundaries, precipitates, etc under different loading and boundary conditions.
Either EN.530.605, EN.510.604, or waiver from the instructor. Student must also have background in programing using MATLAB, C, C++, FORTRAN or an equivalent coding language.

EN.530.717. Machine Learning for Solid Mechanics and Materials Engineering. 3 Credits.
Machine learning (ML) and principles of informatics are playing an increasing role in many aspects of solid mechanics and materials engineering. ML techniques enable the extraction of relationships from a large amount of seemingly uncorrelated data and can expedite the process of predicting deformation in solids and the discovery/design of materials. This course provides an introductory overview for graduate students on ML and principles of informatics as well as provide a survey of applications of ML in solid mechanics and materials engineering.

EN.530.721. Medical Robotics System Design. 3 Credits.
The evolution of medical robotics is a new and exciting development. Medical robotics brings together many disparate areas of research such as development and modeling of robotic systems, design, control, safety in medical robotics, regulatory and ethics, haptics (sense of touch), ergonomics, and last but not the least, medicine. The primary goal of this course is to acquaint the students with the fundamentals of robot design, development, and control and different areas of research that lead to the development of medical robotic systems. We will also cover additional topics specific to medical robotics such as medical image guidance. The course will include a project, where students will learn to design, develop, build, and control a medical robot.
EN.530.646

EN.530.726. Hydrodynamic Stability. 3 Credits.
Hydrodynamic linear stability theory is developed and applied to a variety of flow problems using analytical techniques and numerical methods. Necessary and sufficient conditions for flow stability are derived. Canonical examples are used to introduce various concepts including, e.g. temporal and spatial analyses, asymptotic and transient flow response, convective and absolute instability, global methods, and direct stability analysis.

EN.530.732. Fracture Of Materials. 3 Credits.
An advanced examination of fracture mechanisms in ductile and brittle materials. Both the mechanics and the materials aspects are covered with importance placed on the synthesis of the two approaches. Topics include linear elastic fracture mechanics, ductile fracture, the J-integral, atomistic aspects of fracture in polycrystalline materials, fracture in ceramics and polymers, influence of the material microstructure on fracture toughness and ductility in FCC and BCC materials.

EN.530.738. Micromechanics of Heterogeneous and Granular Materials. 3 Credits.
This graduate-level course provides an introduction to the mechanical behavior of heterogeneous and granular materials from a microscopic point of view. The goal of the course is to provide a foundation for graduate students interested in performing research related to the micromechanics of heterogeneous materials and granular materials. The course employs the principles of continuum mechanics and discusses topics including inclusion and defect theory for materials (e.g., Eshelby's inclusion and inhomogeneity problems, strain fields around cracks and voids) and homogenized properties (e.g., average stresses and strains, homogenization and interaction assumptions, bounds on moduli) for heterogeneous materials with defects and voids. The course also applies the principles of continuum mechanics to homogenization of microscale behavior in granular materials (forces and packing structure) for the calculation of macroscale fields (stresses and strains). The course involves the solution of boundary value problems as well as reading and discussion of recent papers in the field.

EN.530.748. Stress Waves, Impacts and Shockwaves. 3 Credits.
Elastic waves in unbounded media. Elastic waveguides. Waves in elastic-plastic and nonlinear elastic materials. Analysis of impact on materials and structures. Impact on various scales, from planetary to microscopic. Shock waves. Impact signatures in materials (time permitting).

EN.530.761. Mathematical Methods of Engineering I. 3 Credits.
This course is a fast-paced overview of some fundamental topics in applied mathematics including: linear algebra and matrix theory, ordinary differential equations, Laplace and Fourier transforms, as well as an introduction to partial differential equations.

EN.530.766. Numerical Methods. 3 Credits.
Comprehensive introduction to the finite-difference method and associated numerical techniques for solving partial differential equations (PDEs) encountered in Engineering and Physics. Homework assignments and Project require substantial computer programming.

EN.530.767. Computational Fluid Dynamics. 3 Credits.
Advanced introduction to finite-difference and finite-volume approaches to modeling incompressible flows. Computer project requiring programming.

EN.530.777. Multiphase Flow. 3 Credits.
An introduction to basic contemporary ideas concerning gas, liquid, and solid-fluid two-phase flows.

EN.530.800. Independent Study. 3 - 20 Credits.
Graduate students pursue research problems with a faculty supervisor. Although the research is under the direct supervision of a faculty member, students are encouraged to pursue the research as independently as possible.

EN.530.801. PhD Graduate Research. 3 - 20 Credits.

EN.530.803. Mechanical Engineering Seminar. 1 Credit.
Open to Mechanical Engineering PhD students in the first three years.

EN.530.807. Graduate Research Seminar in Fluid Mechanics. 1 Credit.

EN.530.809. Mechanics of Materials and Structures Graduate Seminar. 1 Credit.
Cross-listed with Mechanical Engineering.

EN.530.820. MSE All-Course - Graduate Research. 3 - 10 Credits.
This course will provide a Mechanical Engineering graduate-level research experience to those pursuing an "all-course" master's degree, which will help a student engage in research on a specific topic and/or in specific research group under faculty supervision. Prior to course registration, students will submit a research proposal for approval by the research supervisor and the student's faculty advisor. In case the faculty advisor is the same as the research supervisor, the proposal should be submitted to the ME Director of Graduate Studies for approval. The research will be the equivalent of at least three credits, or approximately 120 hours of work in a typical semester.

EN.530.821. Master's Essay - Research and Writing. 3 - 10 Credits.
This course will be taken by Mechanical Engineering students when doing research and/or writing for the Master's Essay.

EN.530.822. Master's Essay - Co-Op. 3 - 10 Credits.
This course will be taken by Mechanical Engineering students when working in a cooperative environment for writing the Master's Essay. Note that "essay" is the official term for a thesis at Johns Hopkins University.

EN.530.897. Graduate Research - Summer. 3 - 20 Credits.

EN.535 Mechanical Engineering Courses

EN.535.603. Applied Optimal Control. 3 Credits.
The course focuses on the optimal control of dynamical systems subject to constraints and uncertainty by studying analytical and computational methods leading to practical algorithms. Topics include calculus of variations, nonlinear local optimization, global stochastic search, dynamic programming, linear quadratic (gaussian) control, numerical trajectory optimization, model-predictive control. Advanced topics include approximate dynamic programming and optimal control on manifolds. The methods and algorithms will be illustrated through implementation of various simulated examples. Recommended Course Background: Linear Algebra and Differential Equations; experience with control systems; programming in MATLAB and/or Python.

EN.535.606. Advanced Strength Of Materials. 3 Credits.
This course reviews stress and strain in three dimensions, elastic and inelastic material behavior, and energy methods. It also covers use of the strength of materials approach to solving advanced problems of torsion and bending of beams. Prerequisite(s): Fundamental understanding of stress and strain and axial, torsion, and bending effects in linear elastic solids.

EN.535.607. Mechanics of Solids and Structures: Theory and Applications I. 3 Credits.
This course provides an introduction to the mathematical and theoretical foundations of the mechanics of solids and structures. We will begin with the mathematical preliminaries used in continuum mechanics: vector and tensor calculus, then introduce 3D kinematics and strain measures, descriptions of stress in a 3D body, equilibrium, and constitutive rules. These concepts will be applied to develop the constitutive equations for solids, methods for solving boundary values problems that occur in engineering structures, energy methods and foundations of large deformation.

EN.535.608. Hypersonic Technologies and Systems. 3 Credits.
“Hypersonics” is a general term used to describe flight at speeds greater than Mach 5 (or five times the sound speed). The technologies associated with hypersonic flight have been investigated for many decades and applications of hypersonic systems currently include ballistic missiles, re-entry vehicles, launch vehicles, and interceptor missiles. There is currently a resurgence in interest in new hypersonic applications for weapon applications, reusable aircraft, and reusable space launchers. With a view towards the history of hypersonics and developing worldwide trends, this course provides a survey of hypersonic technologies, systems and applications while addressing the underlying fundamental physics, analysis approaches, and design methodologies.

EN.535.609. Topics in Data Analysis. 3 Credits.
This course will provide a survey of standard techniques for the extraction of information from data generated experimentally and computationally. The approach will emphasize the theoretical foundation for each topic followed by applications of each technique to sample experimental data. The student will be provided with implementations to gain experience with each tool to allow the student to then quickly adapt to other implementations found in common data analysis packages. Topics include uncertainty analysis, data fitting, feed-forward neural networks, probability density functions, correlation functions, Fourier analysis and FFT procedures, spectral analysis, digital filtering, and Hilbert transforms. Prerequisite(s): Projects will require some programming experience or familiarity with tools such as MATLAB.

EN.535.610. Computational Methods of Analysis. 3 Credits.
This course will provide an introduction to computational methods of analysis, with the aim of preparing the student to take a real-world problem and break it down to its component parts, perform computational analysis, and report findings in a comprehensive and informative manner. This course introduces the student to several application areas, and the corresponding computational tools, assumptions, and limitations. Throughout the course, the student will solve problems computationally in a hands-on manner, with a particular emphasis on tradeoffs between complexity, cost, and utility.

EN.535.612. Intermediate Dynamics. 3 Credits.
This course develops student’s ability to accurately model the dynamics of single and multi-body engineering systems undergoing motion in 3D space. The course begins with formulating the differential geometry and kinematics of curvilinear coordinates to permit kinematic descriptions of relative motion and rotation of rigid bodies and mechanisms subject to common engineering constraints such as substructure interconnections, dry friction, and rolling. Momentum and inertia properties of rigid body dynamics follow. Students are then introduced to analytical dynamics, where Lagrange’s equations and Kane’s method are derived and studied to facilitate efficient formulation of the equations of motion governing the dynamics of systems subject to conservative and non-conservative forces and engineering constraints. The course also concludes with gyroscopic dynamics with applications to inertial guidance and spacecraft attitude dynamics. Prerequisite(s): Mathematics through calculus and linear algebra.

EN.535.613. Structural Dynamics and Stability. 3 Credits.
This course introduces the propagation of elastic waves, and the loss of stability in engineering structures and systems. In the first part of the course, fundamental physical principles of elasticity and wave mechanics are reviewed and developed to provide students with the capability to model and analyze wave propagation, reflection, and refraction in isotropic and anisotropic engineering structures such as rods, beams, and plates. In the second part of the course, mechanical stability models are studied and applied in terms of dynamic behavior where the combined effects of vibration, gyroscopic motion, impact/shock, and buckling lead to new structural configurations or unstable motions that must often be avoided in design. Applications span nondestructive evaluation, composites, cables, aircraft/space structures, rotordynamics, aeroelasticity, civil engineering structures, and others. Prerequisite(s): Undergraduate or graduate course in vibrations.

EN.535.614. Fundamentals of Acoustics. 3 Credits.
This course introduces the physical principles of acoustics and their application. Fundamental topics include the generation, transmission, and reception of acoustic waves. Applications covered are selected from acoustic arrays, underwater acoustics, architectural acoustics, and biomedical acoustics. Prerequisite(s): Some familiarity with linear algebra, complex variables, and differential equations.

EN.535.618. Fabricatology - Advanced Materials Processing. 3 Credits.
The “Fabricatology” is a course that students can learn how to make desired shapes, structures, and surfaces across various length scales. It will introduce rich scientific and engineering knowledge related to fabrication at multiple length scales and the generated materials and mechanical systems can be utilized for studying diverse topics including energy harvesting, metamaterials, wetting, and information storage. From this course, students can learn principles and technologies to control shapes at various length scales and processes to control internal structures or surface properties for desired properties/functions. They will be also introduced to exciting recent developments in the field such as 3D printing so that they can have a comprehensive knowledge about the subject.

EN.535.620. Fluid Dynamics I. 3 Credits.
This first graduate course in fluid dynamics starts from derivation of the flow equations and examines a number of limiting behaviors. When viscous effects are ignored all together, we obtain the familiar limit of potential flow. Boundary layer theory is introduced to examine the effect of viscosity near surfaces. And in the limit where viscosity is dominant, we obtain what is known as “creeping flow” where inertia can be ignored all together. Our approach will rely on developing the theory and considering classical examples in order to advance our understanding of fluid motion in each of these areas.

EN.535.621. Intermediate Fluid Dynamics. 3 Credits.
This course prepares the student to solve practical engineering flow problems and concentrates on the kinematics and dynamics of viscous fluid flows. Topics include the control volume and differential formulations of the conservation laws, including the Navier-Stokes equations. Students examine vorticity and circulation, dynamic similarity, and laminar and turbulent flows. The student is exposed to analytical techniques and experimental methods, and the course includes an introduction to computational methods in fluid dynamics. It also includes a programming project to develop a numerical solution to a practical fluid flow problem. Prerequisite(s): An undergraduate fluid mechanics course.

EN.535.622. Robot Motion Planning. 3 Credits.
This course investigates the motion planning problem in robotics. Topics include motion of rigid objects by the configurations space and retraction approaches, shortest path motion, motion of linked robot arms, compliant motion, coordinated motion of several objects, robust motion with error detection and recovery, and motion in an unknown environment

EN.535.623. Intermediate Vibrations. 3 Credits.
Course topics include transient and forced vibration of 1- and N-degree-of-freedom systems and an introduction to vibration of continuous systems. Hamilton’s Principle and Lagrange’s equations are used throughout the course to derive the equation(s) of motion. MATLAB is introduced and used to solve the equations of motion and plot the response of the system. This course also addresses common topics in applied vibrations such as the environmental testing, the shock response spectrum, random vibration, vibration isolation, and the design of tuned-mass damper systems. Prerequisite(s): An undergraduate vibrations course.

EN.535.625. Turbulence. 3 Credits.
Fundamental equations of fluid mechanics, Reynolds averaging, and the closure problem. Scaling and self-preservation in boundary-free and wall-bounded shear flows. Isotropic turbulence and spectral theories. Vorticity dynamics, intermittency, and cascade models. Turbulence modeling: one- and two-equation models, Reynolds stress modeling, and large-eddy simulations.

EN.535.627. Computer-Aided Design. 3 Credits.
This course provides a wide-ranging exploration of computer-aided design (CAD) using Creo Parametric (a PTC CAD software, previously called Pro/ENGINEER). Topics include sketching, solid modeling, assembly modeling, detail drafting, geometric dimensioning and tolerancing, advanced modeling, sheet metal modeling, mechanism dynamics, and structural/thermal finite element analysis (FEA).

EN.535.628. Computer-Integrated Design and Manufacturing. 3 Credits.
This course emphasizes the computer automation of design and manufacturing systems. A survey of the automation techniques used for integration in modern design and manufacturing facilities is presented. Discussions are presented related to the system integration of computer-aided design (CAD), computeraided engineering (CAE), computer-aided manufacturing (CAM), robotics, material resource planning, tool management, information management, process control, and quality control. The current capabilities, applications, limitations, trends, and economic considerations are stressed.

EN.535.629. Energy Engineering. 3 Credits.
The course will focus on an analytical system performance technique known as Availability or Exergy Analysis, which is based on the second law of thermodynamics. The course focuses on traditional power and refrigeration systems. However, nontraditional power generation systems will be considered by way of a special project of each student’s choice. It will include an engineering description of the state of the art of the selected topic (e.g., wind or solar power, fuel cell, etc.), and a second law performance analysis of a prototype system will be presented to the class. In addition to the power system topics, the availability analysis will be applied to the combustion and psychrometric processes.

EN.535.630. Kinematics & Dynamics of Robots. 3 Credits.
This course introduces the basic concepts and tools used to analyze the kinematics and dynamics of robot manipulators. Topics include kinematic representations and transformations, positional and differential kinematics, singularity and workspace analysis, inverse and forward dynamics techniques, and trajectory planning and control. Prerequisite(s): The course project and assignments will require some programming experience or familiarity with tools such as MATLAB.

EN.535.631. Intro Finite Element Methods. 3 Credits.
Topics covered by this course include theory and implementation of finite element models for typical linear problems in continuum mechanics including fluid flow, heat transfer, and solid mechanics. Emphasis will be placed on developing a fundamental understanding of the method and its application. Course Note(s): Cannot be counted with 560.730 Finite Element Methods from the full-time Civil Engineering Department.

EN.535.632. Applied Finite Elements. 3 Credits.
This Applied Finite Elements course provides a wide-ranging exploration of the practical applications of finite element analysis (FEA) using both Creo Simulate and Ansys. Creo Simulate's integration with the Creo Parametric, a computer-aided design (CAD) tool, affords a number of advantages, most notably a remarkable efficiency in performing analyses and the possibility for Simulate to seamlessly manipulate the CAD model in performing design optimizations. Within Simulate, students will learn to perform linear structural static analyses of parts and assemblies. Students will also learn to represent preloaded bolts, create both solid and thin shell meshes, and improve the reliability of FEA results through convergence studies. Within Ansys, and industry standard FEA program, students will revisit the most common types of analyses, making some comparisons back to the results from Creo Simulate. Next, students will then learn to partition CAD geometry into mesh-able volumes then construct high quality hexahedral meshes. Finally, students perform a broad array of other simulation types that include transient structural, nonlinear materials, explicit dynamics, and computational fluid dynamics. Opportunities exist throughout the course to individually apply the techniques covered in ways applicable to students' personal interests, career, or career ambitions.

EN.535.633. Intermediate Heat Transfer. 3 Credits.
This course covers the following topics: transient heat conduction, forced and free convection in external and internal flows, and radiation processes and properties. Prerequisite(s): An undergraduate heat transfer course.

EN.535.634. Applied Heat Transfer. 3 Credits.
This course focuses on the inevitable tradeoffs associated with any thermodynamic or heat transfer system, which result in a clear distinction between workable and optimal systems. The point is illustrated by means of a number of concrete problems arising in power and refrigeration systems, electronics cooling, distillations columns, heat exchange, and co-generation systems. Prerequisite(s): An undergraduate heat transfer course.

EN.535.635. Introduction to Mechatronics. 3 Credits.
Mechatronics is the integration of mechanisms, electronics, and control. This interdisciplinary course is primarily lab and project based, but also includes lectures to provide background in key underlying principles. The course's main objective is to provide experience designing and prototyping a mechatronic or robotic system to accomplish a specific task or challenge. Topics include mechanism design, motor and sensor integration and theory, programming of microprocessors, mechanics prototyping, and the design process. Students will work in teams to complete a hardware-based final project. Prerequisite(s): Mathematics through calculus and linear algebra.

EN.535.638. Mechanical Packaging for Electronics Systems. 3 Credits.
This course will provide students with a fundamental understanding of the principles and techniques used to design and analyze the mechanical packaging of electronics systems. Lectures will include discussions on practical approaches to the design of enclosures, including manufacturability and assembly as well as analytical approaches to thermal and structural concerns. Upon completion of this course, students will have a clear understanding of the engineering considerations and tradeoffs used in developing rugged mechanical designs for electronics systems to be used in many environments.

EN.535.641. Mathematical Methods For Engineers. 3 Credits.
This course covers a broad spectrum of mathematical techniques needed to solve advanced problems in engineering. Topics include linear algebra, the Laplace transform, ordinary differential equations, special functions, partial differential equations, and complex variables. Application of these topics to the solutions of physics and engineering problems is stressed. Prerequisite(s): Vector analysis and ordinary differential equations.

EN.535.642. Control Systems for Mechanical Engineering Applications. 3 Credits.
This class provides a comprehensive introduction to the theory and application of classical control techniques for the design and analysis of continuous-time control systems for mechanical engineering applications. Topics include development of dynamic models for mechanical, electrical, fluid-flow and process-control systems, introduction to Laplace transforms, stability analysis, time and frequency domain analysis techniques, and classical design methods. The class will use a series of applications that build in complexity throughout the semester to emphasize and reinforce the material.

EN.535.643. Plasticity. 3 Credits.
The theory of the inelastic behavior of metallic materials. Experimental background and fundamental postulates for the plastic stress-strain relations. Mechanisms of plastic flow; single-crystal and polycrystalline plasticity. Boundary value problems. Variational principles, uniqueness and the upper and lower bound theorems of limit analysis. Slip line theory. Dynamic plasticity and wave phenomena. Finite strain plasticity and instability.

EN.535.645. Digital Control and Systems Applications. 3 Credits.
This class will provide a comprehensive treatment of the analysis and design of discrete-time control systems. The course will build upon the student's knowledge of classical control theory and extend that knowledge to the discretetime domain. This course is highly relevant to aspiring control systems and robotics engineers since most control system designs are implemented in micro-processors(hence the discrete-time domain) vice analog circuitry. Additionally, the course will go into advanced control system designs in the state-space domain and will include discussions of modern control design techniques including linear-quadratic optimal control design, pole-placement design, and state-space observer design. The class will use a series of applications that build in complexity throughout the semester to emphasize and reinforce the material.
EN.535.642 Control Systems for Mechanical Engineering Applications.

EN.535.650. Combustion. 3 Credits.
This is a multidisciplinary course involving applications of thermodynamics, fluid mechanics, heat transfer, and chemistry. Course contents include a review of chemical thermodynamics, chemical kinetics, transport theory, and conservation equations; laminar flow in premixed and non-premixed gases; combustion waves; ignition; combustion aerodynamics; multiphase combustion; and turbulent combustion. Selected applications are discussed including gas turbines, spark ignition and diesel engines, jet engines, industrial furnaces, pollutant formation, and control in combustion. Prerequisite(s): Undergraduate-level exposure to thermodynamics, fluid dynamics, differential equations, and basic chemistry.

EN.535.652. Thermal Systems Design and Analysis. 3 Credits.
Thermodynamics, fluid mechanics, and heat transfer principles are applied using a systems perspective to enable students to analyze and understand how interactions between components of piping, power, refrigeration, and thermal management systems affect the performance of the entire system. Following an overview of the fundamental principles involved in thermal and systems analyses, the course will cover mathematical methods needed to analyze the systems and will then explore optimization approaches that can be used to improve designs and operations of the thermal systems to minimize, for example, energy consumption or operating costs. Prerequisite(s): Undergraduate courses in thermodynamics and heat transfer.

EN.535.654. Theory/Appl Struct Anlys. 3 Credits.
This is a course in classical plate and shell structures with an emphasis on both analysis and application. Both differential and energy method approaches are presented. Topics include an introduction to thin plate theory, its application to circular and rectangular plates, buckling, and thermal effects. Classical thin shell theory is also presented. Applications to common plate and shell structures are discussed throughout.

EN.535.659. Manufacturing Systems Analysis. 3 Credits.
This course is a review of the fundamentals of modern manufacturing processes, computer-aided design/ manufacturing tools, flexible manufacturing systems, and robots. The course addresses relationships between process machinery, process conditions, and material properties. Examples of how components are manufactured within hightech industries are presented.

EN.535.660. Precision Mechanical Design. 3 Credits.
This course will provide the student with a fundamental understanding of the principles and techniques used to design precision machines, instruments, and mechanisms. Lectures will include discussions on the implementation and design of mechanisms, bearings, actuators, sensors, structures, and precision mounts used in precision design. Upon completion of this course, students will have a clear understanding of positional repeatability and accuracy, deterministic design, exact constraint design, error modeling, and sources of machine and instrumentation errors.

EN.535.661. Biofluid Mechanics. 3 Credits.
Introduction to fundamental fluid mechanics of physiological systems including the blood flow in the cardiovascular system and the air flow in the laryngeal and respiratory systems. Basic physiology of those systems will be introduced. Fundamental principles and mathematical/physical models for the air and blood flows in the physiological systems and their practical applications will be discussed. Simple computer models with MATLAB will be used in the course.

EN.535.662. Energy and Environment. 3 Credits.
The course focuses on the impacts of energy consumption and generation on the environment. Second law thermodynamic analysis will be used to help understand the quality of different energy sources and to assess whether they are being used to their fullest abilities. Given the attention given to climate change, greenhouse gas emissions from the energy sector will be evaluated. Life Cycle Assessment will be introduced to help understand broader environmental impacts from the acquisition of raw materials to the disposal of devices and equipment. The course will examine the key places where energy is used in the economy (buildings, industry, transportation) then transition to key sources of energy and issues in generation of energy (utilities, nuclear energy, alternative energy, energy storage, water-energy nexus).

EN.535.663. Biosolid Mechanics. 3 Credits.
This class will introduce fundamental concepts of statics and solid mechanics and apply them to study the mechanical behavior bones, blood vessels, and connective tissues such as tendon and skin. Topics to be covered include the structure and mechanical properties of tissues, such as bone, tendon, cartilage and cell cytoskeleton; concepts of small and large deformation; stress; constitutive relationships that relate the two, including elasticity, anisotropy, and viscoelasticity; and experimental methods for measuring mechanical properties.

EN.535.667. Biomechanics of Human Movement. 3 Credits.
This course explores the methods and underlying principles for the modeling and analysis of human motion. The course begins with the fundamentals of human motion from walking through running. Next, the biology and stimuli needed to produce motion through the coordinated action of musculoskeletal system will be covered. Typical methods used to quantify the kinematics and kinetics of motion will be taught along with optimization techniques needed for analysis. Finally, the simulation of muscle driven locomotion will be taught for walking and running, as well as some discussion of the role of assistive devices.

EN.535.670. Advanced Aerodynamics. 3 Credits.
This course provides the basic aerodynamic concepts and tools for aerospace vehicle design and analysis, focusing on physical-based approaches with some introduction to numerical-based methods, where experimental wind tunnel or flight test data are considered as the benchmark results. The physical-based part will emphasize inviscid-incompressible flow followed by inviscid-compressible flow and introducing some basic elements of viscous flow plus a brief introduction to computational fluid dynamics (CFD), as the numerical-based methods.

EN.535.672. Advanced Manufacturing Systems. 3 Credits.
This course examines the effect that new technology, engineering, and business strategies have on transforming US industry into a world-class, competitive force. Emphasis is placed on the state of the art of factory automation and computer-integrated manufacturing. Topics include advanced manufacturing processes, rapid prototyping, intelligent manufacturing controls, and information technology in manufacturing. Technical principles related to advanced manufacturing are presented. Examples of actual production systems illustrate how industry is adopting the latest technology to meet customer requirements for quality, low cost, and flexibility.

EN.535.673. Mechanized Assembly: Hardware and Algorithms. 3 Credits.
Generally speaking, manufacturing engineering consists of two large subtopics: fabrication and assembly. This course covers topics in the design and analysis of mechanized assembly systems such as those used in parts feeding and pick-andplace machines. Specific topics will include: Describing Planar and Spatial Rotations, Planar Linkages (4-Bar, Crank-sliders), Classical Theory of Gears, Differential Geometry Methods, Singularities of Mechanisms and Robots, Spatial Linkage Synthesis and Screw Theory, Transmissions and Spatial Gearing, Automated Parts Transfer (Fences and Bowl Feeders), Assembly Planning, Tolerancing, Parts Entropy, Deployable Mechanism Design.

EN.535.675. Thermal Sciences for the Built Environment. 3 Credits.
This course will explore the energy transfer in building applications through study of fundamental heat and mass transfer, principles of vapor compression systems, and simulation of energy flows using publicly available software. Buildings account for 40% of energy consumption in the United States, so application of the principles of mechanical engineering can greatly lessen the environmental impact of the built environment while providing the comfort expected from occupants. This course will study the interplay between energy and issues such as comfort, durability, and indoor air quality.

EN.535.684. Modern Polymeric Materials. 3 Credits.
This course will cover a broad range of topics in the polymeric materials science and engineering field. We will address the structure and property relationships in thermoplastics, thermoset, amorphous, semicrystalline, oriented and biological polymeric materials; synthesis and processing (including rheology) of polymers; flow and fracture of polymeric materials under different conditions. Modern polymer characterization techniques will be introduced. Frontiers in the recent findings in biopolymers, polymer based 3D printing, polymers for tissue engineering will also be discussed.

EN.535.691. Haptic Interface Design. 3 Credits.
This course provides an introduction to haptic interface design and analysis for human-robot interaction involving virtual environments, augmented reality, and teleoperation. Topics include human touch perception, haptic-focused mechatronic design, system modeling and analysis (kinematic and dynamic), human-in-the-loop feedback control, and haptic feedback evaluation. Recommended: coursework or knowledge of Dynamics and knowledge of feedback control, mechatronics, and Matlab.

EN.535.706. Mechanics of Solids and Structures: Theory and Applications II. 3 Credits.
This course provides an overview of the area of the mechanics of solids and materials, with the intent of providing the foundation for graduate students interested in research that involves these disciplines. The course is based on the principles of continuum mechanics, and covers the fundamental concepts of elasticity, plasticity, and fracture as applied to materials. One objective is to get graduate students to the point that they can understand significant fractions of research seminars and papers in this area. This mathematically rigorous course emphasizes the setup and solution of boundary value problems in mechanics, and attempts to integrate the primary behaviors with deformation and failure mechanisms in materials. This course does not require Mechanics of Solids and Structures: Theory and Applications I as a prerequisite. It is recommended that students taking this course have taken a prior course in Mechanics of Materials, preferably at the upper-level undergraduate level.

EN.535.711. Symmetries of Crystalline Solids. 3 Credits.
This course covers the mathematical techniques necessary for understanding of symmetry of the solid state topics such as lattices, crystals structure and X-ray diffraction experiment. The class uses examples from crystalline solids and crystallography to introduce mathematical concepts and related problem solving skills. Topics include linear algebra and eigenvalues and eigenvectors, tensor operations, symmetry operations, introduction to Fourier analysis, group theory, and crystallographic groups.

EN.535.712. Applied Fluid Dynamics. 3 Credits.
This course will provide a survey of topics in applied fluid dynamics for the practicing engineer. The first topic will concentrate on pipe and duct flow, looking at friction factors, abrupt changes in area, and pipe systems. This is followed by unsteady flows focusing on pressure transients, such as the water hammer. A section on lubrication theory covering wedge and journal bearings is presented. Open channel flows are discussed with emphasis on optimum cross-sectional shape and specific energy. Turbomachinery such as axial and centrifugal pumps, including specific speed and suction limitations, is described. Fluid dynamic drag and lift from streamlined surfaces are presented, including topics such as vortex shedding, terminal velocity, and cavitation. The approach will emphasize the practical foundation needed to solve real-world problems.
EN.535.621 Intermediate Fluid Dynamics. Projects will require some programming experience or familiarity with tools such as MATLAB.

EN.535.720. Analysis and Design of Composite Structures. 3 Credits.
Topics in this course include anisotropic elasticity, laminate analysis, strength of laminates, failure theories, bending, buckling, and vibration of composite plates. The second part of the course is devoted to the applications of the structural analysis of composite structures by means of finite-elements computer codes.

EN.535.724. Dynamics of Robots and Spacecraft. 3 Credits.
This course provides an introduction to Lagrangian mechanics with application to robot and spacecraft dynamics and control. Topics include rigid body kinematics, efficient formulation of equations of motion by using Lagrange's equations, solutions of equations of motion, Hamilton's principle, and introduction to stability and control theory.

EN.535.726. Robot Control. 3 Credits.
This course focuses on the theory and methods used for the control of robotic manipulators. Topics include review of basic systems theory, robot position control, model-based trajectory tracking, and force control. Stability properties for each control strategy will be analyzed. Practical implementation issues will also be addressed. Students will simulate different control methods using MATLAB.
EN.535.630 Kinematics and Dynamics of Robots, ordinary differential equations, linear algebra.

EN.535.727. Advanced Machine Design. 3 Credits.
This course provides a broad treatment of stress, strain, and strength with reference to engineering design and analysis. Major emphasis is placed on the analytical and experimental methods of determination of stresses in relationship to the strength properties of machine elements under various loading conditions. Also considered are deflection, post-yield behavior, residual stresses, thermal stresses, creep, and extreme temperature effects as applied to the design of fasteners, shafts, power trains, and rotational machinery.

EN.535.731. Engineering Materials: Properties and Selection. 3 Credits.
Become familiar with different classes of engineering materials and their tradeoffs associated with design criteria such as strength, toughness, corrosion resistance, and fabricability, as well as some common test methods for evaluating material properties. This course will concentrate on metal alloys but will also consider polymers and ceramics. Topics specific to metals will include effects of work hardening and heat treatment, corrosion, and elevated temperature properties. Topics specific to polymers will include viscoelasticity, stress relaxation and creep, and phase transitions. Topics specific to ceramics will include flaw-dominated strength, fracture energy, and statistical determination of strength. The course also includes an introduction to the Ashby method of material selection and optimization.

EN.535.732. Fatigue and Fracture of Materials. 3 Credits.
This course will introduce the theory and application of fracture mechanics. The perspectives of multiple disciplines including mechanics, materials, manufacturing, statistics, and nondestructive evaluation will be integrated to develop a holistic view of design and sustainment of fatigue-limited structures. The course will provide a solid foundation of classic approaches to solving fatigue and fracture problems while simultaneously discussing the underlying physical mechanisms that drive material behavior. These methods will be applied during the latter part of the course in a group project where you work with a team on a simulated failure investigation. You will use your knowledge of fracture mechanics and emerging software tools to develop a safety risk assessment for a simulated aviation mishap. Prerequisites: Undergraduate or introductory courses in materials and mechanics and the ability to write code in MATLAB or another language is highly recommended.

EN.535.734. High temperature Materials. 3 Credits.
This is a treatise course on high temperature materials. The primary objective of this course is to provide an introduction to processing, characterization, and properties of various types of materials suitable for extreme environment applications including alloys, ceramics, composites, and carbons. The course will discuss both established high temperature materials and recent advances in high temperature materials development. Other topics to be covered include thermodynamics and kinetics in materials chemistry and structure-property relations.

EN.535.735. Computational Fluid Dynamics. 3 Credits.
This is a three-branch course covering theory, implementation, and application of computational fluid dynamics (CFD). The theory side covers the basics of CFD, finite volume discretization schemes, time integration, solution of systems of equations, boundary conditions, error analysis and turbulence models. On the implementation side students will implement a number of small-scale CFD solvers and pre-processing tools in order to get a working knowledge of the simulation process. The application side covers the use of a fully featured, readily available CFD solver to study an array of gradually complex flow phenomena.

EN.535.736. Computationl Fluid Mech. 3 Credits.
This course explores engineering applications of computational fluid dynamics with background information on the most common numerical methods: two-dimensional inviscid and viscous flows, boundary layer flows, and an introduction to three-dimensional flows. Applications are illustrated utilizing commercially available codes.
EN.535.621 Intermediate Fluid Dynamics and EN.535.641 Mathematical Methods for Engineers. Some programming experience is also assumed.

EN.535.737. Multiscale Modeling and Simulation of Mechanical Systems. 3 Credits.
The successful design of complex engineering systems requires understanding physical processes that bridge multiple length and time scales. This course will introduce students to the fascinating field of multiscale modeling and provide a foundation for understanding systems/devices at a molecular, microscopic, and macroscopic levels. Through a combination of lectures, case studies and hands-on applications, students will learn (1) the principles that govern engineering systems at various length/time scales, and (2) how to develop, use, and hybridize multiscale simulation tools.

EN.535.741. Optimal Control and Reinforcement Learning. 3 Credits.
This course will explore advanced topics in nonlinear systems and optimal control theory, culminating with a foundational understanding of the mathematical principals behind Reinforcement learning techniques popularized in the current literature of artificial intelligence, machine learning, and the design of intelligent agents like Alpha Go and Alpha Star. Students will first learn how to simulate and analyze deterministic and stochastic nonlinear systems using well-known simulation techniques like Simulink and standalone C++ Monte-Carlo methods. Students will then be introduced to the foundations of optimization and optimal control theory for both continuous- and discrete- time systems. Closed-form solutions and numerical techniques like co-location methods will be explored so that students have a firm grasp of how to formulate and solve deterministic optimal control problems of varying complexity. Discrete-time systems and dynamic programming methods will be used to introduce the students to the challenges of stochastic optimal control and the curse-of-dimensionality. Supervised learning and maximum likelihood estimation techniques will be used to introduce students to the basic principles of machine learning, neural-networks, and back-propagation training methods. The class will conclude with an introduction of the concept of approximation methods for stochastic optimal control, like neural dynamic programming, and concluding with a rigorous introduction to the field of reinforcement learning and Deep-Q learning techniques used to develop intelligent agents like DeepMind's Alpha Go.
EN.535.641 Mathematical Methods for Engineers.

EN.535.742. Applied Machine Learning for Mechanical Engineers. 3 Credits.
This course covers machine learning fundamentals (e.g., optimization, perceptron, and universal approximation), some popular and advanced machine learning techniques (e.g., Supervised, Unsupervised, Probabilistic, Convolutional, and Generative Networks), and supercomputing techniques (with a focus on MARCC) to address mechanical engineering-related machine learning problems. The course requires Python 3+ programming skills; a free 3-hour Python 3+ tutorial will be provided to those who need to learn Python.

EN.535.748. Stress Waves, Impacts and Shockwaves. 3 Credits.
Elastic waves in unbounded media. Elastic waveguides. Waves in elastic-plastic and nonlinear elastic materials. Analysis of impact on materials and structures. Impact on various scales, from planetary to microscopic. Shock waves. Impact signatures in materials (time permitting).

EN.535.750. Biomechanics of the cell: From nano- and micro-mechanics to cell organization and function. 3 Credits.
Mechanical aspects of the cell are introduced. Discussion of the role of proteins, membranes and cytoskeleton in cellular function and how to describe them using simple mathematical models.

EN.535.752. Advanced Flight Dynamics and Control of Aerospace Vehicles. 3 Credits.
This course is an introduction to the mathematical derivation, behavioral insight into and control of the dynamics of aerospace vehicles. The course will cover current vehicles of interest ranging from small unmanned aircraft, to hypersonic aircraft and spacecraft in earth orbit. Starting from first principles in vector math and conservation of linear and angular momentum in inertial and non-inertial (rotating) coordinate systems we will develop the fundamental equations of motion that describe the flight of these vehicles. Because understanding is best achieved through hands on experience students will develop and implement the necessary vector math, transformations, earth environment models and rigid body dynamics in MATLAB; the models you develop will directly parallel and follow the progression of the course ultimately realizing a full nonlinear 6-degree-of-freedom simulation of an aircraft that we will use to investigate and understand the nature of their dynamic motion and to discover and implement control systems to change and improve their natural dynamic response.

EN.535.766. Numerical Methods. 3 Credits.
Comprehensive introduction to the finite-difference method and associated numerical techniques for solving partial differential equations (PDEs) encountered in Engineering and Physics. Homework assignments and Project require substantial computer programming.

EN.535.773. Acoustical Oceanography. 3 Credits.

EN.535.782. Haptic Applications. 3 Credits.
An introduction to the required theoretical and practical background in the design and development of haptic applications. Haptic technology enables users to touch and/or manipulate virtual or remote objects in simulated environments or tele-operation systems. This course aims to cover the basics of haptics through lectures, assignments, and readings on current topics in haptics. Prerequisite(s): Recommended course background: graduate and senior undergraduate students who are enthusiastic to learn about haptics and basic familiarity with MATLAB.

EN.535.800. Independent Study. 3 Credits.
An individually tailored, supervised project on a subject related to mechanical engineering. The content and expectations are formalized in negotiations between the student and the faculty sponsor. This course may only be taken in the second half of a student's master degree program. All independent studies must be supervised by a current ME instructor (exceptions must be approved by the Mechanical Engineering Program Chair) and must rely on material from prior ME courses. The independent study project proposal form (see https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration.

EN.535.801. Independent Study. 3 Credits.

EN.540 (Chemical & Biomolecular Engineering)

EN.540.101. Chemical Engineering Today. 1 Credit.
A series of weekly lectures to introduce students to chemical and biomolecular engineering and its role as a profession in addressing contemporary technological, social, ethical, and economic issues in today's world. The lectures will include examples of how chemical and biomolecular engineers apply the principles of physics and chemistry to develop new products, improve process efficiencies, and alleviate the strain on the ecosystem through the design of novel environmentally conscious processes. In addition, the lectures will highlight exciting new areas now being advanced by chemical and biomolecular engineers, such as biochemical engineering, tissue engineering, nanoparticle fabrication, and processing smart polymers for applications in computer technology and as sensors. Freshmen Only.

EN.540.202. Introduction to Chemical & Biological Process Analysis. 4 Credits.
Introduction to chemical and biomolecular engineering and the fundamental principles of chemical process analysis. Formulation and solution of material and energy balances on chemical processes. Reductionist approaches to the solution of complex, multi-unit processes will be emphasized. Introduction to the basic concepts of thermodynamics as well as chemical and biochemical reactions.
(AS.030.101 OR AS.030.103) AND (AS.171.101 OR AS.171.107) AND (AS.030.102 OR AS.030.103 OR AS.110.109 OR AS.171.102)

EN.540.203. Engineering Thermodynamics. 3 Credits.
Formulation and solution of material, energy, and entropy balances with an emphasis on open systems. A systematic problem-solving approach is developed for chemical and biomolecular process-related systems. Extensive use is made of classical thermodynamic relationships and constitutive equations for one and two component systems. Applications include the analysis and design of engines, refrigerators, heat pumps, compressors, and turbines.
AS.110.202;EN.540.202

EN.540.301. Kinetic Processes. 4 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates.
EN.540.203 AND EN.540.303

EN.540.303. Transport Phenomena I. 3 Credits.
Molecular mechanisms of momentum transport (viscous flow), energy transport (heat conduction),and mass transport (diffusion). Isothermal equations of change (continuity, motion, and energy). The development of the Navier Stokes equation. The development of non isothermal and multi component equations of change for heat and mass transfer. Exact solutions to steady state, isothermal unidirectional flow problems, to steady state heat and mass transfer problems. The analogies between heat, mass, and momentum transfer are emphasized throughout the course. Co-requisite: AS.110.302
AS.110.302 OR EN.553.291

EN.540.304. Transport Phenomena II. 4 Credits.
Dimensional analysis and dimensionless groups. Laminar boundary layers, introduction to turbulent flow. Definition of the friction factor. Macroscopic mass, momentum and mechanical energy balances (Bernouilli's equation). Metering of fluids. Convective heat and mass transfer. Heat and mass transfer in boundary layers. Correlations for convective heat and mass transfer. Boiling and condensation. Interphase mass transfer.
EN.540.303 AND (EN.500.113 OR EN.500.133)

EN.540.306. Chemical & Biomolecular Separation. 4 Credits.
This course covers staged and continuous-contacting separations processes critical to the chemical and biochemical industries. Separations technologies studied include distillation, liquid-liquid extraction, gas absorption, membrane ultrafiltration, reverse osmosis, dialysis, adsorption, and chromatography. Particular emphasis is placed on the biochemical uses of these processes and consequently on how the treatment of these processes differs from the more traditional approach.
EN.540.203 AND EN.540.303 AND (EN.500.113 OR EN.500.133);Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.307. Cell Biology for Engineers. 3 Credits.
This course explores fundamental structural details and molecular functions of different parts of the cell. Considerable emphasis is placed on experimental/quantitative approaches to answering these questions. Topics include Central dogma and the nucleus; protein trafficking; ion transporters; cytoskeleton; molecular motors; cell cycle and cell division; signal transduction, cell growth and cancer; cell death, the extracellular matrix; cell adhesion, cell junctions and epithelium; and muscle contraction, cell motility and morphogenesis.
Cell Biology restriction: students who have completed AS.020.306 may not enroll.;AS.020.305

EN.540.309. Product Design Part 1. 3 Credits.
This course guides the student through the steps of product design. Product design concerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill the needs. Students work in small teams to complete a major project demonstrating their understanding of and proficiency in the primary objectives of the course. Students report several times both orally and in writing on their accomplishments. This course is the first part of a two-semester sequence that optionally can be taken instead of EN.540.314 Chemical and Bimolecular Engineering Product Design. The material covered is the same as in EN.540.314, but more time is allowed so that laboratory tests can be performed and/or prototypes can be made. Note that students must take 540.310 to complete this sequence andbefore receiving credits for 540.309.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.303 AND EN.540.490;EN.540.306 AND EN.540.301

EN.540.310. Product Design Part 2. 3 Credits.
This course is the second part of a two semester sequence (with EN.540.309) that optionally can be taken instead of EN.540.314 Chemical and Biomolecular Engineering Product Design. Students continue to work with their team on their product design project. Students report several times both orally and in writing on their accomplishments. The material covered is the same as in EN.540.314, but more time is allowed so that laboratory tests can be performed and/or prototypes can be made. Note that both courses, EN.540.309 and EN.540.310 must be taken to satisfy the Undergraduate degree requirement of the Chemical and Biomolecular Engineering program. The two courses can be started in any term. Recommended Course Background: EN.540.301, EN.540.304, EN.540.311 or EN.540.313 or permission of instructor.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.309

EN.540.311. Projects in ChemE Unit Operations with Experiments. 4 Credits.
This course challenges students with laboratory projects that are not well-defined. Students work in groups to develop an effective approach to experiments. They identify the important operating variables, decide how best to obtain them using measured or calculated values. Based on their results they predict, carryout, analyze and improve experiments. Each student analyzes three of the following projects: distillation, gas absorption, and one of the projects in EN.540.313. In addition to technical objectives, this course stresses oral and written communication.In addition to technical objectives, this course stresses oral and written communication. Students will have additional meeting times with the instructors and outside of class.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.301 AND EN.540.304 AND EN.540.306 AND EN.661.315;EN.540.490 can be taken concurrently with EN.540.311

EN.540.313. Projects in ChemBE Unit Operations with Experiments. 4 Credits.
This course challenges students with laboratory projects that are not well-defined. Students work in groups to develop an effective approach to experiments. They identify the important operating variables, decide how best to obtain them using measured or calculated values. Based on their results they predict, carryout, analyze and improve experiments. Each student analyzes at least two of the following biomolecular projects: bioreactor, biocatalysis and membrane separation and one of the projects in EN.540.311. In addition to technical objectives, this course stresses oral and written communication. In addition to technical objectives, this course stresses oral and written communication. Students will have additional meeting times with the instructors and outside of class.
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.540.301 AND EN.540.304 AND EN.540.306 AND EN.661.315;EN.540.490 can be taken concurrently with EN.540.313

EN.540.314. ChemBE Product Design. 3 Credits.
This course guides the student through the steps of a project in product design. Product design concerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill the needs. It includes the design of a manufacturing process for the product and an estimation of the economic profitability of the concept. Students work in small teams to complete a major project demonstrating their understanding of and proficiency in the primary objectives of the course. Students report several times both orally and in writing on their accomplishments.
EN.540.306 AND EN.540.301;EN.540.303;EN.540.490

EN.540.315. Process Design with Aspen. 2 Credits.
The course guides the students through process design where they study the production of a chemical compound. They select a preferred process and create a flowsheet of the production process. They use Aspen simulation to evaluate the major unit operations of their process. They will carry out a hazard operations analysis on the process and perform an economic analysis when appropriate. Students work in small teams to complete their project and write a report on their work and conclusions.
EN.540.306 AND EN.540.301;EN.540.303;EN.540.490

EN.540.382. Statistical Modeling and Analysis with Python. 2 Credits.
The course introduces several statistical methods, used to analyze and extract useful information from data. Topics covered include descriptive statistics, basic probability theory, error analysis, confidence intervals, hypothesis testing, regression, design of experiments and an introduction to Bayesian Statistics. Students will also learn to perform statistical analysis of data using Python libraries.
(EN.500.113 OR EN.500.133) AND AS.110.202

EN.540.402. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genome-scale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.
AS.020.306 OR (EN.580.440 OR EN.580.441) OR EN.540.307

EN.540.403. Colloids and Nanoparticles. 3 Credits.
Fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hdrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nano- science and technology will be discussed throughout the course with frequent references to recent literature. Meets with EN.540.603

EN.540.405. Modern Data Analysis and Machine Learning for ChemBEs. 3 Credits.
This class will provide an introduction for chemical and biomolecular engineering students to modern methods of measuring and testing hypotheses using experimental or computational data. The course will cover methods of regression and data analysis such as linear and nonlinear regression, Bayesian analysis and principal or independent component analysis. The course will introduce concepts of machine learning including linear and nonlinear separation, neural networks, Gaussian processes and will provide exposure to deep learning concepts. The course will focus generally on image data and will consider topics of image processing, feature extraction and will cover for general data dimensionality reduction. Familiarity with computer programming (ideally Python), statistics and linear algebra are prerequisites.

EN.540.407. Renewable Energy Technologies. 3 Credits.
This course will discuss the recent progress of renewable energy technologies, emphasizing a perspective from chemical engineering. Engineering principles in terms of mass and energy balance, phase equilibrium, kinetics and catalysis, transport, etc. will be applied to analyze the performance of new energy conversion and storage technologies. Topics of interest include solar cells, fuel cells, batteries and biofuels.
EN.540.203 AND EN.540.303 AND EN.540.301

EN.540.409. Dynamic Modeling and Control. 4 Credits.
Introduction to modeling, dynamics, and control. Unsteady state analysis of biomolecular and chemical process control systems. State space and Laplace transform techniques, block diagram algebra, and transfer functions. Feedback and feedforward control. Frequency response and stability analysis. Applications in chemical engineering (chemical reactors and separative processes) as well as biomolecular engineering (biosynthesis, pharmacokinetic modeling and biomolecular modeling based upon central dogma/gene expression). Introduction to nonlinear dynamics.
EN.540.301 AND EN.540.306

EN.540.414. Computational Protein Structure Prediction and Design. 3 Credits.
This class will introduce the fundamental concepts in protein structure, biophysics, optimization and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, design of protein interfaces. Class will consist of lectures and hands-on computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project. Programming experience is recommended.

EN.540.415. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interfacial area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.540.418. Projects in the Design of a Chemical Car. 2 Credits.
Ready to put those concepts from class into practice? Members work over the course of the semester to design and build a chemically powered vehicle that will compete with other college teams at the American Institute of Chemical Engineers (AIChE) Regional Conference. In this course, the students work in small groups to design and construct the chassis along with chemically powered propulsion and break mechanisms within the constraints of the competition. In addition, students will give oral presentation, write reports, and do thorough safety analysis of their prototypes. Both semesters (EN.540.418 and EN.540.419) must be completed with passing grades to receive credit. This course may be repeated.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.419. Projects in the Design of a Chemical Car. 2 Credits.
Ready to put those concepts from class into practice? Members work over the course ofthe semester to design and build a chemically powered vehicle that will compete with other college teams at the American Institute of Chemical Engineers (AIChE) Regional Conference. In this course, the students work in small groups to design and construct the chassis along with chemically powered propulsion and break mechanisms within the constraints of the competition. In addition, students will give oral presentation, write reports, and do thorough safety analysis of their prototypes. Both semesters (EN.540.418 and EN.540.419) must be completed with passing grades to receive credit.

EN.540.421. Project in Design: Pharmacodynamics. 3 Credits.
This is continuation of 540.400 Project in Design: Pharmacokinetics. It is a design course in which the design projects will be to develop pharmacodynamic models of the human body that can be used to understand the physiologic effects of drugs on the body. The course (and software to be developed) will cover the spectrum of ways in which pharmaceuticals affect human physiology. The goal is to develop process models of the human body that will predict pharmaceutical effects as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.Prerequisites540.421 has a prerequisite of 540.400 Pharmacokinetics
EN.540.432

EN.540.422. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society from Nature-made proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high performance materials used in critically demanding areas, such as aviation, aerospace and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources ("green polymer chemistry") will also be covered. Lectures on functional polymers will be focused on their unique properties that are enabled by rational molecular design, controlled synthesis and processing (e.g. supramolecular assembly, and microfabrication). This class of specialty materials can find their use in high performance photovoltaics, batteries, membranes, and composites, and can also serve as "smart" materials for use in coatings, sensors, medical devices, and biomimicry.

EN.540.432. Project in Design: Pharmacokinetics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.540.440. Micro/Nanotechnology: The Science and Engineering of Small Structures. 3 Credits.
The field of micro / nanotechnology has been gaining tremendous momentum as evidenced by an explosive rise in the number of publications, patents and commercial activities. This is an introductory course intended to expose students to the field as well as real world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro and nanofabrication methods and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical and biological applications of emerging micro and nanoscale devices and materials. Co-listed with EN.540.640.Only Undergraduate Seniors and Graduate students may join the course.

EN.540.445. Junk Food Junkies. 3 Credits.
This is a course about how the food we eat affects our health. In particular, the major non-communicable illnesses all are caused by the food we eat causing metabolic dysfunction and metabolic diseases. Currently 70% of the people in the US have metabolic dysfunction and over 50% of us will die from a non-communicable metabolic disease. This course also is about how food companies addict us to eat certain foods and why these addictive foods lead to metabolic dysfunction.

EN.540.465. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered 'chemically' and 'physically/mechanically'. The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include: drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of self-assembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues and immune responses.
Students may take EN.540.465 or EN.540.665, but not both.;EN.540.303

EN.540.468. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306)) OR EN.553.291;Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.490. Introduction to Chemical Process Safety. 1 Credit.
This course covers topics in chemical process safety. Chemical process safety concerns itself with discovery, analysis, and control of risks arising from chemical processes. Starting with the definition of risk and ethical principles that apply to safety-critical situations, we will progress to several types of hazard analysis, discussion of the safety implications of construction materials, incident investigation, fire, toxicity, and the technique called Inherently Safer Design).
EN.540.203 AND EN.540.303;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.540.501. Interdepartmental Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.502. Undergraduate Independent Study. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.509. Undergraduate Internship. 1 Credit.
Intership unpaid and approved by ChemBE faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.511. ChemBE Undergraduate Research. 1 - 3 Credits.
Students do individual projects (or in collaboration with faculty and/or graduate students) in areas basic to chemical engineering. This section has weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.540.600. Chemical and Biomolecular Engineering Seminar I. 1 Credit.
Lectures are presented on current subjects relevant to chemical engineering. Attendance at 80% of departmental seminars is required to receive credit for this class.

EN.540.601. Chemical and Biomolecular Engineering Seminar II. 1 Credit.
Lectures are presented on current subjects relevant to chemical engineering. Attendance at 80% of departmental seminars is required to receive credit for this class.

EN.540.602. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genome-scale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.

EN.540.603. Colloids and Nanoparticles. 3 Credits.
Fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hdrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nano- science and technology will be discussed throughout the course with frequent references to recent literature. Meets with EN.540.403

EN.540.604. Transport Phenomena in Practice. 3 Credits.
Required course for ChemBE Masters students

EN.540.605. Modern Data Analysis and Machine Learning for ChemBEs. 3 Credits.
This class will provide an introduction for chemical and biomolecular engineering students to modern methods of measuring and testing hypotheses using experimental or computational data. The course will cover methods of regression and data analysis such as linear and nonlinear regression, Bayesian analysis and principal or independent component analysis. The course will introduce concepts of machine learning including linear and nonlinear separation, neural networks, Gaussian processes and will provide exposure to deep learning concepts. The course will focus generally on image data and will consider topics of image processing, feature extraction and will cover for general data dimensionality reduction. Familiarity with computer programming (ideally Python), statistics and linear algebra are prerequisites.

EN.540.607. Renewable Energy Technologies. 3 Credits.
This course will discuss the recent progress of renewable energy technologies, emphasizing a perspective from chemical engineering. Engineering principles in terms of mass and energy balance, phase equilibrium, kinetics and catalysis, transport, etc. will be applied to analyze the performance of new energy conversion and storage technologies. Topics of interest include solar cells, fuel cells, batteries and biofuels.

EN.540.614. Computational Protein Structure Prediction and Design. 3 Credits.
This class will introduce the fundamental concepts in protein structure, biophysics, optimization and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, design of protein interfaces. Class will consist of lectures and hands-on computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project. Programming experience is recommended.

EN.540.615. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interfacial area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.540.618. Metabolic Dysfunctions and Related Diseases. 2 Credits.
This course will cover the principles of metabolism in cellular, organismal, and systemic levels and the mechanisms of how metabolic dysfunctions are associated with diseases, including diabetes and cancer. The topics will include but are not limited to the Warburg effect, signaling and metabolism, metabolic crosstalk, metabolic targets for cancer therapy, and state-of-the-art techniques for metabolic analyses. Students must have an understanding of undergraduate-level biochemistry. The grade will be based on attendance, participation in the discussions, and presentations.
EN.540.402 OR EN.540.602

EN.540.621. Project in Design: Pharmacodynamics. 3 Credits.
This is continuation of 540.400 Project in Design: Pharmacokinetics. It is a design course in which the design projects will be to develop pharmacodynamic models of the human body that can be used to understand the physiologic effects of drugs on the body. The course (and software to be developed) will cover the spectrum of ways in which pharmaceuticals affect human physiology. The goal is to develop process models of the human body that will predict pharmaceutical effects as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project. Prerequisites 540.421 has a prerequisite of Pharmacokinetics .
EN.540.632

EN.540.622. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society from Nature-made proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high performance materials used in critically demanding areas, such as aviation, aerospace and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources ("green polymer chemistry") will also be covered. Lectures on functional polymers will be focused on their unique properties that are enabled by rational molecular design, controlled synthesis and processing (e.g. supramolecular assembly, and microfabrication). This class of specialty materials can find their use in high performance photovoltaics, batteries, membranes, and composites, and can also serve as "smart" materials for use in coatings, sensors, medical devices, and biomimicry.

EN.540.628. Supramolecular Materials and Nanomedicine. 3 Credits.
Nanomedicine is a quickly growing area that exploits the novel chemical, physical, and biological properties of nanostructures and nanostructured materials for medical treatments. This course presents basic design principles of constructing nanomaterials for use in drug delivery, disease diagnosis and imaging, and tissue engineering. Three major topics will be discussed, including 1) nanocarriers for drug delivery that are formed through soft matter assembly (e.g., surfactants, lipids, block copolymers, DNA, polyelectrolytes, peptides), 2) inorganic nanostructures for disease diagnosis and imaging (e.g., nanoparticles of gold and silver, quantum dots and carbon nanotubes), and 3) supramolecular scaffolds for tissue engineering and regenerative medicine. Students are expected to learn the physical, chemical and biological properties of each nanomaterial, the underlying physics and chemistry of fabricating such material, as well as their advantages and potential issues when used for biomedical applications. This course will also provide students opportunities for case studies on commercialized nanomedicine products. After this class, students should gain a deeper understanding of current challenges in translating nanoscience and nanotechnology into medical therapies.

EN.540.630. Thermodynamics & Statistical Mechanics. 3 Credits.
In this course we will aim for understanding the thermodynamics of chemical and bio-molecular systems. We will first review classical, macroscopic thermodynamics covering concepts such as equilibrium, stability and the role of thermodynamic potentials. Our goal will be to gain a feel for the generality of thermodynamics. Statistical mechanics provides a link between the mechanics of atoms and macroscopic thermodynamics. We will introduce this branch in two distinct ways: 1) following standard methods of developing concepts such as ensembles and partition functions, and 2) where we will treat the basis of statistical mechanics as a problem in inference. With this foundation, we will consider concepts relevant to understanding the liquid state. Chemical transformations in a liquid are of importance in much of chemistry and biology; quasi-chemical generalizations of the potential distribution theorem will be introduced to present these ideas. We hope to give an overview of modern developments relating equilibrium work to non-equilibrium work, as these are of increasing importance in studies on single molecule systems. Course is open to Chemical and Biomolecular Engineering BS/MS Concurrent and MSE students.

EN.540.631. Kinetic Processes. 4 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates.

EN.540.632. Project in Design: Pharmacokinetics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there is no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.540.635. Software Carpentry. 3 Credits.
A 'crash course' intended to teach new graduate students the fundamentals of programming and practical coding skills that will accelerate facility with computational aspects of graduate research. The course covers how computers work from the inside out, with an introduction to the Linux operating system. Programming will be taught primarily in Python, with an emphasis on solving research-related problems. This peer-taught course will cover variables, conditionals, loops, functions, classes, plotting, data structures and algorithms, with some advanced topics (C++, gradient-based minimization, Procrustes, eigenvalue/vector data analysis, embarrassingly parallel `for' loops). No prior programming skills are required, but experience with an introductory computing language will be helpful. Familiarity with differential equations and linear algebra will be assumed.

EN.540.637. Application of Molecular Evolution to Biotechnology. 3 Credits.
One of the most promising strategies for successfully designing complex biomolecular functions is to exploit nature's principles of evolution. This course provides an overview of the basics of molecular evolution as well as its experimental implementation. Current research problems in evolution-based biomolecular engineering will be used to illustrate principles in the design of biomolecules (i.e. protein engineering, RNA/DNA engineering), genetic circuits and complex biological systems including cells. A course in Biochemistry or Molecular Biology is recommendedMeets with EN.540.437Undergraduates with the appropriate background can take the course with permission of the instructor.

EN.540.640. Micro/Nanotechnology: The Science and Engineering of Small Structures. 3 Credits.
The field of micro / nanotechnology has been gaining tremendous momentum as evidenced by an explosive rise in the number of publications, patents and commercial activities. This is an introductory course intended to expose students to the field as well as real world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro and nanofabrication methods and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical and biological applications of emerging micro and nanoscale devices and materials. Co-listed with EN.540.440.

EN.540.652. Advanced Transport Phenomena. 3 Credits.
It is the goal of this course to move the graduate student (and advanced undergraduate student) from the introductory level of transport phenomena (undergraduate) to a level that will allow them to be effective in researching transport-related topics in a variety of biomedical, chemical and biochemical engineering areas. The basic equations that govern mass, momentum, and energy transport will be derived and used to solve problems that demonstrate the physical insight necessary to apply these equations to original situations. Some topics include solution techniques utilizing expansions of harmonic functions, singularity solutions, lubrication theory for flow in confined geometries, boundary layer theory, Stokes flow, forced convection, buoyancy-driven flow, Taylor-Aris dispersion, and reaction-diffusion. Open to PhD students as well as Chemical and Biomolecular Engineering BS/MSE Concurrent and MSE students.

EN.540.665. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered ‘chemically’ and ‘physically/mechanically’. The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include: drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of self-assembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues and immune responses.Recommended prerequisite: Transport Phenomena - EN.540.303 or equivalent
Students may take EN.540.465 or EN.540.665, but not both.

EN.540.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Knowledge of Linear Algebra and Ordinary Differential Equations is a prerequisite (at an undergraduate level); Some computing experience is desirable. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos.
((AS.110.201 OR AS.110.212) AND (S.110.302 OR AS.110.306) OR EN.553.291[C];Students may receive credit for only one of EN.553.473 OR EN.553.673 OR EN.540.468 OR EN.540.668.

EN.540.671. Advanced Thermodynamics in Practice. 3 Credits.
In this course, we will discuss the important role that thermodynamics plays in chemical engineering practice. After a short review of the first and second laws, we will examine how thermodynamic concepts affect mass and energy balances. We will discuss the properties of systems containing pure species and mixtures and how to analyze the behavior of ideal and real systems. We will estimate heat effects associated with temperature change, phase change, and chemical reaction. The theory associated with properties of pure fluids will be discussed along its application to flow processes. We will present the framework for understanding solution thermodynamics and mixing. Applications of thermodynamics especially important to chemical engineers, such as vapor-liquid equilibrium in distillation and chemical reaction equilibrium in kinetics and reaction engineering, will be discussed. Examples will serve to illustrate how thermodynamic calculations are an integral part of the design and optimization of chemical processes.

EN.540.673. Advanced Chemical Reaction Engineering in Practice. 3 Credits.
Chemical reaction engineering deals with the analysis on data and the design of equipment in which reactions occur. Reactors may contain one or more phases and be used to conduct chemical or biochemical transformations. The course will cover the fundamental aspects of kinetics, data acquisition, data interpretation, heterogeneous catalysis and heat and mass transfer for each type of reactor. Special emphasis will be placed on the practical application of reaction engineering in the petrochemical, chemical, biochemical and materials industries. The course will make student aware of the needs and opportunities for chemical reaction engineering in industry.

EN.540.674. Advanced Separation and Purification Processes in Practice. 3 Credits.
This course covers separation and purification processes (adsorption, absorption, membranes, distillation, chromatography, etc.) critical to the production of chemicals, materials, clean water, safe food, energy and pharmaceuticals. It also covers separations as applied in recycling and reuse and in mitigation of pollution. Integration of separation processes with reactors for intensified processes and reactive separations are also discussed. Emphasis is given on fundamentals of mass transfer processes and how they can be integrated for process design and process scale assessment.
EN.540.303 AND EN.540.203

EN.540.681. Molecular Kinetics and Catalysis. 3 Credits.
This course discusses chemical reaction kinetics, with an emphasis on understanding the macroscopic reaction phenomena (reaction rates, activation energies, rate constants, etc.) from microscopic molecular dynamics. Topics of interest include reacting chemical mixtures, molecular collision theory, potential energy surfaces, transition state theory, uni- or bi-molecular reaction dynamics, etc. Catalytic mechanisms will be discussed in terms of heterogeneous reactions at solid-gas interface and homogeneous reactions in solution phase. Scenarios of applications will cover examples drawn from petroleum and chemical industries, pharmaceutics, renewable energy technologies (e.g., fuel cells), and biomedicine (enzymatic catalysis).
EN.540.301 AND EN.540.630

EN.540.801. Graduate Research. 3 - 20 Credits.

EN.545 (Chemical and Biomolecular Engineering)

EN.545.203. Engineering Thermodynamics. 3 Credits.
This course covers the formulation and solution of material, energy, and entropy balances, with an emphasis on open systems. A systematic problem-solving approach is developed for chemical process-related systems. Extensive use is made of classical thermodynamic relationships and constitutive equations. Applications include the analysis and design of engines, refrigerators, heat pumps, compressors, and turbines. Prerequisite(s): 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. Corequisite(s): AS.110.202 Calculus III (Calculus of Several Variables). Course Note(s): Not for graduate credit.

EN.545.204. Applied Physical Chemistry. 3 Credits.
The topics in this course include thermodynamic models for multicomponent phase equilibrium including vapor liquid equilibrium, phase diagrams, activity models and colligative properties in both non-electrolyte and electrolyte solutions. A link between average thermodynamic properties and microstates and molecular interactions is made via a discussion of intermolecular forces and the partition function. Also covered are thermodynamic relationships to describe chemical equilibria, and basic concepts in quantum mechanics and statistical mechanics.Prerequisite(s): 540.203 Engineering Thermodynamics and either 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.301. Kinetic Processes. 3 Credits.
Review of numerical methods applied to kinetic phenomena and reactor design in chemical and biological processes. Homogeneous kinetics and interpretation of reaction rate data. Batch, plug flow, and stirred tank reactor analyses, including reactors in parallel and in series. Selectivity and optimization considerations in multiple reaction systems. Non isothermal reactors. Elements of heterogeneous kinetics, including adsorption isotherms and heterogeneous catalysis. Coupled transport and chemical/biological reaction rates. Prerequisite(s): 540.203 Engineering Thermodynamics and 540.303 Transport Phenomena I, and either 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.303. Transport Phenomena I. 3 Credits.
This course provides an introduction to the field of transport phenomena, including molecular mechanisms of momentum transport (viscous flow); energy transport (heat conduction); mass transport (diffusion); isothermal equations of change (continuity, motion, and energy); the development of the Navier-Stokes equation; the development of non-isothermal and multicomponent equations of change for heat and mass transfer; and exact solutions to steady-state, isothermal unidirectional flow problems and to steady-state heat and mass transfer problems. The analogies between heat, mass, and momentum transfer are emphasized throughout the course. Prerequisite(s): A grade of C or better in Calculus I and II and 540.202 Introduction to Chemical & Biological Process Analysis or permission of instructor. 540.202 is offered through the fulltime Chemical & Biomolecular Engineering Department. Corequisite(s): 500.303 Applied Mathematics I or AS.110.302. Course Note(s): Not for graduate credit.

EN.545.304. Transport Phenomena II. 3 Credits.
Topics covered in this course include dimensional analysis and dimensionless groups, laminar boundary layers, introduction to turbulent flow, definition of the friction factor, macro-scopic mass, momentum and mechanical energy balances (Bernoulli's equation), metering of fluids, convective heat and mass transfer, heat and mass transfer in boundary layers, correlations for convective heat and mass transfer, boiling and condensation, and interphase mass transfer. Prerequisite(s): 540.303 Transport Phenomena I. 540. xxx courses are offered through the full-time Chemical & Biomolecular Engineering Department. Course Note(s): Not for graduate credit.

EN.545.602. Metabolic Systems Biotechnology. 3 Credits.
The aim of this course is to provide a fundamental understanding of the quantitative principles and methodologies of systems biology and biochemical engineering of metabolism. This includes concepts of cellular growth, cellular stoichiometric models, metabolic networks, metabolite fluxes, and genomescale metabolic models. Quantitative methods and systems biology approaches for metabolic flux analysis and metabolic control theory will be included as well as an analysis of biochemical systems and bioreactors including a consideration of mass transport processes.

EN.545.603. Colloids and Nanoparticles. 3 Credits.
This course explains the fundamental principles related to interactions, dynamics, and structure in colloidal, nanoparticle, and interfacial systems. Concepts covered include hydrodynamics, Brownian motion, diffusion, sedimentation, electrophoresis, colloidal and surface forces, polymeric forces, aggregation, deposition, and experimental methods. Modern topics related to colloids in nanoscience and technology will be discussed throughout the course, with frequent references to recent literature.

EN.545.604. Transport Phenomena in Practice. 3 Credits.
This course will provide a review of core concepts of transport phenomena (momentum, heat, and mass transfer). Chemical and biomolecular engineering problems that are relevant in the areas of medicine, biomaterials, and physiology will be discussed. Application areas will range from oxygen transport in lungs and delivery in tissues as an example of a gas–fluid interface; Fluid flow and shear stress, with blood as an example of a nonNewtonian fluid; molecular transport using cellular transport as an example; filtration and separation (membranes) using the Kidney as an example; and drug delivery and pharmacokinetics. Prerequisite(s): Previous experience with transport phenomena concepts will be helpful but is not required. Knowledge in vector calculus and differential equations is imperative for this course.

EN.545.606. Chemical & Biomolecular Separation. 3 Credits.
This course covers staged and continuous-contacting separations processes critical to the chemical and biochemical industries. Separations technologies studied include distillation, liquidliquid extraction, gas absorption, membrane ultrafiltration, reverse osmosis, dialysis, adsorption, and chromatography. Particular emphasis is placed on the biochemical uses of these processes and consequently on how the treatment of these processes differs from the more traditional approach. Course Note(s): Only with permission of the instructor. Colisted with 540.306.

EN.545.607. Renewable Energy Technologies. 3 Credits.

EN.545.614. Computational Protein Structure Prediction and Design. 3 Credits.
The prediction of protein structure from the amino acid sequence has been a grand challenge for more than 50 years. With recent progress in research, it is now possible to blindly predict many protein structures and even to design new structures from scratch. This class will introduce the fundamental concepts in protein structure, biophysics, optimization, and informatics that have enabled the breakthroughs in computational structure prediction and design. Problems covered will include protein folding and docking, design of ligand-binding sites, design of turns and folds, and design of protein interfaces. Classes will consist of lectures and handson computer workshops. Students will learn to use molecular visualization tools and write programs with the PyRosetta protein structure software suite, including a computational project.
Prerequisite(s): Programming experience is helpful but not required.

EN.545.615. Interfacial Science with Applications to Nanoscale Systems. 3 Credits.
Nanostructured materials intrinsically possess large surface area (interface area) to volume ratios. It is this large interface area that gives rise to many of the amazing properties and technologies associated with nanotechnology. In this class, we will examine how the properties of surfaces, interfaces, and nanoscale features differ from their macroscopic behavior. We will compare and contrast fluid-fluid interfaces with solid-fluid and solid-solid interfaces, discussing fundamental interfacial physics and chemistry, as well as touching on state-of-the-art technologies.

EN.545.619. Project in Design: Alternative Energy. 3 Credits.
This course is a group design project (i.e., not a lecture course). In the class, student groups research the various forms of alternative energy and then model a real-world alternativeenergy process. The goal of the project will be to develop a process model that is sufficiently complete and robust that it can be used to understand the important factor in the process design and/or operation. This design project is focused on the role of alternative energy in the US and world economies. The remainder of the course will be devoted to a technical and economic analysis of an alternative energy technology. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group meets separately each week with the instructor. Hence, there are no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 60 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project. Prerequisite(s): 540.202 Introduction to Chemical & Biological Process Analysis; 540.203 Engineering Thermodynamics; 540.301 Kinetic Processes; and 540.305 Modeling and Statistical Analysis of Data for Chemical and Biomolecular Engineers. Course Note(s): Graduate Level. Meets with 540.401 Projects in Design: Alternative Energy.

EN.545.621. Project in Design: Pharmacodynamics. 3 Credits.
This is a design course in which the design projects will be to develop pharmacokinetic models of the human body that can be used to understand the temporal distribution, spatial distribution, and bioavailability of pharmaceutical drugs. The course (and software to be developed) will cover the spectrum of factors affecting pharmaceutical bioavailability including drug formulation, mode of dosing and dosing rate, metabolism and metabolic cascades, storage in fatty tissues, and diffusional limitations (such as in crossing the blood-brain barrier or diffusional differences between normal and cancerous cells). The goal is to develop process models of the human body that will predict pharmaceutical bioavailability as a function of time and organ (or cell) type and that will work for a wide variety of pharmaceuticals including small molecules, biologics, and chemotherapy agents. This course is organized to replicate group project work as it is practiced in industry. The class is divided into groups (typically 3 or 4 students) and each group will meet separately each week with the instructor. Hence, there are no regularly scheduled class times; student groups sign up for weekly meeting times using Starfish in Blackboard. These meetings typically will be 90 minutes long. The expectations and assignments for this course are quite different from most other courses. There are no weekly lectures by the instructor. Rather, each week each group will make a PowerPoint presentation on the week's topic or their progress on their project.

EN.545.622. Introduction to Polymeric Materials. 3 Credits.
Polymeric materials are ubiquitous in our society, from naturemade proteins and polysaccharides to synthetic plastics and fibers. Their applications range from day-to-day consumables to high-performance materials used in critically demanding areas, such as aviation, aerospace, and medical devices. The objective of this course is to provide an introductory overview on the field of polymer science and engineering. Students will learn some basic concepts in polymer synthesis, characterization, and processing. With the basic concepts established, industrial applications of polymeric materials will be discussed in two categories: structural polymers and functional polymers. Structural polymers, including plastics, fibers, rubbers, coatings, adhesives, and composites, will be discussed in terms of their structure, processing, and property relationship with a flavor of industrial relevant products and applications. Future trends in developing environmentally friendly polymers from renewable resources (green polymer chemistry) will also be covered. Lectures on functional polymers will focus on their unique properties that are enabled by rational molecular design, controlled synthesis, and processing (e.g., supramolecular assembly and microfabrication). This class of specialty materials can find their use in high-performance photovoltaics, batteries, membranes, and composites and can also serve as smart materials for use in coatings, sensors, medical devices, and biomimicry.

EN.545.628. Supramolecular Materials and Nanomedicine. 3 Credits.
Nanomedicine is a quickly growing area that exploits the novel chemical, physical, and biological properties of nanostructures and nanostructured materials for medical treatments. This course presents basic design principles of constructing nanomaterials for use in drug delivery, disease diagnosis and imaging, and tissue engineering. Three major topics will be discussed, including (1) nanocarriers for drug delivery that are formed through soft matter assembly (e.g., surfactants, lipids, block copolymers, DNA, polyelectrolytes, peptides); 2) inorganic nanostructures for disease diagnosis and imaging (e.g., nanoparticles of gold and silver, quantum dots and carbon nanotubes); and (3) supramolecular scaffolds for tissue engineering and regenerative medicine. Students are expected to learn the physical, chemical and biological properties of each nanomaterial, the underlying physics and chemistry of fabricating such material, as well as their advantages and potential issues when used for biomedical applications. This course will also provide students opportunities for case studies on commercialized nanomedicine products. After this class, students should have a deeper understanding of current challenges in translating nanoscience and nanotechnology into medical therapies.

EN.545.630. Thermodynamics and Statistical Mechanics. 3 Credits.
In this course we will aim for understanding the thermodynamics of chemical and biomolecular systems. We will first review classical, macroscopic thermodynamics, covering concepts such as equilibrium, stability, and the role of thermodynamic potentials. Our goal will be to gain a feel for the generality of thermodynamics. Statistical mechanics provides a link between the mechanics of atoms and macroscopic thermodynamics. We will introduce this branch in two distinct ways: (1) following standard methods of developing concepts such as ensembles and partition functions, and (2) where we will treat the basis of statistical mechanics as a problem in inference. With this foundation, we will consider concepts relevant to understanding the liquid state. Chemical transformations in a liquid are of importance in much of chemistry and biology; quasi-chemical generalizations of the potential distribution theorem will be introduced to present these ideas. We hope to give an overview of modern developments relating equilibrium work to non-equilibrium work, as these are of increasing importance in studies on single molecule systems. Registration by instructor permission only.

EN.545.632. Project in Design: Pharmacokinetics. 3 Credits.

EN.545.637. Application of Molecular Evolution to Biotechnology. 3 Credits.
One of the most promising strategies for successfully designing complex biomolecular functions is to exploit nature's principles of evolution. This course provides an overview of the basics of molecular evolution as well as its experimental implementation. Current research problems in evolution-based biomolecular engineering will be used to illustrate principles in the design of biomolecules (i.e., protein engineering, RNA/DNA engineering), genetic circuits, and complex biological systems including cells.

EN.545.639. Advanced Topics in Pharmacokinetics and Pharmacodynamics. 3 Credits.
This course involves a semester-long project in pharmacodynamics. Topics are chosen in consultation with instructor.

EN.545.640. Micro- and Nanotechnology. 3 Credits.
The field of micro-/nanotechnology has been gaining tremendous momentum, as evidenced by an explosive rise in the number of publications, patents, and commercial activities. This is an introductory course intended to expose students to the field and real-world applications. Lectures will include an overview of scaling of material properties at the nanoscale, micro- and nanofabrication methods, and essential analytical tools of relevance to the field. All through the course, we will go over electronic, optical, and biological applications of emerging micro- and nanoscale devices and materials.

EN.545.652. Advanced Transport Phenomena. 3 Credits.
This lecture course introduces students to the application of engineering fundamentals from transport and kinetic processes to vascular biology and medicine. The first half of the course addresses the derivation of the governing equations for Newtonian fluids and their solution in the creeping flow limit. The second half of the course considers how these concepts can be used to understand the behavior of a deformable cell near planar surfaces. Prerequisite(s): Undergraduate Transport Phenomena preferred.

EN.545.660. Polymer Physics. 3 Credits.
This course will cover the physics aspect of macromolecular/ polymeric materials. We will discuss the molecular origin of key physical phenomena, such as chain relaxation, time temperature superposition, free volume, high-strain-rate behavior, phase transitions, flow and fracture, as well as physical aging. Many real-world examples will be used throughout the course. We will also discuss the recent advances in biopolymers, polymers for 3D printing, electro-spinning, and polymers for tissue engineering. Students should have introductory training in materials science.

EN.545.662. Polymer Design and Bioconjugation. 3 Credits.
This course will focus on conventional to most recent inventions on polymer and conjugation chemistry. Weekly lectures will include the reaction strategy, designs and characterization techniques, structure–property relationship, simplistic approaches, and versatile application-oriented solutions to biomaterials and tissue engineering-related challenges. Students will learn how to devise creative strategies and about process design and product development. Prerequisite(s): Preliminary knowledge of organic chemistry is expected. No prerequisites for graduate students.

EN.545.665. Engineering Principles of Drug Delivery. 3 Credits.
Fundamental concepts in drug delivery from an engineering perspective. Biological organisms are viewed as highly interconnected networks where the surfaces/interfaces can be activated or altered "chemically" and "physically/mechanically." The importance of intermolecular and interfacial interactions on drug delivery carriers is the focal point of this course. Topics include drug delivery mechanisms (passive, targeted); therapeutic modalities and mechanisms of action; engineering principles of controlled release and quantitative understanding of drug transport (diffusion, convection); effects of electrostatics, macromolecular conformation, and molecular dynamics on interfacial interactions; thermodynamic principles of selfassembly; chemical and physical characteristics of delivery molecules and assemblies (polymer based, lipid based); significance of biodistributions and pharmacokinetic models; toxicity issues; and immune responses.

EN.545.668. Introduction to Nonlinear Dynamics and Chaos. 3 Credits.
An introduction to the phenomenology of nonlinear dynamic behavior with emphasis on models of actual physical, chemical, and biological systems, involving an interdisciplinary approach to ideas from mathematics, computing, and modeling. The common features of the development of chaotic behavior in both mathematical models and experimental studies are stressed, and the use of modern data-mining tools to analyze dynamic data will be explored. Emphasis will be placed on the geometric/visual computer-aided description and understanding of dynamics and chaos. Prerequisite(s): Knowledge of linear algebra and ordinary differential equations (at an undergraduate level); some computing experience is desirable.

EN.545.671. Advanced Thermodynamics in Practice. 3 Credits.
In this graduate-level course, we will cover important principles in thermodynamics and kinetics along with examples relevant to engineering practice. After a short review of the first and second laws of thermodynamics, we will move on to their application in engines and refrigeration. We will discuss the thermodynamic properties of systems consisting of pure species and mixtures and address phase equilibria. With the key thermodynamic concepts in place, we will discuss topics in kinetics, including the fundamentals of reaction rates, rate laws, multiple reactions, and nonelementary reaction kinetics. Finally, we will address how reactor type and properties, transport limitations, and phase equilibria influence reaction rate.

EN.545.672. Green Engineering, Alternative Energy and CO2 Capture/ Sequestration. 3 Credits.
This course inherently combines green engineering, alternative energy and CO2 capture and storage into a concentrated semester lecture. Green Engineering applies the cost-effective design, commercialization, and use of chemical processes in ways that minimize pollution at the source, and reduce impact on human activities and the environment. After general discussion of applying environmental principles into various chemical processes, this course will switch the gear to apply these green engineering ideas into the energy production that has increasing and critical importance to our modern world, how to minimize the pollution and CO2 emission. There are two ways to follow: 1. Alternative Energy, which uses alternative resources rather than the current dominant fossil fuel for energy production. Alternative energy includes solar, hydro, bioenergy, geothermal, tidal, nuclear energy and et al. The detailed production processes, the long term perspective, policy and advantages/ disadvantages over their counterpart, fossil fuel, will be discussed. 2. Fossil fuel with CO2 Capture and Storage. CO2 capture methods such as chemical solvents/chemical looping, membrane, oxy fuel combustion will be discussed and their technical benefits/limitations will be studied. The storage will cover geological methods (coal bed and saline aquifer), enhanced oil recovery, ocean storage, terrestrial and others. The technical details, cost, future trends and national/international policy (carbon taxes/markets) will be discussed in this course.

EN.545.673. Advanced Chemical Reaction Engineering in Practice. 3 Credits.
Chemical reaction engineering deals with the analysis on data and the design of equipment in which reactions occur. Reactors may contain one or more phases and be used to conduct chemical or biochemical transformations. The course will cover the fundamental aspects of kinetics, data acquisition, data interpretation, heterogeneous catalysis, and heat and mass transfer for each type of reactor. Special emphasis will be placed on the practical application of reaction engineering in the petrochemical, chemical, biochemical, and materials industries. The course will make students aware of the needs and opportunities for chemical reaction engineering in industry.

EN.545.691. Chemical Engineering Modeling and Design for Graduate Students. 3 Credits.
This course is one part of a two-semester sequence in chemical and biomolecular engineering product design. It is intended for students in the Chemical and Biomolecular Engineering master's program. This course guides the student through the complex process of new product design. Product designconcerns the recognition of customer needs, the creation of suitable specifications, and the selection of best products to fulfill needs. Students work in small teams to develop a new product idea, design the product, and then iterate on prototype development. Students report several times on their accomplishments, both orally and in writing. Time is allowed so that laboratory tests can be performed and/ or prototypes can be built.

EN.545.800. Independent Study. 0 - 0 Credits.
Permission of instructor required.

EN.545.801. Indep Study Chem Engr. 0 - 0 Credits.
Permission of instructor required.

EN.553 (Applied Mathematics & Statistics)

EN.553.100. Introduction to Applied Mathematics and Statistics. 1 Credit.
A seminar-style series of lectures and assignments to acquaint the student with a range of intellectual and professional activities performed by applied mathematicians and statisticians. Problems arising in applied mathematics and statistics are presented by department faculty and outside speakers. Recommended Course Background: one semester of Calculus.

EN.553.101. Freshman Experience in Applied Mathematics & Statistics. 1 Credit.
The aim of this course is to provide students with an opportunity to work on a project in a small group setting together with an AMS faculty member. Projects can be varied in nature depending on the faculty member working with a group. The goal of a group could be to develop knowledge of a domain area in which mathematics is applied, to develop knowledge of some technique(s) in applied mathematics, to bring applied mathematics to bear on some application, or to develop knowledge in some foundational topic in mathematics. Faculty will present possible topics to students in the first week of classes. Students will be asked to rank their interests (first choice, second choice, etc.), and will provide their schedules. Based on their preferences, their schedules, and subject to group size limitations, students will be organized into groups of size at most 3, and will be assigned to course sections in the second week of classes. One faculty member will lead each section and will arrange to meet with the group once per week for an hour.

EN.553.111. Statistical Analysis I. 4 Credits.
First semester of a general survey of statistical methodology. Topics include descriptive statistics, introductory probability, conditional probability, random variables, expectation, sampling, the central limit theorem, classical and robust estimation, confidence intervals, and hypothesis testing. Case studies from psychology, epidemiology, economics and other fields serve to illustrate the underlying theory. Some use of Minitab, Excel or R, but no prior computing experience is necessary. Recommended Course Background: four years of high school mathematics. Students who may wish to undertake more than two semesters of probability and statistics should consider EN.553.420-EN.553.430.
Statistics Sequence restriction: students who have completed any of these courses may not register: EN.553.211 OR EN.553.230 OR EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.553.413 OR EN.560.435 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.560.348;Statistics Sequence restriction: students who have completed AS.230.205 may not enroll.

EN.553.112. Statistical Analysis II. 4 Credits.
Second semester of a general survey of statistical methodology. Topics include two-sample hypothesis tests, analysis of variance, linear regression, correlation, analysis of categorical data, and nonparametrics. Students who may wish to undertake more than two semesters of probability and statistics should strongly consider the EN.553.420-430 sequence.
EN.553.111 OR AS.230.205 OR AS.280.345 OR credit for AP Statistics

EN.553.122. Chance and Risk. 3 Credits.
The course is intended for humanities and social science majors. It will help students develop an appreciation of probability and randomness, and an understanding of its applications in real life situations involving chance and risk. Applications, controversies, and paradoxes involving risk in business and economics, health and medicine, law, politics, sports, and gambling will be used to illustrate probabilistic concepts such as independence, conditional probability, expectation, correlation, and variance. Class periods will typically include a combination of presentation of new material, an in-class activity, and class discussion. Attendance and class participation will be an important part of the learning experience. Prerequisites: There is no prerequisite beyond high school mathematics. The course is not open to students who have taken calculus.
Students may not have completed AS.110.106 OR AS.110.107 OR AS.110.108 OR AS.110.109 OR AS.110.113 OR AS.110.202 OR AS.110.211

EN.553.171. Discrete Mathematics. 4 Credits.
Introduction to the mathematics of finite systems. Logic; Boolean algebra; induction and recursion; sets, functions, relations, equivalence, and partially ordered sets; elementary combinatorics; modular arithmetic and the Euclidean algorithm; group theory; permutations and symmetry groups; graph theory. Selected applications. The concept of a proof and development of the ability to recognize and construct proofs are part of the course. Recommended Course Background: Four years of high school mathematics.
Prerequisite(s): EN.553.171 may not be taken concurrently with EN.553.471 or EN.553.472 or EN.553.671 or EN.553.672.
EN.553.171 may not be taken after EN.553.471 or EN.553.472 or EN.553.671 or EN.553.672.;Students may not earn credit for EN.553.171 and EN.553.172.

EN.553.172. Honors Discrete Mathematics. 4 Credits.
Introduction to the mathematics of finite systems. Logic; Boolean algebra; induction and recursion; sets, functions, relations, equivalence, and partially ordered sets; elementary combinatorics; modular arithmetic and the Euclidean algorithm; polynomials rings, group theory; permutations groups and Galois theory; graph theory. Selected applications. The concept of a proof and development of the ability to recognize and construct proofs and analyze algorithms are part of the course. Recommended Course Background: Four years of high school mathematics.
EN.553.172 may not be taken after EN.553.471 OR EN.553.472 OR EN.553.671 OR EN.553.672;Students may not earn credit for both EN.553.171 and EN.553.172.

EN.553.211. Probability and Statistics for the Life Sciences. 4 Credits.
This is an introduction to statistics aimed at students in the life sciences. The course will provide the necessary background in probability with treatment of independence, Bayes theorem, discrete and continuous random variables and their distributions. The statistical topics covered will include sampling and sampling distributions, confidence intervals and hypothesis testing for means, comparison of populations, analysis of variance, linear regression and correlation. Analysis of data will be done using Excel.
AS.110.106 OR AS.110.108 OR AS.110.113;Statistics Sequence restriction: Students who have completed any of these courses may not register: EN.550.230 OR AS.280.345 OR AS.200.314 OR AS.200.315 OR EN.550.310 OR EN.550.311 OR EN.560.435 OR EN.550.420 OR EN.550.430 OR EN.560.348

EN.553.230. Introduction to Biostatistics. 4 Credits.
A self-contained course covering various data analysis methods used in the life sciences. Topics include types of experimental data, numerical and graphical descriptive statistics, concepts of (and distinctions between) population and sample, basic probability, fitting curves to experimental data (regression analysis), comparing groups in populations (analysis of variance), methods of modeling probability (contingency tables and logistic regression). Prerequisite: 3 years of high school mathematics

EN.553.281. Introduction to Mathematical Computing. 4 Credits.
This course introduces a variety of techniques for solving optimization problems in engineering and science on a computer using MATLAB. Topics include the programming language MATLAB, as well as optimization theory, algorithms, and applications. MATLAB optimization tools will also be explored. Algorithms to be covered will include gradient descent, Newton's method, and the simplex method. Applications will include constrained least squares regression, neural networks, and k-means clustering.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (AS.110.201 OR AS.110.212 OR EN.553.291)

EN.553.291. Linear Algebra and Differential Equations. 4 Credits.
An introduction to the basic concepts of linear algebra, matrix theory, and differential equations that are used widely in modern engineering and science. Intended for engineering and science majors whose program does not permit taking both AS.110.201 and AS.110.302.
AS.110.107 OR AS.110.109 OR AS.110.113

EN.553.310. Probability & Statistics for the Physical Sciences & Engineering. 4 Credits.
An introduction to probability and statistics at the calculus level, intended for engineering and science students planning to take only one course on the topics. Combinatorial probability, independence, conditional probability, random variables, expectation and moments, limit theory, estimation, confidence intervals, hypothesis testing, tests of means and variances, goodness-of-fit. Recommended co-requisite: multivariable calculus.Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
(AS.110.108 AND AS.110.109) OR AS.110.113;Statistics Sequence restriction: Students who have completed any of these courses may not register:EN.553.311 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348

EN.553.311. Probability and Statistics for the Biological Sciences and Engineering. 4 Credits.
An introduction to probability and statistics at the calculus level, intended for students in the biological sciences planning to take only one course on the topics. This coursewill be at the same technical level as EN.553.310. Students are encouraged to consider EN.553.420-430 instead. Combinatorial probability, independence,conditional probability, random variables, expectation and moments, limit theory, estimation, confidence intervals, hypothesis testing, tests of means and variances, andgoodness-of-fit will be covered. Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.Recommended Course Corequisite: AS.110.202
(AS.110.108 AND AS.110.109) OR AS.110.113;Statistics Sequence restriction: students who have completed any of these courses may not register: EN.553.310 OR EN.560.435 OR EN.553.420 OR EN.553.430 OR EN.560.348

EN.553.361. Introduction to Optimization. 4 Credits.
An introductory survey of optimization methods, supporting mathematical theory and concepts, and application to problems of planning, design, prediction, estimation, and control in engineering, management, and science. Study of varied optimization techniques including linear programming, network-problem methods, dynamic programming, integer programming, and nonlinear programming. Students should be familiar with computing and linear algebra. Prerequisite: one year of calculus. Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
(AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212)

EN.553.362. Introduction to Optimization II. 4 Credits.
An introductory survey of optimization methods, supporting mathematical theory and concepts, and application to problems of planning, design, prediction, estimation, and control in engineering, management, and science. Study of varied optimization techniques including linear programming, network-problem methods, dynamic programming, integer programming, and nonlinear programming.
EN.550.361 AND (AS.110.202 OR AS.110.211)

EN.553.371. Cryptology and Coding. 4 Credits.
Computing experience. A first course in the mathematical theory of secure and reliable electronic communication. Cryptology is the study of secure communication: How can we ensure the privacy of messages? Coding theory studies how to make communication reliable: How can messages be sent over noisy lines? Topics include finite field arithmetic, error-detecting and error-correcting codes, data compressions, ciphers, one-time pads, the Enigma machine, one-way functions, discrete logarithm, primality testing, secret key exchange, public key cryptosystems, digital signatures, and key escrow.
(EN.550.171 OR EN.553.172) AND (EN.550.291 OR AS.110.201 OR AS.110.212)

EN.553.385. Numerical Linear Algebra. 4 Credits.
A first course on computational linear algebra and applications. Topics include floating-point arithmetic, algorithms and convergence, Gaussian elimination for linear systems, matrix decompositions (LU, Cholesky, QR), iterative methods for systems (Jacobi, Gauss Seidel), approximation of eigenvalues (power method, QR-algorithm) and also singular values and singular-value decomposition (SVD). Theoretical topics such as vector spaces, inner products, norms, linear operators, matrix norms, eigenvalues, and canonical forms of matrices (Jordan, Schur) are reviewed as needed. Matlab is used to solve all numerical exercises; no previous experience with computer programming is required.
(EN.553.291 OR AS.110.201 OR AS.110.212) AND (AS.110.202 OR AS.110.211)

EN.553.386. Scientific Computing: Differential Equations. 4 Credits.
A first course on computational differential equations and applications. Topics include floating-point arithmetic, algorithms and convergence, root-finding (midpoint, Newton, and secant methods), numerical differentiation and integration, and numerical solution of initial value problems (Runge–Kutta, multistep, extrapolation methods, stability, implicit methods, and stiffness). Theoretical topics such as existence, uniqueness, and stability of solutions to initial-value problems, conversion of higher order/ non-autonomous equations to systems, etc., will be covered as needed. Matlab is used to solve all numerical exercises; no previous experience with computer programming is required.
(AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.302 OR AS.110.306).

EN.553.391. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.
EN.553.291 OR AS.110.201 OR AS.110.211

EN.553.400. Mathematical Modeling and Consulting. 4 Credits.
Creating, analyzing and evaluating optimization and mathematical models using case studies. Project-oriented practice and guidance in modeling techniques, with emphasis on communication of methods and results. Applications may include transportation networks, scheduling, industrial processes, and telecommunications. Computation will be emphasized throughout using MATLAB.
Students may receive credit for EN.550.400/EN.553.400 or EN.553.600, but not both.;EN.553.361 OR EN.553.362

EN.553.401. Introduction to Research. 3 Credits.
Aspects of the research process, including reading journal articles, writing mathematics, LaTeX, literature search, problem identification, problem-solving, oral presentations, Beamer, conference attendance, publication of results, and research ethics. An initial research experience, individually and/or in groups, with students identifying and developing projects in the mathematical sciences. Recent research topics have involved percolation, graph domination, Markov chains, birthday problems, gambler's ruin, integer programming, and rendezvous search problems. Instructor's permission required: Interested students must submit an unofficial transcript, vita, and personal statement to the instructor. Open only to undergraduates.

EN.553.402. Research and Design in Applied Mathematics: Data Mining. 4 Credits.
The course will be project oriented with focus on practical uses of machine learning and data mining. Throughout the semester, teams of 4 will work on topics decided by the students and the instructor.
EN.553.436

EN.553.413. Applied Statistics and Data Analysis. 4 Credits.
An introduction to basic concepts, techniques, and major computer software packages in applied statistics and data analysis. Topics include numerical descriptive statistics, observations and variables, sampling distributions, statistical inference, linear regression, multiple regression, design of experiments, nonparametric methods, and sample surveys. Real-life data sets are used in lectures and computer assignments. Intensive use of statistical packages such as R to analyze data. Students may receive credit for EN.550.413/EN.553.413 or EN.553.613, but not both.;EN.553.112 OR EN.553.310 OR EN.553.311 OR EN.553.420

EN.553.414. Applied Statistics and Data Analysis II. 3 Credits.
Part II of a sequence on data analysis and linear models. Topics include categorical and discrete data analysis, mixed models, semiparametric and nonparametric regression, and generalized additive models. Applications of these methods using the R environment for statistical computing will be emphasized.
EN.550.413;Students may receive credit for EN.550.414/EN.553.414 or EN.553.614, but not both.

EN.553.420. Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, covariance and correlation, limit theorems. Students initiating graduate work in probability or statistics should enroll in EN.553.620 or EN.553.720. Prerequisites: one year of calculus. Corequisites: multivariable calculus and linear algebra.Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Students may receive credit for EN.550.420/EN.553.420 or EN.553.620, but not both.;AS.110.109 OR AS.110.113;AS.110.201 OR AS.110.202 OR AS.110.211 OR AS.110.212, can be taken concurrently.

EN.553.421. Honors Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, exchangeability, joint distributions, conditional distributions and expectation, covariance and correlation, limit theorems. The honors version of this course will have enrichment exercises that explore and extend ideas learned in the ordinary lecture. Students initiating graduate work in probability or statistics should enroll in EN.550.620. Auditors are not permitted. Recommended Course Background: one year of calculus and mathematical maturity; Co-requisite: multivariable calculus. By permission of the instructor or by recommendation of an AMS faculty member.

EN.553.426. Introduction to Stochastic Processes. 4 Credits.
Mathematical theory of stochastic processes. Emphasis on deriving the dependence relations, statistical properties, and sample path behavior including random walks, Markov chains (both discrete and continuous time), Poisson processes, martingales, and Brownian motion. Applications that illuminate the theory. Students may receive credit for EN.553.426 or EN.553.626.
Prerequisite(s): Students may not enroll in EN.553.420 in the same semester.
(EN.550.420 OR EN.553.620) AND (EN.550.291 OR AS.110.201 OR AS.110.212);Students may receive credit for EN.550.426/EN.553.426 or EN.553.626, but not both.

EN.553.427. Stochastic Processes and Applications to Finance. 4 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science.Students may only earn credit for one of EN.553.427 or EN.553.627.
EN.553.420 OR EN.553.620;Students may receive credit for only one of EN.550.427, EN.553.427, OR EN.553.627

EN.553.428. Stochastic Processes and Applications to Finance II. 4 Credits.
A basic knowledge of stochastic calculus and Brownian motion is assumed. Topics include stochastic differential equations, the Feynman-Kac formula and connections to partial differential equations, changes of measure, fundamental theorems of asset pricing, martingale representations, first passage times and pricing of path-dependent options, and jump processes.
EN.553.427 OR EN.553.627;Students may receive credit for EN.550.428/EN.553.428 or EN.553.628, but not both.

EN.553.430. Introduction to Statistics. 4 Credits.
Introduction to mathematical statistics. Finite population sampling, approximation methods,classical parametric estimation, hypothesis testing, analysis of variance, and regression. Bayesian methods.
(EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.430/EN.553.430 or EN.553.630 or EN.553.431, but not all.

EN.553.431. Honors Introduction to Statistics. 4 Credits.
Introduction to the theory and methodology of mathematical statistics: parametric estimation, including asymptotic properties of estimators and approximation methods; hypothesis testing; analysis of variance; regression; bootstrapping and nonparametrics. Intended for students with a particular interest in the theoretical foundations of statistical procedures.
EN.553.420 AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (AS.110.202 OR AS.110.211);Students may receive credit for only one of EN.553.430, EN.553.431 or EN.553.630.

EN.553.432. Bayesian Statistics. 3 Credits.
The course will cover Bayesian methods for exploratory data analysis. The emphasis will be on applied data analysis in various disciplines. We will consider a variety of topics, including introduction to Bayesian inference, prior and posterior distribution, hierarchical models, spatial models, longitudinal models, models for categorical data and missing data, model checking and selection, computational methods by Markov Chain Monte Carlo using R or Matlab. We will also cover some nonparametric Bayesian models if time allows, such as Gaussian processes and Dirichlet processes.
(EN.553.420 OR EN.553.620) AND (EN.553.430 OR EN.553.431 OR EN.553.630);Students may take only one of EN.550.632, EN.553.432, EN.553.632 or EN.553.732.

EN.553.433. Monte Carlo Methods. 4 Credits.
The objective of the course is to survey essential simulation techniques for popular stochastic models. The stochastic models may include classical time-series models, Markov chains and diffusion models. The basic simulation techniques covered will be useful in sample-generation of random variables, vectors and stochastic processes, and as advanced techniques, importance sampling, particle filtering and Bayesian computation may be discussed.
Students may receive credit for EN550.433/EN.553.433 or EN.553.633, but not both.;EN.553.430 OR EN.553.431 OR EN.553.630

EN.553.436. Introduction to Data Science. 4 Credits.
Today the term Data Science is widely used covering a broad range of topics from mathematics and algorithms to actual data analysis and machine learning techniques. This course provides a thorough survey of relevant methods balancing the theory and the application aspects. Accordingly, the material and the discussions alternate between the methodology along with its underlying assumptions and the implementations along with their applications. We will cover several supervised methods for regression and classification, as well as unsupervised methods for clustering and dimensional reduction. To name a few in chronological order, the topics will include generalized linear regression, principal component analysis, nearest neighbor and Bayesian classifiers, support vector machines, logistic regression, decision trees, random forests, K-means clustering, Gaussian mixtures and Laplacian eigenmaps. The course uses Python and Jupyter Notebook and includes visualization techniques throughout the semester. Time permitting, an introduction to the Structured Query Language (SQL) is provided toward the end of the semester.
Students may receive credit for EN.550.436/EN.553.436 or EN.553.636, but not both.;(AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.550.291)

EN.553.439. Time Series Analysis. 3 Credits.
Time series analysis from the frequency and time domain approaches. Descriptive techniques; regression analysis; trends, smoothing, prediction; linear systems; serial correlation; stationary processes; spectral analysis.
(EN.553.310[C] OR EN.553.311 OR EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.439/EN.553.439 or EN.553.639, but not both.

EN.553.441. Equity Markets and Quantitative Trading. 3 Credits.
This course introduces equity markets from a mathematical point of view. The properties of equities and equity-linked instruments will be described. Several quantitative trading strategies will be studied. Order execution tactics and the effect of market structure will be analyzed. Students will select a specialized aspect of the equity markets to investigate and complete a related independent project.
EN.553.442 OR EN.553.642 or instructor's permission.;Students may receive credit for EN.550.441/EN.553.441 or EN.553.641, but not both.

EN.553.442. Investment Science. 4 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision-making. Topics covered in the course include the basic theory of interest and its application to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory, and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, portfolio evaluation. The student is expected to be comfortable with the use of mathematics as a method of deduction and problem solving. Students may not receive credit for both EN.550.342 and EN.553.442Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Students may receive credit for only one of EN.550.342, EN.550.442, EN.553.442 or EN.553.642;(AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.620 OR EN.553.430 OR EN.553.431 OR EN.553.630)

EN.553.444. Introduction to Financial Derivatives. 4 Credits.
This course will develop the mathematical concepts and techniques for modeling cash instruments and their hybrids and derivatives.
Students may receive credit for EN.550.444/EN.553.444 or EN.553.644, but not both.;AS.110.302 AND EN.553.420

EN.553.445. Interest Rate and Credit Derivatives. 4 Credits.
Advances in corporate finance, investment practice and the capital markets have been driven by the development of a mathematically rigorous theory for financial instruments and the markets in which they trade. This course builds on the concepts, techniques, instruments and markets introduced in EN.553.444. In addition to new topics in credit enhancement and structured securities, the focus is expanded to include applications in portfolio theory and risk management, and covers some numerical and computational approaches.
EN.553.444 OR EN.553.644;Students may receive credit for EN.550.445/EN.553.445 or EN.553.645, but not both.

EN.553.446. Risk Measurement/Management in Financial Markets. 4 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings and compensatory techniques are addressed.
Students may receive credit for EN.550.446/EN.553.446 or EN.553.646, but not both.;EN.553.444 OR EN.553.644

EN.553.447. Quantitative Portfolio Theory and Performance Analysis. 4 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including, Sharpe, Treynor and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement and attribution; Replicating Benchmark Index (RBI) strategies using cash securities / derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management: Passive, Quasi-Passive (Indexing) Semi-Active (Immunization & Dedicated) Active (Scenario, Relative Value, Total Return and Optimization). In addition, risk management and hedging techniques are also addressed.
Students may receive credit for 550.447/553.447 OR EN.553.647, but not both.

EN.553.448. Financial Engineering and Structured Products. 4 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis).
EN.553.442 OR EN.553.642 OR EN.553.444 OR EN.553.644;Students may receive credit for EN.550.448/EN.553.448 or EN.553.648, but not both.

EN.553.449. Advanced Equity Derivatives. 4 Credits.
This course will cover the pricing, trading and risk management of equity derivatives, with emphasis on more exotic derivatives such as path-dependent and multi-asset derivatives. The course will emphasize practical issues: students will build their own pricing and risk management tools, and gain experience simulating the dynamic hedging of a complex derivatives portfolio. Students will practice structuring and selling equity derivative products. Pricing issues such a model selection, unobservable input parameters and calibration will be discussed, and students will learn techniques to manage the often highly nonlinear and discontinuous risks associated with these products. The course will have a significant computing component: both in the classroom and as homework projects, students will use Excel, write VBA macros and write and call C++ routines in the Microsoft Windows environment (which is the most common computing environment used by the financial industry).
Students may receive credit for EN.550.449/EN.553.449 or EN.553.649, but not both.;EN.553.444 OR EN.553.644

EN.553.450. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional “omics” data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful).
(EN.553.420 OR EN.553.620) AND (EN.553.430 OR EN.553.431 OR EN.553.630) OR equivalent courses in probability and statistics.;Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

EN.553.453. Mathematical Game Theory. 4 Credits.
Mathematical analysis of cooperative and noncooperative games. Theory and solution methods for matrix game (two players, zero-sum payoffs, finite strategy sets), games with a continuum of strategies, N-player games, games in rule-defined form. The roles of information and memory. Selected applications to economic, recreational, and military situations. Prereq: Multivariable Calculus, probability, linear algebra.
Students may receive credit for EN.550.453/EN.553.453 or EN.553.653, but not both.;(AS.110.202 OR AS.110.211) AND (EN.550.420 OR EN.553.620) AND (EN.550.291 OR AS.110.201 OR AS.110.212)

EN.553.461. Optimization in Finance. 4 Credits.
A survey of many of the more important optimization methods and tools that are found to be useful in financial applications.
Students may receive credit for EN.550.461/EN.553.461 or EN.553.661, but not both.;EN.553.442 OR EN.553.642 OR EN.553.444 OR EN.553.644

EN.553.463. Network Models in Operations Research. 4 Credits.
In-depth mathematical study of network flow models in operations research, with emphasis on combinatorial approaches for solving them. Introduction to techniques for constructing efficient algorithms, and to some related data structures, used in solving shortest-path, maximum-volume, flow, and minimum-cost flow problems. Emphasis on linear models and flows, with brief discussion of non-linear models and network design.
Students may receive credit for EN.550.463/EN.553.463 or EN.553.663, but not both.;EN.553.361 OR EN.553.661 OR EN.553.761 OR EN.553.461

EN.553.465. Introduction to Convexity. 4 Credits.
Convexity is a simple mathematical concept that has become central in a diverse range of applications in engineering, science and business applications. Our main focus from the applications perspective will be the use of convexity within optimization problems, where convexity plays a key role in identifying the "easy" problems from the "hard" ones. The course will have an equal emphasis on expositing the rich mathematical structure of the field itself (properties of convex sets, convex functions, Helly-Caratheorody-Radon type theorems, polarity/duality, subdifferential calculus, polyhedral theory), and demonstrating how these ideas can be leveraged to model and solve optimization problems (via a detailed study of linear programming and basics of nonlinear convex optimization). Recommend Course Background: Familiarity with basic real analysis, linear algebra.
Students may receive credit for EN.550.465/EN.553.465 or EN.553.665, but not both.

EN.553.467. Deep Learning in Discrete Optimization. 3 Credits.
The goal of the course is to examine research-level topics in the application of deep-learning techniques to the solution of computational problems in discrete optimization. The first part of the course will cover background material, introducing students to deep learning (focusing on practical aspects) and covering major topics in computational discrete optimization: heuristic methods, dynamic programming, linear programming, cutting planes, column generation, and branch-and-bound. We will then make an in-depth study of research papers where deep learning has been proposed as a solution-technique in discrete optimization, aiming towards discussionsof open research questions. Prerequisites: General mathematical maturity is expected: students should feel comfortable reading on their own Part 1 (Applied Math and Machine Learning Basics) in the text Deep Learning by Goodfellow, Bengio, and Courville.

EN.553.471. Combinatorial Analysis. 4 Credits.
Counting techniques: generating functions, recurrence relations, Polya's theorem. Combinatorial designs: Latin squares, finite geometries, balanced incomplete block designs. Emphasis on problem solving. Recommended Course Background: AS.553.291 or AS.110.201Students who have received credit for AS.110.106 and/or AS.110.107 taken prior to Fall 2020 should contact the course instructor to determine whether they can receive permission to register for this course.
Prerequisite(s): EN.553.171 may not be taken concurrently with EN.553.471, EN.553.472, EN.553.671, or EN.553.672.
(AS.110.109 OR AS.110.113) AND (AS.110.201 OR AS.110.212 OR EN.553.291);Students may receive credit for EN.550.471/EN.553.471 or EN.550.671/EN.553.671, but not both.

EN.553.472. Graph Theory. 4 Credits.
Study of systems of "vertices" with some pairs joined by "edges." Theory of adjacency, connectivity, traversability, feedback, and other concepts underlying properties important in engineering and the sciences. Topics include paths, cycles, and trees; routing problems associated with Euler and Hamilton; design of graphs realizing specified incidence conditions and other constraints. Attention directed toward problem solving, algorithms, and applications. One or more topics taken up in greater depth.
Prerequisite(s): EN.550.171 may not be taken concurrently with EN.550.471 or EN.550.472
EN.550.291 OR AS.110.201 OR AS.110.212;Students may receive credit for EN.550.472/EN.553.472 or EN.553.672, but not both.

EN.553.481. Numerical Analysis. 4 Credits.
Brief review of topics in elementary numerical analysis such as floating-point arithmetic, Gaussian elimination for linear equations, inter-polation and approximation. Core topics to be covered: numerical linear algebra including eigenvalue and linear least-squares problems, iterative algorithms for nonlinear equations and least squares problems, and convergence theory of numerical methods. Other possible topics: sparse matrix computations, numerical solution of partial differential equations, finite element methods, and parallel algorithms.
(AS.110.202 OR AS.110.211) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.291 OR AS.110.302 OR AS.110.417 OR EN.553.386 OR EN.553.388 OR EN.553.391);Students may take only one of EN.550.681, EN.553.481, EN.553.681 or EN.553.781.

EN.553.488. Computing for Applied Mathematics. 3 Credits.
The aim of this course is to develop students' programming skills for solving problems commonly encountered in applied mathematics contexts. Specific problems that arise in applications of mathematics and data science (e.g. from finance, data analysis, or the physical sciences) are used to motivate concepts, techniques, and paradigms related to computation and programming. The Python language as well as a large collection of packages will be introduced. Students should be comfortable using computers but no prior programming background is required.
EN.553.310 OR EN.553.311 OR (EN.553.420 AND (EN.553.430 OR EN.553.431));Students may receive credit for EN.550.488/EN.553.488 or EN.553.688, but not both.

EN.553.491. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.

EN.553.492. Mathematical Biology. 3 Credits.
This course will examine the mathematical methods relevant to modeling biological phenomena, particularly dynamical systems and probability. Topics include ordinary differential equations and their simulation; stability and phase plane analysis; branching processes; Markov chains; and stochastically perturbed systems. Biological applications will be drawn from population growth, predator-prey dynamics, epidemiology, genetics, intracellular transport, and neuroscience.
(EN.553.420 OR EN.553.620) AND (AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306 OR EN.553.291);Students may receive credit for EN.550.492/EN.553.492 or EN.553.692, but not both.

EN.553.493. Mathematical Image Analysis. 4 Credits.
This course gives an overview of various mathematical methods related to several problems encountered in image processing and analysis, and presents numerical schemes to address them. It will focus on problems like image denoising and deblurring, contrast enhancement, segmentation and registration. The different mathematical concepts shall be introduced during the course; they include in particular functional spaces such as Sobolev and BV, Fourier and wavelet transforms, as well as some notions from convex optimization and numerical analysis. Most of such methods will be illustrated with algorithms and simulations on discrete images, using MATLAB. Prerequisites : linear algebra, multivariate calculus, basic programming in MATLAB. Recommended Course Background: Real analysis
(AS.110.202 OR AS.110.211) AND (EN.550.291 OR AS.110.201 OR AS.110.212);Students may receive credit for EN.550.493/EN.553.493 or EN.553.693, but not both.

EN.553.494. Applied and Computational Multilinear Algebra. 3 Credits.
In this seminar we plan to discuss generalizations of theorems and algorithms from matrix theory to hypermatrices. More specifically the seminar will discuss hypermatrix/tensor algebras, rank, spectra and transforms. Using the python friendly free open-source mathematics software SageMath and the hypermatrix algebra package we will discuss applications of hypermatrices to combinatorics, machine learning and data analysis.Preliminary knowledge of the Python language is not required.
AS.110.201 OR AS.110.212 OR EN.550.291;Students may receive credit for EN.550.494/EN.553.494 or EN.553.694, but not both.

EN.553.500. Undergraduate Research. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged individually between students and faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.501. Senior Thesis. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.502. Undergraduate Independent Study. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged individually between students and faculty. Recent topics and activities: percolation models, data analysis, course development assistance, and dynamical systems.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.506. Capstone Experience in Data Science. 3 - 6 Credits.
Project work for Data Science Master's students. Arranged individually between students and faculty.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.512. Group Undergraduate Research. 1 - 3 Credits.
Reading, research, or project work for undergraduate students. Pre-arranged meetings between students and faculty. This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.552. Undergraduate Internship. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.553.600. Mathematical Modeling and Consulting. 4 Credits.
Creating, analyzing and evaluating optimization and mathematical models using case studies. Project-oriented practice and guidance in modeling techniques, with emphasis on communication of methods and results. Applications may include transportation networks, scheduling, industrial processes, and telecommunications. Computation will be emphasized throughout using MATLAB. Recommend Course Background: EN.553.361 OR EN.553.362.
Students may receive credit for EN.550.400/EN.553.400 or EN.553.600, but not both.

EN.553.601. Introduction to Research. 3 Credits.
Aspects of the research process, including reading journal articles, writing mathematics, LaTeX, literature search, problem identification, problem-solving, oral presentations, Beamer, conference attendance, publication of results, and research ethics. An initial research experience, individually and/or in groups, with students identifying and developing projects in the mathematical sciences. Recent research topics have involved percolation, graph domination, Markov chains, birthday problems, gambler's ruin, integer programming, and rendezvous search problems. Instructor's permission required: Interested students must submit an unofficial transcript, vita, and personal statement to the instructor. Prereq: (553.171 or 553.172) and (553.420 or 553.620). Open only to graduate students.

EN.553.602. Research and Design in Applied Mathematics: Data Mining. 4 Credits.
The course will be project oriented with focus on practical uses of machine learning and data mining. Throughout the semester, teams of 4 will work on topics decided by the students and the instructor.
EN.553.636

EN.553.613. Applied Statistics and Data Analysis. 4 Credits.
An introduction to basic concepts, techniques, and major computer software packages in applied statistics and data analysis. Topics include numerical descriptive statistics, observations and variables, sampling distributions, statistical inference, linear regression, multiple regression, design of experiments, nonparametric methods, and sample surveys. Real-life data sets are used in lectures and computer assignments. Intensive use of statistical packages such as R to analyze data. Recommended Course Background: EN.553.112 or EN.553.310 or EN.553.311 or EN.553.420.
Students may receive credit for EN.550.413/EN.553.413 or EN.553.613, but not both.

EN.553.614. Applied Statistics and Data Analysis II. 3 Credits.
Part II of a sequence on data analysis and linear models. Topics include categorical and discrete data analysis, mixed models, semiparametric and nonparametric regression, and generalized additive models. Applications of these methods using the R environment for statistical computing will be emphasized.
Students may receive credit for EN.550.414/EN.553.414 or EN.553.614, but not both.

EN.553.620. Introduction to Probability. 4 Credits.
Probability and its applications, at the calculus level. Emphasis on techniques of application and on rigorous mathematical demonstration. Probability, combinatorial probability, random variables, distribution functions, important probability distributions, independence, conditional probability, moments, covariance and correlation, limit theorems. Recommended course background: (AS.110.109 or AS.110.113) and previously or concurrently (AS.110.202 or AS.110.201 or AS.110.212).
Students may receive credit for EN.550.420/EN.553.420 or EN.553.620, but not both.

EN.553.626. Introduction to Stochastic Processes. 4 Credits.
Mathematical theory of stochastic processes. Emphasis on deriving the dependence relations, statistical properties, and sample path behavior including random walks, Markov chains (both discrete and continuous time), Poisson processes, martingales, and Brownian motion. Applications that illuminate the theory. Students may receive credit for EN.553.426 or EN.553.626. Recommended course background: (EN.553.291 OR AS.110.201 OR AS.110.212).
Prerequisite(s): Students may not enroll in EN.553.620 in the same semester.
Students may receive credit for EN.550.426/EN.553.426 or EN.553.626, but not both.;EN.553.620

EN.553.627. Stochastic Processes and Applications to Finance. 4 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science. Recommend Course Background: EN.553.620.
Students may receive credit for only one of EN.550.427, EN.553.427, EN.553.627

EN.553.628. Stochastic Processes and Applications to Finance II. 4 Credits.
A basic knowledge of stochastic calculus and Brownian motion is assumed. Topics include stochastic differential equations, the Feynman-Kac formula and connections to partial differential equations, changes of measure, fundamental theorems of asset pricing, martingale representations, first passage times and pricing of path-dependent options, and jump processes.
Students may receive credit for EN.550.428/EN.553.428 or EN.553.628, but not both.

EN.553.630. Introduction to Statistics. 4 Credits.
Introduction to the basic principles of mathematical statistics and data analysis. Emphasis on techniques of application. Classical parametric estimation, hypothesis testing, and multiple decision problems; linear models, analysis of variance, and regression; nonparametric and robust procedures; decision-theoretic setting, Bayesian methods. Recommended Course Background: EN.553.620 AND (AS.110.201 OR AS.110.212 OR EN.553.291).
Students may receive credit for EN.550.430/EN.553.430 or EN.553.630, but not both.

EN.553.632. Bayesian Statistics. 3 Credits.
The course will cover Bayesian methods for exploratory data analysis. The emphasis will be on applied data analysis in various disciplines. We will consider a variety of topics, including introduction to Bayesian inference, prior and posterior distribution, hierarchical models, spatial models, longitudinal models, models for categorical data and missing data, model checking and selection, computational methods by Markov Chain Monte Carlo using R or Matlab. We will also cover some nonparametric Bayesian models if time allows, such as Gaussian processes and Dirichlet processes. Recommended prerequisites: EN.553.620 and (EN.553.630 or EN.553.730)
Students may take only one of EN.550.632, EN.553.432, EN.553.632 or EN.553.732.

EN.553.633. Monte Carlo Methods. 4 Credits.
The objective of the course is to survey essential simulation techniques for popular stochastic models. The stochastic models may include classical time-series models, Markov chains and diffusion models. The basic simulation techniques covered will be useful in sample-generation of random variables, vectors and stochastic processes, and as advanced techniques, importance sampling, particle filtering and Bayesian computation may be discussed. Recommended Course Background: EN.553.630.
Students may receive credit for EN.550.433/EN.553.433 or EN.553.633, but not both.

EN.553.636. Introduction to Data Science. 4 Credits.
Today the term Data Science is widely used covering a broad range of topics from mathematics and algorithms to actual data analysis and machine learning techniques. This course provides a thorough survey of relevant methods balancing the theory and the application aspects. Accordingly, the material and the discussions alternate between the methodology along with its underlying assumptions and the implementations along with their applications. We will cover several supervised methods for regression and classification, as well as unsupervised methods for clustering and dimensional reduction. To name a few in chronological order, the topics will include generalized linear regression, principal component analysis, nearest neighbor and Bayesian classifiers, support vector machines, logistic regression, decision trees, random forests, K-means clustering, Gaussian mixtures and Laplacian eigenmaps. The course uses Python and Jupyter Notebook and includes visualization techniques throughout the semester. Time permitting, an introduction to the Structured Query Language (SQL) is provided toward the end of the semester.
Students may receive credit for EN.550.436/EN.553.436 or EN.553.636, but not both.

EN.553.639. Time Series Analysis. 3 Credits.
Time series analysis from the frequency and time domain approaches. Descriptive techniques; regression analysis; trends, smoothing, prediction; linear systems; serial correlation; stationary processes; spectral analysis. Recommended course background: EN.553.620 and (AS.110.201 OR AS.110.212 OR EN.553.291)
Students may receive credit for EN.550.439/EN.553.439 or EN.553.639, but not both.

EN.553.641. Equity Markets and Quantitative Trading. 3 Credits.
This course introduces equity markets from a mathematical point of view. The properties of equities and equity-linked instruments will be described. Several quantitative trading strategies will be studied. Order execution tactics and the effect of market structure will be analyzed. Students will select a specialized aspect of the equity markets to investigate and complete a related independent project.
Students may receive credit for EN.550.441/EN.553.441 or EN.553.641, but not both.;EN.553.442 or EN.553.642, or instructor's permission

EN.553.642. Investment Science. 4 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision-making. Topics covered in the course include the basic theory of interest and its application to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory, and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, portfolio evaluation. The student is expected to be comfortable with the use of mathematics as a method of deduction and problem solving. Recommended Course Background: (AS.110.109 OR AS.110.113) AND (EN.553.291 OR AS.110.201 OR AS.110.212) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430).
Students may receive credit for EN.550.342 or EN.550.442/EN.553.442 or EN.553.642, but not both.

EN.553.643. Energy Markets and Risk Management. 3 Credits.
The course objectives are to provide a deep understanding of commodities markets, with a focus on Energy (Natural Gas, Electricity, Renewable Energy, Crude Oil) and extension to clean energy and corresponding carbon emission markets. The important instruments (Forward, Futures, Options) will be redefined, valued and used in real risk management examples. This course provides an opportunity to bridge the gap between financial models in academy and risk management solutions in complicated energy markets. Students should have a background in probability and financial derivatives.

EN.553.644. Introduction to Financial Derivatives. 4 Credits.
This course will develop the mathematical concepts and techniques for modeling cash instruments and their hybrids and derivatives. Prerequisites: background in Probability and Financial Derivatives.
Students may receive credit for EN.550.444/ EN.553.444 or EN.553.644, but not both.

EN.553.645. Interest Rate and Credit Derivatives. 4 Credits.
Advances in corporate finance, investment practice and the capital markets have been driven by the development of a mathematically rigorous theory for financial instruments and the markets in which they trade. This course builds on the concepts, techniques, instruments and markets introduced in EN.553.644. In addition to new topics in credit enhancement and structured securities, the focus is expanded to include applications in portfolio theory and risk management, and covers some numerical and computational approaches. Recommended Course Background: EN.553.644
Students may receive credit for EN.550.445/EN.553.445 or EN.553.645, but not both.

EN.553.646. Risk Measurement/Management in Financial Markets. 4 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings and compensatory techniques are addressed. Recommended Course Background: EN.553.644.
Students may receive credit for EN.550.446/EN.553.446 or EN.553.646, but not both.

EN.553.647. Quantitative Portfolio Theory and Performance Analysis. 4 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including, Sharpe, Treynor and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement and attribution; Replicating Benchmark Index (RBI) strategies using cash securities / derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management: Passive, Quasi-Passive (Indexing) Semi-Active (Immunization & Dedicated) Active (Scenario, Relative Value, Total Return and Optimization). In addition, risk management and hedging techniques are also addressed.
Students may receive credit for (EN.550.447 OR EN.553.447) OR EN.553.647, but not both.

EN.553.648. Financial Engineering and Structured Products. 4 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis).
Students may receive credit for EN.550.448/EN.553.448 or EN.553.648, but not both.

EN.553.649. Advanced Equity Derivatives. 4 Credits.
This course will cover the pricing, trading and risk management of equity derivatives, with emphasis on more exotic derivatives such as path-dependent and multi-asset derivatives. The course will emphasize practical issues: students will build their own pricing and risk management tools, and gain experience simulating the dynamic hedging of a complex derivatives portfolio. Students will practice structuring and selling equity derivative products. Pricing issues such a model selection, unobservable input parameters and calibration will be discussed, and students will learn techniques to manage the often highly nonlinear and discontinuous risks associated with these products. The course will have a significant computing component: both in the classroom and as homework projects, students will use Excel, write VBA macros and write and call C++ routines in the Microsoft Windows environment (which is the most common computing environment used by the financial industry). Recommended Course Background: EN.553.444.
Students may receive credit for EN.550.449/EN.553.449 or EN.553.649, but not both.

EN.553.650. Computational Molecular Medicine. 4 Credits.
Computational systems biology has emerged as the dominant framework for analyzing high-dimensional “omics” data in order to uncover the relationships among molecules, networks and disease. In particular, many of the core methodologies are based on statistical modeling, including machine learning, stochastic processes and statistical inference. We will cover the key aspects of this methodology, including measuring associations, testing multiple hypotheses, and learning predictors, Markov chains and graphical models. In addition, by studying recent important articles in cancer systems biology, we will illustrate how this approach enhances our ability to annotate genomes, discover molecular disease networks, detect disease, predict clinical outcomes, and characterize disease progression. Whereas a good foundation in probability and statistics is necessary, no prior exposure to molecular biology is required (although helpful). Recommended Course Background: EN.553.620 AND EN.553.630.
Students may receive credit for EN.550.450/EN.553.450 or EN.553.650, but not both.

EN.553.653. Mathematical Game Theory. 4 Credits.
Mathematical analysis of cooperative and noncooperative games. Theory and solution methods for matrix game (two players, zero-sum payoffs, finite strategy sets), games with a continuum of strategies, N-player games, games in rule-defined form. The roles of information and memory. Selected applications to economic, recreational, and military situations. Prereq: Multivariable Calculus, probability, linear algebra. Recommended Course Background: (AS.110.202 OR AS.110.211) AND EN.553.620 AND (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.453/EN.553.453 or EN.553.653, but not both.

EN.553.661. Optimization in Finance. 4 Credits.
A survey of many of the more important optimization methods and tools that are found to be useful in financial applications. Recommended Course Background: EN.553.642 OR EN.553.644.
Students may receive credit for EN.550.461/EN.553.461 or EN.553.661, but not both.

EN.553.663. Network Models in Operations Research. 4 Credits.
In-depth mathematical study of network flow models in operations research, with emphasis on combinatorial approaches for solving them. Introduction to techniques for constructing efficient algorithms, and to some related data structures, used in solving shortest-path, maximum-volume, flow, and minimum-cost flow problems. Emphasis on linear models and flows, with brief discussion of non-linear models and network design. Recommended Course Background: EN.553.361 OR EN.553.761 OR EN.553.661.
Students may receive credit for EN.550.463/EN.553.463 or EN.553.663, but not both.

EN.553.665. Introduction to Convexity. 4 Credits.
Convexity is a simple mathematical concept that has become central in a diverse range of applications in engineering, science and business applications. Our main focus from the applications perspective will be the use of convexity within optimization problems, where convexity plays a key role in identifying the "easy" problems from the "hard" ones. The course will have an equal emphasis on expositing the rich mathematical structure of the field itself (properties of convex sets, convex functions, Helly-Caratheorody-Radon type theorems, polarity/duality, subdifferential calculus, polyhedral theory), and demonstrating how these ideas can be leveraged to model and solve optimization problems (via a detailed study of linear programming and basics of nonlinear convex optimization). Recommend Course Background: Familiarity with basic real analysis, linear algebra.
Students may receive credit for EN.550.465 /EN.553.465 or EN.553.665, but not both.

EN.553.667. Deep Learning in Discrete Optimization. 3 Credits.
The goal of the course is to examine research-level topics in the application of deep-learning techniques to the solution of computational problems in discrete optimization. The first part of the course will cover background material, introducing students to deep learning (focusing on practical aspects) and covering major topics in computational discrete optimization: heuristic methods, dynamic programming, linear programming, cutting planes, column generation, and branch-and-bound. We will then make an in-depth study of research papers where deep learning has been proposed as a solution-technique in discrete optimization, aiming towards discussions of open research questions. Prerequisites: General mathematical maturity is expected: students should feel comfortable reading on their own Part 1 (Applied Math and Machine Learning Basics) in the text Deep Learning by Goodfellow, Bengio, and Courville.

EN.553.669. Large-Scale Optimization For Data Science. 3 Credits.
Optimization formulations and algorithms have long played a central role in data analysis and machine learning. In the era of big data, the need to solve large-scale optimization problems is ubiquitous in essentially all quantitative areas of human endeavor, including industry and science. This course is a mathematically rigorous and comprehensive introduction to the field of large-scale optimization for data science and machine learning, and is based on the latest results and insights. We discuss the most important algorithms in the area, with analysis of their convergence and complexity properties, as well as their practical implementations. Applications of the methods covered in the course can be found virtually in all fields of data science including text analysis, page ranking, speech recognition, image classification, finance and decision sciences. Prerequisites: background in Linear Algebra (or Computational Linear Algebra), Multivariable Calculus, Probability, and a basic knowledge of programming - experience with at least one high-level computing language (e.g.: Python, Matlab, Julia, C, ….).

EN.553.671. Combinatorial Analysis. 4 Credits.
An introduction to combinatorial analysis at the graduate level. Meets concurrently with 553.471. Counting techniques: generating functions, recurrence relations, Polya's theorem. Combinatorial designs: Latin squares, finite geometries, balanced incomplete block designs. Emphasis on problem solving. Recommended Course Background: EN.553.291 or AS.110.201
Students may receive credit for EN.550.471/EN.553.471 or EN.553.671, but not both.

EN.553.672. Graph Theory. 4 Credits.
Study of systems of "vertices" with some pairs joined by "edges." Theory of adjacency, connectivity, traversability, feedback, and other concepts underlying properties important in engineering and the sciences. Topics include paths, cycles, and trees; routing problems associated with Euler and Hamilton; design of graphs realizing specified incidence conditions and other constraints. Attention directed toward problem solving, algorithms, and applications. One or more topics taken up in greater depth. Recommended Course Background: (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.472/EN.553.472 or EN.553.672, but not both.

EN.553.681. Numerical Analysis. 4 Credits.
Brief review of topics in elementary numerical analysis such as floating-point arithmetic, Gaussian elimination for linear equations, inter-polation and approximation. Core topics to be covered: numerical linear algebra including eigenvalue and linear least-squares problems, iterative algorithms for nonlinear equations and least squares problems, and convergence theory of numerical methods. Other possible topics: sparse matrix computations, numerical solution of partial differential equations, finite element methods, and parallel algorithms.Recommended Course Background: Multivariable calculus, linear algebra, and differential equations.
Students may take only one of EN.550.681, EN.553.481, EN.553.681 or EN.553.781.

EN.553.688. Computing for Applied Mathematics. 3 Credits.
The aim of this course is to develop students' programming skills for solving solve problems commonly encountered in applied mathematics contexts. Specific problems that arise in applications of mathematics and data science (e.g. from finance, data analysis, or the physical sciences) are used to motivate concepts, techniques, and paradigms related to computation and programming. The Python language as well as a large collection of packages will be introduced. Recommended Course Background: EN.553.310 OR EN.553.311 OR (EN.553.420 AND EN.553.430). Students should be comfortable using computers but no prior programming background is required.
Students may receive credit for EN.553.488 or EN.553.688, but not both.

EN.553.691. Dynamical Systems. 4 Credits.
Mathematical concepts and methods for describing and analyzing linear and nonlinear systems that evolve over time. Topics include boundedness, stability of fixed points and attractors, feedback, optimality, Liapounov functions, bifurcation, chaos, and catastrophes. Examples drawn from population growth, economic behavior, physical and engineering systems. The main mathematical tools are linear algebra and basic differential equations.

EN.553.692. Mathematical Biology. 3 Credits.
This course will examine the mathematical methods relevant to modeling biological phenomena, particularly dynamical systems and probability. Topics include ordinary differential equations and their simulation; stability and phase plane analysis; branching processes; Markov chains; and stochastically perturbed systems. Biological applications will be drawn from population growth, predator-prey dynamics, epidemiology, genetics, intracellular transport, and neuroscience. Recommended Course Background: EN.553.620 AND (AS.110.201 OR AS.110.212) AND (AS.110.302 OR AS.110.306 OR EN.553.291)
Students may receive credit for EN.550.492/EN.553.492 or EN.553.692, but not both.

EN.553.693. Mathematical Image Analysis. 4 Credits.
This course gives an overview of various mathematical methods related to several problems encountered in image processing and analysis, and presents numerical schemes to address them. It will focus on problems like image denoising and deblurring, contrast enhancement, segmentation and registration. The different mathematical concepts shall be introduced during the course; they include in particular functional spaces such as Sobolev and BV, Fourier and wavelet transforms, as well as some notions from convex optimization and numerical analysis. Most of such methods will be illustrated with algorithms and simulations on discrete images, using MATLAB. Prerequisites : linear algebra, multivariate calculus, basic programming in MATLAB. Recommended Course Background: (AS.110.202 OR AS.110.211) AND (EN.553.291 OR AS.110.201 OR AS.110.212)
Students may receive credit for EN.550.493/EN.553.493 or EN.553.693, but not both.

EN.553.694. Applied and Computational Multilinear Algebra. 3 Credits.
In this seminar we plan to discuss generalizations of theorems and algorithms from matrix theory to hypermatrices. More specifically the seminar will discuss hypermatrix/tensor algebras, rank, spectra and transforms. Using the python friendly free open-source mathematics software SageMath and the hypermatrix algebra package we will discuss applications of hypermatrices to combinatorics, machine learning and data analysis. Preliminary knowledge of the Python language is not required. Recommended Course Background: AS.110.212 OR AS.110.201 OR EN.553.291.
Students may receive credit for EN.553.494 or EN.553.694, but not both.

EN.553.701. Real Analysis: Preparation for the Ph.D. Introductory Examination. 4 Credits.
This course is designed to prepare students for the Real Analysis part of the introductory exam of the Department of Applied Mathematics and Statistics. In this course we will cover fundamental topics in real analysis, such as, Set Theory, The Topology of Euclidean Space, Continuous Mappings, Uniform Convergence, Differentiable Mappings, Inverse & Implicit Function Theorems, Integration Theory, Fourier Series, and Basics of Differential Equations.

EN.553.720. Probability Theory I. 4 Credits.
The course objectives are to develop probabilistic reasoning and problem solving approaches, to provide a rigorous mathematical basis for probability theory, and to examine several important results in the theory of probability. Topics include axiomatic probability, independence, random variables and their distributions, expectation, integration, variance and moments, probability inequalities, and modes of convergence of random variables. The course will include introductory measure theory as needed. Students are expected to have previous study of both analysis and probability. This course is the first half of a yearlong sequence. The second semester's course, EN.553.721 Probability Theory II, will cover classical limit theorems, characteristic functions, and conditional expectation. Prerequisite: real analysis (AS.110.405/AS.110.415)
Students may take EN.550.620 or EN.553.720, but not both.

EN.553.721. Probability Theory II. 4 Credits.
Probability at the level of measure theory, focusing on limit theory. Modes of convergence, Poisson convergence, three-series theorem, strong law of large numbers, continuity theorem, central limit theory, Berry-Esseen theorem, infinitely divisible and stable laws. Recommended Course Background: EN.553.720 AND (AS.110.405 OR AS.110.415)

EN.553.722. Introduction to Stochastic Calculus. 3 Credits.
A graduate-level class on stochastic calculus, providing a rigorous introduction on stochastic integrals and differential equations. (AS.110.405 OR EN.553.701) AND EN.553.720

EN.553.729. Topics in Probability. 3 Credits.
This seminar course will discuss the "probabilistic method," with applications to random graphs and percolation theory. Topics include linearity of expectation, first and second moment methods, the local lemma, correlation inequalities, martingale concentration results, the evolution of random graphs, Poisson approximation, stochastic ordering, bond and site percolation models, and the substitution method for bounding percolation thresholds. Students will present at least two short talks on relevant topics or applications of their choice. Prerequisites: 553.620 Introduction to Probability and 553.672 Graph Theory, or equivalents. No auditors permitted.

EN.553.730. Statistical Theory. 4 Credits.
The fundamentals of mathematical statistics will be covered. Topics include: distribution theory for statistics of normal samples, exponential statistical models, the sufficiency principle, least squares estimation, maximum likelihood estimation, uniform minimum variance unbiased estimation, hypothesis testing, the Neyman-Pearson lemma, likelihood ratio procedures, the general linear model, the Gauss-Markov theorem, simultaneous inference, decision theory, Bayes and minimax procedures, chi-square methods, goodness-of-fit tests, and nonparametric and robust methods.
Students may take EN.550.630 or EN.553.730, but not both.

EN.553.731. Statistical Theory II. 3 Credits.
Advanced concepts and tools fundamental to research in mathematical statistics and statistical inference: asymptotic theory;optimality; various mathematical foundations.

EN.553.733. Nonparametric Bayesian Statistics. 3 Credits.
This course covers advanced topics in Bayesian statistical analysis beyond the introductory course. Therefore knowledge of basic Bayesian statistics is assumed (at the level of “A first course in Bayesian statistical methods”, by Peter Hoff (Springer, 2009). The models and computational methods will be introduced with emphasis on applications to real data problems. This course will cover nonparametric Bayesian models including Gaussian process, Dirichlet process (DP), Polya trees, dependent DP, Indian buffet process, etc. Recommended Course Background: EN.553.432 or EN.553.632 or EN.553.732 or permission from the instructor

EN.553.735. Topics in Statistical Pattern Recognition. 3 Credits.
The Dissimilarity Representation for Pattern Recognition. This course will investigate aspects of statistical inference and statistical pattern recognition associated with observing only dissimilarites between entities rather than observing feature vectors associated with the individual entities themselves.

EN.553.736. System Identification and Likelihood Methods. 2 Credits.
The focus of this roundtable-format course will be stochastic modeling as relates to system identification and maximum likelihood. The principles and algorithms being covered in this course have tremendous importance in the world at large. For example, maximum likelihood is arguably the most popular method for parameter estimation in most real-world applications. System identification is the term used in many fields to refer to the process of mathematical model building from experimental data, with a special focus on dynamical systems. The system identification process refers to several important aspects of model building, including selection of the model form (linear or nonlinear, static or dynamic, etc.), experimental design, parameter estimation, and model validation. This course will cover topics such as the maximum likelihood formulation and theory for dynamical systems, the EM (expectation-maximization) algorithm and its variants, Fisher information, common model structures, online versus offline estimation, the role of feedback in identification (i.e., open-loop versus closed-loop estimation), standard and extended Kalman filtering, and uncertainty characterization (e.g., confidence regions). Recommended Course Background: Undergraduate-level matrix theory and ordinary differential equations; graduate-level course in probability and statistics (e.g., 553.430 or equivalent; in particular, students should have prior exposure to maximum likelihood and Bayes’ rule). Prior experience in data analysis and algorithms will be helpful.

EN.553.738. High-Dimensional Approximation, Probability, and Statistical Learning. 3 Credits.
The course covers fundamental mathematical ideas for certain approximation and statistical learning problems in high dimensions. We start with basic approximation theory in low-dimensions, in particular linear and nonlinear approximation by Fourier and wavelets in classical smoothness spaces, and discuss applications in imaging, inverse problems and PDE’s. We then introduce notions of complexity of function spaces, which will be important in statistical learning. We then move to basic problems in statistical learning, such as regression and density estimation. The interplay between randomness and approximation theory is introduced, as well as fundamental tools such as concentration inequalities, basic random matrix theory, and various estimators are constructed in detail, in particular multi scale estimators. At all times we consider the geometric aspects and interpretations, and will discuss concentration of measure phenomena, embedding of metric spaces, optimal transportation distances, and their applications to problems in machine learning such as manifold learning and dictionary learning for signal processing.

EN.553.739. Statistical Pattern Recognition Theory & Methods. 3 Credits.
This biennial course covers topics in the theory, methods, and applications of machine learning from an explicitly statistical perspective. Recommended Course Background: (EN.550.420 OR EN.553.420 OR EN.553.620) AND (EN.550.430 OR EN.553.430 OR EN.553.630)

EN.553.740. Machine Learning I. 3 Credits.
This course is the first part of a two-semester sequence that focuses on theoretical and practical aspects of statistical learning. After introducing background material on inner-product spaces, reproducing kernels and on optimization, the course discusses fundamental concepts of machine learning (such as generalization error, Bayes estimators and the bias vs. variance dilemma) and studies a collection of learning algorithms for classification and regression. The topics that are discussed include linear and kernel regression, support vector machines, lasso, logistic regression, decision trees and neural networks. Students will need a solid background in multivariate calculus, linear algebra, probability and statistics to complete the course.Recommended Course background: 553.620 and 553.630 or higher, and prerequisites for these courses.

EN.553.741. Machine Learning II. 3 Credits.
This course is the second part of a two-semester sequence that focuses on theoretical and practical aspects of statistical learning. The course will have two distinct parts. The first one will discuss some fundamentals of statistical learning theory, including some concentration inequality, generalization bounds and VC dimension. The second one will introduce problems and algorithms for unsupervised data analysis, including dimension reduction, manifold learning and clustering. Recommended course background: 553.740.

EN.553.742. Statistical Inference on Graphs. 3 Credits.
This course provides an introduction to and overview of current research in random graph inference, with a particular focus on spectral methods and their applications to inference for independent-edge random graphs. Topics include concentration inequalities; analysis of matrix perturbations; spectral decompositions of graph adjacency and Laplacian matrices; consistent estimation of latent variables associated to vertices; clustering, community detection, and classification in networks; and multi-sample hypothesis testing for graphs. Emphasis will be on a framework for establishing classical properties---consistency, normality, and efficiency---for estimators of graph parameters. Students will read papers in the literature and are expected to participate actively in class. Recommended prerequisites EN.553.792 and EN.553.630.

EN.553.743. Equivariant Machine Learning. 3 Credits.
This is a graduate course in the topic of equivariant machine learning and graph neural networks. The course will have a fixed schedule with a preselected list of theoretical research papers to discuss each class (2.5 hours once a week). Each week two students will present one paper to the class and discussion will follow. The evaluation will be based on the quality and clarity of the presentations and in-class participation. There will be no homework nor exams.Prerequisites include basic knowledge of machine learning and probability.

EN.553.749. Derivatives Across Asset Classes. 3 Credits.
The first part of the course will review in depth the main instruments in the various asset classes, as well as the founding results on investment decision, capital budgeting and project financing. The second part will analyze the theory of the firm: capital structure, dilution and share repurchase, dividend policy, Modigliani- Miller theorem and will lead to the contingent claim pricing of corporate debt and equity as in Merton (1974) and its extensions . The third part will extend the CAPM to the Arbitrage Pricing Theory of Ross (1976) and its theoretical and operational consequences. The fourth part will be dedicated to the stochastic modelling of the yield curve to price caps, floors and swaptions, and their use in the Asset Liability Management of a bank and insurance company. This course will not begin until mid-October.
Students may take EN.550.649 or EN.553.749, but not both.

EN.553.753. Commodity Markets and Green Energy Finance. 4 Credits.
The first half of this course will be devoted to energy markets, both in terms of the market itself and how to model peculiar features of this business. First we will discuss fossil fuels, including physical and financial natural gas and LNG; crude and refined petroleum commodities; and possibly coal markets. Then the focus will turn to electricity markets, including market structures; energy, capacity and ancillary services markets; characteristics of demand; power plant commitment and dispatch; the “stack” or market supply curve; characteristics of different plants and fuels; regional differences in markets; and hedging techniques from trading vanilla products all the way to complex multi-commodity structures. We will discuss renewable energy sources, their characteristics, economics, and effects on the larger market, as well as emissions markets as a way of removing pollution externalities. The first half will conclude by elaborating on risk management techniques; credit; legislation and regulation; and derivative accounting as time permits. The second half of the course will turn to shipping, metals and agricultural markets. The metal physical markets will be described, the major Exchanges presented (LME, SHFE), as well as the warehousing issues in the case of base metals. The case of precious metals will be singled out, and gold in particular; and finally uranium and rare earths. Agricultural (grains and softs) markets will be presented, together with the crucial issues of biofuels, fertilizers, water, and arable land. In all cases, there will be a large focus on the trading activities – both to hedge and to gain exposure to commodities – in spot and derivative markets. Numerous examples of forward curves will be provided, as well as volatility skews. The valuation of swaps, spread options and Asian options will be (re)derived. Students should have rudimentary knowledge of financial markets. Recommended Course Background: EN.553.620 and AS.110.108

EN.553.761. Nonlinear Optimization I. 3 Credits.
This course considers algorithms for solving various nonlinear optimization problems and, in parallel, develops the supporting theory. The primary focus will be on unconstrained optimization problems. Topics for the course will include: necessary and sufficient optimality conditions; steepest descent method; Newton and quasi-Newton based line-search, trust-region, and adaptive cubic regularization methods; linear and nonlinear least-squares problems; linear and nonlinear conjugate gradient methods. Recommended Course Background: Multivariable Calculus, Linear Algebra, Real Analysis such as AS.110.405
Students may take EN.550.661 or EN.553.761, but not both.

EN.553.762. Nonlinear Optimization II. 3 Credits.
This course considers algorithms for solving various nonlinear optimization problems and, in parallel, develops the supporting theory. The primary focus will be on constrained optimization problems. Topics for the course will include: necessary and sufficient optimality conditions for constrained optimization; projected-gradient and two-phase accelerated subspace methods for bound-constrained optimization; simplex and interior-point methods for linear programming; duality theory; and penalty, augmented Lagrangian, sequential quadratic programming, and interior-point methods for general nonlinear programming. In addition, we will consider the Alternating Direction Method of Multipliers (ADMM), which is applicable to a huge range of problems including sparse inverse covariance estimation, consensus, and compressed sensing. Recommended Course Background: Multivariable Calculus, Linear Algebra, Real Analysis such as AS.110.405.

EN.553.763. Stochastic Search & Optimization. 3 Credits.
An introduction to stochastic search and optimization, including discrete and continuous optimization problems. Topics will include the “no free lunch” theorems, beneficial effects of injected Monte Carlo randomness, algorithms for global and local optimization problems, random search, recursive least squares, stochastic approximation, simulated annealing, evolutionary and genetic algorithms, and statistical multiple comparisons. Recommended Course Background: Graduate course in probability and statistics and knowledge of basic matrix algebra.

EN.553.764. Modeling, Simulation, and Monte Carlo. 3 Credits.
Concepts and statistical techniques critical to constructing and analyzing effective simulations; emphasis on generic principles rather than specific applications. Topics include model building (bias-variance tradeoff, model selection,, Fisher information), benefits and drawbacks of simulation modeling, random number generation, simulation-based optimization, discrete multiple comparisons using simulations, Markov chain Monte Carlo (MCMC), and input selection using optimal experimental design.

EN.553.766. Combinatorial Optimization. 3 Credits.
The main goal of this course is to introduce students to combinatorial optimization techniques. The first part of the course will focus on combinatorial algorithms for classical problems. The next part of the course will show how polyehdral theory can be used to deal with combinatorial optimization problems in a unifying manner. Familiarity with linear programming and algorithms desirable but not strictly required. Recommended Course Background: Linear Algebra.

EN.553.780. Shape and Differential Geometry. 3 Credits.
The purpose of this class is to provide an elementary knowledge of the differential geometry of curves and surfaces, and to place this in relation with the description and characterization of 2D and 3D shapes. Intrinsic local and semi-local descriptors, like the curvature or the second fundamental form will be introduced, with an emphasis on the invariance of these features with respect to rotations, translations, etc. Extension of this point of view to other class of linear transformations will be given, as well as other types of shape descriptors, like moments or medial axes. Recommended Course Background: Calculus III and linear algebra

EN.553.782. Statistical Uncertainty Quantification. 3 Credits.
This course introduces uncertainty quantification (UQ) on mathematical models and data, with emphasis on the use of stochastic processes and probability theory. Topics include computer experiments, designs, conditional probability, Bayesian inference, Gaussian stochastic processes, continuity, reproducing kernel Hilbert space, covariance functions, computer model emulation, parameter estimation, approximation, dynamic linear models, Kalman filter, computation, sensitivity analysis, functional ANOVA, model selection and calibration. Examples of some continuous time processes will be introduced, such as Brownian motion, Brownian bridge, O-U process, with extensions to multi-dimensional input space. Uncertainty analysis of mathematical models will be the focus from both theoretical and computational perspectives. Applications will concentrate on understanding and predicting the behavior of complex systems in science and engineering. Prerequisite EN.553.620 or EN.553.720 Recommended course background: EN.553.630 or EN.553.730.
Students may take EN.550.782 or EN.553.782, but not both.

EN.553.783. Reliability Analysis. 3 Credits.
Reliability is the likelihood that an item will successfully perform to its specified requirements for a stated period of time and understanding its concepts has many applications within various scientific and engineering disciplines. Designed mainly for beginning level graduate students, this course consists of three major components. First, we will revisit some probability principles which will serve as the foundation for this course. Next, we will explore common lifetime models, model selection, and model fitting methods. Finally, we will look at reliability from a systems perspective where the focus will be on system reliability. Students are expected to present their findings on the applications on reliability presented in published works and/or via course projects. Recommended course background: EN.553.620.

EN.553.785. Asymptotic Analysis. 3 Credits.
Asymptotic analysis is a branch of mathematics that emphasizes finding approximate solutions for either small or large parameters, which have many benefits in various scientific and engineering disciplines. This is because, due to the complexity and mathematical formulation of the problem, analytical solutions are either difficult to obtain or impractical. The goal of this course is to introduce students to some of the most frequently used methods consisting of the following main components. First, an introduction to asymptotic sequences and expansions will be provided as well as some common techniques to obtaining asymptotic expansions on integrals. Next, some common transforms and their inverses will be introduced as well as techniques on finding the asymptotic representation of their inverses. Finally, we will examine some techniques for finding asymptotic representations of solutions resulting from ordinary differential equations. Throughout this course students will also be introduced to some special functions as practical examples to demonstrate how these techniques can be applied to provide robust approximations. Recommended Course Background: Differential Equations and either of the following courses AS.110.405, 110.311, or 110.607.

EN.553.790. Neural Networks and Feedback Control Systems. 2 Credits.
This roundtable course is an introduction to two related areas?neural networks (NNs) and control systems based on the use of feedback. Artificial NNs are effective conceptual and computational vehicles for many important applications; feedback control is relevant to virtually all natural and human-made systems. NNs are applied in areas such as system modeling and control, function approximation, time-series filtering/prediction/smoothing, speech/image/signal processing, and pattern recognition. Topics to be covered for NNs include network architecture, learning algorithms, and applications. Specific NNs discussed include perceptrons, feedforward networks with backpropagation, and recurrent networks. This course also provides an introduction to feedback control systems, including the role of feedback in regulating systems and in achieving stability in systems. We consider stochastic (noise) effects in feedback systems. We also consider the interface of NNs and control by discussing how NNs are used in building modern control systems in problems where standard methods are infeasible. Recommended Course Background: Matrix theory, differential equations, and a graduate course in probability and statistics.

EN.553.791. Internship - Financial Mathematics. 2 Credits.
This course is open only to AMS department master's students.

EN.553.792. Matrix Analysis and Linear Algebra. 4 Credits.
A second course in linear algebra with emphasis on topics useful in analysis, economics, statistics, control theory, and numerical analysis. Review of linear algebra, decomposition and factorization theorems, positive definite matrices, norms and convergence, eigenvalue location theorems, variational methods, positive and nonnegative matrices, generalized inverses. Prerequisite: one semester of real analysis.
Students may take EN.550.692 or EN.553.792, but not both.

EN.553.793. Turbulence Theory. 3 Credits.
An advanced introduction to turbulence theory for graduate students in the physical sciences, engineering and mathematics. Both intuitive understanding and exact analysis of the fluid equations will be stressed. Previous familiarity with fluid mechanics is not required, although it could be helpful.

EN.553.794. Turbulence Theory II. 3 Credits.
This course will continue the theoretical investigation of fluid turbulence, directly following on from EN.550.693. Topics to be considered are turbulent vortex dynamics, Lagrangian dynamics, and special topics such as wall-bounded turbulence, free shear flows, two-dimensional and quasigeostrophic turbulence, MHD turbulence, etc. Cross-listed with Physics

EN.553.797. Introduction to Control Theory and Optimal Control. 3 Credits.
A control system is a dynamical system on which one can act through a parameter that can be chosen freely at any point in time. In this class, we will be interested in two main problems. The first one is controllability, which studies conditions for the existence of controls allowing an initial point to be driven to any other point. The second one is optimal control, in which we will study methods to minimize a certain cost over all possible controls, possibly with endpoint constraints. Such problems have many applications in engineering: crossing a river with minimal fuel, planning trajectories of rocket engines etc. Recommended Course Background: Multivariate Calculus, Linear Algebra, Differential Equations. Some familiarity with Optimization is recommended, but not mandatory.

EN.553.799. Topics In Applied Math. 3 Credits.
Machine learning systems have huge capabilities, and they are increasingly being deployed in many real-world applications. Therefore, it is critical to make sure that they are safe and trustworthy. This course focuses on understanding aspects regarding fairness, privacy, explainability, and robustness of machine learning models.The course will cover a list of recent research papers in the field, featuring practical aspects as well as mathematical aspects of these topics. The course not only focuses on the theory of fairness, privacy, explainablity, and robustness of machine learning models, but also it aims to develop students' communication skills.

EN.553.800. Dissertation Research. 3 - 20 Credits.

EN.553.801. Department Seminar. 1 Credit.
A variety of topics discussed by speakers from within and outside the university. Required of all resident department graduate students.

EN.553.802. Graduate Independent Study. 3 Credits.

EN.553.804. Approved External Coursework. 3 - 20 Credits.

EN.553.806. Capstone Experience in Data Science. 3 - 10 Credits.
Project work for Data Science Master's students. Arranged individually between students and faculty.

EN.553.809. Master's Research. 3 - 10 Credits.
Reading, research, or project work for Master's level students. Arranged individually between students and faculty.

EN.553.810. Probability & Statistics. 1 - 4 Credits.
EN.553.721

EN.553.847. Financial Mathematics Masters Seminar. 1 Credit.
This course is only open to students enrolled in the MSE in Financial Mathematics program. Advanced topics chosen according to the interests of the instructor and graduate students. The course will focus on recent research articles in the financial mathematics literature.

EN.553.861. Nonsmooth Optimization Seminar. 3 Credits.
Readings and seminar in nonsmooth optimization. Topics may include nonsmooth, nonconvex analysis (generalized gradient and subdifferentials) and nonsmooth, nonconvex optimization methods.

EN.555 (Financial Mathematics)

EN.555.627. Stochastic Processes and Applications to Finance. 3 Credits.
A development of stochastic processes with substantial emphasis on the processes, concepts, and methods useful in mathematical finance. Relevant concepts from probability theory, particularly conditional probability and conditional expection, will be briefly reviewed. Important concepts in stochastic processes will be introduced in the simpler setting of discrete-time processes, including random walks, Markov chains, and discrete-time martingales, then used to motivate more advanced material. Most of the course will concentrate on continuous-time stochastic processes, particularly martingales, Brownian motion, diffusions, and basic tools of stochastic calculus. Examples will focus on applications in finance, economics, business, and actuarial science.

EN.555.642. Investment Science. 3 Credits.
This is the key introductory course for the financial mathematics program and introduces the major topics of investment finance. The investment universe, its context of markets, and the flow of global capital are introduced. Details of equities, interest, bonds, commodities, forwards, futures, and derivatives are introduced to varying degree. The concepts of deterministic cash flow stream, valuation, term structure theories, risk, and single- and multi-period random cash flows are presented. Here the neoclassical theory of finance is introduced including the topics of efficient markets, the risk-return twins leading to the mean variance Capital Asset Pricing Model (CAPM), the efficient frontier, the intertemporal models, and Arbitrage Pricing Theory (APT). Some introductory models of asset dynamics (including the binomial model), basic options theory, and elements of hedging are also included in this course. Course Note(s): This course is the same as EN.553.642 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.644. Introduction to Financial Derivatives. 3 Credits.
This is the first of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. The basic cash, hybrid, and derivative instruments are reviewed and set in a rigorous mathematical context. This includes equities, bonds, options, forwards, futures, and swaps, as well as their dealer, overthe-counter, and exchange environment. Models of the term structure of interest rates, spot rates and, the forward rate curve are treated; derived from cash instruments (e.g., bonds and interest rates like LIBOR) as well as from derivatives (such as Eurodollar futures and swaps). Principles of static, discrete, continuous and dynamic probabilistic models for derivative analysis (including the Weiner process, Ito's Lemma, and an introduction to risk-neutral valuation) are applied to develop the binomial tree approach to option valuation, the Black-ScholesMerton differential equation, and the Black-Scholes formulas for option pricing. Course Note(s): This course is the same as EN.553.644 offered by through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.645. Interest Rate and Credit Derivatives. 3 Credits.
This is the second of a two-course sequence devoted to the mathematical modeling of securities and the markets in which they are created and exchanged. Focus turns to interest rate derivatives and the credit markets. The martingale approach to risk-neutral valuation is covered, followed by interest rate derivatives and models of the short rate process (including Heath, Jarrow & Morton and the Libor Market Model); analysis of bonds with embedded options and other interest rate derivatives (e.g., caps, floors, swaptions). Credit risk and credit derivatives, including copula models of time to default, credit default swaps, and a brief introduction to collateralized debt obligations will be covered. A major component of this course is computational methods. This includes data and time series analysis (e.g., estimation of volatilities), developing binomial and trinomial lattices and derivative analysis schemes, and numerical approaches to solving the partial differential equations of derivatives. Course Note(s): This course is the same as EN.553.645 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.
EN.555.644 Introduction to Financial Derivatives

EN.555.646. Financial Risk Management and Measurement. 3 Credits.
This course applies advanced mathematical techniques to the measurement, analysis, and management of risk. The focus is on financial risk. Sources of risk for financial instruments (e.g., market risk, interest rate risk, credit risk) are analyzed; models for these risk factors are studied and the limitation, shortcomings, and compensatory techniques are addressed. Throughout the course, the environment for risk is considered, be it regulatory or social (e.g., Basel capital accords). A major component of the course are the Value at Risk (VaR) and Conditional VaR measures for market risk in trading operations, including approaches for calculating and aggregating VaR, testing VaR, VaR-driven capital for market risk, and limitations of the VaR-based approach. Asset Liability Management (ALM), where liquidity risk as well as market risk can affect the balance sheet, is analyzed. Here, models for interest rate, spread, and volatility risks are applied to quantify this exposure. Another major component of the course is credit risk. Sources of credit risk, how measured risk is used to manage exposure, credit derivatives, techniques for measuring default exposure for a single facility (including discriminant analysis and Mertonbased simulation), portfolio risk aggregation approaches (including covariance, actuarial, Merton-based simulation, macro-economic default model, and the macro-economic cashflow model - for structured and project finance). Finally, there is a brief introduction to concepts and tools that remain valid for large and extreme price moves, including the theory of copulas and their empirical testing and calibration. Course Note(s): This course is the same as EN.553.646 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.647. Quantitative Portfolio Theory & Performance Analysis. 3 Credits.
This course focuses on modern quantitative portfolio theory, models, and analysis. Topics include intertemporal approaches to modeling and optimizing asset selection and asset allocation; benchmarks (indexes), performance assessment (including Sharpe, Treynor, and Jenson ratios) and performance attribution; immunization theorems; alpha-beta separation in management, performance measurement, and attribution; Replicating Benchmark Index (RBI) strategies using cash securities/derivatives; Liability-Driven Investment (LDI); and the taxonomy and techniques of strategies for traditional management (Passive, Quasi-Passive [Indexing] Semi-Active [Immunization & Dedicated] Active [Scenario, Relative Value, Total Return and Optimization]). In addition, risk management and hedging techniques are also addressed. Course Note(s): This course is the same as EN.553.647 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.555.648. Financial Engineering and Structured Products. 3 Credits.
This course focuses on structured securities and the structuring of aggregates of financial instruments into engineered solutions of problems in capital finance. Topics include the fundamentals of creating asset-backed and structured securities—including mortgage-backed securities (MBS), stripped securities, collateralized mortgage obligations (CMOs), and other asset-backed collateralized debt obligations (CDOs)—structuring and allocating cash-flows as well as enhancing credit; equity hybrids and convertible instruments; asset swaps, credit derivatives, and total return swaps; assessment of structure-risk interest rate-risk and credit-risk as well as strategies for hedging these exposures; managing portfolios of structured securities; and relative value analysis (including OAS and scenario analysis). Course Note(s): This course is the same as EN.553.648 offered through the full-time Applied Mathematics & Statistics department for the residence Master of Science in Engineering in Financial Mathematics.

EN.560 (Systems and Civil Engineering)

EN.560.100. Civilization Engineered. 3 Credits.
Civilizations have always faced challenges – whether naturally occurring or manmade – and have had to design solutions in order to survive. Our modern civilization is no different; we face major societal challenges related to resilient cities, human safety and security, decision-making and healthcare, energy infrastructure, and space exploration and habitation, among others, and solving these challenges will require an interdisciplinary approach. This course will look to the past – studying the engineering solutions developed by ancient civilizations – and at the current state of affairs – in preparation for designing solutions to the grand challenges of the future.

EN.560.112. Electromagnetism & Sensors Lab. 1 Credit.
Electricity and magnetism underpins much of modern engineering, as an alternative or addendum to classical Physics this, largely, hands-on laboratory course exposes engineers to the principles of electromagnetism and how they are leveraged in the modern world with a focus on their application in infrastructure and sensor networks.

EN.560.141. Perspectives on the Evolution of Structures. 3 Credits.
Why do buildings and bridges look the way they do today? Students will be provided the tools to answer this question for themselves through a study of the history of the design of buildings and bridges throughout the world from both engineering and architectural/aesthetic perspectives. Only simple mathematics is required (no calculus). Students will participate in individual and group critique of structures from engineering, architectural, and social points of view.
Area: Writing Intensive

EN.560.191. CaSE Collaborative. 0.5 Credits.
From sketching to 3D printing, students in this course will work directly with the tools that civil and systems engineers use to plan and communicate their ideas. Hands-on learning activities will help students develop these skills, with an emphasis on communication and collaboration using graphical tools such as CAD and GIS software and physical specimens fabricated with manual construction and 3D printing.

EN.560.192. CaSE Design. 0.5 Credits.
Through this course, students will be introduced to various design principles and further explore the role of civil and systems engineering design in communities and society. Students will work collaboratively with a civil and systems engineering senior design team or research group to explore the impact of their intended design on communities.

EN.560.201. Statics & Mechanics of Materials. 3 Credits.
This course combines statics - the basic principles of classical mechanics applied to the equilibrium of particles and rigid bodies at rest, under the influence of various force systems - with mechanics of materials - the study of deformable bodies and the relationships between stresses and deformations within those bodies. Fundamental concepts in statics include the proper use of free body diagrams, the analysis of simple structures, centroids and centers of gravity, and moments of inertia. The study of mechanics of materials will focus on the elastic analysis of axial force, torsion, and bending members to determine corresponding stresses and strains. Stress transformations and principal stresses will be introduced.For most majors, students are required to register for both 560.201 Statics and Mechanics of Materials and 560.211 Statics and Mechanics of Materials Laboratory.
Prerequisite(s): EN.560.211
AS.171.101 OR AS.171.107 OR (EN.530.123 AND EN.530.124) or instructor permission.

EN.560.211. Statics and Mechanics of Materials Laboratory. 1 Credit.
The complementary laboratory course for and required corequisite to EN.560.201 Statics and Mechanics of Materials. For most majors, students are required to register for both 560.201 Statics and Mechanics of Materials and 560.211 Statics and Mechanics of Materials Laboratory.
Prerequisite(s): EN.560.201
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.560.240. Uncertainty, Reliability and Decision-making. 3 Credits.
Development and applications of the analysis of uncertainty, including basic probability, statistics and decision theory, with applications in various engineering disciplines, with some emphasis on problems in civil and systems engineering.

EN.560.250. Intro to Mathematical Decision Making. 3 Credits.
This first course in mathematical decision-making and optimization uses quantitative approaches to problem solving. The students are introduced to mathematical modeling and its formulations, solutions methods, output analysis, and hands-on solution techniques. An array of practical problems from Energy, Health, Space, Management, Engineering, and other fields are reviewed, and a number of solution methods including but not limited to, linear optimization, integer optimization, convex optimization, decision analysis, and heuristic algorithms are introduced.

EN.560.255. Dynamical Systems. 3 Credits.
This course will introduce students to the modeling and analysis of dynamical systems using analytical, numerical and qualitative (geometric) techniques. The course will focus on dynamical systems arising in mechanics and vibrations, global climate and infectious disease modeling. The following topics will be covered: linear first and second order ODEs, analytical methods, Laplace and Fourier transforms, control systems, numerical integration, finite differences, nonlinear systems, phase plane analysis, stability, bifurcations, chaos.

EN.560.291. CaSE Coding. 0.5 Credits.
Having taken a computing course in the freshman year, students will further develop their programming skills to solve, understand, or automate problems specific to civil and systems engineering.
AS.110.109 AND EN.500.113

EN.560.292. CaSE Research. 0.5 Credits.
An introduction to the research process, students in this project-based course will develop an appreciation for the role of research in our society and will learn the tools indispensable to researchers, including how to conduct literature reviews, how to read and write technical literature, as well as how to formulate and test a research hypothesis. Students will explore the research process through a variety of methods including as an exercise in uncertainty quantification.

EN.560.301. Structural Systems I. 3 Credits.
This course will introduce students to the structural design workflow from concept and ideation to structural modeling and analysis to member and connection design using the reliability-based limit states approach. This first course in a two-course sequence will focus on the analysis and design of structural systems composed primarily of axial force members (e.g. trusses, cables, and arches). Connections to mechanics-based principles will be emphasized and practical applications using common structural materials such as timber, steel, and reinforced concrete will be covered.

EN.560.302. Structural Systems II. 3 Credits.
This second course in the two-course structural systems sequence will reinforce the structural design workflow from concept and ideation to structural modeling and analysis to limit states design, but with a focus on the analysis and design of structural systems composed of bending members (e.g. frames). Connections to mechanics-based principles will again be emphasized and practical applications using common structural materials such as timber, steel, and reinforced concrete will be covered.
EN.560.301 Structural Systems I OR EN.560.325 Structural Design II

EN.560.305. Soil Mechanics. 4 Credits.
Basic principles of soil mechanics. Classification of soils. Compaction theory. Consolidation seepage and settlement analysis. Stress-strain and shear strength of soils. Introduction to earth pressure theories and slope stability analysis.
EN.560.201 AND EN.560.211;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.560.330. Foundation Design. 3 Credits.
Application of soil mechanics theory and soil test results to the analysis and design of foundations for structures; retaining walls; embankments; design of pile and shallow footing foundations; slope stability.
EN.560.305

EN.560.362. Engineering Mechanics and Materials. 3 Credits.
This course will address linear mechanics of solid and fluid media. Concepts will be reinforced through hands-on fabrication, machining and testing of materials, and by the use of finite element models.

EN.560.391. CaSE Careers I. 0.5 Credits.
Civil Engineering Seminar provides students with opportunities to explore the wide range of civil engineering career paths (e.g. consulting, academia, government, industry, and construction) through invited speakers, field trips to design offices / construction sites, and attendance at professional society meetings. Topics related to engineering ethics, professional licensure, and other professional issues are also discussed.

EN.560.392. CaSE Careers II. 0.5 Credits.
Civil Engineering Seminar provides students with opportunities to explore the wide range of civil engineering career paths (e.g. consulting, academia, government, industry, and construction) through invited speakers, field trips to design offices / construction sites, and attendance at professional society meetings. Topics related to engineering ethics, professional licensure, and other professional issues are also discussed.

EN.560.401. Design Theory and Practice. 3 Credits.
Survey of the major theories of engineering design and the contexts in which they have evolved, and are applied. Practice in three dominant schools of modern engineering design: (i) waterfall or sequential design as commonly employed in civil construction; (ii) iterative/spiral design as employed in rapid prototyping or agile development for devices and software; and (iii) human-centric design as employed by engineers challenged to confront individual or social scale needs.

EN.560.421. Architectural Engineering - Form, Function and Technology. 3 Credits.
This course will cultivate broad knowledge of the use of engineering principles in the art of architecture. Fundamental definitions of architecture in the basic provision of shelter and social use are paired with aesthetics and cultural heritage. The course emphasizes structural frameworks and systems within the Civil Engineering curriculum, while expanding upon their critical intersections with the highly varied specialized components and systems of modern architecture, and the corresponding community of specialists that represent them. Topics include a historical view of the evolution of specialization in architecture, a quantitative review of loads and resistance systems, architectural and structural determinants of form, the function and aesthetics of building surface, and an introduction to environmental systems and their role in design sustainability. The class will include a trip to Fallingwater, the house designed by Frank Lloyd Wright, in western Pennsylvania, which stands as an iconic example of American architecture and a complex example of architectural engineering. This course is co-listed with EN.560.621 and EN.565.621.

EN.560.423. Bridge Engineering. 3 Credits.
This course will explore bridge design and analysis by studying local bridges of various forms, materials, and load demands. Topics include an overview of the history of bridge engineering, an introduction to the AASHTO Standard Specifications for Highway Bridges, analysis techniques and load ratings, bridge details, and substructure design.
EN.560.320 AND EN.560.325

EN.560.429. Preservation Engineering: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete).This course will examine structures made of a wide variety of materials and instruct the student how to evaluate their condition, determine their existing capacity, and design repairs and/or reinforcement. The investigation and analysis procedures learned from this course may then be applied to create economical and durable structural alterations that allow for the reuse of older buildings. Site visits near Homewood campus will supplement lectures.
EN.560.320 AND EN.560.325 or equivalent for graduate students.

EN.560.431. Preservation Engineering II: Theory and Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution--namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.Course is co-listed with EN.560.631 and EN.565.631.
EN.560.429 OR Permission from the instructor.

EN.560.434. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented. Course is co-listed with graduate-level EN.560.634.

EN.560.445. Advanced Structural Analysis. 3 Credits.
Matrix methods for the analysis of statistically indeterminate structures such as beams, plane and space trusses, and plane and space frames. Stiffness and flexibility methods. Linear elastic analysis and introduction to nonlinear analysis. Co-listed with EN.560.619.
EN.560.301

EN.560.450. Operations Research. 3 Credits.
An introduction to operations research and its applications. The course will review the basics of mathematical modelling, linear programming, primal and dual Simplex methods, post-optimization analysis, decomposition methods, and heuristic methods along with sample applications. Recommended course background AS.110.201 and AS.110.109 or equivalent. This course is co-listed with EN.560.650.

EN.560.453. An Introduction to Network Modeling. 3 Credits.
Many real-world problems can be modeled using network structures, and solved using tools from network theory. For this reason, network modeling plays a critical role in various disciplines ranging from physics and mathematics, to biology and computer science, and almost all areas of social science. This course will provide an introduction to network theory, network flow algorithms, modeling processes on networks and examples of empirical network applications spanning transport, health and energy systems. Co-listed with EN.560.653.
EN.553.291

EN.560.458. Natural Disaster Risk Modeling. 3 Credits.
This course will introduce the student to disaster risk modeling process, including: structure of catastrophe models and uses in loss estimation and mitigation, study and modeling of hazards (esp. hurricanes and earthquakes; also flood, landslide, and volcanic), vulnerability assessment including simulation of building damage, and estimation of post-disaster injuries and casualties. Additionally topics will include, exposure modeling (building typology distribution), introduction to disaster economic loss modeling, interpretation of risk metrics (return periods, PML, AAL, VaR, TVaR), their uncertainty, and applicability to management and financial decision making process and elements of present and future risk, such as, climate and exposure changes. Students will gain introductory experience in the use of GIS and simulation with Matlab. This course is co-listed with EN.560.658.

EN.560.462. Failure Mechanics in Materials. 3 Credits.
This course provides an overview of the various modes of failure found in structural materials. The concepts will be demonstrated through both experimental demonstrations and finite element models.

EN.560.501. Undergraduate Research. 1 - 3 Credits.
Research in Civil Engineering
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.511. Group Undergraduate Research. 1 - 3 Credits.
This section has a weekly research group meeting that students are expected to attend.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.526. Independent Study - Civil Engineering. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.560.601. Applied Math for Engineers. 3 Credits.
This course presents a broad survey of the basic mathematical methods used in the solution of ordinary and partial differential equations: linear algebra, power series, Fourier series, separation of variables, integral transforms.

EN.560.604. Introduction to Solid Mechanics. 3 Credits.
Basic solid mechanics for structural engineers. Stress, strain and constitutive laws. Linear elasticity and viscoelasticity. Introduction to nonlinear mechanics. Static, dynamic and thermal stresses. Specialization of theory to one- and two-dimensional cases: plane stress and plane strain, rods, and beams. Work and energy principles; variational formulations.

EN.560.618. Probabilistic Methods in Civil Engineering and Mechanics. 3 Credits.
Covers probabilistic computational modeling in civil engineering and mechanics: Monte Carlo simulation, sampling methods and variance reduction techniques, simulation of stochastic processes and fields, and expansion methods. Applications to stochastic finite element, uncertainty quantification, reliability analysis, and model verification and validation.

EN.560.619. Advanced Structural Analysis. 3 Credits.
Matrix methods for the analysis of statistically indeterminate structures such as beams, plane and space trusses, and plane and space frames. Stiffness and flexibility methods. Linear elastic analysis and introduction to nonlinear analysis.

EN.560.621. Architectural Engineering - Form, Function and Technology. 3 Credits.
This course will cultivate broad knowledge of the use of engineering principles in the art of architecture. Fundamental definitions of architecture in the basic provision of shelter and social use are paired with aesthetics and cultural heritage. The course emphasizes structural frameworks and systems within the Civil Engineering curriculum, while expanding upon their critical intersections with the highly varied specialized components and systems of modern architecture, and the corresponding community of specialists that represent them. Topics include a historical view of the evolution of specialization in architecture, a quantitative review of loads and resistance systems, architectural and structural determinants of form, the function and aesthetics of building surface, and an introduction to environmental systems and their role in design sustainability. The class will include a trip to Fallingwater, the house designed by Frank Lloyd Wright, in western Pennsylvania, which stands as an iconic example of American architecture and a complex example of architectural engineering. This course is co-listed with EN.560.421 and EN.565.621.

EN.560.623. Bridge Engineering. 3 Credits.
This course will explore bridge design and analysis by studying local bridges of various forms, materials, and load demands. Topics include an overview of the history of bridge engineering, an introduction to the AASHTO Standard Specifications for Highway Bridges, analysis techniques and load ratings, bridge details, and substructure design.

EN.560.629. Preservation Engineering I: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete). This course will examine structures made of a wide variety of materials and instruct the student how to evaluate their condition, determine their existing capacity, and design repairs and/or reinforcement. The investigation and analysis procedures learned from this course may then be applied to create economical and durable structural alterations that allow for the reuse of older buildings. Site visits near Homewood campus will supplement lectures. This course is co-listed with EN.565.628.

EN.560.630. Structural Dynamics. 3 Credits.
Functional and computational examination of elastic and inelastic single degree of freedom systems with classical and non-classical damping subject to various input excitations including earthquakes with emphasis on the study of system response. Extension to multi-degree of freedom systems with emphasis on modal analysis and numerical methods. Use of the principles of structural dynamics in earthquake response.

EN.560.631. Preservation Engineering II: Theory and Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution--namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.This course is co-listed with EN.560.431 and EN.565.631.

EN.560.633. Investigations, Diagnosis, and Rehabilitation. 3 Credits.
Why do buildings deteriorate, and how do we address this problem? This course examines the deterioration (by human and nature) of building materials and systems. Through lectures and a field trip, students will learn how to set up and execute an investigation, study the symptoms, diagnose the problems, determine what kinds of tests are needed, design the necessary repairs, and maintain existing systems. This course is co-listed with Engineering for Professionals EN.565.633.

EN.560.634. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented.
Area: Writing Intensive

EN.560.635. Applied Numerical Modeling for Thermal Structural Analysis. 3 Credits.
This course discusses advanced topics in numerical modeling by the nonlinear finite element method with application to structural systems subjected to thermal loads. Covered topics include heat transfer and structural analyses, computational constitutive modeling, best practices for constructing and interpreting numerical models, and use of numerical modeling to support performance-based structural design. The course includes hands-on projects with a nonlinear finite element software. At least one graduate-level course in finite element method and one in structural analysis are prerequisites.

EN.560.636. Lateral Forces: Analysis and Design of Building Structures. 3 Credits.
From earthquakes to wind events, lateral forces constitute some of the most extreme loading conditions for which new and existing building structures must be analyzed and designed to resist. This course provides a fundamental yet practical introduction to the development and application of earthquake and wind loadings on building structures, the dynamic response and behavior of structures to lateral forces, and the bases and requirements for ductile design and detailing of steel, concrete, wood, and masonry lateral force resisting elements. The course will build on these analysis and design fundamentals to examine the technical considerations and methodologies for evaluating the lateral force resisting systems of existing, oftentimes monumental, building structures, and for designing and implementing repairs and retrofits to these lateral systems, including the application of Performance Based Design. This course is co-listed with EN.565.636.

EN.560.637. Preservation Engineering in the Urban Context. 3 Credits.
Technical expertise is fundamental to design and construction within and around historic buildings in the urban context. This course will cover topics related to both design and construction. For below-grade engineering, the course will cover underpinning, bracket piles, secant piles, slurry walls, tie-backs and general shoring approaches to building below or adjacent to existing constructions. For upward additions to existing construction, the course covers strengthening techniques (including temporary shoring and bracing, temporary access options, and temporary protection) and the requirements of the International Existing Building Code (IEBC). Each class will provide both technical guides and case studies, offering perspectives from guest speakers practicing the diverse range of professions tasked to meet this challenge. In lieu of a final exam, students will be required to submit a final paper/project.

EN.560.643. Optimization Modeling Foundations. 3 Credits.
The goal of this course is to introduce a series of optimization modeling techniques, including linear, integer, and robust optimization. The course covers theoretical aspects of modeling and solution methods, as well as foundations and tips for practical examples. Enrollees are expected to know basic linear algebra. Familiarity with linear programming, real analysis, and coding is recommended but not required.

EN.560.645. Topics in Optimization: Integer and Robust Optimization. 3 Credits.
The goal of this course is to introduce various advanced topics in optimization, including integer optimization, robust optimization, and inverse optimization. The course covers theoretical aspects of modeling and solution methods, as well as foundations and tips for practical examples. Enrollees are expected to have completed EN.553.761 or a comparable course on Linear Programming.

EN.560.646. Smart Cities. 3 Credits.
In recent years, sustainability progress has resulted mainly from developing and implementing smart, sustainable technology solutions. This course examines opportunities to drive sustainability through technology applications, deemed the “smart city”. Smart city technology ranges from intelligent infrastructure in modern cities to mobile applications that enable the “sharing economy” and facilitate energy access in remote regions of East Africa. This course will not only concern “first-world” problems; we will explore the transformative solutions currently driving growth in emerging markets and the developing world. Students will develop the skills to piece together a sustainable, smart city.

EN.560.650. Operations Research. 3 Credits.
An introduction to operations research and its applications. The course will review the basics of mathematical modelling, linear programming, primal and dual Simplex methods, post-optimization analysis, decomposition methods, and heuristic methods along with sample applications. Course meets with EN.560.450

EN.560.653. An Introduction to Network Modeling. 3 Credits.
Many real-world problems can be modeled using network structures, and solved using tools from network theory. For this reason, network modeling plays a critical role in various disciplines ranging from physics and mathematics, to biology and computer science, and almost all areas of social science. This course will provide an introduction to network theory, network flow algorithms, modeling processes on networks and examples of empirical network applications spanning transport, health and energy systems.

EN.560.656. Space Systems Cybersecurity. 3 Credits.
Our space systems are under attack. Cyberattacks are among the most prevalent threats to space assets. They are often stealthy, inexpensive and highly effective at achieving an adversary's goal – be it data corruption, IP theft or physical destruction of the satellite. Given space systems are complex, composing ground stations, communications and satellites the surface area of attack is vast and considering the constrained computing capacity of space systems, many traditional security mechanisms are not applicable. This course introduces how an adversary would approach attacking a satellite, opportunities for systems engineers to develop cyber-resilient assets and relevant policies and best practices to support space system cybersecurity. Recommended classes - EP 675.600 and 675.601.

EN.560.657. System Dynamics. 3 Credits.
System dynamics is a powerful analytical framework to model and tackle complex problems that involve interactions among several variables and constraints. Fields of applications include engineering, climate change, resilience, logistics, public policy analysis, business, and decision-making. This course introduces the basics of systems thinking and system dynamics modeling and analysis. Students learn to identify and formulate systems, their parts, and interrelations. They are also trained in simulating systems' behavior using specialized software, with attention to the underlying differential equations. The student also learns to examine the suitability of a model, understand the behavior of the simulated system, and devise potential interventions.

EN.560.658. Natural Disaster Risk Modeling. 3 Credits.
This course will: • Introduce the student to disaster risk modeling process, including: - Structure of catastrophe models. Uses in loss estimation and mitigation. - Study and modeling of hazards (esp. hurricanes and earthquakes; also flood, landslide, and volcanic) - Vulnerability assessment: simulation of building damage, and estimation of post-disaster injuries and casualties. - Exposure modeling (building typology distribution). • Introduction to disaster economic loss modeling: - Interpretation of risk metrics (return periods, PML, AAL, VaR, TVaR), their uncertainty, and applicability to management and financial decision making process. - Elements of present and future risk: climate and exposure changes. - Student will gain introductory experience in the use of GIS and simulation with Matlab. This course is co-listed with EN.560.458.

EN.560.661. Additive Manufacturing and Design. 3 Credits.
Additive Manufacturing (AM) removes many geometric constraints imposed by traditional manufacturing processes. Resultingly, systems can be designed to support and improve multiple design objectives, which has the potential to alter the way products are designed. While this allows for the fabrication of more complex and often unprecedented geometries, it also increases the complexity designers face. In addition, engineers must not only understand AM technologies and materials, they must also be able to synthesize its economic and environmental impacts on a manufacturing value chain. Additive Manufacturing and Design will provide an in-depth overview of the most common – and promising – AM technologies, materials, and design methods by including examples from state-of-the-art research. A particular emphasis is placed on Design for Additive Manufacturing (DfAM), where the different topics will converge to fully utilize the newly created design space.
Area: Writing Intensive

EN.560.667. Topology Optimization and Design for Additive Manufacturing. 3 Credits.
This course will discuss the computational design tool of topology optimization and its application to the design of "structures", including structural systems, complaint mechanisms, multifunctional devices, and material architectures. Particular emphasis will be placed on the emerging trend known as Design for Additive Manufacturing (AM), and the role of topology optimization in guiding the design of parts to be fabricated by AM processes (3D printing, Selective Laser Sintering, etc). The course will largely focus on design problems concerned with mechanical properties, with extensions to fluidic, thermal, optical, etc. properties also discussed. The course assumes some familiarity with finite element methods and assumes no prior coursework in optimization.

EN.560.691. Graduate Seminar. 1 Credit.
Graduate students are expected to register for this course each semester. Both internal and outside speakers are included.

EN.560.692. Civil Engineering Graduate Seminar. 1 Credit.
Seminar series of speakers on various aspects of civil engineering. Different speakers are invited each semester. Full time civil engineering graduate students must enroll in the seminar course every semester unless excused by the Department.

EN.560.730. Finite Element Methods. 3 Credits.
Variational methods and mathematical foundations, Direct and Iterative solvers, 1-D Problems formulation and boundary conditions, Trusses, 2-D/ 3D Problems, Triangular elements, QUAD4 elements, Higher Order Elements, Element Pathology, Improving Element Convergence, Dynamic Problems.

EN.560.731. Structural Stability. 3 Credits.
Concepts of stability of equilibrium, stability criteria, work energy and variational methods. Elastic buckling of columns, beams, frames, and plates. Introduction to inelastic and dynamic buckling.

EN.560.740. Optimization and Learning. 3 Credits.
This course offers an optimization perspective of machine learning. We use fundamental, bottom-up optimization methods to introduce formal concepts in machine learning. The course then builds on these fundamentals to show how optimization formulations can be used to improve the performance and interpretation of machine learning models. Applications to energy and healthcare systems will be provided. A background in optimization is preferred, but no background in machine learning is required. Programming experience is a pre-requisite.
Area: Writing Intensive

EN.560.741. Modern Machine Learning: Applicability, Interpretability, and Uncertainty Quantification. 3 Credits.
This course provides a broad overview of the different machine learning methods and their theoretical foundations. We focus on the applicability of each method for appropriate statistical design, the interpretability of simple or well-constrained methods, the explainability of complex models or black boxes, and the quantitative characterization of uncertainties. Theoretical and technical aspects related to model evaluation and actionable predictions will be covered, including feature selection, variable importance, model intercomparisons, and cross validation. Applications to real problems in natural sciences and engineering will be covered.

EN.560.762. Mechanics of Architected Materials. 3 Credits.
This upper level graduate course will focus on the linear and nonlinear mechanics of a wide range of architected materials; we aim to cover: linear elastic properties of 2D and 3D cellular solids, micromechanics and homogenization, localization, microscopic and macroscopic instabilities, natural architected materials (bone, wood, nacre), wave propagation in lattices and phononics, mechanical metamaterials, and nanostructured materials (carbon nanotubes pillars, DNA origami).

EN.560.770. Advanced Finite Element Methods and Multi-Scale Methods. 3 Credits.
Addresses advanced topics in various areas of the finite element methodology. Covers a range of topics, viz. element stability and hourglass control, adaptive methods for linear and nonlinear problems, mixed and hybrid element technology, eigen-value problems, multi-scale modeling for composites and polycrystalline materials. Recommended Course Background: EN.530.730 or EN.560.730

EN.560.772. Non-Linear Finite Elements. 3 Credits.
This course will discuss state of the art theoretical developments and modeling techniques in nonlinear computational mechanics, for problems with geometric and material nonlinearities. Large deformation of elastic-plastic and visco-plastic materials, contact-friction and other heterogeneous materials like composites and porous materials will be considered. A wide variety of applications in different disciplines, e.g. metal forming, composite materials, polycrystalline materials will be considered.

EN.560.775. Bilevel Optimization in Energy Systems. 3 Credits.
This course provides an overview of bilevel optimization in large-scale, regional-level energy systems. Topics covered include Mathematical Programs and Equilibrium Problems with Equilibrium Constraints, Binary Equilibrium, Energy Infrastructure, and Pricing in Electricity Markets. At least one graduate-level course in continuous optimization as well as programming experience are prerequisites.

EN.560.826. Graduate Independent Study. 1 - 3 Credits.
Independent Study.

EN.560.835. Graduate Research. 3 - 20 Credits.

EN.560.836. Graduate Research. 3 - 20 Credits.

EN.565 (Civil Engineering)

Courses

EN.565.604. Structural Mechanics. 3 Credits.
This course presents basic solid mechanics for structural engineers, including stress, strain, and constitutive laws; linear elasticity and visco-elasticity; introduction to nonlinear mechanics; static, dynamic, and thermal stresses; specialization of theory to one- and two-dimensional cases; plane stress and plane strain, rods, and beams; work and energy principles; and variational formulations. Course Note(s): This course is a requirement for the general Civil Engineering program and the Structural Engineering focus area.

EN.565.606. Geotechnical Engineering Principles. 3 Credits.
This course aims to review and reinforce knowledge of soil mechanics and geotechnical engineering principles for application in a variety of structural and civil engineering projects. The course presents examples of geotechnical engineering design problems. The course then discusses the origin of soil and types of soil, and various relations between weight and volume; methods used to characterize the index properties of soil, and classification of soil; theory of compaction; Darcy's law and the role of permeability, and the theory of two-dimensional seepage; stresses induced in soil by footing and other loading; compressibility of soil, and consolidation and consolidation settlements; shear strength of soil and the laboratory methods of determining shear strength parameters; theories of lateral earth pressure and their application to the analysis of retaining walls; fundamentals of slope stability analysis; fundamentals of the bearing capacity analysis of shallow foundations; and methods of subsoil exploration. Prerequisite(s): 560.305 Soil Mechanics or equivalent. 560.305 is offered on-site through the full-time Civil Engineering Department. Course Note(s): This course is a requirement for the general Civil Engineering program.

EN.565.608. BIM Applications in Civil Engineering. 3 Credits.
This course will introduce students to basic building information modeling (BIM) theory with an emphasis on how BIM is used in the design and construction of buildings. Students will learn how to model basic architectural, structural, and MEP systems in buildings using Autodesk Revit and how to schedule various model elements and create 2D drawings from the 3D model. They will be introduced to algorithmically generated content using Autodesk Dynamo.

EN.565.616. Applied Finite Element Methods. 3 Credits.
This course will introduce finite element methods for the analysis of solids and structures. The following topics will be considered: procedure for defining a mechanics problem (governing equations, constitutive equations, boundary and initial value problems); theory and implementation of the finite element method for static analysis using linear elasticity; and the verification/validation of results using finite element analysis software.

EN.565.619. Advanced Structural Analysis. 3 Credits.
The course will focus on matrix implementations of the stiffness method for the analysis of statically indeterminate structures such as plane/space trusses and plane/space frames. Computational aspects of the stiffness method will be discussed with connections made to commercial software. Linear elastic analysis will be the primary focus, but topics in nonlinear analysis will also be introduced.

EN.565.620. Advanced Steel Design. 3 Credits.
This course examines advanced designs of structural steel buildings including consideration of torsion, lateral-torsional buckling, local buckling, plate girder design, connection design, framing systems for seismic design, nonlinear frame behavior, and principles of stability per the Direct Analysis Method. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design.

EN.565.622. Advanced Reinforced Concrete Design. 3 Credits.
This intensive course covers reinforced concrete materials and specifications and includes the following topics: conception, analysis, and design of beams and columns, slabs, foundations and walls with emphasis on the ultimate strength method. Advanced seismic design topics are then covered building from the basic knowledge of reinforced concrete design. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Reinforced Concrete Design.

EN.565.623. Bridge Design and Evaluation. 3 Credits.
Through lectures, design problems and existing bridge examples, this course illustrates basic bridge knowledge from preliminary design to final design of major structural components. The course covers conventional bridges and other bridge types, including concrete segmental box girders, arch bridges, and cable-stayed bridges. The course is not intended to provide students with intensive training in any particular area of bridge design. The course requires problem solving, a term project, and a final exam. A background in reinforced concrete design and steel design is required. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design and Reinforced Concrete Design.

EN.565.626. Design of Wood Structures. 3 Credits.
This course introduces students to the design of wood structures. Wood structures may be constructed of sawn lumber, glulam, or engineered wood products. The primary focus in this class is on light-framed low-rise wood buildings constructed of sawn lumber or glulam, but concepts related to heavy timber-framed structures and tall wood buildings using cross-laminated timber (CLT) are introduced. Structural behavior under gravity and lateral loads is emphasized, as are analysis and design of the components within the gravity and lateral load resisting systems. The current version of the National Design Specification (NDS) for Wood Construction is used. A background in Steel Design or Reinforced Concrete Design is required. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Steel Design or Reinforced Concrete Design.

EN.565.628. Preservation Engineering I: Theory and Practice. 3 Credits.
The renovation of existing buildings often holds many advantages over new construction, including greater economy, improved sustainability, and the maintenance of engineering heritage and architectural character in our built environment. Yet, the renovation of existing structures presents many challenges to structural engineers. These challenges include structural materials that are no longer in widespread use (e.g., unreinforced masonry arches and vaults, cast iron, and wrought iron) as well as structural materials for which analysis and design practices have changed significantly over the last half-century (e.g., wood, steel, and reinforced concrete). This first course in the theory and practice of preservation engineering will include a review of the building code requirements related to work on existing buildings and a discussion of the load paths (both vertical and horizontal) through such structures. Further, this course will begin its review of structural materials with those that were available prior to the Industrial Revolutionnamely masonry and timber. The course will conclude with an overview of the response of wood structures to wind and seismic loads. Wood deterioration mechanisms and structural repair strategies for wood will also be presented.

EN.565.630. Prestressed Concrete Design. 3 Credits.
Topics include prestressed concrete concepts for both pretensioning and post-tensioning: materials, types of prestress, and prestress losses; design of sections for flexure, shear, torsion, and compression; load balancing technique; consideration of partial prestress, composite sections, and slab systems. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken a first (undergraduate) course in Reinforced Concrete Design.

EN.565.631. Preservation Engineering II: Theory & Practice. 3 Credits.
Building on the content in Preservation Engineering I: Theory and Practice, this course will begin with materials introduced at the start of the Industrial Revolution-namely with the beginning of the use of iron materials as major structural elements within buildings. The course will continue with the introduction of cast iron, wrought iron, and finally, structural steel members. After introducing iron materials the course will continue with the early use of reinforced concrete as a major structural material. The course will discuss the historic structural analysis methods associated with such materials and contrast such methods with more modern analytical approaches. It will also discuss concrete deterioration and repair methods. Concepts related to masonry facade investigation and repair will be presented along with the analytical methods associated with thin-shell masonry construction from the 19th and 20th centuries. The course will conclude with a review of the assessment and retrofit of historic foundations.
EN.565.628 Preservation Engineering I: Theory and Practice

EN.565.633. Investigation, Diagnosis, and Rehabilitation. 3 Credits.
Why do buildings deteriorate? And how do we investigate and diagnose the causes, as well as design and implement appropriate solutions? This course examines the deterioration of building materials and systems caused by both humans and nature. Through weekly lectures and one weekend workshop, students will learn how to plan and execute an investigation, identify the symptoms, determine what tests are needed, diagnose the causes, and design and administer necessary repairs to address deterioration and system deficiencies. Weekly lectures will use a combination of Virtual Live and online formats; a weekend workshop in Baltimore (date TBD) will include hands-on activities and a field trip to a local project site.

EN.565.636. Lateral Forces: Analysis and Design of Building Structures. 3 Credits.
From earthquakes to wind events, lateral forces constitute some of the most extreme loading conditions for which new and existing building structures must be analyzed and designed to resist. This course provides a fundamental yet practical introduction to the development and application of earthquake and wind loadings on building structures, the dynamic response and behavior of structures to lateral forces, and the bases and requirements for ductile design and detailing of steel, concrete, wood, and masonry lateral force resisting elements. The course will build on these analysis and design fundamentals to examine the technical considerations and methodologies for evaluating the lateral force resisting systems of existing, oftentimes monumental, building structures, and for designing and implementing repairs and retrofits to these lateral systems, including the application of Performance Based Design. This course is co-listed with 560.615.

EN.565.637. Preservation Engineering in the Urban Context. 3 Credits.
Technical expertise is fundamental to design and construction within and around historic buildings in the urban context. This course will cover topics related to both design and construction. For below-grade engineering, the course will cover underpinning, bracket piles, secant piles, slurry walls, tie-backs and general shoring approaches to building below or adjacent to existing constructions. For upward additions to existing construction, the course covers strengthening techniques (including temporary shoring and bracing, temporary access options, and temporary protection) and the requirements of the International Existing Building Code (IEBC). Each class will provide both technical guides and case studies, offering perspectives from guest speakers practicing the diverse range of professions tasked to meet this challenge.

EN.565.641. Fundamentals of Construction Management. 3 Credits.

EN.565.658. Natural Disaster Risk Modeling. 3 Credits.
Natural hazards such as floods, earthquakes, and hurricanes exert a heavy toll of victims and economic losses every year. Yet, concentrations of population in hazard-prone-areas, the growth of infrastructure and climate change are aggravating the risk of future losses. Consequently, adequate interventions must be implemented to mitigate the damaging effects of natural hazards. To do this, public agencies, non-profits, and companies formulate mitigation actions such as emergency preparedness plans and building retrofits. Catastrophe models are tools to inform all these efforts, which simulate the socioeconomic risk resulting from the interaction of geophysical events and the spatial distribution of infrastructure.Course note(s): This course is cross-listed with 575.658 Natural Disaster Risk Modeling.

EN.565.664. Advanced Foundation Design. 3 Credits.
This course will introduce the principles and specifics of the geotechnical design of shallow and deep foundations. Topics include design of shallow foundations, including spread footings, combined footings and mat foundations; design of deep foundations, including single piles, pile groups and drilled shafts; design of laterally-loaded piles; construction monitoring and testing methods for driven piles; design of foundations for vibration control; foundations on difficult soils; underpinning; and design of buried culverts.
EN.560.305 Soil Mechanics (or equivalent) or EN.565.606 Geotechnical Engineering Principles.

EN.565.680. Marine Geotechnical Engineering. 3 Credits.
This course introduces students to soil mechanics in the marine environment. Topics covered include the nature of marine sediments, soil behavior due to cyclic loading, marine geotechnical investigations, shallow foundations and dead-weight anchors, pile foundations and anchors, penetration and breakout of objects on the seafloor, and project planning. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken 565.606 Geotechnical Engineering Principles.

EN.565.682. Design of Ocean Structures. 3 Credits.
This course presents a review of structural design theory and practice related to ocean structures. Basic elements of ocean structures are designed using current engineering design codes developed by the American Institute of Steel Construction (AISC) and American Petroleum Institute (API). Topics include ocean environmental forces, material selection, foundation design, and analysis/design of ocean structures.

EN.565.684. Port & Harbor Engineering. 3 Credits.
Planning and engineering of ports and harbors has received renewed worldwide interest as the newest super-large cargo ships push the envelope for channel depth and berth space. This course covers planning of marine terminals and small craft harbors, ship berthing and maneuvering considerations, operational and environmental loads, fender system design, and mooring loads and design principles.

EN.565.686. Sustainable Coastal Engineering. 3 Credits.
This course presents a review of sustainable engineering related to the ocean environment. Sustainable shore protection designs will be investigated such as living shorelines and sills, beach nourishment, and other sustainable methods in order to adapt to coastal hazards such as hurricanes, tsunamis, and sea level rise. Sustainable energy such as coastal wind energy, wave energy, tidal energy, and other sustainable energy sources will be also investigated as alternative energy designs. The importance of sustainable food production will be discussed and aquaculture system designs such as ocean aquaculture, shellfish aquaculture, and other sustainable food production will be studied.

EN.565.720. Special Topics in Civil Engineering Structures. 3 Credits.

EN.565.731. Structural Dynamics. 3 Credits.
This course provides an overview of rigid-body dynamics, free and deterministic forced vibration of undamped and damped single- and multi-degree-of-freedom systems, vibration of continuous systems, approximate methods of analysis, and introduction to random vibration of linear systems. Applications of the principles of structural dynamics to determine a structure's earthquake response are also covered. Instructor assumes that students who enroll in this course have a basic understanding of stiffness and stiffness matrices.
EN.535.641 Mathematical Methods for Engineers.

EN.565.732. Earthquake Engineering. 3 Credits.
Topics for this course include plate tectonics, seismicity of Earth, and engineering seismology-including quantification and classification of earthquake ground motions, dynamics of structures subjected to earthquake loads, design spectra, building code provisions, design concepts and detailing, soilstructure interaction, and response of special structures.

EN.565.734. Wind Engineering. 3 Credits.
This course covers atmospheric circulation, atmospheric boundary layer winds, bluff-body aerodynamics, modeling of wind-induced loads, introduction to random vibration theory, response of structures to fluctuating wind loads, aeroelastic phenomena, wind-tunnel and full-scale testing, computational wind engineering, non-synoptic winds (hurricanes, tornadoes, etc.), and wind-load standards and design applications.

EN.565.736. Structural Fire Engineering. 3 Credits.
This course will discuss the analysis and design of structures exposed to fire. It will cover the fundamentals of fire behavior, heat transfer, the effects of fire loading on materials and structural systems, and the principles and design methods for fire resistance design. Particular emphasis will be placed on the advanced modeling and computational tools for performance-based design. Applications of innovative methods for fire resistance design in large structural engineering projects, such as stadiums and tall buildings, will also be presented.

EN.565.740. Structural Stability. 3 Credits.

EN.565.762. Ground Improvement Methods. 3 Credits.
This course addresses the selection, cost, design, construction, and monitoring of ground improvement methods for problematic soils and rock. Ground improvement methods covered include wick drains, micropiles, lightweight fill materials, soil nailing, mechanically stabilized slopes and walls, grouting, stone columns, dynamic compaction, and soil mixing. Prerequisite(s): 560.330 Foundation Design or equivalent and 565.606 Geotechnical Engineering Principles. 560.330 is offered on-site through the full-time Civil Engineering Department.
EN.565.606 Geotechnical Engineering Principles.

EN.565.764. Retaining Structures and Slope Stability. 3 Credits.
Topics for this course include earth pressure theories; design and behavior of rigid, flexible, braced, tied-back, slurry, and reinforced soil structures; stability of excavation, cut, and natural slopes; methods of slope stability analysis; effects of water forces; shear strength selection for analysis; and stability and seepage in embankment dams. Prerequisite(s): Open to EP Civil Engineering students only, or students who have taken 565.606 Geotechnical Engineering Principles.

EN.565.800. Independent Study in Civil Engineering. 3 Credits.
In this independent study course, qualified students are permitted to pursue short-term research or design projects under the guidance and direction of faculty members.Course prerequisite(s): The Independent Study/Project Form (ep.jhu.edu/student-forms) must be completed and approved prior to registration.Course note(s): This course is open only to candidates in the Master of Civil Engineering program.

EN.565.801. Independent Study in Civil Engineering. 3 Credits.
In this independent study course, qualified students are permitted to pursue short-term research or design projects under the guidance and direction of faculty members.Course prerequisite(s): The Independent Study/Project Form (ep.jhu.edu/student-forms) must be completed and approved prior to registration.Course note(s): This course is open only to candidates in the Master of Civil Engineering program.

EN.570 (Environmental Health and Engineering)

EN.570.108. Introduction to Environmental Engineering and Design. 3 Credits.
Overview of environmental engineering including water/air quality issues, water supply/ wastewater treatment, hazardous/solid waste management, pollution prevention, global environmental issues, public health considerations/environmental laws, regulations and ethics.Cross-listed with Public Health Studies.

EN.570.110. Introduction to Engineering for Sustainable Development. 3 Credits.

EN.570.201. Environmental Biology and Ecology. 3 Credits.
This course will cover basic topics in environmental biology and ecology for environmental engineering majors. The course will begin by describing the basic building blocks of life, cells and cellular components, which are common to all living things. We will then investigate factors that promote multicellularity, plant and animal physiology, and ecological principles that determine the distribution and function of organisms in the ecosystem.

EN.570.222. Environment and Society. 3 Credits.
Humans make their living in the environment. How we do that changes nature and changes us. This class explores human impacts on the environment, how we have thought about our relationship to nature over the millennia, and contemporary environmental discourses.

EN.570.239. Environmental Engineering Chemistry - Current and Emerging Topics. 3 Credits.
Students will utilize their chemistry knowledge to understand contemporary environmental issues in various media. Lectures will discuss the chemical phenomena leading to and resulting from air and water pollution issues. Climate change impacts to air and water chemistry will also be covered.

EN.570.303. Environmental Engineering Principles and Applications. 3 Credits.
Fundamentals and applications of physical, chemical, and biological processes in the natural environment and engineered systems. The first part of this class will cover material balances, chemical equilibrium, chemical kinetics, vapor pressure, dissolution, sorption, acid-base reactions, transport phenomena, reactor design, and water quality. The second part of this class focuses on the principles and design of water and wastewater treatment processes, such as coagulation, sedimentation, filtration, biological treatment processes, and disinfection.

EN.570.304. Environmental Engineering Laboratory. 3 Credits.
Introduction to laboratory measurements relevant to water supply and wastewater discharge, including pH and alkalinity, inorganic and organic contaminants in water, reactor analysis, bench testing for water treatment, and measurement and control of disinfection by-products. Recommended Course Background: EN.570.210 or Instructor Permission. Prerequisite: EN.570.303.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.303

EN.570.305. Environmental Health and Engineering Systems Design. 4 Credits.
Techniques from systems analysis applied to environmental engineering design and management problems: reservoir management, power plant siting, nuclear waste management, air pollution control, and transportation planning. Design projects are required.

EN.570.320. Case Studies in Climate Change - A Field Course. 2 Credits.
In this interdisciplinary seminar class, we will discuss past, present, and future climate change. We will do so through several case studies on California; Eastern California is a hub of research on past climate change, and arguably few states are being more heavily impacted by current climate change than California. Throughout the first half of the course, we will learn how climate has changed in the past, the magnitude of those changes, the possible causes, and the physical and ecological impacts of past climate change. In the second half of the course, we will contrast past climate change with the impacts and severity of contemporary climate change. We will explore how climate change is stressing water resources, air quality, and ecological resilience across California, and we will critically evaluate how the state's recent policy initiatives are ameliorating (or exacerbating) these stresses.? This course has a 2-credit co-requisite in the spring semester where we will travel to Eastern California for a week-long field trip. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite spring field trip.

EN.570.321. Case Studies in Climate Change - A Field Course. 2 Credits.
This is the 2 credit co-requisite course for EN.570.320 Case Studies in Climate Change offered in fall. In this course we will travel to Eastern California for a week-long field trip to explore how climate change is stressing water resources, air quality, and ecological resilience across California. We will critically evaluate how the state's recent policy initiatives are ameliorating (or exacerbating) these stresses. Please email the instructor if you are interested in this course (smill191@jhu.edu) for more details on the co-requisite.
EN.570.320

EN.570.334. Engineering Microeconomics. 3 Credits.
The course introduces the principles of microeconomics and engineering economics, and applications of those principles to environmental engineering and public policy analysis. The financial and economic implications of engineering designs and control policies are critical to their success. We introduce principles of engineering economics and microeconomics (demand and production theory) and their uses in engineering decision making.

EN.570.349. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced.
EN.570.303

EN.570.350. Environmental Hazards and Health Risks. 3 Credits.
This course explores the concepts, assessment, and control of exposure to biological, physical and chemical hazards in the environment, the risk of adverse health outcomes resulting from such exposures, and the relationship between the exposures and health outcomes. These are placed in the context of the multi-disciplinary scientific field of environmental health as an essential component of the wider field of public health. The course is comprised of lectures, examples, group discussions, and group presentations. The proposed course will fill a gap in content and skill development in the issues and techniques relating to human health risk assessment. This course is targeted toward undergraduates who may not have had any exposure to environmental health science, and provides an introduction to environmental health using the framework of health risk assessment. The course first introduces the concepts of exposure to environmental hazards and biological dose, routes of exposure, statistical characterization of exposure variability in populations, and monitoring networks. The next set of concepts relate to hazard characterization, i.e., adverse health outcomes resulting from such exposures using a variety of types of data including in vitro and in vivo studies, and human epidemiological studies and their strengths and weaknesses. The next segment will deal with the quantitative characterization of the relationship between exposure/dose and the adverse health outcomes, i.e., the dose-response relationships, the metrics used for this, and quantitatively characterizing the health risks of a population. The course will introduce students to several tools including mathematical modeling of exposures and risk, and uncertainty analysis.
(AS.171.101) AND (AS.030.101 AND AS.030.102) AND (AS.110.108 AND AS.110.109)

EN.570.351. Introduction to Fluid Mechanics. 3 Credits.
Introduction to the use of the principles of continuity, momentum, and energy to fluid motion. Topics include hydrostatics, ideal-fluid flow, laminar flow, turbulent flow. Recommended Course Background: Statics, Dynamics, and AS.110.302
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.353. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.406. Environmental History. 3 Credits.
Environmental history explores the interactions between social change and environmental transformation, or the ways in which societies modify landscapes and are themselves affected by geological, climatological and changing ecological conditions. Topics include the relationship between climate change and human evolution, the environmental impacts of market-based commodity production and regional economic specialization; the relationship between urbanization and environmental change; how warfare affects and is affected by environmental conditions.
Area: Writing Intensive

EN.570.411. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.412. Landscape Hydrology and Watershed Analysis. 3 Credits.
The purpose of this class is to understand the landscape-scale controls on the fluxes of water and waterborne materials through watersheds. This class differs from the Hydrology and Hydrologic Modeling classes in its focus on data analysis, and its embrace of the complexity of real landscapes. There will be significant quantitative components to the material taught, but emphasis will be on developing a greater sense of the way that landscapes “function”, and how this function is related to real-world issues of water resources and pollution. Students will gain an understanding of how climate, geologic and ecologic setting, and human impacts control the partitioning of water between different fates, the flowpaths through the landscape and the storage and residence time of water. They will also learn conceptual and practical tools for analyzing hydrologic and other landscape data, and integrating this data in a holistic approach to watershed analysis. The class will be of interest for students intending to go into watershed or landscape management, and anyone wishing to pursue research in hydrology, geomorphology or ecology at landscape and watershed scales. The class will include at least one field trip to an instrumented watershed. GIS skills will be an advantage but are not required.

EN.570.415. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.615.

EN.570.416. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machine learning, to explore data sets, explain phenomena and build predictive models. The course begins with an overview of some traditional analysis approaches including ordinary least squares regression and related topics, notably diagnostic testing, detection of outliers and methods to impute missing data. More recent developments are presented, including ridge regression. Generalized linear models follow, emphasizing logistic regression and including models for polytomous data. Variable subsetting is addressed through stepwise procedures and the LASSO. Supervised machine learning topics include the basic concepts of boosting and bagging and several techniques: Decision Trees, Classification and Regression Trees, Random Forests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and Neural Networks. Unsupervised machine learning approaches are addressed through applications using k-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods for assessing model predictive performance are introduced including Confusion Matrices, k-fold Cross-Validation and Receiver Operating Characteristic Curves. Public health and environmental applications are emphasized, with modeling techniques and analysis tools implemented in R.

EN.570.419. Environmental Engineering Design I. 2 Credits.
Through general lectures and case study examples, this course will expose students to some of the non-technical professional issues that they will face as professional engineers and in their second-semester senior design project.

EN.570.420. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth’s surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed. This course meets with EN.570.657, Air Pollution.

EN.570.421. Environmental Engineering Design II. 3 Credits.
Engineering design process from problem definition to final design. Team projects include written/oral presentations. Students will form small teams that work with local companies or government agencies in executing the project. Recommended Course Background: EN.570.303, EN.570.352, and EN.570.419
EN.570.419

EN.570.422. Resilience of Ecological Systems. 3 Credits.
The ability of ecosystems to recover from natural events and human actions is increasingly being threatened by climate change. This course is a study of ecosystems using mathematical models, with a particular focus on quantifying their resilience. We will model a number of ecosystems, including rainforests, lakes, temperate forests, savannas, and grasslands. We will analyze ecological phenomena that impact public health and commerce. These include lake eutrophication and anoxia, forest fires, and insect outbreaks. We will study whole-earth mathematical models, biodiversity, and models to study the spread and control of pandemics. New this semester will be game theory applications, urban ecosystems and environmental justice. In all cases, potential pro-active and reactive management and control approaches will be evaluated. Mathematical techniques will be introduced and developed in a context-sensitive manner. Undergraduate and graduate students are welcome to enroll. Recommended course background (i.e. potentially useful but not required): EN.553.291 or AS.110.302, or equivalent.

EN.570.426. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes.
EN.570.351 or Equivalent

EN.570.428. Problems in Applied Economics. 3 Credits.
This course focuses on a monetary approach to national income determination and the balance of payments. Money and banking, as well as commodity and financial markets, are dealt with under both central banking, as well as alternative monetary regimes. Particular emphasis is placed on currency board systems. Students learn how to properly conduct substantive economic research, utilizing primary data sources, statistical techniques and lessons from economic history. Findings are presented in the form of either memoranda or working papers of publishable quality. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND AS.180.101 AND AS.180.102

EN.570.429. Methods in Microbial Community Analysis. 3 Credits.
This course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions.
Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Open to undergraduates. Co-listed with EN.570.619

EN.570.441. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals.Co-listed with EN.570.641

EN.570.442. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles.
AS.030.101 AND AS.030.102. Course in organic chemistry preferred.

EN.570.443. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.643 (Aquatic and Biofluid Chemistry).

EN.570.445. Physical and Chemical Processes I. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).
EN.570.303 or permission of instructor.

EN.570.446. Biological Process of Wastewater Treatment. 3 Credits.
Fundamentals and application of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater.
Recommended Course Background: EN.570.411

EN.570.448. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes.
Recommended Course Background: EN.570.445 or Permission Required.

EN.570.449. Social Theory for Engineers. 3 Credits.
Engineers work in a social context. This course addresses a number of questions about that social context. How should we understand how societies come about, how they evolve,and why the rules of the game are what they are? What is the relationship between the individual and society, what does it mean to be 'modern,' are there different forms of rationality? How might all this impinge on what it means to be an engineer?
Area: Writing Intensive

EN.570.451. Environmental Dispersion and Transport. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.452. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences.Co-listed with EN.570.652
Area: Writing Intensive
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;EN.570.443

EN.570.454. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.470. Applied Economics & Finance. 3 Credits.
This course focuses on company valuations, using a Probabilistic Discounted Cash Flow Model. Students use the model and primary data from financial statements filed with the Securities and Exchange Commission to calculate the value of publically-traded companies. Using Monte Carlo simulations, students also generate forecast scenarios, project likely share-price ranges and assess potential gains/losses. Stress is placed on using these simulations to diagnose the subjective market expectations contained in current objective market prices, and the robustness of these expectations. During the weekly seminar, students company valuations are reviewed and critiqued. A heavy emphasis is placed on research and writing. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. Advanced excel programming skills are required and students are expected to be pre-screened for research at the Library of Congress in Washington, D.C.. Bloomberg certification is a pre-requisite.
Area: Writing Intensive
EN.660.203 AND (EN.570.428 OR AS.360.528)

EN.570.490. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.491. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment. Co-listed with EN.570.691

EN.570.492. Wolman Seminar - Undergraduates. 1 Credit.
Undergraduates only with permission of instructor.

EN.570.496. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.497. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.501. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.502. Undergraduate Research. 1 - 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.504. Financial Market Research. 3 Credits.
This course investigates the workings of financial, foreign exchange, and commodity futures markets. Research is focused on price behavior, speculation, and hedging in these markets. Extensive research and writing of publishable quality are required. Exceptional work may be suitable for publication through the Johns Hopkins Institute for Applied Economics, Global Health, and the Study of Business Enterprise. An approved research proposal is a pre-requisite.
Area: Writing Intensive
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.505. Undergraduate Independent Study. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.590. Internship - Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.597. Undergraduate Research-Summer. 3 Credits.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.570.607. Energy Policy and Planning Models. 3 Credits.
Methods for optimizing operation and design of energy systems and for analyzing market impacts of energy and environmental policies are reviewed, emphasizing both theory and solution of actual models. Review of linear and nonlinear programming and complementarity methods for market simulation. Recommended Course Background: EN.570.493 and EN.570.495 or equivalent.

EN.570.610. Engineering Microbiology. 4 Credits.
Fundamental aspects of microbiology and biochemistry as related to environmental pollution and water quality control processes, biogeochemical cycles, microbiological ecology, energetics and kinetics of microbial growth, and biological fate of pollutants.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.615. Current Trends in Environmental Microbiology. 3 Credits.
This course will highlight recent discoveries and advances in environmental microbiology such as the identification of novel microbes, changing paradigms in nitrogen cycling, single-cell activity methods and novel methods in microbial community analysis. We will explore these topics by reading and discussing the current literature, supported by short lectures and in class activities related to the topics. Background in microbiology or microbial ecology is recommended. This course will meet with EN.570.415

EN.570.616. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machinelearning, to explore data sets, explain phenomena and build predictive models. The coursebegins with an overview of some traditional analysis approaches including ordinary leastsquares regression and related topics, notably diagnostic testing, detection of outliers andmethods to impute missing data. More recent developments are presented, including ridgeregression. Generalized linear models follow, emphasizing logistic regression and includingmodels for polytomous data. Variable subsetting is addressed through stepwise procedures andthe LASSO. Supervised machine learning topics include the basic concepts of boosting andbagging and several techniques: Decision Trees, Classification and Regression Trees, RandomForests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and NeuralNetworks. Unsupervised machine learning approaches are addressed through applications usingk-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods forassessing model predictive performance are introduced including Confusion Matrices, k-foldCross-Validation and Receiver Operating Characteristic Curves. Public health andenvironmental applications are emphasized, with modeling techniques and analysis toolsimplemented in R. EN.570 616 meets with EN.570.416. Undergraduate (usually Senior) students should sign up for 416 with permission of instructor only.

EN.570.619. Methods in Microbial Community Analysis. 3 Credits.
This graduate level course will provide a practical knowledge of molecular methods used to identify microorganisms present with a sample and gain insight into their function and dynamics. It will provide theoretical background into how to identify microorganisms and infer functional capabilities from genetic material, practical knowledge of common molecular methods and computational skills needed to analyze the resulting sequence data. No background in molecular biology, computation or microbiology is necessary. Course objectives include (1) understanding key aspects of microbial community composition from literature reports; (2) recognizing major microbial taxonomic groups and understanding phylogenetic relationships; (3) developing molecular biology lab skills required to create gene amplicon libraries from an aquatic samples; (4) working knowledge of statistical methods used to associate taxonomic and functional gene information with specific environmental conditions. Recommended Course Background: Microeconomics, Introductory Statistics, Optimization.Co-listed with EN.570.429

EN.570.626. Groundwater, Porous Media, and Hydrogeology. 3 Credits.
Fundamentals of groundwater flow and transport emphasizing groundwater as a major water resource, role of groundwater in the hydrologic cycle and as an agent of geologic processes, groundwater management, and groundwater contamination and its protection. Specific topics include the Darcy equation, storage of water in a porous medium, mass conservation and the groundwater flow equation, solutions to the groundwater flow equation, well hydraulics, unsaturated flow and vadose zone processes, contaminant transport, dispersion and adsorption. Assignments will include quantitative exercises requiring simple computer codes. Recommended Course Background: A course in Differential Equations or Consent of Instructor.

EN.570.631. Collaborative Modeling for Resolving Water Resources Disputes. 3 Credits.
Overview of collaborative modeling in water resources, Economic issues in water resources disputes, Legal issues in water resources disputes, Biological/Environmental issues in water resources disputes, Water management in the Delaware Basin, Understanding and using the Delaware River Basin Commission's water management tool (an OASIS based model of the Delaware, Multi-objective water management, Understanding management trade-offs, Collaborative processes, Reality based negotiation skills, and Consensus building. Recommended Course Background: A strong interest in utilizing scientific tools to help resolve real-world disputes A background in general science – with at least two of the following disciplines: Biology, chemistry, physics, earth science, economics.

EN.570.641. Environmental Inorganic Chemistry. 3 Credits.
Advanced undergraduate/graduate course that explores the chemical transformations of elements of the periodic table. Thermodynamic, kinetic, and mechanistic tools needed to address the multiple chemical species and interfaces that are present in natural waters and water-based technological processes are emphasized. Ligand exchange, metal ion exchange, adsorption/desorption, precipitation/dissolution, electron and group transfer reactions, and other concepts from coordination chemistry will be covered. Applications include elemental sources and sinks in ocean waters, reactive transport in porous media, weathering and soil genesis, nutrient and toxic element uptake by organisms, water treatment chemistry, and rational design of synthetic chemicals. Co-listed with EN.570.441

EN.570.642. Environmental Organic Chemistry. 3 Credits.
Advanced undergraduate/graduate course focusing on processes that affect the behavior and fate of anthropogenic organic contaminants in aquatic environments. Students learn to predict chemical properties influencing transfers of organic chemicals between air, water, sediments, soil, and biota, based on a fundamental understanding of intermolecular interactions and thermodynamic principles. New prerequisites (grad students only): at least one year of undergraduate general chemistry, a course in organic chemistry preferred.

EN.570.643. Aquatic and Biofluid Chemistry. 3 Credits.
Equilibrium speciation of natural waters, biofluids, and engineered systems. Topics include acids, bases, pH, and buffering; the precipitation and dissolution of solids; complexation and chelation; oxidation and reduction reactions; regulation and design. Intended for students from a variety of backgrounds. Recommended Course Background: One year of both Chemistry and Calculus. Meets with EN.570.443 (Aquatic and Biofluid Chemistry)

EN.570.644. Physical and Chemical Processes. 3 Credits.
The application of basic physical and chemical concepts to the analysis of environmental engineering problems. Principles of chemical equilibrium and reaction, reaction engineering, interphase mass transfer, and adsorption are presented in the context of process design for unit operations in common use for water and wastewater treatment. Topics addressed include mass balances, hydraulic characteristics of reactors, reaction kinetics and reactor design, gas transfer processes (including both fundamentals of mass transfer and design analysis), and adsorption processes (including both fundamentals of adsorption and design analysis).

EN.570.647. Hydrologic Transport in the Environment. 3 Credits.
This course considers the transport of solutes and sediments by water through terrestrial landscapes, with an emphasis on the movement of nutrients and contaminants from the landscape into receiving water bodies like rivers, lakes and estuaries. The course will cover the theoretical approaches (advection-diffusion/dispersion, transit time distributions), the use of active and passive tracers to infer transport processes, analysis of water quality time series, runoff generation and flow pathways in watersheds, and the effect of climate variability on transport. Assessment is based on a semester project and in-class presentations. Seniors interested in joining the class must have Hydrology 570.353 and should contact the instructor.

EN.570.648. Physical and Chemical Processes II. 3 Credits.
Fundamentals and applications of physical and chemical processes used in water and wastewater treatment. This class will cover particle interactions, coagulation, flocculation, granular media filtration, membrane processes, and emerging water treatment processes. Recommended Course Background: EN.570.445 or Permission Required.

EN.570.649. Water quality of rivers, lakes, and estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced. Students should have taken EN.570.303 (or equivalent).

EN.570.650. Seminar on Critical Zone Science. 1 Credit.
Seminar class covering foundational literature and current research in soils, geomorphology, hydrology, ecology, geochemistry, biogeochemistry, and related topics. Each semester will focus on a particular theme. The course is pass-fail, with attendance and engagement required, as well as minimal writing assignments intended to encourage critical thinking.

EN.570.651. Environmental Transport and Dispersion. 3 Credits.
The course will provide an overview of the basic foundations of transport and dispersion phenomena in the environment (surface water, groundwater, ocean and atmosphere). The emphasis will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of concentration data. The course will cover classical advection-diffusion concepts, shear dispersion phenomena, and transport in random velocity fields with applications to turbulent diffusion and macrodispersion in groundwater. Although numerical modeling is not the primary objective of the course, we will build a simple computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions will require MATLAB or python (or equivalent programming, although EXCEL may also suffice with macros). If time permits, we will touch upon reactive transport and non-Fickian transport formulations. Recommended course background in EN.553.291 Linear Algebra and Differential Equations and EN.570.351 Fluid Mechanics.

EN.570.652. Experimental Methods in Environmental Engineering and Chemistry. 4 Credits.
An advanced laboratory covering principles of modern analytical techniques and their applications to problems in environmental sciences. Topics include electrochemistry, spectrometry, gas and liquid chromatography. The course is directed to graduate students and advanced undergraduates in engineering and natural sciences. Co-listed with EN.570.452
Area: Writing Intensive
EN.570.443 OR EN.570.643 OR permission of instructor.;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.570.653. Hydrology. 3 Credits.
The occurrence, distribution, movement, and properties of the waters of the Earth. Topics include precipitation, infiltration, evaporation, transpiration, groundwater, and streamflow. Analyzes include the frequency of floods and droughts, time-series analyzes, flood routing, and hydrologic synthesis and simulation. Recommended Course Background: AS.110.302, EN.570.351

EN.570.654. Geostatistics: Understanding Spatial Data. 3 Credits.
Spatial and geographic datasets are becoming increasingly common with improvements in data collection technologies. For example, satellites are able to collect more and more types of earth/environmental data, and web technologies (e.g., social media and e-commerce) provide vast new datasets on social, economic, and public health phenomena. However, many common statistical tools are ill-suited to spatial datasets; these datasets often exhibit complex spatial (and temporal) dependencies that require a special set of tools. In this course, students will learn how to quantitatively analyze, model, and predict spatial and spatiotemporal phenomena. Topics will include quantifying the spatial and temporal properties of data, interpolation and prediction, multivariate models, modeling uncertainty, measurement design, and strategies for very large datasets. We will draw examples from a wide variety of academic disciplines, including environmental engineering, earth science, public health, and political science. Pre-requisites: An introductory course in statistics is recommended. Knowledge of a scientific programming language (e.g., Matlab, R, or Python) will also be helpful.

EN.570.657. Air Pollution. 3 Credits.
The course consists of an introduction to the fundamental concepts of air pollution. Major topics of concern are aspects of atmospheric motion near the earth's surface; basic thermodynamics of the atmosphere; atomospheric stability and turbulence; equations of mean motion in turbulent flow, mean flow in the surface boundary layer; mean flow, turbulence in the friction layer; diffusion in the atmosphere; statistical theory of turbulence; plume rise. Emphasis is place upon the role and utility of such topics in a systems analysis context, e.g., development of large and mesoscale air pollution abatement strategies. Comparisons of the fundamental concepts common to both air and water pollution are discussed.

EN.570.690. Solid Waste Engineering and Management. 3 Credits.
This course covers advanced engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material.

EN.570.691. Hazardous Waste Engineering and Management. 3 Credits.
This course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and site remediation to protect human health and the environment.

EN.570.695. Environmental Health and Engineering Systems Design. 3 Credits.
A collection of systems analytic techniques which are frequently used in the study of public decision making is presented. Emphasis is on mathematical programming techniques. Primarily linear programming, integer and mixed-integer programming, and multiobjective programming. Recommended Course Background: AS.110.106-AS.110.107/AS.110.109

EN.570.696. Urban and Environmental Systems. 3 Credits.
The mathematical techniques learned in EN.570.305 and EN.570.495 are applied to realistic problems in urban and environmental planning and management. Examples of such problems include the siting of public-sector and emergency facilities; natural areas management, protection and restoration; solid waste collection, disposal, and recycling; public health; the planning and design of energy and transportation systems; and cost allocation in environmental infrastructure development.

EN.570.697. Risk and Decision Analysis. 3 Credits.
This class introduces the decision analysis approach to making decisions under risk and uncertainty. Topics covered include decision trees, Bayes law, value of information analysis, elicitation of subjective probabilities, multiattribute utility, and their applications to environmental and energy problems. Textbook: R.T. Clemen, Making Hard Decisions, 2014. Recommended Course Background: introductory statistics and probability.

EN.570.800. Graduate Independent Study. 1 - 3 Credits.

EN.570.801. Doctoral Research. 3 - 20 Credits.

EN.570.803. Master's Research. 3 - 10 Credits.

EN.570.805. Jensen Internship. 3 Credits.
Restricted internship; reserved for students who have received the Jensen Fellowship.

EN.570.841. Wolman Seminar- Graduates. 1 Credit.

EN.570.873. Environmental Science & Management Seminar. 1 Credit.

EN.570.881. Environmental Engineering Seminar. 1 Credit.

EN.575 (Environmental Engineering and Science)

EN.575.601. Fluid Mechanics. 3 Credits.
This course introduces the principles of continuity, momentum, and energy applied to fluid motion. Topics include fluid properties, cavitation and phase changes, hydrostatics, applications of Reynold Transport Equation to control volume analyses, laminar and turbulent flow, viscous boundary layers, form and surface resistance with applications to flow in conduits and channels, pumps, and turbines. This course requires a team project evaluating the design and operational parameters for fluid systems under safety and environmental constraints.

EN.575.615. Ecology. 3 Credits.
The course examines an introduction to the organization of individual organisms into populations, communities, and ecosystems and interactions between organisms, humans, and the environment. Topics include causation and prediction in ecology; evolution and natural selection; populations and competition; biodiversity, extinction, and conservation; the impact of forest fragmentation and deforestation on diversity, erosion and sedimentation; wetland ecology and restoration; succession, stability, and disturbance; eutrophication and the Chesapeake Bay; island biogeography; and global climate change. An independent project will be required regarding a field site visited by the student; the student will examine an ecological, conservation, or restoration event or issue about that site.

EN.575.619. Principles of Toxicology, Risk Assessment & Management. 3 Credits.
Risk assessment and risk management have become central tools in continued efforts to improve public safety and the environment within the limited resources available. This course introduces the basic concepts of environmental risk assessment, relative risk analysis, and risk perception, including identifying and quantifying human health impacts and evaluating ecological risk. The course describes legislative and regulatory initiatives that are attempting to base decisions on risk assessment, along with the controversy that surrounds such approaches. It also addresses specific federal requirements for risk analysis by industry. The course discusses the realities of using risk assessments in risk management decisions, including the need to balance costs and benefits of risk reduction, issues of environmental equity, accounting for the uncertainties in risk estimates, effective risk communication, and acceptable risk.

EN.575.626. Hydrogeology. 3 Credits.
This course is an introduction to groundwater, geology, and to the interactions with contaminant transport between the two. It provides a basic understanding of geologic concepts and processes, focusing on understanding the formation and characteristics of water-bearing formations. The course also addresses the theory of groundwater flow, the hydrology of aquifers, well hydraulics, groundwater resource evaluation, and contaminant fate and transport in groundwater. The relationship between the geologic concepts/processes and the groundwater resource are discussed. Examples include a discussion of the influence of the geologic environment on the availability and movement of groundwater and on the fate and transport of groundwater contaminants. Geotechnical engineering problems associated with groundwater issues are also covered.Prerequisites: Calculus I, Calculus II, Ordinary Differential Equations.

EN.575.629. Modeling Contaminant Migration through Multimedia Systems. 3 Credits.
This course addresses contamination in several physical media as chemical species that migrate through an integrated environment. Contaminants can be released into air, subsurface or surface water from which chemicals can migrate between these media. Predicting the movement as well as human health and ecological impacts of contaminants between the air, groundwater and surface water media requires consideration of transport and fate processes that occur separately within each medium as well as linkages of contaminant interactions between media. The course presents the basic principles and computational methods for simulation of contaminant transport and kinetic fate processes in air, groundwater and surface water. Course assessments include interactive discussion topics, assignments and a course project. Screening level models will be used to evaluate transport and fate of contaminants in the air, groundwater and surface water media for a course project based on a hypothetical yet realistic case study of an industrial facility in the Washington DC region. Students will be responsible for data setup and coding of equations to create Excel spreadsheet models for contaminant fate and transport in the air and surface water and will be responsible for data setup for application of a public-domain Excel spreadsheet model for subsurface contaminant fate and transport in groundwater. Although there are no formal prerequisites for this course, the instructors strongly recommend that the student have a college-level understanding of calculus and fluid mechanics and have good quantitative skills with engineering calculations. Proficiency with the Microsoft Excel spreadsheet program is critical for data setup, coding of equations for model calculations and creating graphic plots of data and multi-media model results.

EN.575.643. Chemistry of Aqueous Systems. 3 Credits.
This course examines the chemical principles necessary to understand water quality and contaminant fate in natural and engineered aqueous systems. Quantitative problem-solving skills are emphasized. Specific topics include acid-base reactions, carbonate chemistry, oxidation-reduction reactions, and metal speciation. Case studies applying fundamental principles to important environmental phenomena (e.g., eutrophication of surface waters, drinking water treatment, soil/ subsurface contamination, ocean acidification, and geoengineering) are key components of this course.

EN.575.645. Environmental Microbiology. 3 Credits.
This course covers fundamental aspects of microbial physiology and microbial ecology. Specific areas of focus include energetics and yield, enzyme and growth kinetics, cell structure and physiology, metabolic and genetic regulation, microbial/ environmental interactions, and biogeochemical cycles. The goal of this course is to provide a basic understanding and appreciation of microbial processes that may be applicable to environmental biotechnology.

EN.575.704. Applied Statistical Analysis and Design of Experiments for Environmental Applications. 3 Credits.
This course introduces statistical analyses and techniques of experimental design appropriate for use in environmental applications. The methods taught in this course allow the experimenter to discriminate between real effects and experimental error in systems that are inherently noisy. Statistically designed experimental programs typically test many variables simultaneously and are very efficient tools for developing empirical mathematical models that accurately describe physical and chemical processes. They are readily applied to production plant, pilot plant, and laboratory systems. Topics covered include fundamental statistics; the statistical basis for recognizing real effects in noisy data; statistical tests and reference distributions; analysis of variance; construction, application, and analysis of factorial and fractional-factorial designs; screening designs; response surface and optimization methods; and applications to pilot plant and waste treatment operations. Particular emphasis is placed on analysis of variance, prediction intervals, and control charting for determining statistical significance as currently required by federal regulations for environmental monitoring.Prerequisite: Undergraduate statistics is strongly recommended

EN.575.708. Open Channel Hydraulics. 3 Credits.
The course covers application of the principles of fluid mechanics to flow in open channels. Topics include specific energy and momentum basics, uniform flow, flow resistance, gradually varied flow, flow transitions, channel design, channel stability and erosion protection, and hydraulic structures. The course also addresses 1D flow numerical computations in irregular and natural channels, and gradually varied flow modeling using HEC-RAS computer software.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulic and basic geometry and basic calculus.

EN.575.713. Field Methods in Habitat Analysis and Wetland Delineation. 3 Credits.
This course provides students with practical field experience in the collection and analysis of field data needed for wetland delineation, habitat restoration, and description of vegetation communities. Among the course topics are sampling techniques for describing plant species distributions, abundance and diversity, including the quadrat and transect-based, pointintercept, and plot-less methods; identification of common and dominant indicator plant species of wetlands and uplands; identification of hydric soils; and the use of soil, topographic and geologic maps and aerial photography in deriving a site description and site history. Emphasis is placed on wetland vegetation, delineation and restoration. While many of the field examples are centered in the Maryland and Washington, DC region, the format is designed so that the student performs field work in the state, country or region in which he or she would like to specialize.
EN.575.615 Ecology.

EN.575.716. Principles of Estuarine Environment: The Chesapeake Bay Science and Management. 3 Credits.
The course examines the basic physical, chemical, and biological components of the Chesapeake Bay ecosystem and how they interrelate in both healthy and degraded states of an estuary. The course focuses on the tidal waters of the Chesapeake Bay and its tributaries. It also covers the relationships of the bay with the surrounding watershed, atmosphere, and ocean as well as relevance to other coastal systems. Particular emphasis is on to anthropogenic stresses such as nutrient and contaminant pollution, habitat modification, and harvest of fish and shellfish. The most current Chesapeake Bay management issues and policies being pursued at the federal, state, and local levels of government are discussed in depth, including their scientific foundation.

EN.575.717. Hydrology. 3 Credits.
This course introduces the fundamental physical principles that are necessary to understand the occurrence, distribution, and circulation of water near Earth's surface. Students will be introduced to the global hydrological cycle and the influence of climate, geology, and human activity. Students will study the processes of precipitation and evapotranspiration; surface water flow, floods, and storage in natural and artificial reservoirs; groundwater flow; and whole-cycle catchment hydrology. Although less emphasized, water-quality and water resources management issues will be discussed and case studies presented. Throughout the course, a quantitative approach is taken in which mathematical descriptions of hydrological phenomena will frequently be an objective. The course will also provide an introduction to hydrological data acquisition and analysis.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics.

EN.575.720. Air Resources Management and Modeling. 3 Credits.
This course focuses on air pollution management and modeling topics with an emphasis on how air quality models can be used to help inform decision makers. In addition to introducing the fundamentals of air pollution and addressing general modeling considerations, topics covered in this course include the health and environmental effects of key air pollutants, how air quality modeling was used in major studies leading to better air quality, US requirements for air quality modeling studies, and current local, national, and international air pollution issues. Atmospheric physics and chemistry are reviewed as they relate to air pollutant transport and transformation. Specific modeling topics include box and plume models, indoor air quality and monitoring, numerical and statistical models, and climate change modeling and decision making. Specific air pollution problems addressed in the course include those at local, regional, and national scales; air pollution problems from a public health perspective; and approaches for developing air pollution control strategies for various air pollutants. A term-long case study assignment is required that leverages these course elements to address a timely and relevant real-world air pollution scenario.

EN.575.727. Environmental Monitoring and Sampling. 3 Credits.
Environmental monitoring and sampling provides the information needed for assessments of compliance with environmental criteria and regulatory permits, and status/trends to evaluate effectiveness of regulatory controls. Students will prepare a Sampling and Analysis Plan (SAP) as a course project to support a site-specific field data collection study for environmental sampling of air, surface water, groundwater, and soils. An overview of historical/current environmental issues, including public health and environmental impacts, for air, surface water, groundwater, and soil, is presented. An overview of regulatory requirements of federal environmental statutes and assessments of effectiveness of the Clean Water Act, Clean Air Act, Safe Drinking Water Act, CERCLA, and RCRA is presented. The course describes pollutant sources and physical, chemical, biological processes that govern transport and fate of contaminants in air, surface water, groundwater, and soils. The course examines the principles, methods, and strategies for monitoring and sampling of air, surface water, groundwater, and soil. Sampling methods are presented for discrete sampling, automated data acquisition, and remote sensing for air, surface water, groundwater, and soils. SAP requirements for the course project will be presented, including key elements of Quality Assurance Project Plans and Field Sampling Plans. The course presents selected concepts of environmental statistics; an overview of data sources available from EPA, USGS and other agencies for air, surface water, groundwater, and soils; and interpretation of environmental data sets with GIS/mapping, data analysis, and statistical methods to support decision-making, site characterization, and evaluation of status/trends. Students will research online opportunities for "virtual" field trips to observe field sampling methods for air, surface water, groundwater, and soils media.

EN.575.728. Sediment Transport and River Mechanics. 3 Credits.
This course examines the processes of sediment entrainment, transport, and deposition and the interaction of flow and transport in shaping river channels. Topics reviewed include boundary layer flow; physical properties of sediment; incipient, bed-load, and suspended-load motion; bed forms; flow duration; sediment loads; hydraulic roughness; scour and deposition of bed material; bank erosion; sediment budgets; channel classification, and size, shape, planform, and migration of river channels. In addition, the course develops techniques of laboratory, theoretical, and sediment modeling and applies them to problems of sediment transport, channel morphology, and channel change. Prerequisite(s): A course in fluid mechanics or an equivalent course in fluid flow or hydraulics. A course in statistics is strongly encouraged

EN.575.730. Geomorphic and Ecologic Foundations of Stream Restoration. 3 Credits.
This course presents principles from hydrology, sedimentation engineering, geomorphology, and ecology relevant to the design and evaluation of stream restoration projects. A watershed context is emphasized in developing the background needed to assess different design approaches. After developing a common foundation in stream dynamics, the course considers trade-offs among restoration objectives, the merits of analog and predictive approaches, the role of uncertainty in restoration design, and metrics for assessing ecological recovery. The course includes online discussions, design exercises, and review papers and finishes with an assessment of a stream in students' geographic regions.

EN.575.743. Atmospheric Chemistry. 3 Credits.
Earth's atmosphere is a vital and fragile component of our environment. This course covers the chemical composition of the atmosphere and the principles of chemistry that control the concentrations of chemical species. Following an introduction to the atmosphere, including its structure and composition, the course investigates basic concepts relating to atmospheric chemical kinetics and photochemistry. This foundation of chemistry and physics is applied to the study of the gas-phase chemistry of the troposphere and the stratosphere including focused study of criteria pollutants such as carbon monoxide (CO), tropospheric and stratospheric ozone (O3), chlorinated fluorocarbons (CFCs), sulfur and nitrogen oxides (NOx and SOx) and particulate matter (PM). Many trace species and their impacts on atmospheric chemistry are investigated. Condensedphase chemistry topics include aqueous-phase chemistry, the chemistry of clouds and fogs and aerosol chemistry (including particulate matter chemistry). The chemistry of climate change and the radiative forcing of atmospheric constituents is studied. The relationship between atmospheric chemistry and air quality is stressed via focusing on negative human health and environmental impacts. The course stresses application of these concepts to current and relevant atmospheric chemistry issues.

EN.575.744. Environmental Chemistry. 3 Credits.
This course focuses on the environmental behavior and fate of anthropogenic contaminants in aquatic environments. Students learn to predict contaminant properties influencing contaminant transfers between hydrophobic phases, air, water, sediments, and biota, based on a fundamental understanding of physico-chemical properties, intermolecular interactions, and basic thermodynamic principles. Mechanisms of important transformation reactions and techniques and quantitative models for predicting the environmental fate or human exposure potential of contaminants are discussed.

EN.575.763. Nanotechnology and the Environment: Applications and Implications. 3 Credits.
This course explores the positives and negatives of nanotechnology: the benefits to use in commercial and environmental applications, as well as considering nanoparticles as an emerging environmental contaminant. The course will analyze nanotechnology through an interdisciplinary outlook for a life-cycle analysis. This analysis will begin with synthesis, manufacturing, unintentional releases, and disposal. We will consider ecological consequences and public health implications of the use of nanotechnology. Students will learn the science behind nanotechnology and how nanoparticle characteristics impact transport in the environment, including human exposure assessment, and a discussion of current measurement tools. Policies regulating nanotechnology and risk assessment will be addressed.

EN.575.801. Independent Project. 3 Credits.
This course provides students with an opportunity to carry out a significant project in the field of environmental engineering, science, technology, planning, or management as a part of their graduate program. The project is individually tailored and supervised under the direction of a faculty member and may involve conducting a semester-long research project, an in-depth literature review, a non-laboratory study, or application of a recent development in the field. The student may be required to participate in conferences relevant to the area of study. To enroll in this course, the student must be a graduate candidate in the Environmental Engineering, Science, and Management Program within the latter half of the degree requirements and must obtain the approval and support of a sponsoring faculty member in the Department of Environmental Health and Engineering. The proposal description and completed required forms must be submitted prior to registration for approval by the student's advisor and the program chair. A maximum of one independent project course may be applied toward the master's degree or post-master's certificate.

EN.575 (Environmental Engineering)

EN.575.604. Principles of Environmental Engineering. 3 Credits.
This course provides knowledge of environmental elements with insight into quantitative analysis and design where applicable. Topics include an introduction to environmental engineering and design process, professional associations, engineering licensure, engineering ethics, and environmental justice; dimensional analysis, mass and energy transfer and balances; environmental chemistry; mathematics of growth and decay; risk assessment and management; surface water pollutants, biological and chemical oxygen demands; eutrophication; water supply systems and drinking water standards; wastewater treatment systems and effluent standards; groundwater flow, contaminant transport, and remediation technologies; remedial and corrective actions at contaminated sites; air pollution sources, control technologies, and atmospheric stability; ambient air quality standards and indoor air quality; global temperature, greenhouse effect and warming potential; global energy balance, carbon emission, and stratospheric ozone depletion; hazardous and solid waste management, landfill disposal, combustion, composting, and recycling; medical waste. Overviews of pertinent environmental laws and regulations will be presented where applicable. The course encompasses conceptual design projects for environmental systems and infrastructures. Course Note(s): This is a required course for all students in the Environmental Engineering, Science, and Management Programs who do not possess an undergraduate degree in Environmental Engineering.

EN.575.605. Principles of Water and Wastewater Treatment. 3 Credits.
Water quality objectives and the chemical, physical, and biological processes necessary for designing and managing modern drinking water and wastewater treatment plants are described in the course. The principles of coagulation, flocculation, sedimentation, filtration, biological treatment, solids handling, disinfection, and advanced treatment processes are presented. The course serves as a basis for the more advanced courses: EN.575.745 Physical and Chemical Processes for Water and Wastewater Treatment, EN.575.706 Biological Processes for Water and Wastewater Treatment, and EN.575.746 Water and Wastewater Treatment Plant Design.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics; two semesters of undergraduate chemistry.

EN.575.606. Water Supply and Wastewater Collection. 3 Credits.
This course covers the fundamental but practical issues of water distribution systems and wastewater/stormwater collection systems. Specific topics of interest in water supply include water supply master planning; design of water storage facilities, water mains, and pumping stations; distribution-system water quality; and service connection issues. Topics covered under wastewater/stormwater collection include hydrology and hydraulics of stormwater/wastewater conveyance systems; design of stormwater detention and retention facilities; and collection system control technologies including green infrastructure. Also covered are regulations governing sanitary sewer overflows (SSOs) and combined sewer overflows (CSOs); public health, environmental, and economic impacts of SSOs and CSOs; sewer system evaluation and rehabilitation methods; stormwater best management practices; and the benefits and challenges of water reuse. Through research papers and discussion forums, students examine case studies that illustrate diverse practical situations and stimulate creative ideas for solving real-life design problems.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow or hydraulics.

EN.575.607. Radioactive Waste Management. 3 Credits.
This course covers fundamental aspects of radioactive substances in the environment; remediation processes for these substances; and their eventual storage, processing, and disposal. It provides a basic understanding of radioactivity and its effect on humans and their environment, as well as the techniques for their remediation and disposal. Topics include radioactivity, the nucleoids, interaction of radiation with matter, shielding, dosimetry, biological effects, protection standards, sources of environmental radiation, risk evaluation, fate and transport analysis, cleanup standards, legal requirements, cleanup technologies, waste disposal, and case studies.

EN.575.620. Solid Waste Engineering & Management. 3 Credits.
This course covers engineering and scientific concepts and principles applied to the management of municipal solid waste (MSW) to protect human health and the environment and the conservation of limited resources through resource recovery and recycling of waste material. Topics include regulatory aspects and hierarchy of integrated solid waste management; characterization and properties of MSW; municipal wastewater sludge utilization; hazardous waste found in MSW; collection, transfer, and transport of solid waste; separation, processing, combustion, composting, and recycling of waste material; and the landfill method of solid waste disposal, which encompasses guidelines for design, construction, operation, siting, monitoring, remedial actions, and closure of landfills. Permitting and public participation processes, current issues, and innovative approaches are also addressed.

EN.575.623. Industrial Processes and Pollution Prevention. 3 Credits.
This course presents the pollution prevention and waste minimization concepts, terminologies, life cycle impacts, and management strategies. The course introduces available remediation techniques for industrial pollution control and prevention and examines specific applications to industries including biological, chemical, physical, and thermal techniques. Topics include current state of knowledge of pollution prevention approaches to encourage pollution prevention strategies, highlights of selected clean technologies and clean products, technical and economic issues, incentives and barriers to pollution prevention, and the role of different sectors in promoting pollution prevention. Pollution prevention and waste minimization techniques such as waste reduction, chemical substitution, production process modification, and reuse and recycling will be addressed with regard to selected industries.

EN.575.703. Environmental Biotechnology. 3 Credits.
This course examines current applications of biotechnology to environmental quality evaluation, monitoring, remediation, and mitigation of contaminated environments. The scale of technology ranges from the molecular to macrobiotic. Relevant topics of microbiology and plant biology are presented. These provide a foundation for following discussions of microbial removal and degradation of organics, phytoremediation of soil and water contaminated with toxic metals and radionuclides, wetlands as treatment processes, biofilms/biofilters for vapor-phase wastes, and composting in alignment with sustainable development goals considering climate change. Emphasis is placed on modeling and design. Advantages and disadvantages of each application are compared. Case studies are presented in the areas of biosensors in environmental analysis, molecular biology applications in environmental engineering, and genetic engineering of organisms for bioremediation. Prerequisites: Prior coursework in environmental microbiology, molecular Biology, or biochemical engineering is recommended but not required.

EN.575.706. Biological Processes for Water & Wastewater Treatment. 3 Credits.
This course develops the fundamentals and applications of aerobic and anaerobic biological unit processes for the treatment of municipal and industrial wastewater. The principles of activated sludge, aeration and clarifier design, fixed film reactors, anaerobic treatment, solids handling and treatment, land treatment, and nutrient removal are presented. This course uses concepts from microbiology and the basic principles of stoichiometry, energetics, and microbial kinetics are used to support the design of biological unit processes.
EN.575.605 Principles of Water and Wastewater Treatment.

EN.575.715. Environmental Contaminant Dispersion and Transport. 3 Credits.
This course will provide an overview of the basic foundations of pollutant transport and dispersion phenomena in the environment including surface water, atmosphere, and groundwater media. The emphasis of the course will be on mathematical formulation of transport equations, analytical solutions, physical insights, methods of analysis of tracer breakthrough curves, spatial and temporal moments analysis. Although numerical modeling is not the primary objective of the course, the students will be provided with the knowledge to build a modest computational toolbox using random-walk particle tracking to visualize and quantify transport processes. Computation of analytical solutions presented in the course will require some knowledge of scientific programming. However, the students will gain such competency during the course.Prerequisites: Undergraduate fluid mechanics (570.351 or equivalent) and differential equations.

EN.575.721. Air Quality Control Technologies. 3 Credits.
This is a multidisciplinary course that involves the applications of chemistry, thermodynamics, and fluid mechanics in the selection and design of air pollution control equipment. Topics include the estimation of potential pollutants, chemical characterization of gas streams to be controlled, theory and practice of air pollution control, and design and costing of control technologies. The course emphasizes the design of systems to reduce particulate matter emissions, volatile organic compound (VOC) emissions, nitrogen oxide emissions, and sulfur dioxide emissions.
EN.575.601 Fluid Mechanics or an equivalent course in fluid flow; an undergraduate course in thermodynamics.

EN.575.732. Energy Technologies for Solving Environmental Challenges. 3 Credits.
This course covers the science, engineering, and operation of energy technologies - on a stand-alone and systems basis - that will reduce carbon dioxide and other greenhouse gas (GHG) emissions, and lower air pollution, with quantitative analysis where applicable. On the supply side, students will learn about solar radiation and its use for solar photovoltaic (PV) technologies (at a cell, module, and system-level) and concentrated solar power (CSP) with thermal storage, and other renewable energy technologies that use wind, water, and biomass, as well as the use of carbon capture and sequestration (CCS). Energy storage technologies covered to support variable renewable energy (VRE) integration include lithium-ion and other types of batteries, pumped hydro, compressed air energy storage (CAES), and longer-term energy storage from the production of hydrogen, using electrolysis and other low carbon methods. End-use energy technologies covered will include battery electric vehicles (BEV), plug-in hybrid (PHEV) and fuel cell electric vehicles (FCEV), and some examples of the use of low carbon heat sources or feedstocks for industrial processes and combined heat and power (CHP).

EN.575.741. Membrane Filtration Systems and Applications in Water and Wastewater Treatment. 3 Credits.
This course covers fundamentals of membrane filtration technology and application in municipal and industrial water and wastewater treatment. Topics include membrane classification, mechanism of separation/ filtration, principle of operation, performance monitoring, maintenance, pilot scale testing, residual disposal, emerging and developing membrane separation technologies, and regulations governing treatment objectives and residual disposal in membrane filtrations systems. This course provides students with in-depth knowledge of the theory, application, and design of membrane filtration systems by engaging them in group assignments and design projects.

EN.575.742. Hazardous Waste Engineering and Management. 3 Credits.
The course addresses traditional and innovative technologies, concepts, and principles applied to the management of hazardous waste and contaminated sites to protect human health and the environment. Topics include regulatory requirements; hazardous waste generators and transporters; permitting and enforcement of hazardous waste facilities; closure and financial assurance requirements; RCRA Corrective Action and CERCLA/Superfund/Brownfields site remediation processes; groundwater flow and fate and transport of contaminants; physical, chemical, and biological treatment; land disposal restrictions; guidelines for design, construction and closure of hazardous waste landfills; environmental monitoring systems; management of medical waste and treatment options; management of underground and aboveground storage tanks; toxicology and risk assessment; and pollution prevention and waste minimization.

EN.575.745. Physical and Chemical Processes for Water and Wastewater Treatment. 3 Credits.
In this course, mass and momentum transport, aquatic chemistry, and chemical reaction engineering are applied to physical and chemical processes used for water and wastewater treatment. Students also learn the theory and practice of various unit processes including disinfection, oxidation, coagulation, sedimentation, filtration, adsorption, gas transfer, and membrane filtration. The goal is to provide a theoretical understanding of various chemical and physical unit operations, with direct application of these operations to the design and operation of water and wastewater treatment systems. Students will use the concepts learned in this class to better understand the design and operation of engineered and natural aquatic systems.
EN.575.605 Principles of Water and Wastewater Treatment.

EN.575.746. Water and Wastewater Treatment Plant Design. 3 Credits.
This course familiarizes students with appropriate design criteria and the design process for water and wastewater treatment plants. This includes design of treatment processes, cost estimates, and a working design team under project managers. Additional course requirements include oral presentations and writing engineering reports.
EN.575.605 Principles of Water and Wastewater Treatment and either EN.575.706 Biological Processes for Water and Wastewater Treatment or EN.575.745 Physical and Chemical Processes for Water and Wastewater Treatment.and Wastewater Treatment)

EN.575.749. Water Quality of Rivers, Lakes, and Estuaries. 3 Credits.
Sustainably managing aquatic environments for ecosystem and public health in a changing climate requires us to understand the combined effect of multiple physical, chemical, and biological processes. This class will equip students to apply their understanding of environmental engineering principles to real-world water quality issues using computer simulation models. The approaches covered are widely used in the US for TMDL studies and NPDES permitting under the clean water act. Emphasis will be placed on gaining insight by understanding fundamental assumptions and equations, and application to classical problems of oxygen demand and eutrophication. Advanced topics including pathogen and toxin dynamics will also be introduced.Prerequisites: Differential equations

EN.575.761. Measurement and Pseudo-measurement in the Environmental Arena. 3 Credits.
In this course, students will be provided with the knowledge to critically investigate practical, theoretical, mathematical, philosophical, sociological, and legal aspects of measurement and pseudo-measurement in environmental science and related disciplines. Students will explore the theoretical and mathematical bases for quantification and trace the relationship between these bases and the expanding role of quantification and pseudo-quantification in environmental research, policy, and decision making. Three theories of measurement (traditional, representational, and operational) will be presented from historical, technical, and philosophical perspectives. Claims to quantification arising in a number of environmental contexts (such as river systems and hydrology) will be closely examined in light of these divergent measurement paradigms.

EN.575.762. Resilience of Complex Systems. 3 Credits.
This course will present a subset of the mathematical techniques often use to gain an understanding of the response of complex systems to acute events and compound threats. Examples of complex systems include: installations, organizations, communities, etc. With the understanding of resilience as ability to withstand and 'bounce back' from major disruptive events, the course will consider resilience as an emergent attribute, and investigate some pre- and post-event approaches to resilience enhancement. The focus of the mathematical modeling techniques presented in this course will be on nonlinear dynamics. We will also discuss relevant variational optimization techniques that can be used to guide measures taken to enhance resilience. The course will include selected applications as case studies; examples include: savanna ecosystems, large installations, communities facing infectious diseases, preparation for and response to coastal storms, etc. Prerequisite(s): Differential Equations.

EN.575 (Environmental Planning and Management)

EN.575.608. Optimization Methods for Public Decision Making. 3 Credits.
This course is an introduction to operations research as applied in the public sector. Public sector operation research involves the development and application of quantitative models and methods intended to help decision makers solve complex environmental and socio-economic problems. The course material is motivated by real-world problems and is presented in an environmental engineering-relevant context. Such problems include air pollution control, water resources management, transportation planning, scheduling, resource allocation, facility location, and biological conservation. Emphasis is placed on skill development in the definition of problems, the formulation of models, and the application of solution methodologies. Methodologies covered in this course include linear programming, integer programming, multiobjective optimization, and dynamic programming.

EN.575.611. Economic Foundations for Public Decision Making. 3 Credits.
The course examines intermediate-level price theory and surveys applications to public-sector decision making. Topics include demand, supply, behavior of the market, and introductory welfare economics. Applications include forecasting, cost-benefit analysis, engineering economics, and public sector pricing.

EN.575.628. Business Law For Engineers. 3 Credits.
This course introduces engineers to the basic legal principles they will encounter throughout their careers. Course discussions cover contracts (formation, performance, breach, and termination), corporations and partnerships, insurance, professional liability, risk management, environmental law, torts, property law, and evidence and dispute resolution. The course emphasizes those principles necessary to provide engineers with the ability to recognize issues that are likely to arise in the engineering profession and introduces them to the complexities and vagaries of the legal profession.

EN.575.635. Environmental Law for Engineers & Scientists. 3 Credits.
This course explores fundamental legal concepts relevant to environmental issues, including the relationship between statutes, regulations, and court decisions. Also included are various forms of enforcement used in environmental rules: command and control, liability, and information disclosure. Specific issues include criminal enforcement, a survey of environmental statutes, regulations and case law, the purpose and misconceptions surrounding environmental audits and assessments, the concept of attorney-client privilege, unauthorized practice of law, and ethical conflicts between the attorney and engineer/scientist roles.

EN.575.637. Environmental Impact Assessment. 3 Credits.
This course examines principles, procedures, methods, and applications of environmental impact assessment. The goal of the course is to promote an understanding of how environmental impact assessment is conducted and used as a valuable tool in the engineering project management decision-making process. Topics include an overview of environmental impact assessment; selection of scientific, engineering, and socioeconomic factors in environmental impact assessment; identification of quantitative and qualitative environmental evaluation criteria; application of traditional and other techniques for assessing impacts of predicted changes in environmental quality; approaches for identifying, measuring, predicting, and mitigating environmental impacts; modeling techniques employed in environmental impact assessment; environmental standards and the environmental impact assessment process; and methodologies for incorporating environmental impact assessment into management decision-making. Students learn to prepare an environmental impact assessment, review and critically analyze an environmental impact statement, use mathematical models for environmental impact prediction, and apply environmental impact assessment as a tool in management decision-making. Case studies of environmental impact assessment for several types of engineering projects are employed.

EN.575.640. Geographic Information Systems (GIS) and Remote Sensing for Environmental Applications. 3 Credits.
Through lectures and laboratory exercises, this course illustrates the fundamental concepts of GIS and remote sensing technologies in the context of environmental engineering. Topics include the physical basis for remote sensing, remote sensing systems, digital image processing, data structures, database design, and spatial data analysis. The course is not intended to provide students with extensive training in particular image processing or GIS packages. However, handson computer laboratory sessions re-enforce critical concepts. Completion of a term project is required.

EN.575.658. Natural Disaster Risk Modeling. 3 Credits.
Natural hazards such as floods, earthquakes, and hurricanes exert a heavy toll of victims and economic losses every year. Yet, concentrations of population in hazard-prone-areas, the growth of infrastructure and climate change are aggravating the risk of future losses. Consequently, adequate interventions must be implemented to mitigate the damaging effects of natural hazards. To do this, public agencies, non-profits, and companies formulate mitigation actions such as emergency preparedness plans and building retrofits. Catastrophe models are tools to inform all these efforts, which simulate the socioeconomic risk resulting from the interaction of geophysical events and the spatial distribution of infrastructure.

EN.575.707. Environmental Compliance Management. 3 Credits.
The course covers compliance with environmental laws and regulations by industry, small business, government facilities, and others. It includes legal responsibilities, environmental management systems, and practices such as audits and information systems and development of corporate policies and procedures that rise to the daunting challenge to harmonize the institution's primary goals with its environmental obligations. Several dimensions of environmental management are discussed: federal, state, and local regulation; scientific/technical factors; public relations and the press; and institutional objectives including economic competitiveness.

EN.575.710. Financing Environmental Projects. 3 Credits.
This course treats the financing of projects from two complementary perspectives: that of a government agency funding source, and that of an environmental utility (water, wastewater, solid waste) that needs funds for its project. It discusses grants, concessionary loans, market loans, and loan guaranties, along with their relative desirability and efficiency. Since grant funding is never available for all projects, the course deals extensively with borrowing/lending. It discusses strategies for maximizing utility income, including appropriate tariff structures and the reform of government subsidy policy from supply-based general subsidies to demand-based targeted subsidies. Operational strategies to maximize income are also discussed, such as techniques to improve billing and collections, reduce losses, and reduce energy costs. Traditional cash flow analyses are used to determine debt service capabilities. Various project cost reduction strategies, such as staging and scaling, are introduced. Grants in the form of upfront project cost buy-downs vs. annual debt service subsidies are compared. Finally, several examples of project financings combining many of the elements introduced during the course are presented and analyzed.

EN.575.711. Climate Change and Global Environmental Sustainability. 3 Credits.
This is a multidisciplinary course that focuses on the critical assessment of science, impacts, mitigation, adaptation, and policy relevant to climate change and global environmental sustainability. The first half of the course introduces students to climate change including impacts and drivers, modeling science, mitigation and adaptation efforts, and social aspects (public opinion, responsibility, etc.). The second half of the class considers how climate change and sustainability relate and explores key sustainability concepts and trade-offs related to sustainability's three pillars of economy, society, and environment. Students will explore course concepts through a combination of materials including news and digital media and press, domestic and international technical reports, and peer-reviewed scientific literature. Discussions will include both physical and social considerations and cover a wide range of sectors (e.g., water, energy) and levels of governance (local, regional, national, international). Students will be required to use both subjective and objective analyses of course concepts through employing critical thinking strategies and active learning. Course assignments will include a combination of discussions, presentations, readings, and interactive exercises.

EN.575.714. Water Resources Management. 3 Credits.
This multidisciplinary course examines the scientific, institutional, and analytical aspects of managing water quantity and quality. Students are provided a historical context that is useful for assessing current policy. The water cycle and basic hydrology are reviewed. The course surveys the laws and regulatory instruments for managing water quantity and quality, which operate across federal, state, and local levels of government. Funding issues associated with water resources management include operating and capital budgets, debt financing, the challenges of pricing, and the role of privatization. The course addresses the management of water supply and demand in the United States by economic sector and by in-stream and off-stream uses. This includes trends in water supply and demand, as well as modeling methods for water supply management. Fundamentals of flood and drought management are covered, with attention given to the context of global climate change and extreme events. The critical role of the general public in water resource management decision making is addressed in the context of structured techniques involving economic analyses, multiobjective analyses, and collaborative decision making. Water quality-based management under the federal Clean Water Act includes the topics of water quality standards, water quality assessments, total maximum daily loads (TMDLs), and ensuing permit requirements. Regional ecological water resources management is addressed for the Susquehanna River and by contrasting the Chesapeake Bay case with other largescale cases.

EN.575.722. Principles of Air Quality Management. 3 Credits.
Air quality management is fundamental to human health and environmental stewardship. This course provides a systematic introduction to the air quality management cycle and how it is applied to protect both outdoor and indoor air quality as well as to mitigate climate change. Air pollutants pose risks at multiple spatial scales—from individual homes to regional and global geographies—and across various timelines—from hours to decades. This course describes the formation, transport, and transformation of air pollution and reviews the historical development of air pollution control programs. As science and technology evolve, the principles of air quality management enhance our ability to protect and restore healthful air quality and address both long-standing and emerging issues. Students will learn how air quality management principles shape and enable a variety of strategies to minimize negative impacts of traditional and newly developed air contaminants. Assignments emphasize analyzing air quality measurements and emissions data as well as comparing and contrasting regulatory approaches. Through a term project students apply knowledge of the principles of air quality management to timely and relevant air quality issues.

EN.575.723. Sustainable Development and Next-Generation Buildings. 3 Credits.
The course will introduce the concepts, applications, and tools for analysis and decision making in support of sustainable environmental development and next-generation communities and building design. Students will be introduced to a variety of challenges related to environmental protection, stewardship, and management of air, soil, and water. The underlying principles of ecological protection, stewardship, reduced environmental footprint, ecosystem capital, sustainable economic development, and globalization impacts will be reviewed. The integration of actions that are ecologically viable, economically feasible, and socially desirable to achieve sustainable solutions will be evaluated. Within this context, the course will explore sustainable building concepts that are intended to provide, throughout their lifetime, a beneficial impact on their occupants and their surrounding environment. Such buildings are optimally integrated on all parameters-initial affordability, timeliness of completion, net life-cycle cost, durability, functionality for programs and persons, health, safety, accessibility, aesthetic and urban design, maintainability, energy efficiency, and environmental sustainability. The principles of LEED building design and certification will also be introduced with a review of example projects. Integrated design and construction practices that significantly reduce or eliminate the negative impact of buildings on the environment and occupants will be assessed in the broad areas of (1) sustainable site planning, (2) safeguarding water and water efficiency, (3) energy efficiency and renewable energy, (4) conservation of materials and resources, and (5) indoor environmental quality. Also, a further critical element being addressed for a successful sustainable building policy and program is an integrated building planning and design process.

EN.575.731. Water Resources Planning. 3 Credits.
The course will discuss the application and interrelationships among microeconomics, ecology, hydrology, and fields related to the planning and management of water systems. Topics will include flood control, navigation, hydroelectric power, water supply, environmental restoration, multi-objective planning, and urban water resource management. The course will demonstrate the process for planning a water resource project, including identifying the problems and opportunities, inventorying and forecasting conditions, formulating alternative plans, evaluating alternative plans, comparing alternative plans, and selecting a plan. Particular attention will be paid to the appropriate interdisciplinary approach to plan formulation.

EN.575.733. Energy and the Environment. 3 Credits.
This course examines the interrelationships between the environment and the ways in which energy is produced, distributed, and used. Worldwide energy use patterns and projections are reviewed. Particular attention is paid to the electrical and transportation sectors of energy use. Underlying scientific principles are studied to provide a basis for understanding the inevitable environmental consequences of energy use. Topics studied include fossil, nuclear, and existing and potential renewable sources, including hydroelectric, geothermal, tidal, wind, and solar. Transportation options including internal combustion, hybrid, and electric options are quantitatively compared. Use of alternate fuels such as biodiesel and ethanol are evaluated. Emphasis is placed on the environmental impacts of energy sources, including local effects resulting from emissions of nitrogen oxides, sulfur, hydrocarbons, and particulates as well as global effects such as mercury release from coal combustion. Carbon emissions are a continuing theme as each energy technology is studied and its contribution to climate change is assessed. Carbon suppression schemes are examined. Particular attention is paid to consequences and effectiveness of government intervention and regulation. The purpose is to help students understand how energy is converted into useful forms, how this conversion impacts our environment, and how public policy can shape these impacts.

EN.575.734. Smart Growth Strategies for Sustainable Cities. 3 Credits.
This course addresses the concepts, practices, and tools for smart growth sustainable urban planning and provides an understanding of how to apply these to urban communities. The sustainable urban development is a pattern of resource use that aims to meet human needs while preserving the environment so that these needs can be met not only in the present but also for future generations to come. In other words, it is the development and restoration of urban areas that will meet the needs of the present without compromising the ability of future generations to meet their own needs. The course addresses a number of urban design concepts for smart growth and sustainable development, including balanced land use planning principles; importance of an overall transportation strategy; providing urban tree coverage; leveraging public transportation accessibility; providing a spectrum of housing availability; integration of office, retail, and housing units; reduction of urban area environmental footprint; use of recycled, reused, reusable, green, and sustainable products; integration of renewable solar energy and wind power into buildings and government systems; transit-oriented development; innovative low-impact storm water management practices; reduction in urban heat island effects; urban water resource management; and energy efficiency and conservation.

EN.575.735. Energy Policy and Planning Modeling. 3 Credits.
This course provides students with comprehensive knowledge on methods for optimizing operation and design of energy systems and methods for analyzing market impacts of energy and environmental policies with emphasis on both theory and solution of actual models. The course also covers linear and nonlinear programming and complementarity methods for market simulation. Prerequisite(s): Microeconomics or optimization methods (linear programming).

EN.575.736. Designing for Sustainability: Applying a Decision Framework. 3 Credits.
In this course, students will apply a sustainability decision framework, developed by the National Research Council, to an environmental project of their choice. This will include developing a project management plan, a project action plan, and an evaluation and adaptation assessment that will outline how sustainability principles will be incorporated into their project. This applied approach will give students experience in systems thinking, linkages across governmental bodies, development of indicators, use of environmental support tools, transdisciplinary cooperation, and the use of structured decision framework.

EN.575.737. Environmental Security with Applied Decision Analysis Tools. 3 Credits.
This multi-disciplinary course examines current and emerging environmental security issues at multinational, national, and regional scales. These issues are approached from the perspective of decision-making for policy, planning, and management. The course begins with an overview and definitions of environmental security within the context of present global demographic patterns, use of natural resources, and climate change. The theory and principles of multi-criteria decision analysis (MCDA) are reviewed, using environmental security examples to illustrate concepts. Three MCDA methodologies are presented, including multi-attribute weighting, Analytic Hierarchy Process, and outranking, which are commonly used to assist decision makers. The MCDA approach is critiqued from the perspective of measurement theory and guidelines for MCDA use are suggested. With both the social sciences and natural sciences providing a framework, several specific environmental security topics are covered in greater depth: energy; air quality; ecosystems and biodiversity; fresh water; agriculture and food; and sea level rise. Within these topics, students will develop MCDA models for particular policy, planning, and management problems under the guidance of the instructors. The course concludes by considering the prospects for environmental security and sustainability in the coming decades.

EN.575.738. Transportation, Innovation, and Climate Change. 3 Credits.
The world stands at the cusp of an unusually dynamic period in transportation's journey to the future. Legacy technologies coexist with powerful forces pushing forward revolutionary innovation. While cars and other vehicles using conventional fuels are forcing climate change, transportation innovations such as electric and automated vehicles to smart infrastructures are creating new lifestyles where transportation reduces carbon emissions. Transportation innovation creates technological and societal “tipping points” that will transform transport. Nevertheless, the direction and consequences of these “tipping points” are yet to be determined. This course explores transportation innovation at the “systems” level to determine whether or not we are bound to the past or moving actively towards a new future. The course assesses uncertainties regarding the capacity to innovate at a rate that will stimulate sustainability, resilience, and livability. The use of these theories and tools will facilitate a more rigorous approach to anticipating the unintended, synergistic, and circular (feedback) effects of transportation innovation processes. This course covers the following topics: mechanisms of climate change; role and efficacy of climate models; legacy transportation technologies versus revolutionary transportation innovations; assessing alternative climate change futures through existing patterns of technological change; identifying exogenous and endogenous threats; and planning for the future through tools borrowed from a variety of disciplines (e.g., public participation, uncertainty and complexity studies, innovation roadmaps, and portfolio management). Because new policies and practices depend on innovation, the course includes group projects designed to build skills for evaluating the direction of innovation over the short, mid, and long-term and the inherent capacity of a particular locality or region to contribute to systemic technological change.

EN.575.747. Environmental Project Management. 3 Credits.
This course educates students on the key elements of an integrated approach to environmental project management, an endeavor that requires expertise in scientific, engineering, legal, public policy, and project management disciplines. Emphasis is placed on critical factors that are often unique to a major environmental project, such as the uncertainty surrounding scope definition for environmental cleanup projects and the evolving environmental regulatory environment. The students learn to develop environmental project plans, establish project organization and staffing, define management functions, develop time management approaches, resolve project conflicts, determine project effectiveness, and implement integrated project management techniques such as the Program Evaluation and Review Technique and the Critical Path Method as they relate to environmental project management, perform pricing and cost estimating, establish cost control, set priorities, and perform trade-off analyses. The course uses environmental project case studies to examine the integrated nature of environmental project management. Examples of topics to be covered in this case study format include environmental security projects, environmental technology deployment projects, privatization of governmental environmental projects, pollution prevention/waste minimization projects, and environmental review of proposed infrastructure projects.

EN.575.750. Environmental Policy Needs in Developing Countries. 3 Credits.

This course will provide students with a thorough understanding of environmental policy needs in developing countries. The world's fastest growing economies are located in developing countries where rapid urbanization and use of natural resources will require supporting infrastructure. However, there are factors that may encourage or limit this growth, including the country's economic structure, governance, cultural history, demographics, and social structure. Through lectures, research, and group exercises, the students will (1) explore the social, economic, and environmental issues that challenge countries in the developing world as they move toward advancing their economies, infrastructure, and governance systems; (2) analyze how the various issues are interconnected and understand how this interconnectedness may affect environmental policy making; and (3) apply critical thinking to the analysis of environmental policy in order to effectively challenge classical assumptions. The student will be expected to analyze a specific environmental issue facing a developing country or region and develop a policy framework to address this issue.

EN.575.751. Environmental Justice, Climate, and Health Equity. 3 Credits.

Where do we begin in understanding the impact of environmental policy and planning on our natural systems and public health? And how do we broaden the adoption of environmental justice frameworks to environmental design, management, and policy? In this seminar, we'll begin by critically assessing the impact of environmental policy and planning on public health. We'll then examine the contributions of public health, policy, and environmental justice movements towards health inequity in the United States and globally. Lastly, applied public health models and methodologies will provide pragmatic approaches to inform environmental design and management. The seminar draws broadly on research and scholarship from anthropology, public health, and engineering to:?Assess how race, class, and gender influence our experiences and perceptions towards our natural systems, built environments, public health, and policy?Examine innovative public health methodologies integrating qualitative, quantitative, and community-based participatory research to rigorously assess the impact of environmental planning on health and inform equitable, healthy, and sustainable design approaches?Translate public health findings and evidence-based approaches to environmental design to inform and empower policymakers, health professionals, and key community stakeholders to transform environmental conditions

EN.575.752. Environmental Justice and Ethics in Environmental Decision-Making. 3 Credits.

This course focuses on the environmental justice and ethics problems facing environmental engineers, planners, and managers. It explores the foundations of the environmental justice movement, current and emerging issues, and the application of environmental justice analysis to environmental policy and planning. It examines claims made by diverse groups along with the regulatory and government policy responses that address perceived inequity and injustice. The course will study the mechanisms that give rise to class, racial, and other kinds of disparities that impact environmental decision-making. This includes the study of affected constituents, communities, industry, government, environmental activists, policy makers, and scholars, allowing students to learn about the causes and consequences of inequitable distributions of environmental benefits and hazards. Students will learn about various methods for researching environmental justice issues and strategies for formulating policies and collaborating with communities. In this course, students will review environmental justice theories and perspectives through case studies of Black Americans, Hispanic Americans, and Native American Nations. The class will focus mainly on the United States, but will include aspects of international issues and perspectives through research projects.

EN.575.753. Communication of Environmental Information and Stakeholder Engagement. 3 Credits.

This course provides students with the skills for communicating scientific environmental data and sustainable engineering design to stakeholders, including scientists in different fields, policy decision makers, and the interested public. The course covers the importance of clear communication of complex scientific information for the development and acceptance of technologies, public policy, and communitybased environmental initiatives. The key stakeholders for environmental engineers, scientists, and managers are specified. Methods of engagement and designing key messages are defined for global, national, and local issues of student interest. Major types of communication media are covered, including written communication and graphics, online communications in short- and long-form new media, and interactive communications such as surveys and citizen science to involve stakeholders in the creation and analysis of big data and dispersed information. The emphasis of the course is from the point of view of an environmental professional (not a marketing professional) and developing an effective sciencebased communications portfolio to share complex scientific information with a broad range of interested parties.

EN.575.759. Environmental Policy Analysis. 3 Credits.
The course explores the process of analyzing environmental policies to ensure human health, that environmental needs are protected, and that the physical environment is preserved, protected, and restored, if necessary. Emphasis is placed on the need to evaluate and make decisions regarding environmental science, human health, sociopolitical, technological, legal, and economic considerations in a context of incomplete information and uncertain futures. Case studies and policies relating to various contemporary environmental issues, for example hazardous waste disposal, natural resource extraction and preservation of natural resources, are critiqued during the semester. The course will lead students through the various steps of the policy analysis process. Students are expected to evaluate policy alternatives, develop evaluation criteria, and apply qualitative and quantitative methods to determine consequences, trade-offs, and potential synergies relating to these environmental issues. Students will then use these skills to create and execute an individual research project that analyzes an environmental policy relating to a specific issue of interest to them, evaluating potential responses to environmental management problems through analyzing the impacts of each policy alternative.

EN.575.771. Data Analytics in Environmental Health and Engineering. 3 Credits.
Data analytics is a field of study involving computational statistics, data mining and machine learning, to explore data sets, explain phenomena and build models for inference and prediction. The course begins with an overview of some traditional analysis approaches including ordinary least squares regression and related topics, notably diagnostic testing, detection of outliers and methods to impute missing data. Next comes nonlinear regression, and regularization models including ridge regression. Generalized linear models follow, emphasizing logistic regression and including models for polytomous data. Variable subsetting is addressed through stepwise procedures and the LASSO. Supervised machine learning topics include the basic concepts of resampling, boosting and bagging and several techniques: Decision Trees, Classification and Regression Trees, Random Forests, Conditional Random Forests, Adaptive Boosting, Support Vector Machines and Neural Networks. Unsupervised approaches are addressed through applications using principal component analysis, k-means Clustering, Partitioning Around Medoids and Association Rule Mining. Methods for assessing model predictive performance are introduced including Confusion Matrices, k-fold Cross-Validation and Receiver Operating Characteristic Curves. Environmental and public health applications are emphasized, with modeling techniques and analysis tools implemented in R.

EN.580 (Biomedical Engineering)

EN.580.110. Immersive Summer Program for Education, Enrichment, and Distinction in Biomedical Engineering. 3 Credits.
This cross-disciplinary, project-based course will introduce students to the field of biomedical engineering with particular emphasis on applying engineering principles to solve problems related to human health. Throughout the course, students will learn and implement modern techniques and methodology to address biomedical questions using biological, computational, and design approaches. Students will (1) apply molecular biology, cell culture, and other wet-lab techniques to answer hypothesis-driven experimental questions; (2) apply programming, coding, and machine learning techniques to analyze data and model disease; and (3) work in small groups to identify, design, and prototype solutions to unmet clinical needs. Guest lectures and workshops will round out the course, introducing students to careers in biomedical engineering, enhancing professional development skills, and providing other tools necessary for future success in the field.

EN.580.111. Biomedical Engineering and Design. 2 Credits.
Working in teams with upperclassmen this course (1) introduces biomedical engineering freshmen to an orderly method for analyzing and modeling biological systems, (2) introduces engineering principles to solve design problems that are biological, physiological, and/or medical, and (3) considers the ethical and professional responsibility in developing biomedical engineering solutions to health care challenges. Freshmen are expected to use the informational content being taught in calculus, physics and chemistry and to apply this knowledge to the solution of practical problems encountered in biomedical engineering. BME Freshmen only.
Students must have completed Lab Safety training prior to registering for this class.

EN.580.112. Design Team Health-Tech Project II. 3 Credits.
A two-semester course sequence where freshmen work with groups of BME upperclassmen mentors, and learn to use engineering principles to solve design problems that are biological, physiological, and/or medical. Freshmen are expected to use the informational content being taught in calculus, physics, and chemistry and apply this knowledge to the solution of practical problems encountered in biomedical engineering.

EN.580.151. Structural Biology of Cells. 3 Credits.
Course provides a rigorous foundation in cell structures and pathways relevant to medicine and bioengineering. Interactive lectures will cover molecular components (biological membranes, proteins, DNA, RNA, glycoproteins); electro-chemical gradients across membranes; structure and functions of the cell nucleus and genome; secretory and endocytic pathways; biomechanics, contractility and cell motility; cell adhesions, tissues and the extracellular matrix; signaling structures and networks; stem cells, cell division and cell specialization; heredity, mutations and phenotypes. This course will feature bioengineering principles including shape, localization, timing and feedback in biological systems. Students also take the 1-credit Structural Biology of Cells Lab.

EN.580.153. Structural Biology of Cells Laboratory. 1 Credit.
Students will learn how to analyze biological data in computational labs that focus on protein 3D structural data (Structural Protein Engineering), DNA/genomics data (Genomes to Clinical Phenotypes) and live-cell imaging data (Molecular Tracking in Cells) to gain an integrated understanding of cells, tissues and the molecular basis of disease. This lab accompanies the 3-credit Structural Biology of Cells course to provide a rigorous foundation in cell structures, pathways and strategies relevant to medicine and bioengineering.

EN.580.204. Social Justice: Fndts & Personal Commitments. 3 Credits.
The course will teach historical concepts from the post civil war years to #blacklivesmatter and will cover key periods in the American experience including Reconstruction, Jim Crow, thestruggle for civil rights, and #blacklivesmatter.The course emphasizes an understanding of both policy and practice, and engages students in series of case studies, practical frameworks, selected readings, and guest lectures. Students willcontemplate and study the ways in which racial justice plays out across a variety of contexts,including public spaces, the workplace, school, family and relationships, and public policy. Theseries of guest lectures will be delivered by practitioners and leaders in the movement for racialjustice. Ultimately, the course aims to empower students to advance racial justice through self,individual and systems advocacy. At the end of the course, students can expect to walk awaywith a) a broad understanding of the drivers of structural racism, b) models of advocacy inadvancing policy change, c) individual and institutional core competencies for anti-racistpractices. Recommended background: an authentic interest in racial justice and models for social change, a willingness to engage in candid, constructive, and challenging conversations and a desire to learn tools with practical applications in the workforce, communityorganizing, and social activism.

EN.580.211. Design Team Health-Tech Project I. 3 Credits.
Sophomore-level version of EN.580.311-312 or Perm. Req'd

EN.580.212. Design Team Health-Tech Project II. 3 Credits.
Sophomore-level version of EN.580.111-112. Permission of course directors required.

EN.580.221. Biochemistry and Molecular Engineering. 4 Credits.
This combined lecture and laboratory course will delve into the workings of the cell and the interactions between cells. The emphasis in this course is on quantitative analysis of reactions between molecules, including receptor-ligand and antigen-antibody specificity, enzyme catalysis, genetic information, protein processing and secretion, cell physiology and cell functions. In the laboratory portion of the course students will gain experimental skills in enzyme kinetics, binding (specificity and affinity), DNA analysis techniques (PCR, forensics), metabolism, membrane potentials and molecular neuroscience. The course will be supplemented with discussion and analysis of classic papers in the field as well as the current literature.Recommended background: Structural Biology of the Cell or a strong background in molecular biology and Chemistry.

EN.580.237. Neuro Data Design I. 3 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. This version of Neuro Data Design is designed for students with less coding experience who wish to develop their writing skills.
Area: Writing Intensive

EN.580.238. Neuro Data Design II. 3 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. This version of Neuro Data Design is designed for students with less coding experience who wish to develop their writing skills.
Area: Writing Intensive

EN.580.241. Statistical Physics. 2 Credits.
Basic principles of statistical physics and thermodynamics of biological systems. Topics included quantitative statistical formulation of entropy and its application in thermodynamic optimizationand conversion principles, the Gibbs/Boltzmann distribution, mixing, and phase transitions.Recommended Background: AS.110.108-109, AS.030.101-102, AS 171.101-102 or equivalent.

EN.580.242. Biological Models and Simulations. 2 Credits.
This course introduces students to modeling and analysis of linear biological systems. Topics include viscoelastic materials, pharmacokinetics, reaction-diffusion-convection equation with applications to molecular transport in tissues. The course also introduces students to the Matlab programming language, which allows them to implement the models discussed in the classroom. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.291 Linear Algebra and Differential Equations.

EN.580.243. Linear Signals and Systems. 2 Credits.
An introduction to signals and linear systems. Topics include first and second order systems, linear time variant discrete and continuous systems, convolution, Fourier series, and Fourier transforms.Recommended background: AS.171.102 and AS.110.201, AS.110.302, or 553.291. 110.302 may be taken at the same time.

EN.580.244. Nonlinear Dynamics of Biological Systems. 2 Credits.
Analysis and simulation of nonlinear behavior in biological systems: bifurcations (cell-fate decision), limit cycles (cell-cycle, neuronal excitations), chaos, and maps. Matlab will be used to simulate these systems and motivate nonlinear analytic tools and stability analysis. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.292 Linear Algebra and Differential Equations.

EN.580.246. Systems and Controls. 2 Credits.
An introduction to the analysis and synthesis of controllers for linear systems. topics include LaPlace transforms, input output and state space representations of linear systems, stability, observability, controlability, and PID controller design. Recommended course background: AS.110.201 Linear Algebra, AS.110.302 Differential Equations, or EN.553.291 Linear Algebra and Differential Equations.
EN.580.243

EN.580.248. Systems Biology of the Cell. 2 Credits.
Cellular systems biology provides a theoretical and quantitative understanding of the interactions between DNA, RNA, and proteins that create the well-regulated system we call life. This course develops first-principles models for the central dogma of molecular biology: information flow through protein signal transduction pathways, gene regulation by protein-DNA physical interactions, transcription of DNA to RNA, translation of RNA to protein, and feedback regulation that closes the cycle. Topics include complex analysis and contour integrals, spectral transforms, linear models for cell signaling, positive and negative feedback, non-linearities introducted by saturation and cooperativity, information content and combinatorial regulation, and instabilities leading to cell fate specification. Recommended Course Background: Linear Algebra, Systems and Controls and programming.

EN.580.298. Advanded Design Team. 3 Credits.
Sophomore-level version of EN.580.498. This independent course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team's technical achievements within the context of biomedical instrumentation. Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.311. Design Team Health-Tech Project I. 3 Credits.
A two-semester course sequence where juniors and seniors work with a team leader and a group of BME freshmen and sophomores, to solve open-ended problems in biomedical engineering. Upperclassmen are expected to apply their general knowledge and experience, and their knowledge in their concentration area, to teach lower classmen and to generate the solution to practical problems encountered in biomedical engineering.Perm. Req'd.

EN.580.312. Design Team Health-Tech Project II. 3 Credits.
A two semester course sequence where juniors and seniors work with a team leader and a group of BME freshmen and sophomores, to solve open-ended problems in biomedical engineering. Upperclassmen are expected to apply their general knowledge and experience, and their knowledge in their concentration area, to teach lower classmen and to generate the solution to practical problems encountered in biomedical engineering.

EN.580.336. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body. The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Fall semester only. S/U grading only.

EN.580.404. Design Team Project Definition. 0.5 Credits.
This course will train student BME Design Teams to identify and assess project options for their BME Design Team year-long project the subsequent year. Students will learn clinical observation tools, root cause analysis and need filtering. The outcome of the course is the ranking, justification and selection of the Design Team project.

EN.580.408. Design Team Leader Project Management. 1 Credit.
This course prepares undergraduate students to lead teams for the subsequent Design Teams course. This course will teach leadership skills, expose students to project options and clinical sponsors, and prepare them to plan and execute a biomedical design project. Course will meet in the Clark Hall Design Studio and the Carnegie Building (SoM) Design Studio.

EN.580.410. Effective Teaching and Management of Engineering Teams. 2 Credits.
Senior biomedical engineering students will assist the core course instructors and PhD students in managing the sections and recitations and or lab component of a course.Permission required.

EN.580.411. Design Team Health-Tech Project I. 3 Credits.
Perm. Req'd. Senior-level version of EN.580.311-312.

EN.580.412. Design Team Health-Tech Project II. 3 Credits.
Senior-level version of EN.580.311-312. Permission of course directors required

EN.580.413. Design Team Leader I. 1 Credit.
This course is for Design Team leaders actively leading a team for the academic year. This course focuses on development of leadership, communication and team management skills in the context of biodesign.

EN.580.414. Design Team Leader III. 1 Credit.
This course is for Design Team leaders actively leading a team for the academic year. This course focuses on development of leadership, communication and team management skills in the context of biodesign.

EN.580.418. Principles of Pulmonary Physiology. 3 Credits.
This course will provide students with an introduction to concepts in the structure and function of the respiratory system. Topics to be covered will include basic anatomy, lung mechanics, gas exchange, tests of pulmonary function and cardiopulmonary exercise, and the effects of disease on aspects of the respiratory system. Class sessions will mix both lecture and hands-on measurement, and will include discussion of instrumentation used in pulmonary measurements and a field trip to a clinical physiology laboratory at JHH. Recommended background: Chemistry, Physics, and Calculus II, and EN.580.222 Systems and Controls or equivalent.

EN.580.424. Neuroengineering and Lab. 3 Credits.
A laboratory course in which various physiological preparations are used as examples of problems of applying technology in biological systems. The emphasis in this course is on the design of experimental measurements and on physical models of biological systems.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.425. Radiology for Engineers. 3 Credits.
This course provides engineering students with an introductory understanding of the principles and practice of radiology – including a spectrum of specialties in diagnostic radiology as well as procedures in interventional radiology and digital pathology. The course includes lectures, working with real image data, and visits to clinical areas at Johns Hopkins Hospital. Each segment of the course emphasizes clinical perspective on imaging (including scanner technology and image analysis) in relation to anatomy, physiology, and pathology. Each segment is led by an expert in a particular discipline in collaboration with the course director. Recommended course background: 580.472, 601.455The course is open to senior BME undergraduates. Enrollment is limited by permission from the course director. Audits are not allowed.

EN.580.426. Neuroengineering: The Neural Control of Movement. 3 Credits.
This half-semester course will delve into how the brain encodes and controls movement. The emphasis in this course is on the theoretical, computational, and experimental approaches that provide the basis of our understanding of how we interact with the world. Lectures will focus on the neural circuits underlying sensorimotor transformations, population coding, motor learning and plasticity, decision-making, functional brain imaging, brain stimulation, and brain machine interfacing. Students will compare neural imaging techniques. The course will be supplemented with visits to medical campus labs and critical analysis of current literature.
EN.580.424

EN.580.427. Microphysiological Systems and Laboratory. 3 Credits.
This course focuses on the principle and application of biological and engineering fundamentals to design microphysiological systems such as organ/tissue chips, 3D-printed tissues, and organoids. This course will introduce the concept of human organ-on-a-chip and organoid engineering and discuss the latest developments in the field of drug development - the shift from animal testing toward human relevant, high content, high-throughput integrative testing strategies. Students will learn various biofabrication techniques such as microfluidics, microfabrication, and 3D bioprinting to create in vitro miniaturized 3D complex human tissue models that mimic the biochemical, electrical, and mechanical properties of organ or tissue function. This course will also cover a wide range of biomedical applications of microphysiological systems in disease modeling, drug screening, precision medicine, and space biology as well as technology commercialization efforts. This laboratory portion of the course consists of three experiments that will provide students with valuable hands-on experience in design, fabrication and applications of microphysiological systems, including organ-on-a-chip systems (tissue/organ chips), 3-D printed tissue constructs, and organoids. Experiments include 1) the basics of human induced pluripotent stem cell differentiation, 2) tissue/organ chip fabrication, and 3) functional phenotypic analysis and drug testing. Spring semester only. Recommended background: EN.580.441, EN.580.442 and EN.580.452

EN.580.428. Genomic Data Visualization. 3 Credits.
As the primary mode through which analysts and audience members alike consume data, data visualization remains an important hypothesis generating and analytical technique in data-driven research to facilitate new discoveries. However, if done poorly, data visualization can also mislead, bias, and slow down progress. This hands-on course will cover the principles of perception and cognition relevant for data visualization and apply these principles to genomic data, focusing on large-scale single-cell and spatially-resolved omics datasets, using the R statistical programming language. Students will be expected to complete class readings, create weekly data visualizations as homework assignments, and make a major class presentation."

EN.580.430. Systems Pharmacology and Personalized Medicine. 4 Credits.
We have moved beyond the 'one-size-fits-all' era of medicine. Individuals are different, their diseases are different, and their responses to drugs are different too. This variability is not just from person to person; heterogeneity is observed even between tumors within the same person, and between sites within the same tumor. These levels of variability among the human population must be accounted for to improve patient outcomes and the efficiency of clinical trials. Some of the ways in which this is being explored include: drugs are being developed hand-in-hand with the tests needed to determine whether or not they will be effective; tumor fragments excised from patients are being cultured in the lab for high-throughput testing of drugs and drug combinations; data-rich assays such as genomics and proteomics identify thousands of potentially significant differences between individuals; and computational models are being used to predict which therapies will work for which patients. This course will focus on the applications of pharmacokinetics and pharmacodynamics to simulating the effects of various drugs across a heterogeneous population of diseased individuals. Such computational approaches are needed to harness and leverage the vast amounts of data and provide insight into the key differences that determine drug responsiveness. These approaches can also explore the temporal dynamics of disease and treatment, and enable the modification of treatment during recovery. Most of the assignments in this course involve some coding and visualization of data (we use Matlab and R), and students undertake a project to simulate a drug or other treatment of their choice. Recommended background: 110.201 Linear Algebra, 110.302 Differential Equations, and 553.311 Probability and Statistics (or equivalent).

EN.580.431. Introduction to Computational Medicine: Imaging. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. This course will cover computational anatomy. Students will learn how to: model anatomies using magnetic resonance imaging data; compare anatomies via mappings onto anatomical atlases; discover anatomical biomarkers of disease; analyze changes in the connectivity of anatomies in disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: Matlab or Python. This course can be taken in conjunction with EN.580.433 which covers computational physiological medicine.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348)

EN.580.433. Introduction to Computational Medicine: The Physiome. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. Computational physiological medicine: develops computational models of disease at the cellular, tissue, organ, and organism level; develops methods for constraining these models using patient data; applies these models to better treat patients. Students will learn how to: use biophysical laws and data to formulate computational models of physiological systems in health and disease; analyze the behaviors of these models using analytical and simulation approaches; apply models to understand their use in diagnosing and treating disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: C++, Matlab or Python.
(AS.110.107 OR AS.110.109 OR AS.110.113) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.430 OR EN.560.348)

EN.580.435. Applied Bioelectrical Engineering. 3 Credits.
This course covers diverse applications of bioelectrical measurements, manipulation and therapy in engineering practice. Topics include functional electrical stimulation, deep brain stimulation, cardiac pacing and defibrillation, tissue ablation and electromanipulation of cells. Students will receive practical training in the simulation of electrical potentials and electric fields in volume conductors, using the finite element package COMSOL. It will be used throughout the course to explore theoretical concepts as well as in a class project. Recommended background: familiarity with MATLAB; cardiac, muscle and brain physiology; and cellular electrophysiology.

EN.580.437. Neuro Data Design I. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended Course Background: numerical programming.

EN.580.438. Neuro Data Design II. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended background: numerical programming.

EN.580.439. Models of the Neuron. 4 Credits.
Single-neuron modeling, emphasizing the use of computational models as links between the properties of neurons at several levels of detail. Topics include thermodynamics of ion flow in aqueous environments, biology and biophysics of ion channels, gating, nonlinear dynamics as a way of studying the collective properties of channels in a membrane, synaptic transmission, integration of electrical activity in multi-compartment dendritic tree models, and properties of neural networks. Students will study the properties of computational models of neurons; graduate students will develop a neuron model using data from the literature. Recommended Course Background: AS.110.302 or equivalent. Meets with EN.580.639.

EN.580.441. Cellular Engineering. 3 Credits.
This course focuses on principles and applications in cell engineering. Class lectures include an overview of molecular biology fundamentals, protein/ligand binding, receptor/ligand trafficking, cell-cell interactions, cell-matrix interactions, and cell adhesion and migration at both theoretical and experimental levels. Lectures will cover the effects of physical (e.g. shear stress, strain), chemical (e.g. cytokines, growth factors) and electrical stimuli on cell function, emphasizing topics on gene regulation and signal transduction processes. Furthermore, topics in metabolic engineering, enzyme evolution, polymeric biomaterials, and drug and gene delivery will be discussed. This course is intended as Part 1 of a two-semester sequence recommended for students in the Cell and Tissue Engineering focus area. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306 or equivalent and AS.030.205Meets with EN.580.641

EN.580.442. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306, AS.030.205Recommended EN.580.441/EN.580.641Co-listed with EN.580.642

EN.580.443. Advanced Orthopaedic Tissue Engineering. 3 Credits.
This course is intended to provide a comprehensive overview on the current state of the field of Orthopaedic Tissue Engineering. Students will apply engineering fundamentals learned in the Tissue Engineering course (EN.580.442/642) with special emphasis on how they apply to bone, cartilage, and skeletal muscle tissue engineering. The development, structure, mechanics, and function of each of these tissues will be discussed. Key articles from the last three decades that focus on stem cell- and cell-free, biomaterial-based approaches to regenerate functional tissues will be presented and analyzed. Practical (regulatory/commercial) considerations that restrict the translation of therapies to the clinic will be discussed.
Grade of B or higher in EN.580.442 OR EN.580.642

EN.580.444. Biomedical Applications of Glycoengineering. 3 Credits.
This course provides an overview of carbohydrate-based technologies in biotechnology and medicine. The course will begin by briefly covering basics of glycobiology and glycochemistry followed by detailed illustrative examples of biomedical applications of glycoengineering. A sample of these applications include the role of sugars in preventative medicine (e.g., for vaccine development and probiotics), tissue engineering (e.g., exploiting natural and engineered polysaccharides for creating tissue or organs de novo in the laboratory), regenerative medicine (e.g., for the treatment of arthritis or degenerative muscle disease), and therapy (e.g., cancer treatment). A major part of the course grade will be based on class participation with each student expected to provide a “journal club” presentation of a relevant paper as well as participate in a team-based project designed to address a current unmet clinical need that could be fulfilled through a glycoengineering approach. Recommended Course Background: EN.580.221 Molecules and Cells.

EN.580.447. Computational Stem Cell Biology. 3 Credits.
This course will provide the student with a mechanistic and systems biology-based understanding of the two defining features of stem cells: multipotency and self-renewal. We will explore these concepts across several contexts and perspectives, emphasizing seminal and new studies in development and stem cell biology, and the critical role that computational approaches have played. The course will start with an introduction to stem cells and a tutorial covering computational basics. The biological contexts that we will cover thereafter include "Cell Identity", "Pluripotency and multipotency", "Stem cells and their niche", "Modeling cell fate decisions", and "Engineering cell fate". This class is heavily weighted by individual computational assignments. The motivation for this strategy is that regularly occurring, moderately-sized computational projects are the most efficient way to impart an understanding of our models of this extraordinary class of cells, and to inspire a sense of excitement and empowerment. Preferred background: familiarity with the UNIX shell. Recommended Background: EN.580.221 - Molecules and Cells or Equivalent.
Students may take EN.580.447 or EN.580.647, but not both.

EN.580.451. Cell and Tissue Engineering Lab. 3 Credits.
Cell and tissue engineering is a field that relies heavily on experimental techniques. This laboratory course will consist of three six experiments that will provide students with valuable hands-on experience in cell and tissue engineering. Students will learn basic cell culture procedures and specialized techniques related to faculty expertise in cell engineering, microfluidics, gene therapy, microfabrication and cell encapsulation. Experiments include the basics of cell culture techniques, gene transfection and metabolic engineering, basics of cell-substrate interactions I, cell-substrate interactions II, and cell encapsulation and gel contraction. Co-listed with EN.530.451. Senior and Graduate students only; others, instructor permission required. Fall semester only. Lab Fee: $100
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.452. Cell and Tissue Engineering Lab. 3 Credits.
This half-semester flipped-content laboratory course will consist of modules that provide students with valuable hands-on experience in cell and tissue engineering. Modules contain experiments including the basics of cell culture techniques, gene transfection, metabolic glycoengineering, and cell encapsulation. Students will collect and analyze their own experimental data, write-up results in publication structured reports, and engage in active discussion of current scientific literature.Students interested in or actively pursuing a Master’s degree should prioritize the full semester 580.754 Cell & Tissue Engineering Lab.Textbook Info None.Pre-requisitesStudents must have completed the online “Introductory Laboratory Safety” and “Bloodborne Pathogens” prior to registering for this class. To access these courses, log in to MyLearning and identify these tutorials.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.453. Immunoengineering Principles and Applications. 3 Credits.
This course focuses on the application of engineering fundamentals to design cell/tissue-based systems for modulating immune response in treating disease. Concepts of immune cell development, surveillance, migration, and activation/inhibition will be introduced. Students will learn tissues in the body important for trafficking of immune players to local sites of therapeutic response, as well as techniques used for their characterization. Engineering concepts required to alter immune cell or tissue function will be explored. Emphasis will be placed on synthetic biology methods such as viral or CRISPR-based techniques as well as necessary (pre/post) isolation and adoptive transfer techniques.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.454. Methods in Nucleic Acid Sequencing Lab. 3 Credits.
Sequencing technology is a rapidly progressing field that requires experience in both wet (molecular biology) and dry (computational analysis) techniques. This laboratory course will consist of three experimental modules that will provide students with valuable hands-on experience in DNA sequencing and analysis. Students will learn basic sequencing library preparation, perform sequencing experiments and analyze the resulting data. Experiments include human targeted sequencing, metagenomic sequencing and genome assembly.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.456. Introduction to Rehabilitation Engineering. 3 Credits.
The primary objective of this course is to introduce biomedical engineering students to the challenges of engineering solutions for persons functioning with disabilities and apply that knowledge to the development of a new, improved device to be used for measurement or treatment of an impairment or disability. In order to achieve this goal, the objectives of the fall semester include: gaining a basic appreciation of the modalities used to treat impairments, the opportunities for application of engineering to improve treatment delivery, understanding the science and engineering applied to helping persons with disabilities function in the everyday world and an basic knowledge of the legal, ethical issues and employment opportunities in rehabilitation engineering. By the conclusion of this class, students should be able to: • Understand the breadth and scope of physical impairment and disability, including its associated pathophysiology • Characterize the material and design properties of current evaluation tools for assessment of impairments and adaptations for disability • Characterize the material and design properties of current modalities of treatment of impairments and adaptations for disability • Apply engineering analysis and design principles to critique current solutions for persons with disabilities in order to suggest improvements In the spring semester (in course EN.580.457), students will learn the biomedical engineering design process and its application to persons with disabilities. Working in groups of four to five, teams will work on a project derived from a needs analysis based on their visits to rehabilitation centers in the fall semester. Project will require instructor approval before the beginning of the spring semester. Each project will consist of a proposal for design of a new device or solution to a problem faced by persons with disabilities, preliminary “virtual” (e.g., CAD), and actual proof of concept working prototype.
EN.580.424

EN.580.457. Introduction to Rehabilitation Engineering: Design Lab. 3 Credits.
Students have the opportunity to apply the knowledge they have gained in the fall semest4er of EN.580.456 and their prior coursework to the development of a new, improved device to be used for measurement or treatment of an impairment or disability. In doing so, they will learn the biomedical engineering design process and its application to persons with disabilities. Working in groups of four to five, teams will work on a project derived from a needs analysis based on their visits to rehabilitation centers in the fall semester. Project will require instructor approval before the beginning of the spring semester. Each project will consist of a proposal for design of a new device or solution to a problem faced by persons with disabilities, preliminary “virtual” (e.g., CAD), and actual proof of concept working prototype.
EN.580.456;Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.458. Computing the Transcriptome. 3 Credits.
This course will introduce computational tools used in the field of transcriptomics to analyze the genes and transcripts expressed in a living cell. Lectures will cover different practical ways to analyze large data sets generated by high-throughput RNA sequencing (RNA-Seq) experiments, including alignment, assembly, and quantification. The students will learn how to use RNA-seq to answer questions such as: what is the complete set of human genes? How do we reconstruct the splice variants that are transcribed in different cell types and conditions? How do we compute which genes are differentially expressed between different RNA-seq datasets? Prerequisites: (1) Familiarity with Python or Perl, (2) the Unix command-line environment, and (3) a basic understanding of programming in R.

EN.580.459. Seminar in Epigenetic Engineering. 1 Credit.
This is an interactive discussion course on topics in epigenetic engineering introduced by the instructor and the students, on cutting edge molecular and computational methods and applications to developmental biology and human disease research. It will be focused mostly on analysis of current literature as well as ongoing research in the Center for Epigenetics.Background: laboratory course in organic chemistry, biochemistry, or cell biology; introductory statistics; familiarity with R, Python, or Matlab
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.460. Epigenetics at the Crossroads of Genes and the Environment. 1.5 Credits.
This is a seminar-style course focused on cutting edge molecular, cellular, mathematical, and computational biology of mammalian epigenetics and epigenomics in relationship to environmental exposure and human disease. The format is a Socratic-style seminar with three alternating components: (1) “Big Ideas” focused on general principles and especially questions from the students; (2) “Current Literature” focused on how to extract believable information in a reasonable time from current journal articles; and (3) “Methods Development” focused on how methods are invented, including computational genomics and engineering methods, with data analysis by the students.Recommended background: Laboratory course in organic chemistry, biochemistry, or cell biology; introductory statistics; familiarity with R, Python, or Matlab

EN.580.462. Representations of Choice. 3 Credits.
In this course we will examine key computational topics from the nascent fields of decision neuroscience and neuroeconomics. After taking this course students will have an understanding of how the field emerged and will develop a critical appreciation of the advantages and limitations of different analytical approaches. Students will also be able to discuss the current knowledge on processes of valuation, value-learning and decision-making in relation to their computational representations at the behavioral and neural level.Linear Algebra and programming experience (python, matlab, or C) recommended.

EN.580.464. Advanced Data Science for Biomedical Engineering. 4 Credits.
This course covers the basics of data science in biomedical engineering. The main topics include, introductory R, data cleaning, reproducible research, basic statistical inference, machine learning and artificial intillegence. Specific topics include: assessing diagnostic accuracy, basic probability, tidy data principles, prediction and data oriented web-app development using R/shiny. Students taking the course will learn a complete and practical pipeline of going from raw data to a data product. Suggest course background: profeciency in basic programming in at least one language, basic calculus, and linear algebra.

EN.580.471. Principles of Design of BME Instrumentation. 4 Credits.
This core design course will cover lectures and hands-on labs. The material covered will include fundamentals of biomedical sensors and instrumentation, FDA regulations, designing with electronics, biopotentials and ECG amplifier design, recording from heart, muscle, brain, etc., diagnostic and therapeutic devices (including pacemakers and defibrillators), applications in prosthetics and rehabilitation, and safety. The course includes extensive laboratory work involving circuits, electronics, sensor design and interface, and building complete biomedical instrumentation. The students will also carry out design challenge projects, individually or in teams (examples include “smart cane for blind,” “computer interface for quadriplegic”). Students satisfying the design requirement must also register for EN.580.571. Lab Fee: $150.
Recommended Course Background: EN.520.345
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.475. Biomedical Data Science. 2 Credits.
This course provides an introduction to data science and machine learning for biomedical engineering. The lectures cover topics in biomedical data processing (convolution, denoising, filtering, edge detection, template matching), biomedical data reduction (feature extraction, principal component analysis), and biomedical data regression, classification (including deep learning), and clustering.
Background: Signals and Systems
(AS.110.202 OR AS.110.211) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.553.310 OR EN.553.311 OR EN.560.348 OR EN.553.420)

EN.580.477. Biomedical Data Science Laboratory. 1 Credit.
This course provides an introduction to data science and machine learning for biomedical engineering. The lectures cover topics in biomedical data processing (convolution, denoising, filtering, edge detection, template matching), biomedical data reduction (feature extraction, principal component analysis), and biomedical data regression, classification (including deep learning), and clustering.
Recommended Course Background: Signals and Systems, Calculus III, Linear Algebra, Probability and Statistics.

EN.580.479. Principles and Applications of Modern X-ray Imaging and Computed Tomography. 3 Credits.
This course provides students with an intermediate-level understanding of the physics, engineering, algorithms, and applications (clinical, pre-clinical, and industrial) of x-ray imaging and computed tomography (CT). It is intended for senior undergraduates (EN.580.479) and/or graduate students (EN.580.679) in Biomedical Engineering, Computer Science, Electrical and Computer Engineering, or related fields in science and engineering. Topics include the physics of x-ray interaction and detection, image quality assessment, 3D image reconstruction (including analytical, iterative, and deep-learning approaches), and quantitative image data analysis. Guest lectures from clinical experts introduce applications in diagnostic and image-guided procedures. The students conduct experimental and computational projects involving acquisition and processing of x-ray CT data. Recommended background: Signals and Systems or an equivalent course and familiarity with Matlab.

EN.580.480. Precision Care Medicine I. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.
Area: Writing Intensive

EN.580.481. Precision Care Medicine II. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.
Area: Writing Intensive
(EN.580.480 OR EN.580.680)

EN.580.482. Precision Care Medicine III. 3 Credits.
Precision Care Medicine III follows Precision Care Medicine I - II. Registration is open only to those students who have completed these courses and who wish to continue project course work under the mentorship of the Biomedical and Engineering PIs. Students will have regular meetings with their PIs.

EN.580.483. Annotate a Genome. 3 Credits.
The course will present practical and specific understanding of approaches for genome interpretation. Topics will include Common Variants, Rare and Novel Variants, Personal Genomics and the Environment, Ethical considerations in personal genomics, Structural Variation, Pharmacogenetic variants, and Genetic Trait Associations. Students will learn bioinformatic methods to predict the impact of variants and to rapidly pull published information about variants identified in a genome. Students will work in teams to do exercises and programming projects on personal genomics datasets. Recommended Background: prior coursework in Genetics, Intermediate Programming

EN.580.485. Computational Medicine: Cardiology. 2 Credits.
A quantitative, model-oriented investigation of the cardiovascular system. The course will for focus on cardiac electrophysiology, mechanics, and hemodynamics using multi-scale physiology-driven models.

EN.580.487. Computational Medicine: Cardiology Laboratory. 1 Credit.
A laboratory course in which various physiological preparations are used as examples of problems of applying technology in biological systems. The emphasis in this course is on the design of experimental measurements and on physical models of biological systems.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.488. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course is designed to give students a foundation in the basics of statistical and algorithmic approaches developed in computational biology/bioinformatics over the past 30 years, while emphasizing the need to extend these approaches to emerging problems in the field. Topics covered include probabilistic modeling applied to biological sequence analysis, supervised machine learning, interpretation of genetic variants, cancer genomics bioinformatic workflows and computational immuno-oncology. Attending the lab section "Annotate Your Genome" is required.
EN.601.220

EN.580.491. Learning, Estimation and Control. 3 Credits.
The course introduces the probabilistic foundations of learning theory. We will discuss topics in regression, estimation, optimal control, system identification, Bayesian learning, and classification. Our aim is to first derive some of the important mathematical results in learning theory, and then apply the framework to problems in biology, particularly animal learning and control of action. Recommended Course Background: AS.110.201 and AS.110.302

EN.580.493. Imaging Instrumentation. 4 Credits.
This course is intended to introduce students to imaging instrumentation. The class will be lab-oriented, giving hands-on experience with data collection and processing using a configurable optical system. Specific topics will include the programming and control of electromechanical elements, imaging data acquisitions, image formation and processing (e.g. 3D reconstruction), and imaging system analysis and optimization.Recommended Course Background: EN.580.222 Systems and Controls or EN.520.214 Signals and Systems. Programming experience highly desirable.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.494. Build an Imager. 3 Credits.
In this hands-on course, students will build an imaging device and learn to apply signals and systems knowledge in imaging system characterization, optimization, and post-processing. The course includes an introduction to two-dimensional signal processing techniques, basic imaging principles, imaging systems modeling, and optimization methods.
Students must have completed Lab Safety training prior to registering for this class, or permission of the instructor.

EN.580.497. Advanced Design Projects. 3 Credits.
This course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team's technical achievements within the context of biomedical instrumentation.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.498. Advanced Design Projects: Genomics and Systems Biology. 3 Credits.
This course will provide project-specific mentorship and guidance for a team to complete a sophisticated prototype and demonstrate technical feasibility towards impacting a clinical problem. Prototyping and testing tools and procedures will be taught and employed on a per-project basis. Documentation of progress through a design history file and course report is required. Teams will be meet biweekly with course faculty through a Desk Review format. Students are expected to work in teams between desk reviews and present progress updates as well as short- and long-term action plans at each desk review. A final presentation is expected at the end of the semester that will involve course faculty as well as a clinical sponsor (called a committee meeting in Design Teams). Additionally, each team must identify a domain expert from the WSE faculty that agrees to attend the final presentation and at least 2 desk reviews. This faculty will focus on guiding and assessing the team's technical achievements within the context of biomedical instrumentation.
Students must have completed Lab Safety training prior to registering for this class.

EN.580.510. Biomedical Engineering Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.550. Biomedical Engineering Group Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group. This section has a weekly research group meeting that students are expected to attend. You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.561. Advanced Focus Area Research: Immunoengineering. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.562. Advanced Focus Area Research: Translational Cell and Tissue Eng. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.564. Advanced Focus Area Research: Biomedical Data Science. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors. Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.565. Advanced Focus Area Research: Imaging and Medical Devices. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background: Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.566. Advanced Focus Area Research: Neuroengineering. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors. Recommended Course Background:Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.567. Advanced Focus Area Research: Genomics and Systems Biology. 3 Credits.
This course provides students with the opportunity to consider unsolved issues within their focus area, delve into the current cutting-edge research, and provide a synopsis of the next steps required to advance a particular field. “Advanced Focus Area Research” is a one-semester course in which students complete a research project, present their work, and write a publication ready manuscript under the guidance of their Primary Investigator (PI) and a Focus Area mentor. Priority to Junior and Senior BME majors.Recommended Course Background:Previous research experience. Students must complete the online Undergraduate Lab safety courses available through “MyLearning” including Bloodborne Pathogens, HIPAA, and any other online training as needed.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.571. Honors Instrumentation. 2 Credits.
Student must have taken 580.471/771. Students will develop a term paper and patent application and carry out a hands-on individual or team project throughout the semester. Previous projects include design of EEG amplifier, voltage clamp and patch clamp, vision aid of blind, pacemaker/defibrillator, sleep detection and alert device, glucose sensor and regulation, temperature controller, eye movement detection and device control, ultrasound ranging and tissue properties, impedance plethysmography, lie detector, blood alcohol detector, pulse oximeter, etc. You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.580.583. Research For 3+1 Students. 3 Credits.
Research for 3+1 students only. Lab confirmation and registration approval required. Course is graded P/F only.

EN.580.584. Research For 3+1 Students. 3 Credits.
Research for 3+1 students only. Lab confirmation and registration approval required. Course is graded P/F only.

EN.580.601. Special Topics in Bioengineering Innovation and Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field.These seminars are taken in a sequence of summer, fall, and spring. They are required for CBID masters students and are open to those students only.

EN.580.602. Special Topics in Bioengineering Innovation and Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field.For CBID MSE students only. Registration with instructor's permission only.

EN.580.603. Special Topics in Bioengineering Innovation & Design. 1 Credit.
This year long seminar series features experts from the medical device industry, venture capital firms, FDA, patent attorneys, entrepreneurs, and many more. They will share their real-world insights into the medical device innovation and commercialization process. Some of the topics covered will include bioethics, regulatory and reimbursement planning, medical device recalls, good design practices, and entrepreneurial success stories. The overarching philosophy of this seminar series is to complement the theoretical and practical aspects of the program curriculum, by learning from the experiences and insights of professionals in the field. For CBID MSE students only.

EN.580.607. Regulation of Medical Devices. 1 Credit.
This course introduces graduate students in Bioengineering Innovation and Design to the medical device regulatory framework, as it pertains to bringing a medical device from concept to market. Topics covered include; FDA Design Controls; Regulatory Approval mechanisms, including the 510k and PMA process; Investigational Device exemption (IDE); planning clinical trials needed for bringing a medical device to market; and postmarket surveillance. Students learn from a series of invited lecturers from the FDA as well as professionals from the medical device industry. This summer course is required for CBID masters students and is not open to any other students.

EN.580.608. Identification and Validation of Medical Device Needs. 6 Credits.
This course teaches the art and skill of identifying medical device opportunities by experiencing real world scenarios in an immersive clinical environment. Students rotate through multiple clinical disciplines and become part of the team of senior clinicians, surgeons, residents, fellows, nurses and medical technologists. They learn to identify unmet medical device needs through direct observations in a variety of clinical settings including the hospital ward and operating room, interviews (with patients, doctors, nurses, hospital administration), literature survey, and more. Concurrently, they learn the process of filtering all observations to a few valid medical device opportunities by assessing the market size, intellectual property landscape, regulatory framework, and competitor dynamics in addition to the clinical impact that such a device could have. The ability to identify a relevant medical device need is an important first step in the medical device innovation cycle; this course aims to provide students with practical hands- on training in that process.

EN.580.610. Intro to Business for Healthcare Innovation & Design. 3 Credits.
This course comprises two distinct, but related, components. The first is a broad introduction to the terms, concepts, and values of business and management. Particular emphasis will be placed on the economic, financial, and corporate contexts of our business culture, and how they impact the organization, strategy, and decision-making of business firms. The second component is an introduction to the sociological and economic forces that shape the development and diffusion of new technologies. This part is primarily designed to provide a framework for determining the commercial viability of new medical devices and the best path for realizing their value, including how to develop a compelling value proposition, analyze markets and competitors, and protect intellectual property. Throughout, the course utilizes individual exercises, case analyses, and team projects. CBID MSE Students Only

EN.580.611. Medical Device Design and Innovation. 4 Credits.
This course introduces you to the process of medical device design and innovation. You will learn the art and skill of identifying medical device opportunities through observations, interviews, and research. Through a combination of lectures, hands on activities, and interactions with clinical stakeholders, you will gain the ability to identify unmet, unarticulated, and underserved needs. Subsequently, you will learn the process of developing well thought out conceptual designs that meet those needs. You will learn to apply an iterative approach towards innovation, by involving and engaging multiple stakeholders and their perspectives throughout the process. Throughout the course modules, you will also follow the journey of several innovative startups/products/ services, that started at JHU-CBID and went through the process outlined in this course.

EN.580.612. Medical Device Design and Innovation. 4 Credits.
For CBID MSE students only.

EN.580.618. Identification and Validation of Global Health Needs. 4 Credits.
Limited to CBID students only

EN.580.619. Bioengineering Innovation and Design - Global Health. 4 Credits.
For CBID MSE students only. Registration with instructor's permission only.

EN.580.620. Principles and Practice of Global Health Innovation and Design. 4 Credits.
For CBID MSE students only. Instructor's Permission Required.

EN.580.623. Insight Informed Innovation II. 3 Credits.
This course is intended to equip students with a structured process and the tools required to:1. Identify opportunities for new medical devices through unmet, unarticulated and underserved stakeholder needs2. Link these insights to an exhaustive set of potential solutions3. Synthesize solutions and features into product conceptsRecommended Course Backgroung: Insight Informed Innovation I (summer)

EN.580.625. Structure and Function of the Auditory and Vestibular Systems. 3 Credits.
This course will cover basic functions of the auditory and vestibular pathways responsible for perception of sound and balance. Topics include: hair cell structure and mechanotransduction, hair cell electromotility and cochlear active force production, hair cell synaptic signaling, cochlear development and role of glia in the inner ear, primary auditory and vestibular stimulus encoding, afferents and the first-order brainstem nuclei, as well as clinical consequences of peripheral damage, physiology of hearing loss, vestibular loss, tinnitus, hair cell regeneration and gene therapy. Moving more centrally, synaptic transmission and signal processing in central neurons, and complex sound perception and movement control will be discussed. Aspects such as speech perception, sound localization, vestibular reflexes, vestibular compensation, and self-motion perception are discussed with an integrated perspective covering perceptual, physiological, and mechanistic data. Grades will be based on participation in class, homework, and first-half and second-half exams (both in class, closed book, short answer/essay types). This course will meet on the School of Medicine campus. Recommended Background: general introduction to Neuroscience. Undergraduates with knowledge in Neuroscience welcome.

EN.580.627. Deep Learning for Medical Imaging. 3 Credits.
Recent advances in machine learning and deep convolutional neural networks in particular, coupled with computational capabilities offered by modern GPUs and increased data availability, have enabled application of deep learning (DL) techniques in medical imaging. Such applications extend beyond image analysis, with increased presence of DL in early stages of the image formation process, including image preprocessing, tomographic image reconstruction, and image postprocessing informed by the requirements of specific clinical tasks. This course will introduce the foundations of deep learning methods used in medical imaging for both image formation and analysis through hands-on assignments and projects in image denoising, tomographic reconstruction, artifacts correction, image segmentation, feature detection/classification, and single/multi-modality registration.Recommended course background: Python and Linear Algebra

EN.580.628. Topics in Systems Neuroscience. 1 Credit.
This course consists of weekly discussions of current literature in systems neuroscience. The selected readings will focus on neural mechanisms for perception, attention, motor behavior, learning, and memory, as studied using physiological, psychophysical, computational, and imaging techniques. Students are expected to give presentations and participate in discussions. Recommended Course Background: AS.110.302, EN.520.214, EN.580.421 or equivalentStudents will have to attend the organizational meeting to be able to enroll. The course is run by the Neuroscience department. Enrollment numbers may be limited by the course directors, and priority will be given to Neuroscience graduate students. Please contact the Neuroscience department for more information and the date of the organizational meeting.

EN.580.631. Introduction to Computational Medicine: Imaging. 2 Credits.
Computational medicine is an emerging discipline in which computer models of disease are developed, constrained using data measured from individual patients, and then applied to deliver precision health care. This course will cover computational anatomy. Students will learn how to: model anatomies using magnetic resonance imaging data; compare anatomies via mappings onto anatomical atlases; discover anatomical biomarkers of disease; analyze changes in the connectivity of anatomies in disease. Class time will emphasize hands-on learning through data analysis, software development, and simulation. All instructional materials will be made available at the beginning of the course. Recommended Course Background: Matlab or Python. This course can be taken in conjunction with EN.580.433 which covers computational physiological medicine.

EN.580.635. Applied Bioelectrical Engineering. 3 Credits.
This course covers diverse applications of bioelectrical measurements, manipulation and therapy in engineering practice. Topics include functional electrical stimulation, deep brain stimulation, cardiac pacing and defibrillation, tissue ablation and electromanipulation of cells. Students will receive practical training in the simulation of electrical potentials and electric fields in volume conductors, using the finite element package COMSOL. It will be used throughout the course to explore theoretical concepts as well as in a class project. Recommended background: familiarity with MATLAB; cardiac, muscle and brain physiology; and cellular electrophysiology.

EN.580.637. Microphysiological Systems. 3 Credits.
This course focuses on the principle and application of biological and engineering fundamentals to design microphysiological systems such as organ/tissue chips, 3D-printed tissues, and organoids. This course will introduce the concept of human organ-on-a-chip and organoid engineering and discuss the latest developments in the field of drug development - the shift from animal testing toward human relevant, high content, high-throughput integrative testing strategies. Students will learn various biofabrication techniques such as microfluidics, microfabrication, and 3D bioprinting to create in vitro miniaturized 3D complex human tissue models that mimic the biochemical, electrical, and mechanical properties of organ or tissue function. This course will also cover a wide range of biomedical applications of microphysiological systems in disease modeling, drug screening, precision medicine, and space biology as well as technology commercialization efforts. This laboratory portion of the course consists of three experiments that will provide students with valuable hands-on experience in design, fabrication and applications of microphysiological systems, including organ-on-a-chip systems (tissue/organ chips), 3-D printed tissue constructs, and organoids. Experiments include 1) the basics of human induced pluripotent stem cell differentiation, 2) tissue/organ chip fabrication, and 3) functional phenotypic analysis and drug testing. Spring semester only. Recommended background: EN.580.441, EN.580.442 and EN.580.452

EN.580.638. Neuro Data Design II. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended background: numerical programming.

EN.580.639. Models of the Neuron. 4 Credits.
Single-neuron modeling, emphasizing the use of computational models as links between the properties of neurons at several levels of detail. Topics include thermodynamics of ion flow in aqueous environments, biology and biophysics of ion channels, gating, nonlinear dynamics as a way of studying the collective properties of channels in a membrane, synaptic transmission, integration of electrical activity in multi-compartment dendritic tree models, and properties of neural networks. Students will study the properties of computational models of neurons; graduate students will develop a neuron model using data from the literature. Differs in that an advanced modeling project using data from the literature is required. Graduate version of EN.580.439. Recommended Course Background: AS.110.302 or equivalent.

EN.580.640. Systems Pharmacology and Personalized Medicine. 4 Credits.
We have moved beyond the 'one-size-fits-all' era of medicine. Individuals are different, their diseases are different, and their responses to drugs are different too. This variability is not just from person to person; heterogeneity is observed even between tumors within the same person, and between sites within the same tumor. These levels of variability among the human population must be accounted for to improve patient outcomes and the efficiency of clinical trials. Some of the ways in which this is being explored include: drugs are being developed hand-in-hand with the tests needed to determine whether or not they will be effective; tumor fragments excised from patients are being cultured in the lab for high-throughput testing of drugs and drug combinations; data-rich assays such as genomics and proteomics identify thousands of potentially significant differences between individuals; and computational models are being used to predict which therapies will work for which patients. This course will focus on the applications of pharmacokinetics and pharmacodynamics to simulating the effects of various drugs across a heterogeneous population of diseased individuals. Such computational approaches are needed to harness and leverage the vast amounts of data and provide insight into the key differences that determine drug responsiveness. These approaches can also explore the temporal dynamics of disease and treatment, and enable the modification of treatment during recovery.Recommended background: 110.201 Linear Algebra, 110.302 Differential Equations, and 553.311 Probability and Statistics (or equivalent).

EN.580.641. Cellular Engineering. 4 Credits.
This course focuses on principles and applications in cell engineering. Class lectures include an overview of molecular biology fundamentals, protein/ligand binding, receptor/ligand trafficking, cell-cell interactions, cell-matrix interactions, and cell adhesion and migration at both theoretical and experimental levels. Lectures will cover the effects of physical (e.g. shear stress, strain), chemical (e.g. cytokines, growth factors) and electrical stimuli on cell function, emphasizing topics on gene regulation and signal transduction processes. Furthermore, topics in metabolic engineering, enzyme evolution, polymeric biomaterials, and drug and gene delivery will be discussed. This course meets with EN.580.441 but includes additional requirements designed for the core curriculum of the RIE (Regnerative and Immune Engineering) track of the BME masters program. The course is also appropriate for Cell & Tissue Engineering Ph.D. students and may be taken by advanced undergraduate students upon permission of the instructor. Prerequisites: Graduate standing with background in cell biology and biochemistry or EN.580.221 or AS20.305 and AS.020.306 (or equivalent) and AS.030.205 or permission of the instructor.

EN.580.642. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed. Co-listed with EN.580.442. Recommended Course Background: EN.580.221 or AS.020.305 and AS.020.306, AS.030.205, EN.580.441/EN.580.641

EN.580.643. Advanced Orthopaedic Tissue Engineering. 3 Credits.
This course is intended to provide a comprehensive overview on the current state of the field of Orthopaedic Tissue Engineering. Students will apply engineering fundamentals learned in the Tissue Engineering course (580.442/580.642) with special emphasis on how they apply to bone, cartilage, and skeletal muscle tissue engineering. The development, structure, mechanics, and function of each of these tissues will be discussed. Key articles from the lat three decades that focus on stem cell- and cell-free, biomaterial-based approaches to regenerate functional tissues will be presented and analyzed. Practical (regulatory/commercial) considerations that restrict the translation of therapies to the clinic will be discussed. Undergraduate by permission only. Recommend Course Background: EN.580.442 or EN.580.642.

EN.580.644. Biomedical Applications of Glycoengineering. 3 Credits.
This course provides an overview of carbohydrate-based technologies in biotechnology and medicine. The course will begin by briefly covering basics of glycobiology and glycochemistry followed by detailed illustrative examples of biomedical applications of glycoengineering. A sample of these applications include the role of sugars in preventative medicine (e.g., for vaccine development and probiotics), tissue engineering (e.g., exploiting natural and engineered polysaccharides for creating tissue or organs de novo in the laboratory), regenerative medicine (e.g., for the treatment of arthritis or degenerative muscle disease), and therapy (e.g., cancer treatment). A major part of the course grade will be based on class participation with each student expected to provide a “journal club” presentation of a relevant paper as well as participate in a team-based project designed to address a current unmet clinical need that could be fulfilled through a glycoengineering approach. Recommended Course Background: EN.580.221 Molecules and Cells or equivalent (molecular and cell biology), college level calculus and calculus-based general physics.

EN.580.646. Molecular Immunoengineering. 3 Credits.
An in-depth study of the use of biomolecular engineering tools and techniques to manipulate immune function for clinical translation. The course will begin with a brief overview of the immune system, placing a particular emphasis on the molecular-level interactions that determine phenotypic outcomes. The remainder of the curriculum will address ways in which integrative approaches incorporating biochemistry, structural biophysics, molecular biology, and engineering have been used either to stimulate the immune response for applications in cancer and infectious disease, or to repress immune activation for autoimmune disease therapy. Recommended background: Biochemistry and Cell Biology or the BME Molecules and Cells. Those without recommended background should contact the instructor prior to enrolling.

EN.580.647. Computational Stem Cell Biology. 3 Credits.
This course will provide the student with a mechanistic and systems biology-based understanding of the two defining features of stem cells: multipotency and self-renewal. We will explore these concepts across several contexts and perspectives, emphasizing seminal and new studies in development and stem cell biology, and the critical role that computational approaches have played. The course will start with an introduction to stem cells and a tutorial covering computational basics. The biological contexts that we will cover thereafter include "Cell Identity", "Pluripotency and multipotency", "Stem cells and their niche", "Modeling cell fate decisions", and "Engineering cell fate". This class is heavily weighted by individual computational assignments. The motivation for this strategy is that regularly occurring, moderately-sized computational projects are the most efficient way to impart an understanding of our models of this extraordinary class of cells, and to inspire a sense of excitement and empowerment. Preferred background: 580.221 Molecules and Cells or equivalent and familiarity with the UNIX shell.
Students may earn credit for EN.580.447 or EN.580.647, but not both.

EN.580.656. Introduction to Rehabilitation Engineering. 3 Credits.
The primary objective of this course is to introduce biomedical engineering students to the challenges of engineering solutions for persons functioning with disabilities. In order to achieve this goal, other objectives include: gaining a basic appreciation of the modalities used to treat impairments, the opportunities for application of engineering to improve treatment delivery, understanding the science and engineering applied to helping persons with disabilities function in the everyday world and an basic knowledge of the legal, ethical issues and employment opportunities in rehabilitation engineering. By the conclusion of this class, students should be able to: understand the breadth and scope of physical impairment and disability, including its associated pathophysiology; characterize the material and design properties of current evaluation tools for assessment of impairments and adaptations for disability; characterize the material and design properties of current modalities of treatment of impairments and adaptations for disability; apply engineering analysis and design principles to critique current solutions for persons with disabilities in order to suggest improvements.

EN.580.658. Computing the Transcriptome. 3 Credits.
This course will introduce computational tools used in the field of transcriptomics to analyze the genes and transcripts expressed in a living cell. Lectures will cover different practical ways to analyze large data sets generated by high-throughput RNA sequencing (RNA-Seq) experiments, including alignment, assembly, and quantification. The students will learn how to use RNA-seq to answer questions such as: what is the complete set of human genes? How do we reconstruct the splice variants that are transcribed in different cell types and conditions? How do we compute which genes are differentially expressed between different RNA-seq datasets? Prerequisites: (1) Familiarity with Python or Perl, (2) the Unix command-line environment, and (3) a basic understanding of programming in R.

EN.580.664. Advanced Data Science for Biomedical Engineering. 4 Credits.
This course covers the basics of data science in biomedical engineering. The main topics include, introductory R, data cleaning, reproducible research, basic statistical inference, machine learning and artificial intillegence. Specific topics include: assessing diagnostic accuracy, basic probability, tidy data principles, prediction and data oriented web-app development using R/shiny. Students taking the course will learn a complete and practical pipeline of going from raw data to a data product. Suggest course background: profeciency in basic programming in at least one language, basic calculus, and linear algebra.

EN.580.674. Introduction to Neuro-Image Processing. 3 Credits.
Developments in medical image acquisition systems such as magnetic resonance imaging (MRI) and computed tomography (CT) have resulted in large number of clinical images with rich information regarding structure and function of nervous system. A challenging task is to extract clinically relevant information from the raw images that can be used to characterize structural alteration of brain in disease state. This course introduces the underlying physical foundation of different image modalities that are used to study neurological disorders followed by presentation of concepts and techniques that are used to process and extract information from medical images, in particular MRI. Topics that are covered include medical image formats, enhancement, segmentation, registration, and visualization.Suggest Course Background: Mathematical Methods For Engineers or equivalent course, Signals and Systems, and Probability.

EN.580.678. Biomedical Photonics I. 4 Credits.
This course will cover the basic optics principles including geometric, beam and wave description of light. The course will also cover the basic generation and detection techniques of light and the principles of optical imaging and spectroscopy. After the basis is established, we will focus on some commonly employed optical techniques and tools for biomedical research including various optical microscopy technologies, fiber optics, Raman spectroscopy, Fluorescence (lifetime), FRAT, FRET and FCS.
The recent development in tissue optics, biomedical optical imaging/spectroscopy techniques (such as OCT, multiphoton fluorescence and harmonics microscopy, Structured Illumination, light scattering, diffuse light imaging and spectroscopy, optical molecular imaging, photo-acoustic imaging) will also be discussed. Representative biomedical applications of translational biomedical photonics technologies will be integrated into the corresponding chapters.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.679. Principles and Applications of Modern X-ray Imaging and Computed Tomography. 3 Credits.
This course provides students with an intermediate-level understanding of the physics, engineering, algorithms, and applications (clinical, pre-clinical, and industrial) of x-ray imaging and computed tomography (CT). It is intended for senior undergraduates (EN.580.479) and/or graduate students (EN.580.679) in Biomedical Engineering, Computer Science, Electrical and Computer Engineering, or related fields in science and engineering. Topics include the physics of x-ray interaction and detection, image quality assessment, 3D image reconstruction (including analytical, iterative, and deep-learning approaches), and quantitative image data analysis. Guest lectures from clinical experts introduce applications in diagnostic and image-guided procedures. The students conduct experimental and computational projects involving acquisition and processing of x-ray CT data. Recommended background: Signals and Systems or an equivalent course and familiarity with Matlab.

EN.580.680. Precision Care Medicine. 4 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.

EN.580.681. Precision Care Medicine. 3 Credits.
Precision Care Medicine is a two-semester project-based learning course. Projects will use methods of machine learning and mechanistic and statistical modeling to develop novel data-driven solutions to important health care problems that arise in anesthesiology and critical care medicine. The scope of such problems is vast, and few have been approached before. Examples include data- and modeling-driven approaches to: optimal selection of patients to be admitted to ICUs; optimal determination of when it is safe to discharge a patient from an ICU; early prediction of pending changes in the clinical state of patients in an ICU; data-driven optimal selection of patient therapy; and others. In the first semester, students will assemble into teams of 3-4, and will work with their project mentors (clinical faculty in the ACCM Department; Drs. Winslow and Sarma) to develop a project work plan. In the remainder of the course, they will apply engineering approaches to solve the important health care problems in their projects. Class time will include: lectures and tutorials covering the physiology, medicine, and engineering principles relevant to each project; project work in a setting where faculty are available to assist students with challenges. Each team will present project updates to the entire class at regular intervals so that every student becomes familiar with each project. Teams will also be charged with designing, validating and deploying a web-application that delivers the computational method for solving the underlying healthcare problem to the user. HIPAA regulations, use of human subjects data, and requirements for FDA Class II and Medical Device Data Systems approval will be covered.
EN.580.480 OR EN.580.680

EN.580.682. Precision Care Medicine III. 3 Credits.
Precision Care Medicine III follows Precision Care Medicine I - II. Registration is open only to those students who have completed these courses and who wish to continue project course work under the mentorship of the Biomedical and Engineering PIs. Students will have regular meetings with their PIs.

EN.580.683. Annotate a Genome. 3 Credits.
The course will present practical and specific understanding of approaches for genome interpretation. Topics will include Common Variants, Rare and Novel Variants, Personal Genomics and the Environment, Ethical considerations in personal genomics, Structural Variation, Pharmacogenetic variants, and Genetic Trait Associations. Students will learn bioinformatic methods to predict the impact of variants and to rapidly pull published information about variants identified in a genome. Students will work in teams to do exercises and programming projects on personal genomics datasets. Recommended Background: prior coursework in Genetics, Intermediate Programming

EN.580.688. Foundations of Computational Biology and Bioinformatics. 3 Credits.
This course will introduce probabilistic modeling and information theory applied to biological sequence analysis, focusing on statistical models of protein families, alignment algorithms, and models of evolution. Topics will include probability theory, score matrices, hidden Markov models, maximum likelihood, expectation maximization and dynamic programming algorithms. Homework assignments will require programming in Python. Recommended Course Background: Math through linear algebra and differential equations, EN.580.221 or equivalent, EN.601.226 or equivalent.

EN.580.689. Modern Optical Microscopy: Theory and Practice. 3 Credits.
This course will teach the fundamental theory in optical microscopy, including propagation of eletromagnetic wave, and Fourier optic. The course will also teach how the theoretical framework is practiced and applied in modern microscopy, by in-class demonstration and hands-on lab projects. Background knowledge: Fourier transform, linear algebra. Students may only earn credit for EN.580.489 or EN.580.689.

EN.580.691. Learning, Estimation and Control. 3 Credits.
This course introduces the probabilistic foundations of learning theory. We will discuss topics in regression, estimation, Kalman filters, Bayesian learning, classification, reinforcement learning, and active learning. Our focus is on iterative rather than batch methods for parameter estimation. Our aim is to use the mathematical results to model learning processes in the biological system. Recommended Course Background: Probability and Linear Algebra.

EN.580.693. Imaging Instrumentation. 4 Credits.
This course is intended to introduce students to imaging instrumentation. The class will be lab-oriented, giving hands-on experience with data collection and processing using a configurable optical system. Specific topics will include the programming and control of electromechanical elements, imaging data acquisitions, image formation and processing (e.g. 3D reconstruction), and imaging system analysis and optimization.Recommended Course Background: EN.580.222 Systems and Controls or EN.520.214 Signals and Systems. Programming experience highly desirable.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.697. Neuro Data Design I. 4 Credits.
In this year long course, students will work together in small teams to design, develop, and deploy a functioning tool for practicing brain scientists, either for accelerating research or augmenting the clinic. The first semester will focus on scoping the tool, including determining feasibility (for us in a year) and significance (for the targeted brain science community), as well as a statement of work specifying deliverables and milestones. The second semester will focus on developing the tool, getting regular feedback, and iterating, using the agile/lean development process. Recommended Course Background: numerical programming.

EN.580.701. CBID Masters Advanced Project. 3 - 10 Credits.
For second year CBID students.

EN.580.702. CBID Masters Advanced Project. 3 - 10 Credits.

EN.580.704. Mathematical Foundations of BME I. 4 Credits.
The course introduces modern techniques in mathematical analysis of biomedical data. Techniques include maximum likelihood, estimation theory via Kalman equation, state-space models, Bayesian estimation, classification of labeled data, support vector machine, dimensionality reduction via principal component analysis, clustering, expectation maximization, and dynamic programming via the Bellman equation.

EN.580.706. Introduction to Biomedical Rodent Surgery Laboratory and Grantsmanship. 3 Credits.
This course has been specifically designed for students interested in understanding the translational aspects of biomedical research and pursuing research as a career. The course aims to introduce diverse yet interlinked research concepts that will equip students with the necessary knowledge and expertise to independently carry out research endeavors in the future. A part of the course includes supervised hands-on in vivo workshops, in which students will learn basic rodent anatomy, physiology and some general experimental procedures. A second component will introduce research methodology, which will enable students to develop their scientific thought process and enhance their critical thinking skills by formulating hypothesis, developing aims, searching PubMed for related literature, understanding ethical guidelines and other regulatory issues. In today's scenario, scientists also need to have a strong communication ability to ensure that their research is accessible at a global platform. This requires skill and knowledge of scientifically drafting manuscripts, writing grants and articulating business plans as well as effectively presenting their research results (presentation, poster, etc.). We will allocate necessary time to develop this science-art as well. Students' attendance and active participation will enrich this exciting and interactive course, which is entirely based on in-class learning.
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.709. Sparse Representations in Computer Vision and Machine Learning. 3 Credits.
Sparse and redundant representations constitutes a fascinating area of research in signal and image processing. This is a relatively young field that has been taking form for the last 15 years or so, with contributions from harmonic analysis, numerical algorithms and machine learning, and has been vastly applied to myriad of problems in computer vision and other domains. This course will focus on sparsity as a model for general data, generalizing many different other constructions or priors. This idea - that signals can be represented with just "a few" coefficients - leads to a long series of beautiful (and surprisingly, solvable) theoretical and numerical problems, and many applications that can benefit directly from the new developed theory. In this course we will survey this field, starting with the theoretical foundations, and systematically covering the knowledge that has been gathered in the past years. This course will touch on theory, numerical algorithms, and applications in image processing and machine learning. Recommended course background: Linear Algebra, Signals and Systems, Numerical Analysis.

EN.580.710. Ethical Challenges in Biomedical Engineering. 2 Credits.
This course will address the mores of scholarship and responsible practices in conducting biomedical research. Discussions will be focused on the grey areas encountered in considering and determining the best conduct for performing biomedical research and will emphasize how decisions depend on multiple factors and contexts. Issues to be discussed will span the main focus areas in the Biomedical Engineering Department: Cell and Tissue Engineering, Imaging, Genomics, Computational Medicine, Biomedical Data Science, and Neuroscience. Each week a short lecture will be presented by a faculty member, followed by breakdown into small groups for discussion and debate. Course restricted to BME PhD Students Only.

EN.580.721. Systems Bioengineering I. 4 Credits.
A quantitative, model-oriented investigation of the cardiovascular system. Topics are organized in three segments. (1) Molecular/cellular physiology, including electrical signaling and muscle contraction. (2) Systems cardiovascular physiology, emphasizing circuit-diagram analysis of hemodynamics. (3) Cardio-vascular horizons and challenges for biomedical engineers, including heart failure and its investigation/treatment by computer simulation, by gene-array analysis, by stem-cell technology, and by mechanical devices (left-ventricular assist and total-heart replacement). Recommended Course Background: EN.580.221 and EN.580.222

EN.580.722. Systems Bioengineering II. 4 Credits.
A quantitative, model-oriented approach to the study of the nervous system. Topics include functional anatomy of the central and autonomic nervous systems, neurons and networks, learning and memory, structure and function of the auditory and visual systems, motor systems, and neuro-engineering.Recommended Course Background: EN.580.221, EN.580.222, EN.580.223, AS.110.302, EN.580.421; Corequisite: EN.580.424

EN.580.723. Introduction to MRI in Medicine. 3 Credits.
Advances in magnetic resonance Imaging (MRI) have resulted in developing techniques such as diffusion imaging, delayed contrast enhanced imaging, tagged, flow map and many other imaging contrasts. These techniques offer insights into the structure and function of brain and other anatomical regions in the body. With increased availability of these techniques in clinical MRI machines, they are now entering clinical practice for the evaluation of disease. This course presents the underlying physical foundation of MRI, with a focus on more advanced techniques and their application in clinical research and practice. Topics that are covered include foundations of MRI (signal detection and construction, image contrast), diffusion weighted imaging, and cardiac imaging. Attention is also drawn to possible artifacts and pitfalls.Suggested course background: Signals and systems/multi-dimensional digital signal processing, differential equations, linear algebra.

EN.580.725. Radiology for Engineers. 3 Credits.
This course provides engineering students with an introductory understanding of the principles and practice of radiology – including a spectrum of specialties in diagnostic radiology as well as procedures in interventional radiology and digital pathology. The course includes lectures, working with real image data, and visits to clinical areas at Johns Hopkins Hospital. Each segment of the course emphasizes clinical perspective on imaging (including scanner technology and image analysis) in relation to anatomy, physiology, and pathology. Each segment is led by an expert in a particular discipline in collaboration with the course director. Recommended course background: 580.472, 601.455Restricted to BME MSE and BME PhD students only. Others by instructor permission. Audits are not allowed.

EN.580.735. Advanced Seminars in Computational Medicine. 1 Credit.
In this course, students will review current literature on the most salient and interesting topics in the emerging field of Computational Medicine, which is focused on the development of quantitative approaches for understanding the mechanisms, diagnosis and treatment of human disease through applications of mathematics, engineering, and computational science. Whenever possible, the publications considered will be directly relevant to the lectures delivered by visiting scholars in the Institute for Computational Medicine's seminar series. Students will be required to search for the most relevant papers in the current literature; read and critically interpret these papers; conduct interactive teaching sessions with the course instructor, other students, and trainees/faculty from the Institute. Potential topics will include: computational anatomy; computational molecular medicine; computational physiological medicine; and computational healthcare. Evaluation will be by the course instructor (pass/fail). Graduate level. Seniors by permission. All registrants must be approved by the course instructor.

EN.580.736. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body. The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Fall semester only. S/U grading only.

EN.580.737. Distinguished Seminar Series in Computational Medicine. 1 Credit.
We live in a new era in the understanding, diagnosis and treatment of human disease. Over the past ten years, extraordinary advances in modeling and computing technologies have opened the door to an array of possibilities that were previously beyond the reach of biomedical researchers. Today's powerful computational platforms are allowing us to begin to identify, analyze, and compare the fundamental biological components and processes that regulate human diseases and their impact on the body.The next step, then, is to harness the potential of these theoretical and computational tools and theory in a meaningful way -that is, to apply this "new medicine" to the exploration and treatment of many of our current diseases. This lecture series will feature world experts in computational medicine as well as laboratories at JHU's institute for Computational Medicine (ICM). Spring semester only.

EN.580.740. Surgery for Engineers. 3 Credits.
This course provides an introduction to basic principles and emerging techniques in surgery, interventional radiology, and radiation therapy for engineering students. Basic principles include introduction to fundamental surgical approaches and tools as well as sub-specialties, including neurosurgery, orthopaedic surgery, ENT surgery, thoracic surgery, and laparoscopic surgery as well as minimally invasive (body and neurovascular) interventional radiology as well as radiotherapy (external beam and brachytherapy). Introduction to cutting edge and emerging technologies include intraoperative imaging (all modalities), surgical navigation, and robotics. Requisite background for engineering students includes analytic geometry, linear algebra, computing (Matlab, Python, or C++), and basic familiarity with the physics of medical imaging. Safety Training: certificate in Bloodborne Pathogens and HIPAA & Research. Recommended course background: 580.472, 601.455

EN.580.742. Neural Implants and Interfaces. 3 Credits.
This course will focus on invasive neural implants that electrically interface with the peripheral or central nervous system. We will investigate the different types of recording and stimulating neural interface technologies currently in use in patients as well as coverage of the biophysics, neural coding, and hardware. We will also cover computational modeling of neurophysiology in the context of implantable devices and their neural interfaces. A final group project will be required for simulating a neural interface system. Recommended course background includes cell biology, physics with electromagnetics (or electrical circuits), chemistry, differential equations, and computer programming.

EN.580.743. Advanced Topics in Genomic Data Analysis. 3 Credits.
Genomic data is becoming available in large quantities, but understanding how genetics contributes to human disease and other traits remains a major challenge. Machine learning and statistical approaches allow us to automatically analyze and combine genomic data, build predictive models, and identify genetic elements important to disease and cellular processes. This course will cover current uses of statistical methods and machine learning in diverse genomic applications including new genomic technologies. Students will present and discuss current literature. Topics include personal genomics, integrating diverse genomic data types, new technologies such as single cell sequencing and CRISPR, and other topics guided by student interest. The course will include a project component with the opportunity to explore publicly available genomic data. Recommended Course Background: coursework in data science or machine learning.

EN.580.745. Mathematics of Deep Learning. 1.5 Credits.
The past few years have seen a dramatic increase in the performance of recognition systems thanks to the introduction of deep networks for representation learning. However, the mathematical reasons for this success remain elusive. For example, a key issue is that the training problem is nonconvex, hence optimization algorithms are not guaranteed to return a global minima. Another key issue is that while the size of deep networks is very large relative to the number of training examples, deep networks appear to generalize very well to unseen examples and new tasks. This course will overview recent work on the theory of deep learning that aims to understand the interplay between architecture design, regularization, generalization, and optimality properties of deep networks. Recommended background: machine learning (EN.601.475), deep learning (EN.520.438 or EN.601.482), graduate-level matrix analysis and linear algebra (EN.553.792) and graduate-level optimization (EN.553.762).

EN.580.746. Imaging Science Seminar. 1 Credit.
Fall semester only.

EN.580.747. Imaging Science Seminar. 1 Credit.
In this seminar course, students will review current literature on the most salient and interesting topics in the fields of Imaging and Data Science through a series of invited talks by leading experts, from foundational ideas to exciting applications. This course is held concurrently to the seminar series of the Center for Imaging Science (CIS) and the Mathematical Institute for Data Science (MINDS). More information will be periodically updated and posted at the CIS and MINDS websites. Graduate level. Seniors by permission.

EN.580.750. Surgineering: Systems Engineering and Data Science in Interventional Medicine. 3 Credits.
This course provides engineering students with deep clinical immersion in interventional medicine complemented by instruction in systems engineering and data science pertaining to medical technology, information, and workflow. The course involves one-to-one matching of students with Clinical Mentors, who oversee the students' clinical immersion and involvement on clinical teams. Weekly class meetings with visitation by one or more of the Clinical Mentors focus on principles of systems engineering and data science as well as journal articles on emerging topics in technology and information science in interventional medicine. Each student completes a course project that addresses a particular question or challenge in technology integration, data-flow, workflow, patient safety, and quality assurance in one of the clinical areas covered in the course. Prerequisites and CertificatesPrerequisite for the course is 580.740 (Surgery for Engineers), which introduces principles and practice of interventional medicine – including open and minimally invasive surgical approaches as well as interventional radiology and radiation oncology. Students must provide a copy of the following certifications, each available as Hopkins myLearning modules at myJHU:• Bloodborne Pathogens• Fluoroscopy Refresher• Patient Privacy for Workforce Members

EN.580.751. Cell & Tssue Engineering Lab. 4 Credits.
Cell and tissue engineering is a field that relies heavily on experimental techniques. This laboratory course will consist of three six experiments that will provide students with valuable hands-on experience in cell and tissue engineering. Students will learn specialized techniques related to faculty expertise in cell engineering, microfluidics, gene therapy, microfabrication and cell encapsulation. Experiments include the basics of cell culture techniques, gene transfection and metabolic engineering, basics of cell-substrate interactions I, cell-substrate interactions II, and cell encapsulation and gel contraction. This course includes an 'advanced topics' component designed to fulfill toe core curriculum requirements of the RIE (Regenerative and Immune Engineering) track of the BME masters program. Offered the first half of fall semester only.

EN.580.752. Advanced Topics in Regenerative and Immune Engineering. 4 Credits.
This course is designed as part of the core curriculum for the RIE track fo the BME masters program. Topics will be selected based on current methods, basic research, and clinical translation of regenerative medicine and immune engineering technologies. Background Knowledge: EN.580.641, EN.580.642, and EN.580.751 or graduate standing and permission of the instructor.

EN.580.753. Cell and Tissue Engineering Lab Advanced Project. 1 Credit.
This one credit laboratory course provides students with the opportunity to obtain experience in advanced project design and implementation in conjunction with the graduate-level Cell & Tissue Laboratory course (EN.580.754). It is appropriate for students who have previously taken the undergraduate version of this course to fulfill the core curriculum requirement of the RIE (Regenerative and Immune Engineering) track of the BME master's program. Graduate students may also take this course will permission of the instructor to pursue additional 'advanced topics' laboratory modules. The work will be completed over the course of the semester in conjunction with the "advanced topics" component of the regular graduate level version of the lab course.

EN.580.754. Cell & Tissue Engineering Lab. 4 Credits.
This flipped-content laboratory course will consist of modules that provide students with valuable hands-on experience in cell and tissue engineering. Modules contain experiments including the basics of cell culture techniques, gene transfection, metabolic glycoengineering, and cell encapsulation. Students will collect and analyze their own experimental data, write-up results in publication structured reports, and engage in active discussion of current scientific literature. An independent group project based in cellular engineering principles will be designed and presented by the students as a capstone for the course.Students who previously completed 580.452 Cell & Tissue Engineering Lab may NOT register for this class.Textbook Info None.Pre-requisitesStudents must have completed the online "Introductory Laboratory Safety" and "Bloodborne Pathogens" prior to registering for this class. To access these courses, log in to MyLearning and identify these tutorials.

EN.580.771. Principles of the Design of Biomedical Instrumentation. 4 Credits.
This course is designed for graduate students interested in learning basic biomedical instrumentation design concepets and translating these into advanced projects based on their research on current state-of-the-art. They will first gain the basic knowledge of instrumentation design, explore various applications, and critically gain hands-on experience through laboratory and projects. At the end of the course, students would get an excellent awareness of biological or clinical measurement techniques, design of sensors and electronics (or electromechanical/chemical, microprocessor system and their use). They will systematically learn to design instrumentation with a focuson the use of sensors, electronics to design a core instrumentation system such as an ECG amplifier. Armed with that knowledge and lab skills, students will be encouraged to discuss various advanced instrumentation applications, such as brain monitor, pacemaker/defibrillator, or prosthetics. Further, they will be "challenged" to come up with some novel design ideas and implement them in a semester-long design project. Students will take part in reading the literature, learning about the state-of-the-art through journal papers and patents, and discussing, critiquing, and improving on these ideas. Finally, they will be implementing a selected idea into a semester-long advanced group project.Meets with 580.471 Graduate students only
Students must have completed Lab Safety training prior to registering for this class. To access the tutorial, login to myLearning and enter 458083 in the Search box to locate the appropriate module.

EN.580.775. Build Your Own Prosthesis. 4 Credits.
This is a graduate level hands-on course to learn how to make prosthetic limbs. The course will begin with doing background literature and technology review. The students will then do up to 8 laboratory exercises and then follow up with 4 weeks of hands on project building on one of the laboratories to take the idea to cutting edge research in the field. The laboratory exercises will include 1) Electrodes for muscle (EMG) and brain (EEG) signal recording. 2) Circuits for signal amplification and acquisition. 3) Signal processing of EMG and ECG using conventional spectral and discriminant analysis. 4) Design of Control of prosthetic fingers and hands. 5) Soft robotics – design of a prosthetic finger. 6) Tactile sensor design. 7) Tactile sensing and feedback for prosthesis. 8) Simulation using graphical animation and augmented reality. The projects done by students will be on advanced topics such as: A) Pattern recognition and machine intelligence of EMG decoding for dexterous hand control. B) Design of soft robotic multi-finger hand. C) Sensory perceptions: perceiving light touch to pain. D) Augmented reality learning, training and performance. In addition, the students will visit prosthetics/robotics laboratories, startup company and Applied Physics Lab where upper limb prosthesis development takes place. They will be expected to devote equivalent of 8 hours of hands on laboratory time, and as much time reviewing the literature, writing laboratory reports, and the final project report as a paper and a patent, and do a demonstration and make a full presentation. The course will be self-paced and open to graduate students who will take part in the laboratory and project development, learn by doing, and demonstrate ability to take basic ideas to advanced, novel solutions. Selection will be based on an interview about skills, readiness, and motivation.

EN.580.781. Biomedical Engineering Seminar. 1 Credit.

EN.580.782. Biomedical Engineering Seminar. 1 Credit.

EN.580.788. Biomedical Photonics II. 4 Credits.
This course serves as the continuation of 580.678 (520.678), Biomedical Photonics I. It will cover the advanced topics on biomedical photonics, including, but not limited to, light scattering (Rayleigh and Mie scattering), photon diffusion, polarization (birefringence), fluorescence, lifetime measurements, confocal microscopy, optical coherence tomography, nonlinear microscopy, and super-resolution microscopy. Representative biomedical applications of some of these technologies will be integrated into the relevant chapters. A hand-on lab section (optional) for students to design and build an imaging instrument, space permitting.

EN.580.801. Research in Biomedical Engineering. 3 - 10 Credits.
Graduate Students only

EN.580.802. Research in Biomedical Engineering. 3 - 10 Credits.
Directed research for MSE and PhD students

EN.580.803. Research in Biomedical Engineering. 3 - 10 Credits.
Course is for students conducting research for credit.P/F grading only

EN.580.805. BME MSE Independent Study. 1 Credit.
Independent Study

EN.580.806. CBID Summer Research. 9 Credits.

EN.580.821. Applied Research and Grant Methodology. 3 Credits.
The goal of this course is to guide a student through the process of designing a scientific project as well as evaluating others' projects (i.e., providing "peer review"). Course requirements include attending lectures describing successive stage of project design; providing iterative oral and written reports on your own research proposal/project; as well providing feedback on your colleagues' (i.e., your fellow students in the class) projects and proposals. A final research proposal to be presented in the format of a NIH-style grant application will provide evidence that a student is capable of designing an advanced research project by identifying a significant biomedical problem, developing innovative approaches to solve it, and then designing a practical, relevant, and implementable research plan. This course is often taken in conjunction with – and based upon – an independent project being done by the student in a research laboratory but students without a laboratory position are welcome to take this course based on a hypothetical research project of their choosing.
EN.500.601

EN.580.843. Independent Study: Advances in Immunoengineering. 2 Credits.
This independent study will investigate the diverse and complex fields of engineering and immunology and how it is transforming patient treatment in cancer, autoimmunity, regeneration, and transplantation.

EN.580.850. BME MSE Research Practicum. 6 Credits.
BME MSE Research Practicum For Thesis-Track Students

EN.585 (Applied Biomedical Engineering)

EN.585.601. Physiology for Applied Biomedical Engineering I. 3 Credits.
This two-semester sequence is designed to provide the physiological background necessary for advanced work in biomedical engineering. A quantitative model-oriented approach to physiological systems is stressed. First-term topics include the cell and its chemistry, transport and the cell membrane, properties of excitable tissue and muscle, the cardiovascular system, and the respiratory system. The second term course covers anatomy of the nervous system, structure and functions of the auditory and visual systems, motor systems, the kidney and gastrointestinal tract, and the neural and neuroendocrine control of the circulation.

EN.585.602. Physiology for Applied Biomedical Engineering II. 3 Credits.
This two-semester sequence is designed to provide the physiological background necessary for advanced work in biomedical engineering. A quantitative model-oriented approach to physiological systems is stressed. First-term topics include the cell and its chemistry, transport and the cell membrane, properties of excitable tissue and muscle, the cardiovascular system, and the respiratory system. The second term course covers anatomy of the nervous system, structure and functions of the auditory and visual systems, motor systems, the kidney and gastrointestinal tract, and the neural and neuroendocrine control of the circulation.

EN.585.607. Molecular Biology. 3 Credits.
The course is intended to serve as a fundamental introduction to cell and molecular biology. Topics generally included are basic chemistry and biochemistry of the cell; structure, function, and dynamics of macromolecules; cell organization; enzyme kinetics; membranes and membrane transport; biochemistry of cellular energy cycles, including oxidative phosphorylation; replication, transcription, and translation; regulation of gene expression; and recombinant DNA technology. Where appropriate, biomedical application and devices based on principles from cell and molecular biology are emphasized.

EN.585.613. Medical Sensors & Devices. 3 Credits.
This course covers the basic and advanced principles, concepts, and operations of medical sensors and devices. The origin and nature of measurable physiological signals are studied, including chemical, electrochemical, optical, and electromagnetic signals. The principles and devices to make the measurements, including a variety of electrodes and sensors, will be discussed first. This will be followed by a rigorous presentation of the design of appropriate electronic instrumentation. Therapeutic instrumentation such as pacemakers, defibrillators, and prosthetic devices will be reviewed. The final part of this course will cover emerging frontiers of cellular and molecular instrumentation and the use of micro- and nanotechnology in these biotechnology fields. The lectures will be followed by realistic experimentation in two laboratory sessions where students will obtain hands-on experience with electronic components, sensors, biopotential measurements, and testing of therapeutic instrumentation.

EN.585.615. Mathematical Methods. 3 Credits.
The course covers mathematical techniques needed to solve advanced problems encountered in applied biomedical engineering. Fundamental concepts are presented with emphasis placed on applications of these techniques to biomedical engineering problems. Topics include solution of ordinary differential equations using the Laplace transformation, Fourier series and integrals, solution of partial differential equations including the use of Bessel functions and Legendre polynomials and an introduction to complex analysis. Prerequisite(s): Familiarity with multivariable calculus, linear algebra, and ordinary differential equations.

EN.585.616. Principles of Medical Instrumentation and Devices. 3 Credits.
Biomedical sensors and devices are an integral part of modern medicine and they are becoming increasingly important with the growing need for objectivity and accessibility in diagnostics and therapeutics. The science and technology that goes into the plethora of sensors, although highly interdisciplinary, mainly derives from basic principles in physics and electrical engineering. This course will (re)introduce these principles and illustrate the application of these principles in a number of classes of medical sensors. It will also review some of the basic ideas and constraints that go into making of a medical device and finally touch upon a few nontechnical principles in applications of medical devices. Course Note(s): Desirable background knowledge includes introductory level electrical engineering, circuit design, college level differential and integral calculus, and introductory human physiology.

EN.585.617. Rehabilitation Engineering. 3 Credits.
This course is an introduction to a field of engineering dedicated to improving the lives of people with disabilities. Rehabilitation engineering is the application of engineering analysis and design expertise to overcome disabilities and improve quality of life. A range of disabilities and assistive technologies will be investigated. The relationship between engineering innovation, the engineering design process, the human-technology interface, and the physical medicine and rehabilitation medical community will be explored. This course will require a semester long design project that addresses an unmet technological need. Students will choose a project with the instructor's approval. An engineering solution will be developed over the course of the semester through specification development, design reviews, and interacting with appropriate members of the medical community. There is a required visit to a local rehabilitation facility. For students who complete a software training module, access to a 3D printer will be available with assistance from an experienced designer. Prerequisite(s): An undergraduate engineering degree or permission of the instructor.

EN.585.619. Regulation of Medical Devices. 3 Credits.
Biomedical engineers are uniquely involved in many aspects of product development, from the inception of the idea to its delivery in the marketplace. This course will cover one major aspect of that process—the objectives and mechanisms of the FDA regulatory system governing the clinical use of medical devices in the United States, including regulatory pathways and device classification. Students will both analyze and discuss management of risk, and they will design controls related to cardiovascular, orthopedic, and neurological devices. By the end of the course, students will have a deep understanding of how the regulatory process is involved in every phase of medical device development.

EN.585.621. Advances in Pulmonary Therapeutics. 3 Credits.
Pulmonary diseases like chronic obstructive pulmonary disease cause a significant burden on the healthcare systems all over the world. For a biomedical engineer, it is therefore important to learn about state-of-the-art diagnostic and therapeutic technologies in pulmonary medicine. This online course introduces pathologies of the pulmonary system along with related preclinical and clinical research methodologies. Modules are designed to cover integration of respiratory physiology with molecular biology, biophysics, pathophysiology, medicine, and biomedical engineering. A combination of video lectures, virtual workshops, literature reviews, student presentations, and problem sets will be used in order to foster critical thinking skills required to address current challenges in respiratory medicine.

EN.585.631. Introduction to Biomechanics. 3 Credits.
This course will explore the human body, modeled as a mechanical system, and fundamental mechanical engineering principles that can be applied to answer questions about its structure and function. In this course, students will be introduced to tools, methods and models used in the biomechanics field. Topics covered will include deformable solid mechanics of the bone and soft tissues, fluid mechanics, statics and dynamics in musculoskeletal biomechanics applications, experimental biomechanics models, computational biomechanics models, and biomechanical sensors and signals. Students will be asked to survey and critique biomechanics research literature, solve simple biomechanics problems, and identify classical biomechanics fields and emerging biomechanics frontiers.Prerequisites:A background in physics or mechanical engineering as well as experience working in MATLAB is encouraged.

EN.585.635. Ethics in Biomedical Engineering Research and Management. 3 Credits.
Bioengineering focuses on the development and application of new technologies in biology and medicine. These technologies often have powerful effects on living systems at the microscopic and macroscopic level. They can provide great benefit to society, but they also can be used in dangerous or damaging ways. These effects may be positive or negative, and so it is critical that bioengineers understand the basic principles of ethics when thinking about how the technologies they develop can and should be applied. On a personal level, every bioengineer should understand the basic principles of ethical behavior in the professional setting. The goal of this semester course is to present the issues of professional conduct in the practice of engineering, research, publication, public and private disclosures, and in managing professional and financial conflicts. The course seeks to teach these concepts through didactic presentations, case studies, presentations of methods for problem solving in ethical matters, and classroom debates on contemporary ethical issues. Investigation of cases includes documentation of students' initial thoughts on issues, then systematic reflection on these thoughts through introduction of multiple perspectives, thought papers and in-class discussions. Case studies cover a wide variety of application areas, including genetic engineering, xenotransplantation, using animals in research, rights of patients and research subjects, and BME technology development.

EN.585.641. Cellular Engineering. 3 Credits.

EN.585.642. Network Science for Biomedical Engineers. 3 Credits.
Network science has emerged as a powerful tool for the study of systems which can be modeled as complex networks. In this course we will introduce the mathematical foundations of network science, with applications to biological networks. Students will learn to employ graph theoretic metrics for the analysis and characterization of complex network models. We will also study recent advancements in network science, including extensions to dynamical networks, multilayer networks and graph signal processing and their biomedical applications. After completing this course, students will be equipped with network science tools to analyze biological networks.

EN.585.685. Methods in Neurobiology. 3 Credits.
Neurobiology is the study of cells of the nervous system and the organization of these cells into functional circuits that process information and mediate behavior. In this course we will explore molecular and cellular aspects of neuronal physiology, their organization into higher systems and approach methodologies used to analyze CNS function at different levels. Such techniques will include recent progress in whole brain imaging, advances in fluorescence microscopy and optogenetics, the basics of single-cell sequencing and the use of cellular, organoids or animal models in neuroscience. We will also discuss deviations from neuronal physiology such as during aging or after onset of CNS related pathologies, including neurodegenerative diseases and approaches to cell reprogramming and regeneration in order to recover cellular function.At the end of this course, students will have a broader understanding on techniques used to study neuronal function at a molecular, cellular and systemic level and will have the basics insights to infer which tools are more appropriate depending on the application.
EN.585.601 AND EN.585.602 Physiology for Applied Biomedical Engineering I II

EN.585.702. Medical Device Innovation and Design. 3 Credits.
This course introduces you to the process of medical device design and innovation. You will learn the art and skill of identifying medical device opportunities through observations, interviews, and research. Through a combination of lectures, hands on activities, and interactions with clinical stakeholders, you will gain the ability to identify unmet, unarticulated, and underserved needs. Subsequently, you will learn the process of developing well thought out conceptual designs, that meet those needs. You will learn to apply an iterative approach towards innovation, by involving and engaging multiple stakeholders and their perspectives throughout the process. Throughout the course modules, you will also follow the journey of several innovative startups/products/ services, that started at JHU-CBID and went through the process outlined in this course.

EN.585.703. Applied Medical Image Processing. 3 Credits.
Developments in medical image acquisition systems such as magnetic resonance imaging (MRI), computed tomography (CT), and ultrasound have resulted in a large number of clinical images with rich information regarding structure and function of different organs in the human body. A challenging task would be to extract clinically relevant information from the raw images that can be used to identify disease at an early stage or to monitor response to treatment. This course briefly introduces the underlying physical foundation of different image modalities followed by presentation of concepts and techniques that are used to process and extract information from medical images. Topics that are covered include medical image formats, enhancement, segmentation, registration, and visualization. MATLAB scripting language will be introduced and used to implement basic algorithms.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers is required, or written permission from the instructor. EN.585.704 Principles of Medical Imaging is recommended. Preliminary knowledge of probability, linear algebra, and human anatomy is strongly recommended.

EN.585.704. Principles of Medical Imaging. 3 Credits.
The objective of this online course is to critically compare different modalities of medical imaging by exploring the electromagnetic spectrum and the acoustic spectrum. By the end of this course, students will be able to demonstrate understanding of each modality's strengths, limitations, and applications. For each modality, we will examine the mathematical and physical foundations of the corresponding spectrum, image formation, image interpretation, image quality, and image processing. We will also evaluate and summarize current and future research trends in medical imaging.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers, or permission from the instructor. An introductory background in physics (electromagnetism) is recommended.

EN.585.708. Biomaterials. 3 Credits.
This course covers the fundamentals of the synthesis, properties, and biocompatibility of metallic, ceramic, polymeric, and biological materials that come in contact with tissue and biological fluids. Emphasis is placed on using biomaterials for both hard and soft tissue replacement, organ replacement, coatings and adhesives, dental implants, and drug delivery systems. New trends in biomaterials, such as electrically conductive polymers, piezoelectric biomaterials, and sol-gel processing are discussed, and the recent merging of cell biology and biochemistry with materials is examined. Case studies and in-class scenarios are frequently used to highlight the current opportunities and challenges of using biomaterials in medicine.

EN.585.709. Biomechanics of Cells and Stem Cells. 3 Credits.
The class starts with introductory lectures on the place of cell mechanics in the broader areas of cell biology, physiology, and biophysics, where the general topics of cell structure, motility, force generation, and interaction with the extracellular matrix are considered. The importance of the cell mechanical properties as indicators of the cell performance under normal and pathological conditions is emphasized. Major experimental techniques, such as micropipette aspiration, atomic force microscopy, and magnetic cytometry, to probe cell mechanical properties are presented. Linear elastic and viscoelastic models are introduced and applied to the interpretation of the mechanical experiments with endothelial cells and fibroblasts. Then the class discusses cell adhesion, spreading, and motility focusing on the experiments and models to estimate traction forces (stresses) produced by the cell. Finally, the effects of various mechanical factors (applied strains or forces, stiffness and viscoelastic properties, surface topography) on stem cell lineage commitment are discussed. Students also read and make presentations on original journal papers covering additional topics, which exposes them to the professional literature and hones their communication skills.

EN.585.710. Biochemical Sensors. 3 Credits.
This course covers the fundamental principles and practical aspects of chemical sensing of physiological signals. The focus of the course is on the electrochemistry and biophysical chemistry of biological sensing elements and their integration with signal transducers. Other topics covered include design and construction of practical sensors, processing and interpretation of signal outputs, and emerging technologies for biosensing.

EN.585.717. Rehabilitation Engineering II. 3 Credits.
This 2-course sequence is an introduction to a field of engineering dedicated to improving the lives of people with disabilities. Rehabilitation engineering is the application of engineering analysis and design expertise to overcome disabilities and improve quality of life. A range of disabilities and assistive technologies will be discussed and investigated. The relationship between engineering innovation, the engineering design process, the human-technology interface, and the physical medicine and rehabilitation medical community will be explored. This course sequence will require a 2-semester long design project that addresses an unmet technological need. Students will choose a project with the instructors' approvals. An engineering solution will be developed over the two courses through specification development, design reviews, and interacting with appropriate members of the medical community. Either live or virtual interaction with a rehab clinic is required. Access to a 3D printer will be available with assistance from an experienced designer.

EN.585.718. Biological Solid & Fluid Mechanics. 3 Credits.
The nonlinear mechanics of the arterial walls is analyzed as an important example of biological solid mechanics. After the introduction of the necessary background on matrices and tensors, the stresses and strains in the arterial wall are defined. Then, the fundamental concept of the strain energy function and its particular forms used in the vascular mechanics are introduced. The experiments (biaxial stretch and inflation-extension) aimed at the estimation of the wall material properties are discussed. In addition to the properties of the normal arterial wall, the mechanics in vascular diseases are studied. First, the stresses and stiffness in atherosclerotic arteries are analyzed, and then the effects of hypertension are discussed. In the second part of the class, the fluid mechanics of blood is studied, including the velocity profiles and shear stress distribution. The non-Newtonian features of blood rheology are presented as well. In the last part of the class, the cells in the blood circulation are considered with the main focus on the red blood cells. The micropipette experiment to estimate the elastic moduli of the red blood cell wall is studied in detail. The recent studies of the red blood cell circulation under pathological conditions (cancer, malaria) are discussed also. In all sections, the latest results of the computational modeling are used to support the main goals of the course. In addition to the regular (weekly) assignments, the students will be given original journal papers to discuss as a group. Finally, the students will be working on a computational project related to one of the major topics of the course.

EN.585.719. Sparse Representations in Computer Vision and Machine Learning. 3 Credits.
Sparse and redundant representations constitute a fascinating area of research in signal and image processing. This is a relatively young field that has been taking form for the last 15 years or so, with contributions from harmonic analysis, numerical algorithms and machine learning, and has been vastly applied to myriad of problems in computer vision and other domains. This course will focus on sparsity as a model for general data, generalizing many different other constructions or priors. This idea - that signals can be represented with just a few coefficients - leads to a long series of beautiful (and surprisingly, solvable) theoretical and numerical problems, and many applications that can benefit directly from the new developed theory. In this course we will survey this field, starting with the theoretical foundations and systematically covering the knowledge that has been gathered in the past years. This course will touch on theory, numerical algorithms, and applications in image processing and machine learning.
Mathematical Methods or equivalent

EN.585.720. Orthopedic Biomechanics. 3 Credits.
This course serves as an introduction to the field of orthopedic biomechanics for the biomedical engineer. Structure and function of the musculoskeletal system in the intact and pathologic states will be reviewed. Further discussion will focus on the design of orthopedic implants for the spine and the appendicular skeleton. Biomechanical principles of fracture repair and joint reconstruction will also be addressed. Peerreviewed journal publications will be used to explore the latest developments in this field.
EN.585.601 and EN.585.602 Physiology for Applied Biomedical Engineering I and II (or equivalent).

EN.585.721. Neural Data Science for Biomedical Engineers. 3 Credits.
In recent years, data science has revolutionized how we make sense and extract information from data. With recent advancements in neuroscience and availability of data, large amounts of data are available for scientists to analyze. In this course we aim to provide data science tools for the challenges encountered in neuroscience datasets, including noise, high dimensions, and lack of ground truth. We will introduce preprocessing pipelines for neural data from multiple modalities, methods for noise reduction, dimensionality reduction, hypothesis testing, spectral analysis, multivariate analysis, and graph theory. At the end of this course, students will be ready to analyze neural data from various recording techniques.

EN.585.722. Neural Connectomics. 3 Credits.

EN.585.724. Neural Prosthetics: Science, Technology, and Applications. 3 Credits.
This course addresses the scientific bases, technologies, and chronic viability of emerging neuroprosthetic devices. Examples include cochlear and retinal implants for sensory restoration, cortical and peripheral nervous system and brain-computer interface devices for deriving motor control and enabling afferent feedback, rehabilitative and therapeutic devices such as deep brain stimulators for Parkinson's disease, functional electrical stimulation systems for spinal cord injuries, and cognitive prosthetic systems for addressing brain trauma. Regulatory (FDA) challenges with emerging technologies and ethical considerations will also be addressed.

EN.585.725. Biomedical Engineering Practice and Innovation. 3 Credits.
This course will cover hands-on experimental and design work primarily in the areas of physiology, cell and tissue engineering, and biomedical instrumentation. In addition to teaching and allowing students to perform state-of-the art experimental techniques, this course will emphasize the business end of biomedical engineering innovation including identification of engineered needs and FDA regulation.
EN.585.601, EN.585.602 and EN.585.615

EN.585.726. Biomimetics in Biomedical Engineering. 3 Credits.
Biomimetics refers to human-made processes, substances, devices, or systems that imitate nature. This course focuses on substances prepared and engineered to meet biomedical uses. It is designed to provide students with: (1) an understanding of the biomimetic process of self-assembly, (2) an introduction to bioengineering biological materials and novel biomimetic materials that include forms and structures useful to bioprocesses, and (3) an understanding of how different instruments may be used for imaging, identification, and characterization of biological and biomimetic materials. Detailed knowledge of biological structure hierarchy is essential for most areas of biomedical engineering, and biological materials are becoming an increasingly important resource in creating new biomimetic materials that possess targeted biological structural and functional properties.

EN.585.729. Cell and Tissue Engineering. 3 Credits.
Cell and tissue engineering are dynamic and rapidly growing fields within biomedical engineering. This course will examine fundamental biological processes and medical engineering tools essential to regenerative medicine both at the singlecell and the whole-organism levels. Topics include stem cell engineering, cell–matrix and cell–scaffold interactions, cell–cell interactions and tissue morphogenesis, wound healing, and in vitro organogenesis. Prerequisite(s): Knowledge of basic molecular and cellular biology, physiology, and math through ordinary differential equations is required.

EN.585.732. Advanced Signal Processing for Biomedical Engineers. 3 Credits.
One of the defining topics for biomedical engineering, signal processing is playing an increasingly important role in modern times, mostly due to the ever-increasing popularity of portable, wearable, implantable, wireless, and miniature medical sensors/ devices. The primary function of all the medical devices is acquisition and analysis of some kind of physiological data, often in a semi continuous real-time manner. From a medical stand point, the benefits that the devices offer pertain to complementing the physician in diagnosis, prognosis, and therapeutics. High-quality signal processing algorithm is a vital part of this process. On the research side, accurate signal processing plays a fundamentally important role in a medical device's validation and translation from bench to bedside. Mastering this important topic can equip the student with skills that can be immediately applied in real-life technological innovations. This new online course will primarily focus on advanced topics in signal processing, including linear and nonlinear analysis of primary electro-physiological signals. Topics will include more traditional Auto-regressive Moving Average Analysis, spectral analysis, and singular value decomposition as well as advanced methods such as entropy computation, dimensionality estimation, state-space reconstruction, recurrence time analysis, parameter estimation, etc. Students will be challenged to write their own algorithms to reproduce select published research results.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering; EN.535.641 Mathematical Methods for Engineers; or written permission from the instructor. Knowledge of MATLAB is strongly recommended.

EN.585.734. Biophotonics. 3 Credits.
This course introduces the fundamental principles of biophotonics and their applications to real-world devices. In a combination of laboratory and classroom exercises, students will design optical systems for evaluation of optical properties of biological media and learn computational methods to simulate light transport in such media. Modern optical measurement techniques including fluorescence spectroscopy, optical coherence tomography, and confocal microscopy will be covered in detail.

EN.585.741. MR Imaging in Medicine. 3 Credits.
Advances in magnetic resonance Imaging (MRI) have resulted in developing techniques such as functional brain imaging, diffusion imaging, delayed contrast enhanced imaging, and tagged imaging. These techniques offer insights into the brain and cardiac structure and function. With increased availability of these techniques in clinical MRI machines, they are now entering clinical practice for the evaluation of neuro and cardiovascular disease. This course presents the underlying physical foundation of MRI, with a focus on more advanced techniques and their application in clinical research and practice. Topics that are covered include functional MRI, diffusion weighted imaging and techniques for mapping white matter fiber bundles, and cardiac cine and tagged imaging. Attention is also drawn to possible artifacts and pitfalls.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering or EN.535.641 Mathematical Methods for Engineers or a written permission from the instructor.

EN.585.742. Tissue Engineering. 3 Credits.
This course focuses on the application of engineering fundamentals to designing biological tissue substitutes. Concepts of tissue development, structure and function will be introduced. Students will learn to recognize the majority of histological tissue structures in the body and understand the basic building blocks of the tissue and clinical need for replacement. The engineering components required to develop tissue-engineered grafts will be explored including biomechanics and transport phenomena along with the use of biomaterials and bioreactors to regulate the cellular microenvironment. Emphasis will be placed on different sources of stem cells and their applications to tissue engineering. Clinical and regulatory perspectives will be discussed.Prerequisite(s): Knowledge of basic molecular and cellular biology, physiology, and math through ordinary differential equations is required.
EN.585.601 Applied Physiology I, EN.585.602 Applied Physiology II and EN.585.607 Molecular Biology

EN.585.743. Modeling Approaches to Cell and Tissue Engineering. 3 Credits.

EN.585.744. Biomedical Applications of Glycoengineering. 3 Credits.
Glycoengineering refers to the improvement of glycosylated molecules through manipulating their glycans (“glycans” is a broad term referring to sugars attached to proteins or lipids that includes all types of carbohydrates including monosaccharides, oligosaccharides, and polysaccharides). This course will cover the basic glycobiology of sugars and then focus on the manipulation of glycans for therapeutic purposes. Specific biomedical applications covered include the role of glycoengineering in the production and efficacy of therapeutic proteins (e.g., monoclonal antibodies); the impact of dietary sugars on human health; and the prospects for carbohydrate-based therapies for intractable human diseases such as metastatic cancer and neurological disorders such as Alzheimer’s disease. Suggested prerequisites include university level cellular biology, molecular biology, or biochemistry courses.

EN.585.747. Advances in Cardiovascular Medicine. 3 Credits.
This course is designed to provide in-depth instruction in cardiovascular physiology (building on the background provided in EN.585.601 Physiology for Applied Biomedical Engineering I) and cardiovascular responses to pathophysiological and environmental stressors. A quantitative, model-oriented approach to physiological responses is stressed. Students will research and present current advances in cardiovascular devices and procedures.
EN.585.601 Physiology for Applied Biomedical Engineering I; EN.585.602 Physiology for Applied Biomedical Engineering II or written permission from the instructor.

EN.585.751. Immunoengineering. 3 Credits.
Immunoengineering is a quickly growing field where engineering principles are used to better understand the dynamics of the immune system and enhance the efficacy of current immunotherapeutics. This course will provide relevant background in our understanding of various immune responses including to pathogens, self, allergens, cancer, and biomaterials. An in-depth engineering perspective and approach will be taken in the analysis of these responses and the development of novel therapeutics. Topics include systems immunology, genetic engineering, nanotechnology, hydrogels, biomaterials, vaccines, cancer immunotherapy, autoimmunity, tissue engineering, stem cells, viruses, bacteria, etc.

EN.585.761. Bioentrepreneurship. 3 Credits.
Through lectures, discussion, and business planning, students will learn how to assess the feasibility of a life sciences startup venture. Over the course of the semester students will evaluate financial and market opportunities, build financial projections and author a business plan. Students will debate a wide range of important issues facing entrepreneurs. As a class, students will identify opportunity, assess the skills and talents of successful entrepreneurs, and investigate models and approaches that help leaders navigate the uncertainties of entrepreneurship and creating new life science ventures. Projects relating to imaging, instrumentation, or translational tissue engineering would be eligible for inclusion.

EN.585.762. Computational Methods in Biomedical Engineering. 3 Credits.

EN.585.770. Global Health Engineering. 3 Credits.
Most biomedical engineers trained in low-resource settings are absorbed into the labor market as clinical engineers supporting hospitals. Once in hospitals, it has been difficult for these engineers to engage in scalable healthcare strengthening activity because they received siloed training that prevents them from adequately addressing the complex context of healthcare delivery. Additionally, many administrators and clinicians are not able to adequately engage clinical engineers because they are unaware of the scope of their activity and their role in healthcare delivery and healthcare strengthening. This course explores the scope of activity required of clinical engineers and their collaborators in poorly resourced healthcare settings. The objective of the course is to develop the core competencies required for clinical engineers to significantly impact the design and management of medical devices and healthcare systems. Topics include an analysis of the continuous engagement model for clinical engineering in low-resource settings, and the application of biomedical engineering design principles to quality management plans, device management plans, and capacity management plans.Prerequisite: Students should have completed one course within their focus area

EN.585.781. Frontiers in Neuroengineering. 3 Credits.
Neuroscientists and neuroengineers are using state-of-the-art tools for understanding the mysteries of the brain. A suite of new approaches is allowing researchers to tap into the brain activity and to measure the electrical, molecular, cellular, and structural changes that underlie complex behaviors as well as neurological disorders such as Alzheimer’s and Parkinson’s disease. This technological burst, spurred by the recent BRAIN (Brain Research for Advancing Innovative Neurotechnologies) Initiative by the US government, affords a unique educational opportunity at Johns Hopkins-especially with the recently inaugurated Kavli Neuroscience Discovery Institute. This multi-instructor course will give students an opportunity to learn the latest advances in the field of neuroengineering from the best experts on campus who are currently contributing their pioneering research in this field.Prerequisite(s): Written permission from the instructor is required. Completion of all required core courses, as well as the core courses for your chosen focus area, is strongly recommended.

EN.585.783. Introduction to Brain-Computer Interfaces. 3 Credits.
Recent advances in neural interfacing and neural imaging technology and the application of various signal processing methodologies have enabled us to better understand and then utilize brain activity for interacting with computers and other devices. In this course, we will explore these technologies and approaches for acquiring and then translating brain activity into useful information. We will also discuss the components of a brain-computer interface system, including invasive and noninvasive neural interfaces, the clinical and practical applications for a variety of users, and the ethical considerations of interfacing with the brain. Students will investigate the benefits and limitations of commonly used signal processing and machine learning methods (which include independent component analysis, Bayesian inference, dimensionality reduction, and information theoretic approaches), and then apply these methods on real neural data. We aim to equip students with the foundational knowledge and skills to pursue opportunities in the emerging field of brain-computer interfacing.
EN.585.615 Mathematical Methods for Applied Biomedical Engineering; EN.535.641 Mathematical Methods for Engineers; or a written permission from the instructor. EN.585.732 Advanced Signal Processing for Biomedical Engineers and a good knowledge of MATLAB are strongly recommended.

EN.585.785. Computational Medicine: Cardiology. 3 Credits.
The goal of this course is to investigate the cardiovascular system using a quantitative, model-oriented approach. The course will address the unique cardiac features that allow for cardiac electrical conduction and the resulting blood flow in the circulatory system through a series of lectures, selected readings, and assignments. Topics are organized in two segments: (1) Electrophysiology focused on the biophysics of single-cell to organ systems in health and disease, (2) Cardiovascular mechanics and CNS regulation of blood circulation. Students will complete two research-based projects throughout the semester that each investigate emerging engineering technologies that are beginning to reshape the standards of clinical care.

EN.585.786. Psychophysiology. 3 Credits.
The measurement of psychophysiology, the physiological manifestations of psychological states, is practiced by collecting self-reports, by taking readings from instruments, and by assessing behaviors. In this course, we focus on the psychophysiological instrumentation employed in the study of emotion. Each module of this course is concerned with a locus or system of interest (including the face and eyes, and cardiopulmonary and integumentary systems), and is presented in three acts. In Act 1, we first review relevant affect science and physiology. Next, in Act 2, we examine the sensors to measure physiological changes attributable to affect. Concluding each module in Act 3, we discuss interpretation of these measurements. We close the course by considering topics in integrative psychophysiology: fusion across loci and systems, and the study of dyadic interaction.
EN.585.613 Medical Sensors and Devices or EN.585.616 Principles of Medical Instrumentation and Devices are strongly recommended.

EN.585.800. Independent Study I. 3 Credits.
This course is an individually tailored, supervised project that offers the student research experience through work on a special problem related to the student's specialty of interest. The research problem can be addressed experimentally or analytically. A written report is produced on which the grade is based. The applied biomedical engineering project proposal form must be completed prior to registration. Prerequisite(s): Permission of the instructor required.

EN.585.801. Independent Study II. 3 Credits.
The course permits the student to investigate possible research fields or pursue topics of interest through reading or nonlaboratory study under the direction of a faculty member. The applied biomedical engineering directed studies program proposal form must be completed prior to registration. Prerequisite(s): Permission of the instructor required.
EN.585.800 Independent Study I

EN.595 (Engineering Management)

Courses

EN.595.660. Planning and Managing Projects. 3 Credits.
This course concentrates on the general methodology of managing a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the project manager. Topics include career aspects of project management; business factors affecting the project and the manager; project organization, planning, execution, and communications; project life cycle; risk analysis; interface management; design review; design control assessment; reporting; and reaction to critical problems. Students are formed into groups, presented with a scenario that simulates the development of a high-technology system, and assigned to make decisions required of the project manager in the execution of the project. The project manager's decisions must then be effectively communicated (and perhaps defended) to a variety of audiences (represented by other students and faculty) that include top management, the customer, functional management, and members of the project team. Course Note(s): The format for this course is either online or a mixed online/live environment called Virtual Live. For the Virtual Live format, weekly lectures are provided either online or live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Contact the instructors for additional information.

EN.595.662. Technical Organization Management. 3 Credits.
This course reviews the challenges of group management and personnel management in a technical organization. Students examine core functions of a technical group-level manager for planning, organizing, controlling, and leading. The course introduces topics relevant to technical group managers, including ethical leadership, team building, innovation environment, customer responsiveness, recruiting, hiring, compensation, delegation, motivation, performance management, conflict management, and organizational learning. Students address typical organization management situations and apply concepts to address expectations and challenges for a group-level manager in a technical organization.
595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.665. Strategic Communications in Technical Organizations. 3 Credits.

This course covers problems and instruction in human communications within a technical organization. Topics include the nature of difficulties in human communications (perception and cognition, semantics, individual differences in processing information, and listening), techniques for effective oral and written communications and presentations, problems in communication between supervisors and subordinates, assignment of work, and reporting to management and sponsors. Students assume roles in various interpersonal situations, meetings, discussions, and conflicts calling for a supervisor to write letters and memoranda; they also deliver oral presentations and participate in group and one-on-one discussions. This course also includes writing winning proposals and developing a technical strategy aligned with the organization's business strategy.

595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.676. Finance, Contracts, and Compliance for Technical Professionals. 3 Credits.

This course introduces the technical manager to all aspects of business management within an organization, ranging from tactical project planning and control, and contract management to higher level corporate financial and legal topics. Students will be guided through weekly topics in the areas of planning a project, scheduling, tracking and the evaluation/assessment of a project. It will also cover contractual considerations for the technical manager. The course will move from managerial business management to financial accounting topics such as direct and indirect costs, revenues, and profits; indices to financial position; use of financial reports; return on investment, net present value; internal rate of return; and financial management (including cash and funds flow statements). Finally, this course will also use the management approaches and practices above and apply them to the world of contracting and legal analysis. Tactical contracting principles, including acquisition planning, contract award, performance, and termination will be covered. Basic legal principles that a senior technical leader will encounter in their career will also be presented. Course discussions cover corporations and partnerships, professional liability, risk management, intellectual property negotiations, and ethics are presented for students to recognize issues that are likely to arise in the engineering profession and introduces them to the complexities and vagaries of the legal profession.

595.660 Planning and Managing Projects. Systems Engineering majors may contact the Systems Engineering Vice Chair regarding prerequisite substitution opportunities (this does not apply to Engineering Management / Systems Engineering Track students).

EN.595.701. Product and Supply Chain Management for Technical Professionals. 3 Credits.

This course provides foundational knowledge of Product and Supply Chain Management for effective engineering and technical leadership, while giving students a taste for the experience of being a product/ supply chain manager. Topics include product management life cycles,? investment strategies and business cases, product types (digital vs. physical vs. cyber-physical), product structures (build to spec vs. build to market), product and services portfolios, cross-organizational structures and governance, product, and services value chains as the basis for the supply chain, mergers and acquisitions, product platforms, and ethics and social responsibility related to products and supply chains. This course also addresses product-as-a-service and agile product/services development.The concepts in the course are reinforced with short case studies, a case-based team project, and fortified by interviews with practicing/retired product and supply chain executives and managers who discuss practical career experiences. Microsoft Teams is used extensively for instructor-student and student-team communication and collaboration.Note: This course is presented in a non-standard combination of asynchronous and synchronous delivery. Lectures are provided asynchronously online. Online (synchronous) attendance is required at bi-weekly seminar-type discussions. These discussions guide the incremental development, launch, sustainment and retirement plan for a product/product portfolio, and include mid-course and semester-end team presentations.

EN.595.660 Planning and Managing Projects,EN.595.662 Technical Organization Management , EN.595.676 Finance, Contracts, and Compliance for Technical Organizations, or instructor permission.

EN.595.727. Advanced Concepts in Agile Technical Management. 3 Credits.

How do highly skilled technical managers and system engineers like you address complex projects with high levels of uncertainty requiring continuous innovation and adaptation? This course will provide you the expertise needed to lead a highly skilled, cross-functional technical workforce capable of successfully executing these most demanding projects. You will participate using an experienced-based style of team-based learning implementing advanced leadership principles designed to deliver game-changing value to your customer. You will learn to apply a blend of agile, lean and design-thinking methods to technical leadership within a complex, evolving system engineering environment while still achieving a set of product requirements and design elements meeting schedule and budget allocations. You will gain critical insight into criteria necessary to assess the relevance of these advanced methods to specific projects and organizational culture. This course is offered through an atypical mix of synchronous and asynchronous delivery environments where you must attend eight (approximately biweekly) fully synchronous online video conferencing sessions. Depending on the Section, these meetings between the full class and instructors typically occur on either Monday or Tuesday evenings and are a mandatory requirement for this course.

EN.595.731. Business Law for Technical Professionals. 3 Credits.
This course addresses legal issues commonly encountered by technical professionals, best practices in identifying and mitigating legal risks, and strategies to avoid costly legal errors and to recognize when professional legal advice is necessary. The course will acquaint students with various areas of the law that can interact to affect a single business transaction and will provide students with legal reasoning skills that can be applied in a technical business environment. Topics include the legal environment of business, contract basics, effective contract negotiations, breach of contract and remedies, intellectual property rights, licensing and technology transfer, protecting confidential and proprietary business information, employment law, Internet law, corporate policies, business ethics, export control regulations, and an overview of the American court system.

EN.595.740. Assuring Success of Aerospace Programs. 3 Credits.
Technical managers, systems engineers, lead engineers, and mission assurance professionals will benefit from this course, which focuses on the leadership of system safety and mission assurance activities throughout the life cycle of a project to achieve mission success. This advanced course provides crucial lessons learned and proven best practices that technical managers need to know to be successful. The integrated application of mission assurance and systems engineering principles and techniques is presented in the context of aerospace programs and is also applicable to other advanced technology research and development programs. Students discuss critical risk-based decision making required from system concept definition and degree auditing through design, procurement, manufacturing, integration and test, launch, and mission operations. Experiences shared by senior aerospace leaders and extensive case studies of actual mishaps explore quality management topics relevant to aircraft, missiles, launch vehicles, satellites, and space vehicles. The course addresses contemporary leadership themes, government policies, and aerospace industry trends in mission assurance requirements, organizational structure, knowledge sharing and communication, independent review, audit, and assessment. Mission assurance disciplines covered include risk management, system safety, reliability engineering, software assurance, supply chain management, parts and materials, configuration management, requirements verification and validation, non-conformance, and anomaly tracking and trending.

EN.595.742. Quality Management in Technical Organizations. 3 Credits.
This course addresses quality management topics and applications vital to steering leadership and business process approaches for various organizations. Course discussions range from the history and development of modern quality programs to the latest in quality and business management, strategic planning, productivity improvement tools, techniques, and the implementation of quality initiatives needed to be successful in today’s highly dynamic and competitive global market. Advanced topics related to the principles and application of quality methodologies are presented such as the impact of leadership and corporate culture on quality and the importance of quality during the proposal and contract review process. Students will understand the elements and implementation strategies of quality assurance tools and systems, including benchmarking, process control, quality measurement, supplier quality management, and auditing. Current applications and strategies for implementing effective quality management are introduced including lean manufacturing philosophies, Deming’s PDCA cycle, Kaizen continuous improvement processes, and risk management. The course also covers a comprehensive and practical understanding of the implementation of quality management systems such as ISO 9001. As a result of the significant impact that software and system safety now have on today’s organizations, sessions dedicated to both topics are also included. Course Note(s): The format for this course is a mixed online/live environment called Virtual Live. Weekly lectures are provided live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Students can also choose to participate in person, in a classroom, at the predesignated day/time. Contact the instructors for additional information.

EN.595.758. Data Science for the Technical Leader. 3 Credits.
The course provides an immersive introduction to data science for scientists and engineers who are in technical leadership positions and recognize the need to lead their organizations into a data-driven future. Through lectures, hands-on exercises, and project assignments, the course illustrates the fundamental concepts of data science and introduces the students to the skills required to apply the tools and techniques through the data science process to problems in support of fulfilling mission objectives. The course exposes the students to data management, data science tools and techniques, the basics of Artificial Intelligence (AI) and Machine Learning (ML), creating and delivering data-driven solutions, evaluating their efficacy, policy, and ethical considerations. Familiarity with desktop operating systems and software, and basic coding/scripting skills are required for the successful completion of this course.

EN.595.762. Leading Technical Organizations. 3 Credits.
The course reviews challenges in the leadership of high-technology organizations at the senior technical management level. Using leadership and organizational behavior theories and practices in conjunction with critical thinking, the student will explore topics that include: senior technical leader roles and responsibilities in relation to ethics, leadership style, motivation, and performance of top management teams. The student will also evaluate leading change, communications and organizational relationships, and the potential effects organizational design and processes play in influencing leader behavior. The student will assume the role of a senior technical leader dealing with typical leadership problems in rapidly changing environments.
EN.595.662 Technical Organization Management (or EN.595.661 Technical Group Management or EN.595.663 Technical Personnel Management)

EN.595.766. Advanced Technology. 3 Credits.
This course emphasizes the impact of recent technological advances on new products, processes, and needs, as well as the role of the technical manager in rapidly evolving technologies. Subject areas and lecture content track current topics of interest, such as trends and developments in microelectronics, communications, computers, intelligent machines, and expert systems. Advanced technologies in application areas such as transportation, space, manufacturing, and biomedicine are also discussed. Students are encouraged to explore new technology areas and share information with each other. The seminar format encourages student participation and culminates in a term paper on a new or emerging technology area. Course Note(s): The format for this course is a mixed online/live environment called Virtual Live. Weekly lectures are provided live (and recorded) on a predesignated day/time, with students/instructors joining from any location via personal computer. Contact the instructors for additional information.

EN.595.781. Executive Technical Leadership. 3 Credits.
This Capstone course explores the roles and responsibilities of technical executive leaders (VPs of Engineering, Manufacturing, CTO, CIO) in the context of a strategic framework. Topics relevant to technical executives are explored, from leading technical strategy development to tactical operations. The concepts in the course are reinforced using case studies, a team project, and fortified by interviews with practicing/retired technical executives who discuss practical career experiences. The format of this course is very different from other Engineering Management courses. Lectures are provided asynchronously online. Required weekly online seminar-type discussions guide the incremental development of a technical strategy, and include a mid-course team presentation. The semester ends with a Capstone presentation, and an executive roundtable discussion. Students will be evaluated on their application of the principles presented in the course, critical thinking applied to the issues posed in the case study, and teamwork as assessed by both the instructors and peer students. Course Note(s): In the Virtual Live format, weekly lectures are provided asynchronously online for students to view in advance of the weekly seminar sessions. The weekly seminar sessions are held at a predesignated day/time, with students/instructors joining live via web-conference using a personal device. The course also includes one Saturday Capstone session in the Baltimore, MD area at the end of the semester. In-person participation with your team is encouraged. Students unable to attend in person will be able to participate online. The Saturday session consists of student teams presenting their capstone technical strategic plan, issues, actions, and execution plans built around an evolving case study. A roundtable discussion will also be held where students have the opportunity to ask probing questions of visiting executives as part of the Capstone Day experience.
Prerequisite(s): EN.595.660 Planning and Managing Projects, EN.595.662 Technical Organization Management (or EN.595.661 Technical Group Management or EN.595.663 Technical Personnel Management), EN.595.676 Finance, Contracts, and Compliance for Technical Organizations (or EN.595.664 Project Planning and Control or EN.595.666 Financial and Contract Management), EN.595.665 Strategy and Communication in Technical Organizations.

EN.595.793. Applied Innovation for Technical Professionals. 3 Credits.
“Fail fast”, “crowdfunding”, “agile”, “open innovation”—the nature of innovation is radically changing in the 21st century. How can technical professionals thrive amidst the new models, tools and processes that are creating faster cycles of disruption? This course will address challenges faced by technical managers in creating and sustaining innovation across a wide range of organizations and environments: from government labs to Fortune 1,000 companies to small businesses and startups. Students will learn the many issues involved in turning creative ideas into a product or service and how to gain support for projects, demonstrate value of the innovation, scale to a profitable venture, and sustain the innovation through successive competitive life cycles. Students will also learn about the challenges and techniques for sustaining innovative cultures in large organizations and how to foster “intrepreneurship”—the concept of creating innovations within the processes and cultures of an already established organization. Case studies and interviews with experienced senior managers will provide students with the latest real-world insights. Course Note(s): The weekly seminar-type presentations/discussions are attended via web meeting. Please refer to the course schedule for updated information.

EN.595.802. Directed Studies in Engineering Management. 3 Credits.
In this course qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or nonlaboratory study under the direction of faculty members. Prerequisite(s): The Independent Study/Project Form (ep.jhu. edu/student-forms) must be completed and approved prior to registration. Course Note(s): This course is open only to candidates in the Master of Engineering Management /Technical Leadership track.

EN.601 (Computer Science)

EN.601.104. Computer Ethics. 1 Credit.
Students will examine a variety of topics regarding policy, legal, and moral issues related to the computer science profession itself and to the proliferation of computers in all aspects of society, especially in the era of the Internet. The course will cover various general issues related to ethical frameworks and apply those frameworks more specifically to the use of computers and the Internet. The topics will include privacy issues, computer crime, intellectual property law -- specifically copyright and patent issues, globalization, and ethical responsibilities for computer science professionals. Work in the course will consist of weekly assignments on one or more of the readings and a final paper on a topic chosen by the student and approved by the instructor.

EN.601.105. CS First-year Experience. 1 Credit.
This course provides first-year computer science majors with an introduction to the field and department. A variety of faculty members will lead weekly small group discussion sections on topics of interest related to the discipline. Upper-year majors will serve as peer mentors for each group (enrollment by permission only). Satisfactory/Unsatisfactory only; counts as elective credits only, not towards CS course credit requirement.

EN.601.124. The Ethics of Artificial Intelligence and Automation. 3 Credits.
The expansion of artificial intelligence (AI)-enabled use cases across a broad spectrum of domains has underscored the benefits and risks of AI. This course will address the various ethical considerations engineers need to engage with to build responsible and trustworthy AI-enabled autonomous systems. Topics to be covered include: values-based decision making, ethically aligned design, cultural diversity, safety, bias, AI explainability, privacy, AI regulation, the ethics of synthetic life, and the future of work. Case studies will be utilized to illustrate real-world applications. Students will apply learned material to a group research project on a topic of their choice.

EN.601.220. Intermediate Programming. 4 Credits.
This course teaches intermediate to advanced programming, using C and C++. (Prior knowledge of these languages is not expected.) We will cover low-level programming techniques, as well as object-oriented class design, and the use of class libraries. Specific topics include pointers, dynamic memory allocation, polymorphism, overloading, inheritance, templates, collections, exceptions, and others as time permits. Students are expected to learn syntax and some language specific features independently. Course work involves significant programming projects in both languages.
(EN.500.132 OR EN.500.133 OR EN.500.134) OR (EN.500.112 OR EN.500.113 OR EN.500.114)

EN.601.226. Data Structures. 4 Credits.
This course covers the design and implementation of data structures including arrays, stacks, queues, linked lists, binary trees, heaps, balanced trees (e.g. 2-3 trees, AVL-trees) and graphs. Other topics include sorting, hashing, memory allocation, and garbage collection. Course work involves both written homework and Java programming assignments.
EN.500.132 OR (EN.500.112 or EN.601.220) or AP Computer Science or equivalent.

EN.601.229. Computer System Fundamentals. 3 Credits.
We study the design and performance of a variety of computer systems from simple 8-bit micro-controllers through 32/64-bit RISC architectures all the way to ubiquitous x86 CISC architecture. We'll start from logic gates and digital circuits before delving into arithmetic and logic units, registers, caches, memory, stacks and procedure calls, pipelined execution, super-scalar architectures, memory management units, etc. Along the way we'll study several typical instruction set architectures and review concepts such as interrupts, hardware and software exceptions, serial and other peripheral communications protocols, etc. A number of programming projects, frequently done in assembly language and using various processor simulators, round out the course. [Systems].
EN.600.120/EN.601.220

EN.601.230. Mathematical Foundations for Computer Science. 4 Credits.
This course provides an introduction to mathematical reasoning and discrete structures relevant to computer science. Topics include propositional and predicate logic, proof techniques including mathematical induction, sets, relations, functions, recurrences, counting techniques, simple computational models, asymptotic analysis, discrete probability, graphs, trees, and number theory.
EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.500.132 OR EN.500.133 OR EN.500.134 OR EN.601.220;Student may not enroll if taken EN.601.231.

EN.601.231. Automata & Computation Theory. 3 Credits.
This course is an introduction to the theory of computing. topics include design of finite state automata, pushdown automata, linear bounded automata, Turing machines and phrase structure grammars; correspondence between automata and grammars; computable functions, decidable and undecidable problems, P and NP problems, NP-completeness, and randomization.
EN.550.171/EN.553.171 OR EN.553.172;Students may not enroll if taken EN.601.230.

EN.601.270. Open Source Software Engineering (Semesters of Code I). 3 Credits.
The course will provide students a development experience focused on learning software engineering skills to deliver software at scale to a broad community of users associated with open source licensed projects. The class work will introduce students to ideas behind open source software with structured modules on recognizing and building healthy project structure, intellectual property basics, community & project governance, social and ethical concerns, and software economics.
EN.601.220 AND EN.601.226

EN.601.277. Disinformation Self-Defense. 3 Credits.
Scientific, statistical and logical literacy is a necessary skill for evaluating policy proposals, reading news articles with an appropriately critical eye, and making informed choices as consumers and voters. Misunderstanding of claims made in scientific publications, online publishing platforms, and mass media drives, in part, the spread of malicious misinformation and propaganda online. Further, many actors have the means, the motive and the opportunity to mislead the public in a variety of subtle and not so subtle ways. This class will give you tools to discern valid and invalid forms of inference and discourse, and give you tools to communicate precisely, argue appropriately, and stay on top of research and news with an appropriately skeptical attitude. The class will draw on historical and modern literature on linguistic, logical, and probabilistic fallacies, statistical and logical inference, data visualization, cognitive biases, and the scientific method.
(EN.553.171 OR EN.553.172) OR AS.150.118

EN.601.280. Full-Stack JavaScript. 3 Credits.
A full-stack JavaScript developer is a person who can build modern software applications using primarily the JavaScript programming language. Creating a modern software application involves integrating many technologies - from creating the user interface to saving information in a database and everything else in between and beyond. A full-stack developer is not an expert in everything. Rather, they are someone who is familiar with various (software application) frameworks and the ability to take a concept and turn it into a finished product. This course will teach you programming in JavaScript and introduce you to several JavaScript frameworks that would enable you to build modern web, cross-platform desktop, and native/hybrid mobile applications. A student who successfully completes this course will be on the expedited path to becoming a full-stack JavaScript developer.
EN.601.220 OR EN.601.226

EN.601.290. User Interfaces and Mobile Applications. 3 Credits.
This course will provide students with a rich development experience, focused on the design and implementation of user interfaces and mobile applications. A brief overview of human computer interaction will provide context for designing, prototyping and evaluating user interfaces. Students will invent their own mobile applications and implement them using the Android SDK, which is JAVA based. An overview of the Android platform and available technologies will be provided, as well as XML for layouts, and general concepts for effective mobile development. Students will be expected to explore and experiment with outside resources in order to learn technical details independently. There will also be an emphasis on building teamwork skills, and on using modern development techniques and tools.
EN.600.120 AND EN.600.226

EN.601.295. Developing Health IT Applications. 3 Credits.
This course is a project-based introduction to working on successful projects in health care. In the first half of the term, students perform reading and homework assignments designed to introduce: (1) the context of health care delivery and health IT, (2) techniques to overcome challenges to conducting health care data analyses, and (3) techniques to design meaningful applications around health care data. In the second half of the term, students work in small groups to solve a real-world problem of their choosing. Includes exercises in written and oral communication and team building. [Oral starting 2019]
(EN.600.120 OR EN.601.220) AND (EN.600.226 OR EN.601.226)

EN.601.310. Software for Resilient Communities. 3 Credits.
This is a project-based course focusing on the design and implementation of practical software systems. Students will work in small teams to design and develop useful open-source software products that support our communities. Students will be paired with community partners and will aim to develop software that can be used after the course ends to solve real problems facing those partners today. Instructors will connect with the community partners and determine viable project areas prior to the course start. Students will meet with their community partners to analyze the challenges in their project area, agree on a concrete target project outcome, and gather requirements for their project. Based on these requirements, students will design and implement open-source software systems. [Oral]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226

EN.601.315. Databases. 3 Credits.
Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems]
EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.318. Operating Systems. 3 Credits.
This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system.
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.320. Parallel Programming. 3 Credits.
This course prepares the programmer to tackle the massive data sets and huge problem size of modern scientific and enterprise computing. Google and IBM have commented that undergraduate CS majors are unable to "break the single server mindset" (http://www.google.com/intl/en/ press/pressrel/20071008_ibm_univ.html). Students taking this course will abandon the comfort of serial algorithmic thinking and learn to harness the power of cutting-edge software and hardware technologies. The issue of parallelism spans many architectural levels. Even ``single server'' systems must parallelize computation in order to exploit the inherent parallelism of recent multi-core processors. The course will examine different forms of parallelism in four sections. These are: (1) massive data-parallel computations with Hadoop!; (2) programming compute clusters with MPI; (3) thread-level parallelism in Java; and, (4) GPGPU parallel programming with NVIDIA's Cuda. Each section will be approximately 3 weeks and each section will involve a programming project. The course is also suitable for undergraduate and graduate students from other science and engineering disciplines that have prior programming experience. [Systems]
EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.320, EN.600.420, EN.601.320, EN.601.420, EN.601.620.

EN.601.340. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]
(EN.600.226 OR EN.601.226) AND (EN.600.233 OR EN.601.229)

EN.601.350. Genomic Data Science. 3 Credits.
This course will use a project-based approach to introduce undergraduates to research in computational biology and genomics. During the semester, students will take a series of large data sets, all derived from recent research, and learn all the computational steps required to convert raw data into a polished analysis. Data challenges might include the DNA sequences from a bacterial genome project, the RNA sequences from an experiment to measure gene expression, the DNA from a human microbiome sequencing experiment, and others. Topics may vary from year to year. In addition to computational data analysis, students will learn to do critical reading of the scientific iterature by reading high-profile research papers that generated groundbreaking or controversial results. [Applications] Recommended Course Background: Knowledge of the Unix operating system and programming expertise in a language such as Perl or Python.

EN.601.356. Seminar: Computer Integrated Surgery II. 1 Credit.
Students may receive credit for EN.601.456 or EN.601.356, but not both. Lecture only version of EN.601.456 (no project). Recommended Course Background: EN.601.455 or instructor permission required.
EN.601.455 or instructor permission.;Students may receive credit for either EN.601.356 orEN.601.456, but not both.

EN.601.402. Digital Health and Biomedical Informatics. 1 Credit.
Advances in technology are driving a change in medicine, from personalized medicine to population health. Computers and information technology will be critical to this transition. We shall discuss some of the coming changes in terms of computer technology, including computer-based patient records, clinical practice guidelines, and region-wide health information exchanges. We will discuss the underlying technologies driving these developments - databases and warehouses, controlled vocabularies, and decision support.

EN.601.411. Computer Science Innovation & Entrepreneurship II. 3 Credits.
This course is the second half of a two-course sequence and is a continuation of course EN.660.410.01, CS Innovation and Entrepreneurship, offered by the Center for Leadership Education (CLE). In this sequel course the student groups, directed by CS faculty, will implement the business idea which was developed in the first course and will present the implementations and business plans to an outside panel made up of practitioners, industry representatives, and venture capitalists. [General]
EN.660.410

EN.601.414. Computer Networks. 3 Credits.
Topics covered will include application layer protocols (e.g. HTTP, FTP, SMTP), transport layer protocols (UDP, TCP), network layer protocols (e.g. IP, ICMP), link layer protocols (e.g. Ethernet) and wireless protocols (e.g. IEEE 802.11). The course will also cover routing protocols such as link state and distance vector, multicast routing, and path vector protocols (e.g. BGP). The class will examine security issues such as firewalls and denial of service attacks. We will also study DNS, NAT, Web caching and CDNs, peer to peer, and protocol tunneling. Finally, we will explore security protocols (e.g. TLS, SSH, IPsec), as well as some basic cryptography necessary to understand these. Grading will be based on hands-on programming assignments, homeworks and two exams. [Systems]
EN.601.226 AND EN.601.229 or permission.;Students may receive credit for only one of EN.600.344, EN.600.444, EN.601.414, EN.601.614.

EN.601.415. Databases. 3 Credits.
Similar material as EN.601.315 covered in more depth for advanced undergraduates. Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems] (www.cs.jhu.edu/~yarowsky/cs415.html)
EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.417. Distributed Systems. 3 Credits.
Graduate version of 601.317 Systems. Students may receive credit for 601.317 or 601.417 but not both. Recommended Course Background: EN.601.220, EN.601.226
Students may receive credit for only one of 417/617;(EN.600.120 OR EN.601.220) AND (EN.600.226 OR EN.601.226)

EN.601.418. Operating Systems. 3 Credits.
Similar material as EN.601.318, covered in more depth. Intended for advanced undergraduate students. This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system.
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229;Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.419. Cloud Computing. 3 Credits.
Clouds host a wide range of the applications that we rely on today. In this course, we study common cloud applications, traffic patterns that they generate, critical networking infrastructures that support them, and core networking and distributed systems concepts, algorithms, and technologies used inside clouds. We will also study how today's application demand is influencing the network's design, explore current practice, and how we can build future's networked infrastructure to better enable both efficient transfer of big data and low-latency requirements of real-time applications. The format of this course will be a mix of lectures, discussions, assignments, and a project designed to help students practice and apply the theories and techniques covered in the course. [Systems] Prerequisites: EN.601.226 or permission. Students can only receive credit for one of 601.419/619. Recommended: a course in operating systems, networks or systems programming.
EN.601.226 (or EN.600.226) AND EN.601.414 or permission from the instructor.;Students may earn credit for EN.601.419 or EN.601.619, but not both.

EN.601.420. Parallel Computing for Data Science. 3 Credits.
This course studies parallelism in data science, drawing examples from data analytics, statistical programming, and machine learning. It focuses mostly on the Python programming ecosystem but will use C/C++ to accelerate Python and Java to explore shared-memory threading. It explores parallelism at all levels, including instruction level parallelism (pipelining and vectorization), shared-memory multicore, and distributed computing. Concepts from computer architecture and operating systems will be developed in support of parallelism, including Moore's law, the memory hierarchy, caching, processes/threads, and concurrency control. The course will cover modern data-parallel programming frameworks, including Dask, Spark, Hadoop!, and Ray. The course will not cover GPU deep-learning frameworks nor CUDA. The course is suitable for second-year undergraduate CS majors and graduate students from other science and engineering disciplines that have prior programming experience and familiarity with Python. [Systems]
EN.601.226 AND EN.601.229;Students may receive credit for only one of EN.600.320, EN.600.420, EN.601.320, EN.601.420, EN.601.620.

EN.601.421. Object Oriented Software Engineering. 3 Credits.
This course covers object-oriented software construction methodologies and their application. The main component of the course is a large team project on a topic of your choosing. Course topics covered include object-oriented analysis and design, UML, design patterns, refactoring, program testing, code repositories, team programming, and code reviews. [Systems or Applications]
EN.601.220 AND EN.601.226 AND (EN.601.280 OR EN.601.290);Students may receive credit for only one of EN.600.321, EN.600.421, EN.601.421, EN.601.621.

EN.601.422. Software Testing & Debugging. 3 Credits.
Studies show that testing can account for over 50% of software development costs. This course presents a comprehensive study of software testing, principles, methodologies, tools, and techniques. Topics include testing principles, coverage (graph coverage, logic coverage, input space partitioning, and syntax-based coverage), unit testing, higher-order testing (integration, system-level, acceptance), testing approaches (white-box, black-box, grey-box), regression testing, debugging, delta debugging, and several specific types of functional and non-functional testing as schedule/interest permits (GUI testing, usability testing, security testing, load/performance testing, A/B testing etc.). For practical topics, state- of-the-art tools/techniques will be studied and utilized. [Systems]
EN.601.290 OR EN.601.421;Students can take EN.601.422 or EN.601.622, but not both.

EN.601.424. Reliable Software Systems. 3 Credits.
Reliability is an essential quality requirement for all artifacts operating in the real-world, ranging from bridges, cars to power grids. Software systems are no exception. In this computing age when software is transforming even traditional mission-critical artifacts, making sure the software we write is reliable becomes ever more important. This course exposes students to the principles and techniques in building reliable systems. We will study a set of systematic approaches to make software more robust. These include but are not limited to static analysis, testing framework, model checking, symbolic execution, fuzzing, and formal verification. In addition, we will cover the latest research in system reliability.
EN.601.220 AND (EN.601.328 OR EN.601.428)

EN.601.426. Principles of Programming Languages. 3 Credits.
Functional, object-oriented, and other language features are studied independent of a particular programming language. Students become familiar with these features by implementing them. Most of the implementations are in the form of small language interpreters. Some type checkers and a small compiler will also be written. The total amount of code written will not be overly large, as the emphasis is on concepts. The ML programming language is the implementation language used. [Analysis] Prerequisites include EN.601.226. No Freshmen or Sophomores.
EN.601.226

EN.601.427. Principles of Programming Languages II. 3 Credits.
This course is designed as a follow-on to Principles of Programming languages. It will cover a wide array of fundamental topics in programming languages, including advanced functional programming, the theory of inductive definitions, advanced operational semantics, advanced type systems, program analysis, program verification, theorem provers and SAT solvers. [Analysis]
EN.601.426

EN.601.428. Compilers & Interpreters. 3 Credits.
Introduction to compiler design, including lexical analysis, parsing, syntax-directed translation, symbol tables, runtime environments, and code generation and optimization. Students are required to write a compiler as a course project. [Systems]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND EN.600.233/EN.601.229

EN.601.429. Functional Programming in Software Engineering. 3 Credits.
How can we effectively use functional programming techniques to build real-world software? This course will primarily focus on using the OCaml programming language for this purpose. Topics covered include OCaml basics, modules, standard libraries, testing, quickcheck, build tools, functional data structures and efficiency analysis, monads, streams, and promises. Students will practice what they learn in lecture via functional programming assignments and a final project.
EN.601.226 OR Instructor Permission

EN.601.430. Combinatorics & Graph Theory in Computer Science. 3 Credits.
This is a graduate level course studying the applications of combinatorics and graph theory in computer science. We will start with some basic combinatorial techniques such as counting and pigeon hole principle, and then move to advanced techniques such as the probabilistic method, spectral graph theory and additive combinatorics. We shall see their applications in various areas in computer science, such as proving lower bounds in computational models, randomized algorithms, coding theory and pseudorandomness. [Analysis]Recommended Course Background: probability theory and linear algebra
EN.553.171 OR EN.553.172 OR EN.550.171; probability theory and linear algebra recommended.;Students may receive credit for only one of 430/630

EN.601.433. Intro Algorithms. 3 Credits.
This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis. [Analysis]
EN.601.226 AND (EN.553.171 OR EN.553.172 OR EN.601.230 OR EN.601.231);Students may receive credit for only one of EN.600.363, EN.600.463, EN.601.433, EN.601.633.

EN.601.434. Randomized and Big Data Algorithms. 3 Credits.
The course emphasizes algorithmic design aspects, and how randomization can be a helpful tool. The topics covered include: tail inequalities, linear programming relaxation & randomized rounding, de-randomization, existence proofs, universal hashing, markov chains, metropolis and metropolis-hastings methods, mixing by coupling and by eigenvalues, counting problems, semi-definite programming and rounding, lower bound arguments, and applications of expanders. [Analysis] (www.cs.jhu.edu/~cs464) Recommended Course Background: Probability
((N.600.363 OR EN.600.463) OR (EN.601.433 OR EN.601.633)) AND (EN.550.310 OR EN.553.310 OR EN.553.311 OR EN.550.420 OR EN.550.620) or equivalent.;Students may receive credit for only one of EN.600.464, EN.600.664, EN.601.434, EN.601.634.

EN.601.435. Approximation Algorithms. 3 Credits.
This course provides an introduction to approximation algorithms. Topics include vertex cover, TSP, Steiner trees, cuts, greedy approach, linear and semi-definite programming, primal-dual method, and randomization. Additional topics will be covered as time permits. There will be a final project. Students may receive credit for EN.601.435 or EN.601.635, but not both. [Analysis]
EN.600.363 OR EN.601.433 OR EN.601.633 OR permission.

EN.601.436. Algorithmic Game Theory. 3 Credits.
This course provides an introduction to algorithmic game theory: the study of games from the perspective of algorithms and theoretical computer science. There will be a particular focus on games that arise naturally from economic interactions involving computer systems (such as economic interactions between large-scale networks, online advertising markets, etc.), but there will also be broad coverage of games and mechanisms of all sorts. Topics covered will include a) complexity of computing equilibria and algorithms for doing so, b) (in)efficiency of equilibria, and c) algorithmic mechanism design. [Analysis]
EN.600.363 OR EN.600.463 OR EN.601.433 OR EN.601.633

EN.601.437. Federated Learning and Analytics. 3 Credits.
Federated Learning (FL) is an area of machine learning where data is distributed across multiple devices and training is performed without exchanging the data between devices. FL can be contrasted with classical machine learning settings when data is available in a central location. As such, FL faces additional challenges and limitations such as privacy and communication. For example, FL may deal with questions of learning from sensitive data on mobile devices while protecting privacy of individual users and dealing with low power and limited communication. As a result, FL requires knowledge of many interdisciplinary areas such as differential privacy, distributed optimization, sketching algorithms, compression and more. In this course students will learn basic concepts and algorithms for FL and federated analytics, and gain hands-on experience with new methods and techniques. Students will gain understanding in reasoning about possible trade-offs between privacy, accuracy and communication. [Analysis] ML: DL, linear algebra, probability
EN.601.433/EN.601.633 AND (EN.601.464/EN.601.664 OR EN.601.475/EN.601.675);Students may only earn credit for EN.601.437 OR EN.601.637.

EN.601.440. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]
(EN.601.226 OR EN.600.226) AND (EN.601.229 OR EN.600.233);Students may receive credit for only one of 340/440/640.

EN.601.441. Blockchains and Cryptocurrencies. 3 Credits.
This course will introduce students to cryptocurrencies and the main underlying technology of Blockchains. The course will start with the relevant background in cryptography and then proceed to cover the recent advances in the design and applications of blockchains. This course should primarily appeal to students who want to conduct research in this area or wish to build new applications on top of blockchains. It should also appeal to those who have a casual interest in this topic or are generally interested in cryptography. Students are expected to have mathematical maturity. [Analysis]
EN.601.226 AND (EN.553.211 OR EN.553.310 OR EN.553.311 OR EN.560.348 OR EN.553.420);Students may recieve credit for only one of EN.600.451 OR EN.601.441 OR EN.601.641

EN.601.442. Modern Cryptography. 3 Credits.
Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis]
Students may receive credit for only one of EN.600.442, EN.601.442, EN.601.642.;(EN.601.230 OR EN.601.231) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.421)

EN.601.443. Security & Privacy in Computing. 3 Credits.
Lecture topics will include computer security, network security, basic cryptography, system design methodology, and privacy. There will be a heavy work load, including written homework, programming assignments, exams and a comprehensive final. The class will also include a semester-long project that will be done in teams and will include a presentation by each group to the class. [Applications] Recommended Course Background: A basic course in operating systems and networking, or permission of instructor.
Students may receive credit for only one of EN.600.443, EN.601.443, EN.601.643.;(EN.600.318/EN.601.318 OR EN.600.418/EN.601.418) OR (EN.600.344 OR EN.600.444/EN.601.414) AND (EN.600.233 OR EN.601.229)

EN.601.444. Network Security. 3 Credits.
This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. [Systems]
EN.600.120 AND EN.600.226 AND (EN.600.344 OR EN.600.444) or permission;Students may receive credit for only one of EN.600.424, EN.650.424, EN.601.444, EN.601.644.

EN.601.445. Practical Cryptographic Systems. 3 Credits.
This semester-long course will teach systems and cryptographic design principles by example: by studying and identifying flaws in widely-deployed cryptographic products and protocols. Our focus will be on the techniques used in practical security systems, the mistakes that lead to failure, and the approaches that might have avoided the problem. We will place a particular emphasis on the techniques of provable security and the feasibility of reverse-engineering undocumented cryptographic systems. [Systems]
Students may receive credit for only one of EN.600.454, EN.601.445, EN.601.645.;EN.600.226/EN.601.226 AND EN.600.233/EN.601.229

EN.601.446. Sketching and Indexing for Sequences. 3 Credits.
Many of the world's largest and fastest-growing datasets are text, e.g. DNA sequencing data, web pages, logs and social media posts. Such datasets are useful only to the degree we can query, compare and analyze them. Here we discuss two powerful approaches in this area. We will cover sketching, which enables us to summarize very large texts in small structures that allow us to measure the sizes of sets and of their unions and intersections. This in turn allows us to measure similarity and find near neighbors. Second, we will discuss indexing --- succinct and compressed indexes in particular -- which enables us to efficiently search inside very long strings, especially in highly repetitive texts. [Analysis]
EN.601.226

EN.601.447. Computational Genomics: Sequences. 3 Credits.
Your genome is the blueprint for the molecules in your body. It's also a string of letters (A, C, G and T) about 3 billion letters long. How does this string give rise to you? Your heart, your brain, your health? This, broadly speaking, is what genomics research is about. This course will familiarize you with a breadth of topics from the field of computational genomics. The emphasis is on current research problems, real-world genomics data, and efficient software implementations for analyzing data. Topics will include: string matching, sequence alignment and indexing, assembly, and sequence models. Course will involve significant programming projects. [Applications]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226;Students may receive credit for only one of EN.600.439, EN.600.639, EN.601.447, EN.601.647.

EN.601.448. Computational Genomics: Data Analysis. 3 Credits.
Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning.Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Prerequisites: EN.601.226 or other programming experience, probability and statistics, linear algebra or calculus.
Students may receive credit for only one of EN.600.438, EN.600.638, EN.601.448, EN.601.648.

EN.601.449. Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm exam, class presentations, and a significant class project. Prerequisites: knowledge of the Unix operating system and programming expertise in a language such as R or Python. [Applications]
Students may receive credit for only one of EN.600.449, EN.600.649, EN.601.749.

EN.601.452. Computational Biomedical Research. 3 Credits.
[Co-listed with AS.020.415] This course for advanced undergraduates includes classroom instruction in interdisciplinary research approaches and lab work on an independent research project in the lab of a Bloomberg Distinguished Professor and other distinguished faculty. Lectures will focus on cross-cutting techniques such as data visualization, statistical inference, and scientific computing. In addition to two 50-minute classes per week, students will commit to working approximately 3 hours per week in the lab of one of the professors. The student and professor will work together to schedule the research project. Students will present their work at a symposium at the end of the semester.

EN.601.454. Augmented Reality. 3 Credits.
Same as EN.601.654, for undergraduate students. This course introduces students to the field of Augmented Reality. It reviews its basic definitions, principles and applications. It then focuses on Medical Augmented Reality and its particular requirements. The course also discusses the main issues of calibration, tracking, multi-modal registration, advance visualization and display technologies. Homework in this course will relate to the mathematical methods used for calibration, tracking and visualization in medical augmented reality. [Applications]
EN.601.220 AND EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.550.291);Students may receive credit for only one of EN.600.484, EN.600.684, EN.601.454, EN.601.654.

EN.601.455. Computer Integrated Surgery I. 4 Credits.
This course focuses on computer-based techniques, systems, and applications exploiting quantitative information from medical images and sensors to assist clinicians in all phases of treatment from diagnosis to preoperative planning, execution, and follow-up. It emphasizes the relationship between problem definition, computer-based technology, and clinical application and includes a number of guest lectures given by surgeons and other experts on requirements and opportunities in particular clinical areas. Recommended Course Background: EN.601.220, EN.601.457, EN.601.461, image processing.
Students may receive credit for only one of EN.600.445, EN.600.645, EN.601.455, EN.601.655.;EN.600.226/EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291) or permission of the instructor.

EN.601.456. Computer Integrated Surgery II. 3 Credits.
This weekly lecture/seminar course addresses similar material to EN.601.455, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from EN.601.455, although it does not have to be. Grades are based both on the project and on classroom recitations. Students who wish to use this course to satisfy the "Team" requirement should register for EN.601.496 instead. Students wishing to attend the weekly lectures as a 1-credit seminar should sign up for EN.601.356. [Applications, Oral]
EN.601.455 or EN.601.655 or permisssion;Students may receive credit for only one of EN.600.446, EN.600.646, EN.601.456, EN.601.656.

EN.601.457. Computer Graphics. 3 Credits.
This course introduces computer graphics techniques and applications, including image processing, rendering, modeling and animation. [Applications]
EN.600.120/601.220 AND EN.600.226/601.226, and linear algebra or permission of instructor.;Students may receive credit for only one of EN.600.357, EN.600.457, EN.601.457, EN.601.657.

EN.601.459. Computational Geometry. 3 Credits.
This course will provide an introduction to computational geometry. It will cover a number of topics in two- and three-dimensions, including polygon triangulations and partitions, convex hulls, Delaunay and Voronoi diagrams, arrangements, and spatial queries. Time-permitting, we will also look at kD-trees, general BSP-trees, and quadtrees. [Analysis]
EN.600.120/EN.601.220 AND EN.600.226/EN.601.226 AND (EN.600.363 OR EN.600.463/EN.601.433 OR EN.601.633)

EN.601.461. Computer Vision. 3 Credits.
This course provides an overview of fundamental methods in computer vision from a computational perspective. Methods studied include: camera systems and their modelling, computation of 3-D geometry from binocular stereo, motion, and photometric stereo, and objectrecognition, image segmentation, and activity analysis. Elements of machine vision and biological vision are also included.
Students may receive credit for only one of EN.600.361, EN.600.461, EN.600.661, EN.601.461, EN.601.661.;(EN.553.310 OR EN.553.311 OR ((EN.553.420 OR EN.553.421) AND (EN.553.430 OR EN.553.431)) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114 OR EN.601.220 AS.250.205)

EN.601.462. Introduction to Spatial Computing. 3 Credits.
This course will provide students with a rich understanding of immersive technology and spatial computing as the next wave of computing after personal and mobile computing, and belongs to the devices that can sense the space or are “spatially” aware. It also covers input systems and interaction modalities that have evolved to support human-computer interaction required for immersive environments. It will go through principles of design thinking as a mindset for creating immersive experiences, and students will explore the practical implication of this subject in healthcare, industry, and society through the projects. Background in Computer Vision (EN.601.461/661) is strongly recommended. [Applications]
EN.601.220 AND EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291)

EN.601.463. Algorithms for Sensor-Based Robotics. 3 Credits.
This course surveys the development of robotic systems for navigating in an environment from an algorithmic perspective. It will cover basic kinematics, configuration space concepts, motion planning, and localization and mapping. It will describe these concepts in the context of the ROS software system, and will present examples relevant to mobile platforms, manipulation, robotics surgery, and human-machine systems. [Analysis]
(AS.110.201 OR AS.110.212) AND AS.110.202 AND EN.601.226;Students may receive credit for only one of EN.600.336, EN.600.436, EN.600.636, EN.601.463, EN.601.663.;(EN.553.310 OR EN.553.311 OR EN.553.420)

EN.601.464. Artificial Intelligence. 3 Credits.
This course is recommended for scientists and engineers with a genuine curiosity about the fundamental obstacles in getting machines to perform tasks such as deduction, learning, planning and navigation. It covers methods for automated reasoning, automatic problem solversand planners, knowledge representation mechanisms, game playing, machine learning,and statistical pattern recognition. Strong programming skills are expected, as well asbasic familiarity with probability. Students intending to also take courses in machinelearning (e.g. 601.475/675, 601.476/676, 601.482/682) may find it beneficial to take thiscourse first, or concurrently. [Applications]
Students may receive credit for only one of EN.600.335, EN.600.435, EN.601.464, EN.601.664.;EN.600.226/EN.601.226

EN.601.465. Natural Language Processing. 4 Credits.
This course is an in-depth overview of techniques for processing human language. How should linguistic structure and meaning be represented? What algorithms can recover them from text? And crucially, how can we build statistical models to choose among the many legal answers? The course covers methods for trees (parsing and semantic interpretation), sequences (finite-state transduction such as morphology), and words (sense and phrase induction), with applications to practical engineering tasks such as information retrieval and extraction, text classification, part-of-speech tagging, speech recognition and machine translation. There are a number of structured but challenging programming assignments. [Applications]
Students may receive credit for only one of EN.600.465, EN.601.465, EN.601.665.;EN.600.226/EN.601.226

EN.601.466. Information Retrieval and Web Agents. 3 Credits.
An in-depth, hands-on study of current information retrieval techniques and their application to developing intelligent WWW agents. Topics include a comprehensive study of current document retrieval models, mail/news routing and filtering, document clustering, automatic indexing, query expansion, relevance feedback, user modeling, information visualization and usage pattern analysis. In addition, the course explores the range of additional language processing steps useful for template filling and information extraction from retrieved documents, focusing on recent, primarily statistical methods. The course concludes with a study of current issues in information retrieval and data mining on the World Wide Web. Topics include web robots, spiders, agents and search engines, exploring both their practical implementation and the economic and legal issues surrounding their use. Recommended Course Background: EN.601.226
EN.600.226 OR EN.601.226

EN.601.467. Introduction to Human Language Technology. 3 Credits.
This course gives an overview of basic foundations and applications of human language technology, such as: morphological, syntactic, semantic, and pragmatic processing; machine learning; signal processing; speech recognition; speech synthesis; information retrieval; text classification; topic modelling; informationextraction; knowledge representation; machine translation; dialog systems; etc. [Applications]Pre-req: EN.601.226 Data Structures; knowledge of Python recommended.
EN.601.226 OR EN.600.226

EN.601.468. Machine Translation. 3 Credits.
Google translate can instantly translate between any pair of over fifty human languages (for instance, from French to English). How does it do that? Why does it make the errors that it does? And how can you build something better? Modern translation systems learn to translate by reading millions of words of already translated text, and this course will show you how they work. The course covers a diverse set of fundamental building blocks from linguistics, machine learning, algorithms, data structures, and formal language theory, along with their application to a real and difficult problem in artificial intelligence.
Students may receive credit for only one of EN.600.468, EN.601.468, EN.601.668.;EN.600.226/EN.601.226 and prob/stat.

EN.601.470. Artificial Agents. 3 Credits.
This course covers a number of topics explored in introductory AI, such as knowledge representation, reasoning, and natural language understanding. Unlike introductory AI, we will pursue these topics based on the transformer neural architecture. We will motivate the material through interacting with agents in games: how to build models that understand user commands, how to generate responses back to a user, and how to reason about a synthetic environment to determine a course of action. Assignments will include programming, presentations on readings, and written summaries of readings. [Applications]
(EN.601.475 OR EN.601.675) OR (EN.601.482 OR EN.601.682) OR (EN.601.488 OR EN.601.688) OR (EN.601.486 OR EN.601.686)

EN.601.474. ML: Learning Theory. 3 Credits.
This is an undergraduate level course in machine learning. It will provide a formal and in-depth coverage of topics in statistical and computational learning theory. We will revisit popular machine learning algorithms and understand their performance in terms of the size of the data (sample complexity), memory needed (space complexity), as well as the overall runtime (computational or iteration complexity). We will cover topics including PAC learning, uniform convergence, VC dimension, Rademacher complexity, algorithmic stability, kernel methods, online learning and reinforcement learning, as well as introduce students to current topics in large-scale machine- learning and randomized projections. General focus will be on combining methodology with theoretical and computational foundations. [Analysis]
AS.110.202 AND ((EN.553.420 AND EN.553.430) OR (EN.553.211 OR EN.553.310 OR EN.553.311) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114) OR (EN.601.220 OR AS.250.205 OR EN.580.200 OR EN.601.107)

EN.601.475. Machine Learning. 3 Credits.
Machine learning is subfield of computer science and artificial intelligence, whose goal is to develop computational systems, methods, and algorithms that can learn from data to improve their performance. This course introduces the foundational concepts of modern Machine Learning, including core principles, popular algorithms and modeling platforms. This will include both supervised learning, which includes popular algorithms like SVMs, logistic regression, boosting and deep learning, as well as unsupervised learning frameworks, which include Expectation Maximization and graphical models. Homework assignments include a heavy programming components, requiring students to implement several machine learning algorithms in a common learning framework. Additionally, analytical homework questions will explore various machine learning concepts, building on the pre-requisites that include probability, linear algebra, multi-variate calculus and basic optimization. Students in the course will develop a learning system for a final project. [Analysis or Applications]
Students may receive credit for only one of EN.600.475, EN.601.475, EN.601.675.;Linear Algebra, Probability, Statistics, Calc III, and Intro Computing/Programming - AS.110.202 AND (EN.553.211 OR EN.553.310 OR EN.553.311 OR ((EN.553.420 or EN.553.421) AND (EN.553.430 OR EN.553.431)) OR EN.560.348) AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.500.112 OR EN.500.113 OR EN.500.114 OR (EN.601.220 OR EN.600.120) OR AS.250.205 OR EN.580.200 OR (EN.600.107 OR EN.601.107)).

EN.601.476. Machine Learning: Data to Models. 3 Credits.
How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.;EN.600.475/EN.601.475 OR EN.600.675/EN.601.675 or equivalent.

EN.601.477. Causal Inference. 3 Credits.
"Big data" is not necessarily "high quality data." Systematically missing records, unobserved confounders, and selection effects present in many datasets make it harder than ever to answer scientifically meaningful questions. This course will teach mathematical tools to help you reason about causes, effects, and bias sources in data with confidence. We will use graphical causal models, and potential outcomes to formalize what causal effects mean, describe how to express these effects as functions of observed data, and use regression model techniques to estimate them. We will consider techniques for handling missing values, structure learning algorithms for inferring causal directionality from data, and connections between causal inference and reinforcement learning. [Analysis] Pre-requisites: familiarity with the R programming language, multivariate calculus, basics of linear algebra and probability.
EN.601.475 OR (EN.553.211 OR EN.553.311 OR EN.553.420 OR EN.553.421) AND AS.110.202 or permission of instructor.;Students may receive credit for only one of EN.600.477, EN.600.677, EN.601.477, EN.601.677.

EN.601.481. Machine Learning: Optimization. 3 Credits.
Optimization is at the heart of machine learning. Most machine learning problems can be posed as optimization problems. However, unlike mathematical optimization where the focus is on efficient algorithms for finding solutions with a high degree of accuracy as measured by optimality conditions, optimization for machine learning focuses on algorithms that are efficient and generalize well. In this course, we will focus on optimization for problems that arise in machine learning, design and analysis of algorithms for solving these problems, and the interplay of optimization and machine learning. The coursework will include homework assignments and a final project focusing on applying optimization algorithms to real world machinelearning problems. [Analysis or Applications]
EN.601.475 OR (EN.553.211 OR EN.553.310 OR EN.553.311 OR ((EN.553.420 OR EN.553.421) AND (EN.553.430 OR EN.553.431)) AND AS.110.201 AND AS.110.202);Students may receive credit for only one of EN.601.481/681.

EN.601.482. Machine Learning: Deep Learning. 4 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice. [Applications]
EN.601.226 AND (AS.110.201 OR AS.110.212 OR EN.553.291) AND (EN.553.310 OR EN.553.311 OR EN.553.420 OR EN.553.420); Python recommended.

EN.601.484. ML: Interpretable Machine Learning Design. 3 Credits.
There are considerable research thrusts that seek to increase the trustworthiness and perceived reliability of machine learning solutions. One such thrust, interpretable machine learning, attempts to reveal the working mechanisms of a machine learning system. However, other than on-task performance, interpretability is not a property of machine learning algorithms, but an affordance: a relationship between interpretable model and the target users in their context. Successful development of machine learning solutions that afford interpretation thus requires understanding of techniques beyond pure machine learning. In this course, we will first review the basics of machine learning and human-centered design. Then, during student team-delivered lectures, we will learn about contemporary techniques to introduce interpretability to machine learning models and discuss recent literature on the topic. In addition to hands-on homework assignments, students will work in groups to design, justify, implement, and test an interpretable machine learning algorithm for a problem of their choosing. Recommended background in (601.454/654, 601.290, 601.490/690 or 601.491/691) and 601.477/677, and coding in Python/PyTorch.
(EN.601.476 OR EN.601.476) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.486. Machine Learning: Artificial Intelligence System Design & Development. 3 Credits.
The field of artificial intelligence (AI) has recently seen a substantial increase in popularity, largely fueled by the successes of training deep neural networks that achieve state-of-the-art performance in a large variety of problems. These successes are not limited to academic benchmarks but have started to impact our everyday lives in the form of products such as Google Lens, Amazon Alexa, and Tesla Autopilot. In order for such AI systems to succeed we must consider its impact on everyday life, its overall capabilities and performance, and the effectiveness of the human-AI interaction. The importance of harmonic interplay between all these components is dramatically highlighted by recent catastrophic events in road transport and aviation. In this project-based course you will work in teams of 3-5 students to 1) Identify a need with high-impact implications on everyday life; 2) Conceptualize and design an AI system targeting this need, and 3) Develop the AI system by refining a demo-able prototype based on feedback received during course presentations. Required course background: (EN.601.475/675 or EN.601.464/664 or EN.601.482/682) and Python programming. Recommended: 601.290 or 601.454/654 or 601.490/690 or 601.491/691 (experience with human computer interface design).
(EN.601.475 OR EN.601.675) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.490. Introduction to Human-Computer Interaction. 3 Credits.
This course is designed to introduce undergraduate and graduate students to design techniques and practices in human-computer interaction (HCI), the study of interactions between humans and computing systems. Students will learn design techniques and evaluation methods, as well as current practices and exploratory approaches, in HCI through lectures, readings, and assignments. Students will practice various design techniques and evaluation methods through hands-on projects focusing on different computing technologies and application domains. This course is intended for undergraduate and graduate students in Computer Science/Cognitive Science/Psychology. Interested students from different disciplines should contact the instructor before enrolling in this course. [Applications]Recommended Background: Basic programming skills.
Students can receive credit for either EN.601.490 or EN.601.690, but not both.

EN.601.491. Human-Robot Interaction. 3 Credits.
This course is designed to introduce advanced students to research methods and topics in human-robot interaction (HRI), an emerging research area focusing on the design and evaluation of interactions between humans and robotic technologies. Students will (1) learn design principles for building and research methods of evaluating interactive robot systems through lectures, readings, and assignments, (2) read and discuss relevant literature to gain sufficient knowledge of various research topics in HRI, and (3) work on a substantial project that integrates the principles, methods, and knowledge learned in this course. [Applications]
EN.601.220/EN.600.120 AND EN.601.226/EN.600.226

EN.601.496. Computer Integrated Surgery II - Teams. 3 Credits.
This weekly lecture/seminar course addresses similar material to 600.455, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project in teams of at least 3 students, under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from 600.455, although it does not have to be. Grades are based both on the project and on classroom recitations. Students who prefer to do individual projects must register for EN.601.456 instead. [Applications, Oral]
EN.601.455 or permission;Students may receive credit for only one of EN.601.456, EN.601.496, OR EN.601.656

EN.601.501. Computer Science Workshop. 1 - 3 Credits.
An applications-oriented, computer science project done under the supervision and with the sponsorship of a faculty member in the Department of Computer Science. Computer Science Workshop provides a student with an opportunity to apply theory and concepts of computer science to a significant project of mutual interest to the student and a Computer Science faculty member. Permission to enroll in CSW is granted by the faculty sponsor after his/her approval of a project proposal from the student. Interested students are advised to consult with Computer Science faculty members before preparing a Computer Science Workshop project proposal.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.503. Independent Study. 1 - 3 Credits.
Individual guided study for undergraduate students under the direction of a faculty member in the department. The program of study, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.507. Undergraduate Research. 1 - 3 Credits.
Individual research for undergraduates under the direction of a faculty member in the department. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.509. Computer Science Internship. 1 Credit.
Individual work in the field with a learning component, supervised by a faculty member in the department. The program of study and credit assigned must be worked out in advance between the student and the faculty member involved. Students may not receive credit for work that they are paid to do. As a rule of thumb, 40 hours of work is equivalent to one credit. Permission required.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.517. Group Undergraduate Research. 1 - 3 Credits.
Independent research for undergraduates under the direction of a faculty member in the department. This course has a weekly research group meeting that students are expected to attend. The program of research, including the credit to be assigned, must be worked out in advance between the student and the faculty member involved.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.519. Senior Honors Thesis. 3 Credits.
The student will undertake a substantial independent research project under the supervision of a faculty member, potentially leading to the notation "Departmental Honors with Thesis" on the final transcript. Students are expected to enroll in both semesters of this course during their senior year. Project proposals must be submitted and accepted in the preceding spring semester (junior year) before registration. Students will present their work publicly before April 1st of senior year. They will also submit a first draft of their project report (thesis document) at that time. Faculty will meet to decide if the thesis will be accepted for honors. Computer science majors only. Students should have a 3.5 GPA in computer science courses at the end of their junior year and permission of faculty sponsor.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.520. Senior Honors Thesis. 1 - 3 Credits.
For computer science majors only, a continuation of EN.601.519.
Recommended Course Background: EN.601.519
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.556. Senior Thesis In CIS. 3 Credits.
EN.600.445 or permission of instructor.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.601.611. Computer Science Innovation & Entrepreneurship II. 3 Credits.
This course is the second half of a two-course sequence and is a continuation of course EN.660.410.01, CS Innovation and Entrepreneurship, offered by the Center for Leadership Education (CLE). In this sequel course the student groups, directed by CS faculty, will implement the business idea which was developed in the first course and will present the implementations and business plans to an outside panel made up of practitioners, industry representatives, and venture capitalists. [General]
EN.660.410

EN.601.614. Computer Networks. 3 Credits.
Topics covered will include applications layer protocols (e.g. HTTP, FTP, SMTP), transport layer protocols (UDP, TCP), network layer protocols (e.g. IP, ICMP), link layer protocols (e.g. Ethernet) and wireless protocols (e.g. IEEE 802.11). The course will also cover routing protocols such as link state and distance vector, multicast routing, and path vector protocols (e.g. BGP). The class will examine security issues such as firewalls and denial of service attacks. We will also study DNS, Web caching and CDNS, peer to peer, and protocol tunneling. Finally, we will explore security protocols (e.g. TLS, SSH, IPsec), as well as some basic cryptography necessary to understand these. Grading will be based on hands-pn programming assignments, homework and two exams. [Systems]Required course background: C/C++ programming and data structures, or permission.
Students can only receive credit for EN.601.414 or EN.601.614, but not both.

EN.601.615. Databases. 3 Credits.
Same material as 601.415, for graduate students. Introduction to database management systems and database design, focusing on the relational and object-oriented data models, query languages and query optimization, transaction processing, parallel and distributed databases, recovery and security issues, commercial systems and case studies, heterogeneous and multimedia databases, and data mining. [Systems] (www.cs.jhu.edu/~yarowsky/cs415.html) Required course background: Data Structures
Students may receive credit for only one of EN.600.315, EN.600.415, EN.601.315, EN.601.415, EN.601.615.

EN.601.617. Distributed Systems. 3 Credits.
Graduate version of 601.317 Systems. Students may receive credit for 601.317 or 601.417 but not both. Recommended Course Background: EN.601.220, EN.601.226
Students may receive credit for only one of 417/617

EN.601.618. Operating Systems. 3 Credits.
Same material as 601.418, for graduate students. This course covers fundamental topics related to operating systems theory and practice. Topics include processor management, storage management, concurrency control, multi-programming and processing, device drivers, operating system components (e.g., file system, kernel), modeling and performance measurement, protection and security, and recent innovations in operating system structure. Course work includes the implementation of operating systems techniques and routines, and critical parts of a small but functional operating system. [Systems] Required course background: Data Structures & Computer System Fundamentals
Students may receive credit for only one of EN.600.318, EN.600.418, EN.601.318, EN.601.418, EN.601.618.

EN.601.619. Cloud Computing. 3 Credits.
Clouds host a wide range of the applications that we rely on today. In this course, we study common cloud applications, traffic patterns that they generate, critical networking infrastructures that support them, and core networking and distributed systems concepts, algorithms, and technologies used inside clouds. We will also study how today's application demand is influencing the network's design, explore current practice, and how we can build future's networked infrastructure to better enable both efficient transfer of big data and low-latency requirements of real-time applications. The format of this course will be a mix of lectures, discussions, assignments, and a project designed to help students practice and apply the theories and techniques covered in the course. [Systems] Prerequisites: EN.601.226 or permission. Students can only receive credit for one of 601.419/619. Recommended: a course in operating systems, networks or systems programming.
Students may earn credit for EN.601.419 or EN.601.619, but not both.

EN.601.620. Parallel Computing for Data Science. 3 Credits.
This course studies parallelism in data science, drawing examples from data analytics, statistical programming, and machine learning. It focuses mostly on the Python programming ecosystem but will use C/C++ to accelerate Python and Java to explore shared-memory threading. It explores parallelism at all levels, including instruction level parallelism (pipelining and vectorization), shared-memory multicore, and distributed computing. Concepts from computer architecture and operating systems will be developed in support of parallelism, including Moore's law, the memory hierarchy, caching, processes/threads, and concurrency control. The course will cover modern data-parallel programming frameworks, including Dask, Spark, Hadoop!, and Ray. The course will not cover GPU deep-learning frameworks nor CUDA. The course is suitable for second-year undergraduate CS majors and graduate students from other science and engineering disciplines that have prior programming experience. Required course background: Data Structures, Computer System Fundamentals, and familiarity with Python. [Systems]
Students may receive credit for only one of EN.601.320, EN.601.420, OR EN.601.620.

EN.601.621. Object Oriented Software Engineering. 3 Credits.
Same material as EN.601.421, for graduate students.This course covers object-oriented software construction methodologies and their application. The main component of the course is a large team project on a topic of your choosing. Course topics covered include object-oriented analysis and design, UML, design patterns, refactoring, program testing, code repositories, team programming, and code reviews. [Systems or Applications] Required course background: intermediate programming, data structures, and experience in mobile or web app development. Students may receive credit for only one of 601.421/621.
Students may receive credit for only one of EN.600.321, EN.600.421, EN.601.421, EN.601.621.

EN.601.622. Software Testing & Debugging. 3 Credits.
Studies show that testing can account for over 50% of software development costs. This course presents a comprehensive study of software testing, principles, methodologies, tools, and techniques. Topics include testing principles, coverage (graph coverage, logic coverage, input space partitioning, and syntax-based coverage), unit testing, higher-order testing (integration, system-level, acceptance), testing approaches (white-box, black-box, grey-box), regression testing, debugging, delta debugging, and several specific types of functional and non-functional testing as schedule/interest permits (GUI testing, usability testing, security testing, load/performance testing, A/B testing etc.). For practical topics, state- of-the-art tools/techniques will be studied and utilized. [Systems]
EN.601.290 OR EN.601.421 OR EN.601.621;Students can only take EN.601.422 or EN.601.622, but not both.

EN.601.624. Reliable Software Systems. 3 Credits.
Reliability is an essential quality requirement for all artifacts operating in the real-world, ranging from bridges, cars to power grids. Software systems are no exception. In this computing age when software is transforming even traditional mission-critical artifacts, making sure the software we write is reliable becomes ever more important. This course exposes students to the principles and techniques in building reliable systems. We will study a set of systematic approaches to make software more robust. These include but are not limited to static analysis, testing framework, model checking, symbolic execution, fuzzing, and formal verification. In addition, we will cover the latest research in system reliability. Recommended course background: EN.601.220 AND EN.601.628.
Students may receive credit for EN.601.424 OR EN.601.624, but not both.

EN.601.626. Principles of Programming Languages. 3 Credits.
Same material as EN.601.426, for graduate students. Functional, object-oriented, and other language features are studied independent of a particular programming language. Students become familiar with these features by implementing them. Most of the implementations are in the form of small language interpreters. Some type checkers and a small compiler will also be written. The total amount of code written will not be overly large, as the emphasis is on concepts. The ML programming language is the implementation language used. [Analysis]Required course background: EN.601.226.
Students may only receive credit for EN.601.426 or EN.601.626, but not both

EN.601.627. Principles of Programming Languages II. 3 Credits.
This course is designed as a follow-on to Principles of Programming Languages. It will cover a wide array of fundamental topics in programming languages, including advanced functional programming, the theory of inductive definitions, advanced operational semantics, advanced type systems, program analysis, program verification, theorem provers and SAT solvers.[Analysis]
EN.601.426 OR EN.601.626

EN.601.628. Compilers & Interpreters. 3 Credits.
Introduction to compiler design, including lexical analysis, parsing, syntax-directed translation, symbol tables, runtime environments, and code generation and optimization. Students are required to write a compiler as a course project. [Systems] Required course background: intermediate programming, data structures and computer system fundamentalsRecommended background: automata and computation theory
Students may receive credit for only one of EN.601.428 or 601.628.

EN.601.629. Functional Programming in Software Engineering. 3 Credits.
How can we effectively use functional programming techniques to build real-world software? This course will primarily focus on using the OCaml programming language for this purpose. Topics covered include OCaml basics, modules, standard libraries, testing, quickcheck, build tools, functional data structures and efficiency analysis, monads, streams, and promises. Students will practice what they learn in lecture via functional programming assignments and a final project. Required course background in data structures (601.226)

EN.601.630. Combinatorics & Graph Theory in Computer Science. 3 Credits.
This is a graduate level course studying the applications of combinatorics and graph theory in computer science. We will start with some basic combinatorial techniques such as counting and pigeon hole principle, and then move to advanced techniques such as the probabilistic method, spectral graph theory and additive combinatorics. We shall see their applications in various areas in computer science, such as proving lower bounds in computational models, randomized algorithms, coding theory and pseudorandomness. [Analysis]Recommended Course Background: probability theory and linear algebra
Students may receive credit for only one of 430/630

EN.601.631. Theory of Computation. 3 Credits.
This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, complexity theory, randomized algorithms, inapproximability, interactive proof systems and probabilistically checkable proofs. Students may not take both EN.601.231 and EN.601.631, unless one is for an undergrad degree and the other for grad. [Analysis]Recommended Course Background: EN.553.171 or istructor permission.

EN.601.633. Intro Algorithms. 3 Credits.
Same material as EN.601.433, for graduate students.This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis. [Analysis] Required background: Data Structures and Discrete Math or Automata/Computation Theory
Students may receive credit for only one of EN.600.363, EN.600.463, EN.601.433, EN.601.633.

EN.601.634. Randomized and Big Data Algorithms. 3 Credits.
Same material as 601.434, for graduate students. The course emphasizes algorithmic design aspects, and how randomization can be a helpful tool. The topics covered include: tail inequalities, linear programming relaxation & randomized rounding, de-randomization, existence proofs, universal hashing, markov chains, metropolis and metropolis-hastings methods, mixing by coupling and by eigenvalues, counting problems, semi-definite programming and rounding, lower bound arguments, and applications of expanders. [Analysis] (www.cs.jhu.edu/~cs464) Required course background: EN.600.363 or EN.601.433 or EN.601.633.
Students may receive credit for only one of EN.600.464, EN.600.664, EN.601.434, EN.601.634.

EN.601.635. Approximation Algorithms. 3 Credits.
Graduate version of EN.601.435. Recommended Background: EN.601.633 or equivalent. Students may receive credit for EN.601.435 or EN.601.635, but not both.

EN.601.636. Algorithmic Game Theory. 3 Credits.
Same material as EN.601.436, for graduate students. This course provides an introduction to algorithmic game theory: the study of games from the perspective of algorithms and theoretical computer science. There will be a particular focus on games that arise naturally from economic interactions involving computer systems (such as economic interactions between large-scale networks, online advertising markets, etc.), but there will also be broad coverage of games and mechanisms of all sorts. Topics covered will include a) complexity of computing equilibria and algorithms for doing so, b) (in)efficiency of equilibria, and c) algorithmic mechanism design. [Analysis]
Students may receive credit for EN.601.436 or EN.601.636, but not both.

EN.601.637. Federated Learning and Analytics. 3 Credits.
Federated Learning (FL) is an area of machine learning where data is distributed across multiple devices and training is performed without exchanging the data between devices. FL can be contrasted with classical machine learning settings when data is available in a central location. As such, FL faces additional challenges and limitations such as privacy and communication. For example, FL may deal with questions of learning from sensitive data on mobile devices while protecting privacy of individual users and dealing with low power and limited communication. As a result, FL requires knowledge of many interdisciplinary areas such as differential privacy, distributed optimization, sketching algorithms, compression and more. In this course students will learn basic concepts and algorithms for FL and federated analytics, and gain hands-on experience with new methods and techniques. Students will gain understanding in reasoning about possible trade-offs between privacy, accuracy and communication. [Analysis] Required:: 433/633 (Algo), 475/675 (ML) or 482/682 (ML: DL), linear algebra, probability
Students may receive credit for only one of 601.437 or 601.637

EN.601.640. Web Security. 3 Credits.
This course begins with reviewing basic knowledge of the World Wide Web, and then exploring the central defense concepts behind Web security, such as same-origin policy, cross-origin resource sharing, and browser sandboxing. It will cover the most popular Web vulnerabilities, such as cross-site scripting (XSS) and SQL injection, as well as how to attack and penetrate software with such vulnerabilities. Students will learn how to detect, respond, and recover from security incidents. Newly proposed research techniques will also be discussed. [Systems]Required background: data structures and computer system fundamentals.
Students may receive credit for only one of 601.640/440/640

EN.601.641. Blockchains and Cryptocurrencies. 3 Credits.
Same as EN.601.441, for graduate students. This course will introduce students to cryptocurrencies and the main underlying technology of Blockchains. The course will start with the relevant background in cryptography and then proceed to cover the recent advances in the design and applications of blockchains. This course should primarily appeal to students who want to conduct research in this area or wish to build new applications on top of blockchains. It should also appeal to those who have a casual interest in this topic or are generally interested in cryptography. Students are expected to have mathematical maturity. Recommended Course Background: EN.601.226 AND (EN.553.310 OR EN.553.420) [Analysis]
Students may receive credit for only one of EN.600.451 OR EN.601.441 OR EN.601.641

EN.601.642. Modern Cryptography. 3 Credits.
Same material as 601.442, for graduate students. Modern Cryptography includes seemingly paradoxical notions such as communicating privately without a shared secret, proving things without leaking knowledge, and computing on encrypted data. In this challenging but rewarding course we will start from the basics of private and public key cryptography and go all the way up to advanced notions such as zero-knowledge proofs, functional encryption and program obfuscation. The class will focus on rigorous proofs and require mathematical maturity. [Analysis] Required course background: Probability & Automata/Computation Theory
Students may receive credit for only one of EN.601.442 OR EN.601.642.

EN.601.643. Security & Privacy in Computing. 3 Credits.
Same material as 601.443, for graduate students. Lecture topics will include computer security, network security, basic cryptography, system design methodology, and privacy. There will be a heavy work load, including written homework, programming assignments, exams and a comprehensive final. The class will also include a semester-long project that will be done in teams and will include a presentation by each group to the class. [Applications] Required Course Background: A basic course in operating systems and networking, or permission of instructor.
Students may receive credit for only one of EN.600.443, EN.601.443, EN.601.643.

EN.601.644. Network Security. 3 Credits.
Same material as 601.444, for graduate students. This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. [Systems]Recommended. Course Background: EN.601.220, EN.601.226 or equivalent
Students may receive credit for only one of EN.600.454, EN.650.454, EN.601.445, EN.601.645.

EN.601.645. Practical Cryptographic Systems. 3 Credits.
Same material as 601.445, for graduate students. This semester-long course will teach systems and cryptographic design principles by example: by studying and identifying flaws in widely-deployed cryptographic products and protocols. Our focus will be on the techniques used in practical security systems, the mistakes that lead to failure, and the approaches that might have avoided the problem.We will place a particular emphasis on the techniques of provable security and the feasibility of reverse-engineering undocumented cryptographic systems. [Systems]
Students may receive credit for EN.600.454/EN.601.445 or EN.601.645, but not both.

EN.601.646. Sketching and Indexing for Sequences. 3 Credits.
Many of the world's largest and fastest-growing datasets are text, e.g. DNA sequencing data, web pages, logs and social media posts. Such datasets are useful only to the degree we can query, compare and analyze them. Here we discuss two powerful approaches in this area. We will cover sketching, which enables us to summarize very large texts in small structures that allow us to measure the sizes of sets and of their unions and intersections. This in turn allows us to measure similarity and find near neighbors. Second, we will discuss indexing --- succinct and compressed indexes in particular -- which enables us to efficiently search inside very long strings, especially in highly repetitive texts. [Analysis]
Students may receive credit for EN.601.446 or EN.601.646, but not both.

EN.601.647. Computational Genomics: Sequences. 3 Credits.
Same material as 601.447, for graduate students. Your genome is the blueprint for the molecules in your body. It's also a string of letters (A, C, G and T) about 3 billion letters long. How does this string give rise to you? Your heart, your brain, your health? This, broadly speaking, is what genomics research is about. This course will familiarize you with a breadth of topics from the field of computational genomics. The emphasis is on current research problems, real-world genomics data, and efficient software implementations for analyzing data. Topics will include: string matching, sequence alignment and indexing, assembly, and sequence models. Course will involve significant programming projects. [Applications]Required course background: Intermediate programming (C/C++) and Data Structures
Students may receive credit for only one EN.601.447/647/747

EN.601.648. Computational Genomics: Data Analysis. 3 Credits.
Same material as EN.601.448, for graduate students. Genomic data has the potential to reveal causes of disease, novel drug targets, and relationships among genes and pathways in our cells. However, identifying meaningful patterns from high-dimensional genomic data has required development of new computational tools. This course will cover current approaches in computational analysis of genomic data with a focus on statistical methods and machine learning. Topics will include disease association, prediction tasks, clustering and dimensionality reduction, data integration, and network reconstruction. There will be some programming and a project component. [Applications]Recommended Course Background: EN.600.226 or other programming experience, probability and statistics, linear algebra or calculus.

EN.601.649. Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm exam, class presentations, and a significant class project. Prerequisites: knowledge of the Unix operating system and programming expertise in a language such as R or Python. [Applications]

EN.601.654. Augmented Reality. 3 Credits.
This course introduces students to the field of Augmented Reality. It reviews its basic definitions, principles and applications. It then focuses on Medical Augmented Reality and its particular requirements. The course also discusses the main issues of calibration, tracking, multi-modal registration, advance visualization and display technologies. Homework in this course will relate to the mathematical methods used for calibration, tracking and visualization in medical augmented reality. Students may also be asked to read papers and implement various techniques within group projects. Recommended Course Background: EN.601.220, EN.601.226, and AS.110.201. [Applications]
Students may receive credit for only one of EN.600.484, EN.600.684, EN.601.454, EN.601.654.

EN.601.655. Computer Integrated Surgery I. 4 Credits.
Same material as 601.455, for graduate students. This course focuses on computer-based techniques, systems, and applications exploiting quantitative information from medical images and sensors to assist clinicians in all phases of treatment from diagnosis to preoperative planning, execution, and follow-up. It emphasizes the relationship between problem definition, computer-based technology, and clinical application and includes a number of guest lectures given by surgeons and other experts on requirements and opportunities in particular clinical areas. [Applications] Required Course Background: data structures and linear algebra or permission.Recommended Course Background: intermediate programming in C/C++, EN.601.457, EN.601.461, image processing.
Students may receive credit for only one of EN.601.455 or EN.601.655.

EN.601.656. Computer Integrated Surgery II. 3 Credits.
Same material as EN.601.456, for graduate students. This weekly lecture/seminar course addresses similar material to EN.601.655, but covers selected topics in greater depth. In addition to material covered in lectures/seminars by the instructor and other faculty, students are expected to read and provide critical analysis/presentations of selected papers in recitation sessions. Students taking this course are required to undertake and report on a significant term project under the supervision of the instructor and clinical end users. Typically, this project is an extension of the term project from EN.601.655, although it does not have to be. Grades are based both on the project and on classroom recitations. Students wishing to attend the weekly lectures as a 1-credit seminar should sign up for EN.601.356. [Applications]
EN.600.445/EN.601.455 OR EN.600.645/EN.601.655 OR permission of the instructor.;Students may receive credit for only one of EN.600.446, EN.600.646, EN.601.456, EN.601.656.

EN.601.657. Computer Graphics. 3 Credits.
Same material as 601.457, for graduate students. This course introduces computer graphics techniques and applications, including image processing, rendering, modeling and animation. [Applications]Permission of instructor is required for students not satisfying a pre-requisite. No Audits.Required course background: EN.601.220 (C++), EN.601.226, linear algebra.
Students may receive credit for only one of EN.601.457 OR EN.601.657.

EN.601.659. Computational Geometry. 3 Credits.
This course will provide an introduction to computational geometry. It will cover a number of topics in two- and three-dimensions, including polygon triangulations and partitions, convex hulls, Delaunay and Voronoi diagrams, arrangements, and spatial queries. Time-permitting, we will also look at kD-trees, general BSP-trees, and quadtrees. [Analysis]
Recommended Course Background: EN.601.220 AND EN.601.226 AND (EN.600.363 OR EN.601.433).
Students may earn credit for EN.601.459 or EN.601.659, but not both.

EN.601.661. Computer Vision. 3 Credits.
This course provides an overview of fundamental methods in computer vision from a computational perspective. Methods studied include: camera systems and their modelling, computation of 3¬D geometry from binocular stereo, motion, and photometric stereo, and object recognition, image segmentation, and activity analysis. Elements of machine learning and deep learning are also included. [Applications]Required course background: Intro to Programming, Linear Algebra & prob/stats
Students may receive credit for only one of EN.601.461, EN.601.661, OR EN.601.761.

EN.601.662. Introduction to Spatial Computing. 3 Credits.
This course will provide students with a rich understanding of immersive technology and spatial computing as the next wave of computing after personal and mobile computing, and belongs to the devices that can sense the space or are “spatially” aware. It also covers input systems and interaction modalities that have evolved to support human-computer interaction required for immersive environments. It will go through principles of design thinking as a mindset for creating immersive experiences, and students will explore the practical implication of this subject in healthcare, industry, and society through the projects. Required course background in intermediate programming, data structures, and linear algebra. Computer vision is recommended. [Applications]

EN.601.663. Algorithms for Sensor-Based Robotics. 3 Credits.
Same material as EN.601.463, for graduate students. This course surveys the development of robotic systems for navigating in an environment from an algorithmic perspective. It will cover basic kinematics, configuration space concepts, motion planning, and localization and mapping. It will describe these concepts in the context of the ROS software system, and will present examples relevant to mobile platforms, manipulation, robotics surgery, and human-machine systems. [Analysis]
Required course background: Data Structures, Linear Algebra & prob/stats
Students may receive credit for only one of 601.463/663/763

EN.601.664. Artificial Intelligence. 3 Credits.
Same material as EN.601.464, for graduate students. This course is recommended for students, scientists, and engineers with a genuine curiosity about the fundamental obstacles in getting machines to perform tasks such as deduction, learning, planning and navigation. It covers methods for automated reasoning, automatic problem solvers and planners, knowledge representation mechanisms, game playing, machine learning, and statistical pattern recognition. Strong programming skills are expected, as well as basic familiarity with probability. Students intending to also take courses in machine learning (e.g. 601.475/675, 601.476/676, 601.482/682) may find it beneficial to take this course first, or concurrently.Prereq: Data Structures ; Recommended: linear algebra, prob/stat.
Students may receive credit for only one of EN.601.464 OR EN.601.664.

EN.601.665. Natural Language Processing. 3 Credits.
Same material as 601.465, for graduate students. This course is an in-depth overview of techniques for processing human language. How should linguistic structure and meaning be represented? What algorithms can recover them from text? And crucially, how can we build statistical models to choose among the many legal answers? The course covers methods for trees (parsing and semantic interpretation), sequences (finite-state transduction such as morphology), and words (sense and phrase induction), with applications to practical engineering tasks such as information retrieval and extraction, text classification, part-of-speech tagging, speech recognition and machine translation. There are a number of structured but challenging programming assignments. [Applications]Prerequisite: Data Structures and basic familiarity with Python, partial derivatives, matrix multiplication and probabilities.
Students may receive credit for only one of EN.601.465 OR EN.601.665.

EN.601.666. Information Retrieval and Web Agents. 3 Credits.
Same material as EN.601.466, for graduate students. An in-depth, hands-on study of current information retrieval techniques and their application to developing intelligent WWW agents. Topics include a comprehensive study of current document retrieval models, mail/news routing and filtering, document clustering, automatic indexing, query expansion, relevance feedback, user modeling, information visualization and usage pattern analysis. In addition, the course explores the range of additional language processing steps useful for template filling and information extraction from retrieved documents, focusing on recent, primarily statistical methods. The course concludes with a study of current issues in information retrieval and data mining on the World Wide Web. Topics include web robots, spiders, agents and search engines, exploring both their practical implementation and the economic and legal issues surrounding their use. [Applications]

EN.601.667. Introduction to Human Language Technology. 3 Credits.
This course gives an overview of basic foundations and applications of human language technology, such as: morphological, syntactic, semantic, and pragmatic processing; machine learning; signal processing; speech recognition; speech synthesis; information retrieval; text classification; topic modelling; informationextraction; knowledge representation; machine translation; dialog systems; etc. [Applications]Required Background: EN.601.226 Data Structures; knowledge of Python recommended.
Students may receive credit for only one of 601.467/667

EN.601.668. Machine Translation. 3 Credits.
Same material as 601.468, for graduate students. Google translate can instantly translate between any pair of over fifty human languages (for instance, from French to English). How does it do that? Why does it make the errors that it does? And how can you build something better? Modern translation systems learn to translate by reading millions of words of already translated text, and this course will show you how they work. The course covers a diverse set of fundamental building blocks from linguistics, machine learning, algorithms, data structures, and formal language theory, along with their application to a real and difficult problem in artificial intelligence. [Applications] Required course background: Data Structures and prob/stats
Students may receive credit for only one of EN.601.468 OR EN.601.668.

EN.601.670. Artificial Agents. 3 Credits.
This course covers a number of topics explored in introductory AI, such as knowledge representation, reasoning, and natural language understanding. Unlike introductory AI, we will pursue these topics based on the transformer neural architecture. We will motivate the material through interacting with agents in games: how to build models that understand user commands, how to generate responses back to a user, and how to reason about a synthetic environment to determine a course of action. Assignments will include programming, presentations on readings, and written summaries of readings. [Applications]

EN.601.674. ML: Learning Theory. 3 Credits.
This is a graduate level course in machine learning. It will provide a formal and in-depth coverage of topics in statistical and computational learning theory. We will revisit popular machine learning algorithms and understand their performance in terms of the size of the data (sample complexity), memory needed (space complexity), as well as the overall runtime (computational or iteration complexity). We will cover topics including PAC learning, uniform convergence, VC dimension, Rademacher complexity, algorithmic stability, kernel methods, online learning and reinforcement learning, as well as introduce students to current topics in large-scale machine- learning and randomized projections. General focus will be on combining methodology with theoretical and computational foundations. [Analysis]

EN.601.675. Machine Learning. 3 Credits.
Same material as 601.475, for graduate students. Machine learning is subfield of computer science and artificial intelligence, whose goal is to develop computational systems, methods, and algorithms that can learn from data to improve their performance. This course introduces the foundational concepts of modern Machine Learning, including core principles, popular algorithms and modeling platforms. This will include both supervised learning, which includes popular algorithms like SVMs, logistic regression, boosting and deep learning, as well as unsupervised learning frameworks, which include Expectation Maximization and graphical models. Homework assignments include a heavy programming components, requiring students to implement several machine learning algorithms in a common learning framework. Additionally, analytical homework questions will explore various machine learning concepts, building on the pre-requisites that include probability, linear algebra, multi-variate calculus and basic optimization. Students in the course will develop a learning system for a final project. [Applications or Analysis] Required course background: multivariable calculus, probability, linear algebra, intro to computing
Students may receive credit for only one of EN.601.475 OR EN.601.675.

EN.601.676. Machine Learning: Data to Models. 3 Credits.
Same material as EN.601.476, for graduate students. How can robots localize themselves in an environment when navigating? Which factors predict whether patients are at greatest-risk for complications in the hospital? Can we reconstruct the brain's "connectome" from fMRI data? Many such big data questions can be answered using the paradigm of probabilistic models in machine learning. This is the second course on machine learning which focuses on probabilistic graphical models. You will learn about directed and undirected graphical models, inference methods, sampling, structure learning algorithms, latent variables, and temporal models. There will be regular assignments, which include theory and some programming. Students will analyze real data for their final project, applying methods discussed in class and writing up a report of their results. [Analysis or Applications] Recommended Background: EN.600.475 or EN.601.675 or equivalent. Students may receive credit for EN.600.476 or EN.600.676, but not both.
Students may receive credit for only one of EN.600.476, EN.601.476, EN.601.676.

EN.601.677. Causal Inference. 3 Credits.
"Big data" is not necessarily "high quality data." Systematically missing records, unobserved confounders, and selection effects present in many datasets make it harder than ever to answer scientifically meaningful questions. This course will teach mathematical tools to help you reason about causes, effects, and bias sources in data with confidence. We will use graphical causal models, and potential outcomes to formalize what causal effects mean, describe how to express these effects as functions of observed data, and use regression model techniques to estimate them. We will consider techniques for handling missing values, structure learning algorithms for inferring causal directionality from data, and connections between causal inference and reinforcement learning. [Analysis] Pre-requisites: familiarity with the R programming language, multivariate calculus, basics of linear algebra and probability.
Students may receive credit for only one of EN.601.477 OR EN.601.677.

EN.601.681. Machine Learning: Optimization. 3 Credits.
Same material as EN.601.481, for graduate students. Optimization is at the heart of machine learning. Most machine learning problems can be posed as optimization problems. However, unlike mathematical optimization where the focus is on efficient algorithms for finding solutions with a high degree of accuracy as measured by optimality conditions, optimization for machine learning focuses on algorithms that are efficient and generalize well. In this course, we will focus on optimization for problems that arise in machine learning, design and analysis of algorithms for solving these problems, and the interplay of optimization and machine learning. The coursework will include homework assignments and a final project focusing on applying optimization algorithms to real world machine learning problems. [Analysis or Applications]Required Course Background: EN 601.475/675 Machine Learning or all of the following:1. Linear algebra (vector spaces, normed vectors, inner product spaces, singular value decomposition2. Probability and Statistics (random variables, probability distributions, expectation, mean, variance, covariance, conditional probability, Bayes rule3. Introductory machine learning (classification, regression, empirical risk minimization, regularization)4. Multivariate calculus (partial derivative, gradient, Jacobian, Hessian, critical points
Students may receive credit for only one of EN.601.481/681

EN.601.682. Machine Learning: Deep Learning. 4 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice. [Applications] Recommended Course Background: (AS.110.201 or AS.110.212 or EN.553.291) and (EN.553.310 EN.553.311 or EN.553.420); numerical optimization recommended.
Students may receive credit for EN.601.482 or EN.601.682, but not both.

EN.601.684. ML: Interpretable Machine Learning Design. 3 Credits.
There are considerable research thrusts that seek to increase the trustworthiness and perceived reliability of machine learning solutions. One such thrust, interpretable machine learning, attempts to reveal the working mechanisms of a machine learning system. However, other than on-task performance, interpretability is not a property of machine learning algorithms, but an affordance: a relationship between interpretable model and the target users in their context. Successful development of machine learning solutions that afford interpretation thus requires understanding of techniques beyond pure machine learning. In this course, we will first review the basics of machine learning and human-centered design. Then, during student team-delivered lectures, we will learn about contemporary techniques to introduce interpretability to machine learning models and discuss recent literature on the topic. In addition to hands-on homework assignments, students will work in groups to design, justify, implement, and test an interpretable machine learning algorithm for a problem of their choosing. Required course background: 601.475/675 or 601.464/664 or 601.482/682; coding in Python/PyTorch. Recommended (601.454/654, 601.290, 601.490/690 or 601.491/691) and 601.477/677.

EN.601.686. Machine Learning: Artificial Intelligence System Design & Development. 3 Credits.
The field of artificial intelligence (AI) has recently seen a substantial increase in popularity, largely fueled by the successes of training deep neural networks that achieve state-of-the-art performance in a large variety of problems. These successes are not limited to academic benchmarks but have started to impact our everyday lives in the form of products such as Google Lens, Amazon Alexa, and Tesla Autopilot. In order for such AI systems to succeed we must consider its impact on everyday life, its overall capabilities and performance, and the effectiveness of the human-AI interaction. The importance of harmonic interplay between all these components is dramatically highlighted by recent catastrophic events in road transport and aviation. In this project-based course you will work in teams of 3-5 students to 1) Identify a need with high-impact implications on everyday life; 2) Conceptualize and design an AI system targeting this need, and 3) Develop the AI system by refining a demo-able prototype based on feedback received during course presentations.Required course background: (EN.601.475/675 or EN.601.464/664 or EN.601.482/682) and Python programming. Recommended: 601.290 or 601.454/654 or 601.490/690 or 601.491/691 (experience with human computer interface design).
(EN.601.475 OR EN.601.675) OR (EN.601.464 OR EN.601.664) OR (EN.601.482 OR EN.601.682)

EN.601.690. Introduction to Human-Computer Interaction. 3 Credits.
This course is designed to introduce undergraduate and graduate students to design techniques and practices in human-computer interaction (HCI), the study of interactions between humans and computing systems. Students will learn design techniques and evaluation methods, as well as current practices and exploratory approaches, in HCI through lectures, readings, and assignments. Students will practice various design techniques and evaluation methods through hands-on projects focusing on different computing technologies and application domains. This course is intended for undergraduate and graduate students in Computer Science/Cognitive Science/Psychology. Interested students from different disciplines should contact the instructor before enrolling in this course. [Applications]Recommended Background: Basic programming skills.
Students can receive credit for either EN.601.490 or EN.601.690, but not both.

EN.601.691. Human-Robot Interaction. 3 Credits.
This course is designed to introduce graduate students to research methods and topics in human-robot interaction (HRI), an emerging research area focusing on the design and evaluation of interactions between humans and robotic technologies. Students will (1) learn design principles for building and research methods of evaluating interactive robot systems through lectures, readings, and assignments, (2) read and discuss relevant literature to gain sufficient knowledgeof various research topics in HRI, and (3) work on a substantial project that integrates the principles, methods, and knowledge learned in this course. [Applications] Required course background: EN.601.220 and EN.601.226. Students may receive credit for EN.601.491 or EN.601.691.

EN.601.713. Future Networks. 3 Credits.
This will be a graduate-level networking course. New applications such as ones for metaverse require networking and computing to be imbedded together. This feature is already beginning to be implemented in 5G and 6G networks; 6G will also allow networks to be used as sensors. These advances are enabled by new technologies such as mobile edge computing, software-defined networking (SDN), network slicing, digital twins, and named-data networking (NDN). This course will start with introductory lectures on these topics. Students will be asked to study new papers and do course projects. These activities should result in longer term research projects. Required Course Background: A course in computer networks (e.g., EN.601.414/614 Computer Network Fundamentals or the equivalent), or permission of the instructor. [Systems]

EN.601.714. Advanced Computer Networks. 3 Credits.
This is a graduate-level course on computer networks. It provides a comprehensive overview on advanced topics in network protocols and networked systems. The course will cover both classic papers on Internet protocols and recent research results. It will examine a wide range of topics, e.g., routing, congestion control, network architectures, datacenter networks, network virtualization, software-defined networking, and programmable networks, with an emphasize on core networking concepts and principles. The course will include lectures, paper discussions, programming assignments and a research project. Recommended Course Background: One undergraduate course in computer networks (e.g., EN.601.414/614 Computer Network Fundamentals or the equivalent), or permission of the instructor. The course assignments and projects assume students to be comfortable with programming.

EN.601.717. Advanced Distributed Systems & Networks. 3 Credits.
The course explores the state of the art in distributed systems, networks and Internet research and practice, trying to see what it would take to push the envelop a step further. The course is conducted as a discussion group, where the professor and students brainstorm and pick interesting semester-long projects with high potential future impact. Example areas include robust scalable infrastructure (distributed datacenters, cloud networking, scada systems), real-time performance (remote surgery, trading systems), hybrid networks (mesh networks, 3-4G/Wifi/Bluetooth). Students should feel free to bring their own topics of interest and ideas. Recommended Course Background: a systems course (distributed systems, operating systems, computer networks, parallel programming) or permission of instructor.

EN.601.718. Advanced Operating Systems. 3 Credits.
Students will study advanced operating system topics and be exposed to recent developments in operating systems research. This course involves readings on classic and new papers. Topics include virtual memory management, synchronization and communication, file systems, protection and security, operating system structure and extension techniques, fault tolerance, and history and experience of systems programming. [Systems]
EN.600.318 OR EN.600.418 OR EN.601.318 OR EN.601.418 OR EN.601.618

EN.601.723. Advanced Topics in Data-Intensive Computing. 3 Credits.
The advent of cloud computing has lead to an explosion of storage system and data analysis software, including NoSQL databases, bulk-synchronous processing, graph computing engines, and stream processing. This course will explore scale-out software architectures for data-processing tasks. It will examine the algorithms and data-structures that underlie scalable systems and look at how hardware and networking trends influence the design and deployment of cloud computing. Recommended Course Background: EN.601.320/420 or permission of instructor. [Systems]
EN.600.320 OR EN.600.420 OR EN.601.620

EN.601.740. Language-based Security. 3 Credits.
This course will introduce Language-based Security, an emerging field in cyber security that leverages techniques from compilers and program analysis for security-related problems. Topics include but are not limited to: Control-flow and data-flow graphs, Program slicing, Code property graph (CPG), and Control-flow integrity. Students are expected to read new and classic papers in this area and discuss them in class. Recommended backgrounds are Operating Systems and preferably Compilers.

EN.601.741. Advanced Topics in Secure and Censorship-Resistant Communications. 3 Credits.
Topics will vary from year to year, but will focus on applied cryptography and communications, focused on the development of secure and uncensorable communication mechanisms for communities at risk. This course will include topics such as: communication protocol design and analysis, blockchain-based protocols, anonymous communication, cryptographic backdoors, and other topics. Emphasis in this course is on understanding how cryptographic issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. The course will consist of in-class workshops and interactive discussions. There will be programming assignments and a course project with real world impact. Students will also be expected to read assigned papers and to present at least one research paper and lead a discussion on it. [Systems]
((EN.601.441 OR EN.601.641) OR (EN.601.442 OR EN.601.642) OR (EN.601.445 OR EN.601.645))

EN.601.742. Advanced Topics in Cryptography. 3 Credits.
This course will focus on advanced cryptographic topics with an emphasis on open research problems and student presentations.

EN.601.743. Advanced Topics in Computer Security. 3 Credits.
Topics will vary from year to year, but will focus mainly on network perimeter protection, host-level protection, authentication technologies, intellectual property protection, formal analysis techniques, intrusion detection and similarly advanced subjects. Emphasis in this course is on understanding how security issues impact real systems, while maintaining an appreciation for grounding the work in fundamental science. Students will study and present various advanced research papers to the class. There will be homework assignments and a course project. A college level security or crypto course at Hopkins or any other school is required.

EN.601.745. Advanced Topics in Applied Cryptography. 3 Credits.
This reading and project based course will explore the latest research in the area of applied cryptography and cryptographic engineering. Topics covered will include zero knowledge, efficient multiparty computation, cryptocurrencies, and trusted computing hardware. Readings will be drawn from the latest applied cryptography and security conferences. The course will include both reading, critical analysis, presentations and a course programming project. [Analysis or Applications]
EN.600.454 OR EN.601.445 OR EN.601.645 OR EN.600.442 OR EN.601.442 OR EN.601.642

EN.601.749. Advanced Computational Genomics: Applied Comparative Genomics. 3 Credits.
The goal of this course is to study the leading computational and quantitative approaches for comparing and analyzing genomes starting from raw sequencing data. The course will focus on human genomics and human medical applications, but the techniques will be broadly applicable across the tree of life. The topics will include genome assembly & comparative genomics, variant identification & analysis, gene expression & regulation, personal genome analysis, and cancer genomics. The grading will be based on assignments, a midterm & final exam, class presentations, and a significant class project. [Applications] Expected course background: familiarity with UNIX scripting and/or programming.

EN.601.760. FFT in Graphics & Vision. 3 Credits.
In this course, we will study the Fourier Transform from the perspective of representation theory. We will begin by considering the standard transform defined by the commutative group of rotations in 2D and translations in two- and three-dimensions, and will proceed to the Fourier Transform of the non-commutative group of 3D rotations. Subjects covered will include correlation of images, shape matching, computation of invariances, and symmetry detection. Recommended Course Background: AS.110.201 and comfort with mathematical derivations.

EN.601.765. Machine Learning: Linguistic & Sequence Modeling. 3 Credits.
This course surveys formal ingredients that are used to build structured models of character and word sequences. We will unpack recent deep learning architectures that consider various kinds of latent structure, and see how they draw on earlier work in structured prediction, dimensionality reduction, Bayesian nonparametrics, multi-task learning, etc. We will also examine a range of strategies used for inference and learning in these models. Students will beexpected to read recent papers and carry out a research project. [Applications or Analysis]
EN.600.465/EN.601.465 or EN.601.665

EN.601.769. Events Semantics in Theory and Practice. 3 Credits.
This course explores selected topics in the nature of event representations from the perspective of cognitive science, computer science, linguistics, and philosophy. These fields have developed a rich array of scientific theories about the representation of events, and how humans make inferences about them -- we investigate how (and if) such theories could be applied to current research topics and tasks in computational semantics such as inference from text, automated summarization, veridicality assessment, and so on. In addition to classic articles dealing with formal semantic theories, the course considers available machine-readable corpora, ontologies, and related resources that bear on event structure, such as WordNet, PropBank, FrameNet, etc.. The course is aimed to marry theory with practice: students with either a computational or linguistic background are encouraged to participate. [Applications]

EN.601.778. Advanced Topics in Causal Inference. 3 Credits.
This course will cover advanced topics on all areas of causal inference, including learning causal effects, path-specific effects, and optimal policies from data featuring biases induced by missing data, confounders, selection, and measurement error, techniques for generalizing findings to different populations, complex probabilistic models relevant for causal inference applications, learning causal structure from data, and inference under interference and network effects. The course will feature a final project which would involve either an applied data analysis problem (with a causal inference flavor), a literature review, or theoretical work. [Analysis] Recommended Background: EN.600.477/677 or EN.601.477/677

EN.601.779. Machine Learning: Advanced Topics. 3 Credits.
This course will focus on recent advances in machine learning. Topics will vary from year to year. The course will be project focused and involve presenting and discussing recent research papers.

EN.601.780. Unsupervised Learning: From Big Data to Low-Dimensional Representations. 3 Credits.
In the era of data deluge, the development of methods for discovering structure in high-dimensional data is becoming increasingly important. This course will cover state-of-the-art methods from algebraic geometry, sparse and low-rank representations, and statistical learning for modeling and clustering high-dimensional data. The first part of the course will cover methods for modeling data with a single low-dimensional subspace, such as PCA, Robust PCA, Kernel PCA, and manifold learning techniques. The second part of the course will cover methods for modeling data with multiple subspaces, such as algebraic, statistical, sparse and low-rank subspace clustering techniques. The third part of the course will cover applications of these methods in image processing, computer vision, and biomedical imaging. Requistes include Linear Algebra, Optimization, and prior exposure to Machine I.

EN.601.783. Vision as Bayesian Inference. 3 Credits.
This is an advanced course on computer vision from a probabilistic and machine learning perspective. It covers techniques such as linear and non-linear filtering, geometry, energy function methods, markov random fields, conditional random fields, graphical models, probabilistic grammars, and deep neural networks. These are illustrated on a set of vision problems ranging from image segmentation, semantic segmentation, depth estimation, object recognition, object parsing, scene parsing, action recognition, and text captioning. [Analysis orApplications] Required course background: calculus, linear algebra (AS.110.201 or equiv.), probability and statistics (AS.553.311 or equiv.), and the ability to program in Python and C++. Background in computer vision (EN.601.461/661) and machine learning (EN.601.475) suggested but not required.

EN.601.787. Advanced Machine Learning: Machine Learning for Trustworthy AI. 3 Credits.
This course teaches advanced machine learning methods for the design, implementation, and deployment of trustworthy AI systems. The topics we will cover include but are not limit to different types of robust learning methods, fair learning methods, safe learning methods, and research frontiers in transparency, interpretability, privacy, sustainability, AI safety and ethics. Students will learn the state-of-the-art methods in lectures, understand the recent advances by critiquing research articles, and apply/innovate new machine learning methods in an application. There will be homework assignments and a course project.

EN.601.801. Computer Science Seminar. 1 Credit.
Required for all full-time CS PhD students. Recommended for MSE students.

EN.601.803. Masters Research. 3 - 10 Credits.
Permission required. Independent research for masters or pre-dissertation PhD students.

EN.601.805. Graduate Independent Study. 1 - 3 Credits.
Permission required. Individual study in an area of mutual interest to a graduate student and a faculty member in the department.

EN.601.807. Teaching Practicum. 1 Credit.
PhD students will gain valuable teaching experience, working closely with their assigned faculty supervisor. Successful completion of this course fulfills the PhD teaching requirement.(grad students) Permission req'd.

EN.601.808. Selected Topics in CS Education. 1 Credit.
This course will explore current issues and research in computer science education. Topics will be drawn from literature, news items, and participant experience. Current faculty and students with interests in academic careers are encouraged to attend.

EN.601.809. PhD Research. 3 - 20 Credits.

EN.601.810. Diversity and Inclusion in Computer Science and Engineering. 1 Credit.
This reading seminar will focus on the question of diversity and inclusion in Computer Science (in particular) and engineering (in general). We aim to study the ways in which the curriculum, environment, and structure of computer science within academia perpetuates biases alienating female and minoritized students, and to explore possible approaches for diversifying our field. The seminar will meet on a weekly basis, readings will be assigned, and students will be expected to participate in the discussion.

EN.601.814. Selected Topics in Computer Networks. 1 Credit.
In this course, we will read, discuss and present classic papers and current research in computer networks. The topic coverage will vary each semester.

EN.601.817. Selected Topics in Systems Research. 1 Credit.
This course covers latest advances in the research of computer systems including operating systems, distributed system, mobile and cloud computing. Students will read and discuss recent research papers in top systems conferences. Each week, one student will present the paper and lead the discussion for the week. The focus topics covered in the papers vary semester to semester. Example topics include fault-tolerance, reliability, verification, energy efficiency, and virtualization.

EN.601.819. Selected Topics in Cloud Computing and Networked Systems. 1 Credit.
Participants will read and discuss seminal and recent foundational research on cloud and networked systems.

EN.601.826. Selected Topics in Programming Languages. 1 Credit.
This seminar course covers recent developments in the foundations of programming language design and implementation. Topics covered include type theory, process algebra, higher-order program analysis, and constraint systems. Students will be expected to present papers orally.

EN.601.831. CS Theory Seminar. 1 Credit.
Seminar series in theoretical computer science. Topics include algorithms, complexity theory, and related areas of TCS. Speakers will be a mix of internal and external researchers, mostly presenting recently published research papers.

EN.601.833. Seminar in Algorithms. 1 Credit.
This course will explore algorithms and theoretical computer science with a focus on algorithms for massive data. Examples of topics include streaming algorithms, approximation algorithms, online algorithms. Students will be encouraged to select a paper and lead a discussion. External speakers will be invited to present current work as well. This course is a good opportunity for motivated students to learn modern algorithmic methods.Recommended Course Background: EN.601.433 or equivalent.

EN.601.845. Selected Topics in Applied Cryptography. 1 Credit.
In this course students will read, discuss and present current research papers in applied cryptography. Topic coverage will vary each semester. Instructor approval required.

EN.601.849. Selected Topics in Computational Immunogenomics. 1 Credit.
Immunology studies defensive mechanisms of living organisms against external threats. Computational immunogenomics is a new branch of bioinformatics that develops and applies computational approaches to the study and interpretation of immunological data, seeking to answer questions about human adaptive immune responses to various pathogens, including but not limited to flu, HIV, and SARS-CoV-2. In this course, students will attend lectures and present immunogenomics papers in a journal club format.

EN.601.856. Seminar: Medical Image Analysis. 1 Credit.
This weekly seminar will focus on research issues in medical image analysis, including imagesegmentation, registration, statistical modeling, and applications. It will also include selected topicsrelating to medical image acquisition, especially where they relate to analysis. The purpose of thecourse is to provide the participants with a thorough background in current research in these areas, as well as to promote greater awareness and interaction between multiple research groups withinthe University. The format of the course is informal. Students will read selected papers. All students will be assumed to have read these papers by the time the paper is scheduled for discussion. But individual students will be assigned on a rotating basis to lead the discussion on particular papers or sections of papers. Co-listed with En.520.746.

EN.601.857. Selected Topics in Computer Graphics. 1 Credit.
In this course we will review current research in computer graphics. We will meet for an hour once a week and one of the participants will lead the discussion for the week.

EN.601.864. Selected Topics in Multilingual Natural Language Processing. 1 Credit.
This is a weekly reading group focused on Natural Language Processing (NLP) outside of English. Whereas methods have gotten very strong in recent years on English NLP tasks, many methods fail on other languages due to both linguistic differences as well as lack of available annotated resources. This course will focus on Cross-Language Information Retrieval, Cross-Lingual Information Extraction, Multilingual Semantics, Massively Multilingual Language Modeling, and other non-English NLP sub-fields. Students will be expected to read, discuss, and present papers. Required course background: EN.601.465/665.

EN.601.865. Selected Topics in Natural Language Processing. 1 Credit.
A reading group exploring important current research in the field and potentially relevant material from related fields. Enrolled students are expected to present papers and lead discussion.
EN.601.465 OR EN.601.665.

EN.601.866. Selected Topics in Computational Semantics. 1 Credit.
This weekly reading group will review current research and survey articles on the topics of computational semantics, statistical machine translation, and natural language generation. Enrolled students will present papers and lead discussions.

EN.601.868. Selected Topics in Machine Translation. 1 Credit.
Students in this course will review, present, and discuss current research in machine translation. Permission of instructor.

EN.601.875. Selected Topics in Machine Learning. 1 Credit.
This seminar is recommended for all students interested in data intensive computing research areas (e.g., machine learning, computer vision, natural language processing, speech, computational social science). The meeting format is participatory. Papers that discuss best practices and the state-of-the-art across application areas of machine learning and data intensive computing will be read. Student volunteers lead individual meetings. Faculty and external speakers present from time-to-time. Recommended Course Background: machine learning or permission of the instructor.

EN.605 (Computer Science)

EN.605.101. Introduction to Python.
Not for a letter grade. Offered pass/fail only. This is a six-week course. The withdrawal deadline is the end of the fourth week. Students must pass each module to pass the course. Course Note(s): Not for graduate credit. This course does not satisfy any admission requirements. Instructor(s): Non-facilitated

EN.605.201. Introduction to Programming Using Java. 3 Credits.
This course enables students without a background in software development to become proficient programmers who are prepared for a follow-on course in data structures. The Java language will be used to introduce foundations of structured, procedural, and object-oriented programming. Topics include input/output, data types, operators, program control flow structures, arrays, strings, and methods. Students will also be introduced to classes, objects, inheritance, polymorphism, exception handling, processing streams and files, collections, wrappers, and generics, and graphical user interfaces. Students will complete several programming assignments and projects to develop their problem-solving skills and to gain experience in detecting and correcting software errors. Prerequisite(s): One year of college mathematics. Course Note(s): Not for graduate credit. A programming methodology course is needed for admission to the Computer Science, Cybersecurity, Data Science, or Information Systems Engineering program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.202. Data Structures. 3 Credits.
This course investigates abstract data types (ADTs), recursion, algorithms for searching and sorting, and basic algorithm analysis. ADTs to be covered include lists, stacks, queues, priority queues, trees, sets, and dictionaries. The emphasis is on the trade-offs associated with implementing alternative data structures for these ADTs. There will be four substantial programming assignments. This course will be taught in a language agnostic fashion. Students may choose to develop their work in Java, C++, or Python (Not for Graduate credit.) Prerequisite(s): One year of college mathematics. 605.201 Introduction to Programming Using Java or 605.206 Introduction to Programming in Python or equivalent. Course Note(s): Not for graduate credit. A course in data structures is needed for admission to the Computer Science, Cybersecurity, and Data Science program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better. A course in data structures is conditionally required for admission to the Information Systems Engineering program. Students who lack this prerequisite can satisfy it by completing this course with a grade of B– or better before taking any course that requires it. A second course in programming is required for admission to the Artificial Intelligence program. Students who lack this prerequisite can satisfy it by completing this course with a grade of B– or better before taking any course that requires it. Students in the Artificial Intelligence program who plan to take the 605.621 Foundations of Algorithms and 605.649 Introduction to Machine Learning Sequence are required to take 605.202 or equivalent.

EN.605.203. Discrete Mathematics. 3 Credits.
This course emphasizes the relationships between certain mathematical structures and various topics in computer science. Topics include set theory, graphs and trees, algorithms, propositional calculus, logic and induction, functions, relational algebra, and matrix algebra. Prerequisite(s): Calculus is recommended. Course Note(s): Not for graduate credit. A mathematics course beyond one year of calculus is needed for admission to the Computer Science, Cybersecurity, or Data Science program. A course in either calculus or discrete mathematics is needed for admission to the Information Systems Engineering program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.204. Computer Organization. 3 Credits.
This course examines how a computer operates at the machine level. Students will develop an understanding of the hardware/ software interface by studying the design and operation of computing system components. In addition, students will program at the assembly language level to understand internal system functionality. Finally, students will become familiar with the machine representations of programs and data, as well as the influence of the underlying hardware system on the design of systems software such as operating systems, compilers, assemblers, and linkers and loaders. Prerequisite(s): 605.202 - Data Structures is recommended. Course Note(s): Not for graduate credit. A course in computer organization is needed for admission to the Computer Science or Cybersecurity program. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.205. Molecular Biology for Computer Scientists. 3 Credits.
This course is designed for students who seek to take bioinformatics courses but lack prerequisites in the biological sciences. The course covers essential aspects of biochemistry, cell biology, and molecular biology. Topics include the chemical foundations of life; cell organization and function; the structure and function of macromolecules; gene expression— transcription, translation, and regulation; biomembranes and transmembrane transport; metabolism and cellular energetics; and signal transduction. The application of foundational concepts in developmental biology, neurobiology, immunology, and cancer biology is also introduced. Course Note(s): Not for graduate credit. Several courses in the Bioinformatics track of Computer Science require background in Molecular Biology. Students can fulfill this requirement by completing this course with a grade of B- or better.

EN.605.206. Introduction to Programming Using Python. 3 Credits.
This course is a practical introduction for those interested in learning Python for a wide variety of applications and use cases. The material has been designed to expose you to common techniques and tools you'll be able to exercise immediately. This course assumes no prior development experience and ranges from beginning to intermediate Python concepts including: creating a Python environment, data types, operators/expressions, data and control structures, conditional statements, classes/objects, functions, multi-threaded applications, testing and deployment tools, REST API's, machine learning, and more. You'll also gain valuable experience with tools like PyCharm/ VSCode, Jupyter Notebooks, Git, PyLint, PyDocs/Doxygen, and many more. Each concept is accompanied by real code samples that will be explained in-detail and the assignments will present you with interesting scientific problems to enable you to practice your Python skills for the purpose of solving real, complex problems. The course is textbook-free and provides a number of hand-chosen readings to supplement the lecture materials. Upon completion of the course you will be equipped with knowledge of the skills and tools to begin tackling problems the Pythonic way.Prerequisite(s): One year of college mathematics.Course Note(s): Not for graduate credit. A programming methodology course is needed for admission to the Artificial Intelligence or Data Science programs. Students who lack this prerequisite can fulfill admission requirements by completing this course with a grade of B– or better.

EN.605.601. Foundations of Software Engineering. 3 Credits.
Fundamental software engineering techniques and methodologies commonly used during software development are studied. Topics include various life cycle models, project planning and estimation, requirements analysis, program design, construction, testing, maintenance and implementation, software measurement, and software quality. Emphasized are structured and object-oriented analysis and design techniques, use of process and data models, modular principles of software design, and a systematic approach to testing and debugging. The importance of problem specification, programming style, periodic reviews, documentation, thorough testing, and ease of maintenance are covered. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.605.602. Software Analysis and Design. 3 Credits.
This course prepares students to successfully engineer secure software systems by addressing critical security challenges across the entire software development life cycle. Students will learn the practical skills for building secure software from the ground up through hands-on labs and exercises. Key topical areas addressed include security in software requirements, design, and development. Common security pitfalls are highlighted and examined as well as the tools and techniques for identifying and eliminating the security vulnerabilities. Security considerations in Mobile code development are also addressed. Parameterized refinement methods and transduction techniques based on mathematical-based proofs are presented as a means of verifying the correctness of code and modifications to code as well as to validate conformance with functional requirements. Software protection techniques such as code obfuscation and water-marking are explored.

EN.605.603. Object-Oriented and Functional Programming in Kotlin. 3 Credits.
This course introduces object-oriented and functional programming in the new programming language Kotlin. Kotlin runs on multiple platforms and virtually anywhere, compiling to native code, JavaScript, the Android runtime, and the Java Virtual Machine. It easily interacts with other Java code. Through this course, you'll become adept at Kotlin programming, an easier-to-use, safer and more productive language than Java. We'll cover the basics of the language, including data types, functions and collections, object-oriented features such as classes, encapsulation, inheritance, composition, delegation and generics, and functional features such as immutability, higher-order functions and functional chaining. You'll learn how to create multi-threaded applications using coroutines and builders that will simplify the use of your libraries using simple Domain-Specific languages. Students will build several projects in Kotlin.Pre-requisites: Competence in a procedural language (such as C, Pascal, or Visual Basic) or object-oriented language (such as Java or C++). Note that this is not an "introduction to programming" class and cannot substitute for 605.201; we assume familiarity with programming in general.

EN.605.604. Object-Oriented Programming with C++. 3 Credits.
This course provides in-depth coverage of object-oriented programming principles and techniques using C++. Topics include classes, overloading, data abstraction, information hiding, encapsulation, inheritance, polymorphism, file processing, templates, exceptions, container classes, and low-level language features. The course briefly covers the mapping of UML design to C++ implementation and object-oriented considerations for software design and reuse. The course also relates C++ to GUI, databases, and real-time programming. The course material embraces the C++11 language standard with numerous examples demonstrating the benefits of C++11. Prerequisite(s): Knowledge of a high level block structures language.

EN.605.606. Programming with Domain-Specific Languages. 3 Credits.
Domain-specific languages (DSLs) are little languages you write that look and feel like a spoken way to specify data or write code. You can use them for input and output, incorporating the jargon and nomenclature of your subject-matter experts (SMEs), as well as inside your own code to make it more expressive and fluent, and often simpler. You can use them as part of your build process to generate hundreds of classes full of otherwise tedious and error-prone boilerplate code from a small specification in a consistent manner. In this course, we'll design and implement several types of DSLs. We'll write code to edit and import data, allowing SMEs more natural-feeling access to your software. We'll create APIs in multiple programming languages to make it easier and more secure for others to use your libraries. We'll generate code to improve productivity and reliability in your own software. Course Note(s): Examples and assignments in this class will be done in several programming languages. We assume a high comfort level with Java and the ability to adapt to new languages quickly.
EN.605.601 Intro to Software Engineering

EN.605.607. Agile Software Development Methods. 3 Credits.
This course emphasizes the quick realization of system value through disciplined, iterative, and incremental software development techniques and the elimination of wasteful practices. Students will study the full spectrum of agile methods, including Scrum, Extreme Programming, Lean, Kanban, Dynamic Systems Development Method, and Feature-Driven Development. These methods promote teamwork, rich concise communication, and the frequent delivery of running, tested systems containing the highest-priority stakeholder features. Agile methods are contrasted with common workplace practices and traditional, Waterfall-based methods. Examples of agile adoption in industry are covered, along with scaling methods for large-scale development. Assignments and projects are designed to help students apply agile principles and practices in their own professional context. Additional subthemes in the course include enterprise agility, team dynamics, collaboration, software quality, and metrics for reporting progress. Prerequisite(s): EN.605.601 Intro to Software Engineering
EN.605.601 Foundations of Software Engineering

EN.605.608. Software Project Management. 3 Credits.
This course describes the key aspects of a software project. It begins with the job description of a software manager and then addresses those topics germane to successful software development management, including organizing the software development team; interfacing with other engineering organizations (systems engineering, quality assurance, configuration management, and test engineering); assessing development standards; selecting the best approach and tailoring the process model; estimating software cost and schedule; planning and documenting the plan; staffing the effort; managing software cost and schedule during development; risk engineering; and continuous process improvement. Personnel management topics, including performance evaluations, merit planning, skills building, and team building, are also covered. This course introduces software engineers aspiring to become technical team leaders or software project managers to the responsibilities of these roles. For those engineers who have advanced to a software development leadership position, this course offers formal training in software project management. Prerequisite(s): Three to five years technical work experience is recommended.

EN.605.609. DevOps and Secure Software Development. 3 Credits.
This course focuses on three key concepts: Agile Software Development, Infrastructure as Code, and Secure Software Delivery. Throughout this course students will learn how to build modern software systems through version control, automated deployment techniques, and improved documentation. This course gathers the latest publications to instruct students on: source code control, virtualization and containerization (Docker) techniques, build automation tools, software composition management/analysis, cloud security, and application security testing (SAST/DAST/IAST/RASP). The course concludes with a team project where students code a functioning DevSecOps pipeline to automate the assessment of software for security.Prerequisite(s): Prior experience in software development in any language is required. Familiarity with software design, cloud development, and architecture techniques is recommended.

EN.605.611. Foundations of Computer Architecture. 3 Credits.
This course provides a detailed examination of the internal structure and operation of modern computer systems. Each of the major system components is investigated, including the following topics: the design and operation of the ALU, FPU, and CPU; microprogrammed vs. hardwired control, pipelining, and RISC vs. CISC machines; the memory system including caches and virtual memory; parallel and vector processing, multiprocessor systems and interconnection networks; superscalar and super-pipelined designs; and bus structures and the details of low-level I/O operation using interrupt mechanisms, device controllers, and DMA. The impact of each of these topics on system performance is also discussed. The instruction set architectures and hardware system architectures of different machines are examined and compared. The classical Von Neumann architecture is also compared and contrasted with alternative approaches such as data flow machines and neural networks. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.605.612. Operating Systems. 3 Credits.
The theory and concepts related to operating system design are presented from both developer and user perspectives. Core concepts covered include process management, memory management, file systems, I/O system management including device drivers, distributed systems, and multi-user concepts including protection and security. Process management discussions focus on threads, scheduling, and synchronization. Memory management topics include paging, segmentation, and virtual memory. Students will examine how these concepts are realized in several current open-source operating systems, including Linux. Students will complete several assignments that require the design and implementation of operating system programs using a high-level language.

EN.605.613. Introduction to Robotics. 3 Credits.
This course introduces the fundamentals of robot design and development with an emphasis on autonomy. Robot design, navigation, obstacle avoidance, and artificial intelligence will be discussed. Topics covered in robot design include robot structure, kinematics and dynamics, the mathematics of robot control (multiple coordinate systems and transformations), and designing for autonomy. Navigation topics include path planning, position estimation, sensors (e.g., vision, ultrasonics, and lasers), and sensor fusion. Obstacle avoidance topics include obstacle characterization, object detection, sensors and sensor fusion. Topics to be discussed in artificial intelligence include learning, reasoning, and decision making. Students will deepen their understanding through several assignments and the term-long robot development project.

EN.605.614. System Development in the UNIX Environment. 3 Credits.
This course describes how to implement software systems in a UNIX (POSIX-compliant) operating system environment. Students will discuss and learn the complexities, methodologies, and tools in the development of large systems that contain multiple programs. Topics include an overview of the UNIX system and its general-purpose tools, advanced makefile usage, UNIX system calls, UNIX process management, threads, and basic and advanced interprocess communication. Additional topics include source code configuration control, Perl, and debugging techniques.Prerequisite(s): Familiarity with UNIX, experience with C++ or C.

EN.605.615. Compiler Design with LLVM. 3 Credits.
The components of a compiler appear in every software application that handles input from an external source. This course shows how the components of a compiler are built and how they fit together to extract meaning from the input and how the data flows through the compiler's components to become useful to applications. Students will get practical experience in how to use the LLVM tools to build a complete compiler for a subset of the C++ programming language that can target almost any platform. Students will also get experience in developing a "Just In Time" component for an application that will accept code as input into the application while it is running, to be compiled and linked into the application so the application can execute it. Prerequisites: This course has no formal prerequisites, but experience with C++ is highly recommended because LLVM is written in C++, and therefore, all homework will be in C++, and this course is software homework intensive.

EN.605.616. Multiprocessor Architecture & Programming. 3 Credits.
This course addresses how to utilize the increasing hardware capabilities of multiprocessor computer architecture's highperformance computing platforms for software development. The famous Moore's Law is still alive, although it is now realized from increasing the number of CPU cores instead of increasing CPU clock speed. This course describes the differences between single-core and multi-core systems and addresses the impact of these differences in multiprocessor computer architectures and operating systems. Parallel programming techniques to increase program performance by leveraging the multiprocessor system, including multi-core architectures, will be introduced. Additional topics include program performance analysis and tuning, task parallelism, synchronization strategies, shared memory access and data structures, and task partition techniques. The course encourages hands-on experience with projects selected by the student.

EN.605.617. Introduction to GPU Programming. 3 Credits.
This course will teach the fundamentals needed to utilize the ever-increasing power of the GPUs housed in the video cards attached to our computers. For years, this capability was limited to the processing of graphics data for presentation to the user. With the CUDA and OpenCL frameworks, programmers can develop applications that harness this power directly to search, modify, and quickly analyze large amounts of various types of data. Students will be introduced to core concurrent programming principles, along with the specific hardware and software considerations of these frameworks. In addition, students will learn canonical algorithms used to perform high-precision mathematics and data transformations. Class time will be split between lectures and hands-on exercises. There will be two individual projects in both CUDA and OpenCL programming, which will allow students to independently choose demonstrable goals, develop software to achieve those goals, and present the results of their efforts.

EN.605.620. Algorithms for Bioinformatics. 3 Credits.
This follow-on course to data structures (e.g., 605.202 Data Structures) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, minimum spanning trees). Advanced topics are selected from among the following: multithreaded algorithms, matrix operations, linear programming, string matching, computational geometry, and approximation algorithms. Students will form groups to work on difficult problems and also to present an advanced topic at the end of the term. The course will draw on applications from Bioinformatics. Prerequisite(s): 605.202 Data Structures or equivalent, and 605.201 Introduction to Programming Using Java or 605.206 Introduction to Programming in Python or equivalent. 605.203 Discrete Mathematics or equivalent is recommended.Course Note(s): This course does not satisfy the foundation course requirement for Computer Science, Data Science, or Cybersecurity. Students can only earn credit for one of 605.620, 605.621, or 685.621.

EN.605.621. Foundations of Algorithms. 3 Credits.
This follow-on course to data structures (e.g., 605.202) provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving computer science. Topics include advanced data structures (red-black and 2-3-4 trees, union-find), recursion and mathematical induction, algorithm analysis and computational complexity (recurrence relations, big-O notation, NP-completeness), sorting and searching, design paradigms (divide and conquer, greedy heuristic, dynamic programming, amortized analysis), and graph algorithms (depth-first and breadth-first search, connectivity, minimum spanning trees, network flow). Advanced topics are selected from among the following: randomized algorithms, information retrieval, string and pattern matching, and computational geometry. Prerequisite(s): EN.605.202 Data Structures or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

EN.605.622. Computational Signal Processing. 3 Credits.
This course introduces algorithms and architectures for the analysis and processing of digital signals, taking the computer science perspective. It emphasizes computational complexity and efficiency and the design and implementation of computer algorithms for processing signals, designing digital filters, and effectively presenting and displaying information. Topics include signal analysis, discrete Fourier transform (definition, applications, and fast algorithms), convolution and correlation, spectral estimation and display, filter design, signal encoding/decoding, time-frequency analysis, Software Defined Radio (SDR), arithmetic computational complexity, and applications Background in signal processing and mathematics will be introduced as needed. EN.605.621 Foundations of Algorithms or equivalent background, some knowledge of complex numbers and linear algebra (vectors and matrices).

EN.605.623. Intro to Enumerative Combinatorics. 3 Credits.
The most basic question in mathematics is How many? Counting problems arise in diverse areas including discrete probability and the analysis of the run time of algorithms.In this course we present methods for answering enumeration questions exactly and approximately. Topics include fundamental counting problems (lists, sets, partitions, and so forth), combinatorial proof, inclusion-exclusion, ordinary and exponential generating functions, group-theory methods, and asymptotics. Examples are drawn from areas such as graph theory and block designs.After completing this course students will be practiced in applying the fundamental functions (such as factorial, binomial coefficients, Stirling numbers) and techniques for solving a wide variety of exact enumeration problems as well as notation and methods for approximate counting (asymptotic equality, big-oh and little-oh notation, etc.).Course prerequisite(s): Linear algebraCourse note(s): This course is the same as 625.617 Introduction to Enumerative Combinatorics.

EN.605.624. Logic: Systems, Semantics, and Models. 3 Credits.
Traditionally, logic is the study of correct reasoning. In the last few decades, logic has become increasingly important to knowledge representation -- a subfield of artificial intelligence concerned with developing representations of the world (often called ontologies) that aid computers in understanding and making sense of data. This course will promote both a theoretical and practical understanding of logic as a stepping stone for working in contemporary knowledge representation. We will begin with a review of categorical, propositional, and predicate logic. We will then survey modal logics, which include systems that represent necessity and probability, as well as other systems that represent time, and moral notions such as obligation and permissibility. The second half of the course will then introduce the semantic web and ontology engineering. Students will explore the top-level ontology Basic Formal Ontology (BFO) and gain familiarity using mereological and temporal relations. In addition, students will create ontologies in the web ontology language (OWL2) and use the language SPARQL to query knowledge graphs. Students will have the option of writing either a research paper or creating an ontology in OWL with slides as part of a final project.

EN.605.625. Probabilistic Graphical Models. 3 Credits.
This course introduces the fundamentals behind the mathematical and logical framework of graphical models. These models are used in many areas of machine learning and arise in numerous challenging and intriguing problems in data analysis, mathematics, and computer science. For example, the “big data” world frequently uses graphical models to solve problems. While the framework introduced in this course will be largely mathematical, we will also present algorithms and connections to problem domains. The course will begin with the fundamentals of probability theory and will then move into Bayesian networks, undirected graphical models, templatebased models, and Gaussian networks. The nature of inference and learning on the graphical structures will be covered, with explorations of complexity, conditioning, clique trees, and optimization. The course will use weekly problem sets and a term project to encourage mastery of the fundamentals of this emerging area. Prerequisite(s): Graduate course in probability and statistics (such as 625.603 Statistical Methods and Data Analysis). Course Note(s): This course is the same as 625.692 Probabilistic Graphical Models.

EN.605.626. Image Processing. 3 Credits.
Fundamentals of image processing are covered, with an emphasis on digital techniques. Topics include digitization, enhancement, segmentation, the Fourier transform, filtering, restoration, reconstruction from projections, and image analysis including computer vision. Concepts are illustrated by laboratory sessions in which these techniques are applied to practical situations, including examples from biomedical image processing. Prerequisite(s): Familiarity with Fourier transforms.

EN.605.627. Computational Photography. 3 Credits.
Computational photography is an emerging research area at the intersection of computer graphics, image processing, and computer vision. As digital cameras become more popular and collections of images continue to grow, we’ve seen a surge in interest in effective ways to enhance photography and produce more realistic images through the use of computational techniques. Computational photography overcomes the limitations of conventional photography by analyzing, manipulating, combining, searching, and synthesizing images to produce more compelling, rich, and vivid visual representations of the world. This course will introduce the fundamental concepts of image processing, computer vision, and computer graphics, as well as their applications to photography. Topics include image formation, filtering, blending, and completion techniques. In addition, the course will discuss different image analysis and rendering techniques including texture analysis, morphing, and nonphotorealistic rendering.

EN.605.629. Programming Languages. 3 Credits.
This course compares and contrasts a wide variety of features of at least twelve programming languages, including programming language history; formal methods of describing syntax and semantics; names, binding, type checking, and scopes; data types; expressions and assignment statements; statement-level control structures; design and implementation of subprograms; exception handling; and support for objectoriented programming. Students will also learn and write fourweek projects in three programming languages (e.g., Python, Perl, and C#).

EN.605.630. Theory of Computation. 3 Credits.
This is a graduate-level course studying the theoretical foundations of computer science. Topics covered will be models of computation from automata to Turing machines, computability, time and space complexity theory, Boolean circuits, and interactive proof systems.

EN.605.631. Statistical Methods for Computer Science. 3 Credits.
Statistical methods are the foundation for data science, artificial intelligence, and much of the field of computer science. Topics include probability, random variables, regression, gradient search, Bayesian methods, graphical methods, and exponential random graph models. Student will have the foundation to excel in future courses in machine learning, data science, algorithms, and more. Practice exercises will develop proficiency in the R programming language.

EN.605.632. Graph Analytics. 3 Credits.
Graphs are a flexible data structure that facilitates fusion of disparate data sets. Applications of graphs have shown steady growth with the development of Internet, cyber, and social networks, presenting large graphs for which analysis remains a challenging problem. This course introduces algorithms and techniques to address large-scale graph analytics. It will blend graph analytics theory, hands-on development of graph analytics algorithms, as well as processing approaches that support the analytics. We will start by introducing graphs, their properties, and example applications, including necessary background on probability and linear algebra. Statistical properties of random and scale-free graphs will be introduced. Graph analytic methods, including centrality measures, graph clustering, partitioning, link inference, and dynamic graph processes such as diffusion, contagion, and opinion formation will be covered. Application of graph analytics to high-dimensional data analysis and data clustering will be discussed. Students will use standard graph interfaces as well as linear algebra-based methods to analyze graphs. Parallelization of analytics to handle larger-scale graphs will be discussed. Students will identify and apply suitable algorithms and analysis techniques to a variety of graph analytics problems, as well as gain experience setting up and solving these problems. There will be hands-on programming assignments.

EN.605.633. Social Media Analytics. 3 Credits.
Today an immense social media landscape is being fueled by new applications, growth of devices (e.g., Smartphones and devices), and human appetite for online engagement. With a myriad of applications and users, significant interest exists in the obvious question, “How does one better understand human behavior in these communities to improve the design and monitoring of these communities?” To address this question a multidisciplinary approach that combines social network analysis (SNA), natural language processing, and data analytics is required. This course combines all these topics to address contemporary topics such as marketing, population influence, etc. There will be several small projects.
Prerequisite(s): Knowledge of Python or R; matrix algebra.
Foundation Prerequisites for Cybersecurity Majors:EN.605.621 AND EN.695.601 AND EN.695.641;Computer Science majors need to complete foundation requirement first.

EN.605.634. Crowdsourcing and Human Computation. 3 Credits.
Crowdsourcing and human computation reverses the typical approach to computing. Rather than using computers to conduct computation that is too difficult for a human, many humans are used to conduct computation that is too difficult for a computer. This course explores computer science topics that lie at the intersection of data science and social psychology. Topics include crowdsourcing, social media, social network analysis, games, gamification, ubiquitous computing, and computersupported cooperative work. Laboratory exercises will involve hands-on data collection and analysis to include Mechanical Turk and require programming in R or Python depending on student preference/ proficiency.

EN.605.635. Cloud Computing. 3 Credits.
Cloud computing helps organizations realize cost savings and efficiencies without spending capital resources up front, while modernizing and expanding their IT capabilities. Cloud-based infrastructure is rapidly scalable, secure, and accessible over the Internet —you pay only for what you use. So, enterprises worldwide, big and small, are moving toward cloud-computing solutions for meeting their computing needs, including the use of Infrastructure as a Service (IaaS) and Platform as a Service (PaaS). We have also seen a fundamental shift from shrinkwrapped software to Software as a Service (SaaS) in data centers across the globe. Moreover, providers such as Amazon, Google, and Microsoft have opened their datacenters to third parties by providing low-level services such as storage, computation, and bandwidth. This trend is creating the need for a new kind of enterprise architect, developer, QA, and operational professional—someone who understands and can effectively use cloud-computing technologies and solutions. In this course, we discuss critical cloud topics such as cloud service models (IaaS, PaaS, SaaS); virtualization and how it relates to cloud; elastic computing; cloud storage; cloud networking; cloud databases; cloud security; and architecting, developing, and deploying apps in the cloud. The format of this course will be a mix of lectures, and hands-on demos. Upon completing this course, students will have a deeper understanding of what cloud computing is and the various technologies that make up cloud computing, along with hands-on experience working with a major cloud provider. Prerequisite(s): 605.202 Data Structures.

EN.605.636. Autonomic Computing. 3 Credits.
This course is an introduction to autonomic and self-aware computing systems. It surveys the field of autonomic computing from its first introductory vision to the current time. The course describes autonomic computing and how it provides self-managing systems with their ability to adapt to unpredictable changes in an environment. It concentrates on the self-awareness properties of autonomic systems, the architecture, the monitoring systems that provide the self-awareness, and the adaptation and decision making needed to adapt to changing environments. The course covers the vision of autonomic computing and how autonomic computing differs from automated and autonomous systems. It discusses the self-awareness properties of autonomic systems and their biological inspiration. Architectures of autonomic systems are covered, which includes autonomic managers that are the core of autonomic systems that provide the self-managing nature of autonomic systems. Adaptation, another important aspect of autonomic computing, is discussed as well as what makes an autonomic system self-aware. The course ends with evaluation and assurance of autonomic systems, and future trends in the field. There will be weekly readings and discussions, approximately bi-weekly assignments that go into depth on selected topics, and a final project or research paper. The project can be an implementation of a part of an autonomic computing system, or a research paper that goes into depth on one of the topics covered or a topic that is of interest to the student.

EN.605.641. Principles of Database Systems. 3 Credits.
This course examines the underlying concepts and theory of database management systems. Topics include database system architectures, transaction management, data models, query languages, conceptual and logical database design, and physical organization. The entity-relationship (ER) model, using ER diagram (ERD) and Enhanced ERD, as well as relational models, are investigated in detail. Object-oriented databases are introduced along with legacy systems based on the network. Hierarchical models as well as big data and NoSQL are also briefly described. Mappings from the conceptual level to the logical level, integrity constraints, dependencies, and normalization are studied as a basis for formal design. Theoretical languages such as the relational algebra and the relational calculus are described, and high-level languages such as SQL, triggers and Stored Procedures are discussed. An overview of file organization and access methods is provided as a basis for discussion of query optimization and execution. The course also covers the causes of performance problems and how to improve database application performance during database design and implementation.Course prerequisite(s): 605.202 Data Structures.

EN.605.643. Linked Data and the Semantic Web. 3 Credits.
The World Wide Web Consortium (W3C) is endeavoring to create standards and technology that support a distributed "Web of data." Collectively, these advances allow the systems we develop to work and interact more effectively, through the use of XML-based languages, and information on how various tags relate to real-world objects and concepts. This course covers a range of Semantic Web technologies, including RDF (Resource Description Framework - a model for data interchange) and OWL (Web Ontology Language), as well as domain-specific standards and ontologies (formal specifications of how to represent objects and concepts). Representative applications of RDF, OWL, and ontologies to various problems will be discussed. Students will apply course concepts to an in-depth project in an area of personal or professional interest. Prerequisite(s): 605.202 Data Structures. Course Note(s): This course may be counted toward a threecourse track in Bioinformatics.

EN.605.644. XML Design Paradigms. 3 Credits.
The course explores understanding the tradeoffs among XML grammars and XML techniques to solve different classes of problems. Topics include optimization of XML grammars for different XML technologies; benefits of using different XML schema languages; tradeoffs in using different parsing approaches; benefits of parsing technology vs. XML query; the role of Web 2.0 to deliver functionality through various web services approaches; exploiting XML to drive audio, visual, and tactile displays; the role of XML in multiplying the power of standard web browser technologies; and the role of Web 3.0 to deliver Semantic Web functionality. XML technologies that will be covered include XML Schema, XPath, XSLT, SAX, DOM, XQuery, SOAP, WSDL, JAX-B, JAX-WS, REST, RDF, and OWL.
EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.645. Artificial Intelligence. 3 Credits.
This is a foundational course in Artificial Intelligence. Although we hear a lot about machine learning, artificial intelligence is a much broader field with many different aspects. In this course, we focus on three of those aspects: reasoning, optimization, and pattern recognition. Traditionally, the first was covered under "Symbolic AI" or "Good Old Fashioned AI" and the latter two were covered under "Numeric AI" (or more specifically, "Connectionist AI" or "Machine Learning"). However, despite the many successes of machine learning algorithms, practitioners are increasingly realizing that complicated AI systems need algorithms from all three aspects. This approach falls under the ironic heading "Hybrid AI".
In this course, the foundational algorithms of AI are presented in an integrated fashion emphasizing Hybrid AI. The topics covered include state space search, local search, example based learning, model evaluation, adversarial search, constraint satisfaction problems, logic and reasoning, expert systems, rule based ML, Bayesian networks, planning, reinforcement learning, regression, logistic regression, and artificial neural networks (multi-layer perceptrons). The assignments weigh conceptual (assessments) and practical (implementations) understanding equally. Prerequisite(s): A working knowledge of Python programming is assumed as all assignments are completed in Python.

EN.605.646. Natural Language Processing. 3 Credits.
This course surveys the principal difficulties of working with written language data, the fundamental techniques that are used in processing natural language, and the core applications of NLP technology. Topics covered in the course include language modeling, text classification, labeling sequential data (tagging), parsing, information extraction, question answering, machine translation, and semantics. The dominant paradigm in contemporary NLP uses supervised machine learning to train models based on either probability theory or deep neural networks. Both formalisms will be covered. A practical approach is emphasized in the course, and students will write programs and use open source toolkits to solve a variety of problems.Course prerequisite(s): There are no formal prerequisite courses, although having taken any of 605.649 Introduction to Machine Learning, 605.744 Information Retrieval, or 605.645 Artificial Intelligence is helpful.Course note(s): A working knowledge of Python is assumed. While some of the assigned exercises can be done in any programming language, we will sometimes provide example code in Python, and many of the labs are best solved in Python.

EN.605.647. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as 625.638 Neural Networks.

EN.605.649. Introduction to Machine Learning. 3 Credits.
EN.605.649 - Introduction to Machine LearningAnalyzing large data sets ("Big Data"), is an increasingly important skill set. One of the disciplines being relied upon for such analysis is machine learning. In this course, we will approach machine learning from a practitioner's perspective. We will examine the issues that impact our ability to learn good models (e.g., inductive bias, the curse of dimensionality, the bias-variance dilemma, and no free lunch). We will then examine a variety of approaches to learning models, covering the spectrum from unsupervised to supervised learning, as well as parametric versus non-parametric methods. Students will explore and implement several learning algorithms, including logistic regression, nearest neighbor, decision trees, and feed-forward neural networks, and will incorporate strategies for addressing the issues impacting performance (e.g., regularization, clustering, and dimensionality reduction). In addition, students will engage in online discussions, focusing on the key questions in developing learning systems. At the end of this course, students will be able to implement and apply a variety of machine learning methods to real-world problems, as well as be able to assess the performance of these algorithms on different types of data sets. Prerequisite(s): EN.605.202 – Data Structures or equivalent.

EN.605.651. Principles of Bioinformatics. 3 Credits.
This course is an interdisciplinary introduction to computational methods used to solve important problems in DNA and protein sequence analysis. The course focuses on algorithms but includes material to provide the necessary biological background for science and engineering students. Algorithms to be covered include dynamic programming for sequence alignment, such as Smith-Waterman, FASTA, and BLAST; hidden Markov models, such as the forward, Viterbi, and expectation maximization algorithms; a range of gene-finding algorithms; phylogenic tree construction; and clustering algorithms. Prerequisite(s): Familiarity with probability and statistics; working knowledge of Java, C++, C, Perl, MATLAB or Python; 605.205 Molecular Biology for Computer Scientists or a course in molecular biology; and a course in either cell biology or biochemistry.

EN.605.652. Biological Databases and Database Tools. 3 Credits.
The sequencing of thousands of genomes, including those related to disease states, interest in proteomics, epigenetics, and variation have resulted in an explosive growth in the number of biological databases, as well as the need to develop new databases to handle the diverse new content being generated. The course focuses on the design of biological databases and examines issues such as those related to data modeling, heterogeneity, interoperability, evidence, and tool integration. It also surveys a wide range of biological databases and their access tools and enables students to develop proficiency in their use. Databases introduced include genome and sequence databases such as GenBank and Ensembl, as well as protein databases such as PDB and UniProt. Databases related to RNA, sequence variation, pathways and interactions, metagenomics, and epigenomics are also presented. Tools for accessing and manipulating data from databases such as BLAST, genome browsers, multiple sequence alignment, gene finding, and protein tools are reviewed. The programming language Perl is introduced, along with the use of Perl in obtaining data via web services and in storing data in an SQLite database. Students will use Perl (Python may be used for some assignments), biological databases, and database tools to complete homework assignments. They will also design a database and will write code in the language of their choice to create their own database as a course project.
(For JHEP Students) EN.605.205 Molecular Biology for Computer Scientists or AS.410.634 Practical Computer Concepts for Bioinformatics or equivalent; EN.605.641 Principles of Database Systems or equivalent; EN.605.202 Data Structures and EN.605.201 Introduction to Programming Using Java.

EN.605.653. Computational Genomics. 3 Credits.
This course focuses on current problems of computational genomics. Students will explore bioinformatics software, discuss bioinformatics research, and learn the principles underlying a variety of bioinformatics algorithms. The emphasis is on algorithms that use probabilistic and statistical approaches. Topics include analyzing eukaryotic, bacterial, and viral genes and genomes, genome sequencing and assembling, finding genes in genomes and identifying their biological functions, predicting regulatory sites, and assessing gene and genome evolution. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent and familiarity with probability and statistics.

EN.605.656. Computational Drug Discovery,Dev. 3 Credits.
Recent advances in bioinformatics and drug discovery platforms have brought us significantly closer to the realization of rational drug design and development. Across the pharmaceutical industry, considerable effort is being invested in developing experimental and translational medicine, and it is starting to make a significant impact on the drug discovery process itself. This course examines the major steps of the evolving modern drug discovery platforms, the computational techniques and tools used during each step of rational drug discovery, and how these techniques facilitate the integration of experimental and translation medicine with the discovery/development platforms. The course will build on concepts from a number of areas including bioinformatics, computational genomic/ proteomics, in-silico system biology, computational medicinal chemistry, and pharmaceutical biotechnology. Topics covered in the course include comparative pharmacogenomics, protein/ antibody modeling, interaction and regulatory networks, QSAR/ pharmacophores, ADME/toxicology and clinical biomarkers. Relevant mathematical concepts are developed as needed in the course. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent.

EN.605.657. Statistics for Bioinformatics. 3 Credits.
This course provides an introduction to the statistical methods commonly used in bioinformatics and biological research. The course briefly reviews basic probability and statistics including events, conditional probabilities, Bayes; theorem, random variables, probability distributions, and hypothesis testing and then proceeds to topics more specific to bioinformatics research, including Markov chains, hidden Markov models, Bayesian statistics, and Bayesian networks. Students will learn the principles behind these statistical methods and how they can be applied to analyze biological sequences and data. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent, and 410.645 Biostatistics or another statistics course.

EN.605.661. Computer Vision. 3 Credits.

EN.605.662. Data Visualization. 3 Credits.
This course explores the underlying theory and practical concepts in creating visual representations of large amounts of data. It covers the core topics in data visualization: data representation, visualization toolkits, scientific visualization, medical visualization, information visualization, flow visualization, and volume rendering techniques. The related topics of applied human perception and advanced display devices are also introduced. Prerequisite(s): Experience with data collection/ analysis in data-intensive fields or background in computer graphics (e.g., 605.667 Computer Graphics) is recommended.

EN.605.667. Computer Graphics. 3 Credits.
This course examines the principles of computer graphics, with a focus on the mathematics and theory behind 2D and 3D graphics rendering. Topics include graphics display devices, graphics primitives, 2D and 3D transformations, viewing and projection, color theory, visible surface detection and hidden surface removal, lighting and shading, and object definition and storage methods. Practical application of these concepts is emphasized through laboratory exercises and code examples. Laboratory exercises use the C++ programming language and OpenGL on a PC. Prerequisite(s): Familiarity with linear algebra.

EN.605.668. Computer Gaming Engines. 3 Credits.
This course examines the fundamentals of computer game software designed to familiarize the students with a broad understanding of many aspects of computer gaming. The course prioritizes broad coverage over deep coverage. Topics include 2D/3D graphics, input/output, real-time simulations, resource management, vector mathematics, sound, concurrency, and so forth, with an emphasis on cross-platform development. Practical applications of these topics are covered in programming assignments throughout the semester with the goal of developing a simple game of the student's choice. Programming assignments are done in C or C++ on PC, MacOS, or Linux. Prerequisite(s): EN.605.668 – Computer Graphics, Linear Algebra is recommended.

EN.605.671. Principles of Data Communications Networks. 3 Credits.
This course provides an introduction to the field of data communications and computer networks. The course covers the principles of data communications, the fundamentals of signaling, basic transmission concepts, transmission media, circuit control, line sharing techniques, physical and data link layer protocols, error detection and correction, data compression, common carrier services and data networks, and the mathematical techniques used for network design and performance analysis. Potential topics include analog and digital signaling; data encoding and modulation; Shannon channel capacity; synchronous and asynchronously transmission; RS232 physical layer interface standards; FDM, TDM, and STDM multiplexing techniques; inverse multiplexing; analog and digital transmission; V series modem standards; PCM encoding and T1 transmission circuits; LRC, VRC, and CRC error detection techniques; Hamming and Viterbi forward error correction techniques; BSC and HDLC data link layer protocols; Huffman, MNP5, and V.42bis data compression algorithms; circuit, message, packet, and cell switching techniques; public key and symmetric encryption algorithms, authentication, digital signature, and message digest techniques, secure e-mail, PGP, and TSL/SSL security algorithms; Ethernet, Wi-Fi, Optical, and IP networks; reliability and availability; and queuing analysis network performance techniques.

EN.605.673. High-Speed Networking Technologies. 3 Credits.
The Internet has experienced unprecedented growth especially since the 1990s and is continuing to evolve in terms of the information transfer speeds and infrastructure capacities in order to accommodate the growing number of users. The demand for bandwidth-both wired and wireless-and innovative new bandwidth-intensive services is soaring. The use of high-definition video, real-time collaboration, e-commerce, social networking, and other multimedia Web applications is becoming increasingly important to individual users and businesses. The use of mobile broadband and file-sharing applications is rising sharply. Advances in research applications and the evolution to cloud networking are also causing bandwidth pressure on existing networks. This course will provide an in-depth understanding of the Internet architecture and underlying technologies and applications that address the challenges summarized above and provide services to users at high availability, reliability, and flexibility in a cost-effective manner. Specific topics to be discussed in this course include high-speed Internet requirements analysis, Internet architecture and protocols, convergence of mobile and terrestrial networks, high-speed LAN/WAN options and configurations, emerging and future switching and transmission technologies, and network virtualization. The course will also cover unique challenges to management and security of the high-speed Internets and how they are addressed. Other topics include emerging technologies and future trends. EN.605.671 Principles of Data Communications Networks.

EN.605.674. Network Programming. 3 Credits.
Emphasis is placed on the theory and practice associated with the implementation and use of the most common processto-process communications associated with UNIX. The interprocess communications comprise both local and distributed architectures. The distributed communications protocols include those most widely implemented and used: the worldwide Internet protocol suite [the Transmission Control Protocol/ Internet Protocol (TCP/IP), and the U.S. government-mandated International Organization for Standardization (ISO) protocol suite]. Practical skills are developed, including the ability to implement and configure protocol servers (daemons) and their clients. Students are expected to have working knowledge of UNIX.
EN.605.671 Principles of Data Communications Networks, or EN.605.614 System Development in the UNIX Environment .

EN.605.675. Protocol Design. 3 Credits.
This course covers the formal design, specification, and validation of computer and network protocols. Design, implementation, and verification of protocols will be illustrated using the latest simulation tools, such as OPNET and NS2. Protocol examples include the latest wired and wireless networks, such as the IEEE 802.X family, as well as protocols in VoIP, Web 2.0, and network security. The course focuses on protocol specification, structured protocol design, protocol models, and protocol validation. Students will gain hands-on experience using simulation tools to design, validate, and assess protocols.
EN.605.671 Principles of Data Communications Networks or equivalent.

EN.605.677. Internetworking with TCP/IP I. 3 Credits.
This course investigates the underlying technology of the Internet. The presentation begins with a survey of distributed applications operating over the Internet, including the Web, electronic mail, VoIP, instant messaging, file transfers and peerto-peer file sharing. The course investigates the details of the Internet architecture and the TCP/IP protocol suite, covering the protocols that provide communications services to end systems and the management and control protocols that create the Internet from disparate underlying networks and technologies. Communications-related protocols analyzed in detail include the foundational Internet Protocol (IP), the connection-oriented reliable Transmission Control Protocol (TCP), the connectionless User Datagram Protocol (UDP) and the Real-Time Protocol (RTP) for streaming media. To allow the student to understand the control and management of the Internet, the course analyzes protocols that support naming (DNS), addressing and configuration (DHCP), management (SNMP) and the dynamic IP routing protocols RIP, OSPF and BGP.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks.

EN.605.681. Principles of Enterprise Web Development. 3 Credits.
This course examines fundamental aspects of Enterprise Web Development including client, middleware and databases as a foundation for follow on courses. It introduces the student to client side development using HTML 5, CSS and JavaScript. After a brief review of Object Oriented Programming in Java, Swing is used to introduce common user interface design patterns. Network protocols and multithreading concepts using Java transition into server-side technologies like Servlets, JavaserverPages and ReST. Java database development with JDBC and web security are also introduced during the semester. While the class covers development using build tools (Maven), basic IDEs are utilized to facilitate the teaching of concepts and demonstration through examples.Prerequisite(s): 605.202 Data Structures.

EN.605.682. Web Application Development with Java. 3 Credits.
This project-oriented course will enable students to use various techniques for building browser-based applications for dynamically generated websites, e-commerce, web-enabled enterprise computing, and other applications that require web access to server-based resources. Particular attention will be paid to methods for making web-based applications efficient, maintainable, and flexible. The course will use at least two sets of tools: servlets/JSP and a higher-level Java-based framework such as JSF 2.0. Major topics will include handling HTTP request information, generating HTTP response data, tracking sessions, designing custom tag libraries or components, page templating, asynchronously updating pages with Ajax, and separating content from presentation through use of the MVC architecture. Additional topics may include HTML5, database access techniques for web apps, web app security, and dependency injection in web apps (e.g., with the Spring framework). Course Note(s): Formerly 605.682 Web Application Development with Servlets and JavaServer Pages (JSP).
EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.683. Java Enterprise Development: Processes, Tools and Infrastructure. 3 Credits.
The focus of this course is to get the student acclimated to the process and tools used in the design to delivery cycle of an Enterprise Application using Java. It will introduce students to the use of build tools and repositories for creating and maintaining software in a team environment. It will then then cover tools and techniques for improving the quality of Enterprise Software like unit and integration testing, code optimization and profiling. It will also cover techniques for automation of processes in testing and deployment of software; like Continuous Integration and the use and orchestration with virtual containers. The course will also look at some modern integrated development environments and demonstrate how they integrate with the aspects of the class. A sample of tools covered in the class will include Maven, Gradle, JMeter, Postman, Jenkins, Git, JProfiler, Docker, Docker Compose, Eclipse and IntelliJ.
EN.605.681 Principles of Enterprise Web Development with Java

EN.605.684. Agile Development with Ruby on Rails. 3 Credits.
Modern web applications are expected to facilitate collaboration, with user participation being a significant facet of the system. Components such as wikis, blogs, and forums are now commonplace. While feature sets continue to expand, there is continuing pressure to develop and deploy capabilities more quickly to enable organizations to remain competitive. This pressure has led to the development of languages and frameworks geared toward rapid prototyping, with Ruby on Rails being the most popular. Ruby on Rails is a model-view-controller (MVC) framework that enables efficient application development and deployment. Techniques such as convention over configuration and object-relational mapping with ActiveRecord along with enhanced AJAX support offer a simple environment with significant productivity gains. This code-intensive course introduces Ruby on Rails, the patterns it implements, and its applicability to the rapid development of collaborative applications.
EN.605.681 Principles of Enterprise Web Development or equivalent; EN.605.202 Data Structures;Computer Science majors require completion of foundation courses.

EN.605.685. Machine Learning: Deep Learning. 3 Credits.
Deep learning (DL) has emerged as a powerful tool for solving data-intensive learning problems such as supervised learning for classification or regression, dimensionality reduction, and control. As such, it has a broad range of applications including speech and text understanding, computer vision, medical imaging, and perception-based robotics. The goal of this course is to introduce the basic concepts of deep learning (DL). The course will include a brief introduction to the basic theoretical and methodological underpinnings of machine learning, commonly used architectures for DL, DL optimization methods, DL programming systems, and specialized applications to computer vision, speech understanding, and robotics. Students will be expected to solve several DL problems on standardized data sets, and will be given the opportunity to pursue team projects on topics of their choice.

EN.605.686. Mobile Application Development for the Android Platform. 3 Credits.
This project-oriented course will investigate application development for the Android mobile platform. We will explore techniques for building well-structured applications, from local and remote data access using databases and REST APIs, through view models that synchronously and asynchronously manage and expose that data, to a Jetpack Compose user interface layer for a simple specification and testing. Assigned projects include demonstrations of full data flow from database to user interface, use of graphics and user-screen interaction, Google Maps, REST API communication and testing.Prerequisites: Strong comfort with Java and its basic APIs. Comfort with concepts such as callbacks, threads, lists, and maps. 605.603 Object-Oriented and Functional Programming in Kotlin is recommended but not required.Course Notes: This course is taught using Kotlin, the primary language for Android development (and required for Jetpack Compose). Kotlin knowledge is not required for this course, and its basics will be covered from the assumption that students are very comfortable with Java. Tools for developing and testing Android apps are available free of charge. Note that Android emulators may run slowly on some machines; physical Android devices are strongly recommended, but not required, for this course.

EN.605.687. Mobile Application Development for the iOS Platform. 3 Credits.
This project-oriented course will investigate application development on iOS platforms. First, we will cover the main language for iOS, Swift, Apple's in-house, open sourced language for iOS and OS X development, along with tools such as Xcode, Interface Builder, Instruments, and Swift Playgrounds. Second, we will discuss the aspects of creating an application: the application life cycle, user experience and data presentation, user interface elements (including how to use the SwiftUI framework), and application performance. Then, we will discuss the application frameworks that the iOS SDK provides: CoreData, SpriteKit, MapKit, and Notifications, to name just a few. Finally, we will prepare your app for deployment, considering localization and internationalization, accessibility, and iTunes Connect. By the end of the class, students will be able to use Xcode, implement the Model-View-Controller paradigm, use Protocols and Delegates, construct a user interface that operates on many different devices, store and retrieve data on the network, interact with the OS or other applications, distinguish between the various iOS frameworks, and explain the App publication process.Course prerequisite(s): 605.201 Introduction to Programming Using Java or equivalent Java or Objective C experience.Course note(s): Access to a Mac running the current version of macOS is required for this class. Development tools can be downloaded for free from the Mac App Store. Additional hardware (iPhones, iPods, iPads) is strongly suggested, as several class examples and some projects will work best (or only work) on devices. *THIS REQUIREMENT IS SUBJECT TO CHANGE*

EN.605.701. Software Systems Engineering. 3 Credits.
Software Systems Engineering applies engineering principles and the system view to the software development process. The course focuses on the engineering of complex systems that have a strong software component. This course is based on the philosophy that the key to engineering a good software system lies just as much in the process that is followed as in the purely technical regime. The course will show how good a software development process is and how to make a software process better by studying successful techniques that have been employed to produce correct software systems within budget. Topics are explored in a sequence designed to reflect the way one would choose to implement process improvements. These topics include steps to initiate process change, methods to establish control over the software process, ways to specify the development process, methods for quantitative process control, and how to focus on problem prevention. Students will prepare term projects. Prerequisite(s): 605.202 Data Structures; one software engineering course beyond 605.601 Foundations of Software Engineering.

EN.605.702. Service-Oriented Architecture. 3 Credits.
Service-Oriented Architecture (SOA) is a way to organize and use distributed capabilities that may be controlled by different owners. SOA provides a uniform means to offer, discover, interact with, and use capabilities to produce desired effects consistent with specified preconditions and requirements. This course describes SOA concepts and design principles, interoperability standards, security considerations, runtime infrastructure and web services as an implementation technology for SOA. Given the focus on shared capabilities, SOA involves more than technology. Therefore, additional topics will include the impact of SOA on culture, organization, and governance. Prerequisite(s): 605.601 Foundations of Software Engineering and 605.704 Object-Oriented Analysis and Design or equivalent experience are highly recommended. EN.605.601 Foundations of Software Engineering and EN.605.704 Object-Oriented Analysis and Design or equivalent experience are highly recommended.

EN.605.704. Object-Oriented Analysis and Design. 3 Credits.
This course describes fundamental principles of object-oriented modeling, requirements development, analysis, and design. Topics include specification of software requirements; object-oriented static and dynamic analysis approaches using the Unified Modeling Language (UML); object-oriented design; object-oriented reuse and maintainability, including design patterns; software implementation concerns; state models; persistence; and the Object Constraint Language (OCL). Prerequisite(s): While there are no programming assignments in this course, experience in an object-oriented programming language such as C++ or Java is important.

EN.605.705. Software Safety. 3 Credits.
This course describes how to develop and use software that is free of imperfections that could cause unsafe conditions in safety-critical systems. Systems engineering and software engineering techniques are described for developing "safeware," and case studies are presented regarding catastrophic situations that resulted from software and system faults that could have been avoided. Specific techniques of risk analysis, hazard analysis, fault tolerance, and safety tradeoffs within the software engineering paradigm are discussed. Prerequisite(s): 605.202 Data Structures.

EN.605.707. Software Patterns. 3 Credits.
Software patterns encapsulate the knowledge of experienced software professionals in a manner that allows developers to apply that knowledge to similar problems. Patterns for software are analogous to the books of solutions that enable electrical engineers and civil engineers to avoid having to derive every new circuit or bridge design from first principles. This course will introduce the concept of software patterns, and explore the wide variety of patterns that may be applied to the production, analysis, design, implementation, and maintenance of software. The format of the course will emphasize the discussion of patterns and their application. Each student will be expected to lead a discussion and to actively participate in others. Students will also be expected to introduce new patterns or pattern languages through research or developed from their own experience. Programming exercises performed outside of class will be used enhance discussion and illustrate the application of patterns. EN.605.604 Object-Oriented Programming with C++ or permission of instructor.

EN.605.708. Tools and Techniques of Software Project Management. 3 Credits.
This course examines tools and techniques used to lead software-intensive programs. Techniques for RFP analysis and proposal development are explored, and techniques of size estimation (function points, feature points, and lines-ofcode estimation) and the use of models such as COCOMO to convert size to effort and schedule are described. In addition, conversion of estimated effort to dollars and the effects of fringe, overhead, skill mix profiles, and staffing profiles on total dollar cost are explained. Moreover, techniques for estimating effort and planning the COTS intensive development programs are described, and tools and techniques for measuring process maturity and process efficiency (e.g., CMMi, Lean, Six Sigma, and Kaizen) are addressed. The course also investigates the formation and management of virtual teams, as well as techniques that can be used to ensure success in this environment. Finally, the course addresses topics that require collaboration between the project manager and human resources, such as personnel retention strategies, managing unsatisfactory performance, and formal mentoring programs. Prerequisite(s): Three to five years technical work experience is recommended.

EN.605.715. Software Development for Real-Time Embedded Systems. 3 Credits.
This course examines the hardware and software technologies behind real-time, embedded computer systems. From smart kitchen appliances to sophisticated flight control for airliners, embedded computers play an important role in our everyday lives. Hardware topics include microcomputers and support devices (e.g., flash, ROM, DMA, timers, clocks, A/D, and D/A), as well as common applications (e.g., servo and stepper motor control, automotive sensors, and voice processing). Software topics focus on unique aspects of embedded programming and include interrupts, real-time control, communication, common design patterns, and special test considerations. The course also explores the unique tools that are used to develop and test embedded systems. Labs, beginning with using Bare Metal and Free RTOS on Arduino for simple devices and culminating with using Linux on Raspberry-Pi for Quad-Copter flight control, are developed.

EN.605.716. Modeling and Simulation of Complex Systems. 3 Credits.
This multi-disciplinary course focuses on the application of modeling and simulation principles to complex systems. A complex system is a large-scale nonlinear system consisting of interconnected or interwoven parts (such as a biological organism, an ecological system, the economy, fluids or strongly-coupled solids). The subject is interdisciplinary with foundations in mathematics, nonlinear science, numerical simulations and statistical physics. The course begins with an overview of complex systems, followed by modeling techniques based on nonlinear differential equations, networks, and stochastic models. Simulations are conducted via numerical calculus, analog circuits, Monte Carlo methods, and cellular automata. In the course we will model, program, and analyze a wide variety of complex systems, including dynamical and chaotic systems, cellular automata, and iterated functions. By defining and iterating an individual course project throughout the term, students will gain hands-on experience and understanding of complex systems that arise from combinations of elementary rules. Students will be able to define, solve, and plot systems of linear and non-linear systems of differential equations and model various complex systems important in applications of population biology, epidemiology, circuit theory, fluid mechanics, and statistical physics.Course prerequisite(s): Knowledge of elementary probability and statistics and previous exposure to differential equations. Students applying this course to the MS in Bioinformatics should also have completed at least one Bioinformatics course prior to enrollment.Course note(s): This course may be counted toward a three-course concentration in Bioinformatics.

EN.605.721. Design and Analysis of Algorithms. 3 Credits.
In this follow-on course to 605.621 Foundations of Algorithms, design paradigms are explored in greater depth, and more advanced techniques for solving computational problems are presented. Topics include randomized algorithms, adaptive algorithms (genetic, neural networks, simulated annealing), approximate algorithms, advanced data structures, online algorithms, computational complexity classes and intractability, formal proofs of correctness, sorting networks, and parallel algorithms. Students will read research papers in the field of algorithms and will investigate the practicality and implementation issues with state-of-the-art solutions to algorithmic problems. Grading is based on problem sets, programming projects, and in-class presentations.
EN.605.621 Foundations of Algorithms or equivalent; EN.605.203 Discrete Mathematics or equivalent.

EN.605.724. Applied Game Theory. 3 Credits.
In many organizations in the private and the public sectors, there is a need to support complex decisions that include a game-theoretic aspect. These decisions impact activities ranging from tactical to strategic, and play out in a number of problems, including monitoring and management of ongoing operations, the dynamics of organizational relationships in the competitive environment, and military force planning. This course extends treatment of game theoretic concepts and constructs, and explores their implementation and application, highlighting key issues such as decision space exploration and analysis, visualization, and the creation and use of models for specific domains. Students will have the opportunity to design a course project based on their area of professional or personal interest.

EN.605.725. Queuing Theory with Applications to Computer Science. 3 Credits.
Queues are a ubiquitous part of everyday life; common examples are supermarket checkout stations, help desks call centers, manufacturing assembly lines, wireless communication networks, and multitasking computers. Queuing theory provides a rich and useful set of mathematical models for the analysis and design of service process for which there is contention for shared resources. This course explores both theory and application of fundamental and advanced models in this field. Fundamental models include single- and multipleserver Markov queues, bulk arrival and bulk service processes, and priority queues. Applications emphasize communication networks and computer operations, but may include examples from transportation, manufacturing, and the service industry. Advanced topics may vary. Prerequisite(s): Multivariate calculus and a graduate course in probability and statistics such as 625.603 Statistical Methods and Data Analysis or equivalent. Course Note(s): This course is the same as 625.734 Queuing Theory with Applications to Computer Science.

EN.605.727. Computational Geometry. 3 Credits.
This course covers fundamental algorithms for efficiently solving geometric problems, especially ones involving 2D polygons and 3D polyhedrons. Topics include elementary geometric operations; polygon visibility, triangulation, and partitioning; computing convex hulls; proximity searching, Voronoi diagrams, and Delaunay triangulations with applications; special polygon and polyhedron algorithms such as point containment and extreme point determination; point location in a planar graph subdivision; dimension reduction in data; and robot motion planning around polygon obstacles. Applications to such areas as computer graphics, big data analytics and pattern recognition, geometric databases, numerical taxonomy, and robotics will be addressed. The course covers theory to the extent that it aids in understanding how the algorithms work. Emphasis is placed on algorithm design and implementation. Programming projects are an important part of the coursework. Prerequisite(s): Foundations of algorithms. Some familiarity with linear algebra.
EN.605.621 Foundations of Algorithms. Some familiarity with linear algebra.

EN.605.728. Quantum Computation. 3 Credits.
Quantum computing is no longer a purely theoretical notion. The NSA and NIST are preparing to transition to quantum resistant cryptography. We have now entered the intermediate-scale quantum era, with near-term applications such as quantum machine learning being explored. Scalable quantum computers aren't here yet, but ongoing developments suggest they are on their way. This course provides an introduction to quantum computation for computer scientists: the focus is on algorithms rather than physical devices, and familiarity with quantum mechanics (or any physics at all) is not a prerequisite. Instead, pertinent aspects of the quantum mechanics formalism are developed as needed in class. The course begins with an introduction to the QM formalism. It then develops the abstract model of a quantum computer, and discusses how quantum algorithms enable us to achieve, for some problems, a significant speedup (in some cases an exponential speedup) over any known classical algorithm. This discussion provides the basis for a detailed examination of quantum integer factoring, quantum search, and other quantum algorithms. The course also explores quantum error correction, quantum teleportation, and quantum cryptography. It concludes with a glimpse at what the cryptographic landscape will look like in a world with quantum computers. Required work includes problem sets and a research project. Prerequisites: Some familiarity with linear algebra and with the design and analysis of algorithms or instructor permission.

EN.605.729. Formal Methods. 3 Credits.
All science requires mathematics. Formal methods used in developing computer systems are mathematically based techniques for describing system properties. These formal methods then can provide frameworks within which developers can specify, develop, verify, and prove systems in a systematic, rather than ad hoc manner. According to some researchers, the application of formal specification and verification methods could avoid disasters such as Heartbleed bug, Ariane 5 rocket explosion, and Therac-25 radiation therapy machine harms. This course is an introduction to the vast world of formal methods. The course starts with review of propositional logic, predicate logic, and covers set theoretic specification methods via Z, temporal specification via PTL, grammars, and logic based methods via Caml and Coq proof assistant. Each student will carry out an investigation of an existing formal verification system, applying it to a suitable problem of the student's choice. Among possible projects will be the formal verification of problem solutions such as designing a semaphore, designing a machine learning algorithm, a web interface, a test suite, a sophisticated data structure, or a theorem.

EN.605.731. Survey of Cloud Computing Security. 3 Credits.
The promise of significant cost savings and inherent flexibility of resources are an impetus for the adoption of cloud computing by many organizations. Cloud computing also introduces privacy and security risks that are not traditionally present in a siloed data center. This course focuses on these security concerns and countermeasures for a cloud environment. An overview of cloud computing and virtualization, the critical technology underpinning cloud computing, provides the necessary background for these threats. Additional topics vary but may include access control, identity management, denial of service, account and service hijacking, secure APIs, malware, forensics, regulatory compliance, trustworthy computing, and secure computing in the cloud. This course follows a seminar-style format where students are expected to lead class discussions and write a publication-quality paper as part of a course project.

EN.605.741. Large-Scale Database Systems. 3 Credits.
This course investigates the theory and practice of modern large-scale database systems. Large-scale approaches include distributed relational databases; data warehouses; and non-relational databases including HDFS, Hadoop, Accumulo for query and graph algorithms, and Mahout bound to Spark for machine learning algorithms. Topics discussed include data design and architecture; database security, integrity, query processing, query optimization, transaction management, concurrency control, and fault tolerance; and query formulation, graph algorithms, and machine learning algorithms on large-scale distributed data systems. At the end of the course, students will understand the principles of several common large-scale data systems including their architectures, performance, and costs. Students will also gain a sense of which approach is recommended for different requirements and circumstances.
EN.605.202 Data Structures; EN.605.641 Principles of Database Systems or equivalent. Familiarity with "big-O" concepts and notation is recommended.

EN.605.742. Deep Neural Networks. 3 Credits.
This course provides a practical introduction to deep neural networks (DNN) with the goal to extend student's understanding of the latest and cutting-edge technology and concepts in deep learning (DL) field. DNNs are simplified representation of neurons in the brain that are suited in complex applications, such as natural language processing (NLP), computer vision (CV), speech processing, and many other predictive models rising from non-linear and unstructured data, including text, images, video, audio. The course starts with a brief review of machine learning (ML) and neural networks (NN), including anatomy of neural networks, model evaluation techniques and feature engineering in Python with TensorFlow (TF) and Keras. It then defines and exemplifies the deep learning with convolutional neural networks (CNN), recurrent neural networks (RNN), long-short term memory (LSTM) networks with attention mechanism, generative adversarial networks (GAN) and deep reinforcement learning (DRL), and transfer learning among other key concepts. This is a hands-on course with significant Python coding requirements. Students will apply neural networks to the computer vision (CV) tasks, natural language processing (NLP) tasks, and domains with structured data. Since DL is a rapidly developing field, the course will also rely on recent seminal publications, which students may be asked to reproduce with small scale datasets as an exercise. Prerequisites: Multivariate calculus, linear algebra, probability/statistics; A neural network OR machine learning course: Examples: EN.605.647, EN.625.638, EN.525.670,EN.605.649, EN.705.601, EN.605.646. A working knowledge of Python is assumed. Prior coding experience data munging, numerical linear algebra, ML, and visualization libraries is highly recommended: Example: Python, Numpy, Pandas, ScikitLearn, Matplotlib.
EN.605.647 Neural Networks

EN.605.743. Advanced Artificial Intelligence. 3 Credits.
Many advanced artificial intelligence systems are using both Machine Learning and Symbolic AI to solve subproblems. This course builds on the foundations of EN.605.645 Artificial Intelligence by delving more deeply into those AI algorithms and approaches that go under the name of Good Old Fashioned AI or Symbolic AI. In this course, we will cover logic programming, expert systems and business rules, fuzzy logic, case based reasoning, and knowledge graphs. We will also explore more advanced versions of planning and reinforcement learning algorithms. The instructor may add additional topics as warranted. Prerequisite(s): EN.605.645 Artificial Intelligence or permission of instructor.
EN.605.645 Artificial Intelligence

EN.605.744. Information Retrieval. 3 Credits.
A multibillion-dollar industry has grown to address the problem of finding information. Commercial search engines are based on information retrieval: the efficient storage, organization, and retrieval of text. This course covers both the theory and practice of text retrieval technology. Topics include automatic index construction, formal models of retrieval, Internet search, text classification, multilingual retrieval, question answering, and related topics in NLP and computational linguistics. A practical approach is emphasized and students will complete several programming projects to implement components of a retrieval engine. Students will also give a class presentation based on an independent project or a research topic from the IR literature. Prerequisite(s): 605.202 Data Structures or permission of the instructor

EN.605.745. Reasoning Under Uncertainty. 3 Credits.
This course is concerned with the problems of inference and decision making under uncertainty. It develops the theoretical basis for a number of different approaches and explores sample applications. The course discusses foundational issues in probability and statistics, including the meaning of probability statement, and the necessity of a rational agent acting in accord with probability theory. We will look at possible generalizations of Bayesian probability, including Dempster-Shafer theory. Next, we will develop algorithms for Bayesian networks—graphical probabilistic models—for exact and approximate inference and consider several application areas. Finally, the course will examine the problem of making optimal decisions under uncertainty. We will explore the conceptual foundations of decision theory and then consider influence diagrams, which are graphical models extending Bayesian networks to the domain of decision analysis. As time permits, we will also look at Bayesian games and Markov decision processes. Pertinent background in probability and theoretical computer science is developed as needed in the course.

EN.605.746. Advanced Machine Learning. 3 Credits.
This course focuses on recent advances in machine learning and on developing skills for performing research to advance the state of knowledge in machine learning. The material integrates multiple ideas from basic machine learning and assumes familiarity with concepts such as inductive bias, the bias-variance trade-off, the curse of dimensionality, and no free lunch. Topics range from determining appropriate data representations and models for learning, understanding different algorithms for knowledge and model discovery, and using sound theoretical and experimental techniques in assessing learning performance. Specific approaches discussed cover nonparametric and parametric learning; supervised, unsupervised, and semi-supervised learning; graphical models; ensemble methods; and reinforcement learning. Topics will be discussed in the context of research reported in the literature within the previous two years. Students will participate in seminar discussions and will present the results of a semester-long research project of their own choosing.
EN.605.649 Introduction to Machine Learning; multivariate calculus;Students cannot receive credit for both EN.605.746 and EN.625.742

EN.605.747. Evolutionary and Swarm Intelligence. 3 Credits.
Recently, principles from the biological sciences have motivated the study of alternative computational models and meta-heuristic approaches to problem solving. Proceeding from a machine learning perspective, this course explores how principles from theories of evolution, natural selection, and swarming behavior can be used to construct machines that exhibit nontrivial behavior. In particular, the course covers techniques from evolutionary computation and swarm intelligence for developing software agents capable of solving problems as members of a larger population of agents. Specific topics addressed include representation and schemata; selection, reproduction, and recombination; theoretical models of computational intelligence; optimal allocation of trials (i.e., bandit problems); search, optimization, and machine learning; evolution of programs; population and swarm dynamics; and emergent behavior. Students will participate in seminar discussions and will complete and present the results of an individual project.
EN.605.649 Introduction to Machine Learning; multivariate calculus.

EN.605.751. Algorithms for Structural Bioinformatics. 3 Credits.
This course is an interdisciplinary approach to the concepts, principals, computational methods and algorithms used in structural bioinformatics. It focuses on the fundamental aspects of structural biology along with computational methods and algorithms for studying protein folding, structure prediction and analysis. Algorithms for the prediction and annotation of protein secondary and tertiary structure and for structurestructure comparison will be studied in depth. We will also show how such algorithms and methods can be adapted for use with nucleic acids structure prediction and analysis. Students will apply various software tools and structure-visualization software to protein structure prediction and structurestructure comparison. Prerequisite(s): 605.205 Molecular Biology for Computer Scientists or equivalent. 605.661 Principles of Bioinformatics is recommended.
EN.605.205 Molecular Biology for Computer Scientists or equivalent. EN.605.661 Principles of Bioinformatics is recommended.

EN.605.755. Systems Biology. 3 Credits.
Systems biology is the study of complex biological systems using theoretical, mathematical, and computational tools and concepts. The advent of genomics, big data, and highpowered computing is allowing better understanding and elucidation of these systems. Central to systems biology is the development of computational models, based on sound statistics, which incorporate biological structures and networks, and can be informed and tested, with data on multiple scales. In this class, students will learn to develop and use different types of models of complex biological systems and how to test and perturb them. Students will learn basic biological system components and dynamics, as well as the data formats, sources, and modeling tools required to interrogate them. Tools will be used relating to functional genomics, evolution, biochemical systems, and cell biology. Students will utilize a model they have developed and available data from public repositories to investigate both a discovery-based project and a hypothesisbased project. Prerequisite(s): Courses in molecular biology (605.205 Molecular Biology for Computer Scientists or 410.602 Molecular Biology) and differential equations.
Courses in molecular biology (EN.605.205 Molecular Biology for Computer Scientists or AS.410.602 Molecular Biology) and differential equations.

EN.605.759. Independent Project in Bioinformatics. 3 Credits.
This course is for students who would like to carry out a significant project in bioinformatics as part of their graduate program. The course may be used to conduct minor research, an in-depth literature survey, or a software implementation related to recent developments in the field. Students who enroll in this course are encouraged to attend at least one industry conference in bioinformatics related to their area of study. To enroll in this course, the student must be within two courses of degree completion and must obtain the approval and support of a sponsoring faculty member. Course Note(s): A student may not receive credit for both 605.759 and 605.802 Independent Study in Computer Science II.

EN.605.767. Applied Computer Graphics. 3 Credits.
This course examines advanced rendering topics in computer graphics. The course focuses on the mathematics and theory behind 3D graphics rendering. Topics include 3D surface representations including fractal geometry methods; visible surface detection and hidden surface removal; and surface rendering methods with discussion of lighting models, color theory, texturing, and ray tracing. Laboratory exercises provide practical application of these concepts. The course also includes a survey of graphics rendering applications (animation, modeling and simulation, and realistic rendering) and software. Students perform laboratory exercises using the C++ programming language.
EN.605.667 Computer Graphics or familiarity with three-dimensional viewing and modeling transformations.;Foundation Prerequisites for Cybersecurity Majors:EN.605.621 AND EN.695.601 AND EN.695.641

EN.605.771. Wired and Wireless Local and Metropolitan Area Networks. 3 Credits.
This course provides a detailed examination of wired and wireless local and metropolitan area network (LAN and MAN) technologies, protocols, and the methods used for implementing LAN- and MAN-based enterprise intranets. The structure and operation of the IEEE 802 media access control (MAC) and physical layer protocols are examined in detail. The 802.2 logical link control, 802.3/Ethernet, 802.4 token bus, and 802.5 token ring protocols are analyzed, and the construction of LAN-based enterprise intranets is examined through a detailed analysis of bridging, routing, and switching techniques. High-speed LAN technologies are discussed through an examination of FDDI, Fast Ethernet, 100VG AnyLAN, ATM LAN Emulation (LANE), and Fibre Channel protocols, along with the new standards for gigabit and 10-gigabit Ethernet. In addition, the 802.6 DQDB and 802.17 Resilient Packet Ring MAN protocols are discussed. Finally, the new and emerging wireless LAN and MAN standards are examined. The 802.11 (Wi-Fi) wireless LAN and 802.15 (Bluetooth) wireless PAN standards are discussed in detail along with the emerging 802.16 (WiMAX) wireless MAN standard. Topics include Manchester and Differential Manchester encoding techniques; bus, star, and ring topologies; optical fiber, coaxial cable, and UTP media; baseband, broadband, and carrierband bus networks; hubs, switched LANs, and full duplex LANs; VLANs and prioritization techniques; transparent and source routing bridge algorithms; packet bursting and carrier extension schemes; wireless spread spectrum and frequency hopping transmission techniques; wireless collision avoidance media access control; and security schemes. Students may use the network lab to configure LAN switches and Cisco routers, as well as to observe the interconnection of LAN networks.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.605.772. Network Security Management. 3 Credits.

Information transfer speeds and infrastructure capacities must continue to evolve to support not only traditional voice and data but also multimedia services such as high-definition video, real-time collaboration, e-commerce, and social networking. While services are provided across terrestrial and mobile networks transparently to users, new technologies such as cloud computing efficiently make the services available to users irrespective of their geographic locations. In this rapidly evolving technological environment, network and security management (NSM) is the key to providing network access and connectivity, ensuring high availability of applications and services, and assuring users of the reliability and security of their transported information. Network Management (NM) encompasses all the activities, methods, operational procedures, tools, communications interfaces, protocols, and human resources pertaining to the operation, administration, maintenance, provisioning, and growth planning of communications networks. Security Management (SM) pertains to monitoring and control of security services and mechanisms including identification, authentication, authorization, access control, confidentiality, intrusion detection, correction, and prevention in order to protect the communications network infrastructure and services. NSM includes setting, monitoring, and maintaining certain performance metrics to ensure high performance levels and quality of service (QoS) to the users, along with support for infrastructure architecture and security planning, design, and implementation. This course examines NSM standards, technologies, tools, industry best practices, and case studies, NSM areas that can be automated through expert systems, current issues, and future trends to adapt to emerging and evolving Internet technologies. Specific Internet and telecommunications standards discussed in depth in this course include SNMPv1, SNMPv2, SNMPv3, RMON, and OSI. Students will apply the standards, architectures, tools, and techniques learned in the course, as well as research state-of-the-art technologies in a team project.
EN.605.771 Wired and Wireless Local and Metropolitan Area Networks, or EN.605.672 Computer Network Architectures and Protocols, or EN.605.677 Internetworking with TCP/IP I, or EN.635.611 Principles of Network Engineering.

EN.605.776. Fourth Generation Wireless Communications: WiMAX and LTE. 3 Credits.

This course compares the WiMAX and LTE fourth-generation (4G) technologies and their performance. An overview of the IEEE 802.16 standards (802.16d/e/j/m/n/p) and WiMAX Forum (Fixed WiMAX vs. Mobile WiMAX, Interoperability certification and Core network) is presented along with the 3GPP standards for LTE and LTE-Advanced as well as LTE network architecture. For WiMAX, the MAC, call flow, 2D resource map, QoS, and scheduling are presented. For LTE, both control plane and data plane protocols for Evolved UMTS Terrestrial Radio Access Network (E-UTRAN) and Evolved Packet Core (EPC) are presented. The topics include protocol architecture, bearer management, signaling, radio resource control (RRC), packet data convergence protocol (PDCP), radio link control (RLC), and MAC. In addition, the role of universal subscriber identity module (USIM), eNodeB, mobility management entity (MME), serving gateway (S-GW), packet data network gateway (P-GW), and home subscription server (HSS) as well as the call flow across these various nodes will be presented. The 2D resource grid along with QoS and scheduling will be explained in detail. The voice over LTE (VoLTE), self-organizing network (SON), LTE-direct, and LTE-Advanced [including coordinated multipoint (CoMP), carrier aggregation, and Intercell interference coordination (ICIC)] will be presented. Finally, spectrum considerations as well as the concept of white space and dynamic spectrum access (DSA) will be discussed. LTE security will be discussed in detail. The course will also highlight some of the Open Source LTE projects, and will discuss the experimental results from various testbeds.
EN.605.202 Data Structures; EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering and another course in the Data Communications and Networking track.

EN.605.777. Internetworking with TCP/IP II. 3 Credits.
This course builds on the foundation established in 605.677, Internetworking with TCP/ IP I. Changes are being made in the infrastructure, operation, and protocols of the Internet to provide the performance and services needed for real-time applications. This course first examines the current architecture and operation of the Internet. The classful addressing concept will be introduced and the mapping of Internet addresses to physical addresses is discussed along with the extensions that have been made to the addressing paradigm, including subnet addressing, classless addressing, and network address translation. The performance enhancements being developed to provide quality of service (QoS) over the Internet and to provide faster routing through the use of IP switching techniques are discussed. Techniques for providing multicasting and mobility over the Internet are examined. Security considerations are addressed by examining Virtual Private Networks and the use of IP Security (IPSec) protocols. The next generation IP protocol (IPv6) is introduced, and the changes and enhancements to the IP protocol operation and to the addressing architecture are discussed in detail. Finally, the development of the Voice Over IP (VoIP) application and the convergence of circuit switching and packet switching are discussed. Topics include subnet addressing, CIDR, DHCP, DNS, NAT, IntServ, DiffServ, RSVP, CIP, MPOA, IP Switching, Tag Switching, MPLS, IP Multicast, IGMP, Reliable Musticast, Multicast Routing Protocols, IP Mobility Home Agents and Foreign Agents, Message Tunneling, Proxy and Gratuitous ARP, VPN Tunneling, PPTP, L2F, L2TP and SOCKSv5, VPN security, IPSec, Encapsulating Security Payload header, Authentication Header, Security Association, IPv6 Addressing, IPv6 protocol and extension headers, Neighbor Discovery, IPv6 Stateless Address Autoconfiguration, DHCPv6, VoIP, H.323 Gateways and Gatekeeper, SIP, SDP, RTP, MGCP, Megaco/H.248.
EN.605.202 Data Structures; EN.605.677 Internetworking with TCP/IP I.

EN.605.779. Network Design and Performance Analysis. 3 Credits.
Networking services are a staple of our daily life. Different types of networks surround us all day long. This ubiquitous networking, thanks to smartphones and tablet computers, gives us the convenience of information at our fingertips. The right network architecture provides the fundamental support for network services, such as the products from Facebook, Google, Apple, etc. This course covers the details of network design and the design process. Starting from requirement specifications, a detail flow analysis is introduced. Examples of different network architecture designs, both in wireline and wireless, will be discussed, including mobile Ad Hoc network (MANET), mesh network, 4G cellular networks, wide area network (WAN), cloud networks, and advanced software define networking (SDN). Performance analyses and network security aspects are considered at every step of the design. Secured architecture covers Virtual Private Network (VPN) and Transport Layer Security (TLS)-based systems, with details on firewall and intrusion detection configurations. The course encourages hands-on projects selected from real network system problems.

EN.605.784. Enterprise Computing with Java. 3 Credits.
This comprehensive course explores core application aspects for developing, configuring, securing, deploying, and testing a Java-based service using a layered set of modern frameworks and libraries that can be used to develop full services. Students will learn thru lecture, examples, and hands-on experience to build multi-tier enterprise services using a configurable set of server-side technologies.The course will specifically cover designing and building components, a data tier, synchronous and asynchronous server-side logic, and integration with the web.The student will also learn to secure the application and tackle various build, testing, and development issues. Specific framework and specification emphasis (e.g., Jakarta EE, Spring, Spring Boot) for designing and developing server-side components will vary per section.
EN.605.202 Data Structures; EN.605.681 Principles of Enterprise Web Development or equivalent. Course Note(s): Students will be assumed to already have strong Java skills and to be comfortable with IDEs.

EN.605.786. Enterprise System Design and Implementation. 3 Credits.
This course explores enterprise architectures for the development of scalable distributed systems. Effective patterns for distributed data access, MVC-based web tiers, and business logic components are explored as students build complex applications. Factors such as caching and clustering that enable distributed systems to scale to handle potentially thousands of users are a primary focus. In addition, creating a reusable blueprint for an enterprise architecture will be discussed. Applications developed utilizing these concepts are selected from current research topics in information retrieval, data visualization, and machine learning.
EN.605.202 Data Structures; EN.605.784 Enterprise Computing with Java, EN.605.707 Software Patterns, or equivalent experience is recommended.

EN.605.787. Front End Web App Development. 3 Credits.
In this course, we build a real web application for a real client. We will go on a field trip to a selected business with a poor website and you get to see the client interview with identifying components of what you need to get out of that interview. We then go through the mockup process and then code the whole site from scratch, utilizing all the concepts we learn in the course. You will learn to create your own responsive design framework, and write your own media queries. In terms of technologies, we cover CSS in depth, including style conflict resolution, selectors types and how they work together, etc.; Twitter Bootstrap Framework (possibly), including the grid system; dive deep into Javascript, including Javascript DOM manipulation; utilize “raw” Ajax without any libraries to help us; and possibly touch on jQuery. We then take a deep dive into a Javascript framework, concentrating on concepts that are prevalent in a lot of modern front end frameworks. Prerequisite(s): Strong/mature programming skills in any programming language.
EN.605.202 Data Structures; EN.605.682 Web Application Development with Java or equivalent servlet and JSP experience.

EN.605.788. Big Data Processing Using Hadoop. 3 Credits.
Organizations today are generating massive amounts of data that are too large and too unwieldy to fit in relational databases. Therefore, organizations and enterprises are turning to massively parallel computing solutions such as Hadoop for help. The Apache Hadoop platform, with Hadoop Distributed File System (HDFS) and MapReduce (M/R) framework at its core, allows for distributed processing of large data sets across clusters of computers using the map and reduce programming model. It is designed to scale up from a single server to thousands of machines, offering local computation and storage. The Hadoop ecosystem is sizable in nature and includes many subprojects such as Hive and Pig for big data analytics, HBase for real-time access to big data, Zookeeper for distributed transaction process management, and Oozie for workflow. This course breaks down the walls of complexity of distributed processing of big data by providing a practical approach to developing applications on top of the Hadoop platform. By completing this course, students will gain an in-depth understanding of how MapReduce and Distributed File Systems work. In addition, they will be able to author Hadoop-based MapReduce applications in Java and also leverage Hadoop subprojects to build powerful data processing applications. Course Note(s): This course may be counted toward a threecourse track in Data Science and Cloud Computing.
EN.605.202 Data Structures; EN.605.681 Principles of Enterprise Web Development or equivalent Java experience.

EN.605.789. Service API Design and Development. 3 Credits.
This comprehensive course explores core aspects for designing, developing, configuring, securing, deploying, and testing Java-based services and service APIs using modern Spring frameworks and libraries. The focus of this course is on APIs for RESTful services and microservices, and interoperation across application components using APIs. The course also introduces the data exchange mechanism and common data formats, as well as security measures and solutions. At the end of this course, students will be able to apply a variety of techniques and will be able to: Apply best design principles, practices and patterns for creating APIs for RESTful services;Document API using YAML and RAML according to OpenAPI/Swagger specification; Create an API management discipline; Implement API security, control API versioning and life cycle stages; Build RESTful services with Spring Framework; Consume RESTful services using JSON and XML data formats; Integrate RESTful API with different data sources through hands-on coding projects; Build, package and deploy RESTful services on cloud-based platform; Conduct API testing using a variety of tools and techniques; Implement security mechanisms for controlling access to deployed services by service consumers using the Spring Security framework. Students will learn through guided lectures and real-world examples. Students will work on assignments and projects where they will apply newly learned techniques and best practices using the iterative approach of enhancing requested capabilities. Course Note(s): Students will be expected to already have a strong foundation in Java programming and to be comfortable with IDEs tools.
EN.605.644 XML Design Paradigms or equivalent XML design and XML processing experience. EN.605.681 Principles of Enterprise Web Development or equivalent.

EN.605.790. Development with React.js. 3 Credits.

EN.605.795. Capstone Project in Computer Science. 3 Credits.
This course permits graduate students in computer science to work with other students and a faculty mentor to explore a topic in depth and apply principles and skills learned in the formal computer science courses to a real world problem. Students will work in self-organized groups of two to five students on a topic selected from a published list. Since students will have selected different courses to meet degree requirements, students should consider the combined strengths of the group in constituting their team. Each team will prepare a proposal, interim reports, a final report, and an oral presentation. The goal is to produce a publication quality paper and substantial software tool. This course has no formal content; each team should meet with their faculty mentor at least once a week and is responsible for developing their own timeline and working to complete it within one semester. The total time required for this course is comparable to the combined class and study time for a formal course.Course prerequisite(s): Seven computer science graduate courses including two courses numbered 605.7xx, all CS foundation courses, and meeting the track requirement; or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.Course note(s): Students may not receive graduate credit for both 605.795 and 605.802 Independent Study in Computer Science II. This course is only offered in the spring.

EN.605.801. Independent Study in Computer Science I. 3 Credits.
This course permits graduate students in computer science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven computer science graduate courses including the foundation courses, three track-focused courses, and two courses numbered 605.7xx, or admission to the post-master's certificate. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.605.802. Independent Study in Computer Science II. 3 Credits.
Students wishing to take a second independent study in computer science should sign up for this course. Prerequisite(s): 605.801 Independent Study in Computer Science I and permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): A student may not receive credit for both 605.759 Independent Project in Bioinformatics and 605.802.
EN.605.801 Independent Study in Computer Science I and permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.615 (Applied Physics)

EN.615.611. Classical Physics. 3 Credits.
This course provides the graduate student in Applied Physics with a review of the basic core topics in classical physics, presented at an entry graduate level. The basic subfields covered are classical mechanics (including fluids and acoustics), thermal (and statistical) physics, electromagnetism (including plasmas and relativity), and optics. The four major core topics (in italics) are treated in roughly equal depth. For each topic covered, the fundamental physical laws are introduced to establish a rigorous but intuitive understanding of the basic physics, which is reinforced with hands-on demonstrations and relevant homework assignments. A final exam will also cover the core concepts and principles to check the student's understanding of the key concepts presented. In addition, each student will delve into one subtopic of their own choosing, according to their interest and needs, treating it in more depth as an extended homework assignment, which will be submitted in written form and given as a brief oral presentation before the end of the semester. This course will complement the modern physics course as well as the advanced mathematical methods course offered in the Applied Physics program. Prerequisite(s): An undergraduate degree in physics, engineering, or a related field.

EN.615.621. Electric Power Principles. 3 Credits.
This is an introductory course on electric power, its distribution, and its applications. The first half of the course focuses on the physics of electric power and its generation, with an emphasis on distribution and distribution systems. Topics to be covered include AC voltages and currents, transmission lines, mono- and poly-phase systems, and losses due to electromagnetic forces. The second half of the course is directed toward applications. Specific applications covered include system analysis and protection, power electronics, induction and permanent magnet motors, transformers, etc. At least one lecture will be used to bring all the concepts together by studying the implementation of an alternative power generation system using wind turbines. During the course of the term, several research papers on power generation and distribution will be read and summarized by the students. A term paper on an electric power subject may be required. Prerequisite(s): An undergraduate degree in physics, engineering, or a related field.

EN.615.641. Mathematical Methods for Physics and Engineering. 3 Credits.
This course covers a broad spectrum of mathematical techniques essential to the solution of advanced problems in physics and engineering. Topics include ordinary and partial differential equations, contour integration, tabulated integrals, saddlepoint methods, linear vector spaces, boundary-value problems, eigenvalue problems, Green's functions, integral transforms, and special functions. Application of these topics to the solution of problems in physics and engineering is stressed. Prerequisite(s): Vector analysis and ordinary differential equations (linear algebra and complex variables recommended).

EN.615.642. Electromagnetics. 3 Credits.
Maxwell's equations are derived and applied to the study of topics including electrostatics, magnetostatics, propagation of electromagnetic waves in vacuum and matter, antennas, wave guides and cavities, microwave networks, electromagnetic waves in plasmas, and electric and magnetic properties of materials. Prerequisite(s): Knowledge of vector analysis, partial differential equations, Fourier analysis, and intermediate electromagnetics.

EN.615.644. Physics of Space Systems I. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. This class presents the fundamental technical background, current state of the art, and example applications in the development of space systems. Topics include systems engineering, space environment, astrodynamics, propulsion and launch vehicles, attitude determination and control, and space power systems. This course is team taught by experts in their respective fields. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Course Note(s): This course may be taken for 700-level credit with the additional requirement of a research paper. See EN.615.744 Physics of Space Systems I.

EN.615.645. Physics of Space Systems II. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. The course presents the technical background, current state of the art, and example applications in the development of space systems. Topics include spacecraft thermal control, spacecraft configuration and structural design, space communications, risk analysis, command and telemetry systems, spacecraft computer systems, systems integration and test, and space mission operations. This course is team taught by experts in their respective fields. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Although preferable, it is not necessary to have taken EN.615.644 Physics of Space Systems I or EN.615.744 Physics of Space Systems I. Course Note(s): This course may be taken for 700-level credit with the additional requirement of a research paper. See EN.615.745 Fundamentals of Space Systems and Subsystems II.

EN.615.646. Physics of Magnetism. 3 Credits.
This is an introductory course on the magnetic properties of materials and magnetic systems. The emphasis of the course is a mastery of the physics of magnetism along with detailed examples and applications. A basic review of magnetic fields and various classical applications is given. Topics include the physics of paramagnetism, diamagnetism, and ferromagnetism. The magnetism of metals is presented along with discussion of Landau levels and the quantum Hall effect. Various applications are presented in detail, including: magnetic resonance, spectroscopic techniques, magnetoresistance, and spintronics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline. Prior knowledge of electromagnetic interactions would be helpful but is not required.

EN.615.647. Fundamentals of Sensors. 3 Credits.
Students will receive an overview of sensors and methods to build networks and systems using sensors. The physics of detectors including fundamental technologies and sampling interfaces will be discussed. Sensor technologies for chemical, biological, nuclear, and radiological detection will be studied in detail. Evaluation methods will be presented for sensor selection based on application-specific information including sensor performance, environmental conditions, and operational impact. DODAF 2.0 methods will be taught and a project based on several viewpoints will be required and presented. Additional studies will include methods for combining results from various sensors to increase detection confidence. As part of the course, students will be given a threat scenario and will be required to select a sensor suite and networking information to design a hypothetical system considering the threat, sensor deployment cost, and logistics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.648. Alternate Energy Technology. 3 Credits.
Energy availability and its cost are major concerns to every person. Fossil fuels in general and oil in particular are limited and the world's reserves are depleting. The question asked by many is, "Are there alternatives to the fossil fuel spiral (dwindling supplies and rising costs)?" This course addresses these alternative energy sources. It focuses on the technology basis of these alternate energy methods, as well as the practicality and the potential for widespread use and economic effectiveness. Energy technologies to be considered include photovoltaics, solar thermal, wind energy, geothermal and thermal gradient sources, biomass and synthetic fuels, hydroelectric, wave and tidal energy, and nuclear. The associated methods of energy storage will also be discussed. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.651. Statistical Mechanics and Thermodynamics. 3 Credits.
After a brief historical review of thermodynamics and statistical mechanics, the basic principles of statistical mechanics are presented. The classical and quantum mechanical partition functions are discussed and are subsequently used to carry out derivations of the basic thermodynamic properties of several different systems. Topics discussed include Planck's black body radiation derivation and the Einstein-Debye theories of the specific heats of solids. The importance of these topics in the development and confirmation of quantum mechanics is also examined. Other topics discussed include Fermi Dirac and the Bose-Einstein statistics and the cosmic background radiation. The importance of comparisons between theory and data is stressed throughout.

EN.615.653. Classical Mechanics. 3 Credits.
This is an advanced course in classical mechanics that introduces techniques that are applicable to contemporary pure and applied research. The material covered provides a basis for a fundamental understanding of not only quantum and statistical mechanics but also nonlinear mechanical systems. Topics include the Lagrangian and Hamiltonian formulation of classical mechanics, Euler's rigid body equations of motion, Hamilton-Jacobi theory, and canonical perturbation theory. These methods are applied to force-free motion of a rigid body, oscillations of systems of coupled particles, and central force motion including the Kepler problem and scattering in a Coulomb potential. Applications are emphasized through in-class examples and homework.
Intermediate mechanics and EN.615.641 Mathematical Methods for Physics and Engineering.

EN.615.654. Quantum Mechanics. 3 Credits.
This course presents the basic concepts and mathematical formalism of quantum mechanics. Topics include the mathematics of quantum mechanics, the harmonic oscillator and operator methods, quantum mechanics in three dimensions and angular momentum, quantum mechanical spin, quantum statistical mechanics, approximation methods, and quantum theory of scattering.
EN.615.641 Mathematical Methods for Physics and Engineering or the equivalent.EN.615.653 Classical Mechanics

EN.615.655. Orbital and Celestial Mechanics. 3 Credits.
This course will focus on the study of orbital and celestial mechanics, using many of the methods that are covered in a traditional advanced mechanics course. We will look primarily at closed form and approximation methods (as opposed to numerical solutions) in a wide variety of problems in orbital and celestial mechanics. Space engineering and applied physics students who take this class will be well-versed in fundamentals that can then be leveraged in more advanced future space applications. Topics will include Newtonian Mechanics, Newtonian Gravitation, Central Force Orbits (with a focus on Keplerian Orbits), Orbital & Interplanetary Maneuvers, Non-inertial Reference Frames, the Lagrangian Formalism, Rigid Body Rotation, the Three Body Problem, Approximation Methods for Orbits, and Lunar Motion. Discussions will include the historical figures in physics who contributed significantly to the topics discussed.
EN.615.641 Mathematical Methods for Physics and Engineering or EN.675.650 Mathematics for Space Systems

EN.615.662. Introduction to Astrophysics. 3 Credits.
In this course we explore the properties of stellar interiors in order to understand stellar structure and evolution. Our emphasis will be on the fundamental physics of matter and radiation at high pressure and temperature. Topics will include star formation by gravitational collapse, thermodynamics of matter and radiation, hydrostatic equilibrium, radiative and convective heat transport, energy production in stars (burning of Hydrogen, Helium, and advanced burning), endpoints of stellar evolution (white dwarfs, neutron stars, and black holes). Familiarity with multi-variable calculus, classical mechanics, thermodynamics, statistical mechanics, and quantum mechanics at the undergraduate level is required.

EN.615.665. Modern Physics. 3 Credits.
This course covers a broad spectrum of topics related to the development of quantum and relativity theories. The understanding of modern physics and its applications is essential to the pursuit of advanced work in materials, optics, and other applied sciences. Topics include the special theory of relativity, particle-like properties of light, wave-like properties of particles, wave mechanics, atomic and nuclear phenomena, elementary particles, statistical physics, solid state, astrophysics, and general relativity.Prerequisite(s): Undergraduate degree in physics or engineering.

EN.615.671. Principles Of Optics. 3 Credits.
This course teaches the student the fundamental principles of geometrical optics, radiometry, vision, and imaging and spectroscopic instruments. It begins with a review of basic, Gaussian optics to prepare the student for advanced concepts. From Gaussian optics, the course leads the students through the principles of paraxial ray-trace analysis to develop a detailed understanding of the properties of an optical system. The causes and techniques for the correction of aberrations are studied. The course covers the design principles of optical Instruments, telescopes, microscopes, etc. The techniques of light measurement are covered in sessions on radiometry and photometry. Prerequisite(s): Undergraduate degree in physics or engineering.

EN.615.680. Materials Science. 3 Credits.
This course covers a broad spectrum of materials-related topics designed to prepare the student for advanced study in the materials arena. Topics include atomic structure, atom and ionic behavior, defects, crystal mechanics, strength of materials, material properties, fracture mechanics and fatigue, phase diagrams and phase transformations, alloys, ceramics, polymers, and composites. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.731. Photovoltaic & Solar Thermal Energy Conversion. 3 Credits.
This is an advanced course in the application of science and technology to the field of solar energy in general and photovoltaic and solar thermal energy systems in particular. The foundations of solar energy are described in detail to provide the student with the knowledge to evaluate and/or design complete solar thermal or photovoltaic energy systems. Topics range from the theoretical physical basics of solar radiation to the advanced design of both photovoltaic and solar thermal energy collectors. A major feature of the course is the understanding and design of semiconducting photovoltaic devices (solar cells). Solar cell topics include semiconductors, analysis of p-n junction, Shockley-Queisser limit, non-radiative recombination processes, antireflection coating, crystalline silicon solar cells, thin-film solar cells, and rechargeable batteries. Solar thermal energy topics include solar heat collectors, solar water heaters, solar power systems, sensible heat energy storage, phase transition thermal storage, etc. The course will also present optimizing building designs for a solar energy system. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.744. Physics of Space Systems I. 3 Credits.
This course is intended for the physicist or engineer interested in the design of space experiments and space systems. This class presents the fundamental technical background, current state of the art, and example applications in the development of space systems. Topics include systems engineering, space environment, astrodynamics, propulsion and launch vehicles, attitude determination and control, and space power systems. This course is team taught by experts in their respective fields and requires a research paper. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Course Note(s): This course may be taken for 600-level credit with the additional requirement of a research paper. See EN.615.644 Physics of Space Systems I.

EN.615.745. Physics of Space Systems II. 3 Credits.
This course examines the fundamentals necessary to design and develop space experiments and space systems. The course presents the theoretical background, current state of the art, and examples of the disciplines essential to developing space instrumentation and systems. Experts in the field will cover the following topics: spacecraft attitude determination and control, space communications, satellite command and telemetry systems, satellite data processing and storage, and space systems integration and testing. This course requires the completion of a research paper. Prerequisite(s): An undergraduate degree in physics or engineering or the equivalent. Although preferable, it is not necessary to have taken EN.615.644 Physics of Space Systems I or EN.615.744 Physics of Space Systems I Course Note(s): This course is also offered for 600-level credit and does not require completion of a research paper. See EN.615.645 Physics of Space Systems II.

EN.615.747. Sensors and Sensor Systems. 3 Credits.
The primary objective of this course is to present recent advances made in the field of sensors. A broad overview includes optical, infrared, hyperspectral, terahertz, biological, magnetic, chemical, acoustic, and radiation sensors. The course will examine basic sensor operation and the implementation of sensors in measurement systems. Other topics to be covered are physical principles of sensing, interface electronic circuits, and sensor characteristics. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline.

EN.615.748. Introduction to Relativity. 3 Credits.
After a brief review of the theory of special relativity, the mathematical tools of tensor calculus that are necessary for understanding the theory of general relativity will be developed. Relativistic perfect fluids and their stress-energymomentum tensor will be defined, and Einstein's field equations will be studied. Gravitational collapse will be introduced, and the Schwarzschild Black Hole solution will be discussed.

EN.615.751. Modern Optics. 3 Credits.
This course covers the fundamental principles of modern physical optics and contemporary optical systems. Topics include propagation of light, polarization, coherence, interference, diffraction, Fourier optics, absorption, scattering, dispersion, and image quality analysis. Special emphasis is placed on the instrumentation and experimental techniques used in optical studies.
EN.615.642 Electromagnetics or the equivalent completed or taken concurrently.

EN.615.753. Plasma Physics. 3 Credits.
This course is an introduction to the physical processes that govern the "fourth state of matter", also known as plasma. Plasma physics is the study of ionized gas, which is the state of the matter for 99.9% of the apparent universe, from astrophysical plasmas, to the solar wind and Earth's radiation belts and ionosphere. Plasma phenomena are also relevant to energy generation by controlled thermonuclear fusion. The challenge of plasma physics comes from the fact that many plasma properties result from the long-range Coulomb interaction, and therefore are collective properties that involve many particles simultaneously. Topics to be covered during class include motion of charged particles in electric and magnetic fields, dynamics of fully ionized plasma from both microscopic and macroscopic points of view, magneto-hydrodynamics, equilibria, waves, instabilities, applications to fusion devices, ionospheric, and space physics. .
EN.615.642 Electromagnetics or the equivalent

EN.615.755. Space Physics. 3 Credits.
This course studies the physics and the history of our utilization of space, the challenges and mitigation of making in situ observations in space. Topics include the history of solar system exploration; the solar cycle; the electrodynamics of the solar upper atmosphere responsible for the solar wind; and the solar wind interaction with unmagnetized and magnetized bodies—how this leads to planetary bow shocks, comets, and magnetospheres and how they are studied. Practical issues include penetrating radiation and its effects on spacecraft and man in space, magnetospheric storm disruptions of ground power distribution and spacecraft charging in the presence and absence of solar illumination with particular reference to applying this knowledge in exploring the outer solar system and beyond.
EN.615.642 Electromagnetics or the equivalent.

EN.615.757. Solid State Physics. 3 Credits.
Students examine concepts and methods employed in condensed matter physics with applications in materials science, surface physics, and electronic devices. Topics include atomic and electronic structure of crystalline solids and their role in determining the elastic, transport, and magnetic properties of metals, semiconductors, and insulators. The effects of structural and chemical disorder on these properties are also discussed.
EN.615.654 Quantum Mechanics or the equivalent.

EN.615.760. Physics of Semiconductor Devices. 3 Credits.
This course examines the physical principles underlying semiconductor device operation and the application of these principles to specific devices. Emphasis is placed on understanding device operation, rather than on circuit properties. Topics include elementary excitations in semiconductors such as phonons, photons, conduction electrons, and holes; charge and heat transport; carrier trapping and recombination; effects of high doping; contacts; the pn junction; the junction transistor; surface effects; the MIS diode; and the MOSFET. Nanotechnology as applied to electronics will be discussed. Prerequisite(s): An undergraduate degree in engineering, physics, or a related technical discipline. Some familiarity with quantum mechanics would be helpful.

EN.615.761. Intro To Oceanography. 3 Credits.
This course covers the physical concepts and mathematics of the exciting field of oceanography and can be taken as an elective. It is designed for the student who wants to learn more about oceanography. Topics range from fundamental small waves to planetary-scale ocean currents. There will be a strong emphasis on understanding the basic ocean processes. Initial development gives a description of how the ocean system works and the basic governing equations. Additional subjects include boundary layers, flow around objects (seamounts), waves, tides, Ekman flow, and the Gulf Stream. Also studied will be the ocean processes that impact our climate such as El Nino and the Thermohaline Conveyor Belt. Prerequisite(s): Mathematics through calculus.

EN.615.762. Applied Computational Electromagnetics. 3 Credits.
This course introduces the numerical methods and computer tools required for the practical applications of the electromagnetic concepts covered in EN.615.642 to daily-life engineering problems. It covers the methods of calculating electromagnetic scattering from complex air and sea targets (aircraft, missiles, ships, etc.), taking into account the effects of the intervening atmosphere and natural surfaces such as the sea surface and terrain. These methods have direct applications in the areas of radar imaging, communications, and remote sensing. Methods for modeling and calculating long-distance propagation over terrain and in urban areas, which find application in the areas of radar imaging, radio and TV broadcasting, and cellular communications, are also discussed. The numerical toolkit built in this course includes the method of moments, the finite difference frequency and time domain methods, the finite element method, marching numerical methods, iterative methods, and the shooting and bouncing ray method. Prerequisite(s): Knowledge of vector analysis, partial differential equations, Fourier analysis, basic electromagnetics, and a scientific computer language.

EN.615.765. Chaos and Its Applications. 3 Credits.
The course will introduce students to the basic concepts of nonlinear physics, dynamical system theory, and chaos. These concepts will be studied by examining the behavior of fundamental model systems that are modeled by ordinary differential equations and, sometimes, discrete maps. Examples will be drawn from physics, chemistry, and engineering. Some mathematical theory is necessary to develop the material. Practice through concrete examples will help to develop the geometric intuition necessary for work on nonlinear systems. Students conduct numerical experiments using provided software, which allows for interactive learning. Prerequisite(s): Mathematics through ordinary differential equations. Familiarity with MATLAB is helpful. Consult instructor for more information.

EN.615.769. Physics of Remote Sensing. 3 Credits.
This course exposes the student to the physical principles underlying satellite observations of Earth by optical, infrared, and microwave sensors, as well as techniques for extracting geophysical information from remote sensor observations. Topics will include spacecraft orbit considerations, fundamental concepts of radiometry, electromagnetic wave interactions with land and ocean surfaces and Earth's atmosphere, radiative transfer and atmospheric effects, and overviews of some important satellite sensors and observations. Examples from selected sensors will be used to illustrate the information extraction process and applications of the data for environmental monitoring, oceanography, meteorology, and climate studies.

EN.615.772. Cosmology. 3 Credits.
This course begins with a brief review of tensor calculus and principles of the General theory of relativity, the Freidmann equation and the Robertson-Walker metric. Cosmological models including radiation, matter, and the cosmological constant and their properties are discussed. Observational parameters, the role of dark matter, and the cosmic microwave background, and nucleosynthesis in the early universe are studied. The flatness and the horizon problems are introduced and the role of inflation in the early universe is discussed. Finally, we discuss the origins and the role of density fluctuations in formation of large structures leading to the current Cosmological constant Cold Dark Matter model of the universe.
EN.615.748 Introduction to Relativity.

EN.615.775. Physics of Climate. 3 Credits.
To understand the forces that cause global climate variability, we must understand the natural forces that drive our weather and our oceans. This course covers the fundamental science underlying the nature of the Earth's atmosphere and its ocean. This includes development of the basic equations for the atmosphere and ocean, the global radiation balance, description of oceanic and atmospheric processes, and their interactions and variability. Also included will be a description of observational systems used for climate studies and monitoring, fundamentals underlying global circulation, and climate prediction models. Prerequisite(s): Undergraduate degree in physics or engineering or equivalent, with strong background in mathematics through the calculus level.

EN.615.778. Optical System Design and Modelling. 3 Credits.
In this course, students learn to design optical systems and model their performance. Students will use commercially available optical design software to complete their assignments and their design project. We will begin with simple lenses for familiarization with optical design software using CODE V, and then move onto more complicated multi-element lenses and reflective systems. For their design project, students may use any software of their choosing (e.g. OSLO, ZEMAX, OpTalix, SYNOPSYS, their own, etc.). Emphasis is placed on understanding the optical concepts involved in the designs while developing the ability to use design software to properly model optical systems. Upon completion of the course, students are capable of independently pursuing their own optical designs and building optical models of existing systems.
EN.615.671 Principles of Optics

EN.615.780. Optical Detectors & Applications. 3 Credits.
This course examines the physics of detection of incoherent electromagnetic radiation from the infrared to the soft X-ray regions. Brief descriptions of the fundamental mechanisms of device operation are given. A variety of illumination sources are considered to clarify detection requirements, with emphasis on solar illumination in the visible and blackbody emission in the infrared. Practical devices, elementary detection circuits, and practical operational constraints are described. An introduction to solid-state and semiconductor physics follows and is then applied to the photodiode, and later to CCD and CMOS devices. A description and analysis of the electronics associated with photodiodes and their associated noise is given. Description of scanning formats leads into the description of spatially resolving systems (e.g., staring arrays). Emphasis is placed on Charged-Coupled Device and CMOS detector arrays. This naturally leads into the discussion of more complex IR detectors and Readout Integrated Circuits that are based on the CMOS pixel. In addition, descriptions of non-spatially resolving detectors based on photoemission and photo-excitation are provided, including background physics, noise, and sensitivity. Selection of optimum detectors and integration into complete system designs are discussed. Applications in space-based and terrestrial remote sensing are discussed, from simple radiometry and imaging to spectrometry. Prerequisite(s): Undergraduate degree in physics or engineering, preferably with studies in elementary circuit theory, solid-state physics, and optics. Students are expected to be proficient using spreadsheets and/or a programming language such as MATLAB or IDL.

EN.615.781. Quantum Information Processing. 3 Credits.
This course provides an introduction to the rapidly developing field of quantum information processing. In addition to covering fundamental concepts such as two-state systems, measurements uncertainty, quantum entanglement, and nonlocality, the course will emphasize specific quantum information protocols. Several applications of this technology will be explored, including cryptography, teleportation, dense coding, computing, and error correction. The quantum mechanics of polarized light will be used to provide a physical context to the discussion. Current research on implementations of these ideas will also be discussed.
EN.615.654 Quantum Mechanics

EN.615.782. Optics and Matlab. 3 Credits.
This course provides hands-on experience with MATLAB by performing weekly computer exercises revolving around optics. Each module explores a new topic in optics, while simultaneously providing experience in MATLAB. The goal is to bridge the gap between theoretical concepts and real-world applications. Topics include an introduction to MATLAB, review of electromagnetism, ray tracing, 1D Fourier theory and propagation in optical fibers, laser beam propagation, paraxial wave propagation in turbulent media, diffraction and holography, polarization and interferometry, optical waveguides and laser theory and related technologies. Students are expected to complete a semester project that will facilitate investigation of a topic of interest not specifically covered in the course. Course Note(s): No prior experience with MATLAB is required. While a background in optics is helpful, it is not required.

EN.615.800. Applied Physics Project. 3 Credits.
This course is an individually tailored, supervised project that offers the student research experience through work on a special problem related to his or her field of interest. The research problem can be addressed experimentally or analytically, and a written report is produced. It is recommended that all required Applied Physics courses be completed. Open only to candidates in the Master of Science in Applied Physics program. Prerequisite(s): It is recommended that all required Applied Physics courses be completed. The Independent Study/Project proposal form (https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration. Course Note(s): Open only to candidates in the Master of Science in Applied Physics program.

EN.615.802. Directed Studies in Applied Physics. 3 Credits.
In this course, qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or non-laboratory study under the direction of faculty members. Open only to candidates in the Master of Science in Applied Physics program. Prerequisite(s): The Independent Study/Project proposal form (https://ep.jhu.edu/current-students/student-forms/) must be completed and approved prior to registration. Course Note(s): Open only to candidates in the Master of Science in Applied Physics program.

EN.625 (Applied and Computational Mathematics)

EN.625.108. Calculus I.
Differential and integral calculus of functions of one independent variable. Topics include the basic analytic geometry of graphs of functions, and their limits, integrals and derivatives, including the Fundamental Theorem of Calculus. Also, some applications of the integral, like arc length and volumes of solids with rotational symmetry, are discussed. Applications to the physical sciences and engineering will be a focus of this course, as this course is designed to meet the needs of students in these disciplines. Course Note(s): Not for credit. Not eligible for financial aid. Prerequisite(s): Pre-calculus (e.g., AS.110.105 or equivalent)

EN.625.109. Calculus II.
Differential and integral calculus. Includes analytic geometry, functions, limits, integrals and derivatives, polar coordinates, parametric equations, Taylor's theorem and applications, infinite sequences and series. Some applications to the physical sciences and engineering will be discussed, and the course is designed to meet the needs of students in these disciplines. Prerequisite(s): EN.625.108 Calculus I Course Note(s): Not for credit. Not eligible for financial aid.

EN.625.201. General Applied Mathematics. 3 Credits.
This course is designed for students whose prior background does not fully satisfy the mathematics requirements for admission and/or for students who wish to take a refresher course in applied mathematics. The course provides a review of differential and integral calculus in one or more variables. It covers elementary linear algebra and differential equations, including first- and second-order linear differential equations. Basic concepts of matrix theory are discussed (e.g., matrix multiplication, inversion, and eigenvalues/eigenvectors). Prerequisite(s): Two semesters of calculus. Course Note(s): Not for graduate credit.

EN.625.240. Introduction to Probability and Statistics. 3 Credits.
This course provides an introduction to probability and statistics with applications. Topics consist of combinatorics, random variables, probability distributions, Bayesian inference, hypothesis testing, confidence intervals, and linear regression. Students will develop proficiency in Excel for statistical analysis. Prerequisite(s): One semester of calculus (EN.625.108 or equivalent)

EN.625.250. Multivariable Calculus and Complex Analysis. 3 Credits.
This course covers fundamental mathematical tools useful in all areas of applied mathematics, including statistics, data science, and differential equations. The course covers basic principles in linear algebra, multivariate calculus, and complex analysis. Within linear algebra, topics include matrices, systems of linear equations, determinants, matrix inverse, and eigenvalues/eigenvectors. Relative to multivariate calculus, the topics include vector differential calculus (gradient, divergence, curl) and vector integral calculus (line and double integrals, surface integrals, Green's theorem, triple integrals, divergence theorem and Stokes' theorem). For complex analysis, the course covers complex numbers and functions, conformal maps, complex integration, power series and Laurent series, and, time permitting, the residue integration method. Prerequisite(s): Differential and integral calculus. Course Note(s): Not for graduate credit.

EN.625.251. Introduction to Ordinary and Partial Differential Equations. 3 Credits.
This course is a companion to EN.625.250. Topics include ordinary differential equations, Fourier series and integrals, the Laplace transformation, Bessel functions and Legendre polynomials, and an introduction to partial differential equations. Prerequisite(s): Differential and integral calculus. Students with no experience in linear algebra may find it helpful to take EN.625.250 Multivariable and Complex Analysis first. Course Note(s): Not for graduate credit.

EN.625.252. Linear Algebra and Its Applications. 3 Credits.
This course is a study of linear systems of equations, vector spaces, and linear transformations in the context of applications including basic data fitting, polynomial interpolation and network flow. The following topics and their basic applications are covered: Gaussian elimination, matrix algebra, determinants, eigenvalues and eigenvectors, diagonalization, linear independence, basis and dimension of vector spaces, orthogonality, Gram-Schmidt process and least-squares method. No software is required. Note for those planning to also take EN.625.609 Matrix Theory: EN.625.252 covers a broad range of topics in linear algebra and its applications at an introductory level, while EN.625.609 focuses in depth on the fundamental theoretical properties of matrices and the consequent significant applications. EN.625.252 introduces basic proof writing techniques, theoretical background and knowledge of applications that will be useful for EN.625.609. Prerequisite(s): EN.625.108 Calculus I. Course Note(s): Not for Graduate Credit

EN.625.260. Introduction to Signals and Systems. 3 Credits.
Linear systems that produce output signals of some type are ubiquitous in many areas of science and engineering. This course will consider such systems, with an emphasis on fundamental concepts as well as the ability to perform calculations for applications in areas such as image analysis, signal processing, computer-aided systems, and feedback control. In particular, the course will approach the topic from the perspectives of both mathematical principles and computational learning. The course will also include examples that span different real-world applications in broad areas such as engineering and medicine. The course is designed primarily for students who do not have a bachelor's degree in electrical engineering or a great deal of prior mathematical coursework. The course will be of value to those with general interests in linear systems analysis, control systems, and/or signal processing. The course will deepen a student's appreciation and understanding of differential equations and their solutions. Topics include signal representations, linearity, time-variance, convolution, and Fourier series and transforms. Coverage includes both continuous and discrete-time systems. Prerequisite(s): Differential and integral calculus. Course note(s): Not for graduate credit.

EN.625.601. Real Analysis. 3 Credits.
This course presents a rigorous treatment of fundamental concepts in analysis. Emphasis is placed on careful reasoning and proofs. Topics covered include the completeness and order properties of real numbers, limits and continuity, conditions for integrability and differentiability, infinite sequences, and series. Basic notions of topology and measure are also introduced. Prerequisite(s): Multivariate calculus.

EN.625.602. Modern Algebra. 3 Credits.
This course examines the structures of modern algebra, including groups, linear spaces, rings, polynomials, and fields, and some of their applications to such areas as cryptography, primality testing and the factorization of composite numbers, efficient algorithm design in computing, circuit design, and signal processing. It will include an introduction to quantum information processing. Grading is based on weekly problem sets, a midterm, and a final. Prerequisite(s): Multivariate calculus and linear algebra.

EN.625.603. Statistical Methods and Data Analysis. 3 Credits.
This course introduces statistical methods that are widely used in modern applications. A balance is struck between the presentation of the mathematical foundations of concepts in probability and statistics and their appropriate use in a variety of practical contexts. Foundational topics of probability, such as probability rules, related inequalities, random variables, probability distributions, moments, and jointly distributed random variables, are followed by foundations of statistical inference, including estimation approaches and properties, hypothesis testing, and model building. Data analysis ranging from descriptive statistics to the implementation of common procedures for estimation, hypothesis testing, and model building is the focus after the foundational methodology has been covered. Software, for example R-Studio, will be leveraged to illustrate concepts through simulation and to serve as a platform for data analysis. Prerequisite(s): Multivariate calculus.

EN.625.604. Ordinary Differential Equations. 3 Credits.
This course provides an introduction to the theory, solution, and application of ordinary differential equations. Topics discussed in the course include methods of solving first-order differential equations, existence and uniqueness theorems, second-order linear equations, power series solutions, higher-order linear equations, systems of equations, non-linear equations, SturmLiouville theory, and applications. The relationship between differential equations and linear algebra is emphasized in this course. An introduction to numerical solutions is also provided. Applications of differential equations in physics, engineering, biology, and economics are presented. This course covers more material at greater depth than the standard undergraduate-level ODE course. Prerequisite(s): Two or more terms of calculus are required. Course in linear algebra would be helpful.

EN.625.609. Matrix Theory. 3 Credits.
This course focuses on the fundamental theoretical properties of matrices. Topics will include a rigorous treatment of vector spaces (linear independence, basis, dimension, and linear transformations), orthogonality (inner products, projections, and Gram-Schmidt process), determinants, eigenvalues and eigenvectors (diagonal form of a matrix, similarity transformations, and matrix exponential), singular value decomposition, and the pseudo-inverse. Essential proof writing techniques and logic will be reviewed and then used throughout the course in exams and written assignments. Computer software will be used in some class exercises and homework. Prerequisite(s): Multivariate calculus

EN.625.611. Computational Methods. 3 Credits.
As the need to increase the understanding of real-world phenomena grows rapidly, computer-based simulations and modeling tools are increasingly being accepted as viable means to study such problems. In this course, students are introduced to some of the key computational techniques used in modeling and simulation of real-world phenomena. The course begins with coverage of fundamental concepts in computational methods including error analysis, matrices and linear systems, convergence, and stability. It proceeds to curve fitting, least squares, and iterative techniques for practical applications, including methods for solving ordinary differential equations and simple optimization problems. Elements of computer visualization and Monte Carlo simulation will be discussed as appropriate. The emphasis here is not so much on programming technique, but rather on understanding basic concepts and principles. Employment of higher-level programming and visualization tools, such as MATLAB, reduces burdens on programming and introduces a powerful tool set commonly used by industry and academia. A consistent theme throughout the course is the linkage between the techniques covered and their applications to realworld problems. Prerequisite(s): Multivariate calculus and ability to program in MATLAB, FORTRAN, C++, Java, or other language. Courses in matrix theory or linear algebra as well as in differential equations would be helpful but are not required.

EN.625.615. Introduction to Optimization. 3 Credits.
This course introduces applications and algorithms for linear, network, integer, and nonlinear optimization. Topics include the primal and dual simplex methods, network flow algorithms, branch and bound, interior point methods, Newton and quasi-Newton methods, and heuristic methods. Students will gain experience in formulating models and implementing algorithms using MATLAB. No previous experience with the software is required. Prerequisite(s): Multivariate calculus, linear algebra. Comfort with reading and writing mathematical proofs would be helpful but is not required. Course Note(s): Due to overlap in subject matter in EN.625.615 and EN.625.616, students may not receive credit towards the MS or post-master's certificate for both EN.625.615 and EN.625.616.

EN.625.616. Optimization in Finance. 3 Credits.
Optimization models play an increasingly important role in financial decisions. This course introduces the student to financial optimization models and methods. We will specifically discuss linear, integer, quadratic, and general nonlinear programming. If time permits, we will also cover dynamic and stochastic programming. The main theoretical features of these optimization methods will be studied as well as a variety of algorithms used in practice. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): Due to overlap in subject matter in EN.625.615 and EN.625.616, students may not receive credit towards the MS or post-master's certificate for both EN.625.615 and EN.625.616.

EN.625.617. Intro to Enumerative Combinatorics. 3 Credits.
The most basic question in mathematics is How many? Counting problems arise in diverse areas including discrete probability and the analysis of the run time of algorithms. In this course we present methods for answering enumeration questions exactly and approximately. Topics include fundamental counting problems (lists, sets, partitions, and so forth), combinatorial proof, inclusion-exclusion, ordinary and exponential generating functions, group-theory methods, and asymptotics. Examples are drawn from areas such as graph theory and block designs. After completing this course students will be practiced in applying the fundamental functions (such as factorial, binomial coefficients, Stirling numbers) and techniques for solving a wide variety of exact enumeration problems as well as notation and methods for approximate counting (asymptotic equality, big-oh and littleoh notation, etc.). Prerequisite(s): Linear algebra Course Note(s): This course is the same as EN.605.623 Introduction to Enumerative Combinatorics.

EN.625.618. Discrete Hybrid Optimization. 3 Credits.
Real-world planning, scheduling, and resource allocation problems are often too large and complex to solve using straightforward applications of classic exact optimization methods. Often a hybrid combination of methods is used to decompose large, unwieldy problems into smaller and computationally-tractable sub-problems. This course introduces the theory, algorithms, and a framework for combining multiple optimization techniques to solve large-scale real-world optimization problems. Techniques include integer optimization, constraint programming, network optimization, heuristics, dynamic programming, and reinforcement learning. The class provides the necessary theoretical underpinnings of the techniques, and focuses on selecting and implementing hybrid methods to solve applied problems. Emphasis is mostly on deterministic methods, but includes some stochastic concepts. Students will gain experience in formulating models of real-world problems, implementing solution techniques using IBM CPLEX and other software, and presenting analytic results clearly and concisely. Some previous experience with a scientific computing language (e.g., Python, MATLAB, Julia, R) is expected.
Linear algebra; some knowledge of mathematical set notation; EN.625.603 or other exposure to probability and statistics.

EN.625.620. Mathematical Methods for Signal Processing. 3 Credits.
This course familiarizes the student with modern techniques of digital signal processing and spectral estimation of discrete-time or discrete-space sequences derived by the sampling of continuous-time or continuous-space signals. The class covers the mathematical foundation needed to understand the various signal processing techniques as well as the techniques themselves. Topics include the discrete Fourier transform, the discrete Hilbert transform, the singular-value decomposition, the wavelet transform, classical spectral estimates (periodogram and correlogram), autoregressive and autoregressivemoving average spectral estimates, and Burg maximum entropy method. Prerequisite(s): Mathematics through multivariate calculus, matrix theory, or linear algebra, and introductory probability theory and/or statistics. Students are encouraged to refer any questions to the instructor.

EN.625.623. Introduction to Operations Research: Probabilistic Models. 3 Credits.
This course investigates several probability models that are important to operations research applications. Models covered include Markov chains, Markov processes, renewal theory, queueing theory, scheduling theory, reliability theory, Bayesian networks, random graphs, and simulation. The course emphasizes both the theoretical development of these models and the application of the models to areas such as engineering, computer science, and management science.
Multivariate calculus and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.624. Network Models and Analysis. 3 Credits.
Networks are at the heart of some of the most revolutionary technologies in modern times. They permeate science, technology, business, and nature. We begin this course with an in-depth mathematical study of the network problems traditionally discussed in operations research, with emphasis on combinatorial approaches for solving them. Students will be introduced to efficient algorithms used in solving shortest path, maximum flow, minimum cost flow problems, and related problems. We next focus on mathematically describing different classes of networks – random, small-world, scale free, dynamic – and their applications in modern network science.
probability and statistics (EN.625.603 or similar course), linear algebra and experience with reading and writing proofs as found in EN.625.609 or similar course. While the course is primarily mathematical, students will be expected to work within at least one programming environment (Matlab or Python will be easiest, but Julia, R and others will also be acceptable).

EN.625.633. Monte Carlo Methods. 3 Credits.
This course is an introduction to fundamental tools in designing, conducting, and interpreting Monte Carlo simulations. Emphasis is on generic principles that are widely applicable in simulation, as opposed to detailed discussion of specific applications and/or software packages. At the completion of this course, it is expected that students will have the insight and understanding to critically evaluate or use many state-of-the-art methods in simulation. Topics covered include random number generation, simulation of Brownian motion and stochastic differential equations, output analysis for Monte Carlo simulations, variance reduction, Markov chain Monte Carlo, simulation-based estimation for dynamical (state-space) models, and, time permitting, sensitivity analysis and simulation-based optimization. Course Note(s): This course serves as a complement to the 700-level course EN.625.744 Modeling, Simulation, and Monte Carlo. EN.625.633 Monte Carlo Methods and EN.625.744 emphasize different topics, and EN.625.744 is taught at a slightly more advanced level. EN.625.633 includes topics not covered in EN.625.744 such as simulation of Brownian motion and stochastic differential equations, general output analysis for Monte Carlo simulations, and general variance reduction. EN.625.744 includes greater emphasis on generic modeling issues (bias-variance tradeoff, etc.), simulation-based optimization of real-world processes, and optimal input selection.
Linear algebra and a graduate-level statistics course such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.636. Graph Theory. 3 Credits.
This course focuses on the mathematical theory of graphs; a few applications and algorithms will be discussed. Topics include trees, connectivity, Eulerian and Hamiltonian graphs, matchings, edge and vertex colorings, independent sets and cliques, planar graphs, and directed graphs. An advanced topic completes the course. Prerequisite(s): Familiarity with linear algebra and basic counting methods such as binomial coefficients is assumed. Comfort with reading and writing mathematical proofs is required.

EN.625.638. Neural Networks. 3 Credits.
This course provides an introduction to concepts in neural networks and connectionist models. Topics include parallel distributed processing, learning algorithms, and applications. Specific networks discussed include Hopfield networks, bidirectional associative memories, perceptrons, feedforward networks with back propagation, and competitive learning networks, including self-organizing and Grossberg networks. Software for some networks is provided. Prerequisite(s): Multivariate calculus and linear algebra. Course Note(s): This course is the same as EN.605.647 Neural Networks.

EN.625.641. Mathematics of Finance. 3 Credits.
This course offers a rigorous treatment of the subject of investment as a scientific discipline. Mathematics is employed as the main tool to convey the principles of investment science and their use to make investment calculations for good decision making. Topics covered in the course include the basic theory of interest and its applications to fixed-income securities, cash flow analysis and capital budgeting, mean-variance portfolio theory and the associated capital asset pricing model, utility function theory and risk analysis, derivative securities and basic option theory, and portfolio evaluation.
Multivariate calculus and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.642. Mathematics of Risk, Options, and Financial Derivatives. 3 Credits.
The concept of options stems from the inherent human desire and need to reduce risks. This course starts with a rigorous mathematical treatment of options pricing, and related areas by developing a powerful mathematical tool known as Ito calculus. We introduce and use the well-known field of stochastic differential equations to develop various techniques as needed, as well as discuss the theory of martingales. The mathematics will be applied to the arbitrage pricing of financial derivatives, which is the main topic of the course. We treat the Black-Scholes theory in detail and use it to understand how to price various options and other quantitative financial instruments. Topics covered in the course include options strategies, binomial pricing, Weiner processes and Ito's lemma, the Black-Scholes-Merton Model, futures options and Black's Model, option Greeks, numerical procedures for pricing options, the volatility smile, the value at risk, exotic options, martingales and risk measures. Course Note(s): This class is distinguished from EN.625.641 Mathematics of Finance: Investment Science (formerly 625.439) and EN.625.714 Introductory Stochastic Differential Equations with Applications, as follows: EN.625.641 Mathematics of Finance: Investment Science gives a broader and more general treatment of financial mathematics, and EN.625.714 Introductory Stochastic Differential Equations with Applications provides a deeper (more advanced) mathematical understanding of stochastic differential equations, with applications in both finance and non-finance areas.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and a graduate-level course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.651. Mathematical Models in Healthcare. 3 Credits.
A firm mathematical foundation for work in biostatistics is provided by a detailed consideration of four mathematical frameworks that can be applied throughout medicine. The class will focus on these framework ideas, which build on earlier coursework in statistics and probability, and their applications. The mathematical frameworks are Markov models, Gaussian processes, logistic regression, and Bayesian networks. The clinical settings to be explored will be associated with treatment, prognosis, and survival within the settings of asthma, diabetes, cancer, and epidemics. While the course is primarily mathematical, students will be expected to work within at least one programming environment (R or Python will be easiest, but Julia, MATLAB, and others will also be supported).
EN.625.603 Statistical Methods and Data Analysis or equivalent. Ability to work within R, Python, Julia, or MATLAB or similar code settings for analysis of data and code development.

EN.625.661. Statistical Models and Regression. 3 Credits.
Introduction to regression and linear models including least squares estimation, maximum likelihood estimation, the Gauss-Markov Theorem, and the Fundamental Theorem of Least Squares. Topics include estimation, hypothesis testing, simultaneous inference, model diagnostics, transformations, multicollinearity, influence, model building, and variable selection. Advanced topics include nonlinear regression, robust regression, and generalized linear models including logistic and Poisson regression.
EN.625.603 Statistical Methods and Data Analysis, multivariate calculus, and basic knowledge of matrix and linear algebra.

EN.625.662. Design and Analysis of Experiments. 3 Credits.
Statistically designed experiments are plans for the efficient allocation of resources to maximize the amount of empirical information supporting objective decisions. Design of experiments is widely applicable to physical, health, and social sciences, business, and government. This course covers the principles and concepts of experimental design and analysis of the general linear model. Design building elements of blocking, randomization, and replication within the context of basic comparative experimentation are extended to concepts of nested and crossed effects, fixed and random effects, aliasing and confounding, and power and sample size. Specific design structures include completely random, randomized block, Latin squares and hypercubes, factorial, fractional factorial, hierarchical/nested, response surface, and space-filling designs. Developing problem solving skills for constructing a variety of designs and making inference on parameters for the associated general linear models are main objectives for the course. Assignments focusing on statistical computation will require suitable statistical software (e.g., RStudio). Assignments focusing on extensive analysis and interpretation will employ JMP.
Multivariate calculus, linear algebra, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given.

EN.625.663. Multivariate Statistics and Stochastic Analysis. 3 Credits.
Multivariate analysis arises with observations of more than one variable when there is some probabilistic linkage between the variables. In practice, most data collected by researchers in virtually all disciplines are multivariate in nature. In some cases, it might make sense to isolate each variable and study it separately. In most cases, however, the variables are interrelated in such a way that analyzing the variables in isolation may result in failure to uncover critical patterns in the data. Multivariate data analysis consists of methods that can be used to study several variables at the same time so that the full structure of the data can be observed and key properties can be identified. This course covers estimation, hypothesis tests, and distributions for multivariate mean vectors and covariance matrices. We also cover popular multivariate data analysis methods including multivariate data visualization, maximum likelihood, principal components analysis, multiple comparisons tests, multidimensional scaling, cluster analysis, discriminant analysis and multivariate analysis of variance, multiple regression and canonical correlation, and analysis of repeated measures data. Coursework will include computer assignments.
Linear algebra, multivariate calculus, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis).

EN.625.664. Computational Statistics. 3 Credits.
Computational statistics is a branch of mathematical sciences concerned with efficient methods for obtaining numerical solutions to statistically formulated problems. This course will introduce students to a variety of computationally intensive statistical techniques and the role of computation as a tool of discovery. Topics include numerical optimization in statistical inference [expectation-maximization (EM) algorithm, Fisher scoring, etc.], random number generation, Monte Carlo methods, randomization methods, jackknife methods, bootstrap methods, tools for identification of structure in data, estimation of functions (orthogonal polynomials, splines, etc.), and graphical methods. Additional topics may vary. Coursework will include computer assignments.
Multivariate calculus, familiarity with basic matrix algebra and EN.625.603 Statistical Methods and Data Analysis.

EN.625.665. Bayesian Statistics. 3 Credits.
In Bayesian statistics, inference about a population parameter or hypothesis is achieved by merging prior knowledge, represented as a prior probability distribution, with data. This prior distribution and data are merged mathematically using Bayes' rule to produce a posterior distribution, and this course focuses on the ways in which the posterior distribution is used in practice and on the details of how the calculation of the posterior is done. In this course, we discuss specific types of prior and posterior distributions, prior/posterior conjugate pairs, decision theory, Bayesian prediction, Bayesian parameter estimation and estimation uncertainty, and Monte Carlo methods commonly used in Bayesian statistical inference. Students will apply Bayesian methods to analyze and interpret several real-world data sets and will investigate some of the theoretical issues underlying Bayesian statistical analysis. R is the software that will be used to illustrate the concepts discussed in class. Course Note(s): Prior experience with R is not required; students not familiar with R will be directed to an online tutorial.
Multivariate calculus, familiarity with basic matrix algebra, and a graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.680. Cryptography. 3 Credits.
An important concern in the information age is the security, protection, and integrity of electronic information, including communications, electronic funds transfer, power system control, transportation systems, and military and law enforcement information. Modern cryptography, in applied mathematics, is concerned not only with the design and exploration of encryption schemes (classical cryptography) but also with the rigorous analysis of any system that is designed to withstand malicious attempts to tamper with, disturb, or destroy it. This course introduces and surveys the ?eld of modern cryptography and will explore the following topics in the field: foundations of cryptography, public key cryptography, probabilistic proof systems, pseudorandom generators, elliptic curve cryptography, and fundamental limits to information operations. Mathematical preliminaries from probability theory, algebra, computational complexity, and number theory will also be covered.
Linear algebra and an introductory course in probability and statistics such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.685. Number Theory. 3 Credits.
This course covers principal ideas of classical number theory, including the fundamental theorem of arithmetic and its consequences, congruences, cryptography and the RSA method, polynomial congruences, primitive roots, residues, multiplicative functions, and special topics. Prerequisite(s): Multivariate calculus and linear algebra.

EN.625.687. Applied Topology. 3 Credits.
The course is both an introduction to topology and an investigation of various applications of topology in science and engineering. Topology, simply put, is a mathematical study of shapes, and it often turns out that just knowing a rough shape of an object (whether that object is as concrete as platonic solids or as abstract as the space of all paths in large complex networks) can enhance one's understanding of the object. We will start with a few key theoretical concepts from point-set topology with proofs, while letting breadth take precedence over depth, and then introduce key concepts from algebraic topology, which attempts to use algebraic concepts, mostly group theory, to develop ideas of homotopy, homology, and cohomology, which render topology "computable." Finally, we discuss a few key examples of real-world applications of computational topology, an emerging field devoted to the study of efficient algorithms for topological problems, especially those arising in science and engineering, which builds on classical results from algebraic topology as well as algorithmic tools from computational geometry and other areas of computer science. The questions we like to ask are: Do I know the topology of my network? What is a rough shape of the large data set that I am working with (is there a logical gap?)? Will the local picture of a part of the sensor field I am looking at give rise to a consistent global common picture? Course Note(s): This course is the same as EN.605.628 Applied Topology.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and an undergraduate-level course in probability and statistics.

EN.625.690. Computational Complexity and Approximation. 3 Credits.
This course will cover the theory of computational complexity and popular approximation and optimization problems and algorithms. It begins with automata theory, languages, and computation followed by important complexity concepts including Turing machines, Karp and Turing reducibility, basic complexity classes, and the theory of NP-completeness. It then discusses the complexity of well-known approximation and optimization algorithms and introduces approximability properties, with special focus on approximation algorithm and heuristic design. The course will specifically target algorithms with practical significance and techniques that can improve performance in real-world implementations.
Introductory probability theory and/or statistics (such as EN.625.603 Statistical Methods and Data Analysis) and undergraduate-level exposure to algorithms and matrix algebra. Some familiarity with optimization and computing architectures is desirable but not necessary.

EN.625.692. Probabilistic Graphical Models. 3 Credits.
This course introduces the fundamentals behind the mathematical and logical framework of graphical models. These models are used in many areas of machine learning and arise in numerous challenging and intriguing problems in data analysis, mathematics, and computer science. For example, the "big data" world frequently uses graphical models to solve problems. While the framework introduced in this course will be largely mathematical, we will also present algorithms and connections to problem domains. The course will begin with the fundamentals of probability theory and will then move into Bayesian networks, undirected graphical models, templatebased models, and Gaussian networks. The nature of inference and learning on the graphical structures will be covered, with explorations of complexity, conditioning, clique trees, and optimization. The course will use weekly problem sets and a term project to encourage mastery of the fundamentals of this emerging area. Course Note(s): This course is the same as EN.605.625 Probabilistic Graphical Models.
Graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.695. Time Series Analysis. 3 Credits.
This course will be a rigorous and extensive introduction to modern methods of time series analysis and dynamic modeling. Topics to be covered include elementary time series models, trend and seasonality, stationary processes, Hilbert space techniques, the spectral distribution function, autoregressive/ integrated/moving average (ARIMA) processes, fitting ARIMA models, forecasting, spectral analysis, the periodogram, spectral estimation techniques, multivariate time series, linear systems and optimal control, state-space models, and Kalman filtering and prediction. Additional topics may be covered if time permits. Some applications will be provided to illustrate the usefulness of the techniques. Course Note(s): This course is also offered in the Department of Applied Mathematics and Statistics (Homewood campus) as EN.553.639.
Graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis) and familiarity with matrix theory and linear algebra.

EN.625.703. Complex Analysis. 3 Credits.
This course presents complex analysis with a rigorous approach that also emphasizes problem solving techniques and applications. The major topics covered are holomorphic functions, contour integrals, Cauchy integral theorem and residue integration, Laurent series, argument principle, conformal mappings, harmonic functions. Several topics are explored in the context of analog and digital signal processing including: Fourier transforms for functions over the reals and the integers, Laplace and z-transforms, Jordan's lemma and inverse transforms computed via residue integration, reflection principle for lines and circles.
Mathematical maturity, as demonstrated by EN.625.601 Real Analysis, EN.625.604 Ordinary Differential Equations, or other relevant courses with permission of the instructor.

EN.625.710. Fourier Analysis with Applications to Signal Processing and Differential Equations. 3 Credits.
This applied course covers the theory and application of Fourier analysis, including the Fourier transform, the Fourier series, and the discrete Fourier transform. Motivation will be provided by the theory of partial differential equations arising in physics and engineering. We will also cover Fourier analysis in the more general setting of orthogonal function theory. Applications in signal processing will be discussed, including the sampling theorem and aliasing, convolution theorems, and spectral analysis. Prerequisite(s): Familiarity with differential equations, linear algebra, and real analysis.

EN.625.714. Introductory Stochastic Differential Equations with Applications. 3 Credits.
The goal of this course is to give basic knowledge of stochastic differential equations useful for scientific and engineering modeling, guided by some problems in applications. The course treats basic theory of stochastic differential equations, including weak and strong approximation, efficient numerical methods and error estimates, the relation between stochastic differential equations and partial differential equations, Monte Carlo simulations with applications in financial mathematics, population growth models, parameter estimation, and filtering and optimal control problems. Prerequisite(s): Multivariate calculus and a graduate course in probability and statistics, as well as exposure to ordinary differential equations.

EN.625.717. Advanced Differential Equations: Partial Differential Equations. 3 Credits.
This course presents practical methods for solving partial differential equations (PDEs). The course covers solutions of hyperbolic, parabolic, and elliptic equations in two or more independent variables. Topics include Fourier series, separation of variables, existence and uniqueness theory for general higher-order equations, eigenfunction expansions, numerical methods, Green's functions, and transform methods. MATLAB, a high-level computing language, is used in the course to complement the analytical approach and to motivate numerical methods.
EN.625.604 Ordinary Differential Equations or equivalent graduate-level ODE class and knowledge of eigenvalues and eigenvectors from matrix theory. (Note: The standard undergraduate-level ODE class alone is not sufficient to meet the prerequisites for this class.)

EN.625.718. Advanced Differential Equations: Nonlinear Differential Equations and Dynamical Systems. 3 Credits.
This course examines ordinary differential equations from a geometric point of view and involves significant use of phase portrait diagrams and associated concepts, including equilibrium points, orbits, limit cycles, and domains of attraction. Various methods are discussed to determine existence and stability of equilibrium points and closed orbits. Methods are discussed for analyzing nonlinear differential equations (e.g., linearization, direct, perturbation, and bifurcation analysis). An introduction to chaos theory and Hamiltonian systems is also presented. The techniques learned will be applied to equations from physics, engineering, biology, ecology, and neural networks (as time permits).
EN.625.604 Ordinary Differential Equations or equivalent graduate-level ordinary differential equations class and knowledge of eigenvalues and eigenvectors from matrix theory. (Note: The standard undergraduate-level ordinary differential equations class alone is not sufficient to meet the prerequisites for this class.) EN.625.717 Advanced Differential Equations: Partial Differential Equations is not required.

EN.625.721. Probability and Stochastic Process I. 3 Credits.
This rigorous course in probability covers probability space, random variables, functions of random variables, independence and conditional probabilities, moments, joint distributions, multivariate random variables, conditional expectation and variance, distributions with random parameters, posterior distributions, probability generating function, moment generating function, characteristic function, random sum, types of convergence and relation between convergence concepts, law of large numbers and central limit theorem (i.i.d. and non- i.i.d. cases), Borel-Cantelli Lemmas, well-known discrete and continuous distributions, homogeneous Poisson process (HPP), non-homogeneous Poisson process (NHPP), and compound Poisson process. This course is proof oriented. The primary purpose of this course is to lay the foundation for the second course, EN.625.722 Probability and Stochastic Process II, and other specialized courses in probability. Note that, in contrast to EN.625.728, this course is largely a non-measure theoretic approach to probability.
Multivariate calculus and EN.625.603 Statistical Methods and Data Analysis or equivalent

EN.625.722. Probability and Stochastic Process II. 3 Credits.
This course is an introduction to theory and applications of stochastic processes. The course starts with a brief review of conditional probability, conditional expectation, conditional variance, central limit theorems, and Poisson Process. The topics covered include Gaussian random vectors and processes, renewal processes, renewal reward process, discrete-time Markov chains, classification of states, birth-death process, reversible Markov chains, branching process, continuous-time Markov chains, limiting probabilities, Kolmogorov differential equations, approximation methods for transition probabilities, random walks, and martingales. This course is proof oriented.
Differential equations and EN.625.721 Probability and Stochastic Process I or equivalent.

EN.625.725. Theory Of Statistics I. 3 Credits.
This course covers mathematical statistics and probability. Topics covered include basic set theory & probability theory utilizing proofs, transformation methods to find distribution of a function of a random variable, expected values, moment generating functions, well-known discrete and continuous distributions, exponential and location-scale family distributions, multivariate distributions, order statistics, hierarchical and mixture models, types of convergence, Delta methods, the central limit theorem, and direct and indirect methods of random sample generation. This course is a rigorous treatment of statistics that lays the foundation for EN.625.726 and other advanced courses in statistics.
Multivariate calculus and EN.625.603 Statistical Methods and Data Analysis or equivalent.

EN.625.726. Theory of Statistics II. 3 Credits.
This course is a continuation of EN.625.725. Topics covered include principles of data reduction: minimal sufficient, ancillary, and complete statistics, estimation methods: method of moments, maximum likelihood, and Bayesian estimation, Cramer-Rao inequality, uniformly minimum variance unbiased estimators, the Neyman-Pearson lemma, the likelihood ratio test, goodnessof-fit tests, methods of finding confidence intervals: inverting a test statistic, pivotal quantities, pivoting CDF, and Bayesian intervals, asymptotic evaluation of point estimators, asymptotic efficiency of MLE, asymptotic hypothesis testing, and asymptotic confidence intervals including large sample intervals based on MLE. This course is proof oriented.
EN.625.725 Theory of Statistics I or equivalent.

EN.625.728. Theory of Probability. 3 Credits.
This course provides a rigorous, measure-theoretic introduction to probability theory. It begins with the notion of fields, sigma fields, and measurable spaces and also surveys elements from integration theory and introduces random variables as measurable functions. It then examines the axioms of probability theory and fundamental concepts including conditioning, conditional probability and expectation, independence, and modes of convergence. Other topics covered include characteristic functions, basic limit theorems (including the weak and strong laws of large numbers), and the central limit theorem.
EN.625.601 Real Analysis and EN.625.603 Statistical Methods and Data Analysis.

EN.625.734. Queuing Theory with Applications to Computer Science. 3 Credits.
Queues are a ubiquitous part of everyday life; common examples are supermarket checkout stations, help desk call centers, manufacturing assembly lines, wireless communication networks, and multi-tasking computers. Queuing theory provides a rich and useful set of mathematical models for the analysis and design of service process for which there is contention for shared resources. This course explores both theory and application of fundamental and advanced models in this field. Fundamental models include single and multiple server Markov queues, bulk arrival and bulk service processes, and priority queues. Applications emphasize communication networks and computer operations but may include examples from transportation, manufacturing, and the service industry. Advanced topics may vary. Course Note(s): This course is the same as EN.605.725 Queuing Theory with Applications to Computer Science.
Multivariate calculus and a graduate course in probability and statistics such as EN.625.603 Statistical Methods and Data Analysis.

EN.625.736. Combinatorial Optimization. 3 Credits.
Combinatorial optimization concerns finding an optimal solution from a discrete set of feasible solutions. In many of these problems, exhaustive enumeration of the solution space is intractable. The main goal of this course is to introduce students to efficient techniques for solving combinatorial optimization problems. The first part of the course will focus on algorithms for classical problems including maximum flow, minimum cut, minimum cost flow, matching theory, bipartite matching via flow, and Edmond's blossom algorithm. The next part of the course will show how polyhedral theory can be used to deal with combinatorial optimization problems in a unifying manner. Topics include basic polyhedral theory, linear programming, integer programming, totally unimodular matrices (TUM), total dual integrality (TDI), and cutting plane theory. Other topics covered may include lattice theory and algorithmic geometry of numbers, semidefinite optimization, matroid theory, and submodular optimization.Course Notes: Familiarity with the basic concepts of Graph Theory (EN.625.636) would be helpful but is not required.
Probability (EN.652.603 or similar course). Linear algebra and experience with reading and writing proofs as found in EN.625.609 or similar course.

EN.625.740. Data Mining. 3 Credits.
The field of data science is emerging to make sense of the growing availability and exponential increase in size of typical data sets. Central to this unfolding field is the area of data mining, an interdisciplinary subject incorporating elements of statistics, machine learning, artificial intelligence, and data processing. In this course, we will explore methods for preprocessing, visualizing, and making sense of data, focusing not only on the methods but also on the mathematical foundations of many of the algorithms of statistics and machine learning. We will learn about approaches to classification, including traditional methods such as Bayes Decision Theory and more modern approaches such as Support Vector Machines and unsupervised learning techniques that encompass clustering algorithms applicable when labels of the training data are not provided or are unknown. We will introduce and use open-source statistics and data-mining software such as R. Students will have an opportunity to see how data mining algorithms work together by reviewing case studies and exploring a topic of choice in more detail by completing a project over the course of the semester.
Multivariate calculus, linear algebra, and matrix theory (e.g., EN.625.609 Matrix Theory), and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis). This course will also assume familiarity with multiple linear regression and basic ability to program.

EN.625.741. Game Theory. 3 Credits.
Game theory is a field of applied mathematics that describes and analyzes interactive decision making when two or more parties are involved. Since finding a firm mathematical footing in 1928, it has been applied to many fields, including economics, political science, foreign policy, and engineering. This course will serve both as an introduction to and a survey of applications of game theory. Therefore, after covering the mathematical foundational work with some measure of mathematical rigor, we will examine many real-world situations, both historical and current. Topics include two-person/N-person game, cooperative/non-cooperative game, static/dynamic game, combinatorial/strategic/coalitional game, and their respective examples and applications. Further attention will be given to the meaning and the computational complexity of finding of Nash equilibrium. Course Note(s): This course is the same as EN.605.726 Game Theory.
Multivariate calculus, linear algebra and matrix theory (e.g., EN.625.609 Matrix Theory), and a course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis).

EN.625.742. Theory of Machine Learning. 3 Credits.
This course introduces various machine learning algorithms with emphasis on their derivation and underlying mathematical theory. Topics include the mathematical theory of linear models (regression and classification), anomaly detectors, tree-based methods, regularization, fully connected neural networks, convolutional neural networks, and model assessment. Students will gain experience in formulating models and implementing algorithms using Python. Students will need to be comfortable with writing code in Python to be successful in this course. At the end of this course, students will be able to implement, apply, and mathematically analyze a variety of machine learning algorithms when applied to real-world data. Course Note(s): Although students will have coding assignments, this course differs from other EP machine learning courses in that the primary focus is on the mathematical foundations underlying the algorithms.
Multivariate calculus, linear algebra (e.g. EN.625.609), and probability and statistics (EN.625.603 or similar course). Comfort with reading and writing mathematical proofs would be helpful but is not required.;Students cannot receive credit for both EN.605.746 and EN.625.742

EN.625.743. Stochastic Optimization & Control. 3 Credits.
Stochastic optimization plays a large role in modern learning algorithms and in the analysis and control of modern systems. This course introduces the fundamental issues in stochastic search and optimization, with special emphasis on cases where classical deterministic search techniques (steepest descent, Newton–Raphson, linear and nonlinear programming, etc.) do not readily apply. These cases include many important practical problems in engineering, computer science, machine learning, and elsewhere, which will be briefly discussed throughout the course. Discrete and continuous optimization problems will be considered. Algorithms for global and local optimization problems will be discussed. Methods such as random search, least mean squares (LMS), stochastic approximation, stochastic gradient, simulated annealing, evolutionary computation (including genetic algorithms), and stochastic discrete optimization will be discussed.
Multivariate calculus, linear algebra, and one semester of graduate probability and statistics (e.g., EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given. It is recommended that this course be taken only in the last half of a student's degree program.

EN.625.744. Modeling, Simulation, and Monte Carlo. 3 Credits.
Computer simulation and related Monte Carlo methods are widely used in engineering, scientific, and other work. Simulation provides a powerful tool for the analysis of realworld systems when the system is not amenable to traditional analytical approaches. In fact, recent advances in hardware, software, and user interfaces have made simulation a “first-line” method of attack for a growing number of problems. Areas where simulation-based approaches have emerged as indispensable include decision aiding, prototype development, performance prediction, scheduling, and computer-based personnel training. This course introduces concepts and statistical techniques that are critical to constructing and analyzing effective simulations and discusses certain applications for simulation and Monte Carlo methods. A major focus is on the role of optimization in modeling and simulation. Topics include random number generation, simulation-based optimization, model building, bias-variance tradeoff, input selection using experimental design, Markov chain Monte Carlo (MCMC), and numerical integration. Multivariate calculus, familiarity with basic matrix algebra, graduate course in probability and statistics (such as EN.625.603 Statistical Methods and Data Analysis). Some computer-based homework assignments will be given. It is recommended that this course be taken only in the last half of a student’s degree program.

EN.625.800. Independent Study. 3 Credits.
An individually tailored, supervised project on a subject related to applied and computational mathematics. The content and expectations are formalized in negotiations between the student and the faculty sponsor. A maximum of one independent study course may be applied toward the master of science degree or post-master’s certificate. This course may not be used towards the ACM MS or PMC if a student also wishes to count 625.801–802 or 625.803–804 towards the MS degree or PMC. This course may only be taken in the second half of a student’s degree program. All independent studies must be supervised by a current ACM instructor (exceptions must be approved by the ACM Program Chair) and must rely on material from prior ACM courses. The independent study project proposal form (see https://ep.jhu.edu/current-students/student-forms/) must be approved prior to registration.

EN.625.801. Applied and Computational Mathematics Master’s Research. 3 Credits.
This is the first in a two-course sequence (EN.625.801 and EN.625.802) designed for students in the master’s program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master’s degree; only one sequence may count toward the degree. For the sequence 625.801 and 625.802, the student will produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.803 and EN.625.804 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.). Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.801–802 towards the M.S. degree. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
Completion of at least six courses towards the Master of Science, including EN.625.601 Real Analysis and/or EN.625.609 Matrix Theory, EN.625.603 Statistical Methods and Data Analysis, and at least one of the following three two-semester sequences: EN.625.717–EN.625.718 Advanced Differential Equations: Partial Differential Equations and Nonlinear Differential Equations and Dynamical Systems, EN.625.721–EN.625.722 Probability and Stochastic Processes I and II, or EN.625.725–EN.625.726 Theory of Statistics I and II. It is recommended that the sequence represent the final two courses of the degree.

EN.625.802. Applied and Computational Mathematics Master’s Research. 3 Credits.
This is the second in a two-course sequence (EN.625.801 and EN.625.802) designed for students in the master’s program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master’s degree; only one sequence may count toward the degree. For the sequence 625.801 and 625.802, the student will produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.803 and EN.625.804 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.801–802 towards the M.S. degree. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.801

EN.625.803. Applied and Computational Mathematics Master's Thesis. 3 Credits.
This is the first in a two-course sequence (EN.625.803 and EN.625.804) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For sequence 625.803 and 625.804, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.801 and EN.625.802 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.803–804 towards the M.S. degree. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
Completion of at least six courses towards the Master of Science, including EN.625.601 Real Analysis and/or EN.625.609 Matrix Theory, EN.625.603 Statistical Methods and Data Analysis, and at least one of the following three two-semester sequences: EN.625.717–EN.625.718 Advanced Differential Equations: Partial Differential Equations and Nonlinear Differential Equations and Dynamical Systems, EN.625.721–EN.625.722 Probability and Stochastic Processes I and II, or EN.625.725–EN.625.726 Theory of Statistics I and II. It is recommended that the sequence represent the final two courses of the degree.

EN.625.804. Applied and Computational Mathematics Master's Thesis. 3 Credits.
This is the second in a two-course sequence (EN.625.803 and EN.625.804) designed for students in the master's program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the 700-level course requirements for the master's degree; only one sequence may count toward the degree. For sequence 625.803 and 625.804, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.801 and EN.625.802 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM M.S. if the student also wishes to count EN.625.803–804 towards the M.S. degree. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.803

EN.625.805. Applied and Computational Mathematics Post-Master's Research. 3 Credits.
This is the first in a two-course sequence (EN.625.805 and EN.625.806) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count toward the certificate. For sequence 625.805 and 625.806, the student is to produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.807 and EN.625.808 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.805–806 towards the PMC. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.

EN.625.806. Applied and Computational Mathematics Post-Master's Research. 3 Credits.
This is the second in a two-course sequence (EN.625.805 and EN.625.806) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics. (Each course is one semester.) A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count toward the certificate. For sequence 625.805 and 625.806, the student is to produce a technical paper for submission to a journal or to a conference with accompanied refereed proceedings. The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.807 and EN.625.808 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.805–806 towards the PMC. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.805

EN.625.807. Applied and Computational Mathematics Post-Master's Thesis. 3 Credits.
This is the first in a two-course sequence (EN.625.807 and EN.625.808) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics (each course is one semester). A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count towards the certificate. For sequence 625.807 and 625.808, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.805 and EN.625.806 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.807–808 towards the PMC. The student must identify a potential research advisor from the Applied and Computational Mathematics Research Faculty to initiate the approval procedure prior to enrollment in the chosen course sequence; enrollment may only occur after approval. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.

EN.625.808. Applied and Computational Mathematics Post-Master's Thesis. 3 Credits.
This is the second in a two-course sequence (EN.625.807 and EN.625.808) designed for students in the postmaster's certificate (PMC) program who wish to work with a faculty advisor to conduct significant, original independent research in the field of applied and computational mathematics (each course is one semester). A sequence may be used to fulfill two courses within the course requirements for the PMC; only one sequence may count towards the certificate. For sequence 625.807 and 625.808, the student is to produce a bound hard-copy thesis for submission to the JHU library and an electronic version of the thesis based on standards posted at https://www.library.jhu.edu/library-services/electronic-theses-dissertations/. (The student is also encouraged to write a technical paper for publication based on the thesis.) The intent of the research is to expand the body of knowledge in the broad area of applied mathematics, with the research leading to professional-quality documentation. Students with a potential interest in pursuing a doctoral degree at JHU, or another university, should consider enrolling in either this sequence or EN.625.805 and EN.625.806 to gain familiarity with the research process. (Doctoral intentions are not a requirement for enrollment.) Course Note(s): The course EN.625.800 Independent Study may not be used towards the ACM PMC if the student also wishes to count EN.625.807–808 towards the PMC. A full description of the guidelines (which includes the list of approved ACM research faculty) and the approval form can be found at https://ep.jhu.edu/current-students/student-forms/.
EN.625.807

EN.635 (Information Systems Engineering)

EN.635.601. Foundations of Information Systems Engineering. 3 Credits.
Creating and operating large-scale information systems requires a holistic approach that manages the blending of software, hardware, networks, and security inherent in modern systems. This course introduces key elements and processes required for designing, analyzing, developing, and integrating complex information systems. The course focuses on the systems engineering approach with specific emphasis on design, development, and deployment. Topics covered include requirements engineering, architecture development, security engineering, cost-benefit analysis, information and networking technologies, and operations. Course Note(s): The required foundation courses may be taken in any order but must be taken before other courses in the degree.

EN.635.611. Principles of Network Engineering. 3 Credits.
This course provides a introductory technical overview of networking and telecommunications for the engineering practitioner. Topics include voice, data, and video communication system fundamentals, including signaling, frequency concepts, transmission media, multiplexing, spread spectrum, signal encoding, error control, switching, and basic terminology. The OSI and TCP/IP reference models are examined along with the basic concepts of protocols, service interfaces, encapsulation, and layering. The course also covers networking and telecommunication techniques, applications technology, and networking topologies and Internetworking architectures. Specific areas discussed include LAN system fundamentals, such as IEEE 802.3 Ethernet, IEEE 802.11 wireless LANs and IEEE 802.15/Bluetooth; and wide-area systems such as cellular and satellite networks. TCP/IP infrastructure and protocols are extensively covered including IP routing, transport layer protocols, and applications including web, email, and real-time applications such as Voice over IP (VoIP). The course also covers the basic principles and protocols for Network Security (IPsec, SSL/TLS) and Management (SNMP).

EN.635.621. Principles of Decision Support Systems. 3 Credits.
Businesses and organizations are flooded with a variety of data from a vast number of sources. Data analysis and use of data analytics in data-driven decision-making processes has become the go-to strategy for business success and for gaining sustainable competitive advantage.This course will introduce students to the technologies that are generally and collectively called “analytics” used to support effective decision-making processes for business. Course topics will cover the latest trends in analytics, including scalable AI, machine learning, IoT, and smart/robo-collaborative assisting systems, composable data and analytics, data fabric, small data models, and XOps. This course will enable students to apply deep knowledge of predictive, descriptive analytics, big data, and web analytics to the development of the best business solutions for their organizations. They will also know which kinds of analytics to apply to specific decision contexts.

EN.635.627. Intelligent Decision Support Systems. 3 Credits.
Businesses and organizations are flooded with a variety of data from a vast number of sources. Data analysis and use of data analytics in data-driven decision-making processes has become the go-to strategy for business success and for gaining sustainable competitive advantage.This course will introduce students to the technologies that are generally and collectively called “analytics” used to support effective decision-making processes for business. Course topics will cover the latest trends in analytics, including scalable AI, machine learning, IoT, and smart/robo-collaborative assisting systems, composable data and analytics, data fabric, small data models, and XOps. This course will enable students to apply deep knowledge of predictive, descriptive analytics, big data, and web analytics to the development of the best business solutions for their organizations. They will also know which kinds of analytics to apply to specific decision contexts.

EN.635.631. Foundations of Data Analytics. 3 Credits.
This foundation course provides an overview of data analysis process, and introduces students to common techniques for data preprocessing, feature extraction, and the creation of statistical models. In particular, students will develop competence in areas of high importance for data scientists and engineers, such as: exploring the trade-off between bias and variance, selecting and creating features, regularizing models, determining optimal hyperparameters, and evaluating model performance. Multiple datasets and data types (e.g., unstructured text, imagery, and time-varying signals) will be considered with the goal of building student confidence across a spectrum of analysis challenges. Particular topics include linear and non-linear regression, decision trees, various approaches to dimensionality reduction, clustering, topic modeling, Bayesian methods, and neural networks. Prerequisite(s): Programming experience in Python, introductory linear algebra, and probability theory recommended.

EN.635.632. Engineering Data Intensive Systems. 3 Credits.
This course provides students with a solid understanding of the data engineering concepts needed to implement reliable data intensive systems. With the emergence of data science as a new field of study, data engineering has gained prominence as a discipline in its own right. Designing and deploying data intensive applications for production environments require skills and experience beyond data science. We start with the basic building blocks of data models, query languages, storage, retrieval, encoding, and schema evolution. Then we move on to distributed data where we examine the unique challenges faced with implementing distributed data systems and some approaches for mitigating these challenges. Throughout the course we consider reliability, scalability, and performance aspects of data stores, batch processing and streaming systems. To deepen our understanding of these concepts, students will implement data systems on their own personal computers using Docker. The technologies you will be working with include Jupyter Notebook, SQL engines, Apache Avro, Elasticsearch (and Kibana), Apache Spark, and Apache Kafka.
EN.635.601 Foundation of Information Systems Engineering. Prior experience with databases, SQL, and Python is recommended.

EN.635.661. Principles of Human Computer Interaction. 3 Credits.
Well-designed human-computer interaction (HCI) is critical to the success of computer and information systems. This course focuses on the HCI design process and covers the underlying scientific principles, HCI design methodology, and the user-interface technology used to implement HCI. Topics include human cognition, HCI theories, user observation and task analysis, prototyping and evaluation techniques, user interface modalities and graphical user interface components, and accessibility. Selected additional topics may include HCI in website design, support of collaborative work, human interaction with automation, and ubiquitous computing. Student design projects are an integral part of the course. Reading the current HCI research literature is also required.

EN.635.671. Data Recovery & Continuing Operations. 3 Credits.
Data recovery and continuing operations refers to the processes, plans, and technologies required for an enterprise to achieve resiliency given unexpected events that may disrupt IT operations. This course provides an overview of the storage technologies to address backup, disaster recovery, and business continuity. Technologies that address auditing, redundancy, and resiliency in the infrastructure (e.g., networks, power, cooling, etc.) are described. Beyond the technologies, processes and plans for continuing operations are covered, including issues such as business continuity, disaster recovery, and risk management.
EN.635.621 Principles of Decision Support Systems is recommended and may be taken concurrently.

EN.635.672. Privacy Engineering. 3 Credits.
Personal information has become a new class of digital property with immense value in commerce and of intense importance to national security and intelligence. Engineering any information system now requires a professional to protect privacy, preserve the information's functional value, and navigate complex domestic and international legal and engineering rules Students will use new visual modeling and analysis tools for designing and executing privacy solutions in both the commercial and governmental sectors. Students will build a final specification for a privacy solution involving regulated personal information.

EN.635.673. Protecting Critical Infrastructure Against Cyber Attacks. 3 Credits.
Cybersecurity is one of the most critical national issues of our time. The trend for cyber-attacks is rapidly increasing in enterprise networks and is extending into other domains like the Internet of Things (IoT) and Industrial Control Systems (ICS). Our 16 Critical Infrastructures are the powerhouses for our military might and our huge economy, and thus protecting these assets is paramount. This class will: (1) introduce students to the history of the problem of Cybersecurity, (2) introduce students to the 16 Critical Infrastructures, and (3) provide students hands-on experience with developing Cybersecurity technology to assess, defend, and monitor enterprise, IoT, and ICS networks.

EN.635.676. Cybersecurity in Information Systems. 3 Credits.
This course describes the systems security engineering process, focusing on security during the design and implementation of information systems. Topics include architecture and design principles, risk assessment, resiliency, and security metrics. The course addresses emerging topics in cybersecurity including wireless security, cloud security, cross domains and the government standards and processes for secure information systems; surveys many aspects of cybersecurity and its impact on the enterprise; and lays the groundwork to architect and build a natively more secure system that can withstand hacking attacks and continue to deliver basic functionality to the enterprise. We will address the federal government standards and recommendations as well as industry's best practices. Students will cover the basic concepts of information security and research the latest security incidents including external attacks and internal leaks to assess and analyze the exploited vulnerabilities. By learning from current incidents, students can build systems that adapt quickly to emerging threats and potentially continue to serve the enterprise, even while under attack. Additionally, the course addresses the assessment of emerging technologies to determine the potential threats to the enterprise as well as the usability to secure the enterprise. Finally, we will address the subject of legal and ethical access control and the balance between privacy and security.

EN.635.682. Website Development. 3 Credits.
This course covers the design and implementation of websites. Various web standards, as developed by the World Wide Web Consortium and browser manufacturers are studied. HTML5 specifications are covered, including topics such as text control, images, hypertext links, forms, and embedded objects (e.g., video and audio). Cascading style sheets (CSS3), a client-side language (such as JavaScript), and server-side programming are also covered. Design and development topics include ease of use/navigation, download time, maintaining a consistent look and feel across multiple pages, building mobile-friendly websites, and Web server selection and configuration. Additional topics include web tools, privacy and security, XML, JSON, and AJAX.

EN.635.683. E-Business: Models, Architecture, Technologies, and Infrastructure. 3 Credits.
This course explores fundamental aspects of the e-Business (electronic business) phenomenon that is currently sweeping through the global economy, as well as design principles and technology used to build computer-based systems in order to support the notion of e-Business. E-Business (electronic business) is an umbrella term, an interdisciplinary topic encompassing both business and technology. This topic addresses a variety of business activities, business processes, and strategic business functions conducted over the Internet in order to service customers, to collaborate with business partners, and to maintain and sustain competitive advantage in the networking economy. The course introduces contemporary management philosophies as they have come to be used for the marketing, selling, and distribution of goods and services through the Internet and other electronic media. The course explores approaches of defining drivers and use cases of conducting electronic business. This course provides an overview of principles and analysis of different models of electronic business. It enables students to design effective e-Business models built on a foundation of business concepts, knowledge of the e-Business environment, and an understanding of the influence of the Internet on business stakeholders, including customers, suppliers, manufacturers, service makers, regulators, managers, and employees. In this course students undertake value analysis and learn to describe value propositions. Business architecture and software infrastructure used to engineer and build e-Business systems will be explained. The modern information technologies associated with the delivery of business capabilities over the Internet will be discussed. The course content will be reinforced by a variety of assignments.

EN.635.711. Advanced Topics in Network Engineering. 3 Credits.
This course is designed to provide an advanced treatment of key topic areas in networking and telecommunications for students who have mastered the basic principles of network engineering. Key operational systems, protocols, and technologies are explored in local, wide, metro-area, storage, and wireless networking. Major topic areas include advanced LAN/WLAN technologies (Power over Ethernet, IEEE 802.1x authentication, VLANs, link aggregation, etc.), Storage Area Network technologies, Virtualized/Cloud networking, Optical Networking, IPv6, Spanning Tree and Dynamic IP routing protocols, "LastMile" Networking (DSL, Cable Modems, etc.), Label Switching, Multicasting, and Multicast routing, real-time application support mechanisms, Quality of Service protocols, Advanced Transport Layer topics (Congestion Notification, TCP options, etc.), and Network Security (address translation, VPNs, stateful inspection, etc.). A major component of the course will be a design project on one of the topic areas covered in the class.
EN.635.611 Principles of Network Engineering or EN.605.671 Principles of Data Communications Networks or equivalent.

EN.635.775. Cyber Operations, Risk, and Compliance. 3 Credits.
This course provides a solid foundation of potential civil and criminal areas of liability, and certain areas in which compliance and risk management are critical. The overarching theme is detection and reduction of potential legal/cybersecurity risks. We start by exploring the legal and regulatory environment that influences and supports cyber-based activities and programs, focusing on multidisciplinary or integrated views of enterprise risk management. We will address key risk management issues from the legal and cybersecurity aspects and analyze legal/ cybersecurity issues in several of the critical infrastructure sectors, such as the financial services, healthcare and public health, and transportation systems sectors. We also review legal and regulatory compliance issues to address cybersecurity risk management for systems development, acquisition, and operation. This includes material impacting the manner in which the cyber community operates, for example, FITARA (Federal Information Technology Acquisition Reform Act) Enhancement Act of 2017. We then review the authoritative guidance provided by the National Institute of Standards and Technology (NIST) Cybersecurity Framework. The Framework is voluntary for the sixteen critical information sectors and mandatory for the federal government, hence the focus on NIST. Risk management threat detection and avoidance is analyzed from an integrated legal/cybersecurity perspective, including system objectives to avert legal liability and minimize enterprise and human loss. Examples address financial services, healthcare and public health, and transportation (mobile devices and autonomous vehicles) systems, and cyber-physical systems (CPS) or Internet of Things (IoT). The overall constitutional and statutory basis within which all cyber law and policy operates is identified and reviewed.

EN.635.776. Building Information Governance. 3 Credits.
Businesses and government agencies confront increasingly complex rules and standards establishing the requirements for how digital information assets are to be created, stored, maintained, accessed, transmitted, received, and disposed. Information system engineers face enormous compliance risks, functional inefficiencies, and remediation costs if they are unprepared to navigate and master all of the technology, business, and legal rules against which digital information must be governed. All of these variables have become more complex as governments and industry partner more closely in counterterrorism investigations and defenses. This course enables engineers to explore and understand these rules and to develop better leadership skills across teams engaged in designing and managing complex governance projects. Assignments will expose engineers to, and teach them to navigate, the traps that global, cloud-based services present. Students completing the course will be able to contribute effectively to the cutting-edge, demanding projects ahead—“big data” transactions, real-time reporting to official agencies, electronic discovery, privacy, and compliance. Students will be expected to actively participate in class exercises, complete written assignments, and develop and present a final written governance proposal.

EN.635.782. Ethics in Intelligent Systems. 3 Credits.
This course is to fortify and enrich the values-assessment and critical thinking skills of engineers as they grapple with the numerous ethical challenges in their professional and personal lives. To that end, the course will define and delineate some global, macro-level concepts and approaches to ethics; move on to review some ethical issues unique to engineers as they apply intelligent technologies such as artificial intelligence and machine learning to developing complex systems; and finally present some finite cases studies and concrete situations by which to apply these ethical principles. This class will stimulate students to help identify a critical thinking zeitgeist and framework by which to filter, absorb and resolve complex ethical problems and questions in both their professions and at the personal level. This class will be completely value-neutral and hence devoid of any one overarching governing ethical school of thought; thus, we are ecumenical in our approaches. Having said that, the IEEE ethically aligned design standards are noteworthy and very salutary to any exploration. This course will make use of a variety of current, recent historical and classical materials to illustrate major themes.

EN.635.792. Management of Innovation. 3 Credits.
A critical issue for entrepreneurs and technical managers is how to translate opportunity into competitive advantage. This course explores the management of innovation, including the technical transition of applied R&D into products, the planning and launching of new products, and product management. Management of discontinuous technologies will be explored. The impact of competition by the introduction of new discontinuous technology will be addressed. Managing engineers through the creative process, as well as innovation and technological evolution, will be covered. The course includes both formal and guest lectures. Case studies will be used as an important learning vehicle.

EN.635.795. Information Systems Engineering Capstone Project. 3 Credits.
This course is designed for students who would like to conduct a major independent project involving a substantial enterprise information system design that builds upon elements of the ISE curriculum. The project includes requirements analysis, IT architecture design, network design, software integration, decision support applications, and deployment planning. Interim deliverables include presentations to the course advisors. Project proposals are required and a mentor will be assigned to the student. Prerequisite(s): Completion of eight courses in the ISE curriculum, including all ISE foundation courses. Course Note(s): Students may not receive graduate credit for both EN.635.795 and EN.635.802 Independent Study in Information Systems Engineering II.

EN.635.801. Independent Study in Information Systems Engineering I. 3 Credits.
This course permits graduate students in Information Systems Engineering to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper. Prerequisite(s): Seven ISE graduate courses including the foundation courses, three concentration area courses, and two courses numbered 635.7xx; or admission to the Post-Master’s Certificate. Students must also have permission of a faculty mentor, the student’s academic advisor, and the program chair.

EN.635.802. Independent Study in Information Systems and Technology II. 3 Credits.
Students wishing to take a second independent study in information systems engineering should sign up for this course. Prerequisite(s): EN.635.801 Independent Study in Information Systems Engineering I and permission of a faculty mentor, the student’s academic advisor, and the program chair. Course Note(s): Students may not receive graduate credit for both EN.635.802 and EN.635.795 Information Systems Engineering Capstone Project.

EN.645 (Systems Engineering)

EN.645.621. Engineering and Measuring Influence. 3 Credits.
Systems engineering requires an understanding of how people interact with complex systems. Often times, human interaction makes up a substantial portion of system variance and controlling this variance is critical for system performance. Engineers must design interventions to influence people through all aspects of the system. Emerging technology can be used to understand, measure, and assess the effectiveness of interventions to influence human behavior and performance. This course will introduce students to theories of behavior change and provide hands on experience using technologies to measure human-system interaction and influence. Technologies will include biometric, psycho-physiological, and neuroimaging systems.

EN.645.631. Introduction to Model Based Systems Engineering. 3 Credits.
The Introduction to Model Based Systems Engineering course provides an overview of what Model Based Systems Engineering (MBSE) is and how MBSE techniques can be applied to the Systems Engineering process to manage complexity, reduce risk, and potentially streamline the engineering design and development effort. Students will utilize an industry-leading system modeling tool and develop artifacts applied to real-world case studies that reinforce the MBSE concepts of methodology, language, and tools.
EN.645.662

EN.645.632. Applied Analytics for Model Based Systems Engineering. 3 Credits.
This course is a continuation of Introduction to Model Based Systems Engineering (MBSE), and provides in-depth exposure to building and using industry-leading system modeling tools to apply and analyze real-world case studies. This course will focus on the application of Model Based Systems Engineering through the use of a modeling language, a modeling method and a system modeling tool as part of the systems engineering process to support requirements, design, analysis, specification, and verification and validation activities of the system. Concepts that were developed from the previous course are now analyzed to assist the systems engineer to explore the solution space using MBSE.
EN.645.631 Introduction to Model Based Systems Engineering.

EN.645.650. Foundations of Human Systems Engineering. 3 Credits.
Systems are designed, built, and used by humans. Their purpose is to help people meet their goals and perform their tasks. This course introduces the foundations of HSE from which system requirements and design elements are derived. The objective is to provide students with the knowledge of human capabilities and introduce human systems engineering concepts and design principles. Human capabilities include visual, auditory, and touch senses, motion, cognitive processing, and decision making. Human systems engineering concepts and design principles include human factors engineering; training; maintenance; environmental, safety, and health; survivability; habitability; manpower; and personnel. Prerequisite(s): Admission into the Systems Engineering program.

EN.645.651. Integrating Humans and Technology. 3 Credits.
This class provides a hands-on introduction to human and cognitive systems engineering. Students will learn and apply user-centered research and innovation methods that are used to discover, document and integrate human capabilities, limitations and needs into the systems engineering process, improving the likelihood that the resulting systems are intuitive, efficient, effective and useful. Topics include needs elicitation, workflow analysis, functional allocation, decision making, prototyping, and performance measurement.
EN.645.662 Introduction to Systems Engineering OR EN.655.662 Introduction to Healthcare Systems Engineering OR EN.675.600 Systems Engineering for Space

EN.645.662. Introduction to Systems Engineering. 3 Credits.
This course introduces students to the fundamental principles of systems engineering and their application to the development of complex systems. It describes how the systems engineering viewpoint can be brought to bear to address engineering challenges as well as the essential role of systems engineering in project management. Topics include defining systems, the system development life cycle, and the systems engineering method. These primary topics are decomposed into requirements analysis, functional design, physical design, design validation, concept development, engineering development, and post development. In addition, the tools and methods at the systems engineer’s disposal are also covered. These include risk analysis, configuration management, design trade-offs, modeling and simulation, and interface management, as well as how these subjects are linked to systems program management activities. More advanced Systems Engineering topics such as Software Systems, System of Systems, Enterprise Systems, and Agile Systems Engineering are introduced. The course defines the breadth and depth of the knowledge that the systems engineer must acquire concerning the characteristics of the diverse components that constitute the total system. Students will work as a group to develop and present a conceptual system architecture chosen from a list of existing systems in order to gain familiarity with architecting, system modeling, and the relationship between requirements, activities, hardware/software, interfaces, and other system elements.Course prerequisite(s): Admission into the Systems Engineering program.

EN.645.667. Management of Systems Projects. 3 Credits.
The course addresses the management of a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the project manager. From the development of a proposal to the delivery of a product to a customer, the efforts to conceive, plan, budget, schedule, monitor, control/direct, and report the progress of the project are discussed. Throughout the project life cycle, the need for good communications, interface and configuration management, and conflict resolution is emphasized. Students assume the role of project managers who must use management tools such as WBS, EVM, and CPN and who must address typical problems that arise in the conduct of a high-technology systems project. Prerequisite(s): Admission into the Systems Engineering program.

EN.645.669. Systems Engineering of Deployed Systems. 3 Credits.
Systems engineering theory typically focuses on the early design and development phases of a system's life cycle, yet over the life of a system, the bulk of engineering effort and the associated costs are not realized until the operations and support (O&S) phase. This course will examine the importance of designing O&S considerations early in a system's life cycle by identifying the appropriate logistic elements and measures, while introducing the necessary analytical processes and tools to support end-to-end life cycle engineering requirements. Manufacturing and production operations will be presented along with the elements that support a system once it is fielded (maintenance planning, reliability prediction, supply support, training, shipping, and system disposal). The course will also explore the requirements and processes associated with major upgrades to deployed systems and the logistics management techniques that must be implemented during initial fielding and deployment. A class project and real-world case studies will underscore the theory and techniques associated with deployed systems engineering.
EN.645.662 Introduction to Systems Engineering or EN.645.667 Management of Systems Projects. College-level Statistics (College-level Calculus preferred but not required).

EN.645.711. Systems Engineering of Missile Technologies. 3 Credits.
This course emphasizes the key systems engineering processes involved in missile design. Missile technologies including electro-optical and radio-frequency sensors used for target detection; aerodynamics; navigation, guidance, and control; propulsion; warheads; fuzes; and signal and image processing are discussed in conjunction with the critical tradeoffs and methods used to meet operational requirements. The course objectives are demonstrated through a system cost-as-an-independent variable trade and design study that is based on trades of sensor type, guidance type, operational constraints and implementation, and how the system is segregated into different sub-system configurations.

EN.645.742. Management of Complex Systems. 3 Credits.
Traditional systems engineering is usually applied to closed, precise, and recursive systems with the assertion that the methodologies used can be scaled up to more elaborate systems of systems. This course addresses the more realistic and emerging field of complex systems, where multiple current development efforts with disparate and nonlinear attributes characterize the system components. Managing complex systems must account for the likelihood of multiple disciplines, differing scales, often unpredictable future states, irreducible uncertainty, and nonlinear behavior. Customers, corporations, governments, technologies, and systems now must be considered on a global scale with a mix of new and legacy systems. The student will be encouraged to think differently and creatively about the approaches to managing complex systems and to use adaptive strategies and tools. Special attention will be given to risk assessment and management for dynamic systems. Case studies and examples will be drawn from commercial industry and DoD/government systems. Students will be expected to discuss several readings and complete academic papers to explore in depth one or more of the concepts discussed.
EN.645.769 System Test and Evaluation or EN.655.769 or advisor and instructor approval. Course Note(s): Selected as one of the electives in the Master of Science in Engineering or Master of Science program or a required course for the post-master's certificate.

EN.645.753. Enterprise Systems Engineering. 3 Credits.
Enterprise Systems Engineering is a multidisciplinary approach to the application of systems engineering principles and systems thinking to large sociotechnical enterprises as complex adaptive systems. Health, energy, food, disaster response, and global transportation systems are all examples of such systems. Systems engineering has been a critical enabler of development, and is key, to addressing the complexities of the evolution of complex systems and systems of systems.?In this course, we explore systems thinking and systems engineering approaches that can be applied to this new class of broad sociotechnical enterprise.? We will examine the characteristics of this class of enterprise and the challenges for applying systems engineering to this type of complex adaptive system. These enterprises are comprised of multiple independent organizations with their own objectives, resources, and authority structures without top-level cross cutting authority and may possess conflicting objectives. A process model will be created to describe the activities of key enterprise elements and interactions which, along with external factors, influence the evolution of such enterprises. This model will be used to understand the current enterprise composition and dynamics and evaluate the impact of issues or actions as the basis for systems engineering trades or recommendations.??
EN.645.769 System Test and Evaluation or advisor and instructor approval. Course Note(s): Selected as one of the electives in the Master of Science in Engineering or Master of Science program or a required course for the post-master's certificate.

EN.645.755. Methods in Human-System Performance Measurement and Analysis. 3 Credits.
This course focuses on human-systems performance measurement (HsPM) methods used to determine whether human-system requirements are met and if the system's design provides effective and efficient human-system performance. Students will gain knowledge of HsPM study design protocols, data collection tools and methods, analysis techniques and processes, and procedures required to execute studies with human participants. The course will provide students with an understanding of HsPM in the context of system design; workplace design; environment, safety, and occupational health; training; and maintenance. Students will be exposed to heuristic evaluations; modeling and simulation of human tasking, including tools for measuring physical limitations, cognitive load, and fatigue; and system testing with the human element.
EN.645.662 Introduction to Systems Engineering.

EN.645.756. Metrics, Modeling, and Simulation for Systems Engineering. 3 Credits.
This course takes an integrated, in-depth view of foundational statistical concepts, modeling, and simulation techniques. Knowledge of typical system-level key performance parameters and their stochastic characterization is critical to the systems engineering process as the basis for decision-making from early system conceptualization through retirement. Relevant probability and statistics concepts are covered in context of SE decision points. Techniques in experimental design, data collection, analysis, and modeling of system metrics as a function of system use and environment are explored as they pertain to characterizing system, subsystem, and component performance. Finally, implementing models in analytic simulations to support requirements, design, upgrade, and replacement/retirement phases of the SE process provides the systems engineer with a solid foundation for making and justifying difficult decisions.
EN.645.662 Introduction to Systems Engineering, EN.645.667 Management of Systems Projects, and EN.645.767 System Conceptual Design.

EN.645.757. Foundations of Modeling and Simulation in Systems Engineering. 3 Credits.
This course provides an introduction to the field of modeling and simulation (M&S) from the perspective of M&S as an essential tool for systems engineering. The course presents an overview of the M&S discipline, the model/simulation development process, the types of models and simulations used in the various phases of the systems engineering life cycle, and the verification, validation, and accreditation of models and simulation. The strengths and limitations of M&S are explored with respect to the application of M&S use in systems engineering. Examples are given for several types of systems, including both military and civilian systems. Statistical methods used in applying M&S in systems engineering are explained. The Arena process modeling tool is used for some examples, an individual assignment, and a team-based project. Upon completion of the course, the student will be able to explain when M&S will provide meaningful support to a technical program, select the appropriate modeling techniques for a given task, plan the development of a model/simulation and the modeling of its input data, and analyze the results of its execution to support decisions at key milestones of a system's life cycle.
EN.645.662 (462) Introduction to Systems Engineering

EN.645.758. Advanced Systems Modeling and Simulation. 3 Credits.
This course is a continuation of EN.645.757 Foundations of Modeling and Simulation in Systems Engineering and provides in-depth exposure to the field of modeling and simulation (M&S) from the perspective of M&S as an essential tool for systems engineering. Advanced statistical methods are used to conduct requirements-driven simulation analysis and experimentation. The course provides treatment of advanced M&S topics, including verification, validation, and accreditation techniques; methods for simulation interoperability and composability; modeling of the system environment, both natural and man-made; modeling of system costs; and the establishment of collaborative M&S environments. The course also explores continuous and real-time simulation. Students are exposed to the techniques used to form conceptual models of mechanical (both translational and rotational), electrical, fluid, thermal, biological, and hybrid systems. The conceptual models are transformed into mathematical models and implemented in a modern simulation package. State-of-the-art tools are explored, and each student is given the opportunity to conduct a simulation study of a complex system. Each student will present a case study and complete a project. Upon completion of the course, the student will be able to conduct or lead the development of the model of a complex physical system, model the input data, and analyze the results to support decisions at key milestones of a system's life cycle.
EN.645.757 Foundations of Modeling and Stimulation in Systems Engineering

EN.645.761. Systems Architecting. 3 Credits.
As the systems that systems engineers face become more complex, it is no longer sufficient to use "good engineering practices." The complex systems of today need to be architected before design work can begin. This course examines the principles and art of systems architecting when developing both individual systems and systems that are components of a system or federation of systems. The objective is to provide students with the principles, techniques, and hands-on experience of architecting modern, complex systems. Students will learn the latest architecture development techniques using DoD and commercial architectural frameworks, then extend those frameworks to specific problems involving unique systems development environments. Topics include the management of underlying system and data models and the special architecting requirements of command, control, and communications systems. Special attention will be placed on visualizing architecture artifacts-qualitatively and quantitatively evaluating architectures and the systems model they represent-and utilizing system architectures for investment decisions. Case studies from actual experiences will be presented. Course Note(s): Selected as one of the electives in the MSE or MS program or a required course for the post-master's certificate.
EN.645.769 System Test and Evaluation or advisor and instructor approval.

EN.645.764. Software Systems Engineering. 3 Credits.
This course for systems engineers covers software engineering principles, artifacts, and approaches for the development of software systems. Topics include software engineering processes and metrics; real-time, distributed, configurable, and object-oriented software; alignment of software systems with overall system design; software-unique aspects of planning, requirements, architecture analysis, design, implementation, testing, and maintenance; understanding important software engineering constraints (performance, security, networking, etc.); and technology trends in software engineering today.
EN.645.662 Introduction to Systems Engineering or EN.655.662 and EN.645.667 Management of Systems Projects or permission from the student's academic advisor and the course instructor.

EN.645.766. Systems Engineering Advanced Technology. 3 Credits.
This course emphasizes the impact on society of recent technological advances on new products, processes, and needs in systems engineering. The roles of the technical manager, program manager, and especially the systems engineer in these rapidly-evolving technologies are addressed as well. Subject areas and lecture content tracks current topics of interest, including but not limited to, trends and developments in hypersonics, artificial intelligent, nanotechnology, robotics, and genetic engineering. Advanced technologies in application areas such as transportation, space, manufacturing, and biotechnology are also discussed. This course also includes a discussion on the ethics of lethal autonomous weapons. Students are encouraged to explore new technology areas and share information with each other. Students' mastery of concepts culminates in a term paper on a new or emerging technology area as it relates to systems engineering.
EN.645.768

EN.645.767. System Conceptual Design. 3 Credits.
This course addresses in detail the systems engineer's responsibilities and activities during the conceptual phases of a system development program. Systems engineering tools commonly employed at this stage of a program are presented along with selected problems that illustrate both the applicability and limitations of commonly employed tools and procedures. The course steps through conceptual design beginning with analysis of needs and objectives and proceeding to the exploration of alternative concepts and the selection of a concept that best meets goals of performance, timeliness, and affordability. Topics include definition of operational scenarios, functional analysis, risk assessment, system tradeoffs, measures of effectiveness, and requirements formulation. Emphasis is on the application of these systems engineering techniques in a team environment to a class project. Students apply systems engineering methods learned from reading and lectures to the development of a realistic system in an ongoing project in a team format.
EN.645.764 Software Systems Engineering or permission of the student's advisor and the course instructor.

EN.645.768. System Design & Integration. 3 Credits.
This course addresses the systems engineering objectives, responsibilities, and activities during the demonstration and validation and the engineering and manufacturing development phases of a system development program. Systems engineering procedures and tools employed during these phases are identified and their use illustrated. Topics include the relationship between a system specification and the system design, systems engineering management plans, risk management, system development models, customer integration into the design process, and design disciplines and practices. The course uses a system problem scenario extensively to illustrate systems engineering principles and specific product design issues.
EN.645.767 System Conceptual Design or permission of the student's advisor and the instructor.

EN.645.769. System Test & Evaluation. 3 Credits.
This course focuses on the application of systems engineering principles to the test and evaluation of system elements and, ultimately, of the total system. Test requirements, selection of critical test parameters, analysis of test results, and determination of remedial action in the event of discrepancies are all systems engineering functions. Topics include validation and verification, similarities and differences in the nature of hardware and software testing, test tools and test procedures, testing during hardware-software integration, quality assurance test, environmental test, and operational test and evaluation. Student problems include scenario case studies using examples developed in the several previous courses.
EN.645.768 System Design and Integration or permission of the student's advisor and the instructor.

EN.645.771. System of Systems Engineering. 3 Credits.
This course addresses the special engineering problems associated with conceiving, developing, and operating systems composed of groups of complex systems closely linked to function as integral entities. The course will start with the underlying fundamentals of systems' requirements, design, test and evaluation, and deployment, and how they are altered in the multi-system environment. These topics will then be extended to information flow and system interoperability, confederated modeling and simulation, use of commercial off-the-shelf elements, and systems engineering collaboration between different organizations. Advanced principles of information fusion, causality theory with Bayesian networks, and capability dependencies will be explored. Several case studies will be discussed for specific military systems of systems, including missile defense and combatant vehicle design, as well as selected commercial examples.Course Note(s): Selected as one of the electives in the MSE or MS program or a required course for the post-master's certificate.
EN.645.769 System Test and Evaluation or advisor and instructor approval.

EN.645.780. Agile Systems Engineering. 3 Credits.
The development of large, complex software-intensive hardware systems has become extremely challenging for systems engineering. For example, automotive designs are now incorporating more than a hundred interconnected individual integrated control units (ICU), each designed to sense environmental factors, both internal and external to the system, and precisely control electro-mechanical devices, all of which are then networked together with the outside world: collectively this evolving technical domain is called a cyber-physical system (CPS). CPS physical and software mechanisms are deeply entwined, operating on dissimilar spatial and temporal scales that exhibit emergent, individually distinct behaviors, and in some systems can include autonomy and the ability to learn. This tight coupling between hardware components and their information-driven software functionality creates an environment of adaptive complexity requiring deliberate, incremental learning intervals with strong feedback throughout the system's development and sustainment lifecycle. This need for continuous learning, and adapting to this learning, is challenging classic systems engineering principles and processes to incorporate new ideas and methods. Systems design and development organizations are turning to a broad set of Agile and Lean methods to manage risk and uncertainty associated with such complexity: the challenge will be in adapting, transforming and extending classic, proven systems engineering methods in order to achieve the same level of disciplined process and delivered value routinely experienced in more traditional projects. This course involves highly-collaborative teamwork requiring at least eight (8) fully-synchronous Zoom-based conferences in order to present student work as a team: meetings are typically two-hours in length and are designed to be highly-engaged, spirited discussions between students and the instructor(s).
EN.645.662 Introduction to Systems Engineering, EN.645.667 Management of Systems Projects, EN.645.764 Software Systems Engineering, EN.645.767 System Conceptual Design and EN.645.768 System Design and Integration

EN.645.781. Systems Thinking and Systems Dynamics. 3 Credits.
Systems thinking is the ability to perform insightful and comprehensive problem solving of complex systems. Fundamental to systems thinking is system dynamics, an approach used to understand the nonlinear behavior of complex systems over time using stocks, flows, internal feedback-loops, a variety of functions, and time-delays. This course will investigate the needs, motivations, and frameworks of systems thinking employing causal-loop diagram archetypes, as well as establish foundational concepts and approaches for systems thinking problem construction. From these foundations, system dynamic approaches, analytical models-tools, and simulations will be constructed to mature foundational systems thinking problem frameworks for quick, insightful, and quantitative impact-analysis. A variety of systems thinking problems will be addressed through the assembly of causal-loop diagrams, followed by the construction of system dynamics models, with a specific focus on emerging challenges of supply management and healthcare systems engineering and delivery. The course concludes with a series of reflective and inspirational challenges and opportunities, with the goal of solidifying comprehensive systems thinking acumen. This course will use The Fifth Discipline by Peter M. Senge, Thinking in Systems – A Primer by Donella H. Meadows, and Systems Thinking Tools – A User's Refence Guide by Daniel H. Kim as course textbooks. Also, a variety of relevant articles, papers, and recorded video material will be used. Vensim © (freeware version: https://vensim.com/) will be the system dynamics modeling tool used in the course.
EN.645.662 Introduction to Systems Engineering AND EN.645.767 System Conceptual Design

EN.645.782. Foundations of Digital and Mission Engineering. 3 Credits.
This course provides an introduction to Digital Engineering and Mission Engineering, both of which are topics of emerging emphasis, particularly in the U.S. Defense community. The course begins with a review of the systems engineering process, with its technical and technical management processes, as it is applied in the U.S. Department of Defense (DoD) acquisition lifecycle. It then provides an overview of the DoD Digital Engineering Strategy, and discusses key competencies needed for Digital Engineering. As Modeling and Simulation (M&S) and Model Based Systems Engineering (MBSE) are key to the implementation of Digital Engineering, the course discusses fundamental concepts of M&S and how models and simulations are used in the various phases of the systems engineering process. Key MBSE concepts are then presented, along with an overview of the Systems Modeling Language (SysML) and its constituent diagrams, followed by an overview of the Object-Oriented Systems Engineering Method (OOSEM). The course then discusses how to apply these MBSE concepts to analyze several selected real-world case studies. A generic framework for a collaborative environment to support digital engineering is presented, along with how it might be used to support the development of digital twins and digital threads for a system. The underlying concepts and the key methodology elements of Mission Engineering are then described, based on the DoD Mission Engineering Guidebook. Finally, the course examines how and why Digital Engineering supports the implementation of Mission Engineering.
EN.645.662 Introduction to Systems Engineering

EN.645.783. Systems Engineering Process Improvement. 3 Credits.
Through lectures and facilitated teamwork, this course presents the fundamental concepts of continuous process improvement in the context of systems engineering. Students will explore how to define, map, model and simulate, assess, manage, and improve a systems engineering process. This will enable students to lead or contribute to a systems engineering process improvement effort on the job, and to be better prepared for certifying their systems engineering expertise.

EN.645.800. Systems Engineering Master's Project. 3 Credits.
This course provides the experience of applying systems engineering principles and skills learned in the formal courses to a specific practical project that is suggested by the student and is presented in a formal proposal. The product of the system project is a final report; also required are interim reports and an oral presentation to permit review of the project objectives and approach. This is an independent course that has no formal classes; the student is responsible for developing their own project timeline and works to complete it within one semester. A student typically has a mentor who is a member of the systems engineering faculty. The program chair, vice chair, and mentor review proposals and reports. The total time required for this course is comparable to the combined class and study time for the formal courses. Course Note(s): Students who plan to register for this course will need to have a project mentor and a topic for their project and should contact the Systems Engineering Program Office (443-778-6002) four to six weeks prior to the semester start date.
EN.645.769 System Test and Evaluation and an approved project concept from their project mentor and project instructor.

EN.645.801. Systems Engineering Master's Thesis. 3 Credits.
This course is the first of a two-semester requirement designed for students in the Systems Engineering Master's program. Thesis students will conduct independent research in the field of systems engineering, under the guidance of an advisor. The intent of the Master's Thesis research is to advance the body of knowledge and the understanding of systems engineering practices, the improvement of systems engineering practices in industry and in government, the evolution of systems engineering tools and techniques, and the solution of systems development issues in the acquisition of advanced systems. In this course, students will gain a foundation in conducting graduate-level, academic research, including an introduction to research paradigms and methodologies, problem/research question formulation, research design, literature search and critique, proposal preparation, data collection and analysis, research ethics, and the canons of research for engineering and science. At the end of this semester, the student will present their research proposal to their thesis committee. Students interested in pursuing a doctoral degree should enroll in the Thesis Option.Prerequisite(s): Completion of all other courses applicable to the Systems Engineering master's degree. Course Note(s): Students who plan to register for this course will need to contact the Systems Engineering Program Office (443-778-6002) four to six weeks prior to the semester start date.

EN.645.802. Systems Engineering Master's Thesis. 3 Credits.
This course is the second of a two-semester requirement designed for students in the systems engineering master's program. Thesis students will conduct independent research in the field of systems engineering, under the guidance of an advisor. The intent of the Master's thesis research is to advance the body of knowledge and the understanding of systems engineering practices, the improvement of systems engineering practices in industry and in government, the evolution of systems engineering tools and techniques, and the solution of systems development issues in the acquisition of advanced systems. In this semester, the student will conduct the research outlined in the research proposal developed during EN.645.801, with guidance and oversight from their thesis advisor. At the end of the semester, the student will deliver their thesis paper acceptable for publishing in a professional peer-reviewed journal and will present a defense of their research to their Thesis Committee. Students interested in pursuing a doctoral degree should enroll in the Thesis Option. Prerequisite(s): Completion of EN.645.801 Systems Engineering Master's Thesis, the first semester of this two-semester course.

EN.650 (Information Security Institute)

EN.650.601. Introduction to Information Security. 3 Credits.
This course exposes students to the cross-disciplinary and broad information security field. It surveys a range of fundamental topics of information security principles, architecture, policy and standard, risk management, cryptography, physical, operation, system and network security mechanisms, and law and ethics, among others. This course includes lectures, case studies, and homework. Students will also complete independent study class projects. Recommended Course Background: Basic knowledge of computer system and information technology.

EN.650.614. Rights In Digital Age. 3 Credits.
This course will examine various legal and policy issues presented by the tremendous growth in computer technology, especially the Internet. The rights that various parties have with respect to creating, modifying, using, distributing, storing, and copying digital data will be explored. The concurrent responsibilities, and potential liabilities, of those parties will also be addressed. The course will focus on intellectual property issues, especially copyright law, and other legal and economic considerations related to the use and management of digital data. Copyright law and its role within the framework of intellectual property law will be presented in a historical context with an emphasis on its applicability to emerging-technology issues. Specifically, the treatment of various works, such as music, film, and photography that were traditionally, analog in nature will be analyzed with respect to their treatment in the digital domain; works that are by their nature digital, such as computer software, will also be analyzed. The current state of U.S. copyright law will be presented, as will relevant international treaties and foreign laws. The goal of the course is to provide those involved or interested in digital rights management with a general awareness of the rights and obligations associated with maintaining and distributing digital data. (This course will be taught in Washington, DC and video-cast on Homewood Campus.)

EN.650.621. Critical Infrastructure Protection. 3 Credits.
This course focuses on understanding the history, the vulnerability, and the need to protect our Critical Infrastructure and Key Resources (CIKR). We will start by briefly surveying the policies which define the issues surrounding CIKR and the strategies that have been identified to protect them. Most importantly, we will take a comprehensive approach to evaluating the technical vulnerabilities of the 18 identified sectors, and we will discuss the tactics that are necessary to mitigate the risks associated with each sector. These vulnerabilities will be discussed from the perspective of ACM, IEEE or other technical journals/articles which detail recent and relevant network-level CIKR exploits. We will cover well known vulnerable systems such the Internet, SCADA or PLC and lesser known systems such as E911 and industrial robot. Also, a class project is required. Recommended Course Background: EN.650.424 or equivalent or permission by instructor.

EN.650.624. Network Security. 3 Credits.
This course focuses on communication security in computer systems and networks. The course is intended to provide students with an introduction to the field of network security. The course covers network security services such as authentication and access control, integrity and confidentiality of data, firewalls and related technologies, Web security and privacy. Course work involves implementing various security techniques. A course project is required. Course Background: EN.601.220, EN.601.226, EN.601.418 or equivalent.
Students may only earn credit for one of the following courses: EN.650.624 OR EN.601.444 OR EN.601.644

EN.650.631. Ethical Hacking. 3 Credits.
Cyber security affects every facet of industry and our government, and thus is now a threat to National Security. This course is designed to introduce students to the skills needed to defend computer network infrastructure by exposing them to the hands-on identification and exploitation of vulnerabilities in servers (i.e., Windows and Linux), wireless networks, websites, and cryptologic systems. These skills will be tested by having teams of students develop and participate in instructor lead capture-the-flag competitions. Also included are advanced topics such as shell coding, IDA Pro analysis, fuzzing, and writing or exploiting network-based applications or techniques such as web servers, spoofing, and denial of service.

EN.650.640. Moral & Legal Foundations of Privacy. 3 Credits.
This course explores the ethical and legal underpinnings of the concept of privacy. It examines the nature and scope of the right to privacy by addressing fundamental questions such as: What is privacy? Why is privacy morally important? How is the right to privacy been articulated in constitutional law?

EN.650.653. Financial Issues in Managing a Secure Operation. 3 Credits.
This course addresses the risks (financial, reputation, business, and third party), costs, ROI, and other business issues concerned in planning and managing a secure operation. Topics include disaster recovery, outsourcing issues; service level agreements; evaluating external security service providers; assessing security total cost of ownership; audit procedures; financial integrity; cost/benefit analyses; back-up and recovery provisions; insurance protection; contingency and business continuity plans; qualitative and quantitative risk analysis; monitoring the security of the enterprise; information economics; performance reporting; automated metrics reporting; responses to threats; effects of security policies and practices on business and customers; preparing a business case for information security investments; and developing cost-effective solutions given constraints in money, assets, and personnel. Case studies and exercises will be used to illustrate financial planning and evaluation of security operations.

EN.650.654. Computer Intrusion Detection. 3 Credits.
Intrusion detection supports the on-line monitoring of computer system activities and the detection of attempts to compromise normal services. This course starts with an overview of intrusion detection tasks and activities. Detailed discussion introduces a traditional classification of intrusion detection models, applications in host-centered and distributed environments, and various intrusion detection techniques ranging from statistical analysis to biological computing. This course serves as a comprehensive introduction of recent research efforts in intrusion detection and the challenges facing modern intrusion detection systems. Students will also be able to pursue in-depth study of special topics of interest in course projects.

EN.650.655. Implementing Effective Information Security Programs. 3 Credits.
This course focuses on the personnel, legal, regulatory and privacy issues that comprise the basic security management areas that must be considered when developing and implementing an effective information security program. Specific topics include security-related legislation, government and industry security frameworks, the identification and management of risk, security controls, defense in depth, critical infrastructure protection, development and implementation of an enterprise wide security strategy, and organizational roles and responsibilities.
Area: Writing Intensive

EN.650.656. Computer Forensics. 3 Credits.
This course introduces the student to the field of applied Computer Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "dead box" (powered off) data extraction and analysis with open-source tools. Topics covered include legal and regulatory issues, forensic imaging and data acquisition from a "dead" system, computer file systems (FAT/NTFS) and data recovery, Windows Registry and configuration records, Windows log analysis and operating system artifacts, memory dump analysis (RAM), software artifacts, computer network forensics, introductory mobile device forensics, case reporting and documentation, end-to-end computer forensic examinations, peer review, and testifying in court.

EN.650.658. Introduction to Cryptography. 3 Credits.
Cryptography has a rich history as one of the foundations of information security. This course serves as the introduction to the working primitives, development and various techniques in this field. It emphasizes reasoning about the constraint and construction of cryptographic protocols that use shared secret key or public key. Students will also be exposed to some current open problems. Permission of instructor only.

EN.650.660. Software Vulnerability Analysis. 3 Credits.
Competent execution of security assessments on modern software systems requires extensive knowledge in numerous technical domains and comprehensive understanding of security risks. This course provides necessary background knowledge and examines relevant theories for software vulnerabilities and exploits in detail. Key topics include historical vulnerabilities, their corresponding exploits, and associated risk mitigations. Fundamental tools and techniques for performing security assessments (e.g., software reverse engineering, static analysis, and dynamic analysis) are covered extensively. The format of this course includes lectures and assignments where students learn how to develop exploits to well-known historical vulnerabilities in a controlled environment. Students will complete and demonstrate a project as part of the course.

EN.650.663. Cloud Computing Security. 3 Credits.
Cloud computing promises significant cost savings via economies of scale that typically are not achievable by a single organization. This course examines cloud computing in detail and introduces the security concerns associated with cloud computing. Key topics include service models for cloud computing, virtualization, storage, management, and data processing. Fundamental security principles are introduced and applied to cloud computing environments. The format of this course includes lectures and hands-on assignments. Students will complete a project and present it as part of the course.

EN.650.672. Security Analytics. 3 Credits.
Security analytics refers to information technology solutions that gather and analyze security events to bring situational awareness and enable IT staff to understand and analyze events that pose the greatest risk. Increasingly, detecting and preventing cyber attacks require sophisticated use of data analytics and machine learning tools. This course will cover fundamental theories and methods in data science, modern security analytical tools, and practical use cases of security analytics. Students of this course learn concepts, tasks, and methods of data science; and how to apply data science to cyber security problems. Students also learn how to use modern software in security analytics. Recommend Course Background: Basic knowledge of statistics; Either python or R programming skill (do not require both).

EN.650.673. Mobile and Wireless Security. 3 Credits.
The past few decades have seen a rapid evolution of wireless LAN and cellular technologies. In addition to wireless access technologies, various types of network layer and application layer mobility protocols have been developed to provide seamless connectivity to mobile users. Maintaining end-to-end security for these mobile users needs to take into account authentication, authorization, integrity and confidentiality as mobile devices change their point-of-attachment. This course will provide an overview of various wireless access technologies, mobility protocol taxonomy and will describe end-to-end security including mobile end point, radio access network, network core, and application services. In addition, this will include hands-on lab experiments to examine security over wireless and mobile networks and a research group project. Overall objective of this course is to impart both theoretical and practical knowledge to the students, and at the same time make them ready for any future research to solve complex problems. Recommended Course Background: Knowledge of TCP/IP, Linux, Fundamentals of Networking

EN.650.681. Global Cybersecurity Trends and Practices. 3 Credits.
This course provides an overview of cybersecurity capabilities and practices in the global community. International organizations engaged in cybersecurity policy and governance and the national strategies of many countries are examined in detail. Students will gain insights into the political, economic, military, and technological components of cybersecurity as practiced in the U.S., UK, China, Russia, and other countries. The course is designed around four general themes: global cyber threats, strategies and policies in response to cyber threats, comparative cybersecurity capabilities of nation-states; and cybersecurity in international politics. Students will also gain an appreciation of key cybersecurity issues like critical infrastructure protection and information sharing in the international context. The course will provide students a broad perspective on the global context of cybersecurity, complementing knowledge gained in other courses in the graduate program. There will be assignments to study key literature and current events, as well as quizzes and a mid-term exam. Students will also conduct research projects that focus on the interaction of technology, policy, strategy, and governance, and present results to the class. EN.650.401/EN.650.601 recommended

EN.650.683. Cybersecurity Risk Management. 3 Credits.
Data breaches, cyber attacks, cybercrime, and information operations in social media continue to increase in frequency and severity, causing businesses and governments to focus more resources on cybersecurity risk management and compliance. Utilizing real-world data breaches and attacks as motivation, this course will provide students knowledge of risk management concepts, frameworks, compliance regimes and best industry practices used to ensure sound cybersecurity practices in government, commercial, and academic organizations. Lab exercises will provide opportunities for students to experience key aspects of the risk management process and help prepare them for post-graduation assignments as cybersecurity professionals. Recommended Course Background: EN.650.601.

EN.650.757. Advanced Computer Forensics. 3 Credits.
This course will analyze advanced topics and state of the art issues in the field of digital forensics. The course will be run in a research seminar format and students will be given both basic and applied research projects in such areas as: intrusion analysis, network forensics, memory forensics, mobile devices, and other emerging issues.

EN.650.836. Information Security Projects. 1 Credit.
All MSSI programs must include a project involving a research and development oriented investigation focused on an approved topic addressing the field of information security and assurance from the perspective of relevant applications and/or theory. There must be project supervision and approval involving a JHUISI affiliated faculty member. A project can be conducted individually or within a team-structured environment comprised of MSSI students and an advisor. A successful project must result in an associated report suitable for on-line distribution. When appropriate, a project can also lead to the development of a so-called "deliverable" such as software or a prototype system. Projects can be sponsored by government/industry partners and affiliates of the Information Security Institute, and can also be related to faculty research programs supported by grants and Contracts. Required course for any full-time MSSI student. Open to MSSI students. Permission required for non-MSSI students.

EN.650.837. Information Security Projects. 1 Credit.
Open to MSSI students Permission Required for non-MSSI students
All MSSI programs must include a project involving a research and development oriented investigation focused on an approved topic addressing the field of information security and assurance from the perspective of relevant applications and/or theory. There must be project supervision and approval involving a JHUISI affiliated faculty member. A project can be conducted individually or within a team-structured environment comprised of MSSI students and an advisor. A successful project must result in an associated report suitable for on-line distribution. When appropriate, a project can also lead to the development of a so-called "deliverable" such as software or a prototype system. Projects can be sponsored by government/industry partners and affiliates of the Information Security Institute, and can also be related to faculty research programs supported by grants and Contracts. Required for MSSI students on full-time status.

EN.650.840. Information Security Independent Study. 3 Credits.
Individual study in an area of mutual interest to a graduate student and a faculty member in the Institute.

EN.655 (Healthcare Systems Engineering)

EN.655.662. Intro to Healthcare Systems Engineering. 3 Credits.
This course introduces students to the fundamental principles of healthcare systems engineering and their application to the development of complex systems. It describes how the systems engineering viewpoint differs from that of the healthcare provider, as well as the essential role that systems engineering plays as an integral component of program management. Topics include integrated systems engineering life cycle purpose and constructs, delineation of different complex system types, requirements analysis, concept definition, system synthesis, design trade-offs, risk assessment, interface definition, engineering design, system integration, and related systems engineering activities. The course defines the breadth and depth of the knowledge that the healthcare systems engineer must acquire concerning the characteristics of the diverse components that constitute the total system. Special topics such as architectures, interfaces, simulation and models, and test and evaluation are discussed in relation to the healthcare systems engineering viewpoint. Students address typical systems engineering problems that highlight important healthcare issues and methods of technical problem resolution.

EN.655.667. Management of Healthcare Systems Projects. 3 Credits.
The course addresses the management of a technical project from concept to operational use, with emphasis on the functions, roles, and responsibilities of the healthcare systems project manager. From the development of a proposal to the delivery of a product and/or service to a customer, the efforts to conceive, plan, budget, schedule, monitor, control/direct, and report the progress of the project are discussed. Throughout the project life cycle, the need for good communications, interface and configuration management, and conflict resolution is emphasized. Students assume the role of project managers who must use management tools such as WBS, EVM, and CPN and who must address typical problems that arise in the conduct of a high-technology systems project.

EN.655.705. Emerging Topics in Health. 3 Credits.

EN.655.767. Healthcare System Conceptual Design. 3 Credits.
This course addresses in detail the healthcare systems engineer's responsibilities and activities during the conceptual phases of a healthcare system development program. Systems engineering tools commonly employed at this stage of a program are presented along with selected problems that illustrate both the applicability and limitations of commonly employed tools and procedures to the solving current healthcare issues. The course steps through conceptual design beginning with analysis of needs and objectives and proceeding to the exploration of concepts and the selection of a concept that best meets goals of performance, timeliness, and affordability. Topics include definition of operational scenarios, functional analysis, risk assessment, system trade-offs, measures of effectiveness, and requirements formulation. Emphasis is on the application of these systems engineering techniques in a team environment to a class project. Students apply systems engineering methods learned from reading and lectures to the development of a realistic system in an ongoing project in a team format.
EN.655.662 Introduction to Healthcare Systems Engineering and EN.655.667 Management of Healthcare Systems Projects, or permission of the student's faculty advisor and the course instructor.

EN.655.768. Healthcare System Design & Integration. 3 Credits.
This course addresses the healthcare systems engineering objectives, responsibilities, and activities during two phases of the system development life cycle: demonstration and validation, and engineering and manufacturing development. Healthcare systems engineering procedures and tools used during these phases are identified and their use illustrated. Topics include the relationship between a system specification and the system design, risk management and patient safety, system design models, healthcare provider and patient integration into the design process, and healthcare design disciplines and practices. The course uses a healthcare system scenario extensively to illustrate systems engineering principles and specific product design issues.
EN.655.767 Healthcare System Conceptual Design or permission of the student's faculty advisor and the instructor.

EN.655.769. Healthcare System Test and Evaluation. 3 Credits.
This course focuses on the application of systems engineering principles to the test and evaluation of healthcare system elements and, ultimately, of the total system. Test requirements, selection of critical test parameters, analysis of test results, and determination of remedial action in the event of discrepancies are all systems engineering functions. Topics include validation and verification, similarities and differences in the nature of hardware and software testing, test tools and test procedures, testing during hardware–software integration, quality assurance test, environmental test, and operational test and evaluation. Student problems include scenario case studies using examples developed in the several previous courses.
EN.655.768 Healthcare System Design and Integration or permission of the student's faculty advisor and the instructor.

EN.655.771. Healthcare Systems. 3 Credits.
This course will cover the fundamental elements of modern healthcare systems, including their structure, processes, and relation to information systems and system interfaces. It also covers the organization, financing, and delivery of healthcare in the United States. It also discusses several potential small and large-scale reforms to the U.S. healthcare system and evaluates their likely effects on healthcare spending, quality of care, and access to care.
EN.655.662 and EN.655.667 or permission of the student's faculty advisor and the instructor.;Course too similar

EN.655.800. Healthcare Systems Engineering Capstone Project. 3 Credits.
This course provides the experience of applying systems engineering principles and skills learned in the formal courses to a specific practical healthcare system project that is suggested by the student and is presented in a formal proposal. The product of the system project is a final report; also required are interim reports and an oral presentation to permit review of the project objectives and approach. A student typically has a mentor who is a member of the Systems Engineering faculty. The program chair and mentor review proposals and reports. The total time required for this course is comparable to the combined class and study time for the formal courses (formerly 645.770). It is self-paced and often takes more than one semester to complete.
EN.655.769 Healthcare System Test and Evaluation and completion of at least 3 of the four required electives and permission of course instructor.

EN.660 (Center for Leadership Education)

EN.660.105. Foundations of American Enterprise. 3 Credits.
Formerly Introduction to Business, this course is designed as an overview comprising three broad categories: the economic, financial, and corporate context of business activities; the organization and management of firms and organizations; and, the marketing and production of goods and services. Topic specific readings, short case studies and exercises all focus on the bases for managerial decisions as well as the long and short-term implications of those decisions in a global environment. No audits. Coursework will be completed asynchronously. Students are required to attend 1 office hour per week, time TBD based on students' availability.

EN.660.106. Clark Scholars Leadership Challenge. 1 Credit.
The Clark Scholars Leadership Challenge is a one credit pass/fail seminar and is designed specifically for the Clark Scholars at JHU who are interested in developing their leadership skills and applying those skills to Hopkins life. The seminar includes both a classroom component and an experiential component. The classroom content includes leadership topics, discussions with university leaders and serves as an introduction to the history, services and involvement opportunities at Hopkins. The experiential component includes programs such as JHU history, faculty student interaction, visits to other JHU campuses and more! Clark Scholars only. S/U only.

EN.660.200. Principles of Finance. 3 Credits.
This course covers central issues in financial management and corporate finance. Students will learn how financial managers make investment, financing and other decisions and what are the tools they use to reach such decisions. Topics covered include time value of money, risk, valuation, capital structure, capital budgeting, dividend policy and mean-variance portfolio selection. The course provides the analytical tools and the financial theories needed to implement sound financial decisions within a corporation (and outside of a corporation). Ideas are presented in a cohesive way within the framework of the no-arbitrage principle, the fundamental principle shaping all aspects of modern finance. Command of the subject is crucially important for anyone considering a career not only in investment banking, investment management or trading, but also in general management, corporate strategy, management consulting, entrepreneurship, and the non-profit world.
EN.660.105 OR AS.180.102

EN.660.203. Financial Accounting. 3 Credits.
The course in Financial Accounting is designed for anyone who could be called upon to analyze and/or communicate financial results and/or make effective financial decisions in a for-profit business setting. No prior accounting knowledge or skill is required for successful completion of this course. Because accounting is described as the language of business, this course emphasizes the vocabulary, methods, and processes by which all business transactions are communicated. The accounting cycle, basic business transactions, internal controls, and preparation and understanding of financial statements including balance sheets, statements of income and cash flows are covered. No audits. Students are required to attend 1 office hour per week, time TBD based on students' availability.

EN.660.250. Identifying and Capturing Markets. 3 Credits.
In this course, students will learn how to identify individual and organizational market needs through entrepreneurial thinking. Exposure to a broad range of organizations—from startups to more established businesses, and a variety of industry sectors, including information technology, healthcare, biomedical engineering, transportation, mass media and energy—will provide students with insight into the role that marketing plays in an organization's ability to identify, capture and grow these markets.

EN.660.270. Clark Scholar Engineering Design I. 1 Credit.
In this course, Clark Scholar students will learn and practice the first stages of design thinking. Students will engage with both industry and academic professionals to identify new innovation targets for future design projects. Additional topics will include multifaceted problem assessment and project selection for Engineering Design II.

EN.660.300. Managerial Finance. 3 Credits.
This course is designed to familiarize the student with the basic concepts and techniques of financial management practice, including how to leverage Microsoft Excel to make financial decisions. The course begins with a review of accounting, financial statement analysis, and the finance function. The course then moves to discussion of financial planning, data mining, time value of money, pro forma development, and project/investment evaluation. A combination of classroom discussions, problem sets, and case studies will be used.
EN.660.203

EN.660.303. Managerial Accounting. 3 Credits.
This course introduces management accounting concepts and objectives including planning, control, and the analysis of sales, expenses, and profits. Major topics include cost behavior, cost allocation, product costing (including activity based costing), standard costing and variance analysis, relevant costs, operational and capital budgeting, and performance measurement. No audits.
EN.660.203

EN.660.308. Business Law I. 3 Credits.
This course is designed to provide students an introduction to legal reasoning and analysis. Further, this course is for the student who is interested in (a) a broad knowledge of law as it relates to modern business, and/or (b) a survey of business-related aspects of law with a view to further legal studies. This course will provide a self-contained and well-rounded study of business law as well as a foundation for continued education in the legal field. Course topics include, business formation, capitalization, torts, contracts, intellectual property, employment issues, and the sale of a business.
EN.660.105

EN.660.310. Cases in Workplace Ethics. 3 Credits.
This course introduces the student to the theories and concepts relevant to resolving ethical issues at work. Students will learn the reasoning and analytical skills needed to apply ethical frameworks to their decision-making, to identify ethical challenges in management and leadership, and to understand the context within which ethical issues arise. Students will learn to raise ethical questions with their leaders, whether at work or the communities within which they live and work. Students will have influence over their learning outcomes by selecting to focus on, and learn to assess and respond to, challenges specific to their industry, field and/or country of interest.

EN.660.329. Social Entrepreneurship Theory and Practice. Community Based Learning. 3 Credits.
Learn the principles, values and skills necessary to lead and succeed in organizations that make a positive difference in today's world. The course is designed to help students identify and provide opportunities to enhance their leadership skills. A "Blueprint for Success" will provide the framework for students to cultivate their own ideas for new socially conscious entrepreneurial ventures. Students will hear from successful current leaders in the field of social entrepreneurship and be provided the opportunity to network with JHU alumni, faculty and staff who are working or volunteering in for-profit or non-profit entities through occupations that make a difference.
Area: Writing Intensive

EN.660.331. Leading Teams. 3 Credits.
This course will allow students to develop the analytical skills needed to effectively lead and work in teams. Students will learn tools and techniques for problem solving, decision-making, conflict resolution, task management, communications, and goal alignment in team settings. They will also learn how to measure team dynamics and performance, and assess methods for building and sustaining high-performance teams. Students will also explore their own leadership, personality and cognitive styles and learn how these may affect their performance in a team. The course will focus on team-based experiential projects and exercises as well as provide opportunities to individually reflect and write about the concepts explored and skills gained throughout the course. No Audits. Recommended Couse Background: EN.660.332 or EN.660.333.

EN.660.332. Leadership Theory. 3 Credits.
Students will be introduced to the history of Leadership Theory from the "Great Man" theory of born leaders to Transformational Leadership theory of non-positional learned leadership. Transformational Leadership theory postulates that leadership can be learned and enhanced. The course will explore the knowledge base and skills necessary to be an effective leader in a variety of settings. Students will assess their personal leadership qualities and develop a plan to enhance their leadership potential. No audits.
Area: Writing Intensive

EN.660.333. Leading Change. 3 Credits.
In this course, we will use a combination of presentation, discussion, experiential learning, research, and self-reflection to investigate issues surrounding leadership and change in communities and the economy. While considering both for-profit and non-profit entitites, we will pursue topics including understanding and using theories of change, finding competitive advantage and creating strategic plans; making decisions, even in uncertain times; valuing differences; employing leadership styles; giving and receiving feedback; understanding employee relations; creating performance measures; and developing organizational cultures; and using the dynamics of influence. No audits.
Area: Writing Intensive

EN.660.335. Negotiation and Conflict Resolution. 3 Credits.
The focus of this class is the nature and practice of conflict resolution and negotiation within and between individuals and organizations. The primary format for learning in this class is structured experimental exercises designed to expose students to different aspects of negotiation and to build tangible skills through interpersonal exchange. While some class time is devoted to presentations on theories and approaches, the class method primarily relies on feedback from fellow classmates on their observations of negotiation situations and on personal reflections by students after each structured experience. Topics include conflict style, negotiation, and group conflict. No audits. Recommended Course Background: EN.660.105, an additional course in the Entrepreneurship and Management Program or in the social sciences.
EN.660.105

EN.660.340. Management Theory and Practice. 3 Credits.
This course introduces the student to the management process by examining the role of the manager from a traditional and contemporary perspective while applying decision-making and critical-thinking skills to the challenges facing managers in today's globally diverse environment. The course examines the techniques for controlling, planning, and organizing resources and leading the workforce.

EN.660.341. Process Innovation and Quality Management. 3 Credits.
This course focuses on both quantitative and qualitative analytical skills and models essential to operations process design, management, and improvement in both service and manufacturing oriented companies. The objective of the course is to prepare the student to play a significant role in the management of a world-class company which serves satisfied customers through empowered employees, leading to increased revenues and decreased costs. The material combines managerial issues with both technical and quantitative aspects. Practical applications to business organizations are emphasized. Recommended Course Background: EN.660.105 Introduction to Business
Area: Writing Intensive

EN.660.342. Supply Chain Management. 3 Credits.
For a firm to execute its competitive strategy successfully, its supply chain must be able to deliver on the firm's promise to its customers. Therefore, it is important for all managers to have an understanding of key supply chain concepts. With this in mind, the goal of this course is to introduce the main trade-offs involved in supply chain management, and the associated challenges and opportunities.The course consists of two parts: • Supply chain fundamentals: This part focuses on managing the flow of material across the entire supply chain so as to achieve a profitable balance between supply and demand.• Challenges in decentralized supply chains: Almost all supply chains involve self-interested players, who must work together to meet the end customer demand. The theme of the second part is inefficiencies caused by a lack of collaboration among the players in the supply chain. Accordingly, we focus on managing supply chains so as to align the incentives of several inter-dependent players. We also illustrate how supply chains are being transformed due to environmental and social responsibility considerations. Class sessions will feature a combination of case study discussions and lectures. The course emphasizes (i) building spreadsheet-ready models that capture supply chain challenges, (ii) asking what-if questions by applying simulation and optimization tools to these models, and (iii) distilling managerial insights from what-if questions and communicating recommendations based on those insights.

EN.660.343. Operations and Service Management. 3 Credits.
This course aims to (1) direct your attention to fundamental problems and issues confronting all operations managers, (2) provide you with language, concepts, and insights which will help you to deal with these issues in order to gain competitive advantage through operations, and (3) further develop your ability to use analytical approaches and tools to understand and handle various managerial situations. Because the course deals with the management of "processes", it applies to both for-profit and non-profit organizations, to both service and manufacturing organizations, and to virtually any functional area or industry.
EN.660.105 OR AS.180.102

EN.660.345. Multidisciplinary Engineering Design 1. 3 Credits.
This course number was formally EN.500.308. Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles.Students will work on teams with colleagues from different engineering disciplines to tackle a challenge for a clinical, community, or industry project partner. Through practicing a creative, human-centered design process, teams will understand the essential need behind the problem, prototype solutions, and test and refine their prototypes. In addition to project work, students will learn healthy team dynamics and how to collaborate among different working styles. Students may choose to move their projects forward towards implementation in Multidisciplinary Engineering Design 2 in spring 2023.

EN.660.347. Action Lab. 3 Credits.
Ever feel stuck? In this course you will learn how to take action through prototyping to move your ideas forward. You will learn the theory and practical skills behind prototyping when moving from an idea to a tangible solution. We will prototype to learn, communicate ideas, and mitigate risk using media ranging from cardboard to circuit boards to code... and maybe even TikTokTM. No prior experience required.

EN.660.352. New Product Development. 3 Credits.
New product development is the ultimate interdisciplinary entrepreneurial art, combining marketing, technical, and managerial skills. Students will experience the full breadth of this art. Working in teams, they will conceive of a product and take it through the development process, culminating in a “Shark Tank”-style pitch by the end of the semester.Topics will span the product development cycle: identifying user needs, brainstorming, industrial design, prototyping techniques, survey design for quantitative research, project management, intellectual property law, sustainable design, and product liability. The learning format will include case studies, exercises, projects, and frequent impromptu presentations. No audits.
EN.660.250 OR EN.500.101 OR EN.510.106 OR EN.520.137 OR EN.530.111 OR EN.560.141 OR EN.570.108 OR EN.580.111 OR EN.530.414

EN.660.355. Sports Marketing. 3 Credits.
This course will allow students to apply marketing principles and concepts to the sports marketing environment while gaining an understanding of how event sponsorships, endorsements, licensing and naming rights are used to achieve business objectives. Through case studies and a group project, students will be exposed to a broad range of sports entities including professional sports teams, governing organizations and sports media.
EN.660.250

EN.660.358. International Marketing. 3 Credits.
This course covers product, pricing, promotion, distribution, market research, organization and implementation and control policies relating to international marketing. It also explores the economic, cultural, political and legal aspects of international marketing. Through interactive and application-oriented assignments and cases, students will gain hands-on experience in analyzing and developing marketing strategies for organizations that market both consumer and business products/services internationally. The client-based project allows every student to be part of a global team (students from Universities around the world) that communicates through an on-line platform, and works on actual client deliverables. One or more local international marketers will be invited to speak to the class. Prerequisite: 660.250 Principles of Marketing.
EN.660.250

EN.660.361. Engineering Management & Leadership. 3 Credits.
When engineers become working professionals, especially if they become managers, they must juggle knowledge of and tasks associated with operations, finance, ethics, strategy, team citizenship leadership and projects. While engineers’ success may depend on their direct input ¬¬ the sweat of their own brow – managers’ success depends on their ability to enlist the active involvement of others: direct reports, other managers, other team members, other department employees, and those above them on the organizational chart. You will learn these concepts and skills in this course.In this course, you will learn about teamwork and people management, and gain an introduction to strategy, finance, and project management. You will practice writing concise persuasive analyses and action plans and verbally defending your ideas. Cross-listed with Mechanical Engineering.Please note that this course will not be available in the spring.

EN.660.363. Leadership & Management in Materials Science and Engineering. 3 Credits.
In this course, you will learn about leadership, social responsibility, strategy, finance, project management and people management specifically in the materials science and engineering fields. You will practice writing concise persuasive analyses and action plans and verbally defending your ideas. You will learn the ethical guidelines for the materials science profession, to resolve team conflicts and co-lead self-managed work teams, and determine how materials science supports society’s sustainability goals and the social responsibilities of materials scientists. Our class time will feel like a business meeting, and we will refer to class periods as meetings. When you complete this course, you will be prepared to be a working professional. Your Teaching Team looks forward to seeing you develop into a career engineer, scientist, manager, entrepreneur, professor or other professional over the years.

EN.660.380. Clark Scholar Engineering Design II. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.381. Clark Scholar Engineering Design III. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.For Clark Scholar Junior’s only.

EN.660.382. Clark Scholar Engineering Design IV. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.383. Clark Scholar Engineering Design V. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.385. Clark Scholar Engineering Design VI. 1 Credit.
In this course Clark Scholar students will continue their training in design thinking. Students will focus on both the identification of needs and the assessment of these needs for project selection. This course will consist of in class workshops and field immersion exercises.

EN.660.400. Practical Ethics for Future Leaders. 2 Credits.
This is an interdisciplinary course on leadership, decision making, and the application of ethics to real world problems. JHU students are future leaders of innovation across many fields, including but not limited to engineering, business, law, journalism, government, science and medicine. The awesome power of emerging technologies to modify our world - our food supply, our health, even people - will only increase and become more pressing in coming years. The goal of this course is to give students a deep and practical grounding in how leaders make decisions, and in particular difficult decisions where there is no clearly right answer. In this two-credit course, we will cover important concepts in the practical application of ethics; in decision making; and leadership. There is a companion 1- credit course, EN.660.406 which forms a second part of the course, and which will take a deep look at a major ethical issue resulting from the newfound capabilities made possible by emerging technologies. Students of EN.660.400 can choose whether or not to register for EN.660.406. The 660.400 course includes pre-reading, videos, and substantive online discussions, as well as weekly meetings in small sections to further analyze and discuss the material. The 660.400 course spans the first two thirds of the semester, leaving the final third of the semester available for the 1-credit EN.660.406.

EN.660.404. Business Law II. 3 Credits.
Building on the material from Business Law I, topics examined include entrepreneurship, business entities and business formation, principles of agency, real property, personal property, bailments, bankruptcy, secured transactions, employment discrimination, business financing, investor protection, antitrust and environmental law. No audits.
EN.660.205 OR EN.660.308

EN.660.406. Practical Ethics for Future Leaders - Special Topic. 1 Credit.
This is a one-credit course that serves as a companion and second part to the Practical Ethics course EN.660.400, which is a co-requisite for this course. In this one-credit course, we will take a deep look at a major ethical issue resulting from the newfound capabilities made possible by emerging technologies. The students will work together in small groups, across multiple meetings with flexible scheduling, to discuss and make decisions on real-world decisions. Previous years' topics have included: the release of genetically modified mosquitoes in Florida; the presence of human decision-makers 'in the loop' for military and surgical autonomous robots; misinformation and hate speech in social media; protection and sharing of genetic and personal information; and school reopening policies during the coronavirus pandemic. The 660.400 course takes place in the final one-third of the semester, leaving the first two-thirds of the semester available for the 2-credit EN.660.400. Students should register for the same section number in EN.660.406 as they do for EN.660.400.
Previous completion of or concurrent enrollment in EN.660.400 required.

EN.660.410. Computer Science Innovation and Entrepreneurship. 3 Credits.
This course is designed to give students in CS the requisite skills to generate and screen ideas for new venture creation and then prepare a business plan for an innovative technology of their own design. These skills include the ability to incorporate into a formal business case all necessary requirements, including needs identification and validation; business and financial models; and, market strategies and plans. Student teams will present the business plan to an outside panel made up of practitioners, industry representatives, and venture capitalists. In addition, this course functions as the first half of a two course sequence, the second of which will be directed by CS faculty and focus on the actual construction/programming of the business idea.Restricted to Juniors and Seniors majoring in Computer Science or by permission of instructor.

EN.660.411. Corporate Strategy and Business Failure. 3 Credits.
The purpose of this course is to bring together theories of corporate strategy and the tools and techniques of strategy consulting. Students will address these in terms of historical case studies where they will have the opportunity to "fix" famous examples of corporate failure. Students will analyze the political, economic, social, and technological contexts of these cases while applying standard tools to the analysis of competing strategic plans.
EN.660.105

EN.660.414. Financial Statement Analysis. 3 Credits.
This course is designed to increase a student's ability to read and interpret financial statements and related information under both GAAP and IFRS (International Financial Reporting Standards). In addition to a review of the basic financial statements and accounting principles, the course will use industry and ratio analysis in addition to benchmarking and modeling techniques to encourage students to think in a more creative way when analyzing historic information or when forecasting financial statements. Students will assess firm profitability and risk, value assets and use spreadsheet models for financial forecasting and decision making. No audits.
EN.660.203

EN.660.419. Strategy Consulting. 3 Credits.
The purpose of this course is to provide students with a background in, and opportunity to experience, business design and strategy consulting in an organizational setting. Business design is fundamentally about identifying and solving the problems that prevent an organization from moving forward, from realizing its goals. Students will form teams, work with an outside sponsor, and treat the experience as a living case. They will explore the problem presented by the sponsor (client), conduct in-depth interviews to validate the problem, design appropriate solutions, and complete the project by developing an implementation plan. Student teams will formally present all of this to the sponsor at the end of the term. This serves as a capstone for the Entrepreneurship & Management minor.
EN.660.105 AND EN.660.203 AND (EN.661.110 OR EN.661.250) OR Instructor Permission.

EN.660.420. Marketing Strategy. 3 Credits.
This writing intensive course helps students develop skills in formulating, implementing, and controlling a strategic marketing program for a given product-market entry. Using a structured approach to case analysis, students will learn how to make the kinds of strategic marketing decisions that will have a long-term impact on the organization and support these decisions with quantitative analyses. Through textbook readings, students will learn how to identify appropriate marketing strategies for new, growth, mature, and declining markets and apply these strategies as they analyze a series of marketing cases. The supplementary readings, from a broad spectrum of periodicals, are more applied and will allow students to see how firms are addressing contemporary marketing challenges. In addition to analyzing cases individually, each student will be part of a team that studies a case during the latter half of the semester, developing marketing strategy recommendations, including financial projections, and presenting them to the class. No audits.
Area: Writing Intensive
EN.660.250

EN.660.450. Advertising & Integrated Marketing Communication. 3 Credits.
This course builds on the promotional mix concepts covered in Principles of Marketing (EN.660.250) --advertising, public relations, sales promotion and personal selling. Students will learn how marketers are changing the ways they communicate with consumers and the ways in which promotional budgets are allocated--and how this impacts the development of marketing strategies and tactics. Working with a client (provided by EdVenture Partners) that has chosen this JHU class as its "advertising agency" and an actual budget provided by the firm, the class will form small teams to mirror the functional organization of an actual ad agency (market research, media strategy/planning, copywriting/design, public relations, etc.). Studentteams will then develop a promotional plan and corresponding budget to reach the desired targetmarket (JHU undergrads who meet the client's criteria), implement the plan and then evaluate itseffectiveness through pre- and post campaign market research conducted on the target consumer. Note: Not open to students who have taken EN.660.450 as Advertising and Promotion. No audits. (Formerly Advertising and Promotion.)
EN.660.250

EN.660.453. Digital and Social Media Marketing. 3 Credits.
This course explores strategies for monitoring and engaging consumers in digital media. Students will gain practical knowledge about developing, implementing and measuring social media marketing campaigns. They will learn how to analyze what consumers are saying and connect with them by leveraging word of mouth, viral and buzz marketing through sites like Facebook, Twitter and YouTube. A series of assignments build upon each other toward a final social media marketing plan for a selected consumer product or service. Co-listed with EN.661.453.
EN.660.250

EN.660.455. Reimagining The City to Resist Climate Change. 3 Credits.
ncreasing draught and arid lands, recurring intense storms, rising sea levels, failing infrastructure and architecture – communities are experiencing the effects of new and frequent perils that we must confront, mitigate, manage, predict and prevent. How can we reimagine cities – a fundamental structure to human life - to resist these realities? What solutions are we finding? How are cities restructuring, innovating with technology, and developing policy to minimize damage and risk? What makes for resilient communities and systems? What new innovations might we consider? This course, taught in seminar style, addresses these and other questions about resiliency through investigation, reading and discussion.

EN.660.458. Entrepreneurial Opportunities in Sustainable Living. 3 Credits.

EN.660.459. Entrepreneurial Spirits. 3 Credits.
Have you noticed the growth of consumer-focused, alcohol related enterprises? New wineries, breweries, distilleries and cideries abound in response to continuing growth in customer demand. Have you contemplated starting this type of enterprise? If so, this may be a course for you!!!We explore the background, opportunities and challenges in each of these spirit arenas as we investigate questions one must answer to make an informed decision about starting or joining such an enterprise. Among the topics we will study are the styles of products, vessels, production processes, costs/returns, sources of raw materials, laws and regulations, marketing options, food parings, customers and the like.Expect to make several local field trips. Also expect to perform several individual and group assignments, the results of which you will be required to share with classmates.

EN.660.460. Entrepreneurship. 3 Credits.
This course provides students with a solid introduction to the entrepreneurial process of creating new businesses. Students will gain an appreciation for the investors' perspective in assessing opportunities, evaluating strategies, and valuing the new enterprise. The course will cover the principal components of building a successful venture including management, market analysis, intellectual property protection, legal and regulatory issues, operations, entrepreneurial financing, and the role of the capital markets. Course work will include case studies and creation of investor marketing materials. Open to Juniors and Seniors. No Audits. Recommended Course Background: EN.660.203
EN.660.105 OR EN.660.250

EN.660.461. Fundamentals of Product Management. 3 Credits.
This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.660.470. Leadership Studies Capstone. 3 Credits.
The Leadership Studies Capstone provides Leadership Studies minors with the opportunity to design a project for which they will perform a leadership role. Advisors will provide students with guidance throughout the semester. Projects must be defined and presented to the Leadership Studies minor director prior to the start of the student's senior year and approved by the conclusion of the first week of classes. Possible projects include experiential social entrepreneurship, developing an environmental venture, leading educational initiatives, leadership in a JHU-approved student organization, and partnership with a JHU Center, among others. Projects must meet the criteria established in the rubric.

EN.660.475. Innovation Lab. 3 Credits.
This course is designed to provide students with the opportunity to explore the commercial opportunities inherent in a business idea that they bring to the class at the outset. For example, this course could be taken in conjunction with Engineering Design courses. Students who do not come with a pre-existing business idea will have the opportunity to join a team. The course focuses on building the skills to validate the business idea by defining a value proposition, analyzing markets and competitors, and designing a pathway to commercialization. As a part of the process, students will learn how to develop a marketing plan, market entry strategies, business and financial models, as well as strategies for addressing intellectual property, licensing, regulatory reimbursement and manufacturing issues. Undergraduates only.

EN.660.500. Professional Internship. 1 Credit.
Students may qualify for an internship with one of the many local employers with whom CLE works or they may arrange a non-local internship on their own. For non-paid internships only, students may apply for sponsorship for academic credit through CLE. Applications must include a resume, transcript and written essay and will be evaluated on the basis of work experience, GPA, writing sample, and course work. Students are expected to complete two reports assigned by the internship coordinator. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.501. Practicum In Entrepreneurship and Management. 3 Credits.
Students work on an existing business or marketing plan/case project under the close supervision of an Entrepreneurship and Management faculty member. Students must apply by submitting a cover letter, resume, unofficial transcript, and essay describing the business concept/ marketing plan. Applications must be approved by both the faculty member and director of CLE. Students are expected to meet regularly with the faculty member and complete assigned readings and projects. Permission required. S/U only.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.594. Business Internship-Summer. 1 Credit.
You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.660.603. World Without Waste: Strategy and Innovation for the 21st Century. 3 Credits.
Complex problems require complex solutions. In this course, students will take a practical approach to the development of the skills necessary to identify and assess compelling problems and opportunities, generate innovative solutions, and communicate those solutions to key stakeholders. Students will engage the tools and practices of innovation and strategy consulting and learn from industry professionals on a range of 21st century challenges. For the final project, students will form teams and select an issue, engage with experts, and develop reports and presentations that provide an overview of the current competitive landscape and recommendations for innovative strategies and solutions.

EN.660.614. Financial Statement Analysis. 3 Credits.
This course is designed to increase a student's ability to read and interpret financial statements and related information under both GAAP and IFRS (International Financial Reporting Standards). In addition to a review of the basic financial statements and accounting principles, the course will use industry and ratio analysis in addition to benchmarking and modeling techniques to encourage students to think in a more creative way when analyzing historic information or when forecasting financial statements. Students will assess firm profitability and risk, value assets and use spreadsheet models for financial forecasting and decision making. No audits. MSEM students only.

EN.660.655. Reimagining The City to Resist Climate Change. 3 Credits.
ncreasing draught and arid lands, recurring intense storms, rising sea levels, failing infrastructure and architecture – communities are experiencing the effects of new and frequent perils that we must confront, mitigate, manage, predict and prevent. How can we reimagine cities – a fundamental structure to human life - to resist these realities? What solutions are we finding? How are cities restructuring, innovating with technology, and developing policy to minimize damage and risk? What makes for resilient communities and systems? What new innovations might we consider? This course, taught in seminar style, addresses these and other questions about resiliency through investigation, reading and discussion.

EN.660.661. Fundamentals of Product Management. 3 Credits.
This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.660.675. Innovation Lab. 3 Credits.
This course is designed to provide students with the opportunity to explore the commercial opportunities inherent in a business idea that they bring to the class at the outset. For example, this course could be taken in conjunction with Engineering Design courses. Students who do not come with a pre-existing business idea will have the opportunity to join a team. The course focuses on building the skills to validate the business idea by defining a value proposition, analyzing markets and competitors, and designing a pathway to commercialization. As a part of the process, students will learn how to develop a marketing plan, market entry strategies, business and financial models, as well as strategies for addressing intellectual property, licensing, regulatory reimbursement and manufacturing issues. Graduate Students only.

EN.661.110. Professional Writing and Communication. 3 Credits.
This course teaches students to communicate effectively with a wide variety of specialized and non-specialized audiences. To do this, students will write proposals in response to JHU-, Baltimore-, or Maryland-based initiatives that focus on a specific area of interest. Potential topics include initiatives to improve urban sustainability, resiliency, health disparities, social justice, mental health/well-being, government/municipal services, and other relevant areas. The class emphasizes writing clearly and persuasively, leveraging evidence effectively, working with key stakeholders, creating appropriate visuals and infographics, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating the real-world environment in which most communication occurs. Projects include resumes, cover letters, memos, proposals, technical reports, and slides. All sections are open to students in any discipline or major. NOTE: This section will focus on SOCIAL JUSTICE INITIATIVES.
Area: Writing Intensive

EN.661.111. Professional Writing and Communication for ESL: Higher Education Initiatives. 3 Credits.
This course teaches ESL students to communicate effectively with a wide variety of specialized and non-specialized audiences and will provide ESL-specific help with grammar, pronunciation, and idiomatic expression in these different contexts. To do this, students will write proposals in response to JHU-, Baltimore-, or Maryland-based initiatives that focus on a specific area of interest. Potential topics include initiatives to improve urban sustainability, resiliency, health disparities, social justice, mental health/well-being, government/municipal services, and other relevant areas. The class emphasizes writing clearly and persuasively, leveraging evidence effectively, working with key stakeholders, creating appropriate visuals and infographics, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating the real-world environment in which most communication occurs. Projects include resumes, cover letters, memos, proposals, technical reports, posters, and slides.
Area: Writing Intensive
Students may take EN.661.111, EN.661.110, or EN.661.120, but not more than one.

EN.661.128. Improvisational Techniques for Communication. 3 Credits.
This course can help you learn how to increase your self-confidence, interpersonal skills, emotional intelligence, and personal effectiveness in a wide variety of social settings—both academic and professional. Using scenarios that encourage creative problem solving, collaboration, imaginative movement, radical acceptance, and deep play, this course can help you be more effective in whatever it is you want to do. This course is appropriate for students in any discipline or major.

EN.661.250. Oral Presentations. 3 Credits.
This course is designed to help students push through any anxieties about public speaking by immersing them in a practice-intensive environment. They learn how to speak with confidence in a variety of formats and venues - Including extemporaneous speaking, job interviewing, leading a discussion, presenting a technical speech, and other relevant scenarios. Students learn how to develop effective slides that capture the main point with ease and clarity, hone their message, improve their delivery skills, and write thought-provoking, well-organized speeches that hold an audience's attention. No audits. Not open to students that have taken EN.661.150.
Area: Writing Intensive

EN.661.251. Oral Presentations for International Students. 3 Credits.
This course is designed to help students push through any anxieties about public speaking by immersing them in a practice-intensive environment. They learn how to speak with confidence in a variety of formats and venues - Including extemporaneous speaking, job interviewing, leading a discussion, presenting a technical speech, and other relevant scenarios. Students learn how to develop effective slides that capture the main point with ease and clarity, hone their message, improve their delivery skills, and write thought-provoking, well-organized speeches that hold an audience's attention. This section of Oral Presentations is open only to international students or students who learned English as a second/additional language. No audits.
Area: Writing Intensive
Students may take EN.661.251 OR EN.661.151, but not both.

EN.661.275. Improvisational Techniques for Collaboration. 3 Credits.
In this improv class, students will dive deeper into the world of improvisation, growing their ability to present information and navigate complex group dynamics, exploring third party collaborations and negotiations. Students will use the principles behind improvisation to enhance their success virtually and in the "real world." Each class will include a variety of immersive activities such as mindfulness and movement; journal prompts; group games; peer lead discussions; role play exercises; and personal presentations. The small class size will allow every student to be participatory, create a close knit learning community, and receive ample feedback. At the end of the semester, students will be able to confidently collaborate with their peers and effectively engage their audience.

EN.661.301. Writing for the Law. 3 Credits.
This course teaches students to communicate effectively in various modes of legal discourse that are fundamental to the practice of law. Students will engage in writing nearly every session and will learn the basics of legal writing, editing (both the student's and others' work), and written/oral advocacy skills. Students can expect to work with litigation-related documents such as pleadings, preliminary and dispositive motions, and appellate briefs as well as non-litigation-related documents such as opinion articles, publications, essays, and various business-related contracts.
Area: Writing Intensive

EN.661.306. Special Topics in Professional Writing: Freelance Travel Writing. 3 Credits.
In this course, students will learn the fundamentals of magazine and travel writing as well as best practices for working as a freelance writer. While gaining familiarity with the genre by reading a selection of exemplary magazine articles, students will learn how to brainstorm ideas, plan research, interview skillfully, take useable photos with smartphones, polish pitches to editors, and write/revise/submit work for publication. Students will use Washington, DC, and Baltimore as the basis for most of our their work but can also choose to travel farther afield. At the end of the course, students will create a blog to showcase their articles, profiles, reviews, travel memoirs, and pitches/queries to potential editors.
Recommended: one prior writing course.
Area: Writing Intensive

EN.661.315. Culture of the Engineering Profession. 3 Credits.
This course focuses on building understanding of the culture of engineering while preparing students to communicate effectively with the various audiences with whom engineers interact. Working from a base of contemporary science writing (monographs, non-fiction, popular literature and fiction), students will engage in discussion, argument, case study and project work to investigate: the engineering culture and challenges to that culture, the impacts of engineering solutions on society, the ethical guidelines for the profession, and the ways engineering information is conveyed to the range of audiences for whom the information is critical. Additionally, students will master many of the techniques critical to successful communication within the engineering culture through a series of short papers and presentations associated with analysis of the writings and cases. No audits. WSE juniors and seniors or by instructor approval.
Area: Writing Intensive

EN.661.316. Culture of the Media Profession. 3 Credits.
This course focuses on building understanding of the culture of the media and publishing professions while preparing students to communicate effectively within it. Working from a base of contemporary writing on professions in media, students will engage in discussion, argument, and project work to investigate the culture of media and challenges to that culture, the impacts of media on society, and the ethical guidelines for the profession. Additionally, students will master many of the techniques of critical media production, editing, and publication through a series of short papers and presentations.Students must have previously taken a writing intensive course.
Area: Writing Intensive

EN.661.317. Culture of the Medical Profession. 3 Credits.
This course is designed to engage students in thinking critically and empathetically about key issues encountered by healthcare professionals. The course, taught in seminar style, explores topics ranging from health disparities and healthcare costs to provider-patient communication and socioeconomics of health care by examining cases and readings that highlight the problems that doctors, administrators, researchers, nurses, and other healthcare professionals face on a daily basis. Guest speakers with a range of clinical backgrounds from physicians to social workers also come to class in order to share their path into medicine and daily life as a medical professional. Course content is focused around three specific course goals: 1) teaching students to consider the culture of the medical profession in general as well as the culture of specific institutions and therapeutic areas; 2) equipping students with the framework to understand health care from diverse socioeconomic and cultural contexts; and 3) providing students opportunities to exercise the communication skills required in healthcare settings.
Area: Writing Intensive

EN.661.355. Special Topics in Professional Writing: Blogging about Food and Culture. 3 Credits.
Explore Baltimore’s thriving food and restaurant scene while learning the art of criticism and best practices for blogging. In this journalism class taught by former New York Times Magazine editor Sarah Smith, students will study the work of some of the best writers in the field, from Laurie Colwin to Pete Wells, and using that work as a guide, write their own essays, reviews and features, which the class will discuss in a workshop setting. Instruction will include the basics of reporting and research; differences in writing for print and online media; ethics and legal concerns; and practical advice for pitching editors and setting up blogs. Recommended Course Background: At least one previous writing course.
Area: Writing Intensive

EN.661.360. Marketing Your Start-up. 3 Credits.
This course provides students who have an enterprise or business idea with a road map for developing a complete marketing plan for their venture. From conducting industry and competitor analyses to formulating a marketing program with corresponding projections, students will have developed a professional marketing plan upon the conclusion of the course. Lecture content will be supplemented by guest speaker presentations by local entrepreneurs and marketing practitioners.
EN.660.250 OR EN.660.105

EN.661.361. P.R. & Media. 3 Credits.
This course focuses on the ways that organizations, both for-profit and non-profit, manage their communications to deliver strategic, coherent and compelling messages to their varied stakeholders. Using case studies and team-based, real world projects, we will explore topics including public and media relations, corporate image, branding, advertising, internal and external communications, crisis management, investor relations, ethics and social responsibility. In the process, we will consider issues ranging from organizational culture and leadership styles to defining strategy, managing conflict, defending positions and disagreeing agreeably. No audits. Recommended Course Background: AS.220.105, EN.661.110, AS.060.113 or AS.060.114, AS.060.215, EN.660.250, EN.660.105, and EN.661.250
Area: Writing Intensive

EN.661.370. Storytelling with Data. 3 Credits.
In the 21st century, information is being created at an astounding rate. Stories about rates of infection, economic indicators, and societal/cultural trends have become increasingly common and urgent in news cycles. In addition, key decisions that inform and influence policy, regulation, and business strategy rely heavily on data visualizations. In this course, you will learn techniques and methods for displaying data and telling the accurate story your data has to say. You will also learn several design principles necessary for creating compelling data visualizations and presentations. Although the course is not tool-specific, students will work with MS Excel and Tableau. No programming experience is necessary, but students are strongly encouraged to come with a working knowledge of Excel. Students may choose to work with their own dataset or, if they have none, will be given one by the instructor.

EN.661.380. Decision Analytics. 3 Credits.
In this course students learn the procedures and processes that researchers use to determine answers to questions such as how to price a product, how to differentiate one product from another, and how to evaluate customer response to an offering. The materials combine fundamentals of research design with statistics procedures to answer the questions that entrepreneurs and marketing managers must answer as they write business plans, develop their product mix, set prices, create advertising and test products. The course combines case study, simulated situations, lecture, discussion and real-time projects to produce answers using the techniques, tools and procedures typically used in North American enterprises.

EN.661.630. Improving Writing and Communication Skills for Scientists and Engineers. 3 Credits.
This course is designed to help engineers and scientists improve their communication skills in an immersive, practice-intensive environment that includes simulation in a wide variety of scenarios, formats, and venues. Throughout the semester, students will work on polishing a journal article or dissertation chapter. Simultaneously, students will learn how to translate that same material to use in a variety of public speaking modalities—job interviewing, department talks, networking sessions, spontaneous “elevator pitch” opportunities, and other relevant scenarios. The course emphasizes developing clarity, becoming more emotionally intelligent, honing a main message, developing effective slides, improving delivery skills and confidence, and translating technical expertise to a wide variety of audiences. No audits allowed.
Area: Writing Intensive

EN.661.713. Advanced Communication for International Students: Applied Mathematics and Statistics Masters. 1.5 Credits.
This course is designed to help only those international students studying in a special cohort toward a Master’s Degree in Applied Math and Statistics. It teaches advanced ESL students to communicate more effectively with a wide variety of specialized and non-specialized audiences in a professional setting with ESL-specific intensive help in grammar, pronunciation, idiomatic phrasing, and overall clarity for students whose native language is not English. Projects include brown bag lunch presentations, elevator pitches, job interviews, staying-on-the-job cultural notes, and business meetings. Class emphasizes writing clearly and persuasively, creating appropriate visuals, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating real world environments in which most communication occurs. P/F grading only.

EN.662.611. Strategies: Accounting & Finance. 3 Credits.
Accounting is described as the language of business. In building a financial foundation, the vocabulary and processes by which all business decisions are captured and communicated is explored. Topics include the interpretation of financial performance, operational and capital budgeting, variance analysis, cost behavior and product costing. Both ratio analysis and discounted cash flow techniques are used. The course content is integrated with the Strategies for Innovation and Growth (EN.662.692)curriculum in a comprehensive end-of-semester project. Open only to students in the Masters of Science in Engineering Management program

EN.662.644. Fundamentals of Product Management. 3 Credits.
Are you curious about what Product Managers actually do? Are you thinking about applying for internships and jobs in this fast-growing field? This course will introduce you to the fundamentals of managing a product throughout its life cycle, from inception through strategic market entry and product innovation, all the way to phase-out. We will work with experts in the field, learning how the role differs from industry to industry. This is a hands-on, project - based course: we will work on real challenges from our client partners, enabling you to practice using the tools and thinking of successful product managers.

EN.662.670. Special Projects in International Consulting. 3 Credits.
Organizational strategy is fundamentally about identifying and solving the problems that prevent an organization from moving forward, from realizing its goals. In the age of Covid-19, the question of industry resilience is a pressing one. Crisis conditions have forced organizations and entire industries to adapt in unforeseen ways. This course will engage students in working with real clients searching for strategic solutions for these newly emerging issues. Students will work in teams with real clients, learn how to do primary research and use design thinking to create value for our client partners. At the end of the term, student teams will formally present their solutions to the client partner.

EN.662.692. Strategies for Innovation & Growth. 3 Credits.
The course is organized into two interconnected parts: innovation and growth, which, together, form the foundation of successful businesses. After successfully completing the course, students should know how to critically analyze businesses and apply an engineering-based thought process to more qualitative problems, as well as understand the elements that can make a company successful. This course will overlap heavily with “Strategies: Accounting and Finance”, and several assignments will require in-depth understanding of the material from that course.MSEM students only.

EN.662.801. MSEM Independent Study. 1 Credit.
Independent study for Master of Science in Engineering Management students

EN.662.802. MSEM Internship. 3 Credits.
MSEM Internship for 3 credits in the management portion of the MSEM program.

EN.662.803. MSEM Graduate Summer Research. 9 Credits.
Summer research course for Engineering Management graduate students.

EN.662.811. M.S. in Engineering Management Seminar. 0.5 Credits.
Professional development seminar for engineering management students featuring outside speakers with engineering management experience. For M.S. in Engineering Management only; P/F only; no audits.

EN.662.812. MSEM Seminar. 1 Credit.
Professional development seminar for engineering management students featuring outside speakers with engineering management experience. For M.S. in Engineering Management only; P/F only; no audits.

EN.663.411. Intro to Zen Meditation. 1.5 Credits.
Interested in meditation but don't know where to start? Curious about Zen philosophy? This course can help. In this class, students will be introduced to the secular practices of Zen meditation--zazen (sitting meditation), kinhin (walking meditaItion), koans (teaching tools), and dharma talks. Each class session will be a mixture of meditation, lecture, how-to demonstration, and discussion. No prior meditation experience is necessary. Students with experience in other styles of meditation are also welcome. Students can bring a cushion/pillow for floor sitting or use a classroom chair for comfort. Class will include readings from Yasutani Roshi's Introductory Lectures on Zazen and Suzuki Roshi's Zen Mind, Beginner's Mind. Class is S/U grading only. No audits. Repeats are allowed.

EN.663.453. Innovation and Design I. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.

EN.663.457. Innovation and Design II. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions, and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.
EN.663.453

EN.663.458. Brewing Science. 1.5 Credits.
Micro-breweries, the fastest growing segment of the manufacturing sector in the US, is an enterprise opportunity for students who are fascinated by fermentation. The class addresses the fundamentals of the science and the manufacturing processes together with enterprise considerations of identifying customers, locations and finances.

EN.663.477. Global Consulting. 1.5 Credits.
Students partner with research teams at the International Iberian Nanotechnology Laboratory through remote meetings to help transition scientific and engineering concepts from lab to life. Consulting projects cover areas including market and competitor analysis, the identification of consumer locations and demographics, and the development of market entry strategies for innovative products and technologies. Students will learn how to navigate the unique nature of international consulting, paying particular attention to building rapport across cultures and technologies. Deliverables come in the form of proposals, memos, comprehensive reports detailing findings and recommendations, and a slide deck of key findings optimized for remote presentations. No prior consulting experience required, but interested juniors and seniors should feel that they can contribute to a professional team.

EN.663.600. Ethical Decision-making in Business and Science. 1.5 Credits.
This course introduces the student to concepts relevant to resolving ethical issues in business, science, and society. Students will learn ethical reasoning skills and frameworks to aid decision-making and to discuss ethical questions with their leaders, whether in a business, consulting or engineering firm, a science lab, or the communities within which they live and work.

EN.663.611. Intro to Zen Meditation. 1.5 Credits.
Interested in meditation but don't know where to start? Curious about Zen philosophy? This course can help. In this class, students will be introduced to the secular practices of Zen meditation--zazen (sitting meditation), kinhin (walking meditation), koans (teaching tools), and dharma talks. Each class session will be a mixture of meditation, lecture, how-to demonstration, and discussion. No prior meditation experience is necessary. Students with experience in other styles of meditation are also welcome. Students can bring a cushion/pillow for floor sitting or use a classroom chair for comfort. Class will include readings from Yasutani Roshi's Introductory Lectures on Zazen and Suzuki Roshi's Zen Mind, Beginner's Mind. Class is P/F grading only. No audits. Repeats are allowed.

EN.663.612. Design Thinking for Your Career. 1.5 Credits.
An engineering education at Hopkins offers unique opportunities to advance your career, intentionally grow your network, develop new professional skills, and land the job of your dreams. This course will use principles of design thinking to help you leverage your Hopkins experience to design a meaningful, fulfilling professional life after JHU. This course will teach you principles to effectively balance academic inquiry, professional development, and personal growth and wellness. Utilizing activities developed at the Johns Hopkins University Life Design Lab, you will have the opportunity to reflect upon your values, identities and aspirations; imagine and prototype possible pathways forward that leverage the resources available at Hopkins; and acquire behaviors, habits, and mindsets to effectively tell your story and build a powerful network. These activities and reflections will serve as the basis of a digital portfolio that you can use as you apply for internships and navigate the job market.

EN.663.615. Building Effective Posters and Slides. 1.5 Credits.
This course teaches techniques in visual communication geared to suit emerging scientists. Students will learn the fundamentals of visual design, including theories of form, color and visual perception. The course will cover principles of typography, grid systems and other methods of establishing visual hierarchy. There will also be a short unit on commercial photography. Students will put this knowledge to work in the classroom to produce slides, conference posters and data visualizations. Grading: P/F or for letter grades.

EN.663.617. Storytelling with Data. 1.5 Credits.
This course explores the process of developing compelling visual stories based on data and information. Students will learn to edit, contextualize, sequence and compare data more effectively. They will also learn to use visual design tools to clarify the message they wish to convey about their data. Topics will include design thinking, visual perception, design theory, color theory, spatial relationships, pattern recognition, page layout, and basic probability and statistic concepts commonly used in the visualization process.

EN.663.618. Professional Presentations. 3 Credits.
This course is designed to help scientists and engineers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded for self-evaluation, and students will receive extensive instructor and peer feedback. MSEM students only. Not open to undergraduates.

EN.663.622. Professional Writing and Communication for Graduate Students. 3 Credits.
This course is designed to help engineers and scientists improve their communication skills in an immersive, practice-intensive environment that includes simulation in a wide variety of scenarios, formats, and venues. Throughout the semester, students will work on polishing a journal article or writing a dissertation chapter, as well as communicating their research to the general public in writing. Simultaneously, students will learn how to translate that same material to use in a variety of public speaking modalities—job interviewing, department talks, networking sessions, spontaneous “elevator pitch” opportunities, and other relevant scenarios. The course emphasizes developing clarity, becoming more emotionally intelligent, honing a main message, developing effective slides, improving delivery skills and confidence, and translating technical expertise to a wide variety of audiences. No audits allowed.
Area: Writing Intensive

EN.663.623. Professional Writing and Communication for International Students: Applied Mathematics and Statistics Masters. 1.5 Credits.
This course will prepare you to be competitive in the world of business by offering you some of the oral and written communication techniques you need to be successful. While working to enhance pronunciation, grammar, idiomatic expressions, and business vocabulary, you will work to speak comfortably in business social settings and meetings and to write effectively in a variety of modes not limited to e-mails, memoranda, resumes, and summary reports. The overall goal for all assignments is to speak and to write in clear, effective English. Moreover, improving oral and written communications will give you confidence, help you to make a good impression, and just maybe give you that “edge” you need to get the job you want or the project you desire once employed. Finally, individual pronunciation conferences will be scheduled with each of you throughout the semester. Applied Mathematics and Statistics Masters students only. P/F only

EN.663.624. Advanced Communication for International Students: Applied Mathematics and Statistics Masters. 3 Credits.
This course is designed to help only those international students studying in a special cohort toward a Master’s Degree in Financial Math. It teaches advanced ESL students to communicate more effectively with a wide variety of specialized and non-specialized audiences in a professional setting with ESL-specific intensive help in grammar, pronunciation, idiomatic phrasing, and overall clarity for students whose native language is not English. Projects include meet-and-greets, effective e-mails, memos, resumes, cover letters, reports, oral presentations, and building an overall comfort level with oral communication in English. Class emphasizes writing clearly and persuasively, creating appropriate visuals, developing oral presentation skills, working in collaborative groups, giving and receiving feedback, and simulating real world environments in which most communication occurs. P/F grading only.

EN.663.626. Improvisation for Enhanced Teamwork and Communication. 1.5 Credits.
Following the lead of innovative communities and businesses, this course turns to improvisation techniques to develop communication skills, encourage creative problem solving, and support teamwork. Designed for students without any acting experience, there are no prerequisites to participate. In a non-threatening, judgment-free atmosphere, we begin with improv fundamentals to help students master the subtleties of communication through voice, expression, and body language. As students experiment with imaginative movement and play, they learn to respond spontaneously and confidently to unforeseen challenges. Working together in pairs and small groups, students build trust and operate as fluid and dynamic team members. Throughout the course students build skills to minimize stress, overcome rejection, find comfort in fear, unleash creativity, and trust in their ability to communicate effectively.

EN.663.631. Intellectual Property Law. 1.5 Credits.
Arranged in modules and taught largely through the case method, the course features the following topics: intellectual property; principal-agent relations; and product liability. Not only will participants learn the principles associated with each topic, but also they will master the questions and concerns to use when working with legal counsel on these issues in the future. GRADING: P/F for most students; letter grades for MSEM students.

EN.663.633. Regulatory Writing. 1.5 Credits.
Regulatory writing explores the preparation of clinical documents throughout the life cycle of a (potential) treatment, starting with describing and reporting data from clinical trials, through preparing regulatory submission documents. Clinical documents to be discussed include clinical trial protocols, clinical trial informed consents (ICFs), investigator brochures (IBs), and clinical study reports (CSRs) among others. Essential skills for creating clear and readable documents including basic grammar and usage as well as sentence structure will also be reviewed.

EN.663.634. Improvisation for Communication. 1.5 Credits.
Have you ever botched a job interview? Do you suffer from socially-induced shyness at networking receptions? This class can help! Using techniques rooted in the principles of improvisation and acting, this course can help you learn how to increase your self-confidence, interpersonal skills, emotional intelligence, and personal effectiveness in a wide variety of social settings—both academic and professional. Using scenarios that encourage creative problem solving, collaboration, imaginative movement, radical acceptance, and deep play, this course can help you be more effective in whatever it is you want to do. This course is appropriate for students in any discipline or major.

EN.663.640. Writing Grant and Contract Proposals. 1.5 Credits.
Almost regardless of professional setting, proposals are used to secure work. They are the basis of funding in consulting, academic research, many social enterprises, business-to-business commerce, and government contracting. They require huge amounts of time and energy, yet success is far from guaranteed. In this module, you will master some of the techniques required for proposal writing success. Among the topics addressed are funding sources, writing skills that work, required content for all proposals, creating one voice in shared documents, dealing with “best-and-final negotiations and other important topics. Expect to complete several writing assignments for class including at least part of your own proposal.

EN.663.641. Improving Presentation Skills for International Students. 1.5 Credits.
This course is designed to help scientists and engineers who are non-native English speakers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded.

EN.663.643. Science Outreach: Communicating Science to the Public. 1.5 Credits.
This course teaches students to communicate effectively with a non-specialized audience including the “voting public”, teachers and high school students. Class projects include developing materials for mainstream science news outlet and a hands-on presentation. Class content emphasizes writing clearly for a non-technical audience, creating appropriate visuals and hands-on manipulatives, developing oral presentation skills, giving and receiving feedback, and simulating the real world environment in which most communication occurs. This is a 7-week course and is not open to undergraduates.

EN.663.644. Writing for Clarity. 1.5 Credits.
This half-semester module helps students learn how to communicate more effectively about their own research to a wide variety of audiences. Using a journal article, dissertation chapter, or other technical summary as a basis, students learn how to revise their work to increase clarity, cogency, concision, flow, storytelling, and audience-sensitivity. This course is open to students in any discipline.

EN.663.645. Improving Presentation Skills for Graduate Students. 1.5 Credits.
This course is designed to help scientists and engineers improve their oral presentation skills in a practice-intensive environment. Students will learn how to hone their message, to craft presentations that address both technical and non-technical audiences, and create clear, compelling PowerPoint presentations. All presentations will be recorded for self-evaluation, and students will receive extensive instructor and peer feedback. This is a half-semester course and is not open to undergraduates.

EN.663.652. Emotional and Cultural Competency. 1.5 Credits.
We live in increasingly diverse society and an increasingly connected world. Times require new skills and awareness; “smarts” as defined by IQ is no longer sufficient for success. Instead, an understanding of other cultures, a willingness to explore the positions of various stakeholders in situations, the capacity and willingness to exercise empathy, and the ability to identify and work with the feelings of self and others are keys to successful participation in the workforce. This Module addresses these skills in theoretical and practical ways so as to expand the awareness and capacities of participants.

EN.663.653. Innovation and Design I. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.

EN.663.657. Innovation and Design II. 3 Credits.
This two-semester course in innovation and entrepreneurship is designed to give students the requisite skills to generate and screen ideas for new venture creation and then prepare the business plan for an innovative technology of their own design. The curriculum will focus on the ability of students to identify market needs, validate those needs, develop appropriate solutions, and construct the business case. Students will form multi-disciplinary teams to explore specific market spaces, usually provided by outside sponsors. The first semester will focus on identifying problems worth solving. During the second semester, teams will 1) select one problem, 2) design and build the solution to that problem, 3) identify the inherent commercial opportunities, and 4) formulate the business plan.
EN.663.653

EN.663.660. Managing People and Resolving Conflicts. 1.5 Credits.
Have you ever had to deal with a difficult person at work or in the lab? Have you been a member of a team on which team dysfunction was so bad that it makes television sitcoms look normal? Why are some companies much more productive and pleasant to work with than others? Do you understand techniques of persuasion and how to participate effectively in negotiations? These topics are among the ideas we develop and practice in this class, using a combination of seminar style reading and discussion, lecture and in-class activity. Graduate students only. Students may take EN.663.660 OR EN.663.663, but not both.

EN.663.665. Key Skills for Successful Product Managers. 1.5 Credits.
All great product managers utilize a handful of foundational knowledge, skills, and capabilities that anchor them as they navigate the complex world of product management. In this course, we will cover these timeless but critical skills from a uniquely product management perspective. Customer Intelligence - From customer characteristics and market conditions to motivations and unmet needs, product managers are constantly learning about their customers. Relationship Building - Building successful relationships in product management is anchored in trust and confidence among the stakeholders and partners within their product ecosystem. Communication skills - Great product managers are masters at communicating the "why" behind their product and adapting their messages to various audiences. Good Judgment and Decision-Making - Successful decision-making comes from knowing how to avoid biases, find the important insights in a sea of data, and ultimately make decisions based on their best judgment. Fanatical Prioritization - Great product managers are fanatical about doing the things that will be most impactful for the product, the business, and the customer.

EN.663.666. Managing Personal Finances. 1.5 Credits.
The class in Managing Personal Finance is designed to familiarize the student with the basic concepts and quantitative techniques of personal financial planning and financial literacy. The course begins with a discussion of budgeting and the time value of money and moves on to the basic principles of financial planning in the areas of taxation, consumer credit, housing decisions, insurance, investing fundamentals and retirement planning.Graduate students only. No undergrads.

EN.663.667. Decision Analytics Fundamentals. 1.5 Credits.
This course engages students to make better decisions using data and analytical models. Content focuses on analytical reasoning, logic, preparing/managing data bases, designing quantitative models and visualizing data. Three types of quantitative models - clustering, linear regression, and logistic regression - are emphasized. Students are required to use Microsoft Excel (the course does not teach Excel, so prior experience with Excel will be helpful). Throughout the course each concept is taught using case studies.

EN.663.668. Brewing Science. 1.5 Credits.
Micro-breweries, the fastest growing segment of the manufacturing sector in the US, is an enterprise opportunity for students who are fascinated by fermentation. The class addresses the fundamentals of the science and the manufacturing processes together with enterprise considerations of identifying customers, locations and finances.

EN.663.669. Foundations for Sustainable Enterprise. 1.5 Credits.
All organizations need a story - one that informs every single business decision. Get the story right and you have a permanent resource for inspiration and also, grounding for when challenges arise. Lasting businesses do not dream up their narratives for PR purposes. Their stories are smart. They are their organizations' DNA. Taking into account emerging neuroscience around persuasion, real-life corporate case studies and current affairs, this class addresses the critical art of storytelling in building and growing a business.

EN.663.670. Project Management. 1.5 Credits.
Projects are temporary activities devised to achieve very specific goals in a designated timeframe for a specified amount of resources. Often they involve disparate activities, frequently separated by distance and sometimes involving different staff and materials. For the project to successfully meet its objectives, all these items must be planned, coordinated and orchestrated. This module explores the processes and tools available to those who must manage projects to optimize outcomes within the primary constraints of time, quality, scope and budget. Class time involves presentations, examples and discussion.

EN.663.671. Leading Change. 1.5 Credits.
Change happens, like it or not!! It is necessary for progress and the result of innovation, yet change makes individuals and organizations so uncomfortable that most people and groups within organizations vigorously resist change. So the questions become how to cause, how to embrace and how to lead constructive change in our selves, our organizations and our communities – in ways that colleagues and would-be colleagues support and contribute toward success. The primary format for learning in this course is seminar style with reading, researching and sharing of information as well as structured, experiential activities designed to build skills through practice and interpersonal exchange. Class time is devoted to discussion, observation, feedback, additional exercises and presentation. Additionally, participants engage in reflection and explanation of their considerations as the course progresses. GRADING: P/F for most students; letter grades for MSEM students. No undergraduates allowed except enrolled MSEM combined bachelor's/master's students.

EN.663.672. Management and Technology Consulting. 1.5 Credits.
Management consulting, an American innovation in organizational development, now has world-wide practice and effects. Almost every business sector— including private, governmental and NGO's— employs consultants. Consultants must be able to effectively frame problems, understand their context, generate solutions, and protect the client and stakeholders, as well as work in a team environment and deliver a quality product. This class addresses the fundamental skills and expectations of working in this profession through a combination of lecture, discussion and exercise.

EN.663.673. Leading Teams in Virtual, International and Local Settings. 1.5 Credits.
Team-based leadership takes place in many different groups. Basic principles related to all contexts will be discussed. The nuances of leading in teams in different environments including face to face, virtual teams such as Skype, Google Chat, etc., and culturally different/global teams will be explored and practiced. The class environment will be discussion, team and practically based. The primary format for learning in this course is seminar style with reading, researching and sharing of information as well as structured, experiential activities designed to build skills through practice and interpersonal exchange. Class time is devoted to discussion, observation, feedback, additional exercises and presentation. Additionally, participants engage in reflection and explanation of their consideration as the course progresses. Further, participants read several texts and articles as well as perform extensive research in preparation for assignments.

EN.663.674. Fundamentals of Management. 3 Credits.
Managers must juggle knowledge of and tasks associated with operations, finance, information technology, strategy, and projects. Much of managerial success, however, depends less on managers' direct input – the sweat of their brows– than on their ability to enlist the active involvement of others: direct reports, other managers, other team members, and those above them on the organizational chart. It is imperative that managers be adept at influencing those over whom they have no formal authority as well as guiding and directing those who report to them. In this course, you will learn and practice the concepts and skills necessary to manage, direct, and guide others as well as content associated with building strategy and structure in organizations.

EN.663.675. Communicating in a Crisis. 1.5 Credits.
A crisis is a major occurrence with potentially negative consequences. In Chinese, the word "crisis" means "dangerous opportunity," signifying that an individual or an organization can emerge stronger from a crisis – not without damage but stronger – with the right management and communication deployed effectively to the right audiences in the right channel. In this course, we will explore what managing a crisis well actually means. Who do you need to communicate with? What channels are appropriate? What messaging works for different audiences? Using the case method, live simulations, and real-world examples we will distinguish the factors that create opportunities from crises from those that deepen the danger.

EN.663.676. Demand Discovery: Finding and Creating Customer Value. 1.5 Credits.
Do you love your smartphone? You're not alone. Steve Jobs knew how to design products that customers fell in love with. So did Henry Ford. So why is it so hard? This course focuses on real-world methods of discovering and profitably delivering value to customers. At the heart of any successful business is the identification and profitable satisfaction of unique customer needs. And the ongoing process of identifying, developing, and delivering new value propositions is the basis for continued growth. But this formula can be elusive for new ventures and existing businesses alike. The course presents leading edge methods and techniques to identify sources of opportunity, design new value propositions, and develop profitable and scalable business models—all while reducing venture risk. Developed from techniques used by entrepreneurs and innovative product managers, this course teaches key principles of offering development and innovation, through a combination of readings, case studies, and real-world exercises. The course will involve practical projects for students to identify and design offering concepts, as well as to test and price them. It is designed for students interested in business, entrepreneurship, intrapreneurship, product management, technology management, venture capital, and management consulting.

EN.663.677. Global Consulting. 1.5 Credits.
Students partner with research teams at the International Iberian Nanotechnology Laboratory through remote meetings to help transition scientific and engineering concepts from lab to life. Consulting projects cover areas including market and competitor analysis, the identification of consumer locations and demographics, and the development of market entry strategies for innovative products and technologies. Students will learn how to navigate the unique nature of international consulting, paying particular attention to building rapport across cultures and technologies. Deliverables come in the form of proposals, memos, comprehensive reports detailing findings and recommendations, and a slide deck of key findings optimized for remote presentations. Open to juniors and seniors with instructor approval.

EN.663.700. Strategies for Financial Accounting. 1.5 Credits.
Strategies for Financial Accounting is designed for anyone who could be called upon to analyze and/or communicate financial results and/or make effective financial decisions in a for-profit business setting. No prior accounting knowledge or skill is required for successful completion of this course. Because accounting is described as the language of business, this course emphasizes the vocabulary, methods, and processes by which all business transactions are communicated. Generally Accepted Accounting Principles are applied to business transactions and ratio analysis is utilized in the interpretation of financial performance. Priority given to Extended Home2Homewood students; instructor permission only.

EN.663.701. Strategies for Managerial Accounting. 1.5 Credits.
Strategies for Managerial Accounting focuses on communication and decision making within an organization (as opposed to Financial Accounting, which focuses on accounting information for decision-makers external to the firm). This course introduces management accounting concepts and objectives including planning, control, and the analysis of sales, expenses, and profits. Major topics include cost behavior; cost allocation; product costing (including activity-based costing); standard costing and variance analysis; and operational and capital budgeting. Priority given to Extended Home2Homewood students; instructor permission only.

EN.663.702. Leadership Theory and Practice. 1.5 Credits.
This course focuses on learning leadership theories and the ways in which a leader can effectively apply those theories in a variety of settings. Students will be introduced to leadership concepts and objectives including historical context, important case studies analysis as well as the competencies needed to be an exceptional leader. Major topics include self-development, interpersonal development, organizational and group development, and sustainability and transitional development. Priority given to Extended Home2Homewood students; instructor permission only. Online only.

EN.663.704. Communicating Clearly in the Workplace. 1.5 Credits.
This half-semester course focuses on teaching students how to communicate effectively through both written and oral communication modes common in any workplace: emails, memos, proposals, and short presentations. This course must be taken after taking Writing with Clarity. This course is for Extended Home2Homewood students only.Recommended Course Background - Writing with Clarity

EN.663.705. Communicating Effectively as a Leader Capstone. 1.5 Credits.
This half-semester course will be co-taught with Leadership Studies. Students who take this course will build upon and significantly refine the case-based leadership skills they learned in a prior Leadership Studies module. In this course, students will work on a team to research, write, and present a case examining a crisis of leadership from the contemporary world of business. This will happen as a case competition between all teams. This course is for Extended Home2Homewood students only.

EN.663.706. Global Marketing. 1.5 Credits.
Through readings and case analysis, this course will expose students to a range of "uncontrollable" external environmental factors—cultural, competitive, technological, economic, political/legal and geographic—that influence the selection of new markets as well as the "controllable" marketing mix decisions determined by managers to support the launch of products for both consumers and businesses. The culminating group project will allow students to analyze an expansion opportunity and recommend a market entry strategy along with financial projections for a product or service to be launched globally.

EN.670 (Institute for NanoBio Technology)

EN.670.502. INBT Undergraduate Research. 1 - 3 Credits.
Student participation in ongoing research activities. Research is conducted under the supervision of a faculty member and often in conjunction with other members of the research group.
Students must have completed Lab Safety training prior to registering for this class.;You must request Independent Academic Work using the Independent Academic Work form found in Student Self-Service: Registration > Online Forms.

EN.670.609. Communication for Scientists and Engineers. 1 Credit.
Developing communications skills is a vital part of the training process to prepare scientists and engineers for successful careers. The course's goal is to provide participants with fundamental training in science communication, focusing on how to present science to a non-expert audience. Students will reach this objective through reading, writing, and classroom activities. Conciseness and clarity are valued in scientific fields, so an emphasis will be on quality rather than quantity of writing. Topics covered generally include: communicating with your target audience, communicating on the web and social media, the editing process, communication resources, and more.
Area: Writing Intensive

EN.670.643. Nanotechnology for Cancer Research Tutorial. 1 Credit.
Students in the NTCR training grant program study and present topics in nanotechnology applied to biology from the scientific literature. For NTCR Fellows only.

EN.675 (Space Systems Engineering)

EN.675.600. Systems Engineering for Space. 3 Credits.
This course introduces students to the fundamental principles of systems engineering and their particular application to the development of space systems. It describes how the systems engineering viewpoint differs from that of the engineering specialist, as well as the essential role that systems engineering plays across the mission design life cycle. Topics include requirements analysis, trade studies, concept definition, interface definition, system synthesis, and engineering design. Techniques and analysis methods for making supportable quantitative decisions will also be explored, along with risk assessment and mitigation planning. The importance of thorough systems engineering from the initiation of the project through launch and flight operations will be emphasized. This is intended as the first course in the Space Systems Engineering program curriculum so that the student establishes a firm grasp of the fundamentals of systems engineering as applied to space programs. Examples will be presented from real space missions and programs, with assignments, special topics, and a team project focused on typical space systems engineering problems and applied methods of technical problem resolution. Prerequisite(s): Admission into the SSE program, or with approval of the instructor.
Cannot have already completed EN.645.662 Intro to Systems Engineering

EN.675.601. Fundamentals of Engineering Space Systems I. 3 Credits.
The effective development of space systems is predicated on a firm understanding of the foundational technical and systems engineering components necessary to both comprehend the design task and formulate an appropriate solution. For engineers and technical managers seeking to develop this working knowledge and associated skills, this course will provide an overview of the key elements comprising space systems and an analytic methodology for their investigation. With a strong systems engineering context, topics will include fundamentals on astrodynamics, power systems, communications, command and data handling, thermal management, attitude control, mechanical configuration, and structures, as well as techniques and analysis methods for remote sensing applications. In addition, a number of supplemental topics will be included to provide further breadth and exposure. This is the first course of a two-semester sequence that features a combination of instruction from practitioner subject matter experts, and a team design project.
Completion of EN.675.600 Systems Engineering for Space, or with approval of the instructor.

EN.675.602. Fundamentals of Engineering Space Systems II. 3 Credits.
This course will build on the foundational elements introduced in 675.601 Fundamentals of Engineering Space Systems I, expanding on the breadth and depth of prior subject matter treatment, as well as their integrated application. Classes will again feature a combination of instruction from subject matter experts and a team design project.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.621. Space Environment and Effects. 3 Credits.
This course will introduce and explore design and verification methods for the space environment in general and radiation and plasma environments in particular. Intended as a practical complement to 675.751, Space Weather and Space Systems, this course will focus on mission requirements definition, design features, analyses and ground testing, state-of-the-art engineering models / tools, and national / international standards associated with the design and operation of modern high reliability space systems. Design and operational impacts will consider Total Ionizing Dose (TID), Total Non-Ionizing Dose (TNID), Single Event Effects (SEE), spacecraft charging, material outgassing, atomic oxygen, and Micrometeoroids / Orbital Debris (MMOD). All phases of a program lifecycle will be discussed – from environment definition through operational anomalies and anomaly attribution. Lectures, journal reading, and homework assignments will prepare engineers to quantify and assess risk as well as mitigate space environmental effects. A final project will consider a more detailed analysis of a system of interest to the student.
Completion of EN.675.600 Systems Engineering for Space or with approval of the instructor.

EN.675.622. Spacecraft Hardware Design Considerations. 3 Credits.
This course will focus on the engineering of hardware systems that will reliably perform in the harsh environment of space. This course will cover design considerations, terrestrial based manufacturing, storage, launch, and on-orbit performance of successful hardware systems, as well as failure modes and mitigations for the design engineer, systems engineer or aerospace program manager. Design and manufacturing concerns covering electrical, electronic, and electromechanical components including part selection, materials considerations, radiation ratings and test, packaging, and manufacturing will be covered. The course will also cover the unique environments from terrestrial based to exo-atmospheric driving design and handling considerations relative to spacecraft hardware.

EN.675.641. Space Systems Cybersecurity. 3 Credits.
Our space systems are under attack. Cyberattacks are among the most prevalent threats to space assets. They are often stealthy, inexpensive and highly effective at achieving an adversary's goal – be it data corruption, IP theft or physical destruction of the satellite. Given space systems are complex, composing ground stations, communications and satellites the surface area of attack is vast and considering the constrained computing capacity of space systems, many traditional security mechanisms are not applicable. This course provides an introduction to how an adversary would approach attacking a satellite, opportunities for systems engineers to develop cyber-resilient assets and relevant policies and best practices to support space system cybersecurity.
EN.675.600 and EN.675.601, or with approval of the instructor

EN.675.650. Mathematics for Space Systems. 3 Credits.
This course is designed to teach Mathematical Methods commonly employed for engineering Space Systems. The course will provide a solid technical foundation in mathematics so the students can apply this knowledge to this broad field. Topics will include select, applicable methods from vector calculus, linear algebra, differential equations, transform methods, complex variables, probability, statistics, and optimization. Various applications to real problems related to space systems and technical sub-disciplines will be used during the semester. No prior knowledge of advanced mathematics is assumed and important theorems and results from pure and applied mathematics are taught as needed during the course. Examples and relevant applications will be utilized throughout the course to further clarify the mathematical theory. Prerequisite(s): The course requires working knowledge of college calculus and algebra, or approval of the instructor.

EN.675.691. Electro-Optical Space Systems. 3 Credits.
The goal of this course is to engage the student with multiple design studies of subsystems of space-based electro-optic systems. The technical and scientific elements necessary to be successful with these studies will be presented during the lectures. The concepts and technologies behind elements such as photon detectors, imaging elements over many spectral bands, optical elements and systems typically used in space sensors, and active optical sources will be described. These concepts and technologies will be the fundamental elements used to describe the various sensor types and modalities used in space electro-optical systems. Prerequisite(s): An undergraduate or graduate degree in a quantitative discipline (e.g., engineering, computer science, mathematics, physics, or equivalent), or with approval of the instructor.

EN.675.692. Scientific Instruments for Space. 3 Credits.
This course covers the details for the development of scientific space flight instruments, from the conceptual design phase, all the way to delivery to the space vehicle. The course presents the space environments and the considerations in designing space flight instruments. These design considerations include mechanical, structural, thermal and electrical and how to overcome some of the challenges during the different phases of design, assembly and test of the instruments. Students are introduced to programmatic considerations including budgeting, scheduling, and staffing. The course also covers the importance of identifying, understanding and verifying design requirements at different levels of space flight instrument development. A detailed study of the instrument development cycle is covered during the course, with references to instruments launched to space throughout the history of the space-age.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.701. Applications of Space Systems Engineering. 3 Credits.
The ability to effectively apply knowledge and skills to new problems and situations is critical in the development of space systems. Building upon the foundational systems engineering and technical skills developed through prior coursework, this course will introduce further topics related to areas of active exploration and investigation, as well as practical details pertaining to mission formulation and assessment. Classes will be structured to include both information exchange led by subject matter experts from across the community and active group discourse. In addition, a number of topical case studies will be worked by students in both individual and group formats. Students will be asked to explore, in depth, various advanced areas of space systems engineering challenges and share information with each other in online discussions.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, and EN.675.602 Fundamentals of Engineering Space Systems II, or with approval of the instructor.

EN.675.702. Materials for Space Systems. 3 Credits.
Through online lectures and Blackboard mini cohorts, this course illustrates the fundamental applications of materials to spacecraft design for a systems engineering perspective. Topics include the environments of dynamics, vacuum, thermal, reactive chemicals, radiation, and electrostatics relating to material selection; applications in the material classes of metals, ceramics, polymers, and composites to spacecraft design; design considerations from preliminary design through product verification, launch, and mission operations; and considerations for environment impacts, commons issues encountered, and lessons learned. The course is not intended to cover materials analysis that is taught specific to individual engineering domains, rather it instructs the application of the materials to the space environment with specific industry examples.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.710. Small Satellite Development and Experimentation. 3 Credits.

The capstone course in the Space Systems Engineering Program will introduce practical methods and tools used for evaluating the design and implementation of space systems—with a particular focus on small satellites and CubeSats. This will be principally achieved through a significant experimentation laboratory component intended to reinforce analytical experience with empirical exposure and insight. The laboratory will build on prior foundational understanding of spacecraft subsystem design and performance, through a structured series of experiments and investigations to be conducted in small student teams. It will utilize tabletop satellite simulator kits that are especially designed for hands-on educational purposes, while drawing heavily on the analysis methods and tools developed in the Fundamentals of Engineering Space Systems I/II sequence. All work is aimed at preparing for and executing a single long-residency-weekend exercise, nominally held the 10th week of the semester at the Johns Hopkins University Applied Physics Laboratory. In lieu of meeting during normal class time during the 10th week, the lab will meet the Friday, Saturday, and Sunday immediately following the normal class date. The lab component will have a mandatory set of core hours during a time period running from Friday at 5 p.m. through Sunday at 12 p.m.; students are responsible for their own travel and accommodations, as required. An optional tour of APL space facilities is planned for 4 p.m. on Friday. There will be no further classes following the residency weekend, with only final laboratory deliverables due per provided instructions.

Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, and EN.675.602 Fundamentals of Engineering Space Systems II, or with approval of the instructor.

EN.675.711. Ground System Engineering and Mission Operations. 3 Credits.

This course will focus on the critical functions performed by ground systems and mission operations throughout the space systems life-cycle and their integrated application. Course topics will include planning and sequencing, uplink and control, testing, real-time operations, communications, data management, data analysis, and assessment. Students will learn about end-to-end best practices that pertain to most missions and how ground systems and mission operations concepts are tailored across a diversity of missions. Examples will be presented from real space missions and programs, with assignments, special topics, and a team project focused on typical ground system engineering problems, mission operations challenges, and applied methods of technical problem resolution.

Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.712. Space Mission Formulation. 3 Credits.

This course covers the creative and generative side of space mission engineering. Highly successful space science and exploration missions are the result of close collaboration between scientists who define the highest-level goals and the engineers who provide the means to make the measurements necessary to achieve those goals. In addition, mission formulation teams must understand the external strategic environment that supports a mission, specifically the government sponsors, their funding capabilities, how their priorities get set, and the cycles they go through. This course will help the student develop an understanding of that external environment, the process of collaboration between the scientists and the engineers and their sponsors, and how to frame mission goals and requirements in terms that lead to mission success. The instructors will provide insight into the formulation of scientific investigations, the process of crafting a compelling and accurate narrative for a mission proposal. Topics also include: derivation of mission requirements, launch vehicle capabilities and selection; mission architecture elements; and project flow from pre-proposal through mission confirmation.

Completion of 675.600 Systems Engineering for Space and 675.601 Fundamentals of Engineering Space System, or with approval of the instructor.

EN.675.713. Fault Management and Autonomy: Improving Spacecraft Survivability. 3 Credits.

This course introduces students to the fundamental principles of fault management engineering as it pertains to space systems. It describes how the fault management engineering viewpoint differs from that of systems engineers and engineering specialists, as well as the role that fault management plays throughout the mission design life cycle. Fault management is a systems engineering function that defines the functional requirements distributed throughout the spacecraft (hardware, software, and autonomy) and ground/mission operations that enable the detection, isolation, and recovery from events that upset nominal operations. Students will learn about the principles of fault management architecture (i.e., driving requirements, redundancy concept, safing and modes concept, ground intervention concept, and critical sequences) and how those principles inform the fault management design, the analytical techniques used for fault analysis, trade studies, and requirements allocation, and the role of the fault management engineer from the initiation of the project through design, integration and test, launch, and flight operation. Examples will be presented from real space missions and programs to emphasize the different implementations of fault management systems given the technical, cost, and schedule constraints.

EN.675.600 Systems Engineering for Space AND EN.675.601 Fundamentals of Engineering Space Systems I or with approval of the instructor.

EN.675.723. Ground System Engineering. 3 Credits.
This course will focus on the critical functions performed by ground systems throughout the space systems life-cycle. Course topics will include planning and sequencing, uplink and control, testing, communications, data management, data analysis, assessment, implementation and deployment of ground systems. Students will learn about end-to-end best practices that pertain to most missions and how ground systems concepts are tailored across a diversity of missions. Examples will be from real space missions and programs, with assignments, immersive hands-on laboratory exercises, special topics, and a team project focused on typical ground system engineering problems and applied methods of technical problem resolution. This course offers a more focused, in-depth exploration of ground systems design and implementation than EN.675.711 Ground System Engineering and Mission Operations. Students will only receive credit towards graduation from one of these 2 courses, EN.675.723 or EN.675.711, not both.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I, familiarity with software engineering principles and writing software, or with approval of the Instructor.

EN.675.731. Spacecraft Propulsion Systems. 3 Credits.
The intent of this class is to teach the basics of propulsion such that you will be able to make informed decisions about which sort of system would be best for a particular application. To do this, the class starts with a basic primer on the physics of propulsion and then covers key elements of the various types of propulsion systems that are typically used on spacecraft, including chemical and electric systems, and also some types of system not typically used now, but that might be available in the future (e.g., nuclear propulsion, matter/antimatter propulsion). In the class, you are introduced to how a propulsion subsystem is used and how it interacts with the rest of the spacecraft, so it can be seen from a system perspective and not just from the subsystem view. Key pros and cons of each type of system presented are discussed, as well as key constraints and failure modes. Subsystem components and performance characteristics are introduced and then used in examples from actual spacecraft to explain why these systems were selected for flight. Then, you are shown how to specify a propulsion subsystem and trade various subsystem types against each other, how to size them, how to integrate and test them, and ultimately how to fly them.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.732. Advanced Topics in Aerospace Hardware. 3 Credits.
This course focuses on spacecraft hardware topics to include current and emerging technologies including hardware in system configurations such as constellations and for sensing and communication applications. The course is grounded in a hardware and software design understanding of materials and operations in the space environment (design rules, material and component considerations, safe life versus fail safe designs, environmental considerations, among other hardware guidelines). Specific topics in hardware addressed in these studies include Instruments and Detectors (Optical, Radio Frequency, Imagers…), Low Earth Orbit Commercial Constellations and Swarms, Geostationary (GEO) and GEO Transfer Comm and Remote Sensing, Flagship Missions, Cislunar, In Situ Resource Utilization, Landers and Samplers, Subsystem specifics, Hardware, Firmware and Software Interfaces and Launch vehicles.
Completion of?EN.675.600?Systems Engineering for Space and? EN.675.601?Fundamentals of Engineering Space Systems I, EN.675.622 Spacecraft Hardware Design Considerations or with approval of the instructor.

EN.675.740. Assuring Success of Aerospace Programs. 3 Credits.
Technical managers, systems engineers, lead engineers, and mission assurance professionals will benefit from this course, which focuses on the leadership of system safety and mission assurance activities throughout the life cycle of a project to achieve mission success. This advanced course provides crucial lessons learned and proven best practices that technical managers need to know to be successful. The integrated application of mission assurance and systems engineering principles and techniques is presented in the context of aerospace programs and is also applicable to other advanced technology research and development programs. Students discuss critical risk-based decision making required from system concept definition and degree auditing through design, procurement, manufacturing, integration and test, launch, and mission operations. Experiences shared by senior aerospace leaders and extensive case studies of actual mishaps explore quality management topics relevant to aircraft, missiles, launch vehicles, satellites, and space vehicles. The course addresses contemporary leadership themes, government policies, and aerospace industry trends in mission assurance requirements, organizational structure, knowledge sharing and communication, independent review, audit, and assessment. Mission assurance disciplines covered include risk management, system safety, reliability engineering, software assurance, supply chain management, parts and materials, configuration management, requirements verification and validation, non-conformance, and anomaly tracking and trending.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.745. Spacecraft Communications Systems. 3 Credits.

EN.675.751. Space Weather and Space Systems. 3 Credits.
This course will explore the space environment in the context of its impact on space system operations. Topics include the impacts of ionospheric variability on HF propagation, satellite communications, and GPS; impacts of energetic charged particles on spacecraft; impacts of auroral precipitation on radar and communication systems; and impacts of varying geomagnetic activity on power grids and space situational awareness. Lectures and homework assignments will prepare engineers to quantify and mitigate space weather impacts, and a final project will consist of a detailed analysis on a system of interest to the student.
Prerequisite(s): An undergraduate or graduate degree in a quantitative discipline (e.g., engineering, computer science, mathematics, physics, or equivalent), or with approval of the instructor.

EN.675.752. Attitude Determination and Control of Space Systems. 3 Credits.
The Attitude Determination and Control Subsystem, or ADCS, is intimately connected with all the other spacecraft subsystems, and will be studied in the context of the systems engineering of the whole spacecraft and its mission. Students will examine the requirements imposed on the ADCS, and will explore how to meet those requirements. To this end, it starts with a student's understanding of rigid-body dynamics as it relates to spacecraft dynamics and will introduce common and classical approaches to problems encountered in the design of this critical spacecraft subsystem. The course will also include a team design project involving an ADCS for a small spacecraft.
Completion of EN.675.600 Systems Engineering for Space, EN.675.601 Fundamentals of Engineering Space Systems I and EN.675.650 Mathematics for Space or with approval of the instructor.

EN.675.753. Spacecraft Avionics Systems. 3 Credits.
This survey course will focus on the management, engineering development and operation of the spacecraft Avionics system consisting of hardware topics covering Spacecraft Processing; Command Data Handling and Command Execution; Telemetry Acquisition, Conditioning and Conversion and Telemetry Data Handling; Bulk data storage; Fault Management Support; and Timekeeping Support. The course is grounded in computer and data architecture fundamentals with focus on key electronics such as data interfaces, spacecraft processors, volatile and non-volatile memories, field-programmable gate arrays (FPGA), and analog sensors and circuits. Spacecraft Avionics systems topics will be applied through reference design scenarios to illustrate requirements/implementation trades bound by the constraints of the space environment and spacecraft data resource limitations. Topics such as hardware development, integration and test and inflight support will be used to illustrate the difficulties inherent to the spacecraft's Avionics system.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.754. Flight Software for Space Systems. 3 Credits.
This survey course reviews the architectures, designs, and implementations of spacecraft flight software systems. The course provides an overview of typical command and data handling software functions and the open-source tools, frameworks, and applications that can implement them. A semester-long programming assignment is provided to build a working flight software system. Special topics include application to resource-constrained Internet-of-Things (IoT) devices, spacecraft security, and space-based networking. Flight software encompasses the complete set of computer instructions running on every processor on a spacecraft.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, experience programming in C, or with approval of the instructor.

EN.675.756. Antenna Design for Space Systems. 3 Credits.
This course presents an engineering approach to the design of antennas for space systems. Students will examine antennas for both large and small space based platforms in earth orbit and beyond. Antenna design is presented in the context of the space environment with particular attention to the flight design and testing cycle, thermal and mechanical considerations, space compatible materials, and high power operation. A primary focus of the course will be single, dual and shaped reflector designs including feed network topologies. Several horn antenna designs including corrugated and multimode horns will be covered as well as feed network components. A variety of other antennas including helices, patches, and arrays will be discussed for applications including: Global Navigation Satellite System (GNSS); Tracking, Telemetry and Command (TT&C); isoflux; smallsat and cubesat antennas. Prerequisite(s): An undergraduate- or graduate-level introductory antenna systems course, or with approval of the instructor. Course Note(s): This course is cross-listed with 525.656 Antenna Design for Space Systems. SSE students can only register for 675.756.

EN.675.761. Reliability Engineering and Analysis for Space Missions. 3 Credits.
This course covers the principal methods of reliability analysis as it pertains to space systems. These seek to help development teams to anticipate and find design and operational issues. Basic analytical techniques covered include fault tree and reliability block diagrams; Failure Mode and Effects Analysis (FMEA); event tree construction and evaluation; and reliability data collection and analysis. More advanced techniques of risk and reliability modeling of systems include Bayesian methods and applications, estimation of rare event frequencies, uncertainty analysis and propagation methods. These methods and techniques are integrated into quantitative assessments to address hardware, software, and human reliabilities, as well as their dependencies.
Completion of EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.768. Spacecraft Integration and Test. 3 Credits.
This course introduces students to the fundamental principles of developing Integration & Test (I&T) programs for space systems. Topics covered will provide a detailed understanding with practical applications of all phases of Spacecraft I&T starting with the design input/planning phase, staffing/budget phase, subsystem and instrument integration phase, environmental testing phase, and finally the launch campaign phase in the field. Classes will be structured to provide students information exchange sessions with subject matter experts and actual practitioners within the I&T community. Students will learn about all of the Electrical and Mechanical ground support equipment needed to build a spacecraft and the importance of the paperwork and processes used throughout all phases to manage spacecraft systems I&T.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor.

EN.675.771. Space Mission Design and Navigation. 3 Credits.
Critical to the development of space missions is the careful analysis and design of the desired path of the space vehicle (mission design) and the determination of the space vehicle's actual state vector (navigation). This course presents these two topics in an integrated manner, intended to provide space engineering professionals with a technical understanding of these complex subjects. Mission Design topics include kinematics, Kepler's Laws, Newton's Law of gravitation, modeling of several fidelity levels of spacecraft trajectory dynamics, and optimization of objective functions and satisfaction of constraints. Navigation topics include dynamics and measurement model formulations, standard estimation algorithms such as the Kalman filter and batch estimators, and performance analysis. This course will focus on the theory from a mathematical derivation perspective, example problems, and practical implementation considerations. This is an algorithm intensive course and students are expected to be comfortable with the following: MATLAB programming (or equivalent), Linear Algebra, Linear Systems, Differential Equations, basic Probability concepts, and Calculus.
Completion of EN.675.600 Systems Engineering for Space; EN.675.601 Fundamentals of Engineering Space Systems I and EN.675.650 Mathematics for Space or with approval of the instructor.

EN.675.772. Verification and Validation of Space Systems. 3 Credits.
A survey course that reviews the specification, verification and validation of spacecraft flight system requirements. The course provides an overview of the requirements gathering process, subsystem allocation, verification methods, typical spacecraft system tests and test events. An overview of the construction of spacecraft comprehensive performance tests and mission scenarios will be part of this course, as well as the development of a requirements verification matrix.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I, or with approval of the instructor

EN.675.781. Physics of Space Security. 3 Credits.
The course will analyze the physics of both the offensive and defensive aspects of space control and determine the advantages and disadvantages based on metrics of performance and cost. The course will detail various types of satellite orbits and their application, spacecraft sensors, ground-based sensors and weapons systems available. The course will look at ground-based jamming in technical detail to include link calculations. Next, the course will address laser weapons and high-power microwave devices that could disable or destroy a spacecraft or sensors. The student will look at the physics of both ground-based and space-based attack on spacecraft to include a non-targeted pellet attack. A detailed analysis of the March 27, 2019 Indian ASAT attack (code name Mission Shakti) on the Microsat-R spacecraft to include debris modeling will be undertaken.
EN.675.600 Systems Engineering for Space and EN.675.601 Fundamentals of Engineering Space Systems I

EN.675.800. Directed Studies in Space Systems Engineering. 3 Credits.
In this course, qualified students are permitted to investigate possible research fields or to pursue problems of interest through reading or non-laboratory study under the direction of faculty members. Prerequisite(s): The Independent Study/Project Form (ep.jhu. edu/student-forms) must be completed and approved prior to registration. Course Note(s): This course is open only to candidates in the Master of Science in the Space Systems Engineering program.

EN.685 (Data Science)

EN.685.621. Algorithms for Data Science. 3 Credits.
This course provides a survey of computer algorithms, examines fundamental techniques in algorithm design and analysis, and develops problem-solving skills required in all programs of study involving data science. Topics include advanced data structures for data science (tree structures, disjoint set data structures), algorithm analysis and computational complexity (recurrence relations, big-O notation, introduction to complexity classes (P, NP and NP-completeness)), data transformations (FFTs, principal component analysis), design paradigms (divide and conquer, greedy heuristic, dynamic programming), and graph algorithms (depth-first and breadth-first search, ordered and unordered trees). Advanced topics are selected from among the following: approximation algorithms, computational geometry, data preprocessing methods, data analysis, linear programming, multi-threaded algorithms, matrix operations, and statistical learning methods. The course will draw on applications from Data Science. Course Prerequisite(s): EN.605.201 Introduction to Programming Using Java or equivalent. EN.605.203 Discrete Mathematics or equivalent is recommended. Course Note(s): This required foundation course must be taken before other 605.xxx courses in the degree. This course does not satisfy the foundation course requirement for Bioinformatics, Computer Science, or Cybersecurity. Students can only earn credit for one of EN.605.620, EN.605.621, or EN.685.621.

EN.685.648. Data Science. 3 Credits.
This course will cover the core concepts and skills in the interdisciplinary field of data science. These include problem identification and communication, probability, statistical inference, visualization, extract/transform/load (ETL), exploratory data analysis (EDA), linear and logistic regression, model evaluation and various machine learning algorithms such as random forests, k-means clustering, and association rules. The course recognizes that although data science uses machine learning techniques, it is not synonymous with machine learning. The course emphasizes an understanding of both data (through the use of systems theory, probability, and simulation) and algorithms (through the use of synthetic and real data sets). The guiding principles throughout are communication and reproducibility. The course is geared towards giving students direct experience in solving the programming and analytical challenges associated with data science. The assignments weight conceptual (assessments) and practical (labs, problem sets) understanding equally. Prerequisite(s): A working knowledge of Python scripting and SQL is assumed as all assignments are completed in Python.

EN.685.652. Data Engineering Principles and Practice. 3 Credits.
This course will cover the core concepts and skills for data engineering with a focus on practical use cases. Data Engineering focuses on the ingestion, storage, transformation, and access of data in ways that enable data science applications to use and derive insight from data. Some of the topics that this course will touch on are dimensional modeling of data, non-relational data, data lakes, modern data warehouses, as well as different data modalities. The course will also cover some of the core supporting technologies in the data engineering world: data pipelines, containerization, schedulers, cloud technologies, and modern data engineering tools/stacks.The course is geared towards giving students direct experience in building solutions to problems associated with data engineering.The assignments will focus on the practical application of principles (labs, projects, assignments) while underscoring the understanding of the fundamental principles (assessments).Prerequisite(s): A working knowledge of Python scripting.

EN.685.795. Capstone Project in Data Science. 3 Credits.
This course permits graduate students in data science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven data science graduate courses including two courses numbered 605.7xx or 625.7xx or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): Students may not receive credit for both EN.685.802 Independent Study in Data Science II and EN.685.795.

EN.685.801. Independent Study in Data Science I. 3 Credits.
This course permits graduate students in data science to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper suitable to be submitted for publication. Prerequisite(s): Seven data science graduate courses including two courses numbered 605.7xx or 625.7xx or admission to the post-master's certificate program. Students must also have permission of a faculty mentor, the student's academic advisor, and the program chair.

EN.685.802. Independent Study in Data Science II. 3 Credits.
Students wishing to take a second independent study in data science should sign up for this course. Prerequisite(s): EN.605.801 Independent Study in Data Science I and permission of a faculty mentor, the student's academic advisor, and the program chair. Course Note(s): Students may not receive credit for both EN.685.795 Capstone Project in Data Science and EN.685.802.

EN.695 (Cybersecurity)

Courses

EN.695.601. Foundations of Information Assurance. 3 Credits.
This course surveys the broad fields of enterprise security and privacy, concentrating on the nature of enterprise security requirements by identifying threats to enterprise information technology (IT) systems, access control and open systems, and system and product evaluation criteria. Risk management and policy considerations are examined with respect to the technical nature of enterprise security as represented by government guidance and regulations to support information confidentiality, integrity and availability. The course develops the student's ability to assess enterprise security risk and to formulate technical recommendations in the areas of hardware and software. Aspects of security-related topics to be discussed include network security, cryptography, IT technology issues, and database security. The course addresses evolving Internet, Intranet, and Extranet security issues that affect enterprise security. Additional topics include access control (hardware and software), communications security, and the proper use of system software (operating system and utilities). The course addresses the social and legal problems of individual privacy in an information processing environment, as well as the computer "crime" potential of such systems. The class examines several data encryption algorithms. Course Note(s): This course can be taken before or after 605.621 Foundations of Algorithms. It must be taken before other courses in the degree.

EN.695.611. Embedded Computer Systems-Vulnerabilities, Intrusions, and Protection Mechanisms. 3 Credits.
While most of the world is preoccupied with high-profile network-based computer intrusions, this online course examines the potential for computer crime and the protection mechanisms employed in conjunction with the embedded computers that can be found within non-networked products (e.g., vending machines, automotive onboard computers, etc.). This course provides a basic understanding of embedded computer systems: differences with respect to network-based computers, programmability, exploitation methods, and current intrusion protection techniques, along with material relating to computer hacking and vulnerability assessment. The course materials consist of a set of eight study modules and five casestudy experiments (to be completed at a rate of one per week) and are augmented by online discussion forums moderated by the instructor. This course also includes online discussion forums that support greater depth of understanding of the materials presented within the study modules.
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance, a basic understanding and working knowledge of computer systems, and access to Intel-based PC hosting a Microsoft Windows environment.

EN.695.612. Operating Systems Security. 3 Credits.
Have you ever wondered how hardware and software faults could affect the security and privacy of a computing environment? Modern general-purpose operating systems have become the lifeline for business and personal use.Throughout the course, students will examine and analyze the modern security mechanisms (e.g. MACs, ASLR, SMEP/SMAP, CFI, PAC, TPMs, and more) and learn the strengths and weaknesses of each approach, ensuring a solid defense against APTs and rootkits. Examining both software and hardware implementations, students will compare how effective these security components are amongst the major OS vendors. As virtualization has become ubiquitous in computing, students will also utilize KVM to build customized virtual machine solutions. Finally, students will examine how these mechanisms compare and are applied to modern mobile operating systems environments.Prerequisite(s): Familiarity with operating system concepts.

EN.695.614. Security Engineering. 3 Credits.
This course covers cybersecurity systems engineering principles of design. Students will learn the foundational and timeless principles of cybersecurity design and engineering. They will learn why theories of security come from theories of insecurity, the important role of failure and reliability in security, the fundamentals of cybersecurity risk assessment, the building blocks of cybersecurity, intrusion detection design, and advanced topics like cybersecurity situational understanding and command and control. The course develops the student's ability to understand the nature and source of risk to a system, prioritize those risks, and then develop a security architecture that addresses those risks in a holistic manner, effectively employing the building blocks of cybersecurity systems— prevention, detection, reaction, and attack-tolerance. The student will learn to think like a cyber-attacker so that they can better design and operate cybersecurity systems. Students will attain the skill of systematically approaching cybersecurity from the top down and the bottom up and have confidence that their system designs will be effective at addressing the full spectrum of the cyber-attack space. The course also addresses how the cybersecurity attack and defense landscape will evolve so that the student is not simply ready to address today's problems, but can quickly adapt and prepare for tomorrow's. The course is relevant at any stage in a student's curriculum: whether at the beginning to enable the student to understand the big picture before diving into the details, at the end as a capstone, or in the middle to integrate the skills learned to date.
EN.695.601 Foundations of Information Assurance.

EN.695.615. Cyber Physical Systems Security. 3 Credits.
The age of Cyber-Physical Systems (CPS) has officially begun. Not long ago, these systems were separated into distinct domains, cyber and physical. Today, the rigid dichotomy between domains no longer exists. Cars have programmable interfaces, Unmanned Aerial Vehicles (UAVs) roam the skies, and critical infrastructure and medical devices are now fully reliant on computer control. With the increased use of CPS and the parallel rise in cyber-attack capabilities, it is imperative that new methods for securing these systems be developed. This course will investigate key concepts behind CPS including: control systems, protocol analysis, behavioral modeling, and Intrusion Detection System (IDS) development. The course will be comprised of theory, computation, and projects to better enhance student learning and engagement . The course will begin with the mathematics of continuous and digital control systems and then shift the focus to the complex world of CPS, where both a general overview for the different domains (Industrial Control, Transportation, Medical Devices, etc.) and more detailed case studies will be provided . Students will complete a number of projects, both exploiting security vulnerabilities and developing security solutions for UAVs and industrial controllers. Several advanced topics will be introduced including behavioral analysis and resilient CPS.Course Notes: There are no prerequisite courses; however, students will encounter many concepts and technologies in a short period of time. Student should have a basic understanding of python programming, networking, matrices, and Windows and Linux operating systems.

EN.695.621. Public Key Infrastructure and Managing E-Security. 3 Credits.
This course describes public key technology and related security management issues in the context of the Secure Cyberspace Grand Challenge of the National Academy of Engineering. Course materials explain Public Key Infrastructure (PKI) components and how the various components support e-business and strong security services. The course includes the basics of public key technology; the role of digital certificates; a case study that emphasizes the content and importance of certificate policy and certification practices; identification challenges and the current status of the National Strategy for Trusted Identities in Cyberspace; and essential aspects of the key management lifecycle processes that incorporate the most recent research papers of the National Institute of Standards and Technology. Students will examine PKI capabilities and digital signatures in the context of the business environment, including applicable laws and regulations. The course also presents the essential elements for PKI implementation, including planning, the state of standards, and interoperability challenges. The course also provides an opportunity for students to tailor the course to meet specific cybersecurity interests with regard to PKI and participate in discussions with their peers on contemporary cybersecurity topics.

EN.695.622. Web Security. 3 Credits.
Information technology security is a broad field. This course focuses on the foundational technologies that build the Web-based Internet (Web) as we know it today. The goal of this course is to guide the learner to adopt a professional security mindset by applying the techniques of threat modeling, risk assessment, and apply the foundational security principles from the two "triad" models: "confidentiality, integrity, and availability" (CIA) and "authentication, authorization, and accounting" (AAA). The self-motivated learner will investigate vulnerabilities, threats, and mitigations with the objective of protecting the data, applications, frameworks, and the supporting complex technology stacks. Security at this level cannot be achieved by technology alone, the course will provide an opportunity to exercise a smart combination of methodologies and techniques that can build confidence and rapport to champion web security within their IT community. Applicable cryptology, digital certificates, and Public Key Infrastructure will be reviewed. Each module will involve hands-on labs that implement local virtual machines, containers, cloud computing environments, and an operative blockchain enabling the learner to probe more deeply into the cybersecurity challenge of each technology solution. The assignments will involve programming and system configuration thus a novice-level exposure of Python, PHP, JavaScript, Linux Commands, basic Internet architecture and common protocols is recommended. Prerequisite(s): 605.202 Data Structures

EN.695.623. Information Security and Privacy. 3 Credits.
As the world becomes more connected and reliant on digital communications, best security practices are required to maintain the privacy of individual and enterprise systems. This course will focus mainly on network perimeter protection, host-level protection, authentication technologies, intellectual property protection, formal analysis techniques, intrusion detection and other current advanced topics. Emphasis in this course is on understanding how security issues impact real-world systems, while maintaining an appreciation for grounding the work in fundamental science. The course will consist of group exercises and interactive discussions. There will be programming assignments and a course project. Students will also be expected to read assigned research papers and lead a presentation and discussion on at least one research paper.

EN.695.634. Intelligent Vehicles: Cybersecurity for Connected and Autonomous Vehicles. 3 Credits.
New technologies within the automotive industry are fusing the physical, digital, and biological worlds to create intelligent vehicles that are designed to enhance occupants' experiences and improve driver safety and efficiency and improve pedestrian safety. The success of these commercial and industrial efforts rest in the principles of assured autonomy. These intelligent technologies exist in a connected ecosystem that includes the Transportation, Energy, and Communication sectors. Examples of the interconnectivity capabilities include: Autonomous Vehicle - transducer, interface, and supporting capabilities; Electric Vehicles - grid connected vehicle charging infrastructure; and Vehicle-to-Vehicle and Vehicle-to-Everything Communication Technologies. This course helps students understand the significance of assured autonomy safety and functional correctness of intelligent vehicles throughout the technology's lifecycle. This course follows a seminar format where students are expected to lead class discussions and write a final report as part of a course project. The course project will teach experimental design and the scientific method. The outcome of the project will be a proposal that, if executed, could result in a workshop-quality publication. Execution of the proposed experiment is encouraged but not required for the class. Proposals will be graded by both the instructor and by classmates. This course is oriented around helping students learn how to make a compelling research contribution to the area of intelligent vehicles and assured autonomy.Students will also learn to critique scientific papers in this research area by reading articles from the literature and analyzing at least one paper in order to lead a class discussion.Prerequisites: This course is suitable for graduate students with little prior experience in the area.

EN.695.637. Introduction to Assured AI and Autonomy. 3 Credits.
In order to drive a future where artificial intelligence (AI) enabled autonomous systems are trustworthy contributors to society, these capabilities must be designed and verified for safe and reliable operation and they must be secure and resilient to adversarial attacks. Further, these AI enabled autonomous systems must be predictable, explainable and fair while seamlessly integrated into complex ecosystems alongside humans and technology where the dynamics of human-machine teaming are considered in the design of the intelligent system to enable assured decision-making. In this course, students are first introduced to the field of AI, covering fundamental concepts, theory, and solution techniques for intelligent agents to perceive, reason, plan, learn, infer, decide and act over time within an environment often under conditions of uncertainty. Subsequently, students will be introduced to the assurance of AI enabled autonomous systems, including the areas of AI and autonomy security, resilience, robustness, fairness, bias, explainability, safety, reliability and ethics. This course concludes by introducing the concept of human-machine teaming. Students develop a contextual understanding of the fundamental concepts, theory, problem domains, applications, methods, tools, and modeling approaches for assuring AI enabled autonomous systems. Students will implement the latest state-of-the-art algorithms, as well as discuss emerging research findings in AI assurance.

EN.695.641. Cryptology. 3 Credits.
This course provides an introduction to the principles and practice of contemporary cryptography. It begins with a brief survey of classical cryptographic techniques that influenced the modern development of the subject. The course then focuses on more contemporary work: symmetric block ciphers and the Advanced Encryption Standard, public key cryptosystems, digital signatures, authentication protocols, and cryptographic hash functions. The course also provides an overview of quantum resistant cryptography and, as time permits, other recent developments such as homomorphic encryption. Complexity theory and computational number theory provide the foundation for much of the contemporary work in cryptology; pertinent ideas from complexity and number theory are introduced, as needed, throughout the course.
EN.695.601 AND EN.605.621OR EN.605.601[C] AND EN.605.611 AND EN.605.621

EN.695.642. Intrusion Detection. 3 Credits.
This course explores the use of network and host based intrusion detection systems (IDS) as part of an organization's overall security posture. A variety of approaches, models, analyzes, and algorithms along with the practical concerns of deploying IDS in an enterprise environment will be discussed. Topics include the products, architectures, and components of IDS, host and network based IDS, network analysis, IDS technologies, Machine Learning, Linux Firewall IPTables, and Tor Networking. The use of ROC (receiver operating characteristic/curves) to discuss false positives, false negatives, precision recall graphs, and missed detection trade - offs as well as discussions of current research topics will provide a comprehensive understanding of when and how IDS can complement host and network security. A variety of IDS tools will be used to collect and analyze potential attacks to include; OSSEC, Tripwire, Snort, Suricata, Neo4j, Zeek (new name Bro), Keras, and Rapid Miner. The course will use virtual machines in labs and assignments to provide hands-on experience with IDS including using test data to quantitatively compare different IDS's.
EN.695.641 Cryptology

EN.695.643. Introduction to Ethical Hacking. 3 Credits.
This course exposes students to the world of ethical computer hacking by discussing foundational concepts, frameworks, and theoretical knowledge that will provide a richer understanding of how and why vulnerable hosts/systems are attacked to motivate and better apply defensive tactics, techniques, and procedures (TTP's). The class looks at fundamental hacking approaches through practical exposure via hands-on assignments, discussions and a quiz. For lab assignments, students are expected to use a computer that will remain air-gapped/off all networks while they complete the deliverable. The course goal is to learn fundamental principles of reconnaissance, scanning, escalation, pivoting, and exploitation that can be leveraged to defend computing infrastructures and systems. Students will primarily use virtual machines in labs to install Kali Linux Tools to include; Lynis, Metasploit Framework, Nmap, SET, WebScarab, Sqlmap, Nessus, John the Ripper, Hydra, Browser Exploitation Framework (BeEF), and Aircrack-ng to provide hands-on experience with Ethical Hacking.
EN.695.601 Foundations of Information Assurance and one of EN.635.611 Principles of Network Engineering or EN.605.671 Principles of Data Communications Networks. Course Note(s): Homework assignments will include programming.

EN.695.644. Computer Forensics. 3 Credits.
This course introduces the student to the field of applied Computer Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "dead-box" (powered-off) data extraction and analysis with open-source tools. Topics covered include legal and regulatory issues, forensic imaging and data acquisition from a "dead" system, computer file systems (FAT/NTFS) and data recovery, Windows Registry and configuration records, Windows log analysis and operating system artifacts, memory dump analysis (RAM), software artifacts, computer network forensics, introductory mobile device forensics, case reporting and documentation, end-to-end computer forensic examinations, peer review, and testifying in court.

EN.695.645. Mobile Device Forensics. 3 Credits.
This course introduces the student to the field of applied Mobile Device Forensics as practiced by corporate security and law enforcement personnel. The emphasis is on "live" (powered-on) data extraction and analysis of Linux-based Android mobile devices/cell phones with open-source tools. Topics covered include data extraction from a "live" system; cell phone file systems (EXT/YAFFS) and data recovery; cell phone configuration records; Android/Linux log analysis and operating system artifacts; memory dump analysis (NAND); Android Operating System application artifacts to include SMS/MMS messaging apps, contacts list, calendar, Gmail, browser bookmarks/searches, call logs, picture/video, and GPS/maps; installed application artifacts such as Facebook, Twitter, and TikTok; cell phone network forensics; Subscriber Identity Module (SIM) card analysis; and Secure Digital (SD) card analysis.

EN.695.711. Java Security. 3 Credits.
This course examines security topics in the context of the Java language with emphasis on security services such as confidentiality, integrity, authentication, access control, and nonrepudiation. Specific topics include mobile code, mechanisms for building “sandboxes” (e.g., class loaders, namespaces, bytecode verification, access controllers, protection domains, policy files), symmetric and asymmetric data encryption, hashing, digital certificates, signature and MAC generation/verification, code signing, key management, SSL, and object-level protection. Various supporting APIs are also considered, including the Java Cryptography Architecture (JCA) and Java Cryptography Extension (JCE). Security APIs for XML and web services, such as XML Signature and XML Encryption, Security Assertions Markup Language (SAML), and Extensible Access Control Markup Language (XACML), are also surveyed. The course includes multiple programming assignments and a project.
EN.605.681 Principles of Enterprise Web Development or equivalent. Basic knowledge of XML. EN.695.601 Foundations of Information Assurance or EN.695.622 Web Security would be helpful but is not required.

EN.695.712. Authentication Technologies. 3 Credits.
Authentication plays a strong role in cybersecurity, and is a critical layer underpinning the “CIA triad.” This course will explore current technologies, issues, and policies surrounding practical authentication. Grouped by something you know, something you have, and something you are, topics will include passwords, certificates and public key infrastructures, graphical authentication, smart cards, biometrics, trusted computing, location authentication, identity federation, and a range of other topics determined by class interest. Each topic will be examined from the perspective of technical strengths, weaknesses, mitigations, and human factors, and will include discussions of authentication policies, trends, and privacy perspectives. Related background is developed as needed, allowing students to gain a rich understanding of authentication techniques and the requirements for using them in a secure environment including systems, networks, and the Internet. Students will prepare and present a research project that reflects an understanding of key issues in authentication. Recommended: EN.695.621 Public Key Infrastructure and Managing E-Security.
EN.605.202 Data Structures; 6EN.95.601 Foundations of Information Assurance. EN.695.621 Public Key Infrastructure and Managing E-Security is recommended.

EN.695.715. Assured Autonomy. 3 Credits.
Autonomic systems leverage the growing advances in control, computer vision, and machine learning coupled with technological advances in sensing, computation, and communication. While this emerging highly connected, autonomous world is full of promise, it also introduces safety and security risks that are not present in legacy systems. This course focuses on the complexities inherent in autonomous systems and the multifaceted and multilayered approaches necessary to assure their secure and safe operation. As these systems become more pervasive, guaranteeing their safe operation even during unforeseen and unpredictable events becomes imperative. There are currently no real solutions to provide these runtime guarantees necessitating cutting edge research to provide state awareness, intelligence, control, safety, security, effective human-machine interaction, robust communication, and reliable computation and operation to these systems. This course follows a seminar-style format where students are expected to lead class discussions and write a publication-quality paper as part of a course project.

EN.695.721. Network Security. 3 Credits.
This course covers concepts and issues pertaining to network security and network security architecture and evolving virtualization and related cloud computing security architecture. Topics include mini-cases to develop a network security context. For example, we will assess the NIST (National Institute of Standards and Technology) unified information security framework. This framework is supported by information security standards and guidance, such as a risk management framework (RMF) and continuous monitoring (CM) process. Applied cryptography and information security—encryption algorithms, hash algorithms, message integrity checks, digital signatures, security assessment and authentication, authorization and accounting (AAA), security association, and security key management (generation, distribution, and renewal) —are discussed with consideration given to emerging cryptographic trends, such as the evolution and adoption of NSA’s (National Security Agency’s) Suite B cryptography. This course presents network and network security architecture viewpoints for selected security issues, including various security mechanisms, different layers of wired/wireless security protocols, different types of security attacks and threats and their countermeasures or mitigation, Next Generation Network (NGN) security architecture that supports the merging of wired and wireless communications, and Internet Protocol version 6 implementation and transition. The course concludes with more comprehensive cases that consider network security aspects of virtualization and cloud computing architecture.
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance and EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.695.722. Covert Channels. 3 Credits.
This course will be a survey course for covert channels and information leakage (side channel) with hands-on investigations into building and defeating covert channels. We will begin with the long history of covert channels dating back to the 1970’s up to the present and beyond by looking at current research in this area. We will explore both storage and timing covert channels and information leakage from general purpose computers, mobile devices, and modern industrial control system devices. It is necessary to be able to write code in at least 1 language (python is preferred), be familiar with computer networking and the use of network packet sniffers.
EN.695.642 Intrusion Detection AND intermediate knowledge of Python.

EN.695.737. AI for Assured Autonomy. 3 Credits.
This is an introductory course in Artificial Intelligence It teaches the basic concepts, principles, and fundamental approaches to Artificial Intelligence. Its main topics include AI Fundamentals, Probability and Statistics, Python Essentials, Supervised Machine Learning, Unsupervised Machine Learning, Neural Networks, Reinforcement Learning, Deep Learning, Natural Language Processing, Decision Tree/Search Algorithms and Intro to Assured Autonomous Systems. Prerequisites: The student should have taken an undergraduate level course on, or be otherwise familiar with, operating systems and networks. Prior programming experience with C, Python or Java is highly recommended. Knowledge of algebra and discrete mathematics is also recommended.

EN.695.741. Information Assurance Analysis. 3 Credits.
This course exposes students to the world of information assurance analysis by discussing foundational concepts and frameworks that can be used to analyze various technologies, mediums, protocols and platforms. Analysis is a fundamental part of the information assurance process and effective implementation can inform policy, forensic and incident response procedures, and cyber security practices. Students will be able to perform analysis activities by using the theoretical knowledge gained on case studies, assignments, and hands-on labs resulting in a richer understanding for information assurance. Topics include the collection, use, and presentation of data from a variety of sources (e.g., raw network traffic data, traffic summary records, and log data collected from servers and firewalls). This data is used for a variety of analytical techniques, such as collection approach evaluation, population estimation, hypothesis testing, experiment construction and evaluation, and developing evidence chains for forensic analysis. The course will also cover Internet of Things (IoT's), Artificial Intelligence, Mobile Application Security, addressing, Border Gateway Protocols (BGP), lookups, anonymization, Industrial Control Systems (ICS), as well as analyzing DNS, HTTP, SMTP, and TCP protocols. Students will primarily use SiLK, NetFlow, Wireshark, Splunk, Zeek (new name Bro), Node-Red IoT framework, and TCPDump tools. Students will also be introduced to various IoT and ICS protocols; WNAN, ZigBee, EMV, and SIGFOX, as well as, CIP, MODBUS, DNP3, OPC, HART, BACnet, and ICCP, respectively.
EN.695.601 Foundations of Information Assurance. Familiarity with basic statistical analysis. EN.695.642 Intrusion Detection or EN.695.611 Embedded Computer SystemsVulnerabilities, Intrusions, and Protection Mechanisms is recommended.

EN.695.742. Digital Forensics Technologies and Techniques. 3 Credits.
Digital forensics focuses on the acquisition, identification, attribution, and analysis of digital evidence of an event occurring in a computer or network. This course provides a broader scientific understanding of the technologies and techniques used to perform digital forensics. In particular, various signature extraction techniques, detection, classification, and retrieval of forensically interesting patterns will be introduced. This will be complemented by studying fundamental concepts of data processing technologies like compression, watermarking, steganography, cryptography, and multiresolution analysis. Emerging standards along with issues driving the changing nature of this topic will be explored. Antiforensic techniques that are used to counter forensic analysis will also be covered. Students will be exposed to relevant theory, programming practice, case studies, and contemporary literature on the subject.
EN.605.612 Operating Systems.

EN.695.744. Reverse Engineering and Vulnerability Analysis. 3 Credits.
Have you ever wondered why software vulnerabilities lead to security issues? Or how malicious actors exploit vulnerabilities? The Reverse Engineering course will help answer these questions and more! Throughout the course, students will use industry standard tools and develop customized solutions to help further binary/code analysis. Using real-world vulnerability classes, students will examine how attackers identify flaws in modern software and exploit these flaws bypassing state-of-the-art protection mechanisms found in modern operating systems. Students will also identify how to patch these issues and develop extensions of protection mechanisms to thwart attacks, raising the bar for the attacker and improving the security posture of a system. Using a combination of static analysis, dynamic analysis, fault injection and fuzzing, this course will provide students with the modern skills needed to help stop attackers!Prerequisite(s): Familiarity with computer architecture concepts.

EN.695.749. Cyber Exercise. 3 Credits.
Students will learn about the nature and purpose of cyber exercises and their role in training and assessing people, teams, technology, and procedures. During the course of the semester, students will design a cyber exercise that meets the specific needs of their organization. At the conclusion of the class, students will have a model template they can use to design, build, and execute their own exercise.
EN.695.641 Cryptology

EN.695.791. Information Assurance Architectures and Technologies. 3 Credits.
This course explores concepts and issues pertaining to information assurance architectures and technologies (IAA), such as a three-level enterprise and cybersecurity architecture offered as one of the security common languages from the National Institute of Standards and Technology (NIST). Key NIST Cybersecurity Center of Excellence (NCCoE) Practice guides pertaining to IAA issues are introduced and analyzed. NIST/NCCoE security guidance and metrics for Zero Trust Architecture (ZTA), continuous diagnostics and mitigation (CDM), and artificial intelligence/machine learning (AI/ML) security guidance and metrics are applied to analysis of selected enterprise and cybersecurity programs, such the Department of Defense (DoD) Zero Trust Reference Architecture, Department of Homeland Security (DHS) Cybersecurity & Infrastructure Security Agency (CISA) Trusted Internet Connections Program (CISA TIC), Federal Aviation Administration (FAA) Air Traffic Modernization (NextGen) process, and Food and Drug Administration (FDA) (for approval of medical devices). Cloud computing security architecture issues for IAA technologies including FedRAMP (Federal Resources Analysis and Management Program) authorization are analyzed. Topics include protecting control systems from non-control systems for information technology (IT) and operational technology (OT) enterprise and cybersecurity risk management. For example, these IT/OT interface issues are critical for the NIST Smart Grid Cybersecurity Strategy, Architecture, and High-Level Requirements. IAA analyses include enterprise Internet of Things (IoT) mobility issues and a virtual laboratory project based on selected Amazon Web Services (AWS) security capabilities for Zero Trust Architecture (ZTA).
EN.605.202 Data Structures; EN.695.601 Foundations of Information Assurance or equivalent, and EN.605.671 Principles of Data Communications Networks or EN.635.611 Principles of Network Engineering.

EN.695.795. Capstone Project in Cybersecurity. 3 Credits.
This course permits graduate students in cybersecurity to work with other students and a faculty mentor to explore a topic in depth and apply principles and skills learned in the formal cybersecurity courses to a real world problem. Students will work in self-organized groups of two to five students on a topic selected from a published list. Since students will have selected different courses to meet degree requirements, students should consider the combined strengths of the group in constituting their team. Each team will prepare a proposal, interim reports, a final report, and an oral presentation. The goal is to produce a publication quality paper and substantial software tool. This course has no formal content; each team should meet with their faculty mentor at least once a week and is responsible for developing their own timeline and working to complete it within one semester. The total time required for this course is comparable to the combined class and study time for a formal course. Course prerequisite(s): Seven cybersecurity graduate courses including two courses numbered 695.7xx, all CyS foundation courses, and meeting the track requirement; or admission to the post-master's certificate program. Students must also have permission of a faculty mentor or academic advisor, and the program chair. Course note(s): Students may not receive graduate credit for both 695.795 and 695.802 Independent Study in Cybersecurity II. This course is only offered in the spring.

EN.695.801. Independent Study in Cybersecurity I. 3 Credits.
This course permits graduate students in cybersecurity to work with a faculty mentor to explore a topic in depth or conduct research in selected areas. Requirements for completion include submission of a significant paper or project. Prerequisite(s): Seven Cybersecurity graduate courses including the foundation courses, three track-focused area courses, and two courses numbered at the 700 level or admission to the post-master's certificate program. Students must also have permission from the instructor.
EN.695.601 AND EN.695.401 AND EN.605.421 Foundations of Algorithms

EN.695.802. Independent Study in Cybersecurity II. 3 Credits.
Students wishing to take a second independent study in Cybersecurity should sign up for this course. Prerequisite(s): 695.801 Independent Study in Cybersecurity I and permission of a faculty mentor, the student's academic advisor, and the program chair.
EN.695.801

EN.700 (Doctor of Engineering)

EN.700.791. Doctor of Engineering Fundamentals. 10 Credits.
This is an intense, professor-guided, individualized course for D.Eng. students preparing for their Preliminary Examinations. The course instructor is the student's primary advisor and sets therequirements. Successful students pass their Preliminary Examinations upon completing this course. Students may enroll in this course for multiple semesters if necessary.

EN.700.792. Doctor of Engineering Research Proposal. 10 Credits.
The purpose of this course is to synthesize a coherent research proposal for the Doctor of Engineering major project. The course instructor is the student's primary advisor, working withthe student to create the research proposal to be defended in a public presentation and private examination. Students may enroll in this course for multiple semesters if necessary.

EN.700.891. Doctor of Engineering Research. 10 - 20 Credits.
Students enroll in this course upon completion of their Research Proposal Examinations while they are conducting advanced engineering research under the supervision of their advisors. Thenumber of credits awarded will vary based on the amount of time students devote to their research; this is exactly analogous to how we assign credit hours for dissertation research forPh.D. students. Course is for Doctor of Engineering students only. Course is repeatable for credit.

EN.705 Artificial Intelligence

Courses

EN.705.601. Applied Machine Learning. 3 Credits.
Machine Learning (ML) is the art of solving a computation problem using a computer without an explicit program. ML is now so pervasive that various ML applications such as image recognition, stock trading, email spam detection, product recommendation, medical diagnosis, predictive maintenance, cybersecurity, etc. are constantly used by organizations around us, sometimes without our awareness.In this course, we will rigorously apply machine learning techniques to real-world data to solve real-world problems. We will briefly study the underlying principles of diverse machine learning approaches such as anomaly detection, ensemble learning, deep learning with a neural network, etc. The main focus will be applying tool libraries from the Python-based Anaconda and Java-based Weka data science platforms to datasets from online resources such as Kaggle, UCI KDD, open source repositories, etc. We will also use Jupyter notebooks to present and demonstrate several machine learning pipelines.
EN.705.621 Introduction to Algorithms OR EN.605.621 Foundations of Algorithms OR EN.685.621 Algorithms for Data Science

EN.705.603. Creating AI-Enabled Systems. 3 Credits.
Achieving the full capability of AI requires a system perspective to effectively leverage algorithms, data, and computing power. Creating AI-enabled systems includes thoughtful consideration of an operational decomposition for AI solutions, engineering data for algorithm development, and deployment strategies. To realize the impact of AI technologies requires a systems perspective that goes beyond the algorithms. The objective of this course is to bring a system perspective to creating AI-enabled systems. The course will explore the full-lifecycle of creating AI-enabled systems starting with problem decomposition and addressing data, design, diagnostic, and deployment phases. The course will also cover ethics and bias in AI systems. The course includes a systems project that will encompass the full-lifecycle with interim milestones throughout the course. Homework assignments will be provided that in involves python programming.

EN.705.612. Values and Ethics in Artificial Intelligence. 3 Credits.
Modern artificial intelligence, and the related area of autonomous systems are becoming so powerful that they raise new ethical issues. This course will prepare professional engineers and developers to thoughtfully engage with the moral, ethical, and cultural aspect of these emerging technology. Topics include: safety considerations for autonomous vehicles, algorithm bias, AI explainability, data privacy, ethical considerations of 'deep fakes', ethics of artificial life, values advocacy within organizations, technological unemployment, and far-future considerations related to AI safety.

EN.705.621. Introduction to Algorithms. 3 Credits.
This course concentrates on the design of algorithms and the rigorous analysis of their efficiency. Topics include the basic definitions of algorithmic complexity (worst case, average case); basic tools such as dynamic programming, sorting, searching, and selection; advanced data structures and their applications (such as union-find); graph algorithms and searching techniques such as minimum spanning trees, depth-first search, shortest paths, design of online algorithms and competitive analysis.

EN.705.640. Cognitive and Behavioral Foundations for Artificial Intelligence. 3 Credits.
As a result of greater computing power and Big Data, artificial intelligence (AI) is rapidlyimproving for well-defined tasks and narrow intelligence. Moreover, it has entered all industriesin a myriad of ways. But will AI ever have human-like general intelligence? What does humanlikegeneral intelligence even mean? Why should we even care? This course is designed toanswer these complex questions by giving students working knowledge of the underlyingprinciples and mechanisms of human behavior and cognition, and how they may be applied tosolving current and rising industry challenges. Key topics to be addressed will include vision,audition, language, learning, emotion and social cognition, creativity, and consciousness.Students will apply learned topics to a final group research project on the topic of their choice.

ME.100 (Biophysics)

ME.100.300. Research Practicum. 0 Credits.
N/A

ME.100.600. Scientific Foundations of Medicine-Macromolecules. 0 Credits.

ME.100.699. Biophysics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Biophysics. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.100.705. Computer Modeling Of Biological Macromolecules: Lecture. 0 Credits.
Lecture will offer an introduction to the mathematical aspects of computer representation and manipulation of macromolecules

ME.100.706. Fundamentals Of Protein Crystallography. 0 Credits.
An introductory course designed to present the core knowledge and theoretical underpinnings of protein crystallography necessary to function in the laboratory. Assigned readings and problem sets will be given.

ME.100.707. Advanced Topics in Protein Crystallography. 1 Credit.
An introductory course designed to present the core knowledge and theoretical underpinnings of protein crystallography necessary to function in the laboratory. Assigned readings and problem sets will be given.

ME.100.708. Proteins and Nucleic Acids. 0 Credits.

ME.100.709. Macromolecular Structure and Analysis. 1.5 Credits.
The course will cover the structure and properties of biological macromolecules and the key methods used to study them, including X-ray crystallography, nuclear magnetic resonance, spectroscopy, microscopy, and mass spectrometry.

ME.100.710. Biochemical and Biophysical Principles. 1.5 Credits.
The physical and chemical principles underlying biological processes are presented and discussed. Topics include thermodynamics, chemical equilibrium, chemical and enzymatic kinetics, electrochemistry, physical chemistry of solutions, and structure and properties of water. Elementary concepts of statistical thermodynamics will be introduced as a way of correlating macroscopic and microscopic properties.

ME.100.712. Computer Modeling Of Biological Macromolecules: Lab. 3 Credits.
The laboratory course will familiarize students with practical aspects of molecular modeling. It teaches the necessary tools to create and manipulate computer generated models of biological-interest molecules. Techniques such as comparative modeling will be introduced.

ME.100.713. Using Structure to Understand Biology. 1 Credit.
The goal of this course is to teach students how to make use of structural information in the PDB using commonly available tools that are accessible to the non-expert. Students will learn how to read a structure paper, understand structure quality and limits of interpretation, and use coordinates from the Protein Data Bank to explore a structure and make figures. Topics covered will include non-covalent interactions, modeling point mutants, identifying binding pockets, making homology models, and calculating electrostatic surface potentials. Classes will combine lectures, hand-on computer demonstrations and critical reading of papers. A final project will require a short write-up and presentation that implements the programs and principles learned in the class

ME.100.714. Single-Molecule Single-Cell Biophysics. 1 Credit.
This elective course offers an introduction to the field of single molecule and single cell biophysics to graduate students in Johns Hopkins University and will be delivered in the School of Medicine. We will examine technologies such as single molecule fluorescence and force measurements, super-resolution imaging and single cell fluorescence detections that enable high precision molecular visualizations in vitro and in cells.

ME.100.715. Proteins and Nucleic Acids II. 3 Credits.
Critical reading and analysis of primary source literature is vital to scientific discourse and discovery. Students will be responsible for analyzing and critiquing papers in diverse topics and systems ranging from replication, transcription, and translation to enzyme mechanism, drug resistance, innate immunity, and signaling. Methods covered will include structural, biochemical, single-molecule, single-cell, and genomic approaches. Students will deliver analytic presentations on at least two ground-breaking papers relevant to these areas, and will be expected to actively participate in class discussion of experimental methodology and logic of other papers assigned in the course.

ME.100.716. Analysis of Macromolecules. 2 Credits.
The course will cover (1) macromolecules, (2) physical chemical principles dictating their biological behavior, and (3) methods to study them. Lectures will focus on practical application of the methods, experimental design, data collection, and elementary aspects of data analysis.

ME.100.801. Research. 0 Credits.
Thesis research

ME.100.804. Topics in Macromolecular Structure and Function I. 0 Credits.
This is the first part of a seminar course covering a variety of topics involving the structure and function of proteins and nucleic acids. Recent topics have included: protein folding, evolutionary significance of introns, protein-DNA interactions, solution structure of peptides, prospects for designing novel proteins, and two-dimensional NMR.

ME.100.807. Research. 0 Credits.
Thesis Research

ME.100.808. Topics in Macromolecular Structure and Function II. 0 Credits.
This is the second part of a seminar course covering a variety of topics involving the structure and function of proteins and nucleic acids. Recent topics have included: protein folding, evolutionary significance of introns, protein-DNA interactions, solution structure of peptides, prospects for designing novel proteins, and two-dimensional NMR.

ME.110 (Cell Biology)

ME.110.301. Research in Cell Biology (Undergraduate). 1 Credit.
N/A

ME.110.302. Research Practicum. 0 Credits.
N/A

ME.110.699. Cell Biology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Cell Biology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.110.726. Nuclear Structure and Human Disease. 0 Credits.
This interactive class covers the 3D organization and dynamics of the cell nucleus and genome in health and disease. Topics include the nuclear envelope, lamina networks, nuclear pore complexes, nuclear import/export, LINC complexes, 3D chromosome organization, dynamic chromatin tethering, phase-partitioning, mitotic disassembly & reassembly of nuclear structure, and diseases (e.g., progeria, heart/muscle disease, brain disorders, metabolic disease) caused by mutations in nuclear lamina proteins. Students are expected to pre-watch lecture videos and come prepared for in-class discussion.

ME.110.727. The Cytoskeleton. 1 Credit.
The Cytoskeleton course addresses advanced topics in the mechanochemical systems that govern and drive cell shape, tissue morphogenesis and integrity, mechanosensing, and the integration chemical signaling and mechanical inputs (force, stress, adhesion). These cellular systems are at the crux of healthy development and disease. We take a no-holds-barred approach in order to have advanced, in depth discussions of the topic. We will embrace molecular, biochemical, biophysical and computational logic and approaches in our thinking during the course.

ME.110.728. Cell Structure and Dynamics. 1.5 Credits.
The objective of this course is to provide the basics of cell biology, including the structure, function and biogenesis of cellular organelles. Also covered are essential concepts on the cytoskeleton, cell-cell and cell-extracellular matrix interactions, cell motility, chaperones, protein turnover and stem cells.

ME.110.730. Membrane Traffic. 0 Credits.

ME.110.731. Mammalian Histology. 0 Credits.

ME.110.732. Developmental Biology. 0 Credits.
Team-taught combined lecture and problem solving course designed to (1) impart the general molecular and cell biological principles that underlie embryonic developmment across a range of model organisms, (2) convey key experimental approaches and findings that have provided significant insight into the governing principles, and (3) expose students to enough descriptive embryology to allow them to comfortably read any paper in the field of developmental biology.

ME.110.733. Principles of Genetics. 2 Credits.
This module covers fundamental principles of genetics, focusing on eukaryotic model systems. Problem sets are an integral learning tool in this course. The course is taught by faculty from the Departments of Molecular Biology and Genetics, Biological Chemistry, Cell Biology, and Physiology. Students must enroll in the Q2 and Q3 sections of this course.

ME.110.800. Advanced Work and Research. 0 Credits.
Thesis Research

ME.110.807. Fundamentals of Confocal Microscopy. 1 Credit.
Teach fundamental concepts of fluorescence and confocal microscopy so that students can pose appropriate questions for meaningful research results. Emphasis on computer-based tools, including Fiji/ImageJ and Imaris, for image preparation and analysis with sessions in computer lab almost every week, complementing lectures. Two additional lab days (Wed) required for operating a generic fluorescence microscope and a confocal microscope, respectively, learning to avoid common errors that preclude quantitative image interpretation.

ME.120 (Art as Applied to Medicine)

ME.120.703. Color Illustration. 0 Credits.
Rendering of scientific subject matter with emphasis on form, texture, and tissue color matching methods. Subject matter for final project: botanical.

ME.120.708. Introduction to Design. 0 Credits.
Introduction to principles of design, cognitive theory and user-centered thinking that will inform the production of clear, functional multimedia.

ME.120.709. Continuous Tone Illustration. 1 Credit.
Continuous tone rendering of medical and biological subjects.

ME.120.710. Pen and Ink Illustration. 0 Credits.
Pen and ink rendering developed by sequential exercises and projects.

ME.120.711. Presentation Visuals. 0 Credits.

ME.120.714. Editorial and Conceptual Illustration. 8 Credits.
Conceptual approach to illustration utilizing brain-storming and problem solving skills to effectively interpret and illustrate manuscripts and clinical or anatomical concepts.

ME.120.715. Biological Illustration. 2 Credits.
Application of illustration techniques to biological, botanical, and natural science topics.

ME.120.716. Medical Sculpture. 3 Credits.
Materials and techniques used in producing instructive three-dimensional medical sculpture and rehabilitative facial prostheses.

ME.120.717. Communications Media (Graphic Design). 1 Credit.
Text editing, typography, layout, and desktop publishing

ME.120.718. Digital Lab Essentials. 0 Credits.

ME.120.719. Anatomical Ilustration and Radiological Visualization. 1 Credit.
A comprehensive overview of the technical aspects of ditigal color anatomical illustration and the fundamentals of incorporating radiologocal visualizations into medical illustration workflows.

ME.120.720. Vector Illustration. 2 Credits.
An overview of the technical aspects of ditigal art production using vector-based digital imaging applications

ME.120.721. Raster Tone Illustration. 3 Credits.
An overview of the technical aspects of digital art production using raster-based digital imaging applications for continuous tone. Creating digital still artwork for print and digital media.

ME.120.722. Introduction to 3D Modeling and Animation. 2 Credits.
This course will introduce the Cinema 4D software as a way of generating 3D assets for use in 2D illustration and as the basis for 3D animation. The course will cover all aspects of working in C4D including user interface, reference image setup, modeling techniques, and materials and textures. Students will gain an understanding and proficiency in C4D to create 3D digital models of surgical instruments, medical devices and basic organic structures. Students will be able to effectively model a variety of objects to begin building a digital 3D asset library for future use and to explore the basics of 3D animation.

ME.120.723. Digital Imaging IV (Animation). 0 Credits.
Theory and techniques for creation of dynamic animation optimized for electronic presentation media.

ME.120.724. Web Animation, Interactivity and Design. 3 Credits.
Theory and techniques for the creation of a dynamic animation with interactivity, optimized for the web; and the development of a web-based portfolio

ME.120.725. Clinical Anaplastology. 7.5 Credits.
Comprehensive overview of human neuroanatomy with a focus on visual communication concepts. Lecture content is supplemented by access to specimens, pathology conferences, and radiological data. Includes creation of a color neuroanatomical illustration.

ME.120.726. Molecular and Cellular Visualization. In-depth review of tructural biology for the medical illutrator, including method for viual background reearch and trategie for viually depicting molecular and cellular data. Culminate with creation of a molecular illutration. Credits.

ME.120.727. Neuroanatomy for the Medical Illustrator. 2 Credits.
Comprehensive overview of human neuroanatomy with a focus on visual communication concepts. Lecture content is supplemented by access to specimens, pathology conferences, and radiological data. Includes creation of a color neuroanatomical illustration.

ME.120.728. 3D Animation. 4 Credits.
Ths course will introduce the Cinema 4D software as the basis for 3D animation. The course will cover all aspects of working in C4D including lighting, rendering, cameras, as well as basic animation and dynamic simulation setup. Students wil gain an understanding and proficiency in C4D to animate in 3D. The goal of this course is to explore the basics of 3D animation.

ME.120.733. 2D Animation. 3 Credits.
Theory and technique for creation of dynamic animation optimized for elecgronic presentation media.

ME.120.750. Surgical Illustration. 7 Credits.
Illustration of surgical procedures from operating room sketches for medical education.

ME.120.751. Ophthalmological Illustration. 3 Credits.
Intensive review of gross and microscopic anatomy of the orbit. Survey of ophthalmological surgical procedures. Special illustration techniques presented. Introduction to the use of patient examining instruments.

ME.120.754. Research and Thesis. 11 Credits.
Original investigation under preceptor and department advisor

ME.120.755. Business Practices for the Medical Illustrator. 1 Credit.
Experience in analyzing problems of the visual artist and formulating practical solutions. Includes operations, finance, production and business management, business entities, taxes and accounting, human resources, marketing and communications, social media, business ethics, contracts and negotiations, and intellectual property.

ME.120.756. Operating Room Sketching. 4 Credits.
Introduction to operating room protocol, observation and recording of surgical procedures.

ME.120.757. Scientific Communication. 1 Credit.
Principles of effective oral and written presentation.

ME.120.758. The Portfolio. 4 Credits.
Professional portfolio and exhibition preparation and presentation, includes effective negotiation in a professional environment.

ME.120.801. Advanced Projects in Illustration. 0 Credits.
Special projects in editorial and conceptual illustration

ME.120.807. Design of Interactive Learning Experiences. 2 Credits.
Design of instructional, interactive media for medicine, public health and science

ME.120.813. Independent Study. 1 Credit.
Independent Study

ME.130 (Functional Anatomy and Evolution)

ME.130.300. Human Anatomy: A Summer Course for Undergraduates and Graduates. 4 Credits.
N/A

ME.130.600. Human Anatomy. 7 Credits.
Required course in the first year medical student curriculum.

ME.130.601. Human Anatomy. 0 Credits.

ME.130.700. Advanced Study and Teaching. 0 Credits.
FAE third year students only: TA in Human Anatomy labs.

ME.130.707. Mammals: Diversity, Structure and Evolution. 0 Credits.

ME.130.708. Biomechanics of the Skeleton. 0 Credits.
Contact Dr. Ruff with course specifics.

ME.130.716. Primate Evolution. 0 Credits.
Course in the evolution of primates.

ME.130.718. Evolutionary Biology. 0 Credits.

ME.130.724. Cladistics. 0 Credits.
The course will cover the foundations of cladistics, introduction to cladistic algorithms, and cladistic implicat ions to functional morphology, biogeography, and oher evoluationay disciplines.

ME.130.726. Advanced Studies of Dinosaurs. 0 Credits.

ME.130.727. Morphometrics. 0 Credits.

ME.130.728. Comparative Vertebrate Anatomy. 0 Credits.

ME.130.729. Current Topics in Evolutionary Morphology. 0 Credits.

ME.130.733. Ecomorphology. 0 Credits.

ME.130.734. Evolution and Ecology of Sensory Systems. 0 Credits.

ME.130.735. Evo-Devo. 0 Credits.

ME.130.736. Comparative Mammalian Anatomy - A Short Lab Course. 0 Credits.

ME.130.737. Human Embryology. 0 Credits.

ME.130.738. Advanced Training and Undergrad Teaching in Human Anatomy. 0 Credits.
TA in Summer Anatomy lab; actual course dates are June 5, 2017 thru June 30, 2017

ME.130.739. Advanced Prosection in Human Anatomy. 0 Credits.

ME.130.741. Comparative Approach to Functional Anatomy. 0 Credits.

ME.130.742. Geometric Morphometrics. 0 Credits.
This course provides the foundations for the statistical analysis of biological shape including both theoretical underpinnings as well as applied methodologies. Topics will include collection of landmark and continuous data, superimposition methods, statistical analyses and methods for visualization of shape variation.

ME.130.743. Anatomy Lectures. 0 Credits.
Lecture only portion of SFM Human Anatomy

ME.130.744. Mammalian Evolution. 0 Credits.
This course will explore the evolutionary history of the mammals. Topics covered will include mammalian origins, Mesozoic mammal diversity, early Cenozoic mammals, and the evolution and adaptations of extant Monotremata, Metatheria, and Eutheria. Evolutionary theory, phylogeny reconstruction techniques, biogeography, and continental drift and the geological history of the earth will also be discussed in the context of mammalian evolution.

ME.130.745. Anatomy Lectures. 0 Credits.
Lecture only portion of SFM Human Anatomy

ME.130.746. Evolutionary Theory and Phylogenetic Comparative Methods. 0 Credits.
This course examines the theory and techniques of evolutionary analysis with special emphasis on vertebrate anatomical and developmental systems. We will examine and critique classic and emerging viewpoints regarding core evolutionary concepts, review basic approaches to tree construction, and investigate methods for studying evolution in a comparative phylogenetic context.

ME.130.747. Introduction to Histology. 2 Credits.
Introduction to basics of histology, using online M-scope imagery and Inversuse-lecutres developed for Scientific Foundations of Medicine, plus individual instruction by FAE faculty.

ME.130.748. Advanced Anatomy Dissection and Research. 5 Credits.
Supervised small group cadaveric dissection focusing on more detailed understanding of specific systems and regional anatomy, anatomical variation, clinical correlations, and comparative anamony.

ME.130.749. Anatomy Teaching Practicum. 0 Credits.
Training in lecturing, small group leadership for presentation of anatomical material; including giving one lecture and assisting in labs in ME:130.300.

ME.130.750. Introduction to Histology. 2 Credits.
Introduction to basics of histology, using online M-scope imagery and Inversus e-lectures developed for Scientific Foundations of Medicine, plus individual instruction by FAE faculty.

ME.130.751. Advanced Anatomy Dissection and Research. 5 Credits.
A supervised small group cadaveric dissection course focusing on more detailed understanding of specific systems and regional anatomy, anatomical vartiation, clinical correlations, and comparative anatomy.

ME.130.752. Anatomy Teaching Practicum. 3 Credits.
Training in lecturing, small group leadership for presentation of anatomical material; includes giving one lecture and assisting in labs in SOM ME:130.300.

ME.130.753. Fundamentals of Human Anatomy. 4 Credits.
This course is designed to give graduate students the fundamentsl to all aspects of human anatomy, and includes demonstrations using human cadavers.

ME.130.800. FAE Advanced Work and Research. 0 Credits.
Research and preparation of dissertation.

ME.130.809. FAE Research Rotation. 0 Credits.

ME.130.810. Dinosaurs. 0 Credits.
The course will cover dinosaur diversity, functional morphology, systematics, evolutionary biology (including the origin of birds), and their end-Mesozoic mass extinction.

ME.130.812. Predissertation Research. 0 Credits.
Predissertation research course for 2nd year FAE students only.

ME.130.813. Readings in Evolutionary Biology: J.B.S. Haldane. 0 Credits.

ME.130.814. Readings in Evolutionary Biology: Mayr (1942) and Simpson (1944). 0 Credits.

ME.130.815. Independent Study in Mammalogy. 0 Credits.

ME.130.816. Independent Study in Ornithology. 0 Credits.

ME.130.819. Morphological Integration and Modularity. 0 Credits.

ME.130.820. FAE Research Rotation, Part One. 0 Credits.
For 1st year FAE students only.

ME.130.821. FAE Research Rotation, Part Two. 0 Credits.
Functional Anatomy and Evoluation research rotation

ME.130.822. Primate Dietary Adaptations. 0 Credits.
This course will explore the range of diets known for extant primates, and the degree to which the evolution of diet ecology has shaped the morphology and physiology of skeletal and soft tissues. Students will be introduced to different ways to characterize diet, test hypotheses concerning adaptation, and to recover ecological signal in a paleontological context.

ME.130.823. Geometric Morphometrics. 0 Credits.
This course provides the foundations for the statistical analysis of biological shape including both theoretical underpinnings as well as applied methodologies. Topics will include collection of landmark and continuous data, superimposition methods, statistical analyses and methods for visualization of shape variation.

ME.140 (Gynecology and Obstetrics)

ME.140.425. Individualized Medicine from Antiquity to the Genome Age. 0 Credits.

ME.140.600. Women's Health Core Clerkship (GYN/OB). 0 Credits.
This clerkship introduces students to the discipline of Gynecology/Obstetrics and Women's Health. Following three days of PRECEDE instruction, students rotate through the following, inpatient obstetrics, inpatient gynecology and selectives. The selectives are chosen from the following: female pelvic and reconstructive medicine, gynecologic oncology, maternal fetal medicine, ambulatory women's health, reproductive, endocrine and infertility, gynecologic pathology, women's mood disorders, fetal therapy, community obstetrics or reproductive health. In addition there is a precepted longitudinal ambulatory experience. Instruction occurs through direct patient contact, operating room and bedside teaching, and student conferences.

ME.140.699. Gynecology and Obstetrics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Gynecology and Obstetrics. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.150 (History of Medicine)

ME.150.699. History of Medicine Elective. 0 Credits.
For Medical Students only. Specialized Topics in History of Medicine. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.150.701. Outline of History of Medicine I: Antiquity to Scientific Revolution. 4 Credits.
This course offers an introductory surven of the development of Western medicine in the premodern period, including its contact and exchange with other medical cultures.

ME.150.702. The History of Modern Medicine. 4 Credits.
The course reviews the social, intellectual, and cultural history of Western medicine from the eighteenth century to the present. The emphasis is on Western medicine as the result of Western political-economic and institutional structures, cultural values, and the rise and complexities of 'scientific medicine'.

ME.150.705. Analogy and Metaphor in Science and Medicine. 0 Credits.

ME.150.711. History of Disease and Disease Control in Comparative Medicine. 0 Credits.

ME.150.713. Oral History Theory and Method. 0 Credits.
The course acquaints students with the range of approaches and techniques of using oral source material in historical research. The course will survey the history of the field and investigate a variety of approaches to conducting and interpreting interviews, including African history, anthropology, the history of science, folklore, and journalism.

ME.150.714. History of Twentieth Century Biomedicine. 0 Credits.
This is a course about levels of understanding. On one level, it is a tour through some signal episodes in the history of biomedicine in the last 100 years or so: the discovery (or invention) of insulin; the revolution in human genetics; cancer; and others. On another level, it is about how one might go about understanding those and other episodes, Through the experiments and laboratory work? Via the clinic? From the patients who were either helped or not? These, of course, are themselves levels of analysis. On a third level, it is about discovering how you best understand something complicated like biomedicine---my hope is that this seminar will change the way you study what you study, whether it be science or history?

ME.150.715. History of Health and Development in Africa. 0 Credits.

ME.150.719. Biography: Graduate Seminar. 0 Credits.

ME.150.721. Topics in Early Modern Medicine. 0 Credits.

ME.150.722. Introduction to the History of Medicine. 3 Credits.
This course introduces students to the key themes, concepts, and methods of the field in a dynamic seminar arranged by thematic modules. Topics covered include: What is Disease? The Healer-Patient Relationship: Seeing the Body; Pain; Medical Technologies.

ME.150.723. Survey of the History of Medicine 1: Classical Antiquity to the Early Middle Ages. 3 Credits.
This course is an in-depth survey of Medicine in Classical Antiquity and the early Middle Ages. All students must submit a History of Medicine Program online application at <http://historyofmedicine.jhmi.edu>. JHU students enrolled in graduate degree programs (not in the School of Medicine) should submit an IDR to their home school to register for this course in addition to the online application.

ME.150.724. Survey of the History of Medicine 2: Medicine From the Black Death to the Scientific Revolution. 3 Credits.
This course introduces students to key themes and concepts in Medieval and Early Modern medicine by means of seminar discussions accompanied by online lectures that provide background. Topics include the emergence of medical licensing; the persistence of religious healing; cross-cultural exchanges; and the patient's perspective.

ME.150.725. Madness and Mental Health in the Modern West. 0 Credits.
This seminar will explore the changing cultural framing of phenomena variously termed madness, insanity, and mental illness; the development of psychiatry, psychiatric institutions, and social policy; and the changing experiences of people with mental illness.

ME.150.726. History of Medicine Survey 3: Science and the Practice of Medicine. 3 Credits.
In this course we will explore health and healing in the 18th and early 19th centuries. We examine the changing basis of European and North American medical theory and practice, the transformation of specialized spaces for healing such as the clinic, the hospital, and the asylum, the impact of epidemic diseases on the differential construction of public health systems, and the role of medicine in the construction of race, class, and ethnicity.

ME.150.727. Survey of the History of Medicine 4: Biomedicine and its Consequences. 3 Credits.
In this course we will explore the rapid transformation of health care from the late 19th century to the present day. We examine the historical connection between the laboratory and the clinic, the transformation of hospitals and medical schools, the shifting epidemiology of disease over the long 20th century, and the role of medicine and healthcare in mediating colonial and post colonial relations between global North and South.

ME.150.728. Healing Spaces: Historical Geographies of Medical Practice. 3 Credits.
Provides an historical introduction to how all kinds of healers, medical practitioners, and care-givers have produced and adapted different spaces to facilitate, promote, and authorize particluar forms of healing. Examples discussed inclued homes, streets, dispensaries, and the emergency room.

ME.150.729. Social and Cultural Histories of Disease. 3 Credits.
Course examines a varitey of historical approaches to interpreting disease.

ME.150.730. Methods in the History of Medicine. 3 Credits.
This course introduces students to basic themes in the secondary literature in the history of medicine, highlighting issues such as the choice of primary sources; varieties of research methods; interpretive strategies; and narrative options. Additional resources from the histories of science and technology will be introduced where appropriate.

ME.150.731. The White Plague: History of Tuberculosis. 0 Credits.
Examination of interrelated scientific, medical, social, and cultral dimensions of tuberculosis from early modernity to the present in various geographical and cultural setting. Extensive reading, research based on primary sources.

ME.150.732. Research Seminar B: The History of Medicine in Place. 3 Credits.
This research seminar examines the role of place and place-making in the history of medicine. Building on themes already addressed in 150.728 Healing Spaces: Historical Geographies of Medical Practice, students will conduct research based on the history of medical practice in specific places. Students will choose a particular place or places as their focus to develop a theoretically and empirically grounded written paper that utilizes primary sources to illustrate the role of place in medical practice, knowledge-making, or both.

ME.150.733. Research Practicum. 3 Credits.
Intensive course held at the Department of the History of Medicine at Johns Hopkins University School of medicine in Baltimore, MD. Will provide students with practical expertise in conducting research in the history of medicine. This course is a prerequisite for students embarking on the preparation of a MA thesis.

ME.150.734. Media History of Science, Technology, and Medicine. 2 Credits.
This research seminar starts from the premise that the production and circulation of scientific knowledge is conducted through media technologies: parchment and paper, books and journals, paper archives and electronic datasets. Likewise knowledge of the body in health and illness is mediated through material objects, from the uroscopy flask to the stethoscope to the PET scan. Students will explore the theory and method of media history in developing their own research projects in the history of science, technology, and medicine.

ME.150.735. Controlling Epidemics: Historical Perspectives/Graduate Seminar. 3 Credits.
This course explores efforts to contain disease epidemics across time and space, from the fourteenth-century black plague to recent epidemics of Ebola and Zika viruses. The course draws on historical materials from Europe, Asia, Africa, and Latin American and emphasizes the ways in which political, social, and economic institutions and practices influence how individuals and societies respond to the threat of disease epidemics. The course will also explore the various approaches that historians have taken to describe the history of epidemics.

ME.150.736. Histories of Reproduction. 0 Credits.
This graduate research seminar explores themes in the histories of reproduction, including childbirth; contraception; abortion; infanticide; sex determination; development; heredity; midwifery; and much else. The course explores these themes over a very long period from classical antiquity to the present, arguing that long continuities have often shaped the history of reproduction. Students will devise an original research topic and write a paper.

ME.150.737. Working with Cases. 3 Credits.
This course considers the history of longevity as a social reality and a set of ideas. It centers on early modern Europe, when people were concerned with both life expectancy and life span and questions about longevity crystallised around the workings of the body, the role of the medical practitioner, population thinking, and philosophical techqiues for improvement.

ME.150.738. The Work of Healing: Medicine and Materiality. 2 Credits.
This research seminar explores how the so-called "material turn" might be explored in our field. Material practices will be analyzed and students will write a research paper on a topic of their choosing and design a pedagogical exercise.

ME.150.739. Medicine, Race, and Colonialism: A Critical History. 3 Credits.
This course addresses the history of medicine, race, and (post) colonialism through a series of case-studies. For each case study, we wil look at primary and secondary sources, investigate different theorectical approaches, and various historiographic questions. The course also engages with critical historical methods, including CRT, postcolonial and decolonial theories, and queer theory among others.

ME.150.801. Research in the History of Medicine: Dissertation. 0 Credits.
(For departmental graduate students after their fields are completed) For doctoral candidates and other advanced students engaged in original research for their dissertation under faculty supervision.

ME.150.802. Readings in the History of Medicine. 0 Credits.

ME.150.813. Medicine and Science in History. A Survey of Historiography. 0 Credits.

ME.150.814. Directed Readings - Ragab. 4 Credits.
Directed readings in History of Medicine

ME.150.815. Cross-Cultural Histories of Medicine. 0 Credits.

ME.150.816. Biomedicine: Histories, Concepts and Practices. 0 Credits.

ME.150.817. Directed Reading. 1 Credit.
Readings from the relevant secondary literature will form the basis for discussion and interpretation in relation to the topic of the student's thesis. Course is available each quarter.

ME.150.818. Directed Research. 1 Credit.
Students undertake research for their Master's thesis under the supervision of a faculty member. Course is available each quarter.

ME.150.891. Directed Readings and Dissertation. 0 Credits.

ME.150.893. Directed Readings. 0 Credits.

ME.200 (Neurology)

ME.200.300. Research Practicum. 0 Credits.
N/A

ME.200.301. Research Practicum. 0 Credits.
N/A

ME.200.600. Neurology Core Clerkship. 0 Credits.
Core clerkship in neurology

ME.200.650. Genes to Society - Nervous System and Special Senses. 0 Credits.
Approximately 9 week course divided into 4 modules. Module 1, Neuroanatomy; Module 2 General Sensory & Motor, Module 3, Special Sensory & Motor, and Module 4, Multi-System Diseases. Each module has its own exam. The exams are cumulative but will focus on the material from the preceding weeks.

ME.200.651. Advanced Clerkship in Critical Care - Neurocritical Intensive Care. 0 Credits.

ME.200.652. Advanced Clerkship in Critical Care - Neurocritical Intensive Care at Johns Hopkins Bayview Medical Center. 0 Credits.

ME.200.699. Neurology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Neurology.
Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.200.701. Translational Research in Neuro-AIDS and Mental Health. 1.5 Credits.
This web-based course covers topics related to HIV-associated neurocognitive disorders (HAND) and includes discussions of the epidemiology, basic virology, clinical features, ethical considerations in research, neuropathology, neuropathology, neuropathogenesis of HIV, imaging techniques, animal models, biomarker, drugs of abuse in HAND, and drug development. Lectures and journal club discussions are archived as well as given live in real time. New this year will include e-learning tools to further expand the educational and training impact of neuroaids experts using open sources courseware and innovative Apps for use on mobile devices.

ME.200.704. Drug Discovery Research. 1.5 Credits.
This course deals with various aspects of the drug discovery process including target identification, medicinal chemistry, in vitro and in vivo drug screening methods, pharmokinetics, drug safety, and intellectual property management. Each lecture is given by an expert on that respective subject with many years of drug discovery research experience. Students will build a borad kknowledge base that will allow them to prepare for a career in pharmaceutical research or basic medical science with implicaiton for novel therapies.

ME.200.707. Drug Discovery Case Studies. 1.5 Credits.

ME.200.708. Pharmaceutical Enterprise. 1.5 Credits.
“Pharmaceutical Enterprise” is a discussion-driven and highly interactive course designed to provide students with greater insights into a range of topics related to pharmaceutical enterprise. The course consists of six modules, each of which begins with a pre-lecture discussion session proceeded by a lecture by an expert in the given subject, and post-lecture discussion session. This 3-segment format enables students to digest the topic thoroughly and gain in-depth knowledge through peer discussion and interaction with lecturers. The course is particularly suited for individuals interested in advancing their career beyond the academic sector.

ME.210 Biomedical Engineering

ME.210.699. Biomedical Engineering Elective. 0 Credits.

ME.210.704. MEP/ Medical Design Initiative. 0 Credits.

ME.210.705. Medical Entrepreneurship: Bridging the Gap Between Research and Practice. 1.5 Credits.
The course aims to bridge the gap between research and practice for Johns Hopkins inventors. Every year, we form interdisciplinary student teams who go through practical and hands-on training and learn about what it takes to take a research idea, translate it for clinical use, and commercialize the product. At the end of the course, these teams will showcase their medical inventions/ideas and pitch to academic and industry leaders (e.g. CEOs, Angels, Grant Organizations) to serve as the judges and give feedback to the teams.

ME.210.801. Special Studies in Biomedical Engineering. 0 Credits.
N/A

ME.210.802. Special Studies in Biomedical Engineering. 0 Credits.

ME.210.803. Special Studies and Research. 0 Credits.
N/A

ME.210.804. Biomedical Engineering Teaching Practicum. 0 Credits.
Graduate biomedical engineering students will assist the core course instructors in developing curriculum, lesson planning, class and homework assignments, assessments, grading policies and overall classroom management in an effort to gain practical training in the student’s major are of study.

ME.220 (Dermatology)

ME.220.600. Immunostaining Targets in CCCA. 0 Credits.

ME.220.669. Dermatology Research. 0 Credits.
Provides an opportunity for students to actively conduct research in Dermatology.

ME.220.699. Dermatology Elective. 0 Credits.
For Medical Students only. Specialized Topics inDermatology .
Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.250 (Health Science Informatics)

ME.250.651. Topics in Interdisciplinary Medicine - Clinical Informatics. 0 Credits.

ME.250.750. Health Information Systems: Design to Deployment. 3 Credits.
N/A

ME.250.755. Natural Language Processing in the Health Sciences. 3 Credits.
There is significant demand in both academia, research and industry for informatics professionals who are well versed in natural language processing (NLP). In this course, students will be oriented to the various applications of NLP in biomedicine, healthcare and public health. The course will emphasize the importance of clearly defining what problem needs to be solved or what questions one seeks to get answered via the use of NLP. Approaches to data mining of free text from the biomedical literature, clinical narratives, and other novel data sources will be covered. There will be opportunities for students to develop NLP and machine learning algorithms. Applications of these tools in epidemiologic surveillance, clinical decision support, and other relevant use cases will be covered.

ME.250.756. Informatics and the Clinical Research Lifecycle: Tools, Techniques and Processes. 3 Credits.
Research informatics deals with how informatics can and should support research and how research is altered by that support. The course addresses the entire life cycle of a clinical-research program: idea generation, team building, protocol development, obtaining funding, addressing ethical concerns, obtaining permissions, recruiting participants, providing the intervention and associated care, data collection, data analysis, data archiving, and results dissemination. The course addresses the related topic of translational informatics, incorporating the results of clinical and bioinformatics research into health practice. In each case, the course will highlight novel principles involved, tools available, evidence for their success, and implications for the future.

ME.250.770. Clinical Data Analysis with Python. 3 Credits.
This course introduces the knowledge of Object Oriented Programming and Python programming language. Covers Python data structures and practical data analysis skills in a clinical informatics context. Presents methods for data manipulation, data cleaning, and data visualization using Python Pandas, Numpy, and Matplotlib libraries. Discusses basicc statistical analyses methods in the healthcare setting.

ME.250.771. Introduction to Precision Medicine Data Analysis. 3 Credits.
This course will introduce students to the rapidly evolving field of precision medicine and the role of big data analytics in improving patient care, clinical decision making, and population health management. The course will provide an overview of the array of different tools that can be used by data scientists and clinical informaticians in a secure research environment.

ME.250.775. Advanced informatics Elective: Informatics Education. 2 Credits.
This practicum is intended to provide senior graduate students with experience in curriculum design, teaching, and pedagogy in the field of informatics. Students will be introduced to the CAHIM accreditation standards and AMIA competencies around health informatics.

ME.250.776. Advanced informatics Elective: Telemedicine. 2 Credits.
This practicum is intended to provide senior students in the Informatics Education Program with experience in the fild of telemedicine. Experiences may include exposure to clinical workflows, strategic planning around technology, reimbursement/policy, elements of data collection, and other esstential concepts.

ME.250.777. Clinical Decision Analysis. 2 Credits.
This advanced elective introduces students to the basic theory and practice of decision analysis as applied to the clinical context, with an eye towards clinical decision support and the place of decision modeling in the informatics context. Topics includes: articulating and structuring in decision trees, creating a decision model, skill building in decision trees, and exposure to Markov models and discrete event simulation.

ME.250.778. Implementing Fast Healthcare Interoperability Resources. 2.5 Credits.
Fast Healthcare Interoperability Resources (FHIR) is transforming healthcare with an open-web services' standards approach to clinical integration. This course is a hands-on experience working on integrating digital health and clinical systems interoperability.

ME.250.779. Advanced Elective in Precision Medicine. 2 Credits.
This elective option is with the Biomedical Informatics and Data Science education program. It is intended for graduate students in the Certificate or Masters programs with an interest in exploring advanced topics on precision medicine analytics. Students will have access to the Precision Medicine Analytics Platform (PMAP) and focus on a specific topic of interest. These topics may include: artificial intelligence, machine learning, common data models, fast healthcare interoperability resources, and the programming languages Python and Structured Query Language (SQL).

ME.250.781. Data Driven Digital Health Entrepreneurship. 1 Credit.
This seminar is for graduate students with an interest in digital health innovation who want to explore pathways to entrepreneurship. We are in the midst of a revolution in digital health with the widespread adoption of electronic medical records and increasing adoption of wearable fitness and health tracking devices. Maturing big data analytics, artificial intelligence and clinical decision support tools allow for rapid deployment of innovations. Although we now have the ability to derive insights from text, data and images spanning petabytes of data, learners in this course will have the opportunity to carefully define what the exact healthcare problem is that any particular solution is looking to solve. They will hear from experts in the field about features of digital health solutions that can be used to solve problems. Students will explore the advantages, disadvantages and value proposition for various digital health solutions and the associated market opportunities.

ME.250.782. Observational Health Research Methods on Medical Records. 3 Credits.
This course provides practical experience working with the OMOP common data model (CDM) from the Observational Health Data Science and Informatics (OHDSI) community. The class will provide students with an understanding of the research challenges posed by traditional healthcare data sources and will highlight the importance of the standardized data model. Students will gain familiarity with tools for cohort discovery such as Athena and Atlas.

ME.250.854. Health Sciences Informatics Mentored Research. 3 Credits.
This course number applies to Research Masters students and both lab rotations for PhD students and to continuing research for PhD students. The informatics research is precepted by a faculty member in the Division or approved by the Training Program Director. The research may originate with the preceptor or with the student, and may be different phases of development. In the case of the lab rotation, most of the activity is supervised by the preceptor. In the case ongoing research, there is supervision by the Training Program Director as well as the research committee assembled by the student. Milestones are set for each quarter. Please note that a comprehensive research plan must by submitted to the program director for approval no later than Septermber 15 of Year 2. Failure to do so will result in probation for the student.

ME.250.855. Health Sciences Informatics Technology Practicum. 3 Credits.
A practical experience supervised by Hopkins faculty that enables students to showcase and develop skills gained during the didactic curriculum. In correct with a preceptor and an academic advisor, students articulate a concrete deliverable and work with the preceptor and their team to accomplish the deliverable. Example activites include, but are not limited to, literature review, systems analysis, systems evaluations, data analysis, or plans for any of these.

ME.250.856. Health Sciences Informatics Independent Study. 3 Credits.
Independent study courses must be approved by the Program Director. Please note that it is important to follow the steps outlined below in order to comply with BIDS/SOM registration and grading policies. Students submit a course description to the Training Program Director. Course Instructor and Program Coordinator. The description will include the length of Independent Study (up to 2 quarters or 1 semester), the time commitment (given in hours per week or quarter), the student's goals and what the deliverable will be. On approval by the Program Director, the Coordinator will supply you with the appropriate course number for registration. It is important that the course instructor be prepared to submit a letter grade on their department letterhead to the Program Coordinator

ME.250.858. Capstone. 8 Credits.
The Capstone Project will generally last 2 quarters. Students will join an active work group, supervised directly or indirectly by the practicum preceptor.

ME.250.859. Informatics PhD Research. 1.5 Credits.
After selecting a laboratory for their thesis, the student will establish a research plan wih their faculty advisor.

ME.250.860. Student Seminar and Grand Rounds. 1 Credit.
Weekly combined seminar and Grand Rounds during term. Students not matriculated in our formal degree or certificate program must seek the instructor's permission. Grand Rounds is open to all for those not seeking course credit for attending.

ME.250.901. HSI: Knowledge Engineering and Decision Support. 3 Credits.
This course provides a framework for understanding decision support in the workflow of the health sciences. The focus is on the types of support needed by decision makers, and the features associated with those types of support. A variety of decision support algorithms are discussed, examining advantages and disadvantages of each, with a strong emphasis on decision analysis as the basic science of decision making.Students are expected to demonastrate facility with one algorithm in paritcular through the creation of a working prototype, and to articulate the evidence and effectiveness of various types of decision support in health sciences and practice, in general.

ME.250.952. Leading Change Through Health IT. 3 Credits.
Prepares learners to lead organizations implementing new IT systems. Covers the knowledge and skills that enable clinical and public health informaticians to lead and manage changes associated with implementation, adoption, and evaluation of effective use of health information systems. The course coveres the following topics: Leadership & governance in Health IT, Project Management, Strategic Planning for Health Information Systems, Workflow Re-engineering and Change Management.

ME.250.953. Introduction to Public Health and Biomedical Informatics. 3 Credits.
Introduces students to the core principles of informatics as applied to the entire range of health, from prevention, through illness, to population and public health. Focuses on frameworks within which to describe and explain health information systems. Provides to non-clinicians basic exposure to the terminology of clinical care and public health. Provides to technical novices of basic exposure to IT terminology. Provides all students entry-level concepts and skills for later courses in the informatics sequences.

ME.250.954. HIT Standards and Systems Interoperability. 3 Credits.
The purpose of this course is to learn the data, information and knowledge standards critical to the successful implementation of local, regional and national health-related information systems. Target competencies are to identify the apropriate level of HITSP standards for an informatics problem, and select the appropriate standard within that level: create use cases and an organizational process to define an interoperability standard for a specific healthcare/regional situation; participate in a national standards-creation process.

ME.250.955. Applied Clinical Informatics. 3 Credits.
This course introduces students to the field of Applied Clinical Informatics, which is focused on improving patient care through enhanced use of clinical information systems. Students will be exposed to a wide range of clinicial workflows and how health information technology and systems support them. Topics in the course included: Bar Coding, Clinical Decision Support, Computerized Provider Order Entry, Electronic Health Records, Electronic Prescribing, Health Information Exchange, Master Patient Index, and Telehealth/Telemedicine. Each of these will be examined within the appropriate context of clinical care transitions, patient saftey and care quality, inpatient/ambulatory care settings, information security and deployment of HIT.

ME.250.957. Database Querying in Health. 3 Credits.
Through class discussion and interactive Python data exercises, this course provides practical experience working with electronic medical record data. The class will provide students access th the Johns Hopkins Precision Medicine Analytics Platform (PMAP) to conduct analysis on a de-identified EMR dataset of 60K patients with over 100 million data elements. The class will work with Jupyter notebooks to learn how to prepare EMR data and contruct models from encounter, symptoms, lab, procedure, vitals and medication data. The topics will include exploratory data analysis,data cleaning, feature extraction, model construction, and evaluation. Working knowledge of SQL is expected and Python encouraged. The class will have access to the PMAP cookbook of Jupyter notebook recipes and Datacamp accounts will be provided for students to master working with major Python librairies Pandas, Matplotlib, Numpy and Sci-kit.

ME.250 (Medicine)

ME.250.300. Research Practicum. 0 Credits.
N/A

ME.250.606. Medicine Core Clerkship. 0 Credits.
Core clerkship in medicine

ME.250.607. Ambulatory Medicine Core Clerkship. 0 Credits.

ME.250.608. Human Pathophysiology Remediation. 0 Credits.

ME.250.610. Genes to Society - Immunology I. 0 Credits.

ME.250.611. Genes to Society - Micro/Infectious Disease. 3 Credits.
4-week course with a focus on lecture, laboratory (both virtudal and "wet" labs), small group exercises, team based learning and clinical correlations on bacteria, viruses, fungi, and parasites. Goal is for the student to build a strong foundation in infectious diseases.

ME.250.612. Genes to Society - Hematology/Oncology. 0 Credits.

ME.250.613. Genes to Society - Immunology II. 0 Credits.

ME.250.614. Genes to Society - Immunological Principles. 0 Credits.

ME.250.615. Advanced Clerkship in Critical Care - Medical Intensive Care. 0 Credits.

ME.250.616. Advanced Clerkship in Critical Care - Medical Intensive Care at Johns Hopkins Bayview Medical Center. 0 Credits.

ME.250.617. Advanced Clerkship in Critical Care - Coronary Intensive Care. 0 Credits.

ME.250.618. Advanced Clerkship in Critical Care - Coronary Intensive Care at Johns Hopkins Bayview Medical Center. 0 Credits.

ME.250.619. Genes to Society - Immunology. 2 Credits.
N/A

ME.250.620. Elective in Primary Care Internal Medicine/Family Practice. 0 Credits.

ME.250.621. Advanced Ambulatory Clerkship. 0 Credits.

ME.250.622. Genes to Society - Hematology. 0 Credits.
N/A

ME.250.699. Medicine Elective. 0 Credits.
For Medical Students only. Specialized Topics in Medicine. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.250.702. Advanced Topics in Molecular Immunology: Computational Immunology. 0 Credits.

ME.250.703. Graduate Immunology. 4 Credits.
This course is offered as a major course for graduate students in the 3rd and 4th quarter to provide a comprehensive survey of modern cellular and molecular immunology. The content is delivered by lectures and small groups. The course is open to graduate students and postdoctoral fellows.

ME.250.706. Topics in Cellular and Molecular Medicine. 1 Credit.

ME.250.709. Immunology Course Discussion. 1 Credit.
The goal of the Immunology Core Course is to correlate what the students are learning in their required First Year Graduate classes with an immunologically relevant topic or technique. The sessions are formatted in a manner such that a student, backed up with the expertise of the faculty leader, can present either a classic or new paper from the literature. In some cases the sessions will consist of demonstration or problems sets.

ME.250.714. HIV Biology. 0 Credits.
This course will review clinically relevant aspects of HIV biology including the discovery of HIV, the steps in the HIV life cycle, the dynamics of HIV replication in vivo, HIV pathogenesis, the immune response to HIV, the pharmacology of antiretroviral drugs, and the statues of efforts to cure HIV infection and develop an HIV vaccine.

ME.250.716. Innate Immunity. 0 Credits.

ME.250.717. Control of Lymphocyte Apoptosis. 0 Credits.

ME.250.719. Tumor Immunology & Immunotherapy. 0 Credits.
This graduate level advanced course focuses on the role of the immune system in cancer biology. It will expand upon basic immunologic principles to discuss the importance of the immune system both as a protector from and a cause of cancer. It will be explored in a faculty-led seminar format. This course is appropriate for graduate students, postdoctoral fellows and research staff/scientists.

ME.250.721. Fundamentals of Immune Recognition. 1 Credit.
This will be an introductory course in Immunology intended for first year graduate students. The emphasis is to provide entering graduate students with a basic foundation in immune cell development, recognition and response. This course will form the basis for more advanced coursework in immunology as well as prepare students for in-depth discussions of the field encountered in seminars, journal clubs and in the laboratory setting.

ME.250.722. Autoimmunity. 1 Credit.

ME.250.723. Immunometabolism. 0 Credits.
Immunometabolism is emerging as an important component of Immune cell regulation. Starting with understanding Warburg physiology the Course will examine key findings in this rapidly evolving field as they relate to basic immunology, autoimmunity, transplantation and immunotherapy for cancer.

ME.250.724. Translational Immunology. 1 Credit.
This graduate level advanced course focuses on the role of the immune system in human health and disease. It will expand upon basic immunologic principles to discuss the importance of the immune system both as a protector from and a cause of disease. Organ specific immune responses, human immune knockouts, and immune responses occurring in the setting of disease will be explored in a paired lecture and journal club format. This course is appropriate for graduate students and postdoctoral fellows who have completed a graduate level course in immunology.

ME.250.725. Immunology Forum. 1 Credit.
The course will cover concepts in innate and adaptive immunology at the contemporary forefront of research at the molecular, cellular, organismal, and human population levels. Subject matter will include basic, translational, and engineering-focused immunology.

ME.250.780. Information Sources & Search Techniques for informatics Professionals. 1 Credit.
As a professional in the health informatics field, you will need to be able to stay current on key topics related to your profession, find evidence to solve informatics problems that cross the disciplinary boundaries of health, computing, and human factors, and contribute publishable papers to the body of informatics scholarship. This course will introduce you to the foundation and skills that you will need to engage in these research endeavors. You will learn about the biomedical sources available to you and how to efficiently and effectively search these sources. You will also learn techniques for evaluating what you find from these sources and what tools to use for storing and managing this information. The course will also address issues in the research field including how open access impacts your work as a scholar and consumer of research. Finally, you will gain the tools for establishing yourself as a professional and staying current in your field.

ME.250.804. Introduction to Immunology Research (Parts I and II). 1 Credit.
This course is designed to expose our first year students to the wide array of Immunology research that is offered here at Johns Hopkins. The course consists of two parts: Part 1. "Chalk Talks" A series of talks by the Immunology faculty to learn about research activities. Part 2. "Immunology Journal Club (IJC)" Created to provide them with an arena for reading and discussing journal articles with their peers. The purpose of the IJC is to help students develop the habit of reading a wide variety of immunology journal articles early and throughout the graduate career.

ME.250.861. Health Science Informatics Research Methods I. 3 Credits.
This course introduces students to the principles of health informatics research design and methods. Topics covered include: identifying health informatics research domains, designing informatics research, selecting appropriate informatics methods, integrating data science in rearch, and conducting literature reviews.

ME.250.862. Health Sciences Informatics Research Methods II. 3 Credits.
This course introduces students to health informatics research methods and processes. Topics covered include: understanding clinical data and knowledge, reviewing specialized health informatics research topics, and conducting a quantitative informatics resarch project.

ME.250.863. Health Sciences Informatics Research Methods III. 3 Credits.
This course introduces students to advanced health informatics analytic methods. Topics covered include: understanding statistical methods used for health informatics research, conducting an advanced analytic project using complex clinical data repositories, and explaining the informatics challenges in the analytic process.

ME.250.864. Health Sciences Informatics Research Methods IV. 3 Credits.
This course introduces students to scientific dissemination methods and career development in health informatics research. Topics covered include: authoring informatics research manuscripts for publication, preparing informatics research grants, and career development options and strategies.

ME.250.958. Digital Health Innovation & Regulatory Science. 1 Credit.
From smartwatch apps and telehealth to the use of artificial intelligence (AI) and machine learning (ML) on big data, digital health is shaking up the health care industry. These tools promise to revolutionize how patients and healthcare providers access health data. In some cases, digital health tools will even diagnose and treat diseases. For all its potential, digital health is not without risks, though. There must be adequate legal, quality, and safety protections to ensure responsible and high-quality innovation. This course will introduce students to the rapidly evolving field of digital health regulation and the role of the FDA, FTC, OCR, and other legal and regulatory bodies in this space. At the end of this course, students will be able to: Define key terminology relevant to the fields of digital health innovation and medical device regulation. Discuss the relationships between regulators, technology developers, healthcare providers, and patients. Describe the requirements for digital health technology to be considered Software as a Medical Device (SaMD) by the FDA Identify the various regulatory pathways for SaMD and the main considerations.

ME.260 (Molecular Biology and Genetics)

ME.260.300. Research Practicum. 0 Credits.
N/A

ME.260.699. Molecular Biology and Genetics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Molecular Biology and Genetics. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.260.708. Fundamentals of Genetics. 2 Credits.
This module covers fundamental principles of genetics, focusing on eukaryotic model systems. Problem sets are an integral learning tool in this course. The course is taught by faculty from the Departments of Molecular Biology and Genetics, Biological Chemistry, Cell Biology, and Physiology.

ME.260.709. Molecular Biology and Genomics. 1.5 Credits.
This course covers the molecular biology and genomics of both prokaryotes (using E. coli as the model organism) and eukaryotes, with a focus on "model organisms" including yeast, flies, worms, mice as well as humans. Both the molecular biology (reductionist) perspective and the genomics (systems biolgy) perspective will be provided on each topic, and there will be heavy emphasis on mechanism and regulation of fundamental processes in biological information transfer DNA->RNA->protein. This lecture module will cover genes and genomes, transcription and RNA world, replication, chromosome structure and function and genome instability.

ME.260.710. Epigenetics. 1 Credit.
While the human genome sequence has been available for over a decade, it has become increasingly clear that epigenetic mechanisms are key to understanding gene regulation, cell differentiation, and disease states. Genome function appears to be governed by its architecture, including chromatin compaction, looping, long- and short-range chromosomal interactions, as well as interactions with sub-compartments such as the nuclear periphery. This course will present recent advances in epigenetics, including Chromatin Biochemistry, Cancer Epigenetics, Epigenetic Epidemiology and Epigenetic Pharmacology.

ME.260.711. Transcription Mechanisms. 1 Credit.
Discussion of current topics in transcription regulation.

ME.260.712. Introductory Molecular Immunology. 0 Credits.
This is an overview course focusing on the fundamental processes involved in the development, activation and regulation of an immune response. The course will draw upon biochemical, genetic, molecular and cellular biological principles.

ME.260.714. Genome Rearrangements. 0 Credits.

ME.260.802. Special Studies and Research. 0 Credits.
Opportunities to carry out special studies and research in various branches of immunology will be made available not only to candidates for advanced degrees but also to other qualified students. Arrangements for such work must be made with individual members of the faculty.

ME.260.811. Special Studies and Research. 0 Credits.
Thesis Research

ME.260.812. Great Experiments in Biology. 1 Credit.
We will read approximately 30 classic papers. The course aims to expose students to some of the greatest experiments in biology from 1750 to the present and the creative thinking that inspired them. Open to all members of the JHMI community.

ME.280 (Ophthalmology)

ME.280.600. Ophthalmology Basic Clerkship. 0 Credits.

ME.280.699. Ophthalmology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Ophthalmology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.280.700. Cellular and Molecular Biology of Photoreceptors. 1.5 Credits.

ME.280.703. Ophthalmology. 0 Credits.
Corequisite(s): ME.290.3

ME.290 (Otolaryngology)

ME.290.699. Otolaryngology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Otolaryngology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.300 (Pathology)

ME.300.601. Introduction to Pathology Remediation. 0 Credits.

ME.300.699. Pathology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Pathology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.300.710. Pathobiology and Disease Mechanisms. 3 Credits.
Pathobiology and Disease Mechanisms provides an intensive study of human disease through traditional lectures, and the discussion of the primary scientific literature including classic and current cutting edge papers. The course combines lectures with small group discussions, and will cover topics relevant to infectious, degenerative, neoplastic, and inflammatory disease of the major organ systems. The primary objective of the course is to understand how research findings elucidate the underlying mechanisms leading to clinical manifestations of disease (seen grossly and microscopically in the traditional Pathology component of the course). Active student participation is required in the form of presenting and discussing papers. The course is open to all Ph.D. and MD/PhD students

ME.300.711. Introduction to Translational Research Rotation 1. 0 Credits.
Introduction to Translational Research I is designed to acquaint pre-doctoral students with the language of anatomic pathology and clinical pathology through practical experiences. Students will rotate through surgical pathology and various laboratory services including chemistry, hematology, the blood bank, medical microbiology, and diagnostic immunology. Students will become acquainted with the resources that can be made available to research, and will appreciate the translational relevance of their research to clinical medicine. Open to students in the Graduate Program in Pathobiology and others with permission of the Program Directors.

ME.300.712. Introduction to Translational Research Rotation 2. 1 Credit.
Introduction to Translational Research II is designed to acquaint pre-doctoral students with the language of anatomic pathology and clinical pathology through practical experiences. Students will rotate through surgical pathology and various laboratory services including chemistry, hematology, the blood bank, medical microbiology, and diagnostic immunology. Students will become acquainted with the resources that can be made available to research, and will appreciate the translational relevance of their research to clinical medicine. Open to students in the Graduate Program in Pathobiology and others with permission of the Program Directors.

ME.300.713. Pathology for Graduate Students: Basic Mechanisms. 3 Credits.
Pathology for Graduate Students: Basic Mechanisms will concentrate on the basic mechanisms of tissue injury and disease both at the molecular level and as they are manifested in human tissues. Normal tissue histology and function will be discussed in relation to organ systems as a basis for the understanding of disease mechanisms. Morning Lectures and discussion groups will be followed by afternoon laboratory and microscopic sessions. Students will dissect and prepare mouse tissues for a histology slide collection that will serve as the basis of some of the microscopic sessions. This block on basic pathogenic mechanisms will prepare students for more advanced topics on organ specific diseases that can be taken individually or in succession. The advanced blocks will be organized under 3 themes: 1) Neoplasia, 2) Immunopathology, and 3) Neuropathology.

ME.300.714. Pathology for Graduate Students: Cancer. 1 Credit.
Pathology for Graduate Students: Cancer will concentrate on the biology of cancer both at the molecular, cellular, and tissue levels. While the course is largely organized to study cancer in the context of specific organs, general principles of neoplasia will be continuously discussed as a basis for understanding the disease process. The format will include lectures, discussion of research papers, and review of histological slides.

ME.300.715. Pathology for Graduate Students: Neuropathology. 1 Credit.
Pathology for Graduate Students: Neuropathology will concentrate on the basic mechanisms of Neuropathology both at the molecular level and in human diseases. Normal tissue histology and function will be discussed as a basis for the understanding of Neuropathology. Animal models of neuropathological diseases will be critically considered

ME.300.716. Pathology for Graduate Students: Immunology/Infectious Disease. 1 Credit.
Pathology for Graduate Students: Immunology and Infectious Disease will concentrate on the basic mechanisms of Immunology and Infection in human diseases. The format will include lectures, discussion of research papers, and review of histological slides.

ME.300.717. Grant Writing 101. 3 Credits.
The course will explore how to pick a scientific area. Students will write mini-grants in the format of an NIH F31 predoc award.

ME.300.800. Research in Pathobiology. 3 Credits.
Long-term research projects will be undertaken with faculty members of the Graduate Program in Pathobiology serving as mentors. Course also covers the three required rotations for 1st years.

ME.300.802. Teaching in Pathobiology. 1 Credit.
Designed to prepare students for teaching through participation as a teaching assistant for Pathobiology required courses.

ME.300.803. Pathobiology Journal Club. 3 Credits.
This course will seek to train graduate students in the fundamentals and art of understanding and determining the quality and structure of scientific publications. Students will select publications for presentation. Papers will be carefully read and scrutinized for detail of experimental background and logic, experimental approach and methods, results, figure composition and presentation, and interpretation. Students, with advice from a faculty mentor, will prepare and present to an audience a PowerPoint presentation on the selected paper. The course is open to all graduate students and postdoctoral fellows.

ME.320 (Pediatrics)

ME.320.600. Pediatrics Core Clerkship. 0 Credits.
The core clerkship in Pediatrics is an eight-week experience in which students care for patients in both inpatient and outpatient (ambulatory) settings. The clerkship focuses on general pediatrics

ME.320.602. Advanced Clerkship in Critical Care - Pediatric Intensive Care. 0 Credits.

ME.320.699. Pediatrics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Pediatrics. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.330 (Pharmacology and Molecular Sciences)

ME.330.300. Research Practicum. 0 Credits.
N/A

ME.330.601. Pharmacology Remediation. 0 Credits.

ME.330.602. Scientific Foundations of Medicine-Pharmacology. 0 Credits.
N/A

ME.330.699. Pharmacology and Molecular Sciences Elective. 0 Credits.
For Medical Students only. Specialized Topics in Pharmacology and Molecular Sciences. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.330.707. Graduate Pharmacology I. 2 Credits.
This course is designed for second year graduate students. It covers basic pharmacology concepts and major drug classes related to disease therapies. The course covers basic principles of enzyme kinetics, receptors, pharmacokinetics, drug metabolism, and drug discovery.

ME.330.708. Primary Source Readings and Analysis. 0.5 Credits.
Students meet in journal club format to critically review research papers related to core courses.

ME.330.709. Organic Mechanisms in Biology. 2 Credits.
This course deals with the chemical mechanisms of enzymes. It is intended to illustrate how catalysis in biological systems can be understood using principles derived from organic reaction mechanisms.

ME.330.710. Mechanisms in Bio-Organic Chemistry. 0 Credits.
This course deals with the mechanisms of action of enzymes, and is intended to introduce some of the basic principle of catalysis and illustrate how our knowledge of organic reaction mechanisms can help in interpreting enzyme-catalyzed processes.

ME.330.711. Virology. 0 Credits.

ME.330.712. Introduction to Glycobiology. 1 Credit.
Each cell carries a rich and varied sugar coating – its “glycocalyx”. From microbial pathogenesis to axon regeneration, the cell’s sugar coating is intimately involved in cell-cell recognition. In addition, sugars constitute the extracellular matrix, regulate glycoprotein folding, distribution and function, and regulate intracellular proteins in a dynamic regulatory system akin to phosphorylation. Glycobiology, the discipline that explores the functions of sugars, is rapidly emerging as the next growth area in understanding molecular structure-function relationships beyond the genome and proteome. This course will introduce you to the discipline, its structural diversity, and its functional implications

ME.330.713. Nutrition and Chronic Disease Prevention. 0 Credits.
We will examine the ways in which nutrition research, dietary practices, and the economic and social realities of food production, regulation, and policy, impact the health span of aging populations. Central themes include: (a) reveiwing intrinsic molecular mechanisms that contribute to the pathological process underlying aging and the development of cancer and chronic illness: (b) identifying agents, especially phytochemical and dietary components, that can modify these pathways: (c) examining potential lessons from the mechanisms plants have evolved for their own protection: (d) examining the role that gastrointestinal microbiota play in the relation between nutrition and disease patterns.

ME.330.714. Essential Grantsmanship: Writing the Research Grant Proposal. 1 Credit.
This course is required for all students in the Pharmacology graduate program and is designed to provide a mentored opportunity to build grantsmanship skills through direct experience in writing, reading, and reviewing research proposals. During this course, students will be guided through the ins and outs of writing a strong NIH F31-style application, beginning with deciding upon the research topic/question and then writing a truncated grant proposal that contains all of the functional elements. Additionallly, students will improve communication skills through a series of chalk talks describing their grant objectives and experimental design, learn appropriate procedures in data presentation, data reproducibility, authenticating and validating reagents, data management, and basic statistical analyses. Students will be refreshed in elements for enhancing rigor and reproducibility through use of the 3R modules that are particularly relevant in grant writing (including Experimental Design, Authenticating and Validating Reagents, and Data Presentation).

ME.330.715. Graduate Pharmacology II. 2 Credits.
This course is designed for second year graduate students. It covers basic pharmacology concepts and major drug classes related to disease therapies. The course includes lectures on therapeutic agents used in infectious diseases, cancer, cardiovascular diseases, endocrine disorders, inflammation, and nervous system diseases.

ME.330.801. Research. 0 Credits.
Lab Research in Pharmacology

ME.330.802. Topics in Pharmacology. 0.5 Credits.
Biweekly seminar series

ME.330.804. Mass Spectrometry in an Omics World. 1 Credit.
This course will cover instrumentation methods and applications of high performance liquid chromatography and mass spectrometry.

ME.330.805. Introduction to Clinical Pharmacology and Medicine. 0 Credits.
This elective is designed to give graduate students some first hand knowledge of pharmacology in the Hospital or clinic. Students will have the opportunity of joining a clinician seeing/treating patients in the Hospital or in a clinic. This experience will vary as a function of the particular clinician the student is teamed up with but will typically involve a review of the drugs being used, mechanisms of action, modes of administration, toxicities, costs and other considerations in drug use. On inpatient units the students will also join rounds, learning the roles that housestaff, nurses, pharmacist, specialty fellow and others play in patient care. Typically a written report or presentation is expected at the end of the elective.

ME.330.806. Research - Pharmacology (BCMB). 0 Credits.
Thesis Research

ME.330.807. Clinical Pharmacology Clinical Conference. 0 Credits.

ME.330.808. Principles of Clinical Pharmacology. 1 Credit.
A series of recorded lecturest by experts from around the country form the bases for a presentation/discussion course that covers the spectrum of clinical pharmacology: pharmacokinetics, drug metabolism and transport, assessment of drug effects, and drug therapy in special populations. One and one half hours for each lecture/discussion. Required course for Clinical Pharmacology fellows.

ME.330.809. Analytical Methods of Clinical Pharmacology. 1.5 Credits.
Course is designed to familiarize students with basic methods of data analysis for PK and PD data analysis through lecture, demonstration, classroom exercises and homework. Course is designed primarily for biomedical graduate and post-doctoral students with existing undergraduate knowledge of biology and chemistry. Some statistical background is highly beneficial. WinNonlin* will be used to demonstrate analytical methods, perform in class exercises, and complete homework assignments.

ME.330.810. Laboratory Basics. 0 Credits.

ME.330.811. Programmed Cell Death and Autophagy. 0 Credits.
Short elective course consists of short lectures, readings, discussions and short assignments on the molecular and cellular biology of programmed cell death and autophagy. Topics include classical and emerging death pathways (e.g. apoptosis, necroptosis, pyroptosis, ferroptosis), autophagy mechanisms (e.g. macroautophagy, mitophagy, chaperone-mediated autophagy) in physiology and disease (e.g. cancer, neurodegeneration, infection and immunity), and crosstalk between these processes. Evaluation based on readings, in-class contributions and short assignments.

ME.340 (Biological Chemistry)

ME.340.300. Research Practicum. 0 Credits.
N/A

ME.340.699. Biological Chemistry Elective. 0 Credits.
For Medical Students only. Specialized Topics in ME Biological Chemistry. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.340.702. Current Topics in Biological Chemistry. 2 Credits.
Current Topics in Biological Chemistry, Rigor and Reproducibility in Research and some additional modue (paper review, proposal writing, Nobel-Prize winning discoveries, DEI, etc.

ME.340.704. Developmental Biology. 1.5 Credits.

ME.340.706. Cell Migration in Development, Homeostasis and Disease. 0 Credits.

ME.340.709. Fundamentals of Glycobiology. 2.5 Credits.
Lectures, journal clubs, and seminars are utilized to provide students with a borad foundation in the field of Glycobiology.

ME.340.710. Techniques in Glycobiology. 4 Credits.
Techniques in Glycobiology

ME.340.711. Bacterial Cell Biology and Development. 0 Credits.
This course will examine a breadth of topics in bacterial cell biology in the form of faculty lectures providing foundational information and student presentations of current research. Topics to be covered include: cell shape, polarity, and division; cell cycle control; intra-and intercellular signaling; bacterial communitites; developmental processes in bacteria; and antibiotic targets and resistance.

ME.340.712. Bacterial Signaling and Communities. 0 Credits.
This course will examine a breadth of topics in bacterial cell biology in the form of faculty lectures providing foundational information and student presentations of current research. Topics to be covered include: cell shape, polarity, and division; cell cycle control; intra- and intercellular signaling; bacterial communities; developmental processes in bacteria; and antibiotic targets and resistance.

ME.340.713. Microbial Pathogenesis. 1 Credit.
This course will examine a breadth of topics in microbial pathogenesis in the form of faculty lectures providing foundational information and student presentations of current research. Various aspects of host-pathogen interactions will be covered including routes of infection; adhesion, invasion and colonization; extracellular, cytosolic and vacuolar pathogens; virulence mechanisms and host cell manipulation; innate immunity and host defense mechanisms; antibiotic therapy and resistance.

ME.340.714. Exosomes: Molecular Mechanisms and Biomedical Applications. 0 Credits.
This course will explore the biology of exosomes and other secreted vesicles, as well as their biomedical roles and translational applications. Class Content will consist of a combination of in-class lectures, assigned readings, assigned literature research projects, and student presentations.

ME.340.715. Graduate Elective in Proteomics. 1 Credit.

ME.340.805. Research in Biochemistry and Molecular Biology. 0 Credits.
N/A

ME.340.806. Research Projects in Biochemistry, Biophysics and Molecular Biology. 0 Credits.

ME.340.808. Research-BCMB. 0 Credits.
Thesis Research

ME.360 (Physiology)

ME.360.602. Scientific Foundations of Medicine-Cell Physiology. 0 Credits.

ME.360.699. Physiology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Physiology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.360.720. Organ Physiology. 6 Credits.
The course provides a basic understanding of the many different aspects of the internal structure and function of the body. It aims to present a comprehensive survey of the complex interrelationships that exist between the structure and function of cells and organs.

ME.360.728. Pathways and Regulation. 2 Credits.
This course will cover the principles of membrane transport, bioenergetics, metabolic pathways, cell cycle and cell death with particular emphasis on regulatory mechanisms including receptor-mediated signaling, small GTPases, lipid molecules, kinases and phosphatases.

ME.360.733. Renal Physiology. 1 Credit.
N/A

ME.360.734. Cardiovascular Physiology. 1 Credit.
N/A

ME.360.735. Endocrinology and Reproductive Physiology. 2 Credits.
N/A

ME.360.736. Pulmonary Physiology. 1 Credit.
N/A

ME.360.737. Gastrointestinal Physiology. 1 Credit.
N/A

ME.360.800. Research. 0 Credits.
Lab Research

ME.360.801. Current Physiology. 1 Credit.
Students are required to attend all Physiology Department Seminars, which will be posted throughout the department. Also, students are required to attend 12 luncheons with seminar speakers. For six of the seminars, the students will be required to read a relevant paper from the speaker's lab prior to the seminar (a relevant paper can be found by searching the web). After the seminar, students will write a 300-500 word summary of the talk (including 5 or more references) and submit to Madeline the Tuesday after the seminar.

ME.360.802. Research - BCMB. 0 Credits.
Thesis Research

ME.370 (Psychiatry)

ME.370.601. Psychiatry Core Clerkship. 0 Credits.
Core clerkship in psychiatry

ME.370.650. Genes to Society - Mind, Brain, Behavior. 0 Credits.
In Brain, Mind and Behavior (BMB) students will begin to access patient's mental states, behaviors, traits, and stories and to identify the pschological factors that differentitate patients as individuals. Although the main clinical focus is on psychiatric disorder, the perspectives introduced in BMB are of use in any clinical setting where the pathogphysiology is either unknown or unable to usefully explain varriation in patient presentation and treatment response. By the end of the course, students will be familari with the major psychiatric disorders and treatments, with basic principles of behavioral biology, and with a pluralistic approach to address the problems of complex patients.

ME.370.651. Neurogastroenterology Mechanisms of Depression. 2 Credits.

ME.370.699. Psychiatry Elective. 0 Credits.
For Medical Students only. Specialized Topics in Psychiatry. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.370.710. Research in Neurogastroenterologic Mechanisms of Depression. 2 Credits.
N/A

ME.370.801. Research Practicum. 0 Credits.
N/A

ME.380 (Surgery)

ME.380.599. Independent Research Elective. 0 Credits.
Provides an opportunity for students to actively conduct research in Surgery.

ME.380.600. Surgery Core Clerkship. 0 Credits.
Core clerkship in surgery

ME.380.601. Advanced Clerkship in Critical Care-Surgical Intensive Care. 0 Credits.

ME.380.602. Advanced Clerkship in Critical Care-Weinberg Intensive Care. 0 Credits.

ME.380.603. Advanced Clerkship in Critical Care - Cardiac Surgery Intensive Care. 0 Credits.

ME.380.699. Surgery Elective. 0 Credits.
For Medical Students only. Specialized Topics in Surgery. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.381 (Plastic Surgery)

ME.381.300. Research Practicum. 0 Credits.
N/A

ME.381.699. Plastic Surgery Elective. 0 Credits.
For Medical Students only. Specialized Topics in Plastic Surgery. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.390 (Neurosurgery)

ME.390.699. Neurosurgery Elective. 0 Credits.
For Medical Students only. Specialized Topics in Neurosurgery. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.400 (Orthopedic Surgery)

ME.400.599. Orthopaedic Surgery Subinternship. 0 Credits.

ME.400.699. Orthopedic Surgery Elective. 0 Credits.
For Medical Students only. Specialized Topics in Orthopedic Surgery. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.420 (Radiology)

ME.420.300. Research in Radiology (Undergraduate). 1 Credit.
N/A

ME.420.600. Research in the Department of Interventional Radiology. 0 Credits.

ME.420.601. Remote Diagnostic Radiology Tutorial. 0 Credits.
Remote Diagnostic Radiology Tutorial

ME.420.602. Radiological Physics and Dosimetry. 3 Credits.
This course will cover the fundamental physics behind radiation production and interaction, including a review of pertinent mathematics, classical mechanics, and nuclear physics. Topics covered: radioactive decay, radiation producing devices, characteristics of different types of radiation, mechanisms of radiation interaction, and essentials of the determination of absorbed doses.

ME.420.603. Radiation Therapy Physics. 3 Credits.
This course will provide a comprehensive survey of basic radiotherapy physics, fundamental radiation therapy, and contemporary radiation therapy.

ME.420.699. Radiology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Radiology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.420.702. Radiological Physics and Dosimetry. 3 Credits.
This course will cover the fundamental physics behind radiation production and interaction, including a review of pertinent mathematics, classical mechanics, and nuclear physics. Topics covered: radioactive decay, radiation producing devices, characteristics of different types of radiation, mechanisms of radiation interaction, and essentials of the determination of absorbed doses.

ME.420.703. Radiation Therapy Physics. 3 Credits.
This course will provide a comprehensive survey of basic radiotherapy physics, fundamental radiation therapy, and contemporary radiation therapy. Topics to be covered include: external beam radiation therapy, brachytherapy, and special procedures. Image guidance methods will be discussed as well as patient and machine quality assurance.

ME.420.704. Radiation Protection and Safety. 2 Credits.
The course will cover the fundamental principles of radiation protection and safety. Topics covered include: principles of radiation protection, radiation units, radiation measurements, practical aspects of the use of radionuclides, ionizing radiation and public health, regulations regarding radiation protection, and radiation shielding of x-ray facilitites.

ME.420.705. Medical Physics Seminar. 0.5 Credits.
This seminar will focus on current topics in imaging, radioomics/AI, therapy, and radiopharm therapy.

ME.420.706. Radiation Biology. 3 Credits.
This course will cover the current state-of-the-art knowledge of the biological consequences of ioning radiation at multiple length and time scales, including molecular, cellular, whloe-body, and population effects, as well as how this knowledge relates to and is continually informed by applications in radiation therapy and radiation safety.

ME.420.707. Nuclear Medicine Imaging. 3 Credits.
This course covers the physics and methodology aspects of Nuclear Medicine Imaging and Positron Emission Tomography.

ME.440 (Neuroscience)

ME.440.300. Research Practicum. 0 Credits.
N/A

ME.440.301. Research in Neuroscience (Undergraduate). 1 Credit.
N/A

ME.440.699. Neuroscience Elective. 0 Credits.
For Medical Students only. Specialized Topics in Neuroscience. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.440.701. Diseases of the Brain. 0 Credits.

ME.440.702. Cellular Substrates of Learning and Memory. 1 Credit.

ME.440.705. Cellular and Molecular Basis of Neural Development II. 1.5 Credits.
This is a seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development.

ME.440.707. Molecular Mechanisms in Synaptic Transmission. 2 Credits.
An advanced seminar and reading course devoted to the molecular and cellular mechanisms underlying synaptic transmission and the regulation of synaptic plasticity. We will discuss fundamental discoveries in th eareas of synapse formation, transmitter release, vesicle recycling, ribbon synapses, dendritic modulation, LTP/LTD, and homeostatic regulation. Students will present two papers and provide written answers to questions about the assigned reading.

ME.440.709. Neuropharmacology. 1.5 Credits.
The course will illustrate the use of diverse approaches (molecular, biochemical, electrophysiological and behavioral) to decipher how psychotropic drugs impact the brain. The course will utilize a lecture format for the first two classes and then switch to a “journal club” format in which students will present classic and recent articles. Topics to be covered include: opiates, benzodiazepines, antipsychotic drugs, and antidepressant drugs.

ME.440.710. Molecular Mechanisms Of Cell Death: Necrosis To Apoptosis. 0 Credits.

ME.440.711. Cellular and Molecular Basis of Neural Development I: Neuronal Differentiation. 1.5 Credits.
A seminar and reading course devoted to the discussion of the cellular and molecular processes underlying neuronal development. Topics include cell proliferation and migration, nervous system patterning, differentiation of neurons and glia, morphogen and growth factor signaling mechanisms, neuronal polarity, and neural stem cell biology. Examples from vertebrate and invertebrate model systems will be covered. This course is designed to complement The Cellular and Molecular Basis of Neural Development II: Axon Guidance and Synaptogenesis, offered alternate years.

ME.440.712. Science, Ethics and Society. 0.5 Credits.
This is a required course for first year Neuroscience students. The course format will consist of focused discussions with the course director and rotating faculty on pre-assigned case studies and more informal discussions about various topics.

ME.440.715. Trends in the Neurobiology of Aging. 0.5 Credits.
This course will reveiw recent research progress in the fields of agin and neurodegenerative disorders with coverage of cellular, moleular, and systems neuroscience.

ME.440.718. Neurobiology. 1 Credit.
For Non-Neuroscience Program students only. This course provides a comprehensive introduction to cellular and molecular neurobiology. Areas covered by the basic science faculty include the following: Neural development (cell specificaion, differentiation, axon guidance, synapse formation); Cellular electrophysiology (ionic conductances, resting potential, action potentials); Molecular biology of synaptic transmission (neurotransmitters and receptors); Sensory transduction (phototransduction, other sensory systems); Synaptic plasticity (mechanisms of synapse modification); and Cellular basis of neurological and psychiatric disorders.

ME.440.720. The Retinal Ganglion Cell. 0 Credits.

ME.440.721. Development and Function of the Spinal Cord Circuitry. 0 Credits.

ME.440.722. Visual System. 0 Credits.
From outer segments of photoreceptors to the Fusiform Face Area of the cerebral cortex we hav ecome to understand how the visual system works at each of many fundamental levels. This course examines the basis for perception of visible objects at each of these levels. We will use teh secondary literature (scientific reviews) to accent the hard-won truths about visual system functional organization and to highlight ongoing controversies. Students will be led through carefully chosen reviews in a series of lectures and written summaries prepared by faculty. Three exams and a final exam will test students not on their memorization of minutiae but on their understanding of fundamental principles.

ME.440.723. Writing About the Brain. 3 Credits.
The goal of this course is to train working neuroscientists to effectively and clearly communicate ideas aboout nervous system function of a general audience

ME.440.724. Neuroscience Career Skills. 1 Credit.
This course is intended to help graduate students in the Neuroscience Graduate Program obtain an appreciation of options, challenges, and steps towards careers in the field of neuroscience.

ME.440.725. Neurobiology of Substance Abuse Disorders. 0 Credits.

ME.440.726. The Hypothalamus: The Brain's Master Homeostat. 1.5 Credits.
The hypothalamus is he central regulator of a broad range of homeostatic behaviors essential to survival, and plays a key role in controlling emotional and appetitive behaviors. This course offers an overview of both historical and recent work on this vital brain region. Topics covered will include the evolution and development of the hypothalamus, control of circadian rhythms and sleep, regulation of hunger and body temperature, as well as hypothalamic regulation of sexual, defensive, and affiliative behavior.

ME.440.727. Brain Diseases: Neurodevelopmental Diseases. 2 Credits.
This course will consider the emerging unity of approaches and concepts in understanding a range of brain diseases such as schizophrenia, bipolar disorder, autism and related disorders.

ME.440.728. Brain Diseases: Neurodegenerative Diseases. 2 Credits.
The course will provide an in-depth examination of the biology of the classic neurodegenerative diseases such as Huntington's disease, Parkinson's disease, ALS and Alzheimer's disease, and other diseases may be considered depending on student and faculty interest.

ME.440.729. Emerging Strategies in Understanding Innate Behaviors. 0 Credits.
This course will focus on the neural control of homeostatic, appetitive and emotional behaviors, with an emphasis on the pypothalamus. It offers an overview of bothhistorical and recent work on this vital brain region. Topics covered will include the evolution and development of the hypothalamus, control of circadian rhythms and sleep, regulation of hunger and body temperature, as well as hypothalamic regulation of sexual, defensive, and social behavior. Each class will include 20-30 minutes of introductory lecture, followed by in-class discussion of 2 relevant recent papers. The final grade will be based on class participation and one 6- page review article or mock grant proposal on any related topic. An optional lecture on good grant writing practices will also be offered.

ME.440.730. Submitting Your First Paper. 0.5 Credits.
This course is taught by Neuroscience Training Program faculty and provide "how to" training and guidance to second year Neuroscience students.This course covers: knowing when you are ready to write, getting started, writing transparent methods, generating figures, writing an effective discussion section, citation manager, writing for rigor and reproduciblity, choosing appropriate statistics, how to choose a journal, peer review, and how to respond to reviews.

ME.440.800. Research in Neuroscience. 0 Credits.
Research in Neuroscience.

ME.440.801. Readings in Neuroscience (Journal Club). 1 Credit.
A weekly talk on current literature topics of special interest. Students present either journal articles or their own research depending on their year in the program.

ME.440.802. Current Topics in Neuroscience (Research Seminar). 1 Credit.
Weekly lecture on current research by active researchers. Topics are chosen so that an overall balance of subjects in neuroscience are covered in the course of a year. Students receive a reading list before the seminar and will be given an opportunity to meet with outside speakers.

ME.440.803. Teaching in Neuroscience. 0 Credits.
TBD

ME.440.804. Directed Readings in Neuroscience. 0 Credits.
Independent course work, directed by assigned faculty member.

ME.440.807. Topics in Somatosensory Research. 0 Credits.
TBD

ME.440.808. Physiology of Sensory Transduction. 1.5 Credits.
A reading/presentation course focusing on visual and chemical transductions. The electrophysiological approach will be emphasized. A couple of long or several short papers will be presented and discussed by students each week.

ME.440.810. Readings In Systems Neuroscience. 1 Credit.
A weekly talk on current literature topics of special interest. Students present journal articles for discussion.

ME.440.811. Neuroscience Cognition I. 4.5 Credits.
This is the first half of a 4-quarter course on the cellular and molecular basis of neural function adn the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) development and structure of the nervous system, (2) cellular neurophysiology, (3) neural signaling and coding, and (4) audition, vocalization, and language. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science departments. The course will also include discussion sections based current literature and several neurotechniques sessions designed to familiarize student with current experimental approaches in cellular, systems and molecular neurosciences. This course is required of all students in the Neuroscience Graduate Program.

ME.440.812. Neuroscience Cognition II. 4.5 Credits.
This is the second half of a 4-quarter course on the cellular and molecular basis of neural function and the neural basis of perception, cognition, and behavior. Topics covered in this half include (1) perception of objects, space, and self, (2) movement and balance, (3) learning and memory, (4) neurological and psychiatric disorders, and (5) global function in the nervous system. Lectures will be presented by faculty in the Neuroscience, Neurology, Biomedical Engineering, Psychology, and Cognitive Science Departments. The course will also have a laboratory component. This course is required of all students in the Neuroscience Graduate Program.

ME.440.813. Current Issues in Systems and Cognitive Neuroscience. 1 Credit.
The mammalian brain is an information processing system without parallel. It excels at recognizing objects and substances, reconstructing space, making decisions, and controllig complex behaviors. The neural mechanisms underlying these abilities are studied by a large community of systems and cognitive neuroscientists. This research has generated a rapidly evolving field of high-profile discoveries and lively debates between competing laboratories. Our course aims to convey a clear sense of this field by focusing on current experimental and conceptual controversies regarding organization and function in the primate nervous system. Each week will focus on a different topic represented by two or more recent papers (selected by an instructor) reflecting timely questions or opposing points of view. Students will present the papers informally and direct a debate over the relative merits of hte conflicting view points.

ME.440.814. Research in Neuroscience (BCMB). 0 Credits.
Thesis Research

ME.440.815. Stem Cells: Unit of Development and Unit of Regeneration. 0 Credits.
This is a seminar and reading course devoted to discussion of different types of stem cells. The course will highlihgt ongoing research at JHU and current advances in the stem cell field.

ME.440.816. Topics in Cortical Plasticity. 0 Credits.
Experience-dependent changes in cortical synapses and circuits are critical for proper development of the nervous system and for memory storage. This course will focus on recent findings on fundamental mechanisms of plasticity from synapses to circuit level through discussions of recent research papers.

ME.440.817. Psychedelics. 0 Credits.
In this course we will explore the history and uses of psychoactive compounds, the neurobiological basis of their activity, and their potential for healing. Along the way we will attempt to debunk some of the most common myths about this especially controversial class of drugs. Each session, one student will take the lead in discussing the assigned primary research articles (except for 2-3 documentary film sessions, which will take up the whole period). Beyond didactic learning, this graduate level course is designed to hone students' skills in oral presentations, critical thinking, as well as composition and editing of manuscripts.

ME.440.818. Bioenergetics, Neuroplasticity and Brain Health. 1 Credit.
Overindulgent sedentary lifestyles are increasingly common with adverse consequences for trajectories of brain health in current and future generations. This course will review findings from studies of humans and animals that are elucidating the cellular and molecular mechanisms by which energy intake and exercise affect structural and functional neuroplasticity. This topic will be considered from a bioenergetic perspective with emphases on brain evolution, developmental neurobiology, adult neuroplasticity and disorders of mood and cognition. The course will consist of a series of introductory lectures, and subsequent class meetings in which hot topics in the field are discussed.

ME.440.819. Rigor, Reproducibility, and Responsibility in Science. 2 Credits.
In this course, students will learn the professional norms and practices central to a successful scientific career. Also, students will learn about what constitutes scientific misconduct and about proper behavior involving issues of authorship and various conflicts of interest. Students will be exposed to rules, regulations, and ethics relating to animal and human experimentation. Further, participants will learn about how to choose a lab, keep proper records, deliver presentations, and seek funding.

ME.440.820. Circuits and Brain Disorders. 2 Credits.
The course is designed to serve as an introduction to neurodegenerative disorders of the nervous system, and is intended to provide a balance of basic neurobiology, clinical presentation, biomarkers, genetics, and therapeutic approaches. One of the goals would be to highlight the distinct circuitry that is most impacted by each disorder. The curriculum includes: (1) one lecture per week and (2) a coordinated journal club once per week.

ME.440.821. Readings in Neuroscience Journal Club. 0 Credits.
Neuroscience training program journal club.

ME.440.822. Computational Principles of Biological Vision. 3 Credits.
This course will present up-to-the-minute synthesis of what are considered the most important insights into how vision, especially object vision, works, at the level of biological information processing. The result will be a coherent, mechanistic account of how the brain transforms images into visual understanding. Also, this course will teach how to critically evaluate current research papers within that framework by incorporating discussions of current papers into the lectures and assignments.

ME.440.823. Grant Writing Skills. 1 Credit.
The course covers topics such as: writing a clear and compelling specifics aims page; writing a concise background section; preliminary data; stating a clear hypothesis; describing how data will be analyzed and how results will be predicted; power analysis and sufficient sample size; problems and alternatives; devising a budget and justification; and using vertebrate and human subjects.

ME.440.824. Cell Physiology of Visual and Olfactory Transductions. 1 Credit.
A reading/student presentation course focusing on visual and olfactory transductions studied by single-cell electrophysiology.

ME.440.825. Quantitative Neurogenomics. 3 Credits.
Modern molecular neuroscience involves an understanding of how the organization and use of the genome contributes to the development, structure, and function of the nervous system. Regulation of the genome and gene expression across different cell types, conditions, and spatial domains can provide insight into the functional organization of the brain and the etiopathology of disease. In this course, students will learn, through a combination of didactic, interactive, and hands-on sessions, the basics of genomic and transcriptional data analysis as applied to current questions in neuroscience. Students will outline and develop workflows and algorithms for both bulk and single-cell analysis of gene expression and genomic data using publicly available datasets. Finally, students will explore methods for spatial analysis of gene expression and how application of newer technologies can enhance understanding of anatomy and connectivity.

ME.510 (Oncology)

ME.510.300. Research Practicum. 0 Credits.
N/A

ME.510.600. Clinical Research in Medical Oncology. 0 Credits.

ME.510.601. Advanced Clerkship in Critical Care - Oncology Intensive Care. 0 Credits.

ME.510.699. Oncology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Oncology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.510.700. Biology of Cancer. 1 Credit.
Emphasis is placed on the fundamental biological processes underlying oncogenesis, and factors affecting the progression of various neoplastic diseases. A basic foundation will be developed that will permit the student to approach various aspects of oncology including epidemiology, carcinogenesis, environmental issues, biologic behavior of the neoplastic cell, and the rationale for the use of various treatment modalities with understanding.

ME.510.701. New Approaches to Cancer Prevention and Therapy. 1 Credit.
Selected timely topics relevant to novel diagnostic and treatment techniques being developed for the management of patients with cancer are considered with a view toward illustrating the underlying principles. Emphasis is placed on illuminating the chemical and biologic basis of therapeutics and their translation impact on clinical practice.

ME.510.705. Viral Oncology. 0 Credits.

ME.510.706. Fundamentals of Cancer: Cause to Cure. 2.5 Credits.
This course is designed to be highly translational, covering fundamental cancer molecular biology to the processes of transformation and metastases, and how targeted therapies emerge from new scientific knowledge. There are four modules: 1) Origins of Cancer; 2) Progression of Cancer; 3) Treatment; and 4) Prevention.

ME.510.707. Statistics and Data Analysis Using R. 1 Credit.
Statistics and Data Analysis Using R is a hands-on introduction to the R statistical software suite for biomedical scientists. It is assumed that the student is familiar with the plots and statistical summaries that are most commonly used in biomedical papers, but no formal background in statistics or programming is necessary. The primary objective is learning to use R, but the course also emphasizes the standards of practice that programmers and data analysts have implemented to ensure transparency, accuracy and accountability. Students are required to have a laptop.

ME.520 (Emergency Medicine)

ME.520.601. Emergency Medicine Core Clerkship. 0 Credits.
Core clerkship in emergency medicine

ME.520.699. Emergency Medicine Elective. 0 Credits.
For Medical Students only. Specialized Topics in Emergency Medicine. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.560 (Urology)

ME.560.299. Downgrading of Grade Group 2 Intermediate-Risk Prostate Cancer from Biopsy to Radical Prostatectomy: Comparison of Outcomes and Predictors to Identify Potential Candidates for Active Surveillance. 0 Credits.

ME.560.699. Urology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Urology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.570 (Anesthesiology)

ME.570.600. The Hospital - JHH. 0 Credits.

ME.570.699. Anesthesiology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Anesthesiology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.580 (Biomedical Engineering)

ME.580.699. Biomedical Engineering Elective. 0 Credits.

ME.600 (Health Sciences Informatics)

ME.600.601. Topics in Interdisciplinary Medicine - Clinical Informatics. 0 Credits.
Required course in the first year medical student curriculum.

ME.600.699. Health Sciences Informatics Elective. 0 Credits.
For Medical Students only. Specialized Topics in Health Sciences Informatics. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.600.700. Health Information Systems: Design to Deployment. 0 Credits.

ME.600.702. HIS Knowledge Engineering and Decision Support. 0 Credits.

ME.600.703. Planning and Evaluation of Health Information Systems. 0 Credits.

ME.600.704. Health Sciences Informatics Fellows Seminar. 0 Credits.
Weekly 2-hour seminar. Research methods, project methods, probabilistic reasoning, employment, ethics, current events. Requires instructor's permission. 1 credit per quarter.

ME.600.705. Health Sciences Informatics Security, Confidentiality And Privacy. 0 Credits.

ME.600.707. Introduction to Public Health and Biomedical Informatics. 0 Credits.

ME.600.708. Standards in Health Informatics Systems. 0 Credits.

ME.600.709. Clinical Informatics. 0 Credits.

ME.600.710. Real Time Disease Surveillance. 0 Credits.

ME.600.711. Health Informatics for Disease Prevention and Management. 0 Credits.

ME.600.712. Data Structures and Algorithms in Informatics. 3 Credits.

ME.600.713. Clinical Software Engineering. 3 Credits.

ME.600.714. Electronic Health Record Data Visualization and Analytics. 0 Credits.
Rapid comprehension of health information is an increasingly important goal and can be achieved with effective visualization techniques. Information visualization is an extremely powerful tool for patients, clinicians and researchers to understand both simple and complex concepts quickly to enable decision making. This course will explore the science and art of information visualization, demonstrate software options to visualize information, provide use cases of visualization to guide decision making, and enable students to develop and refine skills in information visualization.

ME.600.715. Natural Language Processing in the Health Sciences. 1.5 Credits.
There is significant demand in both academia, research and industry for informatics professionals who are well versed in natural language processing (NLP). In this course, students will be oriented to the various applications of NLP in biomedicine, healthcare and public health. The course will emphasize the importance of clearly defining what problem needs to be solved or what questions one seeks to get answered via the use of NLP. Approaches to data mining of free text from the biomedical literature, clinical narratives, and other novel data sources will be covered. There will be opportunities for students to develop NLP and machine learning algorithms. Applications of these tools in epidemiologic surveillance, clinical decision support, and other relevant use cases will be covered.

ME.600.716. Informatics and the Clinical Research Lifecycle: Tools, Techniques and Processes. 0 Credits.
Research informatics deals with how informatics can and should support research and how research is altered by that support. The course addresses the entire life cycle of a clinical-research program: idea generation, team building, protocol development, obtaining funding, addressing ethical concerns, obtaining permissions, recruiting participants, providing the intervention and associated care, data collection, data analysis, data archiving, and results dissemination. The course addresses the related topic of translational informatics, incorporating the results of clinical and bioinformatics research into health practice. In each case, the course will highlight novel principles involved, tools available, evidence for their success, and implications for the future.

ME.600.717. Authoring Effective Teaching Cases in the Simulation EMR Environment. 1 Credit.
This course covers the complexities of designing and deploying high fidelity patient cases in the electronic medical record (EMR) environment. Students will be introduced to the back-end architecture of the training environment as well as key terminology associated with the patient build process. Opportunities will be provided to navigate the simluation EMR from the perspective of a variety of different clinical and operational end-users. Students will gain experience populating standard templates with essential data elements based on pre-existing paper based clinical vignettes.

ME.600.718. Information Modeling. 0 Credits.
This course will provide a high level overview of information modeling in the informatics domain. It will cover the various types of models, tools, and approaches used in modern information models.

ME.600.719. Medical Simulation Lab: Applications of Data, Information, and Knowledge. 0 Credits.
This course will use Medical Simulation technology and concepts as an appraoch to conduct informatics-based research focused on data, information, and knowledge.

ME.600.720. Clinical Data Analysis with Python. 1.5 Credits.
This course introduces the knowledge of Object Oriented Programming and Python programming language. Covers Python data structures and practical data analysis skills in a clinical informatics context. Presents methods for data manipulation, data cleaning, and data visualization using Python Pandas, Numpy, and Matplotlib libraries. Discusses basicc statistical analyses methods in the healthcare setting.

ME.600.721. Introduction to Precision Medicine Data Analysis. 1.5 Credits.
This course will introduce students to the rapidly evolving field of precision medicine and the role of big data analytics in improving patient care, clinical decision making, and population health management. The course will provide an overview of the array of different tools that can be used by data scientists and clinical informaticians in a secure research environment.

ME.600.722. Data Abstraction for the JH CROWN Clinical Registry: Applications of Clinical Informatics in Addressing Novel Infectious Diseases. 1 Credit.
This research elective is intended for graduate students with a clinical background who have an interest in the applications of natural language processing (NLP) techniques in addressing novel infectious disease outbreaks. Students will have an opportunity to perform chart abstraction and unstructured data annotation. They will work alongside clinical researchers, data analysts, and text mining experts to gain experience in the real-world application of creating supervised training sets for maching learning algorithms.

ME.600.723. Information Sources & Search Techniques for Informatics Professionals. 1 Credit.
This course will introduce students to the foundation and skills needed to engage in research endeavors. Students will learn about the biomedical sources available and how to efficiently and effectively search these sources. Also, students will learn techniques for evaluating source data and tools to use for storing and managaing information. This course will also address issues in the research field including how open access impacts the work of scholars and consumers.

ME.600.724. Data Driven Digital Health Entrepreneurship. 0 Credits.
This course will introduce students to the rapidly evolving field of precision medicine and the role of big data analytics in improving patient care, clinical decision making, and population health management. Access will be provided to the precision medicine analytics platform (PMAP) which integrates data from the enterprise wide electronic medical record (EMR) and other sources of data into a Data Commons. The course will provide an overview of the array of different tools that can be used by data scientists and clinical informaticians in a secure research environment.

ME.600.725. Advanced informatics Elective: Informatics Education. 1 Credit.
This practicum is intended to provide senior graduate students with experience in curriculum design, teaching, and pedagogy in the field of informatics. Students will be introduced to the CAHIM accreditation standards and AMIA competencies around health informatics.

ME.600.726. Advanced informatics Elective: Telemedicine. 1 Credit.
This practicum is intended to provide senior students in the Informatics Education Program with experience in the fild of telemedicine. Experiences may include exposure to clinical workflows, strategic planning around technology, reimbursement/policy, elements of data collection, and other esstential concepts.

ME.600.727. Clinical Decision Analysis. 1.5 Credits.
This advanced elective introduces students to the basic theory and practice of decision analysis as applied to the clinical context, with an eye towards clinical decision support and the place of decision modeling in the informatics context. Topics includes: articulating and structuring in decision trees, creating a decision model, skill building in decision trees, and exposure to Markov models and discrete event simulation.

ME.600.728. Implementing Fast Healthcare Interoperability Resources. 2.5 Credits.
Fast Healthcare Interoperability Resources (FHIR) is transforming healthcare with an open-web services' standards approach to clinical integration. This course is a hands-on experience working on integrating digital health and clinical systems interoperability.

ME.600.729. Advanced Elective in Precision Medicine. 2 Credits.
This elective option is with the Biomedical Informatics and Data Science education program. It is intended for graduate students in the Certificate or Masters programs with an interest in exploring advanced topics on precision medicine analytics. Students will have access to the Precision Medicine Analytics Platform (PMAP) and focus on a specific topic of interest. These topics may include: artificial intelligence, machine learning, common data models, fast healthcare interoperability resources, and the programming languages Python and Structured Query Language (SQL).

ME.600.801. Writing the Research Paper. 0 Credits.

ME.600.803. Health Sciences Informatics Grand Rounds. 4 Credits.
A weekly seminar for students, faculty, and invited guests to present ongoing research and work in informatics. Spans the academic year. See the Grand Rounds page for more information. Open to all. For credit, requires >80% attendance. 1 credit per quarter.

ME.600.804. Health Sciences Informatics Mentored Research. 0 Credits.
This course number applies to Research Masters students and both lab rotations for PhD students and to continuing research for PhD students. The informatics research is precepted by a faculty member in the Division or approved by the Training Program Director. The research may originate with the preceptor or with the student, and may be different phases of development. In the case of the lab rotation, most of the activity is supervised by the preceptor. In the case ongoing research, there is supervision by the Training Program Director as well as the research committee assembled by the student. Milestones are set for each quarter. Please note that a comprehensive research plan must by submitted to the program director for approval no later than Septermber 15 of Year 2. Failure to do so will result in probation for the student.

ME.600.805. Health Sciences Informatics Technology Practicum. 4 Credits.
A practical experience supervised by Hopkins faculty that enables students to showcase and develop skills gained during the didactic curriculum. In correct with a preceptor and an academic advisor, students articulate a concrete deliverable and work with the preceptor and their team to accomplish the deliverable. Example activites include, but are not limited to, literature review, systems analysis, systems evaluations, data analysis, or plans for any of these.

ME.600.806. Health Sciences Informatics Independent Study. 0 Credits.
Independent study courses must be approved by the Program Director. Please note that it is important to follow the steps outlined below in order to comply with BIDS/SOM registration and grading policies. Students submit a course description to the Training Program Director. Course Instructor and Program Coordinator. The description will include the length of Independent Study (up to 2 quarters or 1 semester), the time commitment (given in hours per week or quarter), the student's goals and what the deliverable will be. On approval by the Program Director, the Coordinator will supply you with the appropriate course number for registration. It is important that the course instructor be prepared to submit a letter grade on their department letterhead to the Program Coordinator

ME.600.808. Capstone. 3 Credits.
The Capstone Project will generally last 2 quarters. Students will join an active work group, supervised directly or indirectly by the practicum preceptor.

ME.600.809. Informatics PhD Research. 1.5 Credits.
After selecting a laboratory for their thesis, the student will establish a research plan wih their faculty advisor.

ME.600.810. Student Seminar and Grand Rounds. 1 Credit.
Weekly combined seminar and Grand Rounds during term. Students not matriculated in our formal degree or certificate program must seek the instructor's permission. Grand Rounds is open to all for those not seeking course credit for attending.

ME.600.900. Health Information Systems: Design to Deployment. 3 Credits.
A review of health information systems, such as patient record, patient monitoring, imaging, public health, educational, bioinformatics and scholarly systems. This offering teaches the core architectures and technologies of these core systems, focusing on commonalities and differences and designs.

ME.600.901. HSI: Knowledge Engineering and Decision Support. 2 Credits.
This course provides a framework for understanding decision support in the workflow of the health sciences. The focus is on the types of support needed by decision makers, and the features associated with those types of support. A variety of decision support algorithms are discussed, examining advantages and disadvantages of each, with a strong emphasis on decision analysis as the basic science of decision making.Students are expected to demonastrate facility with one algorithm in paritcular through the creation of a working prototype, and to articulate the evidence and effectiveness of various types of decision support in health sciences and practice, in general.

ME.600.902. Leading Change Through Health IT. 3 Credits.
Prepares learners to lead organizations implementing new IT systems. Covers the knowledge and skills that enable clinical and public health informaticians to lead and manage changes associated with implementation, adoption, and evaluation of effective use of health information systems. The course coveres the following topics: Leadership & governance in Health IT, Project Management, Strategic Planning for Health Information Systems, Workflow Re-engineering and Change Management.

ME.600.903. Introduction to Public Health and Biomedical Informatics. 2 Credits.
Introduces students to the core principles of informatics as applied to the entire range of health, from prevention, through illness, to population and public health. Focuses on frameworks within which to describe and explain health information systems. Provides to non-clinicians basic exposure to the terminology of clinical care and public health. Provides to technical novices of basic exposure to IT terminology. Provides all students entry-level concepts and skills for later courses in the informatics sequences.

ME.600.904. HIT Standards and Systems Interoperability. 3 Credits.
The purpose of this course is to learn the data, information and knowledge standards critical to the successful implementation of local, regional and national health-related information systems. Target competencies are to identify the apropriate level of HITSP standards for an informatics problem, and select the appropriate standard within that level: create use cases and an organizational process to define an interoperability standard for a specific healthcare/regional situation; participate in a national standards-creation process.

ME.600.905. Applied Clinical Informatics. 3 Credits.
This course introduces students to the field of Applied Clinical Informatics, which is focused on improving patient care through enhanced use of clinical information systems. Students will be exposed to a wide range of cliniclal workflows and how health information technology and systems support them. Topics in the course included: Bar Coding, Clinical Decision Support, Computerized Provider Order Entry, Electronic Health Records, Electronic Prescribing, Health Information Exchange, Master Patient Index, and Telehealth/Telemedicine. Each of these will be examined within the appropriate context of clinical care transitions, patient saftey and care quality, inpatient/ambulatory care settings, information security and deployment of HIT.

ME.600.906. Real Time Disease Surveillance. 2 Credits.
In this course, we will review the needs and the technologies and provide students with the basic knowledge and skills they need to be critical consumers of these technologies and to enable to follow the emerging research literature over the future.

ME.600.907. Database Querying in Health. 3 Credits.
Through class discussion and interactive Python data exercises, this course provides practical experience working with electronic medical record data. The class will provide students access th the Johns Hopkins Precision Medicine Analytics Platform (PMAP) to conduct analysis on a de-identified EMR dataset of 60K patients with over 100 million data elements. The class will work with Jupyter notebooks to learn how to prepare EMR data and contruct models from encounter, symptoms, lab, procedure, vitals and medication data. The topics will include exploratory data analysis,data cleaning, feature extraction, model construction, and evaluation. Working knowledge of SQL is expected and Python encouraged. The class will have access to the PMAP cookbook of Jupyter notebook recipes and Datacamp accounts will be provided for students to master working with major Python librairies Pandas, Matplotlib, Numpy and Sci-kit.

ME.600.914. Secondary Uses of EHR Data. 2 Credits.
Provides students with the skills to construct queries of EHR systems for research and quality-improvement projects. Topics include linking of identifiers, use of data dictionaries and standards, issues of privacy and security, issues of maintaining semantics, and alternative architectures for operational, data warehousing and data mart systems.

ME.600.915. Health Information Visualization. 0 Credits.
Rapid comprehension of health information is an increasingly important goal and can be achieved with effective visualization techniques. Information visualization is an extremely powerful tool for patients, clinicians and researchers to understand both simple and complex concepts quickly to enable decision making. This course will explore the science and art of information visualization, demonstrate software options to visualize information, provide use cases of visualization to guide decision making, and enable students to develop and refine skills in information visualization.

ME.680 (Comparative Medicine)

ME.680.700. One Medicine. 0 Credits.
One hours seminars by Johns Hopkins Faculty and outside guest speakers dealing with naturally occuring diseases of animals that relate to medical research and human disease, and with animal models of human disease

ME.680.701. Comparative Pathobiology and Genetically Engineered Mice. 0 Credits.

ME.680.702. LAM/PATH Integrated Problem Solving. 0 Credits.
Lectures given by current postdoctoral fellows and their faculty mentors of the department of Molecular and Comparative Pathobiology to give a solid foundation on which they can use for ACLAM and ACVP Board preparation.

ME.680.703. Animal Pathology Laboratory. 0 Credits.
Limited number of persons serve as prosectors on the animal pathology diagnostic service. This entails responsibility for gross and microscopic examination of diseased animals and tissues submitted for diagnosis by investigators with the institutions, by practicing veterinarians, by the Maryland Zoo in Baltimore, and the National Aquarium in Baltimore. Complete necropsy and histopathology laboratories are available and prosectors work under close faculty supervision. Rotational assignments may very according to schedules.

ME.680.705. Introductory Course in Large Animal Surgery. 0 Credits.

ME.680.707. Experimental Design and Scientific Writing. 0 Credits.

ME.680.710. Clinical Conference in Laboratory Animal Medicine. 0 Credits.
Weekly conferences in clinical laboratory animal medicine and clinical pathology. Attendance by comparative medicine and comparative pathology fellows is expected.

ME.680.711. Comparative Pathology Conference. 0 Credits.
Weekly one hour diagnostic slide conference focuses on the discussion of histologic and electron microscopic examples of unknown cases drawn from a wide variety of animal species. Cases are available for study during the week preceding the conference. Participants describe the cases, give differential diagnoses, and discuss etiology and pathogenesis with the guidance of faculty members.

ME.680.712. Phenotyping for Functional Genetics. 1.5 Credits.
This course is intended for graduate students or postdocs at any level, who currently work with, or expect to work with mouse models and genetically engineered mice. This course offers up to 42 contact hours: 11.5hr Laboratory sessions; 24.5hr Lectures; 7 hr. poster sessions, laboratory tours, pathology slide conference. Four (4) Hands-on Laboratory sessions (11.5 hours total) include clinical and physical examination of mice, specimen collection, clinical pathology and anatomic pathology. Familiarity with basic anatomy is expected for participation in laboratory sessions. ONLY Students registered to take this course FOR CREDIT may participate in laboratory sessions.

ME.680.713. Regulations that Govern Animal Research. 0 Credits.
Weekly lecture given by current laboratory animal medicine postdoctoral fellows on the regulations that govern animal research as a part of ACLAM board preparation.

ME.680.714. Systems Pathology of Animals. 0 Credits.
This course will cover essential knowledge on the pathology of domestic and laboratory animals with an emphasis on covering material most relevant to anatomic pathology boards. Diseases are organized by system, including: alimertary, hepatobiliary/pancreatic, respiratory, cardiovascular, urinary, endocrine, bone marrow/blood, nervous, skeletal muscle, skeletal, integument, reproductive (male and female), and the ear and eye. The lectures are geared towards veterinarians pursuing specialty training in anatomic pathology, but may be of interest to select pre-veterinary, veterinary and graduate students, research and veterinary technicians and biomedical researchers.

ME.680.715. Conversations on Research Animal Medicine and Management (CRAMM). 0 Credits.
This course will cover essential knowledge on the biology, husbandry, management and medicine of animals in a research setting, and familiarize participants with common animal models for human disease. The lectures are geared towards veterinarians pursuing specialty training in laboratory animal medicine, but may be of interest to select preveterinary, veterinary and graduate students, research and veterinary technicians and biomedical researchers.

ME.680.802. Journal Club for Laboratory Animal Medicine Board Review. 0 Credits.
Weekly journal club for laboratory animal medicine board review.

ME.700 (Immunology)

ME.700.699. Immunology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Immunology . Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.710 (Human Genetics)

ME.710.300. Research in Genetic Medicine (Undergraduate). 1 Credit.
N/A

ME.710.699. Human Genetics Elective. 0 Credits.

ME.710.700. Advanced Topics in Human Genetics. 1.5 Credits.
Lectures and readings on major areas of researach in contemporary human genetics

ME.710.702. Molecular Mechanisms Of Disease. 1 Credit.
Presentations of literature and concepts related to disease mechanisms

ME.710.723. Molecular Genetic Dissection of Complex Diseases. 1.5 Credits.

ME.710.734. Evolution of Ideas in Human Genetics. 0 Credits.
Presentations of literature starting with Mendel through the present.

ME.710.735. Human Genetics Core Discussion. 0 Credits.
Introduction to human genetics research opportunities

ME.710.736. Introduction to Programming for DNA Analysis. 0 Credits.

ME.710.737. Introduction to Computational Genetics. 1 Credit.
practical training on the use of computers to analyze large-scale genetic data including both family- and population based study designs

ME.710.738. Human Genetics: Consequences of Mendelian Transmission. 0 Credits.
Human Genetics: Consequences of Mendelian Transmission

ME.710.739. Population Genetics: Consequences of Mendelian Transmission. 0.5 Credits.

ME.710.740. Understanding Genetic Disease. 0 Credits.
N/A

ME.710.741. Genes, Chromosomes, Meiosis and Segregation. 1 Credit.
Principles of gene segregation, meiosis and crossing over in mammals. Genetic linkage and genetic association analysis in gene mapping.

ME.710.742. Core Topics in Human Genetics and Genomics. 1 Credit.
The course covers fundamental topics in human genetics and genomics, including human genome structure and analysis, mechanisms of inheritance, gene structure and function, indentifying genetic basis of diseases, molecular basis of genetic disorders, genetic therapies, and ethics in human genetics. Graduate students, residents, and fellows from medical genetics and other specialties who wish to acquire fundamental knowledge in human genetics and genomics and genetic basis of diseases are encouraged to attend this course.

ME.710.743. Coronavirus: Biology, Genetics, and Pathogenesis. 1 Credit.
This graduate course will focus on the biology of coronavirus infection, viral and host genetics, and what is known about pathogenesis with emphasis on vulnerabilities that could be exploited for treatment.

ME.710.744. Genomic Technologies: Tools for Illuminating Biology and Dissecting Disease. 1.5 Credits.
The course addresses the methodology, design, analysis, and application of pivotal technologies whose use and power in genetics is at this time essential for students to understand, including exapmles from the published literature.

ME.710.745. Evolving Concepts of the Gene. 5 Credits.
We focus on classical papers - starting with Darwin and Mendel and working forward through the rediscovery of Mendelism, Morgan and the fly room, the foundations of population genetics, the modern synthesis, the foundations of molecular biology, the extent of variation, through to the discoveries of unanticipated and overlooked aspects of molecular biology including exons/introns, alternative splicing, and microRNAs

ME.710.746. Human Genetics Boot Camp. 2 Credits.
Project based, hands-on workshop frames an introduction to the baseline computational and statistical needs for HG students. It presents the students with exposure to unix scripting, GitHub, python, R, Basic Statistics / Data Analysis, bioinformatics, data processing for genomics among other topics

ME.710.800. Independent Research. 3 Credits.
Thesis lab work

ME.710.802. Research Rotations. 1 Credit.
Students will learn hands-on methods of experimentation. Includes face-to-face interactions with faculty each week.

ME.711 (Berman Bioethics Institute)

ME.711.699. Berman Bioethics Institute Elective. 0 Credits.

ME.712 (The Welch Center)

ME.712.699. Welch Center Elective. 0 Credits.

ME.714 (Bloomberg School of Public Health)

ME.714.699. Bloomberg School of Public Health Elective. 0 Credits.
For Medical Students only. Specialized Topics in Bloomberg School of Public Health. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.715 (Non-Department)

ME.715.699. Non-department Elective. 0 Credits.
For Medical Students only. Specialized Topics in Non-department. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.716 (Physical Medicine Rehabilitation)

ME.716.699. Physical Medicine & Rehabilitation Elective. 0 Credits.
For Medical Students only. Specialized Topics in Physical Medicine & Rehabilitation. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.717 (Radiation Oncology)

ME.717.699. Radiation Oncology Elective. 0 Credits.
For Medical Students only. Specialized Topics in Radiation Oncology. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.718 (Institute of Genetic Medicine)

ME.718.699. Institute of Genetic Medicine Elective. 0 Credits.
For Medical Students only. Specialized Topics in Institute of Genetic Medicine. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.800 (Interdepartmental)

ME.800.300. DDP Research Practicum/Special Studies. 0 Credits.
N/A

ME.800.609. Genes to Society I (inc. Immunology, Microbiology/ Infectious Disease, and Hematology/ Oncology). 0 Credits.

ME.800.610. Genes to Society II (inc. Brain, Mind, & Behavior, Nervous System and Special Senses). 0 Credits.
Required course in the first year medical student curriculum.

ME.800.611. Health Care Disparities Intersession. 0 Credits.

ME.800.612. Health Promotion and Disease Prevention Intersession. 0 Credits.

ME.800.613. Global Health Intersession. 0 Credits.

ME.800.614. Pain Intersession. 0 Credits.

ME.800.615. Disaster Medicine Intersession. 0 Credits.

ME.800.616. Longitudinal Ambulatory Clerkship - 1st year. 0 Credits.
Longitudinal Ambulatory Clerkship - 1st year

ME.800.617. Longitudinal Ambulatory Clerkship - 2nd year. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.618. Transition to Residency and Internship and Preparation for Life. 0 Credits.
This two-week capstone course is offered twice in April of Year Four. The goal of TRIPLE is to prepare students to work effectively as interns, residents and practicing physicians. Additionally, it will help students to develop the knowledge, attitudes and skills necessary to be successful in their professional lives. In addition to Advanced Cardiac Life Support Certification, activities include exercises in Rapid Response scenarios; central venous catheter and interosseus line insertion; airway management; multitasking, organization and prioritization; advanced communications; reflective writing; teaching skills and facilitated small group discussions.

ME.800.619. Scientific Foundations of Medicine (inc. Epidemiology, Macromolecules, Cell Physiology, Metabolism, Genetics, and Pharmacology). 0 Credits.

ME.800.621. Clinical Foundations of Medicine. 0 Credits.
Clinical Foundations of Medicine

ME.800.622. Foundations of Public Health. 0 Credits.

ME.800.623. Scholarly Concentrations. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.624. Translational Science Intersession - Metabolism. 0 Credits.

ME.800.625. Translational Science Intersession - Infectious Disease. 0 Credits.

ME.800.626. Translational Science Intersession - Immunology. 0 Credits.

ME.800.627. Translational Science Intersession - Cancer. 0 Credits.

ME.800.628. End of Life/Palliative Care Intersession. 0 Credits.

ME.800.629. Substance Abuse Care Intersession. 0 Credits.

ME.800.630. Genes to Society III (inc. Cardiovascular, Pulmonary, and Renal). 0 Credits.
Required course in the first year medical student curriculum.

ME.800.631. Genes to Society IV (inc. GI, Reproductive, Endocrine, and Musculoskeletal). 0 Credits.
Required course in the second year medical student curriculum.

ME.800.632. Patient Safety Intersession. 0 Credits.

ME.800.633. Scholarly Concentrations - 2nd year. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.634. Transition to the Wards. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.635. Genes to Society I (inc. Immunology, Microbiology/ Infectious Disease and Hematology/Oncology). 0 Credits.

ME.800.636. Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism, Genetics, Pathobiology, and Pharmacology). 0 Credits.

ME.800.637. Foundations of Public Health: Epidemiology, Ethics & the Health Care System. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.638. Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism, Genetics, Pharmacology, Foundations in Histology & Pathobiology, and Neoplasia). 0 Credits.
The purpose of this course is to present the language and principles of biomedical science that students will be using throughout their study of human health and disease. Course methods include lecture, readings, journal clubs, virtual microscopy, small-group problem-solving sessions and clinical correlations.

ME.800.639. Genes to Society I (inc. Immunology, Microbiology/ Infectious Disease, Hematology, and Dermatology). 0 Credits.
Required course in the first year medical student curriculum.

ME.800.640. Topics in Interdisciplinary Medicine - Disparities and Inequities in Health and Health Care. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.641. Topics in Interdisciplinary Medicine - Obesity, Nutrition, & Behavior Change. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.642. Topics in Interdisciplinary Medicine – Global Health. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.643. Topics in Interdisciplinary Medicine – Pain. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.644. Topics in Interdisciplinary Medicine – Disaster Medicine. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.645. Topics in Interdisciplinary Medicine - Substance Use Disorders. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.646. Topics in Interdisciplinary Medicine – Patient Safety. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.647. Topics in Interdisciplinary Medicine – End of Life/Palliative Care. 0 Credits.
Required course in the second year medical student curriculum.

ME.800.648. Topics in Interdisciplinary Medicine – Metabolism. 0 Credits.
Topics in Interdisciplinary Medicine – Metabolism

ME.800.649. Topics in Interdisciplinary Medicine – Immunology. 0 Credits.
Topics in Interdisciplinary Medicine – Immunology

ME.800.650. Topics in Interdisciplinary Medicine – Infectious Disease. 0 Credits.
Topics in Interdisciplinary Medicine – Infectious Disease

ME.800.651. Topics in Interdisciplinary Medicine – Cancer. 0 Credits.
Topics in Interdisciplinary Medicine – Cancer

ME.800.652. Topics in Interdisciplinary Medicine - Introduction to Regenerative Medicine. 0 Credits.
Topics in Interdisciplinary Medicine - Introduction to Regenerative Medicine

ME.800.653. Integrative Medicine. 0 Credits.
Required course in the first year medical student curriculum.

ME.800.654. Scientific Foundations of Medicine Histology and Pathobiology. 0 Credits.
N/A

ME.800.655. Topics in Interdisciplinary Medicine - High Value Healthcare. 0 Credits.
This three-day course is offered in February of Year One after the Microbiology and Infectious Disease section. The goals of the course are to empower students to understand high value care and advocate for its practice. Lectures serve as the background on why providers order unnecessary labs, imaging, and medications and the changes that are occurring. Interactive small group sessions then allow students to participate in hands-on approaches to improving their role as stewards of healthcare for the healthcare system and most importantly their patients.

ME.800.656. Genes to Society III - Cardiovascular. 0 Credits.
This GTS Cardiovascular course will build upon seminal observations on the structure and function of the cardiovascular system. See course syllabus for full description and objectives.

ME.800.657. Primary Care Leadership Track 1. 0 Credits.

ME.800.658. Primary Care Leadership Track 2. 0 Credits.

ME.800.659. Primary Care Leadership Track 3. 0 Credits.

ME.800.660. Primary Care Leadership Track 4. 0 Credits.

ME.800.661. Topics in Interdisciplinary Medicine - Genomic Medicine. 0 Credits.
Fulfills TIME requirement in the third and fourth year medical student curriculum.

ME.800.662. Pre-clerkship Education Exercises. 0 Credits.

ME.800.699. Interdepartmental Elective. 0 Credits.
For Medical Students only. Specialized Topics in Interdepartmental. Refer to Medical Student Electives Book located at https://www.hopkinsmedicine.org/som/students/academics/electives.html.

ME.800.701. Topics in Interdisciplinary Medicine - Genomic Medicine. 1 Credit.
N/A

ME.800.702. Introduction to the Human Body: Anatomy, Histology, Physiology. 5 Credits.
The focus of the course is an overview exposure to the organ systems of the human body. Class has histology oral presentations.

ME.800.703. CMM Core Discussion. 1.5 Credits.
In section One: Students present a journal article and lead the class discussion. In section Two: 3R online modules with class discussions. In section Three: Compliments Intro to Clinical Research course content.

ME.800.705. Method, Logic and Experimental Design. 1 Credit.
Students meet in small groups with faculty members to read and discuss current research articles. The goal is to learn to critically evaluate experiments, results and to design controlled experiments.

ME.800.707. Computational Biology and Bioinformatics. 0.5 Credits.
This short course is a survey of quantitative methods in modern biology and the computational concepts that are developing to analyze large data sets. Topics range from a review of statistics to problems in sequence analysis to the modeling of complex systems. The goal of the course is to familiarize students with the concepts of computational biology rather than to achieve a deep understanding of any one topic.

ME.800.708. BCMB Core Discussion. 0.5 Credits.
Core discussion is a small-group discussion which corresponds to the BCMB core module lectures.

ME.800.709. Cellular and Molecular Basis of Disease. 3 Credits.
The emphasis of this course is the cellular and molecular aspects of the pathogenesis and treatment of human diseases.

ME.800.710. Beginning Spanish for Medical Personnel. 0 Credits.

ME.800.711. Advanced Beginning Spanish for Medical Personnel. 0 Credits.

ME.800.712. Intermediate Spanish for Medical Personnel. 2 Credits.

ME.800.713. BCMB Responsible Conduct of Research. 0.5 Credits.
This discussion course focuses on responsible conduct of research in science. Topics include Issues of Diversity, Mentoring, Misconduct/Fraud, Authorship, Conflict of Interest, Scientific Record Keeping, Animal and Human Experimentation.

ME.800.715. Effective Scientific Communication. 1 Credit.
Students will have the opportunity to improve their science communication skills and get exposed to the diversity of careers available in science communication.

ME.800.716. Genomic Instability in Human Disease. 1.5 Credits.

ME.800.717. CMM Grant Writing: Nuts and Bolts. 1.5 Credits.
Will give a general overview of the grant writing process to include the significant components of a hypothesis driven scientific grant application and its peer review process. Proposals for this course will be based on each student's current thesis work and will be developed as the thesis proposal.

ME.800.718. Topics in Cellular and Molecular Medicine. 1 Credit.
This course introduces students to CMM faculty and their areas of expertise.

ME.800.719. Scientific Foundations of Medicine (inc. Cell Physiology, Macromolecules, Metabolism and Genetics). 0 Credits.

ME.800.722. BCMB Tutorial. 0 Credits.
One-to-one reading tutorial with a faculty member who is an expert in the chosen field of study. The faculty member will select the papers to be discussed. The minimal duration of the tutorial has to be equivalent to eleven 1.5-hour sessions or a total of 16 hours. The course will be offered every quarter, including during the summer months.

ME.800.723. Computational Genomics Methods. 0 Credits.
Hands-on elective course discussing computational methods (including R, Unix and Python) for manipulating and exploring high throughput datasets.

ME.800.724. Introduction to Clinical Research. 1.5 Credits.
Understand the steps involved in conceiving, conducting and translating clinical research. Prepare and review a clinical research project in groups.

ME.800.725. Medical Scientist Training Program in Research Ethics. 0 Credits.
N/A

ME.800.726. Electron Microscopy: Principles and Practices. 1 Credit.
This course is designed to provide an opportunity for students to learn principles and practices of electron microscopy so they can use then for their thesis projects. The course has two components: lectures and hands-on experimental sessions. Lectures will cover history, principles, and techniques. In the hands-on sessions, students will learn how to process samples for electron microscopy, including, fixation, plastic embedding, high-pressure freezing, freeze-substitution, imaging and image analysis.

ME.800.780. Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism, Genetics, Pharmacology, Foundations in Histology and Pathobiology, and Neoplasia). 0 Credits.
N/A

ME.800.781. Scientific Foundations of Medicine: Macromolecules. 0 Credits.
N/A

ME.800.782. Scientific Foundations of Medicine: Cell Physiology. 0 Credits.
N/A

ME.800.783. Scientific Foundations of Medicine: Histopathology. 0 Credits.
Course is offered in two sections. Students must enroll and attend both sections. The course is designed to provide the foundations to understand organ histology and histopathology. The course begins with basic concepts of tissue organization and ends with globally relevant histopathologic changes seen in disease. The course is primarily designed around the virtual microscopy (VM system within small gorups, occasional lectures, and e-lectures

ME.800.784. Scientific Foundations of Medicine: Metabolism. 0 Credits.
N/A

ME.800.785. Scientific Foundations of Medicine: Genetics. 0 Credits.
N/A

ME.800.786. Scientific Foundations of Medicine: Pharmacology. 0 Credits.
N/A

ME.800.787. Scientific Foundations of Medicine (inc. Macromolecules, Cell Physiology, Metabolism and Genetics). 0 Credits.
N/A

ME.800.788. Scientific Foundations of Medicine: Neoplasia. 0 Credits.
N/A

ME.800.789. 3B's: Bench to Bedside and Back. 1 Credit.
Students in years 3 and 4 will gain further expose and education about the clinical opportunities and translational implications associated with their thesis research,

ME.800.801. Research in Cellular and Molecular Medicine. 0 Credits.
First year students perform 3 lab rotations. Upper-class students in conjunction with thesis advisor perform focused research on his/her thesis project.

ME.800.802. Research in Biochemistry, Cellular and Molecular Biology. 0 Credits.
Laboratory Research

ME.800.803. Biomedical Sciences Practicum (BCMB). 0 Credits.
Provides an opportunity for students to actively conduct research in BME, HGEN, BCMB-2, Biophysics, or PHYS.

ME.800.804. AstraZeneca Scholars Thesis Research. 0 Credits.
Graduate students engaged in the MedImmune Scholars Program will spend 50% of their time during their thesis work at MedImmune which is located in Gaithersburg, MD. This program enrolls students from multiple departments / graduate programs and there will be interdivisional registrations (WSE, SPH, KSAS) for this SOM course. Registration for this course is restricted to students who have been selected for the program.

ME.800.805. BCMB Quantitative Biology Lab. 1 Credit.
Weekly session provide hands-on work to reinforce and further develop computational concepts and problems students learn didactically in the BCMB core courses during the same period. Experimental design, and concepts of rigor and reproducibility will also be emphasized.

ME.800.806. BCMB Computational Biology Bootcamp. 1 Credit.
This intensive one week course is meant to immerse student in computation, and to provide them with the foundational tools to be able to apply modern computational techniques and appropriate statistics to their data.

ME.800.807. Research in Biomedical Science. 0 Credits.
Research course for students in the Crossdisciplinary Program for Biomedical Sciences (XDBio)

ME.800.809. COVID-19 Molecular Virology and Public Health. 0 Credits.
Short elective course with a mix of lectures, readings, discussion, and short assignments on the biology of coronaviruses, potential treatments, therapeutic mechanisms, and contributions by the Johns Hopkins community to deal with the COVID-19 pandemic. Topics include host-pathogen interactions at the moelcular, cellular, and immune/organismal levels, vaccines, and public health strategies.

ME.800.810. Seminar Course. 1 Credit.
During this course, BCMB students will read and analyze papers on different topics related to biochemistry, molecular and cell biology, and will further discuss them with the scientists who led the work. Specifically, these will be selected invited speakers for the various senimar series running on campus by different departments.

ME.800.811. Introduction to Responsible Conduct of Research. 1 Credit.
This first-year course incorporates discussion on topics such as: (a) the scientist as a responsible member of society, (b) research misconduct, (c) data acquisition and management, (d) authorship and publication practices, (e) mentor and trainee responsibilities, (f) use of animals in research, (g) conflicts of interest, (h) collaborative research and (i) human subjects protection. By inviting graduate students from a variety of training programs, the course provides a forum for students to share their experiences. Attendance is required for all sessions.

ME.800.900. Experiential Learning Practicum Course. 1 Credit.
The PDCO Experiential Learning Practicum offers PhD students and postdoctoral fellows the opportunity to gain experience in research-related careers in various sectors via externship opportunities (short-term opportunities with < 10 hours/week time commitment). Through these opportunities, participants will build both technical and non-technical skills that have the potential to aid them in research-related settings. Students will be expected to contribute to the project as outlined in the externship description and meet the stated expectations of the externship host site. Students will be evaluated based on an evaluation submitted by the externship supervisor at the conclusion of the externship.

NR (Nursing)

NR.100

NR.100.100. English for Academic Purposes. 0 - 1 Credits.
Under development

NR.110

NR.110.562. Advanced Practice in Acute Care I. 4 Credits.
This course fosters clinical competency and emphasizes evidence-based practice in adult acute/critical and chronic healthcare settings. It emphasizes the integration of theory, assessment and advanced therapeutics for adults and frail elders in high acuity patient settings. Students will perform comprehensive clinical assessment including appropriate diagnostic and therapeutic testing. Management of acute and chronic health problems will be accomplished with the direction of clinical preceptors. Clinical placements are arranged by faculty and will include placement in one of a variety of acute/critical care areas including, but not limited to: CCU, MICU, SICU, ED, intermediate care, and specialty services such as transplant and oncology. Gerontology experiences in complex long term care, rehabilitation and/or inpatient units specializing in the acute care of elders will also be provided. At weekly seminars, currently recommended diagnostic and treatment regimens will be discussed in a lecture and case study format. Information presented will focus on pathophysiology, subjective and objective clinical data including physical examination, laboratory and diagnostic test results, differential diagnosis and development of a management plan within the scope of Adult-Gerontology ACNP practice. 250 clinical hours.Pre/corequisites: NR.110.508, 110.547, 110.549, 110.572
NR.110.549 is a prerequisite for this course.

NR.110.572. Advanced Diagnostics and Therapeutics. 2 Credits.
This clinical course introduces students to the role and scope of practice for Adult Gerontology – Acute Care Nurse Practitioners. Methods of advanced assessment and treatment modalities utilized with acutely and critically ill adults and elders are discussed. Content includes nutritional support, fluid and electrolyte replacement, transfusion medicine, hemodynamic monitoring, and mechanical ventilation. Analysis of relevant laboratory and advanced cardiopulmonary assessment data is included. Laboratory practice is provided for procedures such as suturing, intubation and line insertion, as well as application of other invasive therapeutic and diagnostic devices.Corequisites: NR.110.547 and 110.549

NR.110.663. Advanced Practice Nursing: Case Studies in Acute Care Nursing. 3 - 5 Credits.
See NR110.562 for description. Course available to Accelerated Postmasters ACNP students only. 125-270 clinical hours.

NR.120

NR.120.501. Professionalism for Nursing in Health Care. 3 Credits.
This course focuses on professional role development in nursing and health care. Content isorganized into seven modules: 1) Local to global health care; 2) Ethics; 3) Interprofessionaleducation; 4) Leadership principles; 5) Health care delivery system; 6) Quality and safety; 7)Professional roles in nursing. The course content will address health disparities,interprofessional communication, teams and teamwork, values, ethics, principles of leadership,and professional roles within both interprofessional and nursing teams. Students will beintroduced to healthcare delivery concepts, such as healthcare delivery systems and healthcare policy and financing. Finally, students will develop their nursing practice by acquiring a basic understanding of healthcare competencies through two frameworks, the IOM competencies for health care professionals and the Quality and Safety Education in Nursing (QSEN) competencies.Pre/corequisites: NR.120.502, NR.120.503, NR.120.504, NR.120.505.

NR.120.502. Foundations of Nursing Practice. 3 Credits.
This course addresses the knowledge and skills needed to provide safe and effective care to patients. Students will explore scientific principles related to nursing interventions and will practice psychomotor skills needed to safely and effectively implement those interventions. Knowledge, skills and attitudes based on QSEN competencies, including person centered care, use of evidence based guidelines, quality improvement, safety and informatics will be incorporated into lab practice and Master's Program Outcomes.Pre/corequisites: NR.120.501, NR.120.503, NR.120.504, NR.120.505.

NR.120.503. Health Assessment I. 3 Credits.
This course provides students with the basic skills to complete a comprehensive health assessment including the physical, psychological, and social aspects of health to support person-centered care. Integrated in this assessment is the collection and analysis of data which are essential in planning safe and effective patient care. Lectures are designed to help the students apply their knowledge of health assessment to both primary and acute care settings. Emphasis is placed on gathering reliable and relevant information; recognizing variations of normal findings; and identifying abnormal findings using common health problems as exemplars.Pre/corequisites: NR.120.501, NR.120.502, NR.120.504, NR.120.505

NR.120.504. Pathophysiology I. 3 Credits.
This course presents basic knowledge of the interrelationship between normal physiology and pathophysiology across the lifespan as applicable to current nursing practice. Selected major health problems are explored, including clinical manifestations and the pathophysiology. Weekly lecture/discussions are organized based on systems and cover topics from the cellular to major organ systems. Clinical courses will provide a clinical opportunity to apply this content.Pre/corequisites: NR.120.501, NR.120.502, NR.120.503, NR.120.505.

NR.120.505. Integrated Clinical Management: Common Health Alterations. 4 Credits.
This combined clinical and theory course introduces nursing basic concepts and frameworks (communication, safety, organization and nursing process). Additionally, this course will also introduce common conditions found in healthcare. Students practice competencies in communication, assessment, nursing interventions, and documentation in a variety of basic acute care clinical settings. Simulation is incorporated as an adjunct to the clinical experience. 112 clinical hoursPre/corequisites: NR.120.501, NR.120.502, NR.120.503, NR.120.504

NR.120.507. Pharmacology. 3 Credits.
The theoretical course, Pharmacology, provides nurses in general practice with an understanding of core drug knowledge including pharmacotherapeutics, pharmacokinetics, pharmacodynamics, contraindications and precautions, adverse effects, and drug interactions. Sources of individual variation in drug response are presented in relation to drug therapy, and include: health status, lifespan and gender, lifestyle, diet, and habits, environment, and culture and inherited traits. Major drug classifications and prototype drugs are presented in a standardized format that includes discussion of pharmacology principles, medication safety issues, nursing implication of drug therapy, as well as, review in relation to patient case scenarios. The nursing process, which is essential for the nursing management of drug therapy, is emphasized, allowing students to apply their critical thinking skills for patients receiving drug therapy. Nursing management in drug therapy includes maximizing therapeutic effects, minimizing adverse effects, and patient and family education. The course content provides nurses in general practice with the knowledge to apply the foundation of basic pharmacology, with an emphasis on an inter-professional approach to practice. Application of this knowledge in the clinical setting allows nurses in general practice the ability to provide safe, effective nursing care using a holistic approach to improve patient and system outcomes. Prerequisites: NR.120.501-120.505

NR.120.509. Promoting Health in Older Adults. 3 Credits.
This course is designed to promote understanding of the aging process and the role of the nurse with implications for promoting healthy aging and providing care across a continuum of care settings. Students will learn about U.S. and global demographic aging trends as well as other factors impacting physical, psychological, social, and spiritual well-being of individuals, families, and populations. Class discussions will include age-related changes and nursing strategies for promoting health, screening, and providing evidence-based care for older adults with complex co-morbidities, polypharmacy, and major geriatric syndromes, while managing health outcomes in various care settings and across transitions of care; economic and policy implications of health care provided by interprofessional teams for older adults; as well as national/international models of care. Learning application activities are designed to enhance student critical thinking in providing care and promoting health and independence in older adults.Prerequisites: NR.120.501-505

NR.120.511. Integrated Clinical Management: Chronic Health Alterations. 4 Credits.
This course focuses on chronic health alterations which impact individuals, families, and the communities within which they reside. Students will use the nursing process to provide comprehensive care to individuals with chronic health alterations in the acute care setting. Students will also use beginning skills to provide education to individuals and families in consideration of the provision of care across diverse health care settings. 112 clinical hours. Prerequisites: NR.120.501-120.505. Corequisite: NR.120.507.
1st semester Masters Entry courses are prerequisites for this course.

NR.120.513. Leadership for Professional Nursing. 3 Credits.
This course focuses on concepts central to the development of the beginning leadership role within the interprofessional team in the health care delivery system. Students will review key elements of management and leadership theory and roles, and will examine strategies and processes that address professionalism; improvement of care delivery; facilitation of change; quality and safety; principles of patient-centered care; evidence-based practice; decision making and problem solving; legal and ethical issues; and use of information technologies. Opportunities to apply knowledge to clinical case studies will be a major course focus.Prerequisites: NR.120.501-120.511

NR.120.515. Psychiatric Mental Health. 3 Credits.
This course focuses on the application of the standards of psychiatric mental health nursing in promoting health and caring for health care consumers (defined as individuals, groups, and populations) with alterations in mental health. The major mental disorders are examined relative to etiology, clinical manifestations, and approaches to treatment, and considering variations among individuals and populations. Theories and principles underlying the provision of evidence-based patient-centered care are addressed. The human and economic impacts of mental disorders on the individual, family, and society are examined relative to ethical and legal considerations, health policy and health care financing. CLINICAL DESCRIPTION: Student clinical experiences are in acute care and community settings working in collaboration with the healthcare team. Students will have an opportunity to conduct comprehensive patient assessments, plan and implement care, and develop skills in therapeutic communication with patients, families, and groups. 112 clinical hoursPrerequisites: NR.120.501-120.511

NR.120.516. Integrated Clinical Management: Complex Health Alterations. 4 Credits.
This course focuses on individuals and groups of clients experiencing complex medical surgical problems requiring therapeutic and restorative care in acute care settings. Students will collaborate with members of interdisciplinary health care teams in planning, implementing, and evaluating care to adults with complex needs in acute care settings. Students will demonstrate competence in providing safe and high quality nursing care to patients (families) with complex health problems in collaboration with other members of the health care team. 112 clinical hours.Prerequisites: NR.120.501-NR.120.511

NR.120.520. Nursing the Childbearing Family. 4 Credits.
In this course, students build on and further develop assessment, care-planning, communication, and leadership skills in the context of caring for childbearing families. The focal learning context is the inpatient labor and delivery and postpartum settings, however the course addresses related issues such as family planning and abortion care. All topics are considered in the context of the Universal Rights of Respectful Maternity Care. Students have the opportunity to examine the gap between evidence-based and current obstetric and neonatal nursing care norms and explore strategies for translation of evidence and effective inter-professional team communication. This course raises questions about and opportunities to impact issues of quality and safety, ethical practice, patient advocacy, and social determinants of health. Students are encouraged to put discussions into a broader social and geographic context and appreciate how these challenges and potential solutions vary across settings. 112 clinical hours.Prerequisites: NR.120.501-120.516

NR.120.521. Child Health. 4 Credits.
In this course, the student will study the unique health and developmental needs of infants, children, and adolescents. The course is designed to develop perspectives on wellness and illness in children, emphasizing family-centered care that incorporates screening, teaching, and health counseling. There is a strong developmental and health promotion focus across settings. The course incorporates principles involved in assessment, planning and implementation of nursing interventions appropriate for children with various complex health problems. Health issues specific to children and health issues expressed in unique ways in children will be emphasized. Integration of child health care knowledge and clinical application of this knowledge is a requirement of this course. 112 clinical hours.Prerequisites: NR.120.501-NR.120.516

NR.120.522. Public Health. 3 Credits.
This course provides students with an understanding of the relationship between public health and nursing practice. The course covers key aspects of public health science including epidemiology, social behavioral sciences, and environmental health. The student will have the opportunity to explore the application of public health science to real life health issues at the population level including evidenced-based approaches for optimizing the health of populations/communities. The content of the course provides the foundation for meeting the public health competencies for the generalist nurse with an emphasis on community assessment, health planning, as well as basic public health competencies such as surveillance, screening, immunization, communication, and outbreak investigation. In addition the student will explore issues related to outcome measurement at the population level and emergency preparedness/disaster management. 112 clinical hours.Prerequisites: NR.120.501-NR.120.516

NR.120.527. Integrated Clinical Management: Synthesis Practicum. 6 Credits.
This final clinical course incorporates both didactic, seminar and clinical experiences. Students will be assigned to one of a variety of types of care settings to complete 224 precepted clinical practice hours under the supervision of course faculty. Emphasis is placed on the synthesis of previous coursework and knowledge as students perform the role of an entry-level professional nurse. Students will develop independence in nursing practice, skill in clinical reasoning, and demonstrate accountability for autonomous professional practice. They will synthesize and apply principles of management theory to their nursing practice and demonstrate entry level skills in nursing leadership.Prerequisites: NR.120.501-120.522

NR.120.529. Population and Public Health Nursing. 4 Credits.
This course focuses on developing public health nursing competencies and constructing knowledge of strategies to improve population health outcomes through public health science and population health management. Competencies are developed through community assessment, and practice in the principles of program development and evaluation to improve population health outcomes. The clinical portion of the course uses a critical service-learning pedagogy. The theory portion draws on the science of public health practice and conceptual frameworks for population health improvement to develop student learning in these areas. Content and approaches to practice are mutually reinforced in the theory and clinical elements. Students are provided an opportunity to explore publicly-available policy and population-level data platforms to inform interventions and to design, implement, and evaluate an agency-focused program at their clinical site. They gain knowledge and experience in navigating health policy frameworks and contributing to their development. Prerequisites: NR 120.513, NR 120.515, NR 120.516, NR 210.608

NR.120.530. Politics & Policy for the Health Care Professional. 1 - 2 Credits.
This course is an overview and an introduction to the political process relevant to health care and for health care professionals. It is intended to prepare health professionals to take active roles in policy development and patient, community, systems, and organizational advocacy. The course will review the steps involved with the political process, and provide students with the basic tools for becoming involved in politics. There will be an emphasis on how to navigate and negotiate political systems. this course will be offered online and include two legislative field trips, one to Washington, D.C. (optional) and the other to a legislative body meeting (mandatory). Students will also be required to interview an expert in health care and politics or health policy, who is a leader in health care and a leader of an organization that takes positions on health care legislation. Limited enrollment.

NR.120.531. Readiness for Practice. 1 Credit.
The purpose of this course is to assist the student(s) synthesize knowledge and skills for entry level registered nurses practice. Essential content is organized according to the National Council of State Board of Nursing practice analysis and NCLEX-RN licensing exam test plan. Based on individual needs assessments and gap analysis, individualized plans are established that include knowledge review, testing preparation, and study skills. This course will utilize group and individualized instruction to facilitate the learning process.

NR.120.534. Quality Improvement & Safety: Systems Applications I. 1 Credit.
Fuld Fellows complete clinical hours. The hours are divided as follows: 50 hours with an assigned Quality Improvement (QI) or Safety project under the guidance of a project mentor and Fuld course faculty, clinical conference meetings (6 hours) with Fuld Faculty. In order to participate as a member of a clinical Quality or Safety project team, emphasis is placed on the synthesis of coursework and knowledge in quality improvement and safety gained in Foundations of Nursing Practice. Using written and verbal communication, Fellows will further develop teamwork and communication skills and leadership skills through reflection, ongoing self-assessment as a QI or Safety project team member, and evaluation of communication that impedes or enhances effective teams. Students will also reflect on the QI and Safety, teamwork and communication, and leadership in their clinical practice sites in their Fuld Fellowship clinical journals and in class discussion. Prerequisites: NR.120.501-120.505Corequisites: NR.120.507-120.511

NR.120.535. Quality Improvement & Safety: Systems Applications II. 1 Credit.
In this course, Fuld Fellows complete clinical hours focused on a Quality Improvement (QI) or Safety project under the guidance of a mentor and course faculty. Fellows continue to participate as a member of a clinical QI or Safety project team and emphasis is placed on the synthesis of 120.534 coursework and knowledge in quality and safety. Teamwork, communication, and leadership skills will continue to develop through ongoing self-assessment and evaluation. In addition, this course will feature guest lectures from interprofessional leaders in the field of QI and patient safety. Prerequisite: NR.120.534

NR.120.537. Community Outreach to Underserved Communities in Urban Baltimore. 1 Credit.
This course provides students with an overview of Baltimore's vulnerable communities and underserved populations. Students gain a broad perspective on factors affecting the health of underserved and vulnerable communities in urban Baltimore. Students will develop cultural competency skills to work effectively in partnership with Baltimore communities. The course includes the history of Johns Hopkins nursing and Baltimore's history, a broad definition of health focusing on social determinants of health factors such as poverty, housing, violence, substance abuse, disparities in health and health care, social justice, vulnerable populations, employment, safety, and the environment. Students will also examine the influence of implicit bias on communication and interventions as well as the importance of integration trauma-informed care in urban environments. Selected Baltimore community health interventions are presented with emphasis on health promotion and community organizing. Local community and civic leaders present their roles and discuss current public health issues facing Baltimore. Students will learn about local neighborhoods, community agencies, and resources and gain basic skills in basic community assessment.

NR.120.538. Nursing Research Seminar. 1 Credit.
This course will provide an exploration of the design and conduct of research in the health sciences. Students will be introduced to common research designs through the discussion of ongoing research of faculty. Students will examine current topics and issues in nursing research. Discussions will cover the ways in which the nursing perspective shapes the conduct and results of research. Topical seminars also will incorporate an interdisciplinary perspective. The goal is to engage students in the ongoing research of faculty and promote intellectual growth among highly motivated pre-licensure Master's students who aspire to learn more about nursing research. The course must be taken each semester that the student is participating in the Research Honors Program.Prerequisite: Admission to Research Honors Program

NR.120.539. Community Perspectives on the Childbearing Process. 2 Credits.
This course focuses on developing initial competence in the birth companion role, based on the Doula model. The Doula model emphasizes physical, emotional, and informational support to the mother before, during, and after childbirth. Maternal and child health nursing and community health nursing theories and practices are reinforced. In addition to class time, biweekly meetings are held to discuss birth experiences and case management issues, and to hear presentations from experts in the field, including lactation consultants, social workers, community health educators and child birth educators. Limited enrollment. Course may span more than one term.

NR.120.544. Seminar in Specialty Nursing: Introduction to Emergency Nursing. 3 Credits.
This course is designed to expand the student's learning in a specified topic related to nursing practice. Advanced theories and principles related to the delivery of nursing care in selected settings and/or with selected patient populations are presented as seen in the ED setting. The course builds on the previous coursework throughout the curriculum. In this Specialty Nursing Seminar, students will acquire an overview of the principals involved in the planning and implementation of nursing interventions for patients in Emergency Department (ED) settings. Content will focus on the unique environment of the ED with an emphasis on patient assessment, triage principles, ACLS protocols, Trauma Patient Management, and Disaster Preparedness & Response Principles. Using a systems approach, the students will review the etiologies, clinical presentations, pathophysiology, and nursing interventions for these patients.Prerequisites: NR.120.501-120.522
NR.120.529[C]

NR.120.545. Seminar in Specialty Nursing: The Nurse's Role in Caring for the Childbearing Family and Newborns. 3 Credits.
This course is designed to expand the student's learning in the childbearing family and newborn care. This course will introduce students to theory and its application to practice and research, providing critical in-depth information of "hot topics" in providing evidence-based care to the childbearing family and newborns. In this nursing specialty seminar, the students will develop a comprehensive understanding of the physiologic, psycho-social, legal, and ethical considerations impacting the nurse's role in caring for the childbearing family and newborns. Students will learn about advanced physiologic principles of genetic screening modalities, including first and second trimester screening and testing for Down's syndrome and open neural tube defects. Students will review physiologic principles underlying screening modalities for fetal well-being during pregnancy and the birth process, including advanced concepts in fetal monitoring. Students will engage in a role play simulation that includes key concepts in quality and safety, including patient advocacy, teamwork and interprofessional communication. Ethical considerations, legal and risk management issues for the nurse in clinical practice will be reviewed. Current practice guidelines from key professional organizations (AWHOHH, ACNM, ACOG, NICHD) will be analyzed from an evidence-based perspective. Neonatal resuscitation will be introduced with practical application.Prerequisites: NR.120.501-120.522
NR.120.529[C]

NR.120.546. Seminar in Specialty Nursing: Acute Care of Children. 3 Credits.
This course is designed to expand the student's learning in a specified area related to nursing practice and research. Advanced theories and principles related to the delivery of nursing care in selected settings and/or with selected populations are presented. The student will build on previous pediatric content, gaining more depth in the acute care topics. During the course, students will examine trauma care, pediatric sepsis and shock, congenital heart defects, child life and non-pharmacologic pain intervention, hematology and oncology, pediatric respiratory diseases and support, and student-led topics of interest in pediatric acute care. The students will select the area of nursing practice and research they would like to explore in more depth. The course will conclude with small group evidence-based practice presentations using questions to be researched that may have been stimulated from problems discovered in previous pediatric clinical rotations.Prerequisites: NR.120.501-120.522
NR.120.529[C]

NR.120.547. Seminar in Specialty Nursing: Introduction to Acute/Critical Care. 3 Credits.
This course is designed to expand the student's learning in a specified topic related to nursing practice. Advanced theories and principles related to the delivery of nursing care in selected settings and/or with selected patient populations are presented. The course builds on the previous coursework throughout the curriculum. Students will acquire an overview of the unique environment of the Acute/Critical Care Unit. The focus will be the principles involved in planning, implementing and evaluating nursing and medical interventions for critical care patients. The students will review the causes, clinical presentations, pathophysiology and hemodynamic changes of patients with respiratory failure, heart failure, intracerebral hemorrhage, renal failure, shock and sepsis. Content will include the medications, advanced monitoring, and equipment used in the critical care setting.Prerequisites: NR.120.501-120.522
NR.120.529[C]

NR.120.548. Seminar in Specialty Nursing: Preparing for Global Nursing. 3 Credits.
This course is designed to orient students to global health priorities and nursing's unique position in meeting international, health-related goals. Students will use weekly topical areas of interest to engage with policy and practice issues relevant to nursing in low and middle income countries (LMIC). Students are encouraged to compare and contrast nursing education, policy, and practice across settings and in so doing, better understand the contribution of nursing in LMIC and their own readiness to contribute in international settings. Learning activities are designed to introduce students to global health priorities and influential international nursing, nongovernmental, and governmental organizations. Students will discuss the complex influences on health in LMIC and explore the connectedness between these and their own experience nursing in the US. Assignments are designed to provide opportunities to explore and apply an expanded range of resources and evidence to the nursing process as they address global health problems.Prerequisites: NR.120.501-120.522
NR.120.529[C]

NR.120.549. Health Systems Science: Interprofessional Collaboration to Improve Medication Safety. 2 Credits.
This course gives interprofessional (IP) learners opportunity to explore topics related to safe, timely, efficient, effective, equitable and patient-centered medication-use systems. Through an interprofessional context, students will explore medication safety issues as they relate to the health care system, evidence-based practice, quality and performance improvement, health information technologies, and, ultimately, health equity. Students will use an interprofessional framework to examine and apply systems thinking, human factors engineering principles, and high reliability principles to medication safety problems. Students will explore experiences of professions (other than their own) involved in the medication-use process to better engage in communication and decision making in the interprofessional environment.

NR.120.550. Health Systems Science: Fostering Future leaders for Interprofessional Practice (Health FLIP). 2 Credits.
This course is designed to develop health care leaders by teaching and providing opportunities health care professional students (nursing, medical, and pharmacy) to practice collaborative strategies in a community setting. Virtual seminars are designed to focus on the IPEC competencies: values and ethics, roles and responsibilities, communication, and teams and teamwork. This program will also apply strengths-based leadership development strategies for our students to: 1) introduce the strength-based paradigm strategy for professional development 2) celebrate the diversity of strengths amongst health professions students 3) foster a sense of community that encourages professional identity and camaraderie with other health professions students. A Strengths-Based Health Professions Workshop will be tailored to students to explore this method in their journey as a leader and a healthcare team member. This interactive and community-oriented program will include customized exercises, materials, and group activities developed from the Strengths Certified Coaching Teams' armamentarium. A variety of learning modalities will be used for this course including, role play, case studies, a mix of in person an virtual health mentor visits, health promotion projects, and didactic seminars by experts in the field. Students will regularly reflect on these experiences as they consider their impact on pursuit of health equity and their future practice with both colleagues and community members.

NR.210

NR.210.600. Advanced Physiology/Pathophysiology. 4 Credits.
This course focuses on principles of physiology and pathophysiology that affect wellness and disease states across the lifespan. The interrelationship between physiology and pathophysiology. Students will apply this knowledge to interpret changes in normal functions that indicate illness and identify principles underlying disease prevention strategies. This course serves as the foundation for clinical reasoning skills used for the advanced practice role.

NR.210.601. Advanced Health Assessment and Measurement. 3 Credits.
This course will build upon health assessment skills developed in the basic nursing educational program. In this course students will attain advanced knowledge and skills in history taking, biopsychosocial and cultural health assessment across the lifespan. The laboratory experiences utilizing a systems approach will focus on assessment of clients and presentation of normal and abnormal findings.Pre or corequisite: NR.210.600

NR.210.602. Clinical Pharmacology. 4 Credits.
This course will build upon basic pharmacology knowledge attained in the professional nurse's education and experience. This advanced course focuses on the clinical use of drugs for clinical conditions most commonly seen in practice and across the lifespan. Principles of rational medication prescribing based on evidenced-based guidelines, pharmacology principles, lifespan considerations, cultural, socioeconomic and legal influences will be presented. Prescription medications will be the focus of the course; however, over-the-counter and complementary and alternative medications will be discussed for certain disease states. Completion of this course will enable students to identify pharmacologic treatments for commonly encountered clinical conditions, as well as, prescribe, manage and evaluate drug therapy.

NR.210.603. Human Growth and Development: Birth through Adolescence. 1 Credit.
This course describes normal and abnormal variations in growth and development from birth through adolescence. An emphasis on appropriate screening, identification, and management of abnormal variations in growth and development will be discussed.

NR.210.604. Health Supervision: Birth through Adolescence. 2 Credits.
Health supervision includes the promotion of a healthy environment through screening, disease and injury prevention, and anticipatory guidance. This course discusses key components of health supervision as well as identification, prevention and management of common health concerns that may be encountered during health maintenance exams in pediatrics.Prerequisite: NR.210.603
NR.210.603 is a prerequisite for this course.

NR.210.605. Diagnostic Skills and Procedures for Advanced Practice Nursing. 2 Credits.
This course provides theoretical knowledge and emphasizes psychomotor skills necessary to provide selected advanced practice nursing interventions utilized in the evaluation and management of patients. This course introduces evaluation, selection, interpretation, and application of diagnostic testing, evaluation techniques and procedures. Evidence-based clinical reasoning and decision-making techniques are presented and applied in simulation lab practices for skills acquisition and demonstration of competency.Prerequisite: NR.210.601
NR.210.601 is a prerequisite for this course.

NR.210.606. Biostatistics for Evidence-Based Practice. 3 Credits.
This course is intended to apply standard statistical methods to develop knowledge and skills, enabling students to understand data collection and analysis methods, interpretation and reporting of statistical results, and critically read and evaluate nursing and the healthcare literature. The emphasis is on understanding the relevance and use of appropriate statistical methods in nursing research. Published nursing research articles in peer reviewed nursing and healthcare journals, and computing lab experiences are used to motivate topics covered in classes. Prerequisite: College level Statistics or Biostatistics course.

NR.210.607. Context of Health Care for Advanced Nursing Practice. 3 Credits.
This three credit course examines the scope and status of professional roles and responsibilities of nurses prepared to assume accountability for quality care outcomes; navigate and integrate care services across the healthcare system; collaborate with and build interprofessional care teams; design innovative nursing practices; and facilitate the translation of evidence into practice. This course focuses on personal leadership and the associated skills and knowledge to practice as a contemporary professional nurse. Course content and activities focus on understanding the forces driving contemporary health care, as well as efficient and effective function in a continuously changing health care environment.

NR.210.608. The Research Process and Its Application to Evidence-Based Practice. 3 Credits.
This course will prepare students for clinical leadership roles in health care through the translation of the best available scientific evidence into nursing practice. Students will develop the requisite critical skills and knowledge to independently search for, review, appraise, and synthesize research literature of particular interest to nursing practice. Students will be prepared to recommend practice changes at the individual- and system-level based on the strength of the evidence. Prerequisite: NR.210.606, 120.508, or 110.507
NR.210.606 is a prerequisite for this course.

NR.210.609. Philosophical, Theoretical & Ethical Basis of Advanced Nursing Practice. 3 Credits.
This course will explore the conceptual, theoretical, and ethical bases of nursing. Selected conceptual models and frameworks of nursing and ethics will be analyzed with emphasis on implications for nursing practice. This course is designed to provide students with frameworks, concepts, and personal and professional exercises for approaching nursing practice issues and to enhance the student's understanding of ethical issues in nursing and in health care and to respond to them specifically.

NR.210.610. Health Promotion and Risk Reduction Across the Lifespan. 2 Credits.
This course introduces the student to current issues, theories, and research in health promotion, disease prevention, and risk reduction related to individuals, families, aggregates, and communities. The role of the nurse in risk assessment, counseling, education, and screening will be emphasized as well as thinking broadly about health promotion needs and health behavior from an ecological perspective.

NR.210.620. Clinical Reasoning I: Common Acute Illnesses in Pediatrics. 2 Credits.
This is the first of five sequential theory courses that will prepare Family Nurse Practitioner (FNP) and/or Pediatric Nurse Practitioner (PNP) students to provide primary care to pediatric patients, especially those experiencing common acute illnesses in one or more body systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis and management of common acute health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for pediatric patients. FNP and PNP students focus on health care for the pediatric population with particular emphasis on underserved and those from various cultures, emphasizing health promotion, patient education, and disease prevention.Prerequisites: NR. 210.600, 210.601, 210.602, 210.603, and 210.604Corequisite: NR.210.605
NR.210.600, 601, and 602 are prerequisites for this course.

NR.210.621. Clinical Reasoning II: Common Chronic Illnesses in Adult/ Geriatric Health. 2 Credits.
This is the second of five sequential theory courses that will prepare Family Nurse Practitioner (FNP) students and AGNP Primary Care students to provide primary care for adults and geriatrics, especially in those experiencing common chronic illnesses in one or more body systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis and management of common chronic health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up for patients with common chronic problems. FNP and AGNP Primary Care students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from various cultures, emphasizing health promotion, patient education, and disease prevention.Prerequisite: NR.210.620Corequisite: NR.210.625
NR.210.620 is a prerequisite for this course.

NR.210.622. Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health. 2 Credits.
This is the third of five sequential theory courses that will prepare primary care nurse practitioner students to provide primary care for adolescents, obstetrical patients and their families, and focus on gender health conditions. This course provides didactic content to prepare the primary care nurse practitioner student to provide primary care to adolescents and adults experiencing acute complex problems with an emphasis in obstetrical, gender and behavioral health systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis, and management of acute complex health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients. Primary care nurse practitioner students focus on health care for adolescents, obstetrical, and gender health populations, with particular emphasis on underserved and those from various cultures emphasizing health promotion, patient education, and disease prevention.Prerequisites: NR.210.621 and 210.625Corequisite: NR.210.626
NR.210.621 and 625 are prerequisites for this course.

NR.210.623. Clinical Reasoning IV: Common Acute and Complex Chronic Illnesses in Primary Care in Adults/Geriatrics. 2 Credits.
This course provides didactic content to prepare the adult/gerontology and family nurse practitioner student to provide primary care to adults and older adults, experiencing common acute and complex chronic illnesses in one or more body systems. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. Content addresses comprehensive diagnosis and management of common acute and complex chronic health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with common acute and complex chronic problems. Nurse practitioner students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from various cultures. Students also emphasize health promotion, patient education, and disease prevention, screening of adult and older populations, and providing culturally competent care.Prerequisites: NR.210.622 and 210.626Corequisite: NR.210.627
NR.210.622 and 626 are prerequisites for this course.

NR.210.624. Clinical Reasoning V: Clinical Management for the Family Nurse Practitioner - Role Transition and Special Topics in Family Health. 2 Credits.
This course provides didactic content to prepare the Family Nurse Practitioner (FNP) student to provide primary care to children and adults throughout the lifespan, experiencing chronic complex health problems with an emphasis on coordination on older populations and selected groups with atypical presentations. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis, and management of acute complex health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients. FNP students focus on health care for all populations and all age groups with particular emphasis on underserved and those from various cultures emphasizing health promotion, patient education, and disease prevention.Prerequisites: NR.210.623 and 210.627Corequisite: NR.210.628
NR.210.623 and 627 are prerequisites for this course.

NR.210.625. Clinical Practicum I: Family Nurse Practitioner. 3 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 168 hours of clinical experience in adult, pediatric, women's health or family medicine setting. This first sequential course will prepare students to diagnose, treat, and follow-up patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, sexuality, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric and adult healthcare settings. Prerequisite: NR.210.620Corequisite: NR.210.621
NR.210.620 is a prerequisite for this course.

NR.210.626. Clinical Practicum II: Family Nurse Practitioner. 3 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 168 hours of clinical experience in adult, pediatric, women's health or family medicine setting. This second sequential clinical course will prepare students to diagnose, treat, and follow-up patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, sexuality, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric and adult healthcare settings.Prerequisites: NR.210.621 and 210.625Corequisite: NR.210.622
NR.210.621 and 625 are prerequisites for this course.

NR.210.627. Clinical Practicum III: Family Nurse Practitioner. 2 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 112 hours of clinical experience in adult, pediatric, women's health or family medicine setting. This third sequential clinical course will prepare students to diagnose, treat, and follow-up patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, sexuality, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric and adult healthcare settings.Prerequisites: NR.210.622 and 210.626Corequisite: NR.210.623
NR.210.622 and 626 are prerequisites for this course.

NR.210.628. Clinical Practicum IV: Family Nurse Practitioner. 2 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 112 hours of clinical experience in adult, pediatric, women's health or family medicine setting. This fourth sequential clinical course will prepare students to diagnose, treat, and follow-up patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, sexuality, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric and adult healthcare settings.Prerequisites: NR.210.623 and 210.627Corequisite: NR.210.624
NR.210.623 and 627 are prerequisites for this course.

NR.210.629. Clinical Practicum V: Family Nurse Practitioner. 4 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 224 hours of clinical experience in adult, pediatric, women's health or family medicine setting. This fifth and final sequential clinical course will prepare students to diagnose, treat, and follow-up patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, sexuality, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric and adult healthcare settings.Prerequisites: NR.210.624 and 210.628
NR.210.624 and 628 are prerequisites for this course.

NR.210.630. Clinical Reasoning I - Clinical Management for the Pediatric Nurse Practitioner: Common Acute Illnesses in Pediatrics. 2 Credits.
This is the first of five sequential theory courses that will prepare Pediatric (PNP) students to provide primary care to pediatric patients, especially in those experiencing common acute illnesses in one or more body systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis and management of common acute health conditions, including appropriate diagnostic procedures, laboratory tests, and follow-up care for pediatric patients. PNP students focus on health care for the pediatric population with particular emphasis on underserved and those from various cultures, emphasizing health promotion, patient education, and disease prevention.Prerequisites: NR.210.600, 210.601, 210.602, 210.603, 210.604
NR.210.600, 601, and 602 are prerequisites for this course.

NR.210.631. Clinical Reasoning II-Clinical Management for the Pediatric Nurse Practitioner: Chronic Illnesses in Pediatrics. 2 Credits.
This is the second of five sequential theory courses that will prepare Pediatric Nurse Practitioner (PNP) students to provide primary care to pediatric patients, especially in those experiencing common chronic illnesses in one or more body systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis and management of common chronic health conditions, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with common chronic conditions. PNP students focus on health care for the pediatric population with particular emphasis on underserved and those from various cultures, emphasizing health promotion, patient education, and disease prevention.Prerequisite: NR.210.630Corequisite: NR.210.635
NR.210.630 is a prerequisite for this course.

NR.210.632. Clinical Reasoning III: Acute Complex Problems with Gender and Behavior Health (with variations). 2 Credits.
This is the third of five sequential theory courses that will prepare the Pediatric Nurse Practitioner (PNP) to provide primary care to the pediatric experiencing acute complex health conditions with an emphasis in gender and behavioral health systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis, and management of acute complex health conditions, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients. PNP students focus on health care for all populations and all age groups with particular emphasis on underserved and those from various cultures emphasizing health promotion, patient education, and disease prevention.Prerequisites: NR.210.631 and 210.635Corequisite: NR.210.636
NR.210.631 and 635 are prerequisites for this course.

NR.210.633. Clinical Reasoning IV-Clinical Management for the Pediatric Nurse Practitioner: Problems Specific to the Newborn/Infant. 2 Credits.
This is the fourth of five sequential theory courses that will prepare Pediatric Nurse Practitioner (PNP) students to provide primary care to clinical conditions that affect newborns and infants in one or more body systems. It integrates evidence-based aspects of care that are based on age, gender, sexuality and social determinants of health. Content addresses comprehensive assessment, diagnosis and management of newborn and infant health conditions, including appropriate diagnostic procedures, laboratory tests, and follow-up care for newborn and infant patients. PNP students focus on health care the newborn and infant with particular emphasis on underserved and those from various cultures, emphasizing health promotion, patient education, and disease prevention.Prerequisite: NR.210.632 and 210.636Corequisite: NR.210.637
NR.210.632 and 636 are prerequisites for this course.

NR.210.634. Clinical Reasoning V - Topics for Pediatric Nurse Practitioner Practice. 2 Credits.
This is the final course in a series of five that provides didactic content to prepare the Pediatric Nurse Practitioner (PNP) student to practice as a PNP in the primary care setting. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. The course emphasizes the legal, regulatory, and scope of practice issues and readies the student for entry into practice. Attention is directed towards quality, safety, and risk management monitoring, and nurse practitioner-driven outcomes. The course will also explore patient transitions of care, palliative care decisions, development of expert communication skills in difficult conversations, and practice-delivery models for care.Prerequisites: NR.210.633 and 210.637Corequisite: NR. 210.638
NR.210.633 and 637 are prerequisites for this course.

NR.210.635. Clinical Practicum I: Pediatric Nurse Practitioner. 2 - 3 Credits.
This first sequential clinical course will prepare students to diagnose, treat, and follow-up pediatric patients and families. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric healthcare settings. 112 clinical hours.Prerequisite: NR.210.630Corequisite: NR.210.631
NR.210.630 is a prerequisite for this course.

NR.210.636. Clinical Practicum II: Pediatric Nurse Practitioner. 2 - 3 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 112-168 hours of clinical experience in a pediatric primary care, newborn nursery, school based health center or pediatric specialty practice. This second sequential clinical course will prepare students to diagnose, treat, and follow-up pediatric patients. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric healthcare settings.Prerequisites: NR.210.631 and 210.635Corequisite: NR.210.632
NR.210.631 and 635 are prerequisites for this course.

NR.210.637. Clinical Practicum III: Pediatric Nurse Practitioner. 2 - 3 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in clinical experiences in a pediatric primary care, acute care or specialty settings. This third sequential clinical course will prepare students to diagnose, treat, and follow-up pediatric patients with common, complex acute, and chronic care conditions. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric healthcare settings.Prerequisites: NR.210.632 and 210.636Corequisite: NR.210.633
NR.210.632 and 636 are prerequisites for this course.

NR.210.638. Clinical Practicum IV: Pediatric Nurse Practitioner. 2 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 112 hours of clinical experience in a pediatric primary care, newborn nursery, school based health center or pediatric specialty practice. This fourth sequential clinical course will prepare students to diagnose, treat, and follow-up pediatric patients. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric healthcare settings.Prerequisites: NR.210.633 and 210.637Corequisite: NR.210.634
NR.210.633 and 637 are prerequisites for this course.

NR.210.639. Clinical Practicum V: Pediatric Nurse Practitioner. 4 Credits.
Under the guidance of a clinical faculty instructor and experienced preceptor, the student will participate in 224 hours of clinical experience in a pediatric primary care, newborn nursery, school based health center or pediatric specialty practice. This fifth sequential clinical course will prepare students to diagnose, treat, and follow-up pediatric patients. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of pediatric healthcare settings.Prerequisites: NR.210.634 and 210.638
NR.210.634 and 638 are prerequisites for this course.

NR.210.640. Clinical Reasoning I: Common Acute Illness. 2 Credits.
This course provides content to prepare the adult/gerontology nurse practitioner student to provide primary care to adults, experiencing common acute illnesses in one or more body systems. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. Content addresses comprehensive diagnosis and management of common acute health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with common acute problems. Nurse practitioner students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from various cultures. Students also emphasize health promotion, patient education, and disease prevention, screening of adult and older populations, and providing culturally competent care.Prerequisites: NR.210.600, 210.601, and 210.602
NR.210.600, 601 and 602 are prerequisites for this course.

NR.210.641. Clinical Reasoning II: Common Chronic Illnesses in Adult/ Geriatric Health. 2 Credits.
This course provides content to prepare the adult/gerontology nurse practitioner student to provide primary care to adults experiencing health problems in one or more body systems. This course prepares students to diagnose, treat and follow-up common chronic illnesses in adults. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. Didactic content addresses comprehensive diagnosis and management of common chronic health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with common chronic problems. Nurse practitioner students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from other cultures. Students also emphasize health promotion and disease prevention, screening of adult and older populations, and providing culturally competent care.Prerequisite: NR.210.640Corequisite: NR.210.645
NR.210.640 is a prerequisite for this course.

NR.210.642. Clinical Reasoning III: Clinical Management for the Primary Care Nurse Practitioner in Acute Complex Issues from Adolescence to Aging and Issues in Gender Health. 2 Credits.
This course provides content to prepare the adult/gerontology nurse practitioner student to provide primary care to adults, including older persons, experiencing health problems in one or more body systems. This course prepares students to diagnose, treat and follow-up acute complex illnesses in adults. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. Didactic content addresses comprehensive diagnosis and management of acute complex health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with acute complex problems. Nurse practitioner students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from other cultures. Students also emphasize interdisciplinary practice and referral patterns for optimal patient health.Prerequisites: NR.210.641 and 210.645Corequisite: NR.210.646
NR.210.641 and 645 are prerequisites for this course.

NR.210.643. Clinical Reasoning IV: Complex Chronic Illness. 2 Credits.
This course provides content to prepare the adult/gerontology nurse practitioner student to provide primary care to adults, including older persons, experiencing health problems in one or more body systems. This course prepares students to diagnose, treat and follow-up complex chronic illnesses in adults. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. Content addresses comprehensive diagnosis and management of complex chronic health problems, including appropriate diagnostic procedures, laboratory tests, and follow-up care for patients with chronic complex problems. Nurse practitioner students focus on health care for all populations and all adult age groups with particular emphasis on underserved and those from other cultures. Students also emphasize health promotion and disease prevention, patient advocacy, screening of adult and older populations, and providing culturally competent care.Prerequisites: NR.210.642 and 210.646Corequisite: NR.210.647
NR.210.642 and 646 are prerequisites for this course.

NR.210.644. Clinical Reasoning V: Topics for Nurse Practitioner Practice. 2 Credits.
This course provides content to prepare the adult/gerontological nurse practitioner student for transition to a primary care nurse practitioner who cares for adults. It integrates evidence-based biomedical, psychological, social and nursing aspects of care that is based on age, gender, culture, and ethnicity. The course emphasizes care of complex patients and the legal, regulatory, and scope of practice issues and readies the student for entry into practice. Attention is directed towards quality, safety, and risk management monitoring, and nurse practitioner-driven outcomes. The course will also explore patient transitions of care, end of life care decisions, development of expert communication skills in difficult conversations, and practice-delivery models for care.Prerequisites: NR.210.643 and 210.647Corequisite: NR.210.648
NR.210.643 and 647 are prerequisites for this course.

NR.210.645. Clinical Practicum I: Adult-Gerontological Nurse Practitioner. 2 - 3 Credits.
The course will prepare students to diagnose, treat, deliver patient education, and follow-up common acute illnesses in adult-gero patients. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of adult care settings. 112 clinical hours.Prerequisite: NR.210.640Corequisite: NR.210.641
NR.210.640 is a prerequisite for this course.

NR.210.646. Clinical Practicum II: Adult-Gerontological Nurse Practitioner. 2 - 3 Credits.
The course will prepare students to diagnose, treat, deliver patient education, and follow-up common acute and chronic illnesses in adults. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of adult care settings. 112 clinical hours.Prerequisites: NR.210.641 and 210.645Corequisite: NR.210.642
NR.210.641 and 645 are prerequisites for this course.

NR.210.647. Clinical Practicum III: Adult-Gerontological Nurse Practitioner. 2 - 3 Credits.
The course will prepare students to diagnose, treat, deliver patient education, and follow-up common and complex acute illnesses and common chronic illnesses in adults. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of adult care settings. 112 clinical hours.Prerequisites: NR.210.642 and 210.646Corequisite: NR.210.643
NR.210.642 and 646 are prerequisites for this course.

NR.210.648. Clinical Practicum IV: Adult-Gerontological Nurse Practitioner. 2 - 3 Credits.
The course will prepare students to diagnose, treat, deliver patient education, and follow-up common and complex acute illnesses and common and complex chronic illnesses in adults. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of adult care settings. 112 clinical hours.Prerequisites: NR.210.643 and 210.647Corequisite: NR.210.644
NR.210.643 and 647 are prerequisites for this course.

NR.210.649. Clinical Practicum V: Adult-Gerontological Nurse Practitioner. 4 Credits.
The course will advance students towards independence in the role of adult/gerontology nurse practitioner in prevention, screening, illness, and care transition for adults. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. Application and utilization of evidence is emphasized in a variety of adult care settings. 224 clinical hours.Prerequisites: NR.210.644 and 210.648
NR.210.644 and 648 are prerequisites for this course.

NR.210.650. Clinical Judgment I-The Role of the CNS in Clinical Decision Making: Common Health Problems. 3 Credits.
This is the first of three sequential theory courses that will provide the clinical nurse specialist (CNS) student with opportunities to demonstrate advanced clinical judgment and to increase their depth of knowledge across the health care continuum within a population focus. The student will synthesize knowledge of common health problems and advanced assessment; develop and evaluate evidence-based nursing and symptom management plans of care; propose strategies for measuring outcomes-driven care; recommend strategies for patient and professional education in the care of patients and their families; and recommend appropriate referrals and consultations across the health care continuum within a population focus.Prerequisites: NR.210.600, 210.601, 210.602
NR.210.600, 601, and 602 are prerequisites for this course.

NR.210.651. Clinical Judgment II-The Role of the CNS in Clinical Decision Making: Acute & Chronic Health Problems. 3 Credits.
This is the second of three sequential theory courses that will prepare the clinical nurse specialist (CNS) student with opportunities to demonstrate advanced clinical judgment and to increase their depth of knowledge across the health care continuum within a population focus. The student will synthesize knowledge of acute and chronic health problems and advanced assessment; develop and evaluate evidence-based nursing and symptom management plans of care; propose strategies for measuring outcomes-driven care; recommend strategies for patient and professional education in the care of patients and their families; and recommend appropriate referrals and consultations across the health care continuum within a population focus.Prerequisite: NR.210.650Pre or corequisite: NR.210.653
NR.210.650 is a prerequisite for this course.

NR.210.652. Clinical Judgment III-The Role of the CNS in Clinical Decision Making: Complex Health Problems. 3 Credits.
This is the third of three sequential theory courses that will prepare the clinical nurse specialist (CNS) student with opportunities to demonstrate advanced clinical judgment and to increase their depth of knowledge across the health care continuum within a population focus. The student will synthesize knowledge of complex health problems and advanced assessment; develop and evaluate evidence-based nursing and symptom management plans of care; propose strategies for measuring outcomes-driven care; recommend strategies for patient and professional education in the care of patients and their families; and recommend appropriate referrals and consultations across the health care continuum within a population focus.Prerequisite: NR.210.651Pre or corequisite: NR.210.653
NR.210.651 is a prerequisite for this course.

NR.210.653. Clinical Practicum I-Clinical Nurse Specialist: Advanced Practice Management. 3 Credits.
This is the first of four sequential clinical practicum courses that provide the clinical nurse specialist (CNS) student with opportunities to develop knowledge and skills in the diverse roles and skills of a CNS. Based on the student's past experience, this practicum is individualized and focuses on the roles and essential skills of the CNS within a population focus. Students are expected to integrate knowledge of disease, evidence based practice, advanced care coordination, and principles of patient/staff education as components of advanced nursing practice in the care of patients and families across the continuum of health care. Students begin to integrate and apply their understanding across the three spheres of influence with emphasis on the patient sphere. Under the guidance of a clinical instructor and experienced preceptor, the clinical nurse specialist (CNS) student will participate in 168 practicum hours within their population focus.Prerequisite: NR.210.650
NR.210.650 is a prerequisite for this course.

NR.210.654. Clinical Practicum II-Clinical Nurse Specialist: Advanced Practice Management. 3 - 4 Credits.
This is the second of four sequential clinical practicum courses that provide the clinical nurse specialist (CNS) student with opportunities to increase knowledge and skills in the diverse roles and skills of a CNS. This course builds on previous CNS coursework. This practicum is individualized and focuses on application of the roles and essential skills of the CNS within a population focus. Students are expected to integrate knowledge of disease, evidence based practice, advanced care coordination, and principles of patient/staff education as components of advanced nursing practice in the care of patients and families across the continuum of health care. Students integrate and apply their understanding across the three spheres of influence with emphasis on the patient and nurse and nursing practice spheres. Under the guidance of a clinical instructor and experienced preceptor, the clinical nurse specialist (CNS) student will participate in 168 practicum hours within their population focus.Prerequisite: NR.210.653Pre or corequisite: NR.210.651
NR.210.653 is a prerequisite for this course.

NR.210.655. Clinical Practicum III-Clinical Nurse Specialist: Advanced Practice Management. 3 Credits.
This is the third of four sequential clinical practicum courses that prepare the clinical nurse specialist (CNS) student with opportunities to increase knowledge and skills in the diverse roles and skills of a CNS. This course builds on previous CNS coursework. This practicum is individualized and focuses on organizational and systems leadership in application of the roles and essential skills of the CNS within a population focus. Students are expected to integrate knowledge of disease, evidence based practice, advanced care coordination, and principles of patient/staff education as components of advanced nursing practice in the care of patients and families across the continuum of health care. Students integrate and apply their understanding across the three spheres of influence: Patient, nurse/nursing practice, and organization/system spheres. Under the guidance of a clinical instructor and experienced preceptor, the clinical nurse specialist (CNS) student will participate in 168 practicum hours within their population focus.Prerequisite: NR.210.654Corequisite: NR.210.652
NR.210.654 is a prerequisite for this course.

NR.210.656. Clinical Practicum IV-Clinical Nurse Specialist: Advanced Practice Management. 3 - 4 Credits.
This is the fourth of four sequential clinical practicum courses that prepare the clinical nurse specialist (CNS) student with opportunities to increase knowledge and skills in the diverse roles and skills of a CNS. This course builds on previous CNS coursework. This practicum is individualized and focuses on evaluation of clinical practice in application of the roles and essential skills of the CNS within a population focus. Students are expected to integrate knowledge of disease, evidence based practice, advanced care coordination, and principles of patient/staff education as components of advanced nursing practice in the care of patients and families with complex needs across the continuum of health care. Students integrate and apply their understanding across the three spheres of influence: Patient, nurse/nursing practice, and organization/system spheres. Under the guidance of a clinical instructor and experienced preceptor, the clinical nurse specialist (CNS) student will participate in 168 practicum hours within their population focus.Prerequisites: NR.210.652 and 210.655
NR.210.652 and 210.655 are prerequisites for this course.

NR.210.660. Introduction to Acute Care. 4 Credits.
This course provides foundational content for Adult-Gerontological Acute Care Nurse Practitioner (AG-ACNP) students to critically think about symptoms, differential diagnoses, evidence-based diagnostic evaluation and management of common acute and chronic illness disease processes based on age, gender, sexuality, culture, ethnicity, psychosocial issues, and integrates ethical principles in decision making. Content focuses on the AG-ACNP role, scope of practice and principles of diagnostic and advanced technologies to provide selected interventions in the care of acutely and critically ill adults across the lifespan. Unique characteristics and risks associated with hospitalized patients are also addressed.Concentrated clinical instruction will allow the AG-ACNP student to develop advanced assessment strategies while enhancing history taking and physical assessment skills. 56 clinical hours.Prerequisites: NR.210.600, 210.601, 210.602, 210.605
NR.210.600, 210.601, and 210.602 are prerequisites for this course.

NR.210.661. Advanced Practice in Acute Care I. 6 Credits.
This is the first of four specialty courses that introduces clinical skills combined with evidence-based practice emphasizing the integration of theory, comprehensive assessment and advanced technologies for acutely ill adults across the lifespan in acute and critical care settings. Content focuses on the pathophysiology, subjective and objective clinical data, differential diagnoses and the development of a management plan considering age, gender, sexuality and social determinants of health within the scope of Adult-Gerontological Acute Care Nurse Practitioner (AG-ACNP) practice.Supervised clinical instruction in acute and critical care settings allows the AG-ACNP student to perform comprehensive assessment skills, diagnosis and management including incorporating relevant diagnostic and therapeutic testing modalities. 168 clinical hours.Prerequisite: NR.210.660
NR.210.660 is a prerequisite for this course.

NR.210.662. Advanced Practice in Acute Care II. 4 Credits.
This is the second of four specialty courses that fosters advanced clinical skills while incorporating evidence-based practice emphasizing the integration of theory, comprehensive assessment and advanced technologies for acutely ill adults across the lifespan in acute and critical care settings. Content focuses on pathophysiology, subjective and objective clinical data, differential diagnoses and the development of a management plan considering age, gender, sexuality and social determinants of health within the scope of Adult-Gerontological Acute Care Nurse Practitioner (AG-ACNP) practice.Supervised clinical instruction in acute and critical care settings allows the AG-ACNP student to improve comprehensive clinical assessment skills including tailoring diagnostic and therapeutic testing modalities. 168 clinical hours.Prerequisite: NR.210.661
NR.210.661 is a prerequisite for this course.

NR.210.663. Advanced Practice in Acute Care III. 4 Credits.
This is the third of four specialty courses that prepares students to assess, diagnose and manage acutely ill adults across the lifespan while emphasizing high acuity of disease entities encountered in acute and critical care settings. Content focuses on incorporating evidence-based practice while utilizing pathophysiology, subjective and objective clinical data, differential diagnoses and the development of a management plan considering age, gender, sexuality and social determinants of health within the scope of Adult-Gerontological Acute Care Nurse Practitioner (AG-ACNP) practice.Supervised clinical instruction in acute and critical care settings allows the AG-ACNP student to enhance comprehensive clinical assessment skills including modifying diagnostic and therapeutic testing modalities. 168 clinical hours.Prerequisite: NR.210.662
NR.210.662 is a prerequisite for this course.

NR.210.664. Advanced Practice in Acute Care IV. 6 Credits.
This is the fourth of four specialized courses that prepares students to assess, diagnose and manage acutely ill adults across the lifespan while emphasizing the highest acuity of disease entities encountered in acute and critical care settings. Content focuses on incorporating evidence-based practice while utilizing pathophysiology, subjective and objective clinical data, differential diagnoses and the development of a management plan considering age, gender, sexuality and social determinants of health within the scope of Adult-Gerontological Acute Care Nurse Practitioner (AG-ACNP) practice.Supervised clinical instruction in acute and critical care settings allows the AG-ACNP student to enrich comprehensive clinical assessment skills including individualizing diagnostic and therapeutic testing modalities. Additionally, palliative care clinical experiences will be provided. 224 clinical hours.Prerequisite: NR.210.663
NR.210.663 is a prerequisite for this course.

NR.210.670. Human Anatomy. 4 Credits.
This four week course offered by the Center for Functional and Evolutionary Anatomy within the JHU School of Medicine meets for 4 hours each day, 5 days a week. It is designed to give undergraduate and graduate students an introduction to all aspects of human anatomy, and includes demonstrations using human cadavers. A regional approach will be employed, beginning with the thorax and abdomen, continuing with the limbs, and ending with the head and neck. Lectures on each topic will be given in the morning, followed by prosection demonstrations (i.e., dissections prepared by departmental staff and presented to students) on human cadavers in the afternoon. Course materials will also involve hands-on work with human bones, various imaging modalities (e.g., radiographs, CT scans), and computer programs. Opportunities are also available for students to observe surgical procedures at the Johns Hopkins Hospital. Student performance will be evaluated by both written and practical (cadaver-based) exams. https://esgweb1.nts.jhu.edu/fae/anatomyinstitute/

NR.210.671. Advanced Pharmacology for Nurse Anesthesiology. 3 Credits.
This course is designed to provide an in-depth foundation of advanced pharmacology principles and their application to anesthesia across the lifespan, including special populations. The course provides detailed explorations of the uptake, distribution, biotransformation, and elimination of currently used clinical anesthesia pharmacotherapeutics. Pharmacogenetic disorders with specific anesthesia implications are examined. Various agents affecting the autonomic nervous system are detailed. Chemotherapeutic agents and anesthetic considerations will be covered.Prerequisite: NR.210.602

NR.210.672. Advanced Pathophysiology for Nurse Anesthesiology. 4 Credits.
This course will cover pathophysiology relevant to anesthesia practice and will build upon the advanced physiology course. The focus will be on the relationship to anesthesia assessment, planning, decision-making and management. Evidence-based practice resulting from relevant research will be incorporated to develop a relationship between patient pathophysiology and anesthesia assessment, planning, decision-making, and management. Students will utilize this information to build a foundation for anesthesia clinical reasoning.Prerequisite: NR.210.600

NR.210.673. Introduction to Anesthesia Equipment, Technology, and Clinical Practice. 2 Credits.
This course introduces students to equipment and technology used in anesthesia practice with an emphasis on patient safety. This course also focuses on student simulation experiences and class discussions in conjunction with in-hospital observational experiences. Prerequisites: NR.210.671, 210.672, and NR.210.674Corequisites: 210.675

NR.210.674. Professional Aspects of Nurse Anesthesiology Practice. 3 Credits.
This course examines the professional role development of the nurse anesthesiologist. Course content focuses on: history of nurse anesthesiology; scope and standards of nurse anesthesiology practice; professional ethics; regulation of practice (governmental and nongovernmental); the healthcare delivery system; legal aspects of anesthesia practice; business of anesthesia (including practice management and anesthesia reimbursement, payment policies, CRNA practice patterns); wellness and substance use disorder; structure and function of state, national, and international anesthesia organizations; professional advocacy and issues in CRNA practice; assessing quality in anesthesia practice; cultural competence; healthcare informatics; and interprofessional collaboration to improve health care. This course provides students with a comprehensive description of the nurse anesthesiology profession.Prerequisites: NR.210.671 and 210.672

NR.210.675. Nurse Anesthesiology Principles I. 2 Credits.
The focus of this course is the development of foundational knowledge to deliver safe, effective anesthesia care across the lifespan. Emphasis will be placed on preanesthesia assessment, evaluation and preparation (patient and anesthetizing area); utilization and interpretation of data (labs and diagnostic exams); formulation and evaluation of anesthesia plans; communication and documentation; fluid assessment and management; patient positioning; anesthesia techniques and complications; and pain theory/ pain management (acute, chronic); postanesthesia care/respiratory therapy. Relevant literature related to evidence-based best practices will be reviewed. Simulation will be incorporated in the course.Prerequisites: NR.210.671 and 210.672Corequisites: NR.210.673 and 210.674

NR.210.676. Nurse Anesthesiology Principles II. 3 Credits.
This course is the second of four anesthesia principles courses and builds on knowledge gained from the first anesthesia principles course. This course provides students with the foundation to provide safe, evidence-based anesthesia to special populations, to patients undergoing local/regional anesthesia, and to patients undergoing common procedures. Anesthesia considerations of geriatric and obese patients will be discussed to include: anatomy, physiology, pathophysiology, pharmacology, anesthetic techniques, and management of complications. Anesthetic management and considerations of patients having various surgeries (orthopedic, intra-abdominal, extrathoracic, extracranial, neck, perineal/pelvic procedures) will be discussed. Local and regional anesthesia techniques will be discussed to include: pharmacology, technique, physiologic alterations, and complications. There will also be a review of enhanced recovery after surgery (ERAS) and hypotensive anesthetic technique. Relevant literature related to evidence-based best practices will be reviewed. Simulation will be incorporated in the course.Prerequisites: NR.210.673, 210.674 and 210.675Corequisite: NR.210.679

NR.210.677. Nurse Anesthesiology Principles III. 2 Credits.
This is the third of four anesthesia principles courses and builds on knowledge gained from the previous anesthesia principles courses. Anesthesia considerations of pediatric and obstetric patients will be discussed to include: anatomy, physiology, pathophysiology, pharmacology, anesthetic techniques, and management of complications. Relevant literature related to evidence-based best practices will be reviewed. This course provides students with the foundation to provide safe, evidence-based anesthesia to special populations. Simulation will be incorporated in the course.Prerequisites: NR.210.676 and 210.679Corequisite: NR.210.680

NR.210.678. Nurse Anesthesiology Principles IV. 2 Credits.
This course is the last nurse anesthesiology principles course and builds upon knowledge gained in the first three principles courses. Course content encompasses anesthesia for surgical procedures including: intrathoracic (cardiac and thoracic), neurosurgical (intracranial and neuroskeletal), and vascular. Principles and ethical concepts of palliative care will also be discussed. Relevant literature related to evidence-based best practices will be reviewed. This course provides students with the foundation to provide safe evidence-based anesthesia for patients undergoing specialty procedures. Simulation will be incorporated in the course.Prerequisites: NR.210.677 and 210.680Corequisite: NR.210.681

NR.210.679. Clinical Residency I. 3 Credits.
This is the first of seven (7) clinical residency courses. Applications of perianesthesia concepts are integrated throughout the clinical experience. An emphasis on patient safety and vigilance, anesthesia topics of pre-operative evaluation, comprehensive equipment check and prevention of iatrogenic complications for general anesthesia are explored. Experiential learning reflects upon the construction of care plans and application of skills and knowledge taught in didactic portion of the curriculumPrerequisites: NR.210.673, 210.674, and 210.675Corequisite: NR.210.676

NR.210.680. Clinical Residency III. 3 Credits.
This is the third in a series of seven (7) courses. This course builds upon the clinical knowledge and foundational concepts developed in Clinical Residency I and in-hospital experiences. Applications of clinical concepts specific to, regional anesthesia and pain management are explored through patient care and simulation as needed. Students begin to incorporate evidence-based research practices and an emphasis is placed on patient safety and vigilance, culturally competent care of the patient throughout the peri-anesthesia continuum, interpersonal communication and integration of critical and reflective thinking of an anesthesia provider. DNP practicum hours will be incorporated into this course for the development of the DNP project.Prerequisites: NR.210.680A Corequisite: NR.210.677

NR.210.681. Clinical Residency IV. 4 Credits.
This course builds upon the clinical knowledge and foundational concepts developed in Clinical Residencies I, II and III. Applications of clinical concepts specific to cardiovascular and thoracic anesthesia, neurosurgical anesthesia and more advanced anesthesia specialty cases are fundamentally explored through simulation and hands on workshops Students begin to incorporate evidence based research practices and an emphasis is placed on patient safety and vigilance, culturally competent care of the patient throughout the peri-anesthesia continuum, interpersonal communication and integration of critical and reflective thinking of an anesthesia provider. DNP practicum hours will be incorporated into this course for the implementation of the DNP project.Prerequisites: NR.210.677 and 210.680Corequisite: NR.210.678

NR.210.682. Clinical Residency V. 4 Credits.
Students use critical thinking skills and best practices in the synthesis and correlation of didactic information to the clinical practice of nurse anesthesia. Students develop, implement, and evaluate anesthesia care plans for all patient populations based on best evidence. Clinical experiences focus on anesthesia care of high acuity patients across the lifespan undergoing elective and emergency surgical and diagnostic procedures. Emphasis on advanced health assessment and differential diagnosis, specialty surgical procedures, insertion of invasive pressure monitoring catheters, advanced airway management and safety and vigilance. Students provide culturally competent care of the patient throughout the perianesthesia continuum. DNP practicum hours will be incorporated into this course for the evaluation of the DNP project.Prerequisites: NR.210.678 and 210.681Corequisite: NR.210.684

NR.210.683. Clinical Residency VII. 3 Credits.
Students develop, implement, and evaluate comprehensive anesthesia care plans for all patient populations based on best evidence. Clinical experiences focus on anesthesia care of special patient populations undergoing a wide variety of diagnostic, surgical, and therapeutic procedures. Students demonstrate skills of ultrasound techniques for peripheral nerve blocks and invasive line insertion with minimal supervision. Student teaching and mentorship opportunities are integrated in the simulation lab. In addition, this course provides the third-year student with opportunities to further explore the role of the DNP through the synthesis and application of advanced principles regarding patient safety, risk reduction, healthcare law, healthcare policy, and bioethics for anesthesia practice.Prerequisites: NR.210.683A

NR.210.684. Seminars in Nurse Anesthesiology I. 3 Credits.
This is the first in a series of two (2) clinical correlation courses. Selected topics and case studies will be applied in an advanced study of scientific principles, principles of therapeutics, and principles of anesthesia practice in order to further develop critical thinking skills and to foster continued integration of theoretical knowledge into clinical practice. This course includes student participation in discussion of clinical experiences, case presentations, and current evidence-based practice articles from anesthesia related literature. Students will critically analyze, synthesize and evaluate the knowledge gained in all previous nurse anesthesia courses and clinical residencies. This course reviews comprehensive topics encountered on the National Certification Examination (NCE). Data management will also be included in this course and will provide students with the knowledge and skills necessary to develop and execute the evaluation plan for the scholarly project. The comprehensive exam (NBCRNA Self Evaluation Exam) will be taken during this course.Prerequisites: NR.210.678 and 210.681Corequisite: NR.210.682

NR.210.685. Seminars in Nurse Anesthesiology II. 3 Credits.
This is the second in a series of two (2) clinical correlation courses. Selected topics and case studies will be utilized in an advanced study of scientific principles, principles of therapeutics, and principles of anesthesia practice in order to further develop critical thinking skills and to foster continued integration of theoretical knowledge into clinical practice. This course also includes student participation in discussion of clinical experiences, case presentations, and current evidence-based practice articles from anesthesia related literature. Students will critically analyze, synthesize and evaluate the knowledge gained in all previous nurse anesthesia courses and clinical residencies. This course reviews comprehensive topics encountered on the National Certification Examination (NCE).Prerequisites: NR.210.682 and 210.684Corequisite: NR.210.683

NR.210.686. Advanced Physiology for Nurse Anesthesiology. 4 Credits.
This course will cover an in-depth focus on human physiology which is essential for the practice of nurse anesthesiology. Topics are covered from a molecular, cellular, tissue, organ, and system perspective. Also covered in this course are physiologic differences related to culture, gender, race, age, and genetics. The content of this course will serve as the foundation for advanced clinical assessment, advanced pathophysiology, clinical decision-making, and management.

NR.210.687. Clinical Residency II. 1 Credit.
This is the second in a series of seven (7) courses. This course builds upon the clinical knowledge and foundational concepts developed in Clinical Residency I and in-hospital experiences. Applications of clinical concepts specific to obstetrical anesthesia, regional anesthesia and pain management are explored through simulation and patient care. Students begin to incorporate evidence-based research practices and an emphasis is placed on patient safety and vigilance, culturally competent care of the patient throughout the peri-anesthesia continuum, interpersonal communication and integration of critical and reflective thinking of an anesthesia provider.

NR.210.688. Clinical Residency VI. 1 Credit.
Students develop, implement, and evaluate comprehensive anesthesia care plans for all patient populations based on best evidence. Clinical experiences focus on anesthesia care of special patient populations undergoing a wide variety of diagnostic, surgical, and therapeutic procedures. Students demonstrate skills of ultrasound techniques for peripheral nerve blocks and invasive line insertion with minimal supervision. Student teaching and mentorship opportunities are integrated in the simulation lab. In addition, this course provides the third-year student with opportunities to further explore the role of the DNP through the synthesis and application of advanced principles regarding patient safety, risk reduction, healthcare law, healthcare policy, and bioethics for anesthesia practicePrerequisites: NR 210.684 and NR 210.682

NR.210.802. Advanced Nursing Health Policy. 2 Credits.
This course examines the public and private sector function of creating and implementing nursing and health policy. The role of political, legal, ethical and social philosophy in defining nursing and health services is examined. There is continued development of student competence in analytic methods for the study of complex nursing and health policy issues. The course considers how policy made by different branches of government and various public and private organizations deeply affects nursing as a profession, its ability to deliver care and the impact on the areas of technology development, assessment and management; professional practice regulation; and patient outcomes management.Prerequisites: NR.210.607

NR.210.803. Nursing Inquiry for Evidence-Based Practice. 3 Credits.
This course utilizes the Johns Hopkins Evidenced-Based Practice Model to guide nursing inquiry. The conceptualization, definition, theoretical rationale and methods of evidenced-based practice will be evaluated, and related research will be described. Production of the integrative review and exploration of systematic reviews are hallmarks of this course. Prerequisites: NR.210.606 and 210.896

NR.210.804. Organizational and Systems Leadership for Quality Care. 2 Credits.
This course facilitates leading, advocating, and managing the application of innovative responses to organizational challenges. Emphasis is placed on development and evaluation of care delivery approaches that meet the needs of targeted patient populations by enhancing accountability for effective and efficient health care, quality improvement, and patient safety. This course focuses on development of strategies to implement change initiatives, manage conflict, and manage the ethical dilemmas inherent in health care organizations.

NR.210.805. Translating Evidence into Practice. 3 Credits.
This course focuses on the integration and application of knowledge into practice. The theories and strategies used to facilitate translation of evidence into practice are considered and analyzed. Theories of change, caring, human needs and value systems are considered with respect to the translation of evidence into practice. A variety of translation strategies, including instructional design, pathways, protocols and programs are discussed. Enablers of translation are considered along with methods of analysis and evaluation. Prerequisites: NR.210.803 and 210.896Corequisite: NR.210.897

NR.210.806. Health Finance. 2 Credits.
This course introduces students to the business and financial aspects of healthcare. Basic financial concepts and misconceptions about cost behavior, pricing and revenue, and cash flow are explored. Concepts are organized around the financial management paradigm: performance planning, performance measurement and performance management. Students will learn how to prepare several types of budgets, how to use performance reports and dashboards to guide performance, and how to prepare a variety of formal and ad hoc financial analyses. The course concludes with discussions related to improving financial performance, developing improvement plans, and making the "pitch" to decision makers.

NR.210.817. Analysis and Evaluation of Individual and Population Health Data. 3 Credits.
Clinical data management is an essential component of evaluating any Evidence Based Practice/Performance Improvement project. A high caliber data management plan and its implementation will provide key stakeholders and decision-makers with the information necessary to make decisions about the value and continuation of each evidence-based intervention. Components of data management include clearly identified outcomes linked to variables and data sources; appropriate data collected for the purpose of measuring these outcomes; adequate statistical power to determine success of the project; proper data cleaning and manipulation techniques; appropriate statistical methods for measuring the outcomes; and a meaningful presentation of outcomes that addresses the concerns and questions of key stakeholders.
The clinical data management course will provide students with the knowledge and skills necessary to develop and execute the data management plan for the scholarly project.Prerequisites: NR.210.606, 210.803, 210.897

NR.210.818. Clinical Data Management and Analyses. 2 Credits.
Clinical data management is essential for the evaluation of any evidence-based practice performance improvement project. A high caliber evaluation plan and its implementation will provide key stakeholders and decision-makers with the information to make decisions about the value and continuance of each evidence-based intervention.Components of an evaluation plan include clearly identified outcomes linked to measures, variables, and data sources; appropriate data collected for the purpose of measuring these outcomes; adequate statistical power to determine success of the project; proper data cleaning and manipulation techniques; appropriate statistical methods for determining the outcomes; and a meaningful presentation of outcomes that addresses the concerns and questions of key stakeholders. this course provides students with the knowledge and skills necessary to develop and execute the evaluation plan for the scholarly project.Prerequisite: NR.210.817.
Corequisite: NR.210.899Corequisite: NR.210.899

NR.210.821. Digital Technologies, Artificial Intelligence, and Machine Learning in the Era of Big Data. 2 Credits.
This course will explore the role of digital technologies in healthcare and the social, economic, and ethical implications of these technologies in policy, practice, education, and research. Students will learn how advances in data collection and innovations in analytic methods are advancing progress in health care and research. They will also consider that not all individuals and communities may benefit equally from digital advances and existing health care disparities may be perpetuated. Through this course students will explore some of the positive and negative issues surrounding disruptive technologies in health care and have an opportunity to apply their knowledge to real world situations.

NR.210.822. Health Information Systems and Patient Care Technologies. 2 Credits.
This course focuses on the evaluation and use of information technology in healthcare at the level of the advanced practice nurse (APN).

NR.210.823. Special Topics: Qualitative Design and Implementation. 1 - 3 Credits.
This course will provide an overview of how qualitative methods can be applied to health-related projects or research. Focus will be on understanding common qualitative approaches used to plan or evaluate programs or research including strategies for collecting, managing and analyzing qualitative data. Prerequisites: NR.210.803 or NR.110.809

NR.210.824. Transitions to Practice. 2 - 3 Credits.
The course lays a foundation to prepare learners to transition from the student to practicing provider role through interactive learning, primary care immersion and specialty care rotations. The aim is to promote independence in the role of primary care nurse practitioner in prevention, screening, illness, and care coordination for patients across the lifespan. It integrates biomedical, psychological, social and nursing aspects of care based on age, gender, culture, and ethnicity. This course is required for all Supporting Nursing Advanced Practice Transitions (SNAPT) Fellowship participants and is an elective for students not in the Fellowship.

NR.210.886. Problem Discovery. 1 - 3 Credits.
This is the first in the series of courses culminating in the DNP Scholarly Project. The purpose of this course is two-fold: first, to introduce the student to the essentials of scholarly writing and the logical presentation of ideas; and second, to then apply these essential skills to the identification of an important practice problem. The student identifies an important practice problem, defines the scope and significance of the problem.For DNP/AP and DNP Executive students in practicum, this course also provides the integrative practice experience necessary for scholarship in translational innovation and improvement for advanced nursing practice and health outcomes. The practicum experience complements the foundational advanced nursing practice experience to identify, develop, implement, evaluate and disseminate the DNP Scholarly Project. Credit hour requirements vary based on the student and degree plan.

NR.210.887. Project Advancement. 1 - 3 Credits.
This is the second of four scholarly project courses. This course focuses on the development of the comprehensive plan for the DNP Scholarly Project. The student develops the plan to ensure translation of the evidence in addressing a significant clinical problem. The student develops the full application for submission to the Institutional Review Board/Ethics Committee. For DNP/AP and DNP Executive students in practicum, this course also provides the integrative practice experience necessary for scholarship in translational innovation and improvement for advanced nursing practice and health outcomes. The practicum experience complements the foundational advanced nursing practice experience to identify, develop, implement, evaluate and disseminate the DNP Scholarly Project. Credit hour requirements vary based on the student and degree plan.

NR.210.888. Project Application. 1 - 3 Credits.
This scholarly project course is the third in the series of four courses. In this course the student implements the approved project plan. This course fosters the student’s development of requisite skills for project implementation, such as managing time and resources, assessing and managing implementation issues, and utilizing communication and collaboration strategies. For DNP/AP and DNP Executive students in practicum, this course also provides the integrative practice experience necessary for scholarship in translational innovation and improvement for advanced nursing practice and health outcomes. The practicum experience complements the foundational advanced nursing practice experience to identify, develop, implement, evaluate and disseminate the DNP Scholarly Project. Credit hour requirements vary based on the student and degree plan.

NR.210.889. Project Evaluation and Dissemination. 1 - 3 Credits.
This is the final component of the scholarly project sequence. Content, as in the other project experiences, reflects the interest of the student and is designed to meet individual student needs and career goals. This final course allows the student, with guidance from mentor and faculty, to complete the clinical project and finalize the scholarly written and oral reports that disseminate and integrate new knowledge. The final products will reflect the student's ability to employ effective communication and collaboration skills, take a leadership role, influence health care quality and safety, transform practice, lead clinical innovation, and successfully negotiate change in health care delivery for individuals, families, populations, or systems across a broad spectrum of healthcare. This course also provides the integrative practice experience necessary for scholarship in translational innovation and improvement for advanced nursing practice and health outcomes. The practicum experience complements the foundational advanced nursing practice l experience to identify, develop, implement, evaluate and disseminate the DNP Scholarly Project.

NR.210.894. DNP Practicum. 1 - 2 Credits.
This course provides the integrative practice experience necessary for scholarship in translational innovation and improvement for advanced nursing practice and health outcomes. The practicum experience complements the foundational advanced practice clinical experience to identify, develop, implement, evaluate and disseminate the DNP Scholarly Project. This course is taken concurrently with the DNP Scholarly Project didactic courses. Credit hour requirements vary based on the student specialty track and degree plan.Corequisites: 210.896, 210.897, 210.898, 210.899

NR.210.895. Independent Study. 1 - 3 Credits.
Scholarly activity under guidance of faculty serves to help students achieve professional goals. This course may be taken as elective credit.

NR.210.896. Problem Identification. 1 Credit.
This is the first in the series of courses culminating in the DNP Scholarly Project. The purpose of this course is two-fold: first, to introduce the student to the essentials of scholarly writing and the logical presentation of ideas; and second, to then apply these essential skills to the identification of an important practice problem. The student identifies an important practice problem, defines the scope and significance of the problem. Prerequisite: NR.210.608 Corequisite: NR.210.894

NR.210.897. Project Development. 1 Credit.
The second scholarly project experience will provide students with the support and direction needed in collaboration with the sponsoring facility and mentor to develop a comprehensive, site specific project, evaluation plan, and IRB proposal. Prerequisites: NR.210.803 and 210.896Corequisite: NR.210.805 and 210.894

NR.210.898. Project Implementation. 1 Credit.
This scholarly project course is the third in the series of four courses. In this course the student implements the approved project plan. This course fosters the student's development of requisite skills for project implementation, such as managing time and resources, assessing and managing implementation issues, and utilizing communication and collaboration strategies.Prerequisites: NR.210.817 and 210.897; Documented IRB approvalCorequisite: NR.210.894

NR.210.899. Project Evaluation. 1 Credit.
This is the final component of the scholarly project sequence. Content, as in the other project experiences, reflects the interest of the student and is designed to meet individual student needs and career goals. This final course allows the student, with guidance from mentor and faculty, to complete the clinical project and finalize the scholarly written and oral reports that disseminate and integrate new knowledge. The final products will reflect the student's ability to employ effective communication and collaboration skills, take a leadership role, influence health care quality and safety, transform practice, lead clinical innovation, and successfully negotiate change in health care delivery for individuals, families, populations, or systems across a broad spectrum of healthcare. Prerequisites: NR.210.898Corequisites: NR.210.818 and 210.894

NR.500

NR.500.601. Public Health Nursing Theory & Practice. 3 Credits.
Analysis of theories relevant to nursing and public health will assist the student in the identification of the unique role of public health nursing across settings. Students will explore the role and function of public health nursing in primary and secondary prevention in the community, state and nation. Special emphasis will be placed on assessing the community as client and developing models of community-based health promotion and prevention.

NR.500.602. Public Health Nursing Theory & Practice - Practicum. 3 Credits.
Students enrolled in this course conduct a community assessment and write a proposal to address or prevent a risk factor or health problem in that population/community. The practicum is conducted in a community agency or established program. 168 hours clinical.Prerequisites: NR.500.601, 500.604, PH.340.601, PH.140.611 & 612 OR PH.140.621, 622 & 623

NR.500.606. Public Health Nursing Leadership, Management, & Evaluation Capstone Practicum. 3 Credits.
The course content addresses the application of principles and theories of leadership, management, and evaluation in a public health nursing setting. The educational focus will be mentored, but student-directed, leadership and evaluation skills development. Each student will be expected to complete an internship with a public health-related agency. During this placement, the student will conduct a program evaluation and analyze the use of management and leadership skills within the agency. The student's leadership skill development will be enhanced by working collaboratively with leaders in their host agency. Early in the semester, each student will identify her/his specific learning and skills development objectives. Faculty will guide students through the process of meeting these. Weekly seminars complement the field experience. 168 hours clinical.Prerequisites: NR 110.560 and 500.602, 604, 605, PH.340.601, PH.140.611 & 612 OR PH.140.621, 622, & 623

NR.500.607. Public Health Nursing/NP Capstone Practicum. 1 Credit.
This course will provide MSN-NP/MPH students with the opportunity to integrate their knowledge of public health problems and population-based assessment, prevention and intervention, with direct care and evaluation of clinical outcomes. Applying this knowledge to the evaluation of public health policy will be an integrating theme of the course. This course will fulfill the SPH Capstone and Integrating Experience requirement. 56 hours clinical.Prerequisites: NR.500.601, 500.602, 500.605, PH.340.601, PH.140.611 and 140.612 OR PH 140.621-140.623Corequisite: NR.110.560

PH.120 (Biochemistry and Molecular Biology)

PH.120.601. Biochemistry II. 5 Credits.
Examines the major metabolic pathways that are central to eukaryotic cell growth and maintenance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.602. Concepts of Molecular Biology. 4 Credits.
Discusses synthesis of macromolecules, the genetic code, regulation of gene expression and gene function, and recent advances in biotechnology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.603. Molecular Biology of Pandemic Influenza. 3 Credits.
Explores how molecular biology is used to understand how specific respiratory viruses create pandemics. Begins with an analysis of the virus that caused the great public health catastrophe, the 1918 Spanish Influenza Pandemic and then examines more recent pandemic viruses, including SARS-Cov-2. Focuses on the use of molecular techniques in defining why specific mutations increase the virulence and pandemic potential of a virus, the pathological response of a host's immune system to a virulent virus and pathological interactions between two different respiratory pathogens. Emphasizes how molecular, pathophysiological and immunological studies may be used to predict a virus' pandemic potential. Reviews how governmental responses affect the spread of a disease with pandemic potential, including the response to SARS-CoV-2.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.604. Introduction to Molecular Biology. 3 Credits.
Molecular biology deals with how nucleic acids and proteins interact within the cell to promote proper growth, division, and development. This course will provide an overview of these processes, including DNA replication, repair, transcription, splicing, protein synthesis, and gene regulation in different organisms. We will also explore many biological tools that have been developed from molecular biology processes, such as DNA sequencing and gene editing (CRISPR-Cas9).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.605. Genome Integrity. 3 Credits.
Provides students with a broad base in fundamental principles of genome integrity. Examines connections between genome integrity, organism fitness, and human diseases and disorders. Addresses 1) Homologous recombination, (2) Non-homologous end joining, (3) Mismatch repair, (4) Transposable elements, (5) Topoisomerases, (6) Structural maintenance of chromosomes and (7) Chromosome segregation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.606. Cellular Stress in Physiology and Disease. 3 Credits.
Discuss molecular mechanisms through which eukaryotes maintain cellular homeostasis in response to stress. Stress response pathways are examined at the DNA, RNA, and protein levels; topics include stress and transcription, RNA processing, and protein quality control. Organelle-specific stress response, such as ER stress and mitochondrion stress responses, are also discussed. Additionally, molecular mechanisms of cellular responses to environmental stimuli, such as heat, hypoxic, oxidative, and starvation stressors, are examined.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.607. Premedical Seminars: Planning and Preparing for Medical School Application. 1 Credit.
Helps students prepare to apply to medical school. Covers specific topics to address the complex premedical journey, including planning the months/years leading up to the application, reviewing the application process, addressing the medical schools' expectations, medical school selection, writing the personal statement, requesting letters of evaluation, interviewing and more.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.608. Gene Editing, therapy and Manipulation. 3 Credits.
Introduces genes and genetics, and their role in the genetic basis of human health and disease. Explores the current status of gene editing and gene therapy technologies both in the context of therapeutics and as tools in the life sciences. A large focus of the class centers on the impact of CRISPR on these technologies. Discuss the ethical implications of these technologies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.610. Biochemistry I: Protein Structure and Enzyme Catalysis. 3 Credits.
Covers the physical and chemical properties of the amino acids, the various elements of protein structure, and the cooperative behavior of multimeric proteins. Explore the kinetics of enzyme-catalyzed reactions, and the active site mechanisms of representative classes of enzymes. Describes the molecular basis of action for selected enzyme inhibitor-based drugs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.613. Nucleic Acid Chemistry. 3 Credits.
Discusses nucleic acid structure, and also describes techniques for manipulating and analyzing nucleic acids, including gel electrophoresis, PCR, and DNA sequencing. Reviews methods used to synthesize nucleosides, nucleotides and oligonucleotides, and chemical reactions that lead to modifications of nucleic acids. Covers topics including DNA-drug interactions, antisense and antigene oligonucleotides, ribozymes and deoxyribozymes, DNA cages, DNA origami, DNA nanostructures, and DNA nanodevices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.616. Advanced Concepts in Biochemistry, Cell and Molecular Biology. 1 - 2 Credits.
Provides a platform for students, postdoctoral fellows and faculty to present and discuss scientific papers from the current literature that deal with mechanisms underlying disease along with accompanying methods. Explores additional aspects that are relevant to conducting and conveying laboratory research, including study design and statistical analysis, manuscript and grant review, policy and practice, and risk assessment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.620. Fundamentals of Reproductive Biology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.622. Molecular and Cellular Mechanisms of Reproduction. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.624. Cancer Biology. 3 Credits.
Explores some of the key molecular and cellular aspects of the biology of cancer. Includes topics: cancer genetics, DNA damage, and cell signaling pathways including RAS and Epidermal Growth Factor Receptors. Covers a select set of current research areas that aim to further the understanding and treatment of cancer. Emphasizes how these molecular mechanisms are regulated, contribute to oncogenesis, and can be targeted therapeutically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.625. Introduction to Cancer Biology. 3 Credits.
This Cancer Biology course will educate students on the principles of cancer biology, including the various genetic and molecular changes normal cells undergo during transformation into malignant cancer cells. To this end, this course will help students to gain an understanding of cellular and molecular mechanisms that go awry, thereby providing optimal conditions for cancer. We will explore the role of mutations in cancer cells, and how they lead to the dysregulation of essential biological properties like programmed cell death, cell proliferation and differentiation. We will also focus on the interface of cancer and medicine. Classical treatment methods will be compared with newer treatment strategies like targeted therapies. We will also explore the challenges associated with diagnosing cancers, as well as ways in which to prevent cancer.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.626. Principles of Cell Biology. 3 Credits.
Provides students with a basic understanding of the structure and functions of eukaryotic cells. Introduces students to new facts and vocabulary pertinent to cell biology, as well as experimental methods used by scientists to define and understand cell structure and functions. Highlights relationships between defects in basic cell functions and human diseases. Classroom time is divided into 8 formal lecture sessions, 3 less formal review/discussion/problem solving sessions, and 3 closed-book, in-class exams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.627. Stem Cells and the Biology of Aging and Disease. 3 Credits.
Exposes students to cutting-edge topics in stem cell biology through a combination of lectures and discussions based on primary literature. Topics include basic stem cell biology in a invertebrate and vertebrate systems, including germline, neural, and epithelial stem cells; the regulation of stem cells by physiology and aging; the connection between stem cells, telomerase, and cancer; and ethical issues pertaining to potential therapeutic applications of stem cells.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.630. Fellowship Grant Writing for Students and Postdoctoral Fellows in Biomedical Research. 2 Credits.
Provides students and postdoc trainees with an overview of the entire fellowship application process, including how to write an effective research proposal and specific aims, how to prepare a NIH style biosketch and how to formulate an effective personal biography. Discusses the peer review process, how fellowship applications are judged and scored. The students and postdocs will gather to form an in-class study section where trainees have the opportunity to review grants in the style of NIH study sections.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.644. BMB SCM Laboratory Rotations. 4 - 8 Credits.
All departmental ScM students spend one to three terms, respectively, participating in the research activities of departmental faculty's laboratories. Students select appropriate rotations in consultation with their academic advisor and the ScM Program Director. The objective is to provide the opportunity for interaction with several faculty members, so that a thesis laboratory may be identified. The course aims to broaden a student's knowledge of laboratory techniques and skills, expose the student to a variety of research areas and to develop the ability to carry out a research project.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.720. Applying Reproductive Biology Literacy Through Service-Learning. 3 Credits.
Builds from "Fundamentals of Reproductive Biology" in 1st term (120.620.01). In this service-learning course, students have the opportunity to extend beyond hypothetical applications of what they have learned, and apply their "reproductive biology literacy" to help in a professional, real-world setting. The service component of this course is for students to produce deliverable(s) of use/value for a community-based organization (CBO), to be complemented by in-class activities to absorb and learn from these experiences in working with the CBO.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.800. MPH Capstone: Biochemistry and Molecular Biology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.820. Thesis Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.821. MHS Student Research. 3 Credits.
Acquaints MHS students with basic research in the biomedical sciences through work under the guidance of a faculty member in the Department of Biochemistry and Molecular Biology, and provides an introduction to hands-on experience in laboratory research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.822. Seminars in Research in Biochemistry and Molecular Biology. 1 Credit.
Integrates academic training with current research in biochemistry and molecular biology and the implications of this research in addressing major public health concerns. Weekly presentations are held by researchers from JHU and other biomedical research institutions on the results of state of the art investigations conducted in their laboratories, emphasizing experimental design and methodology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.825. Advanced MHS Student Research. 5 Credits.
Builds upon existing basic research skills in biomedical sciences and emphasizes more independent hands-on research working under the guidance of a faculty member in the Department of Biochemistry and Molecular Biology or affiliated principle investigator. Provides further experience for future research pursuits at JHU and beyond.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.829. Summer Thesis Research. 12 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.830. Postdoctoral Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.840. Special Studies and Research Biochemistry. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.850. Biochemical Techniques. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.852. Core Research Literature. 1 - 2 Credits.
Provides a complement to the BCMB core curriculum. Student reads research papers relating to a core lecture topic. Discussions are led by a student while a faculty member from Biochemistry or MMI act as facilitator. Helps students to develop skills in reading the primary literature and provides an introduction to the experimental paradigms underlying the concepts presented in the core course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.853. Summer Biochemical Techniques. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.860. Thesis Preparation. 2 Credits.
Students engage in one-on-one independent study with a departmental faculty member who will be the student's thesis supervisor. Prepares students for completing the MHS using independent reading of papers from current literature, combined with meetings with the thesis supervisor to discuss the reading and how to recognize this research to develop the MHS thesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.861. Special Topics in Biochemistry: X-Ray Crystallography-A Hands on Workshop. 3 Credits.
Enables students to carry out all key steps to successfully solve and refine a protein crystal structure. Theoretical aspects are followed by application to various problem sets. Topics include tricks for data collection, data processing and collection. Touches upon all standard techniques such as molecular replacement, SAD phasing and MAD phasing, both in theory and then applied in practical context with previously collected data. Identification of unknown ligand densities and model refinement lead to the last part of preparing publication quality figures using PyMol.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.870. Thesis in Biochemistry and Molecular Biology. 5 Credits.
In consultation with a faculty mentor from the Department of Biochemistry and Molecular Biology, students prepare a critical, scholarly paper on an assigned subject.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.872. Special Studies-Current Topics in BMB. 1 Credit.
Introduces students to the faculty and to current research being conducted in their respective laboratories within the Department of Biochemistry and Molecular Biology and by other training faculty of the Cancer Biology Training Program. Informs doctoral students about research opportunities in each laboratory and allows them to make informed decisions about their choices for laboratory rotations during their first year. Similarly, informs current MHS students who are considering the ScM Program during the second year about potential research opportunities in laboratories of BMB faculty. Provides time for faculty presentation, student questions and further discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.120.895. MPH Practicum: Biochemistry and Molecular Biology. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140 (Biostatistics)

PH.140.604. Introduction to R for Public Health Researchers. 2 Credits.
Provides “hands-on” training for analyzing data in the R statistical software package, a popular open-source solution for data analysis and visualization. Covers data input/output, data management and manipulation, and constructing useful and informative graphics. Geared towards individuals who have never used R or have a little familiarity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.605. Introduction to the SAS Statistical Package. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.606. Survival Analysis. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.607. Multilevel Models. 2 Credits.
Gives an overview of "multilevel statistical models" and their application in public health and biomedical research. Multilevel models are regression models in which the predictor and outcome variables can occur at multiple levels of aggregation: for example, at the personal, family, neighborhood, community and regional levels. They are used to ask questions about the influence of factors at different levels and about their interactions. Multilevel models also account for clustering of outcomes and measurement error in the predictor variables. Students focus on the main ideas and on examples of multi-level models from public health research. Students learn to formulate their substantive questions in terms of a multilevel model, to fit multilevel models using Stata during laboratory sessions and to interpret the results.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.608. Analysis of Longitudinal Data. 2 Credits.
Covers statistical models for drawing scientific inferences from longitudinal data. Topics include longitudinal study design; exploring longitudinal data; linear and generalized linear regression models for correlated data, including marginal, random effects, and transition models; and handling missing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.609. Improving Precision and Power in Randomized Trials by Leveraging Baseline Variables. 0.5 Credits.
Explains what covariate adjustment is, how it works, when it may be useful to apply, and how to implement it (in a preplanned way that is robust to model misspecification) for a variety of scenarios. Demonstrates the impact of covariate adjustment using trial data sets in multiple disease areas. Provides step-by-step, clear documentation of how to apply the software in each setting. Applies the software tools on the different datasets in small groups.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.611. Statistical Reasoning in Public Health I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.612. Statistical Reasoning in Public Health II. 3 Credits.
Provides a broad overview of biostatistical methods and concepts used in the public health sciences, emphasizing interpretation and concepts rather than calculations or mathematical details. Develops ability to read the scientific literature to critically evaluate study designs and methods of data analysis. Introduces basic concepts of statistical inference, including hypothesis testing, p-values, and confidence intervals. Includes topics: comparisons of means and proportions; the normal distribution; regression and correlation; confounding; concepts of study design, including randomization, sample size, and power considerations; logistic regression; and an overview of some methods in survival analysis. Draws examples of the use and abuse of statistical methods from the current biomedical literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.613. Data Analysis Workshop I. 2 Credits.
Emphasizes concepts and illustration of concepts applying a variety of analytic techniques to public health datasets in a computer laboratory using Stata statistical software. Learns basic methods of data organization/management and simple methods for data exploration, data editing, and graphical and tabular displays. Includes additional topics: comparison of means and proportions, simple linear regression and correlation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.614. Data Analysis Workshop II. 2 Credits.
Emphasizes concepts and illustration of concepts applying a variety of analytic techniques to public health datasets in a computer laboratory using Stata statistical software. Masters advanced methods of data analysis including analysis of variance, analysis of covariance, nonparametric methods for comparing groups, multiple linear regression, logistic regression, log-linear regression, and survival analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.615. Statistics for Laboratory Scientists I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.616. Statistics for Laboratory Scientists II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.620. Advanced Data Analysis Workshop. 2 Credits.
Covers methods for the organization, management, exploration, and statistical inference from data derived from multivariable regression models, including linear, logistic, Poisson and Cox regression models. Students apply these concepts to two or three public health data sets in a computer laboratory setting using STATA statistical software. Topics covered include generalized linear models, product-limit (Kaplan-Meier) estimation, Cox proportional hazards model.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.621. Statistical Methods in Public Health I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.622. Statistical Methods in Public Health II. 4 Credits.
Presents use of confidence intervals and and hypothesis tests to draw scientific statistical inferences from public health data. Introduces generalized linear models, including linear regression and logististic regression models. Develops unadjusted analyses and analyses adjusted for possible confounders. Outlines methods for model building, fitting and checking assumptions. Focuses on the accurate statement of the scientific question, appropriate choice of generalized linear model, and correct interpretation of the estimated regression coefficients and confidence intervals to address the question.
Prerequisite(s): Must also register for lab, PH.140.922.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.623. Statistical Methods in Public Health III. 4 Credits.
Prerequisite(s): Must also enroll for PH.140.923
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.624. Statistical Methods in Public Health IV. 4 Credits.
Builds on the concepts, methods, and computing (Stata, R) covered in Statistical Methods 1,2, and 3. Focuses on investigating scientific questions via data analysis and clearly communicating the methodology and results. Uses examples from the contemporary and public health literature and allows students the opportunity to work with their own data over the duration of the class.
Prerequisite(s): Must also enrol for a lab, PH.140.924.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.628. Data Science for Public Health I. 4 Credits.
Presents the basics of data science using the R programming language. Teaches basic unix, version control, graphing and plotting techniques, creating interactive graphics, web app development, reproducible research tools and practices, resampling based statistics and artificial intelligence via deep learning, focusing on practical implementation specifically tied to computational tools and core fundamentals necessary for practical implementation. Culminates with a web app development project chosen by student (who will come out of this course sequence well-equipped to tackle many of the data science problems that they will see in their research).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.629. Data Science for Public Health II. 4 Credits.
Presents the basics of data science using the R programming language. Teaches basic unix, version control, graphing and plotting techniques, creating interactive graphics, web app development, reproducible research tools and practices, resampling based statistics and artificial intelligence via deep learning, focusing on practical implementation specifically tied to computational tools and core fundamentals necessary for practical implementation. Culminates with a web app development project chosen by student (who will come out of this course sequence well-equipped to tackle many of the data science problems that they will see in their research).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.630. Introduction to Data Management. 3 Credits.
Introduces students to the principles and skills required to collect and manage research data in a public health setting. Focuses on tools for collecting data that range from spreadsheets to web-based systems, database fundamentals, data collection form design, data entry screen design, proper coding of data, strategies for quality control and data cleaning, protection and sharing of data, and integrating data from external sources. Includes practical and hands-on exercises that require some entry-level computer programming.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.631. The SAS Statistical Package: A Survey for Statisticians. 3 Credits.
Introduces students to the SAS statistical package using the SAS Studio interface. Using examples of public health data students learn to write programs to summarize data and to perform statistical analyses. Using the interactive matrix language introduces computation within a matrix environment and the development of modular programming techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.632. Introduction to the SAS Statistical Package. 3 Credits.
Introduces students with no experience with SAS. Familiarizes them with the skills needed for effective data management anddata analysis. Covers performing exploratory analysis on data including the creation of tables and graphs. Proceeds next to creating new datasets and altering old datasets. Covers building regression models (linear, logistic, and Poisson), interpreting results and criticizing such models, and attempting to improve them.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.633. Biostatistics in Medical Product Regulation. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.634. Non-Inferiority and Equivalence Clinical Trials. 2 Credits.
Presents the important differences between superiority trials and those intended to show either equivalent effect, or to show that one therapy is no worse than another (but might be better). Explores the problems of setting equivalence margins, preservation of some proportion of active control effect, and emphasizes the use of confidence intervals to interpret the results of studies. Discusses special issues of quality of the trial conduct, assay sensitivity, historical evidence of treatment effects and assumptions of constancy of treatment effects over time. Compares sample size requirements between superiority trials, equivalence trials and non-inferiority trials. Discusses the use of different analysis populations (ITT and per-protocol) and issues of changing conclusions between non-inferiority and superiority. Discusses the regulatory aspects of trial design and interpretation, and reviews existing regulatory guidance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.636. Scalable Computational Bioinformatics. 4 Credits.
Introduces the computational hardware and programming model upon which analysis tools and languages are based. Introduces and uses three main languages (Python, Perl, SQL) and their underlying rationale to develop computer science concepts such as data structures, algorithms, computational complexity, regular expressions, and knowledge representation. Draws examples and exercises from high-throughput sequence analysis, proteomics and modeling of biological systems. Reinforces key concepts through lectures with live computer demonstrations, weekly readings, and programming exercises. Has students working with a High Performance Compute Cluster and the Amazon cloud.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.638. Analysis of Biological Sequences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.640. Statistical Methods for Sample Surveys. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.641. Survival Analysis. 3 Credits.
Introduces fundamental concepts, theory and methods in survival analysis. Emphasizes statistical tools and model interpretations which are useful in medical follow-up studies and in general time-to-event studies. Includes hazard function, survival function, different types of censoring, Kaplan-Meier estimate, log-rank test and its generalization. For parametric inference, includes likelihood estimation and the exponential, Weibull, log-logistic and other relevant distributions. Discusses in detail statistical methods and theory for the proportional hazard models (Cox model), with extensions to time-dependent covariates. Includes clinical and epidemiological examples (through class presentations). Introduces basic concepts and methods for competing risks data, including the cause-specific hazard models and other models based of cumulative incidence function (CIF). Illustrates various statistical procedures (through homework assignments).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.642. Design of Clinical Experiments. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.643. Practice of Statistical Consulting. 3 Credits.
Emphasizes the understanding of, and practical experience in, the spectrum of non-technical aspects of statistical consulting, the art and science of applying statistics to real-world problems. Discusses the elements of a consultation, from defining the research problem to providing final products to the client, interpersonal communication, reproducible work, ethics and consulting in different environments. Develops students' consulting skills via lectures, role-play opportunities, consulting sessions, and actual research projects. Acquaints students with practical consulting experience through shadowing and leading the Biostatistics Center's clinics on Friday mornings. Provides opportunities to work directly with Johns Hopkins researchers to elicit information about the research question, and to provide a presentation and final report to researchers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.644. Statistical Machine Learning: Methods, Theory, and Applications. 4 Credits.
Introduces popular Machine Learning methods and emphasizes their practical usage for data analysis. Acquaints students with methods to evaluate statistical machine learning models defined in terms of algorithms or function approximations using basic coverage of their statistical and computational theoretical underpinnings. Topics covered include: regression and prediction, tree-based methods, overview of supervised learning theory, support vector machines, kernel methods, ensemble methods, clustering, visualization of large datasets and graphical models. Examples of method applications covered include cancer prognosis from microarray data, visualization and analysis of social network data, and graphical models for clinical decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.646. Essentials of Probability and Statistical Inference I: Probability. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.647. Essentials of Probability and Statistical Inference II: Statistical Inference. 4 Credits.
Introduces students to the theory of statistical inference. Includes the frequentist, Bayesian and likelihood approaches to statistical inference including estimation, testing hypotheses and interval estimation. Emphasizes rigorous analysis (including proofs), as well as interpretation of results and simulation for illustration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.648. Essentials of Probability and Statistical Inference III: Theory of Modern Statistical Methods. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.649. Essentials of Probability and Statistical Inference IV. 4 Credits.
Builds on the concepts discussed in 140.646, 140.647, 140.648 to provide the theory for modern statistical methods such as linear models, generalized linear models, random effects models, and marginal regression models. Also discusses the theory of causal inference. De-emphasizes proofs and replaces them with extended discussion of interpretation of results and simulation for illustration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.651. Methods in Biostatistics I. 4 Credits.
Presents fundamental concepts in applied probability, exploratory data analysis, and statistical inference, focusing on probability and analysis of one and two samples. Includes topics discrete and continuous probability models; expectation and variance; central limit theorem; inference, including hypothesis testing and confidence interval for means, proportions, and counts; maximum likelihood estimation; sample size determinations; elementary non-parametric methods; graphical displays; and data transformations. Introduces R and concepts are presented both from a theoretical, practical and computational perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.652. Methods in Biostatistics II. 4 Credits.
Presents fundamental concepts in applied probability, exploratory data analysis, and statistical inference, focusing on probability and analysis of one and two samples. Includes discrete and continuous probability models; expectation and variance; central limit theorem; inference, including hypothesis testing and confidence for means, proportions, and counts; maximum likelihood estimation; sample size determinations; elementary non-parametric methods; graphical displays; and data transformations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.653. Methods in Biostatistics III. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.654. Methods in Biostatistics IV. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.655. Analysis of Longitudinal Data. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.656. Multilevel Statistical Models in Public Health. 4 Credits.
Explores conceptual and formal approaches to the design, analysis, and interpretation of studies with a “multilevel” or “hierarchical” (clustered) data structure (e.g., individuals in families in communities). Develops skills to implement and interpret random effects, variance component models that reflect the multi-level structure for both predictor and outcome variables. Includes topics: building hierarchies; interpretation of population-average and level-specific summaries; estimation and inference based on variance components; shrinkage estimation; discussion of special topics including centering, use of contextual variables, ecological bias, sample size and missing data within multilevel models. Supports STATA and R software.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.658. Statistics for Psychosocial Research: Structural Models. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.664. Causal Inference in Medicine and Public Health I. 4 Credits.
Presents an overview of methods for estimating causal effects: how to answer the question of "What is the effect of A on B?" Includes discussion of randomized designs, but with more emphasis on alternative designs for when randomization is infeasible: matching methods, propensity scores, regression discontinuity, and instrumental variables. Methods are motivated by examples from the health sciences, particularly mental health and community or school-level interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.665. Causal Inference in Medicine and Public Health II. 3 Credits.
Presents principles, methods, and applications in drawing cause-effect inferences with a focus on the health sciences. Building on the basis of 140.664, emphasizes statistical theory and design and addresses complications and extensions, aiming at cultivating students' research skills in this area. Includes: detailed role of design for causal inference; role of models and likelihood perspective for ignorable treatment assignment; estimation of noncollapsible causal effects; statistical theory of propensity scores; use of propensity scores for estimating effect modification and for comparing multiple treatments while addressing regression to the mean; theory and methods of evaluating longitudinal treatments, including the role of sequentially ignorable designs and propensity scores; likelihood theory for instrumental variables and principal stratification designs and methods to deal with treatment noncompliance, direct and indirect effects, and censoring by death.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.673. INTRODUCTION TO STATISTICAL THEORY I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.676. Biostatistical Analysis of Epidemiologic Data I: Basic Tools. 2 Credits.
Begins with a brief review of statistical estimation and probability distributions. Also included is an introduction to bootstrap methods of statistical estimation. Then, confidence intervals are explored in detail. The analysis of two of the most common and important biostatistical/epidemiological tools, namely 2 by 2 tables and 2 by k tables, follows. The roll of a variety of issues such as confounding variables, interaction, bias and independence, key elements in many statistical applications, are an additional focus of these discussions. Weighted averages are discussed particularly in the context of combining tables and estimates.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.677. Biostatistical Analysis of Epidemiologic Data II: Logistic Regression Analysis. 2 Credits.
Presents applications of regression techniques , starting with a review of simple linear regression, as a foundation. Followed by application to non-linear data using more general regression techniques. Then, a complete and extensive description of log-linear regression analysis (also called Poisson regression) and how it works, particularly for the application to count data and tables. Also included is the concept of quasi-independence and the analysis of incomplete tables. Logistic regression techniques are similarly described in detail with emphasis on application to epidemiologic binary outcome data in several contexts. All regression techniques are illustrated with applied examples.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.678. Biostatistics Analysis of Epidemiologic Data III. 2 Credits.
Discusses elementary survival analysis biostatistical tools such as the nonparametric techniques, life tables, Kaplan/Meire survival probabilities and cox regression. Equally, parametric approaches based on exponential and Weibull probability distributions are similarly discussed. Presents six statistical tools often useful in specific situations but rarely found in introductory texts. Two examples are the capture/recapture methods for estimating population sizes, both human and animal populations, and random response survey techniques that guarantee complete confidentially.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.686. Advanced Methods for Statistical Genetics and Genomics. 3 Credits.
Covers statistical methods and theory underlying advanced analysis of genetic and genomic data to address mechanistic hypotheses and to build models for prediction. Topics include methods for complex association testing, inference on genetic architecture using mixed model techniques, methods for understanding causal mechanisms using Mendelian randomization, and integrative genomic analysis and strategies for clinical translation using risk prediction models. Requires making presentations and critiquing published studies that have used advance statistical methods to make new scientific observations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.688. Statistics For Genomics. 3 Credits.
Covers the basics of R software and the key capabilities of the Bioconductor project (a widely used open source and open development software project for the analysis and comprehension of data arising from high-throughput experimentation in genomics and molecular biology and rooted in the open source statistical computing environment R), including importation and preprocessing of high-throughput data from microarrays and other platforms. Also introduces statistical concepts and tools necessary to interpret and critically evaluate the bioinformatics and computational biology literature. Includes an overview of of preprocessing and normalization, statistical inference, multiple comparison corrections, Bayesian Inference in the context of multiple comparisons, clustering, and classification/machine learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.689. Adaptive Enrichment Designs for Confirmatory Randomized Trials: Methods and Software. 1 Credit.
Provides an overview of the strengths and limitations of randomized trial designs that adaptively change enrollment criteria during a trial (adaptive enrichment designs) and have the potential to provide improved information about which subpopulations benefit from new treatments. Explains recent advances in statistical methods for these designs, and presents adaptive design software planning tools. Discusses FDA guidance documents on adaptive designs. Examines methods for improving precision of estimators of the average treatment effect, by leveraging information in baseline variables; these methods can be used in adaptive designs as well as standard (non-adaptive) trial designs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.698. Spatial Analysis III: Spatial Statistics. 4 Credits.
Introduces statistical techniques used to model, analyze, and interpret public health related spatial data. Analysis of spatially dependent data is cast into a general framework based on regression methodology. Topics covered include the geostatistical techniques of kriging and variogram analysis and point process methods for spatial case control and area-level analysis. Although the focus is on statistical modeling, students will also cover topics related to clustering and cluster detection of disease events. Although helpful, knowledge of specific GIS software is not required. Instruction in the public domain statistical package R/RStudio, (to be used for analysis), is provided.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.699. Spatial Analysis IV: Spatial Design and Application. 3 Credits.
Expands students' abilities to design, conduct and report the results of a complete public health related spatial analysis. Focuses on further developing and integrating components of the spatial science paradigm, Spatial Data, GIS and Spatial Statistics. Introduces relevant topics in GIS, spatial data technologies and spatial statistics not previously covered in Spatial Analysis I-III.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.711. Advanced Data Science I. 3 Credits.
In this course, we will focus on hands-on data analyses with a main objective of solving real-world problems. We will teach the necessary skills to gather, manage and analyze data using the R programming language. We will cover an introduction to data wrangling, exploratory data analysis, statistical inference and modeling, machine learning, and high-dimensional data analysis. We will also learn the necessary skills to develop data products including reproducible reports that can be used to effectively communicate results from data analyses. Students will train to become data scientists capable of both applied data analysis and critical evaluation of the next generation next generation of statistical methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.712. Advanced Data Science II. 3 Credits.
Builds on Advanced Data Science I by introducing the idea of data products and encouraging students to build products based on their data analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.721. Probability Theory I. 3 Credits.
Presents the first part of the classical results of probability theory: measure spaces, LP spaces, probability measures, distributions, random variables, integration, and convergence theorems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.722. Probability Theory II. 3 Credits.
Presents the first part of the classical results of probability theory: independence, types of convergence, laws of large numbers, Borel-Cantelli lemmas, Kolmogorov's zero-one law, random series and rates of convergence. Also discusses characteristic functions and weak convergence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.723. Probability Theory III. 3 Credits.
Presents the second part of the classical results of probability theory: central limit theorems, Poisson convergence, coupling, Stein-Chen method, densities, derivatives and conditional expectations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.724. Probability Theory IV. 3 Credits.
Covers basic stochastic processes including martingales and Markov chains, followed by consideration of Markov Chain Monte Carlo (MCMC) methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.731. Statistical Theory I. 4 Credits.
Introduces probability and inference, including random variables; probability distributions; transformations and sums of random variables; expectations, variances, and moments; properties of random samples; and hypothesis testing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.732. Statistical Theory II. 4 Credits.
Introduces modern statistical theory; sets principles of inference based on decision theory and likelihood (evidence) theory; derives the likelihood function based on design and model assumptions; derives the complete class theorem between Bayes and admissible estimators; derives minimal sufficient statistics as a necessary and sufficient reduction of data for accurate inference in parametric models; derives the minimal sufficient statistics in exponential families; introduces maximum likelihood and unbiased estimators; defines information and derives the Cramer-Rao variance bounds in parametric models; introduces empirical Bayes (shrinkage) estimators and compares to maximum likelihood in small-sample problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.733. Statistical Theory III. 4 Credits.
Derives the large sample distribution of the maximum likelihood estimator under standard regularity conditions; develops the delta method and the large sample distribution of functions of consistent estimators, including moment estimators; introduces the theory of estimation in semiparametric regression models based on increasing approximation of parametric models; develops likelihood intervals and confidence intervals with exact or approximate properties; develops hypothesis tests through decision theory.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.734. Statistical Theory IV. 4 Credits.
Focuses on the asymptotic behavior of estimators, tests, and confidence interval procedures. Specific topics include: M-estimators; consistency and asymptotic normality of estimators; influence functions; large-sample tests and confidence regions; nonparametric bootstrap
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.741. Advanced Survival Analysis. 3 Credits.
Introduces statistical models and methods useful for analyzing univariate and multivariate failure time data. Extends Survival Analysis I to topics on length-bias and prevalent samplings, martingale theory, multivariate survival data, time-dependent ROC analysis, and recurrent event processes. Emphasizes nonparametric and semiparametric approaches for modeling, estimation and inferential results. Clinical and epidemiological examples included in class presentation illustrate statistical procedures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.742. Risk Prediction and Precision Medicine. 3 Credits.
Covers various topics for evaluating the performance of biomarkers to predict risk of clinical or disease outcome, specifically including: a. relative, absolute and competing risks for binary and time-to-disease outcomes; b. ROC/AUC biomarker inference with binary outcome; c. ROC/AUC biomarker inference with time-to-event outcome, with censoring and truncation; d. statistical methods and inference for case-control study designs; e. a few topics on precision medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.751. Advanced Methods in Biostatistics I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.752. Advanced Methods in Biostatistics II. 4 Credits.
Surveys basic statistical inference, estimates, tests and confidence intervals, and exploratory data analysis. Reviews probability distributions and likelihoods, independence and exchangeability, and modes of inference and inferential goals including minimizing MSE. Reviews linear algebra, develops the least squares approach to linear models through projections, and discusses connections with maximum likelihood. Covers linear, least squares regression, transforms, diagnostics, residual analysis, leverage and influence, model selection for estimation and predictive goals, departures from assumptions, efficiency and robustness, large sample theory, linear estimability, the Gauss Markov theorem, distribution theory under normality assumptions, and testing a linear hypothesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.753. Advanced Methods in Biostatistics III. 4 Credits.
Introduces generalized linear model (GLM). Foundational topics include: contingency tables, logistic regression for binary and binomial data, models for polytomous data, Poisson log-linear model for count data, and GLM for exponential family. Introduces methods for model fitting, diagnosis, interpretation and inference and expands on those topics with techniques for handling overdispersion, quasi-likelihood and conditional likelihood. Introduces the role of quantitative methods and sciences in public health, including how to use them to describe and assess population health, and the critical importance of evidence in advancing public health knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.754. Advanced Methods in Biostatistics IV. 4 Credits.
Extends topics in 140.753 to encompass generalized linear mixed effects models. Introduces expectation-maximization and Markov Chain Monte Carlo. Introduces functional data analysis. Foundational topics include: linear mixed model, generalized linear mixed model, EM, MCMC, models for longitudinal data, and functional data analysis. Emphasizes both rigorous methodological development and practical data analytic strategies. Discusses the role of quantitative methods and sciences in public health, including how to use them to describe and assess population health, and the critical importance of evidence in advancing public health knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.762. Bayesian Methods I. 3 Credits.
Illustrates current approaches to Bayesian modeling and computation in statistics. Describes simple familiar models, such as those based on normal and binomial distributions, to illustrate concepts such as conjugate and noninformative prior distributions. Discusses aspects of modern Bayesian computational methods, including Markov Chain Monte Carlo methods (Gibbs' sampler) and their implementation and monitoring. Bayesian Methods I is the first term of a two term sequence. The second term offering, Bayesian Methods II (140.763), develops models of increasing complexity, including linear regression, generalized linear mixed effects, and hierarchical models.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.763. Bayesian Methods II. 3 Credits.
Builds upon the foundation laid in Bayesian Methods I (140.762). Discusses further current approaches to Bayesian modeling and computation in statistics. Describes and develops models of increasing complexity, including linear regression, generalized linear mixed effects, and hierarchical models. Acquaints students to advanced tools for fitting Bayesian models, including non-conjugate prior models. Includes examples of real statistical analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.771. Advanced Statistical Theory I. 4 Credits.
Examines statistics as a discipline along the path towards making decisions. First examines the justification of statistics from axioms on informed preferences and its close connection to Bayesian theory, and then examines the role of standardizing intermediate steps, through various additional restrictions on estimation, and studies the properties of the resulting methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.772. Advanced Statistical Theory. 4 Credits.
Examines statistics as a discipline along the path towards making decisions. First examines the justification of statistics from axioms on informed preferences and its close connection to Bayesian theory, and then examines the role of standardizing intermediate steps, through various additional restrictions on estimation, and studies the properties of the resulting methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.773. Foundations of Statistical Inference. 4 Credits.
Investigates the foundations of statistics as applied to assessing the evidence provided by an observed set of data. Topics include: law of likelihood, the likelihood principle, evidence and the likelihood paradigm for statistical inference; failure of the Neyman-Pearson and Fisherian theories to evaluate evidence; marginal, conditional, profile and other likelihoods; and applications to common problems of inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.774. Foundations of Statistics II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.776. Statistical Computing. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.778. Advanced Statistical Computing. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.800. MPH Capstone Biostatistics. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.820. Thesis Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.830. Postdoctoral Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.840. Special Studies and Research Biostatistics. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.850. Advanced Special Topics in Biostatistics. 1 - 22 Credits.
Exposes Biostatistics PhD students to advanced special topics that are not covered in the core courses. Comprises two- and four-week modules, with revolving instructors and topics. Possible topics include: theory underlying analysis for correlated data; latent variable modeling; advanced survival analysis; image analysis; time series; and likelihood inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.860. Current Topics in Biostatistics Research. 1 Credit.
Features presentations by Biostatistics faculty, postdocs and senior students on their research, with a focus on the public health and scientific questions driving the work, why the research makes a difference for the subject area and how to translate the research into practice. Offers an opportunity for discussion and clarification of key Biostatistical concepts being taught in the core courses and how they apply to problems in public health and science. Provides an opportunity for students and faculty to come together and discuss novel research questions and the role that Biostatisticians have in helping to support, enrich and promote solutions to these novel research questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.895. MPH Practicum: Biostatistics. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.921. Biostats Lab for 140.621.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.922. Lab for Biostats 140.622.
Prerequisite(s): Lab for PH.140.622
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.923. Lab for Biostats PH.140.623.
Prerequisite(s): Must also enroll for PH.140.623
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.924. Lab for Biostatatistics 140.624.
Prerequisite(s): Must also enrol for PH.140.624
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.936. Lab - Scalable Computational Bioinformatics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.941. Biostats Lab for 140.641.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.955. Lab for Biostat 140.655.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.958. Biostats Lab for 140.658.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.140.998. Lab for PH.140.698.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220 (International Health)

PH.220.600. International Travel Preparation, Safety, & Wellness. 1 Credit.
Prepares students who aim to work and live overseas. Explores the epidemiology of common morbidity and mortality among travelers. Examines key prevention, safety, and travel medicine principles and services to contextualize risks and maintain wellness. Reviews applicable interventions, appropriate vaccines, and personal protection methods to prepare students to respond to expected and unexpected situations. Assists students with personal preparations for travel through country-specific assignments. Challenges students to examine travel health and safety priorities through case studies and discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.601. Foundations of International Health. 4 Credits.
Provides an overview of foundational approaches and issues in International Health, preparing students to gain the skills and attributes needed to work in global public health. Examines conditions faced by disadvantaged populations, primarily in low and middle income countries (LMICs), and pathways to achieving better health outcomes. Applies principles of health equity and social justice in analyzing global health policies and programs, and develops skills to apply different frameworks for diverse types of public health intervention. Students develop and articulate evidence-informed arguments concerning public health strategies in different contexts, and practice communication skills that demonstrate respect for other cultures and perspectives. They use a range of tools to prepare for work in global public health, including how to conduct situational analyses across a range of settings, how to analyze scale-up, sustainability, and equity, and how to move research into practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.605. Doctoral Seminar in International Health I. 3 Credits.
Explores topics of relevance to International Health, in a six-module format. Each module comprises a set of readings which are discussed in class by students working in groups. Each session is led by a group of students with facilitation by course faculty and guest faculty as appropriate to the topic. Modules include (1) Health and International Development (2)Transitions (demographic, epidemiologic, nutritional and migration), (3) Sanitation programs, (4) Disease Eradication Programs, past present and future , (5) Chronic Disease, a new challenge for programs, (6) Primary Health Care, history, evidence and future
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.606. Doctoral Seminar in International Health II. 3 Credits.
Discusses how to identify a thesis topic, write a proposal, seek funding, understand challenges in execution, and thesis format and write up. Students read five doctoral theses, one from each Department of International Health program, and student groups lead discussions with the former students and their thesis advisors in class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.608. International and Global Health. 4 Credits.
Introduces students to an international perspective of health, disease, injury, and health systems. Develops requisite knowledge and understanding of globalization and health, global disease burden and international health scenario. Using case studies, students perform a comparative analysis of disease burden in various countries, health systems and policies, in developed and developing countries, health sector reforms and country experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.701. School-wide 2nd Year DRPH Seminar. 2 Credits.
Assists 2nd year DrPH students mastering skills related to study design and implementation, as preparation for work on their dissertation proposal. During the course of the year, this seminar series focuses on epistemology, alternative study designs, and how different study designs may best be suited to address different types of research questions. The course builds upon other methods classes and supports students to develop a draft research proposal of their own. While the course is designed to prepare students for their dissertation work, students can complete the course without having decided upon a dissertation topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.800. MPH Capstone International Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.810. Field Placement DRPH Program International Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.820. Thesis Research DRPH IH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.840. Special Studies and Research DRPH Program International Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.842. Doctoral Independent Goals Analysis - International Health. 1 Credit.
Develop a doctoral academic plan through discussions with faculty advisor resulting in the development of a written document called the Individual Development Plan. Review course tracking sheet based on skills and methods student plans to learn. The IDP is a living document that is part of the student's self-assessment and departmental annual review. Supports the student's successful performance in the program and prepares students for their intended future career.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.220.895. MPH Practicum: International Health. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.602. Applications in Managing Health Organizations in Low and Middle income Countries. 3 Credits.
Uses case studies, a simulation, and group-based activities, supplemented by required weekly online lectures and readings, students explore a variety of settings found in low and middle-income countries in which to apply management concepts. Examines: (1) organizational restructuring in response to decentralization, (2) environmental scanning ,(3) systems behavior in hospital organizations, (4) multiple approaches to group decision making, (5) managing to achieve agreement in health organizations, (6) preparing, implementing, and communicating a budget that is based on limited resources within a business, (7) performance improvement concepts and tools in a healthcare organization, and (8) the construct of a “balanced score card” for a health organization. Applies these concepts to the activities and assignments in this management skills learning lab.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.604. Case Studies in Management Decision-Making. 3 Credits.
Students analyze problems and develop strategies based on real dilemmas faced by decision-makers. Students formulate positions before class and actively participate in discussion during class. Cases come from both International and U.S. settings, and deal with issues such as: conflict between budget and program offices, working with governing boards, contracting between government and non-government providers, dysfunctional clinics, reforming hospitals, managing local politics, cutting budgets and collaborating in informal organizations. Develops skills in leadership, negotiation, analysis, communication, and human resource management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.605. History of International Health and Development. 2 Credits.
Examines the history of western efforts to promote health and nutrition in the "developing world" from the beginnings of tropical medicine to recent efforts of disease eradication. Explores the various economic and political interests, as well as cultural assumptions, that have shaped the development of ideas and practices associated with international health in "developing" countries. Topics include history of international health organizations, strategies, and policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.606. Training Methods and Continuing Education for Health Workers. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.607. Essential Skills for Women's Leadership in Global Health. 3 Credits.
Provides a robust understanding of the barriers women face in leadership and guides the development of solutions and strategies for individuals and institutions moving forward. Enhances knowledge about women's leadership in global health including barriers and models/frameworks that have been used to promote women in leadership. Distinguishes various leadership approaches and their implications in different cultural settings, highlighting diversity and intersectionality theories in particular. Builds essential skills including self-awareness, communication, and negotiation. Encourages a solutions-oriented mindset via the development of individual and institutional strategies. Utilizes case studies and discussion exercises that feature diverse organizational and societal contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.608. Managing Non-Governmental Organizations in the Health Sector. 3 Credits.
Familiarizes students with the key competencies required for managing NGOs in the health sector. Though many of the situations described in the lectures are taken from the instructor's experiences in managing international NGOs in developing countries, the material presented is applicable in organizational settings in developed countries as well. Topics correspond to the key responsibilities of NGO or health program directors. Lectures present guidelines, best practices, and management tools for the area of responsibility followed by a discussion of the lecturer's and students' experiences on those topics. Readings, which provide background information, are assigned for each class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.610. Pharmaceuticals Management for Under-Served Populations. 3 Credits.
Students analyze problems and develop strategies based on real world drug management issues, including regulations, manufacture, procurement, distribution, safety, policy, financing and the unique aspects of international pharmaceutical trade, the role of the World Trade Organization -- Trade-Related Aspects of Intellectual Property Rights (WTO-TRIPS), government, NGOs and individuals in the selection and use of pharmaceutical products. Course materials are drawn from both developed and developing countries so that the student will be knowledgeable about the role of Essential Medicines and the formation of a National Drug Policy. Uses a multidisciplinary approach to provide students with an operational understanding of factors influencing access to and use of pharmaceuticals and other health commodities. Collectively, these materials and approaches are intended to stimulate critical thinking on how to improve access to and the use of pharmaceutical products.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.611. Food Security and Nutrition in Humanitarian Emergencies. 2 Credits.
Examines food aid, food insecurity, and nutritional deficiencies as they appear in different types of humanitarian emergencies. Discusses profiles of major international relief organizations involved in nutrition and food assistance and common programmatic interventions used in response to food crises. Emphasizes development of practical skills and knowledge that can be applied in field settings. Students learn to appraise and compare content, cost, and logistical considerations associated with large-scale feeding programs, and become familiar with nutrition surveys and curative nutrition programs. Factors contributing to food insecurity are considered and various response modalities, including in-kind assistance and cash-based approaches, discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.612. Confronting the Burden of Injuries: A Global Perspective. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.613. Introduction to Humanitarian Emergencies. 3 Credits.
Introduces different types of humanitarian emergencies, humanitarian architecture and provides an overview of sectoral focus areas of humanitarian response. Informs students of the environment in which these emergencies occur and how public health responses in various types of emergencies and contexts differ. Explores mechanisms of preparedness, management of response to humanitarian emergencies and long-term recovery.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.614. International Political Science for Ph Practitioners. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.615. Health Emergencies in Large Populations (H.E.L.P.). 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.616. Ethics of Public Health Practice in Developing Countries. 2 Credits.
Provides a forum for discussion and deliberation about ethical issues in the practice of public health (including the conduct of research) in developing countries. Equips students to identify and analyze critical ethical issues and to consider systematically the ethical responsibilities of all parties involved.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.617. Behavioral Economics in Health Decisions. 2 Credits.
Prepares students to challenge superficial intuitive judgments that are attractive because they make obvious sense, but which overlook important considerations that demand more analytical assessment. Discusses human behaviors that then come into play in a more careful analysis, which are then examined for their legitimacy and reasonableness in resolving questions that are traditionally considered to be economic in nature. Develops ways to blend relevant behavioral factors with economic perspectives and methods to design balanced action strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.619. Introduction to Microeconomics. 3 Credits.
Introduces economics of the business enterprise, the household, and the industry. Topics include supply and demand, price and income elasticity, equilibrium of the firm, and the measurement of poverty and inequality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.620. Applying Summary Measures of Population Health to Improve Health Systems. 3 Credits.
Explores the conceptual basis and application of summary measures of population health status. Presents approaches to measuring the burden of disease in populations and their use for guiding resource allocation and planning efficient and equitable health care systems. Lectures, discussions, and group exercises focus on composite indicators, exploring social and ethical value choices, and assessing the burden of disease at national level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.621. Gender and Health: Foundational Theories and Applications. 2 Credits.
Provides a broad overview of the field of gender as applied to public health. Discusses the distinction between sex and gender and how they intertwine. Examines the effect of gender power relations on women's, men's, and gender minorities' health, including transgender and cisgender people. Prepares students to apply foundational theories in gender and health to a broad range of health topics. Presents strategies for incorporating gender analysis into health research and interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.622. Using Qualitative Methods for Program Planning and Evaluation. 1 Credit.
Introduces students to the role of qualitative methods in assessing population needs and designing acceptable interventions. Emphasizes the complementarity of qualitative and quantitative methods and how both should be combined for effective program design, implementation, monitoring, and evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.623. Water, Sanitation and Hygiene in Humanitarian Emergencies. 2 Credits.
Water, sanitation and hygiene (WASH) is an essential component of humanitarian emergency planning and response. This course provides WASH introductory concepts, technical knowledge and practice in humanitarian contexts, including conflict, natural disasters and disease epidemics. Essential cross-cutting issues such as coordination, intersectoral planning and response as well as community and behavioral aspects are provided with examples from recent disasters.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.624. Urban Health in Developing Countries. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.625. Evaluation of District-Level Primary Health Care Implementation in Low-and Middle-income Settings. 3 Credits.
Prepares students to analyze local contexts and project implementation designs in order to develop evaluation plans that can be practically applied to programs in middle and low-resource settings. Discusses actual experiences of helping implementers design evaluations for district level programs, taking into consideration time and budget limitations. Focuses on developing pre-post evaluation plans that measure adequacy of implementation, based on evaluation conceptual frameworks, following theory of change logic. Explores choosing the proper evaluation methodology (i.e. Qualitative and/or Quantitative). Includes choosing appropriate indicators based on internationally accepted primary health care indicators. Explores alternatives for addressing mortality measurement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.626. Introduction to Household Surveys for Evaluation of Primary Health Care Programs in Low- and Middle- Resource Settings. 3 Credits.
Introduces participants to fundamental skills needed to design and manage implementation of household surveys. Presents real world experiences of using the Knowledge, Practice, and Coverage (KPC) tool for household surveys in middle and low-resource settings. Includes constructing a questionnaire from standard KPC modules, indicator selection, sampling plan development, use of parallel sampling, household selection, management and oversight plan, and ethical considerations. Introduces participants to adjustments that can be made so that the survey can be implemented within time and budget constraints.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.627. Issues in the Reduction of Maternal and Neonatal Mortality in Low income Countries. 4 Credits.
Understands the clinical and social causes of high maternal and newborn mortality and morbidity. Exposes students to the clinical, program and policy interventions that address these issues, and evaluates the strength of the evidence supporting these interventions. Offers practical exercises for students to: 1.) understand the scope and epidemiology of both maternal and neonatal problems, and 2.) design and assess programmatic responses to address them. Upon completion, students will have the knowledge base to be able to contribute to program and policy responses with an informed perspective to avert maternal and newborn deaths in different contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.628. Psychological First Aid: Principles and Practice. 2 Credits.
Examines the psychological principles and practical guidelines for the provision of PFA as a means of fostering resilience in others. Provides in-person instruction in the RAPID model of PFA to students as well as practicing professional in a wide range of disciplines. The ability to assist people in acute distress is an essential aspect of healthcare, disaster relief, education, and leadership in all profession.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.629. Prospective policy analysis for health policy and systems research: methods and applications. 2 Credits.
Introduces learners to tools and methods to facilitate aspects of real-time policy analysis (from agenda setting, policy formulation, to policy implementation) and supports them to think through and plan to conduct a prospective policy analysis to a current public health problem, as well as to identify ways of engaging with the policy making process for the identified problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.630. Tackling the Intersectoral Challenge of Antimicrobial Resistance: Problem Solving Seminar. 3 Credits.
Examines antimicrobial resistance (AMR) as an intersectoral challenge, one that affects both our healthcare delivery and food systems. As a One Health issue, AMR also has an environmental dimension: up to 80% of some antimicrobials consumed by humans or food animals may be discharged into the environment. The incentives of traditional business models, where a drug company's revenues come from volume-based sales, are at odds with efforts to ensure access, but not excess use of antimicrobials. Some have called AMR an ongoing pandemic; others have noted the opportunity to invest in shared infrastructure, from infection control and prevention to integrated disease surveillance, that might address both future pandemics and AMR. Invites students to tackle this global health challenge by applying strategic planning tools to deepen one's appreciation and find creative solutions to AMR.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.631. Evaluation Methods for Injury Interventions. 3 Credits.
Prepares students to participate in the design/conduct of LMIC road safety program evaluations using standardized tools from the WHO, and to translate results for advocacy. Introduces the theory and use of these tools/study designs via lectures followed by case studies of how they have been used in LMICs. Students use EpiInfo to compile secondary data and do basic calculations to understand the burden of road crashes in an LMIC and then identify a plausible intervention and propose a study to evaluate its impact. Students work in groups to prepare an advocacy presentation based on a published program evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.632. Introduction to Improving Quality in Public Health Practice. 1 Credit.
Prepares students to design and implement a program of performance and assessment in public health practice. Examines the historical and theoretical background of public health practice and quality improvement. Presents strategies for developing public health practice improvement strategies that can be implemented in a high or low income setting, in a public or private sector, in a national or a sub-national organization. Includes practical tools that can be adapted for local use. Compares top-down and bottom-up approaches to public health practice quality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.633. Policy Advocacy in Low and Middle-income Countries: Application for Real World Challenges. 2 Credits.
Introduces fundamentals of policy advocacy with an emphasis on low- and middle-income countries. Reviews relevant frameworks, presents lessons learned from low- and middle-income countries case studies, and explains approaches for engaging both global and local stakeholders in influencing policy adoption or change. Provides students will skills necessary for developing and presenting an advocacy plan and to strengthen stakeholder engagement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.634. Stress Management for Relief Workers. 2 Credits.
Provides an introduction to the need for, strategic principles of, and tactics for the provision of stress management and crisis intervention to relief workers. Emphasizes on providing assistance to others as well as self-care. Provides awareness of emotional stress faced by health workers providing humanitarian assistance in emergency situations. Includes topics signs and symptoms of stress disorders (critical-incident stress), components of critical-incidence management programs, and provision of services to prevent long-term mental health consequences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.635. Global Advances in Community-Oriented Primary Health Care. 3 Credits.
Introduces students to the origins and recent advances in community-oriented primary health care through case studies from both developing and developed countries. Like hands-on clinical bedside teaching, the course uses real cases to help students develop problem-solving skills in practical situations. Program examples all use community participatory and community-based approaches to address priority health problems. There is a strong focus on equity and empowerment in all cases discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.636. High Performing Organizations in Lmic Settings. 3 Credits.
Provides an understanding of the core features, characteristics, systems and processes adopted by organizations that lead to high performance in LMIC settings. Introduces the Baldrige Performance Excellence Framework in Healthcare and utilizes a case study approach to share organizational best practices in setting standards, building robust processes and creating a culture of continuous improvement and excellence. Includes a contextual and cultural understanding of the LMIC settings that act as facilitators and/or barriers for high performance in LMIC settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.637. Health Information Systems. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.638. Health Systems Research and Evaluation in Developing Countries. 4 Credits.
Builds an understanding of the purpose and nature of health systems research and evaluation (HSRE) as a multi-disciplinary endeavor with scope for diverse inferences. Provides a landscape of the range of research questions and associated methodological approaches and study designs available for HSRE within health system building blocks and at various levels of the health system (macro, meso, micro). In addition, explores cross-cutting issues of equity and social justice, digital health applications and scientific rigor. Fosters the ability to develop different research strategies depending on the research question at hand and to read health systems research (HSR) critically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.639. Health Care in Humanitarian Emergencies. 3 Credits.
Introduces the provision of basic health requirements for refugees other displaced populations. This includes the health of persons displaced by conflict as well as natural and man-made disasters. Although its main concern is with the health needs or those displaced in low and middle-income countries it also touches on the issue of persons resettled to developed countries. Addresses epidemiologic assessment, control of communicable and noncommunicable diseases, nutrition, mental health needs, establishing and managing health services, reproductive health services, ethical decision making, application of International Humanitarian law, and coordinating activities among agencies in international contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.640. Design and Implementation of Incident Management Systems in Low- and Middle-income Countries. 2 Credits.
Introduces students to the design and implementation of organizational structures, specifically the Incident Management Systems (IMS), established to support health emergency response efforts in low- and middle-income countries. Discusses the functions that enable governments and international agencies to effectively respond to health emergencies, including management, planning, operations, logistics, finance, and administration. Reviews effective and ineffective management components of health emergency response efforts using case studies that include the Ebola virus outbreak in West Africa and the COVID-19 epidemic in India. Focuses on the application of the IMS in the context of some management principles.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.641. Measurement Methods in Humanitarian Emergencies. 2 Credits.
Gives students an overview of selected field-based methods used in humanitarian emergencies to measure basic health indicators and demographic characteristics of affected populations. Upon completion, students can describe the assessment process in the various phases of humanitarian emergencies. Students are able to describe a variety of methods, both qualitative and quantitative, used in field-based assessments of humanitarian settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.642. Mental Health Aspects of Disaster: Public Health Preparedness and Response. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.643. Armed Conflict and Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.644. Econometric Methods for Evaluation of Health Programs. 4 Credits.
Introduces students to the application of common econometric methods available to address questions of concern to policy makers, administrators, managers, and program participants regarding evaluation of health programs in low and middle-income countries. Students learn to apply econometric methods in their research and to recognize the limitations in applying the same methods in estimating the impact of a policy intervention. Combines a theoretical development of methods and a numerical application involving continuous dependent variables. Emphasizes the correct use of data in framing relevant questions and understanding the importance as well as the limitations of data analysis in order to equip students with the quantitative skills necessary to evaluate policy alternatives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.645. Large-scale Effectiveness Evaluations of Health Programs. 4 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a systems thinking lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.646. Health Systems in Low and Middle income Countries. 3 Credits.
Explores health systems in low and middle income countries (LMICs), and examines approaches to improving the performance of health systems. Focuses on frameworks, tools, skills, and strategies to understand, influence, and evaluate health systems in LMICs. Identifies key institutions, functions, and performance issues for national and local health systems. By using frameworks and tools, students gain experience in systematically analyzing health systems and methods to plan, implement, and evaluate changes in health systems in a variety of settings, including countries in various levels of demographic, epidemiologic and economic transitions. Covers key controversies in health systems, including issues in monitoring health systems performance, the role of the public sector, dealing with unregulated private health markets, linking priority health programs and health systems, raising accountability in the health system, etc.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.647. Advanced Topics in Economic Evaluation & Modeling for Global Health. 3 Credits.
Presents evaluation techniques to compare health system interventions in international health. Focuses on addressing existing constraints in health systems development, given key policy goals as quality, equity and efficiency. Presents both qualitative and quantitative approaches to evaluate interventions to better inform policy how to improve system performance and functions. Identifies policy goals, actor groups, system functions and ways to assess improvement strategies related to policy goals using existing systems frameworks. Covers key constraints in systems performance such as: effective prevention and treatment programs, patient compliance, health worker performance, inequitable access, collective financing, choosing priorities, and community-level interventions. Comparative methods draw on a mix of epidemiology, health economics, disease modeling, services research, and qualitative techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.650. Health Policy Analysis in Low and Middle income Countries. 3 Credits.
Provides an overview of political frameworks and theories related to policy development and offers practical perspectives on their application to health policy in low and middle income countries (LMICs). Analyzes the political economy of health policy, (ie. how the political environment and country institutions policy development). Introduces the main actors, processes and contextual features that are typical of policy development and implementation in LMICs. Topics encompass national policy and planning frameworks; aid harmonization and alignment; the role of policy networks (particularly civil society actors); policy implementers and their role in shaping policy; and mechanisms for global health policy development. Final sessions focus on practical strategies to strengthen policy processes. Teaching draws upon examples from different diseases, services and health systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.651. Econometrics I. 4 Credits.
Introduces students to the application of basic statistical methods to economic analyses. They use econometrics to support or reject theories from economics using empirical observation. Students cover the basic concepts behind linear regression models by studying cases where the dependent variable is continuous and is a linear function of the parameters of interest. Improves students' ability to conduct economic analysis using observational data, as economic studies rarely benefit from the availability of controlled experiments. Exercises provide hands-on experience in implementing well-crafted empirical analysis. Students learn to employ tools and methods and compare the results with respect to those obtained from initial estimations based on very restricted assumptions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.652. Financing Health Systems for Universal Health Coverage. 3 Credits.
Teaches the financing of health care in low and middle-income countries with the goal of achieving universal health coverage. The course is built around four themes of financing health systems: revenue sources, pooling, purchasing and provision of healthcare. Using this framework students will learn how to evaluate country health financing systems. Progressing through these themes students will learn to use metrics related to health financing, use household surveys to estimate some of these metrics, and also have an in-depth understanding of health financing systems of select countries. At the end of this course students will have a good understanding of health financing for a career in global health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.653. Hospital-Based Injury/Trauma Surveillance in Low- and Middle-income Countries. 3 Credits.
Examines the high, and growing, global injury burden with a focus on low- and middle-income countries. Establishes the need for and complexities of establishing and maintaining reliable injury surveillance systems in LMIC. Focuses on training students on the fundamentals of an injury surveillance system in LMIC settings– data needs, collection, coding, processing and use, as well as on evaluation of such systems, and how to sustain them. Prepares students to participate in designing and sustaining hospital-based injury/trauma surveillance systems in LMIC to inform health program planning at the local and national level. Uses case studies to compare and contrast injury surveillance systems in different LMIC settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.654. Systems Thinking in Public Health: Applications of Key Methods and Approaches. 3 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a systems thinking lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.655. Surgical Care Needs in Low and Middle Income Countries. 2 Credits.
Explores the components of health systems related to surgical care. Focuses on the global burden of surgical disease and trauma, and deficiencies in surgical capacity in LMICs. Case studies from the US, Sierra Leone and Rwanda illustrate common surgical conditions and needed components for a comprehensive health system. Specific topics include surgical care for Women's Health, obstetrical or gynecological injury, and trauma care. Discusses the importance of planning for surgical interventions in disaster management and conflict , including the difference between war surgery and military surgery. Also addresses the economic cost and benefit of surgery and surgical care in LMICs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.656. Conceptual and Evidential Foundations of Health Equity and Social Justice. 4 Credits.
Explores the conceptual bases of health equity and the underlying social justice, human rights, and disparity models for defining health equity. Examines strategies for promoting health equity and the strength of evidence supporting these strategies. Translates various causal models for defining health equity into research and practice frameworks. Presents integrative examples applying relevant concepts to identify causes, consequences, and solutions of health inequities in various contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.657. Disease and Program Costing in Global Health Programs. 3 Credits.
Provides a solid foundation in the key concepts and methods used for costing in global contexts with a focus on practice and policy. Focuses on defining costs and rationales for costing, quantifying the cost, defining the disease case, and identifying cost components that vary by country and settings. Discusses the challenges of costing in low- and middle-income settings and prepares students to design and execute a cost analysis on a global health program and on a disease. Helps students frame cost data and economic evidence for policymaking and advocacy. Includes topics such as taxonomy of costs, perspectives, epidemiological considerations, evaluating data sources, patient/caregiver economic survey design, analysis methods, and dissemination techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.658. Globalization: Challenges and Opportunities for Future Health Systems. 2 Credits.
Everything in life has positive and negative effects, and globalization is just one example of this reality. This course evaluates how globalization creates challenges and opportunities for health systems and health outcomes in general. Students discuss evidence on globalization and health, and propose strategies to leverage its opportunities and mitigates its risks.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.659. Introduction to Health Systems Modeling. 2 Credits.
Introduces students to mathematical and computational modeling and simulation methods to better understand, evaluate, and improve health systems. Addresses the basic concepts of mathematical and computational modeling and simulation and how they may apply to health systems. Covers the basics of economic and operational modeling and simulation, and introduces advanced Microsoft Excel features and the VenSim software.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.660. Systems Science in Public Health: Basic Modeling and Simulation Methods. 3 Credits.
Introduces students to mathematical and computational modeling and simulation methods that can help public health decision makers better understand and improve various systems in public health. Addresses the basic concepts of mathematical and computational modeling and simulation. Covers probability theory, decision analysis, Markov models, compartment models, and systems dynamics models, as well as basics of economic and operational modeling. Introduces TreeAge, and VenSim software. Offers examples of public health systems including both communicable and non-communicable disease control programs (e.g., vaccines, medications, and non-pharmaceutical interventions), dietary and physical activity behaviors and interventions, and healthcare systems and healthcare policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.661. Project Development for Primary Health Care in Developing Countries. 4 Credits.
Allows participants to design a Primary Health Care (PHC) project in a low or middle-income country. Students learn how to navigate needs and limitations, and utilize resources available. Focuses on project design, project implementation and evaluation. Students select one of several Request for Proposals (RFA) for a specific situation, conduct a needs assessment, create a problem statement, set goals and objectives, and a theory of change for this proposed project. Students learn how to address community participation, human resources and their training and supervision, project information, approaches to sustainability, logistics of service delivery, project budgeting and financial management, monitoring, and evaluation, and finally close out of a project. At the conclusion, students develop a proposal ready for submission to a donor that embodies their PHC project design responsive to the RFA.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.662. Globalization and Health: Economic Development. 3 Credits.
Explores how economic development affects global burden of disease and human capital. Focuses on the relationship between economic growth, health, human capital achievement, and socioeconomic inequalities in health. Divided into three parts; the first part examines the effect of wealth on health, as well as, how better health influences human capital and income. The second part examines socioeconomic inequalities in health, primarily focusing on theories of how income inequalities affect health, and the measurement of socioeconomic inequalities in health. Finally, the third and last part examines policy strategies to improve investments in human capital and reduce income inequalities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.663. Globalization and Health: Framework for Analysis. 3 Credits.
Evaluates in depth the influence of globalization on population health across the four main dimensions of globalization (economic, political, cultural and environmental). Teaches the use of analytical tools to observe the impact of globalization on population health using Global Burden of Disease data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.664. Prevention of Unintentional Injuries in American Indian Communities. 2 Credits.
Introduces the basic skills and knowledge required to address the injury burden in the Native American Community. Based upon the nine Core Competencies for Injury and Violence Prevention, provides students with opportunities to practice these skills through application sessions. Prepares students to enter a network of injury prevention colleagues with a specific interest in the prevention of injuries in the Native American community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.665. Early Childhood Intervention in Tribal Communities. 2 Credits.
Examines a constellation of economic, social, historical and cultural challenges to American Indian families that potentially compromise optimal early child development. Reviews opportunities for tribal grantees to assess needs and develop early childhood intervention strategies funded through the Affordable Health Care Act. Explores methods and theoretical approaches to early childhood development and intervention research in tribal contexts. Considers optimal systems of early childhood care in low resource settings. Examines unique aspects of tribal research and culture, emphasizing the importance of community-based and community-engaged approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.666. Introduction to American Indian Health Research Ethics. 2 Credits.
Introduces students to the ethics of human subject research specific to working with American Indian communities. Also introduces ethical theory and principles, followed by a brief history of research ethics in Indian Country. Topics covered in lectures and moderated discussions include the importance of health research in Indian Country, informed consent for research participation, role and function of institutional and ethic review
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.667. An Interdisciplinary Approach to Understanding the Health of Native Americans. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.668. COVID-19 & Infectious Disease Outbreaks in Native American Communities. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.669. American Indian Health Policy. 2 Credits.
Examines the historical, social, political, legal and economic factors and values that have influenced the development and implementation of health policy pertaining to American Indian and Alaska Natives. Focuses on the four substantive areas that form the analytic basis for many of the issues in health policy and management: economics and financing; need and demand; politics/ethics/law; and quality/effectiveness. Discusses the unique relationship between the U.S. federal government and American Indian tribes. Addresses key policy and advocacy issues impacting Tribal communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.670. Collecting, Analyzing and Using Public Health Data in Native American Communities. 3 Credits.
Introduces Native American tribal health leaders, health professionals, health paraprofessionals and others interested in Native American health concerns to the basic concepts of epidemiology and biostatistics. Designed for persons who may not have previous formal training in epidemiology or biostatistics, but may be working to determine or to address tribal priorities for health care, or working in, or interested in clinical research or public health within tribal communities. Prepares students for the core epidemiology and biostatistics courses offered by the School of Public Health. Teaches participants how to collect, analyze and use community data to address public health problems. Participants are asked to work on datasets from tribal communities to apply the principles taught during the course. Individuals do not have be Native American nor work with Native American communities to participate in the course since the concepts can be translated to many public health settings; howe
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.671. Introduction to Quantitative and Qualitative Research for American Indian Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.672. Introduction to Data Management Using American Indian Health Data. 2 Credits.
Introduces Native American tribal health leaders, health professionals, health paraprofessionals, and others interested in Native American health concerns to the basic concepts of data management. Designed for persons who may not have previous formal training in data management but may be working to determine or to address tribal priorities for health care, or working or interested in clinical research or public health within tribal communities. Designed to prepare students for the core courses on data management methods offered by the School of Public Health. Introduces students to basic principles and methods of data management using examples pertinent to American Indian health. Individuals do not have to be Native American, nor work with Native American communities, to participate in the course since the concepts can be translated to many public health settings; however, the examples and assignments will be drawn from Native American settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.673. Mental Health in American Indian Communities. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.679. Introduction to Design and Implementation of Digital Health Programs in Lmic Settings. 2 Credits.
Provides an understanding of different types of digital interventions in healthcare. Reviews existing "global goods" and tools that are helpful in planning digital programs. Examines effective implementation strategies to make digital programs effective using case studies. Reviews critical team skills needed for implementation and scale. Explores emerging analytic methodologies to monitor digital programs. Prepares students to become effective decision-makers and digital health leaders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.681. Global Health Entrepreneurship: from Ideas to innovations.. 3 Credits.
Teaches how to think about possibilities to make a difference in the global health community. Looks at how organizations like Medicine Sans Frontiers, Gates Foundation, and other smaller but impactful NGOs and Foundations had their roots in a team of public health-minded individuals who learned the business of global health and created organizations that fit their vision of how to make a difference in the world. Guides students through the process of idea conception, team and partner building, global health ethics, marketing/branding, finance and other fundamental pieces of creating, building and maintaining a successful global health start-up. Prepares students to conceptualize, design, build and manage sustainable and innovative global public health initiatives specifically focusing on critical and often missed topics such as marketing, budgeting / financial management, fundraising, legal and governance issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.685. Modeling and Simulation for Health Workforce Analysis. 2 Credits.
Introduces modeling tools and statistical techniques to simulate health workforce scenarios. Equips students to analyze the impact of health workforce policies and programs on population health. Focuses on the production, training, distribution, and retention of health workers for primary care in low- and middle-income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.688. Social and Behavioral Foundations of Primary Health Care. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.690. Strengthening Primary Health Care Across the World: Problem Solving Seminar. 3 Credits.
Uses interactive case-based and problem-based strategies to provide a 360 degree perspective on the challenges that typically undermine PHC strengthening, from articulating the relationship between PHC and the rest of the health system to measuring the impact of PHC. Equips students to develop pragmatic strategies that can address inequity in health systems, and promotes inclusion within public health programs through the use of primary health care strategies. Addresses multiple aspects of PHC strengthening from building coalitions to support primary health care, to engaging communities in the delivery of PHC services, to the use of implementation research to fine tune PHC strategies. Focuses on genuine country experiences and problems this seminar draws upon relevant bodies of theory from health systems, social and behavioral theory, social epidemiology, social justice and political science to craft practical strategies to strengthen PHC across the world.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.691. Human Resilience: Public Health Perspectives. 2 Credits.
Examines the nature of human resilience while focusing on how it may be fostered within organizations, communities, and individuals. Focuses upon building resilience systems while touching upon fostering individual resilience. Builds "cultures of resilience" by discussing building organizational and community cultures of resilience drawing not only upon social and community psychology, but also management and leadership tactics that may be employed to foster such cultures in healthcare, public safety, international aid organizations, and communities in general. Fosters resilience in others, developing essential leadership skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.695. Seminar in Humanitarian Health. 0.5 Credits.
Introduces important and evolving issues in global humanitarian health from various perspectives including experts, practitioner, policymakers and academics. Examines trending issues such as new emergencies, politics, human rights, humanitarian architecture, leadership, cash transfers, innovative financing among others. Prepares students to explore practicums, internships, develop capstone projects, and apply to careers in the humanitarian health field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.700. Public Engagement Practices for Scientists (Peps) in International Settings. 2 Credits.
Introduces the fundamentals of PEPS and its importance for public health professionals. Explores applications of quantitative and qualitative methods from other public health disciplines to assess and improve PEPS. Analyzes different frameworks to plan, implement, and assess PEPS, with a focus on low income, global settings. Provides opportunities to practice designing and evaluating PEPS within five engagement goal areas: (1) increasing scientist to scientist engagement, (2) increasing uptake of interventions, (3) increasing evidence-informed public health policy, (4) increasing minority populations into public health science workforce, and (5) increasing capacity of public health science workforce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.701. Applications to Gender Analysis Within Health Research and Interventions. 2 Credits.
Introduces gender analysis as an integral part of health research and interventions. Focuses on teaching students on how to incorporate gender analysis into health research and interventions. Explores: (1) theoretical approaches to gender and health, including intersectionality, masculinities, and non-binary approaches; (2) how gender and gender relations affects health needs, risks, experiences, and outcomes; and (3) ways in which gender analysis can be incorporated into health research and interventions, including the use of gender frameworks and questions, gender assessments, and transformative approaches. Examples will cover a range of international settings, with a focus on low-and-middle income country settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.702. Introduction to Gender Analysis Within Health Systems Research in Lmic Settings. 2 Credits.
Introduces gender analysis as an integral part of health systems research (HSR). Focuses on training students on how to incorporate gender analysis into HSR in LMIC settings. Explores how gender analysis can be incorporated into: (1) HSR content, i.e. the substantive focus of HSR – through the use of sex disaggregated data, gender frameworks and gender analysis questions; (2) HSR process – how HSR itself is imbued by power relations during data collection and analysis; and 3) HSR outcomes – how gender inequities in health systems can be transformed progressively or at least not exacerbated.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.705. Monitoring and Evaluation of Health Systems Strengthening in Low and Middle income Countries. 3 Credits.
Covers the essentials of monitoring and evaluating health systems strengthening in LMICs. The class analyzes the development of theories of change, and their application to the design of monitoring and evaluation systems, as well as alternative approaches to evaluating equity impacts. The development of monitoring indicators, use of quantitative techniques and the integration of M&E into health systems decision making will all be addressed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.710. Designing Transformative innovation for Global Health. 2 Credits.
Familiarizes students with policy analysis tools to help position innovation of technologies or institutions for transformative potential. Demonstrates the application of principles of design guided by public policy and public health concerns to adapt such innovation in resource-limited settings. Considers technologies that are potentially transformative for improving health and narrowing disparities—making water potable, cook stoves more efficient and less polluting, and point-of-care diagnostics more available in local clinics. Examines the context of what makes innovation potentially transformative. Enables students to apply key policy tools such as stakeholder, value chain and market analyses as well as systems thinking, and consider how to structure and critique prize competitions, innovative financing approaches, and public-private partnerships.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.711. Managing District Health Systems in Low and Middle Income Countries. 3 Credits.
Provides a broad understanding of the application of basic principles of health management and leadership at the sub-national level. Focuses on strengthening of district health systems by managing health services through planning and program development and generation and management of resources. Acquaints strategic approaches in effective service delivery with emphasis on forecasting, problem analysis, managing change, supportive supervision and skills development. Discusses issues in implementing and evaluating national health programs, translating national health priorities into action.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.712. Leadership & Management in Humanitarian Health. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.722. Quality Assurance Management Methods for Developing Countries. 4 Credits.
Presents the principles and practice of total quality management methods for health systems in developing countries. Emphasizes integrated district-level health systems management; fostering a genuine team approach in the face of an authoritarian tradition; central importance of community governance; interventions performed according to standards and in an equitable fashion; introducing a measurement-based approach to problem solving, emphasizing analysis of service delivery process and outcome; and developing operational research as an integral component of the management system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.801. Health Systems Program Seminar I. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and activities, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.802. Health Systems Graduate Seminar 2. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Focuses on topics like injuries, evaluation of health programs, health systems strengthening, universal health coverage, among other topics
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.803. Health Systems Graduate Seminar 3. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Focuses on topics like globalization and health, social determinants of health, primary health care, health security, among others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.804. Health Systems Graduate Seminar 4. 1 Credit.
Familiarizes Health Systems students with ongoing faculty research and their areas of research, professionals and organizations in the field of international health, and provides a forum for discussion for current topics in health systems and international health. Discusses topics on evidence and public health knowledge, connection between animal and human health, humanitarian health, health financing, among others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.810. Health Systems Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in management of health programs in low- and middle-income countries according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.820. Thesis Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.830. Postdoctoral Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.840. Special Studies and Research Health Systems. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.850. Msph Capstone Health Systems. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.861. Doctoral Seminar in Health Systems. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.221.945. Large-scale Effectiveness Evaluations of Health Programs Lab.
A complimentary lab course to 221.645.01 LARGE-SCALE EFFECTIVENESS EVALUATIONS OF HEALTH PROGRAMS. This lab will be used to have in-depth discussions and also have students apply some of what they have learned in lectures through structured exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.630. Nutrition, Infection and Immunity. 3 Credits.
Provides an overview of the relationships between nutrition and immune function, with a focus on established and emerging public health problems. Reviews assessment methods for immune function in the context of public health nutrition research. Discusses the impact of the immune response on nutrient metabolism, nutritional status, and interpretation of biomarkers. Examines the deleterious effects of malnutrition on host barrier defenses and innate, humoral, cell-mediated immunity, and mucosal immunity. Presents case studies on the synergistic and antagonistic interactions between the immune response and malnutrition. Provides self-study materials covering the basic tenets of immunology and nutritional status assessment, for students with limited background in immunology or nutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.641. Principles of Human Nutrition in Public Health. 4 Credits.
Prepares students for integrating the biology of nutrition in solving public health problems globally, with application to public health research, policy and practice. It summarizes the history of nutritional sciences as related to public health and provides an integrated overview of the physiological functions of energy, macronutrients and micronutrients that influence health, and risk for disease. Topics include dietary sources and nutrient requirements, absorption, metabolism, and function. The course covers advances in the use of novel assessment techniques and biomarkers in the diagnoses of deficiency and nutritional status, and describes the dynamics of the nutrition transition occurring globally and dietary underpinnings of overweight and non-communicable disease risks. Also covers emerging topics linking nutrition, immunity, gut health and the microbiome.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.642. Assessment of Nutritional Status. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.644. Cellular Biochemistry of Nutrients. 3 Credits.
Students learn biochemical processes of cellular macromolecules, such as DNA, RNA and protein synthesis, with particular emphasis on the function of essential nutrients in these processes. Covers biochemical aspects of carbohydrate, protein, and fat metabolism, and introduces essential concepts of molecular biology, such as structure and function of intracellular organelles and fundamental cellular processes. Topics also include nutritional and hormonal regulation of gene expression and concepts of detoxification to give the nutrition student a full appreciation of the relevance of nutritional biochemistry studies and cells to population perspectives. The course structure consists of core lectures led by faculty..
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.647. Nutrition Epidemiology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.649. International Nutrition. 3 Credits.
Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in low and middle-income settings. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status. Explores the degree to which malnutrition can be prevented or reduced prior to achieving high-income populations or certain economic development, through targeted public and private sector interventions that address the causes of malnutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.651. Nutrients in Biological Systems. 2 Credits.
Provides in-depth review of the metabolism of major macro- or micronutrients and their functional roles in a variety of biological systems. Focuses on biochemical or molecular mechanisms of how nutrients influence health and disease at the cell, tissue, organ, and regulatory network levels. Discusses emerging nutritional -omics studies and biomarkers to provide a global view of complex interactions between nutrients and genes, proteins, metabolites, and gut microbiota.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.652. Nutrition in Disease Treatment and Prevention. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.653. Food Technology and Health. 3 Credits.
Discusses nutritional, chemical, physical, and technological perspectives of food, food ingredients, food quality, food safety, and the regulation thereof. Focuses on the core constituents of foods, and examines the non-nutritional (phytochemical, flavor, pigment, texture and fragrance) constituents of whole foods and food products and their impact on health. Evaluates food delivery and production systems, and specific eating patterns. Students evaluate dietary patterns and develop dietary strategies for specific individual, family, and community dietary needs based upon knowledge of ingredient nutrient composition and ethnic food consumption issues and trends.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.654. Food, Culture, and Nutrition. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.655. Nutrition and Life Stages. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.657. Food and Nutrition Policy. 2 Credits.
Examines the policy making process underlying large-scale governmental, bilateral, and multilateral agency policies and initiatives that directly or indirectly affect 1) the availability and quality of food and 2) the health and nutrition status of populations. Draws examples from the United States as well as low and middle income countries. Includes discussions led by faculty and guest lecturers with diverse experience in developing and implementing food and nutrition policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.658. Critical Thinking in Nutrition. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.659. Critical Thinking in Nutrition II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.660. ADVANCED NUTRITIONAL EPIDEMIOLOGY. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.661. Designing Healthy Diets. 2 Credits.
Examines the factors influencing dietary patterns and food choices in the U.S. and internationally. Focuses on modifying recipes, calculation of nutritional information for foods and recipes, and on planning, analyzing and evaluating dietary choices and patterns using the Nutrition Data System for Research (NDSR) software program and food composition tables, so that they meet guidelines for overall health and wellbeing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.662. Obesity in Public Health. 3 Credits.
Examines obesity as a public health problem, (including prevalence, trends and disparities as well as the health, psychosocial, and economic consequences of obesity and its associated co-morbidities). Explores physiologic, psychological, economic, and cultural drivers of food consumption. Identifies key issues and approaches for current and future public health and environmental approaches to obesity
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.664. Food insecurity and nutrition: Partnering with community organizations to make change. 2 Credits.
Provides the opportunity to learn about community-based public health efforts to improve food security and diet quality and factors that influence food choices across the socio-ecological framework. Works with a community organization that provides community outreach services aimed at addressing food insecurity, improving diet quality, or addressing other nutritional needs of the population(s) they serve. Assesses the food environment and food access landscape for the population the organization they work with serves, and familiarize themselves with other organizations also serving that population. Gains practical experience developing innovative program elements to advance food access and nutrition services while accounting for real world considerations organizations face.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.665. Planning for Food Systems and Public Health. 3 Credits.
Introduces urban and regional planning as an integral part of addressing structural determinants of food and nutrition disparities. Examines the network of actors, infrastructure, resources, power relationships, and local government policies that influence health inequalities in food systems in communities of the US and globally. Includes topics related to food security such as land use, food production, gentrification, environmental sustainability, conflict and trauma, and mobility and transportation. Encourages students' critical thinking in how to reimagine and reshape food and community systems for social, economic, and health equity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.679. Food Insecurity and Nutrition: Partnering with Community Organizations to make change. 2 Credits.
Provides students the opportunity to learn about community-based public health efforts to improve food security and diet quality and factors that influence food choices across the socio-ecological framework. Works with a community organization that provides community outreach services aimed at addressing food insecurity, improving diet quality, or addressing other nutritional needs of the population(s) they serve. Assesses the food environment and food access landscape for the population the organization they work with serves, and familiarize themselves with other organizations also serving that population. Gains practical experience developing innovative program elements to advance food access and nutrition services while accounting for real world considerations organizations face.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.810. Human Nutrition Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop field, laboratory, or clinical skills related to nutrition research or programs according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), university projects, and multi-lateral, private, and/or for-profit sector. Practicum locations exist in the US and typically most regions of the world. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.815. Human Nutrition - Registered Dietitian (RD) Program Practicum. 1 - 16 Credits.
Provides a combination of didactic instruction, competency-based learning activities and supervised experiential learning at clinical facilities, community and public health organizations. Learning experiences include lectures/presentations, group discussions, peer learning and case-based scenarios in preparation for applying knowledge in the practice of dietetics. The practicum engages the student, the practicum site, and the faculty/preceptors in shared responsibility for the provision and acquisition of competencies across a broad spectrum of dietetic practice settings including clinical, food service and community nutrition, culminating in an 8-week public health nutrition experience. Led by the Johns Hopkins Health System Clinical Nutrition Department, the practicum extends from June (following the first 4 terms of coursework) to March of the next calendar year (3rd term of the subsequent academic year).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.820. Thesis Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.830. Postdoctoral Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.840. Special Studies and Research Human Nutrition. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.850. Msph Capstone Human Nutrition. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.860. Graduate Nutrition Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.222.861. Doctoral Seminar in Proposal Development. 1 Credit.
Facilitates doctoral students in the development of research ideas and their dissertation proposals. Incudes the following topics that will vary by term: how to develop a research idea, and components of a solid research proposal – background, design, methods, sample size, analysis, writing to different audiences, research designs in nutrition, ethical review, funding sources and requirements, budgeting, staff management, thesis and manuscript preparation, and professional development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.600. Application of Spatial Analysis Tools to Inform Decision-Making in Lmics. 4 Credits.
Applies spatial analysis tools relevant for policy decision-making in resource-poor settings. Analyzes the concepts and techniques of Geographic Information Systems (GIS) and Exploratory Spatial Data Analysis (ESDA) with a global health focus. Introduces both descriptive and analytical functions of GIS along with additional spatial and geographic concepts including: cartographic communication automated mapping characteristics map projections geocoding coordinate systems the nature of spatial public health data and spatial statistical methods. Provides students with an opportunity to gain hands-on experience in the use of ArcGIS QGIS Geoda SatScan and Geographically Weighted Regression for spatial data analysis and mapping.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.603. Controlling Infectious Disease-1851 to the Present. 3 Credits.
Discusses advanced topics in the field of global health exploring the development of the first international sanitary conferences to responses to present day public health emergencies of international concern. Acquaints students with the colonial roots of international health, the rise of disease eradication strategies and contemporary responses to global epidemics. Introduces students with the histories and roles of several global health institutions such as the World Health Organization, the Pan-American Health Bureau, the World Bank and others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.615. Digital Health Strategies to Control COVID19. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.620. Domestic Immigrant Health Issues and Emerging Diseases. 2 Credits.
Focuses on diseases prominent in domestic immigrant populations. Areas of emphasis are epidemiology, diagnosis, clinical presentations, pathophysiology, strategies for treatment and control, and effects on immigrant populations. Principal diseases covered include diarrheal diseases, tuberculosis, HIV/AIDS, Cysticercosis, Chagas, and Malaria. Covers how the U.S. handles emerging diseases such as Ebola, Nipah, and Zika (e.g., Ebola in volunteers, etc). Examines special topics such as the effects of climate change on infectious disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.621. Design and Implementation of Global Digital Health interventions. 3 Credits.
Provides an understanding of different types of digital interventions in healthcare. Reviews existing "global goods" and tools that are helpful in planning digital programs. Examines effective implementation strategies to make digital programs effective using case studies. Reviews critical team skills needed for implementation and scale. Explores emerging analytic methodologies to monitor digital programs. Prepares students to become effective decision-makers and digital health leaders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.622. Design and Implementation of Global Digital Health Interventions II. 3 Credits.
Reviews necessary components of the digital health ecosystem that need to be addressed in order to develop and implement a successful digital health intervention. Provides an understanding of the different methods used to develop digital health interventions, including user-centered design. Explains the frameworks for the monitoring, evaluating, and reporting evaluation of digital health programs and interventions. Provides hands-on experience in developing digital data collection tools. Reviews components of successfully scaled digital health programs using both case studies and established guidelines.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.626. Special Topics in Global Digital Health. 1 Credit.
Offers a series of seminars on global digital health-related topics - including ethical, legal, and social issues of global digital health, behavioral economics and digital applications, innovative methods in digital health, among others. Includes leading digital health experts at JHU, from other institutions, organizations, government agencies, and industry. Provides the student with an understanding the global digital health context, covering scientific, social, economic, political, and ethical dimensions of the context.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.630. The Practice of Public Health Through Vaccine Case Studies: Problem Solving Seminar. 3 Credits.
Presents several historic vaccine case studies highlighting challenges in emerging science, program design and evaluation, management, policy and communication. Examines decision-making surrounded by scientific uncertainty, controversy and competing public health priorities. Explores the challenges of developing policy and practice decisions within the constraints of emerging and uncertain science. Challenges students to make policy decisions and develop programmatic and communication strategies in real world settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.632. Methods for Planning and Implementing Evaluations of Large-Scale Health Programs in Low and Middle income Countries. 4 Credits.
Prepares students to design, implement, and analyze large-scale evaluations of health programs, focusing on low and middle income settings. Provides students with the skills to conduct household surveys, assessments of provider readiness and quality of care, and documentation of contextual factors, as well as overall planning, design, and analysis of program evaluations. Focuses on adaptation, development, and refinement of project-specific tools; sampling and sample size calculations; and various analytical methods appropriate for program evaluations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.660. Tropical Medicine and Parasitology. 4 Credits.
Provides a broad overview of select tropical medicine and public health issues. Highlights specific tropical diseases and case studies stressing diagnosis, treatment, and implementation of preventive and control measures. Introduces students to clinical tropical medicine and travel medicine. Includes specific topics: the etiology, biology, epidemiology, and clinical presentation of enteritides, intestinal protozoa and helminths, cysticercosis and hydatid disease, hepatitis, viral and arboviral infections, and malaria. Includes practical lab experience in parasitology and diagnosis. Prepares students working with current and emerging health problems in developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.662. Vaccine Development and Application. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.663. Infectious Diseases and Child Survival. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.664. Design and Conduct of Community Trials. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.667. Chronic Diseases in Low and Middle income Countries: Prevalence and Epidemiology. 4 Credits.
Introduces students to the major transitional diseases in low and middle income countries. Lectures detail specific chronic diseases, stressing such areas as significance, prevention, diagnosis and management. Includes both traditional lectures as well as case studies. Gains basic foundation of the epidemiology and challenges in the management of chronic diseases in low and middle income countries, which prepares them to work with research programs and international organizations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.668. Chronic Diseases in Low and Middle income Countries: Study Design and Metrics. 4 Credits.
Provides public health students and medical researchers with the necessary skills to engage in study design and conduct, analytic methods, and use of metrics to help conduct research on chronic diseases in low and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.672. Data Mgmt Methods in Health Research Studies. 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.680. Global Disease Control Programs and Policies. 4 Credits.
Presents the history, social and political context, organization, technical content, funding and evaluation of current, major, global initiatives for disease control. Emphasizes programs focused on health problems of the developing world and includes, initiatives for vaccines and immunization, non-communicable diseases, safe motherhood and reproductive health, malaria, Neglected Tropical Diseases, HIV, emerging infectious diseases, TB, tobacco control, nutritional interventions and injury control. Also examines the process of policy formulation and resource allocation to international health and disease control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.682. Clinical and Epidemiologic Aspects of Tropical Diseases. 4 Credits.
Focuses on infectious diseases that disproportionately affect those in developing countries. Some of these are major killers, others are neglected tropical diseases not covered in other courses. Discusses the epidemiological and clinical aspects of each disease, including diagnosis and treatment. Introduces students to the major infectious diseases that are prevalent and of public health importance in tropical and developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.684. Vector-Borne Diseases in the Tropics. 4 Credits.
Focuses on vector-borne diseases prominent in tropical infections. Emphasizes global epidemiology, diagnosis, clinical presentations, pathophysiology, and treatment of microorganisms as well as characterization and control of vectors. Integrates clinical cases and pathology through laboratory sessions. Covers principal diseases including malaria, African and American trypansomiasis, leishmaniasis, filariasis, yellow fever, dengue, hemorrhagic fevers, Bartonella, Lyme, Rickettsial, plague and toxoplasmosis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.685. Tuberculosis, HIV and Other Chronic Infections in the Tropics. 4 Credits.
Covers the history, clinical presentation, epidemiological factors, new diagnostic techniques, treatment, and control of tuberculosis. Addresses pathophysiology, clinical presentation, ecology, and effects of HIV/AIDS on developing countries, their populations, and resource utilization. Includes additional topics such as other chronic infections that have global public health importance. Emphasizes integrating policies addressing TB, HIV/AIDS, other infections and poverty in resource-poor settings and how these interactions influence control strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.686. Child and Public Health in the Tropics. 4 Credits.
Introduces students to the major global causes of child mortality and the strategies and interventions to reduce child mortality. Includes specific topics: malaria, HIV, measles, pneumonia, diarrhea, neonatal disorders and nutritional deficiencies. Additional topics may include maternal mortality, eye diseases, demography and anthropometry. Focuses on and emphasizes a theme through the different lectures, with the tension and balance between horizontal approaches to child survival, such as Integrated Management of Childhood Illness (IMCI), and vertical programs such as disease eradication programs. Discusses several papers published as part of the Lancet Child Survival and Lancet Neonatal Survival series, and gain hands-on experience applying different child survival strategies using the Lives Saved Tool (LiST).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.687. Vaccine Policy Issues. 3 Credits.
Examines current domestic and international policy issues in vaccine research, development, manufacturing, supply, licensure, delivery, and utilization. Includes topics: priorities for funding vaccine research and development, ensuring an adequate supply of safe and effective vaccines, vaccine financing and new vaccine introduction decision-making, ethics, and compulsory vaccination. Emphasizes the identification of important vaccine policy issues and the formulation and evaluation of policies to address these issues. Presents the roles, responsibilities, and policy positions of key immunization stakeholders via guest lectures by a wide array of experts who have worked for/with important vaccine stakeholders (e.g., UNICEF, The Bill and Melinda Gates Foundation, US Government, and GAVI Alliance). Learns skills including developing a Policy Paper. Includes readings relevant scientific papers and publications of U.S. and international agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.688. Intestinal Infections in the Tropics. 4 Credits.
Provides an overview of the epidemiology, presentation, and effects of microbial, protozoan, and viral intestinal infections, including Salmonella, Shigella, cholera, typhoid, rotavirus, amebiasis, dysentery, H. pylori, Campylobacter, Cryptopsoridium, Cyclospora, and Giardia. Addresses clinical presentation, life cycle, distribution, prevention, and treatment of intestinal helminthes, including Ascaris, Trichuris, Strongyloides, and hookworm. Addresses interactions between parasites, diarrhea, and malnutrition along with treatment, prevention and control strategies, and oral rehydration therapy. Covers Cysticercosis and hydatid disease. Includes laboratory sessions and practical lab experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.689. Biologic Basis of Vaccine Development. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.690. The Design and Analysis of Cluster Randomized Trials. 2 Credits.
Covers the major concepts and methods in the design and analysis of trial in which the unit of randomization is a group of participants. Focuses on design: discusses unmatched, matched, stepped wedge, and other approaches, with particular attention paid to randomization and sample size considerations. Presents a variety of methods for the analysis of these correlated-outcomes studies. Includes special aspects of infectious disease interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.705. Good Clinical Practice: A Vaccine Trials Perspective. 4 Credits.
Acquaints students with the regulatory and ethical standards of conducting trials in accordance with FDA Code of Federal Regulations and ICH GCP Guidelines. Provides students with background and resources needed to conduct clinical trials in healthy populations. Students complete a project based on a real-world vaccine trial focusing on logistical and operational components of protocol design, informed consent process, recruitment considerations, human subjects protection including adverse event assessments and reporting. Additional concepts include the responsibilities of ethical review committees, principal investigators, and sponsors; investigational product management and preparation; data collection methods; quality assurance and quality control (QA/QC). Contributors to the course have experience conducting clinical trials research in various settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.801. Global Disease Epidemiology and Control Program Seminar 1. 1 Credit.
Introduces students to the diverse projects and research activities led by faculty in the Global Disease Epidemiology and Control (GDEC) program. Presents key institutes and centers working to improve international health and introduces faculty-led case studies to identify challenges in ongoing research and practice initiatives. Examines and reflects on the history of prevention and control activities using the book, "A History of Global Health," by Randall M. Packard as a framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.802. Global Disease Epidemiology and Control Program Seminar 2. 1 Credit.
Introduces students to skills and resources for career development within the field of international health. Provides an opportunity for students to focus in on these skills such as giving presentations, tailoring their resume to a public health audience and developing their publication profile. Prepares students for the practicum application process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.803. Global Disease Epidemiology and Control Program Seminar 3. 1 Credit.
Explores a variety of tools and methods applied by GDEC faculty to conduct public health research with a focus on hands-on skills building. Specific sessions address: data sources, including datasets that are publicly available; development of a basic statistical plan; use and interpretation of modeling tools; field data collection; data visualization strategies, and data management considerations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.804. Global Disease Epidemiology and Control Program Seminar 4. 1 Credit.
Prepares students for the activities and requirements of the second year of the MSPH program including the practicum and beyond. Presents best practices and workshop for conducting a strategic literature search. Explains the role and resources of the Institutional review Board (IRB) Explores the continuum of qualitative to quantitative research and programs. Explores practicum and capstone requirements and documentation. Establishes second year MSPH milestones within CoursePlus Portfolio.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.810. Global Disease Epidemiology and Control Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in epidemiologic and data analysis skills applied to diseases of importance in low and middle income countries according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.820. Thesis Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.830. Postdoctoral Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.840. Special Studies and Research Disease Control. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.850. Msph Capstone Global Disease Epidemiology and Control. 2 - 16 Credits.
This course is offered so that MSPH students who are working on their capstone (formerly MSPH essay) can register for credits with their academic advisors. This allows the Department and academic advisors to better track 2nd year MSPH students on their progress towards completing degree requirements. This also allow 2nd year students to more formally block time off in their academic terms to complete their capstone.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.860. Global Disease Epidemiology and Control Program Seminar 2. 1 Credit.
Introduces students to skills and resources for career development within the field of international health. Provides an opportunity for students to focus in on these skills such as giving presentations, tailoring their resume to a public health audience and developing their publication profile. Prepares students for the practicum application process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.861. Global Disease Epidemiology and Control Program Doctoral Seminar. 1 Credit.
Creates a focused, small group environment for the entering PhD students, which actively engages them in relevant, challenging content necessary for success in the PhD program. Seminar supports and extends beyond those topics taught in the classroom setting. The doctoral student education does not merely consist of successful completion of required courses--each student is expected to become a leading scientific expert during the years spent at JHU. It provides an opportunity to engage with senior faculty and move meaningfully toward selection of a dissertation topic and the skills necessary to successfully complete the PhD.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.866. Special Topics in Program Evaluation in International Health. 1 Credit.
Acquaints students with current or on-going examples of large scale evaluations, and the practitioners or organizations that are the key players in implementation and evaluations of maternal and child health programs in low and middle income countries. Provides students with the skills to articulate current methodological issues around program planning, implementation and evaluation. Discusses key publications related to program implementation and evaluation. Introduces student to the various roles and responsibilities of a public health expert in the field of program evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.223.867. Special Topics in Vaccine Science. 1 Credit.
Offers a series of seminars (4 per term) on research and access of vaccine against infectious diseases of global importance including COVID-19, emerging infections, childhood illnesses, and other important vaccine-preventable illnesses. Covers scientific, social, economic, political, and ethical dimensions of vaccine research, development and access. Includes leading vaccine experts at JHU, and from other institutions, organizations, government agencies and industry present seminars. Provides the student with an understanding of the pathways leading to development and utilization of vaccines with public health impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.605. Indigenous Health. 2 Credits.
Examines Indigenous Health through a public health lens. Critically evaluates the historical, social, cultural, and political determinants of Indigenous health utilizing various Indigenous theoretical frameworks. Provide students with an understanding of Indigenous research methodologies and prevention/interventions programs employed to promote and strengthen the overall health status of Indigenous populations globally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.630. The Obesity Epidemic Problem Solving Seminar: What We Can Learn from Native American Communities. 3 Credits.
Provides an overview of trends in obesity in the US, examines use/limitations of data from national surveys and describes how the epidemic varies geographically, by race/ethnicity and socio-economic status. Lectures and activities survey the complex, multi-faceted set of factors that contribute to the obesity epidemic and propagate disparities. Case studies in Native American communities, where some of the highest obesity rates exist, illustrate the importance of community collaboration and inclusion of culture in developing public health programs and policies. This class analyzes how the integration of knowledge, cultural norms and values, and engagement of multiple stakeholders is critical to shaping effective programs and policies. Course prepares students to identify and assess communities with obesity risk factors and propose culturally sensitive strategies to decrease obesity and eliminate underlying health disparities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.689. Health Behavior Change At the Individual, Household and Community Levels. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.690. Qualitative Research Theory and Methods. 3 Credits.
Introduces practical skills for conducting qualitative research in domestic and international settings. Provides an overview of theoretical foundations of qualitative research and different methodologies for qualitative inquiry, including programmatic qualitative research, grounded theory, ethnography, phenomenology, narrative analysis, and case studies. Enables students to develop, interpret, and evaluate three common qualitative data collection methods: in-depth interviews, focus groups, and observation. Emphasizes understanding the basic principles and techniques critical for conduct, including question formation, tool design, sampling, data generation, ethics, and quality. Critically assesses the use of qualitative methods in the published health literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.691. Qualitative Data Analysis. 3 Credits.
Combines lecture, hands-on exercises, and work with individual datasets to guide students through several approaches to managing and analyzing qualitative data in the context of both international and domestic public health research. Offers instruction in how to create efficient and accessible qualitative databases, apply different coding and other analytic strategies to different types of qualitative data, write analytical memos, and present qualitative results in forms appropriate for different target audiences, both academic and programmatic. Provides a brief introduction to the use of computer-aided qualitative data analysis software (CAQDAS).
Prerequisite(s): Must also enroll for PH.224.991
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.692. Methods in Formative Research and Human Centered Design for Intervention Development. 4 Credits.
Examines how to conduct formative research and human-centered design and apply its findings in the design, implementation, and evaluation of public health interventions. Prepares students with conceptual and methodological understanding that can be applied across a diverse range of public health traditions from social science to clinical research including implementation science, program evaluation, community diagnosis, and translational research. Presents and explores method case studies and the use of the data collected to develop tailored, more effective behavioral and community interventions, implementation models, and valid and reliable measurements. Discusses cross-cutting issues in study design, community entry and involvement, data sharing and use, as well as staff development and supervision. Examples presented and analyzed include HIV and malaria prevention and control, Aedes aegypti control, and global maternal and child health care-seeking programs and services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.694. Mental Health Intervention Programming in Low and Middle-Income Countries. 3 Credits.
Introduces students to mental illness symptoms and syndromes found across contexts and the variety of strategies used to treat such symptoms. Discusses mental health services as an integral part of global health program development. Addresses methods of adapting and developing interventions in low-resource countries and humanitarian contexts, as well as research designs used to evaluate these interventions. Challenges students to use critical and creative thinking skills throughout to discuss the issues involved in this relatively new field. Focuses on cross-cultural challenges in conducting mental health research in these settings. Topics covered include an overview of mental health issues in low-resource countries and humanitarian contexts; cross-cultural challenges; developing, modifying and disseminating prevention and intervention strategies; and the interplay between mental health and related topics such as nutrition, fitness and diabetes; HIV; substance abuse; and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.697. Qualitative Research Practicum I: Partnerships and Protocol Development. 2 Credits.
Places students in teams collaborating with a local community-based organization or JHU faculty member to develop a qualitative research project. Introduces key topics in qualitative research including conducting field research, developing study protocol s and data collection instruments, and interacting with qualitative research participants and collaborators. Addresses the practical aspects of qualitative study design (e.g. choosing between data collection methods, resolving logistical challenges, and operationalizing an iterative research design) as well as the practical aspects of ethical review (including the JHSPH IRB and school ethical review processes). Prepares students to develop the components needed to begin the qualitative research project conducted in 224.698.01: Qualitative Research Practicum II: Collecting Qualitative Data and 224.699.01:Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings (NOTE: concurrent or prior enrollment required).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.698. Qualitative Research Practicum II: Collecting Qualitative Data. 2 Credits.
Enables students to begin data collection and analysis for a qualitative research project in collaboration with a local community-based organization or JHU faculty. Discusses the informed consent process, common problems in qualitative data collection (interviews, focus groups, observation) and strategies for addressing them, how to make iterative changes to data collection methods, and different approaches to transcription and translation. Includes a debriefing with qualitative data collectors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.699. Qualitative Research Practicum III: Analyzing and Writing Qualitative Findings. 2 Credits.
Enables students to complete data collection, analysis and write-up of results from a qualitative research project in collaboration with a local community-based organization or JHU faculty. Discusses common challenges in qualitative research including analysis of qualitative data, writing qualitative papers and reports, presenting qualitative findings, and ethical issues related to fieldwork and authorship.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.801. Building Resilience During Times of Uncertainty: An Evidence-Based Guide to Strengthen Your Personal Agency. 1 Credit.
Draws content from positive psychology, neuroscience, and mindfulness to teach the science and practice of building positive mental habits and fostering personal agency. Through a series of interactive sessions that review the scientific basis for these concepts as well as self-reflective exercises, students experience a personal journey to understand where they are now, where they would like to be and the mental tools to get there. Exposes students to several cognitive strategies and practical tools that can help navigate daily challenges, increase positive emotions, decrease stress and plan for the future.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.810. Social and Behavioral Interventions Practicum. 1 - 22 Credits.
Complements and reinforces the didactic portion of the MSPH program. Provides students with an opportunity to apply the knowledge gained during the first year, to develop skills in the development, implementation, and evaluation of social and behavioral global health interventions, according to individually designed learning objectives, and to work as part of a team in an applied research or practice project. Students are placed in a variety of professional settings, which may include: government, non-government organizations (NGOs), multi-lateral, private, and/or for-profit sector. Provide opportunity for feedback for student performance and placement experience
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.820. Thesis Res Soc & Beh Interv. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.830. Postdoctoral Research Social and Behavioral Interventions. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.840. Special Studies and Research Social and Behavioral Interventions. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.850. Msph Capstone Social and Behavioral Interventions. 2 - 16 Credits.
Offers students an opportunity to integrate and apply program skills and competencies to a public health problem in a format that approximates a professional practice experience. Fosters students' ability to produce scholarly papers that provide a meaningful contribution to knowledge of the health of underserved populations. Guides students' development of tangible evidence of expertise that addresses specific applied topics relevant to international health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.860. Social and Behavioral Interventions Program Seminar I:Applied Social Science & Global Health. 1 Credit.
Discusses the history and philosophy of social sciences in public health. Students read the book "Global Health: Why Cultural Perceptions, Social Representations, and Biopolitics Matter" by Mark Nichter. This book serves as a starting point for a series of discussions on why a thorough understanding of the historical, cultural, social and economic context is important in global public health practice; how globalization affects global burden of disease, health equity, and relationship with the social and physical environment; and the role of applied social science theory and methods in shaping and evaluating social and behavioral interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.861. Social and Behavioral Interventions Program Seminar II: Participatory Approaches and the Role of Community. 1 Credit.
Provides an overview of participatory methods as they apply in international health, and discusses the role of community in social and behavioral international health interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.862. Social and Behavioral Interventions Program Seminar III: Intervention Case Studies. 1 Credit.
Discusses intervention case studies examining formative research, implementation process, or monitoring and evaluation aspects. Relevant readings illustrating one or more of these aspects are provided by the SBI faculty, advanced students or other guests who will be leading each of the sessions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.863. Doctoral Seminar in Research Methods in Applied Medical Anthropology I. 4 Credits.
Discusses and explores advanced topics in qualitative methods, including participant observation, interviews and focus groups, content analysis, discourse analysis, and online ethnography. Discusses theories in medical anthropology that are particularly useful in the design and analysis of international health interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.864. Doctoral Seminar in Research Methods in Applied Medical Anthropology II. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.865. Doctoral Seminar in Behavior, Change and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.866. Social and Behavioral Interventions Doctoral Proposal Development Seminar. 2 Credits.
Guides students through the process of developing a dissertation proposal for the doctoral degree in SBI. Introduces the proposal requirements and provides information about the oral defense, including forming committees. Sessions include discussions of students' projects to help define the scope of a dissertation, understand how to use conceptual frameworks, approach the literature review, research methods, and analytic plan. Also discusses research ethics. Students work with the faculty instructor and in pairs and/or small groups to critique each others' proposals during the process of developing their own proposals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.990. LAB for IH 224.690.
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Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.224.991. LAB FOR IH PH.224.691.
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Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260 (Molecular Microbiology and Immunology)

PH.260.600. Introduction to the Biomedical Sciences. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.601. Vector-Borne Disease Control. 3 Credits.
Addresses various vector-borne disease control strategies that target any of the complex interactions between the pathogen, vector and host. Emphasizes on malaria, dengue and other arboviral diseases, as well as Chagas, leishmaniasis and schistosomiasis. Discusses some examples of control strategies such as current and future prophylactic, therapeutic and transmission-blocking vaccines and drugs, vector control, and vector-targeted pathogen transmission control. Addresses interactions between control methods and factors that influence efficacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.603. Biology of the Next Pandemic. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.606. Major Global Infectious Diseases: Prospects for Control. 2 Credits.
Provides in-depth information on the basic pathogenic mechanisms of selected infectious diseases that continue to be of major public health importance worldwide, with an emphasis on underlying problems for development of effective public health interventions. Includes topics: HIV/AIDS, malaria, tuberculosis, measles, as well as infectious disease hazards that may become important in the future. Obtains a working knowledge of the biology of these diseases, including prospects for their effective management and control at both the individual and public health level, and of basic human immunology and vaccinology
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.607. Methods in life sciences, literature and practice. 2 Credits.
Focuses on understanding laboratory research technologies and applying this knowledge to evaluate current scientific literature. Achieves these goals through in-depth small group discussions with a range of faculty expertise, weekly assigned reading, short projects, short writing assignments or other activities. Includes both faculty and student leaders for each session; some sessions held in Core facilities. Includes topic areas: molecular biology, genomics, protein structure and strategies to evaluate the literature (primarily term 1), microscopy technologies, image analysis, flow cytometry and lab notebook archiving (primarily in term 2), cell biology, organelle dynamics, cell signaling, data management and experimental design (primarily term 3).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.611. Principles of Immunology I. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.612. Principles of Immunology II. 3 Credits.
Introduces biological concepts of immunology; molecular nature of antigens; molecular basis for antibody and T-cell receptor structure and diversity; complement; hypersensitivity reactions; cellular basis for the immune response; cell-mediated immunity; adhesion molecules and coreceptors cell activation; cytokines and other soluble mediators; major histocompatibility complex (MHC) antigens; tumor immunology; transplantation immunobiology; mechanisms of resistance to microorganisms; tolerance; autoimmunity; and immuno-deficiency.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.613. Techniques in Molecular Biology. 3 Credits.
During five days of intensive hands-on laboratory instruction, students develop skills in the use of modern laboratory investigative tools in the area of molecular biology. They learn how to perform polymerase chain reaction (PCR) DNA amplification, quantitative PCR, DNA and protein gel chromatography, Western blotting, transformation of bacteria, and expression of heterologous proteins by bacteria.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.615. Critically Reviewing the Scientific Literature. 2 Credits.
Unlike the typical literature review course, focuses specifically on literature that is flawed in the approach or methods used to examine a scientific question and examines how well the conclusions drawn are justified by the data. Oral discussions of assigned literature are accompanied by weekly 2-3 page written reviews, which provides opportunities for students to get feedback on their writing skills, as well as their critical reading skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.623. Fundamental Virology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.624. Advanced Virology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.625. Scientific Grant Writing. 2 Credits.
Covers the critical components of a scientific grant application, common errors in grantsmanship and how to avoid them, grant application review criteria, ethics related to grant writing and reviewing, and identification of funding sources. Students prepare a short (5-page) draft proposal and a revision of this proposal following review. Proposal topics are selected by the students and developed with the instructor. Students also prepare critiques of other students' anonymous, instructor-edited proposals for discussion in class.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.627. Pathogenesis of Bacterial Infections. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.631. Immunology, Infection and Disease. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.633. Autoimmune Diseases of the Endocrine Glands. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.635. Biology of Parasitism. 5 Credits.
Presents a biological basis of parasitic lifestyles with concurrent laboratory including host responses and parasite evasion of host defense mechanisms, transmission, epidemiology, diagnosis, clinical manifestations, pathology, treatment, and control of the major helminthic and protozoan infections of man
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.636. Evolution of Infectious Disease. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.650. Vector Biology and Vector-Borne Diseases. 3 Credits.
Presents the principles of transmission of human and animal pathogens by insects, mites and ticks. Covers basic arthropod biology with special attention to biological properties of vectors and their interactions with pathogens, basic components of arbopathogen disease cycles and principles of pathogen transmission dynamics. Special topics include emerging pathogens, vector genetics, traditional and next generation control strategies and venomous arthropods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.653. Molecular Biology Literature. 2 Credits.
Discusses over two sessions the assigned paper from historic or current scientific literature. Covers only the methodologies and how they work in the first session, the second covers the scientific advancements achieved with these methods. Includes both student and faculty discussion leaders for each session.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.654. Current Literature in Microbial Immunity. 1 Credit.
Current Literature in Microbial Immunity is designed primarily for Master's level students to provide an overview of the current state of research relating to topics in microbial immunity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.656. Malariology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.657. Vector Biology and Disease Ecology Literature. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.658. Advanced Malariology. 2 Credits.
Presents current controversies and issues in malaria research and control in format of topical lecture and discussion each week. Weekly topics include Epidemiology, Pathogenesis, Mosquitoes, Drugs, Diagnostics, Vaccines, Elimination and Control and Economics of Different Interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.663. Biological Response to Biomaterials. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.665. Biological Basis of Aging. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.700. How Do We Know? - Theory and Practice of Science. 3 Credits.
Examines the nature and philosophical foundations of science using an interdisciplinary approach that emphasizes critical thinking and storytelling; discusses the principles of good scientific practice – rigor, reproducibility and responsibility (the 3R's) - by exploring revolutionary discoveries in the life, public health and natural sciences; elaborates the relationship between theory, practice and serendipity in scientific discovery, and concludes with a discussion of the role of scientists in society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.701. Anatomy of Scientific Error. 3 Credits.
Examines sources of error in scientific practice (misconduct or honest mistakes, methodological or systematic errors). Presents real-world examples to analyze errors that cause problems in science across the disciplines. Introduces methodological and mathematical approaches to error reduction. Explores the review- and retraction mechanisms for journal articles and grants as methods of science self-correction. Discusses historic and contemporary cases where errors constitute sources of innovation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.704. Critical Dissection of the Scientific Literature: Taking the Scalpel to Journal Articles. 3 Credits.
Challenges the classical format of a journal club by preparing students to critically evaluate literature across the science disciplines. Acquaints students with concrete applications of the 3 R's of good scientific practice: rigor, responsibility, and reproducibility. Discusses techniques for effective research literature analysis and evaluation. Emphasizes in-depth understanding of journal article preparation, data evaluation, and the context of conclusions and discussion points within a given research field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.705. Fundamentals of Quantitative Reasoning in the Biomedical and Health Sciences. 3 Credits.
Provides a broad introduction to interdisciplinary, scientific reasoning using current problems from science and society. Explores the fundamentals of basic probability and statistics using real-world datasets from a variety of basic science disciplines. Introduces data analysis and visualization in the natural and biomedical sciences. Explains the importance of computational and quantitative methods for hypothesis testing in science, technology, and daily life.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.707. Evidence-Based Teaching in the Biomedical and Health Sciences: Foundations. 3 Credits.
Acquaints students interested in teaching in biomedical and health professional settings with the foundations of how adults learn as well as the science of learning. Explores practical applications of evidence-based teaching techniques most relevant to the biomedical and public health professions. Discusses a variety of assessment techniques, and their alignment with learning objectives and educational strategies using state of the art course design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.708. Evidence-Based Teaching in the Biomedical and Health Sciences – Practice. 3 Credits.
Provides students interested in gaining hands-on teaching experience with opportunities to plan and develop classroom materials on self-selected topics and deliver them in an interdisciplinary classroom setting, mentored by professional educators. Explores evidence-based instructional and assessment strategies to meet identified learner needs in the life and health sciences. Introduces students to a growing community of educational practitioners and scholars across the JHBSPH departments and JH divisions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.709. Evidence-Based Mentoring. 3 Credits.
Examines the literature on evidence-based mentoring. Introduces participants to authentic mentoring situations taken from real-life cases, enriched by practitioner interviews. Discusses responsibilities, reciprocities, and trust-building in mentor-mentee relationships. Emphasizes and nurtures mentorship practices based on self-responsibility, personal growth, active listening, social intelligence, mutual support, goal setting, ethics and equitable leadership, and cultural sensitivity. Focuses on collaborative, reflective practice with the goal of developing one's own, unique mentorship philosophy. Acquaints participants with the benefits of mutual peer support through an inclusive community of practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.710. Communication Practice for Health Science Professionals. 3 Credits.
Introduces students to current trends in presentation design and delivery. Focuses on narrative-oriented thinking to improve information dissemination. Emphasizes clarity and simplicity in communication practice in multiple settings, targeting both lay and interdisciplinary expert audiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.711. Principles of Neuroimmunology. 3 Credits.
Briefly covers the role of specific cells of the central nervous system (CNS), immune functions of CNS cells, and trafficking of leukocytes into the CNS, both in health and disease. Subsequently, it discusses various immune cells, e.g. monocytes, T cells, B cells, inflammatory molecules such as cytokines, chemokines, metalloproteinases, and prostaglandins in more detail, focusing on their role in either protecting from neurological disease or in causing CNS disease pathologies, including cognitive dysfunction. Presentations from experts in the field address topics and diseases, such as multiple sclerosis (MS), the blood brain barrier (BBB), HIV and other neurotropic microbes in eliciting neurological disease and emerging neurotropic infections.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.712. Clinical Immunology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.713. R3 Writing Seminar for Graduate Students. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.715. Unleash Your Writing Superpower: Crafting Clear, Concise and Persuasive Prose. 3 Credits.
Introduces a system of planning, organization, writing and revision. Emphasizes the importance of defining the message, audience and purpose for any piece of writing. Illuminates the basic elements of good writing. Focuses on clear, concise and persuasive writing. Explores the use of rhetoric and storytelling to maximize a piece of writing's impact. Emphasizes best practices in various forms of writing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.717. Graduate Immunology: the Immune Response. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.720. Communications Primer for the Public Health Sciences. 1 Credit.
Acquaints students with the basics of effective oral and written communications in the form of brief exercises. Focuses on clarity and simplicity in presentation practice across disciplines and cultures to emphasize central messages. Introduces students to writing succinctly for advocacy using "compelling writers strategies" for opinion pieces and short speeches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.730. Civility and Professionalism in the Workplace. 1 Credit.
Discusses how to create an inclusive and welcoming workplace atmosphere. Emphasizes culturally sensitive and respectful communication. Familiarizes participants with workplace expectations, acceptable behaviors, and general professional deportment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.800. MPH Capstone Molecular Microbiology and Immunology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.801. Topics in Immunology I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.802. Topics in Immunology II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.810. Field Placement Molecular Microbiology and Immunology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.811. Field Studies in Ecology and Behavior. 3 - 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.812. The Performance of Leadership: Foundations. 2 Credits.
Explores leader and leadership as one's natural self-expression through the ontological/phenomenological model in which ontology is the study or science of the nature and function of being (as in "being a leader"), and phenomenology is the method of direct access used to study and research the nature and function of being (as in being's impact on "exercising leadership effectively"). Introduces a new conversational domain and transformative learning paradigm for leadership. Encourages discovery through discussion, exercises, and assignments. Prepares students to develop the skills necessary to create positive, effective, and sustainable change.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.813. SURVIVAL SKILLS FOR ACADEMIA IN THE LAB SCIENCES. 2 Credits.
Aimed at providing MMI and other lab sciences with the skills necessary to present and publish data and to find post-docs and/or jobs in the laboratory sciences. Topics include time management and organization, preparing effective conference presentations, manuscripts, and curriculum vitae, networking, interviewing, and getting hired.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.815. The Business of Academic Biomedical Research. 1 Credit.
Addresses topics related to business aspects of academic biomedical research, and focuses specifically on organizational, managerial, political, strategic and economical characteristics of academic biomedical research. Prepares students for a career in academic biomedical research by discussing essential features for success, other than the actual science.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.820. Thesis Research Molecular Microbiology and Immunology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.821. Research Forum in Molecular Microbiology and Immunology. 1 Credit.
Prepares students for their future careers by creating a forum in which they can practice the essential skills of scientific communication. Focuses on the oral presentation of research findings resulting from laboratory investigations or literature review to faculty and fellow students. Examines the students' ability to condense and communicate background, hypotheses, experimental design, result presentation, and data analysis in a timed presentation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.822. Seminars in Research in Molecular Microbiology and Immunology. 1 Credit.
Integrates academic training with current research in microbiology, immunology, and infectious diseases. Presents results of state of the art investigations of microbial diseases of public health significance, emphasizing experimental design and methodology for analysis and discussion by researchers from JHU and other biomedical research institutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.829. Summer Thesis Research. 12 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.830. Postdoc Research MMI. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.840. SS/R: Mol Microbiology & Imm. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.844. Causation. 3 Credits.
Acquaints students with the central concept of causation across the biomedical and public health disciplines. Discusses how cause and effect relationships govern today's research and evidence-based decision-making based on the social, physical, political, and economic determinants of health. Compares how fields and sub-disciplines in biomedicine and public health approach causation using research case examples that illustrate major morbidity and mortality-related health problems. Examines strategies to mitigate the limitations of causal inference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.848. Community-Based Practice Through Civic Engagement. 2 Credits.
Examines a participatory, online service-learning approach to enable students regardless of geographical location to engage in real-word, community-based, educational projects. Acquaint students to work with Baltimore-based community organizations through critical reflection on issues of equity and professional practice. Emphasizes the application of professional skills to real-world issues. Discusses the limitations and ethical aspects inherent to civic engagement work. Prepares students to develop evaluation plans and materials for the organizations' identified programs. Emphasizes translation of experiences with Baltimore Community-based organizations into local contexts. Focuses on building reciprocal partnerships that reach beyond "consultancy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.851. Laboratory Rotations. 4 - 8 Credits.
All departmental Sc.M. and doctoral students spend one and three terms, respectively, participating in the research activities of departmental faculty's laboratories. Students select appropriate rotations in consultation with their academic advisors and the departmental Graduate Program Committee.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.855. Pandemics of the 20Th Century. 1 Credit.
Focuses on major pandemics in the human population that have occurred in the 20th century: the 1918 influenza pandemic; the emergence of HIV; the severe acute respiratory distress syndrome (SARS) outbreak of 2002-03; and viral hepatitis (hepatitis B and C viruses). For each pandemic, discussion groups cover a clinical-, public health- and pathogen-oriented reading topic in order to give students a broad understanding of the overall importance of each, as well as to compare and contrast the key aspects of each disease. Focuses on acute and chronic diseases, as well as diseases with different routes of transmission and incubation times between infection and disease. Provides a comprehensive overview of how each pandemic emerged, what key factors dictated spread in the population, and how each pathogen induced disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.895. MPH Practicum: MMI. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.260.935. Lab for MMI 260.635. 3 Credits.
Laboratory sessions examine living and preserved parasites, gross pathology, histopathology, and vectors. Journal discussions based on research papers and topics of fundamental importance to parasitology will involve student participation in a seminar format.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300 (Health Policy and Management)

PH.300.600. Introduction to Health Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.603. The Tools of Public Health Practice and Decision Making. 3 Credits.
Introduces the core functions of public health and the core competencies for public health professionals. Students assess their strengths and academic goals while building their toolbox of public health competencies. Uses case studies to examine the application of the competencies in public health practices. Provides an opportunity to apply knowledge by working in teams to assess a public health problem and propose potential solutions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.610. Public Health Policy. 4 Credits.
Introduces MPH students to the many opportunities in public health policy to improve the health of populations in communities around the world. Focuses on identifying decision-makers, framing problems and key questions, developing and evaluating policy options, and advocating for change. Provides an introduction to some major policy challenges facing public health, such as inequity, injury, tobacco, nutrition, addiction, and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.615. The Tools of Public Health Practice. 1 Credit.
Introduces the challenges and rewards of public health practice. Presents and discusses the core functions and essential services of public health in the context of real world practice examples. Provides opportunities for application of the core competencies of public health professionals. Prepares students for their practicum experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.650. Crisis and Response in Public Health Policy and Practice. 3 Credits.
Studies the phenomenon of crises in public health. From a historical perspective, demonstrates how much of U.S. public health policy traces back to crises and responses that riveted public attention. Explains how substantial increases in FDA authority came about through serial crises in drug, device, food and tobacco markets. Shows that modern vaccine infrastructure emerged out of both disease and vaccine-related crises. From a management perspective, reviews how public health leaders at all levels respond to crises – the good, the bad and the ugly. From a strategic perspective, explores how health officials effectively manage crisis and response in order to win significant policy advances.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.651. Introduction to the U.S. Healthcare System. 4 Credits.
Focuses on the organization, financing, and delivery of healthcare in the U.S. Contrasts the private and public sectors and examines the effects of market competition and government regulation. Examines the ways that medical providers are paid, and explores the major issues currently facing physicians, hospitals, and the pharmaceutical industry. Discusses several potential small and large scale reforms to the U.S. healthcare system and evaluates their likely effects on healthcare spending, quality of care, and access to care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.652. Politics of Health Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.690. Designing your MPH Capstone as a Research Report. 4 Credits.
Discusses the importance of clearly articulating a research question and its associated aims. Reviews search strategies and data bases for a literature review and critical appraisal. Critically examines how students can design research plans to answer their research questions, provides tips for formulating a conceptual framework, define variables and decide how to measure them and select the most appropriate study design (taxonomy).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.712. Formulating Policy: Strategies and Systems of Policymaking in the 21st Century. 3 Credits.
Considers theories, strategies, and participants involved in formulating health and social policies. Discusses defining health and social problems, selecting and assessing policy options, and the role of stakeholders in policy process, as well as the context in which policy decisions are made. Analyzes case studies, discusses theories, participates in service-learning projects and writing exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.713. Research and Evaluation Methods for Health Policy. 3 Credits.
Introduces basic principles and methods for undertaking scientifically rigorous research with a special emphasis on evaluations of interventions intended to improve health and safety. Focuses on evaluations of policy, health care delivery systems, and public health programs. Topics include the evaluation and health policy analysis; common research designs and their strengths and weaknesses; and internal and external validity with the intent of giving students the fundamental tools needed to conduct health policy evaluations and/or making them better consumers of research conducted by others.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.715. Advanced Research and Evaluation Methods in Health Policy. 4 Credits.
Introduces basic principles and methods for undertaking scientifically rigorous research with a special emphasis on evaluations of interventions intended to improve health and safety. Focuses on evaluation of health policies, health care delivery systems, and public health programs. Topics include the relationship between health services research, health policy research, health policy analysis and health program management; common research designs and their strengths and weaknesses; internal and external validity; survey research techniques; qualitative research methods; and basic cost effectiveness analysis with the intent of making students better conductors of research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.721. Foundations in Health Policy I. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development, implementation and analysis of health policies. Explores how different disciplines (political science, ethics, law, economics, sociology, behavioral sciences and history) inform thinking about the development, implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking, informed debate with respect for a range of opinions, and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.722. Foundations in Health Policy II. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development implementation and analysis of health policies. Explores how different disciplines (political science ethics law economics sociology behavioral sciences and history) inform thinking about the development implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking informed debate with respect for a range of opinions and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.723. Foundations in Health Policy III. 2 Credits.
Familiarizes students with some of the foundational readings in health policy and provides an understanding of the theories and conceptual frameworks used in the development, implementation and analysis of health policies. Explores how different disciplines (political science, ethics, law, economics, sociology, behavioral sciences and history) inform thinking about the development, implementation and analysis of health policies that make a difference in the public's health. Emphasizes critical reading and thinking, informed debate with respect for a range of opinions, and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.724. Foundations in Health Policy IV. 1 Credit.
Supplements and builds upon the course entitled Health Policy Analysis and Synthesis. Students analyze and discuss in depth the materials presented in that course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.741. PhD Seminar in Health Policy: Using Secondary Data to Conduct Health Policy Research. 1 Credit.
Provides a small class-size, doctoral-focused experience and examines some of the most common data sources used in the field to study health policy and management research topics. Emphasizes secondary data sources and discusses: (1) data structure and challenges with conducting research with secondary data; (2) developing research questions and testable hypotheses using these data sources; (3) strategies for data cleaning, work flow management, and replication; (4) data protection and storage related concerns; and (5) orally communicating strengths and weaknesses of datasets in the context of research talks. Exposes doctoral students to faculty research projects and the specific datasets being used to conduct this research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.750. Teaching, Learning and Leading – in the Classroom, in the Workplace and in the Community. 3 Credits.
Offers students opportunities for exploring how to design, develop, deliver, and evaluate educational approaches for a range of audiences and to attain professional aims. Considers a variety of approaches for integrating educational practices and strategies into professional practice. Engages students in developing educational philosophies and reflecting upon personal educational experiences and use of educational approaches for professional and leadership advancement. Presents strategies for designing an educational plan.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.800. MPH Capstone Health Policy and Management. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.801. The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health. 2 Credits.
This course provides an overview of some of the nation's major data collection efforts in households and healthcare establishments in the United States. The course introduces population-based and establishment-based surveys conducted by the National Center for Health Statistics, covering policy-relevant topics including health and nutritional status, health care access and utilization, and the provision of services in inpatient, outpatient, ambulatory, long-term, and hospice care settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.830. Postdoctoral Research Health Policy and Management. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.840. Special Studies and Research in HPM. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.860. Special Studies/Research: The Media and the Message: What Public Health Needs to Know about the News. 3 Credits.
Studies contemporary U.S. media through the lens of public health. Analyzes the economic, social and political forces behind the changing media landscape. Provides insight into how news is gathered and how coverage decisions are made. Reviews the current media landscape, provides insight on problems and potential solutions, with specific lessons for practitioners in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.862. Current Issues in Public Health. 1 Credit.
Faculty experts present public health topics of current interest in both industrialized and developing nations, such as health promotion and disease prevention, health care delivery systems, environmental problems and the spectrum of factors influencing the health status of populations and communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.863. HPM Practicum. 2 - 3 Credits.
Provides PhD students in HPM with an integrated, practical experience, applying coursework and theory to real-world settings. Places students based on their individual goals and interests and preceptor needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.870. The Research and Proposal Writing Process I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.871. The Research and Proposal Writing Process II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.300.895. MPH Practicum: HPM. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.615. Seminar in Health Disparities. 3 Credits.
Addresses the nature of racial and ethnic disparities in health status and introduces the research literature on race disparities. Develops an annotated bibliography of research on a minority health topic selected by the class and produces a literature review on that topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.627. Understanding and Preventing Violence. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.635. Policing and Public Health. 3 Credits.
Provides an overview of the history and evolution of policing in the United States and the intersections between policing and public health. Considers both short- and long-term policing impacts, both positive or negative, on the health and safety of communities and individuals through various interactions with the public. Explores how public safety is reimagined through a public health lens to understand the impacts of police on social determinants of health, justice, and equity. Examines needed reforms, police-community relationships, and strategies to co-create public safety
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.645. Health Advocacy. 3 Credits.
Prepares health professionals, (from government health officials, business leaders, non-profit organization representatives to scientists) to advance public health policy improvements. Through lectures, group exercises and a "mock" congressional hearing, students develop the skills to evaluate the policymaking process, create opportunities to inform and influence policymaking, and become more effective in translating and communicating in a policymaking environment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.650. Crafting Effective Solutions to Gun Violence: Problem Solving Seminar. 3 Credits.
Provides a foundation of data, theory and perspectives on understanding gun violence within the United States. Students apply common public health methods for assessing risk and protective factors for multiple forms of gun violence at many levels (individual, family, community), assessing available evidence on prevention options, and determining how to enhance population-level success. Provides an understanding of the legal, political, and institutional constraints and opportunities for enacting policies to curb gun violence. Opportunities to develop plans to prevent gun violence with examples dealing with urban gun violence, domestic violence, and situations in which someone is threatening to commit an act of gun violence (e.g., school or workplace shooting) and develop creative public health alternatives to current approaches to gun violence that promote equity and justice as well as safety will be available.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.660. Connecting Public Health Research with the U.S. Policymaking Process. 3 Credits.
Considers the contradictory role of public health research in the U.S. policy making process. Examines the question of when does research influence the policy-making process and how is it verified and what role can and should researchers play in the process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.692. The Role of Community-Based Organizations (Cbos) and Non-Governmental Organizations (Ngos) in Improving Global Public Health. 3 Credits.
Provides students with a working knowledge of NGOs and CBOs in health and public health, both domestically and internationally. Acquires on-the-ground insights and skills important to those planning a public health career from public health research, to service delivery, to health policy and management, both novice and expert. Presents the roles of CBOs/NGOs in a variety of arenas, including infectious disease control, environmental health, and disaster and humanitarian response. Provides basic skills and lessons, from starting and sustaining an organization, to working with CBOs/NGOs to achieve and maximize the success of your particular public health goals. Discusses the roles of CBOs/NGOs within the larger contexts of globalization, world politics, and social development. Includes guest lectures from domestic and internationally recognized organizations such as the American Red Cross, the National AIDS Fund, and the Center for Disaster and Humanitarian Assistance Medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.771. Case Studies in Communicating With The Media. 1 Credit.
Provides real-life examples of public health communications—both good and bad—and teaches practical skills for effectively sharing messages with the media in the era of "fake news." Students are exposed to techniques and guidelines to understand and handle the media during both crisis and non-crisis situations. Topics include: an overview of the media needs in a crisis, the essential elements of crisis communication plans, tips and techniques for spokespersons, common pitfalls to avoid, audience psychology, non verbal communication and techniques for communicating complex information to the lay audience. Students review videotapes of news coverage and participate in simulation exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.772. Making Effective Public Presentations. 2 Credits.
Enhances skills to construct and deliver oral presentations with clarity and impact. Provides a template for "audience-centered" presentation construction with examples, tools and exercises. Provides individual assessment and feedback for each participant through videotaped exercises and a short formal presentation constructed during the course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.820. Thesis Research in Health Policy and Management. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.301.861. Graduate Seminar in Health and Public Policy. 1 Credit.
Reviews and critiques current literature in health and public policy and evaluates studies from a methodological and conceptual basis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.610. State Healthcare Policy. 3 Credits.
Acquaints participants with the critical role states play in developing and implementing policies that affect both health and health care. Reviews how the role of states has evolved within the US federal system of government where states and the national government both have significant responsibilities. Drawing upon the experience of implementing the health insurance exchanges in Maryland and Alabama, participants assess how state differences affect the implementation of a major new national health program--the Affordable Care Act.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.675. Crisis Response in Public Health Practice: International Perspectives. 2 Credits.
Examines crises from the point of view of an agency leader responsible for designing and implementing an effective response while maintaining credibility and securing long-term policy change. Discusses recent crises including: global response to Ebola and Zika, responses to regulatory failures, foodborne outbreaks, and vaccine controversies. Offers students an opportunity to apply their knowledge by proposing a crisis response plan for a public health agency
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.302.843. SS/R: CRISIS RESPONSE IN PUBLIC HEALTH PRACTICE: INTERNATIONAL PERSPECTIVES. 2 Credits.
Examines crises from the point of view of an agency leader responsible for designing and implementing an effective response while maintaining credibility and securing long-term policy change. Discusses recent crises including: global response to Ebola and Zika, responses to regulatory failures, foodborne outbreaks, and vaccine controversies. Offers students an opportunity to apply their knowledge by proposing a crisis response plan for a public health agency.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.605. Public Health Policy: The Intersection of Science and Politics. 3 Credits.
Employs both lecture and interactive formats to explore the nature of the public health policy process, including how policy is a reflection of knowledge, political will and social strategy. Through presentations by instructors and guest speakers, offers examples of public health policy development highlighting the intersection of science and politics. Deepens and enriches the learning process through field trip(s) that actively engage students with Washington, D.C. public health advocates and policy makers with varying policy roles and perspectives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.607. Public Health Practice. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.610. Issues in Injury and Violence Prevention. 2 Credits.
Addresses prominent sources of injury, including motor vehicles, falls, fires, and firearms. Explores the biological, behavioral, and social issues relating to injury and violence prevention and policy. Emphasizes basic strategies for preventing injuries and deaths in the workplace, home, travel, and recreation, and the relative effectiveness of various types of approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.615. Occupation Injury Prevention and Safety Policy and Practice. 2 Credits.
Provides a link between the public health approach to injury prevention, the traditions of safety science and engineering, and their relationship with ergonomics and biomechanics. Topics covered include identifying the injury problem; using surveillance and record-keeping systems; preventing injuries by government, unions, health departments, and industry; and comparing safety sciences and a public health approach to injury prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.623. Fundamentals of Clinical Preventive Medicine. 3 Credits.
Examines the complex interplay between clinical preventive medicine, population medicine, and the practice of public health. Covers core topics for practice and for the preventive medicine board examination: prevention at the individual and community level; the evidence-based policy approach to prevention; and the creation and use of clinical governance standards and practice guidelines for prevention. Covers high-yield topics in short modules that focus on a clinical prevention frame, including the latest science and best practices in integrative medicine, chronic diseases, communicable diseases, injury and violence prevention. Covers prevention-based approaches to various issues of public health significance including the use of: mind-body medicine, lifestyle medicine, diet and nutrition wellness, motivational interviewing and health coaching, and evidence-based complementary and alternative medicine.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.630. Transportation Policy, Equity and Health. 2 Credits.
Provides an overview of the significant role of national politics on transportation safety policy in the United States. Using case studies of notable safety enhancement efforts in aviation, highway, and other transportation modes, students discover the significant roles and interactions of lobbyists, industry associations, politicians, and Federal Agencies in transportation safety research and subsequent safety improvement rulemaking. Through informal lectures, readings and a field trip to the Baltimore Washington International airport tower, students learn that transportation safety and injury prevention improvements often require significant efforts to successfully navigate the path from research findings to interventions that improve the traveling public's safety and health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.670. Principles and Practice of Injury Prevention. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.684. Health Impact Assessment. 3 Credits.
Since health impact assessment (HIA), is an approach that informs decision-makers about the potential health effects of proposed projects, programs, and policies made in areas outside of the health sector (e.g., education or housing), students learn about HIA through readings, lectures, and hands-on experience. Students study the rationale for conducting HIAs, review a range of analytic methods used to conduct HIAs analyze cases from international and domestic settings, understand its role in policymaking, and walk through the steps of how to conduct a HIA. Students then apply these skills through working on a HIA with a partnering organization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.861. Graduate Seminar in Injury Research and Policy. 1 Credit.
Weekly seminar advances understanding of injury, violence, and resulting disabilities as public health problems. Topics include methodological approaches, substance use and overdose, occupational injury, violence prevention, and disability. Emerging topics as well as the application of policy, law and practice for injury and violence prevention are considered.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.864. SS/RES: SOCIAL INEQUALITIES IN HEALTH IN LIGHT OF ROAD TRAFFIC SAFETY. 3 Credits.
Provides an overview of the various manners in which the road traffic infrastructure and environment may contribute to the occurrence of accidents and injuries and also to social inequalities in mobility and safety. Examines analytic methods related to injury research and prevention using examples from both LMICs and HICs
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.305.865. Advanced Seminar in Injury Prevention. 2 Credits.
Broadens, advances, and challenges existing skills and knowledge of injury prevention students and/or multi-disciplined injury prevention practitioners. Elaborates on the 9 Core Competencies for Injury and Violence Prevention, as developed by the SAVIR-STIPDA Joint Committee on Infrastructure Development. In addition to interactive lecture, students are given as many opportunities as possible, within the constraints of the 2-day training, to practice skills through practical application sessions for a facilitated hands-on, skills-development experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.601. Introduction to Bioethics in Public Health Practice and Research. 1 Credit.
Introduces MPH students to the basic principles and frameworks for research and public health ethics as well as concepts in professional and research integrity as a public health professional. Explores both domestic and global health examples. Focuses on introductory material on public health ethics, research ethics and professional integrity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.625. Ethical Issues in Health Policy: Public Health and Health Care. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.650. Public Health and the Law. 3 Credits.
Introduces non-lawyers to the important role played by the law in determining the public's health. Analyzes judicial opinions, statutes, and regulations in classroom discussions. Covers substantive legal topics including the balance between individual rights and public health initiatives, privacy, medical malpractice, and informed consent.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.655. Ethical Issues in Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.660. Legal and Public Health Issues in the Regulation of intimacy. 3 Credits.
Examines the ways in which the state regulates intimate and private relations and the justifications for such regulation. Particularly focuses on the attention paid to the public health and morality justifications offered by the state for the enactment and enforcement of privacy laws. Topics include: when state regulation of intimate decisions, actions and relationships is justified; the regulation of consensual sexual activity; the regulation of contraception and abortion; the regulation of same-sex sexual activity; and the regulation of same-sex marriage.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.662. Public Health Agencies: Law, Policy and Practice. 3 Credits.
Explores the important and expanding role that regulatory or administrative agencies, such as FDA and EPA, play in protecting and promoting the public's health. Examines agencies' ability to create and implement health policy, and discusses the legal limits on agency powers. Discusses how agencies develop regulations and employ other regulatory tools. Uses case studies to illustrate key concepts, such as the role of science in the regulatory process and the influence of politics on agency actions. Class sessions involve the interpretation and analysis of judicial opinions, regulations, and other administrative materials. Focuses on U.S. regulatory policy, but also examines examples and implications for international health policy. This course builds on the skills introduced in 306.650, and exposes students to new public health law and policy topics relevant to regulatory agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.663. Legal and Ethical Issues in Health Services Management. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.665. Research Ethics and integrity: U.S. and International Issues. 3 Credits.
Introduces ethical theory and principles, including ethics requirements when conducting research with human subjects in the U.S. and/or developing countries. Covers the following topics through lecture and case studies: ethical theory and principles; informed consent in research; Institutional Review Boards; the just selection of research participants; cultural relativism; genetic research; ethical issues in vaccine research; ethics and human rights; appropriate use of placebos; what is owed to research participants, communities, and countries after research is completed; the use of animals in research; and scientific and academic integrity. Familiarized students with research ethics in both the U.S. and global contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.670. Issues in LGBTQ Health Policy. 3 Credits.
Examines the impact and importance of health policy on the health, well-being, and lives of LGBTQ people. Explores how particular health policies, both historically and currently, have contributed to and/or reduced health disparities within LGBTQ communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.861. Graduate Doctoral Seminar in Bioethics. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.306.864. Fogarty Bioethics Fellows Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.307.864. Mental Health Services and Systems Practicum I. 0.5 Credits.
Part I of a year-long practicum that complements traditional coursework by providing exposure to the real-world settings and organizations that compose the mental health care infrastructure. Through site visits and opportunities to interact with representatives from different components of the mental health care system, students will develop an understanding of the historical evolution of the mental health care system in the U.S. and be introduced to the various settings through which mental health services are delivered, including emergency psychiatric services, intensive outpatient treatment, psychiatric rehabilitation, and early intervention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.307.865. Mental Health Services and Systems Practicum II. 0.5 Credits.
Part II of a year-long practicum that complements traditional coursework by providing exposure to the real-world settings and organizations that compose the mental health care infrastructure. Through this course, students will develop an understanding of the operational, organization, and financial aspects of service delivery, barriers to implementation of evidence-based services, and the interaction of other service settings (e.g., social services, criminal justice) with the mental health care system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.600. SS/R: Managing the COVID-19 Pandemic: From Epidemiology to Policy. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.604. Effective Writing for Public Health Change. 3 Credits.
Sharpens writing skills for clear, effective public health communication. Introduces the key elements of successful writing, and how to successfully apply those fundamentals to different communication formats and goals, both traditional and modern. Writing and organization skills practiced through writing assignments focused on practical real-world examples students will face in their careers, including one-pagers, policy memos, and data summaries, including learning to edit, improve, and pressure test the work of others. Professional standards for accuracy, readability, structure, and style that help communicate more effectively and persuasively in the pursuit of public health goals will be presented.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.605. THE IMPACT OF THE FINANCIAL, ECONOMIC AND POLITICAL CRISES ON HEALTH, QUALITY OF LIFE AND WELL-BEING OF POPULATIONS. 3 Credits.
Analyzes the causes of the current worldwide crises, both in developed and developing countries, with a special emphasis on the United States, Canada and Europe. Focuses on the consequences of those crises on health and social policies that affect the quality of life, the well-being and the health of populations. Considers these issues from the political economy, social policy and health policy perspectives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.610. The Political Economy of Social inequalities and Its Consequences for Health and Quality of Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.615. The Opioid Crisis: Problem Solving Seminar. 3 Credits.
Uses interactive case-based and problem-based strategies to provide an overview of the impact of the opioid crisis in the United States. Enables students to develop skills to address different aspects of the opioid crisis. Addresses topics including stigma attached to opioid use and treatment of opioid use disorders, the development of strategies to address such stigma, the importance of data in identifying opportunities for response, assessment of current policy options for addressing the opioid crisis in the United States, and addressing the political challenges to support effective policymaking. Prepares students to undertake data collection at the state level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.630. U.S. Pharmaceutical Policy. 3 Credits.
Examines the pharmaceutical market and addresses the core issues related to pharmaceutical policy within the US health care system, such as drug pricing, regulation, and financing, drug coverage decisions, and ethical aspects of drug regulation. Considers the role of multiple health care system actors involved in and affected by pharmaceutical policy: drug manufacturers, drug regulation agencies, insurers, pharmaceutical benefits managers, health care providers, patients, families, and others. Provides an in-depth analysis of drug pricing strategies, coverage decisions, and access and affordability issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.650. Public Health Perspectives on U.S. Drug Policy. 3 Credits.
Presents a critical examination of U.S. drug policy through a public health lens. Course topics include: policy mechanisms for reducing drug-related harm; implications of various drug control policies on population health and wellbeing; drug control enforcement and the role of the criminal justice system; stigma and the politics of drug policy; the organization and financing of services for people who use substances, including treatment of substance use disorders; and policies and services targeting special populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.660. Food Industry, Politics and Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.680. Health Care and Congress: Perspective From K Street. 2 Credits.
Introduces the roles and functions of the entire legislative process -- from bill introduction, to committee markup, to the enactment of legislation. Throughout this process, students also examine the essential role of congressional lobbyists in shaping health care policy stemming from coalition building, knowing your opponents, organizing grassroots and campaign contribution efforts, identifying key Members of Congress and staff, working with the Administration, testifying on Capitol Hill, and knowing what and what not to tell your constituency. Using a case-study approach, students walk through the process of how an idea goes from an organization into federal or state law.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.701. Effective Presentations and News Media Interviews: Practical Skills for Public Health Practitioners. 3 Credits.
Enhances skills to construct and deliver oral presentations with clarity and impact. Provides techniques and guidelines to increase your effectiveness in translating public health information to various audiences, as well as communicating through the news media during both crisis and non-crisis situations. Includes topics: basics of effective presentations, non-verbal communications, case studies, giving an interview, preparing talking points, advocacy and the news media, and communicating in a public health emergency. Reviews videotapes of news coverage and participate as spokespersons in on-camera simulation exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.810. Field Placement Health Policy-MSPH. 1 - 22 Credits.
Provides students with an intensive “hands on” extension of their academic training under the guidance of one or two senior level health policy professionals and program faculty. Students gain a deeper understanding of how health policies affect the public’s health and further develop their professional health policy skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.842. SS/R: Emerging Dimensions of Social Determinants of Health Inequalites: A Transdiciplinary Integrated Approach. 3 Credits.
Introduces a novel transdisciplinary approach on Social Determinants of Health Inequities (SDHI). Provides an in-depth understanding of macro, meso and micro levels, all of which generate health inequities. Prepares students to examine the changes, causes, and potential policies to address systemic public health and equity-related subjects and the complex interactions between biology, behaviors, society and politics. Integrates a broad range of disciplines, ‘systems thinking’ practices, and methodological pluralism. Reviews research advances, including explanatory case studies and the evaluation of policies and interventions to reduce health inequities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.851. Phase Internship. 1 - 6 Credits.
Public Health Applications for Student Experience (PHASE), offers students the opportunity to gain real world public health practice experience. PHASE internships require students to synthesize, integrate and apply academic theory in public health practice settings. Through PHASE, students have the opportunity to learn first-hand how public health agencies function and engage in public health decision-making on a daily basis
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.852. Applied Health Policy Experience: Health Policy Internship. 2 Credits.
Provides JHSPH graduate students with experience and insight into the public health policy research and development process. Gains insight, while working directly with legislators, into the inner workings of the policy-making process including legal research, stakeholder engagement, and coalition building. Allows interns to provide legislative assistance to the policymaker throughout the legislative session, including legal research and analysis, stakeholder engagement, and writing testimony, bills and amendments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.308.867. MSPH Seminar in Health Policy. 1 Credit.
Introduces work undertaken in health policy settings and prepares MSPH. students in Health Policy and Management for the field placement requirement in the second year of the program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.600. Evaluating Quality Improvement and Patient Safety Programs. 3 Credits.
Prepares students to evaluate Quality Improvement/Patient Safety (QI/PS), projects by developing their competencies in the following areas: 1) Critiquing evaluations of QI/PS projects; 2) Designing a robust evaluation of a QI/PS project; and 3) Conducting a small scale qualitative study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.605. Health Issues for Aging Populations. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.609. Palliative and Hospice Care: Quality of Care and Health Policy. 2 Credits.
Addresses the policy problems related to improving access, quality and cost-effectiveness for palliative and hospice care within the current medical system, using case studies and workshop exercises. Also addresses the challenges and opportunities palliative and hospice care face under health reform. Considers questions such as: what communication strategies can be widely applied to help patients understand and choose care in accordance with their goals and values; how palliative care and hospice services should be delivered by accountable care organizations and medical homes; how palliative care can be integrated into the long-term care environment; and what quality measures should be integrated into performance measurement for all providers of the seriously ill.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.616. Introduction to Methods for Health Services Research and Evaluation I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.617. Introduction to Methods for Health Services Research and Evaluation II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.620. Managed Care and Health insurance. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.631. Population Health Informatics. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of health information technology (HIT) to population health. Emphasizes the population health potential of comprehensive electronic health records (EHRs), personal health records (PHRs), mobile health and telemedicine devices; and consumer focused internet-based based tools. Covers the uses of HIT to define and identify populations and sub-populations of interest, describe the health status and needs of populations, improve the health of populations, and evaluate services provided to populations. Emphasizes the use of HIT within both local, regional and federal public health agencies and population-based private health care organizations such as integrated delivery systems and health insurance plans. Lessons are mainly US oriented but are also applicable to other high and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.635. Population Health: Analytic Methods and Visualization Techniques. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of data science to population health. Covers the uses of informatics to define and identify populations and sub-populations of interest, and describe the health status and needs of them. Describes the process of analyzing population health data from checking data quality to developing predictive models of utilization. Examines different data sources / methods to risk stratify a population of interest and compares the advantage and disadvantages of each data source / method. Describes various techniques to visualize data quality, depict the denominator selection process, and illustrate the risk adjustment results for large populations
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.670. Comparative Health insurance. 3 Credits.
Provides an overview of the organization and financing of health systems in middle and high-income countries – focusing on population coverage, in terms of both how different groups are covered and the benefits package provided. Begins with a conceptual framework of financing flows in the health sector, and proceeds to identify a series of topics and case studies as the subject of specific lectures. Explores in depth the principal models for population coverage – including national health insurance, national health service, social insurance, private insurance, and mixed hybrid models. Provides case studies of health insurance coverage in specific countries, including the United Kingdom, France, Germany, Japan, Taiwan, Chile – with lessons drawn for transitional countries interested in expanding health insurance coverage
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.712. Assessing Health Status and Patient Outcomes. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.716. Advanced Methods in Health Services Research: Analysis. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.720. Applied Econometrics for Health Policy Research. 3 Credits.
Advanced econometrics course that builds on techniques introduced in the prerequisite courses. Topics addressed include techniques for risk adjustment and provider profiling, advanced topics in instrumental variables analysis, calculating appropriate marginal effects and standard errors, heterogeneous treatment effects, decomposition approaches, and methods of assessing the robustness of various estimates. Students work on independent research projects that provide hands-on exposure to research design and data analysis with Stata.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.730. Patient Safety and Medical Errors. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.731. Patient Safety in Developing Countries. 2 Credits.
Introduces students to the rapidly evolving field of patient safety in developing countries, focusing on health systems improvement. Explains the role of global organizations, national governments, institutions, local communities, and individuals in improving patient safety in developing countries. Reviews key global patient safety resources that can be utilized to enhance patient safety in developing country health systems. Students learn how to utilize a “problem solving paradigm” to patient safety, conduct a patient safety situational analysis, and develop an action plan for patient safety at the institutional level. Explores the use of patient safety partnerships between hospitals as a model for inter-continental collaboration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.732. Human Factors in Patient Safety. 3 Credits.
Provides students with the essential concepts, methods and tools to enable them to design effective patient safety interventions and evaluate their impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.750. Applied Research Methods for Health Policy and Management. 3 Credits.
Helps Tsinghua DrPH cohort students synthesize methods content to conduct a valid statistical analysis applied to a Chinese-relevant data set or topic area. Students develop advanced skills in modeling and methods for conducting health policy, healthcare management, and health services research analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.861. Graduate Seminar in Health Services Research and Policy. 1 Credit.
Provides opportunity to learn about the PhD process, faculty research, discuss issues and concepts relevant to the field of health services research, and learn skills important for academic and professional success in the field of health services research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.864. Quality, Patient Safety, and Outcomes Research Practicum. 3 Credits.
Provides students in the Quality, Patient Safety, and Outcomes Research Certificate Program with an integrated experience in quality, patient safety, outcomes research, or a combination of the 3 domains in any one of a wide variety of settings in the health service delivery environment. Students are placed based on their individual goals and interests and the preceptors' needs. Students join an active work group and are supervised directly or indirectly by the practicum preceptor
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.871. Health Services and Outcomes for Aging Populations Practicum I. 0.5 Credits.
Focuses on Home-Based Care and provides an in-depth overview of home-based medical care, skilled home health care, and telehealth. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.872. Health Services and Outcomes for Aging Populations Practicum II. 0.5 Credits.
Students work in small groups to apply the concepts learned in Knowledge Translation, I (309.870.11) to a practical case study of a knowledge translation problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.873. Health Services and Outcomes for Aging Populations Practicum III. 0.5 Credits.
Focuses on the importance of interdisciplinary care in the care of older adults. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.309.874. Health Services and Outcomes for Aging Populations Practicum IV. 0.5 Credits.
Fourth of 4-term sequence. Focuses on issues associated with provision of long-term services and supports in the community, assisted living, nursing homes, and innovative models of care. Complements traditional coursework by providing exposure to the real-world settings and organizations that comprise aging services delivery and infrastructure.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.615. Quality of Medical Care. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.720. Tsinghua DRPH Capstone. 2 Credits.
Helps Tsinghua DrPH students synthesize course content with a specific focus on problem identification and the development of testable hypotheses; how to develop a conceptual model; approaches for conducting a literature review and synthesis. Provides an overview of the DrPH written qualifying examination.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.820. Thesis Research HPM-DRPH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.861. Graduate Seminar in Health Care Management and Leadership. 1 Credit.
Provides opportunity to discuss concepts and issues related to organizational performance improvement, organizational performance indicators, and change strategies. Facilitates preparation for comprehensive exams and the design and conduct of dissertation projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.865. Tsinghua DRPH Seminar. 1 Credit.
Provides opportunity to learn about faculty research, discuss issues and concepts relevant to the field of health management and leadership, and learn skills important for academic and professional success in the field. Intended for DrPH students from the Tsinghua cohort.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.311.867. Tsinghua Graduate Seminar. 1 Credit.
Provides opportunity to discuss concepts and issues related to organizational performance improvement, organizational performance indicators, and change strategies. Facilitates preparation for comprehensive exams and the design and conduct of dissertation projects. Intended for DrPH students in the Tsinghua cohort program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.600. Managing Health Services Organizations. 4 Credits.
Presents a framework for understanding and managing health services and health sector organizations. Discusses strategic and organizational management [e.g., health care environment, stakeholders and customers, missions, vision and values, governance, organizational structure and design]; management & performance improvement tools [e.g., budgeting and financial management, logistics, continuous quality improvement, balanced scorecard, logical framework, learning networks and collaboratives; management role and functions [e.g., leadership style, employee performance, decision-making, human resource management]
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.601. Fundamentals of Management for Health Care Organizations. 3 Credits.
Discusses how to manage in health care organizations, including management processes, organizational structures, and types of governance and management issues of U.S.-based health care delivery systems. Topics to be examined include introduction to health care systems; managing health care organizations; health care environments, administrative management responsibilities; approaches to performance improvement and financial management concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.602. Applied Methods for Optimizing Performance in Health Care Organizations. 2 Credits.
Performance Optimization Methods for Health Care Organizations is designed for MHA students who seek an understanding of continuous improvement in healthcare organizations. The content and framework of the course are designed to provide students with a broad exposure to current knowledge, competencies and management tools required for the effective operation of health care delivery systems. Focus is on how to apply continuous improvement tools and methodologies in various health care environments. Provides a detailed explanation of Lean and Six Sigma methodologies with opportunity to apply these skills to real world examples within health care settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.603. Fundamentals of Budgeting and Financial Management. 3 Credits.
Provides students with an understanding of budgeting as an important management tool. Focuses on budget development, evaluation of the financial status of a department or operating unit and the ability to determine what, if any, corrective actions need to be taken. Includes strategies for measuring and reporting skills. Considers the analytical tools used to support evaluation and decision-making including; volume adjusted variance analysis, benefit-cost ratio analysis, breakeven analysis, process flow analysis, benchmarking, and methods for building cost standards.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.604. Quantitative Tools for Managers. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.607. Quantitative Tools for Managers in Asia. 3 Credits.
Designed to provide concept and real-world application of quantitative tools (methods) commonly applied in the healthcare industry in Asia. Topics to be addressed include: facility location/payout, forecasting and financial analysis, re-engineering and utilization (productivity) management and quality matrix and improvement tools. Applications and case studies will focus specifically on the Asia-Pacific rim.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.610. Foundations of Organizational Leadership. 3 Credits.
Students develop an understanding of the role expectations of the organizational leader and the essential knowledge and skills the role requires. Provides a framework for understanding the process of working effectively with, influencing and leading others. Drawing from a variety of disciplines, emphasizes organizational effectiveness, developing a future vision and direction, leading change and building adaptive organizational cultures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.617. Fundamentals of Financial Accounting. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.620. Performance Measurement in Health Care. 2 Credits.
Focuses on performance measurement for hospitals and describes key aspects and challenges of measurement initiatives in the current context of health care reform in general, and payment reform more specifically. Includes the faculty, all senior health care professionals from the trenches, describing the regulatory environment and Joint Commission and CMS requirements. Summarizes key measures used for public reporting and payment such as chart-abstracted clinical process, administrative data based outcomes, satisfaction, and efficiency. Highlights the advantages and disadvantages of each type of measure and discusses appropriate use of analytics and comparison data including patient satisfaction. Covers current public reporting and pay for performance initiatives and associated challenges. Includes emerging initiatives in the context of the electronic medical records, such as e-measures and meaningful use.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.621. Strategic Planning. 3 Credits.
Focuses on principles of strategic management and competitive analysis to support strategy development for health care organizations. Provides an understanding of how current business and management knowledge is applied to health care organizations to promote future success and competitive advantage. Examining contemporary theory and models, students learn to assess and develop an organization's mission and vision; perform an internal and external strategic assessment; evaluate competitive threats and responses; develop organizational strategies and measures of success; and evaluate the decision-making approaches best able to develop and execute the best strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.623. Financial Management in Health Care I. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.624. Financial Management in Health Care II. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.630. Healthcare Financial Management. 3 Credits.
Provides managers and professionals, both novice and experienced, with the financially quantitative knowledge needed for planning, controlling and managing in contemporary health care organizations under constantly changing conditions. Provides a foundation in the basic financial management skills as well as their advanced application. Introduces the basic business finance approaches to decision-making and governance. Provides students with a sound conceptual and applied understanding of the role that financial and cost management play in the business setting decision-making process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.633. Health Management Information Systems. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.635. Human Resources in Health Organizations. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.650. Non-Traditional & innovative Health Services Partnerships. 2 Credits.
Introduces innovative, non-traditional partnerships as an integral part of achieving a value-based healthcare system. Examines growing trends in healthcare and basic principles and practices of non-traditional partnerships. Discusses the method of building balanced business models to ensure obtainable milestones and returns for all parties. Presents lessons learned by industry leaders who have experienced establishing partnerships with multi-national corporate, investor, and strategic entities focusing on clinical services, population health and health/IT activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.651. Principles and Applications of Advanced Payment Models in Population Health Management. 3 Credits.
Presents an overview of major issues related to the design, function, management, regulation, and evaluation of health insurance and managed care plans and implications for population health management. Provides a firm foundation in basic concepts pertaining to private and public sector health insurance/benefit plans. Includes key topics such as, population care delivery and payment innovations and management techniques, provider payment models, risk-sharing and other incentives for organizational integration, quality and accountability, cost-containment. Reviews innovative payment models and initiatives supporting health care providers and health care organizations in testing alternative care delivery in the context of three core strategies for improving the US health system: improving the way health care providers are paid, improving the way care is delivered, and increasing the availability of information to guide decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.655. Organizational Behavior and Management. 2 Credits.
Explores organizational behavior perspectives and theories, which provide the framework for the critical study of management, and the interpersonal skills and knowledge required by managers in the dynamic health sector. Students develop an approach to thinking about health sector organizations and their complexity. Emphasizes current thinking and the application of theory to practice in the areas of management, employee motivation, group behavior and team development, power and influence plus conflict management and negotiation skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.660. Marketing in Health Care Organizations. 3 Credits.
Introduces students to marketing concepts in health care through readings, guest speakers, small group exercises and individual study. Prepares students to conduct a situational analysis, understanding the market and consumer behavior as well as assessing the capabilities of the organization. Explores primary and secondary market research techniques. Discusses marketing strategy, including positioning and branding, program/service development, pricing, distribution, and promotion. Explains evaluation and measurement methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.670. Negotiation in Health Care Settings. 3 Credits.
Addresses the basic skills needed for effective negotiation of business relationships in health care and other settings. Focuses on understanding and developing a systematic approach to preparing for, structuring, and negotiating key business relationships. Presents basic process and conflict management skills needed for effective negotiation of business relationships in health care. Also explores the ethics of negotiation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.675. Medical Practice Management. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.678. Introduction to Healthcare Quality and Patient Safety: A Management Perspective. 2 Credits.
Introduces students to the latest thinking on healthcare quality and patient safety improvement through didactic sessions, interactive exercises and case studies that have direct relevance for the public health practitioner, healthcare administrator or clinician. Focuses on the specific domains of healthcare quality and patient safety based on the strategies recommended by the Institute of Medicine report "To Err is Human."
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.693. Introduction to Comparative Effectiveness and Outcomes Research. 3 Credits.
Introduces students to the motivation and methods of comparative effectiveness research. Reviews the problems faced by decision makers across the US health care system, and the priority topics for investigation. Explains the role of stakeholders, including payors, manufacturers, health care organizations, professional groups, providers and patients. Explains study designs and methods used in effectiveness research, focusing in particular on observational studies. Also describes the policy implications of this research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.700. Leading Organizations. 3 Credits.
Focuses on the essential principles of personal and interpersonal leadership that can be used in an organizational setting to enhance performance, align and empower personnel, and assure organizational engagement. Applies leadership skills in a hands-on practical way that encourages students to challenge their own beliefs and assumptions about what constitutes leadership. Offers a comprehensive review of contemporary issues and perspectives on leadership. Explores multidisciplinary and systems-oriented approaches as well as classic leadership theory and evolving contemporary beliefs. Includes topics such as development of leadership theories, personal assessment and development, values and ethics, motivation, power, followership, group dynamics, multiculturalism in leadership, conflict resolution, performance excellence, and the change process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.701. Strategic Leadership and Decision Making. 3 Credits.
Examines how leaders formulate coherent and effective strategies for policy-making in a complex and unpredictable environment, consider planning, organization, persuasion, and adaptation to changing national and international pressures, as well as broader studies of strategic decision-making in the modern world. Considers what it means to be an effective strategist, policy-maker, agenda-setter, and change agent. Assess the difficulties involved with fulfilling these often difficult tasks within and outside of the organizational setting.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.702. Leading Change: Building and Empowering Teams. 3 Credits.
Examines the design, management, and leadership of teams in organizational settings. Focuses on the interpersonal processes and structural characteristics that influence the effectiveness of teams, the dynamics of intra-team relationships, and sharing of knowledge and information in teams. Participants will understand the theory and processes of group and team behavior to become successful leaders and adept in leading and managing groups and teams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.703. Learning Organizations & Knowledge Management. 3 Credits.
Explores concepts of organizational learning, analyzes global research trends in how evidence-of-learning is captured in workplace settings around the world, and applies organizational learning models to foster and support innovative workplaces. Discusses how various factors such as diversity, complexity, crises, and increasingly advanced digital solutions (technology) change the pace in which an organization learns, adapts, and competes. Embraces a system perspective of learning at the organizational level-of-analysis grounded in the premise that innovation and sustainable change is contingent upon an organization’s ability to create management structures that apply, analyze, evaluate and convey information, enhance decision-making, and achieve desired results through continuous learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.810. MHA Residency. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.861. MHA Case Competition. 2 Credits.
Introduces students to the case competition early in the year as part of their seminar. Provides students with the opportunity to apply what they have learned in the classroom setting to a real-world case study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.862. MHA Capstone. 1 Credit.
MHA students synthesize and integrate the knowledge and skills they have acquired throughout the program and their field placement to the examination and analysis of a current healthcare trend and its potential implications for health care services and delivery systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.867. MHA Seminar. 1 Credit.
Presents major nutritional problems that influence the health, survival, and developmental capacity of populations in low and middle-income settings. Covers approaches implemented at the household, community, national, and international levels to improve nutritional status. Explores the degree to which malnutrition can be prevented or reduced prior to achieving high-income populations or certain economic development, through targeted public and private sector interventions that address the causes of malnutrition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.869. Healthcare Consulting Practicum. 2 Credits.
Students are required to meet with the client (hospital sponsor of the consulting project) to develop an understanding of the project requirements. Prior to beginning the consulting engagement students will a) devise a plan for carrying out the consultancy, b) prepare a scope letter describing the project, the scope of work, deliverables, timeline and fee arrangement
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.873. SS/R: ADVANCED CONFLICT MANAGEMENT AND COACHING SKILLS. 1 Credit.
Builds upon the strategies and approaches presented in #312.871.97 SS/R - Leadership Skills: Negotiation & Conflict Management in Health Care. Part One teaches participants how to analyze, prepare for, and conduct a successful conversation or negotiation when emotions are running high. Uses case studies, experiential learning, group discussion, and lecture to introduce the “Difficult Conversation” framework developed by members of the Harvard Negotiation Project and a diagnostic tool for managing conflict. Participants are videotaped while participating in a conflict management simulation. Each participant receives an analysis and critique of her/his taped performance and a copy of their filmed simulation. Part Two equips participants with the skills needed to coach supervisees and colleagues through workplace conflicts and strengthen conflict management capacity in the organization. Develops understanding of and proficiency in the use of a conflict coaching framework by using lectures, case studies, group discussions and experiential learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.312.910. LAB for 312.810.
Lab for PH.312.810
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.601. Economic Evaluation I. 3 Credits.
Presents an introduction to the theory, methods, and application of economic evaluation in health care. Provides a specific focus on cost-effectiveness analysis, with an emphasis on identifying and measuring outcomes, understanding incremental cost-effectiveness ratios (ICERs), conducting sensitivity analyses, and incorporating time preferences. Considers decisions about the allocation of funds to different population segments or different types of programs, and to programs with great benefit for a few versus modest benefit for many. Prepares students for advanced topics in Economic Evaluation II-IV.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.602. Economic Evaluation II. 3 Credits.
Builds on the theory and methods taught in Economic Evaluation I to allow students to gain an understanding of intermediate topics in CEA. Provides students with experience of hands on development of decision trees. Focuses on having students become familiar with best practices in this growing field. Establishes the ability to critically appraise published work and construct simple cost-effectiveness models using Excel and other software. Prepares students for more complex modeling covered in Economic Evaluation III-IV.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.603. Economic Evaluation III. 3 Credits.
Builds upon the theoretical concepts taught in Economic Evaluation I-II by providing advanced content in the areas of decision analysis, cost-effectiveness, and alternative approaches of modeling research questions for these fields. Include approaches for calculation of costs and effectiveness measures using standard modeling methods. Compares outputs as a result of decision tree and Markov modeling and introduces sensitivity analysis. Includes group projects to produce a well-thought model on a topic of their own choosing in decision analysis or cost-effectiveness.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.604. Economic Evaluation IV. 3 Credits.
Builds upon the theoretical concepts taught in Economic Evaluation I-II and the methodological skills taught in Economic Evaluation III. Examines advanced methods, as well as areas of controversy with applications to international health. Explores methods for performing cost-effectiveness analysis (CEA) and benefit-cost analysis (BCA) with primary and secondary data. Examines alternatives to CEA, including cost-benefit analysis, stated preference methods, revealed preferences, and multi-criteria decision analysis. Emphasizes an applied experience in conducting economic analysis based on survey data as well as secondary data in a global context. Includes additional applications to adjust CEA to account for equity goals, to project program scale-up, and to account for “behavioral” agents.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.610. Health Economics for Managers. 3 Credits.
Applies the analytical tools of economics to issues in health care that are especially relevant to managers and leaders of health care organizations. Examines topics including: the use of economic incentives to influence health behavior; asymmetric information and the role of agency in health care; the application of behavioral economics to health care; government as payer and regulator, and equity/ethical considerations; the role of health insurance; and the theory of the firm as it applies to physicians, hospitals, and systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.620. Introduction to Behavioral Economics: Theory and Practice. 3 Credits.
Explores the theoretical framework of behavioral economics, and applies that framework to issues in health and healthcare. Addresses elements of the theory of behavioral economics including: prospect theory, System 1/System 2 thinking, hyperbolic discounting, loss aversion, the endowment effect, framing and anchoring, mental accounting and commitment contracts, heuristics and biases, the power of the default, and pricing strategies. Applies these concepts to human behavior in general, as well as that of patients and physicians.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.641. Introduction to Health Economics. 3 Credits.
Introduces students to the application of economic tools to the interaction among the many stakeholders in the health care system and the public health system. Intended for those students who want an overview of health economics, but who do not expect to pursue additional courses in the field. Uses a standard health economics text as the main reading; also draws on articles from the popular press and professional journals that illustrate the tools of economics or their application to health care and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.643. Health Economics. 3 Credits.
Introduces the analytical tools of economics and applies them to issues in healthcare. Topics include: resource allocation in health care; government as payor and regulator; asymmetric information and the role of agency; the market for health insurance; market structure and competitive strategy as it applies to health care organizations; the market for labor in health care; and the market for innovations and technology. Uses mainstream neoclassical microeconomic theory as the basis for analysis, but also explores the implications when the assumptions of this model are violated. Uses a standard health economics text as the main reading, but uses journal articles in the field to examine how the profession is analyzing health care and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.644. Intermediate Health Economics. 3 Credits.
Building on the basic concepts and applications presented in Health Economics I, students in Health Economics II are exposed to some of the seminal topics in health economics, with a particular focus on the issues of human capital, economics of the household and the demand for healthy and risky behaviors. Topics include: the economic returns of education; economics of the household; the demand for health (Grossman Model); addiction; teen sex; obesity, the statistical value of a life, and fertility. While it will not be the focus of the class, some time will be spent on the dynamic modeling and econometric techniques that are used in the papers that we review. Teaching methods include lectures, group discussion and problem solving exercises, and hands on experiments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.653. Advanced Health Economics I. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.654. Advanced Health Economics II. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.655. Advanced Health Economics III. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.656. Advanced Health Economics IV. 2 Credits.
Covers seminal publications in health economics and is targeted towards advanced Ph.D. students. Describes theoretical models in health economics for the determinants of health and demand for healthcare services, the foundations for cost-effectiveness analysis, the supply of healthcare services in competitive, monopolistic, and government-regulated markets, and the provision of private and public health insurance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.685. The Economics of Tobacco Control. 1 Credit.
Introduces students to the economic tools and analysis used to confront the public health challenges caused by smoking. Reviews the evidence of the health and economic consequences of tobacco use. Emphasizes the rationale for increases in taxes, financial incentives to discontinue tobacco cultivation, and regulatory measures such as bans on smoking in public places and restrictions on access for minors. Provides economic tools and background information for public health specialists, policymakers, the news media, and others interested in using evidence-based policy to prioritize and address public health concerns related to tobacco control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.790. Introduction to Economic Evaluation. 3 Credits.
Prepares students to read and interpret cost-effectiveness studies. Introduces the basic economic concepts that are needed in order to understand the recommendations from the United States Panel on Cost Effectiveness in Health and Medicine, such as the distinction between opportunity costs and budgetary costs. Considers review recommendations, particularly as they apply to cost-effectiveness research reports. Discusses the relationship between cost-effectiveness results and other elements of the health care policy decision-making process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.793. Extended Exercises in Cost Effectiveness. 2 Credits.
Provides students with experience in seven short exercises that explore a variety of aspects of cost-effectiveness analysis. Students learn how to link all the steps together to complete a full cost-effectiveness analysis from start to finish. During the two day course, students work in Microsoft Excel to setup a workbook that will allow them to complete a cost-effectiveness analysis, manipulate the results to explore multiple possible assumptions, and have the opportunity to share their work in a format that is easily accessible.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.861. Public Health Economics Seminar. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.313.865. MHS Capstone in Health Economics. 2 Credits.
Produce a scholarly paper that provides a meaningful contribution to knowledge of the health economics. Affords the opportunity to work under the direction of a research mentor and presenting research results to a group of peers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.700. Health Information Systems: Design to Deployment. 3 Credits.
Reviews health information systems, such as patient records, patient monitoring, imaging, public health, educational, bioinformatics and scholarly systems. Teaches the core architectures and technologies of these core systems, focusing on commonalities and differences and design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.703. Leading Change Through Health Informatics. 3 Credits.
This course will review the health information systems through case studies in the evaluation processes. Presents a framework for design and evaluation of systems based on user needs, functions performed, related information activities, and available technology. Skills taught include the use of measures and methods for qualitative and quantitative evaluation of information systems, including cost, performance, effectiveness and benefit/outcome determination.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.707. Introduction to Biomedical and Public Health Informatics. 3 Credits.
This course will contrast differences in roles, needs, and solutions among major players in the national and commercial health IT and informatics communities. The course will define public health informatics and explain why things do or don't happen in IT at the national and institutional levels. The course will apply available sources of data, information, and knowledge to address healthcare and public health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.708. HIT Standards and Systems Interoperability. 3 Credits.
Students learn the data, information, and knowledge standards critical to the successful implementation of local, regional, and national health-related information systems. Target competencies are to identify the appropriate level of HITSP standards for an informatics problem, and select the appropriate standard within that level; create use cases and an organizational process to define an interoperability standard for a specific healthcare/regional situation; participate in a national standards-creation process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.709. Health Sciences Informatics, Knowledge Engineering and Decision Support. 3 Credits.
Provides a framework for understanding decision support in the workflow of the health sciences. Focuses on the types of support needed by different decision makers, and the features associated with those types of support. Discusses a variety of decision support algorithms, examining advantages and disadvantages of each, with a strong emphasis on decision analysis as the basic science of decision making. Students are expected to demonstrate facility with one algorithm in particular through the creation of a working prototype, and to articulate the evidence for efficacy and effectiveness of various types of decision support in health sciences and practice, in general.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.725. Applied Clinical Informatics. 3 Credits.
Introduces the field of Applied Clinical Informatics, which is focused on leveraging clinical information systems and technology to improve patient and family-centered care. Provides exposure to a range of clinical workflows as well as patient/caregiver needs and how these may be supported by health information technology. Topics include: Workflow analysis, clinical decision support (CDS), electronic health record (EHR) and patient portal best practices, health information exchange (HIE), integrated laboratory, imaging and pharmacy information, telehealth and digital health strategies, and evaluation. Considers topics in the appropriate context of care continuum, clinical care transitions, patient safety and care quality, regulatory requirements, information security, organizational governance and project management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.315.727. Database Querying in Health. 3 Credits.
Introduces core concepts of relational databases using Structured Querying Language (SQL) along with terminologies related to clinical databases used in health information systems. Utilizes the Precision Medicine Analytics Platform with access to de-identified medical records of 70K patients with Diabetes with over 100 million data elements, including las, medications, encounters procedures, symptoms, and vitals. Focuses on answering clinical and research questions and discussion around effective data governance. Analyzes 3-yers of data to look for clinical and population-level management strategies for type 1 and type 2 diabetes. Includes analysis of a thorough data quality evaluation framework as well as identifying predictors for hospitalization and rehospitalization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.600. Introduction to the Risk Sciences and Public Policy. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.605. Methods in Quantitative Risk Assessment. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.610. Risk Policy, Management and Communication. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.615. Topics in Risk Assessment. 2 Credits.
Uses a case study approach of a selected risk-based public health issue to integrate student's application of the skills in the risk sciences (risk assessment, risk management, and risk communication).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.700. Climate Change Adaptation in Public Health: Large World Cities. 3 Credits.
Provides an overview of the science behind climate change and highlights the particular risks of global mega-cities due to their concentrated populations, urban heat-island effect, frequent proximity to coasts and rivers, and locus of transport and trade. Uses the WHO and US CDC Guides to Vulnerability for Public Health and the UN Habitat Guide to Vulnerability Assessment for Cities to identify populations at greatest risk from climate impacts. Critically evaluates through case studies actual climate and health adaptive policies as they are implemented in real-life contexts in several large, innovative world cities including San Francisco, London, Rio de Janeiro, Durban, and Copenhagen.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.317.864. Advanced Topics in Climate Change Policy. 2 Credits.
Focuses on advanced issues at the forefront of climate change and public health policy and practice. Takes a complex-systems view that traverses the boundaries between sectors, spans government levels, and integrates perspectives across public and private actors. Topics to be determined each year according to faculty interest and student need. Uses case studies, policy analysis readings, and discussions to foster student learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.603. Applied Microeconomics for Policymaking. 3 Credits.
Introduces the basic principles of microeconomics by emphasizing applications to the solutions of public problems. Students examine how markets operate and the role of government intervention. Acquaints students with public versus private goods, externalities, information asymmetry and other issues. Provides a theoretical framework for addressing policy problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.615. Program Evaluation for Public Policy I. 3 Credits.
Introduces the fundamental principles and practices involved in the design, implementation, and analysis of program evaluations. Topics to be considered include the evaluation of ongoing programs and test of new interventions being considered for broader adoption; determining whether programs are 'working'; procedures involved in implementing an evaluation in the field, including potential pitfalls; procedures for collecting and analyzing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.616. Program Evaluation in Public Policy II. 3 Credits.
Introduces the fundamental principles and practices involved in the design, implementation, and analysis of program evaluations. Topics to be considered include the evaluation of ongoing programs and test of new interventions being considered for broader adoption; determining whether programs are 'working'; procedures involved in implementing an evaluation in the field, including potential pitfalls; procedures for collecting and analyzing data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.623. Social Policy for Vulnerable Populations in the U.S.. 3 Credits.
Explores the social determinants underlying poor health outcomes among vulnerable populations in the U.S. and considers policy approaches to address those determinants. Explores examples of vulnerable populations including but not limited to groups facing extreme poverty, homelessness, serious mental illness, addiction, and disability. Examines definitions of vulnerability; the array of social determinants contributing to poor health outcomes among vulnerable populations in the U.S.; current U.S. social policy approaches for vulnerable populations in the areas of healthcare, disability, poverty, housing, and criminal justice policy; and the politics of social policy in the US. Provides students with opportunities for integrating social policy concepts, theories, and frameworks through an in-depth analysis of the sources of vulnerability and related policy approaches to improve health and social outcomes in specific vulnerable populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.625. Management of Nonprofit Organizations. 3 Credits.
Provides the necessary tools to effectively manage a nonprofit organization. Emphasizes financial, personnel and operations management, focusing on skills necessary to be an executive running a program within a large institution or heading an independent nonprofit agency. Addresses budgeting (both grant and organizational), reading and interpreting financial reports, grant writing techniques and staff and compensation management. Also examines how to work with the legal restraints and opportunities to maximize organizational effectiveness within the laws and regulations that make nonprofits different from the government and for-profit sectors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.636. Urban Policy. 3 Credits.
Explores urban issues through a policy lens. Examines a wide range of urban characteristics and the challenges cities face from fiscal stress and governance to poverty, homelessness, and drugs. Explores policy remedies proposed or tried in the past, how well they have worked, and what other strategies may be tried.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.640. PRACTICAL POLITICS, POLICY AND PUBLIC HEALTH. 3 Credits.
Explores how one effectively influences policy and the connection between policy and politics. Addresses how the two are related via a practical and hands-on approach, focusing on effectiveness, influencing the legislative process, and practical skills. Addresses how to approach legislators and other policy makers, gain insight into the political process, understand how bills are drafted and amended, develop persuasive arguments, and build strategic political coalitions. A sample of issues, with a focus at the state level, include: insurance regulation, reproductive rights, mental health systems, air/water quality, programs for the disabled, and gun policy. Also considers non-health care issues, including education funding and policy, transportation, criminal justice system and jails, gambling/gaming, building development, and election law.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.318.864. Current Issues in Policy Analysis. 2 Credits.
Provides policy researchers with a set of analytical frameworks to gain a greater understanding of policy issues. Explores all aspects of a topical policy issue from its origins, transformations, and impact on health and social justice. Policy topics are determined each year according to faculty interest, student need, and policy saliency. Uses case studies, policy analysis readings, and discussions to foster student learning. Some sessions focus directly on translating policy research into policy alternatives while others focus on the political and social environment
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.600. Quality Management in Health Care. 3 Credits.
Teaches students the basic concepts of quality in health care, and also equips them with approaches and skills to implement sustainable quality assurance programs in the health system. Introduces students to various quality improvement approaches (QC, QA, CQI, TQM), role of standards and norms, use of quality improvement tools, methods of quality assessment, and approaches to operationalize and implement quality assurance programs. Explains the concepts of organization for quality improvement, including Quality Teams (QT) and Quality Control Circles (QCC).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.601. Health Information Management and Decision-Making. 3 Credits.
The course provides an overview of Health Information Management System, its structure and functions. Identify information needs and indicators in the health systems and public health. Describe uses of information for effective management of health services. Review framework and organizational structure of HMIS. Provide a critical review of current issues problems in information management in the health systems in the context of developing countries. Describes various decision models and reviews decision making process in health care; application of information in performance tracking and analysis; monitoring of services and programs, supervision and impact evaluation. The course emphasizes designing health information systems and uses of IT.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.602. Project Management and Evaluation. 3 Credits.
Covers basic concepts and principles of project management and project management cycles. Provides learning opportunities for developing project management skills, and translates modern management concepts into project planning and management using a Log Frame Approach (LFA). Describes implementation structure, coordination and supervision mechanisms, and project evaluation methods. Reviews human aspects of project management such as motivating people, team building, and improving personal influence and effectiveness
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.603. Strategic Management. 3 Credits.
Presents a practical framework for formulating, implementing and controlling organizational and program strategies in public health. Provides an overview of the sub-systems, processes and models in strategic management as applicable to public health and health care organizations. Critically reviews the major environmental trends affecting healthcare organizations. Discusses how to use internal and external environmental analysis to identify the bases of sustained competitive advantage. Presents frameworks for strategy formulation and implementation including SWOT analysis and decision logic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.606. Health Economics and Cost Effectiveness. 3 Credits.
Introduces economic concepts and principles for better resource management in the health care sector. Examines the public finance approach to policy questions relating to the role of government and other stakeholders. Acquaints students with the methodologies of both cost and demand analyses. Demonstrates how to make use of such analyses in policy planning and evaluation, including practical skills in cost effectiveness analysis of public health services and programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.607. Human Resources Management for Health. 3 Credits.
Focuses on the skills necessary for managing people in the health organizations and systems. Introduces concepts of human resource management in the context of organizations including organizational characteristics, learning organizations, human resource planning, recruitment and selection, job analysis and evaluation, performance appraisal, career planning, motivation, leadership, team work, and managing employee relations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.608. Finance Management, Accounting and Budgeting. 3 Credits.
Explains the role of budgeting as a key component of the administrative process. Describes basic financial management concepts and techniques, and provides a foundation for integrating these techniques into health care organizations. Presents strategies for evaluating the financial status of a department or health unit in order to determine whether corrective actions need to be taken. Presents various analytical methods in management decision making, including benefit/cost ratio analysis, variance analysis, and break-even analysis
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.319.610. Principles of Management in Public Health. 3 Credits.
Introduces the basic principles of management in the context of public health. Covers basic management functions such as planning, organizing, implementation, coordination, monitoring, supervision, leading and controlling. Explores strategic management and decision making tools. Addresses core management areas in public health – planning, human resources management, management information systems, logistics and supply chain, financial management and budgeting, communication, and organizational culture and behavior. Discusses concepts of leadership and motivation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.601. Foundational Principles of Public Health. 0.5 Credits.
Provides a broad systematic understanding of the executive practice of public health from its inception to modern day. Uses case studies, as well as ethical and public heath practice frameworks to provide students with a grounding in “what is public health practice,” why it is important, and why it is contested.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330 (Mental Health)

PH.330.600. Racism and Public Mental Health. 1 Credit.
Presents a multi-level understanding of the effects of racism on mental health among historically marginalized racial and ethnic populations. Prepares students to gain introductory knowledge of racism, from a historical and empirical perspective, as a fundamental cause of mental health disparities. Addresses and discusses the personal and vicarious influence of racism on specific psychiatric disorders such as depression, anxiety, schizophrenia, and suicidal thoughts and behaviors.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.602. The Epidemiology of Substance Use and Related Problems. 3 Credits.
Presents an overview of the epidemiology of drug and alcohol dependence and its relevance to public health. Reviews trends in estimates of prevalence and incidence of drug and alcohol use and problems related to use. Examines factors that might influence subgroup variation and health disparities in drug use outcomes using a dynamic approach that addresses changes over time and across the life course. Explores the universe of suspected causal influences and mechanisms ranging from genetic to societal influences using a model in which transitions in stages of drug involvement are influenced by interactions between individual susceptibility and social environmental factors. Presents research methodology and recent innovations in drug and alcohol epidemiologic research. The goal of this course is further understanding of the usefulness of epidemiology for shedding light on the natural history of drug and alcohol use and the relevance of epidemiologic research to basic and clinical research
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.603. Psychiatric Epidemiology. 3 Credits.
Reviews descriptive and analytic epidemiology for major mental disorders. Examines issues of classification and nosology of psychiatric disorders, operational case definitions and measurement techniques, prevalence and incidence rates, natural history, risk factor research and plausible explanations for credible risk factors. Considers aspects of psychiatric epidemiology that illustrate important problems and concepts in epidemiology generally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.604. Seminars in Research in Public Mental Health. 1 Credit.
Integrates academic training with current research in public mental health, including etiological, epidemiologic and intervention research for mental and behavioral disorders across the lifespan. Features presentations by researchers from JHU and other research and practice institutions on the results of state of the art investigations of mental and behavioral health problems and issues of public health significance, emphasizing experimental design and methodology for analysis and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.605. Doctoral Seminar in Public Mental Health. 1 Credit.
Explores and critiques public mental health research and practice, emphasizing key constructs and methods with department faculty through presentations, readings, and group discussions. Develops professional development skills for careers in public mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.606. Digital and Mobile Health Research in Public Mental Health. 3 Credits.
Introduces students to digital and mobile health (mHealth) research in mental health. Covers a wide range of digital health topics and studies on mental and behavioral health conditions. Topics will include using digital health for research participant recruitment, assessment and data collection, as well as mental and behavioral health intervention development and delivery. Offers hands-on experience in digital and mobile health study design and data collection. Provides students a comprehensive overview over of the digital and mobile health field in mental health and encourages creative thinking about how these research methods can be applied.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.607. PREVENTION of MENTAL DISORDERS: PUBLIC HEALTH InterVENTIONS. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.608. School-Based Preventive Interventions and Research. 1 Credit.
Participants will have an an understanding of school-based prevention and research including the theoretical frameworks supporting schools as a context to address public health; the barriers and challenges to implementation of evidence-based interventions in schools; methodological implications of school-based research; and sources of funding for conducting school-based research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.609. Climate Change and Mental Health: Research, Practice, and Policy Perspectives. 3 Credits.
This course will introduce mental health concepts of disorder, distress, well-being, and resilience in the context of climate change. Online course sessions will be structured around three pillars: 1) climate change exposures and their impacts on mental health and well-being, 2) social and environmental justice in climate change and mental health, 3) resilience, psychosocial adaptation, and action. Lectures will be given by research, policy, and mental health practice experts. Research findings on direct and indirect mental health and psychosocial impacts of chronic and acute climate change exposures will be presented. Sessions will explore inequalities in climate change impacts on mental health with examples provided from across local and global social and economic contexts. Individual and community-level resilience, psychosocial adaptation, and areas of priority action will be defined, highlighted, and discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.610. Knowledge for Managing County and Local Mental Health, Substance Use, and Developmental Disability Authorities. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.611. Writing Publishable Manuscripts for the Social and Behavioral Sciences. 2 Credits.
Provides training in the preparation of manuscripts for submission to peer-reviewed journals, with a focus on empirical papers and systematic reviews. Develops students' ability to serve as reviewers and critically evaluate the written work of peers. Covers topics relevant to effective communication and dissemination of ideas, including journal selection, preparation of cover letters, and responses to reviewers. Incorporates student critiques of other students' works in progress and writing accountability group (WAG) activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.612. Introduction to Behavioral and Psychiatric Genetics. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.613. Mental Health and the Gut. 2 Credits.
Explores the strong, bidirectional communication between the gastrointestinal tract and the brain. Reviews the role of the microbiome in shaping brain health, the link between gastrointestinal symptoms and mental health, and new and seminal research on the brain-gut connection in specific psychiatric disorders such as schizophrenia, depression, and autism spectrum disorders. Students will learn to read and critique literature on this subject, and will learn the basics of how to design and analyze a study on the microbiome and mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.614. Advanced Latent Variable Modeling: Matching Model To Question. 3 Credits.
Reviews concepts, key assumptions, and published applications of advanced latent variable methods commonly used in psychology or mental health research including growth mixture models, latent class analysis with covariates and distal outcomes, and latent transition analysis. Acquaints students with the current state of science related to latent variable methods, which is a quickly advancing field, and gives students the tools they need to build an appropriate latent model for their research question. Topics include growth mixture modeling, latent class regression, latent transition analysis, multi-level models, and measurement invariance. Presents students with examples from psychological, mental health, and developmental datasets with applications in the behavioral and social sciences. Students will apply lessons from didactic lectures in assignments and class projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.615. Mental and behavioral health: from birth to early adulthood. 1 Credit.
Introduces students to the field of developmental psychopathology and its fundamental concepts and theoretical perspectives, including sensitive periods and the role of early experiences, risk, and resilience, and developmental pathways. Addresses factors that contribute to the development of psychopathology, including temperament, genetics, neurobiological processes, and social influences at the family, peer, and neighborhood levels. Discusses the contributions of individual-specific and contextual factors on the development of internalizing, externalizing, and substance use disorders across the childhood, adolescent, and emerging adulthood years.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.617. Psychopathology for Public Health. 3 Credits.
Examines the major mental disorders, emphasizing the current thinking regarding their essential features and their assessment in public health research. Class sessions include lectures by the instructor and by experts in particular disorders. Reviews best-practice non-pharmacological and pharmacological approaches to the treatment of disorders, and commonly-utilized measures in public health and clinical contexts, including self- and informant-report measures, clinician-administered scales, and structured interviews.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.618. Mental Health in Later Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.619. Psychiatric Genomics. 3 Credits.
Addresses the rapidly changing landscape of the study of complex genetics diseases. Students explore the current state of the quantitative issues in complex disease genetics, so that they can translate their experiences into research practice. Analyzes genome-wide association scans, epigenetics, and next-generation sequencing, as well as approaches to power calculation, including the use of simulation. Students study the current literature as well as examples from real data sets. In addition to learning the analytic techniques, students also become familiar with the assumptions and limitations of these approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.620. Qualitative and Quantitative Methods for Mental Health and Psychosocial Research in Low Resource Settings. 3 Credits.
Introduces mental health as an integral part of global health research, including using qualitative and quantitative methods to conduct needs assessments and to monitor and evaluate interventions. Presents and critiques qualitative strategies for integrating local cultural perspectives into research models. Examines qualitative and quantitative methods of adapting psychiatric assessment tools for use cross-culturally and presents challenges for developing interventions for use in low-resource contexts. Encourages use of critical and creative thinking skills throughout to discuss the issues involved in this important area of study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.621. Mixed Methods for Research in Public Health. 2 Credits.
Introduces students to the field of mixed methods research, which can be thought of as research in which investigators combine quantitative and qualitative research techniques, methods, approaches, concepts or language into a single study or program of research. Focuses on applications in mental health services research. Acquaints student with the logic of inquiry, which includes the use of induction (discovery of patterns), deduction (testing theories and hypotheses), and abduction (uncovering and relying on the best of a set of explanations for understanding results). Explores which questions lend themselves to mixed methods research. Discusses mixed designs and methods, and writing. Students critique mixed methods manuscripts and proposals, and can outline a mixed methods study based on their own program of research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.622. Neuroimaging: Methods and Applications in Mental and Behavioral Health. 3 Credits.
Provides an introduction to neuroimaging methods, relevance and possible implementations of these methods and background to critically evaluate neuroimaging applications in mental and behavioral health research. Introduces basic principles of neuroimaging as applied to human subjects research and specifically public health research. Reviews various imaging applications in the context of their specific methods, source of signal, goals and limitations, and research design and statistics and relevance to mental and behavioral health. Encourages critical evaluation of neuroimaging methods in public mental and behavioral health through review of published studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.623. Brain and Behavior in Mental Disorders. 3 Credits.
Examines the onset and clinical symptoms of mental disorders over the life course of the developing and aging brain to illustrate neurobiological systems involved in thinking, feeling, and acting. Increases understanding of behavioral disorders, their assessment, neurobiological underpinnings, and systemic influences. Reviews some common disorders, discussion (1) clinical and case studies; (2) definitions and diagnostic methods; treatment, epidemiologic evidence regarding etiology, and (3)challenges to examining brain-behavior relationships across disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.625. Mobile Mental Health Research: Planning and Conducting Ecological Momentary Assessment. 1 Credit.
Introduces mobile health (mHealth) approaches and methods to study human health behavior and mental health in near real-time and everyday life. Provides a brief overview of Ecological Momentary Assessment (EMA) studies and critical study design considerations. Gives students hands on experience setting up a small EMA study using freely available online software and smartphone apps.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.626. Propensity Score Methods in Non-Experimental Research in Mental Health. 1 Credit.
Discusses the importance of the careful design of non-experimental studies, and the role of propensity scores in that design, with the main goal of providing practical guidance on the use of propensity scores in mental health research. Covers the primary ways of using propensity scores to adjust for confounders when estimating the effect of a particular “cause” or “intervention,” including weighting, sub classification, and matching. Examines issues such as how to specify and estimate the propensity score model, selecting covariates to include in the model, and diagnostics. Draws examples from school-based prevention research, drug abuse and dependence, and non-randomized treatment trials, among others. Primarily emphasizes non-experimental studies; however, also discusses applications to randomized trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.628. Gaps and Opportunities in Public Mental Health: A Systems Approach. 3 Credits.
Acquaints students with mental health systems and the development of a comprehensive approach to the delivery of services to a variety of vulnerable populations living in difficult conditions in the community. Topics include a survey of the variety of current mental health services and evidence-based approaches, the impact on services of governance, organization and financing of services including a primer on Medicaid and Medicare, the link between poverty and mental health and the use of jails as mental asylums, the development of a competent workforce and an introduction to international community mental health issues. Features discussion and problem solving and involves a high degree of interaction between the participants as well as several field trips.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.629. Mental Health in General Medical Settings. 1 Credit.
Provides an overview of barriers to mental health care. Introduces evidence-based models of integrated physical and mental health care. Describes an array of mental health interventions that can be delivered in general medical settings (e.g., screening, brief intervention, case management, etc.), and evaluates the evidence supporting the use of such interventions. Explores integrated care in special settings (e.g., low- and middle-income countries, substance use care, emergency department).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.630. Stigma and Mental Health: Issues and Interventions. 1 Credit.
Provides a broad understanding of the interrelationship between stigma and mental health. Focuses on health consequences of stigma for individuals living with mental health disorders. Introduces students to intervention strategies for reducing mental health-related stigma at different health systems and ecological levels, with a focus on the role of mental health service users in stigma reduction. Prepares students to incorporate anti-stigma approaches into their own work.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.631. LATENT CLASS ANALYSIS AND REGRESSION FOR MENTAL HEALTH RESEARCH. 2 Credits.
Addresses latent class analysis, a latent variable method often used in Mental Health research to identify latent groups of individuals based on patterns of categorical observed variables. Use of additional variables to predict latent class membership will also be explored. Includes discussion of examples from the mental health literature as well as hands-on model-fitting using MPLUS. Latent class analysis is a method of modeling categorical latent variables, such as psychiatric diagnoses, as a function of a set of categorical observed variables.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.632. Grant Writing: NIH and Other Funding Sources. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.633. DEVELOPING AND USING LOGIC MODELS/THEORY OF CHANGE FOR BEHAVIORAL HEALTH AND VIOLENCE PREVENTION PROGRAMS. 1 Credit.
Developing and Using Logic Models/Theory of Change for Behavioral Health and Violence Prevention Programs. Introduces the concept of the logic model/theory of change in the development of programming and in the creation of grant applications. Reviews logic models/theory of change strategies from existing programming related to the prevention of behavioral health problems/violence or the treatment/remediation of behavioral health problems/violence/trauma. Discusses strategies for using the logic model/theory of change to build effective teams.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.634. Stigma and Public Health: Issues and Interventions. 3 Credits.
Provides a broad understanding of the public health impact of stigma and discrimination related to a variety of identities and health conditions. Introduces students to frameworks for understanding stigma (including intersectionality), strategies for characterizing and measuring stigma, and intervention approaches for reducing stigma and discrimination at different ecological levels with the goal of improving health equity, access to quality healthcare services, and promoting psychosocial wellbeing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.635. Conflict Resolution Skills in Mental Health. 1 Credit.
Examines the dimensions of conflict in the mental health field including, but not limited to assessing one's personal conflict style; dynamics and elements of negotiation; power disparities; conflicting parties' positions, needs, and interests; Mediation--stages, behaving as a mediator, facilitating agreements; dealing with impasse; techniques to re-frame disputes; dealing with high emotions; ethical dilemmas; conflict coaching; and designing conflict prevention and resolution systems in mental health agencies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.636. Methods for Handling Missing Data in Psychosocial Research. 1 Credit.
Since analyses that use just the individuals for whom data is observed can lead to bias and misleading results, students discuss types of missing data, and its implications on analyses. Covers solutions for dealing with attrition (non-response) and missingness on individual items. These solutions include weighting approaches for unit non-response and imputation approaches for item non-response. Emphasizes practical implementation of the proposed strategies, including discussion of software to implement imputation approaches. Examples come from school-based prevention research as well as drug abuse and dependence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.637. Causal Mediation Analysis. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.638. The Science of Narrative: Why Storytelling Is Important to Research. 1 Credit.
Introduces the basic components of storytelling. Examines the science within the narrative arts. Challenges students to present the art within public health sciences. Emphasizes critical perspective on how nuances and merits of public health research should be expressed to relevant audiences, including community members and policymakers. Explores why storytelling is a powerful modality for conveying uncommon knowledge and insight in a manner that appreciates common experiences. Prepares students to combine data and narrative while acknowledging both as essential to effective public health advocacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.639. The Intersection of Mental and Physical Health. 3 Credits.
Addresses the epidemiology, consequences, measurement, and implications for health service delivery of co-morbidity of mental and physical disorders. Employs a conceptual framework that emphasizes the potential psychological, behavioral, social, and biological mechanisms through which mental and medical illness interact to cause disability and death. This model has implications for development of new service delivery models that integrate the care of mental health disorders into the care of medical conditions such as cancer, cardiovascular disease, and diabetes. Students interact with investigators and clinicians in lecture format, examine case studies, and generate a paper related to a medical-psychiatric co-morbidity of their choosing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.640. Childhood Victimization: A Public Health Perspective. 3 Credits.
Examines childhood victimization across a wide spectrum of victimizations, including sexual and physical abuse, peer and sibling assaults, witnessing domestic violence and verbal abuse and neglect. Acquaints students with the epidemiology of childhood victimization, reviews existing victim and perpetrator-focused interventions, and explores established emerging prevention strategies. Reviews legal policies aimed at reducing childhood victimization, their strengths and weaknesses, and challenges to the notion that childhood victimization is, or can be, effectively addressed solely or primarily via criminal justice interventions
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.641. The Epidemiology of Substance Use and Related Problems. 1 Credit.
resents an overview of the epidemiology of substance use and substance use disorders within a public health framework. Initially we review how drugs are classified and regulated and then we examine trends in estimates of prevalence of use and use disorders. Covers the most common drugs of abuse, including alcohol, tobacco/nicotine, cannabis, opioids, and cocaine. Included are lectures from those with expertise in specific drugs or areas of study within substance use epidemiology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.642. Manuscript Writing for the Social and Behavioral Sciences. 1 Credit.
Trains students to prepare manuscripts for submission to peer-reviewed journals with a focus on empirical papers. Discusses topics relevant to effective communication and dissemination of ideas, including journal selection.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.643. The Science of Narrative: Intersectionality of Storytelling and Public Health. 2 Credits.
Introduces the basic components, concepts, and frameworks of storytelling. Examines the science within the narrative arts. Challenges students to present the art within public health sciences. Emphasizes critical perspective on how nuances and merits of public health research should be expressed to relevant audiences, including community members and policymakers. Explores why storytelling is a powerful modality for conveying uncommon knowledge and insight in a manner that appreciates common experiences. Explores approaches that capture narratives for health research and practice. Prepares students to combine data and narrative while acknowledging both as essential to effective public health advocacy. Encourages a re-imagination of public health's epistemology, pedagogy, and methodology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.646. Autism Spectrum Disorder in Public Health. 2 Credits.
Since the number of children with an autism spectrum disorder (ASD) has increased dramatically over the past two decades and is now a major public health issue, students learn about the state of the science of autism epidemiological and etiological research, and the emerging questions for Public Health. Students also learn about prescriptive epidemiology, genetics, environmental risk factors, and prognosis of ASD, as well as long-term outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.647. Childhood Victimization: An Overview of Public Health Efforts. 1 Credit.
Examines childhood victimization from a public health perspective. Familiarizes students with public health strategies used to address three related domains: detection and prevention, treating victims, and offender interventions. Challenges students to critically examine policy and practice, using cases such as the Penn State sex abuse scandal. Uses small group break-out sessions to help familiarize students with the public health approach to violence prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.648. Child and Adolescent Psychopathology. 1 Credit.
Reviews, in detail, the current and historic role of government as funder, regulator, and provider of mental health services in the United States. Highlights a number of critical dimensions of public mental health programs, including, but not limited to, the organization of services for children, adults, and aging adults; substance abuse services; specialty services designed to enhance long-term recovery support and community integration; supported housing; and integrated behavioral health and primary care. Focuses on the role other public agencies, working in parallel and integrated with public behavioral health agencies, such as Social Services, Social Security, Corrections, Juvenile Justice, Public Health, and Medicaid. Features an overview of public agencies, peer (current and former mental health clients) operated services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.649. Investigating Behavioral Health Outbreaks and Epidemics. 1 Credit.
Introduces outbreak investigation, with a focus on outbreaks and epidemics of behavioral health problems such as substance use, mental health, violence, and neurocognitive disorders. Provides hands-on experience through a practice investigation that uses examples and data from a real outbreak of lung injuries linked to use of e-cigarettes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.650. Methods in Implementation Science. 3 Credits.
Introduces methods, research designs and evaluation approaches that can be used to study implementation science questions. Includes an introduction of methods such as mixed-methods, measurement validity and reliability, randomized and non-randomized designs, and simulation studies using examples from mental and behavioral health settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.651. How to Derive a Polygenic Risk Score. 2 Credits.
Explores what polygenic risk scores are, and what they have revealed to date about human genetic mental health outcomes, with computer laboratory exercises to step-by-step develop the tools needed to create and analyze these scores with genetic study data. Includes creating summary statistics and descriptive figures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.655. Applying the DHHS Healthy People 2020 Model of Health Determinants. 1 Credit.
Presents the model of health determinants, and focuses on the effects on population health and community and personal wellbeing. Explores the health determinants model introduced by the US. Department of Health and Human Services Healthy People 2020 Committee. Discusses the model which links negative social and physical determinants of health, such as abuse, lack of social support, or poor-quality living conditions, with trauma responses, and then with behavioral and health conditions. Discusses population health as an approach to understanding and intervening in this system to prevent trauma and subsequent illness. Examines the dimensions of wellbeing to reflect subsequent health status.Introduces and explores the model and several areas of application.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.657. Statistics for Psychosocial Research: Measurement. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.658. Mental Health and Psychosocial Support in International Humanitarian Settings. 2 Credits.
Explores key issues in the development and evaluation of mental health and psychosocial support interventions with populations affected by humanitarian crises, such as natural disasters and armed conflicts. Discusses such questions as: 'how do populations in diverse socio-cultural settings define mental health in the context of humanitarian crises?'; 'How can we build on existing resources and practices that promote mental health in humanitarian crises?'; 'What is known from epidemiological and intervention studies about common mental health problems and effective interventions in humanitarian settings?'. Challenges participants to reflect on translating science to practice, and vice versa. Course methods entail a mix of multimedia presentations and case discussions, focusing on real-world experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.659. Current Issues in Military Mental Health. 1 Credit.
Explores issues in mental health affecting U.S. military personnel and veterans over more than a decade of war. Presents an overview of the epidemiology of mental disorders and suicide within military populations. Critically reviews existing epidemiological studies and the current military psychiatric epidemiology literature. Introduces military mental health data systems used for surveillance and research. Discusses challenges in prevention and service delivery. Explores the significance of traumatic brain injury. Reviews evolving practices in deployment mental health screening. Addresses controversial topics including the practice of polypsychopharmacy, multiple deployments, recruitment, retention, and separation policies, and the role of the all-volunteer force. Examines current issues in the care of military veterans, including homelessness, suicide, and substance abuse.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.660. Grant Writing for the Social and Behavioral Sciences. 3 Credits.
Targets the development of effective research proposals in public mental health, including the identification of research questions, factors related to significance and innovation, study design, and analytic approaches. Reviews of research proposals and articles address issues such as topic selection, sample selection, measurement , and analytic strategies. Reviews strengths and weakness of proposals and studies and considers recent advances in epidemiologic and statistical methods as alternative approaches for addressing research questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.661. Social, Psychological, and Developmental Processes in the Etiology of Mental Disorders. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.662. Public Mental Health. 2 Credits.
Provides an overview and framework for the full spectrum of public mental health. Presents key concepts in public health applied to mental and behavioral health and disorders. Discusses the causes and consequences of mental health disorders, the frameworks for understanding the origins of these disorders, strategies for treatment and prevention, and issues related to health services and policy for mental and behavioral health
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.663. Mental and Behavioral Clinical Practice Exposure. 2 Credits.
Introduces students to the mental health/behavioral care clinical settings. Acquaints students with the therapeutic relationship that exists between clinician and patient. Presents opportunities for shadowing and research partnerships with clinicians. Provides access to potential clinical data sets for exploration and analysis. Emphasizes practical hands-on experience over didactic secondary exposure. Challenges student notions of the psychiatric patient and their care, while destigmatizing both the illnesses and the treatment processes. Encourages creative hypothesis generation grown from observation of solvable challenges experienced in the field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.664. Introduction to Mental Health Services. 3 Credits.
Examines issues in mental health care utilization, including definition of need for mental health care, concerns about the treatment gap in the community, treatment seeking and barriers to care (most importantly stigma and financial barriers) and treatment seeking models and predictors of mental health treatment-seeking in community settings. Introduces students to the study of delivery of mental health care, including historical trends in the delivery of mental health care in the US, the mental health care system's governance and financing, quality and outcomes of mental health care and mental health services for children and older adults and treatment services for substance disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.665. Climate Change and Mental Health. 1 Credit.
Introduces mental health concepts of disorder, distress, well-being, and resilience that warrant consideration in the context of climate change. Structured around chronic and acute climate change exposures, including rising temperatures, rising sea levels, and disasters, such as floods, hurricanes, and wildfires. Explores mental health impacts of particular climate change exposures with examples from across high-, middle-, and low-resource contexts. Includes discussion of social inequalities on the impacts of climate change on mental health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.666. Sleep and Public Health. 1 Credit.
Provides a foundation of knowledge concerning the basics of sleep, how sleep changes across the lifespan, how it is measured, its links to physical and mental health, important sociodemographic sleep disparities, and implications for public health and policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.667. Mental Health and the Law. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.668. Complex Systems Thinking in Aging Research: Fundamentals and Methods. 1 Credit.
Trains students on the fundamentals of systems thinking. Considers key aging-related health outcomes from a systems science lens. Examines basic systems models (dynamic models, agent-based models, social network models). Examines application of systems thinking on evaluating health programs and polices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.669. Epidemiology of Major Mental Disorders. 2 Credits.
Presents an overview of the epidemiology of anxiety and mood disorders, schizophrenia and associated syndromes, affective psychosis including bipolar disorder, and dementia and related syndromes. Prepares students who have basic knowledge of the clinical features of the syndromes, but will touch briefly on issues of assessment in the context of epidemiology. It includes the fundamentals of descriptive epidemiology for each syndrome (prevalence, incidence, natural history); consequences of the syndromes for impairment, disability, and general health; and an assessment of risk factors for the syndromes, including a discussion of the genetic epidemiology of the syndromes. Examines the special conceptual challenges for the field of epidemiology which are presented by the mental disorders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.670. Creating Trauma Informed and Healing Policies and Practices. 1 Credit.
Provides a broad overview of the challenges presented by traumas including COVID-19 and violence. Reviews how trauma, including COVID-19 and violence, impacts clients, patients, participants in programs or community activities, and those leading these services, supports, and activities. Describes policies and practices that are healing and trauma-informed. Examines opportunities and challenges for creating more healing and trauma-informed organizations, programs, and policies and the challenges encountered. Prepares students to positively impact their own programs, organizations, and activities and to provide consultation to others interested in creating more healing and trauma informed polices, practices, and activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.671. Traumatic Pasts but Hopeful Futures: Resilience and Positive Youth Development in the Context of School-Based Mental Health. 1 Credit.
Introduces research on resilience and youth development that addresses adolescent mental and behavioral health for at-risk youth using the definitions, theories, and measurement of resilience. Focuses on how a framework of positive youth development can inform school-based, universal interventions to build youth resilience, promote self-efficacy, and reduce disparities in youth mental health. Includes discussion of how we can use these frameworks to address mental and behavioral health inequities are exacerbated by the COVID-19 epidemic and protests against structural racism and police brutality.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.672. Evaluation of Mental Health Service Systems. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.673. Prevention Research in Mental Health. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.674. Suicide As A Public Health Problem. 3 Credits.
Introduces students to the following content areas with regard to suicide: history and theories; epidemiology; etiological factors and mechanisms; clinical phenomenology and comorbid disorders; assessment of suicidal behaviors; special populations; preventive and treatment interventions; ethical issues on the conduct of research on suicidal populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.675. Suicide Prevention: Problem Solving Seminar. 3 Credits.
Explores the following suicide-related topics: history, frameworks and theories; epidemiology, etiological factors and mechanisms; national and local suicide data sources; policy and preventive interventions; high-risk populations; common barriers and challenges to implementing and sustaining suicide prevention. Introduces leadership and management competencies including organizational change and strategic plans. Presents strategies for designing systems-level interventions. Engages students in interprofessional team approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.677. Translation of Mental Health Research Into Field-based Public Health Interventions. 2 Credits.
Provides a broad overview of how evidence-based mental and behavioral health interventions are being interwoven into education, health, and community programs in the United States and around the world in order to prevent or intervene with issues of interpersonal violence and trauma-related disorders and promote well-being and mental health resiliency. Introduces examples for different populations across the lifecourse and in different US and global contexts. Addresses challenges of integrating and scaling up interventions in non-clinical settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.680. Promoting Mental Health and Preventing Mental Disorders in Low- and Middle-income Countries. 3 Credits.
Focuses on research and intervention approaches in low- and middle-income countries in the field of mental health prevention and promotion. Particularly emphasizes populations exposed to adversity, and challenges students to bridge the gap between research and practice in this area. Discusses the determinants of mental health, and how they can be targeted: at different life stages and different socio-ecological levels (e.g., family, school, and neighborhood). Addresses such questions as ‘What is resilience, and how can it be promoted?’, ‘How can interventions prevent depression in women exposed to intimate partner violence?‘, and ‘How do poverty, violence and malnutrition impact mental health?‘. Uses real-world examples, and follows a case method approach.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.681. Mental Health and Psychosocial Needs of Refugees After Resettlement in High income Countries. 1 Credit.
Provides a broad understanding of the refugee resettlement process and presents data on the epidemiology of mental health and psychosocial problems among refugees resettled in high income countries like the U.S. Introduces methods for measurement and evaluation of these problems and prepares students to be able to design mental health studies among this population. Explores mental health treatment options and service utilization among resettled refugees in high income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.682. PRINCIPLES AND PRACTICES OF HARMONIZATION IN MENTAL HEALTH RESEARCH. 2 Credits.
Introduces concepts and key assumptions of item response theory (IRT). Explores novel applications of IRT to refinement of measures, assessment of differential item functioning, computer adaptive testing, and calibration of metrics across diverse samples. Students apply lessons from didactic lectures in a laboratory setting using prepared examples. Original data are welcome.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.685. Introduction to Screening for Behavioral Health Conditions. 1 Credit.
Describes the application of screening to different behavioral health conditions across the life course. Reviews key psychometric properties of screening tools. Introduces the desired diagnostic, treatment, and health-related outcomes of screening. Discusses possible harms and drawbacks of behavioral health screening for different stakeholders. Encourages critical thinking when reading empirical research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.688. Public Health and the Good Life. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.690. Applications and Analysis of Epigenetic Data in Public Health Research. 1 Credit.
Presents applications of epigenetic measurement in public health research. Begins by providing a rationale for such work, then describing measurement tools, from single-site methylation typing, to array-based methods, and whole-genome sequencing. Study design options, quality control analyses, and association analyses will then be presented. Examples based on both mental and physical health outcomes will be used.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.698. Strategies for Success: Public Mental Health Career Development and Beyond. 1 Credit.
Provides MHS students with the structure, resources, and support needed to start building a career in Public Mental Health. Explores career options, resume development, interview skills, networking, and salary negotiation through lectures and small-group activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.700. Public Health Approaches in Autism and Developmental Disabilities. 3 Credits.
Examines public health approaches to the assessment, etiology, services, and policy issues related to autism and developmental disabilities. Introduces the state of the science of autism and developmental disabilities epidemiology, and emerging questions for Public Health. Includes presentations and discussions of current information on descriptive epidemiology, genetics, environmental risk factors, and prognosis of ASD. Presents research on long-term outcomes in individuals with ASD. Provides an overview of research progress to date and points to challenges as we work to learn more about this enigmatic neurodevelopmental disability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.800. MPH Capstone Mental Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.802. Seminar on Aging, Cognition and Neurodegenerative Disorders. 2 Credits.
Addresses age-related cognitive and neuropsychiatric disorders that are of particular importance with the rapid expansion of the aging population. Focuses on the major domains of cognition and comparison of the age-related changes that occur in each cognitive domain. Includes emphasis on contrasting the major neurodegenerative disorders related to age and describing the clinical presentation and pattern of cognitive change in each condition. Participants address current strategies for maximizing cognitive function with age and treatment strategies for the primary neurodegenerative disorders. Examines and identifies gaps in knowledge and research approaches to fill these gaps. Explores concepts of cognitive systems, animal and imaging models, and neuropathological changes associated with aging and with disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.805. Seminar on Statistical Methods for Mental Health. 1 Credit.
Discusses recent advances in statistical methods in mental health. Includes student and faculty presentations as well as discussions of recent articles in the literature. Includes topics: missing data, longitudinal data analysis, causal inference, and measurement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.811. MHS Thesis in Mental Health: from Proposal to Publication I. 1 Credit.
Students are required to conduct a systematic review of the literature or a data-driven paper in partial fulfillment of the Master of Health Science (MHS) degree in the Department of Mental Health. Students will be provided with basic research and organizational skills needed for successful completion of the MHS project. Topics include: conducting a systematic review or literature review for data driven papers, selecting an appropriate research design, and interpreting findings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.812. MHS Thesis in Mental Health: from Proposal to Publication II. 1 Credit.
Students are required to conduct a systematic review of the literature or data-driven paper in partial fulfillment of the Master of Health Science (MHS) degree in the Department of Mental Health. Emphasis is placed on revision and dissemination of the final project. Topics include: Selecting an outlet for dissemination (e.g., journal submission, conference presentation) and writing assignments (e.g., cover letter, abstract for conference).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.820. Thesis Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.830. Postdoctoral Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.840. Special Studies and Research Mental Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.895. MPH Practicum: Mental Health. 1 - 4 Credits.
The MPH Practicum is a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.330.990. Computer Lab: Epigenetic Data in Public Health Research. 1 Credit.
Offers hands-on computer lab experience analyzing epigenetics data using quality control and statistical association analyses presented in the course, 330.690 Applications and Analysis of Epigenetic Data in Public Health Research. Real and simulated data will be used to demonstrate software that will implement particular programs. Software applications will primarily use the R statistical environment and packages in BioConductor.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340 (Epidemiology)

PH.340.600. Stata Programming. 2 Credits.
Teaches Stata programming in a systematic way to students who have had exposure to Stata or another statistical package, but may not have the tools to perform complex analytical projects independently. Covers data management, programming concepts, procedural programming, Stata-specific commands and constructs, and project workflow.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.601. Principles of Epidemiology. 5 Credits.
Introduces principles and methods of epidemiologic investigation of infectious and noninfectious diseases. Illustrates methods by which studies of the distribution and dynamic behavior of disease in a population can contribute to an understanding of etiologic factors, modes of transmission, and pathogenesis. Presents different types of study design, including randomized trials, case-control and cohort studies, risk estimation, and causal inferences. Demonstrates the relationship between epidemiology and the development of policy. Laboratory problems provide experience in epidemiologic methods and inferences, illustrating a common-vehicle epidemic; the spread of infectious disease in school, home, and community; epidemiological aspects of a noninfectious disease; vaccination; the epidemiological approach to health services evaluation; rates of morbidity and mortality; sensitivity and specificity; and life table methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.602. Intermediate Epidemiology. 3 Credits.
Covers key principles, designs and methods of observational epidemiology studies. Includes a description of general designs of the main observational studies (birth cohort analysis, ecologic studies, cohort, case-based case-control studies, case-control studies within a defined cohort, and case-crossover studies), measures of disease frequency (cumulative incidence, rate and odds) and of association (relative risk, odds ratio), evaluation of confounding and interaction, types of bias, and the most often used methods of adjustment for confounding effects and their assumptions. Employs lectures and group discussions of exercise
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.604. Introduction to -Omics in Public Health. 2 Credits.
Introduces quantitative scientists to how “omics” can address public health questions. Reviews basic biology concepts for –omics with a focus on genomics, epigenomics, transcriptomics, and metabolomics. Presents commonly used –omic measurement methods and data preprocessing tools. Discusses challenges that may arise in data analysis due to data measurement issues as well as interpretation of results.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.606. Methods for Conducting Systematic Reviews and Meta-Analyses. 4 Credits.
Presents basic methods in the qualitative and quantitative meta-analysis, including formulating a hypothesis that can be addressed via meta-analysis, methods for searching the literature, abstracting information, and synthesizing the evidence. Includes Bayesian and likelihood approaches to meta-analysis quantitative methods. Emphasizes essential steps of conducting systematic reviews through hands-on exercises. Focuses on analytical skills in performing meta-analyses and network meta-analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.607. Introduction to Cardiovascular Disease Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.608. Using Big Data for Epidemiologic Research in Health Care. 0.5 Credits.
Demonstrates a practical approach to big data: where to find it, how to store and analyze it, and why to use it. Provides a technical overview of the utilization of big data with the inclusion of several case examples and inclusion of industry leaders in the application of big data to health care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.609. Concepts and Methods in Infectious Disease Epidemiology. 3 Credits.
Develops deeper understanding of the concepts and quantitative methods unique to infectious disease epidemiology. Builds upon the concepts and methods of general epidemiology and knowledge of specific infectious diseases. Topics include disease emergence, transmissibility and the basic reproductive number, transmission patterns and serial intervals, seasonality, virulence, heterogeneity in hosts and pathogens, herd immunity, diagnosis of infectious diseases, co-infections, and phylodynamics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.610. The One Health Approach to Epidemiology and Global Public Health: Problem Solving Seminar. 3 Credits.
Introduces students to the One Health approach to public health research and practice, providing examples of how evidence shapes public health policy and health promotion, from the local to the global scale. Students will practice strategic thinking and decision making in translating evidence to behavior and policy and will have the opportunity to interact with guest speakers working in One Health fields.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.612. Epidemiologic Basis for Tuberculosis Control. 2 Credits.
Considers subjects and epidemiologic principles relevant to control measures against tuberculosis. Includes the following topics: diagnosis of TB infection and disease; risk factors and epidemiology; prevention by case-finding and treatment, vaccination, and preventive therapy; pediatric TB; TB modeling; and elements of control programs in low-, middle-, and high-income settings. Offers lectures, group discussions, and review of the tuberculosis literature as the primary components.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.613. Design and Conduct of Clinical Trials. 2 Credits.
Introduces clinical trial design in the context of epidemiological concepts, covers various topics in the design and conduct of clinical trials, and profiles clinical trials that illustrate these issues. Topics include the definition and history of clinical trials; trial designs, including phase III-IV, cross-over, factorial, and large, simple designs; internal and external validity; controls, randomization, and masking; ethical issues; introductions to data collection and management and analysis principles; monitoring of trials for safety and efficacy; and use of clinical trial data in healthcare decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.614. Conducting Epidemiologic Research. 2 Credits.
Covers applications of epidemiologic principles in the conduct of observational studies as taught in advanced epidemiologic methods. Focuses on developing skills to conduct and manage a research protocol, monitor data collection, manage data and disseminate results. Covers components of a clinical research team, responsibilities, expertise and tasks study members perform, and organizational, logistical and attitudinal issues that need to be addressed in producing an effective research group. Topics include infrastructure needed for single-site and multi-site studies, selection bias and analytical intent in the determination of populations and methods for recruitment, development of a manual of operations and forms for data collection and administration, data management tools, implementation and review of quality assurance, specimen repository tracking, and useful statistics for evaluating the progress of the study.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.615. Understanding the Relevance of New Analytical Methods to Epidemiological Research. 2 Credits.
Provides a basis for understanding how new analytic methods are relevant to epidemiologic research. Explores methods in "plain English" in order to focus on utility of the methods as well as how to interpret analyses as they are applied to research. Addresses the assumption of the methods and big picture pros and cons.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.616. Epidemiology of Aging. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.617. Pharmacoepidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.618. Epidemiology: the Basics. 3 Credits.
Introduces the population science of epidemiology, including methods and approaches to measurement and outcomes, study design and inference, risk estimation, and surveillance. Provides the essential elements of epidemiology as appropriate for public health scientists.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.619. Topics in Pharmacoepidemiology. 2 Credits.
Introduces the key elements of pharmacoepidemiology. Explores the utilization and effects of drugs in large numbers of people and the application of epidemiological methods to pharmacological issues. Focuses on questions of drug safety and effectiveness, concentrating on clinical patient outcomes and on evaluating the use of therapies. Applies the research methods of clinical epidemiology (e.g., randomized trials, cohort studies, case-control studies, use of secondary data, attention to biases and confounding, effects of non-adherence, active and passive surveillance for adverse events) to study medication exposures and outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.620. Principles of Clinical Epidemiology. 2 Credits.
Presents lectures and interactive sessions designed to expose students to basic principles of clinical epidemiology and introduce key methods utilized in clinical outcomes research. Focuses on principles and methods in clinical epidemiology which would be most utilized by clinicians/clinician researchers for screening and diagnosis of illness as well as for prognostication and decision-making. Introduces methods and issues in studying clinical epidemiology in health care settings (e.g. administrative data).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.623. Cancer Epidemiology, Prevention, and Control. 2 Credits.
Emphasizes the role of epidemiology in cancer prevention and control. Compares and contrasts the descriptive epidemiology, natural history, and pathologic and biologic characteristics of selected common cancers, as well as factors related to their etiology. Discusses the influence of environmental and genetic factors and their interplay on the development of cancer together with the epidemiologic issues involved in their investigation. Provides overview of problems involved in cancer prevention and screening.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.624. Etiology, Prevention, and Control of Cancer. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.627. Epidemiology of Infectious Diseases. 4 Credits.
Introduces the basic methods for infectious disease epidemiology and case studies of important disease syndromes and entities. Includes definitions and nomenclature, outbreak investigations, disease surveillance, case-control studies, cohort studies, laboratory diagnosis, molecular epidemiology, dynamics of transmission, and assessment of vaccine field effectiveness. Focuses case studies on acute respiratory infections, diarrheal diseases, hepatitis, HIV, tuberculosis, sexually transmitted diseases, malaria, and other vector-borne diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.628. Social Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.629. The Epidemiology of LGBTQ Health. 3 Credits.
Introduces constructs of sexual orientation and gender identity in the context of public health. Explores historical, epidemiological, and social perspectives related to the physical and mental health of lesbian, gay, bisexual, transgender and queer (LGBTQ) individuals and communities. Orients students to current and historic epidemiological and contextual issues that shape what is known about LGBTQ health, presents an overview of LGBTQ health disparities and interventions, and develops a foundation for critical thinking about LGBTQ health research and intervention potential.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.630. Topics in Social Epidemiology. 2 Credits.
Provides a systematic and selective overview of conceptual approaches and research findings related to the impact of social context and social phenomena on health. Sessions highlight a different area of frontier social epidemiology research. Social processes examined include 1) social inequalities (including social class differences as well as the effects of income inequality), 2) social networks, 3) neighborhood and urban characteristics, 4) gender inequalities and 5) macro-social changes. Discusses global health approaches to social determinants of health including research experiences from different parts of the world. Includes discussion of methods related to the study of social epidemiology; however, this is not intended to be a methods course. Includes limited lecture matter and thorough group discussions on selected classic papers and latest readings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.633. Data Management in Clinical Trials. 3 Credits.
Acquaints students with important principles of the acquisition, management, and distribution of data in the clinical research environment. Focuses on real-world needs of investigators and emphasizes those issues that researchers need to understand to work effectively with other members of study teams, including coordinators, data entry staff, programmers, and data managers. Covers topics that apply to many studies, and discusses approaches ranging from small single-investigator trials using only a spreadsheet through international networks using sophisticated web-based data management systems, although does not focus on any particular type or size of study. Discusses the benefits and costs of alternatives rather than recommending particular courses of actions. Combines practical and hands-on exercises with advanced treatment of important concepts, although it does not focus on computer programming.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.635. Clinical Trials: Issues and Controversies. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.636. Epidemiology in Evidence-Based Policy. 2 Credits.
Focus on how scientific evidence in general and epidemiologic studies in particular are used to inform health and regulatory policies. Reviews the role of scientists and epidemiologists in translating evidence to practice and policy; examines how science fares in the legislative, regulatory, and judicial settings; addresses methodological issues related to types and availability of evidence to guide policy. Topics include nutrition recommendations (e.g. population-wide sodium intake), environmental policies; opioid epidemic (e.g. safe injection sites); tobacco control and e-cigarettes; health disparity (e.g., racial disparities in kidney transplantation); diabetes prevention; legal and policy implications of class action lawsuits (e.g., gun policy and local food policy); COVID-19 (e.g., evidence-informed policy making during a pandemic); and modelling to guide policy. Guest faculty, experts in their field, present examples, discuss their experiences using evidence to guide policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.639. Assessing Epidemiologic Impact of Human Rights Violations. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.640. Eye Disease: Epidemiology and Control. 1 Credit.
Presents lectures and group discussions on the pathology, clinical manifestations, epidemiology, treatment, and control of the major blinding diseases, including diabetic retinopathy, cataract, glaucoma, trachoma, and age-related macular degeneration, as well as refractive error and ocular complications of Ebola and Zika.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.641. Healthcare Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.644. Epidemiology of Diabetes and Obesity. 2 Credits.
Describes the epidemiology and prevention of diabetes, obesity, and associated complications. Discusses methodological issues associated with evaluating these in epidemiologic studies. Designed to cover the global epidemics of diabetes and obesity, environmental and genetic risk factors, as well as interventions to improve diabetes outcomes and weight management. Includes lectures from several expert faculty members in the School of Public Health and the School of Medicine
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.645. Introduction to Clinical Trials. 3 Credits.
Introduces clinical trial design in the context of epidemiological concepts, covers various topics in the design and conduct of clinical trials, and profiles clinical trials that illustrate these issues. Topics include the definition and history of clinical trials; trial designs, including phase I-IV, cross-over, factorial, and large, simple designs; internal and external validity; controls, randomization, and masking; ethical issues; data analysis principles; monitoring of accumulating safety and efficacy data; and use of data from randomized trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.646. Epidemiology and Public Health Impact of HIV and AIDS. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.648. Clinical Trials Management. 3 Credits.
Provides an overview of methods related to the day-to-day conduct of multicenter randomized clinical trials with an emphasis on the Coordinating Center perspective. Using case studies of multicenter clinical trials for illustration, emphasizes topics related to practical applications such as organizational models, use of standardization, and performance monitoring. Discussion of methods is encouraged, including alternatives to usual practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.650. Nutritional Epidemiology (Sum Epi). 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.651. Emerging Infections. 2 Credits.
Explores the factors promoting the emergence of new infectious diseases and the re-emergence of some of the more traditional infections. Evaluates agent, host, environmental and ecological factors in the emergence of infectious diseases. Presents methods of surveillance and early recognition of several important emerging infections. Includes discussions from lecturers with considerable experience in the investigation of specific emerging infections on the issues specific to emerging infections. Presents and discusses a paper describing an investigation of an Emerging Infection following each one-hour lecture. Presents, describes, and analyzes the factors related to the emergence of infectious diseases, new and old, that have emerged as important public health problems, or which have the potential for major epidemic spread. Explains possible methods for the rapid recognition, prevention, and control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.653. Epidemiologic Inference in Outbreak Investigations. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.654. Epidemiology and Natural History of Human Viral Infections. 6 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.658. Critical Reading of Epidemiologic Literature. 1 Credit.
Develops skills in the critical reading of epidemiologic reports. Reviews key epidemiologic concepts and methods including bias, confounding and interaction. Identifies the key issues and common mistakes in the preparation of epidemiologic reports of empirical research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.660. Practical Skills in Conducting Research in Clinical Epidemiology and Investigation. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.663. Epidemiology Workshop: Interpreting and Using Epidemiologic Evidence. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.666. Foundations of Social Epidemiology. 3 Credits.
Presents applications of social epidemiologic concepts, introduced through weekly online lectures and readings, and the use of discussions and case studies. Prepares students to understand and appreciate the contribution of social factors to disease etiology, course, and the distribution of states of health in populations. Reviews the conceptual and theoretical underpinnings of social epidemiology from an historical perspective. Focuses on the scientific findings in the field from the 1970's until today; the influence of social context on behavior is well known and forms the backbone for most health promotion interventions. Delineates how the social environment influences behavior by shaping norms, reinforcing social control, providing environmental opportunity, and coping strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.667. Health Equity Research Methods to Address Social Determinants of Health. 4 Credits.
Introduces innovative methods, practical tools, and skills required to conduct evidence-based research that addresses the social determinants of health disparities. Draws on theoretical frameworks on fundamental values and principles, including social justice, human rights, the value of diverse ideas and stakeholder perspectives, inclusiveness, trustworthiness, behavioral and implementation science, and community-based participatory design. Uses lectures, panel discussions, and case-based examples to provide opportunities in obtaining feedback on ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.668. Topics in Infectious Disease Epidemiology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.671. Topics in Management of Clinical Trials. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.674. Causal Inference: Emulating A Target Trial to Assess Comparative Effectiveness. 2 Credits.
Introduces students to a general framework for the assessment of comparative effectiveness and safety research. The framework, which can be applied to both observational data and randomized trials with imperfect adherence to the protocol, relies on the specification of a (hypothetical) target trial. Explores key challenges for comparative effectiveness research and critically reviews methods proposed to overcome those challenges. The methods are presented in the context of several case studies for cancer, cardiovascular, renal, and infectious diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.676. Bayesian Adaptive Trials. 2 Credits.
Presents Bayesian adaptive designs and teaches students the skills and considerations necessary to construct such designs. Examines the operating characteristics of Bayesian adaptive designs and the benefits and costs of interim analyses, in particular within the regulatory framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.677. Infectious Disease Dynamics: Theoretical and Computational Approaches. 3 Credits.
Focuses on the dynamic processes that affect the spread of infectious disease. Presents basic conceptual approaches and a survey of specific theoretical and computational methods for simulating the spread of diseases. Specific topics include the effect of population heterogeneity on transmission, simulation of the impacts of interventions, social networks and the links between transmission dynamics and the evolution of pathogens. Particular methods include mathematical models, spatial-temporal analysis of epidemics, social network theory, genetic algorithms, individual based models and other tools of systems epidemiology. Concepts and methods are applied to historical epidemics, current emerging diseases and diseases of international public health importance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.678. Infectious disease transmission models for public health decision making. 3 Credits.
Studies global tobacco control methods in depth. Focuses on designing, implementing, and evaluating tobacco control interventions based on the need of a specific region or country. Highlights the use of multi-level solutions linking policy, communication, prevention, education, regulation, advocacy, and community organizing to address the interdisciplinary problem of tobacco use. Examines the aspects of tobacco use and tobacco control through lectures, case studies, presentations, and discussion.Upon successfully completing this course, students should be able to: • Perform a situational assessment of the tobacco control environment in a particular country including the health and economic burden of tobacco use in the country; • List criteria that can be used to determine the tobacco control priorities of a country, and evaluate the strengths and weaknesses of different criteria for setting tobacco control priorities; • Evaluate the strengths and weaknesses of various strategies to reduce tobacco use; •Select and define appropriate indicators for evaluating progress in implementing a tobacco control intervention; •Utilize acquired methods to plan, implement, evaluate, and lead a tobacco control interventions based on the need of a specific region or country; •Utilize acquired methods to formulate grant applications.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.680. Environmental and Occupational Epidemiology. 4 Credits.
Introduces the key health effects of environmental and occupational exposures and the epidemiologic methods used to identify and estimate those effects. Emphasizes the interplay of methodological issues, including the assessment of environmental exposures and the understanding of specific disease processes in identifying the health impact of environmental exposures in the population. Learns about environmental and occupational exposures (including water and air pollution, food contamination, ionizing radiation, persistent environmental pollutants and emergent environmental exposures) and key methodological issues relevant for these exposures in population studies (including study design, exposure assessment and biomonitoring, disease clusters, dose-response relationships, susceptibility, geographic analysis, and evidence synthesis).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.682. Pharmacoepidemiology Methods. 3 Credits.
Introduces the key elements of pharmacoepidemiology. Explores the utilization and effects of drugs in large numbers of people. Discusses the application of epidemiological methods to pharmacological issues. Focuses heavily on questions of drug safety and effectiveness, concentrating on clinical patient outcomes and on evaluating the use of therapies. Applies the research methods of clinical epidemiology (e.g., randomized trials, cohort studies, case-control studies, use of secondary data, attention to biases and confounding) to the content area of pharmacology (e.g., determinants of beneficial and adverse drug effects, effects of patient heterogeneity on drug effect, effects of non-adherence, active and passive surveillance for adverse events).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.683. Human Rights in Public Health Practice. 2 Credits.
Presents human rights as both a tool and an analytical framework for public health practice. Considers how concepts and values from human rights can enhance the work of public health professionals in a variety of realms. This includes the development of policy in public health, the design and implementation of programs, and identification of human rights obstacles to achieving public health goals and potential responses. Examines the relationship between traditional bioethics and human rights approaches to ethical questions and will conclude with discussions and controversies about the roles of public health professionals in advocacy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.684. Pharmacoepidemiology: Drug Utilization. 3 Credits.
Provides an overview of drug classification systems as well as a review of data sources used for drug utilization research. Reviews methods of investigating drug utilization and evaluating interventions to modify utilization, such as time-series designs and segmented regression analyses. Discusses varied patient, provider, practice and system-level determinants of prescription drug utilization, including their impact on costs and quality of care. Emphasizes the impact of drug formularies, marketing and promotion of drugs, health insurance exchanges, and emerging evidence of benefits and harms.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.686. Introduction to Systematic Reviews and Meta-Analysis. 2 Credits.
Reviews methods used by those performing systematic reviews and meta-analysis, including building a team, formulating a research question and hypothesis, methods for searching the literature, abstracting information, and synthesizing the evidence both qualitatively and quantitatively. Covers how to formulate an answerable research question, defining inclusion and exclusion criteria, searching for the evidence, data extraction, assessing the risk of bias in the underlying studies, qualitative synthesis, meta-analysis, sensitivity analysis, and assessing meta-bias. Acquaints students with a few practicalities of conducting a systematic review using hands-on exercises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.687. Epidemiology of Kidney Disease. 2 Credits.
Studies kidney disease comprehensively, emphasizing chronic and end-stage kidney disease, since kidney disease is characterized as an epidemic worldwide, and the prevalence continues to rise. Highlights controversies and areas of ongoing and future research by reviewing findings from cohort studies, clinical trials, and landmark studies. Emphasizes methodological issues specific to the study of kidney disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.690. Epidemiologic Approaches to Hearing Loss and Public Health. 1 Credit.
Introduces biologic, epidemiologic and clinical aspects of aging-related declines in the auditory system. Demonstrates methods of assessment of auditory function for epidemiologic studies. Reviews current epidemiologic knowledge of sensory function and aging-related outcomes in older adults, including the epidemiology and consequences of dual sensory loss. Presents areas for future research and opportunities for intervention and prevention
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.692. Prisons, Public Health, and Human Rights. 2 Credits.
Explores the public health implications of mass incarceration and discusses the human rights and ethical ramifications of providing health care to men, women, and children in jails, prisons, and detention centers both in the United States and internationally. Takes a systems approach to addressing the basic health needs of the prison population, including infection control, care for acute and chronic medical conditions, and mental health care. Students apply problem-solving skills and explore the challenges of providing care in incarcerated settings. Emphasizes the roles of human rights principles and professional ethics in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.693. Investigation of Outbreaks. 2 Credits.
Learns how to detect, investigate, and interpret disease outbreaks. Focuses on application of epidemiological skills to develop hypotheses relevant to understanding source or reservoirs of infection, modes of spread and possible control measures. Includes simple epidemiological approaches for examining field data on outbreaks and deriving inferences. Reviews the main factors involved in the occurrence of an outbreak and steps in investigating an epidemic. Uses data from large and small epidemics to illustrate the main concepts and terminology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.694. Power and Sample Size for the Design of Epidemiological Studies I. 1 Credit.
Systematically introduces students to sample size and power analysis for the most common epidemiological study designs. Provides participants with the key conceptual elements and practical tools for computing sample sizes to achieve a given level of precision and power in statistical tests.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.696. Spatial Analysis I: ArcGIS. 3 Credits.
Examines the use of Geographic Information System (GIS) software (ArcGIS Pro) as a tool for integrating, manipulating, and displaying public health-related spatial data. Covers mapping, geocoding, and manipulations related to data structures and topology. Introduces the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics. Uses selected case studies to demonstrate concepts along this paradigm. Focuses on using GIS to generate and refine hypotheses about public health-related spatial data in preparation for a formal statistical analysis. Discusses topics related to spatial statistical modeling throughout (although not a required part of the curriculum). Includes both lecture and lab formats with GIS concepts and software-specific details demonstrated during the lab portions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.697. Spatial Analysis II: Spatial Data Technologies. 2 Credits.
Examines technologies for collecting, obtaining and creating spatial data. Technologies considered include, but are not limited to GPS, tablets, tracking devices, cell phones, Google Earth, remote sensing applications, and the Internet. Introduces software applications such as ArcGIS, QGIS, and R for integrating spatial data from the aforementioned technologies into useable forms for spatial analysis. Also covers metadata, data accuracy, and confidentiality/disclosure issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.698. Methods For Assessing Power, Privilege, and Public Health in the United States. 4 Credits.
Discusses emergent health issues and how the choice of measures for power, privilege, and inequality influence results in epidemiological research. Challenges you to reflect on how your own positions of privilege influence your interpretation of data and your public health practice. Provides an opportunity to apply epidemiology research skills to develop and execute a data-driven project on a real-world health problem that can will be presented and used by a community partner.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.699. Epidemiology of Sensory Loss in Aging. 3 Credits.
Introduces biologic, epidemiologic and clinical aspects of aging-related declines in the auditory, visual, and vestibular systems. Demonstrates methods of assessment of sensory function for epidemiologic studies. Reviews current epidemiologic knowledge of sensory function and aging-related outcomes in older adults, including the epidemiology and consequences of dual sensory loss. Presents areas for future research and opportunities for intervention and prevention.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.700. Advanced Stata Programming. 1 Credit.
Presents advanced topics in Stata Programming to expand upon the material in 340.600. Topics include simulations, advanced programming, file manipulation, and code optimization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.701. Epidemiologic Applications of Gis. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.705. Advanced Seminar in Social Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.706. Methods and Applications of Cohort Studies. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.710. Seminar in Disability Health Research. 2 Credits.
Examines disability and disability health within the context of public health research and policy to advance equity and social justice. Discusses the origins and current landscape of disability health research from the perspectives of key stakeholders, inclusive of researchers, advocates, policy makers, with a focus on including the perspectives of people with disability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.715. Problems in the Design of Epidemiologic Studies: Proposal Development and Critique. 5 Credits.
Presents the methodologic and logistic problems involved in designing and conducting epidemiologic studies. Students participate in the preparation of a research protocol for a study in a human population. Offers an opportunity to critically evaluate the adequacy and scientific merit of research protocols, develop an appreciation of the ethical aspects of conducting research involving human subjects, and apply methods and principles learned in earlier (340.751 - 753) and current courses to specific epidemiologic problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.716. Implementation Science Concepts, Methods & Study Designs. 2 Credits.
Digs into how to conceptualize implementation science questions, define implementation outcomes, and leverage frameworks and designs to achieve public health impact.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.717. Health Survey Research Methods. 4 Credits.
Exposes students to the practical aspects of health survey research methods. Emphasizes the development of skills to design and administer a survey. Introduces formative research, sampling methods, questionnaire development, recruitment techniques, interviewer training, and quality assurance/quality control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.721. Epidemiologic Inference in Public Health I. 5 Credits.
Introduces principles and methods of epidemiologic investigation of disease and other health states. Presents different types of study designs, including randomized trials, cohort and case-control studies; measurement of exposures and outcomes; risk estimation; surveillance; program evaluation; and causal inference. Discusses evaluation measures for screening programs and health interventions. Links epidemiologic inferences with the development of policy. Activities provide experience in applying epidemiologic methods, interpreting findings, and drawing inferences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.722. Epidemiologic Inference in Public Health II. 4 Credits.
Expands knowledge beyond introductory level epidemiologic concepts and methods material, using examples from the published literature. Emphasizes interpretation and the ability to critically evaluate issues related to populations/study design, measurement, population comparisons and inference, including: modern cohort study designs; advanced nested designs; novel techniques for exposure assessment; interpretation and utility of measures of impact; sources of bias and methods for their prevention; descriptive and analytical goals for observational study inference; the counterfactual model for defining exchangeability, cause, and confounding; and synthesis of inferences from observational studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.723. Epidemiologic Practice Methods for Population Health Research. 2 Credits.
Introduces quantitative epidemiologic techniques applied by both academics and public health professionals to analyze and interpret routinely collected at the subpopulation level to target and address health inequities. Four modules include instruction in Stata and R, with topics including:1. Weighted Survey Analysis: Analytic techniques for the incorporation of weights in the analysis of survey data to make inferences about the target population.2. Calculating Life Expectancy: Calculation of single-decrement life tables using statistical programs as well as publically available Excel-based tools.3. Estimate Preventable Deaths: Econometric techniques for estimating preventable deaths and potential lives saved from risk factor modification.4. Conceptual Frameworks in Epidemiology: Apply graph theory to understand the relationships between variables in commonly-used causal frameworks. Understand the importance of using conceptual frameworks in guiding epidemiologic inquiry.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.724. Global Cancer Epidemiology. 2 Credits.
Examines the causes, incidence, and trends in cancer globally, with a perspective on the differences across settings. Provides an epidemiological foundation for understanding cancer statistics and engaging in international cancer research and control activities. Covers key concepts such as study designs for cancer epidemiology and interventions, use and meaning of common cancer statistics, levels of prevention, and cancer screening/use of diagnostic tests.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.725. Methods for Clinical and Translational Research. 1 Credit.
Provides an overview of the methods of translational research. Emphasizes developing skills in the interpretation and application of findings of translational research. Topics include study design, biomarkers, statistical analyses, validation strategies, and evidence synthesis methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.726. Implementation Research Methods to Address Real World Epidemiological Questions. 3 Credits.
Considers the use of observational data, including real-world program data, natural experiments and designs for interventions which cannot be ethically or practically randomized and experimental designs, focused on implementation and real-world effectiveness. Analyzes preference-based research methods, which can be observational or experimental, highlighting the importance of human-centered approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.727. Introduction to Health Survey Research Methods. 2 Credits.
Exposes students to the practical aspects of health survey research by emphasizing the development of skills to design and administer a survey questionnaire. Introduces students to formative research, questionnaire development, interviewer training, and quality assurance/quality control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.728. Advanced Methods for Design and Analysis of Cohort Studies. 5 Credits.
Explores advanced methods useful for the design and analysis of cohort studies. Emphasizes methods for analyzing time-to-event data subject to staggered entries using advanced parametric and semi-parametric methods; analytical methods for incomplete observations in cohort studies; methods to measure effects of exposures on time-to-event using relative times and relative hazards; parametric survival analysis methods and taxonomy of hazard functions; coefficients of determination based on parametric models for survival data; regression methods for trajectories of biomarkers; methods for the analysis of interventions in observational studies: confounding by indication, marginal structural models for individual effectiveness; methods for estimating population effectiveness; and methods to jointly analyze longitudinal and survival data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.729. U.S. Based National Health Surveys: their Application and Associated Research Methods. 2 Credits.
Introduces the purpose and application of national health surveys, and the strengths and limitations of this type of data. Uses publicly available survey data collected by the Centers for Disease Control and Prevention's (CDC) National Center for Health Statistics (NCHS), including data from the National Health Interview Survey (NHIS) and National Health and Nutrition Examination Survey (NHANES) to provide practical experience in accessing the data files, designing and executing basic analysis using complex survey data and determining when and how to appropriately conduct age adjustment and trend analysis. While the class utilizes U.S.-based examples, the principles and methods covered are applicable to other settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.730. Assessment of Clinical Cardiovascular Disease. 2 Credits.
Familiarizes students with techniques used to detect and quantify the presence of clinical cardiovascular disease. Tour the hospital, and the dialysis, angiography, echocardiography, and vascular laboratories. Observe radiographic (CT and MRI) imaging of atherosclerosis and review gross and histological specimens of atherosclerosis in the pathology laboratory. Directly observe various cardiac imaging techniques performed including 1) cardiac echocardiography, 2) coronary or peripheral angiography, 3) coronary calcium scores and coronary CT angiography using multi-detector CT, 4) carotid and peripheral vascular studies using ultrasound, 5) the clinical assessment of blood pressure, and 6) DXA and anthropometric measures of body composition.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.731. Principles of Genetic Epidemiology 1. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.732. Principles of Genetic Epidemiology 2. 3 Credits.
Second offering in a three-part series of graduate courses in Genetic Epidemiology. Details the concepts of linkage disequilibrium and population genetics, including methods for admixture analysis useful for adjusting for individual variation in genetic ancestry/background. Presents the principles of genetic association analyses for quantitative and qualitative phenotypes for population-based studies. Details the concepts and tools related to confounding due to population stratification, and approaches for genome-wide association studies. Introduces methods for linkage analysis in families and use of high-throughput sequence data (whole exome and whole genome). Selected class sessions are dedicated to computer labs to illustrate the methods covered.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.733. Principles of Genetic Epidemiology 3. 3 Credits.
Concepts behind linkage and association studies in genome-wide studies, and demonstrates how they can be applied to complex qualitative and quantitative phenotypes (i.e. those where both genetic and environmental factors influence the phenotype). Introduces the principles underlying family-based and population-based study designs and analytical methods for both marker panels and sequencing data (whole exome and whole genome).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.734. Principles of Genetic Epi 4: Emerging and Advanced Methods. 2 Credits.
Discusses advanced topics in genetic epidemiology methods. Builds on the knowledge gained in Principles of Genetic Epidemiology 1-3. Students discuss the details of the methods they have learned, and are also exposed to cutting-edge topics not yet in the mainstream. Also covers emerging topics such as CNV analysis, epigenetic analysis, sequencing analysis, and admixture mapping. Students also carry out an independent analysis project through the term.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.744. Advanced Topics on Control and Prevention of HIV/AIDS. 4 Credits.
Focuses on directed readings and discussion on the science and pathogenesis of HIV/AIDS. Covers dynamics of the HIV epidemic in the populated world, difficulties and contrasts between clinical management of HIV/AIDS in developed and developing countries, prevention and control modalities against HIV/AIDS, and predicting patterns of future growth of the HIV/AIDS epidemic with special reference to global economic impact of HIV vaccine and eradication issues of HIV/AIDS.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.751. Epidemiologic Methods 1. 5 Credits.
Presents as the first course in the Epidemiologic Methods sequence. Introduces students to the principles and concepts used in epidemiologic research. Presents material in the context of an epidemiological framework with three major areas: populations and an introduction to study designs; measurement, including measures of accuracy and disease occurrence; and methods used for comparing populations. Illustrates synthesis lectures on how these elements come together in modern epidemiological research. Provides experience using laboratory exercises and assignments with applying concepts and calculations to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.752. Epidemiologic Methods 2. 5 Credits.
Second offering in the Epidemiologic Methods sequence. Builds on the concepts of epidemiologic reasoning, population health measures, validity, and study design taught in Epidemiologic Methods 1. Provides a detailed presentation of causal inference, study design and threats to validity (confounding, information bias and selection bias). Discusses a wide range of epidemiologic designs in detail, together with their advantages and limitations. Laboratory exercises, assignments, and the MiniProject provide experience with applying concepts and calculations to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.753. Epidemiologic Methods 3. 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.765. Professional Epidemiologic Methods: Epidemiologic intelligence and Population Health Assessments. 2 Credits.
Focuses on practical skills for epidemiological assessments of population health, which include methods for monitoring epidemiological profiles and health trends, using public health information systems for measuring health burden, developing epidemiological profiles and conducting health situation analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.766. Professional Epidemiologic Methods: Surveillance. 2 Credits.
Covers epidemiological methods and analyses for public health surveillance, including novel measurement approaches for “real and near real time” surveillance, syndrome surveillance and surveillance of public health events. Students learn interpretation of analytic strategies including descriptive and inferential epidemiological methods for surveillance data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.767. Professional Epidemiologic Methods: Topics and Methods for Health Situation Analysis. 2 Credits.
Focuses on epidemiological methods and tools used in key health situation analyses. Includes the use of prospective epidemiological scenarios for monitoring health targets and indications. Also covers examples of health priority setting assessments; health needs assessments, and the methods for epidemiological stratification of public health problems. Laboratory exercises provide experience with applying concepts, methods and tools to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.768. Professional Epidemiologic Methods: Decision Making in Health Situation Analysis. 2 Credits.
Covers advanced health situation analyses for the evaluation of effectiveness of public health programs using real public health scenarios and available health information datasets. Covers selected epidemiological metrics for measuring social health inequalities and methods for informing evidence-based healthcare decision-making using epidemiologic data. Also addresses the role of available epidemiological evidence and translational research for public health programs. Laboratory exercises provide experience with applying concepts, methods and tools to problems drawn from real epidemiological data and published literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.769. Professional Epidemiology Methods. 4 Credits.
Trains future leaders using advanced epidemiological methods applied in modern public health practice, and provides students with the key epidemiological competencies for mid-level and senior-level epidemiologists. Covers examples of health priority assessments, health needs assessments, epidemiological stratification of public health problems, measuring health inequalities and evaluation of effectiveness of public health programs using real public health scenarios and available health information datasets. Also covers selected methods for translating epidemiologic data for decision-making. Addresses the role of available epidemiological evidence and translational research for public health programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.770. Public Health Surveillance. 3 Credits.
Acquaints students with Public Health Surveillance, which is a core public health function essential for understanding and monitoring population health. Covers the theory, data collection methods, data analysis techniques, and presentation strategies of the systematic, continuous, analysis and interpretation of population health data to inform planning, implementation, and evaluation of public health practice. Students identify the different types of surveillance, and how each is applied in varied settings. Practical experiences/labs involve creating data collection tools, and reviewing how they can be applied in practice. Real-world surveillance data is used to illustrate methods for analysis, and how surveillance data should be presented to different audiences. Guests who are coordinating and conducting surveillance in different community settings lead interactive discussion sessions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.774. Advanced Theory and Methods in Epidemiology. 4 Credits.
Integrates and extends content taught in the Epidemiologic Methods 340.751-753 sequence. Focuses on the conceptual underpinnings and application of strategies for addressing key methodologic challenges that arise when carrying out epidemiologic research. Incorporates experiential learning components, including a term-long self-directed group research project, and provides resources for students to acquire a working knowledge of how to apply presented methodological tools.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.775. Measurement Theory and Techniques in Epidemiology. 4 Credits.
Reviews concepts, key assumptions, and published applications of measurement theory, including true scores and counterfactual outcomes, latent variables, and validity. Explores novel applications of item response theory to refinement of measures, assessment of differential item functioning, and calibration of metrics across diverse samples. Topics include analysis of novel types of data (biomarkers, high-dimensional data, administrative records, genetics), item response theory, latent growth curve models for longitudinal data and their extensions, and cross-study statistical harmonization and co-calibration. Draws examples from epidemiologic applications in the behavioral and social sciences. Offers students opportunities for applying lessons from didactic lectures in a laboratory setting using prepared examples.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.776. Study Design and Analysis for Causal Inference With Time-Varying Exposures. 3 Credits.
Presents a holistic framework for studying causal effects of time-varying exposures. Builds on 140.664 and 340.774 and explores how to articulate causal questions and clarifies assumptions needed to identify the effects of time-varying exposures. Distinguishes total effects of exposures at a given point in time from those that involve cumulative doses or adherence to dynamic treatment rules. Outlines design parameters such as eligibility, start of follow-up, and artificial censoring with data from cohorts or administrative healthcare records. Reviews the motivation, intuition, and application of advanced methods such as time-dependent propensity scores, marginal structural models, and the parametric g-formula to overcome time-varying confounding and selection-bias. Emphasizes practical application and robustness checks, guideposts for choosing among study designs and analytic methods, and comparative strengths for studies with an etiologic vs. translational focus.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.794. Power and Sample Size for the Design of Epidemiological Studies II. 1 Credit.
Introduces power and sample size (PSS) calculations for the design of more complicated studies, including survival or time-to-event outcomes, cluster randomized trials, studies with correlated outcomes, and non-inferiority trials. Introduces the use of simulation to conduct PSS calculations for the design of special situations where existing PSS tools do not directly apply. Showcases the design and conceptualization processes of real-world examples and how PSS statistical calculations serve as an integral component of the processes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.800. MPH Capstone Epidemiology. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.802. Expert Searching for High Quality Evidence in The Online Environment. 2 Credits.
Introduces students to effective and efficient searching of the medical literature, in particular the skills and knowledge needed to produce an effective search in support of a systematic review of the medical literature. Discusses existing standards and evidence for these standards. Familiarizes students with software that helps with managing the results of literature searches. Addresses the competencies needed to complete comprehensive, systematic, transparent searches of the literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.803. Advanced Topics in Cardiovascular Disease Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.810. Field Placement Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.820. Thesis Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.830. Postdoctoral Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.840. Special Studies and Research Epidemiology. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.853. First Year Epidemiology Doctoral Seminar. 1 Credit.
Introduces current discussion, controversies, and applications of epidemiology. Reviews landmark papers and current literature and provides guided discussions of the materials. Focuses on exploring key paradigms that have influenced the field of epidemiology. Includes discussion of current trends influencing epidemiologic research and training, mentorship, controversies in the assessment of populations and outcomes, individual-level vs. population-health, and the relationship of epidemiology to the health care system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.855. SS/R: Biological Basis of Cardiovascular Disease Epidemiology. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.860. Current Topics in Epidemiologic Research. 1 Credit.
Engages with staff, students, fellows, and faculty in the Department of Epidemiology for exposure to epidemiologic methods as applied in research settings. Provides a broader perspective on contemporary issues in epidemiology and its research, through presentations of current research in the field of epidemiology.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.861. Clinical Trials: Procedures, Design, and Interpretation of Results. 3 Credits.
Augments Introduction to Clinical Trials (340.645). Describes current standards for clinical trial protocols, consent procedures and describes regulatory requirements and expands upon design and analysis concepts presented in 340.645. Reviews key standards for clinical trial protocols, including the SPIRIT guidelines, recruitment and consent of participants, and principles for data acquisition and sharing. Covers regulatory requirements for drug development and adverse event monitoring as well as the statistical aspects of data monitoring for clinical trials. Provides more in-depth discussion of newer designs for clinical trials including non-inferiority design and adaptive designs. Investigates specific analysis issues for handling missing data, interim monitoring and cost-effectiveness. Addresses the synthesis of results from clinical trials in meta-analyses and the role of post-marketing surveillance in assessing drug safety.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.863. Doctoral Seminars in Epidemiology. 3 Credits.
Provides an opportunity for doctoral students to discuss challenges in epidemiology and apply methods and principles learned in didactic courses to formulate research questions and specific aims. Participates in the preparation of dissertation proposal components, develop skills to effectively communicate research questions, and critically evaluate the scientific merit of research proposals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.865. Teaching Epidemiologic Methods and Concepts At the Graduate Level. 1 - 8 Credits.
Review and evaluate critical skills in teaching and communicating science, epidemiology, methods, and theory to a wide range of individuals. Provides a feedback mechanism for learning best practices in education at the graduate level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.871. Welch Center Research Seminar. 1 Credit.
Students, postdoctoral fellows and faculty present contemporary epidemiological research articles, focusing on clinical and cardiovascular epidemiology. Emphasizes presentation skills and the ability to critically evaluate scientific papers. Uses a journal-club format in which one or more papers are distributed in advance. Participants are expected to read and discuss the assigned material. Media reporting/coverage in the lay and medical press is explicitly discussed related to the article. Provides a forum for the discussion of the appropriate use of statistical methods for various study designs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.872. Genetic Epidemiologic Seminars in Current Research and Methodology. 1 Credit.
Emphasizes the importance of reading, understanding, and discussing literature. Presents scientific papers from the current literature in genetic epidemiology (students, postdoctoral fellows, and faculty). Provides students the opportunity to interact with faculty regularly. Reviews current topics and methodology in genetic epidemiology with current faculty and research leaders and practitioners.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.873. Contact Tracing During the COVID-19 Pandemic. 1 Credit.
Provides basic elements and methodology of contact tracing and practical experience by executing these newly learned skills. Reviews current issues and concerns encountered by students. Evaluates and promulgates best practices in contact tracing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.874. Current Topics in Human Rights. 1 Credit.
Reviews a common framework for the analysis of comparative effectiveness and safety research CER randomized trials and observational studies, and presents several applications for cardiovascular, renal, and infectious diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.895. MPH Practicum: Epidemiology. 1 - 5 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.901. Principles of Epidemiology Lab.
Lab for Principles of Epi
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.921. EPIDEMIOLOGIC INFERENCE IN PUBLIC HEALTH I Lab.
EPIDEMIOLOGIC INFERENCE IN PUBLIC HEALTH I LAB
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.951. EPI Methods 1 Lab.
Lab for PH.340.751
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.952. EPI Methods 2 Lab.
Lab for PH.340.752
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.340.953. Lab for Epi PH.340.753.
Lab for EPI 340.753
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380 (Population Family and Reproductive Health)

PH.380.600. Principles of Population Change. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.601. Critically Evaluating the Science for Policy and Practice. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.602. Basic Demography and Population Dynamics. 3 Credits.
Acquaints students with global population trends and patterns; population and health. Enhances technical skills and knowledge regarding use of demographic data for policy analysis development, program strategies and priorities. Examines measures and indicators of nuptiality, fertility, mortality and migration, and migrant health issues. Provides skills in making population estimation and projection.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.603. Demographic Methods for Public Health. 4 Credits.
Teaches students the basic methods demographers use to describe populations and analyze population change. Introduces the concept of a population, describes the demographic approach to populations, and identifies sources of population data. Covers four sets of methods with broad applicability in public health: 1) techniques for describing population composition, distribution, and growth; 2) methods to compare populations (age-period-cohort approaches and standardization and decomposition of rates); 3) single-decrement life tables; and 4) the cohort-component method for population projection. Covers the basic tools used to study the fundamental population processes of fertility, mortality, and migration.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.604. Life Course Perspectives on Health. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.605. Advanced Demographic Methods in Public Health. 4 Credits.
Covers six areas regarding population studies including: population composition, fertility, migration, population projections, an introduction to stable populations, and measures of population health. Draws examples from data from both developed and developing countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.607. Youth Voice in Public Health. 1 Credit.
Examines how project-based and surveillance data can be used by policy-makers and program administrators to determine needed public health services for youth. Defines the major types of data available for decision making and gaps in available data systems including the determinants of health inequities. Highlights the need for young people to collect, interpret and define data for decision-making in public health and explores the developmentally appropriate conditions for authentic youth engagement in the process. Features young people and adult leaders from the Center's Youth Advisory Board in leadership roles.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.610. Substance Use in Women and Families. 3 Credits.
Introduces students to the complex etiology of substance use in women and the impact of substance use on women and their children and families. Provides an overview of the biopsychosocial risk and protective factors for substance use disorders in women. Explores the etiology, epidemiology, data sources, interventions, and policies for women who use substances and their families, from a life course perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.611. Fundamentals of Program Evaluation. 4 Credits.
Familiarizes students with different types of program evaluation, including formative research, process evaluation, impact assessment, cost analysis, and theory-based evaluations. Gains practical experience through a series of exercises involving the design of a logic model, selection of indicators and data sources, and the design of an evaluation plan to measure both a process and impact evaluation. Covers experimental, quasi-experimental, and non-experimental study designs, including the strengths and limitations of each.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.612. Applications in Program Monitoring and Evaluation. 4 Credits.
Builds on 380.611, Fundamentals of Program Evaluation and partially fulfills the MPH practicum requirement. The Fundamentals course prepared students to explain major concepts in program evaluation, perform fundamental tasks in evaluation, and write a basic evaluation plan. This course introduces advanced evaluation methods using concrete illustrations from real world evaluations of public health initiatives. Class sessions will integrate lectures with case studies, experiential learning activities, and reflection. Students will develop enhanced skills in the design of appropriate evaluation plans for specific community-based public health programs, with an emphasis on problem solving to address challenges and promote the usefulness of results. This course includes a service learning component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.616. Child Health Epidemiology. 3 Credits.
Explores conditions and diseases that compromise children's health from birth (congenital anomalies) through adolescence (violence/bullying). Presents methodological challenges to estimating the burden of disease, including the strengths and weaknesses of standardized outcome measures. Analyzes preventive strategies and treatment modalities considering the social context of disease. Encourages creative thinking about needed research and discusses the public health implication of childhood disease. Focuses on domestic health but presents data on the global burden of childhood conditions/diseases, when available.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.620. A Coalition-based SMART Approach to Public Health Advocacy. 3 Credits.
Introduces the coalition-based SMART model of advocacy as an approach for improving public health outcomes and changing public health policies. Examines international case studies in which advocacy focused on decision-makers played a central role and includes lectures from seasoned advocates. Using reproductive health examples, presents foundational advocacy frameworks and enables students to work through advocacy strategies that are adaptive to a variety of health areas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.623. Adolescent Health and Development. 3 Credits.
Consists of online recorded lectures and panel discussions, readings, LiveTalks, and two written assignments focused on an adolescent public health issue of your choosing. Lectures, readings, and discussion explore a variety of aspects of adolescence health and development. Paper assignments enhance knowledge of public health issues affecting adolescents, as well as evidence-based solutions and interventions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.624. Maternal and Child Health Legislation and Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.625. Evidence and Opportunities to Mitigate Childhood Adversity and Promote Well-Being. 3 Credits.
Introduces students to a range of scientific, programmatic and policy evidence related to childhood adversity and well-being. Examines evidence-based interventions and common elements of approaches to both prevent and mitigate the impact of adversity and promote resilience and well-being among children, families and communities. Interventions and programs will focus on communities, public health and health care settings, with a special focus on young children and children with special health care needs. Students evaluate policies, frameworks, interventions and research drawing on conceptual models and evidence related to the successful implementation and scaling of public health and services programs and policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.628. Public Health Perspectives On Abortion. 3 Credits.
This course provides students with an overview of abortion practice in the United States and worldwide from a public health perspective. Lectures and readings enable students to critically evaluate current research, public health practice, and policy related to abortion, and to speak knowledgeably and accurately on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.633. Promoting Equity for Adolescents and Emerging Adults: Problem-Solving Seminar. 3 Credits.
Introduces the scope, unequal distribution, and negative impacts of disconnection from school and the workforce among young people in the United States (“opportunity youth”). Discusses the importance of different sectors and stakeholders for promoting success and eliminating inequalities in outcomes among adolescents and young adults. Highlights the importance of involving young people in all phases of research and policy making. Describes communication strategies for addressing diverse stakeholders, including individuals at all levels of health literacy, for purposes of influencing behavior and policies for adolescents and young adults. Summarizes promising strategies for preventing youth disconnection and re-engaging young people who have become disconnected from school and the workforce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.635. Urban Health in Contemporary America. 4 Credits.
Introduces students to the historical forces associated with the rise of the modern city and the fundamental characteristics of urban living in the U.S. Discusses the impact of the increase in urban settings on population health. Examines contexts of the urban environment that shape health including: the physical environment, housing, education, discrimination and racism, policing, and safety. Explores the complexity and diversity of the determinants of health among domestic urban populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.640. Children in Crisis: An Asset-Based Approach to Working With Vulnerable Youth. 3 Credits.
Uses experienced practitioners, community leaders, and community members to expose students to a wide range of domestic youth health, welfare issues and interventions through an asset lens. Using an asset-based approach, the class highlights domestic youth challenges (e.g., disconnection, homelessness, LGBTQ status and justice involvement) and aims to expose students to thoughts, voices, and perspectives from a variety of different backgrounds. Class sessions feature ample discussion, expert lecturers, youth voices, and an examination of existing programs in and out of Baltimore City. Some students are concurrently enrolled in a practicum component of the course. Classroom discussion will focus on the experiences of practitioners and students and the issues they see youth in the community facing. Overall both practicum and non-practicum students alike will have the chance to read, reflect and discuss programs and interventions that positively impact youth domestically.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.642. Child Health and Development. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.650. Demographic Methods for Measuring Health and Longevity. 4 Credits.
Covers demographic methods commonly used to understand how long people live and how this varies over time, across space, and between population groups. Explores the construction of life tables to calculate life expectancy, and understand its determinants. Introduces multi-state methods to calculate what proportion of their life individuals spend in good health, or affected by various illnesses and limitations. Emphasizes the practical application of these methods to the analysis of several large demographic datasets.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.651. Methods and Measures in Population Studies. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.655. Social and Economic Aspects of Human Fertility. 3 Credits.
Studying fertility is integral to population studies and understanding population changes and dynamics (along with mortality and migration). Offers an essential background for those studying women’s, infant and perinatal health. Covers social and economic theories of fertility change, explores fertility transitions across geographic contexts, examines major distal and intermediate determinants of fertility, and considers policies affecting fertility globally. Based on a mix of lectures, readings, and interactive discussion among students and faculty.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.661. Clinical Aspects of Maternal and Newborn Health. 3 Credits.
Presents morbidity and mortality in the mother, fetus, and newborn and the health care practices utilized to prevent, diagnose, and treat morbidities. Guest speakers in clinical care present lectures from the clinical perspective; course instructors present the public health perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.662. Critiquing the Research Literature in Maternal, Neonatal, and Reproductive Health. 4 Credits.
Discusses the sources of data and analytic and conceptual basis for methodological approaches to the study of maternal, neonatal, and reproductive health. Evaluates selected research articles in maternal, neonatal, and reproductive health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.663. Gender-Based Violence Research, Practice and Policy: Issues and Current Controversies. 3 Credits.
Explores gender-based violence (GBV), including intimate partner violence, sexual violence, and sex trafficking. Topics include the following as they relate to GBV: epidemiology, theoretical frameworks, structural risks and gender equity, policy, prevention and intervention, perpetrators, populations with unique needs, and health consequences spanning sexual and reproductive health, STI, and HIV. Prepares students to undertake meaningful scholarly, community-based, programmatic or policy work in the field. Emphasizes active learning and facilitates application of knowledge and skills gained to real world issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.664. Reproductive and Perinatal Epidemiology. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.665. Family Planning Policies and Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.666. Women's Health. 3 Credits.
Provides an overview of leading topics in women’s health with an emphasis on the US and other developed settings. Examines leading sources of morbidity and mortality through age-gender-race/ethnicity-disaggregated data. For each topic, we examine historical context, risk factors, prevention, and treatment. Considers health from biological, lifecourse, and social determinants perspectives, including via frameworks of women’s health disparities and intersectionality that address inequities in interpersonal, social, political and economic power. Major topics include: non-communicable diseases (cardiovascular disease, cancer), immunology, infectious disease, preventive health, aging, mental health, and violence.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.667. Women's Health Policy. 3 Credits.
Provides an overview of selected, timely policy issues related to women’s health in both developed and developing countries. It covers the history of selected policy concerns, frameworks for viewing these concerns, and specific policies related to women’s health issues such as family planning, gender-based violence, welfare reform, employment and workplace conditions, and disabilities. Topics may change yearly depending on the primacy of the topic or issue.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.668. International Perspectives on Women, Gender, and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.670. Religion, Spirituality and Public Health. 3 Credits.
Presents a broad overview of the ways in which religion and spirituality affect health, both generally and with a particular focus on fertility, family planning and adolescent health. Investigates the outreach of religious organizations tackling public health issues in domestic urban settings and internationally. Examines prescriptions for how faith-based organizations can be more integrated into governmental and NGO public health campaigns.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.697. Health and Wellbeing of the Urban Poor: Labor Markets, Safety Nets, and the Criminal Justice System. 3 Credits.
Examines the causes and consequences of U.S. urban poverty, its implications for health and wellbeing, and explores strategies for addressing it. Covers the major theoretical explanations scholars have advanced to explain the persistence of urban poverty in the U.S. including labor markets, residential segregation, welfare policy, family structure, and the criminal justice system. Discusses consequences, particularly related to health and wellbeing of the urban poor. Within each topic area, introduces students to a range of interventions aimed at alleviating urban poverty.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.701. Accessing Demographic and Population Health Data. 2 Credits.
Provides students with the skills and tools needed to access and use publicly available datasets that are commonly used in demographic and population health research. Introduces online databases and provides instruction on how to use online data analysis platforms to generate commonly used population health indicators quickly and easily. Features two online databases: 1) CDC Wonder: an online database published by CDC that includes data on all deaths and births in the United States; and 2) IPUMS: an online database platform that contains data from over 750 censuses and surveys from around the world.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.703. Prospective Birth Cohort Studies and Developmental Origins of Health and Disease. 2 Credits.
Introduces prospective birth cohort studies related to the developmental origins of health and disease. Provides overview of major US and international birth cohort studies. Compares advantages and disadvantages of their different study designs. Reviews specific considerations in conducting such studies, including field data and bio-sample collection and long-term follow-up. Explains importance of collecting sensitive and specific biomarkers. Emphasizes link between study design and interpretation of study data and thus to understanding the developmental origins of health and disease.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.707. Advocating for Global Reproductive Health. 2 Credits.
Introduces students to policy analysis and advocacy in reproductive health, with a focus on international family planning. Analyzes policymaking processes and ways to influence these processes through evidence-based advocacy within foreign and domestic political and financial environments. Provides first-hand knowledge of effective advocacy efforts and tools. Emphasizes practical application of the Advance Family Planning SMART approach to advocacy, which centers on advocacy objectives that are Specific, Measurable, Achievable, Relevant, and Time-bound (SMART).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.708. Strategic Leadership Principles and Tools for Health System Transformation in PFRH. 2 Credits.
Introduces principles of strategic leadership in the context of facilitating health systems change in low resource settings. Introduces mental models and the household production of health, systems thinking and strategic leverage, personal mastery and commitment to change, action-learning principles and practice, shared vision and creative tension, the theory of constraints and root cause analysis, strategy design and key moves, implementation with accountability, and linking data to action. Develops leadership skills via interactive workbook exercises, small group work and class presentations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.709. Introduction to Program Evaluation in PFRH. 1 Credit.
Familiarizes students with the basic concepts of program evaluation. Teaches skills in writing goals and SMART objectives, as well as developing logic models and creating a plan for a process evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.710. Public Health Perspectives on Abortion Policy. 1 Credit.
Provides students with an overview of abortion practice in the United States and worldwide from a public health perspective. Enables students to critically evaluate current research, public health practice, and policy related to abortion, and to speak knowledgeably and accurately on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.711. Issues in Survey Research Design. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.712. Methods in Analysis of Large Population Surveys. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.720. Masculinity, Sexual Behavior & Health: Adolescence & Beyond. 3 Credits.
Focuses on male health with particular attention to sexual and reproductive health and healthcare use among adolescents, extending throughout the lifespan. Assesses the principal health concerns for sexual and reproductive health, the associated population-based risk factors, and the relative impact of each risk factor. Examines the meaning of masculinity and the impact of masculinity beliefs on males' health and healthcare use. Evaluates strategies to promote population health including the policies and programs or health care delivery that address health concerns and behavior for male sexual and reproductive health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.721. Schools and Health. 3 Credits.
Highlights K-12 schools as public health contexts in 3 ways: as contexts for shaping youth development and behavioral outcomes, for the delivery of health information and services, and for research. Lays a foundation for the connections between health and education by discussing the reciprocal relationship between a young person's health and their educational outcomes including the role that school health can play in addressing disparities in education and health. Explores school context using the ten-component Whole School, Whole Community, Whole Child (WSCC) framework developed by the CDC and the Association for Supervision and Curriculum Development.? Using the framework, explores established standards and practices for schools, opportunities for intervention in schools, and challenges to implementation, evaluation, and research in schools. Dives into the debates around school openings and COVID mitigation measures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.725. The Social Context of Adolescent Health and Development. 3 Credits.
Recognizes the social ecological model, social determinants of health tenants and the life course perspective as tools to understanding adolescent health. Explores the influences of contexts, such as neighborhoods, education and families, on adolescent health and well-being. Examines empirical work to consider the role of context in prevention and interventions aimed at adolescents.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.740. Nutrition Programs, Policy and Politics in the United States: the Impact on Maternal, Child and Family Health. 3 Credits.
Addresses nutrition programs, policies, and politics in the US, and their impact on economically disadvantaged mothers, children, and families. Defines and explores food insecurity. Examines nutrition programs directed at high-risk populations. Reviews the administrative and political considerations of nutrition programs and discusses the nutritional impact on health, growth and development. Discusses corporate and commercial interests, their role in shaping the political discussion and their impact on food and nutrition policy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.742. Family - Health, Public Health and Policy. 3 Credits.
Focuses on understanding how programs and policies are likely to affect the capacities of families to develop and maintain health, and on teaching students to apply analytic methods to evaluate the relative value and impact of various programs or policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.744. Nutrition and Growth in Maternal and Child Health. 3 Credits.
Examines the impact of nutritional status on growth, development, intellectual performance, health status, and the onset and progress of chronic diseases. Considers ethnic, cultural, and environmental issues related to food intake as well as the relationship between physical activity and health. Examines the origin and basis for the identification and assessment of community need using the national nutrition monitoring system. Reviews federally funded nutrition program outcomes and their policy implication.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.747. International Adolescent Health. 3 Credits.
Focuses on the major health issues that affect adolescents and the effective interventions/policies to address these issues in the developing world. Explores the meaning and health of adolescence from various contexts around the world through lectures, readings, video clips, panels, and discussions .
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.749. Adolescent Sexual and Reproductive Health. 3 Credits.
Explores key topics in adolescent sexual and reproductive health (ASRH). Includes topics ranging from the impact of adolescent physical, sexual, and social development on sexual risk-taking behavior to policy and ethical issues influencing adolescent sexual health outcomes. Discusses important clinical topics such as contraception, teen pregnancy, abortion, and sexually transmitted infections using a public health framework from a domestic and global perspective. Explores the role of key social determinants of health and their intersectional functionality in shaping the context through which sexual and reproductive health is operationalized in an effort to develop effective public health solutions to problems facing vulnerable youth.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.750. Migration and Health: Concepts, Rates, and Relationships. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.755. Population Dynamics and Public Health. 2 Credits.
Provides an introduction to population dynamics, the processes by which populations change, as a foundation for understanding population health. Students will learn how births, deaths, and migrations determine the size, growth, age-sex structure, and geographic location of populations. Students will review the proximate and indirect causes of population change and assess their socioeconomic, environmental, and public health consequences. Students will calculate and interpret basic measures used to describe populations and measure population dynamics, and learn the main sources of population data and their strengths and limitations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.756. Poverty, Economic Development, and Health. 4 Credits.
Introduces students to leading theories in economic development and in the macroeconomic determinants of the health of populations, communities, and individuals. Reviews both historical and current cases to answer the following questions: What is economic development? How does economic development occur? Which aspects of development improve and which aspects are detrimental to human health? Can policymakers plot more “hygienic” plans for economic development? Do investments in health and family planning cause economies to prosper?
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.758. Demographic Estimation for Developing Countries. 4 Credits.
Introduces students to defects or deficiencies often experienced in demographic data for developing countries, and how to quantify the magnitude of errors. Describes approaches to data adjustment, with emphasizing the underlying theory and modeling. Also describes unconventional or indirect methods for estimating basic demographic parameters from robust indicators. Heavily emphasizes practical applications and quantitative calculations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.760. Clinical Aspects of Reproductive Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.761. Sexually Transmitted Infections in Public Health Practice. 4 Credits.
Considers features of sexually transmitted diseases relevant to their control, reviewing the natural history of the infections and laboratory diagnosis. Emphasizes public health practice control measures, including policy, behavior intervention, and medical screening/treatment intervention of sexually transmitted diseases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.762. HIV Infection in Women, Children, and Adolescents. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.765. Preventing Infant Mortality and Promoting the Health of Women, Infants and Children. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.767. Couples and Reproductive Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.768. Selected Topics in Women's Health and Women's Health Policy. 4 Credits.
Discusses major health concerns among women in developed and developing countries within a life course framework that integrates biological determinants of health and the social, cultural and economic contexts of women’s lives. Examines a spectrum of current health and policy concerns, and may include family planning, preventive services for women, chronic disease, migration, gender-based violence, and disability. Also includes historical perspectives and a gender justice framework for viewing health policies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.771. Understanding and Changing International Reproductive Health Policy. 3 Credits.
Introduces students to policy analysis and issues in reproductive health, with a focus on international family planning. Teaches how to analyze policymaking processes and ways to influence these processes through evidence-based advocacy. Uses case studies and other readings to analyze policies within the current political and foreign and domestic financial environment. Provides first-hand knowledge of effective advocacy efforts and tools. Focuses on Family Planning 2030 (FP2030), the international partnership launched in 2012. Presents an “insider’s” perspective reflecting their experience and draws from the advocacy approach of the Advance Family Planning (AFP) multi-country initiative. Includes practical application of the SMART Advocacy approach as a core part of the course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.777. Global Population Change and Local Public Health Needs: Problem Solving Seminar. 3 Credits.
Describes global and national population trends, examines their causes, and considers their consequences. Explains why population change in a local area may differ from changes observed in the nation as a whole. Reviews major sources of population data and key measurement concepts. In a series of case studies, analyzes data to describe population changes in both domestic and international settings. Students use these data to develop a strategic plan for addressing the changing public health needs of a local population and to design a system-level intervention for meeting those needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.800. MPH Capstone Population, Family and Reproductive Health. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.810. Field Placement in Population, Family and Reproductive Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.816. SS/R: Population, Family and Reproductive Health Master's Seminar. 1 Credit.
Prepares students to identify and research the central issues in Population, Family and Reproductive Health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.817. PFRH First Year Doctoral Seminar Part 1. 1 Credit.
Facilitates students’ transitions into the PFRH doctoral program. Reviews program requirements and school and departmental resources. Hones skills students need for success in a doctoral program. Develops students’ abilities to formulate scientific questions and understandings of the scientific process. Guides students as they focus their areas of research interest.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.820. Thesis Research PFRH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.821. PFRH Proposal Writing Seminar. 2 Credits.
Focuses on development of dissertation project, writing dissertation proposal, and preparation for Department and Schoolwide Preliminary Exams. Explains dissertation expectations and requirements. Reviews dissertation proposal structure and components. Discusses evaluation of existing research, identification of gaps and topics, and design of research projects. Emphasizes clear communication of ideas. Provides opportunity to present work-in-progress and receive peer feedback. Introduces proposal assessment through review of peers’ work. Provides forum to practice Preliminary Exam presentation including answering questions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.822. PFRH First Year Doctoral Seminar Part 2. 1 Credit.
Examines and demystifies the research process using case examples from existing research conducted by faculty members within the department. Introduces departmental and school-wide resources for conducting effective literature searches, developing sound research designs, funding research, addressing IRB concerns, and disseminating research findings. Encourages the use of critical and creative thinking skills to develop personal research agendas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.823. Research Seminar in Population, Family and Reproductive Health I. 2 Credits.
Provides experience in critical evaluation of historical and contemporary research pertinent to Population, Family and Reproductive Health. Addresses a range of topics, drawing on research from multiple academic disciplines. Critique and discusses conceptual frameworks and empirical articles and examine the methodological and disciplinary perspectives of the research or articles..
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.824. Research Seminar in Population, Family and Reproductive Health II. 2 Credits.
Provides experience in critical evaluation of historical and contemporary research pertinent to the focal areas within Population, Family and Reproductive Health. Addresses a range of topics, drawing on research from multiple academic disciplines. Students and faculty critique and discuss conceptual frameworks and empirical articles and examine their methodological and disciplinary perspectives of the research or articles related to the focal areas.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.830. Postdoctoral Research in Population, Family and Reproductive Health. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.840. Special Studies in PFRH. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.850. PFRH Master's Essay. 3 - 6 Credits.
This is a required course for all master’s students in PFRH. The goal of the essay is for students to apply the skills and knowledge acquired during their academic program to a public health problem or concern of interest to them.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.870. PFRH Special Studies in Public Health Practice. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.880. Lessons in Leadership: Applications for Population, Family and Reproductive Health I. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.881. Lessons in Leadership: Applications for Population, Family and Reproductive Health II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.882. Lessons in Leadership: Applications for Population, Family and Reproductive Health III. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.883. Lessons in Leadership: Applications for Population, Family and Reproductive Health IV. 1 Credit.
Focuses on instruments and tools that assess leadership styles, strengths and weaknesses. Explores communication strategies used by effective leaders and interview public health leaders to identify how they approach their work. Opportunity to read studies in leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.895. MPH Practicum: PFRH. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.380.955. PFRH Lab for 380.755.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390 (Clinical Investigation)

PH.390.631. Principles of Drug Development. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.673. Ethical and Regulatory Issues in Clinical Research. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.675. Outcomes and Effectiveness Research. 3 Credits.
Provides an overview of outcomes and effectiveness research. Emphasizes conceptual, design, and analytical aspects of research including policy implications. Covers both experimental (randomized) and observational designs. Addresses spectrum of outcomes and effectiveness research. Includes topics: qualitative research, cost-effectiveness and adaptive trial design.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.677. Database Design and Implementation in Clinical Research. 2 Credits.
Presents basic concepts of relational database design for clinical and basic research. Includes development of data collection forms, building databases for both “classic” and “longitudinal” projects using REDCap, data quality control, and data security.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.678. Introduction to Quality Improvement & Knowledge Translation Research. 3 Credits.
Introduces basic principles of quality improvement/knowledge translation (QI/KT) research. Focuses on efforts aimed at increasing the extent to which patients receive evidence-based therapies. Discusses the concepts, methods, and applications of QI/KT theory and explores real-world QI/KT projects. Outlines the development of a research proposal for a specific QI/KT topic. Critically appraises a published guideline. Systematically reviews literature around a QI/KT topic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.703. Presentation Skills. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.710. Biomedical Writing I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.711. Biomedical Writing II. 2 Credits.
Introduces the process of writing peer-reviewed research papers and provides a brief overview of grant proposal writing. Emphasizes a logical organization, clear writing, and an understanding of readers’ and reviewers’ expectations. Prepares selected sections of a first draft of a research paper based on their own research, and they receive feedback on their drafts through in-class discussion and written comments from the instructor.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.721. Principles of Grant Writing I. 2 Credits.
Considers the principles of successful clinical research strategies and the requirements of funding agencies. Identifies a defined research project together with a suitable team of mentors and collaborators. Develops a written research proposal in the format of a grant application which integrates the scientific principles of the GTPCI curriculum.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.722. Principles of Grant Writing II. 4 Credits.
Considers the principles of successful clinical research strategies and the requirements of funding agencies. Identifies a defined research project together with a suitable team of mentors and collaborators. Develops a written research proposal in the format of a grant application which integrates the scientific principles of the GTPCI curriculum.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.750. Introduction to Clinical Research. 2 Credits.
Provides an intensive introduction to clinical research methods, emphasizing epidemiological & biostatistical methods.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.751. Seminars in Clinical Investigation. 2 Credits.
Explores topics related to clinical investigation presented by faculty experts from within and outside of Johns Hopkins. Addresses issues related to biomeasurement, the design of randomized clinical trials, challenges with observational cohort studies, studies focusing on special populations (pediatric age group, pregnant subjects, international studies), and research fraud.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.801. Professional Goals and Objectives. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.820. Thesis Research in Clinical Investigation. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.840. Special Studies and Research in Clinical Investigation. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.390.855. Research Forum. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410 (Health Behavior and Society)

PH.301.644. Public Health Advocacy: Grassroots Organizing for Policy Change. 3 Credits.
Provides a practical introduction to grassroots organizing for policy change. Uses foundational literature and case studies to review the history of advocacy and organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.Introduces students to two key areas of knowledge in public health practice: 1) the principles and methods of community organizing and 2) campaigning for policy and structural change. Includes a series of short assignments and group activities that will culminate in a final product: the creation of a campaign plan for changing public policy regarding a specific public health problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.600. Fundamentals of Health, Behavior and Society. 4 Credits.
Introduces students to a social ecological perspective of population health. Challenges students to address societal and structural forces such as socioeconomic position, racial and ethnic and gender sources of inequality as well as interpersonal processes reflected in norms, networks, and social capital. Focuses on behavior, communication, decision-making, and health outcomes at the individual, family, and community levels. Applies these social and behavioral perspectives to a better understanding of health problems and prepares students to develop effective public health interventions for individuals, families, communities, and populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.601. Emerging Tobacco Products and Regulatory Approaches. 3 Credits.
This course provides students with an overview of tobacco product regulation, including cigarettes, smokeless tobacco, shisha, and emerging nicotine delivery systems, such as e-cigarettes and heated tobacco products. Students will explore tobacco regulatory frameworks and national policies; review past regulatory successes and emerging regulatory strategies; search industry patents to understand how product innovation is protected and presented; and study the tobacco industry's tactics to counter tobacco regulation by critically assessing media stories.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.602. Evaluation of Workplace Health Promotion Programs. 2 Credits.
Provides an introduction to workplace health promotion (wellness) programs, including a practical measurement and evaluation guide. Explains the key elements of measurement: structure, process, and outcomes. Reviews rigorous techniques and principles used in applied research studies and how they can be adapted to workplace health promotion evaluations. Offers easy to implement techniques for conducting survey studies at the workplace.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.603. Introduction to Genetic Counseling Research. 1 Credit.
Acquaints first-year genetic counseling students with the thesis proposal development process. Provides an overview of the ongoing research opportunities at Johns Hopkins and the National Institutes of Health. Familiarizes students with possible collaborators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.604. Harm Reduction: A Framework for Evidence-Based Policy and Practice. 3 Credits.
Discusses a variety of harm reduction strategies as they pertain to substance use issues. Introduces various programs that address substance use problems from a harm reduction perspective. Describes the evidence base supporting harm reduction programs. Explores the complicated legal and contextual issues associated with implementation of harm reduction programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.605. Fundamental Tools for Promoting Health Equity. 3 Credits.
Prepare DrPH students to apply health equity frameworks and measurement tools in their everyday functions; Includes four components: definitions and historical perspectives of health equity, health disparity, and social justice; common theoretical frameworks and their applications to different aspects of health equity, health disparities, and social justice; measurement tools used for health equity and health disparities in context; strategies and policies to reduce health disparities and promote health equity; Students complete a final project in which they must propose a program based in theory and proven need within their professional capacity
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.606. Local and Global Best Practices in Health Equity Research Methods. 4 Credits.
Introduces students to innovative methods, practical tools, and skills required to conduct evidence-based research that promotes local and global health equity. Theoretical frameworks draw on fundamental values and principles, including human rights, social justice, the value of diverse ideas and perspectives, inclusiveness, trustworthiness, behavioral and implementation science, and participatory decision-making. Includes lectures, interactive panel discussions, case-based examples, and opportunities to obtain feedback on research ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.607. Introduction to the Video Production Process for Public Health Professionals. 1 Credit.
Introduces public health professionals to the five phases of the video production process: conceptualization, script writing, pre-production (e.g., scouting locations, casting), production (e.g., shooting, voice-over), post-production (e.g., editing, graphics). Acquaints students to the fundamentals of script writing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.608. Applying Systems Thinking to Obesity Prevention. 2 Credits.
Given the complexity of many public health problems, systems thinking is increasingly cited as an approach and competency needed to understand these problems. The field of obesity in particular has benefited from systems thinking, methods and modeling, however, the application of these methods remains in an inchoate stage. Students will explore various systems concepts such as leverage points, heterogeneity, complexity, adaptability, interdependence, and learn how those concepts have been applied in obesity and food system research. Students will learn which systems concepts are most useful for researching specific obesity topics and their limitations. Finally, students will explore how systems research concepts and models critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.609. The Wellness Industry and Public Health: Partners Or Adversaries in Health Promotion?. 1 Credit.
Introduces students to the contemporary wellness industry in the US (including fitness and yoga) and explores the relevance of this industry for public health promotion. Describes core industry strategies for behavior change, and opportunities for public health evidence and research to inform industry practice. Content includes consideration of social media and the application of effective industry communication and motivation strategies for health promotion broadly defined.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.610. Housing Insecurity and Health. 3 Credits.
Introduces the issues of homelessness and its relationship to health. Presents factors leading to homelessness, myths about homelessness, barriers to accessing services, health problems that arise from homelessness, multidisciplinary approaches to health care from homeless persons, and advocacy strategies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.611. Under Pressure: Health, Wealth & Poverty. 3 Credits.
Explores the relationship between health, wealth, poverty, and public policy in the U.S. as well as internationally; assesses past and future strategies to remedy inequities in health and health care. Addresses theories of social class; distribution of poverty across gender, age, and ethnic/racial groups; antipoverty programs and their effects; effects of changes in health care organization on the poor; and possible modifications to provide greater equity. Investigates how a dramatically changing media landscape influences patterns of belief about the causes of poverty and its remedies. Synthesizes scientific evidence with a variety of genres and disciplines including: history, psychology, political science, religious thought, philosophy, geography, literary theory, popular culture, film/media studies, and music.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.612. Sociological Perspectives on Health. 3 Credits.
Presents sociological concepts, paradigms, and theories frequently cited or used as sources of basic ideas and assumptions in contemporary analyses of health behavior and health systems. Discusses the social construction of concepts and theories, especially those that apply to our understanding of health and illness, and the implications of sociological perspectives for public health, including social stratification, deviance, social control, role performance, and stress.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.613. Psychosocial Factors in Health and Illness. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.614. A New View: Improving Public Health Through innovative Social and Behavioral Tools and Approaches. 4 Credits.
Emphasizes real world integrative thinking, tools, and solutions in the pursuit of improving public health in the U.S. and internationally. Presents a global, multifaceted examination of health and illness, exploring the many factors that influence - or even determine - whether we remain healthy or become ill. Using biopsychosocial and environmental/ecological perspectives, explores the most prevalent diseases and health challenges confronting us today. Presents emerging views of health and illness being used in research, program and policy arenas. Examines factors such as socioeconomic status, ethnicity, stress, stigma, social support, coping, and politico-cultural influences through an array of contemporary issues, including: obesity, HIV/AIDS, women's health, bioterrorism, environmental public health, mental health and others. Presents innovative social and behavioral perspectives, tools and approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.615. Research Design in the Social and Behavioral Sciences. 3 Credits.
Provides an overview of the design and conduct of research in the social and behavioral sciences as applied to public health. Draws primarily from the research perspectives and methodologies of sociology, anthropology, and health promotion, students examine the formulation of a research question, selection of a research design, selection of a study site and population, issues and methods of data collection, and measurement validity and reliability. Evaluates the strengths and weaknesses of the major types of research design used in the social sciences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.616. Social and Behavioral Aspects of Public Health. 4 Credits.
Explores social influences on behavior and health. Teaches what research and experience in public health practice can tell us about how to affect social and structural change to improve the health of the public. Draws on theoretical, epidemiological, and case study evidence, uses specific health issues such as substance use, HIV, and stigma, and explores and illustrates the effects of social structures and practices on individual health status and behaviors. Develops a deeper understanding of the key concepts that inform a social and structural perspective on health, including race, class, gender, sexuality, socio-economic status, environments, and social networks and social capital. Also instructs and challenges students to think in terms of multi-level interventions that can influence these factors toward improved health outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.617. Foundations of University Teaching and Learning. 3 Credits.
This eight-week course will prepare participants to be effective teachers who: 1. Are knowledgeable about how learning takes place 2. Can develop and use appropriate active learning strategies in their classrooms 3. Can propose ways to make classrooms more inclusive and equitable
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.618. Using Software in Qualitative Research and Analysis. 1 Credit.
Introduces students to several qualitative data analysis software (QDAS) programs, including MAXQDA, Atlas.ti, NVivo, and Dedoose. Discusses the functions and limitations of qualitative data analysis software. Explores how QDAS can be used throughout a qualitative research project. Explains how to use QDAS for multi-media analysis, including images, video, and audio. Demonstrates how to use QDAS to organize data, produce reports, make comparisons, detect patterns, and facilitate analysis. Demonstrates how to use QDAS in team-based research projects for data coding and analysis. Prepares students to use QDAS to develop deeper insights into their data through visualization and mapping. Complements qualitative research methods and data analysis courses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.619. Social Justice: Policy, Practice, and Research. 4 Credits.
Introduces students to social justice frameworks and operational definitions to apply to research, policy, and practice. Challenges students to address societal and structural forms of oppression across systems in efforts to center cultural values and practices when implementing public health policies or programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.620. Program Planning for Health Behavior Change. 3 Credits.
Introduces students to different health behavior change theories addressing several levels of the Ecological Model. Students review and practice using program planning frameworks and needs assessments for designing effective interventions. Students choose a public health problem of their choice and design a behavior change intervention to address that problem. The process of creating the intervention is guided by a needs assessment and is theoretically informed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.621. The Opioid Crisis: Problem Solving Seminar. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.622. Strategic Leadership Principles and Tools for Health System Transformation in Developing Countries. 4 Credits.
Introduces students to the principles of strategic leadership, placing these in the context of facilitating health systems change in developing countries. Covers the following topics: mental models and the household production of health, systems thinking and strategic leverage, personal mastery and commitment to change, action-learning principles and practice, shared vision and creative tension, the theory of constraints and root cause analysis, strategy design and key moves, implementation with accountability, and linking data to action. Develops leadership skills via interactive computer exercises using STARGuide software, small group work and class presentations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.623. Interprofessional Education Activity.
Provides the opportunity to participate in a case study highlighting the essential role of teams and teamwork in building multi-sector collaborations and partnerships in population health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.624. Genetic Counseling Cancer Standardized Patient Clinical Rotation. 4 Credits.
Prepares students for case preparation and genetic counseling in the cancer setting. Exposes students to a wide range of challenging counseling scenarios that require intermediate and some advanced counseling and communication skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.625. Injury and Violence Prevention: Behavior Change Strategies. 2 Credits.
Expands students' understanding of, and skills in planning, implementing, and evaluating injury and violence prevention programs. Both unintentional and intentional injuries have been the focus of a considerable body of behavioral science research and behavior change interventions. Students read and discuss selected examples of this work and enhance their skills in applying behavioral science principles and best practices to an injury or violence area of interest to them. Topics include historical overview of behavior change and the injury prevention field, as well as examples of behavior change theories, strategies, and methods that have been applied to selected injury and violence problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.627. Human-Centered Solutions to Public Health Challenges. 3 Credits.
Introduces design thinking, a transdisciplinary, human-centered, creative problem-solving approach, and its applications in public health. Focuses on engagement with a Baltimore-based organization to address a real design challenge based on a problem the organization is facing. Provides students with practice using the design thinking process to identify a product, service, or system that more effectively meets end-user needs and preferences. Includes empathetic research methods to uncover insights about the challenge and end-users' experiences, working with stakeholders to generate a range of potential solutions, prototyping, and testing promising solutions, and identifying key considerations for implementation and scale-up. Discusses real-world case studies with HCD practitioners from the Johns Hopkins Center for Communication Programs (CCP).
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.630. Implementation and Sustainability of Community-Based Health Programs. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.631. Introduction to Community-Based Participatory Research: Principles and Methods. 3 Credits.
Introduces students to the fundamental principles of, rationale for, and key considerations in conducting community-based participatory research (CBPR). Offers knowledge of and skills in CBPR that emphasize the importance of community inclusion and partnership as a viable approach to constructing and increasing the acceptance of interventions and improving the health and well-being of populations. Also uses case-based learning as an approach for real world application of CBPR concepts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.635. Applications of innovative Methods in Local and Global Health Equity Research. 4 Credits.
Provides practical methods to develop, implement, and sustain successful health equity research programs in the United States and communities around the world. Introduces students to innovative methods, practical tools, and skills required to conduct rigorous health equity research and translate evidence-based strategies into practice and policy. Topics range from stakeholder engagement and behavioral intervention development to research methods in healthcare services for socially at-risk populations. Includes lectures, interactive discussions, case-based examples, and opportunities to obtain feedback on research ideas from experienced investigators.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.638. Scientific Writing in Health Sciences: Developing A Manuscript for Publication I. 3 Credits.
This course introduces and guides students in the writing of scientific manuscripts for publication in an area related to public health, particularly social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: principles of good writing; tips for writing more efficiently; journal selection; co-author selection, and the anatomy of a manuscript. Students begin the course with a research question (purpose of study) and a summary of quantitative or qualitative (or mixed methods) data they would like to present in a scientific manuscript. This typically takes the form of summary tables. All analyses must be completed prior to the start of the course. Students end the course with at least two sections (e.g., methods and results) of a completed manuscript.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.639. Scientific Writing in Health Sciences: Developing A Manuscript for Publication II. 3 Credits.
This course guides students in the writing of scientific manuscripts for publication in an area related to social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: completion of the manuscript; drafting a cover letter; the process of peer review; revising a manuscript; and proofs and ultimate publication. Students end the course with a completed manuscript for ready for submission to a journal for publication.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.640. Global Tobacco Control. 3 Credits.
Provides an overview of actions taken over 50 years that have led to tobacco control being the most successful public health initiative. Actions of tobacco control are directly linked to changes in societal norms so that smoking is no longer socially acceptable in the US and in other countries. This course presents evidence-based policies, regulations, advocacy and communication strategies responsible for these changes. Challenges still present include disparities as well as introduction of novel products (Juul). The influence of transnational tobacco industries will be discussed and their role in undermining governmental and international actions to control tobacco use.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.642. TOBACCO CONTROL LEADERSHIP. 2 Credits.
Through lectures and discussion students develop an understanding of the role of the tobacco control leader, and the essential knowledge and skills this role requires. Provides a framework for understanding the process of working effectively with and leading others. Emphasizes the role of the leader in leading change and developing a vision for the future of tobacco control.Upon successfully completing this course, students will be able to: • Explain the nature of organizational leadership;• Describe the requirements of effective public health and tobacco control leadership;• Apply principles and theories of leadership to current tobacco control issues and challenges;• Develop a personal philosophy and approach to the practice of leadership.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.645. Applying the Social Ecological Model in Tobacco Control and Climate Change. 3 Credits.
Compares the fields of tobacco control and climate change by describing the lessons learned from tobacco control—one of the most successful public health movements. Provides an overview of tobacco control research and advocacy approaches that form a comprehensive public health strategy and considers the use of the social ecological model to address the threats posed by climate change. Explores how both issues involve economic, social, environmental, and behavioral forces that require multi-level approaches from multiple sectors. Offers insight into industry and private sector interference that obfuscates scientific evidence, confuses the public, and stalls effective regulatory policy for both fields of study. Encourages critical comparative skills throughout to discuss how to improve public health approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.650. Introduction to Persuasive Communications: Theories and Practice. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.651. Health Literacy: Challenges and Strategies for Effective Communication. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.652. Interpersonal Influence in Medical Care. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.653. Contemporary Issues in Health Communication. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.654. Health Communication Programs I: Planning and Strategic Design. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.655. Health Communication Programs II: Implementation and Evaluation. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.656. Entertainment Education for Behavior Change and Development. 4 Credits.
Examines and teaches ways in which education can be subtly but effectively worked into both new and time-honored genres of entertainment in order to foster positive behavior change and life improvement in both developing countries and local environments. Develops students' ability to understand the ingredients of successful entertainment: emotions, empathy, efficacy and empowerment, and how these can be employed to enhance social and personal health and life skills. Examines methodology and develops skills needed to create a successful Entertainment-Education (E-E) project in entertainment (story, drama, etc.) formats with effective behavior change messages.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.657. Communication Strategies For Sexual Risk Reduction. 3 Credits.
Focuses on strengthening students' understanding of sexual risk-taking and provides a solid foundation in communication strategies for sexual risk-reduction from an international perspective. The literature and examples emphasize HIV and STI risk reduction. Adopts a seminar format and consists of readings, discussions, presentations, video viewing, case studies, and critiques of literature on sexual risk-taking and protective behaviors. Includes hands-on analyses and interpretation of empirical data on sexual risk-taking and development of a communication strategy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.658. Health Communication Planning and Management for Behavior Change. 3 Credits.
Provides an overview of concepts and theories in communication with a focus on health behavior change. Explains the importance of health behavior as a contributor to current public health problems and the role of behavior change communication; describes methods of communications needs assessment. Also provides the approaches, conceptual tools in planning and management of communication processes in hospitals and out-reach programs in health services, and to develop skills for effective communication with clients and other stakeholders.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.660. Latino Health: Measures and Predictors. 3 Credits.
Examines the measures and predictors of health for the US Latino population. Learns how psychosocial and other individual-level factors, as well as socio-political, community, and health care delivery factors influence an individual's success in accessing the health care system in a sustainable manner. Learns key steps to design, implement, and evaluate health care programs working to decrease the health disparities gap faced by Latinos in the US, by using case studies that take into consideration the heterogeneity of the Latino population.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.663. Media Advocacy and Public Health: Theory and Practice. 3 Credits.
Broadens students' understanding of health communication to include the strategic use of the news media to support community organizing to change public health policy. Builds on theoretical and empirical work in mass communications, and uses case examples in a number of health policy areas to show how the strategies and tools of media advocacy may be applied to specific public health policy campaigns. Ample opportunities are provided for students to "practice" media advocacy, in the form of writing letters to the editor and opinion pieces, role-playing interviews, and so on. Introduces students to research literature about news media forms and practices; to framing techniques to influence news content and gain access to news channels; and to the relationship between media advocacy and other forms of health communication
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.664. Knowledge Management for Effective Global Health Programs. 3 Credits.
Introduces participants to knowledge management (KM), behavioral science, and adaptive management principles, processes, and tools, and their applicability to the design and implementation of global health efforts. Demonstrates, through real-life examples, how KM, behavioral science, and adaptive management principles can be applied to strengthen public health systems and maximize available knowledge to reach public health objectives. Emphasizes the importance of culture and equity as drivers for program success.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.668. Policy Interventions for Health Behavior Change. 3 Credits.
Examines the major theoretical frameworks that are relevant to the development, enactment, implementation and evaluation of policy interventions that support healthy behavior change. Explores the roles of ideas, interests, institutions, key actors and ethics in the policy process are explored. Discusses how the environment can be influenced to improve the chances of implementing effective interventions to improve the public's health. Presents case studies to critically explore the strengths and limitations of policy change theories as they relate to current hot topics in the area of health, behavior and society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.671. Introduction to Qualitative Research Methods. 3 Credits.
Introduces students to qualitative research methods applied to the investigation of public health issues. Explores the theoretical underpinnings of qualitative research, factors that influence the utility of a qualitative approach, and ethical considerations in qualitative research. Focuses on the qualitative interview and provides an overview of the practical skills and tools required for conducting qualitative interviews and analyzing qualitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.672. Organizing for Public Health with the Six Steps to Effective Advocacy: Turning Public Will into Public Policy. 3 Credits.
Introduces students to a key area of knowledge in public health practice: the principles and methods of community organizing and campaigning for policy and structural change. Focuses on how to mobilize the right people at the right time, with the right demands, to change public policies to promote health. Complements other courses in the school that look at advocating within policy processes or by using the mass media by placing these strategies in the context of the practical daily work and thinking of people who plan and carry out policy change campaigns at grassroots and grasstop levels.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.673. Introduction to Qualitative Data Analysis for Public Health. 2 Credits.
Introduces students to the analysis of interview and focus group data collected as part of qualitative public health research. Explores distinct analytic approaches and traditions, and compares the strengths and weaknesses of different analytic paradigms for different research questions. Introduces computer software for coding and managing data using freely available online demonstration of various software packages. Presents both theoretical and practical dimensions of qualitative data analysis. Emphasizes hands-on learning activities within the classroom to practice and apply concepts learned through readings, lectures, and discussion. Develops skills to conceptualize an analytic plan for qualitative data for future research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.675. Critical Analysis of Popular Diets and Dietary Supplements. 3 Credits.
Focuses on the dietary supplements and diets purporting to promote health, induce weight loss, or treat specific health concerns are widely used by Americans, which are often minimally regulated. Students apply the tools of nutritional science to a critical analysis of popular diets and supplements. Students explore the following: nutrient analysis, dissecting several example diets and supplements in class discussions, preparing a comprehensive written analysis of a specific diet or supplement of their choosing, and presenting their findings orally.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.677. Theory and Practice in Campaigning and Organizing for Public Health I. 4 Credits.
Provides a practical introduction to campaigning and organizing for public health. Combines experiential learning (through participation in an actual campaign) with traditional learning (online lectures, in-class discussions and readings). Uses case studies to review the history of organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Part of a two-term sequence that prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.678. Theory and Practice in Campaigning and Organizing for Public Health II. 4 Credits.
Provides a practical introduction to campaigning and organizing for public health. Combines experiential learning (through participation in an actual campaign) with traditional learning (online lectures, in-class discussions and readings). Uses case studies to review the history of organizing for public health. Introduces campaign planning and management, discusses the role of research and coalition-building, and explores different types of organizing. Part of a two-term sequence that prepares students to participate in and critically assess public health campaigns to change the policies and structures that set the contexts in which people make their decisions about health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.679. Decolonization, Global Communication, and Public Health. 3 Credits.
Applies insights from anti-colonialist texts to the field of global health communication. Critically examines the intersection of theories of economic development, social change, and communication as applied to public health. Introduces the complex and dynamic role of global communication in the social determinants of health. Interrogates “development” discourses as applied to health communication in middle- and low-resource areas countries. Presents evaluations of communication interventions in low- and middle-resource nation-states. Investigates health communication endeavors abroad as well as in low-resource settings in the U.S.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.680. Social Ecological Approaches to Health Regimen Adherence in Chronic Conditions. 3 Credits.
Addresses social approaches to promoting sustained adherence to health regimens among persons living with chronic conditions. Addresses prescribed use of medications, lifestyle changes, and retention in healthcare over time among persons living with HIV/AIDS, hypertension, and other chronic conditions. Enables students to: (1) assess adherence to health regimens, (2) identify correlates of adherence at the individual, interpersonal, and social network levels, and (3) assess major approaches and components of medical adherence interventions, and their linkage to theories of behavior change. Explores social factors impacting vulnerable populations’ medical adherence and health disparities, drawing examples from both domestic and international contexts.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.681. Gay, Bisexual and Other Men Who Have Sex With Men (MSM) and HIV: Theoretical Perspectives on the Us Epidemic. 3 Credits.
Introduces students to key epidemiological, conceptual and historical constructs critical to understanding and responding to the HIV epidemic among gay, bisexual and other MSM in the United States. Explores the role of social and ecological factors and theoretical constructs (e.g., race and ethnicity, intersectionality and minority stress, gender and masculinity, policy and structural changes, and other social determinants) on individual and population-level experience of the HIV epidemic. Provides an in-depth understanding of the challenges to prevention and care in these constituencies through lectures, readings, small group work, and a panel discussion with community stakeholders. Provides students with an ability to develop new lines of theory, research and practice to more effectively apply a socio-ecologic framework to the HIV epidemic and better respond to HIV as a public health issue.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.682. Integrating Children's Mental Health and Primary Care: A Social and Behavioral Science Perspective. 3 Credits.
Examines integration of mental health and primary care as both a solution to chronic shortfalls in the provision of children's mental health services and an example of the processes involved in making change in complex systems. Frames the change process as taking place at three social-ecologic levels: how care is designed to bring about health behavior change at the client/patient/consumer level; how interventions are implemented to influence staff/clinician behavior at the organizational level; and incentives and barriers at the inter-organizational and health systems level. Uses this three-level framework to analyze a range of integration models (the medical home, collaborative and stepped care, task shifting, screening and brief intervention, and co-location of services). Uses examples largely from both ongoing programs in Maryland, Massachusetts, and Ohio with which the instructors are involved, as well as international programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.683. Global Perspectives on LGBT Health. 3 Credits.
This course introduces and guides students in the writing of scientific manuscripts for publication in an area related to public health, particularly social and behavioral sciences. The goal of the course is to facilitate more effective writing of research articles using practical examples and peer feedback. Topics include: principles of good writing; tips for writing more efficiently; journal selection; co-author selection, and the anatomy of a manuscript. Students begin the course with a research question (purpose of study) and a summary of quantitative or qualitative (or mixed methods) data they would like to present in a scientific manuscript. This typically takes the form of summary tables. All analyses must be completed prior to the start of the course. Students end the course with at least two sections (e.g., methods and results) of a completed manuscript.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.684. Effective Risk Communication to Overcome Health Disparities During a Pandemic. 2 Credits.
Prepares students to develop effective risk communication strategies and materials for use during a pandemic. Reviews common theories of social and behavior change communication across the socioecological spectrum. Examines the disproportionate impact of pandemics on marginalized and vulnerable population groups. Challenges students to critically assess risk communication messages and approaches using an equity and disparities lens. Challenges students to develop communication strategies that mitigate the effects of social and structural disparities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.686. Advanced Quantitative Methods in The Social and Behavioral Sciences: A Practical Introduction. 4 Credits.
Presents advanced analytic methods relevant to the social ecological model and other theoretical frameworks common in the social and behavioral sciences. Emphasizes multilevel analyses, longitudinal analyses, and propensity score methods. Introduces factor analysis, analysis of experimental studies, structural equation modeling, and complex surveys. Explores the suitability of these methods to address different research questions and study designs. Provides discussions of underlying concepts and assumptions and presents key issues in their application. Illustrates methods through critical review of published articles and by working through examples in Stata. Presents resources for continued advanced study, including methods courses offered through the school.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.690. Ethnographic Fieldwork. 3 Credits.
Introduces students to ethnography as a method of qualitative research (fieldwork) and a product of this research (written accounts and monographs). Introduces skills and data collection methods fundamental to ethnographic fieldwork, particularly immersion, participant observation, writing field notes, and listening. Discusses what constitutes “the field” in ethnographic fieldwork, the holistic perspective, and “thick description.” Explores key theoretical and methodological issues in contemporary ethnographic fieldwork such as ethics, positionality, reflexivity, and power. Emphasizes the role of ethnographic research in public health. Prepares students to critically assess ethnographic writing. Combines lecture, discussion, and practical skill development.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.710. Concepts in Qualitative Research for Social and Behavioral Sciences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.711. Doctoral Seminar in Mixed Methods for Public Health Research. 3 Credits.
Introduces doctoral students to emerging discussions and applications of mixed methods research in public health. Explores mixed methods as a third research paradigm that involves the utilization of both quantitative and qualitative methods within a single inquiry to enhance the researcher's abililty to understand the problem at hand. Fosters synthesis of and engaged reflection on qualitative and quantitative research training. Specific topics include: history and language of mixed methods research; relevant paradigms and epistemological debates; mixed methods design and research questions; and analysis and dissemination considerations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.712. Theory and Practice in Qualitative Data Analysis and Interpretation for The Social and Behavioral Sciences. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.721. Translating Research into Public Health Programs and Policy. 3 Credits.
Examines how behavioral research (especially intervention research) is used, and not used, by policy makers and program administrators to determine what public health services are delivered. Defines the major types of decisions made in determining services to deliver in public health programs and major decision analytic methods used to aid these selections. Includes these types of decisions: (1) how much to invest in service for one disease area relative to another, (2) determining if an intervention is affordable for large-scale delivery, and (3) choosing how much to invest in each of several different types of services within one disease area. Includes methods decision tree analysis, cost analysis, and cost-utility analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.722. Translating Research into Public Health Programs II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.733. Communication Network Analysis in Public Health Programs. 4 Credits.
Introduces the theory and method of network analysis, its application to public health, emphasizing the dissemination of public health information and the transmission of disease, and the influence of networks on health-related behavior.Introduces the theory and method of network analysis, its application to public health, emphasizing the dissemination of public health information and the transmission of disease, and the influence of networks on health-related behavior. The course consists of class lectures, discussions, labs, reading materials, and problem sets. Data analysis will be conducted using STATA, UCINET and Netdraw software packages. Students need to have the access to Window system to download a free version of UCINET and Netdraw.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.752. Children, Media, and Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.755. Health Communication Programs. 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.800. MPH Capstone Health, Behavior and Society. 2 Credits.
The MPH Capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.810. Field Placement Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.820. Thesis Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.830. Postdoctoral Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.840. Special Studies and Research in Health Behavior and Society. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.850. MHS Research Practicum in Health Behavior and Society. 1 - 16 Credits.
Introduces MHS Social Factors students to hands-on social science research for public health. Provides an opportunity to work extensively with a doctorally trained research mentor. Prepares students to participate in social science research initiatives. Builds students' research knowledge and skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.860. Graduate Seminar in Social and Behavioral Sciences. 2 Credits.
Explores and debates theoretical concepts and orientations in the social and behavioral sciences and their application to public health research and practice through readings, discussion, and writing assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.861. Graduate Seminar in Community-Based Research. 1 Credit.
Explores faculty-community partnership in community-based research (CBPR), education, and practice. Seminar topics may include CBPR principles and ethics, coalition and partnership building, implementation, dissemination, translation and sustainability, media and marketing, advocacy, policy, cultural diversity, collaborative grant writing, and publishing. Speakers include faculty and also community patrons.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.863. Doctoral Seminar in Social and Behavioral Research and Practice. 1 Credit.
Explores and critiques social and behavioral sciences research and practice, emphasizing key constructs and methods of department faculty through presentations, readings, and group discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.864. Critical Issues in Health Disparities. 1 Credit.
Provides an opportunity for students, postdoctoral trainees, and faculty to present scientific papers from the current and/or classic health disparities literature. Emphasizes presentation skills and the ability to critically evaluate scientific papers. Requires participants to read and discuss the assigned material.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.865. MSPH Seminar in Health Education and Health Promotion. 1 Credit.
Introduces a variety of topics important to the profession of health education and health promotion, including both historical and current issues. Presents role definitions and competencies, health education certification, professional organizations representing the field, and other health education and promotion resources. Prepares students for the field placement requirement in the second year of the program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.866. Careers in Health Education and Health Promotion. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.867. MSPH Field Placement Preparation. 1 Credit.
Prepares students to fully understand the MSPH field placement requirements, processes, and opportunities, so that they may make the most of this professional preparation opportunity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.868. Program Planning for Health Behavior Change Practicum. 2 Credits.
Explores program planning application through project-based experiential learning. Includes work in small groups to apply the PRECEDE-PROCEED needs assessment planning framework in a real world setting with a community-based organization or local government agency. Focuses on the basic methods of working with communities and community organizations, types of needs assessment tools, and the skills needed to develop these tools, through four seminar sessions and weekly sessions with community based organization representatives.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.870. HBS Research and Proposal Writing Process for Doctoral Students I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.871. HBS Research and Proposal Writing Process for Doctoral Students II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.881. MHS Seminar in Social Factors in Health I. 1 Credit.
Introduces students to social science concepts in public health and to ongoing social factors research at JHSPH. Introduces students to key concepts and tools necessary to successfully complete the MHS in Social Factors in Health degree program.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.882. MHS Seminar in Social Factors in Health II. 1 Credit.
Provides additional skills in social science concepts for public health research. Introduces research methods for social factors research. Identifies current social factors research of interest to students.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.883. MHS in Social Factors in Health Seminar III. 1 Credit.
Upon successfully completing this course, students will be able to: 1) Identify a range of social scientific research approaches adopted by public health agencies. 2) Identify a range of public health agencies where social science research is conducted.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.884. MHS Seminar in Social Factors in Health IV. 1 Credit.
Advances students' understanding of the relationship between social factors and health outcomes and experiences. Exposes students to research pertinent to social factors in health. Provides MHS students with opportunities to explore applications of public health research skills in a variety of research and practice settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.410.895. MPH Practicum: Health Behavior and Society. 1 - 4 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.610. Practical Genetic Counseling. 2 Credits.
415.610 addresses the chromosomal basis of heredity, chromosomes and genes, tools of human molecular genetics, single gene inheritance, variation, polymorphism and mutation, genes in populations and genes in families. 415.611 presents the role of genetic counseling in health care and emphasizes the essential components of prenatal, pediatric, and adult genetics services. Indications for referral and genetics education and counseling components are illustrated using care examples. Clinical skills and tools are taught including family, medical and development history taking and pedigree construction. Additional case management skills such as the choice of laboratory and test interpretation, and issues in billing and reimbursment of genetic counseling services are addressed. 415.612 -613 expand on the previous two courses to examine the Hemoglobinapathics and Thalassemias as models of molecular pathology, the molecular/biochemical basis of genetic disease, genetics of cancer, gene mapping
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.611. Introduction to Human Genetics I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.612. Introduction to Human Genetics II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.613. Introduction to Medical Genetics I. 2 Credits.
Provides a foundation in medical genetics. Focuses on teaching genetic disorders using a systems approach. Presents an overview of the disease process and differential diagnosis of related genetic disorders. Includes the following topics: birth defects/embryology, prenatal diagnosis, pulmonary disorders, muscle diseases, hemoglobinopathies, ocular diseases, kidney disorders, craniosynostoses, skin disorders, deafness, because knowledge of the genetic contribution to disorders within these categories is critical to the work of genetic counselors and medical geneticists. Prepares students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.614. Introduction to Medical Genetics II. 2 Credits.
Builds upon the material in 415.613, and emphasizes other organ systems. Includes a patient panel where individuals discuss the impact of a genetic disorder on their lives and the lives of their family. Includes the following topics: neurogenetics, cardiac defects, cancer genetics, orofacial clefting, genitourinary disorders, skeletal dysplasias, connective tissue disorders because knowledge of the genetic contribution to disorders within these categories is critical to the work of genetic counselors and medical geneticists. Prepares students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.619. New Genetic Technologies and Public Policy. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.620. Introduction to Genetic Counseling I. 2 Credits.
Compares definitions of genetic counseling (GC) with objectives and service outcomes. Explores counselor values as they relate to roles and responsibilities toward clients. Introduces ethical and policy issues specific to GC in conjunction with a research agenda. Discusses and practices basic tools, including interviewing, history gathering, and case assessment, and nondirective counseling approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.621. Introduction to Genetic Counseling II. 2 Credits.
Compares definitions of genetic counseling (GC) with objectives and service outcomes. Explores counselor values as they relate to roles and responsibilities toward clients. Introduces ethical and policy issues specific to GC in conjunction with a research agenda. Discusses and practices basic tools, including interviewing, history gathering, and case assessment, and nondirective counseling approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.624. Ethical, Legal and Social Implications in Genetics and Genomics Over Time. 3 Credits.
Examines the ethical, legal and social implications (ELSI) of human genetics and genomics through the lens of significant and field-defining periods and events in the history of the field. Examines the ELSI raised by those events, and how the events have shaped and defined the current state of the science and emerging scientific, ethical, policy and public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.630. Therapeutic Genetic Counseling I. 2 Credits.
Equips graduate students enrolled in the JHU/NHGRI Genetic Counseling Program with an applied psychological paradigm for genetic counseling. Defines and illustrates goals and the process of genetic counseling. Teaches students skills to assess clients' cognitive and affective responses to the genetic contribution to disease and risk. Defines components of a therapeutic relationship. Allows opportunities to practice establishing and acting on a therapeutic relationship.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.631. Therapeutic Genetic Counseling II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.640. Health Judgment and Decision Making. 2 Credits.
Provides a foundation in cognitive, emotional, and motivational processes underlying judgment and decision making in a variety of health contexts. Focuses on antecedents and consequences of adaptive and maladaptive health judgments and decisions, with particular attention to risk perception and communication, application of decisional heuristics, and personal beliefs underlying health decisions. Considers how people make decisions, how they respond to health information, and how they mentally represent illness, as well as how health teams make decisions. Prepares students to apply basic research on health judgment and decision-making to effective genetic counseling and other applied settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.650. Facilitating Family Adaptation to Loss and Disability I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.651. Facilitating Family Adaptation to Loss and Disability II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.675. Cancer Genetics: Managing the Risks Through Testing and Counseling. 2 Credits.
Equips graduate students enrolled in the JHU/NHGRI genetic counseling program with principles of genetic components to common diseases, using cancer as the example for this course. Introduces key concepts throughout the course through case-based learning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.701. Genetic Counseling Lab I. 2 Credits.
Explores interactive genetic counseling interventions as they apply to specific clinical settings and client needs. Presents key issues in client education for various medical specialties, and identifies research needs related to genetic counseling. Examines counseling issues through the use of role-plays.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.702. Genetic Counseling Lab II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.710. Medical Genetics and Genomic Medicine: from Diagnosis to Treatment I. 2 Credits.
Examines advances in the diagnosis of genetic disorders and treatments that result from genomic medicine. Focuses on examples from multiple malformation syndromes, autoinflammatory diseases, deletion/duplication syndromes, and Ras-opathies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.711. Medical Genetics and Genomic Medicine: from Diagnosis to Treatment II. 2 Credits.
Examines advances in the diagnois of genetic disorders and treatments that result with a focus on neurocutaneous syndromes, muscular dystrophies, connective tissue disorders and ciliopathies. Both terms aim to prepare students for the board certification exam given by the American Board of Genetic Counseling upon completion of the ScM in genetic counseling.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.820. Thesis Research: Genetic Counseling. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.840. SS/R: Genetic Counseling. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.851. Supervised Clinical Rotations: Genetic Counseling. 2 - 4 Credits.
Clinical placements in adult, pediatric, and prenatal genetic centers in the Baltimore-Washington area provide opportunity to learn about genetic conditions by their impact on individuals and their families, and about roles of the genetic counselor. Individual rotations are scheduled to achieve a wide range of clinical experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.861. Genetic Counseling Seminar: Topics in the Field. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.866. Current Topics in Molecular Genetics I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.867. Current Topics in Molecular Genetics II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.870. Genetic Counseling Clinical Supervision. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.880. Genetic Counseling Program Thesis Proposal Development I. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.881. Genetic Counseling Program Thesis Proposal Development II. 2 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.415.882. Genetic Counseling Program Thesis Proposal Development III. 2 Credits.
This is the third of a series of three courses designed to provide students with the skills needed to turn a research idea into a formally presented and orally defended thesis proposal. In this final course of the series, students will refine their working proposal for submission to the Executive Committee and prepare for the oral examination. They will be expected to have turned a nascent research idea into a workable proposal for the conduct of a research study that will constitute the ScM thesis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550 (Extradepartmental Studies)

PH.550.001. English for Academic Purposes I.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.002. English for Academic Purposes II.
Focuses on academic writing skills including documentation styles, and combines Saturday class meetings with online assignments and one individual conference.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.600. Living Science Ethics - Responsible Conduct of Research. 1 Credit.
Fosters the responsible conduct of scientific research using a combination of lectures, discussion and analysis of case studies. Includes topics: data management, conflict of interest, scientific misconduct, questionable research practices, responsible authorship, peer review, collaborations with peers and industry, trainee-mentor relationships, research ethics and regulatory requirements of the conduct of animal and human research, and the scientist as a responsible member of society.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.601. Implementation Research and Practice. 3 Credits.
Distinguishes implementation science from traditional research and practice. Combines didactic methods and group activities to explore the rapidly evolving topic of implementation as it pertains to public health research and practice. Provides an overview of the concepts, theories, tools, and methods used to advance implementation research and practice. Presents key principles of implementation science from a multidisciplinary perspective and provides practical applications of those principles in both practice and research-based settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.602. Interprofessional Education Activity.
Provides the opportunity to participate in a case study highlighting the essential role of teams and teamwork in building multi-sector collaborations and partnerships in population health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.603. Fundamentals of Immunology. 3 Credits.
Introduces the major molecular and cellular components of the immune system and provides a broad understanding of the biological concepts associated with the induction and regulation of innate and adaptive immune responses. Explores major mechanistic topic areas that include the innate recognition of pathogens, the molecular nature of antigens and antigen presentation; molecular basis for antibody and T-cell receptor structure and diversity; cytokine signaling in immune activation, T cell lineage commitment, cellular basis for antibody production, cellular basis for T cell activation and cellular immunity, and central and peripheral tolerance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.604. Qualitative Reasoning in Public Health. 2 Credits.
Provides students with a broad overview of qualitative methods and concepts used in the public health sciences. Emphasizes the conceptual foundations of qualitative research and how it is used in public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.605. History of Public Health. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.606. Milestones in Public Health. 1 Credit.
Provides a broad overview of public health milestones through the lens of diverse public health faculty spanning from molecular biology, vaccine policy, injury, and micronutrient supplementation to health disparities, legal issues, bioethics, and health security. Reviews a milestone with each lecture as viewed by an individual faculty and provides opportunity for questions and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.607. MPH Seminar in Public Health Topics. 1 Credit.
Provides a broad overview of public health topics through lectures given by faculty across the Departments and Centers of the School. Provides exposure to these issues and discussions that may help students further refine their MPH interests, goals, and future projects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.608. Problem Solving in Public Health. 4 Credits.
Uses divergent public health issues to illustrate a systematic problem solving process for use in addressing public health problems. The problem solving process includes defining the problem, measuring its magnitude, understanding the key determinants, developing a conceptual framework of the relationships between the key determinants, identifying and developing intervention and prevention strategies (either interventions or policies), setting priorities among intervention options, understanding barriers to implementation and evaluation, and developing an effective communication strategy. Consists of lectures, discussions, small-group exercises, a group project, and individual assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.609. Life and Death in Charm City: Histories of Public Health in Baltimore, 1750 to the Present. 3 Credits.
Critically explores a range of important topics in the history of public health in Baltimore from the mid-18th century to the present, including: migration and health; sewers and water supply; infectious disease control (for example, tuberculosis and STDs); housing and lead poisoning; rodent control. Recurrent themes are racial inequality, the geography of poverty and the multiple challenges of urban government. Focuses on the city of Baltimore, but the issues discussed are placed in their wider national and international contexts and take into account broad historical developments in the theory and practice of public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.630. Public Health Biology. 3 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.631. Biological Basis of Public Health. 3 Credits.
Discusses molecular, biochemical, cellular and immunological methodology and approaches for the mechanistic understanding, treatment and prevention of human diseases, and for understanding disease susceptibility. The focus will be on the application of biological methods and approaches to such critical issues as infectious disease, cancer, neurodegenerative disease, COPD, environmental toxicant effects on early development, and reproductive anomalies and their treatment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.714. Secondary Uses of Electronic Health Record Data. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of analytics to Electronic Health Record (EHR) data. Covers the use of EHR data to define and identify populations and sub-populations of patients, evaluate common metrics in health care, and improve patient safety and care quality. Emphasizes the use of EHR data in hospital settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.800. MPH Capstone Extradepartmental. 2 Credits.
The MPH capstone is an opportunity for students to work on public health practice projects that are of particular interest to them. The goal is for students to apply the skills and competencies they have acquired to a public health problem that simulates a professional practice experience.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.840. P.H. Special Studies and Research. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.844. Current Issues in Public Health: COVID-19 Pandemic Response. 2 Credits.
Provides students with expert information and insight around the current COVID-19 pandemic globally. This series will meet virtually, featuring experts on multiple clinical, epidemiological, and social elements of the novel coronavirus.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.845. Comprehensive Or Preliminary Oral Exam for Part Time International DRPH Students. 2 Credits.
Since US Immigration laws require that all International students must be enrolled full time when on campus, students must complete their departmental/program comprehensive examination or their School preliminary oral examination enrolled as a full-time student during the time period of the exam.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.850. MPH MBA Internship. 12 Credits.
MPH MBA Internship
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.853. Seminar for MPH Concentration in Social and Behavioral Sciences I. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.854. Seminar for MPH Concentration in Social and Behavioral Sciences II. 1 Credit.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.855. MA Public Health Biology Thesis. 5 - 6 Credits.
Provides an opportunity for students to, in consultation with a faculty mentor from the Dept of Biochem and Molecular Bio, Environmental Health or Molecular Microbiology and Immunology, prepare a critical, scholarly paper on an agreed upon subject area.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.860. Academic & Research Ethics at BSPH.
Examines academic and research ethics at BSPH in a series of online interactive modules. Focuses on information about the academic ethics code and responsible conduct of research at the School. Explores issues of academic integrity such as proper ethical conduct and referencing, and discusses violations such as plagiarism and cheating, relative to case studies that illustrate situations faced by students and faculty in the academic setting. Addresses topics that include responsible conduct of research, authorship, data management, data ownership, guidelines for professional conduct, research fraud or scientific misconduct, federal and institutional guidelines related to research using human and animal subjects and ethical issues involving vulnerable subjects in research.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.864. Baltimore Community Practicum. 1 - 4 Credits.
Conducts a project involving a defined denominator population at a community-based organization or local health department. Participates in seminar sessions that cover basic methods of outreach to community organizations, attitudes and values about the role of professionals in community-based work, the social contract required of service professionals, and the attitudes required for effective public health practice.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.865. Public Health Perspectives on Research. 2 Credits.
Introduces the substantive and methodologic bases for public health research, emphasizing the critical roles of the quantitative, qualitative, biologic, social, and behavioral sciences in improvement of public health. Highlights principles of high-quality research, including the value of a population perspective, interdisciplinary cooperation, the importance of new measurement techniques, and the interface between theory and practice. Gives students information about the interactions between the public and the researcher.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.867. Introduction to MPH Studies.
Introduces MPH students to their educational program. Includes enrichment seminars, required readingsand assignments, including the Goals Analysis requirement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.870. SS/R: Occupational Medicine Residency-Practicum Year. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.880. SS/R: General Preventive Medicine Residency-MPH. 1 Credit.
Prepare residents in the theoretical, practical, and clinical knowledge and skills essential to leadership roles in the design, management, and evaluation of population-based approaches to health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.890. SS/R: General Preventive Medicine Residency-Residency Year. 6 - 16 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.895. MPH Practicum (Non Departmental). 1 - 4 Credits.
The MPH Practicum is a mentored, hands-on practical public health experience, which involves meaningful participation and interaction with public health professionals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.550.908. Lab for Prob Solving 550.608.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.840. P.H. Special Studies and Research. 0.5 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.867. Designing an MPH Capstone Project. 1 Credit.
Discusses the importance of selecting the appropriate format for addressing different capstone topic. Reviews search strategies and data bases for a literature review. Provides tips for using a citation management software such as RefWorks in order to provide proper attribution to references. Introduces the basic strategies for writing a clear and concise capstone paper. Provides tips for presenting data in tables and graphs. Introduces the basic strategies for giving a good oral presentation. Presents tips for giving and receiving meaningful feedback. Introduces principles for the design of a good poster.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.551.895. Source Practicum Special Studies. 1 - 4 Credits.
Special studies for practicum activities with SOURCE and participating Baltimore City community-based organizations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.602. The Role of Quantitative Methods in Public Health. 0.5 Credits.
Covers the bases for the role of quantitative methods in public health, including how to formulate scientific questions quantitatively, different types of data, properties characterizing high or poor quality of measurements, the implications of statistical uncertainty, and the difference between association and causation. Uses illustrative case examples including the opioid epidemic and aging.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.603. The Role of Qualitative Methods and Science in Describing and Assessing a Population's Health. 0.5 Credits.
Acquaints students with a broad overview of the use of qualitative research methods in public health. Explores the types of critical public health questions best addressed through a qualitative approach and introduces conceptual principles that are foundational to qualitative research. Exposes students to key issues in planning and conducting qualitative research, as well as strategies for analyzing qualitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.604. Causes and Trends in Morbidity and Mortality. 0.5 Credits.
Provides a broad understanding of the top causes of morbidity and mortality globally, in the U.S., and in Baltimore City, as well as the trends in these estimates. Introduces measurement of morbidity and mortality, and threats to the quality of measurements. Addresses the role of population characteristics (age, sex, region, race/ethnicity) in estimates and trends. Discusses case studies of major causes and trends in morbidity and mortality in defined populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.605. The Science of Primary Secondary and Tertiary Prevention in Population Health. 0.5 Credits.
Provides a broad understanding of the different levels of public health prevention: primary, secondary, and tertiary and discusses the impact of each level on prevention in population health. Emphasizes the role of epidemiology in prevention and control; compares and contrasts the descriptive epidemiology, natural history, and pathologic and biologic characteristics as well as factors related to their etiology. Presents the impacts of recent advances in human genomics/genetics, immunology and metabolism on prevention strategies for chronic and acute disease. Introduces basic principles, theories, and methods in the field of prevention science. Identifies public health interventions that operate at multiple ecological levels, including the community, family, and individual. Introduces the role of resilience. Discusses case studies related to the prevention of different physical, mental, behavioral and infectious disease health problems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.606. The Critical Importance of Evidence in Advancing Public Health Knowledge. 0.5 Credits.
Emphasizes the need to establish the credibility of the evidence, based on the rigor of the methods used in generating it (e.g., type of studies, rules of causality, the nature of errors) before employing evidence to advance knowledge, practice, or policy. Discusses the bases for debate about recommendations for particular interventions that impact a population's health, how to weigh their benefits and harms, the ethics of scientific conduct, and effective communication in building evidence. Uses illustrative case examples, such as breast and prostate cancer screening, vaccines for measles and cervical cancer, nutritional sodium reductions, and the opioid epidemic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.607. Essentials of Environmental Health. 0.5 Credits.
Course Description: Summarizes the public health impact of environmental agents (e.g. chemical, biological, physical) present in air, water, soil, food, and the community. Discusses how these agents cause adverse health effects as well as ways to assess the risk of such effects and apply strategies for preventive interventions. Presents systems that have major impacts on environmental health, as well as applications of the science in the real domestic and international world. Through four modules: Foundations; Exposures in Air, Water and Food; Systems; and Cases, exemplifies effects of specific environmental exposures.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.608. Biologic, Genetic and Infectious Bases of Human Disease. 0.5 Credits.
Focuses on the basics of cellular and molecular biology, genetics, and infectious agents. Explains concepts that link basic biology to disease and population health. Illustrates application of biologic and genetic principles to population health using case studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.609. Psychological and Behavioral Factors That Affect A Population's Health. 0.5 Credits.
Shows the role of behavior in health, drawing from smoking and other risk behaviors. Examines factors along the socioecological continuum that influence such behavior. Highlights key determinants for achieving behavior change to improve health outcomes, such as feasibility, self-efficacy and social support. Introduces common types of behavior change interventions, such as counseling and social marketing.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.610. The Social Determinants of Health. 0.5 Credits.
Provides an overview of social, political, and economic influences on health and their role in producing health inequalities within and among populations. Emphasizes key axes of inequality: gender, race/ethnicity, and socioeconomic status. Explains conceptual foundations for social determinants of health and health inequalities. Summarizes evidence linking selected social, political, and economic factors to health and the pathways by which they influence health. Highlights importance of understanding social determinants of health, despite challenges of designing interventions targeting social determinants.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.611. Globalization and Population Health. 0.5 Credits.
Evaluates in depth the complex relationship between globalization and health. Discusses this relationship across the four main dimensions of globalization (economic, political, cultural and environmental). Examines the existing evidence on the impact of globalization on global burdens of disease. Explores the opportunities of globalization and strategies for mitigating its negative effects.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.612. Essentials of One Health. 0.5 Credits.
Introduces the principles of One Health, the interface of human health, animal health and environmental health. Examines the methods and tools for the conduct of One Health studies and the design of One Health programs. Uses a systems thinking approach to explore multiple topics including food systems, food and animal policies, One Health governance, and stakeholder engagement.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.621. Basic Resources Management for Public Health. 1 Credit.
Provides an overview of budgeting and resource management for public health practitioners working in health settings. Discusses the role and functions of governing bodies. Considers the types and categories of performance problems as well as how to determine causes of performance deviations and approaches for remedying them. Explores the tools and resources of budget and resource management.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.622. Creating, Implementing and Monitoring Budgets for Projects and Programs. 1 Credit.
Addresses strategies for creating budgets for projects and programs. Stresses the essential role of budgets in promoting the health of organizations and resource management. Explores how budgets are used to facilitate project and program management, including assessing whether high-quality outcomes are being achieved on time and within resource constraints or whether changes to the work plan, budget, or available resources are needed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.623. Principles of Negotiation and Mediation for Public Health Professionals. 0.5 Credits.
Examines the theory and principles of negotiation and mediation. Through readings and didactic instruction, explores negotiation and mediation processes, models and techniques. Investigates verbal and nonverbal communication and persuasion as well as other factors that influence successfully negotiated compromises of complex public health issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.624. Applications of Negotiation and Mediation for Public Health Professionals. 0.5 Credits.
Offers students opportunities to apply negotiation and mediation principles and models to “get to yes” in their public health negotiation simulations. Uses a negotiation and mediation simulation that will enable students to practice the art of negotiating and examine their personal strengths and weaknesses in these processes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.625. Building Collaborations Across Sectors to Improve Population Health. 0.5 Credits.
This course provides an overview of the essential role interprofessional teams in building multi-sector collaborations and partnerships in population health. Following deliberate, evidence-based methods for effective collaboration, the course identifies and discusses several key factors that can only be addressed through cross-sector efforts. These factors include the social determinants of health, complexity, context, and societal resistance. The Collective Impact Model, designed to tackle entrenched, socially complex issues, is introduced as an evidence-based for effective, large scale, sustainable change.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.552.626. Systems Thinking: Concepts and Methods. 0.5 Credits.
Provides students with an understanding of how to apply systems thinking in public health. Trains students on the fundamentals of systems thinking theory and offers opportunities to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply systems thinking to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policymakers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600 (Online Programs for Applied Learning)

PH.600.601. Seminars in Public Health. 2 Credits.
Introduces the basic principles of the practice of public health at the local, regional, national, and international levels. Uncovers relevant public health topics through a combination of presentations by experts, discussions, and lectures. Focuses on the core competencies required for the effective assessment and improvement of the health and well-being of communities. Explores the public health approach to describing the health of a population, including the importance of understanding the social and cultural context surrounding every community. Covers a broad spectrum of population-based, prevention-oriented issues relevant to public health in the private and public sectors of both domestic and international communities, including global health promotion, disease prevention, health care delivery systems, environmental issues, and the spectrum of factors influencing the health status of populations and communities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.602. Seminars in Public Health: Advanced Topics. 2 Credits.
Expands upon the 1st term of Seminars in Public Health to focus on how to effect public health change. Uses a combination of expert presentations and engaging discussions to explore topics including identification of key stakeholders, acknowledging competing governance priorities, and gathering support for population-level interventions. Explores the dissemination of public health messages, understanding key aspects of speaking to a range of stakeholder audiences and utilizing available communication tools. Focuses on examples of successful advocacy for change, and key lessons learned. Encourages students to utilize the public health approach discussed over the two terms to refine their future career goals.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.611. Professional Development Workshops: Effective online Searching. 2 Credits.
Introduces and explores online sources for finding high-quality, full-text research articles. Also prepares students to use advanced search techniques efficiently within these sources and to manage references using tools such as RefWorks, EndNote, Zotero and Mendeley. Finally, students learn about tools available to use to stay current on topics related to the public health field.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.612. Professional Development: Writing for Results. 2 Credits.
Professional Development: Writing for Results: Introduces a systematic approach to writing— from planning and organization to revision and completion. Emphasizes the importance of defining the message and understanding the audience and purpose. Examines the basic elements of good writing. Focuses on clarity, concision and style. Explores the use of rhetoric and storytelling to maximize a piece of writing’s impact. Emphasizes best practices in various forms of writing, including emails, memos, reports, proposals and op-eds.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.701. Introduction to Epidemiology. 4 Credits.
Introduces principles and methods of epidemiologic investigation of diseases. Illustrates methods by which studies of the distribution and transmission of diseases in populations (including disease outbreaks and epidemics) can contribute to an understanding of etiologic factors and modes of transmission. Covers various study designs, including randomized trials, case-control and cohort studies, as well as risk estimation and causal inference. Discusses applications of epidemiology to solving public health problems, such as identifying sources and strategies for control of disease outbreaks, applying research findings to policy and practice, and program evaluation. Explores quantitative and analytic methods including life tables, disease surveillance, measures of morbidity and mortality, and measures of diagnostic test accuracy.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.702. Intermediate Epidemiology. 4 Credits.
Expands knowledge beyond introductory level epidemiologic concepts and methods material using examples from the published literature. Emphasizes interpretation and the ability to critically evaluate issues related to populations/study design, measurement, population comparisons and inference, including modern cohort study designs; advanced nested designs; novel techniques for exposure assessment; interpretation and utility of measures of impact; sources of bias and methods for their prevention; descriptive and analytical goals for observational study inference; the counterfactual model for defining exchangeability, cause, and confounding; and synthesis of inferences from observational studies as compared with randomized clinical trials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.709. Statistical Concepts in Public Health 1. 3 Credits.
Provides students with a broad overview of Biostatistical methods and concepts used in the public health sciences. Emphasizes the interpretation and conceptual foundations of statistical estimation and inference. Covers summary measures, measures of association, confidence intervals, p-values, and statistical power.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.710. Statistical Concepts in Public Health 2. 3 Credits.
Provides a broad overview of biostatistical methods and concepts used in the public health sciences, emphasizing interpretation and concepts rather than calculations or mathematical details. Develops ability to read the scientific literature to critically evaluate study designs and methods of data analysis. Introduces basic concepts of statistical inference, including hypothesis testing, p-values, and confidence intervals. Topics include comparisons of means and proportions; the normal distribution; regression and correlation; confounding; concepts of study design, including randomization, sample size, and power considerations; logistic regression; and an overview of some methods in survival analysis. Draws examples of the use and abuse of statistical methods from the current biomedical literature.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.711. Public Health Statistics I. 4 Credits.
Provides students with a broad overview of Biostatistical methods and concepts used in the public health sciences. Emphasizes the interpretation and conceptual foundations of statistical estimation and inference. Covers summary measures, measures of association, confidence intervals, p-values, and statistical power. The software package R will be incorporated into the course learning experiences, and students will be able to use R for a portion of each of the four class homework assignments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.600.712. Public Health Statistics II. 4 Credits.
Employs a conceptual framework to highlight the similarities and differences between linear, logistic and Cox Proportional Hazards methods, in terms of usage and the interpretations of results from such models. Provides details for these regression approaches in the “simple” scenario, involving relating an outcome to single predictor. Following this overview of simple regression, explores the use of multiple regression models to compare and contrast confounding and effect modification, produce adjusted and stratum-specific estimates, and allow for better prediction of an outcome via the use of multiple predictors. Offers a brief introduction to linear spline models and propensity score methods for adjustment. T
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.731. Spatial Analysis for Public Health. 4 Credits.
Introduces the field of spatial analysis for public health. Examines concepts through the use of ArcGIS Geographic Information System (GIS) mapping software as a tool for integrating, manipulating, and displaying public health related spatial data. Covers GIS topics including mapping, geocoding, and manipulations related to data structures and topology. Introduces the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics and uses selected case studies to demonstrate concepts along the paradigm. Focuses on using GIS to generate and refine hypotheses about public health related spatial data in preparation for follow up analyses.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.732. Spatial Data Technologies for Mapping. 4 Credits.
Examines technologies for collecting, obtaining and creating spatial data. Considers technologies including GPS, tablets, tracking devices, cell phones, Google Earth, remote sensing applications, and the Internet. Integrates spatial data from the aforementioned technologies into ArcGIS for spatial analysis. Introduces other GIS related software applications such as ArcGIS Online, QGIS and R. Explores relevant properties of spatial data such as format, metadata, and spatial data accuracy. Covers additional topics and concepts that reinforce the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.733. Applied Spatial Statistics. 4 Credits.
Introduces statistical techniques used to model, analyze, and interpret public health related spatial data. Casts analysis of spatially dependent data into a general framework based on regression methodology. Covers the geostatistical techniques of kriging and variogram analysis, point process methods for spatial event and case control data, and area-level analysis. Focuses on statistical modeling and topics relating to clustering and cluster detection of health related events. Provides an introduction to the public domain statistical software R, to be used for analysis. Reinforces skills and concepts related to the spatial science paradigm: Spatial Data, GIS, and Spatial Statistics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.734. Spatial Applications. 4 Credits.
Focuses on further developing and integrating components of the spatial science paradigm: Spatial Data, GIS and Spatial Statistics. Provides an opportunity for students to gain a working knowledge of resources for conducting spatial analysis (e.g., literature, software, and data). Expands students' abilities to design and conduct spatial analysis by providing data for reproduction, and in some cases, extension of analyses from existing studies.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.805. Spatial Analysis Journal Club. 2 Credits.
This course will involve reading and critically evaluating the application and interpretation of spatial statistical methodology in published public health literature. Focus will be on understanding how the epidemiological/public health objectives translate into spatial statistical analyses. Literature reviews will also include outlines detailing spatial statistical methods and analyses that can be applied as an extended and/or alternative analysis.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.880. Spatial Analysis integrative Activity. 4 Credits.
This course will involve the research, analysis and writing of a complete and independent spatial analysis project. Intermediate outlines, hypotheses and objectives produced in previous classes will be finalized. No new material will be covered. The finalized project will follow journal article format including an abstract, and introduction/background, methods, results and conclusion sections. The final project will represent an integrated and synthesized assessment of the spatial science paradigm (Spatial Data, GIS, Spatial Statistics) applied to a relevant public health problem.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.931. Spatial Analysis Lab 1. 2 Credits.
Expands on GIS concepts and skills previously learned with more hands-on practice with epidemiological applications. Focuses on translating an epidemiological problem or getting into a set of spatial objectives that align with our spatial science paradigm. Surveys and summarizes the literature on spatial applications in public health. Prepares students to design a protocol to help identify a public health problem and accompanying data for their MAS Integrative Activity.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.601.932. Spatial Analysis Lab 2. 2 Credits.
Applies spatial concepts and skills towards identifying a public health project that can be the focus of the MAS Integrative Activity. Prepares students to translate projects into a set of spatial objectives that align with the spatial science paradigm. Details out the mechanisms and processes needed for collecting, creating and/or obtaining necessary supporting data for the chosen project.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.631. Essentials of Population Health Management. 3 Credits.
Population health refers to outcomes for a group of individuals. Acquaints students with key concepts related to maintaining the health and wellness of populations. Examines the importance of determinants of health, including medical care, public health, genetics, personal behaviors and lifestyle, and a broad range of social, environmental, and economic factors. Explores this broad view of the determinants of population health and its impact on organizations that may not think of themselves as being in the business of health, such as housing organizations, employers, schools, and others who make decisions and create environments that can help or hinder good health. Population health management (PHM) has emerged as an important strategy for healthcare providers and payers. This course examines the challenges and opportunities to improving health within and across populations, as well as models of value-driven accountable care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.651. Principles and Applications of Advanced Payment Models in Population Health Management. 3 Credits.
Presents an overview of major issues related to the design, function, management, regulation, and evaluation of health insurance and managed care plans and implications for population health management. Provides a firm foundation in basic concepts pertaining to private and public sector health insurance/benefit plans. Key topics include population care delivery and payment innovations and management techniques, provider payment models, risk-sharing and other incentives for organizational integration, quality and accountability, cost-containment. Innovative payment models and initiatives supporting health care providers and health care organizations in testing alternative care delivery and payment models are reviewed in the context of three core strategies for improving the US health system: improving the way health care providers are paid, improving the way care is delivered, and increasing the availability of information to guide decision-making.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.671. Collective Impact: Developing and Leading Community Partnerships to Improve Population Health. 3 Credits.
Identifies the elements necessary to create a culture of collaboration. Following deliberate, evidence-based methods, evaluates components of cultural transformation. Examines strategies related to building infrastructure for collaboration, including application of the Collective Impact Framework.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.681. Applications in Accountable Care: Assessing Quality and Effectiveness of Population Health initiatives. 3 Credits.
This course examines approaches by health plans, employers, and providers to evaluate population health management initiatives, define and measure quality from a population perspective, and assess the impact of Delivery System Reform and multi-payer alignment on outcomes examine new approaches to outcome and cost measurement. By focusing on the role of value measurement as part of a strategic agenda to transform quality and costs, participants will learn how to enable systematic improvement in the care delivery process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.691. Managing Health Across the Continuum: Contemporary Models and Applications of Care Coordination and Management. 3 Credits.
Understanding gained from the evolution of care management models has prompted the need for a more comprehensive approach to managing the health of populations. The continuum of care refers to the concept of managing individuals with various levels and intensity of health services from prevention to chronic disease management and end of life care. In order to manage health across the "community" continuum, health management strategies need to align with data collected from Community Health Needs Assessments and other sources to target identified health risks across the continuum. This course incorporates concepts from various models (e.g. Triple Aim) and provides a framework to transform care delivery. It examines the concepts and strategies of care management, analyzes strategies aimed at primary and secondary prevention, and evaluates models and efforts to expand care management accountability into the community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.701. Applied Concepts and Foundations of High Performance for Population Health. 3 Credits.
Provides students with an understanding of the core features, characteristics, values, culture, and systems that lead to high performance for population health. Introduces evidence-based approaches such as the Baldrige framework that allow organizations to address performance gaps and develop robust processes and a culture of continuous improvement and excellence to improve the health of populations. Utilizes a case study approach to share best practices within population health that lead to sustained high performance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.711. Health Behavior: Improving Health Through Health Education/Promotion. 3 Credits.
Provides students with an overview of the field of health education/health promotion and an opportunity to develop skills in needs assessment and program planning. Reviews the importance of health behavior as a contributor to current public health problems, as well as the role of health education and health promotion in addressing these problems. Learns how to use planning frameworks (PRECEDE/PROCEED and Social Marketing) for conducting needs assessments and designing health promotion programs. Introduces theories of health behavior change and their applications to health behavior change interventions described. Presents examples of health education and health promotion programs from health care and community settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.721. Organizing for Public Health: A Systems Approach. 2 Credits.
Systems thinking, (ST), is a holistic approach to analyzing how components of complex systems interact and adapt. Through systems thinking we can understand how societies organize themselves to achieve collective health goals and how different actors contribute to policy outcomes. Provides students with an understanding of how to apply ST in public health. Trains students on the fundamentals of ST theory and offers an opportunity to apply key methods and approaches to health policy and health questions. Prepares students to ask relevant research questions and apply a ST lens to describe, understand, and anticipate complex behavior. Examines how systems models can be critically appraised and communicated with others so public health policy makers can exercise a greater degree of wisdom and insight.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.731. Population and Consumer Health Informatics. 3 Credits.
Introduces students to concepts, methods, and issues related to the application of health information technology (HIT) to population health. Emphasizes the population health potential of comprehensive electronic health records (EHRs), personal health records (PHRs), mobile health and telemedicine devices; and, consumer focused internet-based tools. Covers the uses of HIT to define and identify populations and sub-populations of interest, and describe the health status and needs of populations. Emphasizes the use of HIT within both local, regional and federal public health agencies and population-based private health care organizations such as integrated delivery systems and health insurance plans. Lessons are mainly U.S. oriented but are also applicable to other high and middle income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.741. Behavioral Economics and Risk: Value-Based Payment Methods and incentives. 4 Credits.
Provides students with tools from mainstream and behavioral economics that can be used for managing population health. Demonstrates the value – and limitations – of these approaches for influencing the decision-making of providers and the health behaviors of individuals, with particular attention to value-based payment methods and incentives. Examines the influence of payment design on provider and patient behaviors and applies concepts of behavioral economics to evaluate and propose essential elements of effective payment models and incentives designed to improve health and reduce costs. Draws on articles from the popular press and professional journals that illustrate how these approaches have been applied in experimental and real situations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.751. The Built Environment: Influences and Challenges to Improving Population Health. 3 Credits.
Focuses on describing the relations between the urban and suburban built environments in the U.S., with emphasis on land use and transportation infrastructure, access to healthy food, access to green space and recreational opportunities, and exposures to air pollution and noise that accompany these community designs all of which have been shown to have an impact on community health. Explores the use of Health Impact Assessments for assessing the programs and policies that do not traditionally evaluate public health outcomes.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.761. Value-Based Concepts of Socially-Responsible Leadership. 3 Credits.
Focuses on the essential principles of personal and interpersonal leadership that can be used in and across organizational settings to enhance performance, align and empower relevant stakeholders, and assure multisector organizational engagement. Provides students with opportunities to learn and apply leadership skills in a manner that encourages them to challenge their own beliefs and assumptions about what constitutes leadership. Offers a comprehensive review of contemporary issues and perspectives on leadership including multidisciplinary and systems-oriented approaches as well as classic leadership theory and evolving contemporary beliefs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.602.880. Population Health Management integrative Activity. 4 Credits.
Emphasizes the research, analysis, and writing of a complete and independent population health management strategy. Prepares students to draw upon the relevant evidence-based concepts of population health and population health management provided through the curriculum. Covers no new material. Focuses on the finalized project, in the format of a consulting report to senior leadership and will contain an executive summary in addition to, introduction, background, assessment and analysis, findings, and recommendation sections. Challenges students to produce a final project paper that will represent an integrated and synthesized assessment of population health management paradigm of Know-Engage-Manage as applied to a defined community.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.651. Case Studies in Quality and Patient Safety. 2 Credits.
• Provides an understanding of the approaches undertaken by US and international health care organizations (HCOs) to institute quality and patient safety initiatives in patient care • Explores the extent, relevance and impact of the HCO's structure and strategy on quality and patient safety functions, • Introduces the Baldrige Performance Excellence framework to assess the quality and patient safety functions, • Describes the quality and safety domains using case studies of different HCOs in the US and international settings, • Emphasizes how the internal HCO culture and external HCO environment serve as facilitators or barriers for implementing quality and patient safety initiatives, and • Highlights key HCO roles senior- and middle-level management play both at the institutional and departmental levels to enable effective practical implementation of quality and patient safety initiatives, including resource allocation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.701. Introduction to Quality of Care for Practitioners. 4 Credits.
Introduces quality issues, including quality assessment and assurance performed by clinicians, health systems, professional societies, and government and other third party organizations who pay for care. Provides a basis to evaluate the effectiveness of quality assessment and assurance activities. Describes different approaches to quality improvement and evaluation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.702. Quality Improvement Tools. 3 Credits.
Describes, demonstrates and trains in the use of key tools used at leading institutions to improve quality of care and patient safety. These will include the Comprehensive Unit-based Safety Program (CUSP), Plan Do Study Act (PDSA), Translating Research into Practice (TRiP), Human Factors Analysis and Classification System (HFACS), Systems Engineering Initiative for Patient Safety (SEIPS), Lean Six Sigma, Management Discussion & Analysis (MD&A), Safer Matrix, briefings, debriefings and TeamSTEPPS©. Presents a framework and strategies for the successful implementation of quality improvement interventions, including specific approaches, methods, structures and resources to promote uptake of the components of an intervention. Learners will gain first hand experience through role playing, individual and group exercises and simulations with each of the techniques.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.711. Science of Patient Safety. 4 Credits.
Provides an introduction to the science of safety and how it relates to problems with patient safety in health care. Explores the extent, nature and impact of safety problems. Introduces definitions for key concepts including error, adverse event, and harm. Provides a framework for understanding factors that cause, mitigate, and prevent errors and patient harm. Emphasizes the role of both individuals and systems in improving patient safety. Explains the importance of achieving a culture of safety, and the concept of high reliability in health care organizations. Points to roles that involve the practical application of this knowledge.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.721. Leadership for Change and Patient Safety and Quality Improvement. 3 Credits.
Describes, demonstrates and builds competence in leadership to support organizational quality and safety, and support transformational change. Explores organizational theory and frameworks for leadership and management. Explains the importance of vision, mission, and strategies for organizations. Describes organizational culture and articulates the role of exploring values and creating a shared vision in developing a culture of patient safety. Explains the roles of top managers, technical leaders and unit managers in safety improvement. Demonstrates the use of analytics in leading and management safety and quality improvement. Describes practices to engage leaders and staff to improve patient safety. Introduces topics including conflict management, negotiation, transparency, managing transitions, and innovation in health care.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.731. Measurement and Evaluation in Quality and Safety. 4 Credits.
Provides an overview of principles of good measurement and introduces applied evaluation methods for real world patient safety and quality improvement efforts that seek to implement evidence-based healthcare. Familiarizes students with important factors that influence success or failure in improvement efforts. Discusses implementation concepts and social and cultural phenomena and how to measure them. Prepares students to conduct initial data gathering, analysis and reporting in the Measurement Lab course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.751. Infection Prevention in Healthcare Settings. 2 Credits.
Introduces hospital epidemiology, infection prevention and antimicrobial stewardship as core components of quality care, including standards and indicators, appropriate strategies and indicators to measure hospital-acquired infection in the U.S. and internationally, key methods for preventing the transmission of infection in healthcare facilities and components and benefits of antimicrobial stewardship programs. Provides a basis to plan effective hospital epidemiology, infection prevention and antimicrobial stewardship activities.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.880. Patient Safety and Healthcare Quality integrative Activity. 4 Credits.
This course will involve the research, analysis and writing of a complete and independent quality and patient safety improvement project. Concepts around the science of quality of medical care, patient safety and measurement will be heavily utilized. No new material will be covered. The finalized project will follow journal article format including an abstract, introduction/background, Literature review, methods, results and conclusion sections. The final project paper will represent an integrated and synthesized assessment of the quality and patient safety paradigm (Q&PS problem—Evidence—Intervention---assessment) applied to a relevant setting within the healthcare delivery process.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.603.931. Measurement Lab in Quality & Safety. 2 Credits.
Familiarizes students with different data sources and measurement methods to assess health care quality and patient safety. Data sources include both secondary data, including from administrative claims, medical records, and malpractice claims, and primary data including from cohorts, surveys, direct observation and clinical monitoring. Introduces different methods to measure structure, process and outcome, including both quantitative and qualitative data. Describes methods to analyze these data including techniques related to risk adjustment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.601. Public Health Humanitarian Emergencies. 4 Credits.
Introduces different types of humanitarian emergencies, humanitarian architecture and provides an overview of sectoral focus areas of humanitarian response. Informs students of the environment in which these emergencies occur and how public health responses in various types of emergencies and contexts differ. The course explores mechanisms of preparedness, management of response to acute and prolonged humanitarian emergencies as well as long-term recovery.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.603. Ethics in Global Health Practice. 2 Credits.
Equips students to identify and analyze critical ethical issues in global health practice. It provides a forum for discussion of and deliberation about these issues, enabling students to explore a range of possible solutions. Students will practice using central concepts and frameworks of public health ethics to consider systematically the responsibilities of public health professionals in real-world global health cases.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.604. Global Epidemiology Policies and Programs. 3 Credits.
Presents the history, social and political context, organization, technical content, funding and evaluation of current, major, global initiatives for disease control. Emphasizes programs focused on health problems of the developing world and includes, initiatives for vaccines and immunization, non-communicable diseases, safe motherhood and reproductive health, malaria, Neglected Tropical Diseases, HIV, emerging infectious diseases, TB, tobacco control, nutritional interventions and injury control. Also examines the process of policy formulation and resource allocation to international health and disease control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.621. Design and Planning of Primary Health Care Projects. 4 Credits.
Help participants to design a Primary Health Care (PHC) project in a low or middle-income country consider its implementation and evaluation. Selects one of several Request for Proposals (RFA) for a specific situation, conduct a needs assessment, create a problem statement, set goals and objectives, and a theory of change for this proposed project. In the course you will learn how to address community participation, human resources and their training and supervision, project information, approaches to sustainability, logistics of service delivery, project budgeting and financial management, monitoring, and evaluation, and finally close out of a project. Develops a proposal ready for submission to a donor that embodies your PHC project design responsive to the RFA at the conclusion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.641. Disaster Preparedness. 2 Credits.
Introduces public health emergency preparedness concepts and procedures that are relevant for natural disasters, technological disasters, terrorism, and emerging threats such as infectious disease outbreaks and pandemics. Describes the roles of various agencies and organizations engaged in emergency preparedness and response and global health security. Describes the interactions across these agencies and organizations that help to ensure public health and safety. Provides an overview of methods to address different types of public health emergencies, including both planning and response perspectives with a focus on recent domestic and international public health emergencies and their consequences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.651. Introduction of Water, Sanitation and Hygiene in Emergencies. 2 Credits.
Introduces water, sanitation and hygiene (WASH) concepts, technical knowledge and practice in emergencies, including natural disasters and humanitarian emergencies. Addresses the importance of intersectoral collaboration among all sectors with an emphasis on WASH, health and nutrition. Focuses on community and behavioral aspects using examples from recent disasters. Describes the roles and coordination frameworks of all actors including Government, United Nations, international and national non-governmental organizations, and donors. Illustrates monitoring and evaluation various WASH methodologies and practices.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.701. Assessment Approaches in Humanitarian Settings. 3 Credits.
The goal of the course is to give students an overview of selected field-based methods used in humanitarian emergencies to measure basic health indicators and demographic characteristics of affected populations. Upon completion, students will be able to describe the assessment process in the various phases of humanitarian emergencies. Students will also be able to describe a variety of methods, both qualitative and quantitative, used in field-based assessments of humanitarian emergencies. These include: qualitative assessments, quantitative surveys. population estimation, and site planning.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.715. Health Needs and Service Provision in Humanitarian Emergencies. 3 Credits.
Addresses the health needs and the provision of health care to populations affected by disasters. Discusses such areas as who provides humanitarian assistance and how it is paid for. Explores strategies for assessing health needs. Considers a variety of topics including the use of information, water and sanitation, reproductive health, food and nutrition, and the provision of health services.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.721. Securing Food Assistance and Nutrition in Humanitarian Emergencies. 2 Credits.
Introduces food security, including the components of food security, causes for the deterioration of food security in humanitarian emergencies and nutritional deficiencies in humanitarian settings. Provides an overview of food and nutrition standards, nutrition surveys and response programming, including organizations involved in nutrition and food assistance and common programmatic interventions and policies used in response to food crises. Topics covered include food assistance strategies, including in-kind assistance, cash transfers and livelihoods programming, as well as preventative and curative nutrition programs. Focuses on recent and past food and nutrition crises to illustrate important concepts and utilizes a field-based approach to guide discussions and consider applications of concepts to real life humanitarian crises.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.731. Management and Leadership in Humanitarian Health. 2 Credits.
Examines an array of management and leadership models. Applies management and leadership theories and models to multiple humanitarian contexts. Assesses students' management and leadership styles and how they may affect humanitarian work. Discusses organizational structures and design as well as culture, and how they can affect humanitarian response.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.741. Human Rights in Humanitarian Emergencies. 2 Credits.
The goal of the course is to give students an introduction to human rights as an analytical framework, a tool, and a source of ethical guidance in humanitarian emergencies. The focus is on how human rights violations may cause, and shape the context of, humanitarian emergencies and how an examination of human rights frameworks and rights-based programs can guide researchers and practitioners to make ethical decisions in their work.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.751. Mental Health and Psychosocial Support in Low-Resource Humanitarian Emergencies. 2 Credits.
Explores key issues in the development and evaluation of mental health and psychosocial support interventions with populations affected by humanitarian crises, such as natural disasters and armed conflicts. Discusses such questions as: 'how do populations in diverse socio-cultural settings define mental health in the context of humanitarian crises?'; 'How can we build on existing resources and practices that promote mental health in humanitarian crises?'; 'What is known from epidemiological and intervention studies about common mental health problems and effective interventions in humanitarian settings?'. Challenges participants to reflect on translating science to practice, and vice versa. Course methods entail a mix of multimedia presentations and case discussions, focusing on real-world experiences.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.771. Social & Cultural Basis for Community and Primary Health Programs. 3 Credits.
Introduces students to the social and cultural aspects of global health programming at community, organizational, and policy levels. Utilizes social and behavioral theories to understand change processes and health program implementation with a particular focus on low- and middle-income countries, and underserved populations. Identifies the factors that promote and inhibit community involvement in PHC program development and implementation. Provides a foundation for planning appropriate Primary Health Care (PHC) programs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.604.880. Humanitarian Health integrative Activity. 4 Credits.
Requires students to synthesize knowledge and skills in humanitarian health on a project topic that demonstrates mastery program competencies. Completes a project on a selected aspect of humanitarian health, using one of a variety of formats including: 1) literature review; 2) program/operational plan; 3) program evaluation; 4) policy analysis; 5) research proposal; or 6) research report using data from a de-identified public data set. Presents results in the form of a final paper and an oral presentation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.621. Tobacco Prevention and Control. 3 Credits.
Introduces tobacco control strategies, policies, and practices to provide an understanding of what is being done to address this public health problem. Provides a historical context in which to understand the consequences of smoking and tobacco use. Provides a framework to understand how tobacco control has evolved and includes practical approaches for tobacco prevention, control, cessation, advocacy, surveillance, and evaluation being implemented in the U.S. and in other countries. Discusses the transnational tobacco companies and their role in undermining actions to control tobacco use. Examines international tobacco control issues and the Framework Convention on Tobacco Control (FCTC) using lectures, case studies, and discussion.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.651. Strategic Communication Planning. 4 Credits.
Focuses on the step-by-step design, implementation, evaluation, and critique of communication programs designed to change behavior relevant to tobacco control Allows students to create actual health communication campaigns guided by P-Process worksheets. The course will explore the concept of stages applied to tobacco control – strategic defensive, stalemate, strategic offensive and consolidation. At the individual level, the course will sharpen approaches to specific audience segments such as non-smoker unlikely to smoke, non-smoker likely to smoke, occasional smoker and established smoker.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.671. Tobacco Regulatory Science. 4 Credits.
Presents an overview of tobacco product regulation, including cigarettes, smokeless tobacco, shisha, and emerging nicotine delivery systems, such as e-cigarettes. Provides students a working knowledge of tobacco regulatory frameworks, including the Framework Convention of Tobacco Control (Articles 9 and 10), and national policies, including the Family Smoking Prevention and Tobacco Control Act. Students learn about past regulatory successes, including fire-safe cigarettes, flavor and menthol bans, and emerging strategies to limit nicotine content. Prepares students to search industry patents to understand how product innovation is protected and presented. Examines the tobacco industry's tactics to counter tobacco regulation by critically assessing media stories.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.701. Leadership in Tobacco Control. 2 Credits.
Through lectures, discussion, and exercises, students develop an understanding of the role of the tobacco control leader in policy development and implementation and the essential knowledge and skills this role requires. The course provides a framework for understanding the process of working effectively with and leading others and emphasizes the role of the leader in leading change and developing a vision for the future of tobacco control.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.735. Quantitative Methods for Tobacco Control. 4 Credits.
Quantitative Methods for Tobacco Control teaches students about the quantitative methods that are most often used in tobacco control and tobacco-related research. Topics to be covered will include study designs and methods commonly used in tobacco control research, including methods to assess the burden of tobacco-related disease and evaluate prevention and cessation interventions. Students have the opportunity to apply these new skills in interpreting and presenting quantitative data.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.745. Qualitative Methods for Tobacco Control. 3 Credits.
• Reviews the methods and rationale for incorporating qualitative approaches into tobacco control research. • Explores the main principles of qualitative research and consider how these principles shape the questions to which qualitative methods can best be applied in tobacco control research. • Introduces applied research techniques used in tobacco control, including observational studies, focus group discussion, in-depth interviews, and documents analysis. • Describes techniques to analyze qualitative data collection and disseminate findings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.605.751. Implementation: Making Change Happen in Tobacco Control. 3 Credits.
Provides an introduction to implementation science in the context of tobacco control. Identifies the challenges associated with tobacco control policy/program implementation and highlights how implementation science can address them. Discusses commonly used implementation frameworks and emphasizes implementation determinants, strategies, and outcomes that may help guide implementation efforts. Examines key implementation topics in the context of tobacco control including industry interference, enforcement and compliance.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.606.601. Fundamentals in Global Health Practice. 4 Credits.
Global health requires practitioners to be well versed in understanding health systems, the controlling disease, and improving the health of mothers and children, and vulnerable populations. This course provides an introduction to these issues. Students will have an opportunity to apply these skills by analyzing the health situation in select low and middle-income countries.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.606.651. Seminars in Health Management Information Systems for Low- and Middle-Income Countries. 1 Credit.
Covers basic components of health information management systems (HMIS) in low-and middle-income countries (LMICs) including vital registration, routine service data, health surveys and surveillance systems. Offers an overview of the use of HMIS data for decision making in LMICs. Describes processes for collecting data through HMIS in LMICs and considers challenges to the quality of HMIS in LMICs with an eye toward strengthening these systems.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.701. Health and Safety Preparation for Global Health Assignments. 1 Credit.
Whether you've traveled before or not, living and working internationally can be challenging. Learn how best to prepare and make the most of your time. Explores health and wellness concerns for travelers. Examines key prevention, safety, and travel medicine principles and services to contextualize risks and maintain wellness. Reviews applicable interventions, appropriate vaccines, and personal protection methods to prepare students to respond to expected and unexpected situations. Assists students with personal preparations for travel through country-specific assignments. Challenges students to examine travel health and safety priorities through case studies and discussions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.704. Essential Medicines, Commodities and Supplies Needed for Community Level Primary Health Care Interventions. 2 Credits.
Primary health care programs in low and middle-income countries require essential health commodities be made available at the community level. Logistic systems need to be developed to ensure that commodities are adequately estimated and delivered. In addition, systems for safely maintaining and monitoring stocks are needed at the community level.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.711. Applying Evaluation to More Effectively Reach Communities Through Primary Health Care. 3 Credits.
Presents fundamental concepts and approaches for evaluating primary health care programs in low- and middle- income countries. Prepares students to analyze real-world programs so that they can make basic decisions resulting in evaluation designs that can be practically applied. Discusses actual experiences of working with implementers to design evaluations that balance methodological rigor with restraints of time and budget. Includes fundamental concepts such as choosing indicators, objectives and appropriate study designs; working with implementers who may not be evaluation experts; and understanding context.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.721. Urban Primary Health Care in Low and Middle-income Countries. 3 Credits.
Presents emergent public health issues related to the rapid growth of urban population in low- and middle-income countries. Explores the inadequacy of conventional health services for meeting the needs of the urban poor. Presents selected cases studies as examples of primary health care approaches that effectively addressed the public health consequences of rapid urbanization.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.724. Applying Household Surveys to Primary Health Care Programs. 3 Credits.
Introduces participants to fundamental skills needed to design and manage implementation of household surveys. Presents real world experiences of using the Knowledge, Practice, and Coverage (KPC) tool for household surveys in middle and low-resource settings. Includes constructing a questionnaire from standard KPC modules, indicator selection, sampling plan development, use of parallel sampling, household selection, management and oversight plan, and ethical considerations. Introduces participants to adjustments that can be made so that the survey can be implemented within time and budget constraints.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.735. Planning Training and Learning Programs for Community Health Workers. 4 Credits.
Discusses the skills required for planning, designing, and evaluating training and learning programs for CHWs. Explores how training and learning needs are determined by CHWs, their communities, and national contexts. Provides students with an opportunity to design a training guide based upon an assessment of CHW's learning needs. Demonstrates how to outline a formative, summative, and follow-up evaluation plan for CHW training and learning needs.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.751. Building Community Capacity for Primary Health Care in Low and Middle-Income Countries. 3 Credits.
This course, coming near the end of the MAS in Community Based PHC, reinforces an understanding of the origins and recent advances in community-oriented PHC through case studies from low- and middle-income countries. Focuses on problem-solving skills in practical situations by connecting case experiences with the contexts where students are working or will work in the future. Examines strategies and frameworks to assess and enhance community-based approaches to building community capacity. Explores current events and emerging opportunities and challenges for community based PHC.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.607.880. Integrative Activity in Community-Based Primary Health Care. 4 Credits.
This course will enable the learner to apply skills obtained through the coursework in the MAS in Community-Based Primary Health Care to design or update a community based PHC program in a real life community. Learners will select a community where they have lived or worked and obtain data and reports to analyze the social, cultural, epidemiological and demographic profile of the community and use this information to design strategies that involvement community members in improving their health. Learners will draw on previous course materials and independent desk review to produce a program strategy/plan document that includes human and material resource development and an evaluation component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.705. Emerging Trends in Pharmaceutical Systems Strengthening. 3 Credits.
Explores pharmaceuticals management and universal health coverage effective, feasible frameworks and possible metrics to measure capacity and accountability. Considers the big picture in pharmaceutical systems: pharma regulatory harmonization and convergence; country, global, and donor financing policies; and sustainability strategies. Presents and contrasts different countries regulatory systems for medicines. Introduces the importance of pharmaceutical harmonization convergence/reliance. Addresses selected challenges within the pharmaceutical services delivery framework among under-served and within LMIC populations.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.712. Frameworks and Tools for Health Systems in Global Settings. 3 Credits.
Explores health systems in global settings, with a focus on low and middle income (LMIC) contexts, and examines approaches to improving the performance of health systems. Focuses on frameworks, tools, skills, and strategies to understand, influence, and evaluate health systems in LMICs. Identifies key institutions, functions, and performance issues for national and local health systems. By using frameworks and tools, students gain experience in systematically analyzing health systems and methods to plan, implement, and evaluate changes in health systems in a variety of settings, including countries in various levels of demographic, epidemiologic and economic transitions. Covers key controversies in health systems, including issues in monitoring health systems performance, the role of the public sector, dealing with unregulated private health markets, linking priority health programs and health systems, raising accountability in the health system, etc.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.725. Quality Management Concepts and Tools for Healthcare in Low and Middle income Countries. 4 Credits.
Presents the concepts, principles, and tools of total quality management methods for health systems in low and middle income economies. Emphasizes integrated health systems management; fostering a genuine team approach in the face of an hierarchical tradition; central importance of community governance; interventions designed based on evidence and standards of practice and in an equitable fashion; introducing a measurement-based approach to problem solving, emphasizing analysis of service delivery process and outcome; and integrating implementation science as an integral component of the management system.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.771. Non-Governmental Organizations and the Administration of Global Health Programs. 3 Credits.
Students will describe the practical challenges and philosophical dilemmas faced by NGOs operating in low- and middle-income countries, and basic concepts in the administration of global health programs. Simulation exercises will allow students to experience and analyze real-world scenarios faced by NGO managers and leaders. The first half of the course will focus on the role of NGOs in the health sector, situating a manager's responsibilities in the broader context of the development and humanitarian environment. The second half will focus on the internal workings of an NGO and the day-to-day challenges of managing strategy, finances, human resources, and accountability.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.608.880. Integrative Activity in Global Health Planning and Management. 4 Credits.
This course will enable the learner to apply skills obtained through the coursework in the MAS in Global Health Planning and management to identify and address an organizational problem or need in a real life organization that focuses on underserved people in aa global health setting. Learners will select an organization where they have worked and obtain data and reports to analyze the environmental, structural, human, technical and policy characteristics of the organization and use this information to design strategies for improving organizational functioning. Learners will draw on previous course materials and independent desk review to produce a program strategy/plan document that includes human and material resource strengthening and an evaluation component.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700 (Berman Institute)

PH.700.600. Basics of Bioethics. 2 Credits.
Offers an introduction to fundamental issues and approaches in bioethics, provides an overview of the history of the field, and highlights the events that led to the birth and growth of bioethics. Introduces theoretical approaches to bioethics, public health policy, research ethics, ethics of genetics and science, and clinical ethics. Provides students with opportunities to gain from the experience of some of the most respected scholars in the field of bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.601. Foundations of Bioethics. 3 Credits.
Offers an introduction to central approaches and issues in bioethics. Includes a discussion of the history of the field and the issues that led to its birth and growth internationally. Introduces philosophical, empirical and non-empirical approaches to bioethics and core ethical issues in clinical care, public health, science and research. Provides a foundation for future study in bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.602. Hot Topics in Bioethics. 3 Credits.
Offers a continuation of the exploration of ethical theory and its use in bioethics begun in "Introduction to Ethical Theory". Utilizes the conceptual and methodological tools from "Ethical Theory" in analyzing topics and cases currently being discussed in bioethics. Although topics will change from year to year, common themes include: discussion of legal changes concerning end of life; the ethics of new reproductive technologies; ethical challenges concerning genome-editing technologies; and global ethical challenges such as climate change and resource allocation.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.603. Introduction to Ethical Theory. 3 Credits.
Explores the relationship between philosophical ethical theory and the practical world of bioethics. In particular, examines the classical accounts of moral obligation and virtue in the context of a variety of contemporary bioethical problems. Further presents the distinction between individual bioethics and collective bioethics, with the goal of determining how the theoretical grounding for these fields differ. The motivating questions are both methodological and substantive: First, how does theory contribute to bioethical investigations? And second, does reflection on ethical theory tell us what to do concerning particular, bioethical problems?
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.604. Methods in Bioethics. 3 Credits.
This course introduces some of the main methods used in bioethics research, scholarship and practice, including philosophical, legal, historical, religious, qualitative, and quantitative research methods. The strengths and weaknesses of each method in addressing bioethical questions or problems will be described. Each method will be illustrated with contemporary topical examples. In addition, one cross-cutting example of an issue addressed by all methods will be discussed.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.605. Critical Reasoning for Bioethics. 2 Credits.
Introduces critical thinking skills that are widely used in bioethics research and practice. Introduces argument mapping techniques and gives students practice extracting arguments from texts and mapping those arguments. Introduces students to common strengths and weaknesses of arguments and gives students practice in evaluating arguments.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.606. Critical Reasoning for Bioethics II. 2 Credits.
This course builds on Critical Thinking in Bioethics Scholarship 1. It builds on student training in argument mapping, identifying common strengths and weaknesses of arguments and evaluating arguments, formulating good arguments and expressing them in text, and writing critical essays.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.621. Ethics in Clinical Practice: Fundamentals, Problems and Approaches. 3 Credits.
Offers students a) a theoretical and practical foundation for identifying and analyzing ethical issues arising in clinical medicine and b) a survey of important current issues and problems in clinical ethics with c) a focus on case analysis and application of principles to problems. Includes interactive content and case-based materials.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.622. Bioethics, Human Rights, and Global Health. 3 Credits.
Explores the theoretical justifications of human rights and their relationship to the contemporary human rights movement based in positive law and how human rights are operationalized. Reviews theories of human rights, evolution of human rights as law, and common ground and tensions between bioethics and legal approaches to human rights. Illustrates how bioethics and human rights concepts apply to key public health issues of our time, particularly as they relate to problems of inequality and inequity. Discuss issues including access to essential medicines, women's health, disease surveillance and response to pandemics, and health claims of immigrants, refugees and prisoners.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.623. Ethics and Decision-Making in Clinical Practice. 3 Credits.
Acquaints students with the ethical dimensions of healthcare decision-making by individuals, including shared decision-making in patient-provider encounters; decision-making in the context of incomplete information, patient disadvantage, distress or conflict; the understanding and approach of providers and systems to the ethical dimensions of decision-making; and relevant social and economic constraints on such decision-making. Explores topics in multiple settings, populations and health conditions, with the goal of making learners aware of the ethical implications of healthcare decisions, both in everyday practice and from a policy perspective.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.625. Bioethics and the Law. 3 Credits.
This course introduces students to the U.S. legal system and analyzes the relationship between law and bioethics. During the course, students will: (1) develop an understanding of the relevance of law for bioethics as a scholarly field and as a profession; (2) become familiar with legal structures, mechanisms, institutions, functions, and sources of law; (3) develop a critical appreciation of the complexity, flexibility, and evolution of law; and (4) develop a set of core legal skills applicable to bioethics scholarship and practice. Specific topic areas include legal duties of health care providers, end-of-life decisionmaking, ownership in body parts and informed consent, health inequities, assisted reproduction, and public health. No background in law is required to take this course.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.630. Food Ethics. 3 Credits.
Introduces students to the primary ethical challenges in the global food system and explores ethical issues in the United States food system. Provides students with the opportunity to think critically about a variety of conflicting views about the ethics of animal agriculture, healthy eating efforts and decision-making about food. Uses theories and tools from practical ethics, political philosophy, and theories of justice to shed light on these issues.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.632. Ethics, Policy, and Emerging Biomedical Technologies. 3 Credits.
Examines the ethics and policy issues raised by emerging biomedical technologies, including stem cell science, genetics/genomics, neuroscience, and synthetic biology. Integrates primers on the relevant science with discussion of the ethics and policy issues raised by the design, conduct and integration of the science into research, clinical care and commerce.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.641. Germs, Genes, Patients, and Populations. 3 Credits.
Explores past, present, and future ethical, legal, social and policy issues at the intersection of infectious disease and genomics. Due to the social nature of contagion, infectious disease challenges individualistic assumptions in bioethical models with public health dilemmas requiring attention to the relationships and interactions between hosts, vectors, pathogens, and environments. Focuses on the potential ethical, legal, and social implications of emerging genomic science and technology for infectious disease control. Each class focuses on a specific type of infectious disease highlighting different notions of disease causation and mode of transmission. Explores in three related contexts: research, clinical practice and public health. Addresses the enduring bioethical concerns about social responsibility, stigma, and the challenge of balancing individual interests and protections against risks of harms to others and to public health.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.642. Vulnerability in Childhood -- from Ethics to Advocacy. 3 Credits.
Introduces students to the concept of vulnerability from an interdisciplinary lens of ethics, philosophy, medicine, and public health. Discusses how special protections for vulnerable populations can impact research and clinical care at the individual and population level. Presents examples of vulnerable populations of children (eg. children with medical complexity, children in foster care, transgender youth) in order to illustrate relevant ethical challenges faced by vulnerable populations. Introduces students to written media (eg. op-ed, letter to the editor) as a tool to advocate for vulnerable children.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.643. Understanding Addiction: Philosophy, Science, Ethics. 3 Credits.
Employs an inter-disciplinary approach to understand the nature of addiction, drawing on philosophy, psychological science, and the perspectives of people who struggle with addiction. Provides an overview of competing models of addiction and evaluates their theoretical foundations and supporting evidence. Explores the heterogeneity of individual-level decision-making in addiction. Distinguishes different ideas of responsibility and how they intersect with addiction research and individual and societal responses to addiction, including drug criminalization. Provides students with the opportunity for in-depth reflection on conceptual and ethical issues surrounding addiction, developing analytic and argumentative skills.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.644. Justice Theory and Health. 3 Credits.
Explores how to make the world a better and more just place from the standpoint of human rights & justice theory. Topics include the distinctive role of justice and structural justice in moral thought, theoretical foundations for human rights, the relationship between human rights & justice, & the related concepts of fairness, power and disadvantage. Explores these topics in the particular context of the pandemic.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.645. Fogarty Bioethics Fellows Seminar. 1 Credit.
Provides a small, interactive setting for discussion of research ethics, ethics committees, and ethics concepts among the trainees and between trainees and affiliated faculty. Divides sessions among the following activities: reviewing and critiquing journal articles related to research ethics; trainees' individual presentations on practicum research progress; guest speakers related to research ethics cases and/or concepts; and development and presentation of original case studies by each trainee. Includes topics standard of care, justice, inducements, research ethics committees, informed consent, and gender roles in research decisions.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.663. Global Food Ethics and Policy. 2 Credits.
Examines global food systems and the policies that impact global food security, and broader aspects of sustainable development including public health, the environment and economies. Presents and critiques different food system policies that determine the availability, affordability, and nutritional quality of the food supply and influence the amount and combination of foods that people are willing and able to consume. Encourages use of critical thinking skills and debate to understand how policy and science interact with regard to food systems. Presents data, case studies and real-time challenges related to global food systems with an emphasis on the development of practical skills to analyze systems approaches.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.665. Introduction to Ethics of U.S. and International Human Subject Research. 2 Credits.
Provides an introduction to the ethics of human subject research and allows participants to apply what they learn to case examples from the U.S. and international settings. Presents ethical principles and a framework for analysis. Reviews key U.S. and international regulations that guide the ethical conduct of research. Through lectures and moderated discussions, addresses a variety of issues including: informed consent for research participation; ethical aspects of study design; just selection of research subjects and duties of justice when working in resource poor settings; and the role and function of institutional review boards/ethics review committees. Uses case discussions to explore research in both domestic and international settings.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.667. Catastrophe Ethics: How to Respond to Public Health Disasters. 2 Credits.
Explores the ethics of responding to large, structural, public health disasters, or 'catastrophe ethics'. Investigates catastrophes with the following property: they are so large that no individual action or person can solve them; rather, they require coordination of large collectives. Focuses on climate change, the Covid-19 pandemic, and structural racism over the course of the week, asking two, overarching questions about each: what are we obligated to do in the face of such crises; and regardless of what we as a society do, what are we obligated to do in our private lives? Investigates the relationship between the structural and the individual answers.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.702. THE ETHICS OF MAKING BABIES. 2 Credits.
Examines one of the most morally significant decisions people face: whether or not to create a new person. Explores our pronatal outlook—a positive moral outlook on the activity of making babies. Considers why it is uncomfortable, and perhaps even threatening, to suggest that procreation is an activity that is subject to a whole variety of moral requirements. Engages students in asking and beginning to answer the question, is it permissible to create a new child.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.801. Bioethics Program Thesis Seminar. 3 Credits.
Provides students with the basic research and organizational skills needed for successful completion of the MBE thesis. Addresses skills needed to conduct a literature review, choose an appropriate topic, and construct a rigorous argument.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.820. Bioethics Program Thesis Research. 1 - 6 Credits.
Provides an opportunity for students to actively conduct research in bioethics.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.830. Postdoctoral Research Berman Institute. 1 - 22 Credits.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.840. Bioethics Program Independent Study. 2 Credits.
Provides students with a one-on-one independent study experience in which they independently review papers from the current literature and meet weekly with a departmental faculty member to discuss them. Offers opportunities for complementary activities which may include participating in related course discussions, seminars, conferences, etc. Culminates with the completion of a written document, typically a substantial paper.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.895. Bioethics Program Practicum. 3 Credits.
The MBE Practicum is a mentored, bioethics experience, which involves either field work with a practicing bioethicist, or applying one's bioethical training to a real-world environment.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PH.700.896. Clinical Ethics Practicum I. 1 Credit.
Introduces common ethical challenges in patient care that arise in different clinical settings, and the systems in place to address them. Explores the perspectives of patients, families, trainees and practicing clinicians on complex ethical dilemmas in clinical care. Presents different methods of analyzing ethical dilemmas in the care of patients, and different styles of communicating about them with patients.
Course location and modality is found on the JHSPH website (https://www.jhsph.edu/courses/).

PY.010 (Studio Lessons)

PY.010.100. Minor Lesson 1/2 Hour. 1 Credit.

PY.010.101. Minor Lesson 1/2 Hr. 1 Credit.

PY.020.100. Minor Lesson 1 Hour. 2 Credits.

PY.020.101. 1 Hr Minor Lesson. 2 Credits.

PY.050.100. Major Lesson 1/2 Hour. 2 Credits.

PY.100.100. Major Lesson 1 HR. 4 Credits.

PY.100.101. Major Lesson 1 HR. 4 Credits.

PY.186.100. Vocal Coaching. 1 Credit.
PY.186.100 consists of weekly half hour-long lessons, designed to develop skills for performing and teaching the art of singing: including repertoire choices, musicianship, language, diction and study methods (background study, wordsmithing, observation, dissection, practicing and organizing), as well as preparation for a jury, hearing, or recital.

PY.380.109. Historical Performance 109 Jury. 1 Credit.
Historical Performance majors only.

PY.380.209. Historical Performance 209 Jury. 1 Credit.
Historical Performance majors only.

PY.380.309. Historical Performance 309 Jury. 1 Credit.
Historical Performance majors only.

PY.410.109. Brass 109 Jury. 1 Credit.
Brass majors only

PY.410.209. Brass 209 Jury. 1 Credit.
Brass majors only

PY.410.309. Brass 309 Jury. 1 Credit.
Brass majors only

PY.415.109. Percussion 109 Jury. 1 Credit.
Percussion majors only.

PY.415.209. Percussion 209 Jury. 1 Credit.
Percussion majors only.

PY.415.309. Percussion 309 Jury. 1 Credit.
Percussion majors only.

PY.420.109. Harp 109 Jury. 1 Credit.
Harp majors only.

PY.420.209. Harp 209 Jury. 1 Credit.
Harp majors only.

PY.420.309. Harp 309 Jury. 1 Credit.
Harp majors only.

PY.425.109. Strings 109 Jury. 1 Credit.
String majors only.

PY.425.209. Strings 209 Jury. 1 Credit.
String majors only.

PY.425.309. Strings Jr Recital/309 Jury. 1 Credit.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.109. Woodwinds 109 Jury. 1 Credit.
Woodwind majors only.

PY.430.209. Woodwinds 209 Jury. 1 Credit.
Woodwind majors only.

PY.430.309. Woodwinds 309 Jury. 1 Credit.
Woodwind majors only.

PY.450.109. Piano 109 Jury. 1 Credit.

PY.450.209. Piano 209 Jury. 1 Credit.
Open to Piano majors only.

PY.450.309. Piano 309 Jury. 1 Credit.

PY.460.109. Organ 109 Jury. 1 Credit.

PY.460.209. Organ 209 Jury. 1 Credit.

PY.460.309. Organ 309 Jury. 1 Credit.

PY.470.109. Guitar 109 Jury. 1 Credit.

PY.470.209. Guitar 209 Jury. 1 Credit.

PY.530.109. Voice 109 Jury. 1 Credit.

PY.530.209. Voice 209 Jury. 1 Credit.

PY.530.309. Voice 309 Jury. 1 Credit.

PY.570.109. Jazz 109 Jury. 1 Credit.

PY.570.209. Jazz 209 Jury. 1 Credit.
Open to Jazz majors only.

PY.570.309. Jazz 309 Jury. 1 Credit.
Open to Jazz majors only.

PY.113 (Recitals)

PY.310.701. Composition Recital (UG). 2 Credits.
Undergraduate recital for Composition Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.310.721. Composition Recital (DMA). 2 Credits.
Open to DMA Composition Majors only.

PY.330.721. Conducting Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Conducting majors. Final recital for MM Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only

PY.330.722. Conducting Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.721[C], needed.

PY.330.723. Conducting Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.722[C], needed.

PY.330.724. Conducting Recital (GR 4). 2 Credits.
4th recital for AD Conducting majors. AD students must take for S/U grade.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.330.723[C], needed.

PY.330.725. Conducting Recital (Concerto). 2 Credits.
Concerto recital for DMA Conducting majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Student must be co-registered in major lessons (Wind Conducting) or Conducting Seminar (Orchestral Conducting): PY.100.100[C], PY.100.100[C], PY.050.100[C], PY.050.101[C], PY.330.845[C], PY.330.846[C], PY.330.847[C], or PY.330.848[C].
Majors only

PY.330.726. Conducting Recital (Chamber). 2 Credits.
Chamber recital for DMA Conducting majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.330.727. Conducting Recital (Lecture). 2 Credits.
Lecture recital for DMA Conducting majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.350.701. Computer Music Recital (UG). 2 Credits.
Undergraduate recital for Computer Music Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.701. Historical Performance Recital (UG). 2 Credits.
Undergraduate recital for Historical Performance Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.721. Historical Performance Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Historical Performance majors. Final recital for MM Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.722. Historical Performance Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.721[C], needed.

PY.380.723. Historical Performance Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.722[C], needed.

PY.380.724. Historical Performance Recital (AD 4). 2 Credits.
4th recital for AD Historical Performance majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.380.723[C], needed.

PY.380.725. Historical Performance Recital (Concerto). 2 Credits.
Concerto recital for DMA Historical Performance majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.380.726. Historical Performance Recital (Chamber). 2 Credits.
Chamber recital for DMA Historical Performance majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.380.727. Historical Performance Recital (Lecture). 2 Credits.
Lecture recital for DMA Historical Performance majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.410.701. Brass Recital (UG). 2 Credits.
Undergraduate recital for Brass instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.721. Brass Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Brass instrument majors. Final recital for MM Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.722. Brass Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.721[C], needed.

PY.410.723. Brass Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.722[C], needed.

PY.410.724. Brass Recital (AD 4). 2 Credits.
4th recital for AD Brass instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.410.723[C], needed.

PY.410.725. Brass Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Brass instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.410.726. Brass Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Brass instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.410.727. Brass Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Brass instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.415.701. Percussion Recital (UG). 2 Credits.
Undergraduate recital for Percussion Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.721. Percussion Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Percussion majors. Final recital for MM Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.722. Percussion Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.721[C], needed.

PY.415.723. Percussion Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.722[C], needed.

PY.415.724. Percussion Recital (AD 4). 2 Credits.
4th recital for AD Percussion majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.415.723[C], needed.

PY.415.725. Percussion Recital (Concerto). 2 Credits.
Concerto recital for DMA Percussion majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.415.726. Percussion Recital (Chamber). 2 Credits.
Chamber recital for DMA Percussion majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.415.727. Percussion Recital (Lecture). 2 Credits.
Lecture recital for DMA Percussion majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.420.701. Harp Recital (UG). 2 Credits.
Undergraduate recital for Harp Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.721. Harp Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Harp majors. Final recital for MM Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.722. Harp Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.721[C], needed.

PY.420.723. Harp Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.722[C], needed.

PY.420.724. Harp Recital (AD 4). 2 Credits.
4th recital for AD Harp majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.420.723[C], needed.

PY.420.725. Harp Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Harp majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.420.726. Harp Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Harp majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.420.727. Harp Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Harp majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.425.701. Strings Recital (UG). 2 Credits.
Undergraduate Senior recital for String instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.721. Strings Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA String instrument majors. Final recital for MM String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.722. Strings Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.721[C], needed.

PY.425.723. Strings Recital (GR 3). 2 Credits.
3rd recital for AD and DMA String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.722[C], needed.

PY.425.724. Strings Recital (AD 4). 2 Credits.
4th recital for AD String instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.425.723[C], needed.

PY.425.725. Strings Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA String instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.425.726. Strings Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA String instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.425.727. Strings Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA String instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.430.701. Woodwinds Recital (UG). 2 Credits.
Undergraduate recital for Woodwind instrument Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.721. Woodwinds Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Woodwind instrument majors. Final recital for MM Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.722. Woodwinds Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.721[C], needed.

PY.430.723. Woodwinds Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.722[C], needed.

PY.430.724. Woodwinds Recital (AD 4). 2 Credits.
4th recital for AD Woodwind instrument majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.430.723[C], needed.

PY.430.725. Woodwinds Recital (Concerto). 2 Credits.
Concerto recital for DMA Woodwind instrument majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.430.726. Woodwinds Recital (Chamber). 2 Credits.
Chamber recital for DMA Woodwind instrument majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.430.727. Woodwinds Recital (Lecture). 2 Credits.
Lecture recital for DMA Woodwind instrument majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.450.701. Piano Recital (UG). 2 Credits.
Undergraduate recital for Piano Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.721. Piano Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Piano majors. Final recital for MM Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.722. Piano Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.721[C], needed.

PY.450.723. Piano Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.722[C], needed.

PY.450.724. Piano Recital (AD 4). 2 Credits.
4th recital for AD Piano majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.450.723[C], needed.

PY.450.725. Piano Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Piano majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.450.726. Piano Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Piano majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.450.727. Piano Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Piano majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.460.701. Organ Recital (UG). 2 Credits.
Undergraduate recital for Organ Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.721. Organ Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Organ majors. Final recital for MM Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.722. Organ Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.721[C], needed.

PY.460.723. Organ Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.722[C], needed.

PY.460.724. Organ Recital (AD 4). 2 Credits.
4th recital for AD Organ majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.460.723[C], needed.

PY.460.725. Organ Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Organ majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.460.726. Organ Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Organ majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.460.727. Organ Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Organ majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.470.309. Guitar Junior Recital. 1 Credit.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.701. Guitar Recital (UG). 2 Credits.
Undergraduate Senior recital for Guitar Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.721. Guitar Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Guitar majors. Final recital for MM Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.722. Guitar Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.721[C], needed.

PY.470.723. Guitar Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.722[C], needed.

PY.470.724. Guitar Recital (AD 4). 2 Credits.
4th recital for AD Guitar majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.470.723[C], needed.

PY.470.725. Guitar Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Guitar majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.470.726. Guitar Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Guitar majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.470.727. Guitar Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Guitar majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.530.701. Voice Recital (UG). 2 Credits.
Undergraduate recital for Voice Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.721. Voice Recital (GR 1). 2 Credits.
1st recital for GPD, AD, and DMA Voice majors. Final recital for MM Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.722. Voice Recital (GR 2). 2 Credits.
2nd recital for GPD, AD, and DMA Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.721[C], needed.

PY.530.723. Voice Recital (GR 3). 2 Credits.
3rd recital for AD and DMA Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.722[C], needed.

PY.530.724. Voice Recital (GR 4). 2 Credits.
4th recital for AD Voice majors. AD students must take for S/U grade.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.530.723[C], needed.

PY.530.725. Voice Recital (DMA Concerto). 2 Credits.
Concerto recital for DMA Voice majors. Must be co-enrolled in major lessons regardless of if in Residency or DIP.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.530.726. Voice Recital (DMA Chamber). 2 Credits.
Chamber recital for DMA Voice majors. May be taken either during Residency or DIP period. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.530.727. Voice Recital (DMA Lecture). 2 Credits.
Lecture recital for DMA Voice majors. Co-registration in major lessons not required (please see DMA handbook for further guidelines).
Majors only

PY.570.701. Jazz Recital (UG). 2 Credits.
Undergraduate recital for Jazz Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.570.721. Jazz Recital (GR 1). 2 Credits.
1st recital for GPD Jazz majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only

PY.570.722. Jazz Recital (GR 2). 2 Credits.
2nd recital for GPD Jazz Majors.
Prerequisite(s): Co-enrollment in major lessons required: PY.100.100[C] or PY.100.101[C] or PY.050.100[C] or PY.050.101[C].
Majors only;Completion or co-registration of previous recital in sequence, PY.570.721[C], needed.

PY.360 (General Studies)

PY.360.501. Friday Noon:30 Recital Series. 0.5 Credits.
Student performances covering all historical periods and a variety of genre. Attendance required in the first two semesters of undergraduate enrollment.

PY.360.503. Friday Noon:30 (Alt Project). 0.5 Credits.
A concert attendance project required in the third and fourth semesters of undergraduate enrollment.

PY.360.505. Music Speaks. 2 Credits.
Exploration of repertoire to explore the process behind their imagining and creation in an effort to move an audience to a deeper understanding.

PY.123 (Professional Studies)

PY.123.111. Exploring Arts Careers. 1 Credit.
This introductory course in Peabody's Breakthrough Curriculum is designed to help students develop a better understanding of their artistic identity and begin to create a context for their art. The class comprises four units -- Place, Purpose, People, and Path -- centered around what it means to be a 21st century artist in Baltimore and beyond. Exploring Arts Careers is a required course for all first-year undergraduates and transfer students.

PY.123.311. Building a Brand and Portfolio. 2 Credits.
Building a Brand and Portfolio is a two-credit course which focuses on career development training. Students will develop a digital portfolio, and conduct and produce an interview with a potential mentor. Digital portfolio will include website, supporting media, artist bio, and resume. Course also covers key professional skills including networking, negotiating, applying for jobs, and financial management.
PY.123.101[C] OR PY.123.111[C]

PY.123.312. Pitching Your Creative Idea (UG). 2 Credits.
Pitching Your Creative Idea, the final course in the Breakthrough Curriculum sequence is a required two-credit course for all third-year undergraduate and first-year master's students. In this project-based course, students develop and practice essential skills for the 21st century performing artist. Through determining and designing an artistic project for a setting external to Peabody, they learn skills in audience research, programming, collaboration, and professionalism, while also building experience advocating publicly for their artistry both verbally and in writing. As the capstone for this class, students create a written grant application and juried proposal, with the option to enter a juried competition for project funding.
Completion of Building a Brand and Portfolio needed, PY.123.311[C].

PY.123.412. Music and Law. 2 Credits.
How does a creative artist make a living — and a life? In this foundational survey course, students will study aspects of law that shape a career in and beyond the arts. Topics include how to get or grant permission to use copyrighted works, how to read a contract, and how to start or join a business. Advanced topics may include negotiation, the analysis of popular music in copyright infringement cases, and current developments in intellectual property law. By learning how copyright law can protect creative works, how contracts can generate income, and how business structures can influence the impact of the artist in society, students will empower themselves to create their future.

PY.123.413. Creativity, Entrepreneurship, and Organizations. 2 Credits.
How do musical compositions make it out into the world? In this practicum, students will get hands-on experience administering the recently discovered archive of a former Peabody composer whose centennial will be in 2021. Participants will help run a not-for-profit corporation, prepare critical and/or performing editions of works, and conclude the term with a recital of these rediscovered compositions. Due to the size of the archive (60+ works), this practicum could repeat each semester and culminate in a centennial concert or festival in 2021.

PY.123.415. Arts Leadership Today. 2 Credits.
Learn through discussion, case studies and hands on practice key aspects of leading and managing an arts organization today including strategic planning, programming, marketing, public relations, fundraising, staffing, budgeting, and community engagement.

PY.123.499. Business of Music Practicum. 1 Credit.
Required for students minoring in the Business of Music.

PY.123.501. Alexander Technique. 2 Credits.
This course is designed to provide students with a practical, experiential understanding of the principles of the Alexander Technique, a process of movement re-education, and the application of those principles to daily activities and to playing an instrument or singing. Much time will be given to the investigation of individual ways of moving. The exploration of this technique will lead students to a quality of movement informed by heightened physical and spatial awareness, improved balance, coordination and breathing, and effortless support. Students will learn how to avoid neck, back and shoulder pain, along with a means of preventing repetitive strain injuries related to playing their instruments.

PY.123.502. Alexander Technique 2. 2 Credits.
This course is for students who have completed PY.123.501 and want to integrate Alexander technique more fully into their performance and practice, as well as daily life. Students who have some other experience with Alexander technique may contact the instructor. During the course, students will deepen their ability to apply the principles of the Alexander Technique to performance and practice, and to choose balanced coordination of their whole selves. Students will learn to be able to rely on their own "Alexander awareness" to access effortless support and balance, to deal with stress, and prevent strain and injury. They will also develop their authentic expression, lively presence, freedom of movement and connection with themselves, their task, and their audience.

PY.123.521. Playing Well 1. 3 Credits.
Offered at the graduate level, this course covers anatomy and movement concepts as applied to music making, with particular attention to those structures at risk for repetitive trauma. This three-credit, 14-week online course is asynchronous, so you can work through the weekly course material when it's convenient for you. Through original and curated videos, assigned reading, participation in discussion boards, and individual assignments, you will learn how musicians use their bodies, exploring the skeletal, muscular, and nervous systems as well as posture and breathing, and analyzing movements that can cause stress and injury.

PY.123.522. Playing Well 2. 3 Credits.
Explores instrumental musicians' playing-related disorders. Topics include an overview of risk factors and injury mechanisms, principles of treatment, medical examinations, and specific injuries and treatments by body region. Students receive information from the expert perspectives of physicians, therapists, and musicians and complete a practical capstone project designed to apply medical and therapeutic knowledge to their work in practice and performance.

PY.123.523. Playing Well 3. 3 Credits.
Three-credit course explores primary and secondary prevention strategies within a framework of prevention, preparedness, response, and recovery. Topics include the importance of exercise, sleep and nutrition; how to plan playing-specific mind and body training and functional conditioning; warm-up, cool-down, unloading, recovery, and regeneration activities as key components of performance training; exposure control to repetition and force through efficient motor learning strategies; and integration of retraining programs in rehabilitation to prevent reinjury.

PY.123.611. Building a Brand and Portfolio. 2 Credits.
Building a Brand and Portfolio is a two-credit course which focuses on career development training. Students will develop a digital portfolio, and conduct and produce an interview with a potential mentor. Digital portfolio will include website, supporting media, artist bio, and resume. Course also covers key professional skills including networking, negotiating, applying for jobs, and financial management.

PY.123.612. Pitching Your Creative Idea (GR). 2 Credits.
Pitching Your Creative Idea, the final course in the Breakthrough Curriculum sequence is a required two-credit course for all third-year undergraduate and first-year master's students. In this project-based course, students develop and practice essential skills for the 21st century performing artist. Through determining and designing an artistic project for a setting external to Peabody, they learn skills in audience research, programming, collaboration, and professionalism, while also building experience advocating publicly for their artistry both verbally and in writing. As the capstone for this class, students create a written grant application and juried proposal, with the option to enter a juried competition for project funding.
Completion of Building a Brand and Portfolio needed, PY.123.611[C].

PY.123.630. Writing About Music. 3 Credits.
Writing About Music is a proseminar to coach structured writing projects in several genres.

PY.250 (Humanities - Language)

PY.250.001. English Level 1a.
This intensive integrated one-year course for Academic Purposes aims to develop the English language skills of listening, speaking, reading, and writing necessary for success in Peabody classes. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of S in order to proceed with their degree requirements. Attendance is mandatory.

PY.250.002. English Level 1b.
This intensive one-year course develops the English skills of listening, speaking, reading, and writing necessary for success in Peabody classes. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.
PY.250.001[C]

PY.250.007. English Level 2a - Grad Studies.
This intensive course for international graduate students develops English skills for academic success. The first semester emphasizes oral communication, including listening and note taking, class discussion, and conversation; academic vocabulary, reading and writing; and cultural differences in and out of the classroom. The second semester concentrates on expository writing, especially resource-based writing, self-evaluation, and editing; critical reading; and informal and formal presentations. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.

PY.250.008. English Level 2b - Grad Studies.
This intensive course for international graduate students develops English skills for academic success. The first semester emphasizes oral communication, including listening, note taking, class discussion, presentations, academic vocabulary, and cultural differences in and out of the classroom. The second semester concentrates on expository writing, editing, and critical reading. Placement is determined through an entrance exam and a personal interview. Students placed in this class must complete the course with a grade of B or better in order to proceed with their degree requirements. Attendance is mandatory.
PY.250.007[C]

PY.250.111. Italian 1a. 4 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of Italian. Open to undergraduates only.

PY.250.112. Italian 1b. 4 Credits.
A thorough study of the fundamentals of comprehension, speaking, reading, and writing, this course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of Italian. Portions of the course are conducted online. Open to undergraduates only. Non-voice majors may take this course for elective credit after completing the full Humanities Core Curriculum.
PY.250.111[C]

PY.250.121. German 1a. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of German. Open to undergraduates only.

PY.250.122. German 1b. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of German. Open to undergraduates only.
PY.250.121[C]

PY.250.131. French 1a. 3 Credits.
A thorough study of the fundamentals of the four language skills: comprehension, speaking, reading, and writing. Concentrating on practical everyday situations, the course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of French. Open to undergraduates only.

PY.250.132. French 1b. 3 Credits.
A thorough study of the fundamentals of comprehension, speaking, reading, and writing, this course aims to provide students with the vocabulary, expressions, and grammatical structures needed to achieve a functional use of French. Open to undergraduates only. Non-voice majors may take this course for elective credit after completing the full Humanities Core Curriculum.
PY.250.131[C]

PY.260 (Humanities - Liberal Arts)

PY.260.021. ESL Writing Intensive 1. 3 Credits.
A year-long course designed for international students who are new to writing in English. Course objectives: teaching students the elements of formal writing, including spelling, grammar, vocabulary, sentence structure, paragraph structure, and the elements of thesis, evidence, and conclusion.

PY.260.022. ESL Writing Intensive 2. 3 Credits.
A year-long course designed for international students new to writing in English. The course introduces foundational writing practices and teaches formal writing skills. Course objectives: teaching students the elements of formal writing, including spelling, grammar, vocabulary, sentence structure, paragraph structure, and the elements of thesis, evidence, and conclusion.
PY.260.021[C]

PY.260.023. Critical Writing Intensive 1. 3 Credits.
A year-long course to prepare students for college-level writing. This course introduces students to foundational academic writing skills in summary, citation, use of evidence, analysis, and argument. Assignments focus on sentence- and paragraph-level coherence, while reinforcing the conventions of standard American English in academic settings.

PY.260.024. Critical Writing Intensive 2. 3 Credits.
A year-long course to prepare students for college-level writing. This course introduces stu-dents to foundational academic writing skills in summary, citation, use of evidence, anal-ysis, and argument. Assignments focus on sentence- and paragraph-level coherence, while reinforcing the conventions of standard American English in academic settings.
PY.260.023[C]

PY.260.115. Core 1. 3 Credits.
Introduction to the practice of analytical thinking and writing in the context of reading foundational historical, philosophical, and/or literary texts. Course objectives: ensuring competence in writing and critical analysis. Students will write four analytical papers (3-4 pages each).

PY.260.216. Core 2. 3 Credits.
Introduction to the basics of writing a research paper. Course objectives: ensuring competence in academic research and writing. Students will select a research topic, find source materials, and complete a formal academic research paper (10-15 pages), with appropriate references properly documented. Prerequisite: Core 1 or approved placement.
PY.260.115[C]

PY.260.241. Art History: European Art Survey, Renaissance - 1855. 3 Credits.
An introduction to the history of art. Open to undergraduates only. Art History 1 surveys European art from the 14th through the mid-19th centuries. It surveys Renaissance painting, sculpture, and architecture in Italy and Northern Europe, its origins in Medieval art, and examines shifts in artistic concepts and forms from the 16th through the mid-18th centuries that led to the emergence of Mannerist, Baroque, and Rococo art. The course concludes with an examination of Neoclassicism, Romanticism, and Realism up through the mid-19th century. Artistic movements, styles and influences relevant to the development of western art will be covered, with the inclusion of some American art traditions as time permits. Additional commentary as it relates to music history will be interwoven.

PY.260.252. Art History: Modernism. 3 Credits.
An introduction to the history of art. Open to undergraduates only. This course offers a survey of avant-garde European and American art from the mid-19th century to the present. Some of the many artistic movements covered include Realism, Impressionism, Post-Impressionism, German Expressionism, Cubism, Dada, Surrealism, De Stijl, early American Modernism, Abstract Expressionism, Pop Art, Minimalism, Conceptual Art, and Postmodernism. Additional commentary as it relates to music history will be interwoven.

PY.260.261. Introduction to Psychology. 3 Credits.
An introduction to the fields and research methods of contemporary psychology, including such topics as biological and social bases of behavior, human development, perception, memory, learning theory, intelligence, and abnormal behavior. Special emphasis will be placed on subjects of importance to music education. Open to undergraduates only.

PY.260.313. Katharine the Great: An Everlasting Film Star. 3 Credits.
How does an artist endure? What makes one star last while another fizzles? Katharine Hepburn, 1907-2003, is ranked by the American Film Institute (AFI) as the “greatest female star in the history of American cinema.” She lived as originally as so many of the film heroines she portrayed. This humanities seminar examines the roles and movies that defined the pioneering Hepburn as an actress, a businesswoman, and progressive thinker in American history. Along the way, we will trace pivotal events and cinematic trends in the 20th century contributing to Hepburn’s legacy.

PY.260.315. Evil in Philosophy, Film, & Literature. 3 Credits.
What is “evil”? How is it depicted in the arts? –In order to address these questions, our two main readings this semester will be Goethe’s drama Faust and Bulgakov’s novel The Master and Margarita. While Goethe’s work is a tragedy, Bulgakov’s novel is a satirical dark comedy. We will pair these readings with selected philosophical essays depicting, for example, Kant’s theory of “radical evil”, and movies, such as “Hannah Arendt”. The discussion topics in this class will be challenging for their intellectual depth, but at the same time incredible fun and entertaining.

PY.260.330. Asian Representation in Film and TV. 3 Credits.
Depictions of East Asian and Asian-American characters in film and television have evolved since the earliest days of Hollywood. Alongside world events and US immigration patterns, representation shifted and a host of stereotypes emerged. Consider the wise guru, the exotic girlfriend, and the martial arts sidekick among many portrayals. This liberal arts seminar offers historical context and critical tools for analyzing and discussing these representations while gaining acquaintance with a range of films and television series.

PY.260.344. Opera: Research as Rehearsal. 3 Credits.
Interesting opera is created not just by memorizing a score and mindlessly practicing and repeating it. Thoughtful research is also a form of rehearsal. Performance can be enhanced and understanding deepened by studying an opera's literary sources, mining its historical context, viewing related artworks, and studying its production history. In other words, doing the work of a dramaturge. Every semester in which it is offered, "Research as Rehearsal" will take as its subject an opera currently being rehearsed by the Peabody Opera Theatre Program. This year we will focus on Handel's Semele, scheduled for performance in March. We will read such texts as Ovid's Metamorphoses (a literary source for the opera) and excerpts from Euripides' Bacchae (since Semele is the mother of Dionysus). We will study paintings like Gustav Moreau's Jupiter et Sémélé and Peter Paul Rubens' Death of Semele. Since the performance will be staged in a 1920s style, we will read F. Scott Fitzgerald's Great Gatsby and watch film versions of the novel. We will also investigate the ways in which this opera's origins in a pagan Greek myth affected its first London reception during the period of Lent and how that in turn affected future rewrites of the opera. Open to Graduates and Undergraduates.

PY.260.359. Core 3. 3 Credits.
Introduction to methods and practices in the humanities, social sciences, or natural sciences. Course objectives: ensuring competence in understanding critical methodol-ogies and academic debate. Students will write two critical assessments involving evidence, evaluation, synthesis, and conclusion (4-6 pages each) and pass a final exam or final project. Students must earn a C+ or better to pass the course. Prerequi-site: Core 2 or approved placement.
PY.260.216[C]

PY.260.360. Core 4. 3 Credits.
Sustained consideration of the role of art (music, literature, fine arts, film) in all aspects of society, focusing on particular periods in history or under particular regimes and political structures. Course objectives: ensuring that students have the opportunity to think historically about the role of art and culture in political society and about the economic and cultural systems supporting the creation of art (e.g. patronage, guilds). Students will be required to write one historical "review" of a work of art in historical context (2-3 pages) and one historical research paper (6-8 pages minimum). Students must earn a C+ or better to pass the course. Prerequisite: Core III or approved placement.
Completion of Core 2 required, PY.260.216[C]

PY.310 (Composition)

PY.310.411. Junior Bach Program. 0.5 - 3 Credits.
Weekly, one-on-one lessons in composition for middle-school students from the St. Ignatius Loyola Academy and Baltimore Leadership School for Young Women. The course culminates in a concert of new student works at the end of each semester.
Open to Composition Majors and those with instructor permission. Non-Composition majors should email the instructor's permission to peabodyregistrar@jhu.edu to be registered.

PY.310.513. Composers of the AACM. 1 Credit.

PY.310.515. Music Now. 2 Credits.
An elective designed to familiarize students with composers, ensembles, and ideas associated with early 21st century music.

PY.310.516. Music Now. 2 Credits.
An elective designed to familiarize students with composers, ensembles, and ideas associated with early 21st century music.

PY.310.545. Composition Seminar (UG). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.546. Composition Seminar (UG). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.691. Composition Portfolio MM. 2 Credits.
The completion of works of major proportions, for full orchestra and chamber ensemble, as required in the Master of Music degree program. Graded on a S/U basis.
Composition majors only.

PY.310.793. Compositions/Commentary. 6 Credits.
The completion of works of major proportions, for full orchestra and chamber ensemble, accompanied by a substantial written commentary, as required in the Doctor of Musical Arts degree program.
Composition majors only.

PY.310.845. Composition Seminar (GR). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.310.846. Composition Seminar (GR). 1 Credit.
Informal sessions in which works of students and faculty are discussed and important contemporary works, trends and techniques are analyzed. Required for composition majors. Open to others with permission of chair of department.
Composition majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.320 (New Media)

PY.320.101. Music for New Media 1. 3 Credits.
A foundation of compositional skills. Students will analyze the work of seminal composers of Western music and learn to compose by mimicking their style. Compositions will be scored and notated for common instruments but realized through software emulation. Software used in class: a digital audio workstation (e.g., Logic Pro) and notation software (e.g., Finale).
Music for New Media majors only.

PY.320.102. Music for New Media 2. 3 Credits.
Further development of compositional skills as they relate to film, TV and video game scoring. Students will analyze historic and contemporary scores, considering the role of music when it is synchronized to picture. Students will be required to make short cues 'inspired by' or as 'clones' of cues from the movies they study. They will examine ways to invoke common cinematic moods using a range of scales/modes, intervals, chord sequences, and instrumental choices. In lab classes they will have time to individually work on simple exercises, making original themes and variations under headphones that they will then share with the rest of the class for critiques. They will have homework time to complete these pieces and be graded on them. Students will delve deeper into sample-based sound libraries, learning how to create simple orchestrations, arranged for common instruments but realized through software emulation. Software used in class: for composition--a digital audio workstation e.g., Logic Pro, Ableton Live, plus the Amadeus orchestral software library etc; for video editing and audio mastering--Avid ProTools.
Music for New Media majors only.;Music for New Media 1, PY.320.101[C], required. Student must have received at least a B- in order to progress.

PY.320.201. Music for New Media 3. 3 Credits.
Students explore the role of sound design by composing soundscapes to accompany moving images, and recording Foley elements. In addition, principals of orchestration studied in the Instrumentation course are applied to software instruments. Students will learn to create an orchestral realization of a composition that sounds as realistic as possible. Final project will be a scene in which they are individually responsible for creating all sound elements except dialogue. Project will model professional work through the use of contracts, timeline development and other project management skills. Prerequisites: Music for New Media 2 and Instrumentation and Arranging; Co-requisite: The Tools of New Media 1.
Music for New Media majors only.;Music for New Media 2, PY.320.102[C], required. Student must have received at least a B- in order to progress.

PY.320.202. Music for New Media 4. 3 Credits.
Students will undertake a semester long research and composition project related to the vast field of composing music for film, TV, or games. This will serve as a guided preparation for the type of projects they may work in their private studies as upperclassman or the capstone project. Each project will be presented to the class, exposing all students to a diverse range of techniques, styles, and conventions – co-developing their vocabulary of scoring. Students will also generate a printed score for a soloist or ensemble to play on one of their compositions and investigate alternative workflows in creating a Main Title or Main Menu Suite.
Music for New Media majors only.;Music for New Media 3, PY.320.201[C], required. Student must have received at least a B- in order to progress.

PY.320.211. The Tools of New Media 1. 2 Credits.
Beyond writing music, music then needs to be implemented to become a part of the soundscape of a game. The ability to implement their music will open up additional opportunities for game composers. Starting with direct implementation in the game engine Unity, students will learn how to create and manipulate objects using the C# programming language. We will then transition into using the middleware audio engine Wwise to create deeper reactivity and variation in our scores.
Music for New Media majors only.;Completion of Introduction to Programming required (PY.350.466[C]).;Music for New Media 2, PY.320.102[C], required. Student must have received at least a B- in order to enroll.

PY.320.212. The Tools of New Media 2. 2 Credits.
How does technology complement and enhance the work of a composer working on film and games? Investigate the key components of modern sample libraries and how best to use them. Use modern synthesizers and samplers to create unique and compelling sonic landscapes to accompany moving images. Through “mock-up” exercises, various aspects of MIDI programming (“virtual orchestration” or “synthestration”) will be explored, culminating in building a moderate sized scoring template.
Music for New Media majors only.;Tools of New Media 1, PY.320.211[C], required. Student must have received at least a B- in order to progress.;Completion of Introduction to Programming required (PY.350.466[C]).

PY.320.301. Mixing Sound for Picture. 3 Credits.

PY.320.419. Internship. 2 Credits.
Music for New Media majors only.

PY.320.495. Music for New Media Capstone. 2 Credits.
The culmination of all course work and private study in the degree, the Capstone Project is equivalent to a recital given by a performance major. By the end of the second year (through instruction in New Media Composition class) students will submit for approval an outline of their intended Capstone Project. Completed projects will be displayed, performed, demonstrated, etc. at the conclusion of their final semester of study.
Music for New Media majors only.

PY.320.501. Music for New Media Seminar. 1 Credit.
A required course for New Media students. Particular attention will be paid to the role of music in media, as well as current industry trends and developments in the field. (1

PY.330 (Conducting)

PY.330.311. Conducting. 1 Credit.
A basic course in orchestral techniques. Offered fall and spring.

PY.330.411. Conducting (Intermediate). 1 Credit.
Designed for the student who desires more intensive study in conducting. Literature will be sequenced with the more difficult works in the Advanced Conducting course. Prerequisite: Basic Conducting or permission of instructor.

PY.330.412. Conducting (Intermediate). 1 Credit.
Designed for the student who desires more intensive study in conducting. Literature will be sequenced with the more difficult works in the Advanced Conducting course. Prerequisite: Basic Conducting or permission of instructor.

PY.330.413. Conducting (Advanced). 1 Credit.
Designed for the student who desires more intensive study in conducting. Prerequisite: Intermediate Conducting or permission of the instructor.

PY.330.414. Conducting (Advanced). 1 Credit.
Designed for the student who desires more intensive study in conducting. Prerequisite: Intermediate Conducting or permission of the instructor.

PY.330.845. Conducting Seminar. 4 Credits.
A seminar in all aspects of conducting as a profession, from orchestra management to program making. Videotapes of each week’s rehearsal with the conductor’s orchestra will be discussed. Required of all conducting majors
Graduate Conducting majors only

PY.330.846. Conducting Seminar. 4 Credits.
A seminar in all aspects of conducting as a profession, from orchestra management to program making. Videotapes of each week's rehearsal with the conductor's orchestra will be discussed. Required of all conducting majors.
Graduate Conducting majors only

PY.330.849. Wind Conducting Seminar. 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.850. Wind Conducting Seminar. 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.851. Wind Conducting Seminar (DMA). 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.330.852. Wind Conducting Seminar (DMA). 1 Credit.
The Graduate Wind Conducting Seminar provides an environment for listening, discussion, analysis, and historical perspectives of wind literature both new and 'standard.' It is a lab class, attendance is required.
Graduate Wind Conducting majors only

PY.350 (Computer Music)

PY.350.409. Hip Hop Music Production 1. 2 Credits.
A history and workshop course designed to illuminate the history of Hip Hop music.

PY.350.410. Hip Hop Music Production 2. 2 Credits.
Conceived as a follow-up class to "Hip Hop Music Production: History and Practice 1", this course is designed to further explore production styles and techniques of prominent as well as lesser known producers, and to provide students with opportunities to build on production skills learned in "Hip Hop Music Production: History and Practice 1". Students will have the opportunity to produce hip hop in a number of different styles, as well as to learn mixing and mastering techniques used to bring a recording project to completion.
Completion of Hip Hop Music Production 1 needed, PY.350.409[C].

PY.350.463. Introduction to Computer Music. 3 Credits.
A study of the techniques, repertoire, and aesthetics of computer music. Composition and research projects are completed using the resources of the Computer Music Studios. Participation in at least one public program.

PY.350.464. Introduction to Computer Music 2. 3 Credits.
A study of the techniques, repertoire, and aesthetics of computer music. Composition and research projects are completed using the resources of the Computer Music Studios. Participation in at least one public program.
Completion of Introduction to Computer Music 1 needed, PY.350.463[C].

PY.350.465. Introduction to Web Design. 3 Credits.
Designed for music students with limited computer experience, this course will provide the skill and awareness to use the computer, the World Wide Web and Internet technologies to support your musical career from the classroom to the concert stage. (May be used for general and music electives.)

PY.350.466. Introduction to Programming. 3 Credits.
This course is designed for musicians and digital artists who wish to learn Multimedia Programming. We will use the Python programming language to examine techniques and algorithms to manipulate sounds, images, movies, text and web pages. Also, we will learn to acquire and use related open-source programs and libraries to simplify our work. No previous programming experience is required.

PY.350.545. Computer Music Seminar (UG). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.546. Computer Music Seminar (UG). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.691. Master's Thesis. 2 Credits.
A scholarly work describing the author's research activities as required for the Research track of the MM program in Computer Music.
Computer Music majors only.;Completion of or co-enrollment in Research Practicum required, PY.350.842[C].

PY.350.693. Portfolio. 2 Credits.
The completion and submission of works of major proportions that utilize computer technology as required by the Master of Music degree program in Computer Music. The compositions must be written during your tenure at Peabody and be approved by your major teacher and departmental faculty. Graded on a S/U basis.
Computer Music - Composition Track majors only.

PY.350.835. Studio Techniques. 3 Credits.
A course that covers advanced computer music studio techniques, including advanced use of MIDI, analog and digital synthesizer programming, sample editing and processing, Time Code and synchronization, and recording and production techniques. Prerequisite: Introduction to Computer Music or equivalent.
Computer Music majors only.;Completion of Introduction to Computer Music 2 required, PY.350.464[C].

PY.350.837. Digital Music Programming 1. 3 Credits.
This course teaches computer programming theory and skills pertaining to computer music composition, performance, and research. The primary focus of the course is the Max/MSP/Jitter suite of programming tools. Prerequisites: Introduction to Computer Music; Studio Techniques, or equivalent.
Prerequisite(s): Students must co-register in Synthesis Theory 1, PY.350.867[C].
Completion of Introduction to Computer Music required, PY.350.464[C].

PY.350.838. Digital Music Programming 2. 2 Credits.
The purpose of Digital Music Programming II combined with Synthesis Theory II is to learn to implement Digital Audio Signal Processing theories and techniques in various programming environments suited to musical composition, performance and research. In particular, we will study SuperCollider, Pd, Processing, Arduino programming, and reading realtime interfaces. Prerequisites: Synthesis Theory I and Digital Music Programming I. Corequisite: Synthesis Theory II.
Prerequisite(s): Students must co-register in Synthesis Theory 2, PY.350.868[C].
Completion of Digital Music Programming 1 required, PY.350.837[C].

PY.350.840. History of Electroacoustic Music. 3 Credits.
The History of Electroacoustic Music is an overview of the development of electroacoustic music in the twentieth century. Intended for the student with little or no knowledge of this field's history and literature, the course is designed to provide a general familiarity with the major trends and developments as well as to allow for more detailed study on topics of particular interest to the class.
Computer Music majors only.

PY.350.841. Research Practicum. 4 Credits.
An intensive course for those following the computer music research/technology track. Substantial individual projects will be pursued. Enrollment by permission of the instructor.
Computer Music - Research Track majors only. Non-Research Track Computer Music majors may take course with department approval.

PY.350.842. Research Practicum. 4 Credits.
An intensive course for those following the computer music research/technology track. Substantial individual projects will be pursued. Enrollment by permission of the instructor.
Computer Music - Research Track majors only. Non-Research Track Computer Music majors may take course with department approval.;Completion of previous semester required, PY.350.841[C].

PY.350.845. Computer Music Seminar (GR). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.846. Computer Music Seminar (GR). 1 Credit.
The seminar focuses on the work of student and faculty composers, with class discussion of on current developments in the field of computer music. Required for computer music majors. Open to others with permission of the faculty.
Computer Music majors only. Non-majors interested in auditing the course should email department chair approval to peabodyregsitrar@jhu.edu.

PY.350.867. Synthesis Theory 1. 2 Credits.
This course examines digital signal processing techniques as applied to computer music applications. A primary focus is on the Csound music programming language. Designed for computer music majors and recording arts majors, but open to others with permission of instructor. Prerequisites: Introduction to Computer Music; Studio Techniques, or equivalent.
Prerequisite(s): Students must co-register in Digital Music Programming 1, PY.350.837[C].
Completion of Introduction to Computer Music required, PY.350.464[C].

PY.350.868. Synthesis Theory 2. 2 Credits.
The purpose of Synthesis Theory II combined with Digital Music Programming II is to learn to implement Digital Audio Signal Processing theories and techniques in various programming environments suited to musical composition, performance and research. In particular, we will examine advanced synthesis theory, animation, psychoacoustic principles, algorithmic composition and video processing, and realtime hardware interfaces. Prerequisites: Synthesis Theory I and Digital Music Programming I. Corequisite: Digital Music Programming II.
Prerequisite(s): Students must co-register in Digital Music Programming 2, PY.350.838[C].
Completion of Synthesis Theory 1 required, PY.350.867[C].

PY.380 (Historical Performance)

PY.380.315. Continuo 1: Figured Bass. 2 Credits.
Designed to develop the skill of continuo playing, fluent reading and improvising from a figured bass, this course uses exercises and repertoire in a cumulative approach. Open to all qualified keyboard students as well as non-keyboard students with proficient keyboard skills and permission of the instructor.

PY.380.337. Baroque Violin/Viola Class. 1 Credit.
An introduction to the playing of early repertoire on period violin or viola and bow. The student will learn the basics of baroque technique and will be introduced to a range of music, from early Baroque to early Classical, and its interpretation from a historical perspective.

PY.380.338. Baroque Violin/Viola Class. 1 Credit.
An introduction to the playing of early repertoire on period violin or viola and bow. The student will learn the basics of baroque technique and will be introduced to a range of music, from early Baroque to early Classical, and its interpretation from a historical perspective.

PY.380.351. Viola Da Gamba Class. 1 Credit.
An introduction to the playing technique of the viola da gamba through easy to intermediate-level ensemble literature. A preparatory step to consort playing and the viol solo literature. Prior string experience is not necessary.

PY.380.352. Viola Da Gamba Class. 1 Credit.
An introduction to the playing technique of the viola da gamba through easy to intermediate-level ensemble literature. A preparatory step to consort playing and the viol solo literature. Prior string experience is not necessary.

PY.380.431. Baroque Oboe Class. 1 Credit.
Students will learn important tenets of 18th century performance practice by looking at major repertoire such as Bach cantatas and Passions, and sonatas and concertos by Handel and Telemann. Focus will be given to relevant examples from J.J. Quantz's 1752 treatise on performance practice. Study may be done entirely on baroque oboe, or a combination of modern oboe with some experimentation on baroque oboe.

PY.380.433. Lute Literature & Notation 1. 2 Credits.
This class will focus on the primary compositional trends and corresponding performance practices of early, middle, high and late baroque music for lute, archlute and theorbo. Each two-hour meeting will be divided into 2 parts: sharing of information from light research assignments and in-class performances of repertoire that demonstrate relevant compositional styles and performance practices, as well as points for consideration when transcribing for classical guitar. Research and performance assignments will be shared among students from week to week. Required for MM guitar majors.

PY.380.434. Lute Literature & Notation 2. 2 Credits.
Intensive study of repertoire and genres for Renaissance lute and vihuela through listening, transcribing, and performance of selected works from French, Italian, and German tablatures. Works of Francesco da Milano and John Dowland will be a main focus. Required for MM guitar majors.

PY.380.435. Viola da Gamba Literature. 1 Credit.
A chronological survey of the viola da gamba and its literature from the 16th to 18th centuries. The class will be an opportunity to become familiar with a rich repertoire little known to non- specialists, and to learn about how the world of the baroque era relates to our own. No prior experience in historical performance is required. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.436. Early Cello Literature. 1 Credit.
A chronological survey of violoncello literature, pedagogical as well as musical, with an emphasis on historical techniques and performance practices of the 17th, 18th, and 19th centuries. No prior experience in historical performance is required, but some familiarity with cello repertoire is expected. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.437. Baroque Violin Literature. 1 Credit.
A chronological survey of the violin and viola literature, pedagogical and musical, from its origins in the 16th century to the high baroque of the 18th century. No prior experience in historical performance is required, but some familiarity with violin repertoire is expected. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.438. Classical Strings Literature. 1 Credit.
A chronological survey of the solo and, especially, chamber music for strings from the time of Leopold Mozart through Beethoven's life and beyond, with consideration of the music's social contexts and performance practices. Included will be an overview of the pedagogical material. No prior experience in historical performance is required. Prerequisite: History of Music 1, 2, or permission of instructor.
Undergrads need PY.610.321[C] OR PY.610.322[C] in order to enroll. Grads need to have passed the Musicology Proficiency exam or passed the music history review course.

PY.380.439. Baroque Cello Class. 1 Credit.
This course combines the history of the violoncello with hands-on experience. Students have use of Peabody's recently "baroqued" instruments and work with primary source tutorials as an introduction to performance practice. Solo and ensemble playing are integral to the course. The art of bowed continuo playing is stressed and practiced in ensembles with other "original" instruments.

PY.380.440. Baroque Cello Class. 1 Credit.
This course combines the history of the violoncello with hands-on experience. Students have use of Peabody's recently "baroqued" instruments and work with primary source tutorials as an introduction to performance practice. Solo and ensemble playing are integral to the course. The art of bowed continuo playing is stressed and practiced in ensembles with other "original" instruments.

PY.380.441. Baroque Ornamentation 1. 2 Credits.
A detailed two-semester course exploring the varied ornamentation practices of Baroque music from around 1600-1765. Emphasizing original sources, improvisation, and performance practice, students learn to execute, add and improvise ornamentation in styles appropriate to the time and national style. The fall semester focuses on ornamentation in the 17th century in Italy, France, Germany and England. The spring semester can only be taken after completion of the fall semester, and focuses on ornamentation in the 18th century.

PY.380.442. Baroque Ornamentation 2. 2 Credits.
A detailed two-semester course exploring the varied ornamentation practices of Baroque music from around 1600-1765. Emphasizing original sources, improvisation, and performance practice, students learn to execute, add and improvise ornamentation in styles appropriate to the time and national style. The fall semester focuses on ornamentation in the 17th century in Italy, France, Germany and England. The spring semester can only be taken after completion of the fall semester, and focuses on ornamentation in the 18th century.
Completion of Baroque Ornamentation 1 required, PY.380.441[C]

PY.380.443. Baroque Flute Class. 1 Credit.
An introduction to the baroque flute (transverse and common) and to its literature from the 18th century, with attention to questions of style, articulation and ornamentation. This class operates on three tracks: beginning group instruction on baroque flute; private or semi-private lessons for advancing baroque flute players; and performance practice-based coaching of baroque repertoire performed on modern flutes. This class interacts with the annual Bach Marathon. No prior historical performance training is required, but students who are not proficient on modern flute should seek permission from the instructor.

PY.380.444. Baroque Flute Class. 1 Credit.
An introduction to the baroque flute (transverse and common) and to its literature from the 18th century, with attention to questions of style, articulation and ornamentation. This class operates on three tracks: beginning group instruction on baroque flute; private or semi-private lessons for advancing baroque flute players; and performance practice-based coaching of baroque repertoire performed on modern flutes. This class interacts with the annual Bach Marathon. No prior historical performance training is required, but students who are not proficient on modern flute should seek permission from the instructor.

PY.380.445. Continuo 2: Advanced Continuo. 2 Credits.
A continuation of Continuo 1: Figured Bass (380.315). Students build upon the basic skills of reading figured bass by playing a wide range of repertoire with other instrumentalists and singers. Students learn to shape the bass line, develop ensemble skills and improvise creative realizations. Repertoire includes 17th and 18th c. works from Italy, France, Germany and England for instruments or voice, including a focus on recitative.
Completion of Continuo 1 required, PY.380.315[C].

PY.380.447. Early Wind Literature 1. 1 Credit.
A chronological survey of the literature for recorder, flute, and oboe from the beginnings of soloistic composition in the late 16th century through the end of the 18th century, with attention to historical context and performance practice. Includes history and development of the instruments themselves and consideration of how the recorder, flute, and oboe repertoires over-lap, differ, and developed over time. No prior early music experience is necessary.

PY.380.448. Early Wind Literature 2. 1 Credit.
A chronological survey of the literature for recorder, flute, and oboe from the beginnings of soloistic composition in the late 16th century through the end of the 18th century, with attention to historical context and performance practice. Includes history and development of the instruments themselves and consideration of how the recorder, flute, and oboe repertoires over-lap, differ, and developed over time. No prior early music experience is necessary.
Completion of Early Wind Literature 1 required, PY.380.447[C].

PY.380.457. Bach/Weiss/Ornamenting Lute & Guitar. 2 Credits.
A practical course, with the goal of achieving sophisticated, idiomatic ornamentations of high baroque German lute music and their arrangements for classical guitar. Students will apply everything studied directly to their instruments and perform their homework in class. Offered on an as-needed basis.

PY.380.491. Harpsichord Tuning and Maintenance. 1 Credit.
A course in tuning and basic maintenance, with special emphasis on historical temperaments and tuning by ear. Includes some study of the various national styles of construction and development of harpsichords. Majors must pass this course with a grade of B or higher. Offered on an as-needed basis.

PY.380.543. Early Vocal Literature: Baroque. 2 Credits.
Transition from Renaissance to Baroque – monody, opera and oratorio, aria, and recitative. There will be an emphasis on coached, in-class performances.

PY.380.544. Early Vocal Literature: Medieval/Renaissance. 2 Credits.
A study of vocal works and styles from the Middle Ages to the Renaissance, from chant and early polyphony to mass, motet, madrigal, and lute song. There will be an emphasis on coached, in-class performances of chants of Hildegard, medieval motets, English lute songs, and English ballads.

PY.410 (Brass)

PY.410.419. Orchestral Repertoire - Trombone. 1 Credit.
The development of orchestral skills through low brass sectionals; performance in trombone choir, departmental recitals, and mock orchestral auditions.
Brass majors only

PY.410.420. Orchestral Repertoire - Trombone. 1 Credit.
The development of orchestral skills through low brass sectionals; performance in trombone choir, departmental recitals, and mock orchestral auditions.
Brass majors only

PY.410.453. Orchestral Repertoire - Horn. 1 Credit.
Open to all horn students who wish to experience a variety of performing situations involving solo and orchestral repertoire. Includes a class recital and mock audition each semester.
Brass majors only

PY.410.454. Orchestral Repertoire - Horn. 1 Credit.
Open to all horn students who wish to experience a variety of performing situations involving solo and orchestral repertoire. Includes a class recital and mock audition each semester.
Brass majors only

PY.410.457. Orchestral Repertoire - Trumpet. 1 Credit.
Open to all trumpet students who wish to experience a variety of performing situations involving solo and orchestral repertoire.
Brass majors only

PY.410.458. Orchestral Repertoire - Trumpet. 1 Credit.
Open to all trumpet students who wish to experience a variety of performing situations involving solo and orchestral repertoire.
Brass majors only

PY.410.459. Respiratory Function - Brass. 1 Credit.
Basic techniques of breathing and breath control for brass instruments tailored to the student's instrument with a goal of enhancing one's use of air and efficiency to improve performances. Consists of five private one-hour lessons during the semester. Enrollment is limited to three students per semester.
Brass or Woodwind majors only

PY.410.547. Brass Ensemble (UG). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass.

PY.410.548. Brass Ensemble (UG). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass

PY.410.847. Brass Ensemble (GR). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass.

PY.410.848. Brass Ensemble (GR). 1 Credit.
Performance of large brass ensemble repertoire and British-style brass band repertoire; rehearsal of important orchestral literature for brass

PY.415 (Percussion)

PY.415.567. Chamber Music for Percussion. 1 Credit.
PY.415.567 Consists of 14 hours of coaching per semester with students performing works for both percussion group and mixed ensemble. The most outstanding of these projects will receive a performance on the Peabody Percussion Group Concert.
Percussion majors only.

PY.415.568. Chamber Music for Percussion. 1 Credit.
PY.415.568 Consists of 14 hours of coaching per semester with students performing works for both percussion group and mixed ensemble. The most outstanding of these projects will receive a performance on the Peabody Percussion Group Concert.
Percussion majors only.

PY.420 (Harp)

PY.420.495. Harp Repertoire. 2 Credits.
Individual performances of standard and contemporary repertoire with discussion of both musical and practical aspects of performance.
May include chamber performances. Required for harp majors in each semester.
Harp majors only.

PY.420.496. Harp Repertoire. 2 Credits.
Individual performances of standard and contemporary repertoire with discussion of both musical and practical aspects of performance.
May include chamber performances. Required for harp majors in each semester.
Harp majors only.

PY.420.545. Harp Seminar (UG). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, resume writing. For all majors from sophomore year. Expectations vary with topic, but normally involve preparation as well as participation.
Harp majors only.

PY.420.546. Harp Seminar (UG). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, and résumé writing. Available to all harp majors; minimum of four semesters suggested.
Harp majors only.

PY.420.629. Harp Pedagogy 1. 2 Credits.
Materials covered in the first semester include principles of hand position, fingering, placing, sequencing of materials, and choice of music, as these apply to beginning students at every age level. The second semester consists of continued discussion as above, plus a practicum level in which each member of the class must teach one student for 12 weeks, after which a mini-recital will provide the basis for group evaluation and final discussion. Graduate students are further expected to prepare specialized teaching materials for beginners. May be taken by all majors beginning sophomore year and may be repeated (at least one year is required).
Harp majors only.

PY.420.630. Harp Pedagogy 2. 2 Credits.
Instructional principles and procedures for their application, with an initial focus on young beginners; successive semesters expand to intermediate level. Two semesters of Pedagogy I prerequisite for participation in the Pedagogy II HarpAdventures/Practicum/Outreach program. Required for harp majors starting in the sophomore year, may be taken earlier by permission.
Harp majors only.

PY.420.647. Harp Pedagogy 3. 2 Credits.
Normally added after the second semester of Pedagogy I. Pedagogy II/HarpAdventures is a practicum that provides instructional and administrative experience for Harp Pedagogy students. This course also functions as an ongoing community engagement project and is repeated every semester.
Harp majors only.

PY.420.648. Harp Pedagogy 4. 2 Credits.
Normally added after the second semester of Pedagogy I. Pedagogy II/HarpAdventures is a practicum that provides instructional and administrative experience for Harp Pedagogy students. This course also functions as an ongoing community engagement project and is repeated every semester.
Harp majors only.

PY.420.845. Harp Seminar (GR). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, resume writing. For all majors from sophomore year. Expectations vary with topic, but normally involve preparation as well as participation.
Harp majors only.

PY.420.846. Harp Seminar (GR). 1 Credit.
Varying topics relative to different aspects of the profession, including audition preparation, arranging, orchestral techniques, amplification, and résumé writing. Available to all harp majors; minimum of four semesters suggested.
Harp majors only.

PY.425 (Strings)

PY.425.449. Orchestral Repertoire - Violin. 1 Credit.
The development of orchestral performance skills for violinists. Emphasis on repertoire and preparation for auditions. Open to majors only.
String majors only.

PY.425.450. Orchestral Repertoire - Violin. 1 Credit.
The development of orchestral performance skills for violinists. Emphasis on repertoireand preparation for auditions. Open to majors only.
String majors only.

PY.425.451. Orchestral Repertoire - Viola. 1 Credit.
The development of orchestral performance skills for violists. Minimum of three students per class. Open to majors only.
String majors only.

PY.425.452. Orchestral Repertoire - Viola. 1 Credit.
The development of orchestral performance skills for violists. Emphasis on repertoire andpreparation for auditions. Open to majors only.
String majors only.

PY.425.465. Orchestral Repertoire - Cello. 1 Credit.
The development of orchestral performance skills for cellists. Emphasis on repertoire and preparation for auditions. Open to majors only.
String majors only.

PY.425.466. Orchestral Repertoire - Cello. 1 Credit.
The development of orchestral performance skills for cellists. Emphasis on repertoire andpreparation for auditions. Open to majors only.
String majors only.

PY.425.467. Orchestral Repertoire - Double Bass. 1 Credit.
The development of orchestral performance skills for double bassists. Open to majors only.
String majors only.

PY.425.468. Orchestral Repertoire - Double Bass. 1 Credit.
The development of orchestral performance skills for double bassists. Open to majors only.
String majors only.

PY.425.641. Violoncello Pedagogy 1. 2 Credits.
Training for prospective cello teachers with study of various pedagogues. Materials covered include setup, left hand, bow hand, sequencing of instruction, and choice of music and activities as they apply to beginning students at every age level. Open to both upper-level undergraduates and graduate majors.
String majors only.

PY.425.642. Violoncello Pedagogy 2. 2 Credits.
Training for prospective cello teachers with study of various pedagogues. Materials coveredinclude setup, left hand, bow hand, sequencing of instruction, and choice of music andactivities as they apply to beginning students at every age level. Open to both upper-levelundergraduates and graduate majors.
String majors only.;Completion of Violoncello Pedagogy 1 required, PY.425.641[C].

PY.425.651. Violin/Viola Pedagogy 1. 2 Credits.
Training for prospective violin/viola teachers with study of various pedagogues. Materials covered include setup, left hand, bow hand, sequencing of instruction and repertoire from the beginning to advanced levels. Observation of violin/viola instructors in the Peabody Preparatory and supervised studio teaching experience. Open to both upper-level undergraduates and graduate violinists and violists in the fall semester and by permission of instructor in the spring semester.
String majors only.

PY.425.652. Violin/Viola Pedagogy 2. 2 Credits.
Training for prospective violin/viola teachers with study of various pedagogues. Materialscovered include setup, left hand, bow hand, sequencing of instruction and repertoire fromthe beginning to advanced levels. Observation of violin/viola instructors in the Peabody Preparatoryand supervised studio teaching experience. Open to both upper-level undergraduatesand graduate majors in the fall semester and by permission of instructor in the springsemester.
String majors only.;Completion of Violin/Viola Pedagogy 1 required, PY.425.651[C].

PY.430 (Woodwinds)

PY.430.455. Orchestral Repertoire - Clarinet. 1 Credit.
The development of orchestral performance skills for clarinet with emphasis on repertoire.
Woodwind majors only.

PY.430.456. Orchestral Repertoire - Clarinet. 1 Credit.
The development of orchestral performance skills for clarinet with emphasis on repertoire.
Woodwind majors only.

PY.430.463. Piccolo Class. 1 Credit.
Woodwind majors only.

PY.430.464. Piccolo Class. 1 Credit.
Covers repertoire from both solo and orchestral literature in order to increase proficiency,familiarity, and comfort with the “little flute.” Emphasis on audition preparation and experience.Required material: Jack Wellbaum’s Orchestral Excerpts for Piccolo.
Woodwind majors only.

PY.430.519. Orchestral Repertoire - Flute. 1 Credit.
The development of orchestral performance skills for flute with emphasis on repertoire.
Woodwind majors only.

PY.430.520. Orchestral Repertoire - Flute. 1 Credit.
The development of orchestral performance skills for flutists with particular emphasis onstandard orchestral flute solos and how they are traditionally performed for today’s ensemblesand conductors, with focus on orchestral audition preparation and the developmentof skills unique to this setting and the demands of this repertoire: employing various stylesof articulation to enhance ensemble playing, learning methods for tuning under differentcircumstances and techniques for projection, exercising improved self-perception andunderstanding, developing knowledge of some acoustic phenomena of other orchestralinstruments, practicing observation as a method for honing one’s own performance skills,applying the laws of nature to the process of creative interpretation. We frequently coverstandard excerpts which apply to the entire flute section or parts thereof. Usually the classincludes one Mock Audition per semester. Students practice building listening, observation,and teaching skills as a part of offering support and feedback to colleagues. They willbecome familiar not only with how to audition but also with how to adjudicate auditions.
Woodwind majors only.

PY.430.573. Orchestral Repertoire - Oboe/ EH. 1 Credit.
The development of orchestral performance skills for oboe and English horn with emphasis on repertoire.
Woodwind majors only.

PY.430.574. Orchestral Repertoire - Oboe/ EH. 1 Credit.
The development of orchestral performance skills for oboe and English horn with emphasison repertoire.
Woodwind majors only.

PY.430.575. Orchestral Repertoire - Bassoon. 1 Credit.
The development of orchestral performance skill for bassoon with emphasis on repertoire.
Woodwind majors only.

PY.430.576. Orchestral Repertoire - Bassoon. 1 Credit.
The development of orchestral performance skill for bassoon with emphasis on repertoire.
Woodwind majors only.

PY.430.591. Oboe Reed Making. 1 Credit.
The construction of oboe reeds.
Woodwind majors only.

PY.430.592. Oboe Reed Making. 1 Credit.
The construction of oboe reeds.
Woodwind majors only.

PY.450 (Ensemble Arts)

PY.450.619. Accompanying & Coaching Skills 1. 2 Credits.
An in-depth study of basic accompanying and vocal coaching skills, including diction and phonetics, standard aria repertoire, operatic and oratorio coaching, discussion of voice types and the fach system, ornamentation, and musical style. Also incorporates score preparation techniques, strategies for playing orchestral piano reductions, continuo/recitative playing, musical theater styles, synthesizer skills, lead sheet reading, transposition, and improvisation. Prepares students for young artist internship auditions and positions. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.620. Accompanying & Coaching Skills 2. 2 Credits.
A continuation of Accompanying and Coaching Skills 1. An in-depth study of basic accompanying and vocal coaching skills, including diction and phonetics, standard aria repertoire, operatic and oratorio coaching, discussion of voice types and the fach system, ornamentation, and musical style. Also incorporates score preparation techniques, strategies for playing orchestral piano reductions, continuo/recitative playing, musical theater styles, synthesizer skills, lead sheet reading, transposition, and improvisation. Prepares students for young artist internship auditions and positions. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.621. Sonata Class. 2 Credits.
Designed for concentrated study of the sonata and instrumental chamber music literature. Audition/permission of the instructor required.

PY.450.622. Sonata Class. 2 Credits.
Designed for concentrated study of the sonata and instrumental chamber music repertoire. Enrollment by audition or permission of instructor

PY.450.625. Accompanying & Coaching Skills 3. 2 Credits.
A continuation of Accompanying and Coaching Skills 3, this course is designed to build repertoire, interpretation, and coaching skills in the operatic literature. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.626. Accompanying & Coaching Skills 4. 2 Credits.
A continuation of Accompanying and Coaching Skills 3, this course is designed to build repertoire, interpretation, and coaching skills in the operatic literature. Open to qualified piano, conducting, and other keyboard students at the graduate level, this course is required for all Ensemble Arts majors. Enrollment by instructor permission.

PY.450.639. Coaching/Opera Workshop. 1 Credit.
Participation as student coach in the preparation and performance of scenes from the operatic repertoire, in simple stagings with piano accompaniment. Offered on an as- needed basis.
Open to Piano majors only.

PY.450.640. Coaching/Opera Theatre. 1 Credit.
Open to Piano majors only.

PY.450.813. Advanced Accompanying. 2 Credits.
A two-semester course which concentrates on important song repertoire, including music by German, American, English, and French composers.

PY.450.814. Advanced Accompanying. 2 Credits.
A two-semester course which concentrates on important song repertoire, including music by German, American, English, and French composers.

PY.450 (Piano/Keyboard)

PY.450.111. Sightreading 1. 2 Credits.
A course to help foster fluency in the essential skill of transforming written music into sound. Includes score scanning, pattern recognition, and analysis of harmonic, rhythmic, and melodic structures in music from all periods. Required for undergraduate piano and organ majors. Also offered as an elective.

PY.450.112. Sightreading 2. 2 Credits.
A course to help foster fluency in the essential skill of transforming written music intosound. Includes score scanning, pattern recognition, and analysis of harmonic, rhythmic,and melodic structures in music from all periods. Required for undergraduate piano andorgan majors. Also offered as an elective.
Completion of Sightreading 1 required, PY.450.111[C]

PY.450.213. Accompanying 1. 1 Credit.
A course designed to acquaint pianists with the listening skills, flexibility, sensitivity, knowledge of musical style, and interpretative skills required of a collaborative artist. Traditional song literature will be discussed, prepared, and performed within a class setting, with an emphasis on the poetic analysis, musicianship, sound production, and pianistic techniques required for effective collaboration. Open to all qualified keyboard students at any level, this course is required for all undergraduate piano majors.
Must have completed Sightreading 1 2 (PY.450.111[C] AND PY.450.112[C])

PY.450.214. Accompanying 2. 1 Credit.
A course designed to acquaint pianists with the listening skills, flexibility, sensitivity,knowledge of musical style, and interpretative skills required of a collaborative artist. Traditionalsong literature will be discussed, prepared, and performed within a class setting,with an emphasis on the poetic analysis, musicianship, sound production, and pianistictechniques required for effective collaboration. Open to all qualified keyboard students atany level, this course is required for all undergraduate piano majors.
Completion of Accompanying 1 required, PY.450.213[C]

PY.450.411. Keyboard Literature: Baroque. 2 Credits.
A broad survey of the many styles of keyboard music from the early to late Baroque periods, focusing on the different national characteristics of music from England, France, Italy and Germany and how they evolve from the 17th to 18th centuries. Students explore this repertoire on the instrument for which it was written – the harpsichord.

PY.450.412. Keyboard Literature: Classical. 2 Credits.
A survey of the piano music of the Classical period, with emphasis on the works of Haydn,Mozart, and Beethoven. Works will be considered from a range of perspectives, includingstylistic, analytic, historical, and interpretive.

PY.450.413. Keyboard Literature: 19th Century. 2 Credits.
A survey of piano music from the Romantic period. Works will be considered from a rangeof perspectives, including stylistic, analytic, historical, and interpretive.

PY.450.414. Keyboard Literature: 20th/21st C.. 2 Credits.
A survey of the piano music of the 20th century, from its post-romantic roots to the present. Works will be considered from a range of perspectives, including stylistic, analytic, historical, and interpretive.

PY.450.628. New Piano Music. 2 Credits.
A course designed for the study and performance of post-1950 solo piano repertoire. Semesterprojects will include playing for and working with living composers. Guests scheduled toparticipate include composer Curt Cacioppo, pianist Leon Fleisher, and conductor Carl St.Clair. For piano majors only.
Open to Piano majors only.

PY.450.667. Piano Pedagogy 1. 2 Credits.
Exploration of principles, materials, and career development in the teaching of piano. Includes observation of Preparatory teachers and some supervised teaching of pre-college students. Open to majors only.
Open to Piano majors only.

PY.450.668. Piano Pedagogy 2. 2 Credits.
Exploration of principles, materials, and career development in the teaching of piano.Includes observation of Preparatory teachers and some supervised teaching of pre-collegestudents. Required for undergraduate piano majors and for MM Piano majors with Pedagogyemphasis, also offered as an elective. Open to majors only.
Completion of Piano Pedagogy 1 required, PY.450.667[C].;Open to Piano majors only.

PY.450.845. Piano Seminar (DMA). 1 Credit.
A seminar required of all doctoral students. Focus is on preparation for entering the musicprofession, including practice teaching, press kit and resume preparation, discussion of jobsearches, and topics of special interest. Offered in alternate years.
Open to Piano majors only.

PY.715.211. Keyboard Skills 1 - Piano Majors. 2 Credits.
A course in keyboard harmony, including transposition, figured bass, melody harmonization, and analysis. Required for undergraduate piano and organ majors.
Open to Piano, Organ, and Harpsichord majors only.

PY.715.212. Keyboard Skills 2 - Piano Majors. 2 Credits.
A course in keyboard harmony, including transposition, figured bass, melody harmonization, and analysis. Open to majors only. Required for undergraduate piano and organ majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of previous course required, PY.715.211[C].

PY.715.311. Keyboard Skills 3 - Piano Majors. 2 Credits.
A course designed to build score-reading skills at the keyboard. Required for undergraduate piano majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of PY.715.212[C] required.

PY.715.312. Keyboard Skills 4 - Piano Majors. 2 Credits.
A course designed to build score-reading skills at the keyboard. Open to majors only.Required for undergraduate piano majors.
Open to Piano, Organ, and Harpsichord majors only.;Completion of PY.715.311[C] required.

PY.715.633. Advanced Keyboard Skills 1 - Piano Majors. 2 Credits.
A course in score-reading, transposition, and figured bass accompaniment. Open to majors only. Required for MM piano majors. Students who completed Peabody's undergraduate courses in keyboard skills (715.155-156 and 715.255-256) with a grade of B or higher are exempt from this course.

PY.715.634. Advanced Keyboard Skills 2 - Piano Majors. 2 Credits.
A course in score-reading, transposition, and figured bass accompaniment. Open to majors and those with significant prior experience only. Required for MM piano majors. Students who completed Peabody's undergraduate courses in keyboard skills (715.155-156 and 715.255-256) with a grade of B or higher are exempt from this course.
Completion of PY.715.633[C] required.

PY.460 (Organ)

PY.460.423. Organ Literature 1. 3 Credits.
A study of selected organ literature from all periods within the context of history, instrument design, and performance practice.
Open to Organ majors only.

PY.460.424. Organ Literature 2. 3 Credits.
A study of selected organ literature from all periods within the context of history, instrument design, and performance practice.
Open to Organ majors only.;Completion of Organ Literature 1 required, PY.460.423[C].

PY.460.425. Resources for Contemporary Church Musicians 1. 3 Credits.
This course is a survey of liturgics, working with the lectionary, choral literature for the average choir, conducting styles and interpretation, hymnody, and related subjects. The fall semester focuses primarily on liturgics, lectionary and hymnody.
Open to Organ majors only. Non-majors interested in taking the course should send an email to peabodyregistrar@jhu.edu with instructor permission attached.

PY.460.426. Resources for Contemporary Church Musicians 2. 3 Credits.
This course is a survey of liturgics, working with the lectionary, choral literature for the average choir, conducting styles and interpretation, hymnody, and related subjects. The spring semester focuses primarily on conducting, conducting from the console, choral literature, anthem accompaniment, children's choir techniques and repertoire, handbell techniques and repertoire, service planning, practical skills for managing a church music program, and forming a personal philosophy of church music.
Open to Organ majors only. Non-majors interested in taking the course should send an email to peabodyregistrar@jhu.edu with instructor permission attached.;Completion of Resources for Contemporary Church Musicians 1 required, PY.460.425[C].

PY.460.510. Organ for Non-Majors 1. 1 Credit.
Open to everyone with basic keyboard proficiency, this introductory course in service playing will cover organ technique, registration, hymn playing, and accessible literature.

PY.460.511. Organ for Non-Majors 2. 1 Credit.
Open to everyone with basic keyboard proficiency, this introductory course in service playing will cover organ technique, registration, hymn playing, and accessible literature.
Completion of Organ for Non-Majors 1 required, PY.460.510[C].

PY.460.545. Organ Seminar (UG). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. A yearly requirement of organ majors.
Open to Organ majors only.

PY.460.546. Organ Seminar (UG). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. Open to majors only.
Open to Organ majors only.

PY.460.845. Organ Seminar (GR). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. A yearly requirement of organ majors.
Open to Organ majors only.

PY.460.846. Organ Seminar (GR). 1 Credit.
Classes in performance covering the repertoire and stylistic concepts from all periods of organ literature. Open to majors only.
Open to Organ majors only.

PY.470 (Guitar)

PY.470.431. Guitar Literature 1 (UG). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.

PY.470.432. Guitar Literature 2 (UG). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present.
Open to Guitar majors only.;Completion of Guitar Literature 1 (UG) required, PY.470.431[C].

PY.470.545. Guitar Seminar (UG). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required of all guitar majors in all semesters of enrollment.
Open to Guitar majors only.

PY.470.546. Guitar Seminar (UG). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required for guitar majors.
Open to Guitar majors only.

PY.470.585. Guitar Music Skills 1. 1 Credit.
The application of theoretical skills to the guitar, including harmony, rhythm, transposition, and analysis.
Open to Guitar majors only.

PY.470.586. Guitar Music Skills 2. 1 Credit.
The application of theoretical skills to the guitar, including harmony, rhythm, transposition, and analysis.
Open to Guitar majors only.;Completion of Guitar Skills 1 required, PY.470.585[C]

PY.470.587. Guitar Music Skills 3. 1 Credit.
A continuation of 470.585-586 for guitar majors; emphasis on form, analysis, transposition, and sight-reading.
Open to Guitar majors only.;Completion of Guitar Skills 2 required, PY.470.586[C]

PY.470.588. Guitar Music Skills 4. 1 Credit.
A continuation of Guitar Music Skills 3; emphasis on form, analysis, transposition, and sight-reading.
Completion of Guitar Skills 3 required, PY.470.587[C];Open to Guitar majors only.

PY.470.631. Guitar Literature 1 (GR). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.

PY.470.632. Guitar Literature 2 (GR). 2 Credits.
A study of the literature for the guitar from the Renaissance to the present. Offered in alternate years.
Open to Guitar majors only.;Completion of Guitar Literature 1 (GR) required, PY.470.631[C].

PY.470.637. Guitar Pedagogy 1. 2 Credits.
A study of guitar instructional principles and procedures for their application. Graduate students enrolled in this course will be required to do more advanced and specialized research and documentation.
Open to Guitar majors only.

PY.470.638. Guitar Pedagogy 2. 2 Credits.
A study of guitar instructional principles and procedures for their application.
Open to Guitar majors only.;Completion of Guitar Pedagogy 1 required, PY.470.637[C].

PY.470.845. Guitar Seminar (GR). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required of all guitar majors in all semesters of enrollment.
Open to Guitar majors only.

PY.470.846. Guitar Seminar (GR). 1 Credit.
A seminar for performance and discussion of the guitar and related repertoire. Required for guitar majors.
Open to Guitar majors only.

PY.510 (Music Education)

PY.510.112. Introduction to Music Education. 1 Credit.
An overview of music teaching as a profession, including an examination of contemporaryphilosophical and pedagogical trends in music education as well as roles and attitudes ofthe elementary and secondary school music teacher.
Open to Music Education majors only.

PY.510.211. Brass Class. 2 Credits.
Study of the trumpet, trombone, horn, and tuba with an emphasis on methods and materialsfor the instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.212. Woodwinds Class. 3 Credits.
Study of the clarinet, flute, oboe, bassoon, and saxophone with emphasis on methods and materials for instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.213. Basic Instrumental Pedagogy. 1 Credit.
Study of the trumpet, clarinet, and violin to familiarize guitarists, vocalists, and pianists with fundamental concepts of brass, woodwind, and stringed instrument playing. Also includes elementary pedagogy related to those instruments.
Open to Music Education majors only.

PY.510.223. Percussion Class. 1 Credit.
Study of the percussion instruments. Emphasis is on playing techniques, percussion notation,and diagnosis of student problems. Also included are basic maintenance and repairprocedures.
Open to Music Education majors only.

PY.510.237. Secondary Choral Ensemble 1. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondary school choir. Also includes methods of teaching singing in the large ensemble setting.
Open to Music Education majors only.

PY.510.238. Conducting the Secondary Instrumental Ensemble 1. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondaryschool band/orchestra. Also includes methods of teaching wind, string, and percussionplaying in the large ensemble setting. Open to majors only.
Open to Music Education majors only.

PY.510.311. Techniques for Teaching Elementary General Music. 3 Credits.
An eclectic approach to teaching vocal and general music in elementary and middle school. Includes organization of instruction, selection of appropriate materials, theories of learning, childhood development, and basic guitar instruction. Observation and guided teaching in local schools are required. Open to majors only.
Open to Music Education majors only.

PY.510.312. Progressive Methods: Instrumental Music. 3 Credits.
Progressive Methods: Instrumental Music is designed to provide students with opportunities to develop and refine instrumental music teaching skills, strategies, and progressive techniques through teaching experiences in remote and/or in-person classroom and rehearsal settings in the public schools. Educational Psychology Content is now covered in Literacy in the Content Areas I and II. Along with best practices in pedagogy for specific instruments and voice, the weekly practicum experiences will include knowledge and practical application of learning theories, classroom management strategies and development of lesson plans with integrated literacy in the content area knowledge. The Guitar Skills component emphasizes strategies for group class instruction at the secondary level while continuing to develop guitar skills for effective modeling.
Open to Music Education majors only.

PY.510.313. Techniques for Teaching Secondary Instrumental Music. 3 Credits.
Principles of secondary education and activities of Conducting the Secondary InstrumentalEnsemble (510.338), plus independent projects and workshops related to marching bandand jazz ensembles. Open to certification candidates only
Open to Music Education majors only.

PY.510.314. Progressive Methods: Secondary General/Vocal Music. 3 Credits.
A performance-based approach to teaching vocal and general music in secondary schoolsand continued study of an eclectic approach to teaching general music. Includes principlesof secondary education, organization of instruction, selection of appropriate materials, theoriesof learning, and adolescent development. Observation and guided teaching in localschools included. Open to majors only.
Open to Music Education majors only.

PY.510.324. Strings Class. 3 Credits.
Study of the violin, viola, cello, and double bass with emphasis on methods and materials for instruction of beginners in the public school setting.
Open to Music Education majors only.

PY.510.337. Secondary Choral Ensemble 2. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondary school choir. Also includes methods of teaching singing in the large ensemble setting.
Open to Music Education majors only.

PY.510.338. Conducting the Secondary Instrumental Ensemble 2. 2 Credits.
Development of conducting skills and rehearsal strategies appropriate to the secondaryschool band/orchestra. Also includes methods of teaching wind, string, and percussionplaying in the large ensemble setting. Open to majors only.
Open to Music Education majors only.;Completion of previous course required, PY.510.238[C].

PY.510.411. Intern Teaching. 6 - 12 Credits.
Supervised student teaching in public schools daily for one semester (8 weeks in elementary, 7 weeks in secondary).
Open to Music Education majors only.

PY.510.414. Music & the Neurodiverse Learner. 3 Credits.
An overview of inclusive teaching strategies for music educators centered on universal design, accessibility, and intersectionality, framed through a disability justice lens.
Open to Music Education majors only.

PY.510.441. Intern Teaching Seminar. 1 Credit.
Concomitant with 411, the seminar is devoted to discussion of problems related to teaching music in the schools. Special emphasis is on practices in the secondary school.
Open to Music Education majors only.

PY.510.609. Advanced Conducting Techniques for Music Educators. 2 Credits.
Advanced Conducting Techniques for Music Educators is designed to help graduate music education students develop score reading and analysis skills, formulate interpretive ideas, as well as develop conducting techniques to communicate those interpretations discovered during score study.
Open to Music Education majors only.

PY.510.611. Psychology of Music Teaching. 2 Credits.
Application of selected theories of learning to teaching music in the elementary and secondary school. Characteristics of childhood and adolescent development will also be examined with implications for designing appropriate musical instruction.

PY.510.612. Research in Music Education. 2 Credits.
A seminar in research specific to music education. Prepares the teacher to read and interpretmusic education research in professional publications. The course includes an examinationof basic procedures of historical, descriptive, and experimental research in musiceducation. Offered in alternate years.
Open to Music Education majors only.

PY.510.613. History & Philosophy of Music Education. 2 Credits.
A seminar on historical and philosophical perspectives of music education. Includes the study of the history of music education in the United States and various philosophies of music education. Offered in alternate years.
Open to Music Education majors only.

PY.510.614. Supervision & Curriculum Development. 2 Credits.
Supervision and Curriculum Development is designed to examine the role of the music supervisor or department coordinator in the public schools including issues concerning curriculum, class scheduling, staff supervision/evaluation/improvement of instruction, budgets, public relations and research problems in planning and executing a modern program. The course includes the development of curriculum guides and materials with specific focus on individual areas of interest.
Open to Music Education majors only.

PY.510.616. Music Education Independent Study. 1 - 3 Credits.
Elective credit may be granted for graduate courses or workshops in an area of specialization; Orff, Kodaly, Dalcroze, or Suzuki certification; courses included in JHU's Carey Business School or School of Education. Students may also enroll in Music Education Electives through Peabody as an Independent Study, with permission of a Music Education Faculty member.

PY.510.620. Kodaly, Orff, Dalcroze: A General Music Methods Seminar. 2 Credits.
A survey of three major general music methods, Kodaly, Orff, and Dalcroze. other methods will be covered depending on the time left in the course. Primarily for graduate Music Education majors.

PY.510.621. Graduate Practicum. 2 Credits.
Observation and guided teaching in a variety of settings, designed to enhance and expand the teaching skills of the practicing educator. Includes individualized video-taping of teaching demonstrations and follow-up conferences. Practicum experiences are arranged according to student interests and needs and may include teaching and supervisory internships.
Open to Music Education majors only.

PY.510.691. Independent Field Study. 4 Credits.
The Independent Field Study is the culmination of applied academic material gained through the graduate music education coursework. The Field Study, usually completed at the end of the degree program, will be a scholarly document dealing with current issues in music education. It may be a research project, a curriculum development project, a lecture-recital or any other type of project concerned with current music education issues. The pre-requisite: Music Bibliography and Research in Music Education courses ensure that the student has the content knowledge and skills needed to complete original research or a research informed project in their field/area of interest. The purpose of the study is to allow the graduate student to demonstrate their working knowledge of research, writing, teaching, psychology, and philosophy within the field of music education in a scholarly document. The music education instructor of the student's choosing chairs the study.
Open to Music Education majors only.

PY.520 (Pedagogy)

PY.520.615. Pedagogy Internship. 2 Credits.
The internship is intended to provide a one-year supervised work experience during which students are expected to demonstrate the ability to present well-planned and engaging classes and lessons. The primary focus is to further develop teaching skill in a studio setting.
Open to Pedagogy majors only.

PY.520.617. Internship Seminar. 1 Credit.
The seminar is intended to provide a forum for the following activities and discussion topics: sharing of successful teaching experiences, group review of videotapes, microteaching, discussion of recordkeeping systems, the business of teaching music, motivational techniques for special situations, and the importance of the parent and parent-teacher relationship.
Open to Pedagogy majors only.

PY.520.618. Portfolio Development. 1 Credit.
Guidance in professional portfolio development. The result will be a professional portfolio which is an organized collection of materials which demonstrate the intern's educational philosophy, knowledge of materials, experience in teaching, professional references, audio and video recording of teaching and performance obtained or collected during the first three semesters of graduate work. In addition, students will discuss employment opportunities, practice answering questions frequently used in the interview process and discuss how to effectively use their portfolio to gain a position as a studio instructor..
Open to Pedagogy majors only.

PY.530 (Voice)

PY.530.469. Italian Diction. 2 Credits.
This course prepares students to sing artistically in Italian through a combination of dictionstudy, text translation, and performance. Prerequisite: minimum one semester of collegestudy of Italian language or permission of instructor.
Open to Voice majors only.

PY.530.471. Russian Diction. 2 Credits.
A study of Russian vocal music, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.473. Opera Literature. 2 Credits.
A study of selected works in opera from the 17th century to present, with emphasis on compositional styles and traditions of performance. Offered in alternate years.

PY.530.474. Opera Literature. 2 Credits.
A study of selected works in opera from the 17th century to present, with emphasis on compositional styles and traditions of performance.

PY.530.475. English Diction. 2 Credits.
A study of the International Phonetic Alphabet and the English language, with particular attention to American English, its unique sounds and their execution in singing.
Open to Voice majors only.

PY.530.477. German Diction. 2 Credits.
A thorough examination of the phonemic/phonetic system of German pronunciation and its application to singing in that language. The course is designed to give students not only the professional tools to analyze the phonetic problems in German texts (and to transcribe those solutions with the aid of IPA), but also the ability to hear for themselves how those solutions can be applied. Special emphasis is placed on Bühnenaussprach/Hochlautung, noting the differences between speaking and singing in that language, and the resulting choices that the student will need to make in achieving a good and flexible singing pronunciation. The course emphasizes speaking and then singing excerpts from the German vocal repertoire from opera, oratorio, and Lieder.
Open to Voice majors only.

PY.530.478. Czech Diction. 2 Credits.
Open to Voice majors only.

PY.530.483. French Diction. 2 Credits.
A study of French vocal music, its poetry and interpretation, with attention to diction (using the International Phonetic Alphabet) and grammar, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.545. Graduate Diction Review 1.
This two-semester course is an introduction and review of the International Phonetic Alphabet and its application in writing, speaking and singing English, French, German and Italian. Emphasis will be placed on the study of the IPA and its application in each of the four languages. Required for graduate voice students who do not pass the Diction Placement Exam.
Open to Voice majors only.

PY.530.546. Graduate Diction Review 2.
This two-semester course is an introduction and review of the International Phonetic Alphabet and its application in writing, speaking and singing English, French, German and Italian. Emphasis will be placed on the study of the IPA and its application in each of the four languages. Required for graduate voice students who do not pass the Diction Placement Exam.
Open to Voice majors only.;Completion of Graduate Diction Review 1 required, PY.530.545[C].

PY.530.589. Vocal Literature: English/Italian. 2 Credits.
A survey of English and Italian song literature from the Renaissance to Modern day, applyingthe International Phonetic Alphabet (IPA) to specific repertoire. Prerequisite: EnglishDiction and Italian Diction.
Undergraduates need to have completed English and Italian Diction in order to enroll, PY.530.469[C] and PY.530.475[C].;Open to Voice majors only.

PY.530.590. Vocal Literature: German/French. 2 Credits.
A study of selected vocal works and styles in French and German from the 17th century tothe present, with emphasis on compositional trends, traditions of performance, and exposureto a wide variety of literature from both cultures and languages. Prerequisite: GermanDiction and French Diction.
Open to Voice majors only.;Undergraduates need to have completed German and French Diction in order to enroll, PY.530.477[C] and PY.530.483[C].

PY.530.615. Selected Topics in Art Song. 2 Credits.
Performance seminar in 6 units, chosen to represent some important touchstones in the repertoire: John Dowland Songs with Lute (setting a standard); Franz Joseph Haydn Canzonettas (setting a standard); Francis Poulenc: 6 Decades of Song; Charles Ives: The Hidden Innovator; Robert Schumann in 1840: the Amazing “Song Year”; Florence Price: The Uncaged Bird
Open to Voice majors only.

PY.530.617. Singing Bach. 2 Credits.
An introduction to the performance of solo vocal repertoire by J. S. Bach. Singers will study and present representative selections from the St. Matthew Passion, St. John Passion B Minor Mass, Magnificat, Christmas Oratorio, and selected cantatas. The elements of style will be addressed, including the rhetoric of Bach recitative. Cultural and historical context will also be examined.
Open to Voice majors only.

PY.530.645. Musical Theatre Survey. 2 Credits.
Analysis and performance of selected works from the American musical theater, beginning with Jerome Kern and continuing to present-day examples. Offered in alternate years.
Open to Voice majors only.

PY.530.671. Operas of Mozart. 2 Credits.
A study of the music and drama of five principle operas. Offered in alternate years.
Open to Voice majors only.

PY.530.672. Operas of Verdi. 2 Credits.
Open to Voice majors only.

PY.530.679. Advanced French Airs and Melodies. 2 Credits.
An in depth study of French vocal music with an emphasis on style and interpretation, as well as attention to diction (reviewing the International Phonetic Alphabet) and grammar, including analysis and performance of selected works.
Open to Voice majors only.

PY.530.680. Survey of African-American Art Song. 2 Credits.
This seminar critically examines the history, nature, and trajectory of art song by African American composers. As such, we will understand that art song by African American composers is significant to the genre of art song as an entity. Using a Critical Race Theory Lens we will investigate the simultaneity race, gender, sexuality, and class oppression as expressed in musical values and the reception history of these works. Students will be required to musically prepare songs, perform them in class, and create short presentations about relevant stylistic elements of the song and information about the composer.
Open to Voice majors only.

PY.530.683. Vocal Pedagogy. 2 Credits.
A class participation course that includes an introduction to various voice teaching methods and their respective approaches to posture and breathing, registration, resonation, coordination, interpretation, and vocal health; an examination of the anatomy and function of the vocal mechanism; student teaching; teacher observation; repertoire and recital planning. Required for the MM in Voice with Pedagogy Emphasis and the DMA in Voice, Option C; an elective for seniors and other graduate students.
Open to Voice majors only.

PY.530.684. Vocal Pedagogy Lab. 2 Credits.
This semester of vocal pedagogy will be continuation of the introduction of relevant content through in-house and guest lecturers. Elements critical to an effective teaching studio will also be covered. Stimulating class discussion will be a vital part of the students’ understanding of class content. Reading assignments accompany each class.
Open to Voice majors only.;Completion of previous course required, PY.530.683[C].

PY.530.685. Verismo Opera. 2 Credits.
Open to Voice majors only.

PY.530.686. Bel Canto Opera. 2 Credits.
Open to Voice majors only.

PY.530.687. Oratorio. 2 Credits.
Participants in this performance seminar will prepare and present representative oratorio repertoire from the 18th century to the present. Students will acquire an understanding of the breadth of styles in this body of repertoire and will complete the course with a list of works of practical value for themselves in the future. The term “oratorio” will be considered broadly, and may include symphonies with voice (e.g. Beethoven 9 and Mahler 2 & 4) but not concert works for solo voice (e.g. Mahler Des Knaben Wunderhorn and Ravel Shéhérezade).
Open to Voice majors only.

PY.530.691. 21st Century Voice 1. 2 Credits.
A performance practice course including score reading, definitions of the technical language of avant garde music, and contemporary vocal techniques. Performance is optional. Offered in alternate years.
Open to Voice majors only.

PY.530.692. 21st Century Voice 2. 2 Credits.
A survey of contemporary vocal literature and notational practices, including discussion oftechniques for learning complex music and coaching of selected repertoire. Students willpresent on topics, techniques, and repertoire. A course for singers, pianists, composers,conductors and others.A continuation of the fall semester. Prerequisite: PY.530.691 or permission of instructor.
Completion of previous course needed, PY.530.691[C].;Open to Voice majors only.

PY.530.695. Advanced Lieder Studies. 2 Credits.
This course is designed to present students with analysis, preparation, and performance of the poetry and music found in German Lieder. Through detailed study of poetry and music, we will trace the development of German song from it’s humble origins, to the great song cycles of Schubert, Schumann, Wolf, Mahler, and beyond. Attention will be paid to appropriate diction, style, and practical performance of the German vocal literature.
Open to Voice majors only.

PY.540 (Opera)

PY.540.491. Acting For Opera 1. 1 Credit.
An approach to dramatic characterization through the development of the actor’s imagination and expressive range, with special emphasis on the ensemble and projection techniques of the lyric stage.
Open to Voice majors only.

PY.540.492. Acting For Opera 2. 1 Credit.
Acting for Opera is a laboratory for the complete singer-actor. The canon of music-theatre continues to expand, and each genre of music has its own evolving style of performance. As such, students will practice working both from the outside-in (using the face, body, and voice to express ideas and emotions) and from the inside-out (using their imaginations as fuel for strong artistic choices). Readings include historic and contemporary discourses on both acting and rhetoric. Students will prepare monologues, dialogue, and recitative scenes assigned by the instructor, and will be graded upon their individual preparation as well as their ability to work in an ensemble.
Open to Voice majors only.

PY.540.513. Movement 1. 1 Credit.
Develops physical awareness, movement skills, and integration of musical and spatial concepts. Includes introductory dance technique, vocabulary and patterns. Active studies in Dalcroze eurhythmics, choreography, characterization and styles provide further abilities useful in opera.
Open to Voice majors only.

PY.540.514. Movement 2. 1 Credit.
This course develops singers' physical awareness, movement skills, and integration of musical and dramatic content. Areas of study include the dynamics of stage space, gesture as a product of characterization, and knowledge of basic dance forms for the opera stage. Processes draw from somatic studies and Jaques-Dalcroze eurhythmics.
Open to Voice majors only.;Completion of Movement 1 required, PY.540.513[C].

PY.540.515. Movement (GR). 1 Credit.
Graduate Acting students will learn how to decode the important information in each script, libretto, and score in order to translate it into vivid performances. Art (and therefore acting) may be subjective, but everyone can cultivate the skills required to become a better singer-actor. The aim of this class is to empower graduate students to make strong artistic choices by demystifying character, style, and rhetoric.
Open to Voice majors only.

PY.540.521. Opera Seminar. 2 Credits.
An advanced course on acting for the Opera stage. This class counts towards the Vocal Literature course requirement.The purpose of this class is to review, strengthen and apply concepts of stagecraft, acting, and character analysis to the advanced singer interested in singing on the Opera stage. This will be done through “Role Preparation”, working exclusively in a given role in an opera. By the end of the semester the student will be able to create from the music and text of the opera role an entire, complete, practical character and performance us.
Open to Voice majors only.

PY.540.522. Opera Seminar. 2 Credits.
An introduction to acting for the Opera stage.
Open to Voice majors only.

PY.540.523. Opera in Action. 2 Credits.
Who gets to make and to experience opera? Opera in Action students will explore these questions and pose their own, using a short opera performance as the catalyst for both classroom and community engagement. Students will work with instructors from various fields to devise activities and foster conversations around music, theatre, and performance. Emphasis will be placed on developing each individual student's musical/dramatic skills in the context of community. Both Voice and Music Education students with a singing background are encouraged to apply.

PY.540.535. Graduate Opera Seminar. 2 Credits.
Individual and group work focusing on language, diction, and the vocal line as it relates to instrumentation and musical texture. Students will explore composers' stylistic, linguistic, and musical choices as the basis for crafting informed interpretations of operatic works in various styles, including 21st-century repertoire. Focus may include both individual arias and role preparation. This course also includes a career overview that encompasses auditions, management, singing in Europe, and professional expectations and standards.
Open to Voice majors only.

PY.540.536. Opera Aria Coaching. 2 Credits.
Bringing an Opera Aria to performance level requires a great deal of 'sleuthing', i.e. detective work. We are who we are in every day life simply by being a living, breathing ever-evolving human being. Our reactions, our personality are ever revealing themselves simply by interacting with the situations and people we encounter. Arias are, however, stories told in a moment in time, in a particular situation that is 'pre-scribed' by a librettist and composer. It is our challenge to find out what the intention of the creators was, what the message to deliver is and what experience brings us to this point. Research, dissection, pondering, in a sense, working backwards to understand the components of an aria will bring us to a point of delivering the message - hopefully - that the team had in mind. Vocal color, word stress, phrasing (both musical and literary) all contribute to a meaningful expression of a character's reaction to a particular situation at a point in time.
Open to Voice majors only.

PY.540.541. Opera Etude Seminar. 1 - 2 Credits.
A course to develop new operatic works by Peabody composers in close collaboration with vocalists. Study includes investigations of vocal function and use; an overview of literature and notational practices; exercises in writing for solo voice and instruments; libretto development; scene improvisation; and discussion of best practices for collaboration. Up to five composers from the fall semester will be chosen to write a 15-minute scene or one-act opera for full production in the spring. **For composers, participation in the fall semester is prerequisite to the spring.** The course is open to composers at the senior-year level or above. Junior-year composers may be enrolled by permission. Singers are enrolled via opera diagnostic auditions at the beginning of the year. Instrumentalists are also invited to participate for credit in both semesters.

PY.540.542. Opera Etude Seminar. 2 Credits.
A course to develop new operatic works by Peabody composers in close collaboration with vocalists. Study includes investigations of vocal function and use; an overview of literature and notational practices; exercises in writing for solo voice and instruments; libretto development; scene improvisation; and discussion of best practices for collaboration. Up to five composers from the fall semester will be chosen to write a 15-minute scene or one-act opera for full production in the spring. **For composers, participation in the fall semester is prerequisite to the spring.** The course is open to composers at the senior-year level or above. Junior-year composers may be enrolled by permission. Singers are enrolled via opera diagnostic auditions at the beginning of the year. Instrumentalists are also invited to participate for credit in both semesters.
Completion of previous course required, PY.540.541[C].

PY.540.552. Stage Directing. 1 Credit.
Open to Voice majors only.

PY.540.639. Opera Workshop. 2 Credits.
An introduction to dramatic characterization as it relates to and is practiced on the Opera stage.
Open to Voice majors only.

PY.540.640. Opera Theater. 2 Credits.
An advanced course on acting for the Opera stage.
Open to Voice majors only.

PY.540.691. Graduate Acting. 1 Credit.
Graduate Acting students will learn how to decode the important information in each script, libretto, and score in order to translate it into vivid performances. Art (and therefore acting) may be subjective, but everyone can cultivate the skills required to become a better singer-actor. The aim of this class is to empower graduate students to make strong artistic choices by demystifying character, style, and rhetoric.

PY.550 (Recording Arts and Sciences)

PY.550.111. Recording 1a - Fundamentals. 2 Credits.
A course designed to introduce the beginning Recording Arts student to components of the recording process, including a detailed analysis of the nature of sound and human perception, digital audio and operation of recording consoles, microphone types and techniques, editing, and other skills. Open to majors and other majors with permission of instructor.
Open to Recording Arts majors. Non-majors who wish to enroll should email the instructor's permission to peabodyregistrar@jhu.edu.

PY.550.112. Recording 1b - Fundamentals. 2 Credits.
A course designed to introduce the beginning Recording Arts student to components of the recording process, a detailed analysis of the nature of sound and human perception, digital audio and operation of recording consoles, microphone types and techniques, editing, and other skills. Open to majors and other majors with permission of instructor.
Completion of Recording 1a with a B- or higher is required, PY.550.111[C].

PY.550.211. Recording 2a - Studio Technology. 2 Credits.
A continuation of Recording I that provides students with an in-depth exploration of the tools and technology associated with the recording process including signal flow, analog and digital theory, signal processing, and recording systems. Open to majors and other majors with permission of instructor
Completion of Recording 1b with a B- or higher is required, PY.550.112[C].

PY.550.212. Recording 2b - Studio Technology. 2 Credits.
A continuation of Recording I that provides students with an in-depth exploration of the tools and technology associated with the recording process including signal flow, analog and digital theory, signal processing, and recording systems. Open to majors and other majors with permission of instructor. Prerequisite: Recording I.
Completion of Recording 2a with a B- or higher is required, PY.550.211C].

PY.550.311. Recording 3a - Classical/Jazz Techniques. 2 Credits.
Building on the Recording I and II courses, students will explore techniques for recording in the "tonmeister" style of engineering, particularly as it relates to microphone techniques for classical and jazz music recording, mixing and editing. Additional topics include surround sound and multitrack production. Open to majors only.
Completion of Recording 2b with a B- or higher is required, PY.550.212[C].

PY.550.312. Recording 3b - Classical/Jazz Mixing and Editing. 2 Credits.
Building on the Recording I and II courses, students will explore techniques for recording in the "tonmeister" style of engineering, particularly as it relates to microphone techniques for classical and jazz music recording, mixing and editing. Additional topics include sur-round sound and multitrack production.
Completion of Recording 3a with a B- or higher is required, PY.550.311[C].

PY.550.411. Recording 4a - Rock/Pop Techniques. 3 Credits.
A continuation of Recording III, this course focuses on contemporary recording techniques associated with rock/pop music production. Topics include multi-track recording, mixing, overdubbing, and headphone monitoring. Open to majors only.
Open to Recording Arts majors only.;Completion of Recording 3b with a B- or higher is required, PY.550.312[C].

PY.550.412. Recording 4b - Rock/Pop Mixing and Editing. 3 Credits.
A continuation of Recording III, this course focuses on contemporary recording techniques associated with rock music production. Topics include multi-track recording, mixing, over-dubbing, and headphone monitoring. Prerequisite: Recording III or permission of instruc-tor.
Completion of Recording 4a with a B- or higher is required, PY.550.411[C].;Open to Recording Arts majors only.

PY.550.419. Recording Internship. 4 Credits.
Undergraduate students work in supervised professional positions in which they will have the opportunity to apply the knowledge and expertise developed during their course of study. The internship requires 320 hours of service in an approved facility. Open to majors only.
Open to Recording Arts majors only.

PY.550.511. Advanced Recording Systems 1. 3 Credits.
Theory and practical application of the tools and techniques used in professional audio recording in all common musical styles. Topics include a review of studio acoustics, human perception of sound, microphone theory and application, signal processing, recording, mixing and mastering. Advanced techniques in Classical, Jazz and Rock music recording, and other styles as time permits. Open to incoming students in the Recording and Production track of the Master of Arts in Audio Sciences program.
Open to Recording Arts majors only.

PY.550.512. Advanced Recording Systems 2. 3 Credits.
Theory and practical application of the tools and techniques used in professional audio recording in all common musical styles. Topics include a review of studio acoustics, human perception of sound, microphone theory and application, signal processing, recording, mixing and mastering. Advanced techniques in classical, jazz and rock music recording, and other styles as time permits. Prerequisite: Acceptance to Recording and Production track of the Master of Arts in Audio Sciences program, or permission of instructor.
Open to Recording Arts majors only.;Completion of Advanced Recording Systems 1 with a B- or higher is required, PY.550.511[C].

PY.550.513. Advanced Studio Production 1. 3 Credits.
Advanced practical training in producing and engineering recordings in a variety of musical styles at a professional level in a masterclass-like environment with an accomplished professional recording engineer. Final capstone projects will be evaluated by a panel of outside producers representing Classical, Jazz and Rock music styles and engineers who are experts in their respective field of professional audio recording, and presented at the end of the year in an open forum attended by all students in the Recording Arts and Sciences department. Open to majors only.
Open to Recording Arts majors only.

PY.550.514. Advanced Studio Production 2. 3 Credits.
Advanced practical training in producing and engineering recordings in a variety of musical styles at a professional level in a masterclass-like environment with an accomplished pro-fessional recording engineer. Final capstone projects will be evaluated by a panel of outside producers representing Classical, Jazz and Rock music styles and engineers who are experts in their respective field of professional audio recording, and presented at the end of the year in an open forum attended by all students in the Recording Arts and Sciences depart-ment. Prerequisite: Recording IV or Advanced Recording Systems.
PY.550.513[C];Open to Recording Arts majors only.

PY.550.515. Musical Acoustics. 3 Credits.
A course concerned with the physics of sound as applied to properties of musical instruments, perception of musical sound, electronic music reproduction, and the spaces in which they perform. Prerequisites for recording arts majors: Basic Recording I and II or equivalent. Prerequisite for non-recording majors: Basic Recording Techniques or equivalent. Open to majors only, others by permission of instructor.

PY.550.516. Electroacoustics. 3 Credits.
This class will cover the basic fundamentals of electro-acoustics subdivided into roughly four units: fundamentals and transducer theory, loudspeakers, headphones and microphones. Prerequisite for Recording Majors: Physics 2.

PY.550.517. Psychoacoustics. 3 Credits.
The course focuses on the basics of the physiological and psychological aspects of hearing with applications to audio and sound systems, architectural acoustics, and musical acoustics. Topics include auditory physiology of the outer and inner ear, masking, critical bands, loudness, duration, binaural hearing, localization, and pitch. Open to majors only.

PY.550.519. Acoustical/Audio Measurements. 3 Credits.
The theory and application of objective acoustical and audio measurements are studied. Measurement techniques used in the evaluation of both physical spaces and electronic equipment are presented. Topics include measurement microphones, sound level meters, noise sources, spectrum and FFT analysis, frequency analysis, reverberation, speech intelligibility, transfer functions, swept sine techniques, audio power measurements, ADC and DAC linearity, harmonic distortion and mixed signal testing.
Completion of Architectural Acoustics 1 required, PY.550.624[C].

PY.550.524. Sound Design/Video Games. 3 Credits.
This course is designed for advanced Composition, Computer Music, and Recording Arts students to study and collaborate on sound design and composition for video games. The class population is made up of 50/50 composers and recording engineers for the purposes of project collaboration. Enrollment by permission of the chair of the department. Completion of Recording 3b, Advanced Recording Systems 1, or Introduction to Programming required, PY.550.511[C], PY.550.312[C], or PY.350.466[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.610. Audio Science and Technology. 3 Credits.
This course is designed to integrate many of the audio and acoustics concepts discussed in the Master of Arts: Concentration in Recording and Production degree curriculum into an exploration of the electronics and acoustics fundamental to audio engineering. Topics include Current, Voltage, and Power in Audio systems; Reactive Circuit Elements; AC Circuits; Semiconductor Devices; Integrated Circuits; Transistor Based Amplifier Circuits; Power Supply Technology; Embedded Systems, and Audio System Engineering. Additional discussion of Architectural Acoustic Fundamentals, including Large Hall and Small room acoustical design. Co- and Pre-requisites: Introduction to Electrical and Computer Engineering (undergraduate) and Advanced Recording Systems (graduate), or permission of the instructor.

PY.550.611. Consumer Audio Systems. 3 Credits.
An introduction to the world of consumer audio electronics. The playback chain: What it is, how it works, and how it sounds. Lectures and outside-of-class projects will include a topology analysis of and critical listening to the following audio components and technologies: preamplifiers; power amplifiers; loudspeakers; disc players; DACs; music servers; computer audio; turntables, cartridges, tonearms, phono preamplifiers for vinyl disc playback; broadcast and internet radio; home theater configuration; interconnects; receivers; lossy and lossless codecs; multichannel audio and bass management; specifications and measurement; wireless audio profiles and codecs; network audio; active products and DSP; and headphones and headphone amplifiers. At the end of the course students will have a deep understanding of these topics and the ability to aurally discern the musical impact various design topologies have on the playback of recorded sound. Co- and Pre-requisites: Recording III (undergraduate) and Advanced Recording Systems (graduate), or permission of the instructor.
Completion of Audio Science and Technology required, PY.550.610[C].

PY.550.624. Architectural Acoustics 1. 3 Credits.
This class covers the fundamentals of architectural acoustics design. Topics will include: Plane and spherical waves; acoustic impedance and sound energy density; reflection, refraction, and diffusion; sound absorption; acoustic materials; psychoacoustic aspects; room modes; statistical versus geometric acoustics; reverberation theory; coupled-space acoustics; behavior of sound in rooms; and large versus small room acoustics. Open to students in the Acoustical Studies track of the Master of Arts in Audio Sciences program or by permission of instructor.

PY.550.625. Audiovisual System Design. 3 Credits.
The objective of this class is to provide students with an overview of commercial audiovisual systems design. This will include both the considerations required to design audiovisual systems and all the ancillary considerations required to properly integrate these systems with architecture, electrical, mechanical, structural, and IT systems.
Completion of Electroacoustics required, PY.550.516[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.626. Noise Control. 2 Credits.
A continuation of Architectural Acoustics (550 • 624) Topics will include: perceptual aspects of noise control; sound power, noise control criteria and standards; hearing loss prevention; environmental acoustics; airborne sound isolation (transmission loss theory, walls, floors, doors, and windows) structure-borne sound insulation (impact insulation theory and floors); vibration isolation (vibration isolators and design); heating, ventilation, and air conditioning (HVAC) noise control; and noise control applications in buildings. Prerequisites: Physical Acoustics, Architectural Acoustics, or permission of instructor.
Completion of Architectural Acoustics 1 required, PY.550.624[C]. Instructor permission may also be granted instead, and should be emailed to peabodyregistrar@jhu.edu in order to enroll.

PY.550.627. Acoustical Modeling. 2 Credits.
Basics of computer modeling for room acoustics and sound system design. Topics include general theory and assumptions underlying computer modeling, different types of acoustical models, auralization, small room acoustics, large room acoustics, and sound system computer models. Introduction to popular computer models including Room Sizer, Room Optimizer, EASE, ULYSSES, and ODEON.

PY.550.631. Graduate Acoustics Seminar. 2 Credits.
This course examines professional practices common in the industry, including interaction with clients, design professionals, and contractors; professional ethics and liability; insurance; contracts and fees; and setting and project documentation. Open to majors only.

PY.550.632. Architectural Acoustics 2. 3 Credits.
This class is a continuation of content introduced in PY.550.624: Architectural Acoustics. This course focuses on analysis, design and application, expanding on established foundations and topical content in previous courses. Architectural acoustics applications for Concert Halls, Recital Halls, Spoken-word Theatre Spaces, Lecture and Classroom Spaces, Worship Spaces, Outdoor Performance Venues, Rehearsal and Practice Spaces, Recording and Production Spaces, Cinemas, Sports Venues, Restaurants and/or Office Spaces may be considered. This course is open to students in the MA in Audio Sciences, Acoustical Studies track, or by permission of instructor.
Completion of Architectural Acoustics 1 required, PY.550.624[C].

PY.550.640. Acoustics Design Practicum. 3 Credits.
In this course taken in the final semester of study, students act as acoustical consultants to design or analyze an existing room or sound system using the knowledge gained through prior classes. The students are responsible for complete analysis, measurements, modeling, design documentation, and presentation of the final design in class. Open to majors only.
Completion of Architectural Acoustics 1 and 2 required, PY.550.632[C] AND PY.550.624[C].;Open to Recording Arts and Acoustics majors only.

PY.550.651. Recording for Musicians 1. 2 Credits.
A comprehensive course in recording and associated technologies designed for the musician who wishes to know about the recording arts. The course is taught parallel to Basic Recording I and II but without the required mathematics and physics and is open to upper-level undergraduates and graduate students of all majors.

PY.550.652. Recording for Musicians 2. 2 Credits.
Designed for non-recording majors, this class offers an overview of the recording process starting with a basic understanding of the acoustics of a performance space; through the signal chain of microphones, signal processing, recording, editing, mixing, and loudspeaker and headphone monitors; to the acoustics of the monitoring environment and the human perception of sound. Additional topics include mastering a final product and distribution on CD and through online services. The completion of PY.550.651 is a prerequisite.
PY.550.651[C]

PY.570 (Jazz)

PY.570.101. Jazz Seminar. 1 Credit.
Jazz Seminar is a course designed to cover general performance practices, topics, repertoire and varying styles within the genre.
Open to Jazz majors only.

PY.570.102. Jazz Seminar. 1 Credit.
Jazz Seminar is a course designed to cover general performance practices, topics, repertoire and varying styles within the genre.
Open to Jazz majors only.

PY.570.127. Jazz Theory Fundamentals 1. 2 Credits.
Designed to establish and reinforce the fundaments of chord scales, harmonic and melodic functions, ear-training, and writing standard forms in jazz. The course also explores basic jazz theory lingo, terms, and nomenclature, as well as transcription, basic reharmonization techniques, and a brief introduction to composition devices of the 20th century. Prepares students for Jazz Improvisation 1 (570.561) and Jazz Keyboard Studies (570.259-260).
Open to Jazz majors only.

PY.570.128. Jazz Theory Fundamentals 2. 2 Credits.
The second part of Jazz Th. Fund. focuses extensively on analysis and composition of standard and through-composed forms using concepts studied in the 1stpart of the course. It also studies the application of 20th century composition devises, as well as basic re-harmonization techniques, modal writing, and an introduction to standard voicings. Prepares students for Jazz Improvisation, Jazz Theory/Keyboard Lab, Arranging.
Open to Jazz majors only.;Completion of Jazz Theory Fundamentals 1 required, PY.570.127[C].

PY.570.259. Jazz Keyboard Studies 1. 2 Credits.
The introduction of the fundamental grammar, vocabulary, and structure of the jazz idiom through the study of its notational conventions, melodic and harmonic functions, and their application on the piano. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.

PY.570.260. Jazz Keyboard Studies 2. 2 Credits.
The introduction of the fundamental grammar, vocabulary, and structure of the jazz idiomthrough the study of its notational conventions, melodic and harmonic functions, and theirapplication on the piano. Prerequisites: Jazz Fundamentals (570.127–128) or placement byinstructor
Open to Jazz majors only.;Completion of Jazz Keyboard Studies 1 required, PY.570.259[C].

PY.570.359. Advanced Jazz Harmony 1. 2 Credits.
A continuation of the techniques and harmonic concepts studied in Jazz Keyboard Studies 1-2. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor
Open to Jazz majors only.

PY.570.360. Advanced Jazz Harmony 2. 2 Credits.
A continuation of the techniques and harmonic concepts studied in Jazz Keyboard Studies 1-2. Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.;Completion of Advanced Jazz Harmony 1 required, PY.570.359[C].

PY.570.361. Jazz Arranging 1. 2 Credits.
A beginning study of the language, techniques, and disciplines employed in arranging music for various jazz ensembles, including orchestration, notation, rhythmic embellishment, melodic ornamentation, chord substitution, and harmonization techniques. . Prerequisites: Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.

PY.570.362. Jazz Arranging 2. 2 Credits.
A beginning study of the language, techniques, and disciplines employed in arrangingmusic for various jazz ensembles, including orchestration, notation, rhythmic embellishment,melodic ornamentation, chord substitution, and harmonization techniques. . Prerequisites:Jazz Fundamentals (570.127–128) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Arranging 1 required, PY.570.361[C].

PY.570.363. Sight Reading. 1 Credit.
"Sight Reading" is a jazz course that is aimed to help the student better their sight reading, starting at the beginner level and working up to advanced material. Students will read jazz transcriptions from, along with the actual recording to play towards, jazz legends such as Miles Davis, Charlie Parker, Cannonball Adderly, Sonny Rollins and John Coltrane. Upon completion of this course, students will have a better grasp on sight reading material at a much rapid pace."

PY.570.431. Global Improvisation. 2 Credits.
A performance/workshop class designed to encourage musical creativity and provide studentswith techniques and strategies for musical improvisation within a collaborative,supportive, and structured environment. The class will include instruction in many aspectsof improvisation and regular audio and video examples of improvisational music will beused to expose students to the variety of ways in which creative musicians are using improvisation in our rapidly changing musical landscape. The majority of student's time willbe spent playing for each other to build confidence and gain knowledge through personalexperience.

PY.570.459. Jazz Composition 1. 2 Credits.
Practical approaches to composition for jazz forces in the jazz idiom, with an emphasis on analysis of standards and projects for small forces.
Open to Jazz majors only.

PY.570.495. Afro-Diasporic Percussion. 1 Credit.
This is a hands-on course open to all majors. Studies part of the extensive repertoire and vocabulary performed by drumming ensembles of Peru, Colombia, Venezuela, Puerto Rico, and Cuba, among others. It also introduces participants to hand-drumming techniques, as well as historical contexts of Afro-Diasporic music in the continent and the application of these languages in contemporary music.

PY.570.561. Jazz Improvisation 1. 2 Credits.
A performance/theory course designed to help students acquire and develop basic language for improvisation through the practical application of information learned in 720 • 127-128 Jazz Fundamentals: chords, scales/modes, melody, rhythm, patterns, harmonic progression, and song forms. Incorporates the performance and examination of several vehicle types, including songs drawn from standard jazz repertoire. Special emphasis will be devoted to the performance and analysis of various improvised solos by master musicians. In addition, development of technical facility, listening/hearing skills, sound, and musical awareness will be addressed. Prerequisites: 570.127-128 Jazz Fundamentals and 570.570 Jazz History or placement by the instructor.
Open to Jazz majors only.

PY.570.562. Jazz Improvisation 2. 2 Credits.
A performance/theory course designed to help students acquire and develop basic languagefor improvisation through the practical application of information learned in Jazz Fundamentals(720.127–128). Incorporates the performance and examination of several vehicletypes, including songs drawn from standard jazz repertoire. Special emphasis is devoted tothe performance and analysis of various improvised solos by master musicians. In addition,development of technical facility, listening/hearing skills, sound, and musical awarenesswill be addressed. Open to majors only. Prerequisites: Jazz Fundamentals (570.127–128)and Jazz History (570.570) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 1 required, PY.570.561[C].

PY.570.563. Jazz Improvisation 3. 2 Credits.
The continued development of knowledge and skills acquired in Jazz Improvisation I with emphasis on increased fluency and mastery. Prerequisite: Jazz Improvisation 2 or placement by the instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 2 required, PY.570.562[C].

PY.570.564. Jazz Improvisation 4. 2 Credits.
The continued development of knowledge and skills acquired in Jazz Improvisation I withemphasis on increased fluency and mastery. Open to majors only. Prerequisite: Jazz Improvisation 1-2 (530.561–562) or placement by instructor.
Open to Jazz majors only.;Completion of Jazz Improvisation 3 required, PY.570.563[C]

PY.570.569. Jazz Analysis/History 1. 2 Credits.
This course covers two main areas of focus: people and methods. It surveys the chronological origins and proliferation of jazz through various styles and artists. The development of jazz as an art form will be traced from the acculturation of Africans in America to the present day by learning about its major instrumentalists, ensembles, composers, arrangers, innovators, revivalists, and revisionists. It also explores the techniques and processes that have been employed by jazz musicians to help make it into the highly structured and evolved art form that it is today. Students will read a wide array of primary and secondary sources and listen to a range of recordings — all with the goal of discovering the various processes, meanings, functions, and experiences of jazz. This class places a strong emphasis on developing listening skills.

PY.570.570. Jazz Analysis/History 2. 2 Credits.
This course has two main areas of focus: 1) The People—a survey of the chronological history of jazz through the use of texts, recordings, videos, and guest lecturers. The development of jazz as an art form will be traced from the acculturation of Africans in America to the present day by learning about its major instrumentalists, ensembles, composers, arrangers, innovators, revivalists, and revisionists. 2) The Methods—a survey of the techniques and processes that have been employed by jazz musicians to help make it into the highly structured and evolved art form that it is today. Students will have experience with first-hand performance, arranging, and composing, along with lectures, demonstrations, and extensive discussion.
Completion of Jazz Analysis/History 1 required, PY.570.569[C].

PY.610 (Musicology)

PY.610.321. History of Music 1. 3 Credits.
A survey of music in the Western classical tradition from antiquity to the late 17th century.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.322. History of Music 2. 3 Credits.
A survey of music in the Western classical tradition from the early 18th century to the late 19th century.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.323. History of Music 3. 3 Credits.
A survey of music in the Western classical tradition from the early 20th century to the present day.
Prerequisite(s): Students cannot take more than one Music History at the same time.
Sophomores must have completed PY.260.115[C] AND PY.260.216[C] in order to enroll in this course.

PY.610.324. Music History in Global Contexts. 3 Credits.

PY.610.414. Musicology Practicum. 1 Credit.

PY.610.601. Music History Review.
A review course covering classical antiquity to the 21st century. Students must earn a passing grade in this course before enrolling in graduate seminars in Musicology. Open to graduate students only. Offered in the summer and fall.

PY.610.605. English Music from Dunstaple to Adès. 3 Credits.
In this seminar we'll explore the roots and developments of English music across nearly seven centuries. Divided into a series of case studies centered around composers, major works, and institutions, this course will investigate English music from a variety of angles. We begin with the organum of the High Middle Ages, explore the Tudor polyphony of the English Reformation, courtly music of the Restoration, Thomas Arne, George Frederic Handel, the English choral revival, Stanford, Elgar, Holst, Vaughan Williams, and Britten. We end our inquiry with the diverse musical paths English music has taken in the last fifty years, finally stopping with Adès's recent opera, The Exterminating Angel. The aim of this course is twofold, to provide students with a clear chronology and to familiarize them with important repertoire, while still addressing critical issues in interaction between music and theology, politics, and gender—to name a few
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.606. Decolonizing Ethnomusicology. 3 Credits.
This course will examine the colonialist underpinnings of ethnomusicology and its persistent effects on current understandings of music in a global context. We will analyze foundational texts in the field, along with newer works that attempt to undo the colonialist legacy upon which the discipline is built.

PY.610.608. George Gershwin's World. 3 Credits.
This course is designed as a series of highlights. We will explore a wide range of musical works and cultural topics related to George Gershwin's life and career. Questions to be posed over the course of the semester will include: Who were Gershwin's colleagues and collaborators? How did Gershwin's music interact with the racial terrain of American culture during the Jim Crow era? And does it continue to engage with issues of race today? How has Gershwin's legacy been shaped by American political and business interests? Did technology play a role in the shaping of his "American" sound? If yes, then how did technology influence Gershwin's creative identity? Students will be asked to lead discussions about Gershwin's compositions, so success is dependent upon setting aside blocks of time on a regular basis to complete the various listening and reading assignments. Written assignments will include creating annotated playlists related to various facets of Gershwin's career and a final research paper/long-form essay that relates to material discussed in class.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.609. Music Therapy from Antiquity to Today. 3 Credits.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.610. Nadia Boulanger. 3 Credits.

Cited as “the most influential teacher since Socrates,” Nadia Boulanger (1887-1979) taught and nurtured generations of young musicians throughout her adult life. Amongrenowned American composers whom she mentored are Aaron Copland, Elliott Carter, Quincy Jones, and Philip Glass. Who was this extraordinary woman who witnessed two world wars and distinguished herself as a legendary pedagogue? What were her teaching methods? How did a Parisienne guide and shape the career trajectories of so many American composers and musicians? This class will explore these questions and many more. In addition to examining history and identifying Boulanger's impact on the current state of musical composition, our course will initiate an oral history project to capture the accounts of the last generation of musicians to work directly with Boulanger toward preserving her legacy.

Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.611. American Film Music and Classical Hollywood Style. 3 Credits.

Film and music have always shared an intimate relationship. Classical Hollywood style dominates the American film industry, dictating the look and sound of most films. Yet filmmakers have always challenged this status quo. Through close viewings—and listenings—of film, we will pursue a more concrete understanding of how music guides our film comprehension, explore how American film music continues to develop, and evaluate how these varied approaches shape the societies in which we live. During this course, you will hone your skills as an academic writer by learning to critically evaluate and craft your own arguments about the roles of music/sound in film. Some of the films covered will include King's Row (1942), Rebecca (1940), Touch of Evil (1958), Vertigo (1958), Breakfast at Tiffany's (1961), Batman (1989), The Remains of the Day (1993), The Social Network (2010), It Happened on Beale Street (2018), and Midsommar (2019). Our topics of inquiry will include representations of jazz, the role of the acousmatic voice, the use of pre-existing music, auteurism, the musically-politically subversive, musical appropriation, and media convergence with digital technologies. Your work will include readings in which we interact with both current and classic scholarly literature; short writing responses that respond to our films and the issues they raise (15-300 words); a short paper focused on the close reading of a scene (800 words); and a final research project on a film music topic of your choice (3000 words). This final project may take different forms—from a recorded analytical film commentary to a more traditional academic paper. Paired with writing workshops and peer review exercises, you will develop the skills necessary to contribute to the greater academic community, write clearly and logically for your intended audience, and formulate original, persuasive arguments.

Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.612. Vocal Contests. 3 Credits.

This course examines voice contests across time. While contests such as American Idol have received widespread attention, these competitions must be understood in terms of a much broader trend towards the proliferation of music prizes, both within and outside the classical music tradition. Our course examines the deep history of the current obsession with voice contests, with examples drawn from the Ancient Greece to the current day. Together we will ask: what sustains the power of prizes? What has driven their incredible proliferation since the outset of the twentieth century, when the Nobel, Pulitzer and modern-day Olympic prizes were first awarded? How does prize culture motor the classical- and popular-music industries? And how should musicians best maneuver themselves within modern-day economics of prestige? While the focus of our course is on vocal contests, this course will be of relevance to all those with an interest in how musical value is created—and tastes shaped—by prize-giving institutions.

Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.613. Stravinsky Perspectives. 3 Credits.

The critical literature addressing the music and aesthetic orientations of Igor Stravinsky (1882–1971) encompasses multiple frames of reference: ritual, discontinuity, octatonicism, neoclassicism, serialism, Russianness, and more. This seminar will sample prominent approaches in scholarship on Stravinsky, tracing several debates and examining representative works.

Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.614. Mahler and Strauss in America. 3 Credits.

In April 1904, Richard Strauss undertook a whirlwind tour of the United States in which he was heralded as the “lion of the musical hour.” Four years later in January 1908, Gustav Mahler made his own American debut, inaugurating a spectacular but troubled relationship with both the New York Philharmonic and the Metropolitan Opera. Their receptions could not have been more different. In this course we use Strauss and Mahler as a lens through which to understand both German and American art at the Fin de Siècle. We will discuss American concert culture, performance practice, and the phenomenon of the celebrity concert tour. We will explore the works that Strauss and Mahler wrote and premiered in this period and their increasingly divergent careers. Finally, we will investigate how Americans, grappling with European art, tried to define their own.

Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.616. Sound Memories: Jazz Autobiography and Memoir. 3 Credits.

In the words of Henry Louis Gates, Jr., “The will to power for black Americans was the will to write; and the predominant mode that this writing would assume was the shaping of a black self in words.” What did the shaping of the black self in words mean for those whose primary mode of expression was musical and improvisational? In their autobiographies and memoirs, jazz musicians’ discursive self-invention would appear to be born of materials and processes akin to those of jazz itself: full of polyrhythms, spontaneous riffing, call and response, and turnarounds. This course examines the autobiographies and memoirs of central figures, such as Ethel Waters, Louis Armstrong, Sidney Bechet, Jelly Roll Morton, Duke Ellington, Billie Holiday, Charles Mingus, Dizzy Gillespie, and Miles Davis. We will ask what relationship these texts bear to musical performances and personas: compositionally, aesthetically, and as represented by other media. For example, do they perpetuate or rather stand in opposition to various jazz mythologies such as the musicians’ intuitive genius or sensationalized drug use? What roles do these myths serve? If together jazz autobiographies can be said to constitute a genre, might these sophisticated textual performances comprise a counter-narrative to official histories of jazz and speak a different kind of truth to power? Note: Lara Pellegrinelli is a new adjunct faculty member who is also teaching for Zane Forshee in the Breakthrough Curriculum this spring. It appears that she does not yet have a JHED ID. Patrick Wallen DOES have her contract details (both from Zane and from me). Please let me know what else I may need to do in order to get her into the system and get her course scheduled.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.617. Experimental Music since 1950. 3 Credits.

This course explores the construction of the idea of “experimental” music since around 1950. We will consider the work of numerous individuals, groups, and movements including John Cage and the New York School, the Chicago-based AACM, the Darmstadt circle, the Lower East Side loft jazz scene, Cornelius Cardew and the Scratch Orchestra, and Fluxus. Through the study of recordings (commercial and archival), scores, artists’ writings, and scholarly literature, we will develop historical and aesthetic understanding of the varied practices that helped create the notion of musical experimentalism. Finally, we will study more recent experimental work including that being done in Baltimore at venues such as the Red Room and at festivals such as High Zero.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.618. German Song in the 19th Century. 3 Credits.

This course considers the repertoire of nineteenth-century German art song through a focused study of the works of four major figures: Schubert, Schumann, Brahms, and Wolf. We will address theories of text in music, evolving notions of the song “cycle,” analytical approaches to the lied, and the place of the lied within the social sphere. We will devote particular attention to Schubert’s Die schöne Müllerin and Winterreise, Schumann’s Dichterliebe, and Brahms’s Vier ernste Gesänge.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.619. Music & Leadership. 3 Credits.

PY.610.620. Social Innovation through Music: Health, Education, and Policy. 3 Credits.

PY.610.621. Exoticism on the Musical Stage. 3 Credits.

Creators of musical works have been continually drawn towards the idea of the “other,” wanting to represent on the stage characters that they perceive as culturally different or outside the norms of their own society. This course focuses on musical works for the stage that contain representations of the “other,” examining how text, music, and staging all work in different ways to exoticize certain characters. Works discussed will include Rameau’s Les Indes galantes (1735), Mozart’s Die Zauberflöte (1791), Bizet’s Carmen (1875), Sullivan’s The Mikado (1885), and Bernstein’s West Side Story (1957), as well as more recent adaptations of these works such as Carmen Jones (1943), Carmen: A Hip Hopera (2001), and the upcoming new West Side Story film (2021). We will address the historical contexts of these works, not to excuse them for their stereotyping practices, but to learn the social, economic, and aesthetic contexts that contributed to their original receptions. In addition, we will examine our own responses to these pieces and discuss the ethics of performing these works today.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.622. Beethoven String Quartets. 3 Credits.

This class uses Beethoven’s string quartets as a lens through which to consider larger issues of Beethoven scholarship. We will pair an in-depth study of the works themselves with an examination of a variety of issues important to Beethoven (and to musicological inquiry in general), such as the history and inherited traditions of the string quartet, music in an evolving capitalist marketplace, the notion of the individual Romantic composer-genius, deafness and the late style, and historical performance practice. Throughout, we will consider the specific roles and responsibilities that performers and scholars share in bringing these magnificent works to life.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.624. England's Queen/Opera's Muse. 3 Credits.

Music flourished in the court of Queen Elizabeth I, who reigned from 1558-1603. Composers thrived in all genres: secular and sacred, instrumental and vocal. Centuries later, the legendary monarch inspired opera composers such as Rossini, Donizetti, and Britten to create musical works dramatizing the renaissance queen’s life. This course reviews the masterpieces of English renaissance and also examines the rich operatic works depicting the royal heroine. Topics to be addressed will include nineteenth century continental reception of English history and twentieth century revivals of the Elizabethan lore.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.626. Technologies in the Concert Hall & Opera House. 3 Credits.
n this seminar we consider material and mechanical complexities of musical events. In successive weeks we examine issues such as: how orchestras have historically been directed; auditoriums illuminated; stage machines used and operas surtitled. Our discussion will be grounded in concrete circumstances at particular venues in locations as diverse as Paris, Bayreuth and New York. Together we will examine some core questions: what did material conventions established at individual venues mean for those who produced and consumed musical works; what was at stake when innovations were introduced, and—above all—how do material conventions established in the past continue to have a hold over musical productions today?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.627. Changing Tunes: Pre-Existing Music in Film. 3 Credits.
Music and film have always shared an intimate relationship. From its inception, film has been injected with pre-existing music, including chant, traditional Western composers from Beethoven to Bartók, and more contemporary artists from the Beatles to Beyonce. This music has influenced American and international film industries alike, shaping the look and sound of film. Through close viewings—and listenings—of film, we will investigate the meaning(s) these musical works can acquire as they are re-used and re-purposed. Similarly, we will explore how, through film, pre-existing music can live on, change, and reify the past through contexts beyond the concert consumption with which we may be more familiar. During this course, we will hone your skills as an academic writer by learning to critically evaluate and craft arguments about the roles of music/sound in film. Some of the topics covered include: canonical works from the 18th and 19th centuries, the use of 20th-century avant garde music in horror, representations of jazz, chant and other medieval genres, anachronistic uses, and popular song. Your work will include studying film clips and full-length films; readings; short writing responses (100-200 words); four short papers focused on close readings of scenes or other supplied prompts (1000-1500 words); and a midterm project. Paired with writing workshops and peer review exercises, you will develop the skills necessary to contribute to the greater academic community, write clearly and logically for your intended audience, and formulate original, persuasive arguments.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.628. New Directions in Beethoven Scholarship. 3 Credits.
There would seem to be little left to learn about Beethoven. The common understanding of the composer as a temperamental, solitary genius, cursed with a tragic hearing loss—often credited with spurring him to produce the world's most profound music—has changed little over the past century and a half. What might remain to be studied? This course takes up the challenge, reconsidering the well-known features of the composer's life, work, and legacy through examining trends in Beethoven scholarship of the last 25 years. What did "heroism" sound like in music, and did Beethoven's contemporaries hear the music in this way? What were the political forces behind Beethoven's work? What can we learn by historicizing the notion of "genius"? How can disability studies inflect our understanding of Beethoven's deafness? And what can Beethoven's conversation books—recently published for the first time in English translation—show us about his life? Through asking these questions, we will consider what various historiographical methods, such as microhistory, disability studies, and actor-network theory, have to offer the study of a repertoire most commonly approached through biography. Consideration of these questions will inevitably shed light on the inherited value systems that make up contemporary musical life, many of which are inherited from nineteenth-century Beethoven reception.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.630. Duke Ellington: The Search for an American Sound. 3 Credits.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.631. Sound Studies. 3 Credits.
What do cultural histories of listening tell us about the value we have ascribed to music at various points in time? And how have the invention of media from the musical score to the MP3 altered how we conceive of music as sound? "Sound Studies" is not a course in which we learn about the acoustic properties of noises or pitches (however interesting such matters may be) but rather a historical course, in which we consider how we can enrich our histories of music when we situate music within broader histories of sound. Our seminars, for instance, consider historical moments when we have listened to sound for truth (as when confessions were first recorded) or other forms of concrete information (as when sound was first communicated across phone lines) and examines how these practices did—and sometimes did not—shape ideas about how we should compose, circulate and consume music. Our case studies will be drawn from the medieval era to the current day.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.632. Music and Evolution. 3 Credits.
This course will examine the bio-cultural evolution of music in light of recent interdisciplinary research on the social bases of human cognitive evolution, and explore its implications for current debates in musicology, ethnomusicology, psychology of music, and human cognitive evolution.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.633. Reenacting Orpheus. 3 Credits.
This course addresses retellings of the Orpheus myth from Monteverdi's L'Orfeo (1607) to Mitchell's Hadestown (2010) and Aucoin's Eurydice (2020). We consider why this myth is so compelling to composers and librettists and explore the complexities involved in adapting the same subject for new audiences.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.634. Baroque Performance Practice. 3 Credits.
This class provides a detailed overview of prevalent performance conventions in the Baroque era as revealed by primary sources, as well as some insight into why these matters are important and what drives the early music movement. Required of all Historical Performance MM students.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.636. Three American Composer-Writers: John Cage, Anthony Braxton, Pauline Oliveros. 3 Credits.

PY.610.637. Topics In Music Cognition. 3 Credits.
This introductory course explores relevant research and theory in the emerging domain of music perception and cognition.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.638. Topics In Music Cognition 2. 3 Credits.
This introductory course explores relevant research and theory in the emerging domain of music perception and cognition.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.639. Music in the Multimedia Franchise. 3 Credits.
Music defines our media experiences. Musical themes can likewise go beyond their original audiovisual framework to operate as musical-cultural texts. This online, asynchronous course uses music as a tool to investigate musical branding and the creation of meaning in the media we consume every day. Through close viewings - and listenings - of films, television episodes, video games, commercials, and other media, this course will explore the meaning(s) these media construct and acquire as both they and their music are re-used and re-purposed in multimedia franchises that expand their content into myriads of installments and platforms.

PY.610.640. Topics in Ethnomusicology. 3 Credits.

PY.610.642. Unraveling Ravel: Beyond Bolero. 3 Credits.
Paradoxically accessible and esoteric, Maurice Ravel's music resides in the canonical repertoire of practically every conservatory student. Yet Ravel's relationship to his own musical training was fraught both as a pianist and composer. This course examines the life and works of the French composer whose legacy permeates the practice rooms of Peabody. Beyond a survey of his compositional output, this seminar will examine the era that produced Ravel. France at the turn of the century, Ravel's studies at the Paris Conservatory, and his relationship with his musical contemporaries will all be topics of discussion. All musicians are welcome to take this class.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.643. Popular Music in Global Perspective. 3 Credits.
Popular music(s)—while they often share certain practices of production and distribution—are made, performed, and enjoyed around the world in a wide variety of languages, genres, and contexts. They are also closely tied to a range of social practices, political projects, and economic concerns as varied as the contexts in which these styles are produced and consumed. In this course, we will examine the production, consumption, and circulation of popular musics in multiple national and transnational contexts. We will discuss ways in which a global perspective might complicate common Western understandings of popular music aesthetics, categorization, and participation. Finally, through a series of case studies, we will seek to understand both the breadth of practice in popular musics and how these musics and the values embedded in them may both support and disrupt global patterns of influence, exchange, and domination.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.644. 19thC Performance Practice. 3 Credits.
This class provides a survey of prevalent performance conventions in the nineteenth century as revealed by primary sources, as well as some insight into why these matters are important and what constitutes the so-called Historically Informed Performance (HIP) perspective.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.650. Pink Noise: Women Making Electronic Music. 3 Credits.
How do the innovations of women making electronic music complicate notions of listening, music history, and the nature of music? Instead of conceptualizing gender and technology as discrete, oppositional, and universally open, this seminar explores electronic music through the lens of feminist critical frameworks and musical analyses in tandem with models of listening – notably Deep Listening as promulgated by Pauline Oliveros and Hildegard Westerkamp's approach to "conscious listening." Inspired and guided by Tara Rodgers' seminal anthology of interviews, Pink Noises: Women on Electronic Music and Sound, we discuss the work, struggles, triumphs, and techniques of pioneers including Daphne Oram, Pauline Oliveros, Wendy Carlos, Ruth Anderson, and Adrian Piper. We will also examine contemporary innovators and cyberfeminist speculative futures. Along with readings and seminar discussion, course activities include research presentations, listening sessions, brief performances, and composition projects.
Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].;Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.

PY.610.651. Foundations of Music Research. 2 Credits.
This course introduces research from the roles of consuming and then creating materials with a focus on how research is created, disseminated, and accessed. Scholars analyze and produce a variety research outputs relevant for music researchers and performing professionals. Students engage with secondary and archival research materials, discuss how to publish and disseminate their own research, and explore how information is organized to optimize the use of academic library resources now and post-graduation. Open to MM and undergraduate Musicology minor students only. Fall and spring.

PY.610.652. Applied Ethnomusicology and Public Musicology. 3 Credits.
The disciplines of ethnomusicology and musicology regularly employ a valuable set of intellectual tools for understanding, discussing, contextualizing, and performing music. What value do scholarly insights such as these have outside of the academy and how might they be put to work? “Applied” ethnomusicology and “public” musicology use the scholarly insights of the two fields in service of a range of practical or entrepreneurial projects and writing that addresses a broad audience. In this course, we will discuss a variety of such projects, as well as some of the ethical and practical concerns that arise when scholars engage with their publics. We will practice multiple styles of writing useful to public-facing scholarship, including grant proposals, program notes, and think pieces. Through both discussion and hands-on experience, we will explore the division between strictly academic and public-facing or applied research, questioning the utility and limits of this boundary.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.653. What was Postmodernism?. 3 Credits.
Few –isms have caused more disagreement and general confusion than “postmodernism.” Pervasively discussed (at least in some quarters) from the 1970s through the mid-1990s, the term has been considerably less dominant in recent years. Yet music students continue to encounter it in textbooks and survey courses as something like the “official” style of the late twentieth century. It is worth asking, then, just what we are talking about when we talk about postmodernism. This course explores the history of the idea in architecture, literary theory, and historiography, among other fields. Our particular emphasis, however, will be on the notion of postmodernism in music. In addition to reading many of the classics of postmodern theory, we will study a wide range of composers and musicians including George Rochberg, Pamela Z, Mauricio Kagel, DJ Spooky, Alfred Schnittke, Laurie Anderson, George Lewis, The Velvet Underground, Helmut Lachenmann, Arthur Russell, and Marina Rosenfeld among others.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.654. Music of the Arab World. 3 Credits.
Study of the music of the Arab world reveals a rich art music tradition, elaborate melodic and rhythmic systems, a central role for improvisation, and a complex relationship to the sacred realm. This seminar will examine the theory, performance practice, repertories, and cultural and historical contexts of Arabic art music, and incorporate work on aural recognition of modes, rhythmic cycles, genres, and performance phenomena. Building on this foundation, students will also survey the sounds of Islam in the Arab world, aspects of Arab identity in music, and musical change in the twentieth century.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.655. Child Stars. 3 Credits.
Over the last century, the child as performer has played a central—if often unacknowledged—role in the Western cultural imagination. Occupying a third space between “real” children and adults, the child star has functioned as a surface upon which (adult) audiences can project their fears and fantasies about the future, the past, innocence, sexuality, talent, and human nature. This course examines the work that child stars perform for Western society at large, pulling apart the various ways that this enduring and meaningful area of performance acquires cultural, economic, and political significance. We'll focus on the careers of young classical music virtuosi, television and film stars, and the Disney-promoted singers of the last few decades; our readings will draw from labor history, race and gender studies, and theories of children's literature. We will ask the following questions: Why is child stardom generally limited to the performing arts (rather than the visual arts, literature, or musical composition)? Why are contemporary child stars always accompanied by a tragic narrative of “lost” childhood, even as their exceptional status is translated into the kind of wealth and recognition that many adults dream of? And what are the ethical issues in promoting, consuming, and sometimes exploiting children's talent?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.658. Beethoven at Work. 3 Credits.
How did Ludwig van Beethoven compose? Modern-day musicians are extraordinarily fortunate that Beethoven saved his work in various stages of completion. Through his surviving autographs and sketches, we have the ability to trace his early ideas to their eventual fruition. The simple becomes sophisticated; the seemingly vapid can be enlivened or abandoned altogether. Perhaps as inspiring as the grandeur of these compositions in their final form is Beethoven's industry and sheer diligence so clearly evident in the sources. This seminar provides performers an opportunity to examine and analyze Beethoven's compositional process and exposes them to practical research tools. This course also delves into evolving musicological trends by accessing digital archives located throughout the world. A visit to the Library of Congress in Washington DC will be scheduled. All musicians are welcome.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.665. Music and Politics. 3 Credits.
This course examines the many ways that music intersected with the global politics of the twentieth century. Focusing primarily (though not exclusively) on the Cold War period, we will explore arts policy in both capitalist and communist nations; examine the roles music and musicians played in state diplomacy; and ask how music functioned between the poles of protest and complicity. Along the way we will pose larger questions about the complex roles a non-material art form can play in the exercise of power, among them: How can music have a political meaning beyond direct references to a state or ideology? What constitutes political "action"? Can a truly apolitical art exist?
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.671. Issues in Ethnomusicology. 3 Credits.
An introduction to the theories and methods of ethnomusicology. Topics include transcription and analysis, fieldwork, performance practice, and intercultural aesthetics.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.672. Ethnomusicology of Western Art Music. 3 Credits.
In this seminar, students will survey an emerging body of writing about the music of the Western classical tradition not as a series of musical works and composer biographies, but as a practice of people making music. One might think of it as an anthropology of art music. Readings will examine conservatory cultures and specific cultural moments of different European, transnational, and global cultures of Western Art Music. Though ethnomusicology typically confines itself to "non-western" or "world" music, the West's classical music tradition is arguably the very first world music. We will also listen to and think about the implications of the work of the transnational community of young practitioners who are making this a global practice in the 21st century.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.674. History of Musical Instruments. 3 Credits.
While the emphasis is on contemporary Western models, the history and technology of precursors and non-Western instruments will be addressed. It is hoped that students will develop a thorough knowledge of the history, technology and performance of their own instruments, as well as an appreciation and some familiarity with all ancient and modern musical instruments. To gain an understanding of the workings of musical instruments, projects will include the construction of instruments from simple ones—constructed from easy recipes and materials readily found around the house— to some requiring more sophisticated formulas and parts. Some of our classes may be held in the Mechanical Engineering Department's Laboratory Space at Wyman Park.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.679. Experiments in Opera since 1970. 3 Credits.
As early as the mid-1920s opera was widely criticized for purportedly being out-of-joint with modernity, irrevocably stuffy, and elitist. By mid-century few composers associated with avant- garde movements were interested in the form. Since the early 1970s, however, there has been a kind of operatic renaissance involving a diverse pool of composers, writers, and artists (although the critiques never stopped). This course surveys an array of the more experimental operas written since 1970 by composers with roots in numerous traditions including serialism, free jazz, fluxus, performance art, and minimalism. We will seek out causes for the operatic turn while exploring how composers, writers, directors, and visual artists have adapted opera to reflect contemporary concerns. Each class will focus on a single work with associated texts by the relevant artists as well as readings drawn from musicology, art history, philosophy, media theory, sociology, linguistics, psychology, and theater studies. In addition to our weekly meetings we will have opportunities to visit composers, opera companies and institutes, venues, and festivals. Composers/librettists/directors covered in the course will include: Igor Stravinsky and W. H. Auden (the sole pre-1970 example); Carla Bley and Paul Haines; Meredith Monk; Gyorgi Ligeti; Robert Wilson and Philip Glass; Karlheinz Stockhausen; Robert Ashley; Anthony Davis and Thulani Davis; Laurie Anderson; Luigi Nono; Anthony Braxton; Heiner Goebbels; Olga Neuwirth and Elfriede Jelinek; and Michel van der Aa.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.683. Expanding the Canon: Women and Minority Composers. 3 Credits.
In this seminar we'll explore the lives and music of twelve female or minority composers with special attention to reception history, and the challenges of expanding the classical canon. Artistic "Canons" are complex, nebulous, and inherently fraught structures, in which cultural establishments reflect and propagate their values. In this course, we will investigate the histories of these canons, and the rationales for the inclusions and, most importantly, exclusions. Our individual case studies are linked by this broader historiographical narrative.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.684. Transnationalism. 3 Credits.
An examination of contemporary world music genres from an ethnomusicological perspective, with emphasis on transnational and global issues.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.689. The Symphonic Century. 3 Credits.
The symphony occupies a prominent place within the history of Western classical music in the "long" nineteenth century. At once a canvas for daring innovations in style and form and a genre strongly allied with notions of "tradition," the nineteenth-century symphony brings together a complex set of issues that illuminate the broader history of music and musical culture of the past 200 years. This course introduces the iconic works of the symphonic tradition, with a focus on music of Haydn, Mozart, Beethoven, Schubert, Berlioz, Schumann, Mendelssohn, Brahms, Bruckner, and Mahler. As we aim to discover what made this music so remarkable in its time and why so many people still care about it today, we will consider each symphony both as a timeless work of art and as a particular moment in cultural history. Close attention will be given to the techniques of structural listening, and our work will be deeply rooted within the historical, philosophical, and political contexts of the time.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.691. Master's Essay. 2 Credits.
A scholarly work written under the supervision of a member of the musicology faculty. Required for the Master's degree in Musicology. Fall and spring.

PY.610.692. Wagner. 3 Credits.
Wagner stands as one of the most famous and controversial exemplars of German musical romanticism. A revolutionary, a composer, a dramaturg, a critic, and––by some metrics––a philosopher, Wagner is an unavoidable voice in the story of opera. In this course we evaluate Wagner's life, works, and historical context. We evaluate patterns of criticism of reception, all with an aim of honing our skills as readers and writers.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.693. American Music. 3 Credits.
A survey of American Music, from colonial times to the middle of the 20th century. There will be a considerable emphasis on relating musical expressions to changing social/historical conditions. We will examine the roles played by technological developments and the rise of the music business shortly after the American Revolution. Our country's varied musical styles invite serious study of all modes of performance and dissemination, not just "classical" composition and performance. Active participation in discussion is a requirement of this seminar, as is writing a research paper on a topic of the student's choice.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.694. Music in Maryland. 3 Credits.
Music in Maryland: from British Colonization through the mid-20th Century: Founded in 1634, Maryland's diverse geography, economy, and settlement begat a rich music history. This course traces music of the great tobacco plantations of the Chesapeake Bay, with their co-mingled African and British music, through the growth of Baltimore into a center of publishing, concerts, opera, church music, instrument-building and teaching. We will examine the roles played by technological developments and the rise of the music business shortly after the American Revolution, also considering developments in sound recording and broadcast radio. Going well beyond `classical` trends, we will also examine rich popular and folk traditions, such as parlor songs and `Sacred Harp` hymnody. Active participation in discussion is a requirement of this seminar, also required are several writing assignments and an in-class presentation on a topic of the student's choice.
Graduate students must meet musicology seminar proficiency requirements in order to enroll in this course.;Undergraduates need to have successfully completed 2 out of 3 following courses in order to register: PY.610.321[C], PY.610.322[C], PY.610.323[C].

PY.610.755. Masters Research. 2 Credits.
An introduction to methods of research through independent written projects in music history. Required of all musicology majors.

PY.610.756. Masters Research. 2 Credits.
An introduction to methods of research through independent written projects in music history. Required of all musicology majors. Fall and spring.

PY.610.791. Dissertation (DMA). 6 Credits.
A study of an original musical topic, approved by the DMA Committee, culminating in the completion and defense of a scholarly work written under supervision of the student's academic advisor. Graded on a S/U basis.

PY.610.792. Lecture-Recital Paper. 2 Credits.
A study of a specific musical topic, approved by the DMA Committee and suitable as the basis for a lecture-recital, culminating in a written paper and a public lecture-recital. Fall and spring. Graded on a S/U basis.

PY.610.813. Doctoral Consultation and Research. 2 Credits.
For graduate students working with a faculty member to complete a dissertation or a lecture-recital essay. Registration required each semester following completion of coursework in order to maintain active status in the program.

PY.610.814. Doctoral Consultation and Research. 2 Credits.
For graduate students working to complete a dissertation or a lecture-recital essay. Registration is required each semester following completion of coursework in order to maintain active status in the program. Fall and spring.

PY.610.847. Musicology Colloquium. 3 Credits.
An introduction to doctoral-level academic study at Peabody. Emphasis is on critical thinking, argument from sources, and written and oral presentations. The course features presentations from invited speakers. Open to DMA and MM Musicology students only. Lectures are open to the general public.

PY.610.848. Musicology Colloquium. 3 Credits.
An introduction to doctoral-level academic study at Peabody. Emphasis is on critical thinking, argument from sources, and written and oral presentations. The course features presentations from invited speakers. Open to DMA and MM Musicology students only. Lectures are open to the general public.

PY.710 (Music Theory)

PY.710.109. Theory 1 Intensive. 3 Credits.
This course includes study of fundamentals, melody, diatonic harmony, and analysis and composition of short homophonic and polyphonic pieces.
Only Undergraduates who test into this course will be allowed to register.

PY.710.110. Theory 2 Intensive. 3 Credits.
A continuation of techniques learned in Theory 1 Intensive and the study of figured bass and chromatic harmony. Also includes an introduction to basic musical forms. Open to undergraduates only.
Completion of Theory Intensive 1 required, PY.710.109[C].

PY.710.111. Theory 1. 3 Credits.
The study of voice leading, melody, figured bass, and diatonic harmony, through analysis and composition. Open to undergraduates only.
Only Undergraduates who test into this course will be allowed to register.

PY.710.112. Theory 2. 3 Credits.
A continuation of techniques learned in Music Theory 1. Studies include non-chord tones and figuration, sequence, tonicization and modulation, chromaticism, and basic principles of form. Open to undergraduates only.
Previous course, Theory 1, needed, PY.710.111[C]

PY.710.113. Theory 1-2. 3 Credits.
This course begins with a reinforcement of chromatic part-writing and voice-leading, and then focuses on two- and three-voice counterpoint in the Baroque style. Placement by examination. Open to undergraduates only.
Only Undergraduates who test into this course will be allowed to register.

PY.710.211. Theory 3. 3 Credits.
This course is a study of music of the Baroque era including invention and fugue, through analysis and model composition. Open to undergraduates only.
Previous course needed, PY.710.112[C] OR PY.710.110[C]

PY.710.212. Theory 4. 3 Credits.
This course centers on music from Viennese Classicism through the emergence of Romanticism, using examples from a variety of genres and formal designs. Open to undergraduates only.
Previous course, Theory 3, needed, PY.710.211[C]

PY.710.214. Theory 3-4. 3 Credits.
A continuation of Music Theory 1–2 (710.113), this class completes the study of the Baroquestyle and moves on to the Classical style and the harmonic, formal, and contrapuntal techniquesin music of the 19th century. Open to undergraduates only.
Completion of Theory 1-2 required, PY.710.113[C].

PY.710.311. Theory 5. 3 Credits.
A study of the music of the late-19th through 21st centuries. Open to undergraduates only.
Completion of previous course needed, PY.710.212[C] OR PY.710.214[C]

PY.710.312. Theory 6. 3 Credits.
Students take one of several specially-designated electives. Open to undergraduates only.
Completion of Theory 5 needed, PY.710.311[C]

PY.710.412. Instrumentation & Arranging. 3 Credits.
A course designed to introduce students to idiomatic writing for orchestral instruments, individually and in standard combinations. Lectures, listening, and score study will be complemented by arranging exercises. Open to Computer Music, Music Education, and Music for New Media majors (others by permission of the instructor). This class may not be used for graduate theory seminar credit.
Open to Computer Music, Music Education, and Music for New Media majors only. Others may take course with permission of instructor.

PY.710.413. Orchestration 1. 3 Credits.
A course for composers and conductors studying instrumental technique and ensemble combinations as demonstrated in orchestral literature, 1750 to the present. Open to conductors and composition majors only. Course must be taken for the entire school year. May not be used for graduate seminar credit.

PY.710.414. Orchestration 2. 3 Credits.
A course for composers and conductors studying instrumental technique and ensemble combinations as demonstrated in orchestral literature, 1750 to the present. Open to conductors and composition majors only. Course must be taken for the entire school year. May not be used for graduate seminar credit.
Completion of Orchestration 1 needed, PY.710.413[C].

PY.710.415. Graduate Theory Review.
An intensive review of the materials and techniques of tonal music, including diatonic and chromatic harmony, part writing, and analysis.

PY.710.462. Music Theory Minor Capstone. 1 - 3 Credits.
This course is required for an undergraduate minor in Music Theory.

PY.710.611. 20th-Century American Symphonic Works. 3 Credits.
This analysis course is for anyone interested in exploring the musical languages expressed within a wide variety of 20th-century American symphonic works. We will explore works by diverse American composers, contextualize their practices via short readings, and develop several analytical approaches to illuminate their music. Special emphasis will be placed on the development of a nuanced foundation from which students will learn to respond critically to the discourse of culturally responsive intersectional analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.612. Mozart. 3 Credits.
This course delves into the music of Wolfgang Amadeus Mozart. We will cover genres including solo sonatas, concertos, chamber music, symphonies, and opera, as well as a range of musical forms. Works will come from both earlier and later periods in Mozart's short life, though the focus will be on his maturity. In some cases we will also briefly examine other contemporary composers in order to better understand what sets Mozart apart and has made him so uniquely beloved. While it is not a performance practice class, we will discuss current understanding of certain performance practice issues in the course of our study, and a range of recordings will be used to demonstrate evolving understandings of this style.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.613. Music And Meaning. 3 Credits.
A consideration of how meaning is conveyed in tonal music. This course includes discussion of semiotic and formalist approaches to characterizing meaning in absolute music, while working towards an inclusive method of analysis considering expressivity as emanating from formal structure
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.614. Why We Get Chills: Music Analysis Meets Cognition. 3 Credits.
This course consults literature in the field of music cognition to explore how it may inform music analysis, which in turn has implications for both performer and listener.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.619. Chamber Music Analysis. 3 Credits.
Analysis of chamber music in various styles, with particular emphasis on works being currently performed in Peabody's chamber music program.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.620. Song Analysis. 3 Credits.
An exploration of the interactions between text and music within the art-song repertoire from various style periods, drawing on theories of drama, linguistics, cognition, and music. Open to graduate students only.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.622. Music Of Scriabin - Pitch Structure/Form. 3 Credits.
The study of musical content in relation to harmonic, tonal, motivic and formal aspects of Scriabin's technique. A significant part of the discussions will be devoted to innovations in pitch structure and form, as well as large-scale musical projects of Scriabin. In particular, we will cover the topics of three stylistic periods in Scriabin's biography, the evolution of his harmony on the examples of harmonic analysis of preludes, etudes, piano miniatures and orchestral compositions. The format of this seminar will include student performances, short presentations and exercises in harmonization.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.624. Amy Beach & Florence Price. 3 Credits.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.625. Dance Music of the Renaissance. 3 Credits.
The study of Renaissance dance as a crucial source for the formation of the common practice styles.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.627. Improvisation for Classical Musicians. 3 Credits.
This course focuses on developing skills in improvisation in Baroque and Classical styles through the understanding of harmony, proper voice leading, good melodic accompaniment, cadence, modulation, and sequence. Topics include melody harmonization, ornamentation and variation, prelude, the free fantasia, and the cadenza. If time permits, chorale setting and fugue. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.629. Music Since 1970. 3 Credits.
Analysis of recent experimental music in a variety of aesthetic styles. Focus will be placed on the structural foundations for these works and its basis in manipulation of time and sonority.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.631. Schubert. 3 Credits.
This seminar will explore Schubert's music in a range of genres, with particular attention to chamber and solo works. Our discussions will be informed by a range of past and present scholars, though our focus will be the scores themselves. Our goal is the development of analytic and persuasive skills, a deeper and clearer understanding of Schubert's style, and, ideally, some sense of how the composer creates his unique 'magic' via distinctive structural and expressive power.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.633. Renaissance Counterpoint. 3 Credits.
An examination through composition of the musical practice of the late Renaissance, including modal theory, species counterpoint, and imitative composition in two and three parts.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.634. Baroque Counterpoint. 3 Credits.
The course concentrates on the contrapuntal practice of J.S. Bach, including analysis and composition of a suite movement, invention, fugue, and chorale-prelude or passacaglia. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.641. Opera Analysis. 3 Credits.
This analysis course is for anyone interested in operatic character development through the use of tonal region, melodic/harmonic growth, development and long-range structural goals. We will explore some of the most beloved characters of opera from the perspective of the musical structures on which they are built. Special emphasis will be placed on developing a nuanced understanding of these characters through the clues buried in the music.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.642. Art of Partimento. 3 Credits.
Partimento is a method of harmony and composition teaching developed in Naples in the 18th Century, which was the basis of conservatory education from the time of Pergolesi though Verdi. It uses figured and unfigured basses as the foundation for extempore and written-out compositions, starting with the simplest chord progression patterns and working up to entire movements. This is a skills-based course in which students will realize examples from the partimento tradition at the keyboard. All students are welcome; keyboard skills required.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.643. Music 1900-1945: German. 3 Credits.
A survey of the important trends in music in the first half of the 20th century. This seminar focuses on the Second Viennese School and Hindemith and examines both the music and the common theoretical tools for its analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.644. Music 1900-1945. 3 Credits.
A survey of important trends in music from the turn of the 20th century. Emphasis on score analysis and listening.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.647. Analysis Early 19c Piano Lit. 3 Credits.
A detailed analysis of representative works from the piano repertoire. Open to graduate students only.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.648. Analysis 19c Piano Lit. 3 Credits.
A detailed analysis of representative works from the piano repertoire. Open to graduate students only.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.649. Music Theory Pedagogy. 3 Credits.
This course investigates and discusses available teaching resources for students who may wish to teach undergraduate theory, including current technology, as well as classroom observation and practice teaching.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.650. Theory Pedagogy Internship. 3 Credits.
This course consists of a semester of supervised teaching for students in Peabody's Master of Music in Music Theory Pedagogy (MM MTP) program.

PY.710.651. Style Analysis of Pierrot Lunaire. 3 Credits.
Analysis of Schoenberg's Pierrot lunaire, its musico-poetic precedent and its lasting impact on dramatic chamber music.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course.

PY.710.658. Expanding the Music Theory Canon. 3 Credits.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C]

PY.710.659. Intersections of Gender & Music Theory. 3 Credits.
This analysis course is for anyone interested in the intersections of gender and music theory. We will explore a wide variety of works by women, contextualize their practices via short readings, and develop creative analytical approaches to illuminate their music. Special emphasis will be placed on living composers and the development of a nuanced analytical tool kit to respond critically and contribute to the discourse of intersectional analysis.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.660. Tonal Composition: Baroque. 3 Credits.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.663. Tonal Analysis Principles. 3 Credits.
A study of techniques for the analysis of common-practice tonal music. A variety of forms, genres, and styles will be explored.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.667. Beethoven String Quartets. 3 Credits.
This course is a study of the string quartets of Beethoven.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.671. Music in Image: Theory of Film Music. 3 Credits.
The study of music in film, emphasizing the emergence of the idea of montage, the question of diegetic and non-diegetic presentations, and the problems of rhythm and meter in both visual and acoustic domains.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.677. Fugue: Bach/Shostakovich. 3 Credits.
This course examines the wide-ranging use of fugue in music from the high baroque to the mid-20th century. The class focuses on the techniques and designs themselves, and how those techniques and designs relate to both the larger works studied and the broader musical styles of the times.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.685. Music Theory Pedagogy Project. 3 Credits.
Designed for Music Theory Pedagogy students, the project will examine a specific aspect of music theory teaching. Students work under the supervision of a faculty advisor. Open to graduate students only. May not be used for seminar credit.

PY.710.687. Well Tempered Clavier Book 1. 3 Credits.
A detailed analysis of the preludes and fugues in Book 1 of Bach’s Well-Tempered Clavier.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.710.688. Well Tempered Clavier Book 2. 3 Credits.
A detailed analysis of the preludes and fugues in Book 2 of Bach’s Well-Tempered Clavier.
Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].;Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.

PY.710.692. Wind Music Orchestration. 3 Credits.
This course explores orchestration developments in repertoire for the modern concert wind band. We will focus on developing an understanding the works of several key contributors to the repertoire and engage in stylistic reductions and model orchestration projects.
Graduate students must meet music theory seminar proficiency requirements in order to enroll in this course. Undergraduates must be Composition or Computer Music majors.;Open to Composition, Computer Music, and Theory minor Undergraduate students; must first complete PY.710.212[C] or PY.710.214[C].

PY.715 (Music Theory - ET/SS)

PY.715.119. Ear Training 1 Intensive. 2 Credits.
This course focuses upon the development of sight-singing and dictation skills from the diatonic major and minor modes. Open to undergraduate students only.

PY.715.120. Ear Training 2 Intensive. 2 Credits.
This course continues a study of diatonic music through sight-singing and dictation skills, with an increased emphasis on harmonic dictation and subdivisions of the beat. Open to undergraduate students only who have successfully completed Ear Training 1.
Completion of Ear Training/Sightsinging Intensive 1 required, PY.715.119[C].

PY.715.123. Ear Training 1. 2 Credits.
This course focuses upon the development of sight-singing and dictation skills from the diatonic major and minor modes. Open to undergraduate students only.

PY.715.124. Ear Training 2. 2 Credits.
This course continues a study of diatonic music through sight-singing and dictation skills, with an increased emphasis on harmonic dictation and subdivisions of the beat. Open to undergraduate students only who have successfully completed Ear Training 1.
Completion of Ear Training/Sightsinging 1 required, PY.715.123[C]

PY.715.125. Ear Training Perfect Pitch 1. 2 Credits.
A Perfect Pitch accelerated version of 710 • 123 and 710 • 223 that covers the material of the two-year course in one year. Open to undergraduate students only.

PY.715.223. Ear Training 3. 2 Credits.
This course introduces concepts of tonicization and modulation through sight-singing and dictation skills. Additional topics include reading C clefs in Bach chorales, hearing structure in compositions in binary form, and rhythmic techniques such as syncopation. Open to undergraduate students only who have taken or passed out of Ear Training 1+2.
Completion of previous course needed, PY.715.124[C] OR PY.715.120[C].

PY.715.224. Ear Training 4. 2 Credits.
This course continues a study of chromatic music through sight-singing and dictation skills with an increased emphasis on modulating to far-related keys, advanced rhythmic techniques, diatonic modes, and aural study of large-scale forms such as sonata form. Open to undergraduate students only who have successfully completed Ear Training 3.
Completion of Ear Training/Sightsinging 3 required, PY.715.223[C].

PY.715.226. Ear Training Perfect Pitch 2. 2 Credits.
A Perfect Pitch accelerated version of Ear-Training 1 (710.123) and Ear-Training 2 (710.223)that covers the material of the two-year course in one year. Open to undergraduate studentsonly.
Completion of Ear Training/Sightsinging Perfect Pitch 1 required, PY.715.125[C]

PY.715.323. Ear Training 5. 2 Credits.
After a short review of highly chromatic late 19th- and early 20th-century music, this class focuses on atonal music, beginning with the late works of Liszt and Wolf and continuing into the music of today. Open to undergraduates who have successfully completed PY.715.224 (Ear Training 4) or PY.715.226 (Ear Training Perfect Pitch) and all graduate students.
Undergraduates need to have completed PY.715.224[C] or PY.715.226[C]. Graduate students must satisfy the music theory proficiency requirement.

PY.715.425. Ear Training Review.
A graduate review course in the principles of ear-training, dictation, sight-singing, and clefs. Open to graduate students only.

PY.715.426. Ear Training Review Intensive 2.
A graduate review course in the principles of ear-training, dictation, sight-singing, and clefs. Open to graduate students only.

PY.715 (Music Theory - Keyboard Studies)

PY.715.155. Keyboard Studies 1. 2 Credits.
A study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.

PY.715.156. Keyboard Studies 2. 2 Credits.
A study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.
Completion of Keyboard Studies 1 required, PY.715.155[C].

PY.715.157. Keyboard Studies 1-2. 2 Credits.
An accelerated study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2. Open to undergraduate students only.

PY.715.255. Keyboard Studies 3. 2 Credits.
A continuation of PY.710.155-156, Keyboard Studies 1 & 2. Emphasis on harmonic and formal analysis as tools for sight-reading and memorization. Repertoire includes solo and duet works, accompaniments, and score-reading. To be taken in conjunction with Music Theory 3-4. Open to undergraduate students only.
Completion of PY.715.156[C] or PY.715.157[C] required.

PY.715.256. Keyboard Studies 4. 2 Credits.
A continuation of 710.155-156, Keyboard Studies 1 & 2. Emphasis on harmonic and formal analysis as tools for sight-reading and memorization. Repertoire includes solo and duet works, accompaniments, and score-reading. To be taken in conjunction with Music Theory 3-4. Open to undergraduate students only.
Completion of Keyboard Studies 3 required, PY.715.255[C].

PY.715.258. Keyboard Studies 3-4. 2 Credits.
An accelerated study of basic skills involved in reading, harmonization, transposition, improvisation, and analysis. Section assignments are determined by audition. To be taken in conjunction with Music Theory 1-2 or Music Theory 3-4. Open to undergraduate students only.
Completion of Keyboard Studies 1-2 required, PY.715.157[C].

PY.800 (Dance)

PY.800.101. Ballet 1a. 3 Credits.
PY.800.101 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.101 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.

PY.800.102. Ballet 1b. 3 Credits.
PY.800.102 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.102 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.

PY.800.103. Modern 1a. 3 Credits.
PY.800.103 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.

PY.800.104. Modern 1b. 3 Credits.
PY.800.104 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 1a required, PY.800.103[C]

PY.800.105. Jazz Dance. 2 Credits.
PY.800.105 consists of a bi-weekly 80-minute long technique studio class in Jazz Dance with possible readings, video viewings, reflection journal and performance attendance with written assignment An intermediate level technique course, PY.800.105 emphasizes movement sequences incorporating isolation and syncopation for the student on an intermediate level.

PY.800.106. West African Dance. 2 Credits.
PY.800.106 consists of a once a week 90-minute long West African Dance studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Exploring movements of traditional dance styles to contemporary, PY.800.106 is an introduction course to West African Dance and Culture. Open to non-majors.

PY.800.107. Afro Fusion. 2 Credits.
PY.800.107 consists of a twice a week 80-minute long Afro Fusion technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Afro Fusion technique providing continued development of the body as an instrument for movement with an emphasis on technique, style and composition. Dance is a continuum of learning. African Diaspora dance is the study of an ever-evolving people rooted in culture. In order to study the dance you must have an understanding of the people.In this course, when we speak of Afro-fusion we are referring to the culture, tradition and experience of people of color. More specifically, we are referring to the people that make up the African Diaspora. Traditionally, in the African community dance is interwoven into the culture of the people. Be it work or play, the body takes on a rhythm and a movement that becomes the dance of the people.Afro-Fusion Dance technique consists of a progression of strengthening exercises that increase skills of coordination, rhythm and flexibility while building core strength and endurance. Traditional styles of West African dance will be seamlessly fused with popular vernacular styles of movement.

PY.800.108. Screen Dance. 2 Credits.
PY.800.108 consists of a once a week 80-minute studio/lab class with possible readings and video viewings. Intensive study of the history, theory and fundamental skills of Screen Dance. This is an elective course that can be taken multiple times for credit.
Open to Dance majors only.

PY.800.109. Gaga. 2 Credits.
PY.800.109 consists of a bi-weekly 80-minute long technique studio class. Gaga--the movement language created by Ohad Naharin, artistic director and choreographer of Batsheva Dance Company in Israel--is a continuous, sensation-based movement class. Students are encouraged to deeply listen to the body and to physical sensations. The research of Gaga is fundamentally physical, and insists on a specific process of embodiment through rich imagery. Gaga is improvisational in nature and focuses on each participant's personal connection to the language. There are no mirrors in Gaga, and there are no observers. The class moves in continuum without breaks for an hour and fifteen minutes.
Open to Dance majors only.

PY.800.110. Tap. 2 Credits.

PY.800.111. Tap 2. 2 Credits.

PY.800.116. Jazz Dance 2. 2 Credits.
Open to Dance majors only.

PY.800.117. Latin Dance Styles. 2 Credits.

PY.800.201. Ballet 2a. 3 Credits.
PY.800.201 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.201 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 1b required, PY.800.102[C]

PY.800.202. Ballet 2b. 3 Credits.
PY.800.202 consists of a daily 80-minute long Ballet technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Designed to further develop technical skills, PY.800.202 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 2a required, PY.800.201[C]

PY.800.203. Modern 2a. 3 Credits.
PY.800.203 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 1b required, PY.800.104[C]

PY.800.204. Modern 2b. 3 Credits.
PY.800.204 consists of a daily 80-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment.Intensive study of Modern Dance technique providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 2a required, PY.800.203[C]

PY.800.301. Ballet 3a. 3 Credits.
PY.800.301 consists of a daily 60-minute long Ballet technique online classes with possible readings, video viewings, reflection journal and performance virtual attendance with written assignment. Designed to further develop technical skills, PY.800.301 focuses on developing strength, proper alignment and correct execution of ballet steps and combinations, emphasizing proper placement of body, head, arms, and legs.
Open to Dance majors only.;Completion of Ballet 2b required, PY.800.202[C]

PY.800.302. Ballet 3b. 3 Credits.
Open to Dance majors only.;Completion of Ballet 3a required, PY.800.301[C]

PY.800.303. Modern 3a. 3 Credits.
PY.800.303 consists of a daily 80-minute or 60-minute long Modern Dance technique studio class with possible readings, video viewings, reflection journal and performance attendance with written assignment. Intensive study of numerous Modern Dance Techniques, including Muller Polarity Technique, providing continued development of the body as an instrument for modern dance with an emphasis on alignment and technique, efficiency, self-correction, style and composition.
Open to Dance majors only.;Completion of Modern 2b required, PY.800.204[C]

PY.800.304. Modern 3b. 3 Credits.
Open to Dance majors only.;Completion of Modern 3a required, PY.800.303[C]

PY.800.401. Ballet 4a. 3 Credits.
Open to Dance majors only.;Completion of Ballet 3b required, PY.800.302[C]

PY.800.402. Ballet 4b. 3 Credits.
Open to Dance majors only.;Completion of Ballet 4a required, PY.800.401[C]

PY.800.403. Modern 4a. 3 Credits.
Open to Dance majors only.;Completion of Modern 3b required, PY.800.304[C]

PY.800.404. Modern 4b. 3 Credits.
Open to Dance majors only.;Completion of Modern 4a required, PY.800.403[C]

PY.800.411. Pilates. 2 Credits.

PY.800.412. Hip Hop. 2 Credits.
Open to Dance majors only.

PY.800.501. Rehearsal/Performance Collaboration Fall. 1 Credit.
PY.800.501 consists of daily/weekly rehearsals with faculty and/or guest choreographers, culminating in a performance of some kind. Designed to further develop performance and technical skills, PY.800.501 focuses on developing & refining proper rehearsal etiquette, memorization proficiency, active listening aptitude, improvisation skills and performance technique.
Open to Dance majors only.

PY.800.502. Rehearsal/Performance Collaboration Spring. 1 Credit.
PY.800.502 consists of daily/weekly rehearsals with faculty and/or guest choreographers, culminating in a performance of some kind. Designed to further develop performance and technical skills, PY.800.502 focuses on developing & refining proper rehearsal etiquette, memorization proficiency, active listening aptitude, improvisation skills and performance technique.
Open to Dance majors only.

PY.800.503. Student Dance Company 1. 2 Credits.
Open to Seniors only. Students must have completed Ballet 3b and Modern 3b.

PY.800.504. Student Dance Company 2. 2 Credits.
Open to Dance majors only.;Open to Seniors only. Must have completed Ballet 3b and Modern 3b.

PY.800.521. Elementary Yoga. 1 Credit.
Elementary Yoga is a gentle movement meditation practice. Asanas (poses) are held for a longer period of time, allowing connective tissues to release and energy to flow through the body. While open to all students, priority will be given to Conservatory Dance majors.

PY.810.201. Somatic Practices 1. 3 Credits.
PY.810.201 is a 3 credit, bi-weekly, 80-minute long Somatics course inclusive of lecture, discussion, guided movement explorations and sequences, readings, presentations and journal reflection.
Open to Dance majors only.

PY.810.202. Somatic Practices 2. 3 Credits.
Open to Dance majors only.;Completion of Somatic Practices 1 required, PY.810.201[C]

PY.810.302. Kiniseology. 3 Credits.
Open to Dance majors only.

PY.810.304. Body Conditioning. 2 Credits.
Dancer specific cross-training & self-care techniques for peak performance and career longevity.
Open to Dance majors only.

PY.820.201. Critical Dance Studies 1. 3 Credits.
Open to Dance majors only.

PY.820.202. Critical Dance Studies 2. 3 Credits.
Open to Dance majors only.;Completion of Critical Dance Studies 1 required, PY.820.201[C]

PY.820.204. The Business of Dance. 1 Credit.

PY.820.301. Dance of the African Diaspora. 3 Credits.
Open to Dance majors only.

PY.820.401. Dance Pedagogy. 3 Credits.
Principles and techniques of the pedagogy of dance, including a survey of contemporary models for movement education. Prerequisites: at least one semester of Somatic Practices and one semester of Choreography.
Open to Dance majors only.

PY.830.101. Music for Dance. 3 Credits.
Open to Dance majors only.

PY.830.102. Dance Production. 2 Credits.
PY.830.102 consists of a bi-weekly 80-minute long theory/laboratory class with readings, video viewings, research project and written assignments. An introduction to the fundamental aspects of dance production, PY.830.102 focuses on the various steps to launch a production/dance festival, possibly including such things as fundraising, publicity, lighting, grant writing, creating media content, etc.
Open to Dance majors only.

PY.830.104. Movement as Sound. 2 Credits.

PY.830.110. Choreolab. 2 Credits.
Open to Dance majors only.

PY.830.201. Contact Improvisation. 2 Credits.
Creative exploration of partner and small-group dance forms following shared points of contact.

PY.830.202. Improv/Authentic Movement. 2 Credits.
Open to Dance majors only.

PY.830.203. Contemporary Partnering. 2 Credits.

PY.830.301. Choreography 1. 3 Credits.
This Choreography Course is designed as an opportunity for student artists to explore the interdisciplinary and cross-sector possibilities of embodiment, performance, and dance-making. How might we integrate, interrogate, and influence our worlds of thought and praxis through the power of our crafts? Students will work in movement-based laboratories, and critical discourse, unpacking the cultural and sociopolitical dynamics at work in our institutional, programmatic, relational, and personal frames. Processes will include, Improvisation, Journaling, and Group Sharing that encourage a holistic lens in perceiving, making, and interrogating performance and other art forms.
Improv/Authentic Movement completion required (PY.830.202[C]).;Open to Dance majors only.

PY.830.302. Choreography 2. 3 Credits.
Choreography 1 needed (PY.830.301[C]).;Open to Dance majors only.

PY.830.303. Choreography 3. 3 Credits.

PY.910 (Ensembles - Large)

PY.910.501. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.502. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.511. Peabody Hopkins Conservatory Choir. 2 Credits.
Comprised of graduate and undergraduate students, faculty, staff, and community members form across The Peabody Conservatory, Johns Hopkins University, and Greater Baltimore, the Peabody Hopkins Conservatory Choir explores and performs works from the past six centuries, with an emphasis on choral-orchestral repertoire in collaboration with the Peabody Orchestra and guest artists.Open to all current students, faculty, staff, and members of the Baltimore Community. Auditions are held at the start of each semester. please contact the Peabody Ensemble Office for more information.

PY.910.512. Peabody-Hopkins Symphonic Chorus. 2 Credits.
A large ensemble of mixed voices devoted to the study and performance of major choral works of the past seven centuries, sacred and secular, a cappella to symphonic. Open to undergraduate and graduate students, faculty and staff of Peabody and Johns Hopkins, and community members. Placement is by audition.

PY.910.513. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.Open to all current students, by audition. Please contact the Peabody Ensemble Office for more information.

PY.910.514. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.

PY.910.515. Peabody Camerata. 2 Credits.
Peabody's select soprano-alto vocal ensemble (16-32 voices), comprised of graduate and undergraduate musicians, and performing music for treble voices from the 12th century to present, with a focus on 21st-century repertoire. The Camerata shares a commitment to evolving and expanding the treble vocal aesthetic through the creation of new work, and the reimagining of existing repertoires.

PY.910.516. Peabody Camerata. 2 Credits.
Peabody's select soprano-alto vocal ensemble (16-32 voices), comprised of graduate and undergraduate musicians, and performing music for treble voices from the 12th century to present, with a focus on 21st-century repertoire. The Camerata shares a commitment to evolving and expanding the treble vocal aesthetic through the creation of new work, and the reimagining of existing repertoires.Students enrolled in this ensemble also participate in Peabody Chamber Choir-small ensemble twice weekly. Time: T, TH 1:30-3:30 pm

PY.910.527. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.528. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.529. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.530. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.537. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.538. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.547. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.548. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.551. Laptop Ensemble. 2 Credits.
This ensemble serves as a meeting point between acoustic and electronic instruments and various technological devices such as laptops, phones, and Arduinos; musicians from various backgrounds will have the opportunity to participate and collaborate together in music making that is unique to the 21st century.
Open to Composition, Computer Music, or Music for New Media majors only.

PY.910.552. Laptop Ensemble. 2 Credits.
This ensemble serves as a meeting point between acoustic and electronic instruments and various technological devices such as laptops, phones, and Arduinos; musicians from various backgrounds will have the opportunity to participate and collaborate together in music making that is unique to the 21st century.
Open to Composition, Computer Music, or Music for New Media majors only.

PY.910.553. Peabody Jazz Repertoire Ensemble. 2 Credits.
The PRJE performs standard big band repertoire from iconic bands such as the Count Basie and Duke Ellington orchestras. The ensemble will focus on jazz orchestra practices and will cover a wide range of material.

PY.910.554. Peabody Jazz Repertoire Ensemble. 2 Credits.
The PJRE performs standard big band repertoire from iconic bands such as the Count Basie and Duke Ellington orchestras. The ensemble will focus on jazz orchestra practices and will cover a wide range of material.

PY.910.801. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.802. Large Ensemble. 2 Credits.
The required course for all students majoring in orchestral instruments during each semester of enrollment, Large Ensemble includes the Peabody Symphony Orchestra, Chamber Orchestra, Modern Orchestra, Opera Orchestra, Studio Orchestra, and Wind Ensemble. Students will rotate through a variety of different ensemble configurations throughout the year, providing them with a broad range of ensemble experiences. Placement is by audition.
Open to orchestral instrument majors only. Placement by audition.

PY.910.811. Peabody Hopkins Conservatory Choir. 2 Credits.
Comprised of graduate and undergraduate students, faculty, staff, and community members form across The Peabody Conservatory, Johns Hopkins University, and Greater Baltimore, the Peabody Hopkins Conservatory Choir explores and performs works from the past six centuries, with an emphasis on choral-orchestral repertoire in collaboration with the Peabody Orchestra and guest artists.Open to all current students, faculty, staff, and members of the Baltimore Community. Auditions are held at the start of each semester. please contact the Peabody Ensemble Office for more information

PY.910.812. Peabody-Hopkins Symphonic Chorus. 2 Credits.
A large ensemble of mixed voices devoted to the study and performance of major choral works of the past seven centuries, sacred and secular, a cappella to symphonic. Open to undergraduate and graduate students, faculty and staff of Peabody and Johns Hopkins, and community members. Placement is by audition.

PY.910.813. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.Open to all current students, by audition. Please contact the Peabody Ensemble Office for more information.

PY.910.814. NEXT Ensemble. 2 Credits.
Peabody's premiere mixed vocal ensemble (16-24 voices) of advanced graduate and undergraduate musicians committed to the expansion of the vocal ensemble art. Specializing in the performance of new, early, x-disciplinary, and transformative repertoire, NEXT Ensemble is reimagining what it means to be a collaborative, creative vocal artist in the 21st century.

PY.910.815. Peabody Camerata. 2 Credits.

PY.910.816. Peabody Chamber Choir. 2 Credits.
A select ensemble of mixed voices (16-24vv) committed to the performance of repertoire for chamber choir, and small chamber ensembles, of the past seven centuries, and specializing in early and modern music. The full ensemble rehearses twice weekly, and additionally breaks into one-on-a-part chamber ensembles. Open to undergraduate and graduate students of Peabody and Johns Hopkins. Placement is by audition. Time: M, W 3:30-5:30 pm. Students enrolled in this ensemble also participate in Peabody Chamber Choir-small ensemble twice weekly. Time: T, TH 1:30-3:30 pm

PY.910.827. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.828. Baltimore Baroque Band. 2 Credits.
Peabody's baroque orchestra explores a broad repertoire on where students work closely with experts. Playing on historical instruments, students gain firsthand experience in period style in an environment combining orchestral discipline and chamber music sensibility.

PY.910.829. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.830. Renaissance Ensemble. 2 Credits.
Open to singers and instrumentalists who wish to play early winds and strings such as recorder, krummhorn, shawm, sackbut, cornetto, rebec, vielle, viola da gamba, lute, cittern, Renaissance guitar, harp, etc. Repertory will include madrigals and chansons, motets and anthems, lute and consort songs, and various instrumental consorts.

PY.910.837. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.838. Peabody Jazz Ensemble. 2 Credits.
The study and performance of literature encompassing all of the jazz idioms with emphasis on historically significant works. Strong readers, sax/flute doubles are required. Student compositions are encouraged. Open to all Conservatory students by audition or permission of instructor. May be repeated for credit.

PY.910.847. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.910.848. Opera Production. 1 - 2 Credits.
Preparation and performance of complete operas with orchestra or opera scene performances. Placement by audition. (1,1 / 2,2 depending on role size)

PY.950 (Ensembles - Small/Chamber)

PY.950.510. West African Drumming. 1 Credit.
PY.950.510/950.810 consists of weekly 2 hour-long lessons covering Djembe Technique, Endurance and Orchestral Drumming.

PY.950.512. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.513. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.523. New Orleans Brass Band. 1 Credit.
The Brass ensemble legacy in New Orleans is the foundation for much of what jazz music and other styles of American music would become in the U.S. The Peabody New Orleans Brass Band will explore the origins and history of the New Orleans Brass tradition while performing music that is both standard current repertoire in the genre.

PY.950.525. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.526. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.527. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.528. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.531. Chamber Ensemble. 1 Credit.
The study and performance of the chamber music literature from all periods of music history and including instrumental groups and combinations of orchestral instruments, keyboard instruments, guitar, early music instruments, and voice, where appropriate. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.532. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.539. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.540. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.541. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.542. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.543. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.544. Harp Ensemble. 1 - 2 Credits.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.549. Pan-American Jazz Ensemble. 1 Credit.
The first semester of this ensemble studies standard pieces by the pioneers of blending Afrodiasporic music from the Americas with jazz since 1930. It also introduces to the fundaments of the Latin-American music language and performs compositions by some of today’s most vanguardist jazz artists from this region.

PY.950.550. Latin Jazz Ensemble. 1 Credit.
The second part of this ensemble continues the study and analysis of standard repertoire by the pioneers of Afro-Diasporic jazz since 1930s. It also workshops the traditional rhythmic concepts of these musics and focuses on performing compositions by some of today's most vanguardist jazz artists from the Americas.

PY.950.553. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lutesongs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.554. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lute songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.556. Gospel Choir. 1 Credit.

PY.950.602. Composition/Premier Lab: Guitar. 2 Credits.
A cohort of performers and composers tasked with creating and premiering a new composition.

PY.950.810. West African Drumming. 1 Credit.
PY.950.510/950.810 consists of weekly 2 hour-long lessons covering Djembe Technique, Endurance and Orchestral Drumming.

PY.950.812. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.813. Hip Hop Ensemble. 1 Credit.
The Peabody Hip Hop Ensemble is an ensemble dedicated to the exploration of collaborative hip hop performance styles and techniques, using electronics such as drum machines and turntables, traditional acoustic instruments, and voice. The ensemble is open to all Conservatory students.

PY.950.823. New Orleans Brass Band. 1 Credit.
The Brass ensemble legacy in New Orleans is the foundation for much of what jazz music and other styles of American music would become in the U.S. The Peabody New Orleans Brass Band will explore the origins and history of the New Orleans Brass tradition while performing music that is both standard current repertoire in the genre.

PY.950.825. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.826. Jazz Combo. 1 Credit.
The jazz combo is the primary chamber ensemble in Jazz Music. It is crucial that every aspiring jazz musician learn how to improvise, dialogue and navigate in a jazz combo setting. This course will explore common practices in jazz combo while providing students a vehicle to perform their compositions and learn various jazz pieces that have become common jazz combo repertoire. Section/Instructor placement made by Department Chair.

PY.950.827. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.828. Baroque Ensemble. 1 Credit.
Small ensembles of instruments and singers formed by faculty coaches who cover aspects of historic performance styles as well as ensemble playing. Instrumental students are matched according to ability on period or modern instruments. Prior experience on period instruments is desirable.

PY.950.831. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.832. Chamber Ensemble. 1 Credit.
The study and performance of chamber music literature from all periods of music history. All groups receive weekly coachings and are required to perform at the end of the semester.

PY.950.839. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.840. Piano Ensemble. 1 Credit.
The study and performance of selected duo piano literature, including music written for one piano, four hands, as well as repertoire for two pianos.

PY.950.841. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.842. Guitar Ensemble. 1 Credit.
The development of guitar ensemble skills with two, three, and four guitars.
Open to Guitar majors only.

PY.950.843. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.844. Harp Ensemble. 1 Credit.
Development of ensemble skills through study of mixed chamber works that feature harp, and occasionally of works for multiple harps.
Open to Harp majors only.

PY.950.849. Pan-American Jazz Ensemble. 1 Credit.
The first semester of this ensemble studies standard pieces by the pioneers of blending Afrodiasporic music from the Americas with jazz since 1930. It also introduces to the fundaments of the Latin-American music language and performs compositions by some of today's most vanguardist jazz artists from this region.

PY.950.850. Latin Jazz Ensemble. 1 Credit.
The second part of this ensemble continues the study and analysis of standard repertoire by the pioneers of Afro-Diasporic jazz since 1930s. It also workshops the traditional rhythmic concepts of these musics and focuses on performing compositions by some of today's most vanguardist jazz artists from the Americas.

PY.950.853. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lute songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

PY.950.854. Renaissance Chamber Ensemble. 1 Credit.
The study and performance of selected Renaissance literature for specific instrumental and vocal groups such as, but not limited to, quartets of like instruments (e.g., guitars), lutes songs (for voice and guitar), and the "English" or mixed consort of violin, flute, viol, lute, and guitar. By invitation of instructor.

SA.100 (Core Courses)

Leadership, Ethics, & Decision Making

SA.100.101. American Foreign Policy Since WWII. 4 Credits.
Covers the history of American foreign policy since World War II, with special attention to analyses and interpretations of the determining factors of continuing significance, including factors and trends in the international and domestic environment of U.S. policy.
Students may not register for this class if they have already received credit for SA.100.720[C]

SA.100.102. Comparative Politics. 4 Credits.
This is a survey course in comparative politics that provides an overview of major theoretical approaches and issue areas in the field of comparative politics. It exposes students to a wide range of themes through reading of foundational work each week. The course starts by introducing competing theoretical approaches adopted by scholars of the field, including the state-centric, comparative historical, rational choice, and institutional perspectives. Using these approaches, the course then proceeds to examine issue areas such as political economy of developed and developing countries, democracy and authoritarianism, voting and parties, nationalism and ethnic politics, and the international context of domestic politics.
Students may not register for this class if they have already received credit for SA.100.750[C]

World Order

SA.100.201. Evolution of the International System. 4 Credits.
Provides an historical and global geopolitical framework for understanding how the modern global system has evolved. Focuses on three broad motifs: (1) the dialectical character of the European state system, (2) the relationship of Europe to the rest of the world and (3) the progressive rise of non-European powers and the growing challenge these have posed to Europe's dominant position in the world. Concludes with reflections on the contemporary international system and its principal actors, with an eye to defining its prospects in the 21st century.
Students may not register for this class if they have already received credit for SA.100.771[C]

SA.100.202. Theories of International Relations. 4 Credits.
This course surveys a variety of broad theoretical approaches to analyzing international politics. Examines approaches to the study of power, state interests, peace and war, international law, and economic cooperation; presents a critique of realist, liberal, and constructivist conceptions of international politics; and introduces basic methodology, weighing the evidence to assess the relative merits of theories.
Students may not register for this class if they have already received credit for SA.100.761[C]

International Economics

SA.100.302. Essentials of International Economics II. 4 Credits.
The course examines key concepts in the areas of Macroeconomics and International Monetary Theory relevant for understanding issues in international affairs. Macro concepts include macro measurement, aggregation, economic growth, inflation, business cycles, government policies to influence the economy, the banking system and interest rates and bond markets. International Monetary concepts include balance of payments, exchange rates, international monetary system, capital flows, and global financial crises. The course is conceptual in nature and requires only basic math skills. Students taking the Essentials International Economics core will not be eligible to take most economic elective classes.

SA.100.303. International Economics I. 4 Credits.
This course provides an introduction to the study of international trade. The first part of the course will focus on theoretical frameworks designed to understand the drivers and implications of international trade and review empirical applications of these models. The second part of the course will cover distributional consequences of trade policy instruments, arguments for trade protection, and the organization of the world trade system. For Non-MAIR students, Principles of microeconomics is a prerequisite for this course; more advanced topics in microeconomics will be introduced throughout the course.

SA.100.304. International Economics II. 4 Credits.
Covers the basic theory underlying international macroeconomics. Topics include international financial markets and the macroeconomics of open economies; balance of payments and the trade balance; exchange rates and the foreign exchange market; expectations, interest rates and capital flows; monetary and fiscal policy in open economies; exchange rate regimes; and macroeconomic policy in open economies. Basic algebra will be used in this class. This course is a prerequisite to most upper-level economics courses.

Research Methods

SA.100.401. Econometrics. 4 Credits.
Provides comprehensive introduction to econometrics. Develops tools for estimating functional relationships and critically reading empirical studies that use different econometric techniques; presents assumptions of multivariate regression and discusses the most common econometric problems and the potential consequences and remedies; and discusses omitted variables, sample selection, heteroscedasticity, autocorrelation, multicollinearity and use of discrete variables. Introduces instrumental variable technique. Uses statistical software in applied exercises.
Students may not register for this class if they have already received credit for SA.340.710[C];SA.100.501[C] OR SA.340.709[C] OR SA.999.702[C]

SA.100.402. Applied Econometrics. 4 Credits.
Focuses on recent empirical issues in international economics and development. Examines both econometric methods and findings. Emphasizes the econometrics models used, estimation problems encountered and techniques developed to address these problems. Aims to evaluate evidence from existing research and extend understanding of econometric methods to carry out independent research. Prerequisite: Econometrics.
Students may not register for this class if they have already received credit for SA.340.731[C];SA.100.401[C] OR SA.340.710[C]

SA.100.404. Macro Econometrics. 4 Credits.
Course seeks to discuss and apply the techniques used in time series econometrics applied to macroeconomics and financial markets, always from a practitioner's point of view. Provides a comprehensive set of tools and techniques for analyzing various forms of univariate and multivariate time series and shows how to use computer programs EViews and Stata to estimate macroeconomic and financial time series models; through extensive use of computers, students have the opportunity to apply in class every technique learned. Aimed at students who wish to pursue a career in macroeconomic policy analysis or financial markets forecasting and for whom grasping concepts such as stationarity, cointegration, causality and changing volatility will be valuable. Prerequisite: Econometrics. Some knowledge of linear algebra and calculus, as well as proficiency with computers, is recommended. Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.340.735[C];SA.100.401[C] OR SA.340.710[C]

SA.100.406. Practical Research Methods. 4 Credits.
This course covers the most common quantitative and qualitative research methods used in practical applications such as by program implementers and their partners and in policy analysis. It focuses mainly on observational methods and those for primary data collection, but will touch on longitudinal research designs, experiments, and secondary data analysis to situate observational research in context and consider creative combinations of designs and methods to answer complex questions. Students will develop the ability to design and implement surveys, focus groups, and interviews, including ethical approval, sampling procedures, and developing budgets and timelines. Additional quantitative and qualitative data collection and analysis methods are reviewed as well. Ethical issues are considered extensively throughout the course.This course was previously titled "Practical Research Methods in International Development".
Students may not register for this class if they have already received credit for SA.400.700[C]

SA.100.408. Research Design and Casual Inference. 4 Credits.
This course introduces students to research methods that are commonly employed today in the field of international relations. The focus of the course is on research designs aimed at establishing causal inferences. There are four main sections to the class, each of which covers one major type of research design. The first section focuses on qualitative research methods. The second section turns to quantitative methods, particularly methods used for analyzing observational data (i.e. non-experimental data). In section III, we study experimental methods. The final section provides an overview of various quasi-experimental methods. Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.600.767[C];SA.100.401[C] OR SA.340.710[C]

SA.100.409. Risk in International Politics & Economics. 4 Credits.
The purpose of this course is to help students work through the challenge of understanding risk in international political and economic relations. That challenge is both methodological and substantive. Students will have to tackle 'how' we understand and 'what' we understand at the same time. Along the way, they will have to consider those things we cannot understand or anticipate with any meaningful degree of precision. They will have to deal with the 'uncertainty' that lies beyond the boundaries of 'risk'. The subject matter is open-ended. Virtually every aspect of politics or economics can be cast in terms of risk and uncertainty, no matter whether we look to the future or reflect upon the past. Therefore, the course builds on a thematically structured, case study approach. Each week introduces a new principle that is useful in understanding risk; each week provides cases that illustrate the usefulness of that new principle. Moreover, as our understanding of risk becomes more sophisticated, the cases become more complex. Theultimate goal is to be able to analyze matters of risk and uncertainty as they manifest around decisions taken by leaders in government or business in the real world.

SA.100.410. Theories & Methods of Qualitative Political Research. 4 Credits.
Research in the social sciences calls upon different methods for gathering information, interpreting data, drawing inferences, and advancing arguments. Qualitative methods rely on direct observation, narrative forms, and tools such as interviews, archival sources, media, participant observation, ethnographic analysis and historical documentation. Qualitative approaches may draw upon inductive techniques (assessing evidence directly) and deductive reasoning (drawing on stylized or logical relationships) when identifying patterns and crafting propositions. The purposes of qualitative methods are broadly similar to those of quantitative methods: drawing inferences (resilient generalizations) from evidence, developing causal arguments about the sources and mechanisms of events, and testing propositions about political behavior. Qualitative methods are also frequently partnered with quantitative methods in "mixed-method" research designs. However, the assumptions and procedures of qualitative methodology are distinct.
Students may not register for this class if they have already received credit for SA.600.774[C]

SA.100.411. Methods in Comparative-International Research. 4 Credits.
This class introduces students to different research designs in comparative and international analysis. The discussion will be based mainly on examples of high-impact studies. Methods covered include cross-national large-N survey, ethnography, interview, small-N comparison, paired comparison, and process tracing. Through intensive engagement with the readings, which are composed of classics and cutting-edge research, students are expected to develop critical appreciation of the diverse methodological strategies underlying different empirical studies and the capability of employing some of the methods in their research.

SA.100.412. Quantitative Research Methods. 4 Credits.
….forthcoming!

Data Analytics

SA.100.501. Statistics for Data Analysis. 4 Credits.
Covers basic statistical tools for data analysis. Emphasizes facility in problem-solving in statistical inference and two-variable regression and correlation analysis. Presents descriptive statistics, probability and probability distributions and their use in hypothesis testing. Uses computer to solve problems and to reinforce statistical concepts. Students may not register for this class if they have already received credit for SA.340.709[C]

SA.310 (International Economics)

SA.310.101. Business Strategies for Global Financial Institutions. 4 Credits.
The objective of the course is for students to learn about the global financial services industry and to equip them with the content and skills necessary to obtain professional employment in financial services, industry in general, or the public sector. The course combines academic teachings with business school cases in “traditional” global financial services, as well as “Fintech”. It emphasizes three areas: Gaining fundamental knowledge of corporate business strategy; Understanding how global financial institutions execute (or fail to execute) their strategies; Developing students’ commercial skills, such as communications, presentation skills and teaming. The class is highly participatory. The work is demanding. Students are urged to review the syllabus in detail. Corporate finance or Financial Decision-Making is recommended as a prerequisite. Please contact me (jkocjan@deloitteretired.com) if you have questions.

SA.310.700. Microeconomics. 4 Credits.
A detailed summary of microeconomic theory using calculus with a focus on policy issues. Highlights the key microeconomic issues related to international economics issues. Much more rigorous, analytic and mathematical than current MA course. This course is open to enrollment by MIEF students only.

SA.310.701. Macroeconomics. 4 Credits.
A mathematical presentation of open economy macroeconomic models of short/long term equilibrium and growth. A review of monetary/fiscal policy as well as measurement issues. More focus on models and quantifying impacts rather than just shifting of curves as with current MA course.This course is open to enrollment by MIEF students only.

SA.310.706. Equity Analysis and Valuation. 4 Credits.
This course is open to enrollment by MIEF students only.

SA.310.707. International Trade. 4 Credits.
Presentation of the classic and modern models of trade between countries and the issues related to trade policy in the global economy. More detailed, analytic and mathematical than current MA course. This course is open to enrollment by MIEF students only.

SA.310.708. Sustainable Finance and Impact Investing. 4 Credits.
This course aims to equip students to analyze sustainable finance and impact investing and become current with the range of current approaches being pursued. The class will be in seminar format and students will be expected to participate actively in class.

SA.310.710. Development Finance. 4 Credits.
“Basically, the 19th century was the age of return (the main question being, how much will the investment bring me?), the 20th century was the age of risk-return (will the return on my investment be enough to justify the risk I take?); and the 21st century appears to be the age of risk-return-impact (how much am I risking, how much can I earn, and what is my impact?)” - Bertrand Badre, Can Finance Save the World? (2018).Bertrand wrote this in the context of the challenge facing the financial system post the 2007-2009 financial crisis; and the recognition by governments across the world that the attainment of the SDGs will only be possible with innovation in financial markets, and a massive partnership with the sources of private capital.The financial consequences of the Covid 19 pandemic are still unfolding, but it is clear that limited public resources will be stretched further. Governments, especially in developing countries, need closer collaboration with private and international capital to explore nontraditional mechanisms to finance crucial development projects.This course explores the role that Development Finance Institutions (DFIs) have today. To be effective in mobilizing capital requires that DFIs fully understand what providers of capital are looking for, and the fiduciary responsibility they have towards those whose savings they manage. The course will enable students to understand key mechanisms and instruments used by DFIs, the role of governments, private capital providers and different institutions and emerging trends in international development finance. The course will build on theoretical foundations of corporate finance and project finance to help students unpack the approaches to development financing design and structuring.The course takes a mixed approach of teaching concepts, case studies and hands-on assignments to help students build analytical skills required to launch a career in International Development Finance.

SA.310.711. Public-Private Partnerships: Creating Public Value in Economic and Social Infrastructure. 4 Credits.

SA.310.712. Organization and Regulation of Infrastructure. 4 Credits.
The course provides a comprehensive treatment of policy issues arising in the organization and regulation of infrastructure ranging from regulation of market structure, choices of ownership (and partnerships) and regulation of market conduct to implications for finance. Most examples are drawn from telecommunications, electricity, transport and water. A multitude of country cases (including current policy debates) from across the globe demonstrate how basic principles interact with politics to yield a plethora of institutional incarnations and insights into variants of “state capitalism” at work. MIEF students only.

SA.310.713. Risk Analysis and Modeling. 4 Credits.
This course develops financial modeling skills through actual hands-on construction of a financial model. Each participant will build his/her own interactive financial model from scratch to practice blending accounting, finance and Excel skills.This course is open to enrollment by MIEF students only.

SA.310.714. Game Theory. 4 Credits.
Traditional economic theory tends to avoid interactive influences among decision-makers. Game theory focuses on analyzing the effects of interaction among individuals and groups with competing and conflicting goals. The course covers cooperative and noncooperative game theory, explaining the nature and selection of pure and mixed strategies, the various equilibrium concepts used and the theory's relationship to traditional optimization analysis. Draws examples from microeconomic theory, international trade and trade policy, arms control, international relations as well as other fields. The course is self-contained with respect to mathematics content. This course is open to enrollment by MIEF students only. Prerequisite: Microeconomics.

SA.310.719. International Financial Markets. 4 Credits.
This is a survey course covering issues in international financial markets. We will cover various markets and financial instruments, including bonds and bond markets, an introduction to derivatives and structured financial products. We also cover the theory of investment, including modern portfolio theory, behavioral finance, fat-tailed distributions/Black Swans and efficient market theory. Finally, we close the course with a selective history of financial crises, which also introduce basic issues related to financial intermediation (banking and shadow banking). There is a strong emphasis on real world financial instruments, institutions and issues. There are no prerequisites, though International Monetary Theory or Accelerated International Monetary Theory will be helpful. This course is open to enrollment by MIEF students only.

SA.310.720. Advanced International Macroeconomics. 4 Credits.
This is an advanced course on open economy macroeconomics. The main purpose of the course is to cultivate and develop the ability to use formal theoretical models to interpret and understand the complex economic reality around us. Topics include current account determination, the relationship between saving and investment, imperfections in international capital markets, insurance mechanisms, the role of the real exchange rate, and fiscal policy. This course is open to enrollment by MIEF students only.
SA.310.724[C]

SA.310.721. Financial Derivatives and Risk Management. 4 Credits.
Introduces options, futures and swaps presented in Corporate Finance. Reviews basics of valuation methods and institutional context in which derivative contracts are traded. Describes use of basic derivative instruments as "building blocks" to construct more complex positions that increase, decrease or transform exposure to specific financial risks. Focuses on how such combinations of derivatives may be used to implement overall risk-management strategy and introduces techniques to manage financial derivatives portfolios, including value-at-risk and credit mitigation. Uses case discussions and culminates in oral presentation of a group project.This course is open to enrollment by MIEF students only.

SA.310.722. Financial Decision-Making. 4 Credits.
Introduces quantitative tools and framework of financial decision-making. Examines present-value techniques, pricing of financial instruments, trade-off between risk and return, portfolio theory, capital budgeting, financial ratio analysis, behavior of financial markets, capital structure decisions, corporate cost of capital issues, option theory and risk management. Approach is rigorous and analytical, and goal is to provide students with conceptual understanding of the ideas of financial theory as well as the quantitative methods necessary to pursue careers involving financial decision-making. This course is open to enrollment by MIEF students only.

SA.310.723. Creating Markets in Infrastructure - Electricity and Beyond.. 4 Credits.
This applied microeconomics course lays out ways to introduce competition across all infrastructure sectors (telecom, energy, transport, water). A deep dive into electricity markets brings out the core challenges, covering: market structure regulation and market design for operations and investment in generation as well as transmission and distribution; competition policy; the integration of renewables into electricity grids and the concept of smart grids. Access pricing principles for telecommunications systems conclude with an overview of the net neutrality debate.
SA.300.699[C] OR SA.300.700[C] OR SA.999.700[C] OR SA.999.699[C]

SA.310.724. International Finance. 4 Credits.
Inter-temporal macroeconomics models involving capital flows and determination of asset prices and equilibrium exchange rates. Examination of models of exchange rate regimes, debt sustainability, and other global macro topics. Focus on intertemporal issues and general equilibrium models is not covered in MA version of course. This course is open to enrollment by MIEF students only.

SA.310.725. Credit Markets and Credit Risk. 4 Credits.
Although the size of credit markets varies across countries, reflecting the level of economic development, its industrial structure and its regulatory regime, globally, credit markets are huge, surpassing by far equity markets as a source of finance for both the private and public sectors. McKinsey estimates that, in 2007, total global financial assets were $225 trillion, of which only $50 trillion was equity, the remainder represented various types of credit instruments. The recent Global Financial Crisis had a significant impact on credit markets, something that will be discussed repeatedly during the course. This course will examine credit markets globally, with a specific focus on understanding the particular nature of credit risk. After an overview and definitions, the mathematics of fixed income instruments will be covered. There will then follow two sections on private sector credit risk, one each for the real and banking sectors. A significant part of the course will then incorporate what has been learned in analyzing private sector credit into a discussion of sovereign credit risk. This course is open to enrollment by MIEF students only.
SA.310.722[C]

SA.310.726. The Modern Financial System: Money, Banking, and Beyond. 4 Credits.
This course examines the role of financial institutions and money in the international economic system. The course begins with an overview of what financial institutions are and what they do. The course will then study the causes of financial crises and the impact that they have on local and global economies. Then this course will study international financial regulation and the impact of interest rate movements on banks. The class will close by studying the new area of digital assets (e.g. Bitcoin, central bank digital currencies (CBDC), stablecoins) and will discuss the potential role they may play in our financial system.

SA.310.727. International Financial Organizations: Institutions and Analytical Methods. 4 Credits.
While this course is about the main international financial organizations, the bulk of the course is about the International Monetary Fund (IMF), the pre-eminent global economic and financial institution. There will be two primary focuses of the course. First, we will study the international financial organizations and the international monetary system from an institutional and historical perspective. Second (and this will form the majority of the course), we will focus on the analytical methods used at the IMF to perform country macroeconomic analysis, specifically, financial programming.

SA.310.728. Central Banking in Emerging Markets. 4 Credits.
This course introduces students to the challenges of central banking in emerging economies while exploring its traditional as well as non-traditional role in economic management. The course topics include monetary policy and transmission mechanism, exchange rate policy, interest rate corridor, role of central bank in economic development, fiscal dominance, and financial stability. It also analyzes the implications of quantitative easing, fiscal stimulus, and austerity measures for emerging markets along with new developments like central bank digital currencies and central banking during the Covid crisis. Calculus and econometrics are desired but not necessary.

SA.310.731. Impact Evaluation in Development. 4 Credits.
The goal of this course is to provide students with an introduction to key methods of quantitative policy analysis and impact evaluation used to analyze policy relevant questions in developing countries. We develop the statistical toolkit of regression analysis, reviewing the bivariate regression model and then continuing with multiple regression, and explore how these methods are applied to policy analysis in five benchmark techniques: randomized trials, direct regression analysis, instrumental variables, regression discontinuity, and difference in differences. We emphasize the distinction between regression as a statistical tool and the additional context knowledge (and occasionally assumptions) that are required to address causal policy questions. We will rely on empirical microeconomic studies (mostly in developing countries) to analyze behavior under different types of market failures and to evaluate the impacts of policy interventions.Pre-requisites: Statistics, econometrics, and microeconomics. Previous knowledge of STATA will be helpful.This course is open to enrollment by MIEF students only.

SA.310.732. Global Investment Management. 4 Credits.
Introduces the process of analyzing, valuing, selecting and managing various financial instruments issued by companies, governments and other entities outside the United States, emphasizing issuers from emerging markets. Intended to bridge theory and practice by focusing on the proper integration of qualitative judgments about issuers and their securities based on the broader economic, political, social and cultural environments in which they operate with the quantitative models driving investment selection and portfolio management at the frontiers of finance today. This course is open to enrollment by MIEF students only. Prerequisite: Financial Decision-Making.

SA.310.734. Quantitative Global Economics. 4 Credits.
Focuses on issues relevant to understanding the world economy: modeling and forecasting of exchange rates, modeling the sustainability of external imbalances, determining the importance of international capital flows and implementing monetary-policy rules. Examines empirical studies in each of these areas by looking at their assumptions, weaknesses and strengths and considering whether there are alternative methods of addressing a given issue. Students learn to develop an independent opinion of how theoretical ideas are applied to policy questions by asking: How much? Does it matter? How do you know?This course is open to enrollment by MIEF students only.

SA.310.735. Topics in Development Economics. 4 Credits.
This is an advanced seminar-style (discussion) course that will dive deeply into a selection of active areas of research in the development economics literature. It can be thought of as a successor course to my introductory survey course Economic Development (SA.310/320/744), although that course is not strictly a prerequisite. Each week we will read 2-4 related papers on a topic where there is an ongoing debate both in the academic literature and in policy circles. Examples include the impacts of foreign aid, industrial policy, the role of culture in economic development, and the economics of urbanization in LMICs. As an advanced course, the purpose of this class is to help students develop the skills to critically engage with any literature in development economics. It is targeted to advanced masters students wanting to go deeper into the literature, doctoral students in related fields, and anyone looking to learn more about how to closely read economic research. It will be particularly useful for those considering going on to a PhD or otherwise considering a career in research, although it will also make those more interested in working in policy into better consumers of research. Prerequisites: introductory microeconomics and macroeconomics, plus at least one statistics or econometrics course. Economic Development is also recommended by not required.This course is open to enrollment by MIEF students only.

SA.310.736. Trade and Development. 4 Credits.
Focuses on trade policy issues in developing countries. Addresses tariff structures, quantitative trade restrictions on imports and exports, exchange controls and the design of trade reform programs. Also looks at the relationship between macroeconomic policy and other domestic policies and trade liberalization. Studies the history of developing countries at the World Trade Organization. Focuses on theoretical tools and analytical techniques rather than case studies.This course is open to enrollment by MIEF students only.

SA.310.740. Enterprise and Development. 4 Credits.
The course covers the major debates around “private sector development” – the interplay between markets, firms and government policy, arguably the main driver of economic development. Fundamental are institutional settings that allow co-operation to function, while allowing competition at the same time. Special topics include the role of informal market, and that of small and medium enterprises. Approaches to inclusive business models including impact investment are debated as well as the relationship between enterprise and values (corporate governance, corporate social responsibility, not-for-profit firms) including measurement approaches targeting social and environmental impact.

SA.310.743. Advanced Topics in Trade Theory. 4 Credits.
A rigorous seminar on international trade and commercial policy covering a broad set of policy-oriented topics. Covers both theory and applications, but emphasizes tools and analytical techniques rather than case studies. Overall goal is to develop a broad conceptual understanding of ongoing issues in international trade and familiarity with the analytical techniques used by economists in developing policy recommendations. This course is open to enrollment by MIEF students only.
SA.310.707[C]

SA.310.744. Economic Development. 4 Credits.
This course introduces students to the study of economic development. Different disciplines have different methods – this class uses the tools of economics to examine the reasons why some places are so much more prosperous than others. Specifically, we will use mathematical modeling and econometrics to develop and test theories of economic growth, structural transformation and poverty alleviation. While the core questions in economic development could be examined anywhere in the world, we will focus on low- and middle-income countries, with some references to the historical literature in richer countries like the United States. This class is targeted at anyone considering a career in research or policymaking in developing countries, but will also provide useful skills and insights to those working on issues of poverty and growth in more developed countries as well.This course is open to enrollment by MIEF students only.

SA.310.747. Behavioral Economics. 4 Credits.
This course examines the relationship between behavioral economics, public finance and public policy. Individuals frequently make decisions that systematically depart from the predictions of standard rational actor economic models. Behavioral economics attempts to explain these departures by integrating an understanding of the psychology of human behavior into economic analysis. This course will review the major themes of behavioral economics and address their implications for public finance in a wide variety of policy-relevant domains, including: savings, consumer credit, education, labor markets, energy use, health care, revenue collection and tax compliance, social welfare programs, and the political process. The course trains students to think critically about problems and apply an understanding of behavioral economics to best address and design policy solutions that improve outcomes. This course is open to enrollment by MIEF students only.

SA.310.749. International Trade Policy. 4 Credits.
This course is designed to familiarize students with some of the major trade policy issues that countries face today. While theory and applications will both be covered, emphasis will be placed on tools and analytical techniques rather than on case studies. Topics covered include the analysis of alternate trade policy instruments, links between trade policy, exchange rates and trade outcomes, optimal policy interventions with market failures, market structure and trade policy, trade and labor markets, the political economy of trade policy, preferential trade agreements (such as NAFTA and the European Union), the design of the world trading system and the numerous challenges it currently faces.Pre-Requisite: International Trade or Internatinal Trade Waiver Exam. This course is open to enrollment by MIEF students only.
SA.310.707[C]

SA.310.750. International Economic Policy. 4 Credits.
This course examines macroeconomic policy in open economies. After covering the basic theoretical foundations on how monetary and fiscal policy should be conducted over the business cycle, we will analyze how such policies are actually conducted in practice and explore why. This is a hands-on course where students will be asked to gather data and perform an empirical investigation on how macroeconomic policies are carried out in their home countries. This course is open to enrollment by MIEF students only.
SA.300.708[C] OR SA.310.724[C]

SA.310.754. Cost-Benefit Analysis. 4 Credits.
Policy decisions require difficult trade-offs of costs and benefits; there is no such thing as a free lunch. Hence, the course will use specific policy areas – including health care, transportation and infrastructure, international aid and development, education, and environmental issues – as examples to provide students with the concepts and tools of cost-benefit analysis to analyze the role of government intervention, its justification, opportunity costs, and implications for efficiency, fairness and effectiveness. The course will cover key theories and concepts that underpin most discussions of public policy on the role and financing of the government sector, including public goods (both national and global), externalities and market failure, tax policy, social welfare economics, market structure, monetary and fiscal policy. We will then place cost benefit within the broader public finance framework. Using these concepts, the course will highlight some of the challenging real-world public policy issues confronting governments in different parts of the world. Students will learn how to develop and apply cost-benefit analysis techniques to the evaluation of public policies.This course is open to enrollment by MIEF students only.

SA.310.761. Multinational Corporate Finance. 4 Credits.
Covers issues related to both international financial markets and financial decision-making within the international environment. Focuses on understanding and forecasting financial conditions in international markets; identifying, measuring and managing exchange-rate risk; taxation of international income; implications of political risk on project valuation; and cost of capital for international projects. Prerequisite: Financial Decision-Making.This course is open to enrollment by MIEF students only.
SA.310.722[C]

SA.310.770. Quantitative Methods I: Basic Econometrics. 4 Credits.
This course covers the basics of econometrics, representing the first half of the econometrics sequence. Statistical concepts of confidence intervals and hypothesis testing will be reviewed in the context of simple and multiple regression analysis using the normal, t, and F distributions. Assumptions made when using regression or function fitting analysis will be examined in the context of multiple regression using matrices. Matrix algebra will be reviewed. Non-linear relationships and relationships involving qualitative variables will be covered as well as understanding the errors involved in prediction. The statistical package Stata will be used throughout this course following a brief use of Excel. Students will prepare a short paper presenting the results of a regression analysis. This course is open to enrollment by MIEF students only.

SA.310.771. Quantitative Methods II: Econometrics. 4 Credits.
A mathematical presentation of econometrics from OLS and the violation of the classical assumptions through advanced econometric techniques for dealing with common econometric problems. Moves faster and further than MA version of the course. Involves lab work.This course is open to enrollment by MIEF students only.

SA.310.772. Cross-Sectional and Panel Data Econometrics: Applied Econometrics for Microeconomics. 4 Credits.
This course is designed to teach the tools and techniques of applied statistics and empirical microeconomics. The class focus is on how the data generation process of collecting sample data from a population frame affects inference with a focus on cross-sectional and panel data. The class examples and exercises will focus on issues related to international development and domestic social issues (e.g. poverty, education, health, labor issues). The emphasis is on applications, not derivations, of methodology. The course will entail a significant amount of analysis of household survey data using primarily Stata. This course covers some of the same topics as Quantitative Methods I and II, both as a tool to reinforce the material and also to provide more applied examples of the estimation issues.This course is open to enrollment by MIEF students only.

SA.310.773. Macro and Financial Time Series Econometrics. 4 Credits.
This course will cover time series analysis with a particular emphasis on aspects of time series analysis that are employed in the empirical analysis and modeling of financial and macroeconomic time series. The course will cover theoretical aspects of time series analysis but will focus on applied and empirical aspects of time series analysis. This course is quantitative and will build upon concepts that have already been learned in previous econometrics courses such as OLS estimation, finite sample and asymptotic properties of OLS and MLE estimators, and hypothesis testing.This course is open to enrollment by MIEF students only.

SA.310.774. Empirical Economic Modeling and Forecasting. 4 Credits.
This course is an introduction to practical empirical economic modeling and forecasting. It focuses on the methodology, practice, and implementation of econometric modeling and forecasting with macroeconomic time series. The course's first part (empirical model building) considers data properties, including integration and cointegration; dynamic specification, including error correction models; and model evaluation and design, including computer-automated model selection algorithms and impulse indicator saturation. The course's second part (empirical economic forecasting) focuses on the roles of forecasting, including in policymaking; the generation and evaluation of forecasts; sources of forecast error; and robustification and improvement of forecasts. Throughout, the course includes discussion of the underlying theory, live data-based presentations of substantive empirical analyses, and hands-on learning in class. The latter two aspects help demonstrate the approach to econometric modeling and forecasting and address empirical questions as they arise. Examples with single-equation and multiple-equation models using different countries' data motivate and illustrate the concepts involved. This course is open to enrollment by only MIEF students.

SA.310.783. Regulation of International Financial Markets. 4 Credits.
This course is open to enrollment by MIEF students only.

SA.310.787. Infrastructure Finance and Modeling. 4 Credits.
This course will use a practical and quantitative approach to understanding infrastructure finance transactions and financial modeling. The goal of the course is to provide an understanding of how the financial structure for an infrastructure transaction is determined from the underlying technical, contractual, and market conditions. Financial Decision-Making is a prerequisite for registration. A working knowledge of accounting and finance concepts and Excel is assumed and necessary.
SA.310.722[C]

SA.310.790. MIEF Applied Research Project. 2 Credits.
Being a successful professional involves providing reliable answers to practical questions. Obtaining reliable answers benefits from two components. First, one needs a theoretical framework used to organize the data. Second, one needs a suitable statistical method to summarize the implications and properties of the data so as to develop an intelligible answer to the question at hand.Unfortunately, there is no "cookbook" available that will turn an amateur into a successful professional. So this course adopts a case-study approach by focusing on two important questions: How can one measure the degree of international capital mobility and how can one determine the extent to which a particular the exchange rate for a particular currency is misaligned.In addition to becoming familiar with these two subjects, students develop the habit of asking two important questions for professional life: How do you know and what is the alternative? A successful applied research project integrates these two questions into providing reliable answers.

SA.310.806. MIEF Skills Workshop: Stata. 1 Credit.
This workshop will introduce Stata and illustrate how to use the software for practical applications, with attention to manual coding. We will cover basic applications - such as simple OLS regressions and charting - as well as binary dependent variable modelling, time-series features, and panel data techniques. The theoretical concepts underpinning empirical analyses will also be reviewed. These workshops are for MIEF students only.

SA.310.807. MIEF Skills Workshop: R. 1 Credit.
This workshop provides an introduction to analyzing data using the statistical programming language, R. It covers the fundamentals of the language, along with the essentials of data ingestion, cleaning, manipulation, and visualization. R is an open-source software environment for statistical computing and graphics used by many economists, governments, and private-sector firms (especially consulting firms). Before coming to the workshop, students should have R installed on their laptops. See the syllabus for instructions on how to install R. https://www.r-project.orgThese workshops are for MIEF students only.

SA.310.808. MIEF Skills Workshop: MATLAB. 0.5 Credits.
This set of hands-on tutorials will give you the basic tools needed to conduct economic and statistical analysis in MATLAB. We will begin by introducing the powerful matrix capabilities of MATLAB, as well as loops using the for command. We will discuss the fzero and fsolve commands for solving systems of equations. These are very important for solving the steady states of Dynamic Stochastic General Equilibrium (DSGE) macro models. Students will learn how to import data into MATLAB and how to fully utilize the graphing capabilities of the software. We will also study how to de-trend data using Band-Pass and HP filtering, and how to compute autocorrelations, cross-correlations and graph impulse responses in MATLAB, all key components of business cycle analysis. Time permitting, we will walk through the steps needed to solve a first-order approximation of a basic Real Business Cycle (RBC) model in MATLAB.These workshops are for MIEF students only.

SA.310.811. MIEF Workshop: Introduction to Python. 1 Credit.
This workshop provides an introduction to the Python programming language with a particular emphasis on analyzing data in Python. Python is an open-source, general purpose programming language used widely across a number of industries and is arguably one of the most popular programming languages in the world today. This workshop will cover environment setup, Python fundamentals, and the foundations of data analysis using the popular pandas and numpy libraries. Open to MIEF students only.

SA.310.815. MIEF Skills: R Programming for Sustainable Finance. 1 Credit.
The aim of this course is to provide students with a set of quantitative tools and reasoning abilities that mirror those used by professional financial analysts, portfolio managers, and policymakers. While many of these skills will be universally applicable, this course grounds them in the application of addressing issues of sustainable finance.Asset managers report that USD 25 trillion of assets implemented Environmental, Social, and Governance (ESG) integration in 2020, up 143% from 2016. The soaring popularity of investing in ESG owes much to its advocates' claims that it helps the end-investor with two challenges. First, climate change and related long-term societal risks increasingly have the potential to affect financial markets, especially over longer investment horizons. Asset owners want to ensure that their asset managers are properly considering these long-term risks. Second, end-investors want to align their investments with their values, especially around the achievement of the Paris Climate Agreement Goals and the United Nations' Sustainable Development Goals (SDGs). This course aims to provide students with the knowledge needed to become a practitioner in the space of sustainable finance and will provide an understanding of the financial system, who the key parties are, and what sustainable financing options are available to market participants, especially across emerging markets. Further, this course will aim to test whether claims about sustainable finance, SDGs, and ESG standards are supported by empirical data.
SA.310.807[C] AND (SA.310.722[C] OR SA.310.761[C])

SA.310.834. Project Finance. 4 Credits.
Provides a practical and quantitative approach to understanding project finance transactions. Focuses on energy transactions in emerging markets. Integrates principles of corporate finance with an understanding of specific technologies, industrial organization, regulatory framework and country-specific policies. Examines foreign exchange issues, taxation, risk evaluation and mitigation and key contractual structures. Discusses typical loan structures and inter-creditor issues. Goal is to understand how the financial structure for a project finance transaction is analytically determined. Students build and apply detailed quantitative financial models. Prerequisite: Financial Decision Making.
Students may not register for this class if they have already received credit for SA.310.787[C];SA.310.722[C]

SA.310.995. MIEF Capstone Course and Project. 4 Credits.
The capstone course will consistent of small groups of students working on a practical project or a current policy issue in their area of interest. The students will delve deeply into the project using the tools they have acquired and prepare a detailed presentation to be made to the class, faculty, as well as outside professionals. Topics may include the following: current account sustainability, exchange rate exposure, investment case study, studies on financial markets, and growth and debt sustainability studies.This course is open to enrollment by MIEF students only.

SA.500 (Development, Climate & Sustainability)

SA.500.100. Green New Deals. 2 Credits.

SA.500.101. Financial Crises and Policy Dilemmas in Emerging Markets. 4 Credits.
Students may not register for this class if they have already received credit for SA.810.727[C]

SA.500.102. Business and Human Rights: Who's Responsibility is it?. 4 Credits.
This course will examine the complexities of transnational and cross-political business practices and strengthen students' ability to counsel corporate clients effectively in a transnational business environment. The class will touch on the legal dimensions of international business and human rights, starting with postwar prosecutions of business leaders in the Nuremburg trials, and continuing through contemporary human rights challenges against corporations and corporate executives based upon their alleged complicity in human rights violations. It will focus on the increasing importance of corporate social responsibility, the creation of shared value for business, and the crucial role of the financial sector, advocacy groups and the internet in rewarding (and penalizing) businesses that do not take human rights and sustainability into account. The class will cover a few sectors that pose specific challenges in the business environment, namely: extractive industries, internet privacy, human trafficking, and health.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.650.766[C]

SA.500.103. Climate Change Impacts: Foundations, Problems, and Solutions. 4 Credits.
This course will explore the impacts of climate change, with an emphasis on developing countries. In the first half of the course, we will characterize the current and expected impacts of climate change and the institutional landscape of global climate governance, particularly climate finance. In the second half of the course, we will examine specific issues arising from or linked to climate change, such as energy poverty and renewables, extreme weather and power grids, drought and human conflict, and adaptive agriculture. Students will become familiar with the scientific community's assessment of climate impacts, the problems arising from climate change in developing countries, and possible solutions to those problems. Students will write policy memos and undertake numerous negotiations on climate change.
Students may not register for this class if they have already received credit for SA.680.888[C]

SA.500.104. Climate Change: Science, Economics and Politics. 4 Credits.
Climate change is anticipated to have catastrophic impacts on the planet and on human civilization over the coming century and beyond. Sea-level rise is expected to have severe consequences on coastal communities; weather extremes such as droughts, heat waves, and hurricanes are expected to intensify; and the combination of these impacts with warming temperatures is expected to influence human activities from agriculture to the development and maintenance of energy systems. Globally, scientists have come to a consensus that greenhouse gas emissions from human activities contribute to present trends in climate. Students will acquire a firm grounding in climate science, mitigation options, economics, and politics that they can leverage at SAIS and throughout their careers. Join us for a lively course on how policymakers and society have addressed this challenge up to now and options into the future, accounting for interactions with the COVID-19 pandemic and beyond. Classroom sessions will involve lectures, seminar discussions, and active learning (e.g., simulations of international climate negotiations).
Students may not register for this class if they have already received credit for SA.680.760[C]

SA.500.105. Comparative Energy and Environmental Governance. 4 Credits.
How are public policies addressing energy and environmental problems designed and implemented at various levels of governance? Why are certain pressing energy and environmental problems addressed, while others ignored? What drives some nations, but not others, to embrace renewable energy and decrease reliance on fossil fuels? Moving beyond the idea that differences in public opinion are primarily to blame for such variation, this course focuses instead on how the design of the state itself influences energy and environmental governance outcomes. Regime type, electoral systems, party rules, fiscal structures, and institutions that determine regional and municipal policy-making authority have enormous impact on policy design and implementation. In addition, energy and environmental problems span regional and national borders, often mapping poorly onto existing governance institutions and spawning a range of unintended consequences.
To systematically examine the link between state institutions and energy and environmental governance, this discussion-intensive seminar applies theories and concepts from literatures on comparative politics to topics in energy and environment, moving gradually from multilateral institutions, through institutions at the national, regional, and municipal levels. The course ends with a class on non-state, market-based governance institutions. To facilitate detailed, comparative analysis and in-class discussion, each week introduces a range of empirical cases drawn primarily from China, Germany, and the United States.Click here to see a video introduction for the course. Click here to see evaluations, syllabi, and faculty bios.
Students may not register for this class if they have already received credit for SA.680.796[C]

SA.500.106. Development Strategies. 4 Credits.
Study of development reveals a range of proposals for economics, political and social reform and an equally wide range of constraints. But the challenge confronting development practitioners is to find a tractable and promising way forward, given country-specific realities. Drawing on a variety of emerging approaches to development policymaking, this course examines how to identify priorities for reform that are feasible in particular country circumstances and that have the potential to build and sustain momentum for development.
Students may not register for this class if they have already received credit for SA.400.818[C]

SA.500.107. Digital Development: Innovative Use of Technology in Emerging Markets. 2 Credits.
The aim of this course is to provide students with a practical, relevant framework to apply participatory and principled approaches to deploying information and communications technologies (ICTs) and digital tools to meet international development goals and improve outcomes in low and middle income countries (LMICs). The course will equip students with the skills and knowledge they need to understand and contribute to this emerging sub-field of international development practice. Each session will include an introduction to relevant foundational knowledge that will provide an entry point whereby technologies such as mobile phones, sensors, drones and tablets can be designed and deployed to address problems in health, education, agriculture, governance and environmental sustainability. Cross-cutting themes such as information security, policy, gender, and inclusion will also be explored. Students will have an understanding of the constraints and benefits of integrating technology into development programs.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.400.797[C]

SA.500.108. Energy Economics. 4 Credits.
The objective of this course is to make you familiar with key economic concepts, ground realities, and policies related to the supply and use of energy. There will be a focus on sustainable energy, but the course will not consider environmental implications, which will be part of the Environmental Economics course. We will consider supply issues (renewables and storage, petroleum, coal, natural gas, nuclear), energy demand and efficiency in various sectors, and their interactions with each other and with the rest of the economy.
Students may not register for this class if they have already received credit for SA.680.772[C]

SA.500.109. Facing the Oil Problem: The United States, Canada, OPEC and the World. 4 Credits.
Every aspect of foreign and domestic policy feels the effect of the oil problem. Solutions will be difficult. The course assesses direct and indirect costs of oil addiction, including global warming. Considers scenarios of supply disruption. Examines who controls oil and how. Explains “peak oil” and the loss of “spare capacity” to cushion price shocks. Looks at heavy oil production from Canada, America’s largest oil supplier. Weighs energy initiatives, alternative energy development and future energy RD&D. Unravels complexities of the oil problem and explores what is to be done about it. (This is a cross-listed course offered by the Energy, Resources and Environment Program that also can fulfill a requirement for the Canadian Studies Program and the Latin American Studies Program.)
Students may not register for this class if they have already received credit for SA.680.759[C]

SA.500.110. Fundamentals of International Law. 4 Credits.
A general introduction to international law, surveying such areas as (among others) the sources of law, the law of treaties and customary international law, statehood and sovereignty, refugees and human rights, the laws of armed conflict, dispute resolution, international organizations, the law of the sea, use of armed force, the role(s) of NGOs, and the law of international trade. The course will consider the differences and similarities between international and domestic legal regimes, and how the two systems interact in theory and in practice. Considerable emphasis will be placed on legal reasoning, exposition, and advocacy. The course is intended for students of all fields of concentration, since it will introduce them to the grammar and syntax of international law: a language with which they will surely need some familiarity whatever their intended career paths. It should be of special interest to potential International Law concentrators, since it will lay the foundation for the exploration of more specialized areas. Examination or paper option, with mid-term writing assignment.
Students may not register for this class if they have already received credit for SA.650.700[C]

SA.500.111. Geospatial Dimensions of Energy and Environment (GIS). 4 Credits.
The energy economy and the natural environment operate over a common matrix, that of geography. To gain a comprehensive understanding of how these phenomena interact and interrelate, one must apply tools that can accurately represent and model the spatial dimension. In this class, students will explore the use of Geographic Information Systems (GIS) and satellite imaging technologies to capture and analyze geospatial data. Topics covered include Spatial Thinking, GIS components, spatial data types and sources, and remote sensing principles, systems and technologies, as they apply to energy and environment. Students will investigate geospatial datasets and develop hands-on skills with mainstream and open-source GIS platforms.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.680.887[C]

SA.500.112. Global Electricity Markets. 4 Credits.
Electricity is fundamental to the functioning of modern society and the electricity grid has been called the greatest engineering achievement of the 20th century. It has also been deemed the lynchpin in combatting climate change – globally, the electricity sector accounts for just over 40% of carbon emissions, and 20% of final energy consumption. This course is designed to provide an introduction to the electric power industry, with a focus on the economic, policy, technology, institutional, and regulatory factors affecting the industry, major current issues and trends, and the prospects for the industry's future development and sustainability.
Students may not register for this class if they have already received credit for SA.680.730[C]

SA.500.113. Global Governance of Energy and Environment. 4 Credits.
This seminar introduces the institutional governance of international energy and environmental affairs. We will consider several questions of contemporary policy relevance. How have governments designed international institutions to meet energy demands in developing countries? What are the principle challenges for the international community in facilitating global energy transitions? To what extent are global institutions capable of meeting the challenges posed by climate change? How have global institutions evolved since the end of the Cold War to handle environmental issues? And what lessons can policymakers learn in designing or building institutions to govern energy sectors and the natural environment? By the end of the seminar we will have learned about the specific energy and environmental challenges and the international strategies developed to meet those challenges. Topics will include oil markets, climate change, renewable energy, ozone depletion, technology innovation, and financing mechanisms. We will cover the relationships between technology and energy, environment and energy, international relations and energy, domestic politics and fossil fuels, and oil and international relations. Sessions will focus on questions relating material from different parts of the seminar to provide continuity from one week to the next.
Students may not register for this class if they have already received credit for SA.680.889[C]

SA.500.114. Global Health Policy. 4 Credits.
The world's countries—low, middle and high-income alike—face numerous health challenges, many shaped by processes connected to globalization. These include combating the COVID-19 and HIV/AIDS pandemics, addressing non-communicable diseases, expanding health coverage and ensuring effective global governance for health. This course will examine these and other issues with an emphasis on facilitating your understanding and critical analysis of central issues in global health policy, and examining the role you can play to address health conditions—particularly those that affect disadvantaged populations.
Students may not register for this class if they have already received credit for SA.400.745[C]

SA.500.115. Humanitarinaism, Aid & Politics. 4 Credits.
Over the past 20 years, the attention given to the humanitarian consequences of conflict has grown considerably, not least due to advances in media technology. These consequences are multiple and transnational: civilian casualties, insecurity and human rights abuses, population displacement and attendant health impacts, food insecurity, damage to traditional political and economic structures—what some have called "development in reverse". The human toll of these conflicts--sometimes fueled by natural resources such as oil, water, land, diamonds, timber, or poppy-- has placed substantial public pressure on donor governments and aid agencies to respond with ever more rapid and effective assistance. The resulting relief programs in turn carry real political repercussions, locally and internationally.The course examines these political repercussions. It provides a foundation for understanding the context of conflict and humanitarian crises, laying out such components as the nature of conflict, forced migration, humanitarian law, how the international aid community functions, and the use of militaries in humanitarian interventions. It also follows current trends in humanitarian action, tracking the role and use of Western aid agencies, the changes arising from counter terrorism policies, and the dynamics of specific crisesClick here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.400.769[C]

SA.500.116. International Development Practicum. 4 Credits.
The practicum is a course designed to provide students with the tools and opportunity to work with an external client on a development problem or opportunity. It allows students the opportunity to apply their research, analysis and practical skills to an issue that is of direct relevance to a client. The team of students works closely with the client to produce a high quality output in the form of a publishable report, policy or program that may be implemented by the client. In addition to allowing students to translate their knowledge into practice, the practicum experience also allows students to make valuable contacts with potential employers. Students audit the course in the fall semester (in additional to their full load) and take the Practicum as a 4-credit course in the spring semester as part of their load.Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.400.901[C]

SA.500.117. International Environmental Law: Crisis and Cooperation. 4 Credits.
This course will explore various aspects of international environmental law and policy, including relating to human health. We will examine international regimes on the ownership, control and management of natural resources, including the international institutions designed to resolve disputes, as well as the prevention and management of pollution problems that do not respect national boundaries. Many international environmental problems are, unfortunately, in a state of crisis, the proliferation of hazardous chemicals and climate change being examples. These and other environmental problems can only be resolved through international cooperation. We will explore ways of catalyzing and actualizing such cooperation. We will also explore approaches to reconciling the particular needs of, and realities facing, developing countries in dealing with these issues. The course is intended to allow students to develop an analytic approach to international environmental problems in order to enable them to participate in designing and implementing solutions to those problems, particularly in an era of increasing interdependence and globalization. The course will also convey substantive information about specific problems and about the policies and legal regimes being used to deal with them.
Students may not register for this class if they have already received credit for SA.680.744[C]

SA.500.118. Energy & Environment Practicum. 4 Credits.
The Energy & Environment (E&E) Practicum is an opportunity for students to work in a consulting-like setting during their second year at SAIS. Teams of four are paired with a client organization on a pro-bono basis to tackle a real-world problem. This is an excellent opportunity to get hands-on consulting experience and acquire marketable skills that can be showcased on your resume and during interviews; and to contribute to the public discourse by addressing a meaningful problem in the energy, resources, and environment space. Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.680.775[C]

SA.500.119. International Human Rights Law Clinic. 4 Credits.
The HR Clinic is a practicum designed to provide hands-on experience in legal mechanisms for the promotion and protection of internationally-guaranteed human rights. The classroom portion of the course will seek to provide students with a solid grounding in human rights principles, treaties, enforcement procedures, and caselaw. The course culminates in a significant report on a case study that will be the principal focus of the entire academic year. The specific topic and subject country for the study will be announced at or shortly before the first class session, but the project this year will explore ways in which domestic legal systems internalize, implement, and enforce human rights norms, making them into legally-enforceable obligations. Students will research more developed systems, to analyze their successes and shortcomings, and will report based on their observation of the subject country, having researched its legal system and conducted interviews with government officials, lawyers, and individuals complaining of human rights violations. There will be an organized fact-finding mission to the subject country during Winter Break, with the report ready for publication by late spring.Students enrolled in the course must register as auditors in the fall semester – meaning that this class will not count towards their full-time status for the fall, but will be in addition to a full course load. They will receive four credits and a grade for the course, in the spring semester. This class has limited enrollment and is by application only. Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.650.780[C]

SA.500.120. International Migration, Diasporas and Development. 4 Credits.
While there are fierce debates on the impact of immigration on advanced industrial countries, the effects of emigration and diasporas on the source country are poorly understood. This seminar will seek to understand the economic, political and social consequences of international migration and diasporas on countries of origin. Is the phenomenon of greater import in the current (and future) context than it has historically been and if so, why? How do selection characteristics of international migrants and reasons for leaving – whether as students, workers or refugees – affect the country of origin? What are the human capital effects ranging from the "brain-drain" of limited human capital to "brain-gain" effects arising and social norms and thereby influence social and political change? When do diasporas engage in "long- distance" nationalism that support more polar political parties and groups from diasporic networks? What are the different forms of economic engagement of diasporas with their countries of origin, ranging from remittances to trade to FDI, and why do these vary? Do diasporas transmit "social" remittances which reshape individual preferences engaged in conflict and civil wars? And what are the effects of destination country policies on immigrant selection, assimilation and deportation on the above questions?
Students may not register for this class if they have already received credit for SA.400.748[C]

SA.500.121. Introduction to Energy, Resources & Environment. 4 Credits.

This course introduces students to the fundamentals of energy, resources and environment. It covers a wide range of topics from the functioning of electricity markets to the challenge of climate policy and the management of air pollution. It also introduces a host of key concepts and analytical frameworks that underpin policy analysis in the field, such as notions of collective action and the role of regulatory agencies in monopolistic markets. The course pays particular attention to the energy-environment nexus, including the challenge of low-carbon development in an era of climate change. The course lays the foundation for other courses in the program.
Students may not register for this class if they have already received credit for SA.680.680[C]

SA.500.122. Life Cycle Assessment. 4 Credits.

Life cycle assessment (LCA) is technique that is widely used by businesses, government, and civil society to quantify environmental impacts of products and processes from materials extraction to waste disposal (cradle-to-grave or even cradle-to-cradle). This course will provide a comprehensive introduction to LCA, an internationally recognized tool that is promoted by organizations such as the United Nations Environmental Program (through the Life Cycle Initiative). Studies employing this technique have uncovered surprising environmental findings, including the trade-offs between plastic and glass bottles, the upstream impacts of gasoline produced from the Canadian Oil Sands, and the hidden impacts of “zero emissions” vehicles. The classroom sessions will include in-depth discussions, exercises with and without software, and guest lectures to engage students with real-world LCA practice. The course has been structured for students to iteratively develop their own real-world LCA on a product of their choice throughout the semester. The technique enables in-depth comparative analyses which may be used to examine the environmental impacts of different products (e.g. dietary or energy choices) or even the influence of supply chain disruptions (e.g., related to COVID-19). While other products will be discussed, there will be an emphasis on energy technologies. This course can fulfill quantitative reasoning requirements.Pre-requisite: Students are strongly encouraged to already have or acquire basic spreadsheet skills in advance of this course. Contact the professor with questions about the course and the prerequisite.Click here to see a video introduction for the course.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.680.855[C]

SA.500.123. Natural Gas Market Fundamentals, Forecasting and Political Drivers. 4 Credits.

This course acts as an introduction to global natural gas markets, with a focus on the methods energy companies, consulting firms, financial institutions, and governments use to analyze and forecast energy prices and fundamentals. The course covers four themes: (a) global natural gas and LNG market fundamentals (key producers, consumers, trade flows and market pricing) (b) methods for forecasting gas supply and demand; (c) geopolitical drivers and trade flows and (d) commercial strategies of international oil companies, national oil companies, and utilities. The primary project for this class is building an excel-based, bottom-up country level gas balance. Accordingly, while there are no prerequisites for this course, students will find the course easier if they have a background in economics (micro, macro) and if they can use data-processing software (e.g. Microsoft Excel). A paper and a presentation will accompany the model.
Students may not register for this class if they have already received credit for SA.680.793[C]

SA.500.124. Nuclear Non-Proliferation Challenges in the 21st Century. 4 Credits.

How can a world of multiple nuclear powers control the spread of this immensely powerful nuclear technology? This course will introduce the student to these challenges by looking at how nuclear weapons work, why some countries are tempted to seek them, and the implications of nuclear weapons for civilian nuclear power and geopolitical stability. Over 50 years have elapsed since an international non-proliferation regime was established based on the 1968 Nuclear Non Proliferation Treaty (NPT). The Treaty assigned responsibility to the International Atomic Energy Agency of the United Nations (IAEA) for applying safeguards to nuclear and related materials, nuclear equipment and facilities to ensure that they remain in peaceful use. New challenges arise from growing interest by some nations in acquiring nuclear weapons to meet their perceived security needs, and the revival of interest in nuclear power as a carbon-free energy source, including from countries that have no experience in nuclear technology. In addition, increasing threats of nuclear terrorism from acts of malice, diversion, sale, and theft of nuclear material and technologies contribute to the scenario of competing nations able to master the technology and thirsting for the security benefits it seems to offer. North Korea and Iran are not alone in this. Students will gain an understanding of the political and military dynamics of nuclear weapons, ways to slow or halt the spread of such weapons and how to reduce the dangers of nuclear terrorism. Group discussions, simulated exercises, and guest lecturers will introduce additional real-world dimensions into the classroom.Click here to see a video introduction for the course.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.680.786[C]

SA.500.125. Reimagining International Development for Children and Youth. 4 Credits.
There are well over two billion children and youth in the world with half living in poverty. Threats to human security are already leading to social disruption in many parts of the world. Investing in education, healthcare, protection, and future economic opportunities for future generations is vital for building a safer, productive, and prosperous society. This course will enable students to have an overview on issues affecting young people's lives at the intersection of poverty and globalization. The course will have a heavy focus on social innovations that have been developed and implemented to support the most vulnerable young people globally. It will also examine many dynamic policies that deal effectively with these issues.
Students may not register for this class if they have already received credit for SA.400.753[C]

SA.500.126. Renewable and Distributed Energy Policy. 4 Credits.
Given the challenges presented by climate change, environmental degradation, and resource scarcity, virtually everybody agrees that "business as usual" in energy production and consumption is no longer tenable. However, for all the compelling reasons to increase the share of energy generated from renewable sources, the development of renewable energy sectors has varied widely across countries. In some economies, more than 30 percent of electricity are now generated from renewable sources, while others have made few attempts to establish domestic renewable energy sectors. This course will examine what's driving the remarkable growth in some countries while others lag behind. To understand such variation, this course provides an in-depth look at the policies and economics of renewable energy – from large scale wind and solar to distributed generation (DG) resources such as rooftop solar, micro-grids, and storage in the U.S., Europe, and Asia. Weekly, discussion-intensive class meetings examine how specific national and state policies are driving growth in renewable energy sectors, how these policies impact renewable energy projects (large and small scale), how and why these policies have differed across nations and over time, and what factors have contributed to policy failure.Click here to see a video introduction for the course.
Students may not register for this class if they have already received credit for SA.680.797[C]

SA.500.127. Research Seminar: Energy and Environment. 4 Credits.
Policy makers, business leaders and other stakeholders in civil society confront many challenges in ensuring a transition to a sustainable energy future. The ERE curriculum provides students with basic and specialized skills and knowledge across a broad spectrum of these challenges. With the introduction of the ERE Research Seminar, students will have the opportunity to conduct more in-depth, focused research on a specific topic under the guidance of an instructor and with inputs from fellow students.Note: successful completion of this course fulfills the capstone oral exam requirement.
Students may not register for this class if they have already received credit for SA.680.857[C]

SA.500.128. Sustainable Development in the Era of Climate Disruption. 4 Credits.
Students will get an introduction and participate in critical discussions of basic concepts, science and debate about climate change and how climate will impact sustainable development, climate change leadership, science, power and politics. This will cover the scientific overview of climate change over geological and historical time, its impact on the availability of basic necessities like freshwater, food security, and energy and a number of case studies that illustrate different societies interaction, adaptation and collapse in relation to climate change. Thereafter, students will learn global, regional and local efforts being undertaken to adapt and mitigate climate change and how these efforts are shaping the global development agenda and the Sustainable Development Goals. There will be case studies understanding the political and ethical contentions of climate and sustainable development and how present and future scenarios could impact food prices, conflict, infrastructure, migration, trade and geopolitical relationships.
Students may not register for this class if they have already received credit for SA.400.799[C]

SA.500.129. The Geopolitics of Energy. 4 Credits.
Energy and geopolitics are intrinsically linked. Profound shifts in the global energy landscape are having major impacts on international relations. This course will address the risks to global energy security, how countries and regions define their energy challenges, and how these perceptions impact their foreign policies and the international system. The course will look at global energy forecasts, the security considerations attached to different fuels and sources of energy, and the key issues impacting the geopolitics of energy in different regions of the world.
Students may not register for this class if they have already received credit for SA.680.765[C]

SA.500.130. The Water, Energy and Food Nexus. 4 Credits.
Energy underpins the modern economy, food and agriculture underpin civilization, and water underpins life on Earth. These three resources are the essence of human existence on this planet and yet their current exploitation and use imperils that very existence. The Food, Energy, Water Nexus, is the exploration of the interrelationships between these resources, the challenges they face individually, and the complex linkages between them. Dealing with these challenges requires an interdisciplinary approach to find integrative technology and policy solutions to complex problems especially as these challenges are exacerbated by global warming and climate change. In this class students will be exposed to the unique features of each element of the nexus, the complex dynamics of their interaction, and the pursuit of integrative solutions. Students will investigate historical, contemporary, and emerging practices that are essential for a sustainable and resilient human society.
Students may not register for this class if they have already received credit for SA.680.792[C]

SA.500.131. Venture Capital and Impact Investing in Emerging Markets. 2 Credits.
This class will thus focus on the intersection of venture capital and impact investing, on this newer asset class for emerging markets, and its specific application in the service of consciously creating impact. Given the roots of the early success stories in impact investing in the financial services sector, this class will focus primarily (although not exclusively) on financial inclusion, as it helps to demonstrate the progression of one impact investment sector that has had both early stage VC support and multiple exits. Financial inclusion also offers an ideal laboratory because it offers a service typically provided by private sector entities (albeit to fewer people than it should) and has been the source of entrepreneurs pursuing pro-poor innovations for decades, led and supported by Grameen, Accion, Women's World Banking, Opportunity International, and many others who pioneered microcredit. But the course will go well beyond the field's microcredit roots and explore what is happening on the frontier in the fintech revolution, as significant portions of the financial services sector begin to digitize and financial services increasingly are delivered via mobile phones. As such, this focus on financial inclusion will, in turn, highlight the power of investing and value creation in many of the newest pro-poor sectors.Click here to see evaluations, syllabi, and faculty bios
Students may not register for this class if they have already received credit for SA.400.795[C];SA.380.760[C] OR SA.510.102[C]

SA.500.132. Practicum on Responsible Digital Development: Ethical Considerations in Implementing Digital Solutions. 4 Credits.
With advances in artificial intelligence and pervasive digitization, policymakers must now contend with ethical dilemmas including such issues as facial recognition, voter profiling and exclusion, labor displacement, algorithmic bias, and addiction. Beyond risks, policymakers must ensure that the communities in greatest need of the benefits of technology benefit from, and have the ability to access it safely. Through engagements with digital development practitioners, the Practicum seeks to expose students to the tradeoffs involved in digitization and ethical dimensions of these choices, while also providing participating clients with well-considered advice and recommendations on these tradeoffs.Click here for Capstone course application information

SA.500.133. Theories of Change in Development: The Good, The Bad, and the Ugly. 4 Credits.
This course looks at the theory and reality of project planning in development agencies, and asks why it is so hard for them to be realistic and to plan to adapt. It covers the starting point of planning and project design and the most salient critiques (rigorous evidence bases and randomized control trials; systems thinking and complexity; Doing Development Differently; Thinking and Working Politically/political settlements). The course builds upon insider understandings of the incentives and processes within large donor bureaucracies and how those shape the processes and ultimately results of the work.

SA.500.134. Global Energy and Climate Policy. 4 Credits.
…. forthcoming.

SA.500.135. Economic Development in Latin America. 4 Credits.
This course examines the economics of Latin America in contemporary comparative perspective. Starting with an overview of long term trends in growth and structural transformation, the course moves on to consider the theoretical approaches which economists have adopted to understand development processes in the region. The introductory phase of the course completed, the next three lectures survey the key macroeconomic themes of fiscal policy, monetary policy and the external balance. The difficulties countries in the region have faced in maintaining macroeconomic stability is an important theme of the course and is referred back to again and again in subsequent sessions. An equally important topic, that of poverty and inequality, forms the basis for the next section of the course. The remainder of the course deals with the challenge Latin America now faces as it struggles to compete in the global economy. The course will entail formal lectures and student presentations/group discussions. Each student (in conjunction with one or two colleagues) will be expected to prepare and present one 20 minute presentation at some point during the course. The presentations will be followed by group discussions led by the course lecturer. Broad indications of themes for the talks provided in this outline. More precise details of the talk topics – along with guidance on sources and formats – will be given in week one of the course.

SA.500.136. Agricultural Development, Poverty Reduction and Food Security. 4 Credits.
...forthcoming

SA.501 (Technology & Culture)

SA.501.100. News Media & International Affairs. 4 Credits.
The purpose of this course is to provide deeper understanding of the interaction between the operations of the news media and the conduct of international relations. This will include an emphasis on how rapidly the major medium of exchange has passed in barely 50 years from newspapers to broadcast to the internet. The instruction will be through a combination of lectures, guest lectures, student discussion and papers. There will be an emphasis on clear and good writing. Student evaluation will be based on participation in discussion and papers.
Students may not register for this class if they have already received credit for SA.600.755[C]

SA.501.101. SAIS Women Lead Practicum. 4 Credits.
The SAIS Women Lead Practicum partners SAIS students with public, private, and non-governmental organizations and provides professional experiences through projects that advance women and contribute solutions to issues of global importance. Student teams work with clients to produce reports, policies or programs. Students will also be expected to participate in a research assignment during Winter Break (travel may be required). Upon their return, teams proceed to analyze, interpret and present results of findings to the SAIS community and clients. Students audit the course in the fall semester (in additional to their full load) and take the Practicum as a 4-credit course in the spring semester as part of their load. The application deadline is July 20. Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.600.729[C]

SA.501.102. Transnational Advocacy. 4 Credits.
The class will examine theories and practices of international advocacy. Students will examine different types of advocacy: from insider lobbying to people powered campaigns, from agenda-setting to rapid response and digital campaigning. They will read academic scholarship on advocacy alongside texts produced by and/or for practitioners. The first half of the course will focus on theoretical dimensions of advocacy – who drives norm change and who resists it? When is advocacy effective? The second half of the class will focus more on advocacy for refugee and migrant rights. Students will evaluate a campaign for refugee and/or migrant rights and develop their own campaign recommendations. Learning Objectives: critically assess theories of international advocacy; identify and compare different types of advocacy organizations, strategies and tactics; develop practical skills in designing and evaluating campaigns.

SA.501.103. Multiculturalism & the Human Rights of Women. 4 Credits.
...forthcoming

SA.502 (Security Strategy, &Statecraft)

SA.500.500. Strategy & Statecraft for US National Security. 2 Credits.

SA.500.501. 21st Century International Security Trends. 2 Credits.

SA.500.502. Genocide and Mass Violence. 2 Credits.
Genocide is often described as the worst of crimes, the nadir of human behavior, and the world's most "odious scourge." The goal of this course is to examine the origins and causes of genocide and to introduce students to the key works and major debates in the growing field of genocide and mass violence research. This course is divided into three parts. First, we will discuss how genocide is conceptualized and defined, explore the theories that try to explain whygenocides occur, and discuss why people may participate in genocidal killing. In the second part we will examine several key case studies of genocide and mass violence. Third, we will complete the course by debating policy approaches to genocide and mass violence including prevention, intervention, post-genocide justice, reconciliation and memory.

SA.502.100. Air Power and Strategy. 2 Credits.
This half-term course introduces the concepts and technology of air power, how they have been developed, used, and become a part of a country's strategy. The course includes air power's use in all military services, primarily of the U.S. military, linking as well the differing perspectives of air power by each service. The course will step though the major elements of air power: command of the air; air to ground operations (including strategic bombing, air interdiction and close air support); and the supporting structures of intelligence/surveillance/reconnaissance, air refueling, and air lift. The course will examine each of these elements through their uses in wars and crises as well as evaluating their future employment. Each student will prepare, present, and write on a selected recent or current air operation (Iraq, Libya, Afghanistan, Syria). This is a half-semester, two-credit course.
Students may not register for this class if they have already received credit for SA.660.753[C]

SA.502.101. American Intelligence: Role Practice and Impact. 4 Credits.
Offers an introduction and overview of the discipline of intelligence. Structured around three themes: the policy context in which U.S. intelligence services perform their missions, the professional techniques of intelligence collection and analysis and the enduring issues, such as counterintelligence, that have characterized the field for centuries. Features a combination of lectures, discussions, field trips and practical exercises designed to give students experience in intelligence writing and briefing. No prerequisites, but Strategy and Policy is recommended.
Students may not register for this class if they have already received credit for SA.660.779[C]

SA.502.102. American Intelligence II: Advanced Concepts in Theory, History, and Practice. 4 Credits.
The course will build on the foundation established in Intelligence I (American Intelligence: It's Role, Practice, and Impact). A version of that course taken in Fall 2020 or Spring and Fall 2021 is a prerequisite. Intelligence II will consist of more advanced work on the theory of intelligence (as related to core intelligence concepts): history, with a focus on key episodes; covert action; ethics; and various aspects of practice and performance. The course will be team taught.
Students may not register for this class if they have already received credit for SA.660.781[C]

SA.502.103. Anthropology for Strategists. 4 Credits.
What relevance does anthropology have for the formulation and execution of national security strategy? This course acquaints students who have a background in strategic studies with anthropological concepts and modes of thinking. Helps students map a social system, identify how power is apportioned within a society, interpret the system of communicative symbols that transmit meaning within a culture, appreciate how and why adversaries fight, identify how cultural forms express and transmit meaning and evaluate social change. Uses a series of case studies to examine how culture affects warfare and the effect of warfare on culture.
Students may not register for this class if they have already received credit for SA.660.890[C]

SA.502.104. Conduct of Foreign Policy. 4 Credits.
Analyzes the bureaucratic political process by which the United States decides and implements its foreign and security policies. Drawing on decision theory and case studies, examines the key institutions involved in the National Security Council process, including the White House, the State and Defense departments and the intelligence community. Also considers the impact of Congress, the media and NGOs. Taught seminar-style, with several role-playing exercises.
Students may not register for this class if they have already received credit for SA.200.701[C]

SA.502.105. Conflict Management Field Trip. 4 Credits.
Twelve students selected through an essay application process participate in a research trip to a designated conflict or post-conflict-region during the spring break March 2022. Students plan and coordinate the trip in close cooperation with Professor Vukovic, depending on destination and area of expertise. Background readings and weekly briefings with local experts take place during the fall semester. During the trip over spring break, students interview local government officials and representatives of the international community, NGOs, academia and the media in order to assess the role of the international community and prospects for progress in the region. Students select a specific area of focus and write a separate analysis and review of their findings to present in a final report at SAIS after the trip. Preference is given to second-year Conflict Management students, but students from all concentrations are encouraged to apply. Information session will be held August 25, and applications are due September 1. Selected participants will be notified by September 6th. This course commitment spans two semesters, and is open for registration only in the Fall semester.
Students may not register for this class if they have already received credit for SA.640.709[C]

SA.502.106. Congress & Foreign Policy. 4 Credits.
Examines Congress as a legislative and political institution, rooted in the Constitution but adapting to new problems and pressures. Studies how members perform their legislative and representational roles and respond to political pressures. Devotes special attention to the legislative processes influencing foreign and defense policy, including the key committees, the budget process, foreign economic policy and use of force issues. Taught seminar style, with numerous role-playing exercises.
Students may not register for this class if they have already received credit for SA.200.700[C]

SA.502.107. Defense Analysis. 4 Credits.
Why bother with quantitative analysis? Because analysis drives many policy debates. The course explores the connection between quantitative analysis and policy formulation in areas such as strategy development, wartime operations, force structure design, budget tradeoffs and weapon system acquisition. Covers many different types of analysis, not only the classic kinds of cost-effectiveness and combat models but also manpower, investment and cost. Although geared toward students going into national security positions, the methods and approaches apply broadly. Aims to make students intelligent consumers of analytic products, not quantitative analysts. No advanced mathematics required.
Students may not register for this class if they have already received credit for SA.660.776[C]

SA.502.108. Disinformation. 4 Credits.
Disinformation—or Active Measures, in old-school intelligence terms —is as old as modern intelligence agencies. The rise of disinformation was linked to the ideological clashes that defined the 20th century, and the entire Cold War. As the Soviet Union went down, the internet went up. And after a short hiatus, disinformation was back with a vengeance. This class explores the history, evolution, and metamorphosis of disinformation over the past century. Students will appreciate some of the unique features of assessing disinformation, understand disinformation operations from an offensive point-of-view, understand the limits of active measures, develop a historical understanding of past the evolution of active measures, appreciate how the internet has changed the old discipline of disinformation, and foster the skills to evaluate and assess threats and develop appropriate responses.
Students may not register for this class if they have already received credit for SA.660.718[C] OR SA.660.738[C]

SA.502.109. Economic Sanctions and Statecraft. 4 Credits.
The global community is increasingly drawing on economic tools to confront the whole panoply of security and policy threats, from terrorism, narcotics trafficking, corruption, and cybercrime to nuclear proliferation and human rights violations. Indeed, financial and economic sanctions have formed the primary U.S. government response to some of this past decade's largest geopolitical threats, whether Iran or North Korea's nuclear programs or Russia's incursions into eastern Ukraine and election meddling. Other countries – most notably China and Russia – have also sharpened their use of economic tools of statecraft, although more often through foreign investment/aid and trade restrictions than through formal sanctions. This course will provide a grounding in the theory and practice of economic sanctions and statecraft as it is employed today – namely, how governments and the United Nations wield financial and economic tools to shape geopolitics and influence the behavior of state and non-state actors. We will examine the emergence of "smart" or targeted sanctions, as well as the oft-misunderstood "secondary sanctions." We will pay particular attention to the design of sanctions programs and the practical elements that are necessary for a sanctions program to succeed. Beyond sanctions, we will assess how trade, assistance, and investment are being used by governments around the world to advance geopolitical, as opposed to economic, goals. Finally, we will take up the trend lines and potential unintended effects of the growing reliance on economic statecraft – how targeted countries are shoring up their defenses and striking back and how policymakers can prepare themselves for the challenges to come.
Students may not register for this class if they have already received credit for SA.660.709[C]

SA.502.110. Global Cyber Threats. 4 Credits.
Who are the hackers that dominate headlines? This course will answer that question not just with broad terms like "Russia" and "China" but with more focused and nuanced analysis. We will focus on known hacking groups, their methods, motivations, and relationship to greater geopolitical developments. The course will focus primarily on state-affiliated threats, though it will touch other realms of the cyberthreat ecosystem as well. Students completing this course will have a foundational knowledge of what nations are doing in cyberspace, an important step towards subject matter expertise.No background in computer science is necessary for this class, though you should be willing to push yourself out of your technical comfort zone and be persistent in learning new skills. We will examine many case studies of historic and contemporary adversary behavior. Students will gain strategic perspective by examining reporting that will include tactical, operational, and strategic insights. Many of these examples are available in the open source literature, but additional context will be provided in class discussion.
Students may not register for this class if they have already received credit for SA.660.724[C]

SA.502.111. Illicit Finance. 4 Credits.
This course will examine the methodologies used by criminals and terrorists to raise and move money, the tools that governments use to track and stop them, and the latest developments in the field. Students will look at how illicit finance campaigns are being fought in the areas of terrorism, organized crime, human rights violations, and cyber-crime. The course will cover both the systemic/structural and targeted/tactical levels of the fight. At the systemic level, governments are working to lift the tide for all boats, and enhance global anti-money laundering and combating terrorist financing (AML/CFT) standards and implementation. In the targeted arena, law enforcement, intelligence, and private sector compliance officers are tracking and targeting financial flows as a means to unravel plots, uncover conspirators, and disrupt networks. At the same time, illicit actors have become more sophisticated and more resourceful in hiding and moving money. Students will learn not just what is being done but how to critically assess tools and policy efforts in the field.
Students may not register for this class if they have already received credit for SA.660.710[C]

SA.502.112. Information Security. 4 Credits.
Infosec is cybersecurity with a sense of history, with attention to technical detail, and with an appreciation for the limits of what is possible. Part of the underlying philosophy of this class is that we cannot understand cyber operations in the twenty-first century without first understanding intelligence operations in the twentieth century. The course will provide a framework for understanding cybersecurity in an intelligence context and the evolution of counterintelligence; provide a foundation to design and deliver cybersecurity policies; explore the main concepts and theories of cybersecurity; promote a technical understanding of the Internet, vulnerabilities, and attacks; develop a historical understanding of past cybersecurity incidents, and foster the skills to evaluate and assess threats and develop appropriate responses.
Students may not register for this class if they have already received credit for SA.660.726[C] OR SA.660.714[C] OR SA.660.715[C]

SA.502.113. Intelligence, Counterintelligence, and Covert Action. 4 Credits.
This course examines the role of intelligence in the formulation of US national security by surveying intelligence organizations, relative strengths and weaknesses of collection disciplines, all-source analysis, and support to war fighters and national policymakers. Taught by a former analyst and executive with 26 years of experience, the course will emphasize intelligence from the practitioner’s point of view. The course will focus on current issues in intelligence, including the continuing evolution of post 9/11 reforms, the rise of non-state threats, and the intelligence lessons learned in Iraq and Afghanistan. A major theme throughout the course will be the challenges associated with reconciling civil liberties and individual freedom with the clandestine nature of collection, counterintelligence, and covert action.
Students may not register for this class if they have already received credit for SA.660.736[C] OR SA.502.101[C] OR SA.502.102[C] OR SA.660.779[C] OR SA.660.781[C]

SA.502.114. International Bargaining & Negotiation. 4 Credits.
Examines bargaining and negotiations from the theoretical and policy perspectives in international diplomacy, including the role of individual negotiators, domestic politics, cultural context, and the international environment. Includes an analysis of bilateral, multilateral and third-party mediation on a wide range of substantive issues. Considers ways in which negotiations may ameliorate conflicts of interest and identity in international politics. Numerous case studies and simulation exercises will be utilized.
Students may not register for this class if they have already received credit for SA.640.719[C]

SA.502.115. International Dispute Settlement Methods. 4 Credits.
Examines hands-on tactics of dispute settlement and mediation on both the local and international scenes. Although relating to conceptual approaches to mediation and negotiation, focuses primarily on interpersonal aspects and the business of bringing people to an agreement. Also looks at ethical aspects of mediation and conflict resolution.
Students may not register for this class if they have already received credit for SA.640.753[C]

SA.502.116. International Mediation. 4 Credits.
The course provides an in-depth study of the current state of the art of international mediation. The aim is to systematically approach the various uses, techniques, and problems of using mediation as a form of third party intervention to manage, resolve, or transform international conflicts. The course will offer an analysis of the history and development of international mediation as a distinct form of conflict management. The students will also get familiar with various factors that affect both the process and the outcome of international mediation. Frist of all, the course will cover a variety of contextual factors that condition any process of international mediation, such as the nature of the dispute (i.e. levels of intractability, degree of violence used, and issues at stake), disputants’ characteristics (i.e. power symmetries and asymmetries in conflict, strategies and tactics used in conflict, and capacities to rally international support) and mediators’ characteristics (i.e. perceived credibility, reputation, bias, interests and leverage which they may employ in the dispute). Secondly, the course will also provide an analysis of various behavioral factors (i.e. mediation strategies) that affect the process and outcome of international mediation. Finally, the students will also study the importance of specific types of agreements that are reached through mediation and their particular impact on both the short and long run. After completing the course the students will be able to better analyze and understand international conflicts and indicate how and why international mediation takes place.
Students may not register for this class if they have already received credit for SA.640.742[C]

SA.502.117. International Staff Ride Leadership Seminar. 4 Credits.
Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.660.725[C]

SA.502.118. Kissinger Seminar: Contemporary Issues in American Foreign Policy and Grand Strategy. 4 Credits.
What is America's purpose in international affairs? What are the major challenges in U.S. foreign policy? What is the future of American power in a changing global system? This course examines these and other critical issues in U.S. foreign policy and global strategy. We will study the opportunities and dilemmas the United States confronts in dealing with terrorism and the Islamic State, great-power competition vis-a-vis Russia and China, the threat of nuclear proliferation and "rogue states," and other issues from international economics to transnational threats. We will consider whether America can maintain its international primacy, and what alternative strategies it might pursue in the future.
Students may not register for this class if they have already received credit for SA.200.734[C]

SA.502.119. Kissinger Seminar: History, Strategy, and American Statecraft. 4 Credits.
This course is part 1 of 2 of the new Kissinger Center curriculum in history, strategy, and statecraft. It provides students with an introduction to issues of strategy, statecraft, and decision-making, framed against the history of U.S. foreign policy. The course begins with a discussion of classic works on strategy and the role of history in policy-making; the bulk of the course then covers key strategic choices and periods in U.S. foreign policy from 1776 to the present, focusing on the post-1945 period. The course addresses subjects from the grand strategy of Washington's Farewell Address, to U.S. strategy in the early nuclear age, to decision-making surrounding the Iraq War and the U.S. response to 9/11. The course can serve as preparation for the core exam in American Foreign Policy.
Students may not register for this class if they have already received credit for SA.200.738[C]

SA.502.120. Net Assessment. 4 Credits.
Net assessment is a novel approach to long-term, strategic, national security analysis developed by Andrew Marshall. The course explores how to analyze and integrate historical and emerging competitive dynamics, institutional and social behavior, innovation studies and technology trends in order to bring fresh, diagnostic insight to senior-level decision-makers. Uses case studies from World War II, the Cold War and the Revolution in Military Affairs. Graded material consists of executive-level, interactive issue papers and a final briefing.
Students may not register for this class if they have already received credit for SA.660.756[C]

SA.502.121. Operations Analysis. 2 Credits.
This half-term course will introduce students to the fundamentals of military operations analysis, their historical importance and their practical application. The overall goal of the course is to enable students to apply relatively straightforward analytic techniques to estimate the relative combat power of opposing military forces. Emphasis will be on modeling air and naval forces, but ground combat modeling will also be discussed.
Students may not register for this class if they have already received credit for SA.660.704[C]

SA.502.122. Psychology and Decision-Making in Foreign Policy. 4 Credits.
Why do leaders, institutions, and states make the decisions they do? International Relations scholars are increasingly recognizing the importance of psychological and other decision-making approaches to understanding world affairs, particularly the crafting and implementation of foreign policy. In this course, we examine individual cognitive biases and heuristics, organizational culture, groupthink, and other dynamics that produce often surprising, suboptimal outcomes in international politics. A major purpose of the course is to think broadly about ways in which these approaches can help inform theoretical work done by political scientists and policy analysts to provide more nuanced understandings of otherwise confounding cases of foreign policy decision-making. We will also draw from numerous empirical examples of crisis decision-making, major foreign policy shifts, and intelligence failure across time and space to evaluate the relative efficacy of various approaches in explaining specific cases.
Students may not register for this class if they have already received credit for SA.600.738[C]

SA.502.123. Race and Empire: The United States From Independence Through World War II. 4 Credits.
This course analyzes US foreign policy from independence through World War II. What is striking about these first 180 years of US diplomacy is how relevant many of its debates and crises are to US policy today. Central to the Founding Fathers was the question of the uniqueness, or exceptionalism, of the American experiment. The tension between Jeffersonian idealism and Hamiltonian realism remains the fundamental divide in US foreign policy debates. The intersection between the idea of Manifest Destiny and the institution of slavery opens a window on the powerful influence of racism on the formulation of US policy. The study of US relations with Native Americans and Latin Americans reveals patterns that persist in US relations with weaker states. In the late nineteenth century, the US clash with European imperialism, the conquest of the Philippines, and the opening toward China and Japan lay the foundations for the US global role in the 20th and 21st centuries. Wilsonian idealism continues to inform the present debate, and myths about American "isolationism" between the wars still distort our understanding of the past.
Students may not register for this class if they have already received credit for SA.200.716[C]

SA.502.124. Seminar in Crisis Simulation. 4 Credits.
Explores the background and discipline associated with simulated crisis events. This hands-on course focuses on developing detailed crisis scenarios and decision-making frameworks, then applying them to complex policy questions involving various national and international actors. Students design and control a campus-wide SAIS simulation in early March. Some 75–80 non-seminar students from all concentrations typically participate. Course meets across fall and spring semesters, though credit for one semester is earned. Limited to 10 students. Second-year Strategic Studies students will receive capstone credit upon successful completion of the class, including the crisis simulation in the spring. Please note this course is offered in the fall semester, but the simulation takes place in the spring semester in late February or early March. Students will receive an I (incomplete) as a grade for the fall class and will receive their final grade for the course upon completion of the simulation.Click here for Capstone course application information
Students may not register for this class if they have already received credit for SA.660.816[C]

SA.502.125. Strategic Studies Research Seminar. 4 Credits.
This course deals with the application of historical method, and historical learning more broadly, to the making of policy, with particular reference to security and strategic issues. It aims to develop students' research skills, and thereby make them effective consumers as well as producers of applied research in the field of strategic studies. At the same time, it examines the way in which historical modes of thought can inform, or distort, strategic decision-making.
Students may not register for this class if they have already received credit for SA.660.751[C]

SA.502.126. Strategy And Policy. 4 Credits.
Provides an overview of strategic studies, which deals with the preparation and use of military power to serve the ends of politics. Discusses the development of warfare from the mid-19th century through the present and addresses major theoretical concepts, including those found in Carl von Clausewitz's On War.
Students may not register for this class if they have already received credit for SA.660.740[C]

SA.502.127. The Art of Strategic Decision. 4 Credits.
A companion to Strategy & Policy or Strategy I (MASCI), this course examines strategic decision-making in war and peace. It asks what those decisions are and explores them in different contexts; it also investigates the obstacles to good decision-making, from cognitive bias to illness. The course is built on historical case studies, short lectures and discussion, with assignments that develop skills in policy writing, group work, and presentation. No prerequisite, but Strategy & Policy or Strategy I, helpful as background.
Students may not register for this class if they have already received credit for SA.660.777[C]

SA.502.128. The Future of War, Strategy and Policy in the 21st Century. 4 Credits.
Strategy II examines the current and future use of force to achieve national objectives, with particular emphasis on emerging domains of 21st century warfare. This course builds upon the courses "Strategy I" and "Strategy and Policy" that provide an introduction to strategic studies, which deals with the preparation and use of military power to serve the ends of politics. The course is structured to cover three broad areas: 1) US Strategy in a Changing World, 2) The Changing Character of War, and 3) Strategic Decision-Making. Lessons will include but are not limited to: Strategic Forecasting, Resource Tradeoffs, Surprise and Adaptability, Civil-Military Relations, Space and Space Warfare, Cyber and Information Warfare, Technology and Future Conflicts, and Asymmetric Vulnerabilities. At the end of the course, students will have a better grasp of the diverse and competing issues that confront today's strategists and policy-makers, with a particular focus on the security challenges facing the United States in the 21st century.
Students may not register for this class if they have already received credit for SA.660.792[C]

SA.502.129. The Human Face of Battle. 4 Credits.
This course examines the experience of war from the viewpoint of the frontline soldier, sailor, airman or Marine. The course will seek to understand what makes young men and women both fight and protect their comrades in the face of grave risks to personal survival, and look at how policy decisions made safely in national capitals translate into deadly combat tasks for young men and women in combat under fire. We will use works of fiction and nonfiction in literature and film to reflect on the enduring nature of war throughout modern history. Understanding what our societies ask of soldiers in battle is essential for future policymakers to make responsible decisions on how and when to use military force.
Students may not register for this class if they have already received credit for SA.660.712[C]

SA.502.130. The Realists. 4 Credits.
This course will cover Thucydides, Machiavelli, Bismarck, Hans Morgenthau, Reinhold Niebuhr, Kissinger and Kenneth Waltz, plumbing their relevance for international politics today. How do the insights of 2500 years help us to understand—or not—the nature of statecraft today?
Students may not register for this class if they have already received credit for SA.660.723[C]

SA.502.131. International Crises: US & Third World. 4 Credits.
Analyzes the actual implementation of containment in the Third World during the Cold War. Focuses on a number of events in Africa and Latin America that flared into international crises. Examines the motivations of U.S. policy, the role of covert operations and the importance of the domestic debates in the United States that they engendered. Assesses the costs and benefits of U.S. policy for Americans, Africans and Latins. Stresses the need to understand these crises from multiple perspectives–-not simply those of the relevant governments and international organizations, but also of nonstate actors such as communist parties, guerrilla fighters and independence movements including the African National Congress of Nelson Mandela. This course is based on the professor's research in the United States, Latin America (including the closed Cuban archives) and Africa.
Students may not register for this class if they have already received credit for SA.200.711[C]

SA.502.132. US Foreign Policy and New World Orders in the 20th and 21st Centuries. 4 Credits.
The US and major European powers have long sought to institute varying kinds of political order across borders. This course will provide a critical examination of such attempts in the 20th and 21st centuries and their legacies for today. The class looks at US and European attempts to compel, institute, or promote "new world orders" as empires waned, Communist regimes assumed power, new forms of European integration emerged, the Cold War unfolded, and technological advances reshaped politics. It will focus on the three times in the 20th century that the US competed in conflicts of European origin and subsequently tried to construct new forms of political order—first in 1918, then again in 1945, and yet again in 1989. Students will compare these episodes in the three parts of the course and evaluate their legacies for the 1990s and the 21st century. The class will set these episodes in their broader context, contrasting them with (1) the actions of Germany and other major European states; and (2) the Communist challenge and the Putinism of the post-Soviet space. It will also assess the impact of global events (such as those in Afghanistan, China, Japan, Korea and Vietnam) and of technological developments on transatlantic relations. Finally, the class will examine the failure on the part of both the US and European states to create actual "world order" and the consequences for transnational challenges today.
Students may not register for this class if they have already received credit for SA.200.709[C]

SA.502.133. US Intelligence, Oversight, and Politics. 4 Credits.
How does intelligence and intelligence oversight work? What are the intelligence politics at play and the trade-offs in secrecy and national security? Intelligence oversight is the intersection of intelligence and politics. In this course we will examine how various intelligence oversight structures developed as well as the shifts in executive, legislative, and judicial oversight mechanisms. We will also explore the challenges of the media, the private sector, and ethics in intelligence oversight and politics. Students will gain insight into intelligence oversight theories as well as the practices and the prospects for oversight to prevent intelligence failures.
Students may not register for this class if they have already received credit for SA.660.729[C]

SA.502.134. World Order in the 21st Century. 4 Credits.
As we look forward several decades, what problems of statecraft are likely to confront us? Will the fragmentation of world politics into three distinct conflict regions, contrasting modes of alliance behavior, and the advent of cyberwarfare threaten national security, thus undermining the capacity to maintain world order in the 21st century? In the face of nuclear proliferation, is deterrence subject to a lowering of the nuclear threshold? By mid-century world population will be in decline in most of the Great Powers. Will globalization suffer? How will oil politics shape future options? Will the advent of aging, urbanization, and increased wealth assist the search for stability and peace? Or will abrupt structural changes on the cycles of relative power of the big states unleash a return of the conditions that led to world war in the first half of the 20th century? What strategies of leadership and balance are available to the United States and to the other Great Powers? How can diplomacy help guide statecraft to surmount these problems in the effort to sustain world order?
Students may not register for this class if they have already received credit for SA.600.788[C]

SA.502.135. Public Diplomacy. 4 Credits.
Public diplomacy is one of the most poorly understood instruments of foreign policy. In exploring the theory and practice of this key aspect of a nation's soft power, this course aims to fill that gap by examining how state and non-state actors seek to establish dialogue with foreign audiences, as well as to inform them and favorably influence their views and policies. Governments and non-government institutions now have a wide range of traditional and non-traditional diplomatic tools at their disposal, including modern technological and commercial techniques, social media, cultural and educational exchanges, and international broadcasting. Particular attention will be paid to "nation-branding" and the use of pop culture as main features of the new public diplomacy. The course is a mix of lecture/discussions, active student participation, guest speakers, and a class visit to a local cultural center. Case studies will focus on the public-diplomacy successes and challenges of the United States, Japan, South Korea, China, and Germany.
Students may not register for this class if they have already received credit for SA.760.707[C]

SA.502.136. Global Diplomatic Challenges. 4 Credits.
Will the fundamental beliefs, practices and understandings which constitute the "rules-based international order" hold? Will multilateralism, international law, global institutions, and cooperation be possible in the future? Are the current architecture, governance, and modalities of coexistence still valid? Will the role of the state be the same? If not, what is next? More than a decade of traumatic events of different kinds (terrorism, financial crisis, pandemics, war) has challenged the international system to the extreme. New powers have emerged, including private actors; distrusts, polarization, hostile competition, and confrontation are increasingly becoming the norm; and yet, challenges, threats and most of all, opportunities, remain shared by all and therefore still demand collective answers. This course will reflect on these fundamental questions and provided students with a strong base to try to answer them.

SA.502.137. Intelligence: From Secrets to Policy. 4 Credits.
This course examines the role that intelligence plays in the formation of national security policy. The course explores the forces and events that have shaped U.S. intelligence. It examines the steps involved in producing intelligence from requirements through collection, analysis and the actual making of policy. The role of intelligence in the major intelligence issues facing the United States today will be discussed as well.

SA.502.138. Intelligence Analysis: Informing Policy and Business Decisions. 4 Credits.
This course examines the role of intelligence analysis in helping to inform the decisions of national security leaders, policymakers, and business executives. The course will explore topics such as the history of intelligence analysis and how it fits within the broader intelligence cycle; theory, tradecraft, and analytic tools of the intel analyst; analytic successes and failures; ethics and politicization; and intelligence analysis in the private sector. The course will highlight the challenges of delivering objective analysis in an increasingly dynamic and polarized information environment, employing case studies of analysis associated with the US war on terrorism, Iraq, the COVID-19 pandemic, and Russia-Ukraine, and consider the value of intelligence analysis as an independent stream of information to senior decision makers in government and industry.

SA.502.139. Critical Infrastructure for Threat Intelligence. 4 Credits.

SA.502.140. Information Operations (Disinformation). 4 Credits.

SA.502.141. The Roots of Information Conflict. 4 Credits.
This course examines the ways the US, China, Russia, Iran, and North Korea all grappled with the advent of the information age, and how this influenced their doctrines and approaches to cyber and information operations. It begins with a look at historical analogs (printing press, telegraph), works through each country, and ends with a look at how international relations might evolve from here.

SA.502.142. International Crises and International Law. 4 Credits.
This seminar will examine how the norms of international law and multilateral structures can contribute to the resolution of acute security crises – and also how they fail. The role of alliances as instruments of deterrence and commitment, the role of national and pooled intelligence, the function of the United Nations in convening negotiations and imposing sanctions, and the unapologetic survival of great power diplomacy and national military strength, will be addressed. We will also look at how atavistic differences – national economic ambition, ethnic competition, and ideological rivalries – can instigate and prolong conflicts. Seminar participants can prepare research papers or take an examination. Contribution to classroom discussions is required. The course will be taught by Jeffrey Pryce, former senior advisor to the Pentagon's Undersecretary for Policy and counsel at the law firm of Steptoe and Johnson in the field of international arbitration.Close analysis of the role and strategy of international and national institutions in security crises is one way to avoid repeating the mistakes of the past – in the destabilized global situation so much in evidence now.

SA.502.143. United Nations and International Security. 4 Credits.
What is the role of the United Nations in maintaining minimum public order? Is it capable of effective action in crisis, and how should it work with other multilateral structures such as NATO and regional groups? The course looks at the crisis in Kosovo, the Dayton process in Bosnia and recent wars in Africa, as well as the work of the United Nations on weapons of mass destruction and human rights law. Discusses the current reform process, the competition for power between the General Assembly and Security Council and the role of the secretary-general and International Court of Justice.

SA.502.144. National Security and Emerging Technology. 4 Credits.
Click here for Capstone course application information

SA.502.145. Genocide and Mass Violence. 4 Credits.
Genocide is often described as the worst of crimes, the nadir of human behavior, and the world's most "odious scourge." The goal of this course is to examine the origins and causes of genocide and to introduce students to the key works and major debates in the growing field of genocide and mass violence research. This course is divided into three parts. First, we will discuss how genocide is conceptualized and defined, explore the theories that try to explain whygenocides occur, and discuss why people may participate in genocidal killing. In the second part we will examine several key case studies of genocide and mass violence. Third, we will complete the course by debating policy approaches to genocide and mass violence including prevention, intervention, post-genocide justice, reconciliation and memory.

SA.502.147. East Asian Security. 4 Credits.
In this course, contemporary security challenges and policy responses in East Asia are analyzed from a variety of different theoretical perspectives. The basic assumption is that only such a multi-facetted approach can help us understand and integrate the broad spectrum of security concerns and the intricate interactions between them, ranging from human security through traditional national security to regional and global security issues, in this highly complex region (defined here as China and its maritime environment in North and South East Asia). And onlysuch a comprehensive understanding of security in East Asia can provide us with useful tools to evaluate national, regional and multilateral policy responses.

SA.502.148. History of European Integration. 4 Credits.
This course is concerned with the historical process by which European nation-states have constructed the institution known as the European Union (EU). It dealsprimarily with political, diplomatic, and economic history, not legal history or the history of European public policy. By the end of the course, students will have aclear picture of principal forces that have driven European integration at the various stages in the 'European Project's' development.

SA.502.149. The Indo-Pacific: cooperation & contestation. 4 Credits.
The Indo-Pacific has developed into a new framework for regional co-operation and contestation between the major powers, replacing the earlier notion of the Asia-Pacific. It reflects the rise of China and its Belt and Road Initiative, which aspires to weld together the Eurasianlandmass and its adjacent areas in a two-pronged, transcontinental and maritime drive. This course explores the material foundations, the perspectives and strategies of the major players in this huge maritime area, the patterns of co-operation and conflict in their interactions andthe arrangements - and their deficiencies - for transregional international order.

SA.502.150. Transatlantic Security. 4 Credits.
... forthcoming!

SA.503 (States Markets Institutions)

SA.503.100. Comparative Political Economy. 4 Credits.
This course is intended to bridge the gap between economics and politics as taught at SAIS. First examines some of the main "currents" in the literature and familiarizes the student with different variants of political economy. Presents an overview of the classical liberal, Marxian/Polanyian and Keynesian understandings of the economy, each of which serves as both a primer to political economy and as an introduction to the main contemporary approaches. Then engages with what many scholars argue is the major approach in comparative political economy: rational choice theory. By contrast, the next section looks beyond the rationalist tradition to the nowadays somewhat neglected historical tradition. Building on the historical tradition, next examines institutionalist approaches, explaining institutional change and stability over time through path dependence and earlier arrangements. Concludes with more social constructivist understandings of political economy, emphasizing the powerful role of economic ideas in the evolution of economic policymaking over time.
Students may not register for this class if they have already received credit for SA.610.770[C]

SA.503.101. Contemporary Theory in International Relations. 4 Credits.
Examines the leading contemporary theories of international relations, showing how each contributes uniquely to the larger literature. How are alliances formed? What is the relationship between absolute and relative gains? How do wars begin? Emphasizes interrelationships, divergences and cumulative developments, from the balance of power to the latest in structural, rational choice and regime theory.
Students may not register for this class if they have already received credit for SA.600.702[C]

SA.503.102. International and Comparative Political Economy of Developing Countries. 4 Credits.
This course welcomes any student pursuing a degree at SAIS. The main aim of the course is the study of the main international and domestic factors behind the economic and political development and under-development of the countries in the world that are not identified or categorized as ‘advanced’ or ‘mature’ capitalist economies.While the focus of the course is on countries that are not considered rich or developed (most countries in the regions of Latin America, Asia, Africa, the Middle East), we will refer to and use material throughout the course that also covers the rich countries and emerging market ones inasmuch as: 1) they were once underdeveloped or have developed recently, and this experience sheds light on those that have not managed to develop or ‘catch up’; and 2) their own growth and development has been in many cases a cause why others have remained undeveloped (i.e. colonialism, imperialism, dependency).The main analytical tools for the study of the international component come from concepts, theories, case studies, and data from the sub-field of International Political Economy (IPE). In turn, the main tools for the study of the domestic component of developing countries come from the sub-field of Comparative Political Economy (CPE).Hence, the course identifies key overlapping international and domestic factors that have led some countries to be poorer, less developed and more vulnerable than the advanced or mature capitalist ones.
Students may not register for this class if they have already received credit for SA.610.704[C]

SA.503.103. International Investment Law. 4 Credits.
Suitable for non-lawyers, this course analyzes the legal framework for private international investment. It considers: sources of international investment law; conditions for admission of foreign direct investment and its treatment; political risks involved such as expropriation; risk mitigation techniques such as political risk investment insurance; and the settlement of investment disputes between states and investors. We review the rights and responsibilities of foreign direct investors, shareholders’ rights and joint ventures. Given the professors’ professional focus, we take a particular look at project finance and sovereign wealth funds. The privatization-expropriation cycle is analyzed. The course delves into international anti-corruption treaties and relevant domestic laws. Aspects of the One Belt One Road initiative are discussed. Active class participation is encouraged.
Students may not register for this class if they have already received credit for SA.650.740[C]

SA.503.104. International Political Economy of Emerging Markets. 4 Credits.
This course examines the relationship between politics and international economics in developing countries, with a focus on the emerging market economies. Throughout the course, we critically evaluate different political science theories of foreign economic policymaking in emerging markets. The course begins with an overview of theories of international political economy. The second section of the course focuses on developing countries’ embrace of economic globalization over the past thirty years. We examine different political reasons for why emerging market and developing countries have liberalized foreign trade, removed barriers to foreign investment, and reduced the state’s role in the domestic economy since the 1980s. The final section of the course of the course explores how globalization has impacted emerging market economies, and considers how governments in these countries have dealt with the new challenges that have emerged in this era of economic globalization
Students may not register for this class if they have already received credit for SA.610.700[C]

SA.503.105. Politics of International Economy. 4 Credits.
How does globalization affect state power? The course examines how market outcomes shape both politics and economics. Develops a dynamic understanding of international political economy and assesses its impact in rich/poor gap models, inequality questions, the convergences of productivity, and problems of trade liberalization and neomercantilism. Applications include state breakup, the oil dilemma and currency crises. Uses this dynamic approach to identify key regional problems in North America, Europe and Asia and to offer policy solutions.
Students may not register for this class if they have already received credit for SA.610.717[C]

SA.503.106. Public Opinion as a Driver for Policymakers: Analytical Tools and Illustrative Case Studies. 4 Credits.
A key driver in any democracy, public opinion determines who will govern and which policies will be likely to succeed. Contrary to general beliefs that public opinion is highly ephemeral, both practice and scientific evidence show that public opinion is a stable, measurable, and ultimately predictable phenomenon. To explore the issue both conceptually and in practice, the course will first offer a review and discussion of relevant literature on the subject and then analyze concrete case studies exploring the uses and misuses of public opinion and polling by political and policy stakeholders. Likely case studies will include primarily Latin American examples, such as the 2002 Lula election, but also extra-regional cases, such as the 2008 Obama election and the Arab Spring, among others. The final objective is to develop a critical eye when analyzing public policy and political problems.
Students may not register for this class if they have already received credit for SA.810.705[C]

SA.503.107. Research Seminar: Political Economy in the Shadow of Conflict. 4 Credits.
This is a research seminar organized around key ongoing debates in international relations, such as the role of institutions, audience costs, leaders, bargaining, reputation, interdependence, and ideas. The course will emphasize critical engagement of the empirical evidence presented in favor of theoretical arguments, encouraging students to devise rigorous new ways to test their observable implications. Can bargaining theory help us understand the outbreak, as well as the termination of, international conflict? Has growing economic integration among states changed the nature of military conflict? Are certain economic interest groups more prone to support military expansion than others? Do democratic institutions enable states to better signal their resolve to adversaries? By the end of the course, students will be able to recognize, engage, and develop their own taste for theoretical arguments, as well as present the most compelling empirical evidence for or against them.
Students may not register for this class if they have already received credit for SA.610.702[C]

SA.503.108. Watching Wall Street from Washington: Financial Market Analysis for the Public Sector. 4 Credits.
This course investigates the strategies for, as well as the relevance of, financial market analysis directed toward policy audiences. Students will develop a deeper understanding of global financial markets and learn how to leverage that understanding shape and achieve policy goals. The course will cover five major topics: 1) Basic techniques for financial market analysis across a variety of major asset classes; 2) The characteristics of financial market analysis – its forms, theoretical underpinnings, advantages, and deficiencies; 3) The hierarchy of policy relevance of financial market analysis; 4) Costs, risks, and difficulties of financial market analysis for the public sector; and 5) Future challenges and formulations of public sector market analysis given the technological developments in finance, money management, and trading.
Students may not register for this class if they have already received credit for SA.610.703[C];SA.100.304[C] OR SA.300.701[C] OR SA.300.706[C] OR SA.999.701[C]

SA.503.109. International Human Rights. 4 Credits.

SA.503.110. Soft Power and Global Politics. 4 Credits.
As the use of military force to resolve disputes between nations becomes less plausible in most regions of the world,the struggle for influence intensies. Among the results has been the rise to global fame of the concept of 'Soft Power', in theory a means to turn a country's attributes and achievements into a lever for gaining advantage in international competitions of all sorts. Google lists 176m references to the term (11/1/13), China has invested in it heavily and consciously. Even nations such as Russia and Iran are using soft power language and tools. During the Syrian crisis, the term was everywhere. But the course will suggest that the land which gave birth to the term – the US – is still the one which enjoys the greatest advantages in this contest, since the most significant form of soft power leverage over time is the one which most successfully proposes models of modernity. No matter how much weaker the appeal of America's military, its banks, its politics compared to their heyday, America's products, icons, technologies, universities,media industries, personalities, etc. can still produce forms of presence and innovation which the rest of the world must reckon with. The course offers an historical perspective on this dynamic. Specifically it focuses on the great variety of models of modernity the US has produced over time and still can, and how the world has come to terms with them (including militant rejection). The course in its early stages is European in focus. Soon it opens out to other regions of the globe, especially Asia. So often the imperative of innovation that the US brings has encountered waves of anxiety about relations between the state and its citizens, between national communities and the market, between generations, genders, ethnic groups and religions. Efforts to understand 'soft power' and the outcomes of the world's encounter with the American version: these are the central issues of the course.

SA.503.111. Political Systems of the Developing World. 4 Credits.
The course is meant to prepare the students to deal with the most important theoretical and substantive issues affecting the nature, functioning and transformation of the political systems of the developing world. It will be focused on the analysis of the most relevant regime-types: authoritarian, military, theocratic, and democratic, and of major political processes such as political development and social modernization, state-building and state failures, politicaltransitions and democratic consolidations. It will draw from a wide range of cross-national and cross-regional cases. Class time will be divided between lectures and discussion. Each topic will be introduced by the instructor. The readings constitute the background for each lecture, but we will build upon them and go well beyond. Occasionally, timely articles on especially significant events will be analyzed in depth. Hopefully, fertile discussions will follow on the assumption thatall students have done their reading. The course will end with a take-home exam.

SA.503.112. After Afghanistan - Any Fuure for Pace Operations, Peacekeeping & Peacebuilding. 4 Credits.
In August 2021 the international media and most politicians reacted with much surprise to the dramatic events at Kabul airport. Thousands of Afghanis, desperate to flee the Taliban rule,were struggling to get on the last planes leaving the country. It did not take long before prominent Western commentators proclaimed that the failure in Afghanistan would be the end oflongstanding, Western inspired conflict management strategies to end violent conflict in failing states by deploying peace operations and getting involved in long term peace- andnation building processes. Indeed, “peace operations”, conducted by a variety of international actors like the UN, EU, NATO, AU, are a strategic pillar of international peace and securitypolicy since the end of the Cold War. In average, more than 150.000 international military, police, and civilians are annually deployed worldwide. No doubt, a number of these missionsare struggling with difficulties similar to those in Afghanistan. But does the failure in Afghanistan really imply that there is no future for peace operations and peacebuilding and thatmissions like those in Mali, Somalia, DR Congo etc. will suffer a fate similar to that in Afghanistan? This is what we want to explore in the class by having a thorough, field based lookat the history, concepts, development and unsolved problems of UN-lead peace operations and peacebuilding.

SA.503.113. Civil Wars and Interventions. 4 Credits.
The course aims to discuss key concepts and analytical framework for analyzing the various phases and facets of intra-state wars, and to show how international interventions can affect the course of these conflict and peace processes. In order to do so, the course first analyzes thecauses of civil wars and other major episodes of collective violence, the dynamics of violence in these conflicts, and early warnings measures that allow to “predict” the onset of conflict. It then examines the different ways in which external/international actors can intervene in domesticconflict, management techniques that may be introduced at various stages of conflict to halt escalation, minimize violence, and to move conflicts toward a sustainable peaceful settlement. This includes an analysis of peacekeeping, peacebuilding and state-building practices, and transitional justice. The course provides students with an advanced understanding of the thriving literature on civil wars and interventions, looking at both qualitative and quantitative scholarship, and offers students the possibility to engage with case studies to explore the real-world conflicts from their origin to their solution. In particular, the course offers detailed treatment of conflicts across continents, such as the wars in Bosnia, Colombia, Sahel region and Syria. Each case study will cover different aspects of the conflict, from their onset to evolution and the role of external actors. The expected outcome is that students will be able to engages with both academic and policy relevant literature in their quest for gaining a better understanding of the conflict cycle.

SA.503.114. Constitutional Development and Democratization. 4 Credits.
The spread of human rights and constitutional, representative government based on the rule of law, as either spurs for development or desirable outcomes of development, seems both possible and urgently necessary and yet we appear to be in a phase where many countries are undergoing a democratic retrogression. This course examines the nature, fate and prospects for constitutional development and democratisation across the globe. Employing both the diachronicand synchronic methods of analysis typical of comparative constitutional law, the course addresses topics such as constitution-making and constitutional amendment; forms of state and forms of government as well as the role and functions of constitutional and supreme courts with the aim of understanding how a given institutional framework may facilitate or obstruct transitions to democracy. The experience of so-called ‘consolidated’ democracies will often be used to examine the transition to democracy of other countries.

SA.503.115. Russia and Ukraine in Peace and War. 4 Credits.
… forthcoming.

SA.503.116. Law and Institutions of the European Union. 4 Credits.
The spread of human rights and constitutional, representative government based on the rule of law, as either spurs for development or desirable outcomes of development, seems both possible and urgently necessary and yet we appear to be in a phase where many countries are undergoing a democratic retrogression. This course examines the nature, fate and prospects for constitutional development and democratisation across the globe. Employing both the diachronic and synchronic methods of analysis typical of comparative constitutional law, the course addresses topics such as constitution-making and constitutional amendment; forms of state and forms of government as well as the role and functions of constitutional and supreme courts with the aim of understanding how a given institutional framework may facilitate or obstruct transitions to democracy. The experience of so-called ‘consolidated’ democracies will often be used to examine the transition to democracy of other countries.

SA.503.117. Great Powers. 4 Credits.
forthcoming

SA.510 (International Economics, & Finance)

SA.510.100. Advanced Topics in Trade Theory. 4 Credits.
A rigorous seminar on international trade and commercial policy covering a broad set of policy-oriented topics. Covers both theory and applications, but emphasizes tools and analytical techniques rather than case studies. Overall goal is to develop a broad conceptual understanding of ongoing issues in international trade and familiarity with the analytical techniques used by economists in developing policy recommendations. Prerequisite: International Trade Theory or Accelerated International Trade Theory. Students may not register for this class if they have already received credit for SA.300.743[C];SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C]

SA.510.101. Business Strategies for Global Financial Institutions. 4 Credits.
The objective of the course is for students to learn about the global financial services industry and to equip them with the content and skills necessary to obtain professional employment in financial services, industry in general, or the public sector. The course combines academic teachings with business school cases in "traditional" global financial services, as well as "Fintech". It emphasizes three areas: Gaining fundamental knowledge of corporate business strategy; Understanding how global financial institutions execute (or fail to execute) their strategies; Developing students' commercial skills, such as communications, presentation skills and teaming. The class is highly participatory. The work is demanding. Students are urged to review the syllabus in detail. Corporate finance or Financial Decision-Making is recommended as a prerequisite. Please contact me (jkocjan@deloitteretired.com) if you have questions.
Students may not register for this class if they have already received credit for SA.390.101[C];SA.380.760[C] OR SA.510.102[C]

SA.510.102. Corporate Finance. 4 Credits.
Introduces quantitative tools and framework of financial decision-making. Examines present-value techniques, pricing of financial instruments, trade-off between risk and return, portfolio theory, capital budgeting, financial ratio analysis, behavior of financial markets, capital structure decisions, corporate cost of capital issues, option theory and risk management. Approach is rigorous and analytical, and goal is to provide students with conceptual understanding of the ideas of financial theory as well as the quantitative methods necessary to pursue careers involving financial decision-making. Students without a background in finance/business should consider taking the online Introduction to Accounting course prior to enrollment or concurrently. In addition, students should take International Economics I concurrently with this course.
Students may not register for this class if they have already received credit for SA.380.760[C];SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C]

SA.510.103. Development Finance. 4 Credits.
"Basically, the 19th century was the age of return (the main question being, how much will the investment bring me?), the 20th century was the age of risk-return (will the return on my investment be enough to justify the risk I take?); and the 21st century appears to be the age of risk-return-impact (how much am I risking, how much can I earn, and what is my impact?)" - Bertrand Badre, Can Finance Save the World? (2018).Bertrand wrote this in the context of the challenge facing the financial system post the 2007-2009 financial crisis; and the recognition by governments across the world that the attainment of the SDGs will only be possible with innovation in financial markets, and a massive partnership with the sources of private capital.The financial consequences of the Covid 19 pandemic are still unfolding, but it is clear that limited public resources will be stretched further. Governments, especially in developing countries, need closer collaboration with private and international capital to explore nontraditional mechanisms to finance crucial development projects.This course explores the role that Development Finance Institutions (DFIs) have today. To be effective in mobilizing capital requires that DFIs fully understand what providers of capital are looking for, and the fiduciary responsibility they have towards those whose savings they manage. The course will enable students to understand key mechanisms and instruments used by DFIs, the role of governments, private capital providers and different institutions and emerging trends in international development finance. The course will build on theoretical foundations of corporate finance and project finance to help students unpack the approaches to development financing design and structuring.The course takes a mixed approach of teaching concepts, case studies and hands-on assignments to help students build analytical skills required to launch a career in International Development Finance.
Students may not register for this class if they have already received credit for SA.380.710[C];(SA.380.760[C] OR SA.510.102[C]) AND (SA.380.834[C] OR SA.510.110[C])

SA.510.104. Economic Development. 4 Credits.
This course introduces students to the study of economic development. Different disciplines have different methods – this class uses the tools of economics to examine the reasons why some places are so much more prosperous than others. Specifically, we will use mathematical modeling and econometrics to develop and test theories of economic growth, structural transformation and poverty alleviation. While the core questions in economic development could be examined anywhere in the world, we will focus on low- and middle-income countries, with some references to the historical literature in richer countries like the United States. This class is targeted at anyone considering a career in research or policymaking in developing countries, but will also provide useful skills and insights to those working on issues of poverty and growth in more developed countries as well.
Students may not register for this class if they have already received credit for SA.320.744[C];(SA.100.304[C] OR SA.300.701[C] OR SA.300.706[C] OR SA.999.701[C]) AND (SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C]) AND (SA.100.501[C] OR SA.340.709[C])

SA.510.105. Game Theory. 4 Credits.
Traditional economic theory tends to avoid interactive influences among decision-makers. Game theory focuses on analyzing the effects of interaction among individuals and groups with competing and conflicting goals. The course covers cooperative and noncooperative game theory, explaining the nature and selection of pure and mixed strategies, the various equilibrium concepts used and the theory's relationship to traditional optimization analysis. Draws examples from microeconomic theory, international trade and trade policy, arms control, international relations as well as other fields. The course is self-contained with respect to mathematics content.
Students may not register for this class if they have already received credit for SA.300.713[C];SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C]

SA.510.106. Global Risk Management and Valuation. 4 Credits.
Covers issues related to both international financial markets and financial decision-making within the international environment. Focuses on understanding and forecasting financial conditions in international markets; identifying, measuring and managing exchange-rate risk; taxation of international income; implications of political risk on project valuation; and cost of capital for international projects. Prerequisite: Corporate Finance.
Students may not register for this class if they have already received credit for SA.380.761[C];SA.380.760[C] OR SA.510.102[C]

SA.510.107. Impact Evaluation in Development. 4 Credits.
The goal of this course is to provide students with an introduction to key methods of quantitative policy analysis and impact evaluation used to analyze policy relevant questions in developing countries. We develop the statistical toolkit of regression analysis, reviewing the bivariate regression model and then continuing with multiple regression, and explore how these methods are applied to policy analysis in five benchmark techniques: randomized trials, direct regression analysis, instrumental variables, regression discontinuity, and difference in differences. We emphasize the distinction between regression as a statistical tool and the additional context knowledge (and occasionally assumptions) that are required to address causal policy questions.
We will rely on empirical microeconomic studies (mostly in developing countries) to analyze behavior under different types of market failures and to evaluate the impacts of policy interventions.Pre-requisites: Statistics, econometrics, and microeconomics. Previous knowledge of STATA will be helpful.
Students may not register for this class if they have already received credit for SA.320.731[C];SA.100.401[C] OR SA.340.710[C]

SA.510.108. International Financial Markets. 4 Credits.
This is a survey course covering issues in international financial markets. We will cover various markets and financial instruments, including bonds and bond markets, an introduction to derivatives and structured financial products. We also cover the theory of investment, including modern portfolio theory, behavioral finance, fat-tailed distributions/Black Swans and efficient market theory. Finally, we close the course with a selective history of financial crises, which also introduce basic issues related to financial intermediation (banking and shadow banking). There is a strong emphasis on real world financial instruments, institutions and issues. There are no prerequisites, though International Monetary Theory or Accelerated International Monetary Theory will be helpful. Limited to 50 students.
Students may not register for this class if they have already received credit for SA.380.722[C]

SA.510.109. Introduction to Economic Development. 4 Credits.
This course is designed to familiarize students with the key economic challenges facing developing countries. It will combine theoretical with empirical analysis and use specific examples from the developing world to deepen understanding of the drivers of economic development and the obstacles that stand in their way. This is an introductory course, without prerequisites, and is appropriate for students without prior course work in development.
Students may not register for this class if they have already received credit for SA.320.724[C]

SA.510.110. Project Finance. 4 Credits.
Provides a practical and quantitative approach to understanding project finance transactions. Focuses on energy transactions in emerging markets. Integrates principles of corporate finance with an understanding of specific technologies, industrial organization, regulatory framework and country-specific policies. Examines foreign exchange issues, taxation, risk evaluation and mitigation and key contractual structures. Discusses typical loan structures and inter-creditor issues. Goal is to understand how the financial structure for a project finance transaction is analytically determined. Students build and apply detailed quantitative financial models. Prerequisite: Corporate Finance. Cannot take if you have already passed Infrastructure Finance and Modeling.
Students may not register for this class if they have already received credit for SA.380.834[C];SA.380.760[C] OR SA.510.102[C]

SA.510.111. Public Finance. 4 Credits.
Introduces the key concepts in public finance that underpin most discussions of public policy regarding the role of the government sector, including public goods (both national and global), externalities and market failure, tax policy, macrofiscal policy and fiscal federalism. Using these concepts, seeks to highlight some of the challenging real-world public policy issues confronting the government sector in different parts of the world and how these are evolving in a globalizing world. Prerequisites: Microeconomics or Accelerated Microeconomics and Macroeconomics or Accelerated Macroeconomics.
Students may not register for this class if they have already received credit for SA.300.754[C];SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C]

SA.510.112. Quantitative Global Economics. 4 Credits.
Focuses on issues relevant to understanding the world economy: modeling and forecasting of exchange rates, modeling the sustainability of external imbalances, determining the importance of international capital flows and implementing monetary-policy rules. Examines empirical studies in each of these areas by looking at their assumptions, weaknesses and strengths and considering whether there are alternative methods of addressing a given issue. Students learn to develop an independent opinion of how theoretical ideas are applied to policy questions by asking: How much? Does it matter? How do you know?
Students may not register for this class if they have already received credit for SA.340.734[C];SA.100.304[C] OR SA.300.701[C] OR SA.300.706[C] OR SA.999.701[C]

SA.510.113. Microfinance and Development. 4 Credits.
Designed for those who wish to gain a deeper understanding of the financial, operational, and public policy aspects of microfinance, this course is ideal for students interested in careers in microfinance analysis, advisory, or investing and in the wider spheres of ethical banking, fintech, and impact investing. The early weeks of the course will explore the foundations of the microfinance movement, dive deep into the products and services associated with financial services for the poor, and ground students in the structure, operations, and technologies used in microfinance institutions. Next, students will take an investor's perspective on microfinance, looking at the application of commercial investment to the sector and its implications, teaching students how to perform financial analysis of microfinance institutions, and discussing how government policies can impact a country's microfinance sector. Finally, we explore the literature on the impact of microfinance, analysis using randomized controlled trials and other research methodologies, and review the criticisms of the modern microfinance movement. The course concludes with a capstone reading and discussion of where the microfinance industry is headed over the next decade, and how to prepare for career opportunities in the field. Prerequisite or Corequisite: Financial Decision-Making.
SA.380.760[C] OR SA.510.102[C]

SA.510.114. Sustainable Finance: Application and Methods. 4 Credits.
This course aims to provide students with a set of quantitative tools and reasoning abilities that mirror those used by professional financial analysts, portfolio managers, and policymakers. While many of these skills will be universally applicable, this course grounds them in the application of addressing issues of sustainable finance from a global perspective. The course will focus on using the R programming language and Excel, to a lesser extent, as tools for transforming real-world data into actionable insights and conveying those insights in a manner consistent with the real-world job responsibilities of sustainable finance analysts.
SA.380.760[C] OR SA.510.102[C]

SA.510.115. Public Sector Economics. 4 Credits.
The course analyzes both the role of the state in the economy, including its manifestation as a Welfare State, and the role played in the public sphere by civil society organizations. The first part deals with the theory of market failures and government failures, the theory of collective economic action, the economic theory of democracy, the analysis of tax systems. The second part of the course uses the concepts developed in the first part to analyze specific governmentalinstitutions, expenditure programs and taxes in a comparative international perspective. These include health care (special attention will be devoted to the Covid-19 pandemic), social insurance, redistribution programs, education, the politics of institutional choice, government decentralization (federalism), political capitalism, the digital revolution and the labor market.

SA.510.116. Evolution of the World Economy. 4 Credits.
forthcoming...

SA.510.117. Asian Economic Development. 4 Credits.
This course gives a survey of the Asian economic development experience over the past half-century, with a focus on its international dimensions. In addition to evaluating the source of the remarkable growth and development of the region, the course considers the many challenges that the region has and will continue to face, from the Asian Financial Crisis in 1997-98 to the Covid-19 pandemic shock. It also looks at conflict and cooperation in the region in the 21st century.

SA.550 (Africa)

SA.550.100. Democracy, Political Reform and Civil Society in Africa. 4 Credits.
This course analyzes the democratization of politics in African states by focusing on the relationship of civil society groups to political elites and formal political institutions. After reviewing independence movements, the course concentrates on the revival of democratic governance from the mid-nineties to the present. Students will assess if and how political parties, international donors, and indigenous civil society groups contribute to increasing accountability and good governance. Classes will include case studies and interviews with international and African actors engaged in the practical work of democratic reform in Africa.
Students may not register for this class if they have already received credit for SA.780.740[C]

SA.550.101. Conflict and the African Great Lakes. 4 Credits.
Africa's Great Lakes region has become synonymous with conflict. Over the last fivedecades, this region has seen genocides, ethnic violence, land disputes, civil war, cross borderconflict and a multi-national war. Burundi, Rwanda, Uganda and the DemocraticRepublic of Congo have been affected by one or many of these destabilizing factors. Thecourse introduces students to the main issues affecting peace, stability and developmentin the Great Lakes.
Students may not register for this class if they have already received credit for SA.780.734[C]

SA.550.102. Making US Policy in Africa: Strategy, Tools, and Tactics. 4 Credits.
Making US Policy in Africa examines the interagency US policymaking process guiding the implementation of African strategic policy by focusing on concrete case studies and interviews with guest speakers from key agencies. It begins with an overview summarizing the evolution of American policy process as it applies to Africa. Subsequent classes assess the strategies, tools, and tactics deployed by agencies to achieve policy objectives in the areas of security, humanitarian crises response, and economic development. By studying case studies and interacting with guest speakers, students gain practical insights into how government institutions formulate and implement US policy in Africa. Institutions include the Departments of State, Defense, and Energy; USAID; Office of the US Trade Representative; and Congress. Evaluation of student performance is based on class participation, formal presentations, and three short professional policy memos analyzing US African policy.
Students may not register for this class if they have already received credit for SA.780.735[C]

SA.551 (The Americas)

SA.551.100. Economics of Immigration. 4 Credits.
Examines the economic causes and consequences of international migration. The central focus is an economic analysis of the general patterns of population flows, their determinants and their impact. Analyzes these primarily within a comparative context of the North American experience, although also considers other case studies. Current US migration policy is examined so as to understand how the US system is 'broken' and what is meant by ' true immigration reform'. Includes consideration of the Canadian experience, in that Canadian immigration policy seems to get many things 'right'.
Students may not register for this class if they have already received credit for SA.840.715[C]

SA.551.101. Energy in the Americas: Conflict, Cooperation & Future Prospects. 4 Credits.
Analyzes the political economy of energy conflict and cooperation in the Americas by function and in terms of major players. The functional component covers the politics of oil, natural gas issues, biofuels, energy infrastructure, energy organization and regulation, private and public sector participation, geopolitics and other energy topics. The major players component includes the politics of energy in Canada, Mexico, the United States, the Andean countries, Brazil, the Southern Cone and Venezuela, and also offers a global perspective on the impact of the world's major energy producers and consumers (i.e. China, India, the Middle East countries and Russia) on the Americas.
Students may not register for this class if they have already received credit for SA.810.761[C]

SA.551.102. Financial Crises and Policy Dilemmas in Emerging Markets and Latin America. 4 Credits.
The course will focus on key macroeconomic and financial policy issues with a focus on Emerging Markets. The course is divided into two parts. The first part explores the causes, dynamics and consequences of selected crises episodes affecting emerging markets, especially in Latin America; from the debt crises of the 1980's to the COVID-19 pandemic. The second part of the course addresses selected issues regarding crisis resolution, including the political economy of crises, their long run impacts on the economy, and the future of the international financial architecture. By the end of the course, it is expected that students will be able to identify the major factors leading to crises in emerging markets, assess the difficult policy trade-offs that policymakers face when dealing with crises, and evaluate alternative policy options.
Students may not register for this class if they have already received credit for SA.810.727[C]

SA.551.103. Mexico, Central America & the Caribbean: New Challenges Amidst Growing Insecurity. 4 Credits.
Introduces students to the changing political economy of Mexico, Central America and the Caribbean. The course is divided into three parts: Mexico (eight sessions), Central America (three sessions) and the Caribbean basin (two sessions). Devotes particular attention to political and economic institutions, political culture, social and political conflict, market liberalization in the region's countries and a case study of Cuba.
Students may not register for this class if they have already received credit for SA.810.903[C]

SA.551.104. Middle Power Diplomacy. 4 Credits.
International relations scholarship pays close attention to the Great Powers, and concern over failed states. With the formation of the G20, there is a multilateral forum where Great Powers and the Rising Powers of Brazil, Russia, India, and China can shape the global agenda. Yet in every era and every stable international order there is an important role for Middle Powers – countries whose capacity to foster or disrupt order leads them to "punch above their weight" in international relations. Canada self-identifies as a Middle Power, but today the status of Middle Power is claimed by states in every region and on every continent.This course considers the dilemmas and strategies of Middle Power diplomacy, and how the United States, Great Powers and Small States interact with them. Over the course of the semester, we will consider what role Middle Powers play in the contemporary international system, and what to do about it.
Students may not register for this class if they have already received credit for SA.840.706[C]

SA.551.105. Policy Consulting Practicum. 4 Credits.
This course gives students the chance to work as a team on a consulting project for a public sector client. An MOU serves as the consulting contract, and the client provides research questions, a point of contact, and access to government professionals and subject matter experts as well as contacts in the private sector to facilitate research. The client and policy topic changes every year, contact the instructor for details.Click here to see a video introduction for the course.
Students may not register for this class if they have already received credit for SA.840.718[C]

SA.551.106. Politics of North American Economic Integration. 4 Credits.
As the renegotiation of the North American Free Trade Agreement (NAFTA) after 25 years demonstrated, economic linkages in North America continue to be contested politically at the national and subnational level. The proposed update, the United States Mexico Canada Agreement, would recommit to deepening continental economic integration while retaining the NAFTA model's governance structure: sovereign governments negotiate regulatory and border security cooperation on an ongoing basis and conduct investment, intellectual property, and monetary policy independently. Students in this course will explore the governance of economic flows among the United States, Canada, and Mexico. The course will evaluate how important sectors have adapted supply chains and market strategies in response to regional economic integration and how economic partners outside North America —like China, the European Union, and Japan—operate in the North American market.
Students may not register for this class if they have already received credit for SA.610.705[C]

SA.551.107. Security, Conflict, and Migration in Latin America. 4 Credits.
This course provides an introduction to the study and analysis of both the history and the evolution of the security policy sphere. This policy sphere is defined in a broad sense—from nation states, to guerrillas and insurgencies, to organized crime, gangs, traffickers, that is, all enemies of the state. The main lens of analysis is the study of the multiple strategies that the US has implemented to confront the evolving conflict and security challenges in Latin America: some debatably successful like Plan Colombia, and others less so, such as the interventions in Nicaragua. The lack of economic opportunity, rampant corruption, weak rule of law and fragile government institutions continue to riddle Latin America and serve as migration factors. Newer initiatives such as the Merida Initiative, the Central American Regional Security Initiative (CARSI) and the Alliance for Prosperity are also analyzed to learn from the past and the present to address shortfalls and potential solutions in a region beleaguered by insecurity and violence, in spite of the absence of international wars.
Students may not register for this class if they have already received credit for SA.810.724[C]

SA.551.108. Understanding Modern Latin American Politics. 4 Credits.
Covers the basic interpretive frameworks that have been employed to analyze political and economic change in Latin America, from the original debates between modernization and dependency theory through the rise of authoritarian regimes to the more recent studies on democratic transitions, democratic strength/weakness, neoliberal politics and economics, the post-Washington consensus years, and the great challenges the region still faces in, among others, effective governance, sustained economic growth, migration, poverty and inequality, and energy and environmental considerations.
Students may not register for this class if they have already received credit for SA.810.700[C]

SA.551.109. Urban Economics in Emerging Markets: Sustainability, Health & Infrastructure. 4 Credits.
Focuses on the urban trends in Latin America and other emerging markets, reviews the factors that explain urban form and discusses public policies that aim at dealing with urban growth while promoting livable and sustainable cities. Reviews the macro and micro foundations of urban economics and urban markets. Looks at the functioning of local governments, the role of city development strategies, municipal finance, access to credit and capital markets, corruption, violence prevention and urban poverty.
Students may not register for this class if they have already received credit for SA.810.799[C];SA.100.303[C] OR SA.300.699[C] OR SA.300.700[C] OR SA.999.699[C] OR SA.999.700[C];SA.100.304[C] OR SA.300.701[C] OR SA.300.706[C] OR SA.999.701[C]

SA.551.110. Latin American Study Trip. 4 Credits.

SA.552 (Asia)

SA.552.100. Asia in International Finance. 4 Credits.
Examines the evolution of the financial systems of Japan and China from 1980 to the present, including structure, regulation, and functioning of these markets in domestic, regional and international contexts. National context includes an in depth review of the structure and operation of the financial markets of Japan and China, including: the key participants, the governmental and regulatory institutions that supervise them, various financial crises in each country with a focus on causes and solutions, reforms over time with a particular focus on liberalization of the financial system and related issues such as corporate governance and legal and accounting issues, the fiscal/monetary processes and policies in each country that affect the financial system, and the historical, political and social factors that affect institutions and policy. Regional context includes the Asian Financial Crisis, the structural causes, the roles of Japan and China, the IMF response and the various proposals to create regional solutions to future crises; roles of regional financial institutions (ADB, AIIB); China's Belt and Road Initiative and the degree/desirability of financial integration in Asia. The international perspective focuses on the geopolitical/geo-economic implications of the structure and regulation of financial markets. Current events/topics in finance relevant to the course are covered and students are encouraged to propose such topics for discussion. Taught by a SAIS alumnus with 30 years of investment banking and private equity experience in Asia and the US. Students wishing to take the class but lacking the prerequisites should email Professor Talarico at gtalari1@jhu.edu for permission to enroll.
Students may not register for this class if they have already received credit for SA.755.720[C];SA.100.304[C] AND ((SA.380.760[C] OR SA.510.102[C] OR SA.380.722[C] OR SA.510.108[C]) OR (SA.380.722[C] OR SA.510.108[C]))

SA.552.101. Asian Energy Security. 4 Credits.
This course surveys the distinctive character of Asian energy security requirements – how they are changing over time, what political-economic forces are driving their transformations, and what those requirements imply for broader economic and political-military relationships between Asia and the world. It gives special attention to Asia's energy dependence on the Middle East and the extent to which Russia and alternative sources, including nuclear power, provide a feasible and acceptable alternative. Cross-national comparisons among the energy security policies of China, India, Japan, Korea, and Western paradigms are used to explore distinctive features of Asian approaches to energy security.
Students may not register for this class if they have already received credit for SA.755.710[C]

SA.552.102. Demystifying Indonesia: The Political Economy of an Important Southeast Asian State. 4 Credits.
This course examines the dynamics of power, business, politics and economic growth in Indonesia. The course begins with a review of modern Indonesian history, its political, social and economic development, and the multiple crises that have brought chaos and opportunity to the world's most populous Muslim state. It examines contemporary Indonesian politics and Indonesia's complex relationships with global capital markets, international financial institutions and donors.
Students may not register for this class if they have already received credit for SA.770.611[C]

SA.552.103. History of Modern Southeast Asia. 4 Credits.
This course introduces students to the history of Modern Southeast Asia as a region and to each country as a distinct polity. It will emphasize the transregional and transnational connections between Southeast Asia and the rest of the world conducted along economic, religious, imperial, ideological, technological, epidemiological, and diplomatic lines. The course is divided into thematic and chronological sections. These sections include: Colonial Southeast Asia; Early Modern Southeast Asia; Imperialism and Colonial Subjectivity; Nationalism, Decolonization, and the Cold War and Contemporary Issues in Southeast Asia. While readings are designed to give historical depth to each polity, lectures/discussions will be broad, over-arching and thematic. This course will provide a firm foundation in understanding the historical, socio-political and economic transformation of modern Southeast Asian countries from colonies (or semi-colonies) to their contemporary contexts.
Students may not register for this class if they have already received credit for SA.770.755[C]

SA.552.104. India's Challenges and the Future of a Sixth of Humanity. 4 Credits.
Since its independence, India has been the world's largest democracy and second largest country, but an extremely poor country as well. However, in a few years India will emerge as the world's largest country with a sixth of the world's population and in a decade it is poised to emerge as the third largest economy riding on the back of nearly four decades of strong economic growth. But India faces many challenges. While some are endemic, others are growing. Many of these – political, economic and institutional – are internal and are shaped by India's multiple social cleavages. Others are more external, stemming from the geopolitics of its neighborhood or the long-term challenges of climate change. The seminar will examine the principal challenges facing India: political and institutional; economic growth; poverty and inequality; demographic; urbanization; natural resources and climate change; and geopolitical.
Students may not register for this class if they have already received credit for SA.790.727[C]

SA.552.105. International Relations of Southeast Asia. 4 Credits.
Considers the contemporary foreign policies and international relations challenges of major countries in Southeast Asia. Surveys key regional issues: evolution of ASEAN; security arrangements; trade conflicts and territorial disputes; the role of China, Japan and the United States; regional integration; transnational issues; and terrorism. Limited to 20 students.Click here to see a video introduction for the course.
Students may not register for this class if they have already received credit for SA.770.712[C]

SA.552.106. Japanese Politics and Foreign Policy. 4 Credits.
An introduction to modern Japanese politics and public policy, considering prospects for major changes in security and economic policy of global importance. After a general introduction to Japanese political development since 1868, undertakes more detailed analysis of current political structure and processes as well as of domestic and foreign policy issues. Emphasizes understanding how domestic and international politics influence the functioning of the Japanese economy, especially in the current historic period of political economic change.
Students may not register for this class if they have already received credit for SA.760.741[C]

SA.552.107. Maritime Security in Indo-Pacific. 4 Credits.
This course will explore maritime issues in Asia, focusing on the maritime interests and maritime strategies of a number of countries, including China, Japan, Australia, the United States, India, Vietnam, and the Philippines, among others. It will begin with an overview of maritime issues in Asia and explore evolving views on maritime interests in several countries and the development of maritime strategies and capabilities intended to address those interests. The course will also include an assessment of different countries' approaches to the security, economic, diplomatic and legal aspects of maritime disputes. The course will cover maritime territorial disputes in the East China Sea, where China claims the Senkaku/Diaoyu islands, which are administered by Japan, and in the South China Sea, where China's claims conflict with those of a number of rivals. This will include assessments of the key actors involved. With respect to China, for example, the key actors include China's navy, coast guard, and maritime militia as well as select state-owned enterprises. The course will also consider Taiwan's role in the maritime disputes. In addition, it will explore other maritime issues of importance to countries in Asia, such as anti-piracy operations, fisheries issues, and energy security concerns.
Students may not register for this class if they have already received credit for SA.755.732[C]

SA.552.108. North Korea: Policymaking Primer. 4 Credits.
This course examines critical issues facing policymakers in and around North Korea and has three purposes. The first is to provide students with a better understanding of the place and role of North Korea in the international system, its people and elites, institutions and ideas, to analyze DPRK's relations with four great powers, focusing on nuclear politics and humanitarian concerns, as well as to give students a better grasp of various actors, their goals and motivations, policy issues and stakes, and policymaking processes in North Korea. In addition, students will explore the dynamics of the inter-Korean relations and consider the problems of nation-building, politics of competitive legitimation, and the question of Korean unification. The second purpose is for students to develop critical thinking and analytical tradecraft skills so that they can produce high quality analytical products for various types of consumers, using open source data and structured analytical techniques. The third purpose is for students to learn and practice the leadership skills required for domestic interagency coordination, multinational coalition-building, and international bargaining, which are part and parcel of any crisis management and resolution process on the Korean peninsula.
Students may not register for this class if they have already received credit for SA.765.744[C]

SA.552.109. Nuclear Proliferation in Asia: Politics and History. 4 Credits.
The course is structured around the background, theory, and application of nuclear politics and history in East Asia. In the first portion of the course students learn about the development of nuclear weapons programs during the Second World War and the Cold War and the differences in proliferation and non-proliferation strategies among early proliferators (e.g. the United States and the Soviet Union). During this portion of the course, students will examine important incidents and policy decisions that shaped nuclear proliferation in world politics. In the second portion of the course, students will learn broader theoretical concepts in International Relations scholarship such as brinkmanship diplomacy, deterrence theory, and alliance security dilemma, and apply them to the study of cases of proliferation, attempted proliferation, and nuclear latency in East Asian countries, including China, South Korea, North Korea, Taiwan, Japan and Australia in order to understand the variance in nuclear exploration, pursuit, and acquisition. The course draws upon canonical texts in the nuclear politics and history literature, and also incorporates recent policy analysis. This course relies on declassified archival documents to illustrate the history and theories addressed in the class, thus fostering a breadth of knowledge on different nuclear weapons cases. While we analyze these cases, I encourage students to engage with primary source documents as well as to think critically and evaluate the arguments put forward by historians and political scientists on nuclear proliferation and non-proliferation.
Students may not register for this class if they have already received credit for SA.755.738[C]

SA.552.110. Political Economy and Development Strategies in East Asia. 4 Credits.
This course examines and compares development strategies in East Asia. The course begins with a section investigating the individual cases of China, Japan, South Korea, Taiwan, and Singapore, with emphasis given to government-business relations, institutions, and policies that influence their development strategies. The second section engages students in a cross-regional perspective by comparing these cases, with special attention to why certain development strategies work in some political and economic contexts but not others. The third section examines how globalization influences development strategies and the distinctive roles of these East Asian economies in global production. It also discusses the roles of international organizations and networks of trade and investment. The course aims to facilitate understanding of the development policies in East Asia both in terms of specific contexts and in a comparative perspective.
Students may not register for this class if they have already received credit for SA.755.722[C]

SA.552.111. Political History of North and South Korea. 4 Credits.
This course gives an historically informed overview of politics and society in the Republic of Korea (ROK or South Korea) and The Democratic People's Republic of Korea (DPRK or North Korea), focusing on profiles in political leadership, the development of political institutions, and societal change. It considers the legacies of colonial regimentation, Cold War militarism, and national division on domestic politics. Specific topics include authoritarianism, democratic transition and consolidation, civil society, government-led industrialization, and debates on Korean unification.
Students may not register for this class if they have already received credit for SA.765.704[C]

SA.552.112. Security Challenges & Military Modernization in South Asia. 4 Credits.
South Asia is home to two of the world's largest militaries, the world's leading arms importer, several major ethnic, religious, and nationalist insurgencies, an array of sophisticated terrorist groups, and two nuclear-armed powers that engage in frequent border skirmishes. This course takes a systematic and in-depth look at how states manage security challenges in this complex region. Topics include analysis of foreign policy decision-making processes and civil-military dynamics; the rise (and export) of Islamic extremism; comparative perspectives on counterinsurgency campaigns undertaken by India, Nepal, Pakistan, and Sri Lanka; India's efforts at military modernization and preparations for China-related contingencies; and the ways in which evolving strategic capabilities and doctrines might affect the risk of nuclear escalation. This course includes a practical focus on policy writing.
Students may not register for this class if they have already received credit for SA.790.728[C]

SA.552.113. The U.S., Japan, and Great Power Competition in Southeast Asia. 4 Credits.
Chinese influence in Southeast Asia poses critical challenges to the U.S.-Japan alliance in an age of great power competition. We will explore those challenges and how the US and Japan are responding through the lenses of geopolitics, geoeconomics, grand strategy, and the arts of statecraft. We will bring these lenses to bear on the questions: "Why is Southeast Asia so important to the region's great powers?" "How are the U.S. and Japan competing with China in Southeast Asia?" and "Is a regional order that imposes restraint on competing great powers possible?"
Students may not register for this class if they have already received credit for SA.760.709[C]

SA.552.114. U.S. Security Policy in the Indo-Pacific. 4 Credits.
Nowhere does the United States face greater long-term security and defense challenges than in Asia. This course, combining a thematic approach with weekly case studies, provides a rigorous examination of key security issues across the Indo-Pacific — from Pakistan to Japan — and their implications for U.S. interests and policy planning. Topics include the evolving Asian security order; defense challenges posed by the rise of China; trends in conventional military modernization; implications of the Sino-Indian rivalry on regional stability; emerging dynamics in Asian nuclear deterrence; and trends in security competition in the maritime, space and cyber domains. This course includes a practical focus on policy writing.
Students may not register for this class if they have already received credit for SA.755.729[C]

SA.552.115. US-Japan Relations in Global Context. 4 Credits.
Examines the evolution of the U.S.-Japan strategic relationship in a changing global and regional geopolitical environment. Gives special attention to the U.S.-Japan alliance and relations with China and the Korean Peninsula. Involves substantial direct dialogue with policymakers, analysts and business leaders, both American and Japanese. The class includes extensive travel study, and students are expected to write a policy-oriented research paper on economic, political, technological or security issues in U.S.-Japan relations, the best of which are published by the Edwin O. Reischauer Center for East Asian Studies in both the English and Japanese languages. Students should have basic knowledge of Japanese diplomacy before taking this course. Taking Japanese Pol & Pub Policy SA.760.741 OR Intro to Japanese Economy SA.760.702 is highly recommended. This course will serve as a capstone course for all Japan studies concentrators and may count as a capstone for students in other concentrations, with approval from the CCEL office showing relevance to a student's course of study and concentration.IMPORTANT: There is limited space available for the associated field trip. All students may register for this class. Those who wish to attend the field trip must submit your cover letter to reischauer@jhu.edu for consideration.Click here to see a video introduction for the course.
Students may not register for this class if they have already received credit for SA.760.749[C];(SA.552.106[C] OR SA.760.741[C]) OR SA.760.702[C]

SA.552.116. Technology and Security in Asia: India. 4 Credits.
This study trip capstone course explores policy challenges that sit at the intersection of technology and security issues in Asia. This academic year, the course will focus on India. During the fall term, students will study theoretical and foundational texts on technology and security; will divide into two groups to select complementary policy research questions; and will plan the trip itinerary and interviews. The provisional topical areas for research are data privacy, security, and localization; and India's investments in AI/ML technologies. Students will travel to India in January 2023. Following the trip, students will complete their group research projects and present their findings at a public event. This course includes practical instruction on writing, interviewing, and public speaking skills. Open to second year MAIR students. Click here for Capstone course application information

SA.552.117. The Korean Economy: Sustaining Convergence to the Highest-Income Countries. 4 Credits.
The course will analyze Korea's transformation from one of the poorest countries in the world in the 1950s to the 10th largest economy today. However, Korea faces serious challenges to continue its convergence to the highest-income countries. The course will focus on the challenges posed by Korea's rapid population aging and the associated fiscal pressures, its polarized economy (large companies versus small and medium-sized enterprises, manufacturing versus services, regular workers versus non-regular workers and men versus women), its dependence on energy-intensive industries and coal, and North Korea.

SA.552.118. Global Korea: Understanding Contemporary Issues. 4 Credits.
This course examines pressing geopolitical and economic issues confronting South Korea, which have immense implications not just for its own national security but also for regional and global security. The course consists of two parts: 1) traditional and emerging security issues related to the Korean Peninsula, and 2) Korea's economic security and other global issues. The first part is designed to understand North Korea in terms of its regime and nuclear capabilities as well as its implications for regional and global security. The first part also examines other pressing security and defense issues such as the Taiwan Strait and Russia's invasion of Ukraine, with a focus on the role of South Korea and the policy implications for South Korea. It will also survey emerging multilateral frameworks, including the Quad and AUKUS, to discuss Korea's potential role and contributions to regional and global multilateralism. Also discussed will be the future trajectory of the US-ROK alliance. The second part of the course assesses how South Korea's economy fits with the changing economic architecture of the Indo-Pacific and across the globe. The topics include global supply chains of critical technologies, climate change and clean energy, infrastructure development and connectivity, digital commerce and trade, the pandemic and public health, and the "soft power" of the Korean wave (hanryu). After an overview of these topics, the course will assess how the US-ROK alliance and economic partnership affects the region and the world's economic security. The course aims to provide students with the information necessary to understand contemporary issues for South Korea and to understand how those issues relate to the evolving concept of the US-ROK alliance and economic partnership, as well as how South Korea can position itself as a global leader.

SA.552.119. Korea Study Trip. 4 Credits.

SA.553 (China)

SA.553.100. New China Course. 4 Credits.

SA.553.101. Advanced Topics in Chinese Foreign Policy: China at the Borders. 4 Credits.
Examines China's relations with the countries along its territorial and maritime periphery, which form a core dimension of Chinese foreign and security policy. China's neighbors have interests that do not always align with China's preferences, some involving fundamental disagreements over territorial rights, resources, and political values. The way in which China manages its relationships also has implications for its broader global goals and how China sees itself as a nation-state. This course also gives close attention to how China manages its physical borders, including through provincial and sub-provincial institutions.
Students may not register for this class if they have already received credit for SA.750.749[C]

SA.553.102. China and International Law. 4 Credits.
Over the past thirty years, China has gone from being one of the most isolated countries in the world to a major player in international affairs. Yet despite its growing power and influence, it maintains an ambivalent attitude towards international law and the liberal international order. This class will explore that ambivalence, and will in particular examine how China might adapt to the existing world order and the ways in which China will look to influence its evolution. The class will cover China's approach to international peace and security, China's membership in the WTO, Beijing's engagement with the international human rights regime, and the South China Sea dispute, among other topics.
Students may not register for this class if they have already received credit for SA.750.602[C]

SA.553.103. China's Political Economy in Transition. 4 Credits.
This course examines the political and institutional foundations sustaining contemporary China's economic growth and reforms, as well as the consequences of its transition. The course focuses on several paradoxes. How does China push for market-oriented reforms without democratizing the authoritarian political system? Is the state still in control in today's economy? How does China reconcile the communist party ideology with its fast-growing private sector, and with elements of capitalism? How does the state balance the centralization and decentralization of economic policy making and implementation? What is the rationale and the consequences of China's internationalization? How does the US-China tech war influence China and its position in the global value chain? Can the "China model" work in other contexts? We will examine these important questions through a combination of conceptual frameworks, real world examples, and policy analysis.
Students may not register for this class if they have already received credit for SA.750.740[C]

SA.553.104. Chinese Foreign Policy. 4 Credits.
This course analyzes the evolution of the People's Republic of China's foreign policy. It deals with China's objectives, institutions, instruments of policy, changing alignments, and growing role in the international system, directing considerable attention to specific policy issues and the policy process.
Students may not register for this class if they have already received credit for SA.750.702[C]

SA.553.105. Contemporary Chinese Politics. 4 Credits.
Analyzes the domestic politics of the People's Republic of China, with particular emphasis on the reform era. This introductory course covers political history, policy process and institutional issues, leadership and the challenge of socioeconomic modernization. Focuses on recurrent and substantive policy issues in Chinese politics.
Students may not register for this class if they have already received credit for SA.750.228[C]

SA.553.106. Leadership in China. 4 Credits.
This course is a broad survey of what leadership looks like in China. The main through-line of the course is the iterative and evolving dynamics between incentives/constraints and agency. We will explore the state as the playing field where these dynamics are played out, over time (to explore continuity and change) and across space (to explore adaptation and innovation). The course does not presume prior knowledge of China or Chinese language, but students new to the study of China are encouraged to pay special attention to the cumulative nature of the course and invest in the readings, particularly in the first four weeks. Although some of the themes of this course may minimally overlap with/ reinforce other courses offered at SAIS, the approach to this class will be significantly different.
Students may not register for this class if they have already received credit for SA.750.752[C]

SA.553.107. The Turbulent Triangle: Taiwan, China and the United States. 4 Credits.
Examines how Taiwan has developed into an economic powerhouse and an open, stable society but also presents one of the thorniest issues in China-U.S. relations. Considers Taiwan's unique international status and its complex sense of identity. Examines the roots of ongoing tensions between Mainland China and Taiwan and the U.S. and how Taiwan, despite its achievements, threatens to become once again a flashpoint.
Students may not register for this class if they have already received credit for SA.750.729[C]

SA.554 (Europe & Eurasia)

SA.554.100. Central Asia Practicum: The Pivot of All Eurasia. 4 Credits.
If Eurasia is the "geographical pivot of history," as Halford Mackinder proclaimed in 1904, to what extent does Central Asia constitute the axis of this super continent – the pivot of the pivot? The course examines this question through the analytical lenses of history, political economy and geopolitics. Strategically located at the crossroads of China, Russia, India, Turkey, and Iran, the region is pulsating with great power rivalries, developmental challenges, and social tensions. Our focus will be on the external influences and domestic drivers that shape the development paths of the five states of Central Asia (CA5)— Kazakhstan, Kyrgyzstan, Tajikistan, Turkmenistan, and Uzbekistan—with episodic examination of neighbors in the Caucasus and Afghanistan. The region is a thriving market for hydrocarbons, minerals and agricultural products, but also a crossroads of illicit drugs, terrorist groups, and weapons. At the same time, innovative educational and civil society organizations offer hope for a new developmental path. The course examines these contradictory trajectories, their implications for regional economic and political development, and the consequences for rivalries and connectivity in Eurasia. Enrollment in this class is by application.
Students may not register for this class if they have already received credit for SA.710.772[C]

SA.554.101. Europe and Islam. 4 Credits.
Introduces the complex interactions of European and Islamic civilizations from the time of the Prophet until the contemporary era. Draws heavily on the cultural, political and military aspects of early encounters between Islam and Christianity. Analyzes the contemporary presence of Islam and Muslims in Europe by focusing on France, Germany and Britain. Examines the relevance of different models of secularism and citizenship in these three countries. Also addresses Islam in the Balkans, Europe's relations with Turkey and the Middle East.
Students may not register for this class if they have already received credit for SA.710.956[C]

SA.554.102. Politics of Protest in Europe and Eurasia. 4 Credits.
This class provides students with an in-depth exploration of the motivations behind, strategies of, and societal changes produced by various instances of collective mobilization across Europe. Some of the main questions we seek to answer throughout this course are: Along what lines of grievance do social movements form? Why do people choose to protest collectively given threats of reprisal? What explains the rise in support for populist outreaches by far-right parties in Europe's most democratic countries? By examining a wide variety of movements, from labor mobilizations such as Poland's Solidarity to ethnic nationalist campaigns by groups such as the Basques and the Kurds, we use comparative analysis to identify points of convergence and divergence across cases. We explore how mobilization strategies spill across borders in "waves" of protest, such as those prefacing the collapse of the Soviet Union. We also investigate how developments in media and technology affect protest outcomes – and when they don't, such as the "Twitter Revolution" that failed in Moldova. Students will gain both empirical insights into particular cases across Europe as well as the conceptual tools used by scholars of comparative politics to analyze the puzzling but highly topical questions above.
Students may not register for this class if they have already received credit for SA.710.707[C]

SA.554.103. Russia: The Making (and Unmaking) of a Super Power. 4 Credits.
Far from expectations of partnership after the Soviet Union collapsed in 1991, Russia looms large in today's international security debates as a nuclear-armed opponent of the US-led world order. The course examines how the Soviet Union acquired and lost superpower status as a backdrop to current Russian efforts to reassert global leadership. The central premise of the course is that modern Russia, to paraphrase Mark Twain, does not repeat but rhymes with the Soviet era. The content is structured chronologically, to give the main sequence of events, and thematically, to enable students to draw comparisons between the Soviet and post-Soviet eras. Themes include state capacity and institutions, economic modernization, national identity and nationalism, and national security. The content enables students to look behind the headlines to historical factors shaping the current worldview of Russian elites and society.
Students may not register for this class if they have already received credit for SA.710.724[C]

SA.554.104. The Balkans: From Fragmentation to What?. 4 Credits.
Explores factors at work in the cycles of conflict and outside control that mark the region. Considers the competing narratives that shape the identities and "history" of the Balkan peoples. Also looks at the problems of shifting borders and populations as well as the definition of the Balkans as a region—including exploration of why an area marginal to greater powers repeatedly draws them into dangerous involvements. The former Yugoslavia's formation and collapse is a central focus, along with the growing Albanian universe and the roles of Greece, Romania and Bulgaria.
Students may not register for this class if they have already received credit for SA.710.992[C]

SA.554.105. The New Turkey. 4 Credits.
The primary objective of this class is to introduce students to Turkey's rapidly evolving domestic and external environment. The first part of the course will broadly cover Turkey's domestic dynamics. After an overview of the Ottoman legacy, the course will analyze the official ideology of the republic, Kemalism, and the role of the Turkish military as the guardian of this official ideology. The course will then focus on the Kurdish question and political Islam as Turkey's two major "identity" problems. The rise of the AKP (Justice and Development Party) in the last decade and the clash between Kemalism, the Kurdish question and political Islam will be a major theme of class discussions and presentations. The second part of the course will primarily deal with Turkish foreign policy and Turkey's evolving strategic vision and culture under the leadership of AKP. Although the main emphasis will be on relations with the Middle East, Turkish Foreign policy towards the European Union and Russia will also be analyzed. The domestic determinants of Turkish foreign policy will be a particularly important theme to explore.
Students may not register for this class if they have already received credit for SA.710.740[C]

SA.554.106. Contemporary Germany. 4 Credits.
What is and what should Germany's international role be? Should it be more active and assertive? Or should it continue along the path of constraint that nevertheless has made it the most important country in Europe and its de facto leader? These old debates are as relevant as ever against the backdrop of Brexit, Russia's war against Ukraine, increasing EU concern about China, global economic woes, and many other challenges. Germany is also the central European player in the transatlantic relationship and exercises significant influence on the West's relations with adversaries and difficult partners. We will study Germany's tumultuous recent history; the sources of its leadership, its strengths and limits; its domestic political context; its extraordinary success as the world's third largest exporter and Eurozone leader; and its foreign and security policy with respect to NATO, the EU, Russia, China, France, Turkey, Central Europe, Israel, and, of course, the United States. We will also look ahead at how Germany's role may evolve in a changing global strategic environment.

SA.554.107. Eurasia's Transformation and the Global Implications. 4 Credits.
Eurasia, stretching from the Western Europe across Russia, Central Asia, and China to the Pacific, is by far the largest continent on earth, with a massive share of global population, economic output, and key natural resources. It has been traditionally Balkanized. Yet since the late 1970s, due to China's modernizations, the collapse of the Soviet Union, and a series of global geo-economic shocks, the nations of this Super Continent have become increasingly interactive, creating fluid new trans-regional political-economic patterns that remain remarkably unexplored. This course explores the critical junctures that made Eurasia the dynamic, growing colossus that it is becoming today, as well as the global implications, from a unique problem-oriented perspective.
It looks first at the developmental and political challenges confronting China, Russia, and key European states as the Cold War waned, how the key nations coped, and how they might have evolved differently. It then considers the new challenges of the post-Cold War world, and how national and local leaders are responding today. Particular attention is given, in this problem—centric approach, to the challenges that growing Eurasian continental connectivity, epitomized in China's Belt and Road Initiative, are creating for US foreign policy and for the grand strategy of American allies in NATO, Japan, and Korea. Note: Some familiarity with Eurasian history and/or politics is recommended.

SA.555 (The Middle East)

SA.555.100. Geostrategy of the Middle East. 4 Credits.
The Middle East has long played a strategic role in the world order. For centuries, its location and complex history has made the region a central concern for strategists. In recent decades, no other world region has been subject to the sustained internal rivalry and great power intervention than the Middle East. The region has produced a series of crises, abiding rivalries, and devastating conflicts including the Arab-Israeli conflict, Iran-Iraq war, the rise of Islamism, U.S. war in Iraq, and the Iranian nuclear program. Over the past six decades American involvement in the region has steadily increased to contend with (and contribute to) these events, and in the process, influence the direction of regional politics. The Middle East remains among the most strategically consequential and geopolitically fluid regions of the world. The recent interest of both Russia and China in the region attests to its relevance to global politics today. Despite long running involvement with the Middle East, understanding its shifting geopolitics remains a challenge for academics and policymakers.This course will examine the historical background to the region's rivalries, examine the reasons for the shifts in balance of power between Arabs, Israelis, Turks, and Iranians. The course will discuss the main cultural and religious axes of conflict and territorial disputes, and how they have become entwined with great power interests. We will examine the main trends, identify the main actors and episodes that have shaped the region's geopolitics. The course will rely on theories of international relations as analytical tools for interpreting patterns of rivalry, conflict, and alliances. The course will also examine how American foreign policy thinking has grappled with the Middle East.
Students may not register for this class if they have already received credit for SA.860.822[C]

SA.555.101. Islam and Politics: Religion and Power in World Affairs. 4 Credits.
The rise of Islamism and the role Islam has played in politics constitutes one of the most important and consequential developments of our time. In recent decades Islamic ideas have become embedded in society, economics and politics of large numbers of Muslim countries in Asia and Africa but have also became part of domestic politics in the West, China, India and Russia. Since 9/11 Islamic activism has also been integral to discussion of international security, deeply influencing ebbs and flows of global conflict. It has dominated news and foreign policy thinking from one major global event to another over the past four decades.
In the process it has posed significant foreign policy challenges, but also raised important questions for historians and political scientists. This course will explain the origins and development of this important historical phenomenon. It will examine how and why Islam has become so politically influential, trace the origins and development of core ideas of Islamism, and how it has shaped global politics in recent decades. The course will examine the life and works of key thinkers and leaders and discuss those events that have defined Islam's role in politics such as the Iranian Revolution, the Afghan Jihad, and the rise of Al-Qaeda and ISIS.
Students may not register for this class if they have already received credit for SA.860.818[C]

SA.555.102. Political Economy of the Middle East. 4 Credits.
The Middle East plays a prominent role in global politics. The focus is often on the region's security challenges. The Middle East is however a vast region that is home to over 400 million people. States, economies, and societies across the region make for complex patterns of political and economic development that are of importance to theoretical understandings of comparative political economy, but also provide insights into the region's security situation, internal rivalries, and the region's place in the global economy and relations with the world's great powers. This course will provide a basis for understanding that dynamic by examining its patterns of economic and political developments, state formation, and relations between the economy, the state and society. The course will trace the historical foundations of modern states and look to theories of comparative political economy that discuss state formation and state-society relations in late-industrializing societies to analyze them. The course will discuss the impact of history and the colonial experience on Middle East politics, and the role of oil in its economic development. We will look at how economics and politics have entwined to shape states and their relations with societies, and the different trajectories of state formation pursued across the region—from secular modernizing states to tribal monarchies and an Islamic Republic in Iran. We will examine the reasons for and nature of authoritarianism, the characteristics of rentier states and patrimonial state-society relations, and the impact of security issues on state formation and behavior. We will also examine social structures in the region, and the way they have reacted to state formation. The course will provide explanations for emergence of strong states, weak and failed ones, as well as particularities of the region's economies.
Students may not register for this class if they have already received credit for SA.860.759[C]

SA.555.103. Washington, Israel and the Arabs. 4 Credits.
Explores history of the Arab-Israel conflict and its evolution. Looks at the trajectory of Arab-Israeli diplomacy, its practice and history. Examines the role of outside powers, with case studies selectively chosen: the Egypt-Israel and Jordan-Israel peace treaties, the aborted Syria peace track and the Israel-Palestine process, from Madrid and Oslo to the present. Examines the role of unilateralism and impact of recent regional Arab upheaval on Israel-Palestine. Discusses the achievements and limitations of diplomatic settlements with implications for the future.
Students may not register for this class if they have already received credit for SA.860.719[C]

SA.555.104. Political Leadership in the Middle East. 4 Credits.
Change in the Middle East has often been attributed to charismatic and powerful leaders, whose influence has been magnified by crisis, wars, and authoritarian traditions. This course combines biography with politics to ask whether, how, and in which circumstances, individual leaders havechanged the course of modern Middle Eastern history. Special attention is paid to the interaction of leaders and mass movements, and leadership dynamics in the unfolding "Arab Spring."

SA.555.105. History and Politics of the Middle East & North Africa. 4 Credits.
The course aims at introducing students to the history and politics of the Middle East and North Africa (MENA), with a focus on the Mediterranean Middle East/Mashreq and Maghreb. Starting with the exploration of the emergence of the modern state system in the region, the course willexamine the post-colonial politics of MENA countries and the current state of affairs. In this context, a number of key issues will be addressed, such as state-society relations, authoritarianism and reform, the role of the military, regional dynamics, conflicts, the strategic importance of the region, political Islam, and democracy and human rights. The course will conclude with a discussion of the Arab uprisings and their outcome, along with the implications for the politics and international relations of the MENA region.

SA.556 (The United States)

SA.556.100. Thinking About America: Power, Knowledge & the Crisis of Democracy. 4 Credits.
In the past half-dozen years, Americans and foreign observers have suddenly seen the United States in a shocking new light. But why should recent events have come as such a surprise to so many? What explains the flawed perceptions that dominated previous popular and scholarly understandings of America? These are the central questions the seminar aims to answer. Focusing on the intellectual dynamics of the current American crisis, the seminar traces the roles that ideas have played in U.S. political and economic history, and it explores how those roles have changed during the past half-century. The seminar is designed for students with some prior academic preparation in U.S. studies. It will enrich the work of any thoughtful social-science researcher or student of American political development; Limit 15
Students may not register for this class if they have already received credit for SA.200.729[C]

SA.556.101. U.S. Constitutional Law and the International System. 4 Credits.
The American tradition of judicial review by independent courts has had an enormous influence on the international development of the rule of law in newly emerging democracies. This seminar, taught by a practicing lawyer, reads some of the classic cases of the American constitutional tradition, including cases on school desegregation, separation of powers, foreign affairs, freedom of religion and speech, control of immigration and the right to be left alone. Looks at the indeterminacy of the original constitutional document and how it has developed through the processes of both political and judicial interpretation.
Students may not register for this class if they have already received credit for SA.650.765[C]

SA.600 (International Relations)

SA.110.400. Mastering the Long Writing Project. 4 Credits.
This course is designed for PhD and DIA students and only open to MA students with permission of the instructor. Even with a solid research design, the challenge of producing a dissertation-length summary of that research remains daunting. Writing a long manuscript—especially on a deadline, and with other competing work demands—is one of the most difficult challenges any student will ever face; yet, without mastering that challenge, a student cannot complete a doctoral degree program. This seminar for PhD and DIA candidates will provide strategies and advice for producing an extended written argument, a valuable skill both in and beyond the academy. The seminar's specific topics and themes will be tailored to the interests of the class members, and the course requirements will be designed to help those students advance the writing of their dissertations. In addition, the course will provide advice on the process of publicizing research findings, and on turning dissertations into published articles and books.
Students may not register for this class if they have already received credit for SA.600.795[C]

SA.110.401. DIA Methods I. 4 Credits.

SA.110.403. DIA Thesis. 8 Credits.

SA.990.890. Graduate Research Practicum. 12 Credits.

SA.630 (Global Risk)

SA.630.720. Microeconomic Risk and International Trade. 4 Credits.
The aim of this course is two-fold. First, we study the microeconomic effects of incentives on the consumer and the producer and their relationship with efficiency. By developing a detailed analysis of the market system, the course provides the framework for policy intervention and the assessment of their effectiveness. Second, we develop an understanding of how the economy works at the aggregate level: the foundations for macroeconomic analysis explain how production, employment, prices and interest rates are jointly determined. By focusing on the economic interaction of individuals, the course develops the theoretical and empirical foundations required to analyze the various macroeconomic policies that affect economic activity.

SA.630.721. Macroeconomic Risk and International Finance. 4 Credits.
This course highlights the economic sources of risk in the international arena. Different economies interact by trading goods and services and by exchanging progressively larger capital flows. In the age of globalization, the economic interdependence of countries generates highly novel challenges: exchange rates are not determined solely by capital movements, but also by the evolution of governance in the international monetary system – a system in which the Eurozone, the newest currency union, is emerging as a global and volatile player. The course develops a rigorous analysis of the different arrangements in the international financial system and their effects on trade direction and intensity and international capital flows. This approach allows us to address some of the most relevant sources of uncertainty in international economics: the future of gains from trade while new trade agreements are being discussed, the benefits of currency unification and the risks for sovereign debt, the heated debate regarding the relationship between global imbalances and the financial crisis of 2007-08 while capital accounts are becoming progressively liberalized.

SA.630.723. Math Review for Risk Assessment. 2 Credits.
This course develops the basic quantitative tools that are necessary for risk analysis. It gives a review of basic mathematical concepts used in economics and risk analysis, including pre-calculus and calculus principles. It also develops tools for data management using Excel. The course therefore provides students with a ready-to-use statistical toolbox that can be used during the remainder of the program.

SA.630.724. Introduction to Statistics. 4 Credits.
In order to understand and evaluate risk and uncertainty it is essential to have a strong command of basic statistical concepts and techniques. This course is designed to furnish students with the fundamental tools of statistical analysis, including analysis of descriptive statistics, probability distributions, statistical inference and related tests, correlation and conditional expectation. In addition to providing familiarity with statistical principles, the course will also include an introduction to basic statistical software packages, namely STATA and advanced tools in Excel. It is a required course for quantitative approaches to risk assessment.

SA.630.725. Fundamentals of Corporate Finance. 2 Credits.
This two-week intensive course introduces students to the basic toolkit for understanding risk in financial markets, with a focus on corporate-finance-related issues and capital markets. It begins with an introduction to net present value and basic accounting. From there is introduces standard financing instruments -- equity, bonds, retained earnings, and bank credit. The course then explains how these instruments are priced, traded and hedged. It concludes with analysis of debt financing and risk management. Students will come away with an understanding of the time value of money, the structure and management of corporate financing, and the relationship between corporate finance, banks, and capital markets.

SA.630.726. Quantitative Approaches to Risk Assessment. 4 Credits.
The classical approach to decision theory builds on a three step iterative process: decision-makers assign probabilities to different possible outcomes, they generate welfare estimates depending upon the different outcomes (relative costs and benefits) for the decision makers involved, and they calculate the expected values of different contingencies.
The process is iterative in the sense that decision-makers reassess probabilities as they gain more information (it is Bayesian), they also make assessments as they learn more about the welfare implications for other important actors (it is game-theoretical), and they learn more about their own possibilities to control events (it is causal). The purpose of this course is to introduce students to the quantitative techniques used in each stage of this process. The course begins by exploring the assignment of probabilities both on the basis of prior assumptions and using more advanced techniques (like Monte Carlo simulations). It then shows how these probabilities can be updated in a Bayesian manner as a result of new information. It looks at how these probabilities can be fed into decision making with multiple actors (through game theory). And it concludes with techniques to evaluate the overall success of the decision-making process. Students will need basic statistics and principles of economics in order to get the most out of this course. Basic skills using spreadsheets would also be of use. The course will provide introductory information about simulation modelling.

SA.630.727. Topics in Corporate Finance. 2 Credits.

SA.630.740. Risk in International Politics and Economics. 4 Credits.
This is a course on social science research methods as they apply to decision-making under conditions of uncertainty. In other words, it looks at how the skills of a social scientist can be put to use in the ‘real world’. The course begins by looking at how decision makers anticipate future events, it explores what evidence they consider and what they ignore, and it looks at the standard models they apply in projecting the future based on the present. The case studies applied in this early part of the course focus on seemingly straightforward economic and financial questions. The problem is that most of the predictions that were made in these areas ended in disaster. Hence the course turns to explore the bias that is built into estimates of the future to understand whether the problem lies in the way the world works or in how we try to understand it. It introduces students to a conceptual vocabulary based on systems theory to make it easier to build more complex relationships into the analysis. And it explores the unintended consequences of policy decisions. Here the case studies move from economics to politics and from crisis to stagnation. This does not offer much of an improvement. Therefore the course makes a third analytic turn to bring the dynamics of human interaction more firmly into focus. It looks at negotiation, communication, and culture as possible sources of error or misunderstanding. The case studies focus on conflict, terrorism, and popular protest. By the end of the course students have a better grasp of where their predictions are likely to falter. They will also understand why such predictions must nevertheless be made. Risk in the international political economy derives from decision-making under conditions of uncertainty. The problem is that uncertainty is inevitable, but decisions must be made regardless of this.

SA.630.742. Instability and Political Change in Consolidated Democracies. 4 Credits.
The purpose of this course is to use a case study methodology to assess how even established democratic societies can rapidly become politically unstable. Again and again, we see nations that are regarded as successful and prosperous democracies descending into acute political turmoil. There is no one model to explain why such swift turnarounds in national fortunes occur (and nor could there ever be one), but by using the case study approach we can identify factors (ideological polarization, defective electoral systems, poor leadership, mistaken macroeconomic policy, constitutional paralysis, class or ethnic conflict, external shocks) that were capable of undermining stability. The presumption of this course, indeed, is that the management even of consolidated democratic societies is a constant struggle against the forces that tend to political dissolution. To this end, the course will examine democratic theory, constitutional law and two important case studies: Great Britain 1970-1979 and Italy 1979-1996.

SA.630.743. Strategic Foresight for Political Risk Analysis: Working with Scenarios. 4 Credits.
Geostrategic risk is the term used to bracket one of the most important collections of variables in macroeconomic policymaking, trade and investment. The onset of war or other forms of violent conflict can close access to foreign markets, disrupt global supply chains, threaten energy resources, and depress business and consumer confidence. Therefore, of primary concern are the points at which diplomacy gives way to conflict and conflict results in violence. Terrorism is similarly disruptive, but the actors involved are different and the scale of direct destruction is (usually) more limited. But these are only the most obvious sources of geopolitical risk. Governments and business leaders should also pay attention to any rise in cross-cultural tensions; they should look at migration flows, human trafficking, and organized crime. Cross-border reputational risk is also a potential problem: today’s special relationship can easily develop into tomorrow’s embarrassment and the next day’s major problem. Finally, there are the unique dynamics associated with multilateral bargaining and international organizations. Students will come away from this course understanding how the broad array of ’international relations’ factors into political and economic calculations. They will gain exposure to a range of causal mechanisms tied to issues like the onset of war, terrorist attacks, criminal activities, cross-cultural sensitivities, complex negotiations and supranational institutions. Along the way, students will prepare case studies to illustrate just how these risks have emerged in diverse parts of the world, but also how they have been managed from the perspective of a single firm or government.

SA.635.700. Microeconomics and International Trade Theory. 4 Credits.
The aim of this course is two-fold. First, we study the microeconomic effects of incentives on the consumer and the producer and their relationship with efficiency. By developing a detailed analysis of the market system, the course provides the framework for policy intervention and the assessment of their effectiveness. Second, we develop an understanding of how the economy works at the aggregate level: this does not only provide the foundations for macroeconomic analysis but, by focusing on the economic interaction of individuals, the course develops the theoretical and empirical foundations required to analyze international trade, its evolution toward global value chains and the challenges to contemporary commercial policy.

SA.635.709. Mathematics and Statistics. 4 Credits.
In order to understand and evaluate risk and uncertainty it is essential to have a strong command of basic statistical concepts and techniques. This course is designed to furnish students with the fundamental tools of statistical analysis, including analysis of descriptive statistics, probability distributions, statistical inference and related tests, correlation and conditional expectation. In addition to providing familiarity with statistical principles, the course will also include an introduction to basic statistical software packages, namely STATA and advanced tools in Excel. It is a pre-requisite course for quantitative approaches to risk assessment. Moreover, this course develops the basic quantitative tools that are necessary for risk analysis. It gives a review of basic mathematical concepts used in economics and risk analysis, including pre-calculus and calculus principles. It also develops tools for data management using Excel. The course therefore provides students with a ready-to-use statistical toolbox that can be used during the remainder of the program.

SA.635.710. Static Models for Understanding Risk. 4 Credits.
This is a course on social science research methods as they apply to decision-making under conditions of uncertainty. In other words, it looks at how the skills of a social scientist can be put to use in the 'real world'. The course begins by looking at how decision makers anticipate future events, it explores what evidence they consider and what they ignore, and it looks at the standard models they apply in projecting the future based on the present. The case studies applied in this early part of the course focus on seemingly straightforward economic and financial questions.

SA.635.715. Economics of Global Markets. 4 Credits.
This course highlights the economic sources of risk in the international arena. Different economies interact by trading goods and services and by exchanging progressively larger capital flows. In the age of globalization, the economic interdependence of countries generates highly novel challenges: exchange rates are not determined solely by capital movements, but also by the evolution of governance in the international monetary system – a system in which the Eurozone, the newest currency union, is emerging as a global and volatile player. The course develops a rigorous analysis of the different arrangements in the international financial system and their effects on trade direction and intensity and international capital flows.

SA.635.720. Systematic Approaches to Understanding Risk. 4 Credits.
The problem encountered in the Static Models course is that most of the predictions that were made in the areas of finance and economics ended in disaster.? Hence this course turns to explore the bias that is built into estimates of the future to understand whether the problem lies in the way the world works or in how we try to understand it.? It introduces students to a conceptual vocabulary based on systems theory to make it easier to build more complex relationships into the analysis. ?And it explores the unintended consequences of policy decisions.? Here the case studies move from economics to politics and from crisis to stagnation.

SA.635.725. Statistical Analysis and Financial Management. 4 Credits.

SA.635.730. Risk and Crisis in the Global Economy. 4 Credits.

SA.635.735. Quantitative Models for Risk Assessment. 4 Credits.

SA.635.740. Understanding Risk in Complex Environment. 4 Credits.

SA.635.745. Regions of the World 1. 4 Credits.

SA.635.750. Regions of the World 2. 4 Credits.

SA.635.900. MAGR Capstone Residency I. 1 Credit.

SA.635.901. MAGR Capstone Residency II. 1 Credit.

SA.635.902. MAGR Capstone. 4 Credits.

SA.620 (Global Policy)

SA.620.000. Global Policy Independent Study. 2 Credits.

SA.620.720. International Politics. 2 Credits.
Presents theoretical and methodological frameworks for understanding international politics and the policy decisions that shape global outcomes. Considers major international trends, such as the rise and fall of great powers, cooperation and conflict between states, and the influence of non-state actors on security, economics, and politics. Explores the institutions, interests, and personalities behind international events, with an emphasis on contemporary world affairs.This course is open to enrollment by GPP students only.

SA.620.721. Comparative Politics. 2 Credits.
Provides a graduate-level introduction to comparative politics. Covers the basic theories and methodologies used to understand comparative political analysis, including theoretical and historical understanding of nation-states; forms of, and transitions between political regimes; contentious politics and conflict; civil society and political participation; institutions of government, including presidentialism, parliamentarism, federalism and legal systems; and characteristics of governance. The course will also compare politics across regions and levels of development. Case and specific country experiences provide foundations for essential concepts.This course is open to enrollment by GPP students only.

SA.620.722. Global Trade and Policy. 2 Credits.
The course will examine the basic theoretical models of international trade and discuss their empirical relevance in explaining the observed patterns of trade between nations. The course will also discuss a variety of trade policy issues such as the gains from trade, the use of alternative trade policy instruments and the organization of the international trade system. The course is designed to enable students to understand the gains from trade both domestically and internationally, properly frame issues around protectionism vs. free trade and develop an understanding of trade as an engine for economic development.This course is open to enrollment by GPP students only.

SA.620.723. Strategy and the Use of Force. 2 Credits.
Provides an overview of strategic studies, which deals with the preparation and use of military power to serve the ends of politics. Discusses the development of warfare from the mid-19th century through the present and addresses major theoretical concepts, including those found in Carl von Clausewitz's On War.This course is open to enrollment by GPP students only.

SA.620.724. Issues in American Foreign Policy and Grand Strategy. 2 Credits.
Examines major functional foreign policy issues facing the United States. Topics such as terrorism, humanitarian intervention and nation-building, migration, and democracy have gone to the top of the foreign policy agenda while regional issues appear less important. How the United States is organized to deal with these cross-cutting issues will also be a major focus.This course is open to enrollment by GPP students only.

SA.620.725. International Monetary Policy and Banking. 2 Credits.
This course offers an analytical framework to study the functioning of the economy as a whole. Such a study involves analyzing the behavior of several markets and how their interactions affect income, prices, employment, exchange rates, and international financial flows. In addition, the course develops the accounting frameworks to understand and monitor international transactions and central banks' operations. The course's framework helps answering various questions of interest: How can monetary policy counteract periods of low unemployment? How are interest and exchange rates determined? What are the consequences for prices, employment, and output of an expansionary monetary policy? This course is open to enrollment by GPP students only.

SA.620.726. Topics in International Development. 2 Credits.
This course serves as a broad introduction to development and integrates economic, political and social dimensions. It introduces students to the multi-faceted and multi-disciplinary nature of development so that they may acquire a better understanding of the theoretical and practical debates around development. The course is underpinned by a discussion of factors driving economic growth and the distribution of income. The prominent role of institutional arrangements is explored including debates about the roles of state, markets and firms. Discussion of the role of individual motives and trust lays the basis for debates on social capital and civil society as well as corruption. Specific examples illustrate the debates such as micro-finance, the provision of healthcare and education, or support for small and medium enterprises. At the same time the examples shed light on popular debates about the “bottom of the pyramid,” “public private partnerships.” or “impact investing.”

SA.620.727. International Law. 2 Credits.
Considers the role of treaty law, customary international law and peremptory norms, as well as problems of reconciling national sovereignty and international law. Also looks at dispute resolution, the rise of NGOs and who can bring a claim (states only? diaspora peoples? individuals?) and at problems such as secession, law of the sea, use of armed force, refugees and human rights. Asks whether international law is just a form of politics, or whether it has a logic and discipline of its own.

SA.620.728. Conflict Management and Negotiations. 2 Credits.
Examines phases of conflict and techniques that may be introduced at various stages of conflict to halt escalation, minimize violence, and move conflicts towards resolution. This includes an analysis of the prevention of violent conflicts, crisis management, the resolution and/or transformation of conflicts, and post conflict peace-building. The course also analyses the impact of the negotiation process on the outcomes of negotiations in both theory and practice, including the role of individual negotiators, domestic politics, cultural context, and the international environment. Special emphasis will be placed on the role of third parties, such as international institutions, state governments, eminent persons, and NGOs in conflict management.

SA.620.729. Leading Change in Global Environment/Global Residency. 4 Credits.

SA.620.730. Political Violence. 2 Credits.
Most violence in contemporary world takes place within and not between states. Millions of people around the globe are confronted with political violence on a daily basis. This class will discuss the different types of political violence, such as civil wars, terrorism, riots and genocide and unpack the different components of political violence, such as when, where and why it begins, who participates, and how violence ends. We will end the class by discussing the long-term impact of political violence on the societies and individuals that have experienced it and the ways to prevent and manage future violent conflicts. ?

SA.620.731. Geopolitics of Energy. 2 Credits.
The global energy landscape is in the midst of fundamental transformation due to strong growth in emerging economies, rapid technological innovation, and growing concern about climate change. These shifts are having profound impacts on global power relationships and are also shaped by international politics and security considerations. In this course we will look at the evolving nature of energy security and the close linkages between energy and geopolitics. The revolution in unconventional oil and gas production in the United States and the consequences of the rapid growth of renewable energy will feature prominently in our analysis.

SA.620.732. Economics of Competitor and Adversary Nations. 2 Credits.
In December 2017, the Administration published a National Security Strategy that outlined a different approach for the United States. The document articulated a security view that identified China and Russia as challengers to US power in a world of growing political, economic and military competition. The document characterized Iran and North Korea as active adversaries who seek to challenge US and allied interests within their region, and to some extent on a global scale. This course examines each of these actors from an economic viewpoint, proceeding from the premise that a national economic base provides the resources from which these nations provide for domestic living standards while at the same time resourcing their national security objectives.The course provides an overview of each nation in context to its reginal and the world economy, and in comparison to the US. The course will examine contemporary and projected trends for each nation and relate these to security and strategy. This is designed as an economics course for security professionals who are NOT economists. The instructor will familiarize students with basic macroeconomic concepts and provide a framework for inquiry which the seminar will apply to each of the actors. The seminar will then draw conclusions for strategy and decision makers.

SA.620.740. International Policy Residency. 2 Credits.
In this interactive residency, students work in teams to research, write, and brief policy memos modeled on a template from the U.S. State Department. Lectures and seminars prepare students for similar research tasks throughout the GPP, with a special focus on building effective writing and briefing skills. Mentors from the SAIS faculty and U.S. policy community guide and assess the policy exercise.This course is open to enrollment by GPP students only.

SA.620.741. Policy Simulation Residency. 2 Credits.
In this three-day residency, GPP students take on the roles of world leaders, as they are presented with a developing international crisis scenario. The residency concludes with teams preparing presentations that outline the situations and courses of action. This residency requires students to stay overnight on the evenings of February 18th and 19th. This course is open to enrollment by GPP students only.

SA.620.742. Policy Leadership Residency. 2 Credits.
By Participating in a military staff ride, students study leadership and examine many challenges of decision-making.

SA.620.764. Politics and Risk. 2 Credits.
This course will explain how public and private organizations incorporate various forms of risk into their strategic and operational plans. Risk is the probability that any particular situation, event, or action will influence an outcome. It is the product of probability and impact. Politics affects risk on many levels (e.g., international, national, regional, and local), and is the result of the interaction of many different elements. This course starts with an examination of basic issues with regard to risk analysis as well as why forecasts often fall short. It then turns to a specific discussion of country structural fragility, problems with collective action policymaking, and operational breakdowns. Although the course focuses more on the risks that face countries than on how particular risks might impact corporations or NGOs, the latter is also examined. The course concludes with an assessment of how to prioritize and mitigate risk.

SA.620.766. Energy Fundamentals. 2 Credits.
The issue of energy demand growth and access to energy services in the developing world is one that will have increasing impact on international economic conditions, the global environment, and international relations. At current rates of growth, developing countries cannot sustain the level of capital investment required to maintain adequate energy services. Rapid rates of energy growth have already caused these countries to emerge as the principal greenhouse gas producers in the first half of the twenty-first century and have and will continue to contribute to significant increases in local and regional pollution. This course will open with an overview of the relationship between energy and development in developing countries and the economic, socio-political, and environmental implications of that relationship. The course will then assess the relative consequences of conventional energy strategies as well as newer, non-traditional options (e.g. energy efficiency, renewables, decentralized power generation) to deliver the needed energy services growth by these countries. The course will also explore the topics of oil and electricity needs, energy demand within different economic sectors, and energy poverty. The course will conclude with an examination of the roles of governments, donor agencies, and the private sector in addressing these challenges.

SA.620.767. Global Trends from a Developing World Perspective. 2 Credits.
The international order is being challenged on many fronts, including the widespread anti-globalization backlash, backsliding European integration, new power dynamics in Asia, catastrophic intra-state conflicts, and historic refugee flows. Developing states find themselves especially vulnerable to many of these trends, as they lack adequate resources and capabilities. Yet exciting progress in other areas, such as technology, holds the prospect for "leapfrogging" to new trade and economic patterns in ways that could offer advantages to late developing states. This course assesses the current global flux from the perspective of developing states and considers policy lessons relevant to the developed world as well.

SA.620.768. National Security Policy Making. 2 Credits.

SA.620.769. Economic Statecraft. 2 Credits.

SA.620.771. Cyber Policy. 2 Credits.
Hacking is now a tool of statecraft. This course will explore how states hack for offensive and defensive purposes, who the major threat actors are, what kinds of harm can be done, and how key strategic concepts apply to cyberspace.

SA.620.773. Transnational Migration and Illicit Networks. 2 Credits.
The increased mobility of people, goods and services across national borders has become an integral part of the modern world. Over the last decades, countries across the world have faced increasing waves of migration, and the combination of these migrations and illicit networks have become a volatile economic and political issue, particularly in the United States, the European Union, and East Asia. The course looks at migration and illicit networks from a comparative perspective, bringing together insights from a variety of social science disciplines including political science, sociology, economics and geography. The course will: i) explore theories of the causes for migration and its interrelation with globalization, which requires to discuss the economic, humanitarian, cultural and security aspects of the phenomenon. ii) draws on European, American, and East Asian examples to zero in how immigration control, political inclusion of immigrant communities, and the linkages between illegal immigration and illicit networks is shaping the current discourse on immigration worldwide; and iii) discuss the role that the (traditional and new) media plays in both reflecting and shaping public opinion on immigration. Overall, this course will offer a global perspective on transnational migration and illicit networks, on the different reasons why people choose or feel compelled to leave their country of origin, and how receiving states respond to migrants' presence, and the key policy and security concerns that are shaping immigration policy around the world.Open to MAGP students only.

SA.620.774. Wartime Decision-Making. 2 Credits.

SA.620.775. Art of Diplomacy. 2 Credits.

SA.620.776. Chinese Foreign and Defense Policy. 2 Credits.

SA.620.777. Governance and Development. 2 Credits.
This course examines how politics can affect economic development, focusing on topics such as corruption, media technologies, representation, culture, and ethnic identity.

SA.620.778. US Intelligence, Oversight, and the Global Context. 2 Credits.
US intelligence agencies inform and sometimes implement US foreign policy. As such, this course asks the critical question--how does US intelligence oversight work to ensure the best outcomes, what are the politics involved, and what are the trade-offs intelligence oversight makes between secrecy and national security in a global context.

SA.620.779. Urban Governance in the Face of Risk. 2 Credits.
This course is designed to equip policy makers with an enhanced understanding of the interconnected nature of contemporary urban challenges and the tools for an environmental and conflict sensitive practice of urban governance. In the face of rapid urbanization, climate change and significant local and global inequalities, urban policy makers across the world – from city officials to civil society activists – struggle to comprehensively analyze urban dynamics, design and implement policies and programs that address the multiple risk factors and create livable cities. This course surveys a variety of areas of urban disaster and climate risk and conflict as well as tools and approaches to manage them. It will give students a chance to apply new insights through group projects and interactive case studies of cities worldwide.

SA.620.780. Security and Conflict in Latin America. 2 Credits.
This course provides an introduction to the study and analysis of both the history and the evolution of the security policy sphere in the Western Hemisphere. This policy sphere is defined in a broad sense—from nation states, to guerrillas and insurgencies, to organized crime, gangs, traffickers, that is, all enemies of the state. The main lens of analysis is the study of the multiple strategies that the US has implemented to confront the evolving conflict and security challenges in Latin America.

SA.620.781. Social Origins of Authoritarianism and Democracy in Greater China. 2 Credits.

This course follows the spirits of Barrington Moore’s Social Origins of Dictatorship and Democracy to compare the development of civil society, contentious politics, and elite conflicts in mainland China, Taiwan, and Hong Kong/Macau since the end of WWII, with an emphasis on the social base, trajectories, and successes/failures of democratization attempts. The course will also cover the growing literature on the question of authoritarian resilience in mainland China, as well as its implications to the wider geopolitical dynamics of the Indo-Pacific.

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CATALOGUE CONTENTS

CATALOGUE ARCHIVES

Prior to the 2020-2021 academic year, each division at Johns Hopkins University published their own catalogue. The archives here include previous versions of these catalogues under their division heading. The University Catalogue is archived under the **Johns Hopkins University Catalogue** Heading.

Johns Hopkins University Catalogue

- Academic Catalogue 2020-2021 (https://e-catalogue.jhu.edu/archive/2020-21/)

Advanced Academic Programs

- Academic Catalog 2019-2020 (https://advanced.jhu.edu/wp-content/uploads/2020/04/2019-2020-AAP-Academic-Catalog.pdf)

Bloomberg School of Public Health

- 2018-2019 Guidebook (https://www.jhsph.edu/offices-and-services/student-affairs/resources/jhsph-guidebook/2018_2019%20Guidebook.pdf)
- 2017-2018 Guidebook (https://www.jhsph.edu/offices-and-services/student-affairs/resources/jhsph-guidebook/2017_2018Guidebook.pdf)
- 2016-2017 Guidebook (https://www.jhsph.edu/offices-and-services/student-affairs/resources/jhsph-guidebook/jhsph_guidebook_2016-17_January.pdf)
- 2015-2016 Guidebook (https://www.jhsph.edu/offices-and-services/student-affairs/_pdf/jhsph_guidebook_2015-2016.pdf)
- 2014-2015 Guidebook (https://www.jhsph.edu/offices-and-services/student-affairs/_pdf/jhsph_guidebook_2014-2015.pdf)

Carey Business School

- 2019-2020 Course catalog (https://carey.jhu.edu/sites/default/files/2019-11/academic-course-catalog-2019-2020.pdf)
- 2018-2019 Course catalog (https://carey.jhu.edu/uploads/documents/brochures/academic-course-catalog-2018-2019.pdf)
- 2017-2018 Course catalog (http://carey.jhu.edu/uploads/documents/Johns_Hopkins_Carey_Business_School_-_Course_Catalog_2017-2018.pdf)
- 2016-2017 Course catalog (https://carey.jhu.edu/uploads/documents/Catalog_2016-2017_final.pdf)
- 2015-2016 Student handbook and course catalog (https://carey.jhu.edu/uploads/documents/Handbook_Catalog_2015-16.pdf)
- 2014-2015 Student handbook and course catalog (https://carey.jhu.edu/uploads/documents/2014-2015_HC_online-version.pdf)

Engineering for Professionals

- 2019–2020 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2019-2020-catalog.pdf)
- 2018–2019 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2018-2019-catalog.pdf)
- 2017–2018 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2017-2018-catalog.pdf)
- 2016–2017 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2016-2017-catalog.pdf)
- 2015–2016 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2015-2016-catalog.pdf)
- 2014–2015 Johns Hopkins Engineering for Professionals Graduate Catalog (https://ep.jhu.edu/files/2014-2015-catalog.pdf)

Peabody Institute

- 2019-2020 Academic Catalog (https://peabody.jhu.edu/academics/academic-calendar-resources/academic-affairs/academic-catalog/)
- 2018-2019 Academic Catalog (https://peabody.jhu.edu/wp-content/uploads/2019/07/AY-18-19-Academic-Catalog.pdf)
- 2017-2018 Academic Catalog (https://peabody.jhu.edu/wp-content/uploads/2017/06/Peabody_Academic_Catalog_2017-18_WEBVERSION-1.pdf)
- 2016-2017 Academic Catalog (https://portalcontent.johnshopkins.edu/Peabody/conservatory/academicaffairs/16-17-catalog.pdf)
- 2015-2016 Academic Catalog (https://portalcontent.johnshopkins.edu/Peabody/conservatory/academicaffairs/15-16-catalog.pdf)
- 2014-2015 Academic Catalog (https://portalcontent.johnshopkins.edu/Peabody/conservatory/academicaffairs/14-15-catalog.pdf)

Nitze School of Advanced International Studies

- 2019-2020 Student Handbook (https://e-catalogue.jhu.edu/archive/file:///C:/Users/aleva1/Desktop/Red%20Book%2019-20_7.30.19.pdf)
- 2018-2019 Student Handbook (https://e-catalogue.jhu.edu/archive/file:///C:/Users/aleva1/Desktop/Red%20Book%20AY%2018-19.pdf)
- 2016-2017 Student Handbook (https://e-catalogue.jhu.edu/archive/file:///C:/Users/aleva1/Desktop/Red%20Book%20AY%2016-17.pdf)
- 2015-2016 Student Handbook (https://e-catalogue.jhu.edu/archive/file:///C:/Users/aleva1/Desktop/Red%20Book%20AY%2015-16.pdf)

School of Education

- 2019-2020 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2020/01/2019-2020-Academic-Catalog-FINAL-VERSION.pdf)
- 2018-2019 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2019/06/AcademicCatalog_2018-19_FinalPrintCopyClean_6.5.19.pdf)
- 2017-2018 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2019/02/AcademicCatalog_2017-18_Finalv2.pdf)
- 2016-2017 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2019/02/AcademicCatalog_2016-17_Final.pdf)
- 2015-2016 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2017/06/SOE2015-16Catalog.pdf)
- 2014-2015 Catalog School of Education (https://education.jhu.edu/wp-content/uploads/2017/06/SOE2014-15AcademicCatalog_Final_12.22.14.pdf)

School of Medicine

- 2013-2014 Academic Catalog (https://www.hopkinsmedicine.org/som/students/academics/catalog/SOMCatalog_1314.pdf)

School of Nursing

- 2019-2020 Catalog and Student Handbook (https://nursing.jhu.edu/academics/documents/2019-20_Handbook_Catalog.pdf)
- 2018-2019 Catalog and Student Handbook (https://nursing.jhu.edu/academics/documents/2018-19_Handbook_Catalog.pdf)
- 2017-2018 Catalog and Student Handbook (https://nursing.jhu.edu/academics/documents/2017-18_Handbook_Catalog.pdf)
- 2016-2017 Catalog and Student Handbook (https://nursing.jhu.edu/academics/documents/2016-17_Handbook_Catalog.pdf)
  - 2016-2017 Plan of Study Addendum (https://nursing.jhu.edu/academics/documents/2016-17_Handbook_Catalog_POS_Addendum.pdf)

Whiting School of Engineering

- 2019-20 Catalog Archive (HTML (https://e-catalogue.jhu.edu/archive/2019-20/)) (PDF (https://e-catalogue.jhu.edu/archive/JHU_2019-2020_Catalog.pdf))
- 2018-19 Catalog Archive (HTML) (http://e-catalog.jhu.edu/archive/2018-19/) (PDF) (https://e-catalogue.jhu.edu/archive/2018-19.pdf)
- 2017-18 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2017-18/) (PDF) (https://e-catalogue.jhu.edu/archive/2017-18.pdf)
- 2016-17 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2016-17/) (PDF) (https://e-catalogue.jhu.edu/archive/2016-17.pdf)
- 2015-16 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2015-16/) (PDF) (https://e-catalogue.jhu.edu/archive/2015-16.pdf)
- 2014-15 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2014-15/) (PDF) (https://e-catalogue.jhu.edu/archive/2014-15.pdf)

Zanvyl Krieger School of Arts and Sciences and the G.W.C. Whiting School of Engineering

- 2019-20 Catalog Archive (HTML (https://e-catalogue.jhu.edu/archive/2019-20/)) (PDF (https://e-catalogue.jhu.edu/archive/JHU_2019-2020_Catalog.pdf))
- 2018-19 Catalog Archive (HTML) (http://e-catalog.jhu.edu/archive/2018-19/) (PDF) (https://e-catalogue.jhu.edu/archive/2018-19.pdf)
- 2017-18 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2017-18/) (PDF) (https://e-catalogue.jhu.edu/archive/2017-18.pdf)
- 2016-17 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2016-17/) (PDF) (https://e-catalogue.jhu.edu/archive/2016-17.pdf)
- 2015-16 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2015-16/) (PDF) (https://e-catalogue.jhu.edu/archive/2015-16.pdf)
- 2014-15 Catalog Archive (HTML) (https://e-catalogue.jhu.edu/archive/2014-15/) (PDF) (https://e-catalogue.jhu.edu/archive/2014-15.pdf)

AMENDMENTS

This page list any changes to the catalogue made after its publication date. You will find a description of the change, date the change was made and a link to the page that was updated

INDEX

C

A

H

N

T

U

V

W

Y

Z